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FASTENING DEVICE

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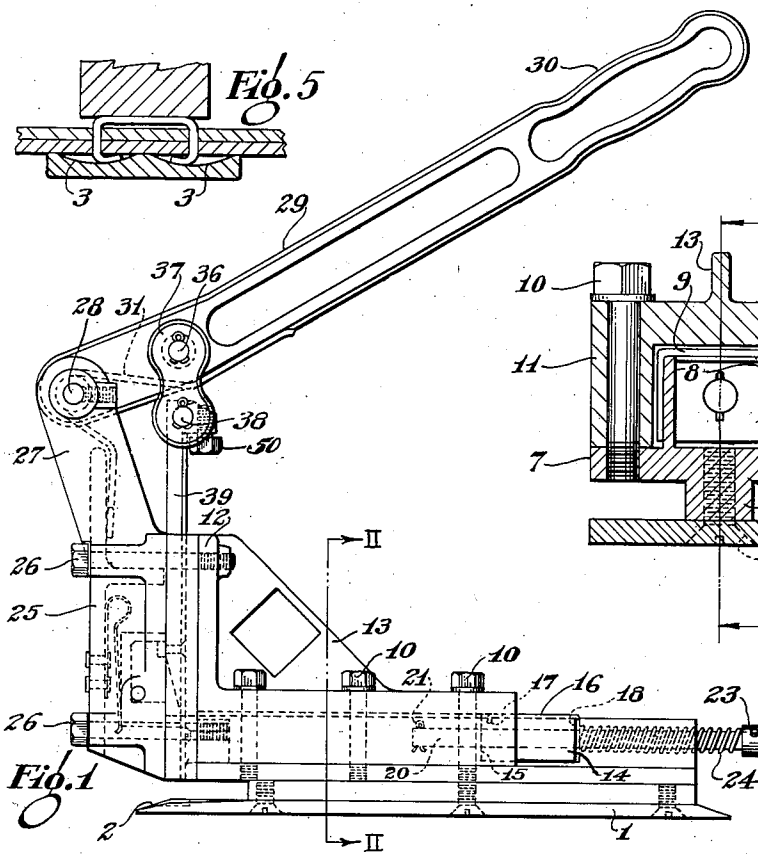



Fig. 1




Fig. 2

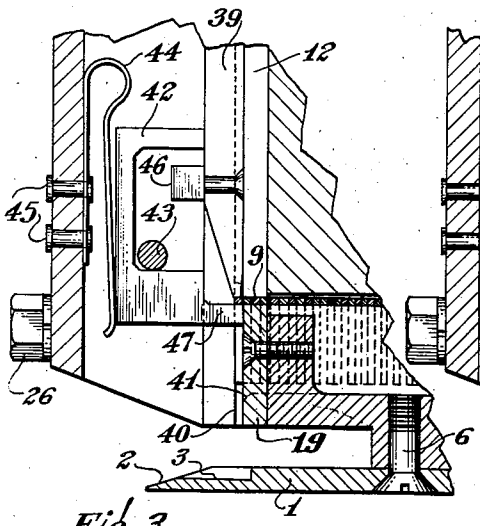



Fig. 3

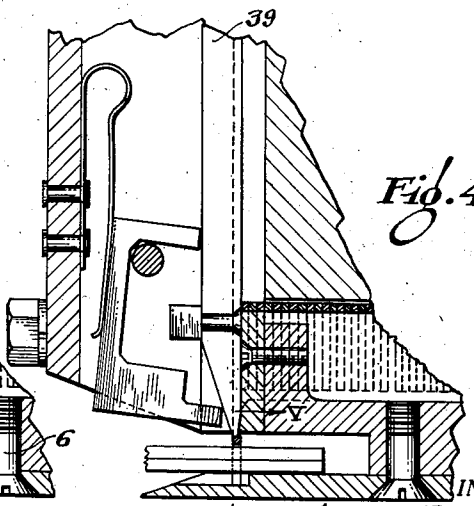



Fig. 4

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## FASTENING DEVICE

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8 Claims. (Cl. 1—49)

This invention relates to fastening devices, and more particularly to devices which fasten articles together by means of deformable retainers, such as metal staples and the like.

An object of the invention is to provide an improved fastening means by which relatively heavy materials may be secured together.

Another object is to provide an improved fastening means which will be simple in construction.

Another object is to provide an improved fastening means which will be efficient in operation.

Another object is to provide an improved fastening means which may be easily used.

Another object is to provide an improved fastening means whereby heavy fastening devices may be applied with comparatively little effort.

Other objects will hereinafter appear.

The invention will be better understood from the description of one practical embodiment thereof, illustrated in the accompanying drawing, in which:—

Figure 1 is a side elevation view of a device designed for applying staples to heavy sheet material such as roofing;

Figure 2 is an enlarged sectional view of the apparatus of Figure 1 taken on line II—II thereof;

Figure 3 is a fragmentary longitudinal sectional view taken on the line III—III of Figure 2, showing the device with its parts in the positions they occupy prior to driving a staple.

Figure 4 is a view similar to Figure 3, showing the parts in positions they occupy during the driving operation; and

Figure 5 is a fragmentary cross sectional view taken on the line V—V of Figure 4.

The device illustrated consists of a flat base or shoe 1, having its front end bevelled as indicated at 2 for easy insertion between the sheets of material, and formed adjacent this bevelled end with curved die surfaces 3 for turning the points of the staple inwardly and clinching it on the under side of the material.

Secured to the base or shoe is a frame conveniently made of two parts, as illustrated, the lower part 4 of which is composed of flanges. One flange 5, being centrally disposed and extending downwardly, is secured to the base as by machine screws 6 having their heads countersunk within the base. Two horizontal flanges 7 extend to the sides, and two parallel vertical flanges 8 extend upwardly to form a guide or magazine for the staples 9 and a housing for the spring by which they are fed.

Secured to the horizontal flanges by machine screws 10 is the upper part 11 of the frame, this being a generally channel-shaped bracket-like member provided at its front end with an upwardly extending flange 12 to which the driving mechanism may be secured. A web 13 is interposed between this flange and the web of the channel-shaped part of the upper frame part to stiffen the same.

Slidable upon the two upwardly extending flanges 8 of the lower frame part, and between these flanges and the interior of the upper frame part, is a follower 14. This follower consists of a sheet metal channel-shaped piece having side flanges 15 and a top flange 16 from the latter of which depends a short front flange 17 and a longer, apertured rear flange 18. The short front flange 17 is arranged to contact a plate 19 fastened to the frame at its forward end and which serves to limit the motion of the follower toward the front end of the machine so that it cannot move into the path of the plunger which drives the staples. This plate also serves as a shear plate to separate the staples from each other and takes the wear which would otherwise come upon the end of the frame. It is preferably of harder material than the frame, which can conveniently be of such light material as aluminum alloy.

A rod 20 extends through the aperture in flange 18 and is provided on its inner end with a pin or the like 21, preventing the follower from sliding off the rod. The other end of the rod is provided with a knurled head 22, having a pin 23 arranged for a bayonet joint or other easily effected connection with a recess in the end of flanges 8. Between the head 22 and flange 18 is a compression spring 24 which serves to urge the follower toward the front of the machine or toward the left as seen in Figures 1, 3, and 4, feeding the staples to position under the end of the plunger.

Secured to the vertical flange 12 at the front of the frame is a housing 25 which carries the driving mechanism. This is secured to the flange 12 as by machine screws 26 and is provided with two upwardly extending lugs 27 carrying adjacent their upper ends a pivot pin 28 upon which is mounted an actuating lever 29, having at its free end a hand grip 30. A spring 31 passing about the pivot holds the lever in its upward position as shown in Figure 1. The frame parts 4 and 11, housing 25 with its lugs 27, and rear part of base 1 constitute in effect a framework supporting the operating parts. This frame-

work is made of separate pieces only for convenience in manufacture, but in use functions as a single part.

A pivot pin 36 connects a link 37 to the lever 29 at a point nearly above the vertical flange of the bracket. This link is connected by a pin 38 to the upper end of a plunger 39, arranged to reciprocate vertically in the housing 25 immediately above the die-shaped recesses 3, guides being formed for it in the space adjacent the flange 12 of the frame, so that upon being moved downwardly it will drive the first staple of the series carried by the frame, clinching its points in the recesses 3. A bolt 50 is set in a tapped hole in the enlarged upper end of the plunger 39 and forms an adjustable stop which, by engagement with the frame at 12, limits the downward motion of the plunger.

A space is provided in the housing 25, forming a continuation of the plunger guides, and having abutments or shoulders 40 so that the first staple in the series must remain immediately below the end of the plunger. The end of member 19 is bevelled at its side as shown at 41 to guide the staples into the space between plate 19 and shoulders 40 on their downward movement.

A substantially C-shaped retainer 42 is arranged to move upwardly and downwardly within the housing, the hollow of the retainer fitting over a pin 43 passing through the housing and the retainer being urged toward the plunger by a spring 44 secured to the housing as by rivets 45. The lower end 47 of the retainer is arranged to project under the end of the plunger and the web of the first staple, as shown in Figure 3, when the retainer is in an uppermost position and the upper end of the retainer is arranged to engage the head of a pin 46 fastened to the plunger. The position of the plunger 39 in Figure 3 is that at which the plunger starts to drive a staple and is a trifle below its uppermost position, which would be, as shown in Figure 1, with the head 46 engaging the upper arm of retainer 42.

The operation of the driving mechanism is best illustrated in Figures 3 and 4.

The operator, having filled the magazine with staples, inserts the forward end of the shoe under the sheets of material which he desires to staple together. As previously indicated, he can do this with one hand. Then he presses downward on the handle 30 of the lever, which depresses the plunger 39 until its lower end contacts the upper surface of the web of one staple.

During this motion the head of pin 46 is moved away from the retaining member 42, the staple is pressed upon the projecting lower end 47 of this member, and then the plunger, staple, and retaining member all move downwardly together, the spring 44 pressing the retaining member against the plunger and frictionally braking or restraining its motion so that it holds the staple tightly against the end of the plunger until the upper end of the retaining member meets the transverse pin 43.

When this happens, the pressure of the plunger, transmitted through the staple, rocks the retaining member in a clockwise direction (as seen in Figures 3 and 4) permitting the staple to pass beyond end 47, but by the time this has happened the ends of the staple have already engaged the die surfaces 3 and are being turned inwardly. Further motion of the lever clinches and flattens the staple, firmly securing the articles together.

If the lever is moved part way down and then retracted before clinching the staple, the head of pin 46 raises the retaining member and retracts the staple before the next succeding staple has had an opportunity to pass into the guides adjacent shoulders 40, so that it is impossible to at one time get two staples into the path of the plunger. Jamming of the apparatus is thus prevented.

Due to the narrowness of flange 5, it is possible to slide the shoe into narrow slots, such for instance as are formed between successive tabs of shingle strips. Also, the staples being broader than the flange, they may be caused, if this should be desired, to span such slots.

The device may also be used for stapling together two slightly spaced sheets of material, or to secure two spaced sheets to a single sheet bridging the space.

The entire device can be placed and actuated by the operator while keeping only one hand upon the handle 30 of the lever, so that when working upon steep roofs or the like he may always have one hand free to hold himself in place.

A large leverage is provided so that relatively heavy staples, for instance about one sixteenth of an inch in cross section may be used, and as the lever is positioned above the base any tendency to tilt the device in operation is overcome.

While I have described the illustrated embodiment of my invention in some particularity, obviously many others will readily occur to those skilled in this art, and I do not, therefore, limit myself to the precise details shown and described but claim as my invention all embodiments, variations and modifications thereof coming within the scope of the appended claims.

I claim:

1. A fastening device comprising a framework, a plunger reciprocable therein, a retaining member, the retaining member being free to move within guideways within said framework whereby it may reciprocate with the plunger, said guideways also permitting oscillation of the retaining member toward and from the plunger, resilient means urging said retaining member against the plunger, and inter-engaging means between the plunger and retaining member.

2. A fastening device comprising a framework having a channel-shaped passage therethrough adapted to receive a series of channel-shaped staples or the like, resilient feed means arranged to feed said staples along said passageway, guideways in said framework intersecting the end of said passageway, a plunger slidable within said guideways, a stop formed in said framework permitting only one fastener to be fed under said plunger at a time, a die fixed to said framework in alignment with said plunger, a lever pivoted to said framework, and a connecting link pivoted to said lever and to said plunger, the framework beneath said passage being of less width than the passage whereby the framework may be slid into a space narrower than the span of the staples.

3. A fastening device comprising a rigid framework, a die carried thereby, a movable plunger carried by said frame-work and movable toward said die, feed means successively supplying fasteners to a position between said plunger and die, the framework having a recess facing the one side of the plunger, a substantially channel-shaped retainer in said recess free to move toward the die in contact with said plunger, and yieldable means holding said retainer with one

flange against said plunger and one flange underlying the end of said plunger to retain a fastener against the end of the plunger as it is being moved toward the die.

4. A fastening device comprising a rigid frame-work, a die carried thereby, a movable plunger carried by said frame-work and movable toward said die, feed means successively supplying fasteners to a position between said plunger and die, the framework having a recess facing one side of the plunger, a substantially channel-shaped retainer in said recess, means holding said retainer with one flange against said plunger and one flange underlying the end of said plunger to retain a fastener against the end of the plunger as it is being moved toward the die, and a stop passing through the recess of the retaining member and secured to the framework for limiting the motion of the retainer.

5. A fastening device comprising a rigid framework, a die carried thereby, a movable plunger carried by said framework and movable toward said die, feed means successively supplying fasteners to a position between said plunger and die, the framework having a recess facing one side of the plunger, a substantially channel-shaped retainer in said recess, means holding said retainer with one flange against said plunger and one flange underlying the end of said plunger to retain a fastener against the end of the plunger as it is being moved toward the die, a stop passing through the recess of the retaining member and secured to the framework for limiting the motion of the retainer, and a projection on the plunger extending into the open side of the retainer and of substantially less size than said open side.

6. A fastening device comprising a frame member having two parallel flanges enclosing a channel-shaped space, a second frame member of generally channel-shape having its flanges bearing upon the first mentioned frame member and spaced from the flanges on the first mentioned frame member whereby a substantially E-shaped space is provided enclosed by said two frame members, feeding means positioned within the central bar of the E-shaped space, a substantially channel-shaped follower connected thereto and slidable along this space between the two sets of flanges, means rigidly securing said frame members together, said first mentioned frame member having a central flange parallel to and narrower than the space defined by said two first mentioned flanges, and a base secured to said flange and projecting laterally to both sides thereof.

7. A fastening device comprising a framework having a channel-shaped passage therethrough adapted to receive a series of channel-shaped staples or the like, resilient feed means arranged to feed said staples along said passageway, guideways in said framework intersecting the end of said passageway, a plunger slidable within said guideways, a stop formed in said framework permitting only one fastener to be fed under said plunger at a time, a die fixed to said framework in alignment with said plunger, and means for operating said plunger to drive a staple against said die, the framework beneath said passage being of less width than the passage whereby the framework may be slid into a space narrower than the span of the staples.

8. A fastening device comprising a rigid framework, a die carried thereby, a movable plunger carried by said framework and movable toward said die, and feed means successively supplying staples to a position between said plunger and die, the framework intermediate said die and said feed means and in line with said plunger being of less width than the span of the staples, whereby the frame may be slid into a space narrower than the span of the staples.

ARTHUR J. STOCK.