

JAMES W. QUEEN.

SAMUEL L. FOX.

ILLUSTRATED CATALOGUE

OF

**Mathematical, Optical, and Philosophical
INSTRUMENTS AND SCHOOL APPARATUS.**

Established in 1853.



This Catalogue is furnished gratis on application, or sent by mail free to all parts of the United States, Canada, and the West Indies.

JAMES W. QUEEN & CO.

924 Chestnut St., East of Tenth St.

PHILADELPHIA:

1859.

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ESTABLISHED IN 1853.

Catalogue *Price* *P 5*

ILLUSTRATED CATALOGUE

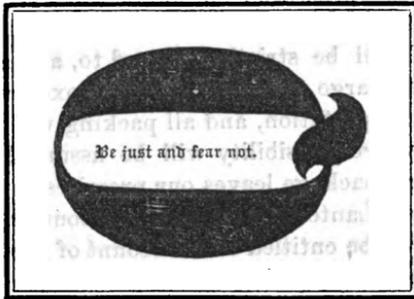
OF

Mathematical, Optical, and Philosophical

INSTRUMENTS

AND

SCHOOL APPARATUS



MADE AND FOR SALE BY

JAMES W. QUEEN & CO.

(SIGN OF FRANKLIN'S HEAD,)

No. 924 Chestnut St., East of Tenth St.,

PHILADELPHIA.

SEVENTH EDITION.

JANUARY,

1859.

NOTICE.

TERMS CASH.

THE numerical arrangement adopted in this catalogue renders it necessary, in ordering any of the articles enumerated, merely to give the number, with the price and edition of the catalogue. No other description is required.

The prices noted will be strictly adhered to, and are the lowest for cash. A moderate charge will be made for boxes when apparatus is to be packed for transportation, and all packing will be done with the utmost care; but no responsibility will be assumed for breakage or other damage after a package leaves our premises.

All bills for Magic Lanterns and Slides, amounting to fifty dollars, or over that sum, will be entitled to a discount of five per cent., and no charge made for boxes or packing.

The safest remittance of money is by a bank-draft payable to our order; or, where that cannot be obtained, gold can be sent with safety by any of the express companies. The sender must pay the charges made by the express company.

Postage-stamps are equal to cash and are readily transmitted in a letter. They will be received in any amount.

Goods ordered per express and bill to be paid to express company will be charged with the collection demanded by the company.

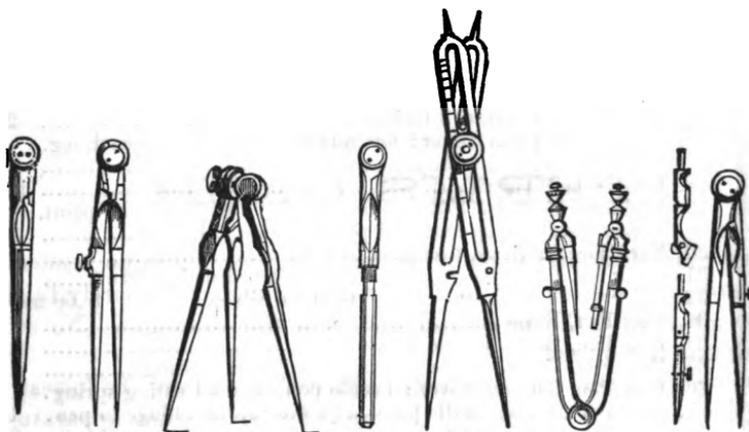
Goods ordered to be sent by mail must be prepaid: therefore the postage must be included in the remittance.

JAMES W. QUEEN & Co.
924 Chestnut St.

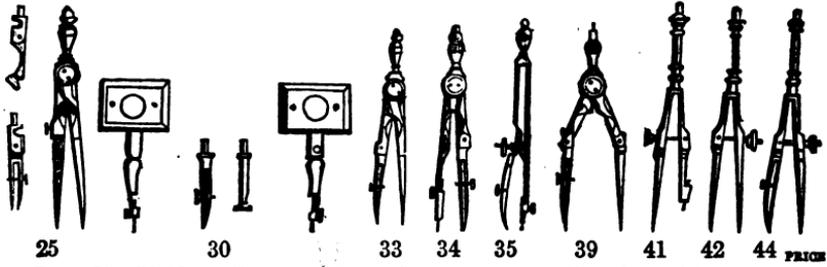
PHILADELPHIA, January, 1859.

CATALOGUE.

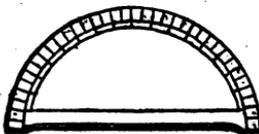
Mathematical Instruments.



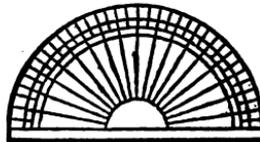
No.	Description	PRICE
1.	Dividers, Brass, brass joints, rivet heads, 5 inch	12 cents
2.	“ “ steel joints, screw heads, 5 inch	25 cents
3.	Dividers, Brass; “ turned cheeks, 4 inch	50 cents
4.	Dividers, Brass; steel joints, hair spring, 5 inch	\$1, 6 inch
5.	“ “ “ superior, 5 in.	\$1 37, 6 in.
6.	Dividers, German Silver; steel joints, turned cheeks, fine finish, 4 inch	62 cents, 5 inch 75 cents, 6 inch
7.	Dividers, German Silver; steel joints, turned cheeks, fine finish, hair spring, 4 inch	\$1 25, 5 inch 1 50, 6 inch
8.	Dividers, German Silver; steel joints, turned cheeks, fine finish, hair spring, superior, 4 inch	\$1 50, 5 inch 1 75, 6 inch
9.	Dividers, Brass; three legged,	
10.	“ German Silver; three legged,	2 75 and 3 50
11.	“ “ fine finish, with shield for pocket,	2 00
12.	“ Brass, bisecting,	50 cts. to 2 00
13.	“ German Silver, bisecting,	1 00 to 2 50
14.	Proportional Dividers, Brass; half divided,	1 75 and 2 25
15.	“ “ “ superior,	6 75
16.	“ “ “ full divided,	7 50
17.	“ “ German Silver; half divided,	2 50
18.	“ “ “ superior,	7 25
19.	“ “ “ full divided,	8 25
20.	Pillar Compasses, Brass,	5 50
21.	“ “ German Silver,	6 75
22.	Dividers, Brass; medium quality, with pen and pencil point, 5 inch	75 cents, 6 inch
23.	Dividers, Brass; medium quality, with pen, pencil point, and lengthening bar,	87
24.	Dividers, Brass; medium quality, with pen, pencil point, and lengthening bar, and addition of pair of plain dividers,	1 25
25.	Dividers, Brass; medium quality, needle point, with pen and pencil points, 3 inches,	1 00



	<p>26. Dividers, German Silver; fine quality, needle point, with pen and pencil points, 3 inches..... 2 25</p> <p>27. Dividers, German Silver; fine quality, with joint in each leg, 3 inches..... 1 75</p> <p>28. Extension Dividers..... 10 00</p> <p>29. Dividers, German Silver; fine quality, with needle point, pen, lengthening bar, and pencil points, 6 inches..... 3 25</p> <p>30. Furniture for Beam Compass, Brass..... 3 00</p> <p>31. " " with adjusting screw..... 3 75</p> <p>32. " " German Silver, " 5 00 to 5 50</p> <p>33. Bow Pen, Brass..... 50</p> <p>34. Bow Pen, Brass, needle points..... 1 00</p> <p>35. Bow Pen, Brass, needle points and adjusting spring..... 1 25</p> <p>36. Bow Pen, German Silver; needle point and adjusting spring. 1 50</p> <p>37. Bow Pen, Brass; needle point, adjusting spring, hinge to pen. 1 50</p> <p>38. Bow Pen, German Silver; needle point, adjusting spring " 2 00</p> <p>39. Bow Pen, German Silver; with joint in each leg..... 2 25</p> <p>40. Bow Pencil, German Silver; joint in each leg..... 2 25</p> <p>41. Bow Pencil, solid steel, ivory handle..... 1 50</p> <p>42. Spacing Dividers, solid steel, ivory handle..... 1 25</p> <p>43. Bow Pen, German Silver, with adjusting spring, pencil and needle points, and extra pen point..... 3 50</p> <p>44. Bow Pen, solid steel, ivory handle..... 1 50</p> <p>45. Bow Pencil, Brass..... 50</p> <p>46. Bow Pencil, German Silver; adjusting spring and needle point..... 1 50</p> <p>47. Drawing Pen, Brass mounted..... 25</p> <p>49. Drawing Pen, German Silver; fine finish, hinge to pen.. 50</p> <p>50. Drawing Pen, German Silver; fine finish, hinge to pen, and protracting pin..... 62</p> <p>51. Drawing Pen, German Silver; fine finish, hinge to pen, and protracting pin, extra fine..... 1 25</p> <p>52. Drawing Pen, German Silver; fine finish, hinge to pen, German Silver points, for red ink..... 75</p> <p>53. Double Drawing Pen, or Railroad Pen, for parallel lines, brass mounted..... 1 75</p> <p>54. Double Drawing Pen, or Railroad Pen, for parallel lines, German Silver, fine finish..... 2 50</p> <p>55. Roulette, for dotting lines..... 50 and 62</p> <p>55½. " " with extra wheels..... 75</p>
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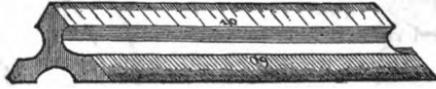
56



58

56. Protractors, half circle, Brass, each..... 25, 50, 75 and 1 00

	PRICE
No. 79. Ivory Scales, 12 inches long, 16 scales off the edge, in 10ths or 12ths, each.....	2 25 and 3 00
80. Ivory Scale, 12 inches long, with diagonal scale, each.....	3 00 to 4 50
81. Box Wood Scale, 6 inches long, same as in school-cases of instruments	25
82. Box Wood Chain Scales, 12 inches long, graduated on edges, 10x20, 20x30, 20x40, 30x50, 40x60, or 60x80, each.....	1 00
83. Box Wood Scale, 12 inches long, Architectural.....	1 00
84. Box Wood Scale, 12 inches long, 16 scales off the edge, in 10ths or 12ths, each.....	1 00



85

85. Box Wood Chain Scale, triangular, 12 inches long, 6 edges, 10, 20, 30, 40, 50 and 60 parts to the inch.....	1 50
86. Box Wood Architectural Scale, triangular, 12 inches long, 6 edges, 12 scales, 3-32ds to 3 inches.....	1 50
87. Box Wood Scale, triangular, 12 inches long, 6 edges, 16 scales off the edge, in 10ths or 12ths.....	1 50
88. Box Wood Scale, triangular, 3, 6 or 8 inches long, 6 edges, 10, 20, 30, 40, 50 and 60 parts to the inch, each.....	50, 75 and 1 25
89. Box Wood Gunter's Scale, 12 inches long 37 cts., wider.....	75
90. Box Wood Gunter's Scale, 24 inches long.....	75
91. Box Wood Comparative Scale of Measures of different Countries, 17 inches long, 4½ inches wide, containing the following measures of length: Swedish, Turkish, Bavarian, Spanish, Portuguese, Moscow, Russian, Amsterdam, German, Austrian, Italian, Hanoverian, French foot, French metre, English.....	5 50

PAPER SCALES.

92. Paper Scale, printed on card-paper, 1½ inch wide, 12 inches long; graduations on one edge inches and 10ths, and the other feet and 100ths.....	10
93. Paper Scale, same as 92, one edge 20 parts to the inch, the other edge, 40.....	10
94. Paper Scale, same as 92, one edge, inches and sixteenths; the other edge, inches and forty-eighths.....	10
95. Paper Scales, printed on card-paper, 19 inches long, for architects and engineers, for set of 6 scales, per set.....	1 00
Series A contains 6 scales, one each, divided to ½, ⅓, ¼, 1, 1½ and 3 inches to the foot, for architects.	
Series B contains 6 scales, one each, divided to 3-32, 1-8, 3-16, 5-16, 3-8 and 7-8 inch to the foot, for architects.	
Series C contains 6 scales, one each, divided to 10, 20, 30, 40, 50 and 60 parts to the inch, for engineers.	
96. Single Scale of any of the above series, A, B, C—each scale.....	25
96½ Paper Scales, same as 95, divided either to ⅓, 1½, 1¼ or 1⅓ inches to the foot, each.....	25
The advantages of these scales are—they expand and contract nearly the same as drawing-paper, do not soil the work, and distances can be set off from them without the use of dividers.	

STEEL STANDARD RULES.

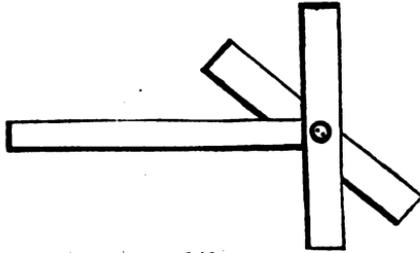
"United States Standard" is marked on each Rule.

97. 24 inch steel rule, divided to 32ds, 48ths, 50ths, and 64ths of an inch	\$3 00
98. 12 " " " " " " " " " " " "	1 50
99. 6 " " " " " " " " " " " "	75
100. 4 " " " " " " " " " " " "	50

- No. 136. Parallel Rules, on Rollers, ebony, brass mounted; 12 inches long, each \$2 62; 15 inches, \$3 37; 18 inches..... 4 00
- 137. Parallel Rules, on Rollers, ebony, ivory graduated edges, brass mounted; 12 inches long, each \$4 25; 15 inches, 5 75; 18 inches 6 00
- 138. Parallel Rules, German Silver; 12 inches long, with 6 inch protractor attached, divided to half degrees, and a scale of 40 on the lower edge, each..... 10 00
- 139. Parallel Rules, same as No. 138, with arm to protractor, each..... 12 00
- 140. Drawing Boards, each..... 1 25 and 1 50



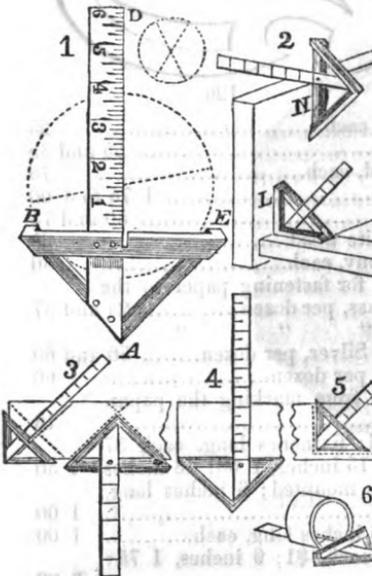
131



141

- 141. T Squares, wood, with arm 18 to 30 inches long, each..... 62 and 75
- 142. T Squares, wood, with arm 18 to 30 inches long, and swivel joint, each..... 1 25
- 143. T Squares, wood, with arm 18 to 30 inches long, swivel joint, and brass bevelled edges, each..... 1 75 to 2 50
- 144. T Squares, all steel, each..... 2 00 and 4 00
- 145. Map Perambulator, for measuring the length of curved lines, rivers, railroads, &c., on maps, each..... 1 50

AMES' PATENT UNIVERSAL SQUARE.



146

This square combines, in a most convenient form, five different instruments,—viz., The TRY-SQUARE, the MITER, the T-SQUARE, the GRADUATED RULE, and (what is entirely new) the CENTRE-SQUARE, for finding the centre of a circle.

Fig. 1 explains its application as a CENTRE-SQUARE. Put the instrument over the circle, as the end of the bolt or shaft, with the arms B A, A E resting against the circumference, in which position one edge of the rule, A D, will cross the centre. Mark a straight line in this position; apply the instrument again to another part of the circumference, and mark another line crossing the first. The point where the two lines cross each other will be the centre of the circle. The whole is the work of a moment. Fig. 2 explains the application of the instrument as a carpenter's TRY-SQUARE, N, and an OUTSIDE-SQUARE, L; Fig. 3, as a MITER; Fig. 4, as a T-SQUARE and a GRADUATED RULE; Figs. 5 and 6 as an OUTSIDE-SQUARE for drawing, and a T-SQUARE for machinists.

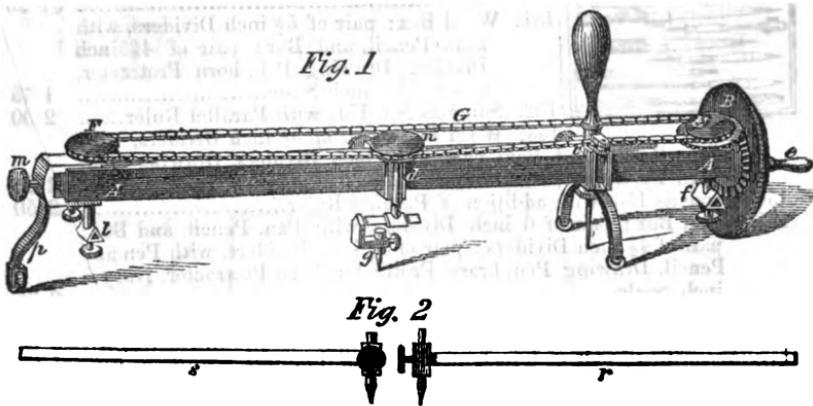
The tongue D A, (Fig. 1), being fastened, as it is, into the triangular frame B A E, cannot be moved or knocked from its place,—in this respect constituting a great improvement over the carpenter's Try-Square, T-Square, and Miter in common use. The instruments are made of the best material, neatly finished, and perfectly true.

“As a CENTRE-SQUARE alone, it is invaluable to every mechanic. . . . In short, it combines, in a most convenient form, so many useful instruments, no mechanic's list of tools can well be complete without a Universal Square.”—*Scientific American*, Sept. 22, 1855.

PRICES:

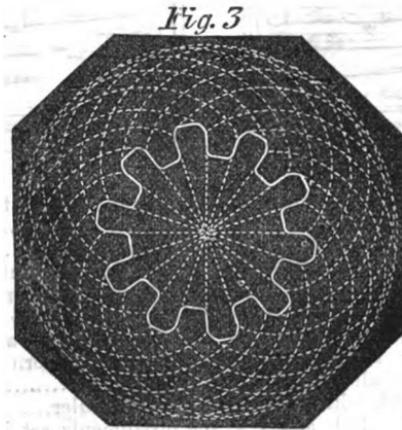
- No. 1, 6 in. blade, \$1 75; No. 2, 8 in., \$2 00; No. 3, 10 in., \$2 25; No. 4, 12 in., \$2 75.

CYCLO-ELLIPTO-PANTOGRAPH.



147. A new, useful, and ingenious instrument for drawing Ellipses, Epicycloid Curves, and Spirals. It can also be used as a Pantograph. The whole machine is packed in a neat box, 17 inches long and 6 inches wide, and is furnished with a printed description and instructions for using; also 36 illustrations of the different figures that can be drawn.

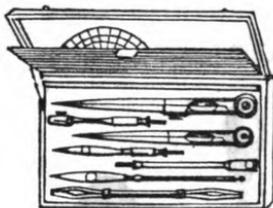
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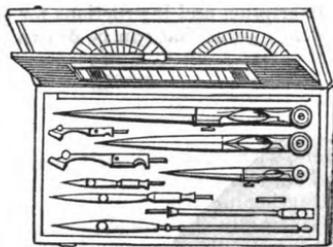
This instrument is calculated to be useful to the Mechanical Engineer, Mathematician, Architect, Designer, and Artists in general, and also for describing in schools the lines produced by the revolution of the primary planets and their satellites. Price..... \$20 00

CASES OF BRASS DRAWING INSTRUMENTS.

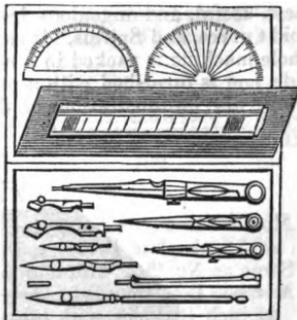
PRICE



- 150. Wood Box; pair of 4½ inch Dividers, with Pen, Pencil, and Bar; pair of 3½ inch Dividers, Drawing Pen, brass Protractor..... **\$1 25**
- 151. Wood Box; pair of 5½ inch Dividers, with Pen, Pencil, and Bar; pair of 4½ inch Dividers, Drawing Pen, horn Protractor, box wood 6 inch Scale..... **1 75**
- 152. Same as No. 151, with Parallel Ruler..... **2 00**
- 153. Wood Box; pair of 5½ inch Dividers, with Pen, Pencil, and Bar; pair of 4½ inch Dividers, Drawing Pen, horn Protractor, ivory 6 inch Scale..... **2 25**
- 154. Same as 153, with addition of Parallel Ruler..... **2 50**
- 155. Wood Box; pair of 6 inch Dividers, with Pen, Pencil, and Bar; pair of 4½ inch Dividers; pair of 3½ inch Dividers, with Pen and Pencil, Drawing Pen, brass Protractor, horn Protractor, ivory 6 inch Scale..... **2 75**
- 156. Same as No. 155, but with the instruments set in a tray, so that colors, etc. may be put below..... **3 00**
- 157. Wood Box; pair of 6 inch needle point Dividers, with Pen, Pencil, and Bar; pair of 4½ inch plain Dividers; pair of 3½ inch needle point Dividers, with Pen and Pencil, Drawing Pen, brass Protractor, horn Protractor, ivory 6 inch Scale..... **3 00**

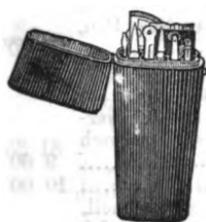


155



157

- 158. Same as No. 157, but with the instruments set in a tray, so that colors may be put below..... **3 25**
- 159. Same as No. 158, with addition of Parallel Ruler..... **3 50**
- 160. Wood Box, with the instruments set in a tray, so that colors, etc. may be put below; pair of 6 inch needle point Dividers, with Pen, Pencil, and Bar; pair of 4½ inch Dividers; pair of 3½ inch needle point Dividers, with Pen and Pencil; Spring Bow Pen, with needle point; Drawing Pen, brass Protractor, horn Protractor, ivory 6 inch Scale..... **3 75**
- 161. Same as No. 160, with addition of Parallel Ruler..... **4 00**
- 162. Wood Box, with lock and key, the instruments set in a tray, so that colors, etc. may be put below; pair of 6 inch needle point Dividers, with Pen, Pencil, and Bar; pair of 4½ inch Dividers; pair of 3½ inch needle point Dividers, with Pen and Pencil; Spring Bow Pen, with needle point; Drawing Pen, brass Protractor, horn Protractor, ivory 6 inch Scale..... **4 25**
- 163. Same as No. 162, with addition of Parallel Ruler..... **4 50**
- 164. Same as No. 162, with the addition of a pair of Proportional Dividers..... **6 00**



165

- | | |
|--|--------|
| 165. Fish Skin Case; pair of 6 inch Dividers, with Pen, Pencil, and Dotter; pair of plain Dividers, Drawing Pen, brass Protractor, Parallel Rule, box wood Scale..... | \$2 50 |
| 166. Same as No. 165, with ivory 6 inch Scale, in place of box wood Scale..... | 2 75 |
| 167. Fish Skin Case; pair of 6 inch Dividers, with Pen and Pencil; pair of 5 inch Dividers, turned cheeks, Bow Pen, Drawing Pen, brass Protractor, Parallel Rule, ivory Scale..... | 3 50 |

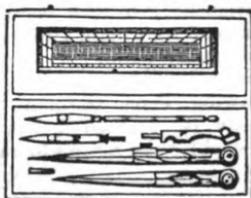
CASES OF FINE GERMAN SILVER INSTRUMENTS,

For Engineers, Architects, and Machinists.

- | | |
|---|------|
| No. 200. Morocco Box; pair of 5½ inch Dividers, with Pen and Pencil, Drawing Pen, 6 inch ivory Protractor..... | 3 00 |
| 201. Morocco Box; pair of 3 inch Dividers, with Pen, Pencil, needle point and Bar, Drawing Pen; no Scale or Protractor..... | 3 25 |



201

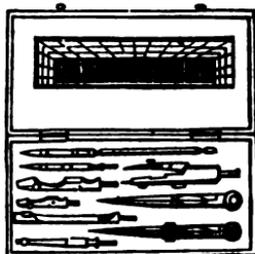


202

- | | |
|---|------|
| 202. Morocco Box; pair of 5½ inch Dividers, with Pen and Pencil; pair of 5 inch plain Dividers, Drawing Pen, ivory Protractor Scale... | 3 50 |
| 203. Same as No. 202, with addition of lengthening Bar..... | 4 00 |
| 204. Morocco Box, rounded corners, for carrying in the pocket; pair of 4½ inch Dividers, with hinge in one leg, needle points, with Pen, Pencil, and Bar; pair of 4 inch Dividers, rounded points, spring Bow Pen, needle point; Drawing Pen, ivory handle, 5 inch ivory Inch Rule, divided to eighths..... | 6 00 |



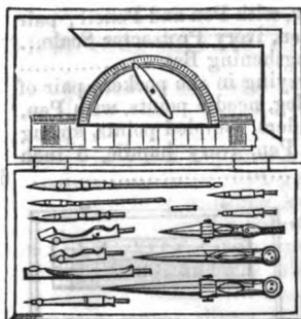
205



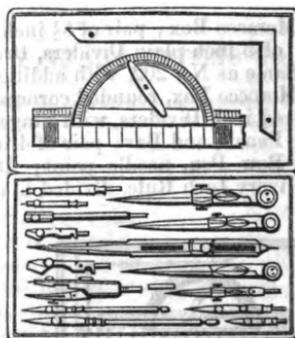
206

- | | |
|--|------|
| 205. Morocco Box; pair of 5½ inch Dividers, with Pen, Pencil, and Bar; pair of 5 inch plain Dividers; pair of 3 inch Dividers, with Pen and Pencil; Drawing Pen, German Silver Protractor, German Silver Square, ivory 6 inch Scale..... | 6 50 |
|--|------|

	PRICE
No. 206. Morocco Box ; pair of 5½ inch Dividers, needle points, with Pen, Pencil and Bar ; pair of 5 inch plain Dividers, Spring Bow Pen, Drawing Pen, 6 inch ivory Protractor.....	20
207. Morocco Box ; pair of 5½ inch Dividers, with pen, pencil, needle point, and bar ; pair of 5 inch plain Dividers ; pair of 3 inch Dividers, with pen, pencil, and needle point ; 2 Drawing Pens, German Silver Protractor, German Silver Square, ivory 6 inch Scale.....	9 00
208. Same instruments as No. 207, in polished wood box.....	10 00
209. Polished Wood Box ; pair of 5½ inch Dividers, with pen, pencil, needle point, and bar ; pair of 5 inch plain Dividers ; pair of 3 inch Dividers, with pen, pencil, and needle point ; Spring Bow Pen, with needle point ; 2 Drawing Pens, German Silver Square, German Silver Protractor, ivory 6 inch Scale.....	12 00
210. Polished Wood Box ; pair of 5½ inch Dividers, with pen, pencil, needle point, and bar ; pair of 5 inch plain Dividers ; pair of 5 inch Hair Spring Dividers ; pair of 3 inch Dividers, with pen, pencil, and needle point ; Spring Bow Pen, with needle point ; 2 Drawing Pens, German Silver Square, German Silver Protractor, ivory 6 inch Scale.....	14 00
211. Same instruments as No. 210, set in a tray, and the box much larger, with lock and key, thus affording space for extra instruments or colors, etc.....	17 00
212. Polished Wood Box, with lock and key, the instruments set in a tray ; pair of 5½ inch Dividers, with pen, pencil, needle point, and bar, (the leg which holds the needle point has a hair spring movement ;) 5 inch plain Dividers ; 5 inch Hair Spring Dividers ; 3 inch plain Dividers ; 3 inch Dividers, with pen, pencil, and needle point, (the leg which holds the needle point has a hair spring movement ;) Spring Bow Pen, with needle point ; 3 Drawing Pens, German Silver Square, German Silver Protractor, ivory 6 inch Scale. All the pens have an extra thickness of steel for the screws to pass through.....	22 50



207



213

213. Polished Wood Box ; pair of 5½ inch Dividers, with pen, pencil, needle point, and bar ; pair of 5 inch plain Dividers ; pair of 5 inch Hair Spring Dividers ; pair of 3 inch Dividers, with pen, pencil, and needle point ; pair of 7½ inch Proportional Dividers ; Spring Bow Pen, with needle point ; 2 Drawing Pens, German Silver Square, German Silver Protractor, ivory 6 inch Scale..... 22 50
214. Polished Wood Box ; instruments same as No. 213, with addition of a Railroad or Double Drawing Pen..... 25 00

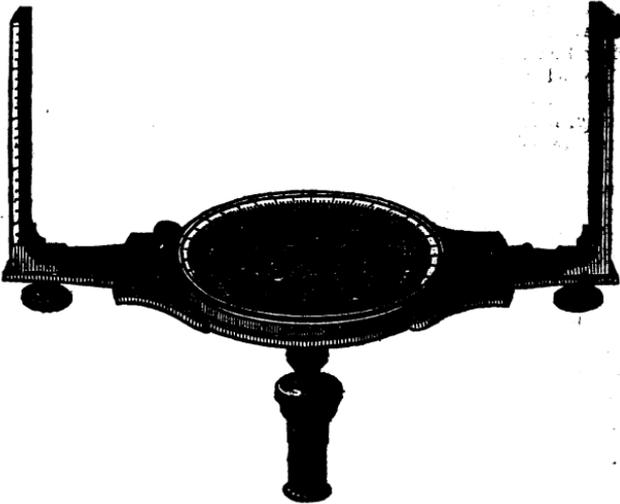
PRICE

- No 215.** Polished Wood Box, inlaid, lock and key, with tray, leaving space below for paints, rules, &c.; pair of $6\frac{1}{2}$ inch needle point Dividers, with pen, pencil, and bar; pair of $4\frac{1}{2}$ inch plain Dividers; pair of 4 inch needle point Dividers, with pen and pencil; Spring Bow Pen, pair of 7 inch Proportional Dividers, 3 Drawing Pens, ivory 8 inch Rule, horn Protractor, ivory 6 inch Scale, 2 wood Squares, 1 wood Curve.....\$25 00
- 216.** Polished Wood Box, inlaid, with brass edges, lock and key, with tray, leaving space below for paints, rules, &c.; pair of 6 inch needle point Dividers, with pen, pencil, and bar; pair of 5 inch Hair Dividers, rounded points; pair of $4\frac{1}{2}$ inch plain Dividers, rounded points; pair of 4 inch Dividers, needle points, with pen and pencil; Spring Bow Pen, needle point, 3 Drawing Pens; pair of $7\frac{1}{2}$ inch Proportional Dividers; Furniture for Beam Compass, with micrometer Screw; 9 inch horn Protractor, 6 inch ivory Scale; 8 inch ivory Scale, one edge divided to inches and eighths, the other to centimeters and millimeters..... 35 00
- 217.** Polished Wood Box; pair of $5\frac{1}{2}$ inch Dividers, with pen, pencil, needle point, and bar; pair of 5 inch plain Dividers; pair of 5 inch Hair Spring Dividers; pair of $7\frac{1}{2}$ inch Proportional Dividers; pair of 3 inch Dividers, with pen, pencil and needle point; Spring Bow Pen, with needle point; 2 Drawing Pens, Double Drawing Pen, Roulette, Beam Compass Furniture, German Silver Square, German Silver Protractor, ivory 6 inch Scale..... 38 00
- SWISS Drawing Instruments, furnished at the Regular Prices.
 ALTENADER'S Drawing Instruments; for sale at his prices.
 These Instruments are acknowledged by Engineers to be superior to any other kind offered for sale.
 Empty Rosewood Boxes, assorted sizes, with tray, lock and key..... 5 00 to 8 00
 These boxes are convenient for those who prefer selecting certain instruments and arranging a case to suit their fancy.

CASES OF SECOND QUALITY GERMAN SILVER INSTRUMENTS.

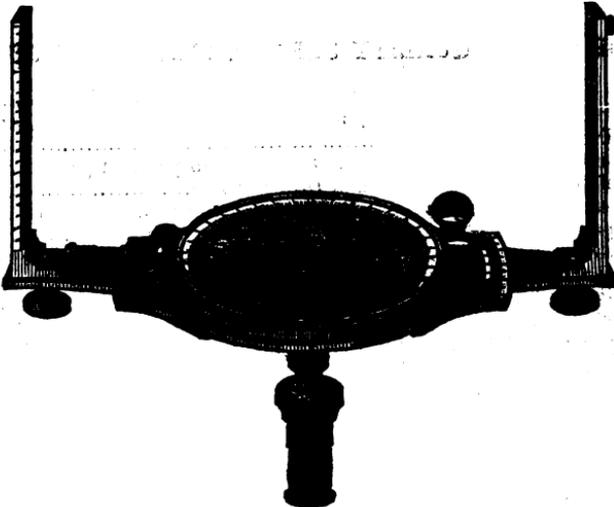
- 218.** Morocco Box; pair of $5\frac{1}{2}$ inch Dividers, with pen and pencil..... 1 00
- 219.** Morocco Box; pair of $5\frac{1}{4}$ inch Dividers, with pen, pencil, and Drawing Pen..... 1 25
- 220.** Morocco Box; pair of $5\frac{1}{4}$ inch Dividers, with pen and pencil; pair of 5 inch plain Dividers and Drawing Pen..... 1 50
- 221.** Morocco Box; pair of $5\frac{1}{4}$ inch Dividers, with pen, pencil, and bar; pair of 5 inch plain Dividers and Drawing Pen..... 1 75
- 222.** Morocco Box; pair of $5\frac{1}{4}$ inch Dividers, needle points, with pen, pencil, and bar; pair of 5 inch plain Dividers, and 2 Drawing Pens..... 2 50
- 223.** Morocco Box; pair of $5\frac{1}{4}$ inch Dividers, needle points, with pen, pencil, and bar; pair of 5 inch plain Dividers; pair of 4 inch Dividers, needle points, with pen and pencil; 2 Drawing Pens... 4 75

SURVEYOR'S COMPASSES, &c.



250

- | | PRICE |
|---|---------|
| No. 250. Surveying Compass; 4 inch needle, 12½ inch plate, two straight levels, Jacob staff mountings..... | \$22 00 |
| 252. Surveying Compass; 5 inch needle, 15½ inch plate, two straight levels, outkeeper and Jacob staff mountings..... | 25 00 |
| 254. Surveying Compass; 6 inch needle, 15½ inch plate, two straight levels, outkeeper, and Jacob staff mountings..... | 30 00 |

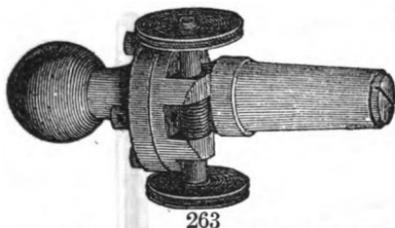


256

- | | |
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| 256. Surveying Compass; 6 inch needle, 15½ inch plate, two straight levels, outkeeper and nonius, and Jacob staff mountings..... | 36 00 |
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GRADING COMPASS.

PAGE

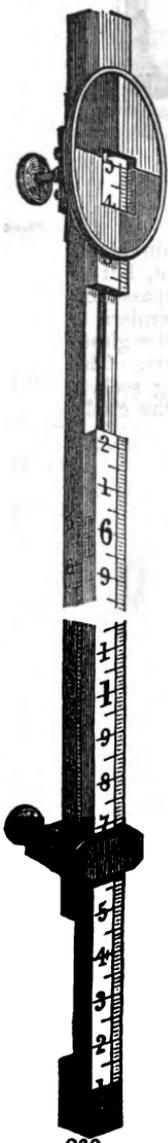


263

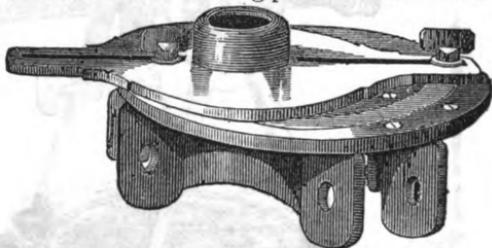
257. It has long been a desideratum to obtain an instrument by which hills might be surveyed with the same facility as planes. The difficulties encountered with the ordinary Compass — the frequent changing of positions, the inaccurate line, the necessity of computing the angle,

are all familiar to every practical surveyor. All these are obviated by the use of the GRADING COMPASS. Many years of service have tested and established its claim for simplicity, accuracy, durability, and convenience. The compass is so constructed that, by elevating one arm of the movable circle, a line may be run from one point to any other within the range of the eye, without changing the position, and at the same time will accurately indicate the angle of elevation on the grade in degrees and minutes. This is accomplished by an arrangement so simple that there is but little opportunity for it ever to be disordered. Its construction will admit of removal and replacement any number of times, without in the least affecting its accuracy. The addition of the grade does not add to the size of the Compass, and consequently it is no more inconvenient to carry than an ordinary one. In the dial of the instrument a Vernier is introduced, so that it may be adapted to any variation of the needle. Each Compass is furnished with a Tripod head and two-pole chain, or, if preferred, a ball and socket for Jacob staff and two-pole chain.....

\$60 00
258. Set of ten iron marking-pins..... 1 50

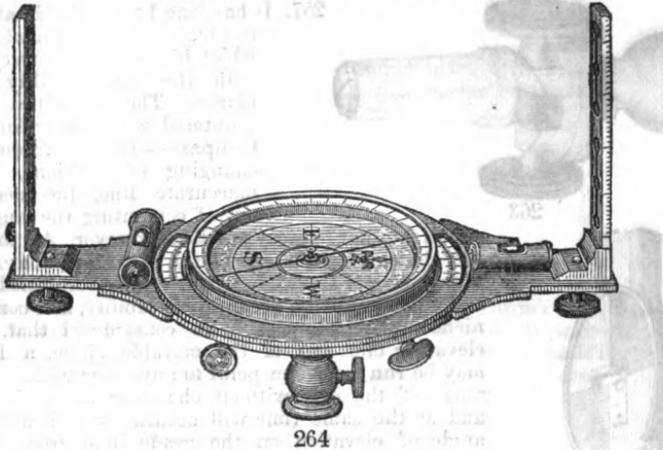


260



259

- 259. Saxe's Patent adjustable Tripod head, with a movement of $2\frac{1}{2}$ inches, enabling the Engineer or Surveyor to adjust his instrument over any given point, without moving the Tripod legs or unscrewing the levelling screws. This is so readily accomplished that it makes this adjuster far superior to any heretofore constructed..... 15 00
- 260. Levelling Rod, made of satin-wood, with improved clamp and tangent, machine divided to tenths and hundredths of a foot, slides out to 12 feet..... 12 00
- 261. Compass Tripod..... 5 00
- 262. " " with levelling screws and clamp, and tangent movement..... 12 00
- 263. Compound Ball, with tangent movement; can be used with Jacob staff or Compass Tripod..... 5 00

THE RAILROAD COMPASS.

No. 264 The Railroad Compass, here represented, has the main plate, levels, sights, and needle of the ordinary instrument, but is also provided with a circle on the outside of the compass-box, divided all around, and reading by two opposite Verniers to single minutes of a degree. The divisions are all under glass, and thus completely protected from dust and moisture. The Verniers are fixed to the main plate, having a long socket, which gives it great stability and a motion around the circle

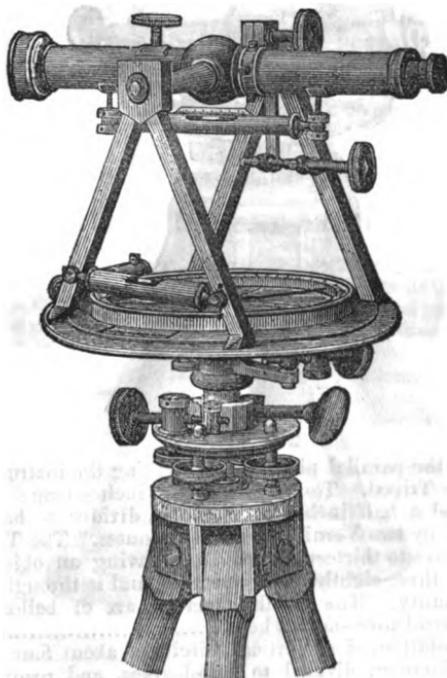
VERNIER TRANSIT COMPASS.

almost perfectly free from friction. The movement of the Vernier plate, with the sights attached, around the compass circle, gives the surveyor the power of laying off the variation of the needle, while the graduated circle enables him to take horizontal angles with great accuracy and minuteness, entirely independent of the needle.....\$57 00

VERNIER TRANSIT.

- No. 265. The Vernier Transit, or Transit Compass, has the same general properties as the Vernier Compass, but is furnished with a Telescope in place of the ordinary sights. The Telescope is from ten to twelve inches long, and sufficiently powerful to see and set a flag at a distance of two miles, in a clear day. With light Tripod..... 65 00
266. To the Vernier Transit a vertical circle, with clamp and tangent screw, (as seen in fig. 265,) is often attached to the axis of the Telescope, giving, with a Vernier, the means of measuring vertical angles to five minutes of a degree. With Tripod..... 75 00

THE SURVEYING TRANSIT.



267

267. This instrument is, in principle, very similar to the Railroad Compass, differing from it mainly in the substitution of the Telescope, with its appendages, for the ordinary sight. The needle of this instrument is five and a half inches long: it has a limb of seven inches diameter, and weighs, with the Tripod head attached, from twelve to thirteen pounds. The Telescope is the same as that used on the Vernier Transit. The instrument is accompanied with an adjusting Tripod head, as represented in the figure..... 105 00

	PRICE
No. 268. With the addition of a Level under Telescope, with ground bubble and scale, and with clamp and Tangent movement, as shown in the cut.....	\$120 00
269. To this can be added a Vertical Circle, with Vernier Reading to single minutes, at a cost of.....	10 00

THE ENGINEER'S TRANSIT.

270. This instrument differs from the one just described in several particulars: the sockets are made much longer, and set down



270

between the parallel plates, so as to bring the instrument very near the Tripod. The needle is five inches long: the limb is seven and a half inches in diameter, divided to half-degrees, and read by two Verniers to single minutes. The Telescope is from twelve to thirteen inches long, having an object-glass of one and three-eighths inch aperture, and is throughout of the finest quality. The levelling screws are of bell-metal, and have a broad three-milled head.....

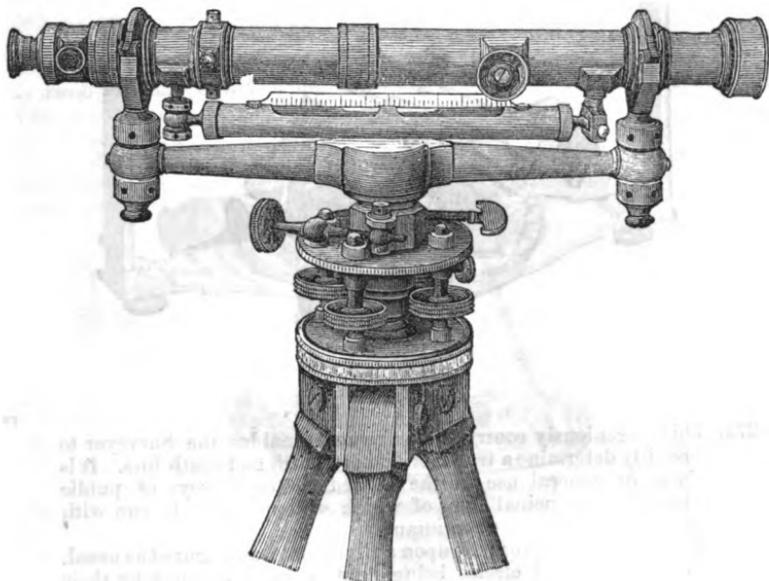
271. With the addition of a Vertical Circle, of about four and a half inches diameter, divided to half-degrees, and reading by the Vernier to minutes, and a "clamp and tangent" movement to axis of Telescope, as represented in fig. 270.....	125 00
272. To this can be added a Level on Telescope, with ground bubble and scale, at a cost of.....	140 00
	10 00

ENGINEER'S LIGHT TRANSIT.

273. This instrument is precisely similar to the one described above, but about one-fourth smaller, and lighter in all its parts. It has a Telescope of about ten inches long, a four-inch needle, and a limb of nearly six and a half inches diameter.....

125 00

ENGINEER'S LEVEL.



274

PRICE

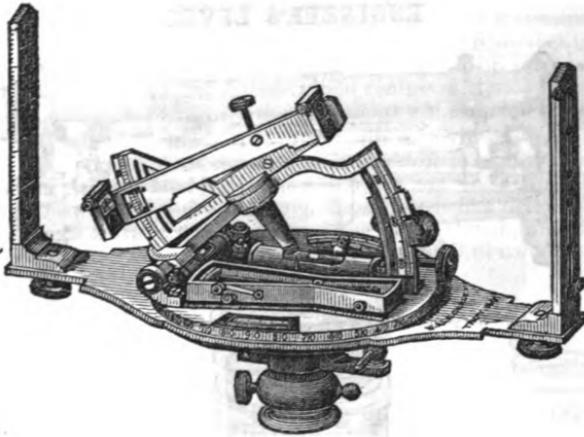
No. 274. An eighteen-inch Y Level, of the most approved form and construction. In this instrument the Telescope is made to revolve readily and truly in the Ys by rings of bell-metal, which, when desired, may be firmly clamped by the clips, and held in any position. It has a rack-and-pinion movement to both object and eye glasses, an adjustment for centring the eyepiece, and another for insuring the accurate projection of the object glass in a straight line. Both of these are completely concealed from observation and disturbance by a thin ring, which slides over them. The Ys of this level are made large and strong, of the best bell-metal, and each have two nuts, both being adjustable with the ordinary steel pin. The level bar is made round, of well-hammered brass, and shaped so as to possess the greatest strength in the parts most subject to sudden strains. The Tripod head has the same plates and levelling screws as that of the Engineer's Transit.....\$95 00

The above instruments can be had of either the Brass or Bronze finish. The bronze instrument looks very showy when new; but when it becomes a little worn, the appearance is worse than one finished in the usual style.

ALL OF THESE INSTRUMENTS ARE WARRANTED.

Inferior instruments are frequently sold by dealers professing to sell none but the very best, and are a frequent source of trouble. There should be a law requiring a test of accuracy. Purchasers are earnestly requested to have our Compasses, Transits, and Levels examined critically, and, if not what they are represented, to return the same at our expense.

SOLAR COMPASS.



275

PRICE

No. 275. This ingeniously contrived instrument enables the Surveyor to readily determine a true meridian, or north and south line. It is now in general use in the United States surveys of public lands, the principal lines of which are required to be run with reference to the true meridian.

The graduations are made upon a silver plate, and figured as usual, all the arcs and circles being read to single minutes by their respective Verniers. Each instrument is furnished with an adjusting socket and tripod.....\$145 00

276. Locke's Hand Level..... 10 00

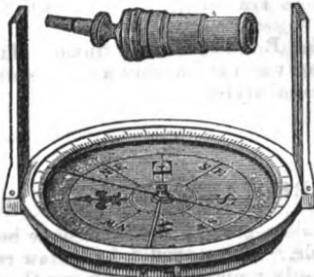
This is the most convenient and portable hand level yet made, being about five inches long and less than one inch in diameter. In its use it does not necessarily require either a stand or target rod. It is held to the eye, and looked through like a small telescope. It is intended for all cases where a simple instrument will give results approximately accurate, as in the reconnoissance for a railroad by the engineer, grading streets, &c., &c.

277. Same, with ball-and-socket-joint..... 9 50

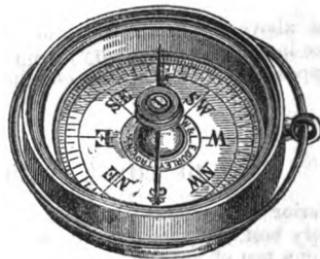
278. Clinometer, or Slope Level, with sights, packed in morocco box... 8 00

279. Odometer, for measuring distances, to be attached to the wheel of a carriage, made with accuracy..... 20 00

POCKET COMPASSES.



281



283

	PRICE
No. 280. Compasses with sights; 2½ and 3½ inches diameter, in morocco cases, each.....	\$5 50 and 8 00
281. Compasses with sights; 2½ and 3½ inches diameter, in morocco cases, with sights and ball-and-socket joints, each.....	7 00 and 9 00
282. Compasses with sights; 4 to 6 inches diameter, with ball-and-socket joints, in walnut boxes, each.....	10 00 to 20 00
283. Miner's Compass, for tracing iron ore.....	6 00

This consists essentially of a dipping needle, about 2½ inches long, which inclines towards any mass of iron and thus discovers its position.

When used for tracing ore, the observer should hold the ring in his hand, and keep the needle north and south, standing with his face to the west.

If held horizontal, it serves, of course, as an ordinary pocket compass. It has a brass cover not shown in the cut.



284

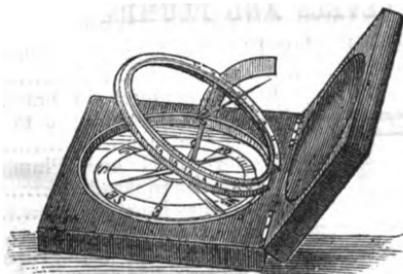


286



292

284. Azimuth Compass, with sights, in morocco case.....	21 00
285. Pocket Compasses; brass, without stop for the needle, each.....	25 to 50
286. Pocket Compasses; brass, watch pattern, with stop, each...	75 and 1 00
287. Pocket Compass; brass, watch pattern, with stop and agate centre.....	2 00
288. Pocket Compasses; brass, with cover and stop, 1½ to 2 inch diameter, each.....	1 50, 1 75 and 2 00
289. Pocket Compasses; gilt, watch pattern, with stop; enamelled dial and agate centre; 1 to 2 inches diameter; in morocco cases (a very superior London article, such as are used by officers in the British army,) each.....	4 50, 4 75, 5 25 and 6 50
290. Pocket Compasses; in mahogany cases, with stop, 1½ to 3 inches diameter, each.....	1 00, 1 25, 1 50 and 2 00
291. Pocket Compass; in mahogany case, 4 inches diameter, with stop and sights, to fold in cover.....	5 50
292. Pocket Compasses for Geologists; brass, with stop and pendulum, to give the angle or inclination, each.....	4 50 to 6 50
293. Boat Compass; floating card.....	1 50
294. Charm Compasses, for wearing on the watch chain, Gold, each 3 00; Silver, 1 50; Gilt, 50 cts. to 1 00	



295

295. Pocket Compass and universal Dial, with graduated arc; may be adjusted for any latitude.....	8 50
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SURVEYORS' AND ENGINEERS' CHAINS.

300. Surveyors' Chains, 2 poles, 50 links, No. 9, wire round rings,	1 25
301. " " 2 " 40 " 8, " " "	1 75
302. " " 2 " 50 " 8, " oval rings,	1 50

No.	Description	Quantity	Unit	Material	Price
No. 303.	Surveyors' Chains,	2 poles,	50 links,	No. 7, wire oval rings,	\$2 00
304.	"	4 "	100 "	9, " round rings,	2 00
305.	"	4 "	100 "	8, " oval rings,	2 50
306.	"	4 "	100 "	7, " "	3 50
307.	50 feet Chains,		50 "	7, " "	2 50
308.	100 " "		100 "	7, " "	5 00

TAPE MEASURES.



320

319. Holland Tape Measures, in patent leather cases; 20 ft. each 60 cts.; 25 ft. 65; 33 ft. 75; 50 ft. 1 00; 70 ft. 1 12; 100 feet..... 1 50
320. London Tape Measures, in heavy leather cases, of the very best manufacture; 50 ft. each 2 50; 70 ft. 3 00; 100 ft. 4 00
321. Metallic Tape Measures, leather cases; a new article, the most durable for Engineers and Surveyors; made of linen thread interwoven with fine brass wire, not so liable to stretch as the usual linen tape, and better calculated to withstand the effect of moisture; 33 ft. each, 2 25; 50 ft. 2 87; 66 ft. 3 25; 70 ft. 3 50; 80 ft. 4 00; 100 ft..... 4 75
322. Steel Tape Measures; all steel, to wind up in a box, same as linen measure, the most accurate durable and portable measure; 33 feet, each 8 00; 50 feet, 11 00; 66 feet..... 14 00
323. Linen Tape Measures, vellum cases; 6 ft. each 37 cts.; 12 ft. 50; 15 ft. 62; 18 ft. 75; 24 ft. 1 00; 30 ft. 1 12; 50 ft..... 1 50
324. Linen Tape measures, brass cases; 6 feet each 20 cts.; 12 feet.... 25
325. Pocket Tape Measures, brass cases, with spring; 3 feet, each 50 cts.; 3 ft. stop, 75; 4 ft. stop, 87; 5 ft. stop, 1 00; 6 ft. stop..... 1 12
326. Pocket Tape Measures, German Silver cases, with spring and stop; 3 feet, each 1 00; 4 feet, 1 12; 5 feet, 1 25; 6 feet..... 1 37

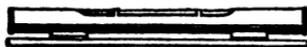
For different works on Engineering and Surveying, see last page of this catalogue.

SUN DIALS.

328. Sun Dials, brass, silvered; made to order, for any latitude, from 4 to 12 inches diameter, each..... 3 50 to 12 00

LEVELS AND PLUMBS.

329. Level, brass mounted; plate 12 inches long, with sights and ball-and-socket joint..... 17 00



330

330. Levels, mounted in brass, for mechanical purposes; 3 to 12 inches long, per inch..... 25
331. Pocket Level and Plumb Attachment, for square..... 25
332. Level Bulbs, unmounted, 2 to 6 inches long, each..... 12 to 50
333. Plumb Bob, brass, accurate; steel point..... 1 00
334. Plumb Bobs, brass, accurate; steel points and screw caps, ea. 1 25 to 1 37

POCKET RULES.

335. One Foot, 4 Fold; box wood, each..... 37 and 50
336. One Foot, 4 Fold; box wood, brass edges..... 1 00
337. One Foot, 4 Fold; ivory..... 75
338. One Foot, 4 Fold; ivory, brass edges..... 1 62
339. One Foot, 4 Fold; ivory, German Silver mounted..... 87
340. One Foot, 4 Fold; ivory, German Silver edges..... 2 00

	PRICE
No. 341. Two Feet, 4 Fold; box wood.....	\$ 50
342. Two Feet, 4 Fold; box wood, brass edges.....	1 37
343. Two Feet, 4 Fold; ivory.....	2 00
344. Two Feet, 4 Fold; ivory, German Silver mounted.....	2 50
345. Two Feet, 4 Fold; ivory, finely graduated, for engineers, graduated on one edge into inches and eighths, one edge inches and sixteenths, one edge inches and twelfths, one edge chamfered and divided $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, and one inch into 12ths.....	4 00
346. Clynometer Rule, 1 Foot, 2 Fold; box wood; for measuring the angles of veins in mines, each.....	3 50 to 6 00
347. Combination Rule, 1 Foot, 2 Fold, box wood. 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.....	3 50
348. Combination Rule, 1 Foot, 2 Fold; ivory, same as above.....	7 00

Optical Instruments.

GOLD SPECTACLES.

LADIES' PATTERN.

350. Ladies' Pattern, sides in one piece, 11 carat gold, per pair.....	5 00
351. " " " " 14 " "	6 75
352. " " " " 16 " " per pair.....	8 00 to 9 00
353. " " " " 18 carat gold, per pair.....	11 00
354. " " " " very light and delicate, per pair.....	5 00 to 7 00

NARROW SLIDING SIDES.

355. Narrow Sliding Sides, 11 carat gold, per pair.....	7 00 to 9 00
356. " " " " 14 " "	8 00 to 10 00
357. " " " " 16 " "	11 00 to 13 00
358. " " " " 18 " "	13 00 to 15 00

TURN-PIN SIDES.

	359. Turn-pin Sides, 11 carat gold	7 00
	360. " " 14 " "	8 00 to 10 00
	361. " " 16 " " per pair.....	11 00 to 13 00
	362. " " 18 " " per pair.....	13 00 to 15 00
	363. Turn-pin Sides, very light and delicate, per pair.....	8 00 to 9 00

BROAD SLIDING SIDES.

364. Broad Sliding Sides, 11 carat gold, per pair.....	11 00
365. " " 14 " "	14 00
366. " " 16 " "	15 00
367. " " 18 " "	17 00

 Any other desired pattern made to order.

SILVER SPECTACLES.

PRICE

No. 368. Ladies' Pattern, sides in one piece, per pair.....	\$1 50 and 1 75
369. Narrow Sliding Sides, per pair.....	1 50 and 2 00
370. Turn-Pin Sides, per pair.....	2 00
371. Broad Sliding Sides, per pair.....	2 50
372. Narrow Sliding Sides, with divided glasses for far and near sight.	2 50
373. Turn-pin " " " " " "	2 50
374. Broad Sliding " " " " " "	3 00
375. Narrow Sliding Sides, horse-shoe pattern, side glasses—green or blue, per pair.....	2 50 and 3 50
376. Turn-pin Sides, same as above, per pair.....	2 50 and 3 50
377. Broad Sliding Sides, ditto.....	4 00

ELASTIC STEEL SPECTACLES.

LADIES' PATTERN.

378. Ladies' Pattern, fine quality, with Convex Glasses, per pair.....	1 25
379. " " " " Concave Glasses, per pair.....	1 25
380. " " " " Green or Blue Glasses, per pair	1 25
381. " " " " medium quality, with Convex Glasses, per pair..	75
382. " " " " Concave Glasses, per pair.	1 00
383. " " " " Green, Blue, or Smoke Glasses, per pair.....	1 00

TURN-PIN SIDES.

384. Turn-pin Sides, with Convex Glasses, per pair... ..	1 00 to 3 50
385. " " " " Concave Glasses, per pair.....	1 25 to 3 50
386. " " " " Green, Blue, or Smoke Glasses, per pair.....	1 00
387. " " " " Horse-shoe, side glasses—green or blue.....	1 00
388. " " " " " " fine quality, per pair.....	2 50 to 3 50
389. Light Sliding Sides, per pair.....	1 00 to 3 00

PULPIT PATTERN.

390. Pantascopic, or Pulpit Spectacles,—allowing the wearer to look over them : a very convenient style for public speakers... ..	1 25 to 1 50
391. The same, with single sides, ladies' pattern, per pair.....	1 25
392. Invisible Spectacles, with the frames set in the glasses, that they may not be seen. These Spectacles are particularly adapted to the comfort of near-sighted persons when riding on horse-back, as the sides are made with hooks passing behind the ears, thus preventing the Spectacles being jolted off the face. They are the lightest article ever made, per pair.....	2 50
393. German Silver Plated Spectacles, per pair.....	50
394. The same in assorted dozens, with good quality glasses; an excellent article for country merchants; per dozen.....	3 50
395. German Silver Plated Spectacles, with Cataract Glasses, per pair.	1 25
396. Millers' or Turners' Spectacles—common frames, with large eyes and plain white glasses, to guard the eyes from chips, per pair...	37

A great variety of Steel and other Spectacles, in assorted dozens, at low prices to the trade.

HAND AND NOSE SPECTACLES, &c.



400. Hand Spectacles, solid gold, to fold, in gold covers, per p. 16 00 to 35 00

	PRICE
No. 401. Hand Spectacles, solid gold, spring in joint, per pair.....	\$8 00 to 18 00
402. " " gold plated, " per pair.....	4 00 to 5 00
403. " " solid gold, square and octagon eyes, with- out spring, per pair.....	7 00 to 10 00
404. " " solid gold, round eyes, without spring...	5 00 to 10 00
405. " " silver, " "	1 50
406. " " tortoise shell, " "	1 25 to 1 50
407. " " horn, " "	75
408. " " steel, " "	1 00 to 1 50
409. " " solid gold, " spring to clasp the nose, per pair....	5 00 to 6 00
410. " " tortoise shell, " "	1 50 to 4 00
411. " " horn, " "	1 00 to 1 50
412. " " steel, " "	1 00 to 1 50
413. Single Eye Glasses, solid gold, each.....	3 00 to 8 00
414. " " gold plated, each.....	1 75 to 2 00
415. " " tortoise shell, each.....	57
416. " " horn, each.....	50
417. " " steel, each.....	50
418. Reading Glasses, mounted in horn, 2 to 4 inches diameter. These are also useful in examining maps, engravings, &c., each.	50 cts. to 4 00
419. Wire Gauze Eye Protectors, with green or blue glasses and elastic band; an excellent article for railroad travelling.....	75 to 1 50
420. Wire Gauze Eye Protectors, green or blue glasses, with steel sides, as spectacles, per pair.....	2 50 to 3 00
421. Goggles, with plated rims, per pair.....	37
422. Silk Shades, with elastic bands, for weak eyes, each.....	37 to 50

Spectacle Glasses, of best quality, fitted to Frames at the following Prices:

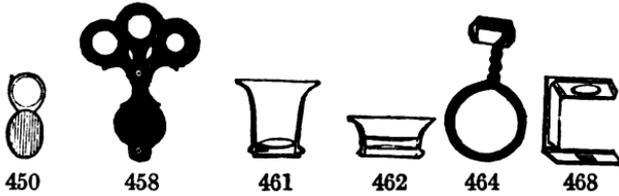
423. Convex, white, per pair.....	37
424. " Cataract, per pair.....	75
425. " Perisopic, per pair.....	50
426. " Green, Blue, or Smoke, per pair.....	50
427. " Divided Glasses, per pair.....	75 to 1 00
428. Concave, white, to No. 12, per pair.....	50
429. " " No. 12 to No. 34, per pair.....	62 to 1 25
430. " Perisopic, per pair.....	75
431. " Green, Blue, or Smoke, per pair.....	75
432. Plain, Green, Blue, or Smoke, per pair.....	50
433. Pebbles, Convex, per pair.....	2 00
434. " Concave, per pair.....	2 50

SPECTACLE CASES.

435. Morocco, each.....	12 to 18 cents.
436. Planished, each.....	25 "
437. German Silver, each.....	37 "
438. Papier Maché, each.....	25 to \$2 50
439. Steel, each.....	25 cents.
440. Silver, each.....	\$8 00 to 15 00

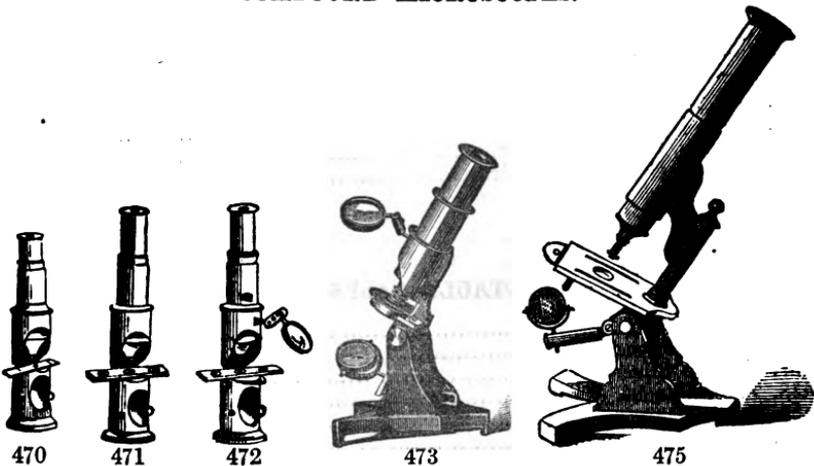
The Prices attached to the Spectacles in the foregoing list are what they will cost with the usual Convex Glasses, unless where otherwise specified. They will cost more with high numbers of Convex or Concave, Cataract, Green or Blue Convex or Concave, and Perisopic Glasses, or with Pebbles.

SIMPLE MICROSCOPES OR MAGNIFYING LENSES, WATCH-MAKERS' GLASSES, &c.



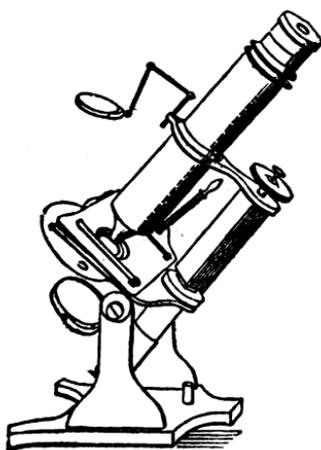
	PRICE
No. 450. Horn mounting, round, 1 lens, each.....	\$37 to 1 00
451. " " " 2 " each.....	50 to 1 00
452. " " bellows-shaped, 1 lens, each.....	37 to 75
453. Brass " " 1 " each.....	50 to 75
454. German Silver Mounting, bellows-shaped, 1 lens, each.....	62 to 1 00
455. Horn " " 2 " " ".....	50 to 1 25
456. Brass " " 2 " " ".....	75 to 1 25
457. German Silver " " 2 " " ".....	1 00 to 2 00
458. Horn " " 3 " " ".....	75 to 1 50
459. Brass " " 3 " " ".....	1 00
460. German Silver " " 3 " " ".....	1 50
461. Watchmakers' Glasses, horn mounting, each.....	25 to 1 25
462. Engravers' Glasses, metal mounting, consisting of two plano-convex lenses, and giving a very clear flat field of view, each.	50 to 75
463. Screw-adjusting Magnifying glasses, on three brass feet, each.....	75
464. Stanhope lens, silver, each.....	1 25
465. Coddington Lens, ivory, each.....	1 50
466. " " silver, with cover, each.....	2 50 and 4 00
467. " " brass mounting, each.....	2 00
468. Thread Counters, for ascertaining the quality of linen, &c. by giving the number of threads in a given space, each.....	50 to 75
469. Seed Microscopes, with glass cylinders to hold the seeds while under examination, each.....	50

COMPOUND MICROSCOPES.



470. Microscope, Brass Body, 1 object lens, power 40 diameters..	2 00
471. " " " 2 " lenses " 40 and 60 " "	3 00
472. " " " 3 object lenses, 20, 60 and 100 diameter, with condensing lens for opaque objects.....	5 00

- No. 473. Microscope, on iron stand, to incline to any angle, with diaphragm, condensing lens, and spring clips to hold the object slide, power 20, 65, and 115 diameters.....\$10 00
474. Microscope, on iron stand, to incline to any angle, with rack adjustment for focus, diaphragm, condensing lens, and spring clips to hold the object slide, power 20, 65, and 115 diameters..... 15 00
475. Queen's Table Microscope, on iron stand, to incline to any angle, slip adjustment for focus, diaphragm, condensing lens on separate stand, spring clips to hold the object slide, mirror with joint for any obliquity of light, achromatic lenses, power 50 to 150 diam. 20 00
476. Queen's Table Microscope, same as No. 475, but with rack adjustment for focus..... 25 00
477. Dr. Woodward's Student's Microscope, same as No. 475, but with micrometer adjustment for focus. This is the most satisfactory microscope ever offered to the student: the powers are 50, 100, 200, and 400 diameters, thus enabling the observer, with the lower powers and the condenser on a separate stand, to examine with ease injected preparations or other opaque objects, and with the higher powers the blood-corpuscles, tissues, urinary deposits, &c. 30 00
478. Dr. Woodward's Student's Microscope, same as No. 477, but power to 600 diameters..... 35 00
479. Polarizing apparatus and selenite plate adjusted to either 475, 476, 477, or 478..... 10 00

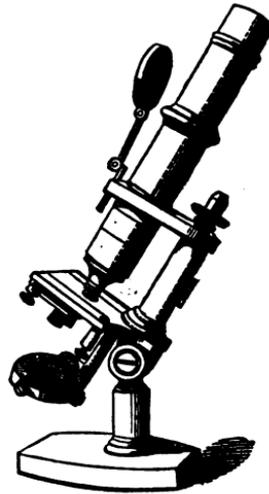


480

480. Queen's Student's Microscope, on iron stand, to incline to any angle, draw tube, two eye pieces, two sets of achromatic object glasses, condensing lens, diaphragm, micrometer adjustment, lever stage, so that the object may be brought directly in the field of view with the greatest facility: polarizing apparatus and selenite plate, dissecting needles, six objects; power 50 to 500 diameters..... 50 00
481. Same as 480, with addition of Camera Lucida, for drawing the object..... 55 00
482. Queen's Educational Microscope, on iron stand, to incline to any angle, with micrometer adjustment for focus, diaphragm with shutter, condensing lens on separate stand, spring clips to hold the object slide, mirror with joint for any obliquity of light, supplementary stage, Lieberkühn to the one-inch object glass, and dark well, parabolic reflector for dark field illumination, polarizing apparatus and selenite plate, Camera Lucida for drawing the object, animalcule cage, glass zoophyte trough forceps, small forceps attached to a brass plate for opaque objects, two eye pieces, one-inch and quarter-inch achromatic object glasses, power 50, 100, 200, and 350 diameters..... 100 00
483. Nachet's Vertical Microscope, with draw tube, two eye pieces, two sets of achromatic object glasses, illuminating lens, and micrometer adjustment; power 60 to 500 diameters..... 45 00
484. Nachet's Microscope, on joint, to turn to any angle; with draw tube, two eye pieces, two sets of achromatic object glasses, illuminating lens, and micrometer adjustment; power 60 to 500 diameters,..... 60 00



483



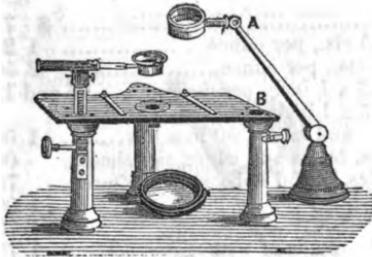
484

PRICE

- No. 485. Nachet's Microscope, same as No. 484, with three eye pieces, three sets of achromatic object glasses, illuminating lens, and micrometer adjustment; 60 to 800 diameters..... \$75 00
486. Nachet's Microscope, same as No. 485, with addition of Camera Lucida, for drawing the object..... 80 00
487. Oberhäuser's Vertical Achromatic Student's Microscope; power 300 diameters..... 27 00
488. Oberhäuser's Vertical Microscope, with five eye pieces, three sets of achromatic object glasses, illuminating lens, and micrometer adjustment, with a prism to draw the object upon paper; power 40 to 750 diameters..... 100 00
489. Oberhäuser's Vertical Microscope, same as No. 488, with addition of a polarizing apparatus..... 125 00
490. Smith and Beck's Educational Microscope. This is the most portable and convenient microscope now made: it is packed in a mahogany case 12 inches long and only 5½ inches square: the body is on brass supports, to incline to any angle; two eye pieces, inch and quarter-inch object glasses, micrometer adjustment for focus, and same apparatus as No. 482, with the addition of glass micrometer ruled to $\frac{1}{100}$ and $\frac{1}{1000}$ of an inch; power 55, 100, 200, and 350 diameters..... 115 00

This microscope has received the recommendation of the best Microscopists in London for the excellence of its optical portion and convenience of its mechanical arrangements.

491. Smith and Beck's best Student's Microscope, on brass stand, to incline to any angle, rack and micrometer adjustment, draw tube graduated, diaphragm with revolving and removable fittings, stage with vertical and horizontal motions by rack and screw, sliding and revolving planes, spring clamping piece, condensing lens on stand, Lieberkühn to $\frac{2}{3}$ object glass, dark wells and holder for opaque objects, parabola for dark field illumination, polarizing apparatus, selenite stage, &c., Camera Lucida and stage micrometer, glass zoophyte trough, animalcule cage, glass plate for objects in fluid, forceps and brass pliers, erecting glass, 3 eye pieces, $\frac{2}{3}$ and $\frac{1}{2}$ object glasses, power 60, 100, 180, 240, 430, and 720 diameters..... 225 00



492

three sets of doublets, of low, medium and high power..... \$20 00

492. Dissecting microscope; a convenient portable instrument with an oblong stage $5\frac{1}{2}$ by $2\frac{3}{4}$ inches, rack adjustment for focus, spring clips to hold object slide, diaphragm, movable arm for carrying the lenses, separate jointed stand, on which any of the sets of lenses can be placed at A and used for rough or preliminary examinations; mirror on joint,

To 492 may be added at B, if desired, a compound body similar to that on 475, and the power of the lenses adapted to the wants of the purchaser. The price will vary from \$10 00 to \$20 00.

493. Solar Microscopes, each..... 30 00 to 60 00

NOTE.—All the microscopes from No. 470 are packed in either neat mahogany or walnut boxes.

494. Surgeon's Microscope, for examining the ear..... 3 75

495. Ophthalmoscopes, for examining the retina of the eye. 1 50, 6 00, and 10 00

ACHROMATIC OBJECT GLASSES AND EYE PIECES.

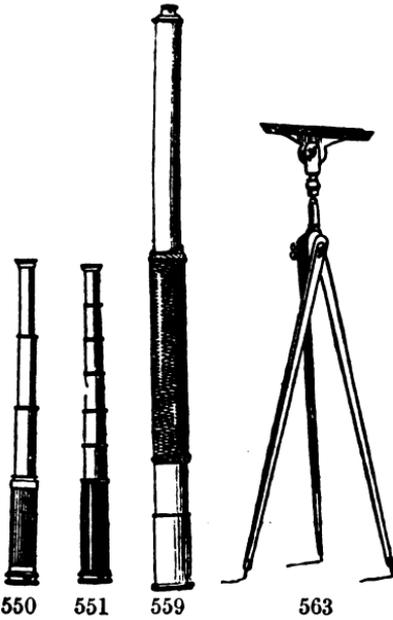
- 500. Achromatic object glasses, Two Inches 10 deg. ang. ap. 10 00
finer..... 15 00
- Achromatic object glasses, One Inch 22 deg. ang. ap. 15.00, 35
degrees 20 00
- Achromatic object glasses, Half Inch 90 deg. ang. ap. to 100
degrees..... 30 00
- Achromatic object glasses, Quarter Inch 115 deg. ang. ap. 30.00,
130 degrees..... 35 00
- Achromatic object glasses, Quarter Inch 140 deg. ang. ap. to 150
degrees 50 00
- 501. French Achromatic Object Glasses, each..... 3 50, 4 00, 6 00 to 9 00
- 502. Eye pieces for microscopes, various powers, each..... 2 50 and 3 00
- 503. Polarizing prisms for microscopes, each..... 3 25 to 10 00
- 504. Condensing lenses on stands, each..... 1 25, 2 50, 3 00, 5 00, and 6 00
- 505. Prism, with collar and adjustments for drawing the magnified
object..... 6 00
- 506. Animalcule Cages, for examining a small animal or a drop of
water, each..... 1 00, 1 50, and 2 00
- 507. Glass Parabolas, for dark ground illumination, each..... 4 00 and 5 00
- 508. Metallic Needle Holder..... 1 50
- 509. Needle in wood handle..... 10
- 510. Forceps of Brass..... 50
- 511. Instrument for making cells of gold size or fluids..... 2 25
- 512. Glass Micrometers, ruled 100 or 200 lines to the inch, each..... 1 00
- “ “ “ 500 or 1000, each..... 2 00
- 513. Marine Glue, per box..... 12
- 514. Canada Balsam, in wide-mouth bottle..... 38
- 515. Gold size, per bottle..... 38
- 516. Glycerine, per bottle..... 25
- 517. Gelatine, per box..... 20
- 518. Glass Slips, 3 x 1 inch, ground edges, per dozen..... 36
- 519. “ “ 3 x 1 “ unground edges, per dozen..... 12
- 520. “ “ small French size, unground edges, per dozen..... 10
- 521. “ “ with cells and covers, for injected preparations, per doz. 2 25
- 522. “ cells or rings only for the above, per dozen..... 50
- 523. “ slips concave centres, per dozen..... 1 50

	PRICE
No. 524. Thin Glass in sheets, per ounce.....	\$ 75
525. " " " squares, per dozen 15 cts., per ounce.....	1 25
526. " " " circles, per dozen 18 cts., per ounce.....	2 50
527. Paper covers for microscope slides, 3 x 1 inch, per dozen.....	06 and 12
528. " " " " 3 x 1 inch, punched, with backs and labels, 50 in a box.....	1 00
529. Coloured paper for microscope slides, backs and edges, per sheet...	06
530. Microscopic Cabinet, to hold 18 slides, bound as book and lettered.	75
531. " " " 24 slides " " " "	1 00
532. " " " 72 " " " "	1 75
533. " " " 72 " made of mahogany.....	1 75
534. Anatomical Preparations, Lung, Skin, Intestines, &c. &c. each....	75
535. Preparations of Bones, Teeth, Insects, Algæ, &c. &c. "	50
536. Infusoria, Acari, Blood-Corpuscles, Minute Tests, Polariscope objects, &c. each.....	50 to 1 00
537. Selenite slides or plates to be used with objects to be polarized....	75
538. Urinary deposits, 12 to 18 different specimens, each.....	50
Consisting of Phosphates, Urea, Hippuric Acid, Oxalate of Lime, Cystine, Sugar from Diabetes, Lithic Acid, &c. &c.	
539. Microscopic Photographs, so minute that they can only be defined by the microscope, many of them being only about one- thirtieth of an inch in size. They consist of views of public buildings, portraits, copies of letters, Lord's Prayer, Creed, Ten Commandments, Queen Victoria, Louis Napoleon, &c. Some of these slides contain 2000 to 3000 letters; each.....	1 00
540. Preparations of Insects, Guano, &c. on small French slides, each. Leg, foot, wing, and eye of fly, flea, trachea of silkworm, proboscis of butterfly, spicules of sponge, petal of geranium, sections of wood, claw of spider, &c. &c.	20
541. Dropping and Dipping Tubes, each.....	12
542. Wooden pliers or forceps for holding glass slides while mounting.	05
543. Watch Glasses, each.....	12
544. Zoophyte Trough, all glass.....	2 75
545. King's Universal Indicator.....	5 00
546. Holders for Heating Test Tubes.....	25
547. " " Watch Glasses.....	50

For the different standard works on the Microscope and its application, see last page of this catalogue.

ACHROMATIC SPY GLASSES AND TELESCOPES.

PRICE



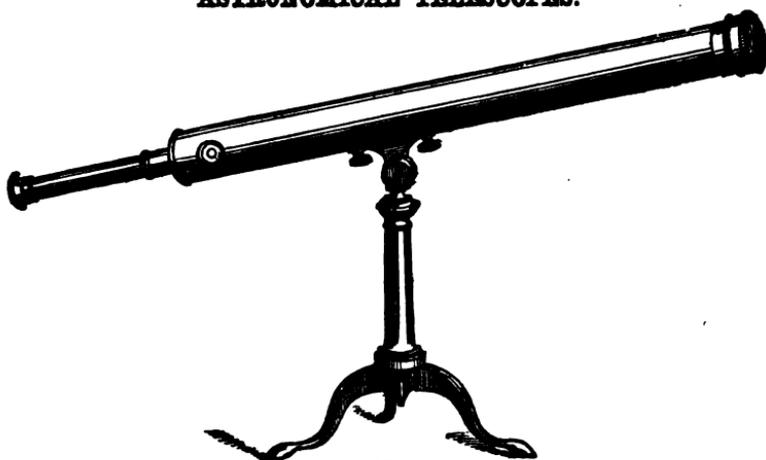
- No. 549. Wood Body, with Cap, three draws, 15 inches long when drawn out, 6 inches when shut up; object glass 1 inch diameter... \$2 25
550. Wood Body, with Cap, three draws, 16 inches long when drawn out, 6 inches when shut up; object glass 1½ inch diameter... 2 50
551. Wood Body, with Cap, six draws, 16 inches when drawn out, 4½ inches shut up; object glass ¾ inch diameter; a very portable pocket Spy Glass..... 3 50
552. Wood Body, with Cap, six draws, 17 inches when drawn out, 4½ inches shut up; object glass 1½ in diameter. This is larger and more powerful than No. 551..... 5 00
553. Wood Body, with Cap, three draws, 30 inches drawn out, 10 inches shut up; object glass 1½ inch diameter..... 6 00

554. Wood Body, with Cap, five draws, 28 inches when drawn out, 7½ inches when shut up; object glass 1½ inch diameter; about the same power as No. 553, but more portable. They are both very clear, and more powerful than the usual ship telescopes..... 8 00
555. Wood Body, with Cap, four draws, 37 inches when drawn out, 11 inches when shut up; object glass 1½ inch diameter; a very superior glass; defines well the moons of Jupiter..... 10 00
556. Same as No. 555, with the addition of a wooden tripod stand, which is necessary for a glass of so high power..... 13 50
557. Ship Spy Glass, wood or metal body, with shade, one draw, 35 inches when drawn out, 20 inches shut up; object glass 1½ inch diameter, each..... 5 00 to 7 00
558. Same as No. 557, but with two draws; more portable, each. 5 00 to 7 00
559. Fine quality Ship Spy Glass, brass body, covered with cord or leather; has shade to keep off the sun and rain; one draw, 36 inches drawn out, 20 inches shut up; object glass 1½ inch diameter; will show readily the moons of Jupiter..... 9 00
560. Same as No. 559, but with two or three draws; 15 inches when shut up..... 9 00
561. Ship Spy Glasses, with crystal object glasses, each..... 9 00 to 12 00
562. Naval Spy Glasses, tapering bodies, 3 feet long..... 15 00

We have many other varieties of Spy Glasses, but the above are the most desirable for the price.

563. Wooden Tripod Stand, with vertical and horizontal motion, upon which to place a Spy Glass; an exceedingly useful article, as a glass of much power cannot be held in the hand with sufficient steadiness to produce the best effect, each..... 3 50 and 4 00
564. Achromatic Telescope, 27 inches when shut up, when at focus 36 inches, object glass 2 inches diameter, 1 terrestrial and 1 celestial eye piece and sun glass, mounted, &c. as No. 564..... 43 00

ASTRONOMICAL TELESCOPES.

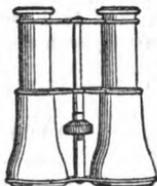


564

PRICE

- No. 565. Achromatic Telescope, 44 inches long when shut up, when at focus 58 inches, object glass scant 3 inches diameter, 2 terrestrial and 1 celestial eye piece and sun glass, rack work adjustment for focus, tripod stand; stand and body made entirely of brass, with strong wood case.....\$100 00
566. Achromatic Telescope, 33 inches when shut up, when at focus 45 inches, object glass $2\frac{1}{2}$ inches diameter, 1 terrestrial and 1 celestial eye piece and sun glass, mounted, &c. as No. 564..... 55 00
567. Achromatic Telescope, 21 inches when shut up, when at focus 30 inches, object glass $1\frac{1}{2}$ inches diameter, 1 terrestrial and 1 celestial eye piece and sun glass, mounted, &c. as No. 564..... 30 00

OPERA GLASSES.



580

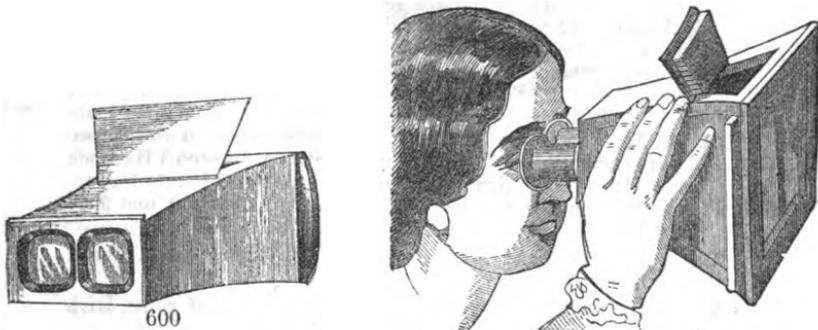


Double Opera Glasses, with achromatic object glasses of best quality, equally adapted for the theatre or for viewing scenery:

- | | | |
|------|--|---------------|
| 580. | Achromatic Opera Glass, all black, each..... | 2 50 |
| 581. | “ “ “ “ “ “..... | 4 00 to 10 00 |
| 582. | “ “ “ black and gilt, each..... | 4 00 to 10 00 |
| 583. | “ “ “ ivory and gilt, each..... | 6 00 to 20 00 |
| 584. | “ “ “ pearl and gilt, each..... | 8 00 to 20 00 |

- No. 585. Achromatic Opera Glass, enamel and gilt, each.....\$12 00 to 20 00
- 586. Marine Opera Glasses, for sea captains and voyagers, giving a large field of view. (For ordinary use these are far preferable to spy glasses.) With strong leather cases, and straps for suspending from the shoulders, each..... 10 00 to 15 00
- 587. Duchesse Opera Glass, with twelve lenses and perfectly achromatic. This is the most portable glass now constructed, being so small that it may be carried without inconvenience in a coat pocket: the magnifying power is high and the field of view large; each.....10 00 and 12 00
- 588. Single or Victoria Opera Glasses, small and neat, each..... 1 50 to 3 00

THE STEREOSCOPE.



The Stereoscope (from the Greek words *stereos*, solid, and *skopein*, to see) is a beautiful optical instrument, the result of the investigations on the subject of Binocular vision, which have been pursued for some years past by eminent scientific men in Europe.

By means of this ingenious and curious instrument, two representations on a *plane* of the same object, taken from different points, appear, when viewed at the same time by both eyes, as only a single picture; and the image has the semblance of being solid or in relief. To produce this effect, accurate drawings of an object may be made from two positions; the most pleasing and interesting effects are from pictures taken by the Daguerreotype. Views of places and buildings are taken, and when placed in the Stereoscope the illusion is complete: it seems scarcely possible that it is a picture that is seen: some objects will appear as if they could almost be touched with the hand, others as if really at a great distance. Paris, Rome, and London may thus be brought to us, if we cannot go to them.

- 600. Stereoscope, Plain black body, each.....\$1 00 to 1 50
- 601. " Mahogany, highly polished, each..... 2 00 and 3 00
- 602. " Morocco, with adjusting top..... 2 50
- 603. " Rose wood, with hinged top..... 3 50
- 604. " Mahogany or Rose wood, on wooden stand..... 5 50
- 605. " " " " on a bronze and lacquered stand, with slide for adjusting to any height. 6 50
- 606. " Box form, covered with morocco, in which 12 views may be kept when not in use..... 4 00
- 607. Slack's Pocket Stereoscope, very portable, in which 12 paper views may be put and carried in the pocket..... 1 25
- 608. Cosmorama Stereoscope, made of Rose wood, with adjustment for focus..... 27 00
- 608½. Same, of Imitation Rosewood, but without adjustment for focus... 23 00

This instrument is very ornamental in finish, and is a suitable addition to the centre-table. It holds 25 glass and 25 paper views, entirely protected from injury, and, by an ingenious mechanical arrangement, each view is successively brought before the eye of the observer. When filled with views on paper, the price will be from \$30 00 to 45 00; when filled with glass views, from \$50 00 to 75 00.

PRICE

- No. 609. Same instrument, to hold 50 glass and 50 paper views.....\$60 00
 610. Same instrument, to hold 100 " 100 " " 75 00

PHOTOGRAPHIC VIEWS FOR THE STEREOSCOPE.

The variety of views on glass and paper has become so extensive that it is impossible, in the limited space allotted, to furnish a complete list of those on hand. Among them may be found the following:—

620. Photographs on paper, uncoloured, \$2 00, 3 00, 4 50, and 6 00, per dozen. The lower-priced are generally views in Paris, Holland, Spain, &c. The medium-priced are generally views in Switzerland, Italy, &c. Those at \$6 00 per dozen consist of views in England, Ireland, Scotland, and interiors of the palaces of Versailles, Tuileries, Fontainebleau, &c.; also American views of Niagara, Trenton, Passaic, and Kaatterskill Falls, White Mountains, Tip-Top House, Catskill Mountains, views on the Wissahickon, (near Philadelphia,) Franklin Statue, (Boston,) Hancock House, (Boston,) Fairmount Water-Works, West Point, &c.
621. Photographs on paper, coloured..... 6 00, 7 50, and 9 00 per dozen.

The lower-priced are generally views of shells, corals, game, animals, groups, &c.

The medium-priced are generally landscapes, views of ruins, Irish lakes and mountain scenery, English do., ghosts, birds' nests, &c.

The finest are groups from life, coloured in the most careful manner, consisting of Courtship, Marriage, Baptism, Picnic party, Evenings at home, Cottage scenes, Crinoline sketches, blind-man's buff, After Marriage, Three o'clock in the Morning, &c.

622. Photographs on glass, uncoloured, \$12 00, 15 00, 18 00, 21 00, per dozen.

The lower-priced are generally views in Paris, of Notre Dame, the Louvre, Tuileries, River Seine, Madeleine Church, Corps Legislatif, Versailles, Trianon, Palais Royal, &c.

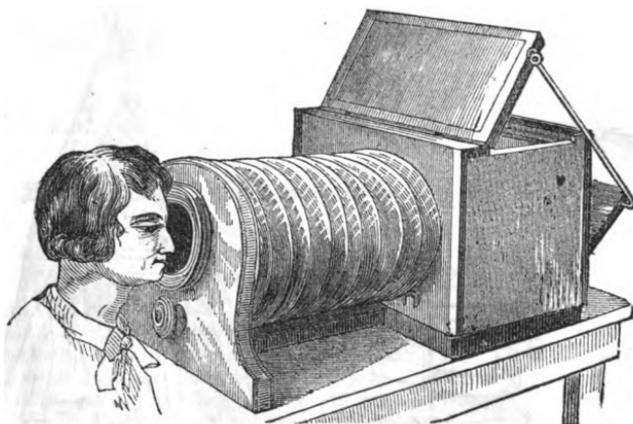
The finest are views in Egypt, Italy, Germany, Turkey, Russia, Switzerland, the Tyrol, &c.

623. Photographs on glass, coloured, American Scenery, \$24 00 per dozen. Niagara Falls, Suspension Bridge, Table Rock, Terrapin Tower, Summer and Winter, White Mountains, Tip-Top House, West Point, Genesee Falls, Passaic Falls, Girard College, Fairmount, Tomb of Washington, Independence Hall, &c.

POLYORAMA PANOPTIQUE.

An entertaining instrument for the family circle, by which one painting will dissolve into another, or change from day to night, merely by viewing them through the medium of reflected or transmitted light.

The observer, while holding the instrument before a strong light, looks through a convex lens at the picture, and at the same time produces the dissolving effect by a gradual change in the admission of the light, giving a most pleasing and interesting effect. They are packed in neat square boxes, with six diagrams, convex lens, and the various adjustments.



630

PRICE

No. 630.	Polyorama Panoptique, with 6 views, 4 by 6 inches each.....	\$2 00
631.	“ “ “ 6 “ 6 by 8 “	3 25
632.	“ “ “ 6 “ 7 by 10 “	5 00
633.	“ “ “ 6 “ 10 by 13 “	9 00

EXTRA VIEWS FOR THE POLYORAMA PANOPTIQUE.

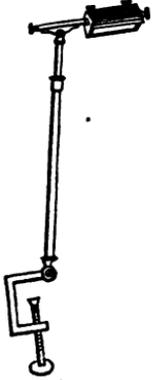
634.	Set of 6 views, 4 by 6 inches each, to fit No. 630, per set.....	1 00
635.	“ 6 “ 6 by 8 “ “ 631 “	1 75
636.	“ 6 “ 7 by 10 “ “ 632 “	2 75
637.	“ 6 “ 10 by 13 “ “ 633 “	5 25

Among the views are the following:—Tuileries, Louvre, Palais Royal, Champs Elysée, Place de la Concorde, Place Vendôme, Père la Chaise, Boulevards des Italiens, Arc de l'Étoile, Madeleine, Notre Dame, Versailles, St. Cloud, Fontainebleau; St. Peter's, Rome; Venice, Rouen, Lyons, Nantes, Havre, Bordeaux; St. Paul's, London; Thames Tunnel, Crystal Palace, Regent Street, Trafalgar Square, Tower of London, Burns's Cottage, Glasgow, Windsor Castle, Siege of Sebastopol, &c. &c.

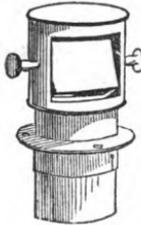
645.	Color Blender, or Prismatic Top, for the recomposition of light; formed in the shape of a top, which, by means of a string and handle, may be rapidly spun round.....	1 00
646.	Migachrome—observations on light, illustrated by the Migachrome, showing the power of temporary retention of images on the retina of the eye, with descriptive book.....	1 75

CAMERA LUCIDA, CAMERA OBSCURA, ETC.

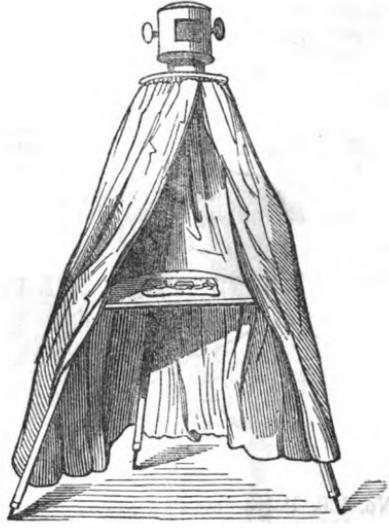
650.	Camera Lucida, each.....	\$4 00 to 12 00
651.	Camera Obscura Head or Lens, without box; a prismatic lens, mounted with brass. This is the best kind of lens for a Camera Obscura, as it forms both lens and mirror, each.....	3 25 to 8 00
651½	King's Portable Photographic Camera, for amateurs.....	35 00
651¾	King's Stereoscopic Camera, for amateurs; so arranged as to take the two pictures for stereoscope-plates without moving the instrument, and in the same time required for single pictures. ...	60 00



650



651



652

PRICE



654

- 652. 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..... \$7 50 to 12 00
- 653. Plain Camera Obscura. In this the object is beautifully represented on a piece of ground glass about six inches square, affording a pleasing amusement to young persons, as representing a moving panorama of animated nature; neat mahogany box..... 4 00
- 654. Diagonal Mirror, with Convex Lens; for viewing perspective prints, each..... 2 00 and 2 50
- 655. Pictures for the above; views in Switzerland, France, &c., per dozen..... 75 cts. to 3 00

CLAUDE LORRAINE, or LANDSCAPE MIRROR.

No. 660. Claude Lorraine, or Landscape Mirror. A pleasing and beautiful instrument, for viewing clouds, landscapes, &c.: particularly adapted for use in the country and at the sea-shore. As the mirror condenses or diminishes the view into a true perspective effect, the instrument is invaluable to the artist, and a very desirable companion for the tourist. The mirror produces, instantaneously, the most charming reflection of scenery, buildings, &c., each..... 2 25 to 6 00

PRISMS.

- 665. Solid Glass Prism; 2 inches long, 37 cts.; 3 in. 50; 4 in. 80; 5 in. 1 25; 6 inches..... 2 00
- 666. Solid Glass Prisms, on mahogany stands, each..... 2 00, 2 50, 3 00
- 667. " " three kinds of glass flint, crown and plate, united; 5 inches long..... 1 50
- 668. Nichols's Prisms, each..... 3 25 to 5 00
- 669. Polarizing Mirror..... 3 75

	PRICE
No. 670. Selenite Designs for Polariscope, each.....	\$2 00 to 10 00
671. Periphanscope, each.....	1 25 and 1 50
672. Kaleidoscope, each.....	25, 50, 75, 1 00
673. Polyprism—making many heads out of one.....	25

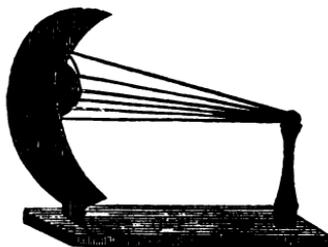
MIRRORS IN BLACK WOOD FRAMES.

674. Magnifying on one side, diminishing on the other.....	1 50
675. Cylindrical (elongating and shortening) each.....	1 50 to 3 00
676. Multiplying (producing several images, “.....	1 50 to 3 00
677. Magnifying on one side, plain on the other, each.....	50 to 2 00

MODEL OF THE EYE FOR SCHOOLS.—Three Parts.

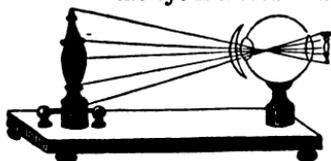


678



679

678. Represents the globe of the eye, containing the various coats and parts, which can be successively removed, showing the arrangement of the eye as it appears on dissection. The globe is about four inches in diameter, and supported on a stand..... 5 00
679. Displays the attachment of the muscles, and the manner in which the eye is moved in the socket..... 3 00



680

680. Is the apparatus for illustrating the position of the image with regard to the retina in perfect, long, and short sight. The inversion of the image by the crossing of the rays (shown by silk cord) is seen much more perfectly than in any other construction..... 4 00

Map or Diagram of the eye, (22 x 15 inches,) handsomely coloured... 75

LENSES, ETC.

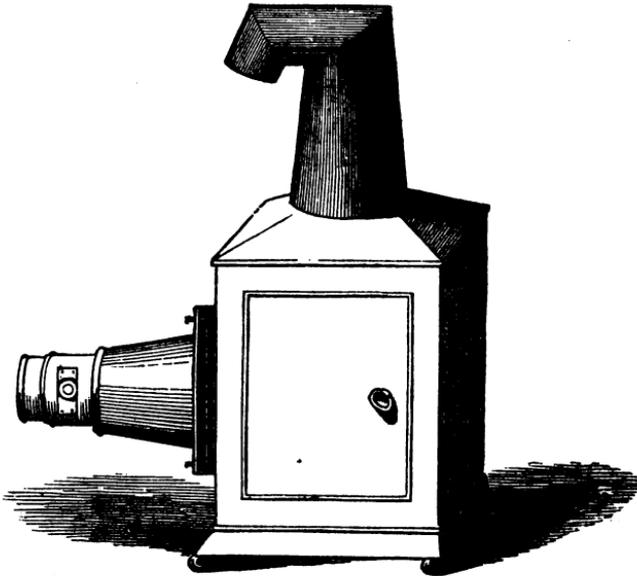
681. Demonstration Lenses. A set of six, showing the formation of the various kinds of Lenses, per set..... 1 50 to 3 50

COSMORAMA LENSES.

682. Double Convex Lens, 6 inches diam., 30 to 72 inches focus,	2 50 to 3 00
683. “ “ 5 “ “ 48 to 72 “	2 00 to 3 00
684. “ “ 5 “ “ 20 to 30 “	1 50 to 2 00
685. “ “ 4 “ “ 8 to 20 “	1 00 to 1 50
688. “ “ 3 “ “ 6 to 36 “	75
689. “ “ 2 “ “ 6 to 36 “	50
690. “ “ 1½ “ “ 2 to 5 “	37
691. Plano-convex Lens, 4 inches diam., 12 to 20 inches focus.....	62
692. “ “ 3 “ “ 12 to 20 “.....	37

LENSES, FIRST QUALITY, FOR MICROSCOPES.						PRICE
No. 693.	Double Convex Lens,	1 inch diameter,	2 inches focus.....			50
694.	"	"	1½ "	"	"	50
695.	"	"	1¼ "	"	"	50
696.	"	"	1 "	"	"	50
697.	"	"	¾ "	"	"	50
698.	"	"	½ "	"	"	50
699.	"	3-16	"	"	"	50
700.	"	"	"	"	"	50
701.	Plano-convex	"	2 "	"	"	50
702.	"	"	1½ "	"	"	50
703.	"	"	1¼ "	"	"	50
704.	"	"	1 "	"	"	50
705.	"	"	¾ "	"	"	50
706.	"	"	½ "	"	"	62
707.	"	3-16	"	"	"	62
708.	"	1/8	"	"	"	62
709.	Achromatic Object Glasses, for ships' telescopes; 1½ inch diameter, 1 50; 1¼ inch, 1 75; 1¼ inch, 2 25; 2 inch.....					2 50
710.	Sets of four Convex Lenses, for eye pieces of telescopes, per set...					2 00
ACHROMATIC OBJECT GLASSES FOR ASTRONOMICAL TELESCOPES.						
711.	2 inches diameter, 36 inches focus, no mounting.....					5 50
712.	2½ "	"	44 "	"	"	11 00
713.	3 "	"	48 "	"	"	22 00
714.	Eye Piece for Astronomical Telescopes, Brass Tube, with Sun Glass.....					4 00

MAGIC LANTERNS.



750

The Magic Lantern was invented by Kircher, about the year 1650. It consists, in its simplest form, of a condensing and object lens; a lamp is placed in a tin box, and the light thrown in a condensed state upon pictures painted in transparent colours, an enlarged image of which is thrown upon a screen or wall. The Magic Lantern, for a long period, was only considered an optical toy to amuse children ;

but, from recent improvements, it has become a popular medium for conveying instruction, and may be employed in illustrating any branch of scientific information, when it is desired to give a vivid and enlarged representation of phenomena to a large assemblage of persons. The Binoptric Dissolving Lantern, with the oxygen illuminating apparatus, is the most perfect instrument yet invented.

We have carefully availed ourselves of every additional improvement to the Magic Lantern, and have always on hand a very large assortment of beautifully-executed Slides, to which we invite the attention of teachers, superintendents of Sunday-schools, and public lecturers.

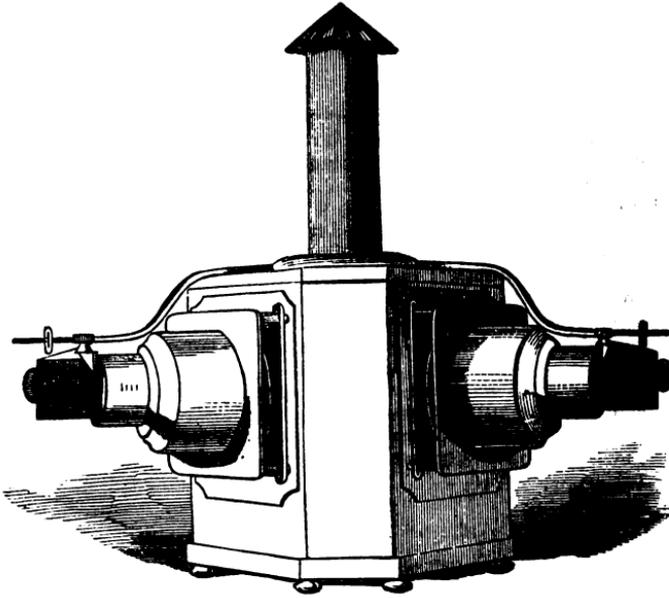
A discount of five per cent. is made from bills for Magic Lanterns and Slides, when exceeding fifty dollars, and no charge made for box or packing.

	PRICE
No. 750. Improved Phantasmagoria Lantern, with rack adjustment for focus, spring to hold slides, solar lamp to burn lard or oil, with condensing lenses 4 inches diameter, the box 10 by 8 inches square, and 16 inches high.....	23 00
751. Improved Phantasmagoria Lantern, with rack adjustment for focus, spring to hold slides, solar lamp to burn lard or oil, with condensing lenses 3½ inches diameter, the box 10 by 8 inches square, and 16 inches high.....	18 00
752. Phantasmagoria Lantern, with brass-slip tube for focus, spring to hold slides, solar lamp to burn lard or oil, with condensing lenses 3½ inches diameter, the box 10 by 8 inches square, and 16 inches high.....	16 00
753. Magic Lantern, no brass work, no spring, entirely plain, but of as high a magnifying power as the \$18 lantern; solar lamp to burn lard or oil, with condensing lenses 3 inches diameter, the box 10 by 6 inches square, and 14 inches high.....	12 00

DISSOLVING VIEWS.

The exhibition of the Dissolving Views is one of the most extraordinary and magical effects that the lantern is capable of producing. No terms can better express these wonderful changes than "dissolving;" for, while the spectator is viewing a painting, it is made, almost imperceptibly, to melt into quite a dissimilar picture. A painting representing the exterior of a cathedral being under view, this is insensibly changed into the interior of the same building, without the observer being able to detect any apparent alteration, until the new picture appears to grow perfectly distinct before him: hence he is led to suppose the change to have taken place upon the same painting; whereas a new view has been substituted, without leaving the screen in darkness for an instant. The mode of producing this pleasing and fascinating illusion is by the employment of two Phantasmagoria Lanterns, of precisely the same magnifying powers, and arranged on a stand, or of the Binoptric Lantern, of which the inventor, Dr. Beechey, says: "This Dissolving Apparatus possesses, within as small a compass as a single lantern of the ordinary description, all the powers of two lanterns, with only one lamp, of intense brightness, free from the objectionable smell and great heat of ordinary lamps, whereby a disk of twenty feet for each tube may be obtained. Each disk is capable of being darkened to any required extent without the least shadow on any portion of the picture; and from the superiority in the optical arrangements of the apparatus, each picture is perfectly flat and well defined to the extreme edge. As the disks may be thrown either together on one circle, or united at various distances in length upon the screen, the number of effects which may be produced may easily be imagined. They present, first, a succession of dissolving views, so accurately and gradually dissolving that the most experienced eye cannot see the operation going on. Secondly, various effects, as falling snow, &c. succeeded by sunshine and rainbow; volcanoes in eruption, &c. Thirdly, double discs, as the two hemispheres

of the globe on the screen at once, full size; or two separate portions of one diagram of extended length, without crowding, as at present, all the objects into one disk. Fourthly, combinations of two moving or revolving slides on one circle, as all the planetary system in motion, &c. &c., or all the vagaries of two chromatrope taken in combination, and permutations of one or two together. The por-



754

tability of the apparatus is also of importance: the whole can be packed—viz., the lantern, gas-bag, retort, purifier, &c., with several dozen slides—in a case two feet square and about eighteen inches deep,—a decided advantage over every other description of dissolving-view apparatus.”

A small lamp is used with the Binoptric: a stream of oxygen gas is thrown upon the flame, producing an intense light, but little inferior to the hydro-oxygen light, and free from all the risk of explosion attendant on the latter, as only the oxygen is used in connection with the lamp.

PRICE

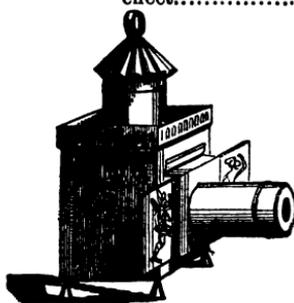
- | | |
|--|----------|
| No. 754. Superior Prismatic Binoptric Lantern, with two sets of condensers $3\frac{1}{4}$ inches in diameter, with lamp, platina wire, &c.; iron retort, purifying bottle, India rubber gas-bag, and tubing for manufacturing the oxygen gas, with printed instructions..... | \$140 00 |
| 755. The Lamp, and all the apparatus for making the gas, which can be used with Nos. 750, 751, and 752..... | 25 00 |
| 756. A pair of Phantasmagoria Lanterns, with rack adjustments for focus, springs to hold slides, solar lamps to burn lard or oil, with condensing lenses 4 inches diameter, the boxes 10 by 8 inches square, and 16 inches high—the whole arranged on a stand, with sliding apparatus for producing the dissolving effect..... | 50 00 |

No. 757. A pair of Phantasmagoria Lanterns, with rack adjustments for focus, springs to hold slides, solar lamps to burn lard or oil, with condensing lenses $3\frac{3}{4}$ inches diameter; the boxes 10 by 8 inches square, and 16 inches high; the whole arranged on a stand with sliding apparatus for producing the dissolving effect..... \$40 00

758. A pair of Phantasmagoria Lanterns, with brass slip-tubes for focus, springs to hold slides, solar lamps to burn lard or oil, with condensing lenses $3\frac{3}{4}$ inches diameter; the boxes 10 by 8 inches square, and 16 inches high; the whole arranged on a stand with the sliding apparatus for producing the dissolving effect..... 36 00

759. Queen's Rack-and-Pinion Dissolving apparatus, added to either of the Nos. 756, 757, or 758..... 3 00

The foregoing Magic Lanterns are priced without any reference to slides whatever; that is, the prices are for the Lanterns when complete and ready for use, with lamps and necessary appendages, including printed instructions, but no slides accompany any of the lanterns at the prices above mentioned.



760

760. Small Magic Lanterns, with twelve slides accompanying each lantern, calculated for the amusement of children, the paintings of various humorous designs, each \$1 00, 1 25, 1 50, 2 00, 2 50

761. Same as No. 760, but in japanned tin boxes, with 12 slides, the paintings superior to the above, each..... 4 00, 9 00, 11 00, 15 00

SLIDES OR PAINTINGS.

ASTRONOMICAL DIAGRAMS,

Of the following Views, in Eleven Sliders, packed in a box, with a description.

- No. 780. Slider No. 1. System of Ptolemy, ditto Copernicus, ditto Tycho Brahé, ditto Newton; 2. Telescopic view of the Moon, ditto of Jupiter, ditto of Saturn; 3. Comparative sizes of the Planets, comparative distances of the Planets, Orbit of a Comet, Comet of 1811; 4. Signs of the Zodiac, Inclination of the Planets' Orbits, Direct and Retrograde motion; 5. Rotundity of the Earth, (*lever movable*;) 6. The Seasons, Phases of the Moon, the Earth's Shadow; 7. Cause of the Sun's Eclipse, ditto Moon's, Inclination to the Moon's Orbit; 8. Eclipse of the Sun, with a Transit of Venus, (*movable*;) 9. Eclipse of the Moon, (*movable*;) 10. Spring Tide at New Moon, ditto Full Moon, Neap Tide; 11. The Constellation Orion, ditto Ursa Major, Various Nebulae, a portion of the Milky Way. Per box..... 18 00
781. Astronomical Diagrams, smaller size, per box..... 10 00

MOVABLE ASTRONOMICAL DIAGRAMS,

The Motion produced by a Rack: in a Set of Nine Sliders, packed in a box, with a lock; one painting on each slide.

782. No. 1. The Solar System, showing the Revolution of all the Planets, with their Satellites, round the Sun; 2. The Earth's annual motion round the Sun, showing the Parallelism of its Axis, thus producing the Seasons; 3. This Diagram illustrates the cause of Spring and Neap Tides, and shows the Moon's Phases during its Revolution; 4. This Diagram illustrates the apparent, direct, and retrograde motion of Venus or Mercury, and also its stationary appearance; 5. A Diagram to prove the

Earth's Rotundity by a ship sailing round the globe, and a line drawn from the eye of the observer placed on an eminence; 6. This Diagram illustrates the Eccentric Revolution of a Comet round the Sun, and shows the appearance of its tail at different points of its orbit; 7. The diurnal motion of the Earth, showing the rising and setting of the Sun, illustrating the cause of day and night, by the earth's rotation upon its axis; 8. This Diagram illustrates the annual motion of the Earth round the Sun, with the Monthly Lunations of the Moon; 9. This Diagram shows the various Eclipses of the Sun, with the Transit of Venus: the Sun appears as seen through a Telescope. Per box..... \$30 00 and 35 00

SELECT SCRIPTURE SUBJECTS,

In Twelve Sliders, containing 39 Subjects, packed in a box, each glass 2½ inches diameter.

No. 783. Slider No. 1. Adam and Eve driven out of Paradise, Hagar and Ishmael, Abraham offering Isaac, Rebecca at the Well; 2. Joseph sold into Egypt, Joseph meeting his Father, the Finding of Moses; 3. The Ark of the Covenant, the Dress of the High-Priest, the Altar of Incense; 4. The Altar of the Burnt Offering, an Aaronite or Scribe, the Golden Candlestick; 5. Return of the Spies, the Brazen Serpent, Balaam and his Ass; 6. Samson and the Lion, Esther before Ahasuerus, the Infant Samuel, Elijah fed by Ravens; 7. David and Goliath, David dancing before the Ark, Nathan reproving David; 8. The Annunciation, the Birth of Christ, Christ brought to the Temple; 9. The Flight into Egypt, the Holy Family, Christ and the Woman of Samaria; 10. Christ Stilling the Tempest, the Good Samaritan, the Lord of the Vineyard and Labourer; 11. The Return of the Prodigal Son, Trial of Peter's Faith, Herodias with the Head of John the Baptist; 12. The Crucifixion, the Women at the Sepulchre, the Morning of the Resurrection, the Disciples at Emmaus. Per box.....\$30 00

VIEWS ILLUSTRATIVE OF SCRIPTURE HISTORY, LANDSCAPES, &c.

In Single Sliders, on Glasses 2½ and 3 inches diameter, one painting only on each slide.

784. The Temptation; Assuaging the Waters; Abraham offering Isaac; Hagar and Ishmael; Isaac blessing Jacob; Esau soliciting a Blessing; Jacob's Dream; Jacob blessing Ephraim and Manasseh; Infant Moses; Amalek overcome; Balak's Sacrifice; Jael killing Sisera; Delilah and Samson; Daniel in the Lions' Den; Shadrach, Meshach, and Abed-nego; Mordecai's Triumph; Esther kissing the Sceptre; Dedication of the Temple; Moses striking the Rock; Saul and the Witch of Endor; Ruth gleaning; Nathan reproving David; Cain and Abel's Sacrifice; Elijah and the Widow's Son; the Deluge; Judgment of Adam and Eve; the Cup found in Benjamin's Sack; Jacob meeting Joseph; Noah's Sacrifice; Rebecca at the Well; the Daughters of Jerusalem weeping; Jeremiah foretelling the Fall of Jerusalem; Balaam and his Ass; Abraham and the Angels; Samuel and Eli; the Ascension; Good Samaritan; Simeon blessing Christ; Raising of Lazarus; Paul and Silas in Prison; Paul preaching at Antioch; Christ entering Jerusalem; Conversion of Saul; the Crucifixion; Petrae; Valley of Sichern; Cedars of Lebanon; Tyre; Lake of Tiberias; Baalbec; Gethsemane; Tomb of Absalom; Bay of Naples; and a large assortment of moonlight views of castles, ruins of old abbeys, &c. &c., each..... 3 00 and 3 25

SUPERIOR VIEWS, ILLUSTRATIVE OF SCRIPTURE HISTORY, LANDSCAPES, &c.,

In single Sliders, on Glasses 3½ inches diameter, one painting only on each slide.

No. 785.	Sphinx, (Egypt); Wailing-Place of the Jews at Jerusalem; Philadelphia, (Asia Minor); Frontier of Egypt; Temple of Dendera; Mount Hor; Approach to Petræa; Mount Tabor; Mount Sinai; Temple of Edfou; Luxor; Apostles' Fountain; Memnonium, (Thebes); Sphynx and Pyramids; El Dier; Pyramids; Der el Kamer; Plain of El Rah; Approach to Karnak; Solomon's Pools; St. Ruth's Priory; Fountain Rue Richelieu, (Paris); Ducal Palace, (Venice); Temple of Peace, (Rome); Yanina, (Greece); Tiber; Church of the Knights-Templars at Luz; Thames Tunnel; Falls of Cydnus, (Syria); Seal-Hunting; Ruins of Andernach, on the Rhine; the Rialto, (Venice); Isola Bella, Lake Como; Lanek Castle, on the Rhine; Windsor Castle; Bacharach, on the Rhine; Venice; Zurich; Naples; Castle of Thurnburg; Mont Blanc; Porte St. Denis, (Paris); Ghigi Palace, (Italy); Corn Market, (Paris); Alhama, (Gibraltar); Castle of Spielz, on Lake Thun; Icebergs; Frostberg, (Switzerland); St. Paul's, (London); Prairie on Fire; Hall of Waters, (Constantinople); Spoleto; Knights Street, (Rhodes); A Dead Camel in the Desert; Snow Bridge; Lake of Como; Inverary Castle; Tell's Chapel, (Lake Lucerne); Tintern Abbey; each.....	PRICE
		\$4 50
786.	The words "Good-Night," in a wreath of roses, for closing the exhibition, each.....	2 00 to 3 50

PAINTINGS, IN PAIRS OR SETS, FOR DISSOLVING VIEWS.

Any two paintings of the same size will answer for dissolving views, care being taken that there is a general likeness of light and shade. A very light object in the centre of one painting, and a very dark object in the centre of the other, will not produce a fine effect.

The following are especially selected in Sets, and are on Glasses 3½ inches diameter.

787.	Storm at Sea—calm, wreck, life-boat, lightning—4 sliders, 14 50	and 16 00
788.	Ship on Fire—in full sail, on fire, "a sail! a sail!" life-boat—4 sliders, very superior.....	17 00
789.	Vesuvius in eruption—day, night, smoke and flame, lava, &c.—3 slides.....	12 50
790.	Water Mill, North Devon—Summer, (wheel in motion,) winter, moonlight and illumination—3 slides.....	14 00
791.	Mosque of Omar—day, night, moonlight, windows illuminated—3 slides.....	11 00
792.	Poppleton Church—summer, winter, night, illuminated clock—3 slides.....	11 00
793.	Rome, St. Peter's, Vatican, St. Angelo—day, night, illumination with fire-works—3 slides.....	13 50
794.	Niagara—day, moonlight, and revolving slide, (water in motion,)—3 slides.....	10 50
795.	Niagara—day, night, rainbow, and revolving slide, (water in motion,)—4 slides.....	14 50
796.	Mont Blanc—day, and revolving slide, (water in motion,)—2 slides.....	8 50
797.	Snowdon—summer, winter, moonlight, cottage lit up—3 slides...	11 00
798.	Scene in Yorkshire—summer, winter, rainbow—3 slides.....	11 00
799.	Tower of London—moonlight, conflagration—2 slides.....	9 00
800.	Esquimaux Village—snow huts, different auroras—3 slides.....	7 50
801.	Scene in Cumberland—summer, winter—2 slides.....	9 00
802.	Loch Lomond—day, moonlight—2 slides.....	9 00
803.	Lake Geneva—summer, winter—2 slides.....	9 00
804.	Bay of Naples—day, night—2 slides.....	9 00

	PRICE
No. 805. Castle of Chillon—day, moonlight—2 slides.....	\$9 00
806. Mill at Lungren—summer, winter—2 slides.....	9 00
807. Mill at Lynnmouth—summer, winter—2 slides.....	9 00
808. Burns's Cottage—summer, winter—2 slides.....	9 00
809. Birthplace of Burns—summer, winter—2 slides.....	9 00
810. Birthplace of Shakspeare—summer, winter—2 slides.....	9 00
811. Old Road and New Road—stage coach, locomotive—2 slides.....	9 00
812. Napoleon— <i>Powerful</i> , at the head of his army; <i>Powerless</i> , at St. Helena—2 slides.....	9 00
813. British Oak—oak-tree, Britannia and sailors—2 slides.....	9 00
814. Newby Abbey—summer, winter—2 slides.....	9 00
815. Black Rock—day, sunset, (movable,)—2 slides.....	7 00
816. Katz, on the Rhine—day, night, lightning—2 slides.....	7 00
817. St. Paul's, London—night, moon rising—2 slides.....	7 00

THE CHROMATROPE, OR CHINESE FIRE-WORKS.

818. These Slides are singularly curious, the effect being very similar to that of the Kaleidoscope. The pictures are produced by brilliant designs painted upon glass, and the glasses are made to rotate in different directions. An endless variety of changes in the patterns is caused by turning the wheel, sometimes *quickly*, then *slowly*, *backward* and *forward*. There are 50 different patterns, $2\frac{1}{4}$ inches diameter, each..... 3 25

TEMPERANCE AND MORAL SLIDES.

819. Drunkard's Progress, 10 slides, one painting on each slide, the glasses 3 inches in diameter, packed in a box. Slider No. 1. Teetotaler; 2. Glass with a Friend; 3. Glass to keep the Cold out; 4. Glass too much; 5. Drunk and Riotous; 6. Jolly Companions every one; 7. Forsaken by Friends; 8. Poverty and Disease; 9. Desperation and Crime; 10. Suicide, per set..... 15 00
820. Progress of Intemperance, 6 slides, one painting on each slide, the glasses 3 inches in diameter, packed in a box. No. 1. Dizzy—"I feel a little dizzy;" 2. Foolish—"Take a bumper and try;" 3. Evidently Inebriated—"Waiter, what have I to pay?" 4. Considerably Intoxicated—"I say, Jack, which is my way to port?" 5. Uncommon Drunk—"Have you seen any thing of a shoe?" 6. Indisputably Dead Drunk, per set..... 9 00

BOTANY.

821. Set of Botanical Sliders, 50 paintings, on 14 slides, packed in a box, with an elementary treatise on Botany..... 29 00

LONG SLIDES OF VARIOUS HUMOROUS SUBJECTS.

822. The Old Man and Ass, or, the folly of trying to please every one—8 views, on two slides, per set..... 5 50 and 7 00
823. Slides with 3 to 6 paintings on each, various humorous subjects, per slide..... 1 25 to 2 00
824. House that Jack built—10 paintings, on 2 slides, per set..... 4 50
825. Natural History Slides, 4 views on each slide, per slide..... 1 00

MOVING DIORAMIC SLIDES.

826. Serenade—a Castle on a Lake: a boat moves towards the castle, and a lady appears on the balcony—very good..... 5 25
827. Noah entering the Ark, per slide..... 3 00 and 5 00
828. Israelites crossing the Red Sea, per slide..... 3 00 and 5 00
829. Burning of the Steamship Missouri—boats passing..... 5 00
830. Mount Vesuvius—boats and vessels moving past, per slide 3 00 and 5 00
831. Downton Castle, " " " 2 50
832. Pembroke, " " " 2 50
833. Holyrood Chapel—people and horses passing..... 2 50

No. 834. Ruins of a Convent,—people and horses passing.....	\$2 50
835. Smugglers' Cave—ships, boats and men passing.....	2 50

LEVER SLIDERS, GIVING NATURAL MOTIONS TO THE FIGURES.

836. Horse Drinking—Ship at Anchor—Phrenological Lecture— School-Mistress, &c. &c., per slide.....	3 50 and 4 00
837. Snow Slide, movable, representing falling snow, each.....	2 00 to 4 00

COMIC AND MOVABLE SLIDES.

In single sliders, one painting only on each slide.

838. Lion's Head, moving eyes and mouth; Tiger's Head, do.; Human Skull, do.; Choice Spirits, (in a Tub;) The Night-Mare; Sailor Riding a Pig; Merlin's Cave, with a Sea-View; Boy Fishing; Juggler; Opening Rose, exposing Cupid; Bloom- ing Carnation; do. Tulip; Turks' Caps; Wreath of Flowers and Good-Night; Passion-Flower; Performance on Two Chairs; Horsemanship; Peacock, with opening tail; Harlequin falling to pieces; Tailor and Goose; Cat following a Rat; Sportsman Shooting; Boy catching Butterfly; Equestrian at Astley's; Blue- Beard, moving eyes and mouth; a Pear (pair); Old Woman and Looking-Glass; Cat and Mice; Chameleon changing colour; Birth of Cupid; Lion seizing a Horse; Farmer and Dog; Tithe Pig; Stuck Fast, (lad in a tree;) Barber Shaving; Barber and Skull; Death on Pale Horse; Man wishing Good-Night, takes off his hat; Clown, whose head falls off; Dancing Clown; Tumbling do.; Punch-Bowl; Water-Drinker; Lamp-Black, (a sweep in a cask;) Cauliflower changing to a Venus; Cook and Calf's Head; the Growing Nose; Changes of Insects from Larvæ and Pupa to Perfect Insects; Animal Spirits; Naval En- gagements between two ships; Navigation, (boys sailing a boat;) Dutch Dentist taking out a Tooth; Battle of the Nile, with Clouds; do. of Navarino; Pineapple, changes to a clown; Cupid among the Roses; Bottled Porter; Taking off a Boot; Cobbler at Work; Blacksmith do.; Tailor Sewing; Black Draught; Dancing Sailor; Tight-Rope Dancer, (male;) Female do.; Jim Crow Dancing; Child with Skipping-Rope; Harlequin and Chest; Clown opening a Chest; Clown and the Old Gentle- man, &c. &c.; each slide, according to style of execution.....	87 to 2 25
839. Seven Ages, 1 slide, 7 paintings.....	1 50
840. Jack and the Bean Stalk, 1 slide, 5 paintings.....	1 00
841. Blue Beard, 2 slides, 1 painting.....	3 00
842. Whittington and cat, 2 slides, 10 paintings.....	3 00
843. John Gilpin, 2 slides, 9 paintings.....	3 00
844. Cock Robin, 2 slides, 10 paintings.....	3 00
845. Cinderella, 3 slides, 13 paintings.....	4 50
846. Robinson Crusoe, 2 slides, 7 paintings.....	3 00
847. Mother Hubbard, 2 slides, 8 paintings.....	3 00
848. Wicks for the Solar Lamps, per dozen.....	12
849. Glass Cones or Chimneys for Solar Lamps, each.....	10

All the Slides marked as sets, or in boxes, are only sold in that way, and not separated. All the Diagrams enumerated can be used in any of the Lanterns described. The views of 3½ inches in diameter are more suitable for the Binoptic or Phantasmagoria with four-inch condensers; if used in a lantern with smaller condensers, a portion of the painting is lost.

General Directions for the Use of the Magic Lantern.

The following Directions are intended as a guide to those unacquainted with the management of the Magic Lantern. Practice will soon suggest to the operator many methods of rendering the exhibition a pleasant and profitable amusement.

The lamp should be carefully trimmed, and filled with the best oil or lard, the flame to stand as high as possible, so that it does not smoke. The greatest cleanliness should be observed with the lamp, a new wick used for each exhibition, and when not in use the oil should be drained out.

By dissolving in each pint of oil two ounces of gum-camphor over a gentle heat, it will be found that the intensity of the light is much increased and that there is very little smoke made by the lamp.

All the lenses should be taken out previous to each exhibition and carefully wiped with a soft muslin or linen cloth.

The room being fully darkened, the lantern should be placed upon a table, about six or eight feet from a white wall, or a white sheet suspended on a wall; or it is frequently preferable to make use of a muslin screen stretched on a frame, the lantern being on one side and the spectators on the other; and it is recommended to wet the screen, that it may be drawn tighter and also rendered more transparent.

The lamp having been lighted and placed in the lantern, close the door of the lantern and move the lamp, by means of the brass rod projecting in front, until a perfect circle is formed on the wall or screen, when the lamp is known to be in its proper position. Much depends on this.

The sliders are placed in the slit in front of the lantern, with the picture inverted, and the focus adjusted by the rack-work. The farther the lantern is from the wall or screen, the larger will be the image, but the illumination will not be so perfect as when closer.

TO PRODUCE THE PHANTASMAGORIA EFFECT.

The operator should be on one side of a screen, as already described, and the spectators on the other. Taking the lantern under his left arm, he should go up prettily close to the screen, and adjust the focus with his right hand; the image, of course, will be very small: he must then walk slowly backwards, at the same time adjusting the focus. As the image *increases* in size, it will appear to the spectators to be coming towards them; and then again let him walk up towards the screen, thus *diminishing* the image, and it will appear to them as if receding. The screen not being seen, the image appears to be suspended in the air, and the deception is complete, even to those accustomed to the exhibition.

The effect is much increased by gradually closing down the brass shutter in front of the lenses as the operator walks up towards the screen. It has the appearance of diminishing the quantity of light, and gives a more perfect *realization* that the image has actually removed from the spectators: of course, it must be gradually raised upwards, as the operator is walking backwards from the screen.

Sliders producing the best Phantasmagoria effect are those containing but one or two figures, and all the rest of the glass painted black.

TO PRODUCE THE DISSOLVING EFFECT.

Requires two lanterns arranged on a stand. The lanterns each turn upon a pivot in front, and are secured at the rear with set screws, by which means they are firmly fixed in their places; it being necessary for the success of the illusion that they do not change their position during the whole exhibition. Incline both lanterns apart at the rear to such an angle that the circle of light from each shall fall precisely upon the same spot on the screen; then give the set screws a turn, which will retain the lanterns at the angle required. There is in front of the pair of lanterns a diamond-shaped shade, which slides in a groove, and is so proportioned that when the wide part is in front of the tube of *one* lantern, the pointed end will not quite reach to the front of the tube of the *other* lantern. Having placed a slider in each lantern, slide the shade along the groove, by the hand, alternately from right to left and left to right; and it follows, that as soon as the shade begins to cover the image proceeding from one lantern, a corresponding portion of the image proceeding from the other lantern is thrown upon the screen. The movement should be slow and regular, and the paintings will imperceptibly and beautifully dissolve the one into the other.

It is of much consequence that the paintings are placed precisely in the centre of the lenses, so that they may fall directly upon each other when the change is

made. They should also be of the same size: a 3 inch slider, for instance, will not dissolve *handsomely* in combination with a $3\frac{1}{2}$ inch slider.

TO OPERATE WITH THE BINOPTIC LANTERN.

Demands more practice and more skill than with the preceding, but, from the perfection of the apparatus, the effects are far more brilliant.

The illuminating power is obtained by forcing a jet of oxygen gas through the centre of the flame of the lamp on to a lime cylinder, supported by a platina wire above the apex of the flame.

DIRECTIONS FOR TRIMMING THE LAMP.

Remove the cotton holder from the lamp, and draw through it a series of the threads of thin, ordinary twist lamp-cotton and of about four inches long; replace the holder, cut the cotton evenly, and draw it up half an inch above the tube; pour alcohol (spirits of wine) into the vessel, and in a few minutes it will have passed up the cotton to its point of ignition. By the aid of a piece of wire, press the cotton down nearly flat, in order that a wider flame may be produced, at the same time being *strictly* careful that none of its fibres interfere with the free passage of the gas from the jet to the lime cylinder, which cylinder is to be placed on the end of the wire at the opposite side.

After having placed the lamp within the lantern, only such an amount of gas should be turned on as will give the maximum of light. Too much gas will cause a black spot on the lime, and thus deteriorate its illuminating power.

TO MAKE THE GAS.

Oxygen gas is not combustible, and cannot, therefore, be attended with danger: it has no smell, and is the vital principle of the atmosphere. To make it, it is only necessary, *first*, to see that the retort is clean, or, at least, free from coal, oil, or any combustible substance; (after making the gas, a residuum is formed at the bottom of the retort, which should be at once removed.) *Secondly*, put into the retort eleven ounces of chlorate of potash, and two ounces of black oxide of manganese, in powder, well mixed together, and lute round the cover with putty or clay; screw it down tightly, put it on a common kitchen-fire, and connect it by means of the lead pipe with the wash-bottle, which should be half filled with water. If the fire is brisk and the materials of good quality, bubbles will soon rise through the water in the wash-bottle: when they come fast and regularly without intermission, allowing all atmospheric air to be expelled, connect the wash-bottle with the gas-bag by the flexible tube, and in about ten minutes the bag will be filled with the purest oxygen gas. When the bubbles cease, or when the bag is full, turn the stop-cock, to prevent gas escaping, and *immediately* unscrew the tube from the wash-bottle, and *take the retort off the fire without loss of time*.

When required for use, attach the tube from the gas-bag to the lamp, previously carefully trimmed, and apply a pressure of about fifty pounds on the bag. The gas should not all be turned on, but the supply regulated by the small stop-cock, so as merely to allow sufficient to pass to produce perfect brightness. This should be particularly attended to; for if too much is turned on, the lime cylinder is cooled, gas is wasted, and the exhibition proves a failure. With judicious management, an intense and uniform brightness may be kept up for over two hours, with a consumption of less than one and a half cubic feet of gas per hour.

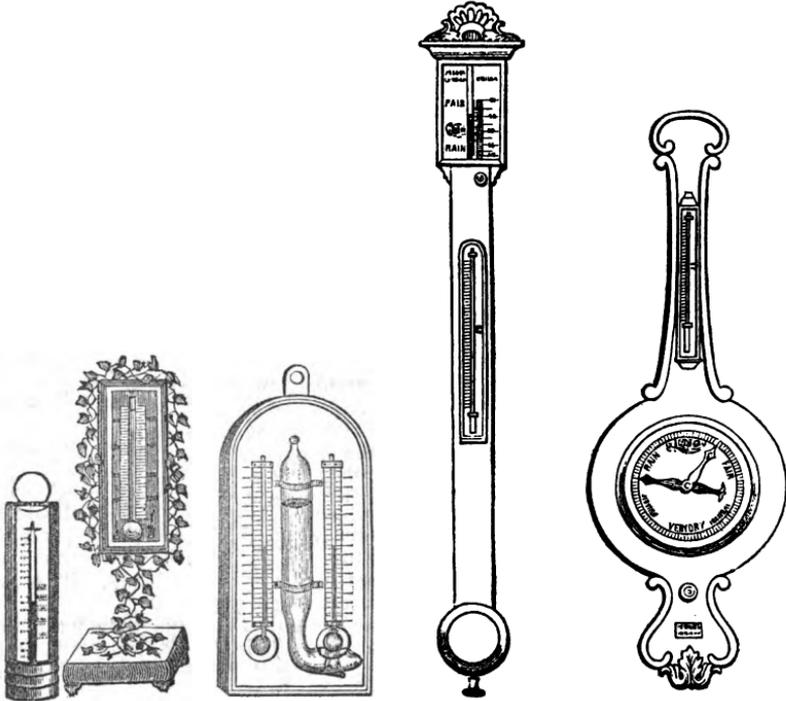
Experience will soon enable those using the instrument to manage the levers and prisms, and with facility to produce all the effects desired. Perfect coincidence of disks is obtained *laterally* by moving the prism on its hinged joint, and *perpendicularly* by moving round the tube containing the shutter.

Meteorological Instruments.

THERMOMETERS, BAROMETERS, HYGROMETERS.

PRICE

No. 850.	Thermometers ; tin cases, 7 inches long, each 50 cts. ; 8 inches, 75 cts ; 10 inches, 1 00 ; 12 inches. \$1 25
851.	“ “ thick scale, for manufacturers or brewers, each 1 50, 1 75, 2 00
852.	“ “ Fahrenheit and Reaumur scales, each 1 25, 1 50, 1 75
853.	“ copper cases ; for baths, etc., each 1 25, 1 50, 1 75, 2 00
854.	“ “ ivory scale, each.....1 50
855.	“ morocco cases, for travelling 1 00, 1 25, 1 50, 2 00, 2 50
856.	“ in box wood, the tube sunk into the wood, 8 to 12 in. 50



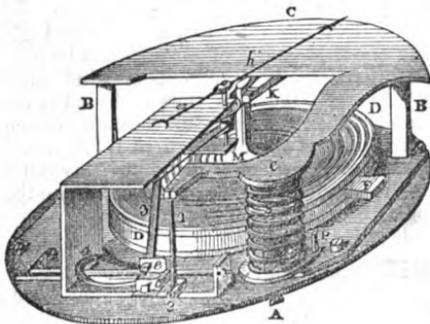
850	870	874	880	883
857.	Thermometers, box wood scale, very neat ; tube set in the wood, each 1 00 to 2 00			
858.	“ chemical ; boxwood scale, with hinge, allowing the bulb to be immersed in acids, etc., graduated from 300 to 700 degrees, each.....2 00 to 3 00			
859.	“ enclosed in glass tube, for liquids, each.....75, 1 25			
860.	“ self-registering, wood scale for cold.....75			

PRICE

No. 861.	Thermometers, self-registering, porcelain scale, for cold.....	\$1 00
862.	“ “ “ box wood scale, “ each.....	1 50 to 1 75
863.	“ “ “ box wood scale, for heat.....	2 00 to 2 50
<p>These self-registering thermometers register of themselves the greatest heat or cold in a day, night, month, or year.</p>		
864.	Thermometers, in leather cases, a superior article, 8 inches, long ivory scale, graduated with Fahrenheit, Reaumur, and Centigrade scales, each.....	4 25
865.	Thermometer, in leather case, Fahrenheit and Reaumur scales....	3 00
866.	“ “ “ 4 inch, 4 scales, 2 on each side.	3 50
867.	“ “ carved oak frames, 12 to 24 inches long; a handsome article, with large, distinct figures, and large column of mercury, well adapted for halls, piazzas, and public buildings each	3 50 to 10 00
868.	Thermometers, rosewood cases, glass fronts, each.....	2 00 to 3 00
869.	“ mahogany case, glass front, each.....	2 00 to 3 00
870.	“ Berlin iron stands, a great variety of patterns each	1 50 to 8 00
871.	“ ivory scales, 6 inches long, on round walnut base, with glass shades; a neat and good article, each.....	2 00 to 2 50
872.	Thermometers, spirit, for low temperatures, each.....	1 00 to 3 00
873.	“ with Reaumur and Centigrade scales, each.....	1 50
874.	Differential Thermometer.....	1 75
875.	Mason's hygrometer, for showing the humidity of the atmosphere: it consists of two thermometers placed side by side, the bulb of one being kept constantly wet by water from the glass fountain between the thermometers. The only reliable hygrometer, and very easily managed; with directions and tables.....	3 00
876.	Saussure's Hair Hygrometer.....	6 00
877.	Weather House Hygrometer; a neat cottage with two doors. In fine weather, the figure of a woman appears at one door; on the approach of damp weather, the woman retires, and a man appears at the other door.....	1 50

BAROMETERS.

878.	Pediment Barometer, with vernier, thermometer on face.....	9 00
879.	“ “ with rack vernier, thermometer on face, face enclosed.....	10 00
880.	Pediment Barometer, with rack vernier, thermometer in front, face enclosed.....	13 00
881.	Pediment Barometer, with rack vernier, graduations on ivory, thermometer in front, face enclosed.....	15 00



885

882.	Pediment Barometer, with rack vernier, thermometer on face; with double readings, so that the height of column can be ascertained with the greatest accuracy.....	20 00
883.	Wheel Barometer, circular dial plate, in mahogany or rosewood frame, each	12 00 to 30 00
884.	Bourdon's Metallic Barometer, without mercury, each	18 00 to 30 00
885.	Aneroid Barometer.....	15 00
886.	“ “ with thermometer attached..	18 00

887. Aneroid Barometers, larger sizes, each.....22 00 to 30 00
The Aneroid Barometer is a simple, beautiful, and accurate indicator of atmo-

spheric changes, constructed on an entirely novel principle. The word "*Aneroid*" is derived from the Greek, *alpha, neros, eidos*, signifying a *form without fluid*.

The Aneroid Barometer is quite as accurate as the Mercurial Barometer, much more portable, and can be transported safely with reasonable care, thus adapting itself to the need of the scientific traveller. It will also prove invaluable for nautical purposes, its action not being affected by the motion of a vessel. The ornamental appearance it presents renders it highly suitable for the hall, library, or parlour.

The action of the Aneroid depends on the effect produced by the pressure of the atmosphere on a circular metallic chamber exhausted of air and hermetically sealed: thus the chamber is a substitute for the Toricellian tube, and the vacuum for the column of mercury.

The usual size is four inches and three-quarters in diameter across the face, and one inch and three-quarters in thickness. The pressure of the atmosphere is indicated by a steel hand pointing to a scale, which is graduated to correspond with the usual barometer. There is also a brass index-hand, attached to the glass covering the barometer, by which to register the changes.

Its internal construction will be understood by reference to the engraving, which represents it when the face is removed, but with the hand still attached.

For a full description of the Aneroid Barometer, with tables for measuring heights, etc., compiled from the best authorities, see *Hand-book of Barometers*, last page of this catalogue. Each purchaser of a Barometer is entitled to a copy of the *Hand-book gratis*.

- No. 888. The Agriculturist's Barometer. This Barometer—for which letters-patent have recently been issued—has the advantage of a cut-off, by which, with perfect safety, the tube can be filled and locked, simply by inclining the instrument, and thus the barometer may be readily carried or forwarded by express with very little risk of damage. The engraving represents the tube and cut-off. Printed directions accompany each Barometer. In handsome metallic case.....\$12 00
Glass cylinder, with brass mountings..... 30 00



888

RAIN GAUGES.

890. Rain Gauge, with graduated float, japanned..... 5 00
891. Rain Gauge, with graduated float, copper..... 8 00
892. Rain Gauge, japanned..... 2 50
893. Rain Gauge, japanned; same as No. 892, with brass rim, to preserve the area of the funnel..... 3 00

These register to the twentieth of an inch, and are the most convenient for families.

These consist of a funnel to collect the rain, and a graduated glass tube, or measure, by which the one-thousandth of an inch can be noted.

The funnel is placed (in a situation free from currents of wind) on the top of a bottle, and secured from being blown off: the rain thus collected is measured by pouring it into the graduated tube. The tube when full contains one-tenth of an inch in depth of the funnel; the divisions between the figures 1, 2, 3, &c. are equal to one-hundredth of an inch in depth, and the small divisions between the figures, if divided into five, are one five-hundredths, or into tenths are one-thousandth of an inch in depth of the funnel.

HYDROMETERS, &c.

900. Glass Hydrometers, for Liquor..... 50
901. " " for Syrup..... 50
902. " " for Alkali..... 50
903. " " for Acid..... 50
904. " " for Acid, with Thermometer attached..... 2 00
905. " " for Concentrated Acids..... 50

PLATINA POINTS FOR LIGHTNING-RODS. 51

	PRICE
No. 906. Glass Hydrometers, for Salt.....	50
907. " " for Oil.....	50
908. " " for Beer.....	50
909. " " Traller & Richter scales, each.....	\$1 00 and 1 50
910. " " Twaddles, for Dyers and Calico Printers, Nos. 1, 2, 3, 4, each.....	1 00
911. Tall Glass Jar, with foot and lip, for Hydrometers.....	63
912. Salometer, for Sea Steamers.....	1 50
913. Urinometers, for Physicians, in paper boxes, each.....	50
914. " " in morocco cases, each.....	1 00 and 1 25
915. " " in morocco case, with graduated glass measure.....	1 75
916. " " in morocco case, with graduated glass measure and Thermometer.....	3 50

SPECIFIC GRAVITY BOTTLES.

920. Glass Specific Gravity Bottle; holding 1000 grains of distilled water, U.S. standard, in tin case, with counterpoise weight.....	1 50
921. Glass Specific Gravity Bottle; holding 1000 grains, same as No. 920, but with ground stopper.....	3 00

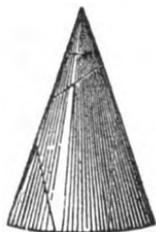
PLATINA POINTS FOR LIGHTNING-RODS, OF PURE PLATINA.

925. Platina points for lightning-rods—the price varying according to the quantity of platina with which the points are tipped, each.....	1 00, 1 25, 1 50, 2 00, 3 00, 4 00
926. Glass Insulators, for lightning-rods, per dozen.....	37
927. Iron Staples, for " " " " " ".....	37

The points are made of a tapering copper body, about 6 inches long, well gilt with pure gold, to prevent the action of the weather, and tipped with solid platina: they have been in use for over twenty-five years, and have given general satisfaction.

It is all-important that the connection of the point with the ground should be perfect. The iron used in the lightning-rod may be half-inch or five-eighth inch diameter, for the upper part of the rod; but it is recommended that the lower part, from about two feet above the ground, should be somewhat stouter. The several lengths of which it is composed should be welded together, if possible, so as to make a continuous rod: where this cannot be done, it is recommended to have them screwed together. The old plan of connection with links is objectionable, as the links become rusty and thus prevent actual contact. The upper end of the rod should extend at least five or six feet above the roof or stack of chimneys to which it is attached: *the lower end should extend into the ground five or six feet below the surface, that it may be always in damp earth, and should be led off in a direction from the building, and, if possible, should be conducted to a well or water.*

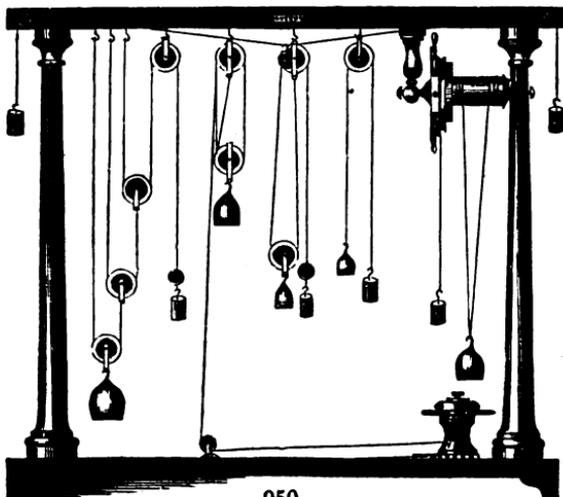
It is entirely a matter of conjecture as to what distance around will be protected by a lightning-rod, and the safest plan, therefore, is to attach a rod to every exposed part of a large house or barn.



946

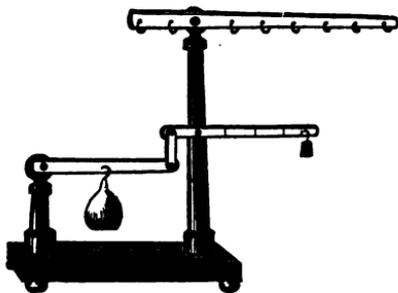
	PRICE
No. 942. Dissected Cube, in paper box.....	50
943. " " wooden box.....	75
944. Numeral Frame, 144 balls.....	75
945. " " 100 balls.....	63
946. Dissected Cone, with pins, showing the Circle, Ellipse, Parabolic and Hyperbolic Sections.....	1 50
947. Dissected Models of Arches or Bridges, illustrating the principle of the Arch.....	1 50
948. Mathematical Paradox, or Curious Block, which fits exactly, and passes through a square, a circle, and a triangle.....	75
949. Dove-tailed puzzle.....	25

MECHANICS' MOTIONS, etc.



950

950. Mechanical Powers, with four sets of Brass Pulleys, Counterpoises, Brass and Japanned Weights, Wheel and Axle on frame and capstan.



951



952



953



954

951. Simple and Compound Levers of Brass, with Weights.
 952. Inclined Plane, with Carriage and Weight.

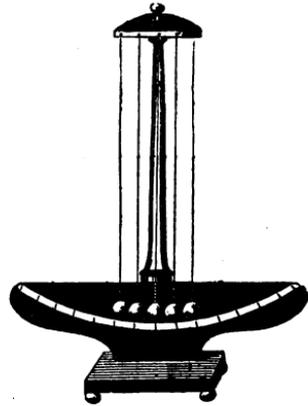
- No. 953. Wedge in two parts.
 954. Screw, in frame.

The above series form a full set of Mechanical Powers, the whole mounted on mahogany stands.....\$30 00

955. A set of Mechanical Powers, consisting of the four most important systems of Pulleys, two straight and one bent Lever, Wheel and Axle, Inclined Plane, Wedge and Screw..... 16 00

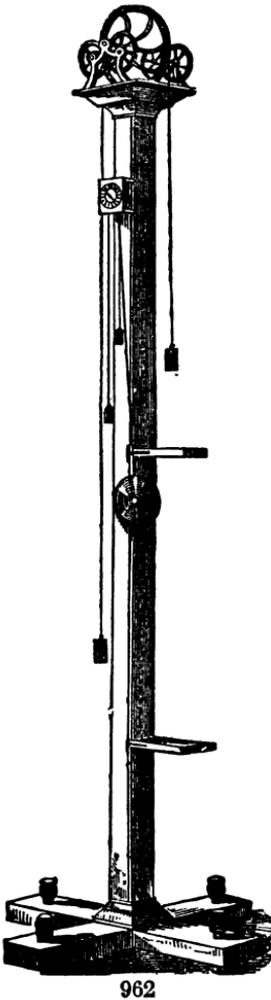


956



957

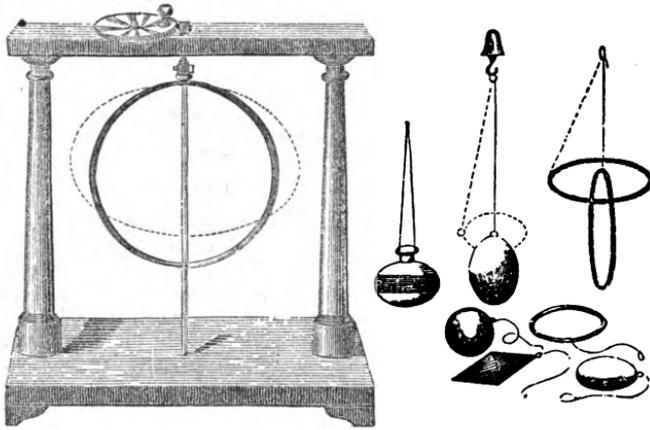
956. Inertia Apparatus. Place a card and ball upon the pillar, draw back the spring, and release it from the hook, so that it may strike the edge of the card. The velocity with which the card is projected prevents any motion being communicated to the ball, and it is left on the pillar..... 1 50
957. Collision Balls, consisting of five ivory balls suspended from a frame with graduated arc..... 7 00
958. Same as 957, but the balls of box wood..... 3 50
959. Set of 8 Illustrations for Centre of Gravity, viz.: 3 Blocks of various figures, with centres of gravity and suspension; two Balls, on rod, with centre of gravity; Leaning Tower of Pisa, with two centres of gravity; Loaded Wheel, on stand, with centre of gravity and magnitude; Mechanical Paradox—a double cone *appears to run up hill*; Horseman, balanced on *two points*. This set also includes a Brass Plumb, Cord, and Handle, for supporting the various articles on centre of gravity..... 7 00



	PRICE
960. Mechanical Paradox—a double cone, which appears to roll up hill.....	75
961. Philosophical Waltzers: one or two beautiful little images are attached to a Glass Lens, which, when placed upon a clean wet plate, and the plate inclined, produce a rotary, progressive motion, illustrating centre of gravity.....	50 and 1 00
962. Atwood's Machine, graduated mahogany Pillar, eight feet, and basement with levelling screws, pendulum, weights, and sliding platforms—illustrating laws of falling bodies.....	20 00
963. A pair of Brass Plates, with handles, for cohesion, per pair.....	2 00 to 4 00
964. A pair of Glass Plates, as last.....	1 00
965. A pair of pure Lead Hemispheres, with handles, per pair.....	1 00 to 1 50
966. Capillary Attraction Tubes, set of six...	75
967. Capillary Attraction Tubes, set of six, on mahogany base.....	1 00
968. Capillary Attraction Tubes, set of six, with Stand and Water Pan.....	1 50
969. Capillary Attraction Plates, for showing the parabolic curve, 75; with pan...	1 00
970. Glass Plate, with hook and cord, for liquid cohesion.....	1 00

Centrifugal Forces, etc.

No. 971. Apparatus for Central and Centrifugal Forces, with eight Illustrations—Sphere, Oblate Spheroid, Prolate Spheroid, Double Cone, Ring, Band, Chain, and Glass with coloured fluid; exhibits, in a beautiful manner, the cause of the planets revolving on their shortest diameter; the cause of their being flattened at the poles; the peculiar effect of rapid rotation upon the loose parts of a body; and a variety of other pleasing effects.... \$7 00



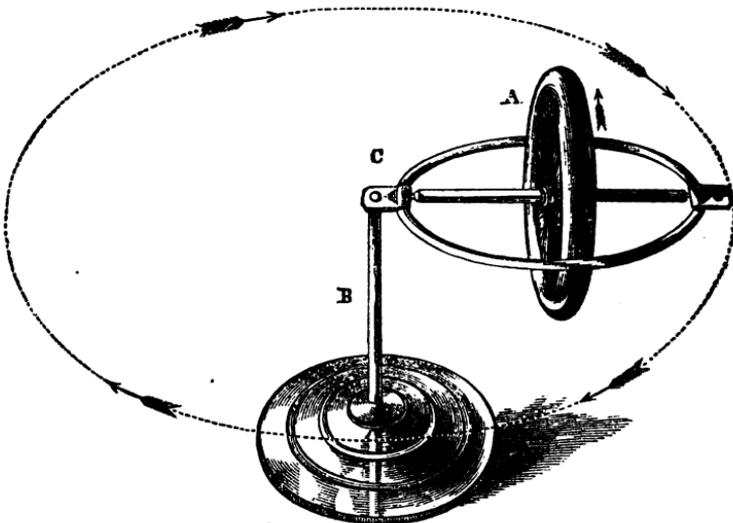
971

No. 972. A Prismatic Cylinder, for the recomposition of white light, to attach to the above.....

PRICE

1 00

GYROSCOPES.



The Gyroscope, or Mechanical Paradox, is simple in construction, and is one of the most beautiful philosophical experiments in the whole range of the natural sciences, illustrating numerous interesting movements of centrifugal force. A wheel, A, is fixed on an axis sustained in a ring of about four inches in diameter; in a line with the axis is a cap, C, to rest on an upright point, B. Wind a cord around the axis, and, by suddenly drawing it off, very rapid motion is given to the wheel A; set the cap C on the point B, and the instrument will sustain itself and revolve around the centre. It may be placed horizontally or at any angle: the motion is the same: if the wheel A revolves in the direction of its arrow, the whole machine will revolve in the direction of the arrows on the outer circle; suspended by a string at C, the motion will be the same as when supported on the point.

No. 973. Gyroscope, all brass, with 6 inch wheel, lever and weight attachment.	\$10 00
974. Gyroscope, all brass, with 4 inch wheel, lever and weight attachment, and three concentric rings.....	10 00
975. Gyroscope, all brass, with 4 inch wheel, with lever and balance weight.....	4 00
976. Gyroscope, brass, lead rim to wheel, 4 inch wheel.....	1 50
977. Gyroscope, all brass, small size, 4 inch wheel.....	1 25

NOTE.—Nos. 973, 974, and 975, with lever attachment, will remain stationary when perfectly balanced, but if overbalanced will revolve in one direction, if underbalanced will revolve in the opposite direction.

Hydrostatics and Hydraulics.



980



987

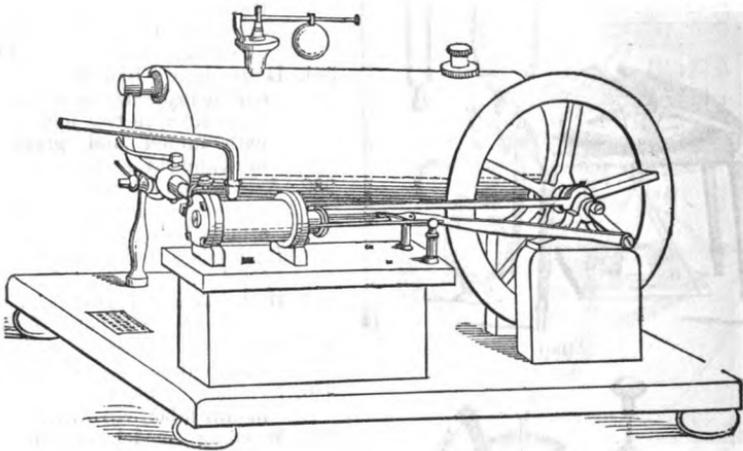
980. Hydrostatic Bellows and Paradox combined, of mahogany, with vessels, tubes, and scale, illustrating that pressure is according to height, not quantity.....	\$10 00
981. Hydrostatic Bellows, of mahogany, six feet of brass tube, in two joints, with funnel and glass tube, and three way cocks.	10 00
982. Archimedian Screw Pump, working model, with pan attached, neatly made....	5 00
983. Bent Glass Tube for fluid level.....	75
984. Hydrostatic Figure, or Bottle Imp, with bottle.	50 and 75
985. Syphons, glass, with mouth tube.....	50 to 75
986. Syphons, brass, with mouth tube.....	1 50
987. Working model of the Forcing Pump, illustrating also the fire-engine, and of the lifting or Household Pump, with glass barrel and lever handle; on one stand, with water jars.	13 00
988. Models of Water-Wheels, overshot, undershot, and breast.....	6 00
989. Hiero's Fountain.....	6 00
990. Apparatus for Spouting Fluids.....	5 00
991. Cylindrical Glass Jar, with Ball, Plate, and Hook; illustrating upward and downward pressure of fluids.....	2 50

	PRICE
No. 992. Glass Globe and Stop Cock, for weighing Air or Gas.....	\$2 00
993. Nicholson's Portable Balance for Specific Gravity, each.....	4 00 to 6 00
994. Equilibrium Tubes, six forms, mahogany base.....	2 50
995. Equilibrium Tubes, six forms, brass capped, mahogany base.....	4 00
996. Glass Model of Centrifugal Pump....	6 00
997. Tantalus's Cup, illustrates intermitting springs.....	1 50
998. Glass Model of Diving Bell, with lead ring.....	1 50
999. Glass Model of Diving Bell, with cap and tube.....	3 50



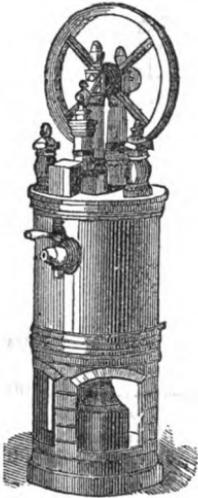
994

Steam.

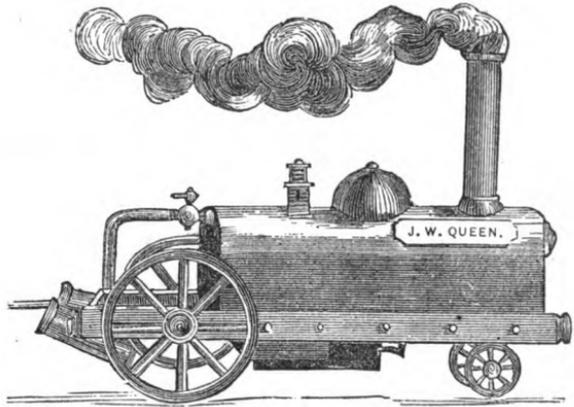


1000

- | | |
|--|-------|
| 1000. Operating Model of High-Pressure Steam Engine; double-acting cylinder; sliding valve; copper boiler, with Spirit Lamp; the engine beautifully finished, of brass, on a wood stand..... | 30 00 |
| 1001. Operating Model of a Locomotive, all of brass, with Spirit Lamp; runs in a circle of five feet diameter..... | 35 00 |
| 1002. Sectional Model of a Low-Pressure Steam Engine, made of pasteboard and wood. By means of a crank at the rear, every part is put in motion, the piston, valves, beam, wheel, and eccentric; it is about 11 inches square, and affords the best explanation for schools, and is very beautifully made..... | 8 00 |
| 1003. Wollaston's Illustration of Low-Pressure Steam Engine; copper Globe boiler, brass cylinder, piston and rod, handle and safety valve..... | 3 00 |
| 1004. Wollaston's Illustration made of glass..... | 1 50 |
| 1005. Revolving Steam Jet of brass, illustrating Hiero's Steam Engine..... | 1 75 |



1006



1001

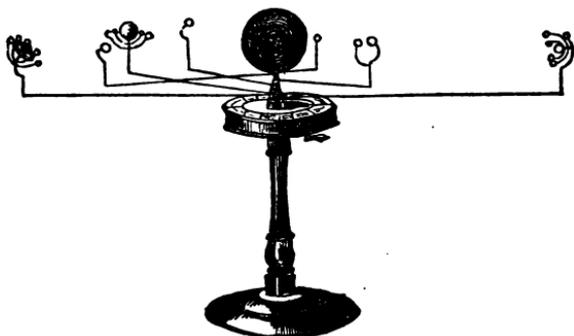
PRICE

No. 1006. Operating Model of High-Pressure Steam Engine, oscillating cylinder, with Spirit Lamp.....	\$8 25
1007. Candle Bombs: when placed in the wick of a lighted candle, they explode with a report like a pistol; per doz.....	25
1008. Glass Eolipile, for vaporizing Ether and inflaming the Jet; a pleasing illustration of the force of vapour.....	25
1009. Sectional Model of a Locomotive, made same as 1002.....	10 00
1010. Sectional Model of Marine Engine for Steam-Boat, made same as 1002.....	8 00

Heat.

No. 1020. Pyrometer, with Spirit Lamp, for showing the expansion of metals by heat, each.....	3 00 and 4 00
1021. Compound Bar of Brass, Iron, and Zinc, for showing the unequal expansion of metals by the same heat.....	75
1022. Brass Ball and Gauge Ring, for showing the expansion of metals in all directions, with Spirit Lamp.....	2 75
1023. Conductometer, with 6 different metals.....	2 00
1024. Improved Conductometer, on stand, with Spirit Lamp, for showing the capacity of different materials to transmit heat; consists of six metals, each to have wax or phosphorus on its extremity....	3 00
1025. Wollaston's Cryopherus, for freezing water.....	1 50
1026. Pulse Glasses, the liquid in which appears to boil by the heat of the hand.....	50
1027. A pair of Plinished Reflectors, 13 inches diameter, in cases which serve for stands, Iron Ball and Stand.....	6 00
1028. Fire Syringe, 7 inch cylinder, with box of tinder.....	1 50
1029. Fire Syringes, larger sizes, each.....	2 00 to 2 50
1030. Cubes for radiation of heat, 6 inches square, the sides of different colours, to be filled with hot water, each.....	1 50
1031. Differential Thermometer.....	1 75

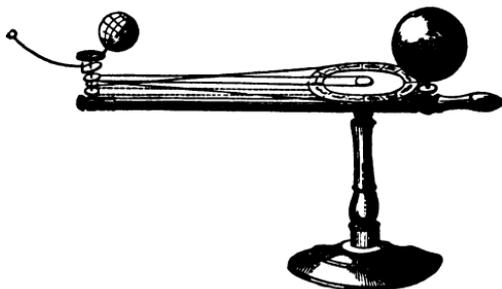
Astronomy and Globes.



1040

No. 1040. School Orrery. The seven planets are made to revolve around the sun by a crank and gearing..... \$10 00

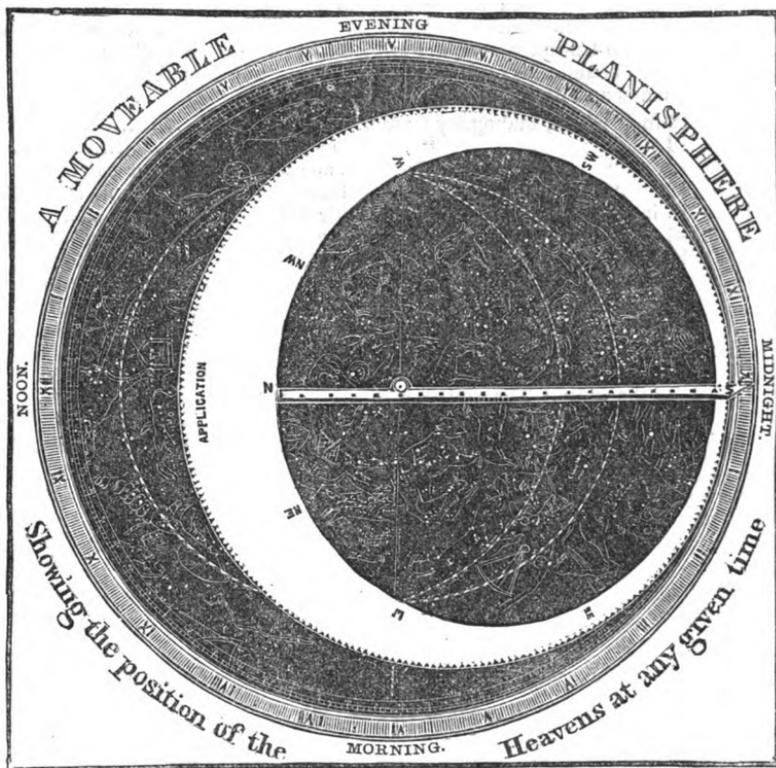
1041. Orrery on Brass stand, with eight planets and motion given to moon around the earth; a beautifully finished and highly ornamental piece of apparatus..... 13 00



1042

1042. Tellurian or Season machine, showing all the phenomena of the seasons; the causes of eclipses, &c. &c. are easily illustrated..... 6 00

1043. Moveable Planisphere, consisting of a map of the heavens projected on the plane of the equator, showing the position of the heavens at any given time throughout the year, with the constellations and the principal fixed stars then visible. The sun's place among the stars is marked on the ecliptic for every day and month of the year. The moon's position may also be found. By bringing any given star to the eastern or western point of the horizon, the position of its rising and setting may be observed, while the index will indicate the time of this phenomena with an accuracy quite sufficient for general observations. It furnishes a cheap, portable, and sufficiently accurate substitute for a celestial globe or a series of charts. It occupies a space of 16 inches square. Attached to it is a description of the principal constellations and fixed stars composing them. The com-



1043

PRICE

mitted on Science and the Arts of the Franklin Institute of Pennsylvania unhesitatingly recommend this map to public patronage. Plain \$2 00, coloured..... \$ 2 50



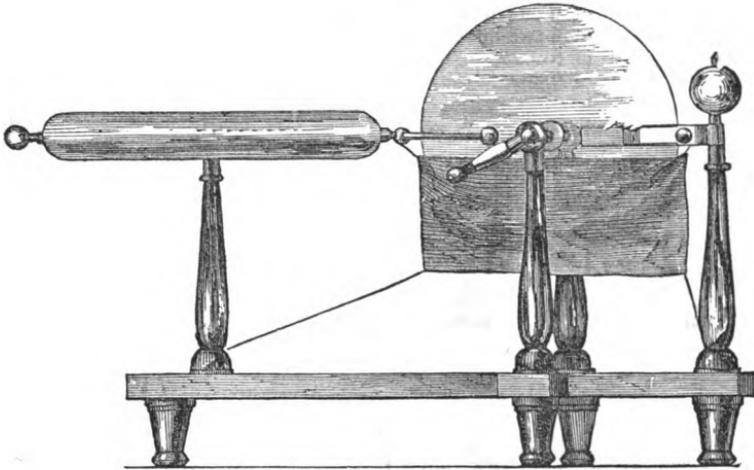
1052

- | | | | |
|-------|--------|---|-------|
| 1047. | 6 inch | Globe, bronze frame, per pair..... | 9 00 |
| 1048. | 6 | “ “ “ “ Terrestrial..... | 4 50 |
| 1049. | 7 inch | Globe, on semi-frame..... | 2 75 |
| 1050. | 10 | “ mahogany frame, per pair..... | 22 00 |
| 1051. | 10 | “ “ “ “ Terrestrial..... | 11 00 |
| 1052. | 10 | “ bronze frame, in plain cases, per pair..... | 24 00 |
| 1053. | 10 | “ “ “ “ Terrestrial..... | 12 00 |

No. 1044. Joslin's Solar-Telluric Globe a new apparatus, combining both the Geography of the Earth and its diurnal and annual motions, showing the cause of the seasons, of the change in length of days and nights, and other interesting phenomena; with descriptive manual..... 7 00

1045. 3 inch Globe, revolving on axis in a box..... 60

1046. 5 inch Globe, do..... 1 00



1104

PRICE

- No. 1104. Plate Electrical Machine; 16 inch plate, with brass Prime Conductor and rubber.....\$20 00
 1105. Plate Electrical Machine; 20 inch plate..... 25 00
 1106. " " 24 " 50 00
 1107. " " 30 " 85 00
 1108. " " 36 "125 00

1109. Leyden Jars, pint, \$1 00; quart, \$1 25; two quart, \$1 75; four quart..... 2 00

1110. Atmospheric Leyden Jar, with crooked stem and ball for suspension, and movable ring with points, quart..... 2 00

1111. Improved Set of Leyden Jars; a two-quart jar fitted as an electrometer jar; a plate which screws upon the stem in place of the ball supports a on e-quart jar, with atmospheric ring..... 4 50

1112. Lightning Jars, showing the zigzag lines of the current, each..... 1 25, 1 50, 2 00

1113. Diamond or Luminous Jars, perforated spots, each..... 1 00, 2 00, 3 00, 4 00



1109



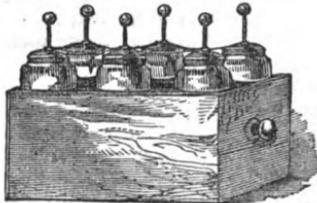
1110



1114



1115



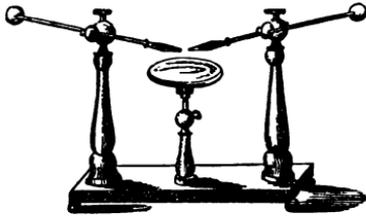
1117



1125

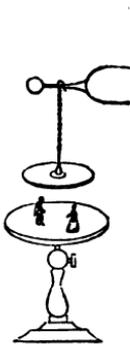
1114. Jars with movable coatings, to explain the Leyden Jar, ea. 2 50 to 3 50
 1115. Electrometer Jars, one and two quarts, each..... 1 50 to 2 50
 1116. Battery of 4 one-quart jars, neatly cased..... 6 00
 1117. " of 6 " " " 8 00

No. 1118.	Battery of 9 one-quart jars, neatly cased.....	\$15 00
1119.	“ of 4 two-quart jars, “	10 00
1120	“ of 6 “ “	14 00
1121	“ of 9 “ “	20 00

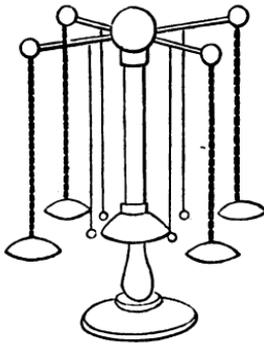


1127

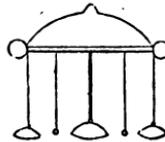
1122.	Battery of 4 four-quart jars, neatly cased.....	12 00
1123.	Battery of 6 four-quart jars, neatly cased.....	18 00
1124.	Battery of 9 four-quart jars, neatly cased.....	25 00
1125.	Jointed Dischargers, with glass handle, each... 3 00 to 4 50	
1126.	Plain Dischargers, with glass handle, each.....	1 50 to 2 00
1127.	Universal Discharger, with adjusting table and press...	6 00



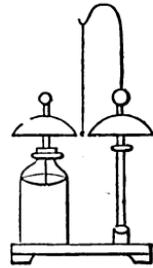
1129



1143



1144

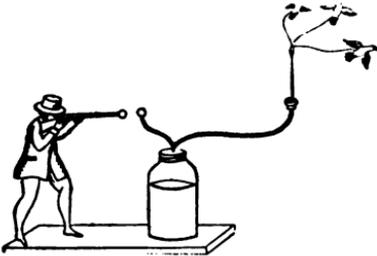


1146

1128.	Metallic Plates for dancing images, to suspend from Conductor...	75
1129.	“ “ for dancing images, on adjusting stand.....	1 50
1130.	“ “ “ on insulated stand.....	6 00
1131.	Pith Images for the dancing plates, per pair.....	50
1132.	“ Balls “ “ per dozen.....	12
1133.	“ Birds “ “ per dozen.....	75
1134.	Bennet's Gold Leaf Electroscope.....	2 50
1135.	“ “ “ with Condenser.....	6 00
1136.	Coulomb's Tortion Electrometer, each.....	10 00 to 15 00
1137.	Quadrant Electrometer, box wood scale.....	1 50
1138.	“ “ ivory scale.....	2 50
1139.	Lane's Discharging Electrometer.....	2 50
1140.	Pith Ball Electrometer, each.....	50 cts. and 75
1141.	Cuthbertson's Balance, Electrometer, by which the force of the shock or charge is weighed.....	6 00
1142.	Saussure's Electroscope.....	2 00
1143.	Chime of 5 Bells, on insulated stand, each.....	6 00 and 8 00
1144.	“ of 3 “ to suspend from the Conductor, each..	2 25 and 3 00
1145.	“ of 2 “ to suspend from the Conductor.....	1 25
1146.	“ of 2 “ one of them being connected with the interior of a Leyden Jar.....	4 00
1148.	Aurora Tube, 3 feet long, with stop-cock, &c. complete, for showing electrical light in rarefied air; also answers for Guinea and Feather tube in Pneumatics, each.....	4 00, 6 00, 8 00
1149.	Luminous Flask, with brass cap and point.....	1 50
1150.	Spiral or Diamond Tubes, each.....	2 00 to 4 00

PRICE

- No. 1151. Insulated Stools, each.....\$3 50 to 6 00
 1152. Electrical Fliers or Whirl, with Rod, each..... 50 and 75
 1153. Set of 3 Fliers on Trident, each..... 2 00



1154

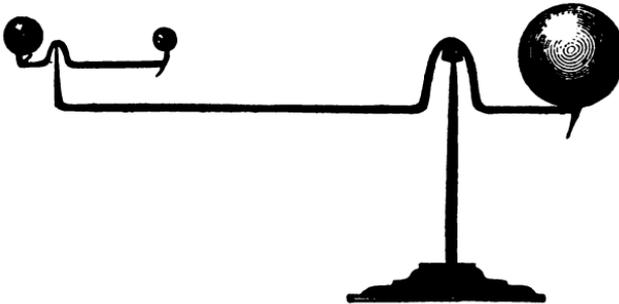


1155

1154. Electrical Sportsman and Birds..... \$5 00
 1155. " to be used with Electrometer Jar, No. 1115. 1 00
 1156. Electrical Fox-Chase..... 3 00
 1157. " see-saw with figures..... 3 00
 1158. " swing, each..... 2 00 and 2 50
 1159. " bucket..... 75
 1160. " Cannon, brass, on brass wheels..... 4 50



1160. Electrical pistol, tin, each..... 2 50
 1161. Electrical pistol, brass..... 50, 75, 1 00
 1162. " spider..... 38
 1164. " powder bomb, illustrates the effect of passing the current through water, each..... 1 00 and 1 25

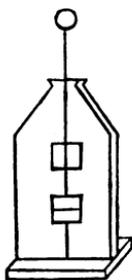


1165

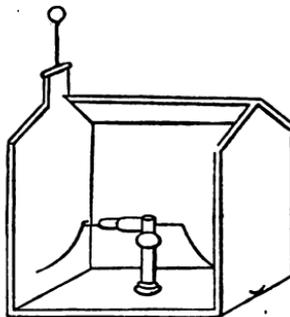
1165. Electrical Orrery, representing the motion of the Sun, Earth, and Moon, each..... 2 00 to 3 50
 1166. Electrophorus, each..... 3 00 to 6 00
 1167. Tissue Figure, or Image, an illustration of the effect of Balls and Points on electrical clouds, each..... 75 cts. and 1 00
 1168. Head of Hair..... 1 00
 1169. Magic Picture; figures of a vase, bottle, &c., arranged upon glass plates with pieces of tin foil, which are rendered luminous by passing the electrical spark through them; each plate..... 75
 1170. Mahogany Model of the gable-end of a house, for illustrating the effects of broken and perfect conductors..... 1 50
 1171. Mahogany Model of a Thunder House, hinged, to be blown down by a Gas Pistol within; also illustrating the preceding..... 5 00
 1172. Mahogany Model of a Obelisk, which is thrown down by the simple discharge of a highly-charged jar..... 3 00
 1173. Jspanned Tin Fire or Lightning House. This is a house of tin,



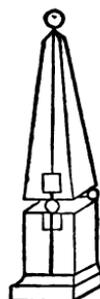
1168



1170



1171



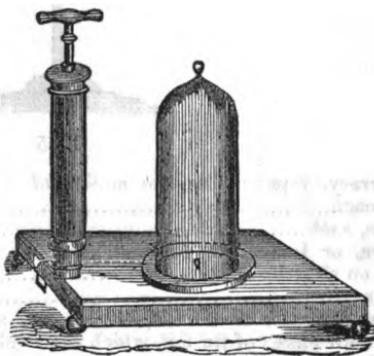
1172

- with a ball of cotton in it, which is set on fire by an electric spark—illustrating lightning..... \$4 00
- No. 1174. Brass Ball on Stand, for igniting cotton and rosin..... 1 00
1175. Apparatus for ignition of Phosphorus, each.....3 50 and 4 00
1176. Ether Cup, with handle..... 63
1177. Luminous Word, as Franklin, Fire, &c., each.....2 50 and 4 00
1178. Egg Stand—for passing a spark through eggs.....1 50
1179. Miser's Plate, in mahogany frame and handle, for giving shocks in an amusing manner, each.....1 50 and 2 50
1180. Rod of Sealing Wax, each.....1 00 and 1 50
1181. Best Amalgam, in Boxes..... 25
1182. Brass Balls on Stems, for Leyden Jars, each.....25 and 50
1183. Tin Foil, for coating jars, per square foot..... 10
1184. Brass Chain, per foot..... 4
1185. Hydrogen Gas Generators, for charging Cannons and Pistols; made of copper..... 2 50
1186. Sliding Directing Rod, three and four feet long, each.....2 00 and 3 00



1178

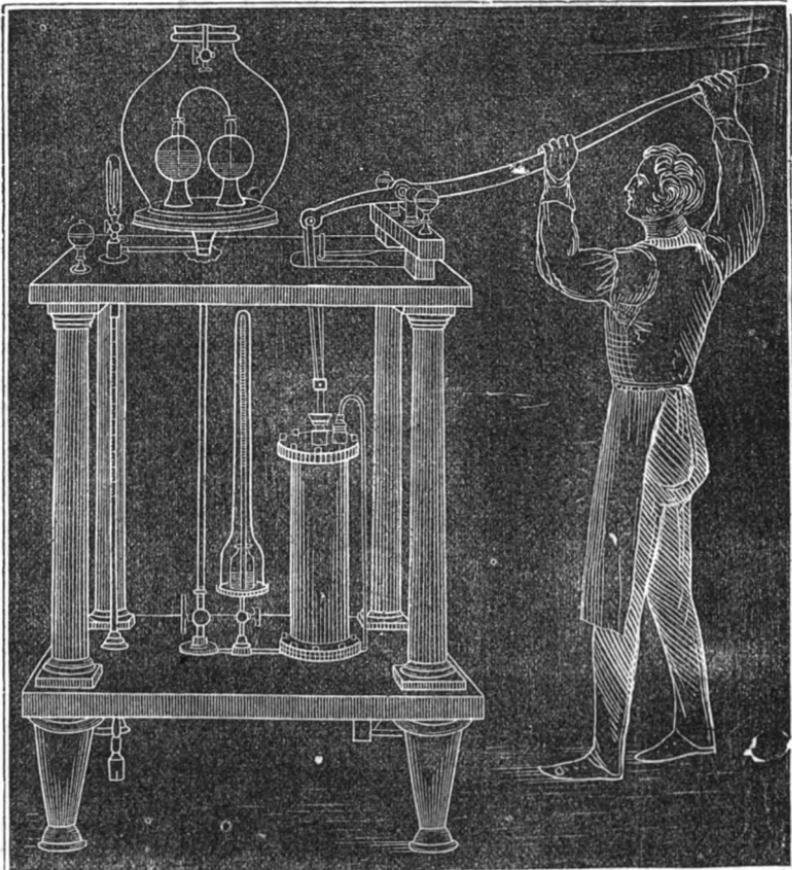
Pneumatics.

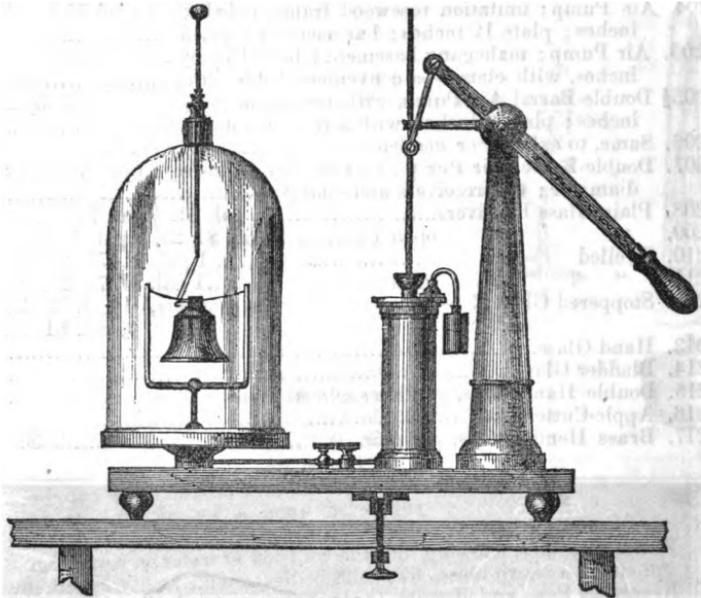


1200

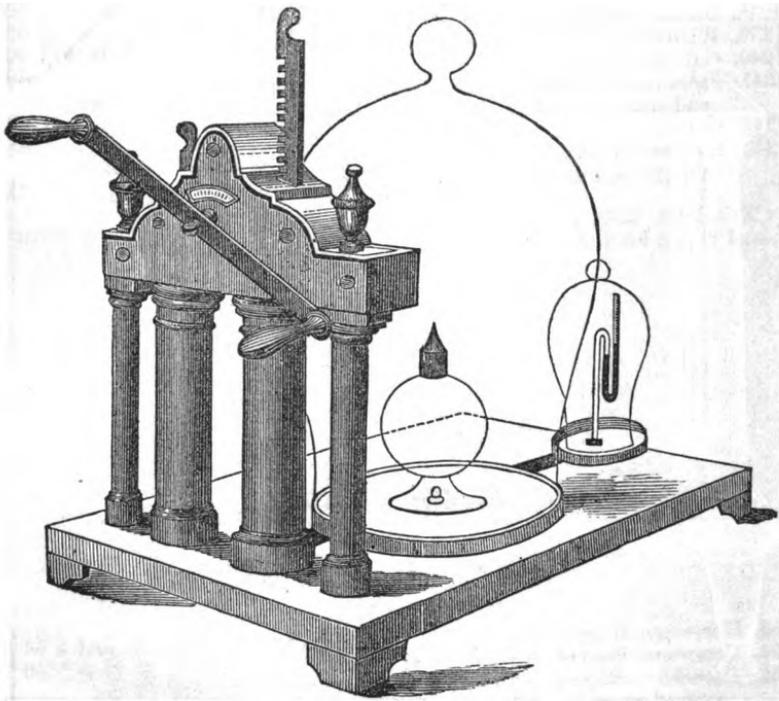
- No. 1200. Single Barrel Air Pump; plate 6 inches, with one receiver..... \$8 00
1201. Single Barrel Air Pump; plate 6½ inches, with one receiver..... 12 00
1202. Single Barrel Air Pump; plate 7¼ inches, with one receiver..... 15 00
1203. Single Barrel Air Pump; on iron stand, the barrel at an angle, for greater convenience; plate 7¼ inches, with one receiver.... 15 00

No. 1204.	Air Pump; imitation rosewood frame, polished; barrel 12 by 3½ inches; plate 12 inches; barometer, gauge, &c.....	\$85 00
1205.	Air Pump; mahogany basement; barrel 7½ by 2 inches; plate 8 inches, with clamp—a convenient Table Pump.....	25 00
1205½	Double-Barrel Air Pump, with mercurial gauge; barrels 9 by 2 inches; plate 9 inches, with 2 receivers and clamp.....	50 00
1206.	Same, to exhaust or condense.....	75 00
1207.	Double-Barrel Air Pump; barrels 7 by 1½ inches; plate 7 inches diameter; two receivers and clamp.....	35 00
1208.	Plain Glass Receivers.....1 gal. \$1, ½ gal. 75 cts., quart 50	
1209.	“ “ open top.....1 gal. \$1 25, ½ gal. 1 00, quart 62	
1210.	Swelled “1 gal. \$1 75, 2 gals. \$3 00	
1211.	“ “ open top.....1 gal. \$1 75, 2 gals. 3 00	
1212.	Stoppered Glass Receivers, (ground glass stoppers,) 1 gal. \$1 25, ½ gal. \$1 00, qt. 62	
1213.	Hand Glass.....	75
1214.	Bladder Glass.....	1 00
1215.	Double Hand Glass, or Philosophical Hand-Cuffs.....	3 50
1216.	Apple-Cutter.....	1 50
1217.	Brass Hemispheres, per pair.....	3 50 to 6 00





1205



1205 1/2



1218



1219

- No. 1218. Fountain in Vacuo, cock, jet, and stand.....\$4 00 to 5 00
 1219. Brass Plate with sliding rod, hook, and clamp: this is necessary in using the bell in vacuo....3 00 to 4 00
 1220. Bolt Head Experiment..... 1 25
 1221. Guinea and Feather Apparatus, each.....4 00 to 6 00
 1222. Bladder and Weight, each.....3 00 to 4 00
 1223. Bell in Vacuo, each.....2 50 to 4 00
 1224. Air Mills, each.....6 00
 1225. Mercury Cup, each..... 75 cts. to 1 00
 1226. Receiver for Mercury Cup, each...2 00 to 3 00
 1227. Block of Wood, weighted to sink in water, to show the air contained in the pores of the wood..... 25
 1228. Copper Vessel, for Condensed Fountain each \$8 00, 15 00, and 20 00
 1229. Condensing Syringe for " 2 50 to 5 00
 1230. Revolving Jet for " 1 50
 1231. Air-Gun Jet for " 1 00
 1232. Funnel and Ball for " 1 25
 1233. Bubble Tube..... 75
 1234. Pneumatic Paradox, of Glass. The ball placed upon one end (the cup) cannot be blown off, and on the other can be supported upon a jet of air. It is used with the mouth..... 38
 1235. Water Hammer, showing that the collision of water in a vacuum produces a sharp noise, like solid bodies, each.....62 cts. to 1 50
 1236. Revolving Fans and Handle, to show resistance of air..... 75
 1237. Palm Glass, the liquid in which appears to boil by the heat of the hand..... 50
 1238. Bursting Squares, per dozen..... 1 50
 1239. Wire Guard for Squares, each.....75 cts. to 1 00
 1240. Gallows Connector..... 1 50
 1241. Freezing Apparatus: Bell Glass, pan for acid, silvered water cup and stand, 6 inch, \$2 50, 7 inch, \$3 00, 8 inch..... 4 00
 1242. Gum elastic tubing, per foot..... 25
 1243. Lubricating oil; will not gum, is well calculated for philosophical apparatus, fine machinery, per bottle..... 25

☞ Nos. 1228, 1229, 1230, 1231, 1232, 1233, form a set, are complete in themselves, and do not need an Air Pump.

Magnetism and Galvanism.

- No. 1250. Horseshoe Magnets, each.....12, 18, 37, 50, 62 cts. and 1 00
 1251. Compound Horseshoe Magnets, each.....2 00 to 5 00
 1252. Horseshoe Magnet, with rolling wire armatures, to exhibit the mutual repulsion of two pieces of iron magnetized by induction each 1 00 to 2 00

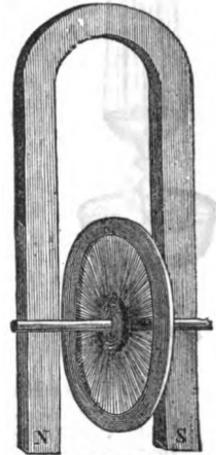
- No. 1253. Horseshoe Magnet, with armature, consisting of iron wire hermetically sealed in a glass tube; to prove that the inductive power of a magnet is not impeded by the interposition of an unmagnetizable body..... \$ 75
1254. U Magnet, with brass wheel armature. In this the attraction of gravity so nearly overcomes the magnetic attraction as to leave but little friction, so that the wheel may be made to revolve rapidly for a long time..... 2 00



1250



1251



1254

1255. Y Armature..... 50
1256. Star Plate..... 50
1257. Bar Magnets, small, each..... 37, 50, 62, and 75
1258. " large, 2 in a box, with armature, each..... 3 00 to 5 00
1259. Natural Loadstone specimen..... 25



1260



1261



1264

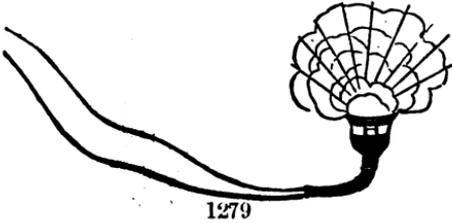


1266

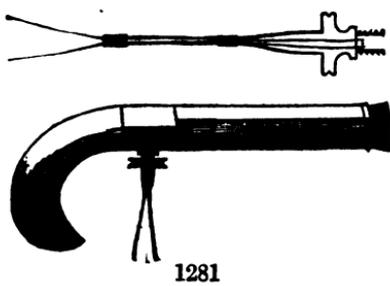
1260. Magnetic needle, on stand plain, for schools..... 1 00
1261. Magnetic Dipping Needle, each..... 1 00 and 1 50
1262. " " on universal joint, so as to exhibit the dip, as well as the north and south, each..... 4 00 to 6 00
1263. Astatic Needle, on stand..... 2 00
1264. Magnetic Toys, Fish, Swan, Steamboat, &c., in box with magnet, each..... 25 cts., 50, and 75
1265. Sulphate of Copper Battery, per cup..... 2 00, 5 00, and 7 00

PRICE

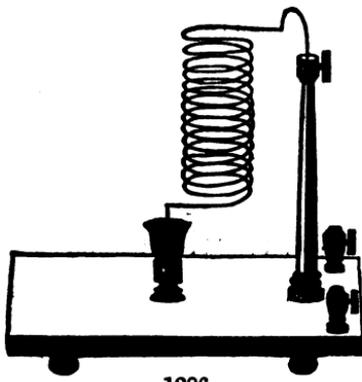
No. 1266.	Smee's Battery, per cup.....	2 00, 3 50, and 5 00
1267.	“ of 2 cups in a box, for Plating or Gilding, with printed instructions.....	4 00
1268.	Chester's Patent Battery of 5 cups.....	10 00
1269.	Groves' Battery, per cup.....	2 00
1270.	“ in sets of 4 in a box.....	8 00
1271.	“ “ 8 “	16 00
1272.	Zinc Cylinders, each.....	50 cts. to 1 00
1273.	Platina Slips, each.....	37 cts. to 1 00
1274.	Porous Cups, each.....	10 cts. to 25
1275.	Glass Cup, each.....	31 cts. to 50
1276.	Binding Screws, each.....	12 cts. to 25
1277.	Frog or Leech Battery. This consists of a strip of silver and a strip of zinc, so arranged as to act on the leg of a frog and producing motion, each.....	50 cts. to 75



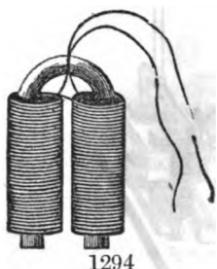
1278.	Powder Cup of Glass, for firing Powder.....	37
1279.	Powder Cup of Brass, for firing Powder.....	50
1280.	Powder cup of Brass, with long mahogany handle, so arranged that the wire may be replaced in a few minutes if burned off; packed in a box, with extra Platina wire and gun-cotton..	1 00



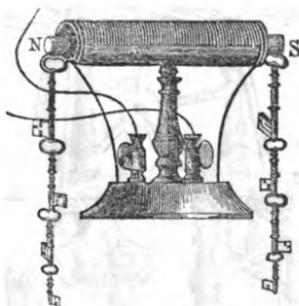
1281.	Voltaic Pistol, for exploding Gases.....	2 50
1282.	Brass Cannon, for “ “ ...	5 00
1283.	Cells for Decomposing Water—2 tubes, for collecting both hydrogen and oxygen.....	3 50
1284.	Galvanic Lamp—without the Battery.....	2 50
1285.	Attracting and Repelling Wires, to exhibit the attractions and repulsions of Electric currents.....	3 50



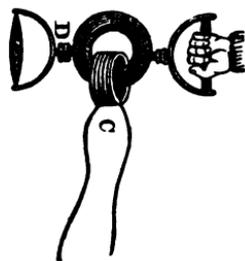
1286.	Contracting Helix.....	3 50
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1294



1295

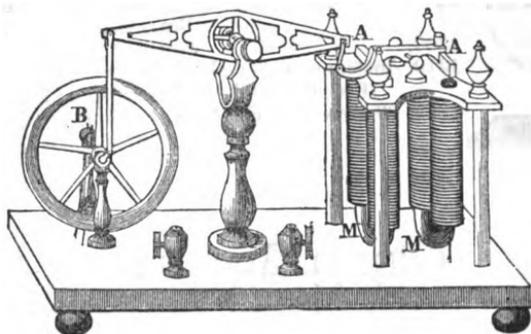


1298

PRICE

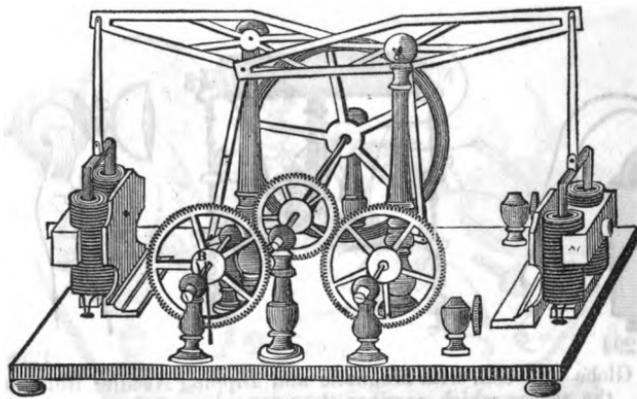
- No. 1296. Globe and coil, with Magnetic and Dipping Needle; illustrates the theory which ascribes the magnetism of the earth to the electrical currents circulating around it at right angles to its axis..... \$4 00
1297. Coil, with rods for suspension, each.....2 00 to 3 00
1298. Heliacle Ring and Semicircles; two iron semicircles, made magnetic by the ring around them, are able to sustain a weight of 50 pounds or more., each..... 2 50 to 4 00

Galvanic and Electro-Magnetic Engines, or Machines.



1299

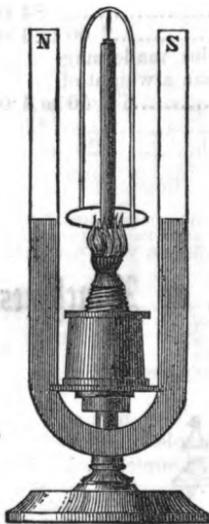
1299. Reciprocating Armature Engine: a very pleasing illustration of motion by magnetism: it does not require a very strong Battery. 10 00
1300. Double Beam Axial Engine..... 15 00
1301. Revolving Armature Engine: this, though not so interesting as the preceding, is a rather different mode of applying the power, and can be easily adjusted..... 6 00
1302. Revolving Bell Engine: this is yet another mode of obtaining motion, and gives more continuous power..... 10 00
1303. Barlow's Spur Wheel, each..... 5 00 to 8 00



1300

PRICE

- 1304. Apparatus for showing the suspension of an iron bar by repulsion; explains the principle of the Axial Engine..... \$4 00
- 1305. Electro-Magnetic Locomotive and Car, with railroad. The Battery is connected to the rails, and not carried in the car..... 35 00
- 1306. Revolving Coil..... 6 00
- 1307. Revolving Electro Magnet..... 5 00

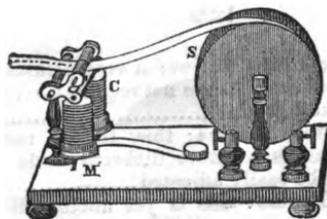


1311

Thermo-Electricity.

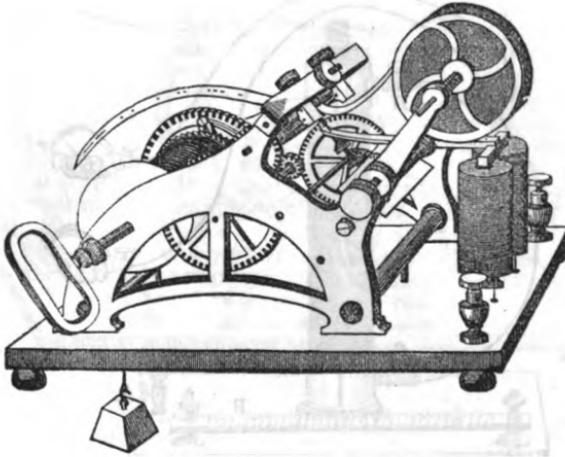
- 1308. Thermo-Electric Pair, German Silver and Brass..... 25
- 1309. " " Series of 10..... 2 00
- 1310. Instrument for showing the production of Heat and Cold by Magnetism..... 4 00
- 1311. Thermo-Electric Arch rotating between the Poles of a U Magnet—with Spirit Lamp..... 4 00

Telegraph Apparatus.



1312

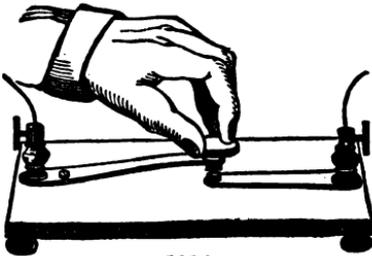
- 1312. Telegraph Working Model, for schools or families.... 5 00, 6 00, 10 00



1313

PRICE

- No. 1313. Telegraph Working Model, with clockwork, and of sufficient size to be of some use.....\$20 00
1314. Signal Key, each..... 1 25 and 2 50



1314

. These models of Telegraphs require the Telegraph Model, the Key, copper wire, and a Battery, to make them complete. Thus, No. 1312 will cost, when completed for use, as follows:—

Model, No. 1312.....	\$5 00
Key, No. 1314.....	1 25
Battery, No. 1266, with extra porous cups.....	4 25
Copper Wire, 10 yds.....	1 00
	\$11 50

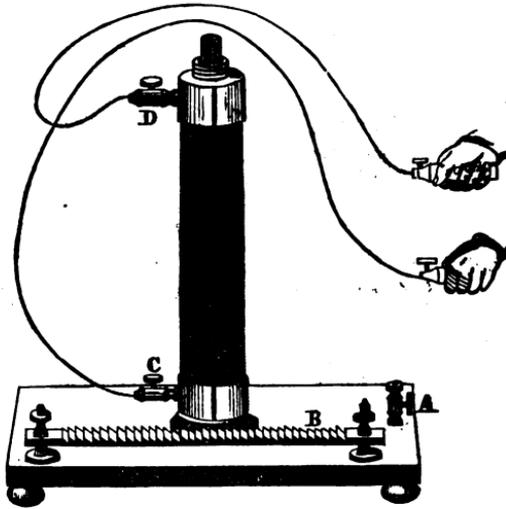
1315. Telegraph Register, Key and Magnet, suitable for Telegraph Lines, complete..... 50 00

Apparatus for Medical Purposes, Shocks, etc.



1316

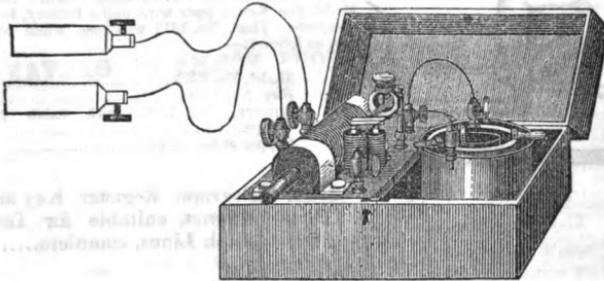
1316. Galvanic Slippers, per pair..... 1 25



1317

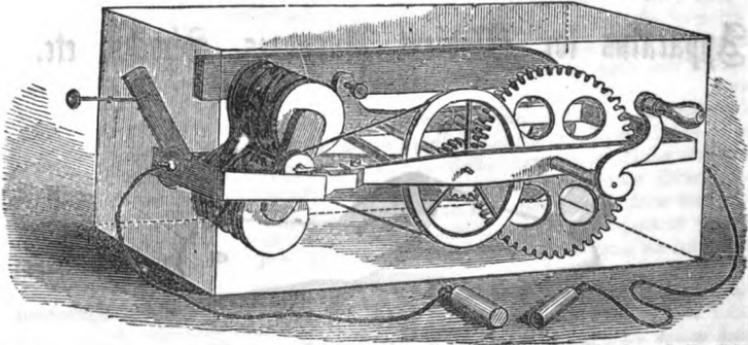
No. 1317. An Analytical Apparatus, for illustrating the effect and object of the soft iron bar or wires, the primary or battery coil of large wire, and the induced coil of fine wire, all of which are generally used in Electro-Magnetic apparatus for shocks, whatever the form may be, each.....\$12 00 to 18 00

PRICE



1318

1318. Portable self-acting Medical Electro-Magnetic Machine, in box, for the cure of nervous diseases, shocks, etc., with printed directions, each..... 6 00, 10 00, 12 00, 15 00



1319

No. 1319. **Magneto-Electric Machine, for nervous diseases.** This machine is widely known as the best article in use for the cure of nervous diseases, such as Nervous Headache, Toothache, Tic Douloureux, Lumbago, Sciatica, and all forms of nervous pain: also, for Paralysis in all its various forms, from a partial loss of sensation or motion, to that of perfect Paralysis.

To physicians and surgeons this is particularly recommended as a truly scientific instrument, combining all the advantages that can be obtained from the use of Electric Machines in the relief of diseases, while it has none of the inconveniences attendant upon the use of all others. Being simple in its construction, and completely enclosed in a firm box, it is not liable to derangement; and, obtaining its electricity directly from a permanent magnet, it is constantly ready for use, and it is not affected by moisture, but is equally powerful in wet as dry weather, and can be graduated to any desirable degree of strength. It requires no acids, and may be used for weeks without opening the box, except occasionally to oil the bearings.....\$10 00

1320. Metallic Insulated Handles, per pair..... 1 25

1321. Sponge Handles, each.....75 to 1 00

1322. Covered Copper Wire, per yard..... 10

 Any of the articles enumerated in Davis' Manual of Magnetism, furnished at Boston prices.

DESCRIPTION OF THE VARIOUS FORMS OF GALVANIC BATTERIES.

Galvanic Batteries consist, essentially, of two metals, separated from each other and immersed in some dilute acid, which will act on one of the metals, but not on the other. The electric current is conducted by wires fastened to each of the metals. The metals commonly used are copper and zinc, and the acid, the sulphuric, (oil of vitriol.) The Sulphate of Copper Battery consists of a double cylinder of copper, and bottom of same metal. The space between the copper cylinders receives the exciting solution. A movable cylinder of zinc is suspended in this solution whenever the battery is to be put in action, and is insulated by supports of ivory or wood resting upon the exterior cylinder. The liquid employed is a solution of sulphate of copper (blue vitriol) in water. To prepare it, a saturated solution of the salt is first made, and to this solution add as much more water: a pint of water will dissolve one-fourth of a pound of blue vitriol. The addition of a small portion of alcohol to this solution is sometimes of advantage, by increasing the permanence of its action. The coating of oxide of copper should always be removed from the zinc after using the battery. This is a more intense battery than Smees'.

Daniel's constant or sustaining battery is formed with a copper cup containing a solution of sulphate of copper, into which is put an unglazed porcelain cup, containing a dilute acid, (sulphuric.) Into this porous cup and acid is placed a rod of zinc covered with mercury, (amalgamated.) The porous cup allows the fluids to come in contact with each other and to transmit the electricity, but prevents any thing passing through to form a deposit. Hence the action is constant, and its energy sustained as long as the zinc lasts and enough of the sulphate is kept in the solution.

Smees' Battery consists of a glass tumbler or other vessel, with an amalgamated zinc cylinder and platina plate or foil, suspended within the cylinders. It is a neat battery, and much used for electrotyping, gold and silver plating, etc. The liquid used to excite this battery is sulphuric acid, (oil of vitriol,) diluted with ten or twelve parts of water by measure.

The exciting fluids are strong nitric acid in the porous cup or cell, and sulphuric acid, diluted with ten or twelve parts of water, in contact with the zinc in the glass vessel.

NOTE.—If a large pair of plates of copper and zinc be formed into a battery, a great quantity of electricity would be evolved, and great heating and melting effects would be produced, but it could not send a current of electricity far through a wire. But if the same pair of plates be cut up into many smaller pairs, and put into as many cups with the exciting fluid, and the zinc of one cup be connected with the copper of the next cup, and so on through the series, the electricity would be found to have an *intensity* of energy which would drive it through a very great length of wire. In the one case there is great *quantity*, in the other *great intensity*. Groves' Battery combines the two principles to a greater extent than any other form of battery, and hence is best adapted to telegraphing.

The price of batteries depends on their size, and may be combined to produce any effects desired.

Sand-Glasses, Weighing-Scales, etc.

		PRICE
No. 1350.	Sand-Glasses, one hour, rosewood frames.....	\$1 75
1351.	“ “ common wood frames.....	62
1352.	“ half-hour, rosewood frames.....	1 50
1353.	“ half-hour, common wood frames.....	0 50
1354.	“ quarter-hour, rosewood “	1 00
1355.	“ 3 minutes, “ “ egg-boiler.....	50
1356.	“ 3 “ white wood and bone frame.....	37
1357.	“ 1 and 2 minutes, rosewood frame, for Daguerreo- typists.....	50
1358.	“ 3 minutes, bronzed frame.....	25

WEIGHING SCALES.

1360.	Weighing Scales, in wood box, each.....	1 50 to 3 00
1361.	Troy Weights, Cup Pattern, 4 ounces to ¼ oz., per set.....	75
1362.	“ 4 to 1 pennyweight, per set.....	25
1363.	“ 6 to 1 grain, per set.....	12

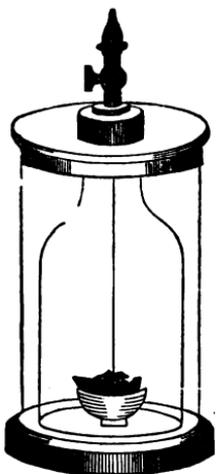
NIGHT-ALARMS—EAR-TUBES.

1364.	Night-Alarms, a portable article for travellers; wakes you at any hour.....	4 00
1365.	Ear-Tubes, a convenient article for dulness of hearing.....	50 and 75

Chemistry.

1370		1370. Blow Pipes, usual form.....	25
1371		1371. Blow Pipes, with bulb.....	50
	ivory mouth-piece and platina point.....	1372. Blow Pipes, Berzelius', with	2 00

	PRICE
No. 1373. Crucibles, sand, 5 in a nest, per nest.....	\$0 10
1374. Candle Bombs, per dozen.....	25
1375. Platina Wire, per grain.....	3
1376. Platina Foil, ".....	3
1377. Prince Rupert's Drops, per dozen.....	50
1378. Hydrogen Gas Generators, made of copper...	2 50
1379. Hydrogen Gas Generators, made of glass, for charging cannons and pistols and filling balloons, each.....	4 00 to 6 00
1380. Hydrogen balloons (without the car)...1, 1	75, 2 50
1381. Syphons of Glass, plain.....	25
1382. Syphons of Glass, with mouth tube.....	50
1383. Bologna Cups of unannealed glass, can be broken by a small piece of flint, but resist a hard blow per dozen.....	1 00
1384. Test Tubes, per doz....	1 25
1385. Wood Stand for Test Tubes.....	75
1386. Glass Tubing, per ft....	10 to 25
1387. Spirit Lamp with cover, each.....	37, 50, 75
1388. Set of Apparatus and Chemicals to illustrate Foster's Chemistry; the whole packed carefully in a strong box for transportation.....	23 00



1379



1380

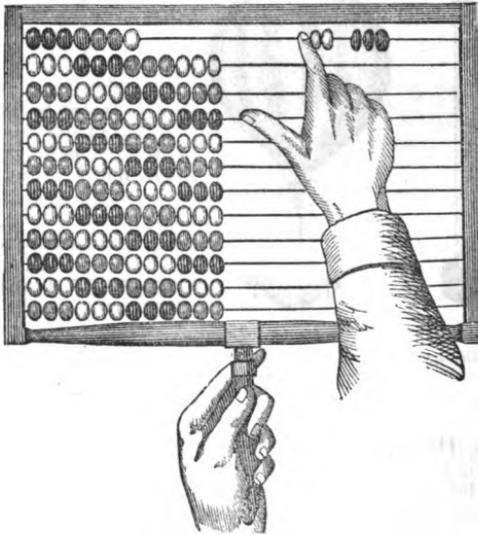
mistry; the whole packed carefully in a strong box for transportation..... 23 00 containing the following: Deflagrating Spoon, $\frac{1}{2}$ lb. assorted Glass Tube, Stop Cock, 3 Test Glasses, Pneumatic Trough, $\frac{1}{2}$ gal., Bell Glass with Stop Cock, 4 oz. Glass Funnel, Pint Retort, $\frac{1}{2}$ pint Retort, 4 oz. Retort, Plain Globular Receiver, Retort Stand, Sand Bath, Hydrogen Generator, Nest of Crucibles, Nest of Beaker Glasses, Glass Spirit Lamp, Test Tube Rack and Tubes, Gas Pistol, Gas Bag and Stop Cock for inhalation, 2 Gas Jets, Quart Specie Jar, Eolophile, 1 oz. Graduated Measures, Pint Flask, $\frac{1}{2}$ Pint Flask, Chemical Flask, pair of Scales and Weights, Pipette, Leaden Cups for Hydrofluoric Acid.

CHEMICALS.—Chlorate of Potash, Oxide of Manganese, Sulphuret of Iron, Copper Turnings, Phosphorus, Caustic Potash, Fluor Spar, Brazil Wood, Litmus, Turmeric, Potassium, Iodine, Bromine, Nickel, Cadmium, Antimony, Arsenium, Platinum, Carb. of Potash, Nit. of Strontia, Chromate of Potash, Bi-Chromate of Potash, Iodide of Potassium, Nitrate of Silver, Nitrate of Ammonia, Sodium, Sulphuric Ether, Zinc, Nut-Galls, Proto-Nit. Mercury, Bi. Chl. Mercury, Aqua. Ammonia, Bottles, &c. (See No. 1467, Books.)

1389. Chemical Cabinet and Laboratory, or First Steps in Chemistry, with Chemicals and Apparatus for performing 116 select and amusing experiments; also book of directions for performing each experiment. The collection consists of 50 chemical preparations, tests, and useful apparatus, without strong acids or other deleterious and dangerous articles. They are perfectly safe in the hands of youth, and are admirably adapted as presents, packed in a neat wood box, with lock and key.....	5 00
1390. Student's Chemical Cabinet, containing 48 boxes and 12 bottles filled with chemical preparations and re-agents, and a large assortment of apparatus of a practically useful size, containing in all upwards of 100 articles, carefully labeled and arranged in a neat cabinet with lock and key.....	10 00
1391. Eolopiles for throwing a burning jet of ether.....	25

Holbrook School Apparatus.

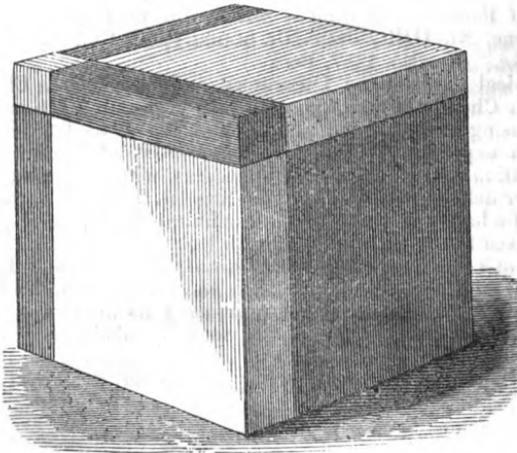
As we are the agents in this city for the sale of the celebrated Holbrook School Apparatus, we can offer the following articles to teachers and others, at the company's prices.



NUMERAL FRAME.

PRICE

No. 1420. Numeral Frame, with 144 Balls.....	\$0 75
1421. " " with 100 Balls.....	63

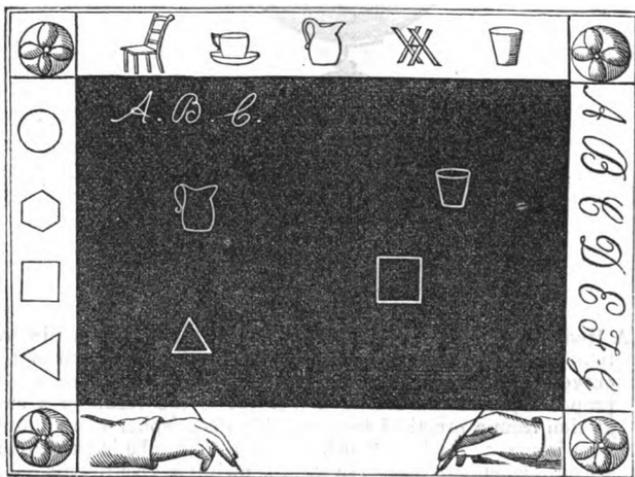


1422

CUBE ROOT BLOCK.

PRICE

- No. 1422. For illustrating Square and Cube Roots, but especially the latter, this sectional Block is admirably adapted, and for convenience is unsurpassed. What teacher will be without one when he can buy it for..... \$0 25
 1423. Same, in paper box..... 50
 1424. Larger size, in wooden box..... 75



1425

THE PRIMARY DRAWING SLATE.

1425. Teaches the right manner of holding the pen; gives copies of writing-letters, both small and capitals; furnishes a variety of drawing-copies, which may be much extended by purchasing the DRAWING-BOOK, prepared to accompany the slate; answers every purpose of the ordinary slate; and is NOISELESS, each..... 20 and 25

GEOMETRICAL SOLIDS.

Geometrical Forms and Arithmetical Solids, consisting of the following forms:—Oblate Spheroid, Sphere, Prolate Spheroid, Hexagonal Prism, Prism, Triangular Prism, Cylinder, Hemisphere, Pyramid and Frustum, Cone and Frustum, and a variety of Cubes and Parallelopipeds, and the Carpenter's Theorem.

1426. The whole set, in paper box..... 1 25
 1427. Same, in neat wooden box with hinges..... 1 50

These will give pupils definite ideas of the shape of solids far better than pages of description, and much more clearly than any drawings can. For explaining the Rules of Mensuration, they afford the only proper means.

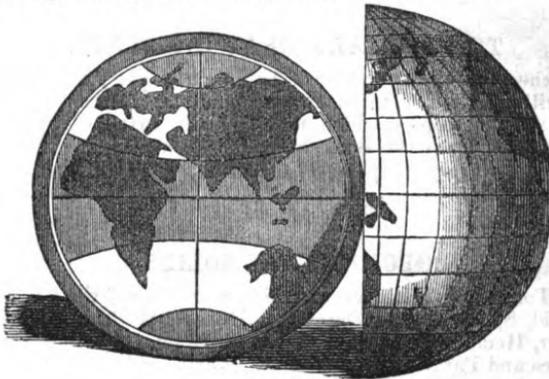
1428. A terrestrial Globe, strongly made, of firm material, and so mounted on a simple pedestal that it can be readily removed and suspended by a cord, and thus be displayed conveniently for familiar illustrations to a class. It is of a convenient size for common use in the school-room, as it can be easily held in the hand, or passed round the class, and yet answers all the main ends of the larger-sized Globes. It is the prettiest and cheapest Globe known in the market..... 1 00



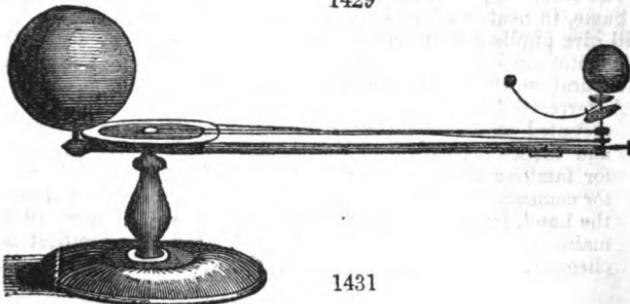
1428

PRICE

No. 1429. A Hemisphere Globe supplies a want long felt, viz., an illustration, which any child can understand, of the reason of the curved lines on a map, and shows how the flat surface is a proper representation of a Globe. It is the result of a suggestion from a practical teacher. Two hemispheres are united by a hinge, and, when closed, a neat little Globe is presented; when opened, two maps are seen, showing the continents, as if through transparent hemispheres, 3 inch, 75, 5 inch..... \$1 50

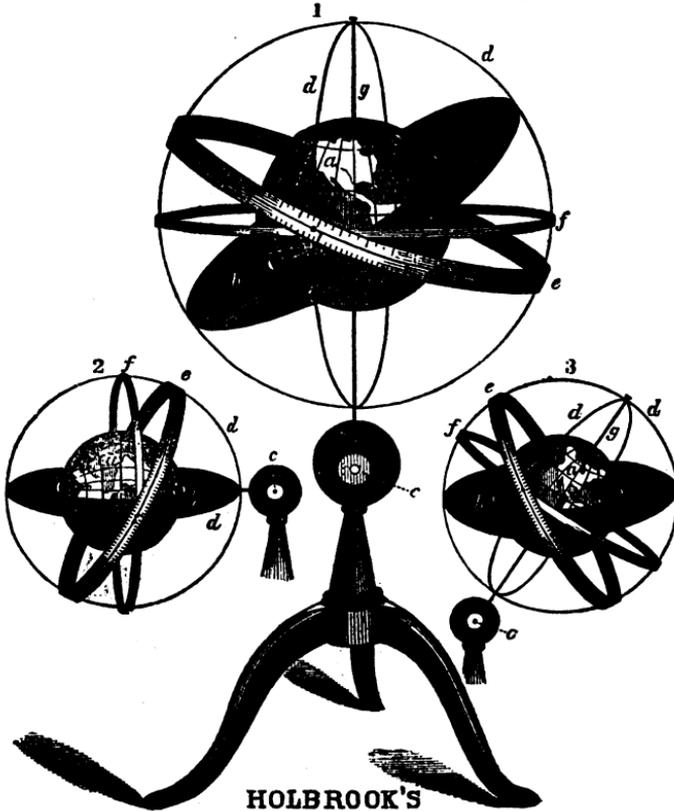


1429



1431

1431. The TELLURIAN is designed to illustrate the various phenomena resulting from the relations of the Sun, Moon, and Earth to each other; the succession of day and night, the change of the seasons, the change of the Sun's declination, the different lengths of day and night, the changes of the moon, the harvest moon, the precession of the equinoxes, the difference of a solar and sidereal year, etc. etc. The Moon revolves around the Earth, and both together around the Sun, while Sun, Earth, and Moon revolve around a common centre of gravity..... \$6 00



HOLBROOK'S
CELESTIAL SPHERE.

1432. The CELESTIAL SPHERE represents the Earth (a) surrounded by the great circles of the heavens; the Meridians, (d) equator, (f) and ecliptic, (e.) The ecliptic is divided into twelve equal parts showing the twelve signs of the zodiac; and its northern edge is marked with the days of the year. The axis (g) may be inclined at any angle desired, by loosening the thumb-screw (c) (see 2 and 3.) A horizon plane (b) is attached, by which the real horizon of any place on the globe may be shown, also the comparative lengths of day and night on any part of the earth and at any season; the rising and setting of the Sun; the Sun's appearance at the North Pole, and its place in the Ecliptic on any day in the year.....

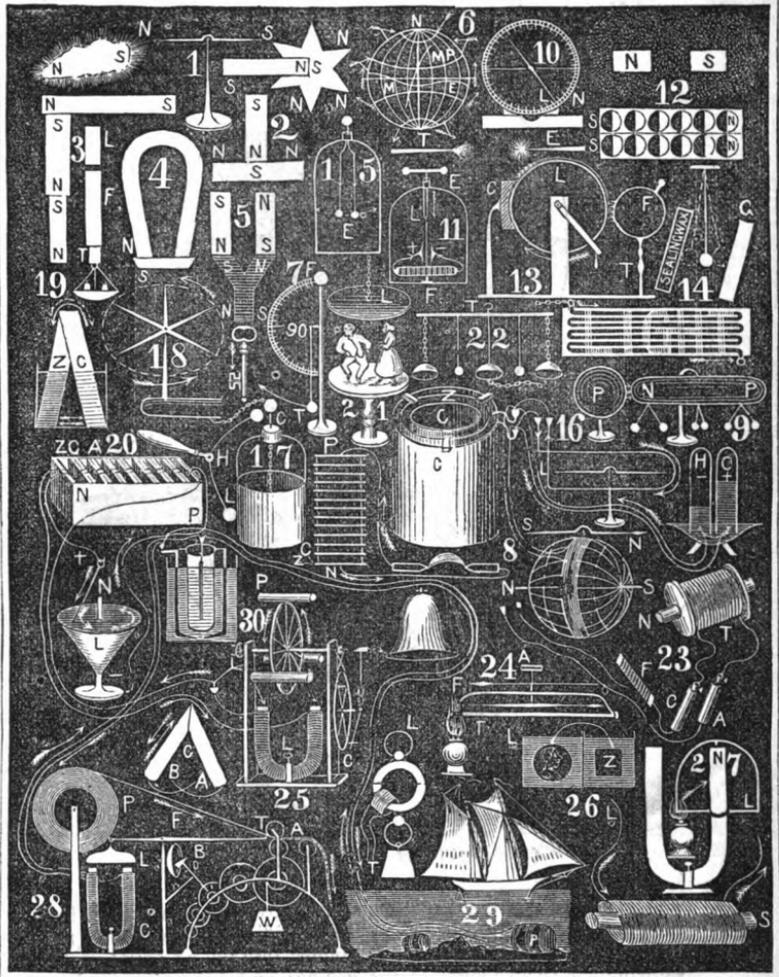
8 00

NO. 10.
JOHNSON'S
PHILOSOPHICAL CHARTS,

Published by
ADOLPHUS RANNEY,

DESIGNED FOR THE USE OF
SCHOOLS AND ACADEMIES.

Copyright secured in 1855, by
F. G. JOHNSON, M. D.



FAC-SIMILE OF CHART NO. 10, REDUCED.

Dr. Johnson's Philosophical Charts, each set consisting of 10 Charts, 34 by 52 inches. They are intended to supply the wants of schools in the absence of apparatus. The teacher is saved the trouble of drawing upon the black-board, as the diagrams are upon a black ground, and can be distinctly seen from any part of the school-room. The engraving is a fac-simile of No. 10, reduced.

No. 1433. The following nine pieces of apparatus are recommended to Teachers, as forming a useful set: they are packed in a neat box with lock and key, and will be forwarded, free of expense, to any of the Adams' Express Co.'s stations in the State of Pennsylvania, upon the receipt of \$20 00. Orrery. Tellurian. Geometrical Solids. Terrestrial Globe. Numeral Frame. Hemisphere Globe. Cube-Root Block. Text-Book or Guide. Magnet.

The Holbrook School Apparatus has received the commendations of many of the most eminent school-superintendents in the country. Every article of the apparatus is intended to employ the hand and eye of the pupil, and thus make the hours of study more pleasant, the ideas gained more clear and practical, and the impressions on the memory more vivid and easily recalled.

Maps, Charts, etc.

	PRICE
1434. Telescope Model; a useful article to exhibit to a class the interior construction or arrangement of the different lenses in a Telescope: Models of the lenses are arranged upon a platform 24 inches long, with silk strings of different colours, showing the pencils of light passing through each lens from the object viewed to the eye of the observer.....	\$3 00
1435. Dissected Maps of the World, neatly bound in book form.....	2 00
1436. Dissected Maps of the United States, neatly bound in book form.	2 00
1437. Dissected Maps of the United States, neatly bound in book form, small size.....	75
1438. Alphabetical Blocks, or A B C, of various sizes; a useful article in teaching children to spell, per box.....	25 to 37
1439. Philosophical Charts, in ten sheets, each 34 by 52 inches, on thick paper, bound edges, including Key, per set.....	5 00
1440. Same, coloured and mounted with rollers, including Key, per set..	10 00
1441. Same, coloured, mounted with rollers and cloth back, including Key, per set.....	15 00

WATER COLOURS.

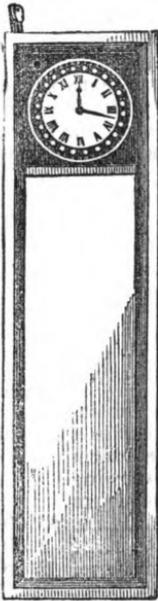
We are now prepared to fill orders for Osborne's Superfine American Water Colours, warranted equal to any imported, at the manufacturer's prices, as follows: Neat Mahogany boxes, with sliding top.

1442. 6 rows, 36 colours, whole size.....	6 25
1443. 5 " 30 " " "	5 25
1444. 4 " 24 " " "	4 25
1445. 3 " 18 " " "	3 25
1446. 2 " 12 " " "	2 25
1447. 1 " 6 " " "	75

HALF SIZE.

1448. 4 rows, 24 colours, half size.....	2 25
1449. 3 rows, 18 colours, half size.....	1 75
1450. 2 rows, 12 colours, half size.....	1 25
1451. 1 row, 6 colours, half size.....	75
1452. Handsome Mahogany and Rosewood Chests, with lock and drawer, paint-stone, water-glass, India Ink, brushes, &c., 12 colours.....	6 00
1453. Do. do. do. do. 18 colours.....	7 50
1454. Do. do. do. do. 24 colours.....	10 00

WATCH-CLOCKS.



No. 1.

The Watch-Clock is used in banks, manufactories, railroad-station buildings, lumber-yards, and other places where a watchman is employed, and serves to show whether he is attentive to his duty.

The Clock has a time-dial, independent of the pin-circle, which may be used as a standard time-piece for the whole establishment.

From the pulls at the top of the clock, wires are led off to the different rooms in the building which the watchman is required to visit. Every half-hour the wires in *all* these rooms are required to be pulled, in order to draw back the pin, which, by the motion of the pin-circle about the dial, presents itself at that time directly over XII.

Should ten minutes more than the half-hour elapse, the pin will have passed on, and cannot be drawn back, but will remain out during the succeeding day, and show the very half-hour the watchman was absent or neglectful of his duty.



No. 2.

The pins which have been drawn are replaced again by the motion of the clock.

The clock should be placed in a room convenient for the exhibition of time, and care should be taken to have the termination of the wires in such places as to cause the watchman to pass over as much of the premises as possible.

A good lock is provided for the case; but many prefer to have the clock placed in a room to which the watchman has no access, and furnish another time-piece to show him when to draw the pins.

In ordering a Clock, the number of places required to be visited by the watchman every half-hour should be stated. Full directions for putting up these Clocks accompany each one.

The wires can be put up by a bell-hanger, or any good mechanic.

	PRICE
No. 1. Plain Black Walnut Case, 3½ feet long, with 1 pull.....	\$35 00
“ “ “ “ “ 2 “	39 00
“ “ “ “ “ 3 “	40 00
“ “ “ “ “ 4 “	41 00
“ “ “ “ “ 5 “	42 00
“ “ “ “ “ 6 “	43 00
“ “ “ “ “ 7 “	44 00
“ “ “ “ “ 8 “	45 00

No. 2 form, Cherry Case, 3½ feet long, stained in imitation of Rosewood, with glass front, \$15 00 in addition to the above prices.

EDUCATIONAL TABLES.

These tables consist of a mahogany frame, on which are sets of letters arranged in alphabetical order. These letters are fastened by a button sliding in a groove, and can be moved to any part of the frame, separately, and formed into words and sentences, in grooved lines made for that purpose in the upper part of the frame. They are very useful in teaching spelling-lessons.

		PRICE
No. 1455.	Table with 3 sets of capital letters.....	\$1 00
1456.	“ 1 “ “ and 3 small sets.....	1 50
1457.	“ 2 “ “ 4 “	1 75
1458.	“ 3 “ “ 5 “ and numerals 1 to 0.....	2 25

Books.

	<i>Price.</i>	<i>Prepaid Postage.</i>
1460. QUECKETT. A Practical Treatise on the Use of the Microscope, including the Different Methods of Preparing and Examining Animal, Vegetable, and Mineral Structures. By John Queckett. Profusely illustrated. 550 pages, last edition.....	5 00	36
1461. CARPENTER. The Microscope and its Revelations, from the last London Edition. With an Appendix, showing the Application of the Microscope to Clinical Medicine. 434 Illustrations, 724 pages. By Francis Gurney Smith, M.D.	4 00	45
1462. BEALE. The Microscope and its Application to Clinical Medicine. By Lionel Beale, M.D., F.R.S. 2d edition, 390 pages, with 270 Engravings, and a Coloured Plate...	4 00	25
1463. HOGG. The Microscope: its History, Construction, and Application; with Directions for Collecting, Preserving, and Mounting objects. 500 Illustrations, 606 pages.....	1 50	25
1464. WYTHES. The Microscopist: a Complete Manual on the Use of the Microscope: Numerous Illustrations. By Rev. Jos. Wythes. 212 pages.....	1 25	13
1465. CLARKE. The Microscope; being a Popular Description of the most Instructive and Beautiful Objects, with Directions for Preparing Slides and Mounting Specimens. Well adapted for the Young Microscopist. 230 pages....	75	12
1466. DICK. The Telescope and Microscope. By Rev. Thomas Dick. 192 pages.....	38	06
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1470. GILLESPIE. Land-Surveying, comprising the Theory and Practice, with the Chain, Compass, Transit, Theodolite,		

		Price.	Prepaid Postage.
	Plane Table, &c. With 400 Engravings, and a Magnetic Chart.....	\$2 00	32
No. 1471.	HEATHER. A Treatise on Mathematical, Surveying, and Optical Instruments, in which their Construction, and Methods of Testing, Adjusting, and Using them, are concisely explained. Numerous Engravings. By J. F. Heather, M.A., London.....	38	07
1472.	NYSTROM. Pocket-Book of Mechanics and Engineering. With Illustrations. By John W. Nystrom, C.E.....	1 50	06
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1474.	Book of the Telegraph; with Descriptions and Illustrations of the Various Telegraphs.....	25	03
1475.	WIGHTMAN. Select Experiments in Natural Philosophy. Numerous Illustrations. By Jos. M. Wightman.....	1 25	21
1476.	DAVIES. The Practical Naturalist's Guide; containing Instructions for Collecting, Preparing, and Preserving Specimens in all Departments of Zoology. Intended for the Use of Students, Amateurs, and Travellers. With Illustrations. By J. B. Davies.....	50	04
1477.	Atlas of Astronomy, Pictorial and Descriptive. Beautifully illustrated.....	75	03
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1481.	QUEEN. A Hand-Book of the Mercurial, Aneroid, and Metallic Barometers, with Tables for Corrections for Temperature and for ascertaining the Heights of Mountains; also, Observations upon the Dew-Point Hygrometer. Compiled from the most authentic sources. By James W. Queen.....	25	02
1482.	JONES. Defects of Sight and Hearing: their Nature, Causes, Prevention, and General Management. By T. Wharton Jones, F.R.S. London. Edited with additions by L. Turnbull, M.D., Surgeon to the Department of Diseases of the Eye and Ear of the Western Clinical Infirmary of Philadelphia.....	75	12
1483.	CHANNING. Medical Application of Electricity. With Illustrations. By W. F. Channing, M.D., 200 pages.....	50	12
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 When books are ordered by mail, the amount of prepaid postage must be included in the remittance, as, if not prepaid, the post-office charges higher rates, and may not forward the book.

N. B. Apparatus imported on commission for chartered institutions, from any of the foreign manufactures at their catalogue prices, free of duty.

I N D E X.

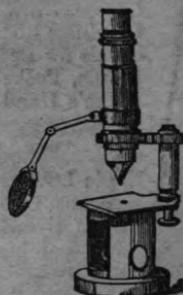
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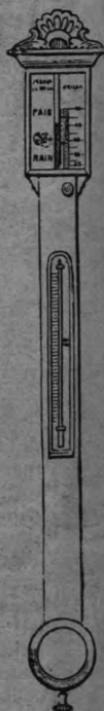
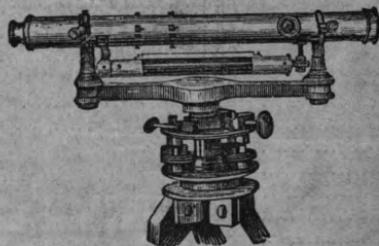
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