

March 18, 1947.

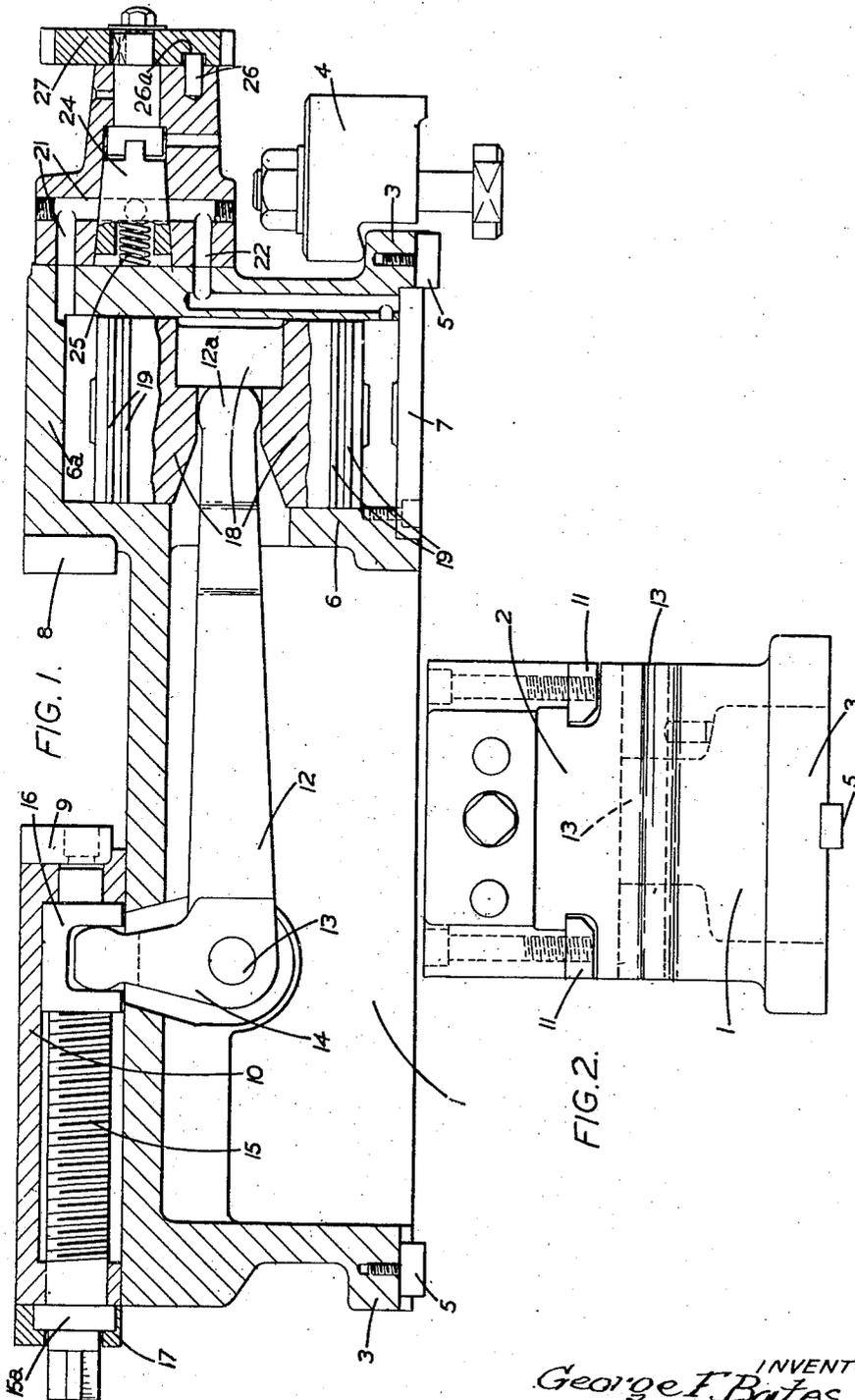
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2,417,625

FLUID PRESSURE OPERATED VISE

Filed Sept. 6, 1944

2 Sheets-Sheet 1



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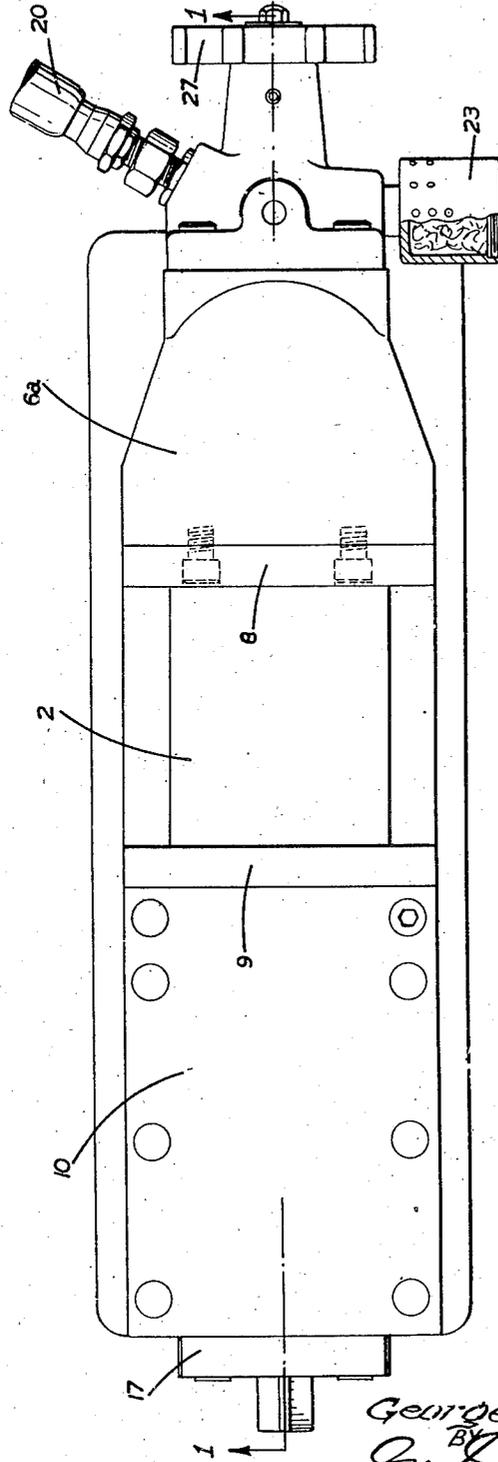
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FIG. 3.



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# UNITED STATES PATENT OFFICE

2,417,625

## FLUID PRESSURE OPERATED VISE

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Application September 6, 1944, Serial No. 552,926  
In Great Britain October 6, 1943

3 Claims. (Cl. 81—17)

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This invention is designed to provide a simple form of fluid pressure (preferably compressed air) operated vise more especially for machine tools. A vise may have to maintain its grip for fairly considerable periods of time. Leakage of the pressure fluid should be reduced to the slightest and the use of glands or packings requiring maintenance avoided.

In a vise according to the present invention a double ended piston is used in a cylinder which is permanently closed at that end to which pressure to close the vise is applied, power being transmitted from an intermediate portion of the piston and the pressure fluid being admitted to, or exhausted from, either end of the cylinder by simple cock control. In the preferred form a vertical cylinder and a fixed jaw of the vise are at one end of a bed with a slideway on which the movable jaw is slidable, the movement being applied by a bell crank lever pivoted under the slideway. The lever can engage a member relatively to which the movable jaw is adjustable, so that a small movement will serve to grip or release work of any size within the maximum jaw opening.

Other parts of the invention are embodied in a typical form illustrated by the accompanying drawings, the parts for which a monopoly is desired being those delimited by the claims.

In the drawings:

Fig. 1 is a longitudinal sectional elevation on the line 1—1 of Fig. 3.

Fig. 2 is an end elevation, and

Fig. 3 is a plan view.

A main casting comprises a hollow bed portion 1 on the upper part of which is a T-slideway 2. External flanges 3 are provided for clamping it (as by clamp 4) in desired position on the usual machine tool table, tenons 5 being attached. At one end there is formed a vertical cylinder 6, the upper end 6a of which is closed and the lower end of which is covered by an end plate 7 secured by screws. The fixed jaw 8 of the vise is secured to the side of the cylinder and the moving jaw 9 is secured to a block 10 slidably mounted on the main casting, attached strips 11 engaging the slideway 2. A bell crank lever is pivoted on a swivel pin 13 in the main casting and one arm 12 extends approximately horizontally into the cylinder while the other 14 is forked as conventionally illustrated by the dotted line in Figure 1 and extends approximately vertically, the forked ends passing on either side of an adjusting screw 15 in the sliding block 10 and engaging in exactly similar recesses on the two sides of the nut 16

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through which the screw operates. The adjusting screw is held in the sliding block by a thrust collar 15a integral with the screw and by a securing member 17 bolted to the block.

A double ended piston 18 each end of which is fitted with piston rings 19 operates in the cylinder. The centre of the piston is slotted to receive the rounded end 12a of the horizontal arm 12 of the bell-crank lever, the point of contact being approximately on the centre line of the piston.

A simple 90° two way cock bolted to the main casting admits compressed air to one or other end of the cylinder from the supply line 20 through drilled passages 21 or 22 and simultaneously opens the opposite end to atmosphere through a silencer 23 which also excludes swarf and dirt from the mechanism. The tapered plug 24 of the cock is kept tight by a spring 25 and its limiting positions are controlled in a conventional manner by a stop peg 26 engaging in an arcuate groove 26a in hand-wheel 27.

It will be appreciated that the sliding block can be set in any desired position to suit work of different sizes by means of the adjusting screw so that the work to be held can be easily put in or taken out and operation of the air cock to admit high pressure air to the upper end of the cylinder and to open the lower end of the cylinder to atmosphere causes the piston to move downwards and thus closes the jaws on the work by means of the bell crank lever. Similarly operation of the air cock to admit high pressure air to the lower end of the cylinder and exhaust the upper end opens the jaws and releases the work.

The flow of air to one or other end of the cylinder may be suitably restricted to modify the speed of movement of the jaws and a reducing valve provided to control the pressure exerted by the jaws on the object held.

It will be understood that, when the vise is holding the work, only the permanently closed end of the cylinder is subjected to air pressure and load of the piston, transmitted through the bell crank lever, nut and adjusting screw collar, is operating on the sliding block 10. The secure holding of the work is thus not dependent on packings, glands, bolts or the like.

I claim:

1. A fluid pressure operated vise having a movable jaw, a cylinder with one end permanently closed, a glandless cylinder head completely closing the other end of said cylinder, a double ended piston in said cylinder, valve means arranged to supply pressure fluid to either end of

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said cylinder at will and to simultaneously open the other end to exhaust, and power transmission mechanism passing through the cylindrical wall of said cylinder and engaged by an intermediate portion of said piston, and arranged to close said jaw when pressure fluid is admitted to the permanently closed end of said cylinder and to open the jaw when pressure fluid is admitted to the other end of said cylinder, the power transmission mechanism including a sliding member and means to adjust said movable jaw relatively to said member.

2. A fluid pressure operated vise having a movable jaw, a glandless cylinder with both ends closed, a double ended piston in the said cylinder, valve means arranged to supply pressure fluid to either end of the said cylinder at will and to open the other end to exhaust, and power transmission mechanism engaged by an intermediate portion of said piston and arranged to close said jaw when pressure fluid is admitted to one of said closed ends of said cylinder and to open the jaw when pressure fluid is admitted to the other closed end of said cylinder, the movable jaw of the vise being slidable upon a hollow bed and the power transmission mechanism including a bell crank lever pivoted on a substantially horizontal axis within said bed and passing through the cylindrical wall of said cylinder into engagement with an intermediate portion of said piston, the power transmission mechanism including a sliding member and means to adjust said movable jaw relatively to said member.

3. A fluid pressure operated vise having a sub-

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stantially vertical cylinder with its upper end permanently closed, a glandless cylinder head closing the other end of said cylinder and a fixed jaw at one end of a bed with a slideway on which a movable jaw is slidable, a double-ended piston in the cylinder and a bell crank lever under the slideway having a longer more or less horizontal arm passing through the vertical wall of said cylinder and engaging an intermediate part of the piston near its center line and a shorter more or less vertical arm engaging a member relatively to which the movable jaw is adjustable.

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