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1906.

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. . and Accessories

INCLUDING

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Photo-Micrographic Apparatus,
and all Accessories.

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W. WATSON & SONS,

OPTICIANS

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ADDRESS.

Since the publication of the last edition of our Catalogue of Microscopes, we have introduced modifications in the constructional details of several of our instruments, and availing ourselves of a new process of metal casting have produced two Microscopes, the "Praxis" and the "Bactil," which combine unique features of unquestionable value and importance. The appreciation of the quality and design of our productions is shown by the demand for our Microscopes, which is now very much larger than at any time previously.

The **Theoretical Department**

is directed by our **Mr. A. E. CONRADY,** who acts as chief Mathematician and Optical Adviser.

Mr. Conrady is the originator and computer of the **Holoscopic Series** of Objectives, Eyepieces and Substage Condensers, also the **Holostigmat** Photographic Lenses, all of which have gained an unrivalled reputation for their accuracy of correction and brilliant performance. These will be found described on pages 101 and 102. The whole of our optical work is now produced under his immediate supervision.

In the **Manufacturing Department** we have added many conveniences for the more accurate production of our Instruments, and for the manufacture of Objectives and Lenses have equipped our works with machines for glass grinding of latest pattern, running with electric motors.

Our works are now probably the largest and most complete in Great Britain for the manufacture of Optical Instruments, and we are continually adding to our manufacturing plant such improved machines as will tend to greater accuracy in the finished work. We have in our employ workmen who possess unequalled experience in producing the highest grade of mechanical and optical work. The machinery we employ has been in nearly every case specially designed and built for our requirements, and we have the utmost confidence in stating that we are able to give unequalled value in our Microscopes and Objectives.

Every piece of apparatus passes through the hands of the **Testing Room Staff,** and faultless adjustment will always be found to prevail in the Watson Instruments.

Our continual aim is to supply Instruments of the most thorough efficiency and to meet the constantly advancing needs of the progressive microscopist. In inviting the perusal of this list we desire to acknowledge our indebtedness to the kind suggestions and recommendations of our patrons, to which in a great measure is due the conspicuous success which has attended our efforts.

These efforts will in no way be relaxed, and it will be our desire to maintain the supremacy already attained by giving such care and attention to commands with which we may be entrusted as will induce our customers to continue their business relations with us and recommend our Instruments as opportunity offers.

1906. W. WATSON & SONS.

W. WATSON & SONS,

Are the appointed Depôt Agents for England for the

Microsopes, Objectives & Accessories

OF

E. LEITZ, WETZLAR.

Several of his Microscopes, Objectives, etc., are quoted in this List. A full Catalogue will be sent on application.

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TERMS.

All goods are marked at **Net Prices** for **Cash,** the small profit over cost of manufacture admitting of **NO DISCOUNT.**

Country and Foreign Orders must be accompanied by a remittance in full, or a satisfactory London **Trade** Reference.

Remittances may be made by Cheques, crossed London & County Bank, also by Postal Orders or Post Office Orders payable at the General Post Office. These also should be crossed.

Customers residing abroad will find a Banker's Draft, drawn on a London Agent at sight (which may be obtained at any Bank), or Post Office Orders, the most advantageous method of sending cash. On large Foreign Orders, to suit the convenience of Customers, we accept a payment of 25 per cent, of the value with the order, and draw for the balance through a Banker against delivery of the Bills of Lading, or instruct the Carriers to collect against delivery of the Goods, whichever may be preferred.

Goods Made to Order.—Where Instruments or Apparatus have to be made specially to order, and vary from our regular Stock patterns, a deposit of 25 per cent. of the approximate cost must be paid.

The goods quoted in this Catalogue are ordinarily kept in stock, unless otherwise noted, so can be at once forwarded on receipt of remittance for price. In the event of any goods being temporarily out of stock, the order will be promptly acknowledged, and the probable date of delivery given.

It is desirable that the Names and Addresses of Customers should be distinctly written.

In the absence of specific instructions, goods are despatched by the route that commends itself to our judgment as the most expeditious, secure and economical. We employ skilled packers only, and use every precaution to ensure safe transit. All goods are sent at the risk of the consignee.

Microscopes are packed and delivered free on rail London (unless otherwise stated). For **Export Orders,** tin-lined cases will be charged at cost price.

The cost of **tin-lined** cases for the various Instruments mentioned in this list will be approximately as follows:—

The Van Heurck and "Club" Microscopes	£0	9	6
The Edinburgh Student's Microscope, Horseshoe form	0	6	6
Do. do. do. Tripod form ..	0	7	6
The Fram Microscope	0	6	6
Either of the Photo-Micrographic Cameras	0	15	0

Where two Microscopes are ordered, one-third extra on the price of the packing case of one as quoted above will be charged, three microscopes two-thirds additional, and so on.

WATSON'S PROGRESSIVE PAYMENT SYSTEM.

Any Instruments in this list, of or exceeding £5 in value, may be purchased by **Monthly** instalments on the following conditions :—

The time allowed for payment may usually be spread over a period not **exceeding** twelve calendar months. The amount is to be paid in **equal** monthly instalments. Special arrangements may be made for an extended payment of large sums.

An extra charge of **ten per cent.** on catalogue prices is made for the accommodation. See example below.*

If the purchaser be a householder he should state the nature of his profession, or employment, how long he has resided at the address given, and give an ordinary business reference. The nature of the business will not be disclosed to the referee.

If the purchaser be a minor, or not a householder, he must state the nature of his profession or employment, the time during which he has been so engaged, give the name of the business house with which he is connected, and of a householder who will guarantee the payment.

The purchaser must agree not to part with the Instrument purchased on this system until the complete instalments have been paid.

The first instalment should accompany the order.

TO MEDICAL MEN.

Registered medical men in practice in England, wishing to avail themselves of the progressive payment system, can do so on sending two business references.

W. WATSON & SONS reserve to themselves the right to refuse orders on this system should they wish to do so. Proposals for special arrangements for longer or shorter periods will receive every consideration.

***Example.**—A Camera or Microscope value £12 may be selected, 10% added to this equals £1 4s. ; total, £13 4s. If payment be spread over a period of twelve months, the monthly instalments will be £1 2s. each.

The above System can only be made applicable to residents abroad if guarantor residing in England be provided.

WATSON'S MICROSCOPE STANDS.

Characteristics:— Perfection and Permanence.

The Microscopes manufactured by us are distinct and unique.

It is not alone our manufacturing facilities, but the extreme care that is exercised in every detail of the making that renders our Instruments the very best in quality and permanent in their working accuracy.

A Definition—and **a Principle.**

The Microscope Stand is a specially designed mechanical structure, upon which are carried, and by means of which are manipulated, the pieces, objectives, condensers, etc., forming the optical system, and upon which the subject for examination is appropriately placed.

The principle which underlies the construction of all our Microscope Stands is not merely that of rendering them suitable for the advantageous and convenient employment and manipulation of the optical system, but that the qualities of the whole may be developed to yield their maximum effect.

Uniformity of Quality.

One grade of workmanship alone prevails in our workshops—the very best. The same men are engaged in the production of the vital parts of the least costly and of the most elaborate of our microscopes. It will be obvious that the same mechanical conveniences are not found in the inexpensive as in the more costly models. Each Instrument, is, however, so far as it goes, of the highest perfection, and in order that students and workers of moderate means may, should they desire to do so, increase the mechanical completeness of our cheaper models at a subsequent date, provision is made by the use of standard gauges in the manufacture for the addition, from time to time, of these extra fittings.

Thus, a beginner taking one of our "F" Edinburgh Student's, "Fram" or "Praxis" Microscopes (pages 42, 55 and 60), can at a later time add the compound substage and mechanical stage to make it complete.

How the quality is attained.

The degree of excellence that is demanded in the constructional work of the Microscope Stand in order to meet the stringent conditions of modern research, necessitates long training and great skill on the part of the workmen engaged in the manufacture.

Our staff is composed of men who have been trained in the art of microscope making by the experience of many years, and this, coupled with the use of the best and most appropriate modern machinery and materials, enables us to produce the irreproachable Instruments with which our name has been so long associated.

No Instrument leaves our hands without satisfying the rigid demands which are made upon it in the Testing Room, and it is finally examined either by a principal or the manager of the microscope department before it is delivered; the beautifully soft and responsive movement to the least touch of the various milled heads is a pre-eminent feature of all our microscopes.

SOME CONSTRUCTIONAL DETAILS.

We would invite special consideration of some of the following particulars regarding the construction of our Microscopes. In passing, we would remark, that many of the designs and devices have been originated in and are peculiar to the Watson Instruments. Their success has led to the making of imitations which have invariably proved quite inferior to our own products. We would therefore request that judgments be formed by the testing of our own fittings only.

THE MOVEMENTS GENERALLY.

The permanent effective working of all the movements of our Microscopes is largely due to the fact that the whole of the frictional parts in which mechanical action takes place are provided with **Adjustable Screws to compensate for wear and tear.**

In all the dovetailed bearings of the Microscope, including the coarse and fine adjustments, mechanical stage, substage, etc., etc., sprung slots are provided as shown in figure 14 on page 32 at G. Screws pass through these slots, as illustrated at F, and if from any cause—wear or vibration—the minutest shake or a severe rattle should be present, it can immediately be controlled by the worker by tightening the adjusting screws. This method will be further understood by a reference to page 8, in which the adjusting screws for the sprung slots of the fine adjustment fittings are indicated at A, and to page 32 where the system as applied to the mechanical stage is illustrated.

In addition, special controlling screws are fitted to all pinions, screws, etc., so that the tension may be varied to suit individual tastes or necessities.

This principle is embodied to the fullest extent in our Microscopes, and is so extremely simple in action that it confers on users of the instruments, more particularly those who may be resident in foreign countries or at a distance from towns, the immense convenience of being able to adjust their own microscopes. It is an advantage that has times and again been appreciated by workers with our instruments, and its value cannot be over-estimated by the practical worker.

Extract from the Report of the Jury of the International Exhibition of Microscopes, Antwerp, 1891, at which we were awarded the only Diploma of Honour for Microscope Stands (Class I.), and Diploma of Honour for Microscope Objects (Class VIII.).

(Class I.) "This firm competed only in Microscope Stands, of which more than twenty were exhibited. They are adapted, according to their different numbers and designs, for the various necessities of microscopical work. The perfection of the workmanship is extraordinary, and the Fine Adjustment to the body, which is effected by means of a lever actuated by a Micrometer Screw, is of incomparable slowness and precision.

"Among the Instruments exhibited is a stand named the Van Heurck Microscope, having been constructed after the ideas of this Micrographer, which the Jury found very remarkable. The elegance of this Instrument, the extreme precision of all its movements, the facilities for using it both visually and for Photo-Micrography, finally its relatively modest price, have influenced the jury in awarding to Messrs. W. Watson & Sons the highest recompense attributed to them."

THE COARSE ADJUSTMENT.

Is effected by means of a diagonal rackwork and spiral pinion, as displayed in Fig. 2 below. In this device there is no interval between the teeth of the rack when engaged by the pinion; an exquisitely smooth movement, with an entire absence of backlash is consequently secured. Special attention is devoted to this important

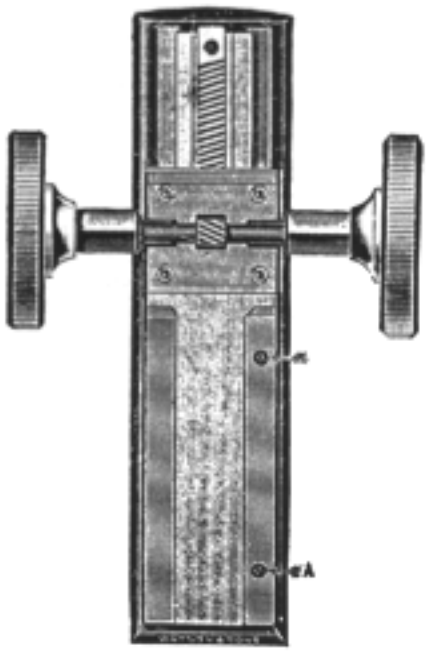


Fig. 2, showing the arrangement of Rack and Pinion and Fine Adjustment dove-tailed fitting with Adjusting Screws A.

feature, and each tooth of the rack is ground to the leaf of the pinion with which it is to act, and we have been the recipients of many expressions of praise for the soft action and adjustment which we impart. The Rev. W. H. Dallinger, in the eighth edition of "The Microscope and its Revelations" (Carpenter), refers to this Coarse adjustment in the following terms: "*From practical use, we can speak of the delicacy of this focussing adjustment with which we have with ease used powers up to* $\frac{1}{8}$ *in., and often have used it with a* $\frac{1}{16}$ *in. objective.*" Mr. Andrew Pringle, in his "Practical Photo-Micrography," in referring to one of our Instruments, states: "*It is one of the two Microscopes with which we can work comfortably, using a* $\frac{1}{8}$ *in. objective and the* **coarse movement** *only.*"

A plate or box covers the pinion and its stems, and is attached by four screws. This plate is so shaped that by tightening or releasing the screws the pressure of the pinion on the rack can be **regulated** and **adjusted** as required.

Extract from the Journal of the Royal Microscopical Society, Feb. 1893, page 95:—

"The Essential point of a microscope is the springing of the dovetail grooves. . . . . In Watson's Microscopes we have two spring slides, one for the coarse adjustment and one for the fine. The moment either movement exhibits the slightest sign of wear the slack can be immediately taken up by tightening the screws. There is no reason, therefore, why in years to come this instrument should not work as well as it does to-day."

THE FINE ADJUSTMENT.

This is made in one form only—our **Standard** pattern—in all our instruments—the Argus model (page 72) excepted.

Our Standard Pattern has been made by us for the past 20 years, and unites the real essentials that are required in such an important movement.

It is extremely simple.

It is exquisitely sensitive and precise in its action.

It is not liable to depreciation with continual use.

It is suitable for working with Objectives of highest power and largest aperture.

Compensating screws enable wear and tear to be adjusted for.

It has, in fact, proved by its sterling qualities that it satisfies the most exacting needs of the up-to-date Microscopist in the fullest manner, and the **Watson Standard Fine Adjustment** has long been regarded as a type that is *facile princeps*.

Its Mode of Action.

The principle on which the working is effected is illustrated in the accompanying fig. 3.

The entire body is raised or lowered by means of a milled head fixed to a screw having a hardened steel point, acting on a lever (the contact surfaces of which are hardened and polished) against a point attached to the body-slide, in a perfect dovetailed fitting, about 2½ inches long.

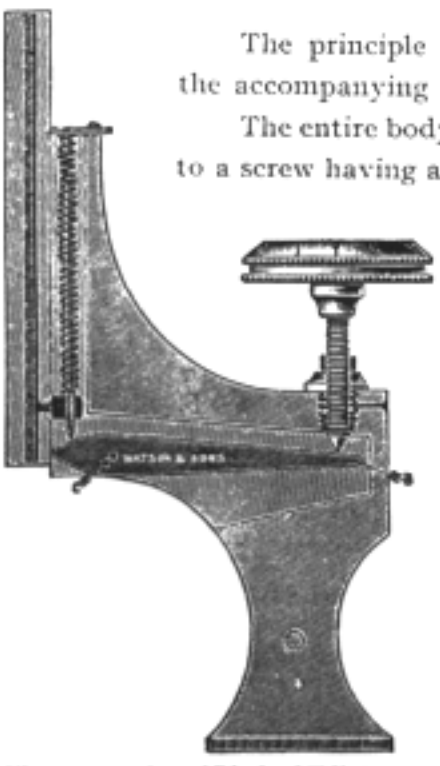


Fig. 3. Section of Limb of Edinburgh Student's Microscope, showing construction of Watson's Standard Fine Adjustment.

At first sight it would appear that the screw controlling this important movement had to bear the entire weight of the body of the Instrument. This, however, is not the case. The turning of the milled-head screw actuates a hardened steel lever (B), varying in length according to the size of the Instrument, the fulcrum (C) of which is placed as closely as possible to the sliding fitting in which the movement of the body takes place, whereby the weight carried by the milled head is reduced to considerably less than in any other form. For instance, in our Edinburgh Student's Microscope—a section of a limb of which is shown in fig. 3—the total length of the lever arms is $2\frac{1}{16}$ in., the arm on the one side being $\frac{1}{8}$-in. long, and on the other $1\frac{1}{16}$ in. The weight of the body, fittings, etc., is 17 ozs. The resistance at the end of the lever is therefore $3\frac{7}{9}$ ozs. We have not included the reactionary spring in these figures, as this is employed in all forms of Fine Adjustment, but the resistance of this is minimised at the point of force, in the same ratio as the weight. Also by means of the long lever an *extremely slow motion* is obtained, the rate of movement being lessened in the same proportion as the weight. This renders our Instruments especially suitable for investigations with the highest power objectives. In Photo-Micrographic work the reliability of this Fine Adjustment is unsurpassed, not being liable to vary during the making of exposures.

The distinct advantages of our Standard Fine Adjustment are :—

1.—In using it the **Distance between the Eyepiece and Objective remains constant.**

2.—Owing to the position of the controlling milled head on the limb, it can be worked with either hand.

3.—Being in a fixed position on the Limb and not carried by the coarse adjustment, as many other forms are, connection with the Focussing Rod of a Photo-Micro. Camera can be conveniently and readily made.

4.—The Thread being a left-handed one, the turning of the milled head effects the movement through the **Lever** in the same direction as a **direct Acting** Fine Adjustment. This is an advantage, especially in Laboratories where several different patterns of Instruments are in use, the opposite motion caused by a Lever being likely to be overlooked and specimens broken. The left-handed screw obviates such risks.

5.—All Fine Adjustments must wear in course of time as the result of friction, and in the majority of cases they cannot be set right, except by the maker or a skilled mechanic. In our Standard form the fitting is sprung, and has two screws (shown in Fig. 2 " A "), by means of which any wear as the result of friction can be at once taken up by the user. This is of the greatest importance to residents abroad, the necessity for returning an instrument to be adjusted being obviated.

TWO-SPEED FINE ADJUSTMENTS.

The Fine Adjustments fitted to modern microscopes of substantial character are designed to work satisfactorily with high-power objectives of large aperture, they are consequently very slow in action, that is, the movement imparted by each turn of the controlling milled head is exceedingly small, as demanded by the necessities of the case. It has been considered that such slow and precise action retards quick work in laboratories when low-power work has to be done, and so that both a quick and a slow-acting fine adjustment may be available in the same instrument, we are now making Fine Adjustments with two speeds, in two different patterns, *viz.* :—

The Spindle Milled Head

and the MALES-WATSON.

THE SPINDLE MILLED HEAD.

(Multiple Speed.)



This is a simple contrivance, as shown in the accompanying figure. It consists of the Watson's Standard Fine Adjustment, in which the ordinary controlling milled head has rising from its centre and fixed to it a spindle, one-sixth of its size. This Spindle can be rapidly rotated between the fingers for low-power adjustments, while the larger milled head can be slowly turned for high powers. It is quite effective and efficient for practical work, and it will be found that the small spindle answers the purpose admirably with low powers, while the larger head produces the ordinary slow movement.

PRICES.

Spindle Milled head fitted to microscopes at time of ordering, extra 3/6

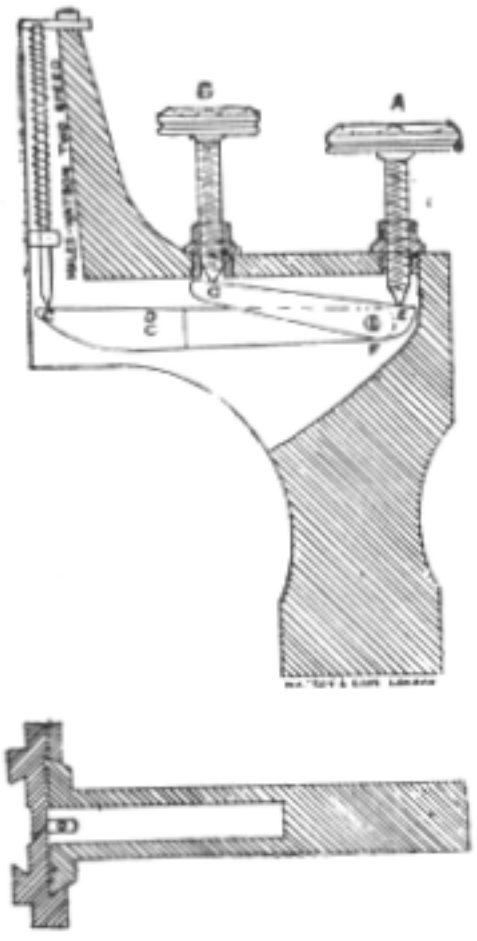
" " " existing microscopes of our own make 5/6

Quotations given for fitting above to microscopes by other makers on application.

TWO-SPEED FINE ADJUSTMENTS—*Continued.*

THE MALES-WATSON (Two-Speed).

(Patented.)



This is Watson's Standard Fine Adjustment, with the addition of an ingenious yet simple independent lengthening arm to the usual lever, by means of which the second speed is secured.

A reference to the accompanying figure and to the illustration of the Circuit Stage Van Heurck Microscope, page 21, will make the matter clear.

The ordinary lever is shown with its fulcrum at D, its point of contact with the microscope fittings at C, and with the controlling milled head A, touching the lever at E. By the use of a coarse thread to this milled head a speed is imparted of about $\frac{1}{100}$th inch = 250 μ for each complete revolution of the milled head A. An additional lever arm is attached to the ordinary one at F, and is actuated by the milled head B touching the lever at G. From a perusal of the detailed description of Watson's Standard Fine Adjustment already given, it will be appreciated that the lengthening of the lever arm in this manner reduces very greatly the rate of movement produced at C, and the travel imparted by each complete rotation of the milled head B is about $\frac{1}{3500}$th inch = about 70 μ. It will be seen from this that provision in conjunction with the coarse adjustment is afforded for **Rapid Working with High or Low Powers with Coarse Threaded Screws** that will stand severe wear and tear, the pitch of the threads of the screws A and B being 36 per inch.

It should be noted that where desired, **other rates of movement than those specified above may be supplied to order,** it being only necessary to fit coarser or finer screws to the milled heads A and B.

PRICES.

The cost of supplying the Males-Watson Two-Speed Fine Adjustment to any new Microscope which would then be made to order would be.. **£2 0 0**

The reader for ascertaining the amount of rotation of milled head is fitted to the slow acting screw only, which is then divided to read microns.

If preferred, the modification of this movement suggested by Mr. E. M. Nelson in the "Journal of the Royal Microscopical Society" (1903, pp. 19 and 20), can be fitted at the same cost.

THE STAGE.

These are essentially of two kinds—

1. Those with plain surface, on which the object is moved by the fingers.
2. Mechanical Stages, on which the object is moved for systematic examination, by means of travelling plates actuated by screws or rackwork and pinion.

In all our Stages ample space is afforded between the front of the limb of the Instrument and the centre of the Stage for the examination of large specimens, the use of troughs, Petrie's dishes, etc.

For all the Stages of the No. 1 type we provide at extra cost, and when requested to do so, a sliding bar upon which the object may be rested and moved, or an attachable mechanical stage. In nearly every case the surface of the stage consists of a sufficiently thick plate of ebonite. The Stages of Type No. 2 are somewhat varied, but the detailed description which is given on page 32 of the Stage of the Royal Microscope, and in particular the method of providing for wear and tear, may be taken as the system of construction throughout. We cannot too strongly emphasise the desirability of having a Mechanical Stage built as a part of a microscope, and not as an attachable accessory. So that no disadvantage may accrue in consequence of having a permanent mechanical stage, we have made a special point of giving a perfectly free surface to the stages—as free as would be the case if no mechanical movements were fitted.

OUR "GRIP" STAGE-SPRING.

Before describing the essential parts we might illustrate the attention that we give to comparatively minor points by a short description of the Spring which holds the Object in position on the Stage. This has for years been a ceaseless source of discussion. This "Grip" pattern of ours, has four advantages:—1, the free rotation of the Spring: 2, a firmly fixed butt: 3, the entire removal of the spring and butt with perfect ease: 4, objectives when revolved on a nosepiece are not liable to catch against the spring, which is made of watch spring metal and lies quite flat, excepting at the tip.



The Spring and Butt fitting complete.



Sectional View of Spring and Fittings.

It will be seen on reference to the above illustrations that the fitting socket which goes into the stage is sprung and that through the middle a conical-shaped pin is passed, to which at the top a little head is attached by screwing. By screwing up this head an expansion of the fitting socket takes place consequent on the drawing upward of the coned pin. This causes the butt when in position to remain firmly fixed in the Stage. When it is required to release it, the head is unscrewed and the spring and butt are removed immediately. This is fitted to all stages of type No. 1, and the majority of type No. 2.

THE SUBSTAGE.

All our Microscopes are provided with a means of carrying the Condenser, Polariser, and other Illuminating Apparatus. In the cheaper instruments this consists of an "underfitting" or tube, which is attached to the underside of the Stage, and in the more complete forms a Compound Substage is supplied, by means of which the apparatus can be exactly centred with the objective, and focussed by rackwork. These are both of the "Universal Size," 1·527 in. inside diameter, as arranged by the Royal Microscopical Society. The Instrument figured (page 23) has a Substage, while that shown (page 64) has a tube fitting.

THE BODY TUBE.

This, in the regular way, is made for the two most popular and generally useful of the sizes adopted as standards by the Royal Microscopical Society, *viz.* :—

The Student's or Continental size, No. 1 ..... ·9173 in. diameter.
The larger size, No. 3..... 1·27 in. diameter.

The former is the diameter universally employed on the Continent.

In order that the larger sized Eyepieces may be employed on the Student's Microscopes, **the majority of our Microscopes** (exceptions are stated in the list) have been reconstructed, so that they now have a **very large outer body tube,** *viz.*, 1¼ in. diameter.

When, therefore, large 1·27 in. Eyepieces are to be used, a suitably large draw-tube is fitted, and when ordinary Student's Eyepieces are chosen, a small diameter of draw-tube is supplied. In either case the outside body tube is the same.

THIS POSSESSES A FURTHER ADVANTAGE.

The increased use of low-power Lenses of our Holostigmat type for the photography of large subjects without eyepieces has necessitated the use of large body tubes. This is now provided for in an amply sufficient manner in all our microscopes.

We are willing at all times to make any desired size of body or eyepiece to order.

The Screw Thread for Objectives in all our microscopes is of the Royal Microscopical Society's universal size.

The improvement in the construction of Objectives and consequent sensitiveness to thickness of cover glass has necessitated the introduction of the

MECHANICAL DRAW-TUBE.

In cases where this is fitted we supply, in addition, a sliding Draw-Tube giving a wide range of adjustment. Such Instruments can be used for Objectives of either Continental or English make, the Body being shorter than the former length—6 inches—and with the Draw-Tubes extended beyond the English length—10 inches—allowing of the adjustment for thickness of cover glass by variation of Tube length, the rackwork Draw-Tube affording means for effecting this in the most precise manner. For the use of Students we have devised a cheap form of rackwork Draw-Tube, as per page 52, which we fit to the Edinburgh Student's Microscopes at an extra cost of 25/- ; but this can only be done where the Eyepiece is of the small size—·9173 in.

It will be noticed that we supply several different forms of

BASE OR FOOT.

All of them have special merit, and are so constructed as to afford rigidity in any position. Of these, that as shown on the Edinburgh Student's Microscope (page 41), known as the Continental or Horse-shoe form, has considerable popularity, and is preferred for laboratory use and by students. It is very compact, making the Instrument exceedingly portable, but the Tripod Foot is unquestionably far superior to the horse-shoe for rigidity in all positions, and is slowly but surely superseding it for high-class Microscopes.

ALUMINIUM AND MAGNALIUM.

These alloys are coming considerably into use, but it is questionable what part in a Microscope can be constructed of them without sacrificing rigidity or durability. We are willing to make any portions of our Instruments in these metals to order, and at present consider they can be advantageously employed for the Draw-Tubes and Milled heads, but anything else can be added if desired, and we shall be pleased to submit estimates for such work. It will be noted that we already make many of the accessories in Aluminium, and as occasion offers shall increase the number of same.

Dr. Henri Van Heurck's

Microscope for Photography, High-power Work and General Purposes.

(Registered No. 169,421.)

A Highest Grade Microscope of full size, combining complete Mechanical Movements.

(Introduced and Manufactured exclusively by W. Watson & Sons.)

The construction is unique, and affords unequalled rigidity.

The principal parts are dovetailed together, not merely screwed.

The Microscope is perfect for Photographic purposes, and occupies a first position for high-power research.

It is exceedingly compact, yet combines every convenience that is demanded by the modern worker.

It is the only Microscope having Fine Adjustments for Body and Substage, which are so placed as to be both conveniently controlled by the fingers of one hand without having to alter the position of the hand.

The Fine Adjustments are of the utmost perfection and sensitiveness.

The aim in the construction of this Microscope has been to present, in the most efficient form possible, mechanical movements of complete and comprehensive description, in a design of maximum rigidity, and to maintain every feature in the most up-to-date manner, so that it may always embody the

Latest conveniences for Practical Work,

and we can assert unhesitatingly that the complete control which is afforded for working enables the finest results to be secured with a rapidity and comfort which is to be found in no other Microscope. We very strongly recommend it, and it can be selected with the satisfaction and assurance that it is

The Very Best that is Made.

This Microscope was first made by us to the specification and order of Dr. Henri Van Heurck, the celebrated Microscopist, of the Botanical Gardens, Antwerp, for conducting the researches for which he has gained such distinction, and for his high-power Photographic work.

Photo-Micrography, especially with high powers of large aperture, demands a working excellence and accuracy in every part of the highest grade—it, in fact, discloses at once the weak points of a Microscope. In the construction of this Instrument the usual causes of failure have been eliminated. It will at once be recognised that the precision which is requisite for high-power photography and which is provided in this Instrument, is of immense value to the ordinary visual worker, for it enables him to secure the fullest and most effective means of conducting his researches. Especially does this apply to Laboratory work, in which reliance has to be placed on the results obtained; and to those who are doing original and accurate work, this Microscope will be found to yield conveniences of importance and value that cannot be over-estimated, and which render it superior to all others. Amateurs will find in it all that smooth and handy working which will cause their observations to be pleasurable and satisfactory.

The Instrument throughout has been made with special patterns, every detail has been modelled for it, and no pains have been spared to render it unexcelled for the high class of work for which it is intended.

The workmanship throughout is the very finest it is possible to incorporate.

The following are constructional features which merit special consideration.

THE COARSE ADJUSTMENT.

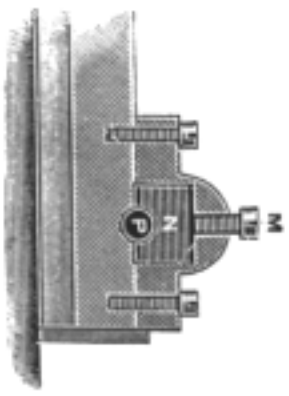


Fig. 10. Sectional View of adjustable fittings of rack and pinion.

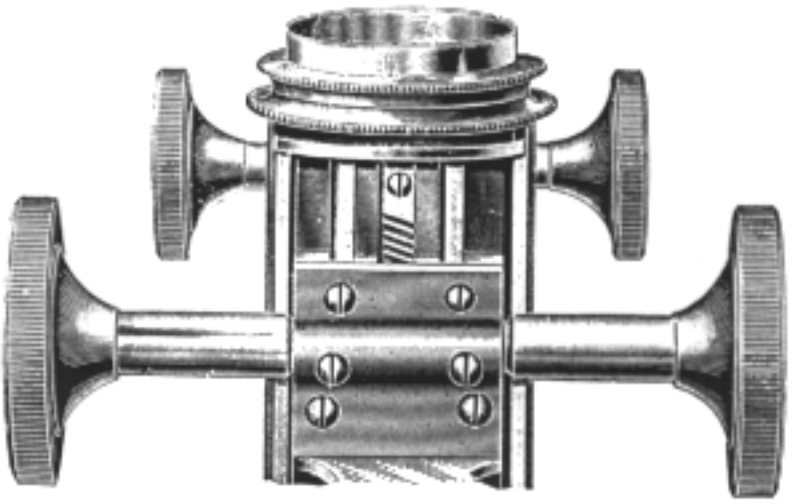


Fig. 11. View of fitting plate of coarse adjustment.

This is effected by means of Watson's diagonal rack and pinion as described on page 8, and has sufficient range to permit of the use of a 4-inch objective. The pressure of the pinion on the rack is adjusted by the two screws in the accompanying figures. N is a block of anti-friction metal which supports the pinion shaft on either side, and it is on this supporting block that two adjusting screws act, one of which, M, is shown in figure 10. The most sensitive relation of pinion to rackwork can be established and maintained at all times. These adjusting screws are shown in position on the fitting plate in figure 11.

THE FINE ADJUSTMENT

is our standard form as described, page 9, but is made with an extra long lever, so imparting an extremely slow movement.

The milled head is divided to $\frac{1}{100}$ths, and one turn of it moves the body, up or down, the $\frac{1}{13}$th of a millimetre. The adjustment is sensitive to the $\frac{1}{100}$th of a turn of the milled head, which would give the $\frac{1}{1300}$th of a millimetre = $\frac{1}{33000}$th of an inch of motion. The Fine Adjustment milled head has a groove in its edge for connecting with the focussing rod of a camera, and has arrows indicating the direction of the movement imparted engraved upon it.

THE BODY

is provided with **two Draw-tubes,** one actuated by **Rackwork** and the other sliding inside it, as shown on page 17. The advantage of having these is, that the body can be made very short or extremely long, and that sufficient latitude can be obtained to use Objectives corrected for either Continental or English tube lengths, and to adjust same for thickness of cover glass by variation of tube length. If the cover glass be thicker than that for which the Objective is corrected, a shorter tube length is necessary; if it be thinner, the body must be lengthened. This can be done in the most precise manner by means of the rackwork draw-tube. The length of the body when closed is 142 millimetres ($5\frac{5}{8}$ inches), and when the two draw-tubes are extended, 305 millimetres (12 inches), being, therefore, shorter than the Continental and longer than the English tube lengths. Both draw-tubes are divided to millimetres, and on the rackwork draw-tube a double scale is engraved, reading continuously from the sliding draw-tube when fully drawn out, or giving the body length when the rackwork draw-tube alone is in use. The utility of this mechanical draw-tube cannot be over-estimated in any Microscope. It permits of quick manipulation, and gives the most perfect results.

The inside top of the draw-tube is smaller than the remainder, the former making a fitting for the eyepiece about 1 inch long, permitting of the tube being blackened inside up to this fitting, thus minimising reflection. The end of the draw-tube has the universal screw for using low-power Photographic Objectives, the Apertometer, etc., and the nosepiece is made removable by unscrewing. The usual size of Eyepiece-fitting provided is the Royal Microscopical Society's gauge, 1·27 in. diameter, but any smaller size can, of course, be employed, and larger sizes can be had specially to order.

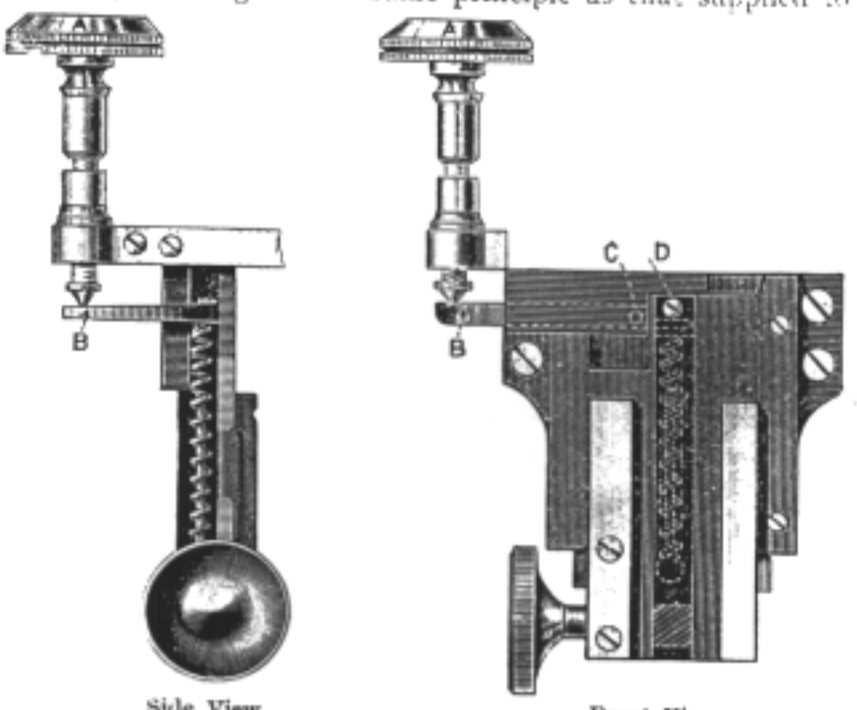
Particulars of

THE STAGE

are given with the specification of each model. In every case the movements provided are of the most perfect and sensitive description that can be manufactured. Concentric rotation is afforded, there is a large rectangular central aperture, and the plates are as thin as can be combined with rigidity. Above all a large clear surface is afforded for the free movement of Specimens with the fingers, and a sliding bar is provided for the support of the object when desired. Adjustments for taking up wear and tear are fitted to the dovetailed plates and working parts in the manner described in connection with the "Royal" Microscope, page 32. Any special arrangement for holding Specimens other than the sliding bar and springs usually provided, can be supplied to order, if required.

THE SUBSTAGE

is made specially for the Instrument, and is of extra strong build. It has rectangular screw adjustments to centre, very fine rackwork to coarse focus, and is provided with a **Fine Adjustment,** working on the same principle as that supplied to the Body



Side View. Front View.

The Fine Adjustment as fitted to the Substage of the Van Heurck Microscope. The Substage itself being removed to show the working.

The method of construction and working is depicted in the accompanying figure. The depression of the lever at "B" by turning the milled head "A" raises the substage, the lever being connected to the substage at "D," the fulcrum being at "C." The reverse effect is produced by a coil spring, on the milled head being turned the opposite way. This Fine Adjustment is a very great convenience, it being a most difficult matter when using a high-power Objective and exchanging an object for one having a different thickness of Slip from that for which the Substage Condenser has been adjusted, to alter the focus of the latter the slight necessary amount. The vibration imparted to the instrument in so doing often prevents the best effect being obtained. If, however, this movement be effected by means of a Lever Fine Adjustment, the hand does not press on a point affecting the optical portions and as there is no consequent vibration, the adjustment can be made with the greatest nicety. The fine adjustment works by a milled head from the upper surface of the Stage, it can therefore be used at the same time as the body fine adjustment, and this is

THE ONLY INSTRUMENT

in which these two motions can be controlled by one hand without having to alter its position—that is, without moving the hand the two adjustments can be controlled by the thumb and fingers. The advantage of this is, of course, inestimable, and will at once be appreciated.

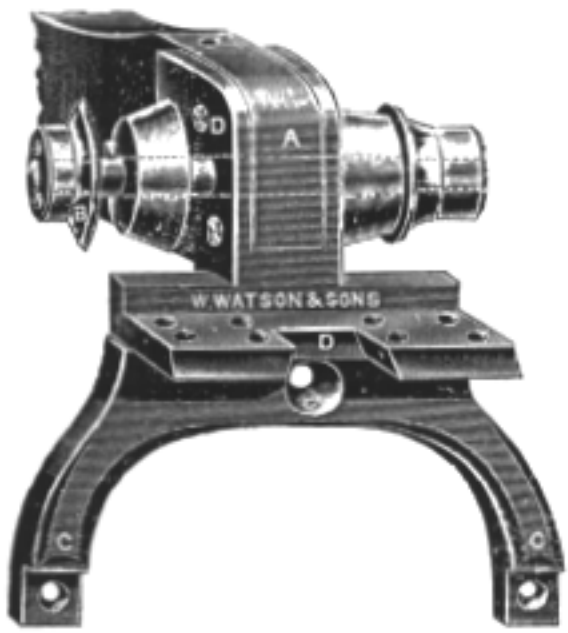
THE MIRRORS,

which are plane and concave, are mounted on a swinging arm, so that they may be turned aside when direct illumination from the lamp is required.

GENERAL CONSTRUCTION.

To reduce vibration to a minimum, the Instrument has been built with one part **fitting into another** and **not merely screwed to it,** rendering it as solid as though it were one piece of metal throughout. The Bracket (CC) carrying the stage, instead of being screwed to the front of the Limb as is usually done, is made in a solid casting, taking the Substage beneath on the plate (D), and going right into the joint at the top of the Pillar.

Full details of this will be seen in the accompanying illustration.



View of the method of fitting the Stage and Limb in the Van Heurck Microscope.
A—Limb. CC and D—Stage Bracket.

THE LIMB (A)

is fitted into the Stage Bracket (D), held firmly by screws, and the joint bolt (B) goes through the whole—Limb and Stage Bracket—rendering the Limb, Stage and Substage as firm as if they were one piece, and we venture to say that the strength and freedom from spring obtained by this means is unique in microscope construction, and altogether superior to microscopes which depend on screws only for the joining together of the parts.

ALL THE MOVEMENTS

can be controlled with one hand on the right-hand side of the Instrument. They are fitted with screws to compensate for wear and tear, and by just giving these a slight turn the user can readjust the bearings—should they require it after long usage—without returning the Microscope to us.

When in the

HORIZONTAL POSITION

the Instrument is quite steady, the limb and body being rigidly supported by the crossbar of the foot. The Stage Bracket is carried below the centre of the Pillar Joint, and brings the Stage itself exactly on the centre, so balancing the parts equally.

There is a steel clamping bar for fixing the Instrument at any angle of inclination.

THE FOOT.

The original Foot constructed for this Instrument was the Continental form, but the Tripod shown, page 19, has met with so much favour and is so strongly recommended by most of the leading Microscopists, that it has superseded the other. We, therefore, shall not in future stock these instruments with the horseshoe form of foot, but shall be willing to make them specially to order. At the points of contact with the table the foot is provided with cork pads, insulating it from vibration, preventing the Instrument from slipping and the table from being scratched. The tripod foot has recently been re-modelled so that the milled head controlling the substage rackwork may stand out beyond the foot when the instrument is set vertically.

ALL THE FITTINGS

are of the universal size.

The Instrument is made in 3 Models—

1. The Grand Model, Van Heurck Stand, pages 18 to 20.
2. The Circuit Stage Van Heurck Stand, pages 21 and 22.
3. The Van Heurck Stand, No. 1, pages 23 to 25.

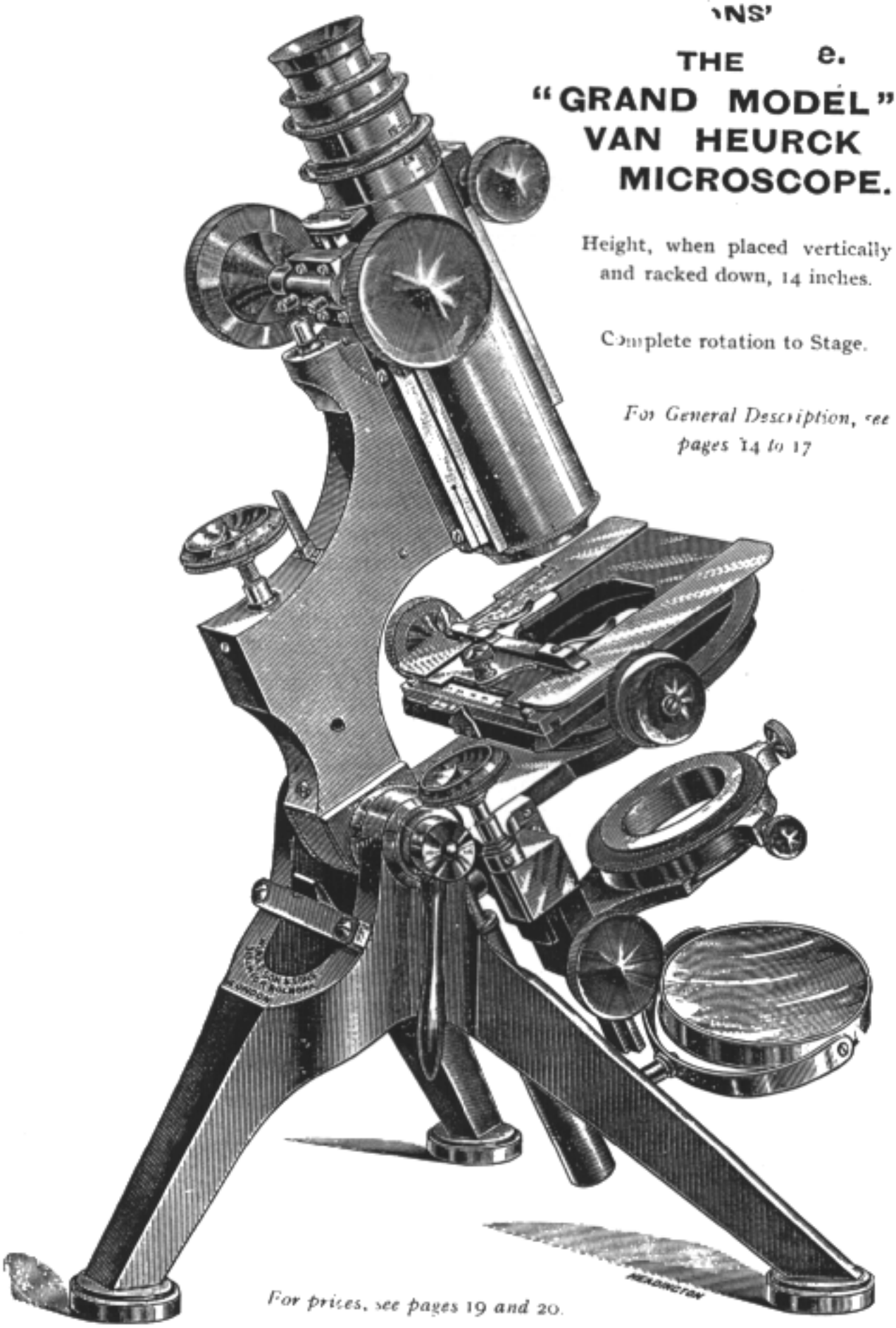
'NS'

THE e. "GRAND MODEL" VAN HEURCK MICROSCOPE.

Height, when placed vertically and racked down, 14 inches.

Complete rotation to Stage.

For General Description, see pages 14 to 17



For prices, see pages 19 and 20.

THE "GRAND MODEL"

Van Heurck Microscope Stand

A Full sized Microscope embodying every convenience.

Illustrated on page 18.

This Microscope is built on the structural lines described on pages 14 to 17. It is of largest size and most massive construction. It affords the utmost freedom in working, and is strongly recommended as a Stand of the highest grade.

SPECIFICATION.—The Stage, which is 5 inches diameter, has rectangular mechanical movements of the utmost precision, controlled by two milled-heads, working on one centre ; about one inch of motion is afforded in either direction, and the whole stage can be **completely rotated** in any position.

The Optical Centre, when the instrument is set horizontally for Drawing, Photography, etc., is ten inches high—the normal vision distance.

The Tripod Foot, which is cork shod, has a spread of over ten inches in each direction, giving extreme steadiness to the whole Microscope.

Diameter of Mirrors, 2¾ inches.

Diameter of Eyepiece fitting—Royal Microscopical Society's, standard size 1·27 in.

Diameter of Substage fitting—Royal Microscopical Society's, standard size 1·527 in.

Screw for Objectives—Royal Microscopical Society's, standard size.

In all other respects the mechanical arrangements are exactly as described on pages 14 to 17. The coarse and fine adjustments, the body with rackwork and sliding draw-tubes, fine adjustment to substage, compensating screws to all working parts, etc., etc.

The workmanship and quality are the very finest it is possible to produce.

PRICE, without Eyepieces or Objectives **£28 10 0**

For the convenience of those who may not require the usual form of Stage supplied with this Instrument, and yet wish to have a microscope of largest size, we substitute the Stage as fitted to the No. 1 Van Heurck Instrument (page 21) the price then being **25 10 0**

The Scop Mechanical Stage (patent), as described page 94, can be fitted instead of the stage illustrated page 19, without extra charge, the cost of the complete Instrument then being **28 10 0**

It should be noted that **complete** rotation of the Stage cannot be effected with the Scop Stage.

PRESENTATION FORM.

" Grand Model " Van Heurck Microscope, on Tripod form of foot, fitted with centring screws to Stage, and clamp screws to fix Stage when centred. Rackwork rotation to stage, with means of throwing pinion in and out of gear. Rotation of Stage divided to degrees, reading by verniers to five minutes. Divisions to movements of Stage, reading by verniers to $\frac{1}{10}$th of a millimetre. Rackwork rotation to Substage, finished in **bright polished lacquered brass throughout** in the very best manner. Without Eyepieces or Objectives **48 10 0**

This is extremely handsome and suitable for presentation

For extra fittings see page 20.

EXTRA FITTINGS for WATSON & SONS' "Grand Model" Van Heurck Microscope.

To the Fine Adjustment.

Alternatives

The Males-Watson Two-speed Fine Adjustment, as described, page 11, and shown on Microscope, page 21 ..... £2 0 0

The Spindle Milled-head for Multiple Speed, as described page 10.... 0 3 6

To the Stage.

Centring Screws to Stage, as shown on Instrument, page 23, and Clamp Screws to fix the Stage when centred 2 10 0

Rackwork rotation to Stage, with means of throwing pinion in and out of gear 1 10 0

Divisions to circumference of Stage to degrees, reading by verniers to five minutes 0 15 0

Divisions to movements of Stage, reading by verniers to $\frac{1}{10}$th of a millimetre 1 1 0

Plate to fit in dovetailed grooves to cover surface of Stage, for rough work 0 17 6

To the Substage.

Rackwork rotation to Substage 1 10 0

Front portion of Substage, mounted on very strong-hinged joint, so that the Substage and Condenser contained in it may be turned aside out of the optical axis, and replaced as desired. With means of fixing securely when in optical axis, complete 1 15 0

Substage mounted on bar, sliding in extra dovetailed fittings, so that the Substage may be set in any desired position, irrespective of the rackwork, which operates independently, so allowing of the use of every variety of Substage apparatus. With clamp screw 1 5 0

BINOCULAR BODY.

*" Grand Model " Van Heurck Microscope, mounted on Tripod form of Foot, with Binocular Body instead of the Monocular. Fitted with rackwork draw-tubes to adjust to width of user's eyes, without Eyepieces £30 10 0

*The length of the body of this Instrument is about 9 inches, the draw-tubes racking out to 10 inches.

Extra Binocular Body of best quality to interchange with the Monocular, the latter being racked out from its bearings and the former replacing it, so that either body may be used at will, rendering the Instrument suitable for all classes of work. With rackwork to adjust to width of user's eyes. Without Eyepieces..... £4 10 0

When two bodies are supplied they are both planed together so that they may exactly correspond; it is, however, advisable to have centring movements to the Stage, so that the Stage may rotate quite concentrically with either body.

MAHOGANY CABINETS, etc., for "GRAND MODEL" VAN HEURCK MICROSCOPE

Mahogany Cabinet to contain Instrument and Apparatus £2 0 0

Best Mahogany Cabinet, with cupboard door to exclude dust, and drawers to contain apparatus 3 0 0

Handsome Mahogany Cabinet, with cupboard door to exclude dust, and having fitted inside a best mahogany flat case to contain variety of apparatus, of very best construction 5 10 0

*Bell Glass Cover for Van Heurck Microscope, on polished ebonised base 0 14 6

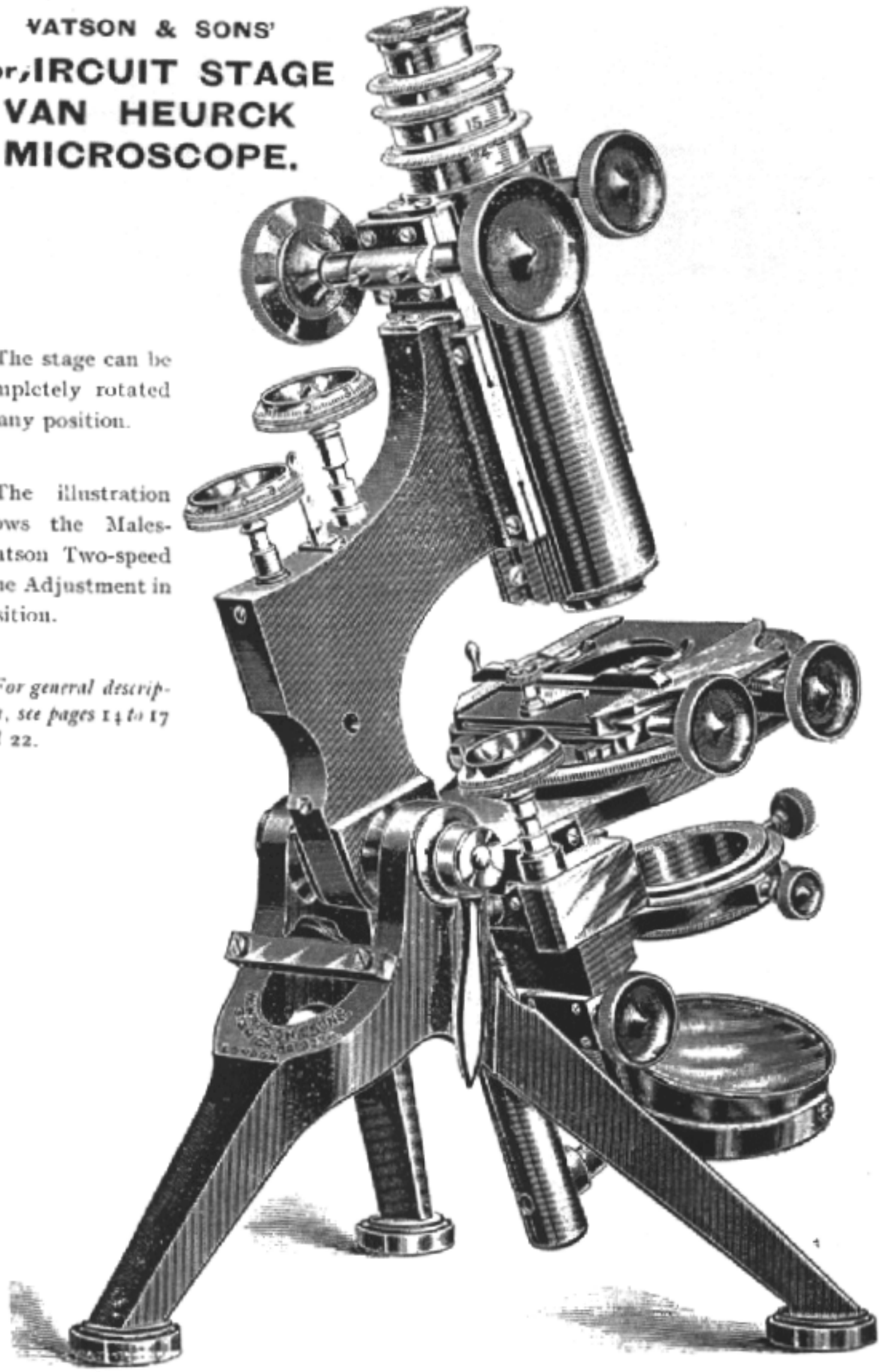
*As this has to be packed separately, the expense of so doing will be charged at cost, and the risk of breakage in transit must be borne by the purchaser.

WATSON & SONS' For CIRCUIT STAGE VAN HEURCK MICROSCOPE.

The stage can be completely rotated in any position.

The illustration shows the Males-Watson Two-speed Fine Adjustment in position.

For general description, see pages 14 to 17 and 22.



Height when placed vertically and racked down, 13⅛ inches.

For specification and prices, see page 22, and extras, page 23.

Price List of W. Watson & Sons' CIRCUIT STAGE VAN HEURCK MICROSCOPE.

Special Feature—Complete rotation to the Stage in any posi

As figured page 21. See description pages 14 to 17.

This Microscope is not quite so massive as the Grand Model Van Heurck Microscope, but is constructed on the same general lines, and is of a size which has proved to be a most convenient one for all classes of workers who appreciate fine workmanship and accuracy of movements. It may be regarded as an Instrument of full size, and is of finest quality. An important feature is the **complete rotation of the Stage,** which is rendered permissible by the use of a bracket supporting the stage and a limb carrying the body, of such a length as to afford the necessary space. The rotation may be effected with the Stage set at any position, and as this movement is both useful and necessary for many classes of work, this model has found exceptional favour, and it undoubtedly deserves it.

SPECIFICATION.

Height. 13⅜ *inches. Height to centre of Eyepiece when set horizontally,* 9½ *inches.*

Stage. *Diameter* 5 *inches. Central aperture,* 1⅞ *inch full. Range of movements of mechanical stage,* 1 *inch in each direction.*

Foot. *Spread* 9 *inches.*

***Eyepiece Fitting.** *Diameter* 1·27 *inches (unless otherwise ordered).*

Mirrors. *Plane and Concave, diameter* 2⅜ *inches.*

***Substage Fitting.** *Diameter inside* 1·527 *inches.*

**These, and the thread for Objectives, are of the universal sizes recommended by the Royal Microscopical Society, and adopted by opticians throughout the world.*

THE SPECIFICATION.

is the same as that of the Van Heurck Microscope No. 1, given on page 24, with the exception that **the height to the centre of the Eyepiece when the Instrument is set horizontally is 9½ inches.**

PRICE.

Monocular Stand only, without Eyepieces or Objectives..... **£21 0 0**

For **Extras** please refer to page 25, the additional fittings for the Circuit Stage Microscope above being identical with those for the Van Heurck Microscope No. 1

BINOCULAR BODY.

* Circuit Stage Van Heurck Microscope, with Binocular Body instead of the Monocular. Fitted with rackwork draw-tubes to adjust to width of user's eyes, without Eyepieces..... **£23 0 0**

*** The length of the body of this Instrument is about 9 inches, the draw-tubes racking out to 10 inches.**

Extra Binocular Body, of best quality, to the above Instrument to interchange with the Monocular, the latter being racked out from its bearings and the former replacing it, so that either body may be used at will. With rackwork to adjust to width of user's eyes, without Eyepieces **£4 10 0**

For further particulars, see page 24.

The above Instrument may be had with the pattern of Stage that is fitted on the **Grand Model Stand,** page 19, at the following

PRICES.

Monocular, without Eyepieces or Objectives **£24 0 0**

Binocular " " **26 0 0**

Or the "Scop" Mechanical Stage, as described page 94, can be supplied at an extra cost of 25/-. Complete rotation cannot be given with the "Scop" Stage.

CASES FOR CIRCUIT STAGE MICROSCOPE.

Mahogany Case, with fittings for apparatus **£1 15 0**

Best Mahogany Case with rebated door to exclude dust, drawers for apparatus, and large handle **3 0 0**

Handsome Mahogany Cabinet, of best construction, having fitted inside a best mahogany flat case to contain apparatus **5 5 0**

* Bell Glass Cover for Instrument, on polished ebonised base..... **0 12 6**

*As this has to be packed separately, the expense of so doing will be charged at cost and the risk of breakage in transit must be borne by the purchaser.

EXTRAS—*continued.*

For Watson & Sons' Circuit Stage and No. 1 Van Heurck Microscopes (see pages 21 & 23).

TO THE FINE ADJUSTMENT.

Alternatives.

The Males-Watson Two-speed Fine Adjustment, as described page 11 and shown on Microscope, page 21	£2	0	0
* The Spindle Milled Head for Multiple Speed, as described page 10	0	3	6

TO THE STAGE.

Centring screws to Stage, as shown on Instrument, page 23, and clamp screws to fix Stage when centred	£2	10	0
* Rackwork rotation to Stage, with means of throwing pinion in and out of gear	1	10	0
* Divisions to circumference of Stage to degrees, reading by verniers to five minutes	0	15	0
* Divisions to movements of Stage, reading by verniers to $\frac{1}{10}$th of a millimetre	1	1	0
* Plate to fit in dovetailed grooves to cover surface of Stage, for rough work	0	17	6

TO THE SUBSTAGE.

Rackwork rotation to Substage	1	10	0
Front portion of Substage mounted on very strong hinged joint so that the Substage and Condenser contained in it may be turned aside out of the optical axis and replaced as desired. With means of fixing securely when in optical axis, complete	1	15	0

* The items marked * can be conveniently fitted to the Microscope at a date subsequent to manufacture, if so desired, at a small extra cost beyond the above prices.

Objectives, Eyepieces and Substage Condensers, see pages 101 to 116.

MAHOGANY CASES for the No. 1 Van Heurck Microscope.

Mahogany Case to contain Instrument and Apparatus	£1	10	0
Best Mahogany Cabinet with cupboard door to exclude dust, and drawers to contain apparatus	2	10	0
Handsome Mahogany Cabinet with rebated door to exclude dust, and having fitted inside a best mahogany flat case to contain variety of apparatus; of very best construction throughout	5	5	0
† Bell Glass Cover for Van Heurck Microscope, on polished ebonised base	0	10	6

† As this has to be packed separately, the expense of so doing will be charged at cost, and the risk of breakage in transit must be borne by the purchaser.

Watson & Sons' VAN HEURCK MICROSCOPE No. 1 EXHIBITION MODEL.

The No. 1 Van Heurck Microscope on Tripod form of foot, fitted with centring screws to Stage, and clamp screws to fix Stage when centred. Rackwork rotation to Stage, with means of throwing pinion in and out of gear. Rotation of Stage divided to degrees, reading by verniers to five minutes. Divisions to movements of stage, reading by verniers to $\frac{1}{10}$th of a millimetre. Rackwork rotation to Substage. Finished in bright polished lacquered brass throughout in the very best manner	£37	10	0
Circuit Stage Model (see page 21), complete as above	40	0	0

These are extremely handsome and suitable for presentation.

Extract from a letter received from Dr. H. Van Heurck :—

"I have finished the inspection of the Instrument, and am very grateful to you for the beautiful Microscope you have made for me. It is a marvel of ingenuity. I send enclosed copy of a description of it I am putting into my book. It is a description, not an advertisement, and a sincere expression of the true reality."

The following are extracts from a Description of this Microscope in the 4th Edition of "Traité du Microscope," by Dr. Van Heurck.

"In this Microscope, which Messrs. W. WATSON & SONS have kindly constructed on our suggestions, we have tried to combine all the comfort for every-day work, as well as the greatest precision possible, for a relatively low price. Messrs. W. WATSON & SONS have admirably understood all our requirements, and the Microscope they have turned out may be really considered a perfect Instrument, realizing in several points a degree of perfection which had never been previously attained.

"The foot of the Instrument is of the horse-shoe shape, bronzed, and has at the toes, near the edges, three holes, fitted with pieces of cork projecting slightly. The object of these pieces of cork is to prevent all vibration being communicated by the table on which the Instrument stands, also the slipping of the Instrument and the scratches which the sharp angles of the foot would occasion on a polished table.

"A short brass pillar, with a joint at the top to allow the Instrument to be inclined, supports the whole Microscope. A clamping screw permits of the Instrument being fixed at any desired inclination, but it is so well balanced as to render this almost unnecessary.

"The stage turns on its own axis. Instead of small gliding plates to keep the rotating circle to its bearings, there are plates with double springs. The result is that a very soft rotation is obtained, and at the same time a perfect rigidity in any position; this also without using a cog-wheel, which generally gives little jerks after it has been used some time.

"The Fine Adjustment is of extreme delicacy, and of precision surpassing that of all the Microscopes in our collection. Each turn of the milled head corresponds to $\frac{1}{15}$th of a millimetre, and the adjustment is so perfect that it is sensible to the $\frac{1}{100}$th of a turn, that is $\frac{1}{1500}$th of a millimetre.

"Now comes the Substage, which we on purpose kept for the last, having in this part to point out improvements which have never existed in any other Microscope. The Condenser can, of course, be centred, and can be raised or lowered by means of the rack and pinion, but, in addition, it is fitted with a Fine Adjustment of great delicacy, allowing of the perfect adjustment of the Condenser (an adjustment so necessary in many cases, and not yet sufficiently appreciated). In the few other Instruments to which this has been previously fitted it has been carried out by means of a single screw, which gives a coarse movement and a loss of time in the change of direction. Here, the Fine Adjustment is working with a lever as in the Fine Adjustment of the body, and the milled head of this adjustment comes above the Stage, and quite close to that of the Body Fine Adjustment. One can therefore obtain a great precision, and work the two Fine Adjustments simultaneously with one hand. * *

"In fact, we have had put into this Instrument all the improvements suggested by many years of work with the Microscope, and Messrs. W. WATSON & SONS have realized all our desiderata with a care and precision which was quite beyond our expectations. We would also add that this perfect Instrument costs less than the large Continental stands, and it will be admitted that the makers in introducing this model have filled a real want to the serious worker."

Extract from the "English Mechanic," :—

"Making every allowance for the praise which the designer would naturally award to his own device when carried out in the most perfect manner possible, we will only say that if a better Microscope is in existence we should like to see it."

Extract from the "Science of Photo-Micrography," by Dr. E. C. Bousfield :—

"The Van Heurck Microscopes by WATSON & SONS (manufactured by them from a specification by the distinguished microscopist and photo-micrographer, whose name they have attached to the stand, and regularly used by him), is a high-class Instrument of excellent workmanship and reasonable price, and will be found adequate to the requirements of its possessor, whatever they may be."

See also Extract from Report of Jury of International Exhibition of Microscopes, Antwerp, 1891, page 5.

We have had the honour of supplying our "Van Heurck Microscope" to the following well-known Microscopists and institutions, among many others:—

THE MUNICIPAL COUNCIL OF SHANGHAI, CHINA.
WALLIS EVERSHED, ESQ., Kendal.
DR. HENRI VAN HEURCK, JARDIN BOTANIQUE, Antwerp.
DR. SIMOENS, Brussels.
WYNNE E. BAXTER, ESQ., J.P., D.L., F.R.M.S.
DR. W. DOBIE, Chester.
D. MIQUEL, ESQ., Chef du Service Micrographie, Observatoire Municpal, Paris.
DR. HENRY G. PIFFARD, 10, West 35th Street, New York.
MONS. L. GIFE, Member of the Jury of the International Exhibition of Microscopes, Antwerp.
MONS. F. VINGERHOETS, 50, Avenue des Arts, Antwerp.
JAMES STELFOX, ESQ., Belfast.
THE COUNTY ASYLUM, STAFFORD (DR. G. MATHESON).
THE GOLD ESTATES OF AUSTRALIA.
G. R. PERRINS, ESQ., Port Elizabeth, South Africa.
DR. J. HASSALL, Northwich.
G. H. BAXTER, ESQ., Hutton Park, Essex.
DR. CREAGH, Ookiep, Cape Colony.
THE INDIAN GOVERNMENT, per INDIA OFFICE.
GEORGE F. JEWELL, ESQ., London, Ontario, Canada.
DR. G. M. LOWE, Isle of Wight.
S. P. COWARDINE, ESQ., University College of Medicine, Richmond, Va.
ANDREW PRINGLE, ESQ., F.R.M.S., Author of "Practical Photo-Micrography," etc., etc.
DR. C. PICTET, Stanzione Zoologica, Naples.
C. E. GARNER, ESQ., Shanghai.
DR. R. H. CUNNINGHAM, New York.
DR. SURVEYOR, Grant College, Bombay.
F. U. P. GILL, ESQ., Nellikuppen, S. Arcot, Madras Presidency.
F. W. MILLS, ESQ., F.R.M.S., Author of "Photography applied to the Microscope," etc., etc.
DR. LINDLEY SCOTT, Author of "The Clinical Examination of Urine."
T. CROSSMAN, ESQ., Albion Brewery, Oldham.
DR. J. H. WHYTE, Professor of Microscopy and Histology, Cooper Medical College, San Francisco.
C. DE CANDOLLE, ESQ., Versoix, near Geneva.
F. J. LLOYD, ESQ., F.C.S., F.I.C.
N. B. H. DEAN, ESQ., M.D., Brighton, Ontario.
E. K. GREEN, ESQ., Cape Town.
G. E. DAVIES, ESQ., Author of "Practical Microscopy."
PROF. J. B. HARRISON, Government Laboratory, B. Guiana.
P. E. RADLEY, ESQ., Hon. Librarian, Royal Microscopical Society.
DR. J. C. GRAHAM, Starling Medical College, Columbus, Ohio.
DR. H. M. EARLY, Columbus, Ohio.
PROF. O'NEILL, Chemical Department, State University, California.
DR. A. ANGELL, County Laboratory, Southampton.
DR. A. H. MACBETH, Buffalo, N.Y.
PROF. C. MOREL, Laboratoire d'Anatomie Pathologique de la Faculté de Médecine, Toulouse.
G. JOHNSTONE STONEY, ESQ., D.Sc., M.A., F.R.S.
DR. OZZARD, Georgetown, Demerara.
PROF. C. H. POTTER, Baltimore Medical College, U.S.A.
UNIVERSITY OF KANSAS, Lawrence, Kan., U.S.A.
UNIVERSITY COLLEGE, Sheffield.
THE UNIVERSITY COLLEGE, LIVERPOOL, per Prof. R. Boyce.
DR. C. H. EVANS, Canton, Ohio.
PROF. STEFANO CAPRANICA, Royal University of Genoa.
DR. J. LEON WILLIAMS, D.D.S., L.D.S.
CROWN AGENTS FOR THE COLONIES.
SAMMUS N. SMITH, ESQ., Philadelphia, Pa., U.S.A.
DR. J. G. SPENZER, Cleveland, Ohio.
C. T. WILLIAMS, ESQ., Secretary of the Microscopical Society, Montreal.
J. F. STONE, ESQ., Columbus, Ohio.
PROF. JOSEPH BEMROSE, McGill College, Montreal.
J. H. OSMOND, ESQ., Manila.
THE CITY OF ANTWERP LABORATORY.
W. J. WOOD, ESQ., Grimsby.
DR. FERRIER, South Norwood, S.E.
PROF. H. DRUYTS, Antwerp.
DR. W. PATERSON, Salta, Argentine Republic.
DR. C. E. COLLINS, East Grinstead.
J. HEATON, ESQ., F.C.S., F.R.M.S., Sunderland.
JAMES WEDELES, ESQ., Melbourne, Australia.
C. T. HEYCOCK, ESQ., F.R.S., Cambridge.
H. ROWLEY, ESQ., Perth, W. Australia.
ARMY MEDICAL DEPT., Washington, D.C., U.S.A.
SENOR DOMINGO DE ORUETA, F.R.M.S., Gijon.
KYRLE BELLEW, ESQ., London.
MILES JOHNSTON, ESQ., Edinburgh.
DR. A. E. DAVIS (late President of Field Naturalists' Club), Edinburgh.
THE COUNTY ASYTUM, Whittingham, nr. Preston.
W. A. LEE, ESQ., Calcutta.
DR. H. KNEVITT, Ealing.
J. RHEINBERG, ESQ., F.R.M.S.
SANGER SHEPHERD, ESQ.
A. GRAY, ESQ., Marine Biological Station, Millport, N.B.
PROFESSOR SUTHERLAND, University College, Dundee.
PROFESSOR G. T. BEILBY, Glasgow.
J. STANNING & SON, LTD., Leyland Bleach Works, nr. Preston.
THE LANCASTER COUNTY ASYLUM.
DR. PLIMMER, St. Mary's Hospital.
DR. A. MOORE, Public Health Department, Shanghai.
PROF. TROUTON, University College, London.
LONDON & NORTH-WESTERN RAILWAY CO., Crewe.
GREAT EASTERN RAILWAY CO.
A. C. DILKES, ESQ., Tardebigge, Bromsgrove.
W. C. ROWDEN, ESQ., Newcastle-on-Tyne.
DR. W. S. CLARK, West Auckland, Co. Durham.
E. HERON ALLEN, ESQ., F.R.M.S., London.
THE MYSORE GOLD MINING CO.
MESSRS. RUDGE-WHITWORTH, LTD., Coventry (specially arranged for Metallurgy).
MESSRS. TAYLOR BROS. CO., Clarence Works, Leeds (specially arranged for Metallurgy).

COMPLETE RESEARCH OUTFIT "L."

"Grand Model," Van Heurck Microscope Stand, as figured page 18 of catalogue	£23	10	0
Males-Watson patent two-speed fine adjustment	2	0	0
Divisions to Stage reading to $\frac{1}{10}$th millimetre	1	1	0
Divisions to Rotation of Stage reading to 5 minutes	0	15	0
Rackwork to Rotation of Stage £1 10s. and Substage £1 10s.	3	0	0
Centring Screws to Stage	2	10	0
Plate to cover Stage for rough work	0	17	6
			£38 13 6
Best Mahogany Cabinet to contain Instrument and Apparatus			5 10 0
Extra Binocular Body to interchange with the Monocular			4 10 0

OBJECTIVES—

For Projection without Eyepiece, Watson's Holostigmatic Lenses (page 106), 35 m/m, £4, 76 m/m, £4	8	0	0
Apochromatic Series by Zeiss—			
24 m/m, £6. 12 m/m, £7. 6 m/m, £9	22	0	0
Oil immersion 3 m/m (1·4 N.A.) £20, 2 m/m (1·3 N.A.) £15	35	0	0
Special Quality, 2 in., £1 10s.; 3 in., £1 10s.; by Watson & Sons ..	3	0	0
			63 0 0

COMPENSATING EYEPIECES BY ZEISS, etc.—

Power	8	12	18	27			
Price	£1 15s.	£1 15s.	£1 10s.	£1 5s.	6	5	0
*Holoscopic Eyepieces by Watson & Sons, 1 pair × 5, 1 pair × 7, 1 pair × 10, £1 2s. 6d.	6	15	0				
					13	0	0

These Eyepieces are provided with adjustment so that they may be used either with Achromatic or Apochromatic Objectives, see page 103. If the Binocular body is not required, one each of these Eyepieces may be omitted.

ACCESSORY APPARATUS—

Holoscopic Oil Immersion Condenser (1·35 N.A.) with Iris Diaphragm and Set of Stops for dark ground and oblique illumination, No. 500	6	10	0
Universal Achromatic Condenser (1·0 N.A.) with Iris Diaphragm and Set of Stops, Nos. 506 and 507 (page 103)	3	15	0
Polariser of specially large size with divided Circle, arranged to work with the above Condensers. Analyser to fit over Eyepiece with divided Circle, and Calespar ..	4	15	0
Set of Selenites for Substage, No. 567	3	3	0
Gifford's Light Screen 4/6, Tinted Glasses for Condensers 5/0	0	9	6
Stand Condenser, No. 602 (page 123)	0	15	0
Ramsden Screw Micrometer in Aluminium, No. 774 (page 135)	3	15	0
Stage Micrometer 5/0, Improved Rousselet's Compressor, No. 660 15/0	1	0	0
Triple Nosepiece, Aluminium £1 12s. 6d., 2 Live Boxes at 10/6 = £1 1s.	2	13	6
Abbe Pattern Camera Lucida in Aluminium, No. 650	2	0	0
Micro-Spectroscope (see page 90)	6	10	0
Microscope Lamp, Nos. 750, 752 and 752A, £6 19 0, Mahogany Case, 15/0	7	14	0
Set of 12 Test Objects in Case (see Object Catalogue)	1	1	0

APPARATUS FOR MOUNTING—

Laboratory Dissecting Microscope with set of three Aplanatic Magnifiers (see page 96)	4	5	6
Dissecting Troughs	0	10	0
Set of Dissecting Instruments, No. 980	1	5	0
Cabinet (Mahogany) of Mounting Apparatus (see page 150)	2	15	0
Cathcart Microtome for Embedding and Freezing (see page 139)	1	7	6
Laboratory Microtome (see page 142) Pattern D complete	7	14	0
Plane Iron 2/6, Section Knife 4/6, Microtome Knife £1	0	7	0

PHOTO-MICRO. APPARATUS—

Laboratory Camera, fitted with Watson-Conrady Condenser System, as figured and described pages 163 to 166, and as per list on page 165	34	6	6
Set of Chemicals for development, &c., in Case	1	12	6
The Illuminant should be chosen from pages 171 and 172.	£227	3	6

Revolving Microscope Table (page 160), **£6 15 0.**
Complete Cabinet of Choice Microscopic Objects, No. 2 (page 159), **£40.**

COMPLETE RESEARCH OUTFIT "M."

The Circuit Stage Van Heurck Microscope Stand, on Tripod foot, as per page 21				£21	0	0
Males-Watson patent two-speed Fine Adjustment	£2	0	0			
Divisions to Stage, reading to $\frac{1}{10}$th millimetre	1	1	0			
Clamp Screw to centring movement of Substage	0	2	6			
Plate to cover Stage for rough work	0	17	6			
Centring Screws to Rotation of Stage	2	10	0			
Rackwork Rotation to Stage	1	10	0			
Dividing Rotation of Stage	0	15	0			
Best Mahogany Case to contain Instrument and Apparatus	2	10	0			
				11	6	0
Extra Binocular Body to interchange with the Monocular				4	10	0

***OBJECTIVES** (see page 102), Watson's Holoscopic Series

25 m/m. £2 15s., 12 m/m. ·65 N.A., £3 10s., 4 m/m. 0·95 £4	10	5	0			
2 m/m. Homogeneous Immersion	8	0	0			
Special quality, 2 in., £1 10s. 3 in., £1 10s.	3	0	0			
				21	5	0

EYEPIECES, Holoscopic Series—

Magnifying powers 5, 7, 10 and 14 diameters at **22/6** each				4	10	0
Extra, to make pairs for Binocular, 1 each, 5 and 7 at **22/6** each				2	5	0

ACCESSORY APPARATUS—

Parachromatic Condenser 1·0 N.A. with Iris diaphragm and set of stops for dark ground and oblique illumination				3	15	0
Abbe Model Illuminator (1·4 N.A.), (Nos. 521 & 524) and set of stops				2	17	6
Ramsden Screw Micrometer Eyepiece £3 15s. Stage Micrometer 5/0				4	0	0
Polariser of specially large size, and Analyser				3	15	0
Micro-Spectroscope (see page 85)				6	10	0
Dust-proof Triple Nosepiece, Aluminium				1	5	0
2 Live Boxes at 10/6 (see page 128)				1	1	0
Microscope Lamp (No. 754, page 133) £1 5s., Mahogany Case, 7/6				1	12	6
Aplanatic Bull's-Eye Stand Condenser (No. 605)				1	10	0
Set of 12 Test Objects (see Object Catalogue)				1	1	0
Abbe Pattern Camera Lucida in Aluminium				2	0	0

APPARATUS FOR MOUNTING—

Cabinet of Mounting Apparatus, Pine (see page 150)				2	5	0
Laboratory Dissecting Microscope with set of three Aplanatic Magnifiers (see page 96)				4	5	6
Dissecting Troughs				0	10	0
Set of Dissecting Instruments (No. 980)				1	5	0
Cathcart Microtome for Imbedding and Freezing (see page 139)				1	7	6
Plane Iron, 2/6, Section Knife, 4/6				0	7	0

PHOTO-MICRO. APPARATUS—

Laboratory Camera (see page 166)	£11	10	0			
2 Inner Frames 3/6, fitting Microscope and supplying connecting Flanges	1	0	0			
				12	10	0
Focussing Glass, 10/6, Projection Eyepiece, £2				2	10	6
Brass-mounted Trough on Stand, to contain Light and Heat Absorbing Media				1	10	0
Chemicals for Development, etc., in case				1	12	6
All necessaries for Photo-Micrography with Oil Light are included above.				£122	6	0

For other Illuminants please refer to pages 171 & 172.

Complete Cabinets of Choice Microscopic Objects (see page 159).

* Apochromatic Objectives and Compensating Eyepieces, as per page 28, may be substituted for above if desired.

W. WATSON & SONS'

Royal Microscope.

This Microscope is designed to afford those practical working advantages for which the Van Heurck Model has gained so high a reputation, but in a more compact form and at a lessened cost. It has all the working mechanical conveniences of the Van Heurck No. 1 Stand, but is built more lightly and is smaller. In particular, the advantageous arrangement of body-tube with the mechanical draw-tube and inner sliding-tube is incorporated. Such an Instrument was constantly enquired for and made to order, and the inclusion of it with our Standard Models has been amply justified by the appreciative demand that has arisen for it.

The many special features that it presents are worthy of the consideration of those who are in search of a high-class Microscope.

We would again emphasize the complete control that is afforded in all the working parts of our Microscopes, for the purposes of adjustment and compensation for wear and tear (see page 7).

SPECIFICATION.

FINE ADJUSTMENT, Watson's Standard as described page 9.

COARSE ADJUSTMENT. Exactly as in the Van Heurck Microscope, and fully described and illustrated, page 8.

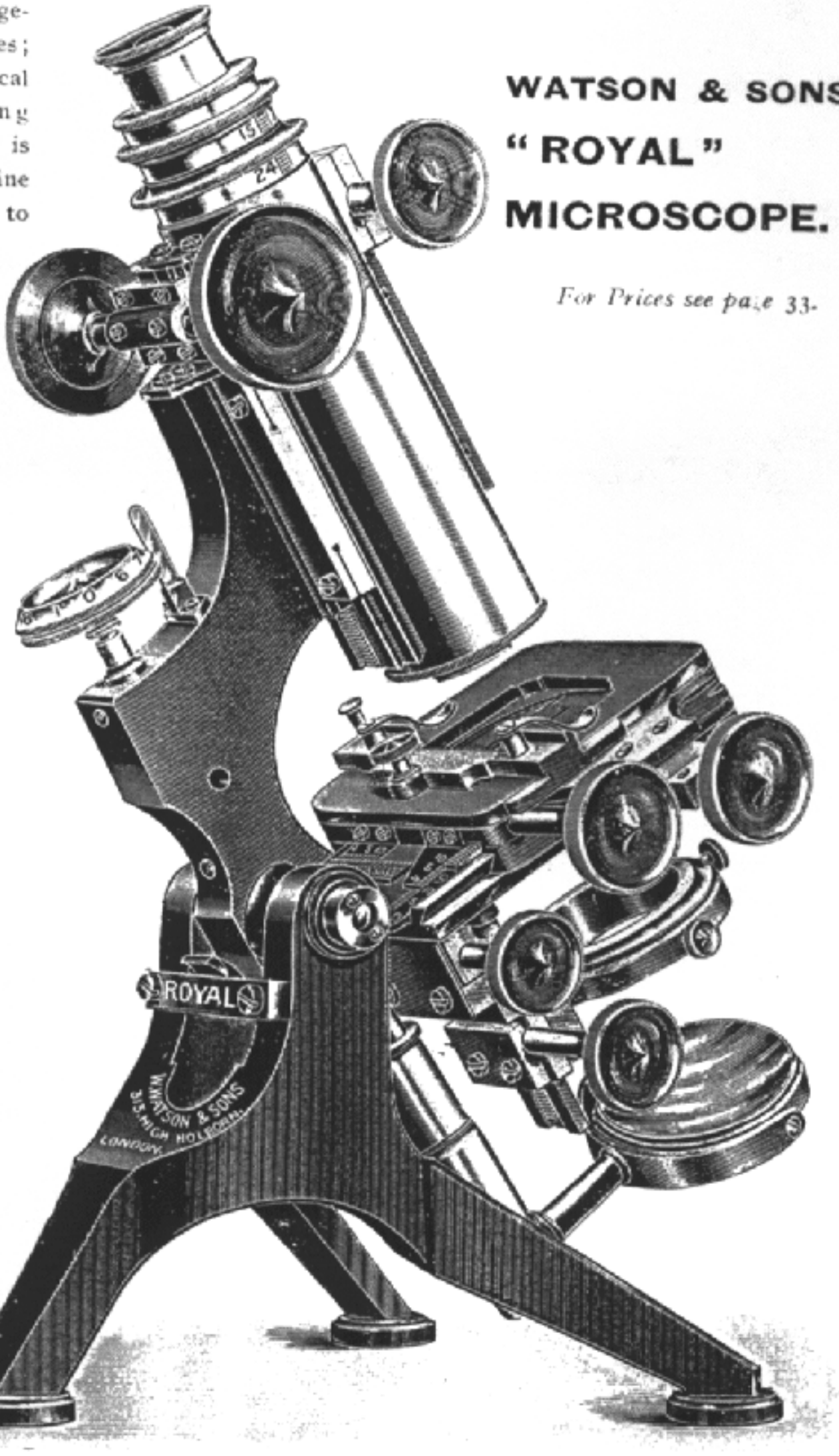
BODY TUBE. It is of large diameter, taking full-sized Eyepieces (1·27 in.), and has a rackwork draw-tube with inner sliding draw-tube, graduated to millimetres, and in all respects similar to the body of our Van Heurck Microscope, as described page 15, permitting of the use of either Continental or English Objectives, the range of body length being variable between 142 m/m and 305 m/m.

THE STAGE surface is seen in full view in fig. 12, page 32, and the manner in which the movements are effected will be plainly seen. The horizontal travel to the Stage is controlled by the rotation of the milled head F, which, however, **remains stationary,** that is, it does not travel with the traversing plates of the Stage. The plate E is connected with the long screw operated by the milled head F, and the screw is supported by a slotted collar G, which gives adjustment for wear, as shown in fig. 13. To give the smoothest possible motion, the screw has a ball fitting, as shown at A: this has a groove in it, which acts as a receptacle for dust. The little plate B fits over the ball and is so attached that no internal shake takes place. C is the adjusting screw for regulating the pressure of the pinion upon the rack in the vertical movement of the Stage. The Verniers D, which can be used for measuring objects or for "finding" purposes, are an extra, as mentioned.

NOTE.—This Microscope is also supplied in portable form (see page 78).

Carries large-sized eyepieces; mechanical and sliding draw-tubes; is fitted with fine adjustment to substage.

Total height, 11 inches



WATSON & SONS' "ROYAL" MICROSCOPE.

For Prices see page 33.

A medium priced Microscope yielding advantages possessed by the most costly models.

The Royal Microscope—*continued.*

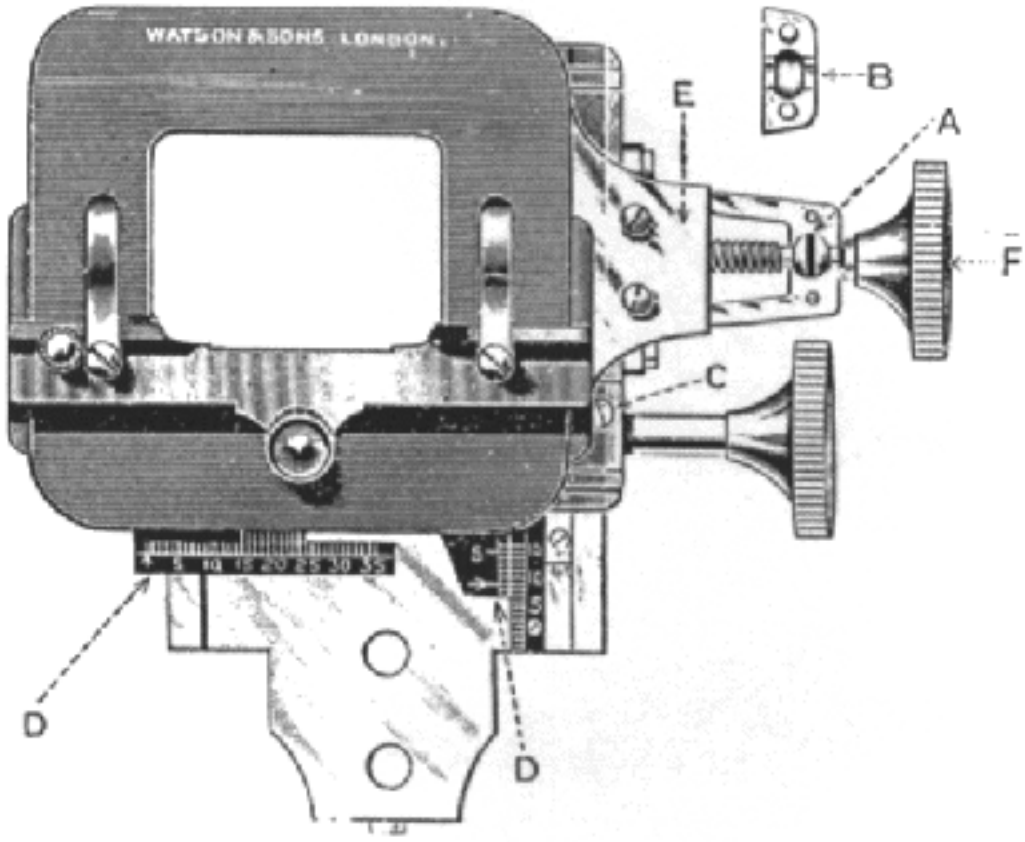


Fig. 12. Surface view of Stage of "Royal" Microscope, showing sliding bar, and method of fitting stationary milled head.

The planed fittings of the Stage have slots through which screws pass at FF and GG, as seen in fig. 14, which is a corner view of the stage, and any wear that may occur in the plates can be immediately taken up.

The advantages of such a stage are manifold, and at once manifest themselves to the experienced worker; but we would mention one distinctive feature very prominently. The large mounts of some condensers that are in popular use prohibit the free working of the mechanical plates of the stage. The stationary milled head enables us to construct the parts in such a manner that the entire range of movement can be utilised under such circumstances. The top plate of the stage is made in two patterns—A, with complete rotation and B, with square aperture and no rotation.

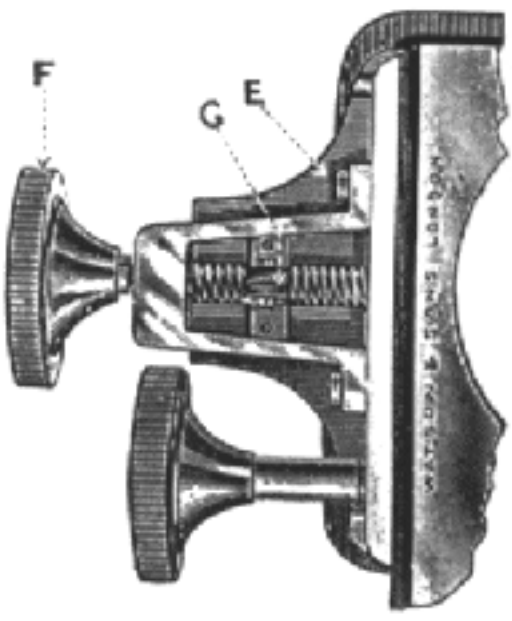


Fig. 13. Method of attaching plate E to screw.
F supports the collar.
G is the slotted adjusting collar.

The latter allows of a still greater range of movement with freedom, without risk of touching the Condenser mount in any position.

The size of the top plate of the stage in either case is $3\frac{3}{8}$ in. square.

It is fitted with a **sliding bar,** which grips the outer edges of the top plate; it can, if desired, be entirely removed, when the upper surface of the stage is left quite free.

The Fine Adjustment to the Substage is controlled by a milled head, conveniently placed behind and just below the stage. It is shown in fig. 15, also the adjusting screw-plate of the coarse adjustment rackwork of the substage.

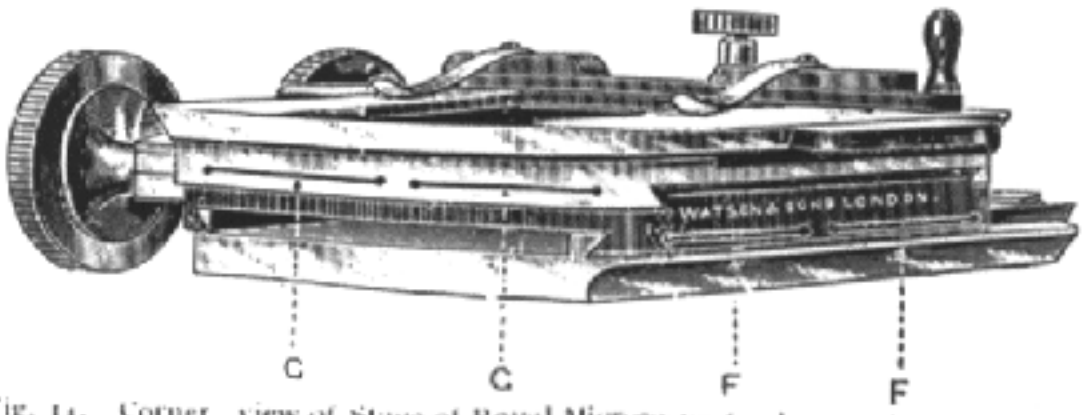


Fig. 14. Corner view of Stage of Royal Microscope to show system of springing.

WATSON & SONS' ROYAL MICROSCOPE.

Continued.

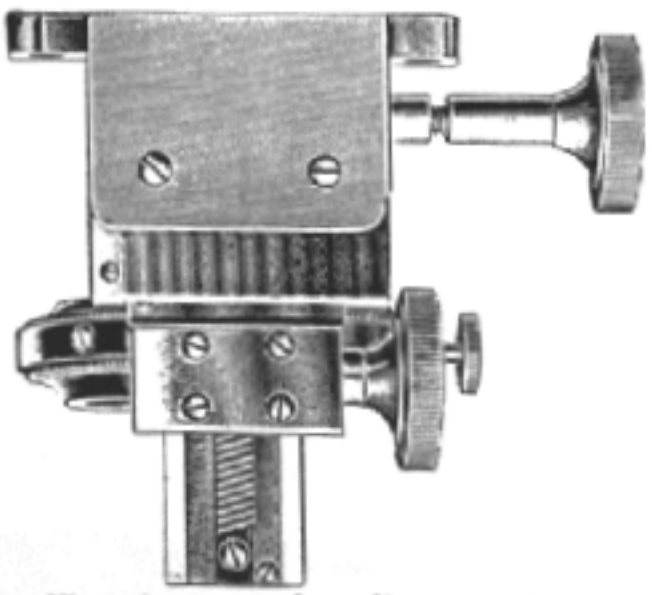


Fig. 15. View of substage fine adjustment from the back.

The Tripod Foot is exceedingly rigid ; it has a spread of seven inches, and is cork shod.

Mirrors, plain and concave.

Note.—The constructional lines of the " Royal " Microscope are identical with the " H " Edinburgh Student's Stand, figured and described pages 47 and 48, which is the **most popular Microscope we manufacture,** and has no rival at anything like the same cost.

PRICE LIST.

" Royal " Microscope, as described above, and figured on page 31, complete, without Eyepieces or Objectives	**£14 10 0**

Alternatives and Extras to the "Royal" Microscope.

Divisions to movements of Stage reading by verniers to $\frac{1}{10}$th of a millimetre, as per figure	**0 17 6**
Concentric rotating Stage as fitted to the Van Heurck Microscope No. 1, in place of the one described with this Instrument, extra	**1 15 0**
Scōp patent Stage, as detailed page 94, fitted to this Microscope instead of the Stage described above, extra cost, including sliding bar	**1 15 0**
Males-Watson two-speed Fine Adjustment, as described page 11	**2 0 0**
Or Multiple Speed Spindle, milled head, as described page 10	**0 3 6**
Binocular Body. " Royal " Microscope with Binocular Body instead of Monocular, without Eyepieces or Objectives	**16 10 0**
Extra Binocular Body to interchange with the Monocular, in the same fittings, without Eyepieces	**4 10 0**

Cases.

Mahogany Case, fitted to receive Instrument and Apparatus, with lock, key and handle	**1 0 0**
Best Mahogany Cabinet, with dust-proof door, drawers for apparatus, best special handle	**2 10 0**
* Glass Shade and Felt Pad	**0 7 6**
* Glass Shade and Ebonized Base	**0 10 6**

*Packing charged at cost.

THE ROYAL OUTFIT.

An Amateur's First-class Set.

Any item not required may be struck out.

Royal Microscope Stand without Eyepieces	£14	10	0			
Divisions to movements of stage reading to $\frac{1}{10}$th m/metre	0	17	6			
Best Mahogany Cabinet	2	10	0			
				£17	17	6
Extra Binocular Body to interchange with the Monocular body				4	10	0

Watson's Holoscopic Objectives—

25 m/m, £2 15 0 12 m/m ·65 N.A., £3 10 0 4 m/m ·95 N.A., £4.....	10	5	0			
2 m/m 1·35 Oil Immersion.....	8	0	0			
Special quality 2-inch Objective.....	1	10	0			
				19	15	0

Watson's Holoscopic Eyepieces—

Diameters 5, 7, 10 and 14.....at	£1	2	6	4	10	0
1 each extra 5 and 7 to form pairs for use with Binocular Body .....at	£1	2	6	2	5	0

Accessory Apparatus—

Parachromatic Condenser 1·0 N.A., with stops, No. 501 ..	£3	15	0			
Polarising Apparatus, No. 557	1	15	0			
Mica Selenite Stage, No. 575	1	6	0			
Bull's-Eye Condenser, No. 602	0	15	0			
Parabolic Side Silver Reflector, No. 576	1	3	0			
Beale's Neutral Tint Reflector, No. 652	0	6	0			
Triple Nosepiece, No. 639	1	5	0			
Aluminium Reversible Compressor, No. 662	1	2	6			
Rousselet Live Box, No. 660, 10/6; Extra Covers, 4/0 ..	0	14	6			
2 Troughs, 2/6; 2 Rousselet's Pipettes at 6d., 1/0.....	0	3	6			
Stage Forceps, No. 695	0	7	6			
1 each Eyepiece (No. 777) and Stage (No. 775) Micrometers at 5/0.....	0	10	0			
Standard Microscope Lamp, No. 754, 25/0; and Case, 7/6	1	12	6			
				14	15	6

Mounting Materials—

Laboratory Dissecting Microscope, page 96.....	2	2	0			
Set of 3 Aplanatic Magnifiers, Nos. 710–712	1	12	6			
Mounting Cabinet, No. 1110	2	15	0			
Cathcart Microtome, pattern No. 825.....	1	7	6			
Set of Dissecting Instruments, No. 981.....	1	0	0			
				8	17	0
Complete Cabinet of 200 Microscopic Slides of general interest, interest, see page 159.....				14	14	0
				£87	4	0

Parachromatic Objectives (pages 103-4) and Huyghenian Eyepieces (page 110) may be substituted for the Holoscopic series included above, if desired.

Are you a Subscriber to
WATSON'S CIRCULATING MICRO. SLIDES?
Subscription, **21/0** for 240 slides.
See Catalogue No. 3.

WATSON & SONS'
"Club" Microscope.

An Ideal Amateur's Instrument.

As figured page 36.

Combines all conveniences that are essential for accurate work, excluding only such as are of value to the Specialist.

This Microscope is designed to meet the wishes of those who require an Instrument of **large size,** which, while accurate and absolutely precise in its working, does not comprehend all the mechanical refinements which are to be found in such completely equipped instruments as the " Van Heurck " and the " Royal " instruments of our make.

A reference to the illustration on page 36 will show that, although it is built on the lines of the " Van Heurck " Microscope, it is not fitted with the mechanical draw-tube nor with the fine adjustment to the substage. Further, the method of building is simplified, but is, nevertheless, thoroughly sound and rigid.

The workmanship is of the finest quality throughout and the Instrument is trongly recommended as a highest class one.

The following is a general specification :—

The Tripod Foot has a spread of 9 inches.

The Coarse Adjustment is by diagonal rack and pinion, as described page 8.

The Fine Adjustment is our Standard lever pattern, as described page 9.

The Body is 1½ in. outside diameter, and can be provided with a draw-tube having an eyepiece fitting for either a Continental eyepiece or for the large capped eyepiece of 1·27 in. diameter, without difference of cost. The instrument that we regularly stock will be fitted to receive the large sized Capped eyepiece, 1·27 in. diameter. When closed, the length of the body is 160 millimetres (6 inches); when extended, 240 millimetres (10 inches).

The Stage, which has a diameter of 5 inches, is fitted with mechanical movements of the very best description, exactly as supplied in the " Van Heurck " Microscope, giving a range of traverse of about one inch in each direction. It rotates concentrically. This stage is provided with a square central aperture, so as to give free working movement for the mounting of the condenser, and to obviate the risk of the condenser mount checking the mechanical movements of the stage. The stage is also fitted with a sliding bar.

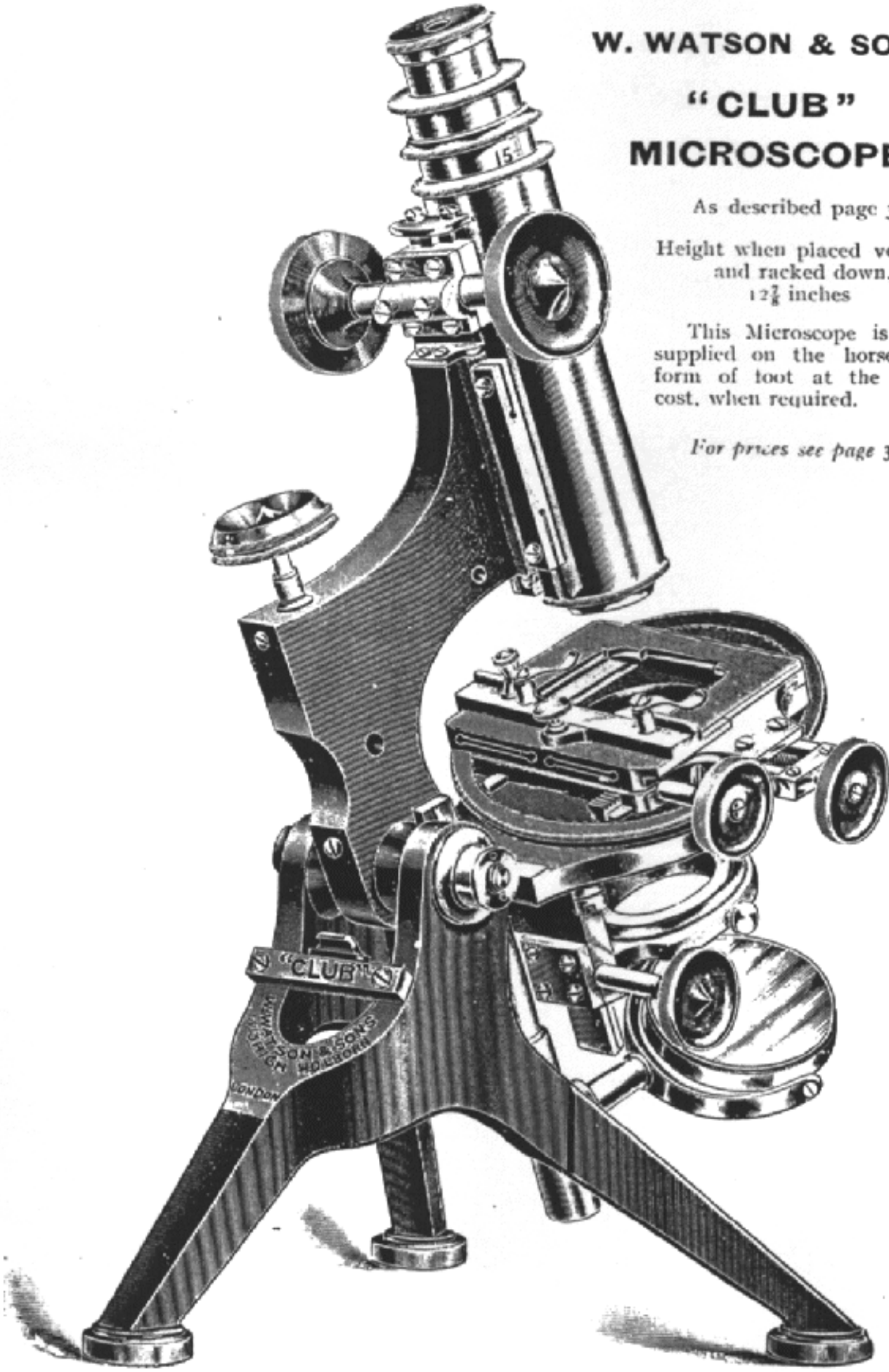
The Substage has rackwork to focus, screws to centre, and is hung on a pivot so that it can be turned aside out of optical axis when it may be desired to do so.

The Mirrors, which are hung on a swinging tail piece, are plane and concave, 2½ in. diameter.

Height to centre when placed horizontally, 9 inches.

With a Binocular body this will be found an ideal Amateur's Microscope.

For prices, see page 37.



W. WATSON & SONS'

"CLUB" MICROSCOPE.

As described page 35.

Height when placed vertical and racked down.
12⅞ inches

This Microscope is also supplied on the horse-shoe form of foot at the same cost, when required.

For prices see page 37.

An Ideal Amateur's Microscope.

PRICES OF WATSON & SONS'
"Club" Microscope.

As described page 35 and figured page 36.

Stand only, **Monocular,** without Eyepieces or Objectives	£15	0	0
Ditto **Binocular,** Do. Do.	18	0	0

Cases.

Mahogany Cabinet to contain Instrument and Apparatus, with lock, key and handle	1	10	0
Best Mahogany Cabinet, with dust-proof door, drawers for apparatus, best special handle	2	10	0
*Glass Shade and Felt Pad	0	9	0
*Glass Shade and Ebonized Base	0	12	6

* Packing charged at cost.

Extras to "Club" Microscope.

Divisions to movements of Stage reading by verniers to $\frac{1}{10}$ of a millimetre.	1	1	0
Males-Watson two-speed Fine Adjustment, as described page 11	2	0	0
Or Multiple Speed Spindle, milled-head do. page 10	0	3	6
Extra Binocular Body to interchange with the Monocular, in the same fittings, without Eyepieces	4	10	0

SET C 100. A FIRST-CLASS COMMENCING OUTFIT.

Binocular "Club" Microscope	18	0	0
Mahogany Cabinet, with drawers for apparatus	2	10	0
Eyepieces—Holoscopic Series, 1 pair each ×5 and ×7, at 22/6 each	4	10	0
Objectives—Holoscopic Series, 25 m/m, £2 15 ; 6 m/m, ·95, £4	6	15	0
Special quality, 2 inch	1	10	0
Universal Achromatic Condenser, No. 506, with box of stops for dark ground and oblique illumination	3	15	0
Bull's-Eye Stand Condenser, No. 602	0	15	0
Dust-proof Triple Nosepiece, Aluminium, No 639	1	5	0
Live Cage, No. 660.....	0	10	6
Stage Forceps, No. 695	0	7	6
Standard Microscope Lamp, No. 754, 25s., and Case 7/6	1	12	6
	£41	10	6
Assortment of interesting Micro Objects	5	0	0
	£46	10	6

The above Set may be varied as desired.

The Edinburgh Student's Series of Microscopes.

Introduced and Manufactured by W. WATSON & SONS.

This series of Microscopes includes Instruments having plain but substantial and accurate fittings, suited to those who need an inexpensive but efficient Microscope, and more completely fitted ones which are provided with every essential mechanical movement and convenience which modern high power research demands, eminently fulfilling the requirements of the Amateur, Photo-Micrographer and high-power worker.

The Instruments are exceedingly moderate in cost, especially considering the advantages they offer from the point of view of comprehensiveness of construction accuracy of performance and, in particular, quality of workmanship, which is of the highest grade.

We confidently recommend these Microscopes to Amateurs, Students and Laboratory workers as unequalled for their various classes of investigation.

We would direct very special attention to the "H" Edinburgh Student's Microscope, listed on page 48.

We have no hesitation in asserting that no Microscope at present offered at anything approaching so moderate a cost presents so many advantages as are to be found in this instrument. The mechanical conveniences for manipulation are very complete, while the precision of the movements is of the utmost perfection. The "H" Model, in particular, is appreciated to such an extent that its sales exceed those of all the other instruments in our list totalled together. A reference to page 53 will give an idea of the widespread use of this series of instruments and, in particular, of this "H" Model.

The complement of the "H" Model, mounted on the horse-shoe form of stand is Model "D." See page 46. It is precisely similar in all respects and offers advantages which are not to be found in any Microscope by a Continental maker.

The Edinburgh Student's Microscope was originally designed for Edinburgh University, but its popularity has grown to so large an extent that it is to-day to be found in laboratories and in the hands of amateurs throughout the world.

A RECOMMENDATION.

The fact that Dr. Henri Van Heurck, the celebrated Microscopist, of Antwerp, has favoured us on separate occasions with orders for two of the "D" Stands for use in his Photo-Micrographic work, and has expressed his great satisfaction with each instrument, alone attests their fitness for the most precise and accurate observations. Writing to us with regard to a "D" instrument we had just supplied him, he says: "The Microscope is excellent, and I see with pleasure that you do your utmost to arrive at a state of perfection."

SPECIAL NOTE.—It will be noticed that the prices of complete sets are frequently less than the total cost of each separate item. Full price therefore cannot be deducted if any item is not required.

THE 'INBURGH STUDENT'S MICROSCOPE.—

(Continued.)

The following are some of the Special Features of this Series of Instruments.

The Fine Adjustment is our standard form as described page 9. One revolution of the milled-head moves the body $\frac{1}{300}$th of an inch, and as it is sensitive to the $\frac{1}{120}$th of a turn, a motion of $\frac{1}{30000}$th part of an inch can be obtained.

The Body is of 1½ inch diameter, so that by merely exchanging the draw-tube it can be arranged to carry either the Continental-sized eyepieces, or those of 1·27 in. diameter. The draw-tube, when out to its full extent, makes the length of the body 10 inches; when closed it is of Continental length. The inside diameter of the top of the draw-tube is smaller than the remainder, the former making a fitting for the eyepiece about 1 inch long, permitting of the tube being blackened inside up to this fitting, and so minimising reflection.

The Stage is of extra large size, being 3½ inches square, the distance from the middle of the central opening to the front of the limb being 2⅜ in., so allowing of the use of large slips, Petri Dishes, etc., etc. It is mounted at the most convenient height, for support to be given to the hands when manipulating the object.

The Fitting for Under-stage Apparatus is hung on a pivot, allowing of it and the apparatus contained in it to be at once turned aside (leaving the mirror free for use) and replaced as required. (See illustration, page 91). If desired, this may be supplied fixed.

The Mirrors are plane and concave, mounted on a swinging arm. They are also adjustable to focus by means of a sliding fitting.

The Fittings are all of universal size.

All the Instruments are inclinable from the vertical to the horizontal position.

The Foot.—It will be noted that the Instrument is mounted on either the horse-shoe or tripod form of foot. The latter has in recent years grown much in popularity on account of its rigidity, and although the horse-shoe model is well proportioned in this Instrument, we strongly recommend the Tripod foot. When the horse-shoe foot is taken, it is cast in one solid piece with the vertical pillar.

All Working parts have compensating screws as described, page 7

OPTICAL PARTS.

The Eyepieces have nickel-plated tubes, and are of best quality.

The Objectives are of our new " Parachromatic " series, in which Jena glass is principally employed. They are specially adapted for students' and general requirements, and will bear favourable comparison with any form of Student's Lens, either Continental or English, and being made on our own premises, under our own supervision, we are able to guarantee the performance of each one of them.

The ⅛th inch, regularly included in the Sets, is that having a Numerical Aperture of ·74 N.A. It is distinguished for its flatness of field, crispness of definition, and long working distance. This last point has been specially studied by us, and this lens will work through the thick cover of a Hæmacytometer. Students will greatly appreciate the working qualities of this Objective. The ⅛th inch of ·87 N.A. can be taken instead of it, if preferred, by those who desire greater resolving power.

The Abbe Model Illuminator (1·2 N.A.) we supply with these Microscopes in an exceedingly efficient and popular form of Substage Condenser, as figured page 115. When using Objectives from a ½-inch upwards, especially with objects requiring a strong transmitted light, the illumination obtainable from the concave mirror is insufficient. The Abbe Model Illuminator collects the light reflected by the mirror, and projects a cone of rays of very wide angle on to the object, giving a perfect brilliance of illumination, even with the highest power Objectives. A Substage Condenser is now recognised as an absolutely essential adjunct to all Microscopes with which serious work is to be done.

SPECIAL FEATURES.

—

Stage covered with ebonite.

—

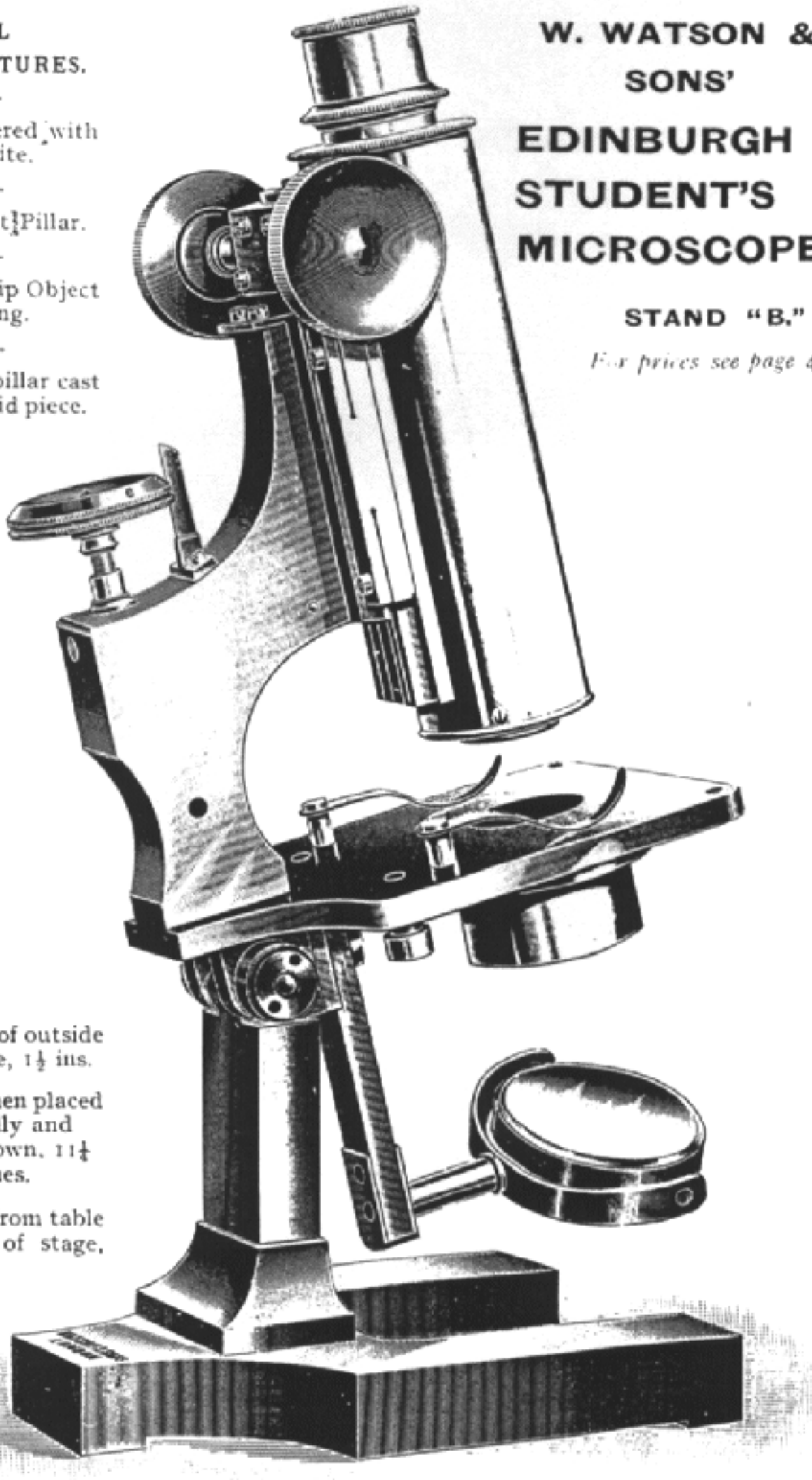
New Short Pillar.

—

Patent Grip Object Spring.

—

Foot and pillar cast in one solid piece.



W. WATSON & SONS' EDINBURGH STUDENT'S MICROSCOPE.

STAND "B."

For prices see page 41.

Diameter of outside body tube, 1½ ins.

Height, when placed vertically and racked down, 11¼ inches.

Height from table to surface of stage, 4⅛ inches.

THE EDINBURGH STUDENT'S MICROSCOPE.

PRICE LIST.

STAND "B." As figured page 40.

STAND "B."—This Microscope is figured on page 40, and a general description of it will be found on page 39. It has recently been modified in several particulars and is now mounted on a very substantial form of pillar, which has been shortened so as to reduce the height to the surface of the stage to $4\frac{1}{8}$ inches and to render it more convenient for use in the vertical position. This Microscope yields many advantages over Instruments of Continental manufacture, and in particular, the Focussing Adjustments are unequalled. The coarse rackwork and pinion being of the very best description, and the Fine Adjustment of our Standard lever pattern

Without Eyepieces or Objectives..... **5 5 0**
Mahogany Case for ditto..... **0 10 6**

SET E104.

STAND " B."—Fitted with
2 Objectives—" Argus " 1 in. and $\frac{1}{4}$ in. (parachromatic series)
1 Eyepiece ;
Mahogany Case complete **7 0 0**
A $\frac{1}{6}$ in. (Parachromatic Series) can be had instead of the $\frac{1}{4}$ in., in Set E104, at an extra cost of **5/0**.

SET E105.

STAND "B."—Fitted with
2 Objectives (Watson's Parachromatic series) $\frac{1}{6}$ in., and choice of 1 in., $\frac{1}{2}$ in., or $\frac{3}{4}$ in. ;
1 Eyepiece, No. 2, or No. 3, or No. 4 ;
Mahogany Case complete..... **7 15 0**

The Scop Abbe Illuminator, No. 529, described page 116 can be added to either of the above sets at an extra cost of..... **0 17 6**

SET E106.

STAND " B."—Fitted with
2 Objectives (Watson's Parachromatic series), $\frac{1}{6}$ in. or $\frac{1}{8}$ in., and choice of 1 in., $\frac{1}{2}$ in., or $\frac{3}{4}$ in. ;
2 Eyepieces, Nos. 2 and 3, or 4 ;
Abbe Illuminator, with iris diaphragm (No. 523) ;
Mahogany Case complete..... **9 5 0**

SET E107. FOR BACTERIOLOGICAL WORK.

STAND " B."—Fitted with the same apparatus as in set E106, together with $\frac{1}{12}$ in. oil immersion objective, 1·10 N.A. ;
Nosepiece, Watson's dust-proof pattern for 3 Objectives (No. 636) ;
Mahogany Case complete..... **14 5 0**

The $\frac{1}{12}$ in. 1·30 N.A. can be taken instead of the one quoted in Set E107 at an extra cost of **20/0.**

BINOCULAR BODY.

STAND "B" as described above, but with Binocular body, without Eyepieces or Objectives..... **8 5 0**
Mahogany Case for ditto..... **1 0 0**

SET E108.

STAND " B."—With Binocular body, fitted with 1 pair of capped Eyepieces 1·27in. diameter and apparatus as in set E105 above, in mahogany case **12 0 0**

SET E109.

STAND " B."—With Binocular body, fitted with 3 best capped eyepieces and apparatus as in set E106 above, in mahogany case..... **13 15 6**

Extras suitable for above Microscope and Stand "F."

(See also page 50).

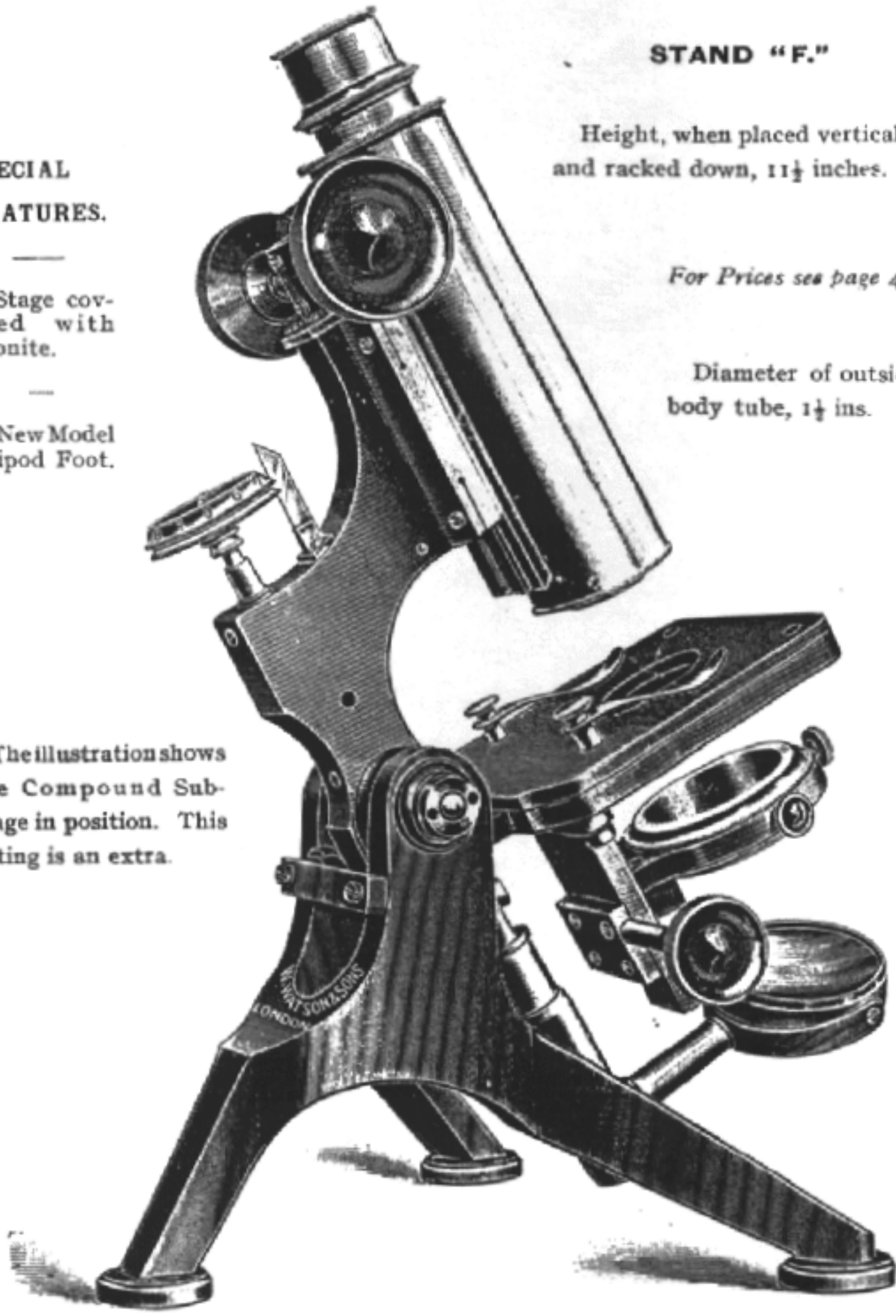
Compound Substage with rackwork to focus and screws to centre as figured, page 91..... **1 17 6**
Mechanical stage, attachable, page 92 ..... **3 0 0**
Sliding bar to stage, No. 458, **10/6** ; Wright's Finder, No. 460 ..... **0 6 6**
Double nosepiece, No. 631, **10/6** ; No. 632 ..... **0 15 0**
Large-sized Capped Eyepieces 1·27 in. diameter to replace Eyepieces included in above sets, each **5/6** extra.

For Objectives, see pages 101 and 106.

Special Notice.—THE STAND " C " described in previous editions of this catalogue, is now omitted for the sake of simplicity. The addition of the Compound Substage at **37/6** makes the " B " MODEL above described. exactly the same as the old " C " INSTRUMENT.

Spiral Focussing Substage, as figured page 117, is supplied to carry the condenser in either of the Sets E106, 7 and 9, at an extra cost of **12/6.**

W. WATSON & SONS'
TRIPOD
EDINBURGH STUDENT'S MICROSCOPE.



STAND "F."

Height, when placed vertically and racked down, 11½ inches.

For Prices see page 43.

Diameter of outside body tube, 1½ ins.

SPECIAL FEATURES.

Stage covered with ebonite.

New Model Tripod Foot.

The illustration shows the Compound Substage in position. This fitting is an extra.

This Instrument corresponds with Stand "B" of the Edinburgh Student's Microscope, page 40

THE EDINBURGH STUDENT'S MICROSCOPE.

PRICE LIST.

STAND "F." As figured on page 42.

ON TRIPOD FORM OF FOOT.

STAND "F."—This Microscope is exactly similar to Stand "B," described page 41, excepting that the Horse-shoe Foot is replaced by the Tripod form of Foot. It offers the special advantage which is associated with the Tripod form of foot alone, of absolute rigidity in all positions and an increased space below the Stage for the use of every description of Substage Condenser. When the Substage Condenser is taken as an extra, the free space for Condensers is greater than that provided in many Instruments of largest size. Without Eyepieces or Objectives..... £5 7 6

Mahogany Case for ditto—..... 1 0 0

SET E114.

STAND "F," as figured, fitted with
2 Objectives— Argus" 1 inch and ¼ inch (Parachromatic series)
1 Eyepiece;
Mahogany Case 7 12 6

A ⅛ in. (Parachromatic series) may be supplied in place of the ¼ inch in Set E114 at an extra cost of **5/0.**

SET E115.

STAND "F," as figured, fitted with
2 Objectives (Watson's Parachromatic series) ⅛ in., and choice of 1 in., ½ in., or ⅔ in.;
1 Eyepiece, No. 2, No. 3. or No. 4;
Mahogany Case, complete..... 8 7 6

The Scōp Abbe Illuminator No. 529, as described page 116, can be added to the above sets at an extra cost of **17/6.**

SET E116.

STAND "F," as figured, fitted with
2 Objectives (Watson's Parachromatic series), ¼ in. or ⅛ in., and choice of 1 in., ½ in., or ⅔ in.;
2 Eyepieces, Nos. 2 and 3, or 4;
Abbe Illuminator, with Iris Diaphragm, No. 523;
Mahogany Case, complete..... 9 17 6

SET E117. FOR BACTERIOLOGICAL WORK.

STAND "F," as figured, fitted with the same apparatus as Set E116 together with
1/12 in. Oil Immersion Objective, 1·10 N.A.;
Nosepiece, Watson's Dust-proof Pattern for 3 Objectives, No. 636;
Mahogany Case, complete..... 14 17 6

The 1/12 in., 1·30 N.A. can be taken instead of the one quoted in Set E117 at an extra cost of **20/0.**

BINOCULAR BODY.

STAND "F."—As described above, but with Binocular Body instead of Monocular, without Eyepieces or Objectives..... 8 7 6

Mahogany Case for ditto..... 1 0 0

SET E118.

STAND "F," with Binocular Body, fitted with one pair best capped Eyepieces, 1·27 in. diameter and Apparatus as in Set E115 above in Mahogany Case..... 12 2 6

SET E119.

STAND "F," with Binocular Body, fitted with 3 best capped Eyepieces and Apparatus as in Set E116 above, in Mahogany Case 13 18 0

EXTRAS.

Compound Substage with rackwork to focus and screws to centre, as shown in the illustration of Stand "F," page 42, and figured separately, page 91..... 1 17 6

For other Extras, please refer to pages 41 and 50.

Special Note.—*For the sake of simplicity, the* STAND "G" *of this Series is no longer listed separately. The addition of the Compound Substage at* **37/6** *makes the "F" model above described exactly the same as the* OLD "G" INSTRUMENT.

W. WATSON & SONS'
EDINBURGH STUDENT'S MICROSCOPE.

STAND "D."

Complete with every mechanical convenience.

Horse-shoe foot and pillar cast in one solid piece, giving great rigidity.

The decided preference which is shown for the horse-shoe form of foot where continuous work is to be done, and frequently of necessity, with the microscope in a vertical position, has induced us to modify this microscope in several important respects, so as to give the fullest convenience for accurate working under those conditions. Its mechanical arrangements render it of a superior type to the best of the Continental models.

In effect, this microscope combines the best features of the most highly developed English microscopes, without sacrificing any of the conveniences which have rendered the Continental model so popular.

In general construction, it is the same as described on page 39, and similar to the " B " model of this series, page 41, the upright supporting pillar being made of a new shape which gives great solidity to the whole fabric. The coarse adjustment by rackwork and the fine adjustment by our standard lever, impart the soft and responsive movements, free from all lateral displacement, which are so essential to the worker with high powers and Photo-Micrography. Objectives corrected either for the English or for the Continental tube length can be used, the length of the tube in conjunction with the draw-tube, giving sufficient latitude for the purpose.

The Mechanical Stage is one of the most important features in this stand. Unlike the general rule in Student's Microscopes, this stage is built as a part of the Microscope, and that without sacrificing any of the convenience which is derivable from the frequent or occasional use of a plain stage where the mechanical attachments are removable,—the top plate being made of extra large size, namely, $3\frac{3}{8}$ in. square, with a distance to its centre from the front of the limb of $2\frac{3}{8}$ inches. The plates in this stage move freely with the substage condenser in focus, and at no part do they come in contact with the mount of the condenser. This is a very important point, and it is brought about by the use of a stationary milled head for the horizontal movements and by the provision of a **square central aperture** of suitable size, to the stage itself. This stage is exquisitely sensitive in its working, and only those who have had experience with mechanical movements of this high-class can become aware of the manner in which labour is reduced, more especially where systematic examination of specimens is necessary, and of the added comfort which is given to microscopical work generally.

The Compound Substage has a rackwork to focus and screws to centre. The increased diffusion of information regarding microscopical manipulation has taught the absolute necessity of having available the means of centring the substage condenser, and further, of focussing it accurately. It is only in proportion as these two important factors are taken into consideration and accurately provided for, that thorough and reliable work can be done.

This Microscope then combines all the real necessities for high-class work. The price, considering such conveniences, is exceedingly moderate, while the quality throughout is of the very finest. All the descriptions of the working parts of the " H " model microscope on page 47 apply to this instrument, the only difference between the two being in the form of foot that is used.

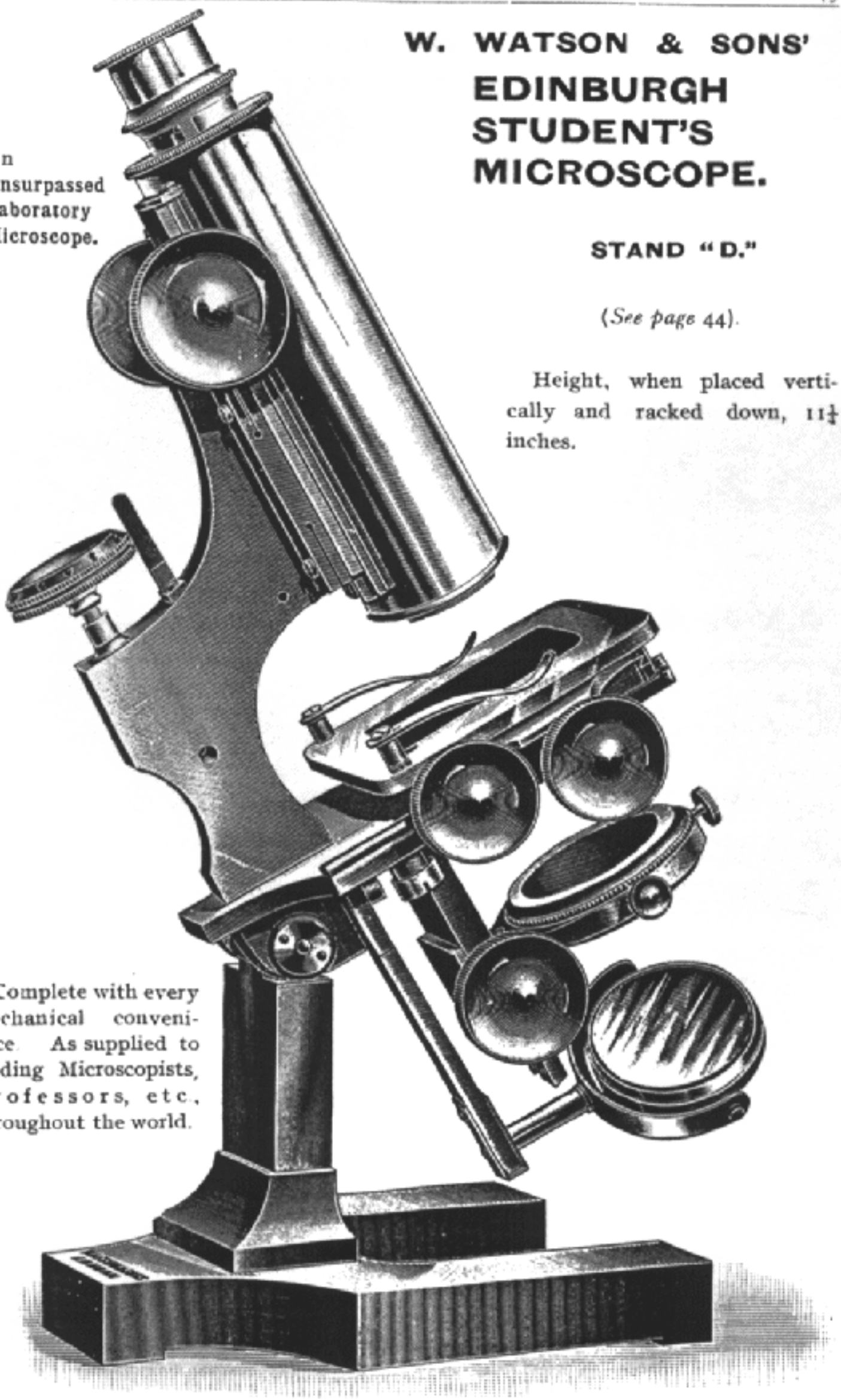
W. WATSON & SONS' EDINBURGH STUDENT'S MICROSCOPE.

An Unsurpassed Laboratory Microscope.

STAND "D."

(*See page* 44).

Height, when placed vertically and racked down, 11¼ inches.



Complete with every mechanical convenience. As supplied to leading Microscopists, Professors, etc., throughout the world.

Diameter of outside Body Tube, 1½in.

PRICE LIST OF THE
EDINBURGH STUDENT'S MICROSCOPE

STAND "D." (As described and figured on pages 44 and 45.)

Complete with every mechanical convenience. As supplied to leading Microscopists, Professors, etc., throughout the world.

STAND "D."—Without Eyepieces or Objectives £9 10 0
Mahogany Case for ditto 0 17 6

SET E124.

STAND "D."—As figured, fitted with
2 Objectives (Watson's Parachromatic series), $\frac{1}{6}$ in., and choice of 1 in., $\frac{1}{2}$ in., or $\frac{2}{3}$ in.;
1 Eyepiece, No. 2, or No. 3, or No. 4;
Mahogany Case, complete 12 10 0

SET E125.

STAND "D."—As figured, fitted with
2 Objectives (Watson's Parachromatic series), $\frac{1}{6}$ in. or $\frac{1}{8}$ in., and choice of 1 in., $\frac{1}{2}$ in., or $\frac{2}{3}$ in.;
2 Eyepieces, Nos. 2 and 3, or 4;
Abbe Illuminator, with iris diaphragm, No. 521;
Mahogany Case, complete 14 15 0

SET E126. FOR BACTERIOLOGICAL WORK.

STAND "D."—As figured, fitted with the same apparatus as in Set E125, together with
$\frac{1}{12}$ in. Oil Immersion Objective, 1·30 N.A.;
Nosepiece, Watson's dust-proof pattern for 3 objectives, No. 636;
Mahogany Case, complete 20 15 0
The $\frac{1}{12}$ in., 1·10 N.A., can be had instead of that quoted in Set E126 at 20/0 less.

WITH HOLOSCOPIC OBJECTIVES AND EYEPIECES.

(See pages 102 and 109.)

SET E127.

STAND "D."—As above, fitted with
2 Eyepieces, Holoscopic Series;
2 Objectives, Holoscopic Series, 1 in., 0·30 N.A., and $\frac{1}{4}$ in., 0·95 N.A.;
Universal Achromatic Condenser, 1·0 N.A., and set of stops, Nos. 506 and 507, or Parachromatic Condenser, No. 501;
Mahogany Case, complete 21 12 6

If large Capped Eyepieces, 1·27 in. diameter, are required instead of the Student's Pattern included with the above Sets, add 5/6 per Eyepiece to the above Sets.

BINOCULAR BODY.

STAND "D."—As described above, but with Binocular body instead of Monocular, without Eyepieces or Objectives 12 10 0
Mahogany Case for ditto 1 0 0

SET E128.

STAND "D."—With Binocular body, fitted with 1 pair of best capped Eyepieces, 1·27 in. diameter, and apparatus as in Set E124 above;
In Mahogany Case 16 5 0

SET E129.

STAND "D."—With Binocular body, fitted with 3 best capped Eyepieces, 1·27 in. diameter, and apparatus as in Set E125 above;
In Mahogany Case 18 15 0

Extras, see page 50.

W. WATSON & SONS'

EDINBURGH STUDENT'S MICROSCOPE.

STAND "H." As figured page 48, and priced page 49.

The Most Popular Microscope we Manufacture.

This Microscope presents special claims to the modern worker, for it combines in itself all those needed movements which enable work to be done, not only with accuracy, but with comfort. It is the most complete of the Edinburgh Student's Series, being practically identical with the "D." Stand, quoted on page 44, excepting for the difference in the mounting; the description of working parts given in connection with that Instrument are therefore applicable to this. The Tripod foot is of such a size and design as to afford absolute rigidity when the Instrument is set at any angle of inclination, or horizontally for photography. There is no tendency to topple over even when the body is racked out to its limit.

The Body is 1¼ inch outside diameter as in all the Instruments of this series, and can be supplied from stock with a draw-tube having a fitting for either the Continental size of eyepiece, or for the large capped eyepieces of 1·27 in. diameter, without difference of cost.

The Mechanical Stage is precisely the same as that illustrated on page 32, in connection with the "Royal" Microscope, excepting that the sliding bar is an extra. All the arrangements for taking up wear and tear there described are included. The horizontal Stage movement is effected by means of a **stationary milled head,** which permits of the free action of the Stage through its entire range, while a condenser, having a mounting, such as the Abbe Illuminator, is in focus. The advantage of this is very great, for the old form of travelling screw touched the condenser mount, and limited the range of action of the Mechanical Stage to oftentimes one-half its full journey, in addition to causing trouble by de-centring the condenser. In order to give the maximum advantage in this respect, the aperture of the Stage is now supplied square, instead of round, and our stock Instruments will be fitted in this manner. If, however, a top rotating plate and circular aperture, as formerly made, be preferred, it will be supplied on request without extra charge.

The movements produced by the screws of this Stage are specially devised to give the softest possible effect, with an entire absence of backlash, and special solidity is imparted to the base-plate to enable this to be done. The highest powers can therefore be used with the fullest satisfaction on this Instrument. It cannot be emphasized too strongly that a Mechanical Stage, built as an integral part of a Microscope, is far superior in working qualities to any independent attachable arrangement, however well it be constructed, and users of this microscope will find the stage to be not only convenient in design, but to be very firm and exquisitely smooth and sensitive in action.

The coarse and fine adjustments are of the best description, and as described on pages 8 and 9 of the Catalogue.

Although the Stand comes under the heading of a Student's Microscope, it is in reality of so complete and advanced a type as to be suitable for the most exacting work, and it has gained for itself an unique position. It is the only instrument so completely fitted and accurately made at so moderate a price. The recognition of this fact has caused it to become the **most popular microscope we manufacture.** We sell a greater number of the "H" Stands than any other Microscope in this list.

Bacteriologists, Histologists and Students have on all hands signified their appreciation of its qualities and it is installed in laboratories throughout the world. For Bacteriology especially, it has been greatly appreciated, and it is in use in the Laboratories of the London School of Tropical Medicine, Guy's, St. Thomas's, St George's, and St Mary's Hospitals, the Cancer Research Institution and many others. Numerous workers who have gained a reputation for their researches have found this instrument fulfil their requirements in the most thorough manner.

Amateurs will find in this Microscope one which adds greater pleasure to their observations on account of its facilities for working. Fitted either with a Binocular body or interchangeable Monocular and Binocular bodies, it produces every desired effect, and is exceedingly compact and convenient in design.

We have supplied one of these instruments to Mr. Andrew Pringle for his Photo-Micrographic Work, and in his book entitled "Practical Photo-Micrography," he refers to it as "one of the two Microscopes with which we can work comfortably, using an ⅛ in. objective and the coarse movement only."

The Instrument is specially suitable for Photo-Micrography, the workmanship and quality throughout are of the very highest class.

Extract from "The Microscope and Its Revelations." (Carpenter.) Edited by the Rev. W. H. Dallinger, LL.D., F.R.S., etc. Eighth Edition. Page 218.—

"One of the finest examples of this class of Microscope at present brought within the reach of the average Student's means is that known as the Edinburgh Student's Microscope "H," by the firm of Watson and Sons. . . . . It will be seen that it has the prime requisite, a rigid foundation combined with lightness, and it is also possessed of a well-constructed mechanical Stage which is built with the instrument, an advantage over the best 'attachable' stage.

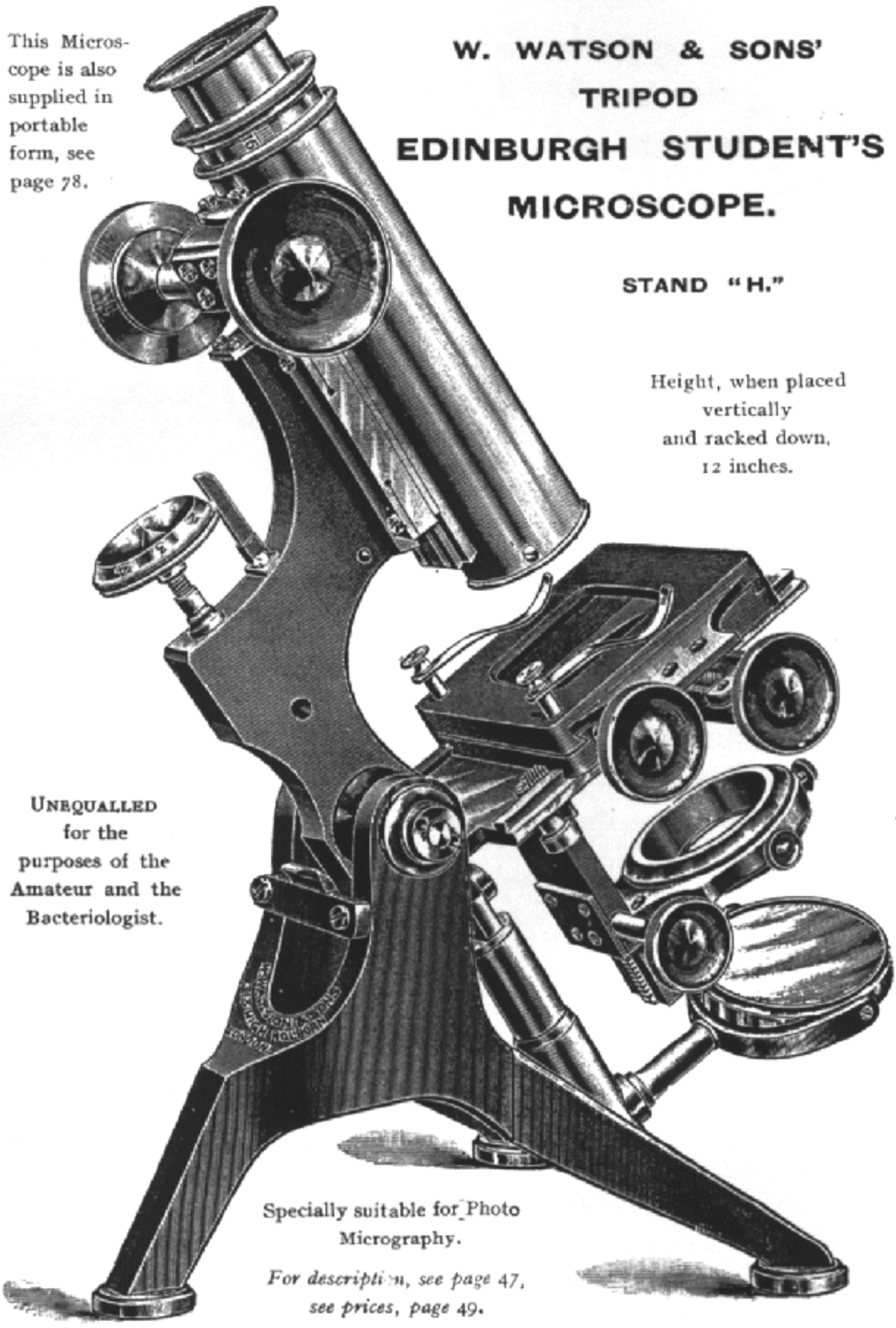
'It is essentially a Student's Microscope, and, although of so low a price, is not only a specimen of the best workmanship, but is also extremely complete, and represents an advanced type of construction capable of doing all ordinary and much experimental work."

This Microscope is also supplied in portable form, see page 78.

W. WATSON & SONS' TRIPOD EDINBURGH STUDENT'S MICROSCOPE.

STAND "H."

Height, when placed vertically and racked down, 12 inches.



UNEQUALLED for the purposes of the Amateur and the Bacteriologist.

Specially suitable for Photo Micrography.

For description, see page 47, see prices, page 49.

Price List of the
EDINBURGH STUDENT'S MICROSCOPE.
STAND "H."

As described and figured pages 47 and 48.

STAND "H," without Eyepieces or Objectives **£9 12 6**
Mahogany Case for ditto **1 0 0**

SET E130.

STAND "H," as figured, fitted with
2 Objectives (Watson's Parachromatic Series), $\frac{1}{6}$ in. or $\frac{1}{8}$ in., and choice of 1 in., $\frac{1}{2}$ in., or $\frac{2}{3}$ in.;
1 Eyepiece, No. 2, 3 or 4;
Mahogany Case, complete **12 15 0**

SET E131.

STAND "H," as figured, fitted with
2 Objectives (Parachromatic Series), $\frac{1}{6}$ in. or $\frac{1}{8}$ in., and a choice of 1 in., $\frac{1}{2}$ in., or $\frac{2}{3}$ in.;
2 Eyepieces, Nos. 2 and 3, or 4;
Abbe Illuminator, best pattern, with Iris Diaphragm, No. 521;
Mahogany Case, complete **15 0 0**

SET E132. FOR BACTERIOLOGICAL WORK.

STAND "H," as figured, fitted with the same apparatus as in Set E131, together with
$\frac{1}{12}$ in. Oil Immersion Objective 1·30 N.A.;
Nosepiece, Watson's Dust-proof Pattern for 3 Objectives, No. 636;
Mahogany Case, complete— **21 0 0**

The $\frac{1}{12}$ in., 1·10 N.A. can be had instead of that quoted in Set E132, at 20/0 less.

WITH HOLOSCOPIC OBJECTIVES AND EYEPIECES.

SET E133.

(See pages 102 and 109.)

STAND "H," as figured, fitted with
2 Eyepieces, Holoscopic Series;
2 Objectives, ditto, 1 in., N.A., 0·30 N.A., and $\frac{1}{8}$ in. 0·95 N.A.;
Universal Condenser 1·0 N.A., and Set of Stops, Nos. 506 and 507, or Parachromatic Condenser, No. 501;
Mahogany Case, complete **£21 17 6**

If large capped Eyepieces, 1·27 in. diameter, are required instead of the Student's Pattern included with the above sets, add 5/6 per Eyepiece to the above sets.

STAND "H," with Binocular Body."

STAND "H," as described page 47, but with Binocular body, instead of Monocular, without Eyepieces **£12 12 6**
Mahogany Case for ditto **1 10 0**

SET E134.

STAND "H," with Binocular body, fitted with one pair of best capped Eyepieces, 1·27 in. diameter, and Apparatus as in Set E130, in Mahogany Case **16 17 6**

SET E135.

STAND "H," with Binocular body, fitted with three best capped Eyepieces, 1·27 in. diameter, and apparatus as in Set E131, in Mahogany Case.. **19 7 6**

SET E136. For General and Amateurs' Use.

STAND "H," as figured, fitted with
2 Eyepieces, Nos. 2 and 3 (Student's Pattern);
3 Objectives, 2 in., 1 in., and $\frac{1}{4}$ in. (Parachromatic Series);
Stand Condenser No. 603, **10/6**;
Universal Achromatic Condenser No. 506 and box of stops;
Live Cage No. 678, **10/6**;
Stage Forceps No. 695, **5/6**;
Dust-proof Triple Nosepiece;
Complete in Mahogany Case **20 0 0**

This Microscope is also supplied in portable form (see page 78).

A subscription of **21/0** to Watson's Circulating Micro-Slides secures the loan of 240 Specimens. See particulars in Catalogue No. 3.

EXTRA FITTINGS FOR MICROSCOPES.

The Edinburgh Student's " " & "F" Stands, the "Fram" and "PRAXIS" Microscopes.

Attachable Mechanical Stage No. 457, page 92	£3	0	0
Sliding Bar to Stage No. 458, page 92	0	10	6
Wright's Finder No. 460, page 92	0	6	6
Double Nosepiece No. 631, **10/6**; Double Nosepiece No. 632	0	15	0
Compound Substage, page 56	1	17	9
Spiral Focussing Underfitting, as described page 117, if taken with a set having a Condenser, 12/6; otherwise	0	15	0
" Argus " Substage with Rackwork to focus, page 91, if ordered with Microscope	0	17	6
Fine Adjustment to Substage, as described in connection with the " Royal " Microscope, page 32	1	5	0

Extras recommended and suitable for the "D" and "H" Edinburgh Student's Microscopes and "Holos" Fram Microscope (page 58).

Instruments with divided Mechanical Stage reading by verniers to $\frac{1}{10}$th of millimetre for use as a " Finder," for measurements, etc., are supplied to order, extra cost	0	17	6
Glass Circle to drop into Eyepiece, with line ruled across centre, to set object against for measurement	0	2	0
By having the above divisions the Stage can be used as a Finder, but it is necessary to have a point against which the object can be placed for this purpose. We therefore, if ordered, fit removable Studs for the purpose, the cost of which is	0	3	0
The necessity for the above is obviated by having a Sliding Bar to the Stage.			
Sliding Bar to Stage, extra	0	12	6
Fine Adjustment to Substage, as fitted to the " Royal " Microscope, described page 91	1	5	0
When this is supplied the Substage should be fixed.			
Scōp patent Mechanical Stage, as described page 94, instead of the pattern quoted with " D " and " H " Edinburgh Student's Microscopes, extra	1	15	0
A clamp screw can be fitted to the centring movement of the Substage, so that when a Condenser is once centred it cannot shift out of centre, at an extra cost of	0	2	6
This is a great advantage for Photography.			
* Extra Mechanical Draw-tube to Monocular body, see page 51	1	5	0
* Males-Watson Two-Speed Fine Adjustment, as described page 11, extra	2	0	0
* Or Multiple Speed Milled Head for Fine Adjustment, as described page 10, extra	0	3	6
* The items marked thus * can also be fitted to any of the Edinburgh Student's or Fram Microscopes.			

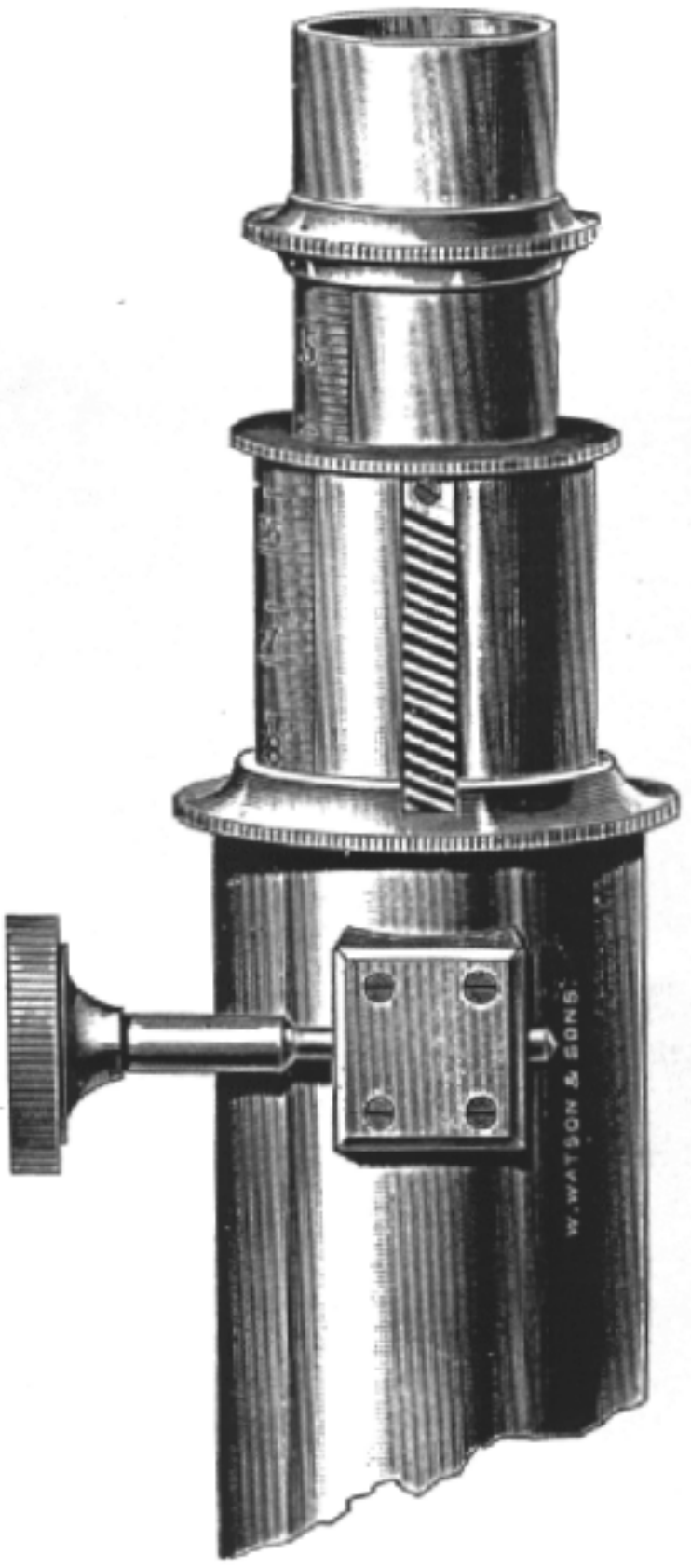
Additional Apparatus for all Edinburgh Student's and Fram Microscopes.

Extra Binocular Body, to interchange with the Monocular, the latter being removed from its bearings and the former replacing it. Price, to order only, without Eyepieces	4	10	0
Universal Achromatic Condenser (1·0 N.A.), specially suitable for Photo-Micrography. In its construction the new Abbe-Schott Glass is employed. Price with Iris Diaphragm (No. 506)	3	7	6
Set of Stops for either Achromatic Condenser or Abbe Illuminator, for dark ground and oblique light, in brass box	0	7	6
Disc of Blue or Yellow Glass, for Abbe Illuminator, each	0	1	6
$\frac{1}{2}$-in. " Parachromatic " Objective, giving very flat field	1	2	0
2-in. ditto Objective	1	2	0
Stage Micrometer, No. 775	0	5	0
Micrometer to drop into Eyepiece, No. 777	0	5	0
Eyepieces, B, C, or D, each **5/0**; E and F, each	0	10	6
Polariscope, fitted with Selenite **17/6, 25/0** and	1	15	0
Camera Lucida	0	6	0
Stand Condenser **7/6, 10/6** and	0	15	0
Triple Nosepiece, bent form, **27/6**; new dust-proof pattern	1	0	0
Double Nosepiece **10/6** and	0	15	0
Milled Head of Fine Adjustment divided to $\frac{1}{100}$ths instead of $\frac{1}{10}$ths, extra	0	3	0
Cork to Base of Microscope at point of contact with table, extra	0	4	0

EXTRAS TO
EDINBURGH STUDENT'S STANDS.

NEW MECHANICAL DRAW-TUBE.

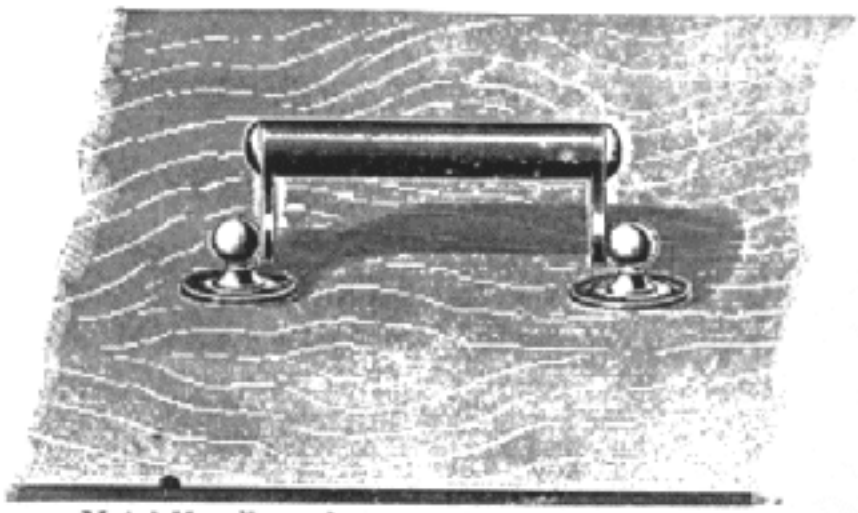
New form of Rackwork Draw-tube with a second Draw-tube sliding inside, as here illustrated and described on page 13. Fitted to either of the Edinburgh Student's or "Fram" Microscope Stands, at time of ordering, extra £1 5s.



This Rackwork Draw-tube cannot be fitted to Microscopes subsequent to their manufacture; we usually keep the "D" and "H" Stands in stock with it ready fitted, but it can be made to order with *any* of the Edinburgh Student's Microscopes.

It can only be arranged to carry the Continental size of eyepieces.

THE EDINBURGH STUDENT'S MICROSCOPE.



Metal Handle as fitted to all our Microscope Cases.
Width between uprights, 4 inches. Diameter of grip is ¾in. full.
This is a most comfortable Handle and very strong.
Price separately, 2/0.

MAHOGANY CASES.

The Case ordinarily supplied with the Instrument is a strong, plain, polished mahogany one, with fittings for apparatus, lock and key, etc., and has solid metal handle, as per illustration, for carrying comfortably. We also supply a very superior polished mahogany case, having cupboard door to exclude dust, and drawers to contain apparatus, with special handle for convenient carrying.

The prices are—

For the **Horse-Shoe Foot Instruments**	£2 0 0
For the **Tripod Foot Instruments**	2 10 0

These may be substituted for the ordinary cases, at the difference in price.

***GLASS SHADE** for either of the Edinburgh Student's Microscopes	0 6 6
Do do. do with ebonised baseboard ..	0 10 6

*Cost of packing these is charged at cost, and risk of breakage in transit must be borne by purchaser.

W. WATSON & SONS' DAIRY TEACHER'S MICROSCOPE.

(As supplied to the County Councils, and recommended by Mr. F. J. Lloyd, F.C.S., F.I.C.)

This Microscope is our well-known Edinburgh Student's "B" Stand, figured page 40, arranged to meet the requirements of dairy work.

Fitted with "B" and "D" Eyepieces, ½ in. and ⅛ in. Objectives of our "Parachromatic" Series, Abbe Model Illuminator, with Iris Diaphragm, Eyepiece and Stage Micrometers, Cover Glasses, Slips, etc., complete in Mahogany Case 9 15 0

Mr. F. J. LLOYD writes as follows:

"AGRICULTURAL LABORATORY,
"4, LOMBARD COURT, LONDON.

"WATSON'S DAIRY TEACHER'S MICROSCOPE.—This Microscope is, in my opinion, admirably adapted for Dairy Teachers.

(Signed) FREDK. J. LLOYD."

FOR BREWER'S WORK.

Either of the Edinburgh Student's Microscopes is suitable in the highest degree for Brewers' purposes, and may be selected according to the mechanical conveniences desired. For the Examination of Ferments a ⅛ or 1/12 Objective is necessary.

MICROSCOPES FOR THE TEXTILE TRADE.

The Objectives necessary for examining Fabrics are the 2 in. **£1 2s.**, and ½ in. **£1 2s. 0d.**, and occasionally for the separate fibres, the ⅛ in. **£1 10s.**

A Stand Condenser, price **10/6**, is also necessary.

These Objectives should be added to the cost of any Microscope that may be selected from this list. The Edinburgh Student's and "Fram" Instruments are exceedingly suitable for this work.

We have had the honour of supplying our Edinburgh Student's Microscopes, among many others, to the following well-known Microscopists, Colleges, etc. Nearly all of whom have had Stands "D" and "H."

THE WAR OFFICE
ROYAL GUNPOWDER FACTORY, Waltham Abbey
ROYAL SMALL ARMS FACTORY, Enfield
ORDNANCE FACTORIES, Royal Arsenal, Woolwich
WAR DEPARTMENT, Chemist, Royal Arsenal, Woolwich
THE ROYAL ARMY CLOTHING DEPARTMENT
FOR COLONIAL GOVERNMENT USE, per THE AGENTS-GENERAL FOR W. AUSTRALIA, NATAL, NEW ZEALAND, CAPE COLONY.
THE SANITARY DEPARTMENT, CAIRO
THE AGRICULTURAL DEPT. OF THE TRANSVAAL (20 "D" Instruments)
THE PUBLIC HEALTH DEPT. OF THE TRANSVAAL
THE CROWN AGENTS FOR THE COLONIES
THE FEDERATED MALAY STATES (Medical Officer)
THE STATE SURGEON, NEGRI SEMBILAN
THE OFFICE OF CONSERVATOR OF FORESTS, E. Mysore, Bangalore City
THE INDIA OFFICE.
E. M. NELSON, Esq., F.R.M.S., Late President of the Royal Microscopical Society, and of the Quekett Microscopical Club.
F. W. MILLS, Esq., F.R.M.S., Author of "Photography Applied to the Microscope," etc.
E. J. BEVAN, Esq., Analyst to the County of Middlesex
M. J. MICHAEL, Esq., Davos Platz
Prof. G. D. LIVEING, Cambridge
ANDREW PRINGLE, Esq., F.R.M.S., Author of "Practical Photo-Micrography," etc.
J. WILLIAMS, Esq., Government Laboratory, Georgetown, Demerara
G. WISHART, Esq., Port Elizabeth, S. Africa
Dr. R. P. MITCHELL, Barberton, Transvaal, S. Africa
S. E. TAYLOR, Esq., San Francisco
ALVEY A. ADEE, Esq., Washington, D.C., U.S.A.
IMPERIAL INSTITUTE LABORATORY
DR. JOHN FR. HOLM, University of Stockholm
WESTMORELAND COUNTY COUNCIL
CHESHIRE COUNTY COUNCIL
JOSE COTORRUELO, Esq., Carthagena, Spain
THE COOPER MEDICAL COLLEGE, San Francisco, Cal., U.S.A, per Prof J. H. Wythe (20 "F" Instruments)
SURGEON-MAJOR D. BASU, Batheen, India
Dr. J. A. LESTRADE, Government Medical Officer, Vieuxfort, St. Lucia, W. Indies
PEOPLE'S PALACE, Mile End, E.
GUY'S HOSPITAL LABORATORY
Dr. MARSH, Northwich
THE ROYAL INFIRMARY, Glasgow
THE CLINICAL RESEARCH ASSOCIATION, 1, Southwark Street, S.E.
Messrs. ABRAM LYLE & SONS
J. W. LOVIBOND, Esq., Salisbury
Dr. DONEHAN, Manila
W. F. PETTERD, Esq., Launceston, Tasmania
Messrs. MOORWOOD, SONS & Co., Sheffield
Mons. J. WARRY, Directeur de l'Hôpital, Struvenberg
D. J. W. PLAXTON, Lunatic Asylum, Jamaica
H. G. GRAYSON, Esq., Melbourne
Mons. J. DUJARDIN, Paris
F. MUIR, Esq., Eastern Telegraph Co., Aden
Dr. HARRIS E. SAWYER, Jorgensen's Laboratory, Copenhagen
Dr. WASHBOURN, Gloucester
Sir A. R. BINNIE, London
Messrs. VICKERS, SONS & Co., Limited, Sheffield
Messrs. C. CAMMELL & Co., Limited, Sheffield
THE EAST LONDON HOSPITAL FOR CHILDREN
Dr. T. COKE SQUANCE, Sunderland
Dr. MARGARET D. SYMINGTON, Nepanee, Ontario
W. C. C. PAKES, F.R.C.S., late of Bacteriological Laboratory, Guy's Hospital, S.E.
THE GENERAL HOSPITAL, Cheltenham
E. G. H. TYRRELL, Esq., Pietermaritzburg
Messrs. PIKE, SPICER & Co., Brewers, Portsmouth
H. TURNER, Esq., Manchester
THE EARLSWOOD ASYLUM, Redhill
Dr. EYRE, Bacteriological Laboratory, Guy's Hospital, S.E.
THE MERCERS' SCHOOL, London
ROUSS PHYSICAL LABORATORY, University of Virginia, U.S.A.
ST. THOMAS'S HOSPITAL, London
BRUNNER, MOND & Co., Northwich
Dr. HALLAM HARDY, The British Central African Administration
H. C. GRAY, Esq., Port Elizabeth, S. Africa
THE EDINBURGH MEDICAL MISSIONARY SOCIETY
F. SHILLINGTON SCALES, Esq., Editor of Microscopy Column, "Knowledge."
BACTERIOLOGICAL LABORATORY, Charing Cross Hospital, W.C.
Messrs. BURROUGHS WELLCOME & Co., London
THE DACCA TWIST CO., Manchester
BOVRIL, LTD., Old Street, E.C.
AGRICULTURAL COLLEGE, Aspatria
CALICO PRINTERS' ASSOCIATION, Manchester
CAIRN & SONS, LTD., The Brewery, Toxteth, Liverpool
Dr. H. R. D. SPITTA, Bacteriological Laboratory, St. George's Hospital, S.W.
TECHNICAL INSTITUTE, Leyton
IMPERIAL YEOMANRY HOSPITAL, Pretoria, and No. 17, General Hospital, Standerton
NATIONAL ANTARCTIC EXPEDITION
R. S. FREW, Esq., St. John's, Newfoundland
THE HOSPITAL, Chesterfield
Rev. D. KENNEDY, Meance, Napier, N.Z.
CROYDON FEVER HOSPITAL, S.E.
THE BOROUGH POLYTECHNIC INSTITUTE, S.E.
Dr. R. NORRIS WOLFENDEN
Messrs. CADBURY BROS., LTD., Cocoa Works
NORTHERN POLYTECHNIC (Chemical Department)
J. H. POLLARD, Esq., Buenos Ayres
W. N. B. WARNER, Esq., The E.S.A. Tel. Co., Swakopmund
J. STEWART REMINGTON, Esq., Carnforth
PUBLIC ANALYST'S OFFICE, Douglas, Isle of Man
NATURAL HISTORY MUSEUM (Botanical Department), South Kensington
METROPOLITAN ASYLUMS BOARD
NATIONAL HOSPITAL, Queen's Square
THE KING'S NORTON METAL Co., near Birmingham
PEEK, FREAN & Co., Bermondsey, S.E.
Dr. J. H. TEACHER, Assistant Professor of Physiology, The University, Glasgow
Dr. J. MACDONALD, Rio Tinto, Spain
A. SICH & Co., Lamb Brewery, Chiswick
Dr. GOADBY, Bacteriological Laboratory, National Dental Hospital, London
D. SHARPE, Esq., M.A., F.R.S., University Museum of Zoology, Cambridge
THE ROYAL MINT, London
A. & F. PEARS, Soap Works, Isleworth
Dr. C. A. BENTLEY, Texpur, Assam
WESTMINSTER CITY SCHOOL
W. D. & H. O. WILLS, Bristol
AGENT-GENERAL FOR NATAL
Professor F. JANSSENS, Louvain
ROYAL PORTSMOUTH, PORTSEA AND GOSPORT HOSPITAL
BRECON AND RADNOR COUNTY ASYLUM
BOROUGH OF STEPNEY (Public Health Department)
L. MATHET, Esq., Montaudan
GREAT WESTERN RAILWAY Co., Engineer's Office, Swindon
WINCHESTER COLLEGE (Science Schools)
THE ROYAL HOSPITAL, SHEFFIELD
THE ROYAL VICTORIA HOSPITAL, WATERLOO, S.E.
Dr. LEIPER, London School of Tropical Medicine
SOUTHWARK UNION INFIRMARY
UNIVERSITY OF MOUNT ALLISON COLLEGE, Sackville, N.B.
Dr. NEISH, Lunatic Asylum, Kingston, Jamaica
THE BROKEN HILL MINE
AGRA MEDICAL COLLEGE (30 "B" Instruments)

Etc., Etc., Etc.

THE EDINBURGH STUDENT'S OUTFIT.

"H" Tripod Edinburgh Student's Microscope (see page 48), with 2 Eyepieces, 1 in. and ⅛ in., "Parachromatic" Objectives, Abbe Model Illuminator, complete with Iris Diaphragm, in Mahogany Case	£15	0	0
Divisions to movements of Stage, reading $\frac{1}{10}$ milimetre	0	17	6
Clamp Screw to centring movement of Substage	0	2	6
Set of Stops for dark ground and oblique illumination	0	7	6
Exchanging Optical part of Abbe Illuminator for Optical part of Universal Achromatic Condenser (1·0 N.A.), page 113.....	1	10	0

Extra "Parachromatic" Objective—

2 in., 15° £1 2s., ½in. £1 2s. 0d.	2	4	0
Homogeneous Immersion $\frac{1}{12}$ in., 1·30 N.A.....	5	0	0

Accessory Apparatus—

Polariscope of large size (No. 557) £1 15s., with adapter (2/6) to fit into and work with the Condenser named above	1	17	6
Eyepiece Micrometer (No. 777) 5/0, Stage Micrometer (No. 775) 5/0	0	10	0
Double Nosepiece 15/0, Live Box (No. 678) 10/6	1	5	6
Rousselet's Compressor (No. 660)	0	15	0
Microscope Lamp (No. 754) £1 5s., Mahogany Case 7/6	1	12	6
Aplanatic Bull's-Eye Stand Condenser (No. 605)	1	10	0
Beale's Camera Lucida 6/0, Set of 12 Test Objects in Case £1 1s.....	1	7	0

Materials for Mounting—

Cabinet of Mounting Apparatus	2	5	0
Laboratory Dissecting Microscope with sliding Adjustments	1	7	6
Three Aplanatic Magnifiers to work with same (Nos. 710 to 712)	1	12	6
Dissecting Dish 1/0; Set of "County Council" Dissecting Instruments 15/0 (No. 983)	0	16	0
Cathcart Microtome for Imbedding and Freezing (No. 814)	1	1	0
Plane Iron 2/6, Section Knife 4/6.....	0	7	0

Photo-Micro. Apparatus—

Student's Photo-Micro. Camera (see page 167)	5	15	0
Two inner Frames 3/6, Fitting Microscope, etc., 12/6; Supplying Connecting Flanges 8/6	1	4	6
Focussing Glass 8/6, Projection Eyepiece £2	2	8	6
Chest containing Chemicals for development, etc.	1	12	6
	£52	8	6

All necessaries for Photo-Micrography with Oil Light are included above.

If Oxy-Calcium or Oxy-Hydrogen Light is desired, one of the Sets listed on page 172 should be added to the above.

Any other Microscope in this list can be substituted for the one quoted above.

EDINBURGH BRANCH—16, FORREST ROAD.

For particulars of Watson's Progressive Payment System, see page 5.

W. WATSON & SONS'

'Fram' Microscope.

A Highest-class Microscope at a very moderate cost.

Figured page 56.

SPECIAL FEATURES.

Construction.—It is exceedingly strong, solid and rigid. The working parts are all fitted and finished by hand in the most skilful manner and with the utmost care. They yield the smoothest and most precise action.

Foot.—Of the well-known Tripod pattern, having a spread of seven inches. The instrument is absolutely steady at whatever working position the body may be inclined.

Coarse Adjustment.—Watson's diagonal rack and pinion, which ensures an exquisitely smooth movement, and an entire absence of backlash, as described page 8.

Fine Adjustment.—Watson's Standard Lever pattern, as applied to all Microscopes of their manufacture. One revolution of the milled-head moves the body 1-300th of an inch, rendering it absolutely exact for high-power work.

All the working parts are fitted with **Compensating Screws** working through spring slots, by means of which any slackness that may arise after an extended period of use can be at once remedied by the worker.

Stage.—Of the Nelson's horse-shoe shape, size $3\frac{3}{8} \times 3\frac{1}{8}$ in. It is covered with Ebonite.

Fittings.—Universal sizes throughout. Objectives, Condensers, and Eyepieces (Continental diameter) by other makers can therefore be employed.

The Body.—The outside diameter of body is of large size $1\frac{1}{2}$ in. diameter, so that the large Eyepieces 1·27 diameter can be used with it by merely ordering a suitable size of draw-tube. This can be supplied without extra cost. Length—152 m/metres. With the draw-tube extended, 250 m/metres. Objectives corrected for both the Continental and English tube-lengths can therefore be used. The Universal objective thread is fitted at the lower end of the draw-tube.

The Fitting for Understage Apparatus is attached to a strongly constructed collar, upon which it may be turned aside out of the optical axis (leaving the mirror free for use) and replaced as required. A compound substage may be had instead of the underfitting, if desired, or this can be adapted subsequently by the user, the fittings being interchangeable.

Mirrors.—Plane and concave, with sliding tube fitting for adjusting.

Height of the Instrument when placed vertically, 11 inches; to underside of stage, $3\frac{3}{4}$ inches.

The Mahogany Case is stoutly made, dovetailed and French polished, with metal handle, as described page 52, lock and key.

Extract from "The Microscope and its Revelations" (Carpenter), page 234, edited by the Rev. W. H. Dallinger, LL.D., F.R.S., etc., respecting the "Fram" Microscope: "We cannot speak too highly of the enterprise and skill shown in the design and manufacture of this Instrument; and yet the student will find that, good as it is, it is one of the least costly Instruments of its class."

The entire Microscope is designed to yield the advantages that are usually associated with the most expensive instruments; the utmost care being bestowed on its construction.

Watson & Sons very strongly recommend it as a highest-class Microscope at a very moderate cost.

For prices, see page 56.

More than 100 of these Microscopes have been supplied to Grant Medical College, Bombay, and large quantities to Laboratories and Technical Institutions throughout the world.

The 'HOLOS FRAM' Microscope.

See pages 57 and 58.

This Microscope is similar in general design to the "Fram" described above, but is equipped with all Mechanical Conveniences.

DIAMETER OF OUTSIDE BODY TUBE, 1¼ ins.

W. WATSON & SONS' "FRAM" MICROSCOPE

(Registered).

A highest-class Microscope at a very moderate cost.

Strongly recommended for the purposes of the Bacteriologist, Student and Amateur.

For particulars see page 55.



Special Features:—Stage covered with Ebonite. New solid tripod.

Mr. E. M. NELSON, President of the Royal Microscopical Society, in his Annual Address, delivered on January 18th, 1899, in reviewing the progress that had taken place in Instruments and Appliances during the past year, concluded with the following remarks concerning WATSON AND SONS' NEW "FRAM" MICROSCOPE.

"Watson & Sons have "fitted to their Stu- "dent's Microscope a "Lever form of Fine "Adjustment on a "thoroughly sound "principle, thereby "raising it to the posi- "tion of a Microscope "that can for the first "time with truth be "called 'good enough "for Histological pur- "poses.'"

The "FRAM" is not only a Student's Microscope at a Student's price,
BUT IT IS MORE.
It is an Instrument suitable for high-power work, Bacteriology, and Photo-Micrography. . . . .
IT IS IN FACT,
A highest-class Microscope at a very moderate cost.

PRICE LIST OF W. WATSON & SONS' "FRAM" MICROSCOPE.

Described page 55. Figured page 56.

A Highest-class Microscope at a very moderate cost

Microscope Stand only, as figured, without eyepieces or objective.....	£4	0	0
Mahogany Case	0	15	0

SET F147.

Microscope Stand as figured, fitted with
2 Objectives, 1 in. or $\frac{2}{3}$ in. Objective ("Argus" series)
and $\frac{1}{4}$ in. Do. ("Parachromatic" series)
1 Eyepiece, No. 1, 2, 3 or 4;

Mahogany Case, complete	6	0	0

A $\frac{1}{6}$ in. (Parachromatic Series) may be taken instead of the $\frac{1}{4}$ in. in Set F147 at an extra cost of 5/0.

SET F148.

Microscope Stand, as figured, fitted with
2 Objectives (Watson's Parachromatic Series), $\frac{1}{6}$ in., and choice of 1 in., $\frac{1}{2}$ in., or $\frac{2}{3}$ in.;
1 Eyepiece, No. 2 or No. 3, or No. 4;

Mahogany Case, complete	6	15	0

A Scop Abbe Illuminator and Iris diaphragm, as listed and described page 116, may be added to the above sets at an extra cost of..... 0 17 6

SET F149.

Microscope Stand, as figured, fitted with
2 Objectives (Watson's Parachromatic Series), $\frac{1}{6}$ in., and choice of 1 in., $\frac{1}{2}$ in., or $\frac{2}{3}$ in.;
2 Eyepieces, Nos. 2 and 3, or 4;
Abbe Illuminator, with iris diaphragm (No. 523);

Mahogany Case, complete	8	5	0

SET F150. FOR BACTERIOLOGICAL WORK.

Microscope Stand, as figured, fitted with the same apparatus as in set F149, together with
$\frac{1}{12}$ in. Oil Immersion Objective, 1·10 N.A.;
Nosepiece, Watson's dust-proof pattern for 3 objectives (No. 636);

Mahogany Case, complete	13	5	0

If best capped Eyepieces 1·27 in. diameter are required instead of the Student's pattern quoted with the above sets, 5/6 per Eyepiece must be added to the above prices.

"Fram" Double Nosepiece No. 631	0	10	6

EXTRAS.

Any of the Extras mentioned on page 50 in connection with the Edinburgh Student's Microscopes are suitable for this Microscope.

The Spiral Focussing Underfitting as described page 117, is supplied with Sets F149 and F150, or if a Condenser is purchased at an extra cost of 12/6; otherwise	0	15	0
"Argus" Substage, as described page 91, of best construction, extra....	0	17	6
Compound Substage with rackwork to focus, and screws to centre (see page 91), to replace ordinary underfitting which must be returned..	1	17	6
Wright's Finder to Stage, as shown on page 92.....	0	6	6
Sliding Bar to Stage, including fitting (see page 92)	0	10	0
Special attachable Mechanical Stage, including fitting (see page 92)	3	0	0
Polariscope, complete with Selenite, 17/6; and.....	1	5	0

Objectives by all the leading makers are kept in stock by Watson & Sons, and may be had with the "Fram" Microscope, if desired, at the prices quoted on pages 101 to 108 of this Catalogue, added to the cost of the "Fram" Microscope and case.

W. WATSON & SONS'

"HOLOS" FRAM MICROSCOPE.

(As described page 59).

For the **Amateur,** the **Student** and the **Laboratory.**

Comprehensive.

Efficient

Exceedingly moderate cost.

A highest-quality Microscope with all Mechanical Conveniences at a very moderate cost.

See prices, page 59.

Diameter of body tube 1½ in.



Spread of Tripod, 7¾ inches.

Height, when placed vertically and racked down, 11 inches.

Price of Stand only (as figured) £8 5 0

W. WATSON & SONS'
"HOLOS" FRAM MICROSCOPE.

As figured page 58.

The extensive demand for a Microscope having a first-class **fixed** mechanical stage that will enable work to be performed with high powers, with precision, and be thoroughly suited to laboratory requirements and especially for Bacteriology, has caused us to introduce a special model of our well-known "Fram" Microscope that combines these conveniences. In all general details it is identical with our "Fram" Microscope, but has in addition :

1. A Mechanical Stage.
2. A Substage, with screws to centre and rackwork to focus.

The Mechanical Stage.—This is generally the same in construction as that fitted to our "H" Edinburgh Student's Microscope (see page 48). The four-thread screw by means of which the horizontal movement is imparted, is controlled by a stationary milled head, and the vertical motion is effected with a spiral rackwork and pinion. The range of movement in each direction is about one inch. The size of the upper surface of this stage is $2\frac{7}{8} \times 3\frac{1}{8}$ in. Hitherto an *attachable* mechanical stage only has been supplied to fit the "Fram" Microscope, and this being at all times greatly inferior in action to a fixed one, the efficiency of the "Holos" Fram instrument will be vastly increased for high-power work, with the new Mechanical Stage.

The Compound Substage.—The Substage is as figured on page 91, No. 450. It is of full size and has rackwork to focus, screws to centre, and can be turned aside with the apparatus contained in it so that direct illumination from the mirror may be obtained when desired.

The Instrument can be recommended in the strongest terms as of the highest efficiency. It is of best workmanship throughout. The price is the lowest at which such a comprehensive instrument has ever been supplied.

Price List of the "Holos" Fram Microscope.

"Holos" Fram Microscope Stand only, as figured, without Eyepieces or Objectives	£8	5	0
Mahogany Case	0	15	0

SET F155.

"Holos" Fram Stand, as figured, fitted with 2 Objectives (Watson's Parachromatic Series), $\frac{1}{6}$-in. or $\frac{1}{8}$-in., and choice of 1 in., $\frac{1}{2}$-in., or $\frac{2}{3}$-in. ; 1 Eyepiece, No. 2, No. 3 or No. 4 ; Mahogany Case, complete	11	0	0

SET F156.

"Holos" Fram Stand, as figured, fitted with 2 Objectives (Watson's Parachromatic Series), $\frac{1}{6}$-in. or $\frac{1}{8}$-in., and choice of 1 in., $\frac{1}{2}$-in., or $\frac{2}{3}$-in. ; 2 Eyepieces, Nos. 2 and 3, or 4 ; Abbe Illuminator, with Iris diaphragm (No. 523) ; Mahogany Case, complete	12	10	0

SET F157. FOR BACTERIOLOGICAL WORK

"Holos" Fram Stand, as figured, fitted with the same apparatus as in Set F156, together with $\frac{1}{12}$-in. Oil Immersion Objective 1·10 N.A. ; Nosepiece, Watson's Dustproof pattern for 3 Objectives (No. 636) ; Mahogany Case, complete	17	10	0

$\frac{1}{12}$ in. Oil Immersion Objective 1·30 N.A., **20/0** extra.

If best capped Eyepieces, 1·27 in. diameter, are required instead of the Student's pattern quoted with the above sets, **5/6** per Eyepiece must be added to the above prices.

Extras.

Divided Scales fitted to movements of Stage, reading by verniers to $\frac{1}{10}$ m/m	17/6
Sliding Bar to Stage	12/6

All the other extra fittings quoted in connection with the "H" Edinburgh Student's Microscope (see page 50), can be applied to this Microscope at the prices there quoted.

W. WATSON & SONS'

NEW MICROSCOPES,

The 'Praxis' and the 'Bactil'

(Registered).

Embodying a new and highly advantageous method of construction, resulting in increased strength in the weakest parts, less deterioration with constant and rough usage, together with highest efficiency in working parts—the movements, both coarse and fine, being of our REGULAR STANDARD PATTERNS, as supplied with our best microscopes.

One of the great factors that has given to our well-known Van Heurck Instrument the premier positin amongst high-class microscopes, is the method introduced by us of dovetailing the parts together instead of merely screwing them in the usual manner. The result has been that it has not only proved to be stronger, but there is a freedom from the peculiar spring which is usually so obvious and objectionable when working with high-power objectives.

In these new microscopes we have, however, been able to carry the system to a greater degree of perfection, for by the use of **specially constructed moulds** we have produced **solid castings** which replace the separate pieces screwed together. **The foot and upright pillar are cast in one solid piece,** and the **stage and limb are cast in one solid piece.**

A strong knuckle joint, upon which the instrument is inclinable to the horizontal connects these two, and forms the **most strongly framed microscope yet produced.**

The screws, which ordinarily fix the pillar to the foot, and the stage to the limb, and which are so liable to loosen, are therefore no longer required, but are replaced by the added strength of solid metal.

These microscopes will be found ideal for all purposes involving constant and rough usage, and particularly for the laboratory, for students, medical men and those who travel.

It should be particularly remembered that the coarse and fine adjustments are of the best possible description, being of the standard patterns employed by us in our most costly microscopes, while the design of the stands generally has been carefully studied to give the fullest working convenience.

We can, with the fullest confidence, recommend these new microscopes to all who require a thoroughly efficient instrument that will bear rough treatment and still retain its working qualities, so as to satisfy the requirements of high-power work. The perfection of the movements and the accuracy of the building are such that these microscopes in every way fulfil the conditions necessary for bacteriology, photo-micrography, and work with high-power objectives generally.

Although the price is low for such an instrument, it is in consequence of the special arrangements we have made for its construction in quantities, and not as the result of the lowering of the quality of any of the working parts.

SPECIFICATION.

—o—

The Coarse Adjustment is of our well-known spiral rack and pinion form, for the exquisitely smooth working of which our instruments are world-famed.

The Fine Adjustment is of our Standard lever pattern, exactly the same as is fitted to all our most expensive microscopes. Each complete turn of the milled head imparts a movement to the body of $\frac{1}{200}$th of an inch.

The Body Tube when closed is 145 mm. ($5\frac{11}{16}$ in.) long; and when the draw tube is extended, 225 mm. long. With a revolving nosepiece in position, the total length would be approximately the full English length. It carries eyepieces of the ordinary continental size.

The Stage is $3\frac{1}{2}$ in. square, is covered with ebonite, and fitted with our "grip" object spring clip. The distance from the middle of the stage to the front of the limb is $2\frac{1}{4}$ in., giving ample room for Petri's dishes, etc.

The Fitting for Understage Apparatus, as usually supplied, is attached to a strong and shapely plate, which is mounted, so that it and the apparatus contained in it may be turned aside from the optical axis when desired.

An Inclining Joint is included.

The Mirrors are plane and concave. They are mounted on a swinging arm, with sliding adjustment.

All the working parts are provided with spring fittings and screws, by means of which the user can re-adjust for wear and tear.

The Objectives supplied with this instrument are of our regular Parachromatic series, and of the highest class.

The Case is a mahogany one, strongly made, fitted with lever lock and new pattern solid metal handle.

W. WATSON & SONS' "PRAXIS" MICROSCOPE.

Height when racked down, 10¾ *in.*

Height to underside of Stage, 3⅞ *in.*

Eyepiece fitting, R.M. Society's Standard Continental Diameter, ·9173 *in.*

Objective Screw and Condenser fitting, both of the R.M. Society's Standard sizes.



The most strongly framed microscope yet produced.

The working movements are of Watson's standard patterns, as fitted to their most costly instruments.

The fine adjustment is Watson's celebrated Lever pattern, and not of the unsatisfactory direct-acting type.

PRICE LIST

OF

W. WATSON & SONS'

"PRAXIS" MICROSCOPE.

As described pages 60 and 61, and figured page 62.

Praxis Microscope, Stand only £3 15 0

Mahogany Case 0 10 6

The "Praxis" Microscope is supplied in the following Sets at the inclusive price quoted against each Set. A Mahogany Case, with lever lock and key and improved metal handle, is included.

Set No.	Objectives.	Eyepieces.	Nosepiece.	Condenser.	Price.
P 161	Two—Choice of 1 in. or $\frac{2}{3}$ in (Argus series), and $\frac{1}{2}$ in. (Parachromatic series).	One—No. 1, 2, 3 or 4	—	—	5 15 0
P 162	Two—(Parachromatic series) Choice of 1 in., $\frac{2}{3}$ in., or $\frac{1}{2}$ in. and $\frac{1}{4}$ in.	One—No. 1, 2, 3 or 4	—	—	6 10 0
P 163	Do.	Two—Nos. 2 & 3 or 4	Double	—	7 2 6
P 164	Do.	Two—Nos. 2 & 3 or 4	—	Scop, as per page 116	7 12 6
P 165	Do.	Two—Nos. 2 & 3 or 4	Double	Scop, with spiral focussing screw	8 12 6
P 166	Do.	Three—Nos. 1, 2 & 3 or 4	Double	Cone Iris Condenser, as per page 117	10 7 6
P 167	Do.	Do.	Triple	Compound substage, No. 450, page 91, with condenser No. 523	10 15 0
FOR	BACTERIOLOGY.				
P 168	Three—Choice of 1 in., $\frac{2}{3}$ in., or $\frac{1}{2}$ in., also $\frac{1}{6}$ in. or $\frac{1}{4}$ in., with $\frac{1}{12}$ in. 1·10 oil immersion.	Two—Nos. 2 & 3 or 4	Triple	Scop, with spiral focussing screw, pages 116 and 117	13 0 0
P 169	Do. but with $\frac{1}{12}$ in. 1·30 oil immersion.	Do.	Do.	Do.	14 0 0
P 170	Three—Choice of 1 in., $\frac{2}{3}$ in., and $\frac{1}{2}$ in., also $\frac{1}{6}$ in. or $\frac{1}{4}$ in., with $\frac{1}{12}$ in. 1·30 N.A. oil immersion.	Two—Nos. 2 & 3 or 4	Triple	Cone Iris Condenser, as per page 117	16 0 0
P 171	Do.	Three—Nos. 1, 2 & 3 or 4	Triple	Compound substage, No. 450, page 91, with condenser No. 523	15 15 0

Extras.

Compound Substage, No. 450, page 91 ..... £4 5 0

Spiral Focussing Underfitting, page 117, if supplied with condenser, 12/6; if without 0 15 0

Wright's Finder to Stage No. 460, extra, 6/6; Sliding Bar to Stage No. 458 0 10 6

Attachable Mechanical Stage, No. 457 ..... 3 0 0

Mechanical Stage, as supplied with the "Bactil" Microscope, page 65.

W. WATSON & SONS'
"BACTIL" MICROSCOPE.

This microscope is as described on pages 60 and 61, that is, the foot and pillar are cast in one solid piece, and the stage bracket and limb—which latter carries the body of the microscope—are also cast in one piece.

The important feature in this microscope is the incorporation of a new form of **mechanical stage,** which has a very free and long range of travel—*viz.*, horizontally 2 inches, and vertically 1½ inches.

We have frequently emphasised the desirability of having the mechanical stage built permanently and as an integral part of the instrument. In no other way can the accuracy of movement that is desirable be provided. The attachable mechanical stage, on the other hand, has many claims to favour on account of the long range of movement which it can afford.

This stage is, to all intents and purposes, built as a permanent part of the instrument, but so that the whole surface of the stage—3½ in. square—shall be available when desired, the horizontal movement, which is entirely contained in the fittings which stand above the level of the stage at the back, can be removed by unscrewing two thumb-screws. It will be noted that when this is taken away the vertical movement is still in position. Fig. 5 shows the surface of the stage without the mechanism for the horizontal movement. This latter is shown in Fig. 4. The complete stage is shown with the microscope on page 66.

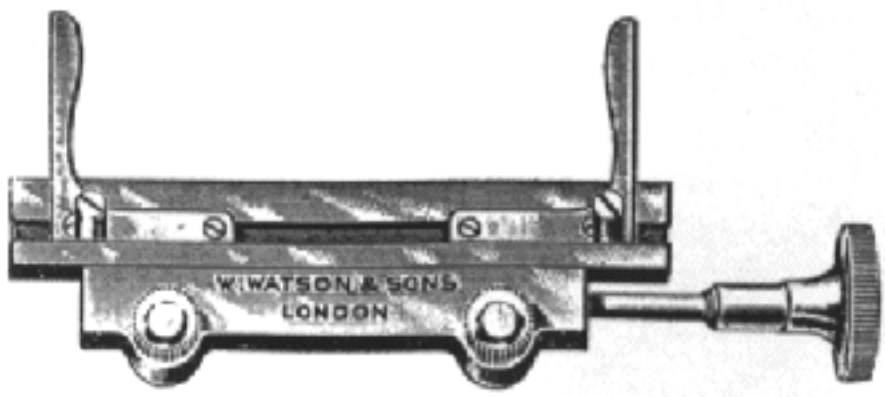


Fig. 4.

Fittings for Horizontal Movement of Mechanical Stage.

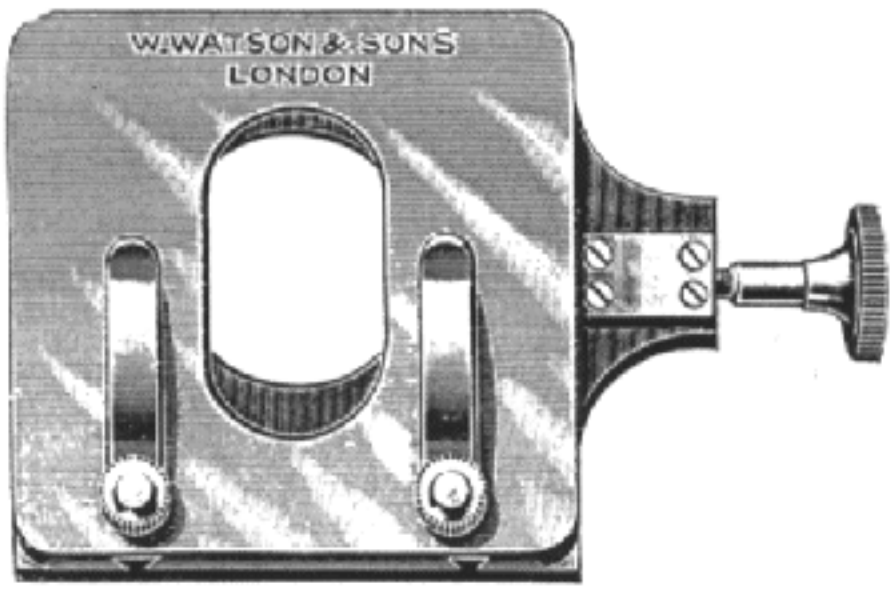


Fig. 5.

Surface View of Stage of "Bactil" Microscope.

With fittings for the Horizontal Movement of Mechanical Stage removed. Note the clear surface.

A pair of Object Spring Clips are supplied for use when the horizontal mechanical movement is removed.

No stage previously constructed has so efficiently combined the perfect rigidity of the permanent mechanical stage, with the long range of movement of the attachable form. It is an advantage which is sure to be greatly appreciated, and only requires to be worked experimentally for its qualities to be at once made apparent.

The Condenser Carrier usually supplied with this microscope is the Compound Substage, as figured No. 450, page 91, with rack-work to focus and screws to centre. It can be turned aside out of the optic axis when desired. Other forms of substage can be provided instead, if preferred.

Those workers in laboratories who prefer a microscope of the continental type will find in this instrument points superior to any of that class, and we offer it with the full confidence of its giving the highest satisfaction. It is in every way suited for high-power work and bacteriology—all the movements being of the best description—while the rigidity of the whole stand is unequalled.

The "Bactil" Microscope can be supplied with the Stage as shown in figure 5, that is with the Vertical Mechanical Movement, but without the Horizontal Movement, at a considerable reduction in cost (see page 67).

The "Bactil" Mechanical Stage can be fitted to many plain Stage Microscopes at a cost of..... **£4 10 0**

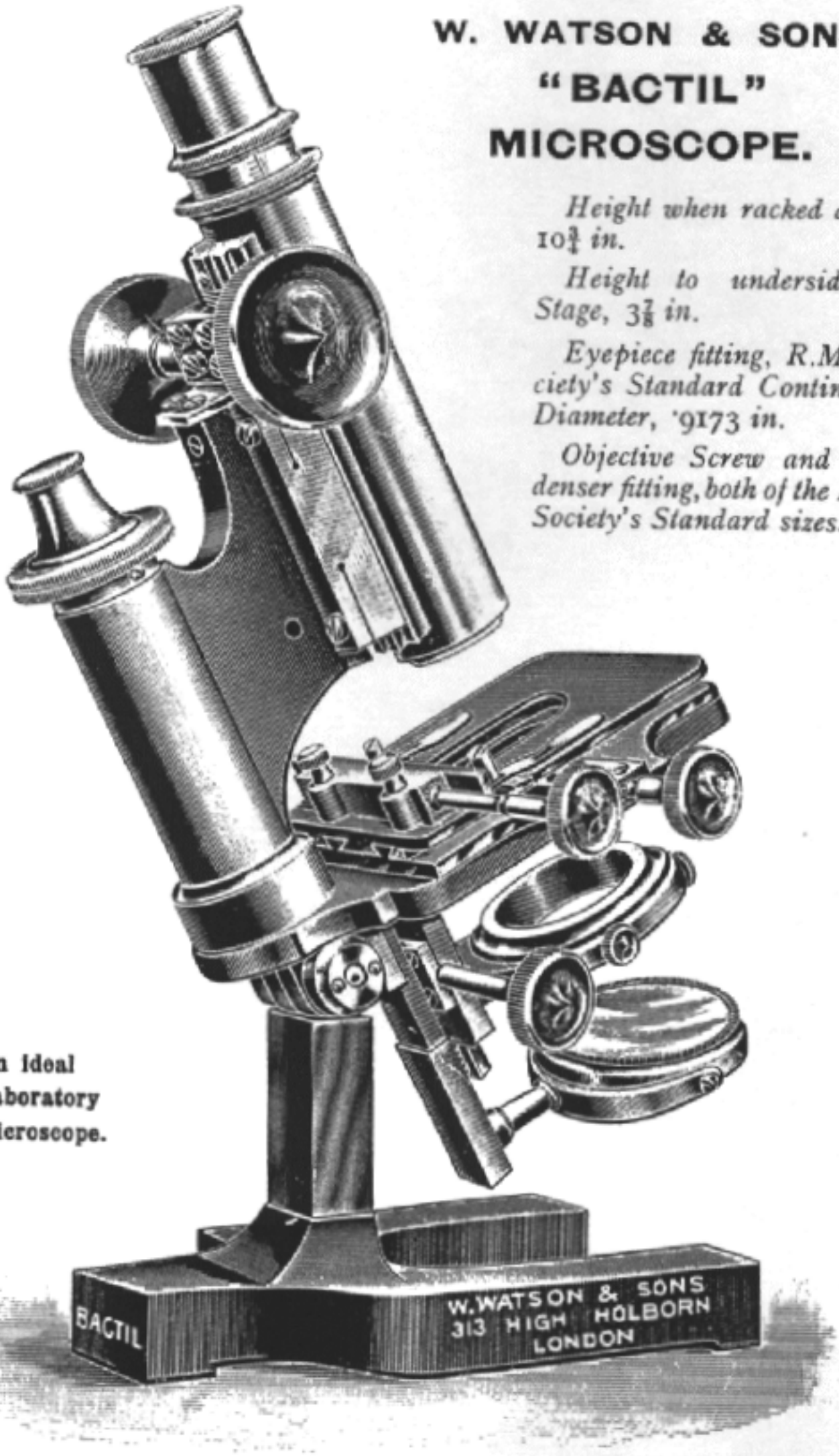
W. WATSON & SONS' "BACTIL" MICROSCOPE.

Height when racked down, 10¾ in.

Height to underside of Stage, 3⅞ in.

Eyepiece fitting, R.M. Society's Standard Continental Diameter, ·9173 in.

Objective Screw and Condenser fitting, both of the R.M. Society's Standard sizes.



An Ideal Laboratory Microscope.

The Mechanical Stage and all the working parts are carried to the highest degree of perfection.

Note particularly—That the range of movement of the Stage screws is 2 inches horizontally and 1½ inches vertically.

That the fittings which carry the horizontal movement can be removed by turning two screws, and that the stage has then a large free surface and a vertical mechanical movement only.

PRICE LIST OF W. WATSON & SONS'
"BACTIL" MICROSCOPE.

"Bactil" Microscope, as described pages 64 and 65, and figured page 66, with mechanical movements to Stage, Compound Substage with rack-work to focus and screws to centre, as figured page 91, without Eyepieces or Objectives £9 15 0

"Bactil" Microscope as above, but with Spiral Focussing underfitting as per page 117, instead of Compound Substage 8 12 6

Mahogany Case 0 17 6

The "Bactil" Microscope is supplied in the following sets at the inclusive price quoted against each item. A mahogany case, with lever lock and key and improved metal handle is included.

Set No.	Objectives.	Eyepieces.	Nosepiece.	Condenser.	Price. £ s. d.
B 192	Two—(Parachromatic series) Choice of 1 in., ⅔ in., or ½ in., and ⅓ or ¼ in.	One—Nos. 1, 2, 3 or 4	—	Compound substage without Condenser	12 15 0
B 193	Do.	Two—Nos. 2 and 3 or 4	Double	Do.	13 10 0
B 194	Do.	Do.	—	Scop Condenser, page 116, and Spiral Focussing underfitting. page 117.	12 15 0
B 195	Do.	Do.	Double	Compound Substage, page 91, and Abbe Illuminator, with Iris diaphragm, No. 521.	15 0 0
FOR	BACTERIOLOGY.				
B 196	Three—(Parachromatic series) Choice of 1 in., ⅔ in., or ½ in., with ⅓ in. or ½ in. and $\frac{1}{12}$ in. oil immersion, 1·30 N.A.	Two—Nos. 2 and 3 or 4	Triple	Do.	21 0 0

The $\frac{1}{12}$ in. Objective (Oil immersion) 1·10 N.A. may be supplied with Set B 22 at 20s. less.

WITH HOLOSCOPIC OBJECTIVES—

B 197	Two—16 mm. (⅝ in.) 4 mm. ·95 N.A. (⅙ in.)	Two — Holoscopic, Nos. 7 and 10	Double	Compound Substage and Parachromatic or Universal Achromatic. *See* pages 97 and 98	22 10 0
B 198	Three—16 mm. (⅝ in.), 4 mm. ·95 N.A. (⅙ in.), 2 mm. 1·35 N.A. oil immersion	Two — Holoscopic, Nos. 7 and 10	Triple	Do.	30 15 0

The $\frac{1}{12}$ in. 1·30 of the Parachromatic series may be included in Set B 24 at £3 less.

Extras and Variations.

Divisions to movements of Stage reading by vernier to $\frac{1}{10}$ m/m. £1 0 0

The **Universal** or **Parachromatic Condenser** may be supplied instead of the Abbe Illuminator in Sets B 21 and B 22 at an extra cost of 1 2 6

The **Coned Iris Condenser** (page 117) may be supplied with the "Bactil" Stand or with Sets B 19 or B 20, in place of the Compound Substage, at an extra cost of 2 0 0

It can be supplied with Sets B 21 and B 22 instead of the Compound Substage and Abbe Illuminator at the same cost.

The **Spiral Focussing Screw** with Scop Condenser, as figured pages 116 and 117, can be supplied to the "Bactil" Stand or with Sets B 19 or B 20, at a reduction of 0 6 0

The "Bactil" Microscope can be supplied with a mechanical movement in the vertical direction only when the Stage surface is as shown on page 65, figure 5, at a **reduction** in cost of 1 15 0

A sliding bar is then recommended at an extra cost of 0 10 6

WATSON & SONS'
"SCHOOL"
MICROSCOPE.

1905 MODEL.

Total height, 19 inches.
Height to underside of stage, 3⅛ inches.



For particulars, see page 69.

A thoroughly efficient Microscope for Botanical, Biological, Entomological, Pond Life and other Studies. With 1 inch "Argus" Objective in case £3 2 0

INSPECTION INVITED.

WATSON & SONS'
School Microscope.

As Figured page 71.

...tructed to the specification of W Jerome Harrison, Esq., of the Science Dept., Birmingham School Board.

Supplied to the London School Board and Numerous Technical Schools.

This Microscope has been specially designed for Educational purposes, and is eminently suitable for Botanical, Biological, Entomological, Pond Life, and other Studies. It is very strongly constructed, absolutely rigid, and the workmanship is of the very best. It is provided with a best quality diagonal rack and pinion coarse adjustment, by means of which high powers can be accurately focussed. The fittings have our usual spring slots and adjusting screws for compensating for wear and tear. No fine adjustment is included with this stand, it being premised that the bulk of the work to be done will be with low and medium powers, not higher in magnification than ⅛ in. For such, the coarse adjustment is ample, it being of the same quality and finish as in our other stands.

It has been the rule in cheap Student's Microscopes to fit a sliding tube for coarse adjustment and a fine adjustment—often of *very inferior* capacity. We are convinced that a good rackwork and pinion coarse adjustment is infinitely superior to the other combination, and many workers of eminence have expressed the same opinion—Dr. Dallinger, in his edition of "The Microscope and its Revelations," giving the rackwork coarse adjustment the premier position in his table showing the relative importance of the various parts of a Microscope, and in the same work (page 237) he says of this instrument :—"*From practical use we can speak of the delicacy of this focussing adjustment with which we have with ease used powers up to ⅛in., and often have used it with a 1/12in. Objective.*"

The Stage is large, measuring 3½ in. × 3½ in and is cast solid in one piece with the limb. This can have an Ebonite covering at a small extra charge.

The Body length is 5½ in. ; with draw-tube extended, 8½ in.

The Mirrors are plane and concave, 1¾ in. diameter, with sliding adjustment.

The Foot is large and very rigid, measuring 5¾ in. × 4⅛ in. wide. An inclining joint is fitted at the top of the pillar. The foot and the pillar are cast in one solid piece.

PRICE LIST.

School Microscope Stand	£2	2	6
Polished Oak Case for ditto, **7/6** ; Mahogany Case	0	10	6
SET S158.			
School Microscope, with 1 Eyepiece and 1 in. "Argus" Objective, complete in Oak case	3	2	0
SET S159.			
School Microscope, fitted with 1 Eyepiece, 2 Objectives, 1 in. ("Argus") and ¼ in. (Parachromatic Series), complete in Oak case	4	7	6
SET S160.			
School Microscope, fitted with 1 Eyepiece, 1 in. and ⅛ in. (Parachromatic Objectives), complete in Mahogany case	4	16	6

EXTRAS.

Parachromatic Objectives.....2 in. **£1 2 0** ; ½ in. **£1 2 6** ; ¼ in.	1	5	0
⅛ in.	1	10	0
Ebonite covering to Stage, extra	0	4	6
Underfitting of universal size to attach to underside of Stage to carry apparatus ; this can be added by the owner at any time	0	2	6
Scōp Abbe Illuminator, with Iris diaphragm (see page 116)	0	17	6
Iris Diaphragm only, of Scōp Abbe Illuminator	0	6	6
Stand Condenser ..... **£0 7 6** and	0	10	6
Fram Double Nosepiece, No 631	0	10	6

All the fittings being of the universal size, any of the accessories quoted for other Microscopes can be used with this one.

WATSON & SONS'

New "Argus" Microscope.

(*Registered and Patented*).

See Illustration, page 71.

The sale of this Microscope since its introduction has far exceeded our expectations, and it has given universal satisfaction. The want of a well made Microscope, at a low cost, is supplied by this instrument.

NOTE —This Microscope is *not* fitted with our Standard Fine Adjustment.

The "**Argus**" Microscope has been designed to provide an instrument of sound construction and good performance at the lowest price possible.

It will enable the student to possess himself of a microscope which will meet his requirements in Biology and encourage those who may possess scientific tastes or inclinations to provide themselves with an instrument for recreation, observation and intellectual occupation in the home, without heavy expenditure.

Many of the details of its construction are quite novel and have been patented, and in particular, the arrangements for coarse and fine focussing are of a strong, precise and unique design.

The following description will give some details of the Instrument :—

The Foot is of the rigid tripod pattern, having a spread of 7 in. The instrument is so mounted upon it that no matter at what angle it may be set upon its axis, it is perfectly firm.

The Coarse Adjustment. This is by means of a helical rackwork and pinion of a new design. The teeth are very precisely cut and an exceedingly smooth and accurate working is imparted. The nosepiece of the microscope can be racked upwards from the surface of the stage 3½ in.

The Fine Adjustment which is **not** of our Standard pattern, is effected by the rotation of a direct-acting screw and gives at once a definite, delicate movement, free from vibration, with which even a $\frac{1}{12}$th in. objective can be accurately focussed. The position in which the controlling milled head is placed is a very convenient one.

The Stage is of brass, of large size, with 3½ in. square surface, and is fitted with springs to grip the object.

The Body. This is finished in bright brass, and measures, when the draw-tube is pushed in, 5½ in.; when the draw-tube, with which it is fitted, is extended, the total length is 9 in. The diameter of eyepiece fitting is the Standard continental size—·9173 in.

An Underfitting of the universal size is attached to the underside of the stage.

All the Fittings are of the universal size, so that eyepieces, objectives, condenser, polariscope, etc., of any make will fit.

The Mirrors are plane and concave, 1¾ in. diameter, with sliding tube-fitting for adjusting.

The Height of the Instrument when placed vertically is 10¾ in.; height to underside of stage, 3¾ in.

The Instrument can be Inclined at any position from the vertical to the horizontal.

Compensating Screws, enabling working parts to be adjusted, should wear and tear render it necessary, are provided as described on page 5.

W. WATSON & SONS' "Argus" Microscope.

See description, page 70.

A Microscope for the Student or Amateur at a popular price.

Price with 1 in. and ¼ in. Objectives, in Mahogany Case,

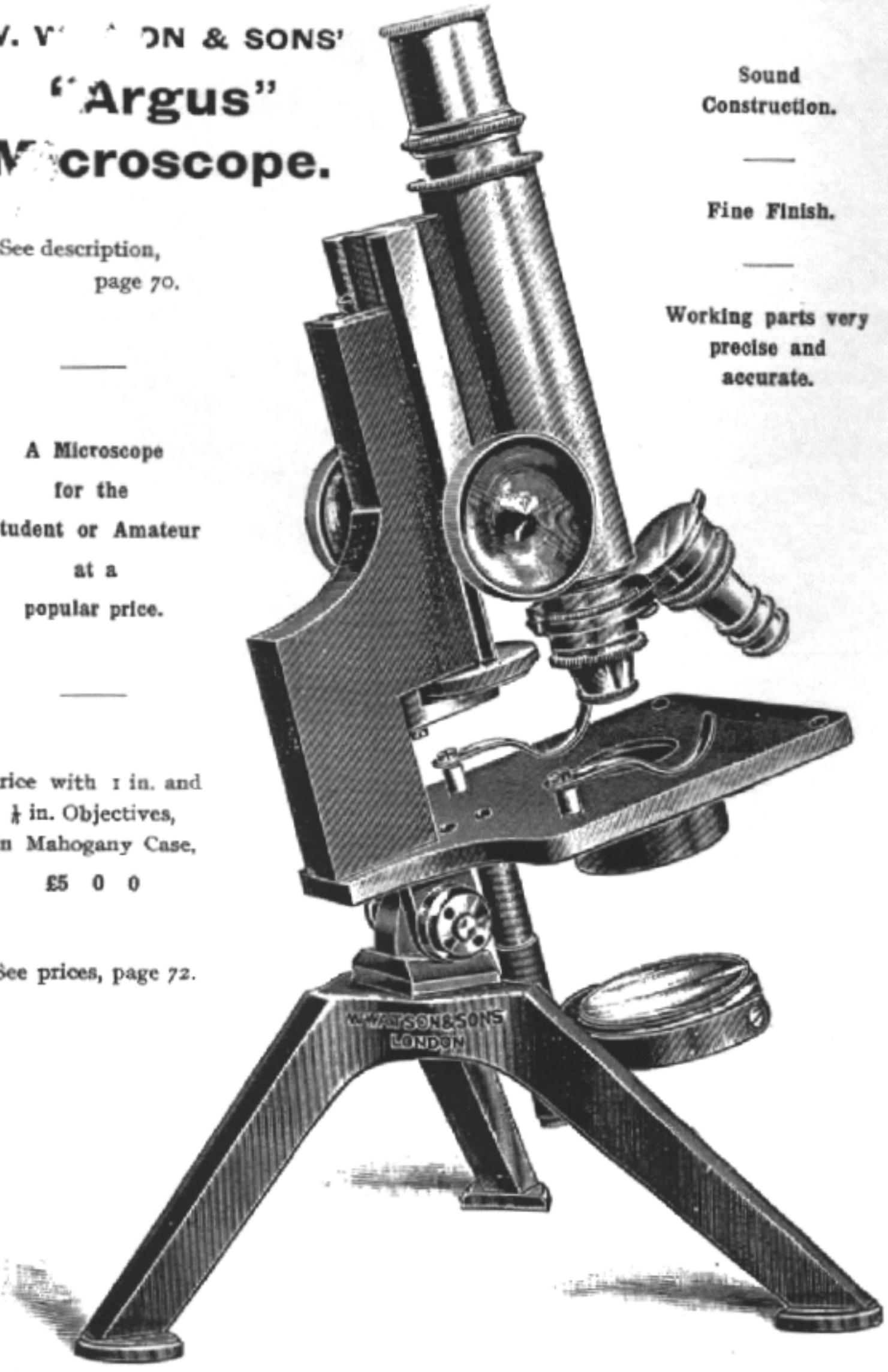
£5 0 0

See prices, page 72.

Sound Construction.

Fine Finish.

Working parts very precise and accurate.



This Microscope is fitted with Coarse and Fine Adjustments of entirely new design, and not of our regular Standard pattern

PRICE LIST OF W. WATSON & SON

"Argus" Microscope.

Described page 70. Figured page 71.

Microscope Stand only, as figured and described without eyepieces or objectives £2 1
Mahogany Case, with lock and key, and handle ..... 0 1[illegible]

SET A170.

Microscope Stand, as figured, fitted with
2 Objectives, " Argus " 1 in. and ¼ in. (Parachromatic Series)
1 Eyepiece ;
Mahogany Case, complete 4 15 0

SET A171.

Microscope Stand, as figured, fitted with
2 Objectives, Watson & Sons' Parachromatic Series, ⅛ in., and choice of " Argus " 1 in. or ⅔ in. ;
1 Eyepiece, No. 2 or No. 3 or No. 4 ;
Mahogany Case, complete 5 0 0

SET A172.

Microscope Stand, as figured, fitted with
2 Objectives (Watson's Parachromatic series), ⅛ in., and choice of " Argus " 1 in. or ⅔ in.
2 Eyepieces, Nos. 2 and 3 or 4 ;
Abbe Illuminator, Scōp pattern, as described page 116, with Iris diaphragm ;
Mahogany Case, complete 6 2 6

The 1 inch **Parachromat.c** objective can be supplied in either of the above sets instead of the **Argus** 1 inch, at an extra cost of **7/6.**

SET A173. With Parachromatic Objectives.

Microscope Stand as figured, fitted with
2 Objectives (Watson's Parachromatic Series), ⅛ in. and choice of 1 in., ½ in., or ⅔ in. ;
1 Eyepiece, No. 2 or No. 3 or No. 4 ;
Mahogany Case, complete 5 12 6

SET A174.

Microscope Stand, as figured, fitted with
2 Objectives (Watson's Parachromatic Series), ⅛ in., and choice of 1 in., ½ in., or ⅔ in. ;
2 Eyepieces, Nos. 2 and 3 or 4 ;
Abbe Illuminator, Scōp pattern, as described page 116, with Iris diaphragm ;
Mahogany Case, complete 6 12 6

EXTRAS.

Double Nosepiece for two objectives, the " Fram," No. 631 ..... 0 10 6
Dust-proof Triple Nosepiece 1 0 0
Sliding Bar—to Stage 0 10 6
Stage covered with Ebonite, extra 0 4 6

NOTE.—It will be noted by reference to page 116, that the "Scōp" Abbe Illuminator can be used complete, or the lens portion can be immediately removed and the iris diaphragm allowed to remain if desired.

The iris diaphragm only can be purchased at a cost of **6/6**, and the Abbe Illuminator added at any subsequent time at a cost of **11/0.**

For extra Objectives suitable for the above Instrument, &c., see pages 102 *to* 104.

MICROSCOPES BY

E. LEITZ, WETZLAR.

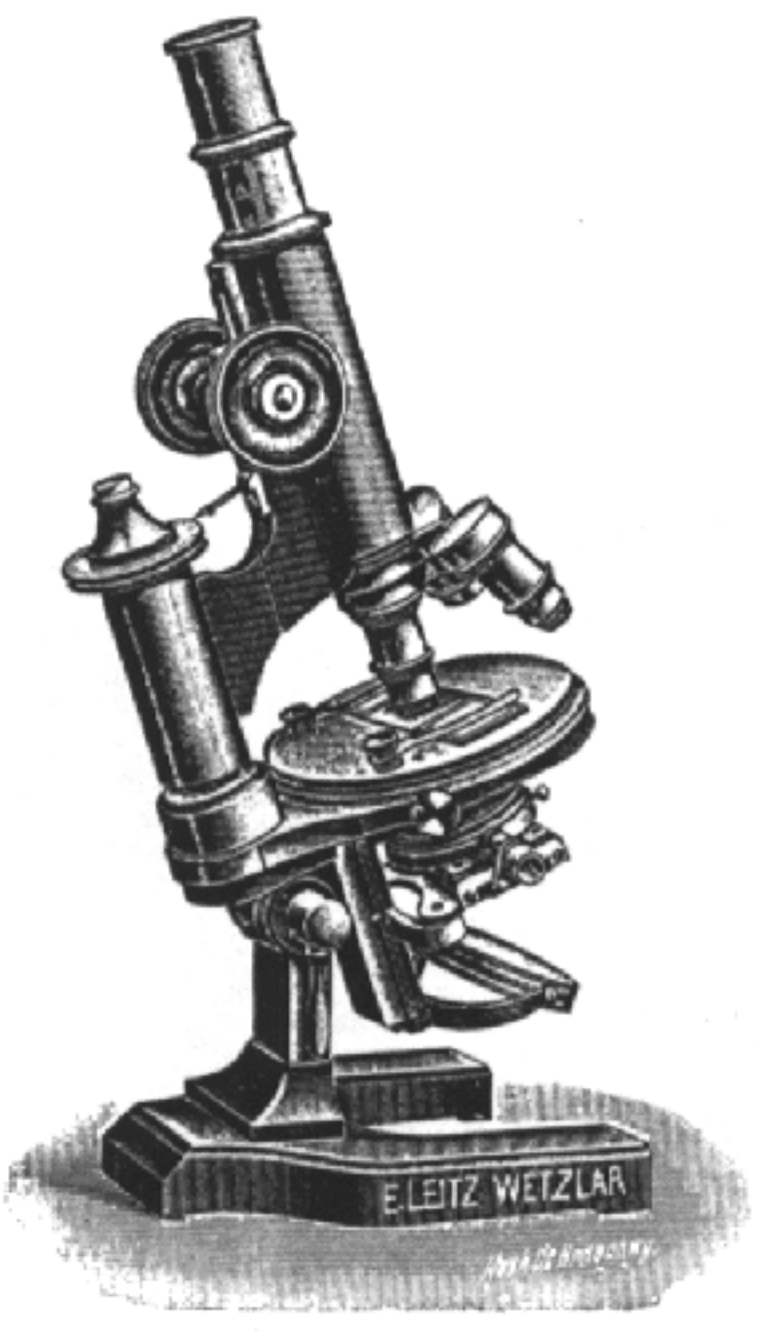
(For Objectives, see page 108).

W. WATSON & SONS beg to announce that, by arrangement with E. Leitz, they act as wholesale and retail agents for his Microscopes, Objectives, etc., in Great Britain. They hold a depot stock of his various Instruments, and customers can have their wants supplied promptly on demand from London at Leitz's list prices.

A full Catalogue will be supplied on application.

Leitz's Microscope Stands are **not supplied alone; Objectives must be ordered with them.**

LEITZ STAND Ia.



This Instrument has a revolving stage with centring screws, large Abbe illuminating apparatus, with rack and pinion to focus, and Iris diaphragm.

Prices.

Stand, with illuminating apparatus and case, no eyepieces or objectives **£9 10 0**

SET 4a.

Stand, with triple nosepiece, objectives 2, 4, 6 and $\frac{1}{12}$-in. (oil immersion), eyepieces 1, 3, 4 and 5.

Complete.... **£20 0 0**

SET 4b.

Stand, with illuminating apparatus, triple nosepiece, objectives 3, 6 and $\frac{1}{12}$-in. (oil immersion), eyepieces 1, 3 and 4, mahogany case.....

£18 10 0

If $\frac{1}{12}$-in. is not required, deduct **£5** from above sets.

Full Catalogue of Leitz's Instruments free on application.

LEITZ STAND IIa.

MEDIUM-SIZED MICROSCOPE,

Inclinable, as figured.

With Abbe Illuminating Apparatus having lateral screw for raising and lowering.

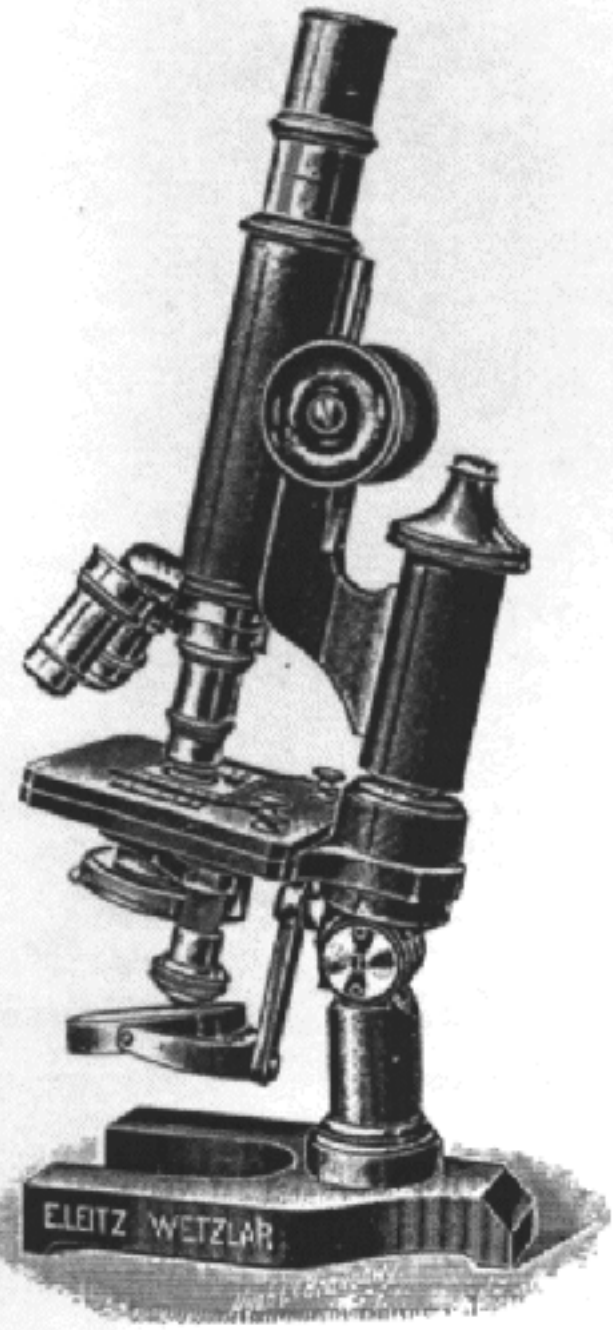
Prices.

Stand only, without illuminating apparatus or other accessories, in case .. **£4 10 0**

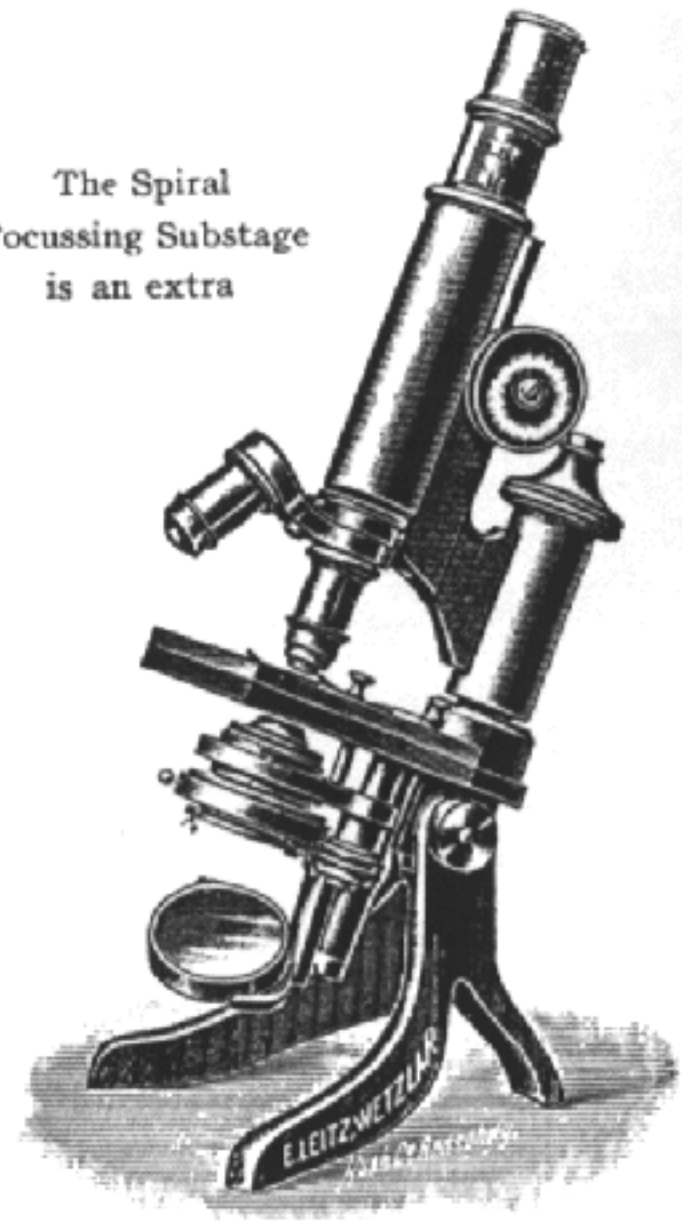
Stand only, with illuminating apparatus, no eyepieces or objectives, etc., in case. **£6 0 0**

Set 9. Stand, with illuminating apparatus, triple nosepiece, objectives 3, 6 and $\frac{1}{12}$, in. (oil immersion), eyepieces 1, 3 and 4, complete in case..... **£15 0 0**

Set 12. Stand, double nosepiece, objectives 3 and 7, eyepieces 1 and 3, complete in case, without illuminating apparatus. **£8 0 0**



The Spiral Focussing Substage is an extra



LEITZ MICROSCOPE STAND IIb.

As figured.

Stand only, as figured, without illuminating apparatus, in case **£2 15 0**

Ditto, with illuminating apparatus and iris diaphragm, in case **£4 0 0**

SET 14.
Stand, with illuminating apparatus, objectives 3 & 7; eyepieces II. and IV., double nosepiece, in case.... **£7 10 0**

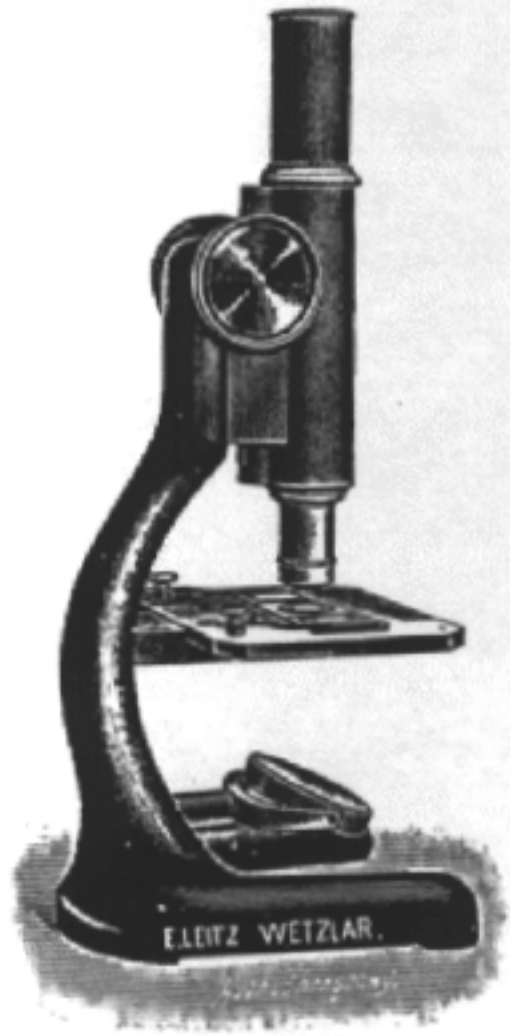
SET 15A.
Stand, with double nosepiece, objectives 3 and 7; eyepieces 1 and 3, in case **£6 5 0**

The spiral focussing Substage as figured is an extra and costs **5/0**.

Without nosepiece—Triple, **£1 0 0**; Double, **15/0** less.

Full catalogue of Leitz's Microscopes sent post-free on application.

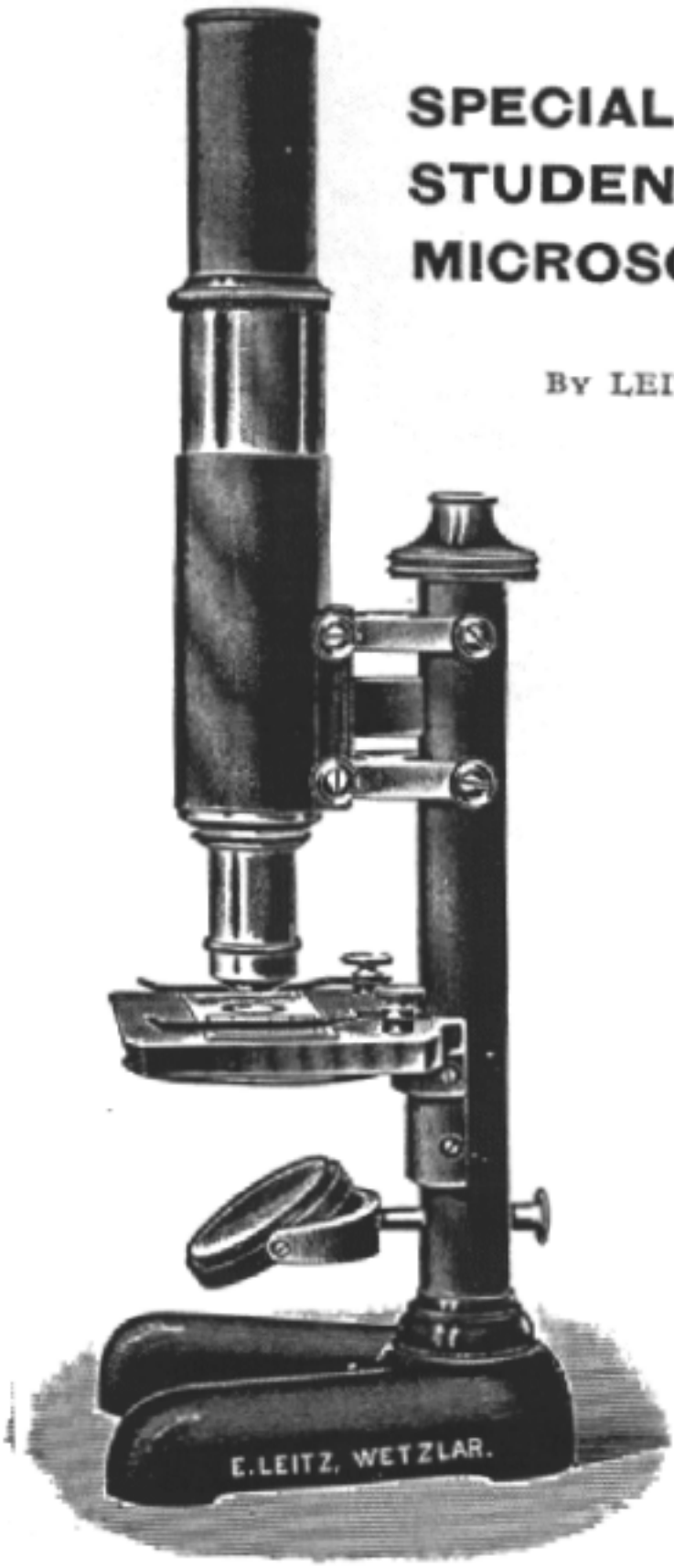
LEITZ'S AUXILIARY LABORATORY STAND.



This Instrument has Rackwork Coarse Adjustment only, and is specially suitable for rough work in the Laboratory. It carries Standard-sized Eyepieces and Objectives.

Price, Stand only £1 0 0

Do., with Objective No. 3, and two Eyepieces in Case 2 5 0



SPECIAL STUDENT'S MICROSCOPE.

By LEITZ.

Student's Microscope, as figured, fitted with adjustable sliding tube for coarse adjustment; micrometer screw fine adjustment, plain stage, with springs to hold objects in position, concave mirror, fitted with one Eyepiece, Leitz Objectives No. 3 ($\frac{3}{4}$ inch) and No. 7 ($\frac{1}{8}$ inch), in Mahogany Case, with lock and key. Price £3 10 0

Ditto, ditto, but with Objectives No 3 ($\frac{3}{4}$ inch) and No. 5 ($\frac{1}{4}$ inch) and one Eyepiece. Price complete 3 5 0

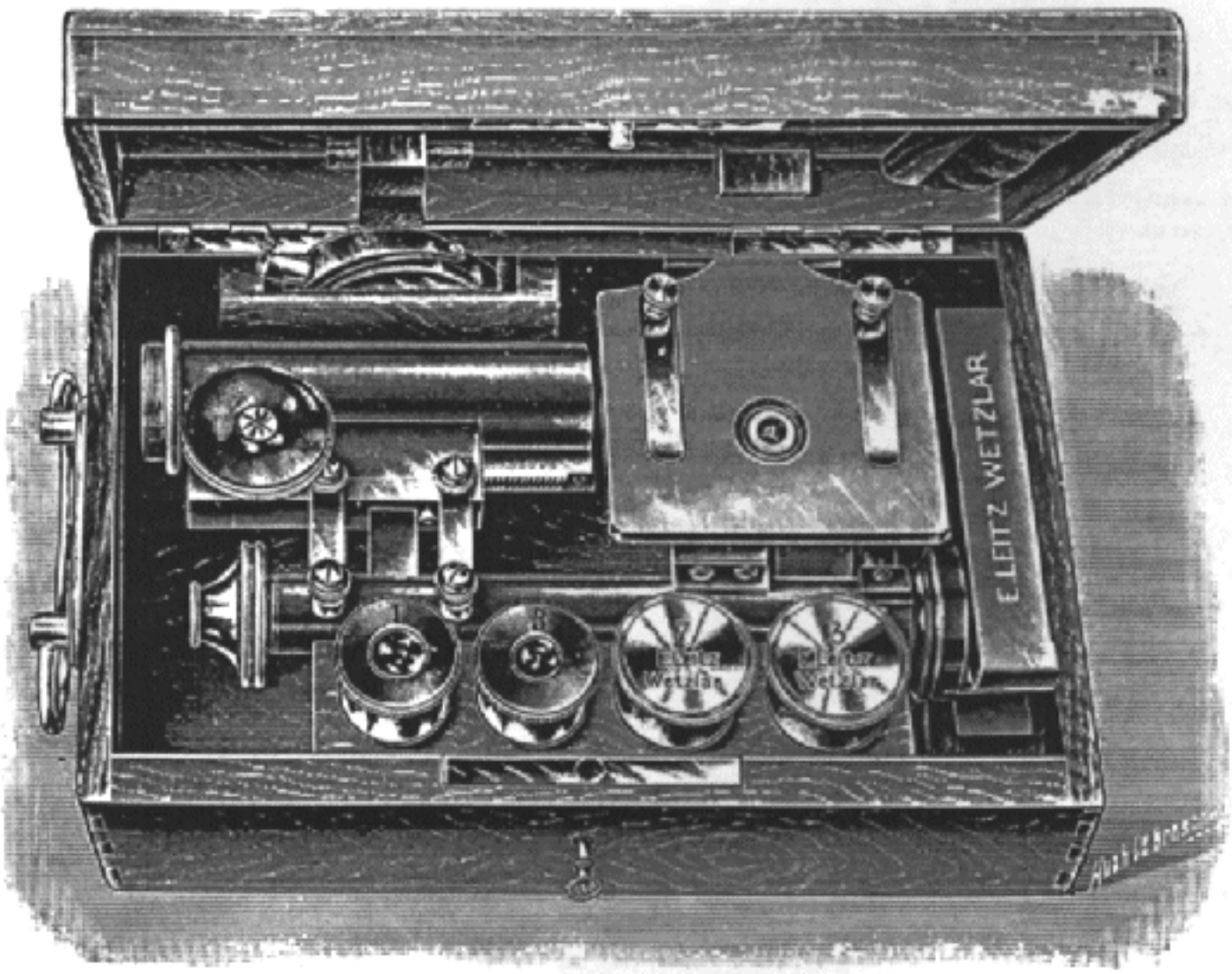
Stand only, in case 1 0 0

The above are useful Student's Microscopes, the Objectives and Eyepieces being of Leitz's standard quality. **They have no provision for carrying a Condenser.**

Leitz's complete Catalogue of Microscopes, post-free on application.

A large stock of Microscopes by Leitz is always on hand, ready for delivery.

TRAVELLING MICROSCOPES, by



SMALL MODEL, as figured.

This Microscope is ready for use after spreading the foot, drawing out the tube and setting the mirror and stage in position. It is provided with fine adjustment by micrometer screw, coarse adjustment by rack and pinion and Abbe illuminating apparatus with Iris diaphragm. The mahogany case is arranged so as to accommodate three objectives and two oculars. It locks, has a handle, and measures $9\frac{7}{8} \times 5\frac{7}{8} \times 3\frac{3}{4}$ in., the whole apparatus weighing 5 lbs. This Stand has no joint for inclination.

Price of this Microscope with Illuminating Apparatus, but without Objectives or Oculars, in case..... £4 0 0
The same, without Illuminating Apparatus, in case..... 3 0 0

LEITZ'S LARGE MODEL TRAVELLING MICROSCOPE

(Size of mahogany case, $11 \times 7\frac{1}{2} \times 3\frac{1}{4}$ in.)

This Instrument (in size like the Leitz's 1b) combines all the essential features of a large laboratory microscope with a folding stand. It will be found invaluable on scientific expeditions, for research work, etc. The system of packing is similar to the illustration of the **Small Model** above.

When lifted out of the case the two parts forming the base are spread and are then held by a spring catch. After raising the tube, the stage is turned round and tightened by means of a lever. It is supplied with large Abbe condenser and Iris diaphragm adjustable by side screw. Coarse adjustment by rack and pinion, fine adjustment by micrometer screw. Graduated draw-tube. The stand has joint for inclination.

Large Travelling Stand with Abbe Condenser and Iris Diaphragm, double Nosepiece, in case £8 5 0
The same, with Objectives 3, 6, Oil-immersion $\frac{1}{12}$ in. N.A. 1·30. Eyepieces I. and III. Magnifications 60—800. Complete in case..... 16 0 0

NOTE.—The above Microscopes by Leitz have universal fittings for Objectives and Continental Eyepieces, but the Substage Apparatus requires to be of Leitz's special sizes.

WATSON & SONS are depot agents for Great Britain for the Microscopes and Objectives of E. Leitz. A full catalogue of his instruments will be sent on application.



W. WATSON & SONS' PORTABLE MICROSCOPE.

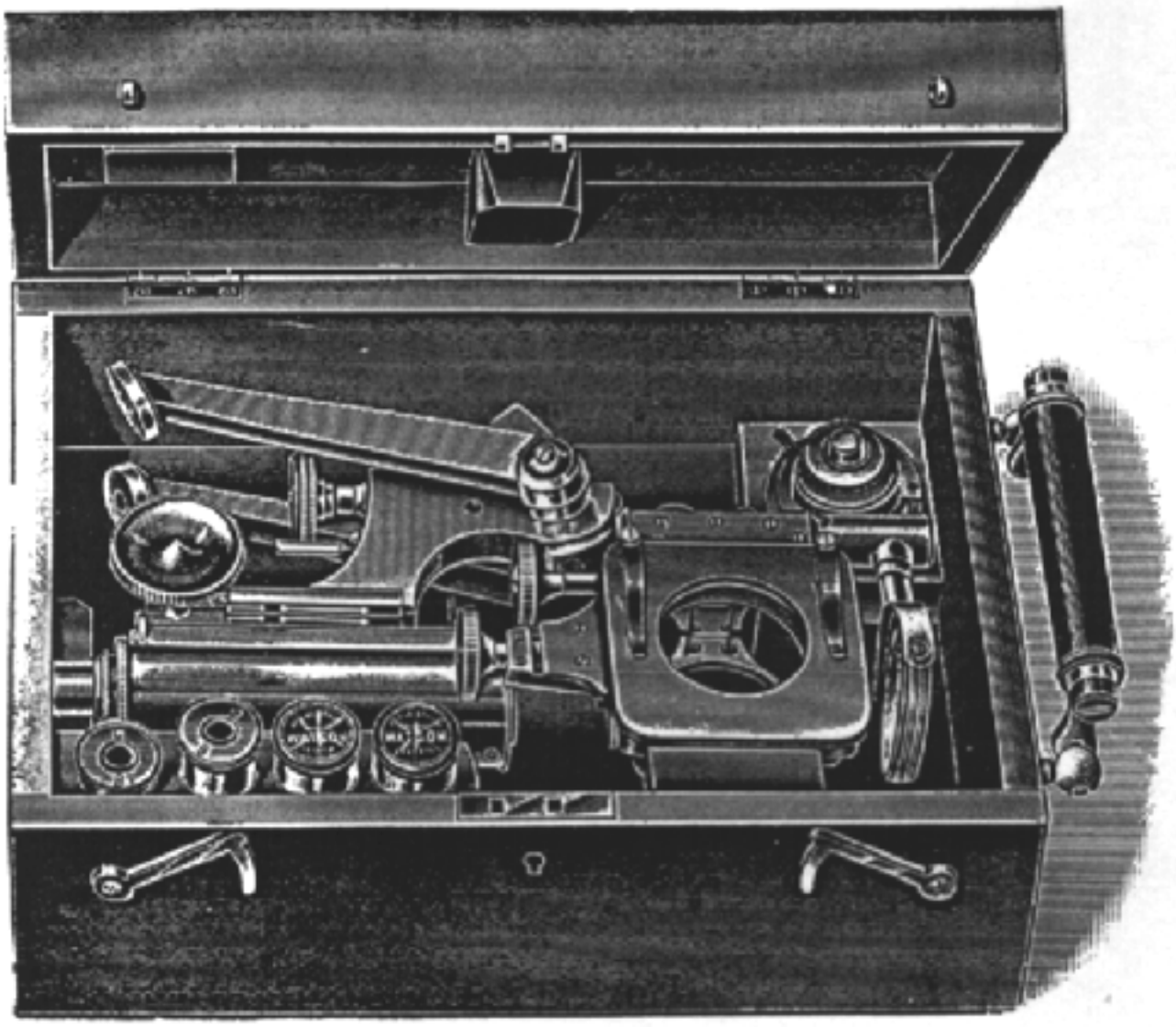
Height when placed vertical and racked down, 9¾ inches.

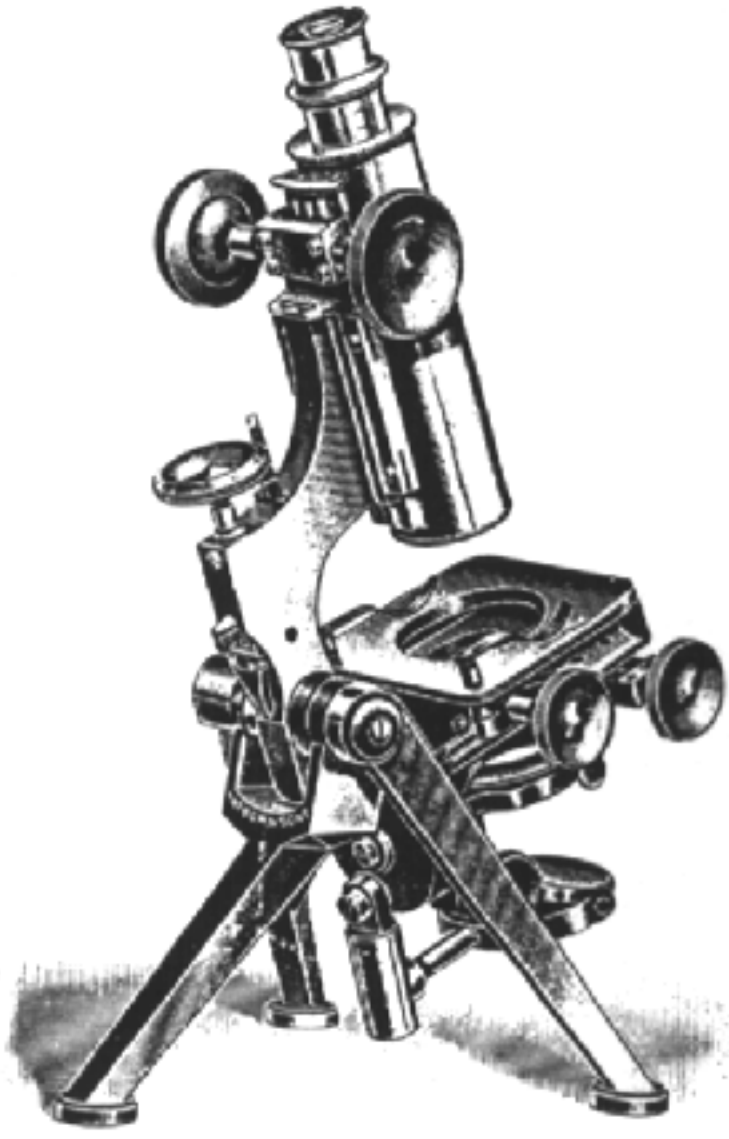
This portable Microscope is not merely intended for temporary use in the absence of a more complete stand, but it is so constructed as to be fit in every way for high-class work. The coarse and fine adjustments are of our Standard Patterns as described pages 8 and 9, and the highest powers can be advantageously worked. The fittings are of the " universal " size throughout, so that the full-sized apparatus can be used with it. It can be made to take either the Continental size of eyepiece, large eyepieces, 1·27 in. diameter, or any other gauge. For packing, the underfitting and mirror are removed, and the tailpiece and tripod legs folded forward under the stage, making an exceedingly compact arrangement. We can very strongly recommend it as a perfectly rigid and practical Microscope. It is usually supplied in a Mahogany Case, measuring outside about 8¼ × 6 × 3¾ in., or a solid Leather Case may be had if desired.

PRICES.

Portable Microscope as described above without Eyepieces or Objectives	£6	5	0
Mahogany Case for the above	1	0	0
Solid Leather Case for the above.....	1	0	0
Extras.—Compound Substage with rackwork to focus and screws to centre of extra compact design.....	2	2	0
Attachable Mechanical Stage, No. 407, page 92	3	0	0

Portable Microscopes.





THE "H" EDINBURGH STUDENT'S AND "ROYAL" MODELS,

as per Pages 30 and 48 of this Catalogue.

These Instruments are now supplied with a folding foot and with the stage and substage to turn on a quadrant, so that when packed for carrying, it is at right angles to its working position. Instruments thus constructed are very compact and when set up are extremely rigid and equal in every respect to the ordinary models. The extra cost over the price of the "H" Edinburgh Student's or Royal Microscope Stands, for the above described portable arrangement is £4 5 0

Best Mahogany Cabinet to contain either of these Instruments, measuring 13 × 9 × 5¾ outside, with specially solid metal handle 1 10 0

Petrological Microscopes.

These Instruments are made in Three Models :—

The Advanced;

The School of Mines;

The "Praxis" Petrological;

and are all fitted with prisms and accessories of the best description.

New High-Angle Condenser Carrier.

We have recently designed a most convenient arrangement for quickly removing the upper portion of the Condenser from the field of view without disturbing the polariser.

The upper portion of the Condenser Mount, containing the lens which produces the high-angled convergence, is carried on a holder which is fitted into the stage itself. This holder can be immediately turned on a pivot so as to bring the Condenser into the optical axis, or remove it therefrom. When high-angled convergent light is required the holder is turned so as to bring the Condenser to the centre of the stage, it is then just below the surface. The polariser is then pushed upwards and in so doing lifts the Condenser from its holder and carries it upwards to the surface of the stage. When the Condenser is not required, the polariser is lowered until the Condenser rests once more on its holder, when it can be at once turned aside.

The above can be fitted to either of our Petrological Microscopes at the time of ordering. The extra cost for the Special Stage and Lens holder being	£1	5	0
High-angle Condenser, fitted with polariser to work with the above.....	0	18	6
Analyser, with divided silvered circle, reading on bevelled circle fitted to top of draw-tube, arranged to rotate over Eyepiece, with removable Calcspar, as shown on instrument illustrated page 80	2	6	6

Note.—The High-angle Condenser Carrier and Condenser are included with the advanced Petiological Microscope described on pages 80 and 81.

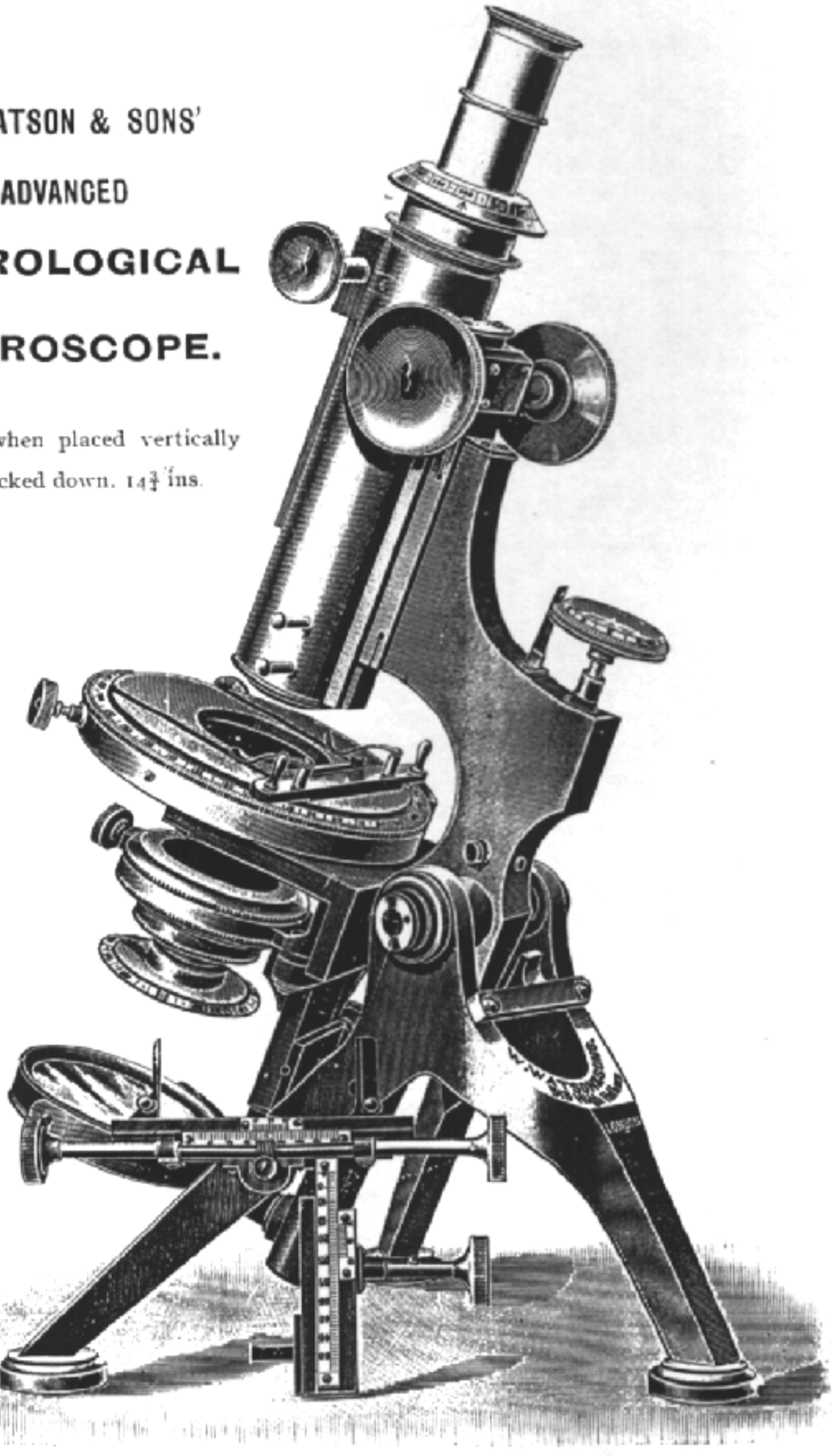
W. WATSON & SONS'

ADVANCED

PETROLOGICAL

MICROSCOPE.

Height, when placed vertically and racked down. 14¾ ins.



For particulars and prices, see page 81.

W. WATSON & SONS'

ADVANCED PETROLOGICAL MICROSCOPE.

Illustrated on page 80.

We have on many occasions been requested to supply our Van Heurck Microscope arranged for Petrological work, and to meet this demand have specially constructed this instrument. In the main it is similar to our Van Heurck Microscope; the foot, limb, and size of body tube being the same, and the coarse and fine adjustments of identical design, the fine adjustment milled head being divided to $\frac{1}{100}$ths.

The stage is a circular brass one, finished dead black, having a sliding bar to carry the object. It is divided to millimetres in horizontal and vertical directions. A separate mechanical stage, as figured, with divisions, and giving a long range of motion, is included, and can be attached at once when required. The circumferential edge of the stage is divided to degrees, and a vernier is fitted reading to five minutes. The stage rotates concentrically, completely, and centring screws are provided for adjustment to the axes of different objectives.

The substage has screws to centre, rackwork to focus, and can be lifted aside with the apparatus contained in it upon a hinged joint; when set in position it is securely fixed by means of a clamping lever.

The body is provided with one draw-tube actuated by rack-work. At the lower end of this tube the universal thread is fitted to carry a Bertrand's lens, etc. At the lower end of the body a Klein's quartz plate and above it an analyser are fitted in boxes, which can be instantly withdrawn when not required.

The eyepiece is provided with cross webs, and above it is fitted a rotating circle, divided on silver, and reading against a fixed bevelled circle at the top of the draw-tube, carrying an accurately adjusted analyser prism and calcspar plate, which may be used either separately or in combination. A polariser, having a specially large prism, is included, the rotating circle of which is divided on a silvered edge, and each quarter-circle is indicated by a spring catch.

The New High-Angle Condenser Carrier, as described page 79, is fitted to this Microscope, together with the high-angle Condenser for showing brushes in Crystals, etc.

The Instrument throughout is of the finest possible quality.

PRICE LIST.

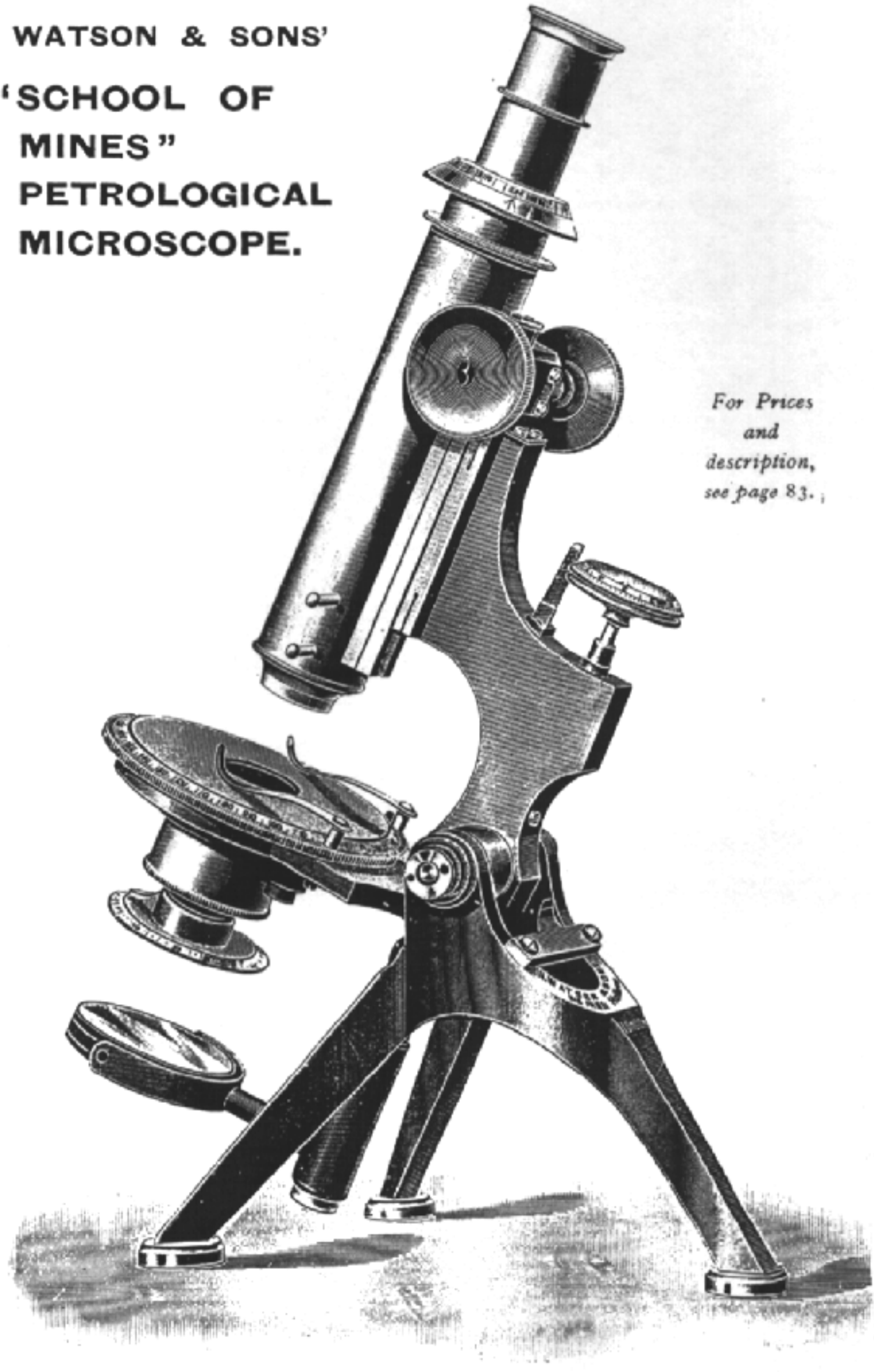
Instrument as described above, completely fitted	£27	10	0
Do. do., but without attachable mechanical stage	24	0	0
Cases, etc.—Well-made mahogany case, with fittings for apparatus	1	10	0
Best mahogany cabinet, with cupboard door to exclude dust, and drawers to contain apparatus	2	10	0
Bell glass cover, with ebonised base	0	14	6

EXTRAS.

Parachromatic Condenser (No. 501), to work over polariser, completely fitted	3	17	6
Objectives, see pages 102 to 108.			
Fine quartz wedge, mounted in body—when purchasing	1	5	0
Bertrand's bi-quartz, fitted to eyepiece	2	10	0

W. WATSON & SONS'

"SCHOOL OF MINES" PETROLOGICAL MICROSCOPE.



For Prices and description, see page 83.

W. WATSON & SONS'

"SCHOOL OF MINES"

PETROLOGICAL MICROSCOPE.

(Illustrated on page 82.)

This Microscope is of similar design to our Tripod Edinburgh Student's Microscope, being fitted with coarse and fine adjustments of the same perfect description, the milled-head of the latter being divided to $\frac{1}{100}$ths.

The stage rotates concentrically, and is divided on its edge to degrees, and reads by a vernier to 5 minutes. The body is fitted with analyser prism and Klein's quartz plate, which can be immediately withdrawn when not in use.

The underfitting tube is mounted on a hinged joint, which permits of its being turned out of the optical axis, and replaced as required. A polarising prism with divided circle and spring catch to indicate each quarter-circle is included. The eyepiece is fitted with spider's web cross lines.

The entire Instrument is of the highest quality throughout.

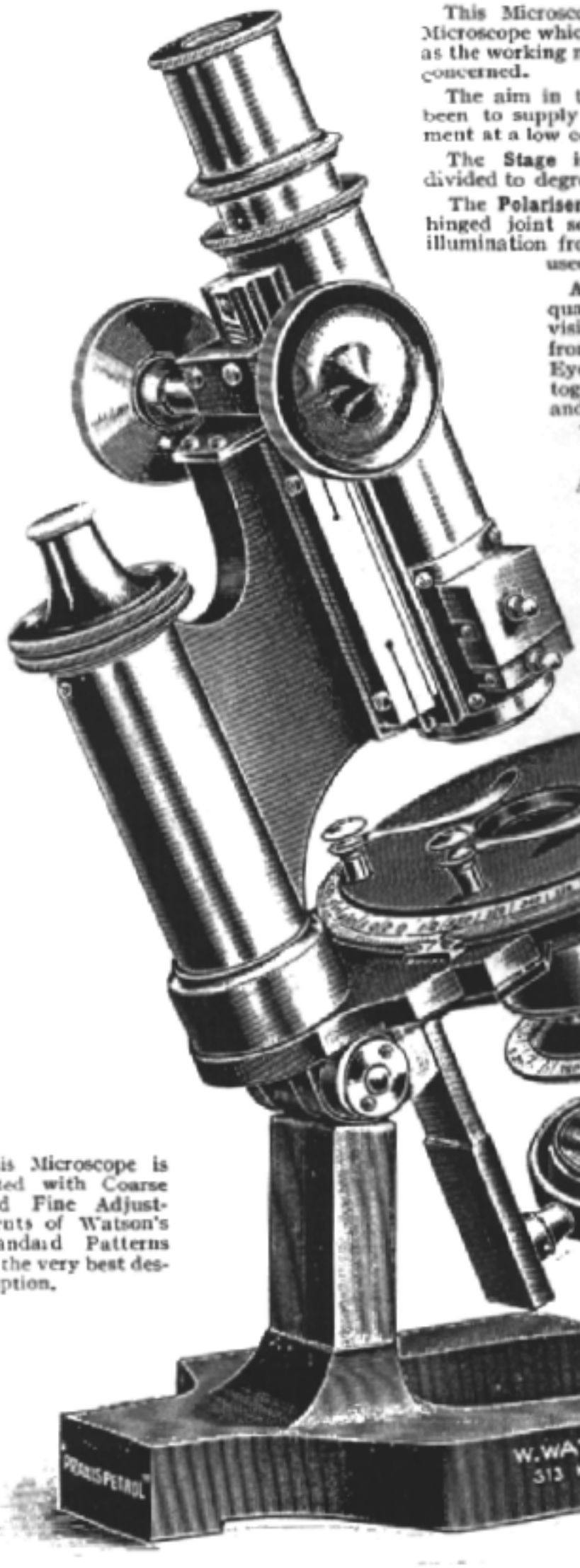
PRICE, as specified above, with 1-inch Objective, complete, in mahogany case **£11 15 0**

N.B.—The analyser over the eyepiece, shown in the illustration, is not included at the above cost.

EXTRAS.

Analyser, with divided silver circle, reading on bevelled circle attached to draw-tube, arranged to rotate over eyepiece, also calcspar plate (which can be removed with its setting when desired), as shown at the eye end of illustration (page 82), condensing lenses to top of polariser, etc., to show brushes in crystals, etc.....	**£3 5 0**
High-Angle Condenser Carrier, as described page 79, fitted to the "School of Mines" or "Praxis" Petrological Microscope	**1 5 0**
Self-centring Nosepiece to make Objective true with rotating Stage....	**0 15 0**
Extra Eyepiece "C," capped	**0 10 6**
Beale's Neutral Tint Reflector for Drawing	**0 6 0**
½-in. "Parachromatic" Objective	**1 2 0**
⅛-in. „ „	**1 10 0**
Stage Micrometer, **5/0** ..... Eyepiece Micrometer	**0 5 0**
Stand Condenser	**0 7 6**
Double Nosepiece .....**10/6** &	**0 15 0**
Centring Screws may be fitted to the Stage of the Petrological Microscope at an extra cost of	**2 0 0**
Bertrand's Lens to fit in draw-tube.....	**0 7 6**
Quartz Wedge, unmounted, **18/0**; or mounted, if ordered with Instrument	**1 5 0**

W. WATSON & SONS'
"PRAXIS" PETROLOGICAL MICROSCOP



This Microscope is identical with the "Pra Microscope which is described on pages 60 to 62, as the working movements and general constru concerned.

The aim in the construction of this instrumen been to supply a good practical and efficient ins ment at a low cost.

The **Stage** is a concentric rotating one and is divided to degrees.

The **Polariser** has a divided circle and is hung hinged joint so that it may be turned aside wh illumination from the Mirror is desired. The prism used is of large size.

An analyser Prism and a Klein's quartz plate are fitted in the body, provision being made for their withdrawal from the field of view when desired. An Eyepiece having cross webs is included together with a 1 inch "Argus" Objective and a mahogany case.

The price of the above complete is

£9 5 0

A 1 inch Objective of the Parachromatic Series may be substituted for the 1 inch "Argus" Series included with the above, at an extra cost of 7/6. Extra Eyepieces, 5/0 each. Other accessories should be chosen from page 83; those there listed being equally suitable for this instrument.

This Microscope is fitted with Coarse and Fine Adjustments of Watson's Standard Patterns of the very best description.

W. WATSON & SONS'

Microscopes and Outfits for Metallurgy.

A twenty-page Illustrated List of Microscopes designed especially for Metallurgy is issued separately, and will be forwarded on application.

We make Three Microscopes for the work, *viz.*:—

The Works Microscope,
The Mint Microscope,
The Metallurgical Microscope, No. 1.

Among the users of our specially designed Metallurgical Microscopes and Accessories are:—

MESSRS. RUDGE-WHITWORTH & CO., LTD., Coventry.

MESSRS. TAYLOR BROS. & CO., Leeds.

SIR W. G. ARMSTRONG, WHITWORTH & CO., LTD.

THE ROYAL MINT (2).

THE IMPERIAL JAPANESE NAVY, TOKIO (2).

THE DAIMLER MOTOR CAR CO., Coventry.

BOROUGH OF LEICESTER EDUCATION DEPARTMENT.

THE MUNICIPAL TECHNICAL SCHOOL, Birmingham (3).

MESSRS. W. & T. AVERY, Birmingham.

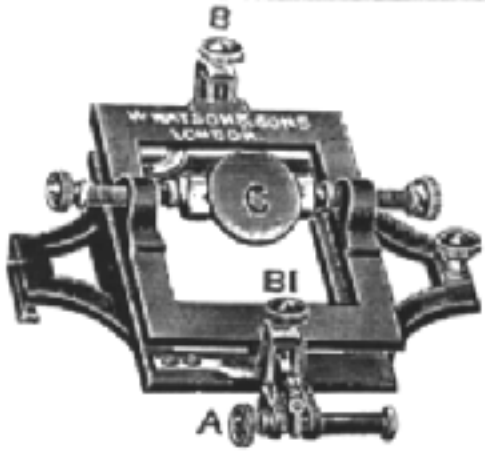
THE ROYAL UNIVERSITY ENGINEERING LABORATORY, Greenwich, S.E.

THE LONDON AND SOUTH-WESTERN RAILWAY CO.

MESSRS. CLAYTON & SHUTTLEWORTH, Lincoln.

MESSRS. GEORGE JONES LTD., Birmingham.

In addition a large number of Microscopes of our ordinary type have been specially fitted up and supplied for Metallurgical work to all the great Railway Companies, including the L. and N.W. Railway Co., G.N.R. Co., Midland Railway Co., G.E. Railway Co., Enfield Small Arms Works, King's Norton Metal Co., near Birmingham; Messrs. Vickers, Sons & Maxim, Messrs. Cammell & Co., Ltd., many Army Officers engaged on technical work, etc., etc.



Universal Metal Holder, fitted with levelling screws. Will attach to any stage.

W. WATSON & SONS' "WORKS" METALLURGICAL MICROSCOPE.

For description see 20-page Supplemental List of Micro-Metallurgical Instruments and Outfits. Post-free on application.

The **"Works" Microscope** is of massive construction, is of finest workmanship, and embodies the latest devices with the maximum of convenience for Metallurgical work.

W. WATSON & SONS'

"Works" Microscope for Metallurgy.

Made originally to the Specification of Mr. H. L. Heathcote, Research Chemist to Messrs. Rudge Whitworth, Ltd., Coventry.

See Illustration, page 86.

An idea of the form and construction of this Microscope can be obtained from the figure on page 86. The general construction is similar to that of our Grand Model Van Heurck Microscope (which is fully described on pages 18 and 19), *i.e.*, the peculiar system of construction which dispenses largely with the attachment of parts merely by screws, is replaced by the more substantial and effective arrangement of machined fittings.

The Foot is of the tripod pattern, which affords stability to the whole instrument, no matter at what angle it may be inclined on the axis at the top of the foot.

The Stage is mounted on a very substantial bracket which, at the back, is fitted by dove-tailed grooves into a frame, in which, by rack and pinion, it can be raised or lowered to or from the body of the microscope. The stage usually supplied is similar to that of our Circuit Stage Van Heurck Microscope with mechanical screws, having a range of motion of 1 in. in each direction. Complete rotation is provided, so that specimens may be examined under every aspect of illumination. In the illustration it will be seen that a sliding bar is fitted to a recess in the stage; this bar may be instantly removed, and a levelling stage or metal holder may interchange with it.

The Coarse and Fine Adjustments are of our best description.

The Body is of extra large diameter, and is fitted with two draw-tubes, one having a rackwork and the other sliding, so that a wide range of body length may be obtained.

Price List of the "Works" Metallurgical Microscope.

"Works" Metallurgical Microscope with rackwork adjustment to draw-tube, mechanical movements to stage, complete rotation to stage, rackwork coarse adjustment for lowering and raising stage, complete on tripod foot as figured	£29	10	0

Important Extras Recommended.

Divisions to movements of stage, reading by Verniers to $\frac{1}{10}$th of a millimetre	1	0	0
Universal Metal holder, £4 10 0; Levelling super-stage	3	5	0

Extra Fittings for rendering Instrument suitable for ordinary observations in addition to metal work.

Compound substage as figured on the instrument, page 86, with rackwork to focus and screws to centre, together with tail-piece carrying mirror, swung on gymbal, with plate and concave complete, as figured	4	0	0
Fine adjustment to substage, if desired	1	10	0

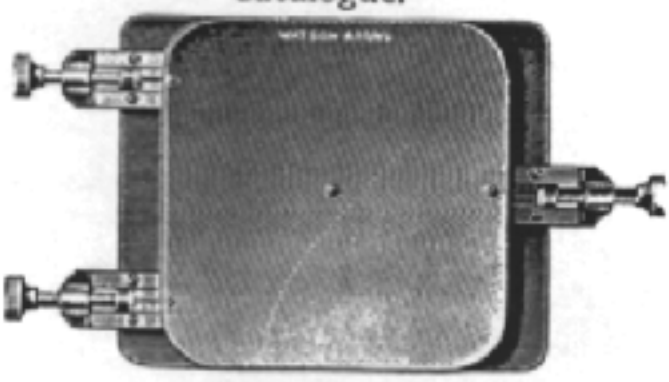
Mahogany Cabinet.

Mahogany cabinet for the above instrument, with drawers to contain objectives and eyepieces, fitted with cupboard door to exclude dust, and having strong carrying handle	3	0	0

For complete particulars of the above and other Metallurgical Microscopes please refer to our special 20-page list of Metallurgical Outfits.

METAL MICROSCOPE N

See Description and Price L. Supplemental Metallurgic. Catalogue.



Levelling Superstage — worked with wedges, screws and a central spring. The most accurate and efficient arrangement yet devised.

Designed especially for the Examination of Metals and Minerals.

Those workers who may wish to use the ordinary Microscope for Metallurgy can, if it be fitted with a Substage, do so quite well by having a stage plate — without a central aperture—to fit into the Substage. Subjects for examination are then placed upon this plate, and focussing can be done with the Substage rackwork, thus obviating the displacement of the Vertical Illuminator when once adjusted. The cost of this Special Substage Stage-plate is 10/6.

A special 20-page Catalogue of Instruments and Accessories for Micro-Metallurgy is issued separately and will be sent post-free on application. It is the most comprehensive list on the subject that is published.

W. Watson & Sons'

Metallurgical Microscope

(No. 1).

As figured page 88.

This Microscope is of best quality throughout.

The Coarse and Fine Adjustments are as described on pages 8 and 9.

The Body is of large diameter, and the draw-tube can be arranged to carry either the Continental or large-sized (1·27 in.) Eyepieces, whichever may be preferred. When the draw-tube is closed, the body length is 152$^{m}/_{m}$; when extended 250$^{m}/_{m}$.

The Stage has mechanical screws, and is constructed in this respect in the same manner as the Stage described in connection with the "H" Edinburgh Student's Microscope, page 47.

The centre of the Stage has a cylindrical fitting into which super-stage plates may be fitted and interchanged. As illustrated in the figure, page 88, a super-stage is supplied having levelling screws for the purpose of adjusting the planes of specimens under examination to right angles with the optical axis. The upper surface of this super-stage is higher than the milled heads controlling the mechanical movements, so that large blocks of metal can be freely moved on the Stage. The surface of the top plate measures 3½ in. by 3½ in. This can be immediately removed, and a specially designed

"Metal-holder," as illustrated in our Special Metallurgical List, can be substituted for it. With these, blocks of metal can be held in the jaws at any angle, or rotated, so obviating the necessity for the long and tedious process of mounting specimens.

A Rackwork of strong, though very smooth and precise construction, is fitted to the stage to permit of its being moved up or down for focussing after the lighting adjustments have been made, when a fresh specimen is examined, etc.

A Vertical Illuminator with glass disc, as figured page 120, is provided with the Instrument, and is usually fitted immediately above the objective, as illustrated.

The Instrument has inclining joint, so that it may be set at any desired angle for working.

The Foot is of horse-shoe shape, very steady and rigid, and allows of the free movement of the Stage downwards when the rackwork is used. It may be mounted on a tripod form of foot if preferred, without extra cost.

PRICES.

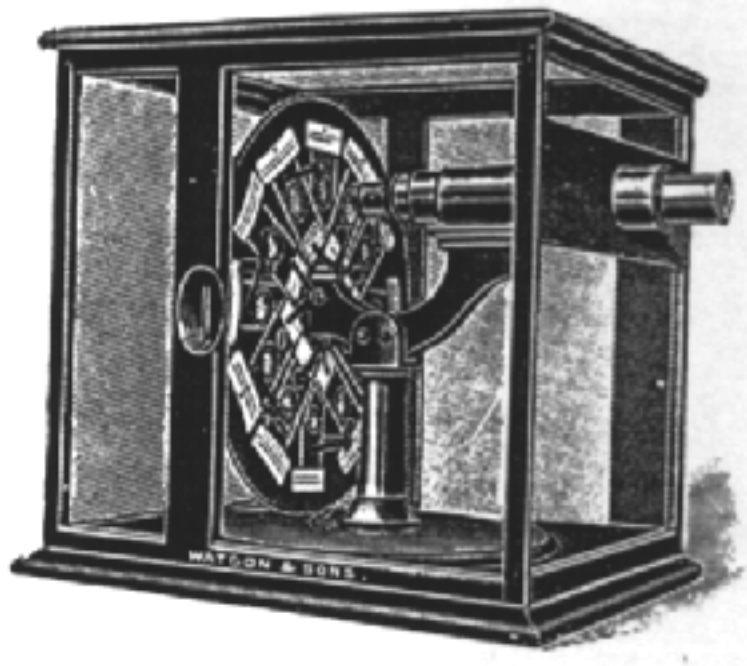
Metallurgical Microscope, as figured page 88, and described above, with super-stage, having levelling screws, vertical illuminator (cover-glass pattern), without Eyepieces and Objectives	£13 10 0
Mahogany Case	1 0 0
*Modified **Metal-holder,** to obviate the necessity for mounting specimens, as described above	1 15 0

NOTE.—If desired, the Metal-holder may be included with the Microscope and the super-stage with levelling screws omitted, at the same cost.

*The Metal-holder is also made in square shape to grip the edges of square stages at the same price. It can be made to order to fit any Microscrope—quotations given.

W. WATSON & SONS'
MUSEUM MICROSCOPE.

(PATENTED.)



This Instrument has been designed especially for the use of students who may be pursuing some particular branch of study or for visitors to museums. Possibilities of study are greatly extended by its use, especially in relation to Botany, Zoology and Geology.

It consists of a dust-proof mahogany-framed glass case, in which the Microscope is fitted. The objects, 12 in number, are mounted upon a disc, which can be rotated from outside the case. The Eyepiece of the Microscope also projects outside the case, and focussing is effected by means of a milled-head, actuating a rackwork and pinion fitted on the right-hand side of the case.

The entire Microscope is of best construction.

PRICE complete, with one Eyepiece and 1½ in. Objective, parachromatic series £10 10 0

Polariscope, with fittings for revolving the polariser from the exterior of the case..... 2 10 0

MICRO-SPECTROSCOPE.

With rack motion to focus, and adjustment for width of slit shows two spectra in the field of view at the same time; the small prism for the second spectrum can be removed when only one is required. The prisms are also arranged to slide from position at will, leaving the field of view open as an ordinary eyepiece. The stage for holding test tubes, etc., can be removed with its mirror from the body of the Instrument when not required. It is fitted with a wave-length scale which can be reflected into the field of view; in mahogany case.. 6 10 0

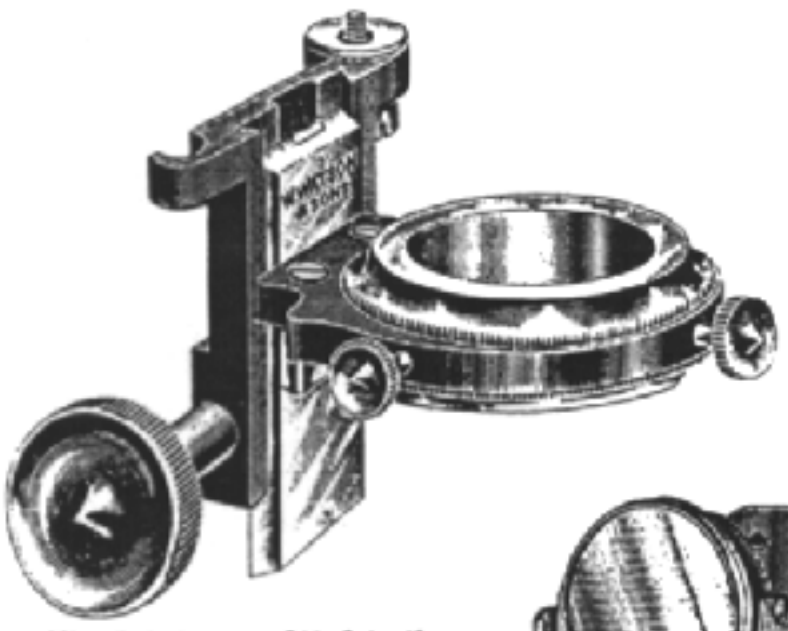
EXTRA FITTINGS

Suitable for the

Edinburgh Student's, "Fram," "Praxis," "Argus,"

And other Microscopes.

EDINBURGH STUDENT'S MICROSCOPE.

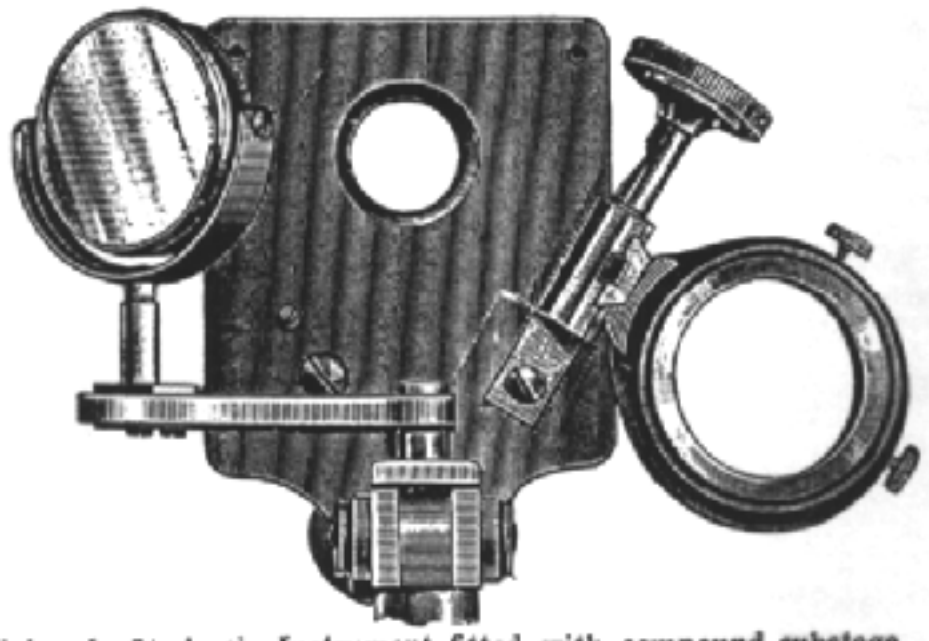


The Substage as fitted to the Edinburgh Student's and "Bactil" Microscope.

This Substage is of best form, and as fitted to our Microscopes. It has best spiral rackwork and pinion coarse adjustment, centring screws to enable the apparatus that may be contained in it to be set exactly coincident with the Optical Axis of the Objective. Of best make throughout.

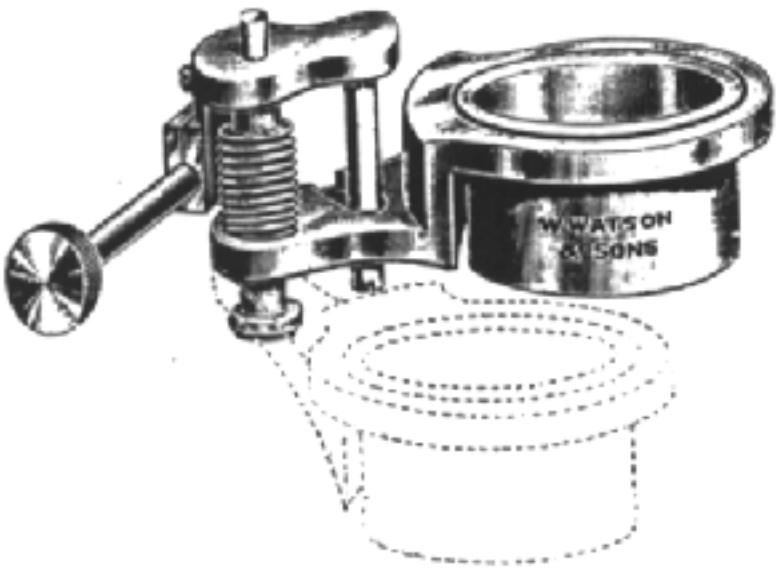
450.—**Price,** fitted to "Edinburgh Student's," "Fram," "Praxis," "Bactil," or "Argus" Microscopes **£1 17 6**

451.—This Substage can be applied to many Student's Microscopes, the inclusive cost of fitting being usually **£2 2 0**



Underside of Stage of "B" Edinburgh Student's Instrument fitted with compound substage showing mirror and Substage turned aside. The underfittings of the "B" and "F" Stands, and the Substages of the "D" and "H" Stands, are fitted in the same manner.

WATSON'S NEW "ARGUS" SUBSTAGE.



Watson's New "Argus" Substage can be fitted to almost any Microscope.

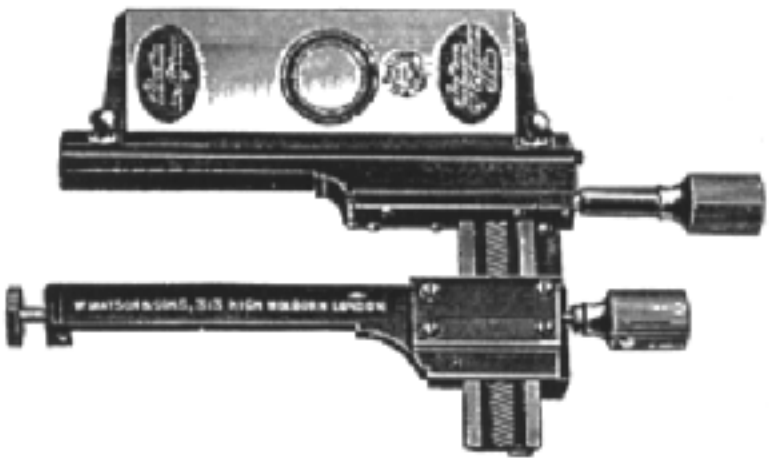
This is designed to supersede the spiral focussing screw which is fitted to the under-fittings of many Student's Microscopes. The rackwork in this new Substage consists of a number of grooves cut on a cylinder, against which a pinion engages as in the ordinary coarse adjustment of microscopes. This can be mounted strongly and to work accurately on almost any microscope. It is provided with a loose ring by which it is centred precisely to the microscope with which it is to be used before leaving our works, and the ring is then held in position by screws.

452.—**Price,** fitted to any of our Microscopes at time of ordering **£0 17 6**

453.—**Price,** including fitting to any of our own and most other makes of Microscopes **1 0 0**

For further Condenser Carriers, etc., see page 114 and 117.

Extra Fittings for Microscop



No. 457.

WATSON'S ATTACHABLE MECHANICAL STAGE.

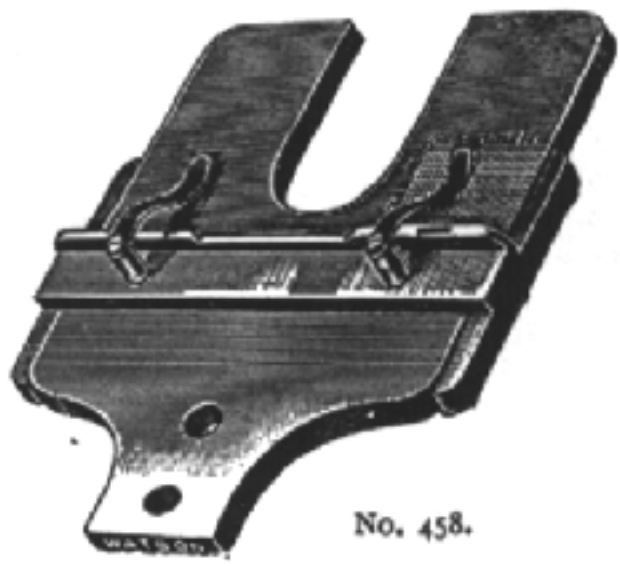
457.—The special feature of this stage is that it can be immediately fixed to a microscope without any special fitting. It is placed upon the stage and grips upon the edges like an ordinary sliding bar; it is then clamped in position by means of a thumb-screw. It has a long range of movement in both horizontal and vertical directions. Strongly recommended £3 0 0

This is stocked to fit the "Edinburgh Student's," "Praxis" and "Fram" Stages, but can be made to order of any special size at an extra cost of 0 5 0

SLIDING BAR FOR STAGE.

458.—This is as depicted in the accompanying figure. It is kept in stock of the size to fit our "Edinburgh Student's," "Praxis" and "Fram" Stages, price.... £0 10 6

459.—To other sizes specially to order 0 12 6



No. 458.

Stage of "Fram" Microscope showing sliding bar.

OBJECT FINDERS.

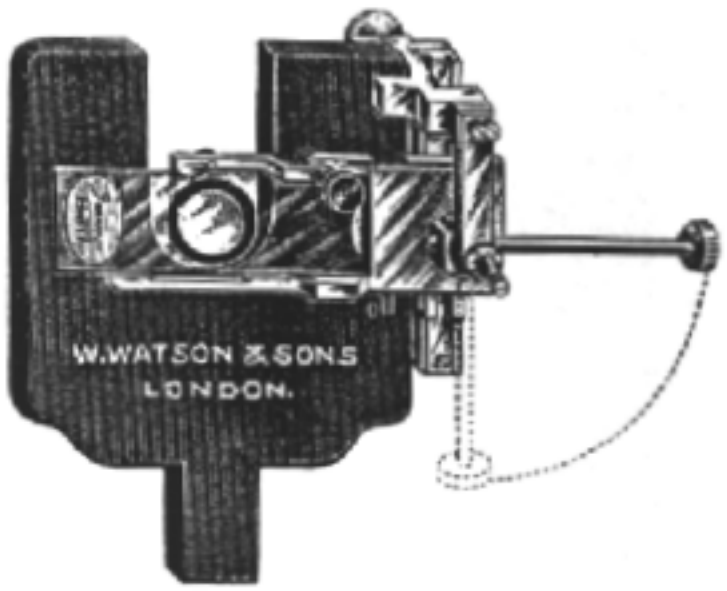
460.—Wright's Finder as shown on Stage in figure above. When no sliding bar is taken, a 1-inch square is engraved upon the Stage surface, divided to $\frac{1}{50}$ in. When a sliding bar is taken, the horizontal divisions are engraved upon the bar itself and the vertical upon the Stage. Price, in either case £0 6 6

460a.—Maltwood's Finder, in case..... 0 6 6

The "Argus"

Attachable Mechanical Stage.

(PATENTED.)



Watson's "Argus" Attachable Mechanical Stage.

This Stage can be fitted to any ordinary Microscope, the method of attachment being by means of a thumbscrew only, and as the mechanism is entirely on the side of the Stage and not behind it, none of the working parts are interfered with by the Instrument. This stage, which is quite new in construction, is controlled by a frictional wheel and one milled head only. At first sight it would appear that some difficulty might occur in moving this milled head from the vertical to the horizontal position, but experience entirely overrides this objection. A steel spring is fitted at the top to give the necessary pressure, and directly the stem of the milled head arrives at the horizontal position, a check pin indicates it and the same occurs when it is turned round to the vertical direction. It should be noted that if it is used at any point between the vertical and horizontal positions, the slide will be carried diagonally.

This Stage cannot fail to work, is entirely free from all chance of backlash, and is beautifully sensitive and accurate, even with high powers. It will be found superior to many of the ordinary expensive attachable Stages. It gives about 1¼ inch of traverse.

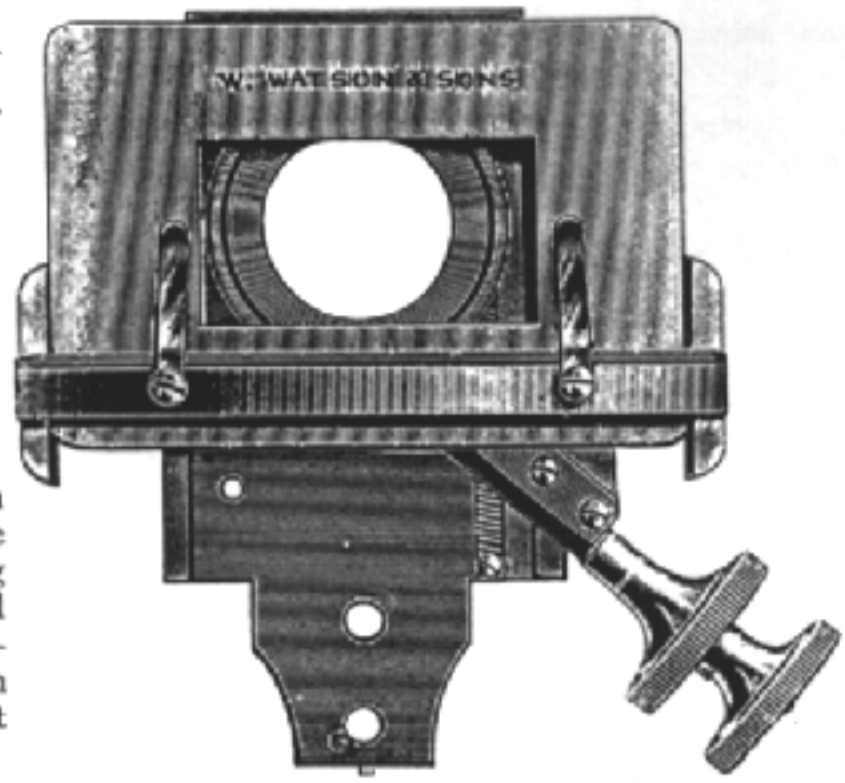
Price..... **£1 15 0**

BACTIL MECHANICAL STAGE—

As described and figured pages 64 and 65, can be fitted to the majority of Microscopes having Square Stages, at a cost of **£4 10 0**

Watson's New Scōp Mechanical Stage.

(PATENTED.)



Designed to give any desired length of horizontal movement, combined with a perfectly clear surface to the stage.

Invaluable to . . .

Bacteriologists, for Blood Examination, and the observation of living specimens.

The repeated inquiry for a mechanical stage other than of the attachable form which gives a long range of movement in a horizontal direction, has induced us for a considerable period to experiment with a view to producing exactly what is required.

We have in this new SCŌP stage, not merely satisfied the condition of great range of movement, but have added the very desirable conveniences of a clear upper surface to the stage, and of actuating both movements from separate milled heads working on one centre. Further, the two movements are of equal speed.

NOTE.—The Stage is usually supplied with a pair of spring clips only. The Sliding Bar shown in the figure is an extra. (See extras.)

RANGE OF MOVEMENT.

For practical purposes this has to be limited to about 2¼ in., so as to leave a sufficient support at each end of the open space in the stage for a 3 in. × 1 in. slip, but it is equally easy in this stage to give 3 in. or more of movement; in other words, the length of movement is only limited by the extreme length of the travelling plate of the stage.

For regular stock, we shall fit this with a movement of 2¼ in., but a greater range may be provided without extra charge.

It will be noted that the under surface of the top travelling plate is bevelled so that it may not interfere with the working of the Condenser.

A plate to fit flush into the oblong aperture, with a small opening, can be included with this stage if desired.

In the vertical direction the usual 1 in. of movement is provided.

CLEAR SURFACE OF STAGE.

The advantages which this stage offers in this respect are superior to all others. A sliding bar, or spring-clips can be had with the stage; these are immediately removable and a Petri's dish or any other large plate used in bacteriological or blood work, can be laid on the surface without hindrance from the screws of the mechanical movements.

THE MOVEMENTS THEMSELVES.

These are effected by rack and pinion of an entirely new design in microscope construction, and the very smoothest and most precise action is guaranteed. The convenience of having the two movements on one common centre actuated by separate milled heads has been advocated for many years by leading microscopists, but this device has usually necessitated a very thick stage and a short range of movement. In the case of the SCŌP stage, this has been obviated, and the fitting of these milled heads has been effected in the most efficient manner for working. As both of the movements are controlled by rackwork and pinion, an equal rate is secured.

POSITION OF THE MILLED HEADS.

It will be observed that these lie in an unusual position, but actually in practice they will be found more readily at hand than that position which usage has dictated for so many years. Also the ends of the mechanical screws do not interfere with the free working, or cause the de-centring of the substage condenser.

THE FITTING OF THE STAGE.

This stage is made of the same size as that on our well-known " H " Edinburgh Student's Microscope, as described on pages 47 and 48 of this catalogue, and is again identical with that of our " Royal " on pages 30 to 33, and it can also be added to our " Fram " Microscope.

PRICES.

The extra cost for the new SCŌP Stage supplied to either the " H " Edinburgh Student's Microscope or " Royal " Microscope, instead of the usual pattern, at time of ordering is	£1	15	0
Ditto to the No. 1 and Circuit Stage Van Heurck Microscopes	1	5	0

No extra charge is made for supplying the Scōp Stage in place of the Stage that is usually fitted to the Grand Model Van Heurck Microscope.

Cost of supplying and fitting this mechanical stage to almost any existing microscope	4	10	0

EXTRAS.

Divisions to movements reading to $\frac{1}{10}$th millimetre	£1	2	6
Flush Plate to fit into oblong aperture, with small central opening, if supplied with the stage ..... extra	0	5	0
Concentric rotating stage in which the mechanical movements would be mounted upon a rotating base as in the Van Heurck Microscope	1	15	0
Sliding Bar to Stage, as shown in illustration	0	10	6
* Large Iris Diaphragm fitted into base plate of stage	1	0	0

* This Iris diaphragm can be used when the condenser is not required, for regulating illumination, and is sufficiently large for a condenser to pass through it when it is opened, or partly opened. It can be made to close round the body of condenser at will.

If desired, the Mechanical Stage may be made to entirely remove, and a plain plate may slide in its place, fitting in the same dovetails. This plate is invaluable for rough work, and has a surface measuring $3\frac{1}{8}$ inches square.

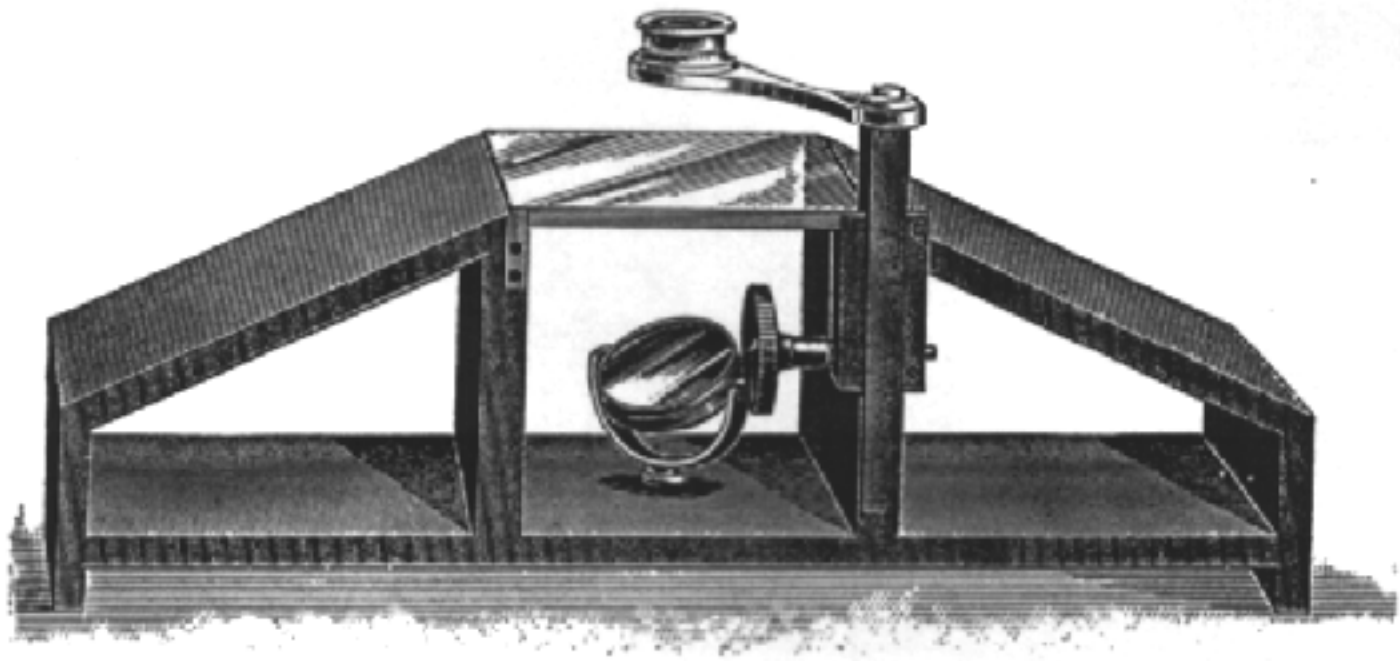
Extra 15/0

For rapid and accurate work, this stage will be found to have no equal.

W. WATSON & SONS'

No. 12 LABORATORY

Dissecting Microscope.



466.—This instrument is constructed of mahogany, and is very strongly built. The sides slope at the most convenient angle to afford steady support to the hands; the stage is of glass, 4½ in. square, and is removable. Arm to carry lenses, having spiral rack and pinion adjustment of best quality, giving long range; double mirrors on gymbal. Without lenses, price..... £2 2 0

467.—Ditto, fitted with 1 in., ½ in., and ¼ in. lenses..... 2 10 0

468.—Exactly similar Instrument to above, but with sliding bar, instead of rackwork, to focus..... 1 7 6

469.—Ditto, with 1 in., ½ in., and ¼ in. lenses..... 1 15 6

470.—It is recommended that the new Aplanatic Triplet Magnifiers quoted on page 130 be taken; they give a flat field and perfect definition, are arranged to fit into this Instrument, and are made in four powers, giving magnifications respectively of 6, 10, 15 and 20 diameters, price, each 0 14 6

471.—Vulcanite stage plate, in addition to the glass one quoted above.. 0 6 6

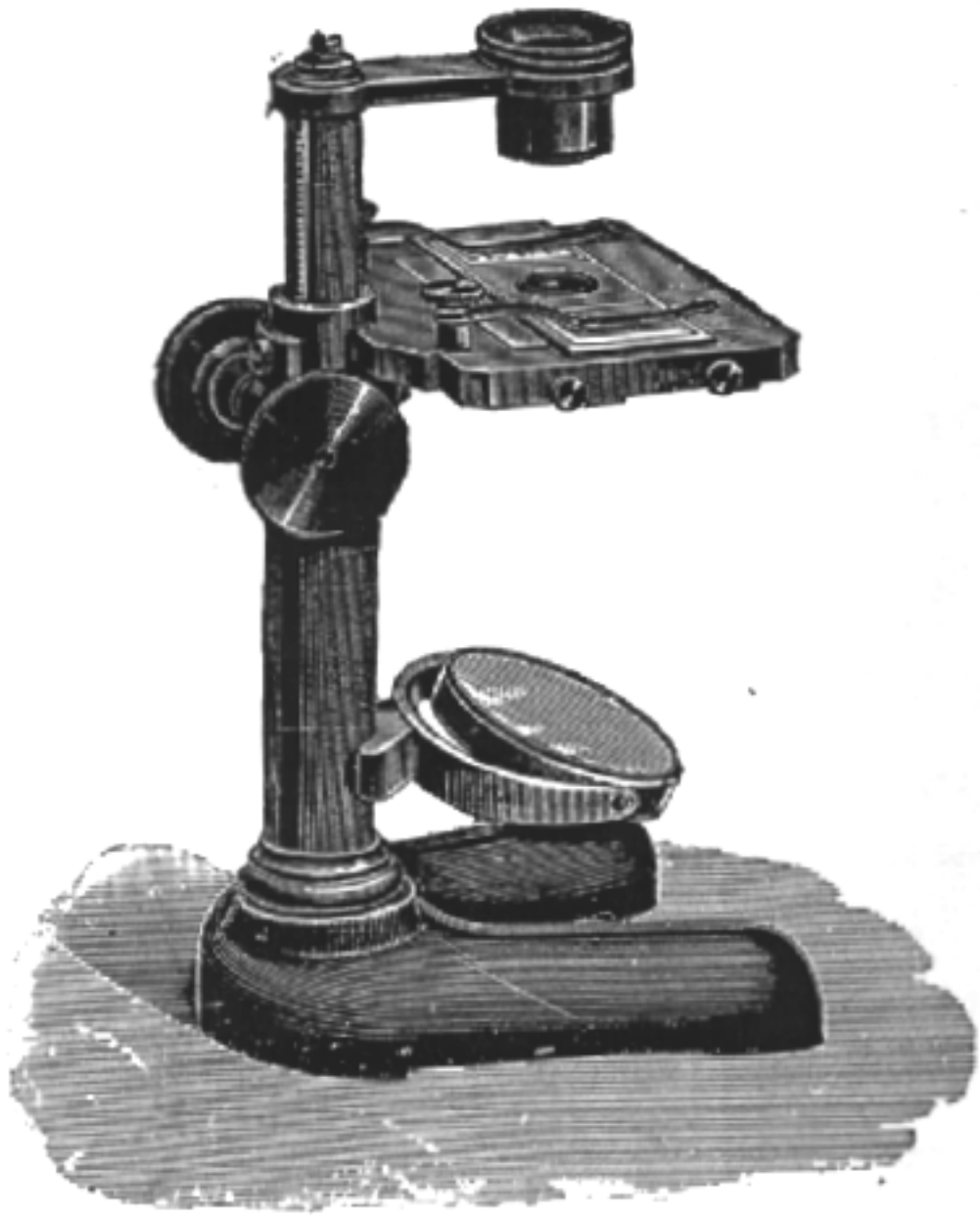
HAND DEMONSTRATION MICROSCOPE.

472.—Demonstration Microscope with screw of universal size to take objective; sliding body to focus with clamping collar to fix in position, the fine adjustment being effected by sliding the eyepiece in or out; draw-tube divided to millimetres; clips to carry descriptive card of object to be examined. Price, with one eyepiece (no objective), in mahogany case..... £1 5 0

Provision is made for the subsequent addition of an Abbe Illuminator. It should be observed that this Microscope has no stand, but is intended to be held in the hand and passed round a class, being directed towards a light for observation purposes.

...E SIMPLEX DISSECTING MICROSCOPE.

By LEITZ.



474. Dissecting Microscope, with adjustment by rack and pinion, plane mirror, glass stage in metal frame, two aplanatic lenses magnifying 10 and 20 diameters, with hand-rests, which attach on either side of the stage, in case..... **£2 0 0**

The above without Lenses **£1 0 0**

475.—Similar Dissecting Microscope to the above, but of extra large size, having Stage of large size, with glass plate, lens carrier, having hinged extension arm, mirror on swinging arm, metal hand-rests covered with leather. Wheel diaphragm and matt glass plate to interchange beneath Stage.

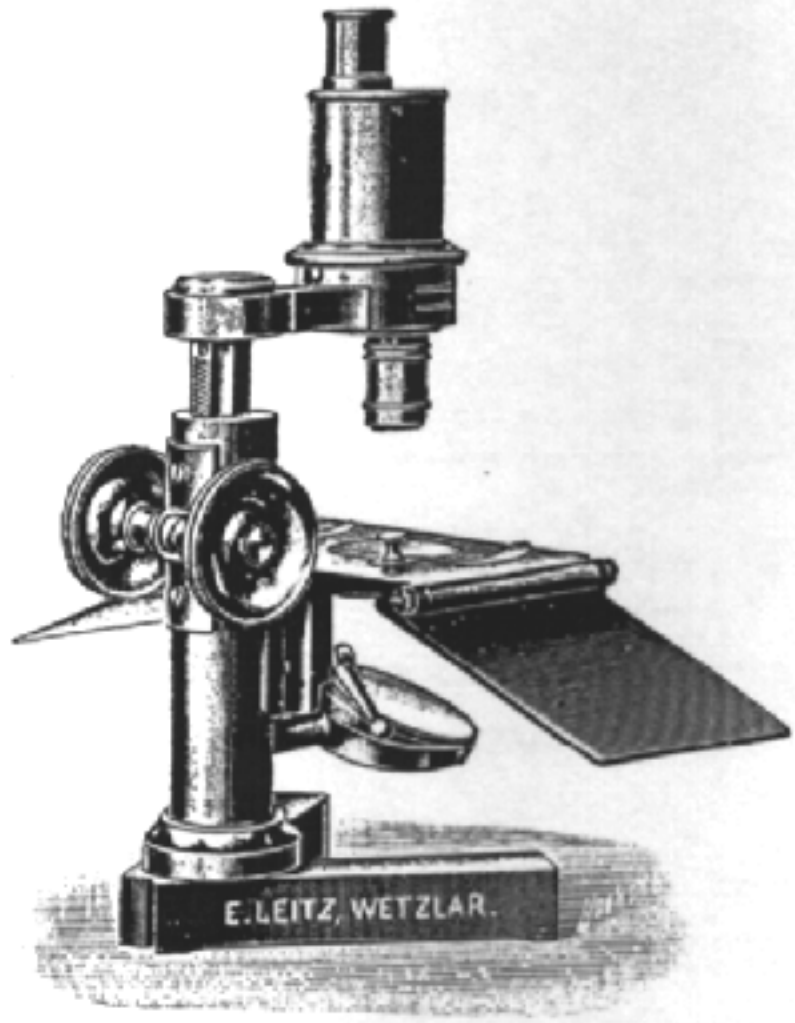
Stand, without Lenses, in Mahogany Case..... **£2 0 0**

Ditto, with 2 Aplanatic Magnifiers, in Case, complete **£3 0 0**

DISSECTING MICROSCOPE.

By LEITZ.

With Erected Image, after Prof. R. Pfeiffer.



This Instrument is designed for the convenient dissection of specimens with magnifications of from 18 to 80 diameters. The working distance of the objective is very long, the field is large and absolutely flat. The objective and eyepiece have an eccentric position on the upper and lower end of the body. Two right-angle prisms are mounted inside the body-tube in such a manner that the image formed by the objective is reflected into the eyepiece, and owing to the interposition of the prisms this image is seen erected. Three objectives of different magnifying powers with specially long working distances have been constructed as follows :—

Objective	1 ..	2 ..	3
Magnification	18 ..	40 ..	80 diameters.
Working distance	93 ..	19 ..	7 mm.

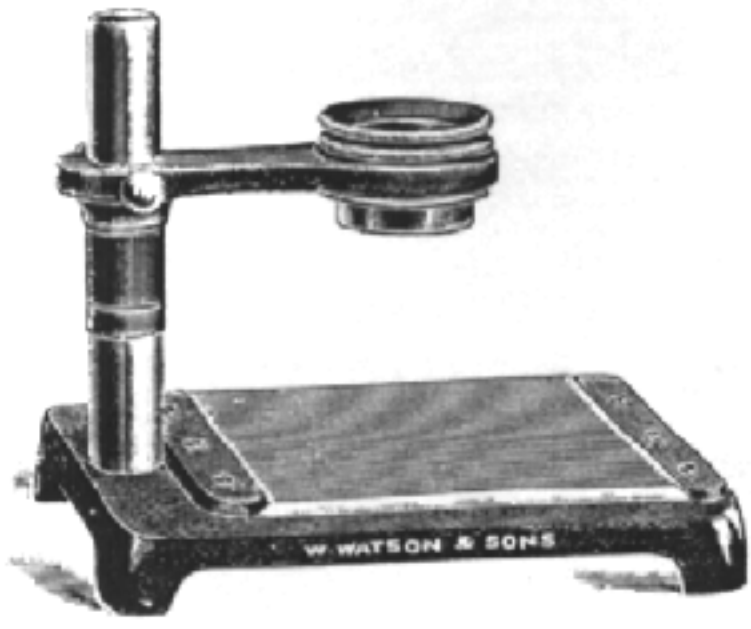
A round glass-plate is set on the stage, below which is an iris diaphragm. A rack and pinion is provided for focussing. The Instrument is made to fold so that it may occupy a minimum of space. The Instrument is furnished in a mahogany case, with nickel-plated handle, lock and key.

The following are the Prices for the Instrument :

481.—Folding Dissecting Microscope, complete with one Eyepiece and Objectives 1, 2, 3, including Mahogany case..... **£7 5 0**

482.—Dissecting Microscope, (same as the Simplex page 97) complete with Erect Prism Tube as above, one Eyepiece and Objectives 2 and 3, including Mahogany case..... **4 10 0**

DISSECTING STAGE.



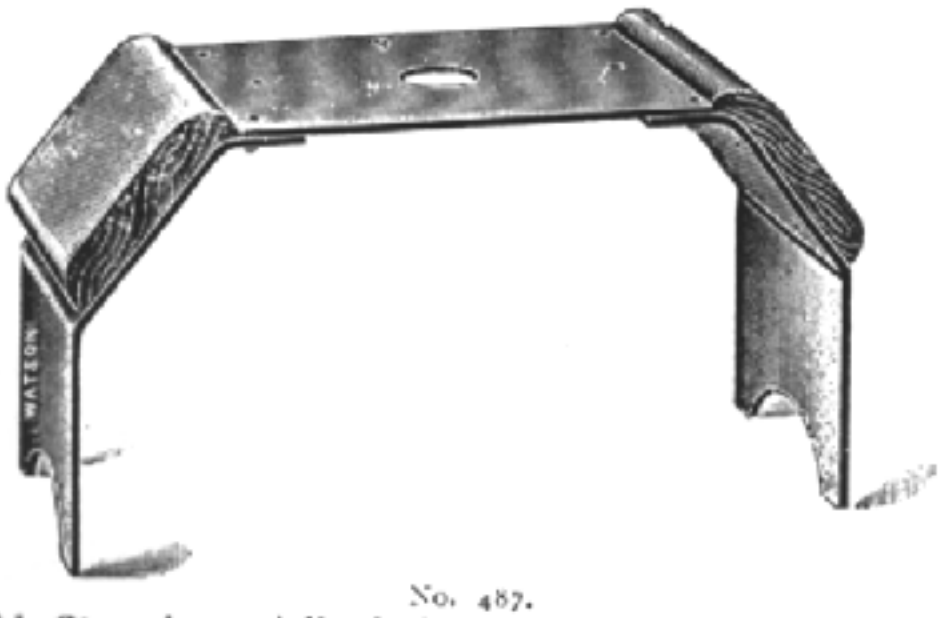
483.—This consists of a metal base, 4 × 3¼ in., to stand on a table, on which fits in grooves a piece of matt opal glass, 2⅝ × 2¾ in. Rising from the base is a cylindrical rod on which slides an arm to carry an Aplanatic Magnifier. This forms a very useful Dissecting Microscope.

Price **£0 7 6**

484.—Special Doublet Magnifier, No. 714 **0 5 0**

West's Table Stage.

OR DISSECTING, MOUNTING, ETC.



No. 487.

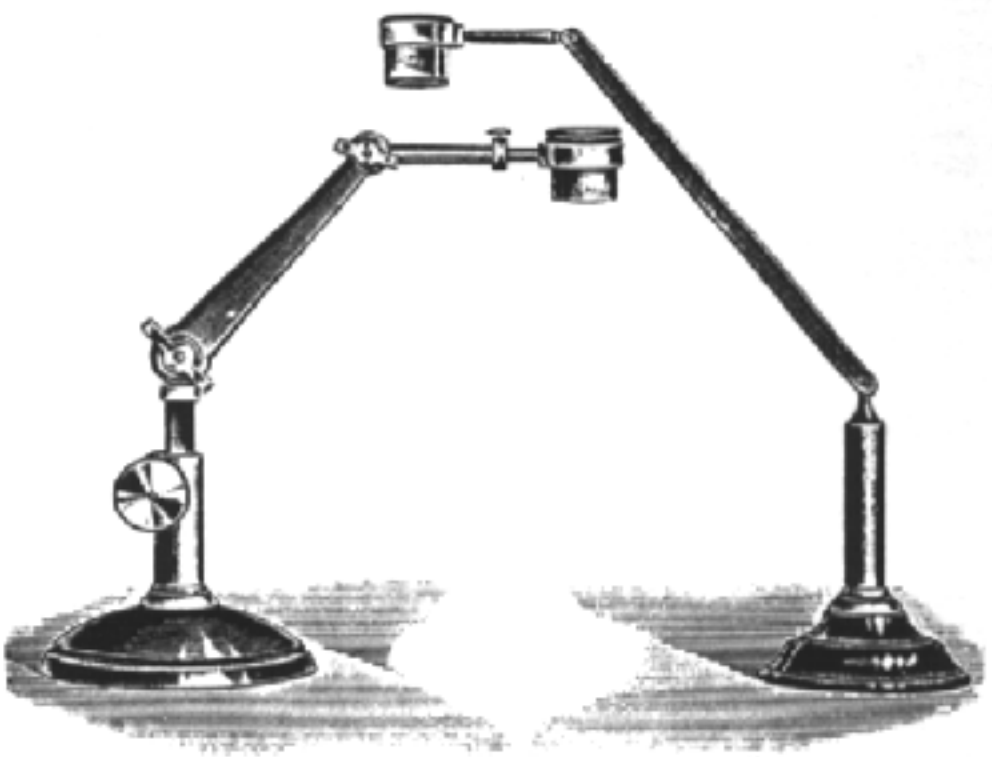
487.—This Table Stage is specially designed to preserve the microscope from injury when working with fluids, or during dissecting or mounting processes. It possesses the unique advantage of working in conjunction with the ordinary microscope, for it covers the fixed stage and is supported upon a table by its vertical sides. The ordinary objectives, eyepieces, and substage apparatus can therefore be worked in the usual way with this Stage. Being constructed of metal, it may be heated, and the sloping sides, which are covered with blocks of Mahogany, protect the hands from the heat, and afford a convenient and efficient support..... **£0 15 0**

Magnifier Holders.

FOR DISSECTING, ETC.

488.—Holder as figured, consisting of an enamelled iron base with vertical pillar, carrying a rectangular bar, which is fitted with rack and pinion for focussing. Two jointed arms and a sliding horizontal adjustment with clamping screw are also provided.
Without lens
£1 0 0

489.—Holder, as illustrated, with enamelled iron foot, universal movements to arms. Without lens,
£0 10 0



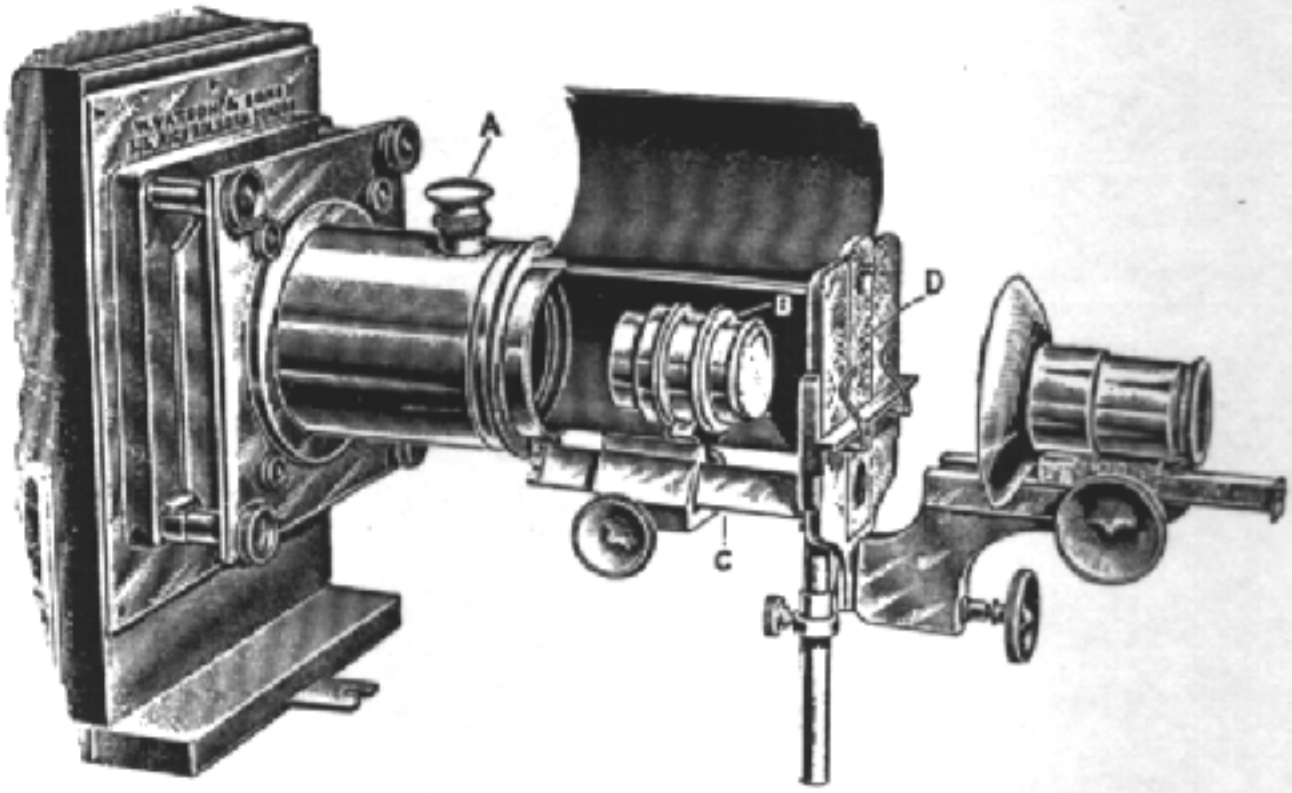
No. 488. No. 489.

490.—Handle with ring for holding Aplanatic Maguifier..... **£0 4 0**

491.—Simple Magnifier Holder, consisting of brass foot and upright rod, carrying a horizontal arm with fitting for lens. A clamp screw is provided to fix the lens at any desired height..... **0 7 6**

Any of the Magnifiers quoted on pages 130 and 131, Nos 700/3 and 710/5, will fit the above holders.

WATSON & SONS' LANTERN MICROSCOPE.



This projection Microscope has been re-modelled both mechanically and optically. It consists of water-trough (A) and parallelising lens, Substage (B) with rackwork adjustment on triangular bar (C), Stage with diaphragms (D) and sliding bar. Body with coarse adjustment by rackwork, and fine adjustment of our standard pattern. Every part is accessible and easily manipulated. It can be used with ordinary microscopic objectives in conjunction with any ordinary Magic Lantern, the projection lens being first removed. Limelight or an Electric Arc Lamp must be employed.

461. Price, with 2 Substage Condensers, and 2 Amplifiers in Mahogany Case £14 0 0

462. Extra Substage Condenser for high powers..... 1 0 0

Leitz's Large Projection Apparatus, for the projection of micro objects, ordinary lantern slides, etc., by electric light only. Full particulars on application.

W. WATSON & SONS' IMPROVED HIGH-POWER BINOCULAR PRISMS.

The continued demand for a Binocular Microscope to work with any powers in satisfactory manner has caused us to manufacture Prisms for this purpose. Hitherto the ½-in. Objective has been the highest power with which the Binocular Microscope with the ordinary Prism could be worked; for higher Powers than this the Prism has had to be withdrawn, and the Monocular body only used. With our Improved Prisms the highest objectives can be worked with comfort. The Binocular tube is not so brilliantly illuminated as the Monocular, but the contrast is not noticeable when the two tubes are in use binocularly, and the definition in the left-hand tube does not suffer materially.

PRICES.

No. 1.—Improved High-power Prism, non-stereoscopic, supplied with any full-sized Binocular Instrument quoted in this Catalogue extra charge £3 15 0

No. 2.—Stereoscopic High-power Prism, supplied with any Binocular Instrument quoted in this Catalogue.....extra charge 6 6 0

When either of the above is ordered with one of our new Instruments, the ordinary Binocular Prism is also supplied to go in the same fitting, so that the stereoscopic effect may be obtained with the low powers as usual.

Either of the above will work with a $\frac{1}{12}$ in. oil immersion objective.

These Prisms cannot be adapted to existing Binocular Microscopes without incurring a rather heavy extra cost. We shall, however, always be pleased to quote for fitting them.

Objectives and Eyepieces.

OBJECTIVES.

The large variety of optical glasses manufactured by Schott & Co., Jena, has enabled the modern optician to introduce into his objectives a greater perfection of correction than had been possible formerly. Year by year steady progress has been maintained in placing at the disposal of the Microscopist a greater perfection of optical means for his work. By making the best possible use of these new varieties of glass, excluding always any that are even suspected of unreliability in any way—however desirable their optical qualities—we are able to meet the requirements of all classes of workers in the two series of Objectives which we offer, classified respectively as the **Holoscopic** and **Parachromatic** series.

The utmost care is exercised in the manufacture and adjustment of all our objectives. All surfaces of the component lenses are polished to **"proof plates,"** thus ensuring the accurate production of the computed curves. Each objective is carefully adjusted for the selected tube-length, and rigorously tested as to optical and mechanical perfection before issue. They are made throughout on our own premises under personal supervision, and we guarantee the performance of each one.

All our objectives are suitable for photo-micrography.

Cover Glass Thickness.—Our objectives are adjusted on a cover glass ·008" thick, and work at their best through this gauge of cover. If a thicker or thinner cover be employed, correction may be effected by lengthening the microscope tube for the latter and shortening it for the former.

We also manufacture a new series of Photographic Lenses—the Holostigmats—which possess all the excellent qualities—flatness of field, freedom from astigmatism, and exquisitely sharp definition—demanded in modern photographic work. Full particulars of these will be found in our Catalogue of Photographic Apparatus (No. 1). Several of the Lenses are specially designed for use with the microscope without an eyepiece (see page 106), and are fitted with the standard microscopical objective thread. We can very strongly recommend this series.

We quote on pages 107 and 108 Apochromatic Objectives by Zeiss, Powell and Lealand, and Leitz, also selected Lenses by various makers of repute, and shall be pleased to supply any others to order at makers' list prices.

Special Note.

When ordering Objectives, it should be stated whether they are required for the Continental or English length of tube. The former is 160 m/metres=about 6 inches long, and the latter 250 m/metres or 10 inches long.

WATSON'S HOLOSCOPIC OBJECTIVES.

This Series embraces a range of exceedingly perfect Lenses, computed by our scientific adviser and expert, Mr. A. E. Conrady.

When dealing with the wide-angled pencils and consequent great angles of incidence which occur in microscope objectives, the usual methods of correcting the chromatic and spherical aberrations prove inadequate; their shortcomings lead to the presence in objectives, produced by their use, of heavy residuals of aberration known to microscopists as spherical zones and as spherical difference of chromatic aberration. The former of these defects leads to the formation of untrustworthy images, because the required phase-relation of the light forming the image is falsified, whilst the chromatic residual prevents the taking of presentable photographs of objects; for it amounts to this: the objective, although tolerably free from spherical aberration for the visually strongest rays, is affected with heavy spherical aberration for other colours, such as those acting most strongly on a photographic plate.

In the Holoscopic Objectives both these defects are minimised; the spherical correction is carried to high perfection by so determining the data that the rays which are geometrically united in the focus arrive there in exactly equal phase and are thus in the relation theoretically demanded, but not hitherto realized in practice.

WATSON'S HOLOSCOPIC OBJECTIVES—*Con.*

The exceptionally perfect spherical correction attained in this manner has often been noticed by expert workers and renders the Holoscopic Objectives extremely valuable for all delicate observations, for it reduces the possibility of being deceived by spurious images to a minimum.

By corresponding methods of computation based directly upon the undulatory theory of light, similar perfection has been aimed at in the correction of chromatic aberration, thus rendering the Holoscopic Objectives capable of yielding very excellent photographs of microscopical objects.

It was found necessary to adopt **entirely new types** of Object Glasses in order to fully realize the perfection aimed at and to produce Objectives which are fully equal to the best Apochromatics in all respects, excepting freedom from secondary colour.

From time to time these Objectives have been highly praised by expert workers who have purchased them on account of their excellent working with deep-power Eyepieces, large solid illuminating Cones, annular and dark-field illumination and the yielding of exquisite photographic effects.

Like the Apochromatics, all Lenses in this series are under-corrected for chromatic differences of magnification; they should therefore be used in conjunction with either our Holoscopic Eyepieces (page 109), or the Compensating Eyepieces (pages 107 and 108).

We have the fullest confidence in recommending these Objectives; they meet the needs of the original investigator and all who would possess the best optical means that can be desired, in the fullest possible manner.

The numerical aperture stated is the **guaranteed minimum** for each Objective. The Lenses may be depended upon to have the magnifying power (within a small percentage) corresponding to the equivalent focus given in the list.

All Holoscopic Objectives are supervised during manufacture and finally tested and passed by Mr. Conrady, and may be absolutely relied on as perfect in every detail.

Price List of W. Watson & Sons' Holoscopic Objectives.

	EQUIVALENT FOCUS.		Initial power Diameters	Numerical aperture.	PRICE.		EQUIVALENT FOCUS		Initial power Diameters	Numerical aperture.	PRICE.
	M/ms.	Inches.			£ s. d.		M/ms.	Inches.			£ s. d.
†‡	24	1	10	0·24	1 15 0		10	$\frac{4}{10}$	25	·55	3 0 0
*	25	1	10	0·30	2 15 0		8	$\frac{1}{3}$	30	·65	3 10 0
	16	$\frac{2}{3}$	15	0·30	2 15 0		6	$\frac{1}{4}$	40	·95	4 0 0
*	16	$\frac{2}{3}$	15	0·45	2 15 0		4	$\frac{1}{6}$	60	·95	4 0 0
	12	$\frac{1}{2}$	20	0·35	2 0 0		OIL IMMERSION.				
	12	$\frac{1}{2}$	20	0·45	2 10 0		3	$\frac{1}{8}$	80	1·30-1·35	8 0 0
*	12	$\frac{1}{2}$	20	0·65	3 10 0		2	$\frac{1}{12}$	120	1·35-1·40	8 0 0

‡ This Objective has a very flat field, see note at foot of page 106.
† Objectives marked † can be supplied for the 6 in. tube length only.
* Do. do. * do. do. 10 in. do.

All others can be corrected for any desired tube length.

The 12 m/m ·35 N.A. is particularly suited for Histological work.

Any of the above can be provided with a collar to correct for thickness of Cover Glass at an extra cost of **30/0**, but it is not recommended or essential for the Immersion Lenses.

Magnifications with Eyepieces.

The Eyepieces used with the above should be either of our Holoscopic or the Compensating series. The numbers given to these Eyepieces represent their initial magnifying powers, and such numbers, multiplied by the initial power of the Objective as shown in the above table give the magnification of the combination when used on a 10 in. tube length; see full magnifications, page 105.

Special Finest Quality Low-Power Objectives.

Approx. Focus. Inches.	Initial power Diameters.	Numerical aperture.	PRICE.
3	4	0·11	£1 10 0
2	6	0·17	1 10 0
1½	8	0·19	1 10 0

W. WATSON & SONS'

"Parachromatic" Series of Objectives.

In the manufacture of these Lenses the best and most durable kinds of Jena glass are employed, with the result that they are more perfectly corrected both for colour and spherical aberration than the Achromatic Objectives of former years.

It will be observed that the NUMERICAL APERTURES in nearly every case have been LARGELY INCREASED, so that each Objective now possesses a good ratio of aperture to power. This quality is a most important one, for on it depends the brilliance of image and the ability of the lens to define fine detail.

The utmost care is exercised in their manufacture and adjustment, a most exhaustive system of testing is adopted, ensuring a uniformity of quality to standard excellence. They are made throughout in our own works under personal supervision, and we guarantee the performance of each one. We are confident in stating that they are unexcelled by any similar series of Objectives, of either English or Continental manufacture.

Notwithstanding the improvements in working qualities, we have been able, in consequence of the largely-increased demand, to so modify our methods of manufacture as to supply them at the EXCEEDINGLY LOW PRICES quoted below.

We may specially refer to our 1 in. and ⅔ in. "Parachromatic" Objectives. These are the powers that are invariably required by students, and the kindly references to their qualities in numerous text-books, together with the great demand we have experienced for them, testifies to their eminent suitability for the work and their high standard of excellence.

Every facility is at all times afforded intending purchasers for testing our Objectives, and we invite comparison and examination.

Approximate Focus.	Initial power calculated for an image distance of 10 inches.	Numerical aperture.	PRICE.
Inches.	Diams.		£ s. d.
4	3	0·08	1 2 0
3	4	0·09	1 2 0
2	6	0·15	1 2 0
1½	8	0·17	1 2 0
1	12	0·21	1 2 0
⅔	15	0·28	1 2 0
½	20	0·34	1 2 0
¼	42	0·68	1 5 0
* ⅔	65	0·70	1 10 0
⅔	65	0·87	1 10 0
⅓	83	0·88	1 10 0
⅕	90	0·90	2 5 0
1/10	103	0·87	2 10 0

* This Objective is essentially a Student's Lens and has been designed to meet his special needs. It gives exquisitely crisp definition, combined with a flat field and good working distance. It is therefore recommended instead of the ⅔ in., 0·87 N.A. for laboratory and general Histological work, and unless otherwise specified is supplied with our Edinburgh Student's "Fram," "Praxis," "Bactil" and "Argus" sets.

WATER IMMERSION OBJECTIVE.

This Objective has a correction collar.

Approximate Focus.	Initial power calculated for an image distance of 10 inches.	Numerical aperture.	PRICE.
Inches.	Diams.		
$\frac{1}{16}$	100	1·0	£4 0 0

OIL IMMERSION OBJECTIVES.

The prices include a supply of Immersion Oil.

These Lenses are of most brilliant performance. The $\frac{1}{12}$ inch 1·30 N.A. has special merit. It has frequently been compared with similar Lenses by other makers, and is invariably selected. It is in use in Bacteriological Laboratories throughout the world. The $\frac{1}{12}$ inch Lens 1·10 N.A. is a new one, and is specially intended for the work of the Bacteriologist and Student. It possesses those intrinsic qualities which render such a lens acceptable to laboratory workers, flat field, good working distance, and exquisite definition.

Approximate Focus.	Initial power calculated for an image distance of 10 inches.	Numerical aperture.	PRICE.
Inches.	Diams.		
$\frac{1}{8}$	82	1·30	£4 15 0
$\frac{1}{10}$	100	1·30	3 15 0
$\frac{1}{12}$	125	1·30	5 0 0
$\frac{1}{12}$	125	1·10	4 0 0
$\frac{1}{16}$	160	1·30	6 0 0

WATSON'S IMMERSION OIL BOTTLE.

Unspillable. Perfectly Clean.

This bottle is made with an inner fitting so that the Oil cannot be spilled, and the dipper is attached to a wooden cap which is considerably larger than the top of the bottle: it therefore never adheres, and when in use the fingers never become soiled.

Price 2/0.

"ARGUS" OBJECTIVES.

These Objectives consist of a single combination of lenses only and although not equal in performance to the beautiful double combination lenses of the same powers of our "Parachromatic" series, they give crisp and brilliant definition and are thoroughly serviceable.

2 inch	N.A. ·11	.....	£0 16 6
1 inch	N.A. ·15	.....	0 12 0
$\frac{2}{3}$ inch	N.A. ·17	.....	0 12 0

MAGNIFYING POWERS OF WATSON'S OBJECTIVES WITH HOLOSCOPIC & HUYGHENIAN EYEPIECES.

Objectives. Parachromatic Series. = No.	Eyepieces. Huyghenian. Diameters A	B	C	D	E	F	Holoscopic. Diameters 5	7	10	14	20
	1	2	3	4	5	6					
4 inches	12	18	24	30	36	45	15	21	30	42	60
3 "	16	24	32	40	48	60	20	28	40	56	80
2 "	24	36	48	60	72	90	30	42	60	84	120
1½ "	32	48	64	80	96	120	40	56	80	112	160
1 "	48	72	96	120	144	180	60	84	120	168	240
⅔ "	60	90	120	150	180	225	75	105	150	210	300
½ "	80	120	160	200	240	300	100	140	200	280	400
¼ "	168	252	336	420	504	630	210	294	420	588	840
⅛ "	260	390	520	650	780	975	325	455	650	910	1300
⅙ "	332	498	664	830	996	1245	415	581	830	1162	1660
⅛ "	360	540	720	900	1080	1350	450	630	900	1260	1800
1/10 "	412	618	824	1030	1236	1545	515	721	1530	1442	3060
Water Immersion 1/16 inch	400	600	800	1000	1200	1500	500	700	1000	1300	2000
Oil Immersion ⅛ inch	328	492	656	820	984	1230	410	574	820	1148	1640
1/12 "											
1·10 N.A. and 1·25 N.A.	500	750	1000	1250	1500	1875	625	875	1250	1750	2500
1/16 inch	640	960	1280	1600	1920	2400	800	1120	1600	2240	3200

WATSON'S HOLOSCOPIC OBJECTIVES.

Objectives. M/ms.	Inches.	Eyepieces. Holoscopic. Diameters 5	7	10	14	20	Compensating. Diameters 4	8	12	18	27
24	1	50	70	100	140	200	40	80	120	180	270
16	⅔	75	105	150	210	300	60	120	180	270	405
12	½	105	147	210	294	420	80	160	240	360	540
10	1/10	250	175	250	350	500	100	200	300	450	675
8	⅓	155	217	310	434	620	120	240	360	540	810
6	¼	200	280	400	500	800	160	320	480		
4	⅙	300	420	600	840	1200	240	480	720	1080	1620
Oil Immersion											
3	⅛	400	560	800	1120	1600	320	640	960	1440	2160
2	1/12	620	840	1240	1680	2480	480	960	1440	2160	3240

All the above magnifications are calculated for a ten-inch tube length. If a shorter or longer tube be used the magnification can be ascertained by making 10 the denominator, and the tube length employed the numerator, and multiplying the above figures by this fraction. Thus, to ascertain the magnification at 6 inches of a ⅛-in. Objective and " B " Eyepiece, the following would be the method :—$390 \times \frac{6}{10} = 234$.

BOTTLE AND OIL FOR IMMERSION OBJECTIVES.—Watson's New Bottle is described on page 104. It is the cleanest and most convenient Bottle obtainable, and should be used by everyone. Price **2/0.** Supply of Immersion Oil, about ½ oz., in corked bottle, **9d.**

One of the above Bottles and a supply of Oil is included with all our Immersion Objectives.

WATSON'S HOLOSTIGMATIC LENSES FOR PHOTO-MICROGRAPHY.

For use without an Eyepiece.

Completely mounted with Iris Diaphragm. Working aperture f/6.

Photo-micrographers often require to take photographs of large subjects under low magnifications. Ordinary Microscope Objectives fail to do such work satisfactorily, and well-corrected photographic lenses have to be substituted. Our small Holostigmats will be found excellently suited for this purpose. They give splendid definition, have a great rapidity=f/6, and a very large, flat and uniformly sharp field that is absolutely free from distortion.

They are intended for use without an Eyepiece, magnification being secured exclusively by camera extension. They have the universal size of Micro-objective thread, and are provided with Iris Diaphragm.

As in most cases where these lenses are employed, it is necessary to "stop down" in order to get the required depth of focus, the following list, which gives the diaphragm opening corresponding to a circle of confusion of ·003 in., may be useful :—

f/45	is sufficient for	× 2	f/11	is sufficient for	× 12
f/32	do.	× 4	f/8	do.	× 18
f/22	do.	× 6	f/6	do.	× 24
f/16	do.	× 8			

In most cases the best results will be obtained by using the diaphragm opening given in this list, but it may sometimes be advisable to use a smaller one to get the required depth of focus for a thick object.

Focus.		Size of Object sharply covered at full aperture, about	PRICE.	Focus.		Size of Object sharply covered at full aperture, about	PRICE.
Inches.	M/ms.			Inches.	M/ms.		
1½	35	25 m/m	£4 0 0	2½	65	43 m/m	£4 0 0
2	50	35 m/m	4 0 0	3	76	51 m/m	4 0 0
				3½	90	60 m/m	4 0 0

For full Catalogue of larger sizes of Watson's Holostigmat Lenses, see Illustrated Catalogue (No. 1) of Photographic Apparatus. Post-free.

A special Stage to attach to the Photo-Micro Camera base when these Lenses are used, is described on page 173.

Special attention is directed to our **Holoscopic Objective, 24 M/m., 0·24** N.A. as a very useful intermediate lens between the above series and our lower power Micro-objectives. This Objective has an exceptionally flat field of about $\frac{1}{10}$ in. diameter, whilst its great aperture (=f/2) enables it to resolve detail far too fine for the Holostigmats or any other photographic objective.

The Macro Illuminator, described on page 114, is especially designed for the even illumination of large objects when photographed with the above and similar lenses.

Apochromatic and Achromatic Objectives and Compensating Eyepieces.

By Carl Zeiss, Jena.

APOCHROMATIC OBJECTIVES.

Focus. M/ms.	Focus. Inches.	Initial power Diameters.	Numerical aperture	PRICE.	Focus. M ms.	Focus. Inches.	Initial power Diameters.	Numerical aperture	PRICE. £ s. d.
70	2¾	For projection without eyepiece		£2 0 0			**Water Immersion**		
35	1½	Ditto.		1 15 0	2·5	1/10	100	1·25	12 10 0
*24	1	10½	0·30	6 0 0			**Oil Immersion.**		
16	⅝	15½	0·30	4 0 0	3	⅛	83	1·30	15 0 0
*12	½	21	0·65	7 0 0	3	⅛	83	1·40	20 0 0
8	⅜	31	0·65	5 0 0	2	1/12	125	1·30	15 0 0
*6	¼	42	0·95	9 0 0	2	1/12	125	1·40	20 0 0
4	⅛	63	0·95	7 0 0	1·5		167	1·30	17 10 0
3	⅛	83	0·95	8 0 0					

* These three Lenses are supplied for the English length of tube (10 inches) only; all others may be had for either Continental or English length. This should be specified when ordering.

COMPENSATING EYEPIECES. By CARL ZEISS, JENA.

These Eyepieces are designed primarily for use with the Apochromatic Objectives. Owing to the form of construction of Objectives having a large aperture it is impossible in the Objective itself to remove all colour, especially on the margin of the field. These Eyepieces have corrections of the opposite kind to that of the Objectives—that is, the Objective is under-corrected and the Eyepiece over-corrected, so producing in conbination a well-balanced image.

Initial Magnifying power, diams.	2 (Searcher)	4	6	8	12	18	27
For Continental length of body.	£ s. d. 1 0 0	£ s. d. 1 0 0	£ s. d. 1 0 0	£ s. d. 1 10 0	£ s. d. 1 10 0	£ s. d. 1 5 0	Not supplied
For English ditto.	1 5 0	1 5 0	Not supplied	1 15 0	1 15 0	1 10 0	1 5 0

The Compensating Eyepieces for the Continental length of body are of the Standard size 0·9173". Those for the 10 in. tube are supplied by Messrs. Zeiss, to us, of the size to fit our large-sized tube—1·27 in.; other diameters can be made to order, in which case the short tube Eyepieces are charged by Zeiss at the same price as those for the 10 in. tube, or an adapter can be supplied to enable the Eyepieces to be employed. The cost of the latter is 4/6.

PLANAR LENSES. By ZEISS (Patented).

These serve as Micro-Objectives for photographing large sections, whole insects, etc., and give a wonderful sharpness of image to the edge of the field. They have the universal size of thread, and are fitted with Iris diaphragm.

Focus, 20 m/m (¾ in.), **Price, £5.** Focus, 35 m/m (1⅜ in.), **Price, £5.**

Selected Achromatic Objectives by Carl Zeiss, Jena.

	Designation.	Numerical Aperture.	Approximate Focus.	PRICE. £ s. d.	With correction collar. £ s. d.
•	aa	0·17	1 in.	£1 7 0	
	A	0·20	⅔ ,,	1 4 0	
	AA	0·30	⅓ ,,	1 10 0	
	B	0·35	⅓ ,,	1 10 0	
	C	0·40	5/12 ,,	1 16 0	
	D	0·65	⅙ ,,	2 2 0	£3 14 0
	DD	0·85	⅙ ,,	2 14 0	4 6 0
	F	0·85	⅙ ,,	3 6 0	
Homogeneous Immersion—					
	—	1·25	1/12 ,,	8 0 0	

Selected Objectives by E. Leitz, Wetzlar.

Achromatic Series.

Designation.	Approximate Focus.	Numerical Aperture.	PRICE. £ s. d.
No. 1	1¾ in.	0·09	0 15 0
,, 2	1¼ ,,	0·14	0 15 0
,, 3	¾ ,,	0·28	0 15 0
,, 4	⅓ ,,	0·55	1 5 0
,, 5	¼ ,,	0·77	1 5 0

Designation.	Numerical Aperture.	Approximate Focus.	PRICE. £ s. d.
No. 6	0·82	⅛ in.	1 10 0
* ,, 6a	0·82	⅛ ,,	2 0 0
,, 7	0·85	⅛ ,,	1 10 0
* ,, 7a	0·85	⅛ ,,	2 0 0
,, 8	0·87	1/10 ,,	2 0 0

* These Objectives have Fluorite in their construction and are recommended by Leitz, in consequence of their superior correction for achromatism to the ordinary No. 6 and No. 7.

Homogeneous Oil Immersion—

Approximate Focus.	Numerical Aperture.	PRICE.
1/10 in.	1·30	£3 15 0
1/12 ,,	1·30	5 0 0
1/16 ,,	1·30	7 10 0

All the above Objectives may be had corrected for either the 6 in. or 10 in. tube length.

Apochromatic Series.

Corrected for either Continental or English tube length.

	Equiv. Focus.	Numerical Aperture.		PRICE.
	16 m/m	⅔ in.	0·30	£3 0 0
	8 ,,	⅓ ,,	0·65	4 0 0
	4 ,,	⅙ ,,	0·95	With correction collar 6 0 0
Oil Immersion	2 ,,	1/12 ,,	1·30	12 10 0

Compensating Eyepieces for above.

For Continental diameter of tube only: for larger sizes an adapter, price **4/6**, may be used.

Power, diameters	4	6	8	12	18
Price.....	£0 16 0	£0 16 0	£1 5 0	£1 5 0	£1 0 0

Selected Objectives by C. Reichert, Vienna.

Designation.	Numerical Aperture.	Approximate Focus.	PRICE. £ s. d.
No. 6	0·77	⅕ in.	1 10 0
,, 7a	0·82	⅛ ,,	1 16 0
"Halb-Apochromatic"—			
—	0·50	⅓ ,,	1 12 0

Designation.	Numerical Aperture.	Approximate Focus.	PRICE. £ s. d.
Homogeneous Immersion—			
No. 17	1·30-1·35	⅛ in.	8 0 0
,, 18b	1·20-1·25	1/12 ,,	5 0 0

The above Lenses by Reichert are corrected for Continental length of tube. If desired for the English length, an extra 10 per cent. is charged by the maker.

Apochromatic Objectives and Compensating Eyepieces by Powell and Lealand.

Focus.	Numerical Aperture.	PRICE.
1½ in.	0·17	£6 0 0
½ ,,	0·64	10 0 0
4/10 ,,	0·70	8 0 0
¼ ,,	0·95	9 0 0
⅛ ,,	0·95	7 0 0
⅛ ,,	0·98	8 0 0

Focus.	Numerical Aperture.	PRICE.
Homogeneous Oil Immersion—		
⅛ in.	1·40	18 0 0
† 1/12 (Special)	1·40	10 0 0
1/10 in.	1·50	45 0 0
1/20 ,,	1·40	35 0 0
1/40 ,,	1·35	50 0 0

Compensating Eyepieces (to fit any size of tube).

Foci ..	2 in.	1½ in.	1 in.	½ in.	⅛ in.	¼ in.
Initial power	5	7½	10	20	27	40 diameters.

Price £2 each.

† A supply of Oil is included with all Immersion Lenses quoted above, with the exception of those marked †, the cost in these cases being 3/6.

† **Semi-Apochromatic,** 1/12 in. Oil Immersion Objective, 1·40 N.A., by **Powell and Lealand,** price **£5.** Oil extra, 3/6.

The above Objectives are supplied corrected to any desired tube length.

Eyepieces.

WATSON & SONS'
"HOLOSCOPIC" EYEPIECES. (PATENTED.)

For use with either

Apochromatic or Achromatic Objectives.
Also with Watson's New Holoscopic Objectives.

(See page 102).



Student's Pattern.

CAPABILITIES—

These Eyepieces are designed to work with **Apochromatic** Objectives, and possess the so-called "**over-correction**" that is associated with the expensive compensating Eyepieces.

They are, in addition, arranged for use with the ordinary **Achromatic** Objectives, an adjustment being provided which permits of the corrections being altered from any desired degree of **over-correction** to **Achromatism.**



Best-capped Pattern.

ADVANTAGES—

The Holoscopic Eyepieces obviate the necessity for two series of Eyepieces for Achromatic and Apochromatic Objectives, because they do the work of both.

Efficiency is not sacrificed; in fact, a more brilliant image is obtained—power for power—than the compensating Eyepieces. They yield an exquisite sharpness of detail.

A very important feature is the provision that is made in these Eyepieces for adjusting them to the individual objective. Very few objectives of the Apochromatic Series are identical in the amount of their **under-correction,** consequently with the ordinary compensating Eyepiece it often happens that so perfect an effect is not produced as would be possible if its correction could be varied.

The price is a very moderate one.

HOW THE EFFECT IS PRODUCED—

The Lenses are of appropriately selected Jena glasses, of durable variety, the curves of which are worked and polished with extreme care and accuracy.

The Adjustment of these Eyepieces is effected by means of a short sliding draw-tube. When this tube is pushed home, the eyepiece is an Achromatic one: by extending it, any desired degree of over-correction can be obtained. The draw-tube bears a divided scale for registering the extension. It will be found convenient to push the sliding draw-tube right in when working with Achromatic Objectives, and to set it at about the division 6 when Apochromatic or Holoscopic Objectives are used.

For Achromatic Objectives, these Eyepieces will be found superior to the ordinary Huyghenian type, on account of their excellent design and working qualities.

MAGNIFYING POWERS—

The Holoscopic Eyepieces are made in two patterns: (1) the ordinary Student's pattern, and (2) the best capped form. The Lenses of the latter in the two lowest powers, presuming they are for a large diameter of tube, are of greater diameter than in the former. Either kind can be used with **any tube length.**

The magnifying powers are calculated for the Holoscopic Objectives and for the 10-inch tube length, and are as follows:—

Student's pattern, 7, 10, 14, and 20 diameters.

Best capped pattern only, large diameter, 5, 7, 10, 14, and 20 diameters.

PRICES.

Student's Pattern, either power, for the Standard Continental diameter of tube, as figured **£0 17 6**

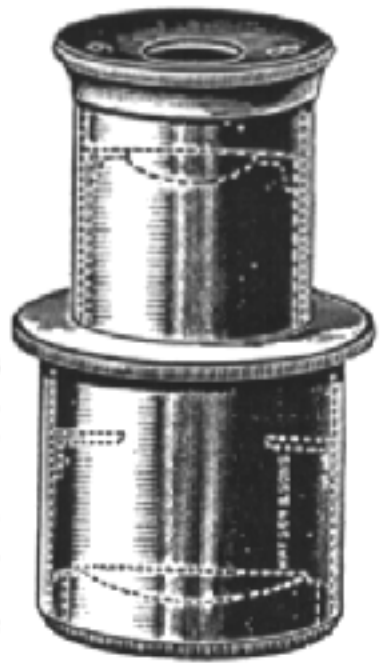
Best Capped Pattern, as figured, made to fit **any** microscope tube to order.
Kept in stock of the Standard large diameter, 1·27 inches **£1 2 6**

The above Eyepieces are perfectly effective when used with **Apochromatic Objectives** by different makers.

EYEPIECES.—*Continued.*

HUYGHENIAN FORM, as ordinarily used.

We have entirely revised the whole of these, and the powers have been arranged so as to form the most convenient series for all classes of work. Two special features characterise all our Eyepieces, which are not usually found in those of other makers:—



1. EACH IS ENGRAVED WITH A FIGURE REPRESENTING ITS INITIAL MAGNIFYING POWER. This enables the worker to at once ascertain the magnifying power that he is employing.

2. THE EYEPIECES ARE ALL MADE TO WORK APPROXIMATELY IN THE SAME FOCAL PLANE. That is, on interchanging Eyepieces of different powers, the object remains practically in focus. This system has many practical advantages, among which are the following:—The working distance of an Objective is not shortened when a high-power Eyepiece is used with it, as is usually the case. No disturbance is caused to the corrections of the Objective on interchanging Eyepieces. Time is saved in working.

They are made in two series: (1) The capped form and (2) the Student's Series, which are without removable caps, and are as supplied with the Edinburgh Student's, "Fram," "School" and "Argus" Microscopes. The latter have nickel-plated tubes.

They are all of the very best quality throughout.

PRICE LIST.

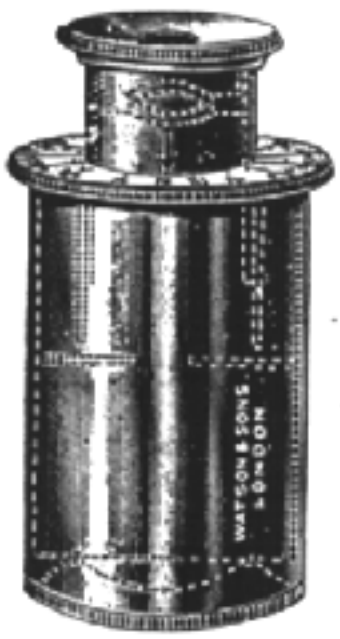
= No.	A 1	B 2	C 3	D 4	E 5	F 6
Initial magnifying power	4	6	8	10	12	15 diams.
Price. Best Capped Eyepiece	**10/6**	**10/6**	**10/6**	**15/0**	**15/0**	**15/0**
Do. Student's Series ..	**5/0**	**5/0**	**5/0**	**5/0**	**10/6**	**10/6**

KELLNER EYEPIECES.

These are Achromatic, and give a very large field. They are most serviceable with low powers, also giving good results in Photography. Price, **£1 3s.** each.

W. WATSON & SONS' PROJECTION EYEPIECES.

For Photo-Micrography.



These Eyepieces have been so arranged by us that they may be used advantageously with Objectives of either the Apochromatic or ordinary series, for photographic purposes, projecting an exquisitely sharp image of the object on the plate. A diaphragm between the lenses limits the field, and a sharp image of it should appear on the screen when the Eyepiece is adjusted. This adjustment may be effected by revolving the Eyepiece cap in a spiral slot, so that the eye or top lens is either brought closer or removed farther away from the diaphragm as may be required, and divisions and a reader are provided for registering positions. Made to fit any size of body without extra charge.

Initial magnifying powers:—

English length of tube—10 in. 3 and 6.
Continental do. — 6 in. 2 and 4.

Price, **£2** each.

Similar Eyepieces of the same power, by Zeiss or Reichert, each **£2.**

Adapters between Continental Eyepieces and any English size, **4/6** each.

SUBSTAGE CONDENSERS.

The light given by the plane or concave mirror is insufficient in quantity and incapable of proper control when delicate structures are to be critically examined under high magnifications. Illumination by means of a Condenser, with centring and focussing adjustments, and with suitable diaphragms, stops, etc., is then indispensable.

English microscopists have long insisted that in order to get a faithful image of fine detail a large axial and absolutely uniform cone of illumination must be used. To provide this, a high degree of correction for spherical and chromatic aberration in the Condenser is requisite. So it comes about that the "Aplanatic Cone" is the criterion of optical perfection of a Condenser, for it is with this quality only that "critical" illumination can be secured. In addition, it should be of suitable power for the Objectives with which it is to be employed. We provide in our range of Condensers for every power of Objective and for all classes of work, as follows :—

	Name of Condenser.	Magnifying power. Complete.	Magnifying power. Top lens removed	Aplanatic aperture. Full aperture. Complete.	Aplanatic aperture. Top lens removed.	Description. Page.	Description. Diameter of back Lens.
Holoscopic Series.	Holoscopic Oil Immersion	$\frac{1}{4}$ in.	$\frac{3}{4}$ in.	1·35	1·25	·60	112	·6 in.
	Universal Condenser	$\frac{4}{10}$,,	$1\frac{1}{8}$,,	1·0	·95	·40	113	·92 ,,
	Aplanatic Low-power	$\frac{8}{8}$,,		·50	·48		114	·6 ,,
	Macro-Illuminator	2 ,,	Single Achro. Combination for low powers.					1·25 ,,
	Parachromatic Condenser	$\frac{2}{4}$,,	$\frac{4}{10}$,,	1·0	·90	·40	112	·62 ,,

and the Abbe Illuminator, page 115.

The Holoscopic Series and the Parachromatic Condenser referred to above are pre-eminently suitable for photo-micrography, the chromatic correction being such as to free them from chemical focus while the corrections for spherical aberration, as their aplanatism proves, is of the highest order.

Apparatus for Microscopes.

The following accessories will fit any of the Instruments quoted in this catalogue or by other modern makers, being of the universal size.

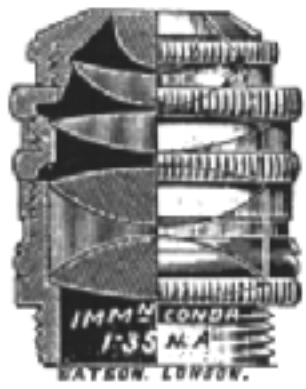
SUBSTAGE CONDENSERS.

W. WATSON & SONS'
"HOLOSCOPIC" OIL IMMERSION CONDENSER.

	Oil immersed complete.	Dry complete.	Dry top lens removed.
Power	$\frac{1}{4}$ in.	$\frac{1}{4}$ in.	$\frac{3}{7}$ in.
Full aperture	1·35	1·0	·60
Aplanatic ..	1·25	·92	·55

The condenser which realizes the fullest resolving and defining power of highest-power Objectives.

Clear Diameter of Back Lens $\frac{6}{10}$ ins.

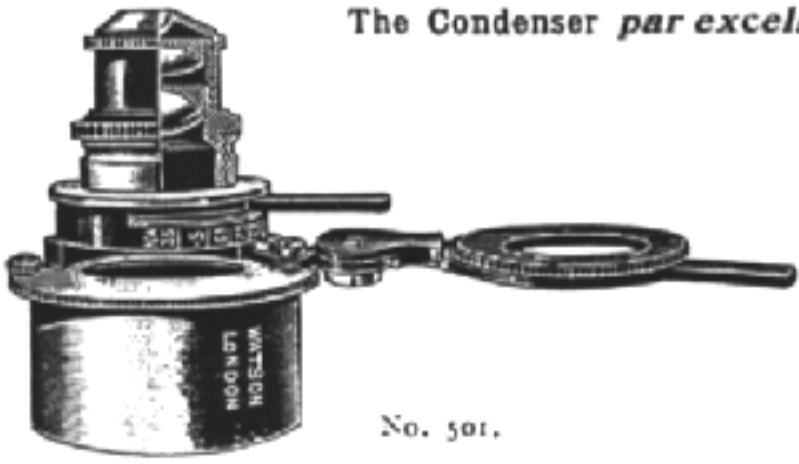


No. 499.

This Condenser possesses the same perfection of corrections as the objectives of our "Holoscopic" series, the same principles being adopted in its construction. The elimination of spherical aberration is indicated by the large aplanatic aperture yielded by it. The full aperture is actually as great as that of any condenser at present made, while its aplanatic cone, on which the working quality depends, is greatly in excess of any similar construction. It may therefore be considered the **most perfect Oil Immersion Condenser** obtainable, a fact which has been widely recognised, for it is used by many of the most distinguished microscopists. It is indeed indispensable to all microscopists who desire to realize the extreme resolving and defining powers of their objectives. The power is a most convenient one for high-power work; it can be used dry if desired, when an aplanatic aperture of ·92 is secured, or with the front lens removed, it forms a most useful and efficient dry condenser for medium and low powers. It may therefore be considered as a generally useful condenser for Objectives of all powers. It gives the finest possible effects.

499. Price of Optical portion only, with Universal Objective Thread.. £5 0 0
500. Completely mounted with Iris Diaphragm, divided to show the apertures at which the condenser is being used, as figured and described for Parachromatic Condenser, 1·0 N.A. below; with set of stops for dark ground and oblique illumination..... 6 10 0

W. WATSON & SONS'
PARACHROMATIC CONDENSER. 1·0 N.A.



No. 501.

The Condenser *par excellence* for medium and high-power workers.

Power, Total $\frac{2}{7}$, with top lens removed, $\frac{4}{10}$ in.

Aperture, complete 1·0.

Aplanatic aperture, complete, ·90.

Diameter of back lens ·62 in.

This Achromatic Condenser is specially designed for work with medium and high-power Objectives of large aperture, its Aplanatic aperture exceeding ·90 N.A. The optical portion has the "Universal" Objective Thread, and is mounted over an Iris Diaphragm, beneath which is a revolving carrier, for Stops for dark ground and oblique illumination. The Iris Diaphragm is divided so as to indicate the N.A., at which the Condenser is being employed. The diameter of the back lens is specially large for such a Condenser. It will be seen from the above description, that this condenser is eminently suited for the highest class of critical and photographic work, and we confidently recommend it.

PRICES.

501. Completely mounted, as figured, with set of stops for dark ground and oblique illumination..... **£3 15 0**
502. Optical part only **2 5 0**
503. Discs of blue, yellow or ground glass for above .....each **0 1 0**

W. WATSON & SONS'

Universal Condenser.

(Holoscopic System.)



Complete.	Front Lens removed—
Power $\frac{4}{10}$ in.	Power, $1\frac{1}{8}$ in.
Total aperture, 1·0 N.A.	
Aplanatic Aperture, ·95 N.A.	Aplanatic Aperture, ·40 N.A.
Diameter of Back Lens, ·92 in.	

For rapid work, a condenser having large lenses is an immense advantage, and in this new Universal Condenser a diameter of back lens is given, which in practice affords all the convenience of the larger sizes, and it will be found that with it work can be done as rapidly and more accurately than with any other Condenser, while the beautiful aplanatic corrections render it the finest all-round Condenser procurable.

It is constructed on our Holoscopic System, a triple back lens producing the correcting effect. It is this system which has enabled us to produce in our Holoscopic Objectives and Oil Immersion Condenser, corrections for spherical aberration, which have made them famous as the best examples of optical skill and perfection in aplanatism of the present day.

As stated above, the diameter of the back lens of this condenser is ·92 in., and the other parts being in proportion, a mounting of convenient size, such as would not materially obstruct the working of even a mechanical stage with small central opening, is secured.

The power is the one that is very suitable for general purposes, with objectives of low, medium and high magnifications, whilst without the top lens it can be used advantageously with the lowest powers.

We would emphasise the enormous aplanatic aperture it yields. Its total aperture is aplanatic, if the exact thickness of slip for which it is corrected be used. Its optical perfection is such as to suit it for work with even the highest powers, and it may in every way be regarded as a "Universal" Condenser.

It will work through any reasonably thick slip, but is slightly under-corrected with thin ones

The Carrier is the same as is used for the Abbe Illuminator (page 115), and will interchange with it. It has iris diaphragm and rotating cell for coloured glasses, black patch stops, etc.

Prices.

		£	s	d
505.	Universal Condenser, optical part only	£2	7	6
506.	Do., completely mounted, with Iris Diaphragm for Substage or Understage	3	7	6
507.	Box containing Set of Stops for dark ground and oblique illumination	0	7	6
508	Coloured, etc., Glasses—blue, yellow, signal green, ground, etc., each	0	1	6
509.	Mechanical Condenser Mount, as per page 114, No. 513	2	15	0

APLANATIC LOW-POWER CONDENSER.

Holoscopic System.

Diameter of back lens, ·6 in.

510.—This Condenser has a power of ⅔ inch and a numerical aperture of ·50, ·48 of which is Aplanatic. It forms a most excellent condenser for low and medium powers up to N.A. ·65.

Price, optical part only with universal objective thread..... **£1 10 0**

511. Completely mounted with Iris diaphragm similar to the Parachromatic Condenser, page 97 (Iris diaphragm not divided), with black patch stops..... **2 12 6**

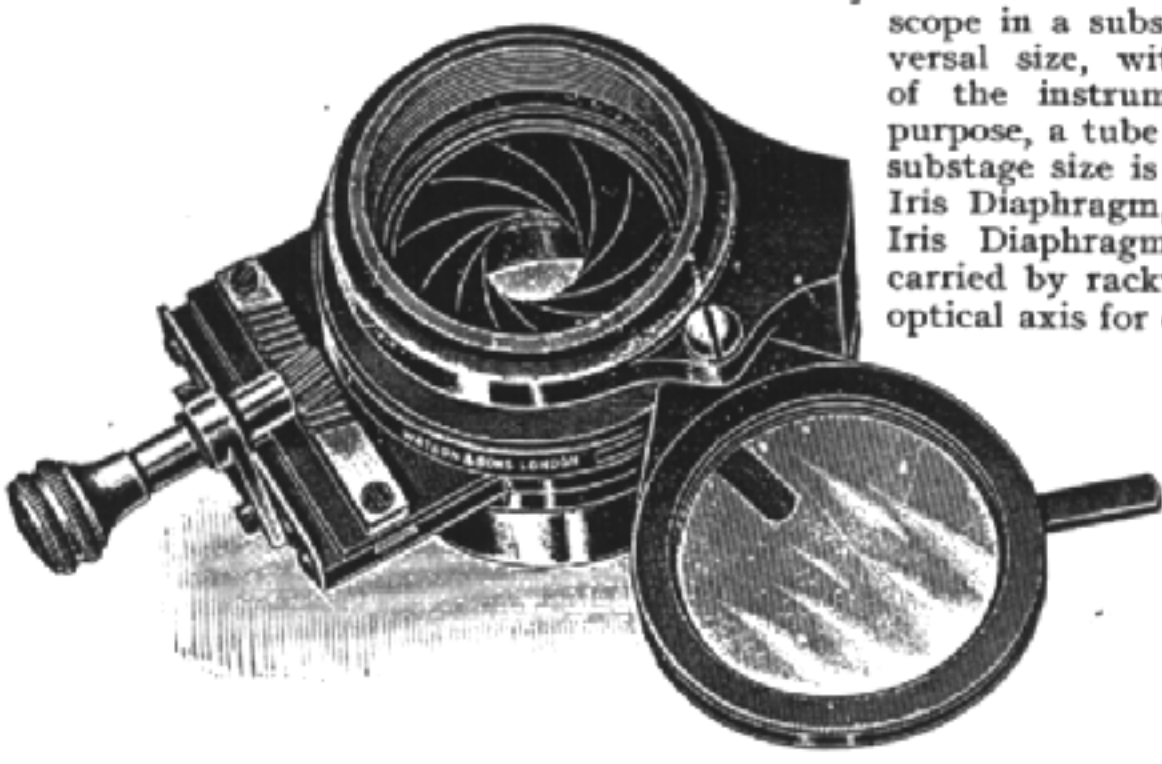
THE MACRO ILLUMINATOR.

512.—This is a single Achromatic Combination of 1¼ in. clear aperture and 2 in. focus. It excels in producing a brilliant and uniform illumination of large objects under low powers. The lens is mounted to fit into the Substage, close to the object, so as to focus the image of the source of light on the **Objective.** Objects up to fully 1 in. diameter may be thus illuminated with absolute uniformity. It is extremely valuable for photography with the Holostigmat (page 91) and Planar (page 92) types of lenses.

Mounted for Substage..... **Price £1 10 0**

WATSON'S
NEW MECHANICAL CONDENSER MOUNT.

513.—The design of this Condenser Mount is such that the advantages obtainable with the Continental Condenser Mount may be secured on an English Microscope in a substage of the universal size, without alteration of the instrument. For this purpose, a tube of the universal substage size is fixed below the Iris Diaphragm, etc., while the Iris Diaphragm itself can be carried by rackwork out of the optical axis for obtaining effects when testing Objectives for oblique illumination, etc. In addition, a rotating ring to carry dark ground and oblique light stops is included.



The mount will be supplied to carry any size of Condenser, and may be purchased separately, or the difference in cost between it and any other Condenser Mount in our List may be added, when it is required with any Condenser in our List.

Price of Mount only, as figured and described above..... **£2 15 0**

SUBSTAGE CONDENSERS.—*Continued.*

W. WATSON & SONS' ABBE ILLUMINATOR.

A good General Condenser.

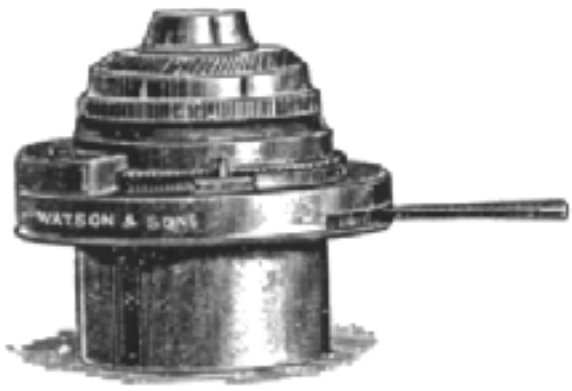


Fig. 1.



Fig. 2.

This Condenser is an exceedingly popular one, on account of the ease and rapidity with which it can be employed and for the brilliance of image which it produces. It possesses a large aperture, and is suitable for either high or low-power work; for the latter purpose the top lens is removed. A beautiful dark ground effect can be obtained with it, even with a ¼-in. Objective of moderate aperture.

It is made in two forms, having numerical apertures of 1·20 and 1·40 respectively.

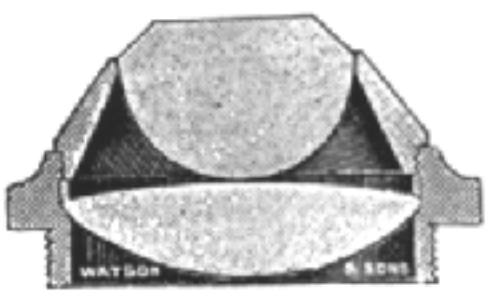


Fig. 3.

OPTICAL PART OF ABBE ILLUMINATOR, 1·20 N.A.

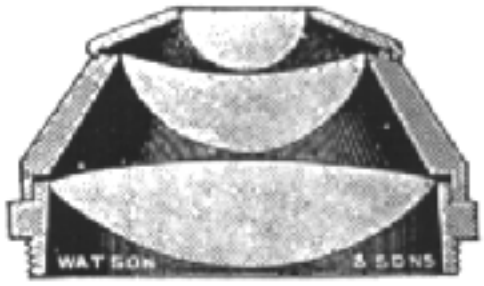


Fig. 4.

OPTICAL PART OF ABBE ILLUMINATOR, 1·40 N.A.

The former is in most general demand, but the latter is advantageous for oblique illumination with Objectives of large aperture. It will be found to give first-rate results in Photo-Micrography.

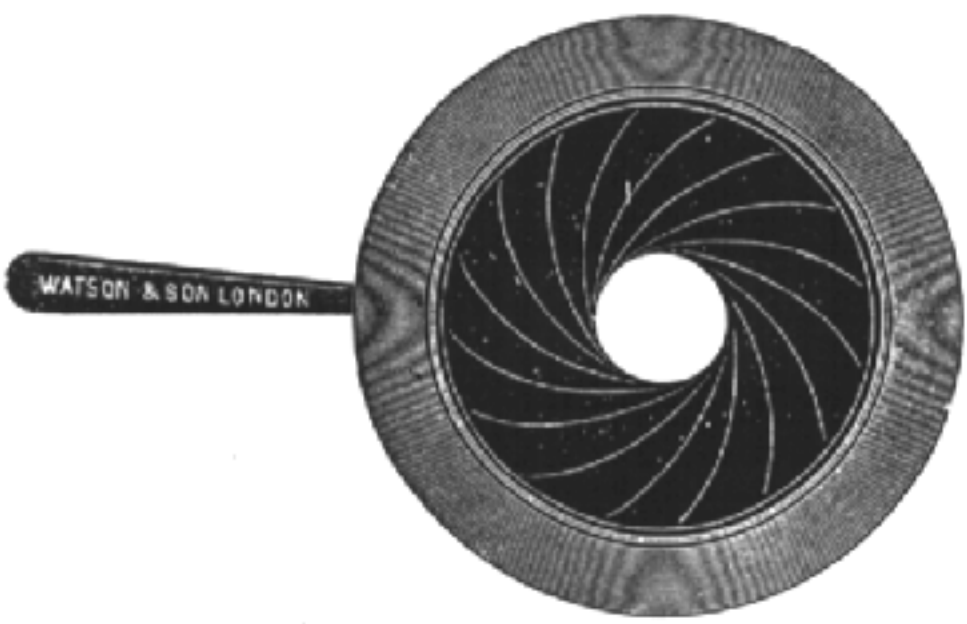


Fig. 5.

We have designed a very perfect Iris Diaphragm for the fittings of these Condensers (as per fig. 5), which permits of the most precise gradation of illumination being immediately obtained.

(*For prices, see page* 116.)

SUBSTAGE CONDENSERS—*Continued.*

PRICES FOR THE ABBE MODEL ILLUMINATOR.

*** FOR SUBSTAGE** (mounted as fig. 1, page 115)—

521. Abbe Illuminator, N.A. 1·20, with very perfect Iris Diaphragm (fig. 5), giving any desired aperture, rotating fitting on swinging arm to carry stops, coloured glasses, etc. Lenses mounted in Aluminium **£2 2 6**

*** FOR UNDERSTAGE** (mounted as fig. 2, page 115)—

523. Abbe Illuminator, N.A. 1·20, with perfected Iris Diaphragm (fig. 5), with carrier on swinging arm to carry stops, etc. Lenses mounted in Aluminium **1 12 6**

524. **1·4 N.A.** Either of the above fitted with optical part 1·4 N.A. instead of 1·2 N.A., extra..... **0 7 6**

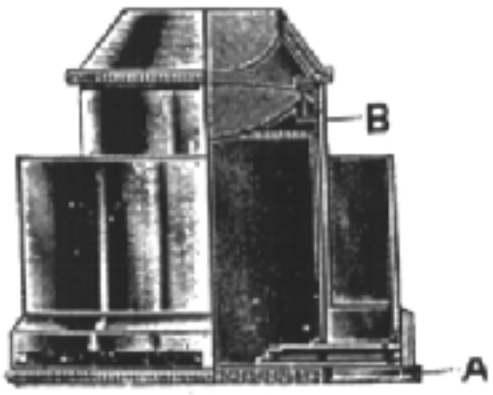
525. Set of Stops for Nos. 521 and 523, for dark ground or oblique illumination, in brass box..... **0 7 6**

526. Disc of Blue, Signal Green or Yellow Glass, also Ground Glass for above, each **0 1 6**

OPTICAL PARTS ONLY, to interchange in the fittings Nos. 521 and 523, mounted in Aluminium—

527. 1·2 N.A., **17/6** (fig. 3). 528. 1·4 N.A., **25/0** (fig. 4).

Watson & Sons' NEW SCŌP ABBE ILLUMINATOR.



529. This Condenser is made especially for use with the moderate priced Student's Microscopes.

The Lenses are of the same form, but rather smaller than with the ordinary Abbe Illuminator; the effects as regards performance and aperture are practically the same.

The **Iris Diaphragm** is shown at A, and this can be **used independently** of the Condenser by withdrawing the optical portion from the tube on which it fits by sliding at B. The convenience is therefore at hand of an Iris Diaphragm for low-power work, and an Abbe Illuminator in conjunction with the Iris Diaphragm for high-power work.

Dark ground and oblique illumination can be obtained by the use of stops which are fitted on a cell immediately below the optical part at B.

It will fit any Microscope, the tube being of the universal size, while the total length can be considerably varied by extending the tube on which the optical part is mounted, so that the top lens may come flush with the surface of the stage.

529. Price, Condenser as described..... **£0 17 6**
530. Optical part only..... **0 11 0**
531. Iris Diaphragm Mount only..... **0 6 6**
532. Set of Dark Ground and Oblique Light Stops..... **0 3 0**
In brass box, extra..... **0 2 0**

Powell & Lealand's APOCHROMATIC CONDENSERS.

Prices.

533. Apochromatic Oil Immersion Condenser, 1·4 N.A., mounted in P. and L.'s special carrier, with stops, complete **£12 0 0**

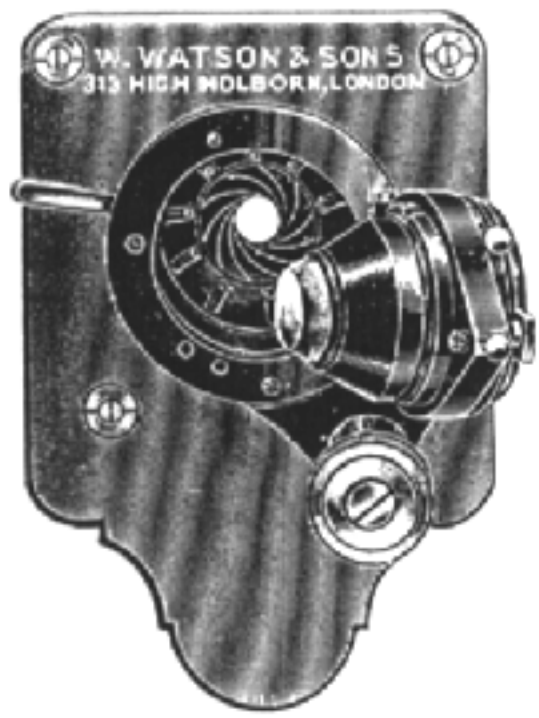
534. † Apochromatic Dry Condenser, 1·0 N.A., optical part only, focus ⅔ in. **6 0 0**

535. Ditto, completely mounted, by Powell & Lealand..... **9 0 0**

† We supply a Carrier similar to that fitted to our Parachromatic Condenser, page 112 at a cost of **£1 15s.,** including the set of Stops, to those who may prefer it.

*It must be understood that the fitting " for substage " implies that it is intended for a Microscope having a compound substage with screws for centring, and the apparatus for which has to be inserted from the upper side, in contradistinction to a tube fixed in the under part of the stage, which would take the understage fittings. The Microscope (page 48) has a substage, that on page 56 an understage.

Coned Iris Condenser.



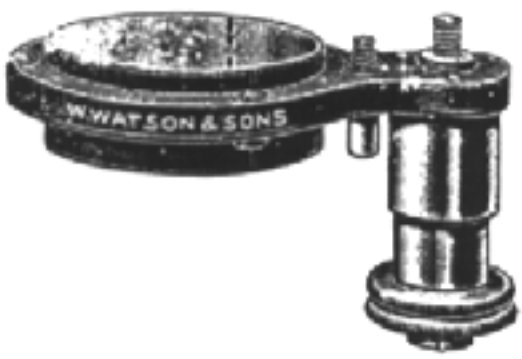
Which may be fitted either to the "Edinburgh Student's," "Fram," "Praxis" or "Bactil" Microscopes.

537.—It is fitted with a spiral focussing screw, and the whole can be lowered and turned aside from the optic axis. When the Condenser is turned down and outwards out of the way, as shown in the figure above, a cone-shaped Iris diaphragm can be operated in the plane of the stage surface. When the Condenser is in use, this coned Iris diaphragm must be opened to its fullest extent. The Condenser itself has the usual Iris diaphragm beneath the back lens, and a cell to carry coloured glasses or stops.

This is only adaptable to certain Microscopes, and a separate quotation would be given after viewing the instrument.

Spiral Focussing Screw.

Underfitting.



538.—This device affords a convenient method of raising and lowering the Condenser which it carries so as to focus it to a nicety. When lowered, the fitting with the Condenser turns aside from the optic axis, and is out of the way. It is made in a superior manner, and is of the universal size, so will carry any understage Condenser.

It can be fitted to many Microscopes at a cost of **17/6**
To our own Instruments the cost of supplying and fitting is **15/0**
Or if a Condenser is purchased at the same time **12/6**

LIGHT FILTERS AND COLOUR ILLUMINATORS.

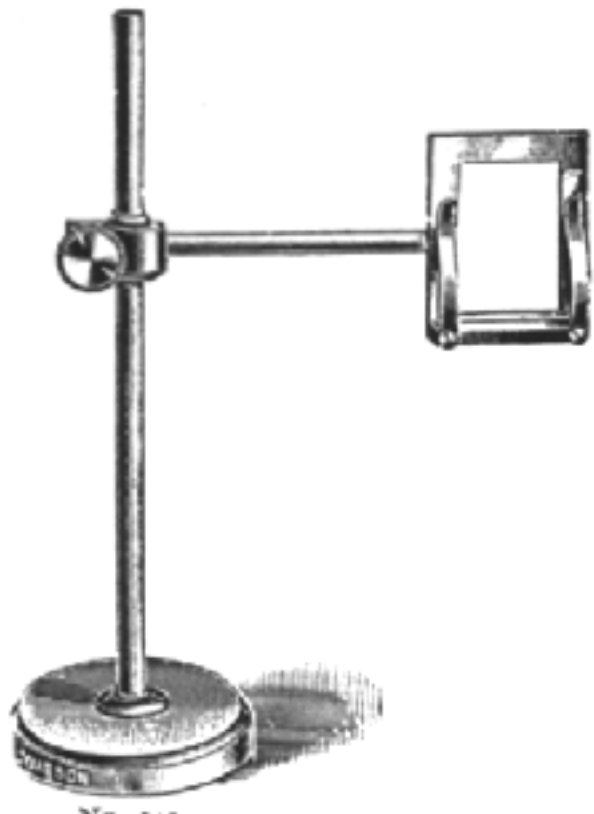
GIFFORD'S MONOCHROMATIC LIGHT SCREEN.

539. This consists of a trough, in which is placed a 3 × 1½ inch slip of blue-green glass, optically worked. The trough is then filled up with a medium composed of aniline green and glycerine. Light from an oil lamp passed through it is found, on examination spectroscopically, to consist of blue-green rays only, the red end being altogether absorbed. Unlike most light filters and screens, this one does not materially diminish the illumination, it being probably the most luminescent screen yet devised. Full particulars for making-up the screens are supplied to purchasers.

Price—Trough and optically-worked slip, with supply of fluid medium **£0 10 6**

540. Stand, as figured, with a frame to hold the trough, with clamp to rising arm (without trough) **1 0 0**

This Stand can be also used for carrying coloured glasses of varying tints and is a most useful accessory.



No. 540.

Note.—This Screen should not be exposed to daylight more than necessary, or it is liable to fade. Fresh green glycerine medium can always be obtained, price **1/0** per bottle.

Kingsford's Troughs, quoted page 129, will be found very convenient for holding light filtering media.

GIFFORD'S GELATINE AND GLASS SCREEN.

541. This obviates the necessity for the fluid Screen above referred to, but does not permit of such accurate colour absorption. It consists of an optically worked disc of green glass, coated with a hard coloured gelatine film, and protected by covering glass. It is the best light filter for the busy worker that can be obtained. To fit any Substage Condenser **£0 4 6**

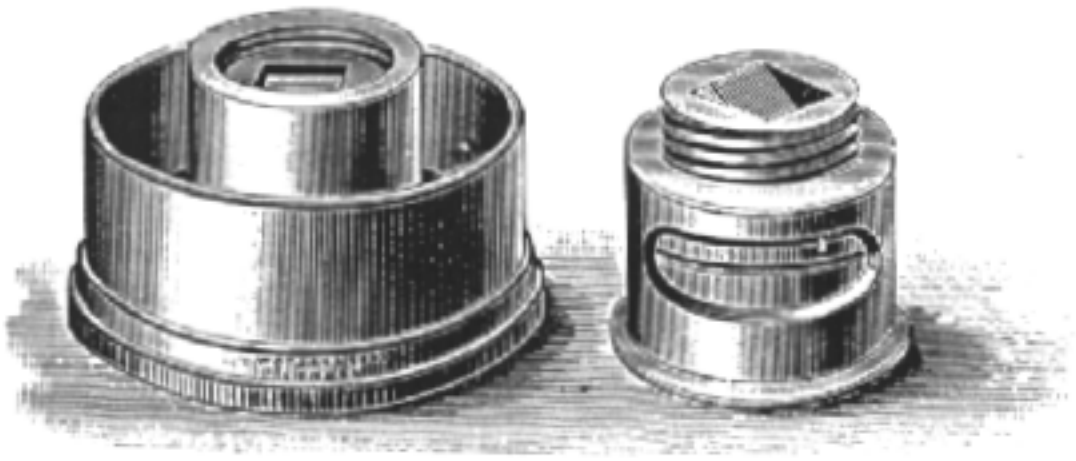
RHEINBERG'S COLOUR ILLUMINATION.

542. Set of Coloured Discs of Gelatine, cut to fit the Stop Carrier of Abbe Illuminator, per dozen pairs **£0 1 6**

SUNDRY ILLUMINATING APPARATUS.

543.	**Paraboloid** for dark ground illumination, largest size	**£1**	**10**	**0**
544.	Ditto, small size, for Instruments without a Substage	**1**	**1**	**0**
545.	**Spot Lens** Ditto, ditto, ditto, ...	**0**	**7**	**6**
546.	Ditto, in Sliding Mount	**0**	**10**	**6**
548.	**Light Moderators** ..... **4s. 6d.** and	**0**	**7**	**6**
549.	Fitting with screw to take Objective for use as Condenser	**0**	**3**	**6**
550.	**Hemispherical Lens,** for attaching to slide	**0**	**5**	**0**
551.	**Erecting Glass,** to fit in draw-tube to erect the image for dissecting, etc.	**0**	**12**	**6**
552.	**Centring Nosepiece,** for making any objective true with a rotating stage	**0**	**15**	**0**

POLARISING APPARATUS, SELENITES, Etc.



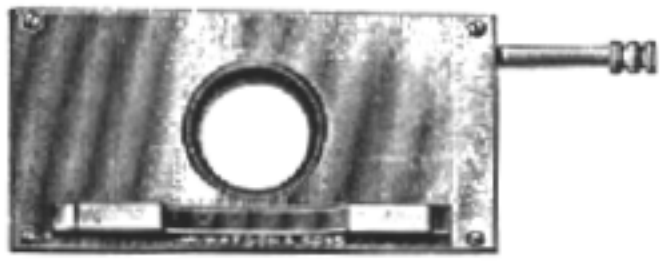
555.	Complete Polarising Apparatus with Selenite	£0	17	6
556.	Larger Prisms, complete with Selenite	1	5	0
557.	Extra large Prisms, ditto ditto	1	15	0
558.	Ditto, ditto, and Rotating Analyser	2	2	0
559.	Very large Nicol Prism, mounted as Polariser (without Analyser)	2	15	0
560.	Very large Nicol Prism, with rotating Analyser	3	15	0
561.	Analyser to fit over Capped Eyepiece.....14/0 and	1	5	0
562.	Ditto, fitted to Body of Microscope	1	10	0
563.	Polariser fitted with Adapter to work in conjunction with Abbe Illuminator or other Condenser, for Substage, extra	0	2	6
564.	**Polariser for Petrological Work,** Prism of large size, having Rotating Flange, divided, with reader and spring catch to indicate quarter circles	2	2	0
565.	Condensing Lens of large aperture to fit over the above Polariser	0	12	6

565a. Tourmalines for polarisation, unmounted from **5/6** each. Mounting to order.

W. Watson & Sons hold a stock of specially fine and extra large Polarising Prisms mounted for Substage at **£4, £5** and **£6** each.

Quotations for any size will be given on application.

SELENITES FOR USE WITH THE POLARISCOPE.



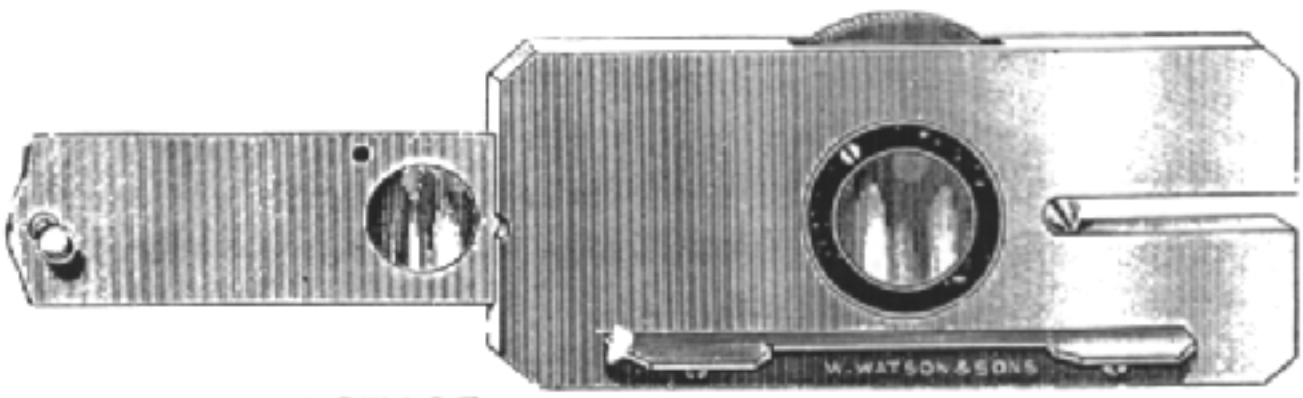
No. 566.

566.	**SELENITE STAGE,** as figured, having pinion to rotate the central well in which Selenites are carried. With a set of 3 Darker's Best Selenites having P/A marked on each, complete	£2	2	0
567.	Set of Darker's best Rotating Selenites for Substage, fitting each into a separate revolving ring so that all three can be rotated over one another independently or in combination ; each ring is made to turn out of the axis when not required. This may be fitted either to the Substage or to the Polariser	3	3	0
568.	Selenites mounted on 3 by 1 slips, 3 varieties.....each	0	2	0
569.	Selenite Films, according to size, mounted in circles.... 2/0 to	0	10	6
570.	Mica Films, ditto, ditto. .....2/0 to	0	10	6
	Designs in Selenite for the Projection Lantern Microscope, a speciality from 12/6 to	5	0	0

Bi-axial Crystals, Etc. See Catalogue No. 3.

SELENITE STAGE—*Continued.*

VARIOUS ILLUMINATORS.



Mica Sele stage. No.

MICA SELENITE STAGE.

573. As figured. A film of Mica is mounted in a revolving disc fitted in a brass plate, on which the object is placed. Beneath the Mica there is a sliding carrier, containing three different Selenites, so that each one may be brought under the Mica, and the latter rotated. By this means the entire series of colours obtainable with any number of Selenite films, either separately or in combination, may be produced. It can be used on any Microscope, and the effects are very fine £1 6 0

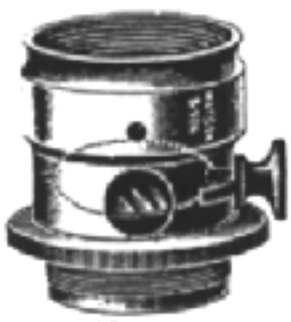
PARABOLIC SIDE SILVER REFLECTOR.



576. This gives beautiful illumination for opaque objects, the light being thrown upon it by the Bull's-Eye Condenser and then reflected on the object. Price, to attach to limb or stage of Microscope, with ball and socket joints, as figured £1 3 0

577. Ditto, ditto, to attach to Nosepiece of Microscope 1 5 0

VERTICAL ILLUMINATOR



No. 590.

590. Glass disc Reflector. This Illuminator is screwed into the Nosepiece of the Microscope, immediately above the Objective, receiving the Objective at its lower end. It is the only means of illuminating the surface of metals, minerals etc., with high powers; it is also useful for ascertaining if a specimen is in contact with the cover glass. This is made with a cover glass, ¼ in. diameter, so as to be of sufficient size for use with Objectives having back lenses of large size. **PRICE** £0 10 6

591. With diaphragm 0 13 6

592. Prism Reflector. We also make the Vertical Illuminator with a prism reflector instead of the Glass disc: this is preferred by many workers ..... **Price,** 0 18 0

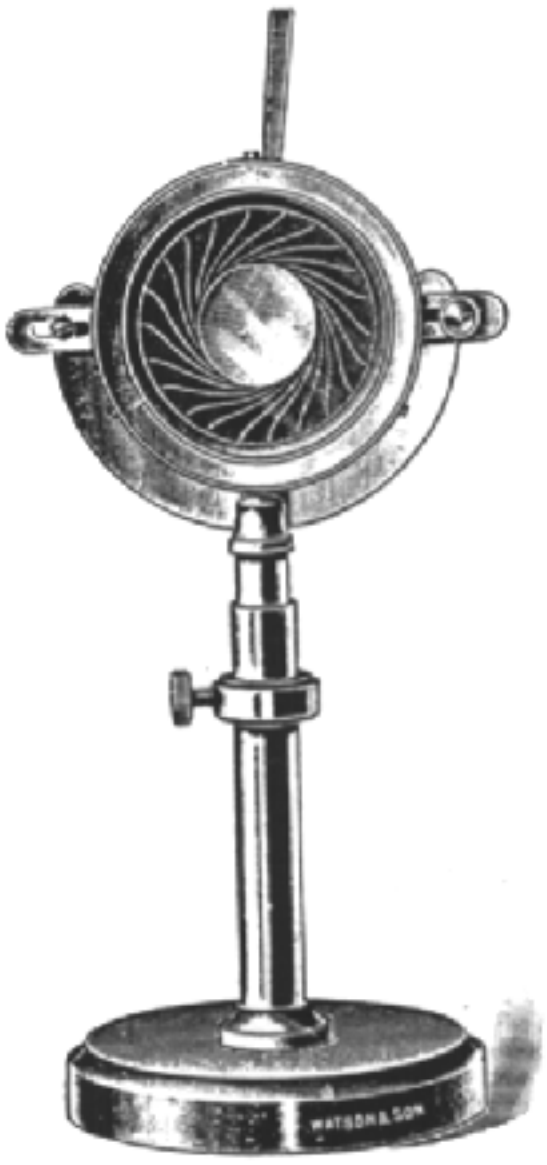
593 An Iris diaphragm is supplied to work over the aperture through which light is admitted to the prism of No. 592, so that the amount may be regulated to a nicety. (Marten's System.) Price extra 1 0 0

NOSEPIECE IRIS DIAPHRAGM OR DAVIS'S SHUTTER.



594. This Iris Diaphragm gives a clear aperture equal in diameter to that of the back lens of any Objective, while the collar in which the leaves work is exceedingly compact. It is specially useful for moderating the Apertures of Objectives, for producing dark ground illumination, and for increasing penetration. So that the handle of the Iris Diaphragm may be readily set at the most convenient position, the thread that screws into the Microscope is made to revolve very stiffly. **PRICE** £0 15 0

595. Ditto, ditto, with fitting to go into Substage, so that Objectives may be used as Condensers 0 17 6



No. 597.

THE SCŌP BULL'S-EYE STAND CONDENSER.

597. We have designed a cheap form of Bull's-Eye, fitted with Iris diaphragm, complete, as illustrated, which will be found exceedingly convenient for Photo-Micrography, the Iris diaphragm being treated as the source of light and enabling the quantity of light to be controlled. It is fitted with centring adjustments; the lens is 2½ in. diameter. For work with the Vertical Illuminator in Metallurgy, etc., it will be found especially valuable, for with it a very small point of light of intense brilliance can be secured.

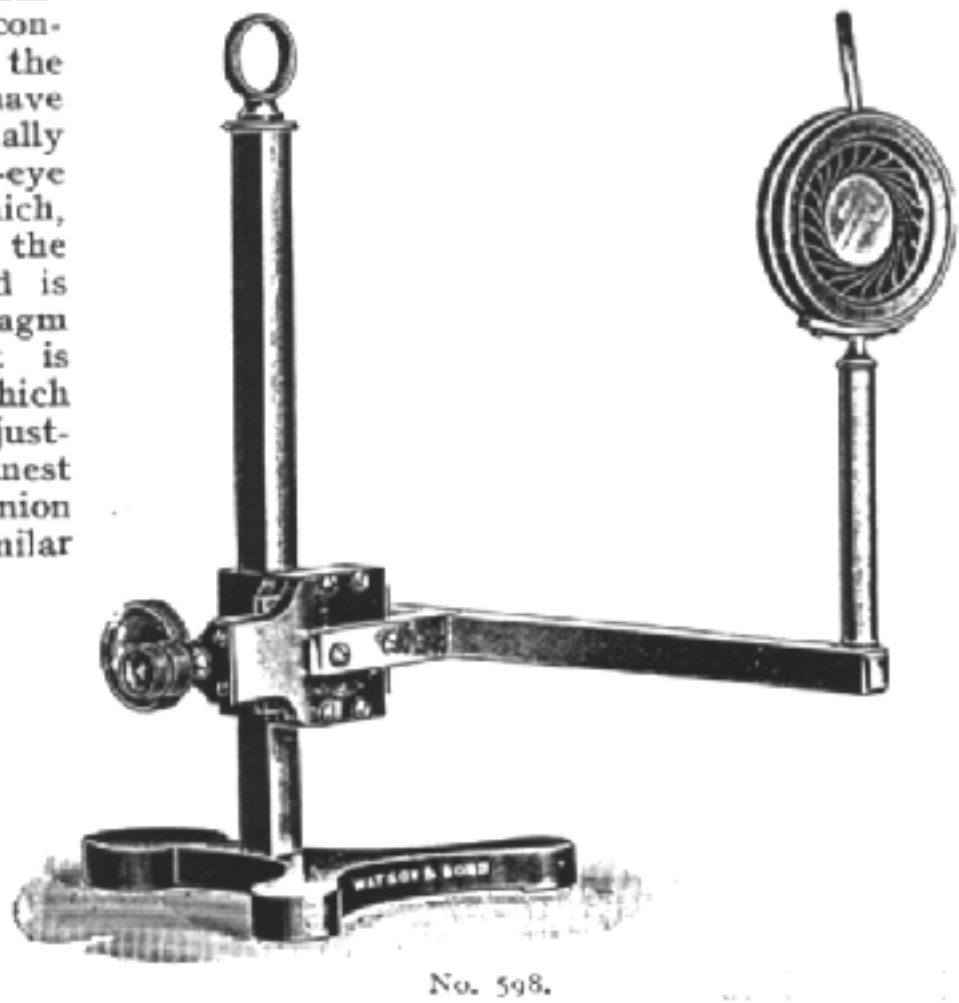
597. **Price,** as figured and described, with Iris Diaphragm—**£1 10 0.**

SCŌP BULL'S-EYE WITH MECHANICAL ADJUSTMENTS.

598. When working with a Vertical Illuminator in the examination of Metal Specimens, etc., constant necessity arises for the minutest possible alteration of the position of the bull's-eye lens, sometimes laterally, and at other times vertically. Workers have constantly complained of the want of convenience for doing this with the ordinary bull's-eye; we have therefore constructed, especially for the purpose, the bull's-eye as listed and figured, which, optically, is the same as the Scŏp Bull's-eye above, and is provided with an iris diaphragm in the same manner, but is mounted upon a pillar on which is a rackwork with which adjustments can be made to the finest point by turning the pinion milled head. Laterally, similar slight movements can be effected by means of a spiral screw.

Price .. £4 0 0

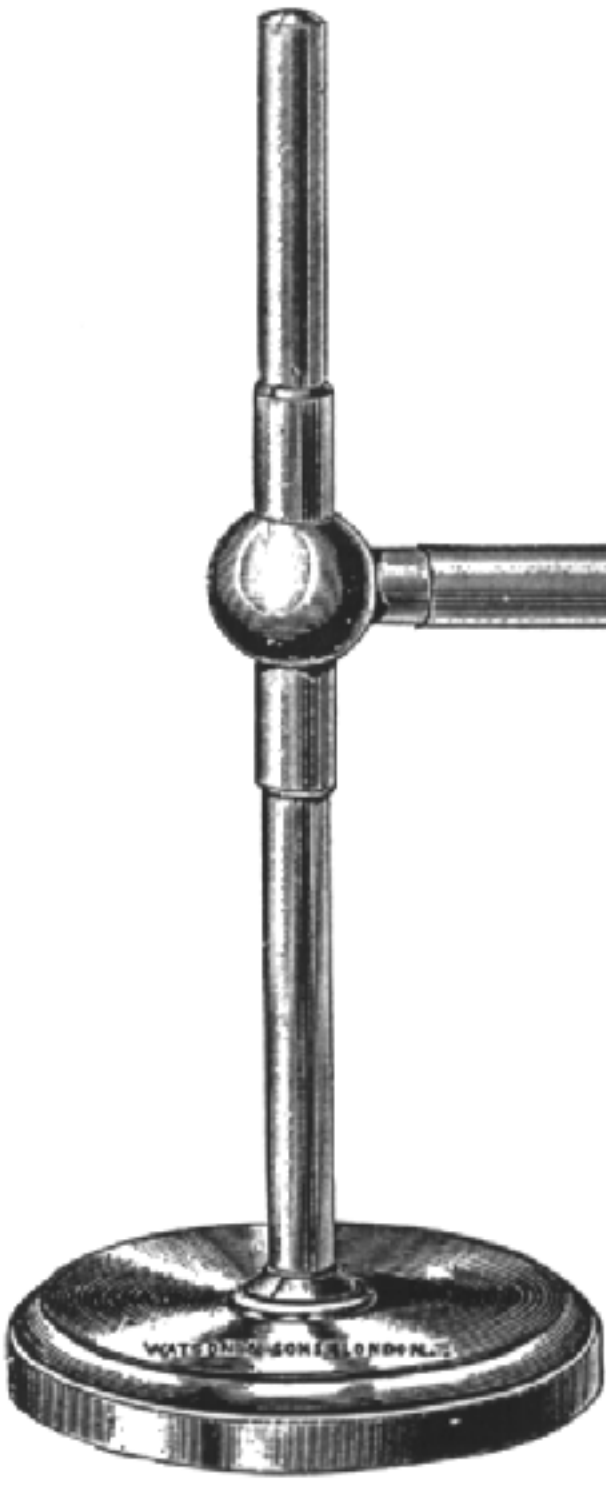
It will be noted that the foot on which this Bull's-eye is mounted is an exceedingly substantial flat tripod.



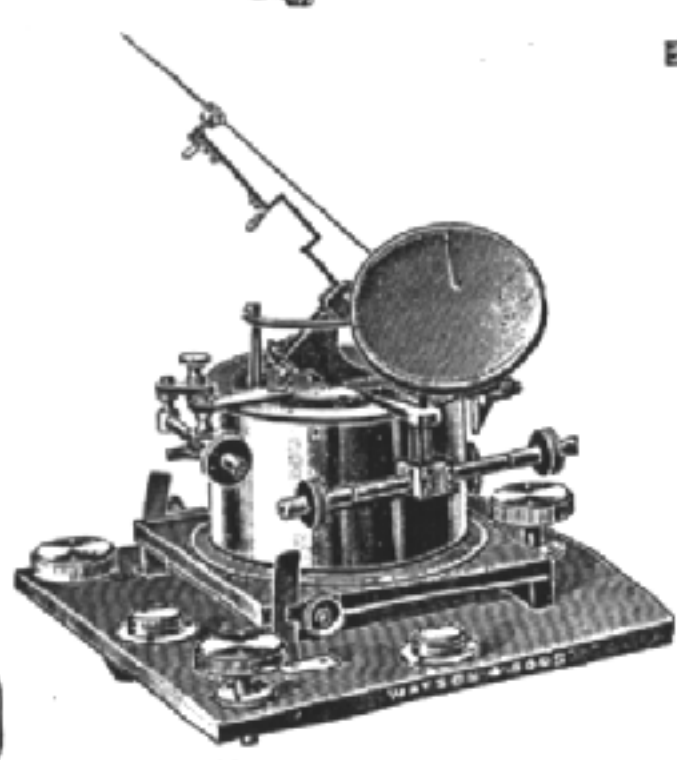
No. 598.

BULL'S-EYE OR STAND CONDENSER.

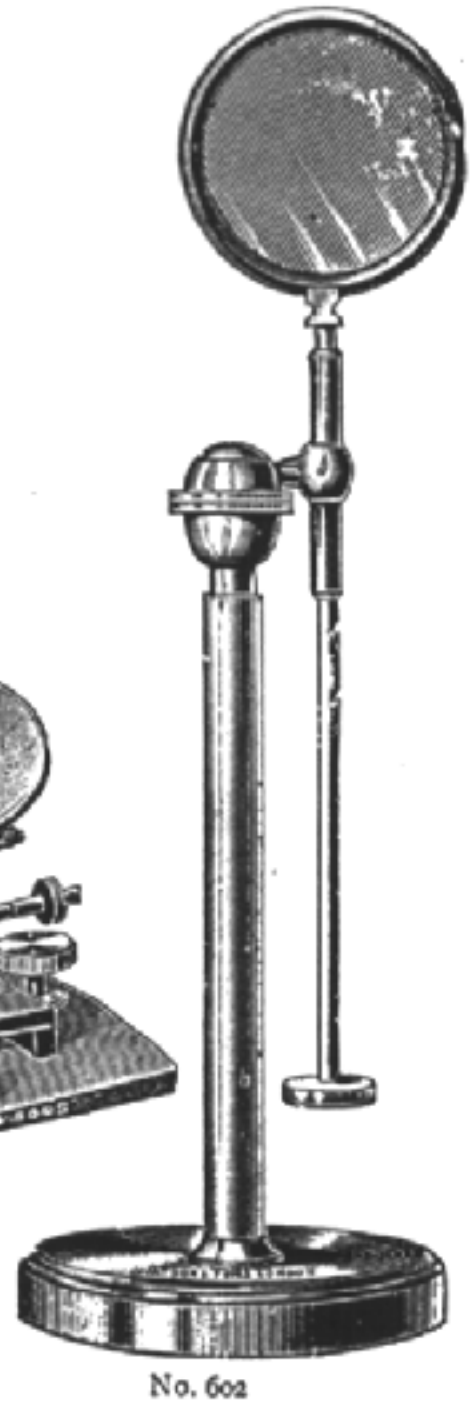
HELIOSTAT.



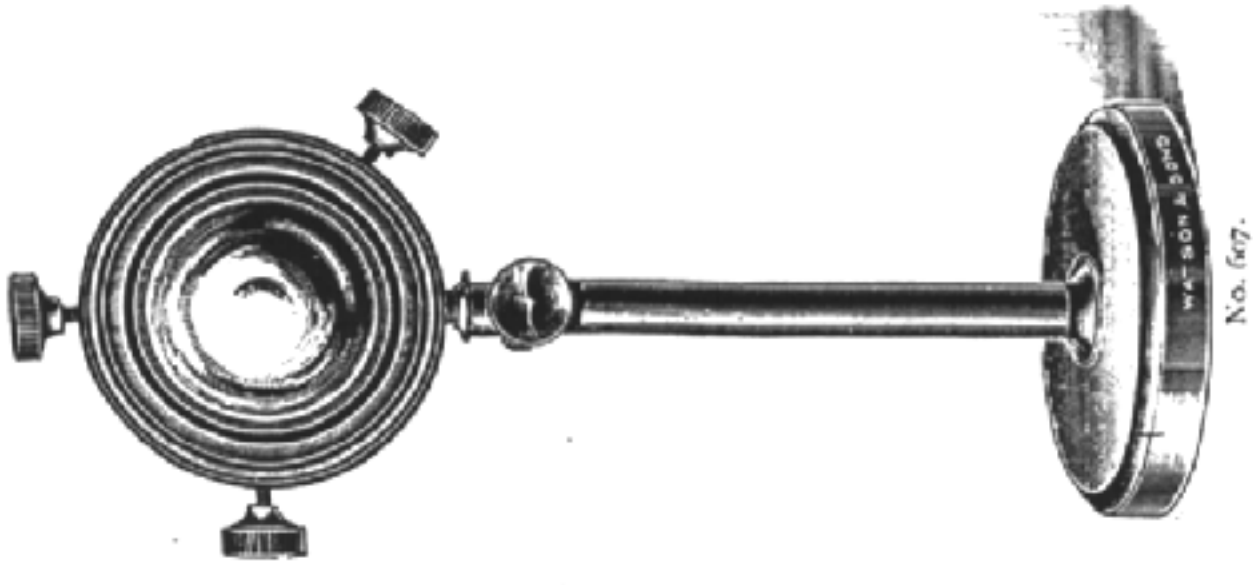
No. 600.



No. 610.



No. 602



No. 607.

For Prices, see page 123.

BULL'S-EYE OR STAND CONDENSER.

HELIOSTAT, ETC.

600.	Stand Condenser, as figured, largest size, with sliding upright and horizontal bars and ball and socket motion to Lens.....	£1	10	0
601.	Ditto ditto smaller size	1	5	0
602.	With upright lengthening bar and ball and socket motions, large size, as figured	0	15	0
603.	Ditto, medium size	0	10	6
604.	Ditto, small size	0	7	6

NEW APLANATIC BULL'S-EYE OR STAND CONDENSER.

As suggested by Mr. E. M Nelson.

605. This form is designed to minimise the large amount of spherical aberration given by the ordinary Stand Condensers, and with it a considerably increased brilliance of illumination is obtainable. It is composed of two Lenses. Its use is specially indicated in photographic work, and it will be found to not only shorten the exposure, but materially improve the image. For ordinary work also it is much superior to the old form.

Price, mounted as No. 602, **£1 10s.**

606.	With Iris Diaphragm.....extra	£1	5	0
607.	Ditto, mounted on upright heavy stand (as figured), with lengthening bar and clamp screw, Lenses fitting in ring having centring screws, and clamp screw to fix centring, specially arranged for photography, projection, etc.	3	0	0
608.	Ditto, ditto, with Iris Diaphragm. This is a most important addition, and enables a clear and evenly illuminated disc to be obtained when photographing, etc. complete	4	5	0

NEW HOLOS APLANATIC CONDENSER.

(Mr. Conrady's Computation.)

609. This Condenser is an Achromatized Aplanat, and utilizes all the light from the illuminant that it is possible to employ for Microscopical purposes. It is designed especially for Photography, and is mounted similarly to No. 607, with centring screws and Iris diaphragm ..... Price complete **£6 5 0**

This is undoubtedly the best Condenser made. Further particulars will be found on page 163.

DR. G. JOHNSTONE STONEY'S IMPROVED HELIOSTAT.

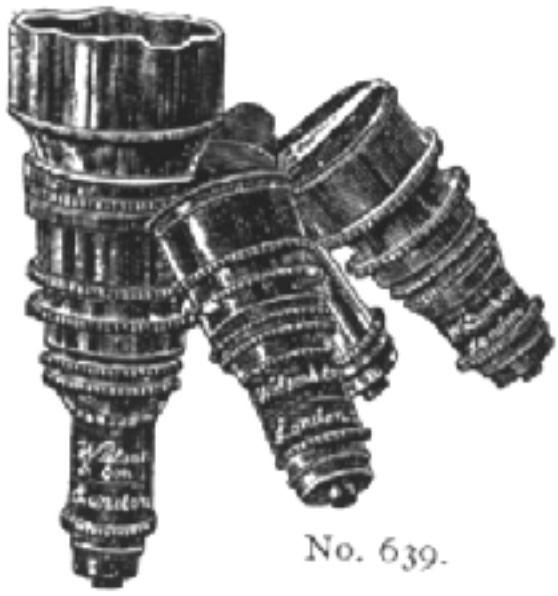
See illustration, page 122.

610. This instrument has been constructed under the supervision of Dr. Stoney, and the improvements effected render it more than ever suited to the requirements of the physicist and photomicrographer. It is mounted upon a stout mahogany base, provided with levelling screws and spirit levels. The lever clockwork movement is of first-rate quality, and a fine adjustment for precisely setting the position of the instrument is afforded by means of a rackwork and pinion and tangent screw. The mirror is parallel worked of fine quality. Price in deal case **£10 10 0**

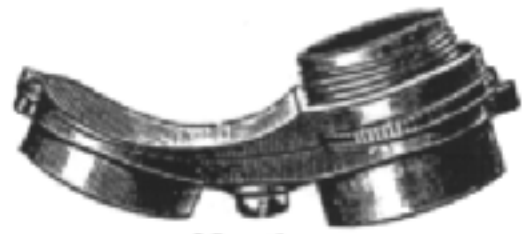
NOSEPIECES.

FOR RAPIDLY CHANGING OBJECTIVES.

Can be fitted to any modern Microscopes by Purchasers.



No. 639.



No. 631.



No. 632.

These Nosepieces are of new design; very compact, and guaranteed perfectly true. We now make them in Aluminium, which is alloyed in order to render it tough and strong. This alloy does not increase the weight, and stands wear and tear perfectly.

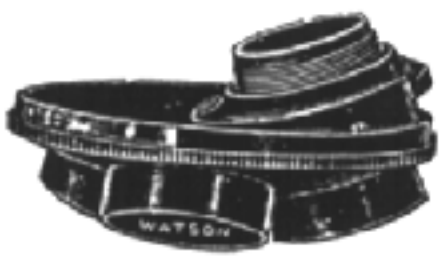
They all have the "Universal thread," so will fit any microscope.

PRICES.

FOR TWO OBJECTIVES (Double Nosepiece).

			£	s	d
630.	Oxidized Nosepiece for use on Instruments without rackwork coarse adjustment		0	9	0
631.	The "Fram" Nosepiece; thoroughly well-made and finished, perfectly true, with rotating screw collar to attach to Microscope, with stop pin, so that Objectives can only be revolved in one direction, as figured, finished in black bronze and lacquered		0	10	6
632.	Special Nosepiece, with spring catch, permitting of the revolution of the Objectives in either direction, finished in black bronze and lacquered		0	15	0
633.	Ditto	Nickel-plated	0	16	6
634.	Ditto	in Bright Brass, polished and lacquered	0	17	6
635.	Ditto	in Aluminium	0	17	6
635a.	Continental pattern, nickel-plated		0	15	0

FOR THREE OBJECTIVES (Triple Nosepiece).



No. 636.

			£	s	d
636.	Watson's new Dust-proof pattern, as figured, with screw collar to attach to Microscope. Of circular form, excluding dust from back of Objectives. Invaluable in Laboratories		1	0	0
637.	Ditto	Nickel-plated	1	3	6
638.	Ditto	in Aluminium	1	5	0
639.	Special pattern, as figured, very light		1	5	0
640.	Ditto	in Bright Brass, lacquered, or Aluminium	1	12	6
641.	Continental pattern, nickel-plated		1	0	0

FOR FOUR OBJECTIVES.

			£	s	d
642.	Watson's Dust-proof pattern, as figure No. 636		1	12	6
643.	Special pattern	Ditto 639	2	0	0
644.	Ditto	in bright lacquered Brass or Aluminium	2	10	0

It is important that Nosepieces when fitted to the Microscope, should be set exactly in the centre of the front of the body, and to maintain the centres for the objectives should be rotated *in one direction only*.

NOSEPIECES—*Continued.*

WATSON'S NEW 'FACILITY' OBJECTIVE CHANGER.

(Provisionally protected.)

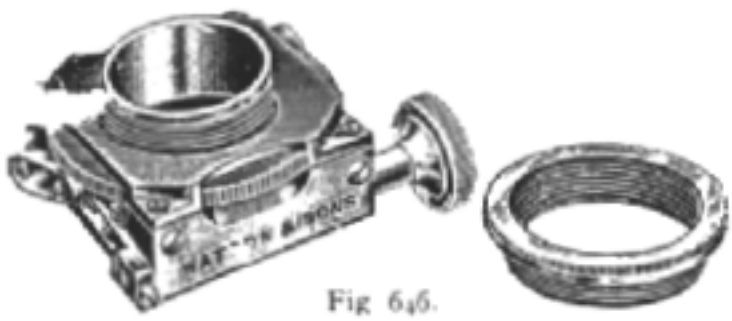


Fig. 646.

646. This new Objective Changer or Nosepiece is both novel in construction and effective in working. It embodies several very important features and eliminates many of the disadvantages of Nosepieces, has no complications and is very strong.

1. It is absolutely reliable.
2. It is very thin, so increasing the tube length in a lesser degree than any other Objective Changing device: the total thickness when in use being 12·5 m/ms (½-in.).
3. It is simple to use.
4. It is made in Magnalium, so is very light in weight while strong in construction.

The Working.—The turning of the handle A causes the inversion downwards of a pair of jaws having a screw thread cut upon them. The objective is placed in the aperture and directly the handle A is released the jaws are carried back to their natural position by the action of a boxed spring, in doing which, their threads engage the threads of the Objective and carry it up to the shoulder. In consequence of the varieties of sizes, within very small limits, that still prevail for Microscopic Objective threads it has been found desirable to supply rings to screw to the Objectives with threads of an absolute gauge, which will be gripped by the jaws of the Nosepiece with certainty.

Price, with three rings as described..... **£1 15 0**

Extra rings, **6d.** each.

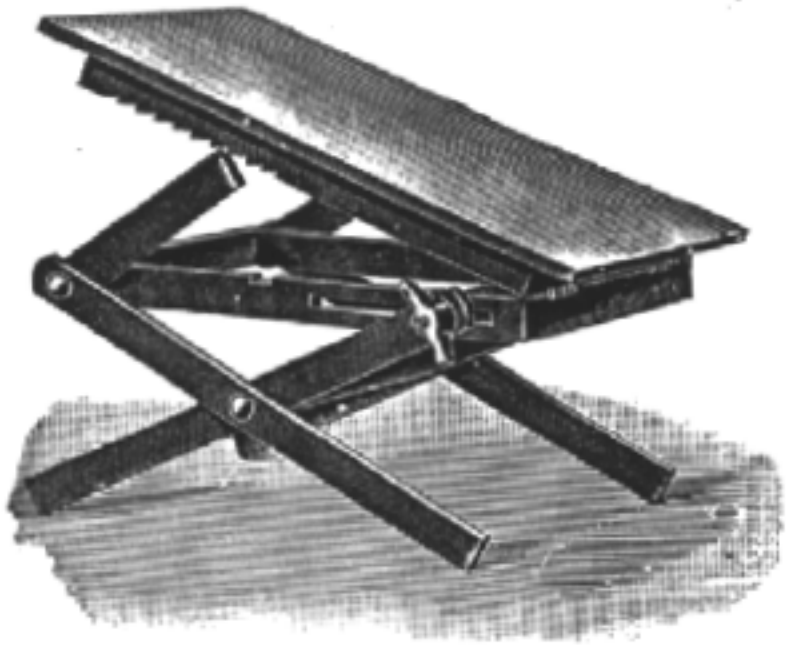
The adapting rings are quite thin and the Objective can be put away in its box without removal.

CAMERA LUCIDAS.

647. **Ashe's Camera Lucida.** As figured and described, Journal of the Quekett Micro. Club, Nov., 1900, page 413.

A modification of Beale's Reflector in which the neutral tint glass is fixed on an adjustable hinged support. A second hinged support carries a small silvered glass disc. The special advantages of this new form are—that the Microscope can be used at any angle and that the image is re-erected and not reversed as in Beale's form .....**Price 21/0**

648. **Large Abbe Drawing Camera Lucida, by Zeiss (latest pattern).** The length of the arm supporting the mirror is 125 m/m (5 in.), the size of the mirror 80 × 125 m/m (3¼ in. × 5 in.), complete in case with light moderating glasses; specially adapted for eyepieces with enlarged field of view..... **£3 12 0**



DRAWING TABLES.

649. **Drawing Table,** with arrangement for tilting to any desired angle, to correspond with inclination of the Microscope, thus obviating distortion of image, as figured **12/6**

DRAWING APPARATUS.

(Continued.)



No. 650. The Abbe Model Camera Lucida in Aluminium.



No. 651.



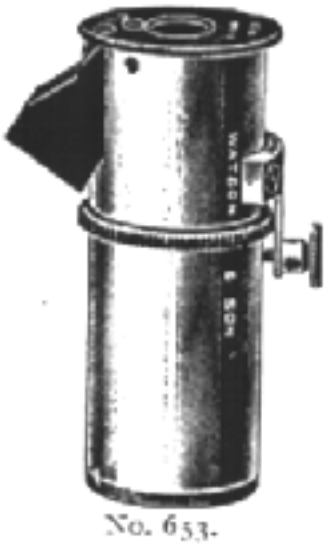
No. 652.

650. This form of apparatus for drawing is considered one of the best and most easily used, giving very satisfactory results. Instead of the image being traced by projection on paper, the reverse is the case, and the paper and pencil are projected into the field of view. The mirror reflects the paper on to the silvered surface of a prism placed over the eye Lens of the Eyepiece of the Microscope, and it is thereby conveyed to the eye. There is a central opening in the silvering through which the usual Microscopic vision can be obtained. We mount this apparatus in a new manner by means of a cloth-lined adapter, fitting over the outside of the Microscope tube; this saves all trouble in centring and ensures centrality; where the Instrument has capped Eyepieces, the Camera Lucida must be adapted to the Eyepiece, the cap being removed. The apparatus may be disconnected from the fitting adapter by means of a sliding pin, and readily replaced, or can be lifted over out of the way, as shown in the drawing, if desired. Being made almost entirely in aluminium it is very much lighter than any other apparatus of the same kind, and does not cause vibration. It can be used with the Microscope at any angle, the only necessity being that the paper on which the sketch is made should be at the same angle as the Instrument. The mirror is parallel worked of best quality to prevent distortion of the image, and two neutral tint shades are provided. Price in case..... **£2 0 0**

NOTE.—In order that this may fit perfectly, the Eyepiece (if a capped one) and draw-tube should be sent to us to adapt to. It works best with low-power eyepieces.

651. Wollaston's Camera Lucida with shades, as figured..... **£1 1 0**

652. Beale's neutral tint Reflector, very efficient..... **0 6 0**



No. 653.

EYEPIECE CAMERA LUCIDA.

653. This is a combined Eyepiece and Camera Lucida, designed for use when the Microscope is set at an angle of inclination of 45°. The drawing paper and pencil point are reflected into the field by the prism attached to the Eye Lens, and tracings can be made with great precision, comfort and rapidity.

With tinted glasses to regulate light, complete.... **£1 5 0**

The Eyepiece combined with the above Camera Lucida may be supplied of any desired diameter of fitting without extra charge.

LIVE



No. 675.

			£		
675.	Live Box, large size, best quality				6
676.	Ditto	medium size			6
677.	Ditto	small size	0		



No. 678.

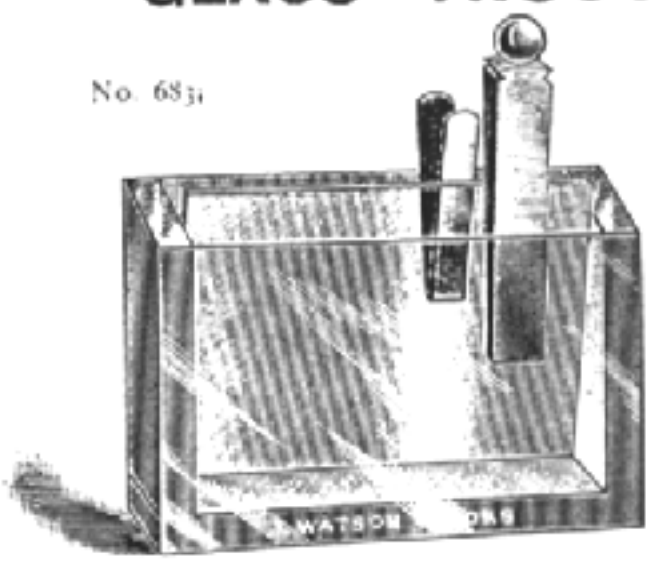
678. Rousselet's Live Box for use with Condenser, Paraboloid, etc. . **£0 10 6**

The advantages of this are:—It can be used in conjunction with the Substage Condenser, Spot Lens, etc., and that there is sufficient margin between the edge of the glass base disc—on which the object is compressed—and the edge of the cell carrying the cover glass, for the Objective to work at any point where compression can take place.

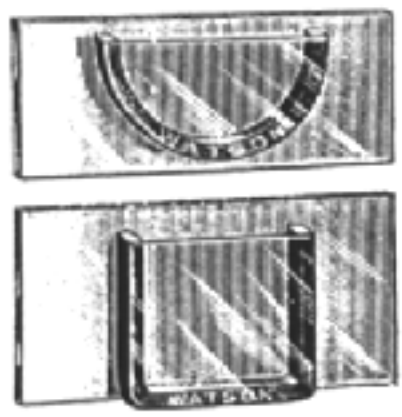
*** Extra covers for Live Boxes, **4/0** per oz.

GLASS TROUGHS, ETC.

No. 683.

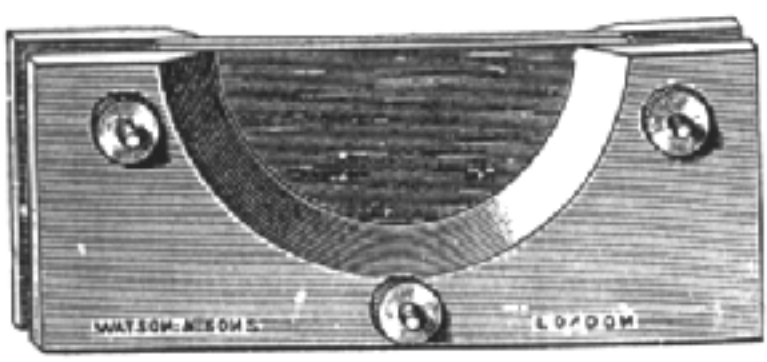


Nos. 681-682.



681.	Improved, for Animalculæ	3 in. × 1 in., **9d.** and	**£0**	**1**	**0**
682.	Ditto ditto	3 in. × 1½ in., **1s. 6d.**; 3 in. × 2 in.,	**0**	**2**	**6**
683.	Ditto	with plates, wedge and spring, for Zoophytes	**0**	**4**	**6**
684.	Special Troughs, made deep from back to front, suitable for the examination of a whole tadpole or large aquatic larvæ		**0**	**1**	**6**
685.	Plain Glass Dish, for dissecting		**0**	**1**	**0**
686.	Large Dissecting Troughs		**0**	**10**	**6**
687.	Glass Animalculæ Tanks	**5s., 7s. 6d.** and	**0**	**10**	**6**
688.	Glass Stage Plates, **1s. 0d.**	large size	**0**	**1**	**6**
689.	Porcelain Dish, 9 in. × 7 in., extra deep, with cork loaded with lead for dissecting under water		**0**	**4**	**6**
690.	Glass Dish, 5 × 4 inch	Ditto ditto each	**0**	**2**	**6**

BOTTERILL'S TROUGH, ETC.



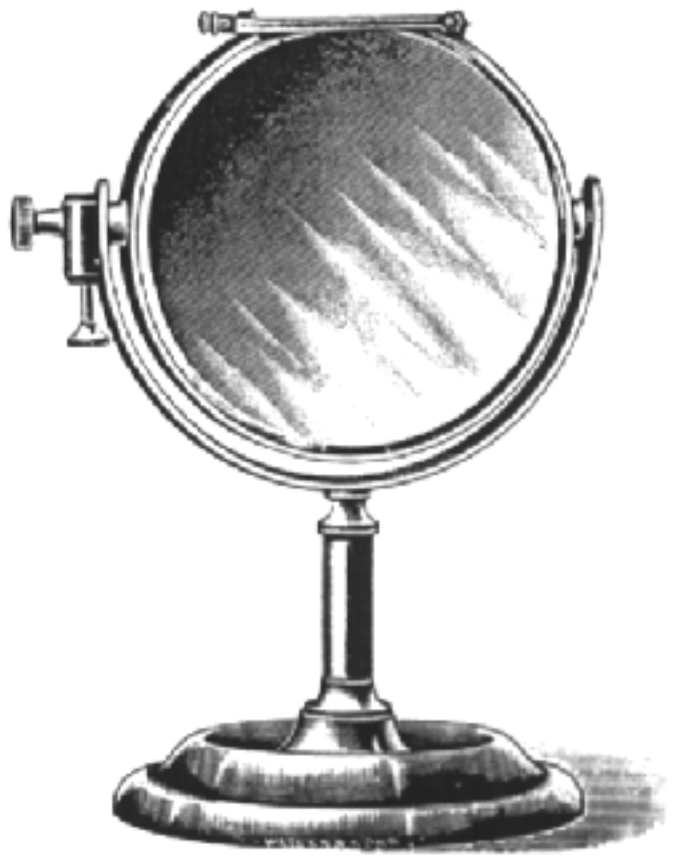
691. This is composed of two plates of vulcanite, held together by three screws, between which are placed two slips of glass separated by an ordinary indiarubber ring. The glasses can be readily taken out and cleaned, and in the event of being broken can at once be replaced.

Price, **3s. 0d.** each.

692. **Botterill's Life Slide** for watching the development of Confervæ, Infusoria, etc. **£0 2 0**



No. 693a.



No. 694.

KINGSFORD'S TROUGHS, FORCEPS, &c.

These troughs are designed especially for watching the development of "Pond Life," and for the purposes of small Aquaria. In addition, they form exceptionally advantageous light filters, the smaller size being particularly fitted for this.

Their construction is very simple, consisting essentially of an outer circle of brass, drawn together at the top by means of a screw or screws. This brass circle is lined with indiarubber, and with blocks of indiarubber so placed as to keep the glass faces, which are circular, in position. These glass discs are gripped by the indiarubber when the tension on the outer metal band is increased by the tightening of the Screws, and an absolutely water-tight fitting is the result.

The distinct advantage over all other troughs is:—

That every part can be taken to pieces and cleaned by merely releasing the Screws,

Any part that may be at any time broken can be at once replaced,

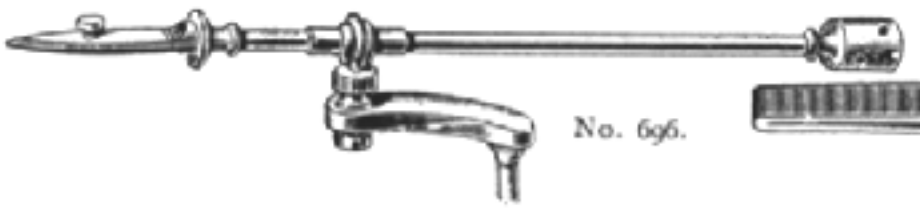
They are made in two sizes.

693. As figured, 2⅜ in., internal diameter. Trough only, to interchange with Bull's-Eye Lens of Stand Condenser £0 7 6

693a. Trough, complete with Stand, as figured 0 14 6

694. Large Table Trough, as figured. with solid metal base, 6 in. diameter. Internal diameter of Trough, 7⅜ in, mounted in gymbal, with clamp to grip at any desired angle, complete 1 10 0

STAGE AND HAND FORCEPS.



No. 696.



No. 697.



No. 695

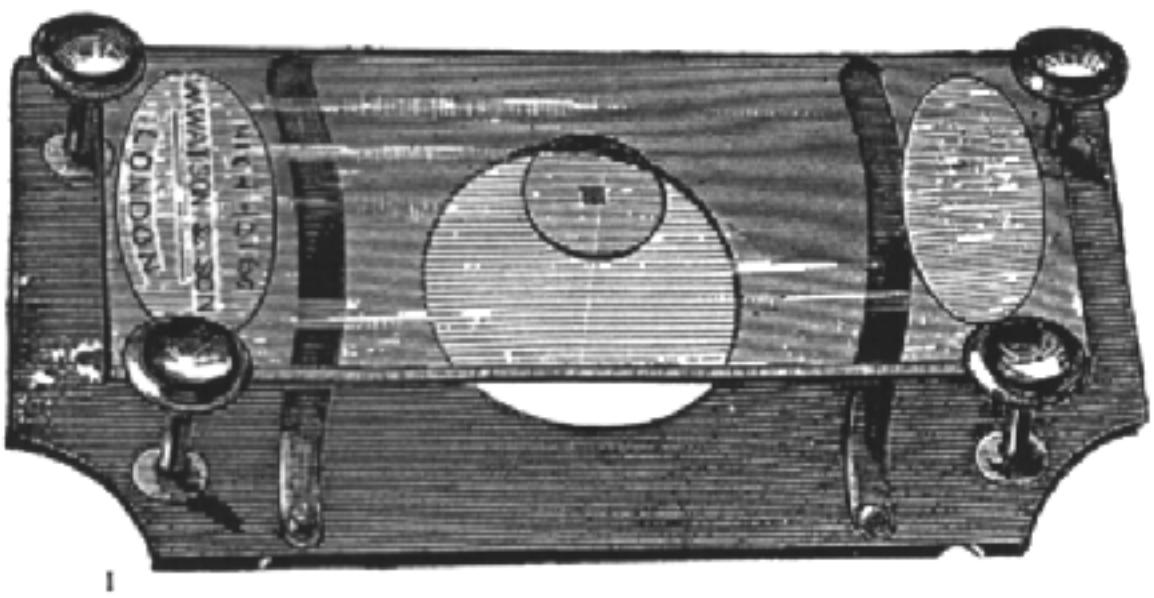
695. **Forceps,** to fit into stage or limb of Instrument to hold objects during examination, 5s. 6d. and £0 7 6

696. Ditto, ditto, best quality 0 10 6

697. Brass hand Forceps, Straight—Small, 9d.; Best, 1s. 6d.: Curved 0 2 0

For Dissecting and Biological Forceps, see page 149.

W. WATSON & SONS' SAFETY STAGE.

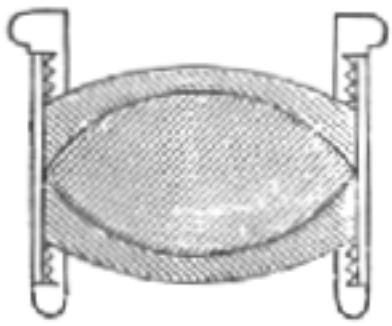


698. For use with high powers. The object is held upon two flat Springs, and should it accidentally be touched by the objective, it at once gives way to them. The base is of polished vulcanite and it is a very light piece of apparatus.

Price, 7s. 6d.

APLANATIC MAGNIFIERS.

Made by W. WATSON & SONS to the formulæ of E. M. NELSON, Esq., late President of the Royal Microscopical Society.



No. 700.

Flat field, bright and exquisitely crisp image.



No. 700A.

These magnifiers are composed of three lenses cemented together, as shown in fig. 700. They give a large and very flat field, exquisite definition, and good working distance. They are constructed entirely of Jena glass, and have been designed to produce finer results than those hitherto made. They all have large apertures, and consequently yield a very brilliant image. For dissecting purposes and as pocket lenses they are unexcelled.

	No. 700	No. 701	No. 702	No. 703
Magnifying Power	6	10	15	20 diameters.
Diameter of Visual Field	1·0 in.	·5 in.	·35 in.	·25 in.
Focal distance from Object to lower surface of Lens	1·27 in.	·73 in.	·5 in.	·37 in.

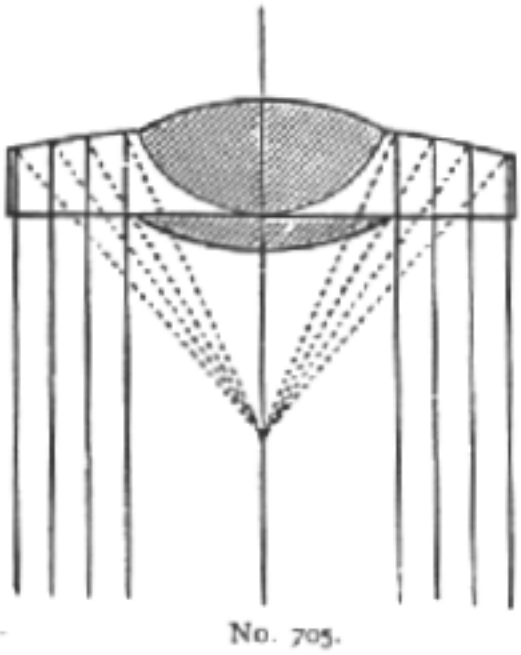
Prices—In nickel-plated dissecting mount, as figured (No. 700), with box, either power.....each **£0 14 6**

The same lenses, in nickelled metal mount for the pocket as figured—

700A. 6 diameters .... **£0 15 6**; 701A. 10 diameters **£0 15 6**
702A. 15 diameters .... **0 15 6**; 703A. 20 diameters **0 15 6**

704. The same lenses, mounted in combination holder, the dissecting mount (No. 700) made as compact in size as possible, to screw into the pocket holder (No. 700A), so that the same lens may be used for either dissecting or pocket.....each **0 18 6**

All the above Magnifiers fit the Laboratory Dissecting Microscope, and the Dissecting Lens Stands, pages 96 to 99.



No. 705.

705. **Mr. E. M. NELSON'S MIRROR LOUP.** This Magnifier is fitted with an extended lens, silvered on the back, which causes the magnifier to reflect light upon the object and so illuminate it. Power, 10 diameters. Price in Pocket Mount **£1 5 0**
For Dissecting Microscopes and Stands for Magnifiers, see pages 96 to 99.

706. **WATSON'S VARIABLE MAGNIFIER.** Magnification, 5 to 10 diameters. By withdrawing the Eyepiece—which is mounted on a tube for the purpose—from a middle lens, the magnification is variable between 5 and 10 diameters. The working distance is quite exceptional, being 2 inches with the maximum magnification. Its size, 3 in. × 1¾ in.—renders it inconvenient for usual pocket carrying, but the advantages yielded by this Magnifier, perfect definition, flat field and long working distance, render it invaluable for laboratory use.

Price £1 5 0

APLANATIC OR "PLATYSCOPIC" MAGNIFIERS. SERIES B.

These Magnifiers are of very fine performance, but are less costly in construction than those on page 130; they are distinguished for flatness of field, very sharp definition and good working distance. They can be strongly recommend d. They are mounted in a similar manner to the illustrations page 130, and fit the Dissecting Microscopes and Stands, pages 96 to 99.

No.	Magnifying Power.	Diameter of Lens.	In dissecting Mounts. PRICES.	No.	In tortoise-shell or Nickelled Metal Pocket Mount. PRICES.
710.	 7	diameters ¾ in. ..	£0 11 6	710A	.. £0 14 6
711.	 10	,, ⅝ ,, ..	0 10 6	711A.	.. 0 13 6
712.	 15	,, ½ ,, ..	0 10 6	712A.	.. 0 13 6
713.	 20	,, ⅜ ,, ..	0 10 6	713A.	.. 0 13 6

SPECIAL SEMI-APLANATIC MAGNIFIER.

This Magnifier is composed of two Lenses only, but gives surprisingly good results. As a useful and cheap Dissecting or Pocket Lens, it will be found quite efficient.

Magnification, 6 diameters—

714. In Dissecting Mount £0 5 0
715. In tortoise-shell mount for the pocket..... 0 8 6

POCKET MAGNIFIERS.



No. 720.



No. 730.



No. 728.



No. 729.

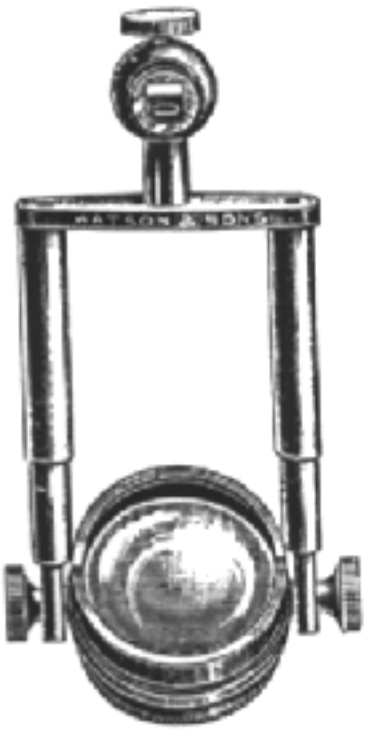
720. Pocket Magnifier, in folding tortoise-shell mount, of the very best quality, 3 lenses with diaphragm, as figured £0 8 6
721. Ditto ditto, 2 lenses, **5s. 6d.** Ditto, 1 lens 0 3 6
722. Ditto ditto, in horn or vulcanite, 1 lens 0 1 6
723. Ditto ditto, ,, ,, 2 lenses 0 2 6
* 724. Ditto ditto, ,, ,, 3 ,, ... 0 3 6
725. Ditto ditto, in vulcanite, 2 extra large lenses 0 7 6
726. **Special Magnifier for Botanical Work,** 2 Plano-Convex lenses 0 2 6
727. Stand to hold either of the preceding, for dissecting 0 2 6
728. Coddington Lens, in German silver mount, in 3 sizes, as figured, **4s. 6d., 5s, 6d.,** and 0 6 6
729. Single Pocket Magnifiers, in 3 sizes, as figured, **1s., 2s. 6d.** and 0 4 6
730. Watchmakers' Eye Glasses, as figured..... 0 1 0

* No. 724 Magnifier is the one adopted by the London School Board for Botanical classes, and is eminently suitable for the purpose.

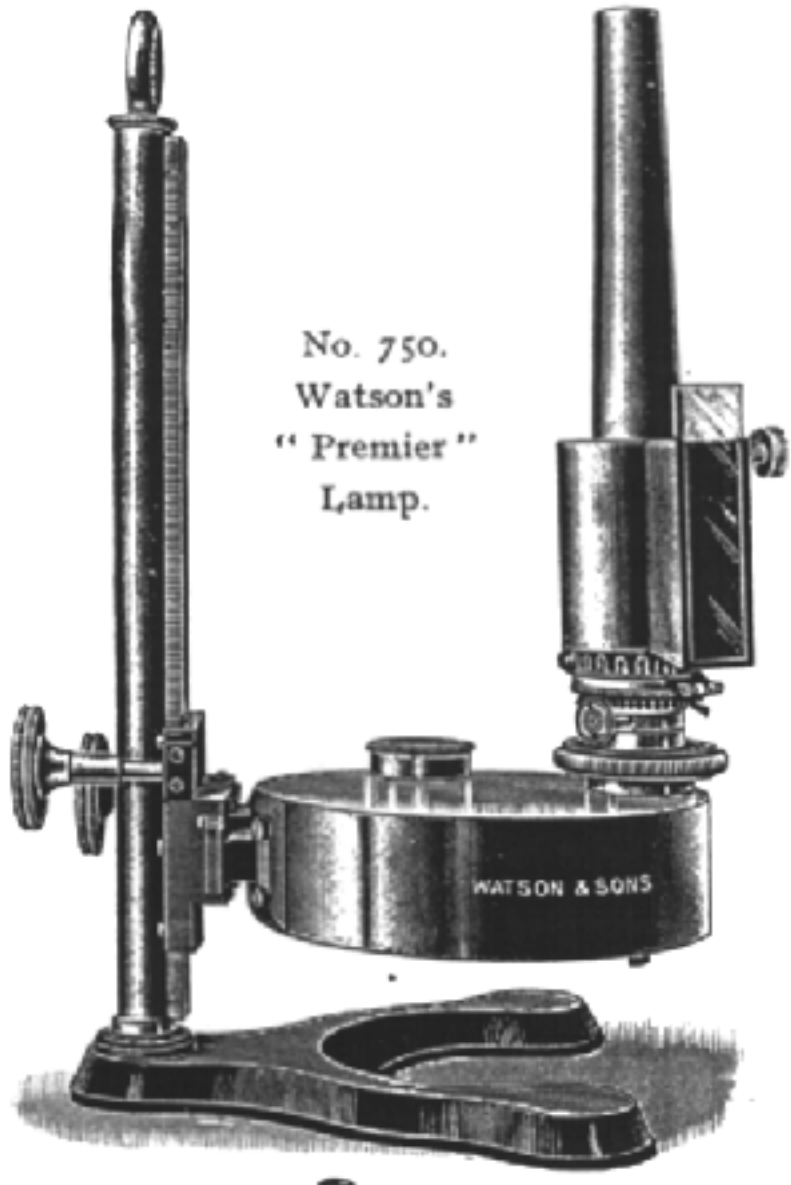
No. 726 is largely used for the same purpose as No. 724 by classes and schools.

Special quotations for quantities.

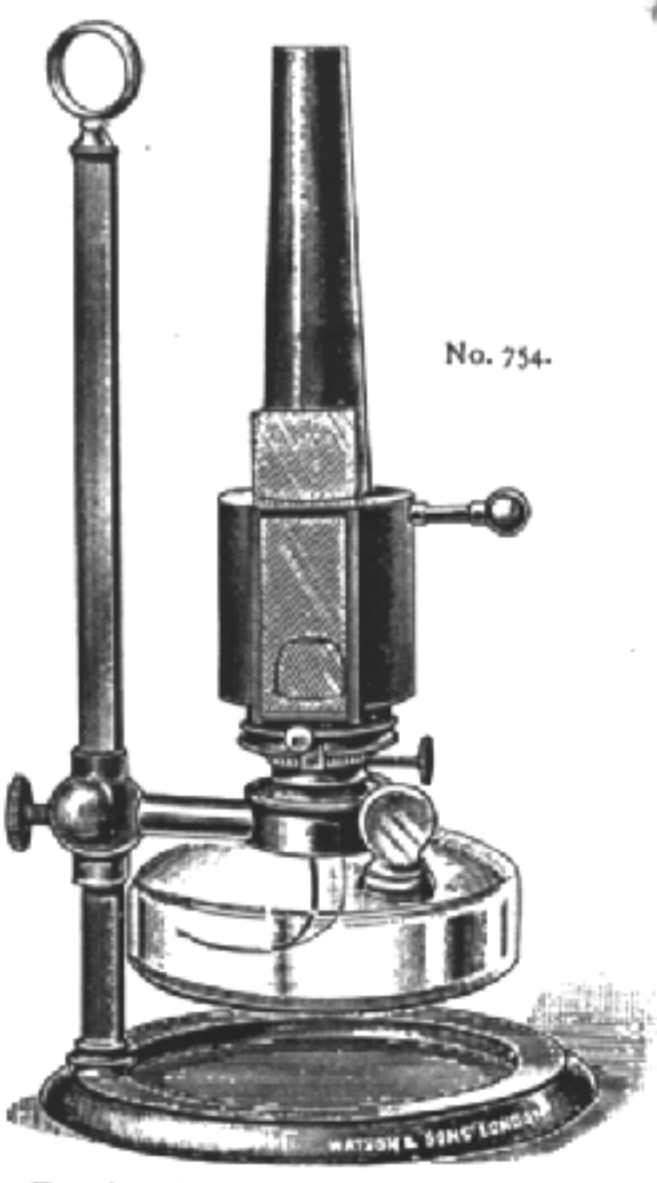
MICROSCOPE LAMPS.



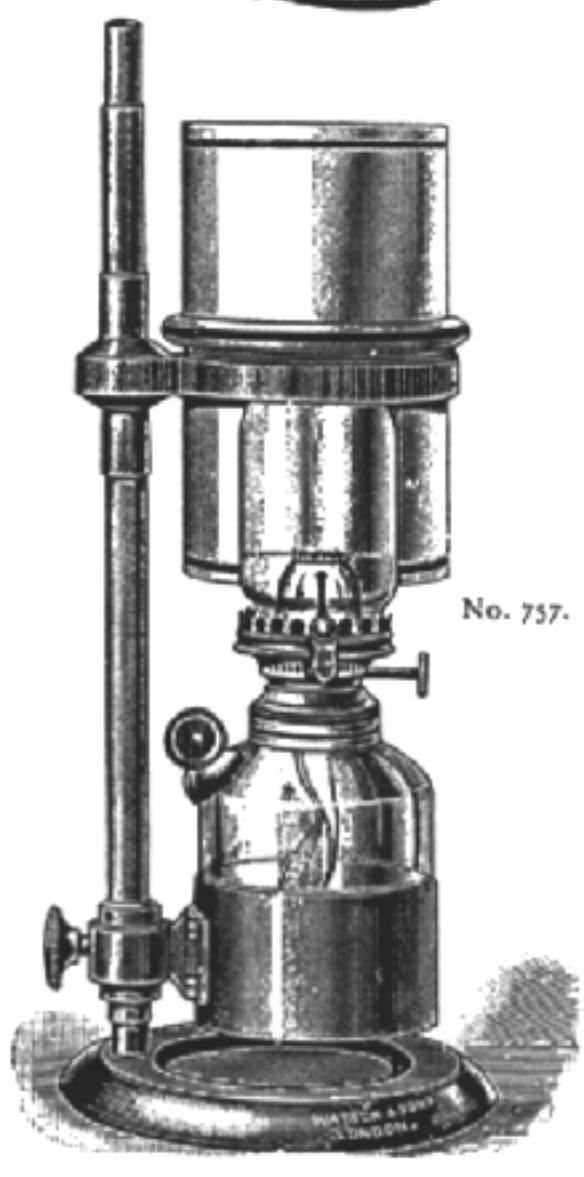
Aplanatic
Ball's-eye, mounted
for Lamp (No. 755).



No. 750.
Watson's
" Premier "
Lamp.



No. 754.



No. 757.

For description and prices, see page 133.

A F MICROSCOPE LAMPS (FOR OIL).

See Illustrations, page 132. Lamps for Gas and Electric Light, see page 136.

WATSON & SONS' "PREMIER" LAMP. This Lamp is provided with rackwork and screw movements, fitted to the upright bar in vertical and horizontal directions, by means of which the light can be exactly set in any desired position. The foot is a very solid one of brass, the oil container is also of brass; the burner can be rotated so that either the flat or edge of wick may be used. Metal chimney for 3 in. by 1½ in. slips, price £4 4 0

751. Ditto ditto without mechanical adjustments..... 2 10 0

752. Nelson's Aplanatic Bull's-Eye, mounted on arm attached to oil container, for use on Nos. 750 or 751, with divided sliding adjustment for focussing, etc. 1 10 0

752A. Iris Diaphragm, fitted to Bull's-Eye, Nos. 752 and 755....extra 1 5 0

753. Mahogany Case for Lamps Nos. 750 and 751 ..... 0 15 0

754. WATSON & SONS' "STANDARD" MICROSCOPE LAMP.—This Lamp is of improved construction and gives a most brilliant light. It is fitted with a metal chimney, having extra large body allowing of free combustion, and fitting to receive ordinary 3 in. × 1½ in. slips. The trouble of broken glass chimneys is thereby avoided, and as the inside is blackened, double reflections are prevented. The container being flat, the light can be brought down very near to the table: also it will be noticed that the stopper is built up from the reservoir, thereby obviating the unpleasant leaking usually found in these flat lamps. The supporting bar being square, the lamp is very rigid and has no tendency to swing round as on a circular tube. It burns for ten hours. (Best paraffin oil should be used). Complete with blue and white slips 1 5 0

This Lamp will be found a most perfect illuminant for Photo-Micrography.

755. Ditto ditto fitted with Nelson's Aplanatic Bull's-Eye Condenser as described page 133 and illustrated page 132 ..... 2 15 0

This is mounted in the manner illustrated, page 132, and fits on to the bar of the lamp stand; means of focussing are provided.

756. Mahogany Case for No. 754 ..... 0 7 6

757. Microscope Lamp, for paraffin, as illustrated, very efficient, very convenient, recommended 0 15 0

758. Most complete Microscope Lamp, for paraffin, on a rising bar (similar to No. 757), to fix at any height, silvered reflector, bull's-eye condenser, tinted chimney and porcelain shade; a very convenient pattern 1 15 0

759. "The Withnell" Microscope Lamp, specially designed as a travelling micro. lamp. Similar in construction to the "Standard" lamp No. 754, but the oil container is of brass throughout. Bayonet catch to chimney and burner. The reservoir and other detachable parts pack into a small tin box. A really efficient, clean, and portable lamp.....price 1 10 0

760. Mahogany Case for Nos. 757 and 758 ..... 0 6 6

761. Small Glass Microscope Lamp, for mineral oil..... 0 3 6

762. Extra Chimneys .....each 0 0 6

763. Extra Shades for Nos. 757 and 758.....each 0 1 6

764. Metal Chimney, as shown on lamp No. 751 (page 134) 0 6 0

NOTE.—It is advisable after use to remove the metal chimney, or it is apt to smell when re-lighted.

WATSON'S NEW STANDARD ELECTRIC LAMP.

For Microscopic Work.

765. A bright lacquered brass standard on weighted base, carries a 16 candle-power Incandescent Lamp, with frosted glass bulb, on a movable double arm, adjustable in all directions. The lamp bulb is enclosed in a bright nickelled reflector of parabolic shape, thus entirely shielding the eyes from the direct glare, and at the same time concentrating the light upon the microscope mirror or work table.



No. 765.

Where current is already laid on, this lamp will be found clean, powerful and instantly ready for use. An automatic switch, wall plug and six yards of flexible twin wire cord are included.

Price, 35/0.

766. Ditto, ditto, with special hood and iris diaphragm, so that the opening of the diaphragm may be used as the source of light..... **£3 10 0**

THE NERNST ELECTRIC LAMP.

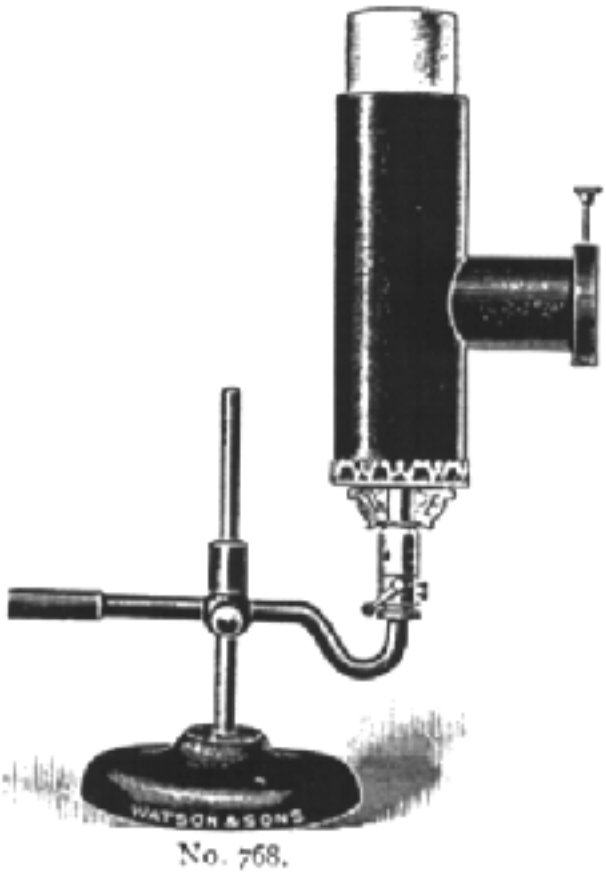
767. This new electric lamp has been found especially valuable for photo-micrography; it can be fitted to any ordinary lamp holder, the candle power yielded being dependent on the voltage, and ranging from 13½ to 46 c.p. It is made for two ranges of voltage:—

¼ ampère, 100 to 250 volts..... Price **5/0**
½ ,, 100 to 150 ,, ... ,, **5/0**

A suitable upright stand with heavy base similar to No. 768 is supplied to carry the above lamp, together with a Russian iron chimney having in front an iris diaphragm through which the light is emitted. The price of this stand with chimney, iris diaphragm and Nernst Lamp, complete with connecting wire and socket, is **£3 10 0**

When ordering please state the voltage of circuit.

Other Nernst Electric Lamps are quoted on page 171 in connection with Photo-Micrographic Outfits.



No. 768.

WATSON'S INCANDESCENT GAS LAMP.

For Microscope Work.

768. Microscope Lamp as figured with Incandescent burner, having bye-pass, mica chimney, metal hood. Complete with mantle, etc..... **£1 10 0**

769. Ditto, with iris diaphragm to hood so that the opening of the diaphragm may be used as the source of light, and the structure of the mantle eliminated **£2 10 0**

770. †Table Gas Lamp, with polished brass cased rod and base. Vertical sliding adjustment, Incandescent burner and metal chimney, complete..... **£1 0 0**

771. Extra for Iris diaphragm to chimney..... **£1 0 0**

772. †The above Lamp can be used as an ordinary table reading Lamp when desired and can be fitted with removable 7½ in. Opal Shade and Holder at an extra cost of **3/6.**

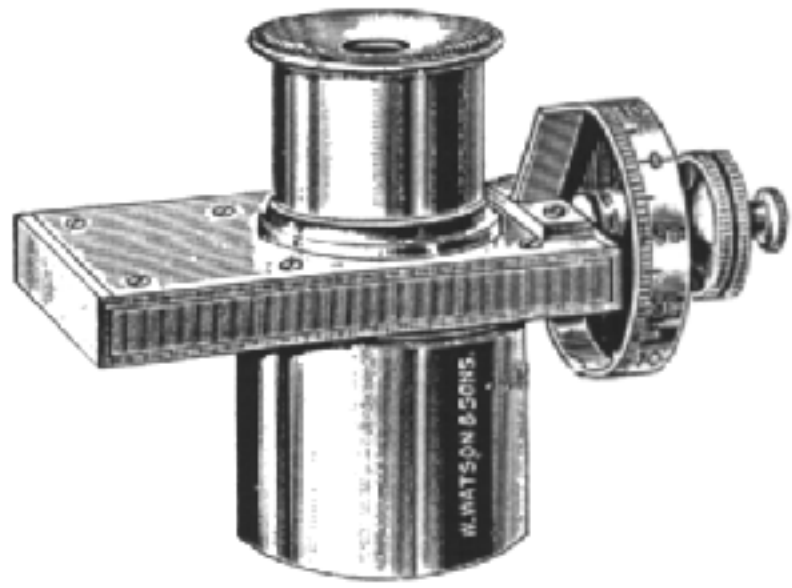
Micrometers.

Ramsden's Screw Micrometer Eyepiece.

Micrometer to drop into Eyepiece.



No. 777.



No. 774.

RAMSDEN'S SCREW MICROMETER EYEPIECE.

774. This is constructed almost entirely of aluminium, and thereby overcomes the vibration that was experienced with the heavy one made in brass. The teeth are cut to $\frac{1}{100}$, and the drum gives the fractional space between the teeth to $\frac{1}{100}$ths. It therefore can be read to the $\frac{1}{10000}$th. The fixed wire is set a little to the side of the field as recommended by Dr. Dallinger.

PRICE, fitted with Huyghenian Eyepiece, of the very best and most accurate construction £3 15 0

The above can also be made to take the ×8 Zeiss Compensating Eyepiece, if desired at the same cost. The Eyepiece is not then included.

775.	Micrometers for Stage, ruled $\frac{1}{100}$th and $\frac{1}{1000}$th of inch	£0	5	0
776.	Ditto ditto $\frac{1}{10}$th and $\frac{1}{100}$th of millimetre	0	5	0
777.	Ditto to drop in Eyepiece, as figured	0	5	0
778.	Ditto ditto ruled in squares	0	5	0
779.	Ditto for Eyepiece with Jackson's adjusting Screw (the Eyepiece requires to be cut for this to be fitted)	0	17	6
	Cutting Eyepiece for ditto	0	5	0
780.	Ditto ditto ditto with best capped Eyepiece	1	15	0
781.	Student's Micrometer Eyepiece, with screw-jointed centre for the insertion of Micrometer No. 777 or 778, and eye lens mounted in sliding tube for focussing the Micrometer	0	8	0

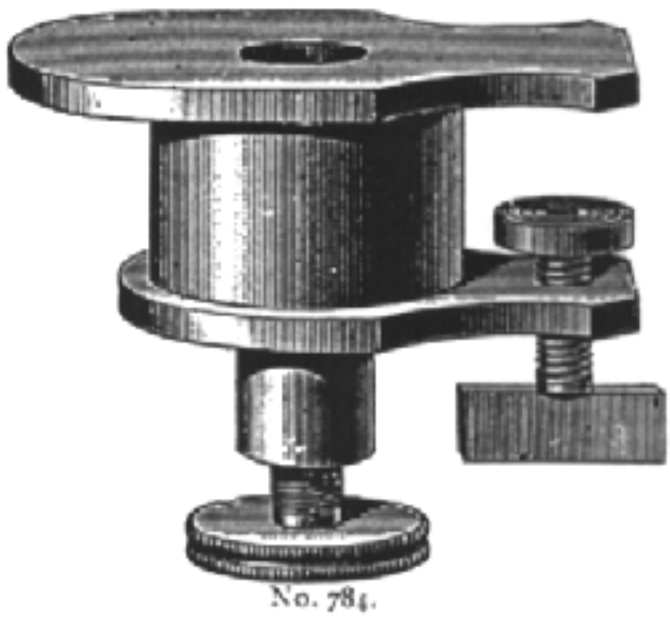
NOTE.—The Micrometer itself is extra.

LEVER COVER-GLASS GAUGE.

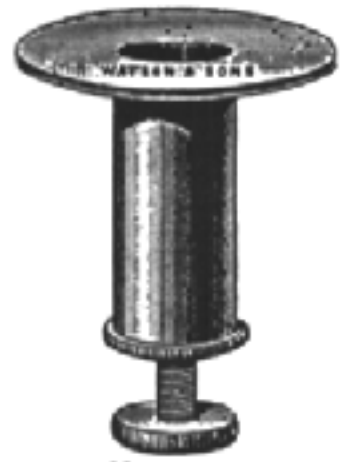
782. This consists of a sheet of brass 6 × 2½ in., on which is fixed at one end a long pointer, reading on a graduated arc at the other end. Mounted on this pointer is a projecting tooth which is pressed against a vertical plate of steel by a spring. The disc of glass to be measured is placed between the tooth and the steel plate, and its thickness is indicated in thousandths of an inch by the figure on the arc against which the pointer reads 1 12 6

This is exceedingly accurate and quickly worked.

MICROTOMES.



No. 784.



No. 787.

784. Mr. Cole's Pattern Section Cutter, as figured 784. This is a most useful and efficient Pattern Section Cutter, being very solid and rigid when in use. The screw for raising the sections is very fine, and the milled-head extra large, enabling very thin sections to be cut..... £1 5 0

785. Set of Punches complete, in case, for cutting out imbedding substances, extra 0 5 0

785a. Mr. Cole's Pattern Section Knife, in case..... 0 4 6

786. Smaller size Microtome, best quality, to attach to table..... 0 17 6

787. Hand Section Cutters, for Botanical work (as figured 787) 0 5 0

788. Ditto ditto ditto with glass top..... 0 7 6

789. Razor blade mounted on fixed handle..... 0 2 6

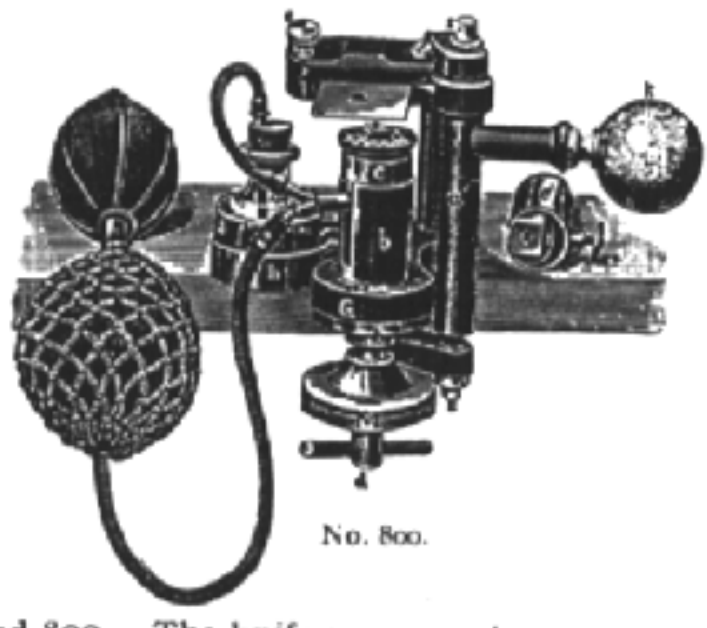
790. Razor of good quality and strong make 0 1 6

JUNG-THOMA MICROTOMES.—For Sections in Celloidin or Paraffin.

797. Pattern I. Length of knife travel 40 c/m., adjustable object - holder, micrometer screw-raising arrangement; one Thoma knife 24 c/m. blade..... £11 10 0

798. Pattern II. Length of travel 27 c/m., fittings as in pattern I., one knife 16 c/m. 8 10 0

799. Pattern III. Length of travel 21 c/m., adjustable holder and clamp, one knife 12 c/m. 6 0 0

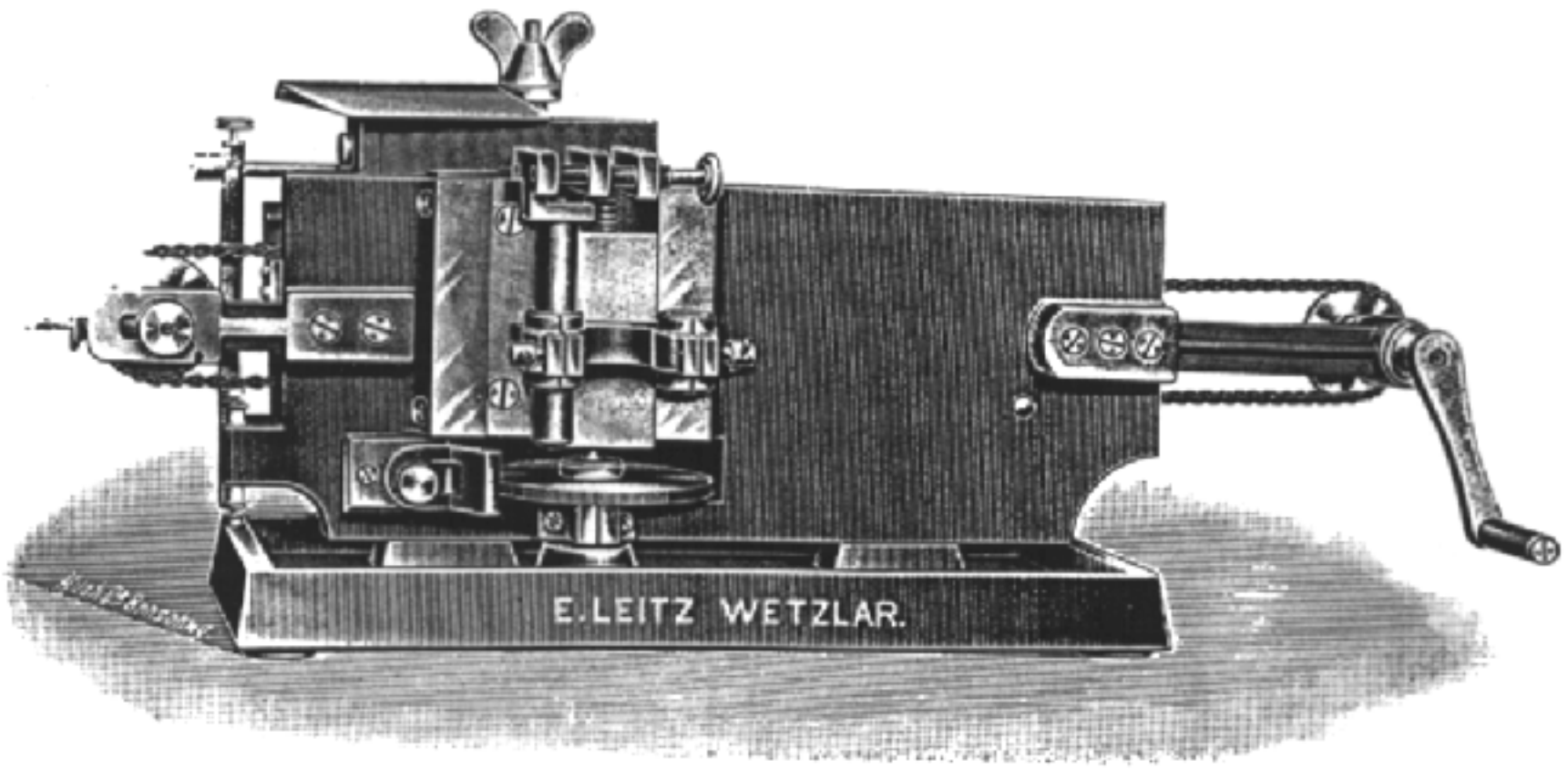


No. 800.

800. Jung's Student's Microtome, as figured 800. The knife movement automatically raises the object-holder, and cuts sections down to $\frac{1}{200}$ m/m. thick. This pattern is specially intended for paraffin-embedded, frozen and hard material. Complete with one knife, freezing and embedding accessories, all in strong fitted wood case.. £2 10 0

801 Jung's New Pattern Student's Microtome, similar to No. 800, but specially arranged for Celloidin preparations. Complete outfit including 3 knives of various shapes, in case, setting wire and tube for knives, section stretcher, object clamp, freezing and embedding accessories, all in strong fitted wood case 4 5 0

MICROTOMES.



No. 802.—Large Sliding Microtome by Leitz.

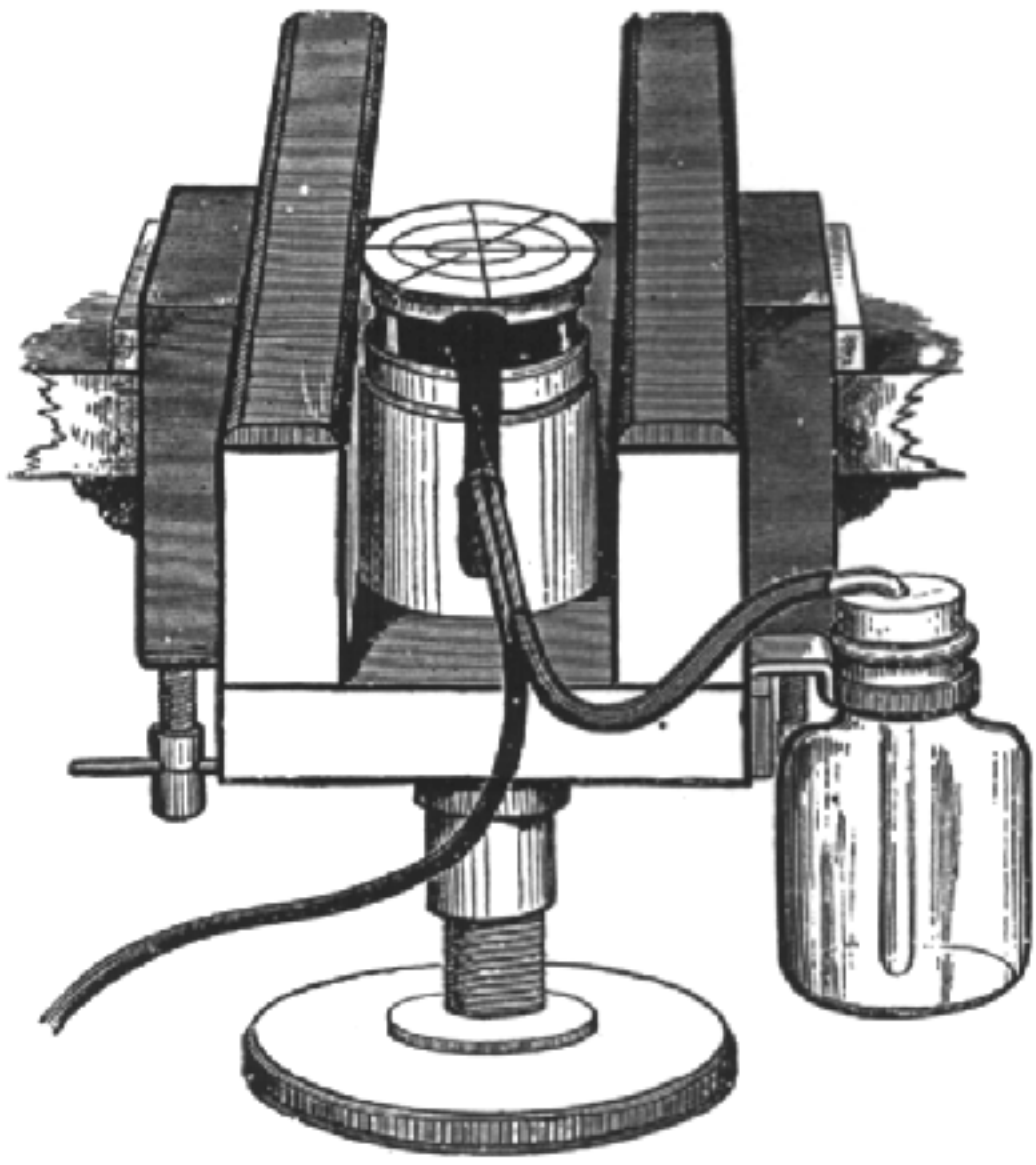
These Microtomes are heavy in construction and of the greatest accuracy and steadiness in working. They are made in three sizes; they have an automatic feed attachment, the knife being moved by either a wheel and chain device or by hand alone. The object clamp is raised vertically by a micrometer screw. This motion is accomplished by turning a large disc having teeth cut into its periphery, a turn of one tooth being equal to an elevation of 0·0025 m/m. The automatic feed is arranged as follows: With each return of the knife carrier to the end of its track, pressure is made upon an adjustable lever which regulates the motion of the micrometer wheel. This device may be so adjusted as to move the micrometer disc to any number of teeth from one to ten with each sweep of the knife. Three different forms of clamps may be had for these microtomes and freezing apparatus as well as paraffin table can also be fitted.

802.	The Large Sliding Microtome has a track 42 cm. long. Its price with automatic feed attachment, wheel and chain arrangement for the knife carrier and fixed clamp, without knife is	£7	15	0
803.	The same, but without the wheel and chain arrangement for the knife carrier	6	5	0
804.	Medium size Sliding Microtome.—Track 32 cm. long; automatic feed attachment; wheel and chain motion of knife carrier and fixed specimen clamp, without knife	7	0	0
805.	The same, but without wheel and chain motion	5	10	0
806.	Fixed Specimen Clamp	0	10	0
807.	Ball and Socket Clamp	0	15	0
808.	Naples Clamp	1	10	0

MICROTOME KNIVES—THOMA'S MODEL.

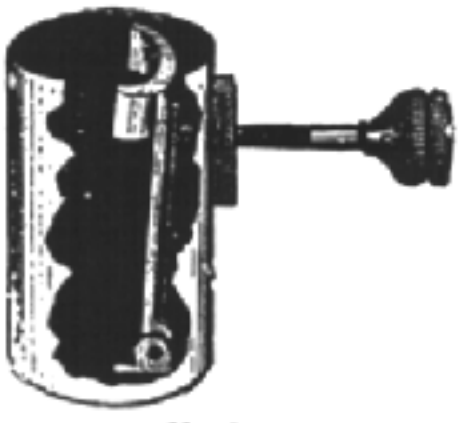
809.	Plane and Concave; length of blade 24 cm. (9½ in.)	£1	13	0
810.	" " " " 16 cm. (6½ in.)	1	1	0
811.	" " " " 12 cm. (4¾ in.)	0	14	0
812.	**Freezing Apparatus**	1	2	6
	Strop, Heidelberg pattern, with 3 prepared surfaces and one side a hone	0	7	6
	Strop for Knives, with 1 surface, 12 × 2 inches	0	6	6
	Do., do., do., 14 × 2 inches	0	7	6

W. WATSON & SONS'
CATHCART MICROTOME.



No. 813.

813. We now supply this useful Instrument fitted for either Ether Freezing or Imbedding. For freezing tissues it is arranged as shown above; when it is required to imbed tissues, the tubes and bottle are withdrawn, and the freezing tube drawn out; this latter is replaced by another tube, as shown No. 813A; the substance to be cut, imbedded in paraffin or other medium, is then inserted, and the clamp screwed. This Instrument is thoroughly well finished, and the adjusting screw milled head is made specially large to permit of a fine movement being obtained. Improved Microtome as above, with double clamp to fasten it to table, spray bellows and freezing apparatus, tubes for making paraffin blocks, etc. .....complete **£1 1 0**



No. 813A.

814. The above Instrument, arranged for Ether Freezing only..... **0 17 6**

815. Ditto ditto Imbedding only **0 15 0**

816. Plane Iron Section Knife, in handle..... **0 2 6**

817. Ether Points, extra sets..... **0 2 0**

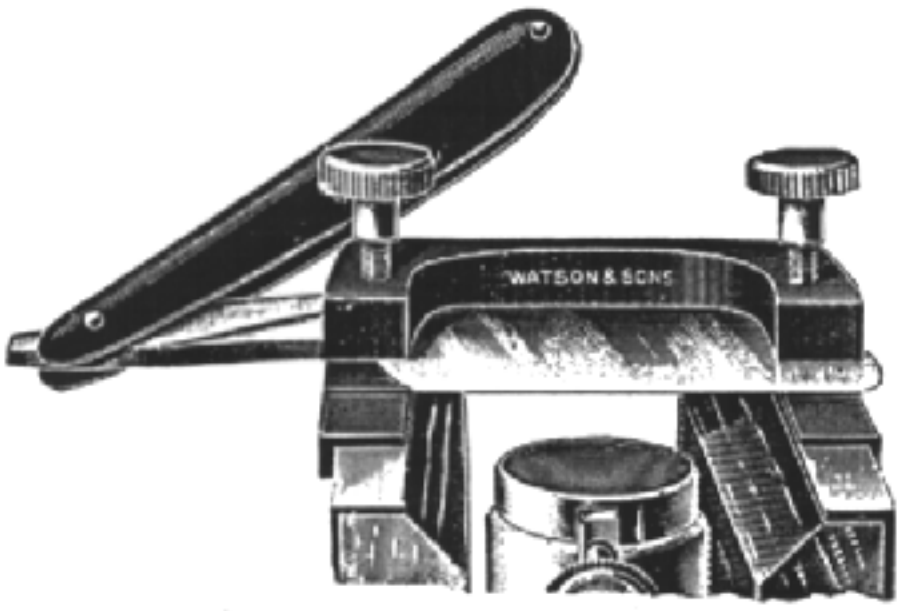
818. Paraffin Wax for imbedding, ordinary quality, per lb., **1/6**; pure white, filtered, hard and soft..... per lb. **0 2 6**

819. Shaped Blocks, for Casting Paraffin Blocks. In brass, neatly finished.....price per pair **0 1 6**

MICROTOMES—*continued.*

W. WATSON & SONS' KNIFE CARRIAGE PATTERN.

CATHCART MICROTOME, No. 825.



No. 825.

825. This popular Microtome resembles that figured page 138 in general construction, but has had several important improvements introduced into its construction recently, as follows:—The glass rails have been replaced by brass plates, upon which a brass knife carriage rides freely. The knife is carried in a universal holder which permits of the edge being set at an angle and the sweep of the cut being varied. The milled head which raises the material that is being cut, has a toothed edge in which a spring tooth lightly engages, by means of which the thickness of section can be accurately measured.

Improved Cathcart Microtome, finished in lacquered brass, with universal knife holder, razor, section thickness indicator, arranged for both freezing and embedding £1 7 6

826. For Freezing only 1 4 0

827. For Embedding only 1 2 0

NOTE.—The plane iron section knife cannot be used upon the brass plate.

SCHANZE LABORATORY MICROTOMES.

The knife is clamped to a heavy iron block which slides to and fro in a V groove, the contact surfaces being faced with lead. Iron framework of massive onstruction to eliminate vibration and give steadiness to knife.

828. Pattern B. For objects 6 × 4 cm., length of knife travel 40 cm., orientating apparatus, lever and micrometer screw adjustment to object-holder, paraffin block table, Heidelberg knife, 25 cm., in case, Ether freezing attachment, nickelled tray, etc. £10 15 0

829. Ditto ditto, for objects 4 × 3, with 17 cm. knife 8 0 0

Larger and smaller forms can be supplied. Particulars on application.

MINOT-ZIMMERMANN MICROTOME.

830. For laboratory use. Instead of the knife travelling to meet the paraffin block, the former is fixed, and the object-holder brought forward by a driving wheel actuating an automatic arrangement attached to the object-holder. Strongly recommended where large numbers of sections have to be cut in a short time.

831. Pattern I. Arranged to cut 6 different thicknesses from $\frac{1}{50}$ to $\frac{1}{500}$ m/m £10 0 0

832. Pattern II. For sections $\frac{1}{50}$ m/m to 1 micron 12 10 0

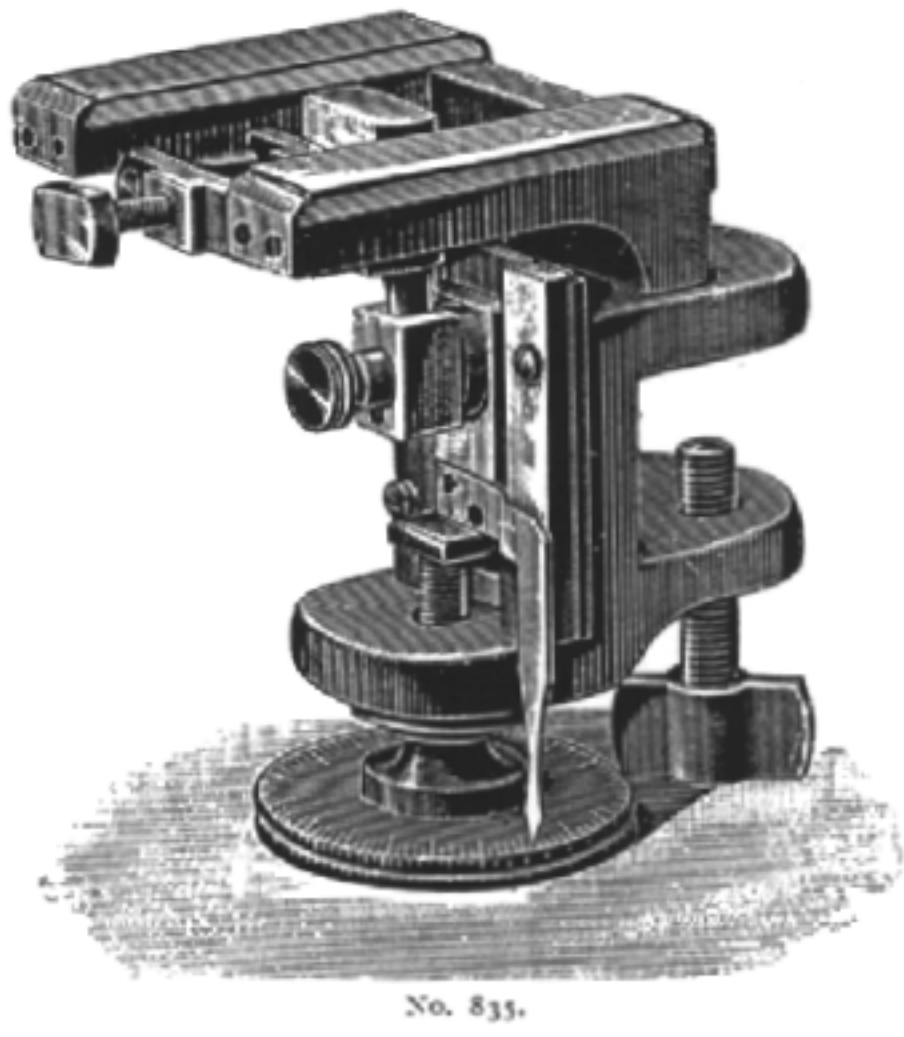
833. Pattern III. For sections 40 to $\frac{1}{2}$ micron, including extra accessories for celloidin sections 15 0 0

SURGICAL INSTRUMENTS.

Surgical Instruments of best quality supplied to Hospitals and similar Institutions, also to Medical Men, on specially advantageous terms. Enquiries invited.

MICROTOME—*continued.*

SMALL MODEL MICROTOME.



No. 835.

This Microtome is provided with a clamping holder for the specimens that are to be cut, and an additional round plate with roughened surface for attaching paraffin embedded tissues. The adjusting milled head is of large diameter, has a very fine screw, and is divided into 50 parts. The knife guides are of glass, 2¾ inches long, secured by metal catches, not cemented. This is a very efficient Microtome.

835. **PRICE** £1 15 0

THE CAMBRIDGE ROCKING MICROTOME.

836. Small Microtome, 1900 Pattern, without razor and object-holder £3 15 0
837. ,, ,, ,, with razor 3 17 6
838. ,, ,, ,, with razor and simple orientating apparatus 4 2 6
839. Large or flat section cutting Microtome, 1900 Pattern, with razor and object-holder 8 10 0
840. Large or flat section cutting Microtome, 1900 Pattern, with double lever to prevent cutting thick and thin sections 9 0 0

For Embedding Baths, see page 143.

MICROTOME ACCESSORIES.

841. Celloidin, Schering's granular, per box of 1 oz. £0 3 6

Cases of stout cloth-covered cardboard with divisions for paraffin blocks—

	2 c/m.	3 c/m.	4 c/m. square.
842. For 100 blocks	6/0	7/6	15/0
843. ,, 200 ,,	10/0	15/0	25/0

844. Jung's Embedding Bath—complete with gas regulator, thermometer, burner, plated dishes, etc., as used at Naples Zoological Station £4 0 0
845. Elder pith ..... per bundle 0 0 6

MICROTOMES.

THE STUDENT'S SERIES OF LABORATORY MICROTOMES.

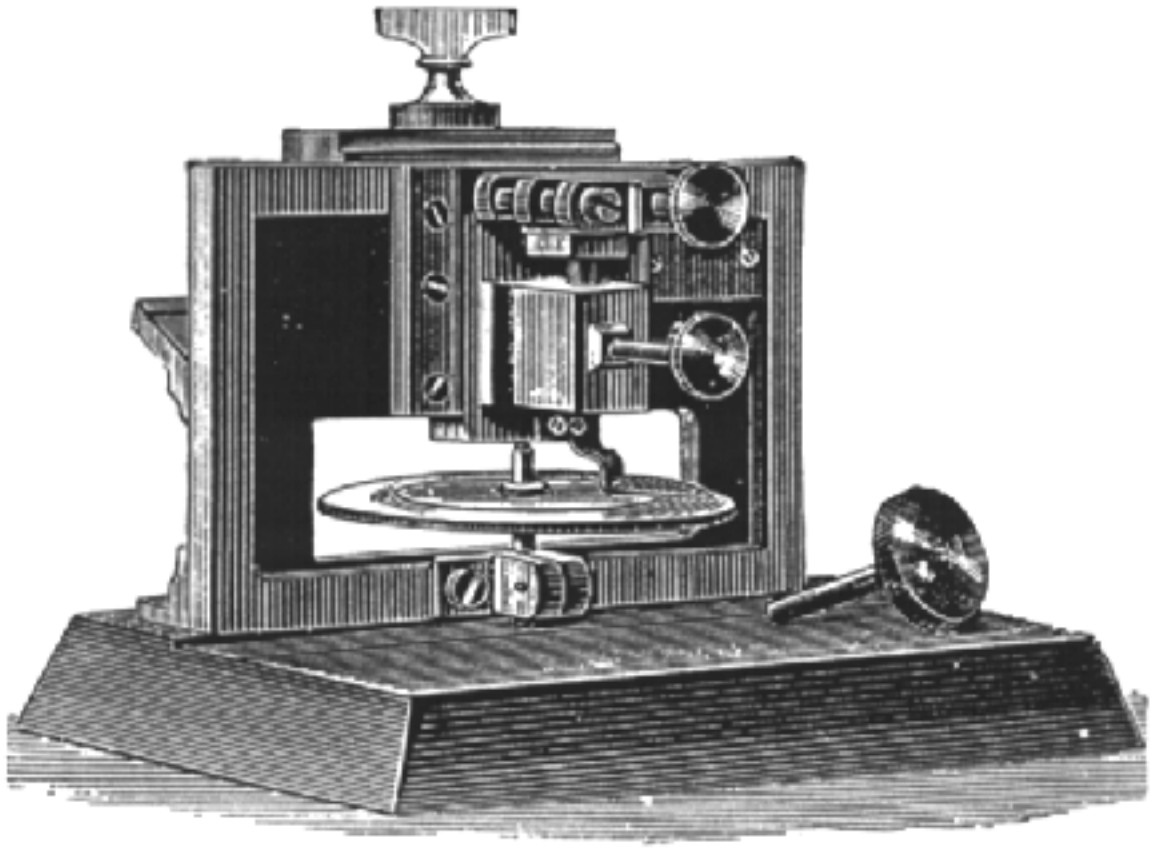


Fig. 1. Microtome Pattern A.

These Microtomes are of sound and accurate construction throughout. The working parts are adjusted with extreme precision, permitting sections of uniform thickness to be easily obtained, while the frame work and fittings are finished in an efficient but less elaborate style than in the more expensive forms of Continental Laboratory Microtomes.

A large number of these instruments have already been supplied—and the users have in all cases expressed complete satisfaction with the results.

Student's A Pattern, as fig. 1, giving 12 c/m length of travel for knife, one object clamp (not orienta ing) to take objects 2 × 2 c/m, and one metal disc for paraffin section	£1	15	0
1 Knife for ditto	0	5	0
1 Case for knife, ditto	0	1	6
Freezing Apparatus, ditto	0	12	6
Polished wooden case to contain Microtome and fittings	0	6	0
	£3	0	0

N.B.—Any of the items in above set may be purchased separately. The minimum thickness of section obtainable with above Microtome is 0·005 millimetre.

Student's B Pattern, similar to pattern A, but of larger dimensions throughout, 15 c/m length of travel, clamp for objects 2 × 2·5 c/m, and metal disc for paraffin	£2	17	6
1 Knife for ditto, 10 c/m long plano-concave (or double concave)	0	9	6
1 Case for knife	0	3	6
Freezing Apparatus	0	16	6
Polished wood Case for Microtome and fittings	0	6	6
	£4	15	6

MICROTOMES—*Continued.*

Student's "C" Pattern, as fig. 2, with orientating clamp for objects up to 2 × 2·5 c/m, lever and fine Micrometer screw raising motions.

Length of travel for knife, 17 c/m; 1 metal disc for paraffin	£3	15	0
1 Knife 14 c/m lon:	0	15	6
Case for 1 knife..	0	4	6
Freezing attachment	1	0	0
Polished wood Case for Microtome and accessories.....	0	9	6
	£6	4	6

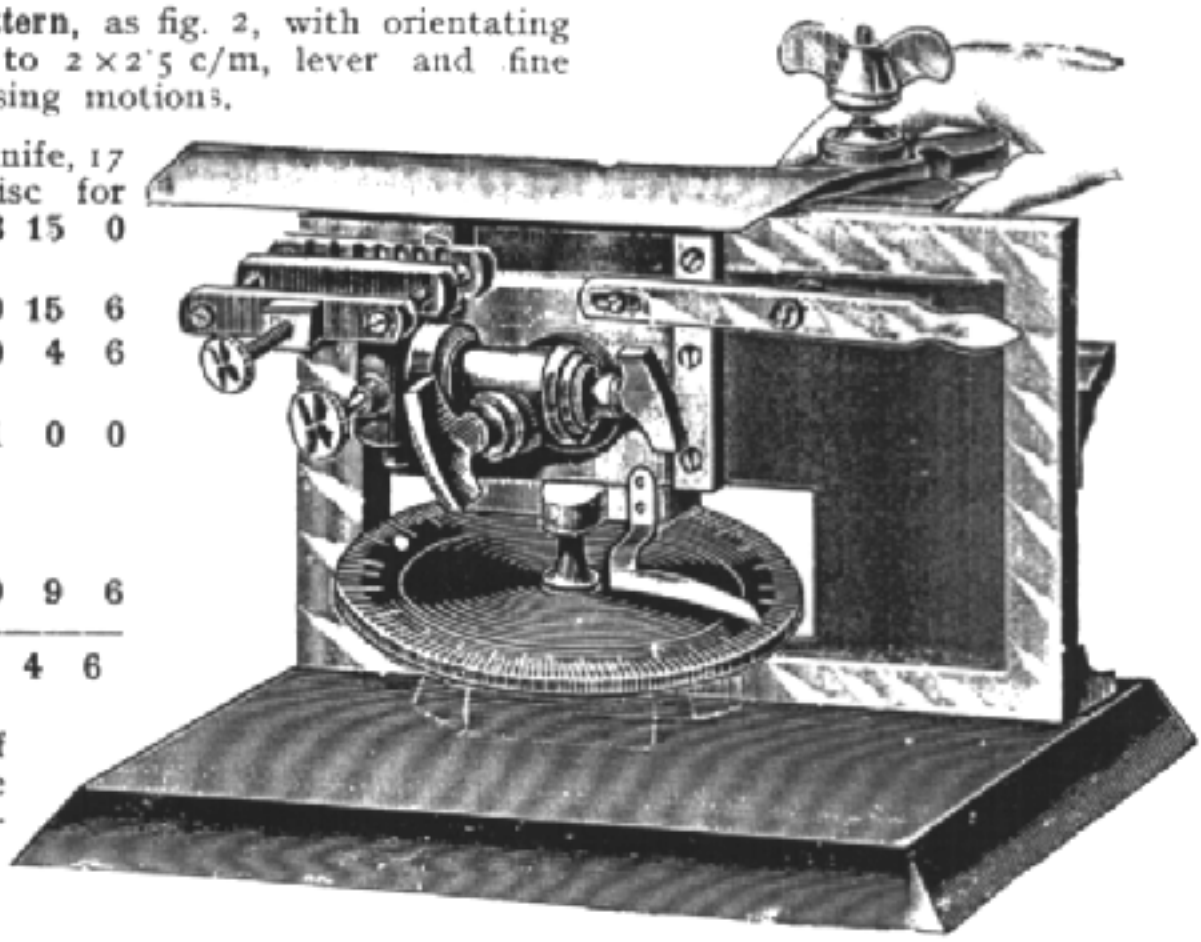


Fig. 2. Microtome Pattern C.

Larger sizes of Pattern "C" can be supplied; full quotations on application.

Student's "D" Pattern, as fig. 3. As will be seen from the illustration, this pattern has—in addition to the lever and Micrometer screw raising movement—a spring ratchet and pall arrangement with handle for automatically raising the object a definite amount after each stroke of the knife. The range of thickness obtainable with this arrangement is from 0·02 m/m. to 0·0075 m/m.

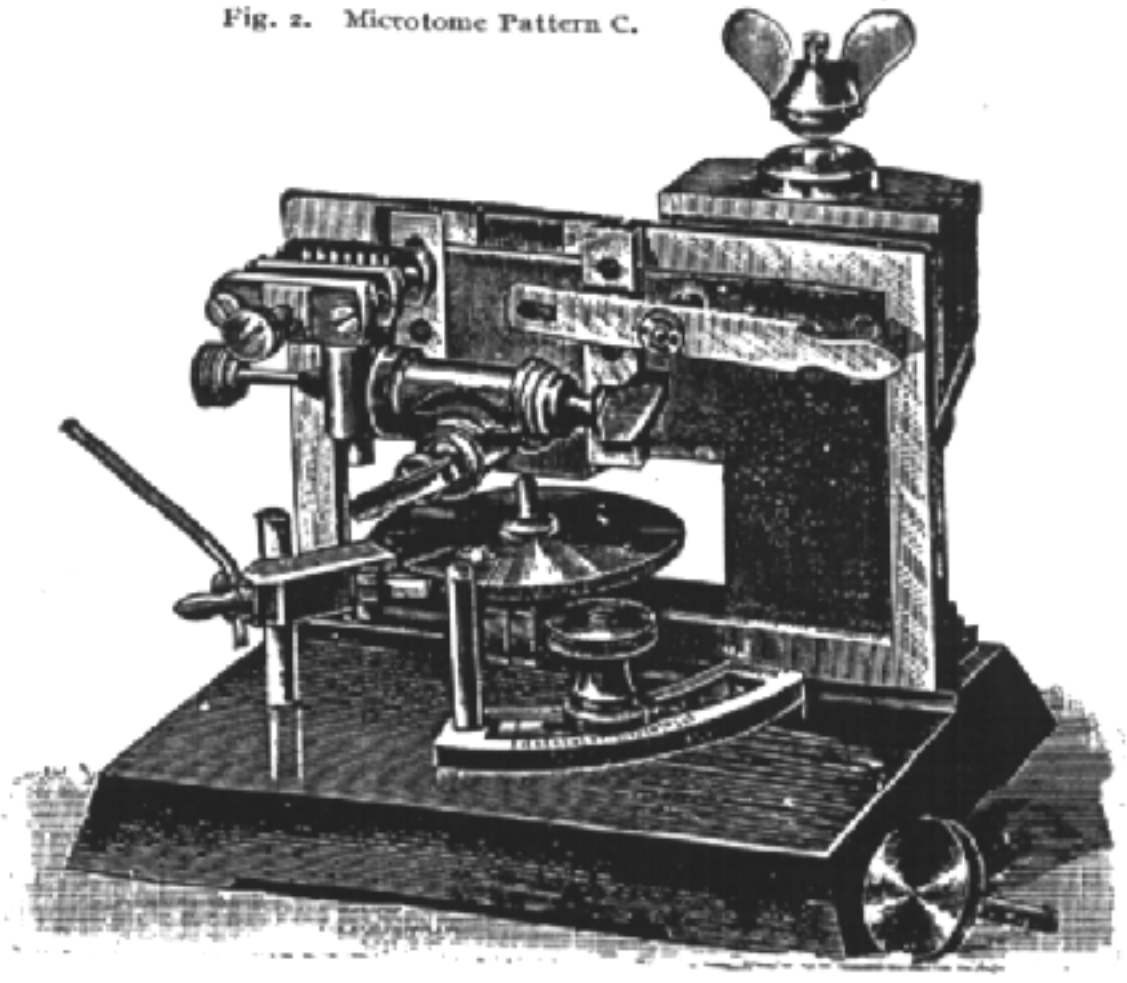


Fig. 3. Microtome Pattern D.

Length of travel for knife, 17 c/m., with clamp for objects 2 × 2·5 c/m., 1 metal disc for paraffin or celloidin	£4	10	0
1 Knife 12 c/m. long, hollow ground	0	11	6
1 do., 14 c/m., plano-concave	0	15	6
1 Ca e for 2 knives	0	7	6
Freezing attachment	1	0	0
Polished wood case for Microtome and accessories	0	9	6
	£7	14	0

EMBEDDING BATHS.

850. Small Laboratory Form made of stout copper, dimensions about 14 in. × 7 in. × 1½ in., with 4 silver-plated copper pans, glass tubes and bottles, drying shelf, thermometer, heat regulator, gas burner, rubber tubing and iron stand for the bath, complete £3 0 0

851. Larger size, about 20 in. × 13 in. × 6 in., similar to above, but with 6 large and 8 small silver-plated copper pans, 22 glass tubes and bottles, complete 5 0 0

The following Bath has been designed, more particularly, to prevent dirt and foreign matter falling into the specimens under preparation.

852. Seven small porcelain pots—four 2⅛ in. in diameter, and three 1¾ in. in diameter—fit into small cups in the Embedding Bath, and are protected when the apparatus is in use, by covers. Two shelves are provided for heating the glass slide; the upper one is for the ordinary 3 in. slide; the lower one, for the long slides used in mounting the ribbon sections. A pocket is provided for holding the bottles of stains and re-agents. A gauge glass shows the height of water in the cistern.

Price, with Page's Glass Regulator £8 0 0

853. If fitted with improved steel regulator, by means of which metal connections can be made all through, thus reducing all risks of fire 9 10 0

854. If fitted with electric heater and regulator 12 0 0

HEARSON'S VACUUM EMBEDDING BATH, heated by gas £5 5 0

Ditto, ditto, working with a Petroleum lamp, for use in colonial and other stations where coal gas is unobtainable..... 6 10 0

For Prices of Hearson's Incubators, see page 148.

REFRACTOMETERS AND POLARIMETERS.

THE BUTTER REFRACTOMETER, by Zeiss.—This Instrument, as its name implies, is intended primarily for the analysis of Butter, but it is also of great utility and convenience for the examination of fats and oils. By its means very accurate determination of refractive indices may be made at any temperature between 10° and 50°C, inclusive of thermal variations of refractive powers, but also, in particular, in the possibility which it affords of distinguishing substances by their different dispersive powers, rendered visible by the different colouring of the critical line. In this way, for instance, mixtures of turpentine and a substance obtained by distillation from petroleum, which is now being fraudulently purveyed as Canadian Turpentine, can at once be recognised.

Full particulars for working can be obtained on application and are supplied with each instrument.

PRICES.

855. Refractometer, in case..... £8 10 0

856. Thermometer, divided into ½ deg. (0 to 50°C) 0 2 3

857. Special Thermometer for Butter and Lard analysis 0 5 0

858. Heating Spiral.. £2 15 0

859. Water Pressure Regulator 0 8 6

860. Zeiss Refractometer, latest pattern, arranged to give direct readings of actual refractive indices, thus avoiding calculation tables. Complete with Heating Spiral, Water Regulator, and two Thermometers 18 8 6

861. Oleo Refractometer, Amagat and Jean's Model, for the analysis of Fats, Oils, Glycerine, Turpentine, etc., as used in Government and Customs' laboratories 15 5 0

862. **UNIVERSAL REFRACTOMETER, Féry's 1904 Model,** giving by a single direct reading the refractive index of all liquid bodies to the fourth decimal place. This instrument, on tripod stand, with gas burner for monochromatic light, and special thermometer £22 10 0

863 Ditto small model, reading to the third decimal place 11 15 0

POLARIMETER.—This instrument has been supplied to leading manufacturers, and is specially intended for the examination of sugar, brewers' materials, such as glucose, malt, etc.; it is also useful for the examination of urine, quinine, essential oils, balsams, drugs, the optical properties of minerals, etc., etc.

864. Complete, in plain box, with 20 centimetre tube, adjustments for zero illumination of field, and observation of angular rotation, right and left £8 5 0

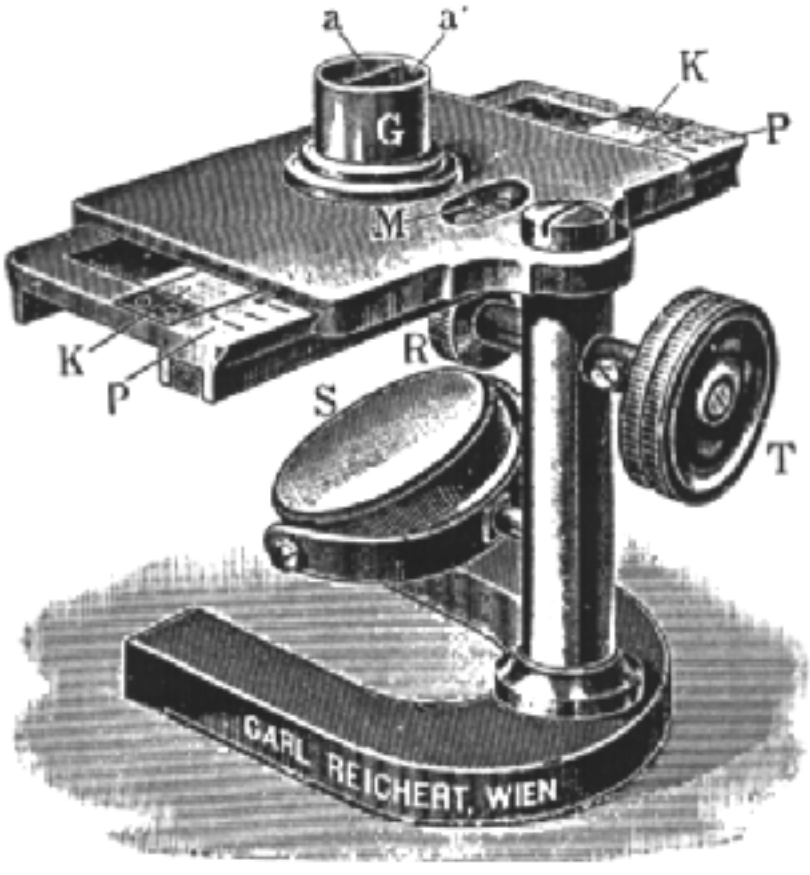
865. Ditto, and improved rackwork and fine movement 9 10 0

866. Mahogany case instead of deal one, extra 1 10 0

867. Laurent's Saccharimeter, small model 14 10 0

868. Ditto, ditto, large Model 18 0 0

BLOOD-TESTING INSTRUMENTS.



No. 900.

FLEISCHL'S HÆMOMETER,

By Reichert.

880. By means of this apparatus the deficiency of hæmaglobin in the blood can be exactly ascertained. Its special advantages are: It is rapid and accurate, only one drop of blood is required; and it is simple to use and convenient to handle. Full instructions for use supplied with each instrument.

Price, **£3.**

Extra Mixing Vessels, each **4/0.**

881. **THE NEW FLEISCHL - MIESCHER HÆMAGLOBINOMETER** the latest form of Fleischl's Hæmometer, including Laker's Puncture Lancet, 6 extra Capillary Tubes, and 1 extra mixing holder, with instructions complete **£5 14 0**

882. **Dr. ADOLPH JOLLE'S FERROMETER,** for the quantitative determination of the iron in the blood, with colorimeter, platinum crucible, tongs, bottle, lancet, and all accessories, in mahogany case **8 0 0**

Dr. GOWER'S INSTRUMENTS FOR BLOOD TESTING—

883. Hæmacytometer **£3 3 0**
884. Hæmaglobinometer **1 1 0**

The two instruments in one case **£4 4 0**

885. Hæmometer, complete with supply of solutions, pipettes, etc..... **4 4 0**
Ditto, without solutions **3 3 0**
886. Pipettes in box, 2 doz., **2s. 6d.**; 6 doz., **7s. 6d.**; 12 doz., **12s. 6d.**
887. Dr. Haldane's Hæmaglobinometer..... **1 11 6**
888. Dare's Hæmaglobinometer **4 14 6**
889. Tallqvist's Hæmaglobinometer, book form **0 5 0**
890. Durham's Hæmacytometer **2 10 0**
891. Wright's Coagulometer **1 15 0**

THE THOMA HÆMACYTOMETER by Zeiss and Leitz.

This apparatus consists of a counting chamber in combination with an accurately calibrated mixing pipette for diluting the blood in a certain ratio (1 : 100 for red, 1 : 10 for white corpuscles), with directions, in case.

		By Zeiss.	By Leitz.
895.	(a) With mixing pipette for red corpuscles	**£1 6 0**	**£1 4 0**
896.	(b) " " " white "	**1 6 0**	**1 4 0**
897.	(c) The same apparatus with both pipettes	**1 16 0**	**1 10 0**

Pipettes Separately—

898. For red corpuscles, diluting (1 : 100): for white (1 : 10).....each **0 9 0** **0 6 0**

899. Separate Counting Chamber only, Zappert's modification, in case **0 14 0**

BLOOD TESTING INSTRUMENTS.—*continued.*

900. **APPARATUS FOR THE CLINICAL DETERMINATION OF THE ALKALINITY OF THE BLOOD,** after C.S. Engel. A modification of the method of Lowy & Kuntz. With full directions, in box.... £1 5 0

901. **EHRLICH'S EYEPIECE** with square diaphragm, for estimating the relative proportions of red and white blood corpuscles in dry preparations. With instructions 1 10 0

Dr. HÉNOCQUE'S INSTRUMENTS for the Spectroscopic Analysis of Blood.

902. (a) Hæmatoscope, small model, comprising graduated glass slip in metal frame, white enamelled metal plate, supply of lancets, calculating table and instructions, in leather case..... 1 10 0

Spare Lancets..... per set 0 3 0

903. (b) Ditto, the same accessories as in (a) set, together with pocket spectroscope 3 12 6

904. (c) Hæmatospectroscope, large size, consisting of special spectroscope on stand, with all necessary accessories, complete in case 15 15 0

Dr. Haig's Capillary Dynamometer 0 10 6

TYPHOID.—New Graduated Pipette with screw compressor for performing the typhoid serum test 1 5 0

BLOOD EXAMINATION CABINETS.

915. Sichel's Micro Re-agent Cabinet, after the design of Mr. Sichel (late R.N. Hospital, Haslar), for the rapid preparation, staining and mounting of blood films. Contains 1 doz. special thin glass slips in rack box, supply of thinnest rectangular cover glasses, labels, Pakes's cover glass clip, puncture needles, cigarette paper, C. Balsam in Xylol, 4 staining solutions :—Jenner's for blood films, malaria, etc., Gibbe's double for Tubercle, Methylene blue and Eosin for contrast. Cover glass forceps. Stoppered Jar for alcohol. With full directions for use, all in neat fitted pine cabinet, leather handle, very compact and portable..... £1 7 6

Special Sets for any particular class of research, supplied to order.

915a. The Tropical Micro Re-agent Set for Blood Film Examination, etc. comprising 6 stains in solution and 6 solid ditto (B.W. & Co.'s), Xylol, Canada Balsam, 2 extra stopper bottles, spirit lamp, wire tripod, funnel, filter papers, 10 cc. graduated measure, glass slides, 3 × 1 in., cover glasses, Cornet forceps, slide labels, stoppered jar to take 3 × 1 in. slides, etc., all in fitted mahogany cabinet, with fall-down front and large drawer for extra sundries ; leather carrying strap £2 10 0



No. 916.

HEATING STAGE.

NEW PATTERN.

916. This Stage is heated with water, is very thin, and can be attached to the Microscope Stage by means of two screws. A condenser suitable for high powers is included.

Price..916. With condenser, in case complete £2 0 0

917. Warm Stage, Stricker's pattern, complete with condenser, in case 1 15 0

SLATER & SPITTA'S NEEDLE.

(STERILIZABLE.)

FOR BLOOD FILM EXAMINATION.



No. 930. Open. Closed.

930. This consists of a nickel-plated holder with the grip for needle made by a screw adjustment, which allows the point to protrude any desired amount. When carried in the pocket, the lancet end is covered with a screwed cap: when in use, this cap is attached to the other end of the holder. The interior of the holder contains an extra supply of needles (Hagedorn's). This needle can be sterilized easily and kept sterile in its own case for any length of time.....price £0 4 6

931. Pakes's Hare lip Needles, specially modified for blood film examination..... each 0 0 4

932. **Ehrlich's Constant Temperature Heating Apparatus,** for fixing and drying blood preparations, etc., copper chamber on tripod, with thermo-regulator and gas burner, with cover to heating plate.... 1 7 6

933. Ditto, ditto, ditto, without cover 0 17 6

934. **Jenner's Stain,** Kanthack's formula, guaranteed to keep good, highly recommend by all the most eminent workers, for blood film examination, per 1-oz. bottle..... 0 1 6

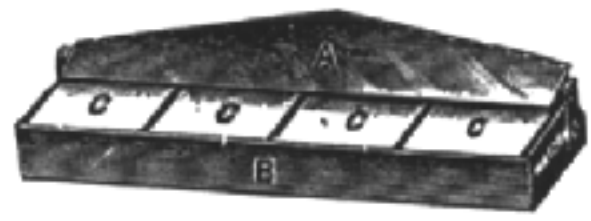
in crystal, per 1 grm. 0 1 0

935. **Leishman's Stain**—modification of Romanowsky's formula, for Blood staining.....In crystal, per ½ grm. 0 1 6

,, solution ,, 25 ,, 0 1 6

PAKES'S COVER GLASS CLIP.

For Blood Films.



No. 935.

936. This Cover Glass Clip has been designed by Mr. Pakes, late of Guy's Hospital Bacteriological Laboratory, to afford increased facility in making Blood Films. "B" is a block of mahogany with a strip of cork let in flush, upon which the spring plate "A" grips the cover glasses "C" The blood is streaked upon the covers with a machine-cut cigarette paper, and a single layer of corpuscles can by this means be obtained, rendering examination much more easy and satisfactory than by the old methods .....price £0 3 0

937. **Pakes's Needles** for use with above.....each 0 0 4

Henocque's Lancets..... per doz. 0 3 0

SURGICAL INSTRUMENTS.

Surgical Instruments of best quality supplied to Hospitals and similar Institutions, also to Medical Men on specially advantageous terms. *Enquiries invited.*

EYE SHADE FOR MONOCULAR MICROSCOPES.



This consists of two parts, as figured, jointed in the middle: one part has in it a circular aperture which slides over the draw-tube of the microscope, and the other part shuts out light from the disengaged eye when using a Monocular Microscope. It is made in vulcanite, in two sizes.

938. For bodies carrying eyepieces of continental size £0 1 6

939. Ditto, ditto, large sized eyepieces..... 0 1 9

BLOOD TESTING, &c., INSTRUMENTS—*continued.*

TEST TUBES.



919.	Set of 6 Test Tubes, various sizes, in cardboard case	£0	0	9
920.	Test Tube Stands ..... each 1/0 to	0	3	0
921.	Glass Compressor, consisting of 2 thick glass plates, about 8 × 2 inches, with 2 clamping screws, and divided into numbered squares, for low-power examination of meat, etc. With 35 squares	0	2	6

EXAMINATION OF SPUTUM, URINE, Etc.

We undertake the Bacteriological examination of specimens on the following terms, for the **Medical Profession only** :—

922.	Sputum for Tubercle	£0	7	6
923.	,, ,, other organisms	0	10	6
924.	Urine for Tubercle	0	10	6
925.	Urine generally, according to requirements ..... 15/0 to	1	15	0
926.	Milk for Tubercle	1	15	0
927.	Pus and Discharges ..... 10/6 to	1	5	0

PHOTO-MICROGRAPHY.

Photo-Micrographs of Micro Slides are taken by a skilled Microscopist, for book illustration, demonstrations, etc.

928.	Magnifications of less than 500 diameters	£0	6	0
927.	,, over 500 diameters	0	10	6

The above prices include Negative and one print.

RADIOGRAPHY—X RAYS.

We have a completely equipped room for Radiographing Patients for Medical Men, or we can send Operators to any part of the country without delay. List of fees on application.

We are manufacturers of **High Frequency** and **Electro Therapeutic Instruments,** a complete price list of which will be sent on application.

SPECTACLES AND PINCE-NEZ.

We make a Speciality of **filling Oculists' Prescriptions** for Spectacles, Pince-Nez, &c. This work has been entrusted to us for many years by well-known Oculists. Frames are in every case made to order to suit the facial shape, &c., and the greatest care is taken in filling the lens portion.

MICROSCOPIC OBJECTS.

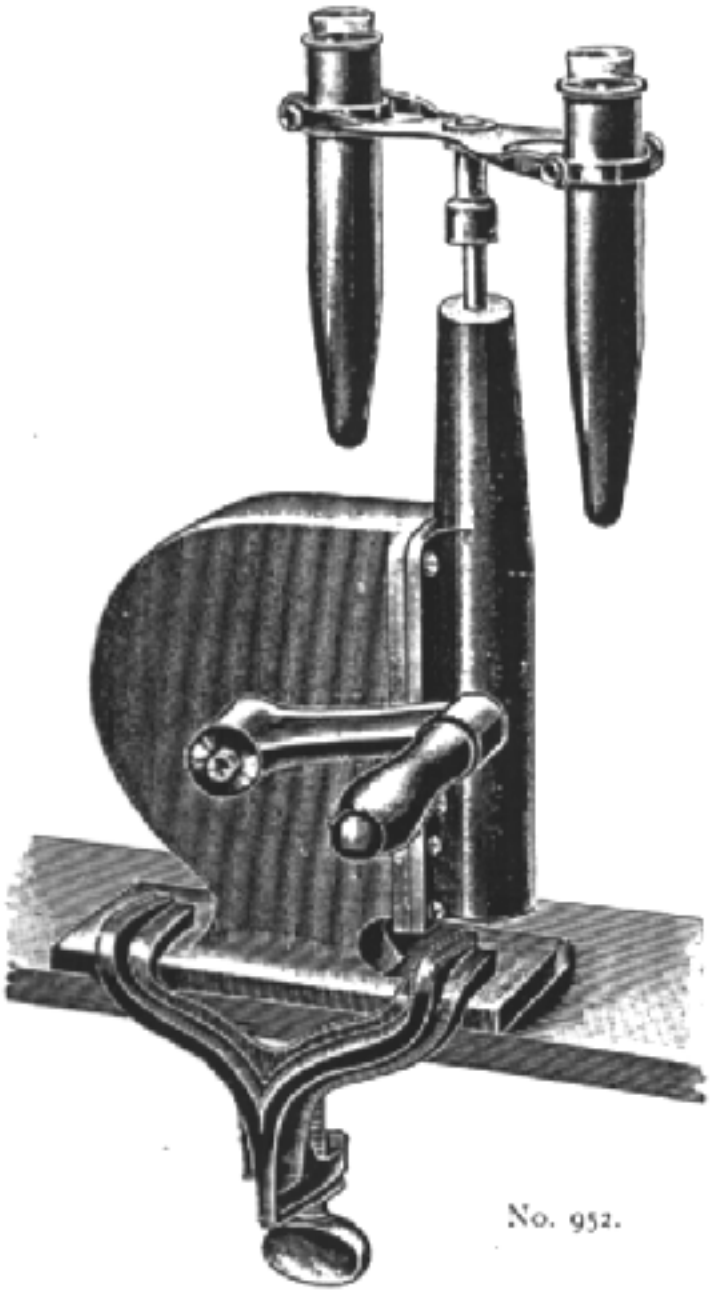
For a Subscription of 21/-, 240 of highest class Micro Specimens may be had on loan.

For full particulars please see our Catalogue No. 3, post-free.

CENTRIFUGAL MACHINES

Of latest design and thoroughly sound construction.

For Urine, Water, Sputum, Milk and Blood Tests.



No. 952.



No. 954.



No. 955.

950. This consists of an enamelled cast-iron case containing the mechanism for rotating, with aluminium holders for **two** test tubes, etc. Speed about 2000 to 3000 revolutions per minute.

With screw clamp for bench, as figured,

Price, £1 17 6.

Included with the Centrifuge is a graduated tube to hold 15 ccm. and a plain tube of similar size.

951. Similar Centrifuge to above with aluminium fittings to carry **four** test tubes, each of 15 ccm. capacity.

Price, £2 2 0.

952. This Centrifuge is constructed with two separate driving axles giving high and low speeds. It will give up to 10,000 revolutions per minute. It consists of a rotating mount for blood tests with two glass tubes of 50 m/m length. Each of these tubes is graduated into 100 parts and has a bore of 0·50 m/m. Further, a second rotating mount for urine, water, etc., tests, as with Centrifuge No. 1, with one plain and one graduated test tube of 15 ccm. capacity, is included. The Centrifuge is provided with a strong screw clamp to attach to a bench.

Price, complete, £2 18 6.

EXTRAS.

953.	Plain test tubes,	15 ccm. capacity	each	£0	0	9
954.	Graduated ,,	15 ccm. ,, (as figured)	,,	0	2	0
955.	,, ,,	for milk tests (as figured)	,,	0	2	0

BACTERIOLOGICAL OUTFITS.

W. WATSON & SONS undertake the supply of complete outfits for Bacteriological Laboratories, and will at all times be pleased to furnish estimates on receipt of specification of requirements. The following is a condensed general list; but W.W. & Sons are familiar with all the most modern apparatus and reagents required for Bacteriological research, and customers may rely on special attention to orders in this department.

CONDENSED LIST OF BACTERIOLOGICAL APPARATUS.

Hearson's Patent Incubators:—

Inside Measure.	956. For use with Gas.	957. For use with Petroleum Oil.
6 × 6 × 7 ins.	£5 5 0	£5 10 0
12 × 12 × 14 ins.	6 10 0	7 0 0
15 × 15 × 18 ins.	9 10 0	10 5 0
20 × 20 × 24 ins.	13 10 0	14 10 0

958.	Incubator, Rohrbeck's, size 10in. × 10in. × 10in., with burner, Regulator & Thermometer		£4	0	0
959.	Gas Burner with Mica Chimney, 5/0; Ditto, Spirit		0	3	6
960.	Sterilizer, Koch's Steam		1	15	0
961.	Sheet Iron Boxes to hold Glass Plates and Tubes during sterilization	3/0 and	0	2	6
962.	Platinum Needles with Glass Handle	1/6 and	0	1	0
963.	Wolfhugel's Colony Counter		0	15	0
964.	Glass Slip, polished edges, 3 in. × 2 in., with ruled squares		0	3	0
965.	Petri's Culture Dishes, flat, to stand on each other, diameter of upper glass dish, 8 c/m., 10d.	10 c/m., per pair	0	1	0
966.	Culture Flasks, Lister's, with side tube, 500, 1/0....750, 1/6....1000 c.c., 2/0 each.				
967.	Boiling Flasks, 8 ozs., 4d. ..... 16 ozs., 6d. ..... 24ozs., 8d. each				
968.	Test Tubes, 5 in. × ½in., 4/0..5in. × ⅝in., 4/6..5in. × ¾in. 5/0..6in. × ⅝in. 5/6 per gross				
969.	Test Tube Brushes	each	0	0	3
970	Glass Funnels, plain .....2 in., 3d.....2½ in., 4d.....3 in., 5d.....3½ in., 6d. each				
971.	Glass Wool for Filtering	per oz.,	0	2	0
972.	Glass Rod and Tubing	per lb.,	0	1	0
973.	Potato Borers		0	1	6
974.	Rubber Caps for Bottles, Culture Tubes, etc., from 1/0 per dozen.				

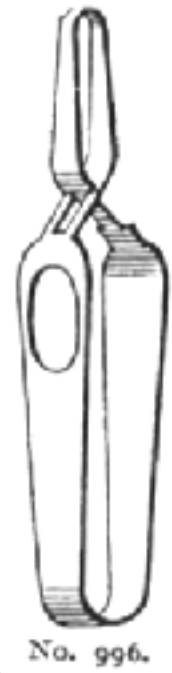
BIOLOGICAL AND DISSECTING INSTRUMENTS.



No. 990.



No. 993.

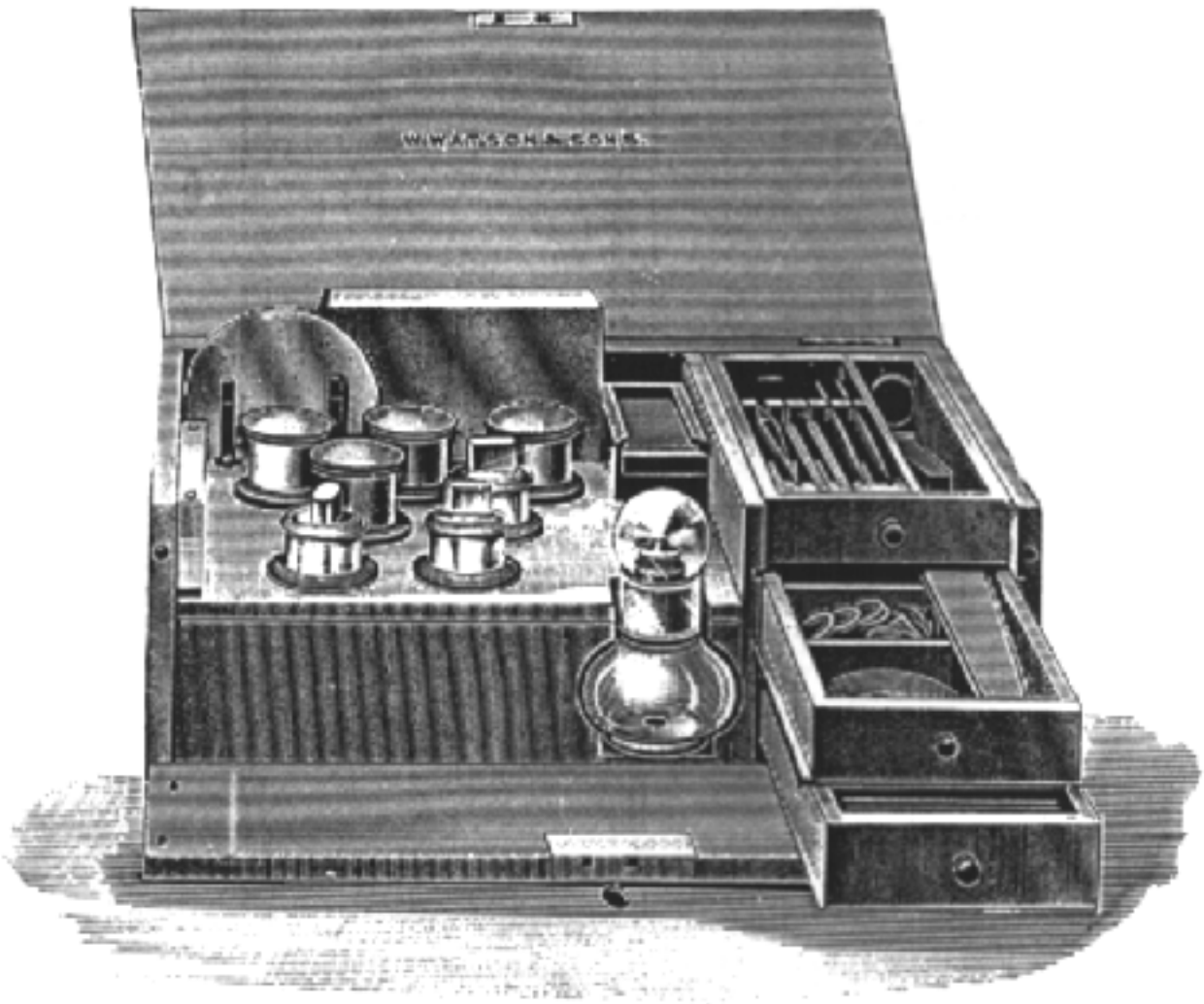


No. 996.

980.	Mahogany Case, containing six Scalpels, two pairs Scissors (plain and curved), two Razors, Seeker, two pairs Forceps (Coarse and Fine), Blow Pipe, Dissecting Hooks, two Needles, etc., etc.....	£1	5	0
981.	Mahogany Case, containing six Scalpels, two pairs Scissors, Forceps, Seeker, two Needles, Dissecting Hooks, Blow Pipe, etc., etc...	1	0	0
982.	Mahogany Case, containing three Scalpels, one pair Scissors, two Needles, Forceps, etc.....	0	10	6
983.	**THE COUNTY COUNCIL SET OF INSTRUMENTS**, as supplied to the County Councils and many Botanical Classes. 6 in. and 4½ in. Forceps, 6 in. and 4¼ in. Scissors, two Scalpels, Blow Pipe with inside wire, Seeker and two Needles, complete in case.....	0	15	0
984.	* **STUDENT'S BIOLOGY SET**, consisting of leather case, with case for six objects attached, containing Curved Scissors, fine Forceps, Spatula, 2 Needles, 2 Scalpels, Razor, Seeker, Glass Rod, Cover Glass and Slips..... price	0	12	6
	* Foreign make, but good instruments in a very neat case.			
985.	**THE SCHOOL SET**, as supplied to Classes under the London County Council and to numerous Technical Schools, consisting of 3 Scalpels, 1 pair each 6 in. and 4½ in., Straight Scissors, Bone Forceps, 1 pair each 6 in. coarse, and fine Curved Forceps, 1 Seeker, 2 Needles, Mahogany Case.....	0	18	6
	Special prices for any of the above sets in quantities of one dozen or more.			
	Sets made up to suit requirements of Teachers at short notice, at low prices.			
986.	Bone Forceps.....	£0	4	6
987.	Dissecting Knives—Scalpels—with ebony handles .....each	0	1	6
988.	Fine Ditto, ditto, with ivory handles .... ,,	0	1	9
989.	Ditto, ditto, In aseptic metal handles .. ,,	0	2	0
990.	Best Dissecting Scissors, straight, 4¼ in. and 4¾ in. long, as figured each	0	2	6
991.	Ditto ditto 6 in. long ..... ,,	0	3	6
992.	Ditto ditto elbow handles ..... ,,	0	4	0
993.	Ditto ditto curved blades. (Fig. 993) ..... ,,	0	4	6
994.	Steel Forceps, 4½ in. long, 1/6; 6 in. long ..... ,,	0	2	0
995.	Very Fine Steel Forceps, straight or curved points, best make ,,	0	2	6
996.	Cornet Forceps, for bacteriological work. (Fig. 996) ..... ,,	0	1	6
997.	Broad point Spring-action Forceps, for cover glasses..... ,,	0	2	0
998.	Dissecting Needles, in plain cedar handles..... ,,	0	0	2
999.	Ditto ditto in cedar handle, with fixing ferrule .... ,,	0	0	3
1000.	Ditto ditto ditto with triangular edged needle.... ,,	0	0	4
1001.	Cutting Needles in ebony handle....one edge, 1/3; double edge	0	1	6
1002.	Ditto ditto aseptic metal handle, ,, 1/6 ,,	0	2	0
1003.	Dissecting Needles, wood handles, 4d.; ivory handles .....each	0	1	0
1004.	Ditto in best ivory adjustable holders ..... ,,	0	2	6
1005.	Set of Hooks for dissecting, Ordinary, 1/0; Best ..... ,,	0	2	0
1006.	Blow Pipe ..... ,,	0	1	0
1007.	Needle Holders, with screw clips ..... ,,	0	1	0
1008.	Injection Syringe, for anatomical and micro work, ½ oz., with 3 cannulæ and stopcock, gilt, in case	0	12	6

MATERIALS FOR MOUNTING OBJECTS.

COMPLETE MOUNTING CABINET.



Containing Turntable, Spirit Lamp, Brass Table, two Dissecting Knives, Forceps and Scissors, Spring Clips, Dissecting Needles, Canada Balsam, Asphalte, Gold Size, Marine Glue, three bottles for Solutions, Glass Slips, Thin Glass Covers, Cells, Labels, etc.

1110. In mahogany case.. **£2 15 0** | 1111. In polished pine case **£2 5 0**

1112. **STUDENT'S MOUNTING CABINET,** contains 3 doz. Glass Slips, Cover Glasses (assorted). Balsam in Benzole, Brushes for ringing, Section Lifter, Labels for slides, Watch Glasses, Fine Scissors, Glass Rod and Pipette, polished pine case with 12 trays to hold 6 doz. objects, all contained in fitted and polished pine cabinet, very compact **1 1 0**

TURNTABLE.

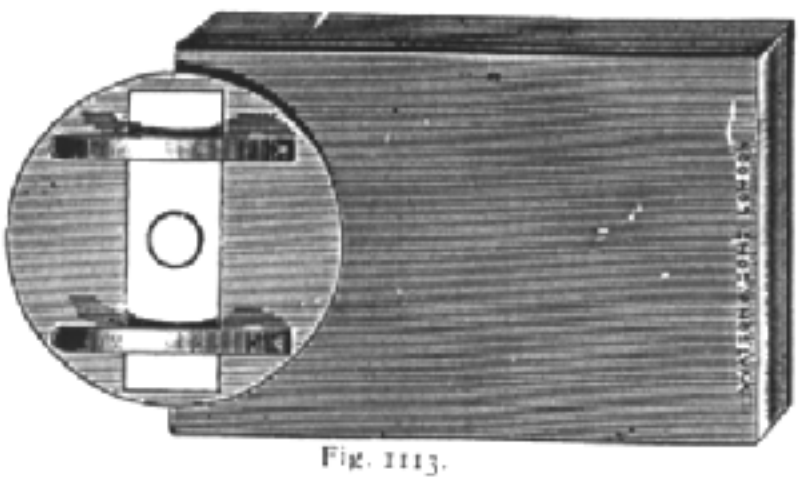


Fig. 1113.

1113. The most efficient form, as figured .. **£0 6 6**

1114. Watson's **Special Turntable,** with extra deep mahogany block of best construction **0 10 6**

1115. Patent Self-centring Turntable, new form **0 15 0**

1116. Brushes for ringing, best camel hair, **4d.** and **0 0 6**

1117. Brushes for ringing, ordinary **0 0 2**

For VARNISHES and CEMENTS, see page 154.

MATERIALS FOR MOUNTING OBJECTS—*Continued*

SLIPS

1120.	Flatted Crown Glass Slips (3 in. × 1 in.), rough edges, per doz. **3d.**	per gross	£0	2	9
1121.	Ditto, ditto, ground edges, per doz. **5d.**, 6 doz. **2/3**	,,	0	4	0
1122.	"The Student's" (3 in. × 1 in.), ground edge slips of excellent quality ..... per doz. **4d.**	,,	0	3	6
1123.	Watson & Sons' Special Continental (3 in. × 1 in.) Slips, ground edges, per doz. **6d.**	,,	0	5	0
	These are of white glass, very thin, and of fine quality.				
1124.	Flatted Crown Glass Slips (3 in. × 1½ in.), ground edges, per doz. **9d.**	,,	0	8	0
1125.	Mahogany Slips (3 in. × 1 in.), with sunk cells or with holes through	per doz.	0	1	0
1126.	Plate Glass Slips (3 in. × 1 in.), excavated cells.....	,,	0	2	0
1127.	Glass Slips (3 in. × 1 in.), with surface of one end ground for lead pencil writing	,,	0	0	9

COVER GLASSES.

These are made in three thicknesses—No. 1, thinnest; No. 2, extra thin; and No. 3, ordinary thickness used.

1128.	Circles—No. 1	**6/0** per oz.	—	1131.	Squares—No. 1 ..	**5/0** per oz.
1129.	No. 2	**4/6** ,,	—	1132.	No. 2 ..	**4/0** ,,
1130.	No. 3	**3/6** ,,	—	1133.	No. 3 ..	**2/9** ,,

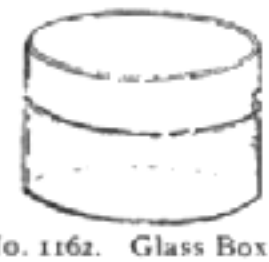
The above prices are for any size from ⅝ in. upwards. Smaller sizes than ⅝ in. are charged at **1/0** per oz. extra.

1134. Special No. 0 Covers. Circles, ¾ in. diameter only. These are excessively thin—·005 inch—for high-power work. They are supplied in Clove oil, in hermetically sealed bottles, **12/0** per oz. Not less than ½-oz. supplied.

SUNDRIES.



No. 1161. Staining Cell.



No. 1162. Glass Boxes.



No. 1159. Glass Capsules.

1157.	Thin Glass Dishes, circular deep, useful as micro-aquaria, etc., per nest of 3.....	£0	1	0
1158.	Rectangular Glass Trough, with cover to take 3 in. × 1 in. slips for washing, etc.	0	1	0
1159.	Round Glass Capsules, as figured, with grooved glass covers, in three sizes ..... each **9d., 1/0**	0	1	3
1160.	Square Glass Blocks, with excavation, for staining, etc., in black or clear glass, with cover.....	0	0	6
1161.	Square Glass Blocks, with excavation, all surfaces polished, for examining objects in liquid under microscope .....each	0	1	0

Glass Boxes, with covers, as figured :—

1162.	1½ in. diameter, **6d.** 1162a. 2 in., **8d.** 1162b. 2½ in., each	£0	1	0
1163.	Buff Block for cleaning thin glass covers .....each	0	1	0
1164.	Hot Plate and Spirit Lamp for mounting	0	5	6
1165.	Wire Spring Clips.....per doz.	0	1	6
1166.	Diamonds for writing on glass .....each	0	5	0
1167.	Ditto, for cutting slips and thin glass .....**15/0** to	1	1	0
1188.	Brushes for ringing, camel hair, best .....**4d.** and	0	0	6
1189.	Ditto, ditto, ordinary	0	0	2

LABELS.

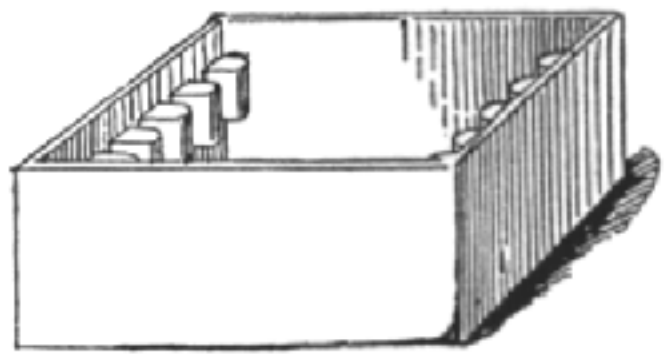
1190.	Superfine Adhesive Name Labels, square .....per 100	0	0	4
1191.	Ditto, ditto, oval .....per packet, **6d.** and	0	1	0
1192.	1000 Adhesive Square Labels, with printed name of student or subject, to order	0	3	6

MATERIALS FOR MOUNTING OBJECTS.

1168.	Ebonite Ring Cells, assorted sizes .....per box 100	£0	2	0
1169.	Pure Tin ditto ditto ..... „	0	2	6
1170.	Round Punches for cutting holes in labels, 1/6 ; large sizes, each	0	2	0
1171.	Watch Glasses, with flat bottoms, 1/6 per doz., plain, per doz.	0	1	0
1172.	Best Injecting Syringe, stop cock, three pipes, in case complete	0	12	6
1173.	Air Pump for mounting, with bell glass receiver.....	1	1	0
1174.	Section Lifters, copper.....6d. and	0	1	0
1175.	Ditto, nickel-plated, ebony handles.....	0	1	0
1176.	**Special** Pencils for writing on glass, various colours.....each	0	0	9



No. 1181
Pipette Stoppered Bottles.

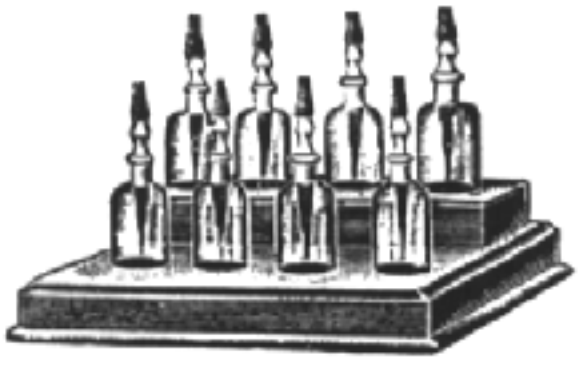


No. 1177.
Staining Trough, Flat Shape.



No. 1184.
Balsam Bottle.

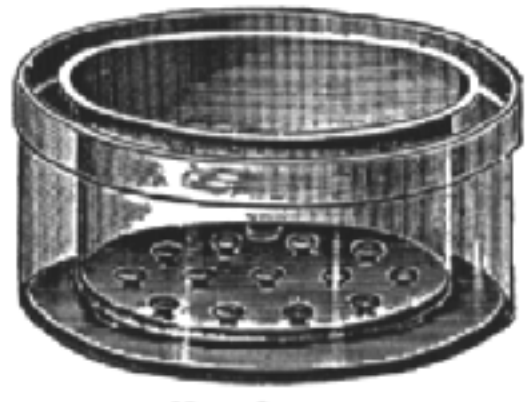
1177.	Grooved Porcelain Trough for 5 slips, 3 in. × 1 in., for washing or staining, flat shape, as figured	£0	1	9
1178.	Ditto, ditto, high shape	0	2	0
1179.	Grooved Glass Trough, with racks for 10 slips, 1½ in. deep, with cover, for washing or staining	0	2	6
1180.	Metal Washing Rack, light, strong, zinc frame, with grooves for 36 3 in. × 1 in. or 3 in. × 1½ in. slips	0	2	0
	Larger or smaller sizes to order.			
	Pipette Stoppered Re-agent Bottles, as figured, in three sizes, 1181, 9d. ; 1182, 1/0 ; and 1183	0	1	3
	Bottle, as figured, with glass cap outside for Balsam and Varnishes, 1184, 1 oz. size, 1/0 ; 1185, 2 oz. size	0	2	0



No. 1186.



No. 1188.



No 1187.

1186.	Sets of Re-agent Bottles in neat wooden stand, as figured.....	£0	8	6
1187.	Section Washer, as figured, consisting of outer glass dish, with removable inner cell, having perforated bottom for staining or washing, clearing and preserving sections after staining ; thoroughly efficient ; strongly recommended.....	0	3	6
1188.	Stoppered Glass Jar, as figured, to take 3 × 1 slip upright, for staining, etc.	0	1	0

MICRO-CHEMICAL PREPARATIONS.

GRÜBLER'S STAINS IN CRYSTAL.

Put up in Glass Tubes with Screw Capsules.

	Grammes	s.	d.
Alum Carmine	2	0	9
Alkannin	5	1	0
Aniline Oil, pure	50	1	0
Alizarin	5	0	9
Alkali Blue	5	0	9
Aniline Blue	5	0	9
" " Black	5	0	9
" Yellow	5	0	9
Aurantia	5	0	9
Benzopurpurin	5	0	9
Biondi-Ehrlich-Heidenhain s triple stain	2	1	6
Bismarck Brown	5	0	6
Borax Carmine	1	0	9
Blue Brilliant	5	0	9
Carmalum	2	1	0
Carmine	5	0	9
Carminic Acid	1	0	9
Chrysoidin	5	0	9
Congo Red	5	0	9
Coralline, Strasburger's	5	0	9
Eosin, Blue Shade	5	0	9
" Yellow	5	0	9
" Methylene Blue	1	1	0
Erythrosin	5	1	0
Fuchsin Acid	5	0	9
Gentian Violet	5	0	9
Green Acid	5	0	9
Haemalum	5	1	6
Haematein, Mayer's	1	1	3
Haematoxylin	5	1	6

	Grammes	s.	d.
Haematoxylin, Eosin	5	1	9
Jenner's Blood Stain	1	1	0
Indigo Carmine	2½	1	0
Iodine Green	5	1	0
Leishman's Blood Stain	½	1	3
Ditto ditto	1	2	0
Magenta	5	0	9
Malachite Green	5	0	9
Methyl Blue	5	0	9
" Eosin	5	0	9
" Green	5	0	9
" Violet	5	0	9
Methylene Blue	5	1	0
" " Medic., pure	5	1	0
" Green	5	0	9
Nigrosin	5	0	9
Orange "G"	5	0	6
Orcein	1	0	9
Picric Acid	5	0	9
Picro Carmine	1	1	0
Rosanilin	5	1	0
Rose, Bengal	5	0	9
Rubin	5	0	9
Safranin	5	0	9
Spiller's Purple	1	2	0
Sudan	5	0	9
Thionin	1	1	0
Toluidin Blue	5	0	9
Tropaeolin	5	0	9
Vesuvin Brown	5	0	6

Box and Postage for Bottles, **3d.** extra.

GRÜBLER'S SETS OF STAINS.

1.	Set of chief Stains for Bacteriology	£0	7	6
2.	Set of Reagents and Stains for Sputum work, in case	1	1	0
3.	For Blood Film work, complete set in polished wood case, including stains and reagents	1	10	0
4.	The same as No. 3, but also including dishes and apparatus	2	5	0
5.	Set of Stains and Reagents to illustrate Strasburger's Micro. Botanical work, in case	2	2	0
6.	Set of Stains and Reagents for Zoology, in case	2	2	0
7.	Set of Stains and Reagents to illustrate Bolle's Lee's Microtomist's Vademecum	3	10	0

Grübler's Physiological Chemical preparations and Culture Media supplied to order.
Special Stains accurately made up to order.

STAINS IN SOLUTION.

Made up to Standard Formulæ

		s.	d.
Alum Carmine	per bottle	0	9
Alcoholic Carmine	"	1	0
Ammonia "	"	1	0
Borax "	"	0	9
Biondi-Ehrlich-Heidenhain triple solution	"	1	0
Borax Methylene Blue	"	0	9
Carbol Fuchsin (Ziehl-Neelsen)	"	0	9
Carbol Thionin	"	1	0
Ehrlich's Triacid	"	1	0
Eosin, Alcoholic	"	0	9
" Aqueous	"	0	9
Eosin-Haematoxylin for Blood Staining	"	1	6
Eosin, Methylene Blue, Leishman's Blood Stain	"	1	6
Fuchsin, Alcoholic	"	1	0

		s.	d.
Haemalum	per bottle	0	9
Haematoxylin—			
Delafield's	"	1	0
Kleinenberg's	"	1	0
Ehrlich's	"	1	0
Heidenhain	"	1	0
Jenner's Blood Stain, Kanthack's permanent formula	"	1	6
Methylene Blue	"	0	9
" Loeffler's Niesl's	"	1	0
Methyl Green	"	0	9
" Violet	"	0	9
Picric Acid	"	0	9
Picro Carmine, Ranvier's	"	1	0
Safranin	"	0	9
Triacid, Ehrlich	"	1	0
Toison's Solution for blood staining	"	1	0

Box and Postage for Bottles, **3d.** extra

MICRO-CHEMICAL PREPARATIONS, STAINS and MOUNTING MEDIA—*Continued.*

THE "SOLOID" STAINS

As prepared by Burroughs, Wellcome & Co., in Tabloid form.

This form of Stain will be found exceedingly useful for the rapid preparation of small quantities of solution when required.

A four-page descriptive list gives full directions as to methods of making up and staining.

The following stains only are obtainable only in Tabloid form :—

Bismarck Brown	0·1 grm.
Borax Methylene Blue	
Ehrlich Triple Stain	
Eosin, pure	0·1 grm.
Eosin Methylene Blue or Jenner's Stain	0·05 grm.
Fuchsine, pure	0·1 grm.
Gentian Violet, pure	0·1 grm.
Gram's Iodine Solution	15 cc.
Hæmatoxylin pure	0·1 grm.
Do. Delafield's	
Methylene Blue	0·1 grm.
Methyl Violet, pure	0·1 grm.
Romanowsky's or Leishman's Stain	0·015 grm.
Sodium Carb.	0·05 grm.
Thionin Blue, pure	0·1 grm.
Toison Blood Fluid	

Price **6d.** per bottle.

Each bottle contains 6 Tabloids.

CHEMICALS AND REAGENTS.

		s.	d.
Acetic Acid	per bottle	0	9
Aniline Oil, pure	,,	1	0
Benzole	,,	0	6
Cedar Oil, thick, for Immersion Objectives, in bottle, with rod	,,	1	0
Ditto, in best form bottle with dipper and wooden cap	,,	3	0
Ditto, thin, for clearing	,,	0	9
Celloidin, granular	per 1 oz. packet	3	6
Chlor-Zinc-Iodine, or Schultz's Solution	per bottle	1	0
Clove Oil	,,	1	0
Eau de Javelle	per 2 oz.	0	9
Flemming's Solution	per 2 oz.	3	0
Formalin, for preservative use, per lb., 3/0; per ½ lb., 1/9; per 4 oz.,		1	0
Gelatine, No. 1a	per 4 oz.	2	0
Glycerine, pure	per bottle	0	6
Gold Chloride, crystal	per 15 grain tube	1	8
Gum Arabic, crystal	per oz.	0	3
Litmus Solution	per bottle	0	6
Osmic Acid	per 1/10 gramme tube	1	9
Paraffin Wax, soft	per lb.	1	0
,, hard	,,	1	0
Phlorogiucin	per 1 gramme	1	0
Toluol	per bottle	1	0

MOUNTING MEDIA.

			s.	d.
Canada Balsam, natural	per ounce		1	0
Do.	dried	,,	1	0
Do.	in Benzole	,,	1	0
Do.	in Xylol	,,	1	0
Do.	in Chloroform	,,	1	0
Do.	as above, but in glass capped bottle,	each	1	6
Canada Balsam, as above, in collapsible metal tubes	each		1	0
Dammar Gum	per bottle		1	0
Deane's Medium	,,		1	0
Farrant's Medium	,,		1	0
Glycerine Jelly	,,		1	0
Styrax Solution for diatom mounting	,,		2	0

CLEARING SOLUTIONS.

		s.	d.
Cedar Oil, thin	per bottle	0	9
Clove Oil	,,	1	0
Origanum Oil	,,	1	0
Xylol	,,	0	6

VARNISHES for finishing Slides.

		s.	d.
Zinc White	per bottle	1	0
Asphalt or Black Varnish	,,	1	0
Blue Varnish	,,	1	0
Green ,,	,,	1	0
Red ,,	,,	1	0

CEMENTS for Cell Making.

		s.	d.
Asphalt or Black Cement	per bottle	1	0
Brown Cement, Ward's	,,	1	0
Bell's Cement	,,	1	6
Caoutchouc and Shellac Cement	,,	1	0
Clarke's Cement	,,	1	0
Gold Size	,,	1	0
Hollis's Glue, liquid	,,	0	6
Marine Glue Solution	,,	1	0

Box and Postage for Bottles, **3d.** extra

COLLECTING MATERIALS, Etc.



No. 1221.

1220.	Corked Bottles for collecting insects, diatoms, etc., 1/6 per dozen, large	£0	2	0
1221.	Metal Pocket Cases, velvet-lined, size $4\frac{1}{10} \times 2\frac{1}{2} \times \frac{12}{16}$ in., containing 5 collecting bottles, corked	0	3	0
1222.	Ditto ditto 5 collecting bottles, stoppered	0	5	6
1223.	Ditto ditto 10 " " (short) corked	0	3	6
1224.	Glass Dipping Tubes ..... each	0	0	3
1225.	Ditto 3 in leather case	0	1	6
1226.	Rousselet's Dipping Tubes for aquatic work, with indiarubber capped top ..... each	0	0	6

POND LIFE COLLECTING APPARATUS.

New and improved form of Jointed Collecting Stick, of best quality cane, with inner sliding stick of polished hard wood. The handle unscrews instead of the lower end, as in former patterns, thus preventing mud or water entering the inner portion. A varied assortment of interchangeable best horn handles are kept in stock. The accessories included are two bottles, bottle clip, drag hooks, line and reel, net ring, spoon and cutting hook.

1227.	Stick complete as above, silver mounted, with accessories	£1	1	0
1228.	" " nickelled mounted "	0	17	6
1229.	The Stick only, without accessories, silver mounted	0	12	6
1230.	" " " nickelled mounted	0	10	6
1231.	Net and Ring to attach to Collecting Stick, with Glass Tube hung in middle of net	0	2	6
1232.	Pond Life Collecting Bottle, with metal cap and syphon attachment	0	5	0

APPARATUS FOR FIELD BOTANY.

1233.	Japanned Tin Collecting Cases ("Vascula"), pocket size	0	1	6
1234.	Ditto, Medium Size, with attachment for shoulder strap	0	2	6
1235.	Ditto, Large do. do. do.	0	3	0
1236.	Leather Shoulder Straps for above ..... 9d. and	0	1	0
1237.	Spud or Fern Trowel, with long and curved blade, in leather sheath, superior quality	0	2	6
1238.	Botanical Drying Paper, thick grey; size of sheet, 22 × 17ins., per ream, £1 5 0; per quire	0	1	6
1239.	Botanical Mounting Paper, Stout Cartridge, 15 × 10 ins., per ream, £1 0 0; per quire	0	1	3

Other sizes cut to order.

1240.	Pressing Boards, of stout hardwood ..... per pair	0	2	6
1241.	Rack Pin and Rope for applying pressure	0	1	0
1242.	Field Collecting Book, extra thick bibulous paper leaves, between hardwood boards, and straps, very light and compact	0	2	9
1243.	**Field Book of larger size**, for collecting and preserving large specimens. A pair of strong well-finished hardwood boards, 11¾ in. × 9½ in., containing one dozen four-fold leaves of thick botanical drying paper, and all held together with two leather straps and carrying handle	0	4	6

Refills for above, 9d. per dozen leaves.

APPARATUS FOR FIELD GEOLOGY.

1244.	Geological Hammers ..... £0 2 6 and	0	3	6
	Do. The "Neilson," approved by the Geologist's Association	0	4	0
1245.	Pocket Acid Bottle, in boxwood case	0	1	0
1246.	Pocket Compass and Clinometer combined, silvered dial	0	5	0
1247.	Chisels for chipping ..... £0 1 0 and	0	0	8
1248.	Collecting Bag, strongly made, broad shoulder strap	0	5	0
1249.	Glass Topped Boxes, round, 2½ in. to 1 in. diameter, per nest of 6	0	1	6
1250.	Do. rectangular, 3¼ in. × 2¼ in. to 2⅜ in. × 1½ in., per nest of 4	0	1	0

Special sizes made to order.

1251.	Plattner's Geological Blowpipe Set, a complete and compact portable laboratory, specially designed for prospectors' and travellers' use. For quantitative and qualitative analysis of Rocks, Minerals and Ores	25	10	0

Full details to intending purchasers on application.

ENTOMOLOGICAL APPARATUS.

1260.	Butterfly Net, with folding ring, 4 joints	0	4	0
1261.	Do. Telescope form, 2-piece	0	7	0
1262.	Collecting Boxes, corked and papered 6d., 9d., 1/0,	0	1	6
1263.	Do. zinc, oval shape 1/0, 1/6,	0	2	6
1264.	Killing Bottles ..... 1/6 and	0	2	0
1265.	Setting Pins, assorted sizes ..... per oz.	0	1	6

All sizes Kirby, Beard & Co's. Pins to order.

1266.	Insect Forceps, with broad gauze points	0	2	6
1267.	Pin Forceps, steel ..... 1/6 and	0	2	6
1268.	Sheet Cork, best, 7 in. × 3½ in., 1/6 dozen; 11 in. × 4½ in., 3/0 dozen sheets.			
1269.	Store Boxes, corked, pine, 10 × 8 in., 2/6; 14 × 10 in., 4/0; 16 × 11 in., 5/0; 17½ × 12 in.	0	6	0
1270.	Glass Front Show Boxes, stained and polished frame, corked and papered, 10 in. × 8 in., 2/6; 14 in. × 10 in., 4/0; 16 in. × 12 in., 5/6.			
1271.	Setting Boards, corked and papered, flat, oval, continental, all 14 inches long.			

Breadth	½	¾	1	1¼	1½	1¾	2	2¼	2½ inches
	5d.	5d.	6d.	7d.	8d.	9d.	10d.	11d.	1/0 each.
	3	3½	4	4½	5 inches.				
	1/2	1/4	1/6	1/8	1/10 each.				

Other Material promptly supplied to order.

NATURE TEACHING.

The special attention that is being devoted to "Nature Teaching"—a subject now recognised by the Science and Art Department—necessitates the use of certain apparatus and material expressly suited for the pursuit of this fascinating study, and additional to the minor accessories usually constructed by the students themselves.

The following lists suggest the requirements for use:—1st, In the Field. In the class. 3rd, For Advanced Study and Museum Purposes.

Where large classes are being formed, W. Watson & Sons will be pleased to furnish special quotations for the supply of material and apparatus required in quantities.

FOR FIELD USE.

SET A.

For Pond Life. Triple Power Pocket Magnifier (724), **3/6**; 1 doz. Corked Collecting Tubes (1220), **1/9**; Set of 3 Dipping Tubes (1225), **1/6**....	£0	6	9
For Botany. Pocket Vasculum, **1/6**; Fern Trowel in Sheath, **2/6**....	0	4	0
For Geology. Hammer, **3/6**; Pocket Acid Bottle, **1/0**; Chisel, **8d.**..	0	5	2
For Entomology. Butterfly Net, **4/0**; Pocket Collecting Box, **9d.**; 1 oz. Assorted Setting Pins, **1/6**	0	6	3
	£1	2	2

SET B.

For Pond Life. Collecting Stick, complete with accessories (1228), **17/6**; Net and Ring (1231), **2/6**; Collecting Jar with syphon (1232), **5/0**; Metal Pocket Case with 5 bottles (1221), **3/0**; best triple Power Magnifier (720), **8/6**	£1	16	6
For Botany. Medium size Vasculum and Strap, **3/6**; Fern Trowel, **2/6**; Field Book for delicate plants, **2/9**	0	8	9
For Geology. "Neilson" Hammer, **4/0**; Pocket Acid Bottle, **1/0**; Chisel, **8d.**	0	5	8
For Entomology. Butterfly Net, 4-joint, **4/0**; Pocket Collecting Box **1/0**; 1 oz. Assorted Setting Pins, **1/6**; Killing Bottle, **2/6**.....	0	9	0
	£2	19	11

SET C.

For Pond Life. Best pattern Collecting Stick (1227), with accessories, **21/0**; Net and Ring (1231), **2/6**; Collecting Jar (1232), **5/0**; Pocket Metal Case with five stoppered bottles (1222), **5/6**; Set of three Dipping Tubes (1225), **1/6**; Aplanatic Pocket Magnifier (choice of Nos 700a to 703a), **15/6**	£2	11	0
For Botany. Large size Vasculum with strap, **4/0**; Fern Trowel in leather sheath, **2/9**; Field Book, large size, **4/6**	0	11	3
For Geology. "Neilson" Hammer, **4/0**; Pocket Acid Bottle, **1/0**; Chisel, **1/0**; Pocket Compass and Clinometer combined, **5/0**; Special Collecting Bag with broad sling, **5/0**	0	16	0
For Entomology. Adjustable Pocket Net, to fit any stick, **4/6**; Killing Bottle, **2/6**; Setting Pins, **1/6**; best Japanned Collecting Box, 9 × 7, with shoulder strap, **5/6**; Coleoptera Bottle, **1/6**; 4 doz. Nested Chip Boxes, **9d.**	0	16	3
	£4	14	6

FOR CLASS OR HOME USE.

For Pond Life. Tank Aquarium, parallel sides, metal bound, **10/6**. For other forms see page 128. The Kingsford Troughs, see page 129.

Large Bell Jar Aquaria, with ebonised wood base, glass cover, etc., from **10/6** upwards.

For Botany. Thick Grey Paper for drying plants .....per quire	£0	1	6
Ditto ditto .....per ream	1	5	0
Thick White Paper for mounting the dried specimens ....per quire	0	1	3
Ditto ditto ditto .....per ream	1	0	0
Pressing Boards with Rack pin and rope .....per set	0	3	6
Set of Dissecting Instruments, No. 982.....	0	10	6

For other Sets and Separate Instruments, see page 149.

NATURE TEACHING APPLIANCES—*continued.*

For Geology. Set of Typical Rocks and Minerals, correctly named, for identification purposes. Small size in neat card case £0 2 6
Larger size in partitioned tray; wood case 1 1 0
For Entomology. Corked Setting Boards. For prices and sizes see page 157.
Store Box, 10 × 8 ins., **2/6**; Glass Front Show Case, 14 × 10 ins., **4/0.**
Small Vertical Compound Microscope on Tripod foot, magnifying about 30 diameters, with sliding focussing movement, price **10/0.**

FOR ADVANCED STUDY AND MUSEUMS.

In addition to the apparatus specified above **For Class Use,** the following are specially recommended :—
A full-size Compound Microscope, such as "The Fram" Model, Set F148, at **£6 15 0**
See page 57.
Complete Set of Biological Dissecting Instruments, No. 980, **£1 5 0.**
Porcelain Tray, with loaded cork bottom, for dissecting specimens in water. No. 689, **4/6.**
For Museums. The New Museum Microscope, as figured and described, p. 90.

WALL DIAGRAMS.

The new "Nature Teaching" Series of Wall Diagrams, embracing Botany and Natural History. Each diagram measures about 3¼ × 2½ feet. The colouring is bold and the figures stand out clearly on a black matt surface background. The drawings are in all cases greatly enlarged, and are most accurate representations from nature. An illustrated and descriptive key, including the English and Latin names, is supplied with each diagram. The following 60 sheets have been prepared and have already been supplied to many leading colleges and science classes.

Each diagram represents one species only, and includes a view of the complete specimen, as well as various aspects of its development and sectional structure.

ZOOLOGY.

1st Series.

No.	
1	Domestic Cat
2	Sheep
3	Common Hare
4	Chaffinch
5	Lizard
6	Common Frog
7	Freshwater Perch
8	Snail
9	Cockchafer
10	Common Garden Spider

2nd Series.

No.	
11	Domestic Goose
12	Common Adder and Ringed Snake
13	Tortoise
14	Mussel
15	Common Honey Bee
16	I. White Butterfly
17	II. ditto
18	Cray Fish
19	Earth Worm
20	Freshwater Polyp or Hydra

3rd Series.

No.	
21	Salamander
22	Common Carp
23	House Fly
24	The Cricket
25	Cyclops
26	Star Fish
27	Tape Worm
28	Lithophyte
29	Infusoriæ
30	Protozoa

BOTANY.

1st Series.

No.	
1	Primrose
2	Pea
3	Horse Chestnut
4	Wild Strawberry
5	Cuckoo Flower
6	Buttercup
7	Scarlet Poppy
8	Potato
9	Convolvulus
10	Rye

2nd Series.

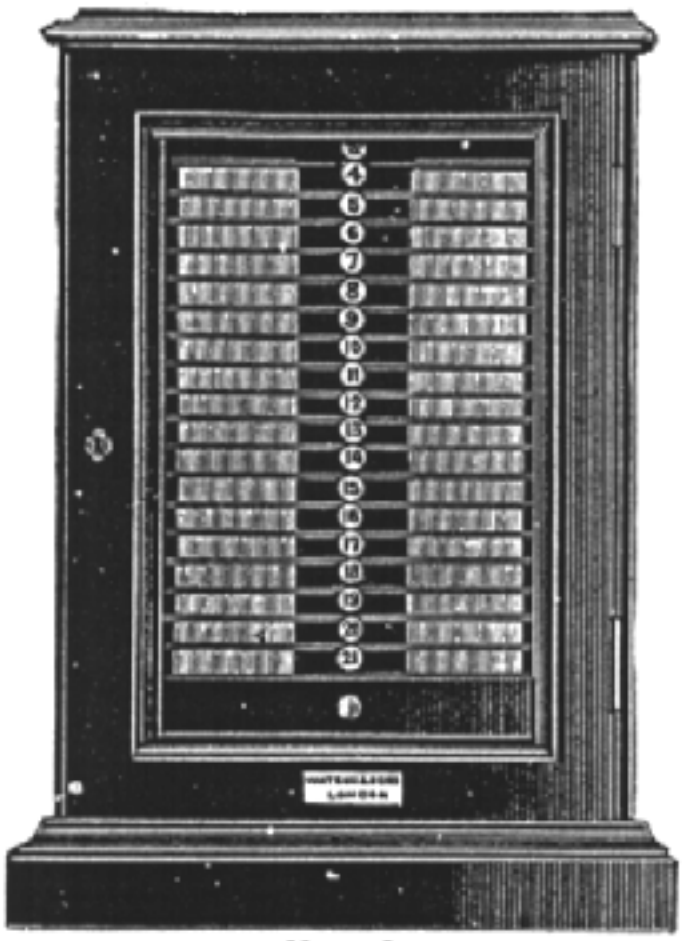
No.	
11	Willow
12	Tulip
13	Pear Tree
14	Blind Nettle
15	Pansy
16	Corn Rose or Poppy
17	Mistletoe
18	Small-leaved Lime
19	Carrot
20	Sunflower

3rd Series.

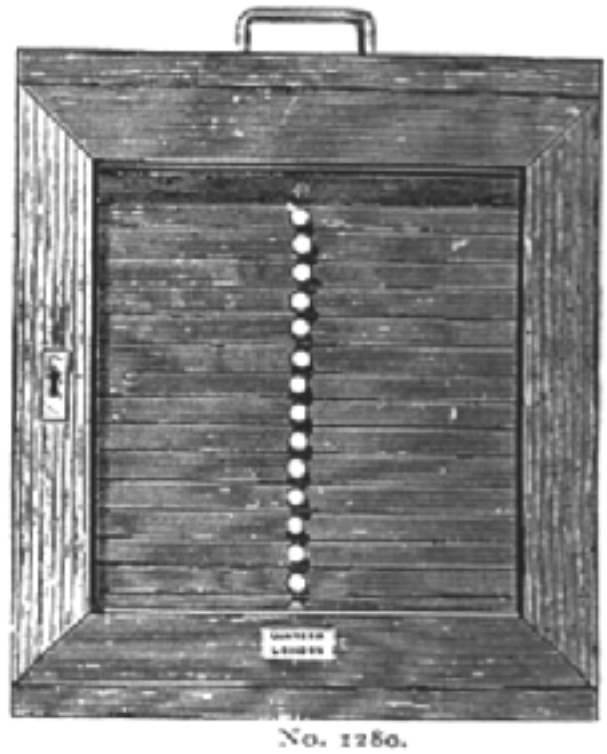
No	
21	Vine
22	Hazel Tree
23	Orchid
24	Pine Tree
25	Common Fern
26	Moss
27	Mushroom
28	Lichen
29	Vegetable Mould
30	Freshwater Algae

Price for each diagram, cloth mounted, specially recommended **4/6**
" " paper mounted **4/0**

CABINETS AND BOXES FOR MICROSCOPIC SUBJECTS.



No. 1284.



No. 1280.

1280. Very neatly made Cabinet of polished pine, with glass door, lock and key, to hold 200 objects, as figured £1 1 0
1281. Ditto ditto, to hold 500 objects 2 0 0
1282. Ditto ditto, to hold 1,000 objects 3 0 0
1283. Mahogany Cabinet of superior workmanship with mouldings top and bottom, to hold 280 objects, each drawer numbered, with an extra drawer deep enough to hold materials, etc. 3 5 0
1284. Large handsome Mahogany Cabinet to hold 500 objects, each drawer numbered and furnished with porcelain plates on the front, as figured 5 10 0
1285. Ditto ditto, to hold 1000 ..... 9 10 0

POLISHED PINE CASES.

1286. Very neat Polished Pine Case, to hold 2 dozen objects in six trays 0 2 6
1287. Ditto ditto 3 ,, ,, ,, 0 3 0
1288. Ditto ditto 4 ,, ,, eight ,, 0 3 6
1289. Ditto ditto 6 ,, ,, twelve ,, 0 4 6
1290. Ditto ditto 12 ,, ,, ,, ,, 0 10 6
1291. Cloth-covered Boxes, with velvet lining, to hold 6, 6d., to hold 1 doz. 0 0 9
1292. Ditto ditto ..... ,, 2 ,, 0 1 0
1293. Ditto ditto ..... ,, 3 ,, 0 1 6

CLOTH-COVERED CASES.

Cloth-covered Cardboard Boxes, with drop fronts, white cardboard trays, with linen-jointed flaps.

1294. With 6 trays to hold 4½ dozen objects 0 1 0
1295. ,, 12 ditto 9 ,, ,, ... 0 1 6
1296. ,, 8 ditto 12 ,, ,, ... 0 2 0

POCKET FOLDING CASES, with outer sheath, very compact—

1297. For 6 objects £0 0 9
1298. For 12 objects, of new form, to prevent movement of the specimens 0 1 6

Pine Boxes with Mahogany Racks—

1299. To hold	6	12	24	36	72	Objects.
	3d.	4d.	6d.	8d.	1/0	each.

1300. Pine Boxes for Postal Transit, to hold 1, 2 or 4 slides, 1/6 per dozen.

MICROSCOPIC OBJECTS.

WATSON'S CIRCULATING MICRO SLIDES. For a Subscription of **21/0** 40 slides may be had for examination during 12 months.

For full particulars see Catalogue No. 3.

Our classified list, representing a stock of 50,000 Microscopic Objects, illustrative of every branch of study, will be forwarded, post-free, on application.

We have undoubtedly the finest stock in the world of Microscopic Objects of the very highest class, each specimen being exactly typical of the structure represented, rendering them of the greatest value to Students.

Rare and interesting specimens affording illustrations in Anatomy, Physiology, Botany, Entomology, Geology, Mineralogy, Diatomaceæ, etc.

We were awarded a Diploma of Honour at the International Exhibition of Microscopes, Antwerp, 1891, for the excellence of our Microscopic Objects.

The following sets are quoted from our Micro-Object Catalogue, and are always kept in stock :—

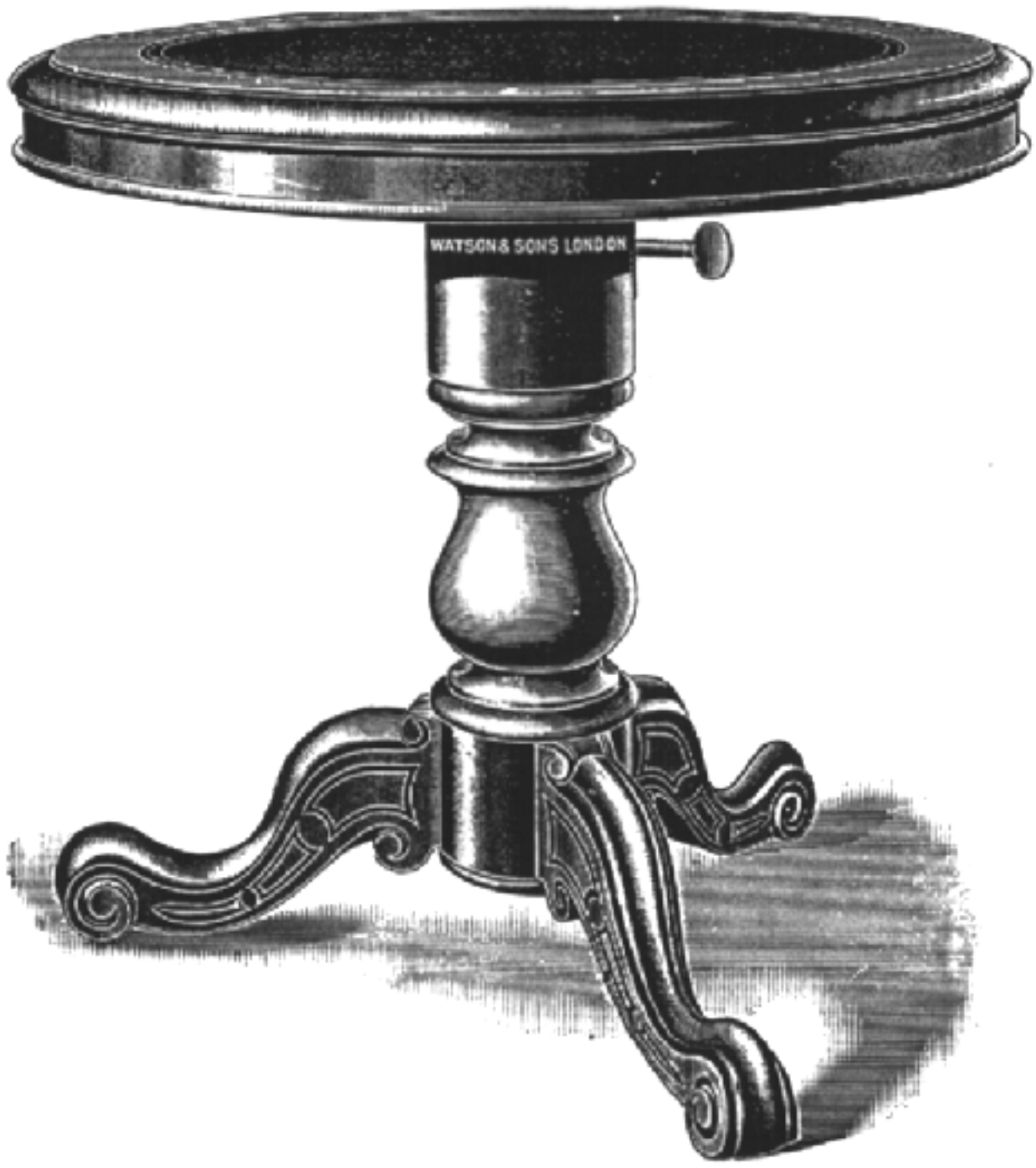
Series 1.—24	Educational Physiological Preparations	**£1**	**15**	**0**
,, 5.—24	Surgical (Pathological) ditto	**1**	**15**	**0**
,, 6.—24	Pathological ditto	**1**	**15**	**0**
,, 7.—12	Typical Urinary Deposits	**0**	**18**	**0**
,, 9.—36	Slides, specially arranged for Students for the Diploma of Public Health (as approved by Dr. F. J. Allan, and referred to in his " Aids to Sanitary Science ")	**2**	**7**	**6**
,, 23.—12	Slides illustrating Physiography	**0**	**14**	**6**
,, 24.—12	Slides illustrating Typical Rocks	**0**	**18**	**0**
,, 11.—12	Test Objects for various powers	**1**	**1**	**0**
,, 12.—24	Choice Selected Diatomaceæ	**1**	**15**	**0**
,, 13.—24	Specially selected specimens for Micro-Polariscope	**1**	**7**	**6**
,, 14.—24	Botanical Slides (Elementary Tissues) specially arranged for use of Students	**1**	**4**	**0**
,, 15.—24	Ditto (Comparative Anatomy) ditto	**1**	**12**	**6**
,, 16.—24	Specially selected interesting opaque objects for Binocular Microscope	**1**	**12**	**6**
,, 17.—24	Ditto specimens suitable for dark ground illumination	**1**	**12**	**6**

COMPLETE CABINETS of MICROSCOPIC OBJECTS.

No. 1.	Very handsome Mahogany Cabinet of the highest quality, containing 1000 Objects of general interest to a Microscopist ; each specially selected to typify in the best manner the subject of which it is illustrative—including rare specimens in Diatomaceæ, Foraminifera, Marine Soundings, Fossil Woods, etc., and comprising a general assortment of Anatomical, Botanical, Geological and Entomological specimens, forming a collection of the very first order and well suited for presentation. Each drawer has a descriptive Tablet affixed notifying its contents	**£75**	**0**	**0**
No. 2.	Very handsome Mahogany Cabinet as above in every respect, but containing 500 Objects, all of the highest quality and including many extremely rare specimens	**40**	**0**	**0**
No. 3.	Very handsome Mahogany Cabinet of the highest quality, as above in every respect, but containing 280 Objects, all of the very finest quality, and including many extremely rare specimens	**24**	**0**	**0**
No. 4.	Very neatly made Pine Cabinet with glass door, lock and key ; containing 200 preparations of the finest quality, illustrations of Anatomy, Physiology, Pathology, Urinary Deposits, etc.	**17**	**10**	**0**
No. 5.	Pine Cabinet as above, containing 200 Objects of general interest : Diatomaceæ, Foraminifera, Marine Soundings ; Crystals for Polariscope, Botanical Specimens, Entomological, etc., all of the very highest quality	**14**	**14**	**0**
No. 6.	Pine Case, containing 72 Objects of General Interest, all of choice quality	**5**	**0**	**0**

Other Microscopic Object Cabinets made to any size or Pattern, and fitted with Typical Slides to illustrate any required branch of Study.

REVOLVING MICROSCOPE TABLE.

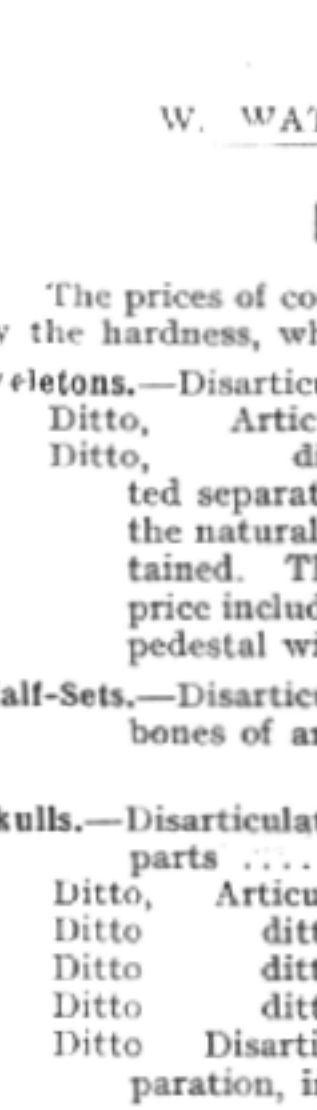


Height, 26 inches. Revolving top, leather-covered, 26 inches diameter. Screw to fix top when rotation is not required. With handsome carved legs of best workmanship throughout. In Oak, Walnut, or Mahogany £6 15 0

HUMAN OSTEOLOGY.

The prices of complete skeletons and many of the individual parts are governed by the hardness, whiteness, development and general condition of the bones.

Skeletons.—Disarticulated, complete	£4	0	0	to	£5	0	0
Ditto, Articulated, complete	5	0	0	to	8	8	0
Ditto, ditto, on Beauchene's system, *i.e.*, each bone mounted separately and held in position by strips of brass, so that the natural distance between each part of the skeleton is maintained. These preparations are of the very finest quality. The price includes a strong brass support mounted on a polished oak pedestal with castors					25	10	0
Half-Sets.—Disarticulated, comprising skull, vertebral column, sternum, bones of arm and shoulder, bones of leg, foot, and hand	£2	2	0	to	3	10	0
Skulls.—Disarticulated, including case with compartments for the various parts	£1	10	0	to	2	10	0
Ditto, Articulated, with teeth	1	0	0	to	1	10	0
Ditto ditto cut horizontally	1	5	0	to	1	15	0
Ditto ditto ditto and vertically	1	10	0	to	2	0	0
Ditto ditto in 7 sections, very complete					3	0	0
Ditto Disarticulated, on Beauchene's system, most perfect preparation, including glass shade and wood base	£5	10	0	to	8	10	0
Hands or Feet.—Articulated, with movements					0	10	6
Ditto ditto without movements					0	6	0
Arms or Legs.—Articulated					1	0	0
Supports for Skeletons.—In lacquered brass with black polished oak base, best quality					2	10	0
Ditto ordinary quality with iron support					1	15	0



Metamorphosis of Edible Frog.

Prepared Skeletons of the Lower Animals on Polished Wooden Base.

Guinea Pig	12 6	Pigeon	12/6
Rabbit	25 0	Frog	8/6

Skeletons of other Animals to order.

Quotations on application.

METAMORPHOSES.

W. Watson & Sons have pleasure in drawing attention to their **Special Sets of Metamorphoses Series.** The annexed illustration is self-descriptive of these unique preparations. Each series contains a complete set of actual specimens to illustrate the chief changes or metamorphoses in the life history of the subject. The specimens in each set are systematically arranged and mounted on opal glass with descriptive labels attached, and the whole preserved in sealed glass museum jars containing clear colourless spirit.

Special price list on application.

BOTANICAL MODELS.

Brendel's Botanical Models supplied to order at makers' prices plus 10 per cent, to cover freight to London.

Special terms for large quantities.

HUMAN ANATOMICAL MODELS

In Papier Maché.

These models are eminently suited for use in Classes and Schools where the individual student handles the model. The material of which they are composed is such that while the minutest details are faithfully reproduced, the possibility of fracture during handling or transit is practically eliminated.

The following is a condensed list. On request, W. WATSON & SONS will be pleased to forward a special (returnable) catalogue giving complete details of other models in this series.

BRAIN.—Natural size, in four parts			£0	15 0
Do	Double size, 4 sections with ventricles and arteries		2	8 0
HEAD—Left half of skull on board. Top removable, showing cerebrum, bones of skull and face. Eye with muscles and optic nerve removable. Arteries, veins and nerves at roots of teeth			0	15 0
EYE.—Enlarged	Five diameters divisible into cornea, choroid, vitreous body and lens		0	12 6
Do.	Do. Ten diameters		1	3 0
Do.	Do. Ten diameters with all muscles, arteries and veins, dissectible		3	7 6
EAR—	Do. Five diameters		0	12 6
Do.	Do. Five diameters, dissectible		1	3 0
Do.	Combined model of Tongue and Ear, natural size, in situ, with nerves and muscles, details of interior of ear well shown		4	4 0
TONGUE.—Tongue and lower set of teeth, dissectible			0	7 6
Do.	Larynx with Tongue, dissectible in five parts		1	2 0
SECTION OF HEAD, to show specially the nose cavities and throat. Cast from a natural preparation			1	10 0
SKIN.—Vertical section, 200 times enlarged, showing the three principal layers, sebaceous and sweat glands, hair roots, muscles, arteries and veins			0	12 6
LARYNX.—Natural size, with muscles, two sections			0	8 6
Do.	With muscles, arteries, veins and glands, dissectible		0	12 6
CHEST—Natural size, opened in front, lung and heart dismountable, with ramifications of the trachea, arteries, veins, etc.			2	7 6
LUNGS AND HEART.—Natural size, both dissectible			1	11 6
HEART.—Enlarged, dissectible			0	17 6
TRUNK—Opened in front, showing larynx, lungs, heart, diaphragm, stomach, liver with gall-bladder, spleen, small and large intestine and bladder. Sections of ribs, clavicle and pelvis			0	18 6
Do.	Natural size, without head, intestines dissectible, showing stomach, liver, spleen, small and large intestine. Lung and heart dismountable with ramifications of the trachea, arteries, veins, etc.		4	17 6
ABDOMEN.—Natural size, intestines dismountable, showing stomach, liver, spleen, small and large intestines			3	5 0
STOMACH.—Dissectible			0	15 0
HUMAN SKELETON.—Natural size, most skilful imitation of nature, each bone separately shown			7	0 0
Do.	do. Half natural size, dissectible in several parts		2	18 0
HAND OR FOOT			0	11 6
MODEL OF A COMPLETE MALE BODY on pedestal.—Chest and all the viscera removable, stomach, lungs and heart dissectible. The muscles of arm and leg in three layers, the two higher layers removable			11	0 0
Do.	do. but with all the parts completely dissectible		17	10 0
Do.	do. natural size, most carefully modelled		55	0 0
Do.	do. do. with about 100 parts dissectible — showing over 2000 separate sections		110	0 0
LEG AND FOOT with muscles, upper layer of muscles removable			3	5 0
SPECIAL SET enlarged models of Blood Corpuscles after Welker, × 5000. Re-examined and arranged by Dr. R. du Bois Reymond. Comprising three red and three white Human Blood Corpuscles. Red Corpuscles of the following:—Goat, Llama, Musk Rat, Frog, Tench, Elephant, Pigeon, Slow Worm, Lamprey, Amphiuma, Casuaris Indicus, Snake, Herring and Pike		the set	2	10 0

PHYSIOLOGICAL MODELS IN PLASTER.

Many of the Models listed above can also be supplied in plaster.
Particulars and prices on application

Photo-Micrography.

In the succeeding pages will be found descriptions of various cameras which have been designed especially for Photo-Micrography, but much of the success that will be attained in the work itself will depend—for the moment ignoring the microscope—on the illuminant and condenser system employed and the manner in which it is fitted up. Undoubtedly, the lamp and condensers should be provided with fittings which will keep them in direct alignment with the optical axis of the microscope, and when, in connection with our cameras we mention that an extra charge is made for fitting the microscope and illuminating apparatus, this system is adopted.

The

Watson-Conrady

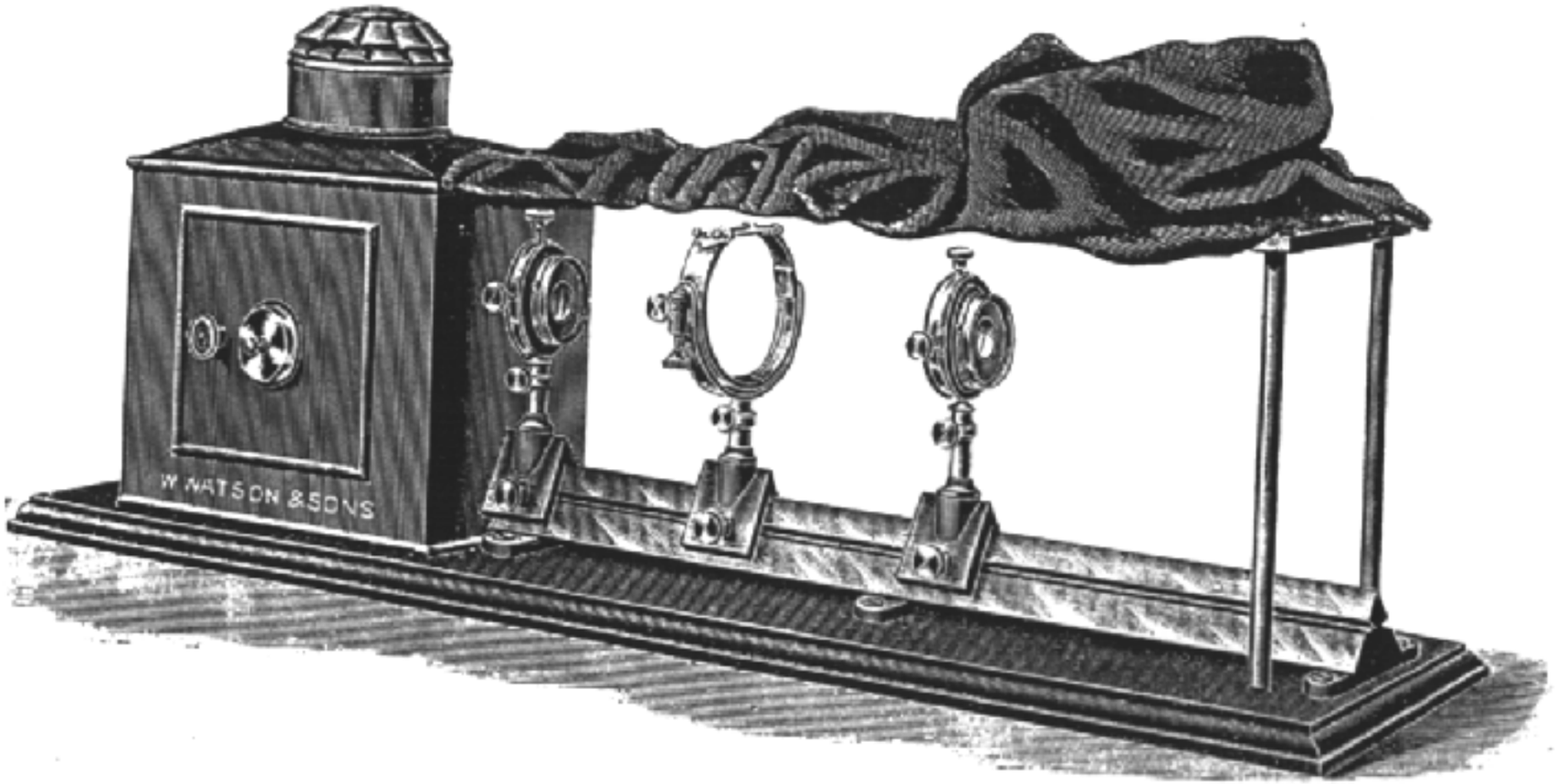
Condenser System.

FOR PHOTO-MICROGRAPHY.

This Condenser System consists essentially of (1) The Condenser, fitted with Iris diaphragm; (2) A trough to contain heat-absorbing or light-filtering media; (3) A separate Iris diaphragm, with or without an auxiliary concentrating Lens; (4) Illuminant or Lamp. All are mounted on metal saddle-shaped bases to slide on a triangular metal bar. Also a source of Light, which may be either Electric, Limelight, Oil, or Incandescent Gas.

(1.) **The Condenser,** which is the prominent feature of the apparatus, is entirely new. It has been specially computed for the purpose, and possesses three most important qualities. It utilizes all the light from the Illuminant that it is possible to employ for microscopical purposes. It is achromatic, and it is constructed of such glass as least absorbs light that is passing through it. In effect, it gives the maximum effect, not merely from the point of view of brilliant light, but on account of the perfection of its achromatic and aplanatic corrections. It is mounted with telescopic tube and clamp for raising and lowering, and is fitted with centring screws so that it may be accurately adjusted. An Iris diaphragm is fitted immediately in front of it. It can be accepted by the worker with the full assurance that by its use he is placed in the most favourable position possible for the finest and most accurate work with, when desired, the maximum rapidity.

(2.) **The Trough** is a modification of Kingsford's pattern, described page 129, mounted on a Saddle to fit the triangular bar. This Trough affords the great convenience of permitting thorough cleansing, the glasses being easily removable for the purpose.



The Watson-Conrady Condenser System—*Continued.*

(3.) **The Separate Iris Diaphragm** will be found invaluable for cutting off stray light and limiting the concentrated beam to the required size.

Accommodation is provided behind this diaphragm for the addition of an auxiliary lens for use with very low powers.

(4.) **The Illuminant or Lamp.**—This may be either Electric, Oxy-hydrogen Limelight, Oil or Incandescent Gas. In any case fitted with means of centring.

This Condenser System can be fitted to any of the Cameras in this list, either in conjunction with the metal triangular bar or mounted upon separate brass bases, arranged to fit in carriers to slide in grooves attached to the baseboard. An increase in length of base is required for the Camera when this System is fitted, which entails an extra cost of **£1 0 0**

PRICES OF WATSON-CONRADY CONDENSER SYSTEM.

Triangular bar, of suitable length, generally about 24 inches	£1	5	0
This bar may be attached to a Laboratory bench or fitted to a mahogany baseboard to carry complete condenser system on triangular bar, together with the microscope accurately centred ; the under side of the baseboard being lined with cork and felt, of best construction. Price of Baseboard alone without triangular bar.....	3	0	0
The Watson Conrady Achromatic Condenser, specially computed as described on page 163, mounted on saddle stand, to slide and clamp on triangular bar ; upright rod having telescopic extension with clamp ; the mounting of optical portion fitted with centring screws and having Iris diaphragm immediately in front of it, complete ..	7	5	0
Trough for light-filtering and heat-absorbing media. Modified Kingsford's pattern Trough, of special size, similar to description on page 129, but mounted on a saddle base to slide and clamp on triangular bar	2	10	0
Separate Iris diaphragm, fitted with centring screws and mounted on saddle stand, to fit and clamp on triangular bar.....	3	15	0
Auxiliary Lens, to work in conjunction with the separate Iris diaphragm for low powers, extra.....	0	12	6
	£18	7	6

Any of the above items of apparatus may be supplied on flat round bases instead of the saddle pieces at £1 each less. So mounted, they are suitable for placing on the baseboard of any Photo-Micro Camera. A charge for fitting to the baseboard is then made, varying from 10/0 to 20/0 according to the amount of work that is entailed. The triangular bar is thereby rendered unnecessary.

EXTRAS (optional)					
Mahogany frame with curtains, to enclose the whole condenser system				1	10	0
Focussing Glass				0	10	6
Projection Eyepieces, Nos. 2 and 4, at £2 each				4	0	0
Connecting flanges to exclude light between microscope and camera per pair				0	8	6
				£24	16	6
The above Condenser system, fitted to and supplied with our Laboratory Photo.-Micro Camera, as described page 166, complete	£11	10	0			
Extra for increased length of baseboard	1	0	0			
	12	10	0			
Less Mahogany Baseboard included in the above Set, which is not needed if this Camera is supplied	3	0	0			
				9	10	0
				£34	6	6

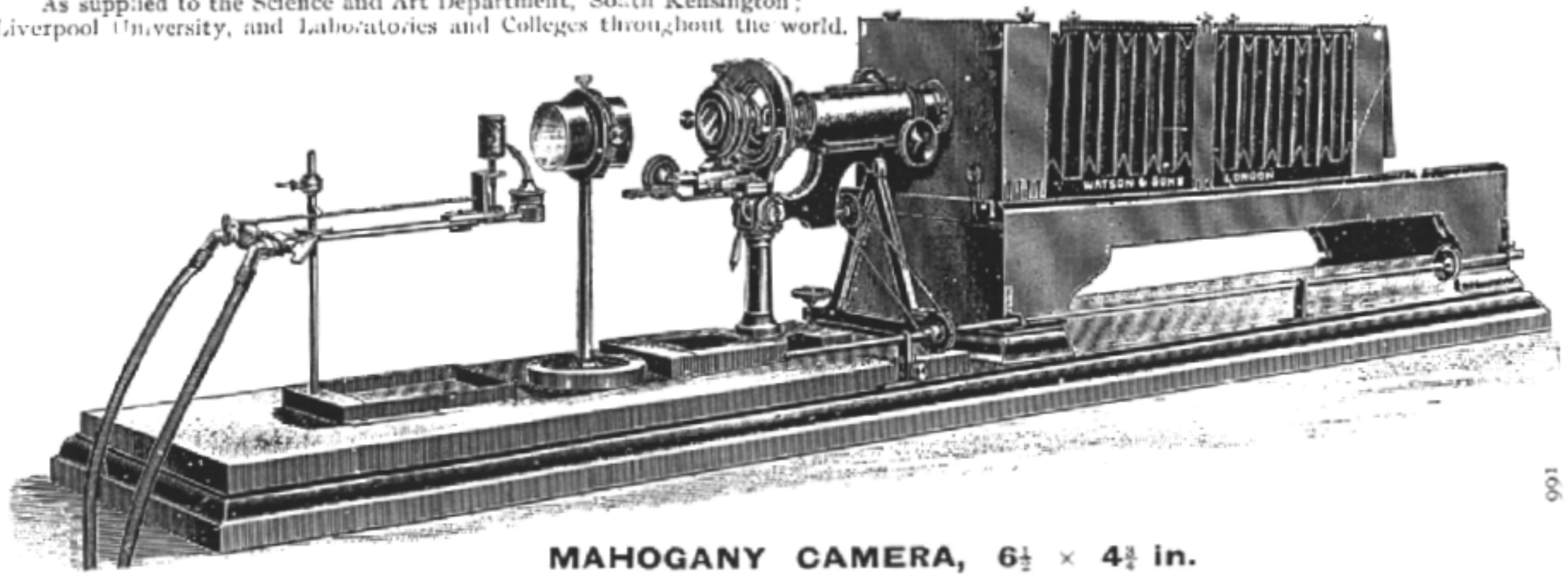
A suitable Illuminant is necessary in addition to the above : particulars of various kinds will be found on pages 171 and 172.

The above Set may be varied as desired and any of the accessories can be purchased separately at the price quoted.

THE LABORATORY PHOTO-MICROGRAPHIC APPARATUS.

MADE TO SUIT ANY MICROSCOPE.

As supplied to the Science and Art Department, South Kensington; Liverpool University, and Laboratories and Colleges throughout the world.



MAHOGANY CAMERA, 6½ × 4¾ in.

This Camera is of the most rigid construction, and suitable for work of the most delicate nature. It has a solid mahogany baseboard, 5 ft. 6 in. long and 1¾ in. thick, running the entire length, carrying both the Camera and Microscope with apparatus. The Camera itself has an extension to 36 inches, a divided scale being let in so that any required amplification can be at once obtained: the bellows is supported in the centre, and at each end has rods and screws for clamping during exposure, giving perfect rigidity and freedom from vibration. The projecting part of baseboard on which the instrument is placed is 24 inches long. On this, rotating on a metal turntable, is fitted another board which can be turned at right angles so that all adjustments may be made visually, then turned back to the photographic position and clamped, when the object, etc., will be readily adjusted. A rod runs along the side of the Camera by which connection is made with the fine adjustment milled head of the Microscope, so that adjustments on the focussing screen may be made from the back of the Camera. This rod is in two pieces, which are instantaneously keyed together or separated immediately in front of the Camera, so that when the rotating front is used the connections between the Microscope and the front part of the rod remain intact. This is a new and most advantageous device. A flap shutter worked from outside is fitted on the inside front of the Camera for making the exposures.

Price, ½-plate size, with 1 double dark slide, plain and ground-glass focussing screens, and mask to give clean edge to photograph **£11 10 0**

Inner frames, **1/9** each. The highest powers may be used and the most critical work may be done with this Camera.

For extra fittings see pages 171 to 173.

Brass Connecting Flanges for Microscope and Camera to exclude light, **8/6**.

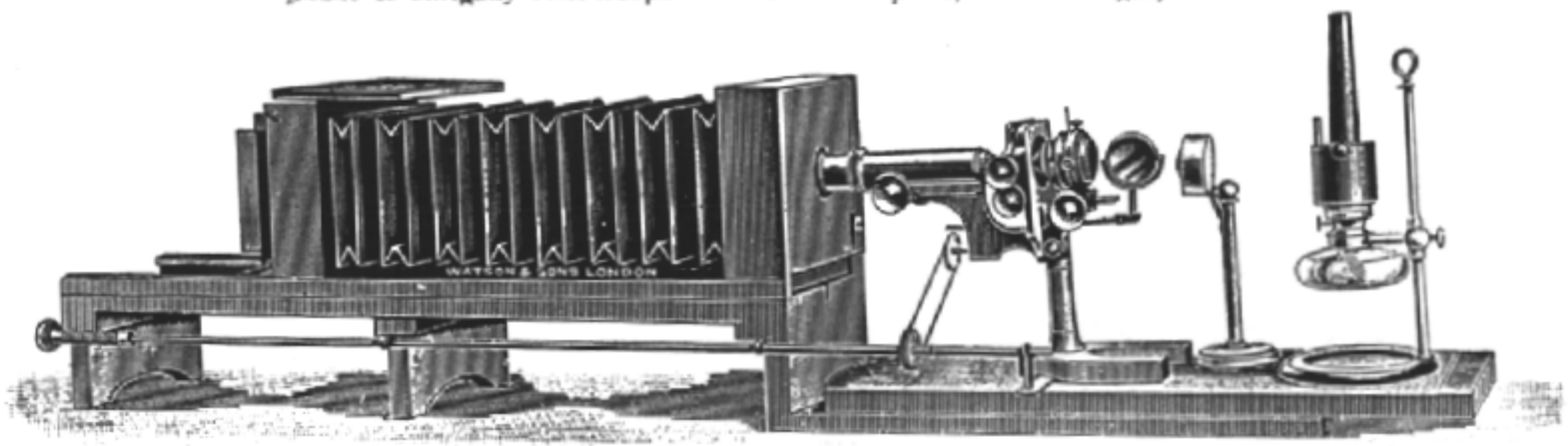
Making Fittings to hold Microscope, Lamp, etc., on baseboard, from **10/0** to **20/0**, according to requirements.

CAMERAS, ETC., FOR PHOTO-MICROGRAPHY.

Returnable Packing Cases for these are charged at cost price.

THE STUDENT'S PHOTO-MICROGRAPHIC CAMERA.

Made to suit any Microscope. Moderate in price, but thoroughly efficient.



MAHOGANY CAMERA, 6½ in. × 4¾ in.

With bellows body, extending to 30 in., the base of the Camera having a divided scale let into it, so that the distance between lens and plate may be accurately known to obtain any desired amount of amplification; has a rod running from the back of the Camera to the front, to attach to the Fine Adjustment, for focussing from back of Camera; fitted with our new pattern projecting detachable front for holding Microscope and Lamp; this consists of two boards, one rotating on top of the other, on metal centres. The Microscope being fitted on the projecting front, the board carrying the Instrument, etc., can be turned half-way round for adjustment visually, and the object fixed in position ready for Photography; the board is then turned back, and locks central with the front of the Camera. In this way the object can be perfectly adjusted without inconvenience.

With one double dark slide. Of sound construction throughout £5 15 0

Inner Frames, for 3¼ × 3¼, 4¼ × 3¼, or 5 × 4 plates, **1/9** each. Extra focussing screen, plate glass, **5/6**.

For extra fittings, see pages 171 to 173.

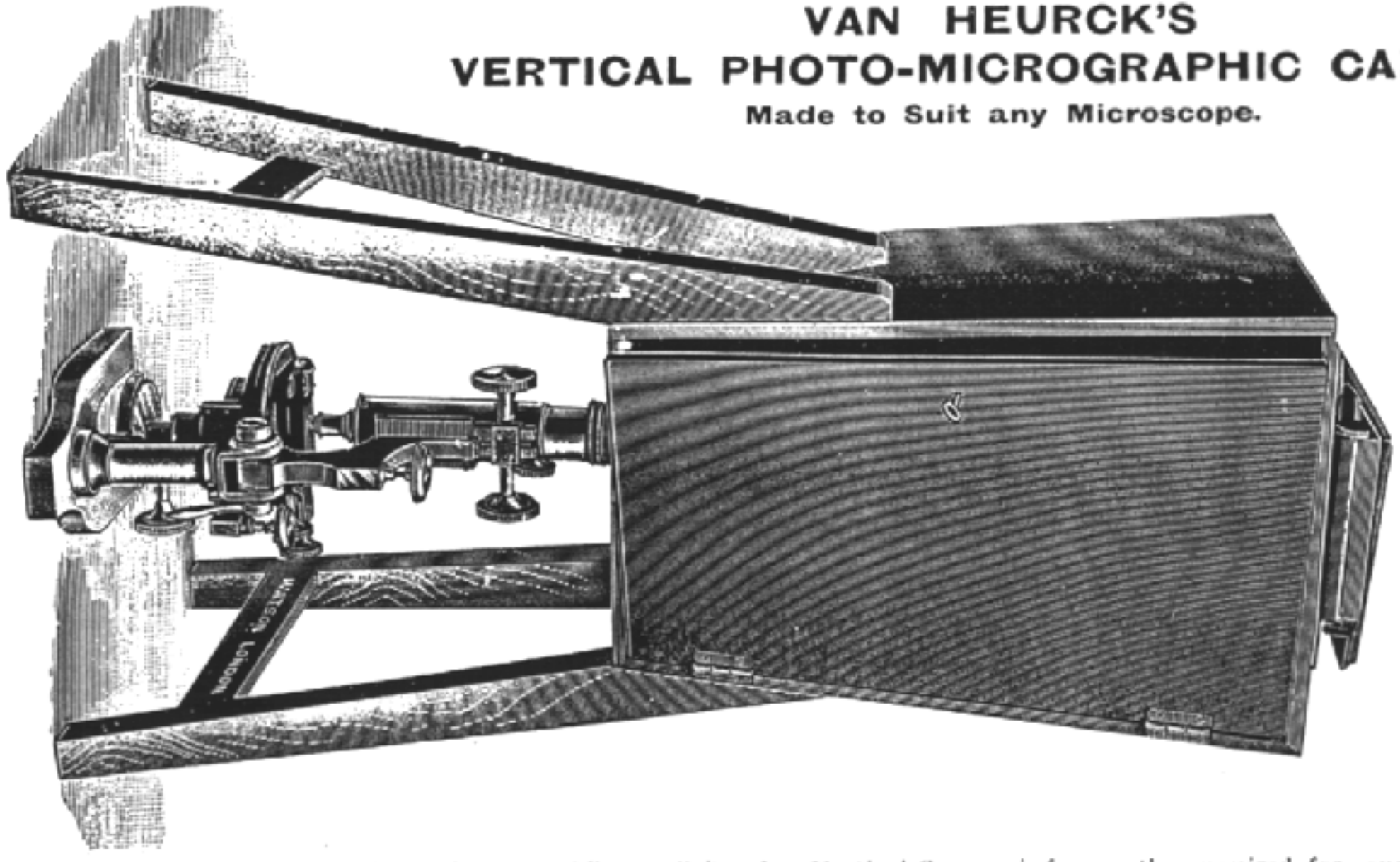
Brass Connecting Flanges for Microscope and Camera to exclude light, **8/6**; Shutter fitted, **15/0**.

Making Fittings to hold Microscope, Lamp, etc., on baseboard, from **10/0** to **20/0**, according to requirements.

The above Camera is kept in stock for instruments having 7½ inch centre or less, when set horizontally; larger sizes are made to order at an extra cost of **10/0**.

VAN HEURCK'S
VERTICAL PHOTO-MICROGRAPHIC CAMERA.

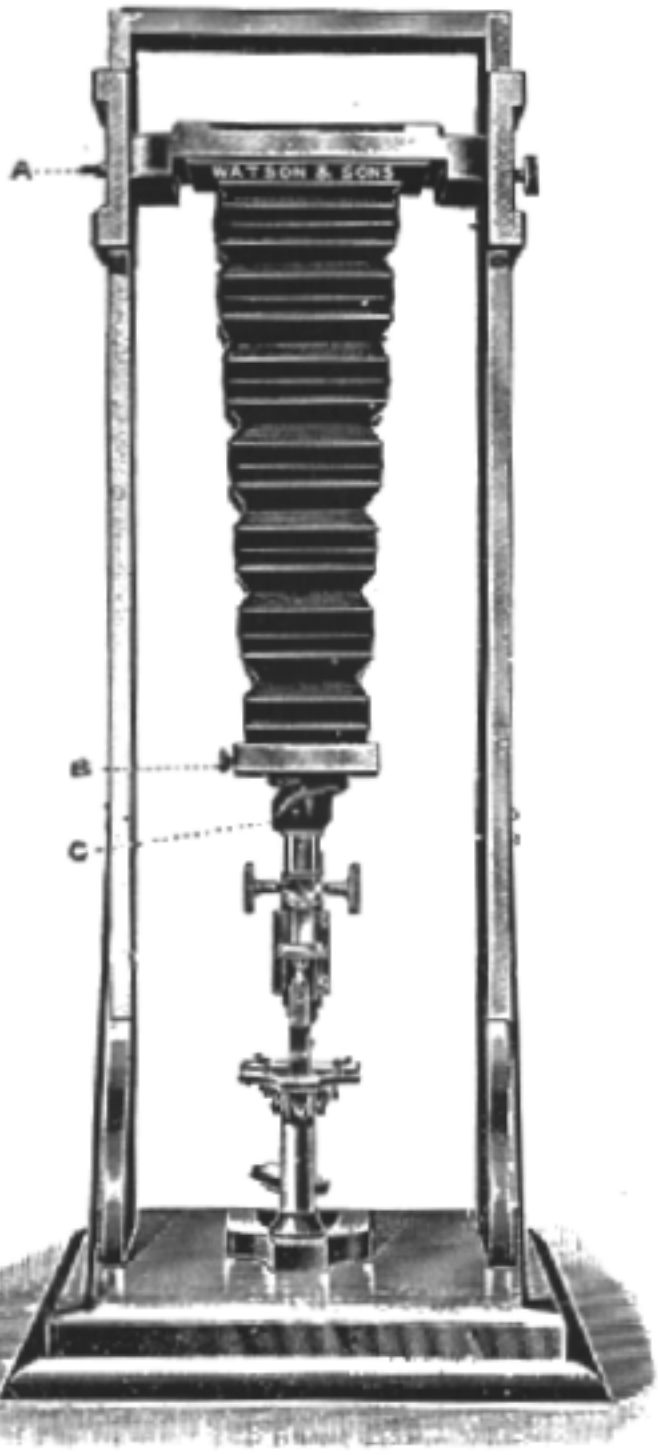
Made to Suit any Microscope.



Although the Horizontal form of Camera is generally used, a Vertical Camera is frequently enquired for, and is becoming increasingly popular, it being exceedingly rigid and efficient, and can be immediately put over the Microscope without necessitating re-adjustment. We now make one as figured above, as used by Dr. Van Heurck for all his delicate high-power work. The tube of the Microscope is attached to the base of the Camera by means of a leather bellows. On one side of the Camera body a door having light-tight fittings is placed, so that the head can enter the Camera, and the eye be placed to the tube of the Instrument to make the adjustments, the door is then closed and final focussing is done on a screen at the top of the Camera. Price, Mahogany mer. . suitable for any Instrument, with mask to give clean edge to picture, diaphragm, and one ½-plate double dark slide. . . . . 15 .

Inner Frames, 1/9 each ; extra Focussing Screen, plate glass 5 0

Mahogany-Baseboard, with levelling screws, and Fittings for the Camera Feet and Instrument 1 10 0



BELLOWS VERTICAL PHOTO-MICRO CAMERA.

This Camera is designed for plates $4\frac{1}{4} \times 3\frac{1}{4}$ in., and is constructed of mahogany throughout.

The baseboard is stoutly built and the uprights are rendered very firm by a pair of brass arms secured from them to the baseboard.

The Focussing Screen "A" can be raised or lowered in grooves provided for the purpose, and clamped in the desired position. A shutter "B" is provided at the lower end of the bellows, and connection between Camera and Microscope is effected by means of a black velvet tube "C." The bellows gives an extension of 20 inches.

PRICE.

Complete, with ground-glass and plate-glass Focussing Screens, Shutter, one Double Dark Slide..... **£6 0 0**

COMBINED VERTICAL AND HORIZONTAL CAMERA.

This Camera is substantially as described above, but the two uprights are cut through about 7 inches from the base and the upper portion mounted on strong brass plates and hinged joints. The cross-bar at the top of the uprights is so shaped as to afford support when the Camera is set horizontally, and two brass arms hold the Camera rigidly when in the vertical position.

This is an exceedingly efficient form of Camera, and will meet the requirements of those wishing to do the two classes of photography. The bellows give an extension of 20 inches.

Price, with ground-glass and plate-glass Focussing Screens, Shutter, one Double Dark Slide, $4\frac{1}{4} \times 3\frac{1}{4}$ in., complete..... **£7 15 0**

EXTRAS FOR ABOVE CAMERAS.

Focussing Rod, **7/6.** Fitting Microscope and Illuminating Apparatus to base of Camera .....**7/6 to £1 0 0**

VERTICAL CAMERA FOR INSTANTANEOUS PHOTO-MICROGRAPHY

As manufactured by us to the design and for the use of Mr. Andrew Pringle.

It consists of a solid Mahogany Camera supported on four legs, which are attached to a massive baseboard. The body is similar to that of the Van Heurck Camera, figured page 168, but is of larger size. At the lower end of the body five runners are fitted, in either of which a tray can be placed carrying an Instantaneous Shutter, which is provided with an arrangement for time exposures and for varying the speed; it has a pneumatic discharger, and is set and worked outside the camera. The metal work of this shutter is of aluminium, the light weight obviating vibration when exposing. When the Shutter is set, a first surface mirror placed at an angle of 45 degrees is exactly over the optical axis of the Microscope, and reflects the image of the specimen that is to be photographed through a brass tube fitted to, and extending from, the exterior left-hand side of the Camera. The tube is provided with a means of raising and lowering to the plane of the Shutter and has an adjustment horizontally. The ground glass for focussing is mounted at the end of the tube, and a sliding adjustment is afforded, so that the distance from this to the Microscope may be identically the same as from the top of the Microscope to the double dark slide in which the sensitive plate is contained. This latter fits on the top of the Camera, and the usual focussing glass is there provided.

To take plates $6\frac{1}{2} \times 4\frac{3}{4}$ in., with two inner Frames, plate-glass focussing screen, mask to give clean edge to picture, of polished mahogany throughout, and of the very finest workmanship and quality..... £25 0 0

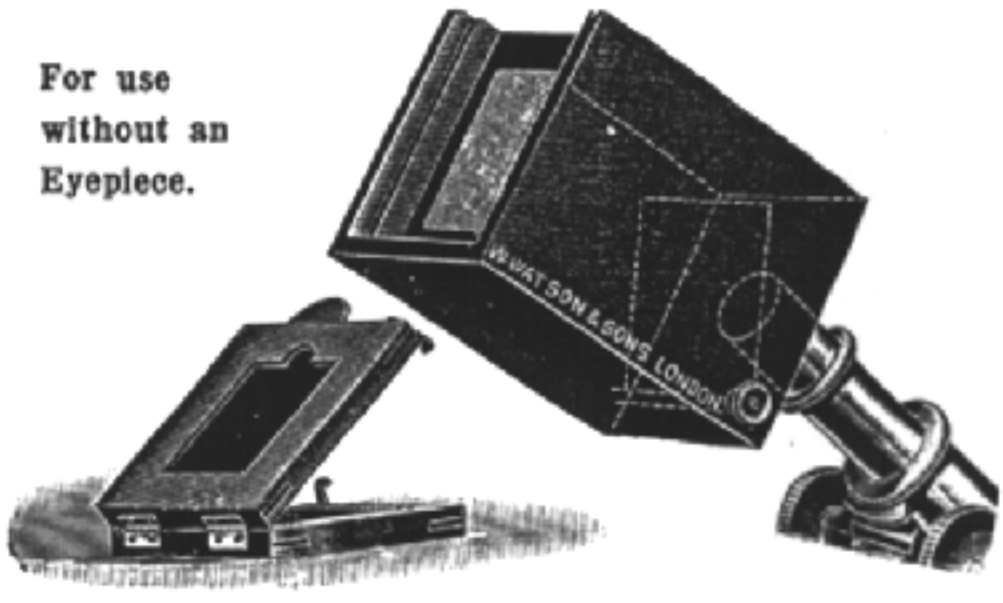
Quarter-plate Repeating Back for same 3 10 0

For Heliostats, see page 123.

For Chemicals for Development and Photographic Apparatus, see Catalogue No. 1, post-free on application.

WATSON'S POCKET PHOTO-MICRO CAMERA.

For use without an Eyepiece.



This miniature Photo-Micro Camera is not a toy—but an instrument of practical value. The front of the Camera is pushed on to the eyepiece end of the Microscope draw-tube, the whole arrangement then being ready for immediate use. The body of Camera is of polished mahogany, measuring about $4\frac{1}{2} \times 3 \times 3\frac{1}{2}$ inches, and is fitted with a removable ground-glass focussing screen. The double dark slide is of the hinged book form, with vulcanite shutters, and takes plates $2\frac{1}{2}$ in. $\times 1\frac{5}{8}$ in. In the interior of Camera is fitted a hinged flap shutter worked from outside, for making the exposure.

We can strongly recommend the above as an easily used and efficient apparatus for rapidly obtaining an accurate photographic record of any interesting micro object.

Price, including cutting aperture in front £0 16 6

Special size Sensitized Plates, 1/0 per packet of 24.

ILLUMINANTS FOR PHOTO-MICROGRAPHY.

For use with Cameras quoted on previous pages.

ELECTRIC. — THE NERNST LAMP.

This is made in a variety of patterns, the simplest of which attaches to an ordinary electric lamp holder and costs 5/-. This gives a light dependent on the voltage, ranging from 13½ to 46 candle power.

This is supplied for ordinary Microscopical work, mounted on a heavy base with holder to raise and lower lamp, and clamp to fix in desired position. Russian iron chimney, with Iris diaphragm, complete with connecting wire and socket.

Price **£3 10 0**

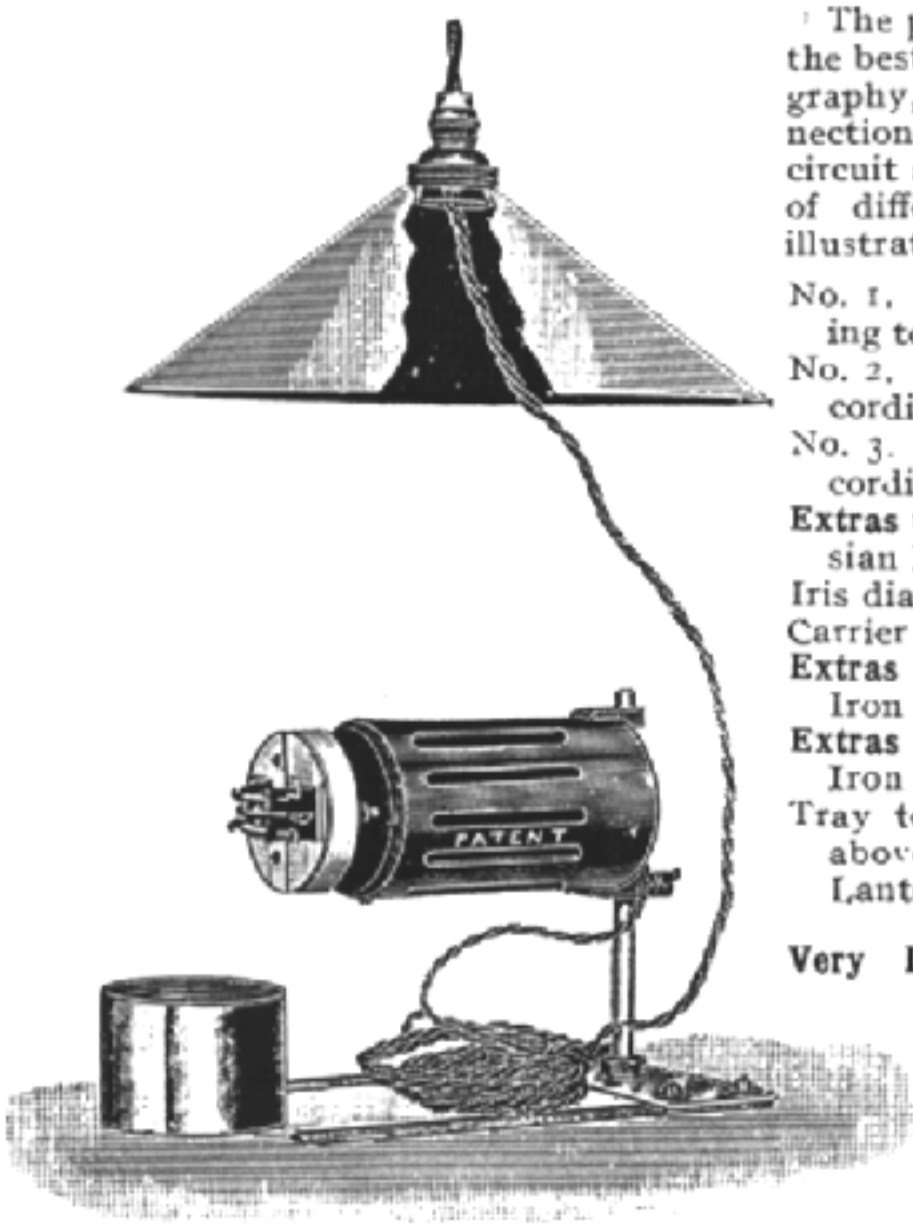


Fig. 1300.

The pattern which is undoubtedly the best yet devised for Photo-Micrography, can also be used by a connection with the ordinary lighting circuit and is made in three patterns of different candle powers, as per illustration, fig. 1300.

No. 1. Candle power 35 to 60, according to voltage, complete ..	**£1 1 0**
No. 2. Candle power 250 to 400, according to voltage, complete	**1 15 0**
No. 3. Candle power 500 to 1000, according to voltage, complete	**2 12 6**
Extras to No. 1.—Small Russian Hood to enclose light	**0 12 6**
Iris diaphragm to Hood	**1 1 0**
Carrier for Coloured Glasses ..	**0 3 6**
Extras to No. 2.—Russian Iron body to enclose light	**1 0 0**
Extras to No. 3.— Russian Iron body to enclose light	**1 10 0**
Tray to carry either of the above in ordinary Magic Lantern	**0 2 6**

Very Important. — It is absolutely essential that it be stated: (1) Whether the current is continuous or alternating; (2) What the voltage of the supply is, when ordering Nernst Lamps.

Any parts damaged can be replaced at small cost.

Full instructions sent with every lamp.

ARC LAMPS.

Shuckert's Electric Arc Lamp, with centring movements, complete, with metal enclosing case	**£9 5 0**
Watson's Hand Feed Arc Lamp, with centring movements.....	**5 5 0**
Russian Iron Case to enclose same	**1 10 0**
Carbons, small supply for either of the above, say.....	**0 10 0**
Cheaper Arc Lamps of simpler design are also supplied at **£2 12 6** and	**4 4 0**

NOTE.—The Voltage of the current supply must be stated when ordering. For the Shuckert and Watson's Arc Lamps a continuous current is necessary.

RESISTANCES for Arc Lamps. — These vary in cost according to requirements, from— **£2 0 0** to **£7 10 0**

Full estimates will be submitted on receipt of particulars.

ILLUMINANTS FOR PHOTO-MICROGRAPHY.—*Continued.*

OXY-CALCIUM LIGHT.

For Oxygen under pressure, and house gas.

Best quality blow-through jet	£1	0	0
1 Brin's Gas Bottle, containing 12 ft. oxygen with key and travelling cover	1	18	6
Regulator for ditto	1	10	0
20 ft. indiarubber tubing	0	15	0
* 1 doz. best hard limes	0	2	6
Brass-mounted trough on stand, to contain light or heat-absorbing media	1	10	0
Aplanatic bull's-eye condenser, as described on page 123, with centring screws on stand	3	0	0
Focussing Glass	0	10	6
Projection eyepiece	2	0	0
	£12	6	6

This Set can only be used if House Gas is available.

OXY-HYDROGEN LIGHT.

Best quality jet, with Pringle's "cut-off," enabling light to be turned down very low when not in use	£3	3	0
Centring adjustment to above, if required, extra	2	2	0
The above mounted on tray to slide on base of Photo-Micro. Camera, extra	0	10	0
The above mounted on saddle stand to slide and clamp on triangular bar of Watson-Conrady Condenser system, extra (The tray is not then required)	1	0	0
2 Brin's Gas Cylinders (oxygen and hydrogen), each containing 12 ft. of gas. with keys and travelling covers	3	16	6
2 Regulators for ditto	3	0	0
20 ft. of indiarubber tubing	0	15	0
*2 doz. best hard limes	0	5	0
Metal enclosing case to cover jet, etc., in Russian Iron	1	10	0
	£16	1	6

*ZIRCONIUM PENCILS.

Price 4/6 each, may be used instead of ordinary Limes, thus securing an exceedingly small point of incandescence.

Cost of adapting jet for Zirconium Pencils, 2/6.

INCANDESCENT GAS.

See Lamps, quoted page 134 of this Catalogue.

OIL.

Microscope lamp (No. 754, page 133) with metal chimney £1 5 0

or

Microscope lamp (No. 757, page 133)..... £0 15 0

DAYLIGHT.

Heliostat, as per page 123.

SETS OF CONDENSERS AND ACCESSORIES.

For use with Photo-Micrographic Cameras to which should be added the minant selected from page 171 and 172.

SET P80.

Watson-Conrady Aplanatic Condenser, with centring screws and Iris diaphragm (as described page 163) ..	£6	5	0
Kingsford's pattern trough, to contain light or heat-absorbing media.....	1	15	0
Focussing Glass	0	10	6
Projection Eyepieces 2 and 4. at £2 0 0 each	4	0	0
	£12	10	6

SET P81.

*Nelson's Aplanatic Bull's-Eye Condenser, as described on page 123, with centring screws and Iris diaphragm	£4	5	0
Kingsford's pattern trough, to contain light or heat-absorbing media (page 129)	1	10	0
Focussing Glass	0	8	6
Projection Eyepiece	2	0	0
	£8	3	6

*The Iris diaphragm may be omitted from the Condenser and the cost reduced 25/0.

SET P82.

Nelson's Aplanatic Bull's-Eye Condenser (No. 605)	£1	10	0
Kingsford's small trough to attach to Stand Condenser Stand (No stand included) for light and heat-absorbing media, see page 129..	0	7	6
Projection Eyepiece	2	0	0
Focussing Glass	0	8	6
	£4	6	0

SET P83.

Stand Condenser No. 603 ..	£0	10	6
Focussing Glass	0	5	0
	£0	15	6

Baseboard to carry either of the above sets with illuminant and Microscope. may be supplied at prices varying from 30/0 to £4 10 0.

Special Note.—The above Sets can be varied in any way that may be desired, but we have endeavoured to quote in them the apparatus that is most essential.

Full particulars of and estimates for Sets of Apparatus will be supplied on receipt of particulars of work to be done.

LOW-POWER PHOTOGRAPHY.

The use of the Photo-Micrographic Cameras in conjunction with low-power Photographic Lenses of the Holostigmat and Planar type renders a support for the specimens desirable other than the ordinary Microscope. We therefore make a Special Carrier to attach to the projecting base of the Camera, consisting of a vertical plate supported upon a horizontal base, fitted with thumb-screws for fixing to Camera base, having upon it a large Stage fitted with horizontal and vertical motions by means of rack and screw.

PRICES.

In polished Mahogany, with brass fittings and guides	£2	15	0
In brass, finished in the same manner as parts of a Microscope	6	15	0

The height from baseboard of Camera to optic axis of Microscope should be accurately stated when ordering the above.

A rackwork to carry the above Stages to and from the front of the Camera can be provided at an extra cost of—

Mahogany Stage	£1	0	0
Brass Stage	2	0	0

WORKS ON THE MICROSCOPE, Etc.

DALLINGER. "The Microscope and its Revelations" (Carpenter). The standard text-book on the microscope and its manipulation. New edition (the eighth), revised and partly rewritten. Edited by the Rev. W. H. Dallinger, LL.D., F.R.S., etc. 1136 pages, 817 illustrations, 23 plates, 8vo cloth.....net £1 4 0
Half calf .....net 1 8 0

New arrangement of above.—To suit the convenience of those workers who desire to purchase only one portion of Dallinger's standard work, the 8th edition can now be had in two volumes—

Vol. I.—"The Microscope and its Accessories" 0 14 0
,, II.—"The Revelations of the Microscope" 0 14 0

CROSS & MARTIN J. COLE. "Modern Microscopy," a handbook for beginners and students. Third edition. Entirely revised and greatly extended, embracing the Microscope and Instructions for its Use; Microscopic Objects, how prepared and mounted; Microtomes, their Choice and Use. 280 pages, 71 illustrations, 8vo...net 0 4 0

SCALES. "Elementary Microscopy." A handbook for beginners. Crown 8vo. 180 pages. 78 illustrations. 1905 ..... 0 3 0

VAN HEURCK. "The Microscope: its Constructon, Manipulation, Technique." "Photo-Micrography," etc. Translated from the French by Wynne E. Baxter, Esq., F.R.M.S..... 0 18 6

PHOTO-MICROGRAPHY.

BOUSFIELD. "Photo-Micrography" 0 6 0
PRINGLE. "Practical Photo-Micrography." New edition 0 3 6
SPITTA. "Photo-Micrography" 0 12 6

MICROSCOPY.

COOKE. "One thousand Objects for the Microscope." New and revised edition. Plain stiff binding, 1/0; cloth binding..... 0 2 6
WOOD. "Common Objects of the Microscope," New edition 0 1 0
GRIFFITH & HENFREY. "Micrographic Dictionary"..... 2 12 6
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DANIEL. Laboratory Studies in Tropical Medicine..... 0 15 6
OERTEL. Medical Microscopy 0 9 0
MUIR & RITCHIE. Manual of Bacteriology 0 12 6
SCHERREN. "Ponds and Rock Pools"..... 0 2 6
SCHERREN. "Through a Pocket Lens"..... 0 2 6
SLATER & SPITTA. "An Atlas of Bacteriology." Illustrated by Photo-Micrographs 0 8 6
SCHAFER. "Elements of Histology" 0 8 6
LEE. "The Microtomist's Vade Mecum." New Edition..... 0 15 0

Postage of the above Books extra.

HAND MAGNIFYING GLASSES.

For Reading, Examining Photographs, Maps, etc.

Of the highest class, in Richly Gilt Mounts, with shaped pearl handles, very handsome in appearance.

		PRICE.	Extra for velvet-lined morocco case.
833.	2⅛ in. diameter	£0 7 6	..... £0 3 0
834.	3¼ in. ,, ...	0 10 6	..... 0 4 6
835.	4 in. ,, ...	0 15 0	..... 0 6 0

In Ornamental Silver Mounts and Handles, Hall marked.

836.	2½ in. diameter	£0 12 6
837.	3½ in. ,, ...	1 5 0

Mounted in Tortoiseshell, with Silver Mounts, Hall marked.

838.	2 in. diameter	£0 10 6
839.	3 in. ,, ...	0 18 6

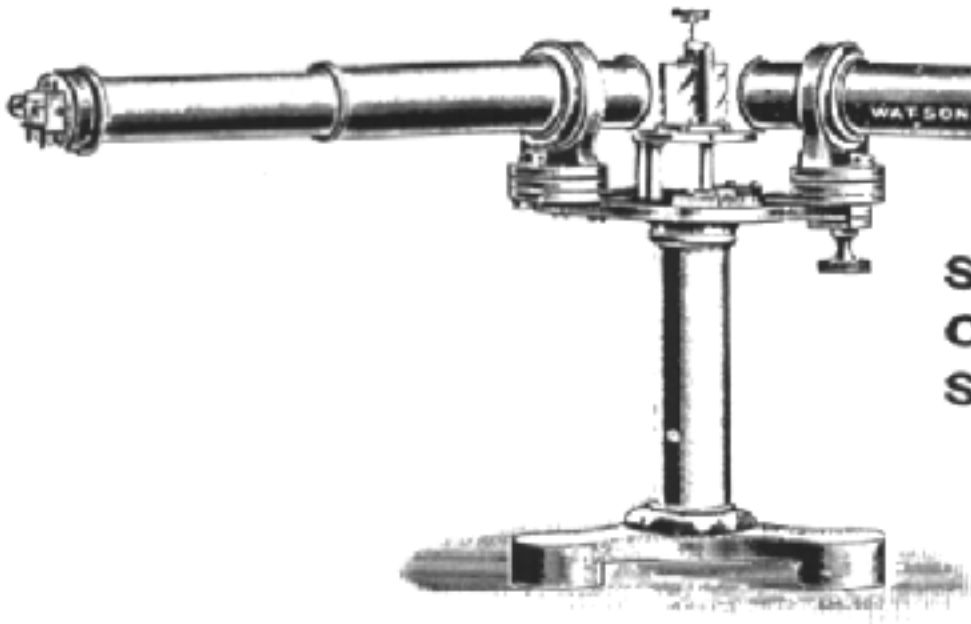
In German Silver Mounts and Black Handles, as figured.

840.	1½ in. diameter	£0 2 0
841.	2 in. ,, ...	0 2 6
842.	2½ in. ,, ...	0 3 6
843.	3 in. ,, ...	0 5 0
844.	3½ in. diameter	0 6 6
845.	4 in. ,, ...	0 8 6
846.	4½ in. ,, ...	0 11 6
847.	4¾ in. ,, ...	0 14 6

LANTERN SLIDES OF WATSON'S INSTRUMENTS.

We have the pleasure to announce that Lantern Slides of any of our Instruments may be borrowed from us FREE OF CHARGE for exhibiting at meetings of Scientific Societies, etc., or may be purchased at 1/0 each.

SPECTROSCOPES.

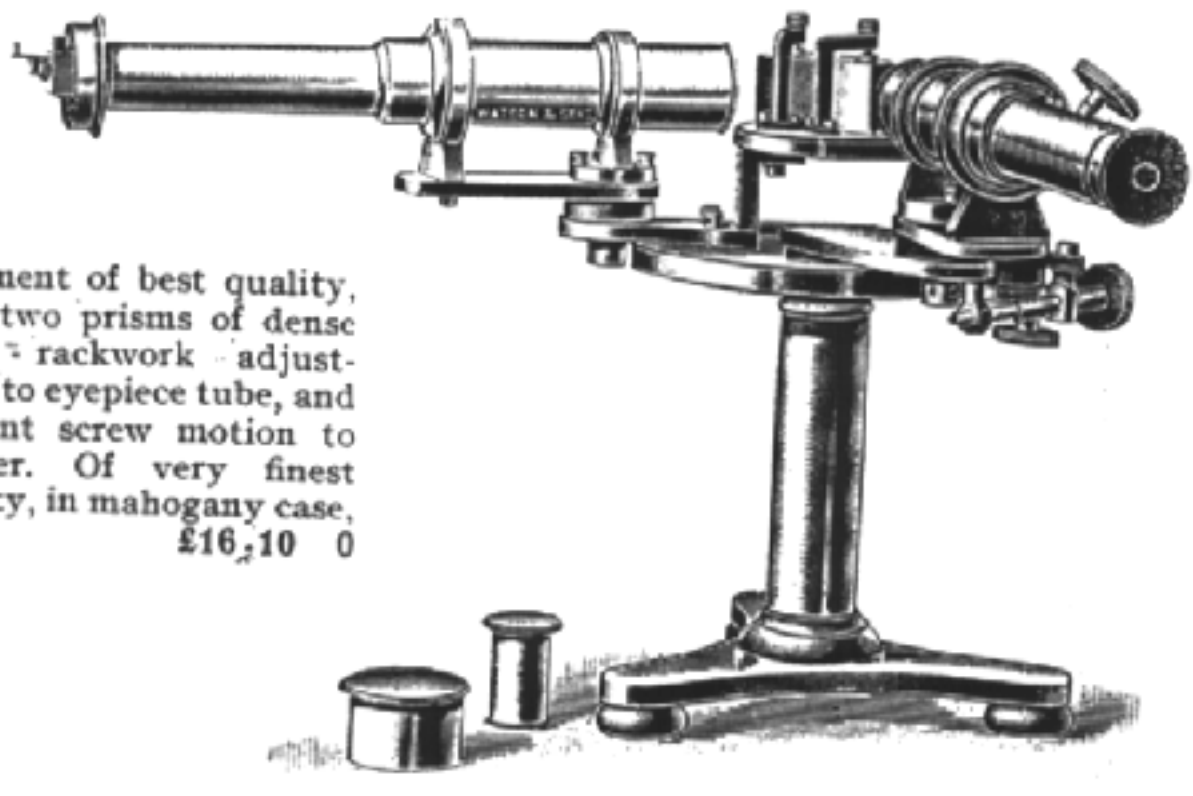


STUDENT'S CHEMICAL SPECTROSCOPE.

WITH TELESCOPE AND COLLIMATOR.

1025. This Instrument is of thoroughly first-class workmanship and quality throughout, and is provided with a single dense 1¼ in. prism. It has achromatic object glasses 1¼ in. diameter, adjustable slit fitted with a reflecting prism, by means of which two spectra can be shown in the field of view at the same time, sliding adjustment to eye end of telescope, and Huyghenian eyepiece. The circle is divided to ½ degrees, and reads by vernier to one minute, enabling angular measurements to be taken. Price, in polished pine case..... **£6 15 0**

Ditto, with rackwork adjustment to eye end of Telescope, as figured.... **7 10 0**



1026. Instrument of best quality, with two prisms of dense glass, rackwork adjustment to eyepiece tube, and tangent screw motion to vernier. Of very finest quality, in mahogany case, **£16 10 0**

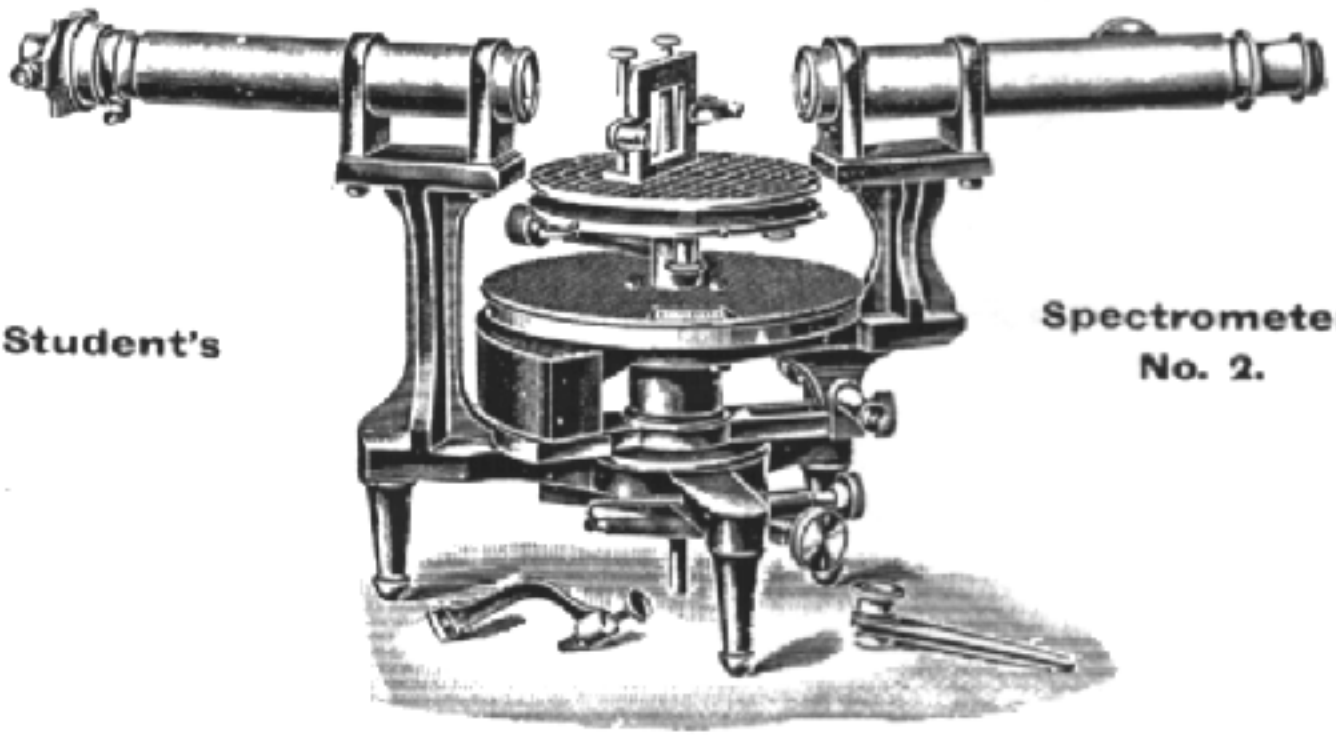
DIRECT VISION SPECTROSCOPES.

1023. Pocket Spectroscope, with adjustable slit, will show many of Fraunhofer's lines, absorption bands in liquids, crystals, etc. In morocco case, **£1 12 6**

1024. Ditto, ditto, with achromatic lenses, and rackwork to focus **2 15 0**

Estimates for Spectroscopes of larger sizes than the above, and for Special Work, on application.

W. WATSON & SONS' SPECTROMETERS.



Student's Spectrometer No. 2.

This is a substantially built Spectrometer designed especially as a thoroughly serviceable, strong and efficient instrument.

The protected circle is 5 inches diameter and reads by vernier to 1 minute.

The telescope is counterpoised and fitted with cross wires and rackwork focussing arrangement. It is carried by a rackwork motion, and has fine adjustment and clamp.

The collimator has a protected adjustable slit and clamping ring.

The prism table is adjustable by means of levelling screws, can be raised or lowered as desired, and can be clamped to the inner circle which carries the vernier.

The optical parts of this instrument are of the best quality, the aperture of the object glass being $\frac{7}{8}$ inch.

It is supplied with 1 eyepiece, grating holder, prism clamp and reader. In case. Price, **£7 7 0**

Extras.

Dense Flint Glass Prism	£0 10 6
Hollow Prism, with $\frac{1}{2}$ inch hole	0 10 6
Replica of Rowland's Grating	0 16 6
Rackwork Movement to Collimator	0 12 6
Two Verniers, extra	0 7 6

LABORATORY SPECTROMETER.

This Instrument is somewhat similar in design to the Student's Pattern above, but is of larger size, the circle being 5 inches diameter and fixed.

The movements of the telescope and of the prism table are each read by two verniers.

The prism has adjustment by levelling screws, and can be raised and lowered. It has clamp and fine adjustment.

The prism table can be detached from the instrument, and a crystal holder or other instrument used in its place.

This instrument is supplied in a case, with two eyepieces, grating holder, prism, clamp and reader.

Price	£14 10 0
With 6 inch circle reading to 30 seconds	15 15 0

Extras.

Dense Flint Glass Prism	£1 0 0
Hollow Prism with $\frac{1}{2}$ inch hole	1 8 6
Replica of Rowland's Grating	0 16 6
Rackwork Adjustment to Collimator	0 12 6

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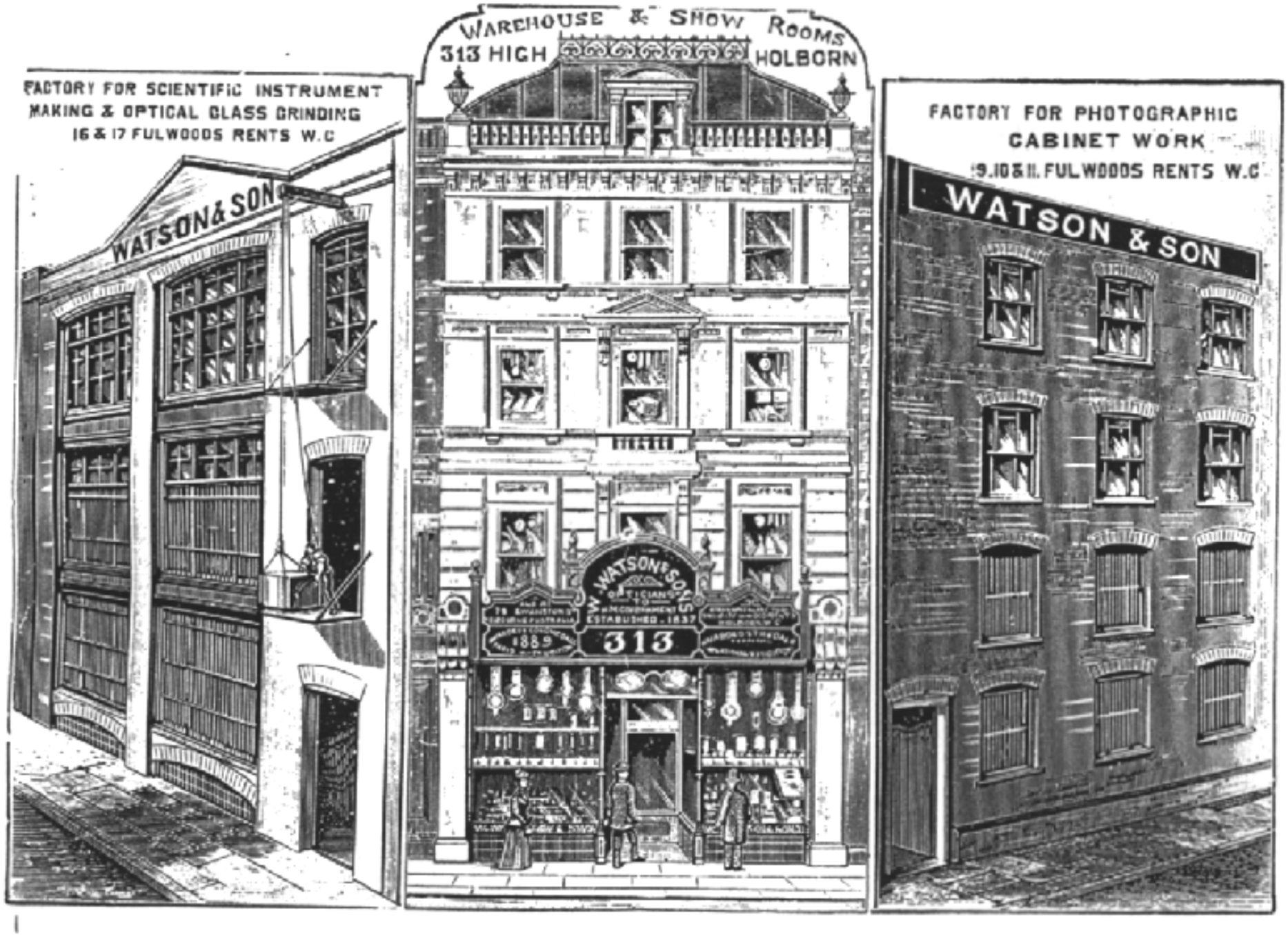

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