

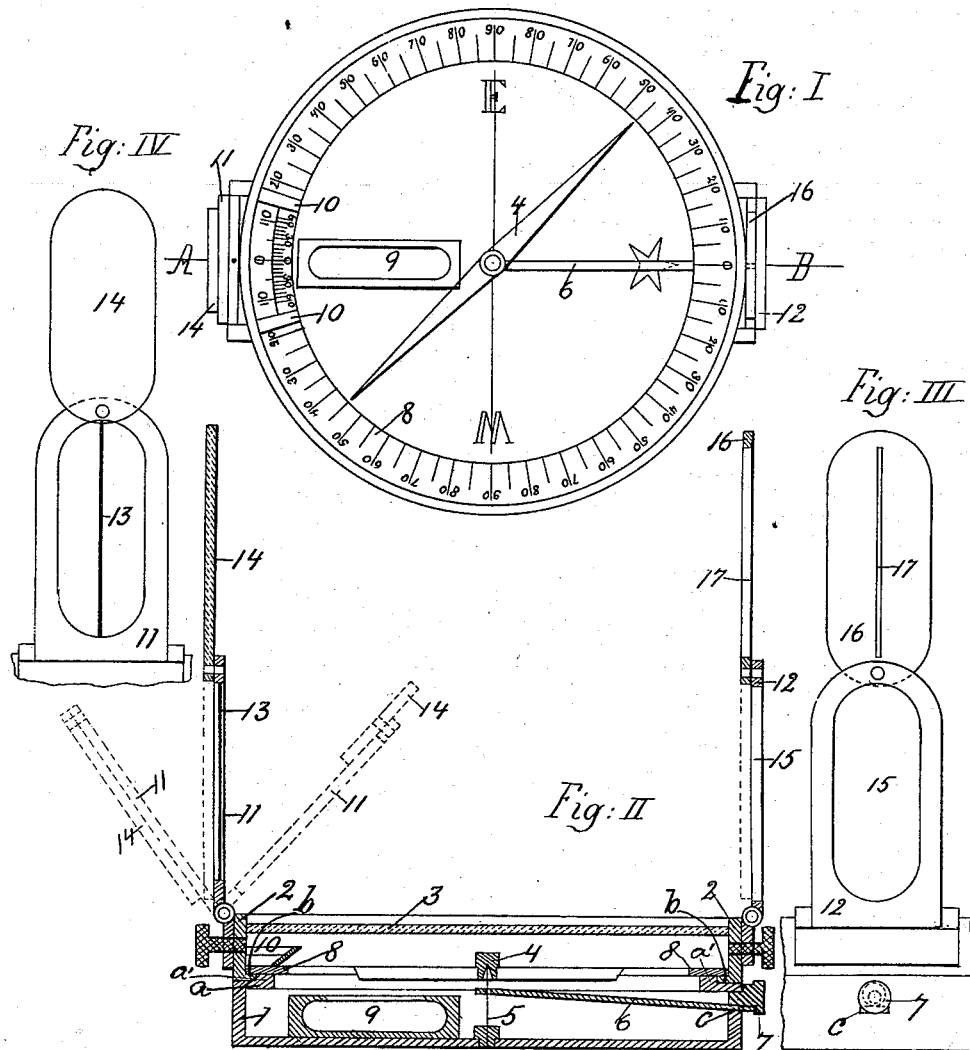
No. 648,380.

Patented May 1, 1900.

J. A. BIRSFIELD.
SURVEYING INSTRUMENT.

(Application filed Aug. 28, 1898.)

(No Model.)



Witnesses
Harry C. Beards
Walter R. Thompson.

Inventor
J. A. Birsfield
By his Attorney
W. J. Application

UNITED STATES PATENT OFFICE.

JULES A. BIRSFIELD, OF DENVER, COLORADO.

SURVEYING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 648,380, dated May 1, 1900.

Application filed August 28, 1899. Serial No. 728,700. (No model.)

To all whom it may concern:

Be it known that I, JULES A. BIRSFIELD, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Surveying Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in surveying instruments, more particularly for prospecting in mining sections or districts for various purposes. It is characteristic for simplicity, is cheap, and reliable or accurate in results, generally useful, light and convenient, and ready for transportation. It combines, in the minimum number of parts, a pocket transit instrument, a compass, a spirit-level, an Abney level, or a clinometer all in a compact form. It is adapted to obtain in a simple and expeditious and most satisfactory manner the readings of horizontal and vertical angles, all measurements being made by one and the same vernier-scale and degree-circle of the compass.

It consists of the combinations of parts, including their construction and arrangement, substantially as hereinafter more fully disclosed, and specifically pointed out in the claims.

It will be understood that latitude is allowed herein as to details, as they may be varied or changed at will without departing from the spirit of my invention and the same yet remain intact and be protected.

In the accompanying drawings, illustrating the preferred embodiment of my invention, Figure I is a plan view thereof. Fig. II is a sectional elevation on the line A-B of Fig. I. Figs. III and IV are detail views of the sights at opposite points of the instrument, respectively.

In carrying out my invention I provide, as usual, a casing or closure produced, preferably, in three principal sections or parts 1 2 3, the bottom section or part 1 having at its upper end an inwardly-extending annular flange or seat terminating in an upstanding shoulder *a'*, and upon this flange or seat rests, and against this shoulder abuts, an inwardly-

projecting flange *b* at the bottom edge of the section or part 2. The section 2 itself rests upon the top edge of said part or section 1, and is thus adapted to permit its being freely turned thereon, as occasion may require. The upper section 2 has a cover 3, preferably of glass, to permit viewing the inclosed parts, and supported or resting upon the flange *b* and shoulder *a'* of flange *a* of the parts or sections 1 2, respectively, is arranged the degree-circle 8 of the ordinary compass, suitably graduated, preferably as shown. The degree-circle plate is suitably secured to the shoulder *a'*, thus holding the section 2 in place upon the section 1 and yet permitting said section 2 to be turned or moved upon the latter section. The bubble tube or level 9 is suitably secured in the bottom section 1 and is arranged in a relatively-parallel plane with the zero-points of the degree-circle.

A magnetic compass-needle 4, arranged upon a steel point 5, centrally arranged in the lower compartment or section 1, is adapted to freely play within the degree-circle 8. The needle 4 is adapted to be held or locked in position by a locking lever or bar 6, extending, as herein shown, through the part 1, as at *c*, and capable of manipulation by a thumb-piece 7, screwing into the casing and having an eccentric shoulder, as shown in Fig. II, adapted as said screw is turned to the right to engage and secure said lever or bar at its outer end.

A vernier 10 is suitably fixed to the section or part 2 immediately above the degree-circle.

Folding sights 11 and 12 are detachably applied or attached to the upper section or part 2, preferably as shown, by thumb-screws. The sight 11 has a sight-line 13, which may be of rubber suitably let into and secured in said sight, bisecting it vertically, as it were, and a pivoted mirror or section 14, adapted to be disposed in alinement with said sight-line. The sight 12 has an enlarged opening 15 and a pivoted section 16, having a vertical or longitudinal sight slit or opening 17 therein and adapted to be disposed in alinement with said enlarged opening.

Some of the uses of this instrument may be stated as follows: first, as an ordinary compass, the parts being disposed as in Fig. I for that purpose and the reading or meas-

urement being taken by the needle; second, with the adjustment of the parts as in Fig. II, the part 14, however, occupying the position indicated in full lines and the part 16 that of the dotted-line position, and the instrument held horizontally and in alinement with the range of vision, the observer by looking directly through the slit or opening 17 of said part 16 and the part 11, its sight-line 13 apparently cutting the object, will see the object in front of him and in the part or mirror 14 the reflection of the object in rear of him, thus providing for making an apparently-straight line without any mechanical movement or adjustment of the instrument therefor; third, by again placing the sight 12 at right angles to the casing, as last disposed, with the part 16 adjusted to its full-line position and the sight 11 placed at an angle of about one hundred and thirty-five degrees, as indicated in the left-hand dotted-line position of Fig. II, with its mirror 14 folded thereon and the instrument held at about a height in the plane of the waist, with the sight 11 nearest the body, the observer by looking directly down into the mirror will see the reflection therein of the object in front of him. Said object may be a pole or light, according to location, as usually adopted by the craft. The instrument may be thus accurately sighted at any object by bringing it in line with the sight-line 13, apparently bisecting the opening 15 in part 12 in the mirror. Holding thus the instrument in one hand and turning with the other hand the several sights, the mirror, and vernier, courses may be taken to objects horizontally at almost any angle.

When ranchers and others use the said in-

strument for ordinary field-work—such as building fences, running ditches for irrigation purposes, &c.—owing to the long distance to be sighted the mirror ordinarily used will prove unreliable.

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

1. In a surveying instrument, the combination of the folding sights and the degree-circle of a compass, one of said sights having a vertically-bisecting sight-line and also a pivoted mirror adapted to range in alinement with said sight-line, substantially as set forth.

2. In a surveying instrument, the combination of the folding sights and the compass degree-circle, one of said sights having an enlarged opening and also a folding or pivoted section or part having a vertical longitudinal viewing-slit adapted to range in alinement with said enlarged opening, substantially as specified.

3. In a surveying instrument, the combination of a compass degree-circle, and the folding sights, one having a vertically-bisecting sight-line and a pivoted mirror adapted to stand in, or out of, alinement with said sight-line, and the other of said sights having an enlarged opening and a pivoted section having a vertical sight-slit, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JULES A. BIRSFIELD.

Witnesses:

S. H. CALHOUN, Jr.,
HARRY C. BEARES.