

June 8, 1943.

P. F. ROSSMANN

2,321,518

FASTENING DEVICE

Filed May 23, 1941

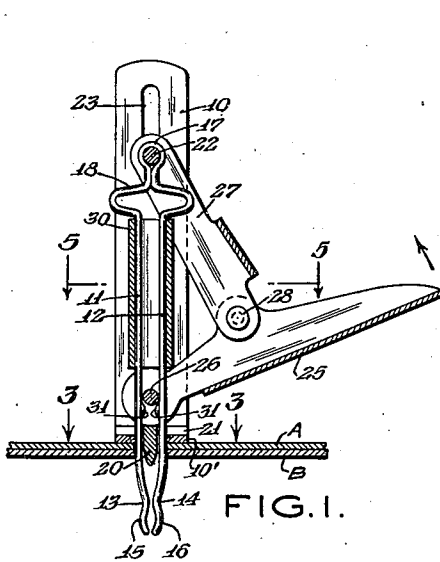


FIG. 1.

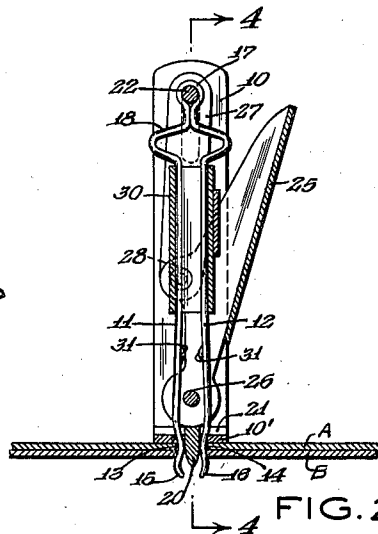


FIG. 2.

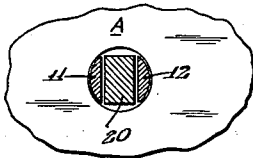


FIG. 3.

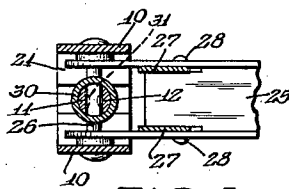


FIG. 5.

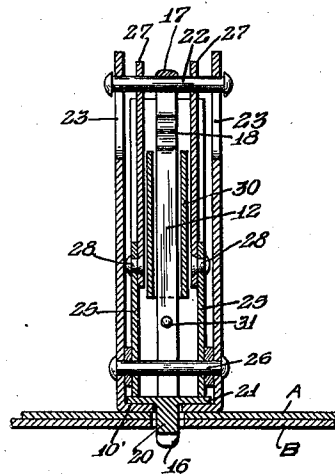


FIG. 4.

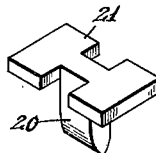


FIG. 6.

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2,321,518

FASTENING DEVICE

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Application May 23, 1941, Serial No. 394,844

15 Claims. (Cl. 85—5)

The present invention relates to fastening devices for temporarily assembling or clamping together perforated metal pieces, such as sheets, prior to a riveting or other operation.

In my copending patent application, Serial No. 384,461, filed March 21, 1941, there is described a device of this character comprising substantially a retainer having a pair of spaced resilient prongs or legs having lower ends provided with lateral protuberances or shoulders and normally urged towards each other. Said prongs are arranged for movement through the opening of a suitable support in sliding engagement with a spreader element arranged therebetween and also held by said support. In the non-use position of the device, the lower ends of the prongs are separated by said spreader and if they are caused to slide past said spreader against the action of a spring by the aid of a suitable tool such as a plier applied to said member on the one hand and said support on the other hand, the lower ends will approach each other so as to allow insertion into the aligned riveting holes of the work to be assembled or clamped. Release of said plier will result in the prongs to move in the reverse direction, thus causing a separation thereof by said spreader element and engagement of the under-surface of the work to be assembled by said protuberances, resulting in a firm clamping action. Removal of the clamping device may be effected in the same manner in a reverse direction.

An object of the present invention is to provide a fastener of the above type which can be readily inserted and removed without the use of a special tool.

Another object is to provide a fastener of the above character of simplified construction and which does not depend upon accurately machined parts for its efficiency.

These and further objects and advantages of the invention will become apparent from the following description of a preferred embodiment thereof taken with reference to the accompanying drawing forming part of this specification, and wherein

Figure 1 is a vertical cross-sectional view of one form of a fastening device or sheet holder embodying the improvements of the invention, shown inserted in the work in unclamped position,

Figure 2 is a view similar to Figure 1 showing the device in operative or clamped position,

Figure 3 is a section taken on line 3—3 of Figure 1,

Figure 4 is a section taken on line 4—4 of Figure 2,

Figure 5 is a section taken on line 5—5 of Figure 1, and

Figure 6 is an isometric view showing the spreader element forming part of the clamping device illustrated.

Like reference characters identify like parts in the different views of the drawing.

In the drawing, item 10 represents a U-shaped frame or body having a pair of parallel walls or legs and a bottom portion 10' engaging the upper of a pair of aligned perforate sheets A and B to be assembled. A pair of spaced resilient prongs or legs 11 and 12 forming a retainer, having lower ends at first bent inwardly as shown at 13 and 14 and followed by curved or arc-shaped extensions forming shoulders or protuberances 15 and 16, are passed through a suitable opening in the bottom portion 10' in sliding engagement with a T-shaped spreader element having a seat portion 21 resting against the inner face of the bottom 10' and a spreader portion 20 at right angle thereto and projecting through the hole in the bottom 10'. The seat portion 21 is provided with recesses as shown more clearly in Figure 6 for passing the legs or prongs 11 and 12. Figure 3 shows the combined cross-sectional width of the prongs 11 and 12 and the spreader 20 to substantially equal the width or diameter of the holes in the sheets A and B.

In the example shown, the prongs 11 and 12 are formed by a U-shaped unitary steel wire bent to further provide a support therefor by a circularly bent upper portion 17 and to provide a certain degree of resiliency in the longitudinal direction of the prongs by the provision of an intermediate loop-shaped portion 18. A pin 22 is passed through the portion 17 and has its opposite end arranged to slide within slots 23 in the walls of the frame 10. The legs 11 and 12 are advantageously of semi-circular or segmental cross section with their flat surfaces facing each other as shown more clearly in Figure 3.

In order to move the prongs 11 and 12 from the inoperative position of the device, Figure 1, to operative position, Figure 2, there is provided according to the present invention a toggle mechanism comprising a channel-shaped lever 25 produced from sheet material and pivoted to a pin or shaft 26 journaled in opposite holes in the walls of the frame 10. A further channel-shaped member or connecting link 27 adapted to nest within the lever 25 is pivoted on the one hand to the lever 25 at an intermediate point 28 there-

of and on the other hand to the pin 22 supporting the prongs 11 and 12. Item 30 is a stiffening tube secured to and encircling the intermediate portions of the legs 12 and 13 to prevent bulging or bending of the latter.

In use, the prongs are inserted into the aligned holes of the sheets A and B by holding support 10 and lever 25 between the thumb and index until the bottom 10' engages the upper sheet A as shown in Figure 1. Thereupon the lever 25 is pushed upwardly in the direction of the arrow whereby pin 22 and with it the entire structure 11-18 will be moved upwardly by the pin sliding in the slots 23 until shortly before reaching the dead center position the loop 18 begins to stretch in such a manner that by further movement of the lever 25 the latter will snap into locked position as shown in Figure 2 wherein pivot 28 has crossed the line connecting the pivots 22 and 26. During this operation the lower ends of prongs 11 and 12 have moved towards the frame 10 so as to become separated by the spreader 20, thus causing the shoulders or protuberances 15 and 16 to engage the underside of sheet B near the edge of the riveting hole and resulting in a firm clamping of the sheets.

Removal of the device may be effected in a reverse manner by returning lever 25 to the original position as will be readily understood. In order to lock the toggle mechanism in the non-operative position, the prongs 11 and 12 may be provided with inward protuberances 31 adjacent to the pin 26 as shown in Figure 1. In the latter case a slight resistance will be felt at the beginning and end of the lever movement. In the construction shown, the inner circular-shaped ends of the lever 25 engage the spreader 20, thus acting as positioning means for the latter.

It is understood that the toggle mechanism may be omitted and the insertion and removal of the device carried out by the aid of a suitable tool in a manner similar as described in the above mentioned prior application. In this case the construction and manufacture of the device shown in the copending application will be greatly simplified.

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

I claim:

1. A fastening device comprising a support provided with an opening, a unitary wire member bent in U-fashion to provide a pair of resilient prongs having their lower ends urged toward each other and having their upper parts bent to form resilient loops, lateral outward protuberances at the lower ends of said prongs, a spreader arranged in relatively fixed relation to said support and projecting through the center of said opening, said prongs being arranged to have their intermediate portions in sliding engagement with the opposite faces of said spreader, the combined cross-sectional width of said prongs and said spreader substantially conforming to the width of said opening, and means for slidably supporting said loop by said support.

2. A fastening device comprising a support provided with an opening, a unitary wire member

bent in U-fashion to provide a pair of resilient prongs having their lower ends urged toward each other and having their upper parts bent to form resilient loops, lateral outward protuberances at the lower ends of said prongs, a spreader having a seat portion arranged in relatively fixed relation to said support and a spreader portion at right angle thereto projecting through the center of said opening, said seat portion having recesses passing said prongs in sliding engagement with the opposite faces of said spreader portion, the combined cross-sectional width of said prongs and said spreader portion substantially conforming to the width of said opening, and means for slidably supporting said loop by said support.

3. A fastening device comprising a support provided with an opening, a unitary wire member bent in U-fashion to provide a pair of resilient prongs having their lower ends urged toward each other, said prongs being formed with shoulders near the lower ends thereof and having their upper parts bent into resilient loops, a spreader arranged in relatively fixed relation to said support and projecting through the center of said opening, said prongs being arranged to have their intermediate portions in sliding engagement with the opposite faces of said spreader, the combined cross-sectional width of said prongs and said spreader substantially conforming to the width of said opening and means for slidably supporting said loop by said support.

4. A fastening device comprising a support provided with an opening, a unitary wire member bent in U-fashion to provide a pair of resilient prongs having their lower ends urged toward each other and having their upper parts bent to form resilient loops, lateral outward protuberances projecting at the lower ends of said prongs, a spreader arranged in relative fixed relation to said support and projecting through the center of said opening, said prongs being arranged to have their intermediate portions in sliding engagement with the opposite faces of said spreader, the combined cross-sectional width of said prongs and said spreader substantially conforming to the width of said opening, a pin supporting the upper end of said member and being slidably mounted in said support.

5. A fastening device comprising a support provided with an opening, a unitary wire member bent in U-fashion to provide a pair of resilient prongs having their lower ends urged toward each other and having their upper parts bent to form resilient loops, lateral outward protuberances at the lower ends of said prongs, a spreader arranged in relative fixed relation to said support and projecting through the center of said opening, said prongs being arranged to have their intermediate portions in sliding engagement with the opposite faces of said spreader, the combined cross-sectional width of said prongs and said spreader substantially conforming to the width of said opening, a pin supporting said member being slidably mounted in said support and a toggle mechanism for adjusting said pin in its extreme operating position.

6. A fastening device comprising a support provided with an opening, a unitary wire member bent in U-fashion to provide a pair of resilient prongs having their lower ends urged toward each other and having their upper parts bent to form resilient loops, lateral outward protuberances at the lower ends of said prongs, a spreader arranged in relatively fixed relation to said sup-

port and projecting through the center of said opening, said prongs being arranged to have their intermediate portions in sliding engagement with the opposite faces of said spreader, the combined cross-sectional width of said prongs and said spreader substantially conforming to the width of said opening, a pin supporting said member slidably mounted in said support, a lever pivoted to said support, the pivoted end of said lever slidably engaging said spreader and a link having one end pivoted to said lever and having its opposite end pivoted to said pin whereby movement of said lever towards said support will cause said prongs to move into operative position with a snap action wherein the lower ends thereof are separated by said spreader.

7. A fastening device comprising a support provided with an opening, a unitary wire member bent in U-fashion to provide a pair of resilient prongs having their lower ends urged toward each other and having their upper parts bent to form resilient loops, lateral outward protuberances at the lower ends of said prongs, a spreader arranged in relatively fixed relation to said support and projecting through the center of said opening, said prongs being arranged to have their intermediate portions in sliding engagement with the opposite faces of said spreader, the combined cross-sectional width of said prongs and said spreader substantially conforming to the width of said opening, a pin supporting said member slidably mounted in said support, a lever pivoted to said support, the pivoted end of said lever slidably engaging said spreader, a link having one end pivoted to said lever and having its opposite end pivoted to said pin, whereby movement of said lever will cause said prongs to move toward said support and move into operative position with a snap action wherein the lower ends thereof are separated by said spreader, and means to lock said lever in non-operative position.

8. A fastening device comprising a support provided with an opening, a member having a pair of spaced resilient prongs having their lower ends urged toward each other, lateral outward protuberances at the lower ends of said prongs, a spreader arranged in relative fixed relation to said support and projecting through the center of said opening, said prongs being arranged to have their intermediate portions in sliding engagement with the opposite faces of said spreader, the cross-sectional width of said prongs and said spreader substantially conforming to the width of said opening, means resiliently connecting said member to said support to allow of movement of said prongs toward and away from said support, a lever pivoted to said support, the pivoted end of said lever slidably engaging said spreader, and a link having one end pivoted to said lever and having its opposite end pivoted to said member, whereby movement of said lever will cause said prongs to move toward said support into operative position with a snap action.

9. In a device of the character described, a body member having an opening, a U-shaped unitary wire member providing a pair of resilient prongs having shoulders and biased towards each other, a T-shaped member having a cross portion resting against the inside of said body member and a spreader portion projecting through said opening, said spreader being interposed between said prongs with the combined cross sectional area thereof and said prongs substantially filling said opening, and a toggle mechanism comprising

a pair of linked levers, one of said levers being fixedly pivoted to said support, and the other lever being yieldingly pivoted to said wire member for clamping said shoulders into engagement with the outer surface of said body member.

10. A fastener for temporarily clamping together perforated sheets in superposed relation comprising a body having a sheet engaging base provided with an opening, a longitudinally expandible retainer projectable and retractable through said opening and having a pair of spaced resilient legs provided with shoulders at their outer ends and biased towards each other, a spreader held in relatively fixed relation to said body and having a portion projecting through said opening and interposed between said legs whereby to space said legs apart, means for slidably supporting the inner end of said retainer by said body, and means for tensioning and locking said retainer in the retracted position to clamp a number of sheets between said shoulders and said base.

11. A fastener for temporarily clamping together perforated sheets in superposed relation comprising a body having a sheet engaging base provided with an opening, a longitudinally expandible retainer projectable and retractable through said opening and having a pair of spaced resilient legs provided with shoulders at their outer ends and urged towards each other, a spreader held in relatively fixed relation to said body and having a portion projecting through said opening and interposed between said legs whereby to space said legs apart, means for longitudinally guiding the inner end of said retainer between two extreme positions to retract said legs inwardly of and project them outwardly of said body, and further means for tensioning and locking said retainer in the retracted position to clamp a number of sheets between said shoulders and said base.

12. A fastener for temporarily holding together perforated sheets in superposed relation comprising a body having a sheet engaging base provided with an opening equal to the sheet perforations, a longitudinally expandible retainer projectable and retractable through said opening, said retainer having a pair of resilient legs provided with shoulders at their outer ends and biased towards each other, a spreader having a cross portion held in relatively fixed relation to said body and a spreader portion projecting through said opening and interposed between said legs whereby to space said legs apart, said legs and spreader portion having a combined cross sectional diameter substantially conforming to the diameter of said opening, and means for tensioning and locking said retainer in the retracted position to clamp a number of sheets between said shoulders and said base.

13. A fastener for temporarily holding together perforated sheets in superposed relation comprising a body having a sheet engaging base provided with an opening, a retainer constituted by a U-shaped wire member projectable and retractable through said opening and having resilient legs provided with shoulders at their outer ends and biased towards each other, said legs being formed with at least one transverse loop to provide a predetermined longitudinal resiliency of said retainer, a spreader in relatively fixed relation to said body and having a portion interposed between said legs whereby to space said legs apart, means for slidably supporting the inner end of said retainer by said body, and further means for longitudinally tensioning and

locking said retainer in the retracted position, thereby to clamp a number of sheets between said shoulders and said base.

14. A fastener for temporarily holding together perforated sheets in superposed relation comprising a body having a sheet engaging base provided with an opening and adapted to rest against one of the sheets, a retainer slidable through said opening and having a pair of resilient legs provided with shoulders at their outer ends and biased towards each other, a removable spreader resting against the inner side of said base and having a portion projecting through said opening and interposed between said legs whereby to space said legs apart, means including resilient connecting means for slidably supporting the inner end of said retainer by said body, a lever pivoted to said body, the pivoted end of said lever slidably bearing upon said spreader, and a link having one end pivoted to the free end of said lever and having its other end pivoted to said last mentioned means, thereby to retract said legs inwardly of said body upon movement of said

lever and into clamping engagement of a number of sheets between said shoulders and said base with a snap action.

15. A fastener for temporarily clamping together perforated sheets in superposed relation comprising a body having a sheet engaging base provided with an opening, a retainer slidable through said opening being constituted by a U-shaped wire member having resilient legs biased towards each other and provided with shoulders at their outer ends, a spreader resting against the inside of said base and having a portion projecting through said opening and interposed between said legs whereby to space said legs apart, and resilient locking means interposed between the inner end of said retainer and said body and adapted to maintain said spreader in bearing engagement with said base and to retract said legs inwardly of said body and clamp a number of sheets between said shoulders and said base.

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