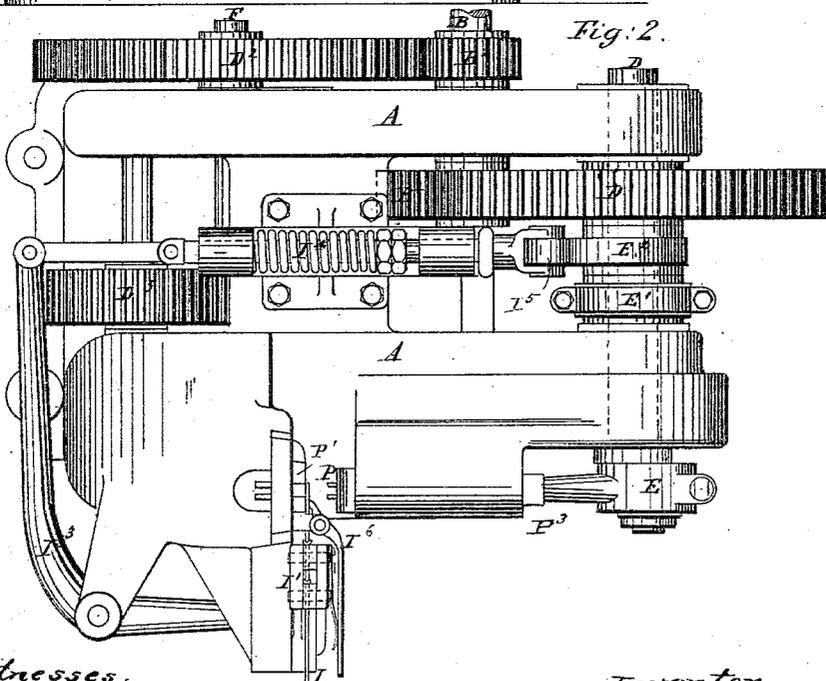
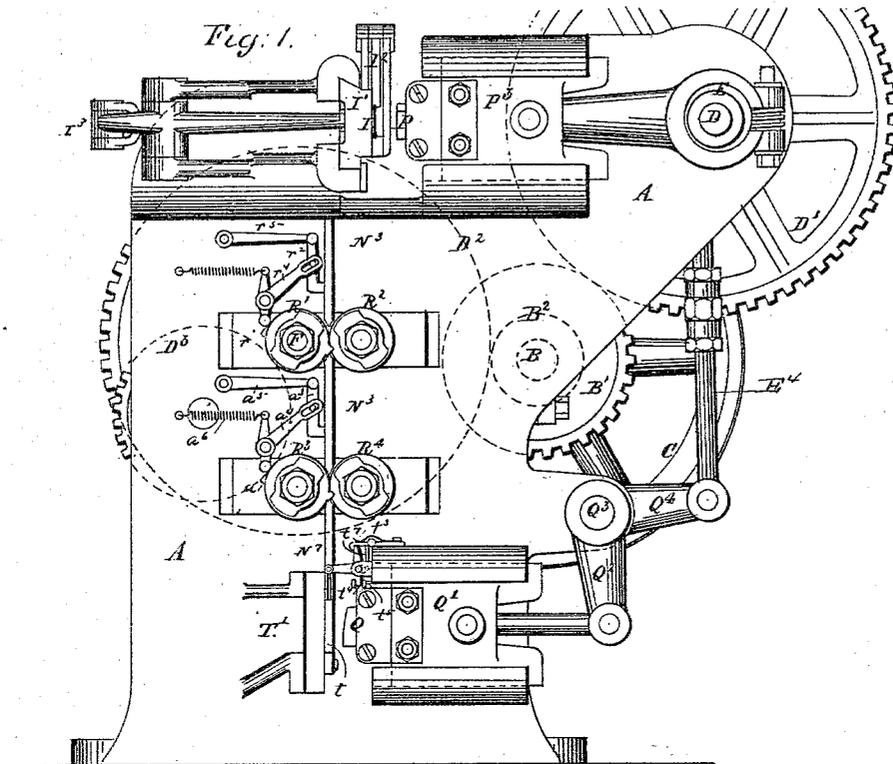


J. A. COLEMAN.

MACHINE FOR MAKING HORSESHOE NAILS.

No. 286,391.

Patented Oct. 9, 1883.



Witnesses.
 Edmund Jewell.
 J. J. Mc Carthy.

Inventor.
 John A. Coleman
 C. M. Alexander atty

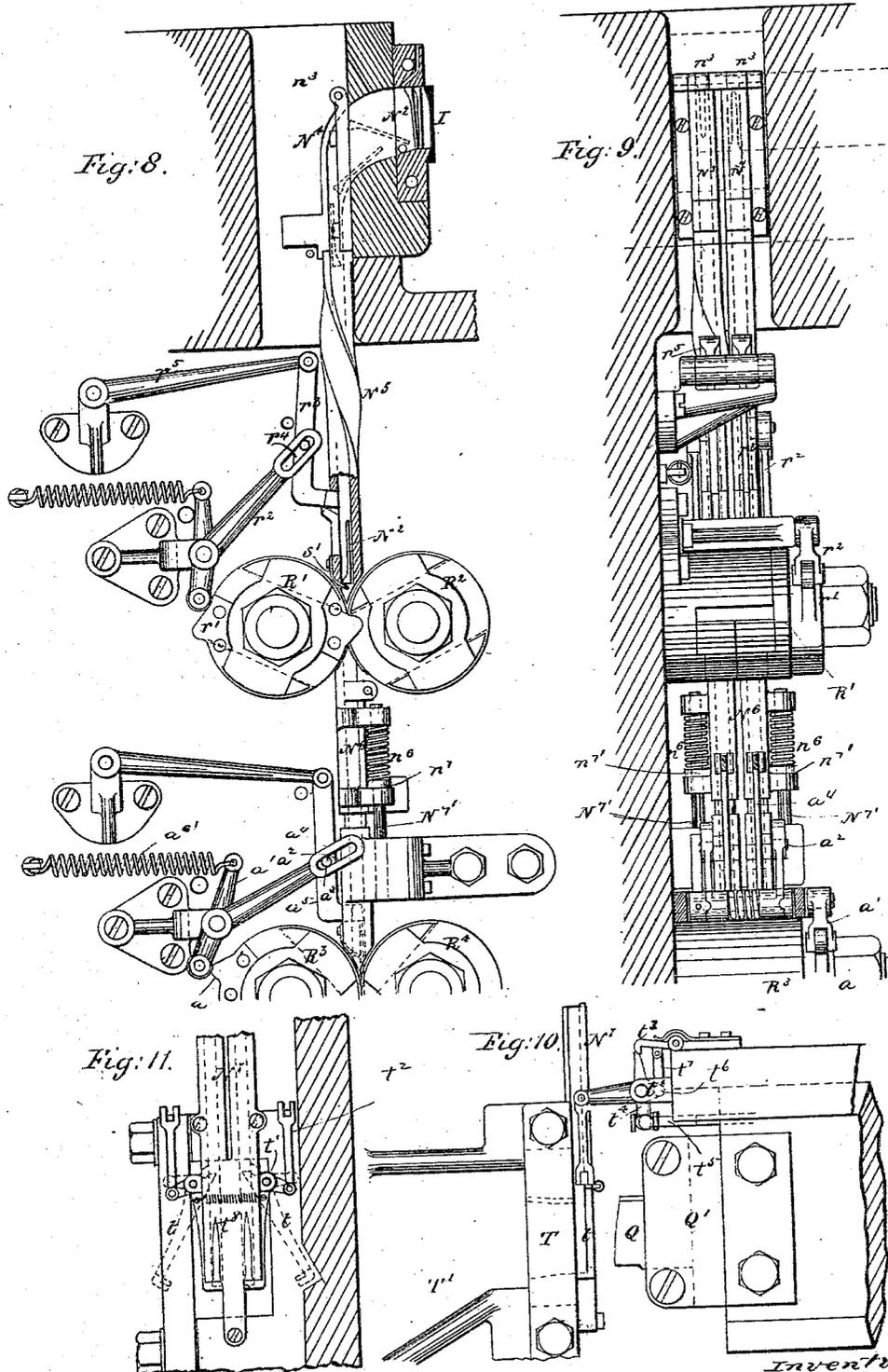
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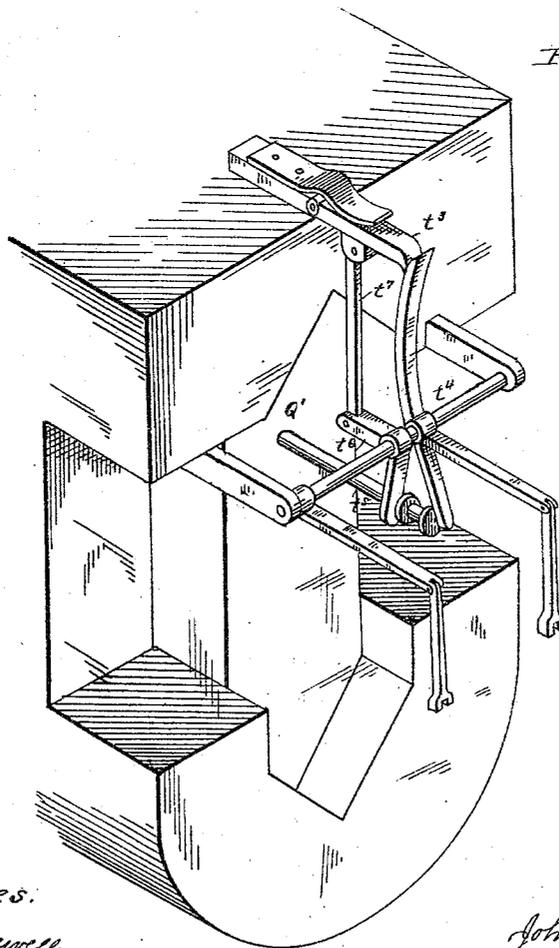
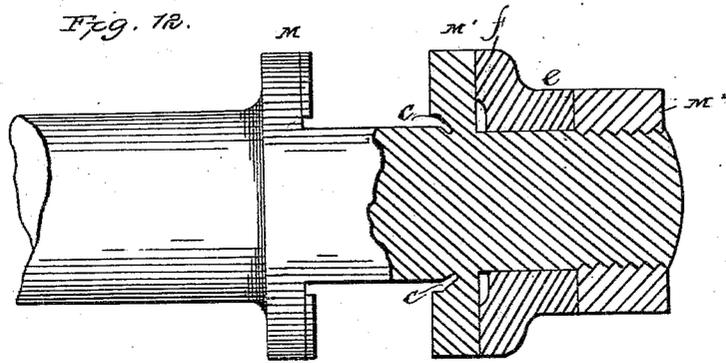
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H. A. Faulmin

Inventor.
John A. Coleman.
E. M. Alexander
Attorney.

UNITED STATES PATENT OFFICE.

JOHN A. COLEMAN, OF PROVIDENCE, RHODE ISLAND.

MACHINE FOR MAKING HORSESHOE-NAILS.

SPECIFICATION forming part of Letters Patent No. 286,391, dated October 9, 1883.

Application filed December 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. COLEMAN, of Providence, in the county of Providence, and in the State of Rhode Island, have invented certain new and useful Improvements in Apparatus for the Manufacture of Nails; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

This invention relates to certain improvements in that class of machines for manufacturing nails, such as are used for fastening horseshoes, and other purposes, in which a series of operations are performed, which are as follows: A bar of iron rolled to a width nearly equivalent to the length of the nails to be formed, and provided at opposite edges with projecting ribs to furnish the additional metal required for the heads of the nails, is subjected to the action of a pair of punches, which at each stroke separate from it a pair of blanks approximately the size of the nails, the blanks being punched with their heads alternately in opposite directions. The punched blanks are then conducted to pairs of rollers engraved on their faces to the configuration of the nail, and the blanks in passing between the rollers, subject to strong pressure, are molded to the required form. Usually two pairs of rollers are employed, the first pair squeezing, drawing, and approximately shaping the nails, and the second pair, by further drawing and squeezing, bringing them to the desired form. Finally, the nails pass from the rollers and are presented to finishing-punches, which press them through dies, so as to cut off protuberances of metal and trim the nails to their finished shape.

My invention has for its objects to provide a machine for performing these operations which shall be compact, simple, and effective, easily accessible for inspection or repair, and capable of being worked rapidly without requiring skilled labor. One important feature of my invention is the means whereby the blanks are unerringly conducted from each operating part to the next in order, and shaped and finished by pressing the flat sides successively between two sets of rollers. The above-mentioned objects I attain by the means illus-

trated in the accompanying drawings, in which—

Figure 1 represents a side elevation of my improved machine; Fig. 2, a plan view thereof; Fig. 3, a rear elevation of the machine; Figs. 4 and 5, detached vertical sectional views of portions of the machine, showing in detail the conduits which lead the nail-blanks from the punches to the first pair of shaping-rollers. Fig. 6 represents a transverse section of one of the rollers; Fig. 7, a plan view of the same. Figs. 8 and 9 represent views, partly in elevation and partly in section on vertical planes at right angles to each other, showing the means by which the blanks are conducted from the punches to the first pair of rollers, and from thence to the second pair of rollers. Figs. 10 and 11 represent similar elevations, showing the means for presenting the rolled blanks to the finishing punches. Fig. 12 is a view, partly in diametrical longitudinal section and partly in side elevation, of the forming-roller; and Fig. 13, a detail perspective view of the punch-slide and the mechanism for operating the pivoted conduit sides or levers *t t*.

The letter A indicates the frame of the machine, which is constructed of metal, and preferably cast in one piece with suitable bearings for the shafts and working parts.

The letter B indicates the main or driving shaft of the machine, which may be driven by means of any suitable motor and intermediate gearing, a clutch-pulley, C, being employed in the present instance.

The letter D indicates a shaft, which is provided with an eccentric, E, for operating the punches, and a cam, E², for working the feed-slide. The said shaft is also provided with a gear-wheel, D', intermeshing with a gear-wheel, E', on the driving-shaft, from which it receives its motion.

The letters R' and R² indicate the first pair or shaping-rollers, and R³ and R⁴ the finishing-rollers. These are mounted on shafts suitably journaled in the frame, and are provided with similar pinions, R⁵, the pinions on the shafts of the rollers R' and R² intermeshing with an intermediate gear-wheel, D³.

The letter I' indicates a slide carrying two fingers, I², pivoted at their tops to said slide,

and hanging in an inclined position, so that when the slide advances the ends of the fingers engage the upper edge of the bar I, from which the blanks are cut, and clamp it, causing it to advance with the slide, said fingers releasing the bar during the back stroke of the slide, the bar being held stationary by the punches while forming the blanks and in the act of entering and passing through said bar. The backward and forward movements of the slide I' are effected by a lever, I³, linked to a spring-rod, I⁴, which has at its end a friction-roller, I⁵, bearing against the cam E², the cam causing the forward stroke of said feed-slide, and the spring on the rod I⁴ causing its backward stroke. The eccentric E operates a slide, P³, carrying two punches, P, which, as they advance, pass through the iron bar I, punching and cutting from it a pair of blanks, N' N², and forcing them into the dies P' P², the blank N' having its head downward and the blank N² having its head upward, as clearly shown in Figs. 4 and 5 of the drawings.

The letter I⁶, Fig. 2, indicates a spring-lever, which bears against the face of the bar I and prevents it from being drawn back from the face of the die when the punches P are withdrawn. The blanks N' N², as they are forced successively through the dies, enter the respective conduits N³ N⁴, by which they are conducted in proper position to be presented to the shaping-rollers R' R². As the blank N' has its head downward, an obstruction, n', is provided, which engages its point, so that as it begins to descend the head will uniformly go first, as indicated in dotted lines in Fig. 4. The blank N², having its head up, has to be turned to bring it to proper position to be dropped, and to effect this an obstruction, n², is provided, which trips it and causes it to fall head downward, as indicated in Fig. 5 of the drawings. In order to facilitate and accelerate the descent of the blanks through the conduits, a stream of lubricating-fluid—such as soap solution—may be directed through the conduits by means of the pipes O, leading from suitable supply tanks or reservoirs. To prevent the conduits from becoming closed by the blanks wedging themselves therein, the backs of the said conduits are hinged at n³ and n⁴, so that they will yield when subjected to undue pressure, and a bar or weight, S, is provided, which is connected to any suitable gearing, by which an alarm may be given or the operation of the machine stopped until the conduits may be relieved.

In some instances the bar I, from which the blanks are cut, instead of being symmetrical on both sides, as indicated by Figs. 4 and 5 of the drawings, is made with ribs on one side only, as shown in Fig. 8, and in this case as the blanks N² are overturned the prominences on their heads are on the sides opposite to the desired position; and in order to turn each blank N², so as to correspond to the blank N', a portion of the conduit below the part N⁴ is

constructed with a helical twist, N⁵, which has the effect of turning each blank, as it descends, half-way round, as indicated in Fig. 8 of the drawings.

At the lower opening of each conduit, in the space between the two rollers R' R², there is secured a light spring, s', which supports the blank until the proper moment comes for its entering between the rollers. At this time a cam projection, r', on the roller R' moves a bent lever, r², which has a slot, r⁴, engaging a pin on a striker, r³, attached to the pivoted arm r⁵. As the arm r⁵ moves downward it thrusts the lower end of the striker r³ through a slot in the back of the conduit, and then causes it to descend on the point of the blank N², so as to push the blank down past the spring s' and rapidly into the space between the rollers, the said striker being withdrawn through the medium of a spring. The pair of blanks having passed through between the first pair of rollers, R' R², and being squeezed, drawn, and partly shaped thereby, enter the lower conduits, N⁶, by which they are conveyed to the lower pair of rollers, R³ R⁴, the arrest and feeding of the successive blanks being effected by means of a projection, a, operating the bent lever, a', which has a slot, a², engaging a pin, a³, on the arm a⁴, to thrust the end of the striker a⁵ through a slot in the back of the conduit, the said striker being withdrawn through the medium of the spring a⁶, these devices being arranged to operate in a manner similar to the arresting and releasing devices operating in connection with the rollers R' and R², as above described.

The conduit-section N⁶ is provided with laterally-projecting lugs, which are bored to fit a fixed rod, N⁷, having a rigid collar, n⁷, upon which collar is adapted to rest a suitable spring, n⁸. The upper lug of the conduit rests upon said spring, which serves to support the conduit and permit it to yield in the event of a blank leaving the rolls R' R² and not entering the conduit truly. The lower lug on the conduit, by reason of its contact with the collar n⁷, prevents the conduit from crowding between the rolls above mentioned. The section of the conduit N⁶ fits over the upper end of the next lower section.

The construction of the rollers is indicated in detail in Figs. 6, 7, and 12 of the drawings. Each roller is provided on opposite sides with steel dies m, which are clamped between the faces M and M', the face M' being so constructed as to spring slightly, when pressure is brought to bear upon it, by means of a screw-nut and a collar interposed between the face M' and the nut, the collar being adapted to bear against said face, near its periphery, so as to clamp the dies. From both of the faces M M' project fillets or lugs, which are adapted to enter recesses in the sides of the dies and prevent them from shifting lengthwise, the said face M' being provided with oblique incisions or saw-cuts, as indicated by the letter

e, on its inner wall, by which it is rendered of a yielding or flexible nature, and made to more readily bind against the dies. The collar *e*, above alluded to, is hollowed out on its face, so as to leave an annulus, *f*, which presses against the face *M'* near its periphery.

In order to adjust the dies accurately, radially, wedge-shaped keys are provided with oversetting flanges *m*² and set-screws, by which they may be adjusted.

From the rollers *R*³ *R*⁴ the nails which have been previously shaped, and which are left with fins or burrs near their ends, descend through the conduits (see Fig. 1) to be subsequently subjected to the action of the finishing-punches *Q*. These punches are secured to a slide, *Q'*, which is operated by an arm, *Q*², on a rock-shaft, *Q*³, another arm, *Q*⁴, of which is linked to the eccentric-rod *E*¹, operated by an eccentric, *E'*, on the shaft *D*. At the bottom of the conduits *N*¹ are located two side levers, *t*. When the said levers occupy the position indicated by the dotted lines in Fig. 11, their respective upper ends in that position project into the conduits, so that the descending nails are stopped by them. As the punch-slide *Q'* advances it carries with it a tappet-rod, *t*², which is provided with two collars, the collar farthest from the punch striking the lower arm of the three-armed lever *t*, causing the horizontal arm of the said lever *t* to separate the lower ends of the levers *t* from the conduits, during which operation the spring-trigger *t*³ drops over the upper arm of the lever *t*, by which the levers *t* are held away from the conduits until the punches have been withdrawn from the conduits, at which time the other or inner collar on the tappet-rod acts against the lower arm of the crank-lever *t*³, and through the pitman *t*⁴ raises the trigger clear of the upper arm of the lever *t*, permitting the levers *t* to be drawn back to the conduits by the spring *t*³. The punches, during the operation above described, force the nails from the conduits and through the trimming-dies *T*, whence they pass away on an inclined chute, *T'*. As the punches do not begin to act on the nails until they (the punches) have passed through the face of the conduits, it follows that the chips or burrs which adhere to the same may be stripped therefrom by the said face on their return-stroke. The object in thus separating the levers *t*, and thereby removing sides and bottoms of the conduits, is to permit the burrs which adhere to the punches to drop therefrom and down through the conduits.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In machines for making horseshoe-nails from a double-headed ribbed plate, the combination of devices as follows, to wit: a horizontally-reciprocating plunger provided with two punches corresponding in shape to the dies, mechanism to feed the nail-plate stand-

ing on its edge edgewise along and against the face of the die-plate, mechanism to operate the plunger and punches to cut out from the plate, the one a nail-blank whose head is downward and formed of the rib on the lower edge of the plate, and the other a blank whose head is upward and formed of the rib on the upper edge of the plate, mechanism to cause all the blanks to fall with their heads directed downward into feed-conduits, mechanism to turn the blanks cut by one of the punches axially half-round during their progress along or through the conduit, in order to bring the heads of these blanks into proper relation to the roller-dies, and swaging roller-dies to receive the blanks from the conduits and swage and give form to the nails, all combined for and operating as described.

2. In a machine for manufacturing nails, the combination, with the dies and punches and their operating mechanism, of the conduits provided with obstructions whereby one set of the blanks are prevented from tipping, and one set of blanks are tripped, and both sets of blanks are directed head downward into the conduits in order to be properly presented to the shaping-rollers, substantially as specified.

3. The combination, in a nail-machine, with the conduits and the shaping and finishing rollers, of the levers normally held by springs and operated by a projection on one of the rollers of each set, and the strikers having concave seats for forcing the nails to the action of the rolls, substantially as described.

4. The combination, in a nail-machine, of the lower conduit having a sliding action and a spring for holding and returning it to a normal position, whereby motion may be given to mechanism for stopping the machine in case the blanks wedge in the conduit, substantially as specified.

5. The combination, in a nail-machine, of the feeding-conduits and rollers with the arresting-spring and striker and its operating devices, whereby the blanks are fed, momentarily arrested, and then advanced to the rollers, substantially as specified.

6. The combination, in a nail-machine, of the lower conduits having opening sides and bottoms formed by pivoted levers, with the finishing-punch and tappets and the three-armed and two-armed levers and triggers, whereby the said sides are operated to arrest and release the blanks in the conduit and to hold the same in readiness for the action of the punches, substantially as described.

7. The combination, in a nail-machine, of the shaping and finishing rolls with the feeding-conduits, one section of which is provided with a helical twist, and the remaining sections of both conduits straight, as distinguished from being twisted, whereby one set of blanks is properly presented to the rolls relatively with the blanks of the other set, substantially as described.

8. In a nail-machine, the shaping or finish-

ing rolls provided with die-clamping faces
made integral with the roller-shaft, one of
said faces being rigid and the other flexible,
and means for forcing the flexible face toward
5 the rigid face, whereby the dies are held be-
tween said faces, substantially as described.

9. In a nail-machine, the combination, with
the shaping or finishing rolls having inclined
die-seats formed thereon and die-clamping
10 faces, of the dies fitting between said faces,
and the wedges interposed between the dies

and the inclined seats, and means for adjust-
ing and securing the wedges to the roll-shaft,
whereby the dies are radially adjusted, sub-
stantially as described.

In testimony whereof I affix my signature, in
presence of two witnesses, this 12th day of De-
cember, 1882.

JOHN A. COLEMAN.

Witnesses:

WM. ALEXANDER,

H. A. TOULMIN.