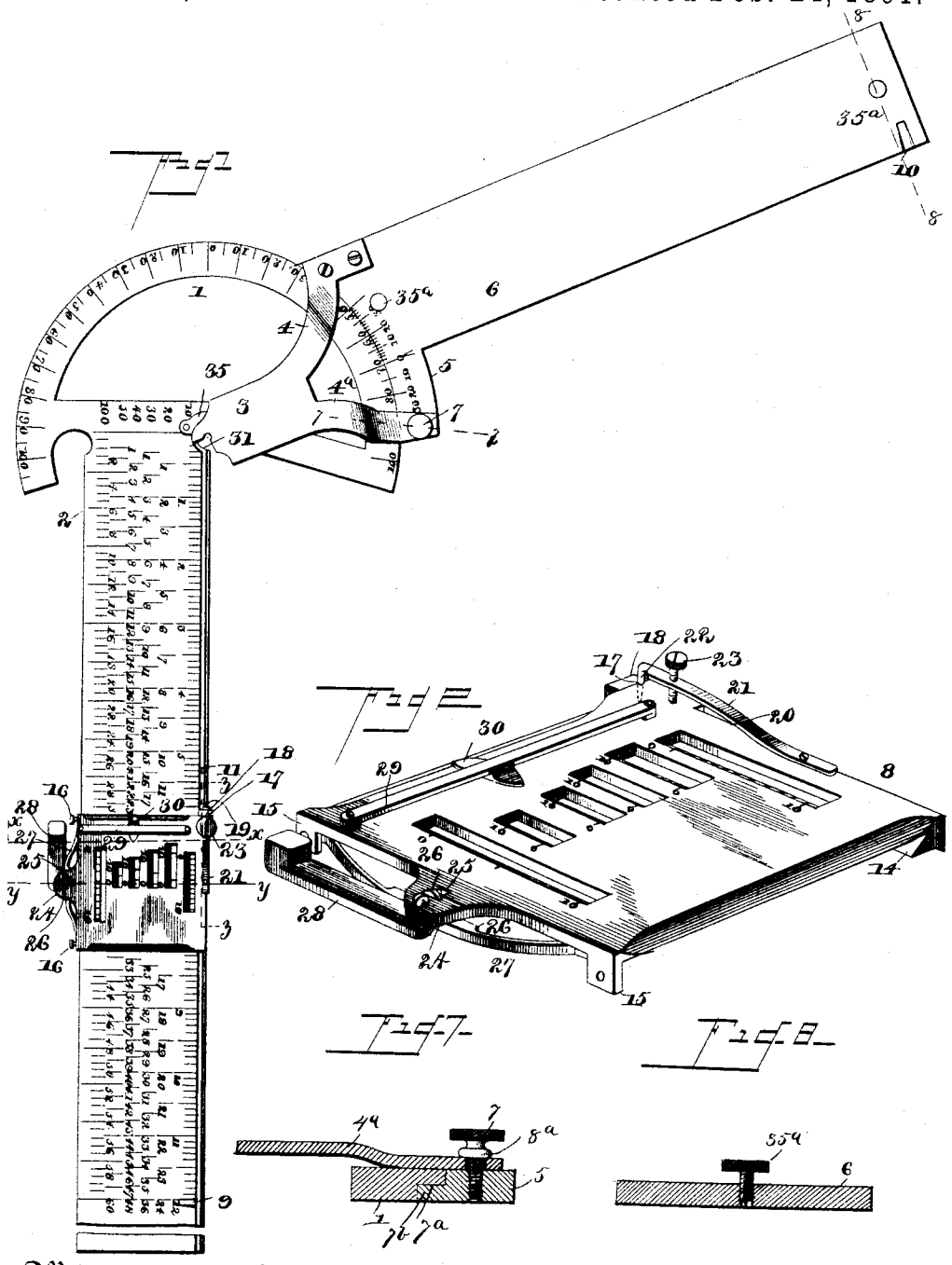
(No Model.) 2 Sheets—Sheet 1.

# P. O'MARRA.

## SURVEYOR'S PLOTTING INSTRUMENT.

No. 446,882. Patented Feb. 24, 1891.



Witnesses
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

# P. O'MARRA.

## SURVEYOR'S PLOTTING INSTRUMENT.

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Fig 3

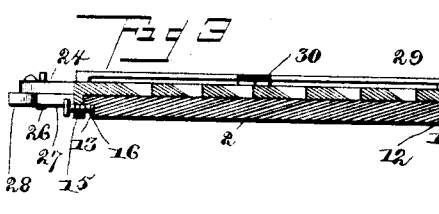



Fig 4

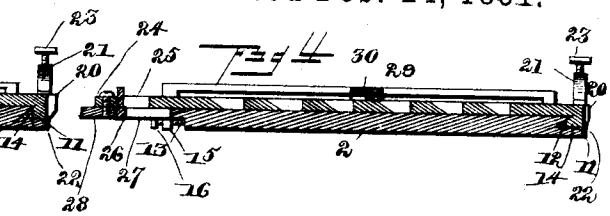



Fig 5

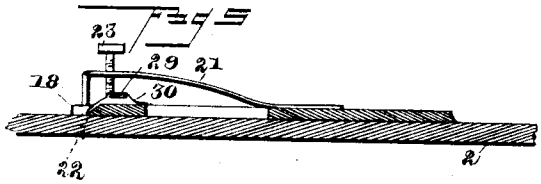
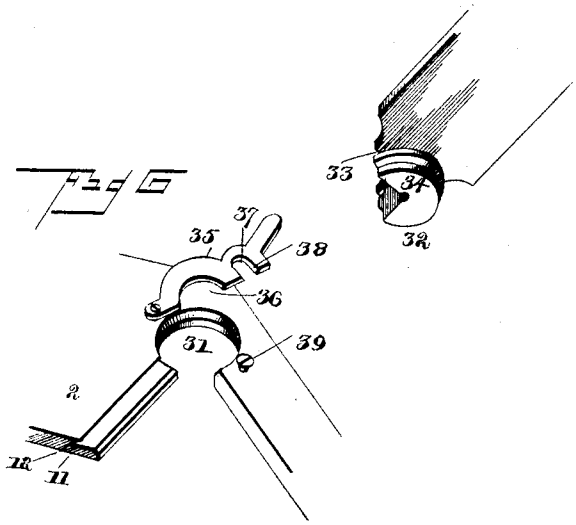



Fig 6




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# UNITED STATES PATENT OFFICE.

PATRICK O'MARRA, OF KINGSTON, NEW YORK.

## SURVEYOR'S PLOTTING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 446,882, dated February 24, 1891.

Application filed November 29, 1889. Serial No. 331,850. (No model.)

*To all whom it may concern:*

Be it known that I, PATRICK O'MARRA, a citizen of the United States, residing at Kingston, in the county of Ulster and State of New York, have invented a new and useful Surveyor's Plotting-Instrument, of which the following is a specification.

This invention relates to surveyors' plotting-instruments; and it has for its object to provide a device to take the place of the protractor and scales ordinarily employed, and by means of which the process of laying off plots may be performed in a more accurate and expeditious manner than by the instruments now customarily employed.

With these ends in view the invention consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a plan view of my improved plotting-instrument. Fig. 2 is a detailed perspective view of the sliding scale. Fig. 3 is a sectional view taken on the line $x\,x$ in Fig. 1. Fig. 4 is a sectional view taken on the line $y\,y$ in Fig. 1. Fig. 5 is a sectional view taken on the line $z\,z$ in Fig. 1. Fig. 6 is a detailed perspective view illustrating the construction of the pivotal joint. Fig. 7 is a sectional view taken on the line 7 7 in Fig. 1. Fig. 8 is a sectional view taken on the line 8 8 in Fig. 1.

Like numerals of reference indicate like parts in all the figures.

1 designates a protractor, which is graduated in half-degree divisions to one hundred and five degrees each side of zero. Said protractor is provided with a radial arm 2, forming a straight-edge, which is in a line with the zero-point of the protractor-scale. Pivotally connected with the protractor at the center of the latter and by means of a joint to be hereinafter described is a plate 3, having outwardly-extending arms 4 $4^a$, the former of which carries the vernier 5, registering with the protractor-scale and reading to one minute. The said vernier has a laterally-extending arm 6, the straight-edge of which is radial to the center of the protractor. The protractor is rabbeted or undercut along its outer edge, as will be seen at $7^a$ in Fig. 7, to receive the flange $7^b$, which is formed upon the adjacent edge of the vernier. The arm $4^a$ of the plate 3 has a perforation through which passes a set-screw 7, extending into the body of the vernier, and having a flange $8^a$, that bears against the upper side of arm $4^a$. It will be seen that by tightening the said screw the vernier may be clamped in any desired position with relation to the protractor.

The arm 2 of the protractor is graduated on scales of ten, twenty, thirty, forty, and fifty feet to one inch and one hundred feet to one foot, and a sliding indicator 8 is provided carrying a vernier of twenty, thirty, forty, and fifty feet to the inch, subdivisions for each scale working on the principle of a Philadelphia level-rod. The scales of ten feet to the inch and one hundred feet to the foot are fully divided on the arm, with a vernier of nine to ten on the indicator-slide, working on the principle of a New York level-rod. Marks 9 and 10 are placed, respectively, on the graduated arm 2 and on the vernier-arm 6 at a distance of twelve inches from the center of the protractor, and the scale-arm 2 is extended beyond the said mark a sufficient distance to enable the sliding indicator to be adjusted beyond the twelve-inch mark 9. It will be seen that by this arrangement of the scales and the indicator-slide the device is made capable of scaling any distance on any conceivable scale much closer than one one-hundredth part of an inch or one one-thousandth part of a foot.

The detailed construction of the arm 2 and the indicator-slide will be readily understood by reference to Figs. 3 and 4 of the drawings. The beveled edge 11 of the arm 2 is provided above its beveled portion with an under-cut 12, and the lower rear edge of said arm 2 is provided with a rabbet 13. The upper edge of the indicator-slide has a dovetailed flange 14, engaging the under-cut 12, and the said slide is provided at its opposite edge with a downwardly-extending flange 15, through which the pins 16 extend into the rabbet 13, thereby holding the slide in position upon the arm 2 in such a manner as to enable it to slide longitudinally upon the latter. The upper left-hand corner of the slide is provided adjacent to the straight-edge of the arm 2 with

a vertical perforation 17 to receive a needle-point for pricking off points upon the paper. Preferably a small block 18 is attached by means of a screw 19 to the upper left-hand corner of the indicator-slide, and the perforation 16 is formed by cutting shallow grooves in the said block 18 and the upper left-hand corner of the indicator-slide, registering with each other.

The indicator-slide is provided with a projection 20, to which is attached a spring 21, the free end of which is provided with a needle-point 22, registering with the perforation 17. Set-screw 23, passing through the spring 21, is adapted to bear against the upper side of the indicator-slide, and thereby prevent the needle-point from penetrating too deeply. By this arrangement it will be observed that the point is necessarily pricked off at the exact point to which the indicator-slide is adjusted, with no possibility of a mistake being made by accident.

The lower edge of the indicator-scale has a projection 24, provided with a slot 25, in which slides a clamp 26, adapted to bear against the lower edge of the arm 2. A spring 27 is arranged to force the clamp 26 normally in an outward direction from the edge of the arm 2, and a cam-lever 28, pivoted to the projection 24, serves to actuate the clamp 26, and thereby to bind the indicator-slide in any desired position upon the arm 2.

The upper side of the indicator-slide is provided with a transverse strap 29, under which slides a pointer 30, which may be set to indicate the scale and vernier which are being used.

The protractor is provided with a segmental recess 31, adapted to receive a stud 32, which extends downwardly from the plate 5 of the vernier. The stud 32 is provided with an annular groove 33 and with an angular recess 34 to receive the point of the pencil or needle-point, the angle of said recess being concentric with the protractor-scale, and consequently in a line with the straight-edge of the arm 2.

35 designates an arm which is mounted pivotally upon the protractor and which has a segmental recess 36 to engage the annular groove 33 of the stud 32, and thus serving to connect the protractor and the vernier pivotally together in such a manner as to enable them to be readily separated when desired. The outer end of the pivoted arm 35 has a recess 37, provided with flanges 38, which are beveled or wedge-shaped and adapted to engage a headed stud 39, secured to the protractor-frame for the purpose of locking or binding the said arm in position when adjusted.

The operation and advantages of my invention will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed, by those skilled in the art to which it appertains.

In plotting with the ordinary protractor it is very inconvenient to set the center of protractor over angle-points and errors are liable to occur.

Protractors are ordinarily constructed without scale-arms, and it has therefore been found necessary to make the lines some distance beyond each angle-point in order to turn for the next angle, and when a number of angles are required with short distance or sides the plotting becomes very confusing to the eye, owing to the number of lines which cross each other, and is often the cause of mistake by measuring from wrong points. By my invention such disadvantages are overcome and a simple, efficient, and easily-operated instrument is produced.

The laterally-extending arm 6 of the pivoted vernier is provided with a pair of set-screws 35ª, extending vertically through said arm and having needle-points at their lower ends adapted to hold the said arm steady upon the paper in cases where a number of angles are to be turned from the same point.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the protractor having an arm graduated, as herein described, and provided with a straight-edge radial to said protractor, the indicator-slide having the verniers registering with the scales upon the graduated arm, and the transversely-sliding pointer and the vernier pivoted centrally to the protractor and having a straight-edge radial to the latter, substantially as set forth.

2. The combination, with the protractor having the graduated arm, of the indicator-slide having a perforation contiguous to the straight-edge of said arm, the spring carrying the needle-point registering with said perforation, the set-screw extending through said spring and bearing against the slide, the clamp to secure the indicator-slide in position upon the graduated arm, and the vernier connected pivotally to the protractor and having the straight-edge radial to the latter, substantially as set forth.

3. The combination, with the protractor having the graduated arm provided with a straight-edge radial to said protractor and having the central recess, of the vernier-plate having an annularly-grooved stud to engage said recess, said stud being provided with an angular recess, the inner corner of which is central to the protractor, the pivoted arm having a segmental recess to engage the annular groove of said stud and having a recess provided with beveled edges, a headed stud mounted upon the protractor and adapted to engage said flanged recess, and the arm extending from the vernier and having the straight edge parallel to the protractor, substantially as and for the purpose herein set forth.

4. The combination, with a graduated arm or straight-edge, of an indicator-slide having the verniers arranged to register with the

scales of said arm or straight-edge, said slide being provided with a perforation contiguous to the edge, a spring carrying a needle-point registering with said perforation, a set-screw extending through said spring and bearing against the slide, and a clamp to secure the indicator-slide in position upon the graduated arm, substantially as and for the purpose set forth.

5. In a plotting-instrument, the combination of a protractor having a radial graduated arm with a vernier pivoted centrally to said protractor and having an outwardly-extending arm which is radial to said protractor, and set-screws extending vertically through the said arm and having needle-points at their lower ends, substantially as and for the purpose herein set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

PATRICK O'MARRA.

Witnesses:
R. J. MARSHALL,
J. H. SIGGERS.