March 23, 1965 A. W. SCHMIDT 3,174,745

FLUID PRESSURE OPERATED VISE OR CLAMP

Filed Nov. 20, 1962

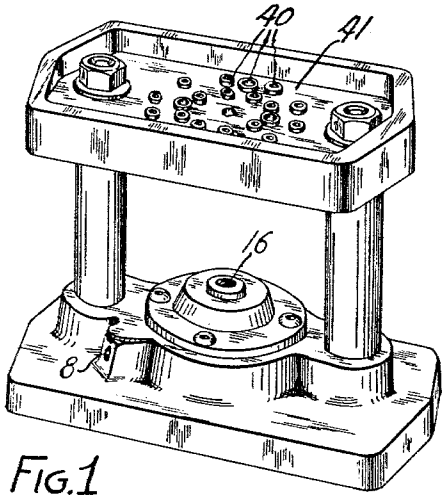


FIG. 1

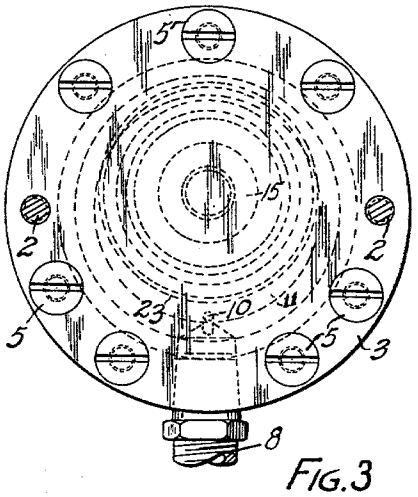


FIG. 3

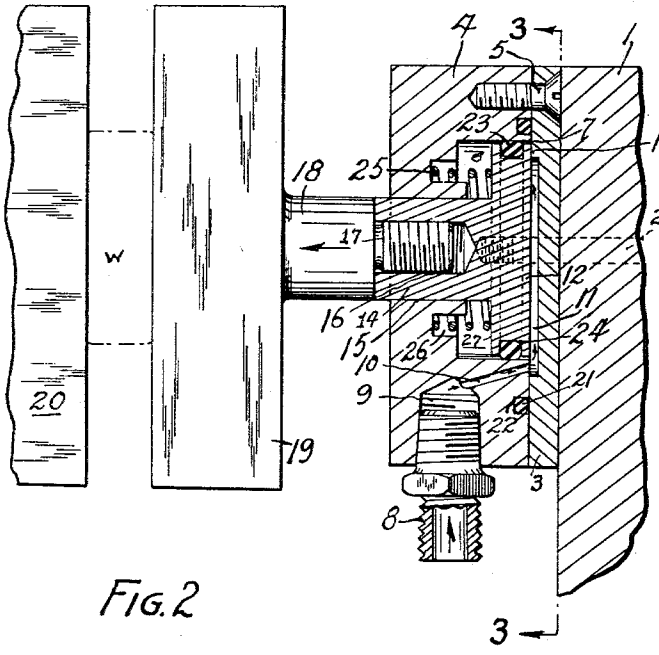


FIG. 2

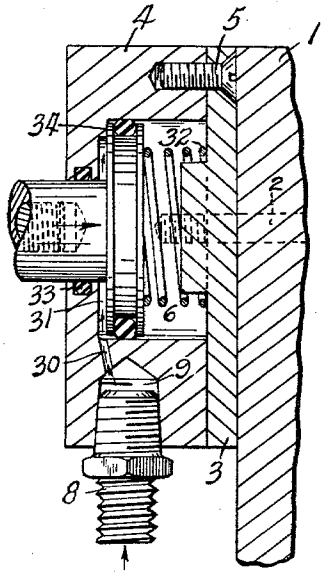


FIG. 4

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United States Patent Office 3,174,745 Patented Mar. 23, 1965



3,174,745

# FLUID PRESSURE OPERATED VISE OR CLAMP

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Filed Nov. 20, 1962, Ser. No. 238,998
2 Claims. (Cl. 269—25)

This invention relates to fluid pressure operated clamps or vises and more particularly relates to such devices which are adaptable for use in connection with drilling jigs and for holding a workpiece in position for the performance of an operation thereon.

It is an object of this invention to provide a fluid operated clamping means which is compact, simple in construction and which may be manufactured at extremely low cost as compared with other types of fluid operated clamps or vises with which I am familiar.

Another object of the invention is the easy adaptability of the device to various uses.

Still another object of the invention is a fluid pressure operated clamping means which can be adapted to exert a pushing effort through the piston and against a workpiece or may be adapted to exert a pulling effort through the piston having connection with the workpiece on which said effort is to be exerted.

A still further object of the invention is to provide simple means of the character disclosed which is quickly responsive to intermittent fluid pressure impulses to apply intermittent clamping pressures upon a moving workpiece passing between relatively movable clamping blocks.

Further objects and advantages of the invention will be more apparent from the following description and illustrations in the drawing in which like reference characters are employed to designate like parts throughout the same.

In the drawings:

FIGURE 1 is a perspective view of a drilling jig showing the present invention applied in use;

FIGURE 2 is a view partly in section through the fluid pressure unit and illustrates and arrangement whereby, upon application of fluid pressure to the cylinder, a pushing effort will be exerted against the workpiece disposed between two clamping blocks;

FIGURE 3 is a bottom plan view taken on line 3—3 of FIGURE 2; and

FIGURE 4 illustrates a device embodying my invention which is adapted to exert a pulling force upon a workpiece having connection with the piston of the unit.

In carrying out an embodiment of my invention as illustrated in the drawings, the same may be described as follows:

In FIGURES 2 and 3, I have illustrated a form of the invention for exerting a pushing force against a workpiece disposed between two clamping blocks and, more specifically, the unit may be mounted upon a mounting block 1 by means of mounting screws 2 carried by the block and passing through aligned openings in the cover plate 3 and the body 4. Cover plate 3 is separately secured to the base of the body 4 by means of a plurality of screws 5 located along the marginal portion of the cover plate and body.

The body 4 is hollowed out to provide a fluid pressure cylinder 6 opening at its base and against the cover plate 3 as at 7. A fluid pressure inlet fitting having provision for connection with a source of fluid pressure is indicated generally at 8 and is threaded into an opening radially disposed within the body 4 as at 9. A passageway 10 communicates with the inner open end of the opening 9 and with a relieved portion of the cover plate 3, as indicated at 11. This relieved portion of the cover plate is eccentric to the axis of the piston and underlies the same when the piston is in the position shown in FIGURE 2.



The relieved portion 11, being eccentric to the axis of the piston, extends diametrically in opposite directions, as shown in FIGURE 2, so that at one end it communicates with the passageway 10 while at its opposite diametrical side it terminates short of the actual diameter of the piston 12 to provide a supporting ledge 13 which acts as an arcuate stop to limit the movement of the piston as it moves in a direction toward the cover plate.

The piston 12 is provided with an integral stem 14 which is axially movable in an opening 15 in the body 4 and which is provided with an axial internally threaded opening 16 to receive the threaded shank 17 carried by the boss 18 of the clamping block 19. Preferably a fixed clamping block 20 complementary to the clamping block 19 is provided, and between these blocks a workpiece W is adapted to be clamped, as illustrated in FIGURE 2.

A packing ring 21, such as an O-ring, is carried within an annular groove 22 formed in the body 4 and opening against the cover plate 3.

The piston 12 is provided with an O-ring or other form of packing member 23 carried in an annular groove 24 provided around the periphery of the head of the piston and has sliding sealing engagement with the inner wall of the cylinder 6.

The piston is spring loaded by means of a coil spring 25, the upper end of which is received within an annular spring retaining opening 26, its lower end exerting compression forces of the spring against the inner face of the piston head, as at 27.

When fluid under pressure is admitted through the fitting 8 and the passageway 10 into the relieved portion of the cover plate, as at 11, it will cause the piston to move to the left against the compression of spring 25 and will thus advance the clamping block 19 against the workpiece W in a direction as indicated by the arrow applied to the boss 18. As long as this fluid pressure is maintained, the workpiece will be rigidly clamped between the blocks 19 and 20. Upon release of the fluid pressure, the spring loaded piston will return to the position shown in FIGURE 2, thus releasing clamping pressure upon the workpiece W.

In FIGURE 4, to illustrate the adaptability of my invention, I have illustrated the manner of applying a pulling force through the application of fluid pressure through the fitting 8 and a passageway 30 to the left hand end of the cylinder 6, as indicated at 31. In this adaptation, the piston 12 is moved from its position as shown in FIGURE 4 toward the right and against the compression of the spring 32. A packing ring, such as an O-ring, is provided at 33 around the piston stem. In this adaptation of the invention, the body 4 is provided with an arcuate wall 34 which overlies the left hand face of the piston for a portion of its periphery and thereby serves as a stop for limiting the movement of the piston to the left under the compression of the spring 32.

In this adaptation of the invention, it will be noted that the forces exerted by the application of fluid pressure into the cylinder 6 will be in a direction to the right, as indicated by the arrow on the piston stem, thus exerting a pulling force upon a workpiece which may be connected with the piston stem.

When fluid pressure is applied to this adaptation of the unit, the piston will move to the right against compression of the spring 32 and when fluid pressure is released, the compression of the spring will urge the spring to the left, as indicated in FIGURE 4.

In FIGURE 1, I have illustrated my invention as embodied in a drilling jig in which the invention is incorporated in the base of the jig and when a clamping block, such as 19, and its threaded stud 17 are threaded in the opening 16, a workpiece may be supported on the block 19 and urged upwardly in the direction of

drills operating through the openings **40** in the drill template **41**. Thus, by the application of fluid pressure into the unit, as provided for in the illustration shown in FIGURE 2, the workpiece will be brought into engagement with drills operating through the template.

Various changes may be made in the details of construction and arrangement of parts of the invention without departing from the spirit thereof or the scope of the appended claims.

I claim:

1. A fluid pressure operated clamp device comprising a body, a fluid pressure cylinder formed in the body and opening through one face of the body, a fluid pressure inlet communicating with the cylinder, an opening through an opposite face of the body communicating with the cylinder, a piston operable in the cylinder, an end plate secured to the body and overlying the open end of the cylinder, a piston rod extending through the opening in the opposite face of the body, a coiled spring concentric with the axis of the piston rod and within the cylinder to normally exert a force of compression on said piston, a clamping block carried by the piston rod, a boss projecting into one end of said cylinder and telescopically receiving one end of said coiled spring, and a relieved area eccentric to and communicating with said cylinder and with said fluid pressure inlet, a portion of a wall of said relieved area extending into the path of movement of the piston to limit its movement in the cylinder in one direction.



2. A fluid pressure operated clamp device comprising a body, a fluid pressure cylinder formed in the body and opening through one face of the body, a fluid pressure inlet communicating with the cylinder, an opening through an opposite face of the body communicating with the cylinder, a piston operable in the cylinder, an end plate secured to the body and overlying the open end of the cylinder, said end plate being relieved about an axis eccentric to that of the piston and in direct communcation with the open end of the cylinder and with the fluid pressure inlet, a portion of a wall defining the depth of the relieved area underlying the open end of the cylinder, a piston rod extending through the opening in the opposite face of the body, a coiled spring concentric with the axis of the piston rod and within the cylinder to normally exert a force of compression on said piston, a clamping block carried by the piston rod, and a boss projecting into one end of said cylinder and telescopically receiving one end of said coiled spring.

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ROBERT C. RIORDON, *Primary Examiner.*