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J. M. E. BAACKES & C. RICHARDS.

NAIL MACHINE.

No. 468,399. Patented Feb. 9, 1892.

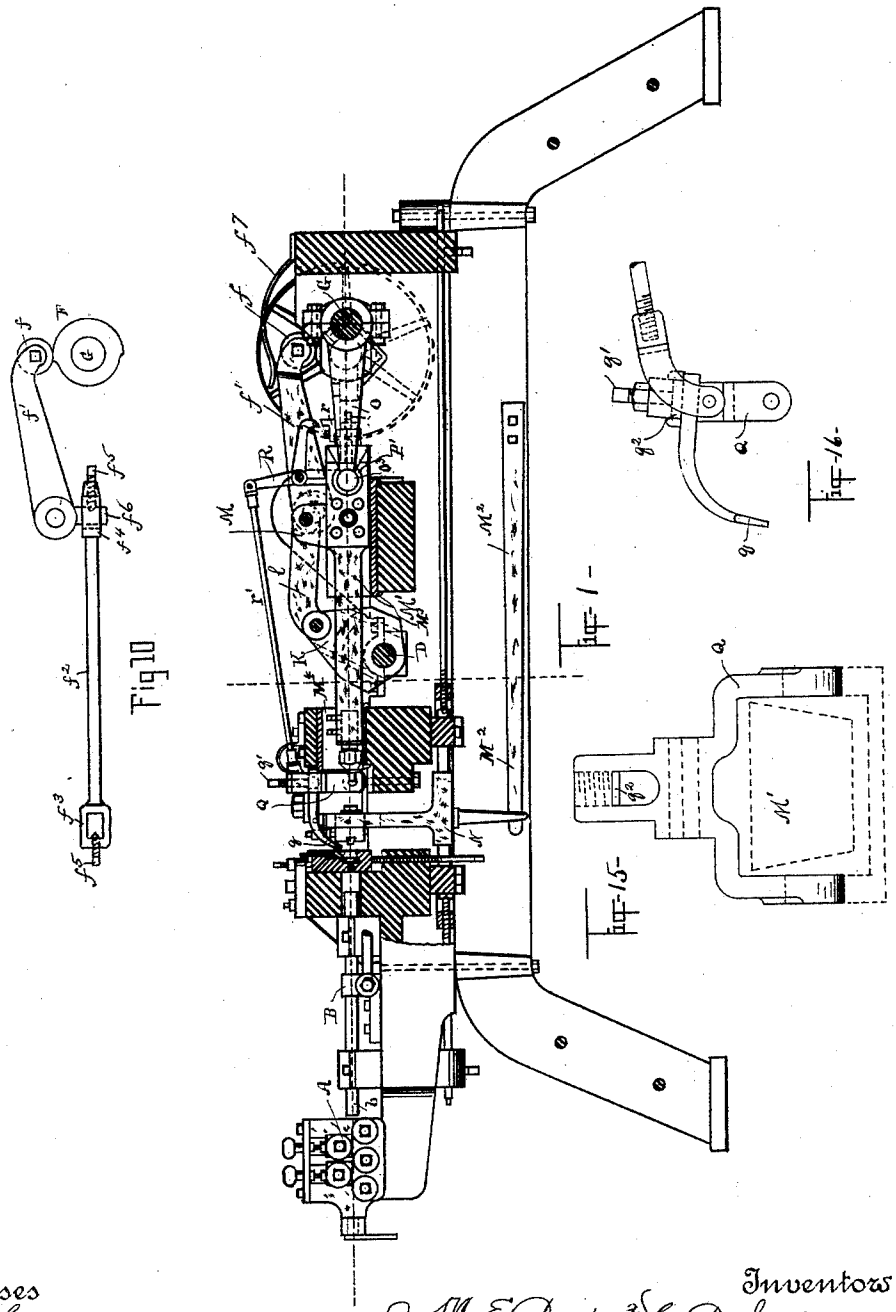

Fig 10

Fig 1

Fig 16

Fig 15

Witnesses
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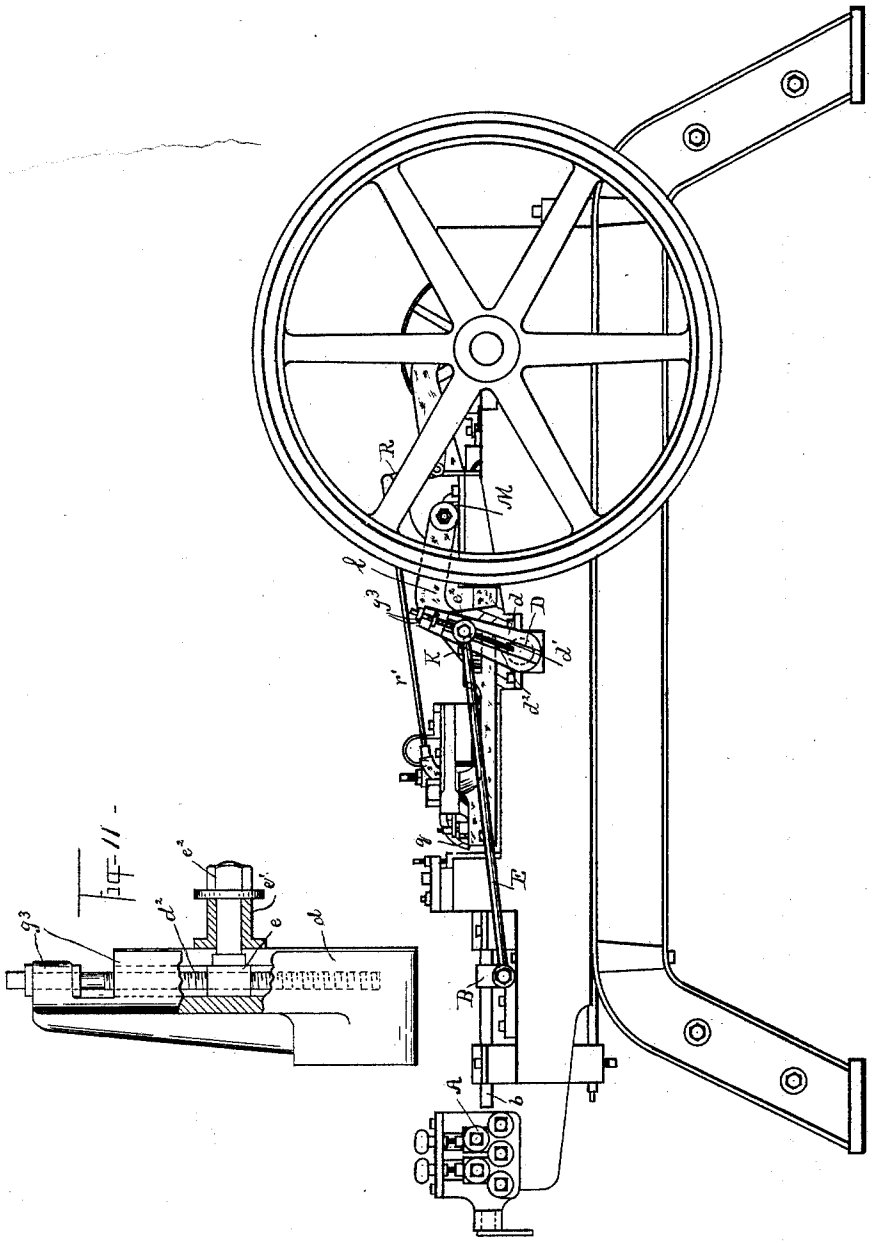

Fig 2

Witnesses
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(No Model.) 4 Sheets—Sheet 3.

J. M. E. BAACKES & C. RICHARDS.

NAIL MACHINE.

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FIG. 3.

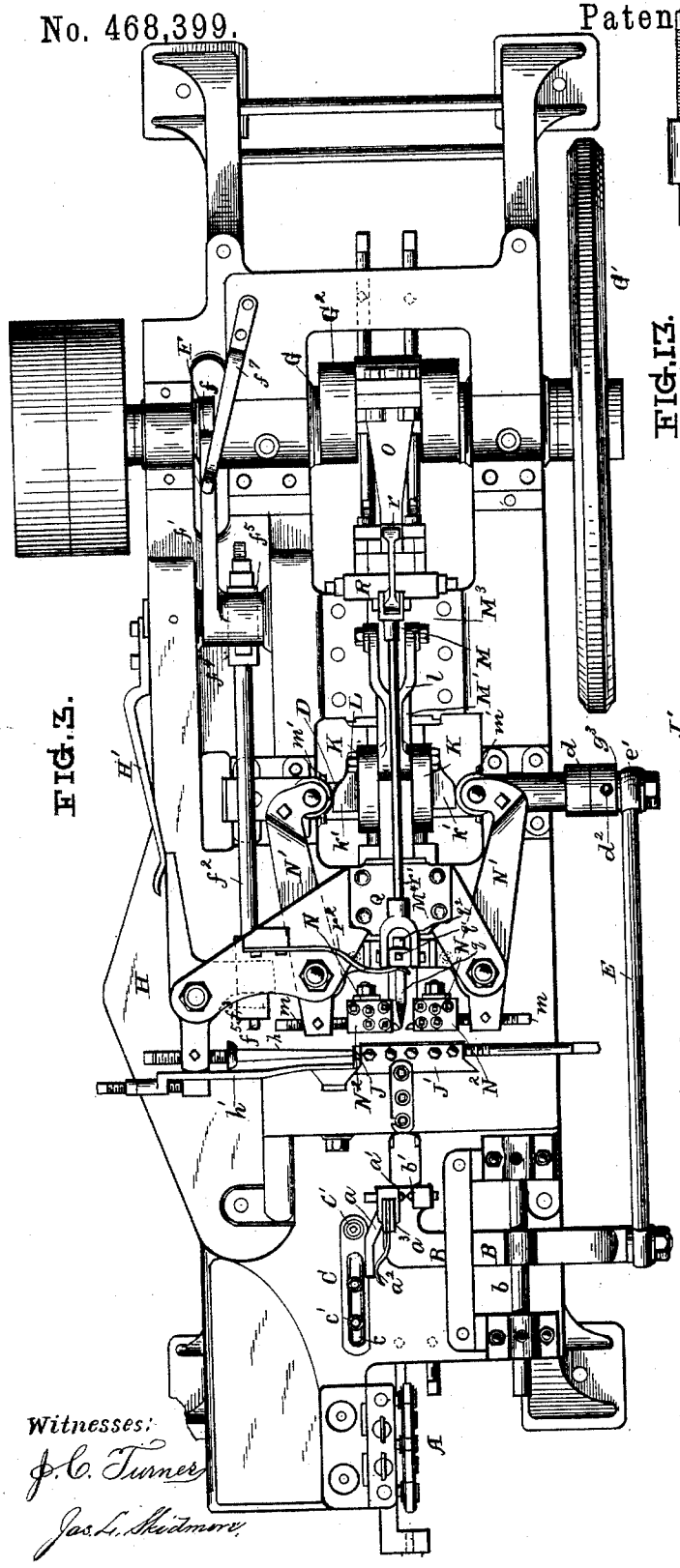

FIG. 13.

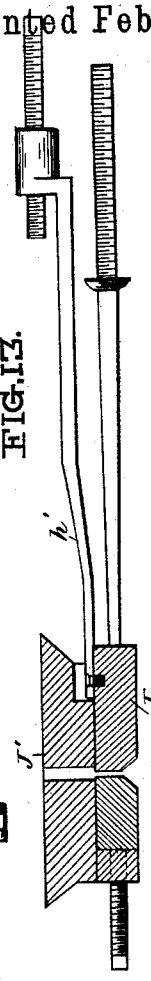

FIG. 13a.

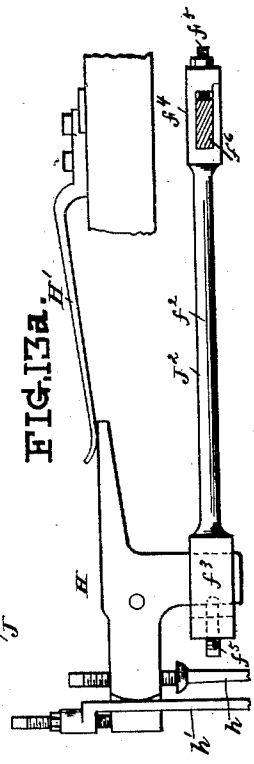

FIG. 12

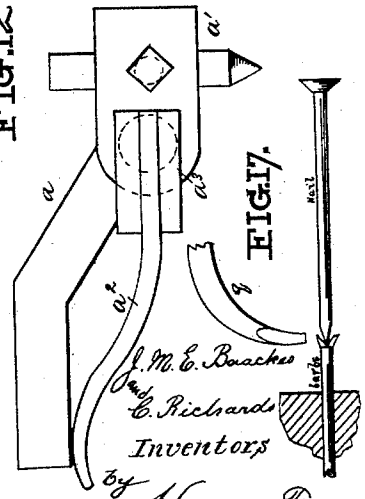

FIG. 17.

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(No Model.) 4 Sheets—Sheet 4.

J. M. E. BAACKES & C. RICHARDS.

NAIL MACHINE.

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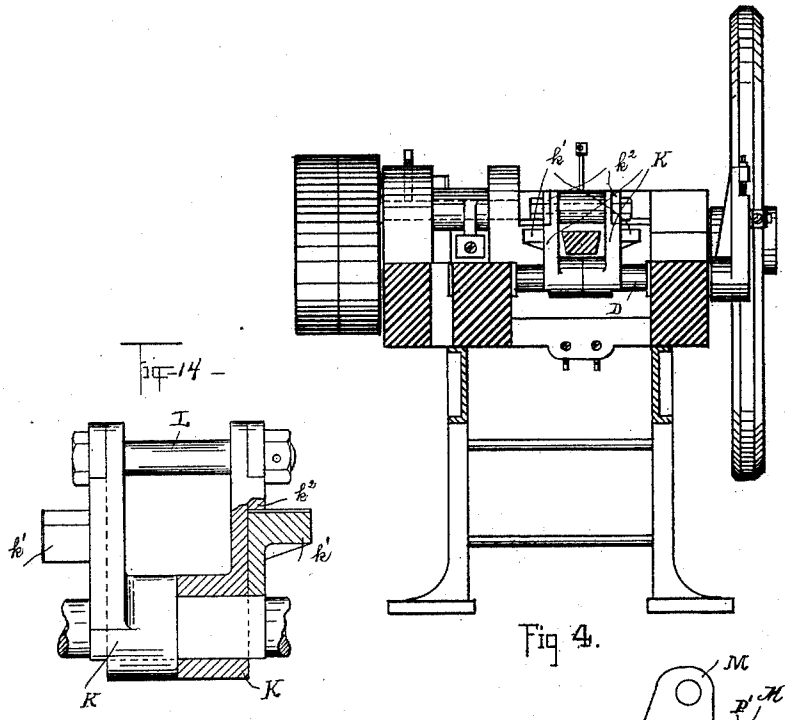

Fig 4.

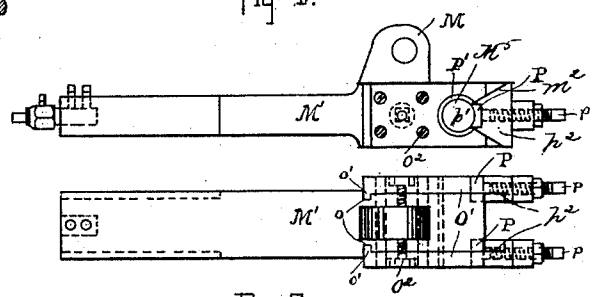

Fig 5.

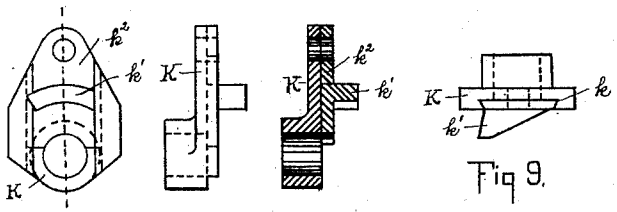

Fig 6. Fig 7. Fig 8. Fig 9.

Witnesses
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UNITED STATES PATENT OFFICE.

JOHN M. E. BAACKES AND CHARLES RICHARDS, OF CLEVELAND, OHIO.

NAIL-MACHINE.

SPECIFICATION forming part of Letters Patent No. 468,399, dated February 9, 1892.

Application filed September 15, 1890. Serial No. 364,937. (No model.)

To all whom it may concern:

Be it known that we, JOHN MICHAEL ENGELBERT BAACKES and CHARLES RICHARDS, citizens of the United States, and residents of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Nail-Machines, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated applying that principle, so as to distinguish it from other inventions.

The objects of our invention are to provide improved means for controlling the clamping device or dog of the wire-feeding mechanism, to provide a double adjustment for the wire-feeding mechanism, to provide improved means for adjusting the die-operating mechanism, to provide improved means for knocking off or expelling the finished nails, to provide improved means for operating the cutters, and to provide an improved joint between the hammer-stock and the pitman for the same.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In such annexed drawings, Figure 1 represents a longitudinal vertical section of our improved nail-machine; Fig. 2, a side elevation; Fig. 3, a top plan view; Fig. 4, a transverse vertical section taken on a line forward of the rock-shaft and looking rearward; Fig. 5, a side view and top view of the hammer-stock; Figs. 6 and 7, a front view and an edge view, respectively, of one rocking-arm and cam for operating the cutters; Fig. 8, a section of said arm; Fig. 9, a top view; Fig. 10, a view of part of the mechanism operating the die; Fig. 11, a view of the adjustable crank upon the rock-shaft; Fig. 12, a view of the wire-gripping dog of the feed mechanism; Fig. 13, a view of the nail-dies and their immediate operating mechanism; Fig. 13^a, a view of the bell-crank which operates the die opening and closing rods; Fig. 14, a view, partly in section, of the rocking arms carrying the cutter-operating cams; Figs. 15 and 16, respectively, a front view and a side view of a portion of the expeller mechanism, and Fig. 17 a detail view illustrating the cut nail, the wire, and a portion of the expeller.

In the drawings the letter A indicates the straightening-rolls, which are journaled in the axial line of the machine at the forward end of the same. The reciprocating feeder B is secured upon a rod b, which has longitudinal sliding bearings in the machine-frame. A lever a is pivoted upon a bolt a^3 upon the inner end or head of the feeder, and the short rear arm of said lever has a dog or chisel a' adjustably secured in it to bear against the wire at a point opposite to a jaw b', rigidly secured upon the feeder. The forward long arm of the lever consists of an oblique rear portion and a straight forward portion, and a spring a^2 is secured in the enlarged head of the pivot a^3 for the lever, and bears with its free end against the long arm of the lever, forcing the same outward. A roller C′ is journaled upon a vertical stud at the rear end of a longitudinally-adjustable plate C, which is secured to slide longitudinally upon the machine-frame upon screw-bolts c', inserted through a longitudinal slot c in the plates.

The main shaft G, to which the driving-power is applied, is transversely journaled near the rear end of the machine-frame and is provided with a suitable fly-wheel G′ and with a double crank G^2 at about its middle. A pitman O is pivotally connected to said crank with its rear end and is formed with a knuckle O^3 at its forward end. The hammer-stock M′ slides in longitudinal guides M^3 and M^4 in the machine-frame, and is formed at its rear end with a bearing M^5, into which the knuckle O^3 of the pitman may fit and rock. Said bearing is lined with a bushing P′, having a portion p' cut out for the pitman. Said cut-out portion or mouth p' registers with a flaring mouth m^2 in the rear end of the hammer-stock. Two cheek-pieces or bearing-pieces O′ are secured upon the sides of the rear portion of the hammer-stock and are formed at their forward edges with vertical ribs or flanges o', which fit into corresponding grooves o in the sides of the hammer-stock. Screw-bolts o^2 secure the cheek-pieces to the sides of the hammer-stock, and the vertical flanges o' and truncate triangu-

lar enlargements p^2 upon the inner faces of the cheek-pieces, fitting in the sides of the flaring mouth of the hammer-stock, serve to prevent longitudinal movement of the cheek-pieces as they reciprocate in the rear guides M^3 of the machine-frame. Bushing-sections P are inserted from both sides through the cheek-pieces, so as to fill out the cut-out portions p' of the bushings P′ and complete the bushing around the ends of the knuckle, and screws p are inserted through the ends of the cheek-pieces and serve to adjust the bushing-sections P against the ends of the knuckles, so as to take up any wear in the bearing. By having the cheek-pieces which close the bearing for the knuckle of the pitman arranged so that they slide within and are retained by the sides of the guides M^3 said bearing will be completely locked and will not be liable to become opened or to have any of its parts become dislocated, which would be liable to occur in an unprotected joint on account of the severe strain and jar upon the same incident to the heading of the nail.

A rock-shaft D is transversely journaled in the machine-frame at about its middle, and said shaft has two wide arms K secured upon it at about its middle. The outer faces of said arms are formed with longitudinal dovetailed grooves k, into which the correspondingly-shaped feet of two oblique cam-flanges k' may fit and be securely held. Dovetailed locking-slides k^2 fit into the grooves and bear with their inner ends against the feet of the cams k', retaining them within the grooves. Said locking-slides are secured in the grooves by means of a bolt L, which is transversely inserted through the outer ends of the slides and of the rocking cam-bearing arms K. A link or connecting-rod l is pivoted with its forward end upon the bolt L, between the rocking arms, and with its rear bifurcated end at both sides of a lug or ear M upon the rear end of the hammer-stock. A crank-arm d is secured upon one end of the rock-shaft D, and is formed with a longitudinal slot d', through which passes a screw d^2, journaled in ears g^3 upon the crank-arm. A pin e has said screw passing through a female-threaded hole in its inner end and slides in said slot, so that it may be adjusted in or out in relation to the rock-shaft by means of said screw. The rear end e' of a connecting-rod E is pivoted upon the pin e, and the forward end of said connecting-rod is pivoted to the outer end of the longitudinally-reciprocating feeder B, which may thus be reciprocated by rocking the rock-shaft, which may be rocked by its connection to the reciprocating hammer-stock.

The heading-die is composed of the stationary die J′ and the movable die J, and the die-closing rod h bears with its inner end against said movable die. The die-opening rod h' is pivoted to said movable die at its inner end. A three-armed lever H is pivoted to rock in a horizontal plane upon the machine-frame and has the outer end of the die-closing rod secured in its forwardly-projecting arm and the other end of the die-opening rod bearing against the same, to be drawn out by it when the forward end of the lever is tilted outward. A spring H′ bears against the rear arm of the lever H. A connecting-rod or so-called "tension-rod" f^2 has slotted or open heads f^3 and f^4 at its ends, the slots or openings in said heads being in planes at right angles to each other, and screws f^5 are inserted through the outer ends of said slotted heads. The laterally-projecting arm of the three-armed lever H projects into the slot in the forward head of the lever, and the downwardly-projecting arm f^6 of a lever f', pivoted upon the frame, projects into the rear head. The distance between the bearing-points of the tension-rod upon the two lever-arms may be adjusted by the screws f^5 in the slotted heads. A roller f is journaled in the rear end of the lever f' and bears against the periphery of a cam F upon the drive-shaft, said roller being forced against the cam by a spring f^7, which bears against the rear end of the lever.

Two cutter-supports or cutter-supporting levers N N are pivoted in the frame at opposite sides of the path of the hammer-stock, and have cutter-heads N^2 for severing and pointing the nails upon their upper ends. Springs M^2 are secured upon the frame and bear with their free ends against the lower ends of the cutter-supports, forcing their lower arms inward and, consequently, their upper arms and the cutters outward. Levers N′ are pivoted to rock in a horizontal plane upon the machine-frame and have screws m inserted through their forward ends to bear against the cutter-heads or upper ends of the cutter-supports. The rear ends of the levers N′ are provided with rollers m', with which they bear against the forwardly-diverging edges of the cam-flanges k'.

A forked yoke Q is pivoted with its legs upon opposite sides of the path of the hammer-stock, forward of the forward hammer-stock guide, has its pivots in the same horizontal plane as the wire, and straddles the hammer-stock. The downwardly-curved expeller q is secured in the upper end of the yoke by means of a gib q^2 and set-screw q'. A bell-crank R is fulcrumed above the rear end of the hammer-stock, and has its rearwardly-extending slightly downwardly-curved arm engaged by a projection r upon the upper side of the pitman when the latter is at the forward and upper portion of its travel. A rod r' is pivoted to the upwardly-projecting arm of the bell-crank, and has its forward bifurcated end pivoted to the upper end of the expeller-yoke. A spring r^2 is secured to the expeller-yoke and to a stationary portion of the frame, and serves to raise the yoke and the expeller.

In practice the wire is fed from the reel

through the straightening-rollers. The chisel or jaw of the feeder clamps the wire against the stationary jaw upon the feeder, acting as a grip upon the wire, and draws the wire toward the heading-die with the feeder. When the feeder moves toward the die the straight portion of the lever *a* will strike the stop formed by the roller C′, and the lever will be tilted against its spring so as to release the wire. By adjusting the slotted plate C and its roller upon the machine-frame, and in relation to the extent of the stroke of the feeder, the chisel or dog of the latter may be tilted out of engagement with the wire at any point of the stroke of the feeder, so that the wire may be fed in any desired length. This releasing device for the wire-grip of the feeder will admit of a double adjustment of the feeding mechanism, one adjustment being accomplished by means of the adjustable crank-pin *e* of the crank-arm *d*, and the other and final adjustment being accomplished by means of the adjustable roller C′. The proper length of wire to form the head of the nail is fed through the heading-die, which is thereupon closed upon the wire by means of the cam upon the main shaft, the lever *f*′, the adjustable tension-rod, the three-armed lever H, and the die-closing rod. The space between the stationary and the movable die, in which the wire is held, may be adjusted by means of the screw-threaded outer end of the die-closing rod, and the degree of force or tension with which the wire is clamped in the die may be controlled by screwing the screws in the slotted heads of the tension-rod farther in or out, shortening and lenghtening the tension-rod, and thus increasing or decreasing the draw of the same upon the three-armed lever. The header or hammer is now forced forward by the revolving crank, and the head of the nail is struck in the die. As the hammer-stock returns by the rearward revolution of the crank upon the main shaft, the rock-shaft D and its cam-arms will be rocked rearward and the forwardly-diverging edges of their cam-flanges will spread the rear arms of the cutter-operating levers N′, and, consequently, cause said levers to force the cutters together and to sever and point the headed nail, which is fed rearward by the rearward rocking of the rock-shaft. The upwardly and rearwardly swinging pitman will cause its stop or projection *r* to strike the rear arm of the bell-crank R, which will tilt said bell-crank and its connecting-rod forward, causing the expeller to be thrown forward and to strike the severed nail at its newly-made point, knocking off the nail. As the expeller descends, it will also perform the still more important office of knocking off the barbs or fins of metal, which are liable to remain upon the end of the wire after the cutters have made the point and cut the wire, as the triangular or semi-pyramidal cut made by said cutters is liable to leave such barbs or fins, as seen in Fig. 17, especially when the cutters have been in use for some time and have become dulled. As the expeller is longitudinally adjustable in its yoke, it may be adjusted according to the amount of wire projecting beyond the dies to form the head, so that the end of the expeller will always tap the wire exactly at the end of the cut and will pass exactly down by the end of the wire, knocking off the barbs and smoothing the end of the wire. This is a very important function, as, if the loose barbs were swaged into the head of the nail, they would drop out after the head had been formed, and would thus mar the finished head. As the expeller-yoke is pivoted in the same horizontal plane as the axial line or the line of travel of the wire, the end of the expeller will, after it has been suitably adjusted, swing perfectly true past the end of the wire, removing the barbs, but without danger of bending the remaining end of the wire out of the straight line. When the projection upon the pitman has passed from beneath the rear arm of the bell-crank, the spring r^2 will return the expeller and its operating parts to their normal position, the expeller being then tilted clear out of the way of the hammer-stock.

As the wire-feeder and the cutters are operated from the rock-shaft instead of directly from the revolving main or drive shaft, said parts of the mechanism will be actuated for so long time only of the revolution of the drive-shaft as is necessary for their operation and will not be engaged or actuated while not performing their work, as they would be liable to be if directly actuated by the drive-shaft. A saving in driving-power as well as in the wear upon the parts of the machine is effected by this construction and the machine may be operated at a comparatively high speed, as no parts are moved excepting when performing actual work.

By journaling the rock-shaft beneath the plane in which the hammer-stock reciprocates and thus having the hammer-stock reciprocating between the cam-bearing arms upon the shaft, said arms may be made sufficiently long to give the cam-flanges sufficient stroke, and the shaft will be out of the way of the hammer-stock, so that it may be made in one continuous piece without any interruption and consequent weakening from recessing it or forming a crank upon it, which would be necessary for the passage of the hammer-stock if the rock-shaft were journaled in the same plane in which the hammer-stock reciprocates.

Other modes of applying the principle of our invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism herein set forth, provided the principles of construction respectively recited in the following claims are employed.

We therefore particularly point out and distinctly claim as our invention—

1. In a nail-machine, the combination of a

reciprocating wire-grip with a stop adjustably secured in the path of said grip to release the same from the wire at a certain portion of its stroke, substantially as set forth.

2. In a nail-machine, the combination of a reciprocating feeder, a wire-grip upon said feeder, and a stop adjustably secured to engage said grip to release the same at a certain portion of its stroke, substantially as set forth.

3. In a nail-machine, the combination of a reciprocating feeder, a pivoted wire-grip having a projecting arm and pivoted upon said feeder, and a stop adjustably secured in the path of said projecting arm to release said grip at a certain portion of its stroke, substantially as set forth.

4. In a nail-machine, the combination of a reciprocating feeder provided with a stationary jaw, a wire-gripping lever pivoted upon said feeder to act against said jaw and provided with a projecting arm, and a stop adjustably secured in the path of said arm to release said lever at a certain portion of its stroke, substantially as set forth.

5. In a nail-machine, the combination of a reciprocating feeder provided with a stationary jaw, a wire-gripping lever pivoted upon said feeder to act against said jaw and provided with a projecting arm, a spring bearing against said arm to force the end of the lever against the stationary jaw, and a stop secured longitudinally adjustable in the path of said lever-arm to engage and rock the same at a predetermined point of the stroke of the feeder, substantially as set forth.

6. In a nail-machine, the combination of a reciprocating feeder provided with a stationary jaw, a wire-gripping lever pivoted upon said feeder to act against said jaw and provided with a projecting arm, a spring bearing against said arm to force the end of the lever against the stationary jaw, and a longitudinally-slotted plate adjustably secured upon screw-bolts in the path of the feeder and provided with a roll which may engage the projecting arm, substantially as set forth.

7. In a nail-machine, the combination of a reciprocating feeder having means for adjusting the length of its stroke, a wire-grip upon said feeder, and a stop adjustably secured to engage said grip to release the same at a predetermined point of its stroke, substantially as set forth.

8. In a nail-machine, the combination, with a revolving drive-shaft, a hammer-stock connected to be reciprocated by said shaft, and a rock-shaft connected to be rocked by said hammer-stock, of wire-feeding mechanism and wire-cutters connected to said rock-shaft to be operated by the same, substantially as set forth.

9. In a nail-machine, the combination of a revolving drive-shaft, a hammer-stock connected to be reciprocated by said shaft, a rock-shaft having projecting arms upon it, a link between said arms and hammer-stock, cams upon said arms, and cutter-actuating levers having their ends engaged by said cams, substantially as set forth.

10. In a nail-machine, the combination of a revolving drive-shaft, a hammer-stock connected to be reciprocated by said shaft, a rock-shaft journaled beneath the hammer-stock and provided with two arms projecting at the sides of the hammer-stock, a link between said arms and the hammer-stock, cam-flanges upon said arms, and cutter-actuating levers having their ends engaged by said cam-flanges, substantially as set forth.

11. In a nail-machine, the combination of a revolving drive-shaft, a rock-shaft connected to be rocked by said drive-shaft and provided with a cam, and a cutter-actuating lever engaged and rocked by said cam, substantially as set forth.

12. In a nail-machine, the combination of a reciprocating hammer-stock, a rock-shaft connected to be rocked by said hammer-stock and provided with a cam, and a cutter-actuating lever engaged and rocked by said cam, substantially as set forth.

13. In a nail-machine, the combination of a reciprocating hammer-stock, a rock-shaft provided with a projecting arm, a link between said hammer-stock and arm, a cam upon said arm, and a cutter-actuating lever engaged and rocked by said cam, substantially as set forth.

14. In a nail-machine, the combination of a movable die, a lever connected to operate said die, a drive-shaft provided with a cam, a lever engaging said cam, and a tension-rod adjustable as to the length and connected to said two levers, substantially as set forth.

15. In a nail-machine, the combination of a movable die, a lever having one arm connected to operate said die, a drive-shaft provided with a cam, a lever engaging said cam with one arm, and a tension-rod having its slotted heads engaging the other arms of said two levers and having screws through their ends bearing against said lever-arms, substantially as set forth.

16. In a nail-machine, the combination of a movable die, a three-armed lever having its forwardly-projecting arm connected to operate said die, a spring bearing against the rearwardly-projecting arm of said lever, a revolving cam, a bell-crank lever engaging said crank with its rearwardly-projecting arm, a tension-rod having longitudinally-slotted heads respectively engaging the inwardly-projecting arm of the three-armed lever and the downwardly-projecting arm of the bell-crank lever, and screws through the ends of said heads and bearing against the lever-arms, substantially as set forth.

17. In a nail-machine, the combination of a rock-shaft, arms projecting from the same and formed with dovetailed grooves in their outer sides, cam-flanges provided with dovetailed feet fitting into said grooves, dovetailed locking-slides in said grooves, and a bolt inserted through said slides and through the outer ends of the arms, substantially as set forth.

18. In a nail-machine, the combination of a rock-shaft, arms projecting from the same and formed with dovetailed grooves in their outer sides, cam-flanges provided with dovetailed feet fitting into said grooves, dovetailed locking-slides in said grooves, a bolt inserted through said slides and arms, a reciprocating hammer-stock, and a link pivoted upon said bolt and to said hammer-stock, substantially as set forth.

19. In a nail-machine, the combination of a pivotal expeller, a pitman, a bell-crank pivoted above said pitman, a connecting-rod between the expeller and bell-crank, and a projection upon the pitman to engage the rear arm of the bell-crank, substantially as set forth.

20. In a nail-machine, the combination of a reciprocating hammer-stock, a pitman connected to reciprocate said hammer-stock, an expeller having a bifurcated yoke pivoted at both sides of said hammer-stock, a bell-crank pivoted above said pitman and having an arm projecting rearward over the same, a connecting-rod between the expeller and the upper arm of said bell-crank, and a projection upon said pitman adapted to engage the rear arm of the bell-crank, substantially as set forth.

In testimony that we claim the foregoing to be our invention we have hereunto set our hands this 9th day of June, A. D. 1890.

J. M. E. BAACKES.
CHAS. RICHARDS.

Witnesses:
J. B. FAY,
E. E. PATE.