J. E. OSMER.

FLUID PRESSURE ACTUATED VISE.

APPLICATION FILED JUNE 8, 1907. RENEWED APR. 22, 1910.

976,285.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

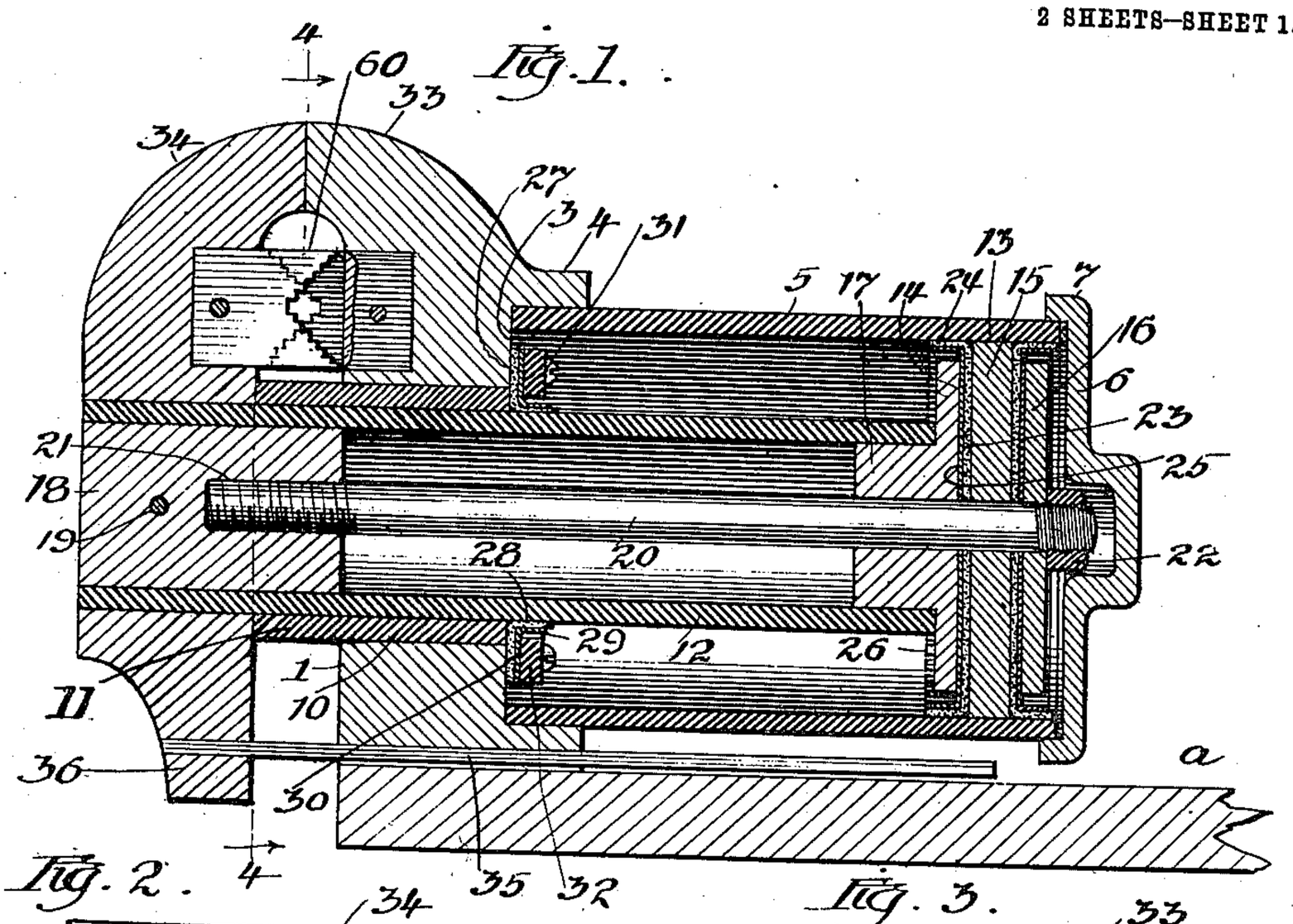


Fig. 2.

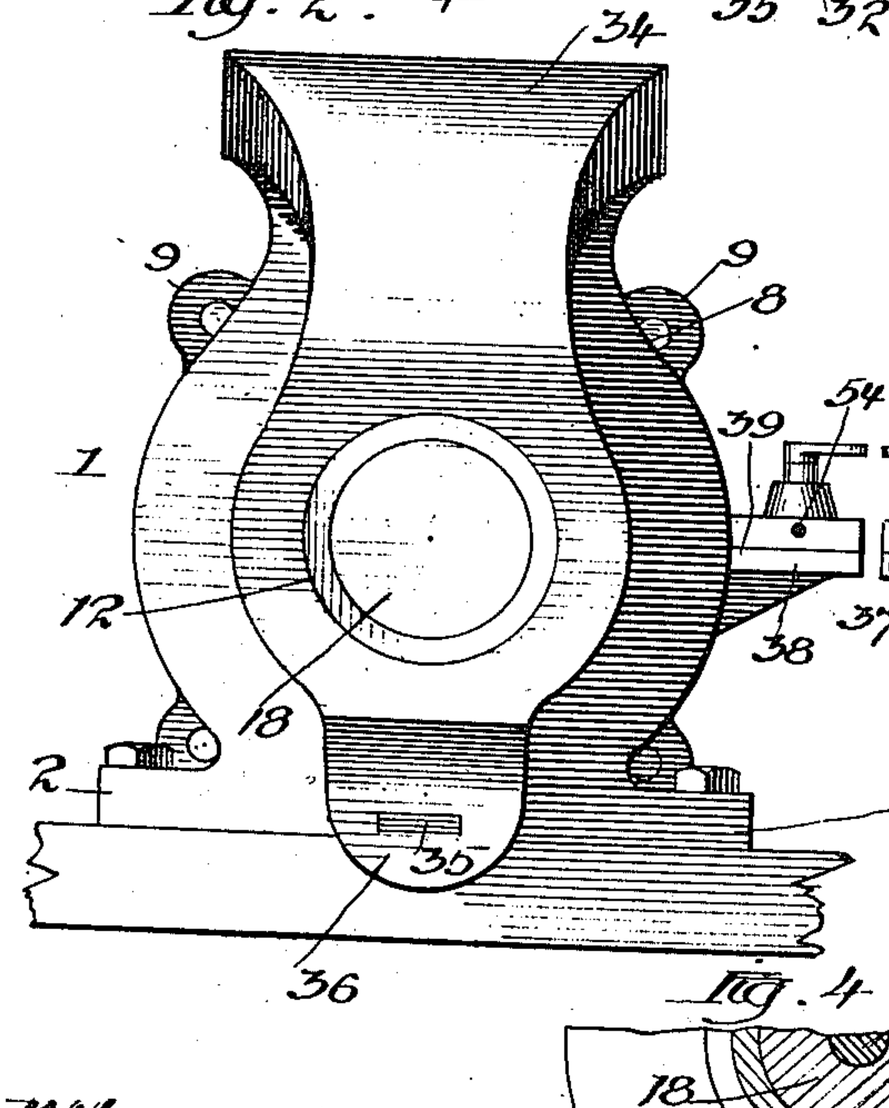


Fig. 3.

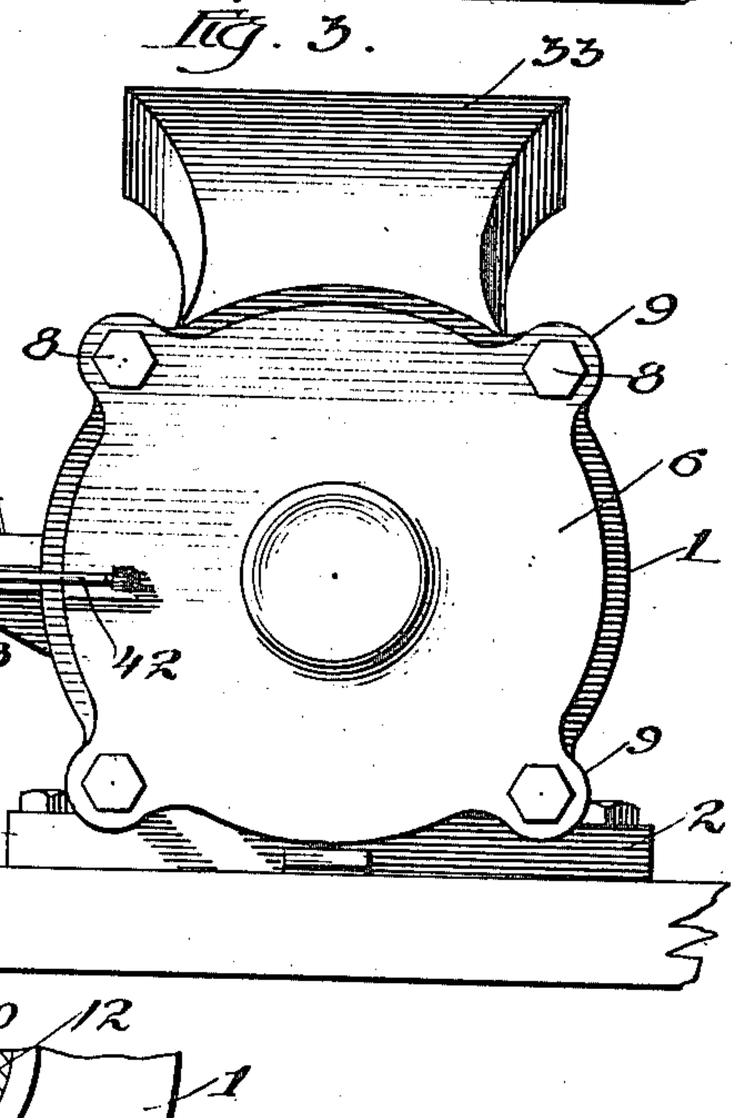
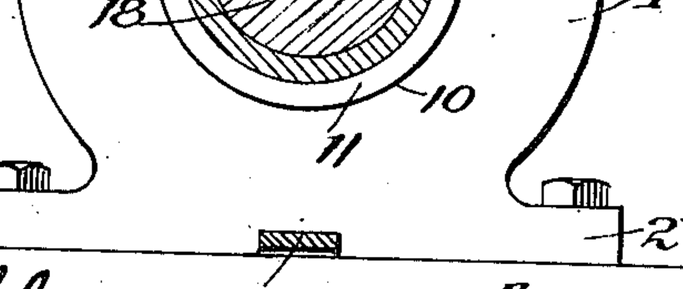


Fig. 4.



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2 SHEETS—SHEET 2.

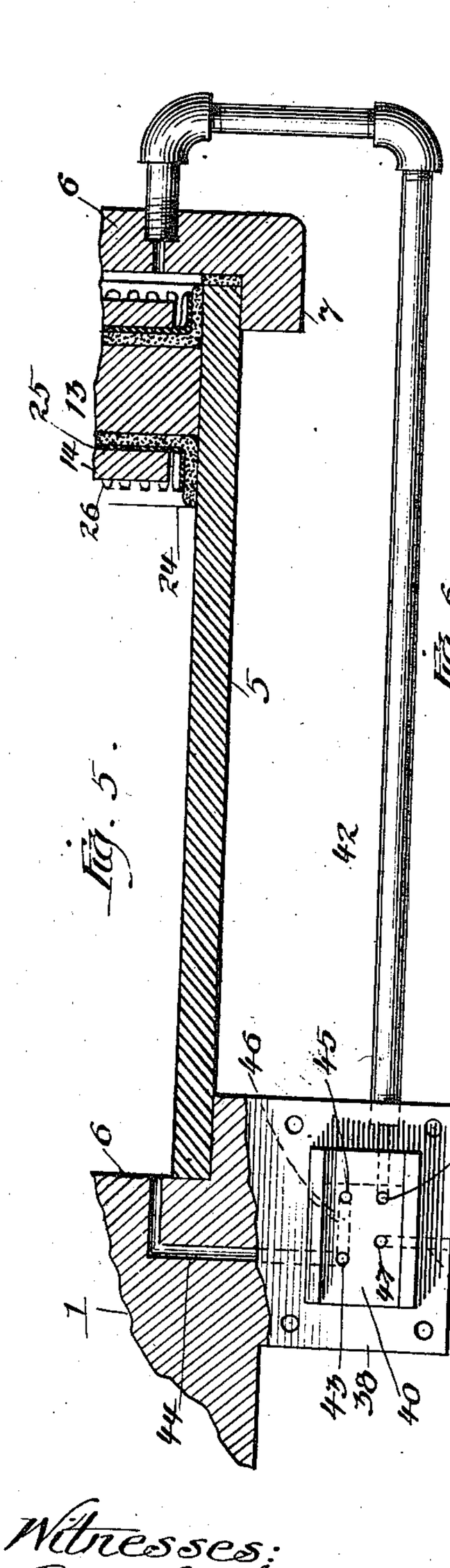

Fig. 5.

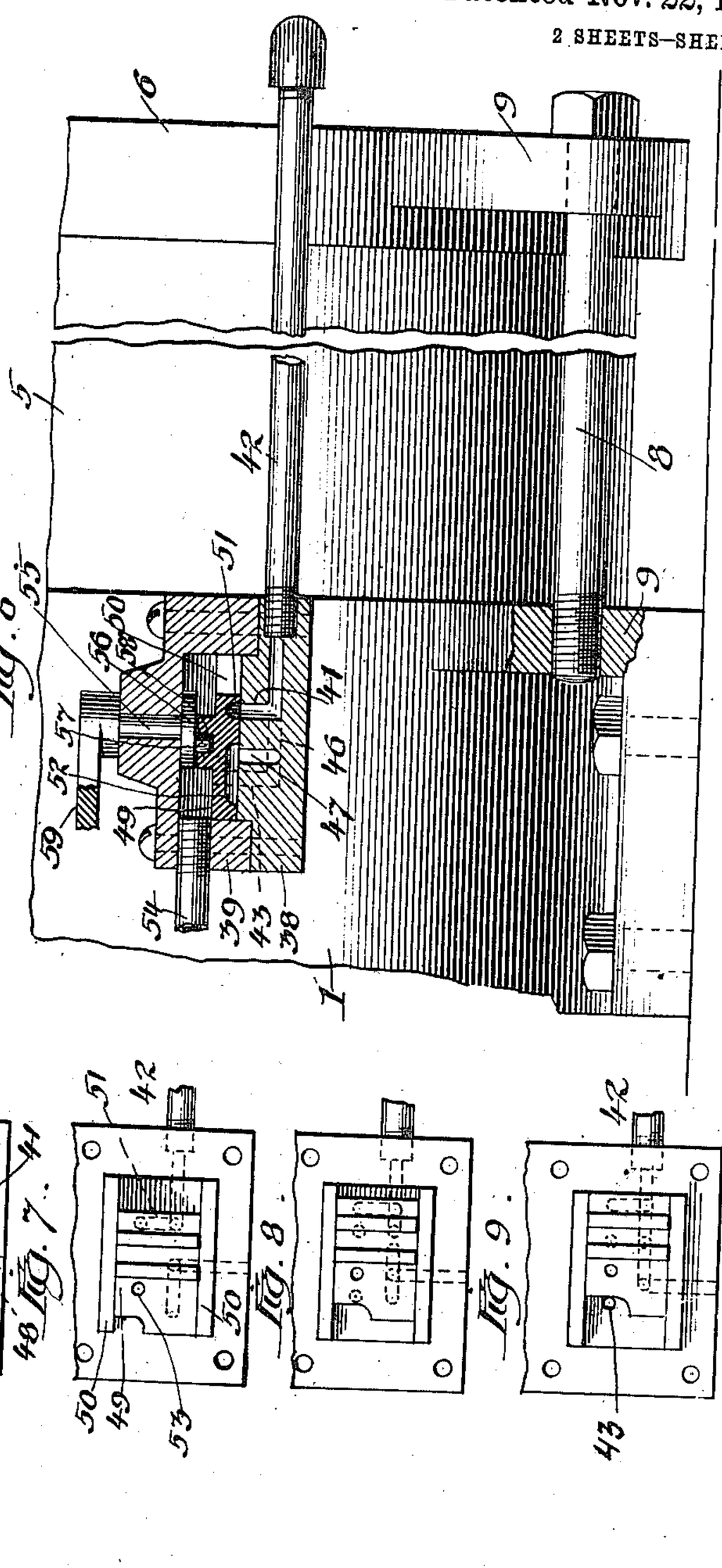

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE-ACTUATED VISE.

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To all whom it may concern:

Be it known that I, JOHN E. OSMER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fluid-Pressure-Actuated Vises, of which the following is a specification.

One of the objects of this invention is the provision in a fluid-pressure-actuated vise, of means for opening the vise with the pressure fluid employed for closing it.

Another object is the provision of means for stopping the movable jaw at points between the extremities of its travel.

A further object is to provide improved means for guiding the movable jaw.

The invention also relates to the other improvements in fluid-pressure-actuated vises hereinafter set forth.

In the accompanying drawings, Figure 1 is a longitudinal vertical central section through a fluid-pressure-actuated vise embodying the features of my invention. Fig. 2 is a front end elevation of the vise, and Fig. 3 a rear elevation thereof. Fig. 4 is a fragmental sectional view taken on the plane of dotted line 4—4 of Fig. 1. Fig. 5 is a view showing the connections between the valve mechanism and the cylinder. Fig. 6 is a fragmental side elevation of the cylinder showing the pressure chest in vertical central section. Figs. 7, 8 and 9 are views illustrating different positions of the valve mechanism.

The embodiment herein shown of the invention comprises a supporting member 1, preferably a casting, said member having lugs 2 by means of which it may be secured to a bench *a* or any other suitable support. Upon the rear side of the supporting member 1 is formed a circular face 3 about which extends an annular flange 4. A cylinder 5 is secured to the supporting member 1 with its forward end abutting upon the face 3. In this instance, the rear end of the cylinder 5 is closed by a head 6 having a flange 7 adapted to fit over said cylinder. The head 6 and the cylinder 5 are secured to the supporting member 1 by means of bolts 8 extending through a plurality of ears 9 formed upon the head and the supporting member, said bolts being screw-threaded into the ears upon the supporting member.

An opening 10 is formed in the supporting member 1 concentric with the cylinder 5 and in said opening is fixed a sleeve 11, said sleeve projecting forward from the face of the supporting member 1 for a purpose to appear hereinafter. Within the sleeve 11 is slidably mounted a piston rod 12, said piston rod preferably being formed of tubing. The piston 13 consists of three disks 14, 15, and 16, the disk 14 having a cylindrical portion 17 filling the rear end of the tubular piston rod 12. The forward end of the piston rod is closed by a plug 18 secured in place by means of a pin 19 or any other suitable means. The disks 14, 15, and 16 are secured together and to the rear end of the piston rod 12 by means of the tie rod 20, the forward screw-threaded end of said rod lying within a screw-threaded opening 21 in the plug 18, and a nut 22 being turned upon the rear screw-threaded end of said rod. Any suitable means may be provided for packing the piston 13, as, for example, a leather disk 23 having an annular portion 24 which is held in contact with the walls of the cylinder by means of a sheet metal expander 25, said expander being slotted to form a plurality of fingers 26. The leather disk 23 and the body of the expander 25 lie between the disks 14 and 15. I have herein shown a duplicate set of similar packing members at the opposite side of the disk 15, but it is obvious that only one of said sets of packing members need be employed. Leakage between the sleeve 11 and the piston rod 12 is prevented by any suitable means, such as a leather packing ring 27 having an annular flange 28, said flange being held in contact with the piston rod by means of spring fingers 29 formed upon a ring 30. The parts 27 and 30 are secured to the face 3 by means of screws 31 extending through said parts and through a ring 32.

The fixed jaw 33, in this instance, is cast integral with the supporting member 1. Upon the outer end of the piston rod 12 is fixed, in any suitable manner, the movable jaw 34. Said jaw is prevented from turning by means of a member 35, preferably in the form of a flat bar, said member being secured in a portion 36 fixed to or formed integral with the jaw 34. Said member is slidably mounted in the space between the attaching lugs 2, being guided in its movement by the walls of said space. The member 35 is spaced above the bench *a* so as to clear the same in its movements. Being located at a considerable distance from the

axis of the piston rod 12, the bar 35 serves efficiently to withstand the stresses tending to turn the movable jaw 34.

The means for admitting pressure fluid to the cylinder 5 for moving the jaw 34 will next be described. In any suitable location, as, for example, upon one side of the member 1 is supported a pressure chest 37, said chest comprising a portion 38 fixed to said member and a cap 39 attached to said fixed portion. Upon the upper side of the fixed portion 38 is formed a valve face 40. A port 41 in said valve face is connected with the space in the cylinder 5 to the rear of the piston 13 by means of the pipe 42. 43 is a port formed in said valve face and communicating with the space in the cylinder 5 in front of the piston 13 through the passage 44. A port 45 in said valve face is connected with the passage 44 by means of the passage 46. 47 is an exhaust port communicating with the atmosphere through the passage 48. A valve member 49 is slidably mounted upon said valve face between guide ribs 50 and is provided in its under side with a groove 51 adapted to connect the ports 41 and 45, and a groove 52 adapted to connect the ports 41 and 47. It also has a port 53 extending therethrough adapted to register with the port 43 when the valve member 49 has been moved into the position in which the groove 51 connects the ports 41 and 45.

54 is a pipe for conducting the pressure fluid to the pressure chest 37.

Any suitable means may be employed for moving the valve member 49. I have herein shown a vertical shaft 55 rotatably mounted in the upper wall of the cap 39. Upon the lower end of said shaft is fixed a face plate 56 carrying a crank pin 57 which lies in a transverse groove 58 formed in the valve member. To the upper end of the shaft 55 is fixed a lever 59 by means of which it may be moved through any suitable connections.

If desired the jaws 33 and 34 may be provided with pipe-holding jaws 60 of any common or preferred form.

When the vise is closed the slide valve 49 is in the position shown in Fig. 9, the space in the rear of the piston 13 communicating with the atmosphere through the pipe 42, port 41, cavity 52, port 47, and passage 48. The space in the cylinder 5 in front of the piston 13 is in communication with the source of pressure fluid through port 43 and passage 44. Positive pressure is now continually being exerted to hold the vise closed. When the vise is to be opened the slide valve 49 is moved into the position shown in Fig. 7, wherein the port 41 is connected with the port 45 through the groove 51 and the port 53 registers with the port 43. The pressure fluid theretofore used for closing the vise now passes from the space in front of the piston 13 through the passages 44 and 46, port 45, groove 51, port 41, and pipe 42 to the rear of the piston. The area of the rear side of the piston 13 being greater than the effective area of the forward side of said piston, the equalizing of the pressure in both ends of the cylinder causes said piston to be moved to the left (Fig. 1), thus opening the vise. At the same time high-pressure fluid is admitted to the cylinder through the ports 53 and 43.

If it be desired to stop the travel of the jaw 34 at a point between the extremities of its movement, the slide valve 49 may be placed in an intermediate position, as indicated in Fig. 8, in which all of the ports leading to the cylinder 5 are blanked.

The sleeve 11 serves to protect the piston rod 12 from injury by tools or pieces of work falling thereon from between the vise jaws.

While I have described in some detail a specific embodiment of my invention which I deem to be new and advantageous in the details of construction, I do not desire to be understood as limiting myself in respect to the broader features of my invention to the specific construction shown and described.

I claim as my invention:

1. In a vise, in combination, a stationary jaw; a movable jaw; a cylinder; a piston for moving said movable jaw; a source of fluid supply; and a valve mechanism in communication with the source of fluid supply and in ported connection with the cylinder on both sides of the piston, said mechanism having means to permit fluid from the source of supply to enter the cylinder to act against the forward side of the piston and to then pass from the forward side to the rear side of said piston.

2. In a vise, in combination, a stationary jaw; a movable jaw; a cylinder and piston for moving said movable jaw, the areas of the opposite sides of said piston being different; and a valve mechanism adapted to place the spaces at opposite sides of said piston in communication, for opening the vise through a secondary expansion of the pressure fluid used in closing the vise, to place the space in front of said piston in communication with a source of pressure fluid supply, and to place the space in the rear of the piston in communication with the atmosphere for closing the vise.

3. In a vise, in combination, a supporting member; a cylinder formed separate from and abutting at one end upon said supporting member and closed at said end by such abutting contact; a head for closing the other end of said cylinder; bolts joining said head and said supporting member for attaching said cylinder to said supporting member; a stationary jaw fixed to said supporting member; a piston in said cylinder; a

piston rod fixed to said piston; and a jaw fixed to said piston rod.

4. In a vise, in combination, a supporting member having a circular face surrounded by an annular flange; a cylinder formed separate from and abutting at one end upon said circular face within said flange and closed at said end by said abutting contact; a head for closing the other end of said cylinder; bolts joining said head and said supporting member; a piston in said cylinder; a piston rod fixed to said piston; a jaw fixed to said piston rod; and a jaw fixed to said supporting member.

5. In a vise, in combination, a supporting member; a cylinder fixed to said supporting member, said supporting member having an opening therein concentric with said cylinder; a sleeve lying in said opening; a piston in said cylinder; a piston rod fixed to said piston and extending through said sleeve; a jaw fixed to said supporting member; and a jaw fixed to said piston rod said sleeve extending into the space beneath said jaws.

6. In a vise, in combination, a cylinder; a piston in said cylinder; a tubular piston rod; a plug secured in one end of said piston rod, said piston comprising a disk having a portion filling the other end of said piston rod, said piston also comprising another disk; and means uniting said disks and said plug.

7. In a vise, in combination, a cylinder; a piston in said cylinder; a tubular piston rod; a plug secured in one end of said piston rod, said piston comprising a disk having a portion filling the other end of said piston rod, said piston also comprising another disk; a tie rod secured at one end to said plug; and means for securing said disks to the other end of said tie rod.

8. In a vise, in combination, a cylinder; a piston in said cylinder; a tubular piston rod; a plug secured in one end of said piston rod, said piston comprising a disk having a portion filling the other end of said piston rod, said piston also comprising another disk; a tie rod one end of which is screw-threaded into said plug; and a nut screw-threaded upon the other end of said tie rod and confining said disks to the end of said piston rod.

9. In a vise, in combination, a supporting member having means at its lower end for attaching it to a bench; a cylinder fixed to the rear side of said support; a piston in said cylinder; a piston rod fixed to said piston; a jaw fixed to the upper end of said supporting member; a jaw fixed to and carried solely by said piston rod; and a guide member fixed to the lower end of said movable jaw for preventing said jaw from turning, said member extending through an opening in said supporting member into the space below said cylinder.

10. In a fluid-pressure-actuated vise, in combination, a casting forming an upright supporting member having attaching lugs at its lower end, and a vise jaw at its upper end, all of said parts being integral; a cylinder secured to the rear face of said supporting member, said face forming one end wall for said cylinder; a piston in said cylinder; and a jaw moved by said piston.

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