

ESTABLISHED IN 1783.

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A  
PRICED AND ILLUSTRATED  
**CATALOGUE**  
OF  
**MATHEMATICAL INSTRUMENTS,**  
OF GERMAN SILVER AND BRASS,  
**SWISS DRAWING INSTRUMENTS,**  
TRANSITS, LEVELS, SURVEYING COMPASSES, TAPE MEASURES,  
CHAINS, SCALES, &c., &c.,  
AND ALL SUPPLIES FOR  
Engineers, Architects, Surveyors and Machinists.

*PARTICULAR ATTENTION IS CALLED TO THE*  
**SWISS DRAWING INSTRUMENTS.**

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*This Catalogue is furnished Gratis, and will be sent free by Mail, to any part of  
the United States, Canada, West Indies and South America.*

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**IMPORTED AND MANUFACTURED,**

And Sold Wholesale and Retail by

**WILLIAM Y. M<sup>c</sup>ALLISTER,**  
**OPTICIAN,**  
**728 CHESTNUT STREET,**  
**PHILADELPHIA, PA.**

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September, 1867.

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PHILADELPHIA:

JAS. B. RODGERS, PRINTER, 52 & 54 NORTH SIXTH STREET.  
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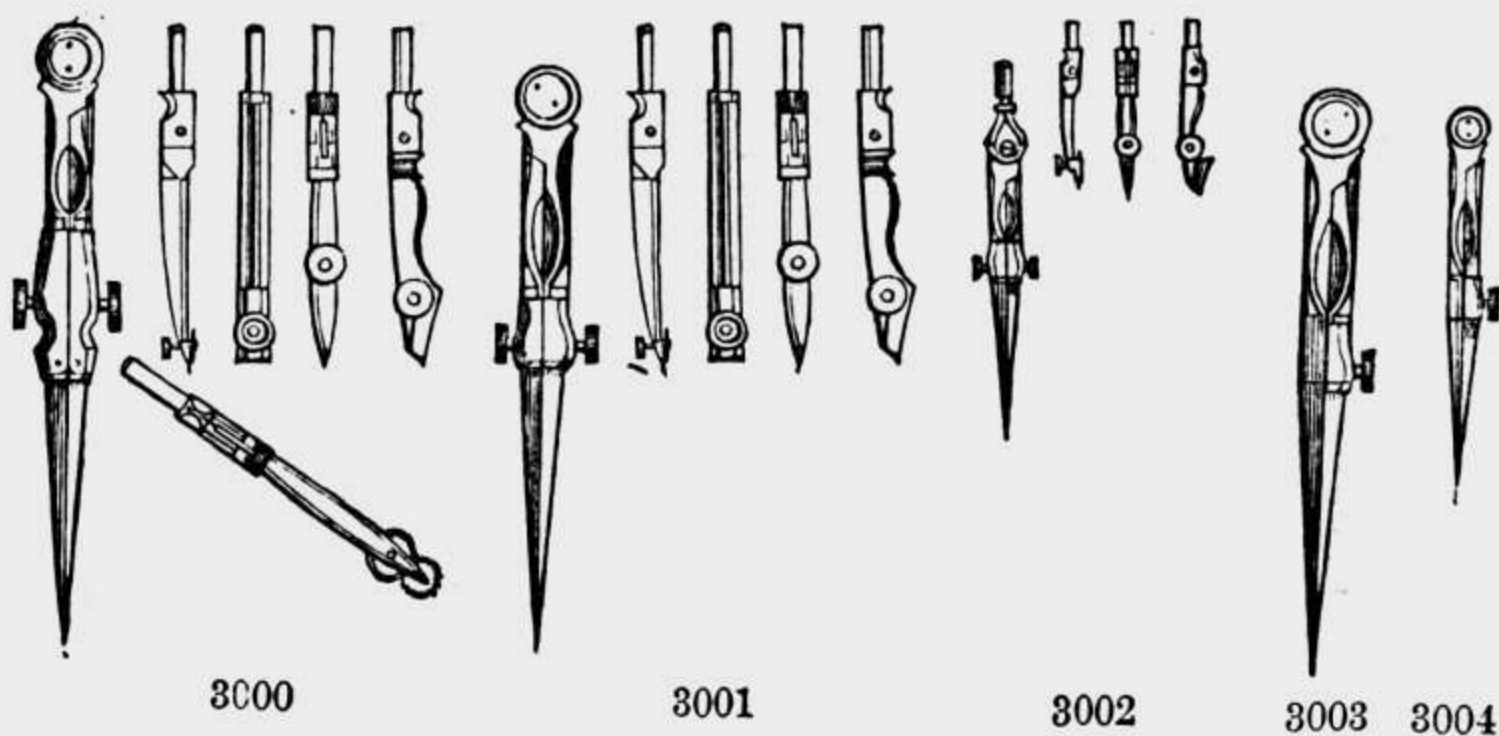
# CONTENTS.

• Alteneder's Instruments,.....	12	Lead Pencils,.....	41
Ball and Sockets,.....	34	Lithograph Pens,.....	42
Beam Compass,.....	4,12	Magnifying Glasses,.....	45
Beam Compass Furniture,.....	12,14,19	Map Perambulators,.....	15
Books,.....	46	Marking Pins,.....	34
Bow Pens,.....	5,12,14,15,19	Mapping Pen,.....	42
Bow Pencils,.....	5,12,14,15,19	Mouth Glue,.....	42
Boxwood Beams,.....	12,14	Odontographs,.....	44
Boxwood Scales,.....	12,25	Paint Slabs and Saucers,.....	42
Calipers,.....	45	Paper, Drawing,.....	42,43
Caliper Rules,.....	30	"    Pattern,.....	43
Caliper Squares,.....	30	"    Profile,.....	43
Camels Hair Pencils,.....	42	"    Tracing,.....	43
Cases of Instruments, Swiss,.....	7,8	"    Pins,.....	6,15,19
"        "        Ger. Silver,.....	15,16,17,18	"    Scales,.....	26
"        "        Brass.....	20,21,22	Parallel Rules,.....	6,30
Centre Gauges,.....	44	Pentagraphs,.....	45
Compasses, Surveyors,.....	33	Plumb Bobs,.....	36
"        Pocket,.....	38,39	Polar Planimeter, .....	9,10,11
Clynometer Rules,.....	32	Protractors, Brass,.....	22
Curves, Horn,.....	6,29	"        Bevel,...	24
"        Wood,.....	29	"        Ivory,.....	24,25
Dividers, in Sets,.....	3,12,13,18	"        Horn,.....	22
"        Hair Spring,.....	3,12,13,18	"        German Silver,.....	13,22,23,24
"        Plain,.....	4,12,13,18	"        Paper,.....	24
"        Bisecting,.....	4,14	"        Swiss,.....	6,24
"        Pocket,.....	4,13	Roulette, or Dotting Pen,.....	6,15
"        Proportional,.....	4,12,14,19	Rules, Excentric,.....	6
"        Three Legged,.....	4,13	"        Parallel,.....	6,30
"        Universal,.....	5,14	"        Steel,.....	26
"        Spacing,.....	5,12,14,15	Sable Hair Pencils,.....	42
Drawing Pens,.....	5,15,19	Steel, Squares,.....	26
"        "        double,.....	6,15	"        Straight edges,.....	28
Drawing Boards,.....	29	Squares, German Silver,.....	29
Erasing Knives,.....	42	Surveying Chains,.....	37
Horn Centre,.....	6,15	Swiss Instruments,.....	3,4,5,6,7,8
Ivory Scales,.....	25	<b>T</b> Squares,.....	28
India Ink,.....	42	Tape Measures,.....	37,38
India Rubber,.....	42	Transits,.....	34
Jacob Staff,.....	34	Triangles,.....	29
Level, Engineers,.....	35	Tripods,.....	34
"        Brass,.....	35	Universal Squares,.....	27
"        Bulbs,.....	35	Vernier Calipers,.....	31
"        Slope,.....	36	Water Colors,.....	40,41
"        Lockes Hand,.....	36	Wire Gauges,.....	44
Leveling Rods,.....	35		

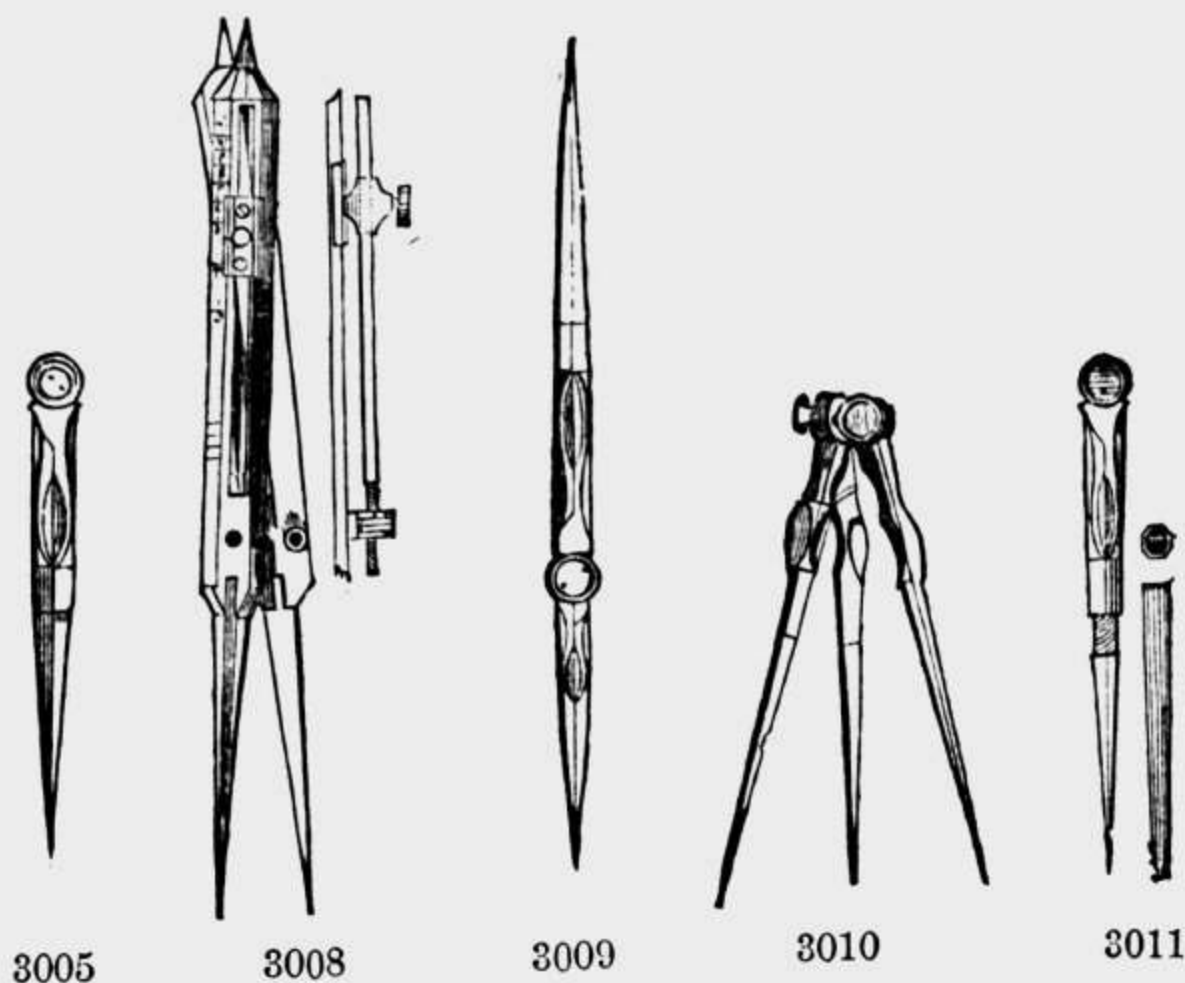
# Swiss Drawing Instruments.

## Extra Fine German Silver Instruments.

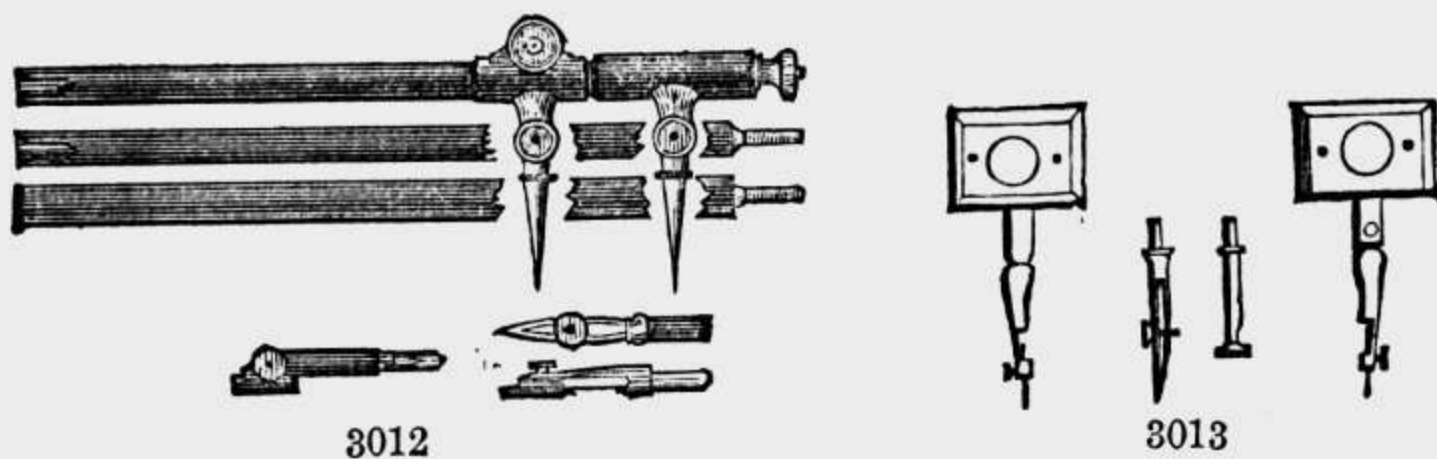
Having purchased from Mr. Amsler, who has retired from business, his interest in, and stock of, these celebrated Instruments, for which he was the principal agent, I am able to offer them on the most favorable terms.



No.		Price.
3000.	Dividers, $6\frac{1}{2}$ inches long, with joints in each leg, with pen, pencil-holder, needle-point, lengthening bar, and dotting pen,.....	\$ 10 00
3001.	Dividers, 6 inches long, with pen, pencil-holder, needle-point, and lengthening bar,.....	7 75
3002.	Dividers, 4 inches long, with pen, pencil-holder, and needle-point,	5 75
3003.	Hair-spring Dividers, $5\frac{1}{2}$ inches,.....	3 20
3004.	" " $4\frac{1}{2}$ " .....	2 60



No.		Price.
3005.	Plain Dividers, $5\frac{1}{2}$ inches, .....	\$2 25
3006.	" " $4\frac{1}{2}$ " .....	2 00
3007.	Proportional Dividers, with Rack, finely graduated, for lines and circles, 9 inches long, .....	11 00
3008.	Proportional Dividers, with Micrometer adjustment, finely graduated for lines and circles, 9 inches long, .....	14 00
3009.	Whole and Half, or Bisecting Dividers, .....	4 00
3010.	Triangular Compass, 5 to 6 inches long, .....	4 75
3011.	Pocket Dividers, with Sheath, .....	2 50



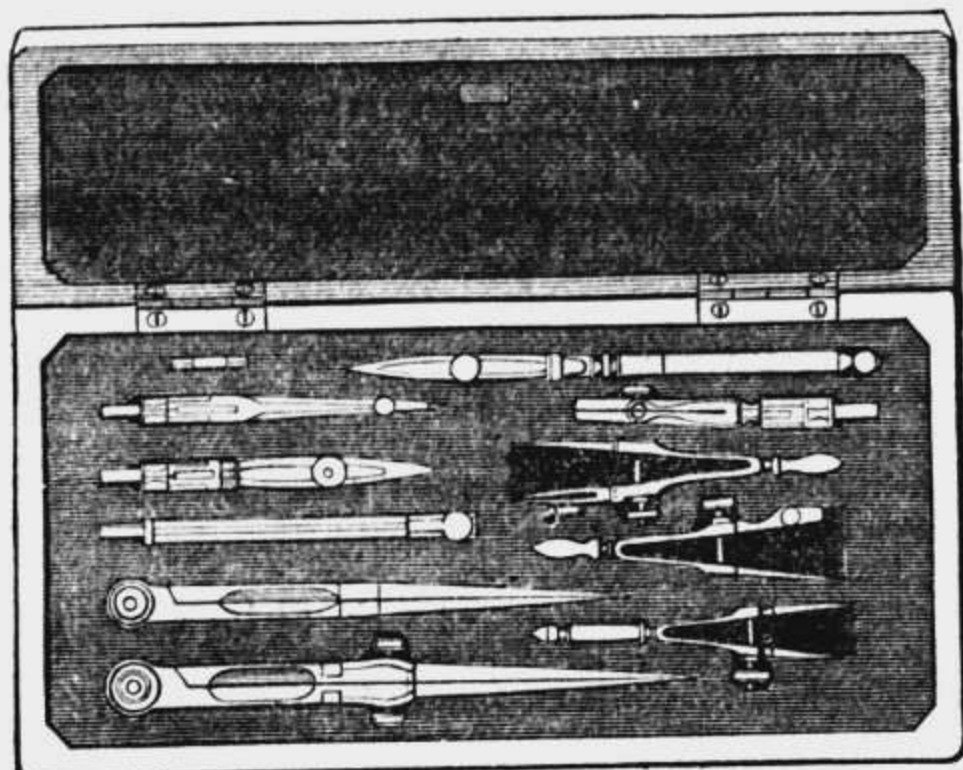
3012.	Beam Compass, 24 inches long, in 3 German Silver bars, with pen, pencil, needle-point, and two straight points, Micrometer adjustment, .....	16 00
3013.	Furniture for Beam Compass, with pen, pencil, needle-point, two straight points, Micrometer adjustment, .....	7 50







# Cases of Extra Fine Swiss Drawing Instruments.

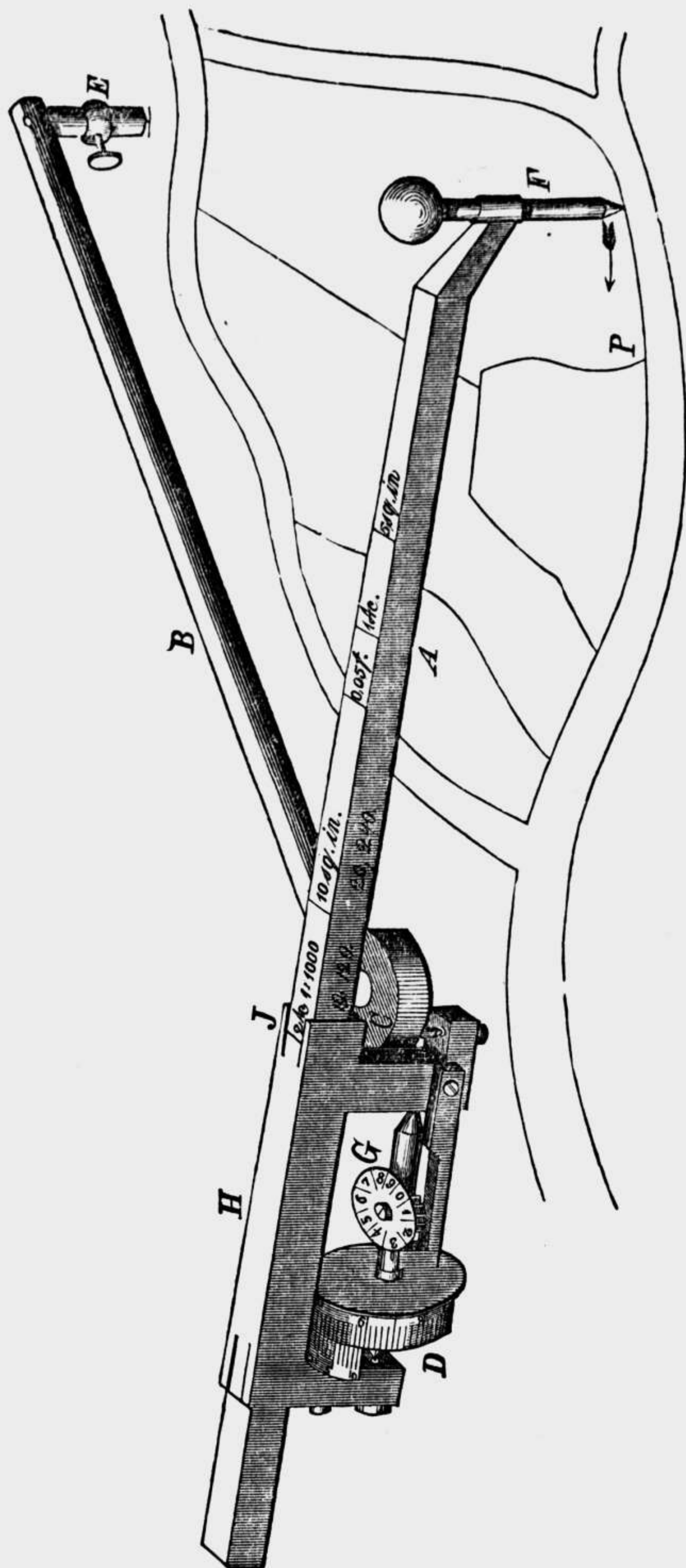


3050

No.		Price.
3050.	Polished Walnut Box, containing:— Pair Dividers, 6 inches long, pen, pencil, needle-point and lengthening bar; Pair Plain Dividers, 5½ inches long; Pair Steel Spacing Dividers; Steel Bow Pen; “ Pencil; Drawing Pen, 5½ inches long; Half Circle Protractor, 4¼ inch, ½ degrees.....	\$23 00
3051.	Polished Rosewood Box, with Tray, Lock and Key, containing:— Pair Dividers, 6 inches long, with pen, pencil, needle-point, and lengthening bar; Pair Plain Dividers, 5½ inches long; Pair Dividers, 3½ inches long, with pen, pencil and needle-point; Pair Steel Spacing Dividers; Steel Bow Pen; Steel Bow Pencil; One Drawing Pen, 6 inches long; “ 4½ “ Half Circle Protractor, German Silver, ½ degrees, 4¾ inches; Boxwood Triangular Scale, 12 inches long,.....	40 00
3052.	Polished Rosewood Box, with Tray, Lock and Key, containing:— Pair Dividers, 6½ inches long, with pen, pencil, needle-point, dotter, and lengthening bar; Pair Hair Spring Dividers, 5½ inches long; Pair Proportional Dividers, with Rack; Spring Bow Pen, with Ivory Handle, pencil, needle-point, and two pen points; Furniture for Wood Beam Compass; One Drawing Pen, 6 inch; “ 5¼ “ “ 4½ “ Half Circle Protractor, 5¾ inch, ¼ degrees, inside centre; Boxwood Triangular Scale, 12 inches long; 6 Paints, India Ink, Paint Slabs, &c.,.....	68 00

No.	Price.
3053. Polished Rosewood Box, with Tray, Lock and Key, containing:— Pair Dividers, $6\frac{1}{2}$ inches long, with pen, pencil, needle-point, dotter, and lengthening bar; Pair Dividers, 4 inches long, with pen, pencil and needle-point; Pair Hair Spring Dividers, $5\frac{1}{2}$ inches long; Pair Plain Dividers, $5\frac{1}{2}$ " " Spring Bow Pen, with Ivory Handle, Micrometer adjustment, pencil, needle-point, and two pen points; Pair Proportional Dividers, 9 inches long, with Micrometer ad- justment; Steel Spacing Dividers; " Bow Pen; " " Pencil; German Silver Bow Pen, with pencil leg; Rail Road Drawing Pen; Dotting Pen, with extra wheels; Three Drawing Pens, one each $4\frac{1}{2}$ inch, $5\frac{1}{4}$ inch, and 6 inch; Red Ink Drawing Pen; Beam Compass, in 3 Bars, 24 inches long; Half Circle Protractor, with arm and vernier, 8 inch, reads to minutes; Ebony Rolling Parallel Rule; " Eccentric Rule; 2 Boxwood Triangular Scales, 12 inches long—10ths and 12ths; Ink Slab and 6 color cups; 12 Paints and India Ink,.....	\$130 00
The above Cases are all lined with the best Silk-Velvet. Nos. 3051, 3052 and 3053, lined with Cotton-Velvet, will be \$5 less.	





3059

AMSLER'S POLAR PLANIMETER.

## Directions for Using Amster's Polar Planimeter.

By means of AMSTER'S POLAR PLANIMETER, a person entirely ignorant of Geometry, may ascertain the area of any planimetric figure, no matter how irregular its outlines may be, more correctly, and in much shorter time, than the most experienced Mathematician could calculate it.

The management of the Instrument can be easily learned in half an hour, and in size it is no larger than a two-foot folding rule.

The Planimeter indicates square feet, or square inches, and acres for surveying.

**DIRECTIONS.**—Preparatory to the use of the Instrument, ascertain its state:—The Index Roller D must play easily, without coming in contact with the nonius, (or vernier.) The screw centres, on which its axis revolves, must be adjusted so as to allow perfect freedom of rotation; the same is to be observed for the centre pin C.

The needle point E ought to project but very little from its socket. Great care must be taken not to bend any part of the instrument.

To ascertain the area of a figure in square inches, slide the square rod A into the tube H, so that the line marked 10 sq. in. (10 square inches,) stands fair with the bevelled part of the tube J. Then set the instrument on the paper, so that the index roller D, the tracing point F, and the needle point E, rest on the paper; press the latter point a little on the paper—not enough to pierce it through. This point is to remain stationary during the whole operation. Set the tracing point F on any point P of the outline, and mark that point, and read off the state of the counting wheel G, and the index roller D. Suppose the counting wheel indicates 3 (as in cut), the index roller 905 (90 degrees to be read on the index roller, and 5-10 on the nonius,) so that the O of the nonius stands on 90 5-1000 of the circumference of the index roller. Write down the number just read off thus, 3,905.

Now follow, with the tracing point F, the outline of the figure, or part of the figure to be measured, with great exactness, in the same direction as the hands of a watch would move, until you arrive at the starting point.

Straight lines may be followed along a rule; then read off again the state of the indicators. Suppose you find now 5,763, *i. e.* the counting wheel indicating 5, and the index roller and nonius 76 3-10 degrees. From these two readings, the area found is to be obtained, and here two points are to be considered.

**A.** If the needle point E is outside of the figure just traced round, the first number (3,905) is to be deducted from the second number (5,763).

5,763	
3,905	and the remainder (1,858) is to
1,858	

be multiplied by ten, equal 18.58;  
which is the area desired.

**B.** If the needle point E is inside of the outlines of the figure, add to the number last read off (5,763) the number marked on the side of the square rod next to where 10 sq. in. is marked on the upper side.

In this case, it is 20,240, the last number 5,763 read off

The number on side	20,240	
	26,003	
	3,905	Deduct from this
	22,098	

amount the number first read off,

22,098 Multiply this remainder by ten, equal 220,98, and this is the amount of square inches, or area of the measured figure.

It is of no consequence whether the roller moves inside or outside of the outlines of the figure, provided it moves on a smooth surface even with the figure.

To obtain the area in square feet, slide the square rod into the tube up to the line marked 0,1 sq. ft. or 0,05 sq. ft. In this case the difference between the first and second readings of the indicators is to be multiplied by 0,1 or 0,05. If the

difference, for instance, is 4,653, the rod being up to the line marked 0,1 sq. ft., then is  $4,653 \times 0,1 = 0,4653$  equal to the area in decimal fractions of a square foot.

If the needle point is within the outlines of the figures as described in B, proceed the same way as at B, but multiply by 0,1 or 0,05.

If the figure to be measured is at a reduced scale, the result has to be multiplied by the square of the proportion of the reduction. If the proportion of the figure to the full size is as 1 : 10, the result is to be multiplied by  $10^2 = 100$ —for instance: the result of the first example is 1,858, which, multiplied by 100,  $(1,858 \times 100) = 1858$  sq. inches, would be the amount of the area.

If the amount of acres is to be ascertained, the proportion of the reduction being 1 : 1000, slide the square rod up to the line marked 2 ac. 1 : 1000, or 1 ac., and operate as indicated above; the result is to be multiplied by 1 or 2, instead of 10 or 5. If the rod is set up to the line marked 1 ac., no multiplication is necessary.

Should the plan of the piece of land be drawn on a smaller scale than 1-1000—for example, 1-5000th—then multiply the result with the square of the proportion of the reduction to the scale of 1-1000. Thus, for the scale of 1-5000, the result would have to be multiplied by  $5 \times 5 = 25$ , (1-5000ths being to 1-1000th as 5 : 1.) If the scale is 1-500th, multiply the result by  $\frac{1}{2}^2 = \frac{1}{4}$ , that is to say, divide the result by 4.

*Remark.*—If, on reading off the horizontal or counting wheel, G, the indicator points near the middle line between two figures, say between 3 or 4, then see how the index roller stands to the nonius. If the 0 on the nonius is on the lower side of the 0 of the roller, therefore near 100, then read 3; but if the 0 on the nonius is on the upper side, therefore near 0 on the roller, then read 4 for unity.

If the horizontal wheel turns on its axis during the tracing operation, so that it goes beyond 0, (in fact 10,) and even marks several revolutions, and then stops at any number—for instance, 7—you read 17 or 27, &c., adding as many times ten as the wheel has made full revolutions.

It is easy to notice the number of revolutions. If the wheel G marks 6, and the roller D is, for instance, on 0 degrees 7-10 degrees, or on 4 degrees 7-10 degrees, then the reading is of course 6,007, or 6,047. The number read off the nonius always taking the third place after the units.

The cut shows the actual size of the Instrument.

Price in Box,..... \$33 00

Draftsmen, Engineers, Surveyors, Ship Builders, Architects, Machinists, will please devote a few moments only to the examination of this instrument, and they will at once be convinced of its great importance and value.



# Mathematical Instruments.

Altenecker's Patent German Silver Instruments, with  
Altenecker's Patent Joint.

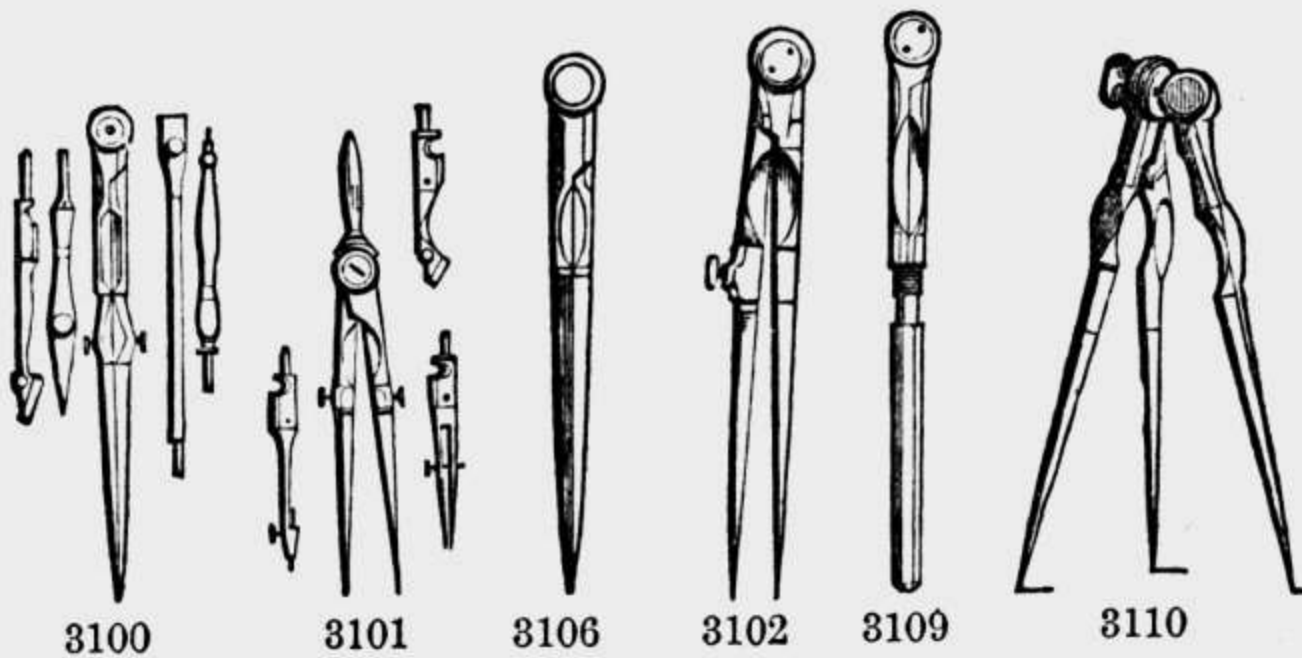
No.		Price.
3060.	Pair 6-inch needle-point Dividers, joint in each leg, with pen, pencil, and lengthening bar,.....	\$10 00
3061.	Pair 3-inch needle-point Dividers, joint in each leg, with pen and pencil points,.....	7 00
3062.	Pair 3-inch needle-point Dividers, with needle-point and pen,.....	4 75
3063.	“ “ “ “ “ pencil,..	4 75
3064.	Pair 6-inch Dividers, with Hair Spring,.....	4 00
3065.	“ 5-inch “ “ .....	3 75
3066.	“ 3½-inch “ “ .....	3 00
3067.	“ 6-inch Plain Dividers,.....	3 00
3068.	“ 5-inch “ .....	2 75
3069.	“ 3½-inch “ .....	2 25
3070.	Bow Pen, German Silver, with needle-points,.....	2 75
3071.	“ “ “ and pencil leg,.....	3 75
3072.	Steel Stepping Dividers,.....	1 75
3073.	“ Bow Pen,.....	2 25
3074.	“ “ Pencil,.....	2 25
3075.	Proportional Dividers, 7½-inch, with Rack movement, and all points movable, which enables the instrument to be used a much greater length of time,.....	21 00
3076.	Beam Compass, 24-inch, in three Bars, with pen, pencil, needle-point, and two straight points.....	16 50
3077.	Beam Compass, 36-inch, in 3 Bars, with pen, pencil, needle-point, and two straight points,.....	18 00
3078.	Beam Compass, 48-inch, in 3 Bars, with pen, pencil, needle-point, and two straight points,.....	21 00
3079.	Furniture for Beam Compass, with improved Micrometer adjustment, with pen, pencil, needle-point, and two straight points,..	9 00
3080.	Furniture for Beam Compass, same as above, but graduated,.....	10 00
3081.	Boxwood Beams for the above, 36 inches long,.....	2 00
3082.	Boxwood Beams, graduated to 10th of an inch, 36 inches long...	3 00



No.		Price.
3083.	Protractor, German Silver, 6-inch, half circle, with Vernier, reading to 3 minutes, $\frac{1}{4}$ degrees, with steel point dotter—a new and very desirable instrument,.....	\$16 00
3084.	Protractor, German Silver, 8-inch, half circle, $\frac{1}{4}$ degrees, with Vernier, reading to minutes, and needle-point dotter,.....	22 00
3085.	Protractor, German Silver, 8-inch, whole circle, with Vernier, reading to minutes, $\frac{1}{4}$ degrees, with needle-point dotter,.....	25 00
3086.	Triangular Scale, of Boxwood, 12 inches long, graduated in 10ths or 12ths, with Parallel Ruler attachment, patented—a new and very complete instrument,.....	5 00

## Fine German Silver Instruments.

OF THE BEST GERMAN MAKE, BUT NOT EQUAL TO THE SWISS.



3100.	Dividers, German Silver, steel joints, 6 inches long, with pen, pencil, needle point, and lengthening bar,.....	4 00
3101.	Dividers, German Silver, 3 inches long, with pen, pencil and needle-point,.....	3 00
3102.	Dividers, German Silver, steel joints, 7 in. long, with hair spring,	4 38
3103.	" " " 6 " "	3 00
3104.	" " " 5 " "	2 50
3105.	" " " 4 " "	2 00
3106.	" " " 6 " "	1 25
3107.	" " " 5 " "	1 10
3108.	" " " 4 " "	85
3109.	Pocket Dividers, German Silver, steel joints, 5 inches long, with shield for pocket,.....	2 75
3110.	Triangular Compass, German Silver, with 3 legs, steel joints, 5 inches long,.....	4 25



3111



3113

3114



3115

No.		Price.
3111.	Proportional Dividers, German Silver,.....	\$9 00
3112.	Proportional Dividers, German Silver, 9 inches long, with Rack, finely graduated for lines and circles,.....	11 00
3113.	Whole and Half Dividers, German Silver, 6 to 7½ inches long,.....	3 50
3114.	Universal Dividers, German Silver, for the Pocket, with handles, with points to shift,.....	8 50
3115.	Furniture for Wood Beam Compass, German Silver, with hair spring adjustment, with pen, pencil, and needle-point,.....	7 00
3116.	Boxwood Beams for the above, 24 and 36 inches long,.....	2 00
3117.	“ “ “ “ graduated to 10ths,.....	3 00



3118



3119



3120

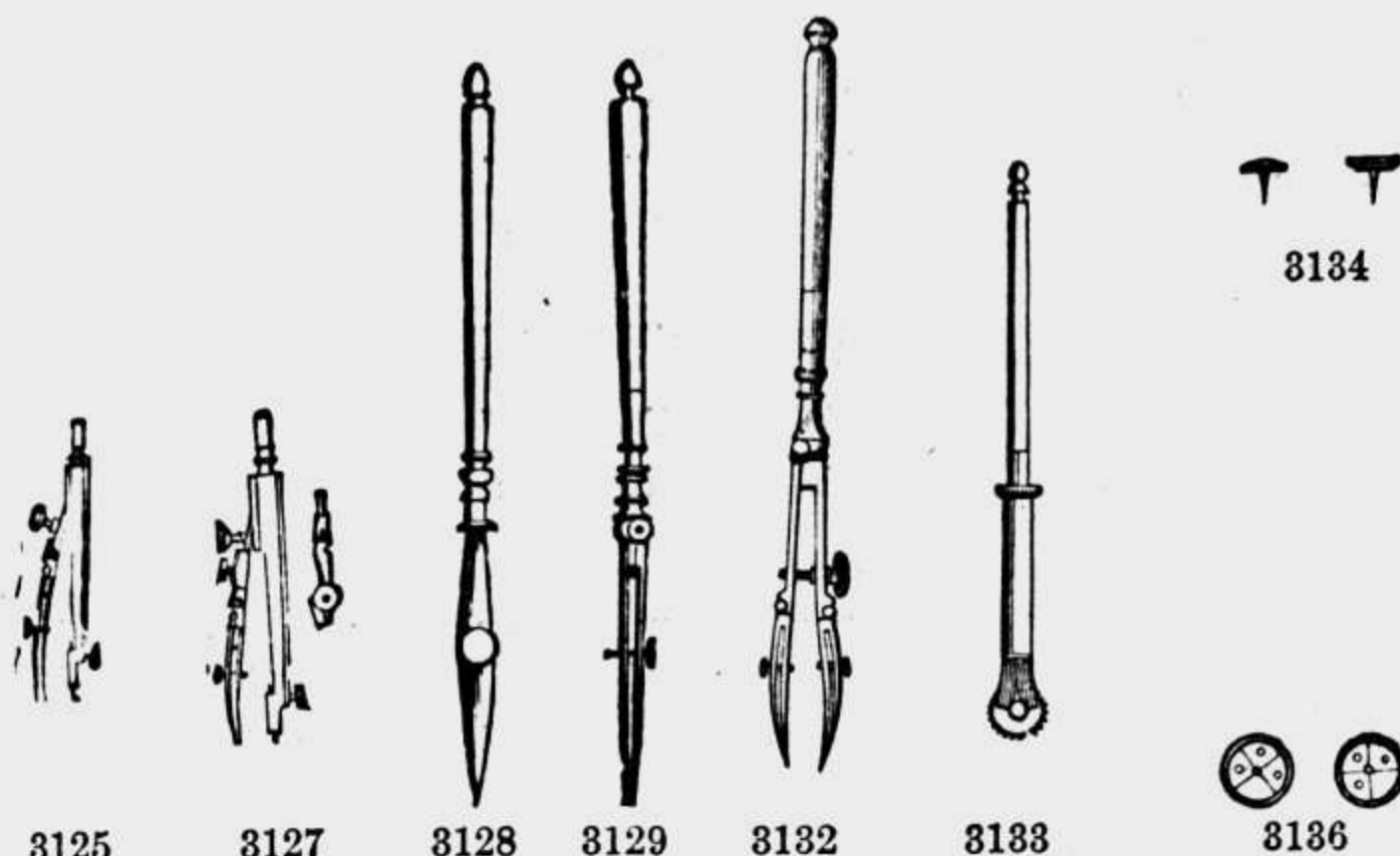


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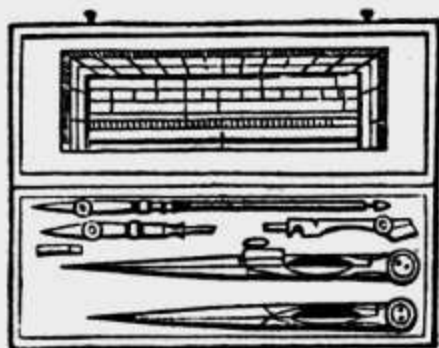
3118.	Steel Spacing Dividers, all Steel, with Metal Handle,.....	1 75
3119.	“ Bow Pen, “ “ .....	2 25
3120.	“ “ Pencil, “ “ .....	2 25
3121.	“ “ Pen, with needle-point, “ “ .....	2 75
3122.	“ “ Pencil “ “ .....	2 75
3123.	Dividers, German Silver, steel joints, with pen, joints in each leg,	3 25
3124.	Dividers, German Silver, steel joints, with pencil, joints in each leg, and needle-point,.....	3 25



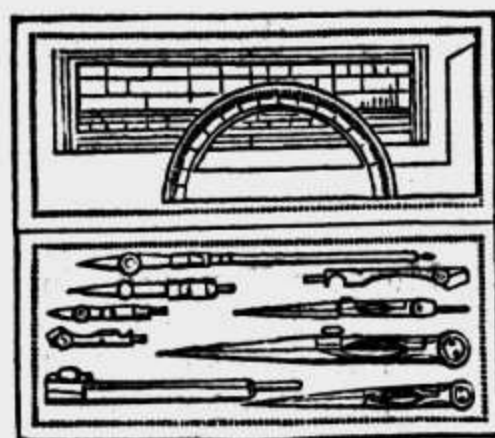
No.		Price.
3125.	Bow Pen, German Silver, with adjusting spring and needle-point,	\$2 00
3126.	Bow Pen, " " " fine finish,...	2 60
3127.	" German Silver, with adjusting spring, needle-point, and pencil leg, .....	3 25
3128.	Drawing Pen, German Silver, hinge to pen,.....	75
3129.	" " " and Protracting Pin, fine finish,.....	1 00
3130.	Drawing Pen, German Silver, hinge to pen, and Protracting Pin, extra fine finish,.....	1 75
3131.	Drawing Pen, all German Silver, for Red Ink,.....	1 00
3132.	Railroad, or Double Drawing Pen, German Silver, fine finish,.....	3 25
3133.	Roulette, German Silver, for dotting lines,.....	1 00
3134.	German Silver Paper Tacks, flat heads,—per doz.....	50
3135.	" " round " " .....	75
3136.	Horn Centres, German Silver rim, each,.....	45
3137.	Map Perambulator, for measuring distances on Maps,.....	2 50

## Cases of Fine German Silver Instruments.

FOR ENGINEERS, ARCHITECTS, AND MACHINISTS.



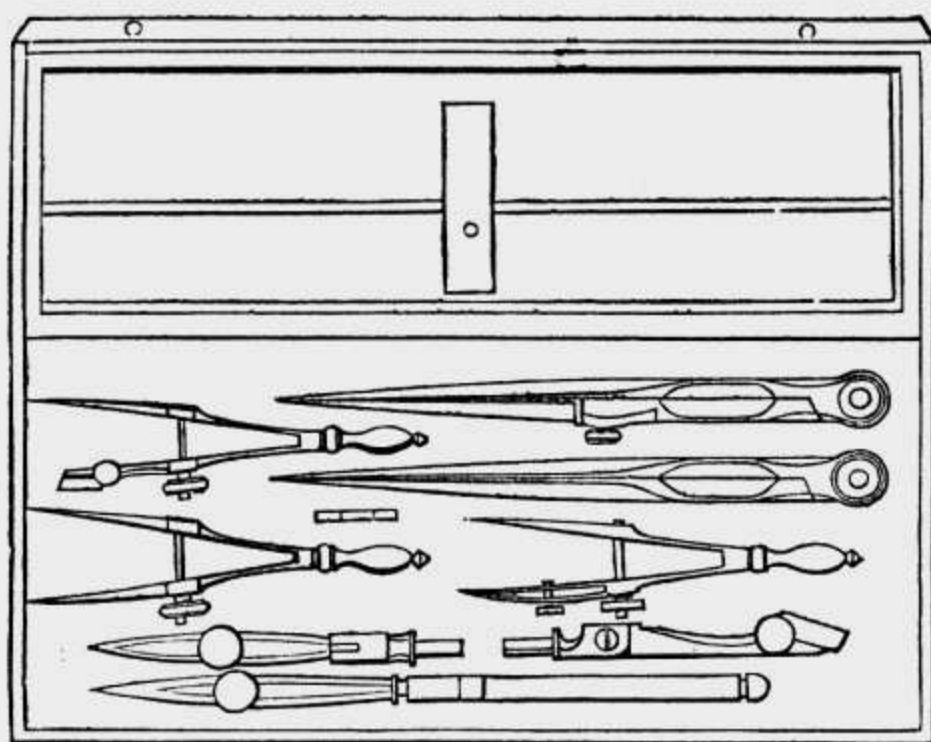
3203



3206

3200.	Morocco Box, containing pair 3-inch Dividers, with pen, pencil, and needle-point,.....	3 50
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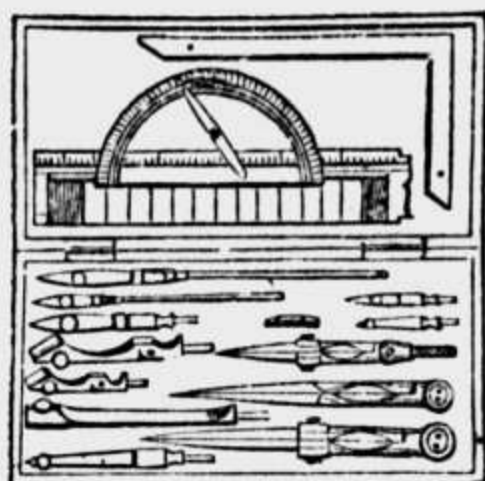
No.		Price.
3201.	Morocco Box, containing Pair 3-inch Dividers, with pen, pencil, and needle-point; One Drawing Pen,.....	\$5 00
3202.	Morocco Box, containing Pair 5½-inch Dividers, with pen and pencil; Pair 5-inch Plain Dividers; Drawing Pen,.....	3 00
3203.	Same as No. 3202, with addition of Ivory Protractor Scale, 6 inches long,.....	4 75
3204.	Morocco Box, containing Pair 5½-inch Dividers, with pen and pencil; Pair 5-inch Dividers; Pair Steel Spacing Dividers; Drawing Pen,.....	4 00
3205.	Same as No. 3204, with addition of Ivory Protractor Scale,.....	5 75
3206.	Morocco Box, containing Pair 5½-inch Dividers, with pen, pencil, and lengthening bar; Pair 5-inch Plain Dividers; Pair 3-inch Dividers, with pen and pencil; Drawing Pen; German Silver Protractor; " Triangle,.....	10 00
3207.	Same as No. 3206, with the addition of Ivory 6-inch Scale,.....	10 88



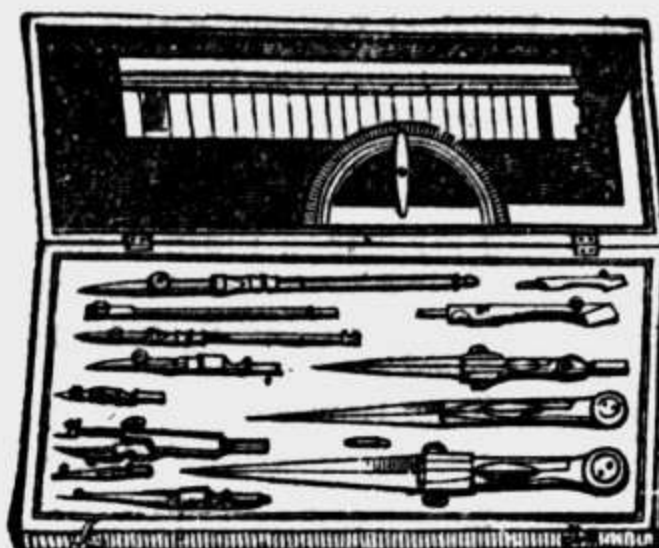
3208

3208.	Morocco Box, containing Pair 5½-inch Dividers, with pen and pencil; Pair 5-inch Plain Dividers; Pair Steel Spacing Dividers; " Bow Pen; " " Pencil; Drawing Pen; German Silver Protractor; Ivory 6-inch Scale,.....	9 00
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3208

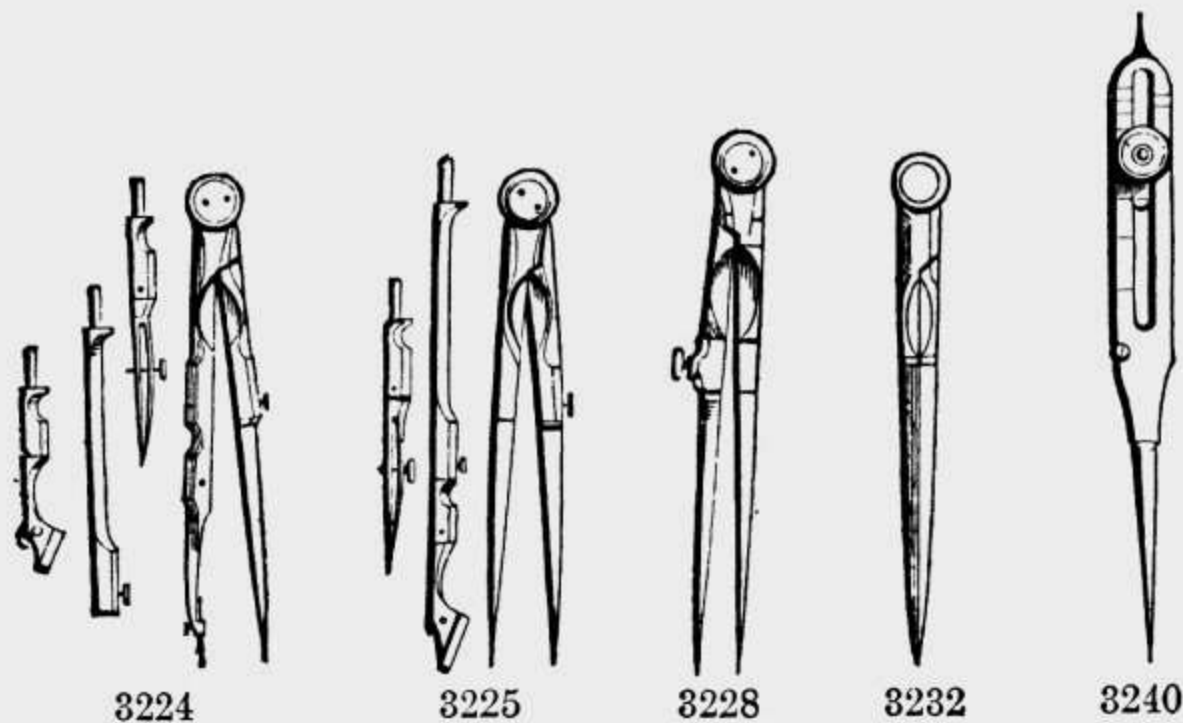


3211

No.		Price.
3209.	Morocco Box, containing Pair 5½-inch Dividers, with pen, pencil, needle-points, and lengthening bar; Pair 5-inch Plain Dividers; Pair 3-inch Dividers, with pen, pencil, and needle-point; Two Drawing Pens; German Silver Protractor; German Silver Square; Ivory 6-inch Scale,.....	\$13 00
3210	Same as No. 3209, in a polished Walnut Box,.....	14 00
3211.	Polished Walnut Box, containing Pair 5½-inch Dividers, with pen, pencil, needle-point, and lengthening bar; Pair 5-inch Plain Dividers; Pair 3-inch Dividers, with pen, pencil and needle-point; Bow Pen, German Silver, with adjusting spring and needle- point; Two Drawing Pens; German Silver Protractor, divided to ½ degrees; German Silver Square; Ivory 6-inch Scale,.....	18 00
3212.	Morocco Box, containing Pair 5½-inch Dividers, with pen, pencil, needle-point, and lengthening bar; Pair 5-inch Hair Spring Dividers; Pair 5-inch Plain Dividers; Pair 3-inch Dividers, with pen, pencil, and needle-point; Two Drawing Pens; German Silver Protractor, divided to ½ degrees; German Silver Square; Ivory 6-inch Scale,.....	13 00
3213.	Polished Walnut Box, containing Pair 5½-inch Dividers, with pen, pencil, needle-point, and lengthening bar; Pair 3½-inch Dividers, with pen, pencil, and needle-point; Pair 5-inch Hair Spring Dividers; Pair 5-inch Plain Dividers; Spring Bow Pen, with needle-point and adjusting spring; Two Drawing Pens; German Silver Protractor; German Silver Square; Boxwood Triangular Scale, 12 inches long,.....	23 00

No.		Price.
3214.	Polished Rosewood Box, with Tray, Lock and Key, giving space below for Colors, India Ink, and containing Pair 6½-inch Dividers, with rounded points, pen, pencil, needle-point, and lengthening bar; Pair 5-inch Hair Spring Dividers; Pair 5-inch Plain Dividers; Pair 3-inch Dividers, with pen, pencil, and needle-point; Steel Spacing Dividers; Steel Bow Pen; Steel Bow Pencil; Pair Proportional Dividers, 9 inches long, with Rack; Railroad Drawing Pen; Three Drawing Pens; Furniture for Wood Beam Compasses; German Silver Protractor; Horn Protractor; One Wood Curve; One Wood Triangle; Box Triangular Scale, 12 inches long; Ebony Parallel Rule, 12 inches long; 12 Paints, India Ink, Slabs, &c., &c.,.....	\$62 00

## Mathematical Instruments of Brass for Schools.



No.		Price.
3224.	Dividers, Brass, steel joints, 6 inches long, with pen, pencil, needle point, and lengthening bar,.....	\$ 1 50
3225.	Dividers, Brass, steel joints, 6 inches long, with pen, pencil, and lengthening bar, .....	1 00
3226.	Dividers, Brass, steel joints, 5 inches long, with pen, pencil, and lengthening bar,.....	1 00
3227.	Dividers, Brass, steel joints, 4½ inches long, with pen, pencil, and lengthening bar,.....	90
3228.	Dividers, Brass, steel joints, with hair spring, 7 inches long,.....	2 25
3229.	" " " " " " " 6 " " .....	1 65
3230.	" " " " " " " 5 " " .....	1 25

No.		Price.
3231.	Dividers, Brass, steel joints, plain, fine finish, 7 inches long,.....	\$ 1 00
3232.	" " " " plain, fine finish, 6 " " .....	1 00
3233.	" " " " " " " 5 " " .....	85
3234.	" " brass " " medium " 6 " " .....	60
3235.	" " " " " " " 5 " " .....	60
3236.	" " " " " " " 4½ " " .....	50
3237.	" " " " " common " 5 and 6 " " .....	25
3238.	" " brass joints, " " " 6 " " .....	25
3239.	" " " " " " " 5 " " .....	20
3240.	Proportional Dividers, Brass, 7½ inches long, divided for lines,	2 50



3241



3243



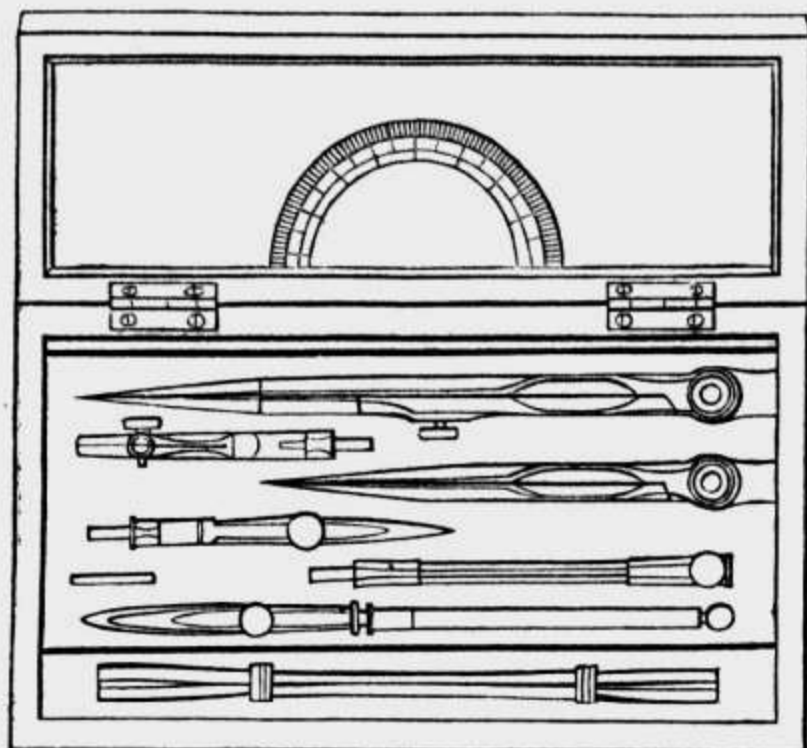
3244



3245

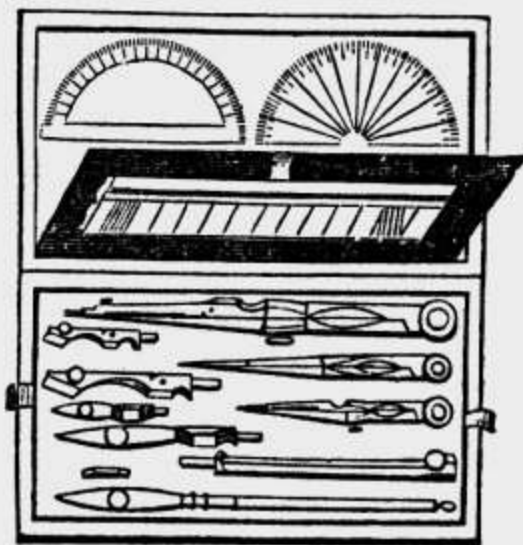
3241.	Bow Pens, Brass, with adjusting spring,.....	\$ 1 00
3242.	Bow Pencils, Brass, with adjusting spring,.....	1 00
3243.	Drawing Pens, Brass, Black Handle,.....	50
3244.	Furniture for Beam Compass, with Micrometer adjustment, pen, pencil, and needle points, .....	6 00
3245.	Brass, Paper, Tacks, per doz.....	40

## Cases of Brass Drawing Instruments, for Schools.



3250.

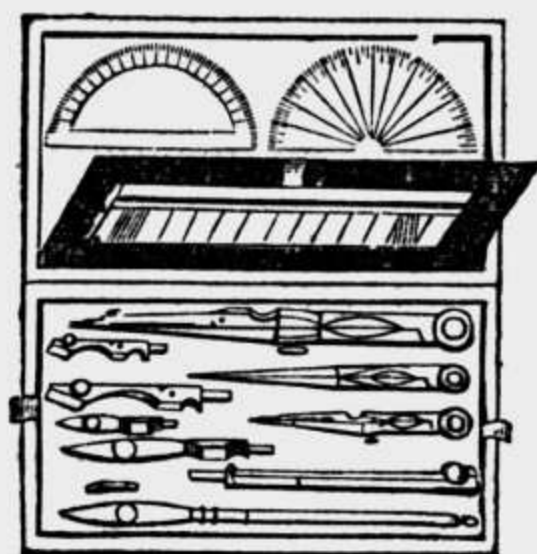
No.		Price.
3250.	Polished Mahogany Box, containing Pair 6-inch Dividers, with pen, pencil, and lengthening bar; Pair 5-inch Plain Dividers; Drawing Pen; Horn protractor, .....	\$ 2 00
3251.	Same as No. 3250, with addition of 6-inch Boxwood Plotting Scale,.....	2 30
3252.	Same as No. 3251, with the addition of Ebony 6-inch Parallel Rule,.....	2 65
3253.	Polished Mahogany Box, containing Pair 4½-inch Dividers, with pen, pencil, and lengthening bar; Pair 4-inch Plain Dividers; Drawing Pen; Brass Protractor; Wood Rule; 2 Wood Triangles; 4 Colors, 2 Color Cups; India Ink, Brushes, and Crayon Holder,.....	2 50
3254.	Same as No. 3253, with the addition of 6-inch Boxwood Scale,....	2 80
3255.	Same as No. 3254, with the addition of Ebony Parallel Rule, 6 inches long,.....	3 15



3256.

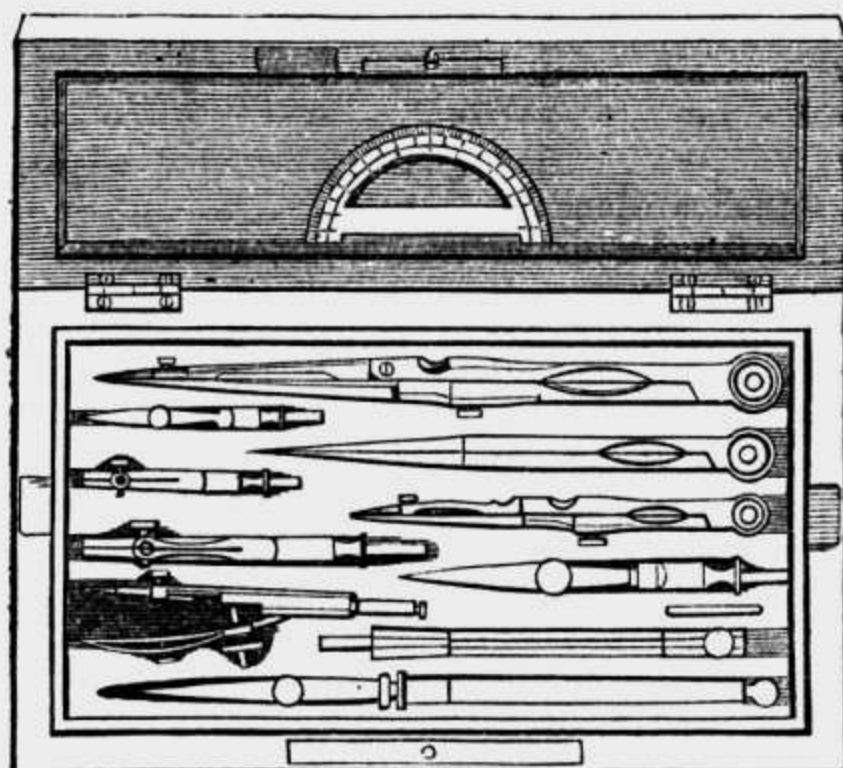


No.		Price.
3256.	Polished Rosewood Box, with Tray, and Lock and Key, containing Pair $5\frac{1}{2}$ -inch Dividers, with pen, pencil, and lengthening bar; Pair 5-inch plain dividers; Pair $3\frac{1}{2}$ -inch Dividers, with pen and pencil; Drawing Pen; Brass Protractor; Horn Protractor; Boxwood Scale, 6 inches long,.....	\$ 3 30
3257.	Same as No. 3256; but has Ivory Plotting Scale, 6 inches long, in place of the Boxwood,.....	4 00
3258.	Same as No. 3257 with the addition of Ebony Parallel Rule.....	4 35



No. 3259.

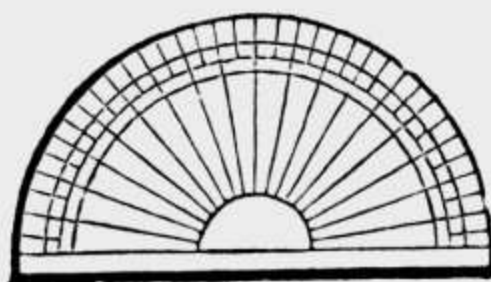
3259.	Polished Rosewood Box, with Tray and Lock and Key, containing:— Pair of 6-inch Needle Point Dividers, with Pen, Pencil and lengthening bar; Pair 5-inch Plain Dividers; Pair $3\frac{1}{2}$ -inch Dividers, with needle point, pen and pencil; Drawing Pen; Brass Protractor; Horn Protractor; Ivory Scale 6 inches long,.....	4 00
3260.	Same as No. 3259, with the addition of Ebony Parallel Rule 6 inches long,.....	4 35



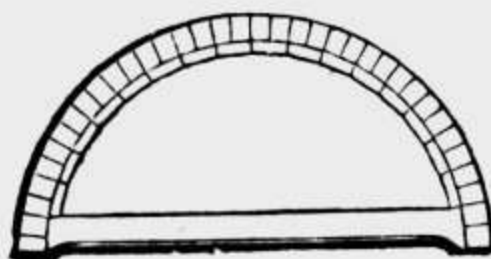
No. 3261.

No.		Price.
3261.	Polished Rosewood Box, with Tray, and Lock and Key, containing: Pair 6-inch Needle Point Dividers, with pen, pencil and lengthening bar; Pair 5-inch Plain Dividers; Pair 3½-inch Needle Point Dividers, with pen and pencil; Spring Bow Pen, with adjusting screw and needle point; Drawing Pen; Brass Protractor; Horn Protractor; Ivory Plotting Scale, 6-inches long.....	\$ 5 00
3262.	Same as No. 3261, with the addition of Ebony Parallel Rule.....	5 35
3263.	Same as No. 3261, with the addition of a pair of Proportional Dividers .....	7 50
3264.	Same as No. 3261, but the instruments are of the very best quality, and all the dividers have rounded points.....	9 00
3265.	Same as No. 3264, with addition of Parallel Rule, and a pair of Proportional Dividers.....	12 00

## Protractors of Horn, Brass, and German Silver.

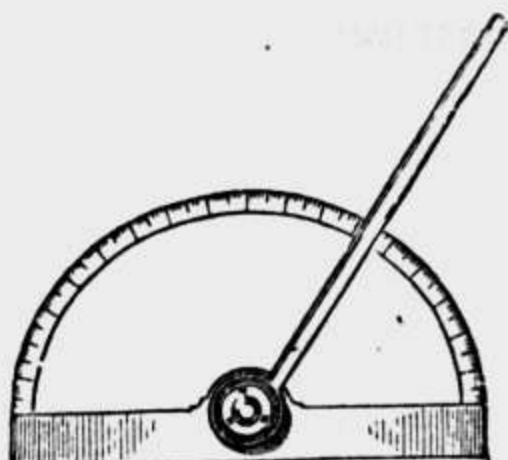


3270.

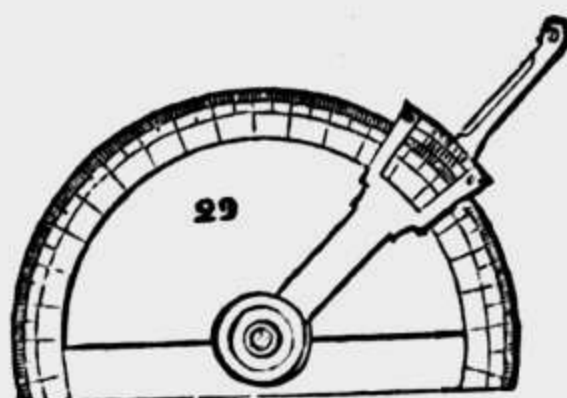


3275.

3270.	Horn Protractor, 4-inch Diameter, ½ Circle.....	\$ 0 25
3271.	“ “ 5 “ “ “ ½ degrees .....	0 50
3272.	“ “ 6 “ “ “ ½ “ .....	0 75
3273.	“ “ 7 “ “ “ ½ “ .....	1 00
3274.	“ “ 8 “ “ “ ½ “ .....	1 25
3275.	Brass “ 4 “ “ “ “ .....	0 25
3276.	“ “ 4½ “ “inside Centre ½ Circle.....	0 50
3277.	German Silver Protractor, 4 inches diameter, ½ Circle.....	0 75
3278.	“ “ “ 5 “ “ ½ “ ½ degrees... ..	1 25
3279.	“ “ “ 6 “ “ ½ “ ½ “ ... ..	1 50
3280.	“ “ “ 7 “ “ ½ “ ½ “ ... ..	3 25
3281.	“ “ “ fine quality, bevelled edges, ½ circle, ½ degree, 4 inches diameter.....	1 75
3282.	G. S. Protractor, 5 inches diameter, ½ circle, ½ degrees, finest quality	2 50
3283.	“ “ 6 “ “ ½ “ ¼ “ “ “ .....	4 00
3284.	“ “ 7 “ “ ½ “ ¼ “ “ “ “ .....	4 50
3285.	“ “ 8 “ “ ½ “ ¼ “ “ “ “ .....	5 00
3286.	“ “ 4 “ “in. centre ½ dz. ½ “ “ “ .....	3 50
3287.	“ “ 5 “ “ “ “ ½ “ “ “ “ .....	4 00
3288.	“ “ 6 “ “ “ “ ½ “ “ “ “ .....	4 50
3289.	“ “ 8 “ “ “ “ ¼ “ “ “ “ .....	6 00



3290.

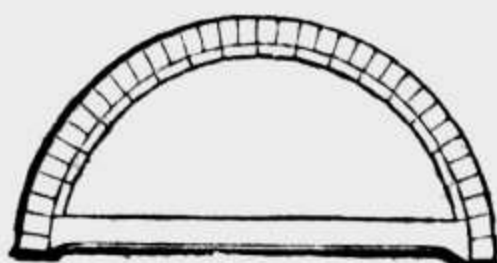


3293.

No.		Price.
3290.	German Silver Protractor, with Horn centre and moveable Arm, $\frac{1}{2}$ circle, $\frac{1}{2}$ degrees, 5 inches diameter.....	\$ 7 50
3291.	German Silver Protractor, with Horn centre and moveable Arm, $\frac{1}{2}$ circle, $\frac{1}{2}$ degrees, 6 inches diameter.....	8 00
3292.	German Silver Protractor, with Horn centre and moveable Arm, $\frac{1}{2}$ circle, $\frac{1}{4}$ degrees, 8 inches diameter.....	10 00
3293.	German Silver Protractor, with Horn centre and moveable Arm, and Vernier, $\frac{1}{2}$ circle, $\frac{1}{2}$ degrees, 5 inches diameter.....	9 00
3294.	German Silver Protractor, with Horn centre and moveable Arm, and Vernier, reading to three minutes, $\frac{1}{2}$ circle, $\frac{1}{2}$ degrees, 6 inches diameter. ....	11 50
3295.	German Silver Protractor, with Horn centre and moveable Arm, and Vernier, reading to minutes, $\frac{1}{2}$ circle, $\frac{1}{4}$ degrees, 8 inches diameter.....	16 00
3296.	German Silver Protractor, whole circle, 5 inches diameter, $\frac{1}{2}$ degrees .....	\$7 50
3297.	German Silver Protractor, whole circle, 6 inches diameter, $\frac{1}{2}$ degrees.....	9 00
3298.	German Silver Protractor, whole circle, 8 inches diameter, $\frac{1}{4}$ degrees.....	12 00
3299.	German Silver Protractor, whole circle, with Horn centre and moveable Arm, 5 inches diameter, $\frac{1}{2}$ degrees.....	9 50
3300.	German Silver Protractor, whole circle, with Horn centre and moveable Arm, 6 inches diameter, $\frac{1}{2}$ degrees.....	11 75
3301.	German Silver Protractor, whole circle, with Horn centre and moveable Arm, 8 inches diameter, $\frac{1}{4}$ degrees.....	15 00
3302.	German Silver Protractor, whole circle, with Arm and Vernier, Horn centre, 5 inches diameter, $\frac{1}{2}$ degrees .....	12 00
3303.	German Silver Protractor, whole circle, with Horn centre, moveable Arm and Vernier, reading to three minutes, 6 inches diameter.....	14 50
3304.	German Silver Protractor, whole circle, with Horn centre, moveable Arm, and Vernier, reading to minutes, 8 inches diameter	16 25
3305.	German Silver Protractor, $\frac{1}{2}$ circle, with Horn centre, moveable Arm and Vernier, with needle point dotter, reading to three minutes, 6 inches diameter, a new and very desirable instrument.....	16 00
3306.	German Silver Protractor, $\frac{1}{2}$ circle, with Horn centre and Vernier, with needle point dotter, reads to minutes, 8 inches diameter...	22 00



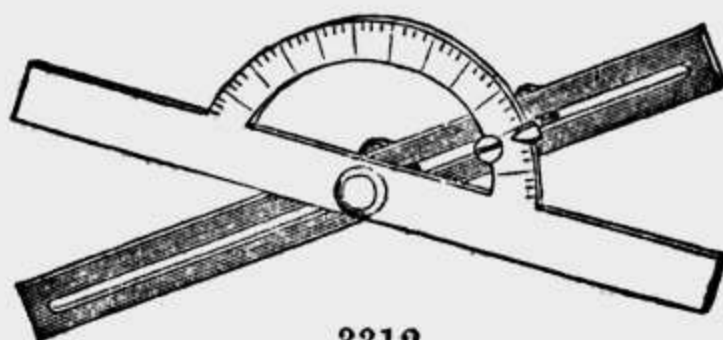
## Swiss Protractors of German Silver.



3307.

No.								Price.
3307.	German Silver Protractor,	$\frac{1}{2}$ circle,	$\frac{1}{2}$ degrees,	$4\frac{1}{4}$ in.	outside centre,			\$ 1 80
3308.	"	"	"	$4\frac{3}{4}$	"	"		2 50
3309.	"	"	"	$5\frac{1}{2}$	"	"		4 00
3310.	"	"	"	5	"	inside centre,		2 75
3311.	"	"	"	$5\frac{3}{4}$	"	"		4 50

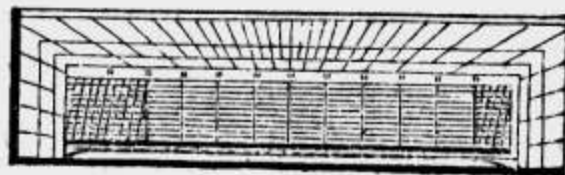
## Bevel Protractors.



3312

3312.	Bevel Protractor, all steel, with Arm 6 inches long, divided to degrees for machinists.....	\$ 6 00
3313.	Bevel Protractor, all steel, with Arm 10 inches long, divided to degrees, for machinists.....	6 50
3314.	German Silver Protractor, 6-inch diameter, $\frac{1}{2}$ degrees, with Composition Blade 40 inches long.....	20 00
3315.	Paper Protractors, $\frac{1}{2}$ circle, 4 to 12 inches diameter.....	25 to .40
3316.	" " whole circle, 4 to 12 " " .....	25 to .40

## Ivory Protractors.



3320.

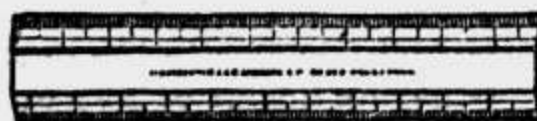
3320.	Ivory Protractor, 6 inches long, $1\frac{3}{4}$ inches wide, whole degrees, with 6 scales of equal parts, 4 scales of feet and inches, 2 scales of chords and diagonal scale.....	\$ 1 50
3321.	Ivory Protractor, 6 inches long, $1\frac{3}{4}$ inches wide, $\frac{1}{2}$ degree, 8 scales of equal parts, 10 scales of feet and inches, 2 scales of chords, diagonal scale and line of 40 on lower edge.....	3 50
3322.	Ivory Protractor, 8 inches long, 2 inches wide, $\frac{1}{2}$ degree, 8 scales of equal parts, 10 scales of feet and inches, 2 scales of chords,	



No.		Price.
	diagonal scale, and line of 40 on lower edge.....	\$ 5 75
3323.	Ivory Protractor, 12 inches long, 2½ inches wide, ½ degree, with 10 scales of equal parts, 12 scales of feet and inches, 2 scales of chords, diagonal scale, and line of 40 on lower edge.....	12 00



3328.



3329.

3328.	Ivory Plotting Scale, 6 inches long, same as in school cases of instruments.....	\$ 0 80
3329.	Ivory Chain Scale, 12 in. long, graduated on two edges 10 and 20,	3 75
3330.	“ “ “ “ “ “ 20 “ 40,	3 75
3331.	“ “ “ “ “ “ 40 “ 60,	3 75
3332.	“ “ “ “ “ “ 30 “ 50,	3 75
3333.	“ “ “ “ “ “ 50 “ 60,	3 75

## Boxwood Scales.



3340.

3340.	Boxwood Scales, 6 inches long, same as in School Cases of Instruments. ....	\$ 30
3341.	Boxwood Scales, 12 inches long, graduated to eighths of an inch, for Schools of Design.....	1 00
3342.	Boxwood Gunter Scales.....	1 00



3345

3345.	Triangular Scale of Boxwood, 24 inches long, for Engineers, graduated to 10, 20, 30, 40, 50, and 60 to the inch.....	\$ 5 00
3346.	Triangular Scale of Boxwood, 12 inches long.....	2 00
3347.	“ “ “ 8 “ “ .....	1 75
3348.	“ “ “ 6 “ “ .....	1 50
3349.	Triangular Scale of Boxwood, 24 inches long, for Architects, graduated to ¾, ⅓, ⅕, ¼, ⅓, ½, ¾, 1, 1½, 3 inches, and 16ths to the foot.....	5 00
3350.	Triangular Scale of Boxwood, 12 inches long.....	2 00
3351.	“ “ “ 8 “ “ .....	1 75
3352.	“ “ “ 6 “ “ .....	1 50
3353.	Triangular Scale, same as No. 3350 or No. 3346, with Parallel Rule Attachment.....	5 00

## Paper Scales.

3355.	Paper Scales, nineteen inches long, 1½ inches wide, for Architects and Engineers, in sets of six.	
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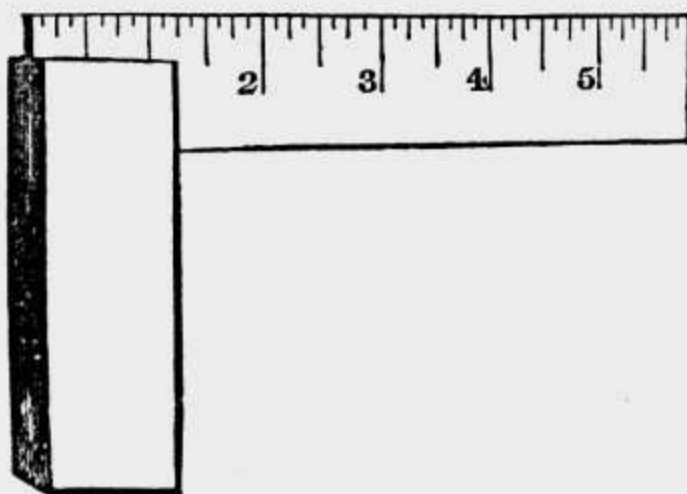
No.		Price.
	Series A contains 6 Scales, one each, divided to $\frac{1}{4}$ , $\frac{1}{2}$ , $\frac{3}{4}$ , 1, $1\frac{1}{2}$ , and 3 inches to the foot—per set,.....	\$ 1 00
	Series B contains 6 Scales, one each, divided to $\frac{3}{32}$ , $\frac{1}{8}$ , $\frac{3}{16}$ , $\frac{5}{16}$ , $\frac{3}{8}$ , and $\frac{7}{8}$ of an inch to the foot—per set,.....	1 00
	Series C contains 6 Scales, one each, divided to 10, 20, 30, 40, 50 and 60 parts to the inch—per set,.....	1 00
	Separate Scales of any of the above, 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 Rules.

### UNITED STATES STANDARD

3356.	Steel Rule, 24 inches long, divided to 8ths, 10ths, 12ths, 14ths, 16ths, 20ths, 24ths, 28ths, 32ds, 48ths, 50ths, 64ths, and 100ths of an inch.....	\$ 4 00
3357.	Steel Rule, 12 inches long,.....	2 00
3358.	" " 9 " " .....	1 50
3359.	" " 6 " " .....	1 00
3360.	" " 4 " " .....	75
3361.	" " 3 " " .....	50
3362.	Steel Shrink Rule, $24\frac{1}{2}$ inches long, divided to $\frac{1}{8}$ and 32ds, for Moulders and Machinists.....	4 50
3363.	Steel Shrink Rule, $24\frac{1}{2}$ inches long, graduated as above, and one side graduated to inches.....	4 50
3364.	Boxwood Shrink Rule, $24\frac{1}{2}$ inches long, graduated like No. 3362.	2 50

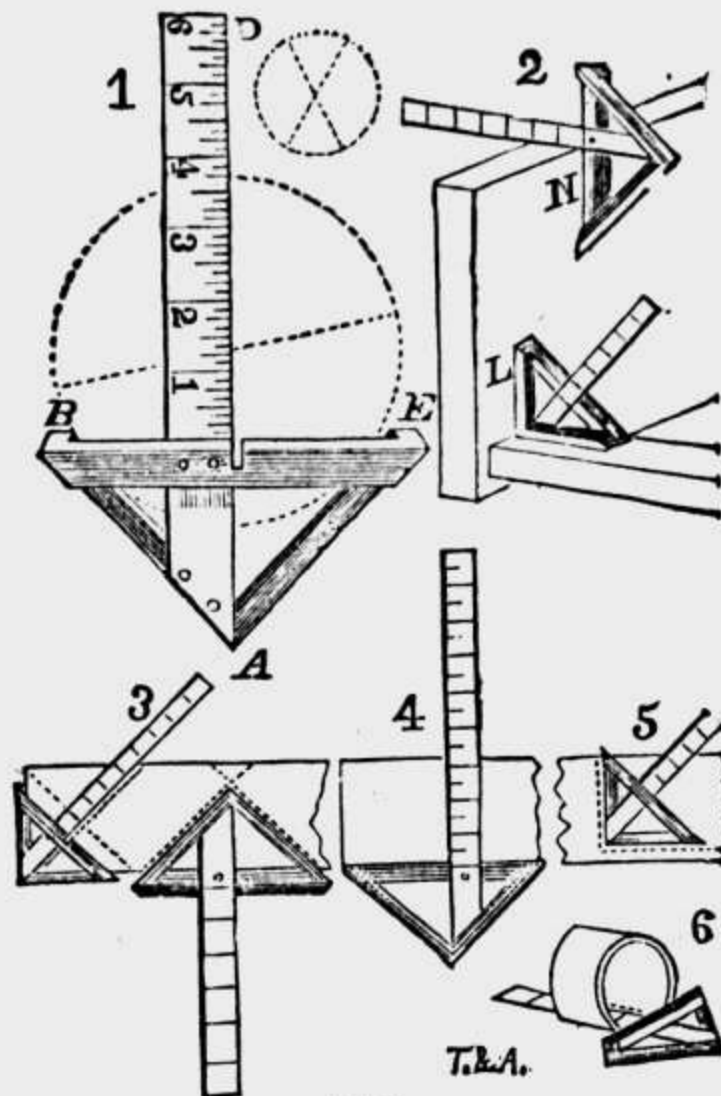
## Steel Squares, for Machinists.



3367.

3365.	Steel Square, Blade 12 inches long, divided to 32ds,.....	\$ 6 00
3366.	" " " 9 " " " " .....	4 00
3367.	" " " 6 " " " " .....	3 50
3368.	" " " 4 " " " " .....	3 00
3369.	" " " 3 " " " " .....	2 50

# Ames' Patent Universal Square.



3370.

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

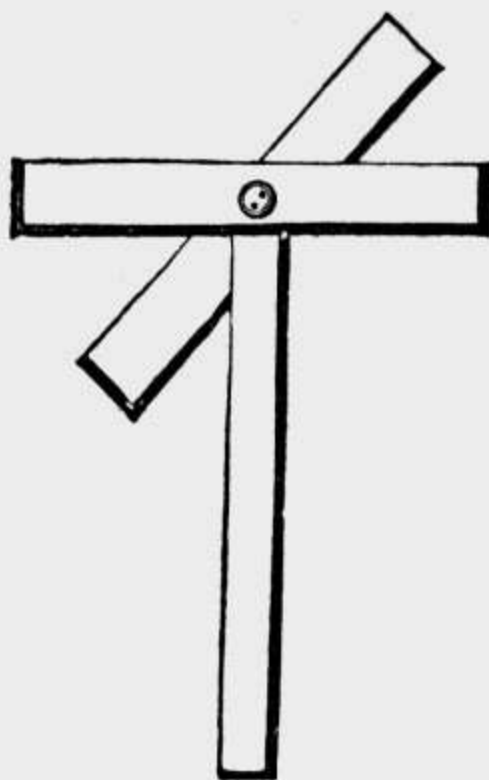
*Fig. 1* explains its application as a CENTRE-SQUARE. Put the instrument over the circle, as the end of a bolt or shaft, with the arms, B A, E A, resting against the circumference, in which position, one edge of the rule, A D, will cross the centre. Mark a straight line in this position; apply the instrument 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 MITRE—*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 Carpenters' Try-Square, T-Square and Mitre, 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."—*Sc. Amer.*, Sept. 22, 1855.

No.		Price.
3370.	Ames Patent Universal Square Blade, 12 inches long,.....	\$ 5 00
3371.	" " " " " 10 " " .....	4 50
3372.	" " " " " 8 " " .....	4 00
3373.	" " " " " 6 " " .....	3 50





8375.

**T SQUARES.**

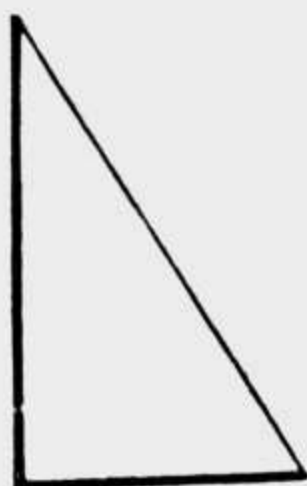
No.		Price.
3375.	T Square, Fixed Head Blade, 18 inches long each.....	\$0 75
3376.	" " " " 24 " " ..... 75 and	1 25
3377.	" " " " 30 " " .....	0 90
3378.	" " " " 36 " " .....	1 00
3379.	" Swivel " " 18 " " .....	1 50
3380.	" " " " 24 " " .....	1 75
3381.	" " " " 27 " " .....	2 00
3382.	" " " " 30 " " .....	2 00
3383.	" " " " 36 " " .....	2 50
3384.	T Square, Swivel Head Blade, made of three kinds of wood, 24 inches long each.....	2 00
3385.	T Square, Swivel Head Blade, made of three kinds of wood, 30 inches long each.....	2 00
3386.	T Square, Swivel Head Blade, made of three kinds of wood, 36 inches long each.....	2 50
3387.	T Square, Swivel Head Blade, with brass edges, 30 in. long each.	3 25
3388.	" " " " " " " 36 " " .....	3 75
3389.	" Head, takes off, and blade can be used as a rule. Blade, 30 inches long.....	2 25
3390.	T Square Head, takes off, and blade can be used as a rule. Blade, 36 inches long.....	2 50

**Steel Straight Edges.**

	Steel Straight Edges, 72 inches long.....	\$ 15 00
3391.	" " " 48 " .....	10 00
3392.	" " " 36 " .....	7 50
3393.	" " " 30 " .....	5 00
3394.	" " " 24 " .....	3 50

Steel Straight Edges, and Steel Blades for T Squares, made to order, of any length.

## Triangles, Squares and Curves.



3395.



3407.



3408.

No.		Price.
3395.	Whitewood Triangles, 30, 60 and 90 degrees, perpendicular, 5 to 9 inches long.....	\$ 0 25
3396.	Whitewood Triangles, 30, 60 and 90 degrees perpendicular, 9 to 12 inches long.....	0 35
3397.	Whitewood Triangles, 45, 45 and 90 degrees.....	0 25
3398.	Triangle, framed of three kinds of wood, open centre, 30, 60 and 90 very well-made perpendicular, 9 inches long.....	1 00
3399.	Triangle, framed of three kinds of wood, open centre, 45, 45 and 90 perpendicular, 6 inches long.....	1 00
3400.	Triangle, India Rubber, perpendicular, 6 inches long, 30, 60 and 90 degrees, and 45, 45 and 90 degrees.....	1 00
3401.	Triangle, India Rubber, open centre, perpendicular, 7 to 10 inches long, 30, 60 and 90 degrees.....	1 25
3402.	Triangle, India Rubber, open centre, perpendicular, 6 to 8 inches long, 45, 45 and 90 degrees.....	1 25
3403.	German Silver Triangle, 30, 60 and 90 degrees perpendicular, 6 to 7 inches long.....	2 50
3404.	German Silver Triangle, 30, 60 and 90 degrees perpendicular, 8 to 10 inches long.....	4 00
3405.	German Silver Triangle, 45, 45 and 90 degrees perpendicular, 4 to 5 inches long.....	2 25
3406.	German Silver Triangle, 45, 45 and 90 degrees, perpendicular, 6 to 7 inches long.....	4 00
	Nos. 3403 to 3406 are made with Ivory buttons inserted in the German Silver, to prevent the triangle from soiling the paper; the larger sizes have handles.	
3407.	German Silver Squares, perpendicular, 6 inches long.....	1 10
3408.	Whitewood Irregular Curves, various patterns..... each	0 25
3409.	Horn " " " " .....	1 00
3410.	Drawing Board, half size, 15 by 21 inches.....	2 50
3411.	" " whole " 30 " 42 " .....	8 00

## Parallel Rules.



3420.

No.		Price.
3420.	Parallel Rules, Ebony, brass mounted, 6 inches long.....each	\$ 0 35
3421.	" " " " " 9 " .....	0 75
3422.	" " " " " 12 " .....	1 00
3423.	" " " " " 15 " .....	1 25
3424.	" " " Ger. Silver " 6 " .....	0 50
3425.	" " all brass, 12 " .....	4 00
3426.	" " " 15 " .....	4 75
3427.	" " " 18 " .....	6 50
3428.	" " " on Rollers, 9 " .....	6 00
3429.	" " " " 12 " .....	8 75
3430.	" " " " 15 " .....	10 00
3431.	" " Ebony Ivory edges, Rollers graduated, 12 in. long, "	6 00

## STEEL CALIPER RULES.

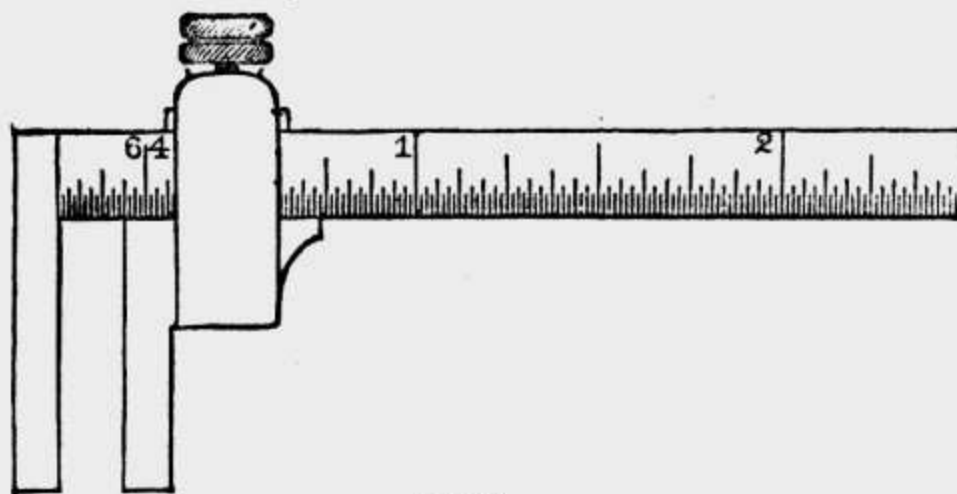


3439.

The above cut is a fac-simile of one side of these rules. The other side is divided into 12ths, 24ths, 48ths, 8ths, 14ths, and 28ths, on the outside, and upon the slide to 32ds & 64ths of inches. When closed they are 3 inches long. The caliper can be drawn out to measure two and a half inches. The thickness of the rule is one-tenth of an inch. The advantages claimed are their superior accuracy and durability, price,.....

\$ 3 00

## Caliper Square.



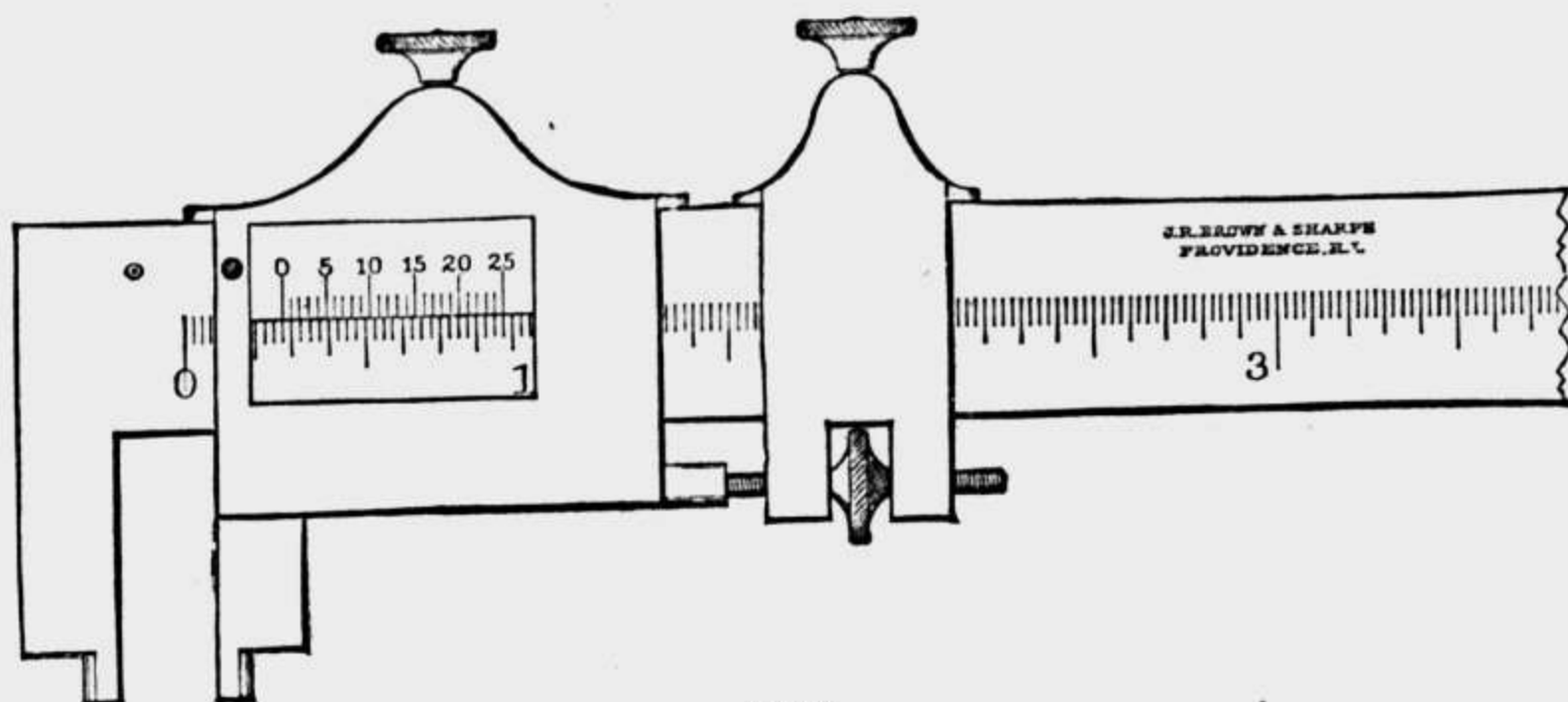
3440.

3440.	Caliper Square, 2 inches long .....	\$ 2 50
3440½.	" " 3 " " .....	3 50



# Vernier Caliper.

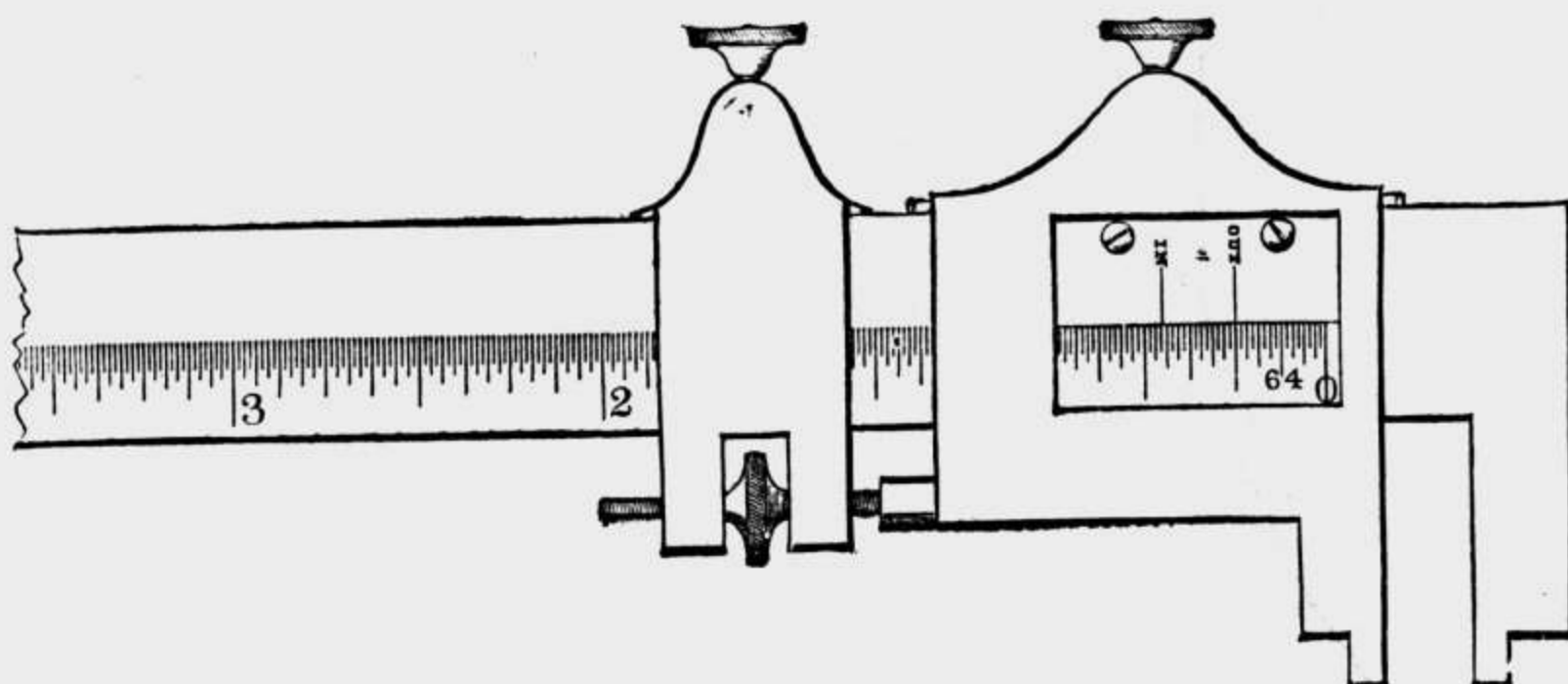
FRONT SIDE.



3441.

- |       |   |          |
|-------|---|----------|
| No.   |   | Price.   |
| 3441. | Vernier Caliper, 6 inches long. The above cut is a fac-simile of one side of the Vernier Caliper, which reads to thousandths of inches. The other side reads to 50th and 64th of an inch, without a Vernier. This instrument is furnished with both inside and outside Calipers, and points, to transfer the distance with dividers. An explanation accompanies each instrument. These instruments are made of steel, and have the points tempered, in Morocco Box..... | \$ 12 00 |

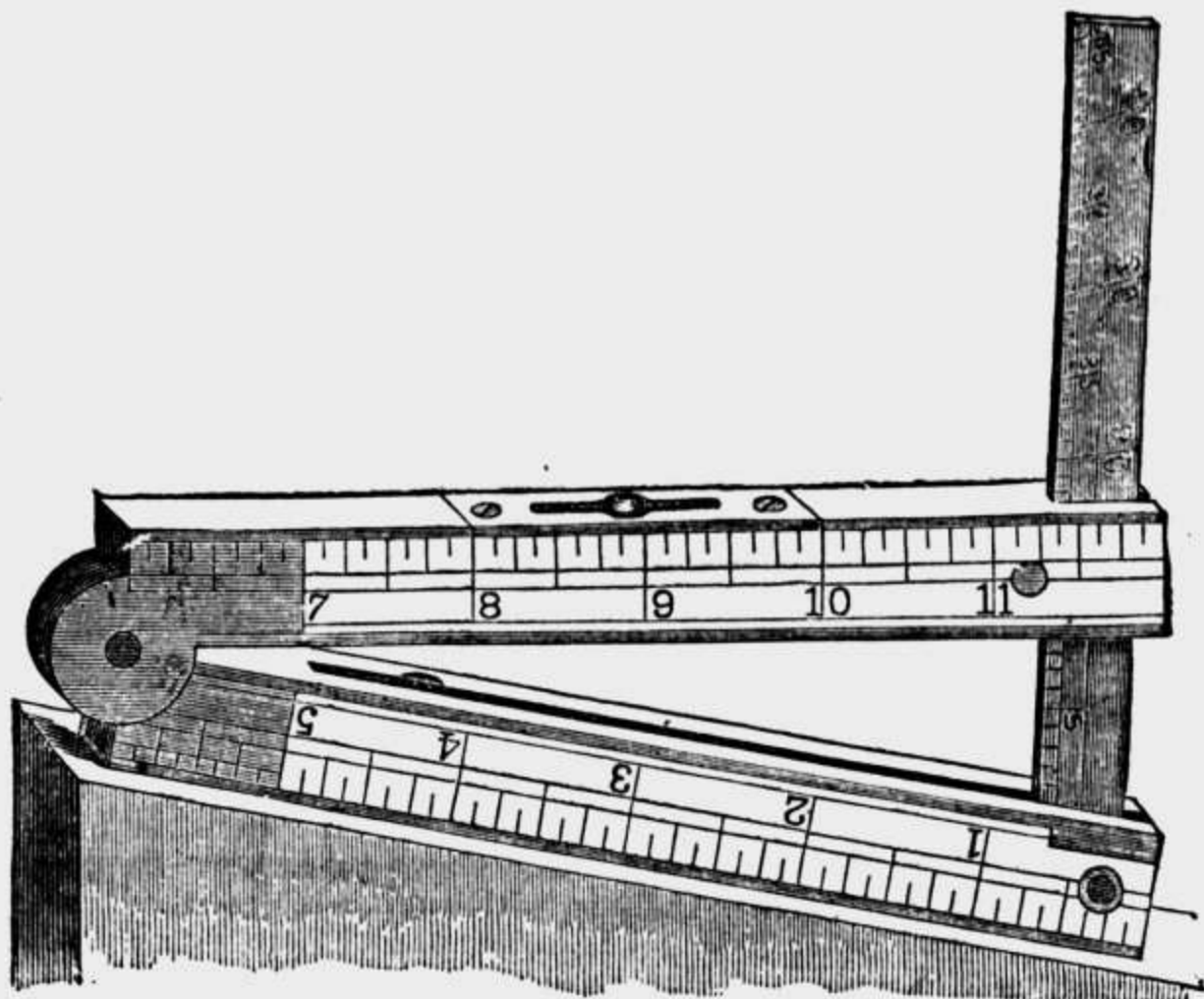
BACK SIDE.



3441.

- |       |  |       |
|-------|--|-------|
| 3442. | Vernier Caliper, 12 inches long, same as 3441, in Morocco Box, | 18 00 |
|-------|--|-------|

## Combination Clynometer Rule.

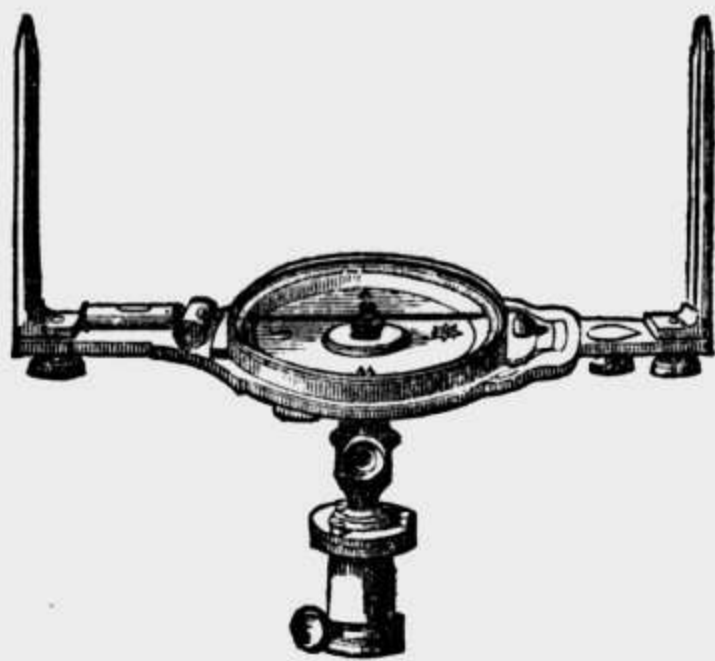


3443.

No.		Price.
3443.	Combination Clynometer Rule; being the very best form of Slope Level yet invented. It combines within itself—Slope Level for Miners, Carpenters' 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 application are perfectly reliable. One foot—two fold. Boxwood.....	\$ 4 00
3444.	Combination Rule, Ivory. One foot—two fold—same as above... A Book giving directions and explanations, for using the Rule, accompany each Rule.	8 50
3445.	Engineer's Slide Rule. Boxwood, 24 inches long—two fold, with Slide and Book ...	2 50
3446.	Boxwood Rule, 1 foot, 4 fold, - - divided to 8th and 16th,	0 75
3447.	" " 1 " 4 " wide " " "	0 75
3448.	" " 1 " 4 " brass edges, " " "	1 00
3449.	Ivory " 1 " 4 " brass mounted, " " "	1 00
3450.	" " 1 " 4 " German Silver mounted " " "	1 50
3451.	" " 1 " 4 " brass edges, " " "	3 50
3452.	" " 1 " 4 " German Silver edges, " " "	2 75 & 4 25
3453.	Boxwood " 2 " 4 " brass mounted, " " "	0 50
3454.	" " 2 " 4 " brass edges, " " "	1 25
3455.	Ivory " 2 " 4 " German Silver mounted " " "	3 00
3456.	" " 2 " 4 " " " edges,.....	7 50
3457.	Boxwood " 2 " 6 " ..... 1 25 and	2 00
3458.	Ivory " 2 " 6 " ..... 6 50 and	7 50

# Surveying Instruments.

## Surveyor's Compasses.

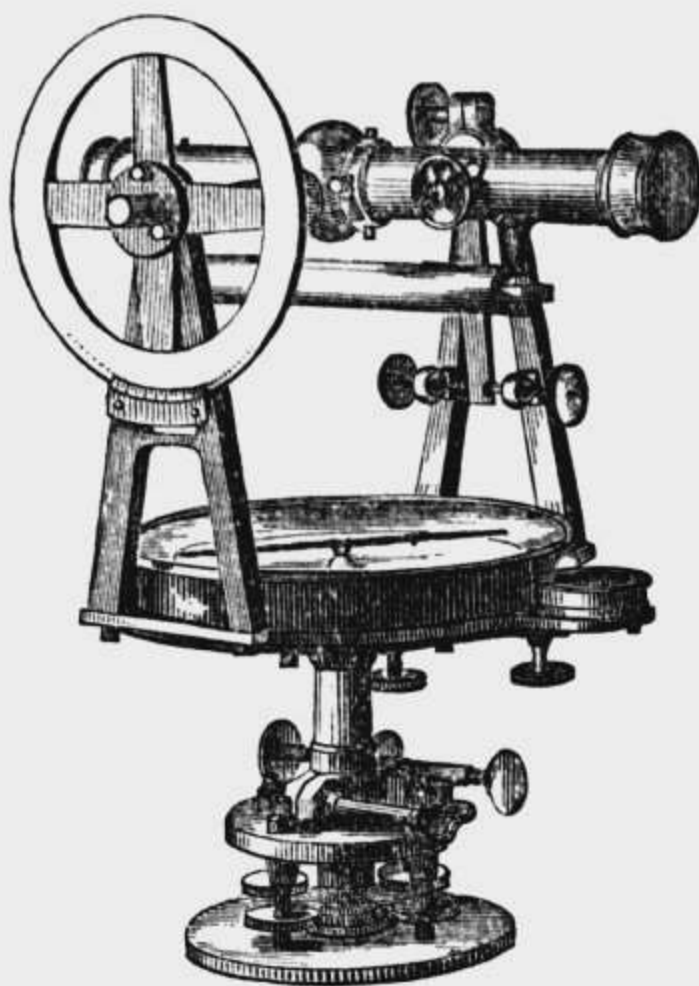


3509

No.		Price.
3500.	Surveyor's Compass, 4 inch needle, 10 inch plate, 1 straight level, ball and socket,.....	\$25 00
3501.	Surveyor's Compass, 4½ inch needle, 12 inch plates, 1 straight level and out-keeper, with cover.....	30 00
3502.	Surveyor's Compass, 5 inch needle, 14 inch plate, circular level and out-keeper, ring divided to half degrees, with cover.....	40 00
3503.	Surveyor's Compass, 5 inch needle, 14 inch plate, circular level, nonius and outkeeper, ring divided to half degrees, with cover,	50 00
3504.	Surveyor's Compass, 5½ inch needle, 15 inch plate, circular level and outkeeper, ring divided to half degrees, with cover,.....	46 00
3505.	Surveyor's Compass, 5½ inch needle, 15 inch plate, circular level, nonius and outkeeper, ring divided to half degrees, with cover,	56 00
3506.	Surveyor's Compass, 6 inch needle, 16 inch plate, circular level and outkeeper, ring divided to half degrees, with cover,.....	50 00
3507.	Surveyor's Compass, 6 inch needle, 16 inch plate, circular level, outkeeper and nonius, ring divided to half degrees, with cover,	60 00
The above Compasses are all made by Wm. J. Young & Co., and are each furnished with a ball and socket, and a neat wooden box.		
3509.	Surveyor's Compass, 5 inch needle, 15 inch plate, 2 straight levels nonius and outkeeper, ball and socket, .....	50 00
3510.	Surveyor's Compass, 6 inch needle, 16 inch plate, 2 straight levels, nonius and outkeeper, and ball and socket,.....	60 00



## Engineer's and Surveyor's Transit.



3513.

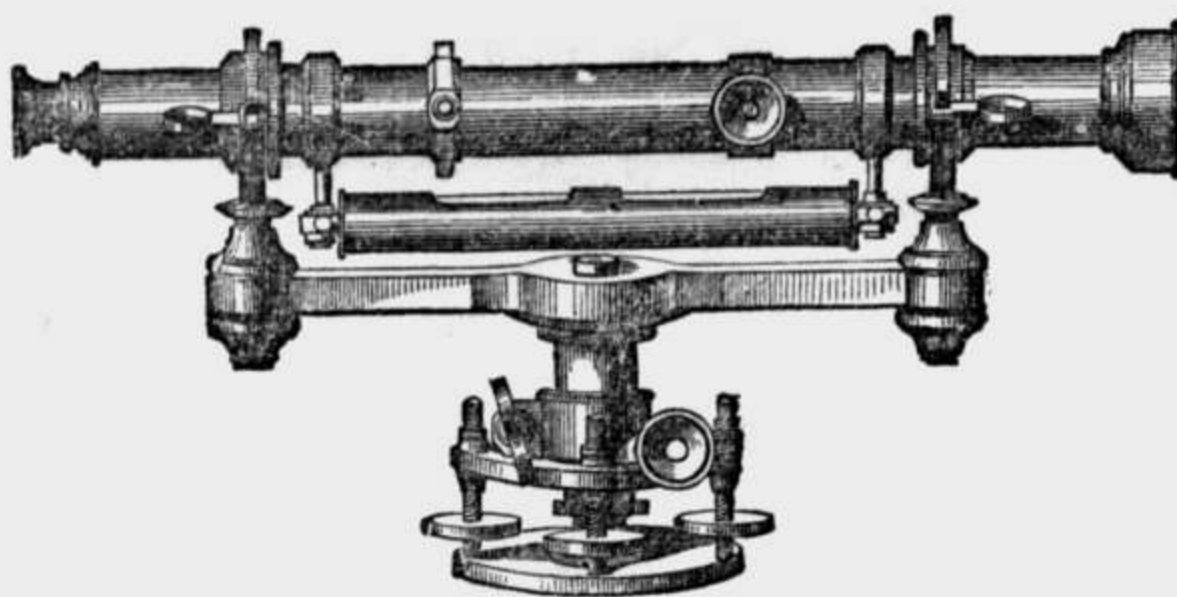
No.		Price.
3512.	Transit, plain, circular plate, tangent movement, 2 straight levels, outside vernier, 10 inch telescope, rack and pinion, movable tripod, 4½ inch needle,.....	\$160 00
3513.	Transit, level to telescope, arc, poising screws and clamp, 4½ inch needle, movable reading glass to vernier, tangent movement, clamp and leveling screws to tripod head, with tripod. Transit is packed in a neat wooden box, with leather strap and handle.	200 00
3514.	Transit, same as No. 3512; but has 5 inch needle to compass,.....	160 00
3515.	Transit, same as No. 3513; but has 5 inch needle to compass,.....	200 00

Each of the Transits have Young's patent tripod head, by which the Instrument can readily be moved directly over the point, after being approximately set by the legs.

The above Transits are made by Wm. J. Young & Co., and are warranted. They are sold at manufacturers' prices.

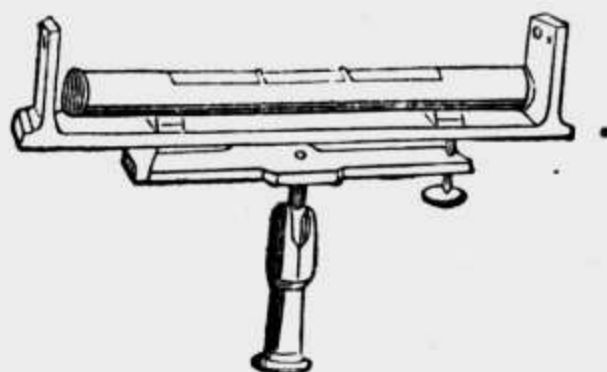
3518.	Jacob Staff,.....	2 50
3519.	Compass Tripod,.....	8 00
3520.	Ball and socket, without Tangent Screw,.....	6 00
3521.	“ “ with “ “ .....	15 00
3522.	Marking Pins, per set of 11,.....	1 65

## Engineer's Level.



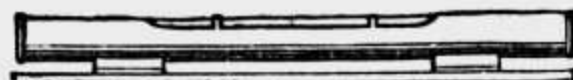
3525.

No.		Price.
3525.	A seventeen inch $\nabla$ Level, of the very best construction, made by Wm. J. Young & Co. Rack and pinion adjustment to object glass, adjustment to eye piece. Clamp and tangent movement; 4 leveling screws, with Tripod.....	\$140 00
3526.	Leveling Rod.....	15 00



3527.

3527.	Level, brass mounted, plate 12 inches long, with sights, and ball and socket joint, in wood case.....	\$ 20 00
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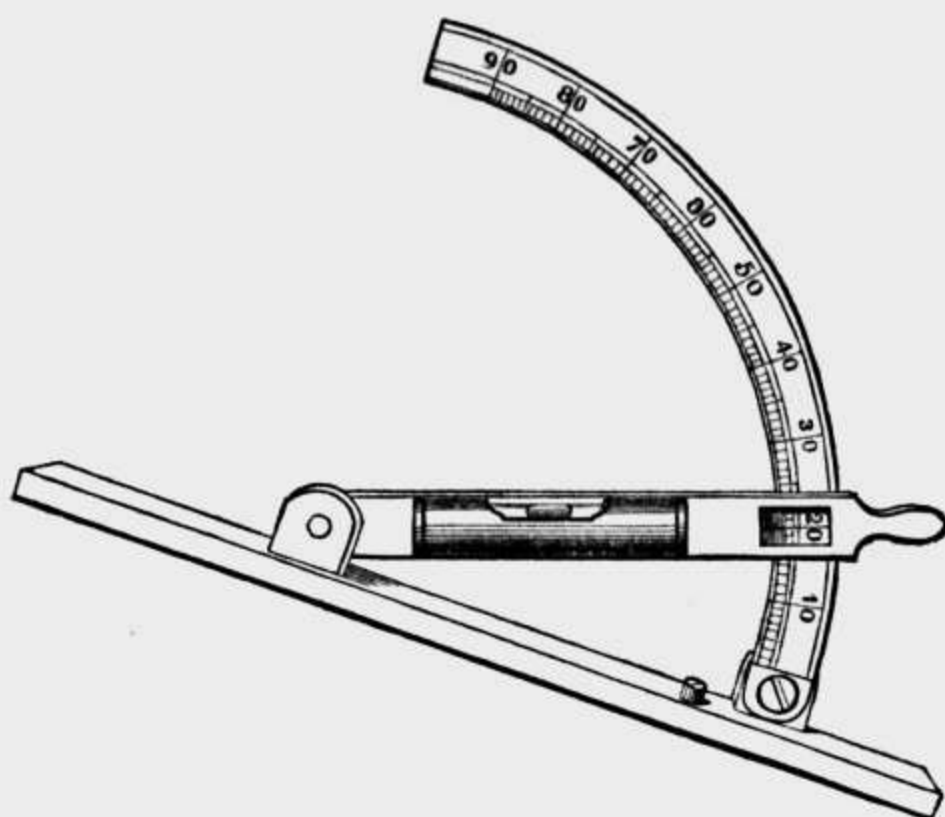


3528.

3528.	Levels, Brass mounted, 3 to 12 inches long, per inch.....	25
3529.	Levels, Brass mounted, with adjustment, 3 to 12 inches long, per inch.....	
3530.	Level Bulbs, unmounted, 2 to 6 inches long.....	12 to 50
3531.	Level Bulbs, unmounted, ground, 2 to 6 inches long.....	\$1 00 to 5 00

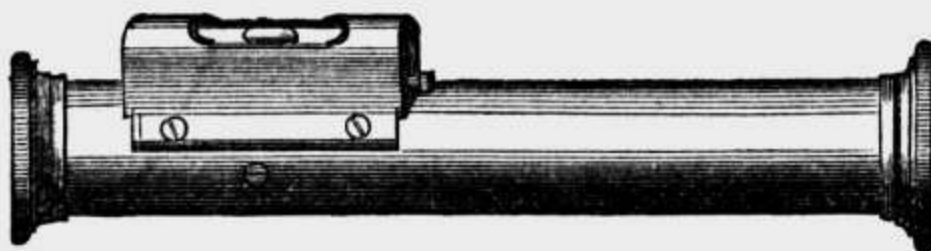
# Levels.

## SLOPE LEVELS.



3535.

No.		PRICE.
3535.	Slope Level, or Clinometer, base $8\frac{1}{2}$ inches long, in a neat wooden box, for Engineers.....	\$12 00
3536.	Slope Level, or Clinometer Square, for Miners, in a neat wooden box.....	10 00
3536 $\frac{1}{2}$ .	Slope Level, 6 inches long, of brass, with sights and arc, to give the angle of elevation. Ball and socket joint.....	16 00



3537.

3537.	Locke's Hand Level, made of German Silver.....	12 00
3538.	" " " " " Brass.....	10 00
3539.	Plumb Bobs, bronze, with screw cap and steel point.....	2 50
3540.	" " " without " " " " " " .....	2 00
3541.	" " iron " " " " " " " " .....	75



3539.



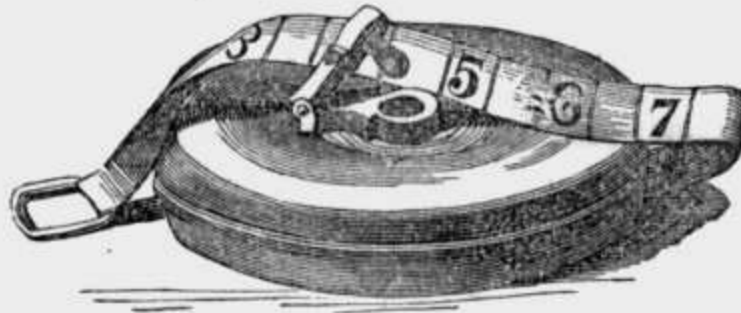
## Surveyor's Chains.



3550.

No.							PRICE.
3550.	Surveying Chain, 2 pole, 50 links, No. 7 Wire.....						\$ 3 25
3551.	" " 2 " 50 " " 8 " .....						2 00
3552.	" " 2 " 50 " " 9 " .....						1 60
3553.	" " 4 " 100 " " 7 " .....						5 00
3554.	" " 4 " 100 " " 8 " .....						4 00
3555.	" " 4 " 100 " " 9 " .....						3 30
3556.	Engineer's Chain, 50 feet, 50 links, No. 6 Wire.....						5 75
3557.	" " 50 " 50 " " 7 " .....						5 25
3560.	" " 100 " 100 " " 6 " .....						11 00
3561.	" " 100 " 100 " " 7 " .....						7 25
3562.	" " 100 " 100 " " 8 " .....						6 25
3563.	" " 100 " 100 " " 9 " .....						5 50

## Tape Measures.



3570.

## CHESTERMAN'S STEEL TAPE MEASURE.

All Steel, in Leather Cases, the most accurate, Durable, and Portable Measure.

3565.	Steel Tape Measure, 100 feet long, in 10ths or 12ths, each....						\$ 22 50
3566.	" " " 66 " " 10ths " 12ths, " .....						15 50
3567.	" " " 50 " " 10ths " 12ths, " .....						12 50
3568.	" " " 33 " " 10ths " 12ths, " .....						9 00
3569.	" " " 10 " " 10ths " 12ths, in German Silver Case, each						4 50

## CHESTERMAN'S METALLIC TAPE MEASURES.

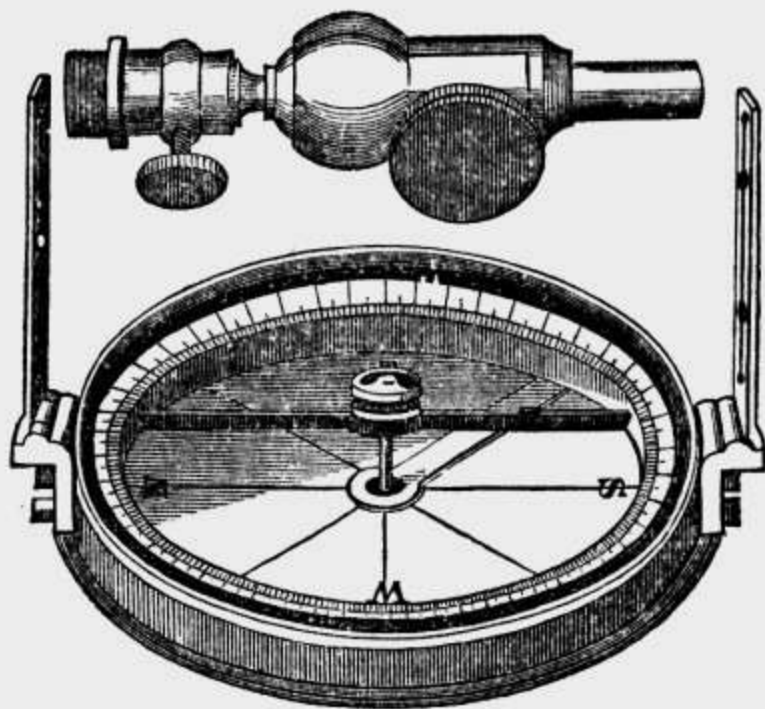
In Leather Cases, made of Linen Thread, interwoven with Fine Brass Wire, not so liable to stretch as the usual Linen Tape, and better calculated to withstand the effect of moisture. The best and finest article for general use.

3570.	Metallic Tape Measure, 100 feet long, in 10ths or 12ths, each.....						\$ 6 75
3571.	" " " 80 " " 10ths " 12ths, " .....						6 00
3572.	" " " 70 " " 10ths " 12ths, " .....						5 25
3573.	" " " 66 " " 10ths " 12ths, " .....						4 75
3574.	" " " 50 " " 10ths " 12ths, " .....						4 25
3575.	" " " 33 " " 10ths " 12ths, " .....						3 25

## POCKET TAPE MEASURES.

No.		Price.
3576.	Pocket Tape Measures, all steel, in German silver cases, with spring and stop, 6 feet, 10ths or 12ths, each.....	\$ 3 75
3577.	Pocket Tape Measures, all steel, in German silver cases, with spring and stop, 3 feet, 10ths or 12ths, each.....	2 00
3578.	Pocket Tape Measure, linen, in silver plated cases, with spring and stop, 6 feet, each.....	1 00
3579.	Pocket Tape Measure, linen, in silver plated cases, with spring and stop, 3 feet, each.....	75
3580.	Pocket Tape Measure, linen, in brass cases, with spring and brass, 6 feet each.....	1 00
3581.	Pocket Tape Measure, linen, in brass cases, with spring and brass, 3 feet each.....	75

## Pocket Compasses.

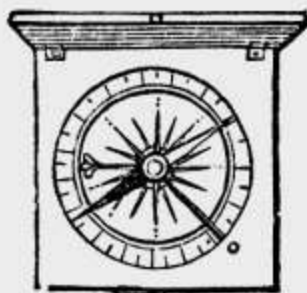


3582.

3582. Compasses of Brass,  $2\frac{1}{2}$  inches diameter, divided to degrees, with sights, and ball and socket joints, in neat morocco cases, each, \$12 00
3583. Compasses of Brass,  $3\frac{1}{2}$  inches in Diameter,..... 14 00
- A very useful pocket Instrument for the Engineer or Surveyor, in making rough surveys.



3593.



3588.



3584.

3584. Geological Compass of brass, with pendulum for ascertaining the angle of dip in rocks, 3 inches diameter, in morocco cases..... \$ 8 00





## American Paints.

### OSBORNE'S SUPERFINE WATER COLORS, WHOLE CAKES.

No.	PRICE.	No.	PRICE.
3610. Purple Madder.....	per cake, \$1 25	3610. Drake's Green,.....	per cake, \$ 25
Gallstone Madder,.....	" 1 25	Antwerp Blue,.....	" 25
Scarlet,.....	" 1 25	Bistre,.....	" 25
Smaltz,.....	" 1 25	Black,.....	" 25
Pink Madder,.....	" 1 15	Blue Black,.....	" 25
Burnt Carmine,.....	" 1 15	Blue Verditer,.....	" 25
Carmine,.....	" 1 15	Bronze,.....	" 25
Carminated Pink,.....	" 75	Brown Pink,.....	" 25
Madder Lake,.....	" 75	Burnt Ochre,.....	" 25
Brown Madder Lake,.....	" 75	Burnt Roman Ochre,.....	" 25
Cobalt Blue,.....	" 50	Burnt Sienna,.....	" 25
Cobalt Green,.....	" 50	Burnt Umber,.....	" 25
Indian Yellow,.....	" 50	Cologne Earth,.....	" 25
Scarlet Lake,.....	" 35	Chrome Yellow,.....	" 25
Yellow Lake,.....	" 35	Chrome Green,.....	" 25
Crimson Lake,.....	" 35	Dragon's Blood,.....	" 25
Purple Lake,.....	" 35	Emerald Green,.....	" 25
Payne's Grey,.....	" 35	Gamboge,.....	" 25
Permanent White,.....	" 35	Green Bice,.....	" 25
Purple,.....	" 35	Green Verditer,.....	" 25
Sepia,.....	" 35	Grey,.....	" 25
Indian Red,.....	" 25	Purple Brown,.....	" 25
Indigo,.....	" 25	Raw Sienna,.....	" 25
Intense Blue,.....	" 25	Raw Umber,.....	" 25
Ivory Black,.....	" 25	Red Lead,.....	" 25
Krem's White,.....	" 25	Red Chalk,.....	" 25
King's Yellow,.....	" 25	Red Orpiment,.....	" 25
Light Blue,.....	" 25	Roman Ochre,.....	" 25
Light Red,.....	" 25	Sap Green,.....	" 25
Lamp Black,.....	" 25	Terra Vert,.....	" 25
Naples Yellow,.....	" 25	Vandyke Brown,.....	" 25
Neutral Tint,.....	" 25	Venetian Red,.....	" 25
Olive Green,.....	" 25	Verdigris,.....	" 25
Prussian Blue,.....	" 25	Vermillion,.....	" 25
Prussian Green,.....	" 25	Yellow Ochre,.....	" 25
Orange,.....	" 25	Yellow Orpiment,.....	" 25

Half Cakes one-fifth less in price.

### OSBORN'S WATER COLORS IN BOXES.

Neat Walnut Boxes, with sliding tops, paint cups, crayon holder and brushes.

No.	PRICE.
3611. Walnut Box, 6 rows, containing 30 colors, brushes, etc.....	\$7 50
3612. " " 5 " " 25 " " " .....	6 50
3613. " " 4 " " 20 " " " .....	5 50
3614. " " 3 " " 15 " " " .....	4 50
3615. " " 2 " " 10 " " " .....	3 50

### HALF SIZE.

3616. Walnut Box, 6 rows, containing 30 colors, brushes, etc.....	4 75
3617. " " 5 " " 25 " " " .....	4 00
3618. " " 4 " " 20 " " " .....	3 50
3619. " " 3 " " 15 " " " .....	2 75
3620. " " 2 " " 10 " " " .....	2 00

Handsome Mahogany and Rosewood Chests.

3622. Mahogany Chest, fitted with lock and drawer, paint stone, water glass, india ink, brushes, crayon holder, rests, etc., with 12 colors.....	8 00
3623. Rosewood Chest, fitted with lock and drawer, paint stone, water glass, india ink, brushes, crayon holder, rests, etc., with 18 colors.....	10 00
3624. Rosewood Chest, fitted with lock and drawer, paint stone, water glass, india ink, brushes, crayon holder, rests, etc., with 24 colors.....	12 50

## WINDSOR AND NEWTON'S WATER COLORS.

No.	PRICE.	No.	PRICE.
3626. Burnt Carmine,.....	per cake, \$2 25	3626. Mars' Orange,.....	per cake, \$2 25
Cadmium Yellow,.....	" 2 25	Pure Scarlet,.....	" 2 25
Cadmium Orange,.....	" 2 25	Purple Madder,.....	" 2 25
Carmine,.....	" 2 25	Smalt,.....	" 2 25
Gallstone,.....	" 2 25	Ultramarine Ash,.....	" 2 25
Madder Carmine,.....	" 2 25		
Half cakes, \$1 10.			
Aureoline,.....	" 1 50	Lemon Yellow,.....	" 1 50
French Blue,.....	" 1 50	Pink Madder,.....	" 1 50
Green oxide of Chrome,.....	" 1 50	Rose Madder,.....	" 1 50
Intense Blue,.....	" 1 50		
Half Cakes, 75 cents.			
Cobalt Blue,.....	" 1 00	Violet Carmine,.....	" 1 00
Orange Vermillion,.....	" 1 00		
Half Cakes, 50 cents.			
Brown Madder,.....	" 80	Purple Lake,.....	" 80
Chinese White,.....	" 80	Roman Sepia,.....	" 80
Constant White,.....	" 80	Ruben's Madder,.....	" 80
Crimson Lake,.....	" 80	Scarlet Lake,.....	" 80
Indian Yellow,.....	" 80	Scarlet Vermillion,.....	" 80
Mars Yellow,.....	" 80	Sepia,.....	" 80
Neutral Orange,.....	" 80	Warm Sepia,.....	" 80
Half Cakes, 40 cents.			
Antwerp Blue,.....	" 40	King's Yellow,.....	" 40
Bistre,.....	" 40	Lamp Black,.....	" 40
Blue Black,.....	" 40	Light Red,.....	" 40
British Ink,.....	" 40	Naples Yellow,.....	" 40
Brown Ochre,.....	" 40	Neutral Tint,.....	" 40
Brown Pink,.....	" 40	Olive Green,.....	" 40
Burnt Roman Ochre,.....	" 40	Orange Chrome,.....	" 40
Burnt Sienna,.....	" 40	Payne's Grey,.....	" 40
Burnt Umber,.....	" 40	Prussian Blue,.....	" 40
Chrome Yellow,.....	" 40	Prussian Green,.....	" 40
Deep Chrome,.....	" 40	Raw Sienna,.....	" 40
Dragon's Blood,.....	" 40	Raw Umber,.....	" 40
Emerald Green,.....	" 40	Red Lead,.....	" 40
Flake White,.....	" 40	Roman Ochre,.....	" 40
Gamboge,.....	" 40	Sap Green,.....	" 40
Hooker's Green, No. 1,.....	" 40	Terra Vert,.....	" 40
" " 2,.....	" 40	Vandyke Brown,.....	" 40
Indigo,.....	" 40	Venetian Red,.....	" 40
Indian Red,.....	" 40	Vermillion,.....	" 40
Italian Pink,.....	" 40	Yellow Lake,.....	" 40
Ivory Black,.....	" 40	Yellow Ochre,.....	" 40
Half Cakes, 25 cents.			

## Lead Pencils.

No.		Price.
3650.	A. W. Faber's superior Siberian Lead Pencils, B. HB. & H., each 25 cents, per dozen.....	\$ 2 50
3651.	A. W. Faber's Hexagonal, Gilt, Nos. 1, 2, 3, 4, each 15 cents, per dozen.....	1 50
3652.	A. W. Faber's black, round and gilt, Nos. 1, 2, 3, 4, each 10 cents, per dozen.....	1 00
3653.	A. W. Faber's black, round and gilt Union, Nos. 1, 2, 3, 4, each 7 cents, per dozen.....	60
3654.	A. W. Faber's black, round and gilt, Star, Nos. 1, 2, 3, 4, each 5 cents, per dozen.....	50
3655.	A. W. Faber's Polygrades in boxes, 4 in each box, per box.....	1 50
3656.	" " " " 7 " " ".....	2 00
3657.	Eagle Pencils, 7 in each box, per box.....	1 25

3658.	Small Lead Pencils for Dividers, each 5 cents, per dozen.....	50
3659.	India Rubber, white, best quality, per piece.....	4 to 20
3660.	India Rubber and Ink Erasers.....	25
3661.	India Ink, good article.....per cake.....	15 to 30
3662.	“ “ best “ .....	30 to 1 00
3663.	“ “ pure “ small cake, \$1 00 each, large.....	8 00
3664.	Mouth Glue, per piece.....	05
3665.	Gillott's Mapping Pen's, per dozen.. ..	85
3666.	“ Lithograph Crow Quill, on cards per dozen .....	1 00
3667.	Erasing knives, each.....	50 to 75

### Brushes, &c.

3668.	Camel's Hair Pencils, common, per dozen.....	15
3669.	“ “ fine quality, 3 to 5 cents each, per dozen....	40
3670.	Sable, “ in quills, finest quality, 15 to 30 cents each, per dozen.....	2 50
3671.	Camel's Hair Pencils with polished handles, assorted, each.....	6 to 20
3672.	Sable “ “ “ “ “ “ “ .....	20 to 50

### Paint Slabs and Saucers.

#### PORCELAIN SLAES

*For India Ink and Colors, Containing three Holes or Cups and one Slanting Division.*

3673.	Porcelain Slab, 1½ X 2¾ inches, each.....	20
3674.	“ “ 2½ X 4 inches, each.....	40
3675.	“ “ 2½ X 4 inches, 3 holes and 3 divisions.....	40
3676.	“ “ 2½ X 4 inches, 3 divisions, best.....	40

### Porcelain Saucers in Nests.

3677.	Containing 6 Saucers 2 inches diameter, per nest.....	75
3678.	“ 6 “ 2½ “ “ “ .....	1 00
3679.	“ 6 “ 3 “ “ “ .....	1 25

### Engineers' Stationery, &c.

#### WHATMAN'S TURKEY MILL DRAWING PAPER.

3680.	Demy,	20 X 15 inches, per sheet	9 cents, per quire,...	1 50
3681.	Medium,	22 X 17 “ “ “	12 “ “ “ ...	2 00
3682.	Royal,	24 X 19 “ “ “	15 “ “ “ ...	3 00
3683.	Super Royal,	27 X 19 “ “ “	18 “ “ “ ...	3 50
3684.	Elephant,	28 X 22 “ “ “	20 “ “ “ ...	5 50
3685.	Imperial,	30 X 21 “ “ “	25 “ “ “ ...	5 50
3686.	Columbier,	34 X 23 “ “ “	30 “ “ “ ...	6 00
3687.	Atlas,	33 X 26 “ “ “	30 “ “ “ ...	6 00
3688.	Double Elephant,	40 X 26 “ “ “	40 “ “ “ ...	8 00
3689.	Antiquarian,	52 X 31 “ “ “	2 00 “ “ “ ...	35 00



**ENGINEERS' DRAWING PAPER IN ROLLS.***Very Strong, for Architects, Engineers, &c., &c.*

3690.	White, extra thick, 40 inches wide, in rolls, per yard,.....	30
3691.	" " " 54 " " " " .....	40
3692.	" " " 60 " " " " .....	50

**DRAWING PAPER ON MUSLIN.**

3693.	In rolls 8 yards long, and 40 inches wide, per yard,.....	1 50
3694.	" 8 " " 55 " " " " .....	2 00

**FRENCH TRACING PAPER.***Very fine quality, very clear and strong.*

3695.	In sheets. Royal, 19 X 25 inches, per sheet, 12 cents, per quire,	2 00
3696.	" Super Royal, 21 X 26 " 15 " " "	2 50
3697.	" Double Elephant, 28 X 40 " 20 " " "	4 00
3698.	In rolls 11 yards long and 43 inches wide, per yard,.....	30
3699.	" 22 " " 43 " " " " .....	30

**TRACING OR VELLUM CLOTH.***Saeger's Patent, Transparent, in Rolls.*

3700.	In rolls 16 inches wide and 24 yards long, per yard,.....	60
3701.	" 36 " " 24 " " " " .....	1 25

**PATTERN PAPER.***Buff Tint, very Strong and Thick.*

3702.	Double Thick, 36 inches, wide, in rolls, per yard,.....	18
3703.	" " 44 " " " " .....	25

**PROFILE AND CROSS-SECTION PAPER.**

3704.	Profile Paper, A, ruling 43 X 17 inches, horizontal ruling, 20 to the inch, per sheet,.....	60
3705.	Profile paper, B, ruling 43 X 17 inches, horizontal ruling 30 to the inch, per sheet,.....	60
3706.	Cross-Section Paper, 23 X 18 inches, 8 feet to inch, per sheet,.....	30
3707.	Trautwine's Cross-Section and Diagram Paper, 10 feet to inch, for embankments of 14 and 24 feet roadway, and for excavations of 18 and 28 feet; ruling 19 $\frac{3}{4}$ X 12 inches, per sheet,.....	30

## Miscellaneous.

### STANDARD WIRE GAUGES.



No.		Price.
3710.	Round Gauges, sizes 0 to 36,.....	\$ 2 50
3711.	“ “ “ 5 to 36,.....	3 50

### CENTRE GAUGES.



3712.	Centre Gauge, same size as cut, made of steel, for machinists,.....	\$ 50
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### WILLIS' ODONTOGRAPH.

3713. This is an instrument recently invented by Prof. R. Willis, of Cambridge University, England, for describing the correct form of the teeth of wheels, and the templets and cutters used in making them. All wheels of the same pitch, but of different sizes, having their teeth drawn with this instrument, will run together correctly. No. 1 is used for drawing the teeth of small wheels by diametrical pitch when only a single arc is required. Price, \$3 50, with drawings and directions for use. No. 2 is for drawing the teeth of larger wheels by circular pitch, where it is necessary to have separate arcs for flanks and faces.— Price, \$3 50, with drawings and directions for use. Price per pair,.....

6 00



## PENTAGRAPHS.

No.		Price.
3714.	Pentagraph made of walnut, for enlarging and reducing drawings,	\$ 4 50
3715.	Plain steel Calipers for outside measure, with adjusting screw.— Measure to $10\frac{1}{2}$ inches,.....	1 00
3716.	Plain steel Calipers for outside measure, with adjusting screw.— Measure to 7 inches,.....	75
3717.	Plain steel Calipers for outside measure, with adjusting screw.— Measure to $3\frac{1}{2}$ inches,.....	75
3718.	Steel Dividers, 8 inch, with arc, clamp screw and adjusting screw,	1 00
3719.	Steel Dividers, 6 inch, with arc, clamp screw, and adjusting screw	90
3720.	Steel Self-Registering Dividers, with clamp screw and adjusting legs, so that the points may always be kept true. Register to 3 inches. A new and very complete instrument,.....	1 50
3721.	Self-Registering Calipers for outside measure, with clamp screw. Register to 3 inches,.....	1 50
3722.	Self-Registering Calipers for outside measure, with clamp screw. Register to 2 inches,.....	1 00
3723.	Self-Registering Calipers, for outside measure, register to 2 inches,	80
3724.	Self-Registering Calipers, for outside measure, register to $1\frac{1}{2}$ inches,.....	60
3725.	Self-Registering Calipers for inside measure, with clamp screw, register to 3 inches,.....	1 50
3726.	Inside and Outside Calipers, to turn, .....	75
3727.	“ “ “ “ in one piece,.....	50

## MAGNIFYING GLASSES

*For Reading Verniers, &c., &c.*

3728	India Rubber 1 lens,	$\frac{1}{2}$ inch diameter,.....	\$ 50
3729.	“ “ 1 “	1 “ “ .....	75
3730.	“ “ 1 “	$1\frac{1}{4}$ “ “ .....	1 00
3731.	“ “ 1 “	$1\frac{1}{2}$ “ “ .....	1 25
3732.	“ “ 8 “	$\frac{3}{4}$ “ “ .....	1 25
3732.	German Silver, 2 lens,	$\frac{3}{4}$ “ “ .....	2 00
3733.	“ “ 1 lens,	$1\frac{1}{4}$ inches diameter,.....	2 00

Any other articles, not enumerated in the catalogue, will be furnished at the lowest price, and on the shortest notice.



## Books.

		Price.	Postage.
3740.	Level Books,.....each,	75	
3741.	Transit Books,.....each,	75	
3742.	Record Books,.....each,	1 25	
3743.	Gillespie's Land Surveying,.....each,	4 00	36
3744.	Gillespie's Manual of Road-Making,.....each,	2 00	20
3745.	Heather's Treatise on Mathematical Instruments,...each,	60	8
3746.	Haupt's Bridge Construction,.....each,	4 00	28
3747.	Minifie's Geometrical Drawing,.....each,	1 50	12
3748.	Warren's Draughtsman's Manual,.....each,	1 25	12
3749.	Warren's Draughtsman's Instruments,.....each,	1 00	12
3750.	Warren's Linear Perspective,.....each,	1 50	16
3751.	Nystrom's Pocket Book of Mechanics and Engi- neering,.....each,	2 50	8
3752.	Practical Surveyor's Companion, by E. W. Bean's, each,	75	8
3753.	Treatise on the Slide-Rule; being a guide to the Engineer, Gauger, Seaman and Student, by Thomas Kentish; illustrated by numerous en- gravings,.....each,	1 25	12
3754.	Trautwine on Railroad Curves. The Field Practice for laying out circular curves for railroads,.....each,	2 00	4
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