Nov. 10, 1942. F. C. WALLACE 2,301,347

CLAMPING TOOL

Filed Jan. 20, 1942

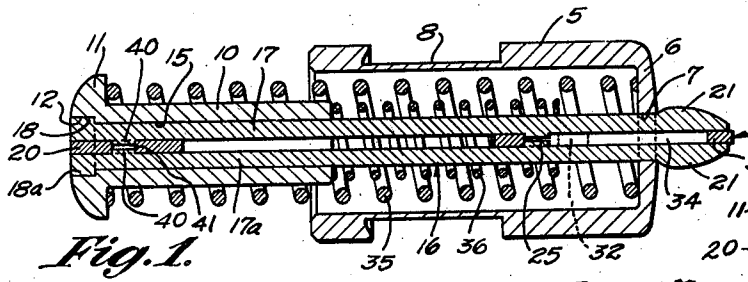
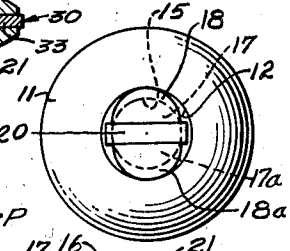


Fig. 1.

Fig. 7.



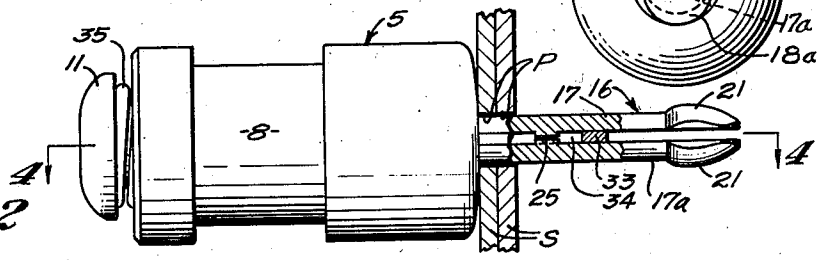


Fig. 2

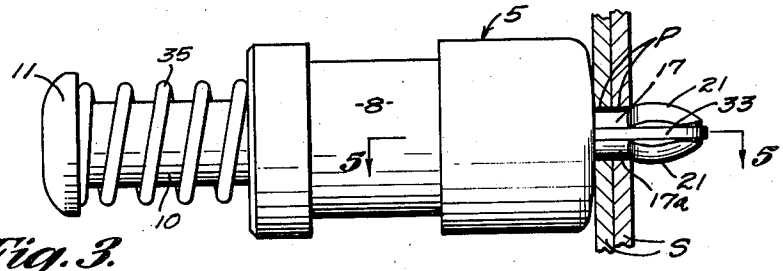


Fig. 3.

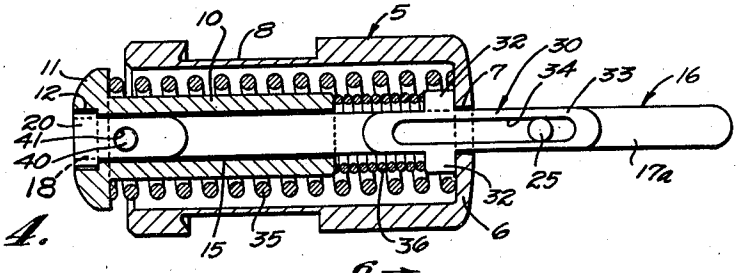


Fig. 4.

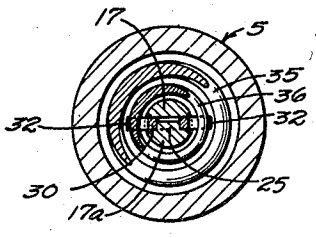


Fig. 6.

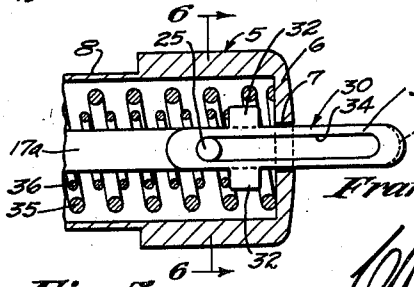


Fig. 5

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2,301,347

CLAMPING TOOL

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Application January 20, 1942, Serial No. 427,449

9 Claims. (Cl. 85—5)

This invention has to do with clamping tools and, in its more particular aspects, it relates to clamps used to hold superposed perforated sheets together with their perforations in register to facilitate riveting. In some aspects this present application involves improvements upon the clamps described and claimed in my copending applications, Serial Number 387,198, filed April 7, 1941, and Serial Number 426,228 filed January 9, 1942.

In the type of clamp shown in my said copending applications a split, elongated retaining member is slidably mounted in a cylindric housing. The forked outer end of the retaining member is provided with enlargements so that when inserted through registering perforations and diametrically expanded by means of an intermediate separator or spreader, the enlargements contact the sheet farthest from the clamp. A spring in the housing cooperates with the opposite end of the retaining member to retract the latter and thereby resiliently clamp the superposed sheets between said enlargements and the adjacent end of the housing. Since the spreader shown in my copending applications is longitudinally immovable, its outer end must at all times project outwardly from the housing a sufficient distance to be passed entirely through the perforations, with the result that when the clamp device is not being used or when it is being applied and removed the outer end of the spreader is exposed since the enlarged ends of the retaining member are drawn against the end wall of the body. I have found that workmen often strike this exposed outer end of the spreader against various objects, resulting in bending or otherwise deforming them and since the combined diameter of the retaining member and spreader is preferably such as to fit the perforations rather snugly, any such deformation of the spreader renders the device ill fitting and less efficient. It is to the overcoming of this objection that my present invention is directed.

It is therefore among the principal objects of my invention to provide a clamp in which the spreader or separator for the retaining member is longitudinally movable whereby to be moved outwardly as the retaining member is protracted from the body and retracted when the retaining member is retracted.

Another object is to effect automatic protraction and retraction of the spreader along with operation of the retaining member.

Another object is the provision of a clamp of this character in which the spreader, body and retaining member are relatively movable to an extent sufficient to permit the sheet engaging ends of the retaining member to be inserted and removed from the perforations without being exposed.

Another object is to provide, in such a clamp, simple, efficient and novel means for assembling and maintaining in assembly the elements comprising the retaining member.

How the foregoing as well as still further objects and advantages are attained will be made apparent from the following detailed description of a presently preferred embodiment of my invention, for which purpose I shall refer to the accompanying drawing, in which:

Fig. 1 is a longitudinal section showing the device when not in use;

Fig. 2 is a side elevation, partly in section, showing the device in course of being applied to or removed from superposed sheets;

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

Fig. 4 is a longitudinal section on line 4—4 of Fig. 2;

Fig. 5 is a longitudinal section on line 5—5 of Fig. 3;

Fig. 6 is a cross-section on line 6—6 of Fig. 5; and

Fig. 7 is an enlarged left-hand end view of Fig. 3.

Referring now more particularly to the drawing, I show at 5 a cylindric clamp body having an end wall 6 provided with a central opening 7 therethrough. An annular recess 8 for receiving an operating and holding tool, not shown, is provided in the body. For mounting the retaining member, to be described, I provide a plunger 10 headed at 11, the head having a countersink 12. A longitudinal bore 15 extends through the plunger.

An elongated retaining member, generally designated by the numeral 16, and comprised of segments 17, 17a headed at 18, 18a has its inner end mounted in the bore of the plunger, the heads resting within the countersinks 12 and being spread apart by an insert 20. The opposite ends of the segments 17, 17a project from the bore through opening 7 and are enlarged at 21 for the purpose to be described.

Each of the segments 17, 17a is provided with a laterally disposed lug 25 for the purpose to be described. A spreader member generally designated by the numeral 30 is interposed between segments 17, 17a. This spreader has a cross arm 32 longer than the diameter of opening 7 so that

it will not pass therethrough, and a central elongated portion 33 which extends outwardly through opening 7 between the segments. Spreader portion 33 is longitudinally slotted at 34, the slot being long enough to permit the desired relative movement of the spreader with respect to the retaining member and wide enough to pass lugs 25 which project into the slot from the inner faces of segments 17, 17a.

The plunger and retaining member are normally urged inwardly of the body by a coil spring 35 which seats at one end against head 11 and at its opposite end against the inner surface of wall 6. A second and relatively weaker coil spring 36 is disposed around the segments 17, 17a within and concentric with spring 35, one end of spring 36 seating against the inner end of plunger 10 and the other end of said spring seats against the cross arm 32 of the spreader.

From the foregoing description it will be seen that as the clamp is being initially applied in perforations P of superposed sheets S, a clamp applying tool (not shown) is employed to press the plunger 10 and the retaining member inwardly of the body against the pressure of spring 35, thus protracting the segments 17, 17a from the position of Fig. 1 to the position of Fig. 2. As this movement takes place, spring 36 moves the spreader longitudinally outwardly with the retaining member until the cross arm 32 abuts the inner surface of wall 6, from which point no further outward movement of the spreader takes place, the parts being so proportioned that in this position the portion 33 of the spreader projects sufficiently outwardly to pass through the registering perforations in the sheets to be clamped. It will be observed that in the position of Figs. 2 and 4, the enlarged ends 21 of the retaining member have been projected outwardly beyond the end of the spreader to permit them to be flexed together beyond said outer end to pass through the perforations. As the pressure on the spring 35 is released by the operating tool, spring 35 acts to move plunger 10 and the retaining member inwardly of the body to resiliently clamp the sheets S between enlarged outer ends 21 and the body end wall 6. During this movement, when the retaining member moves inwardly far enough that lugs 25 engage the inner end of slot 34, the lugs act to move the spreader longitudinally inwardly against the pressure of spring 36 along with retractive movement of the retaining member, in which position the outer end of the spreader and the outer end of the retaining member are substantially flush. When it is desired to remove the clamp from the sheets being clamped, the plunger is again pushed inwardly of the body until the parts are in the position of Fig. 2, after which the retaining member is withdrawn from the perforations. Then upon full release of the spring 35, the retaining member is retracted until the enlarged ends 21 abut the end wall 6 and meanwhile the lugs 25 will have acted to retract the spreader commensurately so that its outer end remains substantially flush with the outer end of the retaining member, in which position the clamp may be freely handled without injury to the spreader.

One manner of assembling my device is as follows: the retaining pin segments are first placed together with the spreader therebetween in such position that the enlarged outer ends 21 of the retaining member may be flexed together and passed outwardly through hole 7 in the body end wall. Next the springs 36, 35 are applied, and then plunger 10 is applied around the segments and pushed inwardly while the segments are held against longitudinal movement, thus compressing the springs and projecting the headed ends 18, 18a outwardly of the countersink 12, in which position the segments may be flexed apart sufficiently to insert between them the separator insert 20 to expand heads 18, 18a against the side wall of the countersink. As best shown in Fig. 7, and by the dotted lines in Fig. 4, the headed portions 18, 18a of the retaining member segments are curved about a radius which permits them to pass through bore 15 when the insert 20 is not inserted therebetween. To positively prevent the insert 20 from working outwardly and accidentally escaping, I provide cooperating means consisting of oppositely disposed lugs 40 on the inner faces of segments 17, 17a and a recess 41 in the insert to receive said lugs. While I show the lugs 40 as being on the segments 17, 17a and the recess 41 as being in the insert, it will be understood that the lugs could be provided in the insert and the segments provided with recesses to receive them; or a lug on only one of the segments would of course suffice.

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 clamp comprising a body, a retaining member slidably mounted in the body, and an expander slidable with respect to the body, said retaining member and expander having interengaging means acting to slide the expander in one direction with respect to the body by virtue of sliding movement of the retaining member and spring means cooperating with the expander whereby to slide the expander in the opposite direction.

2. A clamp comprising a cylindric body, an elongated retaining member slidably mounted in the body for protraction and retraction with respect thereto, said retaining member having diametrically expansible legs, an expander disposed between the legs and being longitudinally slidable with respect to said legs and body, spring means in the body for retracting the retaining member, a second spring in the body for sliding the expander in one direction upon protraction of the retaining member, and means on the retaining member engaging the expander whereby to slide the expander in the opposite direction upon retraction of the retaining member.

3. A clamp comprising a cylindric body, an elongated retaining member slidably mounted in the body for protraction and retraction with respect thereto, said retaining member having diametrically expansible legs, an expander disposed between the legs and being longitudinally slidable with respect to said legs and body, spring means in the body for retracting the retaining member, a second spring in the body for sliding the expander in one direction upon protraction of the retaining member, and means on the retaining member engaging the expander whereby to slide the expander in the opposite direction upon retraction of the retaining member, said second spring being relatively weaker than the first-mentioned spring.

4. A clamp comprising a cylindric body, an elongated retaining member slidably mounted in

the body for protraction and retraction with respect thereto, said retaining member having diametrically expansible legs, an expander longitudinally slidably mounted between the legs, a longitudinal slot in the expander, a lug on each of the legs, said lugs projecting into said slot and being engageable against an end thereof upon retraction of the retaining member whereby to slide the expander inwardly of the body, and spring means bearing against the inner end of the expander and acting to slide the latter outwardly of the body upon protraction of the retaining member.

5. A clamp comprising a cylindric body, an elongated retaining member slidably mounted in the body for protraction and retraction with respect thereto, said retaining member having diametrically expansible legs, an expander longitudinally slidably mounted between the legs, a longitudinal slot in the expander, a lug on each of the legs, said lugs projecting into said slot and being engageable against an end thereof upon retraction of the retaining member whereby to slide the expander inwardly of the body, spring means bearing against the inner end of the expander and acting to slide the latter outwardly of the body upon protraction of the retaining member, and a relatively stronger spring in the body, said last-named spring bearing against and normally urging the retaining member into retracted position.

6. In a clamp of the class described, a body, and a retaining member slidably mounted in the body, said retaining member comprising a plunger having a longitudinal bore, parallel pins mounted longitudinally in the bore, a spreader bar inserted longitudinally between said pins in said bore whereby to hold the latter outwardly against the side wall of the bore, and interengaging lug and recess means presented by the spreader bar and at least one of the pins for retaining the spreader bar between the pins.

7. A clamp comprising a cylindric body having an end wall, a reduced opening through the end wall, a retaining member slidably mounted in the body and having a bifurcated outer end protractable and retractable through the opening, an expander between the bifurcations of said outer end, said expander being slidable with respect to the retaining member and body, means for sliding the expander in one direction upon protraction of said outer end of the retaining member and means for sliding the expander in the opposite direction upon retraction of said outer end, the last named means including laterally projecting means on said outer end of the retaining member engaging the expander.

8. A clamp comprising a cylindric body having an end wall, a reduced opening through the end wall, a retaining member slidably mounted in the body and having a bifurcated outer end protractable and retractable through the opening, an expander between the bifurcations of said outer end, said expander being slidable with respect to the retaining member and body, means for sliding the expander in one direction upon protraction of said outer end of the retaining member and means for sliding the expander in the opposite direction upon retraction of said outer end, the last named means including a lost-motion connection between the bifurcated outer end of the retaining member and the expander.

9. A clamp comprising a cylindric body having an end wall, a reduced opening through the end wall, a retaining member slidably mounted in the body and having a bifurcated outer end protractable and retractable through the opening, an expander between the bifurcations of said outer end, said expander being slidable with respect to the retaining member and body and including a central portion projecting outwardly from the body through said opening and an inner end portion disposed transversely in the body, means for sliding the expander outwardly of the body upon protraction of the retaining member until the inner end portion of the expander engages the end wall of the body as a stop, and laterally interengaging means carried by the expander and retaining member whereby to slide the expander in the opposite direction upon retraction of the retaining member.

FRANK C. WALLACE.