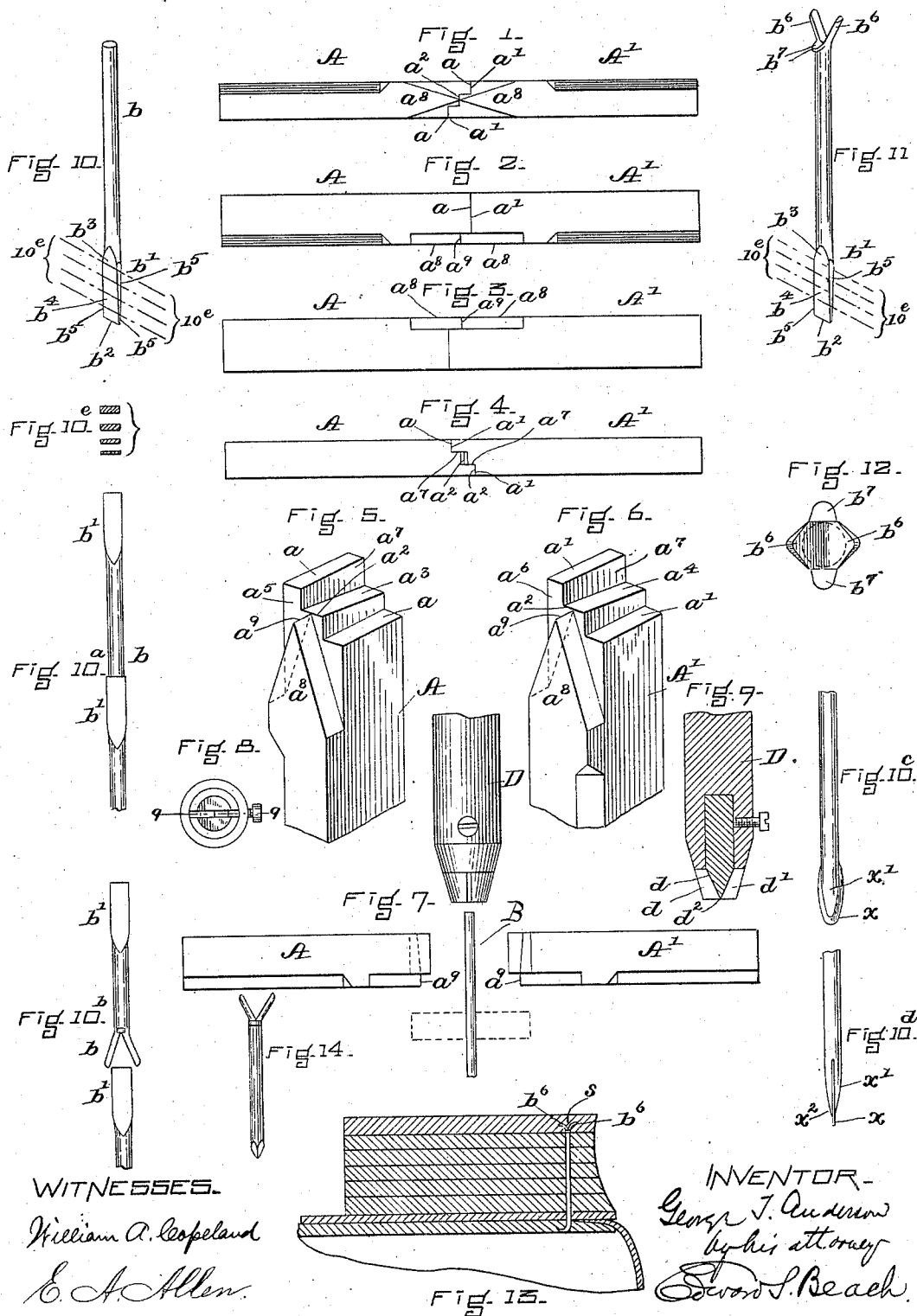


G. T. ANDERSON.
NAIL FORMING DIE.

Patented Jan. 19, 1897.



UNITED STATES PATENT OFFICE.

GEORGE T. ANDERSON, OF BOSTON, MASSACHUSETTS.

NAIL-FORMING DIE.

SPECIFICATION forming part of Letters Patent No. 575,316, dated January 19, 1897.

Application filed March 9, 1896. Serial No. 582,329. (No model.)

To all whom it may concern:

Be it known that I, GEORGE T. ANDERSON, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Nail-Forming Dies, of which the following is a specification.

Referring to the accompanying drawings, Figure 1 is a front view of reciprocal dies which simultaneously form without waste the point end of one nail-section and the head end of a preceding nail; and Figs. 2, 3, and 4 are respectively a top, a bottom, and a rear view of the dies. Figs. 5 and 6 are views of the working faces of the dies. Figs. 5 and 6 are greatly enlarged for greater clearness. Fig. 7 is a top plan view of the point-end and head-end forming dies with a head-end-finishing die in operative position in relation to the point-end and head forming dies. In this view dotted lines indicate the well-known wire clamps of an organized wire-nail machine, such, for example, as the Perkins machine. Fig. 8 is an end view of the head-end-finishing die, and Fig. 9 is a sectional view of the same at line 9 9 of Fig. 8. Fig. 10 is a perspective view, on a large scale, of my new nail in its simplest form, that is, a headless nail with a chisel-point. Figs. 10^a, 10^b, 10^c, 10^d, and 10^e show details of nails. Fig. 11 is a perspective view, on a large scale, showing a head comprising self-clenching spurs and an arresting-wing near the base thereof. The preferred chisel-point is shown in this figure. Fig. 12 is a top plan view of a self-clenching winged nail enlarged. Fig. 13 shows one of my new nails self-clenching in stock forced or spanked on the spur-headed and winged nail. Fig. 14 shows a modification.

The main objects of my invention are, first, to produce nails from a nail-forming wire without waste of stock by simultaneously compressing and severing the wire to form simultaneously the point end of one nail and the head end of another; second, to produce from a nail-forming wire without waste of stock a sharp-pointed wire nail having an automatically-clenching stock-receiving head, and, third, to produce from a nail-forming wire without waste of stock a sharp-pointed wire nail having arresting-wings intermediate its extremities and contiguous to said wings an automatically-clenching head. These are

the principal objects that I have studied to accomplish; and my invention consists in the combination of a pair of dies which simultaneously compress a nail-forming wire to form a nail-point and sever the wire to complete the point of one nail and slit the head end of another and form arresting-wings, all without waste of stock, and also in the aforesaid combination when it includes a reciprocating wing-forming die.

In the drawings illustrating my invention in the best way known to me, A A' are complementary dies which, being actuated in a manner too well known to those skilled in the art to require particular description, simultaneously operate on the intermittently-fed nail-forming wire B to simultaneously form the head end *b* of one nail and the contiguous point end *b'* of the succeeding nail-forming portion of the wire. (See Figs. 10^a and 10^b.) Point end *b'* is formed wholly by compression, except at the very tip or true point *b*², where the compressed point or tip is severed from the preceding head end *b* at the completion of the approachment of the dies A A'. That is to say, all the metal of each point-forming portion of the stock is condensed by die-pressure therearound without the formation of the fins as heretofore.

Nails of this class have been formed heretofore by compression of the stock at the point-forming end in such wise as to produce fins or waste that had to be subsequently cut or broken off. In manufacturing heretofore on any fair scale the daily waste of stock has amounted to several hundred pounds, and this waste has not been by any means the only serious objection to the mode of manufacturing heretofore practiced, for owing to variations in quality or condition of stock or in the action of the point-forming dies the fin-like projections (see *x* in Fig. 10^e) have been of varying extent and thickness, and when too strong to break off nicely, the nails retaining the waste or fragments thereof, have been a waste product themselves. As shown in Fig. 10^d, the points *x'* have been heretofore formed by compression on two opposite sides only of the nail-forming wire, the fins *x* being formed at the acute or very nearly acute side edges *x*² (see Fig. 10^d) of the point end.

In accordance with my invention the die-

faces operate wholly around the wire and so compress and condense the metal wholly around the wire to form the point end, which is preferably parallelogrammatic in cross-section at all points from the inner portion b^3 of the point end b' to the tip or true point b^2 , as shown by the successive cross-sections on a descending scale in Fig. 10^a, these cross-sections being taken at the corresponding lines of Figs. 10 and 11, showing the tapering point end b' with its two broad inclined sides b^4 and narrow inclined edges b^5 . This new wire nail, having a point end wholly formed in dies which compress and condense the stock thereat, has a perfectly smooth and sharp point end that easily penetrates the toughest stock, and the stock being compacted and condensed equally around the lengthwise axis of the nail, as is the case, the nail not only pierces easily, but drives straight; and if the nail-point is given, as I prefer, the particular cross-sectional configuration described its driving qualities are absolutely perfect, so far as I have been able to detect, but for some uses a nail-point of somewhat different cross-sectional configuration will suffice. In the simplest form the head end b is flat, the dies severing the wire at the tip b^2 straight across the wire at right angles to the longitudinal axis of the wire. (See Fig. 10^a.)

To accomplish the foregoing results, dies A A' are formed with reciprocal bearing-surfaces or stop-walls a a' a' on opposite sides of the point forming and severing walls a^2 of the dies. The faces of the dies between the walls a and a' are formed with divergent reciprocal inclines a^3 a^4 , extending from edge to edge of the die-faces in the direction of the wire B. At the tip-forming edges a^2 of the dies these inclines a^3 a^4 meet to form cutting edges for severing the wire at the junction of a true point or tip b^2 with a head end b of another nail. The inclines a^3 a^4 compress and condense the wire at opposite sides to form the broad inclined sides b^4 b^4 . To simultaneously condense and compact the wire to form the narrow inclined edges b^5 b^5 , the bearing-walls or stop-surfaces a a' of die A are in different transverse planes of the die, and so also the corresponding walls of a' a' of the die A' are in different transverse planes of die A'. Consequently one bearing-wall of die A or die A' is above or forward of its incline a^2 , while the other bearing-wall of that die is below or behind that incline. When the dies complete approachment by contact of opposed stop-walls a and a' (the front cutting edges a^2 , formed by the angularity of the opposed divergent inclines a^3 a^4 with the side walls a^3 a^6 of the dies, being then in contact,) the walls a^7 of the dies A and A' are by or across the wire and form the narrow edges b^5 b^5 .

All the reciprocal walls of the die-faces fit nicely and the point-end-forming portion of the wire is wholly encompassed, so that no fin is formed, the metal being wholly saved by condensation of its molecules. However,

this condensation is but slight when the nail-point has the preferred form—opposite broad inclined faces a little wider than the diameter of the shank, which is left round in cross-section. The preferred point edge is a wedge shape, as appears from the foregoing, and consequently is peculiarly adapted to penetrate tough stock. The wedge-point end cuts a path for the round shank, which, on entering the channel formed by the wedge-shaped point end, changes the shape of the hole from a slit to a round and fits and fills the hole thus formed.

Dies A A' are provided, in case it is desired to split the head end b of the nail severed by the tip-cutting edges a^2 , with cutters a^8 , one on each die. The cutting or splitting edges or apexes a^9 of these dies are directly opposite to each other and at an angle to the tip-cutting edges a^2 , so that when the dies are brought together the head end b of a nail contiguous to the nail whose point is being formed is split to form the spurs b^6 b^6 . It is generally desirable to subsequently finish the spurs b^6 b^6 by subjecting the split head end to the auxiliary spur-forming die D, the working face of which is formed with a wedge d , that enters the space formed and left by the dies a^8 between the spurs b^6 b^6 , and with parallel side walls d' at each side of the wedge d at right angles to the cutting edge d^2 thereof. These side walls d' extend away from the edge d^2 in both directions and form spaces between opposed side walls d' and the inclines of the wedge d , in which the spurs or prongs b^6 b^6 are guided and kept from lateral deflection, while wedge d is forced inwardly to separate the prongs to the desired extent and to form arresting wings or projections b^7 b^7 .

The prongs b^6 b^6 are to receive stock forced or spanked on them after the nails have been so driven as to leave the head ends b projecting, and it is desirable that the prongs should be smooth to facilitate penetration. At the same time in many grades of my new nail the auxiliary treatment by die D may be omitted. More uniform and better working split-head-end nails are produced, nevertheless, by use of the auxiliary die D. This auxiliary die, however, has another function which is exercised when the nail is to be provided with the arresting-wings b^7 b^7 . When the die D is forced inwardly with its wedge d between the prongs b^6 b^6 , the corners of its side walls d' and face engage the edges of prongs b^6 and crowd down metal to form at the bottom of the space below the prongs the projections or spurs b^7 at diametrically opposite sides of the nail in line with the bottom of said space. These rings b^7 arrest the nail when it is driven, and as the projections or wings are of a uniform distance from the head extremity in a given-size nail uniform projection of the heads is assured, and when the head ends are split to form said prongs and stock is forced on the prongs a portion s of the stock (see Fig. 13) between the prongs

acts as a wedge to force the prongs apart as the stock is forced home, so that the prongs are automatically clenched as the stock is driven on them, as shown in Fig. 13.

5 For different sizes of nails the dies and working parts thereof will be made greater or smaller, as required.

Wire B is fed and clamped and the dies actuated by the instrumentalities familiar to
10 all skilled in the art.

In Fig. 14, showing a modification, the winged clenching-head has a different point from the preferred chisel-point.

What I claim is—

15 1. A pair of cutting-dies having reciprocal cutting edges which sever the nail from the nail-forming rod or wire; reciprocal edges which simultaneously split the head end of another nail; and reciprocal surfaces which
20 encompass the nail-forming wire peripher-

ally and compress a portion thereof peripherally to a finless-point end.

2. The combination in a nail-making machine, with a pair of reciprocating cutting-dies having reciprocal cutting edges which 25 sever the nail from the nail-forming rod or wire; reciprocal edges which simultaneously split the head end of another nail; and reciprocal surfaces which encompass the nail-forming wire peripherally and compress a 30 portion thereof peripherally to a finless-point end, of a reciprocating wing-forming die.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 29th day 35 of February, A. D. 1896.

GEORGE T. ANDERSON.

Witnesses:

EDWARD S. BEACH,
E. A. ALLEN.