No. 898,413. PATENTED SEPT. 8, 1908.

W. A. MERRALLS.

VISE.

APPLICATION FILED OCT. 3, 1907.

2 SHEETS—SHEET 1.

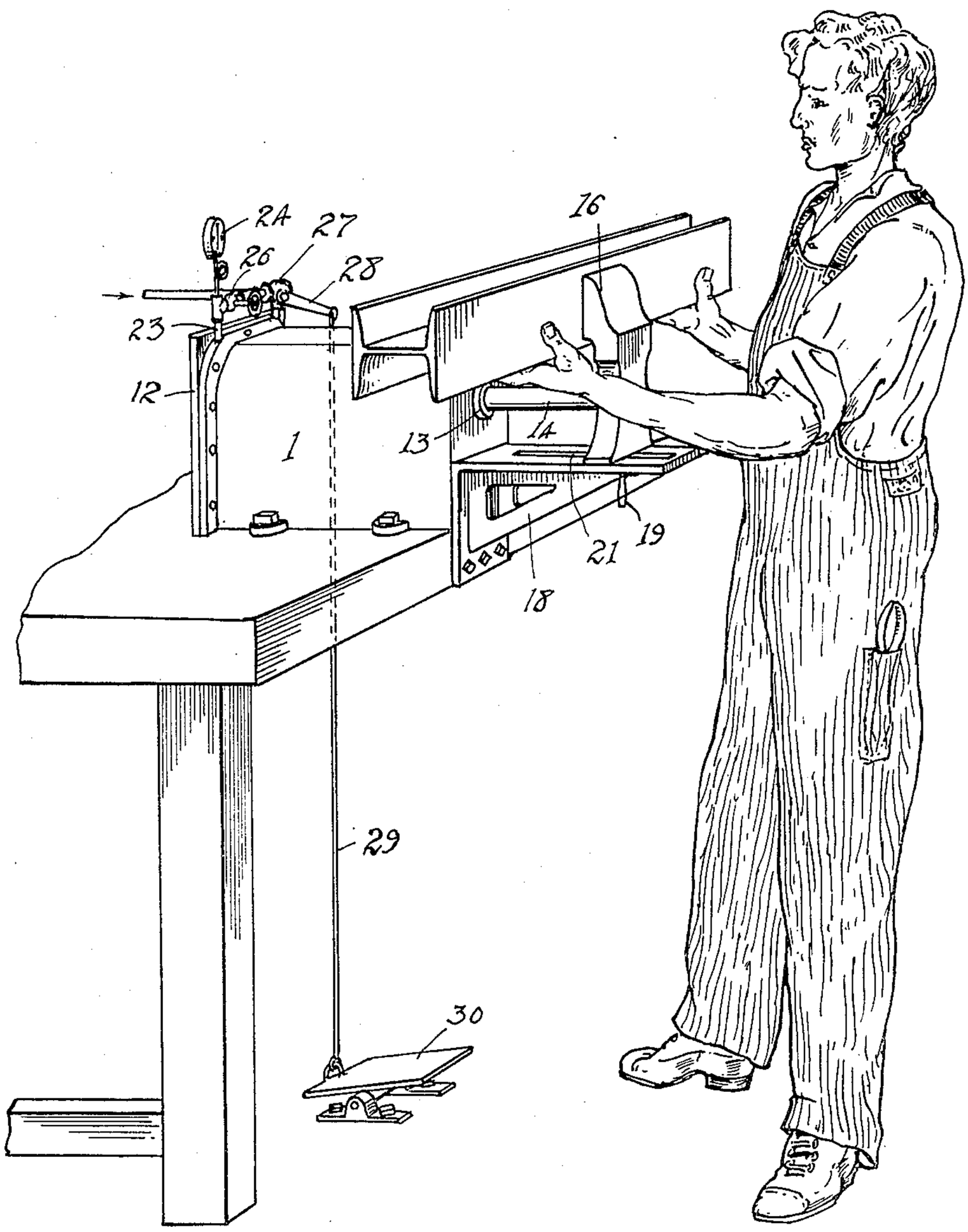

Fig. 1

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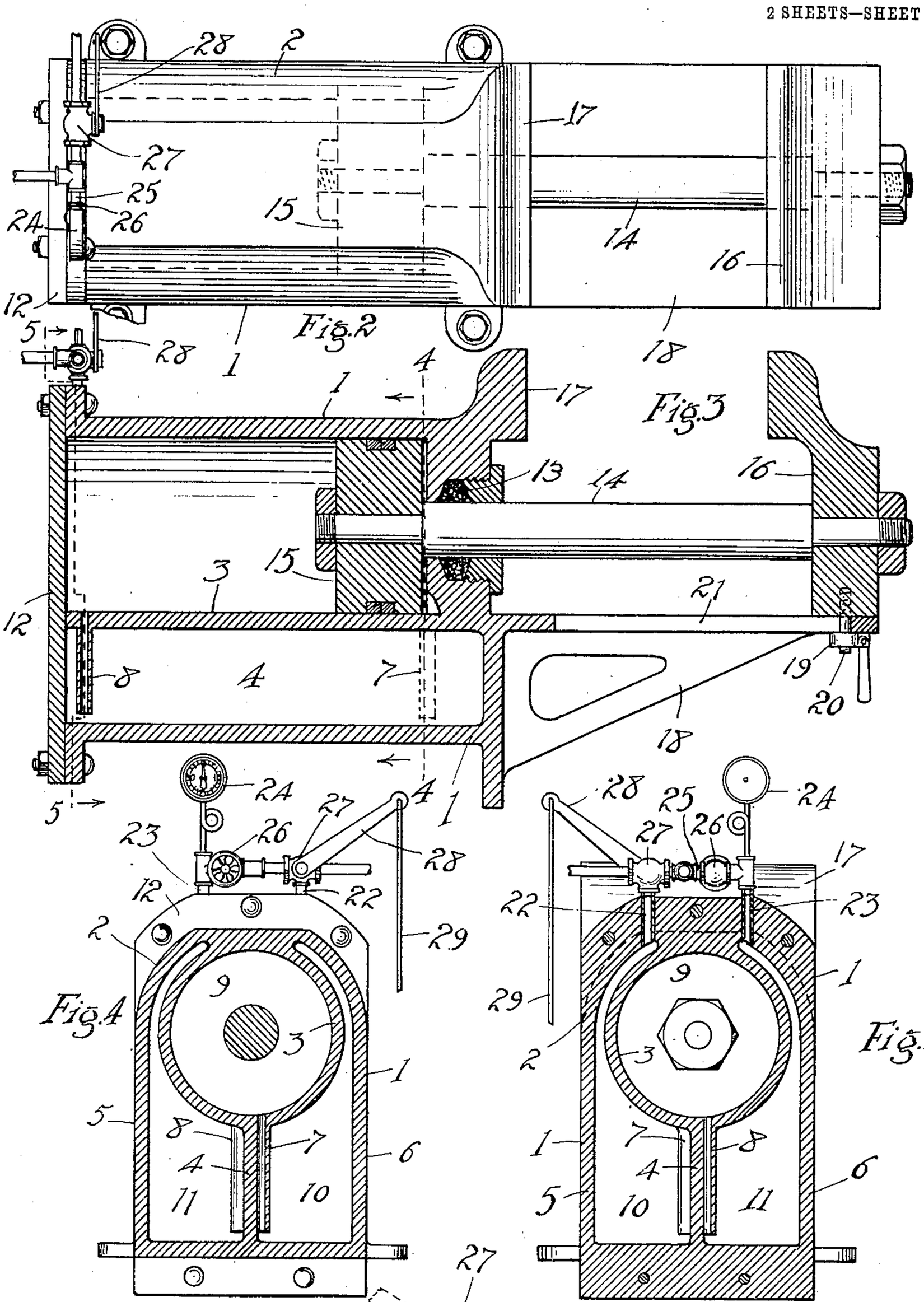

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

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UNITED STATES PATENT OFFICE.

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VISE.

No. 898,413. Specification of Letters Patent. Patented Sept. 8, 1908.

Application filed October 3, 1907. Serial No. 395,719.

To all whom it may concern:

Be it known that I, WILLIAM A. MERRALLS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Vises, of which the following is a specification.

This invention relates to workshop vises, for benches, lathes, or the like, the object of the invention being to provide an appliance of this character, which shall always be open and ready for use, and which shall be more convenient and rapid in operation and durable in use than vises heretofore employed.

In using a workshop vise of the character at present generally constructed, the workman first screws open the vise to a sufficient distance to insert the piece of metal to be operated upon, he then inserts the metal piece and then, while holding it in place, he screws up again the vise to clamp the piece therein. If said piece is too heavy to hold with one hand, the operator has to screw up the vise with his knee, or to obtain the assistance of another person to screw it up while he is holding it. And even when the piece can be held in one hand, it is a troublesome matter to hold it in its proper position while clamping with the other. Again, considerable time is thus wasted in unscrewing and screwing up again the vise. Also, in time the vise gives trouble on account of the screw wearing loose.

The object of the present invention is to provide a vise free from the above objections.

In the accompanying drawing, Figure 1 is a perspective view showing the vise in operation; Fig. 2 is a plan view; Fig. 3 is a longitudinal section; Fig. 4 is a cross section on the line 4—4 of Fig. 3; Fig. 5 is a cross section on the line 5—5 of Fig. 3; Fig. 6 is an enlarged sectional view of the three way valve.

Referring to the drawing, 1 indicates the main casting or body of the vise, comprising an outer wall 2 which may be of any suitable contour, an inner wall 3, the inner surface of which is accurately cylindrical, a central vertical partition 4 connecting the bottom of the inner wall with the bottom of the outer wall, and walls 6 and 5 forming, with the vertical wall 4, two conduits 7, 8, leading to opposite ends of the cylinder. The inner and outer walls 2, 3, and the partition 4 thus form three chambers, a cylindrical chamber 9, a high pressure chamber 10 on one side of the vertical partition 4, and a low pressure chamber 11 on the other side thereof. All of these chambers are closed at the rear by a cover plate or head 12 suitably secured to the main body of the vise. The chamber 10 is connected with the cylindrical chamber 9 at one end of said cylinder by the conduit 7 and the chamber 11 is connected with the other end of the cylinder by the conduit 8, both of said conduits opening into their respective chambers 10, 11, near the bottom thereof. Through a stuffing box 13 at the outer end of the cylinder slides the rod 14 of a piston 15, and the outer end of said rod is attached to a slidable jaw 16, which and a fixed jaw 17 constitute the jaws of the vise. The movable jaw 16 slides upon a bracket or outward extension 18 from the body of the apparatus, and can be clamped at any desired position by means of a drop handle nut 19 upon a screw 20 secured to the movable jaw and sliding in a slot 21 in said bracket.

The chamber 10, which communicates with the end of the cylinder nearest to the jaws of the vise, is connected with a source of supply of high pressure fluid, this connection being made by means of a pipe 22, and similarly the other chamber 11, which is connected to the rear or farthest end of the cylinder, is connected by means of a pipe 23, having a pressure gage 24 therein, with a pipe 25 leading to the pipe 22, and controlled by means of a valve 26. A three way valve 27 controls the pipe 22 and connects the chamber 10 either with the pressure fluid or with exhaust, as desired. The valve 27 is operated by means of a lever 28 and a rod 29, connected with a balanced foot lever 30, so that by pressure upon one or the other end of said lever 30 the valve can be turned to one of the two positions, opening the chamber 10 to pressure or exhaust, as desired. Oil is placed in each of the chambers 10, 11, of sufficient quantity that, when the piston is at its farthest distance from the conduit leading to either pressure chamber, so that the whole of the intervening portion of the cylinder is filled with oil, there is still sufficient oil at the bottom of said chamber to cover the bottom of said conduit, so that air or other pressure fluid cannot escape into the cylinder from said conduit. In the high pressure chamber 10, the pressure is such that by means of the piston sufficient pressure will be given to the movable jaw towards the fixed jaw to properly hold an object in the device, while the

pressure in the chamber 11 is only sufficient to extend the movable jaw outwards again when the pressure in the high pressure chamber has been withdrawn.

The mode of operation of the device is therefore as follows:—In its normal position, the movable jaw is extended outwards as far as possible, there being at that time no pressure in the high pressure chamber and the pressure in the low pressure chamber being sufficient as indicated by the gage to move the movable jaw outwards by the back pressure on the piston. When an operator wishes to clamp an object between said jaws, by means of the foot lever 30 he turns the valve 27 to connect the high pressure chamber 10 with the pipe 22. Through the oil in the high pressure chamber force is thereby imparted to the face of the piston next to the movable jaw to move said piston inwards, clamping the object in the vise. The oil rises from the chamber 10 by the conduit 7 to the cylinder and fills the outer end of the cylinder at the same time that the oil flows out from the other end of said cylinder through the conduit 8 into the low pressure chamber 11. When the operator desires to release the object clamped he reverses the valve 27, which shuts off the high pressure fluid and opens the chamber 10 to exhaust, reducing the pressure therein to atmospheric pressure, whereupon the pressure in the low pressure chamber causes the piston to again move outwards. The gage 24 enables a constant low pressure to be maintained in the low pressure chamber, for if at any time said pressure should fall below a pre-determined magnitude, pressure fluid can be admitted thereinto by means of the valve 26 to raise the pressure in the low pressure chamber to said magnitude.

I claim:—

1. A vise comprising jaws, a cylinder, a piston for said cylinder, a piston rod connected therewith and also with one of the jaws, means for admitting pressure fluid into an end of the cylinder to move said latter jaw toward the other to clamp an object in the vise, or to the other end of the cylinder to move said jaw in the reverse direction to release said object, and a foot lever operatively connected to said means and arranged to be moved by a downward pressure into one position to admit said fluid into one end of the cylinder, and to be so moved into another position to admit it into the other end thereof, substantially as described.

2. A vise comprising jaws, a cylinder, a piston in said cylinder, a piston rod connected therewith, and also with one of said jaws, a three-way valve arranged in one position to permit pressure fluid into an end of said cylinder to move said jaw, and in another position to permit the escape of said fluid from said end, and a foot lever operatively connected with said valve, substantially as described.

3. A vise comprising jaws, a cylinder, a piston for said cylinder, a piston rod connected therewith and also with one of said jaws, a valve for admitting pressure fluid into an end of said cylinder to move said jaw, and a foot lever operatively connected to said valve, and arranged to be moved by a downward pressure of the foot thereon into a position to open said valve and admit said fluid into said end, and also to be moved by a downward pressure of the foot into another position to close said valve and permit said fluid to escape from said end, substantially as described.

4. A vise comprising jaws, a cylinder, a piston for said cylinder, a piston rod connected therewith and also with one of said jaws, a three-way valve for admitting pressure fluid into an end cylinder to move said jaw, and a foot lever operatively connected to said valve, and arranged to be moved by a downward pressure of the foot thereon into a position to open said valve and admit said fluid into said end, and also to be moved by a downward pressure of the foot into another position to close said valve and permit said fluid to escape from said end, substantially as described.

5. In a vise, the combination of jaws, a cylinder, a piston in said cylinder, a piston rod connected with said piston and also to one of said jaws, high and low pressure chambers, means for connecting the high pressure chamber with high pressure fluid, and conduits leading to opposite ends of the cylinder from the respective chambers, substantially as described.

6. In a vise, the combination of jaws, a cylinder, a piston in said cylinder, a piston rod connected with said piston and also to one of said jaws, high and low pressure chambers, means for connecting the high pressure chamber with high pressure fluid, conduits leading to opposite ends of the cylinder from the respective chambers, means for controlling said conduits, and a foot lever operatively connected with said controlling means, and arranged to be moved by a downward pressure into one position to open one of said conduits and close the other, and to be so moved into another position to close the first conduit and open the second, substantially as described.

7. In a vise, the combination of jaws, a cylinder, a piston therein, a piston rod connected to said piston and operatively connected to one of said jaws, a casing forming high and low pressure chambers, and conduits leading respectively from said chambers to the opposite ends of said cylinder, each conduit extending to the cylinder from the bottom of its chamber, substantially as described.

8. In a vise, the combination of jaws, a cylinder, a piston therein, a piston rod connected therewith and also with one of said jaws, means for admitting pressure fluid into said cylinder, and auxiliary means for adjustably holding said latter jaw at any point desired of its movement, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM A. MERRALLS.

Witnesses:
FRANCIS M. WRIGHT,
D. B. RICHARDS.