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HYDRAULIC VISE

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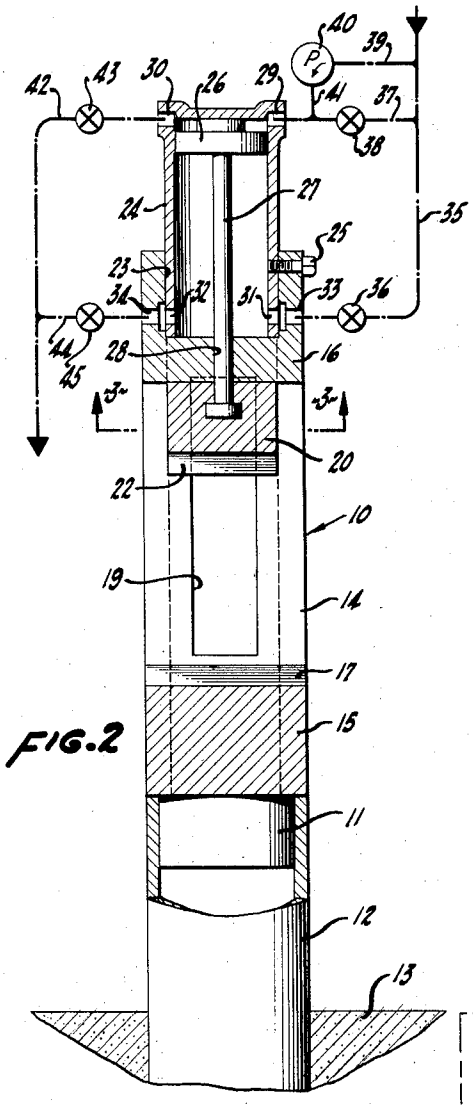

FIG. 2

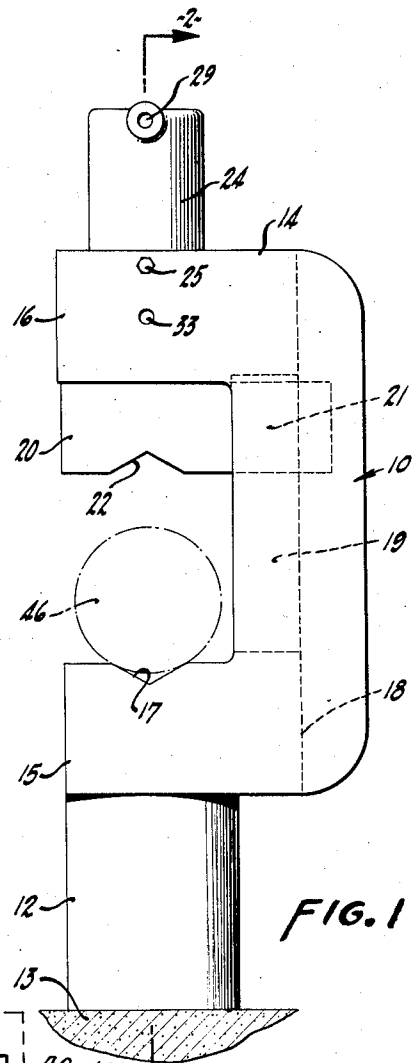

FIG. 1

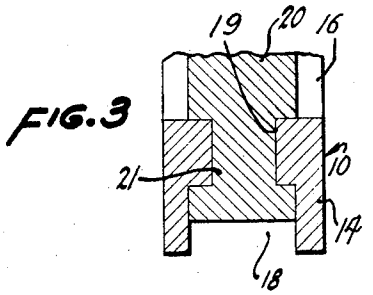

FIG. 3

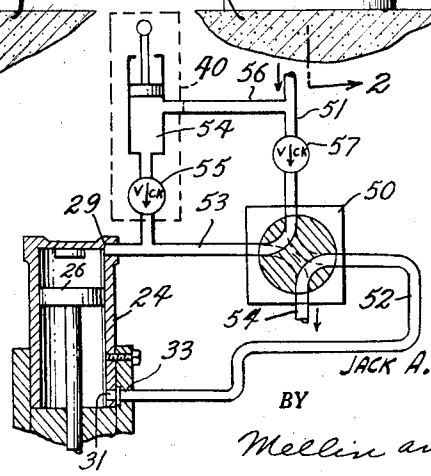

FIG. 4

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HYDRAULIC VISE

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1 Claim. (Cl. 81—17.2)

This invention relates to a vise and more particularly to a hydraulic 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 vise which may be closed or opened by the application of city-water pressure to one end or the other of a hydraulic cylinder, and wherein a hand pump is provided to apply pressures higher than the city-water pressure when needed.

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 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, thus providing a stationary inwardly facing jaw. The rear face of the base portion of the C-shaped member **14** is provided with a longitudinally extending groove **18**. A longitudinal slot **19**, narrower than the groove **18**, connects the groove **18** with the inner opening between the legs **15** and **16**. A sliding jaw **20**, having a dovetail extension **21**, is slidably mounted in the slot **19** in the manner best seen in Fig. 3. As can be seen in Figs. 1 and 2, the sliding jaw **20** is provided with a V-shaped notch **22** in opposed relation with the notch **17** previously described.

A blind bore **23** extends inwardly from the outer surface of the upper leg **16**, and a hydraulic cylinder **24** is mounted therein by bolts **25**. A piston **26** is slidably mounted in the cylinder **24**. A piston rod **27** connected to the piston **26** extends through a bore **28** in the leg **16** and is connected to the sliding jaw **20**.

A pair of inlet and outlet ports **29** and **30**, respectively, are located adjacent the upper end of the cylinder **24**. Similarly, a pair of inlet and outlet ports **31** and **32**, respectively, are located adjacent the lower end of the cylinder **24**. The ports **31** and **32** are in register with two ports **33** and **34** formed in the leg **16**.

A fluid conduit **35** connects the port **33** with a source or water under pressure (not shown), for example, the city-water supply, and a valve **36** is incorporated in said

conduit. Similarly, a branch conduit **37**, having a valve **38** incorporated therein, connects the water supply with the port **29**. A branch conduit **39** connects the water supply to the inlet side of a hand pump **40**. Another conduit **41** connects the outlet of the pump **40** with the conduit **37** between the valve **38** and the port **29**. A conduit **42** connects the port **30** with a discharge drain (not shown). A valve **43** is incorporated in the conduit **42**. Another conduit **44**, having a valve **45** 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 **46**, the valves **38** and **45** are opened while the valves **36** and **43** remain closed. The fluid enters the cylinder above the piston **26** and forces the sliding jaw **20** downwardly into contact with the object **46**. The fluid below the piston **26** escapes through the conduit **44** and the valve **45**. If it is desired to tightly grip the object, the valve **38** is closed and the hand pump **40** is operated to apply additional pressure above the piston **26**. When it is desired to open the vise **10**, the valves **38** and **45** are closed and the valves **36** and **43** are opened, thus applying pressure below the piston **26** through the conduit **35** and permitting the fluid thereabove to escape through the conduit **42**.

While the various valves 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. Thus, in the embodiment shown in Fig. 4, the cylinder **24** need have only two ports, and a four-way valve **50** combines the functions of valves **36**, **38**, **43** and **54**. A conduit **51** connects a first port of valve **50** with a source of fluid under pressure, such as a city water supply. A conduit **52** connects a second port of the valve **50** with the port **33** at the lower end of cylinder **24**. The port **29** at the upper end of cylinder **24** is connected by a conduit **53** with a third port in the valve **50**. A drain pipe **54** makes connection with the fourth port of valve **50**. The pump **40** is connected between the conduits **51** and **53** and includes a cylinder-and-piston assembly **54** and a check valve **55** therebelow to maintain a boosted pressure on the upper surface of piston **26**. A conduit **56** provides a fluid passage between the cylinder of pump **40** and the fluid under pressure in conduit **51**. A check valve **57** in conduit **51** which closes to block a reverse flow toward the fluid supply conveniently substitutes for actuating the valve **38** in the schematic arrangement of Fig. 2 when it is desired to use pump **40**.

In an operation of the embodiment of Fig. 4, the valve **50** is operated to interconnect the conduit **51** with the conduit **53**, and the conduit **52** with the drain pipe **54** when it is desired to lower the movable jaw **20** into engagement with an object **46**. The fluid under pressure enters the cylinder through the port **29** and forces the piston **26** downwardly, the fluid therebelow escaping through the conduit **52**. If it is desired to more tightly grip the object, the piston of pump **40** is actuated, the check valve **55** serving to transmit the higher pressure created by pump **40** and the check valve **57** serving to retain this pressure for application to the piston **26**.

To raise the movable jaw **20**, the four-way valve **50** is rotated to interconnect the conduit **51** with the conduit **52**, and the conduit **53** with the drain pipe **54**. Fluid pressure is transmitted by the check valve **57** in conduit **51** and operates to raise the piston **26**. Fluid thereabove in cylinder **24** passes out through the conduit **53** and pipe **54**.

From the foregoing description, it may be seen that the invention provides a simple efficient vise adapted in normal use to be opened and closed by city-water pres-

sure, and wherein additional pressure may be applied by use of a simple hand pump incorporated therewith.

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 member 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 member in an upright position, means defining a shouldered opening in said base portion including a groove in the outward face of said base portion extending longitudinally thereof and a slot in the forward 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 mounted on 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-supply system 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, second conduit 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, and a hand pump in said first conduit means connected between the inlet for said water supply and the end of said cylinder remote from said movable jaw for increasing the pressure of the water in said end of said cylinder remote from said movable jaw.

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