No. 808,205. PATENTED DEC. 26, 1905.

H. KERN.

JOINT FOR COMPASSES.

APPLICATION FILED MAY 7, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

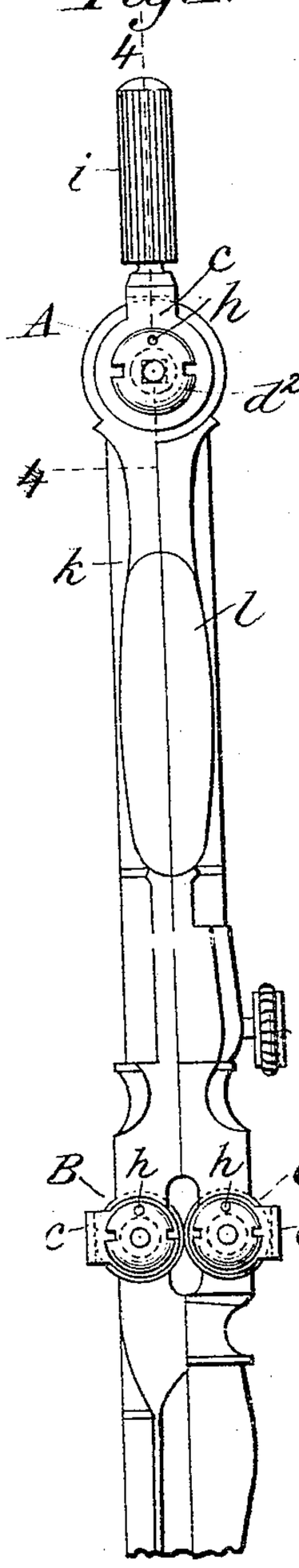


Fig. 2.

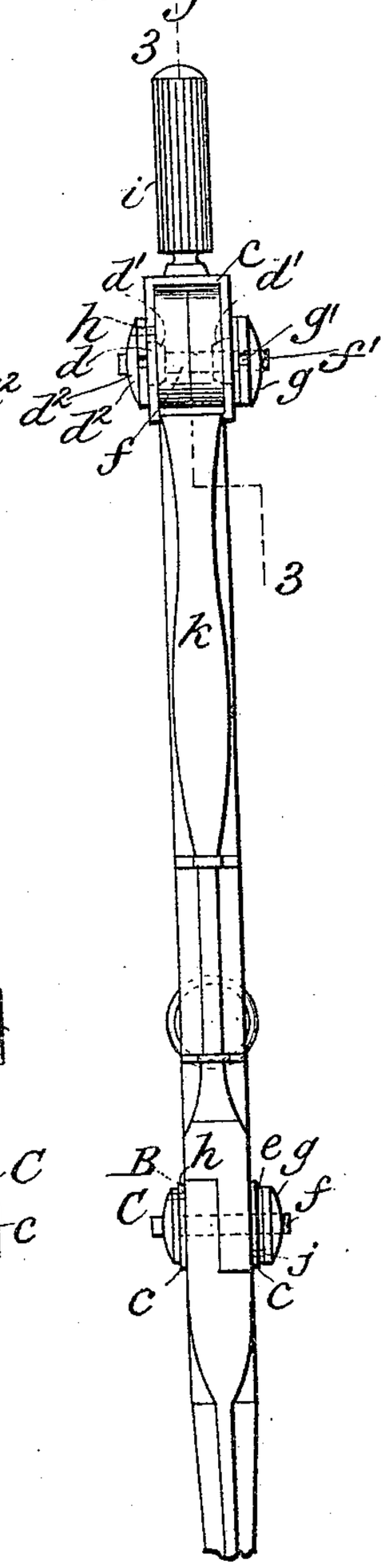


Fig. 3.

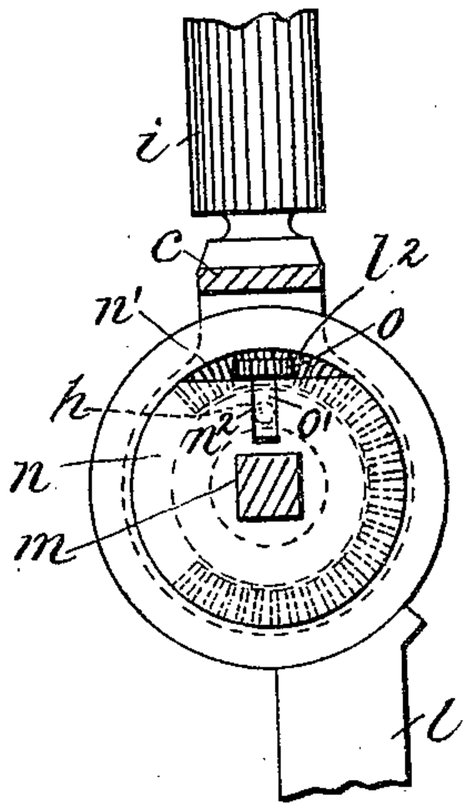
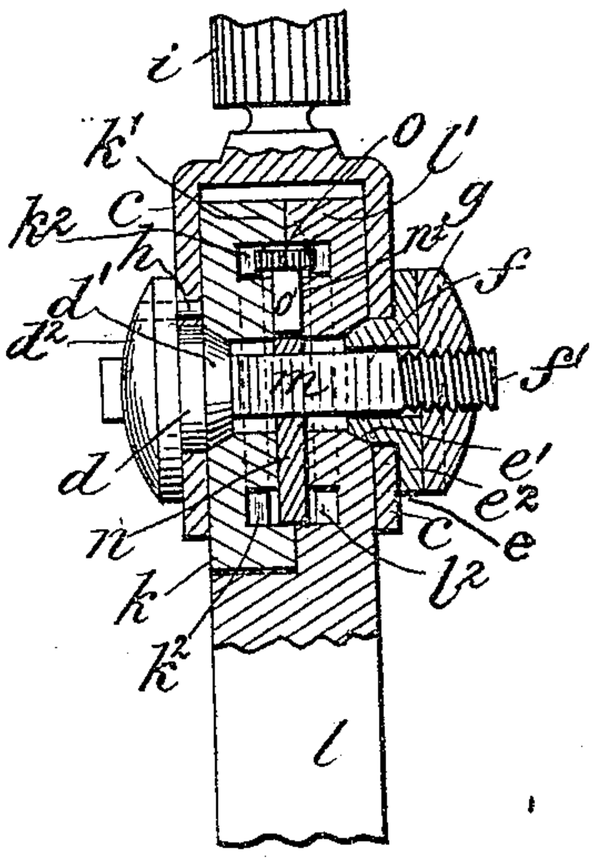


Fig. 4.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 5.

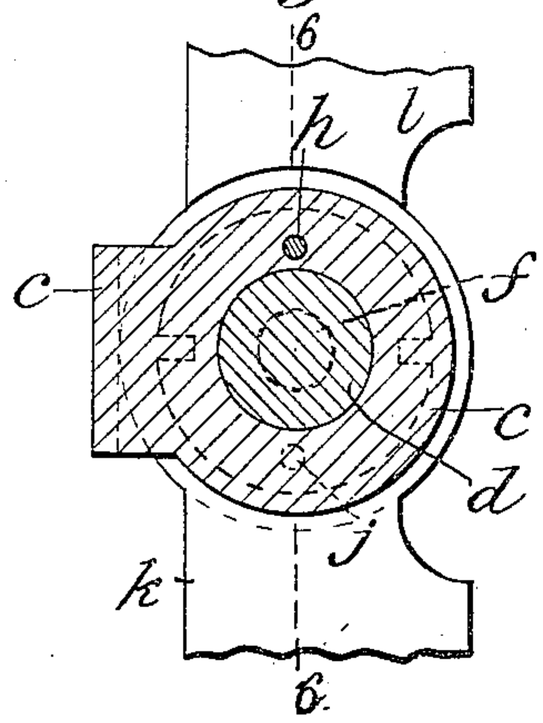


Fig. 6.

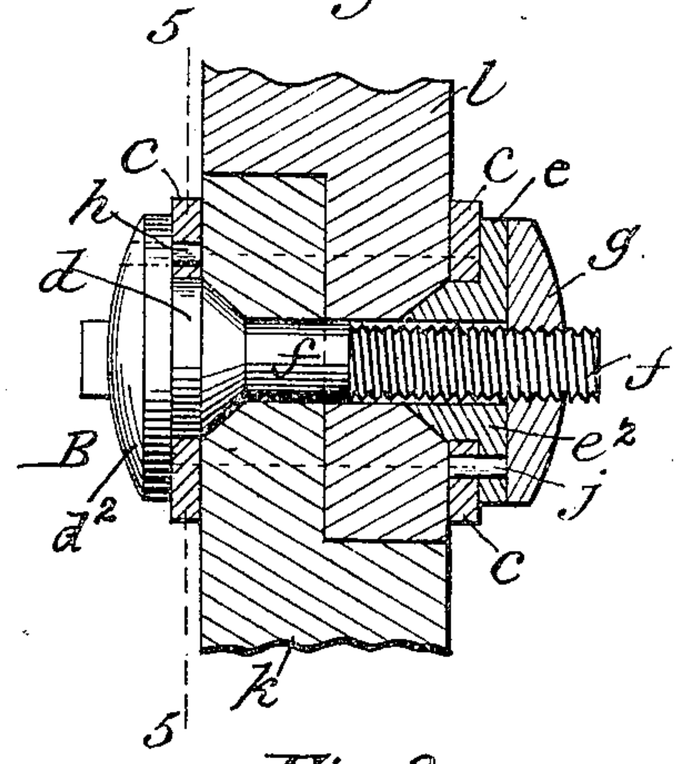


Fig. 7.

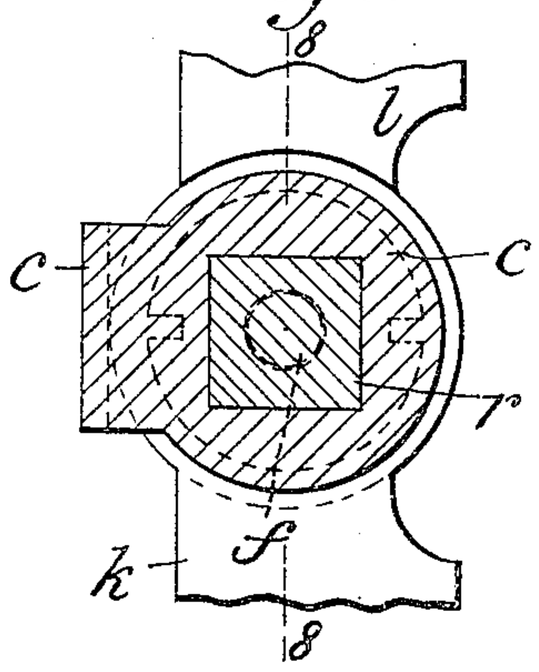


Fig. 8.

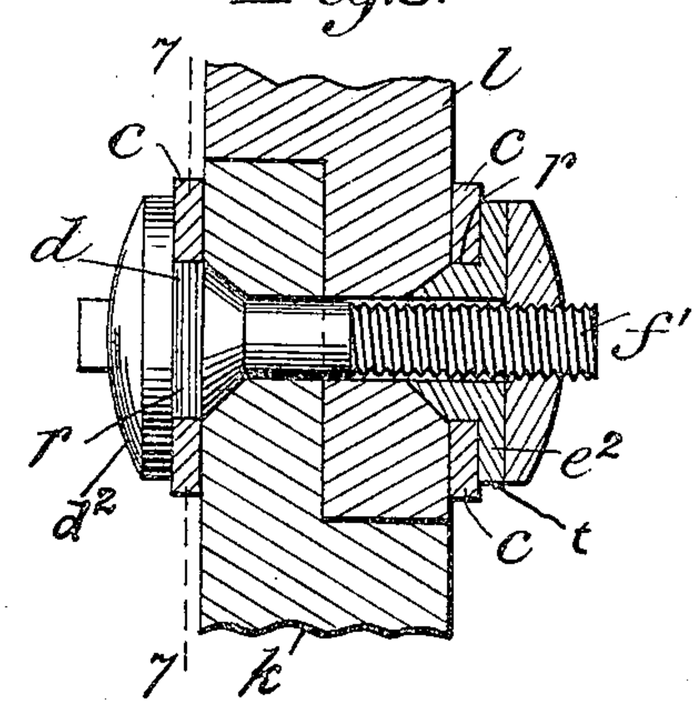


Fig. 9.

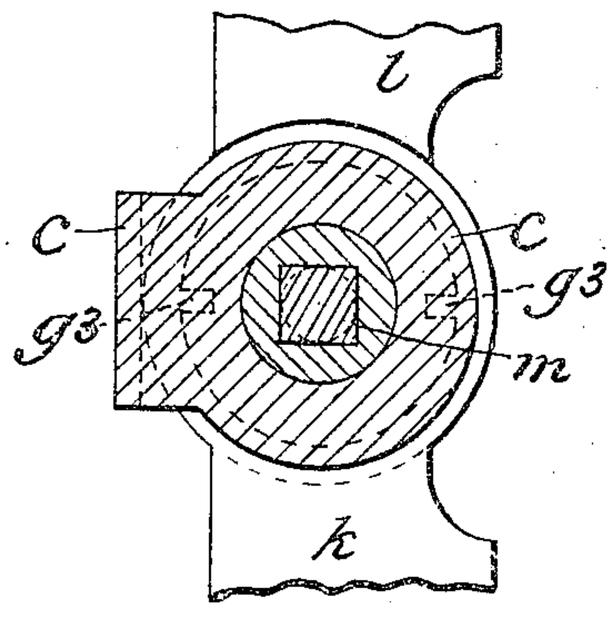
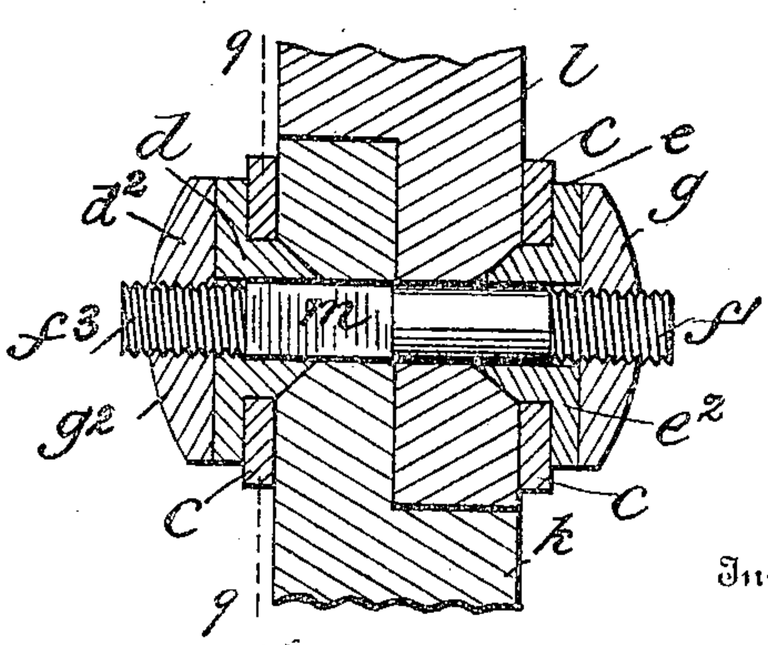


Fig. 10.



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JOINT FOR COMPASSES.

No. 808,205. Specification of Letters Patent. Patented Dec. 26, 1905.

Application filed May 7, 1904. Serial No. 206,833.

To all whom it may concern:

Be it known that I, HEINRICH KERN, a citizen of Switzerland, residing at Aarau, in the Republic of Switzerland, have invented certain new and useful Improvements in Joints for Compasses; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to joints for compasses and similar instruments, such as dividers, calipers, and the like.

In compass-joints as hitherto constructed with centering-pivots there has always been a necessity of providing a comparatively heavy yoke or fork for the support of the centering pivots or studs, or in case the clamp-screw passed through the jointed head complicated arrangements not readily manipulated by those not specially skilled were rendered necessary in order to effect an adjustment of the clamp-screw and to prevent changes of such adjustment when changing the position of the parts connected by the joint relatively to each other.

It is the object of the present invention to remove these objections and at the same time to obtain the benefits of a joint-clamp involving the use of conical centering-pivots.

It is also the object of the invention to provide means for causing the two legs of the compasses or similar instruments to move through equal angles when such instruments are opened or closed in such a way that the legs of the instrument will always occupy equal angles with respect to the handle-stem at the top of the same.

With the above objects in view my invention involves the combination with a yoke and two centering-pivots, preferably provided with shoulders bearing against the outer surfaces of the yoke, of means for positively securing said pivots against rotation with respect to each other and with respect to the yoke and means for clamping the pivots or the parts to be mounted.

My invention, moreover, involves suitable gearing arranged in the interior of the joints, whereby the movement of one leg of a compass will positively effect the movement of the other leg through the same angle.

Finally, my invention also consists in such further features and combination of parts, as will be hereinafter described, and pointed out in the claims appended to this specification.

In the accompanying drawings I have represented a joint embodying my invention in its preferred form as applied to compasses, such joints being there shown as applied both at the connecting-point of the two legs of the compasses as well as to the intermediate parts of said legs, such intermediate joints being applied either to the centering-leg of the compass or to the usual removable drafting pen or pencil holder.

In the drawings, Figure 1 represents a front elevation, and Fig. 2 a side elevation, of a pair of compasses embodying the invention; Fig. 3, a longitudinal vertical section through the head-joint on the line 3 3 of Fig. 2; Fig. 4, a similar section on line 4 4 of Fig. 1; Fig. 5, a similar section through the knee-joint on the line 5 5 of Fig. 6; Fig. 6, a similar section of the knee-joint on the line 6 6 of Fig. 5, and Figs. 7, 8, 9, and 10 show similar sectional views of somewhat modified forms of knee-joints.

As seen from the drawings, the head-joint A of the compasses having the legs *k* and *l*, as well as the knee-joints B and C, are formed according to the present invention—that is to say, with conical centering-pivots and screw-clamping devices for the same. I will first describe the head or top joint A as shown in in Figs. 1 and 2 and in detail in Figs. 3 and 4.

The head or top joint A, which connects the two legs *k* and *l* of the compasses, consists of two centering-pivots *d e*, which pass through openings in the arms of the yoke *c*, provided at its top with the usual handle-stem *i*. These centering-pivots *d e* have conical portions *d' e'*, which engage similar conical or tapering seats, one in each of the two legs *k* and *l*, as shown, and are provided with shoulders d^2 e^2 for bearing against the outer surfaces of the arms of the yoke *c*. These centering-pivots *d e* and with them the legs *k* and *l* are clamped together in the following manner: Firmly secured to the centering-pivot *d* is a bolt *f*, which is screw-threaded at its outer end at *f'* and which is squared or of any suitable angular cross-section at its intermediate portion *m*, so as to fit into a corresponding square central socket in the centering-pivot *e*. By this means a rotation of the two centering-pivots with respect to each other is prevented. To prevent a rotation of the centering-pivots with respect to the yoke *c*, suitable means, such as the pin *h*, passing from the shoulder d^2 of the centering-pivot *d* into a corresponding socket in the yoke *c*, is provided. The

screw-threaded end of the bolt f is engaged by the clamp-nut g, provided with any suitable means, such as the usual peripheral notches g', for turning the same by a suitable key for the purpose of clamping or unclamping the joint A.

For the purpose of securing at all times an equal angular motion for the two legs k and l, or, in other words, for keeping them symmetrical with respect to the handle-stem i in all of their positions, so that the said handle-stem will always occupy a vertical position when the instrument is in use, I provide the following means: Between the two head-plates k' and l' of the compass-legs k and l is arranged a disk n, whose squared central opening engages and is mounted on the squared portion m of the screw-bolt f, as shown in Figs. 3 and 4. Thereby the disk is secured against rotation. As shown, this disk n is cut away at the top n' and, moreover, has a radial slot n^2 for forming a bearing for the spindle o' of a pinion o, which extends to both sides of the disk, as shown. The spindle o' and with it the pinion o are held in place and guarded against falling out or becoming displaced by the fact that the former is inclosed between the two head-plates of the legs k and l and held in the slot n^2. This pinion engages two circular racks or cog-surfaces k^2 l^2, arranged on the inner surfaces of the head-plates k' and l'.

The operation of the head-joint thus described will be apparent from the foregoing. When the clamp-nut g is tightened upon the screw-thread f' of the bolt f, the two conical portions of the centering-pivots d and e are drawn together, and with them the head-plates k' and l' of the legs k and l are accurately and firmly clamped and held against accidental movement with respect to each other. Moreover, when the draftsman manipulating the instrument opens up or closes the legs of the compasses there will be no danger of an undue loosening of the clamp-nut for the reason that the squared portion m and the pin h prevent any rotation of the pivot e with regard to the pivot d or of the two pivots with relation to the yoke c. Hence there can be no loosening of the clamp-nut g, due to the frictional contact of the same with the pivot e, resulting from opening or closing the compass. Finally, the movement of one of the compass-legs in either direction with respect to the handle-stem i will cause its circular rack, which meshes with the pinion o, to rotate the same, and the latter in turn meshing with the circular rack on the inner surface of the head-plate of the other compass-leg will cause the latter to rotate to the same extent in the opposite direction. Thus the angle of the two legs with respect to the handle-stem i will be equal at all times.

The knee-joints B and C, which are shown in Figs. 1 and 2 and in detail in Figs. 5 and 6, are in all respects similar to the head-joint A, except that they omit the pinion and auxiliary parts for securing equal angular motion for the two parts united by the joint, and in the present instance the screw-bolt f of the joint-clamp is not squared, but cylindrical in cross-section, and passes loosely through all of the parts except the clamp-nut g, which is threaded on the same, as will be understood. In order to prevent the rotation of the centering-pivot e in the present case with respect to the centering-pivot d, the former is secured to the yoke c by a pin j passing from the shoulder e^2 of said pivot e into the yoke c. The operation of this joint will be understood at once from the above description of the head-joint.

In Figs. 7 and 8 I have illustrated a vertical longitudinal section and in a vertical section on line 8 8 of Fig. 7 a modified arrangement of the compass-joint under my invention. The joint, it will be noted, is in all respects the same as that described in connection with Figs. 5 and 6, except that a different arrangement for preventing the rotation of the centering-pivots d and e with respect to each other and with respect to the yoke e is provided. As will be seen from these figures, the pins h and j in Fig. 6 are omitted and instead of them the centering-pivots d and e are provided, each with a non-circular portion or collar r, which fits into a corresponding bearing or hole in the yoke c, as shown. By this means, as will be readily understood, the centering-pivots d and e are held against rotation in the yoke and with respect to each other.

In Figs. 9 and 10 I have, moreover, shown in sections similar to Figs. 7 and 8 another modified form of joint, which differs from that of the form shown in Figs. 5 and 6 by that the threaded bolt or post f is provided with two screw-threads f' and f^3, one at each end, and that the intermediate portion of the same is squared or polygonal in cross-section, as at m. The centering-pivots d and e have central sockets of similar cross-sections, so as to fit on the squared portion, so as to be enabled to slide longitudinally but not to turn on the same. This construction is similar to that shown in Fig. 4, except that both ends of the post f are threaded and that both centering-pivots are loose on the same. To secure the parts in place and clamp the joint-clamp, nuts g and g^2 are provided at each end, said clamp-nuts being furnished with the usual notches g^3 or any equivalent device for turning the said clamp-nuts when clamping or unclamping the joint.

It will be noted from the above that in all the forms shown the centering-pivots are secured against rotation with respect to each other and with respect to the yoke in which they are mounted. They thus form an effective centering-clamp for the joint when used together with the clamping nut or nuts and

are adapted to take up wear. They afford a simple and effective means for forming an accurate joint and producing the necessary friction between the parts connected by the joint, while at the same time they allow the parts united to be bent to the desired angle without any danger of the joint becoming loosened by such bending. Moreover, it follows from this construction that the yoke *c* may be made comparatively light and small in dimensions, thus essentially improving the appearance of the instrument. It will also be noted that under my invention the pivots are positively secured against rotation with respect to the yoke or to each other and not by frictional clamping means, as has been practiced heretofore. Such frictional clamping means are unreliable and subject to wear, and, moreover, they necessitate considerable thickness for the arms of the yoke. With my construction the yoke may be made very thin and attractive in appearance.

The shoulders d^2 e^2, with which the pivots are provided under my invention and which bear against the outer surfaces of the yoke, also add to the effectiveness of the joint, since they afford as good bearing for the clamp-nuts *g* and g^2 and also contribute to permitting the arms of the yoke *c* to be made very thin consistent with good workmanship.

The gearing for securing an equal angular movement of the two legs of the compass or similar instrument by virtue of its peculiar construction and arrangement may be placed entirely within the interior of the head A of the instrument, thereby also contributing to neatness and appearance.

What I claim, and desire to secure by Letters Patent, is—

1. In a joint for compasses and similar instruments, a pair of centering-pivots in combination with a member for connecting and clamping them on the parts to be united by the joint and for positively securing them against rotation with respect to each other.

2. In a joint for compasses and similar instruments, a pair of conical centering-pivots engaging conical sockets in the parts to be united by the joint, in combination with a member for connecting and clamping them on such parts and for positively securing them against rotation with respect to each other.

3. In a joint for compasses and similar instruments, a yoke and a pair of centering-pivots passing through said yoke and engaging the parts to be united by the joint, in combination with means for preventing relative movement of the pivots and for clamping them on the parts to be united by the joint, and means for positively securing them against rotation with respect to the yoke.

4. In a joint for compasses and similar instruments, a yoke and a pair of centering-pivots passing through said yoke, one of said pivots being positively fixed against rotation with respect to the yoke, and means for connecting the two pivots and securing the same against rotation relative to each other.

5. In a joint for compasses and similar instruments, a yoke, a pair of centering-pivots mounted on and passing through the respective arms of the yoke and engaging the parts to be united by the joint, and means for preventing rotation of the pivots relative to each other, in combination with means, carried by the pivots and engaging the yoke for securing the pivots against rotation with respect to the yoke.

6. In a joint for compasses and similar instruments, a yoke, a pair of centering-pivots provided with shoulders bearing against the outer surfaces of the yoke and mounted on and passing through the respective arms of said yoke and engaging the parts to be united by the joint, and means for preventing relative rotation of the centering-pivots, in combination with means carried by the pivots and engaging the yoke for securing the pivots against rotation with respect to the yoke and with respect to each other.

7. In a joint for compasses and similar instruments, a yoke and a pair of centering-pivots mounted on and passing through the respective arms of the yoke and engaging the parts to be united by the joint, in combination with means for clamping the pivots on the parts to be united by the joint and preventing rotation of the centering-pivots relative to each other, and means carried by the pivots and engaging the yoke for securing the pivots against rotation with respect to the yoke and with respect to each other.

8. In a joint for compasses and similar instruments, a yoke and a pair of centering-pivots provided with shoulders bearing against the outer surfaces of the yoke and mounted on and passing through the respective arms of said yoke and engaging the parts to be united by the joint, in combination with means for clamping the pivots on the parts to be united by the joint and preventing rotation of the pivots relative to each other, and means carried by the pivots and engaging the yoke for securing the pivots against rotation with respect to the yoke.

9. In a joint for compasses and similar instruments, a yoke and a pair of centering-pivots provided with shoulders bearing against the outer surfaces of the yoke and mounted on and passing through the respective arms of said yoke, in combination with means for securing one of the pivots against rotation with respect to the yoke, a screw-bolt partly of non-circular cross-section passing from one of the pivots through a corresponding opening in the other, and a nut bearing on the shoulder of the latter pivot and engaging the thread of the screw-bolt.

10. In a joint for compasses and similar instruments, a yoke and a pair of centering-piv-

ots provided with shoulders bearing against the outer surfaces of the yoke and mounted on and passing through the respective arms of said yoke, in combination with means for securing one of said pivots against rotation with respect to the yoke, a screw-bolt partly of non-circular cross-section carried by one of the pivots and passing through a corresponding opening in the other, and a nut bearing on the shoulder of the latter pivot and engaging the thread of the screw-bolt.

11. In a joint for compasses and similar instruments, a yoke and a pair of centering-pivots mounted on and passing through the respective arms of the yoke and bearing upon the parts to be united by the joint, in combination with means for securing one of the pivots against rotation with respect to the yoke, a screw-bolt partly of non-circular cross-section passing from the secured pivot through a corresponding opening in the other pivot, and a nut bearing on the latter pivot and engaging the thread of the screw-bolt.

12. In a joint for compasses and similar instruments, a yoke, and a pair of centering-pivots provided with shoulders bearing against the outer surface of the yoke and mounted on and passing through the respective arms of said yoke, in combination with means for securing one of said pivots against rotation with respect to the yoke, a screw-bolt partly of non-circular cross-section forming part of one of the pivots and passing through a corresponding opening in the other pivot, and a nut bearing on the shoulder of the latter pivot and engaging the thread of the screw-bolt.

13. In a joint for compasses and similar instruments, two head-plates provided with interior circular racks, and a clamping device for uniting the head-plates in combination with a disk arranged between the head-plates and secured against rotation with respect to the clamping device and a pinion arranged between and meshing with the circular racks and journaled in the disk.

14. In a joint for compasses and similar instruments, two head-plates provided with interior circular racks and a bolt passing through the head-plates and means for clamping the head-plates together on said bolt, in combination with a disk mounted and secured against rotation on said bolt and between the head-plates and provided with a radial slot, and a pinion whose spindle is mounted in the said radial slot, said pinion meshing with the said interior circular racks.

In testimony whereof I affix my signature to this specification in the presence of two witnesses.

HEINRICH KERN.

Witnesses:
F. SENN,
R. STÜNZ.