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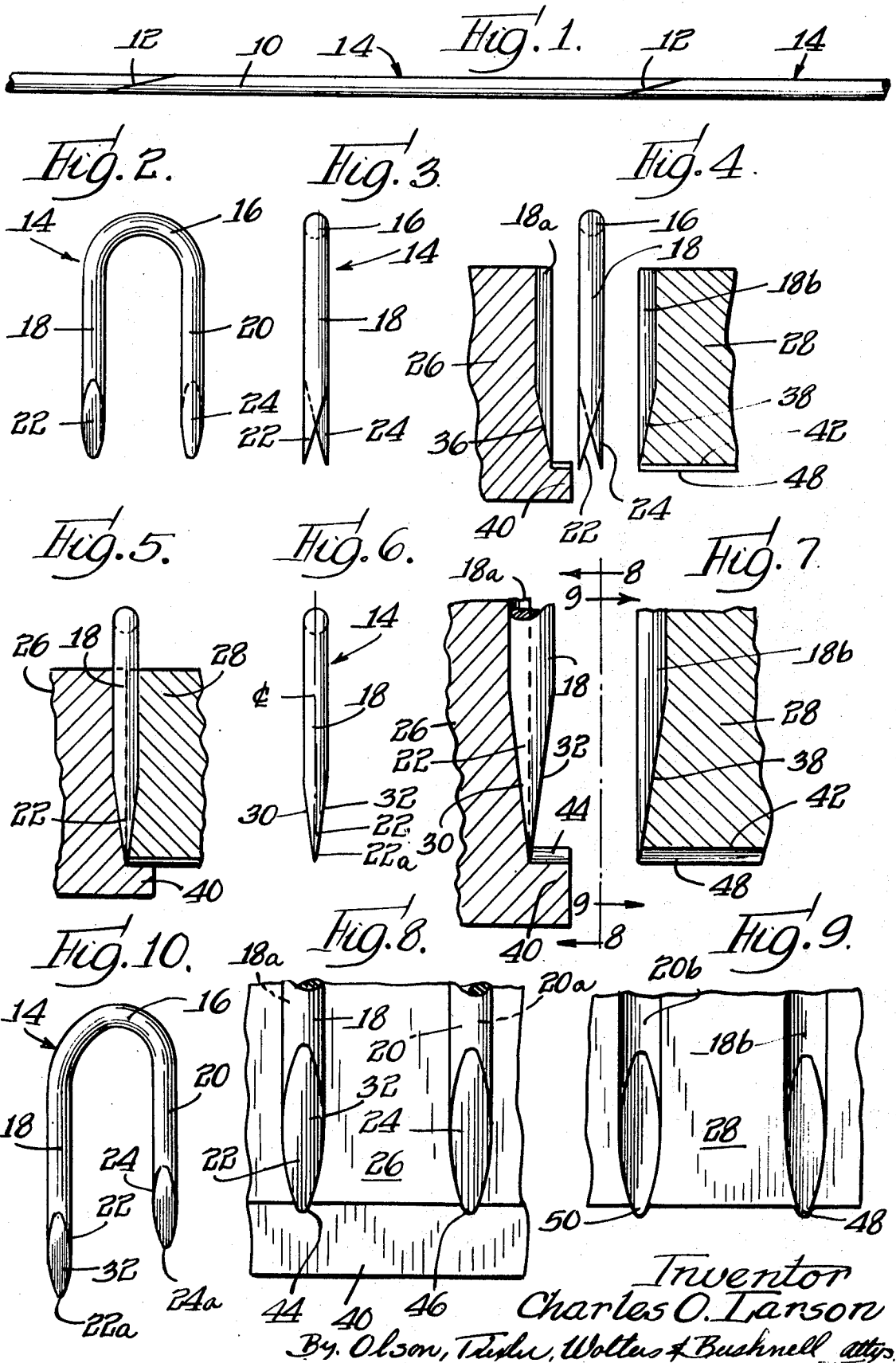
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3,605,402

METHOD OF MANUFACTURE OF CURVED TIP STAPLES

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2 Sheets-Sheet 1



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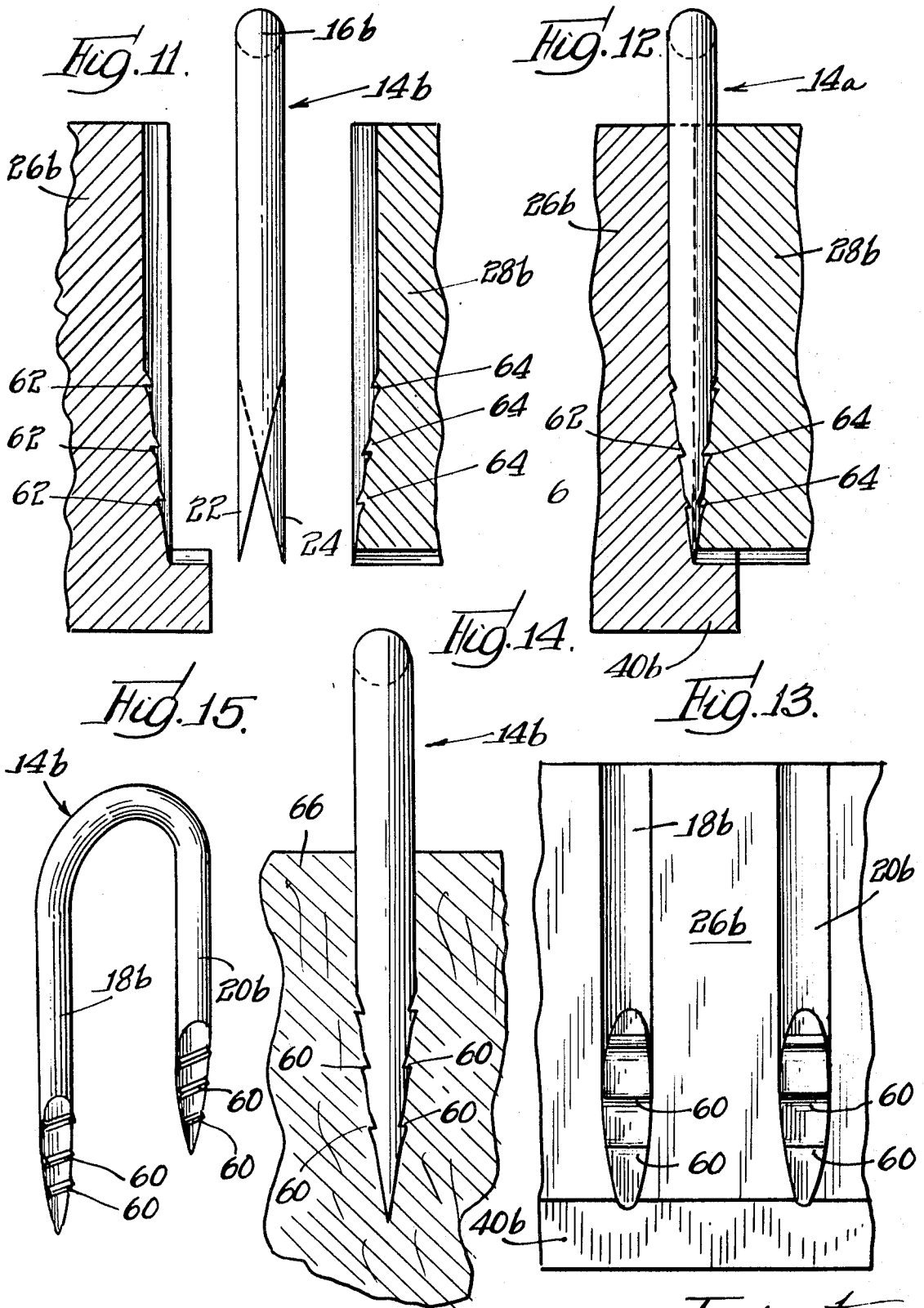
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3,605,402 METHOD OF MANUFACTURE OF CURVED TIP STAPLES

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7 Claims

ABSTRACT OF THE DISCLOSURE

In accordance with the present disclosure an elongated piece of wire, of appropriate gauge, is severed diagonally at predetermined spaced points. Each wire length thus formed is then bent into staple form whereby to provide a staple the tines of which taper in opposite direction. The staple tines are then reshaped into symmetrical form, by suitably shaped dies; and in connection with this reshaping operation a predetermined curved shape may be imparted to the tine ends; whereby to provide a staple structure having similarly formed symmetrical tines, the ends of which have a predetermined curved smooth shaping. Barbs or the like may also be simultaneously formed on the staple tines.

This invention relates to staples, and to methods for manufacturing staples; and concerns particularly a staple structure the tines of which are symmetrically and similarly shaped, and provided with predetermined curved surfaces at their ends.

Conventional staple structures are provided with tines the bevelled surfaces of which project in opposite directions, whereby the staple tends to twist and become deformed as it is driven into a workpiece. In instances wherein the two tines have been similarly shaped, sharp edges have frequently been provided, leading to undue splitting of the workpiece, as well as discomfort to the hands and damage to the user's gloves, due to the sharp edges and points provided.

In accordance with the present invention a staple is provided, and an improved method is provided for making staples, whereby a staple structure may be produced, having symmetrical and similarly shaped tines, and wherein the tine surfaces have curved ends or tips of predetermined shape, whereby to avoid sharp points with their incident disadvantages, and may, if desired, also be provided with holding barbs.

An object of the invention is to provide a staple which overcomes difficulties encountered with conventional staples of the prior art.

A further object of the invention is to provide a staple, and method of manufacture, which has similarly shaped symmetrical tines, the ends of which have curved tips of predetermined shape; and may also have holding barbs, simultaneously applied.

A further object of the invention is to provide a staple structure which is devoid of sharp points, on all tine surfaces, whereby to promote ease of handling by the user.

Still further objects of the invention are to provide a staple structure having improved holding power, which may be more readily and accurately driven into a workpiece, and which minimizes splitting of the workpiece.

A still further object of the invention is to provide a staple, and method of manufacture, which is economical, and may be readily carried out, to provide a staple structure having the foregoing recited characteristics.

Various other objects, advantages and features of the invention will be apparent from the following specification, when taken in connection with the accompanying

drawings, wherein a preferred embodiment of the invention is set forth for purposes of illustration.

In the drawings, wherein like reference numerals refer to like parts throughout:

FIG. 1 is a view showing a wire piece, of suitable gauge, and of a type and kind suitable for forming the staples of the present invention;

FIGS. 2 and 3 are front and side views, respectively, of the staple structure of the present invention, after the first forming step thereof;

FIGS. 4 and 5 are sequential views showing a second step in the forming of the staple of the present invention, particularly with reference to the reforming or shaping of the staple tines and the tine ends;

FIG. 6 is a side view of the staple, after the forming operations of FIGS. 4 and 5;

FIG. 7 is a view similar to FIG. 4, on an enlarged scale, and more particularly showing the structure of the reforming dies;

FIGS. 8 and 9 are face views of the die members shown in FIG. 7, taken as indicated by the lines 8—8 and 9—9 thereof, respectively, and more particularly showing the construction of the dies;

FIG. 10 is a perspective view of the completed staple, formed in accordance with the method of the present invention;

FIGS. 11 and 12 are views, similar to FIGS. 4 and 5, respectively, but showing a modified form of structure;

FIG. 13 is a view similar to FIG. 8, showing the die and staple of FIGS. 11 and 12;

FIG. 14 is a view showing the staple of FIGS. 11 and 12 driven into a workpiece; and

FIG. 15 is a perspective view of the staple of FIGS. 11 and 12.

Referring more particularly to the drawings, and first to FIGS. 1—10, in FIG. 1 there is shown a length of wire 10, of suitable gauge, and of desired cross-sectional shape, in accordance with the desired cross-section of the staple body to be formed. In FIG. 1, the wire 10 is shown of conventional round cross-sectional shape.

In accordance with the method of the present invention, the wire 10 is cut into suitable lengths by diagonal cuts, as indicated at 12. As will be understood, each wire length between successive cuts will form one staple, upon the subsequent shaping of the staple body.

The diagonal cuts 12 may be formed by any suitable severing dies, or other cutting means, the angle of the taper of the cut being determined in accordance with the desired taper to be imparted to the ends of the staple tines.

After severance of the wire into suitable lengths, the wire may be shaped into conventional staple form, as shown in FIGS. 2 and 3, by conventional staple forming dies. It will be seen that the staple thus formed, generally indicated by the reference numeral 14, is composed of a bight body portion 16, and tines 18 and 20. Each tine has a bevelled end portion as indicated respectively at 22 and 24.

By reference to FIGS. 2 and 3, it will be seen that the bevelled tine ends 22 and 24 project in opposite directions, whereby, if this were the finished staple form, the tines upon being driven into a workpiece would tend to rotate the staple and distort it upon being driven into the workpiece body.

In accordance with the present invention, the staple is next engaged by a pair of reshaping dies, as indicated at 26 and 28, in FIGS. 4 and 5, whereby to reshape the tine ends into symmetrical form, and to impart a similar shaping to each tine, each in respect to the other.

More particularly, as the dies are closed, as sequentially indicated by FIGS. 4 and 5, the tine end 22 will be bent or reshaped to the right, as seen in FIG. 4; and the tine

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end 24 will be bent or reshaped to the left, whereby both tine ends will be symmetrical, in relation to the associated tine body, and both tine ends will be similarly shaped, one in respect to the other, as will be more particularly seen by reference to FIG. 6, showing the staple after the re-forming operation. Thus, referring to FIG. 6, wherein the tine end 22 is more particularly shown, it will be seen that the faces of the tine, as indicated at 30 and 32, are symmetrical, and the tine tip, as indicated at 22a, will lie along the center line of the tine 18. As a result of this shaping, as the staple is driven into a workpiece, there is no tendency for the staple to twist, or to become distorted as it is driven home.

To effect the reshaping of the tine ends, it will be seen that the cooperative cavities 18a-18b and 20a-20b of the dies 26 and 28 are provided with complementary tapered surfaces 36 and 38, having the same taper, so as to impart a symmetrical shaping to each tine end.

In accordance with the present invention, and as best shown in FIGS. 7, 8 and 9, a further feature is provided in the method step carried out by the reshaping dies. It will be seen that die member 26 has a forwardly projecting foot portion 40, which is adapted to slide beneath the lower surface 42 of the die member 28, as the dies are brought into engagement. Further, as best shown in FIG. 8, it will be seen that the die ledge or foot 40 may be provided with arcuate or curved recesses 44 and 46 at the end of die cavities 18a and 20a, whereas die member 28 is provided with a pair of complementary projections 48 and 50 at the ends of die cavities 18b and 20b, projection 48 being adapted to slide within recess 44, and projection 50 being adapted to slide within recess 46, as will be understood.

It will be seen that by reason of the shaping and shearing action thus provided by the die recesses 44 and 46, and the corresponding cooperative projections 48 and 50, a predetermined arcuate or curved smooth shaping is provided to the extreme tip ends of the tines whereby to provide smooth oval tips to the ends of the staple, avoiding sharp points upon all of the staple tine surfaces. It will be seen that the original diagonal severances 12 impart a general oval shaping to the tapered tine ends, and this oval shaping may be preserved and/or modified, by the action of the cooperative die members 26 and 28.

It will thus be seen that the objects of the invention are provided, viz, a staple is formed which has symmetrical, similarly shaped tine ends. The tine ends are of general oval shape, and the extreme ends of the tines are of predetermined arcuate or smooth curvature, avoiding sharp points and their incident disadvantages to the hands and gloves of the user. The staple thus provided is easier to drive, minimizes splitting of the workpiece, and has improved holding power. During the driving operation there is no tendency for the staple to bend or twist or otherwise become distorted. The nontwisting action improves holding power. The two tines of the staple are parallel, at all points, and provided with a predetermined taper, in accordance with the angle of severance of the original wire.

In FIG. 10 the extreme ends of the tines are indicated by the reference numerals 22a and 24a.

In FIGS. 11 and 12 a method of forming is shown wherein barbs, as indicated at 60, FIG. 14, are formed on the staple tines as an incident to the tine end reshaping

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operation. To this end die member 26b is provided with recesses 62, and die member 28b is provided with recesses 64, so that as the dies are brought together the barbs 60 will be formed on the tines simultaneously with the tine end reshaping. The staple thus formed, having further increased holding power, is shown in perspective in FIG. 15, and driven into a workpiece 66 in FIG. 14.

It is obvious that various changes may be made in the preferred embodiments set forth, without departing from the spirit of the invention. The invention is accordingly not to be limited to the particular embodiments shown and described, but only as indicated in the following claims.

The invention is hereby claimed as follows:

1. The method of making a smooth tip wire staple comprising severing a wire diagonally at predetermined spaced points, shaping the wire lengths thus provided into staple form to provide a bight portion and a pair of parallel tines terminating in tine end portions, and reworking each of the tine end portions to displace the cross-section of the material thereof into out-of-round transverse cross-section with opposed symmetrical portions of identical shape diverging from work penetrating tips.

2. The method of making a wire staple as defined in claim 1 wherein the extreme tine tips are provided with a predetermined curved shaping during the tine reworking operation.

3. The method of making a wire staple as defined in claim 1 wherein barbs are formed on the tines during the tine reworking operation.

4. The method of making a wire staple as defined by claim 1, wherein the reworking of the tines is effected by a pair of cooperable complementary shaped clamping dies.

5. The method of making a wire staple as defined in claim 1, wherein the reworking of the tine end portions forms them with opposed symmetrical flat portions diverging from the tips.

6. The method of making a wire staple as defined in claim 5, wherein the reworked flat portions assume a generally oval outline with tips included in the curvature at one end thereof.

7. The method of making a wire staple as defined in claim 1, wherein the reworking of the tine end portions locates the tips substantially on the longitudinal center axis of the respective tine.

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