

Nov. 23, 1943.

F. O. ARNOLDI ET AL

2,334,982

MULTIPLE RIVETER

Filed Feb. 28, 1940

4 Sheets-Sheet 1

FIG. 2.

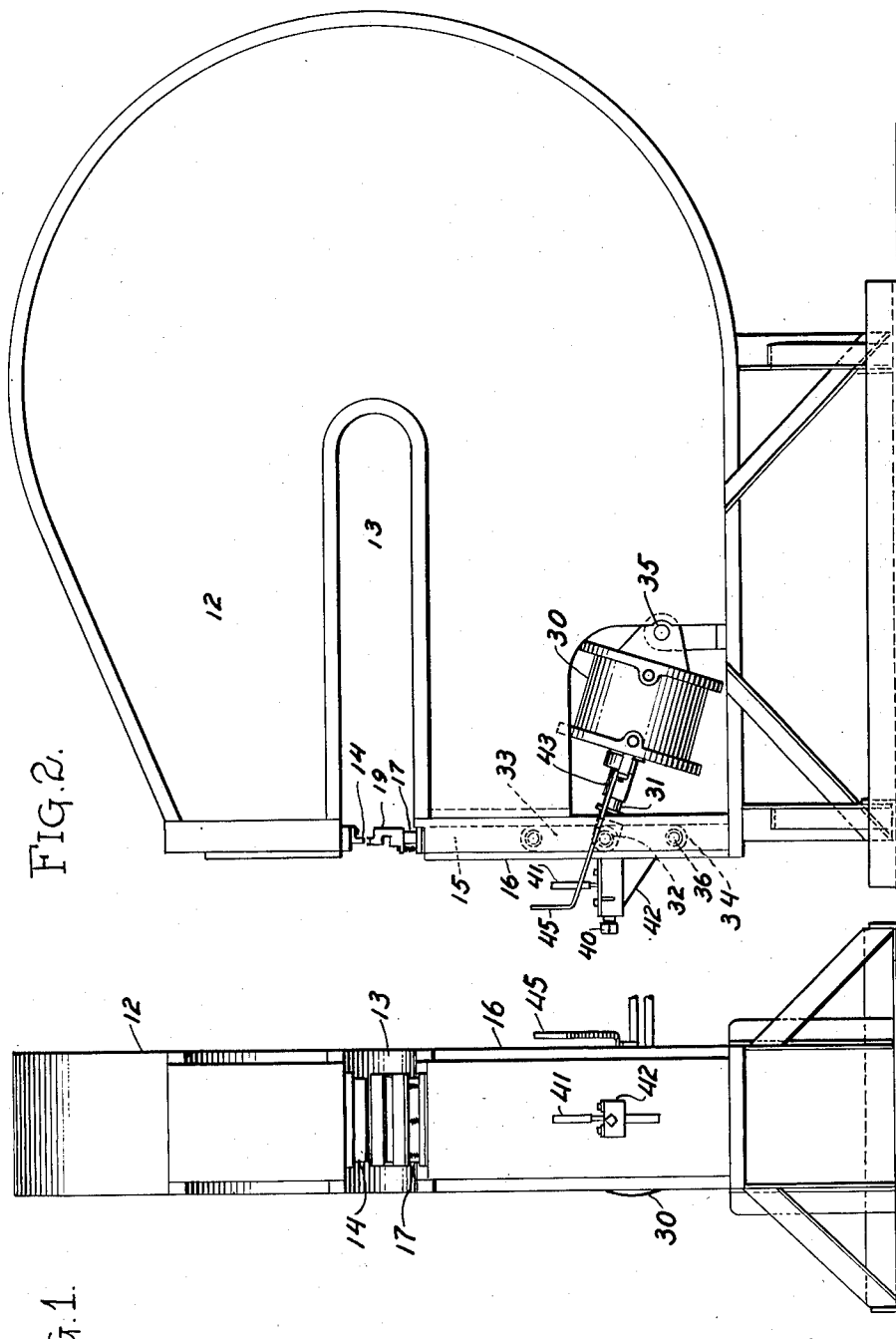


FIG. 1.

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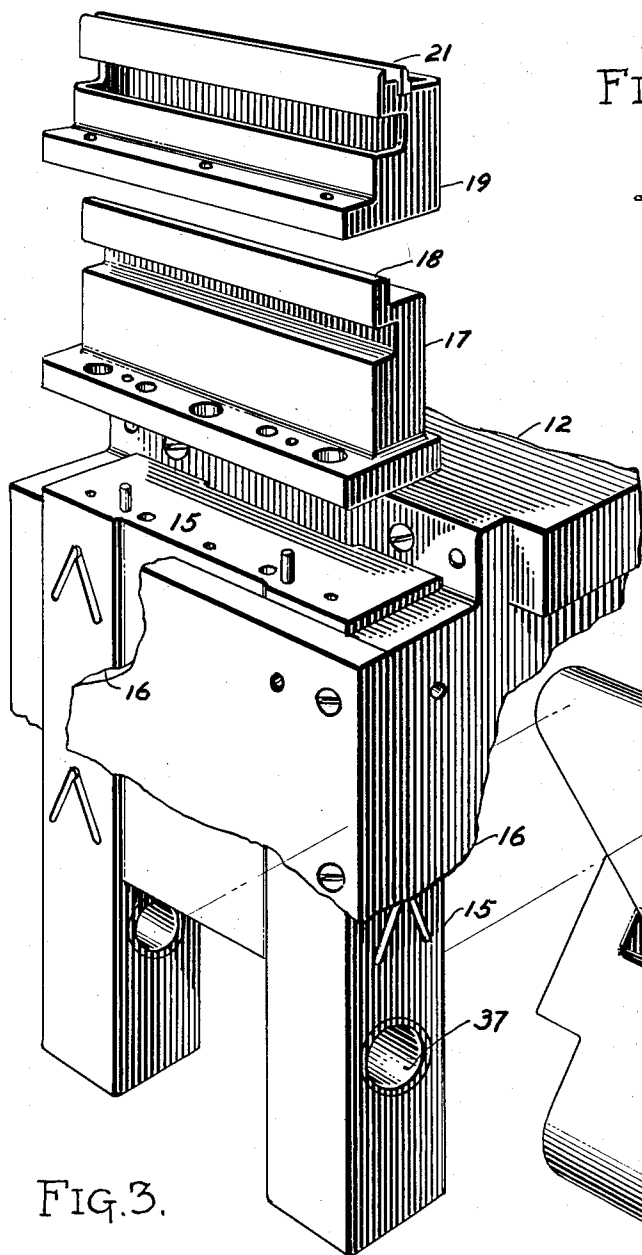
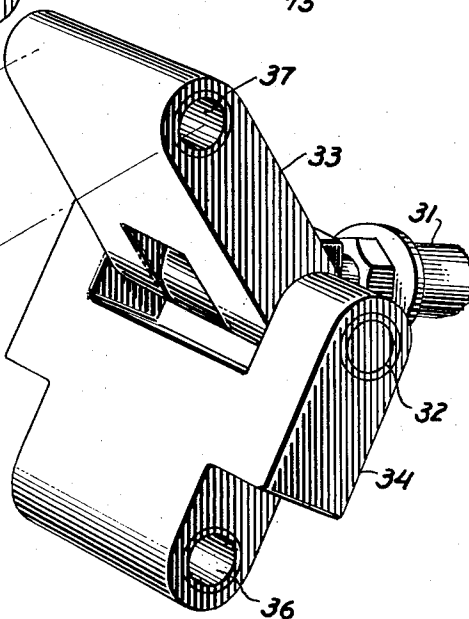
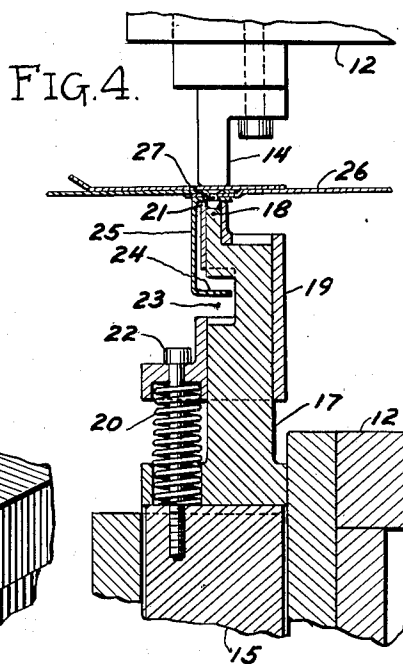


FIG. 3.



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FIG. 5.

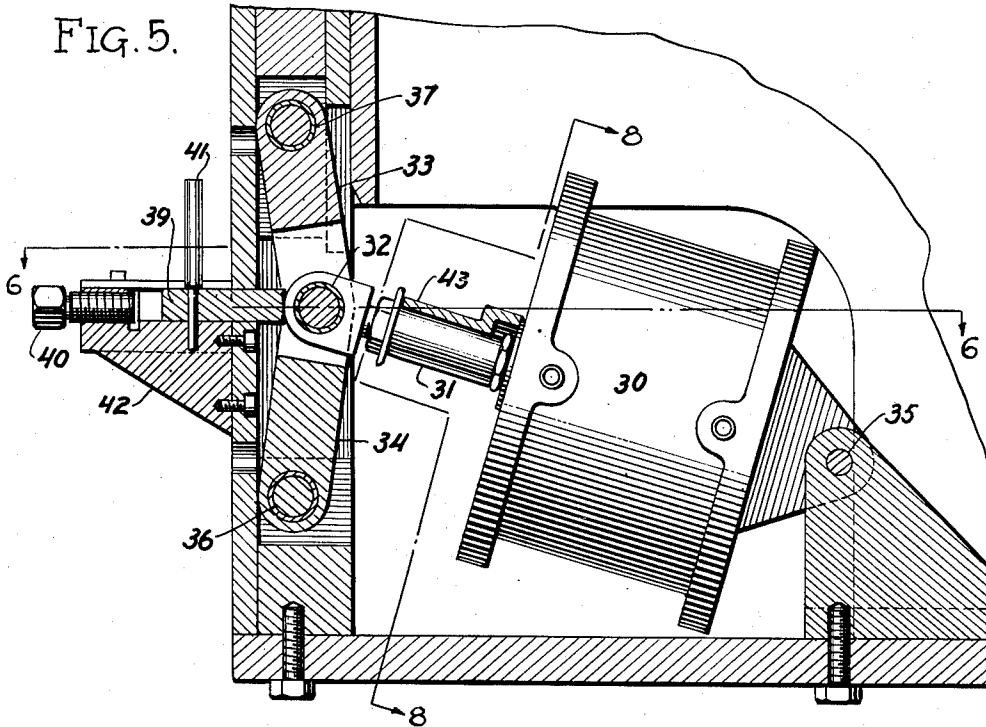


FIG. 6.

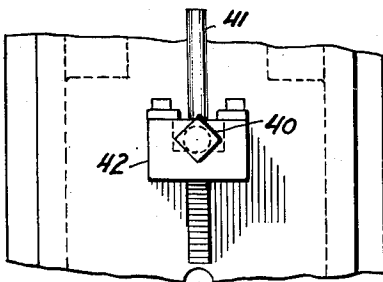
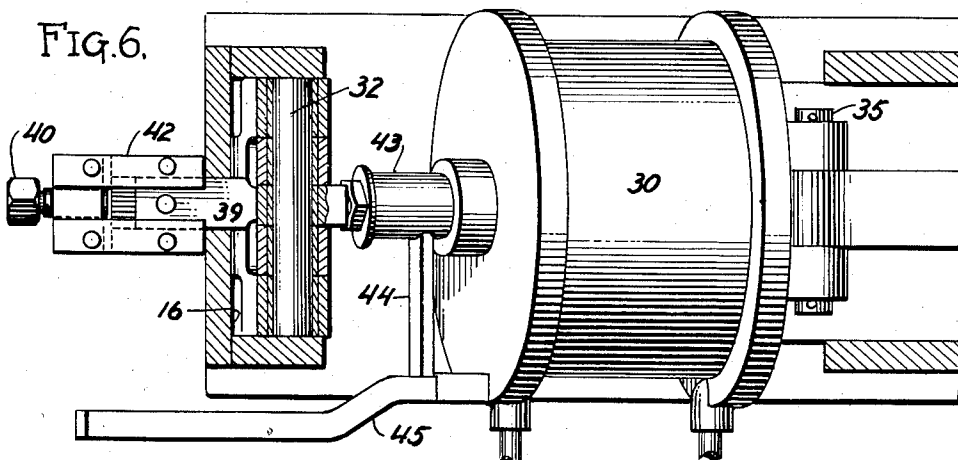


FIG. 7.

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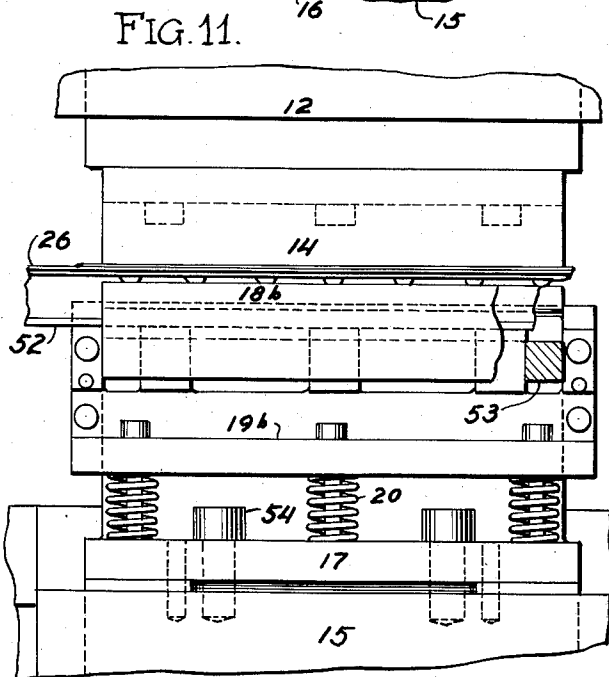
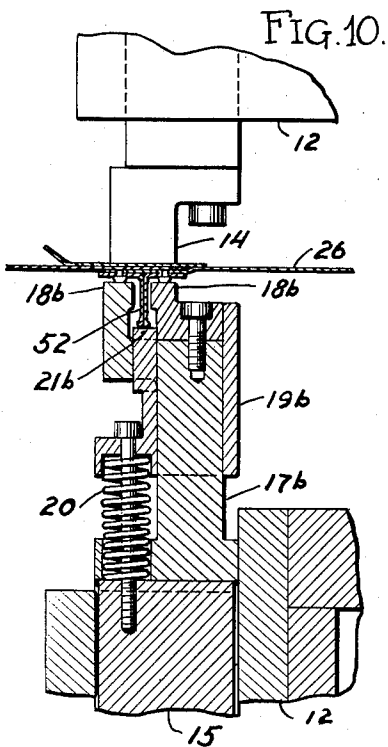
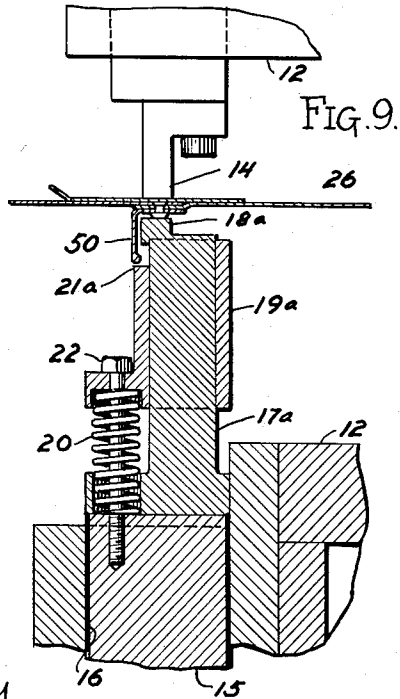
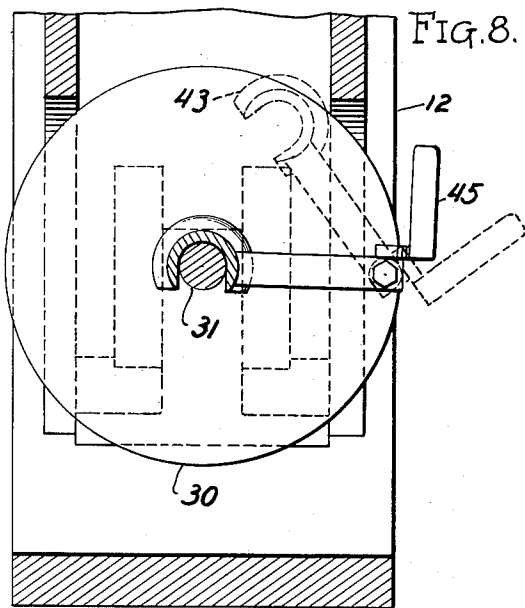
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,334,982

MULTIPLE RIVETER

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Application February 28, 1940, Serial No. 321,148

7 Claims. (Cl. 78—52)

This invention relates to rivet presses and is particularly concerned with a type of press arranged for quick action and for driving a plurality of rivets simultaneously.

An object of the invention is to so arrange the press as to allow of the quick interchange of the anvils thereof so that anvils adapted for particular forms of sheet metal components may be assembled upon the press.

A further object is to provide quickly controllable means for varying the stroke of the press, so that a short stroke may be used to expedite production and so that a long stroke may be used when necessary for changing the anvils and for allowing clearance when obstructions are present in the work to be riveted.

A further object of the press is to provide a toggle action of such form that, when actuated by a prime mover, the first part of the press ram travel is rapid with relatively little pressure, while the last part of the press ram travel is slow and powerful.

A further object is to provide means for adjusting the stroke of the press ram by which the overall height of assembled driven rivets may be established.

Various other objects will become apparent in reading the annexed detailed description in connection with the drawings, in which,

Figs. 1 and 2 are respectively front and side elevations of a press according to the invention;

Fig. 3 is a large perspective view of a portion of the press, ram, and operating mechanism showing certain of the parts in disassembled relation;

Fig. 4 is an enlarged section through the movable ram and anvil;

Fig. 5 is an enlarged section through a lower part of the press showing the operating mechanism for the ram;

Fig. 6 is a section on the line 6—6 of Fig. 5;

Fig. 7 is an enlarged front elevation of a fragment of the press;

Fig. 8 is a section on the line 8—8 of Fig. 5;

Figs. 9 and 10 are sections, similar to Fig. 4, showing alternate forms of anvils and pressure plates; and

Fig. 11 is an enlarged front elevation of a portion of the press showing the anvil arrangement as in Fig. 10.

As shown in the whole in Figs. 1 and 2, the press comprises a yoke 12 having a gap 13 for the reception of the metal sheet upon which work is to be accomplished. The front end of the yoke above the gap carries a fixed but replaceable

anvil 14 which comprises a narrow rectangular element having a flat and hard lower face. Directly below the anvil 14, a ram 15 is slidably carried in guides 16, and upon the upper end of the ram a lower anvil 17 is secured, the top face of said anvil shown at 18 in Fig. 3 comprising an elongated flat rectangle lying directly opposite the upper anvil 14. Embracing the anvil 17 is a slidable pressure member 19 which is urged upwardly by a plurality of springs 20 so that, when the anvils are separated, the top faces 21 of the pressure member lie above the face 18 of the lower anvil. Screws 22, passing through the pressure member and engaging the press ram, are adjustable to limit the upward travel of the pressure member relative to the lower anvil. As shown in Figs. 3 and 4, the anvil 17 and the pressure member 19 are provided with a groove 23 within which a flange 24 of a channel member 25 may be disposed when such a channel member is being secured by riveting to a piece of sheet metal 26. The long flat anvils 14 and 18 allow for the assembly of a plurality of rivets 27 in pre-formed holes in the work and after these rivets are all brought beneath the anvil 14, raising of the ram 15 effects simultaneous driving of all rivets.

The means by which the ram is raised and lowered comprises a cylinder 30 containing a piston, not shown, from which a piston rod 31 protrudes to a hinge connection 32 with upper and lower toggle plates 33 and 34 respectively, the cylinder 30 being hinged to the frame of the machine as at 35. The lower end of the toggle link 34 is hinged as at 36 to the frame of the machine while the upper end of the toggle link 33 is hinged as at 37 to the ram 15. Accordingly, when the piston rod 31 is withdrawn into the cylinder, the toggles 33 and 34 buckle and draw the ram downwardly. When pressure is applied to the back of the cylinder 30, the toggles 33 and 34 are straightened out, forcing the ram 15 in an upward direction. It will be appreciated that when the toggles 33 and 34 are in the first phase of their ram raising motion, the mechanical advantage is relatively low while the motion imparted to the ram is fast, whereas at the last part of the piston travel, the toggles 33 and 34 are nearly aligned and the mechanical advantage is large while the ram motion is slow.

Adjustment of the top limit of motion of the ram 15 is effected by a slidable block 39 shown in Figs. 5, 6, and 7 which may be adjusted inwardly and outwardly by a screw 40 to form an abutment for the toggle hinge, this abutment

resisting cylinder pressure only, and not the multiplied pressure which would exist at the working face of the anvil 17. This adjustment is readily accessible to an operator so that he may adjust ram travel in accordance with the overall height of compressed rivets which may be dictated by different sizes of rivets and different thicknesses of sheet material. A pin 41 may be inserted through suitable holes in the block 39 and in the support 42 to hold the ram safely in its low position when anvils are being changed or replaced, against the possibility of accidental operation of the cylinder 30.

In an actual press of this character, the full travel of the ram 15 is about $3\frac{1}{2}$ inches which is necessary for changing anvils and for escaping interferences with projections which may occur on work being operated upon. However, such a large travel for the ram is ordinarily unnecessary so a travel limiting shoe 43 is secured to a strut 44 and a handle 45 in such a manner that it may be dropped over the piston rod 31 to limit the down stroke of the ram 15 to any desired dimension which, for the type of work for which the machine was built is about three-fourths of an inch. The reduced ram travel permits of faster normal press operation. The dimensions above recited are in no way to be construed as limitations to the scope of the invention.

Fig. 9 shows an alternate form of lower anvil, designated at 17a, which projects straight up from the ram 15 and carries a working face 18a which lies opposite the upper anvil 14. This is embraced by a pressure member 19a which has no such recess as above described but which rather, has a working face 21a spaced below the face 18a of the anvil to bear upon the edge of the web of an angle member 50 which is to be riveted to the sheet 26, the member 19a thus holding the angle member against the sheet prior to the engagement of the anvils with the securing rivets.

Figs. 10 and 11 show essentially the same elements, designated by the letters b, except that the anvil working faces 18b are paired to drive two rows of rivets, one on each side of a T member 52 being secured to the sheet 26, the working face 21b of the pressure member 19b being shaped to engage the edge of the flange of the T member 52 prior to rivet driving. The front working face 18b of the anvil 17b is secured to the central part of the anvil by struts 53 between which suitably formed struts of the pressure member 19b are slidable.

In all embodiments the lower anvil unit 17 is secured to the ram 15 as by screws 54, shown in Fig. 11. By lowering the ram and removing these screws, the lower anvil assembly may be readily detached and replaced by another ram assembly of a form adapted to the work to be done. In using the press of this invention, suitable work tables are disposed on either side thereof to support large sheets of metal being worked upon, and the metal is merely slid along these tables, rivets having previously been inserted in holes formed in the work, until the rivets are between the press anvils, whereupon the operator admits pressure fluid to the cylinder 30 by a valve, not shown, to effect driving of the rivet. Release of the valve permits of ram lowering for moving the work to a new location.

While we have described our invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art, after understanding our invention, that various changes and

modifications may be made therein without departing from the spirit or scope thereof. We aim in the appended claims to cover all such modifications and changes.

We claim as our invention:

1. In a rivet press for securing angle members to a plate, an elongated rectangular bifurcated anvil the end faces thereof being adapted to engage parallel rows of rivets passed through holes in the angles and plate, the angle flanges of angle members entering between the bifurcated portions of the anvil, and a resiliently urged slidable element between said bifurcated portions adapted to engage the edges of said angle flanges to press the angle members into contact with the plate prior to and during rivet pressing.

2. In a rivet press for securing work members to one another and for simultaneously driving at least two spaced rivets in the work, a pair of anvil elements spaced apart and defining a space therebetween, a work holding member between said anvils and slidable relative thereto into work member engagement between the rivets, and means for pressing said work holding member toward the work for holding the work prior to and during the driving of the rivets.

3. A multiple rivet press comprising a pair of opposed anvils movable toward and away from one another, said anvils having elongated substantially rectangular flat faces adapted to engage a plurality of rivets, a movable ram detachably carrying one of said anvils, a work holding member slidably carried by said one anvil, a plurality of openings in said one anvil, and spring means in each of said openings, said spring means being interposed between said ram and work holding member to bias said holding member outwardly beyond the face of said one anvil and toward the other anvil.

4. In a multiple rivet press, a pair of anvils one of which is movable and both of which are of elongated substantially rectangular form to bridge and simultaneously squeeze two or more rivets in a single riveting operation, said movable anvil having formed therein a plurality of openings spaced lengthwise thereof, spring means in each of said openings, a relatively slidable holding member shaped to closely embrace said movable anvil, means movable with said member and spanning said openings and against which said springs bear at one end to urge said member normally outwardly and into engagement with the work to be riveted prior to the riveting operation, said means by its engagement with a part fixed with respect to said movable anvil being adapted to limit the extent of outward movement of said member, and means to move said movable anvil.

5. In a riveting machine, a support, a stationary anvil carried thereby, a slidable anvil movable toward and away from said stationary anvil, operating means for said slidable anvil comprising a link mechanism connected to the slidable anvil and a piston-cylinder assembly operatively connected to said link mechanism, said link mechanism being arranged to provide an operating stroke for the slidable anvil such that the mechanical advantage derived from the link mechanism increases as the slidable anvil approaches the stationary anvil, and abutment means movable into the path of movement of a part of said operating means to limit the return movement of the slidable anvil away from said stationary anvil and movable out of the path of

movement of said part to permit a maximum return movement of said slidable anvil.

6. In a riveting machine having a stationary anvil and a slidable anvil movable toward and away from said stationary anvil, operating means for said movable anvil comprising a toggle assembly connected to said slidable anvil and a piston-cylinder assembly having a piston rod operatively connected to said toggle assembly, and abutment means movable into the path of movement of a part of said operating means to limit the return movement of the slidable anvil away from said stationary anvil and movable out of the path of movement of said part to permit a maximum return movement of said slidable anvil.

7. In a riveting machine, a support, a stationary anvil carried thereby, a slidable anvil movable

toward and away from said stationary anvil, operating means for said movable anvil comprising a toggle link pivotally connected to said slidable anvil, a second toggle link pivotally connected to the support and to the first toggle link, a piston-cylinder assembly pivotally secured at one end to the support and a piston rod extending from the other end of said assembly and pivotally connected to said toggle links, and abutment means movable into the path of movement of a part of said operating means to limit the return movement of the slidable anvil away from said stationary anvil and movable out of the path of movement of said part to permit a maximum return movement of said slidable anvil.

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