Aug. 22, 1944. I. ROSSI ET AL 2,356,619

FASTENER

Filed April 19, 1941 2 Sheets-Sheet 1

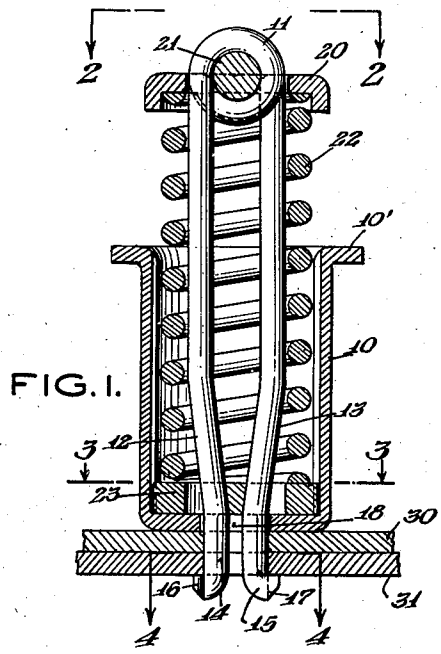


FIG. 1.

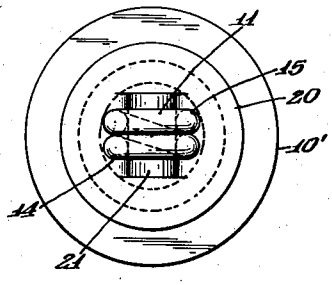


FIG. 2.

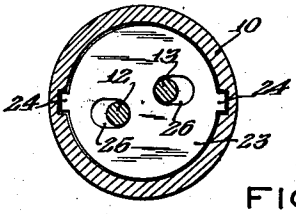


FIG. 3.

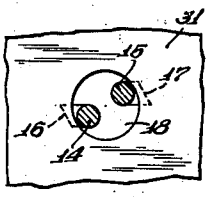


FIG. 4.

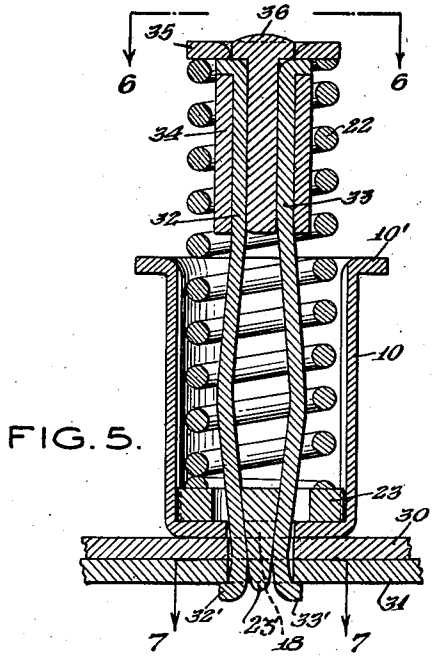


FIG. 5.

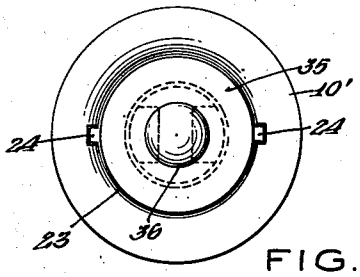


FIG. 6.

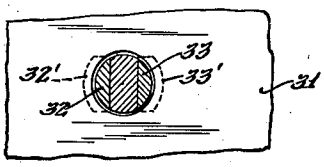


FIG. 7.

INVENTORS
Irving Rossi
Peter F. Rassmann
BY Hul Rau
ATTORNEY

Aug. 22, 1944. I. ROSSI ET AL 2,356,619

FASTENER

Filed April 19, 1941 2 Sheets-Sheet 2

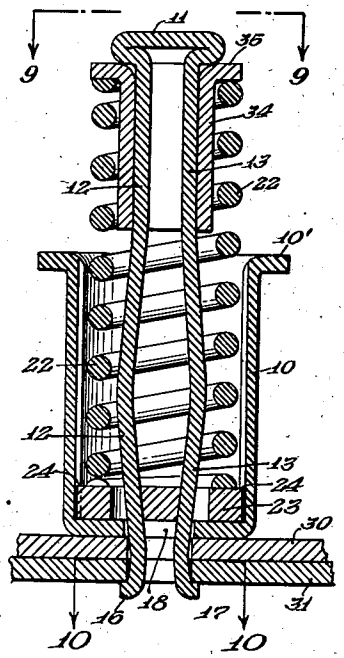


FIG. 8.

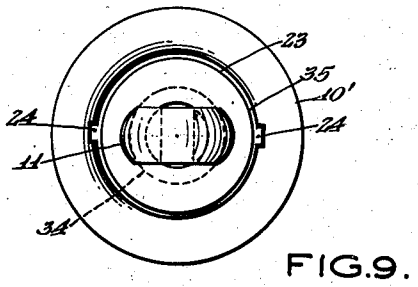


FIG. 9.

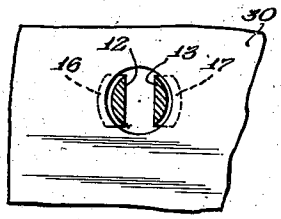


FIG. 10.

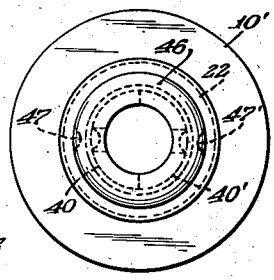


FIG. 13.

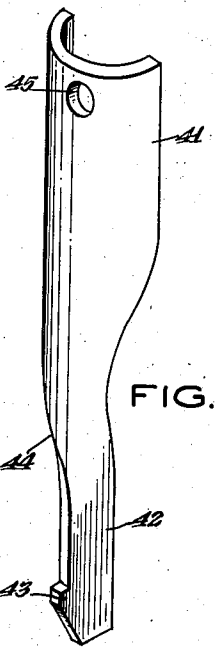


FIG. 12.

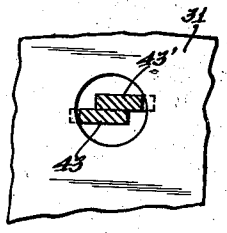


FIG. 14.

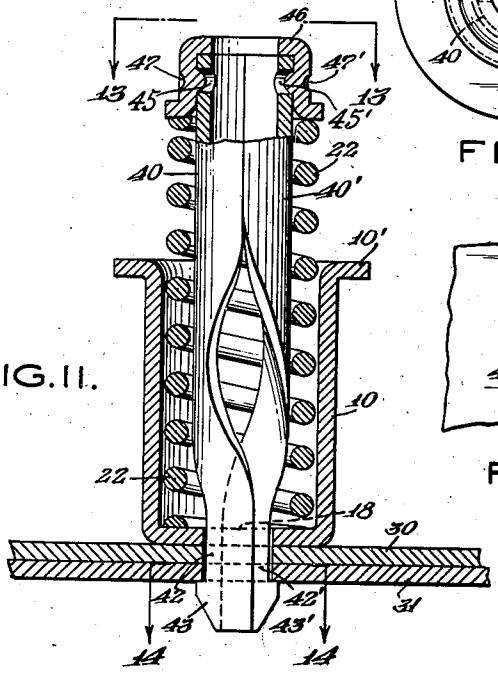


FIG. 11.

INVENTORS
Irving Rossi
Peter F. Rossmann
BY Karl Nau
ATTORNEY

Patented Aug. 22, 1944

2,356,619

UNITED STATES PATENT OFFICE

2,356,619

FASTENER

Irving Rossi, West Orange, N. J., and Peter F. Rossmann, Buffalo, N. Y.; said Rossmann assignor to said Rossi

Application April 19, 1941, Serial No. 389,410

8 Claims. (Cl. 85—5)

The present invention relates to devices for clamping or assembling perforated plates, sheets or other pieces preparatory to a riveting or other operation requiring a temporary assembly of the elements.

In the copending U. S. patent application, Serial No. 384,461, filed on March 21, 1941, by Peter F. Rossmann, co-applicant in this application, there is described a device of this character also known as a skin fastener comprising substantially a cup-shaped housing or other support provided with an opening in the bottom wall thereof through which are passed a pair of spaced resilient legs or prongs extending from a member arranged in spring restrained relatively movable relation to said housing. The lower ends of said prongs are formed with transverse outward projections and urged towards each other to allow insertion into and removal from the aligned holes of two or more superposed work pieces to be assembled. A spreader having one portion resting against the inner bottom surface of said cup and a spreader portion at right angle thereto projecting through said opening is disposed between said prongs to normally maintain the same in spread position through the action of said spring and to cause said projections to engage the underside of said cup adjacent to said opening. By temporarily compressing said spring by means of a suitable tool applied to said cup and member, respectively, the prongs will slide over said spreader portion thus causing the lower projections thereof to approach each other to allow of insertion of the fastener into or removal from the work to be clamped or assembled.

The present invention relates to an improved construction of a fastener of the above general character as described in said copending application.

The object of the present invention is to do away with the special spreader and to provide a fastener of simplified design and construction suited especially, though not limitatively, for use with thin sheets and smaller sizes of the riveting holes as encountered in the manufacture of airplane parts or the riveting or other assembly of thin and light metal parts.

This and further objects and advantages of the invention will become more apparent from the following detailed description taken with reference to the accompanying drawings forming a part of this specification and wherein:

Figure 1 is a vertical cross-section of one form of fastener embodying the principles of the invention,

Figure 2 is a top view of the fastener shown in Figure 1,

Figures 3 and 4 are sections taken on lines 3—3 and 4—4 respectively, of Figure 1,

Figure 5 is a vertical cross-sectional view of a fastener of modified construction,

Figure 6 is a top view of the fastener shown in Figure 5,

Figure 7 is a section taken on line 7—7 of Figure 5,

Figure 8 shows a further modification of a fastener according to the invention,

Figure 9 is a top view of the fastener shown in Figure 8,

Figure 10 is a cross-section taken on line 10—10 of Figure 8,

Figure 11 shows still a further embodiment of a fastener in vertical cross-section embodying the principles of the invention,

Figure 12 is a perspective view of a component part of the fastener shown in Figure 11, and

Figure 13 is a top view of the fastener shown in Figure 11,

Figure 14 is a section taken on line 14—14 of Figure 11.

Like reference numerals identify like parts throughout the different views of the drawings.

Referring more particularly to Figures 1 to 4, the fastener shown comprises substantially a cup-shaped member or body 10 having a flange 10' at its open end and an opening 18 provided in the bottom wall thereof. Item 11 is a resilient member or retainer produced by bending a rod or bar in U-fashion to provide two adjacent circular loops at one end (see Figure 2) and a pair of laterally displaced legs or prongs having upper parallel portions followed by inwardly inclined portions 12 and 13 and terminating in lower parallel portions 14 and 15, respectively, at closer spacing from each other than the upper parallel portions as seen from the drawings. The lower ends of portions 14 and 15 are formed with outward transverse projections or shoulders 16 and 17, respectively, and the member is so formed and conditioned that the lower portions 14 and 15 are urged away from each other or tend to spread in an outward direction in such a manner that the projections 16 and 17 will engage the underside of cup 10 adjacent to the opening 18 (non-use position), or the underside of the lower of two or more aligned perforated pieces such as plates 30 and 31 to be clamped (use or operative position), by the action of further means to urge projections 16 and 17 in a direction towards the cup 10. The latter comprises a coil spring 22

encircling the member 11 and having one end engaging a washer 23 resting upon the inner bottom face of cup 10 and having its other end engaging the underside of an inverted dish-shaped member or cap 20. The latter is provided with a suitable opening adapted to receive the loop portion of member 11 and is locked against the latter by means of a pin 21 passed through the loops of member 11 and resting in a depression in the upper face of member 20. The washer 23 is prevented from rotation by the provision of projecting keys 24 engaging grooves in the inner wall of cup 10. The washer is further provided with suitable openings 25 and 26 through which are passed the legs or prongs 12 and 13, respectively.

The aforedescribed device has the advantage that it can be easily assembled or taken apart to exchange defective parts without requiring bending or other operations producing a permanent deformation during the assembly. In use, part 20 is pressed towards flange 10' by the aid of a suitable tool such as a special plier thereby compressing spring 22 and causing inclined surfaces 12 and 13 to glide past and cam with the wall of opening 18. As a result the lower portions 14 and 15 of the member 11 will be forced towards each other, thereby causing shoulders 16 and 17 to clear the opening 18 and allowing insertion of the fastener into the aligned holes of the plates to be assembled. Release of the plier will result in an upward movement of member 11 and spreading of the legs 14 and 15 and a firm clamping of the plates 30 and 31 as shown in the drawings. Removal of the fastener may be effected in the same manner as is readily understood.

Referring to Figures 5 to 7, the resilient member is comprised of two separate elements or legs 32 and 33, the upper parallel portions of which engage the opposite inner faces of a tubular member 34 having an upper flange 35. The upper ends of the legs 32 and 33 are bent outwardly at a right angle and engage corresponding openings in the side wall of member 34 directly underneath flange 35. A spreader or separator 36 is forced in between the legs 32 and 33. The latter are first bent outwardly and then inwardly to provide a pair of gliding surfaces and to cause the lower transverse projections or shoulders 32' and 33' to approach and recede from each other in substantially the same manner and for the same purpose as described with reference to Figures 1 to 4. While in the construction according to Figures 1 to 4 the legs of member 11 are preferably of circular cross-section, the cross-section of the legs 32 and 33 in the construction of Figures 5 to 7 is advantageously of segmental form as shown more clearly in Figure 7. The washer 23 may be provided with a spreader 23' at right angle thereto projecting through the opening 18 and the aligned holes in the sheets 30 and 31 to serve as a guide for the legs or prongs 32 and 33 and to centralize and straighten up the fastener.

The embodiment shown in Figures 8 to 10 is similar to that of Figures 5 to 7, with the exception that the resilient member is formed of a single element 11 bent in U-fashion with a single loop, similar to the construction of Figures 1 to 4, and flattened or otherwise deformed after insertion into member 34 so as to become permanently locked against the flange 35 of the latter. Other details are similar to those of Figures 1 to 5.

Referring to Figures 11 to 14, there is shown a further construction of a fastener embodying the principles of the invention and employing resilient legs or prongs constructed and cooperating in the manner proposed by the invention. There are provided for this purpose a pair of resilient members 40 and 40' shaped or bent from a blank of steel in the manner shown in Figure 12 for one of the members. The upper portion 41 is bent to a semi-cylinder and the lower portion provided with a transverse projection or shoulder 43 is bent at right angle to the original surface of the blank to provide a pair of flat elements in shearing engagement with each other if the upper portions of the members 40 and 40' are held against each other to form a complete cylinder as shown in Figure 11. To this end there is provided a cup 46 fitting over the upper portions of the members 40 and 40' and secured thereto in any suitable manner such as by instruck portions 47 and 47' engaging holes 45 and 45' through the members. The device may be applied and removed in the same manner as described hereinbefore by pushing cup 46 towards cup 10 by means of a plier or the like, thus causing the inclined surfaces 44 of members 40 and 40' to engage or cam with the wall of hole 18 and force the lower legs 42 and 42' to approach each other in scissors fashion, thereby allowing insertion of the fastener into and removal from the work to be clamped in substantially the same manner as described with reference to the preceding embodiments of the invention.

It will be evident from the foregoing that the invention is not limited to the specific constructional details and arrangement of parts shown and described herein for illustration, but that the principle underlying the invention will be susceptible of variations and modifications coming within the broader scope and spirit thereof as defined in the appended claims. The specification and drawing are accordingly to be regarded in an illustrative rather than a limiting sense.

We claim:

1. A fastener comprising a cup having an opening provided in the bottom wall thereof, a head movable axially towards and away from said cup, an elongated resilient element bent in U-fashion to provide a plurality of concentric circular loops and a pair of spaced legs urged apart by their own spring tension, said loops being secured to said head and said legs projecting through said opening, shoulders at the lower ends of said legs, a coil spring encircling said legs and engaging the inner bottom surface of said cup and said head, respectively, to cause said shoulders to engage the underside of said cup adjacent to said opening, said legs having intermediate portions forming angles with the axis of said opening to force said legs together by camming with said opening upon moving said head towards said cup.

2. A fastener as claimed in claim 1, wherein said resilient element is secured to said head by passing said loops through an opening of said member, and a locking pin passed through said loops and engaging said head.

3. A fastener for temporarily assembling perforated sheets in superposed relation comprising a thimble-shaped housing having an opening through the bottom thereof of a size equal to the sheet perforations, a retainer slidable through said opening and having a pair of spaced resilient legs provided with shoulders at their outer ends and urged apart by their own spring tension, spring means interposed between said housing and the inner end of said retainer to draw said

legs inwardly of said body and to hold the sheets to be assembled clamped between said shoulders and said housing, said legs having outer portions bent at an angle towards each other and adapted to cam with the edge of said opening upon compression of said spring means to force said retainer outwardly of said housing and thereby to cause said legs to approach each other and enable their insertion through and removal from the sheet perforations.

4. A fastener for temporarily holding together perforated sheets in superposed relation comprising a thimble-shaped housing having an opening through the bottom thereof substantially conforming to the sheet perforations, a U-shaped retainer having a pair of resilient legs provided with shoulders at the outer ends thereof and biased away from each other, spring means interposed between said housing and said retainer to urge said legs inwardly of said body and to hold the sheets to be clamped between said shoulders and said housing, said legs having portions adjacent to said opening bent at an angle towards each other and adapted to cam with the edge of said opening upon compression of said spring means to force said retainer outwardly of said housing and thereby to cause said legs to approach each other and enable their insertion through and removal from the sheet perforations.

5. A fastener for temporarily holding together perforated sheets in superposed relation comprising a thimble-shaped housing having an opening through the bottom thereof substantially conforming to the said perforations, a U-shaped retainer slidable through said opening and having a pair of resilient legs provided with shoulders at the outer ends thereof and biased away from each other, a coiled tension spring encircling said retainer having one side bearing against the bottom of said housing and having its opposite side engaging the inner end of said retainer, said legs having intermediate portions bent at an angle towards each other and adapted to cam with the edge of said opening upon compression of said spring to force said retainer outwardly of said housing and thereby to cause said legs to approach each other and enable their insertion through and removal from the sheet perforations.

6. A fastener for temporarily holding together perforated sheets in superposed relation comprising a thimble-shaped housing having an opening through the bottom thereof of a size equal to the sheet perforations, a retainer slidable through said opening having a pair of spaced resilient legs provided with shoulders at their outer ends and urged apart by their own spring tension, a washer resting against the bottom of said housing and having spaced apertures for passing said legs, a coil spring encircling said retainer, said spring having one side bearing against said washer and having its opposite side engaging the inner end of said retainer, said legs having outer portions bent at an angle towards each other and adapted to cam with the edge of said opening upon compression of said spring to force said retainer outwardly of said housing and thereby to cause said legs to approach each other and enable their insertion through and removal from the sheet perforations.

7. A fastener for temporarily holding together perforated sheets in superposed relation comprising a thimble-shaped housing having an opening through the bottom thereof substantially conforming to the sheet perforations, a retainer slidable through said opening having a pair of spaced resilient legs provided with shoulders at their outer ends and biased away from each other, a washer resting against the bottom of said housing and having spaced apertures for passing said legs, a coiled tension spring encircling said retainer, said spring having one side bearing against said washer and having its opposite side engaging the inner end of said retainer, said legs having intermediate portions bent at an angle towards each other and adapted to cam with the edge of said opening upon compression of said spring to force said retainer outwardly of said housing and thereby cause said legs to approach each other and enable their insertion through and removal from the said perforations, said washer having a transverse conical extension projecting through said opening and slidably engaging the inner faces of the bent portions of said legs.

8. A fastener for temporarily assembling perforated members in superposed relation comprising a body having a base provided with an opening of a size equal to the perforations in the members to be assembled, a retainer slidable through said opening having a pair of spaced resilient legs provided with shoulders at their outer ends and urged apart by their own spring tension, spring means interposed between said body and the inner end of said retainer to draw said legs inwardly of said body and to hold the members to be assembled clamped between said shoulders and said base, said legs having outer portions bent at an angle inwardly and adapted to cam with the edge of said opening upon compression of said spring means to force said legs outwardly of said body and thereby to cause said legs to approach each other and enable their insertion through and removal from the perforations in the members to be assembled.

IRVING ROSSI.
PETER F. ROSSMANN.