A. WAIN.

AUTOMATIC LEVELING APPARATUS.

APPLICATION FILED NOV. 4, 1908.

925,058. Patented June 15, 1909.

2 SHEETS—SHEET 1.

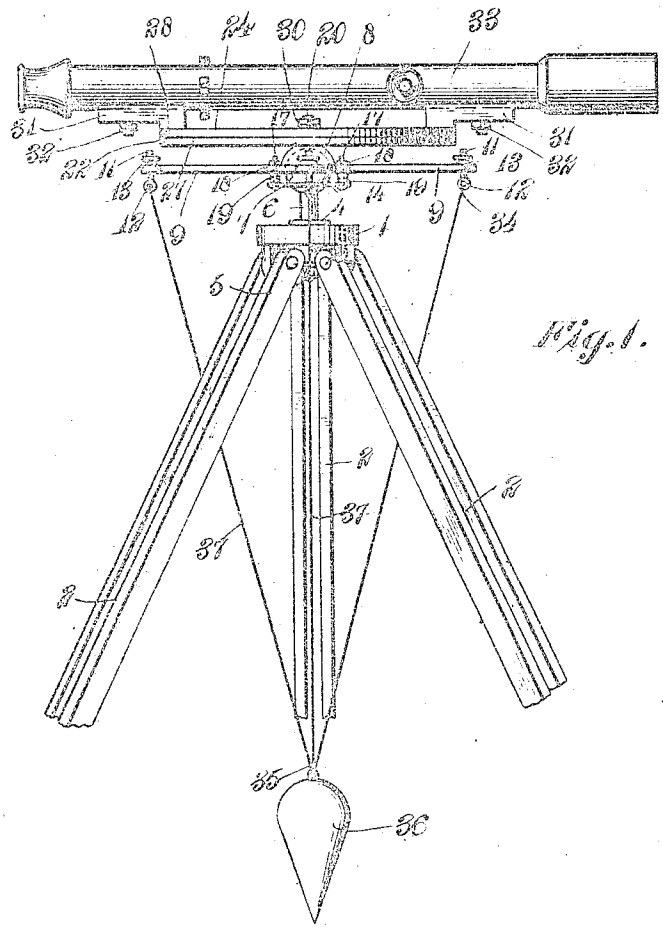


Fig. 1.

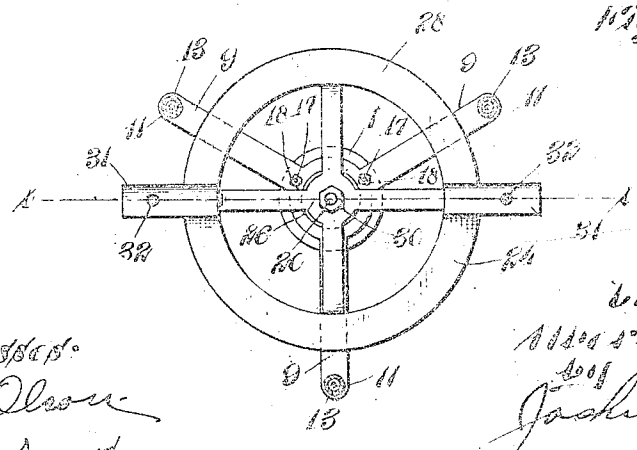


Fig. 2.

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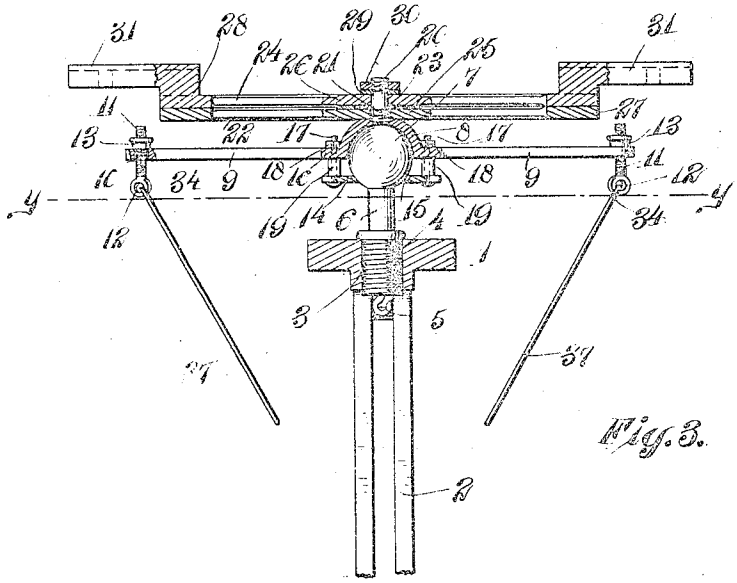


Fig. 3.

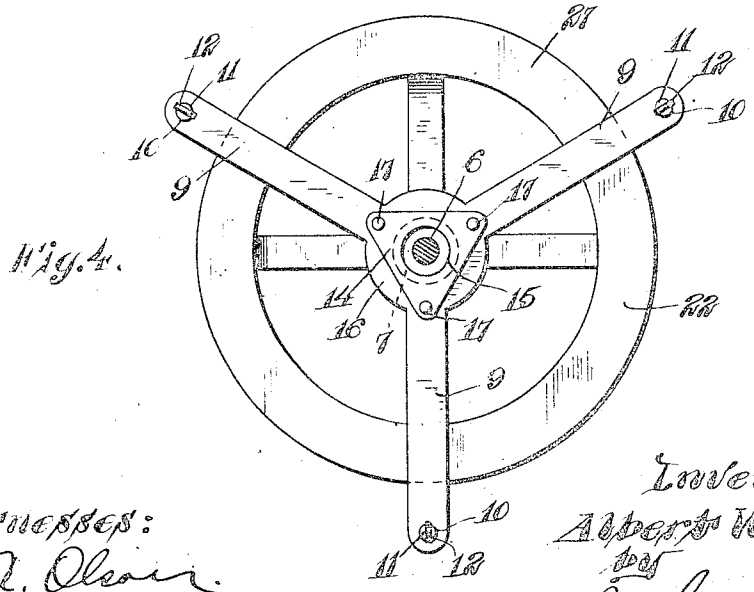


Fig. 4.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC LEVELING APPARATUS.

No. 925,058. Specification of Letters Patent. Patented June 15, 1909.

Application filed November 4, 1908. Serial No. 460,988.

To all whom it may concern:

Be it known that I, ALBERT WAIN, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Automatic Leveling Apparatus, of which the following is a specification.

My invention relates to leveling devices or tripod-heads for engineers' levels, compasses, plane-tables, etc., but more especially it relates to leveling devices, where it is necessary to obtain a perfect level, and it is desirable to accomplish the same as rapidly and with as little risk of error as is possible.

The object of my invention is to provide a leveling device of the character mentioned, which will be adapted when properly arranged to automatically bring to a perfect level, the instrument mounted upon the same.

A further object of my invention is to provide a device of the character mentioned, which will be of the highest possible efficiency, and which will be of comparatively simple construction, hence, of low cost to manufacture.

Other objects will appear hereinafter.

With these objects in view, my invention consists in a leveling device characterized as above mentioned, and in certain details of construction and arrangement of parts all as will be hereinafter more fully described, and particularly pointed out in the claims.

My invention will be more readily understood by reference to the accompanying drawings forming a part of this specification, and in which,

Figure 1 is a side elevation of the preferred form of my device showing the application of the same in connection with an engineer's level, Fig. 2 is a top plan view thereof, the level telescope being removed, Fig. 3 is an enlarged vertical longitudinal section taken on substantially the line x—x of Fig. 2, and Fig. 4 is a horizontal section thereof taken on substantially the line y—y of Fig. 3.

Referring now to the drawings, 1 indicates the ordinary circular metal table of a tripod to the under surface of which are pivotally connected the ordinary legs 2 thereof. Said table is provided with a centrally disposed, vertically extending threaded circular perforation 3. Snugly fitting and threaded into said perforation 3 is a plug 4 in the lower extremity of which is fixed a centrally positioned, depending hook 5. Centrally positioned, and upwardly extending from said plug 4, the same being preferably formed integrally therewith, is a reduced, preferably cylindrical shank 6, the upper extremity of which is provided with a ball 7, preferably formed integrally therewith. Said ball 7 may be of any suitable diameter, but is perfectly spherical in shape, the center thereof lying exactly in the line of the longitudinal axis of the plug 4 and shank 6. Snugly and exactly fitting said ball 7, is a semi-spherical cup or socket 8. Radially extending from the lower edge of said cup 8, the same being preferably formed integrally therewith, and preferably disposed at angles of 120 degrees to each other in the same plane, are arms 9 of equal lengths. Snugly fitting in perforations 10 provided in the end portions of said arms 9 at equal distances from the inner extremities of said arms, are the vertically extending threaded shanks 11 of eyes 12. Threaded upon said eye-shanks 11, are adjusting thumb-nuts 13.

14 indicates a retaining plate which may be of any suitable shape, but is preferably, as shown in the drawings, triangular. Said plate is provided with a centrally positioned, circular perforation 15 of a diameter slightly less than that of the ball 7. The rounded circular edge surrounding the perforation 15 of said plate 14, rests in close proximity to the peripheral surface of the ball 7, as clearly shown in Fig. 3, said plate being secured to the annular flange 16 of the cup 8 by means of threaded bolts 17 extending through said plate and flange and nuts 18 threaded upon the upper end portions of said bolts, said plate being spaced apart from said flange preferably by means of sleeves 19 provided upon said bolts 17 and interposed between said plate and said flange. Centrally positioned and vertically extending from said cup member 8, the axis thereof in other words being perpendicular to the plane of the arms 9, is a cylindrical projection 20, the same being preferably formed integral with said cup 8. Suitably fixed, preferably by being threaded, at its center upon the base portion 21 of said projection 20, is a circular spider disk 22. Said disk is so disposed that the upper surface thereof lies in a plane perpendicular to the axis of the projection 20. Revolubly mounted upon the reduced portion 23 of the projection 20, the under surface thereof resting upon the upper surface of the disk 22, is a

spider disk 24 of a construction substantially the same as that of the disk 22. The central portions 25 and 26, respectively, of said disks 22 and 24 are of a thickness slightly less than that of the peripheral portions 27 and 28, respectively, thereof, hence, said disks contact each other at their peripheral portions only, as clearly shown in Fig. 3.

29 is a washer and 30 a lock-nut threaded upon the upper end portion of said projection 20, the same serving obvious purposes.

Radially extending and arranged diametrically opposite each other upon the upper surface of the disk 24, the same being preferably formed integrally therewith, are vertically and horizontally extending standards 31 upon which is arranged so that the axis thereof shall be in a plane parallel to said disk 24, and secured in any suitable manner thereto, but preferably by screws 32, a telescope 33 of any ordinary or preferred form. Having their upper extremities 34 suitably fixed to the eyes 12 and the lower extremities 35 fixed to a plumb 36 of any suitable weight are cords 37. Said cords are of equal lengths and are preferably formed of metal, the latter not readily being affected by the weather.

In order to facilitate the initial proper positioning or adjustment of my device, that is, of the plumb 36, the before-mentioned hook 5 is provided, the same being as before stated, in alinement with the longitudinal axis of the plug 4 and shank 6. Upon adjusting the tripod so that the table thereof shall be in a horizontal plane, a plumb is suspended from said hook and the exact position of the lower extremity or point thereof is noted. Now upon suspending the plumb from the eyes 12 by the cords 37, by means of the adjusting nuts 11 it is evident that the point of said plumb may be brought to register exactly with the before noted position thereof, whereupon it is evident that the arms 9, the disks 22 and 24, and consequently the telescope 33, will be positioned in a horizontal plane.

By the provision of a device as described, it is evident that a reliably efficient form of automatically adjustable leveling apparatus for carrying an engineer's level telescope or other similar instrument is facilitated, insuring positive and immediate or instantaneous positioning of said instrument in operative position without regard to the character of the surface of the ground over which the engineer may be required to pass.

While I have shown what I deem to be the preferable form of my device, I do not wish to be limited thereto, as there might be many changes made in the details of construction and arrangement of parts without departing from the spirit of my invention. And although I have designed my device with special reference to engineers' levels, it is understood that I may use the same in connection with any other instrument or device to which it is applicable.

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

1. In a device of the class described, the combination with a table, of a ball supported above said table, a semi-spherical cup member mounted upon said ball, radially extending arms projecting from said cup member and provided with perforations in the ends thereof, eye-bolts slidably mounted in said perforations, thumb-nuts threaded upon the upper end portions of said bolts and resting upon the upper surfaces of said arms, cords secured to and depending from the eyes of said bolts, a plumb secured to the lower extremities of said cords, means for locking said cup member against displacement from said ball, and means connected with said cup member for supporting an engineer's telescope, substantially as described.

2. In a device of the class described, the combination of a table, with a ball supported above the same, a semi-spherical cup, mounted upon said ball, a cylindrical projection extending upwardly from said cup, a disk threaded to the base portion of said projection, said projection above said disk being smooth and reduced in diameter, a second disk resting upon said first mentioned disk and pivotally mounted upon the upper reduced portion of said projection, substantially as described.

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

ALBERT WAIN.

Witnesses:
JANET E. HOGAN,
W. C. SMITH.