

March 30, 1937.

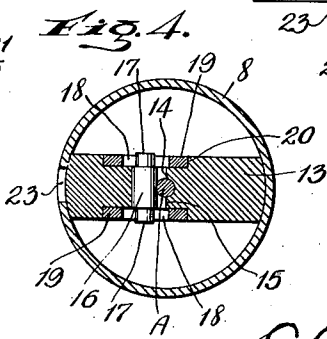
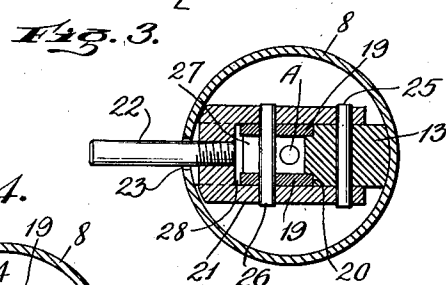
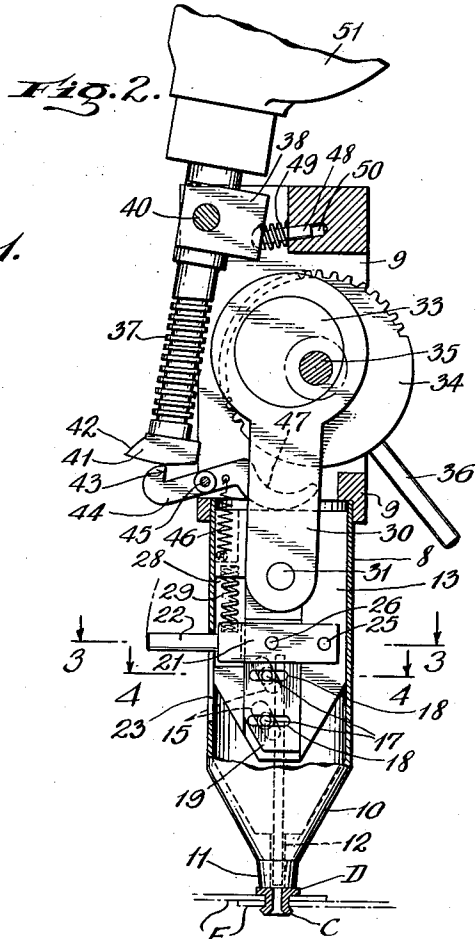
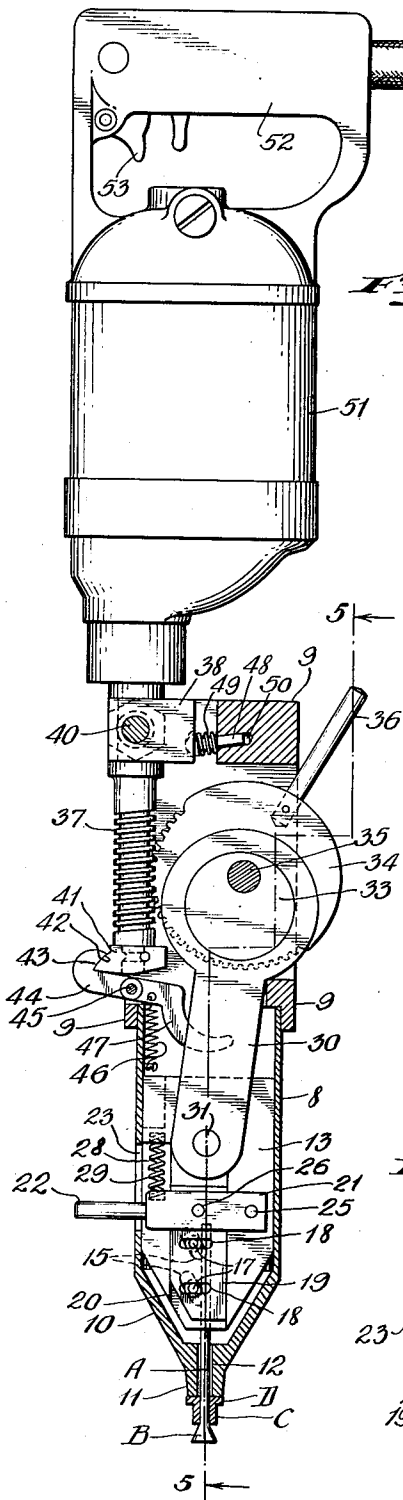
R. H. BEGG

2,075,162

RIVET SETTING DEVICE

Filed April 4, 1934

2 Sheets-Sheet 1



INVENTOR
ROSS H. BEGG
BY
C. C. Cousins
ATTORNEY

March 30, 1937.

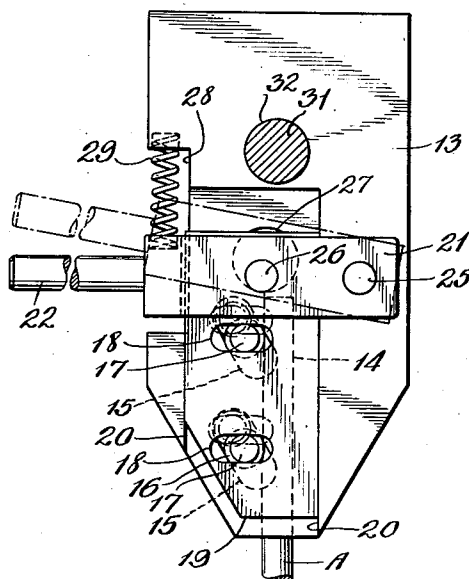
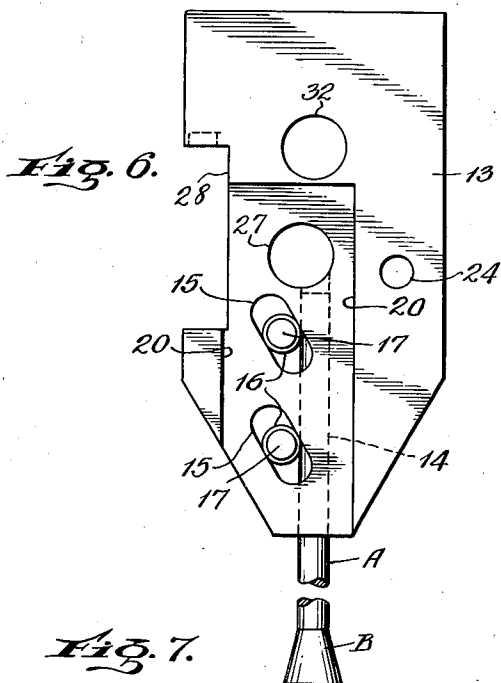
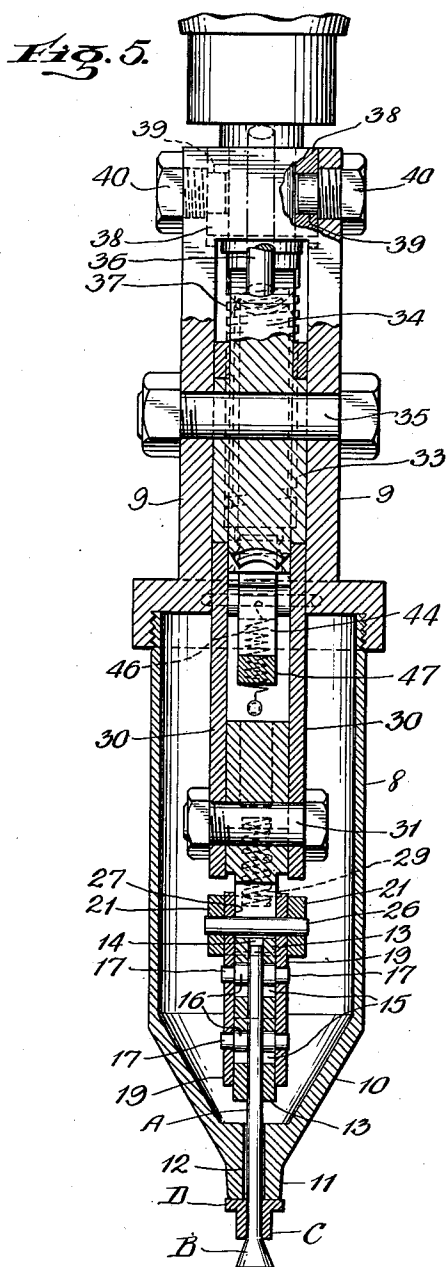
R. H. BEGG

2,075,162

RIVET SETTING DEVICE

Filed April 4. 1934

2 Sheets-Sheet 2



INVENTOR
ROSS H. BEGG

BY

C. C. Cousins
ATTORNEY

UNITED STATES PATENT OFFICE

2,075,162

RIVET SETTING DEVICE

Ross H. Begg, North Haledon, N. J., assignor to
Breeze Corporations, Inc., Newark, N. J.

Application April 4, 1934, Serial No. 718,934

17 Claims. (Cl. 218—19)

This invention relates to a device for setting hollow rivets.

Where it is desired to rivet two pieces of material together it is not always possible to have access to both sides of the work. Under such conditions it is usual to apply a hollow rivet in the following manner: A hole sufficiently large to receive a rivet is punched or drilled in the two pieces of material to be secured together. A hollow rivet having a flange thereon is mounted on the shank of a headed mandrel. The head of the mandrel and the rivet are inserted in the hole provided, the rivet is held in place by pressure applied to the flange thereof and the mandrel is drawn through the rivet to deform and spread the end thereof opposite the flange. The broad object of this invention is to provide a tool or machine to hold a rivet in position and draw a headed mandrel therethrough.

Depending upon the size of the rivet, considerable force may be necessary to draw the mandrel through the rivet. It is not desirable to use manual means for this purpose. Therefore, a further object of this invention is to provide a motor driven means to draw the headed mandrel through the rivet. To this end, a further specific object of the invention is to provide a driving worm and a worm wheel with eccentrics thereon to reciprocate a mandrel holding means.

Where a power driven, reciprocating mandrel holding means is used it is desirable to stop the operation of the mandrel holding means at the top of its stroke. If the mandrel were again forced through the rivet after it has once been withdrawn, it might cause damage to the rivet. It is also desirable that the operator know when the mandrel has been entirely withdrawn through the rivet, so that the tool will not be removed from the rivet until the mandrel is entirely removed. Therefore, a further object of the invention is to provide means to automatically stop the motion of the mandrel holding device when the mandrel has been entirely drawn through the rivet and at the same time indicate to the operator that the operation is complete.

When the mandrel is drawn through the rivet the head of the mandrel is deformed so that a new mandrel is used for each operation. Accordingly, it is desirable to provide a mandrel holding means which will permit the easy removal and insertion of mandrels. Therefore, a specific object of the invention is to provide a mandrel holding chuck which will hold the mandrel firmly in place while the mandrel is drawn through the rivet, but which will not bind the

mandrel so that it may be quickly removed and another mandrel substituted.

A further object of the invention is to provide a simple, inexpensive device, easy and positive of operation but fast in action.

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

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

Figure 1 is a vertical section, the driving means being in elevation, showing the position of the parts at the beginning of the riveting operation;

Figure 2 is a vertical section, partly in elevation, showing the position of the parts at the conclusion of the riveting operation;

Figure 3 is a horizontal section taken approximately on line 3—3 of Figure 2, looking in the direction indicated by the arrows;

Figure 4 is a horizontal section taken approximately on line 4—4 of Figure 2, looking in the direction indicated by the arrows;

Figure 5 is an enlarged vertical section taken approximately on line 5—5 of Figure 1, looking in the direction indicated by the arrows;

Figure 6 is an enlarged front elevation of the mandrel holding chuck; and,

Figure 7 is a front elevation of the chuck shown in Figure 6, together with its associated parts.

Referring to the drawings, 8 designates a cylindrical housing to which is joined a substantially rectangular open-sided housing 9. The housings or casings 8 and 9 contain all of the operative parts of the device with the exception of the motor driving means. The lower end of the housing 8 is tapered as shown at 10 and terminates in a squared nose 11. The nose 11 is provided with a bore 12 to receive the shank of a mandrel A having a tapered head B. A hollow rivet C is carried on the mandrel A and is provided with a flange D adapted to abut the nose 11, and to lie against one of the plates E which are to be joined together as shown in Figure 2.

Disposed in the housing 8 is a chuck body 13 having a bore 14 to receive the shank of the mandrel A. The bore 14 registers with the bore 12. As best shown in Figures 6 and 7 the chuck body 13 is provided with a plurality of slots 15 formed at an angle to the bore 14. The lower ends of the slots 15 merge with the bore 14 and gripping rolls 16 are disposed in the slots 15.

The rolls 16 are adapted to bear against the mandrel A to hold the mandrel firmly in position. As shown in Figure 6 longitudinal pressure downwardly on the mandrel A, or, conversely, upward movement of the chuck 13 against the resistance of the mandrel A, will cause the rolls 16 to grip the mandrel A more firmly and hold it in place.

The ends of the gripping rolls 16 are reduced as shown at 17, and are carried in horizontal slots 18 in control plates 19. The control plates 19 are slidable on the chuck body 13 in recesses 20 which form guideways for the plates 19. A forked lever 21 is provided to move the control plates 19 and has an extension 22 which projects through a slot 23 in the housing 8. A hole 24 is provided in the chuck body 13 through which is disposed a pivot 25 to hold the lever 21 to the chuck body 13. The lever 21 is secured to the plates 19 by means of a pivot 26. An opening 27 is provided through the chuck body 13 to permit movement of the pivot 26. A recess 28 is formed in the chuck body 13 to receive the transverse portion of the lever 21 and also to receive a spring 29 to exert downward pressure on the lever 21. The pressure of the spring 29 forces the plates 19 downward. The rolls 16 are carried downward by the slots 18 in the plates 19, and therefore caused to bear against the mandrel A to hold it firmly in place.

The chuck 13 is moved in the casing 8 by means of straps 30 which are connected to the chuck 13 by means of a shaft 31 disposed through an opening 32 in the chuck 13. The upper ends of the straps 30 surround eccentrics 33 on a worm wheel 34 which is rotatable on a shaft 35. The worm wheel 34 carries a projecting member 36 for manual operation thereof as hereinafter described. As shown in Figures 1 and 2 the wheel 34 is not provided with teeth around its entire periphery, but as will be shown hereinafter, this is not necessary since the teeth on only one portion of the wheel 34 are used.

Adjacent the worm wheel 34 and in engagement with the teeth thereof is a worm 37. At the point where the worm 37 enters the housing 9, the worm 37 is reduced and is carried in a bearing 38. The bearing 38 is provided with recesses 39 to receive the inner ends of studs 40. With this construction the worm 37 is free to rotate on its vertical axis and at the same time the bearing 38, together with the worm 37 may be rocked on a horizontal axis.

The lower end of the worm 37 is carried in a bearing 41 which is provided with a lip 42. The lip 42 of the bearing 41 is normally engaged by a hooked portion 43 of a lever 44 carried on a pivot 45 in the housing 9. A spring 46 has its ends connected respectively to the lever 44 and the housing 9 so as to maintain the hook 43 in engagement with the lip 42 on the bearing 41. The lever 44 on its inner end is provided with a curved extension 47 in the path of movement of the chuck 13.

Disposed adjacent the bearing 38 is a plunger 48, provided with a spring 49. The plunger 48 is carried in a recess 50 in the upper part of the housing 9 and bears against the bearing 38 for the purpose hereinafter described.

The upper end of the worm 37 is connected to the shaft of a driving motor generally designated as 51. The driving means 51 may be of a type in common use for drilling and similar work, and the worm 37 may be connected thereto in any suitable manner. The casing of the motor 51 is

provided with the usual hand grip 52 and the usual trigger switch 53 to start and stop the motor 51. The usual cable 54 is provided to supply electric current from a source of power to the motor 51. It will be obvious that other means to rotate the worm 37 might be substituted for the motor 51, but the motor 51 is desirable for speed, power and ease of operation.

The operation of the device is as follows:

The rivet C is first placed on the mandrel A. The lower edge of the rivet C will abut the tapered head B of the mandrel A. The mandrel A is then inserted in the chuck 13. In order to insert the mandrel A the chuck 13 is placed in the position shown in Figure 1. The control plate lever 21 is operated by the extension 22 to the dotted line position shown in Figure 7. This draws the control plates 19 upward and carries the gripping rolls 16 to the upper extremities of the angular slots 15. The shank of the mandrel A may then be inserted through the bore 12 in the nose 11 and into the bore 14 in the chuck 13. When the mandrel A has been inserted to a point where the flange D of the rivet C abuts the nose 11, the lever 21 is released and the rolls 16 grip the shank of the mandrel A in the bore 14.

At this time the worm 37 is in engagement with the teeth of the worm wheel 34 and the parts are in the position shown in Figure 1. The head B of the mandrel A and the rivet C are entered in the opening formed in the plates E. The tool is pressed against the flange D on the rivet C and the trigger switch 53 is operated to apply power to the motor 51 and cause rotation of the worm 37. As the worm 37 rotates the wheel 24 is turned on its shaft 35 and carries with it the eccentrics 33 which draw the straps 30 upward thereby drawing the mandrel A through the rivet C. As the pressure is applied the head B of the mandrel A spreads the inner end of the rivet C. As the head B encounters the resistance of the plates E together with the resistance of the rivet C, the head A will itself become deformed so that it may be drawn through the rivet C. When the head B of the mandrel A is drawn through the rivet C the rivet C is securely set in place as shown in Figure 2. The chuck 13 moves sufficiently to draw the mandrel A and what was the head B entirely within the bore 12.

As the mandrel A is drawn within the bore 12 the upper end of the chuck 13 strikes the extension 47 on the lever 44 and rocks the lever 44 on its pivot 45 thereby disengaging the hook 43 from the lip 42 of the bearing 41. When the lip 42 is released from the hook 43 the worm 37 quickly disengages from the wheel 34 and moves to the position shown in Figure 2. The spring pressed plunger 48 assists to a certain extent in moving the worm 37 out of engagement with the wheel 34. However, this action, which is referred to as a "breaking" action, is principally due to the fact that the line of force from the handle 52 where manual pressure is applied to the rivet C is not straight. The line of force is through the axis of the worm 37 and is then offset and continues from the center of the shaft 35 through the axis of the mandrel A. Therefore, since pressure is applied to hold the flange D of the rivet C against the plates E, when the lower end of the worm 37 is released the machine immediately "breaks".

When the riveting operation is complete the parts are in the position shown in Figure 2 and the wheel 34 is returned to the position shown in

Figure 1 by operation of the extension 36. The extension 36 may be permanently secured on the wheel 34 or may be a separate element insertable therein. In fact, the extension 36 could be eliminated except that it gives greater leverage to return the wheel 34 to position. When the wheel 34 is returned to the position shown in Figure 1 the worm 37 is again placed in engagement with the wheel 34. The plunger 48 has merely maintained the worm 37 out of inadvertent engagement. The lower end of the mandrel A will now project from the bore 12. The lever 21 is operated to release the mandrel A, which is withdrawn and a new mandrel A with a rivet C thereon is inserted in the chuck 13, and the machine is ready to set another rivet.

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

1. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a housing having a portion thereof adapted to bear against a rivet, a mandrel receiving chuck movable in the housing, a driven worm and worm wheel and means connecting the worm wheel and chuck to move the chuck.

2. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a member to bear against a rivet, a chuck to receive a mandrel, a rotatable wheel having an eccentric thereon, connecting means between the chuck and the eccentric and means to rotate the wheel.

3. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a member to bear against a rivet, a chuck to receive a mandrel, a driven worm, a worm wheel provided with an eccentric and connecting means between the eccentric and the chuck.

4. A device of the character described comprising a casing having a nose portion to bear against a rivet, said nose portion having a bore to permit the passage of a mandrel, a mandrel holding member movable in said casing and provided with a mandrel receiving bore in alignment with the bore in said nose portion, means to move the chuck and a driven worm to operate the chuck moving means.

5. A device of the character described comprising a casing having a nose portion to bear against a rivet, said nose portion having a bore to permit the passage of a mandrel, a mandrel holding member movable in said casing and provided with a mandrel receiving bore in alignment with the bore in said nose portion, means to move the chuck comprising a gear having eccentrics thereon and connecting means between the eccentrics and the chuck and a driven worm to turn the gear.

6. A device of the character described comprising, in combination, a casing, a mandrel receiving chuck movable in the casing, a gear, means on the gear to reciprocate the chuck, connecting means between the reciprocating means and the chuck, a shaft to drive the gear and a motor to drive the shaft.

7. A device of the character described comprising, in combination, a casing, a mandrel receiving chuck movable in the casing, a worm wheel provided with an eccentric, a strap connecting the eccentric and the chuck, a worm to turn the worm wheel and a motor to drive the worm.

8. A device of the character described comprising,

in combination, a member to bear against a rivet, a mandrel receiving element movable with relation to said member, a worm wheel provided with eccentrics, straps connecting the eccentrics and the mandrel receiving element, a worm to turn the worm wheel and means to rotate the worm.

9. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a member to bear against a rivet, a chuck to receive a mandrel and draw it through a rivet, means to move the chuck and means disposed in the path of movement of the chuck to automatically indicate when a mandrel has been entirely drawn through a rivet.

10. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a member to bear against a rivet, a chuck to receive a mandrel and draw it through a rivet, means to move the chuck and means disposed in the path of movement of the chuck to automatically stop the movement of the chuck when a mandrel has been drawn clear of a rivet.

11. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a member to bear against a rivet, a chuck to receive a mandrel, a worm and worm wheel assembly to move the chuck and means to automatically disengage the worm from the worm wheel when a mandrel has been drawn clear of a rivet.

12. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a member to bear against a rivet, a chuck to receive a mandrel, a worm and worm wheel assembly to move the chuck and means to automatically disengage the worm from the worm wheel when a mandrel has been drawn clear of a rivet comprising a pivoted hook in the path of movement of the chuck, said worm being normally maintained in engagement with the worm wheel by the hook.

13. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a member to bear against a rivet, a chuck to receive a mandrel, a worm and worm wheel assembly to move the chuck, said worm being carried on a pivot and held in engagement with the worm wheel and means to permit the worm to rock on its pivot to a position out of engagement with the worm wheel.

14. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a mandrel holding means comprising a chuck provided with a bore to receive a mandrel, said chuck having slots formed therein which merge with the bore and gripping elements in the slots to hold a mandrel in the bore.

15. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a mandrel holding means comprising a chuck provided with a bore to receive a mandrel, said chuck having slots formed therein which merge with the bore, control plates movable with relation to the chuck and mandrel gripping rolls disposed in the slots and engaged by the plates.

16. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a mandrel holding means comprising a chuck provided with a bore to receive a mandrel, said chuck having slots formed therein which merge with the bore, mandrel gripping rolls disposed in the slots, control plates adjacent the chuck in engagement with the rolls and means operable through the plates to releasably maintain the rolls against a mandrel in the bore.

17. In a device for setting hollow rivets by drawing a headed mandrel through a rivet, a mandrel holding means comprising a chuck provided with a bore to receive a mandrel, said chuck
5 having slots formed therein which merge with the bore, mandrel gripping rolls disposed in the slots, control plates adjacent the chuck in engagement

with the rolls and means operable through the plates to releasably maintain the rolls against a mandrel in the bore comprising a spring pressed member pivoted on the chuck and connected to the plates.

ROSS H. BEGG.