(No Model.) 2 Sheets—Sheet 1.

F. REINECKE.

TRIPOD.

No. 356,891. Patented Feb. 1, 1887.

Fig: 1.

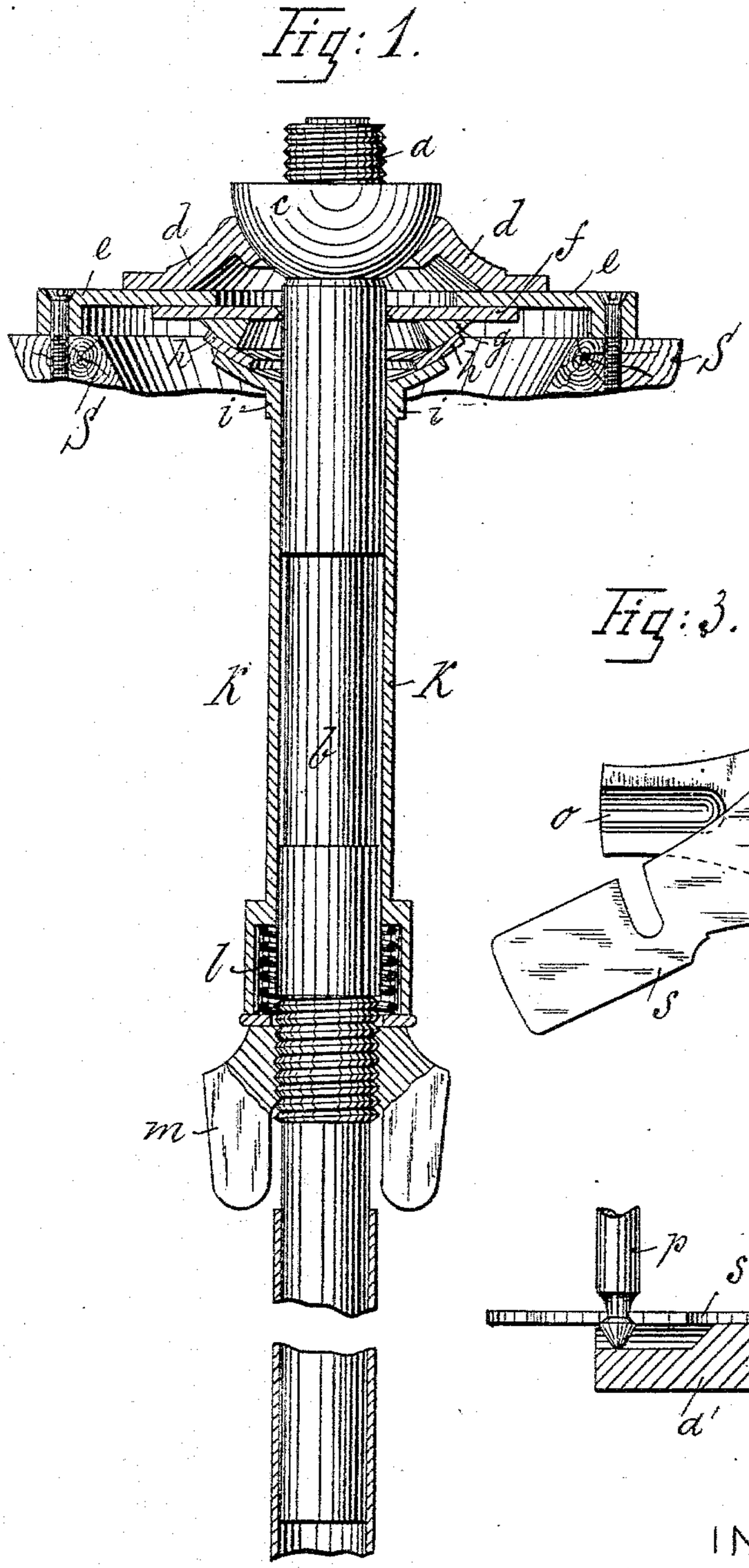


Fig: 3.

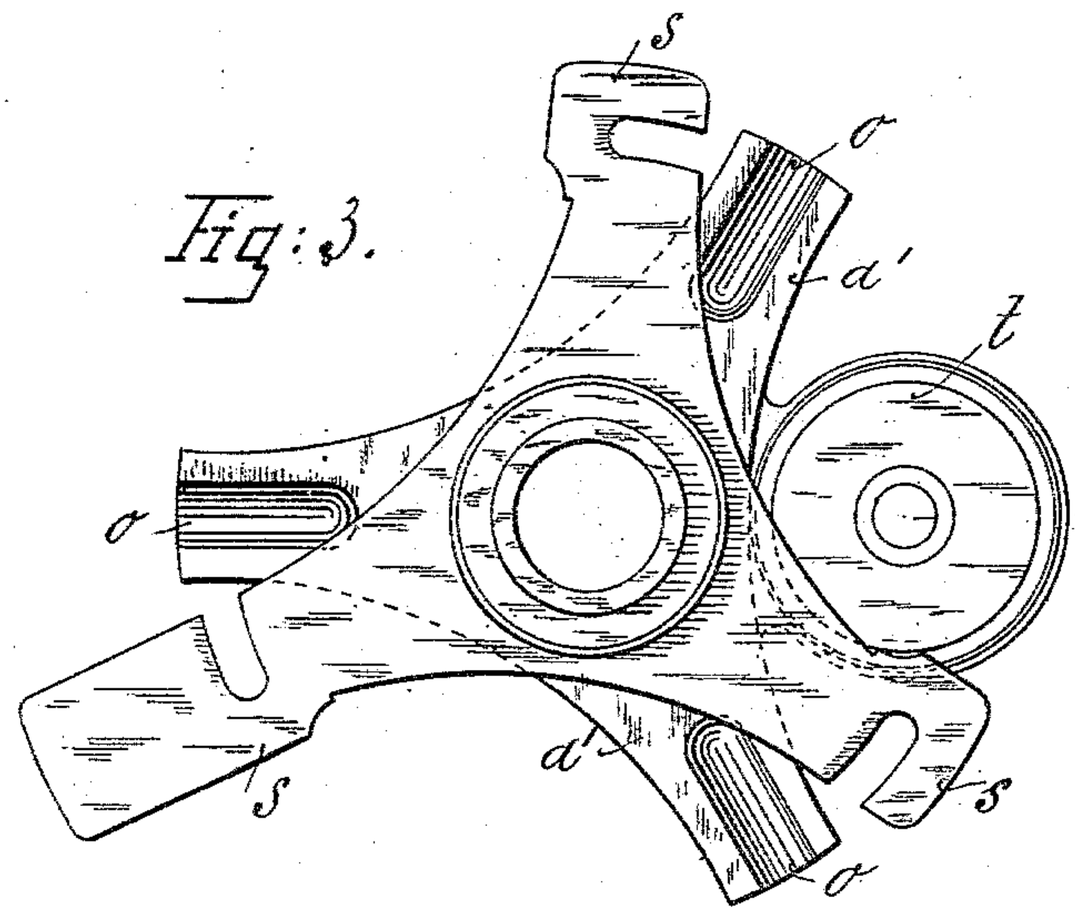
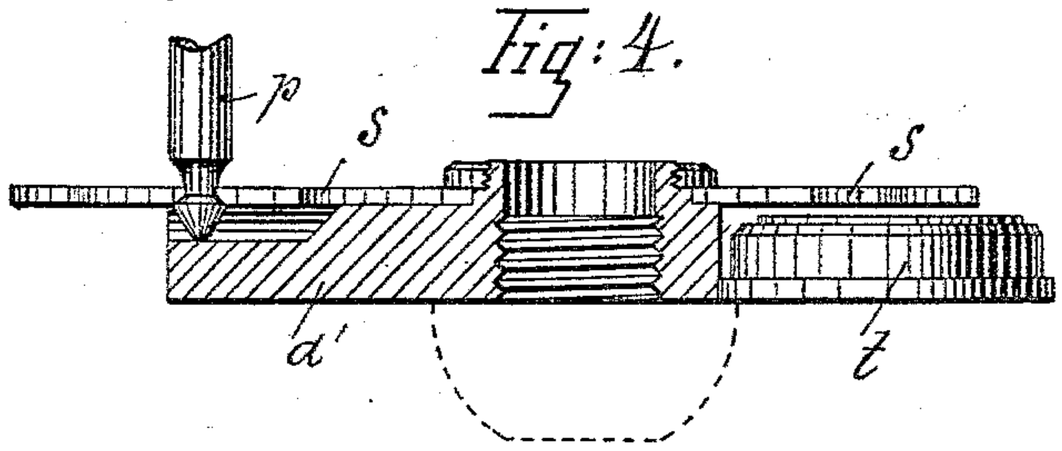


Fig: 4.



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By his Attorney:

Henry Connett

(No Model.) 2 Sheets—Sheet 2.

F. REINECKE.

TRIPOD.

No. 356,891. Patented Feb. 1, 1887.

Fig: 2.

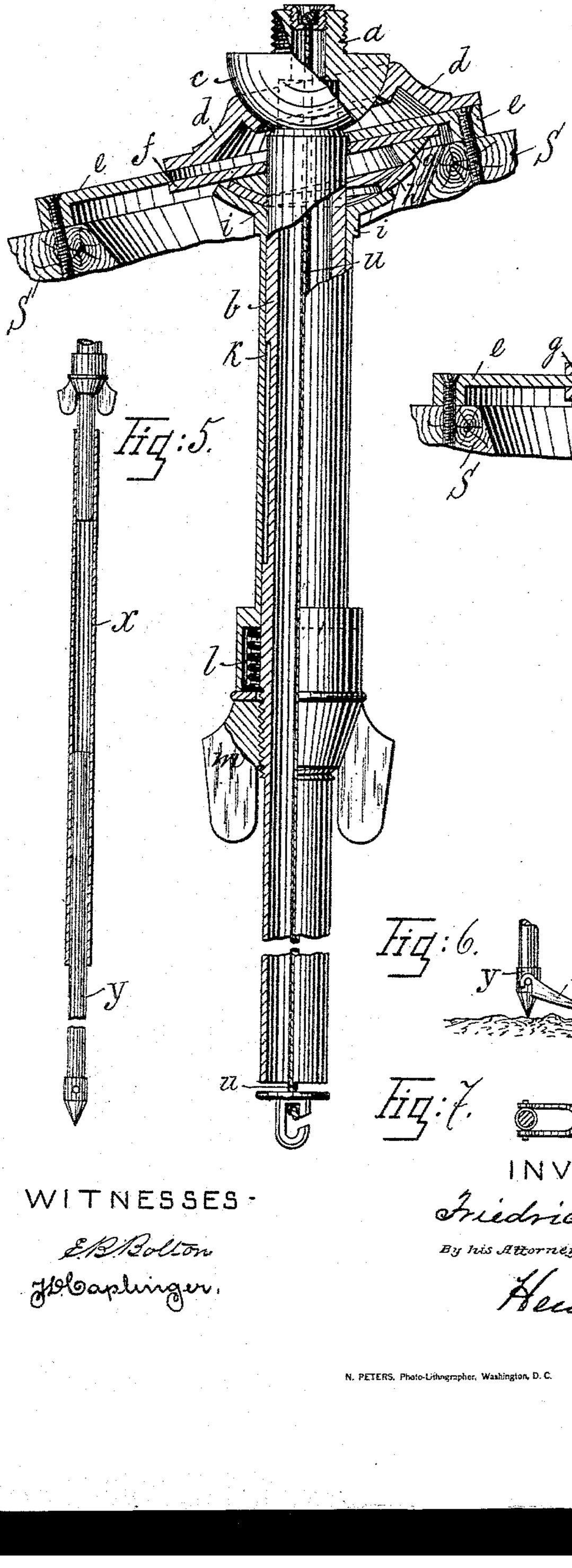


Fig: 5.

Fig: 8.

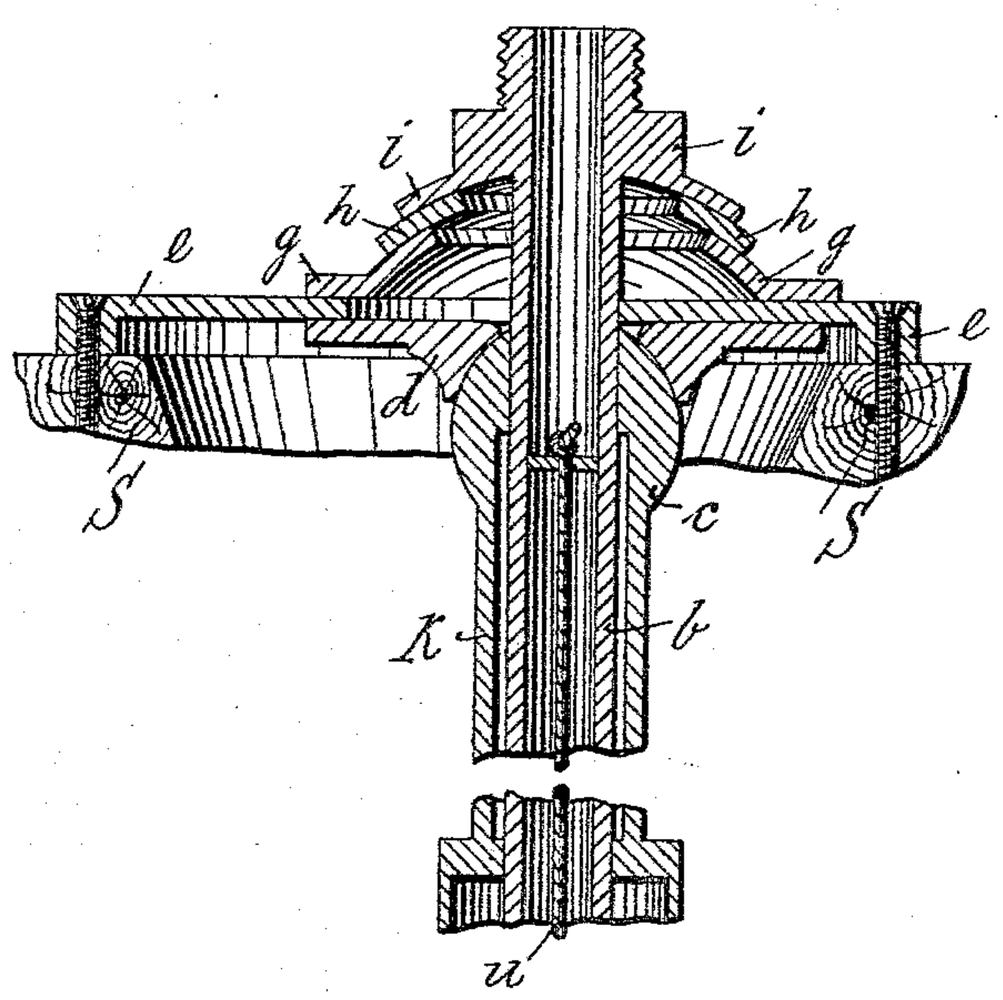


Fig: 6.

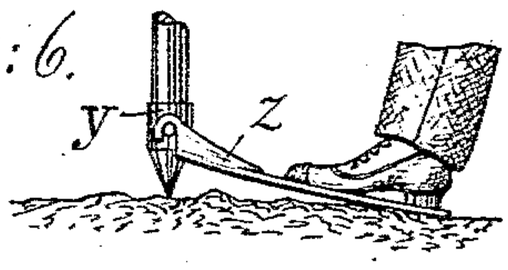
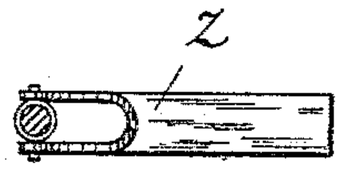


Fig: 7.



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UNITED STATES PATENT OFFICE.

FRIEDRICH REINECKE, OF BERLIN, GERMANY.

TRIPOD.

SPECIFICATION forming part of Letters Patent No. 356,891, dated February 1, 1887.

Application filed October 5, 1886. Serial No. 215,405. (No model.) Patented in Germany January 8, 1886, No. 36,577.

To all whom it may concern:

Be it known that I, FRIEDRICH REINECKE, of the city of Berlin, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Tripods with Horizontal Adjustment for Surveying and other Instruments, (for which a patent was granted to me in Germany under date of January 8, 1886, No. 36,577;) and of which I declare the following to be a specification.

This invention relates to improvements in tripods with horizontal adjustment for surveying and other instruments, said horizontal adjustment being so constructed that it can be connected to the head of any ordinary tripod, and serves to rapidly and correctly adjust the surveying or other instrument in horizontal direction. The said horizontal adjustment is so constructed that instruments of various constructions can be attached to the tripod—that is to say, not only instruments which are simply screwed onto a pivot, but also such provided with three or more feet can be applied to the tripod.

This improved horizontal adjustment renders the customary fine adjustment-screws unnecessary, and avoids this time-consuming system of adjustment and the resulting wear and tear of the screws. A further advantage of this new adjustment is that the instrument can be rapidly and accurately adjusted in the horizontal plane even when the head of the said tripod leans so considerably to one side that the ordinary regulating-screws could not be used, and the device can furthermore be so arranged that it acts as plumb or as sheathing for the plumb-line.

In the accompanying drawings, Figure 1 is a vertical section of the head of the tripod with horizontal adjustment. Fig. 2 is a like section showing the head of the tripod in inclined position. Fig. 3 is a top view of the device for receiving instruments, with three or more feet in connection with the horizontal adjustment. Fig. 4 is a vertical section of the device shown in Fig. 3, with the spirit-level and the arms *s* and foot *p* in elevation. Fig. 5 is a section and part elevation of the central tube of the horizontal adjustment, arranged as plumb, on a reduced scale. Fig. 6 is an elevation of a device for driving the point of the said plumb into the ground; and Fig. 7 is a top view of the device shown in Fig. 6, with the plumb-rod in section, also on a reduced scale. Fig. 8 represents a section of the improved horizontal adjustment wherein the ball or hemisphere of the universal or ball-and-socket joint is arranged below the socket. In this case the disk *f* can be dispensed with, and the parts *f* and *g* replaced by the curved ring *g*.

The theodolite, surveying, or other instrument, which carries a very sensitive spirit-level, is either screwed directly onto the screw-pivot *a* or placed by its feet on an intermediate base-plate, *a'*, screwed on the said screw-pivot *a*. This pivot *a* forms the upper end of a central tube or adjusting-lever, *b*, which can be moved in any direction, so as to adjust the instrument horizontally. The head *c* of this adjusting-lever moves in an annular socket, *d*, and thus forms a ball-and-socket joint, which said socket *d* is arranged to slide on the guide-plate *e*, which has a large central opening. A stout flange on the periphery of the guide-plate *e* permits of the same being securely attached to the wooden skeleton head S of the tripod. A disk, *f*, with central opening, the edges of which are so reamed out that the movement of the lever *b* is not impeded, permits the passage of the said lever and glides on the lower surface of the guide plate *e*. A ring, *g*, the lower surface of which is turned off to a corresponding part of a ball or sphere, is applied to the lower surface of the plate or disk *f*, glides on the same, and is embraced by a ring, *h*, of corresponding form, which is carried by the socket-like flange *i* of the tube *k*, which surrounds the adjusting-lever and is guided on the same. The annular socket *d* and also the socket-like rings, of which several can be employed, must be arranged concentrical to the ball *c* of the ball-and-socket joint. The inclination of the adjusting-lever to the guide-plate *e* of the tripod depends on the number of rings employed.

The lower part of the tube *k* is extended so as to form a receptacle, *l*, for a helical spring located around the adjusting-lever. This spring presses against the upper inner surface of the space so formed and against the upper surface of a fly-nut, *m*, which is screwed on the adjusting-lever *b*, so that when the said nut

is turned to the right the spring *l* will be compressed and the tube *k* forced upward, thus creating so much friction between the parts of the horizontal adjustment that the same are securely fixed in position and a further movement of the adjusting-lever *b* prevented.

As the upper flat surface or horizontal axis of the ball *c* of the joint *c d*, to which the horizontal base-plate of the instrument is attached, always remains perfectly rectangular to the axis of the adjusting-lever *b*, the instrument is horizontally adjusted as soon as the said lever *b* occupies a vertical position.

In order to facilitate the horizontal adjustment of the instrument, it is necessary that a circular or box spirit-level, *t*, be applied to the base-plate of the apparatus.

The adjusting-lever *b* is, as aforementioned, moved by hand after releasing the fly-nut *m*, the spirit-level serving to facilitate the adjustment. The positions of the parts of the horizontal adjustment are represented in Fig. 2 in highly inclined position of the head of the tripod.

The base-plate *a'* is applied to the screw-pivot *a* of the adjusting-lever *b* when surveying-instruments with feet are employed, and is given with each tripod as reserve part.

The plate *a'* is provided with appropriate recesses or grooves *o*, so that instruments with feet of various dimensions can be used in one and the same apparatus. The feet *p* of the surveying-instrument are preferably so formed, as shown in Fig. 4, and fixed to the base-plate by a suitable top plate or cover, *s*, with recesses or notches which engage and embrace the feet *p*.

The adjusting-lever *b* is composed of an appropriate tube, within which the plumb-line *u* is arranged, so as to protect the same against the effects of wind, &c.

According to the construction as represented in Fig. 5, the plumb and line are replaced by a rigid construction consisting of a straight tube which slides over the extended adjusting-lever *b*, and in which the pointed rod *y* can slide up and down.

This device offers many advantages over the plumb-line, for the reason that when the instrument has been horizontally adjusted the point *y* will be exactly vertical to the axis of the lever *b*, which forms a right angle with the upper surface of the horizontal axis of the ball *c;* or, as represented by Figs. 6 and 7, the point *y* can be driven into any spot from which measurements or other operations are to be effected by means of the treadle *z*, and the head or upper part of the apparatus adjusted so as to form the requisite vertical line. In this manner measurements can be carried out much more rapidly than by any other known means.

Fig. 8 represents the arrangement of the like parts as shown in Figs. 1 and 2, but in inverted order.

The central opening in the plate *e* is so large that the instrument can be readily moved to any point where it is desired to effect the measurements or other operation.

Having now particularly described my said invention, I declare that what I claim is—

1. The combination of the tripod-head S, the apertured guide-plate *e*, fixed thereon, the socket *d*, mounted thereon, the ring *g*, mounted on the opposite side of said plate *e*, the ball or head *c*, the adjusting-lever *b*, secured to said ball, the embracing-tube *k*, provided with a socket, *i*, the spring *l*, and the nut *m*, all arranged substantially as set forth.

2. The combination, with the tripod-head S and its plate *e*, of the sliding socket *d*, the hemispherical head or ball *c*, mounted in said socket with its plane face uppermost, and provided with a screw, *a*, on said face to receive the instrument, the adjusting-lever *b*, secured rigidly to and pendent from said ball, and means for holding said ball or head *c* down into its socket with a yielding or spring pressure, substantially as set forth.

3. The combination of the ball and socket *c d*, adjusting-lever *b*, attached to the ball or head *c*, the tube *x*, and the rod *y*, all arranged substantially as and for the purposes set forth.

4. The combination of the screw-pivot *a*, the adjusting-lever *b*, the ball and socket *c d*, the guide-plate *e*, the rings *f*, *g*, and *h*, the tube *k*, provided with a socket, *i*, the spring *l*, the nut *m*, and the tripod-head S, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FRIEDRICH REINECKE.

Witnesses:

A. STEFFEN,

B. ROI.