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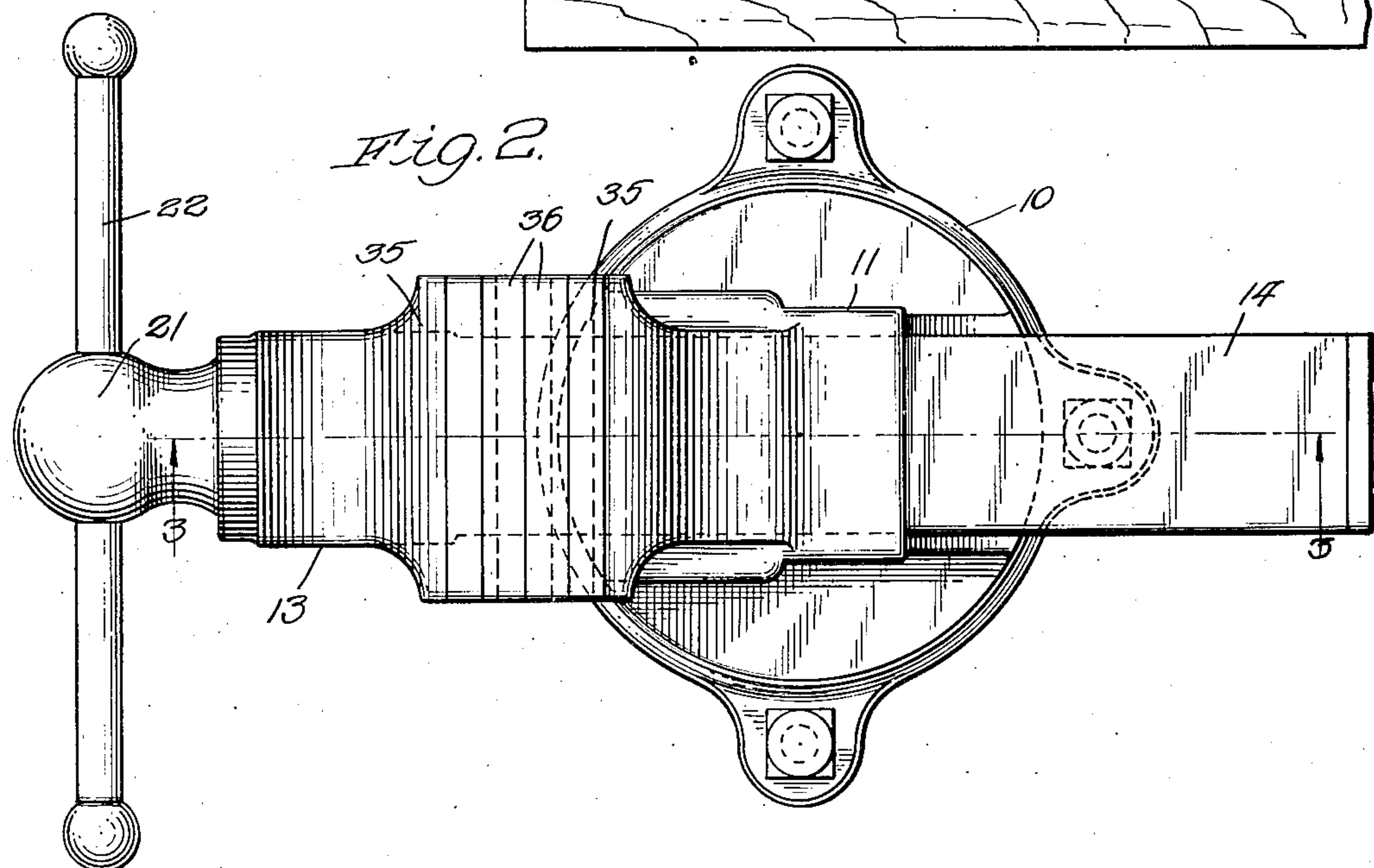
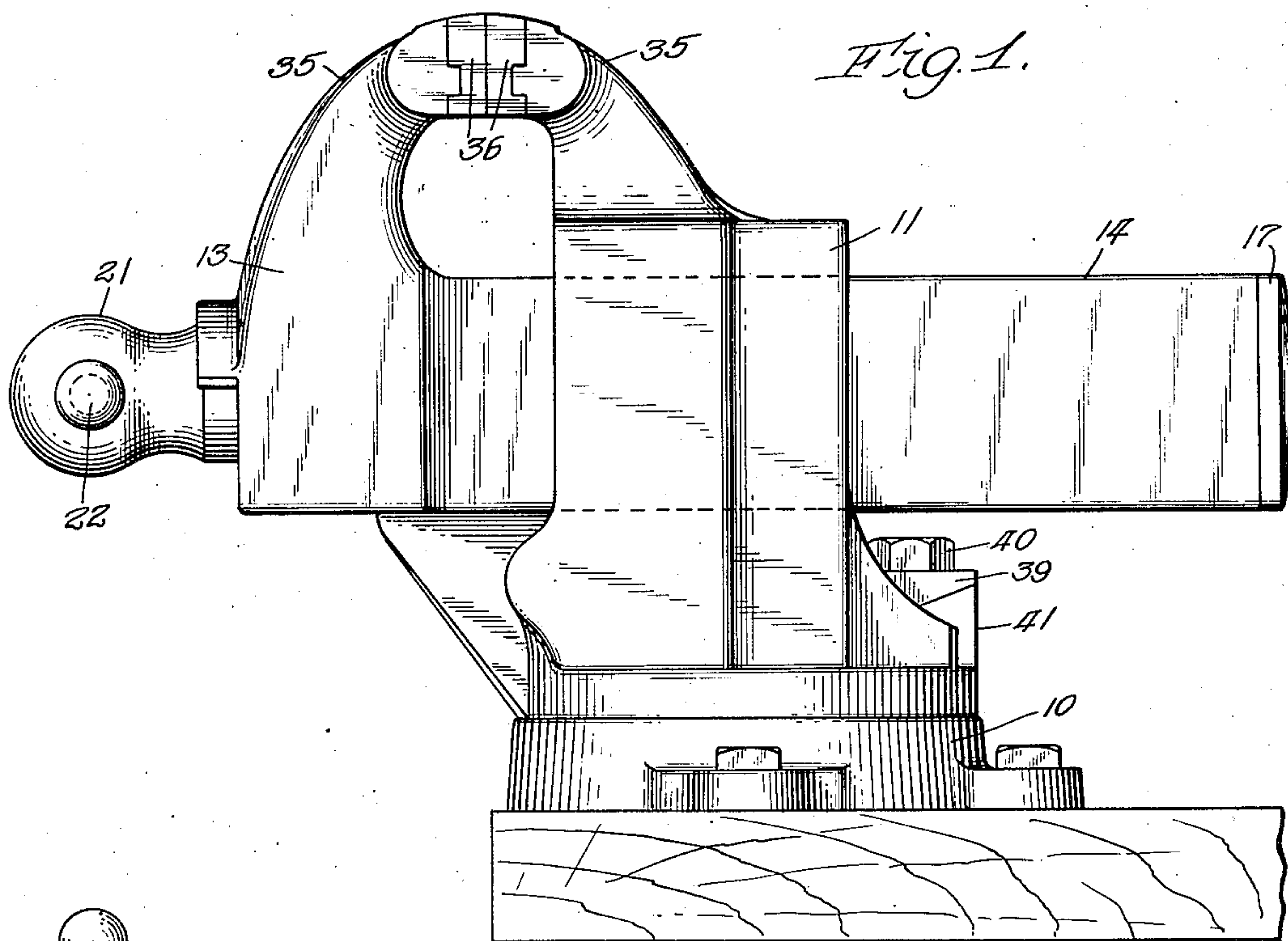
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2,485,641

SCREW OPERATED VISE HAVING A TOOTHED NUT AND
DISPLACEABLE RATCHET FOR QUICK-OPENING

Filed April 28, 1945

3 Sheets-Sheet 1



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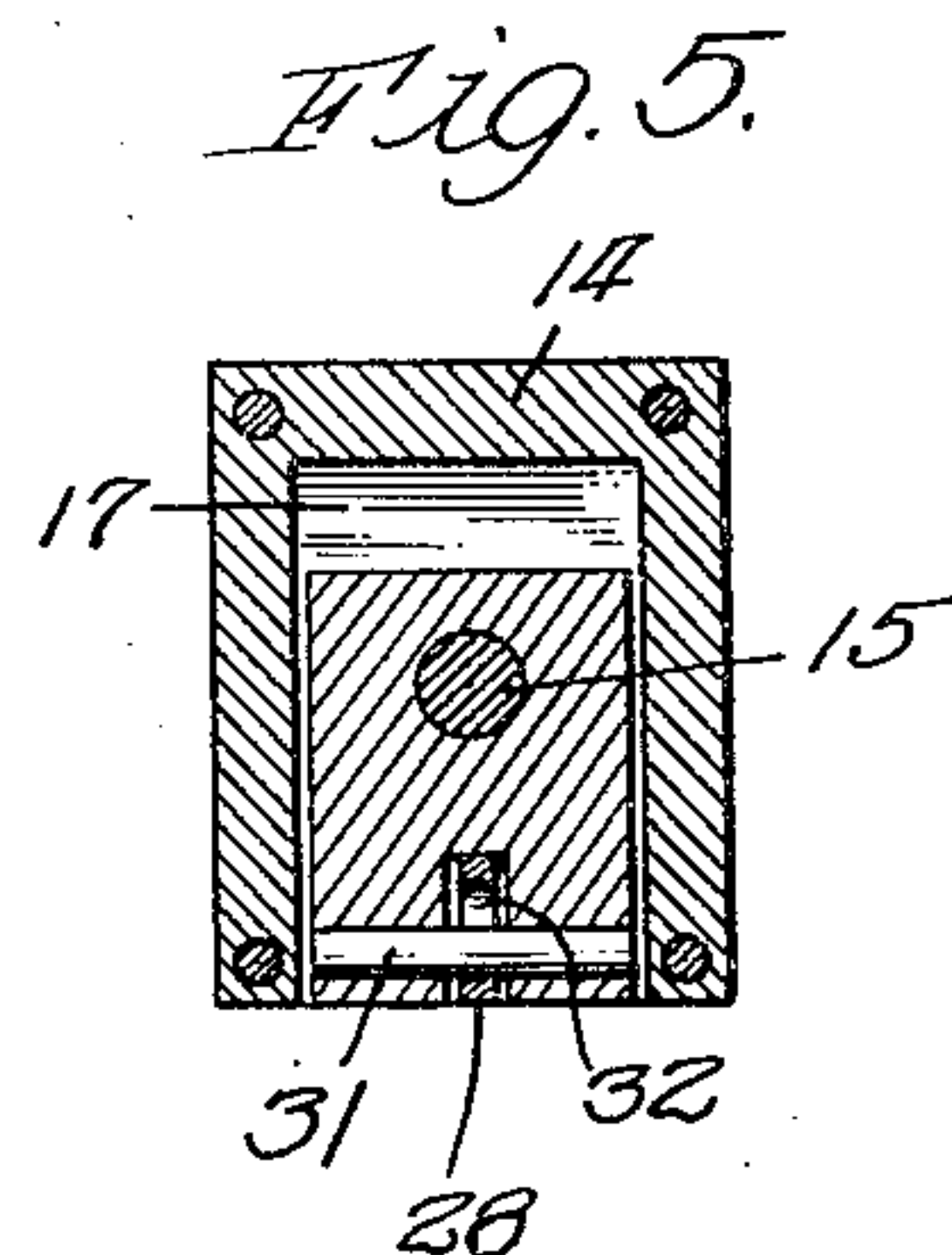
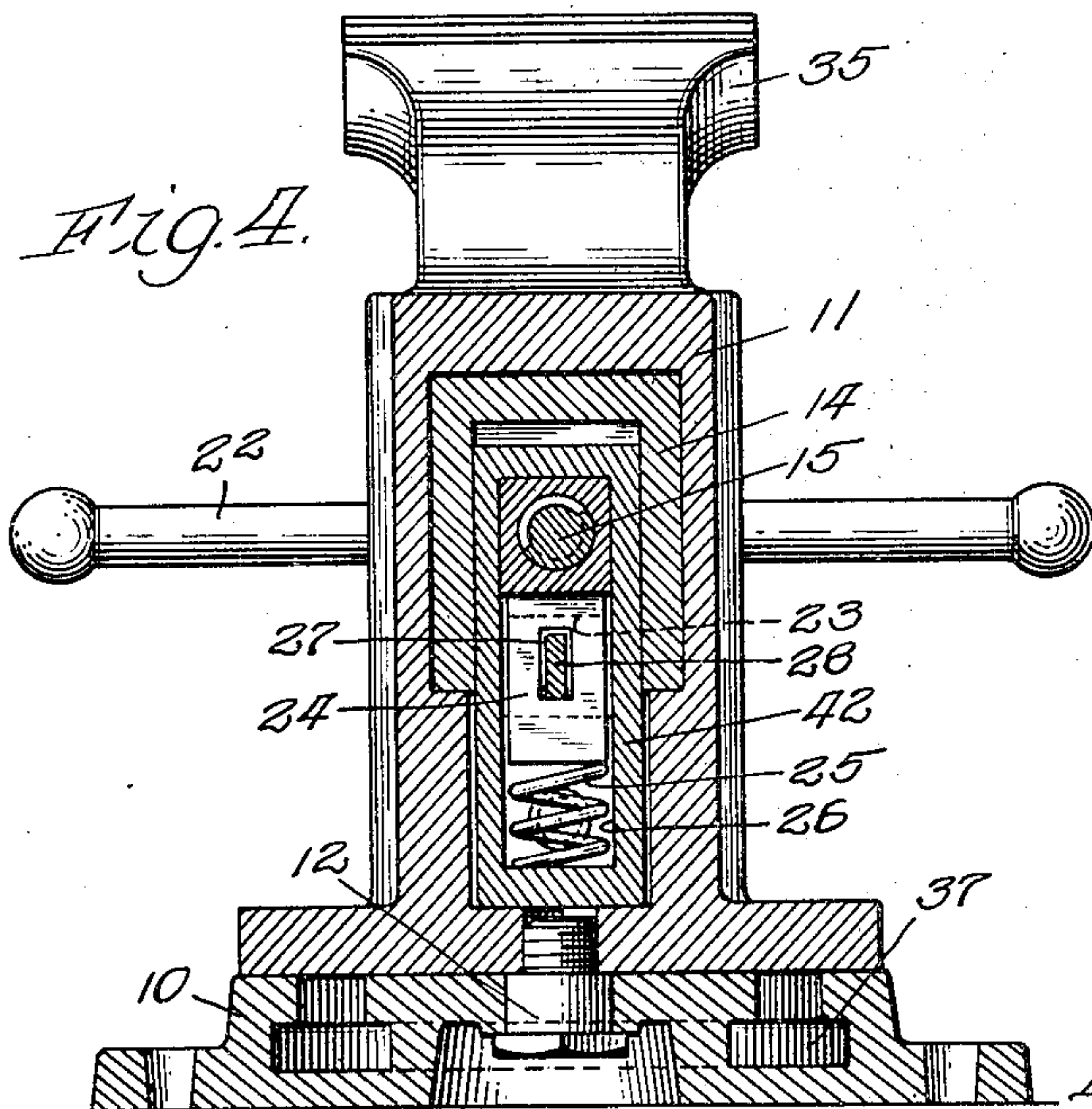
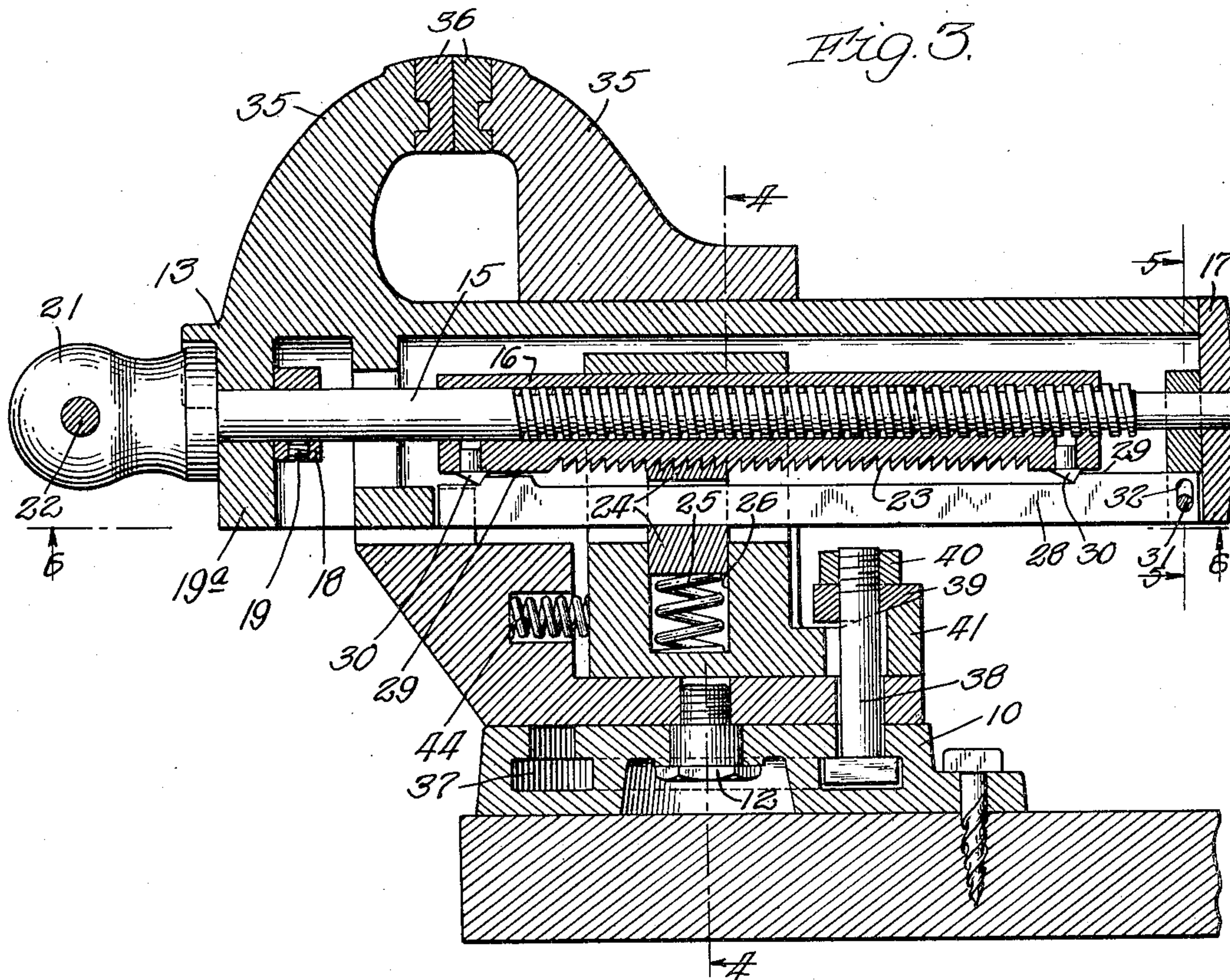
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3 Sheets-Sheet 2



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Oct. 25, 1949.

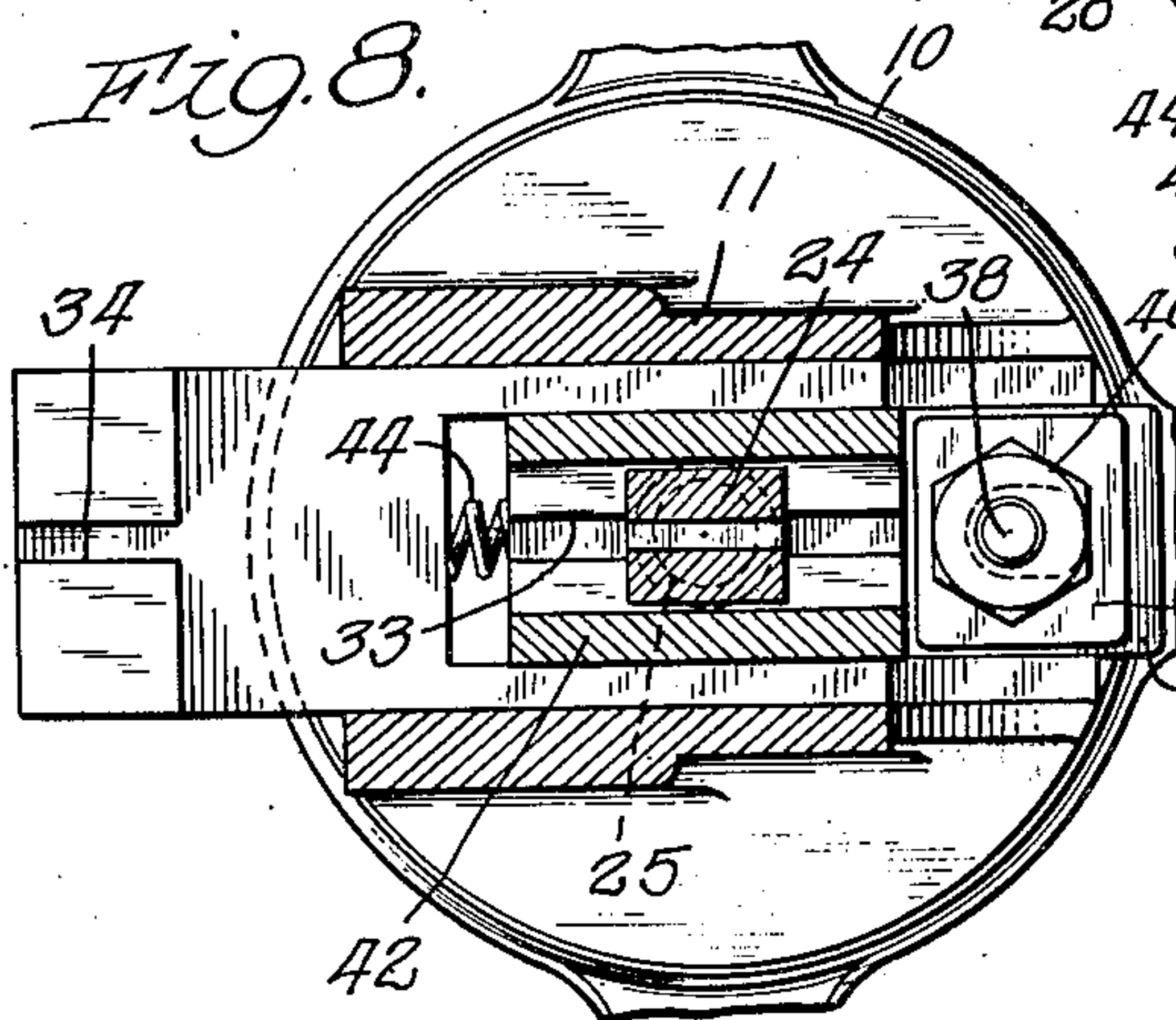
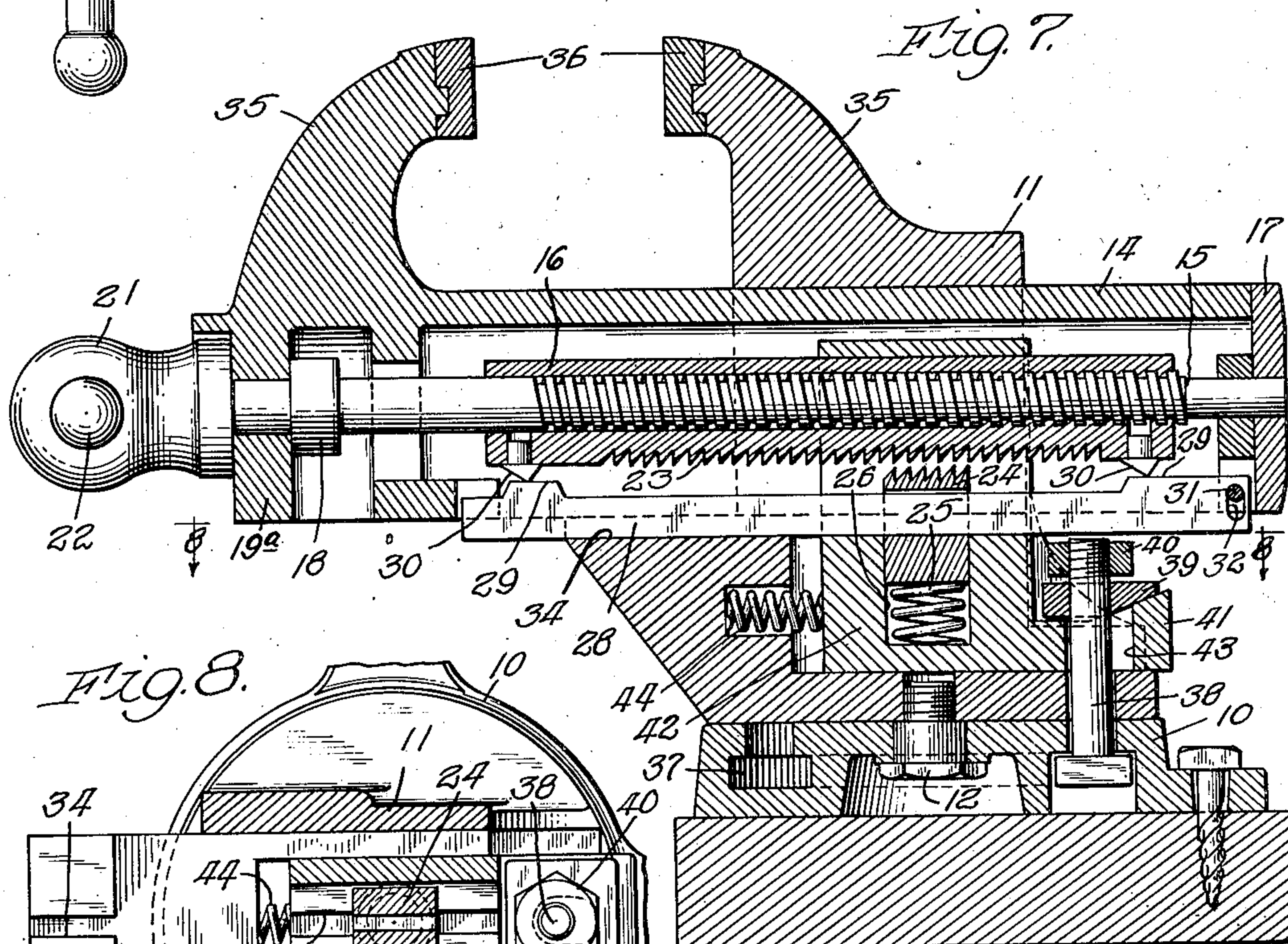
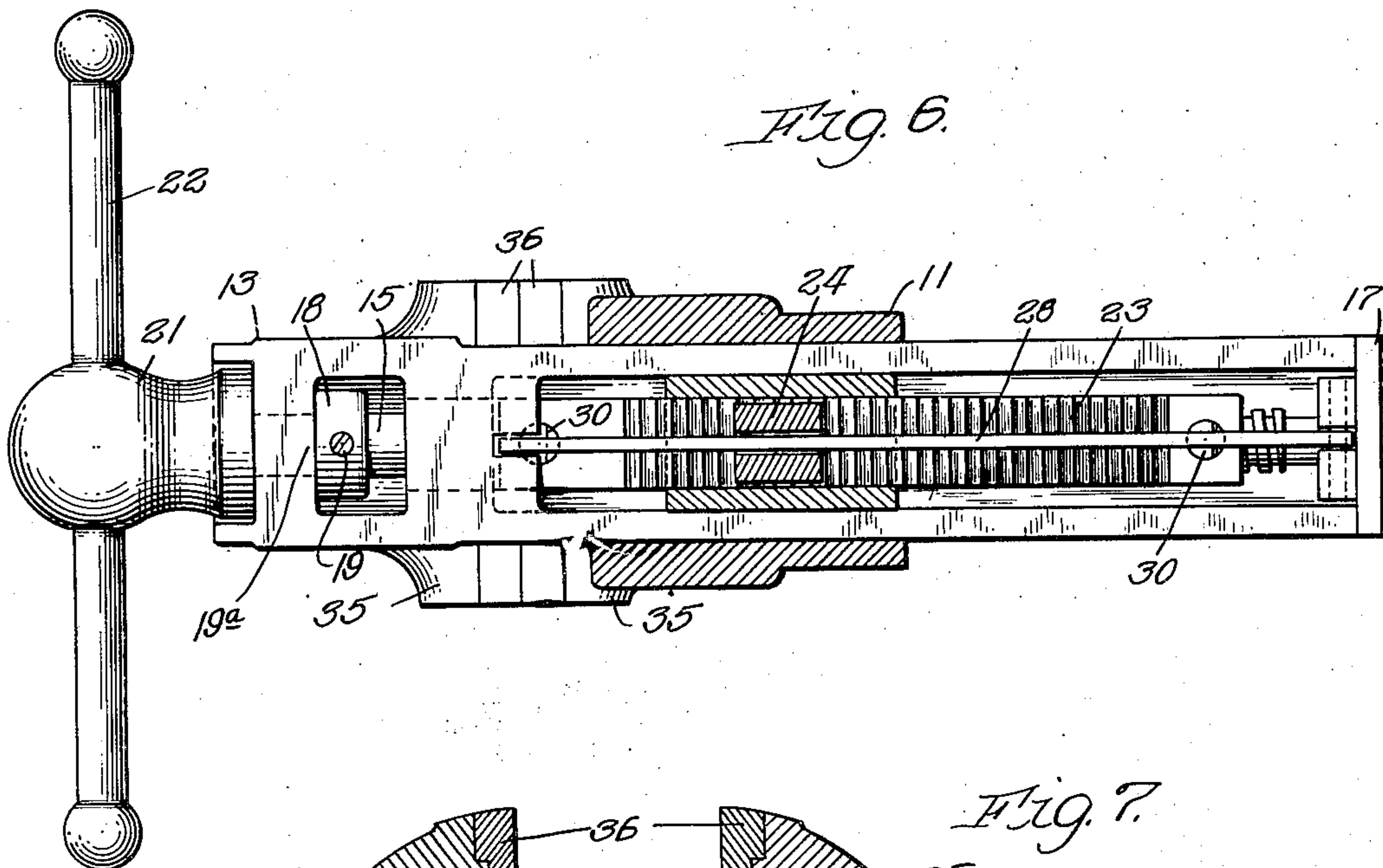
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SCREW OPERATED VISE HAVING A TOOTHED NUT AND
DISPLACEABLE RATCHET FOR QUICK-OPENING

Filed April 28, 1945

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,485,641

SCREW OPERATED VISE HAVING A
TOOTHED NUT AND DISPLACEABLE
RATCHET FOR QUICK OPENINGRay M. Nelson, Rock Island, Ill., assignor to
Birtman Electric Company

Application April 28, 1945, Serial No. 590,762

6 Claims. (Cl. 81—28)

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This invention relates to a quick-opening vise in which the movable jaw structure of the vise can readily be moved to desired position relative to the fixed jaw structure, and relates also to an automatic lock for locking a vise in any desired position on its base.

The ordinary machinist's vise has two clamping jaws, one fixed in position and the other movable relative thereto. These vises include a threaded bolt extending from the movable jaw to the fixed jaw, employed for tightening and loosening the jaws. In such a vise it is necessary to unscrew the bolt when it is desired to open the vise for a larger piece of work. The opening of the jaws by unscrewing the bolt is slow and laborious.

I have invented a quick acting vise wherein the movable jaw structure may be readily disengaged from the fixed jaw structure and moved to any desired position without requiring the unscrewing of the bolt necessary in opening the old vises. In my new vise the movable jaw may be positioned wherever desired relative to the fixed jaw structure, the work placed within the jaws, and the jaws then tightened by turning the bolt, as in the old vises. I have also invented an automatically locking base for the vise in which the body portion of the vise is locked to the base in any desired position relative thereto by merely tightening the bolt to clamp the jaws together. The vise which is the subject of this invention is of simple and sturdy construction, and permits the worker to do his work more efficiently than he was able to with the prior vises.

The invention will be described as related to a typical embodiment of the same set out in the accompanying drawings. Of the drawings, Fig. 1 is a side elevation of a vise embodying this invention; Fig. 2 is a plan view of the vise of Fig. 1; Fig. 3 is a vertical section taken along line 3—3 of Fig. 2; Fig. 4 is a vertical section taken along line 4—4 of Fig. 3; Fig. 5 is a vertical section taken along line 5—5 of Fig. 3; Fig. 6 is a horizontal section taken along line 6—6 of Fig. 3; Fig. 7 is a vertical section similar to Fig. 3 but showing the vise in open position; and Fig. 8 is a horizontal section taken along line 8—8 of Fig. 7.

The vise shown in the accompanying drawings comprises a base 10, a fixed jaw structure 11, rotatably mounted by means of screw 12 on the base, and a movable jaw structure 13. The movable jaw structure has a horizontal elongated section 14 inserted in an opening in the fixed jaw structure. This elongated section 14 carries a threaded screw 15 in its interior, which engages an elongated nut 16, also within the horizontal

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section 14. The bolt and nut are both capable of movement with the movable jaw structure. The bolt 15 is rotatably held within the elongated section 14 by means of a mounted plate 17 at the rear of the vise and a collar 18 engaging a downward projecting portion 19^a that is located at the front of the vise. This collar is held in place by means of a headless screw 19 bearing upon the bolt 15. At the front of the bolt, and pressing against the downward projecting portion 19^a, there is located the usual enlarged head 21 that serves as a mounting for a lever 22. This lever is used for turning the threaded bolt 15.

The elongated nut 16 is provided on its bottom with serrations 23 forming a rack, with each serration having a rear portion substantially vertical, and a front portion sloping downward. Mounted beneath the elongated nut and within the bottom of the fixed jaw structure is a ratchet 24 having serrations on its top surface normally engaging those of the elongated nut 16. The serrations on the ratchet 24 are similar in shape to those on the nut 16, but are positioned opposite thereto so that the ratchet 24 and nut 16 are normally in closely engaged relationship. In order to provide this close engagement the ratchet is normally urged upward by means of the spring 25. The ratchet 24 and spring 25 are both mounted in a depression 26 in the base of the fixed jaw structure.

In order to provide for disengaging the ratchet 24 from the elongated nut 16 there is provided a horizontal opening 27 near the top of the ratchet. Through this hole there extends a horizontal bar 28 arranged beneath the nut 16 and substantially parallel thereto. The bar has raised portions 29 at each end. At each end of the elongated nut 16 there are positioned downwardly extending studs 30 adjacent the raised portions 29 on the bar 28. These studs have sloping surfaces corresponding to sloping surfaces on the raised portions 29. As shown in Fig. 3, the studs are located in front of the raised portions so that when the bolt 15 is turned in a counterclockwise direction, which is opposite that used for clamping the jaws, the nut will move backward so that the studs push the horizontal bar 28 down. This serves to disengage the ratchet 24 from the nut 16. In order to guide the horizontal bar 28 in its movement, there is provided near the rear of the elongated section 14 a horizontal pin 31, extending at right angles to the bar through a vertical slot 32. Grooves 33 and 34 are provided in the vise beneath the bar 28 to permit movement of the bar.

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The quick opening vise operates as follows: When the vise is in clamping position as shown in Fig. 3, the bolt 15 is turned in a counter-clockwise direction looking from the front of the vise, in order to release the movable jaw structure 13. The turning of the vise in the counter-clockwise direction for about one-half a turn causes the elongated nut 16 to move backward along the bolt. The backward movement pushes the horizontal bar 28 down when the studs 30 press against the raised portion 29 of the bar. This also pushes the ratchet 24 down against the action of ratchet spring 25, and disengages the serrated portion of the ratchet from the serrated portion of the nut 16. In this position the movable jaw structure can be moved to any desired position relative to the fixed jaw structure. The work can then be placed between the jaws 35 and the vise tightened by turning the bolt 15 in clockwise direction. The clockwise turning serves to pull the nut forward and permit the bar 28 and ratchet 24 to move back to its normal position under the influence of ratchet spring 25. In this position the serrations on the ratchet engage the serrations on the nut. Due to the particular shape of the serrations, further tightening of the bolt 16 serves to draw the jaws 35 tightly together, thereby binding the work between the hardened steel surfaces 36 of the jaws 35.

The vise illustrated in the accompanying drawings also includes an automatic lock for locking the rotatable portion of the vise to its base. This locking mechanism works automatically as the vise jaws are tightened around work held therebetween.

In the base 10 of the vise there is provided a circular groove 37 having a bottom portion of greater cross-sectional area than the top. Within the groove is located a vertical bolt 38 extending up into the rotatable portion of the vise. This bolt has a slanting wedge 39 near the end, with the slope of the wedge being away from the vise. This wedge is held in place by means of a nut 40 on the end of the vertical bolt 38. The wedge 39 engages a wedge-shaped portion 41 on the bottom of the rotatable part of the vise. The wedge-shaped portion 41 is a part of that portion of the fixed jaw structure which holds the ratchet 24. This portion 42 has a top surrounding the elongated nut 16, which is slidably mounted therein. The ratchet holding portion 42 is loosely mounted within the bottom of the fixed jaw structure so that it is free to move horizontally from front to back of the vise. In order to permit this movement to be unrestrained, the bolt 38 extending from the base to the rotatable portion of the vise extends through a hole 43 in the wedge shaped portion, and this hole is considerably larger than the bolt. The ratchet holding portion 42 is normally held toward the rear of the vise by means of a spring 44.

The automatic locking device operates as follows: When the vise is in open position as shown in Fig. 7 the spring 44 pushes the ratchet holding portion 42 toward the rear of the vise. This permits the two wedge shaped portions 39, 41 to fit loosely against each other and thus permit easy rotation of the vise. As soon as work is placed between the jaws 35, and the bolt 16 tightened in engagement with ratchet 24, the pull on the ratchet forces the holding portion 42 toward the front of the vise, and locks the two wedges 39, 41 together. This locking of the wedges locks the vise firmly on its base.

Having described my invention in considerable

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detail as related to a typical embodiment of the same, it is my intention that the invention be not limited by any of these details unless otherwise specified, but rather be construed broadly within the spirit and scope of the accompanying claims.

Attention is directed to my co-pending application, Serial No. 591,548, filed May 2, 1945, now Patent No. 2,471,444, dated May 31, 1949, wherein other features of the vise are claimed.

I claim:

1. A quick opening vise comprising a movable clamping jaw structure, a fixed clamping jaw structure, a threaded bolt mounted in the movable jaw structure, a nut having at least one side serrated engaging said bolt, said bolt and nut being capable of movement with the movable jaw structure, a ratchet mounted in the fixed jaw structure engaging said serrations for holding the nut fixed preparatory to clamping the jaws together, a displaceable member mounted in the movable jaw structure and slidably engaging said ratchet, and a stud mounted on said nut for displacing said member away from the nut to disengage said ratchet from the nut preparatory to moving the movable jaw structure relative to the fixed jaw structure.

2. A quick opening vise comprising a movable clamping jaw structure, a fixed clamping jaw structure, a threaded bolt mounted in the movable jaw structure, a nut having at least one side serrated engaging said bolt, said bolt and nut being capable of movement with the movable jaw structure, a ratchet mounted in the fixed jaw structure engaging said serrations for holding the nut fixed preparatory to clamping the jaws together, a spring normally urging the ratchet into nut engaging position, a rod member mounted in the movable jaw structure and slidably engaging said ratchet, and a stud mounted on said nut for bodily displacing said rod member away from the nut to disengage said ratchet from the nut preparatory to moving the movable jaw structure relative to the fixed jaw structure.

3. A quick opening vise comprising a movable clamping jaw structure, a fixed clamping jaw structure, a threaded bolt mounted in the movable jaw structure, a nut having at least one side serrated engaging said bolt, said bolt and nut being capable of movement with the movable jaw structure, a ratchet mounted in the fixed jaw structure engaging said serrations for holding the nut fixed preparatory to clamping the jaws together, a spring urging the ratchet into nut engaging position, a rod member mounted in the movable jaw structure and slidably engaging said ratchet, and means mounted on the nut for engaging said rod member to displace the rod member bodily away from the nut, thereby disengaging the ratchet from the nut preparatory to moving the movable jaw structure relative to the fixed jaw structure, said means being operable when the bolt is moved in a direction opposite that employed in clamping the jaws.

4. A quick opening vise comprising a movable clamping jaws structure, a fixed clamping jaw structure, a threaded bolt mounted in the movable jaw structure, a nut having at least one side serrated engaging said bolt, said bolt and nut being capable of movement with the movable jaw structure, a ratchet mounted in the fixed jaw structure engaging said serrations for holding the nut fixed preparatory to clamping the jaws together, a spring urging the ratchet into nut engaging position, a rod member mounted in the movable jaw structure and slidably engaging said

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ratchet, said rod member being mounted substantially parallel to said nut and having at least one beveled raised portion extending toward the nut, and at least one stud extending from the nut in contact with the bar member adjacent the front of the raised portion, so that movement of the bolt in a direction opposite that employed in clamping the jaws causes the stud to move onto the raised portion of the rod member and displace it, thereby disengaging the ratchet from the nut preparatory to moving the movable jaw structure relative to the fixed jaw structure.

5. A quick opening vise comprising a movable clamping jaw structure, a fixed clamping jaw structure, a threaded bolt mounted in the movable jaw structure and capable of being rotated about its major axis, an elongated nut having a flat side with serrations therein and engaging said bolt but held against rotation therewith, said bolt and nut being capable of movement with the movable jaw structure, a ratchet mounted in the fixed jaw structure having serrations normally engaging those of the elongated nut for holding the nut fixed preparatory to clamping the jaws together, a spring urging the ratchet into nut engaging position, a rod member mounted in the movable jaw structure substantially parallel to the elongated nut and slidably engaging said ratchet, a beveled raised portion on said rod member extending toward the nut, a stud extending from the nut and in contact with the rod member adjacent the front of said raised portion, so that movement of the bolt in a direction opposite that employed in clamping the jaws causes the stud to move onto the raised portion of the rod member and displace it away from the nut, thereby disengaging the ratchet from the nut preparatory to moving the movable jaw structure relative to the fixed jaw structure.

6. A quick opening vise comprising a movable clamping jaw structure, a fixed clamping jaw structure, a threaded bolt mounted in the movable jaw structure and capable of being rotated about its major axis, an elongated nut having a flat side with serrations therein and engaging said bolt but held against rotation therewith, said bolt and nut being capable of movement with the movable jaw structure and said serrations extending along the nut a distance greater than the distance of movement of the movable jaw structure, a ratchet mounted in the fixed jaw structure having serrations along one side nor-

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mally engaging a portion of those of the elongated nut for holding the nut fixed preparatory to clamping the jaws together, said ratchet serrations extending a shorter distance than those of the nut and the difference between the two distances being substantially equal to the distance of permissible movement of the movable jaw structure, a spring urging the ratchet into nut engaging position, a rod member mounted in the movable jaw structure substantially parallel to the elongated nut and slidably engaging said ratchet, a beveled raised portion on each end of said rod member extending toward the nut with each raised portion being beyond the end of the nut serrations, a pair of studs extending from the rod member with one stud being in contact with the rod member adjacent the front of one raised portion and the other stud adjacent the front of the other raised portion, so that movement of the bolt in a direction opposite that employed in clamping the jaws causes the studs to move onto the raised portions and displace the rod member away from the nut, thereby disengaging the ratchet from the nut preparatory to moving the movable jaw structure relative to the fixed jaw structure.

RAY M. NELSON.

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