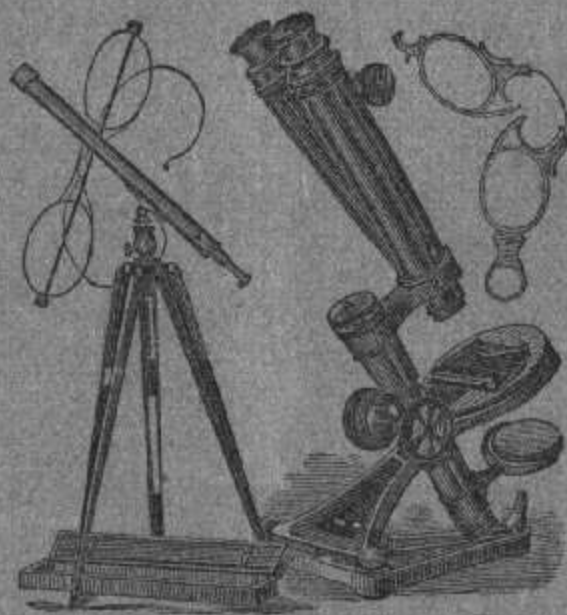


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MATHEMATICAL INSTRUMENTS,

* PHYSICAL * APPARATUS, *

METEOROLOGICAL INSTRUMENTS,



FOR SALE BY

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1883.



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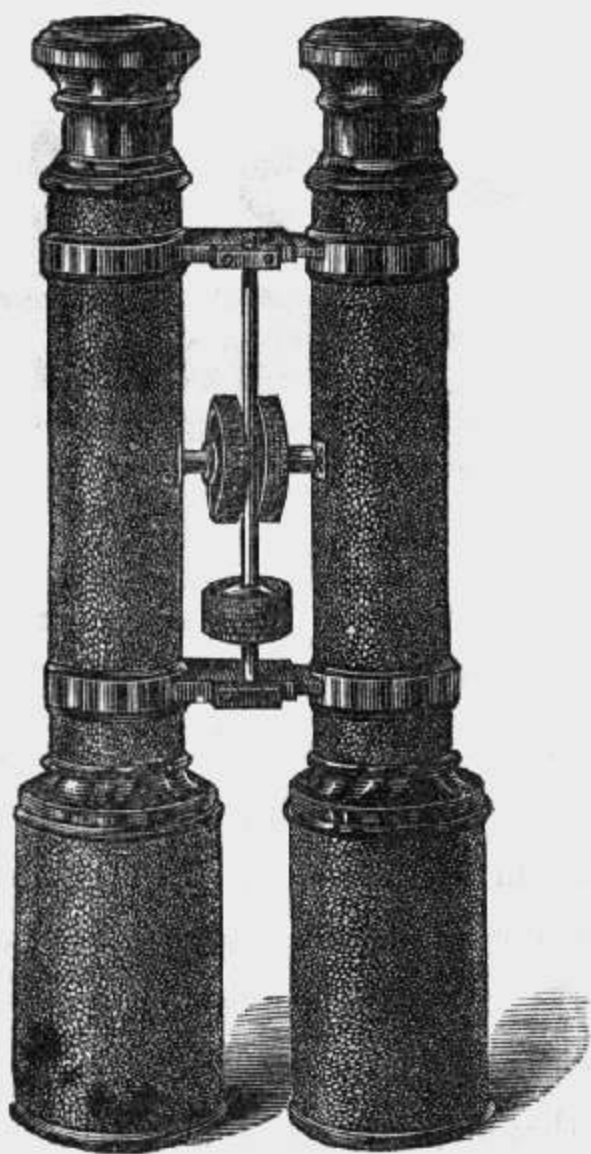
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SPY-GLASSES.

Binocular
Telescope.

PRICE,
WITH CASE, \$45.



Height, $9\frac{1}{2}$ inches.
Power, 18,
Three times that
of an ordinary
Field Glass.

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Send for our Priced and Illustrated Catalogue of over 600 styles and sizes of Opera, Tourist, Race, Field, and Marine Glasses, Spy-Glasses, and Telescopes, 32 pages.

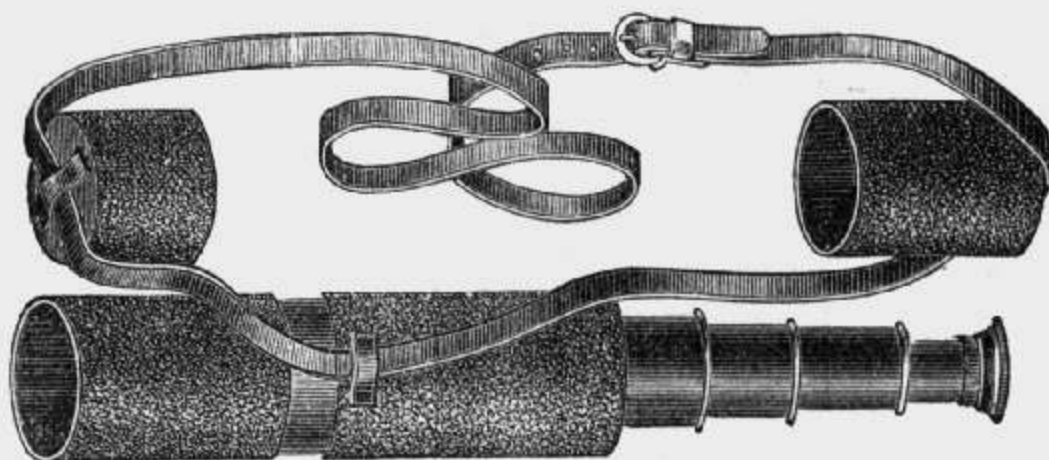
52505

SEND FOR CATALOGUE.

THE

"TOURIST'S" AND "SIGNAL SERVICE"

SPY-GLASS.



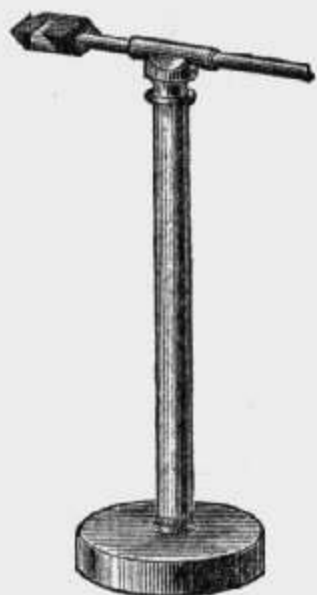
The above is an engraving of the best instrument made for general use. It embodies the three most important qualifications of a good spy-glass, viz.: great defining power, lightness, and portability. This glass will, under ordinary circumstances, enable the observer to make out signals at a distance of 26 miles, read the name on a light-ship at 9 miles, make out wild fowl at 16 miles, show shot marks at very longest ranges, the time by a church clock at 6 miles, and persons walking at 10 1/2 miles. It is fitted with two leather caps, to which is attached a strap, thus forming a light and efficient case.

Length when closed,	. 9 1/2 inches.
" " open,	. 34 "
Diameter of Object Glass,	2 "
Weight,	1 3/4 lbs.

PRICE, COMPLETE, \$20.00.

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CAMERA LUCIDA. (for Drawing).



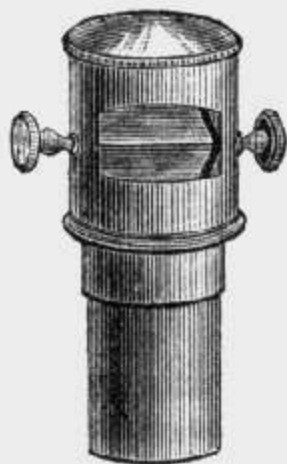
2360.



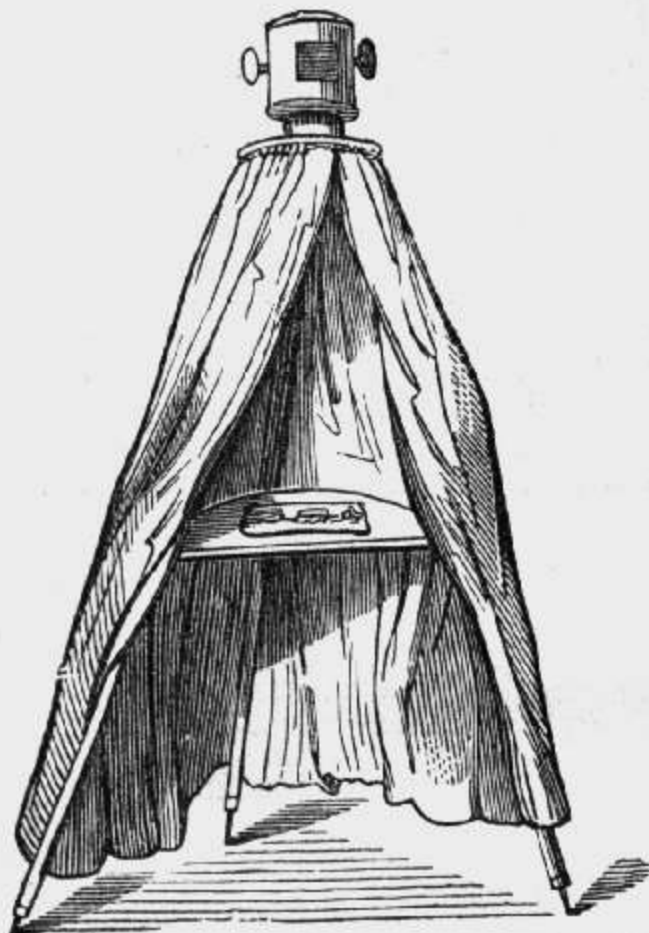
2361.

No.		PRICE.
2360.	Camera Lucida, with circular base, in box,	\$7 50
2361.	Camera Lucida, with clamp for edge of table,	10 00
2362.	Camera Lucida, with clamp for edge of table, two tinted glasses, one spherical convex and one spherical concave lens,	20 00

CAMERA OBSCURAS. (for Drawing).



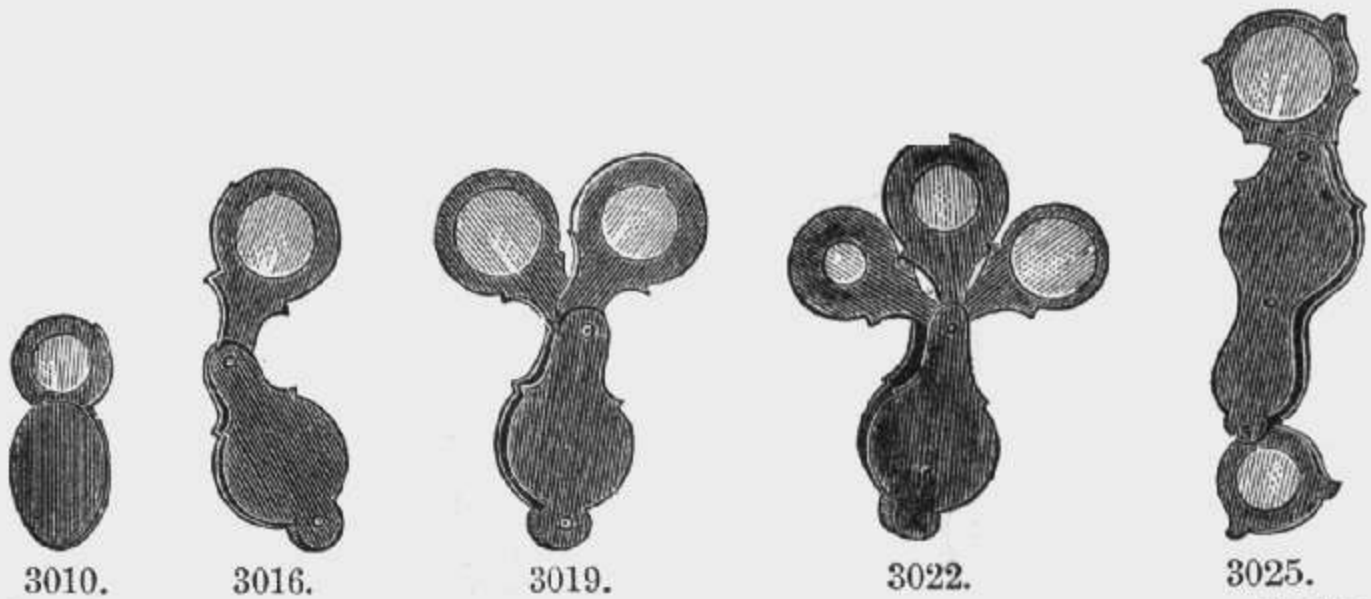
2364.



2367.

2364.	Camera Obscura Head or Lens, without box; a prismatic lens, mounted with brass. This is the best kind of lens for a Camera Obscura, as it forms both lens and mirror, prism $1\frac{1}{8}$ inches long,	5 00
2365.	Camera Obscura Head, prism $1\frac{1}{8}$ inches long,	7 50
2366.	Do. do. $2\frac{1}{8}$ do.	10 00
2367.	Improved Camera Obscura. This is recommended as the best drawing apparatus yet introduced; it is light and portable, and can be used to satisfaction by persons entirely unacquainted with drawing, each,	20 00

SIMPLE MICROSCOPES.



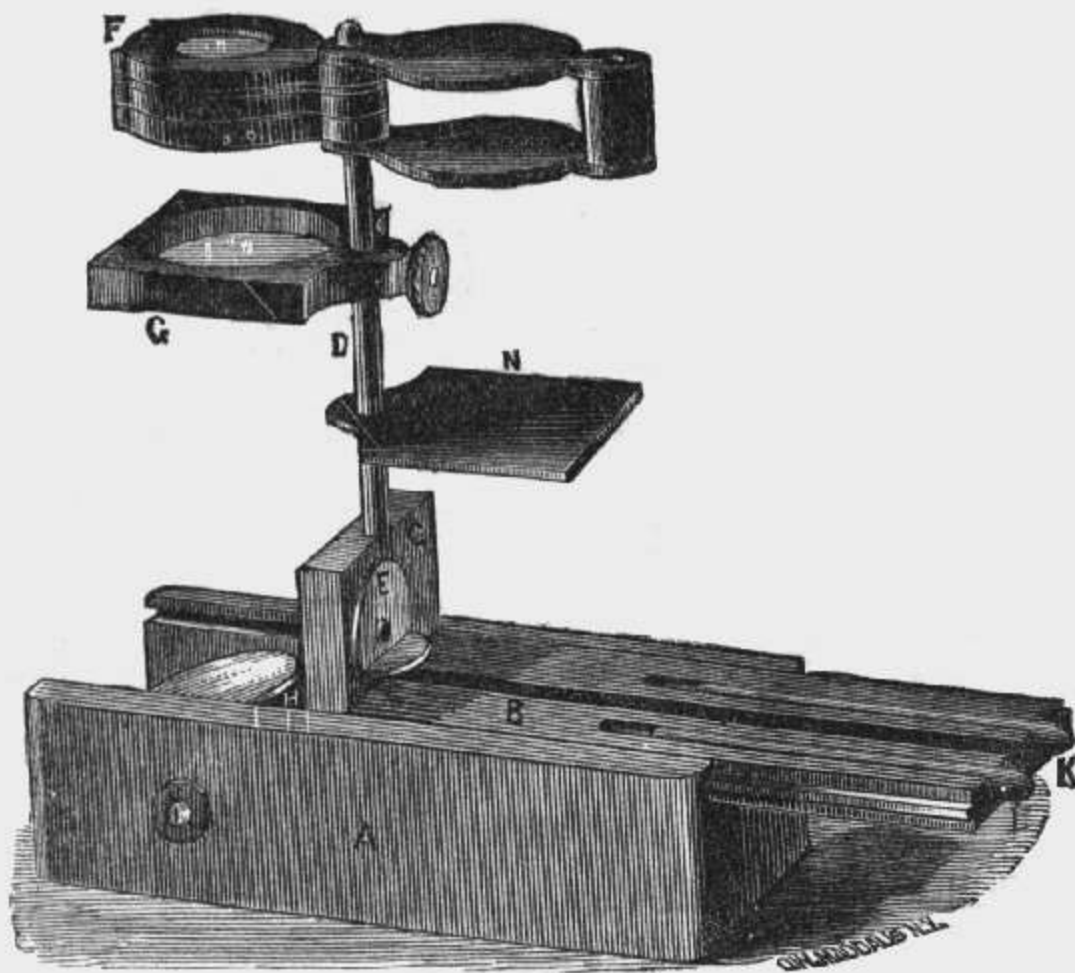
No.							PRICE.
3010.	Hard rubber case and frame, round form,	1	double convex lens,	$\frac{3}{4}$	in. diam.	30	
3011.	Do.	do.	do.	1	do.	40	
3012.	Do.	do.	do.	1	do.	60	
3013.	Do.	do.	do.	1	do.	90	
3014.	Do.	do.	do.	2	do.	$\frac{7}{8}$ and 1	
3015.	Do.	do.	do.	2	do.	1 and $1\frac{1}{4}$	
3016.	Do.	do.	bellows form,	1	do.	do.	
3017.	Do.	do.	do.	1	do.	do.	
3019.	Do.	do.	do.	2	do.	$\frac{1}{2}$ and	
3020.	Do.	do.	do.	2	do.	$\frac{3}{4}$ and	
3022.	Do.	do.	do.	3	do.	$\frac{1}{2}$ to	
3023.	Do.	do.	do.	3	do.	$\frac{1}{2}$ to	
3025.	Rubber case and frame, 1 double convex lens, $\frac{3}{8}$ inch diameter, of high power at one end, and 1 double convex lens $\frac{1}{2}$ inch diameter of medium power at the other end					1 25	
3027.	Achromatic Triplet, of high quality, giving exquisite definition. In tortoise-shell case, with ring for watch-guard. This is made of 3 sizes, giving either 10, 15, or 20 diameters; in ordering, state which is wanted					9 00	
3027 $\frac{1}{2}$.	Achromatic Triplet, same as above, but in metal frame, heavily nickel-plated					9 50	
3028.	Achromatic Triplet, giving power of 40 diameters, in silver case . .					14 00	
3028 $\frac{1}{2}$.	Achromatic Triplet, giving power of 40 diameters, in engraved gold case, for watch-guard					20 00	



3035.	Coddington Lens, brass frame, three sizes	\$1 00, 1 50 and 2 00
3036.	Do. silver do.	2 25
3037.	Do. do. do. with cover	2 50
3037 $\frac{1}{2}$.	Do. do. do. do. large size	4 00
3038.	Do. large size, with cover, plated.	3 75
3039.	Do. do. do. and engraved	5 00
3040.	Do. do. do. gilt and engraved	6 00

SIMPLE MICROSCOPES, WITH STANDS.

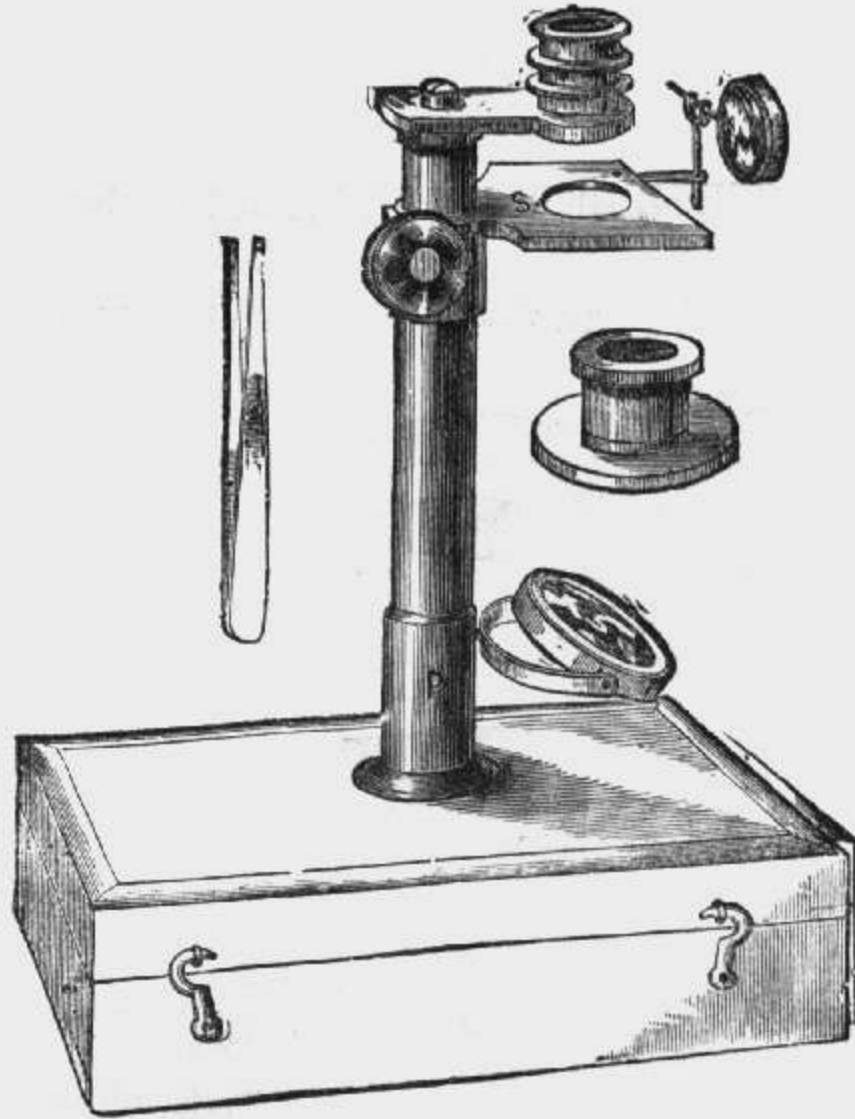
No.	PRICE.
3050. The Excelsior Microscope, with 2 dissecting needles and 3 lenses, .	\$2 75



3050.

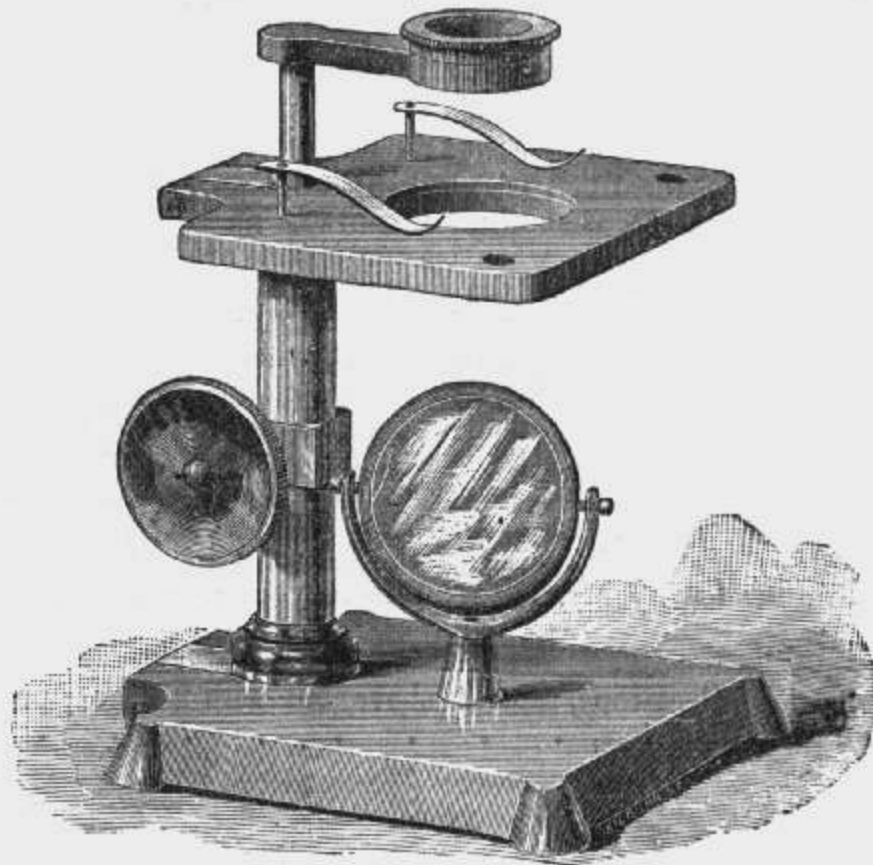
The neat walnut case furnished with this Microscope, and into which it packs, serves as a stand when in use, as shown. It contains an adjustable mirror for illumination of transparent objects; when opaque objects are under examination, the diaphragm shown is used to shut off the light. This is supported by a steel stem, which also carries the stage and lenses. The lenses (No. 3024½) may be used separately from the stand, and carried in the pocket, when desired. The stage slides smoothly upon the stem for focussing, and may be clamped in position by the set-screw; it may be used for the examination of objects in water, or reversed and used with the flat side up, if preferred. The power ranges from about 5 to 25 diameters, which is sufficient to show the separate corpuscles of frog's blood, and a very great variety of interesting objects. As a dissecting Microscope, its efficiency may be greatly increased by temporarily screwing the case fast to a board about 6 inches square (as recommended by Mr. Phin); this may be done without defacing the instrument.

3051. The Excelsior Microscope, same as above, but with 2 lenses; power	\$2 50
about 5 to 18 diameters,	



3056.

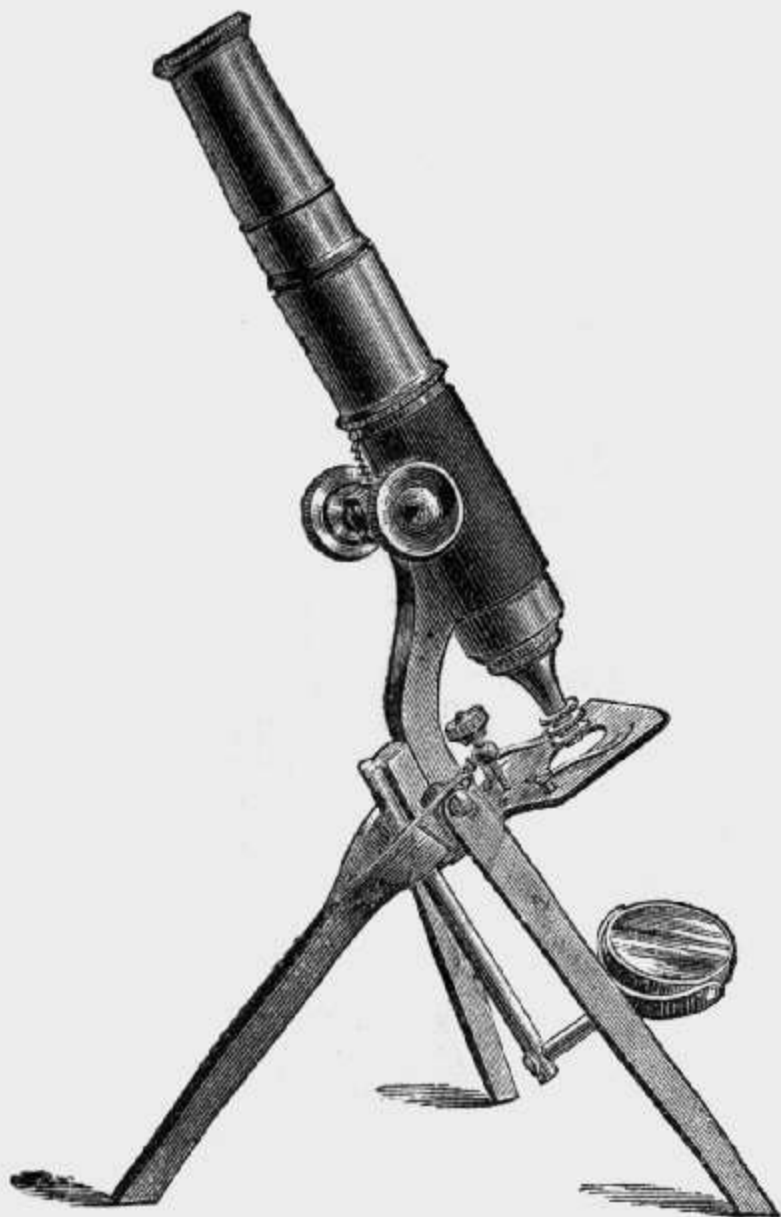
No.		PRICE.
3056.	THE SCHOOL MICROSCOPE,	\$6 00



5042.

5042.	COMPACT DISSECTING MICROSCOPE,	10 00
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QUEEN'S "TOURIST."



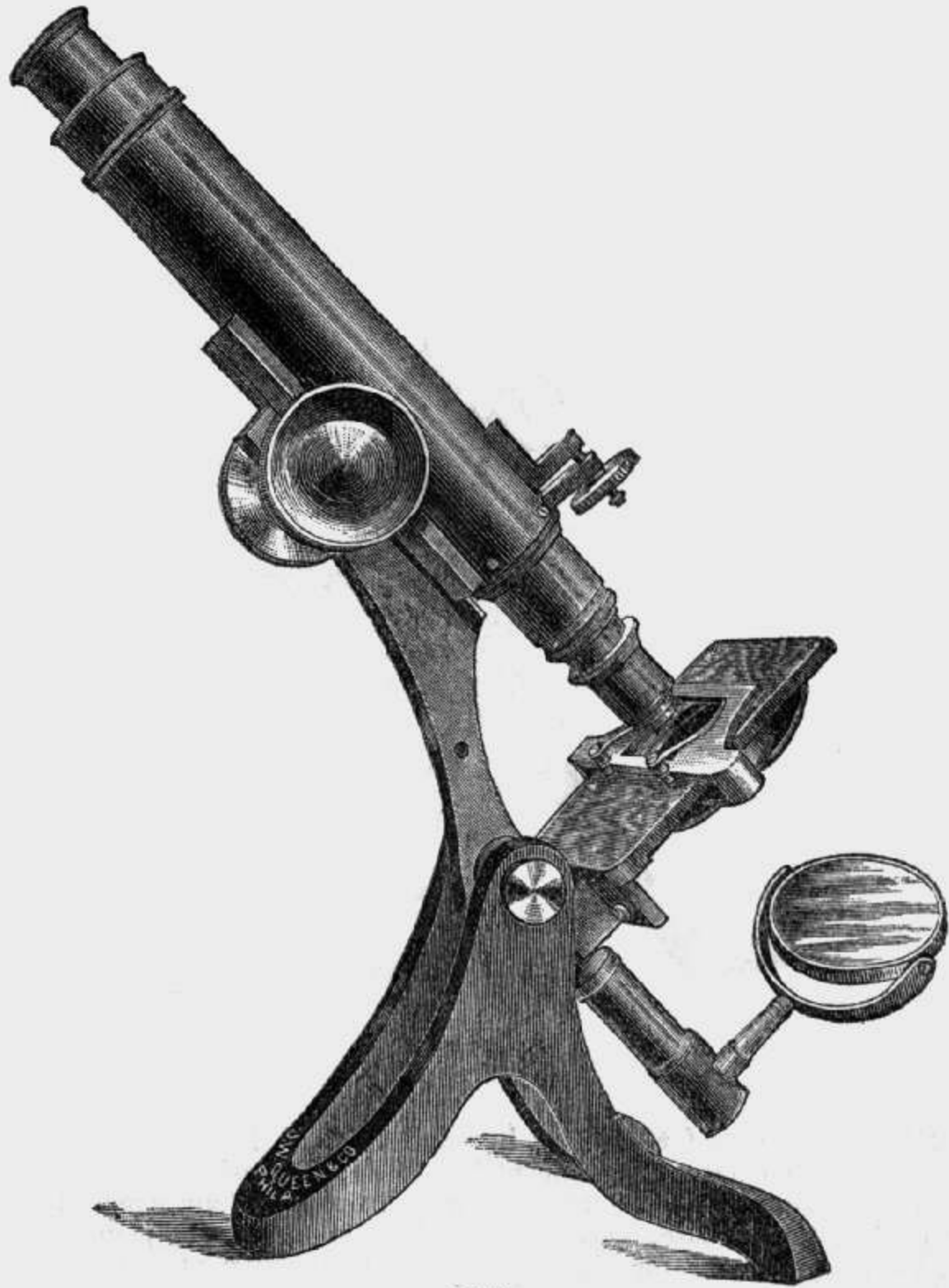
3077.

This Microscope, now for the first introduced by us, is made very portable, to meet the want of a compact instrument for use at the seaside, etc. It folds into a space about $6\frac{1}{2} \times 3\frac{1}{4} \times 2\frac{3}{8}$ inches. It is of brass throughout, handsomely finished, has broad and firm tripod base, axis for inclination to any angle, plane and concave mirrors, with adjustments for obliquity. For illumination of opaque objects, the mirror bar may be removed and replaced in the reverse position, thus bringing mirrors above the stage. The instrument stands 12 inches high when draw-tube is extended (as shown in illustration). Society screw, carrying an adapter with Achromatic Object-glass of $\frac{4}{10}$ ths inch focus, dividing to $\frac{8}{10}$ ths, which gives powers ranging from 40 to 140 diameters.

3077 and 3079 have a good fine adjustment, moving the stage, as in our Holmes' Class Microscope.

No.	PRICE.
3077. Queen's Tourist, with rack and pinion and fine screw adjustments; with live-box and forceps, in mahogany case,	\$22 50
3078. The same, without fine adjustment,	20 00
3079. Queen's Tourist, with coarse adjustment by slip-tube and fine screw adjustment, with live-box and forceps, in case, "	17 50
3080. The same, without fine adjustment,	15 00

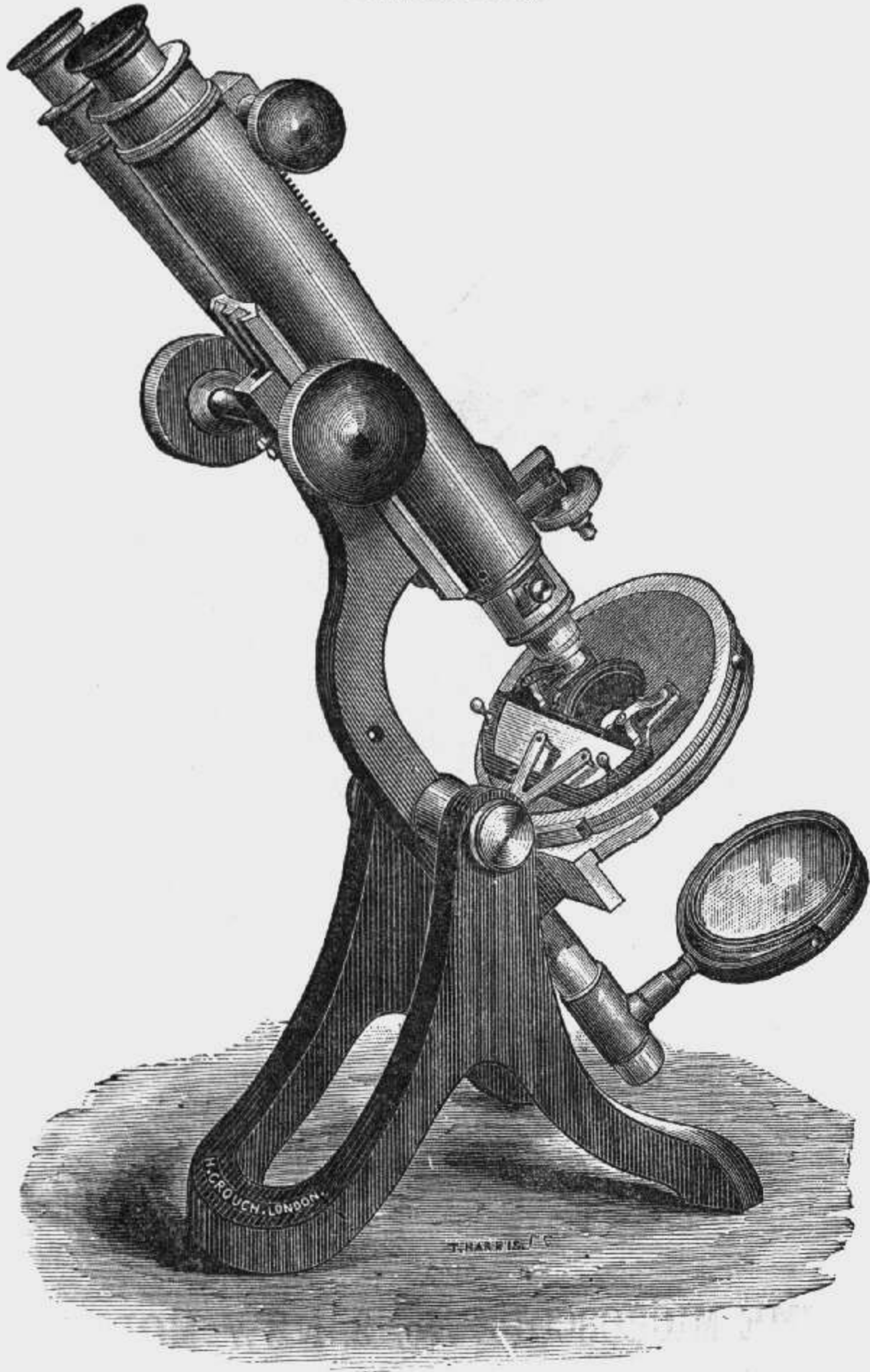
CROUCH'S NEW HISTOLOGICAL MICROSCOPE.



3100.

No.	PRICE.
3100. Crouch's New Histological Microscope, with	
No. 1 Eye-piece, giving from 45 to 350 diameters;	
No. 2 do. do. 70 to 530 do.	
1-inch Object-glass, 16° angular aperture;	
¼ do. do. 90° do. do. (this handsomely re-	
solves <i>P. angulatum</i> ;)	
Glass Slip with ledge, for examination of liquids.	
In upright portable mahogany case, with brass handle, lock and key,	
and fittings for all the accessory parts that are furnished with No.	
3101,	\$55 00
3103. The same, binocular,	75 00

CROUCH'S STUDENT'S MICROSCOPE (BINOCULAR AND MONOCULAR).



3105.

3105. CROUCH'S STUDENT'S MICROSCOPE, Binocular, with 4 eye-pieces, 2 objectives, stage micrometer, stage forceps, etc., in case \$110 00
3106. CROUCH'S STUDENT'S MICROSCOPE, Monocular, with 2 eye-pieces and 2 objectives, in case 85 00

JAS. W. QUEEN & CO., Sole American Agents.



3129.

ACME MICROSCOPE No. 3, NEW MODEL.

The entire microscope is of brass, highly finished. The draw-tube is turned out larger inside below the top, so that the long eye-piece does not rub off the black finish, hence there is no bright surface to cause reflection with the shorter eye-pieces. The eye-pieces are designated by their equivalent focal length, as are objectives; thus the (approximate) powers given by various combinations are easily calculated.

The body-tube has the "broad-gauge" screw for low powers of excessive aperture, in addition to the standard society-screw.

The rack-and-pinion adjustment has a long range. The fine adjustment is a very delicate and truly working one, suitable for the highest powers. The body is firmly carried upon rollers, and is moved by a lever actuated by a screw at the rear of the arm. The head of screw is graduated so that measurements of thickness may be made directly or by the application of a simple formula.

The stage is of black glass, with movable object-carrier held down by two ivory points, and has complete rotation. A plain brass stage with rotating stage-plate and spring clips (as in the former model) is furnished instead of glass stage at a less price. Both stages have a standard screw-thread in the lower plate for the reception of selenite, which can be rotated independently of the Nicols prism. Other accessories also may be thus fitted if desired (the hemispherical lens, for example).

The sub-stage is movable on the mirror bar, is of the gauge most usually adopted, and carries an adapter having society-screw, for the use of objectives as achromatic condensers. To this is screwed an iris diaphragm, conveniently shaped like a short objective. This may be placed close to the object or at any required distance.

The mirrors (plane and concave) are also adjustable on the mirror bar; the usual position is at the focal distance of the concave mirror from the object. Mirrors alone or with the sub-stage may be swung obliquely or above the stage. A graduated disk back of the stage registers the degree of obliquity, and may be used for the measurement of angular aperture.

Both stage and sub-stage are susceptible of centering adjustment by loosening the capstan-head screws which hold them in position, centering by hand, and tightening again by a steel key furnished with the instrument.

The base (which is somewhat larger in the binocular form) is firmly attached to the pillar by a thumb-nut. The advantage of this arrangement is, that it may be rotated in order to support the weight to best advantage in different positions of the body; thus, when the latter is vertical the toe should be placed forward, and this position is generally the best.

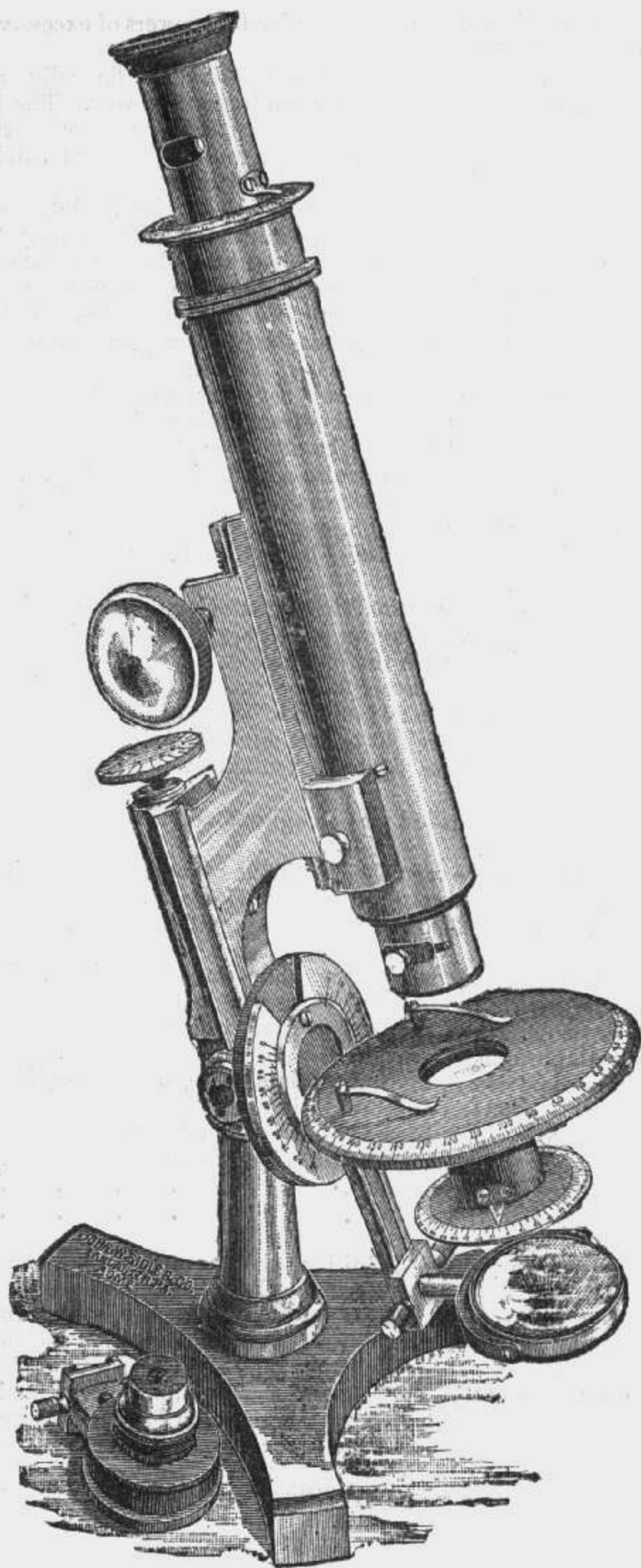
Wear of moving parts is provided for throughout, and the adjustments may in many cases be made by the owner.

There is an extra nose-piece furnished with the binocular, so that it (as a monocular) may be used with objectives of the very widest aperture consistent with the society-screw, without any reduction of aperture by diaphragms.

3123.	Acme Microscope No. 3, monocular, glass stage, brass base, iris diaphragm, one ocular (no objectives), in neat walnut case,	\$63 00
3124.	Acme Microscope No. 3, monocular, plain rotating brass stage, brass base, iris diaphragm, one ocular (no objectives), in case,	55 00
3129.	Acme Microscope No. 3, binocular, glass stage, brass base, iris diaphragm, one ocular (no objectives), in case,	88 00
3131.	Acme Microscope No. 3, binocular, plain rotating brass stage, brass base, iris diaphragm, one ocular (no objectives), in case,	80 00
3132.	$\frac{3}{4}$ -inch objective, 27° aperture,	8 00
3133.	$\frac{1}{2}$ -inch do. 100° do.	14 00

These lenses give clear, sharp definition, and we recommend them very highly as an outfit for either 3123, 3124, 3129, or 3131. We also recommend that an additional ocular (No. 3154, see below) be obtained; in this case the powers will range, with the binocular, from about 60 to 550 diameters; with the monocular, from about 60 to 700 (owing to the longer tube). The price of the complete microscope is readily seen by simply adding the prices of stand and objectives (and extra ocular, if taken) together; thus, the price of 3124, with $\frac{3}{4}$ and $\frac{1}{2}$ objectives and 2 oculars, is \$82.00.

3154.	Extra oculars, 2-inch, 1-inch, and $\frac{1}{2}$ -inch focus, each,	5 00
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No. 3145. The Lithological Microscope,

PRICE. \$95 00

We are authorized subscription agents for

COLE'S STUDIES IN MICROSCOPICAL SCIENCE,

a work issued in parts, thoroughly illustrated with colored lithograph plates, and accompanied by prepared objects of the finest character—an unique undertaking in microscopical literature.

Volume I has just been completed, and has been a great success, the execution being thorough and very creditable. Volume II will be divided into two sections, as follows:

SECTION I. "ANIMAL HISTOLOGY," will commence with No. 1 on the 7th of July, 1883; the succeeding numbers will appear at monthly intervals.

SECTION II. "BOTANICAL HISTOLOGY," will commence with No. 2 on the 14th of July, 1883; the succeeding numbers will appear at monthly intervals.

These will be preceded by an introductory essay, entitled "THE METHODS OF MICROSCOPICAL RESEARCH," the first number of which will be published on or about the 16th of June, 1883, and continued weekly thereafter until completed.


There will also be issued a new and separate series, entitled "POPULAR MICROSCOPICAL STUDIES," commencing on the 28th of July, 1883, the succeeding numbers at monthly intervals.

It is intended that each number shall contain a microscopical preparation of some attractive object skillfully mounted, and an accurate, highly finished plate of the preparation.

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"POPULAR MICROSCOPICAL STUDIES."					
Annual subscription (including registration of preparation),	1	6	6	or 6 75

All books and slides mailed direct from London to our subscribers.

 A special circular will be sent on application.

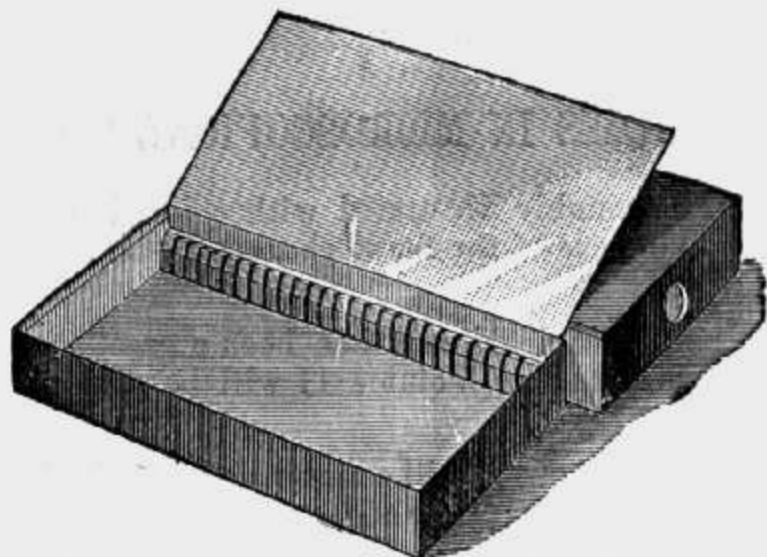
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THE NEW OBJECT-BOX,

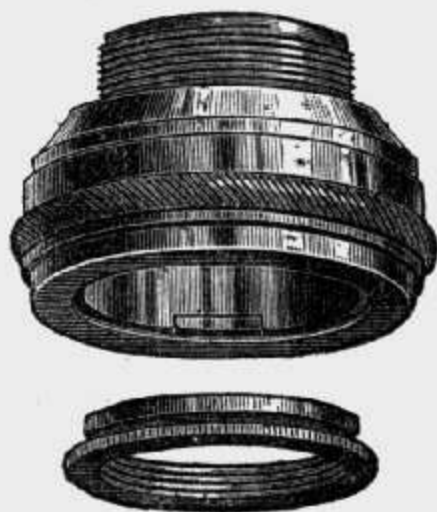
illustrated above, with folding lid and sliding cover, has been received with great favor wherever shown. It has walnut racks, holding 25 slides, is well made, having all corners bound with muslin, and is neatly finished with dark pebbled paper. The aperture in end of cover allows the box to be opened by pressure with the finger; while the lid prevents the slides dropping out should the top be turned downward. Price, 30 cents.

MOLLER'S DIATOM TEST-PLATE,

of the well-known style, consisting of 20 diatoms, arranged according to their difficulty of resolution as tests, but MOUNTED IN MONOBROMIDE OF NAPHTHALINE, are now in stock. This mode of mounting delicately marked objects has great advantages, particularly for immersion lenses of large aperture, giving images of much greater strength of detail than can be obtained with balsam, and not reducing the effective aperture of such lenses to 1.00 numerical aperture, as is the case with dry mounts. Price, \$6.00.

NEW UNIVERSAL MOUNTING MEDIUM,

aqueous solution, of great refractive index, which can be lowered as required by the addition of pure water, to suit different objects. (See *Jour. Roy. Mic. Soc.*, 1882, p. 167.) Per bottle, 60 cents.



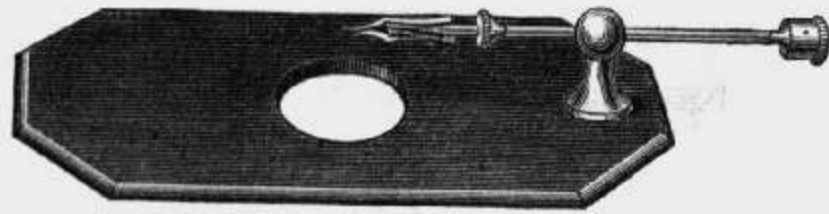
THE FACILITY NOSE-PIECE (patented),

for changing objects without screwing or unscrewing, answers well the purpose for which it is designed. It operates on the principle of the Universal chuck, and is furnished with four grooved rings which screw upon the objectives and are kept there permanently. For those who have more than four objectives, extra rings can be furnished at 25 cents each. The nose-piece may be kept permanently upon the microscope, and the change of objective is made almost instantly. Price, \$5.00.

THE MICROGRAPHIC DICTIONARY,

NEW EDITION (fourth), is just received. Price, \$20.00.

MICROSCOPICAL ACCESSORIES.



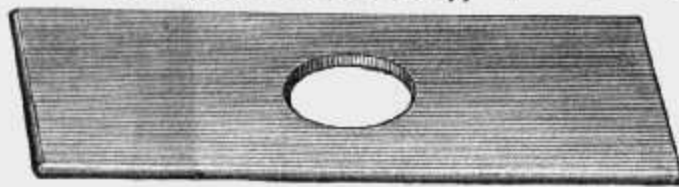
3526.

No. 3526. Stage Forceps, on slide or carrier (simple, but efficient), PRICE. \$1 50



3529.

3529. Sub-stage Condenser, with apertures of about 20°, 40°, 70°, and 110°, dividing combinations for high or low power, with plain adapter, \$8.00; with centering adapter, 13 50



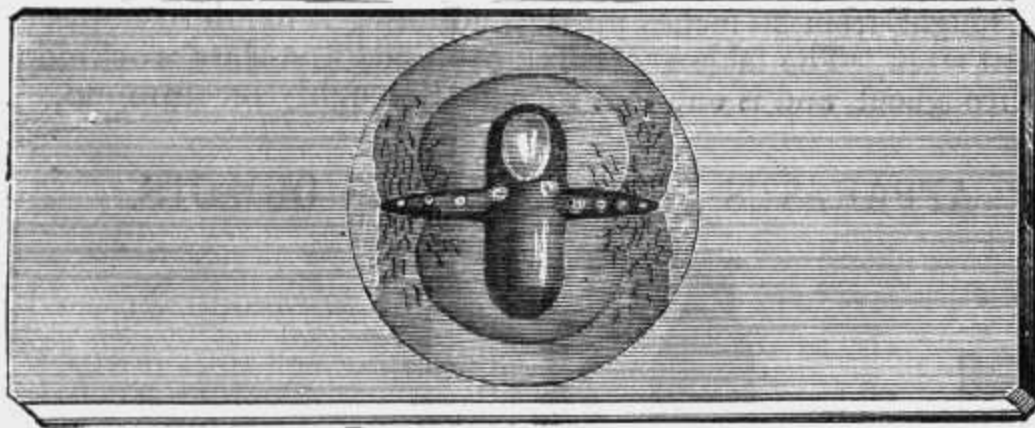
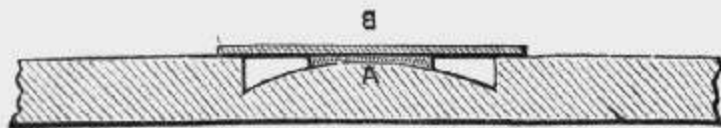
3470.

3470. Deby's Growing Slide, or Moist-chamber, 50



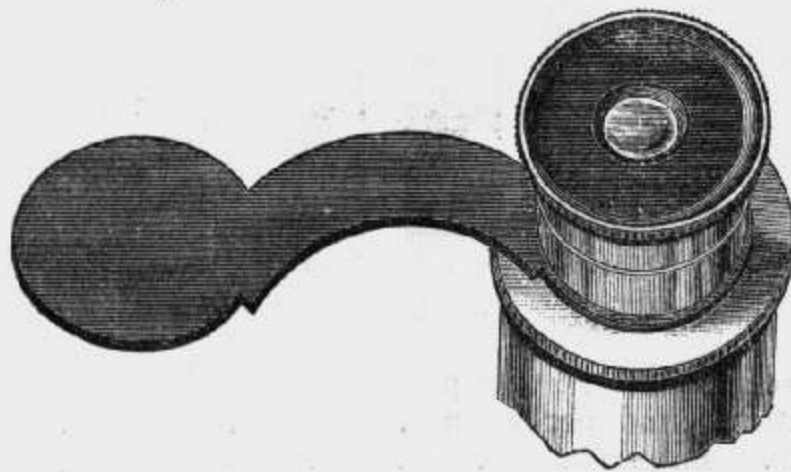
3536.

3536. Weber Growing-slide, or Moist-chamber, 75



3474.

3474. Holman's Life Slide, 1 50



3463.

3463. Eye-shade (Pennock's form), for use with Monocular Microscope, making it easy to keep both eyes open, 1 00

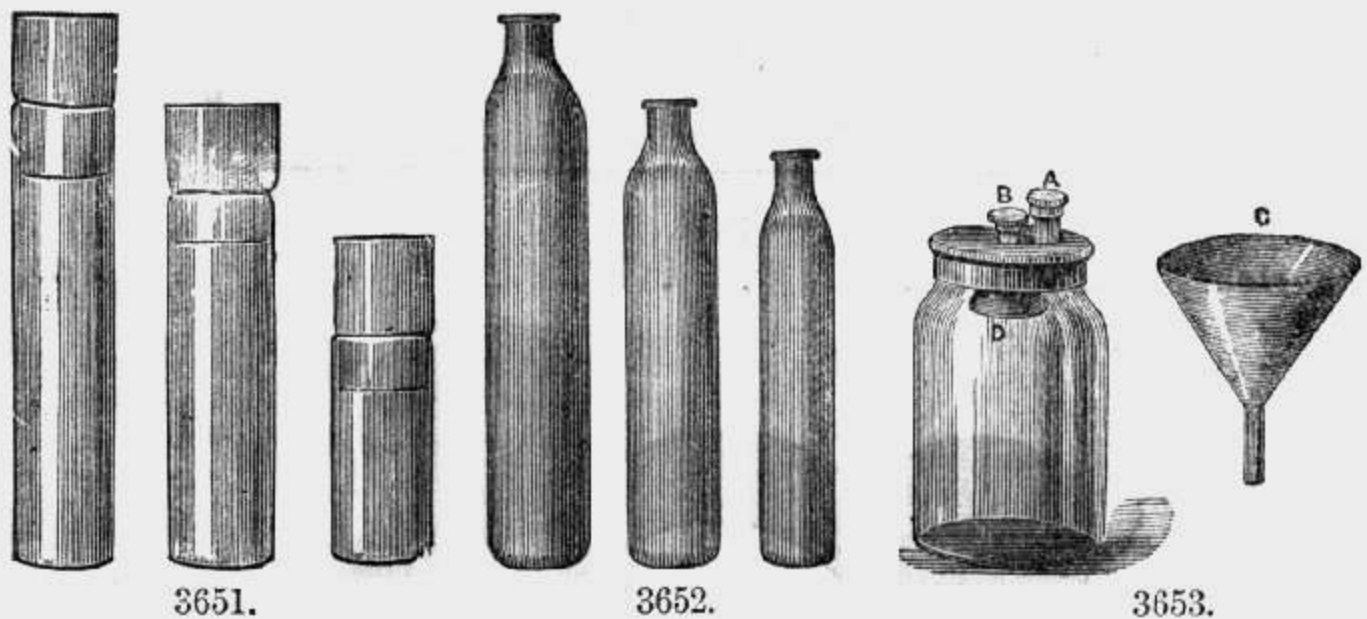
QUEEN'S REVOLVING MICROSCOPE TABLE.



3517.

No.		PRICE.
3517.	Queen's Revolving Microscope Table; has a very heavy and firm tripod base of cast iron, handsomely finished, and of neat and graceful appearance. The top is of handsomely finished walnut, 28 inches in diameter. A novel feature is that the top may be set and rotated at any height, from 26 inches up, thus adapting it to microscopes of different sizes. The table is of substantial and first-class workmanship throughout, and is one that we can thoroughly recommend,	\$12 00

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3650.	Collecting Boxes, for insects, with glass covers, each,	10
3651.	Do. Bottles, round, per dozen,	25 to 75
3652.	Do. do. flat, each,	10 to 15
3653.	WRIGHT'S MICROSCOPIC COLLECTING BOTTLE,	2 50

KLAEGER AND CARLSBADER INSECT PINS.

	PRICE.
Per 100,	\$0 15
Per 1,000,	1 25

SHEET CORK, 3½x12 inches.

Per dozen,	1 00
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We desire to close out the following ENTOMOLOGICAL GOODS (which are in good condition, except where otherwise specified), and to this end offer them at

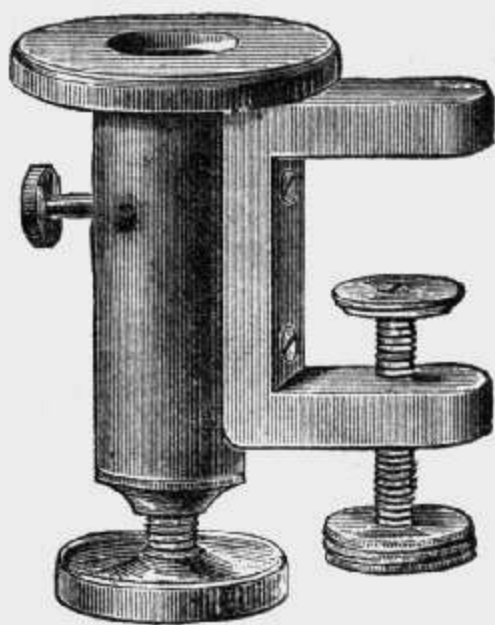
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4. Mahogany do. do. cork bottom, 7¼x4 do.	2 25	1 00
5. Exhibition Box, morocco covered, cork bottom, 6¾x4¼ do.	2 25	1 00
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7. Zinc Larva Box, with perforated lids, oval, 5½x3 in.,	50	20
8. Zinc Sugar Box, with brush, folding handle, 5 inches high,	1 25	50
9. Zinc Killing Box, 3½ inches high, compartment for chloroform, 2 lids,	50	25
10. Setting House, medium size, perforated lid, drawer with four compartments,	5 25	2 00
11. Setting House, large size, perforated lid, drawer with four compartments,	7 50	3 00
12. Breeding Cage, large size, perforated ends, glass back, door in front,	2 50	1 00
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15. Bottle Carbolic Acid,		10

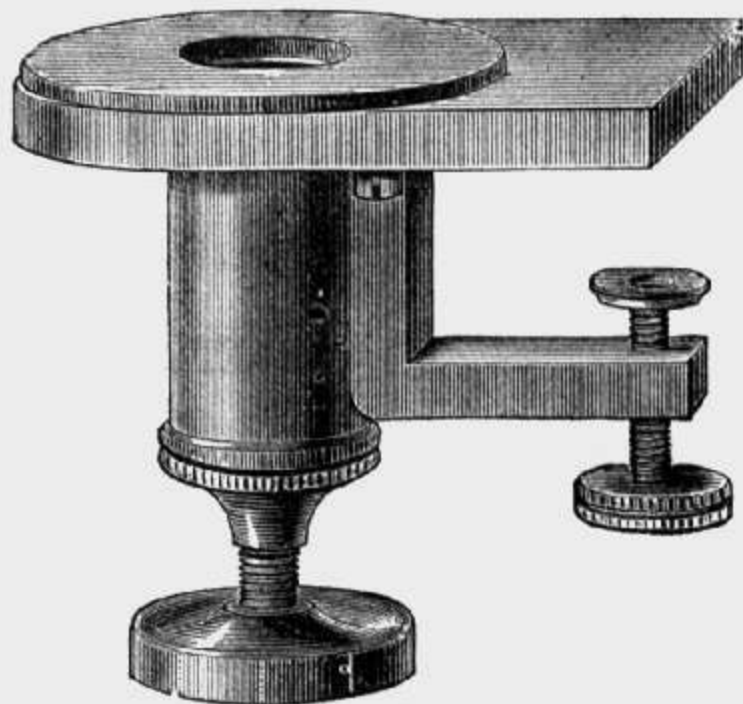


3731.

No.							PRICE.
3726 to 3731.	Forceps, 15 cents to \$1 25

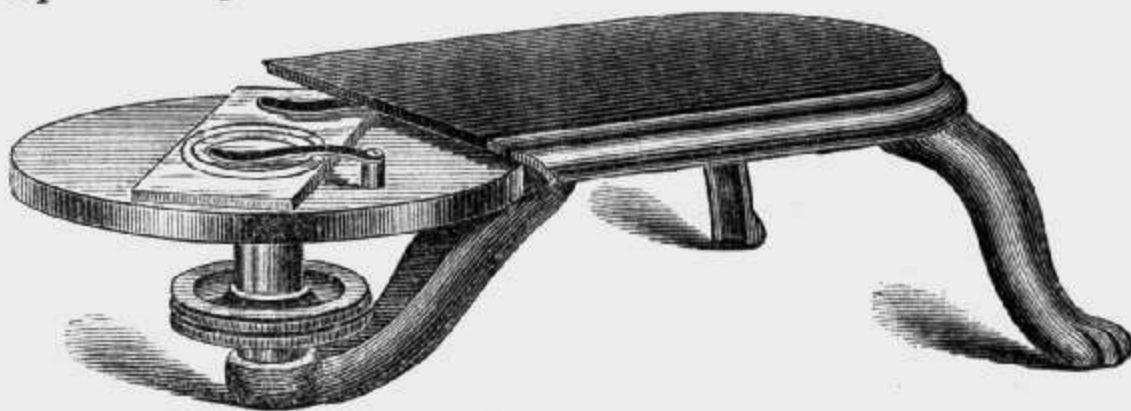


3752 1/2.



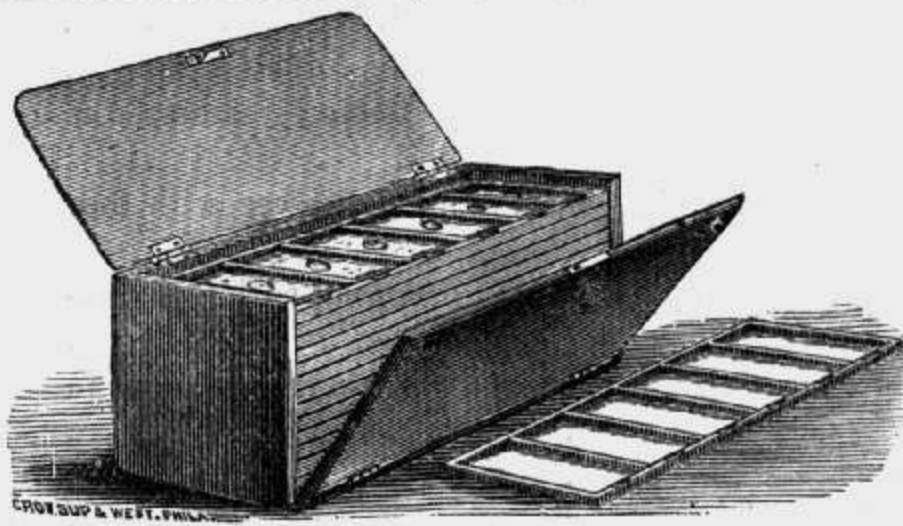
3753.

3752 1/2.	Section Instrument, with glass top and clamp, for cutting hard tissues,	8 00
3753.	Do. Army Medical Museum Pattern, with large glass top and clamp to fasten to table, for cutting soft tissues,	10 00



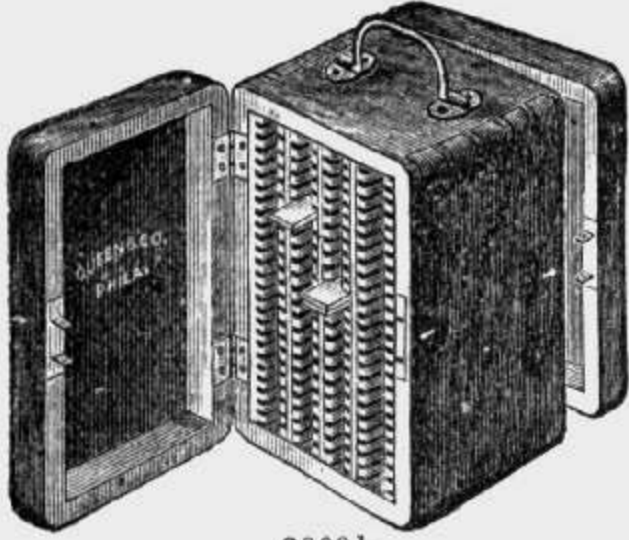
3763 1/2.

3763 1/2.	Queen's Comfortable Turn-Table,	3 00
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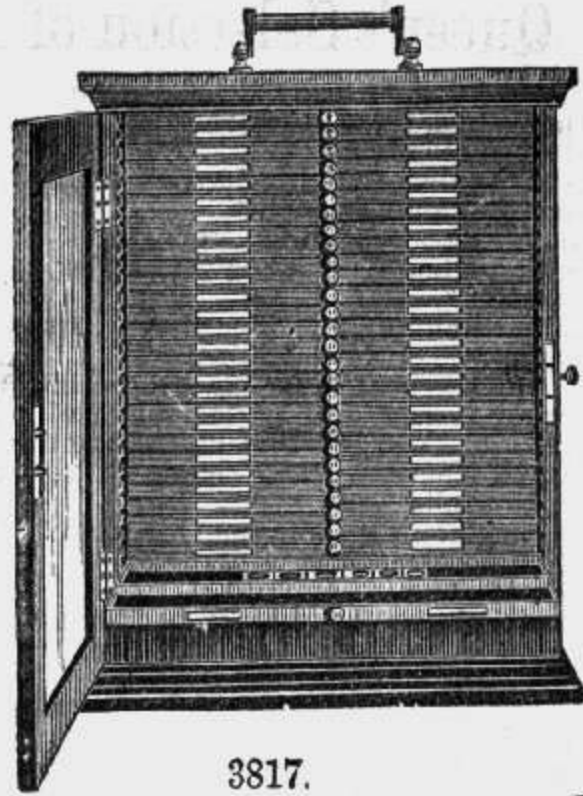


3808.

3808.	Mahogany Cabinet, with trays for 72 slides,	3 25
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3809 1/2.

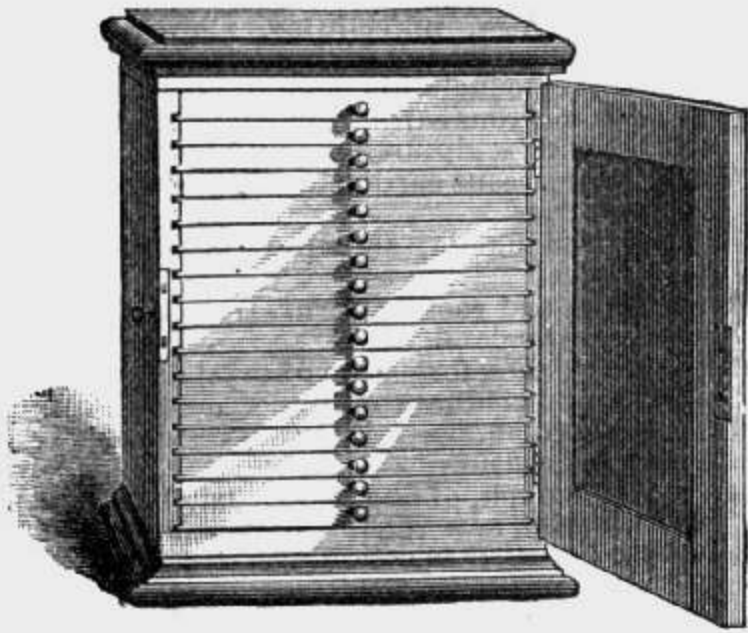


3817.

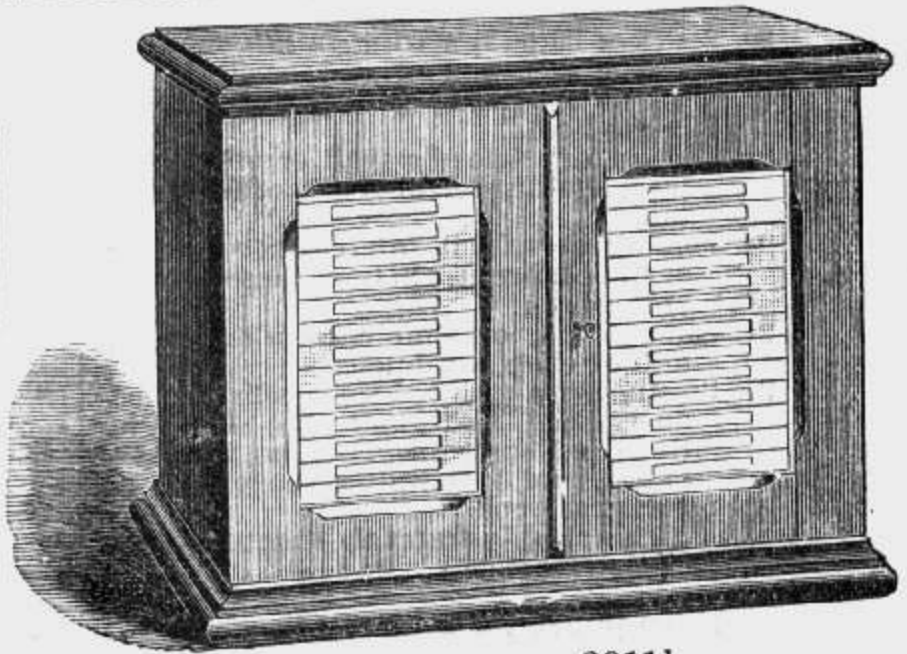
No.		PRICE.
3809 1/2.	Portable Cabinet, walnut, with racks, holding from 200 to 400 objects (the latter number, if slides are placed back to back, which can generally be done except where the objects are mounted in deep or large cells); neatly finished, with strong handle and locks,	\$5 50

QUEEN'S POPULAR CABINETS,

OF POLISHED MAHOGANY, WITH RAISED LEDGES IN EACH DRAWER TO ALLOW OF THE EASY REMOVAL OF OBJECTS.



3810 1/2.



3811 1/2.

3810 1/2.	For 350 Slides, 17 drawers, with lock,	15 00
3811 1/2.	For 600 do. 15 do. do. glass panel doors,	23 00

FINEST MAHOGANY CABINETS,

WITH NUMBERED KNOBS AND PORCELAIN TABLETS.

3812.	For 500 Objects, solid door,	35 00
3813.	For 500 do. with glass-panel door,	40 00
3814.	For 750 do. solid door,	44 00
3815.	For 750 do. with glass-panel door,	50 00
3816.	For 1000 do. solid door,	55 00
3817.	For 1000 do. with glass-panel door,	70 00

Queen's Selection of Fine Objects for Schools.

1. Human lung, section, double-injected (arteries red, veins blue), showing air-cells and capillaries.
2. Bone, section, showing haversian canals, lacunæ, and canaliculi.
3. Human blood, showing corpuscles.
4. Reptilian blood, showing corpuscles and nuclei.
5. Feather of humming-bird, showing transition from down to feather.
6. Hair of sheep (wool), showing the imbricated surface and curled form, which give it its well known felting properties.
7. Hair of mouse, showing cellular structure of medulla.
8. Silk fibre from cocoon spun by caterpillar of *Bombyx mori*.
9. Scale of fish (eel), cycloid.
10. Parasitic insect (head-louse, body-louse, or flea).
11. Antenna of moth, feather-shaped.
12. Eye of beetle, compound, showing multiplied images just above the object.
13. Leg and foot of honey-bee, with dilated tibiae, showing pollen-brushes.
14. Sting of wasp, showing barbs, sheath, and poison-sacs.
15. Ovipositor of cabbage butterfly.
16. Proboscis of blow-fly, showing pseudo-tracheæ or rows of teeth.
17. Spinneret of spider (organ for secreting and spinning silk).
18. Spiracles (or stigmata) of *Dytiscus* beetle, with scales and hair, preventing the entrance of foreign bodies to the tracheæ.
19. Tracheæ, or breathing-tubes, of caterpillar, of *Vanessa*, showing stiffening by spiral fibres.
20. Scales of butterfly's wing, *in situ*, showing arrangement and striated structure.
21. *Trichina spiralis*, or pork-worm, encysted in the flesh.
22. Tongue, or palate of a snail, or other mollusk, showing serrated or toothed structure.
23. Foraminifera, fossil, from chalk, consisting of the calcareous shells of these minute protozoans.
24. Parenchyma, or simple cellular tissue, pith of elder, *Sambucus*.
25. Prosenchyma (pointed wood-cells), dotted ducts, and medullary rays shown in three sections, transverse, longitudinal-radial, and longitudinal-tangential, of *Sassafras* wood.
(This also illustrates the structure of the exogenous stem.)
26. Transverse section of the endogenous stem, showing isolated fibro-vascular bundles.
27. Spiral vessels, in longitudinal section of *Impatiens* or *Rheum*.
28. Stomata, or breathing pores, in cuticle of Iris.
29. Starch-grains in cells of potato (cell contents).
30. Plant-crystals in cuticle of onion (cell contents).
31. Fibres of cotton, from seed of *Gossypium* (muslin).
32. Fibres of flax (bast-tissue of *Linum usitatissimum*) or linen.
33. Pollen of Japanese lily, showing markings on cell-wall.
34. Transverse section ovary of poppy, showing ovules *in situ*.
35. Fructification of fern, double stained, showing sporangia, or spore-cases; some specimens show spores also.
36. Spores of *Equisetum*, showing spiral filaments, or "elaters," for disseminating the spores.
37. Mould, *Mucor mucedo*, or other fungus, showing mycelium, or vegetative part, and fructification.
38. Marine Alga, or seaweed; *Ptilota* or other good specimen.
39. Fresh-water Alga, *Spirogyra*, showing arrangement of chlorophyll in spiral bands.
40. Fresh-water Alga, *Spirogyra*, showing formation of zygospores by conjugation of adjacent filaments (sexual mode of reproduction).
41. Fresh-water Alga, unicellular, showing multiplication by cell division (asexual mode of reproduction).
42. Fossil diatomaceous earth from Richmond, Va., showing sculptured discoid forms.
43. Fossil diatomaceous earth, showing longitudinal forms.
44. Diatoms, *Biddulphia*, showing box-like structure.
45. Fossil stems and roots of ferns, from coal measures, England.
46. Fatty acid, to show formation of crystals by heating and gradual cooling.
47. Micro-photograph, portrait, late President James A. Garfield.
48. Micro-photograph, of fine print; 1st chapter of Genesis, new version, according to Darwin; or other selection.

Price per set, neatly cased, \$23.00

Queen's Botanical Series,

arranged, with the kind assistance of Professor C. E. Bessey, of the Iowa Agricultural College, Ames, Iowa, to illustrate his "Botany for High Schools and Colleges," showing the most important features of plant structure, from the simple cell and its contents to the most elaborate tissue formations.

THE CELL—

1. Protoplasm and nucleus in cells of root tip of *Anthericum vittatum*. (Carmines stained.)
2. Cell-wall in pollen of Japanese lily; this specimen shows reticulated markings.
3. Cell-formation by union in *Spirogyra* (sexual mode; conjugation), showing zygospores *in situ*.

PRODUCTS OF THE CELL—

4. Chlorophyll-grains in cells of leaf of moss.
5. Starch-grains in cells of tuber of potato, section.
6. Aleurone grains in castor-bean (*Ricinus*), section.
7. Crystals (prisms) in scales of onion bulb.
8. Oil-cells or receptacles in rind of lemon, section.

TISSUES—

9. Single cells, *Protococcus* (Alga), from trunk of tree. (This also shows cell-multiplication by division.)
10. Spurious tissue in *Hydrodictyon utriculatum* (fresh-water Alga).
11. Parenchyma (simple cellular tissue), pith of elder (*Sambucus*), trans. section.
12. Collenchyma, stem of *Solanum*, trans. section. (Stained.)
13. Sclerenchyma, shell of cocoanut (*Cocos nucifera*), two sections.
14. Fibrous tissue, shown as bast in longitudinal and transverse section of Peruvian-bark (*Cinchona*).
15. Laticiferous tissue, second form (reticulately anastomosing vessels), in root of *Scorzonera*. (Stained.)
16. Sieve tissue, from *Cucurbita*, longitudinal and transverse sections.

TRACHEARY TISSUE—

17. Spiral, reticulated, and annular vessels in *Impatiens*, longitudinal section.
18. Scalariform vessels in root-stock of fern, *Aspidium*, longitudinal section.
19. Pitted or dotted vessels, in longitudinal section, of *Sassafras*.
20. Tracheides, in longitudinal-radial section, of pine; showing also transverse sections of the medullary rays.

EPIDERMAL SYSTEM—

21. Epidermal cells, shown in vertical section of *Marchantia*.
22. Stomata and cells of cuticle of Iris.
23. Trichomes, shown by stellate hairs or scales from *Eleagnus argentea*.

FIBRO-VASCULAR SYSTEM—

24. Fibro-vascular bundles of endogenous stem, as shown in longitudinal and transverse sections of stem of Indian corn (*Zea Mais*).

Price, in neat case, \$12.50

Queen's Series of Vegetal Esculents and Adulterations.

1. Rye flour.
2. Sago starch.
3. Starch of Bermuda arrow-root.
4. Potato starch, *in situ*.
5. Wheat flour, with plaster.
6. Do. do. do. chalk.
7. Chocolate, Cacao, powder.
8. Cocoa, do. do. without oil.
9. Do. shells, do. do.
10. Cacao, with brick-dust.
11. Do. do. wheat flour.
12. Tea-leaf.
13. Seeds of coffee, long. section.
14. Do. do. trans. do.
15. Do. do. do. do. roasted.
16. Coffee, powder.
17. Do. do. with rye.
18. Do. do. do. chicory.
19. Rhizome of chicory, trans. section.
20. Do. do. long. do.
21. Black pepper, powder.
22. Do. do. section of fruit.
23. White do. do. do.
24. Allspice, powder.
25. Do. do. with cedar wood.
26. Clove, long. section.

27. Clove, trans. section.
28. Do. powder.
29. Cinnamon-bark, Java, two sections.
30. Do. do. Ceylon, two sections.
31. Do. do. China, do. do.
32. Do. do. Ceylon, powder.
33. Do. do. do. do. with cedar, *Cedrela-odorata*.
34. Do. do. do. powder, with red cedar, *Juniperus virginiana*.
35. Cinnamon (*Cassia*) bark, two sections.
36. Do. do. do. powder.
37. Do. do. do. do. with cedar wood.
38. Guinea pepper, fruit and seed, two sections.
39. Do. do. powder.
40. Ginger-root, two sections.
41. Do. powder.
42. Do. do. with rye.
43. Turmeric-root, section.
44. Cardamom-seed, powder.
45. Do. do. with rye.
46. Galanga rhizome, long. section.
47. Do. do. trans. do.
48. Do. do. powder.

Price per set, neatly cased, \$21.00

Queen's New Series of Textile Fabrics

is now ready, and will comprise the following objects :

VEGETAL FIBRES—

1. Cotton, hairs from seed of *Gossypium herbaceum*.
2. Jute, from stem of *Corchorus textilis*.
3. Hemp, from stem of *Cannabis sativa*.
4. Flax, from stem of *Linum usitatissimum*.
5. New Zealand flax, from stem of *Phormium tenax*.
6. Ramie, or China grass, from stem of *Boehmeria tenacissima*.
7. Manila hemp, from petiole of *Musa troglodytarum*.

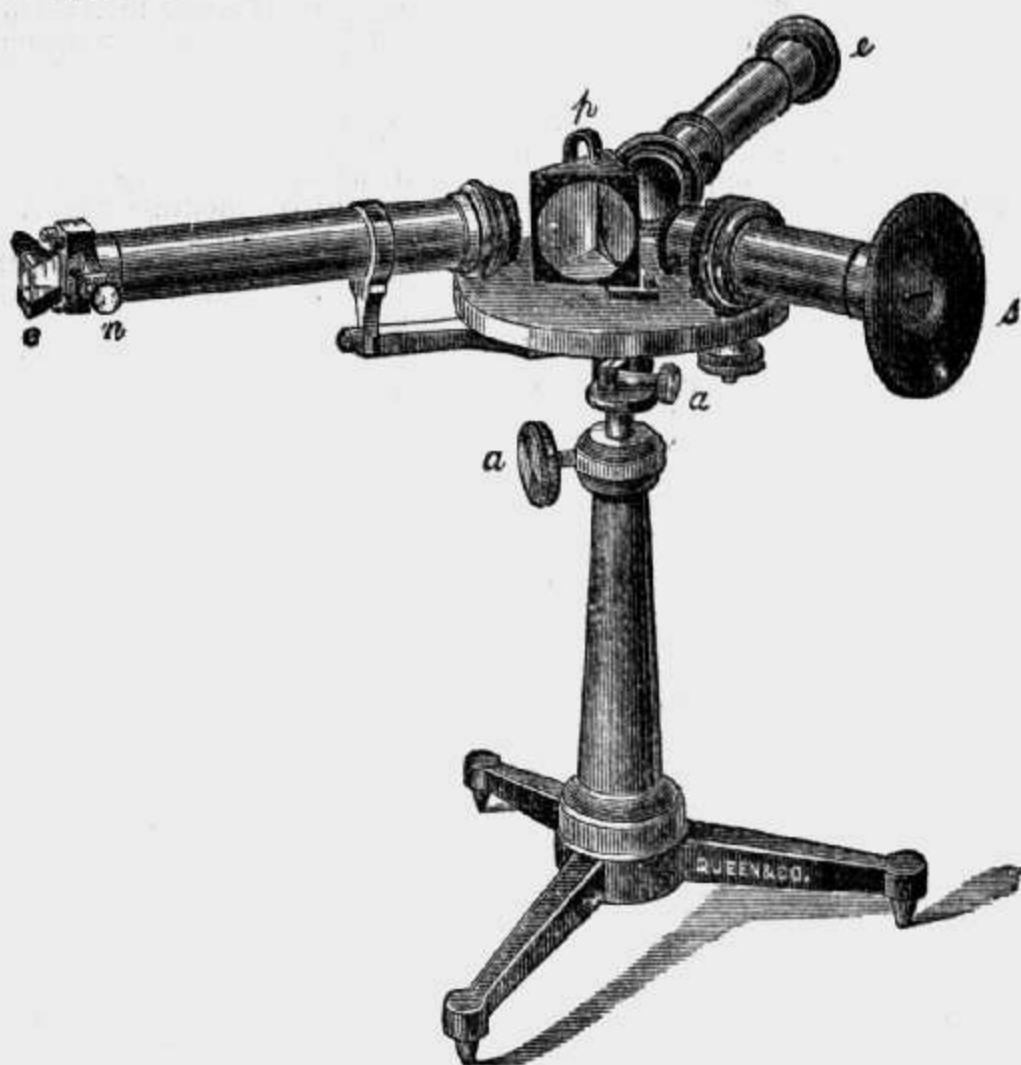
8. Cocoanut fibre (coir), from husk of cocoanut, *Cocos nucifera*.

ANIMAL FIBRES—

9. Wool, hair of sheep, showing imbricated structure and curled form, which give it the property of felting.
10. Mohair, hair of Angora goat.
11. Alpaca, wool from Llama.
12. Silk fibre, from cocoon spun by caterpillar of *Bombyx mori*.

Price, in neat box, \$5.50

QUEEN'S NEW LABORATORY SPECTROSCOPE.



PRICE.

We desire to bring to the notice of teachers and students our new Spectroscope, furnished with flint glass prism *p*, 33 mm. high, improved slit with micrometer screw *n*, adjustable telescope *l*, by means of clamp-screw *a*, the telescope has 7 mm. aperture, 147 mm. focus. The prism *p* and telescopes are mounted on a finely finished brass table, supported on a neat tripod stand; the table is adjustable vertically, and can be fixed by a set screw *a* at the side, complete with comparison prism *c*, and photographed scale *s*, for measurement of spectra. The increasing interest felt in diffraction spectra has induced us to furnish an instrument suited to their production; also, in this case the prism is removed, and the small brass frame with diffraction plate replaces it. We believe this spectroscope supplies a want long felt, and that it will be of great service for student's use, to save larger and finer instruments in the laboratories of many universities. The extremely low price at which it is furnished brings it within the reach of all, . . . \$35 00
 Brass pin and support for diffraction gratings when used with Spectroscope, . . . 1 50

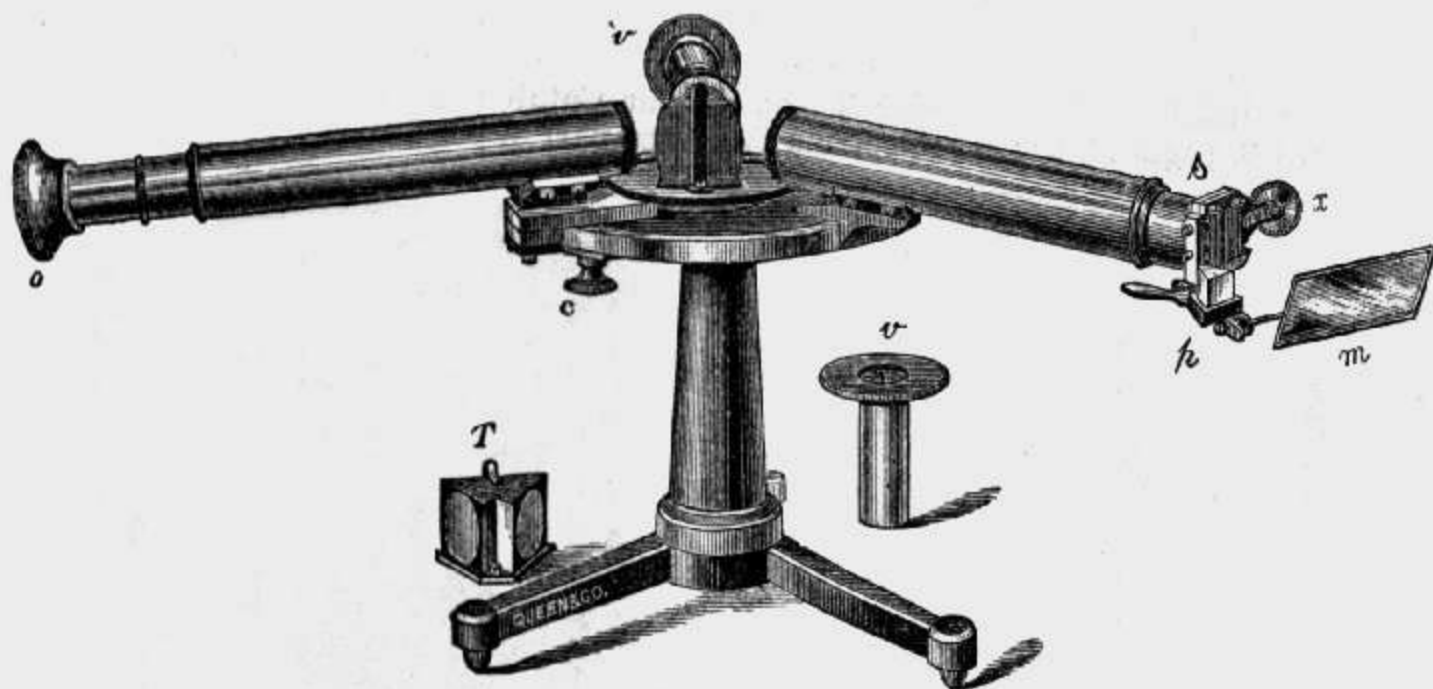
DIFFRACTION GRATINGS.

These gratings are ruled with great care on the new dividing engine of W. A. Rogers. The maker has placed the prices very low so that they may be widely sold, and thus aid in the popularization of science. They will be found to give very fine results, with our Laboratory Spectroscope.

Diffraction Grating, on prepared glass, 1,000 lines to the centimetre,	15 00
Do. do. on commercial glass, 2,000 lines to the centimetre,	12 00
Do. do. 10,000 lines to the inch,	12 00
Do. do. 20,000 do. do.	12 00

We are prepared to furnish special gratings, as to size and number of lines, as may be desired. Those on prepared glass are fit for special spectroscopic investigations.

QUEEN'S THOLLON SPECTROSCOPE.



The most remarkable improvement of this Spectroscope is in the new *Thollon*, or triple prism with which it is fitted. The new prism *T* consists of a dense glass prism of 90° , with two additional prisms cemented to it; this combination gives wonderful results; the nickel line between the *D* can be seen, and for projection the results are still more astonishing; the solar lines have been distinctly seen, without a slit, by simply using a round aperture.

Prof. Geo. F. Barker has carefully measured the dispersion, etc., of the *Thollon* prism with the following interesting results:

Angle of the inner prism,	90°
Do. do. outer prisms,	15°
Angle of compound prism,	60°
Deviation for <i>A</i> ,	77° 40'
Do. do. <i>D</i> ,	80° 30'
Do. do. <i>H'</i> ,	98° 30'
Index for <i>A</i> ,	1.8593
Do. <i>D</i> ,	1.8764
Do. <i>H'</i> ,	1.9579

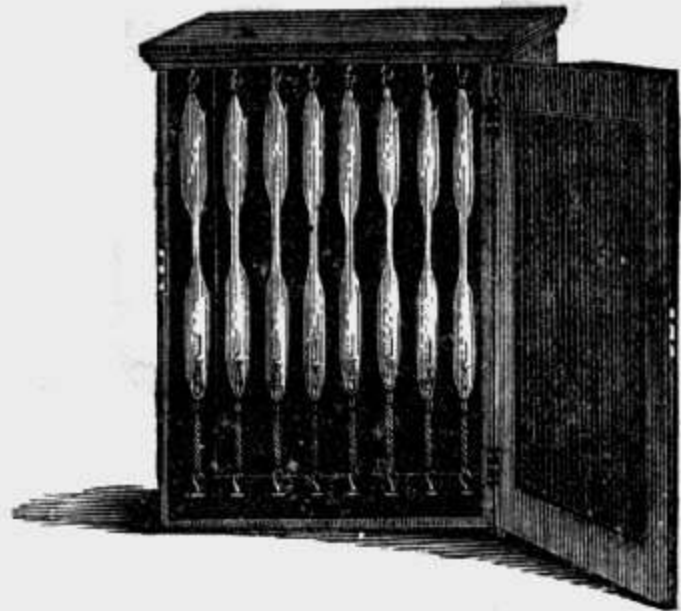
DISPERSIVE POWER.

Angular length of spectrum,	20° 50'
Dispersion,	0.0986
Dispersive power of <i>Thollon</i> prism,	0.1125

This elegant instrument is substantially mounted, the telescope *O* has one inch in aperture and nine inches focus. It is supplied with two prisms 38 mm. high, to be used alternately; one is the *Thollon* prism *T*, with it instead of a photographed scale, a micrometer slit *V* carried on the third tube *V* is used to measure the spectrum; the position of the bright line of the slit is determined by means of a divided arc and vernier, on the spectroscopy table. The other prism is of dense flint glass, and gives a good spectrum, separating the *D* line; an extra tube is supplied with the usual photographed scale, for use with this prism; a comparison prism *p* and new heliostat *m* are also supplied. This latter new and convenient attachment will be found of great use, when using sunlight, being so completely under the control of the operator. This instrument is also provided with a new slit, *S*, which is kept closed by a spring, and opened by screwing up a

No. PRICE.
 milled-head x; in this way the slit cannot be injured by being closed too tight. Our Laboratory Spectroscope is also provided with a similar slit. Complete with two prisms, one for great and one for small dispersion as above, \$100 00

For a detailed list of Geissler Tubes, see our Catalogue, part 4, pages 104, 105; also part 3, pages 63, 64; for Spectrum Tubes see part 4, page 105.



- | | | | |
|-------------------|--|-------------------|----|
| 1885.
PART 2D. | 1886.
PART 2D. | 1887.
PART 2D. | |
| 1885. Part 2d. | Plucker's Tubes for obtaining the spectra of gases, | 2 | 00 |
| 1886. Part 2d. | Stand for single Plucker's Tube, | 2 | 00 |
| 1887. Part 2d. | Set of eight Plucker's Tubes, with brass mountings, in box; a safe and convenient arrangement, | 23 | 00 |

We have recently received an unusually large assortment of the celebrated Plucker's Spectrum Tubes, which contain traces of various gases and solids in a pure state, for use with the Ruhmkorff Coil and the Spectroscope; the late solar researches render these tubes invaluable to the teacher and physicist. We are happily able to offer these at low prices. To popularize these tubes, we have arranged an Amateur's Set, for use with our Laboratory Spectroscope.

We would bring to the notice of scientists, the new *end on Spectrum Tubes* which we are now able to furnish; they give magnificent results with the Spectroscope.

NEW MAP OF THE SOLAR DIFFRACTION SPECTRUM, by Lerebours and Secretan, 37 inches long, 12 inches wide, beautifully colored. This map, when mounted, is an attractive addition to a lecture-room. Unmounted, 3 75
 Mounted in neat frame with protecting glass, 6 25

Two Spectrum Maps, one consists of a prism, showing dispersion of rays; the other shows the bright spectrum beautifully colored, per pair, . 1 25

We can now supply Carre carbon pencils for electric light experiments from 1 mm. to 20 mm. thick, some of the sizes can be furnished with hole in the centre, viz.: tubes of carbon.

AMATEUR'S SPECTROSCOPIC SET.

- | | | | |
|-----------------|--|----|---------|
| 5735. Part 4th. | Ruhmkorff Induction Coil, | 10 | 00 |
| 5480. Part 4th. | Grenet Battery, pint size, | 4 | 00 |
| 5851. Part 4th. | Hydrogen Spectrum Tube, | 2 | 00 |
| 5852. Part 4th. | Nitrogen do. do. | 2 | 00 |
| 5858. Part 4th. | Flouride of Boron Spectrum Tube, | 2 | 00 |
| | | | \$20 00 |

This simply indicates about what is wanted. The battery and coil can be increased in size to advantage, and the tubes increased in number.

THE
ELECTRO-DYNAMIC HOUSEHOLD MOTOR.

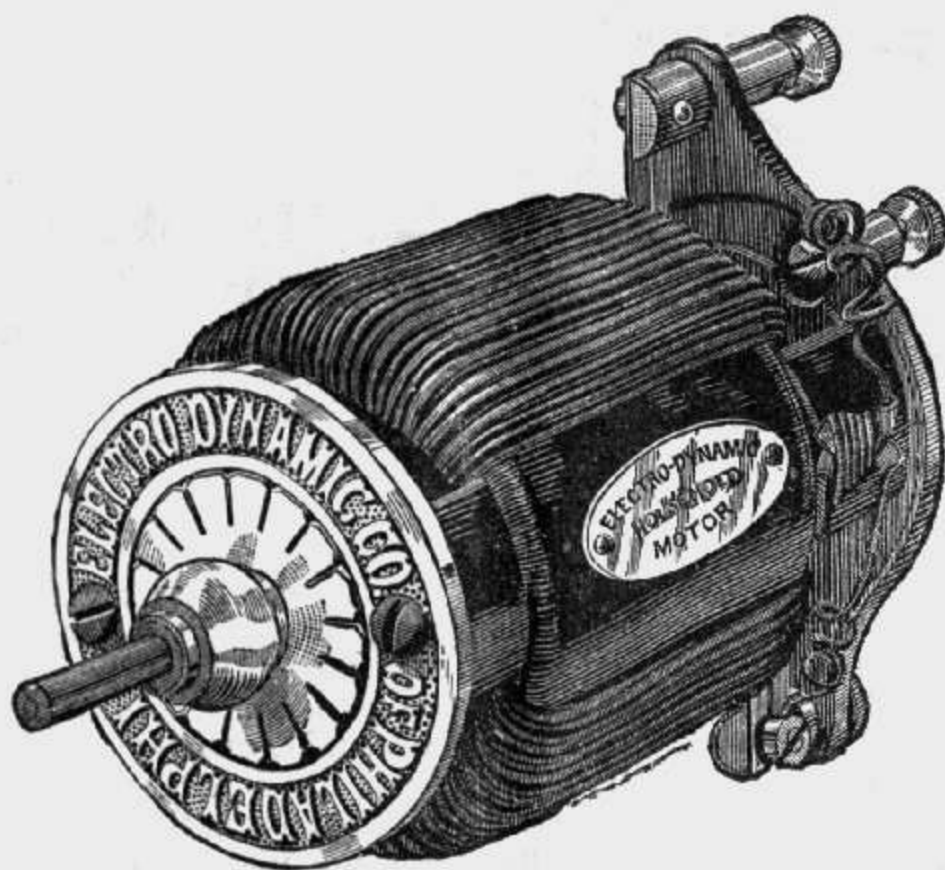
THE NEW AND ONLY

Practical Electrical Motor for the Dwelling, the Counting House,
the Laboratory, etc., etc.

WEIGHT, 40 OUNCES.

SIMPLE IN CONSTRUCTION.

STRONG AND DURABLE.



LOW IN PRICE.

ALWAYS READY FOR USE.

This is the only Engine in the world which can lift 1000 times its own weight one foot in one minute.

NO DANGER, NO NOISE, NO HEAT, NO FUMES.

With this Motor the sewing-machine, instead of bringing ill-health and misery upon women, and a sure inheritance of woe to their children, becomes a pleasant occupation.

One can refresh himself at pleasure with a delicious breeze in sultry weather from a portable fan, and the laboratory and household is supplied with a portable power requiring no shafting.

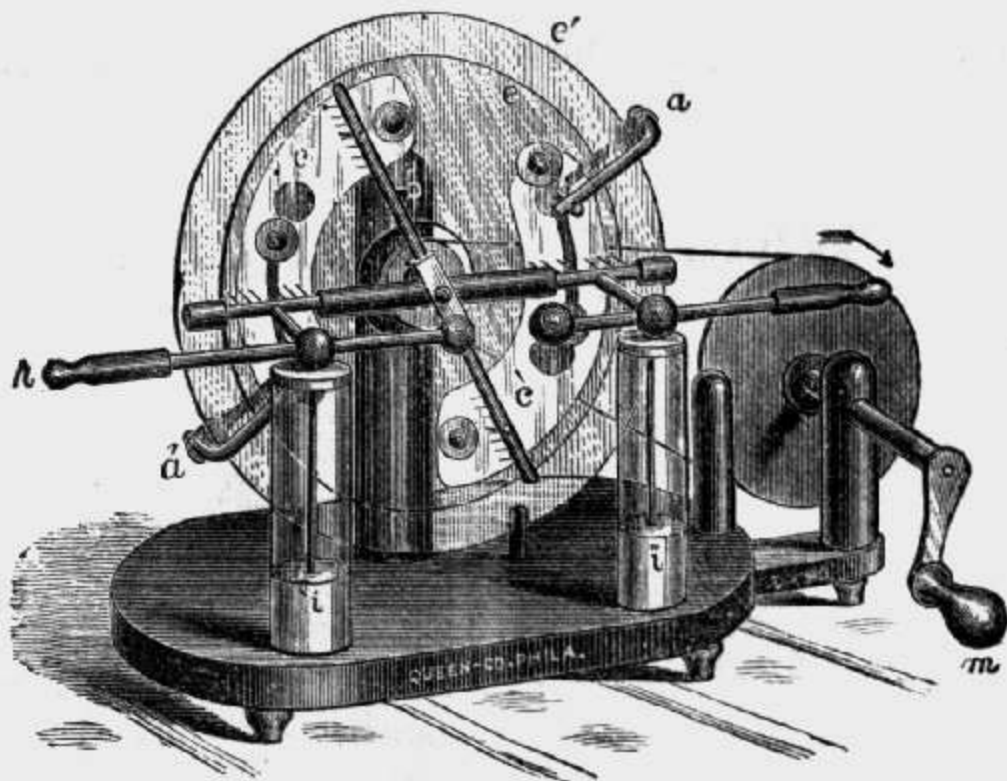
More than \$100,000 has been spent in perfecting this machine, in special tools for its manufacture, to bring it within the reach of all.

JAS. W. QUEEN & CO.,
924 CHESTNUT STREET,
PHILADELPHIA.

TYNDALL'S SET OF ELECTRICAL APPARATUS.

Collection of Electrical Instruments, designed to accompany Tyndall's Lessons on Electricity. 57 pieces. Complete set.....	PRICE. \$65 00
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QUEEN'S NEW TOEPLER-HOLTZ ELECTRICAL MACHINE.



No. 1.

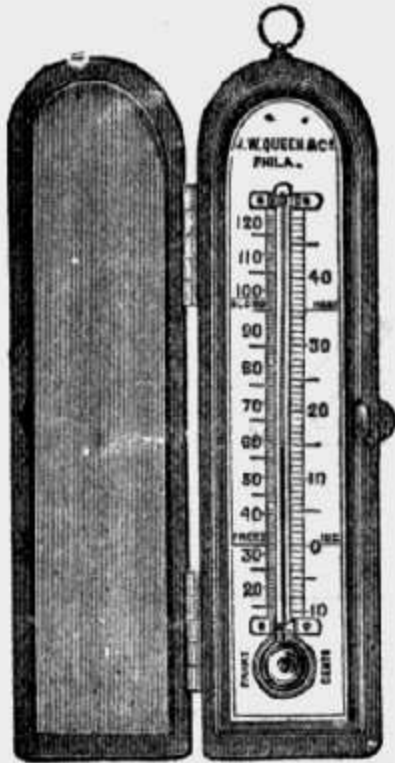
- | | |
|--|---------|
| No. 1. QUEEN'S NEW TOEPLER-HOLTZ ELECTRICAL MACHINE; gives long and brilliant discharges; self-charging; works in all weathers. Diameter of revolving plate, 26 centimeters = 10½ inches, giving 5-inch spark. Mounted on finely polished base..... | \$25 00 |
| No. 2. QUEEN'S NEW TOEPLER-HOLTZ ELECTRICAL MACHINE; self-charging, more finely finished than the above, fitted with rubber supports, with neat and new arrangement for adjusting the combs, etc., to the plates; also with adjustment for the plates. Diameter of revolving plate, 31 centimeters (about 12½ inches)..... | 50 00 |
| No. 3. QUEEN'S NEW TOEPLER-HOLTZ ELECTRICAL MACHINE; self-charging, and finished same as No. 2, and fitted with rubber supports, with neat and new arrangement for adjusting the combs, etc., to the plates; also with adjustments for the plates. Diameter of revolving plate, 41 centimeters (about 16½ inches) | 80 00 |
| No. 4. QUEEN'S NEW TOEPLER-HOLTZ ELECTRICAL MACHINE; self-charging, finished same as No. 2, and fitted with rubber supports, with neat and new arrangement for adjusting the combs, etc., to the plates; also with adjustments for the plates. Diameter of revolving plate, 52 centimeters (about 21 inches)..... | 115 00 |

We can also furnish double and four-plate machines. Prices on application.

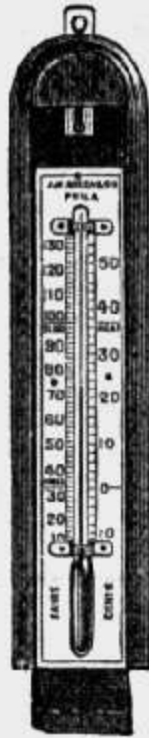
- | | |
|--|------|
| Rotary Cylinder, to be placed between the poles of our new Toepler-Holtz machine. The cylinder will be caused to revolve rapidly by the electrical attraction and repulsion..... | 3 50 |
| CROOKES' RADIOMETER; very sensitive..... | 4 50 |

Prof. Crookes' wonderful Radiometer has excited the most intense interest among scientists everywhere.

POCKET THERMOMETERS AND ANEROID BAROMETERS



12116.



12123.

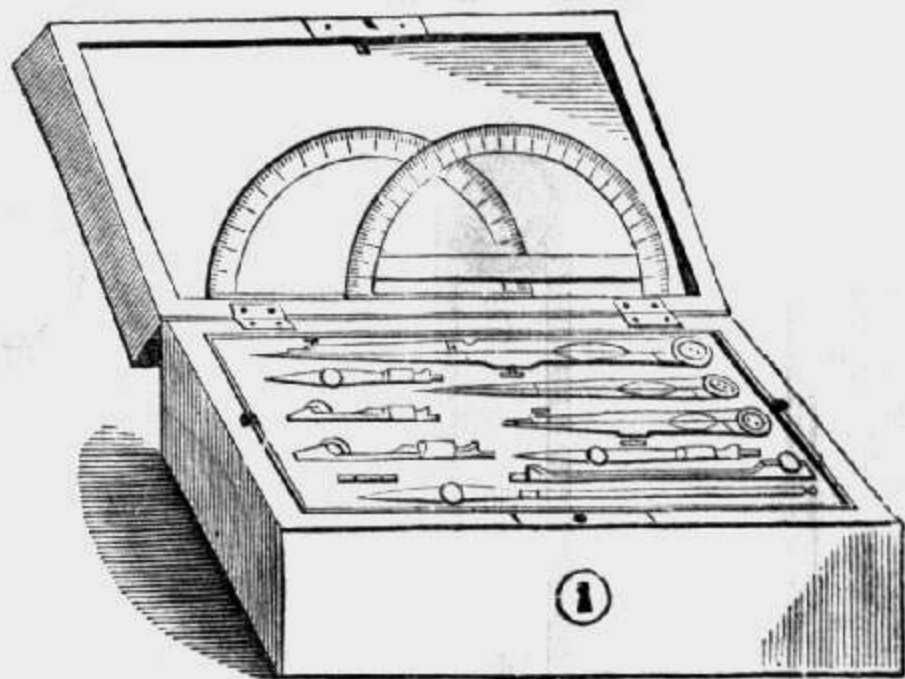


13505.

No.		PRICE.
12110.	POCKET THERMOMETER, 4 inches long, cylinder form, with paper scale, in fine brass case,	\$1 00
12111.	POCKET THERMOMETER, 4 inches long, in mahogany case, with metal scale,	1 00
12112.	POCKET THERMOMETER, 4 inches long, in ebony case, with ivory scale,	1 25
12116.	POCKET THERMOMETER, 5 inches long, enamel tube, double ivory scale, in morocco case,	3 00
12123.	POCKET THERMOMETER, 6 inches long, enamel tube, ivory scale, in walnut case, with sliding lid,	4 25
13505.	POCKET MOUNTAIN ANEROID, compensated for temperature, 1 $\frac{3}{4}$ in. diameter, altitude scale to 3,000 or 5,000 feet, in morocco case,	20 00
13507.	POCKET MOUNTAIN ANEROID, compensated for temperature, 1 $\frac{3}{4}$ in. diameter, altitude scale to 10,000 feet, in morocco case,	21 00
13508.	POCKET MOUNTAIN ANEROID, compensated for temperature, 1 $\frac{3}{4}$ in. diameter, altitude scale to 15,000 feet, in morocco case,	24 00
13510.	POCKET MOUNTAIN ANEROID, compensated for temperature, 2 $\frac{1}{2}$ in. diameter, altitude scale to 3,000 or 5,000 feet,	20 00
13512.	POCKET MOUNTAIN ANEROID, compensated for temperature, 2 $\frac{1}{2}$ in. diameter, altitude scale to 10,000 feet,	21 00
13513.	POCKET MOUNTAIN ANEROID, compensated for temperature, 2 $\frac{1}{2}$ in. diameter, altitude scale to 15,000 feet,	24 00

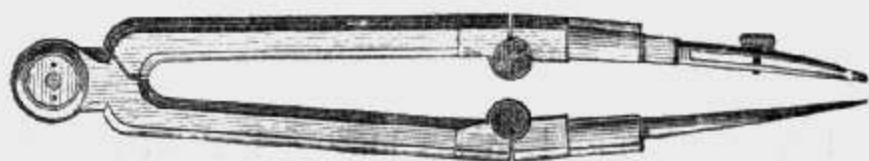
USEFUL INSTRUMENTS AND MATERIALS.

SELECTED FROM OUR MATHEMATICAL CATALOGUE.



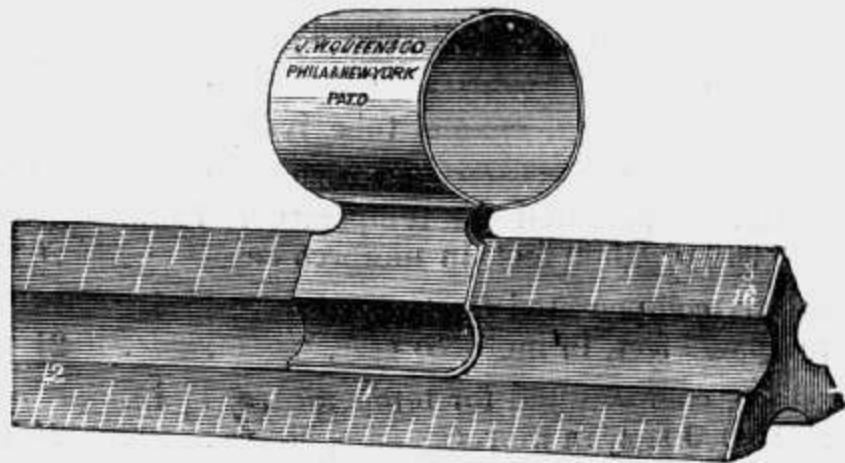
58.

- | No. | PRICE. |
|--|--------|
| 58. Rosewood case of Brass Drawing Instruments, No. 58, with lock, key, and tray, 13 pieces, | \$3 00 |
| 107. Morocco box of fine German Silver Drawing Instruments, No. 107, 15 pieces, | 9 75 |



79.

- | | |
|---|------|
| 79. Pocket Dividers, German silver, No. 79, with folding pen and pencil points (a complete set of instruments), | 5 50 |
|---|------|

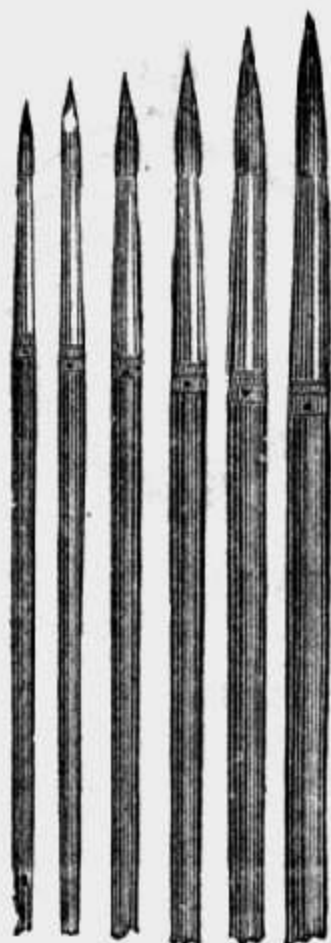


463.

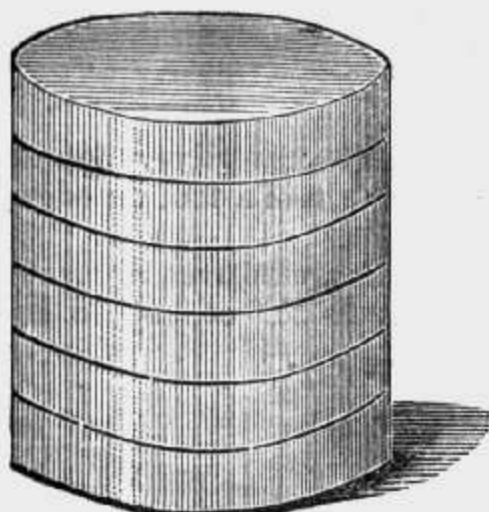


466.

- | | |
|---|------|
| 463 and 466. Triangular Boxwood Scales, for draughtsmen, 12 inches in length, graduated either in decimals for engineers, No. 463, or duodecimally for architectural work, No. 466, | 2 00 |
| Scale Guard, for do., | 25 |



878.

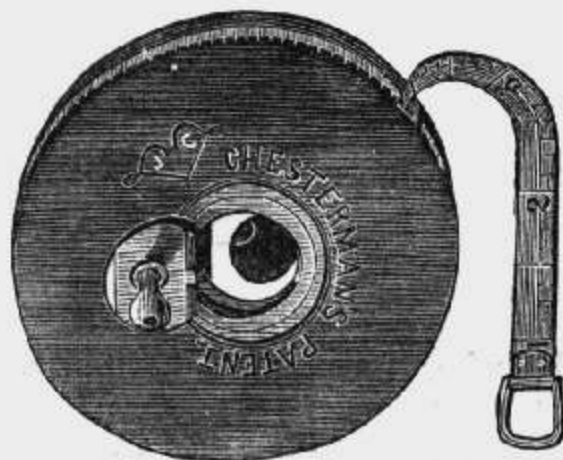


859.

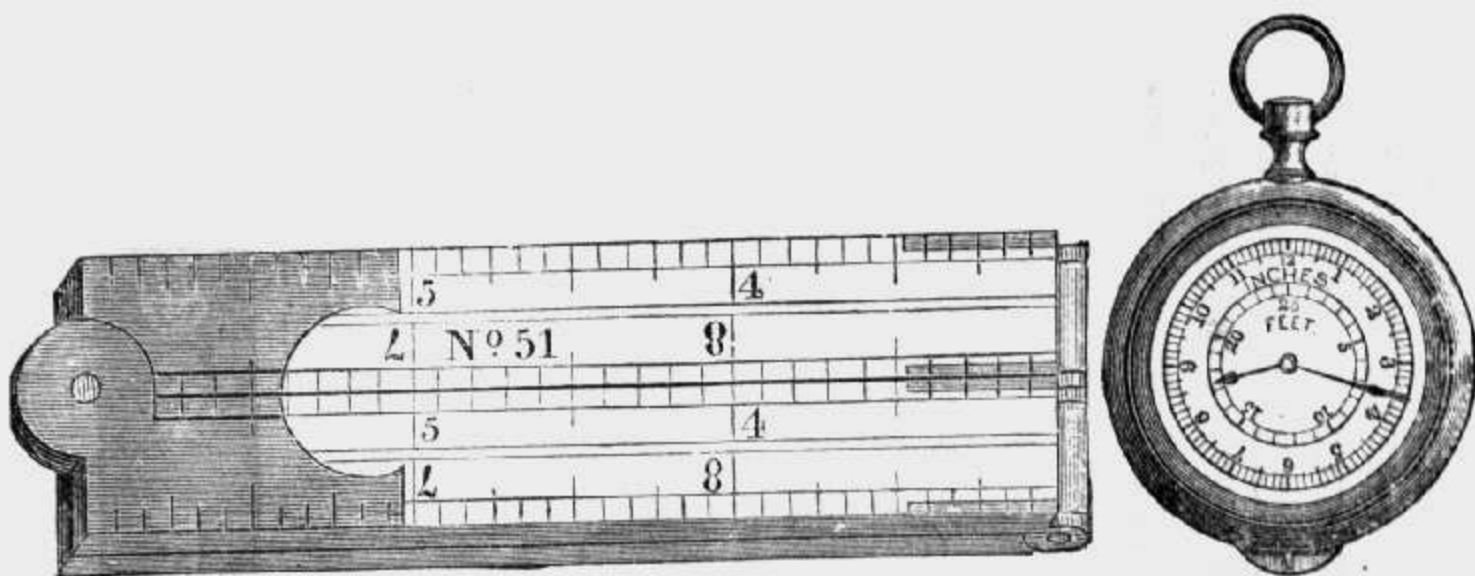


901.

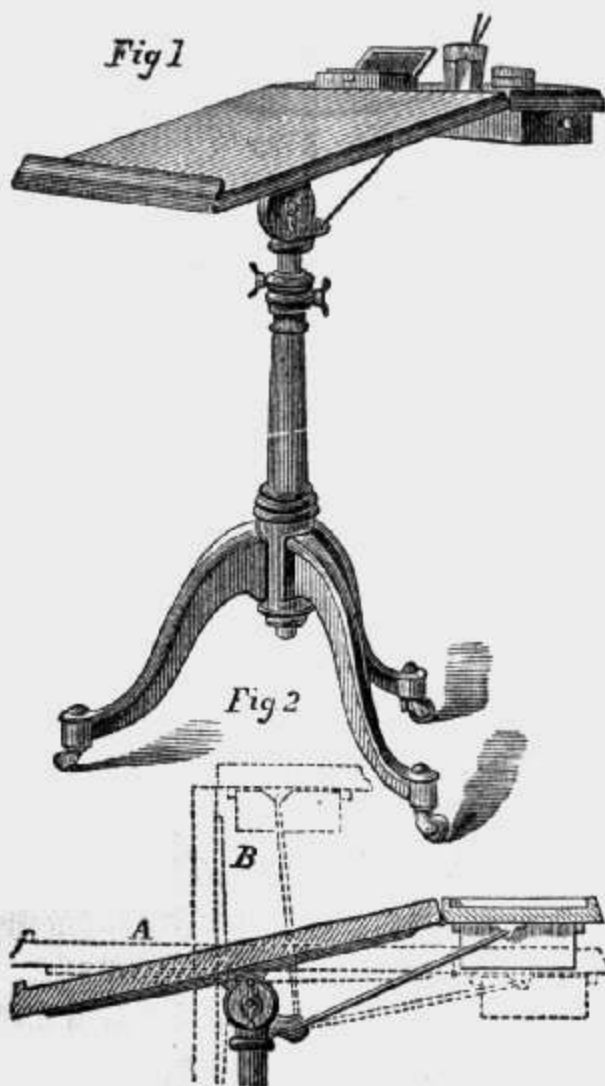
No.	PRICE.
878. Camel Hair Brushes, with wood handles. Nos. 1 and 2, each 10 cts. ; 3 and 4, each 12 cts. ; 5 and 6, each	\$0 15
China Nest, 2½ inches in diameter, containing 5 saucers and a cover. Per nest,	60
903. India Ink. Per cake,	40
905. India Ink, extra super. Per cake,	2 00



Pedometer, for measuring distances walked, watch form and size, nickel-plated case,	5 00
Tape Measures, linen, in cases, 3 feet, 50 cts. ; 6 feet, \$1.00 ; 50 feet,	1 50
Tape Measures, steel, with metric and English scales ; 3 feet, \$1.75 ; 6 feet,	2 75

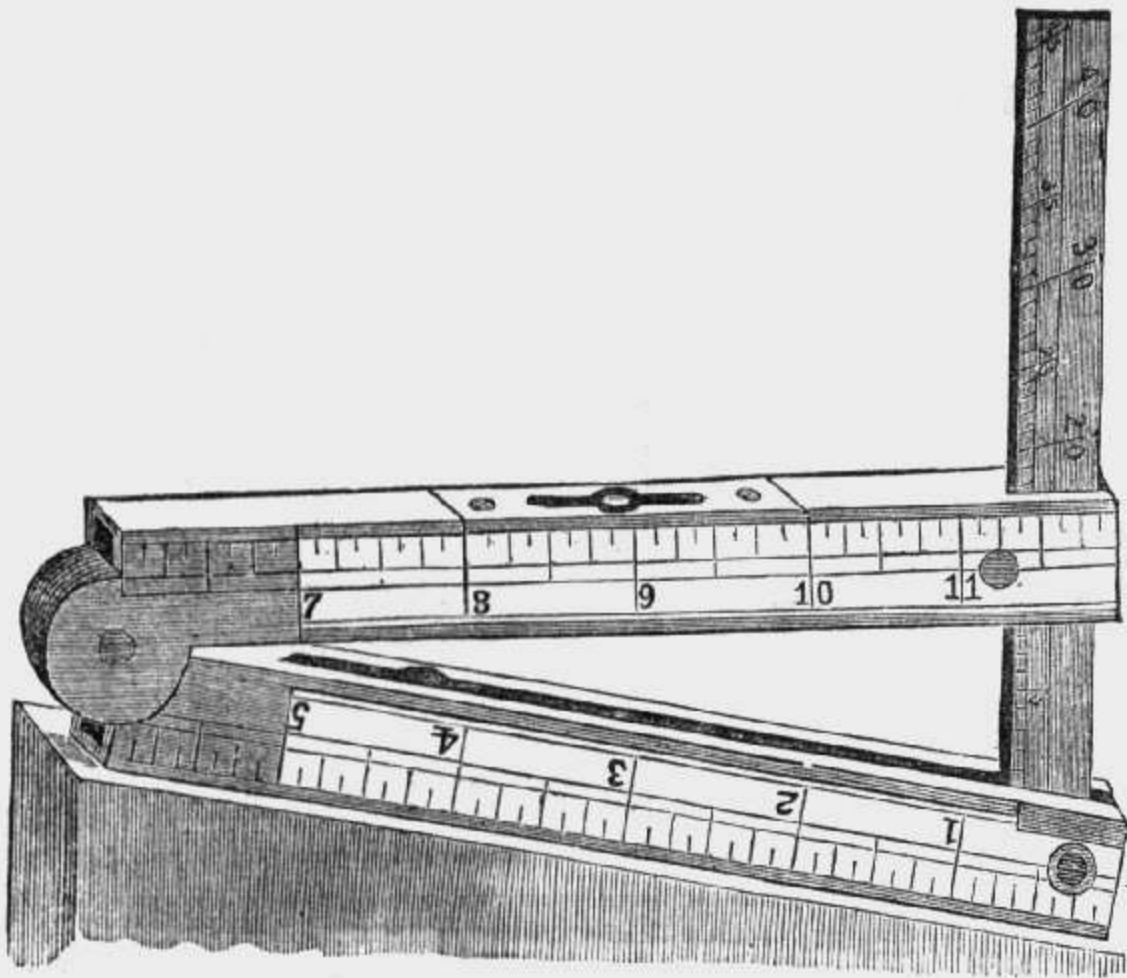


Ivory Pocket Rule, 1 foot, 4-fold, German silver mounted, graduated in 8ths, 10ths, 12ths, 16ths, and 100ths of a foot on edges,	\$2 25
Boxwood Rule, 1 foot, 4-fold,	25
The Charm Measuring Instrument, measures accurately any line, whether straight or curved, as long as 25 feet, and in inches and fractions of inches,	2 50



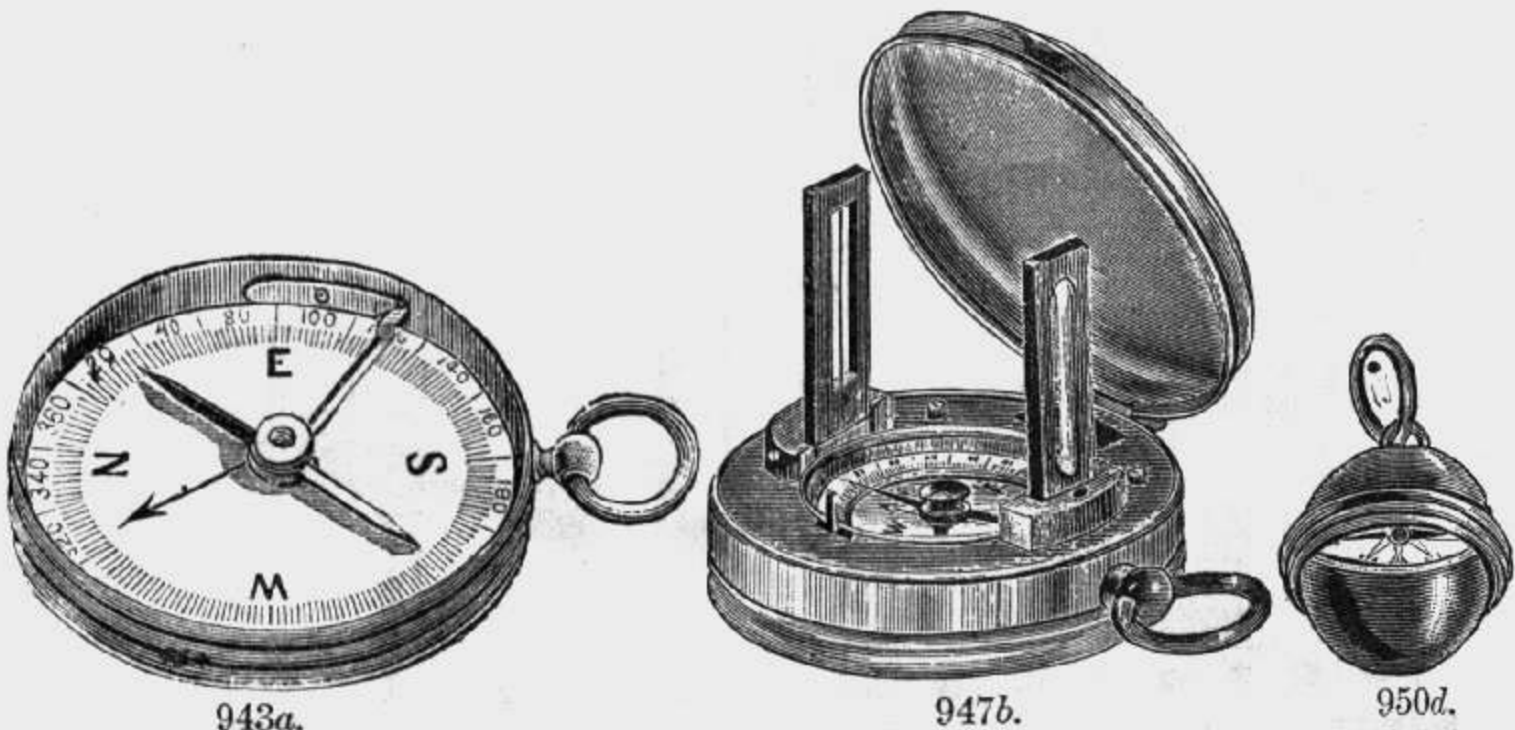
681. Drawing Table, black walnut top, 22x26 inches, ornamented iron stand on casters, 12 50

These tables, suitable for architects' offices, counting-rooms, etc., or for home use, can be readily fixed at any height from 30 to 44 inches, with the top horizontal, vertical, or inclined at any angle, while the instrument shelf and drawers always remain level. In any of these positions the top can be allowed to rotate, or the whole firmly clamped. Total weight, 55 pounds.



No.	PRICE.
1116. Combination Rule, 1 foot, 2-fold, boxwood. This is the most convenient and useful pocket-rule ever made; it combines in itself a carpenter's rule, spirit level, square plumb, bevel, indicator brace, scale, draughting scale of equal parts, T square, protractor, right-angle triangle, and with a straight edge can be used as a parallel ruler, all the parts of which, in their separate applications, are perfectly reliable,	\$2 50

An explanation and directions for use accompany each of the Combination Rules.



943a. Pocket Compass, brass, round, 1½ inches in diameter,	1 25
947b. Do. do. nickel-plated hunting case, 2¾ inches in diameter, with folding sight,	7 00
950d. Charm Compass, nickel-plated, gimballed mounted,	2 00

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THE STANDARD.

15027.

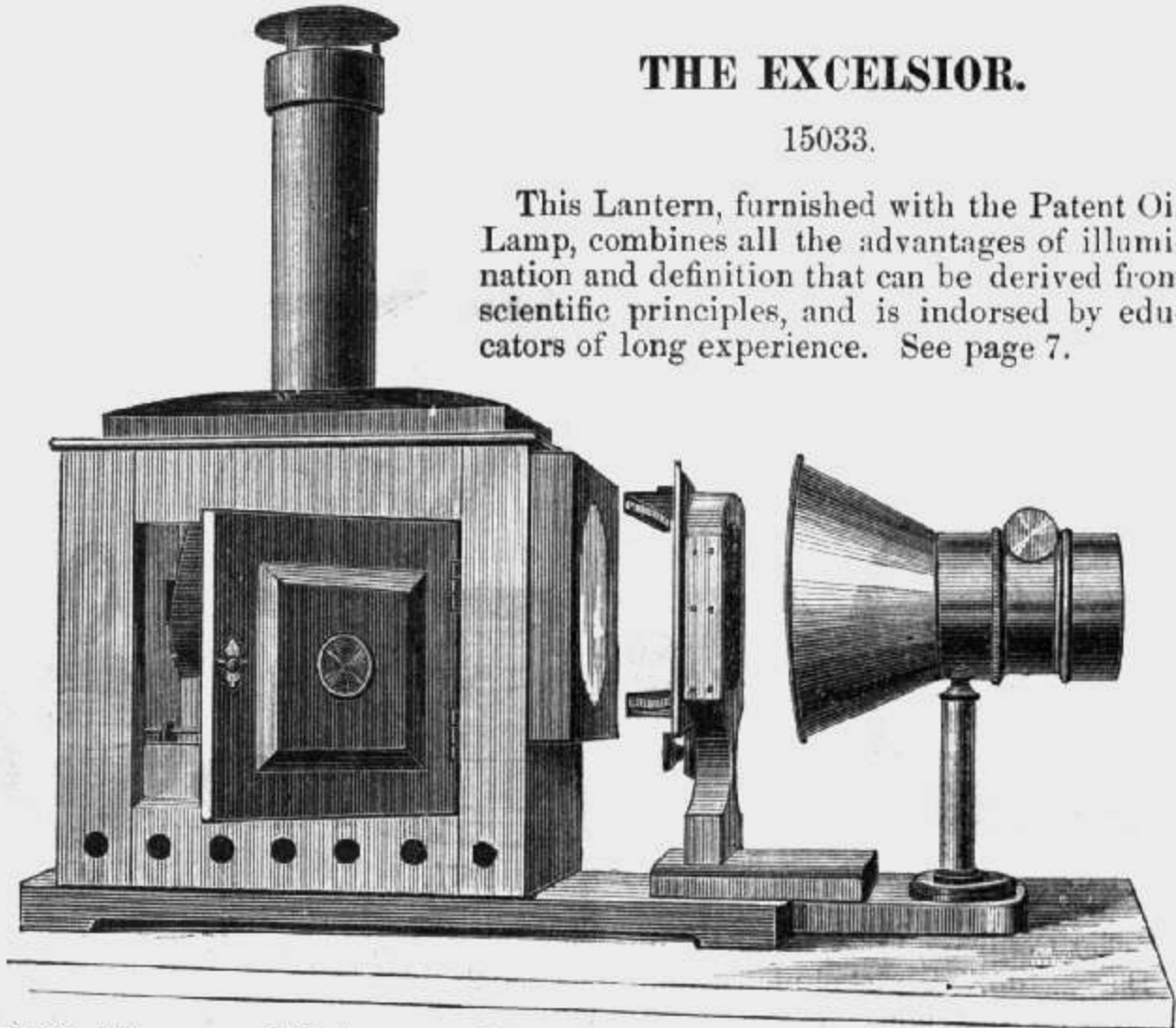


15027. This is also made of Russia iron, on polished walnut base, with 4-inch condensing lenses, achromatic objective with each adjustment for focus, and Newton's tri-wick lamp, giving a uniformly illuminated disk of about 8 feet, the picture sharply cut. Price, \$35.00.

THE EXCELSIOR.

15033.

This Lantern, furnished with the Patent Oil Lamp, combines all the advantages of illumination and definition that can be derived from scientific principles, and is indorsed by educators of long experience. See page 7.



15033. The general fittings are the same as those of the Illuminator, but it has a door at the side, so that an oxy-hydrogen jet may be used instead of the oil-lamp; it is also provided with an adjustable carrier to concentrate all the available light upon the picture, with patent oil-lamp. Price, \$60.00.

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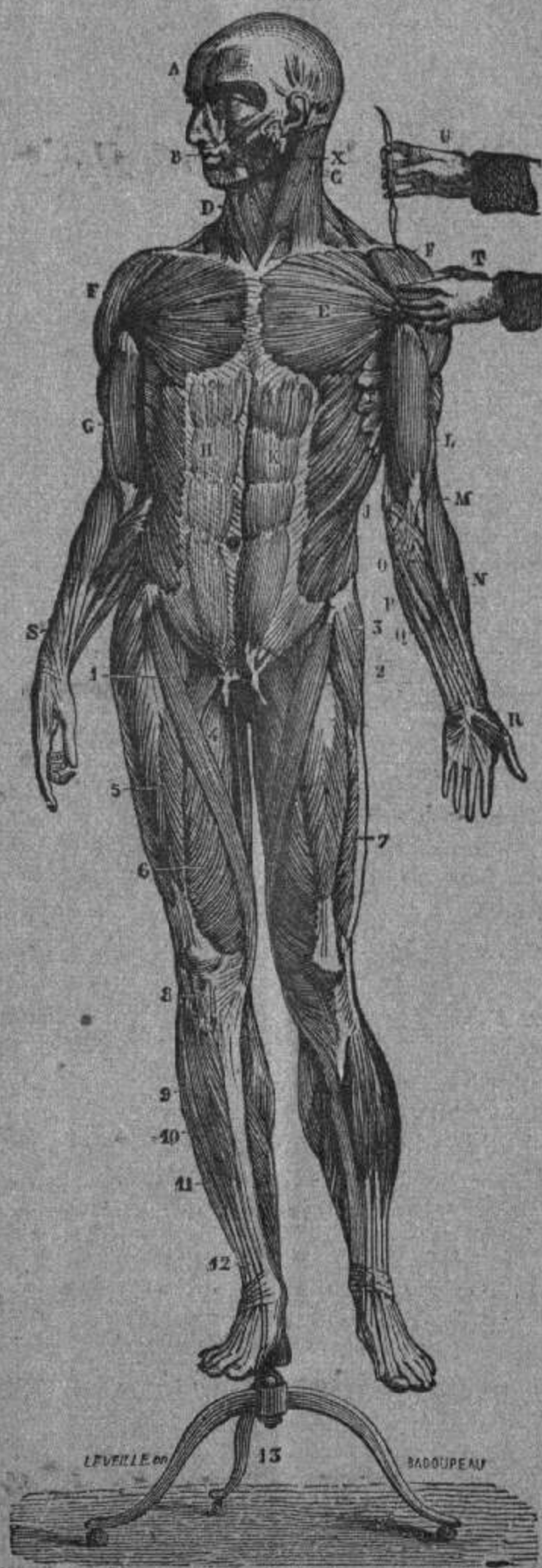
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