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A CATALOGUE OF

MICROSCOPES

OBJECTIVES, OCULARS,

AND

ACCESSORY APPARATUS,

FOR

Biological and Medical Research,

Students' Use and all General Purposes.

MANUFACTURED BY

JAMES SWIFT & SON, Ltd.,

81, TOTTENHAM COURT ROAD,

LONDON, W.1.

ENGLAND.

Magnifiers.

No. 280.

No. 1236.

No. 261.

No. 253.

No. 1230.

APLANATIC TYPE.

These combinations consist of crown and flint elements cemented together. By reason of their design they yield large flat fields and colourless images free from distortion. They are fitted in either folding pocket mounts of nickel silver or in cells to drop into the arms of dissecting microscopes.

In mounts for dissecting stands.

261.	x 6	*Aplasix*	£0 17 6
263.	x 10	*Aplaten*	0 17 6
265.	x 15	*Aplafiv*	0 17 6
267.	x 20	*Aplatwe*	0 17 6

In folding mounts for the pocket.

251.	x 6	Plassa	£1 2 6
253.	x 10	Platena	1 2 6
255.	x 15	Plafifa	1 2 6
257.	x 20	Platwea	1 2 6

Combination Mounts with two Aplanatic Lenses.

1230.	x 6 & x 10	*Abladub*	£2 5 0
1234.	x 10 & x 20	Aplagul	£2 5 0
277.	Watchmaker's Glass fitted with x 6 aplanatic lens	Watapla	0 18 6

UNCORRECTED TYPE.

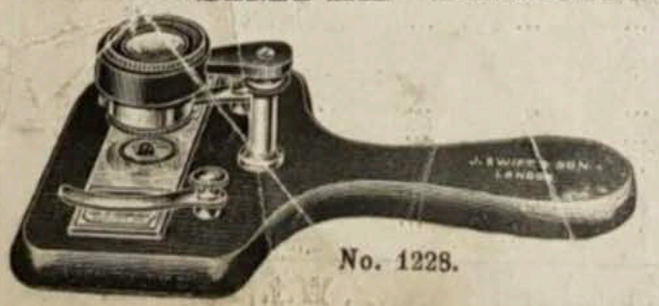
No. 275.

601.	Simple Lens x 5, in mount for stand	Dasfiv	£0 5 0
603.	„ „ x 10, „ „ „	Disten	0 5 0
275.	Three single lenses in folding mount	Trilens	0 8 6
276.	Two „ „ „ „	Tulens	0 3 0
278.	One „ „ „ „	Unlens	0 2 0
280.	Watchmaker's Eyeglass, ebonite mount	Watlens	0 2 0
1236.	**Focostat Lens** mounted to fit the handle of a needle, pen or pencil, the point of which is always in focus; complete with dissecting needle	Fostat	0 10 6
1240.	**Meniscus Magnifier.** This is a special lens x 2½ which covers an undistorted field of 90 mm. so it is extremely useful for searching a large object. It is in a thin folding nickel silver mount similar to No. 253	Memmag	0 15 0

Luvex Reflecting Magnifiers. These consist of single lens magnifiers in folding mounts, somewhat similar to No. 278. The rear surface of the lens is silvered but has a central clear part rather larger than the pupil of the eye. In use the magnifier is held close to the eye with the reflecting surface towards the sky or an artificial light source and the object at its focus. Under these conditions a bright patch of light is concentrated on the object which not only illuminates the surface but enters cavities and pits and enables them to be examined.

1096.	*Double Convex Lens .75 in. diameter*	Luvone	£0 5 6
1098.	*Double Convex Lens 1.25 in. diameter*	Luvtre	0 8 6
1099.	„ „ „ „ „ in solid Nickel Silver Mount	Luvfor	0 15 6

SIMPLE DEMONSTRATION MICROSCOPES.



No. 1228.

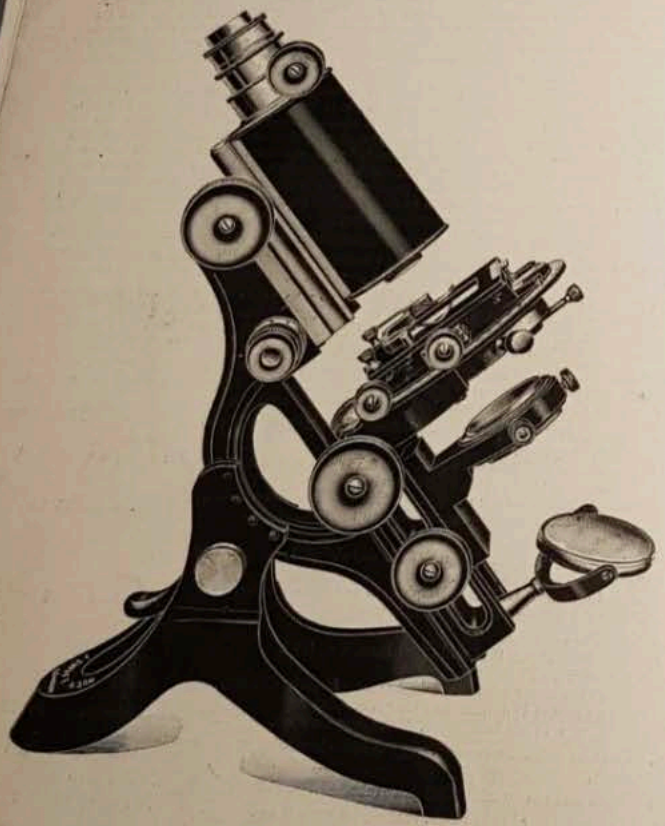
1228. This consists of a flat plate with spring clips to hold the object and a focussing holder to carry an Aplanatic Magnifier. It is particularly convenient for handling and passing round a class. As illustrated but without lens,

Demicro £0 12 6

1229. This is similar to the preceding but in place of the lens holder a short compound microscope, which carries standard objectives and oculars, is fitted. Complete with ocular and choice of 2 in., 1 in. or ⅔ in. objective,

Demike £3 10 0

"Symposium" Microscope.



"Symposium" Microscope.

The original microscope of this type was built specially for exhibition at the Symposium on "The Microscope, Its Design, Construction and Application" held at Burlington House, London, under the Presidency of Sir Robert Hadfield, Bart. It was designed in accordance with suggestions given by Sir Herbert Jackson, K.B.E., F.R.S., and Mr. J. E. Barnard, F.R.S., late President of the Royal Microscopical Society, and was shown as being the highest development attained in microscope construction. It is arranged to yield the greatest accuracy of adjustment with the utmost ease of manipulation and at the same time to allow of the instantaneous addition or exchange of all necessary accessories and apparatus. In order that metal surfaces and other opaque bodies may be conveniently examined by incident light, the stage is provided with a rack and pinion focussing movement while the lower end of the body is fitted with a dovetail slide to accommodate a particularly efficient vertical illuminator which can be supplied if required. This slide will also take a special petrological nosepiece which comprises an analyser prism in sliding mount, Bertrand lens, aperture for Klein's plate and slot for quartz wedge. This nosepiece in conjunction with a swing out polariser for the substage transforms the instrument into a fully equipped petrographical microscope. If the Improved Sliding Condenser Changers, as described on page 25, and the other requisite accessories be adopted, observations can be made or photographic records obtained of an object under every possible variation of illumination and with the minimum of manipulation. The following are some of the conditions of lighting under which the object can be visually observed and photographed without its being in any way readjusted.

(a) With transmitted light from the Achromatic Condenser.
(b) With a black field with the Dark Ground Illuminator.
(c) With a Quartz Condenser for examining its fluorescence.
(d) Under polarised light with the Petrological Nosepiece and Polariser.
(e) Under incident light with the Vertical Illuminator.

The Polariser, which is inserted into the under side of the substage, is mounted on a swing arm so that it can instantly be brought into or removed from the optic axis and can be used either alone or in conjunction with any of the condensers.

The Limb is swung on the tripod on the "Wale" principle and so the instrument is equally steady, rigid and well balanced in the inclined and horizontal positions as when vertical; a clamp is fitted so that it can be fixed at any inclination.

The Coarse Adjustment which has ample range is actuated by a diagonal rack and pinion.

The Fine Adjustment is the "Improved Climax" pattern, as illustrated and described on page 17.

The Stage Focussing is by a very heavy and massive rack and pinion movement with bearing surfaces 40 mm. wide and a large milled head on each side. It has a range of 25 mm. when the instrument is vertical and 65 mm. when inclined. An additional advantage of this movement is that when used in conjunction with the coarse adjustment, the very lowest power objectives can be employed.

The Rotating Mechanical Stage, as illustrated, is 125 mm. over all and has centring screws and a clamp to the rotation, which extends through 280°; the edge is divided and reads by means of a vernier to 5'. The range of the mechanical movements is 35 mm. in each direction with scales and verniers reading to .1 mm. The stage bar and spring clips can be removed, leaving the top surface entirely free for the use of a Petri dish, etc.

By undoing the centring screws and removing the clamping milled head, the entire stage can be lifted out of its bearing ring, and replaced, for rough work, by a plain one with ebonite surface. If preferred, the mechanical stage as described with the "Premier" Microscope can be fitted to this stand in place of that described above; in this case its edge is divided.

The Body Tube which is made of "Duralumin" has an internal diameter of 53 mm. so as to allow of the use of wide angle photographic lenses, etc. Rack and pinion and telescopic drawtubes are fitted, giving a tube length varying from 130 mm. to 270 mm.

Binocular Bodies instantly convertable to monocular, as illustrated and described on page 24, can be supplied to interchange with the ordinary monocular body.

The Substage, which is focussed by a rack and pinion movement, is of R.M.S. standard size and provided with centring screws. After the removal of the mirror which is carried on a stout cylindrical fitting, the whole substage may be racked out of its bearings and entirely removed.

No.		Code Word.	Price.
1061.	Stand only with mechanical stage, as described, rackwork drawtube and centring substage in mahogany cabinet		
1063.	Stand exactly as preceding but with mechanical stage as on "Premier" microscope	Sympon	£137 10 0
1064.	High Power Binocular Bodies, as described on page 24, to interchange with monocular body	Sympre	137 10 0
1065.	Petrological Nosepiece, as described, with Analyser, Bertrand Lens, Slot, etc., and swing out Polariser to fit substage below condenser	Symbin	17 10 0
1067.	Vertical Illuminator Nosepiece with interchangeable plane glass and adjustable speculum reflectors	Symnos	22 10 0
1069.	Circular vulcanite covered stage with clamp to interchange with mechanical stage	Symvert	7 10 0
		Sympla	5 0 0

High Power Binocular.

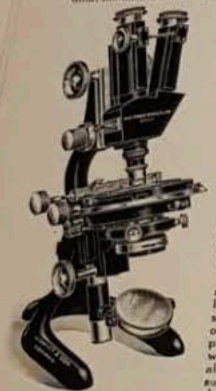
All the preceding models can be fitted with binocular bodies, as shown in the illustration, in place of the usual monocular tube. These are available for use with all objectives from the lowest dry to the highest immersion system and with any standard type of eyepiece. The design adopted is, without question, the most satisfactory in performance and convenient in use that is obtainable. Its principal advantages are :—

Equal illumination in both tubes. — Resolution as in a monocular.
Short tube length. Convergent bodies. Monocular instantly at will.

The first two of the above are secured in most modern designs, the rest only in some.

This design incorporates the most desirable feature of convergent tubes which are both more comfortable in use and convenient for manipulation than the parallel bodies adopted in some models. Automatically the human eyes converge when about to examine a near object, such as one under the microscope, and so with convergent tubes the two images instantly blend. With parallel bodies a more or less extended period of time is required to effect this result. A secondary advantage of the convergent tubes is that when using them the eyes are correctly accommodated for the examination of objects lying on the table near the microscope. This eliminates an appreciable amount of muscular effort in the eyes when looking from microscope to table and vice versa which is inevitable with parallel tubes. An outstanding and unique advantage with this design is that the microscope can be instantly converted into a monocular. The entire binocular optical system is contained in a sliding box just above the objective and is immediately pushed out of the path of rays by a slight pressure on the knob at the side. This leaves the vertical tube free and unobstructed for the critical monocular examination of any difficult object, for photomicrography, etc.

This method of changing from binocular to monocular is not only much more expeditious but is more satisfactory mechanically than any of those where binocular bodies have to be unclamped and removed and then be replaced by the single tube. The width between the bodies is adjustable to suit the varying inter-ocular distances of different observers. This is effected by means of a rack and pinion movement acting simultaneously on the two draw-tubes, which alters the width to suit any inter-ocular distance between 56 mm. and 68 mm. To meet abnormal widths below or above these limits, bodies specially adjusted can be supplied. When the tubes are set for the normal inter-ocular distance of 60 mm. the tube length is 160 mm. It should be noted that with practically every type of high power binocular at present available, including all those in which the adjustment of the distance between the eyepieces is by mechanical means such as rackwork or screw, an increase or decrease of the inter-ocular distance involves a lengthening or shortening of the tube length.



"Universal" Microscope with H.P. Binocular Bodies.

937. *High Power Binocular Bodies, as illustrated and described, to "Universal," "I.M.S.," "Research," or "Army" microscope in place of the regular monocular body ... Hibin* £15 0 0

938. *High Power Binocular Bodies, as illustrated and described in addition to the regular wide monocular body ... ... Bodi* 17 10 0

Binocular Eyepiece.

This apparatus is available for immediate use on the great majority of microscopes. It can be inserted into the top of the drawtube in place of the ordinary ocular or, by means of a suitable adapter, attached direct to the top of the body tube after the removal of the entire drawtube fitting. This latter is the preferable method and in order that the correct adapter may be supplied, it is essential for us to be informed of the make and serial number of the microscope on which it is to be used and the diameter and length of the body, excluding the drawtube and rotating nosepiece. As with the regular high power binocular described above, the tubes are convergent, which arrangement we have adopted in preference to parallel tubes after consultation with several eminent oculists. Adjustment for inter-ocular distances between 50 mm. and 70 mm. is obtained by moving the bodies, which are mounted on a common centre, against each other. When attached direct to the body the tube length is increased to about 225 mm. but a negative lens of suitable power is mounted in the tube to correct the adjustment of ordinary objectives for this length. This lens can be removed by unscrewing and can be dispensed with when using objectives up to about n.a. 0.65. The greater tube length is accompanied by an increase in magnification of approximately 50% ; consequently if x4 oculars be used instead of x6 and x6 instead of x10, the total magnification is about the same. This apparatus yields stereoscopic relief on suitable objects with all powers, which effect is enhanced, particularly at high magnifications, by the use of special semi-circular diaphragms over the oculars. These diaphragms are mounted to fall in the Ramsden circle and should be set so that the two inner halves are occluded, the outer halves only passing the rays.

318. *Binocular Eyepiece, as described, with adapter and pair of Huyghenian oculars x6 ... Binch* £10 10 0
319. *Ditto, but with pair of Compensating oculars x6 ... ... Bincom* 12 10 0
320. *Pair of Stereoscopic Diaphragms to fit over oculars ... ... Bindia* 0 15 0

SPECIAL ADDITIONS FOR

"Army" "Research" "I.M.S." and "Universal" Microscopes.

The following accessories are adaptable to the above microscopes and if likely to be required should be ordered with the stand in the first instance. Should they be ordered subsequently it is necessary for the instrument to be returned to our works for fitting.

No. 616. Centring Screws to Substage. When only an Abbe Condenser is used, centring screws are of but little advantage they are, however, extremely desirable with an Achromatic condenser or when two or more condensers are used interchangeably ... ... Centrs £1 0 0

No. 1011. Rack and Pinion Draw-Tube. The addition of this to the ordinary sliding draw-tube enables objectives corrected for either the long English or short Continental tube to be used to the best advantage. In addition to this it gives an extremely accurate movement ... ... Rakdr £4 0 0

No. 285.

No. 285. Fine Adjustment to Substage. This is offered to meet the need felt by many workers with highly corrected condensers. As will be seen from the sectional illustration the milled heads of the two movements are coaxial, the outer one operating the coarse and the inner one the fine motion. The movement of this is conveyed to the dovetail slides of the substage through a vertical lever as in the "Climax" fine adjustment ... ... Subfin £4 0 0

No. 501. Analyser in Body. By far the most convenient manner in which to have the analyser mounted is to slide in and out of the lower end of the body when it can instantly be thrown in or out of action, as in a petrological microscope. This analyser works very conveniently with Polariser No. 492 ... Tubin £3 15 0

No. 502. Rotating Analyser in Body. This analyser is exactly as the foregoing, except that it is capable of complete rotation by means of a milled ring ... ... Rotban £4 15 0

No. 492. Polariser on Swing Arm. This polariser is mounted on a swinging arm below the iris diaphragm and so can instantly be thrown in or out of the optic axis. It can be used in conjunction with the condenser or without it. A most efficient condenser for use with this polariser is the achromatic "Paraplan," as described on page 8, which with the prism supplied can be worked at practically full aperture ... Polarm £4 15 0

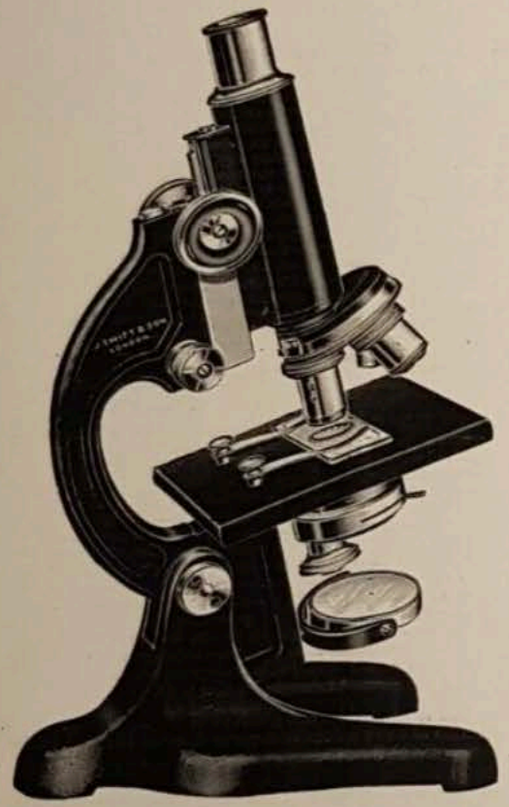
Improved Sliding Condenser Changer.

In that it requires only one iris diaphragm and that both this and the condenser in use are always correctly centred, this apparatus is a marked advance on that originally suggested by Mr. Akehurst. It consists of two parts, (a) the substage slide, comprising an iris diaphragm with a swing-out cell for stops, above which is a female dovetail slide for the reception of the condenser slide (b) which comprises a male dovetail slide bearing a plate on which is mounted, with means of adjustment for centring, a socket into which the condenser screws. One of these latter is required for each condenser. The method of adjustment is as follows. The substage slide is inserted in the substage, the iris closed to a pinhole which is centred by means of the substage centring screws while under observation with a low power objective and ocular. The centring screws must not be touched again till all the condensers are centred. The condenser slide, into which the condenser is screwed, is pushed into the dovetails of the substage slide until it butts up against the stop screw. The two capstan head screws which hold the condenser socket on the plate are loosened just sufficiently to allow the socket and condenser to move over the plate. While observing with the same low power objective and ocular, the diamond ruled cross on the upper surface of the condenser is slid to the exact centre of the field and the two screws tightened up, first by means of the fingers and finally with the small tommy rod supplied. Each condenser requires a separate slide and each is centred independently in this manner. All the condensers we supply for use with this apparatus are ruled with a cross and we are always pleased to rule those of any other make. As the cross is marked in the exact optic axis of the condenser and this has been set exactly over the centre of the iris, it is obvious that when the cross is brought central by means of the substage screws, both condenser and diaphragm are in perfect collimation with the objective in use. As the cross is so fine it can be used for centring with the highest powers ; it has no effect whatever on the optical performance of the condenser and obviously cannot be seen when the condenser is in focus on the object. In order to render it visible for centring the iris should be closed down very considerably.

No. 654. Substage Slide, with Iris Diaphragm ... ... Subsli £3 10 0
No 655. Condenser Slide, each ... ... Consli £1 0 0

"B.S.G. Standard" Microscope.

MODEL B



JAMES SWIFT & SON'S

"B.S.G. Standard" Microscope.

The "B.S.G. Standard" Microscope included in the following outfits was specially designed and constructed to meet the requirements of the specification drawn up by the British Science Guild in order to provide an entirely efficient instrument of modern type at a moderate cost. The specification was published by the British Science Guild after consultation with a very large number of professional microscopists, such as Principals of Science Departments, Directors of Public Laboratories and Technical Institutions, Research Workers, etc., with the result that the design, combined with good workmanship and reliable materials, ensures a lifetime of service to the student, practitioner or private worker.

The Base is a massive casting of horse-shoe type with rounded contour. The axis joint at the top allows of the inclination of the limb from the vertical to the horizontal position.

The Limb is suitably curved to permit of its being easily grasped by the hand; when held in this manner no strain is put upon any of the adjustments or working parts.

The Stage measures 4¼ in. x 4½ in. and is provided with spring object clips. It is composed of a special black moulded composition which is extremely tough and impervious to heat and reagents. By reason of its position in relation to the limb it allows of the examination of the entire surface of a 6 in. Petri dish. To special order a circular, centring rotating stage can be substituted for the fixed rectangular pattern.

The Body is 1¼ in. diameter and of a fixed length of 160 mm.; to special order a sliding draw-tube with a scale divided in mm. can be provided.

The Coarse Adjustment is actuated by a machine cut rack and pinion.

The Fine Adjustment is a modification of our "Improved Climax" vertical lever pattern, as shown on page 15, introduced and patented by us over forty years ago and now of almost universal adoption. It is operated by twin milled heads, one on either side of the limb, an entire revolution of which moves the body .2 mm. It ceases to act should the objective touch the slide and so considerably lessens chance of damage to the objective or specimen.

The Substage. Four different types of substage fitting are provided and these distinguish the four different "B.S.G. Standard" models A, B, C and D. They carry:—

A.—Plain Understage Tube.
B.—Screw Focussing and Swing-out Substage.
C.—Rackwork Focussing and Swing out Substage.
D.—Rackwork Focussing, Centring and Swing-out Substage.

All the above substages are of the R.M.S. standard size 1.527 in. internal diameter. Model A can always be converted into model B, C or D by the addition of the requisite substage.

The Mirrors are plane and concave, mounted in a gymbal with universal movement.

The Mechanical Stage. An attachable mechanical stage can be supplied at any time. This is instantly fitted to or removed from the microscope.

"B.S.G. Standard" Microscope. Model A.

WITH PLAIN UNDERSTAGE TUBE.

1750. Stand only, in cabinet with lock and handle ... ... Astanof **£8 10 0**

COMPLETE OUTFITS.

With Objectives of Low Aperture.

Set 1752. ... Astanol ... **£13 0 0**
Stand, as described, in cabinet.
Objective ⅔ in. n.a. 0.17.
Objective ⅙ in. n.a. 0.65.
Ocular x8.

Set 1754. ... Astamm ... **£16 0 0**
Stand, as described, in cabinet.
Objective ⅔ in. n.a. 0.17.
Objective ⅙ in. n.a. 0.65.
Ocular x8.
Abbe Condenser and Iris Diaphragm.
Dustproof Triple Nosepiece.

Set 1756. ... Astanyf ... **£23 0 0**
Stand, as described, in cabinet.
Objective ⅔ in. n.a. 0.17.
Objective ⅙ in. n.a. 0.65.
Objective 1/12 in. oil imm. n.a. 1.0
Oculars x6 and x10.
Abbe Condenser and Iris Diaphragm.
Dustproof Triple Nosepiece.

With Objectives of High Aperture.

Set 1751. ... Astamab ... **£14 10 0**
Stand, as described, in cabinet.
Objective ⅔ in. n.a. 0.28.
Objective ⅙ in. n.a. 0.85.
Ocular x8.

Set 1753. ... Astamec ... **£19 0 0**
Stand, as described, in cabinet.
Objective ⅔ in. n.a. 0.28.
Objective ⅙ in. n.a. 0.85.
Oculars x6 and x10.
Abbe Condenser n.a. 1.20 and Iris Diaphragm.
Dustproof Triple Nosepiece.

Set 1755. ... Astamd ... **£26 10 0**
Stand, as described, in cabinet.
Objective ⅔ in. n.a. 0.28.
Objective ⅙ in. n.a. 0.85.
Objective 1/12 in. oil imm. n.a. 1.30.
Oculars x6 and x10.
Abbe Condenser n.a. 1.20 and Iris Diaphragm.
Dustproof Triple Nosepiece.

1790.	Attachable Mechanical Stage	Stammec	**£6 10 0**
254.	Small Abbe Condenser, n.a. 1.0 in Simple Iris Diaphragm	Abbesim	**1 10 0**
1791.	Sliding Drawtube, divided and figured in mm.	Stantub	**0 10 0**
1792.	Centring Rotating Stage, in place of fixed pattern	Stanrot	**extra 2 10 0**