Aug. 25, 1942. F. C. WALLACE 2,294,013

CLAMPING TOOL

Filed Jan. 9, 1942

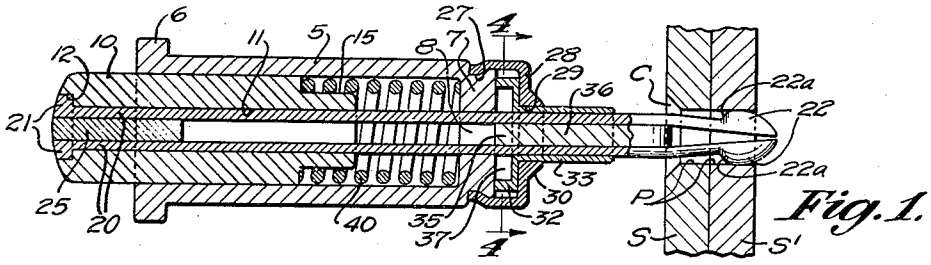


Fig. 1.

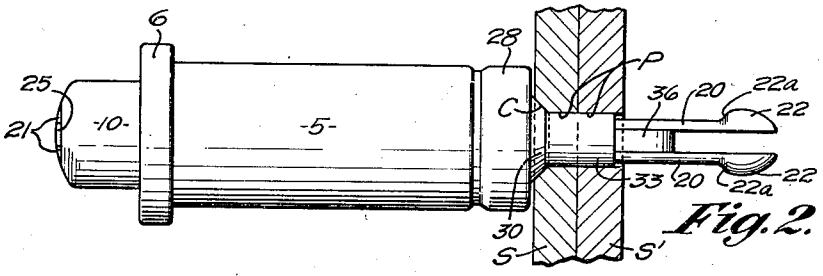


Fig. 2.

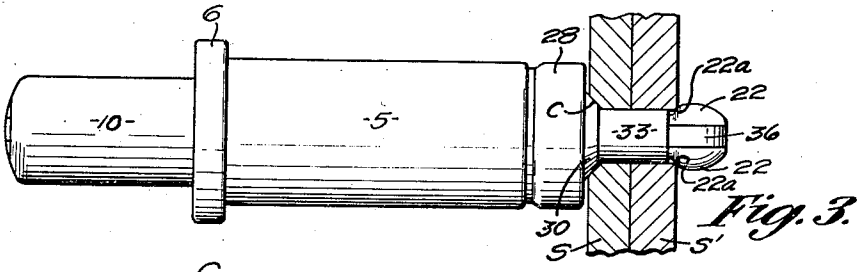


Fig. 3.

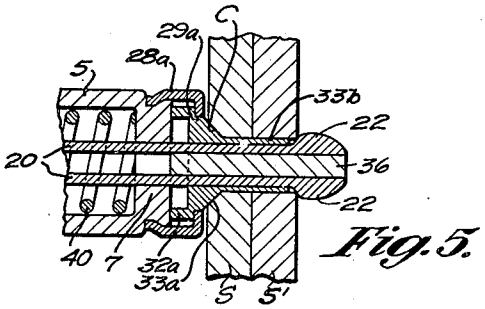


Fig. 5.

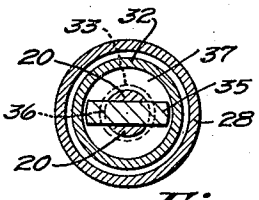


Fig. 4.

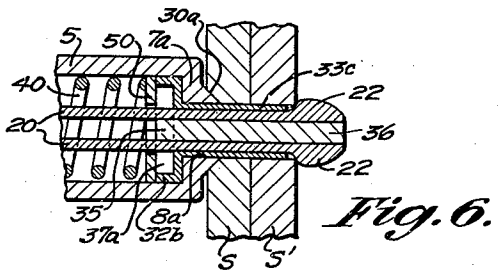


Fig. 6.

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CLAMPING TOOL

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Application January 9, 1942, Serial No. 426,227

15 Claims. (Cl. 85—5)

This invention relates to clamping tools and in its more particular aspects it has to do with temporary fasteners for clamping perforated sheets together in superposed relation, with their perforations in register, for the reception of rivets or the like. This present invention is by way of improvements upon my copending applications, Serial No. 387,085, filed April 7, 1941, and Serial No. 408,085, filed August 23, 1941.

In the clamps of my said copending applications a split retaining member is slidably mounted in a body to be projected therefrom for insertion through the registering perforations in the sheets, said retaining member having an enlarged outer end portion which engages the sheet farthest from the clamp body as the retaining member is retracted towards the body, thus clamping the superposed sheets between said enlarged outer end portion and the clamp body. A spreader is used to diametrically spread the legs of the retaining member apart. This spreader has a portion extending outward from the body between the expansible legs of the retaining member to a point spaced outwardly from the body a distance slightly greater than the combined thickness of the sheets to be clamped, and it is necessary to project the enlarged ends of the retaining member outwardly beyond the outer end of said spreader portion a distance sufficient to enable them to be flexed together to be passed through the perforations. When the device of my said prior applications is in inoperative or non-clamping position position the retracting spring in the body acts to draw the enlarged ends of the retaining member inwardly against the outer face of the body end wall. This materially increases the non-functional protractive movement of the retaining member in the next subsequent use, thus requiring greater manual operating effort and wear of the parts.

It is therefore one of the principal objects of my present invention to provide a clamp which reduces to a minimum the manual travel of the retaining member and the effort necessary for operation, and which also reduces to a minimum the wear on the parts.

Another object of my present invention is the provision of a clamp embodying means for more efficiently clamping and registering the holes in superposed perforated sheets having countersunk perforations.

Another object is the provision of a clamping tool embodying a body projection around the retaining member, which is insertable through the registering perforations to more accurately register the perforations and protect their side walls, as well as reduce to a minimum wear on the retaining member.

Still further objects and advantages are inherent in my invention and how those as well as the foregoing are achieved will become apparent from the following detailed description of a presently preferred adaptation thereof, for which purpose I shall refer to the accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view showing my clamp in course of being applied through perforations in the sheets;

Fig. 2 is an elevation showing the clamp in another position which it occupies in course of being applied in and removed from perforations in the sheets;

Fig. 3 is an elevation showing the device in clamping position;

Fig. 4 is a section on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary section showing a variational form; and

Fig. 6 is a fragmentary section showing another variational form.

With particular reference to Figs. 1 to 4, inclusive, I show at 5 a cylindric body presenting an annular flange 6 at its outer end to be engaged by a clamp applying tool, not shown. For instance, an applying tool suitable for this purpose is shown in the copending application of H. H. Helbush et al., Serial No. 411,878, filed September 22, 1941. Body 5 has an end wall 7 provided with a central hole 8 to slidably pass the retaining member to be described.

A plunger 10 having a central longitudinal bore 11, countersunk at one end 12, is slidably mounted in the bore of the body, the plunger having a reduced diameter inner end portion 15.

A retaining member consisting of two parallel pins 20 headed at their inner ends 21 and enlarged at their outer ends 22 to provide shoulders 22*a*, is also slidably mounted in the body, the inner ends of the pins being mounted in the longitudinal bore 11 of the plunger. The heads 21 of the pins fit in the countersink 12 and the pins are spread apart and made secure in this mounting by means of a bar 25 inserted therebetween, all as more particularly described and claimed in my copending application Serial No. 427,449, filed Jan. 20, 1942.

The outer end of the body has an annular groove 27 into which the peripheral portion of an end cap 28 is crimped. This cap has a central opening 29 concentric with hole 8 and the cap portion around the opening projects out-

wardly and is beveled to present a dimple 30 conforming to the shape of a countersink C provided in perforation P in sheet S. A companion sheet is designated as S'. The end wall of the cap 28 is spaced from the end wall 7 of the body whereby to provide a space therebetween to receive the cup-shaped inner end 32 of a tubular member 33, the pins 20 being slidable through the tubular member 33.

A T-shaped spreader having a cross arm 35 and a central arm 36 is disposed between the pins 20, the cross arm 35 resting and being rotatable in the recess 37 provided in the cup-shaped end portion 32 of the tubular member. The tubular member is also rotatable with respect to cap 28 and body 5. While the spreader is free to rotate with the retaining member, it is held against longitudinal movement between the end wall 7 and the inner end portion of the tubular member. Central arm 36 of the spreader projects outwardly from the cap 28 between pins 20 and beyond the outer end of tubular member 33 so that when inserted through registering perforations in the sheets its outer end projects beyond the exterior surface of the sheet farthest from the cap. A coil spring 40 seats at one end against the inner surface of end wall 7 and at its opposite end against the plunger 10, the reduced diameter portion 15 of the plunger fitting into the end of the spring.

In operation, a clamp applying tool (not shown) is used to hold the body and push the plunger inwardly of the body against the spring pressure until the enlarged ends 22 of the pins are spaced far enough outwardly from the outer end of the central arm 36 of the spreader to permit the enlarged ends 22 to flex together for insertion through the registering perforations in the sheets (see Fig. 1), the pins being made of a resiliently flexible material. The tubular portion 33 projects substantially through the registering perforations and dimple 30 fits within the countersink C (see Fig. 2). Then the spring is released and acts to retract the pins and resiliently clamp the sheets between shoulders 22*a* and the cap 28 together with dimple 30 (see position of Fig. 3). To remove the clamp, the applying tool is again applied to the body to push the plunger inwardly to the position of Fig. 2, in which position the enlarged ends 22 of the retaining pins may be flexed together and permit withdrawal through the perforations.

In the form of Fig. 5, the parts are as before described except that instead of forming the dimple 30 as an integral part of the end cap 28, I here show an end cap 28*a* having a relatively larger central opening 29*a* and I show a tubular insert having a cup-shaped end portion 32*a* and an exteriorly beveled outer dimple portion 33*a* adapted to fit into the countersink C in sheet S, this dimple terminating in the tubular end portion 33*b*. Here also the tubular insert is rotatable with respect to the end cap and body.

In the device of Fig. 6 the parts are also as first described with the following exceptions: Instead of providing an end cap 28 as first described, I here provide an enlarged opening 8*a* through the end wall 7*a* of the body 5 and mount the cup-shaped inner end portion 32*b* of member 33*c* within the body, the outer end of the tubular member projecting outwardly through opening 8*a*. Cross arm 35 of the spreader rests and is rotatable in the recess 37*a* provided by the cup-shaped inner end 32*b* of the tubular member, the tubular member being rotatable relative to the body. A washer 50 is interposed between the inner end of the spring 40 and the end 32*b* of the tubular member, so that the cross arm 35 is held against longitudinal movement between this washer and the inner end portion of the tubular member. The end wall 7*a* of the body presents a projection 30*a* through which hole 8*a* also passes, the projection having a beveled outer annular surface whereby to fit into and conform to the shape of the countersink C provided in the sheet S.

While I have resorted to considerable detail for the purpose of making my invention understood, I wish it understood that within its broader scope, as defined by the appended claims, various modifications and adaptations may be made without departing from the spirit of the invention.

I claim:

1. A device for temporarily clamping together superposed perforated sheets, comprising: a body, an elongated retaining member reciprocally mounted in the body, said retaining member having its outer end projecting through the inner end of the body and being protractable and retractable with respect thereto, a clamp element carried by the outer end of the retaining member, and means projecting outwardly from the inner end of the body in position to be engaged by said clamp element upon retraction of the retaining member whereby to limit retractive movement of the latter.

2. A device for temporarily clamping together superposed perforated sheets, comprising: a cylindric body, an elongated retaining member reciprocally mounted in the body, said retaining member having its outer end projecting through the inner end of the body and being protractable and retractable with respect thereto, a clamp element carried by the outer end of the retaining member, resilient means in the body normally urging the retaining member into retracted position, and a tubular projection extending outwardly from the inner end of the body around the retaining member, the outer end of said projection being engageable by the clamp element upon retractive movement of the retaining member and functioning to arrest said movement in such position that the clamp element is spaced outwardly from the inner end of the body a distance equal to the length of the projection.

3. A device for temporarily holding together superposed perforated sheets, comprising: a cylindric body, an elongated retaining member reciprocally mounted in the body, said retaining member having its outer end projecting through the inner end of the body and being protractable and retractable with respect thereto, a clamp element carried by the outer end of the retaining member, resilient means in the body normally urging the retaining member into retracted position, and a sleeve around said retaining member, said sleeve being concentric with and projecting outwardly from the inner end of the body in position to be engaged by the clamp member upon retractive movement of the retaining member whereby to limit said movement.

4. A device for temporarily holding together superposed perforated sheets, comprising: a cylindric body, an elongated retaining member reciprocally mounted in the body, said retaining member having its outer end projecting through the inner end of the body and being protractable and retractable with respect thereto, a clamp element carried by the outer end of the retaining member, and a sleeve disposed around the retaining member and being insertable into registering perforation n the sheets, said sleeve having

an outside diameter substantially equal to the diameter of said perforations and projecting outwardly from the inner end of the body a distance substantially equal to the combined thickness of the sheets.

5. In a device for temporarily holding together superposed sheets having registering perforations, one of which perforations has a countersink, a cylindric body having an end portion presenting a projection insertable in and conforming to the shape of the countersink, an opening through said end portion and projection, an elongated retaining member reciprocally mounted in the body, the outer end of the retaining member extending through said projection and being protractable and retractable with respect thereto whereby to engage and clamp said sheets inwardly against the projection.

6. In a device for temporarily holding together superposed sheets having registering perforations, one of which perforations has a countersink, a cylindric body having a coaxial end projection insertable in and conforming to the shape of the countersink, a central opening through said projection, a concentric tubular portion extending outwardly from the projection, said tubular portion being insertable in and conforming to the shape of the perforations, an elongated retaining member reciprocally mounted in the body and extending through said projection and tubular member, and means on the outer end of the retaining member functioning to clamp said sheets against the projection.

7. A device for retaining perforated sheets in superposed relation, comprising: a cylindrical body having an end wall, an opening through the end wall, an end cap secured to the body in position spaced outwardly from the end wall, a hole through the cap concentric with said opening, a projection carried by the cap and being insertable in a perforation in at least one of the sheets, a passageway through the projection concentric with said hole, and an elongated retaining member reciprocally mounted in the body and extending outwardly through said projection, said retaining member being protractable and retractable with respect to the projection whereby to engage and clamp the sheets towards the cap.

8. A device for retaining perforated sheets in superposed relation, comprising: a cylindric body having an end wall, an opening through the end wall, an end cap secured to the body in position spaced outwardly from the end wall, a hole through the cap concentric with said opening, a projection carried by the cap and being insertable in a perforation in at least one of the sheets, a passageway through the projection concentric with said hole, an elongated retaining member reciprocally mounted in the body and extending outwardly through said projection, said retaining member being protractable and retractable with respect to the projection whereby to engage and clamp the sheets towards the cap, and a sleeve around said retaining member, said sleeve having its inner end disposed between the end wall and cap and having its outer end extending outwardly through and beyond the projection whereby to be inserted in registering perforations in the sheets.

9. The device of claim 8 in which said sleeve and cap are relatively rotatable.

10. A device for retaining perforated sheets in superposed relation, comprising: a cylindric body having an end wall, an opening through the end wall, an end cap secured to the body in position spaced outwardly from the end wall, a hole through the cap concentric with said opening, a projection carried by the cap and being insertable in a perforation in at least one of the sheets, a passageway through the projection concentric with said hole, an elongated retaining member reciprocally mounted in the body and having parallel legs extending outwardly through said projection, said legs being protractable and retractable with respect to the projection whereby to engage and clamp the sheets towards the cap, a sleeve around said legs, said sleeve having its inner end disposed between the end wall and cap and having its outer end extending outwardly through and beyond the projection whereby to be inserted in registering perforations in the sheets, and a spreader having its inner end rotatably anchored in the inner end of the sleeve, said sleeve extending outwardly therefrom between said legs whereby to spread the legs apart.

11. A device for retaining perforated sheets in superposed relation, comprising: a cylindric body having an end wall, an opening through the end wall, an end cap secured to the body in position spaced outwardly from the end wall, a hole through the cap concentric with said opening, a projection carried by the cap and being insertable in a perforation in at least one of the sheets, a passageway through the projection concentric with said hole, an elongated retaining member reciprocally mounted in the body and having parallel legs extending outwardly through said projection, said legs being protractable and retractable with respect to the projection whereby to engage and clamp the sheets towards the cap, a sleeve around said legs, said sleeve having its inner end disposed between the end wall and cap and having its outer end extending outwardly through and beyond the projection whereby to be inserted in registering perforations in the sheets, a spreader having its inner end rotatably anchored in the inner end of the sleeve, said sleeve extending outwardly therefrom between said legs whereby to spread the legs apart, and a radial projection on the outer end of each of the legs, said last-named projections being engageable against the outer end of the sleeve upon retraction of the legs whereby to limit the retractive movement of the legs.

12. A device for retaining perforated sheets in superposed relation, comprising: a cylindric body having an end wall, an opening through the end wall, a tubular member having an enlarged inner end disposed in and held against longitudinal movement with respect to the body, said member extending outwardly through and beyond said opening and being insertable in at least one of said perforations, and a retaining member reciprocally mounted in the body and having a radially expansible portion extending outwardly through the tubular member for engaging and clamping the sheets towards the end wall.

13. A device for retaining perforated sheets in superposed relation, comprising: a cylindric body having an end wall, an opening through the end wall, a tubular member having an enlarged inner end disposed in and held against longitudinal movement with respect to the body, said member extending outwardly through and beyond said opening and being insertable in at least one of said perforations, and a retaining member reciprocally mounted in the body and having a radially expansible portion extending outwardly through the tubular member for engaging and clamping the sheets towards the end wall, said

retaining member presenting a stop element engageable against the outer end of the tubular member when the device is removed from the sheets whereby to limit movement of the retaining member inwardly of the body.

14. A device for retaining perforated sheets in superposed relation, comprising: a cylindric body having an end wall, an opening through the end wall, a tubular member having an enlarged inner end disposed in and held against longitudinal movement with respect to the body, said member extending outwardly through and beyond said opening and being insertable in at least one of said perforations, a retaining member reciprocally mounted in the body and having a radially expansible portion extending outwardly through the tubular member for engaging and clamping the sheets towards the end wall, and an expander having a head portion rotatably secured in the inner end of the tubular member, said expander having a portion extending outwardly through the tubular member in expanding engagement with the retaining member.

15. The device of claim 12 in which said tubular member and body are relatively rotatable.

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