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STUDENTS and RESEARCH

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MICROSCOPES

A New Conception in Design
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"SERVICE"
"BACTIL"
"KIMA"
UNIVERSAL BINOCULAR

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Makers of Microscopes and Scientific Instruments
313, HIGH HOLBORN, LONDON, W.C.1
WORKS: HIGH BARNET, HERTFORDSHIRE

Preliminary

THE story of Watson's **"Service"** Microscope discloses the developments which have taken place in the foremost Students' instruments in recent years.

From the time of its introduction in 1918, it has proved acceptable and much appreciated in every Laboratory where it has been used.

There is no finality in microscope construction, but as knowledge has grown the **"Service"** Microscope has been altered, in some cases in comparatively unimportant details, the sum of which has contributed to the excellence of the model as manufactured to-day.

Before describing at length the outstanding features which make the **"Service"** Microscope unique in its value for Laboratory and Research work, a few points might be emphasised for the special consideration of prospective users.

(1) **Minimum number of parts.**—The aim in the latest model of Watson's **"Service"** Microscope has been to obviate all possible separate parts by using comprehensive single castings.

(2) **Watson's Optical Bench construction.**—Watsons believe they were the first to incorporate this system in their microscopes, and it not only ensures accuracy of optical axis through the whole lens-system, but enables all essential parts to be machined to and fitted on this optical bench framework.

Thus it carries the body, the stage, the substage and the mirror stem.

Only those who have used a **"Service"** Microscope can be aware of the rigidity and permanent value of this arrangement.

(3) **Adjustable Fittings.**—It has been the practice of Watsons for more than forty-five years to provide as far as practicable, adjustable fittings to all working parts.

In the **"Service"** Microscope this is carried to a more successful and effective point than ever before, and it ensures efficient working for an indefinite period.

(4) **The Body.**—For the first time the body has ceased to be made of tubing. It is a corporate part of the dove-tailed fitting to which the rackwork coarse adjustment is fitted.

The whole is one solid piece, and the body tube is formed by drifting out the metal from the solid.

The risk of the body loosening or coming away from the coarse adjustment fittings is entirely eliminated.

(5) **Substages.**—The spiral screw focussing adjustment which has had a vogue for so many years in Students' Microscopes has been abolished in the Watson's **"Service"** Microscope, and in place of it a substage with rackwork to focus, carries the condenser. Milled heads are available on **both** sides of the Substage.

(6) **The coarse and fine adjustments** are of the highly responsive type that is always associated with Watson Microscopes, while the beauty and convenience of design, the general balance of the instrument when set up for work, no matter what the position may be, contribute to the confirmation of our claim that the

WATSON
"SERVICE" MICROSCOPE

IS TO-DAY

The Best Students' Microscope in the World

WATSON'S
"SERVICE" MICROSCOPE
With Latest Improvements

Watson's **"Service"** Microscope is somewhat larger in size than the average microscope for Students' use. This is necessary to attain the several objects that the manufacturers have in view.

In the first place it is desirable that there should be perfect freedom for the use of every kind of objective and condenser, and both above and below the stage space is allowed for this.

It enables a Research and a Students' Microscope to be combined in one.

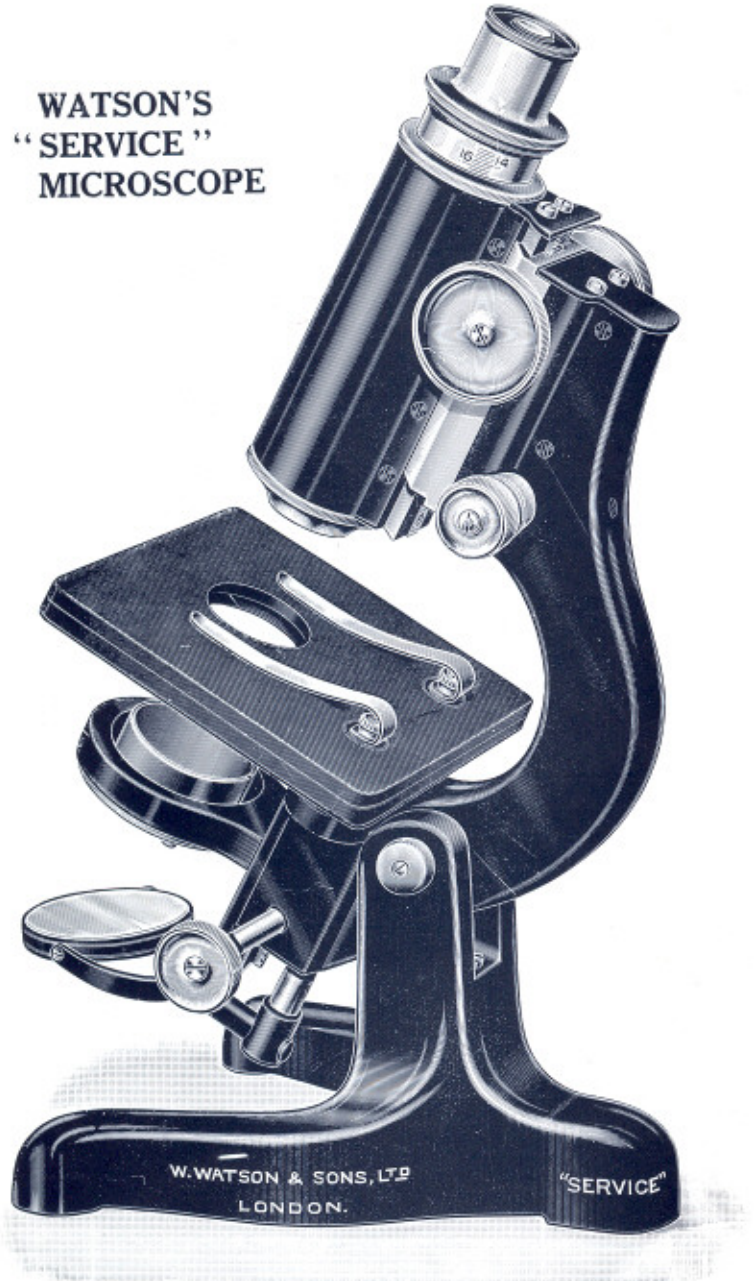
Every part in the **"Service"** Microscope is standardised so that if at a subsequent date the user found it desirable to add refinements for Research work, provision is made for the immediate attachment of such items as mechanical stage, compound centring substage, etc., thus converting the instrument into a complete Research model.

The **"Service"** Microscope Stand is worthy of these additions, and everything in it is of the highest order of excellence.

The following pages give particulars of the important features in the **"Service"** Microscope, already referred to.

The Student of to-day requires an Instrument that will give him unlimited facilities for his present and future work. The **"Service"** Microscope fulfils every condition.

WATSON'S "SERVICE" MICROSCOPE



Height, 12½ ins.; Size of Stage, 4¼ ins. square; Height to underside of Stage, 4 11/16 ins.
Spread of Foot, 7 9/16 × 5¾ ins.

OPTICAL BENCH LIMB

(*See page 7*)

When the **"Service"** Microscope was introduced, the desirability of reducing the quantity of parts was considered, and the optical bench system of construction was devised. This has proved in long years of experience to offer advantages over every other method.

The limb runs continuously from the upper end which carries the body to the lower end in which the mirror stem fits. The dove-tailed fittings at the body end, and the dove-tailed fittings at the lower end which carry the substage, are machined in a continuous operation, thus ensuring perfect alignment.

These fittings are machined to a master gauge without tolerances other than due to the feel of the fit in the gauge. The variations are less than one-tenthousandth of an inch.

It will be readily seen that the old bugbear so frequently referred to in text books, by which the approach of the body to the substage and of the substage to the body caused decentration, is eliminated, and as the whole of the structure is in a solid casting, a degree of stability is imparted to the instrument which can only be appreciated by comparison with less stable designs.

Incidentally, the machining to a master gauge permits of interchangeability of the various parts.

The bracket or support "L" to which the stage is attached is tested for squareness with the bearings "F" and "S" by means of a special indicator gauge which gives a direct reading of the angular relation of the surfaces.

It will be readily seen from the foregoing that the number of separate parts that are used in the making of the Watson Microscope is reduced to a minimum.

WATSON'S OPTICAL BENCH LIMB

as fitted to the "Service" Microscope

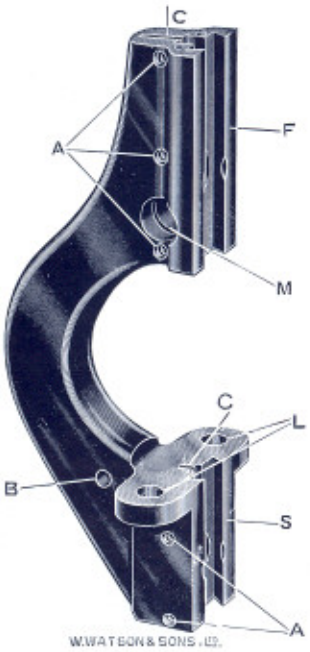


Figure 1.

A. Screw holes for adjusting the slides. *B*. Hole for axis bolt.

C. Saw cut which permits the adjustment of the slides.

F. Fine adjustment slide. *L*. Holes in the extension for attaching the stage.

M. Hole into which the fine adjustment micrometer screw and nut are assembled.

S. Substage slide.

ADJUSTMENTS TO MECHANICAL MOVEMENTS

For forty-five years the provision of a means of adjusting mechanical fittings has been an outstanding feature of Watson's Microscopes, and after this long experience they assert that it is the only way to ensure the lifetime of efficient working that is the experience of the users of Watson Instruments. It is simple and effective. The dove-tailed fittings of the slides in which movements take place in a microscope are of the most precise description. They must slide sweetly, but without the suggestion of a shake. Every minute displacement would appear magnified by the objective. However accurately a microscope may be made, such influences as heat and climate apart from actual wear and tear may cause alteration in the metal surfaces, introducing unexpected disturbance. The merest trace of change can be at once corrected with the adjusting screws.

In the illustration on page 7 a slot is shown at "C," and this slot can be slightly closed or opened, so expanding or contracting the bearings at "F." All that is necessary is to give a fraction of a turn to the screws "A." These screws have a push and pull action, so that when a fitting is made it can be fixed. Similar screws are shown on the substage bearings under the same letters.

We would remark that we are able to give a guarantee with our microscopes for five years of efficient working, because we know that any of our mechanics can adjust a microscope so far as the fittings are concerned in a very short space of time, and it has been our habit for many years, to give service in this way free of charge to laboratories in all parts of the country where our microscopes are in use. Watson's microscopes give a lifetime of working service, with efficiency.

COARSE AND FINE ADJUSTMENTS

The **Coarse Adjustment** is by spiral rackwork and pinion.

The **Fine Adjustment** is of the Lever type, with lateral milled heads on either side of the Limb. A complete turn of the milled heads produces a movement of the body of 1/125 ins. (·22 mm.).

The action of the Fine Adjustment is arranged to impart a definite up and down movement, and the lever is so placed and shaped that its pressure against its opposing point is always perfectly vertical. There is no rocking action which would be likely to create a disturbed image, even with high powers.

The custom hitherto in making this type of Fine Adjustment has been to obtain reactionary movement by means of a compression spring. This has resulted, in certain makes of Microscopes, in an unsatisfactory Fine Adjustment, on account of the gradual reduction in the power of the spring. In our instrument a new recoil spring of tempered cast steel is used, and a new element of permanency is introduced thereby. This ensures responsiveness and accuracy whether the Instrument be used vertical or horizontal.

The micrometer screw which moves the lever, with the milled heads which operate it from either side of the limb, are all contained in one unit, and can be fixed to any instrument when it is completely finished, as shown in Fig. 3, the steel rod and screw being shown separately beneath the assembled fitting.

Fig. 2.

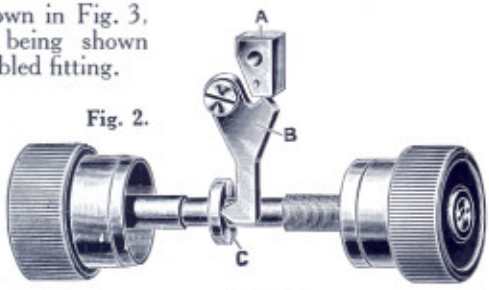


Figure 2. The action of the Fine Adjustment.

A. The Block which is attached to the Fine Adjustment Slide.

B. The Lever.

C. The Travelling Wheel that imparts the movement actuated by the screw on the right, which is revolved by the milled heads.

Fig. 3.

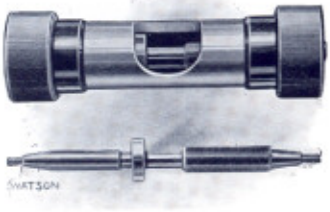


Figure 3.

The Assembled Fine Adjustment Spindle.

Beneath, the beautifully shaped Steel Rod and Screw.

THE BODY AND DRAWTUBE

It is usual for the body to be made from drawn seamless tubing, the screw end which carries the objectives being fitted at the lower end by screwing, and the dove-tailed bearing which carries the rackwork for the coarse adjustment, fixed to the tubing by means of screws and perhaps in addition, soldering.

This last fitting in particular has frequently come apart in days gone by. Such a thing cannot happen with the Watson **"Service"** Microscope, because the bar is a solid part with the body itself, as also is the screwed end which carries the objective.

The whole of this portion is made from solid extruded metal, and the aperture of the body is drifted out, the fittings for the coarse adjustment being separately machined to the optical axis thus obtained.

Weight is not materially increased, but the strength of construction makes this an outstanding advance in Students' Microscopes, and the number of loose parts is reduced.

The drawtube has been increased in size to 34 mm. and the effect of this modification is to overcome internal reflection so freely associated with the narrower diameter of drawtube hitherto fitted on all Students' Microscopes, as the eyepiece is virtually suspended within this tube. At the lower end and forming a part of the drawtube itself, is a thread of the standard R.M.S. gauge in which can be mounted a low power objective, analyser or other fitting. The drawtube can be immediately withdrawn from the body for the attachment of these fittings. The tube has a double engraved scale, reading on one side the tube length without nosepiece and on the other side the tube length with nosepiece in position. The top of the drawtube carries the Standard Students' Eyepiece. This fitting is provided with a coarse thread, so that when it is rapidly unscrewed and the whole aperture of the wide drawtube made available for the use of low power objectives in photomicrography where no eyepiece is required, the objectionable cut-off is obviated.

Reference to page 11 will explain the foregoing, the solid casting consisting of :

The body. **The nosepiece end.**

Dovetailed fittings for Coarse Adjustment.

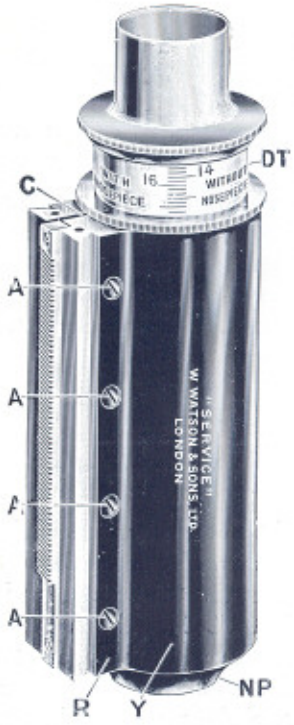


Figure 4.

The solid body and coarse adjustment fittings of the "Service" Microscope.

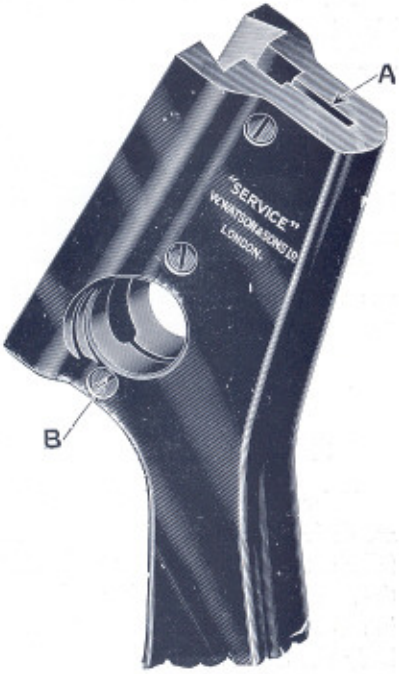


Figure 5.

The limb of the "Service" Microscope shewing Fine Adjustment fittings.

Figure 4.—The portions marked *R*, *Y* and *NP* are from solid metal without joints. *A* are adjusting screws for expanding or contracting the Slot *C* in the Coarse Adjustment dovetailed fitting. *DT* is the drawtube.

Figure 5.—Adjusting Screws *B* for compressing or expanding the Slot *A* and adjusting Fine Adjustment fittings. The action is very minute, but all that is necessary for taking up wear.

THE STAGE

This is fitted on the arms *L* which form a portion of the limb (see Fig. 1, page 7). These are of a suitably solid character and are machined with the same accuracy as the other fittings.

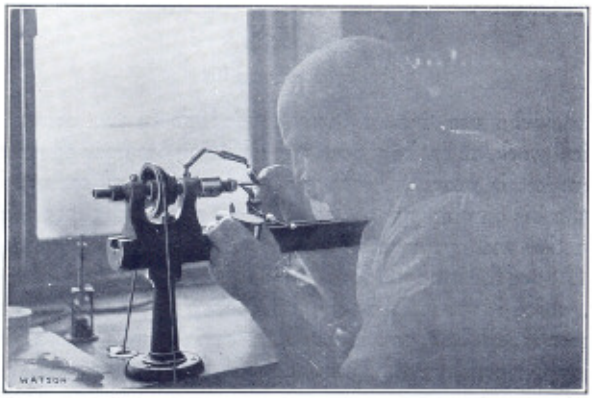
The stage is of large size, 110 mm. wide. It consists of a metal core pierced with periodical holes. This is covered on all surfaces in ebonite by a vulcanizing process. The ebonite unites through the holes and there is, therefore, no fear of swelling or detachment owing to any extreme conditions of temperature. After vulcanizing, the surfaces of the stage are not only machined parallel and flat, but the upper surface is finished on an optical plane tool ensuring its absolute flatness. It is specially suited to attachment of a mechanical stage at any subsequent date.

CONDENSER CARRIER OR SUBSTAGE

Reference has already been made in this list to the advantages which are derived from the Watson Optical Bench system of construction. It follows that if the support and dovetail which carries the Substage is in the same plane as the similar fitting which carries the body, and is machined in a continuous line, the Substage will always approach the body, and the body the Substage, in absolute alignment. In the past, difficulties have arisen, especially when high-power Condensers, dark-ground illuminators, etc., have been used, because it happened that as the Substage, with its Condenser, was raised or lowered, it caused decentration.

One result of this improved construction of Watsons is to remove these disadvantages, and to assist in doing so they have abandoned, in their Service Microscope, the Spiral Focussing Screw Condenser Carrier, which has for so long been fitted to Microscopes for students' use. A Substage, in three different patterns, fitted with rackwork to focus, and having two Milled Heads, one on either side of the limb, is now provided.

THE TOOL ROOM, WATSON'S WORKS, HIGH BARNET



MOUNTING AND CENTRING $\frac{1}{12}$ IN. IMMERSION FRONT LENS, WATSON'S WORKS, HIGH BARNET

SIMPLE SUBSTAGE

(As illustrated, Fig. 6, page 15)

This consists of a solid casting with tube to carry the condenser in sleeve pattern mount with iris diaphragm. A certain amount of latitude is given to the sleeve fitting so that at any subsequent date, if after rough handling in the laboratory, it is found that the condenser is no longer central, necessary centring can be carried out by releasing the screws *AS*. This substage is provided with rackwork focussing. The adjusting screws to the dovetailed fitting are shown at *A*.

CENTRING SUBSTAGE

(As illustrated, Fig. 7, page 15)

For this, in addition to the plain casting mounted on the rackwork slide, centring screws *CS* are provided so that any form of condenser can be axially aligned to the optical system, but instead a new form of substage condenser mount has been designed in which the optical part of the condenser hinges aside laterally. It is secured by a steel catch and released by a trigger.

INTERCHANGEABLE CONDENSER SLIDES

(As illustrated, page 16)

For those who use two or three condensers in the course of their microscopical work, an entirely new type of fitting has been designed. The substage bracket is provided with centring screws and mounted in this bracket is the iris diaphragm. In setting up, the iris diaphragm is centred to the objective and eyepiece of the instrument by means of the screws provided. Above the bracket, dove-tailed fittings are machined to carry the condenser, which is mounted on a plate to slide into these. For centring, the condenser is slid into position and the aerial image of the diaphragm as formed by the condenser is examined. If the iris diaphragm no longer appears central, centring screws are provided on the condenser slide. The optical part is thus brought into alignment with the iris diaphragm, the objective and the eyepiece, ensuring perfect accuracy. All condensers used are aligned in this manner.

SIMPLE SUBSTAGE. (*As described, page* 14)

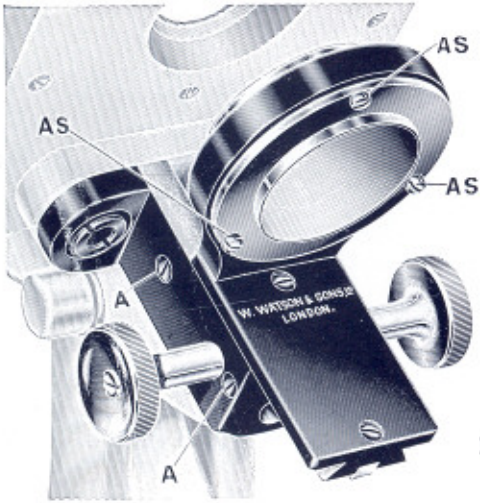


Figure 6.

COMPOUND SUBSTAGE. (*As described, page* 14)

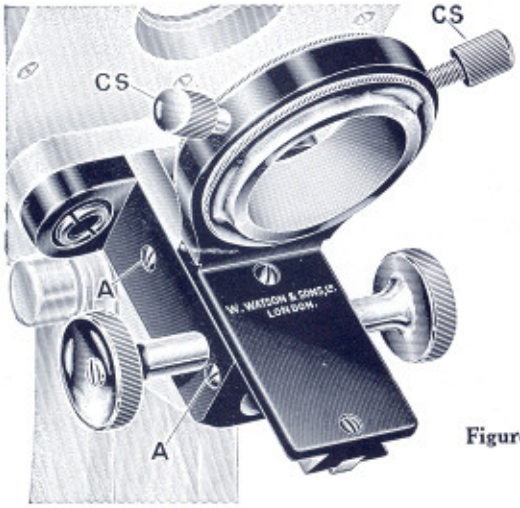
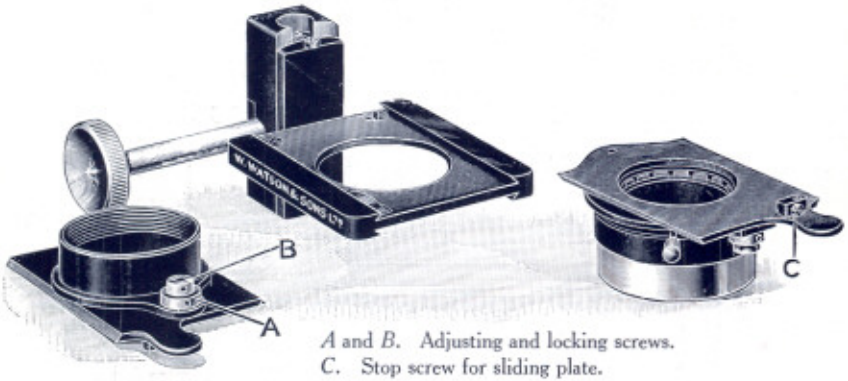


Figure 7.

INTERCHANGEABLE CONDENSER SLIDES

(*As described, page* 14)



A and *B*. Adjusting and locking screws.
C. Stop screw for sliding plate.

MIRRORS

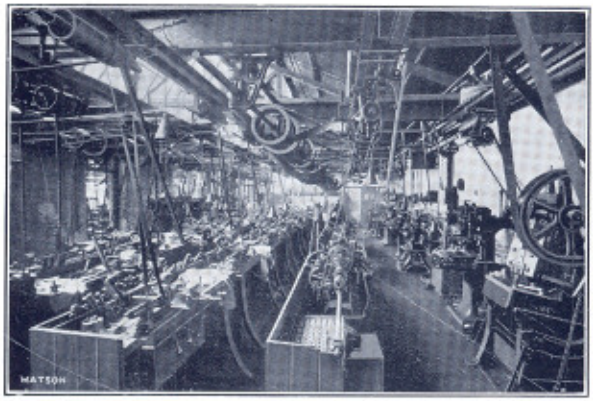
The mirrors are plane and concave, 50 mm. diameter, mounted in gymbal on a rod which is independently extensible. This rod is fitted in the limb itself and the mirrors can be employed with the condenser at any position.

FOOT

The foot is a modified horseshoe pattern ensuring stability of the microscope in all positions.

FINISH

The microscope is heavily enamelled with black enamel which will be found resistant to re-agents. The drawtube is chromium plated and the milled heads, drawtube top and middle slide, are lacquered.



THE MACHINE SHOP, WATSON'S WORKS, HIGH BARNET

THE INTERIOR OF THE MICRO-OBJECTIVE SHOP, WATSON'S WORKS, HIGH BARNET

MECHANICAL STAGES

To suit the preferences of workers, mechanical stages of different patterns are made, all of which can be quickly fixed on the Stage of the **" Service "** Microscope, and removed when not required.

THE " SERVICE " MECHANICAL STAGE (Fig. 8)

To design a Mechanical Stage which was better in effective working and mechanical design than existing types, and at the same time permit of its being repeatedly fixed or removed as desired, was the aim in connection with the **" Service "** Microscope. It is difficult adequately to describe the manner in which this has been accomplished.

The method of attachment is by simply removing the two ordinary spring object holders, which are used on the plain stage. Two studs (see Fig. 12) which protrude from the underside of the Attachable Mechanical Stage, then go into the same holes. These studs have screwed ends, and the Stage is held fast by small nuts fitting on these screwed ends from the underside of the Stage. The fitting is as rigid as when the Stage is built as part of the Microscope, and there is no liability to rock, because the flat surface of the Stage and the underplate of the Mechanical Stage are in perfect contact.

The horizontal movement, which gives a traverse of 75 mm., travels on a ∧ and flat and no shake can occur. A specially made worm and hobbed rack carries the plates.

In the vertical direction the movement (37 mm.) is by rackwork and pinion.

The Object, when in position on the Mechanical Stage, permits of the use of any Objective within the range of its traverse.

The object is held in position against a plate on the left-hand side by a spring clip, the extremity of which has upon it a small rotating wheel *B*. To remove or insert an Object, it is only necessary to press the part *A*, on releasing which, a small coil spring causes the wheel *B* to clip the Object Slide. The top lens of the Condenser is not touched by the stage plates. The Stage is fitted with scales and Verniers reading to 1/10 mm.

The Stage already described is equal in every way, when fitted, to the built-in Mechanical Stage, of this type.

Code Word	No.		£	s.	d.
Mab	A3000	Price - - - -	9	5	0

"ALPHA" ATTACHABLE MECHANICAL STAGE

A pattern of mechanical stage which corresponds more with the usual attachable type is the "Alpha" Mechanical Stage.

This has been specially designed to suit the "Service" Microscope, to which it is readily and rigidly attached by inserting the fitting pins into the holes usually occupied by the stems of the stage clips. The transverse movement is the large amount of 75 mm. and the movement to and from the limb is 37 mm. Scales and verniers are provided for these movements and may be read to one-tenth of a millimetre.

Code Word	No.		£	s.	d.
Macar	A3001 (See Fig. 10)	Price - -	7	0	0

"STUDENT" MECHANICAL STAGE (Fig. 11)

This stage is made to a new design in which single extra strong castings are used in place of parts joined together by screws. As usually stocked the Student Mechanical Stage is provided with screws for attachment to the "Kima" or "Service" Microscopes by means of the stage-spring holes, but it may be obtained furnished with screw-clamps to attach it to any plain stage.

The movements enable a 3 × 1 inch slide to be completely examined. Scale and verniers can be supplied at small extra cost.

Code Word	No.		£	s.	d.
Maces	A3003 - - - - - -	Price	4	5	0
Maczu	A3004 with scales and verniers - -	,,	4	15	0

THE "SERVICE" MECHANICAL STAGE

(*As described, page* 18)

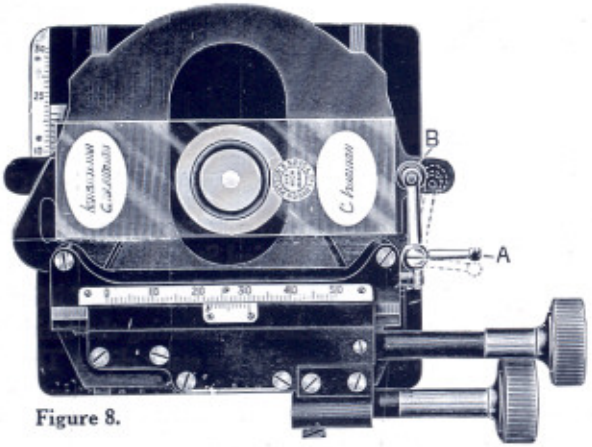


Figure 8.

THE "ALPHA" MECHANICAL STAGE

(*As described, page* 19)

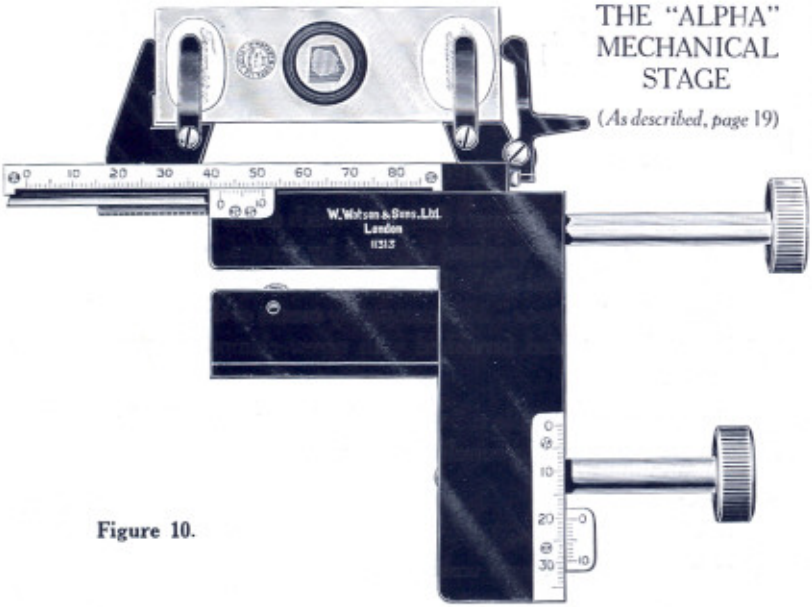
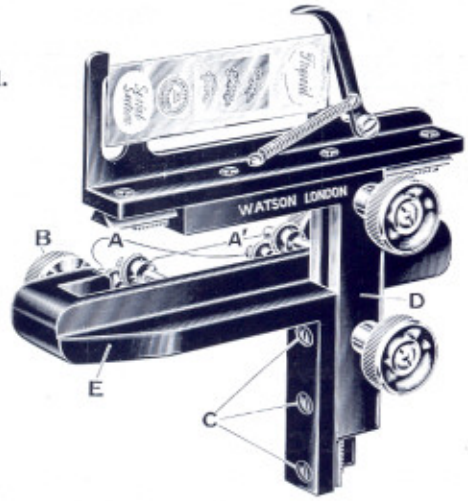


Figure 10.

THE "STUDENT" MECHANICAL STAGE

(As described, page 19)

Figure 11.



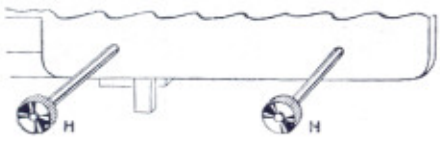


Figure 12.

The attaching studs and screws of the "Service" and "Alpha" Stages.

ATTACHABLE MECHANICAL STAGES

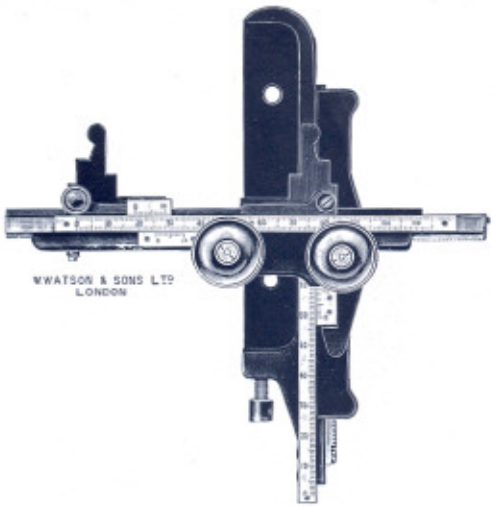


Figure 14. Murray's Long-Range Mechanical Stage

MURRAY'S LONG RANGE ATTACHABLE STAGE (Fig. 14)

For the examination of Serial Brain, Entomological, and other sections over an area of 115 mm. × 85 mm. This Stage was devised by Dr. Murray, of the Imperial Cancer Research Laboratories, for work in which a Mechanical Stage having a long range of movement was a desideratum. It is different from other stages of a similar character, particularly in its great stability and rigid method of attachment to the plain stage. In use it has been found advantageous in every way and it is strongly recommended to those workers who need such a stage. The horizontal traverse is 115 mm. and the vertical 85 mm.

Code Word	No.		£ s. d.
Mader	A3012	Price - - - -	11 5 0

All of the foregoing stages can be fitted to Microscopes by other makers, plus a charge if special adaptation is necessary.

THE OPTICAL EQUIPMENT

The Objectives that are made by us for the **"Service"** Microscope are of the well-known Parachromatic series, and are widely known and appreciated for their superb qualities.

The system employed for checking curve and thickness, with accuracy of mounting and centring, enables uniformity of quality to be guaranteed, and the best possible performance to be secured.

$\frac{2}{3}$" and $\frac{1}{6}$" Objectives are adjusted to work in the same focal plane. The $\frac{1}{6}$" is of the well-known Semi-Apochromatic type with a long working distance of 1 mm. which not only enables it to work through abnormally thick cover slips but saves breakages.

The "Versalic" $\frac{1}{12}$" Oil Immersion Objective has its front fixed by metal bezel instead of cement. It is therefore practically immovable. This lens is considered unsurpassed for the examination of stained subjects, such as Bacteriological and Histological specimens. Its mount is finished black to distinguish it from the others.

A cheaper type of $\frac{1}{12}$" Immersion Objective, the "Utility," is now offered with a slightly reduced Numerical Aperture. As however the ability of a lens to divide fine structure is dependent on the Numerical Aperture, the "'Versalic' is preferable."

CONCLUSION

From the foregoing it will be seen that a large amount of thought and originality have been put into the construction of the **"Service"** Microscope.

This has been done in the hope that the offer of an instrument having unprecedented and unique advantages, may lead those who have the selection and recommendation, and who use Microscopes, to choose a Watson's

British Made "Service" Microscope

not merely because it is British made, but because it is superior to any other for its specific purposes. It has been faithfully made to a specification, to which many of the most celebrated Microscopists and Laboratory workers have given their thought, experience, and unanimous approval.

When that specification was prepared, it was intended that the instrument should be the best possible in every way. The details that were to be included have, in the **"Service"** Microscope, been incorporated in such a faithful manner as to give advantages in stability, comfort and accuracy, unequalled by any other student's microscope in the world, and we are assured that an unprejudiced consideration of the merits set out in these pages will lead to the universal use of the **"Service"** Microscope, for it is beyond comparison, the BEST STUDENTS' MICROSCOPE obtainable at the present time.

FOR CABLING PURPOSES THE COMBINATION OF THE SHORT WORDS FOR MECHANICAL STAGES, NOSEPIECES, &c., WITH THE WORDS FOR THE SETS WILL INDICATE THE REQUIREMENTS

PRICE LIST

OF

Watson's "Service" Microscope

Code Word and No.		£	s.	d.	
Malpa. A 3053	**"Service"** Microscope Stand only with plain under-stage Carrier -	9	1	6	
Malpy. A 3054	**"Service"** Microscope Stand only, with Simple Substage, as described on page 14 - - - - - - - - - -	10	11	6	
Malro. A 3055	**"Service"** Microscope Stand only with Compound Substage - -	13	0	0	
	Note.—A fitted mahogany cabinet is included with the sets specified below, but if it is not required a deduction of £1. 4. 9 may be made from the price of the set.				
Mamon. A 3063	**"Service"** Microscope Stand with Rack Focussing Substage $\frac{2}{3}$ in. and $\frac{1}{6}$ in. Parachromatic Objectives 2 Eyepieces (Nos. 1, 2, 3, or 4) Abbe Illuminator with Iris Diaphragm No. 3151 Triple Nosepiece - - - - - - - - - - -	20	0	0	
Manac. A 3064	**"Service"** Stand with Simple Substage, with Objectives, etc., as in Set 3063 with the addition of : $\frac{1}{12}$ in. "Versalic" Oil Immersion Objective - - - - -	~~27~~	~~10~~	~~0~~	26·10·0
Manag. A 3065	**"Service"** Stand with Compound Substage having rackwork to focus and screws to centre, and complete Accessories as in Set 3064 - -	~~29~~	~~15~~	~~0~~	28·15·0
A 3069	**"Service"** Stand with Substage having centring screws and two Condenser Changer Slides with independent centring adjustment. Complete with accessories as in set 3064 and with the addition of Holoscopic Immersion Paraboloid optical part only and funnel stop for $\frac{1}{12}$ in. Oil Immersion Objective - - - - - - - - -	36	0	0	
	Note.—"Utility" $\frac{1}{12}$ in. Oil Immersion Objective 1.25 (price £5) can be supplied in sets A 3064 and A 3065 at a reduction in price of	~~2~~	~~10~~	~~0~~	1·10·0

EXTRAS

Manda. A 3066	**"Service"** Mechanical Stage as described on page 18, Fig. 8, may be included with any of the above Sets at an extra cost of - - -	9	5	0
Manfu. A 3067	**"Alpha"** Attachable Mechanical Stage, as described on pages 19 and 20, may be included in any of the above Sets at an extra cost of -	7	0	0
Mange. A 3068	Pointer to No. 2 Eyepiece - - - - - - - - -	0	5	0

Packing and carriage charged extra.

Special Mahogany or Teak Cabinets with Screwed Joints and Fittings, suitable for Foreign, Colonial and Tropical Use, are supplied at a cost of 20/- beyond the prices shown above.

WATSON'S "BACTIL" MICROSCOPE

FOR RESEARCH, THE LABORATORY AND GENERAL HIGH-POWER WORK

The **"Bactil"** Microscope is in its general construction the same as the **"Service"** Microscope but with the added and very important modification that the instrument is fitted, finished and adjusted in the same manner as our best Research Microscopes ; each part is co-ordinated and the instrument is built up and supplied complete with its mechanical fittings.

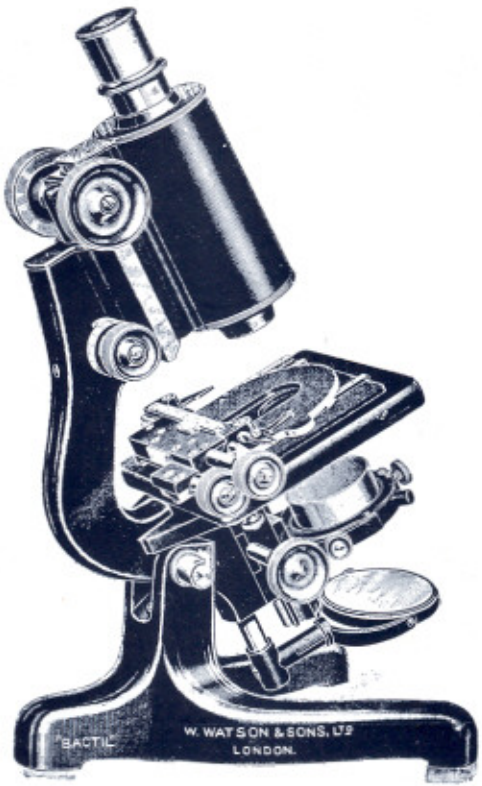
It is possible to add the **"Service"** Mechanical Stage and a Compound Substage to a **"Service"** Microscope, but the result achieved by building the whole at one time as in the **"Bactil"** Microscope is more satisfactory and its advantages will be readily recognised. One important modification is incorporated. The plain stage of the **"Service"** Microscope is replaced by a solid metal plate carrying the Mechanical Stage which is built-in in this model. For the examination of fluids or for rough work the whole of the mechanical movements of the Stage are racked off and a supplementary plain plate is slid into position along the dove-tails of the vertical movements of the mechanical stage and renders the microscope available for all forms of work. This plate is so designed that its surface is in the plane of the top plate of the mechanical stage, thus overcoming the difficulty consequent upon the necessity for varying condenser height. The Mechanical Stage has 3 ins. of horizontal and 1½ ins. of vertical motion. The Substage is of the compound centring type and the condenser mount provides for the hinging of the optical part of the condenser out of optical axis. Compensating bearings are fitted to all movements.

The whole instrument receives most careful and accurate adjustment and ensures that smooth and exquisite working that can only be imparted by the expenditure of unrestricted time on the part of skilled craftsmen.

Dr. Murray's Long Range Stage described on page 22 may be supplied in place of the **"Service"** Mechanical Stage, if desired, at an extra charge of £3 0 0.

WATSON'S "BACTIL" MICROSCOPE

Height, 12½ inches. Spread of foot, 7 5/16 inches.



PRICE LIST

OF

Watson's "Bactil" Microscope

Code Word and No.		£ s. d.
Merid. B 3272	**"Bactil"** Microscope Stand only with Mahogany Case - - -	27 10 0
Meria. B 3273	**"Bactil"** Microscope and Mahogany Case, two Objectives Parachromatic Series, $\frac{2}{3}$ in. and $\frac{1}{6}$ in Two Eyepieces Nos. 1, 2, 3, or 4 Abbe Model Illuminator with Iris Diaphragm No. 3151 Double Nosepiece	36 12 6
Merit. B 3274	**"Bactil"** Microscope in Mahogany Case, three Objectives $\frac{2}{3}$ in. $\frac{1}{6}$ in. Parachromatic Series $\frac{1}{12}$ in. "Versalic" Oil Immersion Two Eyepieces, Nos. 1, 2, 3, or 4 Abbe Model Illuminator with Iris Diaphragm, No. 3151 Triple Nosepiece, dust-proof pattern	~~43 5 0~~ 42.10.0
Merle. B 3275	**"Bactil"** Microscope Stand in Mahogany Case, three Objectives Holoscopic Series, 16 mm., 4 mm., 2 mm., Oil Immersion Two Holoscopic Eyepieces magnifying 7, 10 or 14 Universal Condenser in understage Iris mount No. 3135 Triple Nosepiece dustproof pattern - - - - - - -	60 10 0
Merma. B 3276	**"Bactil"** Microscope Stand and Mahogany Case, three Apochromatic Objectives, 16 mm., 4 mm., 2 mm., Oil Immersion Three Holoscopic Eyepieces, magnifying 7, 10 and 14 diameters Parachromatic Condenser, completely mounted No. 3144 Triple Nosepiece, dust-proof pattern - - - - - - -	71 10 0
Merri. B 3277	The Universal Condenser No. 3135, can be supplied in place of the Abbe Illuminator in sets 3273 and 3274 at an extra charge of - -	4 0 0

EXTRAS

Merik. B 3278	Rackwork draw tube can be supplied in addition to sliding draw tube at an extra cost of - - - - - - - - - - -	4 10 0
Merjo. B 3279	$\frac{1}{12}$ in. "Utility" Oil Immersion Objective. This can be supplied in set B 3274 instead of the "Versalic" $\frac{1}{12}$ in. at a reduction of -	~~2 10 0~~ 1.10.0
B 3280	Extra for centring substage with two centring condenser carrier slides, add to any of the above prices - - - - - - - -	4 5 0

WATSON'S "KIMA" MICROSCOPE

This instrument conforms to the specification for a Student's Microscope as drawn up by the British Science Guild. It is similar in general outline to the **"Service"** Microscope but is slightly smaller in size. All fittings for optical parts are to standard sizes.

The various parts of the **"Kima"** Microscope are made to exact dimensions before assembling to ensure uniformity and easy replacement. This method enables a reliable and efficient Microscope to be produced at a very moderate price.

SPECIFICATION

Coarse Adjustment.—Diagonal rack and pinion of standard quality.

Fine Adjustment.—Vertical lever pattern, operated by milled heads on both sides of the limb. One turn of heads moves the body 0.1 mm. ($\frac{1}{125}$ in.).

Body-Tube.—Total tube-length, 160 mm. ($6\frac{1}{3}$ in.). If tube-length is to be varied from the standard a draw-tube must be added, see extras, page 30. Universal standard fittings for Objectives and Eyepieces.

Stage.—Dimensions 100×95 mm. ($4 \times 3\frac{3}{4}$ in.). Distance from optic axis to limb exceeds 3 in.

Underfitting.—Universal size. Fixed or with screw focussing movement. See extras, page 30.

Limb.—Curved for convenience in lifting.

Joint.—Inclination through 90 degrees with rigid support at all positions.

Foot.—Modified horseshoe.

Mirrors.—Plane and Concave.

Finish.—Hard black enamel, milled heads in bright lacquer.

PRICE LIST

OF

Watson's "Kima" Microscope

A Fitted Case is included with the Sets specified below, but if not required a reduction of 20/- will be made from the Set.

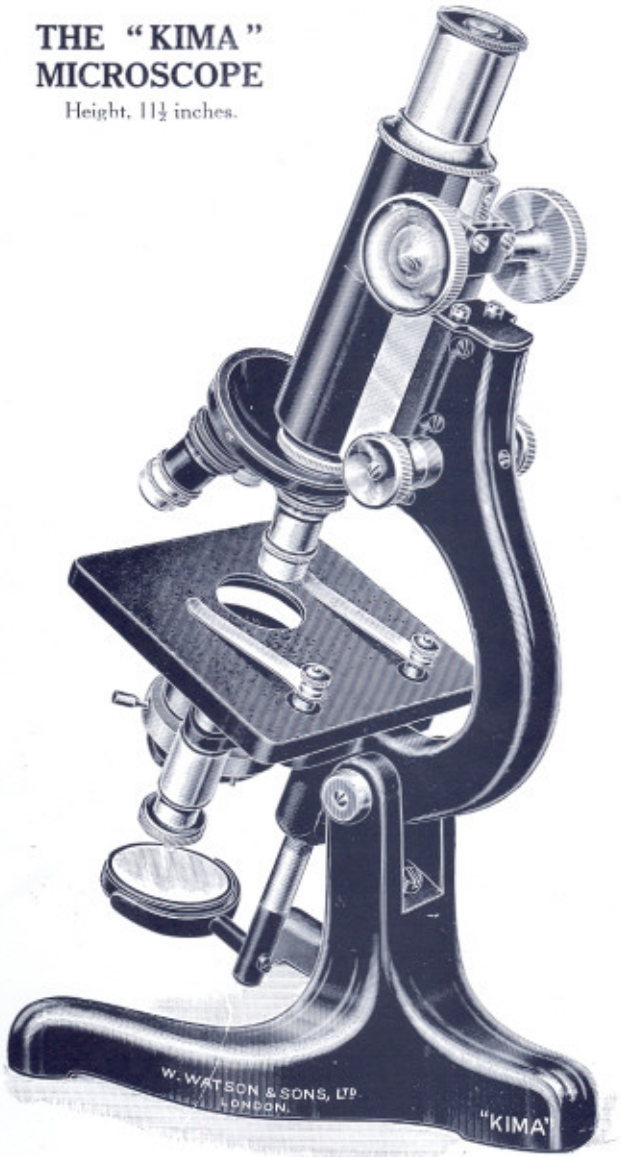
Code Word and No.		£	s.	d.
Kaleb. A 3015	Stand with Argus Objectives $\frac{2}{3}$ in. and $\frac{1}{6}$ in. One Eyepiece (No. 1, 2, 3, or 4) - - - - - - - -	8	10	0
Kalid. A 3016	Stand with Argus Objectives $\frac{2}{3}$ in. and $\frac{1}{6}$ in. One Eyepiece (No. 1, 2, 3 or 4) Iris Diaphragm to fit Understage fitting - - - - - - -	9	5	0
Keelo. A 3017	Stand with Abbe model Illuminator Iris Diaphragm No. 3151 Argus Objectives $\frac{2}{3}$ in. and $\frac{1}{6}$ in. Two Eyepieces (Nos. 1, 2, 3 or 4) Double Nosepiece - - - - - - - - - - -	12	10	0
Kegon. A 3018	Stand with Spiral Screw Underfitting No. 3108 Argus Objectives $\frac{2}{3}$ in. and $\frac{1}{6}$ in. Abbe Illuminator, with Iris Diaphragm No. 3151 Two Eyepieces (Nos. 1, 2, 3, or 4) Triple Nosepiece - - - - - - - - - - -	13	12	6
Kepol. A 3019	Stand with Spiral Screw Underfitting No. 3108 Argus Objectives $\frac{2}{3}$ in. and $\frac{1}{6}$ in. and "Utility" $\frac{1}{12}$ in. Oil Immersion Abbe Illuminator with Iris Diaphragm No. 3151 Two Eyepieces (Nos. 1, 2, 3, or 4) Triple Nosepiece - - - - - - - - - - -	18	12	6
Kepla. A 3019a	$\frac{1}{12}$ in. "Versalic" instead of $\frac{1}{12}$ in. "Utility," extra to set A 3019 -	2	10	0

EXTRAS

Kestr. A 3024	Draw Tube - - - - - - - - - - - -	0	8	6
Masho. A 3107	Compound Substage - - - - - - - - - -	3	17	6
Mason. A 3108	Spiral Focussing Screw Underfitting - - - - - - -	0	17	6

THE "KIMA" MICROSCOPE

Height, 11½ inches.



WATSON'S
Universal Binocular Microscope

Abridged description. Full particulars on application.

Binocular vision enables the object to be seen in a manner that has never been possible through a monocular tube. It is natural to use the two eyes simultaneously, and the comfort derivable in such circumstances of microscopal work is very pronounced.

THE UNIVERSAL BINOCULAR BODY

Can be used with the lowest power Objective, and the highest Power Oil Immersions.

There is no diminution in resolving power or definition.

A pronounced stereoscopic effect is produced.

Ocular fatigue is obviated.

The design is so sturdy that no part is likely to become deranged.

No Special Eyepieces required.

It is the ideal form of Binocular Microscope.

It can be fitted to most Microscopes to interchange with the ordinary Monocular body.

PRICE LIST

For the **"Service," "Bactil,"** and **"Patna"** models for the Binocular body in addition to and interchangeable with the monocular body, with one pair of Eyepieces, add :

Code Word and No.		£	s.	d.
Sabre. B 4312	For the "Universal" High Power Pattern - - - - - -	14	0	0
	For either of the above instruments, fitted with a Binocular body instead of the usual Monocular, with one pair of Eyepieces add :			
Sacad. B 4321	For the "Universal" High Power Pattern - - - - - -	12	0	0
Synco. B 4350	"Universal" High Power Binocular Body, mounted as an Eyepiece to fit into the body tube of any Microscope complete with one pair of Eyepieces - - - - - - - - - - - - - -	10	0	0

The Binocular Bodies B 4312 and B 4350 must be specified at the time of ordering the Microscope, they cannot conveniently be fitted afterwards.

WATSON PUBLICATIONS

MICROSCOPES AND ACCESSORIES

Catalogue of Microscopes and Accessories :

Part 1. Student's Microscopes.
Parts 1 and 2. Student and Research Microscopes and Accessories.
Part 3. Objects for the Microscope.
Part 4. Metallurgical Microscopes and Accessories.
Part 5. Photomicrographic Cameras and Accessories.
Part 6. Petrological Microscopes and Accessories.
Part 7. Microscopes for Industrial Purposes and Specialised Apparatus.

Booklet :
The Book of the Watson Microscope.

Booklet :
The Service Microscope.

Journal :
Watson's Microscope Record, January, May, September.

PHOTOGRAPHIC APPARATUS

Catalogue of Photographic Cameras and Lenses.

Supplementary Catalogue :
Secondhand Cameras and Lenses.

TELESCOPES AND BINOCULARS

Catalogue of Astronomical Telescopes.
Catalogue of Binoculars and Terrestrial Telescopes.

Supplementary Catalogues :
Secondhand Astronomical Telescopes, Binoculars and Terrestrial Telescopes.

OPTICAL AND METEOROLOGICAL INSTRUMENTS

Catalogue of Optical Instruments.
Dictionary of British Optical Instruments (with Price List), 2/6.
This is a most complete List of Modern Optical Instruments with definitions and illustrations.

Leaflet :
The Oxford Astrolabe.

Leaflet :
New Selenium Density Meter or Photometer.

Booklet :
Spectacles and Eyeglasses.

W. WATSON & SONS, LTD.

Makers of Microscopes

ALL PRICES INCREASED 50%