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3,096,679

SHEET CLAMP HAVING A ONE EARED SPREADER BAR

Sterling B. Jones, West Covina, Calif., assignor to Mono-gram Precision Industries, Inc., Culver City, Calif., a corporation of California

Filed Mar. 14, 1960, Ser. No. 14,740

2 Claims. (Cl. 85-6)

This invention relates to securing devices, and more particularly to improvements in clamps for holding sheets of material together.

Sheet clamps are commonly employed for temporarily holding sheets of material together, e.g., metal panels that are to be riveted together. Typically, such sheets are provided with a plurality of aligned openings to receive the rivets. To hold the sheets together as the riveting proceeds, clamps are used wherein elongated, slidable needles with enlarged heads extend from a clamp body through the aligned openings in the sheets. The sheets are clamped between the clamp body and the heads of the needles.

The clamping action is achieved by continually forcing the needles toward the clamp body. In spring-action clamps, this is accomplished by means of a spring that surrounds and engages the needles within the clamp body, and a fixed spreader bar extending from the clamp body between the needles. The spring normally urges the needles therewith into the clamp body, so that the heads ride up on the spreader bar. Thus spread apart, the needles cannot pass into the clamp body, nor can they pass through the aligned openings in the sheets to be fastened.

To operate the clamp, the needles are forced against the spring until they override the spreader bar and the enlarged heads come together. The heads are then passed through the aligned openings. The spreader bar also extends through such openings, so that upon releasing the force on the needles, the spring is free to urge the needles rearwardly, whereupon the heads ride up on the spreader bar to engage the adjacent sheet of material. To release the clamp, the needles are forced forwardly until the heads override the spreader bar and come together, whereupon the needles can be withdrawn through the openings. Upon release of the needles after they are withdrawn, the spring forces them rearwardly until their heads abut the clamp body.

In a typical spring clamp of the prior art, the spreader bar, which is a T-shaped element, becomes cocked in the assembly thereof with the spring and the needles. This is the type of clamp wherein the spring, the needles and the spreader bar are assembled together and placed in one end of the clamp body, and the body at its opposite end is closed to prevent the assembly from being dislodged therefrom. In such cocked position, the spreader bar will not readily pass through the openings, so it is forced. Such forcing causes damage to the sheets of material being fastened, and also to the clamp. The damage to the clamp in some instances is so severe that the clamp must be discarded. As will be apparent, such prior art clamps are unduly costly to use.

It is an object of this invention to provide a clamp structure that overcomes the above and other disadvantages of prior art clamps.

It is another object of this invention to provide a spring clamp of the type described in which the spreader bar cannot be cocked in assembly.

It is also an object of this invention to provide an improved spring clamp having a minimum number of component parts of simple design and rugged construction.

The above and other objects and advantages of my invention will become apparent from the following descrip-

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tion taken in conjunction with the accompanying drawing of an illustrative embodiment thereof, in which:

FIGURE 1 is an exploded view of the parts of the improved clamp of my invention;

FIGURE 2 is a longitudinal side view of the parts assembled in a clamp body, showing one end of the spring abutting the ear on one side of the spreader bar;

FIGURE 3 is a fragmentary plan view taken along the line 3-3 of FIGURE 2, showing more clearly the arrangement of the spring and the ear on the spreader bar to prevent cocking of the spreader bar; and

FIGURE 4 is a fragmentary sectional view of the end portion of the clamp, showing the needles extended over the spreader bar to permit them to pass through the aligned openings in sheets to be fastened together.

Referring to FIGURES 1-3, there is shown a sheet clamp comprising a rod 10 which terminates at one end in a pair of elongated needle elements 11, 12. The needles 11, 12 have enlarged heads 13, 14, and are arranged so that the ends of the confronting faces of the heads 13, 14 are normally touching, and to this end the needles may be formed of spring metal.

The needles 11, 12 are surrounded by a compression spring 15. As shown, the spring 15 at one end rests against a washer 16 that surrounds the fixed ends of the needles. In the particular arrangement illustrated, the diameter of the rod 10 is greater than the distance between the remote surfaces of the needles, whereby to provide, at the fixed ends of said needles opposite the heads thereof, abutment means, for retaining the spring in position, in the form of a radial shoulder or seat 17 for the washer 16.

The spring 15 at its opposite end abuts a washer 18 that surrounds the needles adjacent their heads 13, 14. As shown, there are relatively sharp transitions between the heads and the main bodies of the needles, providing shoulders 19, 20 adapted to engage the adjacent surface of the washer 18. The spring 15 normally is compressed sufficiently to cause the washers 16, 18 to be seated against the shoulder 17 of the rod 10 and the shoulders 19, 20 of the heads 13, 14.

The heads 13, 14 are normally separated by a spreader bar 21. The spreader bar 21 is a thin, generally rectangular element that extends at one end through the washer 18.

The spreader bar 21 is held in fixed spaced relation to the washer 18 and the adjacent end of the spring 15. To this end, a short ear projection 22 is provided on one edge of the spreader bar 21, intermediate the ends of said bar and substantially at right angles to said one edge. The ear 22 is located between the washer 18 and that portion of the adjacent turn of the spring 15 that is spaced from the washer 18 a distance equal to the length of the ear 22. Conversely, the ear 22 is made so that it fits between the washer 18 and the last turn of the spring 15 without binding. In this way, the ear 22 and the spring 15 are in non-interfering relation, i.e., the spring 15 does not exert any thrust on the ear 22. The thrust is applied only against the washer 18 and the needles 11, 12, whereby the spreader bar is not skewed or cocked as in prior art clamp arrangements. In such arrangements, as where a T-shaped spreader bar is employed, the spring abuts the laterally extending portions, exerting a thrust thereon that cocks the spreader bar to one side. In the present arrangement, the washer 18 and the last turn of the spring 15 essentially form the fixed end walls of a chamber or compartment for housing that portion of the spreader bar 21 carrying the ear 22. The fixed walls of this compartment serve to limit the spreader bar 21 against relative axial movement which may be caused by frictional drag of the needles 11, 12 over the surface of the spreader bar. However, in actual practice, this frictional drag is minimal, and there is essentially no tendency for the

spreader bar to move axially in relation to said chamber or compartment.

To further aid in keeping the spreader bar 21 properly centered, the width of the spreader bar is made substantially equal to the inner diameter of the spring 15. Since a substantial part of the spreader bar extends past its ear 22 into the spring, the spreader bar cannot be cocked within the spring.

To assemble the parts as above described, the washer 16 is placed around the needles and lowered to the fixed ends thereof. Then the spring 15 is lowered over the needles and compressed. Next, the spreader bar 21 is located between the needles and against the end of the spring 15. In this position, the spreader bar is not between the heads 13, 14, thereby permitting them to be in touching relation. With the heads thus close together, the washer 18 is slipped over them. Then spreader bar 21 is moved to separate the heads of the needles, and the spring 15 is released, thereby to force the washer 18 against the shoulders 19, 20. The resultant sub-assembly will hold together and may be completed immediately or may be stored for subsequent completion.

With the subassembly thus prepared, the clamp assembly process is continued by placing the subassembly in a clamp body 25 (see FIGURE 2) with the heads 13, 14 extending from one end thereof. The body is peened over at its other end, whereby the washers cannot emerge from the body. The body has an external shoulder 26 to be engaged by a forked jaw 27 of a pair of pliers. The end of the rod 10 that extends from the body 25 is adapted to be engaged by the other jaw 28 of the pliers. Thus, forcing the jaws 27, 28 together causes the rod 10 and the needles 11, 12 to move longitudinally. When the heads 13, 14 have cleared the spreader bar 21 and come together, they are inserted through aligned openings 29, 30 in sheets 31, 32 to be fastened (see FIGURE 4). Then the rod 10 is released to be retracted under the force of the spring 15, whereupon the heads 13, 14 ride up on the spreader bar 21, and the shoulders 19, 20 come into engagement with the adjacent sheet 31. In this manner, as in prior art clamps, the sheets 31, 32 are firmly clamped between the heads 13, 14 and the clamp body 25.

The arrangement of the spreader bar 21 in accordance with my invention also helps to prevent rotation of the spreader bar relative to the spring 15. As shown in FIGURES 2-4, the end of the spring is disposed against the ear 22 and extends laterally therefrom. Thus, the ear 22 is effectively held against lateral movement between the end of the spring and the portion of the final turn adjacent the other side of the ear.

It will be apparent from the foregoing that while a particular form of my invention has been illustrated and described, various modifications can be made without departing from the spirit and scope of my invention. Accordingly, I do not intend that my invention be limited, except as by the appended claims.

I claim:

1. A sheet clamp comprising: a hollow body having re-

stricted openings at its ends, thereby providing transverse surfaces; a washer in said body having flat, substantially parallel surfaces engaging the transverse surface at one end; a rod extending into the opposite end of said body and having a flange engaging the transverse surface at said opposite end; a compressed coil spring extending between said flange and said washer, a substantial portion of the end coil abutting the washer; a pair of needles fixed at one end to said flange, said needles extending through said spring and said washer to the exterior of said body, the exterior ends of said needles having enlarged heads with surface portions to engage the outermost surface of said washer; a spreader bar having a portion within said spring and extending through said washer and between said heads, said spreader bar having parallel edges; and an ear extending substantially at right angles from one edge only of said spreader bar intermediate the ends of said bar, said ear being located between said washer and the adjacent end turn of said spring, said ear being disposed adjacent the end of said end turn, said portion of the bar within the spring having a width substantially equal to the inner diameter of the spring.

2. In a spring clamp having a clamp body, an assembly to be positioned in the body comprising: a pair of elongated needles extending through said clamp body, said needles having enlarged heads projecting from one end of said body, the transitions between remote sides of said needles and their heads being abrupt, the ends of the needles opposite the heads thereof being connected to the end of a rod; an elongated plate having substantially parallel edges and an ear on one edge only, said ear extending at substantially right angles to said one edge and being intermediate the ends of said plate, said plate being disposed between said enlarged heads; a compressed coil spring surrounding said needles and extending from said enlarged heads to said rod; said ear being disposed beside the end of the adjacent end turn of said spring; said plate having a portion thereof extending within the spring and having a width substantially equal to the inner diameter of the spring; abutment means associated with said rod for retaining said spring in position; an element having flat, substantially parallel surfaces surrounding said needles immediately adjacent said abrupt transitions, a substantial portion of said adjacent end turn of said spring engaging said element; whereby the spring acting on said abutment means causes said enlarged heads to be urged into engagement with said element surrounding said needles.

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