

March 9, 1943.

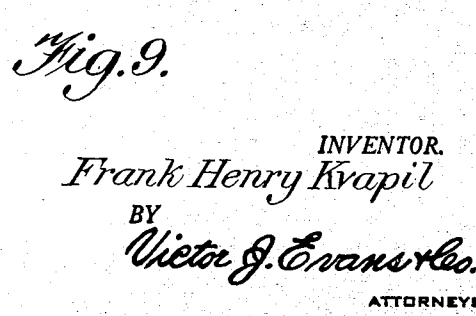
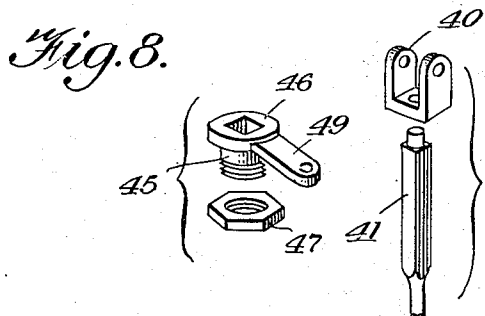
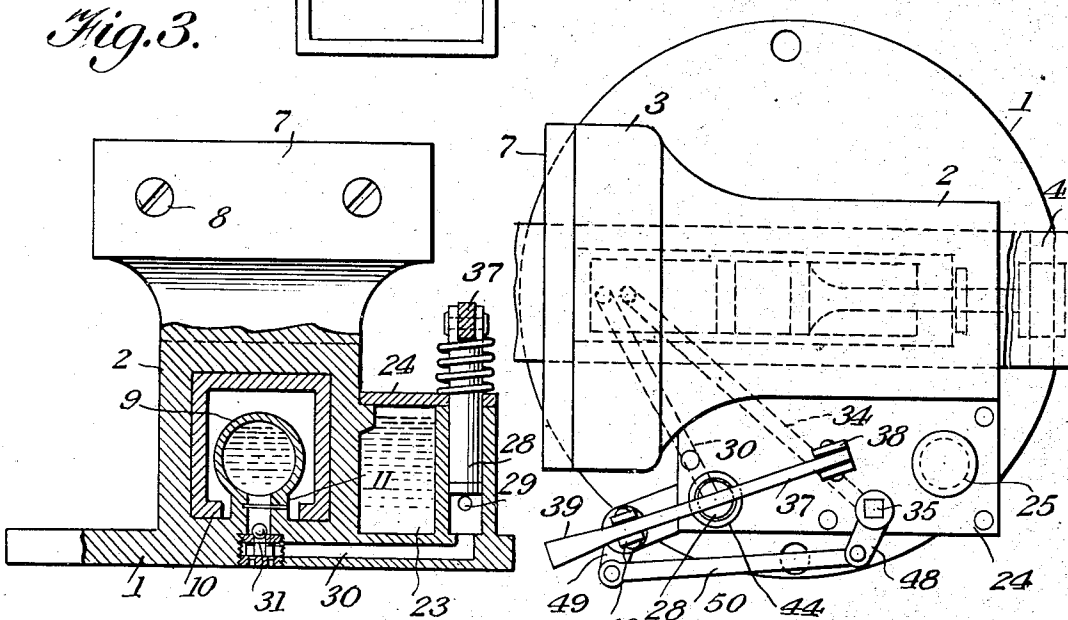
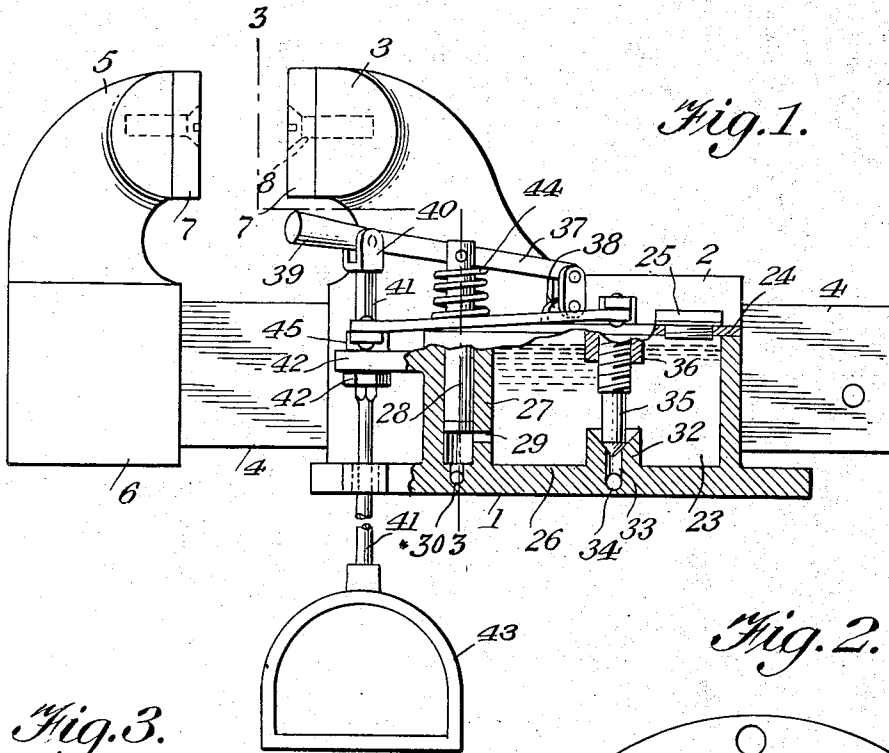
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2,313,348

HYDRAULIC CLAMPING DEVICE AND PUNCH

Filed Oct. 20, 1941

2 Sheets-Sheet 1



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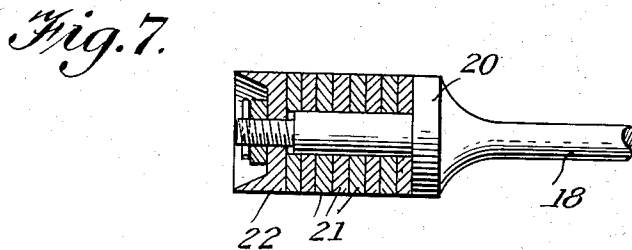
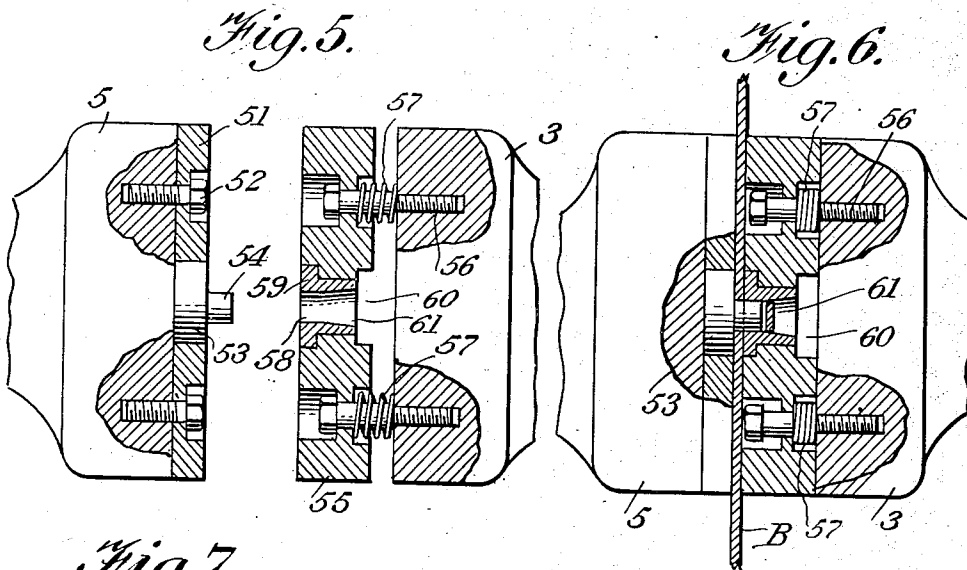
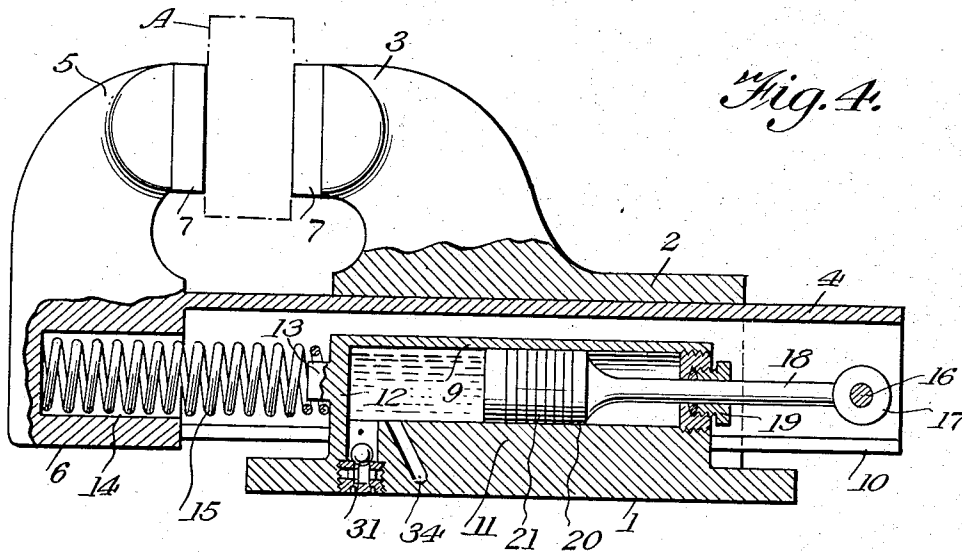
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HYDRAULIC CLAMPING DEVICE AND PUNCH

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HYDRAULIC CLAMPING DEVICE AND PUNCH

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Application October 20, 1941, Serial No. 415,807

2 Claims. (Cl. 81-17)

This invention relates to hydraulic clamping devices and punches, and its general object is to provide a device of that character, in the form of a vise which makes it possible for the operator to use both hands for holding the work in proper position between the jaws, while clamping or punching the same, in that the device includes a stationary jaw and a movable jaw, and can be operated solely, by the foot of the operator. This not only brings about expeditious movement of the latter jaw to closed position but to release the same from the work, and the movable jaw is automatically moved to open position when released, as well as is normally held accordingly.

A further object is to provide a hydraulic vise that can be used in the capacity of a punch, in that the vise jaws include detachable face plates which can be readily substituted by die and punch stud carrying plates.

Another object is to provide a vise that can be converted into a punch, and is simple in construction, inexpensive to manufacture, and extremely efficient in operation, use and service.

This invention also consists in certain other features of construction and in the combination and arrangement of the several parts, to be hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In describing the invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:

Figure 1 is a side elevation of the vise with parts broken away and in section.

Figure 2 is a top plan view thereof, with parts broken away.

Figure 3 is a sectional view taken on the line 3-3 of Figure 1.

Figure 4 is a longitudinal sectional view with parts broken away and in elevation.

Figure 5 is a partial sectional view illustrating the die and punch stud carrying plates attached to the vise jaws and with the movable jaw in open position.

Figure 6 is a similar view, with the jaws in closed position and the punching means in use.

Figure 7 is a fragmentary view of the jaw moving piston and illustrates the head thereof in section.

Figure 8 is a detail view, illustrating the foot stirrup rod guide and valve operating member.

Figure 9 is a detail view, illustrating the upper portion of the stirrup rod and the swiveled U-coupling for connecting the pump lever thereto.

Referring to the drawings in detail, the reference numeral 1 indicates the base of my device, the base being of disk shape in the form shown, and is provided with openings for receiving suitable means to secure the device to a bench or the like. Formed on and extending diametrically of the upper face of the base is a horizontally disposed rectangular hollow box like body 2 having formed on and rising from the forward portion thereof, a forwardly directed stationary jaw 3.

Fittingly mounted for sliding movement through the body 2, is a hollow frame like shank 4, for the movable jaw 5, the latter having the shank formed thereon and extending rearwardly from the lower portion 6 thereof, and the upper portion of the jaw 5 is directed rearwardly for cooperation with the stationary jaw, as clearly shown in Figures 1 and 4. The jaws per se are of the usual vise type, but have detachable work bearing face plates 7 secured thereto by bolts 8.

Formed on and extending longitudinally of the bottom wall of the box like body 2 is a cylinder 9 of a diameter to be spaced from the top and side walls of the shank, and the side walls of the shank are formed with inturned flanges 10 mounted on the bottom wall of the body, as shown in Figure 3, which likewise illustrates that the cylinder is formed with a base web 11 along the length thereof for elevating the same slightly above the bottom wall of the body, and that the flanges are disposed upon opposite sides of and spaced from the web.

The cylinder is formed with a front wall 12 having a lug 13 formed on and extending forwardly therefrom and the lower portion 6 of the movable jaw has a bore 14 therein, the bore extending longitudinally from adjacent its front face and opens through the rear face thereof. The bore 14 provides a seat for a coil spring 15 that has its end convolutions bearing against the inner wall of the bore and the front wall of the cylinder respectively, the lug acting to hold the spring in place, and the spring acts to urge and hold the movable jaw to and in open position, as will be apparent upon inspection of Figure 4.

Secured to and bridging the side walls of the shank adjacent the rear end thereof, is a pin 16 having a sleeve 17 mounted thereon, and formed on and extending forwardly from the sleeve is the connecting rod 18 of the head of a piston or ram, the head being mounted for reciprocation in the cylinder 9, and the rear end of the cylinder is closed by a threaded stuffing gland cap 19 for the rod. The head is preferably of laminated construction and includes a disk shaped

inner portion 20 having a stud formed on and extending centrally therefrom. Mounted on the stud are disk layers 21 of brass or the like, and the layers are removably secured in place by a cup like member 22 that is removably secured to the stud by a cotter pin spaced from the member 21 by a washer, as clearly shown in Figure 7.

Formed on the base and body and disposed laterally of the latter is an oil or fluid reservoir 23 having a filling opening in the top wall 24 thereof, that is closed by a cap 25. A portion of the base 1 provides a bottom wall 26 for the reservoir and formed on and rising from the bottom wall is a cylinder 27 of a pump, the latter including a plunger 28 mounted for reciprocation in the cylinder 27 and extending through the top wall 24. The cylinder 27 has a port 29 adjacent to the lower end thereof for passage of fluid from the reservoir into the cylinder, and disposed between the lower end of the latter and the forward end of the main cylinder 9 is an inlet passage 30 through which the fluid is pumped from the reservoir to the cylinder 9. A check valve 31 is arranged at the exit end of the passage 30, to prevent return of the fluid to the reservoir, as will be apparent.

A control valve is provided for releasing the fluid from the cylinder 9, and the valve includes a conical seat member 32 formed on and rising from the bottom wall of the reservoir, and disposed between the bore 33 of the seat member and the forward end of the cylinder 9, is a return passage 34. The stem 35 of the control valve is threaded in a collar 36 formed on and depending from the top wall 24 of the reservoir, and the lower end of the stem is of conical formation to fit the seat for closing the return passage, as clearly shown in Figure 1.

Pivoted intermediate its ends to the upper end of the plunger 28 is a lever 37 which has one end linked to an ear 38 secured to the top wall 23. The opposite end of the lever is formed with a handle portion 39 and pivotally secured to the lever at the juncture of the handle portion therewith is a substantially U-shaped member 40 having the upper end of a vertical stirrup rod 41 swiveled thereto, so as to allow rotation of the rod, for a purpose which will be later apparent. The upper portion of the rod 41 is square cornered, and the rod extends through an arm 42 formed on and extending forwardly from the reservoir, and the rod also extends through an ear formed on the base 1, the arm and ear acting as guides for the rod, as will be apparent. Secured to the lower end of the rod 41 is a foot stirrup 43.

Sleeved on the plunger 28 between the lever 37 and the top wall of the reservoir is a coil spring 44 that normally holds the plunger in an elevated position above the port 29, as best shown in Figure 1, and the square cornered portion of the rod 41 is slidably mounted in a collar 45 that is swiveled in the guide opening of the arm 42, the collar having a square cornered bore fitting the square cornered portion of the rod, and the collar is formed with an annular flange 46 at the upper end thereof, which cooperates with a nut 47 on the lower end of the collar to secure the latter to the arm 42.

Fixed to the upper end of the stem 35 of the valve for opening and closing the same, is a tongued member having the tongue 48 thereof extending laterally therefrom, and a like tongue 49 extends laterally from the flange of the collar 45. Pivotally connected to the tongues are the ends of a link 50, as best shown in Figure 2.

From the above description and disclosure in the drawings, it is believed that the operation of the vise will be obvious, but it might be mentioned that the movable jaw 5 is normally held in open position by the coil spring 15, as best shown in Figure 1. When it is desired to clamp the work, such as indicated by the letter A between the jaws, the work is disposed accordingly, and the operator places his foot within the stirrup 43. The control valve is then closed, by the operator giving the stirrup a slight turn in one direction. This is accomplished by turning the threaded portion of the valve 35 in the collar 36 rigidly carried by the reservoir. After the valve is closed, the fluid is pumped through the passage 30 from the reservoir into the cylinder 9 by a pedaling action on the stirrup and as the fluid is pumped into the cylinder, it will force the piston rearwardly and close the movable jaw against the work. The pump can also be operated by the lever if desired, especially if additional pressure is necessary, after the movable jaw has closed on the work. When it is desired to release the work, the stirrup is given a slight turn in an opposite direction to open the valve, and the fluid within the cylinder 9 will then return to the reservoir through the passage 34. The spring 15 will then urge the jaw 5 to its open position of Figure 1.

In order to convert the vise structure above described into a hydraulic punch, the face plates 7 are removed from the jaws and the die and punch stud carrying plates of Figures 5 and 6 are attached to the jaws. The stud carrying plate is indicated by the reference numeral 51 and is secured to the movable jaw by bolts 52. The plate 51 is provided with a centrally disposed hole that has removably and fittingly mounted therein a disk 53 formed with a punch stud 54.

The die carrying plate 55 is movably secured to the stationary jaw by relatively long bolts 56 that are threaded for a portion of their length and from the threaded portions to the heads thereof the bolts 56 are enlarged to provide shoulders abutting the stationary jaw, as best shown in Figure 5, and the plate 55 is slidably mounted on the unthreaded portions of the bolts 56, as well as is normally urged and held spaced from the jaw by coil springs 57 sleeved on the bolts. The die or female member 58 for receiving the stud 54 is removably mounted in a centrally disposed hole in the plate 55, and of course is arranged in the path of the stud, the die being flanged as at 59 to limit its inward movement in the hole of the plate, and the rear face of the plate is recessed as at 60 about the hole, with the recess extending through the lower edge of the plate to provide a slug passage, as will be apparent upon inspection of Figure 6, which illustrates the punching means in use and a slug removed from the work B.

The front face of the plate 55 is recessed to provide a seat for the flange 59, so that the die is disposed flush with the front face of its plate, and in order to allow free movement of the slugs through the bore of the die, it will be noted that the inner portion of the bore is tapered outwardly as at 61. The confronting faces of the plates are of course recessed for receiving the heads of the bolts, and the stud members and dies are made in different sizes, to be interchangeably associated with the plates, as will be apparent.

It is thought from the foregoing description that the advantages and novel features of the invention will be readily apparent.

It is to be understood that changes may be made in the construction and in the combination and arrangement of the several parts, provided that such changes fall within the scope of the claims.

What I claim is:

1. A hydraulic device comprising a base, a hollow body secured to the base, a stationary jaw secured to and rising from the body, a spring pressed movable jaw provided with a shank slidably mounted through the body, a cylinder extending longitudinally of and within the body, a piston mounted for reciprocation in the cylinder and connected to the shank, a fluid reservoir, a pump for forcing fluid from the reservoir into the cylinder in advance of the piston for closing the movable jaw relative to the stationary jaw, said pump including a plunger extending vertically through the reservoir, a lever pivotally connected intermediate its ends to the upper end of the plunger and having one end pivotally

anchored, a rod pivotally connected to the lever adjacent to its opposite end and depending therefrom, guiding means for the rod, a foot stirrup secured to the lower end of the rod for actuating the pump through the medium of the lever, a valve for releasing said fluid from the cylinder to allow return of the movable jaw to open position, and means operated by a slight oscillation of the stirrup for opening the releasing valve.

2. A hydraulic device comprising the structure of claim 1, said valve including a seat, a threaded stem for the valve and movable on the threads thereof for disposal into and out of seated position, said rod being swiveled to the lever and including a square cornered portion, and means coupled to the square cornered portion for rotation with the rod and linked to the stem, whereby the valve is controlled by the stirrup.

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