Dec. 5, 1944. F. C. WALLACE 2,364,408

SHEET METAL CLAMP

Filed April 9, 1943

Fig. 1.

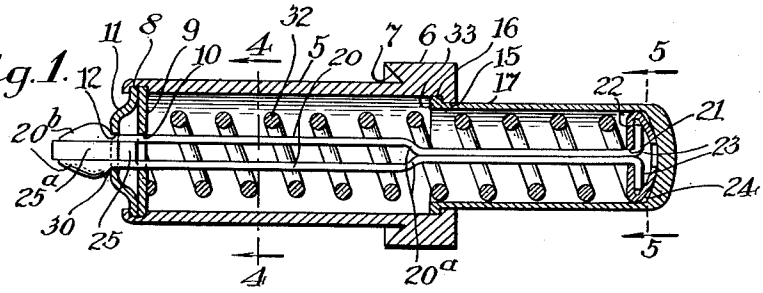


Fig. 2.

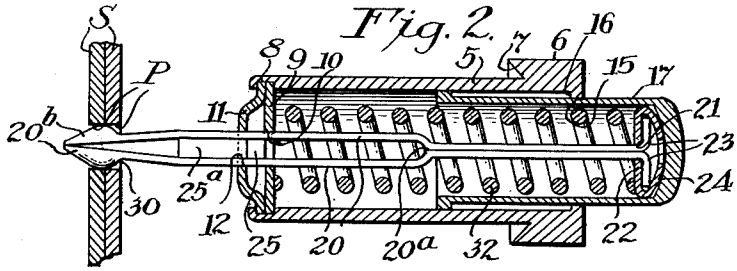


Fig. 4.

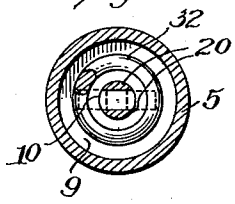


Fig. 3.

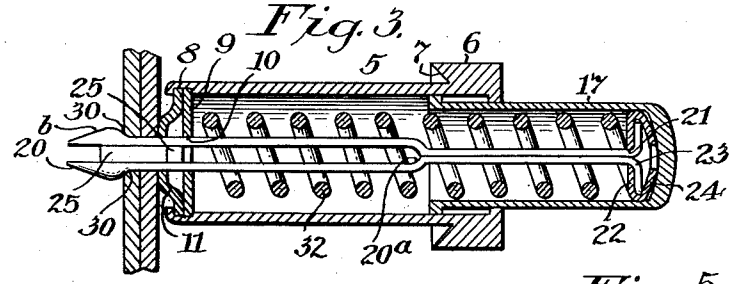


Fig. 6.

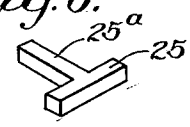
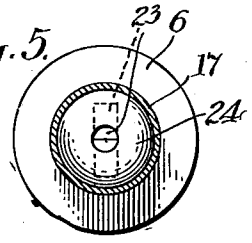


Fig. 5.



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2,364,408

SHEET METAL CLAMP

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Application April 9, 1943, Serial No. 482,413

3 Claims. (Cl. 85—5)

This invention relates to sheet metal clamps of the type commonly used for holding together superposed perforated sheets with the perforations in alignment.

My invention has for one of its primary objects the provision of safety features for clamps of the type wherein a pair of clamping fingers or pins are reciprocally mounted in a cylindric body for protraction and retraction relative thereto, the retraction being accomplished by a relatively strong spring normally urging the clamping pins into retracted position relative to a spreader positioned therebetween. When such a clamp is in work-clamping position, or even in idle position, the only element preventing the spring from forcing the parts into disassembly are the enlarged outer ends of the pins engaging the work or the end of the clamp body, as the case may be. If the enlarged ends wear unduly or break off, the spring acts to propel the pins and body in opposite directions with considerable force with the result that not infrequently serious injury results to workmen. By my invention I provide simple and effective means for safe-guarding against this danger.

Another object is the provision in such a clamp of an improved clamp pin construction and arrangement.

Another object is the provision of a clamp incorporating improved means of assembly.

Still further advantages are inherent in my invention and how those as well as the objects hereinabove pointed out are achieved will be apparent from the following detailed explanation of presently preferred embodiments, for which purposes I shall refer to the accompany drawing in which:

Fig. 1 is a longitudinal section showing parts in position occupied when device is not in use;

Fig. 2 is a longitudinal section showing retaining pins protracted preparatory to inserting in perforations;

Fig. 3 is a longitudinal section showing device in clamping position;

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

Fig. 5 is a section on line 5—5 of Fig. 1; and

Fig. 6 is a perspective of the spreader.

Referring now to the specific example of my invention illustrated in the drawing, the numeral 5 denotes a cylindric body having an annular flange 6 providing an undercut shoulder 7 for the reception of a clamp-operating tool, not shown. At the outer end of the bore of the body there is a counter-bore 8 for the reception of an end wall or ring member 9 having a central opening 10 therethrough, and a dished cap 11 having a central opening 12 has its peripheral edge fitting within the counter-bore 8 against the end wall 9, both the end wall and cap being held in the body by peening the end of the body over the peripheral edge of the cap.

The opposite or inner end of the body has a bore 15 of relatively reduced diameter whereby to provide a shoulder 16 which acts as a stop to limit outward movement of a thimble 17, which latter is reciprocally mounted in the body.

Mounted within the body and the thimble I provide a plunger comprising a pair of retaining pins 20 whose inner ends project through a central opening 21 in a cap 22 and are bent over as shown at 23 to prevent the pins from being pulled out of the cap. The side walls 24 of the cap are bent over to provide a housing for the inner ends of the pins. By means of this cap the inner ends of the pins are held against lateral separation.

The inner opposed faces of the pins abut each other to a point spaced inwardly of the body from the cap 22, at which point 20*a* they offset outwardly to provide a space between the outer end portions of the pins. The outer ends of the pins project through the concentric holes 10, 12 astride a T-shaped spreader, whose inner cross arm 25 is rotatably disposed in the space provided between the end wall 9 and cap 11 and whose central leg 25*a* projects through opening 12 in the cap 11 between the pins 20.

The outer end of each of the pins 20 has an enlargement 20*b* providing a shoulder 30 facing the outer end of the body.

A coil spring 32 bears at one end against end wall 9 and at its other end against cap 22 within the thimble and thus normally urges the retaining pins 20 into retracted position and normally urges the thimble outwardly of the body.

To prevent escape of the thimble and its carried elements from the body, the thimble is provided with a peripheral flange 33 which engages the shoulder 16 when the retaining pins are in fully retracted position. The outer, closed end of the thimble is spherical so that when engaged by a relatively flat clamp-operating tool only a minimum of fractional resistance to rotation of the thimble and its carried pins relative to the body is offered, such relative rotation being desirable to prevent damage to the retaining pins when they are engaged by a tight fit in a perforation in the work.

To assemble my improved clamp, the pins 20 are first assembled in the cap 22 and inserted in

the thimble along with the spring. Then the thimble and its carried pins and spring are inserted longitudinally of the body bore, being inserted from the outer end, after which the wall 9 is applied. Next the cap 11 is applied and held sufficiently separated from wall 9 to insert the spreader. By then compressing the spring sufficiently the outer end of the body is crimped over the peripheral edge of the cap 11. Another simple procedure for assembly is to first insert the thimble 17 into the body from the outer end, then insert the pins through the opening in the cap 11, then insert the spreader by placing its cross arm in and against the dished surface of the cap and projecting its central arm outwardly through the cap opening and between the pins, then applying the ring 9 over the pins. Next, the cap or ferrule 22 is applied, the inner ends 23 of the pins are bent over, and the side wall 24 of the cap 22 is bent over the pins. Then this assembly may be inserted in the body from the outer end thereof and secured in position as by peening the outer end of the body.

To operate the clamp, it is placed in a clamp-operating tool, for instance of the character shown in United States Patent No. 2,296,439, and while the body is held stationary, the thimble with its carried pins are forced inwardly of the body against the pressure of the spring to protract the outer ends of the pins far enough beyond the outer end of the spreader leg 25*a* to be flexed together by engagement with the side walls of the perforations P when inserted in registering perforations P in the sheets S to be clamped (see Fig. 2). Usually the diameter of the hole 12 through the cap and the diameter of the perforations P are substantially the same and each hole is of a diameter equal to the combined thickness of the two pins and interposed spreader at a point immediately above the shoulders 30. Release of the tool pressure on the thimble permits the spring to retract the pins relative to the spreader and body, thus causing the sheets S to be clamped resiliently between the shoulders 30 and the cap 11 (see Fig. 3).

From the foregoing it will be observed that any accidental escape of the outer ends of the pins through the openings 9 and 12—as will occur if the engaged ends become unduly worn or break off—the thimble and body are prevented from completely separating by virtue of the annular flange 33 on the thimble encountering the body shoulder 16.

Another important advantage of the structure described resides in the facility and economy of providing for assembly.

I claim:

1. A sheet metal clamp, comprising, in combination, a cylindric body, an end cap secured on the body in position closing the outer end thereof, said cap presenting an opening therethrough, a dished inner portion and an outer work-engaging portion, a plunger reciprocally mounted in the body, said plunger presenting a pair of work-engaging pins protractable and retractable through said opening, spreader means for separating the pins, including a T-shaped bar having its cross arm disposed in the dished portion of the cap and having its central arm projecting outwardly from the cap through said opening and between the pins to a point spaced outwardly from the outer surface of the cap, an inwardly disposed flange on the inner surface of the body adjacent its inner end, a coil spring in the body around and retractively engaging the plunger and tool-operated means for protracting the plunger against the pressure of said spring, comprising a plunger-engaging member reciprocally mounted in and projecting from the inner end of the body for manual engagement, said member having a relatively increased diameter inner end portion engageable against said flange when the plunger is in fully retracted position.

2. A sheet metal clamp, comprising, in combination, a cylindric body, an end cap mounted on the body in position closing the outer end thereof, said cap presenting an opening therethrough and a work-engaging outer surface, a plunger reciprocally mounted in the body, said plunger having a work-engaging member protractable and retractable through said opening, a spreader member having a laterally projecting inner end portion disposed in the cap and an outer end portion projecting outwardly through said opening in engagement with the work-engaging member, an inwardly disposed flange on the inner surface of the body adjacent its inner end, a coil spring in the body around and retractively engaging the plunger and tool-operated means for protracting the plunger against the pressure of said spring comprising a plunger-engaging member reciprocally mounted in and projecting from the inner end of the body for manual engagement, said member having a relatively increased diameter inner end portion engageable against said flange when the plunger is in fully retracted position.

3. A sheet metal clamp comprising a body presenting a longitudinal bore having a reduced diameter inner end portion providing an inwardly facing shoulder, a ring in the outer end of the bore, a cup-shaped cap secured to the outer end of the body, said cap having an opening concentric with the ring, a plunger reciprocally mounted in the bore for protraction and retraction through said ring and opening, a spreader having a laterally projecting inner end portion mounted between the cap and ring and an outer plunger-engaging portion projecting outwardly through said opening, a coil spring in the body bearing at its outer end against the ring and bearing at its inner end against the plunger to normally urge the plunger retracted, and tool-operated means for protracting the plunger against the pressure of the spring, comprising a plunger-engaging member reciprocally mounted in and projecting from the inner end of the body, said member presenting a peripheral flange engageable against said first-named shoulder when the plunger is fully retracted.

FRANK C. WALLACE.