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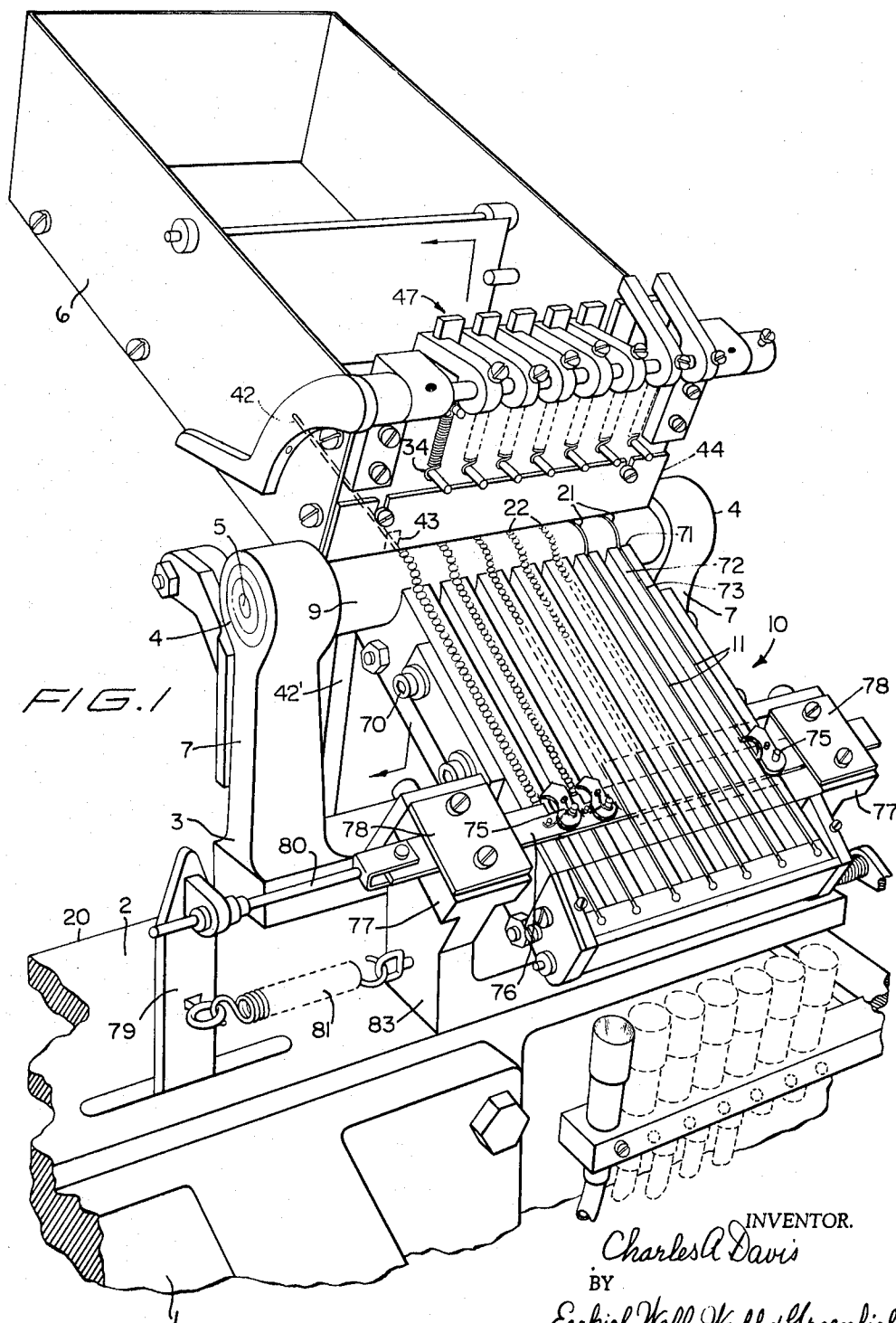
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3,246,799

PICK-OFF MECHANISM

Filed Dec. 13, 1963

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

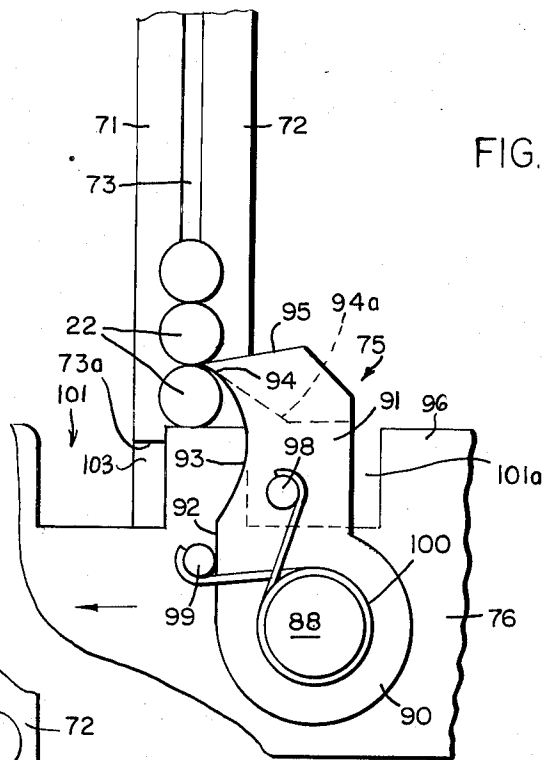


FIG. 2

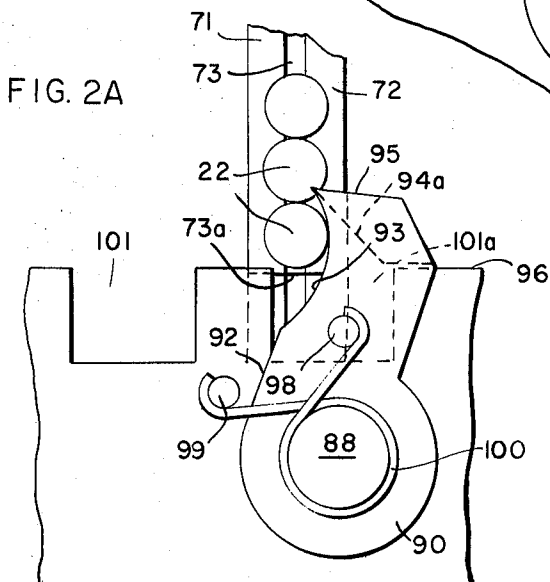


FIG. 2A

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PICK-OFF MECHANISM

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The present invention relates to a feed mechanism used primarily in connection with a nailing machine and more particularly, the present invention relates to an improved nail pick-off mechanism for a nailing machine feed mechanism, such, for example, as the type shown in my United States Letters Patent 3,071,291 issued January 1, 1963.

In Patent 3,071,291 an improved nailing machine feed mechanism is disclosed. While the feed mechanism disclosed in that patent operates with greater certainty and efficiency than those heretofore known, occasional difficulties have been encountered by nail jamming in the slots of the chutes leading from the nail hopper. In that construction, pick-off fingers or pawls function to secure the next to the lowermost nail in the chute while the lowermost nail drops from the chute as a result of the pull of gravity. This operation is, however, somewhat uncertain because nails occasionally hang up at the bottom of chute or raceway.

It is therefore an object of this invention to provide an improved pawl or pick-off mechanism for a nailing machine feed mechanism which not only firmly and securely holds a column of nails in a chute during the actuation of the mechanism of the type shown in the aforementioned patent, but also provides a positive downward force and feed for moving the lowermost nail of the column from the chute or raceway to the nailing mechanism.

It is also an object of the present invention to provide an improved feed mechanism for a nailing machine which is certain of operation over prolonged periods of time and which is relatively inexpensive to maintain and repair.

A still further object of this invention is to provide a pawl and rack arrangement of improved design adapted for separating a leading nail in each of several columns of nails from the columns themselves for further movement to the nailing machine, with the leading nail in each column separated with positive force from the column.

These and other objects and advantages of the present invention will be more clearly understood from a consideration of the accompanying drawings in which:

FIG. 1 is a perspective view of the feed mechanism of a nailing machine with the nailing machine shown in fragmentary form;

FIG. 2 is a plan detail of an improved pawl and rack mechanism, and FIG. 2A is the mechanism shown in FIG. 2 at a subsequent point of actuation.

The present invention may be embodied in the construction of nail feed mechanisms in general in which it is desirable to separate with a positive force, the lowermost nail of a column of nails contained within a downwardly extending chute. The invention also has application to the feed control of components having configurations similar to those of nails, including for example, screws, rivets, pins, etc. But the preferred embodiment of this invention is directed toward a construction useful in a nail feed mechanism of the type shown in United States Letters Patent 3,071,291.

The nail feed mechanisms with which the present invention may be used, may in turn be used in conjunction with various types of nailing machines such as heel nailing machines. The nail feed mechanism may be sup-

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ported on a frame 2, suitably secured in any fashion to the machine 1. This frame preferably provides a horizontal flat surface. At the rear edge 20 of the frame there is secured by bolts or other suitable means, a support 3. This support 3 is formed with parallel opposed vertically extending legs 7 having enlarged upper ends with each end having fixed therein aligned journals 4. Axially supported within these journals at its end is a shaft 5 having intermediate the journals an enlarged center portion 9 with a series of parallel slots 21 spaced apart and coincident with chutes 11, more completely described hereinafter. The slots have a depth sufficient to accommodate the length of the nails 22 which are being fed through the feed mechanism and which pass through these slots 21. The shaft 5 is adapted to be reciprocally rotated about the axis of the shaft 5. The hopper 6 is rigidly secured to the shaft 5 and is adapted to be reciprocally rotated with it. This hopper may be shaped and constructed to conform with the hopper illustrated in the foregoing patent. The hopper 6 may be reciprocally moved from a horizontal position to the position illustrated in FIG. 1 and then back to a horizontal position by conventional means. Thus, if desired, an actuating arm 42' pivotally engaging the lower surface of the bottom of the hopper and reciprocally moved from drive source (not shown), operating off a cam arrangement may be used to effect this reciprocal movement of hopper 6. The hopper is provided with a series of slots 42 in the bottom of the hopper with these slots parallel to one another and extending from the forward wall 34 of the hopper rearwardly.

In the embodiment illustrated, seven such slots are provided each aligned with one of the slots 21 in the sleeve 9. One of these slots is illustrated at 42 in dotted outline. These slots 42 have a width sufficient to receive the shanks but not the heads of nails contained within the hopper. Thus nails agitated by the rocking motion of the hopper will fall into the slots 42. These nails move forwardly due to the rocking motion of the hopper towards the lower edge of the forward wall 34. They pass through the slots illustrated at 43 in the forward wall and drop into slots 21 in the section 9 which comprises a series of chutes 11. It is desirable to utilize a gate mechanism generally illustrated at 47 of the type described in the aforesaid patent, together with an adjustable plate 44 to control the feed of nails to the chutes without likelihood of jamming. The details of this arrangement may be the same as in the aforesaid patent.

This reciprocating hopper 6 and gate mechanism 47 provide a constant flow of nails 22 into the slots 21. These nails slide from the slots 21 into the chutes 11 in the raceway generally indicated at 10. Each of the chutes 11 is identical in arrangement with each chute aligned with a slot 21. The chutes are spaced one from another by spaces (not shown), which may comprise sleeves mounted on shafts secured at their ends at opposite sides of the outermost chutes by bolts or the like, as illustrated at 70. Each chute is formed with a U-shaped cross section providing sliding walls 71, 72 spaced apart a distance coincident with the width of slots 21. The channels 73 formed by these side walls extend the full length of the chutes and are adapted to receive the nails 22 as they slide downwardly from the slots 21.

The rear edges of the chutes 11 are arcuately curved to coincide and bear against portion 9 so as to present a smooth bearing surface to the shaft portion.

Intermediate the ends of the chutes 11 and toward the lower end of the chutes, there is provided means for simultaneously isolating the lowermost nail in each column of nails in the channels 73. This means comprises a series of pawls 75, with one pawl for each chute 11. The pawls 75 are pivotally mounted on a rack 76 which

extends above and normal to the length of the chutes 11. This rack 76 is mounted for longitudinal reciprocal movement within the bearing blocks 77 and retainer plates 78. The rack 76 is actuated by the actuating arm 79 projecting upwardly through the frame 2 and interconnected to the rack 76 by means of a rod 80, fixed at one end to the arm 79 and pivotally engaged in the other to the rack 76. This arm 79 may be positively actuated in one direction by a mechanism associated with the machine 1 and timed to coincide with the desired operation of this machine. The return mechanism for the arm 79 may comprise a helical spring 81 fixed at its ends between the supporting frame 83 on which the blocks 77 are mounted and the arm 79. Each pawl 75 is pivotally mounted to the rack 76 by means of a pin 88, rigidly secured to the rack. Each pawl 75 is formed with a flat member lying substantially parallel to the rack 76. This flat member comprises a hub 90 through which the pin 88 projects, and a finger 91. The finger is provided with a leading or forward edge 92 having arcuate recess 93 at its end. The arcuate recess terminates at the free end of the finger in a pointed wedge 94, with the other side of the wedge 94 being formed by the free end edge 95 of the finger. The finger 91 projects upwardly beyond the upper edge 96 of the rack 76, with the distance of projection to the pointed wedge 94 equaling the diameter of the nail heads normally used in the machine. The width of the finger may vary but the leading edge 92 should be preferably aligned with a line passing tangentially through the column of nails on the right side thereof, as viewed in FIG. 2, when the rack is in its normal static position.

Each pawl has its pin 88 projecting beyond the outer surface of the pawl. A pin 98 also projects from this surface parallel to and spaced from the pin 88. A third pin 99 projects from the rack to a point beyond the exposed or upper surface of the pawl 75. The pin 99 is positioned to engage the leading edge 92 of the pawl 75 so as to limit rotation of the pawl in a counterclockwise direction, as viewed in FIG. 2. Wire springs 100 are looped about the pins 88 of each pawl and are provided with two legs respectively engaging the opposite sides of pins 98 and 99 of each pawl. These springs tension the pawls into rotating movement about the pins 88 and towards the pins 99.

The pawls 75 are positioned immediately adjacent recesses 101, 101a in the upper edge 96 of the rack 76, as illustrated in FIG. 2 the rack 76 and recesses 101, 101a are related and positioned such that recess 101a is positioned immediately to the right of the channel 73 shown in FIG. 2 when the rack is not actuated by arm 79, as viewed in FIG. 1. In this non-actuated position, the lower surface of the rack 76 is in surface contact with the upper surface of the chutes 11. Thus, the lowermost nail in the column of nails 22 is engaged by the upper edge 96 of the rack 76 which prevents the lowermost nail 22 from moving further downwardly in the chute. The lower end of each chute 11 is stepped downwardly or recessed at a point 73a just under rack 76. Thus, as rack 76 is moved to the left, as viewed in FIG. 2a, by the actuating arm 79, the lowermost nail in each column of nails will come into alignment with a recess 101a. The lowermost nail will be forced downwardly into the recess by the rearwardly projecting shoulder 94a of the pawl which moves to the left with the rack. On this movement the pointed wedge 94 and shoulder 94a will be forced between the lowermost and next lowermost nail 22. The edge 95 will thereupon secure and support the column of nails while the lowermost nail 22 is being forced downwardly. As the rack continues to move toward the left, the downward pressure on the lowermost nail 22 is increased due to the increased tensioning of spring 100, the force of which will be released when the lowermost nail 22 becomes aligned with the recess 101a. As soon as this occurs the lowermost nail is forced downwardly into the

recess 101a relieving the tension of springs 100. The nail forced into the recess will thereupon fall into the stepped portion of the chute, free of the rack 76. The released nails will thereafter move downwardly past the rack 76 sliding downwardly along the inclined chute 11 at the lower portions thereof, towards the forward edge of the chute. The secondmost nail in each chute 11 is, however, retained in position above the rack 76 by engagement with the pawl 75, as described above. As the rack 76 returns to its initial position by moving toward the right under tension of spring 81, the pawl 75 will be returned towards its initial position, thus moving away from the nail that was originally second lowermost and thereby releasing it to slide into contact with the upper edge 96 of the rack 76.

A similar operation occurs in each channel. It will be noted, however, that each channel is individually operatively controlled and thus if jamming or difficulty occurs in one channel, it will not affect operation in the other channels.

At the lower end of the raceway 10, there is provided a transport 110 which may be of the type described in the aforementioned patent. The nails may then be delivered in a known fashion from the channels by the transport to the nailing mechanism.

What is claimed is:

1. In a nailing machine feed mechanism having a plurality of parallel chutes each adapted to contain a column of nails with the heads of said nails positioned on the upper surface of said chute and with a reciprocally moving flat bar forming an elongated rack extending across each chute and positioned to engage the head of the lowermost nail in each column when in a retaining position, said rack having release means for releasing said lowermost nail on lateral movement of said rack over said chute,

a device for retaining the second lowermost nail in each chute and simultaneously forcing said lowermost nail downwardly on lateral movement of said rack comprising,

a pawl for each chute, means pivotally mounting said pawls on said racks, spring means for individually tensioning each pawl for rotation about said mounting means in one direction, stop means for limiting the rotation of said pawls in said direction, said pawls each having a forward edge terminating in a pointed wedge at the free end thereof, an arcuate recess formed in said forward edge immediately adjacent said pointed wedge and positioned to engage the head of said lowermost nail on lateral movement of said rack, said pawl having a free end edge projecting beyond the upper edge of said bar for engagement of the head of said second lowermost nail on lateral movement of said rack, said pointed wedge in the retaining position of said rack positioned above said bar a distance equal to the diameter of the head of said lowermost nail whereby said pointed wedge is adapted on lateral movement of said rack to move between said second lowermost and lowermost nails and in cooperation with said arcuate recess and said free end edge simultaneously retain all nails but the lowermost in said column and force the lowermost downwardly from said column.

2. A device as set forth in claim 1 wherein said means for releasing said lowermost nail includes a recess for each chute extending downwardly from the upper edge of said bar with said arcuate recesses of said of each pawls adapted to be pivoted against the tension of said spring means while in engagement with said lowermost nails over said recesses on said lateral movement of said rack.

3. In a nailing machine feed mechanism having a plurality of parallel chutes each adapted to contain a column of nails with the heads of said nails positioned on the upper surface of said chute and with a reciprocally

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moving flat bar forming an elongated rack extending across each chute and positioned to engage the head of the lowermost nail in each column when in a retaining position, said rack having release means for releasing said lowermost nail on lateral movement of said rack over said chute,

a device for retaining the second lowermost nail in each chute and simultaneously forcing said lowermost nail downwardly on lateral movement of said rack comprising,

a pawl for each chute, means pivotally mounting said pawls on said rack, spring means for individually tensioning each pawl for rotation over a limited arc in one direction, a pointed wedge integral with each of said pawls for separating said lowermost nail from said column and each of said pawls also having a free end edge and arcuate recess for simultaneously supporting the remainder of said column and forcing said lowermost nail downwardly.

4. In a mechanism for controlling the individual feed of substantially cylindrical elements retained parallel to one another in a column within a chute and having a release mechanism including a movable retaining rack extending transverse to said chute with release means at

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least in part formed therein and adapted to be actuated on movement of said rack, the improvement comprising the combination of means for moving said rack, means for separating the lowermost element from said column, means for simultaneously supporting the remainder of said column and means for simultaneously exerting a positive downward force on said lowermost element on movement of said rack.

5. The improvement as set forth in claim 4 wherein said means for separating includes a pawl having a pointed wedge positioned to move between said lowermost element and said other elements with a second portion of said pawl supporting said other elements.

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