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METHOD OF SETTING RIVETS

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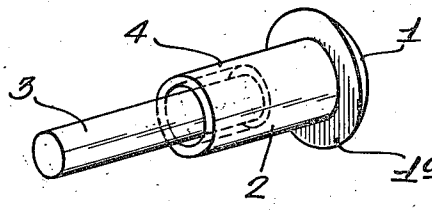


FIG. 1.

FIG. 2.

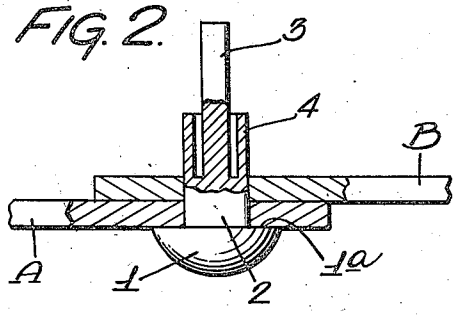


FIG. 3.

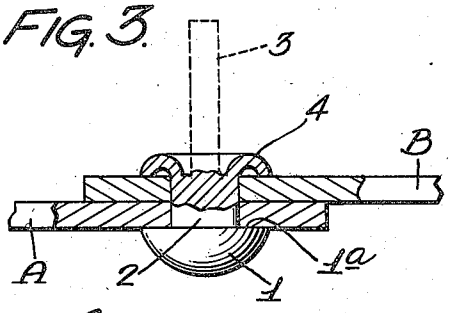


FIG. 4.

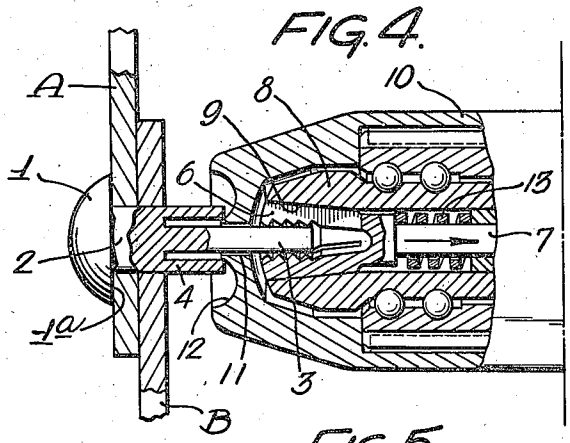
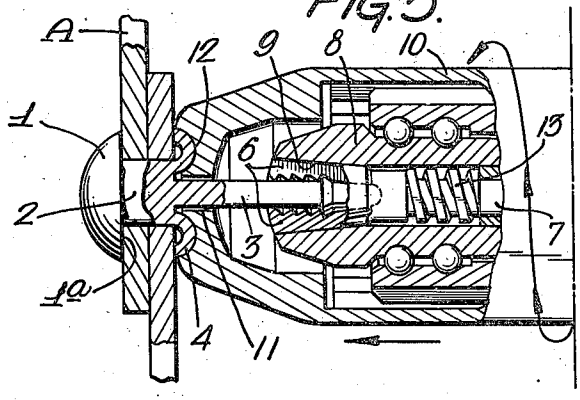


FIG. 5.



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METHOD OF SETTING RIVETS

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2 Claims. (Cl. 218—29)

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This invention relates to new and useful improvements in riveting, and more particularly to the setting of rivets adapted for application from one side only of the work to be riveted together.

In the construction and assembly of structures of metal and other materials one generally employed method of attaching pieces of material is by riveting, and this is particularly true in the case of aircraft and similar structures where many of the parts are shaped and arranged so that there is not sufficient clearance or space for the use or insertion of the usual bucking bars. In such instances, it is necessary either to employ a type of rivet that may be applied from one side only of the work, or to employ a mode of assembly other than riveting.

It is known that rivets of the type which may be applied from only one side of the work are to be found in the prior art. However, such rivets for the most part consist of a plurality of separable parts and are generally objectionable in that the several parts must be assembled and also held in assembled relation while the rivet is inserted through the work to be riveted together. This requires time and care on the part of the user and generally slows down production. Furthermore, such rivets when secured in place are generally of the open or "eyelet" type and this is neither adequate nor desirable for many classes and kinds of work.

The present invention, therefore, contemplates certain improvements in the setting of rivets of the type that may be applied from one side only of the work, and the principal object of the invention is to provide a novel method of setting a rivet of the type described which comprises an integral and unitary structure.

A still further object is to provide a novel method for setting or securing a rivet made according to the present invention.

These and other objects of the invention and the various features and details of the construction and application thereof are hereinafter fully set forth and shown in the accompanying drawing, in which:

Figure 1 is a view in perspective of a rivet embodying the present invention;

Figure 2 is a view partially in section showing the rivet inserted through aligned openings in a pair of structural plates and in position to be set;

Figure 3 is a view similar to the disclosure in Figure 2 showing the rivet applied or set; and

Figures 4 and 5 are diagrammatic views partially in section showing the manner or method by which the rivet may be set.

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Referring now more particularly to the drawing, a rivet embodying the present invention comprises essentially integral and unitary head and shank portions 1 and 2, respectively. As shown, the shank 2 is of a predetermined diameter less than that of the head 1 and includes a coaxially extending neck portion 3 of reduced diameter and a shoulder flange portion 4 disposed in radially spaced concentric relation with respect to said neck portion 3.

The neck portion 3 of the shank projects outwardly beyond the spaced concentric shoulder flange 4 as shown, and the base of the said neck 3 and the base of said shoulder flange 4 reside in a common plane which lies cross-sectionally of the shank 2 in predetermined axially spaced relation with respect to the adjacent or under face 1a of the rivet head 1. In practice, and as shown in Figure 2 of the drawing, the distance or space between the under face 1a of the rivet head 1 and the plane of the bases of the neck 3 and flange 4 preferably is equal to the thickness of the two or more pieces of material that are to be secured together by the rivet. Too, the axial length and radial thickness of the shoulder flange 4 in a given rivet may vary according to the size and nature of the pieces of material to be riveted together.

As illustrative of the manner of applying the rivet of the present invention there is shown, in Figure 2, a pair of overlying metal plates A and B suitably drilled for attachment by a rivet which is inserted through the plate holes as indicated. With the rivet positioned as shown in said Figure 2 it may then be finally "set" by grasping the neck portion 3 thereof and exerting a pull axially on the rivet in a direction away from the sheet B to seat and hold the rivet head 1 firmly against the sheet A and, at the same time, the shoulder flange 4 is spun and thereby rolled outwardly over and onto the adjacent surface of said sheet B. The projecting neck portion 3 of the rivet then may be broken away to provide a riveted joint constructed and arranged as shown in Figure 3 of the drawing.

One form of device for setting the rivet is shown in Figures 4 and 5 of the drawing. This device may comprise a pair of cooperable jaws 6 carried on the outer end of a shaft 7 which is mounted for axial movement within a fixedly mounted tubular bushing 8. The interior surface of the bushing 8 at the outer end thereof is inclined or beveled as indicated at 9 and corresponding inclined surfaces are provided on the outer lateral surfaces of the jaws 6 as shown.

Mounted exteriorly of the fixed bushing 8 for both rotary and longitudinal sliding movement with respect thereto is a sleeve 10 the outer end of which is provided with an axial opening 11 and formed as indicated at 12 to provide a tool for spinning or rolling over the rivet shoulder flange 4. Normally, when the device is not in use, the shaft 7 and jaws 6 are held in their outermost position longitudinally with respect to the bushing 8, and with their end faces abutting the inner end face of the sleeve 10, by means of a spring 13. With the jaws 6 held in this position by said spring 13 they reside outwardly along the inclined surfaces 9 of the bushing a distance sufficient to permit said jaws to open to an extent to permit insertion therebetween of the neck 3 of the rivet.

When the rivet neck 3 is inserted inwardly of the end opening 11 of the sleeve 10 and between the jaws 6, as aforesaid, the shaft 7 and said jaws 6 are retracted or actuated relative to the fixed bushing 8 in the direction of the arrow (Fig. 5) against the action of the spring 13, thereby causing the surfaces 9 of the bushing to cam the jaws 6 toward each other and clamp the neck 3 of the rivet therebetween, as shown. The rivet is thus firmly held in place with its head 1 against plate or sheet A, and while the rivet neck is held in this manner by the jaws 6, the sleeve 10 is driven rotationally and, at the same time, advanced relative to the bushing 8 toward the sheet or plate B, thereby causing the tool end 12 of said sleeve to engage and spin or roll the rivet shoulder flange 4 outwardly over and onto the adjacent surface of the sheet or plate B as shown in Figure 5 of the drawing. The sleeve 10 is then retracted and the pull on shaft 7 released, whereupon the spring 13 actuates the jaws forwardly or outwardly of the bushing causing them to release their grip upon the rivet neck 3 and the device then may be removed and the rivet neck 3 broken away to provide the riveted joint construction of Figure 3.

From the foregoing it will be seen that the present invention provides a novel method of setting a rivet that may be applied from one side only of the work and which is of unitary solid construction providing high resistance to shear stresses.

While particular embodiments of the invention have been herein illustrated and described, it is not intended that the invention be limited to such disclosures but that changes and modifications may be made and embodied therein within the scope of the claims.

We claim:

1. A method of riveting which comprises providing a solid unitary headed rivet having an integral solid shank portion to extend through an opening in a structure to be riveted and including a coaxially extending plain surfaced neck portion of reduced diameter and a radially spaced concentric shoulder flange portion arranged both integral with said shank portion and adapted to project beyond the structure with the neck portion projecting beyond said flange portion, and setting the rivet after inserting the same through said opening by gripping the plain surface of and applying an outward pull on the projecting neck portion of the rivet and simultaneously engaging the radially spaced concentric shoulder flange and circularly spinning and thereby axially rolling the same outwardly over and onto the adjacent surface of the structure to be riveted.

2. A method of riveting which comprises providing a solid unitary headed rivet having an integral solid shank portion to extend through an opening in a structure to be riveted and including a coaxially extending plain surfaced neck portion of reduced diameter and a radially spaced concentric shoulder flange portion arranged both integral with said shank portion and adapted to project beyond the structure with the neck portion projecting beyond said flange portion, setting the rivet after inserting the same through said opening by gripping the plain surface of and applying an outward pull on the projecting neck portion of the rivet and simultaneously engaging the radially spaced concentric shoulder flange and circularly spinning and thereby axially rolling the same outwardly over and onto the adjacent surface of the structure to be riveted, and then breaking away and removing the solid integral neck portion of the rivet adjacent the rolled shoulder.

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