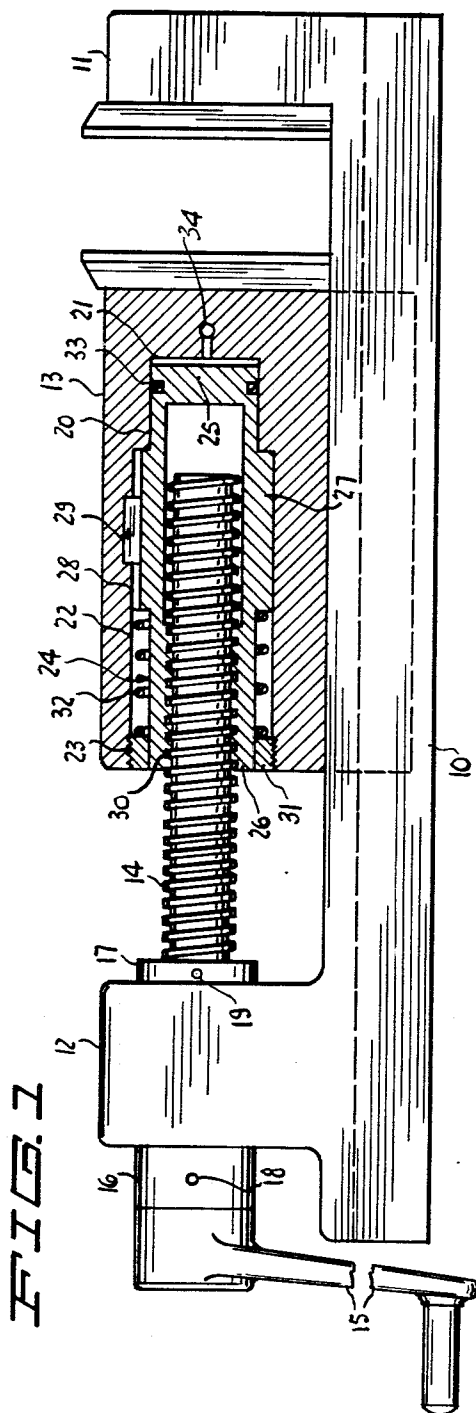
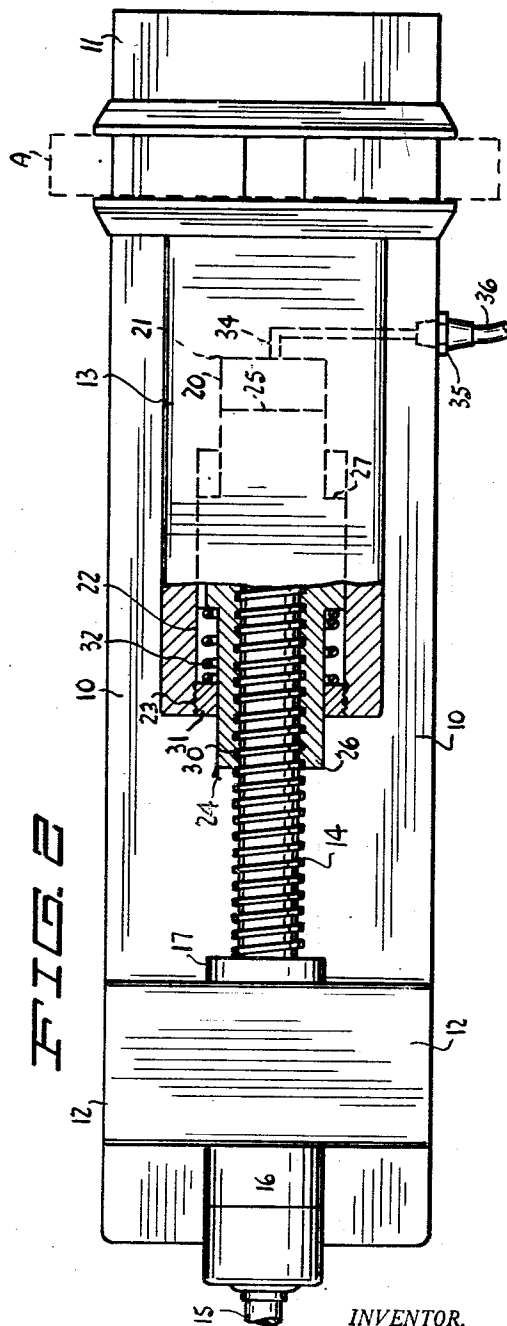


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HYDRAULIC MACHINE VISE HAVING A SCREW-ADJUSTED
PISTON HOUSED IN A SLIDABLE JAW
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HYDRAULIC MACHINE VISE HAVING A SCREW-ADJUSTED PISTON HOUSED IN A SLIDABLE JAW

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3 Claims. (Cl. 81—17.2)

My invention relates to improvements in combination manual and fluid-actuated vises and this application is a division from my prior application Serial No. 368,928, filed July 20, 1953, for Hydraulic Vise, and now Patent No. 2,693,727, issued November 9, 1954.

In my prior application, in addition to a disclosure of the type of vise herein described and claimed, there is also shown and claimed a bench type of vise which is commonly secured to a work bench and used for holding various types of work while it is filed or otherwise operated upon. In order to speed up and make much easier the operation of such vises, it is desirable to provide for a rough manual adjustment of the spacing between the jaws and then to utilize a quick acting, fluid-operated means for finally closing the jaws upon the work, this being particularly the case where a large number of workpieces of the same dimensions are to be handled in succession in accordance with modern production methods. My present invention has as its primary object to provide a combination manual and fluid-operated vise of the type commonly known as a machine vise, for the reason that it is used for holding work upon a drill press, milling machine or other machine. In this type of vise dimensions are frequently important since there is sometimes a lack of clearance between the bed or table of the machine and the tool, and it is a further object of my invention to provide means for fluid-actuating the vise which does not increase its size while still providing for jaw pressures sufficient to hold the work under all circumstances. Still another object of my invention is to provide fluid-actuating means for a vise of this character which is readily adapted to machine vises as they are presently constructed, making the invention not only applicable to the initial fabrication of new vises with a minimum of added expense but also rendering the invention capable of being added to existing vises with a minimum of alteration thereof.

These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawings, in which—

Fig. 1 is a side elevation showing a machine vise fitted with fluid-actuating means according to my invention, the movable jaw in this case being shown in section and as roughly adjusted by means of the usual hand screw to a position which will permit a workpiece to be placed between the jaws.

Fig. 2 is a top plan view partially in section and showing the movable jaw urged into engagement with the workpiece by the fluid-actuating means.

Referring now more particularly and by reference characters to the drawing, the machine vise chosen for illustration conventionally comprises a base 10 upon one end portion of which is a stationary jaw 11 and adjacent the opposite end of which is a stationary, upstanding lug 12. In a completely conventional manner a movable jaw 13 is reciprocally mounted upon the base 10 between the stationary jaw 11 and the lug 12 for movement toward

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and away from the former for receiving and clamping the work. In the ordinary vise this movement of the jaw 13 is accomplished by means of a hand screw 14 extending through the lug 12 and provided with a handle 15 at what may be regarded as the forward end of the vise. The hand screw 14 is usually threaded into the jaw 13 and is held against axial displacement through the lug 12 by collars 16 and 17 pinned at 18 and 19 to the screw at the front and rear of the lug so that turning the handle 15 will slide the jaw 13 toward or away from the stationary jaw 11. This type of vise per se is, of course, well known and functions satisfactorily except that for production work where large numbers of similar workpieces must be handled, it is desirable that means be provided for more rapid closing of the jaws, which labor saving function I obtain by provision of the fluid-actuating mechanism next to be described. It will be noted, however, that the application of the fluid-actuating mechanism does not in any way interfere with the normal screw actuation of the vise and the same may still be used for manual operation and, of course, may be pre-set to any rough adjustment by operation of the hand screw.

The movable jaw in accordance with my present invention is provided with a cylindrical bore 20 closed at the end 21 nearest the stationary jaw 11 but opening at the opposite end toward the lug 12, said cylinder or bore being coaxial with and larger in diameter than the hand screw 14. The greater part of the length of the bore 20 toward its open end is diametrically enlarged with respect to its inner, rear end, as designated at 22, and near the open extremity of the bore the same is tapped at 23. Slidably but non-rotatably mounted in the bore 20 is an operating piston, designated generally as 24, having a closed end 25 which faces the closed end 21 of the bore. The central portion of the annular skirt or wall 26 of the piston 24 is diametrically enlarged at 27 to slidably fit the enlarged part 22 of the bore 20 and this enlargement on the piston is provided with a longitudinally extending keyway 28 receiving a key 29 engaged in a recess in the interior of the bore. Thus the piston 24 is permitted axial sliding movements but is held against rotation and the interior of the piston is provided with suitable threads, as designated at 30, to threadedly engage the hand screw 14. An annular collar 31 is threaded into the open end of the bore 20 and slidably fits the adjacent end of the piston 24, and an expansion coil spring 32 is braced between this collar and the enlargement 27 of the piston to normally bias the movable jaw 13 away from the stationary jaw 11, as will be readily understood. It will also be understood that rotation of the screw 14, through its coaction with the threads 30 in the interior of the operating piston 24, will move the jaw 13 toward and away from the jaw 11.

A sliding fluid-tight seal is provided by an O-ring 33 or equivalent between the end portion of the piston 24 and the inner or rear end of the bore 20. The closed ends 21—25 of the bore and piston confront each other and fluid under pressure from a suitable supply source may be conducted to the interior of the bore between these confronting ends through a duct or channel 34 which is here shown to open out to one side of the jaw 13, and into which duct said fluid may be introduced by use of a suitable fitting 35 and flexible hose 36.

It will now be readily appreciated that the hand screw 14 may be used for rough setting the space between the jaws 11—13 so that a plurality of workpieces may be readily placed in succession between the jaws, one such workpiece being designated at A in Fig. 2. Once this rough adjustment has been made the operator may then, by admitting fluid under control of a suitable valve (not shown) to the bore 20 between the confronting end faces aforesaid, cause the thrust of this fluid to urge the mov-

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able jaw 13 toward the stationary jaw 11 a sufficient distance to secure a grip upon the workpiece, as seen in Fig. 2. As this action occurs, and as also shown in Fig. 2, the jaw 13 moves with reference to the operating piston 24 and hand screw 14 so that the former projects some distance out of the bore 20 and forwardly beyond the collar 31. Once the work has been completed upon each individual workpiece the fluid pressure is relieved and the spring 32 reasserts itself to re-open the vise jaws ready for the next operation.

In my parent application hereinbefore identified, I have disclosed an air-hydraulic system for operation of the vise which permits the use of the ordinary shop air pressures and magnifies the effective pressure on the vise jaws, and while such operating system may be used with the present vise I do not, of course, limit myself thereto.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the function and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. A work-holding vise having a base, a stationary jaw and a lug spaced apart on the base, a movable jaw reciprocally mounted on the base between the lug and the stationary jaw and movable toward and away from the latter, a hand screw rotatably but axially immovably mounted through the lug and extending toward the movable jaw, said movable jaw having a cylindrical bore closed at one end but opening at the other toward the lug and being coaxial with the screw, a hollow piston non-rotatably mounted in said bore and relatively slidable with respect thereto, said hollow piston having a bore closed at one end but opening toward the lug and into the open end of which bore said hand screw is threaded, and means for supplying fluid under pressure between the closed ends of the bore in the movable jaw and of the hollow piston whereby the thrust of the fluid reacting between these ends will force the movable jaw toward the stationary jaw.

2. A work-holding vise having a base, a stationary jaw and a lug spaced apart on the base, a movable jaw reciprocally mounted on the base between the lug and the stationary jaw and movable toward and away from the latter, a hand screw rotatably but axially immovably mounted through the lug and extending toward the mov-

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able jaw, said movable jaw having a cylindrical bore closed at one end but opening at the other toward the lug and being coaxial with the screw, a hollow piston non-rotatably mounted in said bore and relatively slidable with respect thereto, said hollow piston having a bore closed at one end but opening toward the lug and into the open end of which bore said hand screw is threaded, means for supplying fluid under pressure between the closed ends of the bore in the movable jaw and of the hollow piston whereby the thrust of the fluid reacting between these ends will force the movable jaw toward the stationary jaw, and means in said bore yieldably biasing the movable jaw away from the stationary jaw.

3. A work-holding vise having a base, a stationary jaw and a lug spaced apart on the base, a movable jaw reciprocally mounted on the base between the lug and the stationary jaw and movable toward and away from the latter, a hand screw rotatably but axially immovably mounted through the lug and extending toward the movable jaw, said movable jaw having a cylindrical bore closed at one end but opening at the other toward the lug and being coaxial with the screw, a hollow piston non-rotatably mounted in said bore and relatively slidable with respect thereto, said hollow piston having a bore closed at one end but opening toward the lug and into the open end of which bore said hand screw is threaded, the bore in the movable jaw being enlarged toward its open end and internally tapped at its open-end, an annular collar threaded into the tapped open end of this bore and slidably engaging the adjacent end of the piston, said piston being itself diametrically enlarged at its central portion to fit the enlarged portion of the bore in the jaw and these coacting surfaces having a keyway and key to prevent rotation of the piston, a spring braced between said collar and the enlarged portion of the piston to bias the movable jaw away from the stationary jaw, and means for supplying fluid under pressure to the bore in the movable jaw between the closed end of said bore and the closed end of the piston to thrust the movable jaw toward the stationary jaw.

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