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DIFFERENTIAL SCREW FOR VISES

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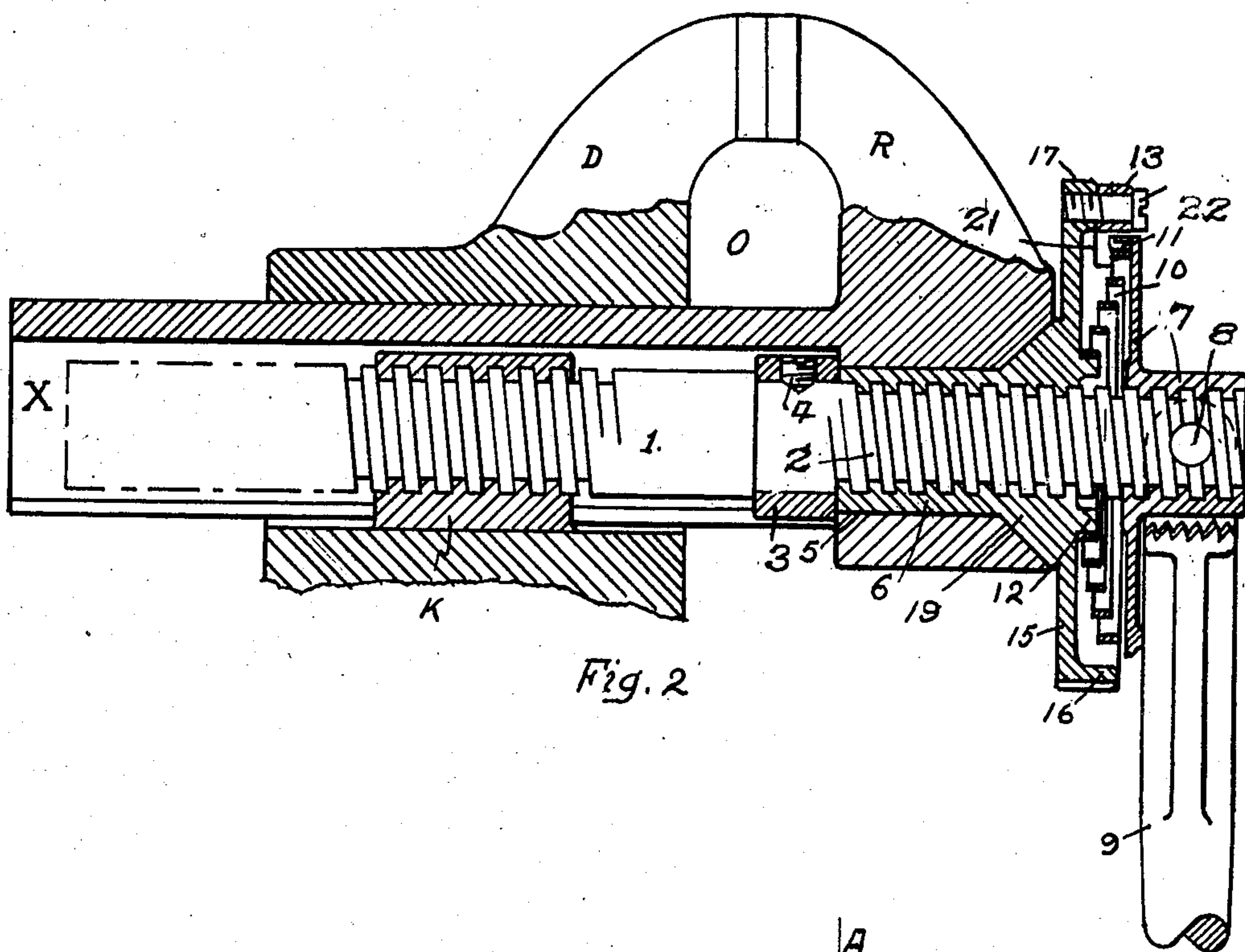


Fig. 2

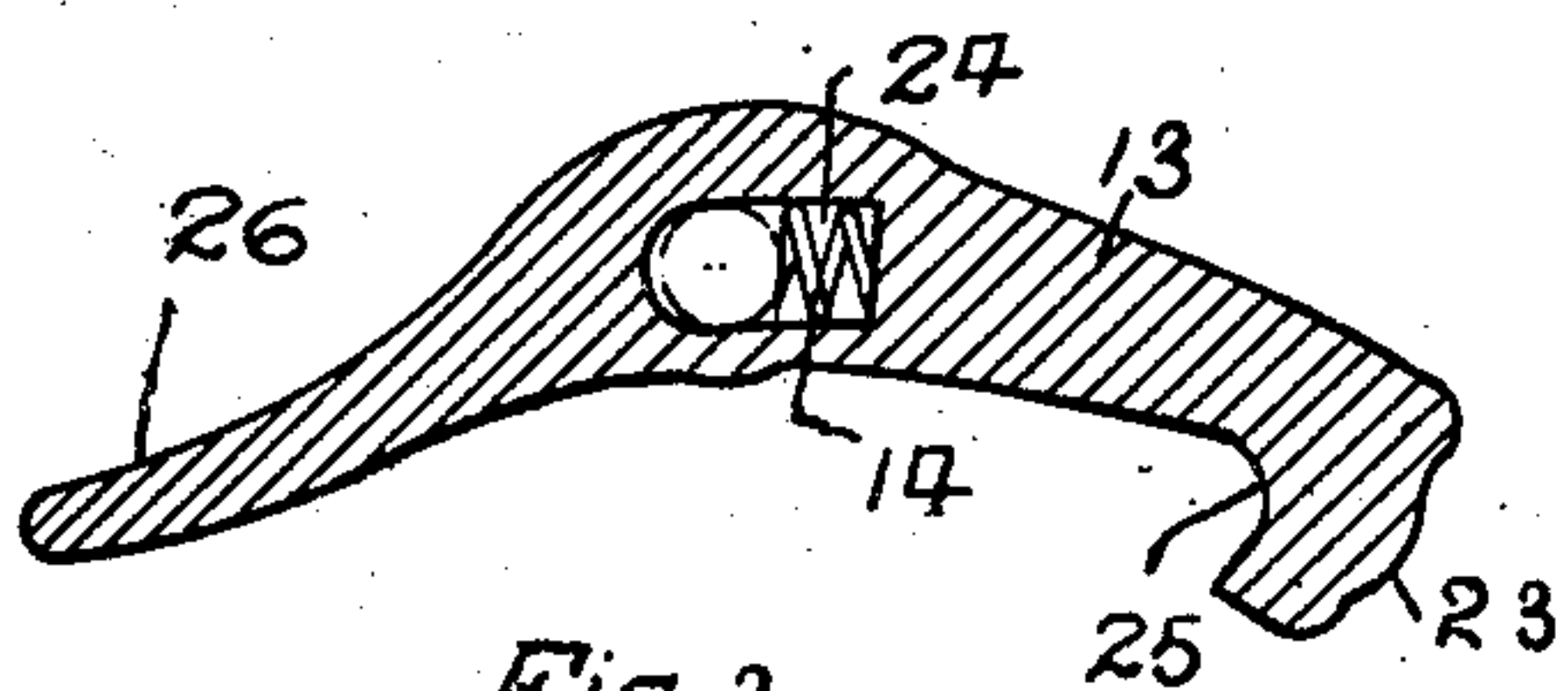


Fig. 3

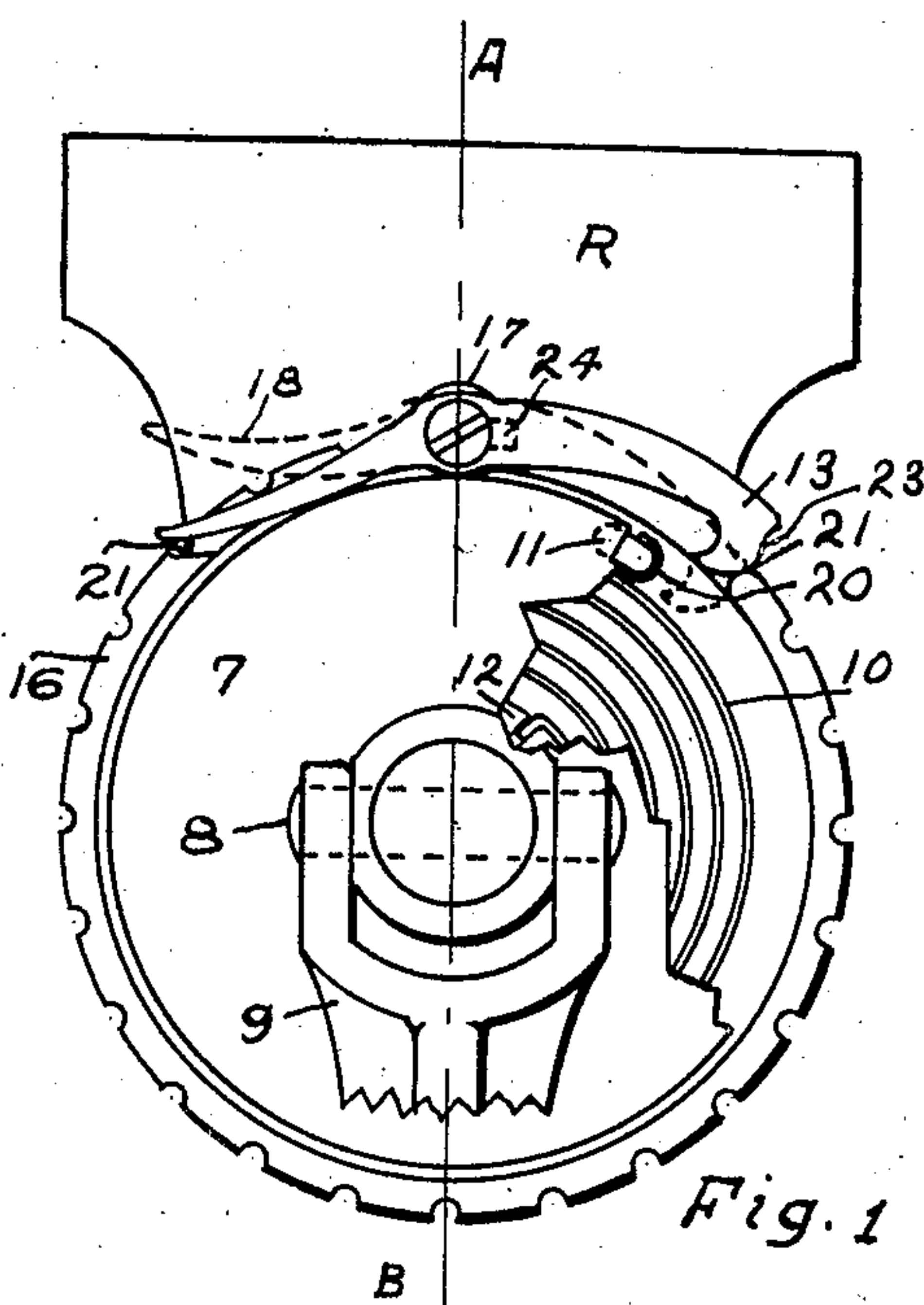


Fig. 1

WITNESSES

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## UNITED STATES PATENT OFFICE

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## DIFFERENTIAL SCREW FOR VISES

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2 Claims. (Cl. 81—33)

The invention relates to an operating screw for vises, which shall be positive and rapid in its action for opening and closing the vise when idle, and automatically provide means for exerting a powerful pressure the instant the vise jaws come in contact with work held between them. This is to be accomplished without the necessity of manipulating any part of the vise other than the handle.

The invention also provides for instantly locking the differential feature out of action when the vise is to be used on soft material, or on light work where the full power of the screw is not required, or when it is desired to set the jaws more snugly against the work, before bringing the differential action into use.

Another salient object is, to achieve the above results without introducing a screw of objectionably fine pitch, in the construction of the mechanism used.

To accomplish these and other desirable results, the invention consists in the novel construction and arrangement of parts, as described in detail, and set forth by the accompanying drawing, in which drawing, similar designating characters refer to the same parts throughout the series.

Figure 1 is a front elevation of the screw mechanism, and a vise of conventional type equipped therewith. Parts of the operating handle and a flanged collar have been removed to reveal other essential parts referred to in the description.

Figure 2 is a vertical longitudinal section, taken on the line A—B, Figure 1, of the invention as it appears in place in the body of a vise.

Figure 3 is a section of the latch 13.

O generally represents a vise having a fixed jaw D, in a body, in which a fixed nut K, serves as an anchorage for the operating screw of the vise. A movable jaw R, is mounted in slidable relation with the jaw D, by a hollow beam X, fixed in the base of the jaw R, and projecting through a corresponding opening in the body of the vise. These parts are shown only as a setting for the mechanism to be described, and do not constitute a part of the invention.

The screw 1 is provided with a coarse thread at one end, of sufficient length to extend through the nut K, and provide a range of action equal to the intended capacity of the vise. The opposite end has a portion of its length turned to a slightly smaller diameter, and provided with a thread 2, of slightly finer pitch than that operating in the nut K. At the juncture of the two diameters, a collar 3, is mounted on the smaller end of the screw, and retained in place by the set-screw 4.

In the body of the movable jaw, in line with the nut K, a hole 5 is formed, constituting a bearing for the sleeve 6, threadedly mounted on the finer threaded end of the screw, next to the collar 3. The hole is of less diameter than the collar 3, but has its outer rim countersunk to correspond with a conical portion 19, formed on the sleeve 6.

The sleeve 6 has a barrel portion of less diameter than that of the collar 3, which affords a bearing for the jaw R, a conical portion 19, which provides a thrust-bearing on the outer side of the jaw, and a flanged portion 15, which terminates in a handwheel 16, outside the jaw R.

A flanged collar 7, spaced a short distance from the sleeve 6, is fixed to the smaller end of the screw 1, by means of a pin 8, which pin also serves as a pivot for attaching the operating handle 9. A flange on the collar 7 approaches the rim of the hand-wheel 16, forming with it a housing in which a spiral spring 10, is located.

The spring 10 is an automatic differential control for the screw 1. It is attached at one end to a boss 12, centrally located on the end of the sleeve 6. Thence it spirals clockwise and outwardly through several turns, to a point near the rim of the flange 7. At this point a protuberance 11, on the inner side of the flange, engages a loop 20 in the end of the spring 10, tending to carry it forward in a clockwise direction. The torsion thus engendered tends to keep the sleeve 6 firmly abutted against the collar 3, but admitting of one or more revolutions of the screw within the sleeve 6, before the collar 7 will abut the sleeve 6.

Now, with the vise jaws open: when motion is imparted to the screw 1 by means of the handle 9, the sleeve 6, under the tension of the spring 10, will move as a unit with the screw 1, causing the jaw R to approach the jaw D in a ratio determined by the thread in the nut K. If the motion be continued after the jaws make contact with work held between them, the friction engendered on the conical portion 19 of the sleeve 6 will cause it (the sleeve) to stand still, while both threads on the screw 1 will pass on through their respective nuts; the spring 10 acting as a yielding medium to admit of such action. The differential action of the two threads thus revolving in unison, will cause the jaw R to approach the jaw D in a greatly reduced ratio, thereby affording a powerful leverage for tightening the jaws on the work.

The screw action described in the preceding paragraph is fully automatic, both for tightening



and loosening the vise, and under ideal conditions will give perfect results. Under practical conditions however, I prefer to employ means for locking the differential out of action when so desired, and this I accomplish in the following manner.

5 A deep notch 21 is formed in the rim of the hand-wheel 16, adjacent to the flanged collar 7, and extending a considerable distance around the rim of the wheel. In this notch, a latch 13 is pivotally mounted, being held in place by a screw 10 22, passing through an elongated hole 24, in the body of the latch, and into a boss 17, formed above the rim of the hand-wheel, midway of the ends of the notch 21—21. A hook 25 is formed at 15 one end of the latch, and the latch is so poised in relation to the flanged collar 7, that the hook, when depressed as indicated by the dotted lines 18, will engage both the protuberance 11 on the flange 7, and the end of the notch 21, preventing 20 any further relative motion between the collar 7, and the sleeve 6.

By pressing the opposite end 26 of the latch 13, the hook may be made to release its hold on the flange 7, restoring the differential function to the screw as already described.

25 In the body of the latch 13, adjacent to the screw 22, a compression spring 14 is placed at one end of the elongated hole 24. The tendency of this spring is to keep the corrugated end 23, of the latch, in close contact with the abrupt 30 end of the notch 21. The corrugations on the end of the latch are so formed as to act coordi-

nately with the rounded end of the notch, causing the latch to remain in or out of action as the case may be.

The principle of the differential screw has been used in the past for many purposes, but, what I 5 claim as new is:

1. In a vise, a combination of a screw having threads at one end, operating in a fixed nut in the body of the vise, a plain collar near the other end of the screw, threads of a finer pitch than the 10 first threads, extending from the collar to the end of the screw, a sleeve threadedly mounted on the second threads, the sleeve forming a cylindrical bearing and a thrust bearing for the movable jaw of the vise, a flanged sleeve fixed to the end 15 of the screw beyond the collar and separated from the latter, and a spring attached to the sleeve and the flanged sleeve, with tension adjusted to keep the sleeve abutted against the plain collar, substantially as described. 20

2. In a vise, a combination of a screw having a plain collar near its end, a thread extending from the collar to the end of the screw, a sleeve comprising a bearing for the movable jaw of the 25 vise, mounted on the thread, a flange on the sleeve terminating in a hand-wheel outside the jaw, a flanged collar fixed to the end of the screw beyond the sleeve and separated therefrom, and a latch mounted in a notch in the rim of the hand-wheel, releasably engaging both the hand-wheel 30 and the flanged collar, for the purpose described.

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