

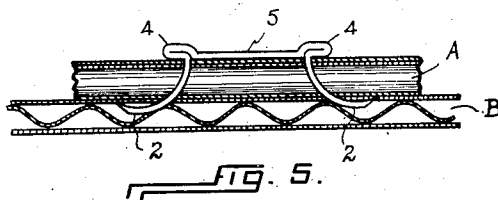
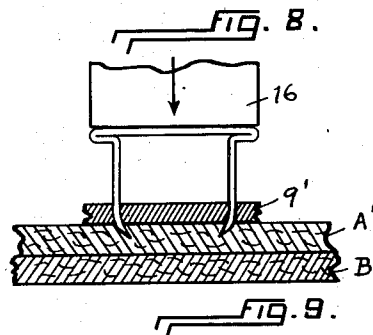
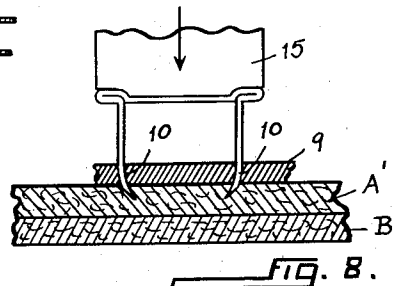
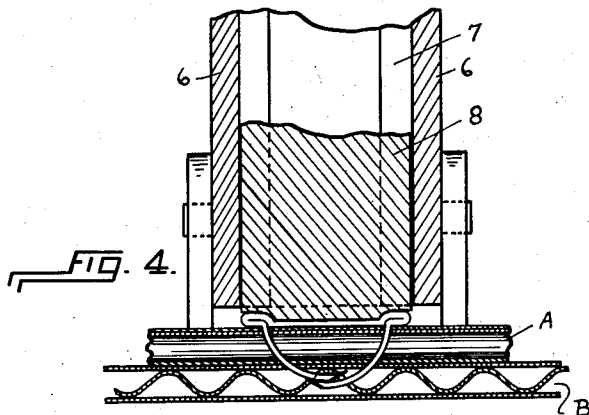
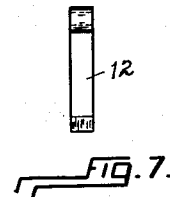
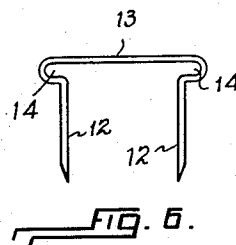
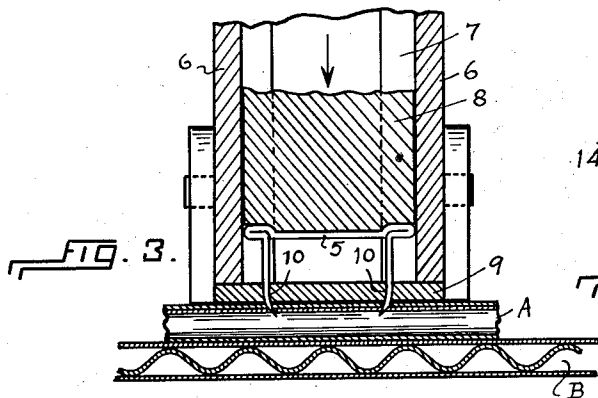
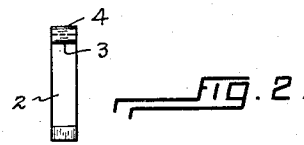
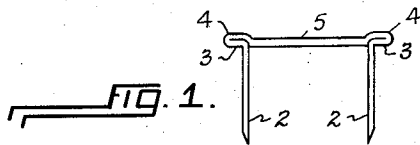
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J. C. LANG

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STAPLE AND METHOD OF STAPLING

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STAPLE AND METHOD OF STAPLING

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Application November 30, 1942, Serial No. 467,367

1 Claim. (Cl. 85—49)

This invention relates to the art of stapling and is for an improvement in a staple and method of stapling, by means of which the staples may be more effectively driven and the holding power of the staples increased when they are driven. In my copending application Serial No. 467,366 filed November 30, 1942, I have disclosed a method and apparatus for driving staples wherein the legs of the staple, upon leaving the staple guide of the driver, pass through appropriately curved slots in a metal plate or mask, by means of which the legs are deflected from a vertical plane, and are caused to enter the material at a predetermined curvature. The legs are progressively turned by means of this mask as the staple is driven, so that when the staple has penetrated almost, but not to the full depth to which it is driven, the legs will be clinched. The mask is then withdrawn from engagement with the legs of the staple so that the bridge or crown of the staple may be driven down against the work into which the staple is driven, in a final clinching operation. In the said copending application the staple is illustrated as being a conventional U-shaped staple.

I have found that the holding power of the staple may be substantially increased and that the staple will be stronger and capable of being more effectively driven if, instead of being of the conventional U-shape, it is of a modified form in which the crown of the staple has laterally projecting lobes at each end thereof, with the legs of the staple set inwardly from the outer ends of the lobes. These lobes formed of looped metal, extending as they do beyond the ends of the crown, increase the spread over which the holding power of the staple is effective. The lobes, moreover, are formed by looping the metal of which the staple is formed at the point where the upper end of the leg merges into the crown. The end of the leg of the staple then abuts against the bridge or crown, while the fold in the metal producing the lobe is at right angles to the leg and serves to reinforce the leg. Any tendency of the upper part of the leg of the staple to bend is more effectively resisted. Moreover, the driver can exert a downward force on the crown of the staple, which is transmitted in a vertical direction to the legs of the staple; whereas with the conventional U-shaped staple, the driver transmits force to the leg at a point where the leg curves to join the crown. However, if the crown of the staple were straight, only the under surfaces of the lobes of the staple would actually contact the paper or other material into which

the staple was driven, whereas the portion of the crown between the legs would be spaced upwardly from the surface of the material. My invention further contemplates depressing or counter-sinking the crown of the staple so that the under surface of the crown between the legs is in the same plane as the under surface of the lobes. This additionally reinforces the legs against undesired bending.

In another of my copending applications, Serial No. 467,365 filed November 30, 1942; I have specifically shown and described one form of driver and a method of driving staples of this particular form. The said application is complementary to the present one in that it is for driving the staple herein shown and claimed.

My invention may be more fully understood by reference to the accompanying drawing, in which:

Figure 1 is a front elevation of a staple embodying my invention;

Figure 2 is a side elevation of the staple shown in Figure 1;

Figure 3 shows the staple of Figure 1 in the process of being driven, a portion of the driver being shown in section and the material into which the staple is driven also being shown in section. The view shows the staple in the position which it occupies in the initial portion of the driving stroke;

Figure 4 is a view similar to Figure 3, showing the staple after it has been completely driven;

Figure 5 is a view showing the staple completely driven but with the legs turned outwardly instead of inwardly;

Figure 6 is a view similar to Figure 1, showing a modified form of staple;

Figure 7 is a side elevation of the staple shown in Figure 6;

Figure 8 is a schematic view, showing an initial step in the driving of the staple of Figure 6, showing the closing up of the lobes of the staple;

Figure 9 is a view similar to Figure 8, showing starting of the driving operation for the modified form of staple.

Referring first to Figures 1 and 2, the staple is formed of a single length of material and it has two legs, each designated 2. The upper end of these legs is outwardly turned, forming a shoulder 3 which is at right angles to the legs. The material is folded back upon itself, forming laterally projecting lobes or flattened loops 4, and between these loops is a crossbar 5. The crossbar 5 is depressed below the surface of the top

of the lobes so that the under surface of the cross-bar is in a plane with the under surface of the shoulders 3.

By reason of this arrangement the staple as thus formed has several advantages. In the first place, the legs 2 are set inwardly from the ends of the staple. This enables the driver to exert a direct downward thrust on the legs of the staple, whereas in the conventional U-shaped staple the legs are at the very end of the crown and are joined to the crown through a 90° bend and downward pressure is transmitted through this 90° bend, tending to fold the staple. The outwardly turned shoulder 3 forms in effect a foot on the base for supporting the leg of the staple against the crown so as to brace the legs of the staple and render them more resistant to undesired bending. The outwardly turned lobes or flattened loops, being of two thicknesses of material, further impart rigidity to the structure. Moreover, these lobes increase the "spread" of the staple without increasing the distance between the legs so that the staple is less likely to cut into or through the material into which it is driven. This is particularly important in connection with the fastening of corrugated fiber board where the driving tool frequently forces the crown of the conventional staple down to a point where it cuts through or into the surface of the corrugated board. The outwardly turned lugs or lobes on the staple tend to limit the downward movement of the staple and prevent cutting more effectively than does the conventional crown. By countersinking the crown between the two lobes so that the under surface of the crown is flush with the under surface of the loops the staple has contact with the surface into which it is driven throughout the full length of the crown, whereas if the crown were not depressed in this way only the under side of the lugs or lobes would be tight against the material and the mid-span of the crown of the staple would be above the material. Moreover, the lobes cover the openings which the points of the staple make when it is driven into the material and aid in reinforcing the paper or cardboard at a point where it has been weakened. In addition to this, the staple is often clinched, as shown in Figure 5, by turning the legs of the staple outwardly in the material into which they are driven. This increases the holding power of the staple because of the claw or clamping effect which exists between the outwardly turned leg and the outwardly extending lug or lobe.

In my said copending applications, Serial Nos. 467,365 and 467,366, the method of driving the staple in order to accomplish the clinching of it is more fully described and claimed. Figures 3 and 4, however, show steps in the process of driving. In Figures 3 and 4, 6 designates the housing of a stapling machine having a guide-way 7 in which reciprocates a driver 8. The lower surface of the driver is shaped to conform to the top of the staple as clearly shown in the drawing. At the bottom of the housing 6 is a slotted mask or guide 9, this guide plate 9 having two slots therein, designated 10, positioned to register with the free ends of the legs of the staple. These slots have a curvature corresponding to the curvature which it is desired to impart to the legs. As the staple is forced down, the legs, passing through the slots 10, are deflected toward each other and as the staple continues to move down the bending of the legs

progresses. When the crown 5 of the staple hits against the surface of the mask 9 the mask is withdrawn, whereupon the driver completes the driving of the staple as shown in Figure 4. In the driving of the staple the curving of the legs accomplishes the clinching of the staple so that as shown in Figure 4 the legs are closed inwardly at a predetermined curvature. They can be clinched in the lower of two overlapping box flaps without the staple passing through the bottom surface of the lower flap and without any anvil being required to deflect the legs. In Figures 3 and 4, the overlapping box flaps formed of corrugated material are designated A and B. Figure 5 shows the staple of Figure 1 with the legs deflected outwardly instead of inwardly. This is accomplished by reversing the curvature of the slots 10 in the mask 9.

Instead of completely preforming the staple before it is driven, the modification shown in Figures 6, 7 and 8 may be employed. This method is particularly designed for use where the staple is to be driven into a hard fiber board. In these figures the legs of the staple are designated 12 and the crown is designated 13. The legs and the crown are connected by open loops 14. The driver 15 of the stapling tool has a shape similar to the driver 8 in Figure 3. When the legs of the staples formed as shown in Figure 6 hit the top surface of the hard fiber board there is considerable resistance to their initial penetration, whereupon the open loops 14 close, forming lobes similar to the lobes on the staples shown in Figure 1. During the closing of these loops the motion of the driver with respect to the staple accelerates, and when the loops are closed there is a sudden impact which overcomes the initial resistance of the legs to penetrate the fiber board. Once the legs have penetrated the fiber board the driving proceeds as illustrated in Figures 3 and 4, there being a guide plate 9 with slots 10 therein, as previously described. The closing of the loops of the staple is also utilized to depress the crown of the staple so that before the staple has been completely driven it assumes the form shown in Figure 1.

The provision of the open loops to give a certain amount of resilience in the driving of the staple is deemed to be particularly desirable where the overlying layers of material A' and B' are dense fiber board or other relatively hard material.

In Figure 9 the staple is substantially of the form shown in Figure 1, except that the crown is not depressed. This form of staple is less desirable than that shown in Figure 1 but in some applications may be preferred. In the method of driving this staple the bottom end of the driver, designated generally as 16, is straight. The legs are uniformly straight similar to the legs of the staple shown in Figure 1 and they are bent inwardly by the slotted guide plate or mask 9. When the head of the staple is flattened down in the final part of the driving operation, the top portions of the legs move straight down a distance equal to the thickness of the mask. This causes the inwardly turned free ends of the staple to move together, this final operation thus clinching the staple tighter as the mask 9 is withdrawn. While I have illustrated and described certain embodiments of my invention it will be understood that this is by way of illustration and that various changes and modifications may be made within the contemplation of

my invention and under the scope of the following claim.

I claim:

A new article of manufacture comprising an integral staple formed of a continuous strip of metal, the staple having spaced legs with outwardly turned loops at the top thereof, the tops of

the loops being connected by a depressed crown, the undersurface of the crown being in the same plane as the undersurfaces of the loops whereby the undersurfaces of the loops and the undersurface of the crown bear against the work into which the staple is driven.

JOSEPH C. LANG.