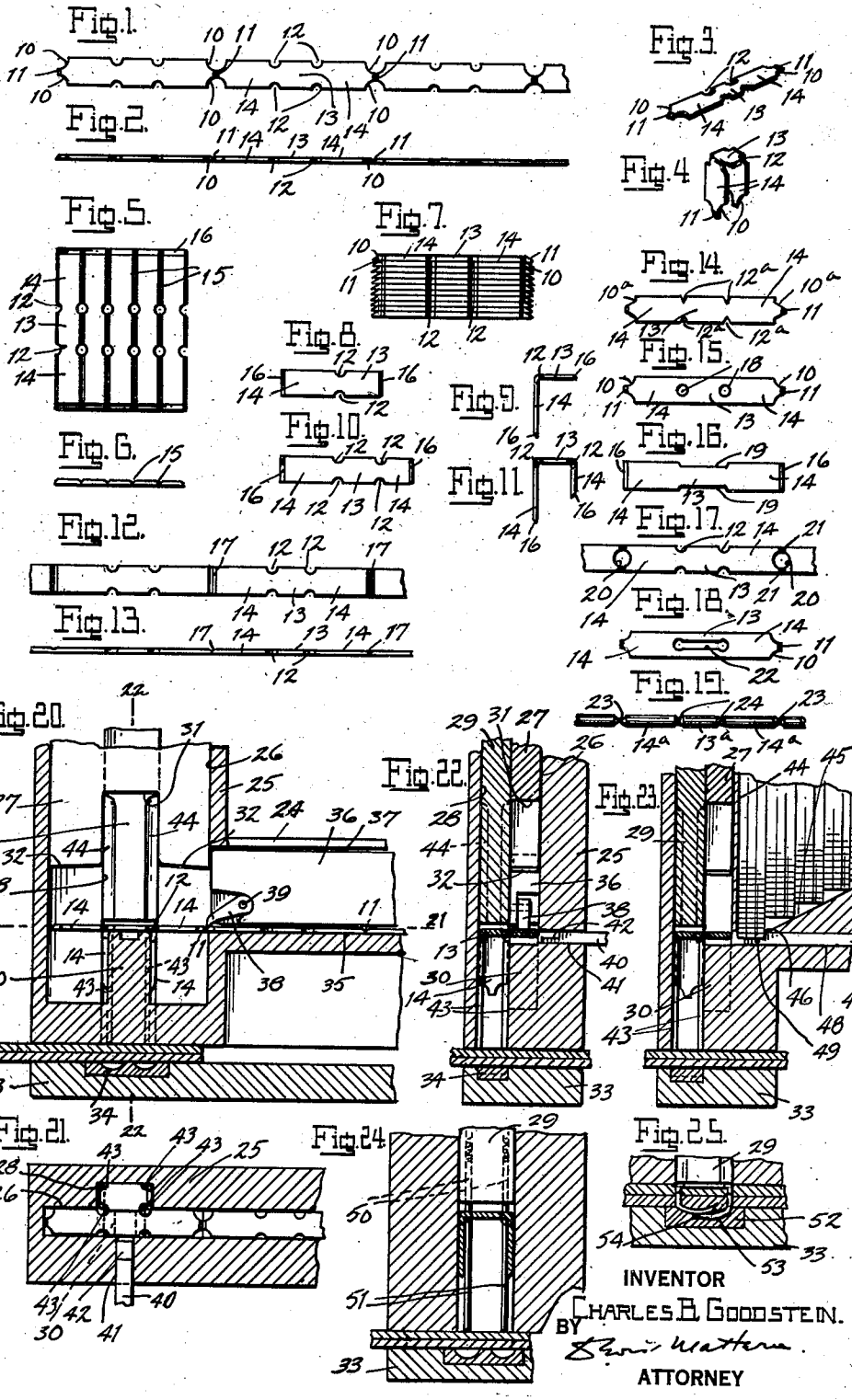
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STAPLE BLANK

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STAPLE BLANK

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The present invention relates to an improved staple blank, and method and means for driving same, and it is proposed to provide for the carrying out of all stapling and stitching requirements of such uses as the stapling, tacking, or stitching of corrugated board, fibre board, cardboard, wood, and other materials.

Stapling and tacking machines are those generally referred to as employing pre-formed staples, these usually being of U-shape and adapted to have their legs driven through the material to be stapled, and thereupon clinched in the case of stapling machines, and allowed to remain straight in the case of tacking machines. Stitching machines are those which employ a roll of wire from which a staple-forming length of wire is cut, and thereupon formed into U-shape and driven through the material. In the case of stapling and tacking machines, particularly where the staple stock is relatively wide, only relatively small quantities can be loaded in the feeding chamber, thereby requiring frequent re-loading which is both costly and time consuming, especially in the use of such machines in industrial production work.

In the case of stitching machines these are usually of intricate and expensive construction, due to the necessary complication of mechanisms required in the several steps of making and driving staples from ordinary wire stock, these steps including wire straightening, feeding, cutting, forming and driving. Because of this complication such machines very often produce imperfect staples, frequently get out of order, and require constant supervision, all of which is costly and time consuming.

It is an object of the present invention to provide an improved form of staple blank by which staples may be supplied in quantities, either in stacked or strip form, and to provide in such blank a weakened portion or portions whereby the staple may be easily and perfectly cut, formed and driven. It is further proposed to provide such staple blank which will insure accurate feeding in the stapling machine.

A further object is to provide a staple blank by which the staple, according to the invention, may be formed and driven in a stapling machine by an improved method, according to the invention, consisting in first shaping the flat blank in the machine into U-form, and then transferring it to a position in the machine where it is driven through the material, and further to provide means whereby while driving through the material the legs of the formed staple will be supported both at the inner and outer sides against buckling.

With the above and other objects in view, an embodiment of the invention is shown in the accompanying drawing, and this embodiment 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 staple blank strip, according to the invention, showing a plurality of staple blanks connected together in longitudinal succession.

Fig. 2 is an edge view thereof.

Fig. 3 is a perspective view of one of the blanks in flat relation prior to being bent into staple form.

Fig. 4 is a perspective view showing the same blank bent into inverted U-shape staple form.

Fig. 5 is a plan view of a staple blank strip showing a plurality of staple blanks integrally connected together in transverse succession.

Fig. 6 is an edge view thereof.

Fig. 7 is an edge view of a staple stack, according to the invention, in which a plurality of staple blanks are arranged in stacked relation, being either unconnected for loose stacking in the machine, or connected by an easily breakable adhesive, arranged either between the adjacent surfaces or on the edges.

Fig. 8 is a plan view of a modified form of staple blank having only one leg portion.

Fig. 9 is a side elevation showing the blank of Fig. 8 bent into staple form.

Fig. 10 is a plan view of a further modified form of staple blank having one leg shorter than the other.

Fig. 11 is a side elevation showing the blank of Fig. 10 bent into staple form.

Fig. 12 is a plan view of a modified form of staple strip in which the weakened connecting portions between the staple forming blanks extend the full width of the blank.

Fig. 13 is an edge view thereof.

Fig. 14 is a plan view of a further modified form of staple blank.

Fig. 15 is a plan view of another form of staple blank.

Fig. 16 is a plan view of still another form of staple blank.

Fig. 17 is a plan view of another modified form of staple blank forming strip.

Fig. 18 is a plan view of a further modified form of staple blank.

Fig. 19 is a plan view of a further modified form of staple blank forming strip formed of wire.

Fig. 20 is a vertical sectional view of a machine, adapted to feed, cut, form, and drive staples according to the invention.

Fig. 21 is a horizontal sectional view taken along the line 21—21 of Fig. 20.

Fig. 22 is a transverse vertical sectional view taken along the line 22—22 of Fig. 20.

Fig. 23 is a vertical sectional view of a modi-

fied form of machine adapted to the use of staple blank stacks.

Fig. 24 is a vertical sectional view of the lower portion of the machine, showing a modified form of plunger, adapted for the driving of staple blanks of the type illustrated in Figs. 15 and 18.

Fig. 25 is a fragmentary vertical sectional view showing a modified form of anvil for bending the staple legs in overlapping relation.

Referring to the drawing and more particularly to Figs. 1 to 4 thereof, the staple blank strip according to the exemplary embodiment of the invention illustrated therein, is formed of a strip of metal which may be supplied in any suitable length from a coil, and which may be furnished in coil form for use in the stapling machine, the strip being drawn therefrom and continuously fed into the machine. The strip is provided at equally spaced intervals with notches 10—10, opposite each other, and in spaced relation to provide a narrow weakened connection between the staple forming blanks, this weakened connection being preferably further weakened by grooving, as at 11, across the narrow portion of the connection, this grooving either being at one side, as shown, or at both sides, if desired, and being V-shaped so that it not only points the end of the staple blank, but disposes the weakest point at the division line between the two staple blanks. The notching furthermore provides converging ends upon the staple leg portions which facilitate penetration through the material to be stapled, and also in clinching the ends by engagement with the anvil, and as will hereinafter more fully appear, allows these ends to first curl so that when the staple is clinched the ends will readily imbed in the under surface of the material.

The notches 10—10, or the groove 11, or both, may be conveniently utilized for accurate feeding of the staple strip in the machine by engaging the feeding means, which will preferably be arranged to reciprocate, in these equally spaced notches and grooves.

Intermediate the ends of the staple forming blank spaced notches 12—12 are provided in opposed elation at each edge, to provide a staple crown or bridge portion 13 between the notches 12—12, and leg portions 14—14 between the notches 12—12 and the end forming notches 10—10. As shown in Fig. 4 these notches 12 predetermine the point of bending of the staple blank into U-form, insuring accurate bending of each staple along predetermined lines, so that the staples thus formed will be uniform. The notches 12—12 furthermore provide means which cooperate in the machine with retaining ribs, or the like, to support the staple legs at both the inner and outer sides during the driving of the staple, so that the legs cannot buckle, and will therefore be driven through the material with great accuracy, and will penetrate with a minimum amount of force applied to the staple driving plunger.

In Figs. 5 and 6 I have illustrated a staple strip consisting of a plurality of staple blanks, similar to the blank as shown in Fig. 3, but connected in transverse succession, that is, by grooves 15, formed either by cutting, or swedging, or rolling between the staple blank forming portions, producing weakened connections between the portions. Instead of forming the leg ends by notching, as shown in Figs. 1 to 4, I have shown the ends pointed by beveling, as at 16. It will be understood, however, that this is optional.

In Fig. 7 I have shown a series of the individual staple blanks arranged in stacked form, the staple blanks being similar for instance to the blank shown in Fig. 3, but which may be of any of the other modified forms illustrated. This stack either consists of the blanks loosely arranged, that is, unconnected by adhesive, or consists of the blanks connected by a suitable easily breakable adhesive such as lacquer, glue, or the like.

In Figs. 8 and 9 I have illustrated a modified form of staple blank consisting of a crown portion 13 and only one leg portion 14. This will engage the material in a manner similar to a tack. The ends are shown beveled, as at 16.

In Figs. 10 and 11 I have illustrated another modification in which one of the leg portions 14 is shorter than the other. In this case only one leg will be clinched upon the underside of the material being stapled.

In Figs. 12 and 13 I have illustrated a modified form of staple strip in which the staple strip blanks are connected by weakened portions produced by grooves 17 extending the full width of the strip.

In Fig. 14 I have illustrated a modified form of staple blank in which notches 12^a—12^a are provided intermediate the ends and which are of V-form, as distinguished from the semi-circular notches 12. The ends of the staple legs are provided with the notches 10^a as distinguished from the semi-circular notches 10.

In Fig. 15 I have shown the staple blank weakened at predetermined points intermediate its ends by perforations 18—18.

In Fig. 16 I have shown a modification in which the crown portion 13 of the staple blank is made narrower than the leg portions by means of cut-outs 19—19 at each side, the ends of these cut-outs predetermining the weakened points of bending between the staple crown and the staple legs.

In Fig. 17 I have shown a modified form of staple strip in which the staple forming blanks are formed at their ends by means of perforations 20 producing weakened connections between the staple forming blanks and forming double material penetrating staple leg ends. The connection may be further weakened by grooving as at 21, which also serves to point the double leg ends.

In Fig. 18 I have shown a modified form of staple blank somewhat similar to the form shown in Fig. 15, but having a slot 22 extending longitudinally of the crown portion, the ends of the slot predetermining the points of bending.

In Fig. 19 I have shown a staple forming strip formed of wire, the staple blanks being connected by annular grooves 23, and the points of bending between the crown portion 13^a and the leg portions 14^a—14^a being determined by smaller annular grooves 24—24.

In Figs. 20 to 22 I have shown a machine adapted to the feeding, cutting, forming, and driving of staples from the staple blank strip, according to the invention, such strip being of the type as shown either in Figs. 1 and 2, Figs. 12 and 13, Fig. 17, or Fig. 19. The machine may also have individual or unconnected successively arranged staples used thereon.

The body 24 of the stapling machine is provided at one end with a head portion 25 having a vertical passage 26 in which a staple forming plunger 27 is adapted to reciprocate, and a smaller vertical passage 28 disposed intermediate

one wall of the passage 24, and within which a staple driving plunger 29 is adapted to reciprocate.

In the base of the passage 24 there is provided a staple forming post 30 about which the staple blanks are adapted to be bent into inverted U-shape through cooperative engagement of the end of the plunger 27, which is provided for this purpose with a forming recess 31, the lower edges 32 of the plunger at each side of the recess being preferably inclined downwardly and outwardly and the outer end of one of said edges 32 being adapted to act as a staple cutting knife as well as a stop for the staple feeder, as will presently more fully appear.

The passage 28 in which the plunger 29 moves extends to the lower end of the body 24 for the purpose of allowing the staple to be forced out of the passage and through the material, the material being disposed upon a support 33 having a staple leg clinching anvil portion 34.

The staple strip is fed through a slot 35 into the passage 26 being so arranged that the strip as it is fed into the passage rests upon the upper end of the post 30. Any suitable means may be provided for intermittently feeding the strip. I have shown such means as consisting of a slide 36 movable in a slideway 37 and carrying a pawl 38 pivoted at 39 in the recessed end of the slide, and which drops into engagement with one of the notches of the strip, whereupon forward movement of the slide causes the strip to be fed forwardly.

Upon feeding of the strip into the passage 26 the plunger 27 is depressed, first by cutting off the staple blank from the strip, and then causing the staple blank to be bent into inverted U-form about the post 30. Thereupon this formed staple is fed into the passage 28 by means of a plunger 40 operating in a passage 41, having a notched end 42 for engaging about the bridge portion of the staple.

When the staple is in this position it is ready to be driven by the plunger 29. It will be understood that the plungers 27 and 29 will operate together, the plunger 29 driving a staple which has been formed by the plunger 27 during the preceding operation, and the plunger 27 forming another staple blank into U-form simultaneously with the driving of the previously formed staple. After each such operation the formed staple is first moved into the passage 28 by means of the plunger 40, and a new staple forming blank is fed into the passage 26.

Upon the corners of the post 30 disposed within the passage 28 there are provided ribs 43—43 which extend from the upper end of the post to the lower end of the passage 28, and in opposed relation thereto upon the wall of the passage 28 there are provided similar ribs 43—43, these ribs being in position to engage the inner surfaces of the staple legs to support the same against buckling, and to clear the crown portion 13 of the staple as it is driven by engaging in the notches 12—12. The driving plunger 29 is recessed at its corners, as at 44, to also clear these ribs.

By this arrangement the staple legs are rigidly supported as they are being driven through the material, so that they will easily penetrate the material with a minimum amount of force, this being due to the fact that the entire vertical force of the plunger is applied in a vertical direction to the legs without component losses. This is of particular importance in the stapling of tough material, such as fibre board, leather, or the like.

In Fig. 23 I have shown a modification of the machine adapted to feed the staple blanks in stacked form, and for this purpose there is provided a staple stack containing chamber 44 having its base inclined, as at 45, to an outlet 46 where the foremost stack is disposed in operative relation, a number of other stacks being arranged in the chamber so that as one becomes used up the other moves downwardly into operative position in relation to the outlet opening 46. The feeding means or the individual staple blanks consists of a feed bar 47 moving in a passage 48 and notched, as at 49, to engage the staples. As one staple is moved into place upon the post 30 the previously formed staple upon the post is moved thereby into the passage 28, where it is in position to be forced downwardly by the plunger 29.

In Fig. 24 I have shown a modification adapted for the feeding of staple blanks of the types shown in Figs. 15 and 18. In this form the plunger 29 is provided with vertical passages 50 in which spring pressed rods 51 are engaged. In the raised position of the plunger these rods are extended and disposed above the staple. As the plunger moves downwardly the rods engage the holes 18 in the case of the staple blank shown in Fig. 15, and the ends of the slot 22 in the case of the staple blank shown in Fig. 18, thus supporting the staple legs at their inner sides against buckling. As the plunger continues to move downwardly to force the staple downwardly in the passage the rods move up into the passages 50.

In Fig. 25 I have shown a modified form of anvil 52 having a recess 53, one side of which is upwardly offset, as at 54, so that the clinched ends of the staple legs move into overlapping relation. This arrangement lends itself to the convenient locking together of the clinched legs as by interlocking formations, cold solder, spot welding, or the like. By making the staple leg ends oppositely beveled they will pass into overlapping relation without the necessity for the special anvil formation 54. This type of staple provides an especially secure clinch because of its completely enclosing or encircling form.

I have illustrated and described preferred and satisfactory embodiment of the invention, but it will be obvious 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. As an article of manufacture, a staple blank formed from a flat, thin strip of metal having parallel sides and an end adapted for insertion in the work, and having intermediate the ends opposed notches to form a bending line across the blank to define a bridge portion and a leg portion, said notches each having its side nearest the bridge portion inclined toward that portion so that when the leg is bent for insertion, the open notch will be formed in line with the inner face of the leg portion to accommodate a guide element in a stapling mechanism.

2. As an article of manufacture, a staple blank as defined in claim 1, but having two pairs of opposed notches to define a bridge portion intermediate two leg portions.

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