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A. SHERMAN ET AL
FLUSH-RIVETING PROCEDURE

2,395,348

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Fig. 1.

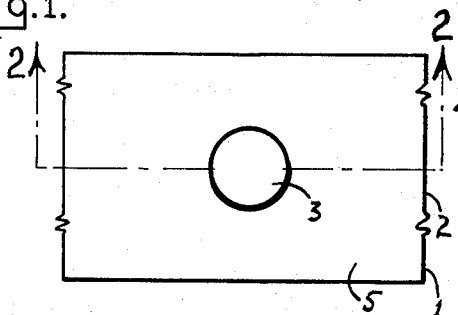


Fig. 3.

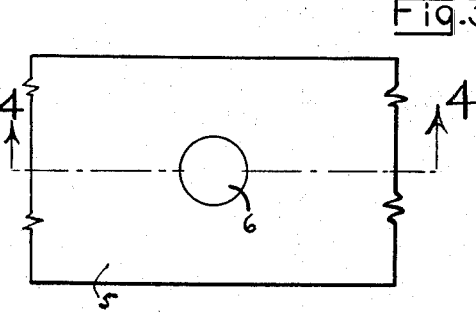


Fig. 2.

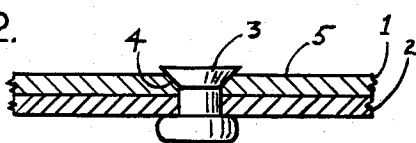


Fig. 4.

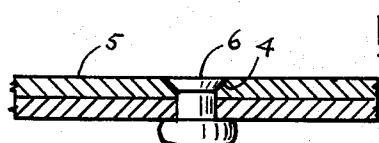


Fig. 5.

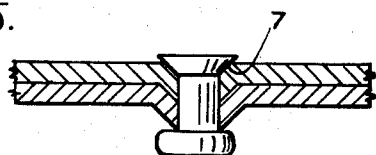


Fig. 6.

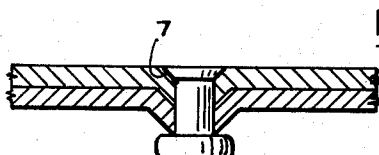


Fig. 7.

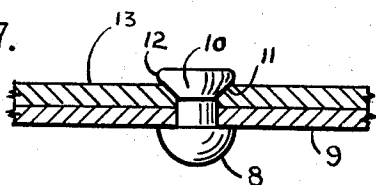


Fig. 8.

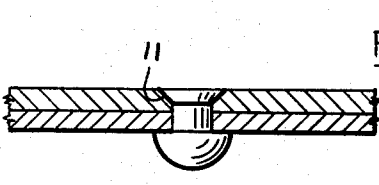


Fig. 9.

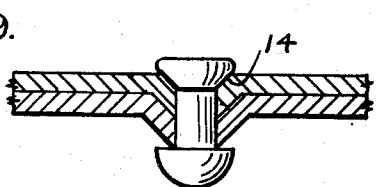
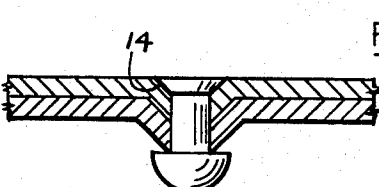


Fig. 10.



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UNITED STATES PATENT OFFICE

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FLUSH-RIVETING PROCEDURE

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3 Claims. (Cl. 78-46)

Our invention relates to improved procedures for flush riveting which provide inherently smoother and structurally tighter riveted surfaces than are provided by the procedures of flush riveting which have been heretofore known to the art.

Flush-riveting procedures are distinguished by the enlarged counter-sunk entrances of the rivet holes which form recesses, in the member to be riveted, that match the corresponding portions of the heads of the rivets.

In our invention, any known method of flush riveting is modified to include the following operations: the riveting procedure is performed so as to deliberately leave each rivet head, that is set in a countersunk recess in the surface where smoothness is desired, projecting somewhat from that surface; and the projecting portion of each rivet head is subsequently removed, to any desired degree of smoothness with the surface, by a spot-facing operation, such as can be performed by a suitable end-mill, or equivalent device, being advanced, while rotating, against the rivet head, with the axis of rotation perpendicular to that surface in which the rivet head is set.

In the accompanying figures, various embodiments of our invention are illustrated. Figure 1 is a plan view, and Figure 2 is the corresponding cutaway side-elevation, of a conventional countersunk-rivet driven in two sheets 1 and 2, so as to allow the preformed rivet head 3, seated in the preformed machine-countersunk recess 4, to project from the surface 5 of the outside sheet. Figure 3 is a plan view, and Figure 4 is the corresponding cutaway side-elevation, of the countersunk rivet of Figure 1 after the projecting portion of the rivet head has been removed by a spot-facing operation, as previously described, so as to leave the new outside surface 6 of the rivet head as flush or even with the surrounding surface 5 of the sheet as may be desired. Figures 5 and 6 are similar, respectively, to Figures 2 and 4 excepting that the preformed countersunk recess is a dimpled-countersunk recess 7, instead of a machine-countersunk recess. Figure 7 is a cutaway side-elevation of an ordinary rivet, not a countersunk rivet, which has been driven in two sheets with the preformed rivet head 8, such as a round head as shown for purposes of illustration, on the inside surface 9 of the riveted assembly. The driving operation has upset some of the excess shank material of the rivet to form a head 10 seated tightly in the preformed machine-countersunk recess 11. Figure 8 is a cutaway side-elevation of the rivet of Figure 7 after the excess rivet-

head material 12, projecting above the surrounding surface 13, has been removed by a spot-facing operation in a manner similar to that performed on the rivet of Figure 4. Figures 9 and 10 are similar, respectively, to Figures 7 and 8 excepting that the preformed countersunk recess is a dimpled-countersunk recess 14 instead of a machine-countersunk recess.

For purposes of illustration, single rivets have been shown fastening portions of two sheets together, but it is obvious, to anyone skilled in the art, that our invention is not so limited but is capable of wide utility in any application where rivets are employed without departing from the intent and object of our invention.

We are aware that, in the art of flush riveting, flush-riveting practices have been employed in which countersunk rivet heads were deliberately allowed to project from the surrounding surface of the riveted object in order to insure that these rivets be structurally tight. We are also aware that, in the art of flush riveting, attempts have been made, prior to our invention, to remove the projecting portions of the rivet heads in order to achieve a smooth riveted surface which is often desirable for reasons other than structural, such as, for reasons of optimum aerodynamic results. The methods employed in the art, prior to our invention, for removing the projecting portions of the rivet heads to be smooth with the surface, however, have always been of such a nature as to unavoidably cut, mar, scrape, or otherwise mar the surface of the riveted sheet in places elsewhere than in the immediate vicinity of the rivet heads themselves. Our invention differs from the prior art in that it employs a spot-facing operation to remove the projecting portion of each rivet head, and therefore does not cut, mark, scrape, or otherwise mar the surface of the riveted sheet elsewhere than in the immediate vicinity of the rivet head. The use of such spot-facing operations, in connection with flush riveting, was unknown in the art prior to our invention. Our invention, therefore, produces a different and more desirable result than those known in the prior art.

We claim:

1. The process of flush riveting wherein a countersunk rivet having a preformed flat-topped head tapered conically toward the shank is inserted in a rivet hole whose entrance has been enlarged to form a recess tapering conically inward which matches said countersunk rivet head excepting that said recess was made sufficiently shallow with respect to said rivet head so that the

top of the rivet head projects slightly beyond the surface surrounding the recess, the portion of the shank projecting through the member to be riveted is enlarged by a forging operation, and the said projecting portion of the countersunk rivet head is removed by a suitable end-mill tool which is capable of machining flat a circular area.

2. The process of flush riveting wherein a countersunk rivet having a preformed flat-topped head tapered conically toward the shank is inserted in a rivet hole whose entrance has been enlarged to form a recess tapering conically inward by means of a machine-countersinking operation so as to match said countersunk rivet head excepting that said recess was made sufficiently shallow with respect to said rivet head so that the top of the rivet head projects slightly beyond the surface surrounding the recess, the portion of the shank projecting through the member to be riveted is enlarged by a forging operation, and the said projecting portion of the counter-

sunk rivet head is removed by a suitable end-mill tool which is capable of machining flat a circular area.

3. The process of flush riveting wherein a countersunk rivet having a preformed flat-topped head tapered conically toward the shank is inserted in a rivet hole whose entrance has been enlarged to form a recess tapering conically inward by means of a dimple-forging operation so as to match said countersunk rivet head excepting that said recess was made sufficiently shallow with respect to said rivet head so that the top of the rivet head projects slightly beyond the surface surrounding the recess, the portion of the shank projecting through the member to be riveted is enlarged by a forging operation, and the said projecting portion of the countersunk rivet head is removed by a suitable end-mill tool which is capable of machining flat a circular area.

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