Oct. 31, 1933. E. H. CURTIS 1,933,317

CLINCHING WIRE NAIL

Filed Dec. 2, 1932

Fig.1.

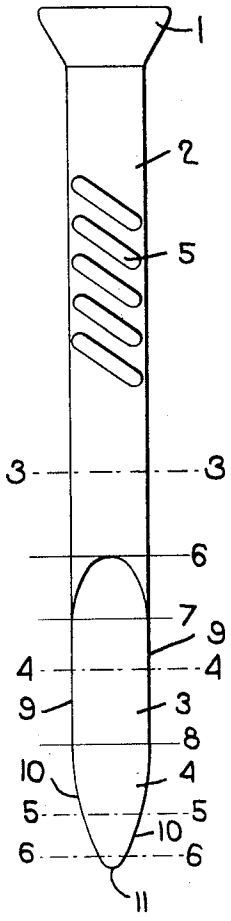


Fig.2.

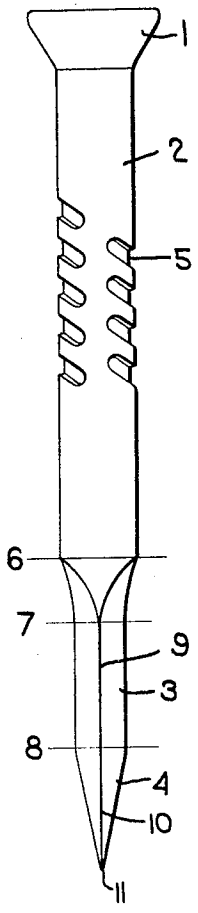




Fig.3.




Fig.4.




Fig.5.




Fig.6.

Inventor.
Edgar H. Curtis
by Heard Smith & Tennant.
Attys.

Patented Oct. 31, 1933 1,933,317

# UNITED STATES PATENT OFFICE

1,933,317

## CLINCHING WIRE NAIL

Edgar H. Curtis, Framingham Center, Mass., assignor to Charles F. Baker & Co., Inc., Boston, Mass., a corporation of Massachusetts

Application December 2, 1932. Serial No. 645,380

1 Claim. (Cl. 85—30)

This invention relates to a clinching wire nail. This type of nail, while not restricted as to size is usually of relatively small size and is chiefly employed in the making and repairing of boots, shoes and similar articles. Such nails are largely used by cobblers and driven into position by a hammer.

The object of the invention is to provide such a nail which may be easily stuck into the leather or other material by hand to position it preparatory to driving in with the hammer.

A further object of the invention is to provide such a nail that will act as it is driven into leather or other fibrous material with minimum injury thereto. The nail of this invention when it is driven in insinuates itself with a gradual crowding or forcing apart of the fibres and with a minimum of fibre destruction or breakage.

The invention has for its futher object to provide such a nail in which a sharp point and penetrating tip are backed up by the metal of the nail to the full extent required to enable the nail to be driven through the material without deflection from its course and without bending of the penetrating tip or the clinching shank until the penetrating tip comes into engagement with a clinching surface.

The invention has for its further object to provide such a nail which may be readily and economically shaped by the action of a pair of cooperating dies.

These and other objects and features of the invention will more fully appear from the following description and drawing and will be particularly pointed out in the claim.

The drawing shows a clinching nail embodying the invention. The drawing is much enlarged and shows, in fact, the dimensions of an ordinary size nail embodying the invention multiplied ten times.

In the drawing:

Fig. 1 is a view looking at one side of the nail.

Fig. 2 is a view at right angles to Fig. 1 or looking at one edge of the needle.

Figs. 3, 4, 5, and 6 are cross sections taken, respectively, on the lines 3—3, 4—4, 5—5, 6—6, of Fig. 1.

The nail of this invention is of wire made of any suitable metal and comprises essentially, beside the usual head 1, three sections, namely, a main shank 2, a clinching shank 3, and a clinching and penetrating tip 4.

The main shank 2 is cylindrical and of the full diameter of the wire from which the nail is made. As customary, it is shown provided with oppositely disposed inclined corrugations 5. The cylindrical section of the main shank terminates at 6.

The clinching shank 3 extends between the lines 7 and 8 and presents two diametrically opposite sharp edges 9 substantially parallel to the longitudinal axis of the nail.

This clinching shank 3 presents throughout its length a double convex lens-shaped cross section shown in Fig. 4. The major axis of this cross section which terminates at the sharp edges 9 is consequently substantially equal to the diameter of the main shank 2 while the minor axis is also constant throughout the length of the clinching shank, thereby rendering the cross section of the clinching shank constant throughout its length. The main shank 2 merges symmetrically and gradually into the clinching shank as illustrated between the lines 6 and 7.

The clinching and penetrating tip extends from the line 8 to the end of the nail and the main shank merges into the clinching and penetrating tip, as illustrated. This tip has oppositely disposed sharp edges 10 prolonged from the sharp edges 9 of the clinching shank. These sharp edges 10 extend in similar oppositely and diametrically opposed smooth convex curves converging to a terminal point 11. The cross section of the clinching and penetrating tip is, throughout its length, also double convex lens-shaped, as shown in Figs. 5 and 6. But, as will be observed from Figs. 1 and 2, the major axis of this cross section decreases with the convergence of the curvature of the sharp edges 10, while the minor axis decreases from the same length as the minor axis of the clinching shank 3 to a point and the rate of decrease of the minor axis is in direct proportion to the distance of the cross section from the terminal point 11 so that viewing the nail edgewise as in Fig. 2, the boundaries of the tip extend in straight lines from the clinching section 3 to the point 11.

The result of the construction of main shank, clinching shank, and clinching and penetrating tip thus illustrated and described is to produce what may be regarded as a theoretically perfect nail for the intended purpose. It will be observed that the entire portion of the nail below the main shank adapts itself readily and economically to formation by the action of two opposed dies.

The nail at its penetrating end is theoretically a point and is very readily pressed into the leather by hand sufficiently to enable it to retain

its position until struck by the hammer. But it will be observed that immediately the point 4 enters the leather or other material, it has a three-fold wedge action, first, the surfaces of this tip 4 exert a wedging action in the direction of the length of the nail and, secondly and thirdly, the convex surfaces extending away from each edge 10 exert a wedging action toward the longitudinal axis of the nail. These three wedging actions take place simultaneously. This construction not only enables the extreme end of the tip readily to be pushed into the material by hand, but it also enables the nail readily to be driven through the material by the hammer or other driving implement.

This construction is further peculiarly adapted to an efficient penetrating action under hammer blows. The hammer blow upon the nail exerts, when the size of the nail is compared with the energy imparted by the blow to the head of the nail, a very great pressure tending to force the sharp edges 10 into the material. Whenever great pressure is exerted to force a cutting edge into material, it follows that the cutting edge must be backed up by a correspondingly great increase in the rear of the cutting edge of the metal of the tool. This principle is observed in the nail of this invention in that the metal of the nail increases from the sharp edges 10 and the terminal point 11 toward the center of the nail to that extent required to enable the nail to be driven with any required blow into leather or other material for which the nail is employed.

It will also be observed that the clinching and penetrating tip 4 is of a peculiar shape which readily insinuates itself into fibrous material, crowding the fibres apart with a minimum of injury thereto.

The clinching function of the nail is primarily taken by the clinching shank 3 which, by reason of its shape, ensures that when the nail is clinched, it will bend in the direction of the minor axis of its cross section.

The clinching and penetrating tip may also be employed for the clinching function. For example, in attaching heels, such as rubber heels, the nails may be selected of such length that when driven through the heel and into engagement with the clinching surface the tip portion 4 only will be bent over and clinched. This will be sufficient to hold the heels in place, while at the same time it allows the ready removal of the worn heel without injury to the body of the shoe.

The invention thus presents a very simply, theoretically and practically efficient clinching wire nail.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

A clinching wire nail characterized by a cylindrical main shank merging symmetrically and gradually into a clinching shank having two diametrically opposite sharp edges substantially parallel to the longitudinal axis of the nail and presenting throughout its length a double convex lens-shaped cross section, the major axis of which is substantially equal to the diameter of the main shank, the minor axis being constant also throughout the length of the clinching shank, thereby rendering the cross section of the clinching shank constant throughout its length, the said clinching shank merging into a clinching and penetrating tip having sharp edges prolonged from the clinching shank edges in similar oppositely and diametrically opposed smooth convex curves converging to a terminal point and presenting throughout its length a double convex lens-shaped cross section, the major axis of which decreases with the convergence of the said edges and the minor axis of which decreases from that of the clinching shank to a point and in direct proportion to its distance from the terminal point.

EDGAR H. CURTIS.