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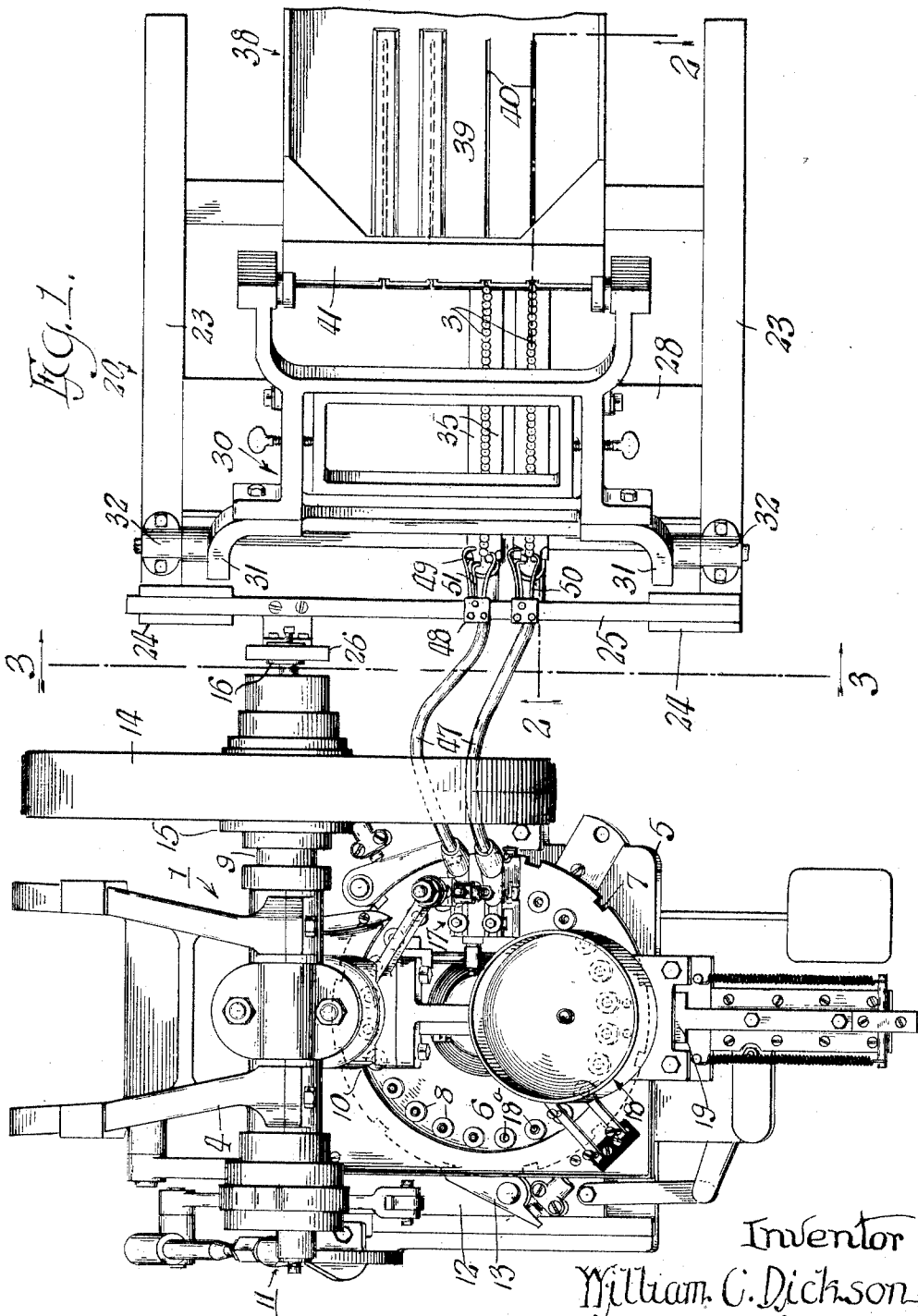
W. C. DICKSON

1,845,651

NAIL FEEDING MECHANISM

Filed Feb. 4, 1929

3 Sheets-Sheet 1



Inventor

William C. Dickson

Attorney

Feb. 16, 1932.

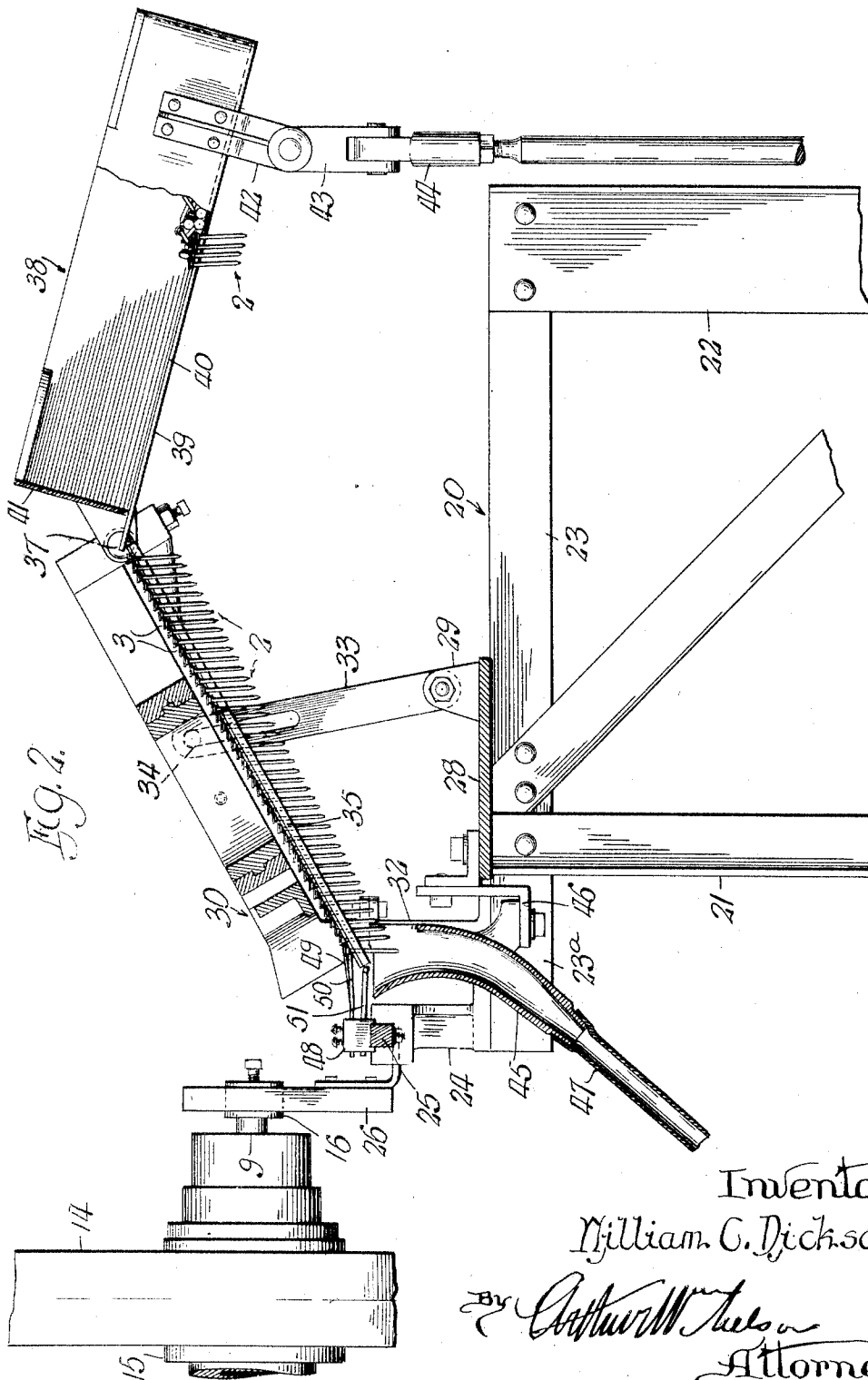
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3 Sheets-Sheet 2



Inventor
William C. Dickson
By *Arthur W. Nelson*
Attorney

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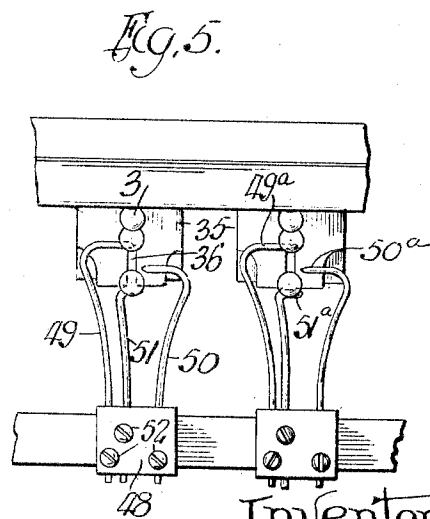
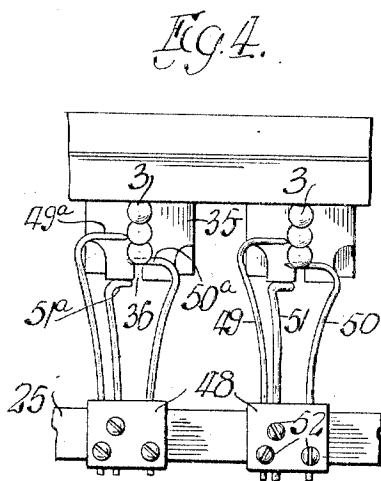
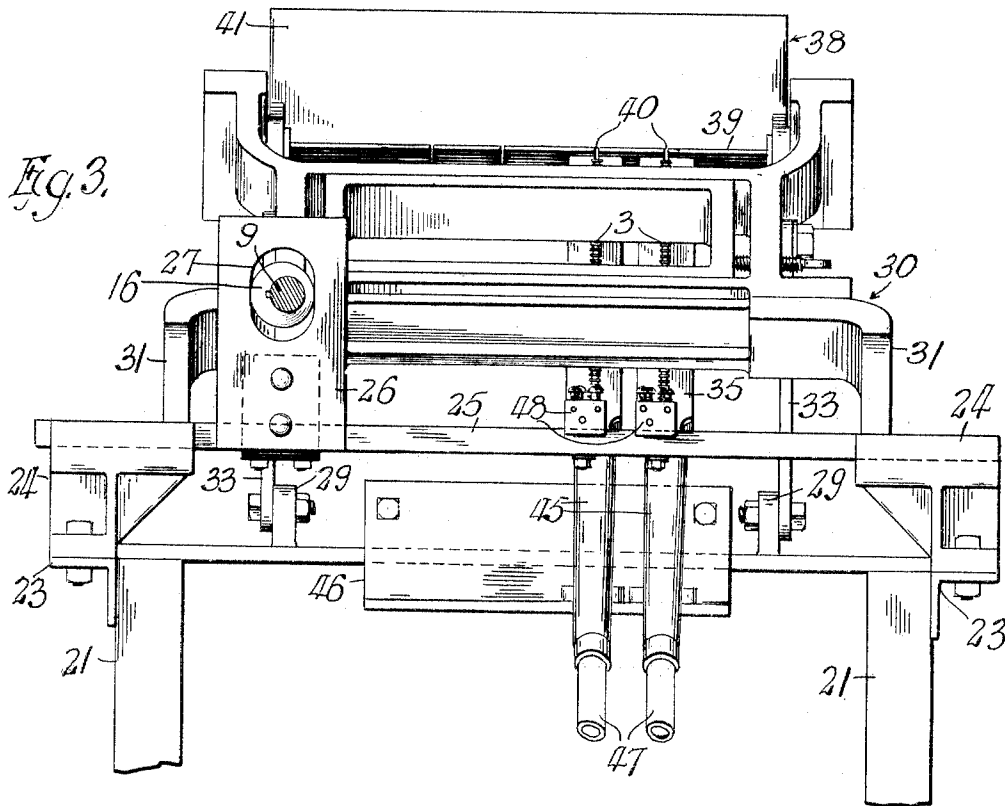
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3 Sheets-Sheet 3



Inventor

William C. Dickson

By *Arthur W. Nelson*
Attorney

UNITED STATES PATENT OFFICE

WILLIAM C. DICKSON, OF EVANSTON, ILLINOIS

NAIL FEEDING MECHANISM

Application filed February 4, 1929. Serial No. 337,293.

This invention relates to improvements in nail feeding mechanisms and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

In certain machines, such as for instance machines which compress a softer metal about the head of a nail to form a weather-proof cap thereon, the nails must be fed from a nail hopper to the desired mechanism of the machine, one at a time at desired intervals and in proper position for operation thereupon by such mechanism.

The hopper which is of the rocking type, has longitudinally extending slots therein into which the nails enter, point down and are guided in this manner to enter aligned slots in an inclined, stationary nail holding plate, down which the nails move in a pendent position, with the nail heads on the top side of the plate. While supported in rows upon said plate, an excess of nails is built up therein so that a continuous supply is assured.

The nails are discharged one at a time, from the bottom or lower end of said nail holding plate, into a conduit which directs the nails to the desired mechanism of the machine and my invention particularly relates to the means which permit the discharge of but one nail at a time from each slot in the nail holding plate.

The primary object of the invention is to provide improved means associated with the bottom end of the nail supporting plate, for discharging but a single nail at a time from each slot in said plate and to so dispose the various elements of said means as to first isolate the nail to be discharged from the others before it is discharged, so that no entanglement can take place and the discharged nail drops point down into the conduit directing it to the mechanism operating thereupon.

Another object of the invention is to provide such means which includes a plurality of fingers so acting upon the nail to be discharged, as to first separate or release said nail from the others in the row and permit said nail to move to a position spaced there-

from and then to permit said released nail to be discharged therefrom after which the next nail is acted upon in the same manner.

These objects of the invention as well as others, together with the many advantages thereof, will more fully appear as I proceed with my specification.

In the drawings:—

Fig. 1 is a top plan view of my improved nail feeding mechanism as it appears when used in connection with a nail head capping machine for delivering nails thereto.

Fig. 2 is a longitudinal vertical sectional view through my improved nail feeding mechanism, as taken on the line 2—2 of Fig. 1.

Fig. 3 is a transverse vertical sectional view through the same as taken on the line 3—3 of Fig. 1.

Fig. 4 is a detail view in plan elevation on an enlarged scale of the nail separating and releasing fingers in that position after having released and discharged a nail.

Fig. 5 is a view similar to Fig. 4 with the parts in a changed relation as will later appear.

Referring now in detail to that embodiment of the invention illustrated in the accompanying drawings and especially to Fig. 1 thereof, 1 indicates as a whole a machine for applying caps to the nails 2 by compressing a small pellet like mass of softer metal about the head 3 of each nail. As said machine forms no particular part of the present invention, its structure will only be described generally.

Said machine includes a punch press like frame 4 having a bed plate 5 upon which is mounted a step by step rotative die carrying plate 6. In the periphery of said plate is formed a plurality of arcuately spaced notches 7—7 and within said periphery is provided a plurality of arcuately spaced die blocks 8, there being a pair of die blocks for each notch. At the top of the frame 4 is journaled a horizontally disposed, laterally extending crank shaft 9. To the middle crank like portion of said shaft is operatively connected a vertically reciprocating cross head 10 carrying punches (not shown)

adapted to coact with the die blocks 8 therebeneath, to compress the masses of softer metal upon the nail heads 3 to form the caps thereon. At the left hand side of the frame is means indicated as a whole as at 11 to reciprocate a forwardly and rearwardly extending bar 12 sliding in a suitable guide groove in the left hand side of the bed 5. On said bar is pivoted a spring pressed pawl 13 which in the reciprocation of the bar 12, engages in one of the notches 7 in the die carrying plate 6 so as to impart step by step rotative movement to said plate.

On the right hand side of the crank shaft 9 is a belt driven pulley 14 adapted to be connected to and disconnected from the crank shaft by a suitable clutch 15. On that extremity of the crank shaft, beyond the pulley 14 is fixed an eccentric 16. At the right hand side of the bed plate and overhanging a portion of the die carrying plate 6 is a nail guiding and inserting means 17 by which nails 2 fed thereto as will later appear are delivered into the dies one at a time.

At the front of the bed plate is a hopper 18 to hold the pellets 18^a of softer metal, which are delivered by mechanism 19, one at a time into each die upon the head of the nail therein. After the dies are thus loaded they move step by step until they register with the punches (before mentioned) on the cross head which compress the pellet thereon to form the cap upon the nail head after which the capped nail is discharged from the machine and the empty dies once more pass beneath the nail guiding and inserting means 17 to receive the nails as before described.

To the right hand side of the machine thus generally described, is located a structural frame work indicated in Fig. 1 as at 20 as a whole. Said frame work includes front and rear pairs of upright legs 21 and 22 respectively, the legs of each pair being connected together at the top by angle bars 23—23 respectively. The inner end 23^a of each angle bar 23 extends beyond the associated leg 21, 21 toward the machine 1 and each of said ends has secured thereto an upright bracket 24. Reciprocating in said brackets is a horizontally disposed bar 25, rectangular in cross section. Secured to said bar is an upright plate 26 having a vertically elongated opening 27 of a width to receive the eccentric 16 before mentioned. It is apparent that for each rotation of the crank shaft 9, which is the equivalent of one cycle of operation of the nail capping machine, the bar 25 receives one complete reciprocation.

The angle bars 23—23 are connected together above the legs 21—21 by a cross plate 28 which includes upright ears 29—29 respectively spaced inwardly from the angle bars 23—23. An open framelike casting 30 having laterally spaced arms 31—31 at its

lower or bottom end is pivotally connected by means of said arms to upright brackets 32 rising from the angle bar ends 23^a—23^a, said pivotal connection being disposed in approximately the horizontal plane of the reciprocating bar 25. Said frame 30 is inclined upwardly from said pivotal connection toward the plane of the legs 21 and is supported in said inclined position by means of links 33 each pivotally connected to an ear 29. The top end of said link has a pin and slot connection 34 with the open framelike casting 30, so that the angle of inclination of said casting may be readily adjusted.

Secured to the bottom of said frame, is a plurality of pairs of plates 35—35, with the plates of each pair spaced apart to provide therebetween a slot 36 of a width sufficient to receive the shanks of the nails 2 whereby they hang point down and with the heads of the nails engaging the top sides of both plates of each pair as best shown in Fig. 2. To the top end of the open framelike casting 30, there is pivoted as at 37, one end of a rocking nail hopper 38. Said hopper is in the form of an open top box into which the nails are dumped promiscuously. In the bottom wall 39 of said hopper slots 40—40 are provided which line up with the slots 36—36 defined by the plates 35—35. At the inner or pivoted end of the hopper is a wall 41 which terminates a short distance above the bottom 39. The outer or free end of said hopper carries a bracket 42 which is connected by a link 43 to the top end of a vertically disposed rod 44 reciprocated in any suitable manner.

With a supply of nails in the hopper 38 and with the rod 44 in reciprocation, it is apparent that a rocking movement is imparted to the hopper about the pivotal connection as an axis. In this rocking movement of the hopper the pointed end of the shanks of some of the nails are certain to enter the slots 40 in the bottom wall thereof. As the hopper swings upwardly, the nails in said slots will slide down the bottom wall thereof toward the pivoted end of the hopper. With the slots 40 registering or lining up with the slots 36 provided by the plates 35, it is apparent that some of said nails will enter into the slots 36 to build up in a row therein as best shown in Figs. 1 and 2.

Associated with the bottom or discharge end of each slot 36, is an open top, funnel like member 45 into which the bottommost nail of the associated slot 35, drops when said nail is discharged therefrom as will later appear. Each funnel like member 45 is supported from the cross plate 28 by means of a bracket 46. To the bottom end of each funnel is connected the top end of a tube or conduit 47, the bottom end of which is connected to an associated means 17 which guides and inserts

the nail passing down said conduit into the proper die member 8.

When a row of nails is in each slot 36, it is apparent that without some means associated with the bottom end thereof, all the nails in each row would simply move downwardly under gravity toward the bottom of the slot and would discharge themselves therefrom. To discharge but the bottommost nail in each slot therefrom, in timed relation with respect to the operation of the nail capping machine, I provide the following mechanism.

On the top surface of the reciprocating bar 25 there is provided a pair of blocks 48, which are spaced apart, a distance equal to the spacing between the slots 36—36. Each block carries a plurality or group of fingers 49—50 and 51 respectively which for convenience I have termed a separating, a releasing and a discharging finger respectively. The separating finger and the releasing finger are both disposed in approximately the same horizontal plane, and both are adapted to overhang the bottom ends of the associated plates 35—35 defining the slots 36 while the discharging finger is disposed in the plane of the end extremities of said plates. One end of all of said fingers extends through suitable openings in the associated block 48 and are secured in place therein by clamping screws 52. By loosening said screws the fingers may be adjusted to the proper position in said blocks and are there secured in said position by tightening up said screws.

The separating finger 49 is longer than the releasing finger 50 which in turn is longer than the discharging finger 51. The separating and releasing finger each has an oppositely inturned end part 49^a and 50^a respectively, the extremities of which are pointed, while the discharging finger has a shorter inturned end part 51^a which extends or points in the same direction as the end part 49^a of the finger 49.

With the parts in the position they occupy as best shown in Fig. 4 and wherein the bar 25 has just moved to the left to discharge a nail from each slot 36, it is apparent that the releasing finger extends across its associated slot to prevent any movement of what is now the bottommost nail in said slot. It is also apparent that the separating finger of each group is free of and to the left of said nails in the associated row of nails. As the bar 25 moves toward the right, the finger part 50^a moves away from the associated slot and the finger portions 49^a and 51^a move toward and across said slot. In this movement the finger part 49^a moves behind the bottommost nail in its associated row and separates that one from the row, in the meantime holding back the others in said row against movement. As the finger portion 50^a moves away from said slot, it releases the bottommost

nail which is free to move by gravity toward the extreme bottom end of the slot which is now closed off by the finger part 51^a. This separates and isolates the bottommost nail in each row from its companions so that when the bar 25 moves toward the left again, the finger part 51^a will uncover the bottom end of the slot from which the bottommost nail drops by gravity into the funnel member 45 and down the tube 47 to the means 17 for guiding and inserting the nail into the proper die 8.

I have found by actual operation that by the mechanism described the separation of the bottommost nail from the others in the row, prevents any entanglement or interference with said bottommost nail so that it drops true in the funnel member and does not spin or whirl so the nail passes quickly down the tube which is always clear. By thus discharging the nails into the associated funnel member, there is no possibility of one nail catching the other in the tube or conduit when the machine operates at high speed so that the nails are accurately and positively fed and jamming of the nails is avoided.

By so placing the fingers 49 and 50 above the plates 35—35, the parts 49^a and 50^a of said fingers operate upon the nails just below the heads thereof so that they do not act to swing the nails out of the perpendicular plane, when they engage the nails for the purpose described.

The mechanism though simple, is extremely positive and efficient for its intended purpose so that the nail head capping machine may be operated at a greater speed without jamming due to faulty feeding of the nails.

While in describing my invention I have referred in detail to the form, arrangement and construction of the various parts thereof, I do not wish to be limited thereto except as may be pointed out in the appended claims.

I claim as my invention:—

1. A nail feeding mechanism embodying therein, means inclined to the horizontal and providing an open ended slot adapted to receive a plurality of nails hanging pendently therein by their heads, a movable member adapted when in one position to be engaged by the bottommost nail for holding said plurality of nails in said slot and adapted when in another position to release said bottommost nail, a second member movable with the first member and immovable relative thereto for separating the bottommost nail from said plurality when released by said first member a third member for opening and closing the open bottom end of said slot movable with the first two members but immovable relative thereto and acting in one limit of its movement to permit the discharge of the bottommost nail from said slot and acting in the other limit of its movement to hold said last mentioned nail in the bottom end of said slot

and a shiftable element rigidly connected to the movable members for operating said movable members.

2. A nail feeding mechanism embodying therein, means inclined to the horizontal and
 5 providing an open ended slot adapted to receive a plurality of nails hanging pendently therein by their heads, a movable member adapted when in one position to be engaged by the bottommost nail for holding said plu-
 10 rality of nails in said slot and adapted when in another position to release said bottommost nail, a second member movable with the first member and immovable relative thereto for separating the bottommost nail from said
 15 plurality when released by said first member, a third member for opening and closing the open bottom end of said slot movable with the first two members but immovable relative thereto and acting in one limit of
 20 its movement to permit the discharge of the bottommost nail from said slot and acting in the other limit of its movement to hold said last mentioned nail in the bottom end of said slot and an actuator element rigidly connect-
 25 ed to all of said members.

3. A nail feeding mechanism embodying therein means inclined to the horizontal and providing an open ended slot adapted to re-
 30 ceive a plurality of nails hanging pendently therein by their heads, a bar reciprocable in a plane at a right angle to said slot and a plurality of fingers connected to and movable with said bar, two of said fingers having
 35 parts overhanging said means and adapted to traverse said slot in the movement of said bar, the other finger movable with the other two fingers but immovable thereto and having a part disposed in the plane of the end of
 40 said means and adapted to open and close the end of the slot therein.

4. In a nail feeding mechanism, a reciprocable bar, a plurality of fingers extending laterally from the bar and all being of differ-
 45 ent lengths, the two longer fingers having ends disposed inwardly toward each other, the third and shortest finger having an end extending in the direction of the end of the longest finger.

5. In a nail feeding mechanism, a reciprocable bar, a plurality of fingers extending laterally from the bar and all being of different lengths, the two longer fingers being dis-
 50 posed in substantially the same horizontal plane and having ends bent to extend toward each other, the third and shortest finger being
 55 disposed in a plane below that of the others and having an end extending in the direction of the end of the longest finger.

6. In a nail feeding mechanism, a reciprocable bar, a plurality of fingers extending laterally from the bar and all being of different lengths, the two longer fingers having
 60 ends disposed inwardly toward each other, the third and shortest finger having an end

extending in the direction of the end of the longest finger, all of said fingers being adjustably secured with respect to said bar.

In testimony whereof, I have hereunto set my hand, this 31st day of January, 1929.

WILLIAM C. DICKSON.

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