March 8, 1955 W. A. FORRESTER 2,703,402

SPACE-SAVING STAPLE AND STAPLE CLIP

Filed May 20, 1954

Fig. 1.

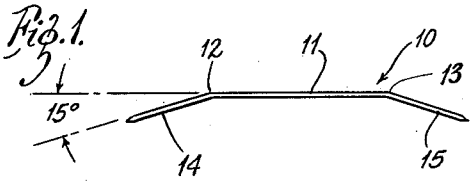


Fig. 2.

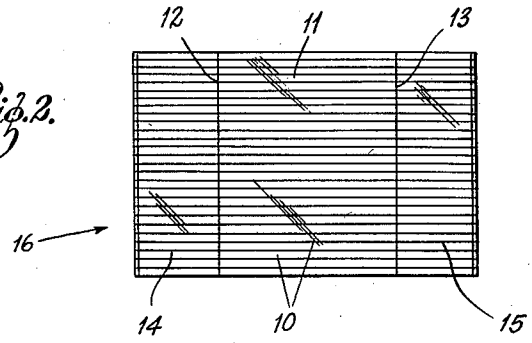


Fig. 3.

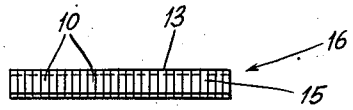
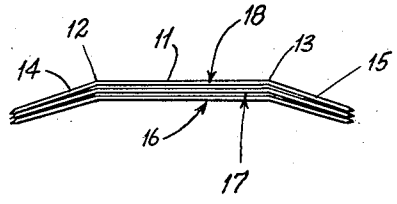


Fig. 4.



INVENTOR:
WILLIAM A. FORRESTER.
By Kingsland, Rogers & Ezell
ATTORNEYS

United States Patent Office 2,703,402 Patented Mar. 8, 1955

2,703,402

SPACE-SAVING STAPLE AND STAPLE CLIP

William A. Forrester, Herrin, Ill., assignor to International Staple and Machine Company, Herrin, Ill., a corporation of Pennsylvania

Application May 20, 1954, Serial No. 431,131

1 Claim. (Cl. 1—56)

This invention relates to improvements in staples and staple clips and, in particular, is concerned with a staple that may be used in a staple clip in a plurality of superimposed stacks so as to occupy a minimum of space.

In the past, staples have been used in staple clips wherein the staples have vertical legs, and such structure has necessitated a large amount of wasted space in stacking one clip of staples upon another. Thus, in stapling machines which use a large number of staples in industrial usages and other applications, the magazine for the stapling machine has of necessity been quite large. This is very objectionable in certain applications where space is at a premium.

The conventional staple of U-shaped form has a flat crown connected to vertical legs, and when staples in formed staple clips are packed one upon another there is a very high degree of lost space in between. This is so because the bottom of the legs of an uppermost staple clip rests upon the crown of the staple clip immediately beneath it.

By means of this invention, there has been provided a staple and staple clip wherein the formed staple clips are especially well adapted for nesting in a minimum of space so that the density of the staple clips when stacked one upon another is at a maximum. Wastage of space is obviated when the clips are placed in magazines, and the magazines required for handling the same number of staple clips for a stapling machine as used in the past can be greatly reduced in size. Alternatively, by employing the same size of magazine as used in the past, a much larger number of staple clips made according to this invention can be used, compared to the number of conventional clips that could be used in the past.

The staple and staple clip of this invention are formed in such a manner that the legs are bent at an angle between the axis of the crown and a line vertical therewith in such a manner that the staples when formed in the clip can be closely nested one upon another. Therefore, there is very little loss of space in the vertical stacking of one clip upon another, as compared with the case in the past, since the legs of the staple herein rest upon the top portion of the underlying staple leg and not the crown when one clip is stacked vertically upon another. The staple clip wherein the legs of the staples are angularly disposed, as mentioned, is then used in a stapling machine in which the legs of the staple are bent to a vertical position with respect to the crown, and subsequently employed in a conventional type of stapling operation.

Accordingly, it is a primary feature of this invention to provide a staple and staple clip of a configuration wherein nesting of one staple clip upon another is possible with a minimum of space wastage in between.

It is a further object of this invention to provide a staple and staple clip wherein a staple clip may be stacked directly upon another staple clip with a minimum of space in between, and wherein the staple clip is so formed that the legs of the staple form a beam in the staple clip to prevent breaking apart of the staple clip under normal conditions of wear and use.

It is still a further object of this invention to provide a staple clip wherein the staples in the clip have legs angularly disposed with respect to the crown of the staple between 0° and 90° for maximum space utilization when one clip is stacked upon another.

It is yet a further object of this invention to provide a staple clip wherein the staples have angularly disposed straight legs so that the staples in the clip cannot be broken apart under normal conditions of use, and wherein the angularly disposed legs are adapted to be later bent to a vertical position and employed in a stapling operation.

Other objects of this invention will appear to those skilled in the art and in the detailed description of this invention which follows.

In the accompanying drawings there is disclosed one embodiment of this invention showing a particular angular disposition of the staple legs, but it is to be understood that this invention is not limited thereto, and that these drawings are for the purpose of illustration only.

In the drawings:

Fig. 1 is an elevation of a single staple;

Fig. 2 is a top plan view of a staple clip formed from the staple of Fig. 1;

Fig. 3 is a side view in elevation of the staple clip of Fig. 2; and

Fig. 4 is a front view in elevation of several vertically stacked staple clips.

Referring now to the drawings, Fig. 1 shows a single staple generally indicated at **10**. This staple is provided with a flat crown **11** and shoulders **12** and **13** to which are connected, respectively, legs **14** and **15**.

As shown in the drawing of Fig. 1, legs **14** are connected to the crown **11** at an angle of 15°, but this particular angular disposition is for the purpose of illustration only and the invention is not limited thereto, as will be understood later.

The staple **10** is shown in a clip **16** in Fig. 2 wherein the staples are connected side by side, as is further apparent from the side view of staple clip **16** appearing in Fig. 3. The joining together of the staples **10** at their sides may be done in conventional manner by any adhesive or plastic coating, as is well understood in the art. Further, if desired, the staples may be integral with one another and separated by a coining operation so that there are slots or grooves which define the side boundaries of the staple.

Use

The staple **10** after it has been formed in a clip **16** is ready for use in a magazine. The clips **16**, **17** and **18** are especially well adapted to be stacked one upon another, as shown in Fig. 4, so that a maximum space utilization efficiency is effected. By referring to this figure, it will be seen that the crowns of the staples in the superimposed clips are very close to one another with only a very small separation between them.

The staple clip **16**, because of the angular disposition of the staple legs **14** with respect to the crown **11**, resists bending and breaking apart of the individual staples. This is because there is a high beam strength present which resists bending or breaking apart of the staples in the staple clip. The offset or angular disposition of the legs **14** which are joined to an adjacent staple at their sides gives this beam strength that is so important in a formed staple clip.

The angular disposition of the legs **14** with respect to the crown **12** can be varied from the 15°, which has been shown for the purpose of example. This variation can be from above 0° to slightly less than 90°. However, as the angular disposition of the leg **14** with respect to the crown **11** approaches 0°, the beam strength of the formed staple clip is reduced, and a completely flat clip in which the legs **14** and **15** are in the same plane as the crown will be very easy to bend and break apart into individual staples in normal handling, which is to be avoided. Conversely, as the angular disposition increases to 90°, vertical stacking of one staple clip upon another necessitates a greater wastage of space, and at 90°, as previously mentioned, the bottom of the legs **14** rests upon the crown of the underlying staple clip so that there is neither nesting nor automatic centering, as is present in the staple clip of this invention.

The formed staple clip **16** is inserted in a magazine, as is apparent from Fig. 4, so that one clip is stacked upon another, and by conventional means in the art the appropriate magazine clip is fed to the guiding and feeding means of the stapling machine. Thereafter the staple which is to be used in a stapling operation is broken apart from its clip and subjected to a forming operation so that

the legs **14** and **15** are bent at right angles to the crown **11** to the conventional configuration of the U-shaped staple.

Various changes and modifications of this invention may be made, as will appear to those skilled in the art, and such changes and modifications as are within the teaching of this invention are to be included therein, as defined by the claims appended hereto.

What is claimed is:

A staple clip comprising a plurality of staples connected together at their sides into a clip by a breakable bond that holds them together until they are separated by a staple driving machine, each of said staples having a crown provided with two shoulders spaced from one another and defining the ends of said crown, and two substantially straight legs extending from said crown at each of the shoulders in a diverging direction at an angle of about 15° to the projected extension of the crown, whereby the clip is substantially unbendable so as to resist breakage of the bond between adjacent staples, by bending along the longitudinal axis of the clip, each of the staples being adapted to be clinched toward the underneath side of said crown, said staple clip being adapted thereby to receive a second staple clip in overlying position and a third staple clip in underlying position in a nested relation, said nesting being effected by the mating relation of said crown and the slight divergence of the staple legs along substantially their entire length.

References Cited in the file of this patent

UNITED STATES PATENTS

1,377,295	Wentworth	May 10, 1921
1,671,809	Briggs	May 29, 1928
1,939,631	Randall	Dec. 12, 1933
2,103,176	Randall	Dec. 21, 1937
2,589,491	Goodstein	Mar. 18, 1952