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HYDRAULIC PIPE VISE

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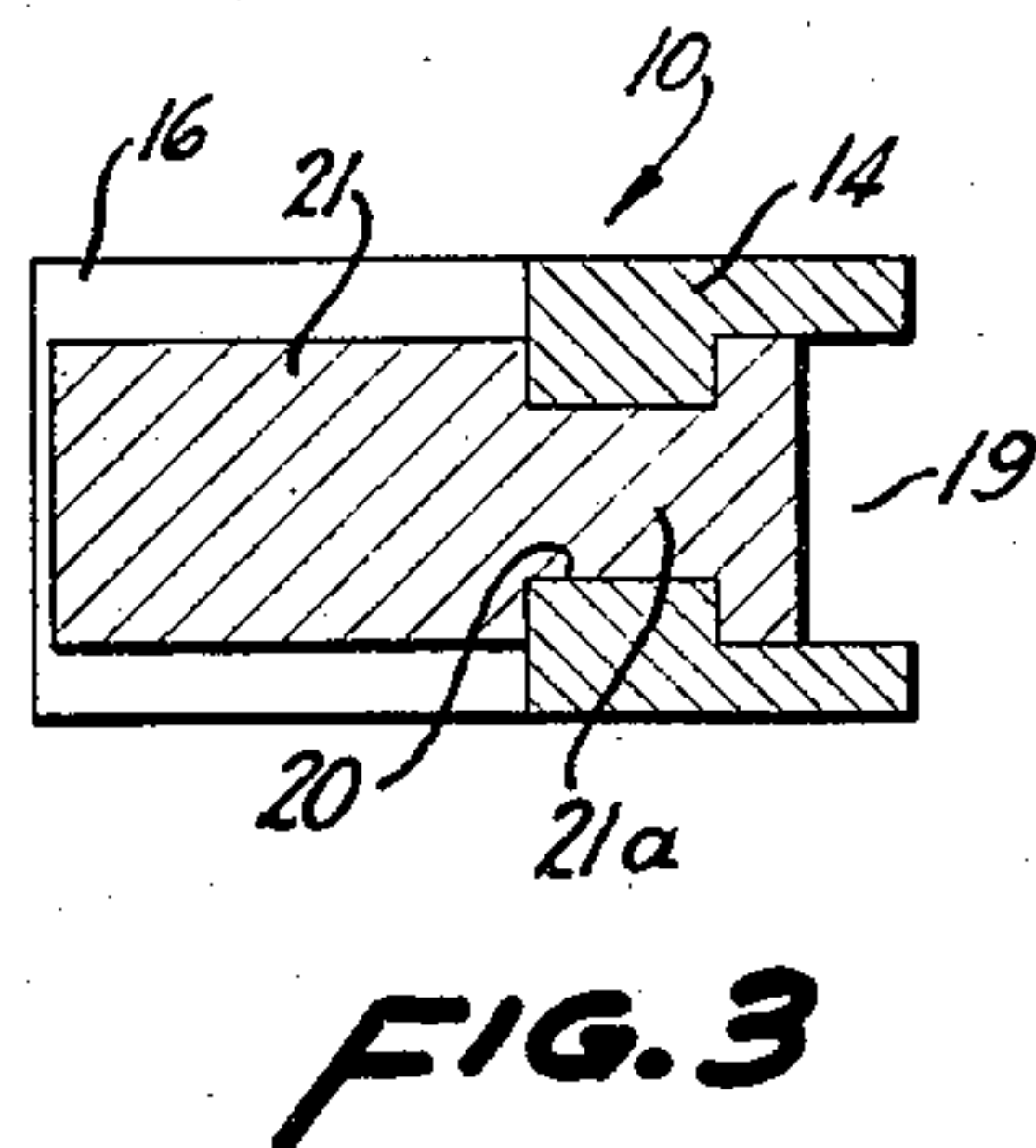
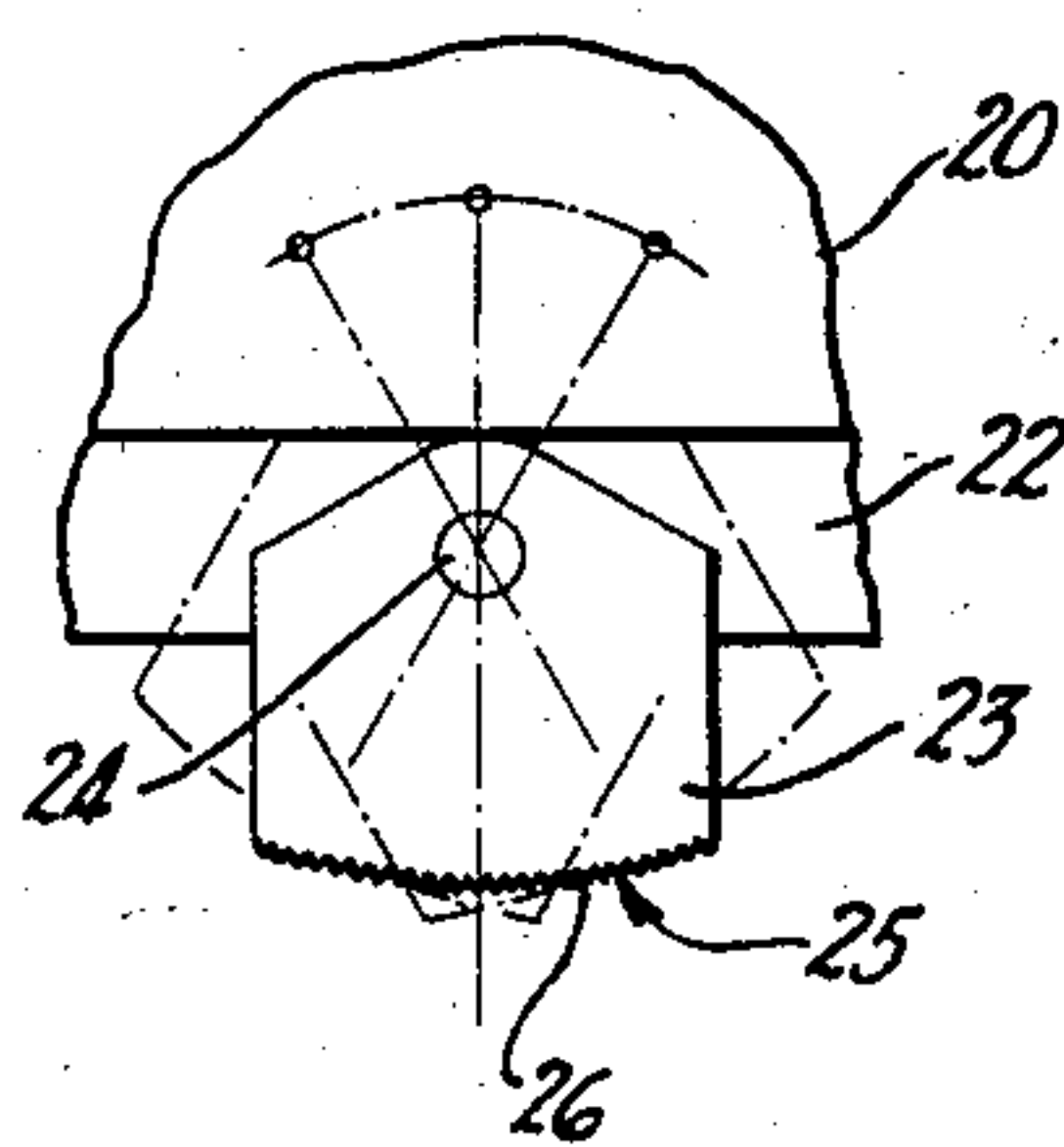
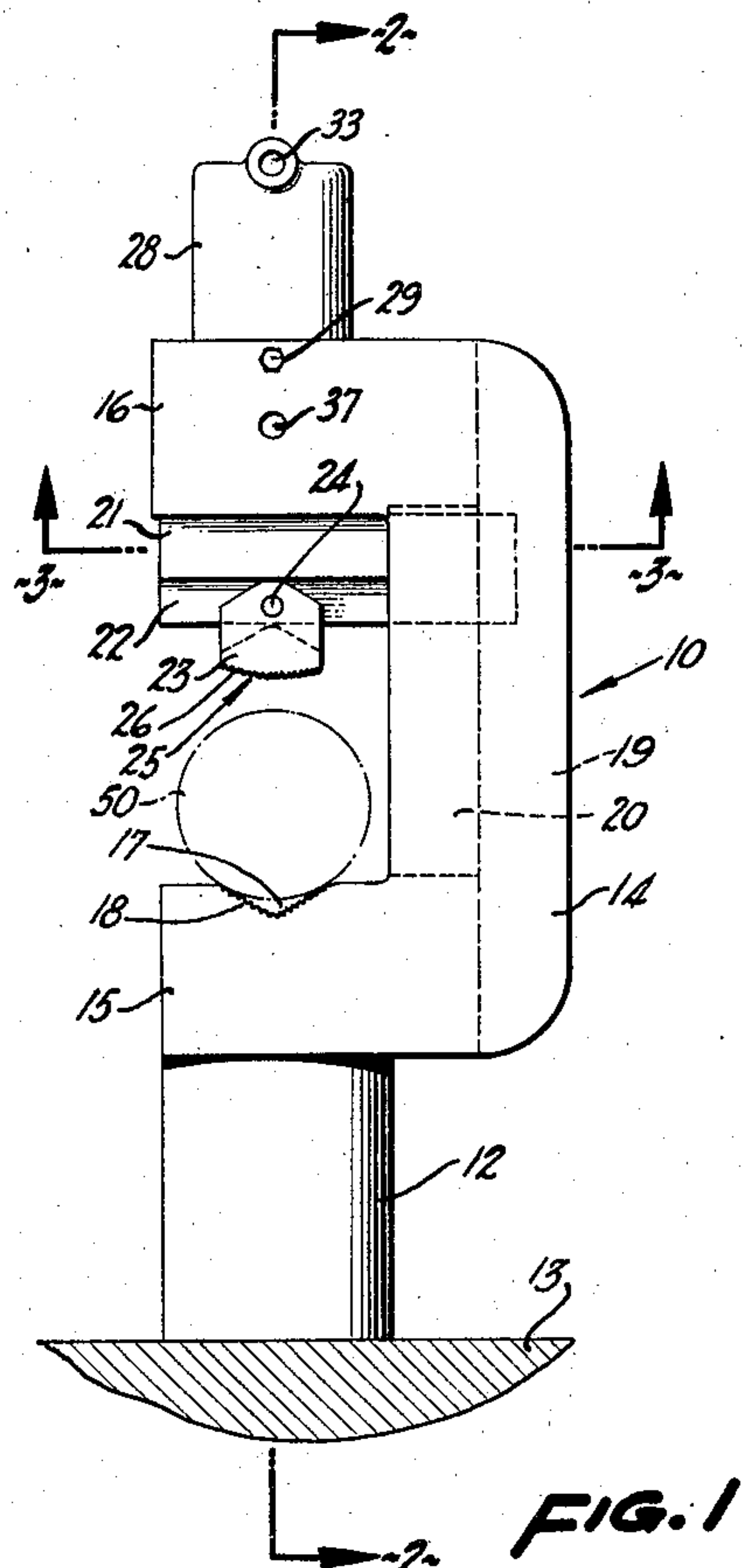
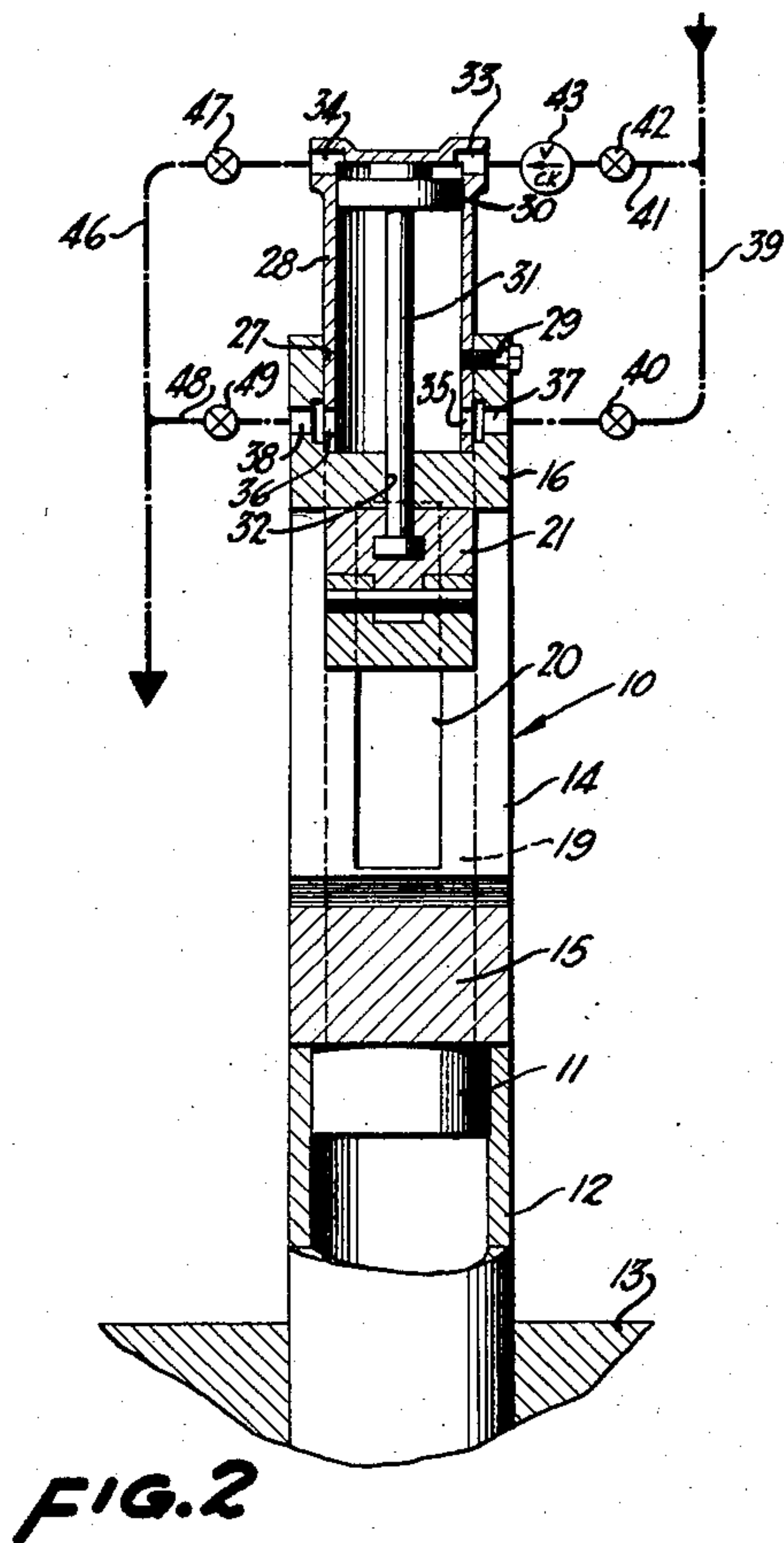
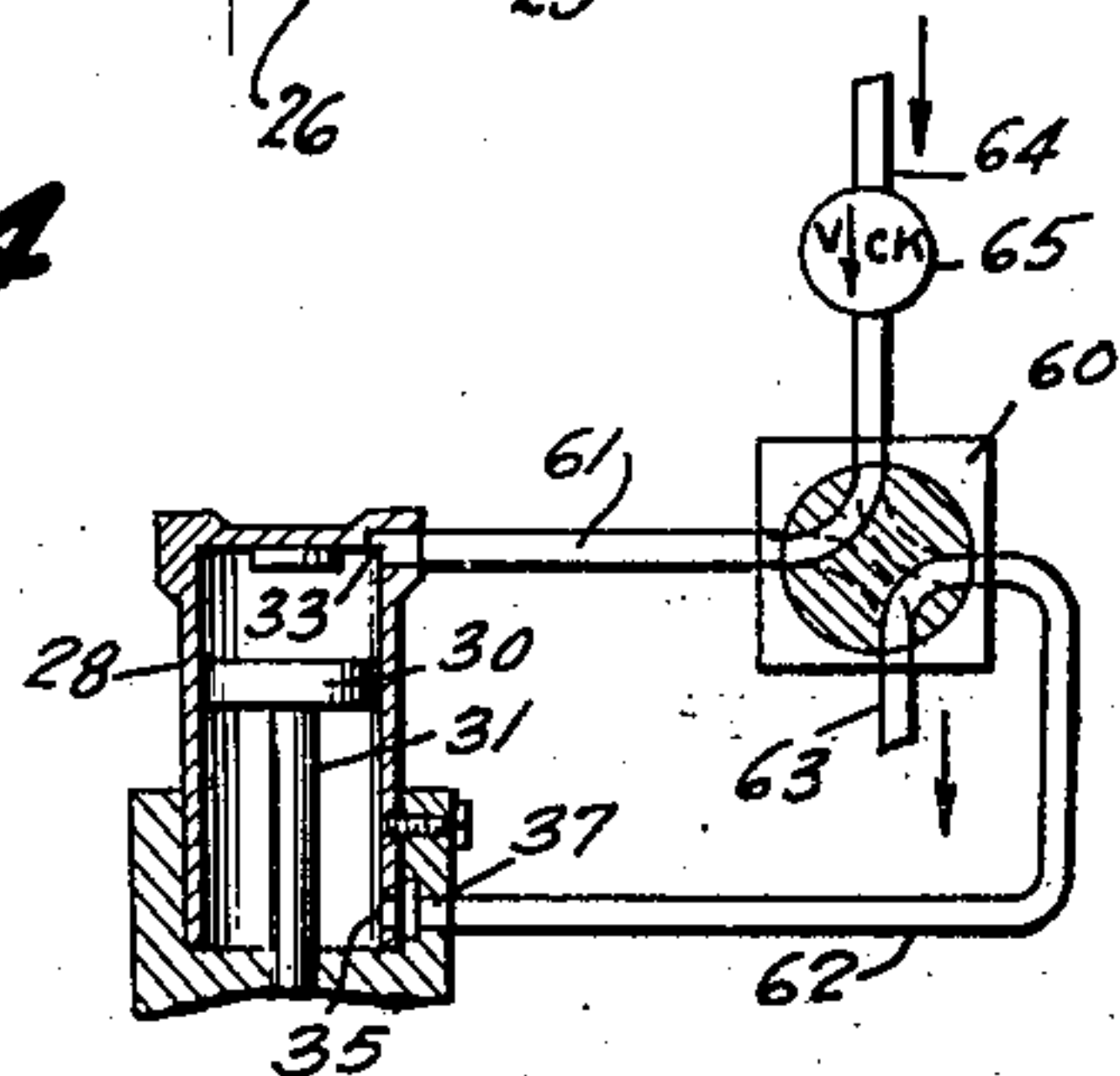


FIG. 4

FIG. 5



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HYDRAULIC PIPE VISE

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1 Claim. (Cl. 81—17.2)

This invention relates to a vise and more particularly to a hydraulic pipe vise adapted to be actuated by conventional city-water pressure but capable of applying pressures greater than said city-water pressure.

The principal object of this invention is to provide a hydraulic pipe vise which may be closed or opened by the application of city-water pressure to one end or the other of a hydraulic cylinder.

A further object of the invention is to provide a pipe vise according to the preceding object wherein the movable jaw is provided with a gripping member eccentrically mounted.

A preferred form of the invention is described in the following detailed specification, and illustrated by way of example in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a vise embodying the principles of the invention.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary view of the movable jaw and the eccentric gripping member mounted thereon.

Fig. 5 is a fragmentary sectional view, similar to Fig. 2, of another form of the hydraulic system.

Referring now to the drawings, wherein the same reference numerals are used to denote the same elements throughout the various views shown, the vise, generally indicated at 10, is provided with a stub shaft 11 at its lower end. The stub shaft 11 is slidably received within the upper end of a vertical tubular supporting post 12 embedded in the floor 13.

The vise 10 comprises a C-shaped member 14 having two legs 15 and 16. The stub shaft 11 is connected to the outer side of the leg 15 and extends perpendicularly thereto whereby the C-shaped member 14 is mounted in an upright position. The lower leg 15 is provided with a V-shaped notch 17 extending transversely across the inner surface thereof, providing a stationary inwardly facing jaw having teeth 18 formed therein. The rear face of the base portion of the C-shaped member 14 is provided with a longitudinally extending groove 19. A longitudinal slot 20, narrower than the groove 19, connects the groove 19 with the inner opening between the legs 15 and 16. A sliding jaw 21, having a dovetail extension 21a, is slidably mounted in the slot 20 in the manner best seen in Fig. 3. As can be seen in Figs. 1 and 4, the sliding jaw is provided with an inwardly extending central projection 22 and a jaw 23 is pivotally mounted thereon by a pin 24 extending therethrough. The arcuate face 25 of the jaw 23 is eccentric with respect to the pin 24 and is provided with a plurality of teeth 26.

A blind bore 27 extends inwardly from the outer surface of the upper leg 16, and a hydraulic cylinder 28 is mounted therein by bolts 29. A piston 30 is slidably mounted in the cylinder 28. A piston rod 31 connected to the piston 30 extends through a bore 32 in the leg 16 and is connected to the sliding jaw 21.

A pair of inlet and outlet ports 33 and 34, respectively,

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are located adjacent the upper end of the cylinder 28. Similarly, a pair of inlet and outlet ports 35 and 36, respectively, are located adjacent the lower end of the cylinder 28. The ports 35 and 36 are in register with two ports 37 and 38 formed in the leg.

A fluid conduit 39 connects the port 37 with a source of water under pressure (not shown), for example, the city water supply, and a valve 40 is incorporated in said conduit. Similarly, a branch conduit 41, having a valve 42 incorporated therein, connects the water supply with the port 33. A check valve 43 is inserted in the conduit 41 between the valve 42 and the port 33. A conduit 46 connects the port 34 with a discharge drain (not shown). A valve 47 is incorporated in the conduit 46. Another conduit 48, having a valve 49 therein, connects the port 34 with said drain.

In the operation of the vise 10, to lightly grip an object such as indicated in dot-dash lines at 50, the valves 42 and 49 are opened while the valves 40 and 47 remain closed. The fluid enters the cylinder above the piston 30 and forces the sliding jaw 21 downwardly into contact with the object 50. The fluid below the piston 30 escapes through the conduit 48 and the valve 49. When a torque is applied to the object 50 tending to rotate said object, the eccentric gripping member 23 tends to rotate about its pivot 24. The eccentric arcuate face 25 thus tends to decrease the distance from the stationary jaw 15 and force the piston 30 upwardly. Since the fluid above the piston 30 is trapped by the check valve 43 the cam action of the jaw 25 tightens the grip on the object 50. When it is desired to open the vise 10, the valves 42 and 49 are closed and the valves 40 and 47 are opened, thus applying pressure below the piston 30 through the conduit 39 and permitting the fluid thereabove to escape through the conduit 46.

While the various valves 40, 42, 47 and 49 are shown schematically as separate valves, it is contemplated that the various valving functions could all be combined in a single multiple ported valve structure operated by a single control lever or handle. Referring to Fig. 5, in this arrangement only the ports 33 and 35 in the cylinder 28 are required. A four-way rotary valve 60 has one pair of opposite ports connected to the ports 33 and 35, respectively, by means of conduits 61 and 62. A conduit 63 connects a third port of the valve 60 with a drain and a conduit 64 connects the opposite port of valve 60 with a source of fluid pressure, such as a city-water supply. A check valve 65 is inserted in the inlet conduit 64 to maintain pressure on the piston even though the object 50, when turned, exerts a back pressure greater than the pressure of the inlet fluid.

To lightly grip an object with a vise incorporating the hydraulic system of Fig. 5, the four-way valve 60 is rotated to interconnect the conduit 61 with the conduit 64, and the conduit 62 with the conduit 63. The check valve 65 permits passage of fluid into the upper end of cylinder 28 to force the piston 30 downwardly, the fluid therebelow escaping through the drain conduit 63. To tightly grip the object, the object is rotated and the check valve 65 operates, as described above, to retain the higher pressure above the piston 30. To raise the movable jaw, the valve 60 is rotated to interconnect the conduit 61 with the conduit 63 and the conduit 62 with the conduit 64. Fluid under pressure is thus admitted below the piston 30 and is drained through the conduit 61.

From the foregoing description, it may be seen that the invention provides a simple efficient pipe vise adapted in normal use for being opened and closed by city-water pressure, and wherein additional gripping pressure is automatically applied when a torque is applied to the object being gripped.

While I have shown and described the preferred form of my invention, it is obvious that various changes may be made therein by those skilled in the art, without departing from the scope of the invention as defined in the appended claim.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

In a hydraulic vise, an integral C-shaped vise member of heavy stock including an upper and a lower horizontally disposed leg and a vertically disposed base portion connecting said legs; tubular means extending perpendicular to said lower leg for mounting said C-shaped vise member in an upright position; means defining a shouldered opening in said base portion including a groove in the outer face of said base portion extending longitudinally thereof and a slot in the inner portion of said base portion in communication with said groove, a movable jaw having a narrowed portion slidably received in said slot and having an enlarged extension slidably received in said groove in said base portion for movement parallel to said lower leg; a hydraulic cylinder received in the upper portion of said upper leg, a piston slidable within said cylinder, a piston rod extending through said upper leg and connecting said piston to said movable jaw to move said movable jaw toward and away from said lower leg, first conduit means for connection with a water system for supplying water under pressure to the end of said cylinder remote from said movable jaw and for discharging water from said end of said cylinder adjacent said movable jaw, second con-

duit means for supplying water under pressure to said end of said cylinder adjacent said movable jaw and for discharging water from said end of said cylinder remote from said movable jaw, valve means for controlling said first and second conduit means; said movable jaw having a downwardly extending central projection, a pipe-gripping member having spaced lateral portions pivoted on said central projection, said pipe-gripping member having a toothed, single, convex arcuate face, the radius of curvature of said face being greater than the distance from the pivot point of said member to the arcuate face thereof, and said pipe-gripping member also having sloped central stop portions for engaging said central projection on said movable jaw to limit rotation of said member about its pivot.

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