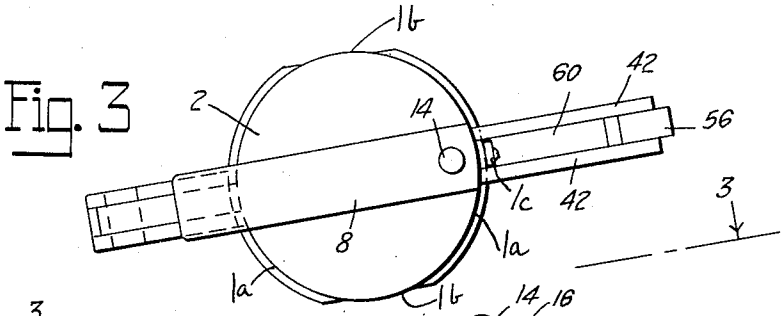
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SQUEEZE RIVETER

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Fig. 3



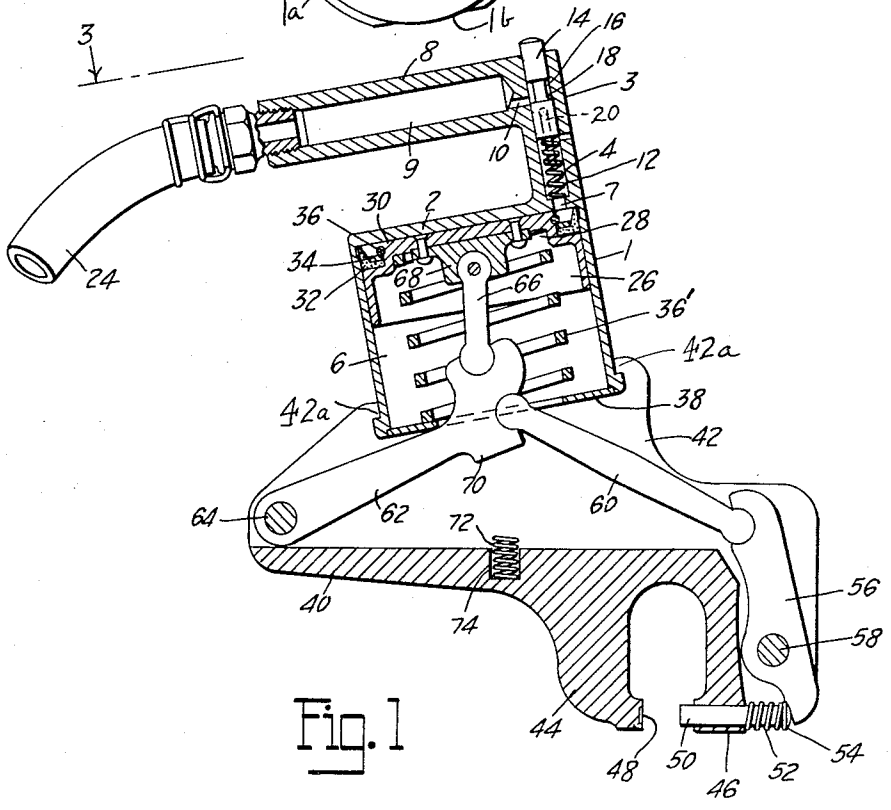


Fig. 1

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SQUEEZE RIVETER

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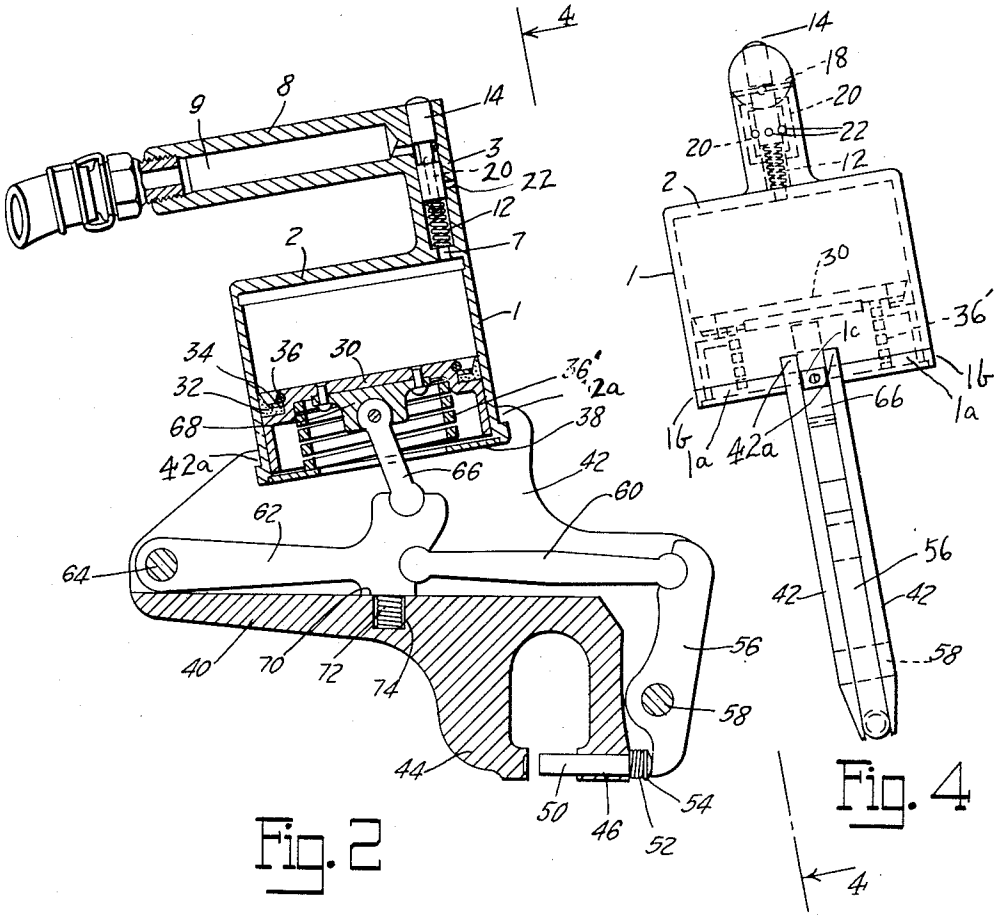


Fig. 2

Fig. 4

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UNITED STATES PATENT OFFICE

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SQUEEZE RIVETER

Application filed January 17, 1928. Serial No. 247,312.

The present invention relates, generally, to riveting machines adapted for use with fluid pressure. The invention relates more particularly to riveting machines which are compact and light of weight so as to be portable and useable manually. The invention further relates to manually portable and operable riveting machines having their moving parts substantially all enclosed or guarded, and to machines of this kind in which a high degree of multiplication of pressure is obtained in a small space.

Various objects and advantages of the machine of the invention will appear from the following description of an illustrative embodiment thereof and from the accompanying drawings, and the invention also consists in the various devices and combinations and arrangements of parts set forth in the appended claims.

In the drawings showing the illustrative embodiment of the invention;

Figs. 1 and 2 are elevational views in midsection showing, respectively, the device illustrated in the open position and in the closed or compression position;

Fig. 3 is a plan view of the device with the parts in their respective positions as shown in Fig. 1; and

Fig. 4 is an end view looking in the direction of the arrows 4—4 of Fig. 2.

In the drawings the cylinder 1 has formed unitary therewith an end closure or head 2 which carries a tubular stem 3 which is near the edge thereof and projects therefrom in a direction parallel to the axis of said cylinder 1. The bore 4 of said stem 3 extends longitudinally throughout and at its inner end connects with the bore 6 of cylinder 1 through the port 7. At its outer end said stem 3 carries the tubular handle 8 which extends diametrically backward over said cylinder 1 in spaced apart relation therewith. The bore 9 of said handle 8 connects with said bore 4 through a port 10. In preferred form, and as shown, said cylinder 1, cylinder head 2, stem 3, and handle 8 are formed as a unitary casting.

A compression spring 12 nests with its lower end against the bottom of said bore 4 and, in its normal expanded condition, holds the throttle plunger 14 with its outer end projecting from said handle 8, (see Fig. 1). Said plunger 14 has formed thereabout intermediate its length the annular groove 16 whose upper and lower limits serve, by engagement with the pin 18 extending thereinto from the side wall of said stem 3, to limit the movement of said plunger 14 in the respective directions of movement thereof. In the depressed position of said plunger 14 said groove 16 connects said port 10 with the upper ends of the ducts 20, 20 which extend downwardly through the wall of said stem 3 and reconnect with bore 4 at points below the lower end of said plunger 14. Vent ports 22, 22 extending from said bore 4 outwardly through the wall of said stem 3, are closed by said plunger 14 when it is in the downward, pressure applying position. When said plunger 14 is in the raised position said ports 22, 22 serve as exhaust ports for said cylinder 1.

A flexible or other hose 24, connected to the outer end of said handle 8, serves to carry pressure fluid to the device.

In said cylinder bore 6 is a piston 26 which is hollow and has a shallow circular depression 28 on the inside face of its head and a circular boss 30 on the outside face of its head. A cup washer 32 of leather or other suitable material and of annular form, is held in position about said boss 30 by a washer 34 held thereagainst by a spring ring 36 seated in an annular groove formed in the lateral surface of said boss 30. A compression spring 36′, seated with one end in said circular depression 28 and with its other end against an annular disc 38 clamped to the outer end of said cylinder 1 tends to move and hold said piston 26 against cylinder head 2.

A narrow frame 40 has two spaced apart sides 42, 42 which solidly connect with said cylinder 1 on the end opposite said head 2, one on each side of a diameter thereof, which diameter is preferably aligned with the axis of said handle 8. Sides 42 have portions 42*a* (Figs. 1, 2 and 4) engaging a flange 1*a* on cylinder 1, which flange is cut away at dia-

metrically opposite points 1b (Figs. 3 and 4) to permit frame 40 to be applied to or detached from the cylinder in an obvious manner. Any suitable means such as a block 1c (Figs. 3 and 4) secured to cylinder 1 between sides 42 may be provided to lock frame 40 against movement with respect to cylinder 1.

Intermediate its ends, frame 40 carries the downwardly projecting jaws 44 and 46, the former 44, being an anvil jaw and having a depression 48 therein for engaging the ends of rivets compressed thereagainst. Extending through said jaw 46, opposite said depression 48, is the rivet pressing plunger 50, which can be of a length to suit the work engaged thereby. The working end of said plunger 50 can be shaped to suit the work to be handled thereby. A compression spring 52 mounted about the outer part of said plunger 50 bears with one end against said frame 40 and with its other end against an annular flange 54 on said plunger 50, and tends to move said plunger 50 into the open position and against one end of a lever 56 which is positioned between said sides 42, 42.

Said lever 56 is pivoted near said plunger 50 on a stud 58. A toggle arm 60 mounted between said sides 42, 42 is pivoted at one end to the long end of said lever 56 and at its other end, at a point adjacent the center of said cylinder 1, is pivoted to one end of a toggle arm 62 which, at its other end, is pivoted to a stud 64, at the opposite end of said frame 40 from said lever 56. A connecting rod 66 is pivoted at one end to a socket member 68, fixed to the inner face of the end of said piston 26, and at its other end has pivotal connection with said toggle arm 62 near the latter's connection with said toggle arm 60. At its inner end, on the lower side thereof, said toggle arm 62 carries a stop lug 70 which stops said toggle arms 60 and 62 from downward movement beyond the dead center position, as shown in Fig. 2. A spring 72 seated in a bore 74 in said frame 40 at a point opposite said lug 70 serves to move said toggle arms 60 and 62 from the dead center position after applied pressure on said piston 26 is relieved and permits the use of a relatively light spring at 36'.

In the use and operation of the apparatus above described for compressing a rivet, said hose 24 being connected to a source of pressure, pressure is applied by depressing said plunger 14, as with the thumb of a hand grasping the tool by said handle 8, to connect said part 10 through said channel 16, thence through said ducts 20, 20, to said port 7 and to said piston 26 which is thereby moved to depress the inner ends of said toggle arms 60 and 62 whereby the outer end of said arm 60 is thrust outwardly against the long end of said lever 56, the inner end of which, with pressure greatly multiplied over that applied on piston 26, actuates said plunger 50 toward said anvil jaw 48, where maximum pressure is applied as said toggle arms reach the dead center position. When said plunger 14 is released said spring 12 will move it up until it is stopped by said pin 18 at which position said ports 22, 22 are open to said bore 4 and pressure from pipe 24 is shut off, said spring 72 will move said toggle arms 60 and 62 from the dead center position, and said spring 36' will move piston 26 and the arms 60 and 62 and lever 56 into the off position. Spring 52 will at the same time move said plunger 50 into the open position. In a device made substantially to the scale and proportions as shown in the drawings, the piston being three and one half inches in diameter, a pressure of eighty pounds of air applied through said hose 24 is sufficient to head a duralumin rivet seven thirty-seconds of an inch in diameter. The test pressure, on an Olson testing machine, for the heading of this material and diameter is three tons. The weight of a device having the parts, proportions and size indicated and shown is, when made of cast iron and steel, about nine and one-half pounds and is, accordingly, well adapted for hand control and manipulation by a single operator. The shape of the device is such as to enable places to be reached which are practically inaccessible with ordinary tools and machines, thereby rendering it particularly useful to air craft manufacturers.

It is to be understood that various changes and omissions can be made in the devices and arrangements and combinations of parts as shown without departing from the scope of the invention as established by the claims.

I claim as my invention:

1. A squeeze riveter comprising a frame, a cylinder mounted on said frame, an anvil jaw and another jaw rigidly mounted on said frame, the latter jaw having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever pivoted to said frame and adapted, at a point rearwardly of its pivotal connection, to engage said compression plunger, a toggle arm pivoted to said frame, a second toggle arm having pivotal connection with said lever at a point further from the pivot of said lever than the plunger engaging part of said lever and having cooperative pivotal connection with said toggle arm, a piston in said cylinder, and power transmitting means connected between said piston and said toggle arms.

2. A squeeze riveter for manual support and operation comprising a frame, a cylinder mounted on said frame, an anvil jaw and another jaw rigidly mounted on said frame, the latter jaw having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever pivoted to said frame and adapted to engage said compression plunger, a toggle arm pivoted to said frame, a second toggle arm having pivotal

connection with said lever and having cooperative pivotal connection with first said toggle arm, a piston in said cylinder, and power transmitting means connected between said piston and said toggle arms, said frame being formed into a protecting cover over said lever, toggle arms and connecting means.

3. A squeeze riveter for manual support and operation comprising a frame, a cylinder mounted on said frame, an anvil jaw and another jaw rigidly mounted on said frame, the latter jaw having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever pivoted to said frame and adapted, at a point rearwardly of its pivotal connection, to engage said compression plunger, a toggle arm pivoted to said frame, a second toggle arm having pivotal connection with said lever at a point further from the pivot of said lever than the plunger engaging part of said lever and having cooperative pivotal connection with said first toggle arm, a piston in said cylinder, and power transmitting means connected between said piston and said toggle arms, said frame being formed into a protecting cover over said lever, toggle arms and connecting means.

4. A squeeze riveter for manual support and operation comprising a frame, a cylinder mounted on said frame, an anvil jaw and another jaw rigidly mounted on said frame, the latter jaw having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever pivoted to said frame and adapted to engage said compression plunger, a toggle arm pivoted to said frame, a second toggle arm having pivotal connection with said lever and having cooperative pivotal connection with said first toggle arm, a piston in said cylinder, power transmitting means connected between said piston and said toggle arms, and means for stopping said toggle arms from movement beyond the dead center in a direction away from said connecting means.

5. A squeeze riveter for manual support and operation comprising a frame, a cylinder mounted on said frame, an anvil jaw and another jaw rigidly mounted on said frame, the latter jaw having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever pivoted to said frame and adapted to engage said compression plunger, a toggle arm pivoted to said frame, a second toggle arm having pivotal connection with said lever and having cooperative pivotal connection with said first toggle arm, a piston in said cylinder, and power transmitting means connected between said piston and said toggle arms, means for stopping said toggle arms from movement beyond the dead center in a direction away from said connecting means, and means for moving said toggle arms away from the dead center position toward said connecting means.

6. A squeeze riveter for manual support and operation comprising a frame, a cylinder mounted on said frame, an anvil jaw and another jaw rigidly mounted on said frame, the latter jaw having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever pivoted to said frame and adapted to engage said compression plunger, a toggle arm pivoted to said frame, a second toggle arm having pivotal conection with said lever and having cooperative pivotal connection with said first toggle arm, a piston in said cylinder, power transmitting means connected between said piston and said toggle arms, means for stopping said toggle arms from movement beyond the dead center in a direction away from said connecting means, means for moving said toggle arms away from the dead center position toward said connecting means, and means for moving said piston in a direction away from said connecting means.

7. A squeeze riveter for manual support and operation comprising a frame, a cylinder mounted on said frame, an anvil jaw and another jaw rigidly mounted on said frame, the latter jaw having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever pivoted to said frame and adapted to engage said compression plunger, a toggle arm pivoted to said frame, a second toggle arm having pivotal connection with said lever and having cooperative pivotal connection with said first toggle arm, a piston in said cylinder, power transmitting means connected between said piston and said toggle arms, and means acting directly on said compression plunger for moving the latter away from said anvil jaw.

8. A pneumatic squeeze riveter for manual support and operation comprising a frame, a cylinder mounted on said frame, an anvil jaw and another jaw mounted on said frame, the latter jaw having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever pivoted to said frame and adapted at a point in rear of its pivotal connection to engage said compression plunger, a toggle arm pivoted to said frame, a second toggle arm having pivotal connection with said lever at a point further from the pivot of said lever than the plunger engaging part of said lever and having cooperative pivotal connection with said first toggle arm, a piston in said cylinder, power transmitting means connected between said piston and said toggle arms, a compression plunger on said carrying jaw, said frame being formed into a protecting cover over said lever, toggle arms and connecting means, a handle for said riveter formed as a conduit for fluid pressure to said piston and cylinder, a valve for said conduit having means tending to hold it closed and having a handle portion adapted to be engaged by the thumb of a

hand gasping said handle, means for stopping said toggle arms from movement beyond the dead center in a direction away from said connecting means, means for moving said toggle arms away from the dead center position toward said connecting means, and means for moving said piston in a direction away from said connecting means.

9. In combination, a cylinder closed at one end, a frame carried by said cylinder at its other end, said frame comprising two side members, fixedly mounted on said cylinder in parallelism with the axis thereof and in spaced apart relation to each other and one on either side of said axis, a pair of jaws carried by said frame, one being an anvil jaw and the other having a compression plunger reciprocably mounted thereon in operative relation to said anvil jaw, a lever between said sides pivoted intermediate its ends and with one end adapted to bear against said compression plunger, a pair of toggle arms between said side members with a pivoted connection therebetween, one of said toggle arms having its outer end pivoted to said frame and the other having its outer end pivoted to said lever, a piston in said cylinder, and pivotal connection between said piston and said toggle arms, a spring mounted in said frame for moving said toggle arms from the dead center position toward the pivotal connection between them and said piston, and a spring tending to move said piston toward the closed end of said cylinder.

10. A portable squeeze riveter for manual support and operation having a power cylinder and a frame secured thereto, said frame having an anvil, a compression plunger and power transmitting means for the latter, said cylinder and said frame having cooperating means permitting application or detachment of the same in one angular position and securely holding the same together in assembled relation in another angular position.

11. A portable squeeze riveter for manual support and operation having a power cylinder and a frame secured thereto, said frame having an anvil, a compression plunger and power transmitting means for the latter, said cylinder having a radially projecting flange cut away at diametrically opposite points and said frame having opposed portions for engagement with said cylinder flange to maintain said parts in assembled relation, the cut away portions of the flange permitting convenient application or separation of said cylinder and frame.

12. A portable squeeze riveter for manual support and operation having a power cylinder and a frame secured thereto, said frame having an anvil, a compression plunger and power transmitting means for the latter, said cylinder having a radially projecting flange cut away at diametrically opposite points, said frame having spaced sides with projecting portions to engage said flange to maintain said cylinder and frame in assembled relation, the cut away portion of the flange permitting convenient assembling and separation of said parts, and a locking block arranged for disposition between the sides of said frame and for attachment to said cylinder to hold said cylinder and frame against relative angular movement.

Signed by me at Detroit, in the county of Wayne, and State of Michigan this 14 day of January, 1928.

EDWARD W. STEVENS.