July 26, 1938. M. VOGEL 2,125,211

METHOD OF PRODUCING A STAPLE STRIP

Filed Oct. 9, 1937

Fig. 1.

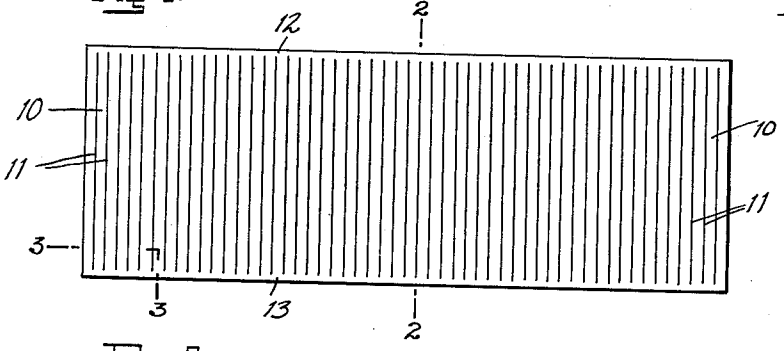



Fig. 2.

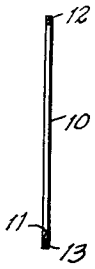



Fig. 3.

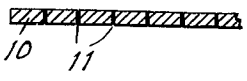



Fig. 4.

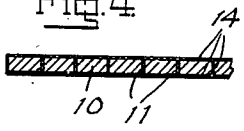



Fig. 5.

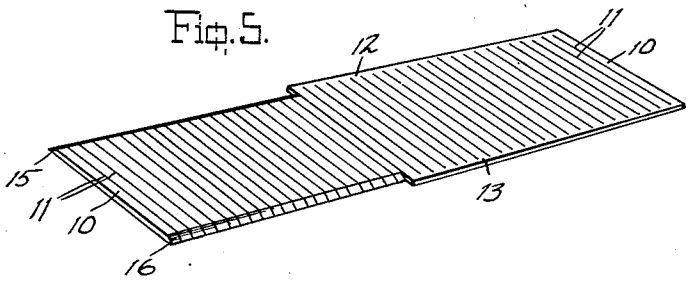



Fig. 6.

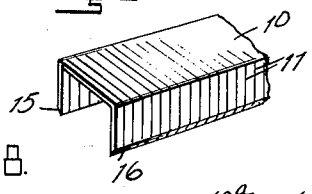



Fig. 7.

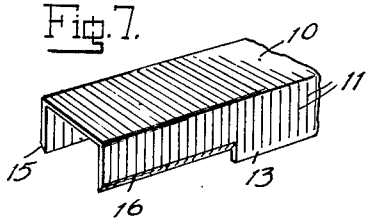
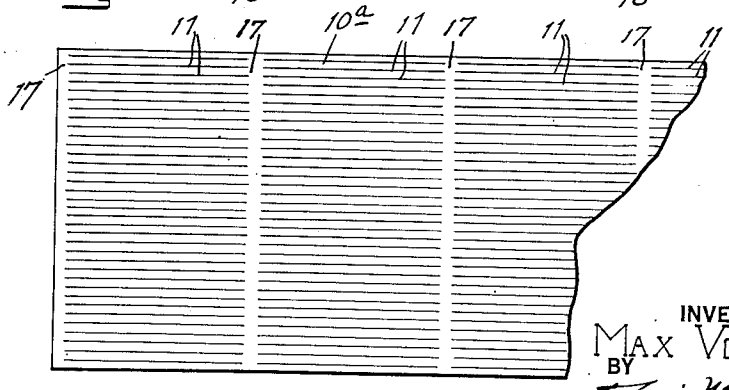



Fig. 8.




INVENTOR
MAX VOGEL
BY
ATTORNEY

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# UNITED STATES PATENT OFFICE

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## METHOD OF PRODUCING A STAPLE STRIP

Max Vogel, Bridgeport, Conn.

Application October 9, 1937, Serial No. 168,175

7 Claims. (Cl. 59—77)

The present invention relates to an improved staple strip and method of producing the same, and particularly a staple strip formed from sheet metal in which the individual staples are completely severed by sheer cuts and caused to adhere together by an adhesive applied while the staples are integrally connected in the metal sheet by unsevered marginal portions of the sheet beyond the staples, the staple strips being produced by removing said marginal portions to leave strips of individual sheet metal staples connected together only by the adhesive.

It has been the practice heretofore to produce staple strips from sheet metal by forming the same in a blanking or cutting die, in which case small connecting portions have been provided between the individual staples to retain them in strip form. In one example, as shown in the patent to Maynard No. 1,733,506, dated October 29, 1929, the connecting portions were in the form of integral unsevered sections in the bridge or central portion of the staple. In another example, as shown in the patent to Sachs No. 1,964,142, dated June 26, 1934, integral uncut portions are provided at the ends of the staple legs. In both of these cases the staple strip is apt to become bent and the individual staples displaced, either through the premature separation of the legs in the case of the Maynard structure, or the premature separation of the bridge in the case of the Sachs structure.

Also there is difficulty in severing the staples from the strip in the stapling machine because of the necessity of cutting or breaking the integral connection portions. This is especially true where the connecting portions are at the ends of the legs because the resistance of the connecting portions is apt to cause the staple legs to become bent and distorted before the staple is severed. Also any slight variation in the connecting portions will cause them to offer different resistances to severing, so that one connecting portion may become severed before the other causing buckling, distortion, or breakage of the staple. Where attempts have been made to facilitate severing of the connecting portions by employing a softer metal it has been found that such staples could not satisfactorily penetrate the material to be stapled, and would bend or buckle.

For these reasons the tendency has been to make staples from wire instead of sheet metal and these have been held in strip form by the use of solder, and also by a film of glue or other similar adhesive, in which case each staple has to be individually formed. In both of these methods of causing the individual wire staples to adhere it is of course necessary to support them in contacting relation upon a suitable mandril, so that it is not possible to apply the solder or adhesive uniformly to the entire surface of the individual staples, and for this reason such staple strips have the adhesive applied either only to the outer surface or only to the inner surface, and this does not provide an adequate bond to prevent premature separation of the staples from the strip.

An object of the present invention is to produce a staple strip from sheet metal in which the disadvantages of the previous sheet metal staple strips are eliminated, and in which advantages of economy, speed of production, and efficiency in use are obtained over wire staples. To this end it is proposed to produce in a band or plate of sheet metal a series of staple severing cuts, each cut being substantially the length of the staples. While the cut staple forming pieces are retained together in the form of a strip by the uncut portions of the band or plate adhesive is applied to both surfaces of the strip and also between the surfaces of the cuts, which adhesive is allowed to dry while the severed staple forming pieces remain connected in the sheet metal band or plate. Thereupon the staple strips are severed from the band by cutting away the uncut connecting portions so that staple strips are produced consisting of a series of severed individual staple members retained together in strip form by the adhesive applied to the strip before its severance from the sheet metal band or plate. It is further proposed to point or bevel the edges of the staple forming strip to form the points of the staple legs, by means of the cuts which separate the strip from the band.

With the above and other objects in view embodiments of the invention are shown in the accompanying drawing, and these embodiments will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawing:

Fig. 1 is a plan view of a sheet metal band having sheer cuts produced therein to separate the individual staple forming portions.

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is an enlarged sectional view taken along the line 3—3 of Fig. 1.

Fig. 4 is a sectional view similar to Fig. 3, but showing the strip provided with adhesive.

Fig. 5 is a perspective view showing a portion of the band in which the connecting marginal

portions have been removed to produce a staple strip of individual staples connected only by the adhesive.

Fig. 6 is a perspective view showing the staple strip bent into U-form.

Fig. 7 is a perspective view showing the staple strip bent into U-form prior to the removal of the connecting marginal portions, a portion of the strip being shown in which the marginal portions have been removed to produce a staple strip of individual staples connected only by the adhesive.

Fig. 8 is a plan view of a modified method according to the invention of producing a series of staple strips of predetermined length from a band of sheet metal.

Similar reference characters indicate corresponding parts throughout the several figures of the drawing.

Referring to the drawing the sheet metal band 10, as shown in Figs. 1 and 2, is of a width slightly greater than the length of the individual staples, and may be of unlimited length so that by being fed into a suitable sheering machine the spaced parallel staple separating cuts 11 may be continuously produced therein, thus producing a staple strip forming band of unlimited length which may be later separated into the desired lengths of staple strips. The cuts 11 extend to within a short distance from each longitudinal edge of the strip so that integral continuous marginal portions 12 and 13 are provided which retain the staple forming portions in integral connected relation in the sheet metal band.

The entire surface of the band has an adhesive coating 14 applied thereto, and as shown in Fig. 4, this adhesive not only entirely covers the upper and lower surfaces of the staple forming portions but also extends into the cuts 11, and therefore forms a bond between the cut edges of the staple forming pieces, which in addition to providing a better bond between the individual staples provides a protective coating. The adhesive may be of any suitable type, as glue, lacquer, or the like, or it may be in the form of a very thin solder coating, in which case it may be caused to adhere by passing an electric current through the band, or by otherwise heating it. Electric current or heat may be utilized for drying or baking a lacquer or similar coating. A metallic deposit which both coats and bonds the staples may be produced by placing the band in a suitable galvanic bath.

The next step consists in removing the marginal portions 12 and 13 of the band, leaving the non-integral individual staple forming portions in strip form connected only by the adhesive. The marginal portions may be removed by sheering and thereupon the ends of the staple strips may be pointed, as at 15 and 16, or the pointing may be produced by the removal operation, either by a diagonal sheer cut or by grinding.

In some cases the staple strips are used in the stapling machine in flat form, the individual staples being bent into U-form during the driving in the machine. In this case a staple strip will be supplied in suitable lengths as shown at the left-hand portion of Fig. 5. In the case of machines which use preformed U-shaped staples the strips will be bent into U-shape, and this shaping operation may be performed either after the marginal portions are removed, as shown in Fig. 6, or before they are severed, as shown in Fig. 7, the marginal portions being cut or ground from the ends of the legs to produce the staple strips of U-shape form. In this latter case the band may be formed into U-shape either before or after the adhesive is applied.

In Fig. 8 I have shown a modified form of forming the strips in which the sheet metal band 10a is of a width corresponding to the predetermined lengths of the staple strips to be formed, and is of unlimited length, the cuts 11 being arranged parallel to the length of the band instead of transversely, as shown in Figs. 1 and 2. The adhesive is applied to the band before severing of the strips, and the strips are severed simply by removing the uncut connecting portions 17 between the groups of cuts 11, the pointing being done either by the removal cut or as a subsequent separate operation.

According to the present invention staple strips may be produced with much greater speed and economy than heretofore, and the facility with which the material may be entirely coated makes it possible to provide completely protected and better bonded staple strips. Also harder metal may be employed than is the case with staples such as shown in the Sachs and Maynard patents because it is not necessary to cut through metal in the use of the staple strip in the stapling machine. In the case of depositing a metallic coating in a galvanic bath plain iron sheet may be employed, without danger of rust setting in, as the coating which may be non-rusting metal will provide a complete protection against rust.

I have illustrated and described preferred and satisfactory embodiments of my invention, but it will be understood that changes may be made therein, within the spirit and scope thereof as defined in the appended claims.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. The method of producing staple strips of adhesively connected non-integral staples from a metal sheet which consists in producing a series of staple separating cuts in said sheet, at least one end of said cuts terminating inwardly of the edge of said sheet, whereby the staple forming portions are integrally connected, causing said staple forming portions to adhere by bonding means applied before removal of the staple strip from the sheet, and removing said strip by cutting inwardly of the ends of said staple separating cuts.

2. The method of producing staple strips of adhesively connected non-integral staples from a metal sheet which consists in producing a series of spaced parallel staple separating cuts of equal length in said sheet, the ends of said cuts terminating inwardly of the edges of said sheet, whereby the staple forming portions are integrally connected by continuous uncut portions, causing said staple forming portions to adhere by bonding means applied before removal of the staple strip from the sheet, and removing said continuous uncut portions by cutting inwardly of the ends of said staple separating cuts to produce a staple strip.

3. The method of producing staple strips of adhesively connected non-integral staples from a metal sheet which consists in producing a series of spaced parallel staple separating cuts of equal length in said sheet, the ends of said cuts terminating inwardly of the edges of said sheet, whereby the staple forming portions are integrally connected by continuous uncut portions, causing said staple forming portions to adhere by bonding means applied before removal of the staple strip from the sheet, and removing said continuous uncut portions by bevel cutting inwardly of the

ends of said staple separating cuts to produce a staple strip, having pointed staple ends.

4. The method of producing staple strips of adhesively connected non-integral staples from a metal sheet which consists in producing a series of staple separating cuts in said sheet, at least one end of said cuts terminating inwardly of the edge of said sheet, whereby the staple forming portions are integrally connected, causing said staple forming portions to adhere by bonding means applied before removal of the staple strip from the sheet, removing said strip by cutting inwardly of the ends of said staple separating cuts and forming said strip into U-shape prior to said cutting operation.

5. The method of producing staple strips of adhesively connected non-integral staples from a metal sheet which consists in producing a series of staple separating cuts in said sheet, at least one end of said cuts terminating inwardly of the edge of said sheet, whereby the staple forming portions are integrally connected, causing said staple forming portions to adhere by bonding means applied before removal of the staple strip from the sheet, removing said strip by cutting inwardly of the ends of said staple separating cuts and forming said strip into U-shape after said cutting operation.

6. The method of producing staple strips of adhesively connected non-integral staples from a metal sheet which consists in producing a series of staple separating cuts in said sheet, at least one end of said cuts terminating inwardly of the edge of said sheet, whereby the staple forming portions are integrally connected, causing said staple forming portions to adhere by applying an adhesive to the upper and lower surfaces and within said cuts before removal of the staple strip from the sheet, and removing said strip by cutting inwardly of the ends of said staple separating cuts.

7. The method of producing staple strips of adhesively connected non-integral staples from a metal sheet which consists in producing a series of staple separating cuts in said sheet, at least one end of said cuts terminating inwardly of the edge of said sheet, whereby the staple forming portions are integrally connected, causing said staple forming portions to adhere by subjecting said sheet to a metal depositing galvanic bath before removal of the staple strip from the sheet, and removing said strip by cutting inwardly of the ends of said staple separating cuts.

MAX VOGEL.