United States Patent

Perkins et al.

[54] MAGAZINE AND FEED ASSEMBLY FOR A FASTENER-DRIVING TOOL

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- [51] Int. Cl......B25c 1/04
- [58] Field of Search......227/109, 112, 120, 127, 136

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[45] Sept. 5, 1972

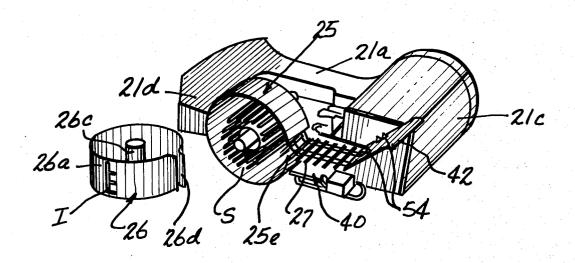
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Primary Examiner—Granville Y. Custer, Jr. Attorney—Pendleton, Neuman, Williams and Anderson

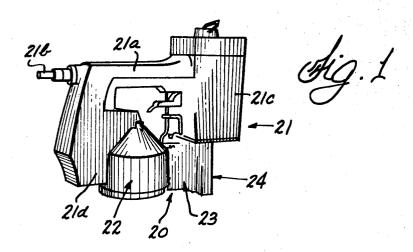
[57] ABSTRACT

A magazine and feed assembly for a fastener-driving tool is provided wherein the magazine is formed of a pair of complemental sections which are adapted to assume a plurality of selected positions of assembly and form a chamber in which a plurality of collated fasteners are accommodated. An outlet port is formed by the sections and a guide extends outwardly from said port and terminated at a fastener firing station. Cooperating with the guide is a power-actuated feed means which is adapted to intermittently move the fasteners along the guide to the firing station.

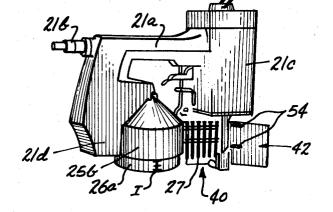
14 Claims, 12 Drawing Figures



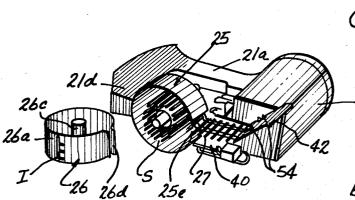
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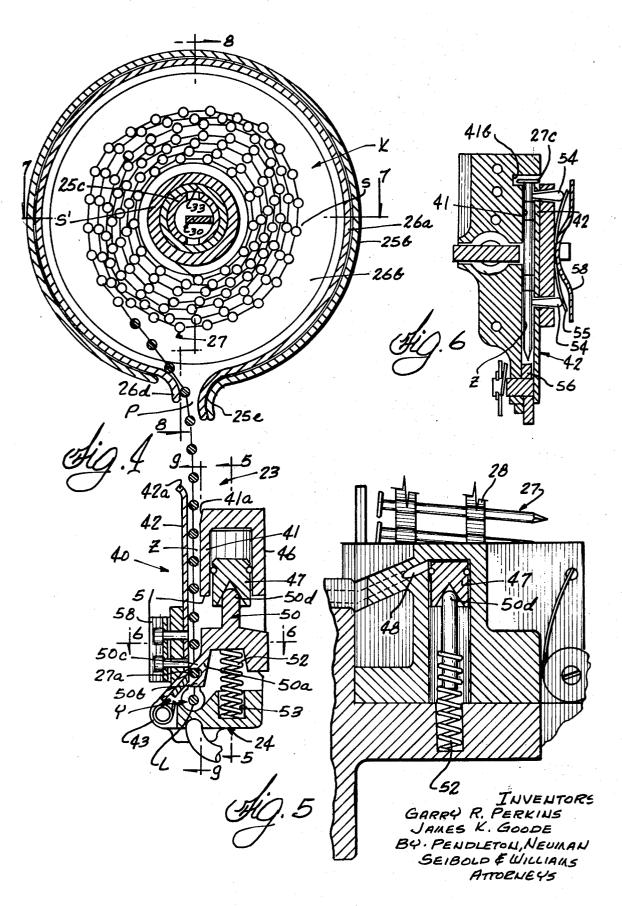


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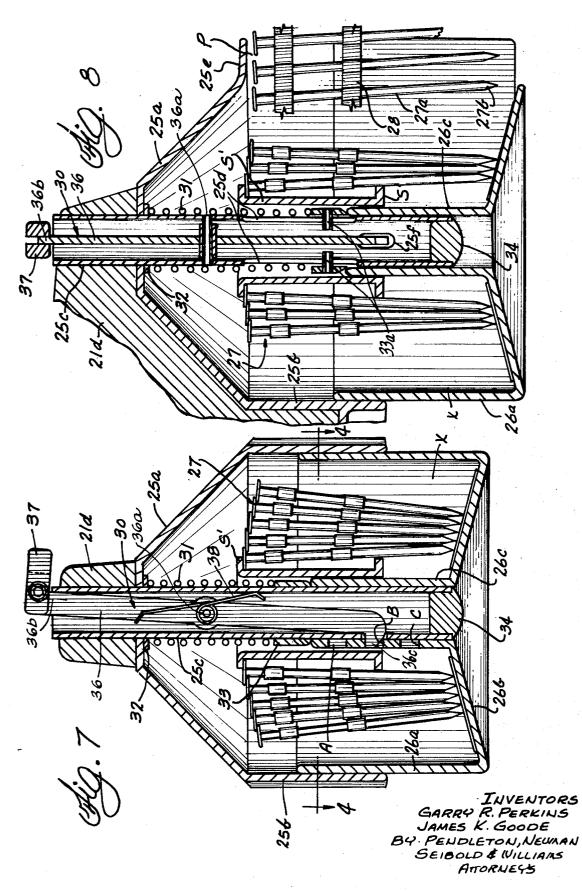
INVENTORS GARRY R. PERKINS JAMES K. GOODE BY PENDLETON, NEUMAN, SEIBOLD & WILLIAMS ATTORNESS PATENTED SEP 5 1972

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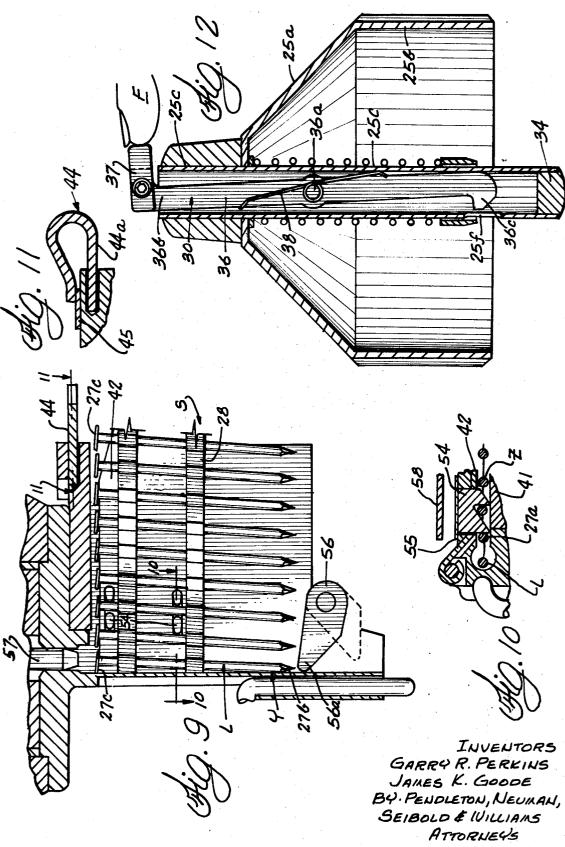
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SHEET 3 OF 4



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SHEET 4 OF 4



MAGAZINE AND FEED ASSEMBLY FOR A FASTENER-DRIVING TOOL

BACKGROUND OF THE INVENTION

Various fastener-driving tools have heretofore been 5 provided which because of certain design characteristics are beset with one or more of the following shortcomings: (a) the magazine and feed mechanism are adapted to accommodate only fasteners of a single size and shape thereby materially reducing the utility of ¹⁰ the tool; (b) jamming and binding of the fasteners within the tool frequently occurs; (c) loading and reloading of the tool are awkward and time-consuming manipulations; (d) the various component parts comprising the feed mechanism are susceptible to excessive wear and require frequent adjustments; and (e) the fasteners, when fed into the firing station, are unstable and frequently drop out of position or assume askewed positions before being driven into a workpiece.

SUMMARY OF THE INVENTION

Thus, it is an object of this invention to provide a magazine and feed assembly which avoids the aforenoted shortcomings.

It is a further object of this invention to provide a magazine which is self-adjusting to the size of fasteners accommodated therein.

It is a still further object of this invention to provide a magazine and feed assembly which is of simple yet stur- 30 dy construction and is effective in operation.

Further and additional objects will appear from the description, accompanying drawings, and appended claims.

In accordance with one embodiment of the invention 35 a magazine and feed assembly for a fastener-driving tool is provided which comprises first and second complemental magazine sections that are removably interconnected and self-adjusting so as to form a chamber for accommodating a plurality of collated fasteners. 40 The magazine sections cooperate to form an outlet port through which the individual fasteners pass as the tool is operated. Extending outwardly from the outlet port is a fastener guide which terminates in a firing station. Mounted adjacent the guide and cooperating therewith ⁴⁵ is an adjustable feed means which intermittently engages and moves the fasteners along the guide to the firing station.

For a more complete understanding of the invention reference should be made to the drawings wherein.

FIG. 1 is a perspective side view of a fastener-driving tool embodying one form of the improved magazine and feed assembly.

FIG. 2 is similar to FIG. 1, but showing one guide component in an open position and exposing the ⁵⁵ fasteners located therein.

FIG. 3 is a perspective bottom view of the tool of FIG. 2, but showing the complemental magazine sections disassembled and exposing the collated fasteners accommodated within the magazine chamber.

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FIG. 4 is an enlarged fragmentary horizontal sectional view of the improved magazine and feed assembly of FIG. 1, taken along line 4—4 of FIG. 7 and with the feed means shown in an extended position.

FIG. 5 is an enlarged fragmentary sectional view taken along line 5—5 of FIG. 4 and showing the feed means in a retracted position.

FIG. 6 is an enlarged fragmentary sectional view taken along line 6-6 of FIG. 4.

FIGS. 7–9 are enlarged fragmentary sectional views taken along lines 7–7, 8–8, and 9–9, respectively, of FIG. 4.

FIGS. 10–11 are enlarged fragmentary sectional views taken along lines 10–10 and 11–11, respectively, of FIG. 9.

FIG. 12 is an enlarged fragmentary sectional view similar to FIG. 7, but showing only one of the magazine sections subsequent to the magazine locking mechanism being manually moved to its release position.

Referring now to the drawings and more particularly 15 to FIG. 1, one form of the improved magazine and feed assembly 20 is shown incorporated in a portable, pneumatically operated fastener driving tool 21, commonly referred to in the trade as a power nailer. The improved 20 assembly as hereinafter described is not limited to the driving tool, as illustrated, but may be incorporated in various other types of power tools utilized for driving screws, rivets, etc. In addition to the assembly in question, the illustrated tool 21 includes a hollow han-25 dle 21a, a hose connector 21b protruding from the rear end of the handle, and a housing 21c mounted on the forward end of the handle and accommodating a drive piston and cylinder combination and various valves and controls therefor.

The improved assembly 20 comprises a sectional magazine 22 secured to a depending extension 21d of the tool handle 21a, and a feed mechanism 23 extending laterally forward from the magazine and terminating in a nose section 24 which is in vertical alignment with and connected to the housing 21c.

As seen in FIG. 3, the magazine 22 comprises a stationary upper or first section or container 25 which is of inverted substantially cuplike configuration and a removable lower or second section or cover 26 which is also substantially cuplike in configuration. Section 26 is adapted to be assembled in telescoping relation with section 25 to form a cylindrically shaped canister or chamber X which is adapted to accommodate a coiled 45 strip S of collated fasteners 27. The fasteners in the illustrated embodiment constitute round, flat-head nails having the shanks 27*a* thereof interconnected by flexible tape sections 28. All of the fasteners constituting the coiled strip S have the pointed ends 27*b* thereof fac-50 ing downwardly, or towards the magazine section 26.

The magazine sections 25 and 26 may be formed of suitable plastic, metal or the like or a combination thereof. That is to say, upper section 25 may be of plastic or metal, and the lower section 26 formed of an expendable inexpensive material such as plastic or a formed fibrous material such as paper.

The upper section 25 has a substantially cone-shaped upper portion 25a and a cylindrically-shaped lower portion 25b. Extending axially downwardly from the apex of the upper portion 25a is a hollow spindle or first stem 25c, see FIG. 7. The spindle 25c has a portion thereof projecting upwardly from section 25 and is affixed by suitable means to the handle extension 21d. Disposed within the spindle 25c is a locking mechanism 30 which will be described more fully hereinafter.

Encompassing the exterior of spindle 25c is a coil spring 31 the upper end of which abuts a shoulder 32

formed on the spindle and engaging the upper end of section 25. The lower end of spring 31 is connected to an ejector sleeve 33 which is slidably mounted on the exterior of spindle 25c. The lower end of spindle 25c is closed by a plug 34, see FIGS. 7 and 12.

The lower magazine section 26, as seen in FIGS. 3, 7, and 8 has a cylindrical wall 26a, a concave bottom 26b. and an axially disposed upwardly extending tubular member or hollow second stem 26c. The size of the wall 26a is such that it telescopes within the cylindrical lower portion 25b of section 25 and the tubular member 26c is sized so as to slidably accommodate within the upper open end thereof, the lower portion of the spindle 25c. When the spindle is assembled in the 15 tubular member 26c, the latter abuts the ejector sleeve 33 and moves same upwardly along the spindle 25ccausing the coil spring 31 to be compressed. The ejector sleeve 33 is slidably connected to spindle 25c by transverse pins 33a which extend into elongated slots 20 25d formed in the spindle, see FIG. 8.

The outside diameter of tubular member 26c is such that a spool piece S' about which the fastener strip is snugly coiled, can be readily slipped thereover when the tool is being loaded or reloaded. Formed in the tu- 25 facilitate entry of each fastener shank between the bular member 26c are longitudinally spaced apertures A, B, and C, see FIG. 7, the function of which will be discussed more fully hereinafter along with the locking mechanism 30.

The cylindrical walls 25b and 26a of the magazine 30 sections 25 and 26 are provided with longitudinally extending slots 25e and 26d which cooperate with one another when the sections are assembled to form an outlet port P for the magazine chamber or canister X.

The exterior of the cylindrical wall 26a of magazine 35 section 26 is provided with suitable indicia I, portions of which are exposed beneath the lower edge of the depending cylindrical wall 25b of section 25 when the two sections are telescopically assembled. The indicia I is 40 coordinated to the spacing of the apertures A, B, and C formed in tubular member 26c of section 26 and thereby enables the user of the tool to readily determine the size fastener accommodated within the magazine without requiring the latter to be disassem- 45 see FIGS. 4 and 5. The closed end of the cylinder is in bled.

The locking mechanism 30, as illustrated in FIGS. 7 and 8, includes an elongated lever or rod 36 disposed within and pivotally connected at 36a to spindle 25c. The upper end 36b of the lever protrudes from the 50 A portion 50a of the distal end of the arm protrudes upper end of the spindle and has affixed thereto a finger tab 37 which is exposed and may be readily manipulated by the finger F of the user, when the magazine sections are to be disassembled, see FIG. 12.

The lower end 36c of the lever is hook-shaped or off- 55 set to form a prong and is adapted to extend through an elongated slot 25f formed in the spindle. The lever 36 is biased in a clockwise direction, see FIG. 7, by a spring 38 so that lever 36 will normally assume a position whereby the end 36c protrudes outwardly through slot 60 25f. When the magazine sections 25 and 26 are assembled, the lever end 36c will selectively engage in one of the apertures or recesses A, B, or C formed in tubular member. Positive interlocking engagement is effected 65 between the lever end 36c and the tubular member 26c by reason of the force exerted on the latter by coil spring 31. When manual force is exerted on the finger

tab 37 causing the lever to pivot in a counter-clockwise direction, the protruding hook-shaped end of the lever is retracted into hollow spindle 25c, see FIG. 12, whereupon the lower magazine section 26 is ejected by the force of compressed spring 31.

The feed mechanism 23, as seen in FIGS. 2 and 4, includes a guide 40 which comprises a first plate member 41 and a second plate member or door 42, the latter being hingedly mounted to move between a closed, operative position, as seen in FIG. 4, and an open position, as seen in FIG. 3. When plate member 42 is in its open position, the uncoiled end of the fastener strip S can be properly threaded into the guide. Once the strip end is properly positioned on the exposed surface of plate member 41, member 42 is moved to its closed position, see FIG. 4. When in the closed position, plate members 41 and 42 are disposed in spaced, substantially parallel relation. The spacing Z between the adjacent surfaces of the plate members is slightly greater than the maximum diameter of the shank 27a of each fastener comprising the strip S. The edges 41a and 42a of the plate members facing the outlet port P of the magazine are flared outwardly a slight amount so as to closed plate member 41 and 42. The enlarged heads 27c of the fasteners are disposed above plate member 42 on one side and are disposed on the other side within an elongated slot 41b formed in the upper portion of plate member 41, see FIG. 6, so that there is no interference between the fastener heads 27c and the plate members during movement of the fasteners through the guide.

Plate member 42 is biased by a spring 43 to assume an open position. Thus, to retain the member 42 in its closed position, a latch 44, see FIGS. 9 and 11, is provided which is mounted on member 41 for pivotal adjustment about the elongated leg 44a of latch 44 as an axis. The latch 44, when in its latching position, see FIG. 11, engages a projecting tongue 45 carried by the member 42.

Plate member 41 is provided with a cylinder 46 in which is slidably mounted an air-actuated piston 47, communication with a passageway 48 leading to a source of compressed air, not shown. Adjustably disposed within a V-shaped groove formed in the face of piston 47 is an elongated arm 50, see FIGS. 4 and 5. through an elongated slot 51 formed in plate member 41. The arm portion 50a is provided with a pair of ratchet teeth 50b and c. The forward face of each tooth is flat and disposed at substantially a right angle with respect to the direction of travel of the piston 47. The back face of each tooth, on the other hand, is inclined. Thus, when the piston and arm are moving forwardly. relative to the guide plate member 41 as a unit (i.e., to the left as viewed in FIG. 4), the forward flat face of tooth 50c will abut the shank 27a of the second fastener from the free end of the strip S and thereby move said abutted fasteners and the lead fastener L forward until said lead fastener L is positioned within the firing station or drive channel Y which is adjacent the outer terminus of the guide and forms a part of the nose section 24. Because all of the fasteners comprising the strip S are interconnected by tape sections 28, movement of

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certain of the fasteners by the ratchet teeth of arm 50 causes the uncoiling of the strip within the magazine and successive movement of the strip fasteners out through the port P and between the guide plate members.

Once piston 47 has reached its fully extended position, as seen in FIG. 4, the air pressure behind the piston is automatically released and the piston is automatically returned to its fully retracted position, see FIG. 5, by a coil spring 52. One end of spring 52 is 10 disposed within a pocket 53 formed in the nose section 24 and the other end contacts the forward end of arm 50. As the piston and arm are retracted as a unit, the inclined rear faces of ratchet teeth 50b and c will contact the shanks of the rearwardly disposed fasteners and cam the arm 50 a slight amount in a counterclockwise direction, as seen in FIG. 4, about the inner end 50d of the arm as a fulcrum.

To prevent the collated fasteners disposed within the 20 guide spacing or track Z from receding from the firing station Y as the arm and piston are retracted, the fasteners are held fast in place by a pair of spring loaded detents 54 which are carried on plate member 42, see FIG. 6. The detents are biased by a leaf spring 25 55 to project into the space . The forward and rear faces of each detent are shaped similar to the corresponding faces of the teeth 50b and c, previously described. The force exerted on the detents 54 by spring 55 is such that they will readily be cammed out 30 of the way by the shanks of the advancing fasteners when the latter are moved by the arm teeth 50b and c. The detents 54 are vertically spaced relative to one another and are disposed above and below the teeth 50b and c of arm 50. Thus, the detents serve an addi- 35 tional function of properly orienting the fasteners within the guide space Z preparatory to being fed to the firing station Y.

As seen in FIGS. 6 and 9, the lower or discharge end 40of the firing station Y is normally closed by a spring loaded toe pawl or holding element 56 which is carried by plate member 41. The toe pawl 56 is biased to normally assume a position as shown in FIGS. 6 and 9 wherein the end 56a of the pawl subtends the pointed 45 2 wherein said first and second sections are adapted to end 27b of fastener L when it is disposed within the firing station Y. Thus, the toe pawl 56 prevents the fastener L from accidentally falling out of station Y prior the fastener being driven therefrom by pneumatically actuated driver blade 57, see FIG. 9. When the 50 lead fastener L is expelled from the firing station Y by the driver blade, the toe pawl 56 will be moved in a counter-clockwise direction to a release position, as seen in dotted lines in FIG. 9, by the expelled fastener whereby the head 27c of the fastener may readily move 55 therepast.

To prevent the detents 54 from being retracted too far by the advancing fasteners in the guide space Z, a winged stop piece 58 is secured to the exposed surface of plate member 42, see FIG. 6. The ends of the stop 60 piece 58 are in registered, outwardly spaced relation with respect to the outer ends of detents 54. Disposed between the outer ends of the detents and the ends of the stop piece is leaf spring 55, see FIG. 6.

Thus, it will be seen that an improved magazine and 65 feed assembly has been provided which is adapted to accommodate fasteners which vary in size and shape

over a wide range. The magazine is of simple yet sturdy construction and is readily self-adjustable to accommodate various size fasteners. Loading and reloading of the magazine and feed assembly may be expeditiously accomplished.

While a magazine and feed assembly of a particular design has been illustrated, it is to be understood that the claimed invention is not intended to be so limited. We claim:

1. In a fastener-driving tool, a fastener magazine and feed assembly comprising a stationary magazine first section; an adjustable magazine second section releasably mounted on said first section and cooperating therewith to form a chamber and an outlet port therefor for accommodating a plurality of collated fasteners; manually actuatable locking means carried by one of said sections and biased to assume a first position to effect engagement with the other of said sections and retain said sections in selected positions of assembled relation to accommodate fasteners of varying size; resilient means cooperating with said sections to effect automatic disassembly of said sections when said locking means is actuated to a second position; a fastener guide extending outwardly from said outlet port; and power-actuated fastener-feed means mounted on said guide for engaging at least one of the leading fasteners accommodated by said guide and moving same a predetermined distance relative to said guide.

2. The fastener magazine and feed assembly of claim 1 wherein said first and second sections are of traylike configuration and disposed in inverted telescoping selfadjusting relation; the extent to which said sections are telescoped being adjusted to the length of the fasteners accommodated within said chamber.

3. The fastener magazine and feed assembly of claim 2 wherein both of said sections are provided with complementary portions cooperating with one another to form the outlet port through which only a single collated fastener is passable at a given time from said chamber to said guide.

4. The fastener magazine and feed assembly of claim assume a plurality of selected telescoping positions, and said second section is provided with exposed indicia indicating the selected telescoping position in which said sections are assembled.

5. A magazine structure for a fastener driving machine comprising a fastener holding container, a first hollow stem within said container, a rod pivotally movable within said stem having a prong at its lower portion, a cover underlying said fastener holding container having a second hollow stem portion adapted to fit about said first hollow stem portion and provided with a plurality of spaced recesses therewithin adapted to be selectively engaged by said prong.

6. A magazine structure as described in claim 5 including a spring means carried by said rod biasing said rod in engaged position with one of said recesses and handle means upon said rod at one end thereof.

7. A magazine structure as described in claim 6 including a cover ejecting member carried by said firstnamed stem.

8. A magazine structure as described in claim 7 said cover ejecting member including a pusher member carried by said first stem and adapted to abut the second stem portion of said cover and spring means biasing said pusher member against said second stem portion.

9. A magazine structure as described in claim 8 said first stem provided with a hollow elongate slot 5 therewithin, said pusher member having a projection disposed within said elongate slot.

10. A feed mechanism for a fastener driving machine comprising a fastener track, a pivotal openable door overlying said track, means for selectively retaining 10 said door in open or closed position, first fastener feed means within said track, a pair of spaced feed pawls carried by said door having ratched portions thereupon, and spring means upon said door connected to said feed pawls.

11. A feed mechanism as described in claim 10 said spring means being a single leaf spring.

12. A feed mechanism as described in claim 11 including spring means connected to said door and said track and biasing said door into open position.

13. A structure as described in claim 5 including a feed mechanism adjacent said magazine, said feed mechanism comprising a fastener track, a pivotal

openable door overlying said track, spring means connected to said door and to said track normally biasing said door into open position, first fastener feed means within said track, latch means carried by said door and said track, a pair of spaced feed pawls carried by said door having ratched portions thereupon, and a single leaf spring carried by said door and connected to said feed pawls.

14. A structure as described in claim 13 including a
drive improvement mechanism having, in combination, a drive channel provided with a lateral slot opening thereinto, a pivotally movable holding element within said channel and said lateral slot, said holding element
being below the undriven position of a nail disposed within said drive channel, coil spring means secured to said feed mechanism and to said holding element normally maintaining said holding element in blocking position with respect to said nail, said holding element
moving to unblocking position with respect to said nail as soon as said nail is driven from said channel and abuts said holding element.

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UNITED STATES PATENT OFFICE CERTIFICATE OF CORRECTION

Patent No. 3,688,966 Dated September 5, 1972

Inventor(s) GARRY R, PERKINS and JAMES K. GOODE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below: In the ABSTRACT, line 8, "terminated" should be "terminates"; Column 1, between lines 48 and 49, the heading "<u>DESCRIPTION</u>" should be inserted; Column 5, line 26, after "space", insert -- Z --; Column 7, line 13, (claim 10), "ratched" should be "ratchet"; Column 8, line 6, (claim 13),"ratched" should be "ratchet".

Signed and sealed this 13th day of February 1973.

(SEAL) Attest:

EDWARD M.FLETCHER,JR. Attesting Officer

ROBERT GOTTSCHALK Commissioner of Patents