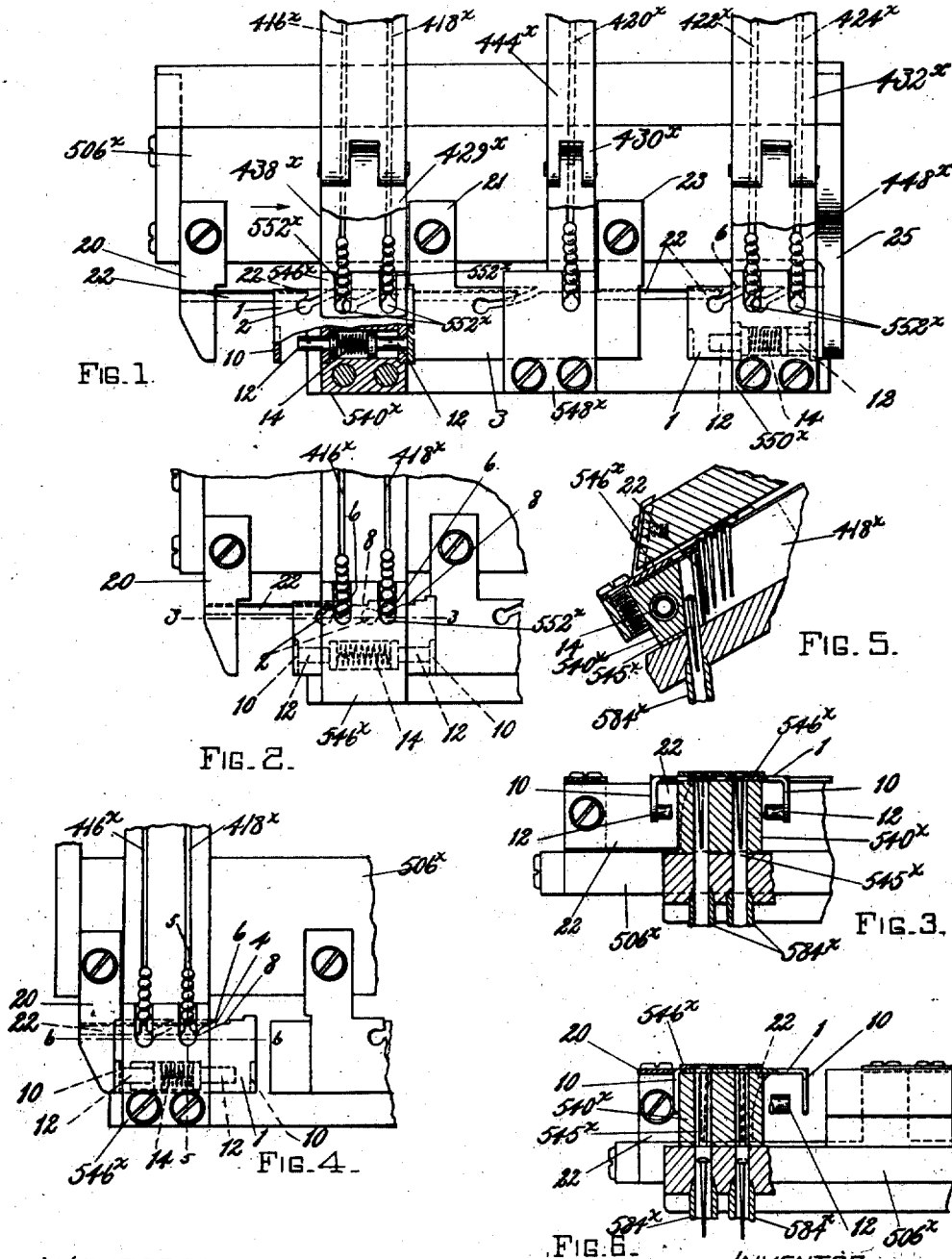


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NAIL FEEDING MECHANISM.
APPLICATION FILED MAY 26, 1904.

1,002,421.

Patented Sept. 5, 1911.



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NAIL-FEEDING MECHANISM.

1,002,421.

Specification of Letters Patent.

Patented Sept. 5, 1911.

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To all whom it may concern:

Be it known that I, RONALD F. McFEELY, a citizen of the United States, residing at Beverly, in the county of Essex and Commonwealth of Massachusetts, have invented certain Improvements in Nail-Feeding Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to mechanism for feeding nails or other articles and has for its object to provide improved means for insuring a certain and reliable separation of the nails or other articles and their delivery one by one from a raceway or raceway section.

The invention is herein shown as embodied in a mechanism for feeding nails or tacks and as applied to the machine illustrated and described in United States Letters Patent No. 663,777, granted December 11, 1901, although it is obvious that the invention may also be embodied in mechanism for feeding other articles than nails and that it may be applied to any machine in which nails require to be delivered one at a time.

The several features of the invention, including details of construction and combinations of parts, will be hereinafter described and pointed out in the claims.

Figure 1 of the drawings is a plan view of the lower ends of the raceways and of the nail-feeding mechanisms, the feeding mechanism for the left-hand raceway being partially broken away better to show its construction. Fig. 2 is a plan view of the mechanism at a different period of its operation. Fig. 3 is a section on the broken line 3-3 of Fig. 2. Fig. 4 is a view similar to Figs. 1 and 2 with the mechanism at a different period of its operation. Fig. 5 is a section on the broken line 5-5 of Fig. 4. Fig. 6 is a section on the broken line 6-6 of Fig. 4, the view being similar to Fig. 3, but showing the parts at a different period of their operation.

In the construction herein shown as embodying my invention the nail-feeding mechanism is arranged at the lower ends of the raceways, of which a plurality are shown, there being illustrated in Fig. 1 double raceways 438* and 448* and a single raceway 444*. The raceways are inclined

downwardly and provided with grooves 416*, 418*, 420*, 422*, and 424* in which the nails, supplied from a hopper, become suspended by their heads and slide toward the lower or discharge ends. The raceways are preferably provided with covers 429*, 430*, 432*, which hold the nails in place in the raceways. End blocks 540* are located at the lower ends of the raceways and are provided with vertical discharge openings 545*, one for each of the raceway grooves, through which the nails after being separated are delivered one at a time into the conductor tubes 584* which may guide them to the nail-inserting mechanisms. The discharge openings and tubes are large enough to permit the nails to pass freely down them, but not large enough to permit a nail to turn therein end for end. The end blocks are provided with cover plates 546*, 548*, 550* secured to their upper faces and having grooves 552* in continuation of the raceway grooves and terminating over the discharge openings in the end blocks, the grooves in the cover plates being wide enough to receive and guide the heads of the nails in their passage from the raceways to the discharge openings.

The construction thus far described is substantially the same as that shown and described in said Letters Patent, wherein the same parts are designated by similar reference characters.

The improved mechanism for separating the lowermost nail in the raceway groove from the line of nails above it and delivering said lowermost nail into the discharge opening of the end block comprises a tack separator and a gate for each raceway. The separator is herein shown as an integral plate 1, but it might obviously comprise separate fingers or bars. The separator plates for the two double raceways are duplicates of each other and the present invention will be described chiefly in connection with the feeding mechanism for the left-hand one of the double raceways.

The separator plate 1 is laterally movable in a guideway provided for it between the raceway and end block on the lower side and the cover plate 546* on the upper side, as shown most clearly in Figs. 3 and 5. The separator plate is thus located in a plane immediately below the heads of the nails in the raceway and it has near its upper edge

discharge openings 2 corresponding in size and shape with the discharge openings 545* in the end block 540*. Leading obliquely from the edge of the separator plate to the openings 2 are throatways 4. The separator plate has sharp, pointed separating fingers 6 on the upper side of the throatways and at the mouth of the throatways are nail seats, 8 which are inset or cut into the upper edge of the plate below the path of the points of the fingers 6 as shown in Fig. 4 and in which seats the nails may become located slightly below the points of the separating fingers, as shown in Fig. 1. The lower wall of the passageway from the seat 8 to the discharge opening 2 forms a nail-holding face for holding the separated nail from free passage down the raceway until the separator plate has been moved to withdraw said face, as will be described. The separator plate may be actuated by any desired means, and as herein shown said plate has at its lower or front end depending ears 10 which are adapted to engage spring-pressed plungers 12 located in a transverse guideway in the end block 540* and acted upon by a spring 14. The plungers 12 are of such a length and are so arranged that when the separator plate 1 is in its intermediate position, as shown in Fig. 2, the plungers will each contact with one of the ears 10 of the separator plate and hold said plate balanced in such position.

The machine is provided with a transversely movable slide 506* reciprocated preferably by yieldingly actuated mechanism which may be the same as that shown for this purpose in the above-mentioned Letters Patent. The slide 506* has projecting from its front edge arms 20, 21, 23, and 25 located in the plane in which lie the separator plates 1. The separator plate 3, operating in connection with the middle or single raceway, is, as shown, integral with the arms 21 and 23.

The arrangement of the mechanism above described is such that when the parts are in the position shown in Fig. 1 the separator plates 1 are held at the left-hand extreme of their movement by the arms 21 and 25 and the nail seats 8 of the separator plates are in alinement with the raceway grooves and receive the lowermost nails from the lines of nails. When the slide 506* is moved to the right the arms 21 and 25 are withdrawn from the separator plates 1 and these plates are moved to the right by the springs 14 acting through the right-hand plungers 12 to move the separator plates into their intermediate or balanced position, shown in Fig. 2, in which position they come to rest. In this movement of the separator plates the pointed fingers 6 pass between the lower nails and the nails next above them to separate the lower nails from the lines of nails,

said fingers moving, as will be understood, in a plane immediately below the heads of the nails, and the lower nails are, in the movement of the separator plates, caused to pass along the throatways 4 into the position in the throatways shown in Fig. 2. The separator plates remain at rest in this position with the separated nails standing in the throats of the plates while the slide 506* continues to move to the right.

Devices 22, herein termed gates and of which there is one for each raceway, are shown as carried by the same slide 506* which carries the arms 20, 21, 23, and 25, although of course the gates may be carried and actuated by means entirely independent of the means which actuates the separator plates. The gates are thin plates and are secured to the front side of the slide 506*, as shown in Figs. 3 and 6. The outer or right-hand end of each gate is shaped as shown in dotted lines in Figs. 3 and 6 with the front edge inclined or beveled so that the upper pointed corner is in advance of the remaining portion of the edge. The gate is located directly beneath the edge of the separator plate in the vertical plane of the separating finger 6, and when the parts are in the position shown in Fig. 1 the advance end of the gate is some distance to the rear or left of the point of the left-hand separating finger of the plate 1. When the slide 506* is moved to the right, as above described, to permit the separator plate 1 to take the lowermost nail from the raceway grooves and then assume its intermediate or balanced position where it comes to rest under influence of spring 14, as shown in Fig. 2, the gate 22 will still occupy a position with its advance end to the left of the left-hand separating finger 6, which at this time stands between the lowermost nail and the nail next above it in the raceway groove. The separating fingers 6 stand between the nails near their heads and slightly spread them at the period in the operation of the machine shown in Fig. 2, and in the continued movement of the slide 506* to the right, the separator plate being at rest, the gate 22 advances point first into the space between the lowermost nail and the line of nails above. The gate 22 is preferably of a height about equal to or slightly greater than the length of the nails for which the raceway grooves are adapted, or, as herein shown, substantially as wide as the grooves are deep, and therefore, when the gate comes between the lowermost nail and the nail next above, it prevents the shank or point of the nail next above the separated one from swinging or tilting forwardly and getting into the path of the separated nails or in any way interfering with the passage of the separated nail downwardly through the discharge opening 545* in the end block 540*. The gate 22 thus effectually closes the

raceway groove and completely shuts off the line of nails from the discharge opening 545*. The separator plate remains at rest until the slide 506* has carried the gate 22 across both of the raceway grooves of the double raceway and completely closed said raceway grooves, after which the arm 20 meets the left-hand end of the separator plate and moves said plate to the right against the pressure of the spring 14, carrying said plate into the position shown in Fig. 4. In this movement just described of the separator plate the separated nails have been caused to travel along the throatways from the position shown in Fig. 2 to the openings 2 at the inner ends of the throatways, and having reached said openings 2 the separated nails, being free to fall through the discharge openings 545*, have descended into the conductor tubes 584*, as shown in Figs. 4, 5, and 6. In the movement of the parts into the position shown in Fig. 4 the spring 14 has been compressed, and when the slide 506* is reversely moved the said spring 14 will carry the separator plates to the left into normal or balanced position. At this time, however, the separating fingers 6 will stand across the raceway grooves and the nails will not be permitted to enter the seats 8 until the parts have been still further moved to the left into the position shown in Fig. 1, at which time a cycle of the operation of the tack-separating mechanism will have been completed.

It will now be understood that the separator plates take the lowermost nails of the lines of nails and deliver them to the discharge openings in the end blocks, and that as herein described the operation may be best understood by considering it as carried out by three different steps, although of course the movements of the parts are very rapid so that in practice the several steps constitute one continuous operation. In the first step, shown in Fig. 1, the lowermost nail enters the seat 8 of the separator plate while the separator plate is at rest at one extreme of the reciprocation of the slide 506*. In the second step, shown in Figs. 2 and 3, the nail is moved into the throatway 4 where it is held by the lower wall of the throatway, and becomes slightly separated from the line of nails which are held back by the separating finger 6. This is followed by a pause in the movement of the separator plate, which is held in this position by the spring 14 while the gate 22 is advanced into the space between the separated nail and the nails next above to close the raceway groove. In the third step, shown in Figs. 4, 5, and 6, the separated nail is moved to the discharge opening 2 and allowed to fall through the opening 545* into the conductor tube 584*, the raceway groove being completely closed by the

gate during this delivery of the separated nail. The separator plate performs the entire nail-separating operation while the gate 22 closes the raceway groove after the lowermost nail has been segregated from the others and holds the lines of nails back so as to insure that the separated nails shall have an uninterrupted passage in being delivered into the conductor tube.

While in the construction in which the invention is herein shown as embodied the separator plates are actuated at one time by the springs 14 and at another time by the slide which carries the gates, it is obvious that the invention is not limited to constructions in which different means are employed for actuating these parts at different times.

Having thus described my invention, I desire to claim and secure by Letters Patent of the United States:—

1. In a machine of the class described, the combination with a raceway, a nail separator, and means for actuating said separator for separating the lowermost nail in the raceway from the line of nails therein, of a gate, arranged to occupy a retracted position during the separation of the nails and means for moving said gate between the separated nail and the line of nails for holding back the line of nails during the delivery of the separated nail.

2. In a machine of the class described, the combination with a raceway, and means for separating the lowermost nail in the raceway from the line of nails, of a gate, and means for actuating the gate to close the raceway and for actuating the separating means to discharge the separated nail.

3. In a machine of the class described, the combination with a raceway, a separating device having a wedge-shaped member, and means for actuating said separating device to force the wedge-shaped member between the lowermost nail and the line of nails, of a gate and means for moving the gate into the space formed by the wedge-shaped member between the lowermost nail and the line of nails.

4. In a machine of the class described, the combination with a raceway, a gate for closing the raceway, a separating device having a seat for the lowermost nail in the raceway and a separating finger arranged with relation to the seat to pass behind the nail located in the seat, of actuating mechanism by which the separating device is moved to separate and then deliver a nail and the gate is moved to close the raceway before the separated nail is delivered.

5. In a machine of the class described, the combination with a raceway, a separator plate provided with a separating finger, a discharge opening, and a throatway connecting the discharge opening with the edge of the plate, of means for actuating the

plate for forcing the finger between the lowermost nail and the line of nails and moving said lowermost nail into the throatway, a gate, and actuating mechanism for moving the gate to close the raceway and moving the plate to transfer the separated nail through the throatway to the discharge opening after the raceway has been closed.

6. In a machine of the class described, the combination with a raceway, a separator plate having a seat adapted to receive the lowermost nail in the raceway, a discharge opening, an oblique throatway connecting the seat with the discharge opening, and a separating finger adjacent to said throatway, of a gate and operating mechanism for moving the separator plate to force the separating finger between the lowermost nail and the line of nails, means for there- after moving the gate to close the raceway and for subsequently moving the separator plate to force the nail into the discharge opening.

7. In a machine of the class described, the combination with a raceway, a separator and a gate, of actuating means for first moving the separator to separate the lowermost nail from the line of nails and sustain said nail, and actuating means for then closing the gate across the raceway and moving the separator to discharge the separated nail.

8. In a machine of the class described, the combination with a raceway for holding headed nails and a wedge-shaped separating device adapted to be forced between the nails adjacent to their heads, of a gate provided with an edge inclined downwardly and rearwardly from the separating device, and actuating means for forcing the separating device between the nails, said machine having provision for thereafter forcing the gate between the shank of the separated nail and the nail next above it in the raceway.

9. In a machine of the class described, the combination with a raceway for holding headed nails, of a separator having a wedge-shaped separating finger adapted to be forced between the nails adjacent to their heads, a gate provided with a pointed edge located below the separating finger, actuating means for forcing the separating finger between the nails and means for thereafter forcing the gate point first between the shanks of the nails.

10. In a machine of the class described, the combination with a raceway, of a separator plate provided with a nail seat, a discharge opening, and a throatway leading from the nail seat to the discharge opening, of yielding means for holding the separator plate in balanced position with the seat and discharge opening both out of alignment with the raceway, and means for moving

said plate to put the seat and the discharge opening alternately in line with the raceway.

11. In a machine of the class described, the combination with a raceway, a separator plate provided with a nail seat, a discharge opening, a throatway leading from the nail seat to the throatway, and a separating finger adjacent to said throatway, of yielding means for holding the separator plate in balanced position with the separating finger extending across the raceway, and means for moving said plate alternately to opposite sides of said balanced position.

12. In a machine of the class described, the combination with a nail raceway and means for separating the lowermost nail from the line of nails in the raceway and delivering the separated nail, of a gate, and means for moving the gate between the separated nail and the line of nails for closing the raceway during the delivery of the separated nail.

13. A machine of the class described having a nail passage and a nail raceway leading into the side of the nail passage, combined with means for separating the lowermost nail in the raceway from the line therein and discharging said separated nail into the passage, and other means for closing the raceway side of the nail passage during the discharge of the nail.

14. In a machine of the class described, the combination with a raceway, a nail separator, and means for actuating the nail separator to separate the end nail in the raceway, of a gate and means for moving the gate between the end nail and the line of nails to hold back the line of nails during the delivery of the end nail, substantially as described.

15. In a machine of the class described, the combination with a nail raceway, a separator, and a gate, of means for actuating the separator and the gate in time relation to cause the gate to close the raceway before the discharge of the nail from the separator.

16. In a machine of the class described, the combination with a nail raceway, a separator, and a gate, of means for actuating the separator and the gate in time relation to each other and to the raceway to cause the separator to separate a nail and hold it while the gate closes the raceway and then to deliver the nail before the gate re-opens the raceway.

17. In a machine of the class described, the combination with a raceway in which nails are suspended by their heads, of an endwise movable separator comprising a rigid structure arranged to engage the nails near their heads and having a pointed separating finger, a nail seat in the body portion of the separator located in front of the

finger point and inset relatively to said point, an uninterrupted nail passage extending inwardly from said nail seat and obliquely with relation to the direction of reciprocation of the separator to transfer the nail toward its discharging position at that end of the oblique nail passage which is opposite to the nail seat end of the passage, said separator being arranged with relation to the raceway to receive a nail in the nail seat, which is located at one side of the mouth of the oblique nail passage and has its nail stopping wall substantially parallel with the direction of reciprocation of the separator, when the oblique nail passage is entirely at one lateral side of the raceway groove and to cause the nail to enter the oblique passage only after the separator has been actuated from the nail receiving position.

18. In a machine of the class described, the combination with a raceway in which nails are suspended by their heads, a separator arranged to engage the nails near their heads, and a gate arranged to engage the nails below their heads, of means for actuating the separator to effect a separation between the endmost two nails and for actuating the gate to close the raceway behind the end nail before that nail is discharged from the separator.

19. In a machine of the class described, the combination with a grooved raceway, a separator having an oblique nail guiding face, a gate extending below the separator into the path of the shanks of the nails, and mechanism for moving the separator to open a space between the endmost two nails in

the raceway and for relatively moving the gate and the raceway to close the raceway groove to the shanks of the nails before the end nail is set free.

20. In a machine of the class described, the combination with a nail raceway, of a separator including a plate located in a plane substantially parallel with the plane of the nail heads and provided with an oblique slot, a gate including a plate located in a plane substantially perpendicular to the separator plate, and means for relatively actuating said parts transversely of the raceway to separate a nail and hold it in the slot of the separator plate until the raceway groove is closed by the gate and then to deliver the separated nail.

21. A machine of the class described having, in combination, a separator and a gate cooperating with a plurality of raceway grooves, said separator having a separating finger for each raceway groove, and actuating mechanism arranged to effect a slight movement of the separator to project the points of the several fingers across the raceway grooves and then to effect a dwell in the separator movement while the gate is projected across the several raceway grooves and for thereafter advancing the separator to effect delivery of the nails.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RONALD F. McFEELY.

Witnesses:

CHARLES E. GRUSH,
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