

(No Model.)

G. HANNES.

TRIPOD HEAD FOR SURVEYORS' INSTRUMENTS.

No. 470,802.

Patented Mar. 15, 1892.

FIG. 1.

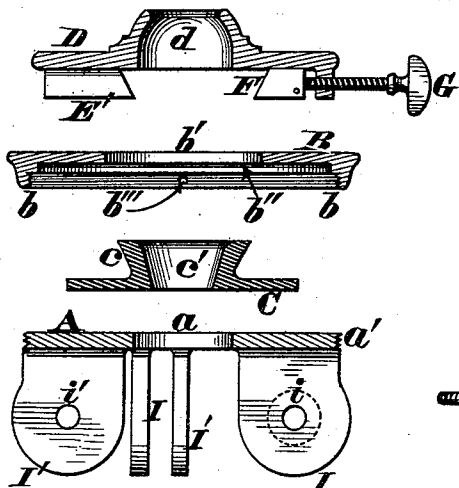


FIG. 2.

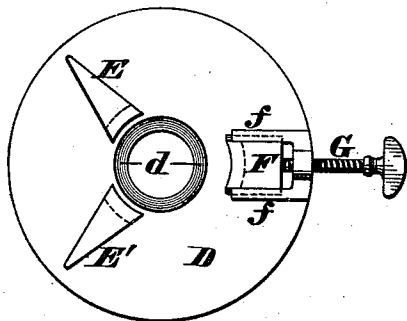
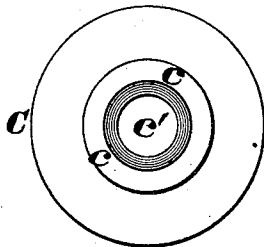


FIG. 3.



Attest.
Arthur Moore
Harry Byrne.

FIG. 4.

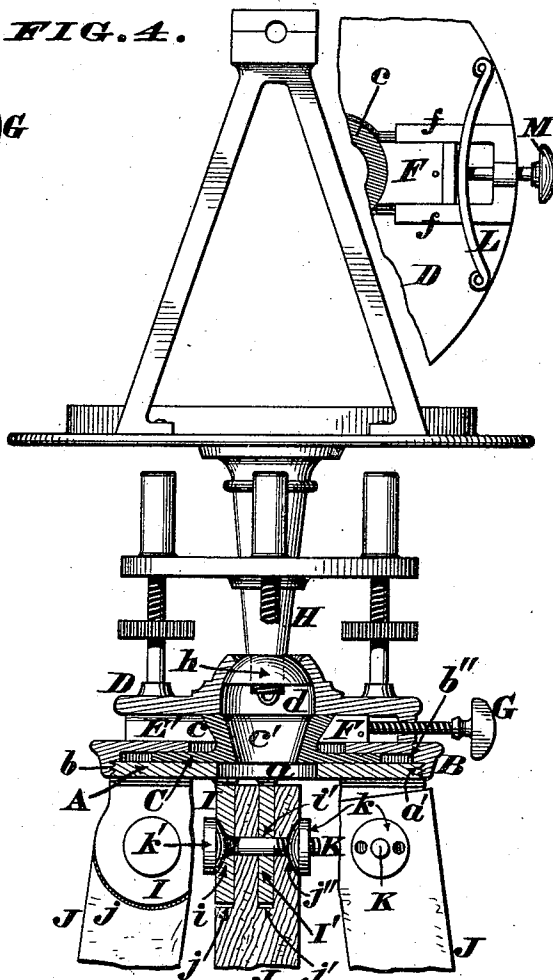
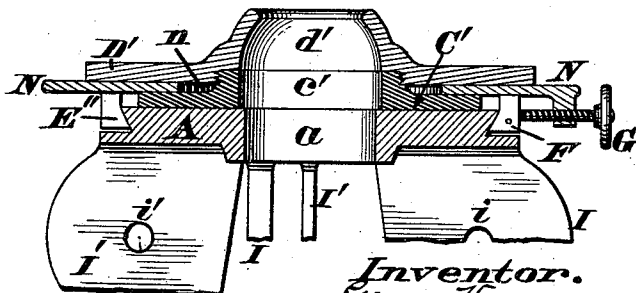


FIG. 6.



Inventor.
George Hannes.
By James H. Lozman.
Att'y.

UNITED STATES PATENT OFFICE.

GEORGE HANNES, OF CINCINNATI, OHIO.

TRIPOD-HEAD FOR SURVEYORS' INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 470,802, dated March 15, 1892.

Application filed December 29, 1891. Serial No. 416,418. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HANNES, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Tripod-Heads for Surveyors' Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the annexed drawings, forming part of this specification.

This invention relates to those theodolites, transits, levels, and other similar surveyors' instruments whose tripod-heads are provided with laterally-shiftable plates that enable a quick horizontal adjustment within a limited range for the purpose of bringing the plumb-bob in line with the exact center of a "stake" or monument or other starting-point; and the first part of my improvements comprises a novel combination of devices wherewith said shifting plate is securely locked in place after the desired adjustment has been effected, the details of said combination being herein-after more fully described.

The second part of my improvements comprises a novel way of coupling the legs to the tripod-head, which coupling devices are of such a character as to afford a steady joint and to allow any "lost motion" in the same to be readily taken up by an engineer or surveyor, as hereinafter more fully described.

In the annexed drawings, Figure 1 is an axial section showing the four principal parts of my tripod-head separated from each other. Fig. 2 is a plan of the under side of the lower leveling-plate. Fig. 3 is a plan of the upper side of the shifting plate proper. Fig. 4 is an axial section showing the shifting plate and its accessories applied to a surveyor's instrument. Figs. 5 and 6 are modifications of my invention.

Referring to Fig. 1, A represents a tripod-head composed of a flat metallic disk having a central opening *a* and a screw-thread *a'*, the latter being cut around the periphery of said disk and serving to engage with the internal thread *b* of a cap B, having a central opening *b'*. Furthermore, this cap has a shallow cylindrical counterbore *b''* to admit the shifting plate proper C, which latter is a disk with

a central boss *c*. This boss is cylindrical, with undercut sides, and has a central opening *c'*.

D is a disk constituting the lower plate of the leveling-head of any approved form of engineers' or surveyors' instruments, the under side of this plate being provided with a fixed lug and a sliding gib. I prefer, however, to employ a pair of fixed lugs, as seen at E E' in Fig. 2, which lugs are generally radial, their inner ends being inclined at practically the same angle as the outside of boss *c*.

F is an adjustable gib confined within guides *f* of the disk D and capable of being advanced and retracted by a screw G or its equivalent, the inner end of said gib being inclined in the same manner as the ends of the fixed lugs E E'. Disk D has a concave socket *d* to admit a hemispherical nut *h*, screwed to the lower end of the spindle H of a theodolite, transit, level, or other similar instrument.

Each leg is coupled to the tripod-head in the following manner: Projecting from the under side of said head are six ears arranged in pairs I I', the ear I having a countersink *i*, while the other ear has a circular hole *i'* drilled through it. Each leg J is cut away at *j* to admit the ear I, is slotted at *j'* to fit snugly against the other ear I', and has a countersink *j''*, within which latter is seated a nut *k*, whose inner end is convex. This nut *k* engages with a bolt K, having a head *k'*, the inner end thereof being convex to fit snugly within the countersink *i* of ear I.

My improved instrument is fitted together and operated in the following manner: The laterally-shiftable plate C is placed upon the tripod-head A and confined thereon by the cap B, whose thread *b* engages with the screw *a'* of said head. This cap is screwed down as far as the counterbore *b''* will permit, and then said cap may be held in place by a small screw engaged with the hole *b'''*. (Seen in Fig. 1.) When thus screwed home, sufficient clearance is afforded between said cap and the tripod-head to permit the plate C being readily shifted from side to side, while at the same time no material vertical play of said plate is allowed. The gib F being now retracted, as seen in Fig. 1, the lower plate D of the leveling-head, with the instrument properly mounted thereon, is placed upon the cap

B in such a manner as to cause the lugs E E' to engage under that portion of boss *c* projecting above said cap. Gib F is then advanced and engaged with the boss, thereby affording
 5 three bearings on the latter, which dovetail connection allows the leveling-plate D to be turned around in any direction, but prevents any possible detachment of the instrument from the tripod-head until said gib has been
 10 intentionally retracted. Reference to Fig. 4 shows that the boss *c* is materially less in diameter than the central opening *b'* of cap B, which affords sufficient clearance for the plate C to be shifted from side to side in either
 15 direction until the plumb-bob is accurately over the center of the stake or other fixed point from which the survey is to be taken, the "bob" being suspended from a staple inserted in the lower end of spindle H. The
 20 instrument is now secured in position by cautiously turning the screw G, so as to advance the gib F still farther, which act wedges said gib and lugs E E' very firmly against the inclined sides of the boss *c*, the result being to
 25 slightly elevate the plate C and clamp it immovably against the under side of cap B, and, as the latter is fastened to the tripod-head, the instrument is perfectly steady and its proper level position has not been disturbed. The
 30 peculiar method of joining the legs to the tripod-head also adds to the stability of the instrument, the bearing of the bolt-head *k'* and nut *k* within the respective sockets *i* and *j''* affording sufficient friction to prevent these
 35 parts working loose with ordinary usage; but if any lost motion should occur it can be remedied in a few moments by cautiously tightening the nut *k*.

In the modification of my invention seen
 40 in Fig. 5 the gib F is constantly advanced to an engaged position by a spring L bearing against its outer end, a pull M being provided for the retraction of said gib; but in another modification (seen in Fig. 6) the shifting
 45 plate C' is confined between the tripod-head A and a plate N, having a central circular opening *n* and provided on its under side with a lug E'' and sliding gib F, which lug and gib are capable of engaging with the undercut
 50 periphery of said head. Shifting plate C' is

screwed or otherwise attached to a leveling-plate D', having a socket *d'*, that serves the same purpose as the socket *d*, previously referred to. By turning the screw G to advance the gib F the plate C' will be clamped
 55 down tightly upon the head A after said plate has been laterally shifted to bring the plumb-bob to the proper position. Finally, in the drawings the tripod-head has been shown as though it were provided with four
 60 legs; but in actual practice three legs will be used, as with all surveyors' instruments.

I claim as my invention—

1. In combination with the tripod-head of a surveyor's instrument, a laterally-shiftable
 65 plate provided with a boss having undercut sides, and a lower leveling-plate having a fixed lug and a sliding gib, which lug and gib are adapted to engage with said boss and thus
 70 lock the shifting plate, substantially as herein described.

2. In combination with a surveyor's instrument, the tripod-head A, having a cap B secured thereto, which cap is provided with a
 75 central opening *b'* and counterbore *b''*, the laterally-shiftable plate C, fitted between said head and cap, an undercut boss *c*, projecting from said plate C and passing through the opening *b'* of said cap, and a lower leveling-
 80 plate D, having a pair of fixed lugs E E' and a sliding gib F, which lugs and gibs engage with said boss in the manner herein described, and for the purpose stated.

3. In a surveyor's instrument, the tripod-head A, provided with a pair of ears I I', one
 85 ear being provided with a countersink *i* and the other ear with a hole *i'*, in combination with the leg J and bolt K, said leg being cut away at *j*, slotted at *j'*, and countersunk at
 90 *j''* and said bolt being provided with a head *k'* and nut *k*, whose inner surfaces are convex and fit within said countersinks *i* and *j''*, all as herein described.

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

GEORGE HANNES.

Witnesses:

JAMES H. LAYMAN,
 SAMUEL M. QUINN.