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STAPLE WITH RAISED BRIDGE PORTION

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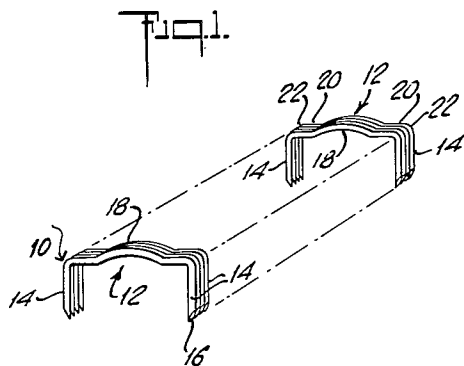


Fig. 2.

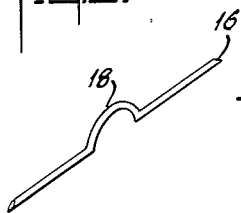


Fig. 3.

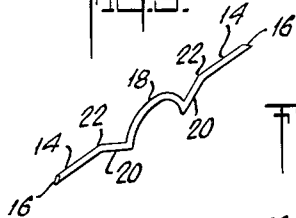


Fig. 4.

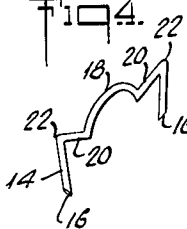
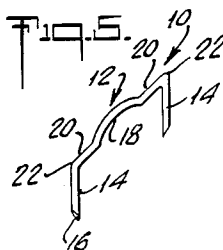


Fig. 5.



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1

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STAPLE WITH RAISED BRIDGE PORTION

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1 Claim. (Cl. 85—49)

The present invention relates generally to staples, and in particular it relates to staples of thin section wire for use in stitching and stapling machines, and to a novel method of forming the same.

While many different forms of staples have been proposed heretofore, the art generally has settled upon a staple of inverted U-shape, having a straight connecting bridge component and a leg at each end thereof downturned at right angles to the bridge. While this type of staple, usually provided in an elongated strip or bar having a plurality of individual staples detachably connected in side-by-side relationship, is generally satisfactory, it has many disadvantages. Particularly, under driving stress the legs are apt to take up the pressure with resultant deformation and jamming within the exit slide of the staple-driving mechanism. Moreover, the bridge component, if in the least out of line with the staple-driving blade, splits or cracks, again resulting in jamming of the mechanism.

It is the main object of the present invention, therefore, to provide a new and improved staple and a new and improved method of making same.

It is a further object of the present invention to provide a new and improved staple having the bridge section of irregular outline.

It is a further object of the present invention to provide a new and improved staple having the bridge section thereof of upwardly crowned in the central portion thereof.

It is a still further object of the present invention to provide a new and improved method of forming a staple which comprises the steps of crowning upwardly the center of the wire strip, thereafter angling a short portion of the strip on each side of the crown upwardly and away from the crown, thence down-turning the ends of the strip, and finally disposing the angled portions adjacent the crowned center at right angles to the downturned end portions.

Other, further and more specific objects of the present invention will in part be obvious and in part specifically pointed out in the following description of an illustrative embodiment of the present invention, considered with the annexed drawings, wherein:

Figure 1 is a perspective view of a number of staples in accordance with the present invention arranged in side-by-side relationship in clip form; and

Figures 2, 3, 4 and 5 are perspective views illustrating the successive steps in the formation of the staple of the present invention.

The staple according to the present invention is indicated generally by reference numeral 10, and comprises an originally straight, elongated strip of thin round wire of the order of .0195" in thickness, $\pm .0005$ ", and about .960" long. As seen in Figures 1 and 5, each staple 10 includes a connecting bridge 12 and a pair of legs 14, 14 extending downwardly from bridge 12. The lower ends 16, 16 of legs 14, 14 at the outer sides thereof are sheared at an angle of about 60° to the horizontal, thereby to provide a pointed leading portion which will more positively enter the material being stapled.

2

Bridge 12 is about .500" from side to side, or more than half the length of the wire strip. In the finished staple, the central portion 18 of bridge 12, to the extent of about .231", or a little less than half the length thereof, is crowned upwardly, on a radius of about .230". The degree of curvature of crown 18 is exaggerated to a greater degree during the formative steps illustrated in Figures 2, 3 and 4, and in practice the crown is curved on a radius of about .190", but in final condition, the central portion 18 is crowned on a radius substantially equal to the length of the crowned portion.

The bridge portions 20, 20 between the crowned center 18 and the ends 22, 22, are perfectly straight, and legs 14, 14 extend downwardly from bridge 12 at right angles to portions 20, 20. Legs 14, 14 are each about .230" in length, or substantially equal to the length of the crowned portion 18 and to the radius on which said center 18 is crowned. The top of the crowned portion extends .0285", $\pm .003$ ", above the level of bridge portions 20, 20.

The staple 10 is formed in the following manner and in the consecutive steps listed below:

(1) Initially, center portion 18, a little less than one-quarter of the length of the wire strip, is crowned upwardly, as seen in Figure 2; (2) thereafter, the straight portions 20, 20 immediately adjacent crown 18 are reversely angled upwardly and away from crown 18, as illustrated in Figure 3, each portion 20 being a little more in length than half of the crown 18; (3) thence legs 14, 14 are downturned as illustrated in Figure 4.

During the fabricating steps detailed above, the wire strip is firmly held under tension by the forming mechanism. Upon release thereof, however, the wire will spring back to a balanced position between the elastic limit of the bent wire for each opposite direction of bend during the forming operations. Thus, crown 18 will become shallower, flattening from the deep curve of Figures 2, 3 and 4 to the shallow curve of Figures 1 and 5, and the crown sides pieces 20, 20 will straighten into right-angle relationship to legs 14, 14.

About one hundred and five staples 10, when butted and cemented in the side-by-side relationships of Figure 1, will make up a clip about $2\frac{1}{16}$ " in length.

When a clip of ordinary staples is inserted in a stapler magazine, a reasonably close fit, with little or no tolerances, is needed in order to prevent jamming of the staples in the stapler exit, or breakage of the staples. A staple according to the present invention, however, may slop-fit within the magazine, for the increased length of the bridge, due to the crowned center 18, will cause a tightening or a close fit of the staple legs 14, 14 in the exit channel and against the sides thereof. Furthermore, as the stapler ram descends, the initial point contact of the driver blade with the top of staple crown 18 is increased as the crown is flattened to a line contact over the entire length of crown 18 and bridge 12, thereby insuring driving pressure over the entire bridge length, even if the original point contact is off-center. As a result, staples according to the present invention will be more effectively driven than is possible with conventional staples.

Variations and departures from the specific teachings and dimensionings described hereinabove, may be possible, but it is to be appreciated that my invention is to be limited only by the claim hereto appended.

I claim:

A substantially U-shaped wire staple for stapling devices, said staple comprising a bridge and legs downwardly depending from the ends of said bridge and integrally formed therewith, said bridge including an intermediate upwardly directed arcuate crown portion, the ratio of the radius of curvature of said crown portion to the height thereof being approximately .230 to .0285, said crown portion extending for less than approximately on half the

3

length of said bridge and said legs being approximately
one half the length of said bridge.

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