May 30, 1944. P. VAN SITTERT ET AL 2,350,002

RIVETING TOOL

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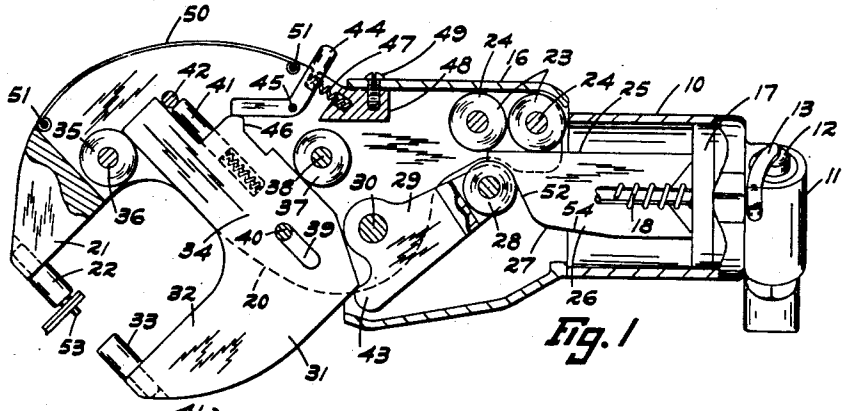

Fig. 1

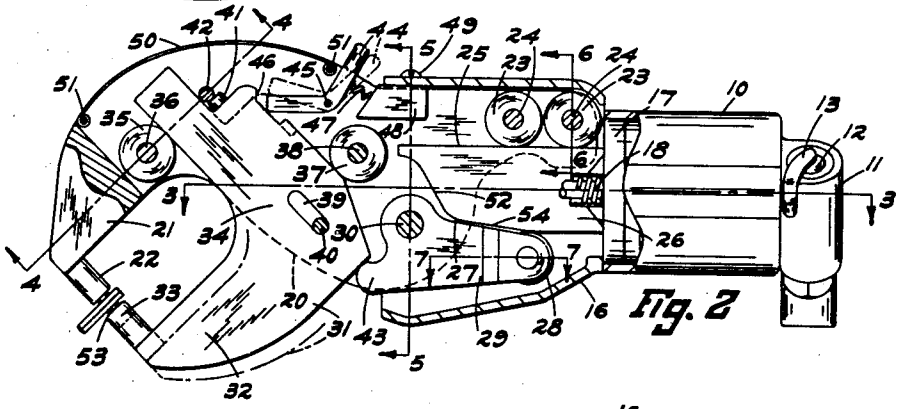

Fig. 2

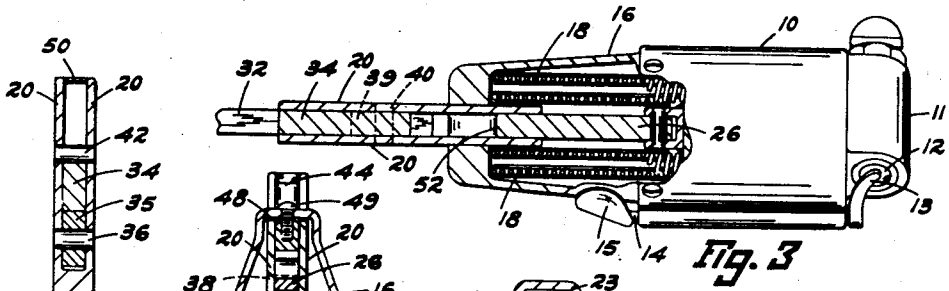

Fig. 3

Fig. 4

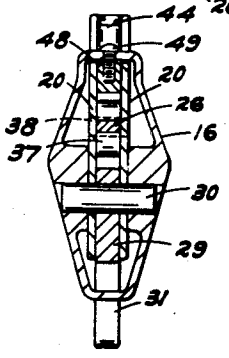

Fig. 5

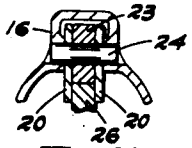

Fig. 6

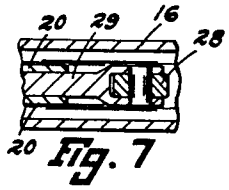

Fig. 7

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RIVETING TOOL

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Application December 11, 1941, Serial No. 422,602

6 Claims. (Cl. 78—48)

This invention relates broadly to portable tools for performing work such as riveting, stamping, punching, shearing or pressing, but more particularly to improvement in portable fluid actuated riveters with which pressure rather than impacts is applied on the rivet.

Such portable tools, often referred to as rivet squeezers, are well-known in the art. They include a motor housing having a yoke secured to its front end and carrying a riveting die adapted to cooperate with a riveting plunger operated by the motor. In such cases the die and plunger are disposed coaxially with the center axis of the motor or at right angles therewith. In this type of rivet squeezer, generally referred to as standard type, the depth of the throat of the yoke being rather small limits the use of this tool for riveting near the edge of the work. Efforts made to increase the depth of the throat have encountered objections caused by the yoke having to project laterally further from the center axis of the tool, resulting in a cumbersome and unbalanced front end incapable of reaching rivets located in confined places.

In an effort to overcome this difficulty, the standard type was modified to include a pair of pivotally mounted jaws each carrying a rivet die movable within an arc generally having its center on the center axis of the tool. This second type of tool, generally referred to as allegator type, while enabling the reaching of rivets located further away from the edge of the work, offers serious disadvantages resulting from the pivotal movement of the cooperating jaws and dies. The rivet squeezed between these dies will often have its head offset relative to the center axis of the rivet. In other words, the pressure applied on the rivet instead of being an axial pressure as that obtained with a standard tool, actually is exerted in oblique direction relative to the center axis of the rivet, causing the head of the rivet to be lopsided.

It is therefore an object of this invention to produce an improved rivet squeezer offering the advantages of the allegator type of riveters but equipped with parallelly movable jaws enabling axial pressure to be applied on the rivets.

Another object of this invention is to produce a rivet squeezer equipped with parallelly movable jaws located obliquely with respect to the handle of the tool, thereby resulting in a compact well balanced front end enabling the squeezing of rivets in places heretofore inaccessible by the allegator type of squeezer.

Another object of this invention is to produce a fluid actuated portable rivet squeezer or the like forming a simple and compact assembly which is strong, durable and efficient.

In the drawing:

Fig. 1 is a side elevational view mostly in section with some of the parts cut away to show details of construction of a rivet squeezer embodying the invention.

Fig. 2 is a view similar to Fig. 1 but showing some of the parts in a different position.

Fig. 3 is a longitudinal sectional view taken in a plane indicated by line 3—3 in Fig. 2.

Figs. 4, 5, 6 and 7 are cross sectional views taken in planes indicated by lines 4—4, 5—5, 6—6 and 7—7 respectively in Fig. 2.

Referring to the drawing, 10 and 16 represent the two parts of a housing, the part 10 being a cylinder formed at one end with an integral boss 11 having slidably therein a throttle valve 12 for controlling admission of the pressure fluid in the cylinder. The throttle valve is preferably operated by a latch 13 fastened at one end of a rod 14 which extends longitudinally through the wall of the cylinder and is terminated by an operating trigger 15. To the inner end of the cylinder 10 is secured a front housing part 16 which toward its front end is substantially of diamond cross sectional shape as shown in Fig. 5, while the other end resembles more closely the cross sectional shape of the cylinder 10.

Slidable within the cylinder part 10 there is a piston 17 actuated toward the front housing part 16 by means of pressure fluid such as compressed air controlled by the throttle valve 12 and preferably returned by means of compression springs 18.

Rigidly secured to the part 16 and projecting lengthwise from one end thereof, there are two parallel plates 20. These plates are especially shaped to accommodate component parts of the mechanism about to be described and have their outer ends united together by a solid block forming a jaw 21, which as shown is made an integral part of the plates but could be detachably secured thereto in any suitable way. The stationary jaw 21 carries a detachable riveting die 22. Within the front housing 16 there are mounted between the plates 20, two rollers 23 each carried by cross pin 24 supported by the plates 20 as well as the side walls of the front housing 16 as clearly shown in Fig. 6. These rollers are adapted to be engaged by the straight upper side 25 of a driving member or wedge 26 attached to the piston 17 for slidable movement therewith. This wedge extends between the plates 20 and has its lower side 27 en-

gaging a roller 28 rotatably carried by one end of a lever 29 also located between the plates 20 and pivotally supported by a cross pin 30 whch extends through the side walls of the housing part 16 as shown in Fig. 5.

Also slidable between the plates 20 there is an L-shaped member 31 having a portion extending below the plates to form a jaw 32 parallel to the stationary jaw 21 and carrying a riveting die 33 which is coaxial with the similar die 22. The member 31 is also provided with a guide portion 34 disposed at right angles from the jaw 32 and slidable between the plates 20 where it has one of its sides engaged by a roller 35 mounted between the plates 20 on a cross pin 36 and its other side engaged by a roller 37 also mounted between the plates 20 on a cross pin 38. In order to hold the member 31 between the plates 20, the guide portion 34 is provided with an elongated slot 39 through which passes the cross pin 40. Preferably the jaw 32 is constantly urged away from the jaw 21 by a spring pressed plunger 41 carried by the guide portion 34 and active against a cross pin 42 carried by the plates 20. The heel portion of the member 31 is engaged by the rounded end 43 of the lever 29 through which the jaw 32 is moved toward the jaw 21 upon pivotal movement of the lever resulting from the longitudinal movement of the wedge 26. For limiting the opening movement of the jaw 32 there is provided a pivotally mounted latch 44 located on a cross pin 45 between the plates 20 and having its inner end engageable with a stop 46 provided on the guide portion 34, while the other end of the latch projects upwardly from the plates 20 for manual operation, the latch being constantly urged into operative position by a compression spring 47 inserted between the latch 44 and a block 48 secured to the front housing part 16 by a set screw 49. In order to prevent admission of dust or the like between the plates 20, there is provided therebetween within the upper end thereof a cover 50 held in position by cross pins 51.

Operation.—With the parts positioned as shown in Fig. 1, when the throttle valve 12 is opened, motive fluid is admitted into the rear end of the cylinder 10 and creates pressure on the piston 17 for driving it together with the wedge 26 toward the left in Fig. 1, in which instance the longitudinal movement of the wedge due to the engagement of its specially shaped side wall 27 with the roller 28 will cause the pivotal movement of the lever 29 in clockwise direction in Fig. 1, resulting in the rounded end 43 of the lever to push the jaw 32 toward the stationary jaw 21. In this instance, it will be seen that during the initial movement of the wedge 26, its relatively sharply inclined portion 52 will cause a rapid pivotal movement of the lever 29 and the consequential rapid movement of the jaw 32 toward the jaw 21. This initial movement is calculated to bring the riveting die 33 in contact with the work or rivet 53 already engaged by the riveting die 22. Thereafter the roller 28 will be engaged by the relatively slow inclined portion 54 of the wedge 26 for imparting a slower movement of the jaw 32 toward the jaw 21 resulting in greater pressure of the riveting die 33 against the rivet 53 for upsetting the rivet. During this working stroke of the jaw 32, the guide portion 34 engaged by the rollers 35 and 37 is slidably guided therebetween to maintain the jaw parallel to the jaw 21 and consequently the riveting die 33 coaxial with the die 22.

When the piston 17 has reached the end of its working stroke, pressure fluid previously admitted into the rear end of the cylinder part 10 is exhausted and the piston and wedge are returned in their original position by means of compression springs 18. Concurrently the jaw 32 is driven in its original position by the spring pressed plunger 41 and acts on the lever 22 for also causing the latter to assume the original position shown in Fig. 1.

Normally the opening of the jaw 32 relative to the jaw 21 is controlled by the latch 44 engaging the stop 46. When desired, this latch may be rotated in clockwise direction in Fig. 1 by compressing the spring 47, causing the inner end of the jaw to be lifted relative to the stop 46 and enabling further opening of the jaw 32 until the cross pin 40 reaches the end of the slot 39, as shown in Fig. 1.

It will be noted that the distance between the roller 28 and the cross pin 30 of the lever 29 is materially greater than that between the rounded end 43 and the cross pin 30, thereby affording mechanical advantages or multiplication of power which is transmitted from the wedge 26 to the jaw 32.

From the foregoing description it is apparent that by disposing the jaws so as to form an obtuse angle with the housing, that is, disposing them in a manner similar to that of an S wrench, it is possible to increase the depth of the throat or opening between the jaws without necessitating excessive lateral projection of the stationary jaw on one side of the center axis of the tool. Through this novel disposition of the jaws, they extend about equally from opposite sides of the center axis of the tool, resulting in a compact and well balanced tool front end.

Although the foregoing description is necessarily of a detailed character, in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining and it is to be further understood that various rearrangements of parts and modifications of structural detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

We claim:

1. In a rivet squeezer, a housing, a power actuated piston slidable in said housing, a pair of parallel plates extending lengthwise of said housing through one end thereof, a stationary jaw carried by said plates, a second jaw carried between said plates for movement toward said stationary jaw in parallel relation therewith, means on said second jaw and disposed at right angles thereto to form slidable guide means between said plates for maintaining said second jaw in parallel relation with said stationary jaw, and means responsive to the slidable movement of said piston for imparting slidable movement to said second jaw.

2. In a rivet squeezer, a housing, a power actuated piston slidable in said housing, a pair of parallel plates extending lengthwise of said housing through one end thereof, a stationary jaw carried by said plates, a second jaw slidably fitted between said plates for slidable movement toward said stationary jaw, guiding means between said plates integral with and disposed at right angles to said second jaw for maintaining it in parallel relation with said stationary jaw, and means responsive to the slidable movement of said piston

for imparting slidable movement to said second jaw.

3. In a rivet squeezer, a housing, a pair of parallel plates extending lengthwise from one end of said housing, a stationary jaw carried by said plates, a second jaw including a guide portion slidable between said plates for movement of the second jaw toward the stationary jaw in parallel relation therewith, and guiding means between said plates and on said stationary jaw for said guide portion maintaining said second jaw parallel to said stationary jaw.

4. In a rivet squeezer, a housing, a pair of parallel plates extending lengthwise from one end of said housing, a stationary jaw carried by said plates, a substantially flat element including a guide portion slidable between said plates, a jaw portion movable toward the stationary jaw in parallel relation therewith, and guiding means between said plates for said guide portion maintaining said jaw portion parallel to said stationary jaw.

5. In a rivet squeezer, a housing, a power actuated piston slidable in said housing, a pair of parallel plates extending lengthwise of said housing through one end thereof, a stationary jaw carried by said plates, a second jaw held between said plates for movement toward said stationary jaw, said second jaw being substantially L-shaped and including a portion extending below said plates parallel with said stationary jaw, the other portion of said second jaw extending at right angles to form guide means slidable between said plates for maintaining said second jaw in parallel relation with said stationary jaw, and means responsive to the slidable movement of said piston for imparting slidable movement to said second jaw.

6. In a rivet squeezer, a housing, a power actuated piston slidable in said housing, a pair of parallel plates extending lengthwise of said housing through one end thereof, a stationary jaw carried by said plates, a substantially L-shaped member held between said plates, said member having a portion extending below said plates to form a second jaw parallel to said stationary jaw, the other portion of said member being at right angles to form guide means slidable between said plates for maintaining said second jaw in parallel relation with said stationary jaw, a lever pivoted intermediate its ends between said plates, a roller on one end of said lever, and the other end of said lever having a rounded portion in engagement with the heel portion of said L-shaped member, whereby actuation of said piston will effect engagement thereof with said roller to swing said lever on said pivot for imparting slidable movement to said second jaw.

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