June 19, 1923.

1,459,449

H. O. HEM

PIVOT RETAINER

Filed April 12, 1920

2 Sheets-Sheet 1

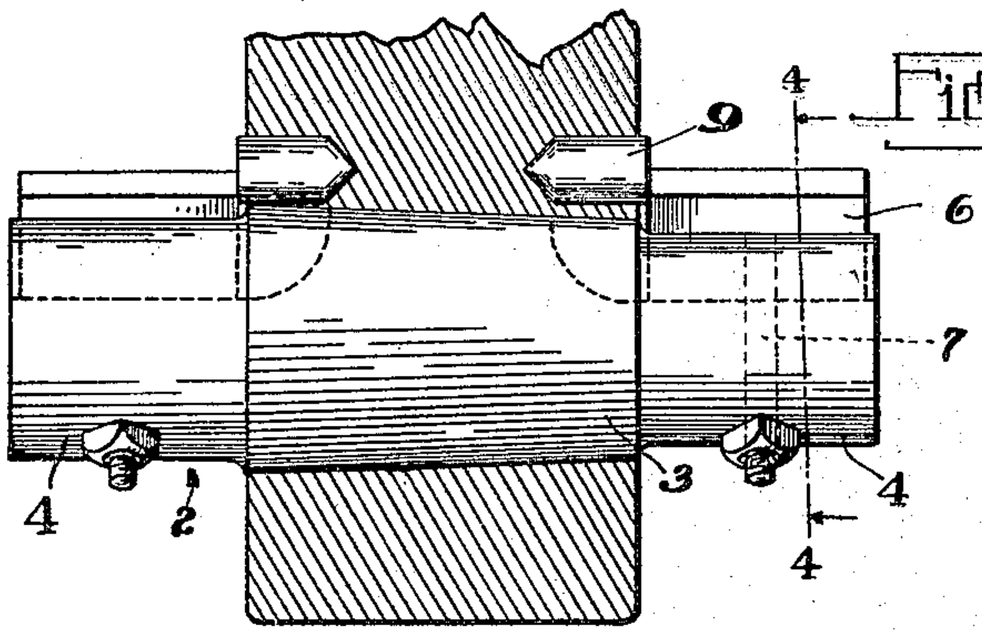

Fig. 3.

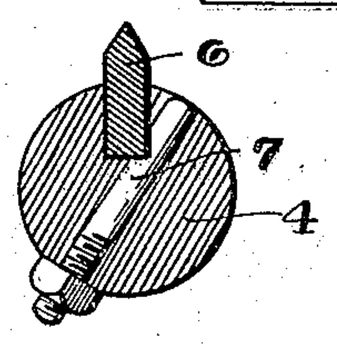

Fig. 4.

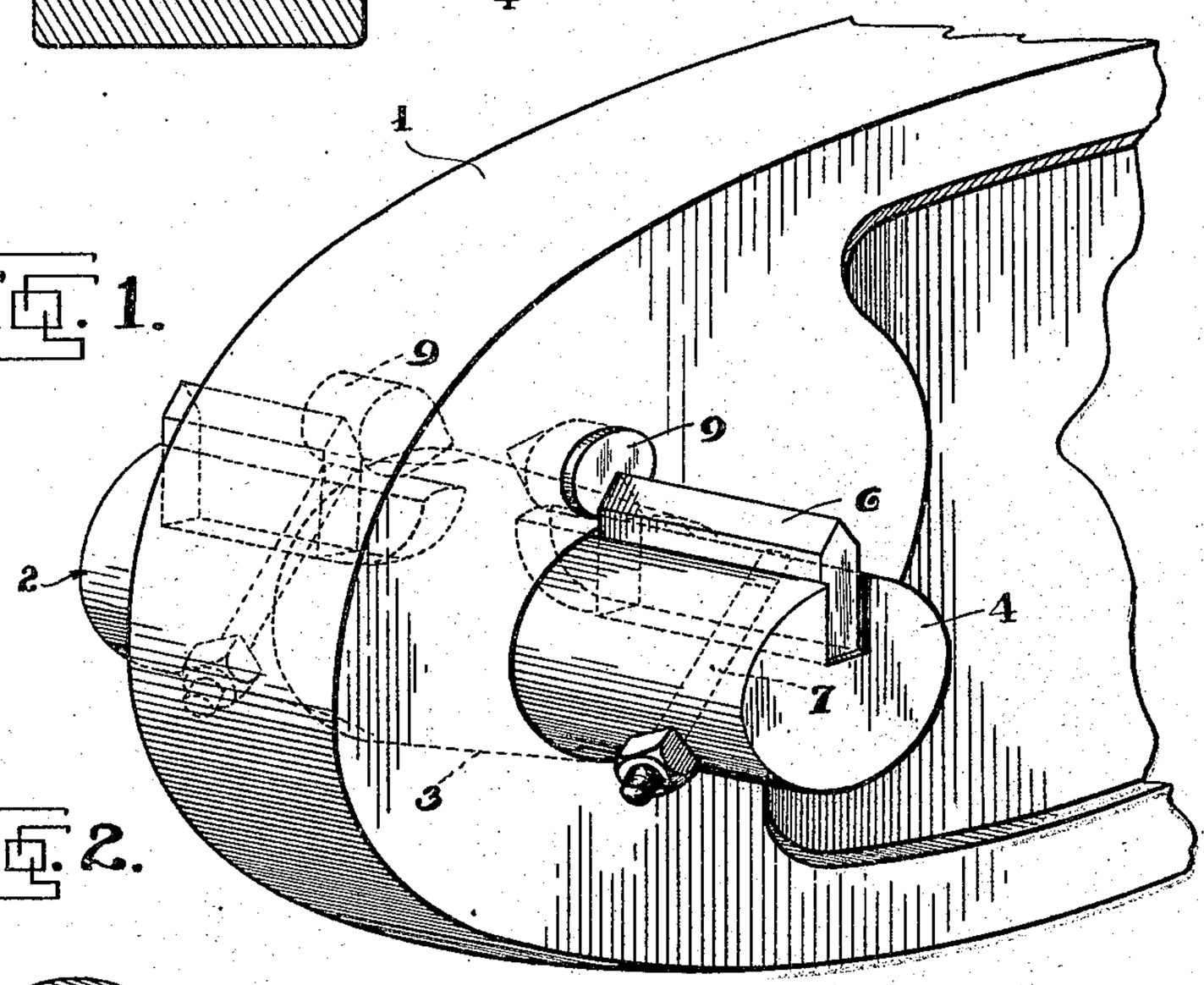

Fig. 1.

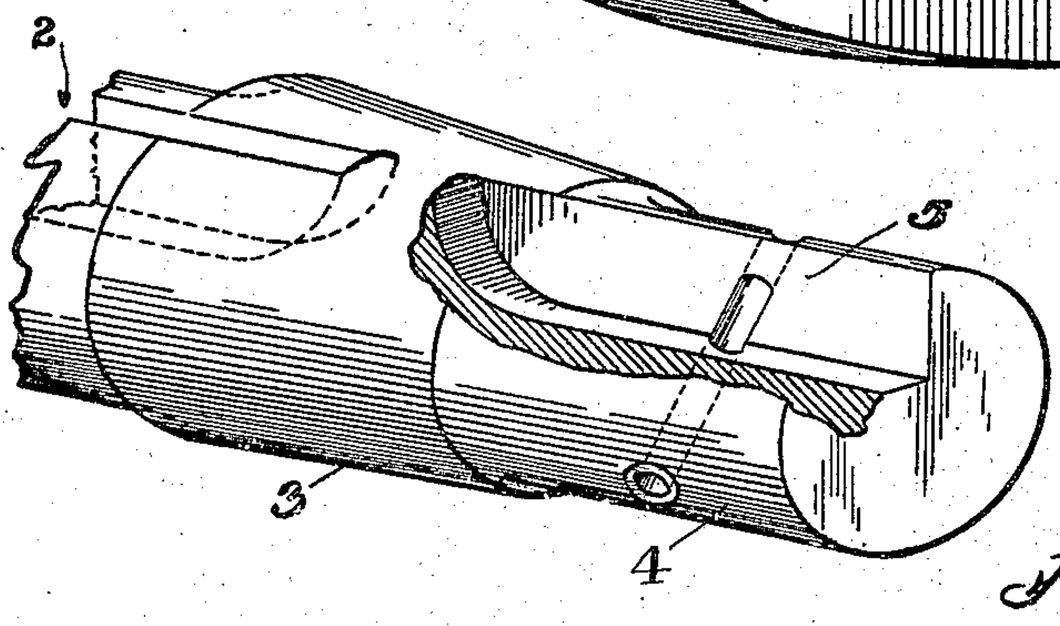

Fig. 2.

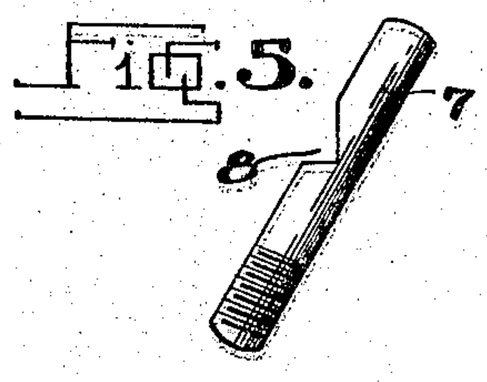

Fig. 5.

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PIVOT RETAINER

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Fig. 6.

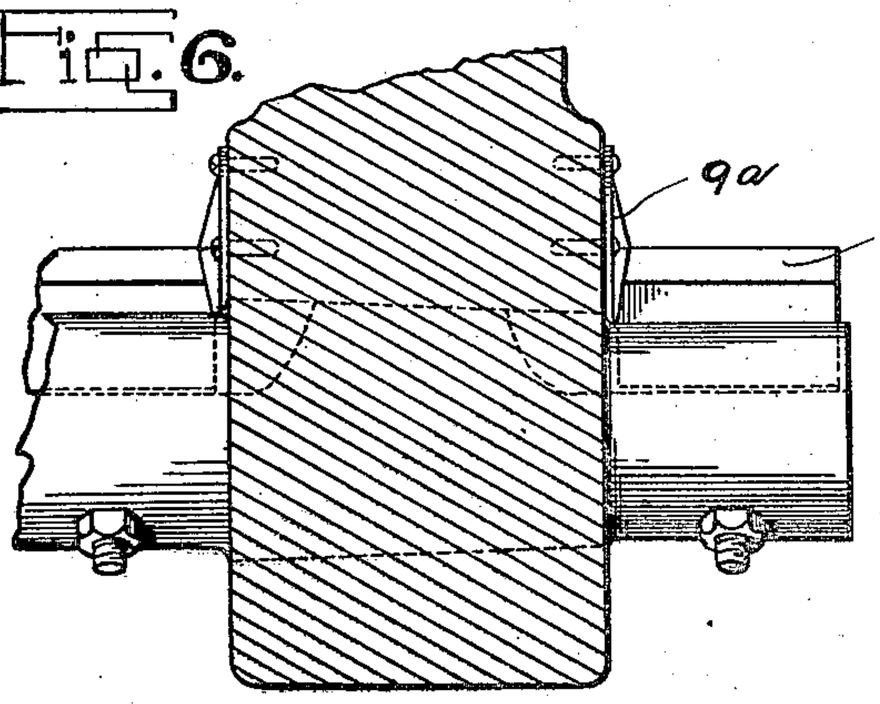

Fig. 7.

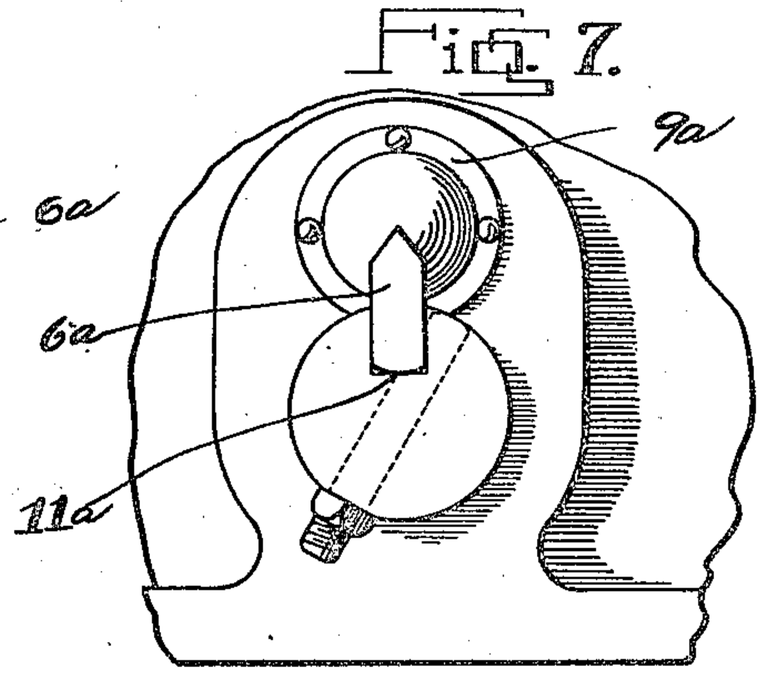

Fig. 8.

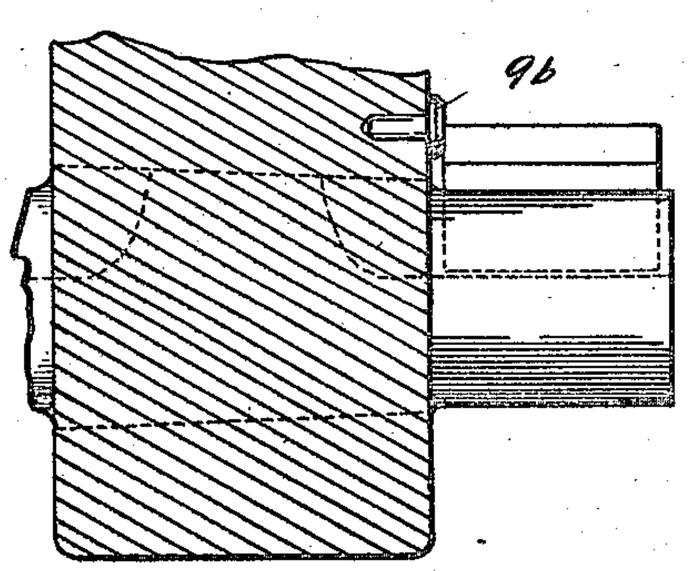

Fig. 9.

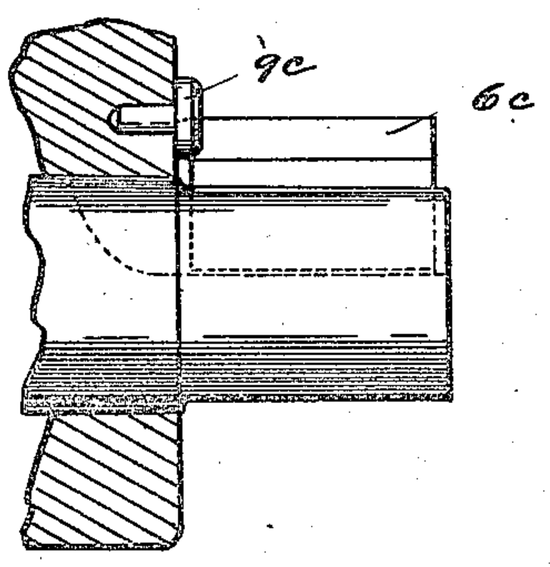

Fig. 13.

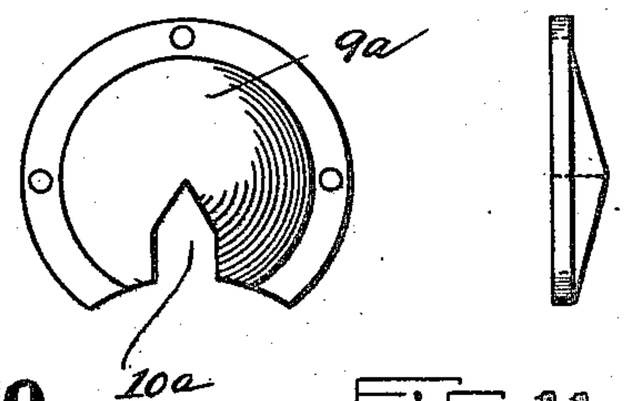

Fig. 10.

Fig. 11.

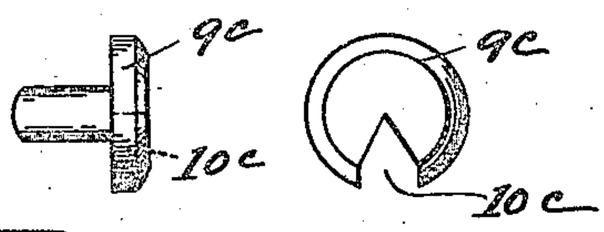

Fig. 12.

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Patented June 19, 1923. 1,459,449

UNITED STATES PATENT OFFICE.

HALVOR O. HEM, OF TOLEDO, OHIO, ASSIGNOR TO TOLEDO SCALE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF NEW JERSEY.

PIVOT RETAINER.

Application filed April 12, 1920. Serial No. 373,433.

To all whom it may concern:

Be it known that I, HALVOR O. HEM, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Pivot Retainers, of which the following is a specification.

This invention relates to means for mounting knife-edge pivots such as are used in instruments and machines in which it is desirable to reduce friction to a minimum, and particularly to means for mounting such pivots in scale levers. As such machines are now constructed the knife-edge pivots are usually placed in the mould in which the lever is to be cast and are thus fixed in place when the metal of the lever solidifies. In order that the scale may weigh properly, the pivots in scale levers must be placed with great exactness and the practice of casting the levers with the pivots in place results in the loss of many castings owing to the pivots having been improperly placed or having shifted in the mould. Furthermore, the pivots lose their temper and often warp during the casting process and must be re-shaped and re-hardened, which involves grinding and heat-treating operations that, when the pivots are fixed in the lever, are difficult to carry out, especially if the lever be a heavy one. Where a pivot is thus fixed in place it must be formed of a bar of sufficient cross-section to support the weight, and as these bars are of high-grade steel, their cost is considerable. The practice of inserting the pivots in holes drilled in the lever is also followed to some extent, but such inserted pivots must be formed of even heavier bars than are used to form pivots which are fixed in place in casting and the cost of such inserted pivots is therefore also very great. The principal object of this invention is to provide improved means whereby pivots containing a minimum amount of expensive metal may be securely and accurately fixed to a scale lever.

Another object is to provide means for securely fixing a pivot to a lever so that the pivot may be readily detached and replaced.

Another object is to provide a thrust bearing member which also acts as a lock to hold the pivot in place.

Other objects and advantages will be apparent from the following description, in which reference is had to the accompanying drawings illustrating preferred embodiments of my invention and wherein similar reference numerals designate similar parts throughout the several views.

In the drawings:—

Figure 1 is a perspective view of the end of the lever equipped with my invention;

Figure 2 is a similar view of a fragment of a pivot retainer of my invention, removed from the lever;

Figure 3 is a vertical section through the lever showing the retainer in elevation;

Figure 4 is a vertical cross-section through the retainer and pivot taken substantially on the line 4—4 of Figure 3;

Figure 5 is an elevation of the retaining bolt;

Figure 6 is a vertical section through a fragment of the lever showing another form of the device;

Figure 7 is a side elevation of the parts shown in Figure 6;

Figures 8 and 9 are fragmentary vertical sections showing further modifications;

Figures 10 and 11 are respectively a side elevation and an edge view of the thrust bearing of the form shown in Figure 6;

Figure 12 is an elevation of the thrust bearing shown in Figure 9; and

Figure 13 is a view at right angles to Figure 12.

Referring to the drawings in detail, and particularly to the form shown in Figures 1 to 5 inclusive, the lever 1 on which the pivots are to be mounted according to my invention is provided with tapered openings for receiving pivot retainers 2, the central portions of which are tapered, as at 3, to fit snugly in the openings in the lever. Owing to this tapered formation the pivot retainers may be driven into place so that they will be held with all necessary firmness, though they may, when necessary, be driven out. Substantially cylindrical projections 4 are formed at the ends of the pivot retainer 2, and aligned, longitudinally-extending grooves 5 with their sides substantially parallel are milled in the sides of the projections 4 to receive the pivot bars 6. The pivot retainers may be of relatively inexpensive material, such as soft steel, while the pivot bars 6 may be formed of pivot steel of the highest grade.

Extending obliquely through each of the

ends 4 and cutting into the corners of the grooves 5 are holes to receive retaining bolts 7, each of which is provided with a right-angle notch 8 to receive the corner of the corresponding pivot bar 6. In order to provide thrust bearings for the bearing blocks (not shown) which are engaged by the knife-edge pivots 6 when the scale is assembled, hardened steel pins 9 are driven into depressions bored in the metal of the lever.

In assembling the device the retainer 2 is driven into place in the lever and the bolts are placed in the bolt holes, with the notches 8 substantially flush with the corners of the grooves 5. The pivots are then seated in the grooves and the bolts 7 are tightened up, thus securely clamping the pivots in place against the opposite walls of the grooves 5.

The form shown in Figures 6, 7, 10 and 11 differs from the structure already described in that the thrust bearing 9^a is in this form attached to the lever by means of screws and provided with a recess 10^a into which the inner corner of the pivot 6^a fits when it is in place. The pivot and retainer are thereby positively held against turning movement. The pivot bars 6^a in this form differ from those first described in that the sides opposite the knife edges are crowned, as shown at 11^a. If the bottom of the groove in the form shown in Figure 1 engages the bottom of the pivot at one side rather than uniformly, a heavy weight on the pivot edge will tend to tilt it to one side and thereby affect the accuracy of the scale. The bottom of the groove will, however, engage the crowned surface substantially at its center, whether the parts are machined perfectly true or not, and a load on the pivot will not therefore tend to tilt it.

The form shown in Figure 8 differs from that shown in Figures 1 to 5 in that the thrust bearing 9^b is provided with a head and a shank so that the hole in the lever may be smaller than is the case with the form shown in Figures 1 to 5.

In the form shown in Figures 9, 13 and 14, the thrust bearing differs from the one shown in Figure 8 in that it is provided with a recess 10^c to receive the corner of the pivot 6^c and thereby hold it in place.

From the above description it is apparent that while the pivots 6 sustains the wear, the shearing and bending strains are sustained by the pivot retainers. The pivots may therefore be made of ample strength with the use of very little expensive metal. It is also apparent that the pivots may be removed for re-sharpening or replacement without removing the scale levers, and that when the parts are assembled they are firmly held against relative movement.

While it will be apparent that the illustrated embodiments of my invention herein disclosed are well calculated to adequately fulfill the objects primarily stated, it is to be understood that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

Having described my invention, I claim:

1. In a device of the class described, in combination, a lever having a round bore therethrough, a round pivot retainer snugly fitting in said bore, said pivot retainer having a groove therein, a pivot bar seated in said groove, and wedging means for securing said pivot bar in said groove.

2. In a device of the class described, in combination, a member having a groove therein, a pivot bar seated in said groove, and a notched bolt passing through said member and wedgingly engaging said pivot bar.

3. In a device of the class described, in combination, a member having a groove therein, a bolt passing through said member and having a notch substantially registering with one corner of said groove, a pivot bar seated in said groove and notch, and means for forcing said bolt longitudinally and thereby clamping said pivot bar in said groove.

4. In a device of the class described, in combination, a member having a substantially rectangular groove therein and a bore cutting one corner of said groove, a bolt in said bore having a notch substantially registering with the corner of said groove, a pivot bar seated in said groove, and means for moving said bolt longitudinally.

5. In a device of the class described, in combination, a member having a substantially flat-bottomed groove therein, and a pivot bar immovably seated in said groove and having a crowned surface engaging the bottom of said groove.

6. In a device of the class described, in combination, a member having a substantially rectangular groove therein and a bore cutting one corner of said groove, a bolt in said bore having a notch substantially registering with the corner of said groove, a pivot bar seated in said groove and having a crowned surface engaging the bottom of said groove, and means for moving said bolt longitudinally.

7. In a device of the class described, in combination, a lever member, a knife edge pivot secured thereto, and a pivot at one end of said thrust bearing having a notch receiving a portion of said pivot.

8. In a device of the class described, in combination, a member having a substantially rectangular groove therein and a bore cutting one corner of said groove, a bolt in said bore having a notch substantially reg-

istering with the corner of said groove, a pivot bar seated in said groove, means for moving said bolt longitudinally, and a thrust bearing at one end of said pivot bar having interlocking engagement therewith.

9. In a device of the class described, in combination, a lever having a bore therein, a pivot retainer received in said bore, said pivot retainer having a groove, a pivot seated in said groove, and a thrust bearing secured to said lever, said thrust bearing having a notch receiving a portion of said pivot.

HALVOR O. HEM.

Witnesses:
C. E. WILCOX,
C. O. MARSHALL.