June 2, 1942. F. L. MOLER 2,284,834

ARTICLE USED FOR HOLDING SHEETS OF MATERIAL TOGETHER

Filed Feb. 25, 1941

Fig. 1.

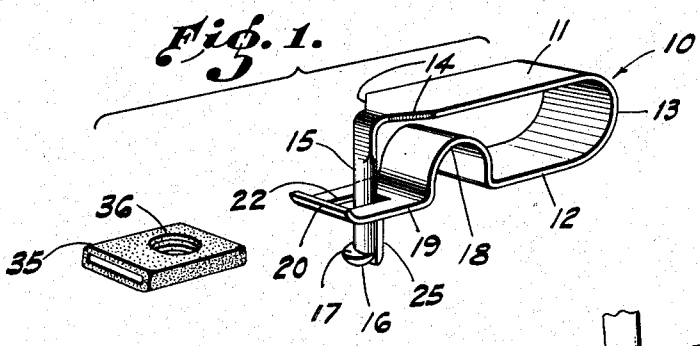


Fig. 7.

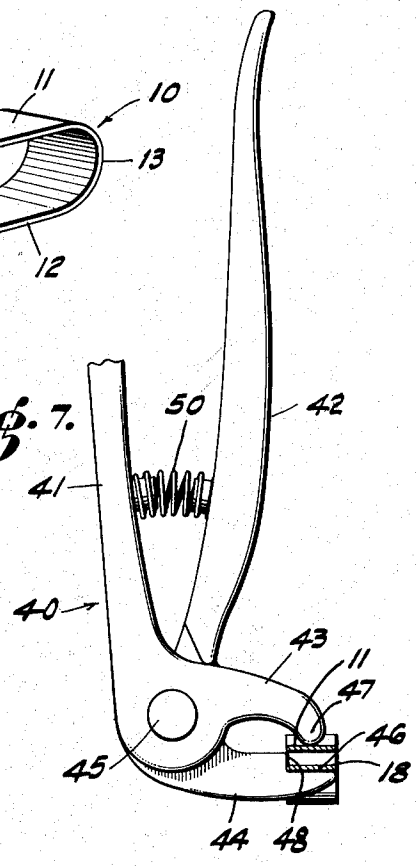


Fig. 2.

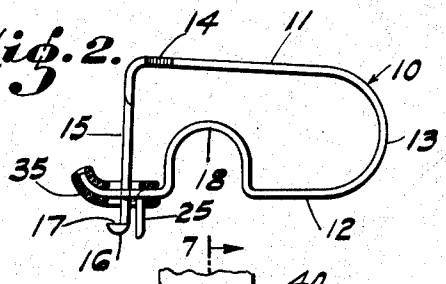


Fig. 3.

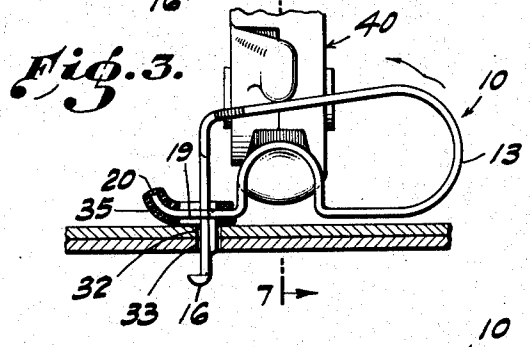


Fig. 4

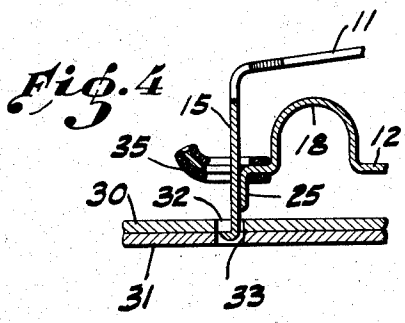


Fig. 5.

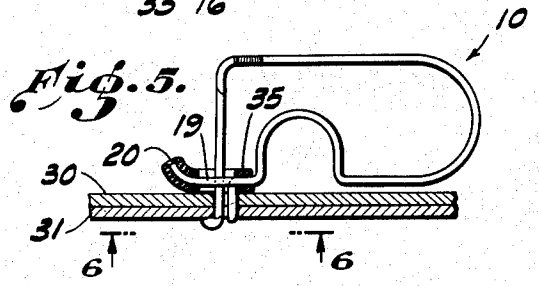
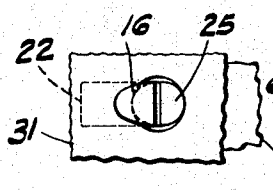


Fig. 6.



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ARTICLE USED FOR HOLDING SHEETS OF MATERIAL TOGETHER

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Application February 25, 1941, Serial No. 380,445

11 Claims. (Cl. 85—5)

This invention relates to fasteners of the spring clip type.

In many operations for instance in the riveting of the sheets of metal making up an airplane wing, it is necessary to properly align the rivet holes and then pass bolts, or other temporary fastening devices through enough of the said holes to securely hold the plates or sheets so that the rivet holes are maintained in aligned position, and the plates or sheets in contact with each other. In order to insure a perfect riveting job, these fasteners must completely fill the hole and in my improved device, this is done resiliently. The number of fasteners varies from every second hole to every twentieth (or more) hole. The plates are then riveted through the aligned holes not containing a temporary fastener. Then the temporary fastener is removed and rivets are secured in these holes, the permanent rivets holding the sheets. The riveting is now complete and the temporary fasteners are ready for another riveting job.

The general object of this invention is to improve temporary rivets or fasteners of the above described type.

A specific object is to provide a fastener made completely of a single piece of sheet spring material.

Another object is to provide such a fastener which may be, and preferably is, made by stamping and bending only.

Another object is to provide a fastener of the above described type which has a double element passing through the aligned perforations, one of said elements having a hook or projection which engages the underside of the bottom sheet, the other element associated with a bearing member adapted to press against the top of the upper sheet, and a single spring means connecting the two elements which resiliently urges the two members apart, thus forcing the holes into perfect alignment, and at the same time urges the hook or projection upward and the bearing member downward, thus pressing the sheets tightly together.

Still other objects are; to provide an improved device capable of securing thin sheet metal aeroplane "skins" together and aligning rivet holes provided through the "skins" wherein the exposed surface of the metal is prevented from becoming marred; to provide a device peculiarly constructed whereby the tool for inserting and removing the device cannot slip and thereby mar or damage the material being worked upon; to provide a device adapted for more accurately aligning rivet holes of different diameters; and to provide a more efficient tool operated device of the kind stated and one which is more economical to construct and better adapted to perform the functions for which it is intended.

An object of the invention is also to improve upon the application filed by me January 31, 1940, Ser. No. 316,556.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of that which is claimed without departing from the spirit of the invention.

Referring to the accompanying drawing wherein is shown a preferred embodiment of the invention as now being manufactured,

Fig. 1 is a perspective view of the device in its compressed position, there is also remotely included in the figure a perspective view of an elastic sleeve.

Fig. 2 is a side elevation of the device in its unstressed position. In this figure as well as in Figs. 3, 4, and 5, the elastic sleeve is shown in its operative position in section.

Fig. 3 is a side elevation of the device in its fully compressed position after it has passed through the aligned perforations of the superposed plates which are shown in section. A portion of an applied tool for the purpose of inserting the device into its operative position being included in the view.

Fig. 4 is a partial enlarged vertical sectional view showing the device at an intermediate stage as it passes through the aligned holes in the superposed plates.

Fig. 5 is a view of the device in operative position, holding two plates together.

Fig. 6 is an enlarged view taken on line 6—6 of Fig. 5.

Fig. 7 is a view looking in the direction in which the arrows 7—7 point in Fig. 3.

Referring in detail to the drawing, the invention is shown embodied in a one piece clip 10 of resilient strap metal having an upper run 11 and a lower run 12, said runs being united at one end by an arcuate bend 13. That end of the run 11 which is farthest from the bend 13 has at each side edge a bevel 14 whereby it is greatly narrowed to form a tongue 15. This tongue is directed downwardly at about a right angle to the run 11 and is furnished at its lower end with a

laterally directed tip 16 having an upwardly directed, flat shoulder 17 which is located at that side of the tongue which is farthest from the bend 13 which unites the runs 11 and 12 of the clip.

In order to adapt the lower portion of the clip 10 to cooperate in the desired manner with the aforesaid tongue 15 the lower run 12 is provided with an upwardly arched portion 18 and beyond this arcuate part is continued as a terminal run 19 which has an upwardly inclined extremity 20, there being, through said run 20, a rectangular aperture 22 of sufficient size to permit the offset tip 16 of the tongue 15 readily to pass through it, and the extent of said aperture lengthwise of the clip being sufficient to allow the tongue 15 to assume the various positions required in the operation of the device.

At the inner end of the aperture 22 is provided a downwardly directed finger 25 which is preferably by the same stamping operation that produces the aperture 22, the length of the aperture being sufficient to enable the manufacturer to utilize the downwardly stamped material for the formation of said finger.

In Fig. 5 the device is shown in its applied position wherein it is clamping together the metal plates 30 and 31, said plates being shown as respectively provided with the aligned rivet holes 32 and 33. It is to be understood that each of said plates will contain a plurality of rivet holes positioned to match properly with the rivet holes of the other so that when any two pairs of said holes are maintained properly aligned all the other holes will also be properly aligned in readiness to receive the rivets whereby the two plates are secured together in a face to face contact with each other.

In order to prevent the portion of the clip 10 which necessarily contacts with the upper plate 30 from in any way marring said plate a rubber sheath or sleeve 35 is provided to slip over the terminal run 19 of the lower part of the clip 10. Said sleeve is of a flat character and has through its double side portions an aperture 36 which aligns with the clip aperture 22 when the sheath is in place and at such time maintains the lower limb 12 of the applied clip spaced away from the upper face of the sheet 30, as shown in Figs. 3 and 5. Said sleeves function as a cushion to prevent the device from marring the metal to which it is applied.

For the purpose of applying the clip to the pair of plates shown, a tool 40 is provided having handle arms 41 and 42 which are respectively provided with angularly directed cooperating gripping jaws 43 and 44, there being a connecting pivot 45 which extends through the tool at the junctures of said jaws with said arms. The jaw 44 is nearly straight and is provided at its extremity with an internal right angled recess 46 and the jaw 43 has a tip portion 47 which is deflected in a direction to enter said recess when the jaws are closed. At the inner end of the recess 46 the jaw 44 has a shoulder 48 which is abuttable against an edge portion of the clip 10 to aid the operator to apply said tool properly to said clip.

The automatic opening of the jaws of the tool is produced by the spiral compression spring 50 mounted between the handle portions of the tool in a conventional manner.

In using the tool 40 to put the clip 10 into place, the operator will apply the tool to the clip in the manner illustrated in Fig. 7, where it will be seen that the recessed tip portion of the jaw 44 underlies the arcuate portion 18 of the clip and the end portion of the other jaw 43 is abutting against the upper surface of the top run 11 of the clip, the accurate applying of the tool to the clip being facilitated by abutting the jaw shoulder 48 against an edge of the arcuate part 18 of the clip. After thus applying the tool its jaws will be forced sufficiently close to each other to contract the clip till its tongue 15 abuts flatwise against and projects beyond its finger 25. Then both said finger and tongue are projected through two or more alined openings through a plurality of plates, and these two elements substantially fill the holes through which they extend. Upon the removal of the tool from the applied clip the shoulder 17 of the offset tip 16 prevents the clip from becoming displaced from its applied position until the workman applies the tool to the clip to remove it. After contracting the clip between the jaws of the tool the removal of the clip will be facilitated by tilting it in the direction indicated by the arrow in Fig. 3, the upwardly deflected tip 20 of the run 19 of the clip facilitating such tilting movement.

Owing to the fact that the inbent part 18 of the metal strap which forms the clip provides a seat for one of the jaws 44 of the gripping tool, said jaw may be more readily applied to the clip and with less danger of marring the plate 30.

One or more applied clips will be used to constitute temporary fasteners for holding together two or more plates preparatory to securing such plates together by means of rivets or other fasteners occupying their alined apertures. The run 19 of the clip acts as a bearing member adapted to press downwardly on the upper face of the top plate or sheet while the hook part 16 of the clip engages the underside of the lower plate or sheet, and the intervening body portion of the clip affords a spring means which urges said bearing member vertically toward the hook and at the same time spreads them apart horizontally to make close contact with opposite edge portions of the alined holes.

It will be obvious, from Fig. 4, wherein is illustrated an intermediate step of the operation of placing the clip in the applied position, that the alined openings in the plates do not afford room enough for the simultaneous insertion of the finger 25 and the hooked portion of the tongue; hence it is necessary to project the hooked portion of the tongue through the opening in advance of the finger, whereupon partially unstressing the clip by releasing the grip of the tool upon it causes the finger to enter the hole alongside the tongue.

The angularly directed, substantially straight tongue 15 of the clip is of sufficient length to insure that said tongue will at all times project through the aperture 22 a varying distance dependent upon the extent to which the clip may be compressed.

What is claimed is:

1. A temporary fastener comprising an element adapted to be inserted into and partially fill a hole, another element adjacent to the first element, the two elements substantially filling the hole, the first element connected to a bearing member adapted to press downwardly on the upper face of a top sheet, the second element having a hook adapted to engage the underside of a lower sheet, and spring means simultaneously urging the bearing member towards the hook and the two said elements apart.

2. A temporary fastener comprising an element

adapted to be inserted into and partially fill a hole, another element adjacent to the first element, the two elements substantially filling the hole, the first element connected to a bearing member adapted to press downwardly on the upper face of a top sheet, the second element having a hook adapted to engage the underside of a lower sheet, and a single spring means simultaneously urging the bearing member towards the hook and the two said elements apart.

3. A temporary fastener comprising an element adapted to be inserted into and partially fill a hole, another element adjacent to the first element, the two elements substantially filling the hole, the first element connected to a bearing member adapted to press downwardly on the upper face of a top sheet, the second element having a hook adapted to engage the underside of a lower sheet, and means simultaneously urging the bearing member towards the hook and the two said elements apart.

4. A temporary fastener comprising an element adapted to be inserted into and partially fill a hole, another element adjacent to the first element, the two elements substantially filling the hole, the first element connected to a bearing member adapted to press downwardy on the upper face of a top sheet, the second element having a hook adapted to engage the underside of a lower sheet, and a single means simultaneously urging the bearing member towards the hook and the two said elements apart.

5. A temporary fastener comprising an element adapted to be inserted into and partially fill a hole, another element adjacent to the first element, the two elements substantially filling the hole, the first element connected to a bearing member adapted to press downwardy on the upper face of a top sheet, the second element having a hook adapted to engage the underside of a lower sheet, and spring means simultaneously urging the bearing member towards the hook and the two said elements apart, said fastener being made of a single sheet of spring material.

6. A temporary fastener comprising an element adapted to be inserted into and partially fill a hole, another element adjacent to the first element, the two elements substantially filling the hole, the first element connected to a bearing member adapted to press downwardly on the upper face of a top sheet, the second element having a hook adapted to engage the underside of a lower sheet, and a single spring means simultaneously urging the bearing member towards the hook and the two said elements apart, said fastener being made of a single sheet of spring material.

7. A loop shaped resilient clip for the purpose stated, having an aperture through one of its end portions, the opposite end portion of said clip extending through and projecting beyond said aperture, said projecting portion of the clip having an extremity provided with a hook and said apertured portion of the clip having a finger which occupies an adjacent, generally parallel relation to said projecting clip portion, said finger being subjacent to one side of said aperture and said hook being directed toward the opposite side of said aperture, said aperture being of a sufficient size to allow said finger and hooked extremity to spring apart for the purpose specified.

8. A looped shaped resilient clip of strap metal for the purpose stated having an aperture through one of its end portions, the opposite end portion of said clip constituting a tongue which projects through said aperture different distances according to whether said clip is in a stressed or an unstressed condition, the end portion of the strap opposite to said tongue having a laterally projecting finger to cooperate with said tongue to form means for interiorly gripping apertured parts, a side run of said strap being bent inwardly toward the opposite side of the clip thus providing a seat for one of the jaws of a tool applied externally to the clip to compress the latter.

9. A temporary fastener having a metal portion consisting of a single elongated piece of resilient metal, said fastener being of a looped character with opposed spaced apart limbs, one of said limbs having through it an aperture adjacent to which is a finger carried by the apertured limb, said finger extending away from the space inclosed by the loop, the other of said limbs having a tongue which projects through said aperture and is furnished with a hooked extremity therebeyond to engage the outer face of one of a plurality of juxtaposed plates being held in a flatwise contacting relation to each other by the device.

10. The subject matter of claim 9 and, the limbs of said fastener being springable toward each other to disengage said hook from the plate which it normally contacts when the device is in its applied position.

11. The subject matter of claim 9 and, a part of one of said limbs being bent inwardly toward the other limb thereby forming a seat to receive one of the jaws of a tool of the pincers type for the purpose of pressing said limbs toward each other preparatory to removing the clip from its applied position.

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