Aug. 22, 1939. A. S. GORSHKOFF 2,170,323

RIVET SETTING DEVICE

Filed Feb. 15, 1939

Fig. 1.

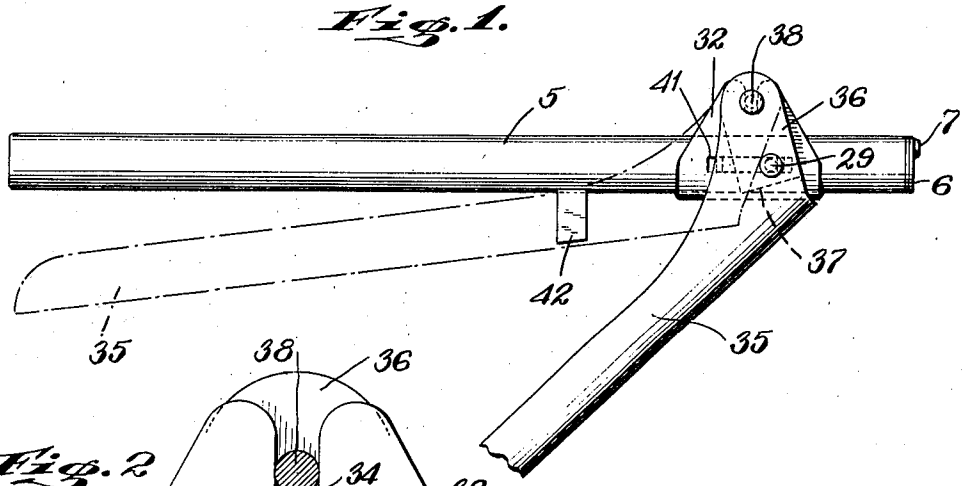


Fig. 2

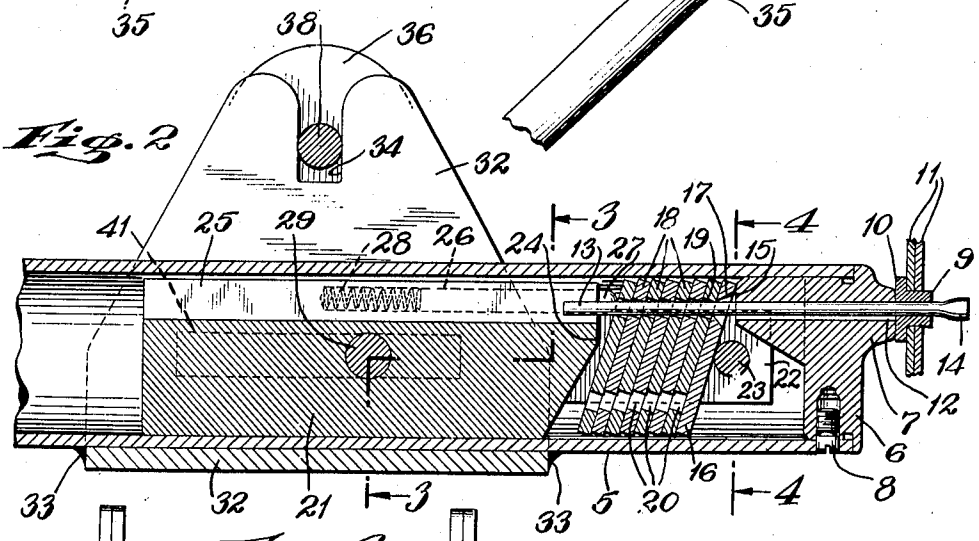


Fig. 3.

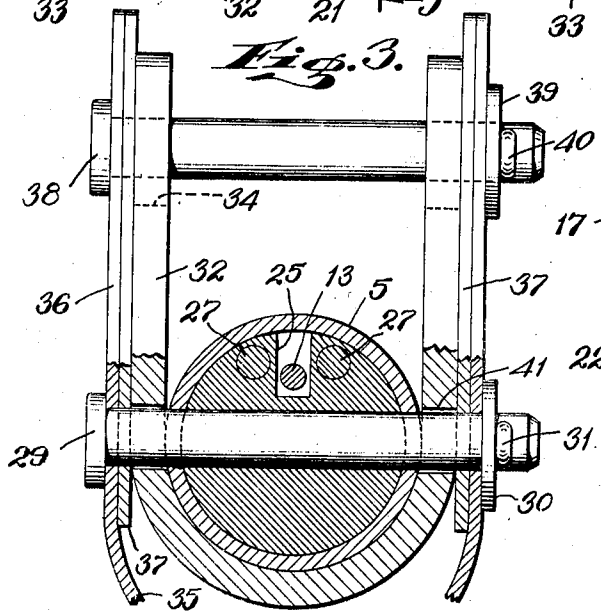
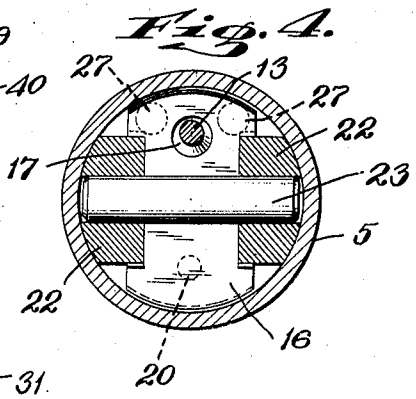


Fig. 4.



INVENTOR
ALEXIS S. GORSHKOFF
BY Cousins + Cousins
ATTORNEYS

Patented Aug. 22, 1939 2,170,323

UNITED STATES PATENT OFFICE

2,170,323

RIVET SETTING DEVICE

Alexis Serge Gorshkoff, New York, N. Y., assignor to Breeze Corporations, Inc., Newark, N. J.

Application February 15, 1939, Serial No. 256,485

6 Claims. (Cl. 218—19)

This invention relates to a device for setting hollow rivets.

Where it is desired to secure two pieces of material together it is not always possible to have access to both sides. Under such conditions it is common to drill a hole through both pieces of metal, insert a headed mandrel and a flanged rivet through the opening. The rivet is held in place while the mandrel is withdrawn therethrough so as to expand and upset the inner end of the rivet, so as to secure the two pieces of material together. This method of setting a rivet is well known in the art, as shown, for example, in Patent 2,075,162, issued to Begg, March 30, 1937.

The broad object of the present invention is to provide a manually operable rivet setting device which will be easy to operate but positive and rapid in its operation. A specific object of the invention is to provide a device which will be inexpensive to manufacture and which will not involve precise machining of a large number of parts.

In using devices of this character it is customary to mount a rivet on the mandrel and insert the mandrel into the rivet setting device before the rivet is applied to the work. Where the device is used in a vertical position with the mandrel pointing downward, there is always a likelihood that the mandrel and rivet will fall out of the rivet setting device before being applied to the work. Accordingly, a further object of the invention is to provide a rivet setting device in which means are included to prevent the mandrel from falling out even though the device is used in a vertical position. Specifically, an object of the invention is to provide a plurality of plates having aligned openings through which the mandrel may be inserted, the plates being under spring pressure so that they will grip the mandrel to prevent its accidental removal. A further, more specific object of the invention is to provide a plurality of plates as above described, which will grip a mandrel and draw the same through the rivets to accomplish the desired results.

The invention consists of the construction, combination and arrangement of parts, as herein illustrated, described and claimed.

In the accompanying drawing, forming part hereof, is illustrated one embodiment of the invention, in which drawing similar reference characters designate corresponding parts, and in which:

Figure 1 is a side elevation of the device, the operating handle being partially broken away;

Figure 2 is a vertical section taken longitudinally of the device, the rearward end of the main body being partially broken away;

Figure 3 is an enlarged vertical section taken approximately on line 3—3 of Figure 2, looking in the direction indicated by the arrows; and

Figure 4 is an enlarged vertical section taken approximately on line 4—4 of Figure 2, looking in the direction indicated by the arrows.

Referring to the drawing, 5 designates a casing which is preferably cylindrical and open on its rearward end. The front end of the casing 5 is provided with a closure member 6 and a projecting nose portion 7. The end portion 6 may be held in position on the casing 5 by means of an ordinary screw 8. As shown in Figure 2, a rivet 9 having a flange 10, is inserted through an appropriate opening in the two pieces of material 11 which are to be secured together. Extending through the member 6 from the nose 7 is a bore 12 which receives a mandrel 13 having a head 14. In the operation of the device the nose 7 is pressed against the flange 10 of the rivet 9 while the mandrel 13 is drawn through the rivet 9 to upset the rivet on the side opposite the flange 10. In this operation the head 14 is deformed so that a new mandrel is used for each rivet. Where aluminum rivets are used the head 14 is dimensioned so that it will pass through the rivets by displacing a portion of the aluminum. In this way the mandrel 13 may be re-used without deforming the head 14.

The rearward side of the closure 6 is formed with an extension 15. Disposed in the casing 5 immediately behind the extension 15 is a plurality of unconnected plates 16 and 18. As shown by Figure 4, the shape of the plates 16 and 18 may be substantially that of an I having a rounded top and bottom to fit the internal contour of the casing 5. If desired, the sides of the plates 16 and 18 may be straight rather than indented. The initial plate 16 is similar to the plates 18 except that the plate 16 is provided with a rearwardly tapering opening 17. The remaining plates 18 are provided with upper openings 19 which are not tapered. The object of the tapered opening 17 in the plate 16 is to permit easy insertion of the mandrel 13 through the openings 17 and 19 in the several plates. In Figure 2 seven plates 18 are illustrated. However, the number of plates 18, as well as the thickness of individual plates, may be varied to suit various conditions of work.

Near their lower extremities the plates 18 are provided with openings 20. The object of the

opening 20 is to permit the plates 18 to be inverted in order to double their service life.

Movably disposed in the casing 5 is a chuck 21. The forward end of the chuck 21, being the right hand end as viewed in Figure 2, is divided into two forwardly projecting extensions 22. The extensions 22 are of the shape shown in Figure 4. However, where straight sided plates 16 and 18 are used, the extensions 22 may be segmental in cross-section and fill all of the spaces in the casing 5 not occupied by the plates 16 and 18. Disposed through the extensions 22, but forwardly of the plates 16, is a stud 23 permanently secured in position.

The function of the stud 23 is to impose an eccentric load on the plates 16 when the chuck 21 is moved rearwardly of the casing 5. If desired, the stud 23 may be located well below the center line of the plates 16 so as to increase the eccentricity of the load applied to the plates 16 and 18. Between the extensions 22, the chuck 21 is provided with a forward wall 24 adapted to contact the most rearward plate 18, as hereinafter described.

On the upper face of the chuck 21 is formed a longitudinal slot 25 into which the rearward end of the mandrel 13 projects, as best shown in Figure 3. The purpose of the slot 25 is to permit the easy removal of the mandrel 13 through the rearward end of the casing 5 after the mandrel 13 has been drawn through the rivet 9. On either side of the slot 25 are formed recesses 26 in the chuck 21. Pins 27 operated by springs 28 are disposed in the recesses 26 to bear against the rear of the plates 18. The purpose of the pins 27 is to maintain the plates 18 and 16 at a slight angle, as shown in Figure 2. When the chuck 21 is moved rearwardly the plates 18 will not rest against the wall 15, but their angular displacement is limited by the angle of the lower portion of the wall 24. The parts as shown in Figure 2 are ready for the movement of the chuck 21 to the left so as to draw the mandrel 13 through the rivet 9. The chuck 21 is moved longitudinally of the casing 5, by means of a bolt 29 extending through the chuck 21 and the associated parts, yet to be described. The bolt 29 is provided with the usual washer 30 and split pin 31 to maintain the same in position.

Disposed around the casing 5 is a U-shaped bracket 32. The bracket 32 is secured to the casing 5 by means of seam welds 33 or by any other suitable means. The bracket 32 extends above the casing 5 and on its upper extremities is provided with complementary recesses 34. In order to operate the chuck 21 there is provided a handle 35 which may be of ordinary pressed metal, substantially U-shaped in cross-section. As an integral part, the handle 35 is provided with a U-shaped extension 36, substantially coextensive with the bracket 32. To re-inforce the extension 36 there are provided complementary, substantially rectangular plates 37 secured to the inner walls of the extension 36 by means of spot-welding or other suitable means. Where the metal of the handle 35 and extension 36 is of sufficient thickness, the re-inforcing plate 37 may be dispensed with.

Disposed through the upper portion of the extension 36 and plate 37 is a pivot 38 provided with the usual washer 39 and split pin 40 to retain the same in place. The pivot 38 passes through the recesses 34 in the bracket 32 so that the pivot 38 is free to move vertically or "float" in the recess 34. Longitudinally of the bracket 32, on a line with the bolt 29, are provided complementary slots 41 to permit the chuck 21 and bolt 29 to move upon operation of the handle 35. A stop member 42 is secured to the lower portion of the casing 5 to limit the upward movement of the handle 35.

The cycle of operation is as follows: A rivet 10 is mounted on a mandrel 13 and the mandrel is inserted in the bore 12 of the front portion 7. A tapered opening 17 is placed in alignment with the mandrel so that it may be easily forced through the openings 19 in the plates 18 and project into the slot 25. If desired, the chuck 21 may be moved to the right slightly from the position shown in Figure 2 which will cause the plates 16 and 18 to assume a position more nearly vertical. Movement of the plates 16 to the right is prevented by the rear wall 15 of the member 6. As the wall 24 of the chuck 21 contacts the rearward plate 18, the stud 23 will also move forward, permitting the plates 18 to assume a vertical position, thus aligning the holes 19 and permitting the mandrel 13 to be easily entered there-through. In the position shown in Figure 2, the spring pin 27 will bear against the upper portion of the plate 18, causing the edges of the opening 19 to bind against the mandrel 13. In this way accidental removal of the mandrel 13 by falling from the bore 12 is prevented, although the tool is used in a vertical position.

The device is placed against the work 11 with the rivet 9 and head 14 extending through the work. The handle 35 is operated to the dotted line position shown in Figure 1. This draws the chuck 21 with its extension 22 rearwardly or to the left of Figure 2. The stud 23 applies pressure to the plates 16, which is transmitted to the remaining plates 18. This causes the plates 18 to assume a position having a greater angle from the vertical and exerts pressure on the mandrel 13 to securely hold the same in position. Continued rearward motion of the chuck 21 moves the plates 18 and 16 rearwardly and draws the mandrel 13 through the rivet 9. It will be understood that the nose 7 is held firmly against the flange 10 of the rivet during the operation. As the mandrel head 14 is drawn through the rivet the head is de-formed. When the mandrel has been entirely drawn through the rivet, the handle 35 is returned to the full line position of Figure 1, which causes the wall 25 of the chuck 21 to bear against the rearward plate 18 and straighten the plates in the casing 5. As the openings 19 again become aligned, the mandrel 13 may be readily removed. The removal of the mandrel 13 may be accomplished by tilting the device. If the device is tilted upwardly the mandrel 13 will fall through the slot 25 and out through the rear end of the casing 5. If the device is tilted downwardly the mandrel 13 will fall forward, through the bore 12 to the outside of the device, and the device is ready for the repetition of the operation with a new mandrel 13 and a new rivet.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A device for setting hollow rivets comprising a casing having a portion to bear against a rivet, a plurality of plates disposed in the casing having apertures to receive a mandrel and means to move the plates to grip a mandrel and draw the same through a rivet.

2. A device for setting hollow rivets comprising a casing having a portion to bear against a rivet,

a plurality of plates loosely and movably disposed in the casing having apertures to receive a mandrel and means to move the plates to grip a mandrel and draw the same through a rivet.

3. A device for setting hollow rivets comprising a casing having a portion to bear against a rivet, a plurality of plates disposed in the casing having apertures to receive a mandrel and means comprising a slidable member surrounding the plates and a lever to move the member to move the plates to grip a mandrel and draw the same through a rivet.

4. A device for setting hollow rivets comprising a casing having a nose portion to bear against a rivet, said nose portion being formed with a bore to receive a mandrel, a chuck movable in the casing, said chuck comprising a slidable block having complementary side extensions joined by a cross member, and a plurality of plates loosely disposed within the confines of the chuck and movable therewith, said plates being formed with openings to receive a mandrel and adapted to be subjected to angular stress upon movement of the chuck to grip and draw the mandrel through the rivet.

5. A device for setting hollow rivets comprising a casing having a nose portion to bear against a rivet, said nose portion being formed with a bore to receive a mandrel, a plurality of plates disposed in the casing, said plates having openings in alignment with the bore and adapted to receive the mandrel, said plates being in a plane substantially normal to the longitudinal axis of the device, spring means acting on the plates to effect an angular displacement thereof to grip a mandrel and means to move the plates to draw a mandrel through a rivet.

6. A device for setting hollow rivets comprising a casing having a nose portion to bear against a rivet, said nose portion being formed with a bore to receive a mandrel, a plurality of plates disposed in the casing, said plates having openings in alignment with the bore and adapted to receive the mandrel, said plates being in a plane substantially normal to the longitudinal axis of the device, spring means acting on the plates to effect an angular displacement thereof to grip a mandrel and means to move the plates to draw a mandrel through a rivet, comprising a movable block having a portion surrounding the plates and a pivoted handle to move the block.

ALEXIS S. GORSHKOFF.