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T. SIBLEY

DEVICE FOR SETTING FASTENERS IN SHEET MATERIAL

Filed June 23, 1925

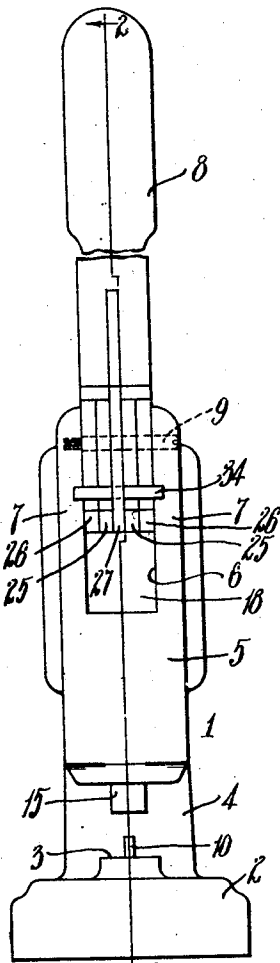


Fig. 1.

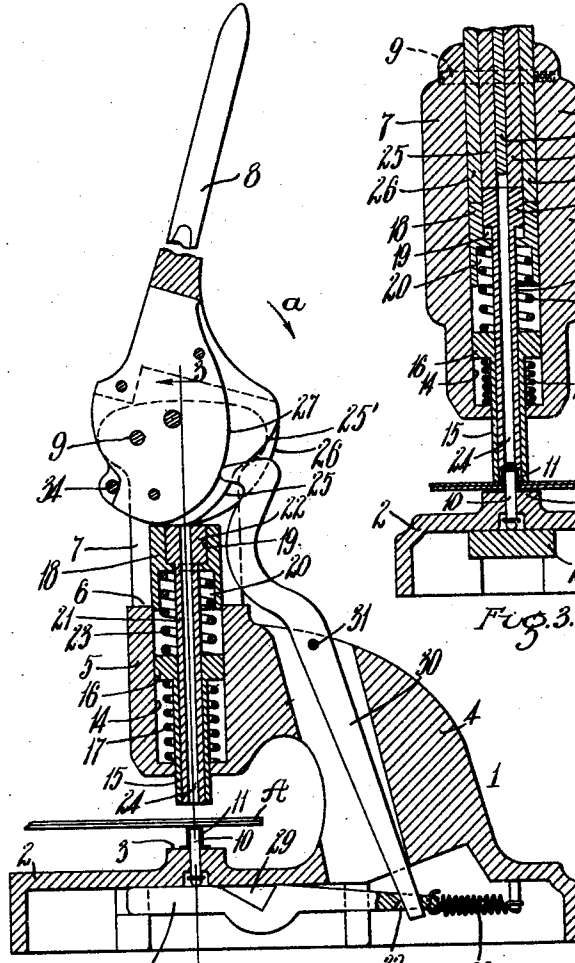


Fig. 2.

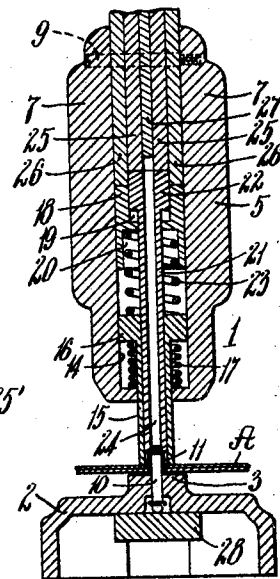


Fig. 3.

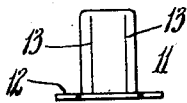


Fig. 5.

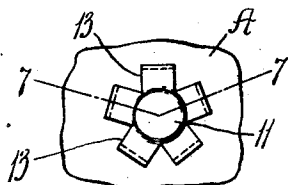


Fig. 6.

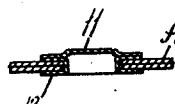


Fig. 7.

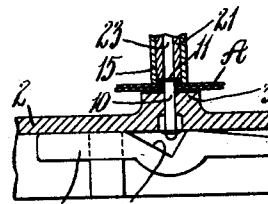


Fig. 4.

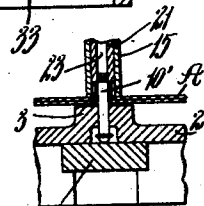


Fig. 8.



Fig. 9.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR SETTING FASTENERS IN SHEET MATERIAL.

Application filed June 23, 1925. Serial No. 39,120.

This invention relates to a device for setting fasteners in sheet material, and has for its object to provide a small portable hand operated device for setting a type of fastener known to the trade as "Challenge eyelets" in sheet material, as for example, through a plurality of sheets of paper and thereby fastening said sheets together.

It is still further an object of the invention to provide a device in which the operations of punching the sheet material and setting a fastener therein is accomplished with a single rocking movement of an operating lever, the punching mechanism which includes the fastener to be set, the latter constituting a punch, being operated to perforate the sheet material during the first part of the rocking movement of the operating handle, a continued movement of said handle then operating a yielding clamping mechanism and pushing the material downwardly upon said fastener and against the flange at the bottom thereof with the body portion or barrel of said fastener projecting upwardly through the perforation. The fastener, with the material thereon, is then clamped by said yielding clamping mechanism upon a rigid seat provided upon the base of the device, said clamping mechanism compensating for the various thicknesses of material that may be encountered, after which the positioning pin upon which the fastener is mounted is allowed to drop by mechanism operated by the operating lever, thereby permitting the latter to apply pressure to and collapse the upper portion of the barrel of said fastener and compress the same against the sheet material.

The invention consists in a device for setting fasteners in sheet material as set forth in the following specification, and particularly as pointed out in the claims thereof.

Referring to the drawings:—

Figure 1 represents a front elevation of a device for setting fasteners in sheet material embodying my invention.

Fig. 2 is a vertical sectional elevation as taken on the line 2—2 of Fig. 1, the various parts being illustrated in their normal position.

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 2, the sheet material with a fastener projecting therethrough being illustrated clamped against the seat of the frame and with the positioning pin in its

uppermost position projecting into the fastener.

Fig. 4 is a detail vertical section illustrating the positioning pin for the fastener in its released position and a fastener collapsed and flattened against the sheet material.

Fig. 5 is an enlarged front elevation illustrating a fastener upon which the device of this invention is designed to operate.

Fig. 6 is an enlarged plan view illustrating the upper side of a fastener after it has been inserted in the sheet material and secured thereto.

Fig. 7 is a detail section taken on the line 7—7 of Fig. 6.

Fig. 8 is a sectional view of a modified embodiment of the invention illustrating a positioning pin of sufficient length to permit the closed end of a fastener to be punched therefrom during the operation of perforating the sheet material.

Fig. 9 is a view similar to Fig. 7 illustrating a fastener from which the closed end has been punched.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 1 is a frame embodying therein a base 2 having a seat portion 3 formed thereon, said seat portion being raised a suitable distance above the upper surface of said base. Projecting upwardly and forwardly from the rear of the base 2 is a neck 4 which terminates in a head 5, the upper portion of which is slotted at 6, thereby forming furcations 7 between which an operating lever 8 is pivoted upon a suitable pin 9.

Slidably mounted within the base 2 and projecting upwardly through the seat portion 3 of said base is a pin 10, the latter constituting a support and positioning means for a fastener 11, the latter being of a type known to the trade as Challenge eyelets. The fasteners 11 are constructed from a single piece of thin sheet material, being formed with an approximately cylindrical shaped body portion closed at one end thereof and open at the other end thereof, and having a flange 12 extending outwardly therefrom at its open end, and said fastener has slits 13 which extend through the flange 12 and for a greater portion of the length of the body as illustrated in Fig. 5.

The head 5 of the frame 1 has a cylindrical recess 14 formed therein and located in longitudinal alignment with the position-

ing pin 10, and slidably mounted within said recess is a bottom member 15 of a clamp for sheet material A in which the fasteners 11 are to be inserted. The clamping member 15 is shouldered at 16, and a coil spring 17 surrounds said member, one end of said spring engaging the bottom of the recess 14 and the other end of said spring engaging the under surface of the shouldered portion 16 of said clamping member.

Another member 18 is also slidably mounted within the recess 14 at the upper end thereof, said member also forming a portion of the hereinbefore mentioned clamp, and said member 18 has a cylindrical recess 19 extending downwardly from the upper end thereof, and a cylindrical recess 20 extending upwardly from the lower end thereof. Mounted within the member 18 and extending downwardly therefrom and into and through the member 15 is a die 21, the latter having a head portion 22 that is located within the recess 19 of the member 18. A coil spring 23 surrounds the die 21, the lower end of said spring bearing against the shouldered portion 16 of the clamping member 15, and the upper end of said spring being located within the recess 20 of the clamping member 18, and abutting against the upper end of said recess. The coil spring 23 is constructed of relatively heavier wire than the coil spring 17 and will, therefore, withstand a greater pressure before being compressed.

It will, therefore, be seen that the clamping members 15 and 18 are each slidably mounted within the recess 14 of the head 5, being yieldable relatively to said frame and to each other, while the die 21 is slidably mounted within each of said clamping members 15 and 18, and is, therefore, also yieldingly mounted relatively to the frame 1. The die 21 has a hole 24 extending upwardly therethrough, the diameter of said hole being approximately the same size as the diameter of the positioning pin 10, and the lower end of said hole co-operates with the upper portion of a fastener 11 mounted upon the positioning pin 10 in forming a perforation in the sheet material A when the latter is forced by the die 21 against said fastener, the material punched from the sheet material being forced upwardly through said hole 24 with each successive operation of the device.

The die 21 and members 15 and 18 comprising the clamp for the sheet material are actuated by the operating lever 8 as follows:—Located upon the operating lever 8 at the pivoted end thereof are two cam plates 25, each of which are constructed to engage the upper extremity of the head portion 22 of the die 21. Also located upon the operating lever 8 adjacent to and upon the outer side of each of the cam plates 25

are two other cam plates 26, each of which are adapted to engage the upper extremity of the clamp member 18. Located between the cam plates 25 is a cam plate 27, the purpose of which will be hereinafter mentioned. Each of the cam plates 25, 26 and 27 are securely riveted together and to the operating lever 8, and in effect form a part of said lever, and when the latter is rocked, the various cam surfaces will engage the die 21 and member 18 of the clamp and will actuate the same in a manner hereinafter to be mentioned.

Slidably mounted within the base portion 2 of the frame 1 and acting as a support to normally hold the positioning pin 10 in its uppermost position as illustrated in Figs. 2 and 3, is a member 28 having a V-shaped notch provided in its upper surface. The member 28 is actuated at the proper time to release the positioning pin 10 and allow the latter to move downwardly into the notched portion 29 of said member by a lever 30 pivoted at 31 to the neck portion 4 of the frame 1. The lower end of the lever 30 projects into an opening 32 provided in the member 28 while the upper end of said lever engages the cam plate 27 previously mentioned and as illustrated in Fig. 2, a spring 33 normally holding the various parts in the positions illustrated. By releasing the positioning pin 10 as hereinbefore mentioned, the fastener 10 is permitted to be collapsed by the die 21 and the upper portion of said fastener is flattened upon the sheet material A and the various layers comprising said sheet material are secured together between the flattened portion of said fastener and the flange 12 thereof as illustrated in Fig. 7. A pin 34 extending through the cam plate 27 limits the extent to which the lever 8 may be rocked toward the left in Fig. 2.

The general operation of the device hereinbefore specifically described is as follows:—Assuming that the various parts are all positioned as illustrated in Fig. 2, a fastener 11 is placed upon the positioning pin 10 and a plurality of layers of sheet material which it is desired shall be fastened together are inserted between said fastener and the lower end of the die 21. The operating lever 8 is then rocked in the direction of the arrow *a*, Fig. 2, and during the initial portion of the rocking movement of said lever, the surfaces of the cams 25 and 26 engaging the upper extremities of the die 21 and clamping member 18 respectively will cause said die and clamping member to move downwardly in unison, the movement transmitted to the clamping member 18 being transmitted through the spring 23 to the lower clamping member 15, causing the latter to move downwardly in unison with the die 21 until the lower extremities of said

die 21 and member 15 contact with the upper surface of the sheet material A.

The die 21 will now cooperate with the fastener 11 to perforate the sheet material after which the downward movement of said die will cease because of the contour of the cams 25. The cams 26, however, are so formed that the clamping members will continue to descend until the lower extremity of the clamping member 15 has forced the sheet material A against the flange 12 of the fastener 11 as illustrated in Fig. 3. During this movement of the cams 26, the differences in the strength of the springs 17 and 23 will permit the clamping members to compensate for different thicknesses of material that it may be desired to fasten together. As soon as the operating lever reaches a point in its rocking movement where the sheet material and fastener therein have been clamped against the seat 3, the cam 27 will rock the lever 30 and move the sliding member 28 from the position illustrated in Fig. 2 to that illustrated in Fig. 4, whereupon portions 25' of the cams 25 will engage the upper portion of the head 22 of the die 21, and there being no resistance upon the positioning pin 10 on account of the fact that the notch 29 is located directly therebeneath, the upper portion of the fastener 11 will collapse and be flattened against the upper surface of the sheet material A as illustrated in Figs. 4 and 7.

After a fastener has been inserted in the sheet material and flattened thereagainst, the portions of said fastener that are located between the slits 13 will project radially from the body portion of said fastener as illustrated in Fig. 6.

In Fig. 8 I have illustrated a modified embodiment of my invention in which a positioning pin 10' normally projects above the surface of the seat 3 a slightly greater distance than the height of the fastener 11 with the result that when the die 21 descends, the sheet material A will first be perforated, after which the closed upper end of the fastener will be punched therefrom. The clamp 15 will then force the sheet material A downwardly upon the fastener and finally the upper portion of said fastener will be collapsed and flattened against the upper surface of the sheet material in exactly the same manner as previously mentioned.

The fastener when inserted in the sheet material and flattened thereagainst will appear as illustrated in Fig. 9, there being an opening extending entirely therethrough and the fastener will therefore constitute an eyelet. In all respects, save the length of the positioning pin 10', the mechanism and operation thereof is exactly the same as previously set forth in connection with Figs. 1 to 7 inclusive.

I claim:—

1. A device for setting fasteners in sheet material comprising, in combination, a frame, means to support and position a fastener upon said frame, means including said fastener for perforating sheet material, means for collapsing said fastener upon said sheet material, and yielding means for forcing said fastener through the perforation in said sheet material prior to the collapsing operation.

2. A device for setting fasteners in sheet material comprising, in combination, a frame, means to support and position a fastener upon said frame, means including said fastener for perforating sheet material, means for collapsing said fastener upon said sheet material, and yielding means for forcing said fastener through the perforation in said sheet material and for clamping said sheet material and fastener upon said frame prior to the collapsing operation.

3. A device for setting fasteners in sheet material comprising, in combination, a frame, means to support and position a fastener upon said frame, a die slidably mounted in said frame, a clamp slidably mounted upon said die, and an operating lever adapted to force said die into co-operative relation with said fastener to perforate said sheet material, to operate said clamp to clamp said sheet material and fastener upon said frame, and to cause said die to collapse said fastener upon said sheet material.

4. A device for setting fasteners in sheet material comprising, in combination, a frame, means to support and position a fastener upon said frame, a die slidably mounted in said frame, a clamp surrounding said die and yieldable relatively thereto, and an operating lever adapted to force said die into cooperative relation with said fastener to perforate said sheet material, to operate said clamp to force said sheet material through the perforation therein and clamp said sheet material and fastener upon said frame, and to cause said die to collapse said fastener upon said sheet material.

5. A device for setting fasteners in sheet material comprising, in combination, a frame, means to support and position a fastener upon said frame, a die slidably mounted in said frame, a clamp surrounding said die and including two members, each slidably mounted within said frame and yieldable relatively to each other, and an operating lever adapted to force said die into co-operative relation with said fastener to perforate said sheet material, to operate said clamp to force said sheet material through the perforation therein and clamp said sheet material and fastener upon said frame, and to cause said die to collapse said fastener upon said sheet material.

6. A device for setting fasteners in sheet material comprising, in combination, a frame, means to support and position a fastener upon said frame, a die slidably mounted in said frame, an operating lever, means actuated by said lever to force said die into co-operative relation with said fastener to perforate said sheet material and to collapse said fastener upon said material, a clamp, and means also actuated by said lever to force said clamp into engagement with said sheet material to hold the latter during the collapsing operation.

7. A device for setting fasteners in sheet material comprising, in combination, a frame, means to support and position a fastener upon said frame, a die slidably mounted in said frame, an operating lever, means actuated by said lever to force said die into co-operative relation with said fastener to perforate said sheet material and to collapse said fastener upon said material, a clamp surrounding said die and including two members, each slidably mounted within said frame and yieldable relatively to each other, and means also actuated by said lever to force said clamp into engagement with said sheet material to hold the latter during the collapsing operation.

8. A device for setting fasteners in sheet material comprising, in combination, a frame, means to support and position a fastener upon said frame, a die slidably mounted in said frame, an operating lever, means actuated by said lever to force said die into co-operative relation with said fastener to perforate said sheet material and to collapse said fastener upon said material, a clamp surrounding said die and embodying therein two members, each of said members slidably mounted with said frame and being yieldable relatively to each other and to said die, and means also actuated by said lever to force said clamp into yielding engagement with said sheet material to hold the latter together with said fastener during the collapsing operation.

9. A device for setting fasteners in sheet material comprising, in combination, a frame, a pin to position a fastener upon said frame, means beneath said pin to support the same, a die slidably mounted in said frame, a clamp slidably mounted upon said die, and an operating lever adapted to force said die into co-operative relation with said fastener to perforate said sheet material, to operate said clamp to clamp said sheet material and fastener upon said frame, to withdraw the support from beneath said pin, and to cause said die to collapse said fastener upon said sheet material.

10. A device for setting fasteners in sheet material comprising, in combination, a frame, a pin to position a fastener upon said frame, a slide located beneath said pin

to support the same, a die slidably mounted in said frame, an operating lever, means actuated by said lever to force said die into co-operative relation with said fastener to perforate said sheet material and to collapse said fastener upon said material, means also actuated by said lever to withdraw the supporting slide from beneath said positioning pin, thereby permitting the collapse of said fastener, a clamp, and means also actuated by said lever to force said clamp into engagement with said sheet material to hold the latter during the collapsing operation.

11. A device for setting fasteners in sheet material comprising, in combination, a frame, a pin to position a fastener upon said frame, a slide located beneath said pin to support the same, a die slidably mounted in said frame, an operating lever, means actuated by said lever to force said die into co-operative relation with said fastener to perforate said sheet material and to collapse said fastener upon said material, means also actuated by said lever to withdraw the supporting slide from beneath said positioning pin, thereby permitting the collapse of said fastener, a clamp surrounding said die and including two members, each slidably mounted within said frame and yieldable relatively to each other, and means also actuated by said lever to force said clamp into engagement with said sheet material to hold the latter during the collapsing operation.

12. A device for setting fasteners in sheet material comprising, in combination, a frame, a pin to position a fastener upon said frame, a slide located beneath said pin to support the same, a die slidably mounted in said frame, an operating lever, a cam fast to said lever to force said die into co-operative relation with said fastener to perforate said sheet material and to collapse said fastener upon said material, a cam also fast to said lever to withdraw the supporting slide from beneath said positioning pin, thereby permitting the collapse of said fastener, a clamp surrounding said die and including two members, each slidably mounted within said frame and yieldable relatively to each other, and a cam also fast to said lever to force said clamp into engagement with said sheet material to hold the latter during the collapsing operation.

13. A device for setting fasteners in sheet material comprising, in combination, a frame, means to position a fastener upon said frame, means including said fastener and the positioning means therefor for perforating the sheet material, means to punch the closed end of said fastener and to collapse said fastener upon said sheet material, and means for forcing said fastener through the perforation in said sheet material prior to the collapsing operation.

14. A device for setting fasteners in sheet

material comprising, in combination, a frame, a pin to position a fastener upon a frame, means including said fastener and the positioning pin for perforating the sheet material, means to punch the closed end of said fastener and to collapse said fastener upon said sheet material, and means to force said fastener through the perforation in said sheet material prior to the collapsing operation.

15. A device for setting fasteners in sheet material comprising, in combination, a frame, a pin to support and position a fastener upon said frame, a die slidably mounted in said frame, a clamp slidably mounted upon said die, and an operating lever adapted to successively force said die into co-operative relation with said fastener to perforate said sheet material, to then force said die into co-operative relation with said positioning pin to punch the closed end from said fastener, to operate said clamp to clamp said sheet material and fastener upon said frame, and to cause said die to collapse said fastener upon said sheet material.

16. A device for setting fasteners in sheet

material comprising, in combination, a frame, a pin to position a fastener upon said frame, a slide located beneath said pin to support the same, a die slidably mounted in said frame, an operating lever, a cam fast to said lever to force said die into co-operative relation with said fastener to perforate said sheet material, to then force said die into co-operative relation with said positioning pin to punch the closed end from said fastener, and to finally collapse said fastener upon said sheet material; a cam also fast to said lever to withdraw the supporting slide from beneath said positioning pin, thereby permitting the collapse of said fastener, a clamp surrounding said die and comprising two members, each slidably mounted within said frame and yieldable relatively to each other, and a cam also fast to said lever to force said clamp into engagement with said sheet material to hold the latter during the collapsing operation.

In testimony whereof I have hereunto set my hand.

TARRANT SIBLEY.