

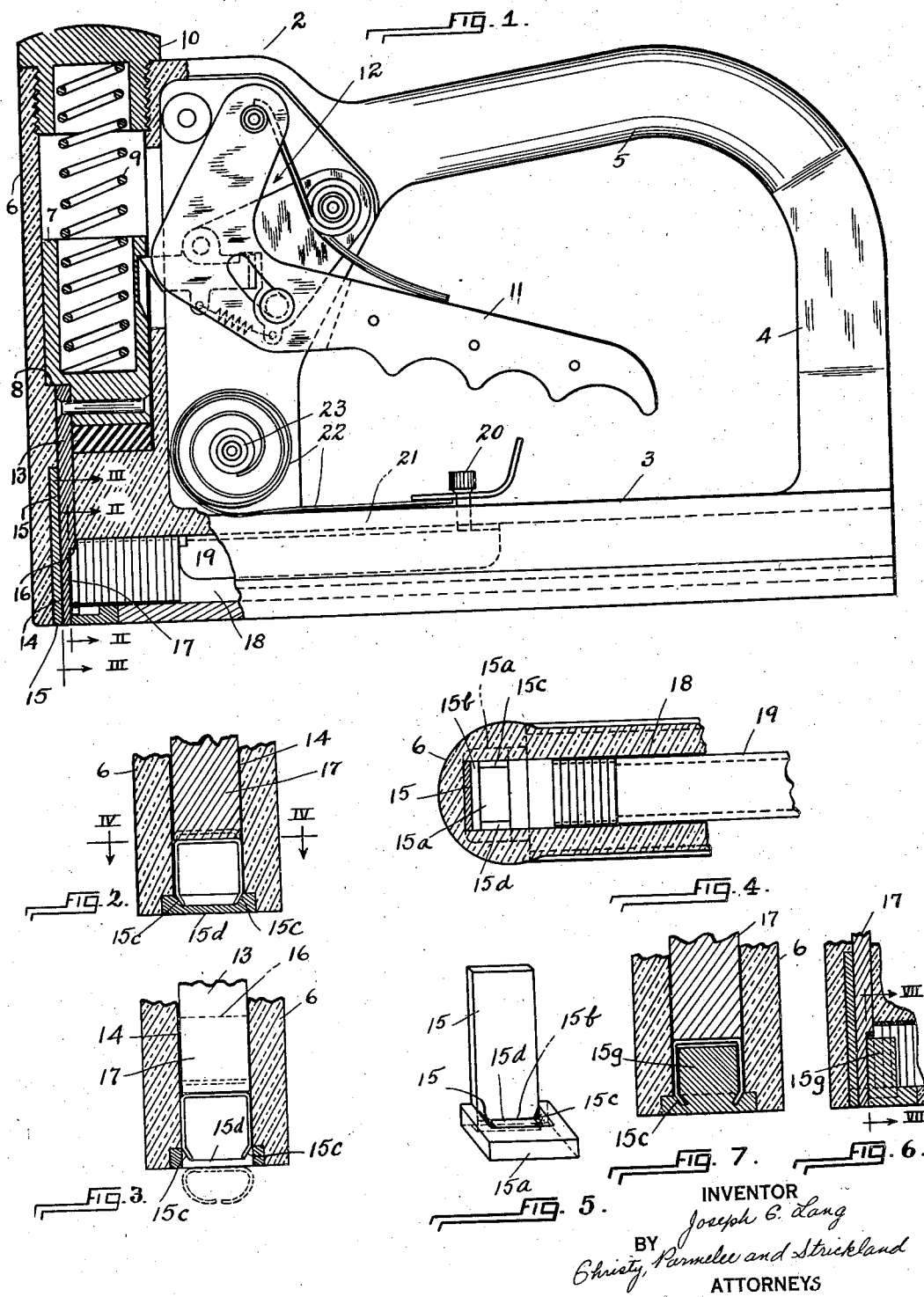
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J. C. LANG

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STAPLING MACHINE AND METHOD

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2,408,563

STAPLING MACHINE AND METHOD

Joseph C. Lang, Pittsburgh, Pa., assignor to
Bocjl Corporation, a corporation of Delaware

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6 Claims. (Cl. 1-49)

1

This invention pertains to the art of stapling and particularly to a machine and method of shaping the staples in the course of driving them.

In my copending application Serial No. 443,197 filed May 16, 1942, I have disclosed a method of stapling wherein the free terminal portions of the legs of an otherwise conventional staple are turned inwardly toward each other at a slight angle before the staple is driven. As disclosed in said application, if such a staple is driven by a sudden sharp blow through one of two overlying lifts of cardboard or corrugated paperboard the staple will penetrate the upper lift and enter the underlying lift. As it enters the underlying lift the free ends of the legs of the staple will move inwardly and clinch. Usually this clinching will be accomplished without the staple passing through the underlying layer or lift of cardboard.

The present invention is for a stapling device in which ordinary staples having parallel legs may be prepared and driven in the aforesaid method. In general, the invention contemplates the incorporation in a staple driving device having a feeding mechanism for feeding ordinary staples and of a driver having two portions. One of these portions engages the staple which has previously been prepared and drives it into the material. The other portion of the driver operates on the staple which is to be next consumed, forces the legs thereof downwardly against suitably disposed anvil elements to bend or toe the legs of the staple inwardly.

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

Figure 1 is a view partly in section and partly in elevation of a stapling machine embodying my invention;

Figure 2 is a fragmentary vertical section in the plane of line II-II of Figure 1;

Figure 3 is a section similar to Figure 2 but in a plane slightly closer the front, being in the plane of line III-III of Figure 1;

Figure 4 is a fragmentary horizontal section in the plane of line IV-IV of Figure 2; and

Figure 5 is a detail view in perspective of one of the anvil elements of the machine.

Figure 6 is a longitudinal section of the staple guide end of the machine only, showing a slight modification;

Figure 7 is similar to Figure 2, this view being in the plane of line VII-VII of Figure 6.

While my invention may be incorporated in any suitably constructed stapling device such as those which are now generally in use, I have for the purposes of illustration disclosed a form of stapler similar to that shown in my copending application Serial No. 443,199 filed May 16, 1942, issued on Oct. 31, 1944, as U. S. Letters Patent No. 2,361,483. In the drawing, 2 designates gen-

2

erally the body of a stapling device, this body having a base portion 3, an upwardly projecting portion 4 at the rear of the base, a handle portion 5 spaced above the base, and an upright part 6 at the forward end of the base. Within the part 6 is a plunger 7 that is moved downwardly toward an abutment 8 by means of a compression spring 9, the upper end of this spring being confined by an adjusting nut 10. A movable hand lever 11 projects into the space above the base 3 and the fixed handle 5, and a mechanism described in detail in my said copending application and designated herein generally as 12 is so arranged that when the handle 11 is moved upwardly the plunger 7 is lifted against the compression of spring 9 to a predetermined point when the plunger is automatically released and is driven with considerable force and at high velocity downwardly toward the abutment. Secured to the lower end of the plunger 7 is a metal driver 13 which is substantially rectangular in cross section and which operates in a vertical guideway 14 in the part 6 of the frame.

Secured in one face of the guideway is a wear-plate 15, this plate being in the shape of the letter L, having a foot portion 15a through which is an opening 15b through which the staple is driven. Extending forwardly from the opening, the sides of this foot are sloped toward each other, forming inclined anvils 15c (see Figure 2). These inclined surfaces are of sufficient vertical height to bend or toe the ends of the staples, prior to driving, inwardly. The web 15d ties the two anvil portions together and makes the structure rigid. The member 15 is preferably molded into the machine frame when it is being formed so as to be securely held in place.

The lower portion of the driver has a transverse shoulder 16 in the face thereof which is turned away from the wear-plate, this shoulder being spaced upwardly from the tip of the driver a distance slightly greater than the height of a single staple adapted to be used in the machine. The lower terminal portion of the driver 13, i. e. that part designated 17 which is below the shoulder 16, is the part of the driver which initially contacts the staple which is to be driven.

In the base member 3 of the device is a longitudinally extending inverted channel 18 having a pusher 19 movable therealong. This pusher is adapted to bear against the end of a row of staples received within the channel 18 and yieldably urge such row of staples along the channel toward the driver. In order to move the pusher, the pusher is provided with a pin 20 that projects upwardly through a slot 21 in the top of the channel 18, this pin 20 being connected to a spring metal tape or ribbon 22, the inner end of which is coiled about a post 23.

The portion 17 of the driver is of a thickness

3

approximately equal to the thickness of a single staple and the shoulder 16 is of a thickness also equal to that of a single staple so that the combined thickness of the driver is equivalent to the thickness of two staples. The guideway 14 extends downwardly across the extreme left-hand end of the channel 18, passing through the foot 15a of the insert 15 as previously described, so that when a row of staples is moved by operation of the pusher 19 the extreme left-hand staple will abut against the wear-plate 15 and be in the path of the portion 17 of the driver. The second staple from the left-hand end will then be under the shoulder 16.

In the operation of the stapler, when a charge of staples is first put into the magazine or channel 18 the left-hand end of such row of staples will be pushed over against the driver. When the hand lever 11 is operated for the first time to lift the driver the driver is moved out of the way of the staples and the row of staples is immediately pushed over a distance equal to the thickness of two staples so that the endmost staple is against the wear-plate 15. Then, when the driver is released the part 17 will eject the first staple from the machine. The shoulder 16 will engage the second staple and drive it down a slight distance, causing the points of the staple to be cammed in or toed inwardly by the anvil elements 15c. Upon the driver being lifted again this staple will then be projected into the path of portion 17 of the driver and the next succeeding staple in the row will be in the path of the shoulder 16. Thus, after the first staple each succeeding staple will have the free terminals of the legs thereof toed inwardly before the staple is ultimately driven. By reason of this arrangement the machine is adapted to operate on conventional staples and each staple is successively pre-formed to the desired toed-in confirmation before it is driven.

While the invention provides a means for forming each conventional staple successively into a toed-in staple and then driving it, this is accomplished without any substantial increase in the cost of a conventional stapler and without any complication of the mechanism. The only departure which has to be made from the conventional staple driving mechanism is in the driver, the clearance space for the driver, and in the provision of the anvil elements 15c.

Should it be necessary to support the interior of the staple while it is being bowed, the modification shown in Figures 6 and 7 may be resorted to. In these figures the part 15d has an upstanding projection 15g under the offset portion 16 of the driver, thereby leaving a space at the sides of said projection only wide enough to form a staple guide. By reason of this, the legs of the staple above the anvil surfaces 15c can not bend inwardly.

While I have illustrated and described one particular embodiment of my invention it will be understood from the foregoing that the invention is not confined to the particular machine shown but is applicable to any stapler using a reciprocating driver wherein U-shaped staples may be operated upon at a station in advance of the driving station for the bending or toeing in of the points of the staple, although the toed-in staples are most effectively used only in drivers of the character in which the driver is propelled at a relatively high speed against the staple, and consequently the invention finds its greatest utility

4

in stapling devices of this kind. It will be understood however, that various changes and modifications may be made in the particular construction and the various parts within the contemplation of my invention and under the scope of the following claims.

I claim:

1. A stapling machine of the class described comprising a frame structure having a staple guide therein, a driver operable in the guide, means for delivering preformed staples to the guide one at a time, and means at one side of the guide in the machine for toeing the ends of the legs of the staples inwardly relative to the upper portions of the legs before they are delivered to the guide.

2. A stapling machine of the class described comprising a frame structure providing a staple guide, a driver operable in the guide, means for moving a succession of staples toward the guide, and means associated with the driver and at one side thereof for striking the staples before they reach the guide for toeing the ends of the legs of the staples inwardly relative to the upper portions of the legs in advance of the staples being delivered to the guide.

3. A stapling machine of the class described comprising a frame structure having a staple guide therein, a driver operable in the guide, a magazine in the frame through which the staples are moved for delivery to the guide, means in said magazine adjacent and in advance of the guide providing oppositely positioned inclined anvil portions, means for moving the staples along the magazine, and means associated with the driver for engaging a staple positioned over said anvil portions for forcing the staple against the anvil portion, and thereby toe the ends of the legs of the staple inwardly relative to the upper portion of the legs.

4. A stapling machine of the class described comprising a frame structure having a staple guide therein, a driver operable in the guide, said driver having an offset shoulder portion on one face thereof spaced inwardly from the driving end thereof, means for moving the staples toward the guide, and means in the frame under the shoulder portion of the driver providing downwardly convergent anvil portions over which the ends of the staple legs move in advancing toward the guide, said shoulder being so positioned that when one staple is driven the next succeeding staple is engaged by said shoulder and the legs thereof forced against said anvil portions to toe the ends of the legs inwardly a predetermined extent.

5. The method of stapling with conventional staples having parallel leg portions which comprises successively presenting the staples to a driver, successively operating upon each staple before it is presented to the driver to toe the free ends of the legs inwardly to a predetermined extent while the legs above such toed-in portions are parallel.

6. The method of stapling with conventional staples having parallel leg portions which comprises successively presenting the staples to a driver, successively operating upon each staple before it is presented to the driver to toe the point ends of the legs inwardly to a predetermined extent, and operating the driver with a quick, sharp blow to drive the staple.

JOSEPH C. LANG.