(No Model.) 3 Sheets—Sheet 1.

D. E. KEMPSTER.

DIE FOR USE IN MAKING HORSESHOE NAILS.

No. 429,036. Patented May 27, 1890.

Fig. 7.

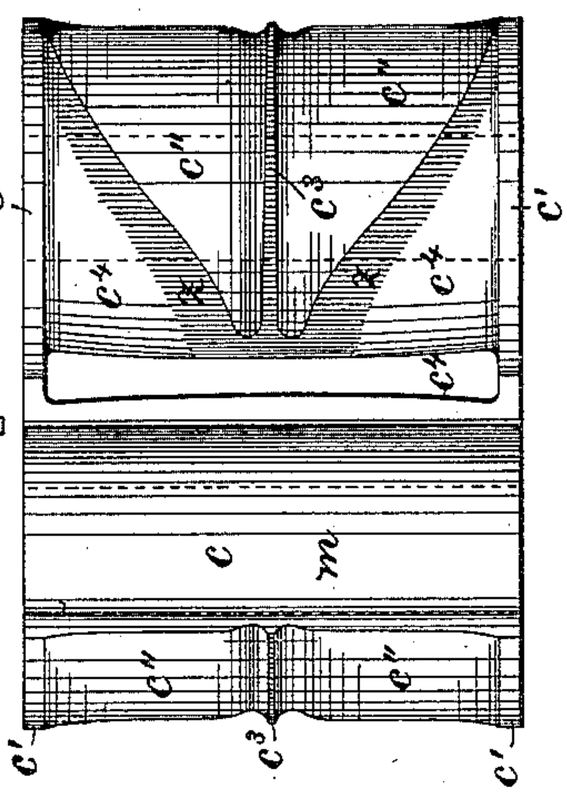


Fig. 8.

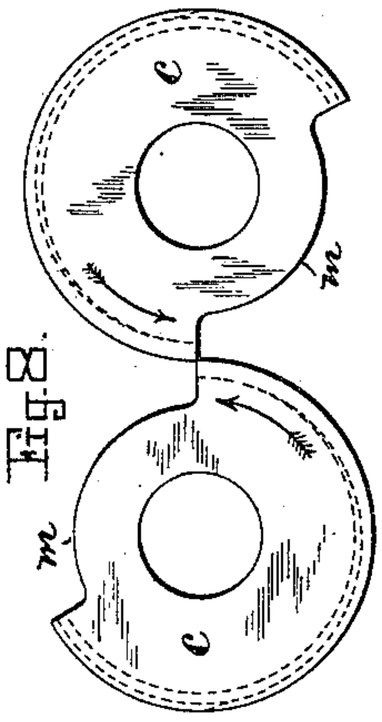


Fig. 1.

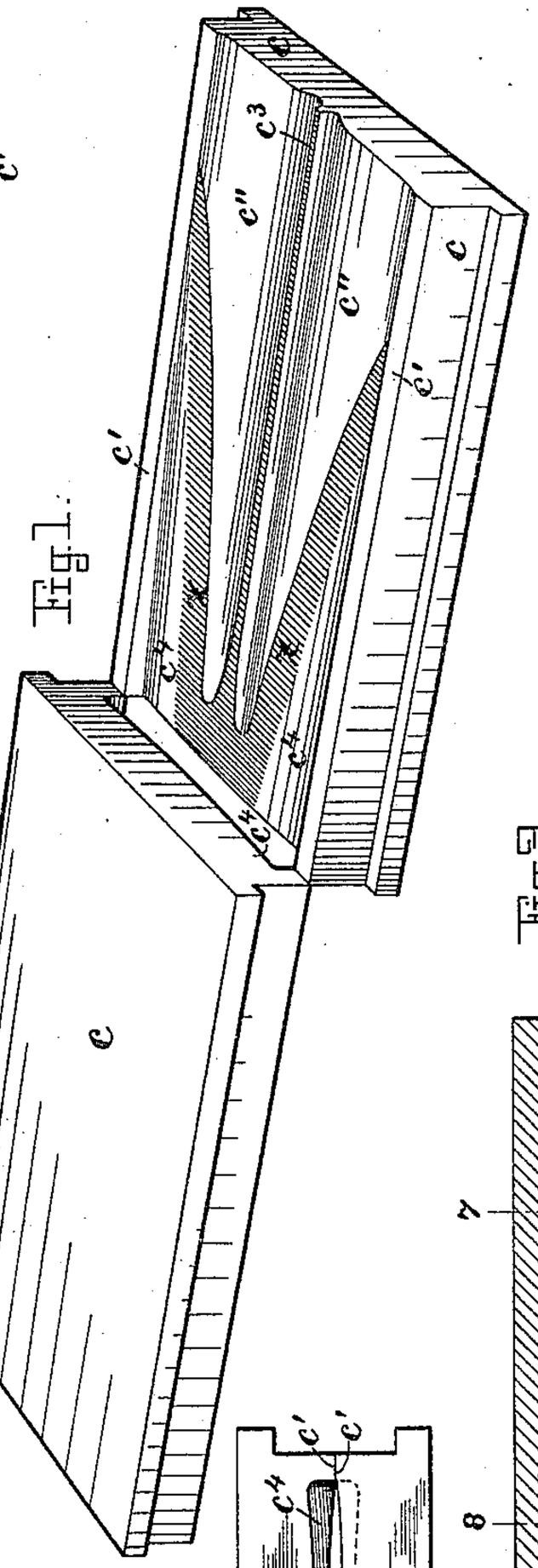


Fig. 9.

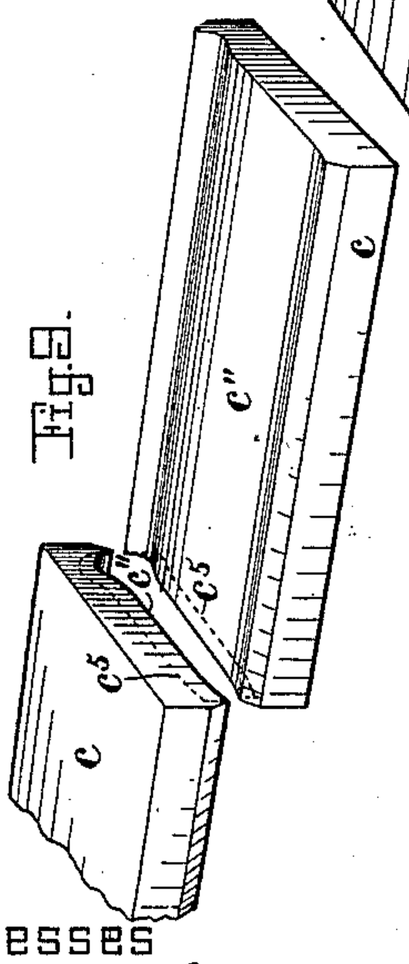


Fig. 2.

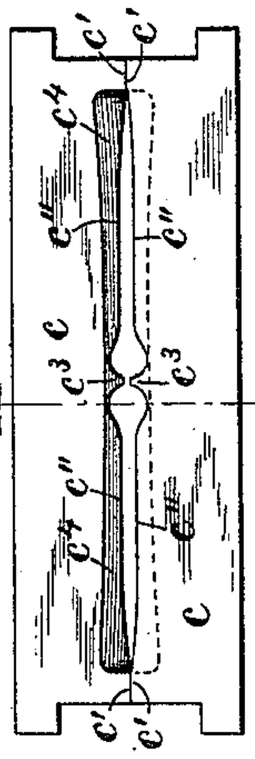


Fig. 3.

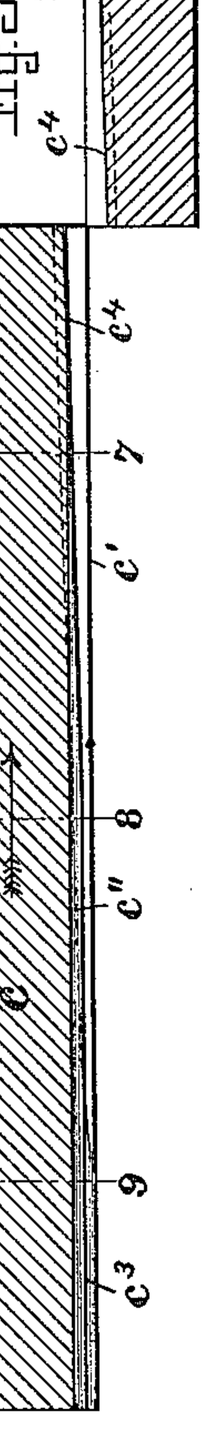


Fig. 4.

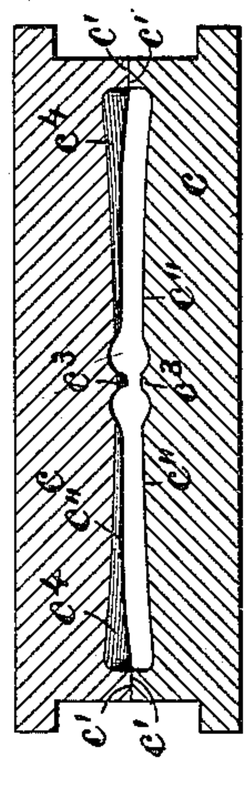


Fig. 5.

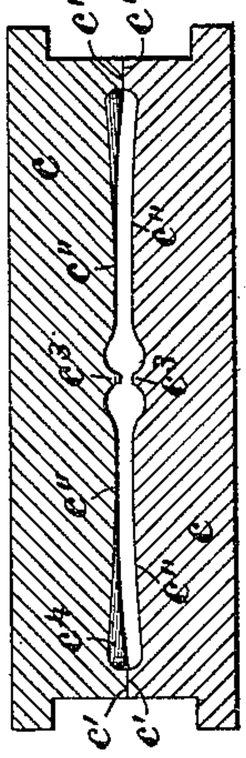
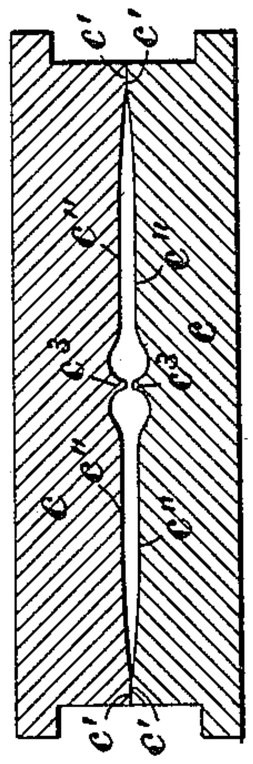


Fig. 6.



Witnesses

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M. H. Avery.

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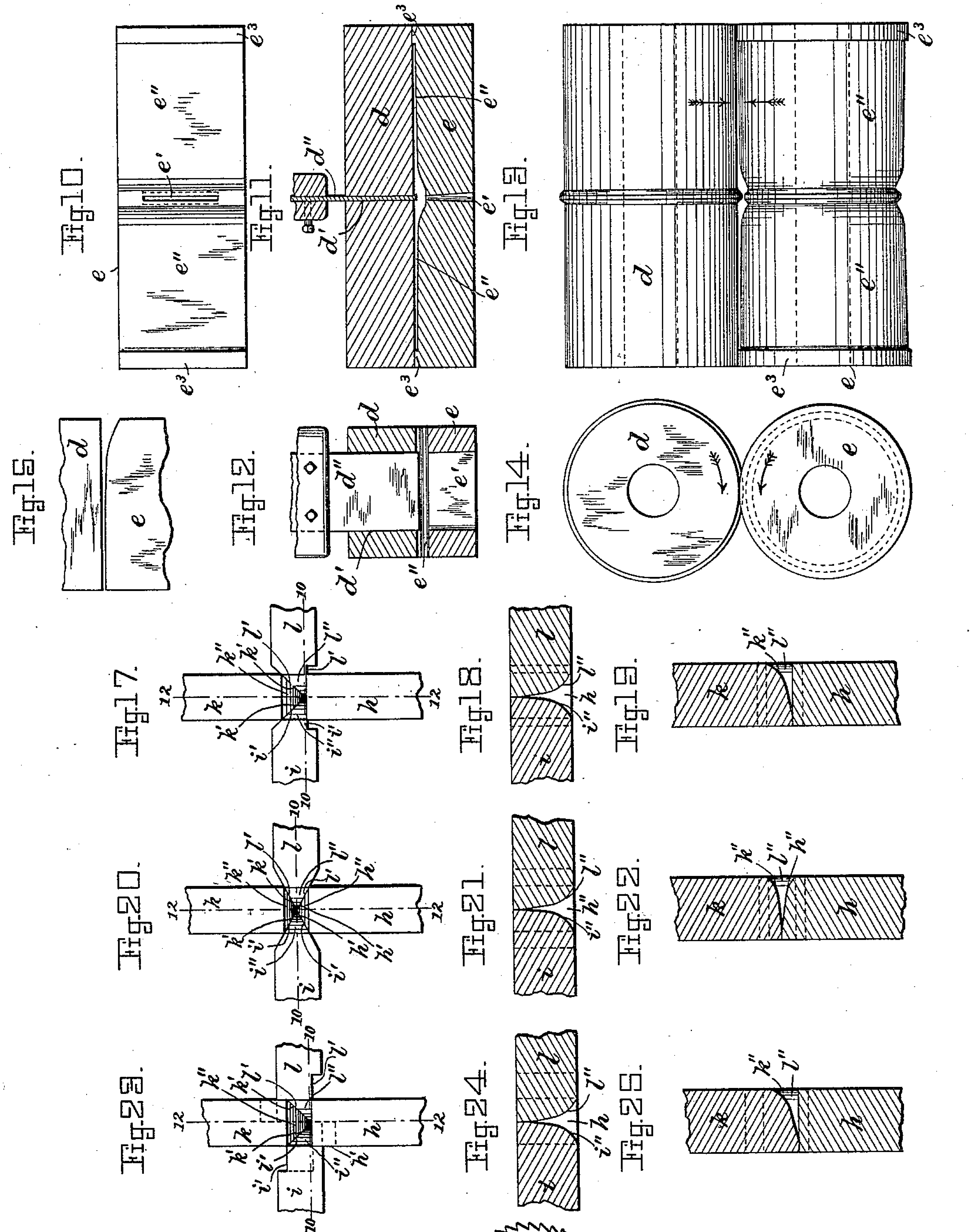
(No Model.) 3 Sheets—Sheet 2.

D. E. KEMPSTER.

DIE FOR USE IN MAKING HORSESHOE NAILS.

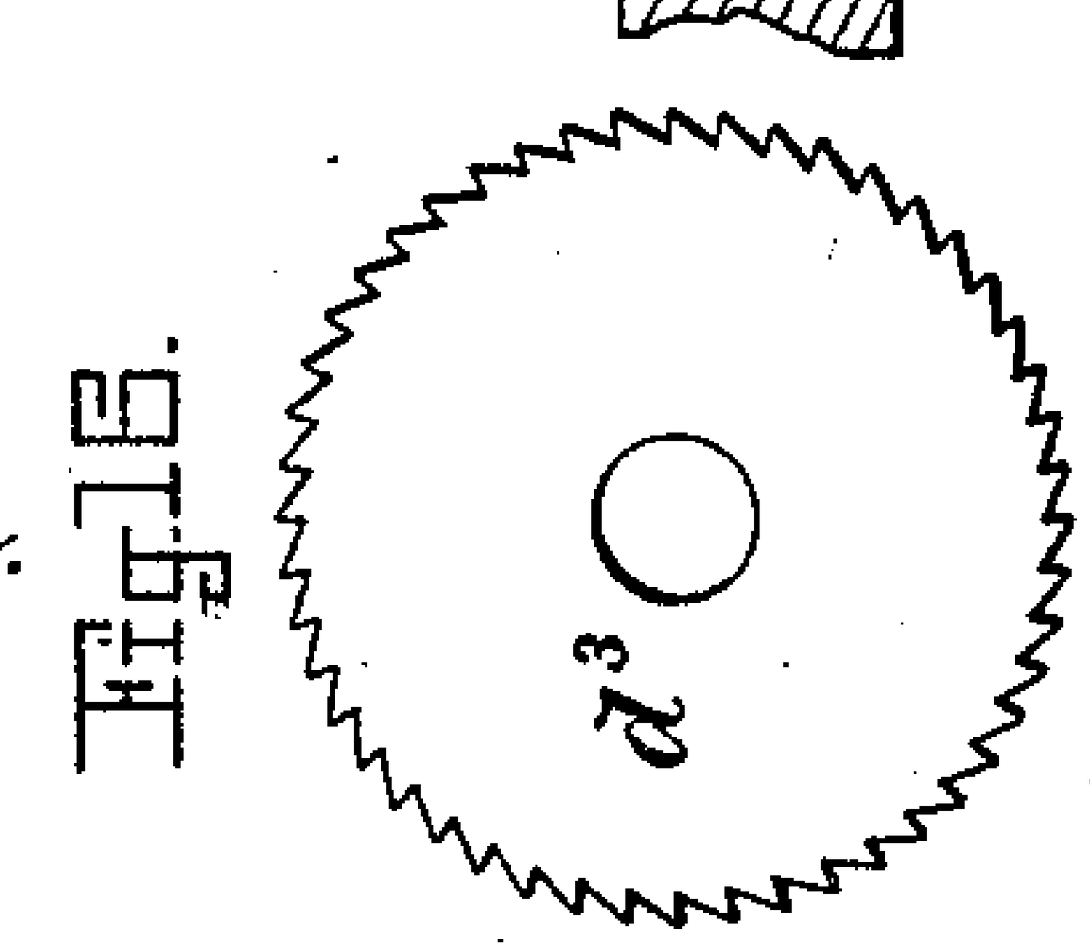
No. 429,036. Patented May 27, 1890.



Witnesses

Henry Chadbourne.

N. H. Avery.



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(No Model.) 3 Sheets—Sheet 3.

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DIE FOR USE IN MAKING HORSESHOE NAILS.

No. 429,036. Patented May 27, 1890.

Fig 27.

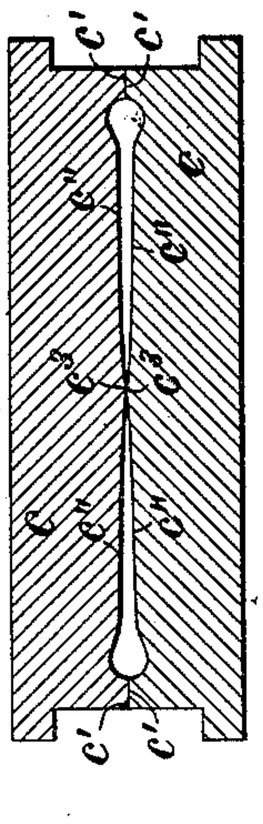


Fig 28.

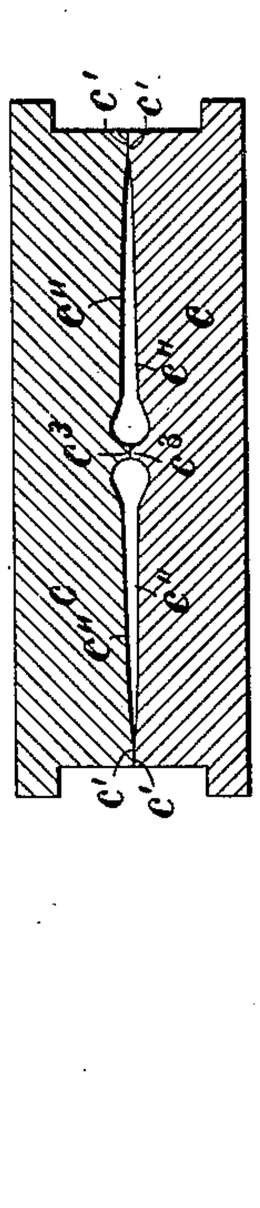


Fig 28.

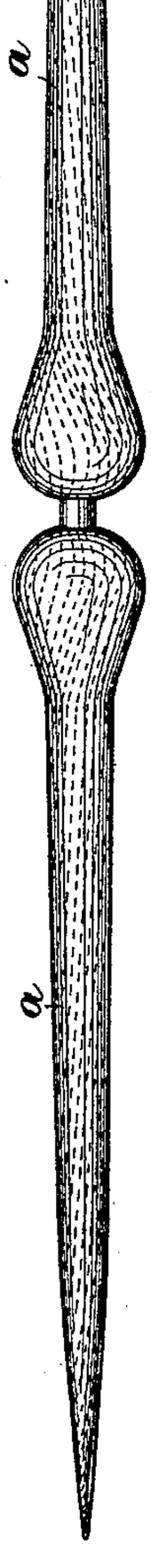


Fig 29.

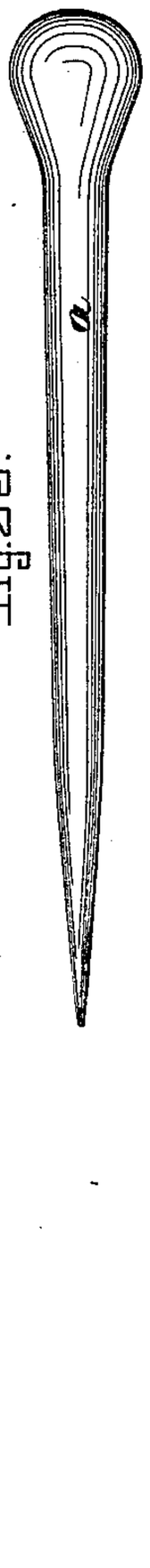


Fig 30.

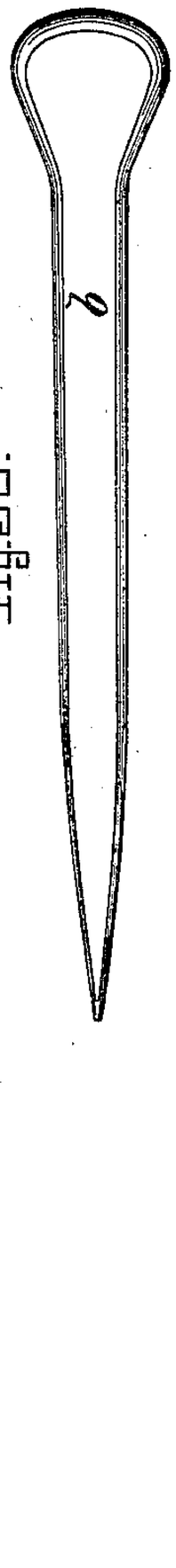


Fig 31.

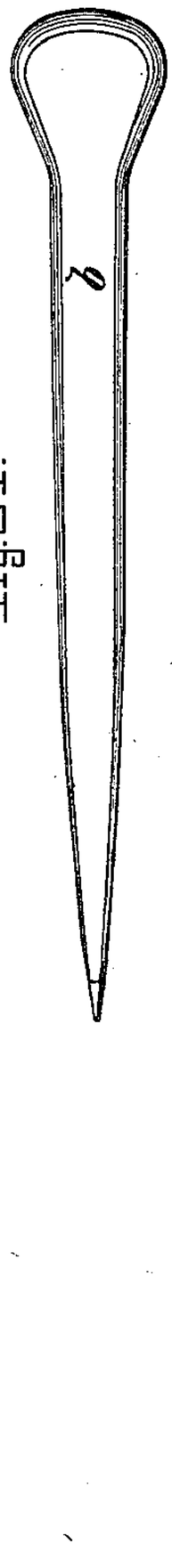
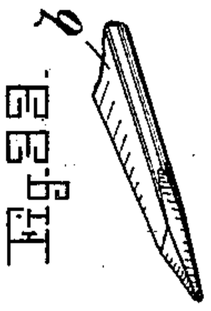


Fig 32.

Fig 33.



Witnesses

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UNITED STATES PATENT OFFICE.

DANIEL E. KEMPSTER, OF BOSTON, MASSACHUSETTS.

DIE FOR USE IN MAKING HORSESHOE-NAILS.

SPECIFICATION forming part of Letters Patent No. 429,036, dated May 27, 1890.

Original application filed March 15, 1889, Serial No. 303,408. Divided and this application filed October 21, 1889. Serial No. 327,625. (No model.)

To all whom it may concern:

Be it known that I, DANIEL E. KEMPSTER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Appliances or Dies for Use in the Manufacture of Horseshoe Nails and Blanks therefor; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to the manufacture of animal-shoe nails, and has for its object to provide improved means whereby the process, method, or art illustrated and described in my application for Letters Patent filed in the United States Patent Office March 15, 1889, Serial No. 303,408, and of which the present application is a division, may be expeditiously and economically carried out, and thereby produce the improved animal-shoe nail and nail-blank shown and described in my application for Letters Patent, filed in the United States Patent Office April 23, 1888, Serial No. 271,534.

My invention consists in the construction and combination of the appliances or dies herein described, and the special features thereof are clearly pointed out in the claims at the end of this specification.

In the drawings hereto annexed and forming a part of this specification similar letters of reference indicate corresponding parts wherever they occur thereon.

Figure 1 represents a perspective view of two duplex platen-dies for cross-rolling or roll-forging double or "twin" nail-blanks, said dies being shown in about the position they occupy when first starting to roll the metal blank. Fig. 2 is an end view of said dies as seen from the right of Fig. 1. Fig. 3 is a longitudinal section of said dies on the line A B in Fig. 2. Fig. 4 is a cross-section of said dies on the cross-line 7 in Fig. 3. Fig. 5 is a cross-section of said dies on the cross-line 8 in Fig. 3. Fig. 6 is a cross-section of said dies on the cross-line 9 in Fig. 3. Figs. 7 and 8 are side and end views, respectively, of said dies when made in the form of rolls instead of platens, said die-rolls being cut away at *m* to permit the completed nail-blank to drop out. Fig. 9 is a perspective view of platen-dies for forming single nail-blanks, said dies being slightly changed in construction and arranged to operate in a little different manner from the platen-dies before alluded to, as will be described hereinafter. Fig. 10 is a top view of a "female" die for flattening the duplex or twin nail-blank rolled forging thereon. Fig. 11 is a longitudinal section of duplex male and female flattening-dies, and shows also a punch and die for cutting apart and separating the duplex or twin nails. Fig. 12 is a central cross-section of said flattening-dies, and also a side view of the nail-separating punch or die. Figs. 13 and 14 are side and end views, respectively, of said flattening-dies when made in the form of rolls instead of platens. Fig. 15 is a broken side view of male and female flattening-dies for flattening single nail-blanks. Fig. 16 is a side view of a metal saw or toothed cutter, which may be used for separating the duplex or twin nails instead of the punch and die shown in Fig. 12. Figs. 17, 20, and 23 are top or plan views of four nail-pointing dies, showing different ways of shaping their converging working-surfaces so that they may be able to all act simultaneously upon the four sides, on two sides, and two edges of the point of the nail. Figs. 18, 21, and 24 are respective sections of the same on the lines 10 in Figs. 17, 20, and 23. Figs. 19, 22, and 25 are respective sections of the same on the lines 12 in Figs. 17, 20, and 23. Figs. 26 and 27 are respective cross-sections of two forms of duplex nail-forging dies, showing the central parting-rib arranged to divide the metal blank into two separate and complete nail-blanks. Fig. 28 is a side view of a round duplex or twin nail-blank as formed by the dies shown from Figs. 1 to 8, inclusive. Fig. 29 is a side view of a round single nail-blank as formed by the dies shown in Figs. 9, 26, and 27. Fig. 30 is a face view of a flattened nail as formed by the dies from Figs. 10 to 15, inclusive. Fig. 31 is a face view of a flattened nail bevel-pointed and finished as

formed by the dies from Figs. 17 to 25, inclusive. Fig. 32 is a side edge view of said flattened and bevel-pointed or finished nail. Fig. 33 is a perspective view showing more plainly the compressed and beveled point of said finished nail.

As my present invention has to do only with the various special appliances or dies, and as machines for operating said dies may be modifications of old and well-known mechanisms, I therefore do not deem it essential in this specification to enter into a detailed description of said machines, as any person skilled in the art to which my special appliances or dies pertain will by the description thereof herein given readily see that machines for operating said appliances or dies in the manner I have described can be easily produced by any skilled mechanic.

In view of the foregoing the forging-dies *c* *c* shown in the drawings from Figs. 1 to 6, inclusive, are straight platens and are assumed to be mounted in a suitable machine (one or both dies being made to reciprocate) with their working-faces adjacent to each other and adapted to travel as indicated by the arrows in Fig. 3 when cross-rolling or roll-forging metal introduced between their converging faces, and thereby produce round duplex or twin nail-blanks *a a* similar to that shown in Fig. 28. Said dies *c* have plane-faces *c'*, which lie parallel to each other when in working position, and within said plane faces are sunk longitudinally the working-grooves *c''*, the working-surfaces of said grooves being shaped in cross-section corresponding to and the converse of the longitudinal configuration of one-half (more or less) of the round duplex or twin nail-blank *a a*, as shown in Figs. 1 to 6, inclusive. A central rib c^3 within the working groove *c''* partly divides said duplex or twin nail-blank, as shown in Fig. 28.

If preferred, the central rib c^3 may rise flush with the plane faces *c'*, substantially as shown in Figs. 26 and 27, and thus entirely divide and separate said blank into two complete nail-blanks similar to that shown in Fig. 29; or, if preferred, the central parting-rib c^3 may be partly or entirely dispensed with, and the two nails be connected by metal nearly or quite the full size of the diameter of the head or blade or shank, as the case may be.

The working-grooves *c''* are formed of equal width from end to end, but made tapering as to depth—that is to say, the die-grooves *c''* have tapering portions c^4, commencing about on the cross-line 9 in Fig. 3 and deepening toward their starting ends, where said grooves are a little deeper than one-half the diameter of the metal nail rod or blank from which the round nail-blank is to be forged. This allows the metal blank to freely enter between the tapering surfaces of the die-grooves prior to its being rolled therein. Said tapering surfaces may be milled or scored, as at *z*, if so preferred, to aid in the rotation of the blank during the operation of the dies; or, if desired, said surfaces may be left smooth, excepting the central parting-rib c^3, which I prefer to mill or score its entire length, and also form far enough below the surfaces of the plane faces *c' c'* to leave a metal connection between the heads of the two nail-blanks *a a*, as shown in Fig. 28, as I find a considerable saving of time is effected in the subsequent operations on said nail-blanks by thus handling them in duplex or twin form.

The tapering portions c^4 of the die-grooves *c''*, I denominate their "reducing" and "spreading" surfaces, and the balance or longitudinally-straight portions of said grooves their "forming" or "finishing" surfaces.

The reducing and spreading surfaces c^4 may be formed straight or slightly tapering in cross-section, or they may be formed convex or crowning, as shown in Figs. 1, 2, and 7. I prefer to form said reducing and spreading surfaces in this manner, preferably, as last described, as I find the dies will condense and draw out the metal gradually into shape without tearing it apart or disrupting the fibers of the same, as is often the case when the reducing and spreading surfaces run diagonal to the line of movement of the die and stand oblique to the plane of the same, as with this latter construction a greater longitudinal strain is brought upon the metal being forged thereby.

Figs. 4, 5, and 6 are cross-sections of the dies *c c* on the cross-lines 7, 8, and 9, respectively, in Fig. 3, showing different positions the dies occupy when in operation, and serve to illustrate the progression in change of form which would be given a metal blank being rolled between the converging faces of the die-grooves.

The forging-dies *c c* shown in Figs. 7 and 8 are substantially like these just described, excepting they are in the form of rolls instead of platens, and it is evident that the nail-forging dies may, if so desired, be both formed segmental or curved, or one die may be concaved longitudinally and its companion die convexed longitudinally, or one die may be straight and its companion die curved or made a roller-die; or they may be made of any other form of construction preferred, and be arranged to (either one or both) be revolved, vibrated, or reciprocated, as may be required. It is also evident to any mechanic that I may, if so preferred, form the working-grooves in any of the dies referred to without any tapering portions c^4 therein and make them alike from end to end, and by simply giving said dies a forward and backward movement to cause their working-faces to gradually approach each other while rolling the metal the same result is obtained upon the forging as when the dies are tapered and operated as first described. This construction would require no invention, but is simply an equivalent modification of the forging devices.

The forging-dies *c c* shown in Fig. 9 are

substantially like those shown in Fig. 1, excepting that their working surfaces or grooves are shaped to form a single nail-blank *a* and are made straight longitudinally, or without any tapering portions c^4, and, as before suggested, are assumed to be mounted in a machine suitably constructed and arranged so that the dies will separate from each other sufficiently far apart, as shown, to admit the insertion of the metal blank prior to its being rolled, and then as the dies rotate said metal they are caused to gradually approach each other, and thus compress, condense, and form the metal into the shape of a single round nail-blank *a*, as shown in Fig. 29. If preferred, the die-grooves may be formed tapering longitudinally, the shape of the complete nail-blank, as shown in the dotted lines c^5 in said figure, and in that case the dies would not need to have the opening and closing movement before mentioned.

The forging-dies *c c* shown in Figs. 26 and 27 may be formed and operated, so far as their working-grooves are concerned, in either of the ways before described. The only peculiarity in them which I desire to point out is that they have their central parting-rib c^3 constructed and arranged so as to divide the metal and separate it into two complete nail-blanks, and thus dispense with any cutting devices for separating the two nails after they are forged, as is required when using forging-dies which have the two nails joined by a metal connection either at their heads or points. The matter of cutting apart the duplex or twin nail-blanks, either while forging or when flattening them, is merely a question of economy in their manufacture, and will be governed by all the attending circumstances, and the method and time of cutting them apart is adopted which gives the best results for the particular size or style of nail-blank being made.

The nail rolling or forging dies *c* have their forming-surfaces c'' shaped tapering in cross-section, so as to distribute the metal and roll the round nail-blank into such tapering shape or form as will positively insure that when said round blank is flattened on two opposite sides to give it the required thickness of a finished nail it will also cause said nail to assume the proper finished width or tapering face form without the necessity of operating or acting upon the side edges of the nail. This feature of forming the round nail-blank tapering, so as to predetermine the shape and form of the flattened nail and insure its assuming the proper width or face form by simply flattening it to the thickness required in the finished nail, is a great improvement, and will be found fully and minutely described and broadly claimed in my product and process applications referred to at the beginning of this specification, and the dies herein shown for rolling the round nail-blanks are shaped upon their working-surfaces to produce nail-blanks of this description or having the particular tapering form, whereby when they are flattened to the required thickness of the finished nail they will not bulge out across the middle portion of the body or blade broader than they are in the neck under the head, but will take just the required width throughout and assume the proper face form, as before stated. Furthermore, by constructing the nail-rolling dies *c* with their reducing and forming surfaces sunk within a working-groove, as herein shown, I am able to bodily confine and roll a metal blank entirely separated from the main rod or bar, thus adapting said dies for use in automatic nail-rolling machines, wherein the speed of operating on the metal is very much greater than can possibly be attained with dies having their forming-surfaces raised upon or above their faces, so as to adapt them for rolling metal articles upon the end of a rod or bar or from metal blanks containing more metal than is requisite to form the article being made.

I have shown the forging-dies in all the views as having their working-surfaces cut or shaped to form a special-shaped animal-shoe-nail blank; but it is evident, and I would have it understood, that I may change or modify the shape of the die-grooves so as to produce a nail-blank of another shape, if so preferred for any purpose—such as, for instance, when desirable to bevel and finish the point of the nail by flattening, indenting, and clipping or cutting the metal in the manner shown in my application for Letters Patent filed in the United States Patent Office October 10, 1889, Serial No. 326,593. In that case the nail-blank would be formed straight, or nearly so, in the shank or under the head, so as to give said blank sufficient metal when flattened and indented for the cutters or punch and die to act upon and shear or clip the nail-blank, and thus finish and bring it to a beveled point.

The flattening-dies *d* and *e* shown in Figs. 10, 11, and 12 are straight plate-dies, and are assumed to be mounted in a suitable machine, so that one or both dies will reciprocate and compress or flatten the metal nail-blank *a a* introduced between their adjacent working-faces. The male die *d* has a plane face provided with the opening d', through which passes the nail-separating punch or male die d'', suitably mounted in the aforesaid machine, so as to reciprocate independent of the male flattening-die *d* and enter its co-operating female die e', formed in the female flattening-die *e*. In the face of said female die *e* is sunk a groove e'', the surface of said groove being formed in cross-section corresponding to and the converse of the longitudinal configuration of the flattened nails edgewise, substantially as shown in Fig. 11. The plane faces e^3 e^3 on the female die *e* act as a stop for the male die *d* to strike against, thus admitting of great pressure being given the nail-blanks to bring them all to an exact thickness without danger of crushing them

by the blow. It is evident that part or all of the plane faces or stops e^3 e^3 may be formed on the male die d, if preferred; or said stops may be entirely removed from the dies and other means employed for gaging or stopping the blow.

If preferred, the flattening-dies d and e may be made solid or unprovided with any nail-separating dies d'' and e', and the flattened and connected twin nails may be cut apart or separated by other means—as, for instance, the metal saw or toothed cutter d^3 may be suitably held and revolved in the flattening machine or press, and the flattened duplex or twin nails may be automatically fed across it and cut apart and separated thereby, as is readily understood by any mechanic.

The nail-flattening dies d e shown in Figs. 13 and 14 are substantially like those just described, excepting they are in the form of rolls instead of platens, and said roller-dies are also unprovided with any nail-separating dies, and, furthermore, if preferred, the roller-dies may be so constructed or shaped on their faces as to roll the round nail-blank lengthwise instead of crosswise, and thus compress and flatten it to the shape, taper, and thickness edgewise of a finished nail.

The nail-flattening dies d and e shown in Fig. 15 are substantially like those shown in Fig. 11, excepting they are formed for flattening a single nail-blank, and they are also without any stops formed integral therewith, such as are shown in said latter figure.

It is evident that the flattening-dies, if preferred, may also be formed in curved or segmental shape, and be revolved, vibrated, or reciprocated, as required, and any of said flattening-dies described, when operated as specified, flatten the round nail-blank a into a flattened and unpointed nail b, substantially as shown in Figs. 30 and 32, with the exception of the beveled point shown in said latter figure. I wish to state, also, that in practice the faces or working-surfaces of the nail-flattening dies are formed or shaped with a suitable curve longitudinally, so as to bend as well as to flatten the nails, and thus give them the usual and proper curvature or "set" required for driving, as is readily understood by those familiar with this class of nails, and although I have shown in the drawings the surfaces of the flattening-dies, and also the flattened nails, as straight longitudinally, it being somewhat easier to so represent them, yet, as before stated, they may be curved more or less, as desired, for any particular size or style of nail.

The nail-pointing dies h i k l shown in Figs. 17 to 25, inclusive, represent different ways of shaping the working ends of said dies, so that they may all be brought up together simultaneously to compress the nail upon all sides, and either set of said dies shown may be assumed to be properly mounted in a suitable machine, and, being shaped or cut away as shown, are all four adapted to act simultaneously upon the point of the nail b and compress it upon all sides, or rather upon its two sides and two edges, and thus evenly condense the metal and bring it to a perfectly beveled and hardened point, as shown in Fig. 33, without any lateral displacement alternately in opposite directions of the fibers of metal composing the point of the nail, as it is drawn to a point without spreading the metal laterally.

Heretofore in the usual custom of beveling the points of the nails by compressing or hammering said nails when cold it has been found necessary, in order to operate upon the small blade or point of the nail and have the pointing-dies or hammers clear each other while in operation, to act upon said points alternately, first upon two opposite sides and then upon two opposite edges, or vice versa. This lateral displacement alternately in opposite directions of the fibers of metal composing the delicate point of the nail necessarily fractures the minute crystals of metal and destroys the tenacity and cohesiveness of the fibers thereof, thus engendering laminations and minute cracks, and although such nails seem apparently sound, as far as any external appearance can denote, when they are driven into the hoof they develop slivers and split points, to the very great danger of disabling the animal being shod thereby. My improved dies above referred to effectually overcome the objections and defects mentioned, and also hasten the operation of pointing the nails. I prefer to use said dies constructed as shown in Figs. 17, 18, and 19, and, although they may all four reciprocate to and form a common center, I prefer to make the die h stationary to form an anvil for the back of the nail to rest against, and the dies i k l, I bevel and shape substantially as shown at i' k' l', so as to permit their working ends or faces to come together simultaneously and compress the point of the nail against the anvil or die h, the four dies when all brought together forming a pocket or complete die of the exact shape of the finished and beveled nail-point. The dies i k l are flared or rounded on their upper corners, as shown at i'' k'' l'', to correspond with the size of the mouth of the conductor or spout through which the nails pass automatically point first from the flattening-dies to and into the said pointing-dies. The upper or top corner of said dies being flared, as before stated, prevents the nails from lodging thereon and causes them to drop into proper position, where they are firmly held during the operation of pointing them. The dies i k l are caused, by a suitable cam or other mechanism, to reciprocate simultaneously a certain number of times, generally about three compressions, to condense and bevel the point of the nail, and then said dies are caused to open apart wide enough to permit the finished nail when liberated to pass entirely through, and then immediately close together sufficiently far to form a proper-

sized pocket or V to catch the next succeeding nail and allow it to settle far enough into said pocket to give the necessary metal stock when held or clamped in position for the dies to act upon and condense and bevel to a point. The die *k* is properly-shaped on its face to impart the desired bevel to the point of the nail, and when reciprocated is forced against the plane or anvil die *h*, and the dies *i l* are forced against each other and have their faces shaped the proper angle of the tapering side edges of the point of the nail, the working-edge of the moving dies being beveled, substantially as shown, so as to all converge to a common center on the anvil-die *h*, and thus condense and bevel the point of the nail by acting simultaneously on all sides of it, and consequently without spreading the metal laterally, as hereinbefore stated.

The pointing-dies *h i k l* shown in Figs. 20, 21, and 22 are substantially like those just described, excepting the die *h*, being shown as also beveled and shaped as at *h' h''*, and the dies *i k l* being shaped to co-operate therewith. The dies shown in Figs. 23, 24, and 25 are substantially like the two sets just described, they merely showing a little different manner of beveling and shaping the working ends of said dies, as at *h' h'' i' i'' k' k'' l' l''*, as will be readily understood by any mechanic on referring to the drawings without further description other than to state that in the operation of either set of the pointing-dies shown the end of the round-edged nail *b*, Fig. 30, is neatly and squarely drawn out to a perfectly-beveled point, substantially as shown in Figs. 31, 32, and 33, without leaving any "fins" or seams thereon denoting the junction between the several dies.

Having now described the several appliances or dies, I will briefly give a general description of their operations, and also point out the superior qualities given the nails thereby.

In making the round nail-blanks *a* the metal rod may first be cut up into short pieces or blanks containing just sufficient metal stock to be forged into a single or duplex nail-blank, as desired, and said blanks may then be automatically fed, either hot or cold, into the forging-dies, where they are quickly rolled and formed into shape. I prefer, however, to make use of a system or automatic metal-rolling mill, similar to those shown in patents granted to me April 10 and August 28, 1888, and numbered 380,759 and 388,565, respectively. In that case the coil of wire nail-rod is supported upon a suitable reel and passes off through a furnace, which heats it nearly to a welding heat, and passing thence through feed-rolls, which intermittently feed it into the forging-machine, where suitable blanks are intermittently severed therefrom, and passed into the forging-dies, where they are rapidly rolled or forged into shape, said shape in its preferred form being the duplex or twin nail-blank *a a*, connected by a metal connection at their heads, as shown in Fig. 28. The entire operation of the nail-forging mill being continuous and automatic is therefore capable of great speed. The round nail-blanks when cold, and after having the usual oxide or scale removed therefrom, are next placed in suitable bulk in the hopper of the combined nail feeding, flattening, and pointing machine, where they automatically feed down into and between the flattening-dies, where they are compressed or stamped and flattened into the desired thickness, taper, and curvature edgewise of the nails and partly beveled on their points or not, as preferred, by the descent of the upper or male die *d*, and while the double nail-blank is thus compressed and firmly held between said flattening-dies the die *d''* descends and severs the metal connection between them, and as the flattening-dies are separating the two nails are caused to drop and enter point first into two separate conductors, which guide them down into two sets of pointing or beveling dies, where they are quickly given the necessary finished and beveled point required, and are then dropped into suitable receptacles provided therefor.

The entire operation of the combined nail feeding, flattening, and pointing machine being continuous and automatic is therefore also, like the forging-mill, capable of great speed, and this machine and also a special form of forging-machine, both of which are designed especially for the manufacture of animal-shoe nails, will form subjects for other applications for patents hereafter.

I would state herein that when forming the round nail-blanks of cold metal or when forging them from steel instead of iron I prefer to combine and operate the flattening-dies in connection with the forming or forging dies, thereby forming or forging and flattening the nails in one and the same machine, and also when working cold metal I sometimes prefer to combine and operate the pointing-dies in connection with the forming or forging dies and the flattening-dies, thereby making the complete nail in one combined machine.

In reducing or forging metal by compressing and rotating it between adjacent die-faces in the usual and well-known manner of making rolled forgings the surface movement or rotation of the metal blank when work is being performed, if there is no slip, is the same as the rate of linear movement of the dies, or the length of the working-surfaces on said dies, which have acted upon and forced said metal blank to revolve. Consequently in roll-forging any small tapering cylinders or spindles similar to the blade or shank of the round nail-blank, as the work progresses and the blank becomes tapering and variable in size, being prevented from slipping by the hot plastic metal engaging the milled or scored surfaces of the dies, the smaller diameters of said blank are compelled to rotate

faster than the larger, as must be readily perceived, and thus the fibers of the metal composing the blank are spun or twisted somewhat as represented by the dotted lines in Fig. 28. The degree of pitch or twist given the fibers of metal depends upon the degree of taper given the blank and upon whether the smaller portions of said blank are permitted to slip past the die-surfaces without being rotated thereby, as by relieving the die-faces so as to reduce the friction on the blank and dispensing with the milled or scored surfaces other than that on the central parting-rib c^3 the blank may be rolled into form without materially twisting the metal, as shown in Fig. 29, it slipping in the dies, so that the smaller portions are not revolved any faster than the approximate speed of the largest diameter of the blank. This spinning or twisting of the fibers of the hot metal during the formation of the nail is especially desirable when using an inferior or low-cost grade of iron, as it tends to close up and weld or knit together any seams or imperfections existing in the metal and materially adds to the homogeneity, strength, and durability of the nails, as will be readily understood and appreciated by those acquainted with the art of working metal, and most especially with the art of forging and pointing animal-shoe nails.

The nails manufactured with my improved appliances or dies are necessarily of superior quality, as by the use of my roll-forging dies the metal composing the nails is condensed and toughened, and by the use of the flattening-dies the nails are hardened, stiffened, smoothly finished, and given the proper curvature or set, and by the use of the pointing-dies the nails are given a solid, dense, hardened, beveled point.

I would have it understood that I do not wish to limit myself to the specific styles or forms of construction of the dies herein described, as they may be modified any way within the scope of mechanical skill for producing animal-shoe nails of other shapes than the particular one herein shown without departing from the essential spirit of my invention—as, for instance, the nail-pointing dies $i\ l$, if so preferred, may extend toward the head of the nail, so as to compress and flatten the rounded side edges of said nail when compressing its point, and, furthermore, the four nail-pointing dies may, if so desired, act alternately first upon two faces and then upon two side edges, or vice versa. I prefer, however, to arrange and operate said dies as before described.

I do not in this application claim the round rolled forged nail-blank, nor a nail or nail-blank having the fibers of its metal twisted, nor a nail or nail-blank having other improvements herein described, as these features are already claimed in my application for Letters Patent filed in the United States Patent Office April 23, 1888, Serial No. 271,534. Neither do I claim in this application the improved process, method, or art of manufacturing animal-shoe nails herein described, as I have already claimed it in my application for Letters Patent filed in the United States Patent Office March 15, 1889, Serial No. 303,408. Neither do I claim in this application a round duplex or twin animal-shoe-nail blank, as I have already claimed it in my application for Letters Patent filed in the United States Patent Office October 10, 1889, Serial No. 326,593.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. In the manufacture of animal-shoe nails, the combination of the two nail rolling or forging dies $c\ c$, provided with the working-grooves c'', of equal width from end to end and of tapering depth, substantially as described.

2. In the manufacture of animal-shoe nails, the combination of the two nail rolling and forging dies $c\ c$, provided with the working-grooves $c''\ c''$, of equal width from end to end and having tapering portions $c^4\ c^4$, substantially as described.

3. In the manufacture of animal-shoe nails, the combination of the two nail-flattening dies $d\ e$, substantially as herein shown and described.

4. In the manufacture of animal-shoe nails, in combination, the male flattening-die d, having the opening d', provided with the punch d'', and the female flattening-die e, having the opening or die e', groove e'', and plane faces $e^3\ e^3$, all substantially as and for the purpose set forth.

5. In the manufacture of animal-shoe nails, the duplex nail-flattening dies, combined with each other and with mechanism, substantially as herein described, for cutting apart and separating the duplex nails, as set forth.

6. In the manufacture of animal-shoe nails, the combination, with the duplex nail-flattening dies and the described mechanism for cutting apart said duplex nails, of the nail pointing or beveling dies, substantially as described.

7. The four converging dies $h\ i\ k\ l$, combined and arranged with each other to operate substantially as described, and for the purpose herein set forth.

8. In the manufacture of animal-shoe nails, the combination, with the nail-flattening dies, of the nail pointing or beveling dies, substantially as described.

9. In the manufacture of animal-shoe nails, the combination, with the dies for rolling the round nails, of the dies for flattening said nails, substantially as described.

10. In the manufacture of animal-shoe nails, the combination, with the dies for rolling the round nails and the dies for flattening said nails, of the dies for beveling the points of said nails, substantially as described.

11. In the manufacture of animal-shoe nails,

the combination of the following instrumentalities, to wit: the dies for rolling the round tapering nails, the dies for flattening said round nails on two opposite sides to give them the proper width and thickness, and the dies for compressing and beveling the points of said nails, all co-operating to produce the finished nail, substantially as herein described.

In testimony whereof I affix my signature in presence of two witnesses.

DANIEL E. KEMPSTER.

Witnesses:
HENRY CHADBOURN,
M. B. MCMANUS.