Feb. 7, 1961 C. B. GOODSTEIN 2,970,313

STAPLE IMPROVEMENT

Filed Feb. 18, 1959

Fig. 1.

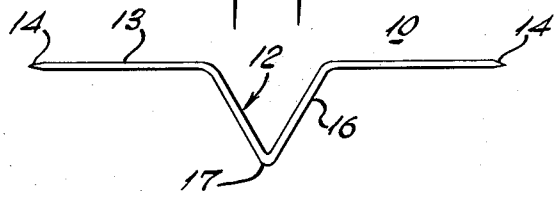


Fig. 2.

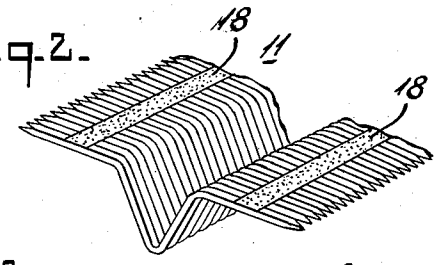


Fig. 3.

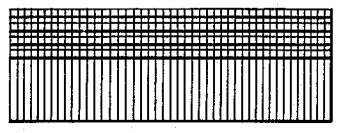


Fig. 4.

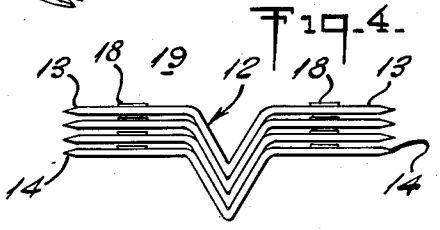


Fig. 5.

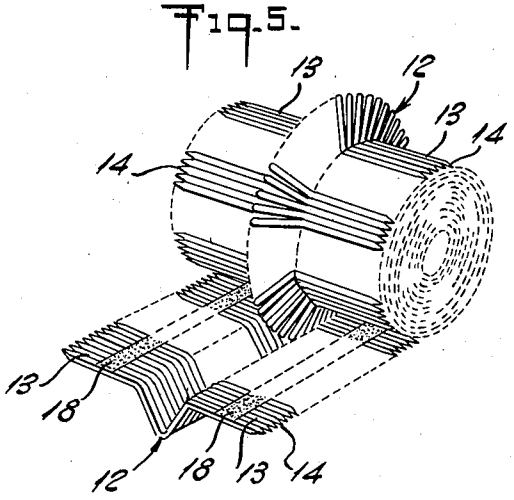
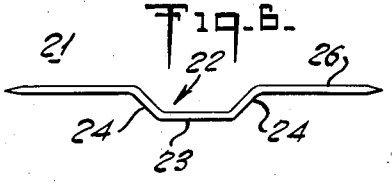


Fig. 6.



INVENTOR
Charles B. Goodstein
BY Stanley O'Meder
ATTORNEY

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STAPLE IMPROVEMENT

Charles B. Goodstein, 43 Hilldale Road, West Hartford, Conn.

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3 Claims. (Cl. 1—56)

The present invention relates generally to improvements in staples and similar fasteners and it relates more particularly to an improved cartridge or strip of staple elements which may be compactly arranged to occupy a minimum of space thereby facilitating the storage and loading of large quantities of the staple elements, the elements being of such configuration as to be readily shaped for driving by a staple machine of simple construction.

The conventional stapling machines are generally of two types, those employing a coil of wire which is cut and shaped into a staple prior to the driving thereof and those which employ a cartridge of preformed staples of substantially U-shaped configuration, the staples being arranged in stacked end to end relationship and separably secured to each other by a suitable adhesive. The former type of stapling machine is characterized by its complexity and relatively high cost and requires frequent servicing, thereby limiting its uses. On the other hand, the stapling machines employing the conventional staple cartridge possess, among other drawbacks, the limitation that the stapler magazine can accommodate only a relatively small number of staples by reason of the shape of the staples and cartridge thereby necessitating the frequent reloading of the stapling machine. Furthermore, in packaging the conventional staple cartridge, considerable space is wasted resulting in excessive bulk.

It is thus a principal object of the present invention to provide an improved staple or fastener element.

Another object of the present invention is to provide an improved semi-formed staple which may be assembled into continuous strips capable of being compactly stacked in closely nested arrangement or which may be wound into a tight coil wherein successive convolutions are in substantially full abutment and in which the semi-formed staple may be easily completed prior to the driving thereof in a simple stapling machine without adversely affecting the ultimate strength of the staple.

A further object of the present invention is to provide an improved staple element cartridge of the above nature which may be inexpensively fabricated and which may be employed in a stapling machine of simple construction requiring a minimum of complex mechanisms and forming dies.

The above and other objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawing wherein

Fig. 1 is a front elevational view of an improved staple element embodying the present invention.

Fig. 2 is a top perspective view of a plurality of staple elements illustrated in Fig. 1, assembled in a strip in accordance with the present invention.

Fig. 3 is a side elevational view of a vertical stack of the staple element strips.

Fig. 4 is a front elevational view of the stack of staple elements.

Fig. 5 is a continuous strip of staple elements wound into a tight coil cartridge.

Fig. 6 is a front elevational view of another form of staple element embodying the present invention and which may be employed in the above manner.

In a sense the present invention contemplates the provision of an improved fastener cartridge of the character described comprising a plurality of staple elements disposed in end to end stacked arrangement, each of said staple elements including a depending intermediate crown portion having upwardly directed side arms and aligned legs projecting laterally outwardly from said arms and means separably connecting said stacked staple elements to form a strip thereof. The side arms of the crown portion should be upwardly outwardly inclined thereby permitting the compact stacking of plurality of staple element strips by reason of the crown portion of the staple elements being capable of closely nesting in the crown portions of the staple elements of the next successive strip. Moreover, a long strip of the staple elements may be tightly coiled since the staple element crown portions may nest in the crown portion of those of the next successive convolution. In the latter case the successive fastener elements of the strip should be joined only along their leg upper surfaces by flexible means, as will be hereinafter set forth. By merely flattening the crown portion of the staple element it forms the staple bridge portion and orients the horizontal legs to downwardly inclined position permitting their further simple bending to vertical parallel positions and thus allowing the driving of the staple. These staple finishing steps may be simply effected in any well known manner in the stapling machine just prior to the driving of the staple. It should also be noted that the shape of the staple element facilitates the simple guiding and feeding of the cartridge. It is apparent from the above that a large quantity of the staple elements in strip form may be packed with a minimum of wasted space permitting the compact storage thereof as well as the loading thereof in a stapler magazine of relatively small size.

Referring now to the drawing, and more particularly to Figs. 1 to 4 thereof which illustrate a preferred embodiment of the present invention, the numeral **10** generally designates a semi-formed staple element of improved configuration which may be assembled into a long strip or cartridge **11**. The staple element **10** comprises a depending intermediate crown portion **12** and a pair of aligned outwardly directed horizontal legs **13** preferably but not necessarily of equal lengths and provided with pointed ends **14**. The crown portion **12** is of substantially V-shaped configuration including a pair of upwardly outwardly inclined arms **16** joined at their bottom by a preferably rounded elbow **17**. The legs **13** are preferably symmetrically disposed with respect to the vertical axis of the crown portion **12**, and perpendicular thereto, and are integrally connected at their inner ends to the upper ends of the crown arms **16**. The staple element **10** is formed of a single length of wire of round, rectangular or other transverse cross section and of a gauge in accordance with the size and required strength of the finished staple.

A plurality of fastener elements **10** are arranged in stacked end to end relationship to form the strip **11** as illustrated in Fig. 2. The stacked staples are separately joined by a pair of flexible friable film strips **18** which adhere to the upper surfaces of the fastener element legs **13**. It is important to note that the successive crown portion **12** and the underfaces of the legs **13** are preferably unconnected thereby permitting the upward curving of the strips **11** by reason of the crown portions **12** and leg underportions being freely separable.

The assembled strip **11** of staple elements **10** may be

fabricated by equipment of the type conventionally employed in the manufacture of finished staple strips. The film 18 may be applied in the usual manner by a roller, brush or the like in the form of a liquid coating which is permitted to set or dry. An example of such a coating is vinyl chloride or vinylidene chloride dissolved in a suitable solvent such as acetone or methylethyl ketone. Where the strips 11 are not to be wound or curved the connecting film may be applied to any desired or convenient parts of the staple elements.

As seen in Figs. 3 and 4 of the drawing, a plurality of staple element strips 11 may be compactly arranged in a vertical stack 19. In the aforesaid arrangement the staple element crown portions 12 of the respective upper strips 11 closely nest in the staple element crown portion 13 of the next successive corresponding lower strip 11. As a result there is a minimum of wasted space thereby permitting the efficient storage and packaging of the staple elements as well as the loading of large numbers thereof into relatively small stapler magazines.

An alternative method of assembling or packaging the staple elements 10 is illustrated in Fig. 5. In this case a long strip of the staple elements is wound into a coil 20 with the crown portions 12 being outwardly directed. The winding of the staple element strip is facilitated by reason of the crown portions 12 being relatively freely movable and the underfaces of the legs 13 being unattached thus permitting the separation of the crown portions 12 and leg underfaces consequent to the winding of the staple element strip into a coil and the convex curvature thereby imparted to the under surface of the strip. The coil 20 may be tightly wound since the staple element crown sections of the coil inner convolutions nest in the staple element crown sections of the corresponding next successive convolution.

In employing the staple element 10 the crown portion 12 is flattened by suitable dies to form the staple bridge portion and the legs 13 are bent about their inner ends until they are substantially vertical and mutually parallel and depend perpendicularly from the staple bridge. It is important to note that inasmuch as the staple legs 13 are not deformed, per se, they retain their full strength. The staple finishing steps may be sequentially or concurrently performed and may be effected in the stapling machine immediately or shortly prior to the driving of the staple in any manner well known in the art. The staple cartridge, whether in strip or coil form, is advanced in the stapling machine in the usual manner and the leading staple element is separated therefrom during or prior to the shaping operation.

In Fig. 6 there is illustrated another form of staple element 21 which embodies the present invention and differs from that above described only in the shape of the depending crown portion 22. More particularly the crown portion 22 includes a horizontal lower section 23 and a pair of upwardly diverging side arms 24. Aligned pointed legs 26 project horizontally outwardly from the upper ends of the side arms 24 and are preferably of equal length and symmetrical with respect to the vertical medial axis of the crown portion 22. In all other respects

the staple element 21 is similar to the staple element 10 and its assembly into strips, stacks and cartridges and the use thereof are as above described in connection with the staple element 10.

Although the present invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous variations, additions and omissions may be employed without transcending the scope of the invention as hereinafter claimed.

What is claimed is:

1. An improved fastener cartridge of the character described comprising a plurality of vertically stacked strips of staple elements, the staple elements of each of said strips being disposed in closely adjacent side by side arrangement, each of said staple elements including a depending intermediate crown portion having upwardly outwardly inclined side arms and colinearly aligned legs projecting laterally outwardly from the upper ends of said arms, and means separably connecting said stacked staple elements in each of said strips, the crown portion of said staple elements nesting in the crown portion of the staple elements of the next successive strip.

2. An improved fastener cartridge of the character described comprising a plurality of staple elements disposed in closely adjacent side by side arrangement, each of said staple elements including a depending intermediate crown portion having upwardly outwardly inclined side arms and colinearly aligned legs projecting laterally outwardly from the upper ends of said arms, and a flexible film adherent to and connecting the upper surfaces of each of said legs to form a strip of said staple elements, the undersurfaces of said legs and said crown portions of successive staple elements being relatively movable, said crown portions being shaped to permit the nesting therein of the crown portions of superimposed similarly shaped staple elements.

3. An improved fastener cartridge of the character described comprising a plurality of staple elements disposed in closely adjacent side by side arrangement, each of said staple elements including a depending intermediate crown portion having a linear horizontal base and upwardly outwardly inclined side arms and colinearly aligned legs projecting laterally outwardly from the upper ends of said arms, and means separably connecting said stacked staple elements to form a strip thereof, said crown portions being shaped to permit the nesting therein of the crown portions of superimposed similarly shaped staple elements.

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