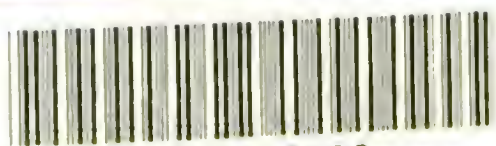


# MICROSCOPES & *Their Accessories.*



1912-13

W. WATSON & SONS, LTD.  
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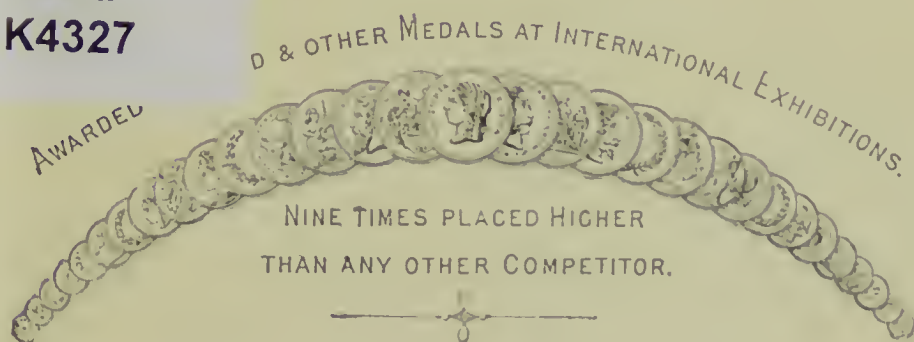
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# MICROSCOPES

. . . and Accessories

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## W. WATSON & SONS, LTD.

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- 2B** The Book of the Watson Microscope.
- 2C** Descriptive and Illustrated Catalogue of Metallographic Microscopes and Accessories.
- 2D** in 3 Sections. Section 1—Photo-Micrographic Cameras and all Accessories.

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**Goods Made to Order.**—When Instruments or Apparatus are made specially to order, and vary from our regular Stock patterns, the full approximate cost must be paid at the time of ordering.

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

Customers' Names and Addresses should be distinctly written.

**Forwarding.**—In the absence of specific instructions, goods are despatched by the route that seems to us the most expeditious, secure, and economical. We employ skilled packers, and use every precaution to ensure safe transit. All goods are sent at the risk of the consignee.

**Packing.** Microscopes are packed and delivered free on rail London (unless otherwise stated).

For **Export Orders**, tin-lined cases for the various Instruments will be approximately as follows:—

Van Henrck Microscope .....	£0 9 6
Edinburgh Student's Microscope, Horseshoe form....	0 6 6
Do. do. do. Tripod form .....	0 7 6
Fram Microscope .....	0 6 6
Any one 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.

Packing cases for bell-glass covers are charged at cost, and are not returnable. Bell glasses are sent at purchaser's risk only.

## MICROSCOPES IN SETS.

A concession is made in the total price of several Microscopes quoted in "sets" with Objectives, etc. That is, if each item be added at its list price, the total will be substantially more than in the following pages. If, therefore, any portion of such sets is not required, it cannot be deducted at its full price. This is only possible in consequence of the quantity of sets that are constantly ordered: one profit being made on the whole. If outfits are required comprising different accessories from those listed, full list price must be paid for each item.

## PROGRESSIVE PAYMENTS.

Any Instrument of our own manufacture in this list, above £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 to be paid in **equal** monthly instalments. Special arrangements for large sums may be made for an extended period.

An extra charge of **ten per cent.** on catalogue prices is made for this accommodation. As for **Example**.—A Microscope or Camera 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.

If the purchaser be a householder he should state his profession, or employment, how long he has resided at the address given, and add 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 his profession or employment, the time 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 not part with the Instrument purchased on this system until the complete instalments have been paid.

The first instalment should accompany the order.

Members of the medical profession practising in England, and wishing to avail themselves of the progressive payment system, can do so on sending two business references.

W. WATSON & SONS, LTD., reserve the right to refuse progressive payments. Proposals for special arrangements for longer or shorter periods, or for smaller sums, will receive every consideration.

This System is only applicable to residents abroad if a householder living in England guarantee the progressive payments.

## REASONS FOR CHOOSING A WATSON MICROSCOPE.

They are British made, and have a special claim on British workers.

They are scientifically constructed for scientific work, and whenever a Microscopist is desirous of wresting from his instrument the utmost it is capable of producing, he has of necessity to employ the refinements and conveniences which the long experience of experts has proved to be the sole means for achieving such results, and which are embodied in the Watson Microscopes.

The following are distinctive features of the Watson instruments. They will not be found in **combination**, and, in the majority of cases, not individually in any make of Continental Microscope.

### The Watson Microscope has

The Tripod foot which imparts perfect rigidity. A Microscope so mounted does not fall over when touched.

A long range of Coarse Adjustment, enabling it to be used for low magnification as well as for the highest. Low-power Objectives are also supplied.

A mechanical draw-tube which allows of precise adjustment of the tube length for thickness of cover glass.

A Mechanical Stage scientifically constructed as a part of the whole instrument, and not an easily-disordered attachable accessory.

A Compound Substage with centring screws, so that the Condenser or dark ground illuminator may be easily rendered axial with the Objective. It is fitted with rackwork to focus, and can be supplied with a Fine Adjustment.

The Watson-Wenham Binocular Body, the ideal arrangement for low-power workers and amateurs.

The fittings carry Substage Apparatus, Eyepieces and Objectives of the Royal Microscopical Society's standard size.

The working parts have sprung fittings with adjusting screws, whereby wear and tear may be compensated for.

The Substage Condensers have the necessary aplanatic cones for developing the fullest capacity of the Objective.

### WATSON'S BRITISH-MADE MICROSCOPES

are the instruments of to-day and the future. If you use one of them you will work to the fullest advantage.

## A FIVE YEARS' GUARANTEE

Accompanies all Microscopes made by W. WATSON & SONS, LTD.,  
together with

### "THE BOOK OF THE WATSON MICROSCOPE,"

a 28-page illustrated book giving hints on the use of the Microscope, directions for its preservation and adjustment, and much information for beginners in Microscopy. A table showing the magnifications of the Objectives and Eyepieces in the outfit is also provided.

The following is a copy of the guarantee :—

## W. Watson & Sons' Microscopes.

### GUARANTEE.

We hereby guarantee

1 That the Microscope No. \_\_\_\_\_ sold herewith has been made and finished in our works at High Barnet, Herts., and London, and all reasonable precautions taken to secure excellence both of material and workmanship.

2 If any defect—not being a defect resulting from wear and tear, improper adjustment, dirt, misuse, neglect or abuse—should appear in any part of this instrument within **FIVE YEARS** from the date of invoice, we will make good or replace such defective part free of charge, and will pay carriage on such part both ways, namely, to and from our Head Office, 313 High Holborn, London, W.C.

3. To inspect and adjust this Microscope free of charge at any time within **TWO YEARS** from the date of invoice if sent carriage paid to our Head Office, 313 High Holborn, London, W.C.; and

4. To correct the effects of fair wear and tear to this Microscope free of charge at any time within **TWO YEARS** from the date of invoice if sent carriage paid to 313 High Holborn, London, W.C., provided the instrument has not been exposed to abuse, dirt, misuse or neglect.

This Guarantee is given only to the original purchaser, and is not transferable, and does not apply to any instrument which has been bought second-hand, let out on hire, taken out of the United Kingdom, or from which the name and number have been removed. All instruments excepted from this Guarantee are excluded from any Guarantee of any kind, and are used at the owner's sole risk.

**W. WATSON & SONS, LTD.**

NOTE.—Where a number of Watsons' Microscopes are in use in one Laboratory or Institution, a Mechanician will be sent to clean and adjust them on request at any time within two years from the date of supply without any charge whatever for services. The only expenses incurred would be for out-of-pocket, travelling (third class), and, if necessary, hotel charges.

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## INTRODUCTION.

For more than twenty-five years the manufacture of Microscopes, Objectives and Accessory Apparatus has been one of the leading features of our business, and the universal demand consequent on the ever-increasing usefulness and importance of the Microscope in all departments of science, research and manufacturing, together with its unique advantages as a means of recreation, have necessitated the expenditure on it of all the genius and skill which technical knowledge, long experience and high ideals can suggest.

We are the largest manufacturers of Microscopes in Great Britain; our instruments have gained a world-wide reputation, and they embody the latest developments and facilities for critical working.

In consequence of a disastrous fire in the Spring of 1910, our Works machinery and tools were entirely destroyed. This necessitated rebuilding, and we have to-day a factory with every modern convenience, adapted for our particular purposes, and equipped with the latest and entirely new machinery and tools.

Our Works are situated at High Barnet, Hertfordshire, and present the most favourable conditions that can be desired and modern facilities provide, for the manufacture of scientific instruments. The motive power for all the machinery is electrical, it is lighted throughout with electricity and warmed by hot-water pipes.

Our endeavour is to maintain for British-made Microscopes, Lenses, and Scientific Instruments the first position in the world. Our instruments are not only superior in design but have unique conveniences for accurate working. We know that for efficiency and value they are unapproached by foreign-made instruments. We respectfully urge the claim of British-made instruments for British workers. Purchasers who place their confidence in us may rest assured of our personal service and interest.

We are always pleased to receive suggestions in connection with our productions and to give such communications our most careful consideration, for we gratefully recognise that our increasing success is in no small measure due to the generous co-operation of our patrons, to whom we are indebted for many valuable suggestions and kind recommendations.

W. WATSON & SONS, LTD.

## AN INVITATION.

An invitation is given to all who may be interested in Microscopy or Scientific Instruments to visit our works. A representative, by appointment, at the Head Office, will accompany them.

## CONSTRUCTIONAL DETAILS OF THE WATSON MICROSCOPES.

**THE QUALITY.** Although we include a wide range of models at varying prices, one quality of workmanship only obtains—the best.

Our staff is composed of men who have been trained in the art of microscope making for 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 of each adjustment is a distinguishing feature of all our instruments.

**THE MOVEMENTS GENERALLY.** The permanent effective working of the movements of our Microscopes is largely due to the fact that 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 3 on page 11. 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 be immediately controlled by the worker tightening the adjusting screws. This method will be further understood by referring to page 14, in which the adjusting screws for the sprung slots of the fine adjustment fittings are indicated at A.

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.

*Too much emphasis cannot be laid on the value and importance of this feature. Its inclusion entails substantially greater cost in manufacturing than the unadjustable fittings, but it enhances the effective working of the instrument so appreciably that our instruments give a life-time of working efficiency, and are renowned for this valuable quality.*

The “Book of the Watson Microscope” gives full directions on this subject.

**THE FOOT OR BASE** is varied in design to suit different tastes in regard to this feature. All are properly proportioned so as to efficiently carry the mechanical part of the instrument in a thoroughly rigid manner. The **horse-shoe** or Continental pattern is frequently preferred for laboratory and students’ use, because of its compactness and great portability. It is generally used in an upright position, the weight of the foot thus imparting the maximum stability.

In the highest-class microscopes, however, the **tripod** is superseding the horse-shoe, for it affords equal steadiness, no matter at what angle the instrument may be inclined. Moreover, the constructional principle is undoubtedly more scientific.

**STAGES.**

These may be of two forms :—

- (1) With a plain surface—on which the object is moved by the fingers ; or
- (2) With mechanical movements—consisting of plates moved by screws, or rack and pinion, and the object resting on them carried in any direction, thus facilitating systematic examination.

In each form there is ample space between the front of the limb and the centre of the Stage for the examination of large specimens, the use of troughs, Petri's dishes, etc.

The **plain stages** have an ebonite surface, as it is more pleasant to use than brass. When desired, a sliding bar or an attachable mechanical stage can be provided, see pages 150-1. We however strongly recommend that the Mechanical Stage be built as part of the microscope, and not fitted as a detachable accessory.

The **mechanical stages** are as follows :—

- (a) Our Standard, as fitted to the "D," and "H," Edinburgh Student's stands.
- (b) The Scop Stage.
- (c) The Research Stage.
- (d) The Bactil Stage.
- (e) Auxiliary Range Stage.

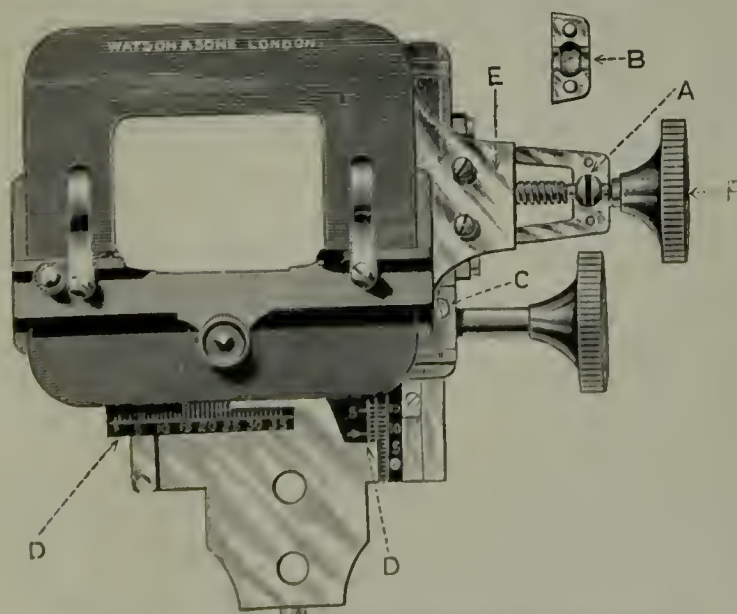
**(a) WATSONS' STANDARD PATTERN.**

Fig. 1. Surface view of our Standard Stage showing sliding bar, scales and verniers, and method of fitting stationary milled head.

The Stage surface as in full view fig. 1, and the manner in which the movements are effected will be plainly seen. The horizontal travel to the Stage is made by the rotation of the stationary milled head F, that is, it does not move 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. 2. To give the smoothest possible motion, the

screw has a ball fitting (A): in this is a groove, which acts as a receptacle for foreign matter. 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, Fig. 1, which can be used for measuring or for "finding" objects, are an extra.

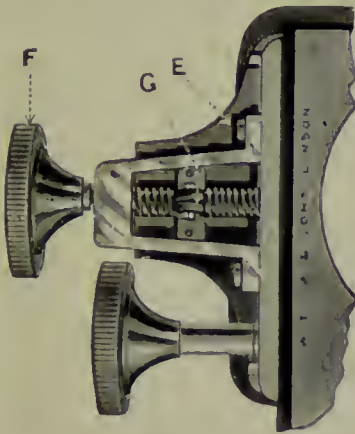


Fig. 2. Method of attaching plate E to screw.  
E supports the collar.  
G is the slotted adjusting collar.

The planed fittings of the Stage have slots through which screws pass at FF and GG (fig. 3), so that any wear in the plates can be immediately taken up.

The advantages of this stage are manifold, and at once occur to the experienced worker; but we would mention one distinctive feature very prominently. The large mounts of some condensers in popular use obstruct the free working of the mechanical plates of some patterns of stage. The stationary milled head enables the entire range of movement to be utilised under such circumstances.

The size of the top plate is 3½ in. square.

The sliding bar is an extra, costing 12/6; it can, if desired, be entirely removed, the upper surface of the stage is then left quite free.

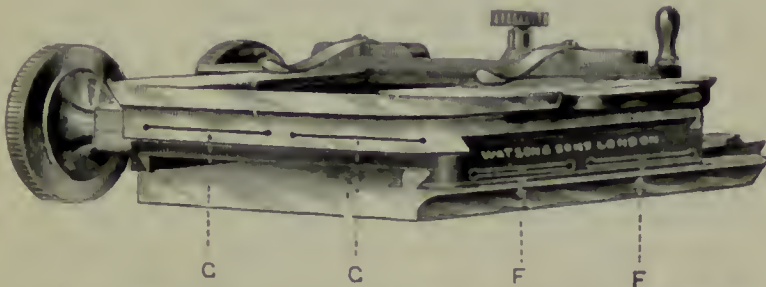


Fig. 3. Corner view of Standard Stage to show system of springing.

## (b) WATSONS' SCOP STAGE

This stage has been devised to give a large horizontal range of motion, and the advantage of the two controlling milled heads being on one axis and of equal speed. For practical reasons it has been found necessary to limit the horizontal travel to 2 inches so as to afford sufficient support at each end of the stage aperture for a 3 × 1 in. slip. The movement in the vertical direction is 1 inch.

This stage appeals to those whose work necessitates the stage having a long traverse; and in particular it may be pointed out that the object springs can be immediately removed when a free surface to the stage is desired. The sliding bar shown in the illustration (which is an extra) can also be entirely removed. More rapid working can consequently be effected

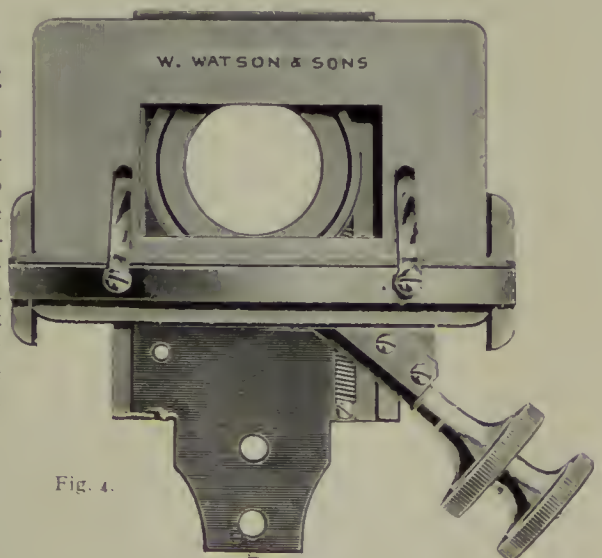


Fig. 4.



by the unusual yet most convenient position in which the milled heads are placed. In fact, they are more readily at hand than in the position which many years' usage has dictated. It is a Stage that has been much appreciated.

(c) THE RESEARCH STAGE.

This is shown in position on the "Research" Microscope on page 51. It gives a range of movements of  $1\frac{3}{4}$  inches horizontal and 1 inch vertical.

The movements are both on one axis and work with great precision. It is a pattern of stage that is much appreciated by many workers.

(d) THE BACTIL STAGE.

This is shown in position on the Bactil Mk. IV. Microscope on page 47. The ranges of movement are  $1\frac{1}{2}$  inches vertical and 2 inches horizontal. The Object is gripped on the right-hand side by a new type of finger; it is independent of spring action, and ensures a certainty of action that is often otherwise checked when immersion oil is used.

(e) THE AUXILIARY RANGE STAGE.

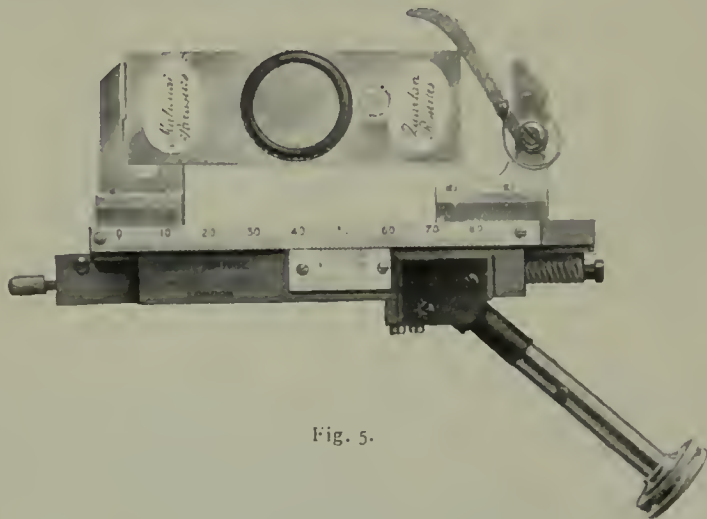


Fig. 5.

This is intended to be used in addition to the ordinary Mechanical Stage, to give an increased horizontal travel. Thus, it can be fitted to the grooves that ordinarily receive the sliding bar on the "Standard" Stage and will give an additional range of  $2\frac{1}{4}$  inches. It can in like manner be added to the Stages of the Van Heurck and Research Microscopes. It has found immediate appreciation.

PRICES OF STAGES.

The Stages here described may be substituted for those quoted with the Microscopes in the succeeding pages at the extra cost stated.

	'D' or 'H' Edinburgh Student's or "Royal"	No. 1 or Circuit Stage Van Heurck.	Grand Model Van Heurck.	Extra for Divisions to movements
(b) "Scop" may be fitted to the .. ..	at an extra cost of *£1 15 0 ..	£1 15 0 ..	£0 15 0 ..	£1 0 0
(c) "Research" ..	1 5 0 ..	..	..	0 17 6
(d) "Bactil" ..	1 5 0 ..	..	..	0 17 6
(e) Auxiliary Range ..	2 5 0 ..	2 5 0 ..	2 5 0 ..	0 10 0

\* An extra charge of 10/6 is made for the Sliding Bar on the D or H Edinburgh Student's Microscope. It is included with the other Instruments specified above.



### THE "GRIP" STAGE SPRING.

This pattern has four distinct advantages :—(1) the free rotation of the Spring ; (2) a firmly fixed butt ; (3) the easy removal of the spring and butt ; (4) objectives are not liable to catch against it when revolved on a nosepiece ; it is made of watch spring metal and lies quite flat, except at the tip.



The Spring and Butt fitting complete.

Fig. 1. Sectional View of Spring and Fittings.

It will be seen from the above illustrations, that the fitting socket which goes into the stage is sprung, and that through the middle a conical shaped pin passes, at the top of which a little head is attached by screwing. By screwing up this head an expansion of the fitting 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. To release it, the head is unscrewed and the spring and butt are removed immediately. This is fitted to the stage of all our Students' Microscopes.

### THE SUBSTAGE.

All Watson microscopes have means for carrying the condenser, polariser, and other illuminating apparatus. In the cheaper instruments this consists of a plain tube, or underfitting (as shown in the Praxis microscope, page 27), sometimes with adjustment by a Spiral Screw movement (see page 152), while in the case of the more expensive stands a compound substage, with rackwork and centring movements is fitted (see "H." Edinburgh Student's microscope, page 43). In every case, these are of universal size, Royal Microscopical Society's standard (1.527 in.) inside diameter. A still more elaborate pattern is fitted with a fine adjustment in addition to the rackwork focussing movement. This is shown in position on the Van Heurck and "Royal" microscopes, illustrated on pages 67 and 55 ; and is described on pages 59 and 52.

### HANDLES TO MICROSCOPE

The shape of the Limb in all our Microscopes renders the usual handle unnecessary. Most so-called handles rarely accommodate more than two fingers and are quite unsuitable for carrying an instrument. Our Fine Adjustments cannot pinch the fingers, and the limb is so suitably shaped as to make it a natural and convenient part to lift by.

## THE COARSE ADJUSTMENT

This is a diagonal rack and spiral pinion, as shown in Fig. 7 below. With this construction the teeth successively engage with the pinion, and thus an exquisitely-smooth movement, with an absence of loss or backlash is secured. Each tooth of the rack is ground to its own leaf of the pinion, and a perfection of motion is imparted which is obtainable by no other device. A plate or box covers the pinion and its stems, and is attached by four screws: by regulating the latter a most perfectly graduated pressure between rack and pinion can be applied as desired. Many valuable commendations have been expressed with this feature of our stands. The late Rev. W. H. Dallinger in the eighth edition of "The Microscope and its Revelations" (Carpenter) says:

*"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  $\frac{1}{12}$  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."

The "Journal of the Royal Microscopical Society," February, 1893, page 95, says: "The essential part of a microscope is the springing of the dovetail grooves. . . . In Watsons' 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."

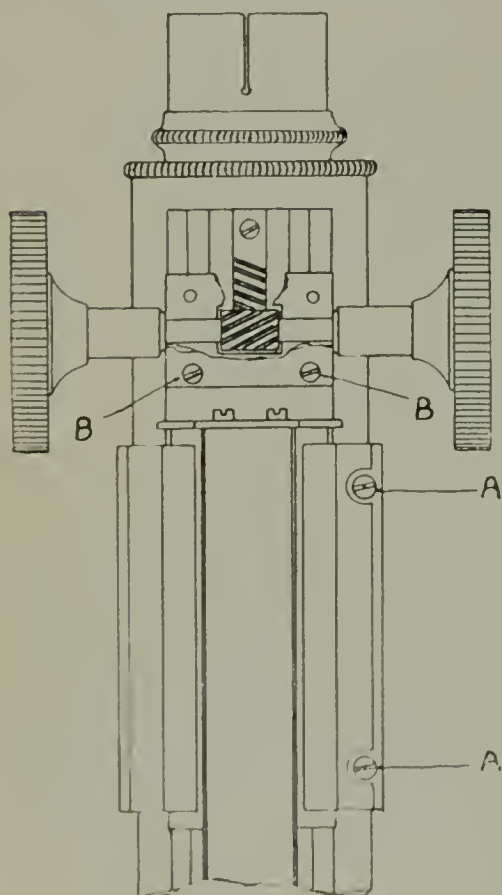


Fig. 7, showing the arrangement of Rack and Pinion, and Fine Adjustment dovetail fitting with Adjusting Screws A.

## THE RANGE

of the Coarse Adjustment is a most important feature. All our Microscopes have sufficient to focus low power Objectives—generally a 3 inch; in the smaller models, a 2 inch. The connection between insects and disease has demanded ample latitude for the examination of the former.

## THE FINE ADJUSTMENT

This is constructed in two designs, both on the Lever principle, one working horizontally, the other vertically.

**The Standard Lever.** As will be seen from figure 8 the lever in this pattern is set horizontally. It has been made by us for the **past twenty years**, and it is at the present day generally admitted to be the most accurate, reliable and scientific in principle, of any now in use. It combines simplicity of construction with great delicacy of action, will not deteriorate with use, and is suitable for objectives of the highest power and aperture.

The principle of its construction is shown in Fig. 8. The whole body of the instrument is supported on the shorter end of a lever "C" contained in the limb of the stand. The long end rests against the point of a micrometer screw, which is actuated by a milled head. The spiral spring merely keeps the body pressed closely against the lever, and is a necessary part of all similar movements. It will be observed that the fulcrum "D" is as close as possible to the body, thus minimising the actual weight to be raised, by increasing the ratio between the two ends of the lever. Thus, in the Edinburgh Student's microscope, the arm on one side is  $\frac{3}{4}$  in. long, and on the other side  $1\frac{1}{2}$  in. The weight of the body to be lifted is 17 ozs. Therefore, the actual resistance amounts only to  $3\frac{1}{4}$  ozs. If the

objective touch the cover glass, the slight pressure exerted by this weight is not sufficient to break the cover glass, and thus it combines the additional merit of a **Safety Fine Adjustment**.

Also, the rate of movement is reduced in the same ratio, and a very slow motion is communicated by this system. As an instance, the movement imparted by one complete turn of the milled head in the Edinburgh Students' Instrument is  $\frac{1}{300}$  of an inch, and as it is sensitive to a fractional part of a turn, a precision and fineness is obtained which is unequalled for high-power work. Both the lever itself, and the bearing points, are of polished hardened steel, wear is thus reduced to a minimum. The length of the dove-tailed bearing in which the body moves is about  $2\frac{1}{2}$  inches.

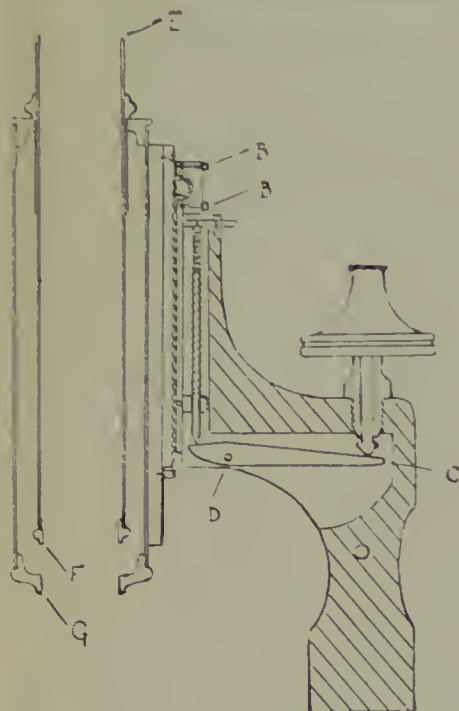


Fig. 8. Section of Limb of Edinburgh Student's Microscope, showing construction of Watsons' Standard Fine Adjustment, etc.

B—Screws holding pinion plate in contact with rack of Coarse Adjustment. C—Lever. D—Fulcrum of Lever of Fine Adjustment. E—Eyepiece fitting at top of draw-tube. F—Universal objective thread at lower end of draw-tube. G—Objective thread at nosepiece end of body.

The principal advantages of this fine adjustment are that: it is very strongly constructed and cannot easily become deranged; the distance between eyepiece

**THE FINE ADJUSTMENT—Continued**

and objective remains constant; the milled head can be controlled by either hand; the head can be conveniently geared to the focussing rod of a Photo-Micro-Camera; the fingers cannot be pinched, as there is no external fitting on a pillar; the whole movement can be easily adjusted by the worker himself, by means of the spring-fitted slides. This latter is an advantage of especial interest to the microscopist abroad, as it obviates the necessity for returning an instrument to the manufacturers for adjustment. "The Book of the Watson Microscope" gives full directions on this point.

**THE VERTICAL LEVER**

Shown in fig. 9 is the method adopted in the Fine Adjustments of the Standard Mk. I., the Bactil Mk. IV. and the Research Instruments.

It is similar to that of our well-known Standard pattern, but the lever is placed vertically instead of horizontally. For many purposes the controlling milled head at the side of the limb is preferred by some workers, but it has hitherto been associated with a more or less complicated mechanism which must rapidly deteriorate.

This is not the case with our lever form, the very simplicity of which is a recommendation. There are no cogs, cams or anything likely to become defective or easily worn out.

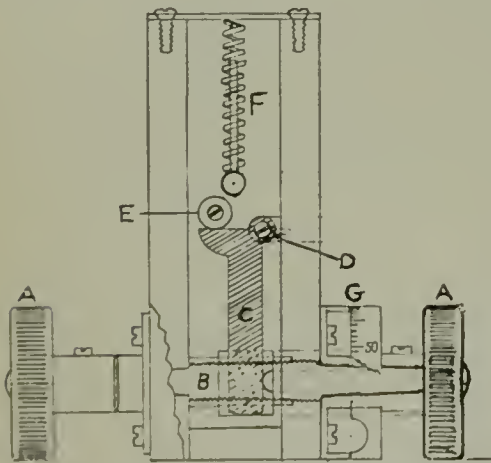


Fig. 9.

A is the actuating milled head turning the screw B, on which is fixed a rounded nut which presses against the lever C. The fulcrum is at D, and the sliding fitting is raised by pressure against the pivot E. The reactionary effect is produced by the weight of the body and its fittings and the coil spring F. The long lever and the short distance between the fulcrum and the point of pressure produce an exceedingly slow and sensitive movement. The milled head A occupies a fixed position; it does not travel with the screw.

The rate of movement of the Adjustment is read on the divided drum G.

It is exquisitely sensitive to the least turn of the milled heads, and the weight of the body and the rate of movement are alike minimized by the disproportion in the arms of the lever, so that no injury is likely to occur if the objective is brought in contact with the cover glass by its means. It is in fact

**A SAFETY FINE ADJUSTMENT.**

A complete rotation of the milled head moves the body  $\frac{1}{1000}$  in., but it is sensitive to less than  $\frac{1}{1000}$  of a turn, so that the reading may be less than  $\frac{1}{1000000}$  in.

The worker always knows whether the body is ascending or descending.

Its great advantages are **SIMPLICITY, EFFICIENCY,**  
**PERMANENT WORKING QUALITY.**



## TWO-SPEED FINE ADJUSTMENTS

## THE MALES-WATSON

This pattern of two-speed movement is a development of our Standard Fine Adjustment. The elaboration consists of a supplementary lever controlled by a second milled head, which gives the additional movement desired. Reference to the accompanying figure, will show clearly the principle involved.

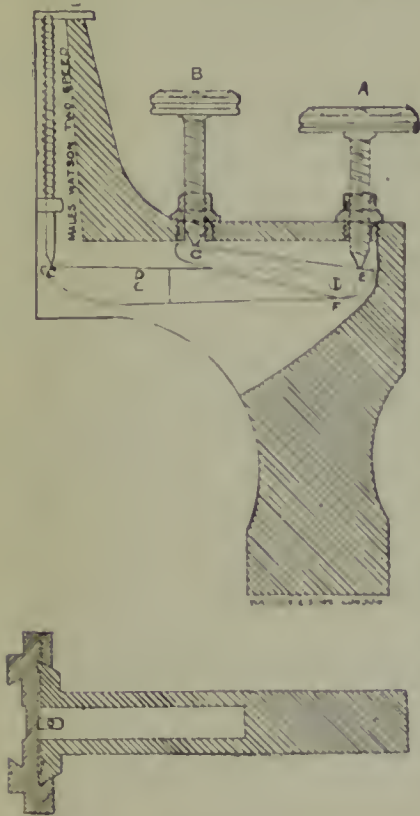


Fig. 9A

The extra cost for supplying the Males-Watson Two-Speed Fine Adjustment to any of our Microscopes at time of ordering is ..... £2 0 0

It is supplied to order only.

*The index showing the amount of rotation of milled head is fitted to the slow-acting screw only, which is then divided to read microns.*

## THE BODY TUBE

This, in stock instruments, is made to receive one of the two most popular and generally useful sizes adopted as standards by the Royal Microscopical Society.

The Student's or universal Continental size, No. 1 ..... 9173 in. diameter.

The larger size, No. 3 ..... 1'27 in. diameter.

We now make the majority of our instruments with the outer or body tube of  $1\frac{1}{2}$  in. diameter, which allows of either a large or small draw-tube being fitted, to suit the tastes and requirements of individual workers. A further advantage is also obtained in that lenses of the Holostigmat type (see page 95), which are designed to work without eyepieces, may be conveniently used with all such large tube bodies.

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



## THE MECHANICAL DRAW-TUBE

The improvement in Objectives, and consequent increased sensitiveness to thickness of cover glass, has necessitated the introduction of the **mechanical draw-tube**, and it is supplied to our Van Heurck and Royal Instruments, see pages 55 and 67.

With this is fitted, in addition, a sliding Draw-Tube giving a wide range of adjustments. The Body length with the draw-tubes closed is 142 millimetres (5·6 inches), and is therefore shorter than the Continental length of 6 inches. With the Draw-tubes extended it is 305 millimetres (12 inches) long, or 2 in. longer than the English length of 10 inches. Such instruments can therefore be used for all Objectives, and allow of the adjustment for thickness of cover glass. The rackwork Draw-tube effects this in the most precise manner.

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, and giving the total length when the rackwork draw-tube alone is in use. This fitting gives great control in working, and its value for obtaining critical effects is inestimable.

## BINOCULAR MICROSCOPES.

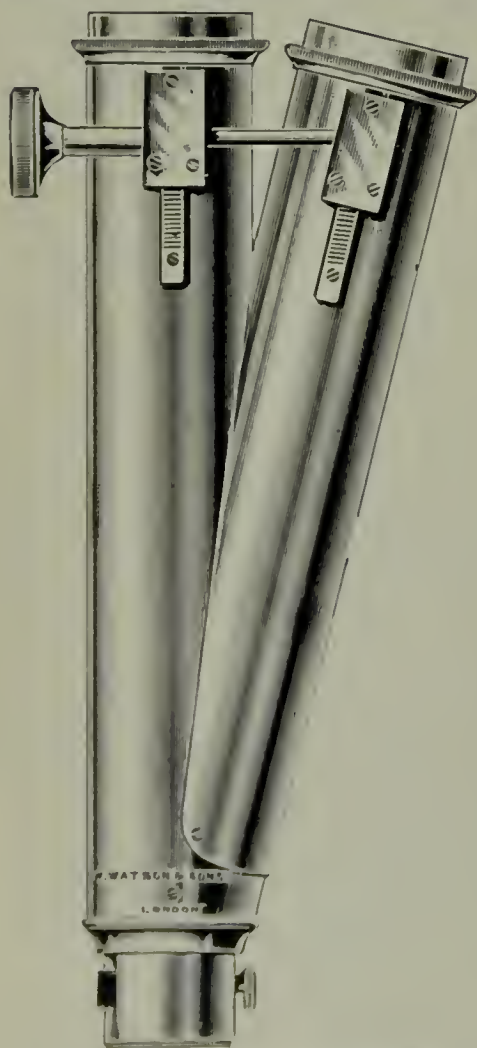


Fig. 10. Binocular Body for Microscope.

### The Watson-Wenham Stereoscopic System.

The prices for binocular bodies for the various instruments will be found in the list, either separately to interchange with the monocular body, or for the stands with binocular body only.

The Binocular Microscope offers many advantages and conveniences, especially to the amateur. Very few specimens that are examined with low powers are thin and flat and it is difficult to form a correct idea of shape and structure with the Monocular instrument. Examined with the Binocular, the several planes of a globular or irregularly shaped object stand out in wonderful stereoscopic clearness, giving a new beauty and charm, with better understanding of the subjects observed, together with the increase in comfort from employing both eyes. The effect with pond life subjects is most striking. Its many advantages are frequently overlooked. It cannot be advantageously used with objectives having a numerical aperture over  $\cdot 34$ , but by sliding out the binocular prism when high power objectives are used, the light passes directly up the straight or monocular tube alone, and no depreciation is suffered.

A rackwork is provided to the draw-tubes so that the inter-ocular centres may be altered as required.

## SECOND-HAND MICROSCOPES.

From time to time we have Second-hand Microscopes, Objectives, and Accessories of our own, and by makers of repute. We shall be pleased at all times to send particulars of them. As the stock is constantly changing, it is desirable that full details of the kind of instrument or apparatus required should be given.

A list of second-hand instruments is published periodically, and will be regularly forwarded to customers desiring to receive one.

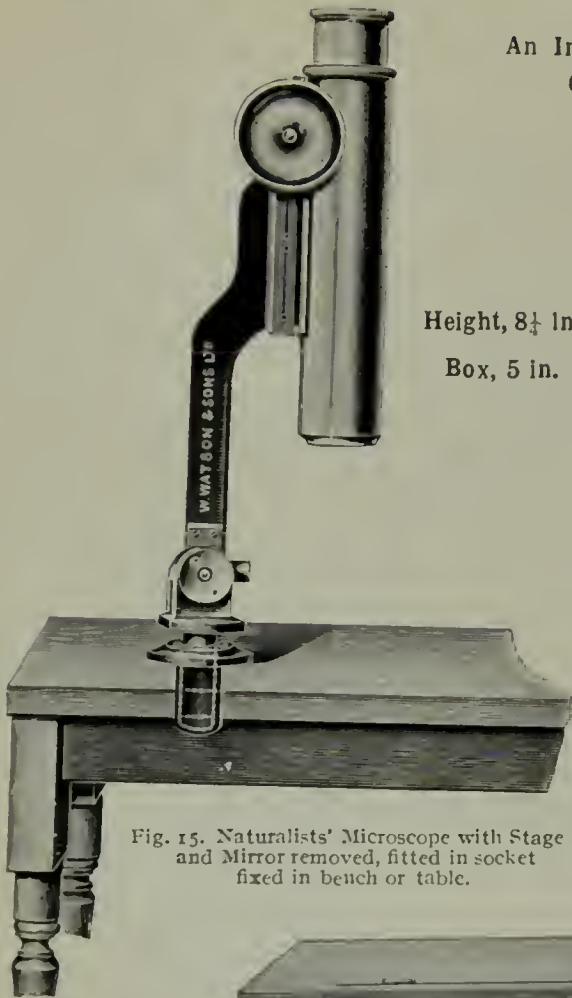
Second-hand microscopes and accessories are taken in exchange or purchased for cash.

### TO ENQUIRERS ABROAD.

The ready sale for modern Instruments, second-hand, prevents the offer of such being open after the interval necessary for a reply from the Colonies, etc. If customers will send a description of their wants with remittance we will send the first Instrument coming into our hands that will suit the requirements. As wide a discretion as possible should be given.

## THE NATURALISTS' MICROSCOPE.

An Inexpensive Microscope of Sound Construction for Everyone.



Height,  $8\frac{1}{4}$  in.

Box, 5 in.

Fig. 15. Naturalists' Microscope with Stage and Mirror removed, fitted in socket fixed in bench or table.

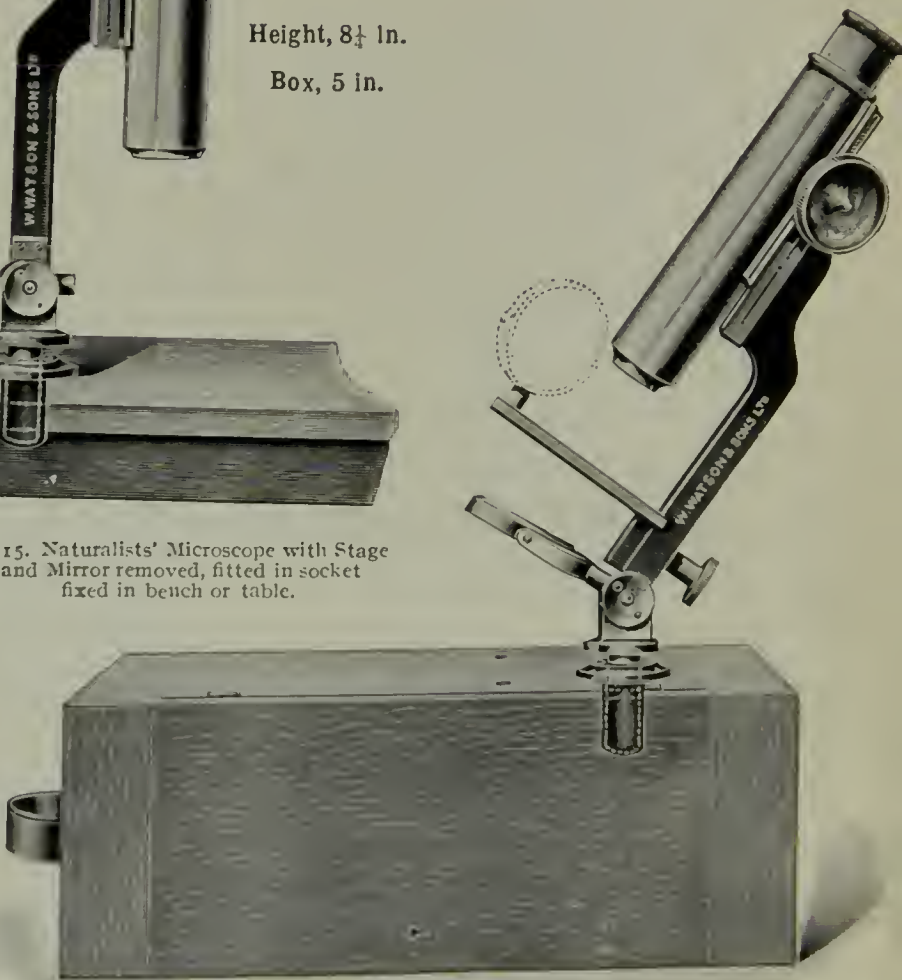


Fig. 11. Naturalists' Microscope mounted in socket on side of containing case.

The Naturalists' Microscope has been designed primarily for the numerous and ever-increasing number of Naturalists and Nature Students, and it will be found invaluable as a Biological Class instrument; its uses, however, are not limited to these circles. The modern demands of hygiene, and the progressive knowledge of the "infinitely little," as factors in success in numerous trades and occupations has led us to believe that the information given in text books will be better understood and rendered more interesting if supplemented by personal observation, with this Microscope.

To the Agriculturist, Bee-keeper, Farmer, Gardener, Seedsman, Stock-breeder, in the Dairy, the Bakehouse and the Orchard it has become a necessity, while the Housekeeper, in addition to its recreative and educational value, can quickly learn to detect adulterations in food, etc., and in numerous other sections it will be found valuable beyond expectation, as its possibilities are developed and appreciated.

The instrument is well-made, and has an **Inclining joint**.

It has a **coarse adjustment** by diagonal rack and pinion.

The **Stage** is removable as shown in Fig. 15.

The **Mirror** can be removed from beneath the stage, and fits in a hole on the stage, for super-stage illumination.

The **base** for this Microscope is intended to be formed either by the case in which it is supplied, or by the bench on which it is to be used.

When the case is supplied, a **socket** to receive the cone-shaped fitting at the lower end of the Microscope is let into the side.

When no case is supplied, a **socket** is sent with the instrument, and it can be readily fitted to any **bench** or **table**.

It will be understood that the Microscope is merely placed in the socket; sockets can, therefore, be fixed in benches, and the Microscope placed in position or removed as desired without interfering substantially with the bench surface.

## NATURALISTS' MICROSCOPE.

### PRICES.

Microscope Stand, with socket to fit into bench, as illustrated and described	£1	0	0
Strong Case for ditto .....	0	7	6
Extra Sockets to fit bench, etc. .... each	0	2	0

Complete Sets, consisting of Naturalists' Microscope with the Accessories enumerated.

M.200. Microscope, with one Eyepiece and 2-inch Argus Objective. Magnification 28 diameters .....	£2	0	0
M.201. Microscope, with one Eyepiece and Combining Objective 2-inch and 1-inch. Magnifications 30-60 diameters .....	2	3	6
M.202. Microscope, with one Eyepiece and Combining Objective 1-inch, $\frac{1}{2}$ -inch and $\frac{1}{4}$ -inch. Magnifications 60-180 diameters ....	2	3	6
M.203. Microscope, with one Eyepiece, Argus 1-inch, Parachromatic $\frac{1}{4}$ -inch, Stand Condenser No. 1604. Magnifications 45-180 diameters .....	3	6	6

If a Case is required, please add 7/6 to the above sets.

The following Objectives are also recommended for use with this instrument:—

**Argus Series**—2 inch, 16/6; 1 inch, 12/0;  $\frac{2}{3}$  inch, 12/0.

**Parachromatic Series**— $\frac{1}{4}$  inch, 25/0;  $\frac{1}{8}$  inch, 30/0.



THE  
School Microscope.

As Figured page 23.

Supplied to the County Councils and Technical Schools of London, Cheshire, Essex, Glamorganshire, etc.

This Microscope has been specially designed for Educational purposes, and is eminently suitable for Biological, Botanical, Entomological, Pond Life, and other Studies. It is very strongly constructed, absolutely rigid, and the workmanship is of the best. It has a best quality diagonal rack and pinion coarse adjustment, by which high powers can be accurately focussed. The fittings have our usual spring slots and adjusting screws for compensating wear and tear. No fine adjustment is included, as the bulk of the work will be with powers not higher than  $\frac{1}{2}$  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 Students' Microscopes to fit a sliding tube for coarse adjustment and a fine adjustment—often of *very inferior* capacity. We are convinced that a good rack and pinion coarse adjustment is infinitely superior to the other combination, and many workers of eminence have expressed the same opinion—the late 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  $\frac{1}{2}$  in., and often have used it with a  $\frac{1}{2}$  in. Objective."

The total height when racked down is 11 inches.

The Body length is  $5\frac{1}{4}$  in., and with draw-tube extended,  $8\frac{3}{4}$  in.

The Foot is large and rigid, measuring  $5\frac{1}{4}$  in.  $\times$   $3\frac{3}{4}$  in. wide. An inclining joint is fitted at the top of the pillar.

The Mirrors are plane and concave,  $1\frac{3}{4}$  in. diameter, with sliding adjustment.

The Stage is large, measuring  $3\frac{1}{2}$  in.  $\times$   $3\frac{1}{4}$  in., and is covered with ebonite.

PRICES.

Microscope, Stand only as described .....	£2 10 0
Polished Mahogany Case .....	0 10 6

COMPLETE SETS

Of the School Microscope, in Mahogany Case, with the following accessories:

No.	Objectives.	Eyeieces.	Nosepiece.	Condenser.	Price.
S 207	1 Inch Argus.	1—(1, 2, 3 or 4)	—	—	£3 7 6
S 208	Two—1 in. "Argus" and $\frac{1}{2}$ in. Parachromatic.	Do.	—	—	4 15 0
S 209	Two—1 in. or $\frac{3}{4}$ in. and $\frac{1}{4}$ in. Parachromatic Series.	Do.	—	—	5 5 0
S 212	Two Do. do.	2 Do.	—	Scop Abbe Illuminator, No. 1971, and tube underfitting	6 7 6
S 213	Two Do. do.	2 Do.	Double	Scop Abbe Illuminator, No. 1971, and spiral focussing underfitting page 152	7 7 6

EXTRAS.

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
Attachable Mechanical Stage, No. 3001, page 150.....	2 2 6
Scop Abbe Illuminator, with Iris diaphragm, No. 1971 .....	0 17 6
Iris Diaphragm.....	0 6 6

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



**THE "SCHOOL" MICROSCOPE.**

Height, 11 inch

**NON-INCLINABLE MICROSCOPE.**

In all its working parts, and in general construction this Microscope is identical with the Praxis, described on page 26. The only difference being in the pillar and its attachments to the foot and through the Stage, in which latter it forms a rigid, non-inclinable support. The description of the Praxis Microscope therefore applies to this in every particular excepting the foot pillar and its joint.

**PRICES.**

Non-inclinable Microscope, Stand only .....	£3 12 6
Mahogany Case .....	0 10 6

**Complete Sets.** Consisting of Non-inclinable Microscope, Mahogany Case with Lock and Key, and the following accessories :—

Set No	Objectives.	Eyepieces.	Nosepiece.	Condenser.	Price.
N 500	Two—(Parachromatic), $\frac{1}{4}$ in. and Choice of 1 in., $\frac{1}{4}$ in., and $\frac{1}{2}$ in.	1—(1, 2, 3 or 4).	—	—	£6 2 6
N 501	Two — (Parachromatic), $\frac{1}{4}$ in. and Choice of 1 in., — in., or $\frac{1}{2}$ in.	Do.	—	—	6 7 6
N 502	Do.	2—(1, 2, 3 or 4).	Double No. 2847.	—	7 0 0
N 503	Do.	Do.	—	Scop, as per page 103, No. 1971.	7 7 6
N 504	Do.	Do.	Double No. 2847.	Scop, with spiral focussing screw.	8 7 6
N 505	Do.	Do.	Do.	Improved Abbe Illu- minator, No. 1958.	8 5 0
N 506	Do.	3—(1, 2, 3 or 4).	Do.	Do. No. 1958 and spiral focussing screw.	9 2 6
N 507	Do.	Do.	Do.	Compound substage, page 152, with con- denser No. 1958.	10 7 6
FOR BACTERIOLOGY.					
N 510	Three—Choice of 1 in., $\frac{3}{4}$ in., or $\frac{1}{2}$ in., also $\frac{1}{4}$ in. or $\frac{1}{8}$ in., with $\frac{1}{2}$ in. 1.20 N.A. oil immersion.	2—(1, 2, 3 or 4).	Triple No. 2849.	Scop, No. 1971	12 5 0
N 511	Do. but with $\frac{1}{12}$ in. 1.30 N.A. oil immersion.	Do.	Do.	Do.	13 5 0
N 512	Three—Choice of 1 in., $\frac{3}{4}$ in., and $\frac{1}{2}$ in., also $\frac{1}{4}$ in. or $\frac{1}{8}$ in., with $\frac{1}{2}$ in. 1.30 <sub>2</sub> N.A oil immersion.	3—(1, 2, 3 or 4).	Do.	Abbe Illuminator, No. 1958 and spiral focussing screw	14 10 0
N 513	Do.	3—(1, 2, 3 or 4).	Do.	Compound substage, page 152, with con- denser No. 1958.	15 15 0

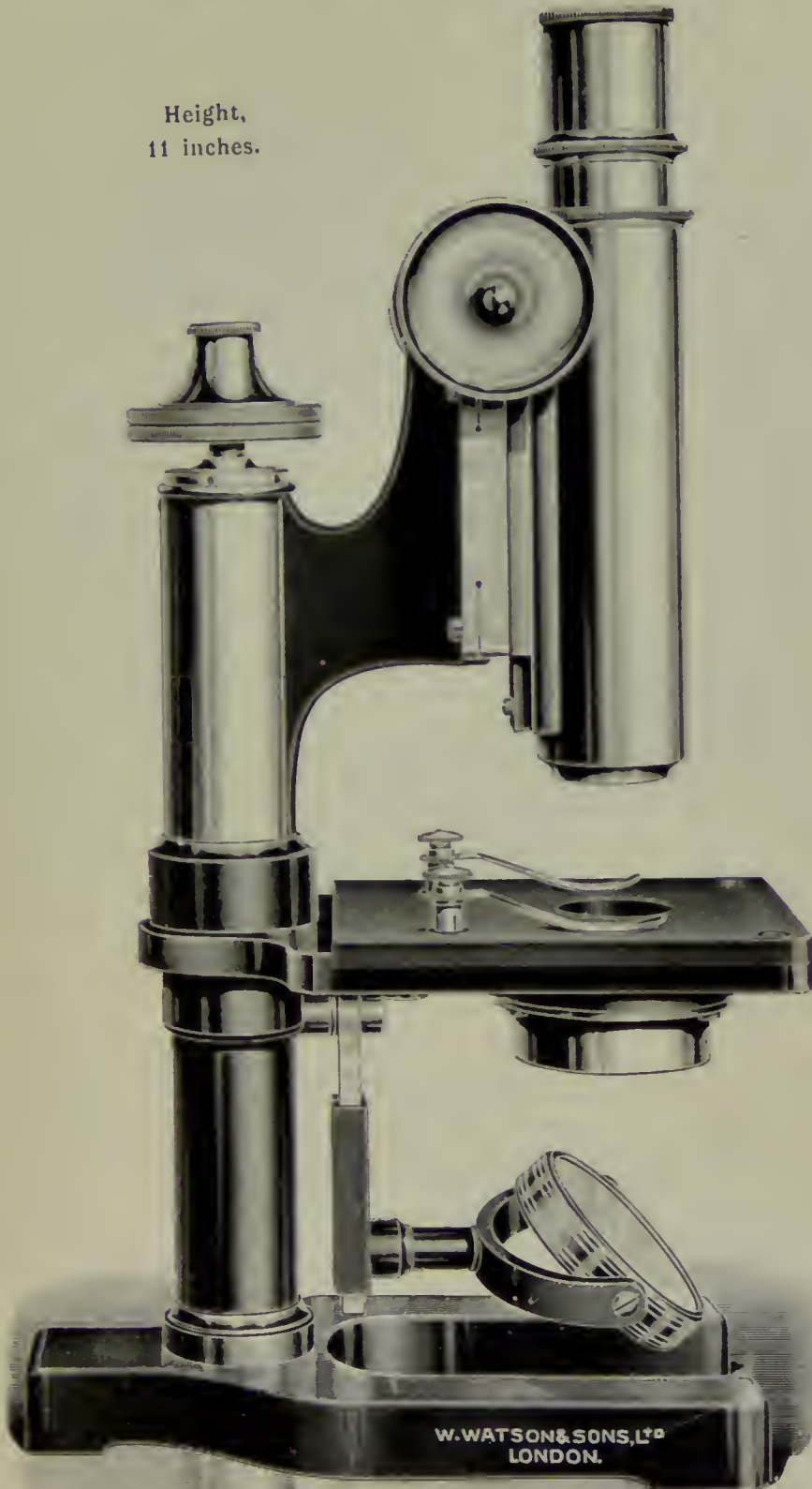
**SPECIAL EXTRAS.**

Attachable Mechanical Stage, designed especially for the "Praxis" Microscope, page 130, No. 3000, £2 17 6; or No. 3001 .....	£2 2 6
Divisions to above Stage movements, giving readings to $\frac{1}{10}$ $\frac{0}{10}$ , extra .....	0 7 6
Compound Substage, see page 152 .....	1 17 6
Spiral Focussing Underfitting, if supplied with Condenser .....	0 12 6

For other suitable Extras, see page 40.

# NON-INCLINABLE MICROSCOPE.

Height,  
11 inches.



## THE "PRAXIS" MICROSCOPE.

*For prices see page 28.*

This stand is constructed differently from the other microscopes described in this list. The working parts generally are of our standard patterns, with spring fittings and screws for adjustment for wear and tear, as described on page 9, but the frame of the instrument has been modified so as to place upon the market a stand with all the desirable British features, which can compete in price with the many Continental productions now obtainable.

The principles followed are briefly: the foot and pillar are cast in one piece, the stage and limb are inseparably united. These two parts are connected by a strong axial joint, the result being an instrument more firmly and solidly-framed than any other yet made, and free from any suspicion of spring or vibration in its parts. These stands are highly recommended where the microscope is liable to rough usage, laboratory use, students' use and travelling. They are unrivalled for experimental work with acids, etc.

The "Praxis" is eminently suited for those medical practitioners who, for everyday work, need a simple stand without costly mechanical refinements.

It is very portable, being compact and light in build. All the parts are of (R.M.S.) Standard size, and the horseshoe foot will support the microscope steadily in any position. It should be especially noted that all the working parts are of our regular pattern and that nothing is sacrificed to so-called "cheapness." These microscopes are "cheap" in the true sense: they will last for years without getting out of order.

### SPECIFICATION.

**The body** when closed is 145 mm. ( $5\frac{11}{16}$  inch) 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 Standard Continental, or Student's size.

**Coarse and Fine Adjustments** of our Standard patterns, as described on pages 14 and 15.

**The Fittings for Condenser, etc.**, turn aside from the optical axis.

**The Mirrors** are plane and concave.

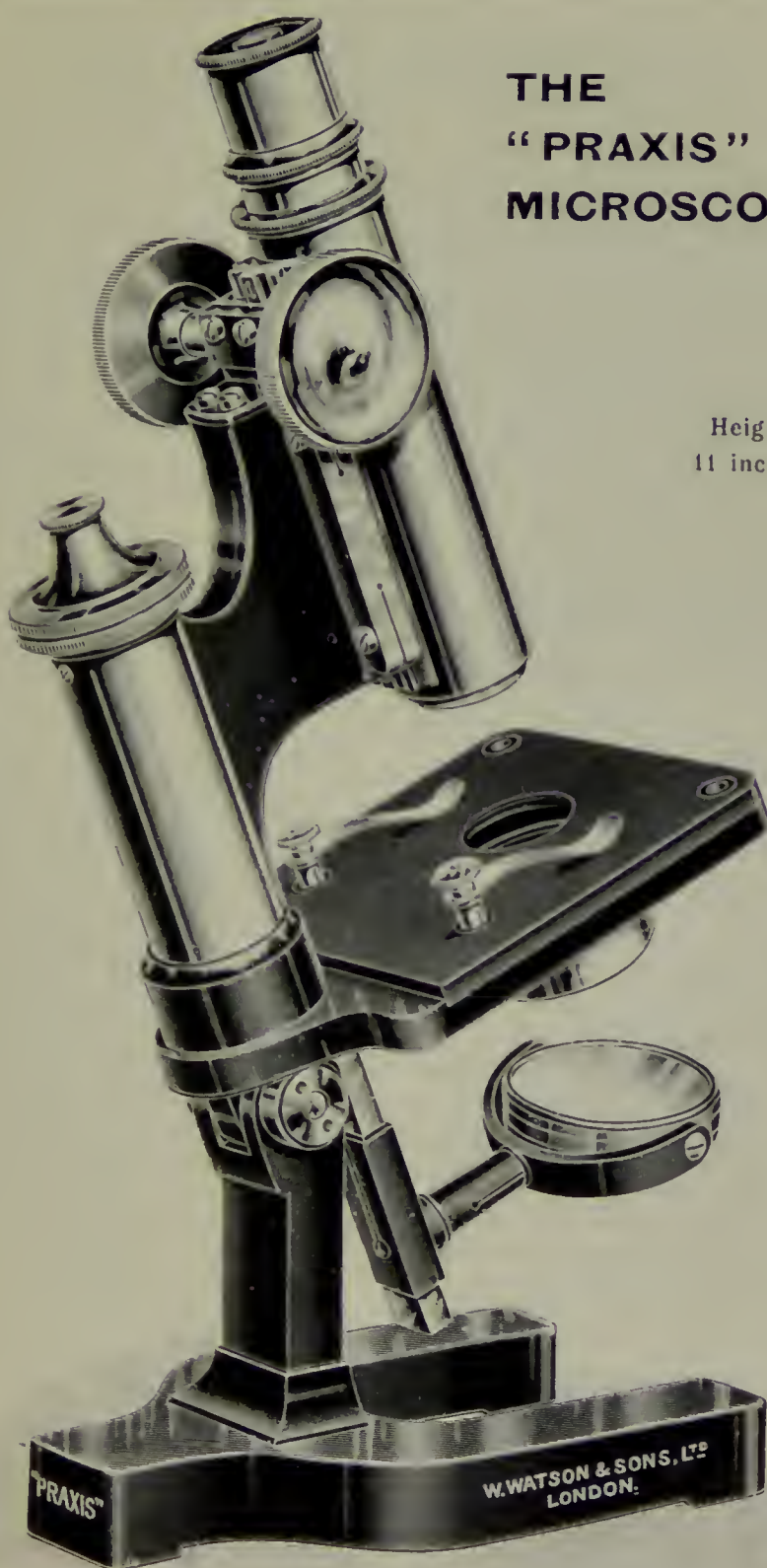
**The Stage**, Ebonite covered, is  $3\frac{1}{2}$  inches square, and gives ample room for Petri's dishes, etc., the distance from the front of the limb to the centre of the Stage being  $2\frac{1}{2}$  inches.

The Instrument is inclinable to the horizontal.



**THE  
"PRAXIS"  
MICROSCOPE.**

Height,  
11 inches.



For prices see page 28.

## PRICES OF THE "PRAXIS" MICROSCOPE.

A full description of this stand is given on page 26.

### PRICES.

Microscope, as described, Stand only.....	£4 0 0
Mahogany Case .....	0 10 6

**Complete Sets.** Consisting of Praxis Microscope, Mahogany Case with lock and key, and the following accessories.

Set No	Objectives.	Eyepieces.	Nosepiece.	Condenser.	Price.
P 220	Two—(Parachromatic) $\frac{1}{4}$ in. and choice of 1 in., $\frac{3}{8}$ in., or $\frac{1}{2}$ in.	1—(1, 2, 3 or 4).	—	—	£6 10 0
P 221	Two—(Parachromatic), $\frac{1}{4}$ in. and Choice of 1 in., $\frac{3}{8}$ in., or $\frac{1}{2}$ in.	Do.	—	—	6 15 0
P 222	Do.	2—(1, 2, 3 or 4).	Double No. 2847.	—	7 7 6
P 223	Do.	Do.	—	Scop. as per page 103, No. 1971.	7 15 0
P 224	Do.	Do.	Double No. 2847.	Scop. with spiral focussing screw.	8 15 0
P 225	Do.	Do.	Do.	Improved Abbe Illuminator, No. 1958.	8 12 6
P 226	Do.	3—(1, 2, 3 or 4).	Do.	Do. No. 1958 and spiral focussing screw.	9 10 0
P 227	Do.	Do.	Do.	Compound substage, page 152, with condenser No. 1958.	10 15 0

### FOR BACTERIOLOGY.

P 228	Three—Choice of 1 in., $\frac{1}{4}$ in., or $\frac{1}{2}$ in., also $\frac{1}{8}$ in. or $\frac{1}{16}$ in., with $\frac{1}{2}$ in. 1'20 N.A. oil immersion.	2—(1, 2, 3 or 4).	Triple No. 2849.	Scop. with spiral focussing screw, page 103.	13 2 6
P 229	Do. but with $\frac{1}{2}$ in. 1'30 N.A. oil immersion.	Do.	Do.	Do.	14 2 6
P 230	Three—Choice of 1 in., $\frac{1}{4}$ in., and $\frac{1}{2}$ in., also $\frac{1}{8}$ in. or $\frac{1}{16}$ in., with $\frac{1}{2}$ in. 1'30 N.A. oil immersion.	3—(1, 2, 3 or 4).	Do.	Abbe Illuminator, No. 1958 and spiral focussing screw.	14 17 6
P 231	Do.	3—(1, 2, 3 or 4).	Do.	Compound substage, page 152, with condenser No. 1958.	16 2 6

### SPECIAL EXTRAS.

Attachable Mechanical Stage, designed especially for the "Praxis" Microscope, page 150, No. 3000, £2 17 6. or No. 3001 .....	£2 2 6
Divisions to above Stage movements, giving readings to $\frac{1}{10}$ m/m .....	0 7 6
Compound Substage, see page 152 .....	1 17 6
Spiral Focussing Underfitting, if supplied with Condenser .....	0 12 6

For other suitable Extras, see page 40

## THE "FRAM" MICROSCOPE.

The Fram Microscope is, to the Student and Amateur, what the "H" Edinburgh Student's model is to the more advanced worker; namely, an instrument that may be absolutely relied upon to properly fulfil all the purposes for which it is designed, and this at the lowest price compatible with high-class workmanship. It is largely used in Laboratories, County Councils, and Technical Institutions, throughout the world: more than one hundred and fifty have been supplied by us to the Grant Medical College, Bombay.

The late Rev. W. H. Dallinger, I.L.D., F.R.S., etc., in his edition of Carpenter's "Microscope and its Revelations" (page 234), says of 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."

Mr. E. M. Nelson, late President of the Royal Microscopical Society, in his Annual Address, in reviewing the progress that had taken place in Instruments and Appliances, concluded with the following remarks concerning Watson & Sons' "Fram" Microscope: "Watson & Sons have fitted to their Student's Microscope a Lever form of Fine Adjustment on a thoroughly sound principle, thereby raising it to the position of a Microscope that can for the first time with truth be called 'good enough for Histological purposes.'"

The instrument is designed to yield the advantages usually associated with the most expensive instruments. The utmost care is bestowed on every part of its construction.

Many improvements in constructional details have been incorporated in recent months.

It is, in fact, a highest class instrument at a very moderate cost.

### SPECIFICATION.

The **height** of the instrument when placed vertically and racked down is  $11\frac{1}{4}$  inches.

The **foot** is a solid cast tripod and has a spread of  $6\frac{1}{2}$  inches, supporting the instrument firmly in any position.

The **body** is of large size, capable of carrying a draw-tube to take 1.27 eyepieces, if so desired. The small sized draw-tube, as usually fitted, is divided to c/m and extends to full 10 in. The lower end of the draw-tube is threaded to carry low-power objectives, etc.

The **stage** is  $3\frac{1}{2} \times 3\frac{1}{2}$  inches and of the Nelson horse-shoe shape. The upper surface is covered with ebonite, and has our Grip stage springs.

A strong **understage** is provided which can be swung out of the optical axis if necessary. The coarse adjustment is of our standard diagonal form, as described on page 14, and is fitted with the same care as in the more expensive stands.

The **fine adjustment** is our standard pattern, which is generally accepted as being the most delicate and durable made. One revolution of the milled head raises the objective  $\frac{1}{800}$ th inch. (See page 15).

The **bearings** are sprung and fitted with compensating screws.

All **fittings** are of the R. M. Society's standard gauge.

The **mirrors** are plane and concave.

It is inclinable to the horizontal. The mahogany case is dovetailed and polished, with comfortable handle, lock and key.

**Prices**, etc., appear on page 30.

PRICES OF THE  
‘Fram’ Microscope.

A detailed description of this instrument is given on page 29. The extra fittings, etc., are mentioned on page 40.

PRICES.

Microscope, Stand only, as described and figured,	£4 5 0
Mahogany Case .....	0 15 0

COMPLETE SETS

Consisting of “Fram” Microscope in Mahogany Case with the following accessories:—

No.	Objectives.	Eyepieces.	Nosepiece.	Condenser.	Substage.	Price.
Fm 251	Two—Parachromatic, $\frac{1}{4}$ in. and choice of 1 in., $\frac{1}{2}$ in., or $\frac{3}{4}$ in.	1—(1, 2, 3, or 4)	—	—	—	£7 0 0
Fm 252	Two—Parachromatic, $\frac{1}{4}$ in. and Choice of 1 in., $\frac{1}{2}$ in. or $\frac{3}{4}$ in.	Do.	—	—	—	7 5 0
Fm 253	Do.	Do.	—	Scop Abbe No. 1971	—	8 2 6
Fm 254	Do.	Do.	Double No. 2847	Do	Spiral focussing as described p. 152	9 5 0
Fm 255	Do.	2—(1, 2, 3 or 4)	—	Improved Abbe No. 1958	—	8 15 0
Fm 256	Do.	Do.	Double No. 2847	Do.	Do.	9 17 6
Fm 257	Do.	Do.	Do.	Do.	Compound rack-work, see p. 152	11 0 0
FOR BACTERIOLOGY.						
Fm 258	Do. and $\frac{1}{4}$ in. 1'20 N.A. oil immersion.	Do.	Triple No. 2849	Do.	Spiral focussing	14 5 0
Fm 259	Do.	3 Do.	Do.	Do.	Compound as described p. 152	15 12 6
Fm 260	Do. with $\frac{1}{4}$ in. oil immersion, 1'30 N.A.	2 Do.	Do.	Do.	Do.	16 7 6

EXTRAS. (See also page 40)

Attachable Mechanical Stage, No. 3013, page 111 .....	£3 0 0
Sliding Bar to Stage, 12'6 Wright's Finder .....	0 6 6



# THE "FRAM" MICROSCOPE.

Height, 11½ inches.

Spread of Foot,  
6½ inches.



## The "STANDARD" Mk. 1.

The solid proportions of this Microscope will be evident on reference to the illustration on page 33. The foot is substantial and rigid. The stage measures 4 x 4 inches and is covered with ebonite.

The fine adjustment is of our vertical lever pattern as described page 16. The coarse adjustment gives a working distance between the nosepiece and stage of  $3\frac{1}{2}$  in., permitting its use for Entomology, and large sections with low powers.

The body tube is of large diameter ( $1\frac{1}{2}$  in.), suitable for photography.

### PRICES.

"Standard" Microscope, Mk. I., Stand only.....	£6 10 0
Mahogany Case.....	1 0 0

### COMPLETE SETS.

Consisting of above Microscope, Mahogany Case with lock and key, and the following accessories:—

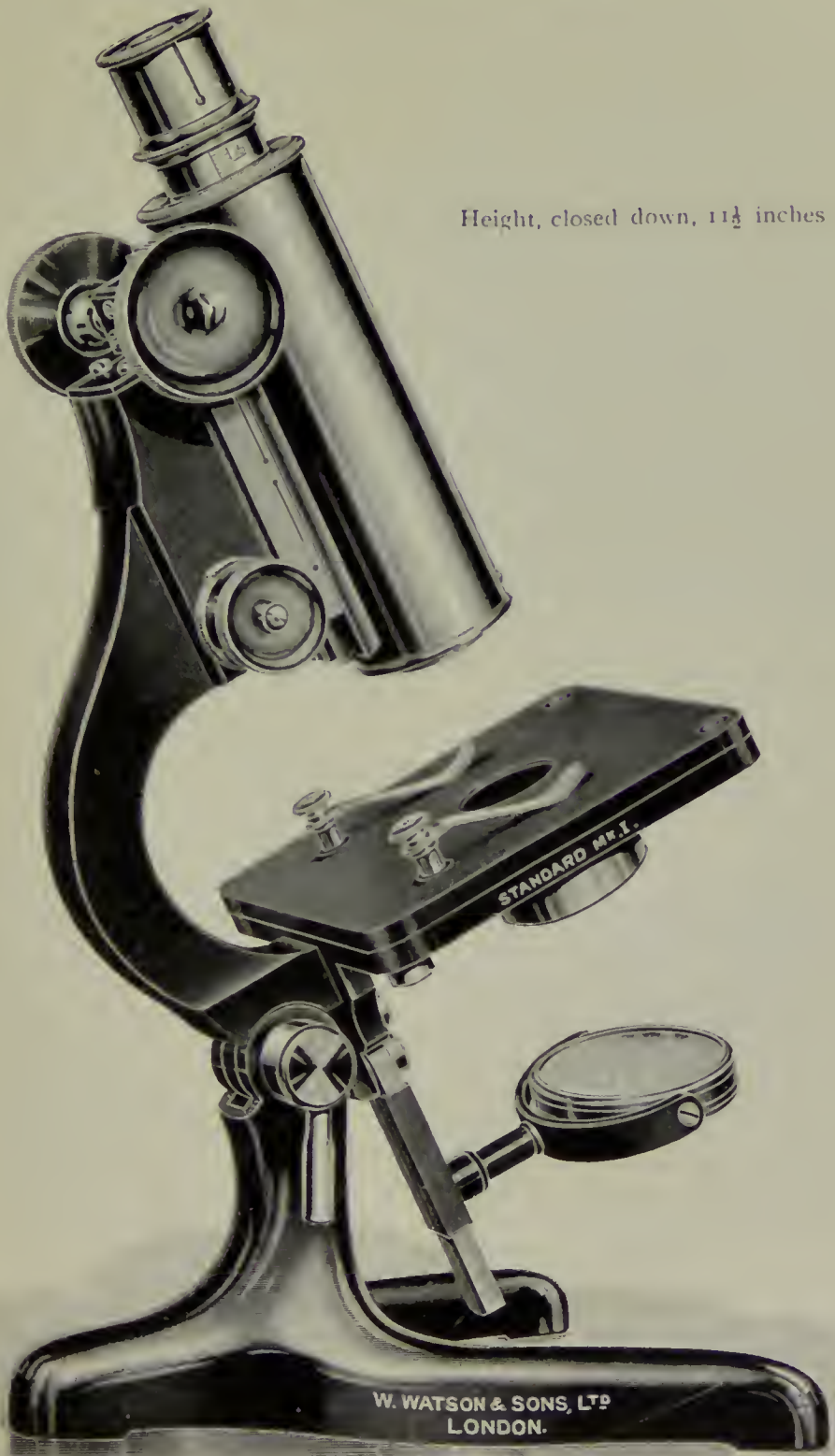
Set No.	Objectives.	Eyepieces.	Nosepiece.	Condenser.	Price.
Sd 270	Two—Parachromatic, $\frac{1}{2}$ in. and choice of 1 in., $\frac{2}{3}$ in., or $\frac{1}{4}$ in.	1—(1, 2 or 3	—	—	£9 10 0
Sd 271	Two — (Parachromatic), $\frac{1}{2}$ in. and Choice of 1 in., $\frac{2}{3}$ in., or $\frac{1}{4}$ in.	Do.	—	—	9 15 0
Sd 272	Do.	2—(1, 2, 3 or 4).	Double No. 2847.	—	10 7 6
Sd 273	Do.	Do.	—	Scōp, as per page 103, No. 1971.	10 15 0
Sd 274	Do.	Do.	Double No. 2847.	Scōp, with spiral focussing screw.	11 15 0
Sd 275	Do.	Do.	Do.	Improved Abbe Illuminator, No. 1956.	11 12 6
FOR BACTERIOLOGY.					
Sd 276	Three—Choice of 1 in., $\frac{2}{3}$ in., or $\frac{1}{4}$ in., also $\frac{1}{2}$ in. or $\frac{1}{4}$ in., with $\frac{1}{4}$ in. 1:20 N.A. oil immersion.	2—(1, 2, 3 or 4).	Triple No. 2849.	Scōp, with spiral focussing screw, page 103.	16 2 6
Sd 277	Do. but with $\frac{1}{4}$ in. 1:30 N.A. oil immersion.	Do.	Do.	Do.	17 2 6
Sd 278	Three—Choice of 1 in., $\frac{2}{3}$ in., and $\frac{1}{2}$ in., also $\frac{1}{4}$ in. or $\frac{1}{4}$ in., with $\frac{1}{4}$ in. 1:10 N.A. oil immersion.	3—(1, 2, 3 or 4).	Do.	Improved Abbe Illuminator, No. 1958 and spiral focussing screw.	17 17 6
Sd 279	Do.	3—(1, 2, 3 or 4).	Do.	Compound substage, page 112, with condenser No. 1958.	19 2 6

### EXTRAS.

Attachable Mechanical Stage, with divisions to movements.....	£0 17 6
Compound Substage (see page 152) .....	1 17 6
Spiral Focussing Underfitting, No. 3020, if supplied with Condenser..	0 12 6

## The "STANDARD," Mk. I.

Height, closed down,  $11\frac{1}{2}$  inches





We have had the honour of supplying our Edinburgh Student's Microscopes to the following well-known Microscopists and Institutions, amongst many others. In the majority of cases either the "D" or the "H" model has been selected.

- The Hon. ALVEY A. ADEE, Washington, U.S.A.  
 AGENT-GENERAL FOR NATAL.  
 AGRA MEDICAL COLLEGE (30 Instruments).  
 AGRICULTURAL COLLEGE, Aspatia.  
 THE AGRICULTURAL DEPT. OF THE TRANSVAAL  
 (20 "D" Instruments).  
 BACTERIOLOGICAL LABORATORY, Charing Cross  
 Hospital, W.C.  
 E. J. BEVAN, Esq., the County of Middlesex  
 Analyst.  
 Sir A. R. Binnie, London.  
 BIRKBECK COLLEGE (Botanical Dept.), London.  
 THE BOROUGH POLYTECHNIC INSTITUTE, S.E.  
 BOROUGH OF STEPNEY (Public Health Depart-  
 ment).  
 BOVRIL, LTD., Old Street, E.C.  
 W. K. BRADGATE, Esq., Imperial Railways of  
 North China, Hsinho.  
 BRECON AND RADNOR COUNTY ASYLUM.  
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 BRUNNER, MOND & Co., Northwich.  
 BURROUGHS WELLCOME & Co., LTD., London.  
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 JOSE COTORRUELO, Esq., Carthagena, Spain.  
 THE CROWN AGENTS FOR THE COLONIES.  
 CROYDON FEVER HOSPITAL, S.E.  
 THE DACCA TWIST Co., Manchester.  
 DUFF DEVELOPMENT Co., 9, New Broad St., E.C.  
 THE EARLSWOOD ASYLUM, Redhill.  
 THE EAST LONDON HOSPITAL FOR CHILDREN.  
 THE EDINBURGH MEDICAL MISSIONARY SOCIETY.  
 EDUCATION DEPARTMENT, Preston.  
 Dr. EYRE, Bacteriological Laboratory, Guy's  
 Hospital, S.E.  
 THE FEDERATED MALAY STATES (Medical Officer)  
 Dr. GADBY, Bacteriological Laboratory, Nation-  
 al Dental Hospital, London.  
 H. G. GRAYSON, Esq., Melbourne.  
 GREAT WESTERN RAILWAY Co., Engineer's  
 Office, Swindon.  
 GUY'S HOSPITAL BACTERIOLOGICAL LABORATORY.  
 Dr. JOHN F. HOLM, University of Stockholm.  
 IMPERIAL INSTITUTE LABORATORY.  
 THE INDIA OFFICE.  
 I.I.H. THE JAM OF NAWANAGAR.  
 Professor F. JANSSENS, Louvain.  
 Rev. D. KENNEDY, Meince, Napier, N.Z.  
 KING'S NORTON METAL Co., near Birmingham.  
 LEIBIG'S EXTRACT OF MEAT Co., 4, Lloyd's  
 Avenue, E.C.  
 Dr. LILPER, London School of Tropical Medicine.  
 Dr. J. A. LESTRADE, Government Medical Officer,  
 Vichixort, St. Lucia, W. Indies.  
 LINGGI PLANTATIONS LTD., Seremban.  
 LIPTON'S LABORATORY, Roule Road, S.E.  
 Prof. G. D. LIVINGE, Cambridge.  
 LONDON HOSPITAL.  
 LONDON SCHOOL OF TROPICAL MEDICINE, Royal  
 Albert Dock.  
 ABRAHAM LYELL & SONS.  
 Dr. MACALISTER, Liverpool.  
 Dr. IAN MACDONALD, Huelva, Spain.  
 Dr. J. MACDONALD, Rio Tinto, Spain.  
 THE MERCER'S SCHOOL, London.  
 METROPOLITAN ASYLUM BOARD.  
 F. W. MILLS, Esq., F.R.M.S., Author of "Photo-  
 graphy Applied to the Microscope," etc.  
 Dr. R. P. MITCHELL, Barberton, Transvaal.  
 MOORWOOD, SONS & Co., Sheffield.  
 NATIONAL ANTARCTIC EXPEDITION.  
 NATIONAL HOSPITAL, Queen's Square.  
 NATURAL HISTORY MUSEUM (Botanical Depart-  
 ment), South Kensington.  
 Dr. NEISH, Lunatic Asylum, Kingston, Jamaica.  
 E. M. NELSON, Esq., F.R.M.S., Late President  
 of the Royal Microscopical Society, and of  
 the Quekett Microscopical Club.  
 NEWPORT (MON.) HOSPITAL.  
 NORTHERN POLYTECHNIC (Chemical Department)  
 THE OFFICE OF CONSERVATOR OF FORESTS,  
 E. Mysore, Bangalore City.  
 ORDNANCE FACTORIES, Royal Arsenal, Woolwich.  
 W. C. C. PAKES, Esq., F.R.C.S., Government  
 Bacteriologist, Pretoria.  
 PARSEE LYING-IN HOSPITAL, Bombay.  
 A. & F. PEARS, Soap Works, Isleworth.  
 PEEK, FREAN & Co., Berinoudsey, S.E.  
 PEOPLE'S PALACE, Mile End, E.  
 PIKE, SPICER & Co., Brewers, Portsmouth.  
 D. J. W. PLAXTON, Lunatic Asylum, Jamaica.  
 ANDREW PRINGLE, Esq., F.R.M.S., Author of  
 "Practical Photo-Micrography," etc.  
 PUBLIC ANALYST'S OFFICE, Douglas, Isle of Man.  
 PUBLIC HEALTH DEPT. OF THE TRANSVAAL.  
 ROUSS PHYSICAL LABORATORY, University of  
 Virginia, U.S.A.  
 THE ROYAL ARMY CLOTHING DEPARTMENT.  
 ROYAL GUNPOWDER FACTORY, Waltham Abbey.  
 ROYAL HOLLOWAY COLLEGE, Egham.  
 THE ROYAL HOSPITAL, Sheffield.  
 THE ROYAL INFIRMARY, Glasgow.  
 THE ROYAL MINT, London.  
 ROYAL PORTSMOUTH, PORTSEA AND GOSPORT  
 HOSPITAL.  
 ROYAL SOUTHERN HOSPITAL, Special Research  
 Department, Liverpool.  
 ROYAL SMALL ARMS FACTORY, Enfield.  
 ROYAL WATERLOO HOSPITAL FOR WOMEN AND  
 CHILDREN, London.  
 THE ROYAL VICTORIA HOSPITAL, Waterloo, S.E.  
 ST. THOMAS'S HOSPITAL, London.  
 THE SANITARY DEPARTMENT, CAIRO.  
 Dr. HARRIS E. SAWYER, Jorgensen's Laboratory,  
 Copenhagen.  
 D. SHARPE, Esq., M.A., F.R.S., University  
 Museum of Zoology, Cambridge.  
 F. SHILLINGTON SCALES, Esq., M.A., M.D., Sec-  
 retary of Royal Microscopical Society. Author  
 of "Practical Microscopy."  
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 St. George's Hospital, S.W.  
 Dr. T. CORE SQUANCE, Sunderland.  
 THE STATE SURGEON, Negri Sembilan.  
 Dr. MARGARET H. SYMINGTON, Nepeanee, Ontario.  
 Dr. J. H. TEACHER, Professor of Physiology, The  
 University, Glasgow.  
 TECHNICAL INSTITUTE, Leyton.  
 TECHNICAL SCHOOLS, Plymouth.  
 TYNEMOUTH CORPORATION WATERWORKS.  
 UNION OF SOUTH AFRICA, High Commissioner for  
 UNIVERSITY COLLEGE, Cardiff.  
 UNIVERSITY COLLEGE, Dundee.  
 UNIVERSITY OF MOUNT ALLISON COLLEGE, Sack-  
 ville, N.B.  
 VICKERS, SONS & Co., Limited, Sheffield.  
 WAR DEPARTMENT Chemist, Woolwich.  
 Monsieur J. WARRY, Directeur de l'Hospital,  
 Struvenberg.  
 WESTMINSTER CITY SCHOOL.  
 WESTMORELAND COUNTY COUNCIL.  
 J. WILLIAMS, Esq., Government Laboratory,  
 Georgetown, Demerara.  
 W. D. & H. D. WILLS, Bristol.  
 WINCHESTER COLLEGE Science School.



## THE EDINBURGH STUDENT'S SERIES OF MICROSCOPES.

This series of instruments was originally supplied to students at the University of Edinburgh. Its popularity soon led to further development and variation of patterns. Each instrument is capable of being specially arranged to suit individual requirements.

All the prices are strictly moderate, while every detail of design and finish has been most carefully considered; the result being that the student is enabled to provide himself with an English-made instrument of the highest grade, at a price taking value for value, unapproached by any other maker.

We desire to draw special attention to the "H" Model, on page 43. It is the most completely fitted of the series, having mechanical stage, compound substage, and graduated draw-tube. It is eminently suited for high-class laboratory work and is excellent for photo-micrography. The "H" Model is used in the laboratories of hospitals and medical schools throughout the world, and as evidence of its extreme popularity, we may mention that our total annual sales of this stand are more than all our other patterns combined.

### GENERAL SPECIFICATION of the EDINBURGH STUDENT'S MICROSCOPE.

The **body** is of large diameter,  $1\frac{1}{4}$  in., and admits a large-sized draw-tube and 1.27" eyepieces, if desired. The body, with draw-tube closed, is slightly under 6 inches in length, and 10 inches with draw-tube extended, thus admitting objectives corrected for either English or Continental tube length. All tubes are blackened inside to minimise reflection.

The **foot**, whether of the horse-shoe or tripod form, is rigid and efficient. We always advocate the tripod pattern, where extreme portability has not to be considered. Its spread is 7 inches.

The **stage** is of large size, being  $3\frac{1}{2}$  in. square, and is conveniently arranged for Petri's dishes, etc.

The **substage** fitting, whether simple or compound, may be swung out of the optical axis when desired.

The **fine adjustment** is of our standard pattern, as before described (page 15). One revolution of the milled head moves the body one three-hundredth of an inch. The action is sensitive to one-hundredth of a turn of the milled head, thus giving a motion of one thirty-thousandth of an inch to the objective.

Each instrument has **plane and concave mirrors**.

All **ittings** are of R.M.S. Standard gauge, and all bearings sprung with compensating screws, as described on pages 9, 10, etc.

## PRICES OF THE EDINBURGH STUDENT'S MICROSCOPE. STAND "F."

This Microscope is mounted on a rigid Tripod foot, and the Instrument is one of the most serviceable high-class Stands for the purpose of the Amateur or Professional. The general description is given on page 35.

It is strongly recommended as being suitable and worthy to receive additions as occasion may necessitate, a mechanical stage or compound substage being easily fitted. The stage is covered with ebonite.

This Microscope can be supplied on a horse-shoe form of foot at the prices given below for the Instrument itself, but when a complete set is taken, the price is reduced 10/0, as a smaller case is only required.

### PRICES

Microscope, as described, Stand only .....	£5 12 6
" " but with Binocular instead of Monocular Body .....	8 12 6
Mahogany Case for Monocular Microscope .....	1 0 0
" " Binocular " .....	1 10 0

### COMPLETE SETS

Consisting of "F" Edinburgh Student's Microscope in Mahogany Case, with handle, lock and key, and the following accessories:—

No.	Objectives.	Eyepieces.	Nosepiece.	Substage.	Condenser.	Price
F 281	Two — Parachromatic $\frac{1}{4}$ in. and Choice of 1 in., $\frac{1}{2}$ in., or $\frac{3}{8}$ in.	One—(1, 2, 3 or 4)	--	—	—	£8 12 6
F 282	Two — Parachromatic $\frac{1}{4}$ in., and Choice of 1 in., $\frac{1}{2}$ in. or $\frac{3}{8}$ in.	Do.	—	—	—	8 17 6
F 283	Do.	Do.	—	—	Scop Abbe No. 1971	9 15 0
F 284	Do.	Do.	Double No. 2847	—	Do.	10 5 0
F 285	Two — Parachromatic $\frac{1}{4}$ in. or $\frac{1}{8}$ in. and Choice of 1 in., $\frac{1}{2}$ in. or $\frac{3}{8}$ in.	Two—(1, 2, 3 or 4)	—	—	Full sized Abbe No. 1958	10 2 6
F 286	Do	Do.	—	Spiral focus- ing under- fitting, see page 152	Do.	10 15 0
F 287	Do.	Do.	—	Compound rackwork substage, see page 152	Do.	11 17 6
FOR BACTERIOLOGY.						
F 288	Do. and $\frac{1}{4}$ in. 1.20 N.A. oil immersion.	Do.	Triple dust-proof No. 2849	Spiral focus- ing under- fitting, see page 152	Do.	15 12 6
F 289	Do. but with $\frac{1}{4}$ in. 1.30 N.A. oil immersion.	Do.	Do.	Compound substage, see page 152	Do.	17 15 0

### EXTRAS. (See also page 40)

Attachable Mechanical Stage No. 3013, page 151..... £3 0 0

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.

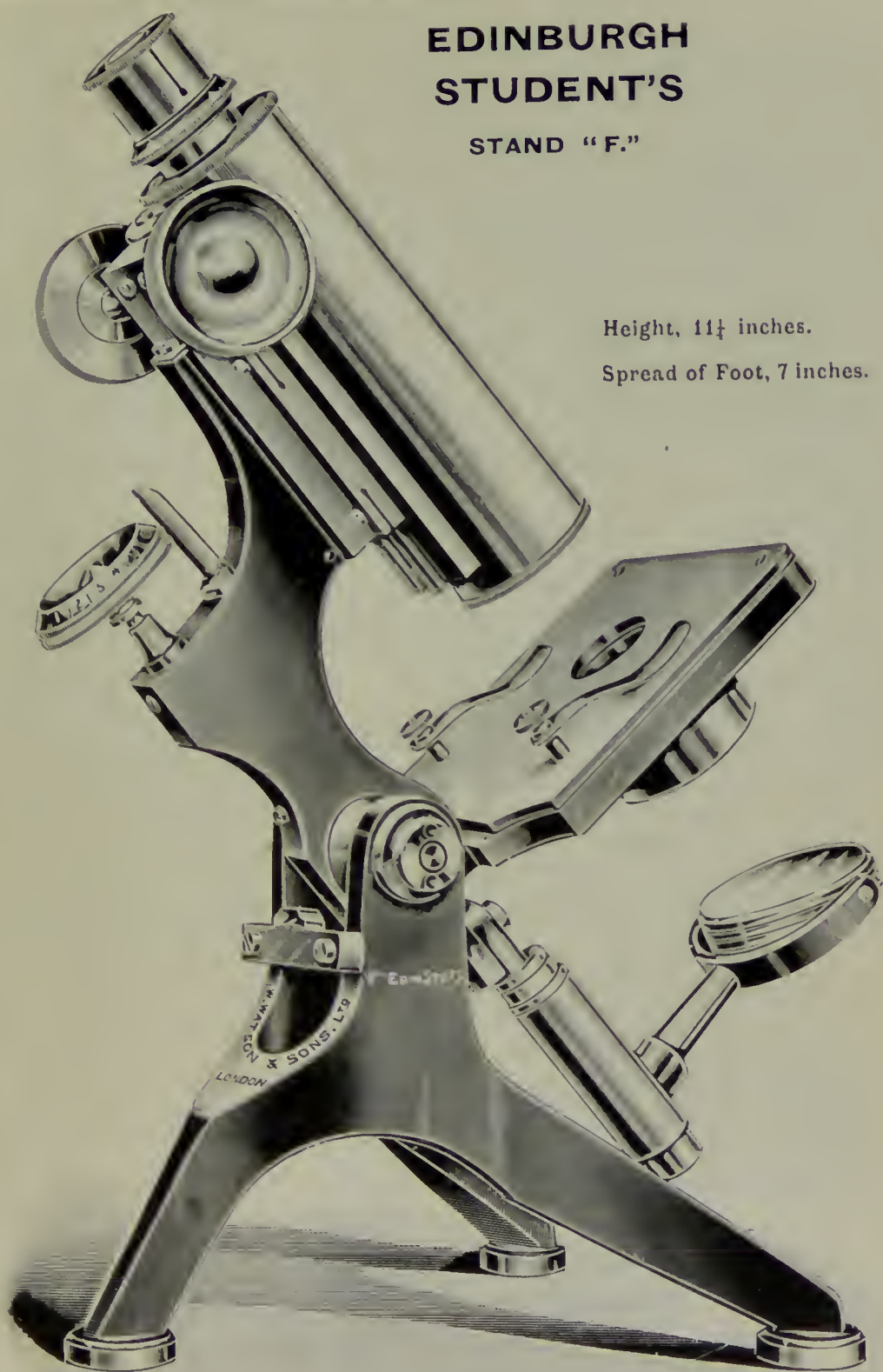
Compound Substage, as described page 152..... 1 17 6

## EDINBURGH STUDENT'S

STAND "F."

Height,  $11\frac{1}{4}$  inches.

Spread of Foot, 7 inches.



## PRICES OF THE EDINBURGH STUDENT'S MICROSCOPE. STAND "D."

This Microscope combines every mechanical facility for high-power work, including a mechanical stage and mechanical substage with centring movements. The construction of these is detailed on page 35, and in connection with the "H" Model of the Edinburgh Student's series (pages 41 to 43), with which latter instrument the "D" is identical, excepting in the pattern of the foot. We would again draw attention, however, to the fact that the stage movements are so arranged that at no point do they foul the front lens of the substage condenser, and the large opening in the top plate of the stage enables this to be accomplished without in any way curtailing the range of movement.

The demand for a high-class laboratory microscope mounted on a compactly designed foot has caused the "D" model to find much favour with those workers who prefer this type of stand. This microscope combines all the conveniences claimed for the Continental makes, while including at the same time the great advantage of a perfect working mechanical stage, designed and built as an integral part of the structure.

### PRICES.

Microscope, Stand only, as described.....	£10 0 0
Mahogany Case for Monocular Stand.....	0 17 6

### COMPLETE SETS

Consisting of "D" Edinburgh Student's Microscope in Mahogany Case, with handle, lock and key, and the following accessories:—

No.	Objectives.	Eyeieces.	Nosepiece.	Condenser.	Extras.	Price.
D 300	Two — Parachromatic $\frac{1}{4}$ in. and Choice of 1 in., $\frac{1}{2}$ in. or $\frac{3}{4}$ in.	1—(1, 2, 3 or 4)	—	—	—	£13 0 0
D 301	Do.	2—(1, 2, 3 or 4)	—	Full size Abbe No. 1957	—	15 5 0
D 302	Do.	Do.	Double No. 2847	Do.	—	15 15 0
D 303	Do.	Do.	Do.	Do.	With sliding bar and divisions to stage	17 5 0
FOR BACTERIOLOGY.						
D 304	Do. and $\frac{1}{4}$ in. 1'30 N.A. oil immersion.	Do.	Triple dust-proof No. 2849	Do.	—	21 2 6
D 305	Do.	Do.	Do.	Do.	With sliding bar and divisions to stage	22 12 6
WITH HOLOSCOPIC OBJECTIVES.						
D 306	Two—Holoscopic 1 in. 0'30 N.A. $\frac{1}{2}$ in. 0'95 N.A.	2—Holoscopic (any power).	—	Universal or Par- achromatic, pp. 100 & 101	—	22 2 6

### EXTRAS. (See also page 40)

**LARGE CAPPED EYEPIECES.** If these are required 1'27 in. diameter instead of the Student's pattern included with the above sets, add 5/6 per Eyepiece to the above sets.

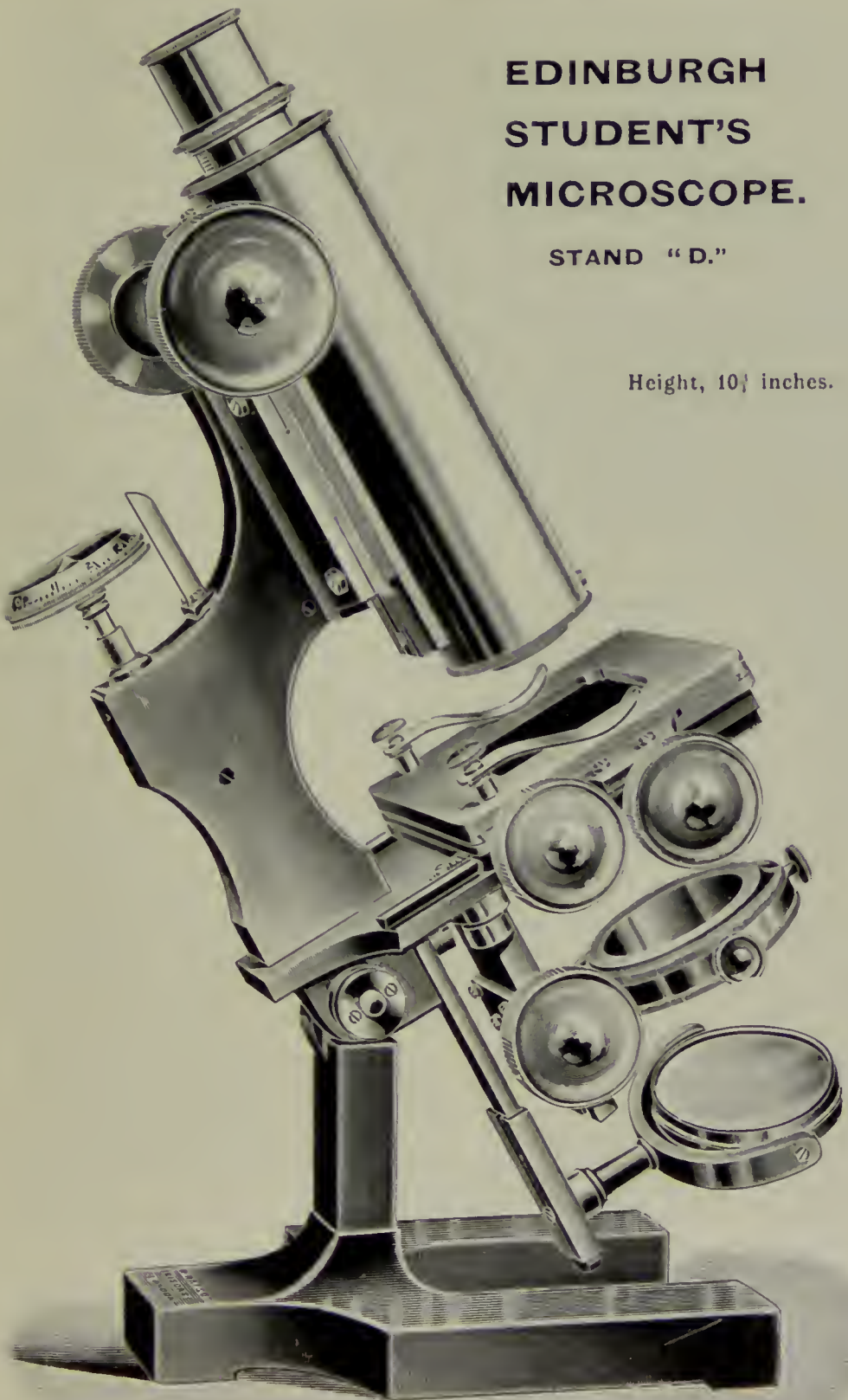
Sliding Bar to Stage .....	£0 12 6
Divisions to movements of Stage .....	0 17 6
Auxiliary Range Stage, as described page 12 .....	2 5 0



**EDINBURGH  
STUDENT'S  
MICROSCOPE.**

**STAND "D."**

Height, 10 $\frac{1}{2}$  inches.



## EXTRAS FOR THE EDINBURGH STUDENT'S AND OTHER MICROSCOPES.

### FOR MODELS D. and H. EDINBURGH STUDENT'S.

Divisions to movements of mechanical stage, reading by verniers to $\frac{1}{10}$ m/m	£0	17	6
Ruled Glass Measuring Disc for Eyepieces for use with above.....	0	2	0
Studs to stage, for use when divisions are fitted.....	0	3	0
(These are not needed if a sliding bar is included.)			
Fine adjustment to substage, see page 13 .....	1	5	0
Clamp Screw to centring movement of substage .....	0	2	6
Auxiliary range Stage, increasing the horizontal mechanical movement to 3 inches .....	2	5	0

### FOR ALL MICROSCOPES WITHOUT MECHANICAL STAGE.

Attachable Mechanical Stage, No. 3013, page 151 .....	3	0	0
Sliding Bar to Stage, No. 3014, page 151 .....	0	12	6
Wright's Finder, No. 3002 .....	0	6	6

### FOR ALL MODELS.

Parachromatic or Universal Achromatic Condenser (110 N.A.), specially suitable for Photo-Micrography. Price with Iris Diaphragm .....	3	7	6	
<i>Either of these may be taken in place of the Abbe Illuminator, No. 1957, included in the sets, at 25/- extra</i>				
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. 2541.....	0	5	0	
Micrometer to drop into Eyepiece, No. 2538.....	0	5	0	
Eyepieces, No. 1, 2, 3, 4 or 5, each .....	0	5	0	
Polariscope, fitted with Selenite, page 148 .....	20/0, 30/0 and	2	2	0
Camera Lucida, No. 2058 .....	0	6	0	
Stand Condenser, page 116 .....	7/6, 10/6 and	0	15	0
Triple Nosepiece, new dust proof pattern, No. 2849 .....	1	0	0	
Double Nosepiece, No. 2847 .....	0	12	6	
Milled Head of Fine Adjustment divided to $\frac{1}{100}$ ths (instead of $\frac{1}{10}$ ths) extra	0	3	0	
$\frac{1}{2}$ th in. (2 m/m) Oil Immersion " Holo-scopic " Series 137 in place of the $\frac{1}{2}$ th in. 130 included with the Sets " for Bacteriology," extra .....	3	0	0	

### BELL-GLASS COVERS.

For Edinburgh Student's, Fram, Praxis and Baetil Microscopes .....	0	5	6
Do. with ebonized base .....	0	8	6

## THE EDINBURGH STUDENT'S MICROSCOPE. STAND "H."

This instrument is illustrated and priced on pages 42 and 43 of this list, but as the most popular model made by us it merits a few words of special description and commendation. With the exception of the pattern of the foot, the "H" is identical with the "D" stand (pages 38 and 39), and one description of the working parts applies to both instruments.

In its general design, this microscope leaves nothing to be desired. It is massive, without being cumbersome; and the arrangements and proportions of its various parts will be found in practice most convenient. Constructed, as it is, with a perfect-working mechanical stage and substage, and furnished with a graduated draw-tube, and the most sensitive of fine and coarse adjustments, this microscope is capable of any class of work. Thus, with one twelfth in. oil immersion objective and other apparatus, as detailed in Set H344, it is extensively used in bacteriological work and is unsurpassed for the purpose. Arranged with a projection eyepiece and objectives of high aperture, it will stand the severest test of high-power photo-micrographic work. Fitted with a binocular body, the highest powers then used may be easily focussed with the coarse adjustment only. The instrument can carry out many other varieties of microscopical work with equal ease and satisfaction to the users.

The late Rev. W. H. Dallinger, I.L.D., F.R.S., etc., in his edition of Carpenter's, "The Microscope and its Revelations" (Eighth Edition, page 218), says: "One of the finest examples of this class of microscopes at present brought within reach of the average student's means, is that known as the Edinburgh Student's Microscope 'H' by Watson & 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."

We have also 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 a one-eighth in. objective and the coarse movement only."

The "H" Model is in regular use for bacteriological research and general laboratory work. How widely it is distributed can be seen from page 34.

### SPECIFICATION.

The **height** when placed vertically and racked down is  $11\frac{1}{2}$  inches.

The **tripod** spreads 7 inches and is quite firm in any position.

The **body** is 6 inches long and  $1\frac{1}{2}$  in. diameter, and can be supplied with a draw-tube to take either student's or large capped eyepieces at the same cost.

The **mechanical stage** is our standard pattern with compensating screws, as described, page 10. The milled head controlling the horizontal motion is stationary, and the plates so arranged that the condenser is not fouled at any point of the travel.

The **substage** has rackwork focussing and centring screws, as on page 152.

A sliding bar and divisions to the movements may be advantageously added, as shown in our list of extras to the stand, page 40.

All the movements are of the most delicate description and the whole instrument finished with the utmost care and precision.

The **fittings** throughout are of R.M.S. standard gauge. We can unhesitatingly recommend this microscope as the ideal for all classes of general microscopical work.



## PRICES OF THE EDINBURGH STUDENT'S MICROSCOPE. STAND "H."

A special detailed description of the "H" Model of the Edinburgh Student's Series, appears on page 41.

### PRICES

Microscope, Stand only, as figured on page 43.....	£10	2	6
" " " but with Binocular instead of Monocular Body .....	13	2	6
" " " with both Monocular and Binocular interchangeable bodies .....	15	2	6
Mahogany Case for Monocular Instrument .....	1	0	0
" " Binocular " .....	1	10	0

### COMPLETE SETS

Consisting of "H" Edinburgh Student's Microscope in Mahogany case with the following accessories:—

No.	Objectives.	Eyepieces.	Nosepiece.	Condenser.	Extras.	Price.
H 340	Two—Parachromatic $\frac{1}{4}$ in. or $\frac{1}{2}$ in. and 1 in. or $\frac{1}{2}$ in. or $\frac{3}{4}$ in.	1—(1, 2 3 or 4)	—	—	—	£13 5 0
H 341	Do.	2—(1, 2, 3 or 4)	—	Abbe Hlr., No. 1957	—	15 10 0
H 342	Do.	Do.	Double No. 2847	Do.	—	16 0 0
H 343	Do.	Do.	Do.	Do.	With sliding bar and divisions to stage	17 10 0
FOR BACTERIOLOGY.						
H 344	Do. and $\frac{1}{2}$ in. 1'30 N.A. oil immersion.	Do.	Triple dust-proof No. 2849	Do.	—	21 7 6
H 345	Do. but with $\frac{1}{2}$ in. 1'20 in place of $\frac{1}{2}$ in. 1'30	Do.	Do.	Do.	—	20 7 6
WITH HOLOSCOPIC OBJECTIVES.						
H 346	Two—Holoscopic 1 in. 0'30 N.A. $\frac{1}{2}$ in. 0'95 N.A.	2—Holoscopic (any power)	—	Universal or Para- chromatic pp. 100 & 101	—	22 7 6
H 347	Do. with $\frac{1}{2}$ in. 1'37 N.A. (Oil immersion).	Do.	Triple No. 2849	Do.	—	31 5 0
H 348	Do.	Do.	Do.	Do.	With sliding bar and divisions to stage	32 15 0
SPECIAL—FOR GENERAL AND AMATEURS' USE.						
H 349	Three — Parachro- matic, 2 in., 1 in., and $\frac{1}{2}$ in.	2—(2 and 3)	Do.	Universal (page 100) and box of Stops	Stand Conden- ser No. 2167, Live Cage No. 2447, Stage Forceps, No. 3015	20 5 0
WITH BINOCULAR MICROSCOPE.						
H 350	Do.	1 pair No. 2 & one only No. 3. Best capped, 1'27 in. diam.	—	Abbe Hlr., No. 1957, & box of Stops, No. 1959.	Do.	22 10 0

### EXTRAS (See also page 40)

Fine Adjustment to Substage, as described page 13 .....	£1	5	0
Sliding Bar to Stage .....	0	12	6
Divisions to Stage movements, reading by verniers to $\frac{1}{10}$ m/m .....	0	17	6
Auxiliary Range Stage, giving a range of horizontal movement of 3 inches. see page 12 .....	2	5	0
Large size Capped Eyepiece in place of Student's pattern in above sets, each, extra .....	0	5	6

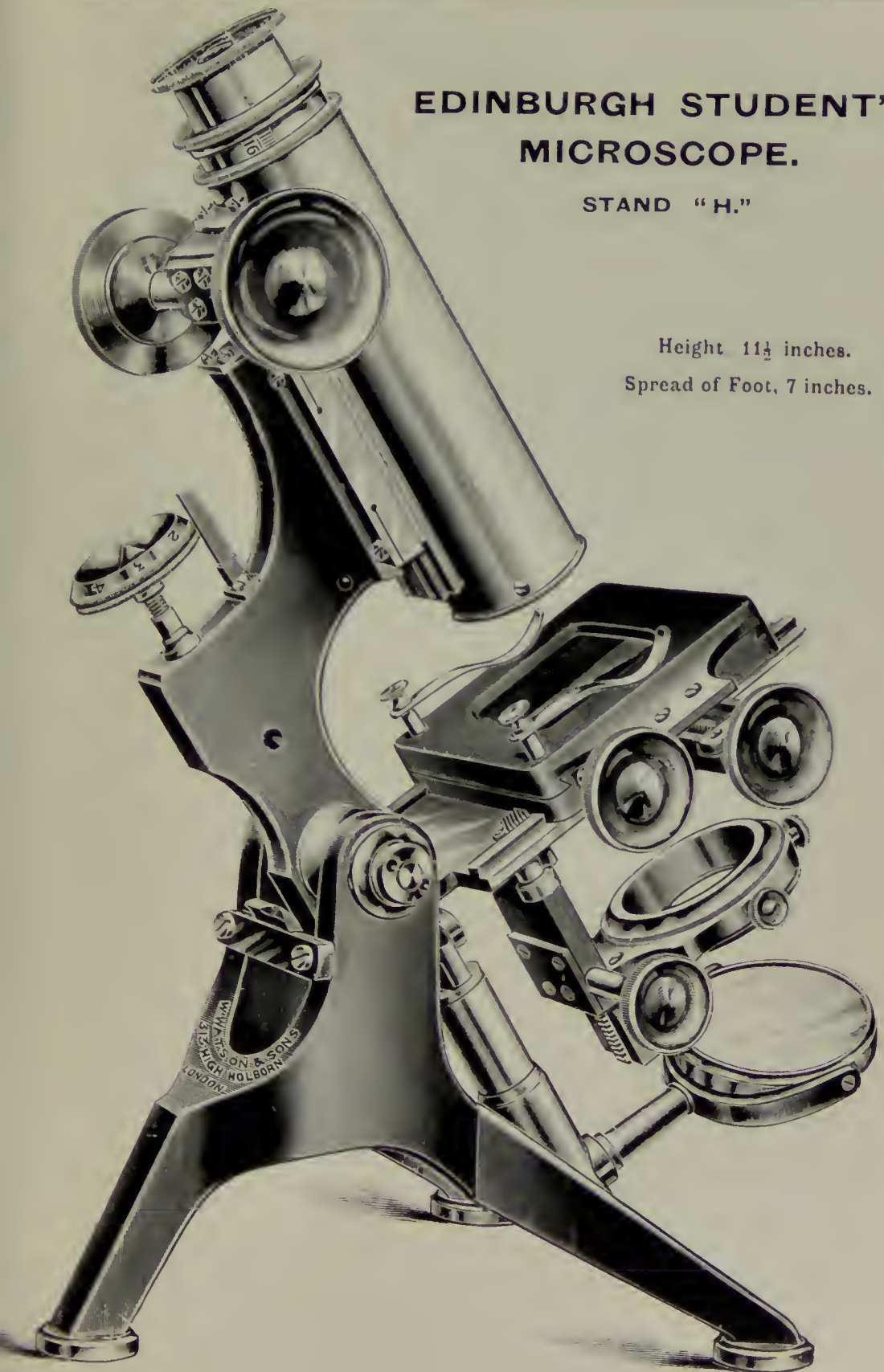


## EDINBURGH STUDENT'S MICROSCOPE.

STAND "H."

Height  $11\frac{1}{2}$  inches.

Spread of Foot, 7 inches.



## EDINBURGH STUDENT'S RESEARCH OUTFIT.

This is an equipment at a moderate price, to form a complete outfit for low and medium-power work, examination of mounted bacteriological slides, measurement of objects, dark-ground exhibitions, examinations with polarized light, dissecting, sectioning and mounting of objects, and photo-micrographic work with oil illuminant.

"H" Tripod Edinburgh Student's Microscope with 2 Eyepieces, 1 in. and $\frac{1}{2}$ in., "Parachromatic" Objectives, Abbe Model Illuminator complete with Iris Diaphragm, in Mahogany Case, as on page 42, set H341 .....	£15	10	0
Divisions to Stage movements, reading to $\frac{1}{10}$ millimetre ....	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 100 .....	1	5	0
			£18 2 6

### Additional Objectives—

2 in., £1 2s., $\frac{1}{2}$ in. £1 2s. od. ....	2	4	0
Homogeneous Oil Immersion $\frac{1}{2}$ in. 1.30 N.A. ....	5	0	0
			7 4 0

### Accessories—

Polariscope of large size (No. 2918) working with the Substage Condenser .....	2	2	0
Eyepiece Micrometer (No. 2538) 5/0, Stage Micrometer (No. 2541) 5/0 .....	0	10	0
Double Nosepiece 10/-, Live Box (No. 2447) 10/6 ..	1	0	6
Rousset's Compressor (No. 2430) .....	0	15	0
Microscope Lamp (No. 2396) £1 5s., Mahogany Case 7/6	1	12	6
Aplanatic Bull's-Eye Stand Condenser (No. 2170) ....	1	10	0
Beale's Camera Lucida 6/0, Set of 12 Test Objects in Case £1 1s. ....	1	7	0
			8 17 0

### Mounting Materials

Cabinet of Mounting Apparatus, No. 2758 .....	2	5	0
Laboratory Dissecting Microscope with sliding Adjustments and three Aplanatic Magnifiers to work with same, page 70 .....	2	3	0
Dissecting Dish 1/0; Set of "County Council" Dissecting Instruments 15/0 (No. 2319) .....	0	16	0
Cathcart Microtome for Embedding and Freezing (No. 2567) .....	1	1	0
Plane Iron 2/6, Section Knife 4/6 .....	0	7	0
			6 12 0

### Photo-Micrographic Apparatus

Student's Photo Micro. Camera (see separate list, 2D.)	6	10	0
Two inner Frames 3/6, Fitting Microscope, etc. 12/6; and Connecting Flanges 8/6 .....	1	4	6
Focussing Glass 8/6, Projection Eyepiece £2 .....	2	8	6
Chest with Chemicals for development, etc. ....	1	12	6
			11 15 6
			£52 11 0

## The BACTIL Mk. IV.

This Microscope combines all the necessary mechanical conveniences for high power, photo-micrographic and laboratory purposes, and is the elaborated model of the "Standard" (Mk. I.) instrument described on page 32.

A reference to the illustration, page 47, will give a general idea of the massive proportions of the various parts, so that absolute stability and permanent efficient working under continuous and rough usage may be ensured.

**The Stage.** This is a special feature. It has a horizontal movement of 2 in. and  $1\frac{1}{2}$  in. vertically. The gripping of the object under examination is not effected in the usual way, by means of a metal finger held against the slip by means of a spring; the grip of the finger is made by the turning of a small milled head which rotates a spiral slot and sets the finger. The great disadvantage of the spring is manifested when an Oil Immersion Objective is used. To a certain extent the oil causes an adhesion between the object and the objective and when the mechanical stage milled head is turned the adherent object pressing against the metal finger causes a slight increase in the tension of the spring, and an apparent back lash in the movement. This very objectionable trouble is removed by this new arrangement of ours.

The Mechanical Stage can be bodily removed by racking it upwards and sliding it from its bearings. Its place can then be taken by a perfectly plain metal stage 4 x 4 inches, which interchanges in the same fittings (see Extras).

**The Coarse Adjustment** is by diagonal rack of spiral pinion, as described on page 14, giving a free working distance between the nosepiece and the surface of the stage of  $\frac{3}{4}$  in., enabling low-power objectives to be used in the examination of large subjects.

**The Fine Adjustment** is of the Vertical Lever Pattern, as described page 16.

**The Body Tube** is of large size,  $1\frac{1}{2}$  in. diameter, and when the draw-tube is closed measures  $14\frac{5}{8}$  in. ( $5\frac{11}{16}$  in.). With draw-tube extended the length is  $22\frac{5}{8}$  in. ( $8\frac{13}{16}$  in.).

**The Compound Substage** has rack-work to focus, can be lifted aside out of the optical axis when desired, and is supplied with or without centring screws, as preferred.

**The Mirrors** work to and from the Stage in the optical axis, and can be entirely removed when desired.

**The Shapely Form** of the limb provides a convenient and suitable grip for lifting or carrying the instrument.

## PRICE LIST OF

## The "BACTIL" Mk. IV. MICROSCOPE.

"Bactil" Microscope, Mk. IV., Stand only.....	£11 17 6
Mahogany Case .....	1 0 0

## COMPLETE SETS.

Consisting of the above Microscope, Mahogany Case with lock and key, and the following accessories:—

Set No.	Objectives.	Eye pieces.	Nose piece.	Condenser.	Extras.	Price.
B 351	Two—Parachromatic $\frac{1}{2}$ in. or $\frac{1}{4}$ in. and 1 in. or $\frac{1}{2}$ in. or $\frac{1}{4}$ in.	1—(1, 2, 3 or 4).	—	—	—	£15 2 6
B 352	Do.	2—(1, 2, 3 or 4).	—	Improved Abbe Hlr., No. 1957.	—	17 5 0
B 353	Do.	Do.	Double No. 2847	Do.	—	17 15 0
B 354	Do.	Do.	Do.	Do.	With inter- changeable plain stage plate and divisions to stage	19 2 6
FOR BACTERIOLOGY.						
B 355	Do. and $\frac{1}{2}$ in. 1.30 N.A. oil immersion	Do.	Triple dust-proof No. 2849	Do.	—	23 2 6
WITH HOLOSCOPIC OBJECTIVES.						
B 356	Two—Holo-scopic 1 in. 0.30 N.A. $\frac{1}{2}$ in. 0.95 N.A.	2—Holo-scopic (any power)	Double No. 2847	Universal or Para- chromatic pp. 100 & 101	—	24 12 6
B 357	Do. with $\frac{1}{2}$ in. 1.37 N.A. (Oil immersion).	Do.	Triple No. 2849	Do.	—	33 0 0
B 358	Do.	Do.	Do.	Do.	With inter- changeable plain stage plate and divisions to stage	34 7 6

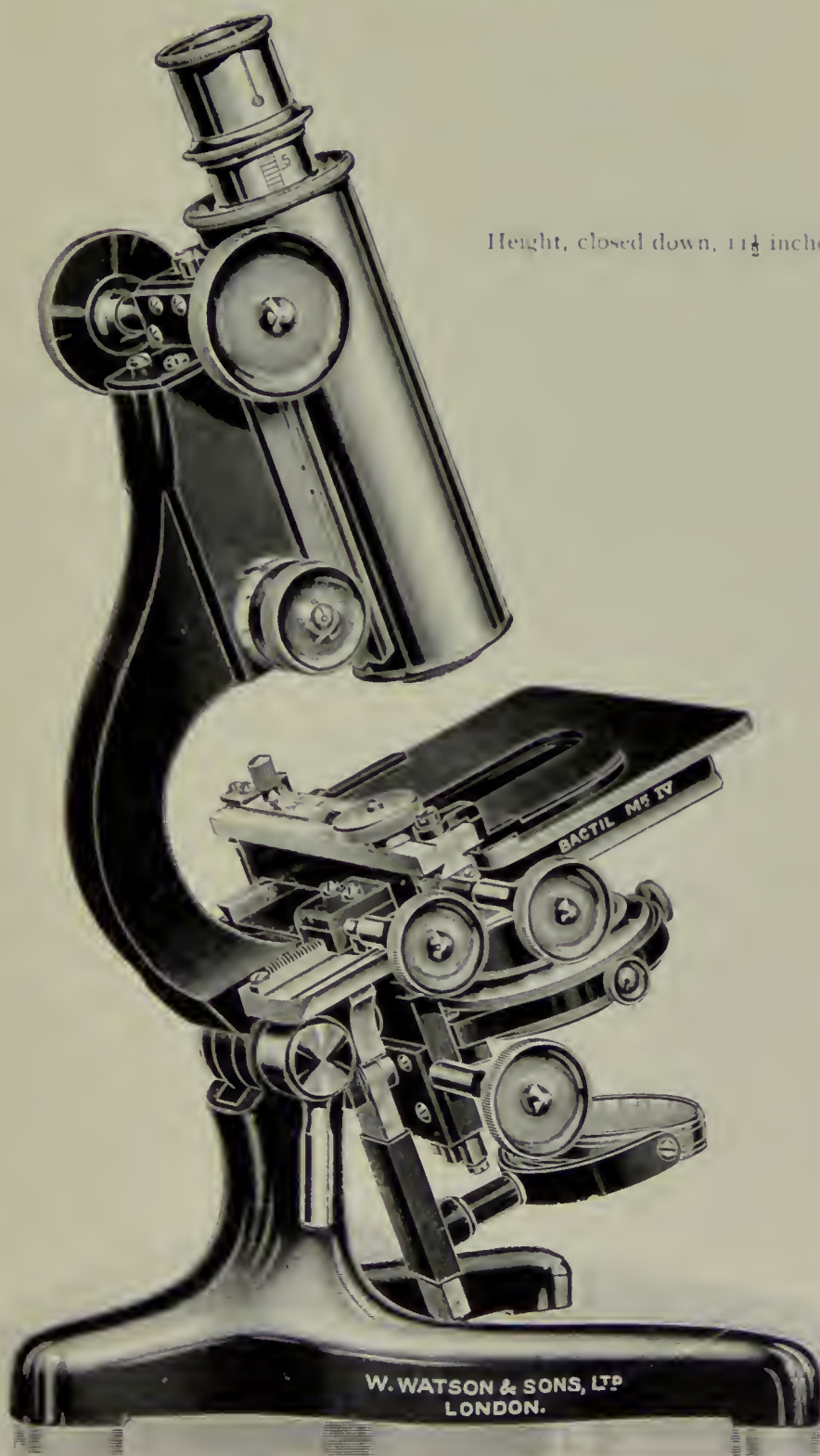
## EXTRAS.

Plain Brass Stage Plate, 4 x 4 inches, to interchange with Mechanical Stage .....	£0 10 0
Divisions to movements of Stage, reading to 1.10 m. metre.....	0 17 6



## The "BACTIL," Mk. IV.

Height, closed down,  $11\frac{1}{2}$  inches



## THE ROYAL OUTFIT.

### An Amateur's First-Class Set.

#### Microscope

The Royal, Stand only as described page 52 .....	£15	0	0
Divisions to stage movements .....	0	17	6
Binocular body to interchange with monocular.....	5	0	0
			<hr/>
			20 17 6
Best Mahogany Cabinet .....			2 10 0

#### Objectives and Eyepieces

Watson's Holoscopic Objectives, 25 m/m .....	£2	15	0
" " " 12 m/m '65 .....	3	10	0
" " " 4 m/m '95 .....	4	0	0
" " " (oil immersion) 2 m/m 1'37 N.A. ....	8	0	0
" " " 2 in. ....	1	10	0
1 each $\times 10$ and $\times 14$ Holos. Eyepieces at 25/0 .....	2	10	0
2 each $\times 5$ and $\times 7$ (pairs for Binocular) at 25/0 .....	5	0	0
			<hr/>
			27 5 0

#### Accessories

Parachromatic Condenser 1'0 N.A., with stops, No. 1944..	£3	15	0
Polarising Apparatus, No. 2918.....	2	2	0
Mica-Selenite Stage, No. 2939 .....	1	6	0
Bull's-Eye Condenser, No. 2167.....	0	15	0
Silver Parabolic Side Reflector, No. 2197.....	1	3	0
Beale's Neutral Tint Camera Lucida, No. 2058 .....	0	6	0
Triple dust-proof Nosepiece, No. 2849 .....	1	5	0
Aluminium Reversible Compressor, No. 2431.....	1	2	6
Rousselet Live Box, No. 2447, 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. 3015.....	0	7	6
Micrometer, one each for Eyepiece, 7/6 (No. 2540) and Stage (No. 2542) at 5/0 .....	0	12	6
Standard Lamp, No. 2396, 25/0; and Case, 7/6 .....	1	12	6
			<hr/>
			15 5 0

#### Mounting Materials

Laboratory Dissecting Microscope, page 70, and set of 3 Aplanatic Magnifiers .....	£3	7	0
Mounting Cabinet, No. 2757 ..	2	15	0
Cathcart Microtome, pattern No. 2572 .....	1	7	6
Set of Dissecting Instruments, No. 2314 .....	1	0	0
			<hr/>
			8 9 6
Complete Cabinet of 200 Microscopic Slides of general interest, No. 2875, see page 145 .....			14 14 0
			<hr/>
			£89 1 0

This set may be varied to meet individual requirements and every assistance towards a suitable selection will be afforded intending purchasers.

## The "RESEARCH."

The general construction of this Microscope is identical with that of our popular "II" Edinburgh Student's Model, and it is of the same proportions. It has, however, several features which make it distinct from all our other instruments, among which are the following:

1. **The Stage.** A new pattern Stage with a horizontal travel of  $1\frac{1}{4}$  in., the controlling milled heads both working on the same axis. This Stage is a particularly convenient pattern. It has a large top surface, and the action of the milled heads has been so contrived as to secure the fullest efficiency in working. The vertical movement is 1 in.

2. **The Fine Adjustment** is by means of our vertical lever, working from the side of the limb, as described on page 16. This instrument may be also supplied with our standard horizontal lever if preferred, at a reduced cost, as mentioned under "Alternatives," page 50.

3. **The Mirrors** are entirely removable, but when set in position a slot in the tube engages a pin in the stem and keeps the mirrors always in alignment with the optical axis.

4. **The Body Length.** The body is supplied with a draw-tube, the latter divided to millimetres. When the draw-tube is closed the total length of the body is 145 mms., and when the draw tube is extended 225 mms. It will be observed that the use of a revolving nosepiece does not cause the total length of the body to exceed the 100 mms., for which short tube objectives are corrected.

5. **The range of Coarse Adjustment** gives a working distance between the nosepiece of the Microscope and the surface of the stage of  $3\frac{1}{2}$  inches, so permitting of the use of low-power objectives.

6. **A Tightening Handle** is fitted to the axis joint.

The Compound Substage with rack-work to focus and provision for turning out of the optical axis is supplied with or without centring screws, as preferred, at the same cost.

The combination of advantages offered in this Microscope, together with the perfection of the whole of the mechanism and construction, give it unique claims to favour.

PRICE LIST OF  
The "RESEARCH" MICROSCOPE.

Microscope Stand only, as figured page 51 and described page 49.....	£12	0	0
Mahogany Case for ditto.....	1	0	0

COMPLETE SETS.

Consisting of "Research" Microscope, in Mahogany Case, with the following accessories :—

Set No	Objectives.	Eyepieces.	Nosepiece.	Condenser.	Extras.	Price.
Rh 360	Two—Parachromatic $\frac{1}{4}$ in. or $\frac{1}{8}$ in., and 1 in. or $\frac{1}{2}$ in., or $\frac{3}{4}$ in.	1—No. 1 or 2 or 3.	—	—	—	£15 5 0
Rh 361	Do.	2—Nos. 1, 2, 3 or 4.	—	Improved Abbe Illr., No. 1957	—	17 7 6
Rh 362	Do.	Do.	Double No. 2847	Do.	—	17 17 6
Rh 363	Do.	Do.	Do.	Do.	With sliding bar and divisions to stage	19 7 6
FOR BACTERIOLOGY. Rh 364	Do. with $\frac{1}{4}$ in. 1.30 N.A. (Oil immersion).	Do.	Triple No. 2849	Do.	—	23 7 6
WITH HOLOSCOPIC OBJECTIVES.						
Rh 365	Two—Holoscopic $\frac{1}{4}$ in. 0.30 N.A. $\frac{1}{8}$ in. 0.95 N.A.	2—Holoscopic (any power)	Double No. 2847	Universal or Para- chromatic pages 103 and 104	—	24 15 0
Rh 366	Do. with $\frac{1}{4}$ in. 1.37 N.A. (Oil immersion).	Do.	Triple No. 2849	Do.	—	33 2 6

ALTERNATIVES AND EXTRAS.

"Standard" Lever Fine Adjustment instead of horizontal lever, see description, pages 15 and 16, 20 0 less than above prices.

Divisions to movements of Stage, reading by Verniers to 1.10 m. metre..	£0	17	6
Sliding Bar to Stage.....	0	12	6
Universal or Parachromatic Condenser instead of Improved Abbe Illuminator, in either of the above sets.....extra	1	5	0



The  
"RESEARCH"  
MICROSCOPE.

Height,  $11\frac{1}{2}$  inches.

Spread of Foot, 7 inches.



## THE "ROYAL" MICROSCOPE.

Carries large-sized Eyepieces : has Mechanical and Sliding Draw-tubes : stage bolted to limb as in Van Heurck Microscope : and new swinging out Substage.

For high-class practical work, with absolute rigidity, in a convenient size, this Instrument is unexcelled, for it combines all those working qualities which have gained so high a reputation for the Van Heurck Microscope, but in a more compact form and at a lower cost.

The height, when placed vertical and racked down, is  $11\frac{1}{4}$  inches.

The tripod foot is shod with cork and has a spread of 7 inches.

**The Stage** is our standard pattern, as described on page 10. It is fitted with a sliding bar.

In particular:—

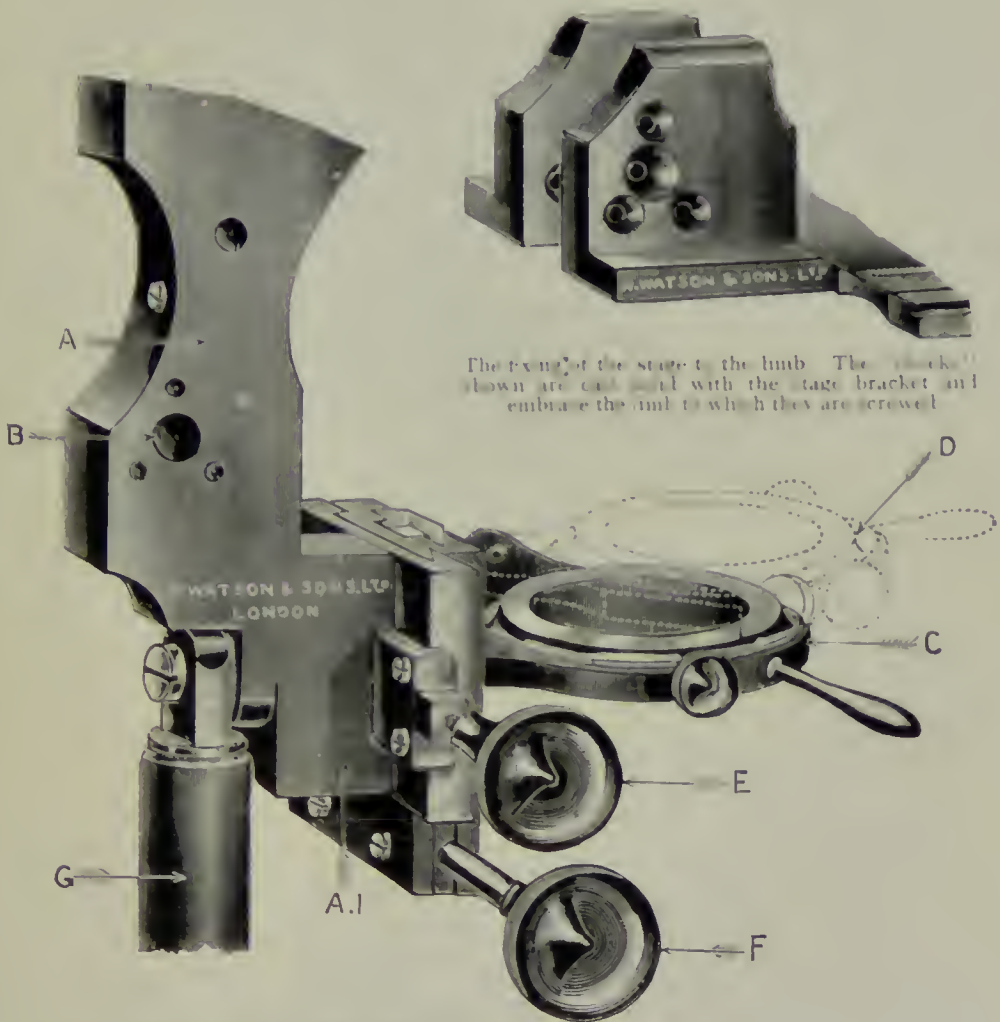
**The Mechanical Draw-tube** with inner sliding draw-tube, as described page 18, is incorporated. It carries eyepieces 1.27 in. diameter, but, if so desired, can be supplied to carry eyepieces of the Students' or Continental size.

**The union of parts.** The method of uniting the stage and limb and bolting all together, as described with the Van Heurck Microscope, on page 59, is used here. Further, the limb is continued beneath the stage and carries the Compound substage. The latter is therefore quite independent of the stage itself. This will be more clearly understood by reference to the accompanying illustration. It will be observed that the Stage base is continued in a solid casting so as to embrace the Limb "A," to which it is screwed, the axis bolt passing through the whole at "B."

The Limb "A" is continued downwards so as to support the stage base from beneath and carry the Substage on the part marked A1.

**The Substage**, which in the regular model has coarse adjustment and centring screws only, but may be provided with fine adjustment if desired at an extra cost of £1, has, in addition, a new swing out arrangement for turning the condenser and the centring fitting only, out of the optical axis, as shown in the illustration, "C" representing the axial position and "D" when turned aside. A spring catch secures all when the condenser is in use. E and F represent the milled heads of the fine and coarse adjustments of the Substage respectively.

The Coarse Adjustment is by diagonal rack and pinion as described page 14, and in connection with the Van Heurck Microscope, on page 57



The lower end of the Limb of the Microscope - to show the build of the various parts.

The Fine Adjustment is our standard lever pattern, as described page 15.

It will thus be seen that the many special features combined in this Microscope render it worthy of those who require an instrument of the highest class. It will be found to respond in the fullest manner to the exacting demands of the photomicrographer and high-power worker. Its many conveniences enable the best results to be obtained rapidly with all types of objectives. It will be found invaluable in the laboratory, for which its strong construction and excellent mechanical stage are especially advantageous, while for the varied purposes of the Amateur, it will be found unequalled.

## PRICES OF THE "ROYAL" MICROSCOPE.

Royal Microscope, stand only, as described, pages 52 and 53 .....	£15 0 0
Royal Microscope, as described pages 52 and 53, but with Binocular instead of Monocular body .....	17 10 0
Royal Microscope, as described pages 52 and 53, having both Monocular and Binocular interchangeable bodies.....	20 0 0
Mahogany Cabinet to contain Microscope and apparatus. ....	1 0 0
Mahogany Cabinet to contain the Binocular Instrument .....	1 10 0
Mahogany Cabinet, superior construction, with cupboard door and drawer for apparatus .....	2 10 0
Bell-glass Shade ..... 8/6 With ebonized base .....	0 10 6

### COMPLETE SETS

of Royal Microscope in Mahogany Case, with handle, lock and key, and with the following accessories:—

No.	Objectives.	Best Capped Eyepieces.	Nosepiece.	Condenser.		Price.
R 381	Two—Parachromatic $\frac{1}{4}$ in., '74 N.A. or $\frac{1}{2}$ in. and 1 in., $\frac{1}{2}$ in. or $\frac{3}{4}$ in.	2—Nos. 1, 2, 3 or 4	—	Abbe No. 1957	—	£21 0 0
R 382	Do.	Do.	Double No. 2847	Do.	Divisions to Stage	22 7 6
R 383	Do. with $\frac{1}{2}$ in. Oil Immersion, 1'30 N.A.	Do.	Triple No. 2849	Do.	—	26 17 6
WITH HOLOSCOPIC OBJECTIVES						
R 384	Two—25 m/m. '30 N.A. and 4 m/m. '95 N.A.	2—Holo-scopic, 5, 7, 10 or 14.	—	Universal No. 1928	—	27 17 6
R 385	Do.	Do.	Double No. 2847	Do.	Divisions to Stage	29 5 0
R 386	Do. with 2 m/in Oil Immersion 1'37 N.A.	Do.	Triple No. 2849	Parachromatic No. 1944	—	36 15 0
SPECIAL FOR GENERAL AND AMATEURS' USE.						
R 387	Three—Parachromatic 2 in., 1 in., and $\frac{1}{4}$ in.	2—Nos. 2 and 3	Triple No. 2849	Abbe Illuminator No. 1957 and box of Stops	Stand Condenser No. 2167, Live Cage No. 2447, Stage Forceps No. 3015	25 0 0
R 388	Three—2 in., Special Series, 25 m/m, '30 and 4 m/m, '95 N.A. Holo-scopic Series	2—Holo-scopic 7 and 10	Triple No. 2849	Universal Condenser, No. 1928, and box of Stops	Do.	32 10 0

If small sized Eyepieces are preferred, deduct 5/6 per Eyepiece from above prices.

### EXTRAS (See also page 40)

Divisions to movements of stage reading by verniers to $\frac{1}{16}$ th of a millimetre .....	£0 17 6
Auxiliary Range Stage to give 3 inches of horizontal movement, as described page 12 .....	2 5 0
Fine adjustment to substage .....	1 0 0
Adapter to carry Eyepieces of Continental size .....	0 4 6

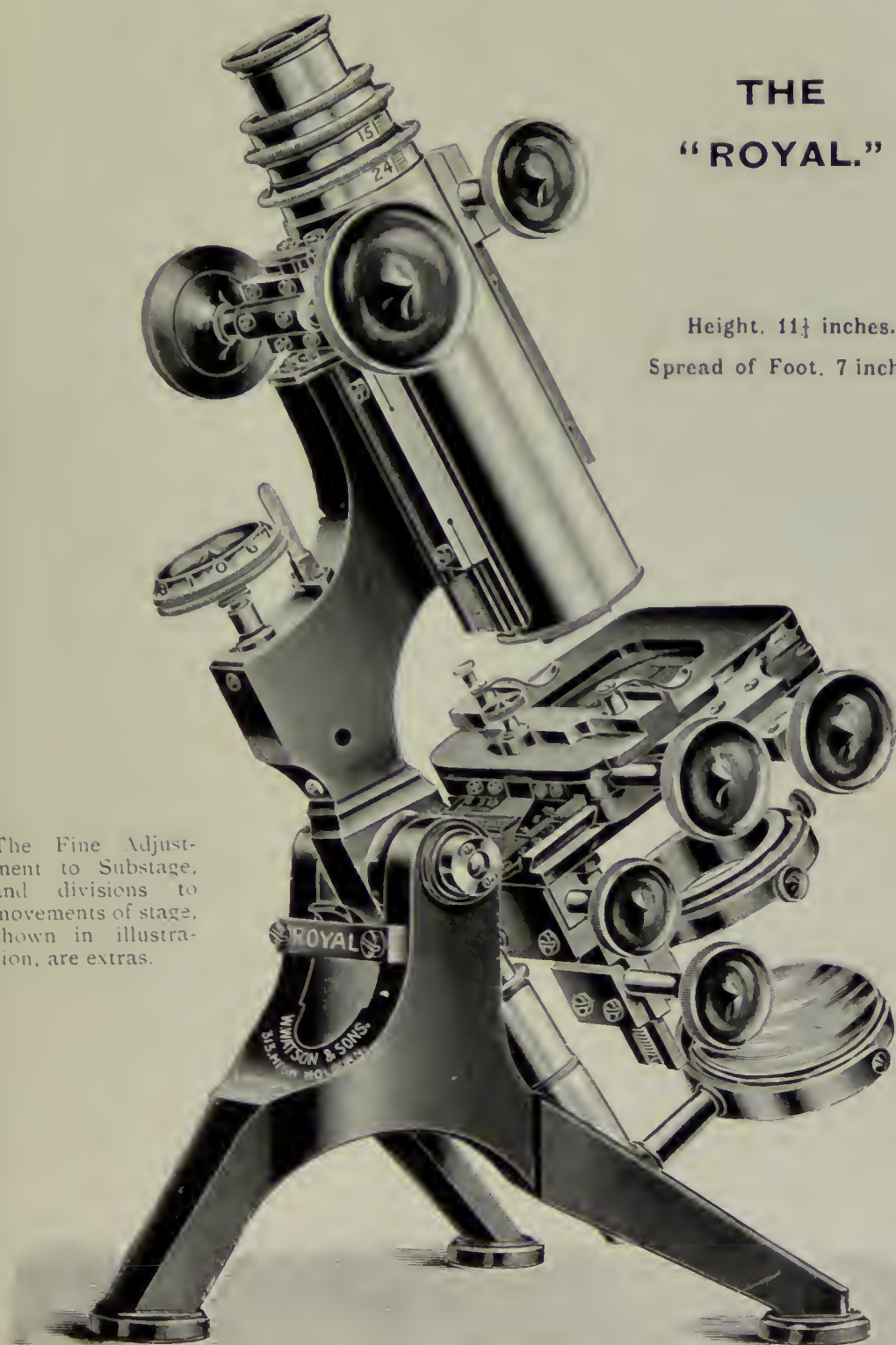


## THE "ROYAL."

Height.  $11\frac{1}{2}$  inches.

Spread of Foot. 7 inches.

The Fine Adjustment to Substage, and divisions to movements of stage, shown in illustration, are extras.



**COMPLETE RESEARCH OUTFIT "M."**

The Circuit Stage Van Heurck Microscope Stand, on Tripod foot, as page 62.....	£22	5	0	
Fine Adjustment to Substage, as in " Royal " Microscope....	£1	5	0	
Divisions to Stage, reading to $\frac{1}{10}$ th millimetre .....	1	1	0	
Clamp Screw to centring movement of Substage. ....	0	2	8	
Plate to cover Stage for rough work .....	0	17	6	
Centring Screws to Rotation of Stage.....	3	0	0	
Rackwork Rotation to Stage .....	1	15	0	
Dividing Rotation of Stage .....	1	0	0	
Best Mahogany Case to contain Instrument and Apparatus....	2	10	0	
		11	11	0
Extra Binocular Body to interchange with the Monocular .....	5	0	0	

**\*OBJECTIVES** (see page 94), 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, 1.37 N.A. ....	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 25/0 each.....	5	0	0
Extra, to make pairs for Binocular, 1 each, 5 and 7 at 25/0 each..	2	10	0

**ACCESSORIES**

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.), (No. 1957) and set of stops.....	2	10	0
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 149) .....	8	5	0
Dust-proof Triple Nosepiece, Aluminium .....	1	5	0
2 Live Boxes at 10/6 .....	1	1	0
Lamp (No. 2396), £1 5s., Mahogany Case, 7/6 .....	1	12	6
Bull's-Eye Stand Condenser (No. 2153) .....	2	12	6
Set of 12 Test Objects (see Object Catalogue) .....	1	1	0
Abbe Pattern Camera Lucida .....	2	0	0

**MOUNTING APPARATUS**

Pine Cabinet of Mounting Apparatus (see page 139) .....	2	5	0
Dissecting Microscope with set of three Aplanatic Magnifiers (see page 70) .....	3	7	0
Dissecting Troughs .....	0	10	0
Dissecting Instruments (No. 2316) .....	1	5	0
Cathcart-Darlaston Microtome for Imbedding and Freezing (see page 134) .....	2	5	0
Plane Iron, 2/6, Section Knife, 4/6 .....	0	7	0

**PHOTO-MICROGRAPHIC APPARATUS**

Laboratory Camera (see separate list 2D) .....	£12	15	0
2 Inner Frames 3/6, fitting Microscope and supplying connecting Flanges 20/- .....	1	3	6
	—	—	—
		13	18 6

Watson Conrady Condenser on Stand with centring screws and Iris diaphragm (No. 2174) .....	6	5	0
Pocussing Glass, 10/6, Projection Eyepiece, £2 .....	2	10	6
Trough on Stand, to contain Light and Heat Absorbing Media.....	1	10	0
Chemicals for Development, etc., in case.....	1	12	6
All the necessaries for Photo-Micrography with Oil Light are included above.	£135	3	6

Complete Cabinets of Choice Microscopic Objects (see page 145).

\* Apochromatic Objectives and Compensating Eyepieces, as per page 148, may be substituted for above if desired.

## THE VAN HEURCK MICROSCOPE.

**For Research and General Purposes.**

This is the most completely-fitted model which we make, and represents all that is most modern in microscope design and manufacture.

The aim in its construction 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, and we can assert unhesitatingly that the complete control which is afforded in working enables the finest results to be secured with a rapidity and comfort which is unique. It has brought the most gratifying testimony from many of the leading microscopists of the day, and this, coupled with the fact that the Van Heurck is now used by many of the foremost workers in every branch of research is a sufficient guarantee of the perfection attained.

This Microscope was first made by us to the specification and order of the late Dr. Henri Van Heurck, the celebrated Microscopist, of the Botanical Gardens Antwerp, for conducting the researches for which he 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 of the highest grade in every part—it is, in fact, the severest test to which a microscope can be put. 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 embody every convenience for rendering such work more easy and exact.

The Van Heurck is, in fact, the last word in modern microscope construction.

The Van Heurck series includes three models—The No. 1, The Circuit Stage, and the Grand Model. The general construction of these instruments merits special consideration.

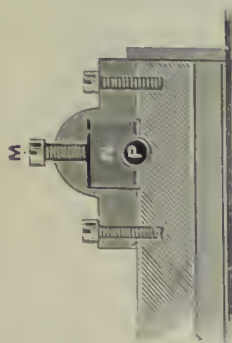


Fig. 21. Sectional View of adjustable fittings of rack and pinion.

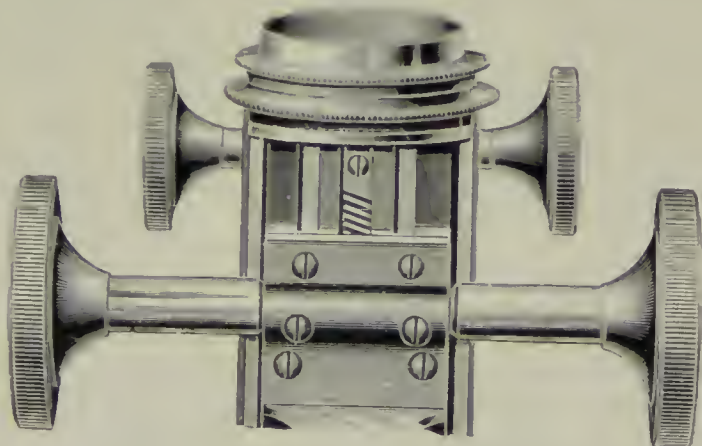


Fig. 22. View of fitting plate of coarse adjustment.

### THE COARSE ADJUSTMENT

is effected by Watson's diagonal rack and pinion described on page 14, and has sufficient range for a 4-inch objective. The pressure of the pinion on the rack is adjusted by the two screws shown in the accompanying figure 21. N is a block of anti-friction metal which supports the pinion shaft on each side, and it is on this supporting block that two adjusting screws act, one of which, M, is shown in figure. The most sensitive relation of pinion to rack can be established and maintained at all times. These adjusting screws are shown in position on the fitting plate in figure 22.



## THE FINE ADJUSTMENT

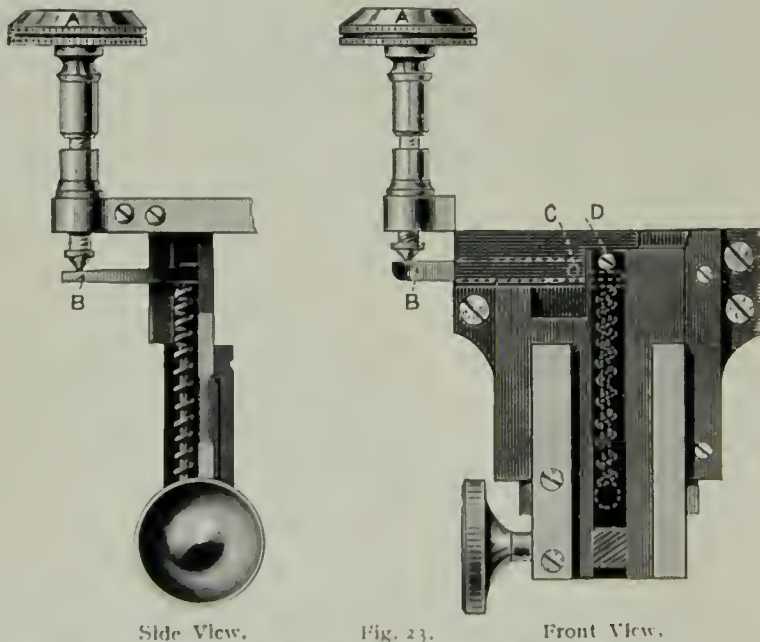
is our standard form as described on page 15, but, being made with a very long lever, the motion imparted is reduced.

The milled head is divided to hundredths, and one revolution moves the body, up or down, the thirteenth of a millimetre. The adjustment is sensitive to the hundredth of a turn of the milled head, which would give the one thirteen hundredth of a millimetre, or the  $1/33300$ th of an inch of motion.

## THE BODY

is provided with two Draw-tubes, one actuated by Rackwork and the other sliding inside it, and described on page 18. The advantage of having these is, that the body can be made very short, or extremely long. Thus sufficient latitude can be obtained to use Objectives corrected for either English or Continental tube lengths, and to adjust them for thickness of cover glass by variation of tube length.

The lower end of the draw-tube has the universal screw for low-power Photographic Objectives, the Apertometer, etc., and the nosepiece is removable by unscrewing. The usual size of Eyepiece-fitting 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.



Side View. Fig. 23. Front View.  
Fine Adjustment as fitted to the Substage of the Van Heurck Microscope, working from upper surface of stage. The Substage itself is removed to show the construction.

## THE STAGE

varies in each of the three stands of the Van Heurck series. Particulars are given in the specifications of the respective models. 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 to support the object when desired. Adjustments for taking up wear and tear are fitted to the dovetailed plates and working parts in the manner before described. Any special arrangement for holding Specimens, other than the usual sliding bar and springs can be supplied to order, if required.



## THE SUBSTAGE

is of specially substantial construction; it has rectangular screw adjustments to centre, very fine rackwork to focus, and is arranged to swing out of the optical axis, as in the "Royal" Microscope, page 53. A Fine Adjustment is included with the Grand Model Instrument, and is supplied at an additional cost (see Extras) to the other models. It may be either of two patterns: (1) to work from above the Stage surface on the method shown in figure 23 and in position on the Instruments on pages 61 and 67, or (2) by means of a vertical lever worked by a milled head, mounted parallel with and just above the rackwork milled head of the Substage, as shown (F) on the Circuit Stage Instrument on page 63.

A Fine Adjustment is of great utility and enables slight alterations to be made to the focus of the Condenser without imparting vibration to the whole fabric, thereby affording great accuracy.

## A SPECIAL FEATURE.



View of the method of fitting the Stage and Limb in the Van Heurck Microscope.

A—Limb. CC and D—Stage Bracket.

The maximum stability is imparted by a unique system. Instead of adjoining parts being merely screwed together, they are fitted one into the other, thus rendering the structure as solid as though it were one piece of metal. As will be seen from the accompanying figure, the Bracket CC carrying the stage, instead of being screwed to the front of the limb, as is customary, is made in one solid casting, taking the substage beneath on the plate D, and going right into the joint at the top of the pillar. 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 if they were one piece. 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 their parts.

## THE FOOT.

The original Foot for this Instrument was of the Continental form, but the Tripod has met with so much favour and is so strongly recommended by most of the leading Microscopists, that it has entirely superseded it. We shall not, therefore, in future stock the horseshoe foot, but shall be willing to make it specially to order. At the points of contact with the table the foot is provided with cork pads, to further reduce vibration, while preventing the Instrument from slipping and the table from being scratched. The tripod foot has recently been slightly re-modelled for the three Instruments, and is now as on pages 61 and 63, so that the milled head controlling the substage rackwork may stand out beyond the foot when the instrument is vertical.

The stand is perfectly steady in any position, and the joint has a steel clamping bar, to fix it at any desired angle.

All the fittings are of the universal (R.M.S.) size.

## PRICES OF THE

### No. 1

## VAN HEURCK MICROSCOPE.

The No. 1 Van Heurck Microscope is the least expensive of the three models in this series. The workmanship is as perfect as in the Grand Model and the Circuit Stage, and the general dimensions are the same as the latter, but being more closely built, complete rotation of the Stage is not possible.

### SPECIFICATION

The **height** of the stand when vertical and racked down is  $12\frac{1}{2}$  inches. The height to optical centre when placed horizontally is  $8\frac{3}{4}$  inches.

The **tripod** is shod with cork and has a spread of  $7\frac{3}{4}$  inches.

The **stage** is 5 inches in diameter, and has a range of movement of about 1 inch in each direction. It has almost complete rotation.

The **compound substage** is arranged to be lifted aside from the optical axis when desired.

The **mirrors** are plane and concave, and are  $2\frac{3}{8}$  inches diameter.

All **fittings** are of R.M.S. Standard gauge.

### PRICES.

Microscope, Stand only .....	£19 15 0
Microscope, as above, but fitted with Binocular instead of Monocular body and tubes to adjust to width of user's eyes .....	22 5 0
(The length of this Binocular body is about 9 inches, the draw-tubes racking out to 10 inches.)	
Microscope, as above, but having both Monocular and Binocular interchangeable bodies .....	24 15 0

### EXHIBITION MODEL

The No. 1 Van Heurck Microscope on Tripod foot, 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 one-tenth of a millimetre. Rackwork rotation to Substage. Finished in <b>bright polished lacquered brass throughout</b> in the very best manner .....	38 15 0
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### CASES

Mahogany Case for Instrument and Apparatus .....	1 10 0
Mahogany Cabinet of superior construction, with cupboard door to exclude dust and drawers for apparatus .....	2 10 0
Mahogany Cabinet with rabbeted door to exclude dust, and fitted inside with a flat mahogany case for apparatus; of handsome design and best construction .....	5 5 0
Bell Glass Cover on polished ebonized base .....	0 10 0

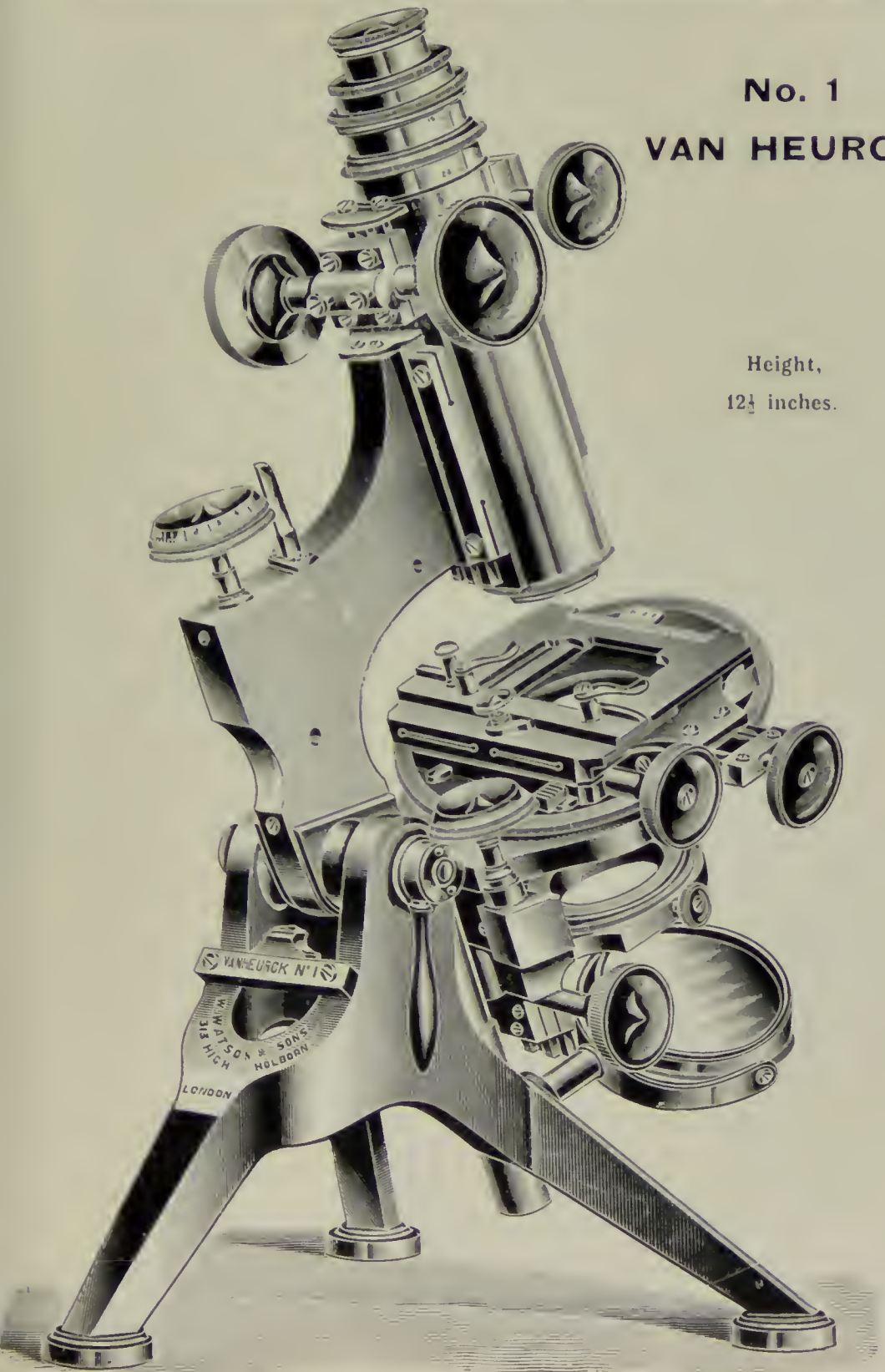
*As the Bell Glass Cover has to be packed separately, the expense of so doing will be charged at cost, and the risk of breakage in transit must be borne by the purchaser.*

The extra fittings and accessories to the No. 1 are identical with those to the Circuit Stage, for which see page 64.

For "Sets," see page 65.

**No. 1**  
**VAN HEURCK.**

Height,  
12½ inches.



The Fine Adjustment to Substage and divisions to movements of Stage are Extras.



PRICES OF THE  
CIRCUIT STAGE  
VAN HEURCK MICROSCOPE.

This Microscope is generally similar in design to the No. 1, but has complete rotation to stage. To secure this the bracket carrying the stage is lengthened and the limb is extended to correspond; this makes the height to centre when placed horizontal somewhat greater. The Instrument is of full size, and is proportioned in every detail to secure the maximum stability and effectiveness.

SPECIFICATION

The height of the stand when placed vertically and racked down is 12½ in. The height to optical centre when horizontal is 9¾ in

The tripod is shod with cork and has a spread of 7¾ in.

The stage is 5 inches in diameter, and moves 1 inch in each direction.

The compound substage is arranged to be lifted aside from the optical axis.

The mirrors are plane and concave, and 2¾ in. diameter.

All fittings are of Standard (R. M. Society's) gauge

PRICES

Microscope, Stand only .....	£22	5	0
Microscope, as described above, but with Binocular instead of Monocular body and tubes to adjust to width of user's eyes .....	24	15	0
(The length of the body of Binocular Instrument is about 9 in., the draw tubes racking out to 10 in.)			
Microscope, as described above, having both Monocular and Binocular interchangeable bodies.....	27	5	0
Microscope, as described above, but having stage the same pattern as that fitted to the Monocular Grand Model .....	25	5	0
Ditto ditto with Binoocular body ..	27	15	0

CASES

Mahogany Cabinet to contain instrument and apparatus.....	1	15	0
Mahogany Cabinet of superior construction, with cupboard door to exclude dust, and drawers to contain apparatus .....	3	0	0
Mahogany Cabinet with cupboard door to exclude dust, and inside a flat mahogany case to contain various apparatus. Of handsome design and best construction .....	5	5	0
Bell Glass Cover on polished ebonized base for Van Heurck microscope	0	12	6

*As the bell-glass cover 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.*

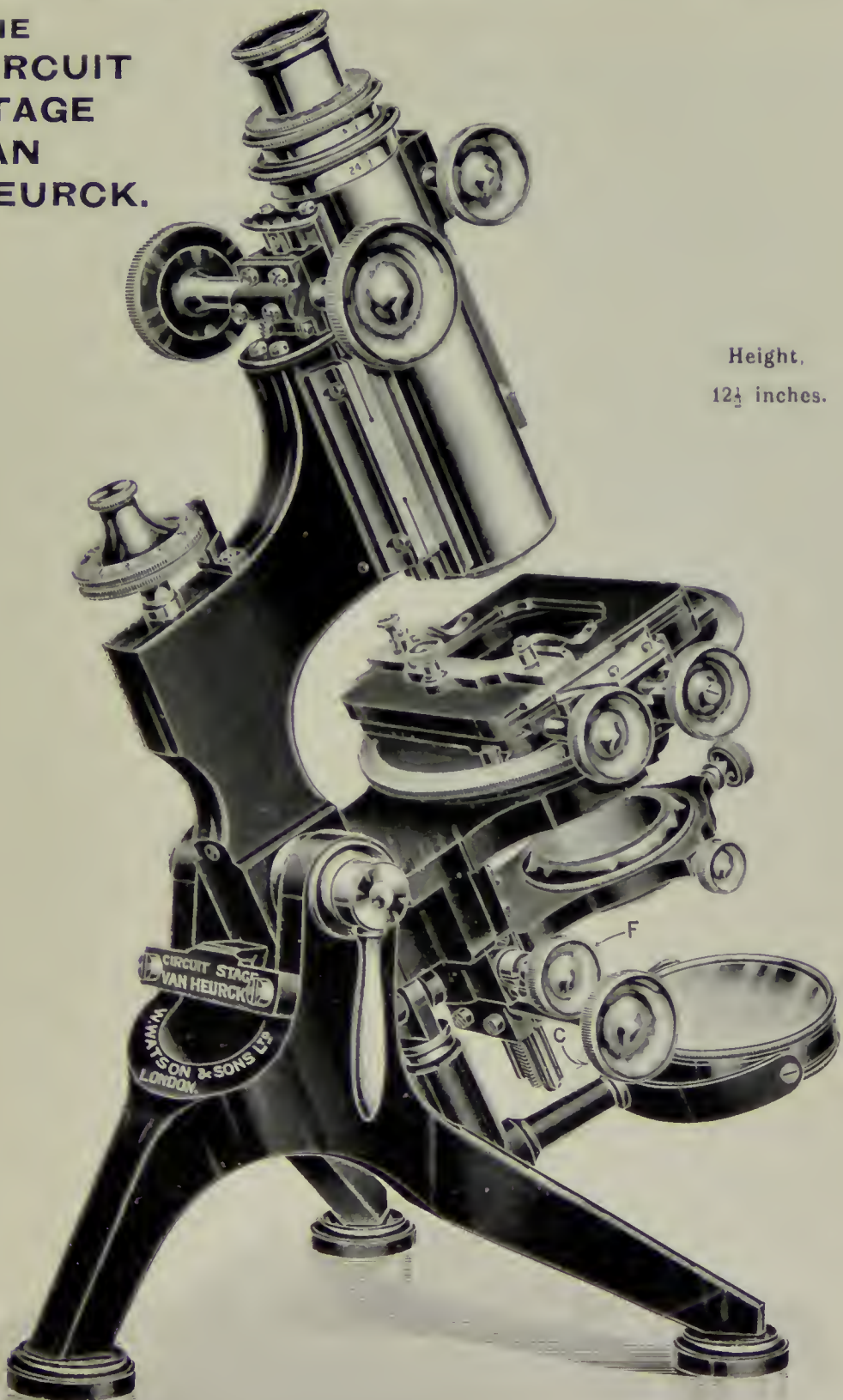
For extra fittings to the Circuit Stage Van Heurck, see p. 64.

For "Sets," see page 65.



**THE  
CIRCUIT  
STAGE  
VAN  
HEURCK.**

Height,  
12½ inches.



## Extra Fittings and Accessories for the No. 1, and Circuit Stage

### VAN HEURCK MICROSCOPES.

#### THE STAGE

Centring screws to Stage, and clamp screws to fix Stage when centred..	£3 0 0
Rackwork rotation to Stage, with means of throwing pinion in and out of gear .....	1 15 0
* Divisions to circumference of Stage to degrees, reading by verniers to five minutes .....	1 0 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
* Screw to clamp rotation of Stage .....	0 4 6

*This last-named is not required when rackwork rotation is taken.*

†Scop pattern Mechanical Stage, as described page 11 .....	1 15 0
Auxiliary Range Station to give 3 inches of movement as shown page 12	2 5 0

† Partial rotation only is available when this is fitted.

\* These items can be conveniently fitted to the Microscope at a small extra cost after manufacture.

#### THE SUBSTAGE

Rackwork rotation to Substage ..	£1 10 0
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#### FINE ADJUSTMENT TO SUBSTAGE

(1) With milled head to work above the surface of the Stage as shown on page 58, and on the Microscope, page 61 .....	1 15 0
(2) To work in same manner as depicted for the Royal Microscope, on page 57 .....	1 5 0

For complete list of objectives, eyepieces, condensers, etc., see page 88 onwards.

A complete outfit suitable for high-class work and including the Circuit Stage Microscope is detailed on page 76.

## COMPLETE VAN HEURCK MICROSCOPES

consisting of Microscope, Stand and Accessories as below      Complete in Mahogany  
Cabinet with lock and key.

Microscope—	No. 1.			Cirenit Stage.			Grand Model.		
	£	s.	d.	£	s.	d.	£	s.	d.
<b>SET VH—392.</b> Two Parachromatic Objectives—1 in., ·74 N.A., and choice of 1 in., $\frac{3}{8}$ in. or $\frac{1}{2}$ in. Two Eyepieces, large capped pattern Abbe Illuminator, improved aplanatized form, No. 1957. Mahogany Cabinet . . . . .									
	26	10	0	29	5	0	40	0	0
<b>SET VH—393.</b> Same as Set VH, but with the addition of dust proof triple nosepiece and $\frac{1}{4}$ in. 1·30 N.A. Oil Immersion Objective..									
	32	10	0	35	5	0	46	0	0
<b>SET VH—394. WITH HOLOSCPOIC OBJEC- TIVES.</b> Two Hologscopic Objectives—25 mm. and 4 mm. Two Eyepieces, Hologscopic, capped pattern. Universal Condenser, No. 1928. Complete in Mahogany Cabinet . . . . .									
	33	5	0	36	0	0	45	10	0
<b>SET VH—395.</b> Same as Set VH, but with the addition of $\frac{1}{4}$ in. 1·37 N.A. Oil Immersion Objective, Hologscopic Series and dust- proof triple Nosepiece, complete in best Mahogany Cabinet, with drawers for apparatus . . . . .									
	43	5	0	46	5	0	56	0	0
<b>SET VH—396. FOR AMATEURS' USE.</b> Binoocular and Monoocular bodies to inter- change. Three Hologscopic Objectives—25 mm., 12 mm., ·45 N.A., 4 mm. First Series Objectives, 2 in. and 3 in. Hologscopic Eyepieces—1 pair $\times 7$ , one only $\times 10$ . Universal Condenser, No. 1928, with set of Stops for dark ground and oblique illumination. Bull's-Eye Stand Condenser, No. 2167. Ronselet's Live Cage, No. 2447, and Compressor No. 2430. Stage Forceps No. 3010. Complete in best Mahogany Cabinet . . .									
	49	5	0	52	5	0	62	0	0

The above sets are suggestive and may be varied at the differences in the Catalogue prices. Extras, such as Divisions to movements of Stage, additional Mechanical Screws, etc., etc., can be added at the respective prices given with each Instrument.

## PRICES OF THE GRAND MODEL VAN HEURCK MICROSCOPE.

This is the largest and most completely fitted of the three Van Heurck Stands. It is especially recommended to those who require the very highest-grade instrument for the most critical work.

### SPECIFICATION.

The **height** of the stand, when placed vertically and racked down is 14 in. The height to optical centre, when the stand is horizontal is 10 in.

The **tripod** is shod with cork and has a spread of  $9\frac{3}{4}$  in.

The **stage** is capable of complete rotation, and has a range of about 1 inch of motion in each direction. The milled heads work on one centre, and, if desired, can both be rotated simultaneously, affording a diagonal movement. The diameter of the stage is 5 in.

The **compound substage** is arranged to be lifted aside from the optical axis and is fitted with a fine adjustment to work from the upper surface of the stage as shown on the instrument on page 67.

The **mirrors** are plane and concave, and are  $2\frac{3}{4}$  in. diameter.

All fittings are of R.M.S. standard gauge.

The instrument is accurately balanced and remains firm and rigid in any position, and is therefore especially recommended for photo-micrographic, analytical and general high-class work.

The construction has been detailed on pages 57-59.

Stand only .....	£31 10 0
Microscope, as described above, but with stage as fitted to the "No. 1" Model (page 61) .....	28 10 0
Microscope, as above, but with Binocular instead of Monocular Body and tubes to adjust to width of user's eyes .....	34 0 0
(The length of the Binocular Body is about 9 in., the draw-tubes racking out to 10 in.)	
Microscope, as above, with both Monocular and Binocular interchangeable bodies .....	36 10 0
(When two bodies are supplied they are planed together, that they may correspond exactly; we recommend, however, that centring movements be fitted to the stage, so that the latter may rotate quite concentrically with either body.)	

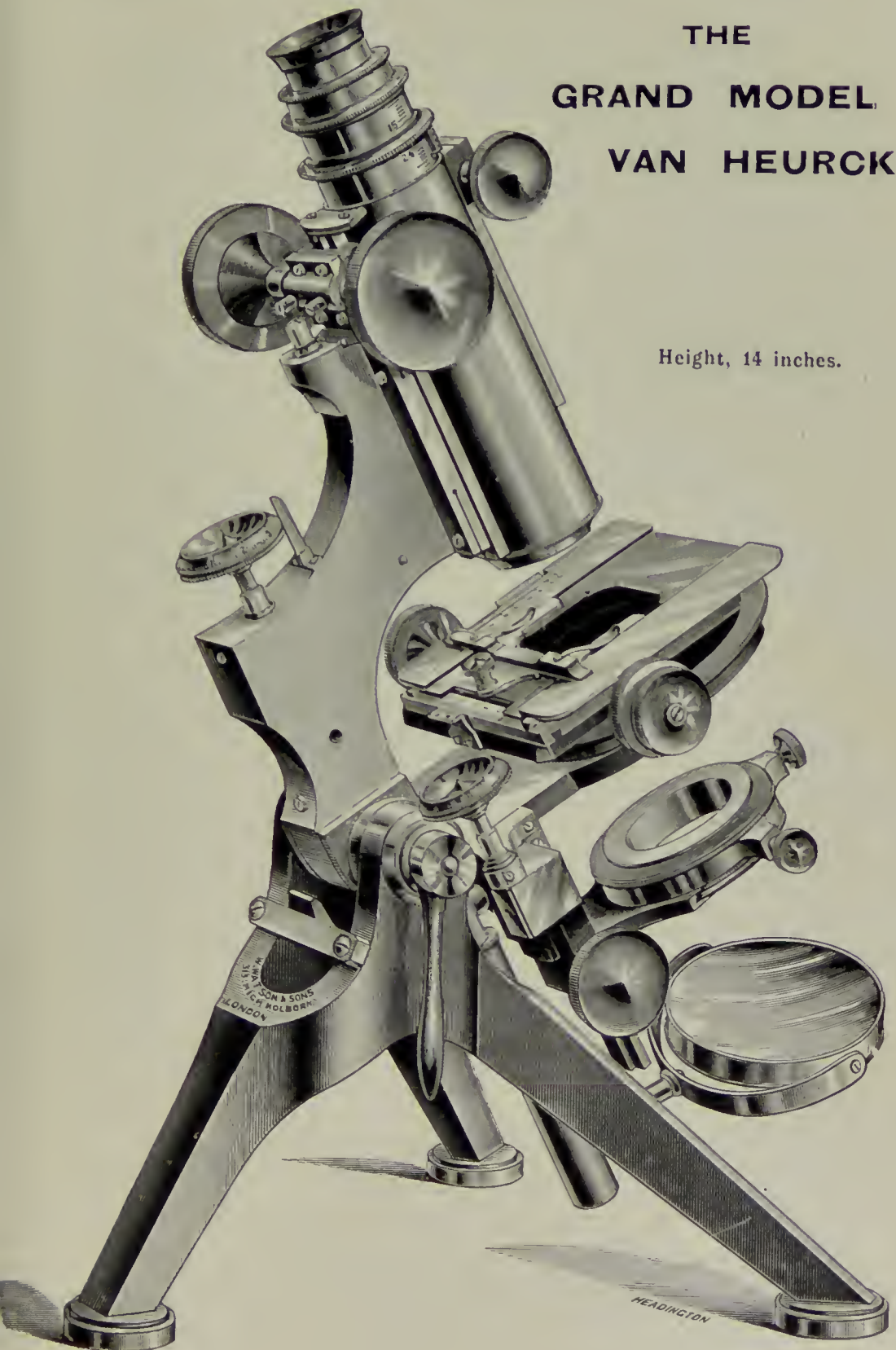
### PRESENTATION FORM.

"Grand Model" Van Heurck Microscope, on Tripod foot, fitted with centring screws to Stage, and clamp screws to fix to centred Stage. 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 one-tenth of a millimetre. Rackwork rotation to Substage. Finished throughout in bright polished lacquered brass in the very best manner. Stand only .....	52 10 0
For extra fittings to the "Grand Model," see page 68.	



THE  
GRAND MODEL  
VAN HEURCK.

Height, 14 inches.



## Extras for the Grand Model VAN HEURCK MICROSCOPE.

### To the Stage

Centring Screws to Stage, and Clamp Screws to fix Stage when centred .....	£3 0 0
Rackwork rotation to Stage, with means of throwing pinion in and out of gear .....	1 15 0
Circumference of Stage divided to degrees, reading by verniers to five minutes .....	1 0 0
Divisions to movements of Stage, reading by verniers to one-tenth 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
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, thus allowing the use of every variety of Substage apparatus. With clamp screw.	1 10 0

### CABINETS

Mahogany Cabinet to contain Instrument and Apparatus .....	2 0 0
Mahogany Cabinet, superior construction, with cupboard door to exclude dust, and drawers to contain apparatus.....	3 10 0
Mahogany Cabinet, with cupboard door to exclude dust, and having fitted inside a flat mahogany case to contain apparatus. Of handsome design and best construction .....	5 15 0
Bell-Glass Cover on polished ebonized base, for Van Heurck Microscope	0 14 6

As the Bell-Glass Cover 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.

For complete list of objectives, eyepieces, condensers, etc., see page 88 onwards.

A suggestion for a complete high-class outfit is given on opposite page. We are at all times glad to assist and advise intending purchasers, and to arrange special outfits for various classes of research. Customers are invited to examine our models before purchasing, as it is only by critical inspection that the superiority of our instruments can be fully appreciated.

## THE GRAND MODEL COMPLETE RESEARCH OUTFIT.

"Grand Model," Van Heurck Microscope Stand, as figure, page 67 .. .. .	£31 10 0	
Divisions to Stage reading to $\frac{1}{10}$ th millimetre .. .. .	1 1 0	
Divisions to Rotation of Stage reading to 5 minutes .. .. .	1 0 0	
Rackwork to Rotation of Stage £1 15s. and to Substage £1 10s. .. .. .	3 5 0	
Centring Screws to Stage .. .. .	3 0 0	
Plate to cover Stage for rough work .. .. .	0 17 6	
		£40 13 6
Best Mahogany Cabinet to contain Instrument and Apparatus .. .. .		5 15 0
Extra Binocular Body to interchange with the Monocular .. .. .		5 0 0

### OBJECTIVES

For Projection without Eyepiece, Watson's Holostigmatic Lenses (page 98) 35 m/m, £1.70 m/m, £4 .. .. .	8 0 0	
*Apochromatic Series by Zeiss—		
24 m/m, £0. 12 m/m, £7. 5 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, by Watson & Sons, 2 in., £1 10s.; 3 in., £1 10s. .. .. .	3 0 0	
		68 0 0

\* Holoscopic Objectives as in Set "M," page 16, may be substituted for above, if desired.

### EYEPIECES

Compensating by Zeiss. Power 8, £1 15 0; 12, £1 15 0; 18, £1 15 0; 27, £1 10 0 .. .. .	6 15 0	
†Holoscope, by WATSON, 1 pair each $\times 5$ , $\times 7$ , $\times 10$ at £2 15 0 per pair .. .. .	7 10 0	
		14 5 0

† These Eyepieces are provided with adjustment so that they may be used either with Achromatic or Apochromatic Objectives, see page 10. 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. 1942 .. .. .	6 10 0	
Universal Achromatic Condenser (1.0 N.A.) with Iris Diaphragm and Set of Stops, Nos. 1928 and 1929 .. .. .	3 15 0	
Polarizer of specially large size with divided Circle to work with the above Condensers, No. 2020 .. .. .	3 5 0	
Analyser Eyepiece, with divided Circle, No. 2927 .. .. .	2 10 0	
Set of Selenites for Substage, No. 2938 .. .. .	3 3 0	
Gifford's Light Screen 4/6, Tinted Glasses for Condensers 5/0 .. .. .	0 9 6	
Stand Condenser, No. 2153 .. .. .	2 12 6	
Screw Micrometer in Aluminium, No. 2535 .. .. .	3 15 0	
Stage Micrometer 5/0, Improved Roussellet's Compressor, No. 2430, 15/0 .. .. .	1 0 0	
Triple Nosepiece, Aluminium £1 5s. od., 2 Live Boxes at 10/6 = £1 1s. .. .. .	2 6 0	
Abbé Pattern Camera Lucida, No. 2055 .. .. .	2 0 0	
Micro-Spectroscope, see page 140 .. .. .	8 5 0	
Microscope Lamp, Nos. 2391 and 2397, £6 19 0, Mahogany Case, 15/0 .. .. .	7 14 0	
Set of 12 Test Objects for all powers, in Case (see Object Catalogue) .. .. .	1 1 0	

### MOUNTING APPARATUS—

Laboratory Dissecting Microscope with set of three Aplanatic Magnifiers (see page 70) .. .. .	3 7 0	
Dissecting Troughs .. .. .	0 10 0	
Set of Dissecting Instruments, No. 2318 .. .. .	1 5 0	
Cabinet (Mahogany) of Mounting Apparatus (see page 139) .. .. .	2 15 0	
Cathcart Darlaston Microtome for Embedding and Freezing (see page 134) .. .. .	2 5 0	
Microtome, Schanze, No. 2625 .. .. .	12 15 0	
Plane Iron 2/6, Section Knife 4/6 .. .. .	0 7 0	

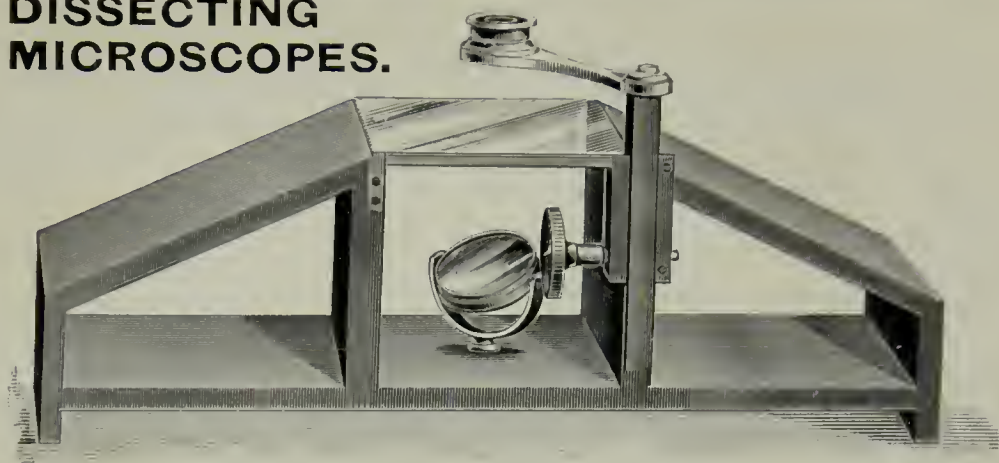
### PHOTO-MICROGRAPHY—

Laboratory Camera, fitted with Watson-Conrady Condenser System, as figured and described in separate list (2D), with Argus Arc Lamp, Fittings to Camera, etc. .. .. .	24 12 0	
Set of Chemicals for development, etc., in Case .. .. .	1 12 6	

**£231 8 0**

Revolving Microscope Table (page 156), £8 10 0,  
Complete Cabinet of Choice Microscopic Objects, No. 2 (page 145), £40.

## DISSECTING MICROSCOPES.



"Laboratory." No. M400.

- M400.—This instrument is strongly made of mahogany. The sides slope at a convenient angle, affording support to the hands, the stage is of glass,  $4\frac{1}{2}$  in. square, and removable. Arm to carry lenses, having spiral rack and pinion adjustment of best quality, giving long range; mirror on gymbal. Complete with Aplanatic Magnifiers, Nos. 2481 and 2483, magnifying 10 and 20 diameters ..... £2 18 0
- M401.—Ditto, ditto, without Lenses ..... 2 0 0
- M402.—Exactly similar Instrument to above, but to focus with sliding bar instead of rackwork ..... 1 5 0
- M403.—Ditto, with Aplanatic Magnifiers, Nos. 2481 and 2483, magnifying 10 and 20 diameters ..... 2 3 0

## PORRO-PRISM ERECTOR FOR DISSECTING MICROSCOPES.



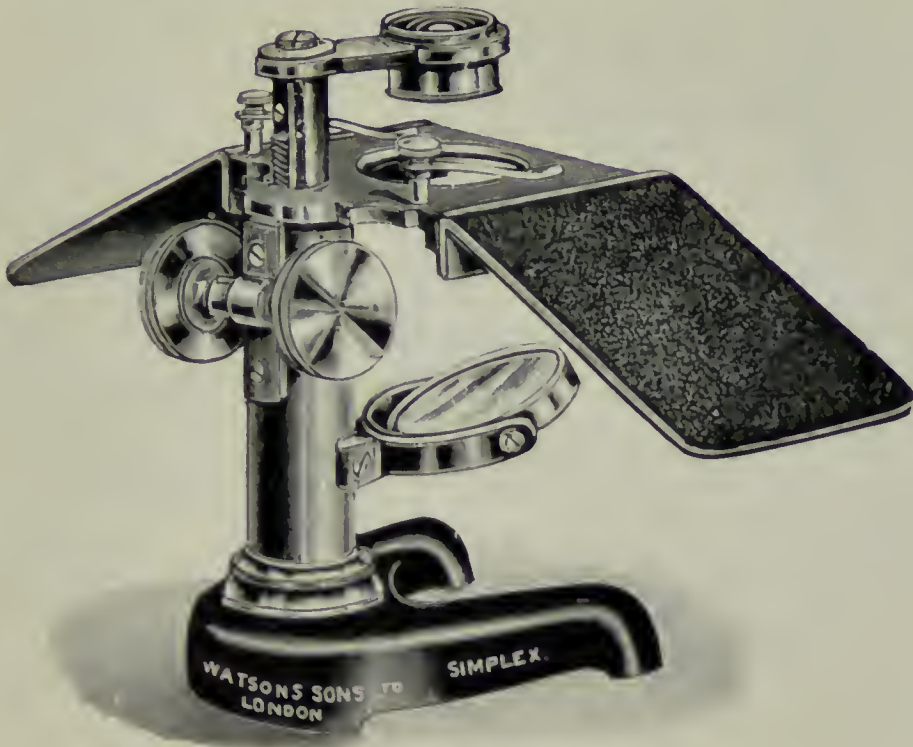
No. M405.

This fits both the Laboratory and Simplex Dissecting Microscopes and enables ordinary microscope objectives to be used instead of the usual dissecting type. Greater working distance with high powers is thereby afforded. Further, the image is seen erected instead of inverted and enables dissecting to be done with greater facility. We recommend the  $1\frac{1}{2}$  in., 1 in. and  $\frac{3}{4}$  in. objectives, which give magnifications of 35, 50 and 80 diameters, and ample working distance.

### PRICES.

- M405.—Porro-Prism Erector with Ramsden Eyepiece ..... £1 17 6
- Objectives, Argus Series .....  $1\frac{1}{2}$  in. 12/0    1 in. 12/0     $\frac{3}{4}$  in. 12/0
- Parachromatic Series .....  $1\frac{1}{2}$  in. 22/0    1 in. 20/0     $\frac{3}{4}$  in. 20/0



**"SIMPLEX" DISSECTING MICROSCOPE.**

No. M416.

- M416.—This Stand receives all the Aplanatic Magnifiers mounted for Dissecting, on page 129. For focussing, it is fitted with a rackwork and pinion adjustment. It is fitted with glass disc for Stage, plane mirror, and matt opal reflector, complete with hand rests. Price.. £1 0 0
- M417.—The above Stand, fitted with simple lens magnifying 9 diameters. Excellent for botanical work..... 1 2 6
- M418.—The above Stand, with one Aplanatic Magnifier, selected from page 129 ..... 1 9 0
- M419.—The above Stand, with two Aplanatic Magnifiers, selected from page 129 ..... 1 18 0

**TRIPOD DISSECTING MICROSCOPE.**

Two lenses with a diaphragm between are mounted in a fitting which screws into the tripod stand; the screw, which is long, gives focussing adjustment.

Very useful for Botanical Classes, Schools, etc.

Made in two sizes :—

- M420.—Lenses  $1\frac{3}{8}$  in. diameter, magnification about seven diameters, working distance from front of lower lens, about  $1\frac{1}{8}$  in..... 2/6
- M421.—Lenses,  $1\frac{1}{4}$  in. Do., do., about nine diameters, working distance from front of lower lens about  $\frac{3}{4}$  ins. .... 1/6

DISSECTING MICROSCOPES.

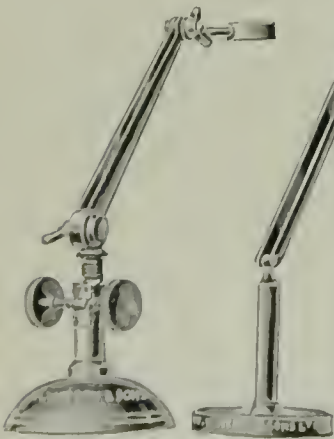


No. M430.



No. M433.

- M430.—This is a simple metal base,  $4 \times 3\frac{1}{8}$  in., on which fits in grooves a piece of matt opal glass,  $2\frac{7}{8} \times 2\frac{3}{4}$  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 5 0
- M431.—Single Lens Magnifier for ditto, magnification about 9 diameters.. 0 2 6
- Special Doublet Magnifier, No. 2484 ..... 0 5 0
- M432.—Handle with ring for holding Aplanatic Magnifier ... 0 4 0
- M433.—Magnifier Holder as figured, 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



No. M434



No. M435



No. M436.

- M434.—Magnifier Holder, with rackwork to focus, and two joints with clamps ..... £0 18 0
- M435.—Magnifier Holder on firm base, with universal movements in ball joints ..... 0 10 0
- M436.—The University Dissecting Stand, heavy iron stand with short upright, having horizontal rod working on ball and socket joints, and carrying aplanatic magnifiers, very strong and solid . . . . 1 5 0

Any of the Magnifiers in Dissecting Mounts quoted on page 120 will fit the above holders.

## METALLURGY.

A separate Illustrated List, 2 C, is published of Microscopes, Photo-Micrographic Apparatus and Complete Outfits, especially designed and arranged for Metallurgical work.

We have supplied our Instruments to numerous Government Departments and manufacturers, and the various models cover the needs of most workers. We are, however, open at any time to submit quotations for Instruments specially constructed to fulfil peculiar requirements.

We make five different models of Metallurgical Microscopes, as follows :—

The “**Junior Metallurgical.**”—An inexpensive model for Laboratories and Students.

The “**No. 1.**”—Similar to the “**Edinburgh Students’**” models. On either a tripod or horseshoe foot.

The “**Mint.**”—A similar Instrument to the “**Works**” pattern, but of smaller size.

The “**Works**”—A largest-size Instrument of massive construction, yielding every facility for all classes of work.

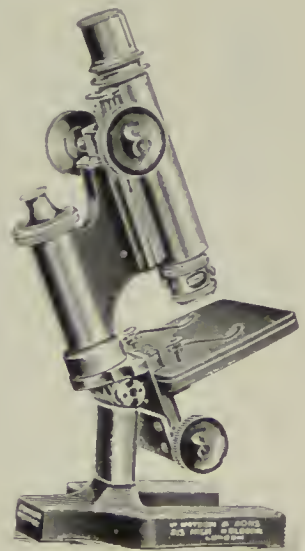
The “**Horizontal.**”—A horizontal Instrument arranged for photography.

In all the above, the Stage is fitted with rackwork so that it may be raised or lowered, rendering unnecessary the alteration of the coarse adjustment when once the illumination has been arranged.

This Special List of Metallurgical Microscopes will be sent post-free on application.

The following, amongst many others, are users of our Metallurgical microscopes and accessories :—

SIR W. G. ARMSTRONG, WHITWORTH & CO., LTD.  
 MESSRS. W. & T. AVERY, Birmingham.  
 BOROUGH OF LEICESTER EDUCATION DEPARTMENT.  
 THE BRITISH THOMSON-HOUSTON CO., LTD., Rugby.  
 MESSRS. BROWN BAYLEY’S STEELWORKS.  
 MESSRS. CAMMELL & CO., LTD.  
 MESSRS. CLAYTON & SHUTTLEWORTH, Lincoln.  
 THE DAIMLER MOTOR CAR CO., Coventry.  
 MESSRS. ELEY BROS., LTD.  
 THE ENFIELD SMALL ARMS WORKS.  
 MESSRS. GEORGE JONES, LTD., Birmingham.  
 THE GREAT EASTERN RAILWAY CO.  
 THE GREAT NORTHERN RAILWAY CO.  
 THE IMPERIAL JAPANESE NAVY, TOKIO (2).  
 THE KINGS NORTON METAL CO.  
 THE LANCASHIRE & YORKSHIRE RAILWAY CO.  
 THE LONDON AND NORTH-WESTERN RAILWAY CO.  
 THE LONDON AND SOUTH-WESTERN RAILWAY CO.  
 THE MIDLAND RAILWAY CO.  
 THE MUNICIPAL TECHNICAL SCHOOL, Birmingham (3).  
 ROYAL ORDNANCE COLLEGE, WOOLWICH.  
 THE ROYAL MINT (2).  
 THE ROYAL ENGINEERING LABORATORY, Greenwich, S.E.  
 MESSRS. RUDGE-WHITWORTH & CO., LTD., Coventry.  
 MESSRS. TAYLOR BROS. & CO., Leeds.  
 UNIVERSITY OF LIVERPOOL (DEPT. OF CHEMISTRY).  
 MESSRS. VICKERS, SONS & MAXIM.  
 THE LONDON GENERAL OMNIBUS CO.  
 MESSRS. CALLENDER’S CABLE CO.  
 MESSRS. GUEST, KEEN & NETTLEFOLD.  
 THE DURHAM STEEL & IRON CO.  
 TECHNICAL COLLEGE, BRADFORD.  
 THE DONCASTER WIRE CO.,  
 ETC., ETC.

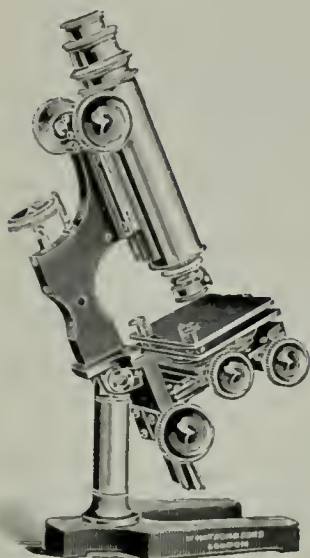


Junior Metallurgical  
 Microscope...£5 10 0

For other patterns see next  
 page.

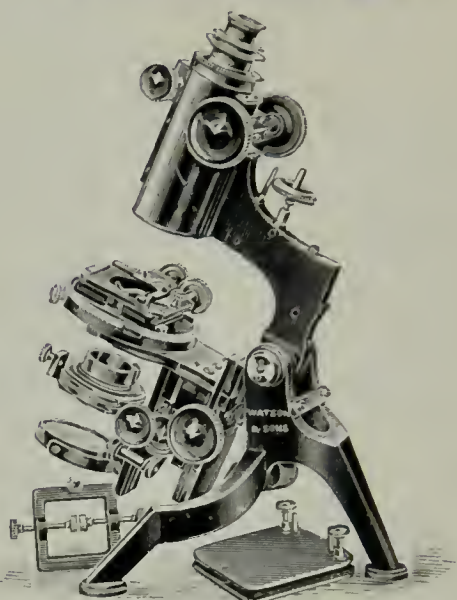


# Microscopes for Metallurgy.



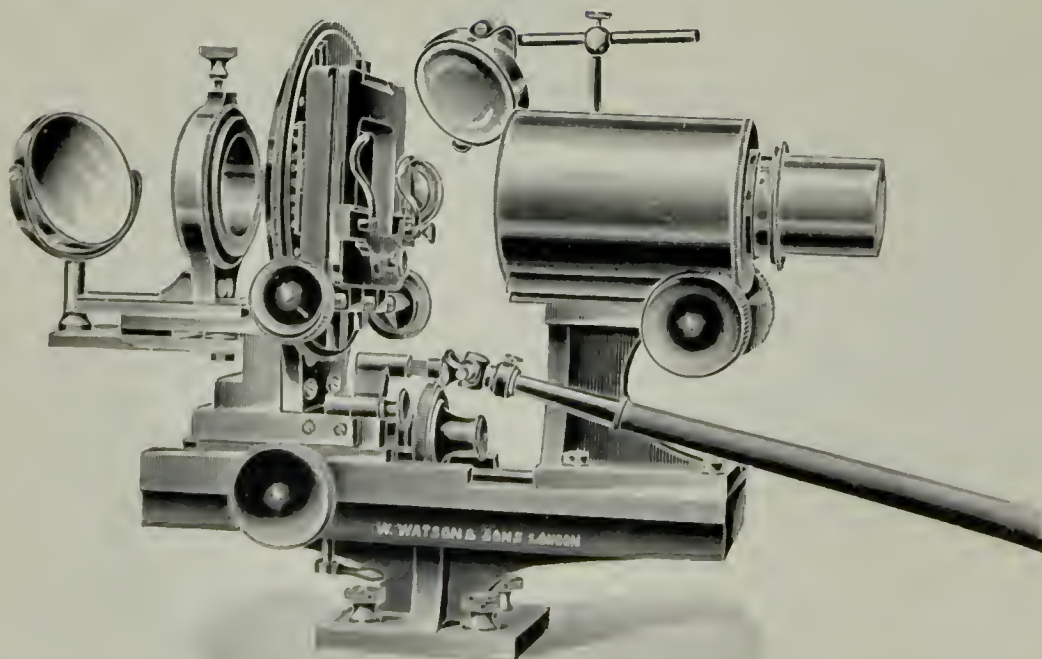
**"The No. 1"**

With Vertical Illuminator and  
Levelling Stage. £13 10s.



**The "WORKS" MODEL.**

Price £29 10s.



**The "HORIZONTAL" MODEL.**

Price £20.

For full particulars of all the above, and everything for Micro-Metallurgy,  
see our Special List 2C, post-free on application.



# Microscopes

## FOR

# Petrology.

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For Petrological work, we make three distinct models, namely, the "Praxis," the "School of Mines," and the "Advanced"; thus giving a wide choice in model and price. The "Praxis" is made on the same principles as described on page 26. The "School of Mines" is similar to our Edinburgh Students' stands. The "Advanced" is an instrument designed on the lines of our Van Heurck microscope, as regards the foot, limb and general adjustments. In each case a revolving circular stage is provided, which, at the periphery, is divided to degrees.

A Klein's quartz plate is fitted to the body tube, and an analyser prism provided. Both of these may be withdrawn from the optical axis when desired. For critical work an analyser with divided circle to work over the eyepiece may be employed.

Each stand has a polarizer with spring catch, to indicate quarter circles.

Several improvements have been introduced in these Instruments since the last issue of this Catalogue, the "Advanced" model having been in several respects re-constructed. In this a new "Lever" carrier for high-angle Condensers to work over the polarizer is fitted, but for its use a compound substage is necessary.

We also continue to make our regular pattern of stage high-angle lens-carrier as heretofore. This consists of an arm mounted between the upper and lower plates of the stage and actuated from outside, which carries the top lens of the condenser system, enabling it to be brought into the optical axis or turned away as desired. This does not impede either focussing or centring, and renders the removal of the Polarizer unnecessary. It can be fitted to any of our Microscopes if specified when ordering at an extra cost of 35/0.

PRICE OF THE  
"PRAXIS"  
PETROLOGICAL MICROSCOPE.

Supplied to the Technical College, Huddersfield, University of Liverpool ; Hartley University College, Southampton ; University of Sheffield ; Wilson College, Bombay ; Burnley Technical College, India Office, etc., etc.

This instrument is identical in construction with the Praxis Microscope, described on page 26, and it is thoroughly recommended as an efficient instrument at a very low cost. The prisms are considerably larger in size than is usual in an instrument of this class, the Polarizer being No. 2925, page 148. The Standard Objective Screw is fitted at the lower end of the draw-tube to receive a Bertrand's Lens. The appreciation of its many qualities is shown by the large number we have supplied to educational institutions.

SPECIFICATION.

The stage has concentric rotation and is divided to degrees.

The polarizer has a divided circle and spring catch to indicate quarter-circles and may be swung aside when desired. It has a prism of large size.

The body is fitted with removable analyser prism and quartz plate.

The eyepiece is cross-webbed, with adjustment to the eye-lens for focussing the webs.

PRICE.

SET P.P. 459.

Microscope, as described above, with 1 in. parachromatic objective and mahogany case with handle, lock and key..... £10 0 0

SET P.P. 460.

Praxis Petrological Microscope, fitted with 1 in. and 1/2 in. parachromatic objectives ; cross webbed eyepiece No. 2, and extra eyepiece No. 4 ; high angle condenser fitted to polarizer and removable by unscrewing ; spiral focussing underfitting, to carry polarizer and condenser, with arrangement for turning out of optical axis, double nose piece and centring nose piece, complete in mahogany case .... £13 10 0

EXTRAS.

M461 Body slotted to receive Bertrand's Lens below Eyepiece, with focussing adjustment ..... 1 0 0

M462 High Angle Condenser fitted to polarizer and removable by unscrewing ..... 0 17 6

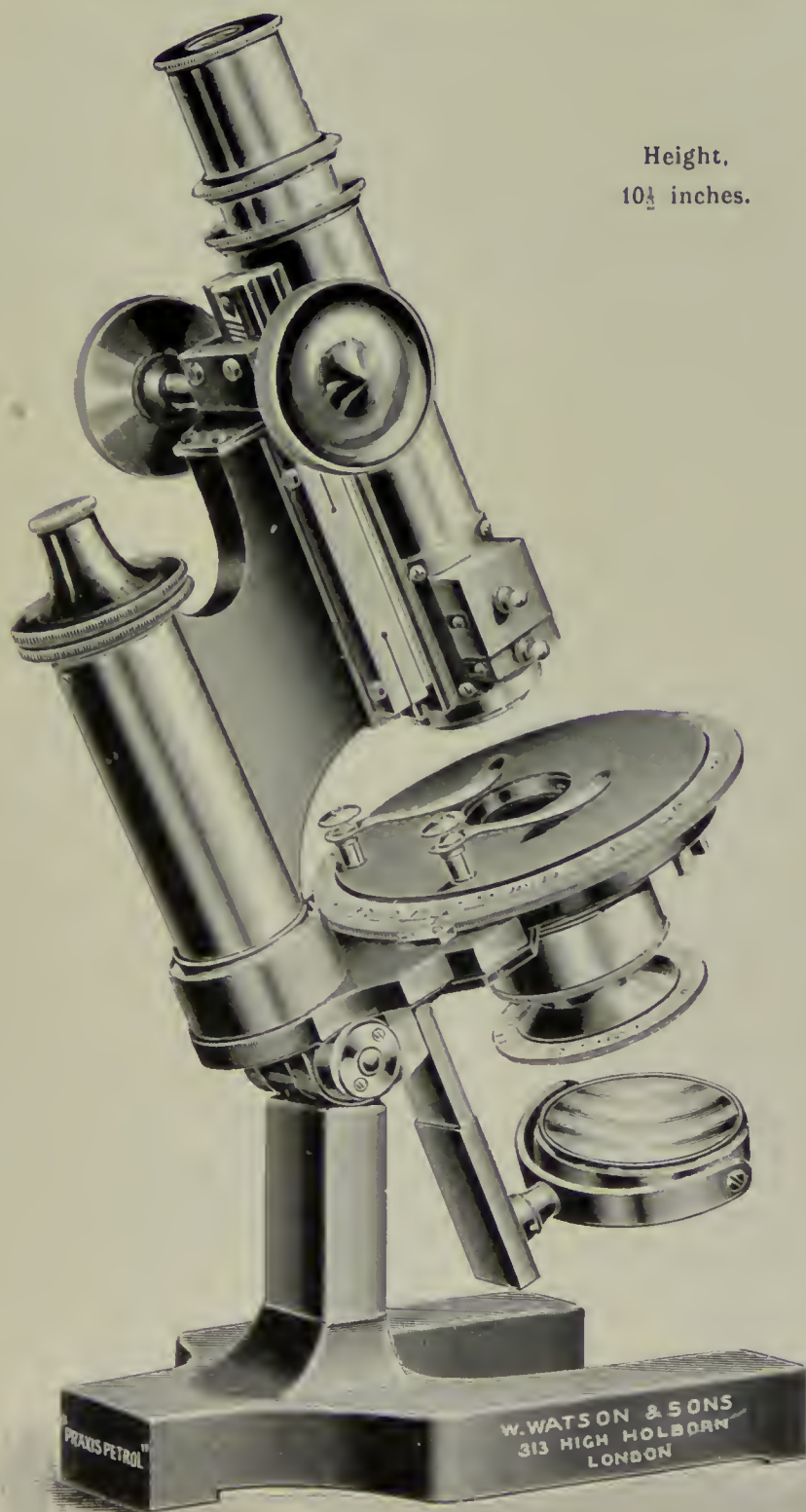
The extra fittings to the "School of Mines" Microscope are suitable to the "Praxis" stand (See page 72.)

OBJECTIVES.

Extra objectives should be selected from page 93

**THE PETROLOGICAL PRAXIS.**

Height,  
10½ inches.



# THE "SCHOOL OF MINES" PETROLOGICAL MICROSCOPE.

## SPECIFICATION.

The design is similar to our Tripod Edinburgh Students' stands.

The Stage,  $3\frac{1}{4}$  in. diameter, rotates concentrically and is divided at the periphery to degrees, reading by a vernier to five minutes.

The body is fitted with removable analyser and Klein's quartz plate.

The underfitting to stage is hinged to be swung out of optical axis if desired.

The polarizer is of large size, has divided circle and is fitted with spring catch to indicate quarter circles.

The lower end of draw-tube has the Standard Objective Thread to receive a Bertrand's Lens.

The eyepiece has spider-web cross lines, with adjustment to the eye lens for focussing the webs.

## PRICE.

### S.M. 470.

Microscope Stand, as above, with 1 inch parachromatic objective and mahogany case, with handle and lock and key ..... £12 5 0

### SET S.M. 471.

School of Mines Petrological Microscope. Objectives, 1 in. and  $\frac{1}{6}$  in.

Parachromatic Eyepieces, Nos. 2 and 4, the former with cross-webs:

high angle condenser, fitted to polarizer, and mounted in spiral

focussing underfitting with provision for turning out of optical axis.

Double Nosepiece. Centring Nosepiece. Complete in Mahogany

Case ..... £15 15 0

## EXTRAS.

Analyser Eyepiece, with divided silver circle, No. 2928 ..... £2 10 0

High Angle Condenser fitted to polarizer and removable by unscrewing.. 0 17 6

Lever High-angle Condenser Carrier, to fit over Polarizer, see page 80 .. 2 10 0

When this is supplied a Compound Substage, No. 3027, costing 37/6 extra is necessary.

Or the Stage High-angle Condenser Carrier, as described page 75, can be fitted ..... extra 1 15 0

Centring Screws to Stage ..... 2 0 0

Bertrand's Lens, fitted in body of Microscope below Eyepiece, with sliding tube for adjusting ..... 1 0 0

Bertrand's Lens to attach to lower end of draw-tube..... 0 7 6

Quartz Wedge, unmounted ..... 0 18 0

„ „ (if ordered with instrument) and mounted ..... 1 5 0

„ plate, cut perpendicular to Optic Axis to show concentric rings 0 4 0

Stand Condenser ..... 0 15 0

Centring Nosepiece ..... 0 15 0

Double Nosepiece, No. 2847, if bought with the Microscope ..... 0 10 0

Beale's Neutral Tint Reflector..... 0 6 0

Stage Micrometer ..... 0 5 0

Eyepiece „ ..... 0 7 6

Mica Films, „  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and  $\frac{1}{8}$  wave length ..... set 0 12 6

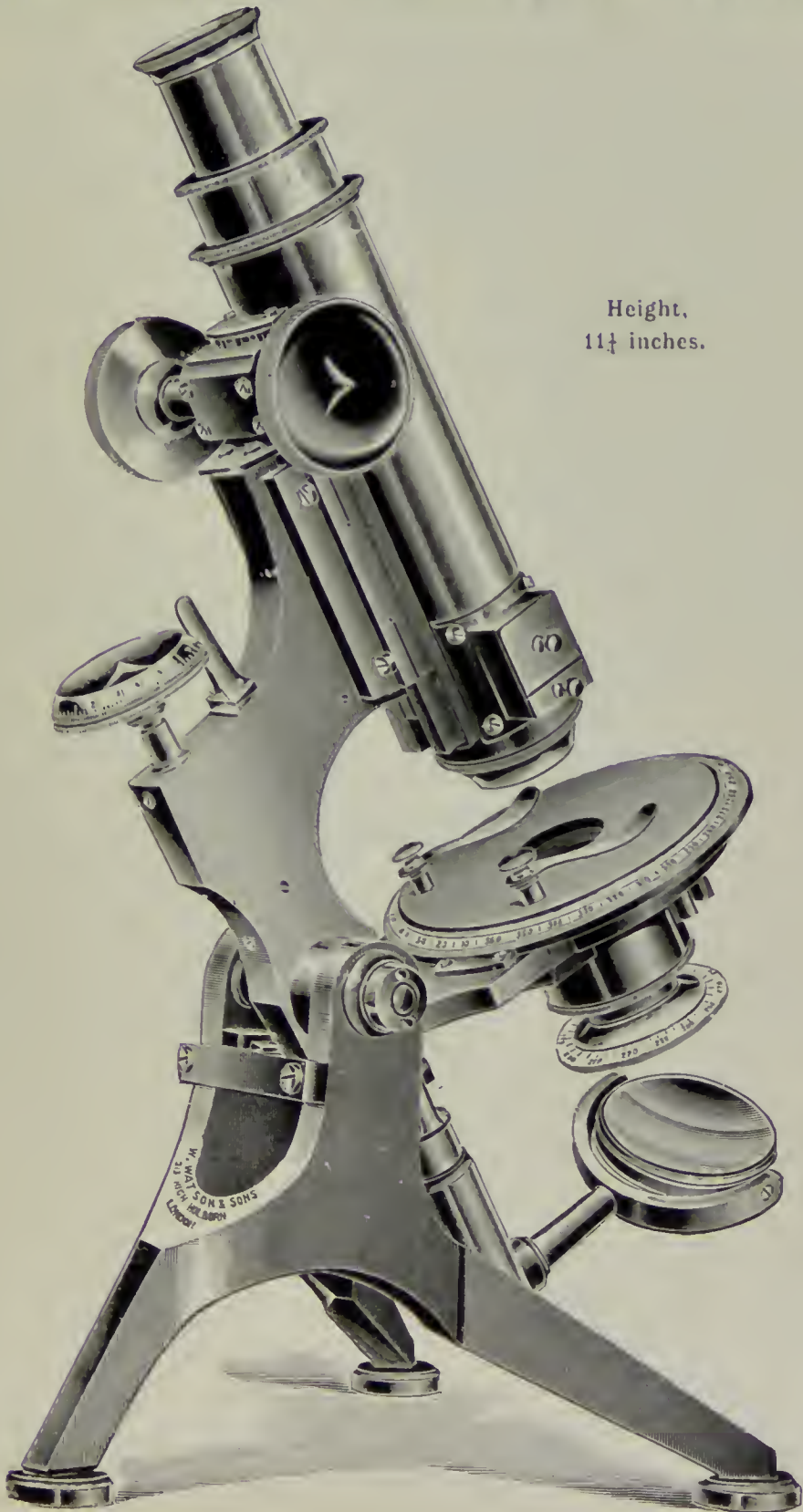
Right and left handed Quartz to superimpose to show Airy's Spirals .. 0 8 6

## OBJECTIVES.

For extra objectives, see page 92.



PETROLOGICAL "SCHOOL OF MINES."



Height,  
11 $\frac{1}{4}$  inches.

## THE "ADVANCED" PETROLOGICAL MICROSCOPE.

The general design of this instrument is that of the **Van Heurck Model**.

It is mounted on a similar type of **tripod foot**, having a spread of  $8\frac{1}{2}$  ins., and is fitted with rack and pinion coarse adjustment and our standard lever fine adjustment.

The **stage** has a diameter of  $4\frac{1}{8}$  inches. It is fitted with a sliding bar and centring screws. The **edge** is divided on a silvered surface to degrees reading by a vernier to one minute.

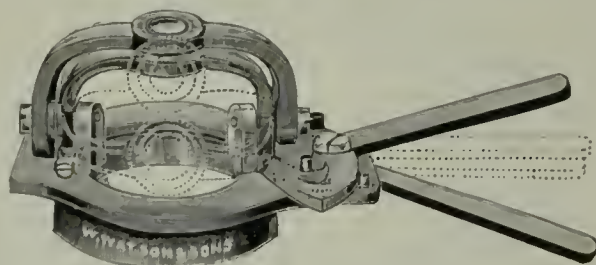
A **mechanical stage** may be supplied to fit on to the surface of the ordinary rotating stage if desired.

The **body** is of large diameter—2 inches—and is fitted with a rackwork draw-tube divided to millimetres, the lower end has the universal objective thread so that a low-power Bertrand's lens may be inserted for the examination of large crystals, etc. The **draw-tube** is slotted to receive a Bertrand's lens immediately beneath the eyepiece, and the outer body has a suitable corresponding slot to give latitude for adjustment, the actual focussing being done by means of the rackwork draw-tube.

At the lower end of the body a large **field analyser** is fitted which can be rotated 90°, the rotation reading against a divided scale. Beneath this is a slot to carry a quartz plate or quartz wedge. A quartz plate is included with the instrument.

The **eyepiece** and **analyser prism** are combined, the latter having a large field and rotating with a reader against a circle divided to degrees. The eyepiece is slotted and has cross webs.

The **polarizer** fits into the substage of standard size and has an extra large prism, the circle by which it is rotated being divided on a silvered edge and each quarter circle indicated by a spring catch.



Lever High-Angle  
Condenser System.

Mounted above the polarizer but detachable from it at will, is the "**Lever High-angle Condenser system**, either or both of whose lenses can be turned out of the field or brought into position without touching the polarizer in any way, as illustrated. It is probably the simplest and most effective arrangement yet devised.

The **substage** is fitted with centring screws and the whole of the substage apparatus can be used for ordinary microscopical purposes. It can also be turned out of the optical axis with the apparatus in it.

This Microscope offers every advantage that can be desired in a modern Petrological instrument. Its rigidity is unequalled, the accuracy of the working parts is of the very best, while the optical side is unusually perfect.

### PRICES.

"Advanced" Petrological Microscope Stand, as specified above	£29 10 0
Mahogany case to contain instrument and apparatus	1 10 0
Ditto, best quality, with cupboard door and drawers for accessories	2 10 0
Bell Glass Cover, with ebonized wood base	0 14 6
Attachable Mechanical Stage	3 10 0
Rackwork rotation to stage	1 15 0
Fine Quartz Wedge to slide in body (at time of ordering)	1 5 0
Bertrand's bi quartz, fitted to eyepiece	2 10 0
Calspar plate to work between top of eyepiece and analyser	0 8 6
Parachromatic Condenser, to work over polarizer in place of "Lever"	
High-angle Condenser System	1 12 6

For further extras, see page 78.

W. WATSON & SONS, LTD., 313 HIGH HOLBORN, W.C. 81

# THE "PETROLOGICAL ADVANCED."

Height,  
13½ inches.

Spread of Tripod,  
8½ inches.





HIGH-POWER PORTABLE MICROSCOPE.

This Instrument is shown set up for use on page 83; and packed in its box for travelling, below.

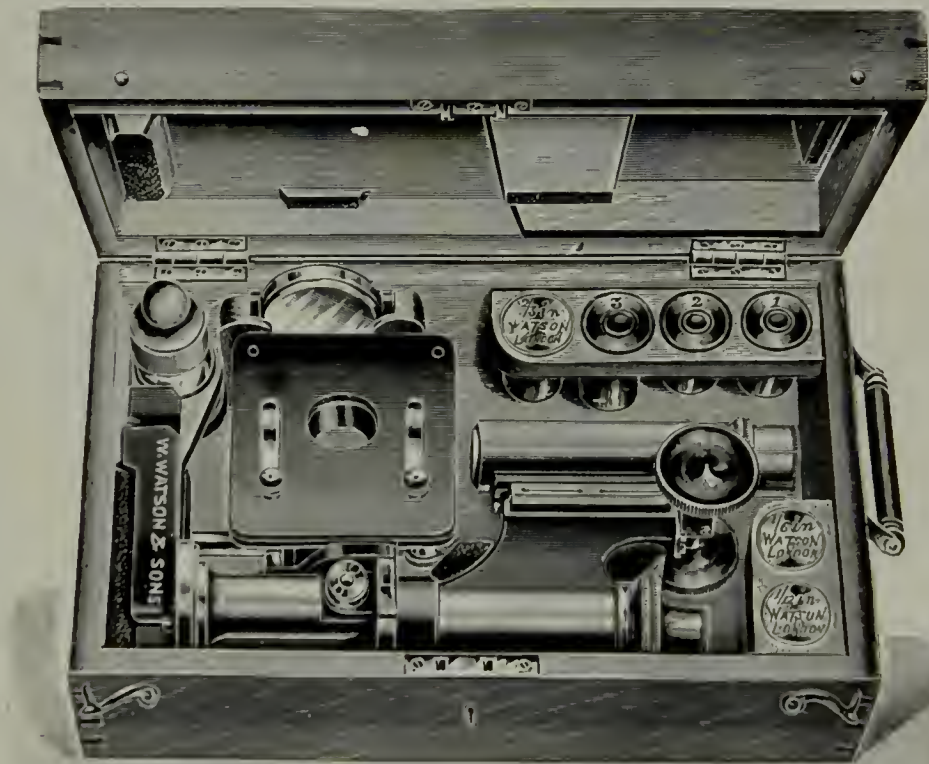
The great point aimed at and attained in the construction is—  
Perfect rigidity and suitability for work with Oil Immersion Objectives.

The weight, in case, is 8 lbs. 13 ozs., and the outside measurements of the case containing it are  $11\frac{1}{4} \times 7\frac{3}{8} \times 4\frac{1}{8}$  inches.

The spread of the feet is  $6\frac{1}{2}$  inches.

The Coarse and Fine Adjustments are of our standard patterns.

The Fittings throughout are of the R.M.S. gauge, and the Eyepiece fitting of the Continental diameter.



PRICES

H.P. 480.— The Stand, as figured, but with plain tube underfitting, and mahogany case with handle and lock and key, complete .....	£7	5	0
H.P. 481.— Ditto, with $\frac{3}{4}$ in. and $\frac{1}{4}$ in. Parachromatic Objectives, two Eyepieces, Abbe Illuminator, No. 1958, complete, in Mahogany Case with handle and lock and key .....	11	0	0

FOR BACTERIOLOGY—

$\frac{1}{2}$ in. Oil Immersion Objective, 1.30 N.A. ....	5	0	0
Triple Dust-proof Nosepiece .....	1	0	0

EXTRAS

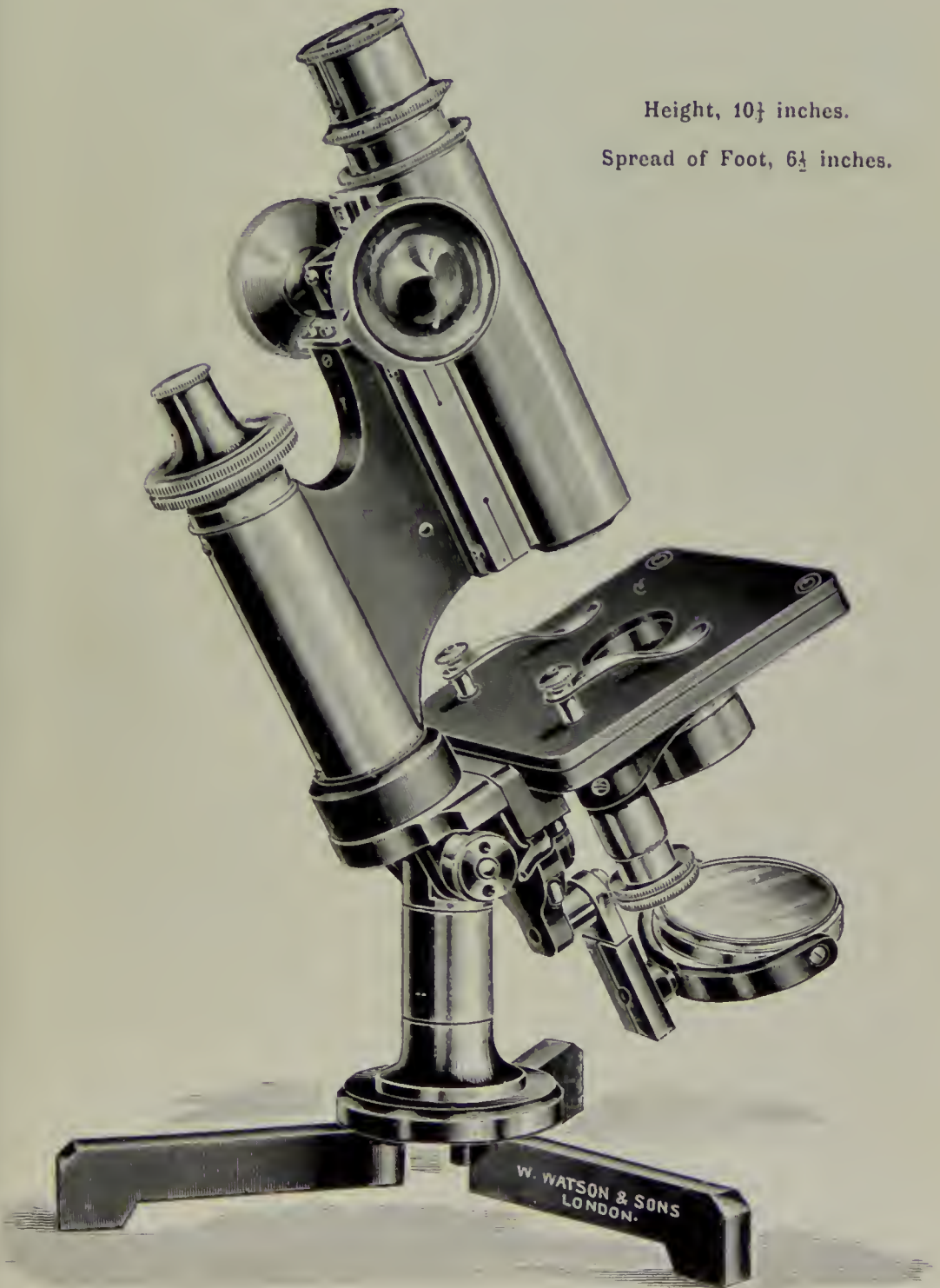
Attachable Mechanical Stage, as on page 150, No. 3000, £2 17 6; or No. 3001 .....	2	2	6
Spiral-Focussing Screw underfitting, as on page 152 .....	0	15	0
Do. do. if Condenser is taken .....	0	12	6



## HIGH-POWER PORTABLE MICROSCOPE.

Height,  $10\frac{1}{2}$  inches.

Spread of Foot,  $6\frac{1}{2}$  inches.

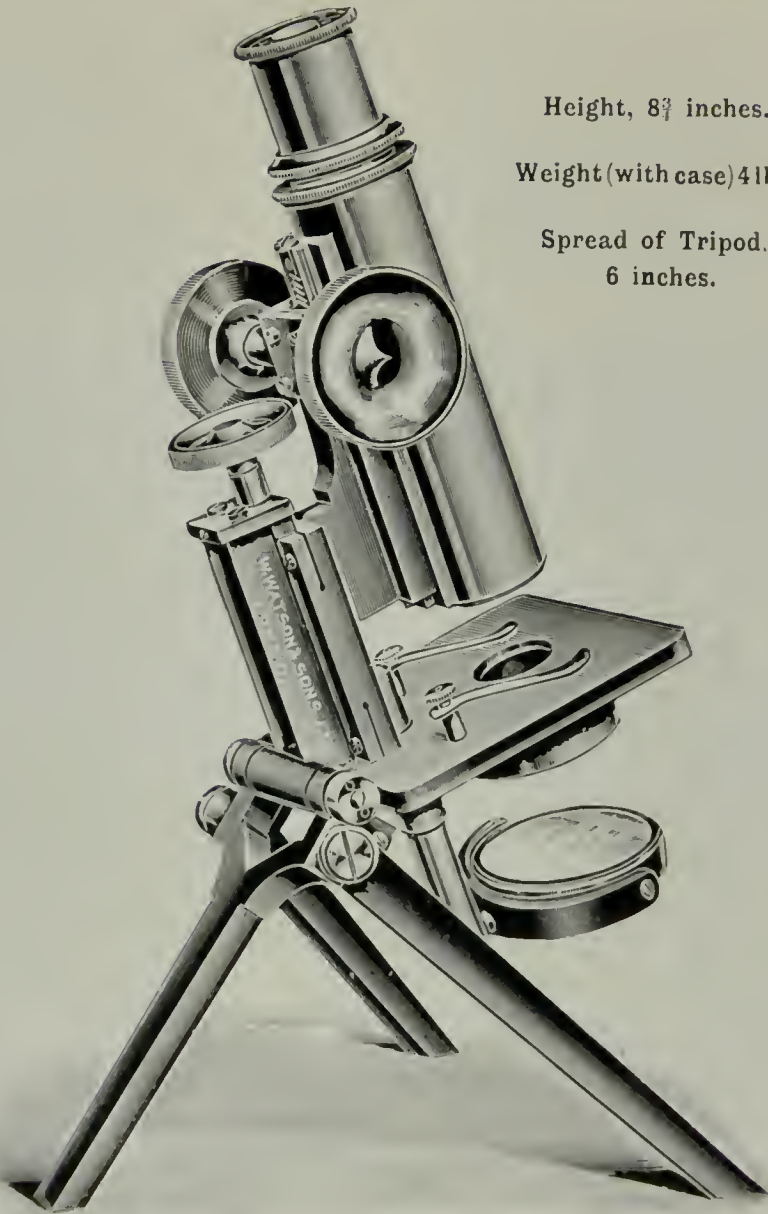


W. WATSON & SONS  
LONDON.

PORTABLE

84 W. WATSON & SONS, LTD., 313 HIGH HOLBORN, W.C.

## THE "CLUB" PORTABLE MICROSCOPE.



Height,  $8\frac{1}{2}$  inches.

Weight (with case) 4 lbs.

Spread of Tripod.  
6 inches.

A rigid, compact, and thoroughly efficient Microscope, sufficiently strong to bear constant travelling. It does not necessitate taking any part to pieces; the legs fold backwards against the limb; the mirror tailpiece pushes upwards through the Stage, and the whole packs completely in a stiff leather case, with space for Eyepieces and Objectives, measuring about  $7\frac{1}{2} \times 4\frac{1}{2} \times 3\frac{1}{2}$  inches.

The Coarse Adjustment is of Standard pattern, as described page 14, and enables a 3-in. Objective to be focussed. The Fine Adjustment is a direct-acting one with Micrometer Screw.

The Mirrors are Plane and Concave.

The Body, which is fitted with draw-tube, carries Eyepieces of Student's size.

It is a thoroughly practical and efficient microscope, suitable for high-power work, and carries apparatus of Universal size, so that the accessories of larger instruments can be used with it.

Stand only, as figured, in Stiff Leather Case . . . . . £5 0 0

## MICROSCOPES FOR SPECIAL WORK.

Most of Watson's Students' Microscopes can be fitted for special or trade purposes. Below are quoted some of the leading models, with suitable apparatus for various special branches of research.

Estimates for any of our other stands, fitted for any desired work, will be willingly submitted on application.

The following sets include a mahogany case with handle and lock and key.

### BREWING.

The "Fram" microscope, as described on pages 29-31, with two eyepieces, $\frac{3}{8}$ in. and $\frac{1}{4}$ in. objectives, substage condenser, and mahogany case, as per set, Fm 255, page 30 .....	£8 15 0
The Edinburgh Student's "H" Microscope, as described on pages 41-44, with two eyepieces, $\frac{3}{8}$ in. and $\frac{1}{4}$ in. objectives, substage condenser, and mahogany case, as per set H 341 .....	15 10 0
The same stand, with two eyepieces, $\frac{3}{8}$ in., $\frac{1}{8}$ in. and $\frac{1}{12}$ in. objectives, substage condenser, triple nosepiece, and mahogany case, as per set H 344 .....	21 7 6

### DAIRY WORK.

The Edinburgh Student's "F" Microscope, as described on page 36, with two eyepieces, $\frac{1}{2}$ in. and $\frac{1}{4}$ in. objectives, substage condenser, stage and eyepiece micrometers, a supply of slips, covers, etc., in mahogany case .....	11 5 0
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NOTE.—This Microscope is as supplied to the County Councils, and recommended by Mr. F. J. Lloyd, F.C.S., F.I.C.

### PAPER TRADE.

The instrument recommended by Mr. R. W. Sindall in his book "Paper Technology," is the following:—

Edinburgh Student's "H" Stand, as on pages 41-44, with eyepieces Nos. 2 and 3, objectives  $\frac{1}{2}$  in. and  $\frac{1}{4}$  in. parachromatic series, Price £13 5 0

This Set has found considerable favour in this trade. Variations made according to individual requirements.

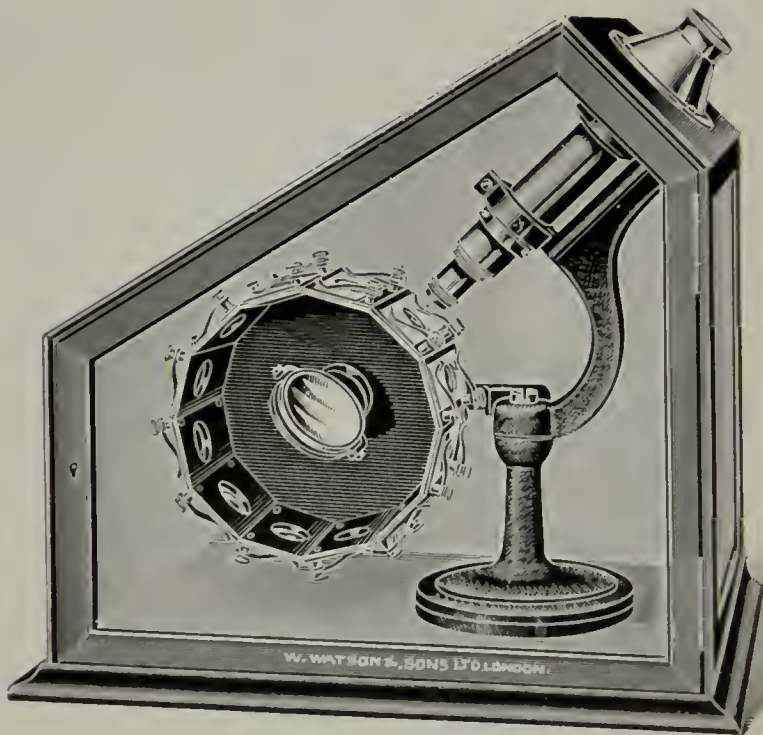
### TEXTILE TRADE.

The "Fram" Microscope, described on pages 29-31, with one eyepiece, 2 in. and 1 in. objectives, stand condenser, and mahogany case ....	£7 10 0
The same Outfit, but with the addition of a $\frac{1}{8}$ in. objective, and Abbe illuminator, No. 1958 .....	10 5 9
The same Outfit, with a disc vertical illuminator .....	10 3 6

## THE WATERHOUSE PATTERN.

# Museum Microscope.

As supplied to the South Kensington and other Museums.



The Museum Microscope gives facilities to display a number of mounted microscopic objects in a museum or exhibition, where it is required to leave the instrument unattended, and at the same time prevent the injury of microscope and specimens. As here illustrated, it will be found thoroughly reliable, and adequate in every way.

It consists of a dust-proof mahogany-framed glass case, in which the Microscope is fitted. The  $3 \times 1$  in. objects, 12 in number, are placed upon a brass drum, which can be rotated from outside the case, a spring catch indicating when the object is centred. The Eyepiece of the Microscope projects outside the case, and fine focussing is effected by moving the eyepiece end in a spiral slot.

This new pattern combines advantages which past experience has suggested, and in addition to placing the observer in the most favourable position for examining, every part, is securely fixed to prevent interference with any loose or easily-removed parts. The door is fitted with a lever lock.

**PRICE** complete, with one Eyepiece and  $1\frac{1}{2}$  in. Parachromatic Objective £12 10 0



# MAGNIFYING POWERS

(in nearest whole numbers)

## OF

# WATSON'S OBJECTIVES & EYEPIECES.

Tube length, 200 m/m ( $7\frac{7}{8}$  ins.). Image distance, 250 m/m. (10 ins.).

The longer the body tube the greater the magnification.

All these are calculated for a tube length of 200 m/m ( $7\frac{7}{8}$  ins.). With a shorter or longer tube the magnification can be ascertained by making the tube length employed the numerator, and 200 the denominator, and multiplying the above figures by this fraction. Thus, to ascertain the magnification at 250 m/metres of a  $\frac{1}{8}$ -in. Objective 74 N.A. and No. 2 Eyepiece, the following would be the method  $293 \times \frac{250}{200} = 366$  diameters.

## PARACHROMATIC.

Objective.		Eyepiece.									
		HUYGHENIAN						HOLOSCOPIC			
		Diameters						Diameters			
No.		1	2	3	4	5	6	5	7	10	14
A	B	C	D	E	F						
4 inch	....	10	12	16	20	24	30	10	14	20	28
3 ..	.....	13	16	21	26	32	39	13	18	26	36
2 ..	.. ..	24	29	38	48	58	72	24	34	48	68
$1\frac{1}{2}$ ..	....	30	36	48	60	72	90	30	42	60	84
1 ..	.....	42	50	67	84	100	126	42	58	84	116
$\frac{3}{4}$ ..	.....	66	80	105	132	160	198	66	92	132	184
$\frac{1}{2}$ ..	.....	80	96	128	160	192	240	80	112	160	224
$\frac{1}{4}$ ..	.....	174	209	278	348	418	522	174	244	348	488
.. 0.74 N.A.	244	293	390	488	586	732	924	244	342	488	684
.. 0.87 N.A.	284	340	454	568	680	852	1084	284	398	568	796
$\frac{1}{16}$ ..	.....	350	420	560	700	840	1060	350	490	700	980
$\frac{1}{8}$ ..	.....	390	468	614	780	930	1170	390	546	780	1092
$\frac{1}{10}$ ..	.....										
Water											
Immersion.		400	480	640	800	960	1200	400	560	800	1200
$\frac{1}{10}$ ..	.....										
Oil Immersion.											
$\frac{1}{16}$ inch, 1.20 or	560	672	896	1120	1344	1680	2160	560	784	1120	1568
$\frac{1}{12}$ .. 1.30 N.A.	500	600	800	1000	1200	1500	1900	500	700	1000	1400
$\frac{1}{8}$ inch	680	816	1088	1300	1632	2040	2600	680	952	1360	1904

## HOLOSCOPIC.

\* New form see page 91.

Objective.		Eyepieces.								
		HOLOSCOPIC.				COMPENSATING.				
		Diameters				Diameters				
M ms.	Inches.	5	7	10	14	4	8	12	18	27
24	1	40	56	80	112	32	64	96	144	216
16	$\frac{2}{3}$	60	84	120	168	48	96	144	216	324
12	$\frac{3}{4}$	80	112	160	224	64	128	192	288	432
10	$\frac{1}{10}$	100	140	200	280	80	160	240	360	540
8	$\frac{1}{8}$	120	168	240	336	96	192	288	432	648
6	$\frac{1}{6}$	160	224	320	448	128	256	384	576	864
4	$\frac{1}{4}$	240	336	480	672	192	384	576	864	1296
Oil Immersion.										
2	$\frac{1}{2}$	480	672	960	1344	384	768	1152	1728	2592

## Objectives.

In recent years we have supplied far superior objectives at substantially lower cost than was formerly possible. This has been principally due to the improvement in optical glass, and the introduction of new types and varieties, which have afforded the mathematician a wider range of material on which to base his calculations. Further, the Microscope has become essential in so many departments of science and manufacture, that the demand has enormously increased.

By taking full advantage of the facilities afforded by the new types of glasses—especially those manufactured by Schott & Co., of Jena—by the elimination from our formulæ of all glasses which may be even suspected of unreliability; by systematic methods of manufacture; and the use of proof plates for testing the polished curves so as to ensure the accurate fulfilment of the computations; we have been enabled, in our two principal series of lenses—

1. The PARACHROMATIC, and
2. The HOLOSCOPIC,

to produce objectives which satisfy the worker engaged in any research whatever, and to offer advantages in many of them which are not to be found elsewhere.

We also make low-power lenses for photographic use with the Microscope, without eyepieces, known as—

### HOLOSTIGMATS.

These different series of lenses are separately detailed in succeeding pages.

### TUBE LENGTH.

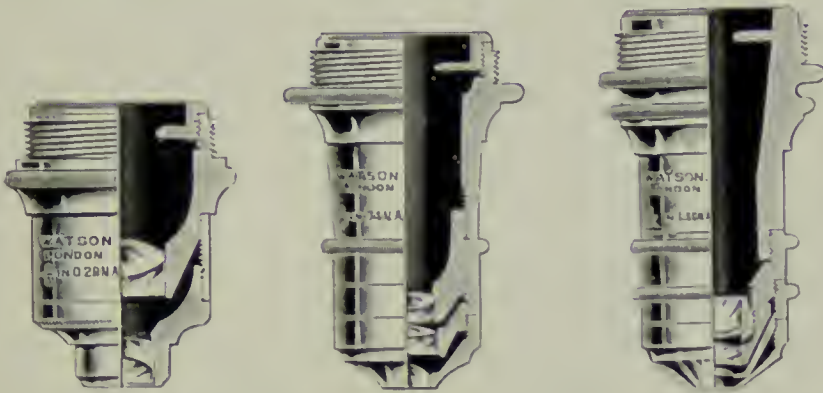
All our Objectives are corrected for an 8 inch tube with a .007 inch ( $\cdot 17 \text{ mm}$ ) thick cover glass, but we can supply them corrected for any desired tube length, or cover glass thickness, by request and without extra charge.

The advantage of correcting for an 8 inch tube length is that it permits of their use on any short body Microscope with a draw-tube; with the majority of the instruments that have long bodies; and with the extra length given by a revolving nosepiece. It also affords in most cases a range of adjustment for tube length.

All our Objectives, before issue, are examined and approved by our optical expert, Mr. Conrady.

# Objectives.

## THE PARACHROMATIC SERIES.



Low-power Objective.  $2\text{ in. to } \frac{1}{2}\text{ in.}$     High-power Objective.  $\frac{1}{4}\text{ in. to } \frac{1}{8}\text{ in.}$     Oil Immersion Objective.  $\frac{1}{2}\text{ in.}$

The illustrations above show the general construction of the low-power, high-power and Immersion Objectives of our Parachromatic Series.

### Working Distance.

In this series, the Objectives will be found to possess a greater working distance than is usual, the  $\frac{1}{4}\text{ in.}$  which is so greatly appreciated, has the great working distance of more than 1 millimetre.

The advantages of long working distances are obvious and not only enable observations to be made with great rapidity and safety, but dissecting and other manipulations of subjects which are usually impossible can be conducted with ease.

The high and low-power Objectives may come approximately into the same focus when rotated on a nosepiece.

### Low Powers.

A special study has been made in the production of the low powers that they may yield the utmost crispness of definition and flatness of field.

### The One-Sixth Inch.

Of the high-power dry objectives, the  $\frac{1}{6}\text{ in.}$  (semi-apochromatic) is the one which is most universally used, and we have been fortunate in introducing recently a new type of lens of this power, semi-apochromatic, which possesses the

### Unusually Long Working Distance of more than One Millimetre.

An ample working distance in a lens of this power has long been a desideratum, but almost invariably it has been so short that difficulty has been experienced in focussing through the cover-glass of a Haemacytometer, or any other than a No. 2 ( $.008\text{ in.}$ ) cover glass.

Our new  $\frac{1}{6}\text{ in.}$  permits the examination of objects with thick covering glasses, which has proved an immense boon to workers. This does not sacrifice other important qualities, in fact its perfection of correction, both of spherical and chromatic aberration, renders it exceptionally fine in performance. This, allied with its great working distance, makes it superior to any other lens produced at the present time for all who use their Instrument on other than specially-mounted specimens, and it particularly appeals to Students, Laboratory workers, and those who are interested in pond life.

**PARACHROMATIC OBJECTIVES**—*Continued.*

On the subject of working distance, Mr. E. J. Spitta, L.R.C.P. Lond., M.R.C.S., Eng., F.R.A.S., F.R.M.S., who is the author of several works on the Microscope, has a paragraph in his recently published text book, entitled, "Microscopy," as follows:—

"It is a subject of regret that all firms do not state the working distance of their objectives, for a long one is a great recommendation, and a matter often overlooked by the student who is making a purchase. The use of a long working distance is particularly noticeable in laboratories, where the microscope is used as a tool and often not too carefully handled, for if such free distance be very short with the lens in use at the moment . . . . an accident may happen with surprising rapidity."

An interesting paper on the subject of our new  $\frac{1}{8}$  in. was recently contributed to the Royal Microscopical Society's "*Proceedings*" by Mr. E. M. Nelson, late President of the Royal Microscopical Society, London. The following is an extract.

**"A NEW SEMI-APOCHROMATIC  $\frac{1}{8}$  in."**

**By Edward M. Nelson.**

"During the recess a new objective, *viz.*, a  $\frac{1}{8}$  in. of N.A. 0.74, computed by Mr. Conrady, has been brought out by Messrs. Watson & Sons. The novelty of its construction gives it the altogether abnormal working distance of 1 m/m., an attribute that will render this objective in many ways useful to biologists, medical men, metallurgists, etc.

"Measurements show that its power and aperture are as stated. Its performance upon the usual test objects is exceptionally good; the lenses are very well put together, and exhibit no signs of eccentricity. With the large N.A. of 0.65, and F-line screen, Grayson's 60,000 band was resolved; this agrees with the table of limits, where 60,300 is the limit given for N.A. 0.75. Sections of animal and vegetable tissues, and entomological details were brilliantly shown. The images of diatoms were particularly bright and clear, those of *Angulatum*, *Formosum* and *Navicula rhomboides*, were very sharp. Few lenses (apart from apochromats) have shown as well as this new  $\frac{1}{8}$ -in. a balsam-mounted coarse *Formosum*, the most severe test to which a dry lens, such as this, can be subjected.

"Bacteria were next examined, and Flagella could be seen without any special difficulty. They are not, however, of much service as tests for microscopical lenses, but as several Fellows of this Society belong to the medical profession, some of them might like to know the kind of image this lens gives of bacteria.

"Now with regard to its working distance, this was not directly measured, but when the slide upon the stage was turned upside down, it was found that the lens would just **focus the object through the slip**. The thickness of the slip was then measured by a screw micrometer as being 0.064 in.; this divided by the refractive index, say 1.52, is 0.042, or  $\frac{1}{24}$  in. This lens is normally corrected for an 8 in. tube, which is very handy, as it suits either a long or short body.



**PARACHROMATIC OBJECTIVES**—*Continued.*

"One more point before dismissing this subject. The measured sensibility for the tube-length correction of this lens is just about half that of modern semi-apochromatic sixths—a property which will, of course, prove very acceptable to a biologist, as his mind will be to a great extent relieved from anxiety and strain concerning a correction about which his ideas are in general hazy and undefined. But while it is unimportant to a microscopist, who can in a few seconds deftly bring his objective into best adjustment, it will nevertheless be the subject of considerable interest to him, because first-rate objectives seldom possess this useful property of insensibility to tube-length adjustment. Old objectives with triple fronts held this quality in a marked degree, but most modern semi-apochromats with single fronts require the tube length to be closely watched if fine results are to be obtained.

"The manifest usefulness of a lens of this description is my excuse for bringing it to the notice of the Society."

The new one-sixth is supplied with our Microscopes.

So successful has the introduction of this one-sixth inch objective proved, that all the other high-power dry lenses have been re-computed on a similar formula, to give as far as permissible, the same distinctive corrections, and advantage in working distance.

Objectives from one inch to one-ninth are arranged to work approximately in the same focal plane when rotated on a nose-piece.

**The Oil Immersion Objectives.**

The 1 1/2 In. 1.30 N.A. has been re-computed by Mr. Conrady, and is now made in two forms. As originally made it was exactly 1 1/2 inch and had the corresponding magnification. It was, however, pointed out that all the other makers give the magnification of 1 1/4 inch to the Objectives they describe as 1 1/2 inch, and that habit made it desirable that we should supply our Objective of similar power. The new pattern is marked \*1 1/2 in., and is actually 1 1/4 inch. We propose to supply this latter lens unless the other is specifically called for.

It was found that certain lenses gave superior effects with coloured objects to others which apparently were equally perfect in correction and construction. This new lens has been designed especially for Laboratory work, particularly on stained specimens, which it shows with greater sharpness of detail than usual. Its aperture is fully 1.30; it has excellent working distance, and great flatness of field.

Mr. E. J. Spitta, M.R.C.S., L.R.C.P., F.R.A.S., F.R.M.S., who examined one of these lenses very exhaustively, remarked at the conclusion of his report:—"Let me congratulate you on what I consider one of the finest lenses on the market."

The 1 1/2 In. 1.20 N.A. is a speciality with us. Its price is very moderate, the aperture is never less than 1.20 and is often as high as 1.24. In reality, therefore, it fully suffices for bacteria and blood examination, while the flatness of field consequent on the reduced aperture is alone an advantage under certain conditions. It may be had of the 1 1/2 inch or \*1 1/2 inch type.

All the lenses of this Series are corrected for a tube length of 8 inches with a cover glass of .007 inch (= .17 mm. metre) thick, but can be supplied to order corrected for any other tube length desired.

Every facility for testing and comparing objectives is at all times afforded attending purchasers.

## WATSON & SONS' PARACHROMATIC OBJECTIVES.

Approximate Focal Length.	Initial power calculated for an image distance of 10 inches.	Numerical aperture.	PRICE.		
Inches	Diams.		£	s.	d.
4	3	0.08	1	5	0
3	4	0.09	1	5	0
2	6	0.15	1	2	0
1½	8	0.17	1	2	0
1	12	0.21	1	0	0
¾	15	0.28	1	0	0
⅝	20	0.34	1	2	0
⅜	42	0.68	1	5	0
*⅙	65	0.74	1	10	0
⅙	65	0.87	2	0	0
⅓	83	0.88	1	10	0
⅓	90	0.90	2	5	0
⅓	103	0.87	2	10	0

\* This is the Objective referred to for its unique qualities on page 89.

**Oil-Immersion.** See note re ⅙th in. on page 91.

Approximate Focus.	Initial power calculated for an image distance of 10 inches.	Numerical aperture.	PRICE.		
Inches.	Diams.		£	s.	d.
⅙ and *⅙	125	1.20	£4	0	0
⅙ and *⅙	125	1.30	5	0	0
⅙	160	1.30	6	0	0

The price includes an oil bottle and supply of oil.

### Water-Immersion with Correction Collar.

Approximate Focus.	Initial power calculated for an image distance of 10 inches.	Numerical aperture.	PRICE.		
Inches.	Diams.		£	s.	d.
⅙	100	1.00	£4	0	0

## "ARGUS" OBJECTIVES.

These Objectives have 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
¾ inch	N.A. .17	0 12 0

Objectives by any maker supplied to order at their list price.

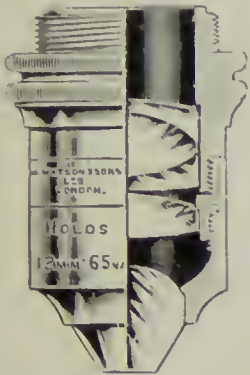
## OBJECTIVES.

## THE HOLOSCOPIC SERIES.

A reference to the illustration will show that the construction of this series of objectives is not of the usual type, the correction depending largely on a cemented triple combination at the back.

The special factors which have made these objectives famous will be best appreciated from the following considerations.

When dealing with the wide-angled pencils and consequent great angles of incidence which occur in microscope objectives, the usual methods for correcting chromatic and spherical aberration 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 mitted in the focus arrive there in exactly equal phase and are thus in the relation theoretically demanded, but not hitherto realized in practice. 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 spurious images to a minimum.

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 Objectives to realize the perfection aimed at, and to produce Objectives equal to the best Apochromatics, except in freedom from secondary colour.

These Objectives have been highly praised by expert workers who have purchased them for their excellent working with deep-power Eyepieces, large solid illuminating Coues, annular and dark-field illumination, and the yielding of exquisite photographic effects.

They meet the needs of the original investigator, and all who would possess the best optical means, in the fullest possible manner.

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

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 96), or the Compensating Eyepieces (page 158).

We would draw special attention to the 24 m/m 0.24 of the series; this has a particularly flat field of about  $\frac{1}{16}$ th in. diameter, rendering it a useful intermediate lens between the Holostigmats (see page 95) and the low-power micro. objectives. Also to the 12 m/m .35, which is admirably suited for histological work. The 2 m/m, which has a guaranteed minimum aperture of 1.37 N.A. is a superb lens and has no equal at anything like the same price. Microscopists requiring the maximum resolving power will find their wishes satisfied with this lens.

PRICES OF  
HOLOSCOPIC OBJECTIVES.

Equivalent Focal Length.		Initial power Diameters calculated for an image distance of 10 inches.	Numerical aperture.	Tube Length.		PRICE.
Mm.	In.			From stock for 8 in. only.		
				to order.		
24	1	10	0.24	6" to 8" only	Dry	£1 15 0
25	1	10	0.30	8" to 10" "	"	2 15 0
16	$\frac{2}{3}$	15	0.30	6" to 10" "	"	2 15 0
16	$\frac{2}{3}$	15	0.45	8" to 10" "	"	2 15 0
12	$\frac{1}{2}$	20	0.35	6" to 8" "	"	2 0 0
12	$\frac{1}{2}$	20	0.45	6" to 10" "	"	2 10 0
12	$\frac{1}{2}$	20	0.65	8" to 10" "	"	3 10 0
10	$\frac{1}{2}$	25	0.55	6" to 10" "	"	3 0 0
8	$\frac{1}{2}$	30	0.65	6" to 10" "	"	3 10 0
6	$\frac{1}{2}$	40	0.95	6" to 10" "	"	4 0 0
4	$\frac{1}{2}$	60	0.95	6" to 10" "	"	4 0 0
2	$\frac{1}{2}$	120	1.37	6" to 10" "	Oil Immersion	8 0 0

Although we continue to correct the above series of objectives for either the 6 in. or 10 in. tube length to order, all lenses supplied from stock are corrected for the 8 in. tube length. This tube length suits almost all modern microscopes and has the great advantage of permitting adjustment for thickness of cover glass in a manner that no objective corrected for either a 6 in. or 10 in. tube length has.

Extract from "Microscopy," by Dr. E. J. Spitta. Published January, 1909.

"Recently, however, the objectives made by Messrs. Watson & Sons under the name of the 'Holoscopic Lenses' from computations by Mr. Conrady, are so perfect that they DO admit of much higher eyepiecing than was borne by the older make. For this reason Mr. Conrady has given Holoscopic lenses much higher N.A. than usual, so as to render their performance the more complete."

And further—

"The finest achromatic combination half inch it has been our lot to examine is that of the Holoscopic Series by Watson & Sons."

Special Finest Quality Low-Power Objectives.

APPROX. FOCAL LENGTH.	Initial power Diameters	Numerical aperture.	PRICE.
Inches.			
3	4	0.11	£1 15 0
2	6	0.17	1 15 0
$1\frac{1}{2}$	8	0.19	1 15 0



## WATSON & SONS' OBJECTIVES.

### Holostigmatic Lenses for Photography.

This is a series of photographic lenses, possessing exceptionally fine corrections, specially suited for low-power photo-micrographic work. In dealing with large specimens, the ordinary microscopic objectives, even of the lowest power, fail to give satisfactory results, and the want thus felt will be found to be met by the use of the Holostigmatic lenses. These give splendid definition, have a great rapidity =  $f/6$ ; and a very large, flat and uniformly sharp field, absolutely free from distortion. They are mounted with an iris diaphragm, and have the standard (R. M. S.) gauge thread, so that they can be used with any ordinary microscope.

### No Eyepiece must be used.

As in most cases where these lenses are employed it is necessary to "stop down" to get the required depth of focus, the following list, which gives the diaphragm opening corresponding to a circle of confusion of  $\cdot 003$  in., may be useful:—

$f/45$ is sufficient for $\times 2$	$f/11$ is sufficient for $\times 12$
$f/32$ do. $\times 4$	$f/8$ do. $\times 18$
$f/22$ do. $\times 6$	$f/6$ do. $\times 24$
$f/16$ do. $\times 8$	

In most cases the best results will be obtained by using the diaphragm opening given in this list, but it may sometimes be advisable for a thick object to use a smaller one to get the required depth of focus.

The Macro Illuminator (page 99) is specially designed for use with these lenses. A special stage to attach to the photo-micro. camera base when these Lenses are employed is described in special photo-micro. list.

Focus		Size of Object sharply covered at full aperture, about	PRICE.
M/ms.	Inches.		
35	$1\frac{1}{2}$	25 m/m	£4 0 0
50	2	35 m/m	4 0 0
65	$2\frac{1}{2}$	43 m/m	4 0 0
76	3	51 m/m	4 0 0
90	$3\frac{1}{2}$	60 m/m	4 0 0

For larger lenses in this series, see our No. 1 (Photographic) Catalogue, post-free.

### Immersion Oil Bottle.

Combines several important features:—

- 1 It is unspillable.
- 2 Does not soil the fingers.
- 3 The cap never sticks.
- 4 No waste of oil.

M2835. As figured. A small well is used with an inner tube-fitting similar to an unspillable inkpot. A dust-proof cap of boxwood is provided which completely covers the top, but at the same time does not grip it. At the centre of this cap is a small wooden rod passing down to the bottom. To take a drop of oil, it is only necessary to lift off the cap and touch the objective with the point of the wooden rod. The fingers are never soiled, and the cap never sticks.



M2835.

M2836. Bottle of Immersion Oil	£0 2 0
	0 0 9

**"HOLOSCOPIC" EYEPIECES.****For Apochromatic, Achromatic, or Watson's New  
Holoscopic Objectives.****NEW FORMULA, 1912.**

Two new features have been introduced into these Eyepieces.

1. The Eye-point has been made longer than formerly by the introduction of Achromatic lenses, enabling more comfort to be secured in working.
2. In the re-computing, a special aim has been kept in view to neutralize the inherent want of flatness of field in the Objective by an unusual formula for the optical part of these Eyepieces.

These Eyepieces are already very largely used, and these new qualities will increase their utility and unique value.

**CAPABILITIES—**These Eyepieces are designed to work with **Apochromatic Objectives**, and possess the so-called "**over-correction**" associated with the expensive compensating Eyepieces.They are, in addition, arranged for the ordinary **Achromatic Objectives**, an adjustment being provided for altering the corrections from any desired degree of **over-correction** to **Achromatism**.**ADVANTAGES—**

The Holoscopic Eyepieces obviate the necessity for two series of Eyepieces for Achromatic and Apochromatic Objectives, as they do the work of both.

Efficiency is not sacrificed: in fact, a more brilliant image is obtained—power for power—than with the Compensating Eyepieces. They yield an exquisite sharpness of detail.



Student's Pattern.



Best-capped Pattern.

A very important feature is the provision 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 it often happens that with the ordinary Compensating Eyepiece so perfect an effect is not produced as would be possible if its correction could be varied.

**HOW THE EFFECT IS PRODUCED—**

The **Lenses** are of appropriately selected durable Jena glasses, the curves of which are worked and polished with extreme care and accuracy.

The **Adjustment** of these Eyepieces is effected by 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 effective 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 on account of their excellent design and working qualities will be found superior to the ordinary Huyghenian type.

**MAGNIFYING POWERS—**

The Holoscopic Eyepieces are made in two patterns: (1) the ordinary Student's pattern, and (2) the best capped form. Either kind can be used with **any tube length**.

The magnifying powers are calculated for the 10-inch tube length, and are as follows:

Student's pattern, 7, 10, 14 and 20 diameters.

Best capped pattern only, 1.27 in. diameter, 5, 7, 10, 14 and 20 diameters.

**PRICES.**

Student's Pattern, either power, for the Standard Continental diameter of tube, as figured, new formula.....	£1 0 0
Best Capped Pattern, as figured, of the Standard large diameter, 1.27 inches, new formula .....	1 5 0
Other special sizes to order .....	0 5 0

**Huyghenian Eyepiece, or ordinary type.**

We wish to draw attention to two special features which characterize our Eyepieces, and are not usually found elsewhere :—

1. EACH IS ENGRAVED WITH ITS INITIAL MAGNIFYING POWER. This enables the worker to speedily ascertain the total magnifying power employed.

2. THE EYEPIECES 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 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. There is no disturbance to the corrections of the Objective on interchanging Eyepieces, thus working time is saved.

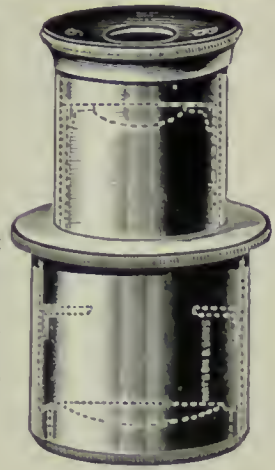
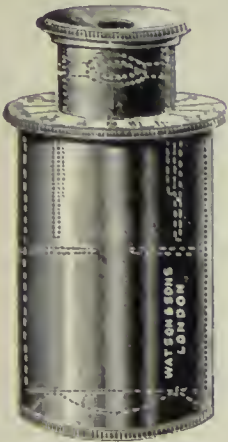
The Huyghenian Eyepieces are made in two patterns : (1) the capped form, and (2) the Student's form. The former are of the large diameter 1.27 in.; the latter are as usually supplied with the Edinburgh Students', Fram, Bactil, and similar instruments, and fit the regular Continental diameter of tube.

The construction is the best throughout.

The Eyepieces are numbered 1 to 5, No. 1 being the weakest. They were formerly described as A, B, C, D, etc., but this lettering is no longer used.

**PRICES.**

No. formerly	1 A	2 B	3 C	4 D	5 E	6 F
Initial magnifying power	5	6	8	10	12	15 diams.
Best Capped Pattern . . . .	10 6	10 6	10 6	15 0	15 0	15 0
Student's Pattern . . . . .	5 0	5 0	5 0	5 0	10 6	10 6

**Projection, for Photo-Micrography (New Formula, 1912).**

These Eyepieces 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 is effected by revolving the Eyepiece cap in a spiral slot, so that the eye or top lens is brought closer or farther away from the diaphragm, as may be required, and divisions and a reader are provided for registering positions. Made to fit the Continental and English size (1.27 in.).

Initial magnifying powers :—

English length of tube—10 in. . . . . 6  
Continental do. — 6 in. . . . . 4.

Price, £2 each

Adapters between Continental Eyepieces and any English size, each, 4/6

Eyepieces of special size, 5 0 additional to all above prices.

**Eye-shade.**

M2362.

This consists of two parts, jointed in the middle, as figured : 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.

M2362. For bodies carrying eyepieces of continental size . . . . . £0 1 6  
M2363. Ditto, ditto, large-sized eyepieces . . . . . 0 1 9



## Condensers—Substage.

A high degree of excellence in the illuminating apparatus of a microscope cannot be too strongly insisted upon. With low powers the light reflected directly from a mirror is generally sufficient, but not so with the high powers. Here it is not only necessary to obtain **more** light, but it is imperative that such light should be under perfect control, and that the quality of the system producing the illuminating cone should be as carefully considered as the objective itself. In short, the condenser is a necessary adjunct: not a mere refinement. The better the quality of objective used, the more perfect must be the substage condenser, if the full virtues of the former are to be exhibited. A well-corrected objective demands a condenser having an aplanatic aperture which is proportionate to its own. A good objective, under favourable conditions, will bear a solid cone of illumination of three-fourths its numerical aperture: the condenser should be selected accordingly.

In our series of substage condensers, we provide for all classes of work, with every power of objective, as follows:—

Condenser.	Full Aperture.	Aplanatic Aperture.		Equivalent Focus.		Page.	Diameter of Back Lens.
		Complete.	Top Lens Removed.	Complete.	Top Lens Removed.		
Macro Illuminator	—	—	—	Inch. ·2	Inch. —	98	1·25
Aplanatic Low-power	·50	·48	—	·66	—	98	·61
The Universal	1·0	·95	·40	·4	1·33	99	·77
The Parachromatic . . . . .	1·0	·90	·40	·29	·4	100	·62
Oil Immersion (Holoscopic Series)	1·30 to 1·40	Full	·55	·22	·55	100	·6

And our well-known aplanatised Abbe Illuminator, page 102.

The freedom of the lens-system from spherical aberration shows the degree of aplanatism attained. In the above table the aplanatic aperture is very large in relation to the full aperture: a sufficient indication of high efficiency.

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.

**WARNING.** Several Condensers are offered in competition with our Series, professing to have similar large aplanatic apertures. On testing, we have found many quite inferior to their representations. We guarantee that all our Condensers have the aperture—both numerical and aplanatic—claimed for them.



# Condensers—Substage.

## APLANATIC LOW-POWER.



This is a most excellent condenser for low and medium powers, up to a numerical aperture of  $\cdot 65$ . It has a power of  $\frac{3}{8}$  in. and a numerical aperture of  $\cdot 50$ , of which  $\cdot 48$  is Aplanatic. The diameter of the back lens is  $\cdot 6$  in.

M1913.—Optical part only, with universal R.M.S. thread £1 10 0

M1914.—Completely mounted, similar to Parachromatic Condenser, page 101, with iris diaphragm and set of stops, complete..... 2 12 6

## THE MACRO ILLUMINATOR.

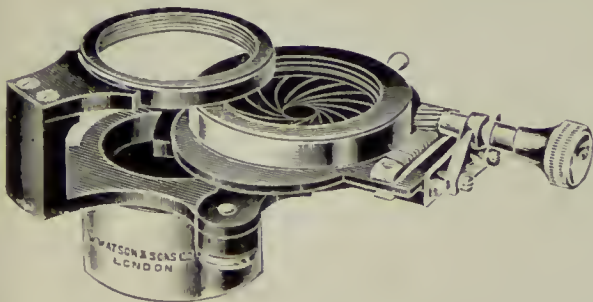


M1915.—This is a single Achromatic Combination of  $1\frac{1}{4}$  in. clear aperture and 2 in. focus. It excels for its brilliant and uniform illumination of large objects under low powers. The lens is mounted to fit into the Substage, close to the object, so as to focus the image of the source of light in the **Objective**. Objects up to fully 1 in. diameter may be thus illuminated with uniformity. It is extremely valuable for photography, with Holostigmat lenses (page 95), and low-power objectives.

Mounted for Substage ..... Price £1 10 0

## WATSON'S MECHANICAL CONDENSER MOUNT.

M1916.—The design of this Condenser Mount is such that the advantages obtainable with the Continental Coudeuser 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.

The mount is 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 ..... £3 10 0

# Condensers Substage.

## Holoscopic System.

### The Universal Condenser.



M1927.

For rapid work, a condenser having large lenses is an immense advantage, and in the Universal Condenser a diameter of back lens is given, which in practice affords all the convenience of the larger sizes. 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 Condensers, corrections for spherical aberration, which have made them famous as the best examples of optical skill and perfection in aplanatism of the present day.

The power 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 be used for which it is corrected. Its optical perfection suits it for work with the highest powers. It is a "Universal" Condenser in every way.

It will work through any reasonably thick slip, but is slightly under-corrected for thin ones. This can, however, be corrected by partly unscrewing the front lens so as to cause it to touch the slip when in focus.

The Mounting is the same as used for the Abbe Illuminator, with which the Holoscopic Condenser will interchange. It has iris diaphragm and rotating cell for stops, etc.

Power		Total Aperture.	Aplanatic Aperture.		Diam. of Back Lens
Complete	Front lens removed.		Complete	Front lens removed.	
1/4 in.	1/3 in.	1.10	.95	.40	.77

### PRICES.

M1927.—Optical part only.....	£2 7 6
M1928.—Completely-mounted with iris diaphragm .....	3 7 6
M1929.—Set of stops for dark-ground illumination, etc. ....	0 7 6
M1930.—Coloured glasses—blue, yellow, signal green, ground, etc., Dr. Spitta's "pot green" (in two thicknesses), each .....	0 1 6

# Condensers—Substage.

## The Holoscopic Oil Immersion Condenser.

This condenser has the fullest resolving and defining power for the highest power objectives.

It possesses the same perfection of correction 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 widely recognised, as it is used by many of the most distinguished microscopists. It is indeed indispensable to all microscopists who would 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 all Objectives.

The numerical aperture of this condenser varies according to the thickness of slip through which it has to work. It is normally made to work through slips up to 1.6  $m/m$  thick, and has then an N.A. of about 1.34. If made to order to work through slips not exceeding 1.3  $m/m$ , its N.A. can be brought up to 1.40. On the other hand, if greater working distance is demanded, the N.A. falls proportionately to 1.30.



M1911.

	Oil immersed complete.	Dry complete.	Dry, top lens removed.
Power .....	22 in.	22 in.	55 in.
Full aperture .....	1.30—1.40	1.0	1.60
Aplanatic aperture .....	do.	.92	.55

Clear diameter of Back Lens, 6 in.

### PRICES.

M1941. Optical part only, having standard R.M.S. thread ..... £5 0 0

M1942. Completely mounted with iris diaphragm, similarly to Parachromatic Condenser shown below, with divisions to indicate aperture employed. With set of stops complete..... 6 10 0

For coloured glasses see M1945.

## The Parachromatic.



M1944.

This is the condenser *par excellence* for medium and high power workers. 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.

This condenser is eminently suited for the highest critical and photographic work, and we confidently recommend it.

Power.		Aperture.	Aplanatic Aperture	Diameter of Back Lens.
Complete.	With top lens removed			
29 in.	4	1.0	.90	62 in.

### PRICES.

M1943.—Optical part only, having standard R.M.S. thread ..... £2 5 0

M1944.—Completely mounted, as figured, with set of stops ..... 3 15 0

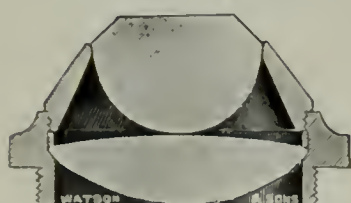
M1945.—Discs of blue, yellow, signal green, ground-glass or Dr. Spitta's "pot green" (in two thicknesses), for either of the above Condensers, each ..... 0 1 0



# Condensers—Substage.

## WATSON'S NEW APLANATISED ABBE ILLUMINATOR.

**Increase of more than .15 of Aplanatic Aperture.**



Optical part of Abbe Illuminator.  
1.20 N.A.

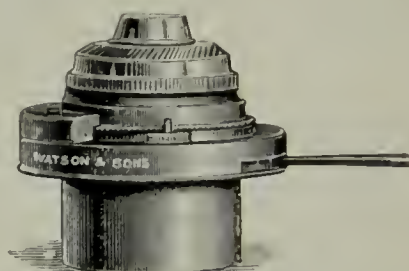
was the subject of special consideration with us, and by re-computing we are able to offer this Condenser with a higher degree of aplanatism than has hitherto been attained, viz., .65 N.A.,—that is more than .15 N.A. in excess of Dr. Dallinger's calculated aplanatic aperture of the original Abbe Illuminator. This greatly increases the field of usefulness of this Condenser.

The aplanatism of even this improved Condenser does not compare with that yielded by the Achromatic Condensers, Nos. 1927 to 1943. For original research and critical work with Oil Immersion objectives, we strongly advise one of the latter. It can be supplied mounted either for substage or understage.

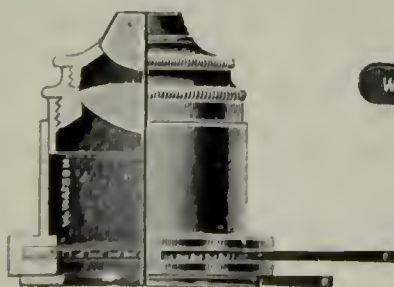
The Abbe Illuminator is universally used for both high and low-power work; for the latter purpose the top lens is removed. A beautiful dark-ground effect may be obtained with it.

The continued popularity of this Condenser is due to the ease and rapidity with which it can be employed and for its brilliancy of image.

Although its numerical aperture is great, being 1.20, the Aplanatic Cone has hitherto been so low that it has presented drawbacks for work with first-class large aperture objectives. The matter



Mounted for Substage.  
No. M1957.



Mounted for Understage No. M1958.

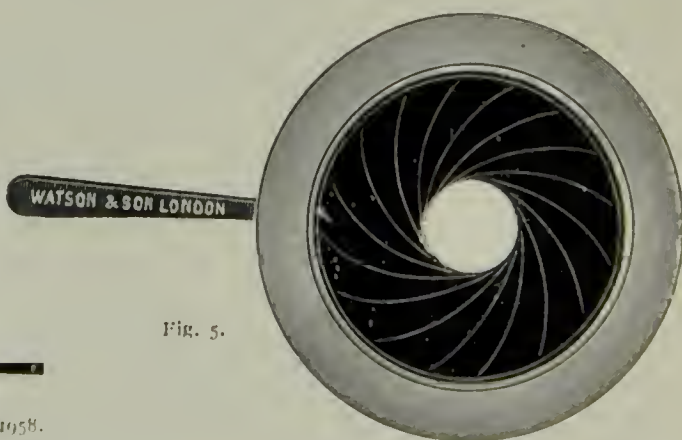


Fig. 5.

We have designed a very perfect Iris Diaphragm for the fittings of these Condensers (as fig. 5), which permits the most precise gradation of illumination being immediately obtained.

### PRICES.

M1956.—Optical part only, N.A. 1.20 .....	£0 17 6
M1957.—Completely mounted for substage, with iris diaphragm and carrier for stops, N.A. 1.20 .....	2 2 6
M1958.—Completely mounted for understage with iris diaphragm and carrier for stops, N.A. 1.20 .....	1 12 6
+ M1959.—Set of stops for dark-ground, etc., illumination in brass box ..	0 7 6
M1960.—Discs of glass, tinted, blue, signal green, yellow, ground glass, Dr. Spitta's "Pot Green," (2 thicknesses), etc., each .....	0 1 6



# Condensers—Substage.

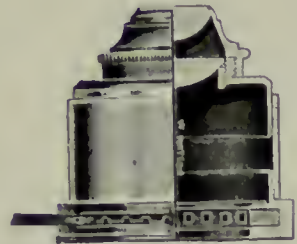
## The Scop Abbe Illuminator.

This is a cheap form of condenser especially designed for Students' microscopes. It is of similar construction to the ordinary Abbe Illuminator, but the lenses are a little smaller. An iris diaphragm is fitted, and by sliding the optical part from its place, the iris can be employed independently—a valuable consideration. Provision is also made for the use of stops and coloured discs, it being necessary to remove the optical part, insert the stop in a cell beneath and replace the optical part.

The mount is of universal R.M.S. size, and to allow of adjustment, the optical part is on a sliding fitting.

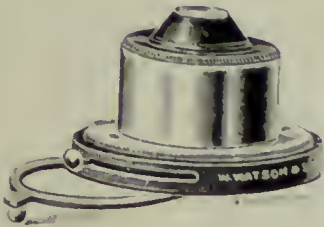
### PRICES:

M1971.—Complete Condenser as described	£0 17 6
M1972.—Optical part only	0 11 0
M1973.—Mount with iris diaphragm, only	0 6 6
M1974.—Sets of stops for dark-ground illumination, etc.	0 3 0
M1975.—Brass box for stops	0 2 0



M1971

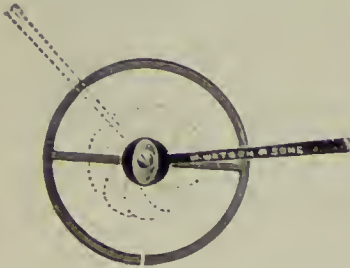
## Abbe Illuminator: Continental Pattern.



This is exactly similar to the Continental model, and is finished nickel-plated in best style. There are several makers who supply a fitting on their microscopes for Condenser within a fraction more or less of 30 m/m ( $1\frac{3}{16}$  ins.). We therefore stock this size Condenser and can alter it to fit exactly without extra charge.

It should be noted that the price is materially lower than Continental ones.

M1970.—Complete Abbe Illuminator, 1'20 as above, with carrier for Stops	£1 0 0
M1977.—Complete Abbe Illuminator, 1'20 as above, without carrier for Stops	0 18 6



## Dark-Ground Illumination by Expanding Stop.

This Expanding Stop is constructed in a similar manner to an Iris diaphragm, but instead of having a variable central aperture it has an opaque disc of variable size, enabling the best results to be obtained with different objectives.

Expanding Stop. No. 1976.

M1978.—Expanding Stop for dark-ground effects, suitable for the mounting M1958. The central disc variable in size from $\frac{1}{16}$ in. to $\frac{3}{4}$ in.	£0 7 6
M1979.—Ditto, ditto, variable from $\frac{1}{16}$ to $\frac{9}{16}$ in.	0 10 0

To fit the expanding stop to mount 1957, an alteration is necessary to the mount, costing 1/6.

It is also supplied to order with a suitable degree of variation for the Condensers on page 101, price, 10/6.

**Note.**—These Stops are somewhat fragile, and no responsibility can be accepted for them after leaving our hands.

W. WATSON & SONS'

HOLOS IMMERSION PARABOLOID.

(For exhibition of Ultra Microscopic Particles).



Gives a brilliantly illuminated object with an intensely black background with high-power dry Objectives up to .95 N.A. Specially suited for showing unstained, living Bacteria.

For the convenience of those who use the English type of Microscope, the optical portion of the Holo Immersion Paraboloïd is so mounted that it can be interchanged with the ordinary optical part of the Abbe Illuminator and similar Condensers supplied by ourselves and other English houses, and therefore used in conjunction with the Iris diaphragm mounting which carries the Abbe Illuminator optical part, No. 1957 and 1958.

It can also be supplied to fit any other make of Microscope that may be specified.

ESSENTIALS OF SUCCESSFUL WORKING.

- 1. The Holo Immersion Paraboloïd must in every case have oil between it and the object slip, and the contact must be maintained, and all air bubbles avoided.
- 2. The Condenser must be accurately centred.
- 3. The object slip must be within 20 per cent. of the thickness engraved on each of the Paraboloïd mountings. A supply of suitable slips is included with each instrument.
- 4. The specimen should be in as thin a layer of fluid as possible.
- 5. The source of light must be a very brilliant one, and a Bull's-eye condenser should be used.

The annular illumination provided by the Paraboloïd extends from about N.A. 1.0 to N.A. 1.45, and it is noteworthy that the use of the iris diaphragm cuts out the rays of low numerical aperture first, so that the illumination becomes more and more oblique. This is a very favourable circumstance, as it secures the greatest resolving power attainable under the circumstances of dark-ground illumination for all objectives exceeding .48 numerical aperture.

The smaller the source of light the more care is required in making the adjustments, and in using slips of the proper thickness. The latter is, therefore, engraved on the mount of each instrument.

Oil and other immersion objectives can only be used with the Paraboloïd if a stop is used which reduces their numerical aperture below 1.0.

PRICE LIST.

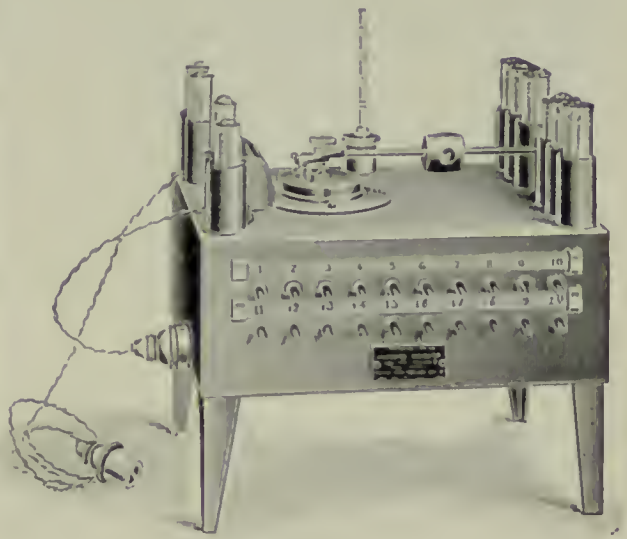
M1988.	Optical part only mounted to fit Abbe Illuminator Carrier such as is supplied with English Microscopes, with immersion oil and supply of suitable slips.....	£1 10 0
M1989.	Complete Paraboloïd with mounting for Sub-stage or Under-stage to fit any Microscope, with oil and supply of suitable slips....	2 0 0
M1990.	This Paraboloïd must be accurately centred, and if the Microscope has no centring screws to the Sub-stage, a Centring Nosepiece should be used, which is supplied with the complete Paraboloïd at the special extra charge of .....	0 12 6

**BACTERIOLOGICAL APPARATUS.**

- M2000. Boiling Flasks, 8 ozs., 5d. ; 16 ozs., 6d. ; 24 ozs., 8d. each.  
 M2001. Glass Funnels for filtering, 2 in., 3d. ; 2½ in., 4d. ; 3 in. 5d. ; 3½ in., 6d. each.  
 M2002. Glass Rod and Glass Tubing, various diameters, per lb., 1/2.



No. M2003.



No. M2004.

**Incubators.**

M2003. Hearson's Patent Incubators, fig. 2003. When ordering, please say whether for use with Gas or Oil.

1	..	6 x 6 x 7 in.	..	£4 16 6	4	..	15 x 15 x 18 in.	..	£10 18 6
2	..	9 x 9 x 12 „	..	6 0 0	5	..	20 x 20 x 24 „	..	15 10 6
3	..	12 x 12 x 14 „	..	7 10 0					

The above prices include Thermometer, 2 Chimneys, Funnel, one yard of Wick, packing case and packing.

M2004. Hearson's Special pattern Incubator, for **Opsonic Index**, capable of holding 20 serum pipettes—in separate compartments—nickel-plated water bath, with thermometer and thermo-regulator. Adapted for use with either Gas, Oil or Electric Current. Price ..... £4 4 0

M2005. Ditto, with additional compartments to contain 10 Test Tubes, price ..... 4 19 0

M2006. Pipettes, for Opsonic Incubator ..... per doz. 8d.

M2007. Curved Capsules, for collecting blood ..... per doz. 1/0

M2008. Petri's Culture Dishes, diam. of upper dish, 8 cm., 10d. ; 10 cm. per pair, 1/0

M2009. Platinum Needles in glass handle, each, 1/6.

M2010. Potato Borers, each, 2/0.

M2011. Spirit Lamps, each, 10d.

M2012. Test Tubes, 5 x ½ in., 5 x ⅝ in., 5 x ¾ in., 6 x ⅝ in.  
 per gross, 5/0 5/6 6/0 7/0

M2013. Test Tubes, Set of Six, various sizes, in cardboard case ..... £0 0 9

M2014. Test Tube Brushes ..... each 0 0 2

M2015. Test Tubes, Rubber Caps for ..... per doz. 0 1 6

M2016. Test Tube Stands ..... each 1/0 to 0 3 0

M2017. Wolfhugel's Colony Counter, each, 15/0.

W. WATSON & SONS, Ltd., undertake the complete equipment of Bacteriological Laboratories and will be pleased to furnish complete estimates on application.



**BLOOD TESTING APPARATUS.**

M2018.	Dynamometer, Dr. Haig's Capillary .....	£0 10 6
M2019.	EHRLICH'S EYEPIECE with square diaphragm, for estimating the relative proportion of red and white blood corpuscles in dry preparations. With instructions .....	1 10 0
M2021.	Hæmacytometer (Durham's) .....	2 10 0
M2022.	Hæmacytometer (Dr. Gower) .....	3 3 0



M2023.	Hæmacytometer and Hæmaglobinometer (Dr. Gower's), both instruments in one case .....	4 4 0
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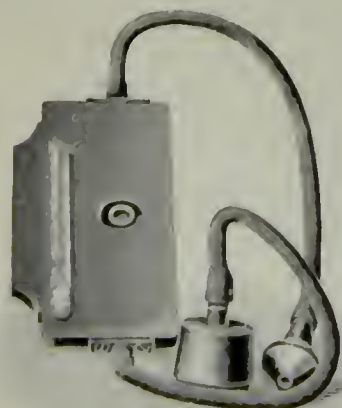
**THE THOMA HÆMACYTOMETER.**

This apparatus consists of a counting chamber in combination with two accurately calibrated mixing pipettes for diluting the blood in a certain ratio (1 : 100 for red, 1 : 10 for white corpuscles), with directions, in case.

	No. M2024.	By Watson.	By Zeiss.
M2024.	(a) With mixing pipette for red corpuscles ....	—	£1 4 0
M2025.	(b) " " " white " ....	—	1 4 0
M2026.	(c) The same apparatus with both pipettes ....	£1 5 0	1 10 0

**Pipettes Separately—**

M2027.	For red corpuscles, diluting (1 : 100) : for white (1 : 10) .....	0 4 0	0 6 0
M2028.	Separate Counting Chamber only, Zappert's modification, in case .....	0 13 0	0 15 0
M2029.	Türks' Counting Chamber, in case .....	0 17 0	—
M2030.	Hæmaglobinometer (Dare's) .....	—	4 14 6
M2031.	HÆMAGLOBINOMETER, THE FLEISCHL - MIESCHER, 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 13 0
M2032.	Hæmaglobinometer (Dr. Gower) .....	—	1 1 0
M2033.	Do. do. do. (German make) .....	—	0 10 6
M2034.	Hæmaglobinometer, Dr. Haldane's .....	—	1 11 6
M2035.	Hæmaglobinometer, Tallquist's, book-form .....	—	0 5 0
M2036.	Hæmatocrit, Gaertner's .....	—	0 16 0
M2038.	Hæmometer, Dr. Lloyd Jones', complete with supply of solutions, pipettes, etc. ....	—	4 4 0
M2039.	Pipettes for ditto, in box, 2 doz., 2s. 6d.; 6 doz., 7s. 6d. ....	—	—
M2040.	Hæmometer, Sahli's .....	—	1 1 0
M2041.	Heating Apparatus, Ehrlich's Constant Temperature, for fixing and drying blood preparations, etc., copper chamber on tripod, with thermo regulator and gas burner, with cover to heating plate .....	—	1 10 0
M2042.	Ditto, ditto, ditto, without cover .....	—	1 0 0

**HEATING STAGE.**

M2043. This very thin Stage is heated with water, and can be attached to the Microscope Stage by means of two screws. A condenser suitable for high powers is included.

Price ....	With condenser, in case complete .....	£2 0 0
M2044.	Warm Stage, Stricker's pattern, with condenser, in case complete .....	2 0 0



BLOOD TESTING APPARATUS (Continued).

M2050. Pakes's Hare-lip Needles, specially modified for blood film examination ..... each £0 0 4

SLATER & SPITTA'S PUNCTURE NEEDLE.



No. M2051. Open.



Closed.

THE MOST EFFICIENT PATTERN.

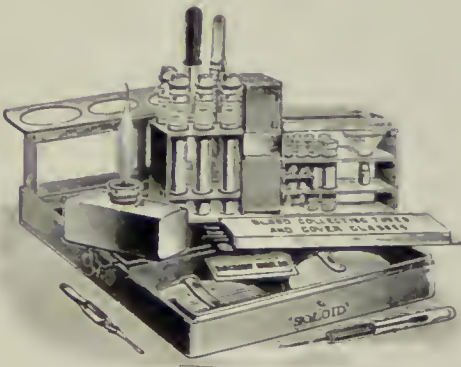
M2051. This consists of a nickel-plated holder with adjustable grip for needle, which allows the point to protrude any desired length. The interior of the holder contains an extra supply of needles (Hagedorn's). This needle can be sterilized easily and kept sterile in its own case for any length of time ..... price 0 4 6

SNAKE-BITE POCKET LANCET. Sir Lauder Brunton's.

M2052. A simple and practical method of destroying snake venom in the bitten part. The instrument consists of a lancet covered with cap sheath in a wood case 2½ inches long. At one end is a receptacle to hold crystals of permanganate of potash. With full directions for use.

Price, per dozen ..... 5/0  
Sample instrument. .... 6d.

Special quotations for large quantities.



No. M2053.

M2053. The 'Soloid' Brand Bacteriological Outfit, containing 3 stoppered bottles, with Dehydrating Solution, Distilled Water, etc., 1½ drams each, bottle of Canada Balsam, graduated pipette, 2 forceps, 1 doz. 3×1 slips, spirit lamp, glass funnel, 2 watch glasses, metal case of No. 9 needles, filter papers, 12 pipettes for collecting blood, cover glasses, glass rod for powdering micro stains, a sterile swab. One tube each of following "Soloid" stains: Eosin, Methyl Violet, Fuchsin, Romanowsky Stain, Jenner Stain, Haematoxylin (Delafield), Toison Blood Fluid. All the above in neat aseptic metal pocket case 5 in. × 3½ in. × 1½ in. Price ..... £1 5 0

M2054. Typhoid Serum Test. Graduated Pipette, with screw compressor for performing the typhoid serum test ..... 1 5 0

**WORKS ON THE MICROSCOPE, Etc.**

CROSS & MARTIN J. COLE. "Modern Microscopy," a handbook for beginners and students. Fourth edition. Entirely revised and greatly extended, embracing the Microscope, and Instructions for its Use; Microscopic Objects, how prepared and mounted; with Chapters on Special Subjects by various writers, including:—The Petrological Microscope; Rotifera; Water Mites; Foraminifera; Mosses; Nature Study; and Foods. 325 pages, numerous illustrations, 8vo .....	net	£0	6	0
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Half calf. Published 32/-.....	net	1	8	0
To suit the convenience of those who desire to purchase only one part, the 8th edition can now be had in two volumes—				
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Vol. II.—"The Revelations of the Microscope".....		0	14	0
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SCALES. "Practical Microscopy." A handbook for beginners. Crown 8vo. Second Edition .....		0	5	0
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COLE. "Diseases of the Blood" .....		0	10	6
CONNOLD. "Gleanings from the Field of Nature," with 24 full-page illustrations, etc. ....		0	3	6
DANIEL. Laboratory Studies in Tropical Medicine.....		0	16	0
FRANKLAND. "Our Secret Friends and Foes," an introduction to Bacteriology .....		0	3	0
HATCH. Text-book of Petrology. Sixth edition, 1910.....		0	7	6
KERR. "The Hidden Beauties of Nature." New edition.....		0	2	6
KERR. "Nature through Microscope and Camera" .....		0	6	0
LEE. "The Microtometist's Vade Mecum." New Edition.....		0	15	0
RHODES. Micro-Petrology for beginners. 1912.....		0	2	6
SCHAFER. "Elements of Histology".....		0	10	6
SCHERREN. "Ponds and Rock Pools".....		0	2	6
SCHERREN. "Through a Pocket Lens".....		0	2	0
SCHERREN. "Popular Natural History of the Lower Animals" (Invertebrates), with 168 Illustrations .....		0	2	6
STEVENS. "By Paths in Nature," with 72 illustrations .....		0	2	6
SQUIRE. "Methods and Formulae for the preparation of Tissues for Microscopical Examination" .....		0	3	6
WOOD. "Common Objects of the Microscope," New edition.....		0	1	0

**PHOTO-MICROGRAPHY.**

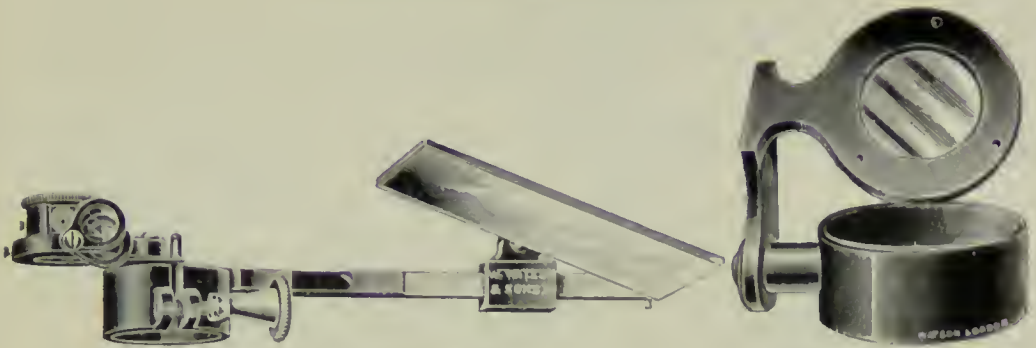
BAGSHAW. Elementary "Photo-Micrography." Second Edition .....		0	2	6
PRINGLE. "Practical Photo-Micrography." New edition .....		0	3	6
SPITTA. "Photo-Micrography." .....		0	12	6

Postage of the above books extra.

**LANTERN SLIDES OF WATSONS' INSTRUMENTS.**

Lantern Slides of any of our Instruments are lent by us FREE OF CHARGE for exhibiting at meetings of Scientific Societies, etc., or may be purchased for 1/0 each.

## CAMERA LUCIDAS.



The Abbe No. M2055

Beale's No. M2056

**The Abbe Pattern.**

M2055. This is considered to be one of the best and most easily used camera lucidas. Instead of the image being traced by its projection on paper, the reverse is the case, the paper and pencil being 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 when desired. The apparatus may be turned aside from the optical axis, as shown in the drawing. 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 in the same plane as the stage. Two neutral-tint shades are provided. Price in case..... £2 0 0

NOTE.—That this may fit perfectly, the Eyepiece (if a capped one) and draw-tube should be sent to us to fit it. It works best with low-power eyepieces.

**The Abbe Camera Lucida.** By Zeiss.

M2056. This is similar to the foregoing, but is made by Carl Zeiss, and of specially large size. The length of the mirror arm is 125 m/m (5 in.) and the size of the mirror 80 × 125 m/m (3¼ × 5 in.). Specially adapted for eyepieces with enlarged field of view. Complete in case with light moderating glasses. Price..... 3 12 0

**Ashe's.**

M2057. This is a modification of Beale's Reflector, in which the neutral-tint glass is on an adjustable hinged support. A second hinged support carries a small silvered disc. The advantages of this form are, that the Microscope may be used at any angle, and the image is erect instead of reversed as in Beale's form. Price..... 1 1 0

(This pattern is described and figured Journal of Quekett Micro. Club, Nov. 1900, p. 413.)

**Beale's.**

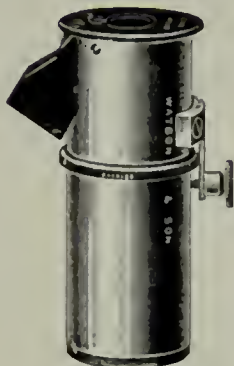
M2058 Beale's neutral-tint Reflector, as figured..... 0 6 0

CAMERA  
LUCIDAS

Continued.



Wollaston's. No. M2061.



No. M2059.



No. M2060.

**Drawing Eyepiece.** (As figured)

M2059. This is a combined Eyepiece and Camera Lucida, for use when the Microscope is inclined at an angle of  $45^\circ$ . 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 with the above Camera Lucida fits the Student's size. If required of larger size, an adapter is supplied at an extra cost of 4s. 6d.

**Drawing Table.**

M2060. Inclines to any angle, thus obviating distortion of image. Size of table, 12 x 9 inches, as figured, and of best make. Price ..... £0 10 0

**Wollaston's.**

M2061. As figured, with shades ..... 1 1 0

**Projection Prism for Drawing.**

No. M2062

M2062. With this device excellent effects may be obtained for drawing with the Microscope. The instrument is set horizontally and the prism fitted over the Eyepiece, the latter being 10 inches from the table. A sheet of paper is laid on the table beneath and the head of the worker, together with the Eyepiece end of the Microscope tube down to the paper, are enclosed with a cloth so as to exclude all extraneous light. If the instrument is illuminated and focussed in the ordinary way, a disc of light will be seen projected on the paper, and after re-focussing the object can be

drawn with great facility. A very brilliant illuminant is a necessity for this purpose, such as an electric arc, oxy-hydrogen or Nernst lamp. Price fitted to any eyepiece ..... 1 2 6

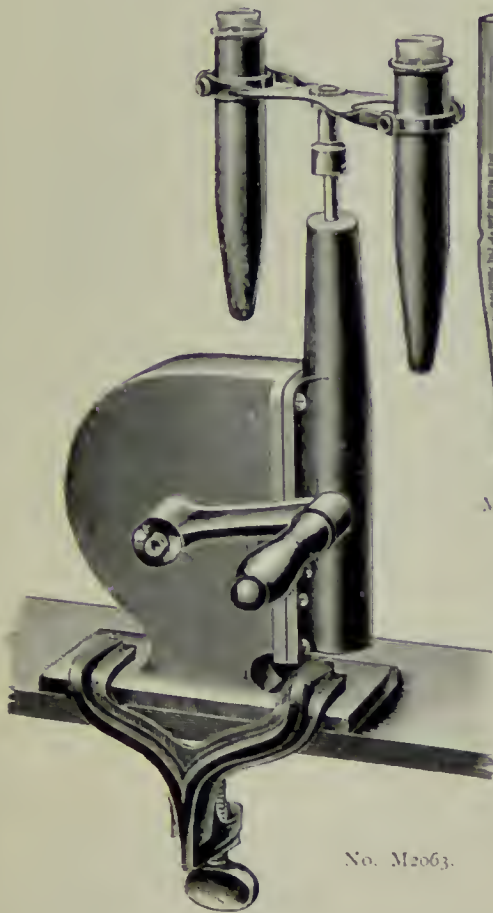
The above will be found quite as effective as many of the very high-priced outfits on the market.



## CENTRIFUGES.

Of latest design and thoroughly reliable construction.

For Blood Tests, Milk, Sputum, Urine and Water.



No. M2063.

M2063. Centrifuge of cast iron, as figured, with aluminium holders for **two** test tubes, screw clamp for bench, and one each plain and graduated 15 c.cm. tubes.

Speed from 2,000 to 3,000 revolutions per minute.

Price.... £1 10 0

M2064. Similar Centrifuge to above with aluminium fittings to carry **four** test tubes, each of 15 c.cm. capacity.

Price.... £1 17 6

M2065. This Centrifuge is made with two separate driving axles, giving speeds up to 10,000 revolutions per minute. It has a haematocrit with two 50 mm. tubes, each graduated to 100 parts and of 7.5 mm. bore. A second rotating mount for Urine, Water, etc. tests is included as with Centrifuge No. M2063, also one plain and one graduated test tube of 15 c.cm. capacity, and strong screw clamp for table.

Price, complete ..... £2 7 6

M2066. Centrifuge, with Electric Driving Gear, fitted with 2-arm attachment, one graduated and one ungraduated tube.

For continuous current of 110 volts ..... £4 10 0

M2067. „ „ 200 „ ..... 5 10 0

M2069. Haematocrit Attachment for Electric Centrifuge ..... 0 10 0

M2070. Centrifuge to be driven by water. The driving gear is connected with the water supply pipe of the laboratory by means of a strong india-rubber tube. The speed of rotation depends on the height or pressure of the water supply.

Price with 4 tubes..... 2 0 0

„ Haematocrit Attachment ..... 2 15 0

Tubes for Centrifuges.

M2071 Graduated as figured M2072A and M2072B ..... 1/6 each.

M2072. Plain, shaped as in figure M2072A ..... 6d. „

COLLECTING APPARATUS.



Fig. M2087.



Fig. M2083.

Collecting Stick, as figured, new and improved form of best quality cane with inner sliding rod of polished hard wood. The handle unscrews and thus mud and water are prevented from getting into the inner screws when the stick is used as a walking stick.

In the silver ferrule stick, the inner rod when extended is held in position by a bayonet catch, while in the nickel ferrule pattern, the lower end of inner rod has a taper fitting.

A varied assortment of best horn handles is kept in stock.

M2083.	Complete Outfit, consisting of silver ferrule stick, with 2 wide mouth bottles, and metal clip for same, metal ring (without net) cutting hook, metal spoon for mud, etc., triple drag hook, with 6 feet line and brass reel	£1	1	0
M2084.	Complete Outfit, with nickel ferrule stick and same accessories as above	0	17	6
M2085.	The Stick only, as figured, silver ferrule, without accessories	0	12	6
M2086.	Do., do., nickel do., do.	0	10	6
M2087.	Muslin Net and Ring (6 in. diam.) with glass tube hung in middle of net as illustrated. A most useful accessory	0	2	6



Fig. M2092.

M2088.	Silk of Special Quality of very fine mesh for making nets, 24 ins. wide, per yd. 6/- and	0	7	6
M2089.	Muslin for nets, special quality, per yard	0	0	8
M2090.	Pond Life Collecting Bottle, with metal cap and syphon attachment	0	5	0
M2091.	Specimen Tubes, with flat bottom, Corked			
	1 1/2 x 3/4 in. 1 1/2 x 1 in. 2 x 1/2 in. 2 1/2 x 1/2 in. 3 x 1/2 in. 3 x 1 in. 4 x 1 in.	6d.	1/6	9d.
			9d.	2 0
				3 0
				3 0 doz.
	Metal Pocket Case, nickel-plated, and velvet-lined.			
M2092.	4 1/4 x 2 1/2 x 1 1/2 in., containing 5 collecting bottles, corked, Fig. M2092	0	3	6
M2093.	Do., do., 5 do., stoppered	0	5	6
M2094.	Do., do., 10 short corked tubes	0	4	0
M2095.	Glass Dipping Tubes, various shapes, each	0	0	2
M2096.	Do., do., set of 3, in case	0	1	0
M2097.	Rousslet's Pipettes, with fine capillary tube for transferring animalcules to troughs, each	0	0	6
M2098.	Strong White Glass Rectangular Aquarium Jars, moulded, 6" x 4" x 4" price	0	2	6

FIELD BOTANY COLLECTORS.

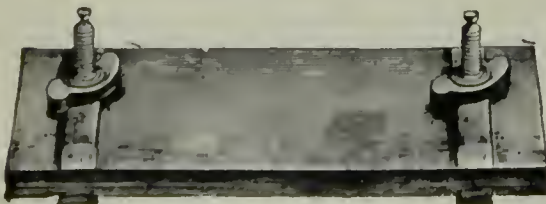


Fig. M2101.



Fig. M2105.

M2099.	Botanical Drying Paper, thick grey, size of sheet, 22 x 17 ins., per ream	£1	5	0
M2100.	Botanical Mounting Paper, Stout Cardstock, 15 x 10 ins., per ream, £1 0 0. per quire	0	1	3
	Other sizes cut to order.			
M2101.	Botanical Press, with screw, as illustrated, in hard wood, size 18 x 8 1/2 in.	0	5	6
M2102.	Collecting Cases, or Vaseline, Japanned Tin			
	Flat Shape	7 x 4	8 x	11 x 5
		1 6	2 0	2 6
				3 6
				4 6
M2103.	Leather Shoulder Strap for above	1	3	and
M2104.	Fern Trowel, with long and curved blade, in leather sheath, superior quality	0	2	6
M2105.	Field Book, as figured, for collecting and preserving large specimens. A pair of strong well-finished hard wood boards, 11 1/2 x 9 1/2 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
M2106.	Pressing Boards, of stout hard wood	0	2	6
M2107.	Rack Tin and Rope for applying pressure	0	1	0

**ENTOMOLOGICAL APPARATUS.****Butterfly Nets.**

Fig. M2117.

- M2117. 4-joint Folding Metal Ring, fig. M2117, with gauze net ..... £0 4 0  
 M2118. Telescopic Handle net, 2 piece, with folding cane ring and net, new pattern .. 0 8 6  
 M2119. Collecting Boxes, deal, corked and papered, 6d., 9d., 1 0 and ..... 0 1 6  
 M2120. Cork, best quality.  
 In Sheets .. 7 × 3½ in. 11 × 4½ in. -

1 6 3 0 per doz. sheets.

- M2121. Entomological Pins, assorted sizes, K. B. & Co.'s, per oz. .... 0 1 6  
 All sizes Kirby Beard & Co.'s and Tayler & Co.'s Pins supplied to order.

- M2122. Entomological Pin Forceps ..... 0 1 6  
 M2123. Forceps, Green Gauze, scissors pattern, for large insects ..... 0 2 6



Fig. M2124.

- M2124. Killing Bottle or Collecting Jar of special stout white glass, without neck, 6 × 2½ ins., with boxwood top cork, fig. M2124 ..... 0 1 0

- M2125. Killing Bottles for Chloroform (Brass) empty ..... 0 2 6

- M2126. Killing Bottle (Glass), with neck, large size wide mouth, with boxwood top cork (without killing material).. 0 1 0

- M2127. Killing Boxes, Zinc ..... 9d. and 0 1 0

- M2128. Larva Breeding Cage, with 2 compartments ..... 0 5 0

- Do. do. with water tanks for preserving the food plant ..... 0 7 6

- M2129. Setting Boards, corked and papered, flat, or oval, all 14 ins. long.

Breadth ½ ¾ 1 1½ 1¾ 2 2½ 2¾ ins.  
 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.

- M2130. Setting House. Plain Deal Drying House with 10 assorted setting boards, with drawer, handle, etc., 12 × 9 × 5 inches ..... 0 9 6

- M2131. Show Cases with glass front, corked and papered, with camphor cells.

10 × 8 in. 14 × 10 in. 10 × 12 in.

2 6 4 0 5 6

Other sizes supplied to order.

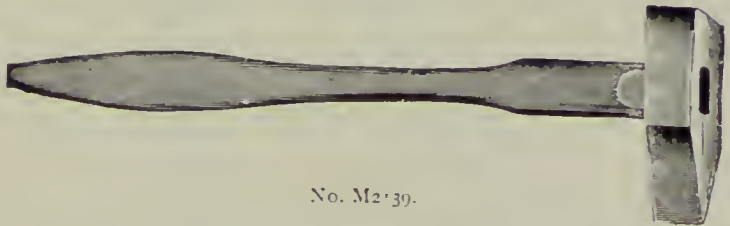
- M2132. Store Boxes, deal, corked, with camphor cells.

8 × 6 in. 10 × 8 in. 14 × 10 in. 10 × 11 in. 17½ × 12 in.

2 0 2 6 4 0 5 0 6 0

- M2133. Travelling Case (folding), 14 × 10 × 4 ins., with 9 or 12 setting boards ..... 0 11 6

- M2134. Zinc Boxes, oval, corked, for either collecting or relaxing  
 9d., 1 0, 1 6 and 0 2 0

**FIELD GEOLOGY.**

No. M2139.

- M2135. Acid Bottle, in boxwood case, for pocket ..... £0 1 0

- M2136. Chisels for chipping ..... 1 0 and 0 1 6

- M2137. Collecting Bag, strongly made, broad shoulder strap ..... 0 4 6

- M2138. Compass and Clinometer combined, silvered dial, for pocket .. 0 5 0

- M2139. Geological Hammers, as fig. M2139 ..... 2 6 and 0 3 6

- M2140. Do., do. The "Neilson," approved by the Geologists' Association ..... 0 4 0

- M2141. Glass-Topped Boxes, round, 1 in. to 2½ in. diameter, per nest of 6 0 1 6

- M2142. Do. rectangular, 3½ in. × 2½ in. to 2½ in. × 1½ in., per nest of 4 0 1 0

- M2143. Student's Sets of Hand Specimens in neat cardboard case, with names and localities. 20 specimens in each set: Igneous Rocks, Metallic Minerals; Earthy Minerals; price per set ..... 0 2 6

Condensers.

STAND OR BULL'S EYE.

New Pattern. Fig. M2153.

M2153.—Of extra large size, 3 in. diameter lens, having universal movements fitted with clamping collars. Of massive construction and best finish throughout, forming a suitable accessory to a first-class microscope. Price, as figured ..... £2 12 6

The Sc̄op.

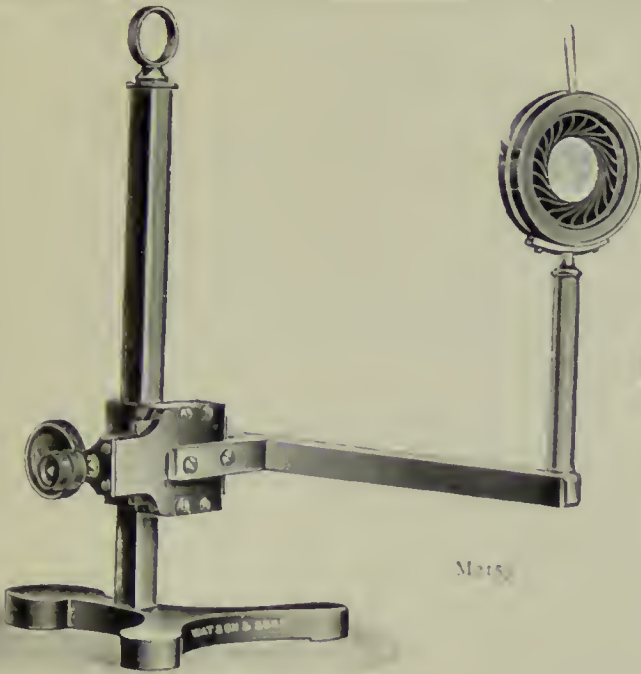
M2154.—This is a cheap form of condenser, on a lengthening pillar. The lens is 2½ in. diam., and fitted with an iris diaphragm, horizontal adjustment being also afforded. It is particularly intended for use with the vertical illuminator, or for photo-micrography. With it a small point of light of intense brilliancy may be obtained. The iris diaphragm gives complete control of the beam of light. Price, as figured ..... 1 10 0

Sc̄op with Mechanical Adjustments.

M2155.—This is mounted with mechanical adjustments, as shown in illustration. It is frequently found when working with a Vertical Illuminator in the examination of Metal Specimens, etc., that necessity arises for the minutest possible alteration of the position of the bull's eye lens, sometimes laterally, sometimes vertically. The Mechanical Sc̄op Condenser fulfils every demand in such cases. It is mounted upon a rackwork pillar 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. The whole is mounted upon a substantial tripod foot. Price ..... 4 0 0



**CONDENSERS.**  
**STAND or BULL'S EYE.**



M2152.



M2154.



M2153.

## Condensers.

### STAND OR BULL'S EYE.

M2166.	Stand Condenser, as figured, largest size, with sliding vertical and horizontal bars, and ball and socket motion to Lens . . . .	£1 10 0
M2167.	With upright lengthening-bar, and ball and socket motions, large size, as figured . . . . .	0 15 0
M2168.	Ditto, medium size . . . . .	0 10 6
M2169	Ditto, small size . . . . .	0 7 6

### Aplanatic—Mr. E. M. Nelson's Formula.

M2170 Is designed to minimize the spherical aberration of the ordinary Stand Condensers, and to considerably increase the brilliancy of illumination. It is composed of two Lenses. Its use is specially indicated in photographic work, and it will be found not only to shorten the exposure, but to materially improve the image. For ordinary work it is much superior to the old form.

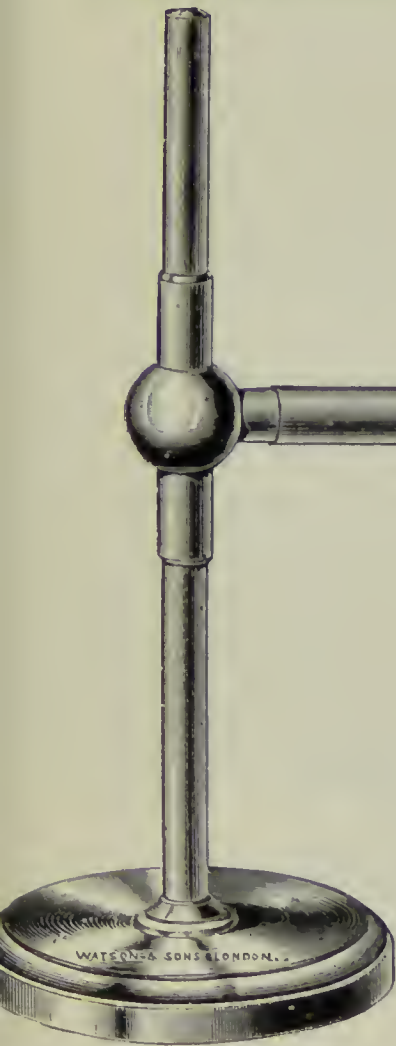
Price, mounted as No. 2167, £1 10s.

M2171	With Iris Diaphragm . . . . .extra	£1 5 0
M2172.	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
M2173.	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

### The Watson-Conrady Achromatized Aplanat.

M2174.	This is a highest-class Achromatized Aplanatic Combination, specially computed by our Mr. Conrady for photographic and critical visual work. Although of medium size, it utilises all the rays from the illuminant which it is possible to employ for microscopical purposes. Mounted on massive stand with lengthening bar, with centring screws and Iris diaphragm (similar to illustration No. 2172) . . . . .	£6 5 0
M2175	Simple form to above, mounted with upright lengthening bar and ball and socket motion, similar to No. 2167 . . . . .	3 10 0

# CONDENSERS—STAND OR BULL'S EYE.

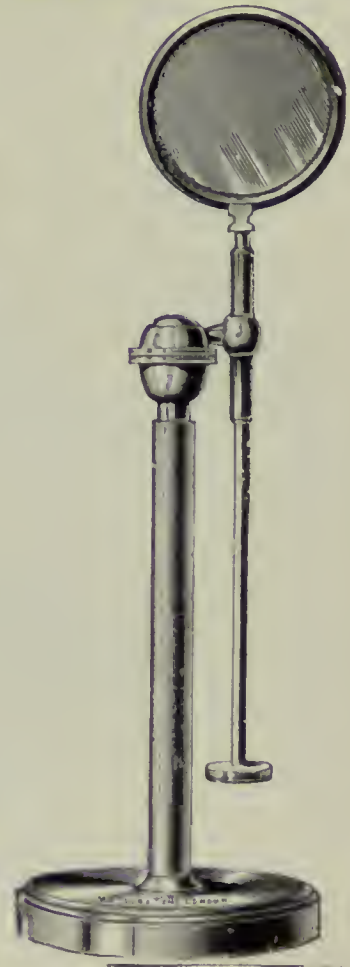


M2166.

For Prices  
see page 116



M2172.



M2167.

## STAGE CONDENSERS, ETC.

### SILVER PARABOLIC SIDE REFLECTOR.

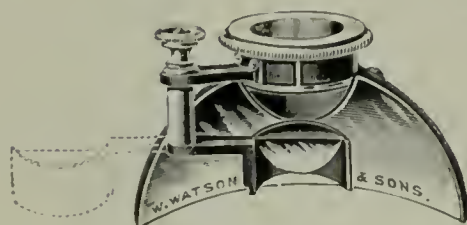


M2197. This gives beautiful illumination for opaque objects, the light being thrown by the Bull's-Eye Condenser and then reflected on the object. Price, to attach to limb or stage of Microscope, with ball and socket joints, as figured . . . . .

£1 3 0

M2198. Ditto, ditto, to attach to Nosepiece of Microscope . . . . . 1 5 0

### SORBY PARABOLIC REFLECTOR.



No. M2199.

M2199. Consisting of a parabolic surface with an auxiliary reflector, which latter may be turned aside if desired. With the auxiliary in use, a very useful oblique ray is obtained, which throws structure into strong relief. This reflector may be used with powers up to 1 in., and is made to slide on to the mount of the objective. It is especially suitable for metallurgical work. Price . . . . .

£1 15 0

### NOSEPIECE IRIS DIAPHRAGM OR DAVIS'S SHUTTER.



No. M2200

M2200. 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 collar to which it is attached is made to revolve very stiffly. Price . . . . .

£0 15 0

M2201. Ditto, ditto, with fitting to go into Substage, so that Objectives may be used as Condensers. . . . . 0 17 6

### SUNDRY ILLUMINATING APPARATUS.

M2202.	Paraboloid for dark-ground illumination . . . . .	£1 10 0
M2203.	Spot Lens Ditto, ditto, . . . . .	0 7 6
M2204.	Ditto, in Sliding Mount . . . . .	0 10 6
M2205.	Light Moderators . . . . . 4s. 6d. and	0 7 6
M2206.	Screw Fitting to take Objective as Condenser . . . . .	0 3 6
M2207.	Erecting Glass, to fit draw-tube to erect the image for dissecting, etc. . . . .	0 12 6



## VERTICAL ILLUMINATORS.

### The Vertical Illuminator.

By means of this, opaque objects adherent to the cover glass, or uncovered, may be examined with the highest powers. It has become an important accessory for the microscopical examination of metal surfaces.

The Vertical Illuminator is attached to the lower end of the Microscope body and receives the objective. A concentrated beam of light is directed from the illuminant by means of a Bull's-eye, through a small aperture in the side of the Illuminator, and falls upon a reflector inside. In one form this reflector consists of a disc of thin cover-glass and in the other of a prism. By means of the reflector the light is thrown downwards through the objective to the specimen, thus illuminating it, the objective acting as its own condenser. The specimen is then viewed through the eyepiece and objective in the ordinary way.

**NOTE.**—Some workers are more successful with the prism Vertical Illuminator than with the cover glass disc pattern, and *vice versa*. It will, however, be generally found that both kinds have their distinctive advantages. For a complete equipment, therefore, both are necessary.



M2217.



M2219.

M2217.	Cover-glass Reflector, as figured.....	£0 10 6
M2218.	Ditto, with metal diaphragm to aperture .....	0 13 0
M2219.	Prism pattern, as figured .....	0 18 0
M2220.	Ditto, with Iris diaphragm .....	1 10 0

M2221. This improved cover-glass pattern was designed by Dr. Johnstone Stoney, to enable the large back lenses of certain objectives to be filled with light. The reflector is larger than in other patterns, and fills the largest back lens of objectives in general use. A large body tube is essential with this Illuminator.

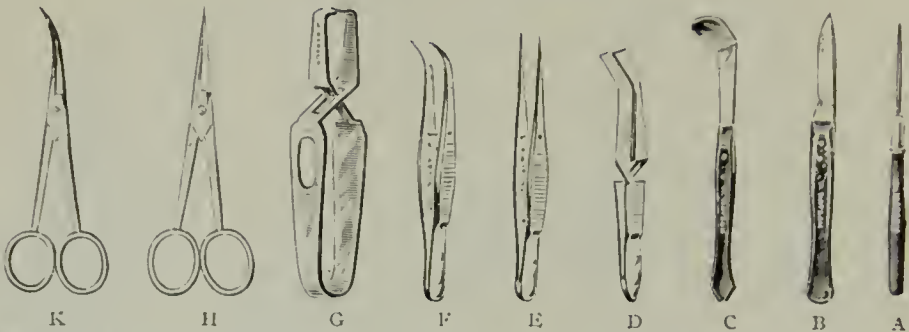
Without Iris diaphragm ..... £1 5 0



M2221.

M2222.	With Iris diaphragm .....	£1 10 0
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The Iris diaphragm of No. M2222 may be mounted with eccentric adjustment at an extra cost of 7/6.

**DISSECTION.****COMPLETE SETS.**

**N.B.**—All Dissecting Knives and Scalpels of Best Sheffield Steel.

M2314.	Six Scalpels (assorted), two pairs Scissors (straight and curved), two section razors, seeker, two pairs forceps (coarse and fine), blow-pipe, two needles, chain hooks, in best quality polished mahogany case, lock and key. Price.....	£1 5 0
M2315.	Same as No. M2314, but without the two razors. Price.....	1 0 0
M2316.	School set; three scalpels, two scissors, bone cutting forceps, two pairs ordinary forceps (coarse and fine), seeker, two needles, in mahogany case. Price.....	0 18 6
(As supplied to L.C.C. and Technical Schools.)		
M2317.	Students' Set: Two scalpels, two needles, curved scissors, forceps, spatula, razor, seeker, glass rod, cover glasses, slips, in velvet-lined leatherette-covered case, with tray attached for six object slips. Price.....	0 12 6
(These Instruments are of foreign make, but well finished and reliable.)		
M2318.	Three scalpels, two needles, scissors, forceps, seeker, mahogany case. Price.....	0 10 6
M2319.	Two scalpels, two pairs scissors, two pairs forceps, two needles, blowpipe and seeker, in mahogany case. Price.....	0 15 0
(As supplied to the County Councils.)		

**FORCEPS.**

M2320.	Best quality, straight, 4½ in. steel. Fig. E.....	0 1 6
M2321.	Ditto, 6 in. ....	0 2 0
M2322.	Ditto, very fine points, straight or curved. Fig. F.....	0 2 6
M2323.	Coronet pattern, for Bacteriology. Fig. G.....	0 1 6
M2324.	Broadpoint Spring Action (for cover glasses). Fig. D.....	0 2 0
M2325.	Bone-Cutting Forceps.....	0 4 6
M2326.	Brass: small, 9d.; large, 1/6; curved.....	0 2 0

**NEEDLES, Etc.**

M2327.	In plain cedar handles.....	each	0 0 2
M2328.	In cedar handle, with ferrule, removable (fig. A).....	"	0 0 3
M2329.	In polished wood handles.....	"	0 0 4
M2330.	In ivory handles.....	"	0 1 0
M2331.	In ivory adjustable holders.....	"	0 2 6
M2332.	Cutting Needles, ebony handles, 1 edge.....	"	0 1 3
M2333.	Ditto, 2 edges.....	"	0 1 6
M2334.	Ditto, in Aseptic metal handle, 1 edge.....	"	0 1 6
M2335.	Ditto, ditto, 2 edges.....	"	0 2 0
M2336.	Needle Holders, with screw clips.....	"	0 1 0
M2337.	Dissecting Hooks.....	per set	0 1 0
M2338.	Ditto, best.....	"	0 2 0
M2339.	Blowpipe, German Silver with wire.....	each	0 1 0
M2340.	Injection Syringe, ½ oz., with 3 cannulæ and stopcock, lacquered brass, in leather case.....		0 12 6

**SCALPELS.**

M2341.	Various shapes and sizes, ebony handles. Fig. B.....	each	0 1 6
M2342.	Ditto, ditto, Ivory handles.....	"	0 1 9
M2343.	Ditto, ditto, aseptic metal handles.....	"	0 2 0

**SCISSORS.**

M2344.	Best quality straight, 4½ in. or 4 in. Fig. H.....	each	0 2 6
M2345.	Ditto, 6 in. ....	"	0 3 6
M2346.	Ditto, elbow pattern.....	"	0 4 0
M2347.	Ditto, curved, Fig. K.....	each, ¾ and	0 4 6

**SECTION LIFTERS.**

M2348.	Copper, cup shape.....	each	0 0 6
M2349.	Aluminium, flat end.....	"	0 0 4
M2350.	Nickelled Copper, ebony handle. Fig. C.....	"	0 1 0
M2351.	Double end, nickelled.....	"	0 1 3

**SEEKERS.**

M2352.	Round handle.....	8d. each	Square handle.....	0 0 8
Special quotations for quantities of instruments. Special sets arranged to suit Teachers' requirements				

## Lamps. ELECTRIC

M2373. Electric standard lamp, as figured. Made of lacquered brass, with nickel-plated hood to enclose bulb, universal movements. An ideal lamp for mounting and for general observational purposes, being always ready. Price, with switch, wall plug, 6 yards twin flexible wire, and one 16 candle-power frosted bulb..... £1 15 0

M2374. Plainly-made Electric lamp, having enamelled hood; universal movements, with switch, wall-plug and flexible wire; without bulb £1 1 0

### Watson's Nernst Microscope Lamp



Specially advantageous for photo-micrography. Nernst "B" Lamp,  $\frac{1}{4}$ -ampère size, is mounted on tripod foot as figured. The lamp holder can be raised, lowered or tilted, to any desired angle and clamped in position.

This is a most convenient mounting for the Nernst Lamp.

The voltage of the circuit, also whether continuous or alternating, must be stated when ordering.

The + and — Contact must be connected correctly if the supply is continuous.



### Prices

M2375.	Microscope, Nernst Lamp-Holder and Stand complete, as described .....	£2	2	0
M2376.	Spare Burners, 2 3 each. Extra resistance.....	0	1	0
M2377.	Non-reversible Bayonet Holder, to prevent reversal with key switch .....	0	1	6
M2378.	Plug adapter for carrying flexible wire for ordinary bayonet-holder .....	0	1	3
M2379.	Silk-covered flexible wire, per yard.....	0	0	4

### Argus Hand-Feed Arc Lamp

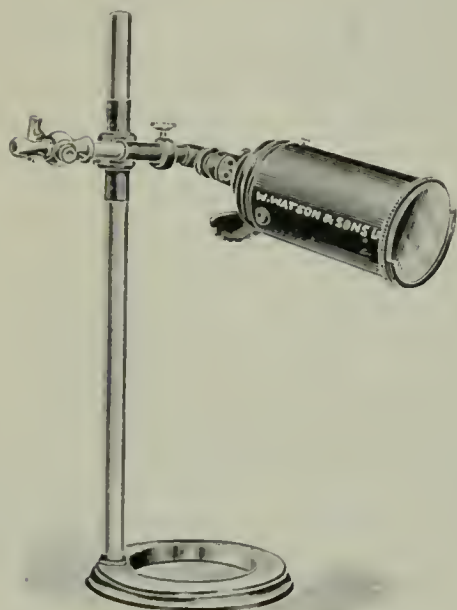
M2380.	Specially designed for Micro work. Arranged on the right-angle principle, maximum light is obtained from the Carbons. It is compact and small, consumes only about 4 ampères of current, so can be connected to ordinary domestic supply. Price, with hood and condensing lens on stand.....	£2	0	0
A Resistance is required for the above—For 100 Volts .....		0	14	6
For 200 Volts .....		1	2	6

For full particulars of the above see Catalogue 2D, Part II.

## Lamps. GAS

M2381. Microscopic Lamp, as figured, with Incandescent burner, bye-pass, and metal chimney. Complete with mantle, etc. .... £1 10 0

M2382. 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



M2383

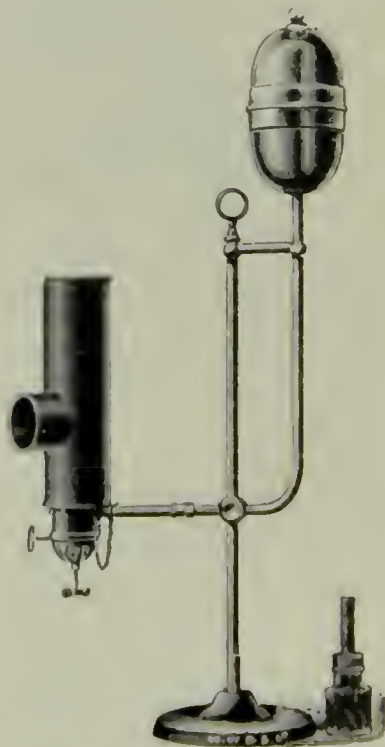


M2381-2

M2383. Inverted Incandescent Gas Lamp, as figured; sliding adjustment to raise and lower with clamp; hood, regulator to air inlet, coloured glass disc, tap and connection. Can be set at any angle..... £1 5 0

## Petrol Vapour Incandescent Gas Lamp.

M2384. This lamp will be found especially advantageous where gas and electric light are not available. The container at the top is filled with petrol, the burner is warmed by means of a small spirit lamp to cause vaporization, and the light is obtained by the incandescence of a mantle as in the incandescent gas light. The light is most brilliant and actinic, is easily controlled. It is strongly recommended for photo-micrography, the new dark-ground condensers, etc. Price, with Metal outside Chimney, complete ..... £1 10 0  
This lamp is a commercial article of American manufacture.



M2384



# Lamps. Paraffin.

See Illustrations, page 124.

## "PREMIER."

M2391.	This is a highest-class Microscope Lamp, 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. It has very solid brass foot and brass oil container; the burner can be rotated so that either the flat or edge of wick may be used. With Metal chimney for 3 in. by 1½ in. slips, price	£4	4	0
M2392.	Ditto, ditto, without mechanical adjustments	2	10	0
M2393.	Nelson's Aplanatic Bull's-Eye, mounted on arm attached to oil container, for use on Nos. 2391 or 2392, with divided sliding adjustment for focussing, etc.	1	10	0
M2394.	Iris Diaphragm, fitted to Bull's-Eye, Nos. 2393 and 2397, extra	1	5	0
M2395.	Mahogany Case for Lamps, Nos. 2391 and 2392	0	15	0

## "STANDARD."

M2396.	The type most frequently used by workers. It has a flat glass reservoir, which allows of the light being brought close to the table. The lamp itself may be securely fixed at any height on the upright bar, which latter being square, prevents it from swinging round. A metal chimney, taking 3 × 1½ slips, is provided. This lamp will burn for 10 hours and is especially suitable for photo-micrography. With supply of blue and white slips	1	5	0
This Lamp will be found a most perfect illuminant for Photo-Micrography.				
M2397.	Ditto, ditto, fitted with Nelson's Aplanatic Bull's-Eye Condenser, as described page 110	2	15	0
This is mounted in the manner illustrated, page 124, and fits the bar of the lamp stand; means of focussing are provided.				
M2398.	Mahogany Case for No. 2396	0	7	6

NOTE.—After use remove the metal chimney, or it may smell when re-lighted.

## "STUDENT'S."

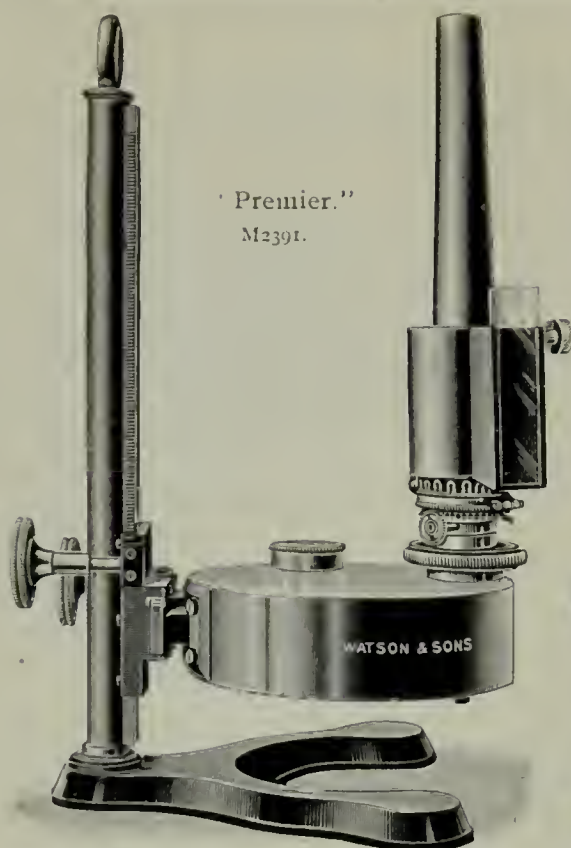
M2399.	As illustrated, very efficient, and convenient, recommended	0	15	0
M2400.	Mahogany Case for above	0	6	6

## STILES' "UNIVERSAL."

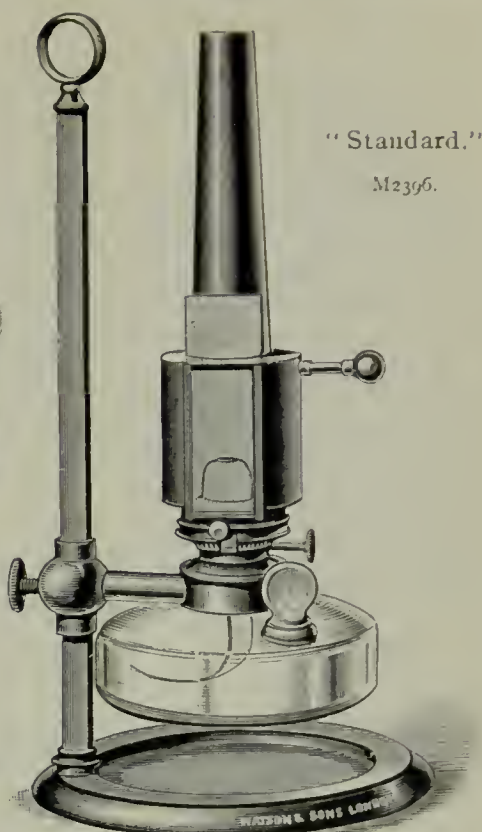
M2401.	Fulfils essential conditions in very efficient manner. Designed by an experienced microscopist to do what is required in a simple way. The metal reservoir is 4¾ in. diameter; the burner, which is mounted near the circumference, rotates, so that either the flat or edge of the flame can be used; metal chimney, taking 1½ in. slips; very firm; plain, and strong, with metal diaphragm and slips	0	10	6
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## "WITHNELL."

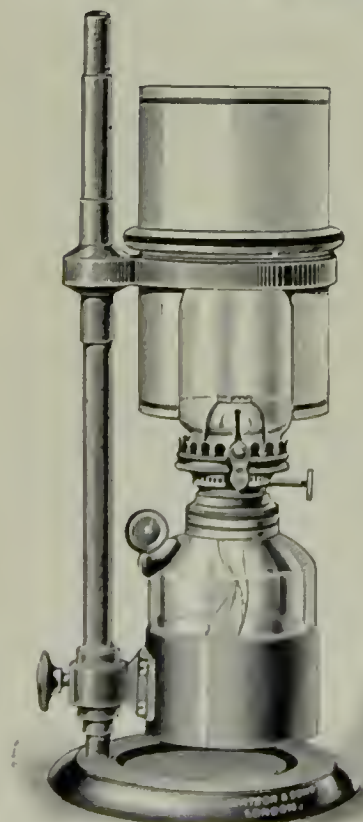
M2402.	Specially designed for travelling. Similar in construction to the "Standard" lamp No. M2396, but the oil container of brass throughout. Bayonet catch to chimney and burner. The reservoir and other detachable parts pack into a small tin box. A really efficient, clean, and portable lamp, price	1	10	0
M2403.	Glass Microscope Lamp, as supplied with No. 2399	0	3	6
M2404.	Extra Glass Chimneys for any of the above, blue or white, each	0	0	6
M2405.	Extra Shades for No. 2399, each	0	1	6
M2406.	Metal Chimney, as shown on lamp No. 2396, fits also No. 2399	0	6	0
M2407.	Blue Tinted Slips, 3 × 1½ in., for Standard lamp No. M2396			
	per dozen	0	2	0



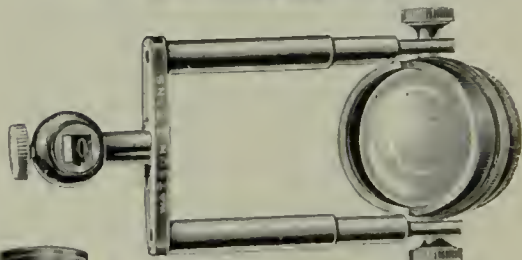
'Premier.'  
M2391.



"Standard."  
M2396.



"Student's." M2399



"Nelson" Aplanatic Bull's-Eye  
M2397.



Stiles' "Universal Lamp."  
M2401

For description and prices, see page 123.

## Life Cells.

### Rousselet's Compressor.



No. 2430

M2430. The compression is by means of a screw in the drum, and the cover glass having a square top, media may be introduced during examination of specimens. The Objective may be worked at any point where compression takes place. The arm carrying the cover glass may be turned completely aside for cleaning or replacing covers, and is held centrally by a spring catch. We have introduced a special improvement with two screws, instead of cement, to hold the cover glass. Price, with covers ..... £0 15 0

### Reversible.



M2431. With this form the specimen may be examined from either side. Made of aluminium throughout. Price, with covers..... 1 2 6

### Dunning's Life Cell.



No. 2432.

### Improved Life Slide.



No. 2434.

M2432. This consists of a brass base, recessed to receive a rectangular glass plate. The upper plate also has a glass centre. The trough is filled and the cover set against the pins and lowered into place, superfluous water being then removed. Price..... £0 4 6

M2433 For extra deep cells, an ebonite plate is supplied at an extra cost of ..... 0 1 0

M2434. Improved Life Slide. A plate of ebonite has a central glass disc, with  $1\frac{1}{4}$  in. clear viewing space, in the centre. The ebonite plate is recessed to the glass on both sides, so that when a cover is placed in position, either the shallow or deep side can be used; further, being reversible, both sides of the specimen can be viewed. With cover glasses ..... 0 2 6

## Life Slides and Troughs.



No. M2444.

M2444.	Live Box, large size, best quality	£0 10 6
M2445.	Ditto medium size	0 5 6
M2446.	Ditto small size	0 2 6



M2447.

M2447.	Rousselet's Live Box for use with Condenser, Paraboloid, etc.	£0 10 6
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The advantages of this are:—It can be used with the Substage Condenser, Spot Lens, etc., and 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.

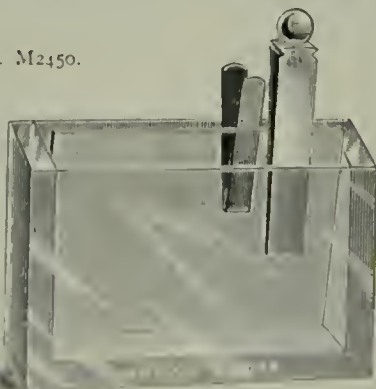
M2448.	ROUSSELET'S PIPETTES for aquatic work, with indiarubber capped top, each	£0 0 6
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## Glass Troughs.



No. M2451.

No. M2450.



No. M2449



No. M2449. 3" x 2"

M2449.	Troughs for Animalcules various widths, $3 \times 1$ , 9d. and $1/0$ ; $3 \times 1\frac{1}{2}$ , $1/6$ $3 \times 2$	2/6
M2450.	Zoophyte Trough, with plate, wedge and spring	4/6

### Metal-bound tanks for small aquaria, etc.

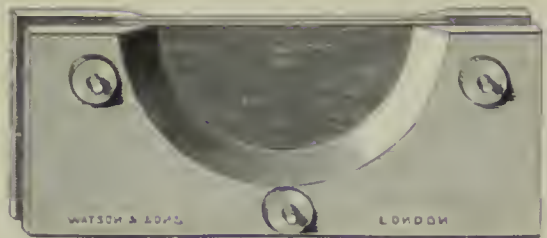
M2451.	These are made in four sizes of varying widths. They are excellent for pond life purposes— $5 \times 4 \times \frac{3}{4}$ in.	3 6
	As figured, $5\frac{3}{4} \times 4\frac{1}{2} \times 1\frac{1}{4}$ , $7/6$ ; $8 \times 6 \times 2$ , $10/6$ ; $11\frac{1}{2} \times 7\frac{1}{2} \times 3$	12/6
M2452.	Large Dissecting Troughs	10/6
M2453.	Plain Glass Dissecting Dish	1/0
M2454.	Deep Glass Dish, $5 \times 4$ , with loaded Cork for dissecting under water	2/6
M2455.	Porcelain ditto, $9 \times 7$ , ditto ditto	4/6
M2456.	Glass Aquarium, metal-bound, on wooden base	10/6
M2457.	Gla Stage Plates, $1/0$ ; large	1/6



**GLASS TROUGHS***(Continued)***BOTTERILL'S TROUGH.**

M2467. This has 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 apart and cleaned, and in the event of being broken can at once be replaced.

Price, 3s. 0d. each



No. M2467

**KINGSFORD'S TROUGH.**

No. M2469.



No. M2470.

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 especially. 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. They are absolutely water-tight.

The distinct advantages over all other troughs are that:—

By merely releasing the Screws, all parts can be taken to pieces and cleaned.  
Any broken part can be at once replaced.

M2468.	As figured on M2469, 2½ in., internal diameter. Trough <b>only</b> , to interchange with Bull's Eye Lens of Stand Condenser .....	£0 7 6
M2469.	Trough, complete with Stand, as figured.....	0 14 6
M2470.	Large Table Trough, as figured, with 6 in. solid metal base. Internal diameter of Trough, 7½ in. mounted in gymbals, with clamp to fix at any desired angle, complete .....	1 10 0

## LIGHT FILTERS, Etc.

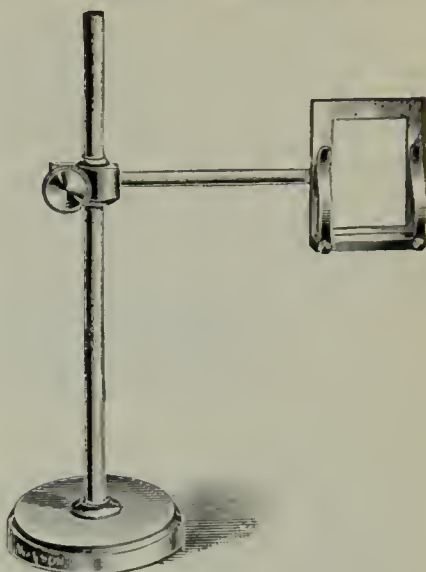
### GIFFORD'S MONOCHROMATIC LIGHT SCREEN.

M2474. This consists of a trough, in which is placed a  $3 \times 1\frac{1}{2}$  inch slip of optically worked blue-green glass. The trough is then filled with a medium composed of aniline green and glycerine. Light from an oil lamp passed through it is found, on spectroscopic examination, 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

M2475. 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.



M2475.

Note.—This Screen should not be exposed to daylight more than necessary, or it may fade. Fresh green glycerine medium can always be obtained, price 1/0 per bottle.

Kingsford's Troughs, page 127, will be found very convenient for holding light-filtering media.

### GIFFORD'S GELATINE AND GLASS SCREEN.

M2476. This replaces the fluid Screen above referred to, but without 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 obtainable for the busy worker. To fit any Substage Condenser.. £0 4 6

### RHEINBERG'S COLOUR DISCS.

M2477. Set of Coloured Gelatine Discs, to fit the Stop Carrier of Abbe Illuminator, per dozen pairs ..... £0 1 6

### WRATTEN & WAINWRIGHT'S "M" SCREENS.

For Photo-Micrography and Visual Work.

Nine different screens are provided in this series, viz.: Scarlet, Green, Blue Violet, Purple, Orange, Pure Red, Strong Yellow, Blue, Bright Yellow. Several of these can be used in pairs to produce different tints. They are most excellent screens and strongly recommended.

Prices of Sets of 9 Filters:—

M2478. Cemented in glass, 2 inches, square.....in case	£1 10 0
M2478A Ditto, ditto, 4 " " " " " " " " " " " "	4 0 0
M2478B. In Gelatine Film.....per set	0 10 0
M2478C. Special Stand to hold one or two 2-inch Screens.....	0 15 0

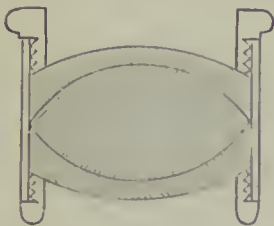
### PHOTO-MICROGRAPHS.

Photo-Micrographs of Micro. slides are taken by a skilled microscopist for book illustrations, demonstrations, lantern slides, etc.

Magnifications under 500 diameters with one Negative and one print	£0 6 0
Ditto, over ditto " " " " " " " " " " " "	0 10 6

Magnifiers—Aplanatic.

(Also known as Platyscopic Lenses.)



No. M2480

Flat field, bright and  
exquisitely  
crisp image.



Nos. M2480-3.



Nos. M2480A-M2483A.

These magnifiers consist of three lenses cemented together, as shown in Fig. M2480. They give a large and very flat field, exquisite definition, and good working distance. They all have large apertures, and consequently yield a very brilliant image. They are unexcelled for dissecting purposes and pocket lenses, and strongly recommended.

	No. M2480	No. M2481	No. M2482	No. M2483
Magnifying Power .....	6	10	15	20 diameters.
Diameter of Visual Field .....	1.0 in.	.5 in.	.35 in.	.25 in.
Focal distance from lower surface of Lens to Object .....	1.27 in.	.73 in.	.5 in.	.37 in.

Three patterns of mounting are supplied for these Magnifiers :—

- 1. Similar to M2480, to fit any of the Dissecting Microscopes and Lens Stands quoted on pages 70-72.
- 2. Similar to M2480A, in nickelled metal for the pocket.
- 3. A Combination pocket mount, similar to M2480A, to receive either of the Dissecting Mounts, pattern M2480, so that the same magnifier may be used either for dissecting or the pocket.

PRICES.

PRICES.					
No.	Magnifying Power.	In dissecting Mounts.	No.	In Nickelled Metal Pocket Mount.	In Combination Mount as described above.
M2480 ..	6 diameters	£0 10 0 ..	M2480A ..	£0 12 6	.. £0 15 6
M2481 ..	10 „	0 10 0 ..	M2481A ..	0 12 6	.. 0 15 6
M2482 ..	15 „	0 10 0 ..	M2482A ..	0 12 6	.. 0 15 6
M2483 ..	20 „	0 10 0 ..	M2483A ..	0 12 6	.. 0 15 6

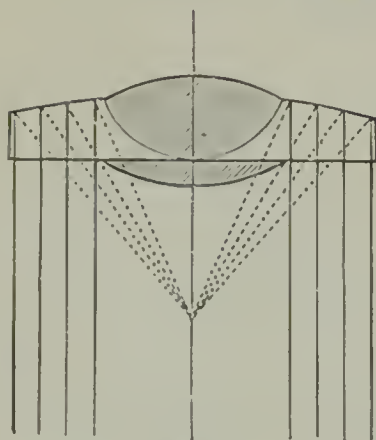
Special Doublet Magnifier.

This Magnifier is composed of two Lenses only, but gives very good results. As a useful and cheap Dissecting or Pocket Lens it is much appreciated. Magnification, 6 diameters—

M2484.	In Dissecting Mount .....	£0 5 0
M2485.	In tortoise-shell mount for the pocket .....	0 8 6

All the above Magnifiers fit the Dissecting Microscopes and the Dissecting Lens Stands, pages 70 to 72.

## MAGNIFIERS—Continued.



No. M2495.

## NELSON'S MIRROR MAGNIFIER.

M2495. This is an aplanatic magnifier mounted in the centre of a reflecting surface, which enables light to be concentrated on the object under examination. Power, 10 diameters.

Price, in pocket mount, ..... £1 5 0

## VARIABLE MAGNIFIER. (Brücke System).

M2496. By means of a sliding adjustment, the magnifying power of this lens is variable between 5 and 10 diams. Its somewhat large size ( $3 \times 1\frac{3}{8}$  in.) makes it inconvenient for pocket use, but its exceptional working distance—2 inches at 10 diameters—together with its flat field and fine definition, render it invaluable for laboratory purposes £1 5 0



No. M2497.

## POCKET MAGNIFIERS.



No. M2506.



No. M2505.



No. M2507.

M2497.	Pocket Magnifier, in folding tortoise-shell mount, of the very best quality, 3 lenses with diaphragm, as figured .....	£0 6 6
M2498.	Ditto ditto, 2 lenses, 5s. 0d. Ditto, 1 lens .....	0 3 6
M2499.	Ditto ditto, in horn or vulcanite, 1 lens .....	0 1 3
M2500.	Ditto ditto, " " 2 lenses .....	0 2 6
*M2501.	Ditto ditto, " " 3 " .....	0 3 6
M2502.	Ditto ditto, in vulcanite, 2 extra large lenses .....	0 7 6
*M2503.	Special Magnifier for Botanical Work, 2 Plano-Convex lenses	0 2 6
M2504.	Stand to hold either of the preceding, for dissecting .....	0 2 6
M2505.	Coddington Lens, in German silver mount, in 4 sizes, as figured, 4s. 6d., 5s. 6d., 6s. 6d., and .....	0 8 6
M2506.	Watchmakers' Eye Glass, as figured .....	0 1 0
M2507.	Pocket Magnifiers, with horn Cases, in 3 sizes, as figured, 1s., 2s. 6d. and .....	0 4 6

\* Nos. M2501, M2503 are adopted by many Technical Schools, Botanical classes, etc., and are eminently suitable for the purpose.

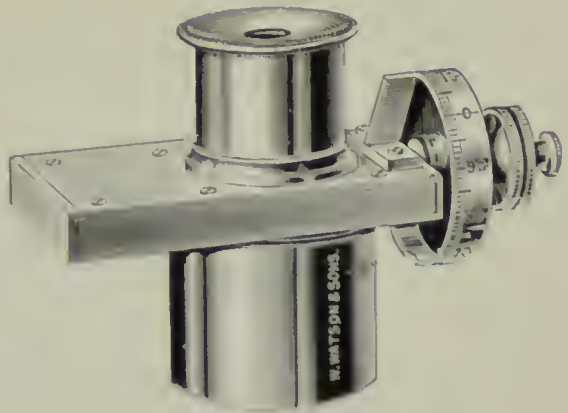
*Special quotations for quantities*





Eyepiece  
Micrometer.

No. M2538



Screw-Micrometer Eyepiece.  
No. M2535.

### Screw-Micrometer Eyepiece.

M2535. This is constructed almost entirely of aluminium, and is very light in weight. The teeth are cut to 1 m/m, and the drum indicates the 1/100 part of each tooth. The reading can therefore be taken to 1/100th part of a millimetre. The fixed web is set a little to the side of the field, as recommended by Dr. Dallinger. Of best and most accurate construction. Price, with Huyghenian Eyepiece... £3 15 0

M2536. Screw Micrometer Eyepiece, similar design to above, but in brass. The eye lens has sliding focussing adjustments and it is of the utmost precision throughout. It is made for Eyepiece fittings of Students' or Continental diameter—9.173 in.—only ..... 2 10 0

The above are also made to take Zeiss Compensating Eyepiece  $\times 8$  at same cost (the Eyepiece not being then included).

### Students' Screw-Micrometer Eyepiece.

M2537. Micrometer Eyepiece, with screw-jointed centre for insertion of Micrometer No. M2538 or M2539 and sliding eye-lens for focussing micrometer. Without micrometer..... £0 8 0

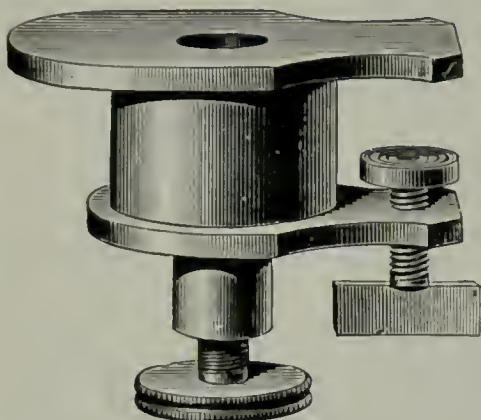
### Eyepiece Micrometers.

M2538. Ruled with scale, as figured ..... 0 5 0  
 M2539. Ditto, ditto, in Squares ..... 0 5 0  
 M2540. Ditto, ditto, the same as No. M2538 or M2539, but mounted to fit large-sized capped Eyepiece..... 0 7 6

### Stage Micrometers.

M2541. On  $3 \times 1$  slips, Ruled to 1/100 and 1/1000 in. .... 0 5 0  
 M2542. Ditto, ditto, 1/10 and 1/100 m/m. .... 0 5 0

Microtomes.



M2552.



M2556.

M2552. Mr. Cole's Pattern Section-Cutter, as figured. This is a most useful and efficient Section-Cutter, being very solid and rigid 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 10 0

M2553. Set of Punches, complete in case, for cutting out embedding substances, extra ..... 0 5 0

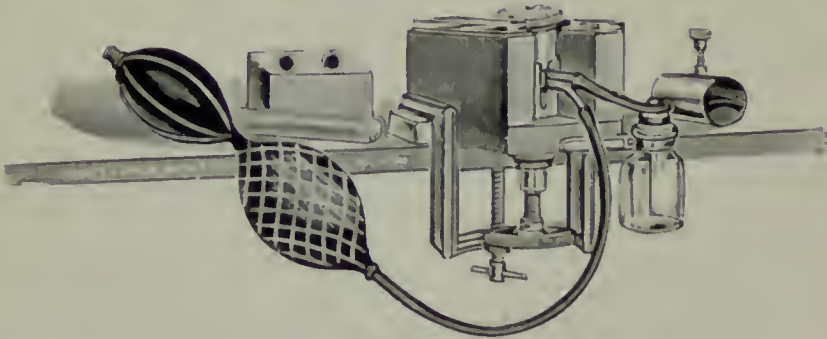
M2554. Mr. Cole's Pattern Section-Knife, in case..... 0 4 6



M2557

M2556. Hand Section-Cutter, for Botanical work (as figure M2556) ..... 0 5 0

M2557. Darlaston's Hand Section-Cutter, as fig. M2557. Of simple construction, but of especially solid make, enabling considerable accuracy to be attained. It is of solid brass, 1½ inch diameter, and has a well ¼ inch diameter. The raising screw — which is purposely fitted loosely to facilitate exact adjustment — has 35 threads to the inch ..... 0 8 6

**MICROTOMES**—*Continued.***THE CATHCART.**

M2567

**The Cathcart Microtome No. M2567.**

This popular form of Microtome is fitted for Ether Freezing or Embedding. For freezing tissues it is arranged as shown above; to embed tissues the tubes, bottle, and the freezing tube are drawn out; the latter being replaced by another tube, with clamp. The substance to be cut (embedded in paraffin or other medium) is then inserted, and the clamp screwed up. This Instrument is thoroughly well-finished, and the adjusting screw milled head is made specially large to permit a fine movement.

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

M2568	The above Instrument, arranged for Ether Freezing only ....	0 17 6
M2569.	Ditto ditto for Embedding only .....	0 15 0
M2570.	Plane Iron Section Knife, in handle.....	0 2 6
M2571.	Ether Points, extra sets .....	0 2 0

**W. WATSON & SONS' KNIFE CARRIAGE PATTERN****Cathcart Microtome No. M2572.**

M2572.

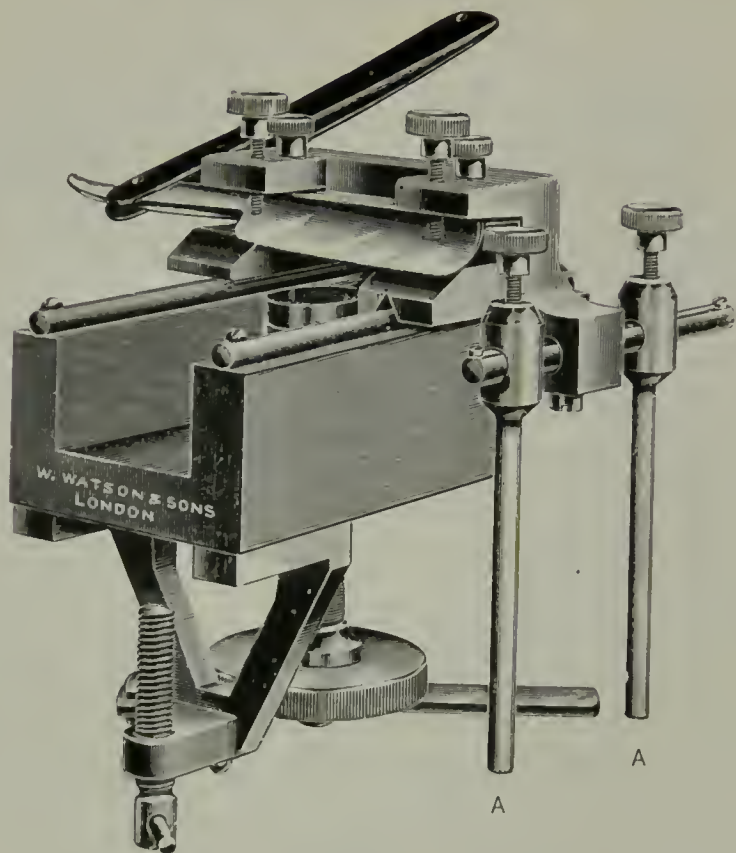
This is a similar instrument to No. M2567, but the razor carrier runs on brass, and not glass, guides. This latter has an adjustment allowing the razor edge angle to be adapted to the work in hand. The milled head for raising the material is also furnished with an indicator by which the thickness of section can be accurately gauged.

Price, for Freezing and Embedding with one razor .. £1 7 6

M2573.	For Freezing only, £1 4 0	M2574.	For Embedding only 1 2 0
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NOTE.—The plane-iron-section knife cannot be used upon the brass guides.

MICROTOMES—Continued



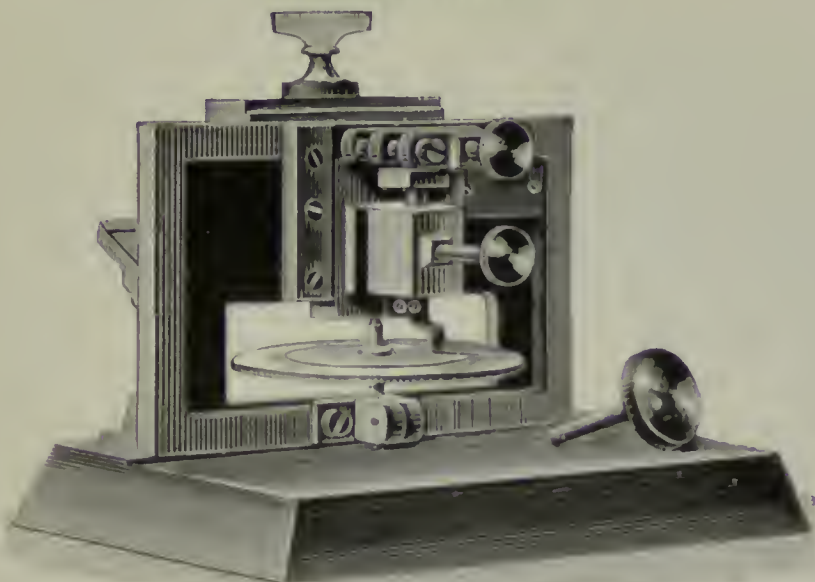
M2584.

The Cathcart-Darlaston (Registered.)

Realising the demand for a low-priced microtome, which, while preserving the simplicity and excellence of the Cathcart pattern, would yet enable the worker to cut sections of a definite thickness, we have lately carried out a suggestion made by Mr. Darlaston, and produced an elaboration of the ordinary Cathcart microtome which will, we believe, be much appreciated by careful workers. The illustration shows the general principle, which is briefly as follows:—The forks A are attached to the knife carriage, and in drawing the latter back one of the forks engages with a lever attached to the milled head, and thus raises the material a distance of from 1/250 to 1/5000 of an inch, according to the position in which the forks are placed, thumb-screws permit the distance between the two being varied at will. The forward traverse of the carriage causes the second fork to engage, which replace the lever in its original position ready for the return thrust. The entire system is automatic, and work as accurate as that of a complicated and expensive instrument is possible. The automatic motion may be dispensed with at pleasure, and the milled head rotated by the hand as usual.

M2584.	Price, complete, for Freezing and Embedding	£2	5	0
M2585.	For Embedding only	2	0	0
M2586.	For Freezing only	2	2	6
M2587.	Razor for above	0	1	6



**MICROTOMES** *Continued.***THE STUDENTS' SERIES OF LABORATORY  
MICROTOMES.**

M2507. Students' "A" Pattern.

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.

M2507. Students' "A" Pattern, as figured, giving 12 c/m length of knife travel, one object clamp (not orientating) to take objects 2 x 2 c/m, and one metal disc for paraffin sections .....	£1 18 0
M2507a. 1 Knife for ditto .....	0 5 6
M2507b. 1 Case for knife, ditto .....	0 1 9
M2507c. Freezing Apparatus, ditto .....	0 13 9
M2507d. Polished Wood Case for Microtome and fittings .....	0 6 6
	<hr/>
	£3 5 6

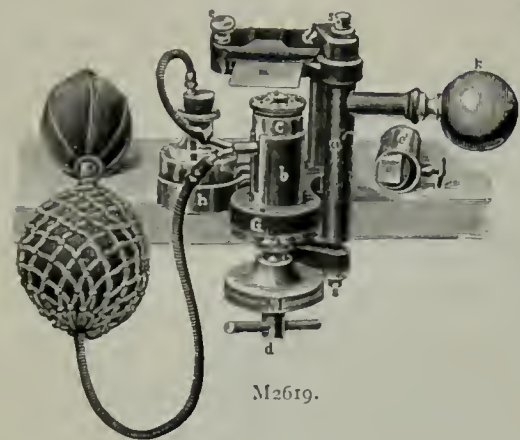
Any of the above items may be purchased separately. The minimum thickness of section obtainable with above Microtome is 0.005 millimetre.

M2598. Students' "B" Pattern, similar to pattern "A," but of larger dimensions throughout, 15 c/m length of knife travel, clamp for objects 2 x 2.5 c/m, and metal disc for paraffin .....	£3 3 0
M2598a. 1 Knife for ditto, 10 c/m long plano-concave (or double concave) .....	0 10 6
M2598b. 1 Case for knife .....	0 3 6
M2598c. Freezing Apparatus .....	0 18 0
M2598d. Polished Wood Case for Microtome and fittings .....	0 9 6
	<hr/>
	£5 4 6

Larger sizes of similar patterns to above supplied to order. Prices on application.

MICROTOMES—Continued.

JUNG MICROTOMES.



M2619. Students' Microtome, as figure M2619. The knife movement automatically raises the object and cuts sections down to  $\frac{1}{200}$  m/m thick. 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

M2620. Students' Microtome, similar to M2619, 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, supply of Ethyl Chloride, all in strong fitted wood case.. £4 5 0

**JUNG-THOMA MICROTOMES**,—with sliding knife block moved by hand—and mounted on heavy iron frame, nickel-plated. The object-holder is moved up an inclined plane to meet the knife by means of a very fine Micrometer screw attachment.

M2621. Model I. (A) Length of knife travel 40 c/m, with object clamp and sliding carrier, micrometer-screw raising arrangement, one Thoma knife, 24 c/m and setting attachment to knife ..... £12 0 0

(B) The same set, but with most complete form of micrometer screw, with ratchet attachment and object-holder, with fine screw movements to Orientation ..... 14 5 0

M2622. Model II. Length of travel, 27 c/m; and accessories as with Model I. set A, one knife, 16 c/m..... 8 5 0

M2623. Model III. Length of travel, 21 c/m; and accessories as in Model I., set A ..... 5 10 0

M2624. Ether-Freezing Attachments for above—

For Model I.	II.	III.
£1 18 0	£1 6 0	£1 2 0

SCHANZE MICROTOME.

In this pattern the knife is clamped to a heavy steel block sliding in a V groove. The fine micrometer-screw raising arrangement to object-holder works in a vertical direction and is permanently fixed to the framework. The latter is of massive construction, to eliminate vibration and give steadiness to the knife.

M2625. Model B, set A, length of knife travel, 40 c/m for objects up to  $6 \times 4$  c/m. Object clamp with orientation—coarse and fine micrometer-screw raising adjustment, 1 knife, 25 c/m ..... £12 15 0

M2626. Model B, set B, as above, but for objects  $4 \times 3$  c/m, with 1 knife, 17 c/m ..... 8 0 0

M2627. Ether-Freezing Attachment, for set A ..... 1 8 0

M2628. Ditto, ditto, for set B ..... 1 2 6

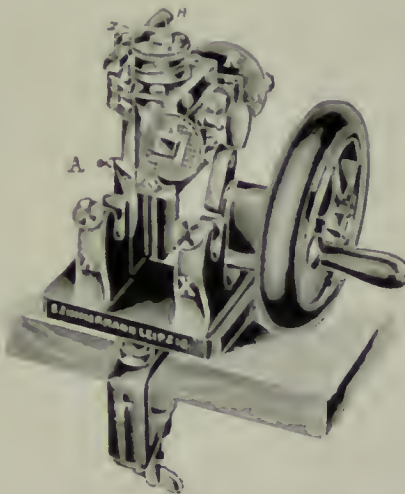
**MICROTOMES**—Continued.**THE MINOT MICROTOME.**

Large model for laboratory use. Instead of the knife travelling to meet the paraffin block, it 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 quickly.

M2638.	Pattern I. To cut 6 different thicknesses from $\frac{1}{80}$ to $\frac{1}{200}$ m/m, with knife .....	£11	14	6
M2639.	Pattern II. For sections $\frac{1}{80}$ m/m to 1 micron., with knife ..	14	10	0
M2640.	Pattern III. For sections 40 to $\frac{1}{2}$ micron, including extra accessories for celloidin sections, and with knife .....	16	16	0

The Minot Microtome,  
small model,  
M2641.

For Histological and  
Embryological work.



M2641.

Maximum size of  
Paraffin Block  
30 25 m/m.

Maximum depth of  
Paraffin Block between  
knife edge and block  
holder 20 m/m.

Automatic feed adjust-  
ment for sections  
5 to 30 microns.

M2641.	The Minot Microtome, small model, M2641, for use with Paraffin-embedded blocks, including plano-concave section knife, 7 cm. blade and plain wooden case .....	£5	10	0
M2642.	The same set as above, but with Ethyl-chloride Freezing Attachment and supply of Ethyl-chloride .....	6	5	0
M2643.	The same as set M2642, but with addition of object clamp for hard material, 2 extra metal object holders, graduated scale attachment and extra knife 12 cm. blade .....	7	10	0

**THE CAMBRIDGE ROCKING MICROTOME.**

This type of Microtome produces a continuous ribbon of sections from paraffin-embedded material. It deals with objects up to about 12 mm. × 20 mm., and cuts sections from .024 mm. to .002 mm. in thickness.

M2644.	Small Rocking Microtome, with simple object holder, but without razor .....	£4	2	6
M2645.	Ditto, ditto, complete with razor, simple object holder and orientating object holder .....	4	10	0
M2646.	Large or flat section cutting Microtome, with double level to prevent cutting thick and thin sections, maximum diameter of Object, 30 m/m. Will cut sections from .015 m/m to .002 m/m in thickness. Complete with simple object holder, orientating object holder and razor .....	9	18	0

**MICROTOME KNIVES.**

M2653.	Razor Blade with fixed handle .....	£0 2 6
M2654.	Strong Razor, of good quality .....	0 1 6
M2655.	Cole's Pattern Section Razor, with fixed steel handle .....	0 5 0
M2656.	Plane Iron-handle for Cathcart Microtome .....	0 2 6

Plano-concave blades.

M2657.	Thoma pattern, with curved handle, in case—	
	Length .. 24 .. 20 .. 16 .. 12 c/m	
	36/0 .... 30/0 .... 23/6 .... 14/6	
M2658.	Jung pattern, with short straight round shank, in case—	
	Length 30 .. 24 .. 20 .. 17 .. 12 .. 8 c/m	
	45/0 .. 27/0 .. 22/0 .. 13/6 .. 10/6 .. 7/6	
M2659.	Metal Handle, with screw clamp to hold the Jung Knives when stropping or sharpening .....	0 4 0

**MICROTOME ACCESSORIES.**

M2660.	Brass Moulds I-shaped for casting paraffin blocks, per pair..	0 1 9
M2661.	Celloidin (granular), in 1 oz. packets only, per packet .....	0 3 6
M2662.	Cloth-Covered Cardboard Cases, with divisions for holding paraffin blocks.	
	For 100 blocks .....	2 c/m. 3 c/m. 4 c/m.
	7/0 .... 8/6 .... 16/0	
	„ 200 „ .....	11/6 .... 16/0 .... 26/0
M2663.	Elder Pith for embedding, per bundle .....	0 0 6
M2664.	Paraffin Wax, Hard or Soft, for Embedding, per lb. ....	0 1 0
M2665.	Ditto, ditto, pure white filtered, per lb. ....	0 2 6
M2666.	Rubber Spray Bellows for Ether Freezing Microtomes .....	0 3 6
M2667.	Stones for setting, best quality—according to size, from .....	0 2 6
M2668.	Strops for Microtome Knives, with 1 surface, 12×2 inches ..	0 6 6
	ditto, 14×2 „ .....	0 7 6
M2669.	Strop, Heidelberg pattern, with 3 prepared leather surfaces and the fourth side a hone .....	0 7 6

**EMBEDDING BATHS.**

M2670.	Small Laboratory Bath of stout copper, about 12"×7"×3", with iron stand, 4 silver-plated copper pans, glass tubes and bottles, drying shelf, thermometer, heat regulator, gas burner, and rubber tubing, complete .....	3 0 0
M2671.	Small Embedding Bath with Oil Lamp and Mechanical Regu- lator. The dimensions of this bath are the same as M2670, and the accessories are the same, excepting that the gas burner and gas regulator are replaced by an oil lamp and mechanical regulator ..	5 15 0
M2672.	Large Embedding Bath, measuring outside about 16"×12"×8". It is provided with 2 drying shelves for slides, two upper compart- ments with hinged copper lids for glass and porcelain vessels. Accessories include 7 porcelain capsules with lids, Thermometer, steel gas regulator, 2 gas burners and tubing .....	9 15 0
M2673.	Vacuum Embedding Water Bath, heated by gas. Uniformity of temperature is maintained by means of a thermostatic capsule acting upon a gas valve by which the supply of gas is regulated .....	5 0 0
M2674.	Vacuum Embedding Water Bath, heated by petroleum lamp with thermostatic heat regulator. Specially designed for use where coal-gas is unobtainable .....	7 0 0



W. WATSON & SONS, LTD., 313 HIGH HOLBORN, W.C.

## MOUNTING MATERIALS.

- |        |   |            |
|--------|---|------------|
| M2749. | Air Pump with bell glass receiver   | £1 1 0     |
| M2750. | Bottle with ground-on outside cap, for Balsam, etc., as figured.<br>1 oz., 1/0; 2 oz., each   | 0 2 0      |
| M2751. | Pipette Stopped Reagent Bottles, as figure M2751.<br>small, 9d. Medium, 1/0. Large, 1/3 each. |            |
|        | M2752. Sets of ditto, on solid wood stand, as figure<br>M2752                                 | from 0 8 6 |



No. M2731.  
Pipette Stopped Bottles.



No. M2700  
Balsam Bottle



No. M2752

- |        |  |              |    |   |   |
|--------|--|--------------|----|---|---|
| M2753. | Brushes for Ringing, best quality      | each 4d. and | £0 | 0 | 6 |
| M2754. | Ditto ordinary                         | each         | 0  | 0 | 2 |
| M2755. | Buff Blocks for cleaning Cover Glasses | per pair     | 0  | 2 | 0 |
| M2756. | Clips, Spring Wire, for mounting       | per doz.     | 0  | 1 | 6 |

**COMPLETE CABINETS FOR MOUNTING.**



Containing Asphalt, 3 Bottles for Solutions, Brass Table, Canada Balsam, Cells, Cover Glasses, 2 Dissecting Knives, Dissecting Needles, Forceps and Scissors, Glass Slips, Gold Size, Labels, Marine Glue, Spirit Lamp, Spring Clips, Turntable, etc.

- |        |  |         |        |                       |        |
|--------|--|---------|--------|-----------------------|--------|
| M2757. | In mahogany case..   | £2 15 0 | M2758. | In polished pine case | £2 5 0 |
| M2759. | <b>STUDENT'S MOUNTING CABINET</b> , contains Balsam in Benzole,<br>Brushes for ringing, Cover Glasses, Fine Scissors, Glass Rod and<br>Pipette, Glass Slips, Labels, Section Lifter, Watch Glasses, polished<br>pine case with 12 trays to hold 6 doz. objects, all contained in fitted<br>and polished pine cabinet, very compact ..... |         |        |                       |        |
|        |  |         |        | 1                     | 1 0    |

MOUNTING MATERIALS—*Continued.*

## COVER GLASSES.

(Best quality only).

In three thicknesses—No. 1, very thin; No. 2, medium; and No. 3, ordinary thickness used.

Circles, $\frac{5}{8}$ in., $\frac{3}{4}$ in., $\frac{7}{8}$ in. and 1 in. diam.						Squares, $\frac{5}{8}$ in., $\frac{3}{4}$ in., $\frac{7}{8}$ in. and 1 in.					
		Per 1 oz.	Per $\frac{1}{2}$ oz.	Per $\frac{1}{3}$ oz.			Per 1 oz.	Per $\frac{1}{2}$ oz.	Per $\frac{1}{3}$ oz.		
M2768.	No. 1	4/6 ..	2/3 ..	1/2		M2768A	No. 1	3/6 ..	1/9 ..	11d.	
M2769	No. 2	3/6 ..	1/9 ..	11d.		M2769A	No. 2	3/0 ..	1/6 ..	9d.	
M2770.	No. 3	2/9 ..	1/5 ..	9d.		M2770A	No. 3	2/0 ..	1/0 ..	6d.	

Assortment of above sizes at same rate. Special quotations for quantities.

Only the above sizes regularly kept in stock.

Smaller, intermediate or larger sizes of, and not less than  $\frac{1}{2}$  oz., can be cut to order at 1/0 per oz. extra.M2771. **Special No. 0 Covers.** Circles,  $\frac{3}{4}$  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  $\frac{1}{2}$ -oz. supplied.

## COVER GLASS GAUGE.

M2772. This consists of a sheet of brass  $6 \times 2\frac{1}{8}$  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. Exceedingly accurate and quickly worked. Price .....

£1 12 6

M2773. Diamonds, for Cutting Slips and covers ..... 15/0 to 1 1 0

M2774. Diamonds, for Writing on Glass ..... 0 5 0

## SLIDES OR SLIPS.

## 3 x 1 inches, ground-edges.

		per doz.	per $\frac{1}{2}$ gross.	per gross.
M2775.	Chance's Flatted-Crown .....	5d.	2/6	4/6
M2776.	"The Student's" greenish tint, thin	4d.	1/9	3/6
M2777.	Special Continental, white glass, very thin	6d.	2/6	5/0
M2778.	Glass Slips, 3 x 1 ins., with round or oval excavation in centre, suitable for pond life, or objects to be mounted without pressure	per doz.		2/0
M2779	Coloured Slips: blue, green, ground glass and yellow, unworked, each			6d.

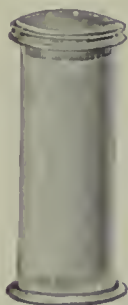
## 3 x 1½ inches, ground-edges.

M2780.	Chance's Flatted-Crown ....	8d. per doz.; 3/0 per $\frac{1}{2}$ gross; 6/0 per gross.
M2781.	Blue Slips for use with metal lamp chimneys .....	per doz. 2/0

M2782. **Mahogany Slips**, 3 x 1 ins., with circular aperture or sunk cells in centre, for opaque objects..... per doz. 1/0

**MOUNTING MATERIALS**—*Continued.*

M2793. Jar, Stoppered, to take  $3 \times 1$  slips upright, as figure M2793, each £0 1 0



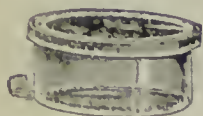
No. M2793.



No. M2799.

**LABELS.**

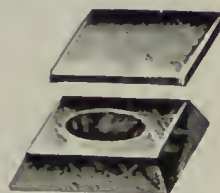
M2794.	Adhesive Slide Labels, square, 3 lines, per 100 .....	0 0 4
M2795.	Ditto 5 lines .....	0 0 6
M2796.	Ditto oval, for $3 \times 1$ inch slips, per 500 .....	0 0 6
M2797.	Ditto square, with printed name or other matter to order, per 1000 .....	0 3 6
M2798.	Pencils, Special Grease, for writing on glass.....each 6d. and	0 0 9
M2799.	Porcelain Trough, with grooves for 5 slips, $3 \times 1$ , as fig. M2799, flat shape, 1/9 each; high shape .....	0 2 0
M2800.	Punches for cutting labels .....	1/6 and 0 2 0
M2801.	Ring Cells, Metal, $\frac{5}{8}$ in., $\frac{3}{4}$ in., $\frac{7}{8}$ in. diameter..... per 100	0 2 6
M2802.	„ Vulcanite „ „ „ „	0 2 0

**GLASS SUNDRIES.**

No. M2806. Glass Capsule.



No. M2805. Glass Box.



No. M2803. Staining Cell.

M2803.	Blocks, Square, with excavation, black or clear glass ....each	£0 0 6
M2804.	Blocks, Square, with excavation, for use under microscope, all surfaces polished .....	each 0 1 0
M2805.	Boxes, with covers, as figured, $1\frac{1}{2}$ in., diam., 8d., 2 in., 10d., $2\frac{1}{2}$ in.	0 1 0
M2806.	Capsules, Round, with grooved covers, as figured, in 3 sizes, each, 9d. 1/0	0 1 3
M2807.	Circular Dishes, deep .....	per nest of 3 0 1 0
M2808.	Section-Washer, consisting of outer glass dish with removable inner cell, having perforated bottom .....	0 3 6
M2809.	Glass Trough and cover, with grooves to take 10 slips .....	0 2 6
M2810.	Rectangular Trough, with cover to take $3 \times 1$ slips .....	each 0 1 0
M2811.	Watch-glasses, plain, per doz., 1/0; flat bottom, per doz. ....	0 1 6

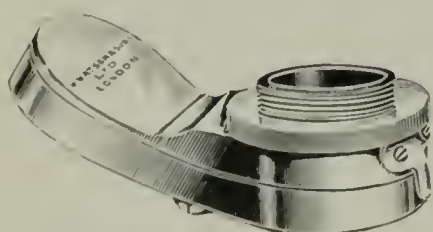
## NOSEPIECES OR OBJECTIVE CHANGERS.

These Nosepieces will fit any Microscope, and work with Objectives by all makers. They have the Standard screw thread of the Royal Microscopical Society, which is universal throughout the world.

These Nosepieces have gained wide appreciation for their working qualities, and being made by machinery specially designed for the purpose, their accuracy of centring is unsurpassed; special attention has been bestowed to afford strength for a long life of working usefulness.

It should be noted that when fitted to the microscope, nosepieces should be set centrally with the body projecting outwards towards the centre of the stage, and to ensure the correct centring of objectives, should always be revolved in one direction only.

### DOUBLE FOR TWO OBJECTIVES.



No. M2847.

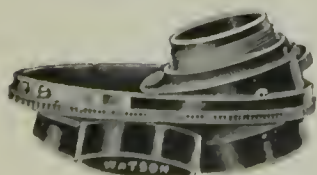
M2846. Oxidized, for instruments having no rackwork coarse adjustments £0 9 0

M2847. New pattern Nosepiece of extra strong construction, designed for continuous use, completely rotating. Finished either black, bronzed, lacquered, or nickel-plated, as may be preferred £0 12 6

When supplied with one of our new microscopes . . . . . 0 10 0

M2848. Specially light pattern in polished aluminium . . . . . 0 17 6

### TRIPLE FOR THREE OBJECTIVES.



No. M2849

M2849. New dust-proof pattern, as figured. A really efficient form, invaluable for laboratory work. In lacquered bronze . . . . . 1 0 0

M2850. Ditto, ditto, nickel-plated 1 0 0

M2851. Ditto, ditto, aluminium 1 5 0

### QUADRUPLE FOR FOUR OBJECTIVES.

M2852. Dust-proof pattern, similar to triple nosepiece figured above . . 1 12 6



**OBJECTIVE CHANGERS**—*Continued.***The "FACILITY" OBJECTIVE CHANGER.**

(Provisionally protected.)

M2863. This new Objective Changer or Nosepiece is both novel in construction and effective in working. It embodies several very important features; eliminates many of the disadvantages of Nosepieces; has no complications; and is very strong.

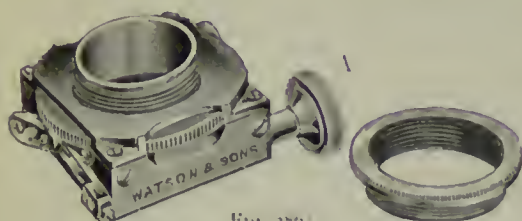


Fig. 2863.

1. It is absolutely reliable.
2. It is very thin, and increases the tube length less than any other Objective Changing device: the total thickness when in use being 12.5 mm ( $\frac{1}{2}$ -in.).
3. It is simple to use.
4. It is made in Magnalium, so is very light in weight while strong in construction.

**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 with certainty be gripped by the jaws of the Nosepiece.

**Price,** with three rings as described . . . . . £1 15 0

Extra rings, 6d. each.

The adapting rings are so thin that the Objective can be stowed in its box without the ring's removal.

**SLIDING OBJECTIVE CHANGER.****BY ZEISS.**

This consists of a "Tube Slide" attached to the Microscope body, and Objective slides, each of which carries an Objective and is slid on to the Tube slide. This can be done very rapidly, and when once each Objective has been accurately centered in its slides, for which convenient provision is made, an object will be found with each power in the same position in the field.

**PRICES.**

M2864.	Tube Slide—one only is necessary for each Microscope . . . . .	£0	8	0
M2865.	Objective Slides (one is required for each Objective), each . . . .	0	8	0
M2866.	Leather Case for 3 Objectives and Slides . . . . .	0	6	0
M2867.	Mahogany Case for 6 ditto, ditto, . . . . .	0	15	0

**CENTERING NOSEPIECE.**

M2868. To fit any Microscope. Centres an objective with a concentric rotating stage, which has no centering arrangement. Effective and convenient . . . . . 0 15 0

## OBJECTS FOR THE MICROSCOPE.

---

No worker who values his Microscope as an aid to Natural Science should fail to provide himself with our Classified List of Microscopic Objects (Dept. No. 3), which forms a separate publication. The number of slides amounts to over 40,000, and for the comprehensive nature of the list, and the minute attention paid to each specimen, it is unequalled. The slides are prepared by experts, each of mature experience in his speciality. The objects are, therefore, fitted to be used in the most critical manner. As standard specimens for demonstrators and students they are unsurpassed.

Amateurs also, are strongly advised to investigate the particular sections which appeal to them. Such studies as Botany, Diatomaceæ, Entomology, Geology, etc., are fully dealt with, and it is always possible to obtain for selection a large number of striking preparations.

There is a **Circulating System** for the benefit of those who wish systematically to follow up their investigations without having to purchase large numbers of slides. The only conditions are :—

**Subscription** of one Guinea, payable in advance, for a period of one year, or half-a-guinea for six months.

Consignments of Slides are despatched as desired in batches of one, two or three dozen. Subscribers for one year are entitled to examine 240 specimens, and those for six months, 120.

Subscribers are not restricted to any stereotyped sets, but can choose any slide from the catalogue, not exceeding 2/6 in value.

Postage to customer is prepaid.

Further details in List No. 3.

On the next page are several standard sets, which are typical of the subjects in the general collection.

## CABINETS OF MICROSCOPIC OBJECTS

### COMPLETE FOR PRESENTATION, Etc.

M2871. Handsome Mahogany Cabinet of finest workmanship and finish, containing 1000 objects of varied interest. Each specimen is a carefully-selected example of the subject it typifies. Many novel and interesting preparations are included, Anatomical, Entomological, Zoological, etc., also many rare Diatomaceæ, Foraminifera and Radiolaria, forming a collection of the highest order, eminently suited for presentation. Each drawer has a tablet of its contents..	£75	0	0
M2872. Handsome Mahogany Cabinet, equal to the above in every respect, but containing 500 objects .....	40	0	0
M2873. Mahogany Cabinet, as above, containing 280 objects, all carefully selected, including many novel and attractive slides for exhibition purposes, as well as a large number of rare specimens of Zoological interest, etc. ....	24	0	0
M2874. The Student's Cabinet, of polished pine with glass door, lock and key, containing 200 preparations, illustrating Anatomy, Bacteria, Pathology, Physiology, Urinary Deposits, etc. ....	17	10	0
M2875. The Amateur's Cabinet, containing specimens of general interest—Botanical Sections, Crystals for Polariscope, Diatomaceæ, Entomological Objects, Foraminifera, Hydrozoa for Dark Ground Illumination, Soundings, all of the highest quality .....	14	14	0
M2876. Pine Case, containing 72 objects of General Interest, all carefully prepared and selected .....	5	0	0
Other Microscopic Object Cabinets made to any size or pattern, and furnished with slides typical of any required subject.			

## EDUCATIONAL SERIES FOR STUDENTS.

### BOTANY.

Two sets of Typical Structures, the first (Series 14) being 24 Elementary Tissues, and the second (Series 15) illustrating the Comparative Anatomy of Plants. These have been adopted by the London County Council for use in their Technical Classes, Series 14 in case .....	£1	4	0
„ 15 „ .....	1	12	6

### EMBRYOLOGY.

Seven slides, illustrating the development of a Chick, mounted in Canada Balsam, showing with great distinctness the nervous and circulatory system, etc., in case. ....	1	8	0
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### EXHIBITION SLIDES.

An attractive selection of 36 interesting objects, many of which are quite novel in character, including slides for Polariscope and Dark Ground Illumination .....	2	17	6
Forensic Medicine.—Set of twenty-four slides of hairs, blood corpuscles, starches, etc., as suggested by R. Henslowe Wellington, Esq., M.R.C.S., L.R.C.P., Barrister-at-Law, etc. ....	1	10	0

### GEOLOGY.

Twenty-four Typical Rock Sections, sedimentary, metamorphic and igneous. Several peculiar specimens are included showing features which have never before been demonstrated in a Microscopic section. The series will be found very useful for Petrological candidates for the B.Sc. degree. Price .....	1	16	0
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### PHYSIOLOGY.

Four complete series (Nos. 1-4) of 24 Typical Tissues, each a selected example of its kind. The complete series illustrates the Standard Text-books of Histology. Per set of 24, in case .....	1	15	0
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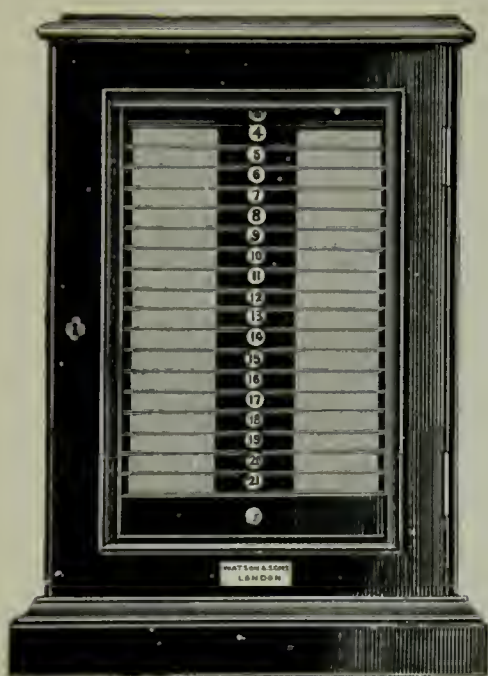
### PUBLIC HEALTH.

Thirty-six specimens, suitable for candidates for the Diploma, as approved by Dr. F. J. Allan and mentioned in his "Aids to Sanitary Science" .....	2	7	6
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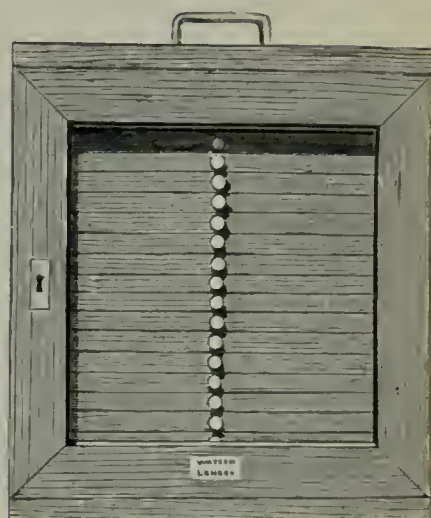
### ZOOLOGY.

Twenty-four selected specimens, Cœlenterata, Infusoria, Polyzoa, Protozoa, Vermes, etc. Many of these, apart from their Biological interest, will be found of great interest as exhibition objects. In case .....	2	2	6
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## MICROSCOPIC OBJECT CABINETS AND BOXES.

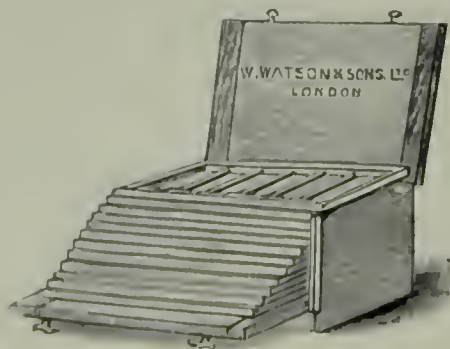


No. M2582.



No. M2878.

- |        |   |    |    |   |
|--------|---|----|----|---|
| M2878. | Neatly-made Cabinet of polished pine, with glass door, lock and key, to hold 200 objects, as figure .....   | £1 | 1  | 0 |
| M2879. | Ditto ditto, 500 objects.....   | 2  | 0  | 0 |
| M2880. | Ditto ditto, 1,000 objects .....  | 3  | 0  | 0 |
| M2881. | Mahogany Cabinet of superior workmanship with mouldings top and bottom, to hold 280 objects, each drawer numbered, with an extra deep drawer for materials, etc. .... | 3  | 5  | 0 |
| M2882. | Large handsome Mahogany Cabinet to hold 500 objects, each drawer numbered and furnished with porcelain plates, as figure....  | 5  | 10 | 0 |
| M2883. | Ditto ditto, to hold 1,000 .....  | 9  | 10 | 0 |



## POLISHED - PINE CASES.

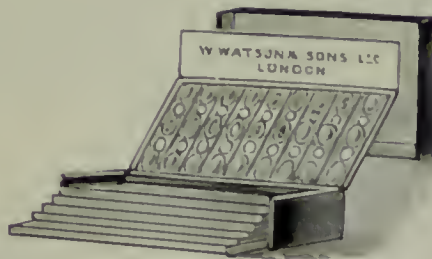
- |        |           |          |                                       |  |   |     |
|--------|-----------|----------|---------------------------------------|--|---|-----|
| M2884. | Very neat | Polished | Pine Case, to hold 2 dozen objects in |  |   |     |
|        | four      | trays    |                                       |  | 0 | 2 6 |
| M2885. | Ditto     | ditto    | to hold 3 dozen objects in six trays  |  | 0 | 3 0 |
| M2886. | Ditto     | ditto    | " 6 " " twelve trays                  |  | 0 | 3 6 |
| M2887. | Ditto     | ditto    | " 12 " " " "                          |  | 0 | 6 6 |



## MICROSCOPIC OBJECT CABINETS AND BOXES

(Continued).

M2896.	Cardboard Trays with double flap cover, holding 20 slips 3" x 1" in separate partitions. The slips lie flat, and the spaces are numbered for indexing .....			£0	0	9
M2897.	Cloth-covered Boxes, with velvet lining— to hold 6, 6d., to hold 1 doz			0	0	9
M2898.	Ditto	ditto	2 "	0	1	0
M2899.	Ditto	ditto	3 "	0	1	6



### CLOTH-COVERED CASES.

Cloth-covered Cardboard Boxes, with drop fronts, white cardboard trays, with linen-jointed flaps.

M2900.	With 6 trays to hold 4½ dozen objects .....	0	1	0
M2901.	„ 12 ditto 9 „ „ .....	0	1	6
M2902.	„ 8 ditto 12 „ „ .....	0	2	0

### POCKET FOLDING CASES

with outer sheath, very compact—

M2903.	For 6 objects .....	0	0	9
M2904.	For 12 objects, to prevent movement of the specimens .....	0	1	6

Pine Boxes with Racks—

M2905.	To hold	6	12	24	36	72	Objects.
		3d.	4d.	6d.	8d.	1/0	each.

M2906. Pine Boxes for Postal Transit, to hold 1, 2 or 4 slides, 1/6 per dozen.

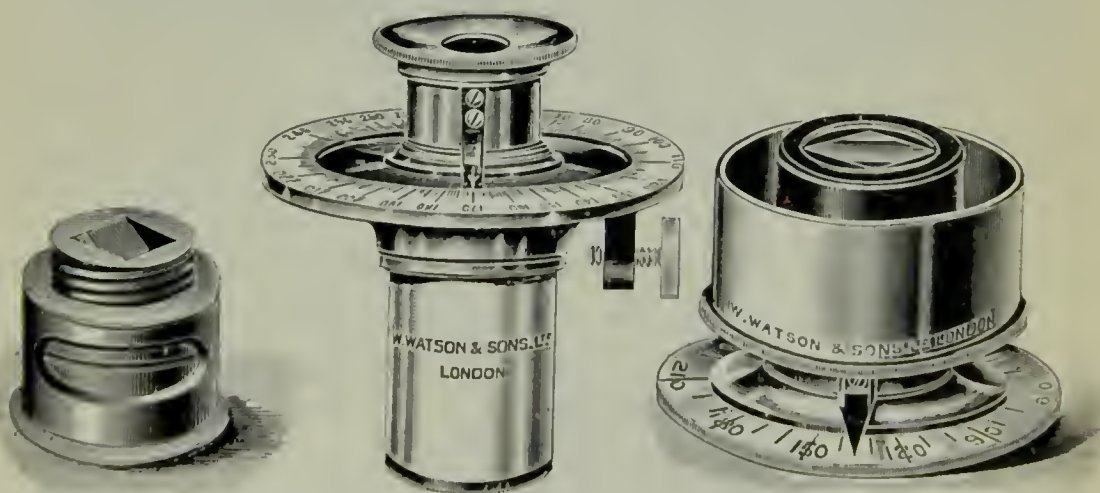
**POLARIZING APPARATUS.**

Polarizer. No. M2916.



Analyser. No. M2916.

M2916.	Complete Polarizing Apparatus with Selenite, as figured.....	£1	0	0
M2917.	Ditto, larger prisms .....	1	10	0
M2918.	Extra large Prisms, ditto ditto .....	2	2	0
M2919.	Rotating Analyser, as per figure, in place of usual fixed form, extra .....	0	7	6
M2920.	Very large Nicol Prism, mounted as Polarizer (without Analyser) .....	3	5	0
M2921.	Very large Nicol Prism, with Rotating Analyser .....	4	7	6
M2922.	Analyser to fit over Capped Eyepiece ..... 17/6, 25 0 and .....	1	10	0
M2923.	Ditto, fitted to Body of Microscope.....	1	10	0
M2924.	Adapting Polarizer to work in conjunction with Abbe Illuminator or other condenser for Substage.....	0	2	6



Rotating Analyser. M2919.

Eyepiece Analyser. M2927.

Polarizer with divided circle. M2925.

M2925.	Polarizer for Petrological Work, large size Prism with Rotating Flange, divided, with reader and spring catch to indicate quarter circles .....	£2	12	6
M2926.	Condensing Lenses of large aperture to fit over the above Polarizer .....	0	17	6
M2927.	Analyser to fit over Eyepiece, with large field prism, rotating with reader against divided circle, complete with Student's Huyghenian Eyepiece, having cross-webs.....	2	5	0
M2928.	Ditto, with best large sized Capped Eyepiece .....	2	10	0
M2929.	Extra for Calcspar plate to above.....	0	12	6

Tourmalines for polarization, unmounted, from 5/6 each. Mounting to order.

In consequence of the scarcity of suitable Iceland Spar, the cost of prisms has substantially increased and is still increasing. We are still able to offer some specially fine and extra large polarizing prisms at £4, £5 and £6 each. Quotation for any size will be given on application.

**POLARISCOPE SELENITES.**

M2937.

- M2937. **SELENITE STAGE**, as figured, with pinion to rotate the central well carrying the Selenites. With a set of 3 Darker's Best Selenites having P/A marked on each, complete ..... £2 2 0
- M2938. Set of Darker's best Rotating Selenites for Substage, each fitting into a separate revolving ring so that all three can be rotated over one another independently or in combination; each ring can be turned out of the axis when not required. This may be fitted either to the Substage or to the Polarizer ..... 3 3 0



Mica Selenite Stage. M2939.

**MICA-SELENITE STAGE.**

- M2939. 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. Thus 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. The effects are very fine ..... £1 6 0
- M2940 Selenites mounted on 3 by 1 slips, 3 varieties ..... each 0 2 0
- M2941 Selenite Films, according to size, mounted in circles .. 2/0 to 0 10 6
- M2942 Mica Films, ditto, ditto, ..... 2/0 to 0 10 6
- M2943 Designs in Selenite for the Projection Lantern Microscope, from 12/6 to 5 0 0

Bi-axial Crystals, Etc. See Catalogue No. 3.

**MICRO-SPECTROSCOPE.**

- M3231. 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 ..... 8 5 0

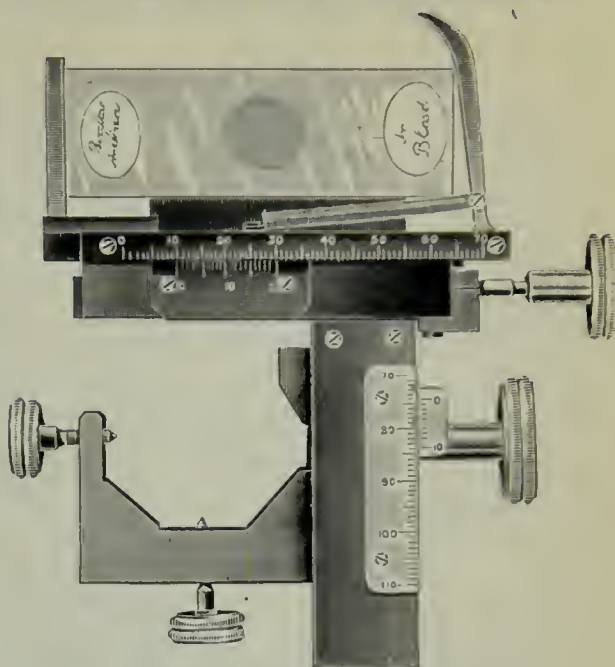
**ATTACHABLE MECHANICAL STAGES.****THE "SENIOR."**

M3000.—The attachable stage figured is suited to a limited number of microscopes only. It is intended primarily for our Praxis and Non-inclinable microscopes, also the high-power portable instrument, page 82, but it also fits certain microscopes of continental make and is substantially lower in price. It has a range of movement horizontally of  $2\frac{1}{4}$  inches, and vertically of  $1\frac{1}{2}$  inches. It can be quickly fixed or removed.

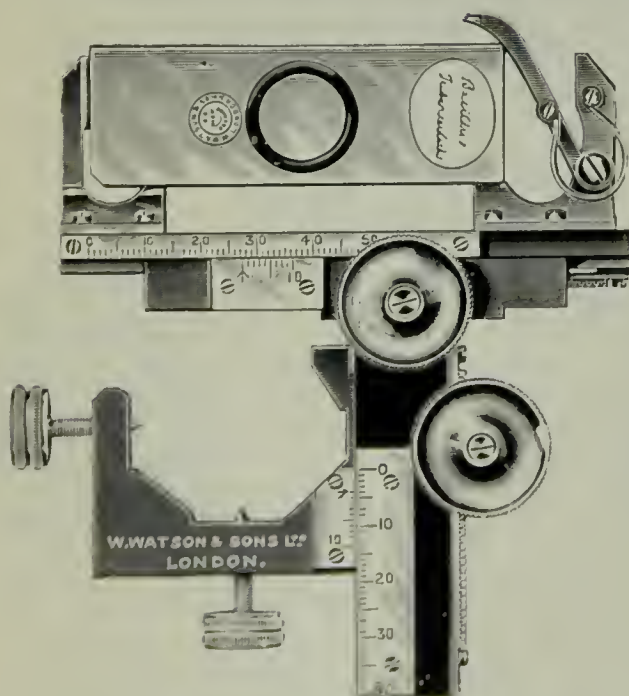
PRICE ..... £2 17 6

Divisions to movements, as in figure,

extra ..... 0 7 6



No. M3000.



No. M3001

**THE "JUNIOR."**

M3001.—This Stage answers the same purposes as No. M3000 above, but is of simpler construction. It is thoroughly efficient and can be well recommended. Length of horizontal movement,  $2\frac{1}{4}$  inches.

PRICES..... £2 2 6

Divisions to movements as in figure,

extra ..... 0 7 6

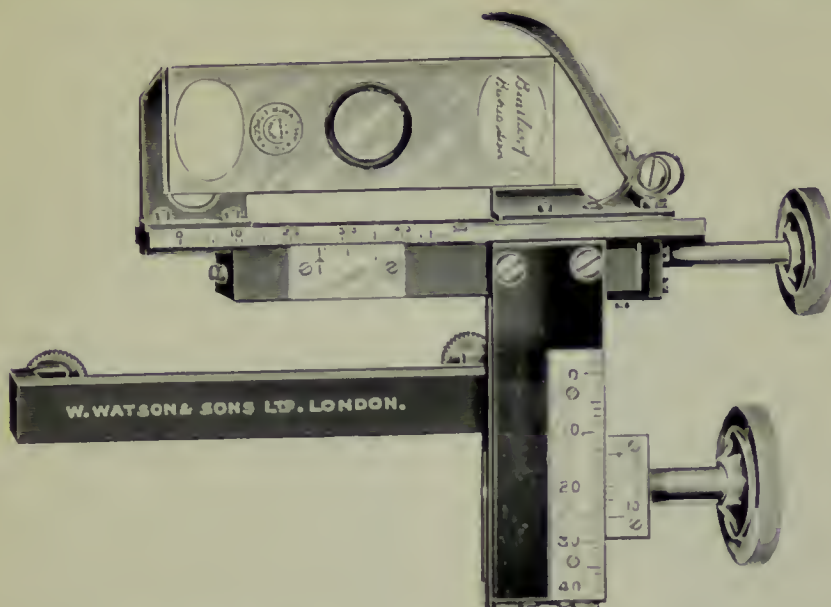
**OBJECT FINDERS.****WRIGHT'S FINDER.**

M3002.—This consists of a 1-inch square on stage surface, divided to  $\frac{1}{10}$ th in. When a sliding bar is taken, the horizontal divisions are engraved on the bar itself, and the vertical upon the stage.

PRICE, in either case ..... 6/6

M3003. Maltwood's Finder, in case ..... 6/6



**ATTACHABLE MECHANICAL STAGE.**

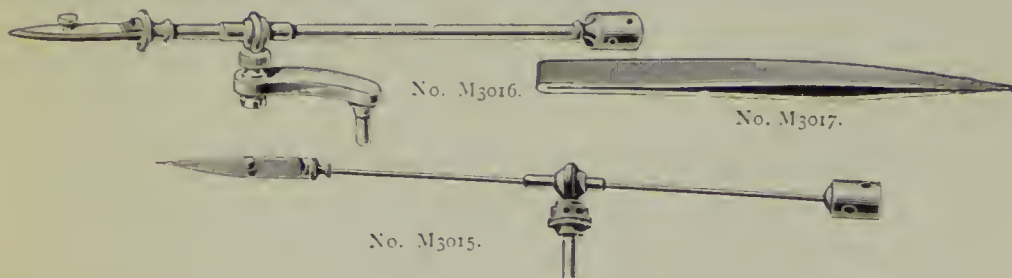
M3013.—The method of attaching this Stage to the Microscope is quite simple, it being only necessary to fit it on like a sliding bar and tighten two thumb-screws. It is stocked for the Edinburgh Student's, Praxis, Fram, and Standard Mk. I Instrument Stages. It gives  $2\frac{1}{4}$  ins. of horizontal traverse, and one inch of vertical.

PRICE .....	£3	0	0
Ditto, with divisions to movements as in figure.....	3	7	6
Any special size, extra .....	0	5	0

**AUXILIARY RANGE STAGE** See page 12**SLIDING-BAR FOR STAGE.**

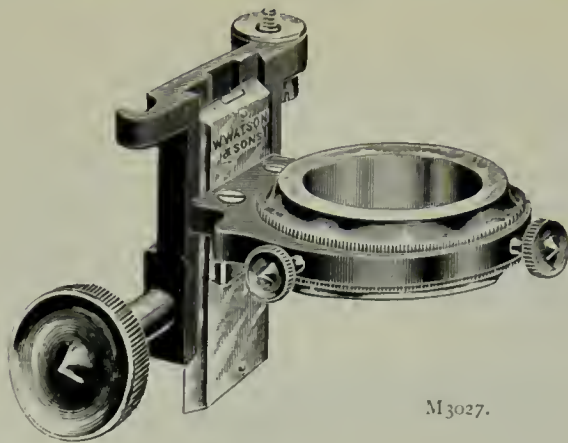
M3014.—Supplied to fit the Stages of all our microscopes that have not mechanical movements.

PRICE, if ordered with Microscope ..... £0 12 6

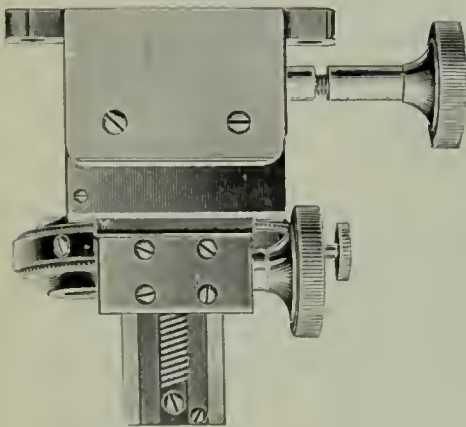
**STAGE FORCEPS.**

M3015. Forceps, to fit into stage or limb of Instrument to hold objects during examination .....	5/6 and	£0	7	6
M3016. Ditto, ditto, best quality .....	0	10	6	
M3017. Brass Hand Forceps, straight, small, 9d.; best straight, 1/6, curved .....	0	2	0	

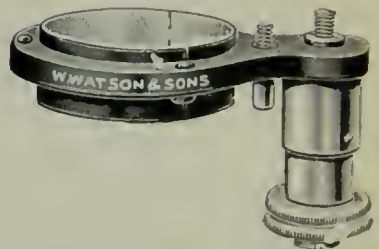
COMPOUND SUBSTAGE.



M3027.



M3028. View of substage with fine adjustment from the back.



M3029. Underfitting with spiral focussing screw.

M3027. Illustrates the pattern regularly fitted to our Edinburgh Student's and higher-priced stands. It has rack and pinion focussing arrangement, centring screws to enable the light to be set exactly central with any objective, and is mounted on a swing fitting, which allows of the whole apparatus being swung clear of the instrument axis if desired. The extra cost of this substage when fitted to any of our microscopes at time of ordering is ..... £1 17 6

It can be adapted to most existing stands at an inclusive charge of..    2   2   0

COMPOUND SUBSTAGE WITH FINE ADJUSTMENT.

M3028. The position of the extra milled head controlling the fine adjustment is shown in illustration, and in other respects the substage is similar to the compound stage described above, excepting that it cannot be swung out of the optical axis. Extra cost to M3027 ..... £1 5 0

UNDERFITTING WITH SPIRAL FOCUSSING SCREW.

This device affords a convenient method of raising and lowering the Condenser which it carries, so as to focus it accurately. 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, is of the universal size, so will carry any understage Condenser.

- M3029. It can be fitted to many Microscopes for.. ..... 17/6
- M3030. Supplying and fitting to our own Instruments .. ..... 15/0
- M3031. If a Condenser is purchased at the same time .. ..... 12/6

## GRÜBLER'S STAINS IN CRYSTALS.

M3041.

Put up in Glass Tubes with Screw Capsules.

	Grammes	s. d.		Grammes	s. d.
Acetin Blue .....	5	0 9	Gentian Violet .....	5	0 9
Acid Carmine .....	1	0 9	Gold-Orange (Griesbach) .....	5	0 6
"  Picric .....	5	0 9	Green (Acid) .....	5	0 9
Alizarin .....	5	0 9	Haemalum .....	5	1 6
Alkali Blue .....	5	0 9	Haematein (Mayer's) .....	1	1 3
Alkanuin .....	5	1 0	Haematoxylin, pure .....	5	1 6
Alum Carmine .....	2	0 9	Haematoxylin-Eosin .....	5	1 6
Aniline Blue .....	5	0 9	Indigo Carmine .....	2½	1 0
"  Blue-Black .....	5	0 9	Indulin .....	5	0 9
"  Green .....	5	0 9	Iodine Green .....	5	1 0
"  Yellow .....	5	0 9	Jenner's Blood Stain .....	1	1 0
Auramin .....	5	0 9	Leishman's .....	½	1 3
Aurantia .....	5	1 0	"  " .....	1	2 0
Azoblue .....	5	0 9	Magnala Red .....	5	1 0
Azur I., Giemsa's Stain .....	1	7 6	Magenta Red .....	5	0 9
"  II, .....	1	4 0	Malachite Green .....	5	0 9
"  II, Eosin .....	1	6 0	Methyl Blue .....	5	0 9
Benzo-azurin .....	5	0 9	"  Eosin .....	5	0 9
Benzo-purpurin .....	5	0 9	"  Green .....	5	0 9
Biebrich's Scarlet .....	5	0 9	"  Orange .....	5	1 0
Biondi-Ehrlich-Heidenhain triple stain .....	2	1 6	"  Violet .....	5	1 0
Bismarck Brown .....	5	0 6	Methylene Blue .....	5	1 0
Bleu de Lyon (Griesbach) .....	5	0 9	"  "  medic, pure .....	5	1 0
Blue, Brilliant .....	5	0 9	"  Green .....	5	0 9
"  Hofmann's .....	5	0 9	Naphthol Yellow .....	5	0 9
Borax Carmine .....	1	0 9	Nigrosin .....	5	0 9
Bordeaux Red .....	5	0 9	Orange " G " .....	5	0 9
Brasilin .....	1	1 0	Green .....	1	1 0
Carmalum .....	2	1 0	Phloroglucin .....	1	1 0
Carmine .....	5	0 9	Picric Acid .....	5	0 9
"  Ammonia (Hoyer's) .....	2	1 6	Picro Carmine, Ranvier's .....	1	1 0
China Blue .....	5	0 9	Resorcin-Fuchsin .....	1	1 3
Chromogen, Weigert's .....	5	0 6	Rosanilin .....	5	1 0
Chrysoidin .....	5	0 9	Rose, Bengal .....	5	0 9
Congo Red, Nissl's .....	5	0 9	Rubin .....	5	0 9
Coralline, Strasburger's .....	5	0 9	Safranin .....	5	0 9
Dahlia .....	5	0 9	Scarlet .....	5	0 9
Diamantfuchsin .....	5	0 9	Spiller's Purple .....	1	2 3
Double Green .....	5	0 9	Sudan (Red) .....	5	0 9
Eosin, pure .....	5	0 9	Thionin (Blue), pure .....	1	1 0
"  Blue shade, soluble in water .....	5	0 9	Toluidin Blue .....	5	0 9
"  Yellow .....	5	0 9	Vesuvium Brown .....	5	0 6
Eosin-Methylene-Blue (Leishman's) .....	1	1 0	Victoria Blue .....	5	0 9
Erythrosin .....	5	1 0	Water Blue (Unna) .....	5	0 9
Fluorescin .....	5	1 0	Wright's Blood Stain .....	½	1 3
Fuchsin (Acid) .....	5	0 9			

Box and Postage for Single Bottle, 3d. extra.

M3042.

## SETS OF GRÜBLER'S 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 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 Microtome's Vade Mecum .....	3	10	0

Grübler's Physiological Chemical preparations and Culture Media supplied to order.

Special Stains accurately made up to order.

# Micro-Chemical Preparations.

## STAINS IN SOLUTION.

M3052.

Made up to Standard Formulæ.

	s.	d.		s.	d.
Azur Blue, Giemsa's Solution ..per bottle	1	9	Haematoxylin:—		
Alcoholic Carmine .....	"	1 0	Erhlich's .....	per bottle	1 0
Alum Carmine .....	"	0 9	Heidenhain's .....	"	1 0
Ammonia Carmine .....	"	1 0	Iodine Green .....	"	1 0
Borax Carmine .....	"	0 9	Iodine Solution .....	"	0 9
Bismarck Brown .....	"	0 9	Jenner's Blood Stain, Kanthack's		
Biondi-Erlich-Heidenhain, triple	"	1 0	permanent formula .....	"	1 6
Borax-Methylene-Blue .....	"	0 9	Leishman's Blood Stain .....	"	1 3
Carbol Fuchsin (Ziehl-Neelsen)	"	0 9	Methyl Blue .....	"	0 9
" Gentian Violet .....	"	1 0	" Green .....	"	0 9
" Thionin .....	"	1 3	" Green-Pyronin Solution	"	1 0
Erhlich's Triacid .....	"	1 0	" Violet .....	"	0 9
Eosin, Alcoholic .....	"	0 9	Methylene Blue .....	"	0 9
" Aqueous .....	"	0 9	" " Loeffler's .....	"	1 0
Eosin-Haematoxylin for Blood	"	1 6	" " Borax .....	"	0 9
Eosin-Methylene-Blue (Leishman's)	"	1 6	" " Polychrom .....	"	1 3
Fuchsin, Alcoholic .....	"	0 9	Neisser's Stain for B. Diphtheria.	"	1 0
Gentian Violet .....	"	0 9	Picric Acid Solution .....	"	0 6
Gibbe's Double Skin for T. Bacillus	"	1 6	Picro Carmine, Ranvier .....	"	1 0
Giemsa's Blood Stain .....	"	1 9	Romanowsky's Stain .....	"	1 3
V. Geison's Stain .....	"	0 3	Safranin aqueous .....	"	0 9
Gram's Iodine .....	"	1 0	" alcoholic .....	"	1 3
Green, Acid Aniline .....	"	0 9	Thionin Carbol .....	"	1 3
Haemalum (Mayer's) .....	"	0 9	Toison's Solution for Blood .....	"	0 9
Haematein (Unna's) .....	"	1 3	Triacid, Ehrlich's .....	"	1 0
Haematoxylin:—			Toluidin Blue .....	"	1 0
Delafield's .....	per bottle	1 0	Vesuvium Brown .....	"	0 9
Kleinenberg's .....	"	1 0	Weigert's Stain for Elastic tissue	"	1 6
			Wright's Stain for Blood .....	"	1 0

Box and Postage for Single Bottles, 3d. extra.

## Burroughs Wellcome & Co.

### M3053. 'SOLOID' BRAND MICROSCOPIC STAINS.

(Trade Mark)

'Soloid' Microscopic Stains will be found exceedingly useful for the rapid preparation of small quantities of solution.

A descriptive list, in each packet, gives full directions for making up and staining.

The following 'Soloid' stains are obtainable:—

Bismarck Brown, pure	0.1 gm.	8d.	Haemalum	0.1 gm.	8d.
Borax Methylene Blue		8d.	Haematoxylin, pure	0.1 gm.	8d.
Erhlich Triple Stain		10d.	Methyl Violet, pure	0.1 gm.	8d.
Eosin, pure	0.1 gm.	8d.	Methylene Blue	0.1 gm.	8d.
Eosin-Azur (for Giemsa staining			Romanowsky Stain (Leishman's		
with one solution)	0.038 gm.	1/6	Modification)	0.015 gm.	8d.
Eosin-Methylene Blue (Leishman's			Romanowsky Stain (Wright's		
Jenner's Stain)	0.04 gm.	8d.	Modification)	0.05 gm.	8d.
Fuchsin (Basic), pure	0.1 gm.	8d.	Sodium Carbonate	0.05 gm.	8d.
Gentian Violet, pure	0.1 gm.	8d.	Thionin Blue, pure	0.1 gm.	8d.
Gram's Iodine Solution	1 c.c.	8d.	Toison Blood Fluid		8d.

Each tube contains 6 'Soloid' products.



**MOUNTING MATERIALS**—*Continued.***M2836. MICRO-CHEMICALS AND REAGENTS.**

	s.	d.
Acetone, pure ..... per bottle	0	9
Acid, Acetic ..... "	0	9
" Hydrochloric ..... "	0	6
" Nitric ..... "	0	6
" Osmic ..... per 10 grammes tube	1	9
" Sulphuric ..... per bottle	0	6
Agar-Agar, in powder ..... per oz.	0	4
Alum, pure ..... "	0	4
Aniline Oil, pure ..... per bottle	0	9
" Sulphate ..... "	1	0
Benzole..... "	0	6
Cedar Oil, thick, for Immersion... "	0	9
Celloidin, granular .... per 1 oz. packet	3	6
Chlor-Zinc-Iodine (Schultz) .. per bottle	1	0
Copper Acetate Solution ..... "	0	6
Eau de Javelle ..... per 2 ozs.	0	9
Flemming's Solution ..... "	3	0
Formalin, 40 per cent. solution, per lb. 3/0		
per ½ lb., 1/9 ..... per 4 ozs.	1	0

	s.	d.
Gelatine, No. 1a ..... per 4 ozs.	2	0
Glycerine, pure ..... per bottle	0	6
Gold Chloride, crystal, per 15-grain tube	1	8
Gum Arabic cryst. .... per oz.	0	3
" Dammar ..... "	0	4
" Tragacanth ..... "	0	6
Litmus Solution ..... per bottle	0	6
" Books, Red or Blue .... each	0	2
Naphthalin Entomological preservative,		
..... per oz.	0	2
Paraffin Wax, Soft ..... per lb.	1	0
" Hard ..... "	1	0
" pure filtered ..... "	2	6
Peptone ..... per oz.	1	0
Phloroglucin ..... per 1 gramme	1	0
Potass. Bichromate ..... per oz.	0	2
Potash, Caustic ..... per bottle	0	6
Toluol ..... "	1	0
Venice Turpentine ..... "	1	0

**M2837. MOUNTING MEDIA.**

Canada Balsam, Natural ..... per bottle	1	0
" " Dried ..... per oz.	1	0
" " in Benzole ..... per bottle	1	0
" " in Chloroform ..... "	1	0
" " in Xylol ..... "	1	0
" " any of above in		
glass capped bottle ..	1	6
" " in collapsible tubes each	1	0
Deane's Medium ..... per bottle	1	0
Farrant's Medium ..... "	1	0
Glycerine Jelly ..... "	1	0
Styrax Solution, for Diatom		
mounting ..... "	2	0

**M2839.****VARNISHES for finishing Slides.**

Blue Varnish ..... per bottle	1	0
Green " ..... "	1	0
Red " ..... "	1	0
Zinc White ..... "	1	0

Box and Postage for Single Bottles, 3d. extra

**M2838. CLEARING MEDIA.**

Benzole..... per bottle	0	6
Bergamot Oil ..... "	1	0
Cedar Oil, thin ..... "	0	9
Clove Oil ..... "	1	0
Origanum Oil ..... "	1	0
Turpentine ..... "	0	6
Xylol..... "	0	6

**M2840. CEMENTS for Cell Making and Ringing.**

Asphalt or Black Cement ..... per bottle	1	0
Bell's Cement ..... "	1	6
Brown Cement, Ward's ..... "	1	0
Caoutchouc and Shellac ..... "	1	0
Club Black Enamel ..... "	0	6
Glue, Hollis's Liquid ..... "	0	6
Gold Size ..... "	1	0
Marine Glue Solution ..	1	0

**TURNTABLES.**

M2820. The "Facile" Ball-bearing Turntable. An improvement on all existing patterns, fig. M2820. In this form the table is balanced in the ordinary way on a hardened steel pin and rotates on a dead hard steel ball, thus reducing friction to a minimum, and ensuring a smooth and steady revolution. The hand support is placed high, enabling a careful application of the brush. The brass table is engraved with a circle which exactly encloses a 3 × 1 slip, thus giving instant centring. Price .....



No. M2820.

£0 10 6

M2821. Turntable, ordinary pattern, as Fig.

M2821 ; very efficient 0 6 6

M2822. Self-centring pattern, with concentric revolving adjustment

0 15 0

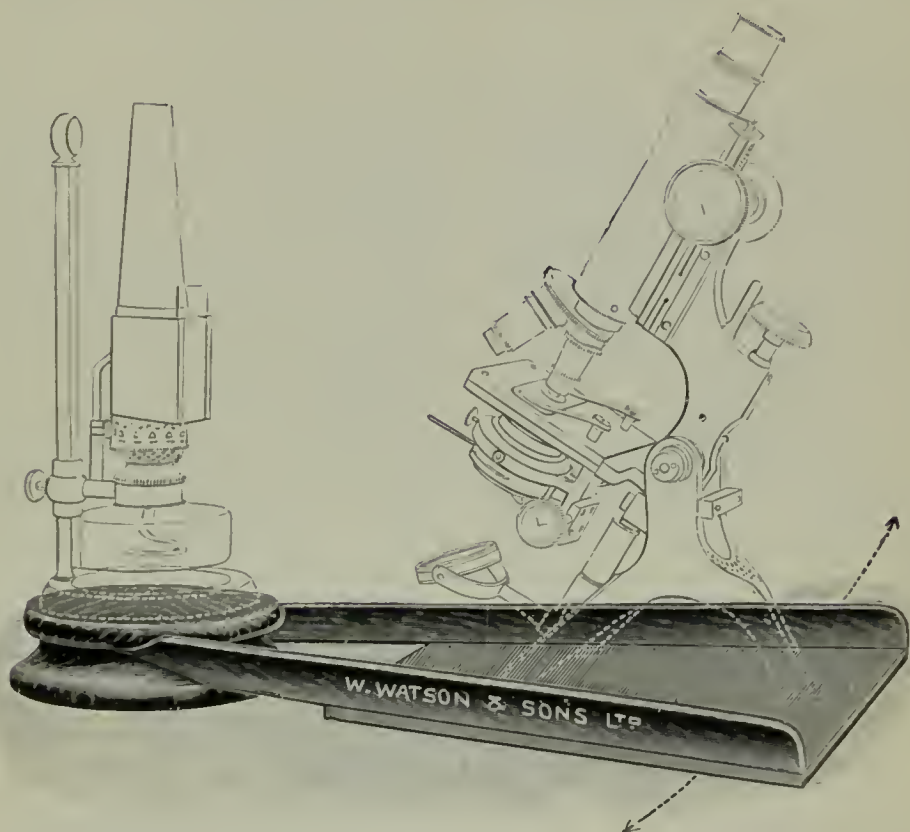
M2823. Washing Rack, Metal, grooved for 36 slips, 3 × 1 or 3 × 1½

in., light and strong 0 2 0



No. M2821.

WATSON & SONS' "SPANSA"  
REVOLVING MICROSCOPIC TRAY.



The Microscope is placed on a cloth-lined tray which has two extended arms connected by a circular block, having on its under-side a centre pin. The centre pin fits into an oak base, which is cloth-lined on the side in contact with the table. The under side of the tray is fitted with "domes of silence" and can be revolved on the centre pin, the lamp being placed on the wooden circle over the centre, and revolving with the microscope and therefore maintaining its position constantly in relation to the instrument.

It will be readily seen that a device of this description allows of several people using the same microscope in succession with the minimum of inconvenience. The whole tray and contents can be moved bodily without trouble when desired. It is constructed in oak, wax polished.

This device is made to the design of Mr. A. J. H. Brown and suggestions of Mr. E. Harcourt Tyrrell.

PRICE . . . . .	£0 12 6
Complete Microscope Table, with revolving top in Oak, Walnut or Mahogany . . . . .	8 10 0

## Zeiss Microscopes.

The Instruments by this maker are usually in stock and prompt delivery customary.

### STAND I.

This is one of the large Zeiss models and is of latest design. It is fitted with their new form of "Berger" Fine Adjustment, and with a Mechanical Stage, as figured. The Abbe Illuminating Apparatus is adjustable by rack work and the Iris diaphragm can be laterally displaced.

#### PRICES.

Stand and Illuminating Apparatus, in Case .....	£20	0	0
SET ZB. Stand, Apparatus and Case, with Eyepieces 2, 3 and 4, Objectives A, D, and $\frac{1}{2}$ in. Oil Immersion, Triple Nosepiece, £30	18	0	0
SET ZB. Stand as above, with Illuminating Apparatus and Case, with Eyepieces 2 and 4, Objectives "A" and "D," Double Nosepiece ....	£24	2	0

The above Stand can be supplied with a plain round vulcanite stage instead of the Mechanical Stage for £3 15 0 less.

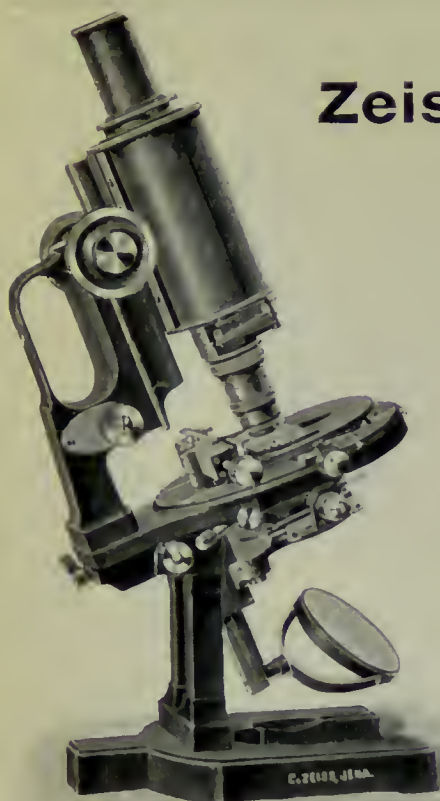
### STAND IV.

An instrument of medium and very convenient size; it has a fixed round stage, and Abbe Illuminator.

#### PRICES.

Stand, as described and figured, with Abbe Illuminator, in Case, £10	10	0
SET ZC. Stand, Illuminating Apparatus, and Case with Eyepieces 2, 3 and 4, Objectives "A," "D" and $\frac{1}{2}$ in. Oil Immersion, Triple Nosepiece .....	£21	8 0
SET ZD. Stand, Illuminating Apparatus and Case, with Eyepieces 2 and 4, Objectives "A" and "D," Double Nosepiece .....	£14	12 0

Complete Catalogue of Zeiss Microscopes on application.





# OBJECTIVES AND COMPENSATING EYEPIECES.

By CARL ZEISS, JENA.

## Apochromatic.

Focus.		Initial power Diameters.	Numerical aperture	PRICE.	Focus.		Initial power Diameters.	Numerical aperture	PRICE.
M.ms.	Inches.				M.ms.	Inches.			
70	2 $\frac{3}{4}$	For projection without eyepiece		£2 0 0					£ s. d.
35	1 $\frac{1}{2}$	Ditto.		1 15 0	2'5	$\frac{1}{10}$	100	1'25	12 10 0
*24	1	10 $\frac{1}{2}$	0'30	6 0 0			Oil Immersion.		
16	2 $\frac{3}{8}$	15 $\frac{1}{2}$	0'30	4 0 0	3	$\frac{1}{8}$	83	1'30	15 0 0
*12	1 $\frac{1}{2}$	21	0'65	7 0 0	3	$\frac{1}{8}$	83	1'40	20 0 0
8	1 $\frac{3}{8}$	31	0'65	5 0 0	2	$\frac{1}{2}$	125	1'30	15 0 0
*6	1 $\frac{1}{4}$	42	0'95	9 0 0	2	$\frac{1}{2}$	125	1'40	20 0 0
4	1 $\frac{1}{8}$	63	0'95	7 0 0	1'5	$\frac{1}{16}$	167	1'30	17 10 0
3	1 $\frac{1}{8}$	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. Please specify when ordering.

## Achromatic Objectives.

Designation.	Numerical Aperture.	Approximate Focus.	PRICE.			With correction collar.
			£	s.	d.	
aa	0'17	1 in.	1	7	0	
A	0'20	3 $\frac{1}{2}$ "	1	0	0	
AA	0'30	3 $\frac{1}{2}$ "	1	10	0	
B	0'35	1 $\frac{1}{2}$ "	1	10	0	
C	0'40	3 $\frac{1}{2}$ "	1	10	0	
D	0'65	1 $\frac{1}{2}$ "	1	15	0	
DD	0'85	1 $\frac{1}{2}$ "	2	10	0	£ s. d.
E	0'85	1 $\frac{1}{2}$ "	3	0	0	3 10 0
						4 0 0

## Homogeneous Immersion —

—	1'30	1 $\frac{1}{2}$ "	6 5 0
---	------	-------------------	-------

## 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 ( $\frac{3}{4}$  in.), Price, £5. Focus, 35 m/m ( $1\frac{1}{4}$  in.), Price, £5.

## 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 combination a well balanced image.

Initial Magnifying power, diam	2 (Searcher)	4	6	8	12	18	27	
For Continental length of body.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Not supplied
	1 0 0	1 0 0	1 0 0	1 10 0	1 10 0	1 15 0	1 15 0	
For English ditto.	1 10 0	2 0 0	1 10 0	2 0 0	1 15 0	1 15 0	1 10 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. It will generally be found economical to buy the eyepieces of the continental diameter, together with an adapter between the larger and the smaller size, costing 4/6





## ZEISS MICROSCOPES.

### STAND V.

This is a popular pattern of Student's Microscope. It is not inclinable. The stage is round, the coarse adjustment by rackwork, and the micrometer screw fine adjustment of the usual type.

### PRICES.

Stand "V" with Simplified Abbe Illuminator, 1 to N.A., in case..... £6 0 0

Set Z.E. Stand as above with illuminating apparatus and case, with eyepieces 2 & 4, objectives A & D, and double nosepiece..... £10 2 0

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**MICROSCOPES BY ANY MAKER  
SUPPLIED TO ORDER AT LIST PRICE.**

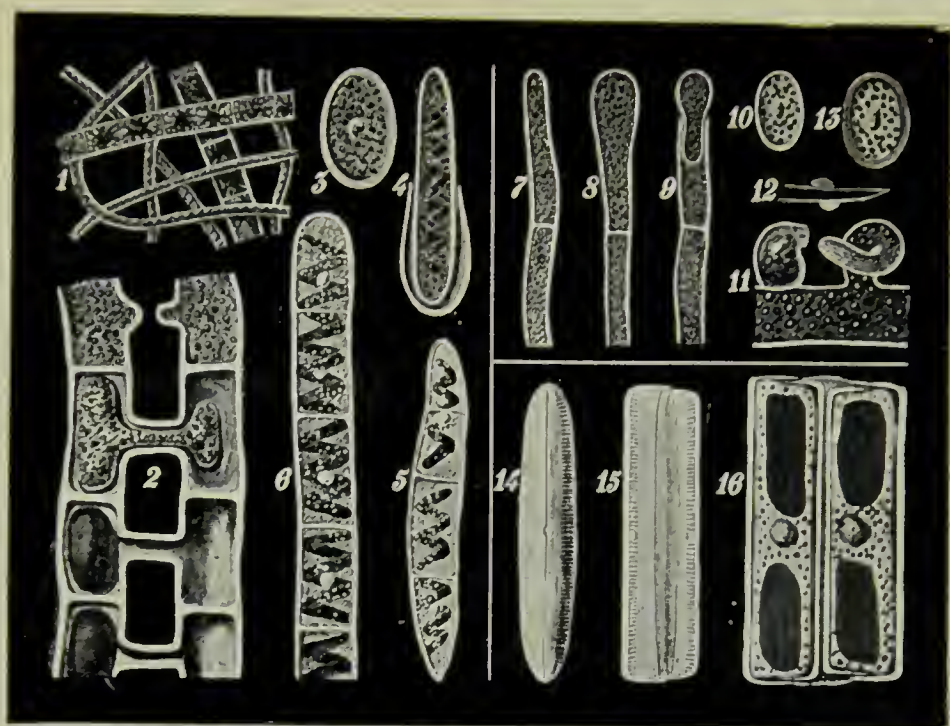
Every opportunity is given for comparing Objectives and Instruments, so that the purchaser may ensure his outfit suiting his requirements.

## SECOND-HAND MICROSCOPES.

WATSON & SONS have from time to time Second-Hand Microscopes by all the best makers, in first-class condition, at most moderate prices.

***Full particulars of these will be sent on request.***

# WALL DIAGRAMS for "Nature Teaching," etc.



M3090.

Diagram 30.

Botany, 3rd Series.

## Fresh-water algae, Pinnularia, Spirogyra, Vaucheria.

M3090.—The new "Nature Teaching" Series of Wall Diagrams, as fig. M2304, embraces Botany and Natural History. Each diagram measures about  $3\frac{1}{2} \times 2\frac{1}{2}$  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 of nature. An illustrated and descriptive key, including the English and Latin names, is supplied with each diagram. The following 70 sheets have been prepared and 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.

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- 9 Convolvulus
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- 11 Willow

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- 43 Equisetum

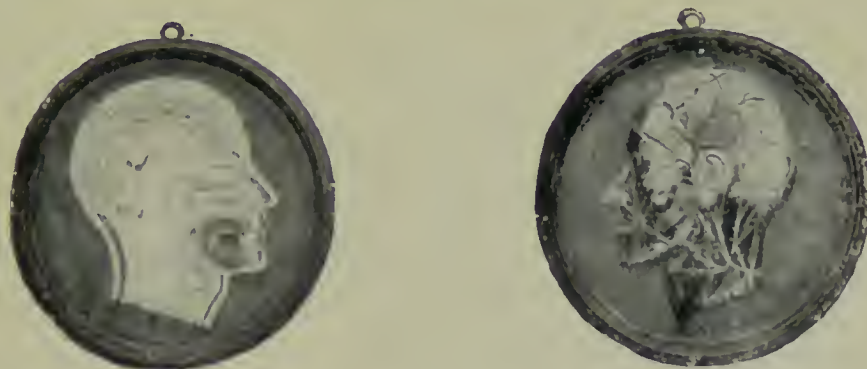
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Price 4 6  
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In Papier Maché.



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M <sub>3166</sub> .	<b>TRUNK.</b> —Opened in front, showing larynx, lungs, heart, diaphragm, stomach, liver with gall-bladder, spleen, small and large intestine and bladder, Sections of ribs, claviele and pelvis..	0	18	6
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		3	10	0
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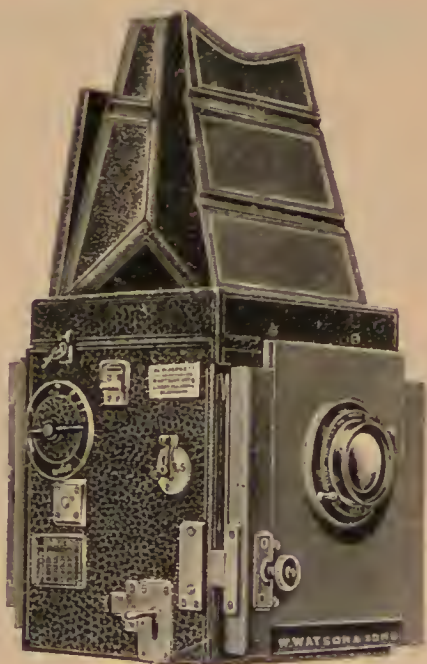
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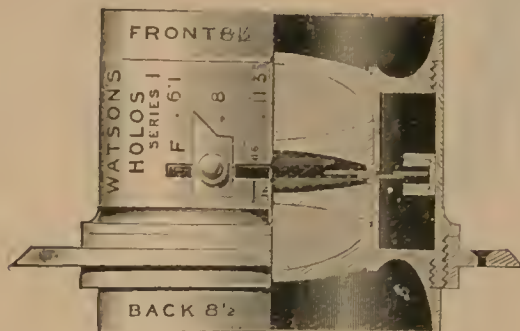
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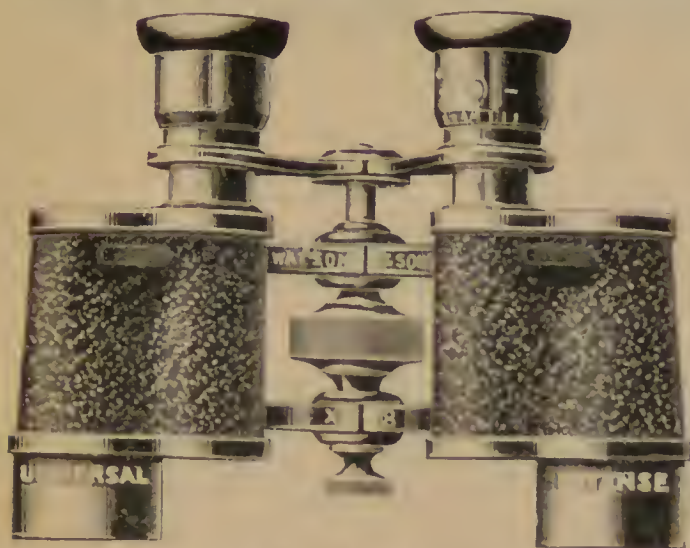
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