Dec. 9, 1952 2,620,537

JEAN EMILE FRANCOIS GOBIN DIT DAUDÉ
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RESILIENT FASTENER FORMED OF FOLDED METALLIC STRIPS

Filed Feb. 20, 1948 4 Sheets-Sheet 1

Fig.1.

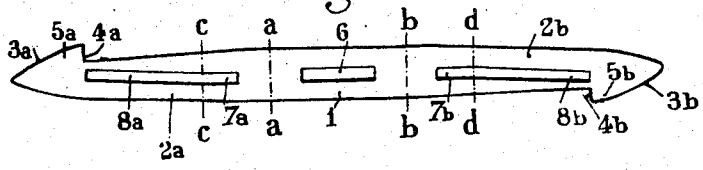


Fig.2.

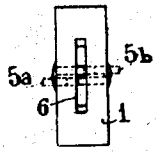


Fig.3.

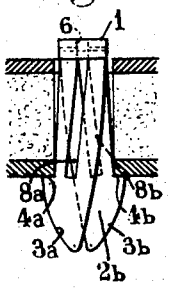


Fig.4.

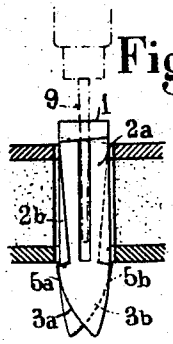


Fig.5.

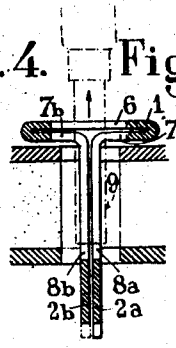


Fig.7.

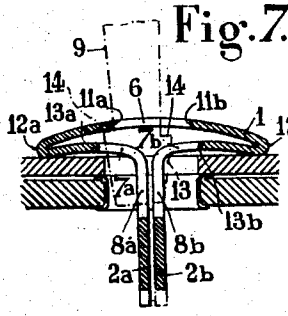


Fig.6.

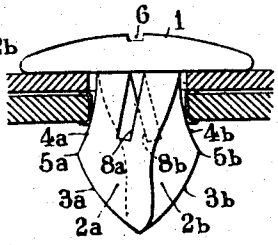


Fig.8.

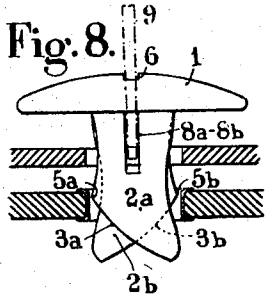


Fig.9.

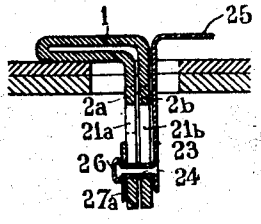


Fig.10.

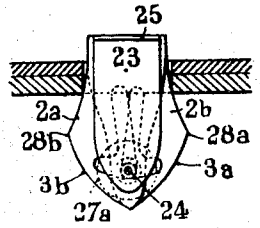
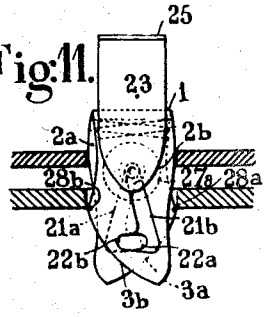


Fig.11.



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Fig.12.

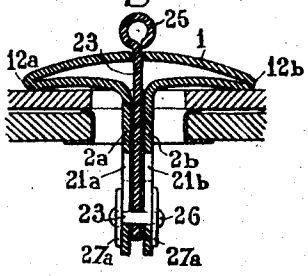


Fig.14.

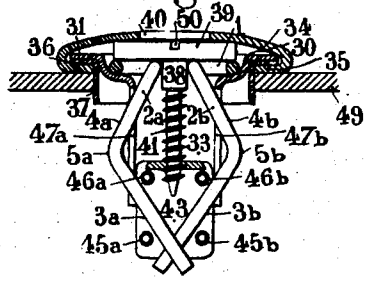


Fig.13.

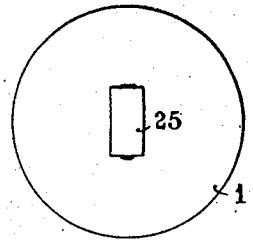


Fig.15.

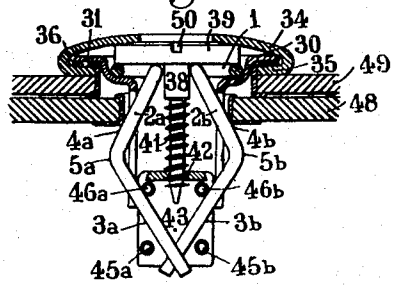


Fig.17.

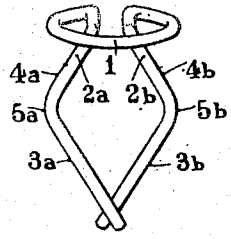


Fig.16.

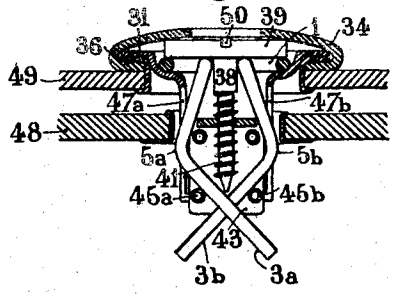


Fig.18.

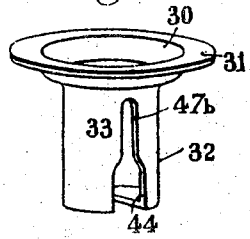
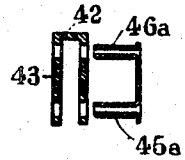


Fig.19.



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Fig.20.

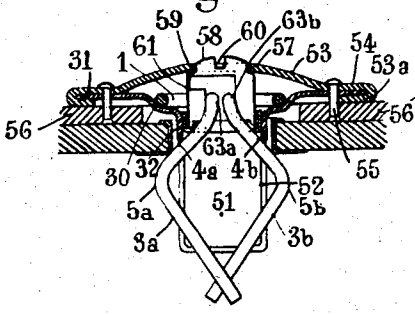


Fig.21.

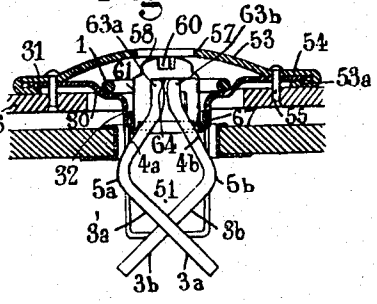


Fig.22.

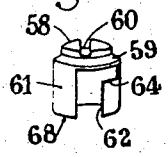


Fig.23.

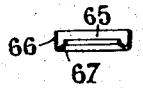


Fig.24.

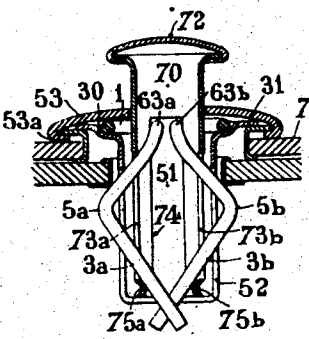


Fig.25.

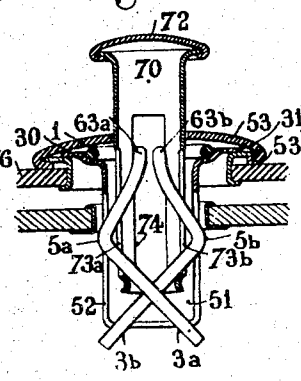
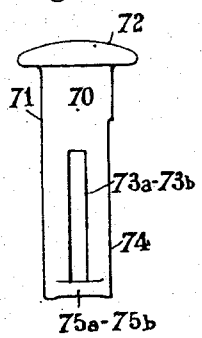


Fig.26.



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Fig. 30.

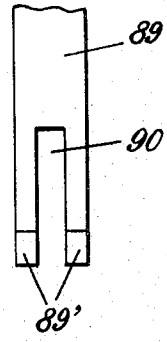


Fig. 31.

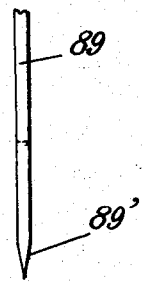


Fig. 27

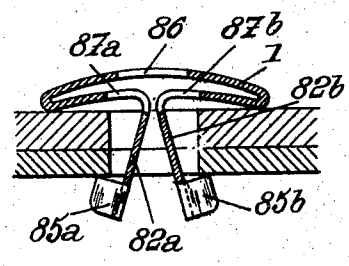


Fig. 28.

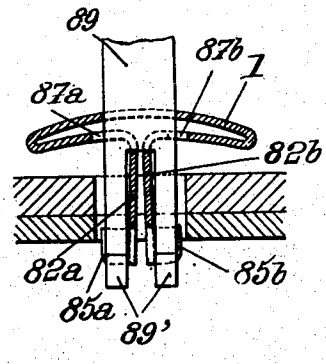
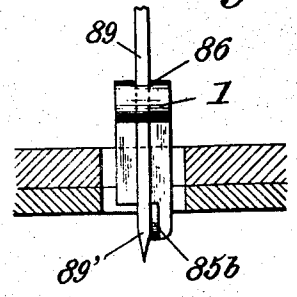


Fig. 29.



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Patented Dec. 9, 1952 2,620,537

UNITED STATES PATENT OFFICE

2,620,537

RESILIENT FASTENER FORMED OF FOLDED METALLIC STRIPS

Jean Emile François Gobin dit Daudé, Neuilly-sur-Seine, France, now by change of name Jean E. F. Gobin-Daudé

Application February 20, 1948, Serial No. 9,897
In France November 15, 1938

Section 1, Public Law 690, August 8, 1946
Patent expires November 15, 1958

5 Claims. (Cl. 24—213)

1

The present invention relates to resilient fasteners and in particular, but not exclusively, to those of the type described in French Patent No. 829,099, dated Nov. 15, 1937, and constituted by a metallic strip suitably cut out and folded so that the central portion thereof constitutes the fastener head and the two ends, located against each other after folding, form two resilient arms constituting together the stem of the fastener.

The object of my invention is to make it possible to act positively upon the resilient arms of said fasteners, and to move toward each other the projecting portions of their arms, so that the stem of the fastener can be moved freely in the orifice of the support on which it is to be fixed or from which it is to be detached.

Certain embodiments of the fastening device according to my invention are further to include a part or tool which immobilizes the arms of the fastener in retracted position. These fastening devices then have the advantage that they can be riveted on the work, even when the possibility of fixing or detaching every fastener individually is excluded, for instance when it is desired to fix upon any rigid support a piece of work which is itself rigid, such as a door or observation panel.

Preferred embodiments of my invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example and in which:

Figs. 1 to 5 show a first embodiment;
Figs. 6 to 8 show a second embodiment;
Figs. 9 to 11 show a third embodiment;
Figs. 12 and 13 show a fourth embodiment;
Figs. 14 to 19 show a fifth embodiment;
Figs. 20 to 23 show a sixth embodiment;
Figs. 24 to 26 show another embodiment;
Figs. 27 to 31 show still another embodiment.

The fastener shown by Figs. 1 to 5 is of the type described in the above mentioned patent and constituted by a flat metallic strip cut as shown by Fig. 1, and folded along lines *a*—*a*, *b*—*b*, *c*—*c* and *d*—*d* of said Fig. 1 so as to be given the shape shown by Figs. 2 to 5. It includes a head 1 and two resilient arms 2*a*, 2*b* provided with penetration inclined surfaces 3*a*, 3*b* and fixed or holding surfaces 4*a* and 4*b*; the points where surfaces 3*a*, 3*b* meet inclined surfaces 4*a* and 4*b* constitute projections 5*a* and 5*b*.

According to my invention, the head 1 of this fastener is provided with a longitudinal slot 6, and its resilient arms with slots the portions 7*a*, 7*b* of which are also longitudinal as far as folding lines *c*—*c*, *d*—*d*, whereas portions 8*a*, 8*b* are slightly inclined toward projections 5*a* and 5*b* respectively.

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Figs. 2 to 4 show that, by introducing the end of a flat tool, say the blade 9 of a screw-driver, into slot 6 and slots 7*a* and 7*b* and pushing it into slots 8*a* and 8*b*, a resilient displacement of resilient arms 2*a* and 2*b* is produced which brings projections 5*a* and 5*b* toward each other, as shown in particular by Fig. 4, so that they no longer project outwardly beyond the edges of the orifice of the support. It is then possible to introduce into or to remove the fastener from this orifice.

The resilient pressure of the side walls of slots 8*a* and 8*b* on the blade 9 of the screw-driver is generally sufficient to ensure that when the screw-driver is pulled out, the fastener also comes therewith. When this pressure risks being insufficient, it is advantageous to make use of the fastener and tool shown by Figs. 6 to 8, the latter making it possible to remove with certainty the fastener through a positive action, after the projections have been retracted. For this purpose the edges 11*a* and 11*b* of slot 6 are farther from fold lines 12*a* and 12*b* than the edges 13*a* and 13*b* of slots 7*a* and 7*b*, and the blade 9 of the tool is wider at its end 13, thus forming one or two steps 14. In order to remove such a fastener, after having driven blade 9 into slots 8*a* and 8*b* as above indicated, said blade is slightly pivoted so as to engage step 14 under one of the edges 11*a* or 11*b* of the slot 6 of the fastener head 1. A traction exerted on the handle of the tool is positively transmitted to the head 1 of the fastener, which is then easily removed.

In this embodiment, projections 5*a*, 5*b*, instead of being sharp as in Figs. 1 to 5, are more obtuse.

Figs. 9 to 11 also show a fastener which can be removed through a positive action. In this case the fastener is a disymmetrical one. Its head 1 is not provided with a slot, but its resilient arms 2*a* and 2*b* have slots formed therein, as above. However, these slots are of a special shape, including in addition to portions 21*a* and 21*b*, which play the same part as the slots 8*a* and 8*b* of the above described embodiments, portions 22*a* and 22*b* substantially at right angles to portions 21*a* and 21*b* and connected therewith. A pull piece 23, for instance cut from sheet iron, carries a lug or pin 24 at one of its ends, and is bent at its other end, at 25. Pin 24 is engaged in the slots of resilient arms 2*a* and 2*b* and has a wider end 26 which prevents it from escaping from the slots, eventually with the interposition of a washer 27*a*.

In order to remove such a fastener, it suffices to pull out the bent end 25 of pull piece 23, thus causing pin 24 to slide in slots 21*a* and 21*b*, and

bringing arms 2a and 2b toward each other and retracting projections 28a and 28b, until said pin 24 comes to rest against the ends of said slots. If the bent end 25 of pull piece 23 is further pulled out, the pull is then transmitted positively through pin 24 and the edges of slots 21a and 21b to the arms 2a and 2b of the fastener which can then be easily removed.

In order to make it possible to drive this fastener into position while leaving the pull piece in the position shown by Fig. 9, slot portions 22a and 22b must be provided. Pin 24 slides in these slot portions when the fastener is driven into position, during the resilient displacement of arms 2a and 2b caused by the action of the edges of the orifice formed in the assembly in which the fastener is to be set upon inclined surfaces 3a, 3b and 2a, 2b.

It should be noted that the connection between pin 24 and the side walls of slots 21a and 21b is irreversible, and that it suffices to dispense with the portions 22a and 22b of the said slots, or to arrange pull piece 23 and pin 24 in such manner that the latter cannot penetrate into these slot portions, to ensure a positive locking of this fastener.

Figs. 12 and 13 show a fastener of the pull piece type, made to operate like the preceding one, but of symmetrical structure. In this case, the head 1 of the fastener is provided with a slot parallel to folds 12a and 12b, and through which slides the end of pull piece 23. Arms 2a and 2b are located at a sufficient distance from each other to enable this pull piece to pass between them. For the remainder, the arrangement is equivalent.

Figs. 14 to 19 show a modification.

The fastener, shown in elevational view by Fig. 17, is constituted by a metallic wire section the central portion of which constitutes the round head 1, and the ends of which, first bent at 90° in the plane of the head, toward the center thereof, are then curved at 90° perpendicularly to said plane to form arms 2a and 2b, each of which includes a penetration inclined surface 3a, 3b and a fixed inclined surface 4a, 4b, connected together to form bends 5a and 5b.

The head 1 of this fastener rests upon cup-shaped part 30 located between flange 31 and the cylindrical portion 32 of a sleeve shown in elevation by Fig. 18. A cap 34 engages through its folded edges 35 the flange 36 of annular piece 37. A screw 38 includes a head 39 the under face of which rests upon the head 1 of the fastener and the upper face of which is in contact with the under face of cap 34. A central orifice 40 is provided in cap 34 to permit of passing a screw driver therethrough. The threaded portion 41 of screw 38 engages an orifice 42 of suitable diameter of piece 43, shown by Fig. 19. This piece 43, made of sheet metal bent and folded into U shape, is provided with a plurality of holes through which pass tubular studs 45a, 45b and 46a, 46b intended positively to displace the elastic arms 2a and 2b of the fastener, as it will be hereinafter explained. For this purpose, piece 43 is adapted to slide without rotating in the slot 44 provided in sleeve 33. The bends 5a and 5b of said fastener project to the outside of the slots 47a and 47b of sleeve 33. Annular piece 37 serves to rivet the whole of the fastener upon the piece of work 49 as shown by Figs. 15 and 16.

The operation is as follows:

By rotating screw 38 in the clockwise direction, for instance by means of a screw-driver engaged in the groove 50 of its head 39, I produce an upward sliding of piece 43, which cannot rotate. In the course of this sliding movement, tubular studs 45a and 45b come into contact with inclined parts 3a, 3b, slide thereon and produce a resilient deformation of arms 2a and 2b with a retraction of bends 5a and 5b, as shown by Fig. 16.

When all the fasteners riveted on the piece of work have been resiliently deformed in this way, it is possible to remove as a whole said piece of work by moving it away from support 48 to which said piece of work was fixed through said fasteners, or, on the contrary, to place it on said support by introducing said fasteners into the orifices provided for this purpose in said support.

By rotating screw 38 in the opposite direction, that is to say in the anticlockwise direction, I cause piece 43 to slide downwardly. Tubular studs 46a and 46b come into contact with inclined surfaces 3a and 3b, slide thereon and produce a resilient deformation of arms 2a and 2b with a displacement of bends 5a and 5b away from each other, as shown by Fig. 15. The fastener is then locked in fixed position.

The fastening device shown by Figs. 20 to 23 is of the same type as that shown by Figs. 14 to 19. In particular, its fastener is similar, with the difference that no passage for screw 38 is provided between the radial parts of the fastener head 1.

This head 1 rests in cup-shaped part 30, extending between flange 31 and the cylindrical part 32 of sleeve 51. This sleeve is very similar to the sleeve 33 shown by Fig. 18 and differs therefrom only in that slot 52 is of uniform width, its only function being to guide the inclined surfaces 3a, 4a and 3b, 4b of the fastener and to prevent it from rotating. Cap 53 has its edges 53a clamped on those of sleeve 51. It includes a plane annular portion 54 riveted at 55 on the piece of work 56. Through the central orifice 57 of cap 53 the head 58 of a push piece projects in the state of rest. This head 58 is provided with a groove 60 and is connected with body 61 through a shoulder 59 bearing, in the position of rest, against the edge of the central orifice 57 of cap 53. Body 61 is provided with a large vertical notch 62, in which are normally engaged the radial portions 63a and 63b of the fastener head 1, and with a horizontal slot 64 into which said radial portions can penetrate. Piston 65 includes a vertical wall 66 and a conical collar 67, the inclination of which is substantially equal to that of the resilient inclined surfaces 4a and 4b. The lower edge 68 of body 61 is engaged in piston 65.

The operation is easy to understand. When a pressure is exerted upon the push-piece, for instance by means of a screw-driver engaged in groove 60, this pressure is transmitted to piston 65, which slides in sleeve 51, and the conical collar 67 of which, through its action upon inclined surfaces 4a and 4b, positively displaces toward each other the resilient arms of the fastener arms. When this displacement is sufficient for retracting bends 5a and 5b, the push-piece is rotated in such manner as to engage into its horizontal slot 64 the radial portion 63a of the fastener and also eventually the radial portion 63b, which then prevents any sliding of the push-piece and holds the arms of the fastener in retracted position (Fig. 21).

When such a locking of the resilient arms is not necessary, for instance when the head of the fastener is riveted upon a flexible movable panel,

or one or two fasteners at most are riveted upon a rigid observation door, I may utilize the fastening device illustrated by Figs. 24 to 26.

This device is of the same type as the preceding one and differs therefrom only in that push-piece 58 and piston 65 are replaced by pull-piece 70. This pull-piece, shown separately by Fig. 26, includes a cylindrical body 71 the flaring upper end of which is covered by a cap 72; two longitudinal slots 73*a* and 73*b* are provided for the bends 5*a* and 5*b* of the fastener, and a large notch 74, also longitudinal, affords passage for the radial portions 63*a* and 63*b* of said fastener. Two stamped portions 75*a* and 75*b* cooperate with inclined surfaces 3*a* and 3*b*.

In order positively to bring the resilient arms of this fastener into retracted position, it suffices to exert a pull on pull-piece 70, stamped portions 75*a* and 75*b* then compressing inclined surfaces 3*a* and 3*b* and thus retracting bends 5*a* and 5*b*. By further pulling piece 70, the operator drives toward himself the fastening device, and the piece of work 76 on which this device is riveted.

In the embodiment of Figs. 27 to 31, the arms 82*a*, 82*b* are constituted by the ends of a metal strip bent into the shape shown by Fig. 27. Instead of being twisted as in the embodiment of Figs. 1 to 5 (where the arms 2*a*, 2*b* are adjacent to each other and located in parallel planes respectively), the metal strip is, in this case, merely bent so that said arms 82*a*, 82*b* are located in two planes intersecting each other along a line, at right angles to the plane of Fig. 27, normally located in, or close to, the surface along which the head 1 of the fastener bears against one side of the piece of work.

A portion 85*a*, 85*b* of the end of each of these arms is bent at right angles thereto, so as to constitute projections whicsh are applied, by the resilience of the fastener, against the other side of said piece of work after the arms have been passed through the aperture formed in this piece of work.

In order to permit an easy removal or setting of this fastener, I make use of a tool 89, constituted by a blade provided with a central longitudinal notch 90 so as thus to constitute a kind of fork. The head of the fastener is provided with a notch 86, 87*a*, 87*b* located in a plane at right angles to the planes of arms 82*a* and 82*b* and adapted to accommodate this tool to permit free passage thereof.

Thus when, as shown by Fig. 28, this tool is driven into this slot and against the outer sides of arms 82*a*, 82*b*, the branches of the fork formed by this tool slide along said arms and cause them to pivot toward each other so as to be finally nearly parallel, for which position, the projections formed by bent portions 85*a*, 85*b* are retracted to the inside of the aperture of the piece of work and the fastener can be easily removed, or, on the contrary introduced.

The slot provided for the tool is located in a plane different from that of bent portions 85*a*, 85*b* so that this tool does not come to bear aaginst the edges of said bent portions. Preferably, the end of the tool is bevel-shaped, as shown at 89' so that, even if this end comes into contact with the edges of said bent portions 85*a*, 85*b*, the tool slides therealong.

It goes without saying that many modifications might be brought to these fastening devices without departing for this reason from the scope of the present invention. Thus, for instance, the tubular studs 46*a* and 46*b* of the embodiment shown by Figs. 14 to 16 might be replaced by a single stud acting simultaneously on both of the inclined surfaces 3*a* and 3*b*, or by a V-shaped stamped piece playing the same part. Likewise, tubular studs 45*a* and 45*b* might be replaced by a single stud disposed in the angle formed by the projecting ends of resilient arms 2*a* and 2*b*. The fastening device illustrated by Figs. 20 and 21 might be riveted on the piece of work 56 by means of an annular piece analogous to the annular piece 37 of the preceding embodiment. In this case, if sleeve 51 has a tendency to rotate during the locking operation, it can be prevented from doing this, same as the fastener, by means of a tongue rigid with the fixed annular piece, or with cap 53.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. For use in fastening an assembly provided with an aperture extending therethrough, a fastener which comprises a resilient metal strip folded, bent and twisted to form a structure including a loop-shaped head adapted to bear against the edge of said aperture on one side of said assembly and two arms extending in a general direction at right angles to the bearing surface of said head so as to be adapted to pass through said aperture, said arms, which are respectively located in two adjacent planes parallel to each other and to this direction and are provided with lateral projections located in said planes, one projection on one side of one arm and the other on the opposite side of the other arm, being resiliently urged by the twist imparted to said structure in opposed directions parallel to said planes and transverse to the above mentioned direction so as to have, when passed through said aperture, their projections expanding beyond the edge thereof on the other side of said assembly, said two arms being provided with respective slots located in two planes at right angles to the above mentioned planes, intersecting each other along a line located substantially in the middle portion of the width of both of said arms and diverging toward said projections, respectively, said head being arranged to permit of moving a flat tool into both of said slots to move said arms and retract said projections toward each other.

2. For use in fastening an assembly provided with an aperture extending therethrough, a fastener which comprises a resilient metal strip folded, bent and twisted to form a structure including a loop-shaped head adapted to bear against the edge of said aperture on one side of said assembly and two arms extending in a general direction at right angles to the bearing surface of said head so as to be adapted to pass through said aperture, said arms, which are respectively located in two adjacent planes parallel to each other and to this direction and are provided with lateral projections located in said planes, one projection on one side of one arm and the other on the opposite side of the other arm, being resiliently urged by the twist imparted to said structure in opposed directions parallel to said planes and transverse to the above mentioned

direction so as to have, when passed through said aperture, their projections expanding beyond the edge thereof on the other side of said assembly, said two arms being provided with respective slots located in two planes at right angles to the above mentioned planes, intersecting each other along a line located substantially in said bearing surface of the head and in the middle portion of the width of both of said arms and diverging toward said projections, respectively, said head being provided with a slot parallel to said line and directly above it, whereby a flat tool can be introduced through said last mentioned slot into the two first mentioned slots so as to move said arms and retract said projections toward each other.

3. For use in fastening an assembly provided with an aperture extending therethrough, a fastener which compirses a metal strip folded and bent to form a structure including a loop-shaped head adapted to bear against the edge of said aperture on one side of said assembly and two arms extending from said head in a general direction at right angles to the bearing surface of said head so as to be adapted to pass through said aperture, said arms, which are respectively located in two planes intersecting each other along a line substantially located in said bearing surface and which are provided near their free ends with outward projections transverse to said planes, being resiliently urged by the resilience of said structure to diverge from each other to have, when passed through said aperture, their projections applied against the other side of said assembly on either side of said aperture, respectively, the central part of said head being provided with a hole to accommodate a forked tool capable, when engaged through said hole from the outer side of said head, to engage the outer faces of said arms and to move them toward each other so as to retract said projections to the inside of the periphery of said aperture.

4. A fastener according to claim 3 in which said projections consist of portions of the ends of said strip that form said arms, said portions being bent at right angles to said arms.

5. For use in fastening an assembly provided with an aperture extending therethrough, a fastener which comprises a resilient metal strip folded and bent to form a structure including a slotted loop-shaped head adapted to bear against the edge of said aperture on the one side of said assembly and two arms extending in a general direction at right angles to the bearing surface of said head adapted to project through said aperture, said arms, which are provided with lateral outwardly extending projections, being urged respectively in opposite directions crosswise to said general direction by the resiliency of said folded and bent structure to have, when passed through said aperture, their projections expanding beyond the edge thereof on the other side of said assembly, said arms including respective surfaces adapted to be engaged by a tool forced through the slot in said head from the outside of the latter to retract said projections inwards clear of the edges of said aperture and thereafter pulled out of it together with the whole fastener.

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