

Sept. 21, 1943.

E. S. CLARKE

2,329,744

NAILS AND METHOD FOR THEIR MANUFACTURE

Filed July 20, 1942

2 Sheets-Sheet 1

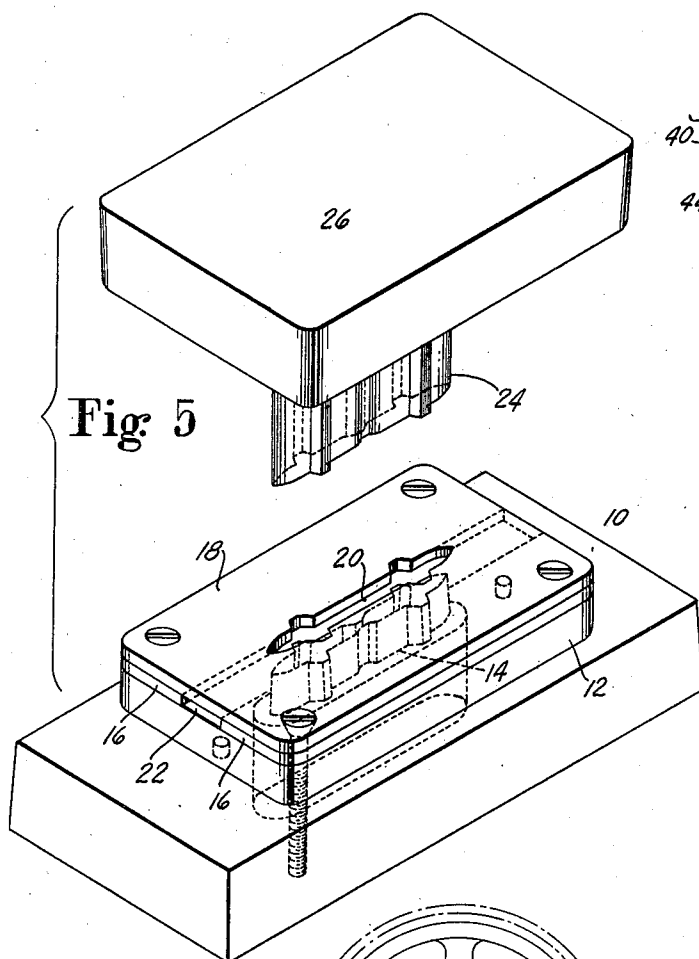


Fig. 5

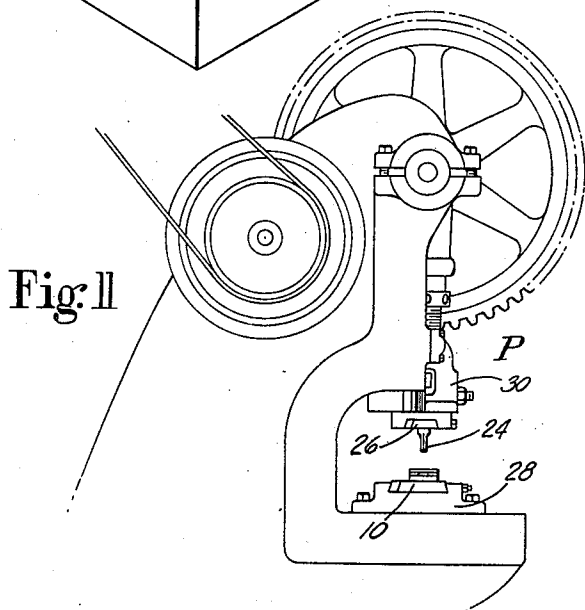


Fig. 11

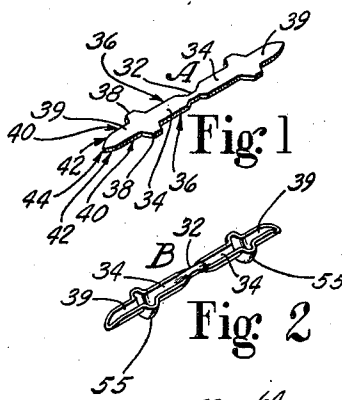


Fig. 1

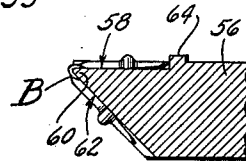


Fig. 2

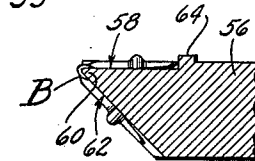


Fig. 7

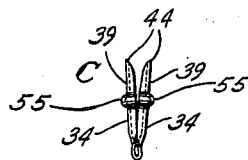


Fig. 3

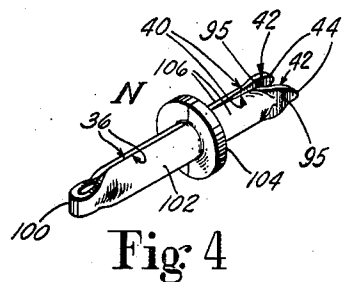


Fig. 4

INVENTOR:
Eugene S. Clarke
By his attorney
Merrill C. Cady

Sept. 21, 1943.

E. S. CLARKE

2,329,744

NAILS AND METHOD FOR THEIR MANUFACTURE

Filed July 20, 1942

2 Sheets-Sheet 2

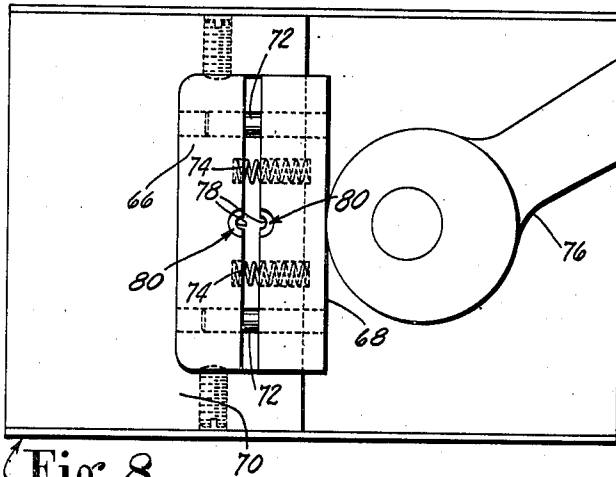


Fig. 8

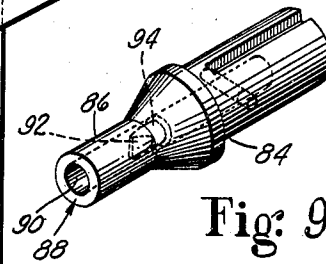


Fig. 9

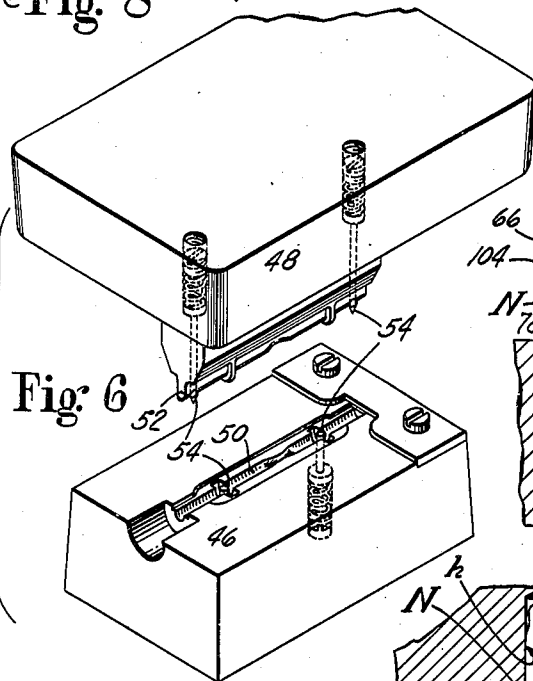


Fig. 6

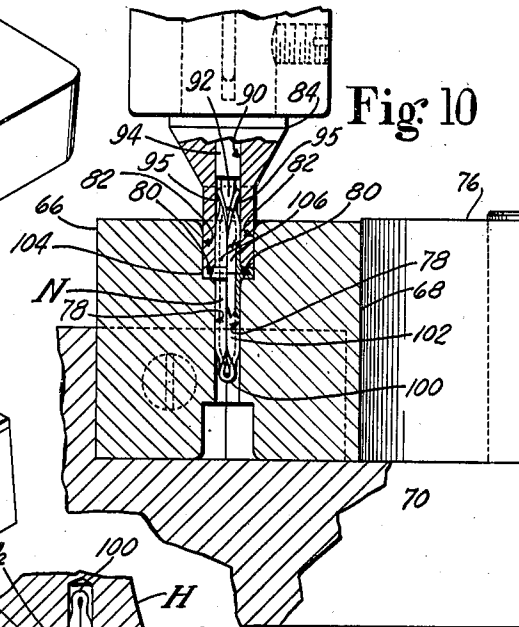


Fig. 10

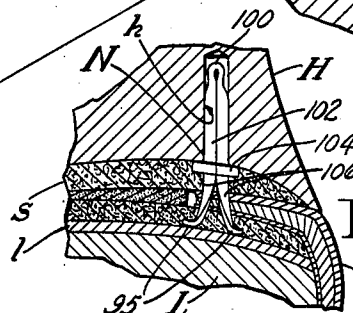


Fig. 12

INVENTOR:
Eugene S. Clarke
By his attorney
Merrill C. Clark

UNITED STATES PATENT OFFICE

2,329,744

NAIL AND METHOD FOR ITS MANUFACTURE

Eugene S. Clarke, Groveland, Mass., assignor to
United Shoe Machinery Corporation, Flemington,
N. J., a corporation of New Jersey

Application July 20, 1942, Serial No. 451,551

14 Claims. (Cl. 85—11)

This invention relates to nails and their production, it being of special utility in connection with such fastenings employed for the attachment of heels to shoes.

In Letters Patent of the United States No. 2,200,385, Eich, May 14, 1940, is disclosed a nail utilized for the above-mentioned purpose. This is of the collar-type formed from solid wire, with a shank at one side of the collar bifurcated and adapted to be inserted and clinched oppositely in the heel-seat of a shoe, while the shank at the opposite side of the collar may have applied to it a hole formed in a heel to be attached. In this operation, the ends of the divided shank are deflected outwardly after passing through the heel-seat, to produce the clinch by contact with the heel-plate of the last upon which the shoe is mounted. To accomplish this with the bifurcation formed in the solid shank requires the application of considerable force, and the last-plate tends quickly to be so mutilated that it must be replaced. Then, too, the amount of metal required for the solid-shank nail renders it expensive. My invention has as an object the provision of a nail, which may be clinched easily and effectively and which is relatively inexpensive.

In the attainment of this object, a feature of the invention consists of a nail formed of a strip of sheet-metal bent upon itself to furnish a body with its opposite sides connected and diverging from each other at one end, each side being convexed outwardly to form a tubular shank. The connection between the sides of the body is at one end thereof. Such a nail, while giving by its tubular shank ample strength to resist bending with a minimum amount of metal, provides by its diverging portions prongs which may be deflected and clinched by the application of a comparatively small force and with little effect upon the last-plate or other contact member. To facilitate this clinching, the diverging ends are preferably flattened. This also serves to penetrate the work more readily. As in the nail of the Eich patent, that of the present invention may have a collar projecting between its ends with its opposite walls in substantial parallelism. The divergence between the sides of the body is shown as starting in proximity to the collar, it being first gradual to ensure outward separation in clinching, and then more abrupt to provide the portions which are deflected to form the clinch. By making the connecting end-portions narrower than the adjacent portions, a point is produced which renders easier its entrance into the work.

A further feature of the invention is concerned

with the manufacture of my improved nail. There is formed from sheet-metal a strip having connected transversely convex portions, each provided with a pointed end, said strip being bent preferably at a flat central portion, until the edges of the convex portions are in proximity to each other. This results in a nail having a body-portion with a tubular shank. By forming the opposite edges of each of the convex portions first parallel to each other and then converging, upon bending the strip the opposed parallel edges of the two portions may be brought into substantial contact, while the corresponding converging edges of such portions will diverge from each other to give the desired bifurcation. Transverse enlargements are formed in the convex portions and pressed at opposite sides to furnish a flattened collar, the pointed ends preferably being transversely flattened simultaneously therewith.

In the accompanying drawings, illustrating my improved nail and means by which it may be made,

Fig. 1 shows in perspective a blanked-out strip of sheet-metal having the desired peripheral contour;

Fig. 2 is a similar view of the strip of Fig. 1, which has been laterally-convexed;

Fig. 3, a side elevation of the strip of Fig. 2 bent into the preliminary form of the nail-body;

Fig. 4, a perspective view of the finished nail;

Fig. 5, a separated perspective view of the blanking die and its punch;

Fig. 6, a like view of the lower and upper convexing dies;

Fig. 7, a vertical section of a fixture over which the convexed strip is bent;

Fig. 8, a top plan view of clamping mechanism for the bent strip;

Fig. 9, a perspective view of the pressure member by which the collar of the clamped nail is pressed and the points flattened;

Fig. 10, a central vertical section through the clamping mechanism and the co-operating pressure member;

Fig. 11, a side elevation of a punch-press with the aid of which the various nail-forming operations may be accomplished; and

Fig. 12, a vertical transverse section illustrating a nail utilized for the attachment of a heel to a shoe.

A lower die 10 (Fig. 5) includes a plate 12, in which is an opening 14 having the contour of a blank A (Fig. 1), which it is desired to cut. Upon the die-plate rest spacers 16, 18, carrying a strip-plate 18 in which is an opening 20 larger than

the die-plate-opening 14. Between the spacers beneath the stripper-plate a channel 22 is formed, through which may be fed a ribbon of sheet-metal from which the blanks are to be cut. With the die 10 co-operates a punch 24, mounted upon a reciprocatory block 26 and so fitting the die-opening 14 that upon entrance thereto it will sever a blank from the sheet-metal in the channel 22. For this operation, the die 10 may be mounted upon the bed 28 of a punch-press P (Fig. 11), while the portion 24 is carried by the power-actuated plunger 30 of the press. The blank which the die and punch thus produce consists of a strip A, having at its center a neck 32 narrower than the adjacent portions 34, 34. The opposite edges 36, 36 of each of these adjacent portions are parallel to each other, beyond which is a lateral curved projection 38 succeeded by terminal portions 39 having edges 40, 40, first converging slightly toward each other, after which they are inclined more abruptly at 42, 42 to meet at a point 44.

The strip A is next convexed transversely to the form B of Fig. 2. This may be accomplished by the use of a lower die 46 and a mating upper die 48 (Fig. 6), the former having a depression 50 over which the strip is laid and the latter a projection 52 for co-operation with the depression. The customary spring-actuated strippers 54 are associated with both dies to clear the work therefrom. They may be applied to the punch-press P similarly to the blanking die and punch. The form of the depression and projection is such that the neck 32 of the strip A is left flat, but at each side the body-portions are uniformly convexed transversely, except that the areas at the projections 38 are pressed more deeply, forming semi-circular beads or enlargements 55 extending outside the body-portions.

As the next step in the production of the nail, a preliminary bend may be given to the convex strip B with the aid of a fixture 56 (Fig. 7). This is shown as an abutment of angular form, having a horizontal top wall 58 and a point 60, from which a lower wall 62 extends downwardly and rearwardly. Upon the upper wall is a gage-projection 64. The dimensions of the fixture are such that when the operator lays one of the strip-portions 34, 39 upon the wall 58 with the edges 36, 40 down, the neck 32 is located over the point 60. The outer end of the strip may thereupon be sent back so the opposite halves lie at an angle to each other. The flat neck permits this to be done readily. With the bend thus started symmetrically, the opposite portions of the strip may be forced together more closely, as appears at C in Fig. 3.

To complete the formation of the nail, it is placed between a fixed member 66 and a movable member 68 of the mechanism 70 of Figs. 8, 9 and 10. The member 68 is shown as guided for horizontal movement upon rods 72, 72, and urged normally away from its companion by expansion-springs 74, 74. It may be forced into clamping relation to the member 66 by a cam-lever 76. With the clamping mechanism mounted upon the bed 28 of the punch-press P, the bent strip C is placed with the connecting neck 32 down between registering recesses 78, 78 in the members 66 and 68. The undersides of the beads 55 rest upon horizontal surfaces 80, 80, which are at the bottom of enlarged recesses 82, 82 in the members above the recesses 78. There is applied to the plunger 30 of the press P a pressure member 84. This has a cylindrical terminal 86 entering the

recesses 82, with an end-surface 88 co-operating with the shoulders 80, 80. An axial bore 90 in the member 84 receives the upper portion of the nail-body. When the plunger of the press descends, the surface 88 bears upon the upper sides of the halves of the bead and compresses them, so the upper and lower faces become parallel. Simultaneously with this action, the beveled end 92 of a projection 94 fixed in the bore 90 is forced between the opposed ends of the clamped strip, bending them back against the wall of the bore and flattening them laterally at 95, as is shown in Fig. 10. When the plunger of the press is raised and the lever 76 retracted, the completed nail may be removed.

Referring to Fig. 4, the nail N has an elongated tubular body with its opposite sides joined at one extremity by the flat neck of the blank, which gives a somewhat reduced point 100. The edges 36, 36 of each of the strip-portions 34 are now respectively parallel to those of the opposite portion, so there is formed a substantially cylindrical tubular shank 102. This extends to the compressed beads, which form together a compact annular flange or collar 104. The adjacent edges 40, 40 of the portions 39 first diverge gradually from the collar, and then more abruptly at the edges 42, 42. There is thus furnished at this side of the collar the tubular bifurcated shank 106, 106 with the flattened points 95, 95.

The nail N is shown in one of its applications in Fig. 12 of the drawings. Here, we have a fragment of the heel-seat-portion of a shoe S, into which has been driven the divided portions 106, 106 of the nail N, which is but one of a set which would be employed. Because the points 95 are flattened, they penetrate the heel-seat material more readily than would the laterally convexed contour, and their considerable divergence starts promptly their separation from each other upon insertion. Since these points are relatively thin, they bend readily, the clinch not only starting in the heel-seat material but also progressing considerably therein, being completed upon comparatively light engagement with the heel-plate L of the last L within the shoe. This being the case, said plate suffers little mutilation. The less divergence of the portions 106 along the edges 40 at the inner side of the points make certain that clinch will be initiated in the right direction to give the maximum retaining effect, and that these portions will not be crumpled irregularly by a tendency to bend inwardly. The tubular form of the portions 106 is still maintained. The flat collar 104 is forced into the outsole s of the shoe, leaving the shank 102 projecting. A heel H with holes, one of which is shown at h, pre-drilled in the correct relation, is pressed upon the nail-shank, the hole being of somewhat smaller diameter than is the shank. The point 100 furnishes a leader, causing ready reception of the nail-shank by the heel-hole. The wall of the hole grasps the shank, and the heel is held firmly in place by a fastening of ample strength.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A nail consisting of a strip of sheet-metal bent upon itself to furnish a body with its opposite sides connected at one end to furnish a reduced point and having at the other end spaced material-penetrating points, each side being convexed outwardly to provide a tubular shank.

2. A nail consisting of a strip of sheet-metal bent upon itself to furnish a body with its oppo-

site sides connected at one end by a central portion narrower than the adjacent portions and diverging from each other at the other end to furnish spaced material-penetrating points, each side being convexed outwardly to provide a tubular shank.

3. A nail consisting of a strip of sheet-metal bent upon itself to furnish a body with its opposite sides connected at one end to furnish a reduced point and diverging from each other at the other end, each side being pointed and convexed outwardly to provide a tubular shank but with the diverging ends flattened at the points.

4. A nail consisting of a strip of sheet-metal bent upon itself to furnish a body with its opposite sides connected at one end and diverging from each other at the other end, there being a collar projecting from the body between the ends.

5. A nail consisting of a strip of sheet-metal bent upon itself to furnish a body with its opposite sides connected at one end and diverging from each other at the other end, there being a collar projecting from the body between the ends and having substantially parallel opposite outer walls.

6. A nail consisting of a strip of sheet-metal bent upon itself to furnish a body with its opposite sides connected at one end and diverging from each other at the other end, there being a collar projecting from the body between the ends, the divergence between the sides starting in proximity to the collar.

7. A nail consisting of a strip of sheet-metal bent upon itself to furnish a body with its opposite sides connected at one end and diverging from each other at the other end, there being a collar projecting from the body between the ends, the divergence between the sides starting in proximity to the collar, it being first gradual and then more abrupt at the ends.

8. The method of manufacturing nails, which consists in forming from sheet-metal a strip with pointed ends and transversely convex at each side of its central portion, with said central portion flat and of less width than the adjacent portions, and bending the strip at the flat portion until the edges of the convex portions are opposite each other.

9. The method of manufacturing nails, which consists in forming from sheet-metal a strip transversely convex at each side of its central portion, said convex portions having opposite edges which are first parallel to each other and then converge, and bending the strip at the cen-

tral portion until the opposed parallel edges of the two convex portions are in substantial contact and the converging edges of said two convex portions diverge from each other.

10. The method of manufacturing nails, which consists in forming from sheet-metal a strip transversely convex at each side of its central portion and with pointed ends, bending the strip at the central portion until the edges of the convex portions are opposite each other, and flattening the pointed ends.

11. The method of manufacturing nails, which consists in forming from sheet-metal a strip transversely convex at each side of its central portion and with pointed ends, there being transverse enlargements formed in said convex portions, and bending the strip at the central portion until the edges of the convex portions and their enlargements are opposite each other.

12. The method of manufacturing nails, which consists in forming from sheet-metal a strip transversely convex at each side of its central portion and with pointed ends, there being transverse enlargements formed in said convex portions, bending the strip at the central portion until the edges of the convex portions and their enlargements are opposite each other, and pressing the opposite sides of the enlargements together to furnish a flattened collar surrounding the two convex portions.

13. The method of manufacturing nails, which consists in forming from sheet-metal a strip transversely convex at each side of its central portion and with pointed ends, there being transverse enlargements formed in said convex portions, bending the strip at the central portion until the edges of the convex portions and their enlargements are opposite each other, pressing the opposite sides of the enlargements together to furnish a flattened collar surrounding the two convex portions, and flattening the pointed ends.

14. The method of manufacturing nails, which consists in forming from sheet-metal a strip transversely convex at each side of its central portion and with pointed ends, there being transverse enlargements formed in said convex portions, bending the strip at the central portion until the edges of the convex portions and their enlargements are opposite each other, clamping the bent strip in this relation, pressing the opposite sides of the clamped enlargements, and simultaneously therewith flattening the pointed ends.

EUGENE S. CLARKE.