No. 817,214. PATENTED APR. 10, 1906.

T. ZIMMERMAN.

T-SQUARE.

APPLICATION FILED DEC. 3, 1903.

2 SHEETS—SHEET 1.

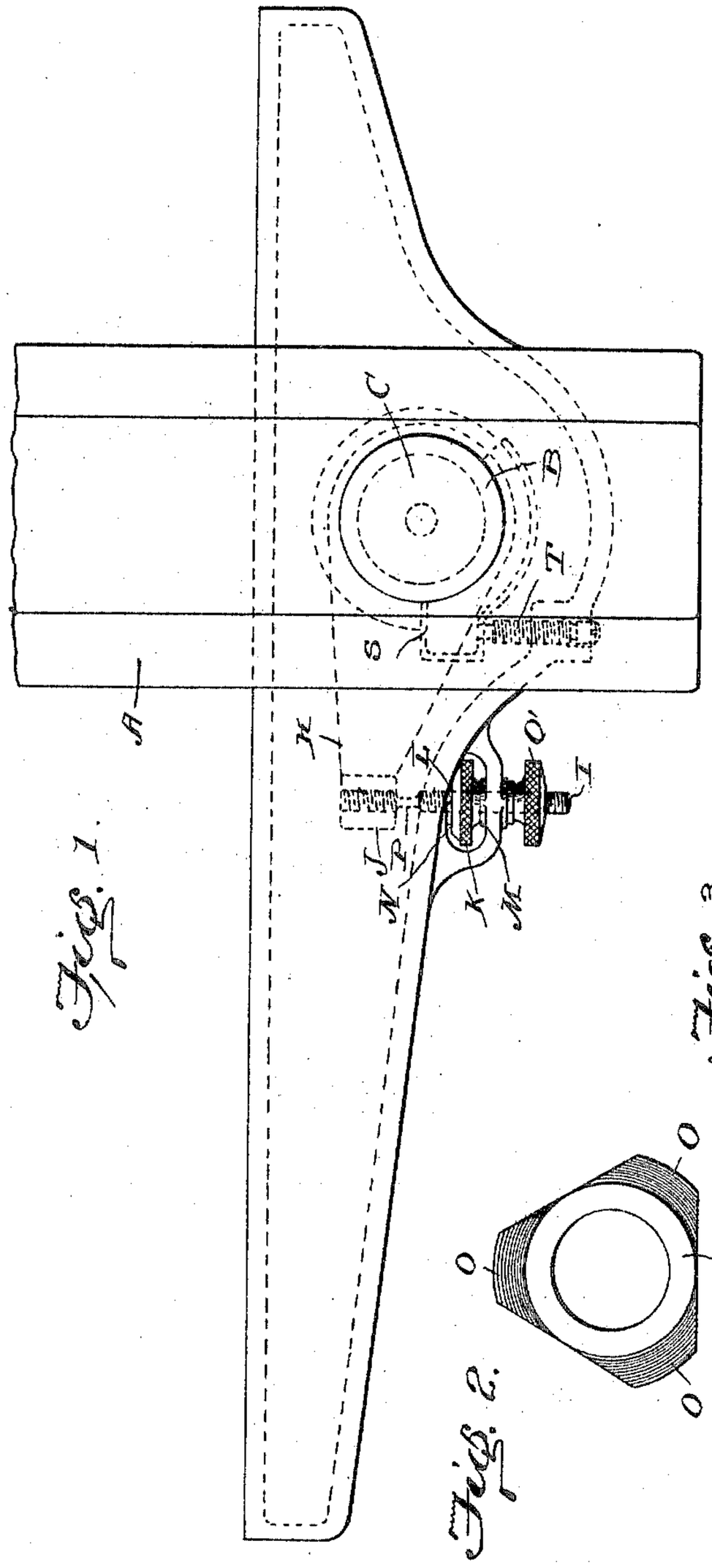

Fig. 1.

Fig. 2.

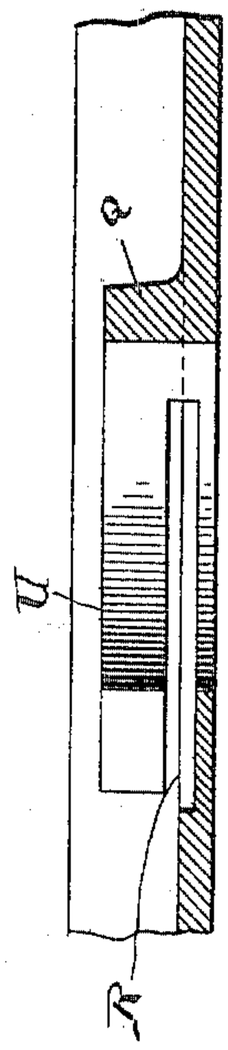

Fig. 3.

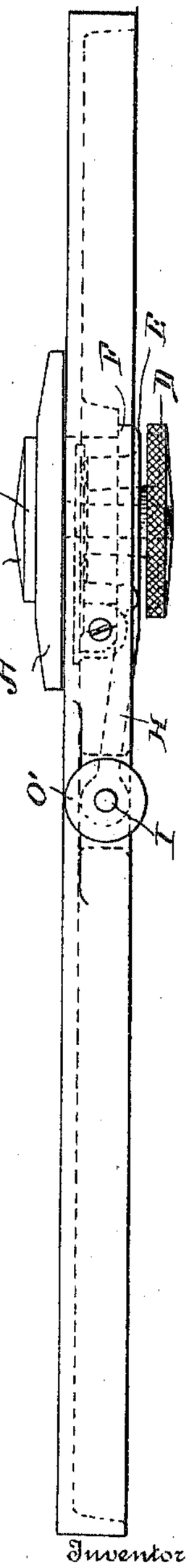

Fig. 4.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 5.

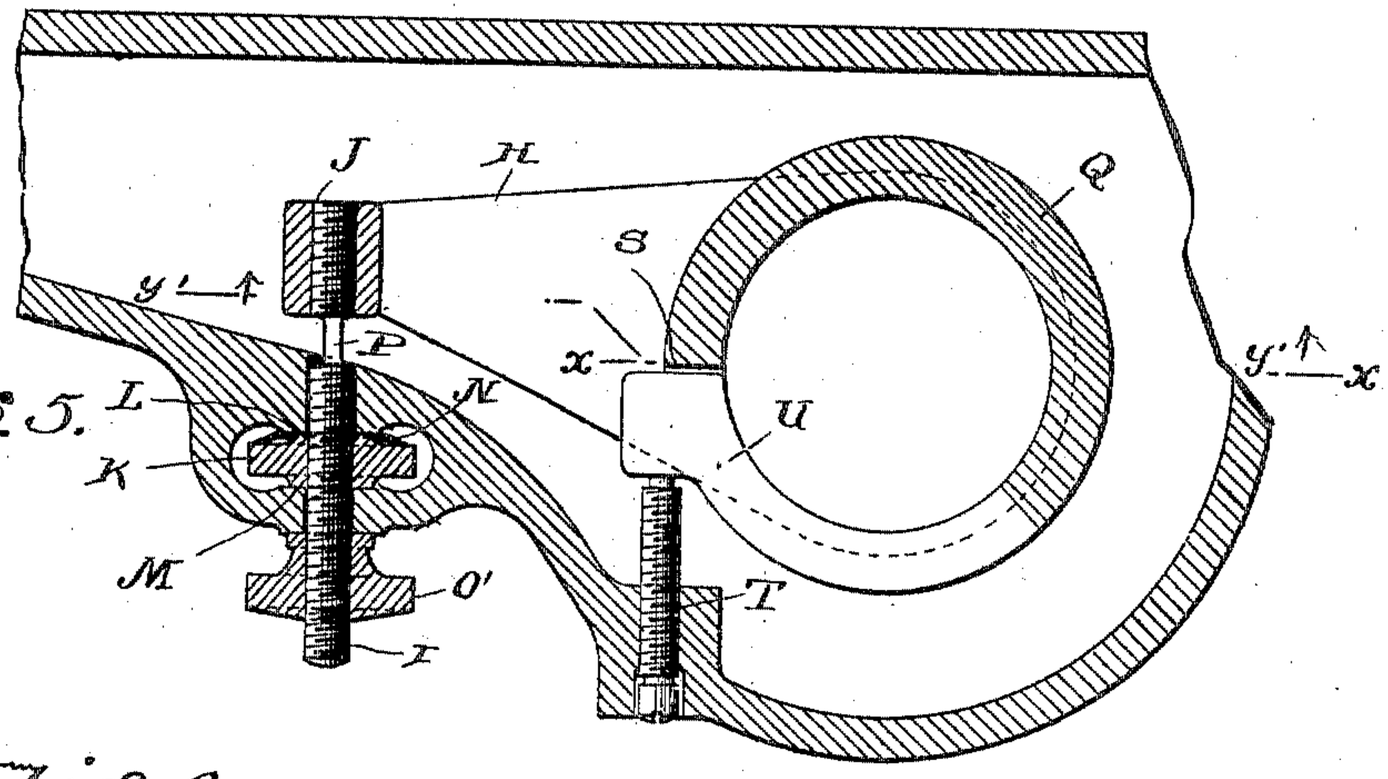


Fig. 6.

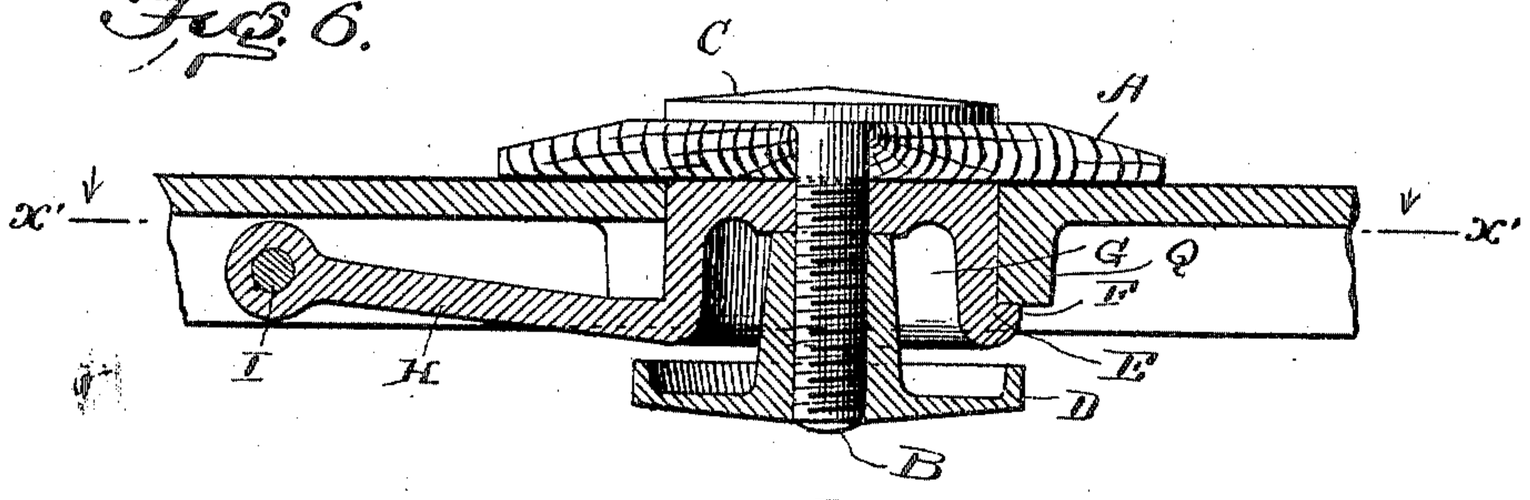
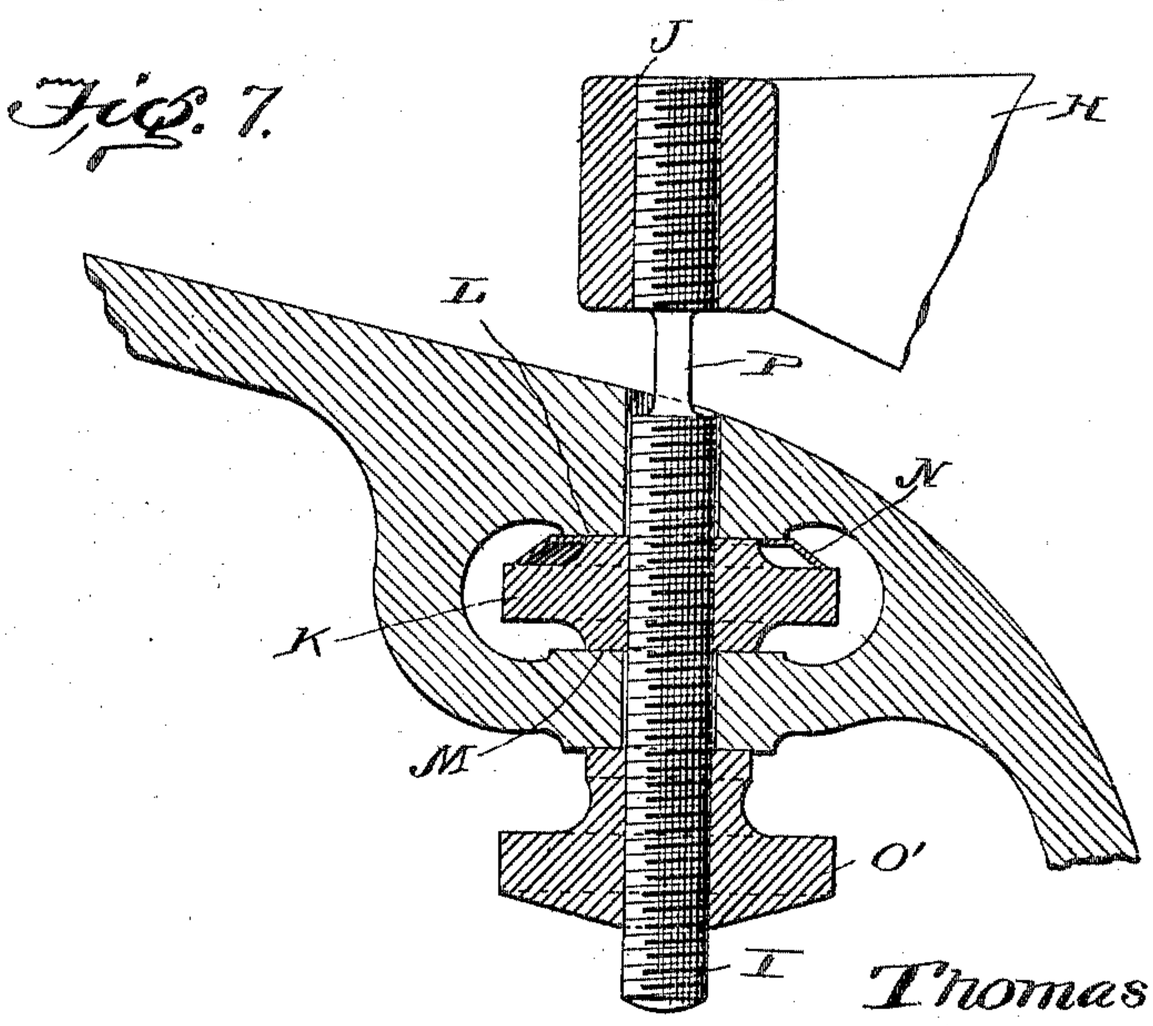


Fig. 7.



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UNITED STATES PATENT OFFICE.

THOMAS ZIMMERMAN, OF SPRINGFIELD, OHIO.

T-SQUARE.

No. 817,214. Specification of Letters Patent. Patented April 10, 1906.

Application filed December 3, 1903. Serial No. 183,561.

To all whom it may concern:

Be it known that I, THOMAS ZIMMERMAN, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in T-Squares, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in draftsmen's T-squares; and the two essential objects in view are, first, to mount the blade in the head by means of a construction by which all lost motion due to wear can be taken up between the rotary and the stationary parts, and, secondly, to adjustably connect the blade with the head by means of a construction of adjusting mechanism which shall be wholly free from lost motion, whether due to inaccuracy in the fitting of the parts or to wear as the result of use, whereby the blade and head are relatively rigid when locked.

With these essential objects in view my improvements consist, essentially, as to the first object, of a contractible bearing in the head, with means to contract it so as to make it take up the wear between it and the spindle carried by the blade, and essentially, as to the second object, of an adjusting-screw for holding and adjusting an arm on the blade-spindle relatively to the head, the screw having a flexible portion or section, so that it will bend to compensate for the curvilinear movement, although the screw itself moves in a right line.

In the accompanying drawings, forming a part of this specification, and on which like reference-letters indicate corresponding parts, Figure 1 is a plan view of a T-square head and a part of a blade embodying my invention; Fig. 2, a detail view of the lost-motion washer; Fig. 3, a sectional view of a part of the head, taken through the bearing, the head being inverted in this figure and the section being on the line x x of Fig. 5; Fig. 4, an end elevation of what is shown in Fig. 1; Fig. 5, a horizontal sectional and plan view taken on the line x' x' of Fig. 6 looking downward and with the pivot-bolt and hand-bolt removed; Fig. 6, a vertical sectional view taken on the line y' y' of Fig. 5 and looking in the direction of the arrows, and Fig. 7 an enlarged detail sectional and plan view showing more clearly the adjusting-screw and its connections for changing and maintaining the relation of the spindle to the head.

The letter A designates part of the blade of a T-square, having a clamping-screw B, with an extended head C and a hand-nut D. This screw and nut perform the office of binding the blade to the spindle E. The spindle comprises a central circular body accurately turned or finished on its exterior and preferably having a shoulder F, while cored or hollowed out in the interior, as shown at G, to lengthen it and to receive the shank of the hand-nut D. The spindle E also has an arm H extending laterally therefrom. The spindle is rotatably mounted in the bearing of the head to be presently referred to. The arm H extends along under the top of the head and receives one end of the adjusting-screw I, which is preferably connected to the arm by a screw-threaded connection, as indicated at J. As the screw does not rotate, this threaded connection between it and the arm is a very satisfactory one, absolutely free from lost motion. The screw-threaded portion of the screw I, which lies within the arm H, and the screw-threaded aperture J in said arm, within which said screw-threaded portion is located, are of a sufficient length and the fit between the engaging screw-threads is sufficiently tight to prevent the screw I from rotating when the adjusting-nut K, hereinbefore referred to, is rotated. Any suitable rigid connection between said screw and the arm H may be employed. The screw I is slidably mounted in the head, as very clearly shown in Figs. 5 and 7. An adjusting-nut K, nicely fitted to the threads on the body of the screw I, stands between a bearing-face L and a bearing-face M, so that when the nut is rotated the screw is adjusted lengthwise, thereby swinging the arm H in one direction or another and changing and fixing the angle of the blade to the head of the T-square.

A spring cup-shaped washer N is placed between the nut K and the shoulder L, its prongs O pressing on the nut to take up any lost motion due to wear on the bearing-faces M and on the ends of the nut. The washer is resilient or springy, so as to constantly exert a slight pressure between the face L and the nut, thereby keeping the nut from having any endwise play or lost motion due to wear or due to any inaccuracy in original fitting.

It will be observed that the central aperture of the washer is of greater diameter than the adjacent hub or cylindric body of the nut, which is thus accommodated by said aper-

ture, so that the body of the nut extends through the washer, bringing its end bearing-face into close proximity with the coöperating bearing-face of the head. By reason of this construction the fit of the nut between the bearing-faces of the head may be made very accurate and the lost motion correspondingly reduced.

The characteristic of the screw itself is embodied in a portion thereof being resilient or capable of flexing. This portion is indicated at P, where the screw is reduced in thickness, so as to form a comparatively thin web or section, enabling the screw to bend to compensate for the slight curvature of the path described by the arm in being adjusted from one position to another. The advantage of this construction is that it avoids the lost motion which is inevitably present sooner or later where the adjusting-screw is connected at one of its ends by means of a pivot or ball-and-socket joint to enable it to compensate for the curvature just referred to. A lock-nut O′ on the screw I serves to additionally lock it in any adjusted position.

Referring now to the feature of preventing lost motion between the movable and stationary parts involved in the pivotal connection of the blade to the head it will be seen, particularly from Figs. 3 and 5, that the head has a bearing Q in the form of an extended annulus or hub to receive the spindle E. This bearing has a portion thereof rendered flexible, so as to be slightly adjusted to contract the opening in the bearing as may be required to take up the wear and prevent lost motion between the bearing and the spindle. This contractibility of the bearing is made possible by slotting out a part of the wall of the bearing, as shown at R in Fig. 3, and by cutting through the wall radially, as shown at S in dotted lines in Fig. 1 and in full lines in Fig. 5. Thus a portion of the wall of the bearing is rendered flexible and may be adjusted inward by the screw T, mounted in the head and bearing at one end against the spring portion U of the said wall of the bearing. Therefore when wear takes place and lost motion is about to occur between the bearing Q and the spindle E the opening or bore of the bearing is radially contracted to the nicest degree.

Thus in my T-square it will be seen that I have provided for adjusting and maintaining the blade at different angles to the head and for taking up the wear between the parts which form the pivot of motion between these members of the device.

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

1. In a T-square, a head and blade, a spindle pivotally mounted in the head and secured to the blade, said spindle having an arm, and an adjusting-screw secured in fixed relation to the arm, mounted in the head so as to be fed longitudinally relatively thereto, and provided adjacent to the arm with a portion of reduced diameter, whereby said adjusting-screw is made flexible to compensate for the changes in the angular relations of the head and arm arising from such adjustment, substantially as described.

2. In a T-square, the combination, with a head having a bearing, of a blade having a spindle rotatably mounted in said bearing and provided with an arm, an adjusting-screw secured in fixed relation to the arm and slidably mounted in the head, and an adjusting-nut mounted to rotate without longitudinal movement in the head, the adjusting-screw passing through said nut and being provided between the head and arm with a portion of reduced diameter, whereby said adjusting-screw is rendered flexible, substantially as described.

3. In a T-square, a head and blade pivotally connected, and an adjusting-screw for regulating their angular position, said screw being connected in fixed relation to the blade at one end eccentrically with respect to the pivotal axis of the blade and head and arranged at an angle to a radius passing through its connection with the blade, said adjusting-screw having a reduced portion adjacent to its connection with the blade, whereby it is rendered flexible, the other end of said adjusting-screw being slidably mounted in the head, said head having a recess with opposite bearing-faces through which the adjusting-screw passes, a nut mounted on said screw in said recess and fitting between the bearing-faces, and means for taking up lost motion between said nut, screw and bearing-faces, substantially as described.

4. In a T-square, a head and blade pivotally connected, and an adjusting-screw for regulating their angular position, said screw being connected in fixed relation to the blade at one end eccentrically with respect to the pivotal axis of the blade and head and arranged at an angle to a radius passing through its connection with the blade, said screw having a reduced portion adjacent to its connection with the blade whereby it is rendered flexible, the other end of said screw being slidably mounted in the head, said head having a recess with opposite bearing-faces through which the adjusting-screw passes, a nut mounted on said screw in said recess and fitting between the bearing-faces, said nut having reduced end portions and a central body of larger diameter than said end portion, and a spring-washer bearing against the body of said nut at one of its margins and against one of the bearing-faces at its other margin, said washer having a central aperture for the passage of the reduced end portion of the nut, substantially as described.

5. In a T-square, a blade, a spindle con-

nected thereto and having an arm, a head having a contractible bearing, means carried by the head to contract the bearing, and other means to adjust the arm to different positions.

6. In a T-square, a blade, a spindle carried thereby and having an arm, a head having a bearing, a portion of the wall of which is yielding, a screw carried by the head to adjust said portion of said wall, and another screw and its nut carried by the head, said latter screw engaging with said arm.

7. In a T-square, a blade, a spindle carried thereby and having an arm, a head having a bearing a portion of the wall of which is yielding, the wall being slotted to leave a portion of it free, a screw carried by the head and adapted to adjust said part of the wall, and another screw and its nut carried by the head, said latter screw being connected to the arm and having a flexible portion, whereby the blade may be adjusted relatively to the head and lost motion between the head and blade may be taken up.

8. In a T-square, a head having a bearing whose wall is slotted circumferentially and radially to leave a yielding portion, and a screw carried by the head and working against said yielding portion in the wall.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS ZIMMERMAN.

Witnesses:

AL. H. KUNKLE,

IRVINE MILLER.