Dec. 23, 1941. S. F. BAUWENS 2,267,185

TIE HOOK AND FORMING DIE

Filed Dec. 26, 1939

Fig. 1

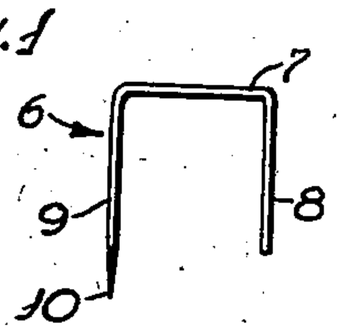


Fig. 2

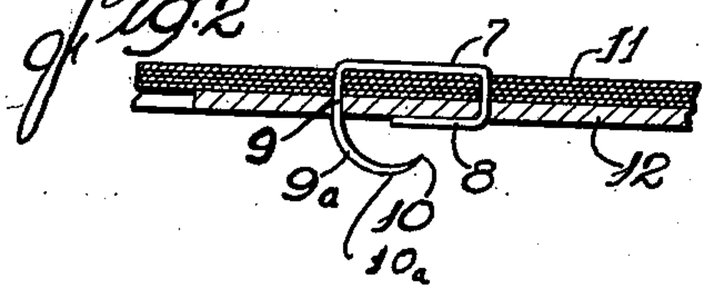
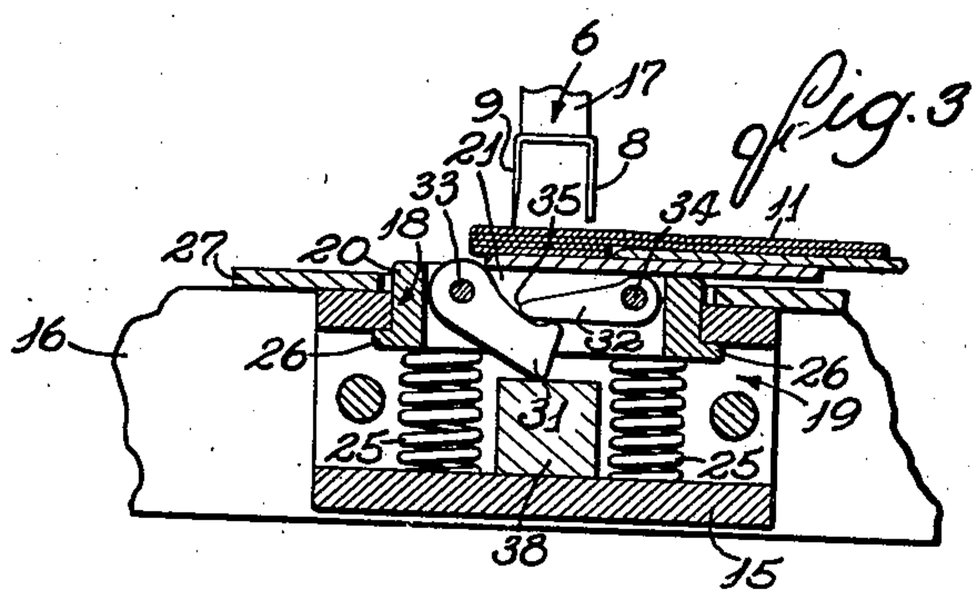


Fig. 3



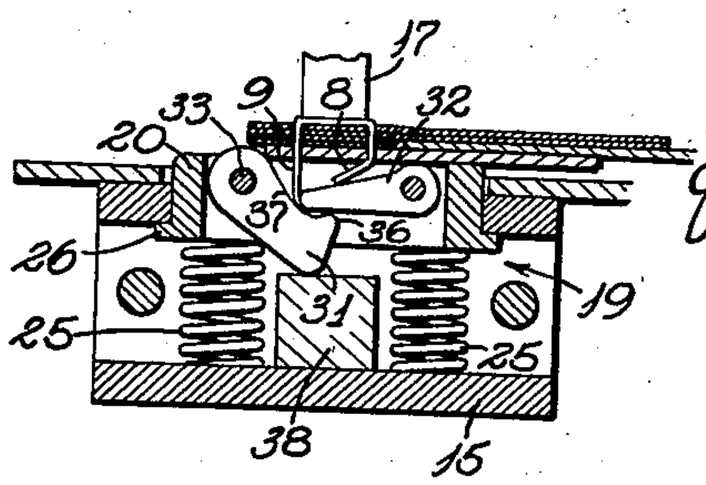


Fig. 4

Fig. 5

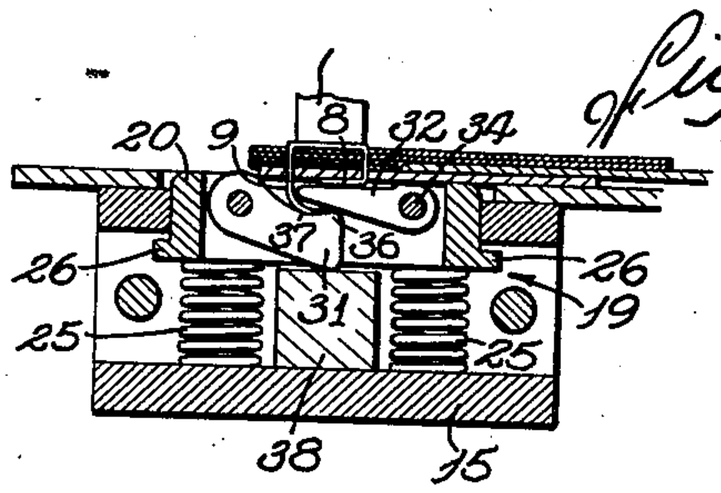
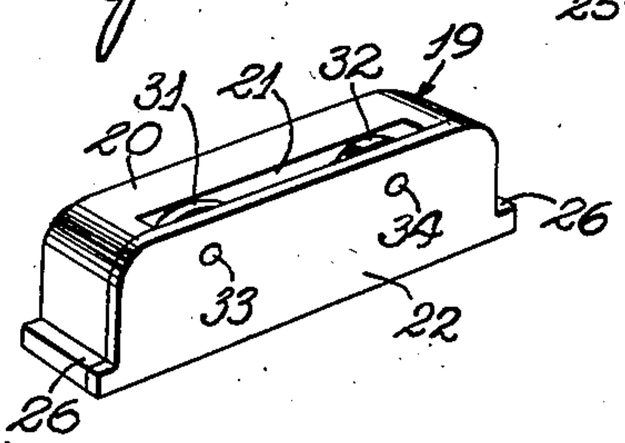


Fig. 6



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TIE HOOK AND FORMING DIE

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Application December 26, 1939, Serial No. 310,898

7 Claims. (Cl. 1—4)

The invention relates to improvements in dual purpose fastening devices or tie-hooks and to a die unit for forming the same.

Tie-hooks of the above general character are particularly suitable for use in the manufacture of composite hat bands of the type shown in my copending application Serial No. 263,637 filed March 23, 1939, of which the present application is a continuation in part. In this environment they perform the dual function of permanently fastening together separate parts of the bands such as a strip of ribbon material and a stiffening member of fibre or the like and additionally provide a hook portion for detachably securing the assembled band to a hat. Tie-hooks of this type, as heretofore constructed, have a tendency to tilt with reference to the band and become detached from the hat when the band is pulled endwise, thus making it difficult to apply the band properly and to maintain it in the correct position when the hat is in use.

With the above in view, one object of the present invention is to improve the holding characteristics of tie-hooks of the above type.

Another object is to provide a novel die unit for forming the improved tie-hooks.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment illustrated in the accompanying drawing in which:

Figure 1 is a side view of a partially formed tie-hook.

Fig. 2 is a view showing the completed tie-hook as applied to a hat band, the band being shown in section.

Figs. 3 to 5, inclusive, are sectional views of the die unit showing successive steps in the forming of a tie-hook.

Fig. 6 is a perspective view of the die carrier forming a part of the unit.

The improved fastening device is preferably constructed from a single piece of steel, brass or other stiff wire stock preliminarily bent into a staple like blank 6 to facilitate assembly with material with which it is used. As shown in Fig. 1, the blank 6 is of generally U-shaped form having a cross member 7 with legs 8 and 9 extending substantially at right angles thereto. The latter leg, which eventually constitutes the hook portion of the device, is preferably the longer of the two and terminates in the ground point 10 so that it will not tear the fabric to which it is hooked.

When applied to a hat band such as that shown in Fig. 2 as comprising one or more strips of ribbon material 11 and a fibre reenforcing strip or stiffening member 12 laid together in face-to-face relation, the leg 8 is bent inwardly substantially parallel to the cross member 7 and crimped against the fibre strip 12. It thus serves to tie or clamp the parts of the band together and additionally holds the fastening device rigidly in place with the leg 9 in a plane substantially perpendicular to the plane of the band.

The hook portion of the device is formed from the leg 9 by bending the leg to a shape which materially improves the holding characteristics of the device. More specifically, the leg 9 is bent to form a hook having an upper or base portion 9_a inclined inwardly and downwardly with respect to the cross member 7 that is, the upper portion is disposed at an angle to the plane of the band or other material through which the staple is driven. The lower or tip portion 10_a of the leg is further bent so as to lie substantially parallel to the cross member. In practice it has been found that the ideal form can be approximated most conveniently by forming the hook portion with a generally arcuate contour such as that illustrated in Fig. 2. The novel form of the hook above described is an extremely important factor in enabling it to hold more securely than the straight hook heretofore employed. The latter, for example, becomes detached when tilted forwardly a relatively small amount. The improved hook, on the other hand, retains its hold even when tilted substantially at right angles to the material to which it is attached. This makes the hook particularly suitable for detachably securing bands to hats or the like.

While the improved hook above described may be formed by any suitable mechanism, I have provided a novel die unit for forming such tie-hooks in an efficient and expeditious manner. This unit, as herein shown, is adapted to be incorporated in stapling machines such as the one disclosed in my copending application above referred to.

Referring now to Figs. 3 to 5, the die unit in its preferred form comprises a channel-shaped member 15 adapted to be rigidly secured to the base 16 of the machine in alinement with the means for driving the staple through the band material herein shown as a plunger 17 which may be moved toward and from the unit in known manner. Slidably mounted in a notch 18 in the leg of the channel frame adjacent the plunger, is a die carrier 19. This carrier as shown in Fig. 6, comprises a body member 20 of generally rectangular form having a recess 21 in one side

face. A side plate 22 fixed to the body portion covers the open side of the recess, thus forming an open-ended pocket alined with the plunger of the stapling machine.

Yieldable means herein shown as helical compression springs 25 are interposed between the bottom of the carrier and the adjacent leg of the channel frame to urge the carrier outwardly to the position shown in Fig. 3. The limit of outward movement of the carrier is determined in this instance by stops in the form of ears 26 integral with the body member 20 and the side plate 22 of the carrier. In this limit position the top of the carrier projects slightly above a plate 27 which forms the work table of the stapling machine, the upper surface of the carrier thus acting to support the fabric pieces 11 and fibre strip 12 while the staple is being driven home.

Within the recess 21 of the carrier 19 are mounted a pair of crimping die elements or dogs 31 and 32. These dogs are mounted on pivot pins 33 and 34 respectively, so as to swing in a vertical plane. One of the dogs, in this instance the dog 32, acts to crimp the staple leg against the under side of the fibre strip 12. Further, this dog acts jointly with the dog 31 to bend the leg 9 into the arcuate configuration hereinbefore described.

As will be seen by reference to Fig. 4, the dog 32 is generally wedge shaped in form and is of sufficient length to extend substantially across the width of the staple blank and up to the path followed by the leg 9 as it emerges from the under side of the fibre strip 12. The tip of this dog is preferably rounded as at 35 so that the point of the leg 9 can readily slide past and engage the dog 31 as the staple is driven home. In its normal position as shown in Figs. 3 and 4, the free end of the dog 31 rests on a rounded projection or cam 36 formed on the free end of the companion dog and its upper edge presents an inwardly and downwardly inclined surface adapted to deflect the staple leg 8 inwardly as shown in Fig. 4.

The upper edge portion of the companion dog 31 is formed to provide a generally concave guiding surface 37 extending rearwardly of the cam surface 36. The free end of this dog rests on a fixed abutment 38 which normally holds the dog with its guiding surface inclined downwardly and inwardly whereby to deflect the point 10 of the staple leg 9 inwardly as it approaches the position shown in Fig. 4.

At the beginning of the operation the parts of the die occupy the positions shown in Fig. 3. As the plunger 17 descends, it drives the staple blank 6 downwardly and forces the two legs through the band material until the cross member 7 engages the upper surface thereof as shown in Fig. 4. At this stage of the operation the leg 8 is bent inwardly from the point at which it leaves the fibre strip 12, while the point 10 of the leg 9 is bent inwardly between the rounded tip of the dog 32 and the concave guiding surface of the dog 31.

Upon further depression of the plunger, the die carrier is moved downwardly against the action of the springs 25 until it reaches the position shown in Fig. 5. In this downward movement the dogs are swung about their respective pivots to complete the forming operation by reason of the engagement between the dog 31 and the fixed abutment 38. The pivotal movement of the dog 32 serves to bend or crimp the staple leg 8 substantially flat against the underside of the band material so that it lies generally parallel to the cross member 7 of the staple blank. The end portion of the leg is thus forced into tight clamping engagement with the fibre strip 12.

While the leg 8 is being crimped in the above manner, the two dogs cooperate to bend the leg 9 into the arcuate hook of the improved form illustrated. Thus as the lower dog rocks about its pivot, it forces the staple leg 9 inwardly against the tip of the upper dog which functions in this instance as an anvil. Since the upper dog also rocks on its pivot, its pointed engagement with the staple leg 9 changes continuously so that the staple leg is gradually bent into arcuate configuration. The joint action of the dogs is essential to obtain this form, particularly when using staple blanks of stiff wire stock such as are required for tie-hooks of the type under discussion.

It will thus be seen that the improved tie-hooks are formed by simply forcing the staple blanks through the material to be assembled and into operative relation to the cooperating dies or dogs. Thus, a single downward stroke of the plunger of a stapling machine is sufficient to produce the finished tie-hook. Upon withdrawal of the plunger the die carrier is returned to its upper position by the springs 25 and the dogs are freed so that the assembled band may be removed from the stapling machine by simply lifting it from the die unit.

It will be apparent from the foregoing that the invention provides a tie-hook of novel and advantageous character which, by reason of its specially shaped hook portion, is enabled to maintain a secure hold regardless of the tension applied to the band with which it is associated. The invention also provides a die unit of novel construction for forming such tie-hooks with a minimum of labor and expense.

I claim as my invention:

1. The combination with means for driving a U-shaped staple through a plurality of pieces of material arranged in face-to-face relation, of a die carrier located in the path of said driving means and having a recess positioned to receive the staple legs as they emerge from the underside of the material, an elongated die element disposed within said recess and pivoted at one end to said carrier, a second elongated die element disposed within said recess and pivoted at one end to said carrier, said second element having its free end underlying and supporting the free end of the first element, means yieldably urging said carrier toward the driving means while permitting it to move with the driving means when the staple is driven home, and a stationary member coacting with the free end of the second element normally positioning both elements with their upper surfaces inclined inwardly and downwardly with respect to the surface of the material whereby to deflect the staple legs inwardly as they emerge from the underside of the material, said stationary member acting in the movement of the carrier to swing the free ends of the die elements toward the material to crimp one staple leg against the underside of the material and to bend the other staple leg into an arcuate hook with its point spaced from the underside of the material.

2. The combination with means for driving a U-shaped staple through a plurality of pieces of material arranged in face-to-face relation, of

a die carrier located in the path of said driving means and having a recess positioned to receive the staple legs as they emerge from the underside of the material, an elongated die element disposed within said recess and pivoted at one end to said carrier, a second elongated die element disposed within said recess and pivoted at one end to said carrier, said second element having its free end underlying and supporting the free end of the first element, means yieldably urging said carrier toward the driving means while permitting it to move with the driving means when the staple is driven home, and means acting on the second element in the movement of the carrier for swinging both elements about their pivots to cause one element to crimp one of the staple legs substantialy flat against the underside of the material and to cause the elements jointly to bend the other staple leg into a hook.

3. The combination with means for driving the legs of a U-shaped staple through the several parts of a composite hat band or the like, of a die unit positioned to act on the staple legs after their insertion through the band to form the staple into a tie-hook, said unit comprising, in combination, a pivoted die element having an upper surface engageable by one of the staple legs as it emerges from the band and operative to deflect the leg inwardly, said element having a tip portion engageable with the inner side of the other staple leg to resist inward deflection of the same, a second pivoted die element having an upper surface engageable by the other staple leg as it emerges from the band and operative to bend the leg around the tip of the first element, and means for simultaneously swinging said die elements about their pivots, said first element acting to crimp said one staple leg against the underside of the band and acting jointly with said second element to bend the other staple leg into a hook.

4. The combination with means for driving the legs of a U-shaped staple through the parts of a hat band or the like, of a die unit positioned to act on the staple legs as they emerge from the underside of the band for forming the staple into a tie hook, said unit comprising a die element having an upper surface portion operative to deflect one of the staple legs inwardly and a tip positioned to engage the inner side of the other staple leg to resist inward deflection of the same, a second die element having an upper surface operative to bend said other leg inwardly around the tip of the first element, and means for actuating said elements simultaneously to crimp said one leg against the underside of the band and to bend the other leg into an arcuate hook.

5. The combination with means for driving the legs of a U-shaped staple through the parts of a composite hat band or the like, of a die unit positioned to act on the staple legs as they emerge from the underside of the band to form the staple into a tie-hook, said unit comprising, in combination, a die element having an upper surface portion operative to deflect one of the staple legs inwardly and a tip portion engageable with the inner side of the other staple leg to resist inward deflection of the same, a second die element having an upper surface operative to bend said other leg inwardly around the tip of the first element, and means for actuating said elements simultaneously, said one element acting to crimp said one staple leg against the under side of the band and both elements acting jointly to bend the other leg into a hook having a portion disposed at an angle to the plane of the band and its tip portion substantially parallel to said plane.

6. The combination with means for driving the legs of a U-shaped staple through a plurality of pieces of material arranged in face-to-face relation, of a die unit positioned to bend the staple legs after their insertion through the material, said unit comprising a movable die carrier, means yieldably holding said carrier in an advanced position to support the material while said staple is being driven home, said carrier and the material being moved together a predetermined distance after the staple is driven, a pair of die elements mounted on said carrier, and a stationary member coacting with said elements in the movement of the carrier to cause one element to crimp one of the staple legs substantially flat against the underside of the material and to cause the elements jointly to bend the other staple leg into a hook having a portion inclined with respect to the plane of the material and its tip portion substantially parallel to said plane.

7. The combination with means for driving the legs of a U-shaped staple through the several parts of a composite hat band or the like, of a die unit positioned to act on the staple legs after their insertion through the band to form the staple into a tie-hook, said die unit comprising, in combination, a die element having a surface portion operative to crimp one staple leg against the underside of the band and an end portion constituting an anvil, and a second die element operative to bend the other staple leg over the anvil portion of said first element into a hook having its tip portion disposed substantially parallel to the plane of the band.

SERAPHINE F. BAUWENS.