

No. 690,008.

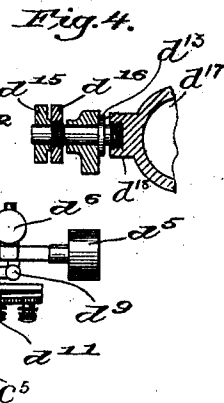
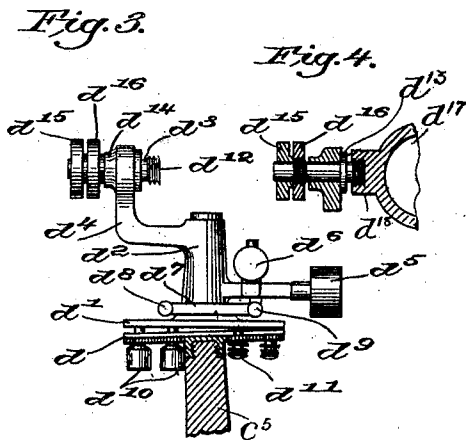
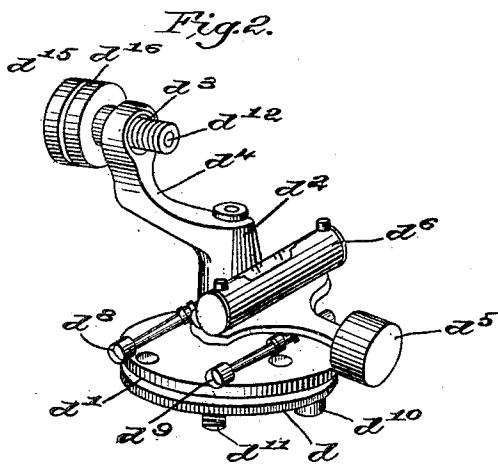
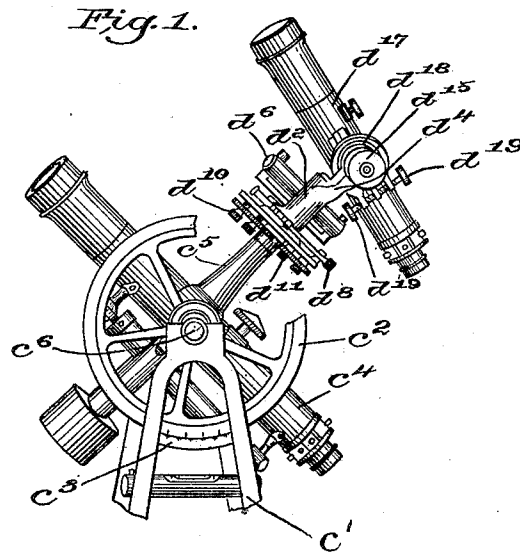
Patented Dec. 31, 1901.

C. L. BERGER.

EQUATORIAL ADAPTER FOR MINE SURVEYING INSTRUMENTS.

(Application filed Nov. 17, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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EQUATORIAL ADAPTER FOR MINE-SURVEYING INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 690,008, dated December 31, 1901.

Application filed November 17, 1899. Serial No. 737,267. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN L. BERGER, a citizen of the United States, residing at Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Equatorial Adapters for Mine-Surveying Instruments, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is primarily intended as an improvement for mining-transits, although I do not limit it to this particular kind of transit, inasmuch as my invention is applicable to surveyors' transits and indeed with slight modifications to engineers' telescopes or to any measuring-telescope.

The United States Government requires that all mining plants and public-land surveys shall be run with reference to meridians, and it is therefore extremely desirable to have a transit by means of which the surveyor may at any time find his meridian without waiting for high noon or any other condition usually considered necessary, and accordingly I have provided an equatorial adapter which can be attached in any suitable position to the ordinary mining or surveying instrument, preferably vertically, over the main axis of the telescope of the latter, and by means of this adapter the desired results may be obtained.

This "equatorial adapter," as I term it for convenience, may be used in any situation that the surveyor may find himself in and being exceedingly compact, light, and simple affords no inconvenience, but renders the mining-transit more universal and complete.

My invention will be more particularly described and its operation explained in the course of the following description, reference being had to the accompanying drawings, illustrative of one form of my invention, and the latter will be more particularly defined in the appended claims.

In the drawings, Figure 1 shows in perspective my equatorial adapter applied to a usual mine-transit. Fig. 2 is an enlarged perspective view of the equatorial adapter. Fig. 3 is a side elevation thereof. Fig. 4 is a detail in vertical longitudinal section.

It will be observed that I have termed my invention an "equatorial adapter," one reason therefor being to distinguish it from the ordinary equatorial attachments heretofore employed with certain surveying instruments.

My invention does not reside in the equatorial telescope, but resides in providing means for adapting a single surveying instrument to both solar and mining work—*i. e.*, by my adapter one mining-transit may be used for ascertaining the meridian at any time of day, thereby enabling the operator to dispense with the usual solar-telescope attachment or instrument and do practically all his work with one instrument.

Referring to the drawings, it will be seen that I have shown in the drawings of this case an instrument of the general character shown in my United States Patent No. 559,117, dated April 28, 1896, said instrument comprising a stand c^1 , vertical circle c^2 , vernier c^3 , main telescope c^4 , and central post or vertical axis c^5 , on which the auxiliary telescope is mounted, this being one of that class of instruments in which two telescopes are used, the auxiliary telescope being mounted on the post c^5 or on the end c^6 of the horizontal axis of the main telescope for certain requirements of mine-surveying, as fully set forth in my said patent.

The "equatorial adapter," as I have chosen to term the mechanism by means of which the transit is arranged to determine accurately the desired meridian, as will be presently explained, is mounted for convenience, proper balance, &c., on the end of the vertical post c^5 , although this particular location is not vital, and includes the approximately parallel plates $d d'$ or other means for truly leveling the adapter, a polar axis or post d^2 , and a declination axis or spindle d^3 at right angles to the axis d^2 , the declination-axis being carried by a bracket d^4 , shown as extending rigidly from the upper end of the polar axis d^2 , there being also herein shown a counterbalance-weight d^5 , a level d^6 , and a clamping-ring d^7 , secured by a usual milled screw d^8 and provided with a slow-motion screw d^9 . The "plates" (and by this term I include any leveling means) $d d'$ are shown as adjusted

by means of thumb-screws d^{10} , working in the plate d in opposition to springs d^{11} , bearing against said plate, and the heads of posts depending through said plate from the plate d , as is well understood. The declination axis or spindle d^3 is threaded at its inner end d^{12} and provided with a shoulder d^{13} , (see Fig. 3,) bearing against the head d^{14} of the bracket d^2 and preventing longitudinal movement of the axis relatively to said bracket, said axis being rotated by a thumb-nut d^{15} and locked against rotation by a check-nut d^{16} . The auxiliary telescope d^{17} is provided on one side with a hub d^{18} to screw onto the end c^6 of the main horizontal axis and also to receive the threaded end d^{12} of the axis d^3 , whereby the telescope is secured rigidly on said axis against the shoulder d^{13} thereof.

Having thus explained the mechanical construction of the present and preferred embodiment of my adapter, I will now explain its operation.

It being understood that the transit proper is in thorough adjustment and has been properly leveled, &c., as for ordinary work, the two telescopes are brought into perfect longitudinal alinement in the same vertical plane, and the auxiliary telescope is then clamped to the polar axis a^2 by means of the clamp d^7 . The main telescope c^4 is then set to the sun's declination and refraction for the particular day and hour (according to the proper tables) by means of the vertical arc or circle c^2 and clamped in this angular position. Then the auxiliary telescope d^{17} is turned on its declination-axis d^3 to a strictly-horizontal position, this position being determined by means of a level, (not shown,) and the auxiliary telescope is then fastened in its truly-horizontal position by means of the check-nut d^{16} , the opposing thumb-screws d^{19} being used for the final adjustment in getting the true horizontal plane. Thereupon the main telescope c^4 is turned farther on its horizontal axis a distance corresponding to the colatitude of the particular place of observation, this distance or angle being read off on the vertical circle c^2 . This brings the auxiliary telescope into proper range with the sun, this being the object sought. The reason I call this feature of my invention an "adapter" is because it is an intermediate device, whereby the ordinary auxiliary telescope of a mining instrument can be made to fill all the requirements of a solar telescope specifically made for that purpose. In other words, in an instrument of the kind shown in the drawings the usual auxiliary telescope may be used for vertical sighting or regular mine work and may also be used by means of the adapter for determining the meridian or for regular solar work.

I do not limit myself to the constructional details shown.

Having described my invention, what I

claim as new, and desire to secure by Letters Patent, is—

1. The combination with a transit of the kind having a main telescope, an auxiliary telescope and a threaded fixed support movable with said main telescope, of an equatorial adapter mounted on said threaded support and comprising a polar axis extending perpendicular to the plane including said telescope and its horizontal axis, and a threaded declination-axis extending at right angles to said polar axis and rotatable independently of said auxiliary telescope, for removably securing said auxiliary telescope to said declination-axis, the threads of the fixed support, and of the declination-axis being the same size, substantially as described.

2. The combination with a surveying instrument having a main telescope and an auxiliary telescope, the main telescope being provided with a threaded non-removable support movable therewith, and the auxiliary telescope having a hub threaded to fit said support, of an equatorial adapter in the form of a detachable, independent device, capable of being used as an intermediary mechanism between the two telescopes, the said adapter including a polar axis, adjustable means for alining said axis perpendicular to the plane including said main telescope and its pivotal axis, a bracket extending laterally from said polar axis, and means at the free end of said bracket for removably mounting said auxiliary telescope thereon, substantially as described.

3. The combination with a surveying instrument having a main telescope and an auxiliary telescope, of an equatorial adapter including a polar axis, means carried by the polar axis for alining said axis perpendicular to the plane including said main telescope and its pivotal axis, a bracket extending solely from one side of said polar axis, and an axis in the form of a threaded thumb-screw at the free end of said bracket for mounting said auxiliary telescope thereon for instant removal when desired, substantially as described.

4. A solar adapter, having a declination-axis comprising a spindle mounted to rotate in a bearing and having a threaded inner end extending beyond said bearing, a thumb-nut for retaining said spindle, and means for clamping said spindle against rotation, and a telescope having an internal thread to fit said threaded end of the spindle for securing the telescope on the spindle, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHRISTIAN L. BERGER.

Witnesses:

GEO. H. MAXWELL,
JOHN C. EDWARDS.