

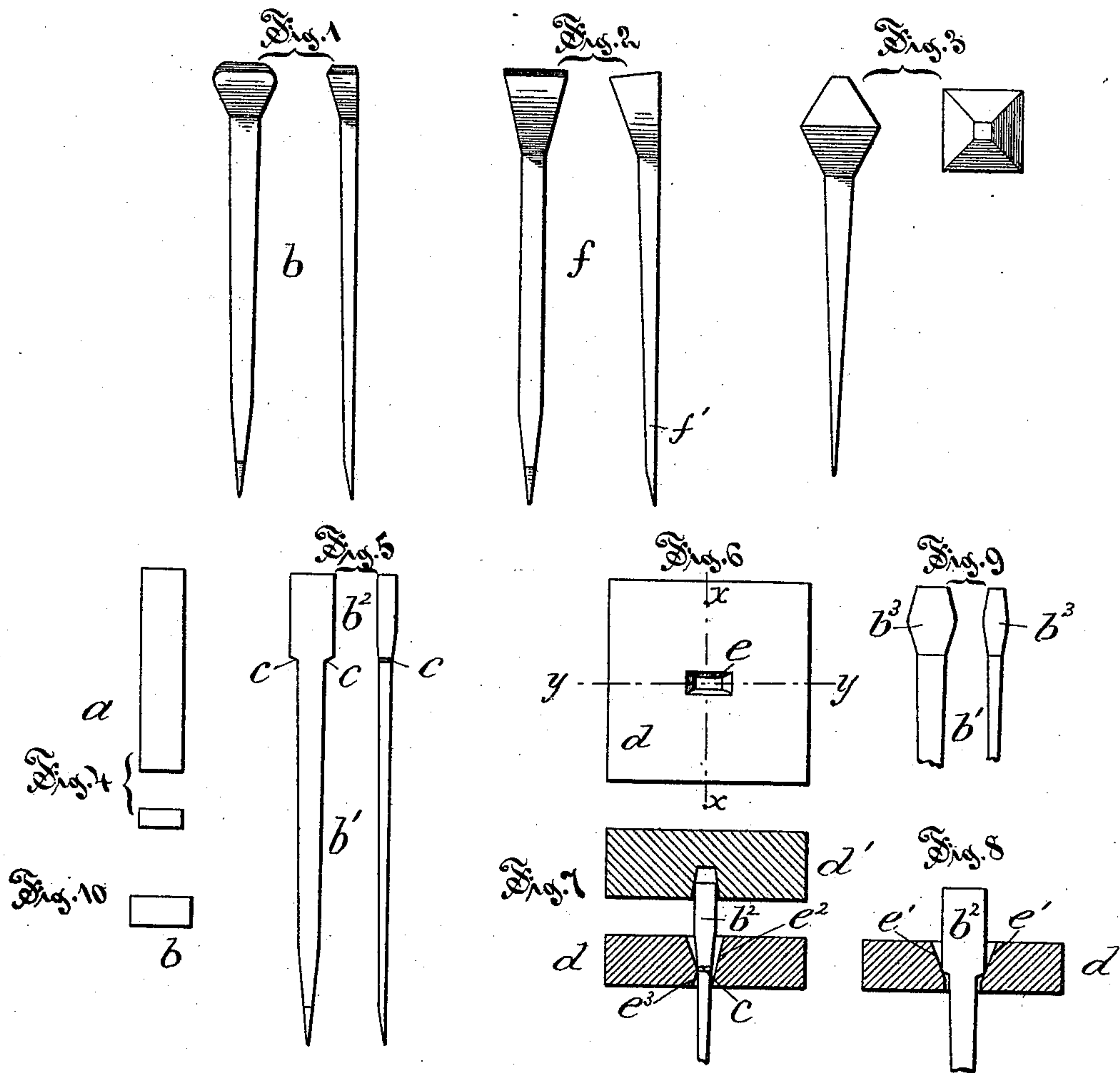
(No Model.)

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G. J. CAPEWELL.
MANUFACTURE OF HORSESHOE NAILS.

No. 351,573.

Patented Oct. 26, 1886.



Witnesses:

W. M. Yorkman,
A. R. Williams,

Inventor:

George J. Capewell,
by Simonds & Burdett,
Attys.

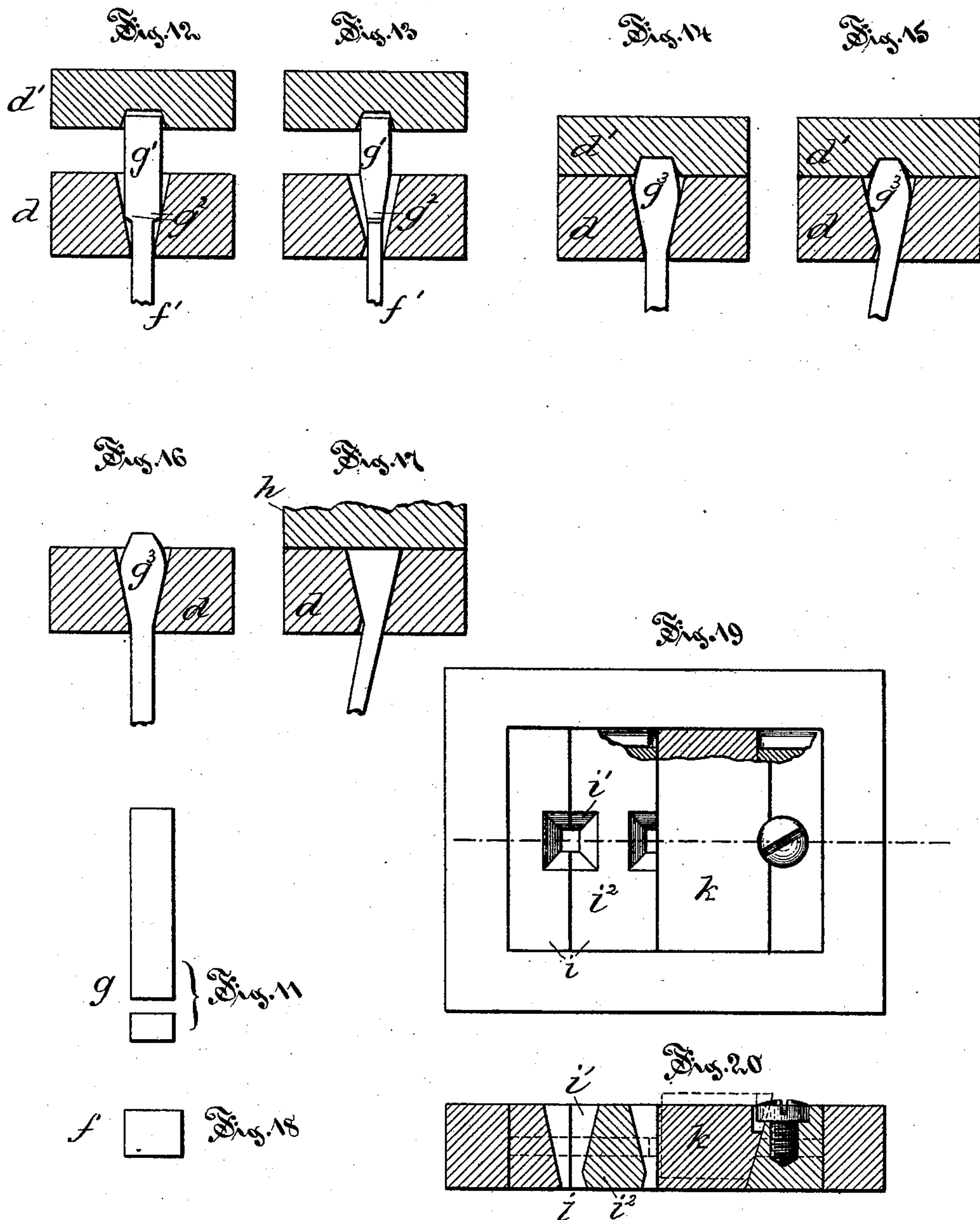
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UNITED STATES PATENT OFFICE.

GEORGE J. CAPEWELL, OF CHESHIRE, CONNECTICUT.

MANUFACTURE OF HORSESHOE-NAILS.

SPECIFICATION forming part of Letters Patent No. 351,573, dated October 26, 1886.

Application filed July 6, 1886. Serial No. 207,255. (No model.)

To all whom it may concern:

Be it known that I, GEORGE J. CAPEWELL, of Cheshire, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in the Manufacture of Nails, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My improvements relate, more particularly, to horseshoe-nails and devices for and methods of making them from cold stock, and my object is to make such nails with any desired size of head from nail wire or stock of relatively small cross-section.

The horseshoe-nails in common use in Europe have, as compared with the shanks, very large heads, of peculiar shape, that, prior to my improvements, have practically limited their making to hand-work or necessitated the heating of the stock when machines are used.

My improvements, which enable me to use cold stock and greatly increase the product of machines for any given time, as well as to perfect the product in point of strength and durability, consist in forming the nail-shank on a blank of suitable size, then swelling the head-section of the blank laterally in dies, and then completing the head-forming by successive blows or pressure in dies of the required shape; in the blank with an abrupt shoulder where the shank terminates, and in the method of heading such a blank in a die having a socket with walls of a less slope than the shoulder has, as referred to the axis of the blank, and in details of the several dies and blanks, and of the methods employed in heading the nails, as more particularly hereinafter described, and pointed out in the claims.

Referring to the drawings, Figure 1 shows in front and edge view a horseshoe-nail of the type in common use in the United States. Fig. 2 shows in front and edge view a nail of the kind used in England. Fig. 3 shows in front and top view a horseshoe-nail of the kind in use in France and other parts of Europe. Fig. 4 shows in plan and end view a blank for making the nail shown in Fig. 1. Fig. 5 shows in plan and edge view the blank with the nail-shank formed. Fig. 6 is a top or plan view of the lower heading-die. Fig. 7 is a view in central vertical section, on plane denoted by line

xx in Fig. 6, through the lower heading-die and one form of the upper die. Fig. 8 shows the lower die in vertical cross-section on plane denoted by line yy of Fig. 6. Fig. 9 shows in front and edge view the head part of the nail-blanks in the first stage of the operation of forming the head. Fig. 10 is a top view of the finished head made from the blank shown in Fig. 4. Fig. 11 shows in plan and edge view the blank suitable for making the size of nail-head shown in Fig. 2. Fig. 12 is a view in central vertical section through the lower heading-die, showing the blank flatwise in place in the die. Fig. 13 is a view through the heading-die in section on a plane at right angles to the section shown in Fig. 12, showing the blank edgewise in the die. Fig. 14 is a view in central section of the heading-dies, showing the blank edgewise in the dies. Fig. 15 is a similar view in section of the heading-dies, showing the blank flatwise. Fig. 16 is a view in section of the lower heading-die, showing the blank for the operation of the first set of dies. Fig. 17 is a view in vertical central section of the heading-dies, showing the nail-blank in an advanced stage in the operation of making the head. Fig. 18 is a plan view of the top of the head of the nail shown in Fig. 2. Fig. 19 is a plan view of a sectional form of lower heading-die. Fig. 20 is a view in vertical section of the same.

In the accompanying drawings, the letter a denotes a nail-blank, which is an oblong piece of metal cut usually from a long rod or wire of stock that is rectangular in cross-section. This blank is of suitable size from which to make the nail b , (illustrated in Fig. 1 of the drawings,) and in the practice of my invention the shank b' is first formed from the blank by means of dies that operate on the blank without preliminary heating. This shank may, however, be formed in any desirable and ordinary manner, the head-section b'' of the blank being left substantially of the dimensions illustrated in Fig. 5. Looking at the nail-blank edgewise, the taper is gradual on the opposite sides from the head-section into the shank-section, while on the edges of the blank are formed the abrupt shoulders c , where the head-section merges into the shank-section of the nail-blank. It is with the operations or steps in forming the head to which the blank is subjected from

this stage to the final stage that my invention particularly relates, and in forming the head I make use first of the heading-dies d d' . The heading-die d has a socket, e , tapering from its broader opening in the upper face of the die to the narrower portion on the reverse side of the die. This socket has on the two sides e' a substantially straight taper from the upper to the lower surface of the die, although both sides are relieved slightly near the bottom of the die, while on one of the remaining sides the lower portion, e^3 , is cut away at an angle with the upper part of the sloping surface on a plane more nearly conforming to the slope of the opposite side, e^2 , which is an even slope from top to bottom. In compressing the oblong head-section of the blank to the requisite final shape of the head, there is danger of crippling this section in the first blow struck upon it by the heading-dies in old processes; and this is particularly the case when this head-section b^2 is made so long as to provide a sufficient mass of stock to form a large head. It is this crippling of the stock in the head-section that I effectually prevent by placing the nail-blank in the heading-dies with the shoulders c resting against the opposite and regular sloping sides of the socket, as shown in Fig. 8 of the drawings, the blank standing erect in the die, and in this position striking it with a cupped die, d' , the form of the cup or recess in this die d' being governed by the size of stock from which the head is to be formed.

The result of the operation of the cupped die upon the nail-blank, as described, is to swell the head-section at about its central portion, b^3 , as shown in Fig. 9, and thus form a brace against bending or crippling at this part, if it is desirable to finish the head by striking the blank a further blow endwise with a flat or other die while it is held in the lower die.

The function of the shoulders c on the nail-blank is to support it in the socket e in the die d by the contact of the outer edge of such shoulders with the sloping sides e' of the socket, the effect being that when the head-section of the blank is compressed lengthwise by a blow or pressure in the dies the blank will not be pushed far enough into the socket to cause it to jam, the angular shape of the shoulders at the parts in contact with the sides of the socket providing sufficient resistance to inward movement of the blank to cause the head-section to be compressed lengthwise and yet leave the blank so loosely held in the die that it may be readily pushed out when required. If it were not for the resistance to inward motion thus offered by this peculiar construction of the relative parts of the socket in the die and the blank, the latter would be pushed so far through the die as to prevent or greatly obstruct its removal, except with extreme difficulty, from any heading-socket in a solid die of the kind denoted by the letter d .

The head of the nail b may be finished while the blank is still held in the socket e by means of a flat die, that causes the head-section to fill out into the socket and conform substantially in shape with it. This final forming of the head causes the blank, that until this time has stood substantially erect in the socket, to tip over toward the side e^2 in the socket and the shank to project at a corresponding angle with the lower face of the die. This makes one side of the head conform substantially to the plane of the back of the nail while the opposite side stands at the proper slope to the front of the nail, the top of the head sloping downward slightly from the plane of the back of the nail, or beveled. The degree of this latter slope or bevel of course depends upon the relative thickness of the head, and in the case of the nail of the type shown at b will be very slight. The nail after the head is thus finished is easily pushed out from the sockets in the die.

In making a nail, f , with a proportionally large head the blank g , which is usually cut from a wire or rod of stock that is rectangular in cross-section, as in the other case, is used. After forming a shank, f' , by any ordinary and convenient process the blank is pressed in a die, d , the socket in which is proportionately larger than the socket used in making the nail b in about the ratio by which the head of the nail f exceeds the head of the nail b . The head-section g' of this blank is subjected to the action of the cupped die and the socketed die to produce the peculiar swell g^3 , (see Fig. 16,) a result precisely the same as that produced in the operation already described with relation to the head of the nail b , the shoulders g^2 on the blank g having precisely the same function as in the case of the other nail. The nail-head may be subjected to the operation of a number of dies having cups or recesses of various shapes prior to the final blow with a flat die, h , the blank remaining meanwhile in the socket in the die d . The effect of the final blow tips the nail-blank to one side, as in the case already described, so that the shank projects at an angle from the lower side of the die, as shown in Fig. 17, the bevel or angular slope of the upper side of the die with relation to the back of the nail being, in the case of the head of the nail f , as shown in Fig. 2, quite considerable.

When it is desired to make a nail of the shape composed of frustums of pyramids joined at their bases, of the type shown in Fig. 3, the blank is of course subjected to the action of a flat finishing-die, but the head is left in one of the intermediate stages substantially in the condition shown in Fig. 16 of the drawings.

The relative area in cross-section of the nail-blank and the finished nail-head is shown in one instance in Figs. 4 and 10, and in the other in Figs. 11 and 18.

In order to form a comparatively large head,

it was formerly necessary to use a nail-stock of an area in cross-section almost equal to that of the head in its largest part, and to draw the nail-shank down from this large stock. This
 5 was impossible unless the stock was heated, and a process that involves this heating of the blanks is objectionable, for reasons bearing not only on the time taken, and on the large number of steps in the process, but also on the
 10 quality of the finished article—points unfavorable to this process as compared with my process, in which the stock has no preliminary heating.

By means of my improvement in the method
 15 of making the heads, stock of proper size to be drawn down into a shank without unfavorably affecting the tenacity and cohesion of the fibers of the metal may be used, and although this requires a relatively long head-section to
 20 be left, yet such a head-section is by my process and devices thoroughly and exactly compressed while unheated to the desired shape and size, gaining in such process extreme compactness, density, and wearing qualities.

25 Instead of making use of the peculiar resisting shoulders on the blank, a sectional die, i , divided in a plane lengthwise of the head, may be used, the plane of the section passing through the socket i' . By backing up one die
 30 part by the body of the block and the opposite die part or section by means of a sliding wedge, k , provision is made for the ready removal of a nail-blank from the socket after the head has been formed. In the form of
 35 sectional die shown the movable part i^2 is held in the die-block by splines taking into grooves in the edges of the block. The wedge moves in and out of its socket in a plane at substantially right angles to the face of the dies, and
 40 it may be moved by spring-actuated plungers

that, just before the heading-die strikes, come in contact with the wedge and force the wedge in and the die parts together. The wedge may be pushed out by any convenient device. These several dies are of course intended and
 45 are adapted for use in an automatic nail-making machine, and such a machine forms the subject-matter of an application for a patent to be shortly filed by me.

I claim as my invention—

1. The process or method of forming nail-heads, that consists in compressing the shouldered head-section endwise between socketed dies, one of which supports the blank by the shoulders and the other engages the outer end
 55 of the blank, all substantially as described.

2. In making nails, the method of preventing the jamming of the nail-blank in the socket, which consists in forming on the lower end of the head-section of the blank shoulders
 60 with greater angle of slope, as referred to the axis of the blank, than the supporting-walls of the socket in the die, all substantially as described.

3. The nail-forming die d , having a socket, e , with the regular sloping wall e^2 , and an opposed wall, e^3 , of irregular slope, whereby a nail-blank is tipped sidewise in completing a head formed in the die, all substantially as described.

4. An improvement in the method or process of beveling the head of a nail in dies,
 70 which consists in supporting the nail-blank in a die with a socket having one wall of regular slope and the opposite wall of irregular slope, all substantially as described.

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Witnesses:

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 H. R. WILLIAMS.