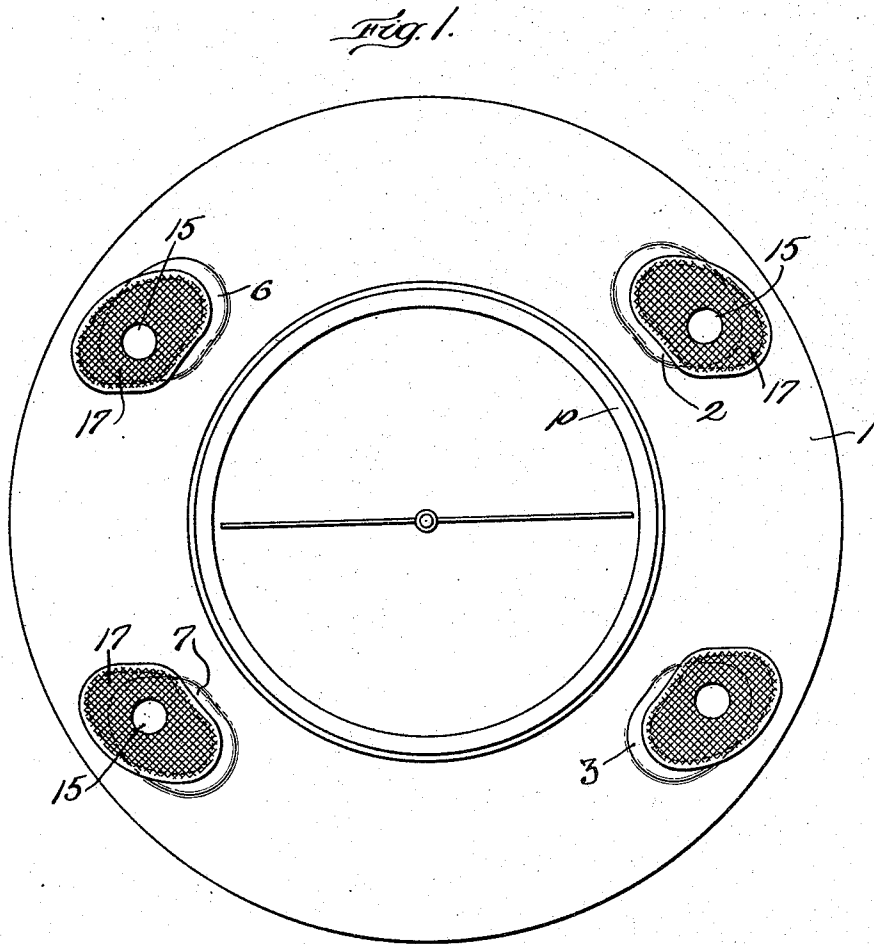


W. A. BERGER.
TELESCOPE SUPPORT.
APPLICATION FILED FEB. 21, 1914.

1,179,271.

Patented Apr. 11, 1916.
3 SHEETS—SHEET 1.



Witnesses:

Edward Maxwell

James R. Hodder

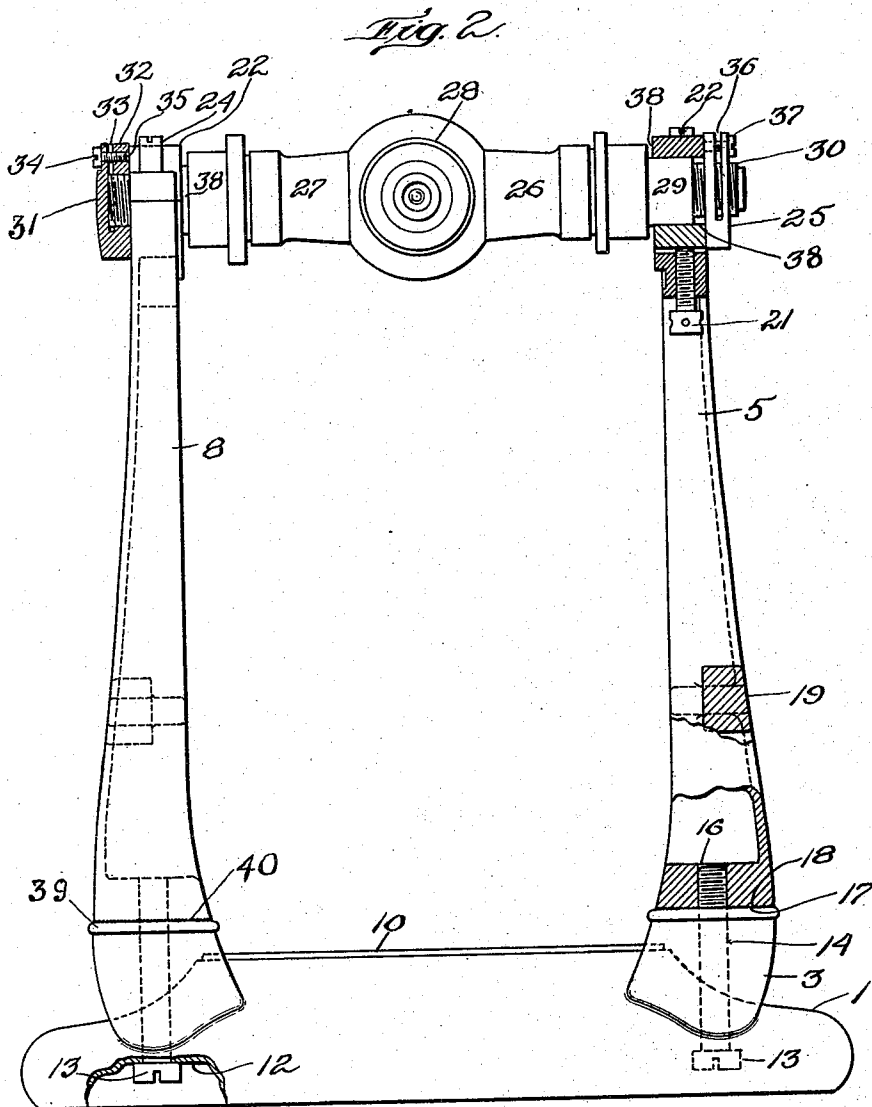
Inventor:

William A. Berger,
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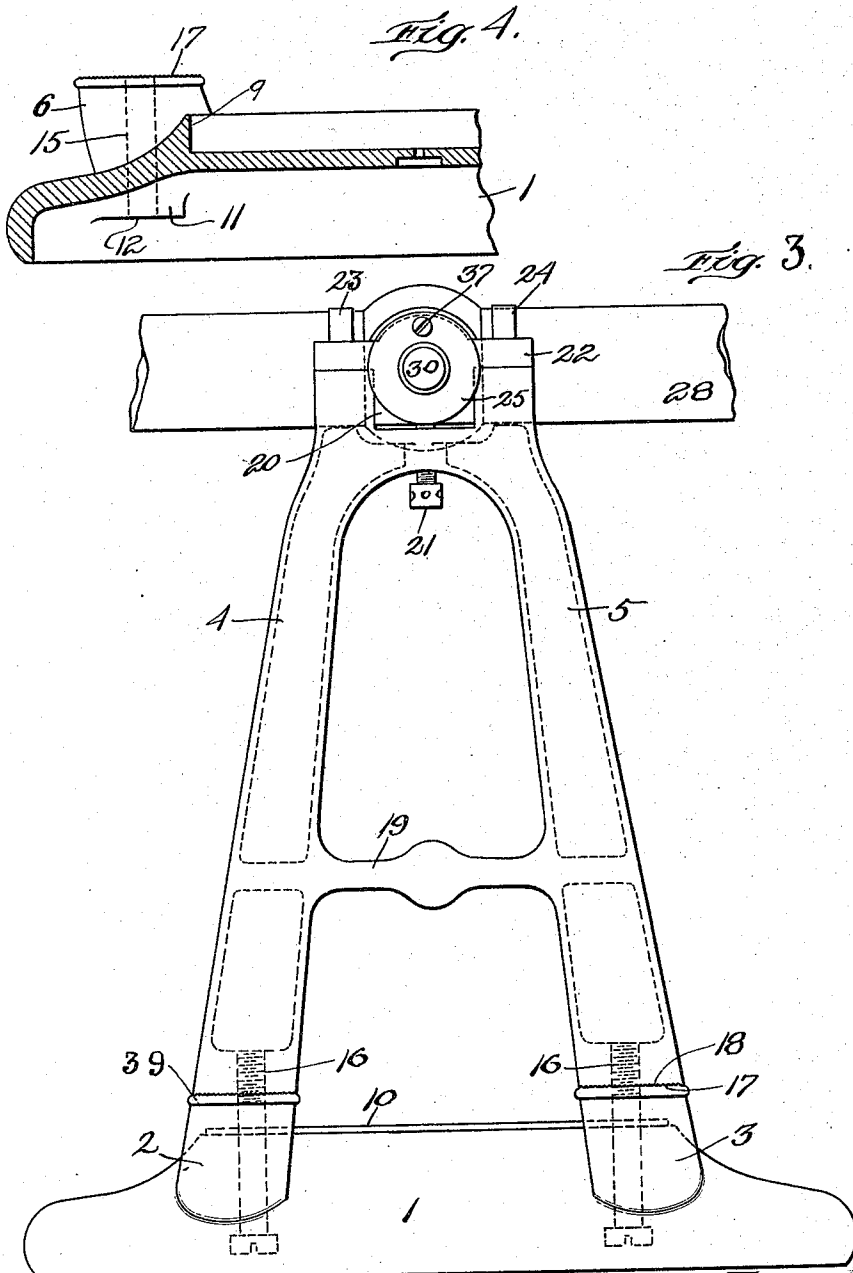
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UNITED STATES PATENT OFFICE.

WILLIAM A. BERGER, OF BOSTON, MASSACHUSETTS.

TELESCOPE-SUPPORT.

1,179,271.

Specification of Letters Patent.

Patented Apr. 11, 1916.

Application filed February 21, 1914. Serial No. 820,276.

To all whom it may concern:

Be it known that I, WILLIAM A. BERGER, a citizen of the United States, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Telescope - Supports, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention is a telescope support, and its object is to improve and perfect supporting standards and adjustments for instruments of precision.

In the prior patent to C. L. Berger, No. 1,003,419, is illustrated a construction of standards having provision for sliding adjustment to enable the telescope and standard to be properly positioned and accurately "trued," and my present invention is an improvement in enabling similar adjustments for a telescope support to be more accurately, readily, and economically made than has heretofore been possible.

A further important feature of the invention is to secure the advantages of lateral adjustments, both of the supporting standards and of the trunnions or pivotal support of the telescope in said standards, without the necessity of providing slides, guideways, adjusting screws, and the like. It will be readily appreciated that the manufacture of a plurality of slideways in instruments of precision requires great care in alining and truing all such slideways and all the bearings thereof, and my present invention obviates these objections and enables all such adjustments to be made more simply, quickly, and accurately than by such slideways, as heretofore.

In my present improved construction, I prefer to form the telescope supports in two sections, with the lower base portion planed off smooth and true, and the corresponding contacting face of the upper portion similarly planed to rest upon the lower portion, and these two portions of each support are then secured together by any suitable means, preferably a screw passing through an enlarged opening in the lower part and threading into a tapped socket in the upper portion. This construction enables me, at any time, to true up the entire support by removing the upper portion and replaning the lower face, either at a slight bevel or per-

fectly horizontal, it being a very simple machine operation to so plane the face of a support thus removed, for truing the support. This construction, furthermore, is of special advantage in enabling the telescope support of a transit, for example, which has been bent or distorted in use, to be again trued into precise supporting relation whereas heretofore the entire standard would have to be discarded and a new one substituted, as it is impossible from a manufacturing standpoint to straighten or true up a bent and distorted casting.

A further feature of the invention is the simple means of adjusting the telescope, relatively with the supports, by laterally sliding the trunnions of the telescope, to bring the telescope itself into the line of collimation.

Other features of the present invention are the provision of an improved water-shedding base, reinforced standards to carry heavy telescopes, and more firm and accurately wearing pivotal bearings for the telescope trunnions. I also provide a simple and novel form of locking and clamping nuts to hold the telescope in adjusted position, without disturbing the adjustment to which it has been set.

Other features of the invention, novel combinations of parts, and details of construction will be hereinafter more fully pointed out and claimed.

Referring to the drawings, illustrating a preferred embodiment of the invention, Figure 1 is a plan view of the improved base, with the supporting standards and the telescope removed; Fig. 2 is an end view, partly in cross section, of the telescope in its bearings; Fig. 3 is a side view, on the same scale, of a pair of the supporting standards and a fragmentary view of the telescope; and Fig. 4 is a fragmentary view of the base, partly in section.

In the manufacture of instruments of precision, such as transits, and the like, during the past fifteen years, there has been a very pronounced increase in weight, owing to the increased power, heavier telescopes, etc., so that the forms of supporting standards heretofore utilized were unsuited for modern usage. A mere increase in size of the supporting standards, to carry this increased weight, would be highly objectionable as rendering the entire instrument too

heavy for transportation and use. Accordingly, my base and standards are made to secure the greatest possible strength with a minimum of weight and material and to this end the base 1 is of curved contour, being also formed to secure the advantages of a water-shedding effect, and to protect the supporting and adjusting head on which it may be mounted, and also to hold the usual horizontal compass in its center. In making the exterior contour of the base 1 in proper form to secure the water-shedding effect, it will be understood that I may provide suitable bosses thereon for the usual vernier openings, plate levels etc., if desired, bosses for the supporting standards being cast in the plate as shown. The bosses for the standards are formed in suitable position at opposite sides, those indicated at 2 and 3 being for one pair of standards 4 and 5 (see Fig. 3) and the opposite pair 6 and 7 being for a corresponding supporting pair; one, 8, being shown in Fig. 2. I prefer to make the base 1 with its walls substantially parallel with the outer contour as indicated in Fig. 4, and partly in cross section in Fig. 2, and to provide a flange 9 to receive the horizontal compass 10. Underneath each supporting boss on the base 1 is a shoulder, as shown at 11 in Fig. 4, to provide a horizontal face 12 upon which the head 13 of a screw 14 may bear, which is adapted to pass loosely through a vertical aperture 15 in each boss and be tapped into a correspondingly threaded opening 16 in the adjacent lower end of the standards. Each of the bosses 2, 3, 6, and 7 has its topmost face 17 planed true and preferably in a perfect horizontal plane and the abutting face 18 of each of the upper supporting standards is similarly planed true to fit the lower face 17 and afford a firm, solid, compact bearing. The screw 14 engaging the end portion of the top standards and drawing up tightly will hold the same in firm and solid position on the base 1 and yet enable the standards to be easily removed and the faces 18 thereon trued or planed to fit. If desired a limited adjustment can be secured by this planing, a slight bevel being planed to draw the supporting standards 4 and 5, for example, inwardly or outwardly, a slight bevel at this low point effecting a considerable range of adjustment at its topmost point where the journal bearings for the telescope are mounted. I prefer to form the supporting standards 4 and 5 of substantially U-shaped form, the opening of the U being inwardly so as to secure the benefit of the water shedding feature in these standards as well as in the base. The lower end of each standard is formed solid to receive the tapped opening 16 and threaded end of the securing bolt 14, as already explained. I also prefer to form each pair of supporting standards with a solid cross brace 19, this construction affording great rigidity with a minimum of metal and weight. The upper part of each pair of standards, see Fig. 3, carries the usual sliding journal box 20 and adjusting screw 21 therefor, and a cap piece 22 held in position by the screws 23 and 24 as is customary. However, I form the outer faces of the box 20 and cap 22 true and smooth to act as a bearing for the lock nut 25, as will be described. I prefer to employ the usual Y type of bearing for the trunnions 26 and 27 of the telescope 28, but so form the bearing trunnions and retaining nuts to secure a lateral pressing effect on the standards and prevent any lateral or side play when a heavy instrument is being carried. The end of each trunnion is reduced at its bearings, 29, and the outer end is still further reduced and threaded at 30, to receive a locking nut 31, shown at the left in Fig. 2. This form of locking nut is intended to close the end of the bearing to protect the same from the weather, and has its inner face 32 true and smooth to bear against the corresponding face of the box 20 and cap 22. The threading on of these locking nuts serves to adjust the telescope laterally and secure it in the correct line of collimation. This lateral adjustment is easily, readily and quickly secured without slides, adjusting screws, or other complex mechanism; and when the desired adjustment is secured the locking nut is locked in position without displacing it by having a saw kerf 33 for substantially one-half its diameter and a set screw 34 passing freely through the outer part and being tapped into the inner more rigid half, as indicated at 35, Fig. 2. Where it is desired to extend the threaded trunnion 30 sufficiently to receive an auxiliary telescope, as is often the case in mine work, I provide a different type of locking nut, shown at 25, this being an ordinary open locking nut, also formed with a saw kerf 36 therein, and provided with a tightening screw 37 to retain the nut locked in adjusted position in a manner similar to that just described with regard to the nut 31. A sufficient amount of play between the bearing and the thicker part of the trunnions to permit this lateral adjustment is shown at 38. The adjustment of the nuts 25 or 31 and the locking of these nuts in exact adjusted position is of especial importance, as such locking in no way disturbs the adjustment already obtained, and these nuts are preferably tightened so as to permit the oscillation of the telescope 28 on its trunnions without any appreciable lateral movement or play. The locking nuts are therefore formed with the heavier and more rigid portions adjacent the bearing faces with which they contact, and on which they have a rotatable action, the less rigid outer por-

tions of each nut being depressed or sprung sufficiently to lock the nut on the threaded portion 30 of the trunnion by the tightening of the screws either 37 and 34 depending on whether the locking nut is a closed cap like 31 or open like 25.

I prefer to form a bead 39 where the supporting bosses meet, and may also ornament the outer ends of the contacting faces of each standard, and its boss, as indicated at 40, Fig. 2, in order to cover up the same. If desired, I may form the boss of slightly greater diameter than that of the contacting standard, so as to taper or fine down the former over the latter after the pieces are rigidly secured to thus cover up the joint, and may then further ornament the same as indicated at 40 so that the entire standard has the appearance of a single integral piece with the base 1, and yet is readily removable therefrom.

It will be readily appreciated that in manufacturing as well as in subsequently truing up an instrument which has been distorted in use, the construction permitting the detachment of the supporting standards from the base and truing up and re-planing the respective contacting faces, permits of a considerable range in adjustment. Furthermore this re-planing may be easily, quickly, and accurately accomplished at a minimum of expense and labor, and furthermore enables a bent or distorted standard to be trued up and replaced, whereas formerly a similarly distorted standard would have to be entirely discarded. The additional features of the water-proofing structure, increased strength with light weight and simplicity of lateral adjustment of the telescope are advantages which will be readily appreciated by those skilled in the art. Furthermore each standard may be separately and independently trued and ad-

justed, which is very important from the manufacturing standpoint.

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

1. A telescope support, comprising a pair of supporting standards, trunnions on said telescope adapted to rest on said standards, and adjusting nuts on each trunnion bearing upon said supports to adjust the telescope horizontally with relation to said standards.

2. A telescope and a support therefor, comprising a pair of supporting standards, trunnions on said telescope adapted to rest on said standards, comprising threaded end portions on the trunnions, a nut adapted to be threaded thereon and bear on the outer surface of its adjacent supporting standard, the inner faces of the standards being spaced from the unthreaded part of each trunnion to permit horizontal lateral adjustment of the telescope by manipulation of said nut.

3. A telescope and a support therefor, comprising a pair of supporting standards, trunnions on said telescope adapted to rest on said standards, comprising threaded end portions on the trunnions, a self-locking nut adapted to be threaded thereon and bear on the outer surface of its adjacent supporting standard, said nut having a threaded engaging portion adapted to be distorted into binding position on said threads when the telescope has been adjusted for collimation, whereby the nut is locked without distorting the said adjustment.

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

WILLIAM A. BERGER.

Witnesses:

JAMES R. HODDER,
R. J. HERSEY.