United States Patent [19]

Perkins et al.

[11] **3,797,723**

[45] **Mar. 19, 1974**

[54] **FASTENER-DRIVING TOOL**

[75] Inventors: **Garry R. Perkins**, Palatine; **James K. Goode, Jr.**, Cary, both of Ill.

[73] Assignee: **Spotnails, Inc.**, Rolling Meadows, Ill.

[22] Filed: **Feb. 7, 1972**

[21] Appl. No.: **224,113**

[52] **U.S. Cl.** **227/109**, 227/126

[51] **Int. Cl.** **B25c 1/00**

[58] **Field of Search** 227/126, 132, 123, 109

[56] **References Cited**

UNITED STATES PATENTS

2,482,156	9/1949	Crosby et al.	227/126
3,086,207	4/1963	Lingle et al.	227/123
2,361,483	10/1944	Lang	227/132
2,857,596	10/1958	Allen et al.	227/126
3,633,811	1/1972	Ploen	227/109

Primary Examiner—Granville Y. Custer, Jr.
Assistant Examiner—Harold P. Smith, Jr.

[57] **ABSTRACT**

A powered fastener-driving tool is provided which includes a housing in which a driving piston is mounted for reciprocatory movement, and a fastener magazine extending laterally from said housing. The housing and magazine are of unitary construction. A nose section depends from the housing and is connected to one end of the magazine. The nose section is provided with a chamber into which fasteners are successively fed from the magazine. A fastener feed assembly is mounted on the magazine and is adapted to automatically feed the fasteners from the magazine to the chamber.

5 Claims, 9 Drawing Figures

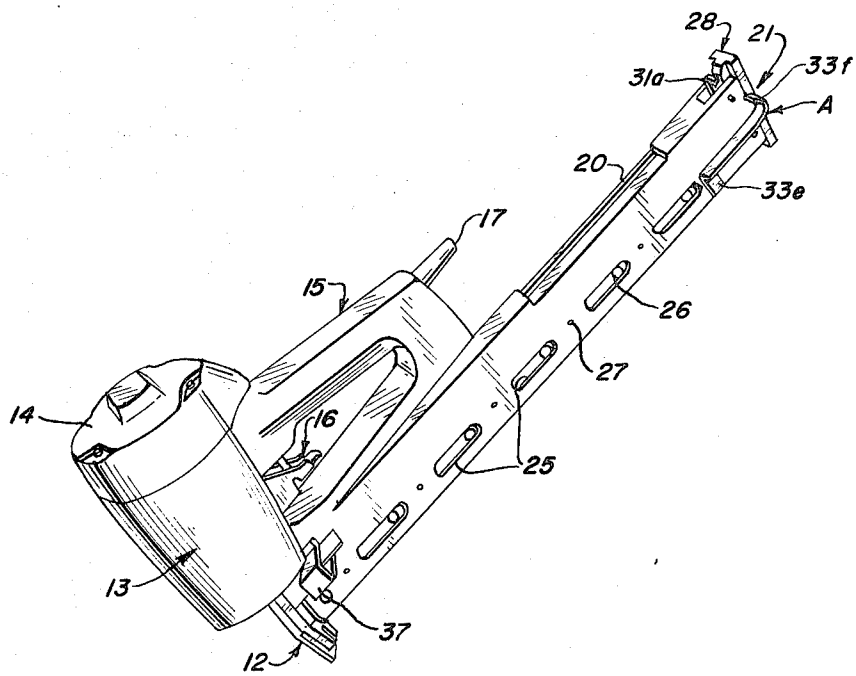
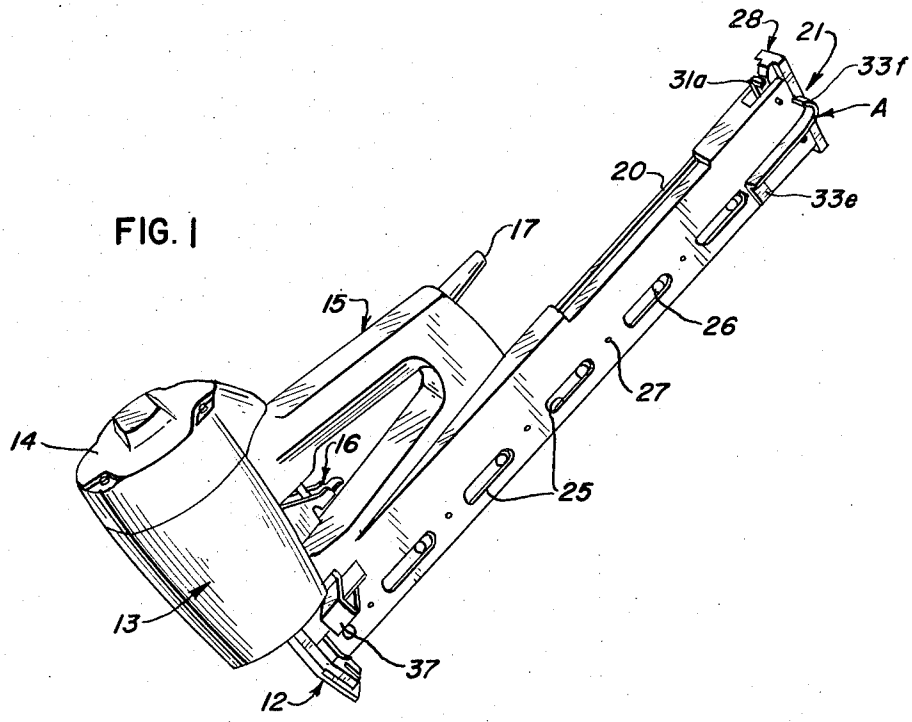


FIG. 1


28
21
331
31a
A
20
33e
17
15
26
27
14
16
25
13
37
12

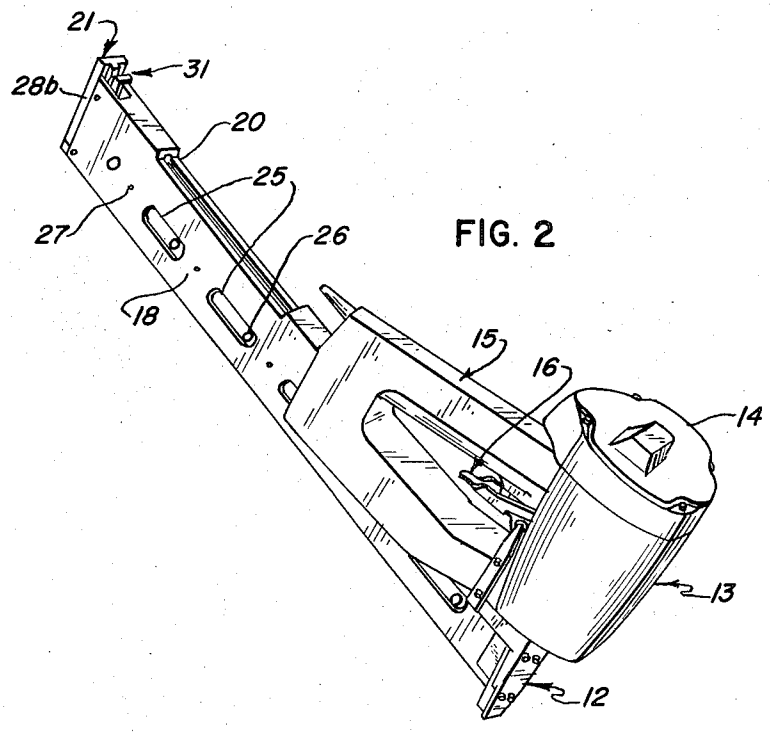
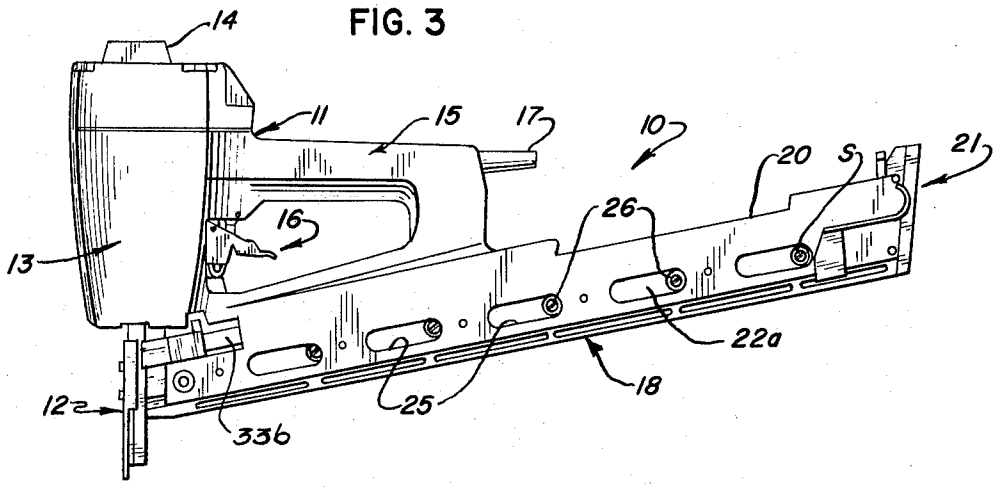

21
31
28b
20
25
27
26
18
15
16
14
13
12

FIG. 2

FIG. 3



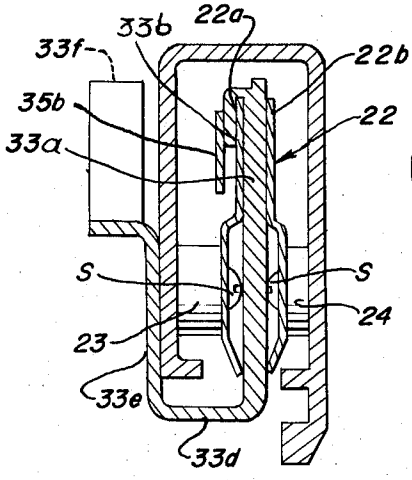


FIG. 9

FIG. 6

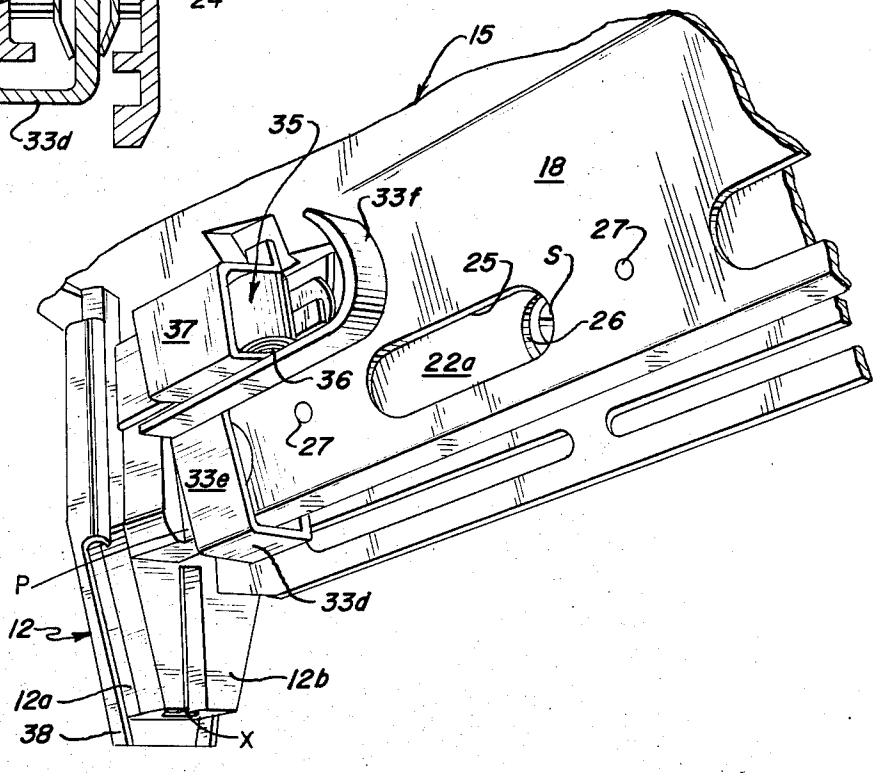
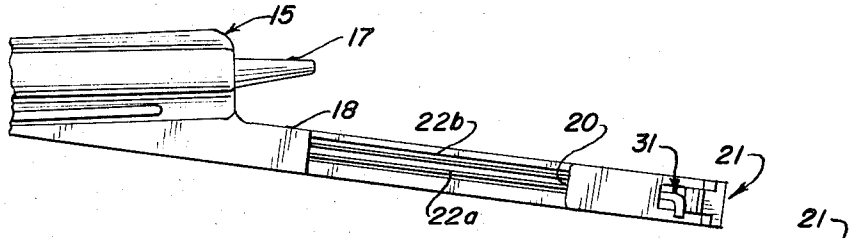


FIG. 4



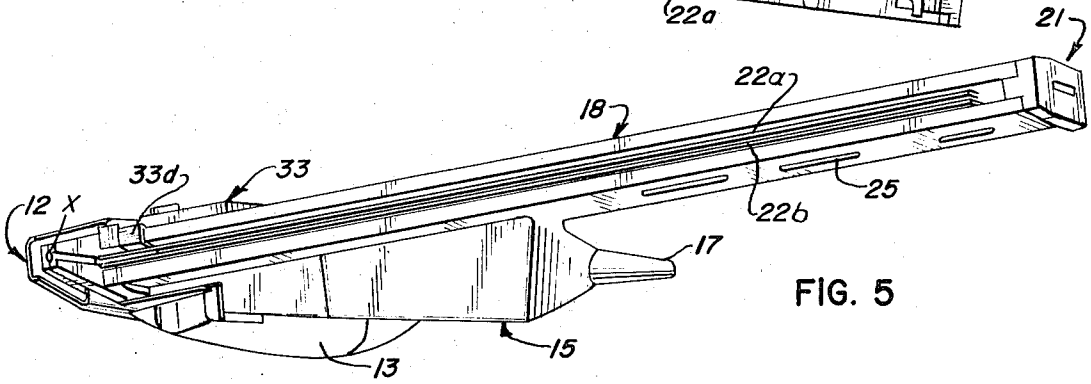


FIG. 5

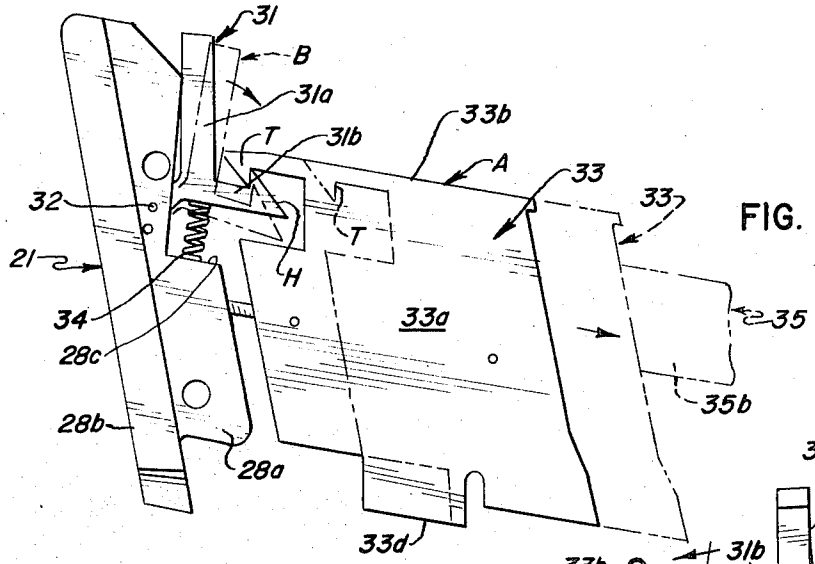
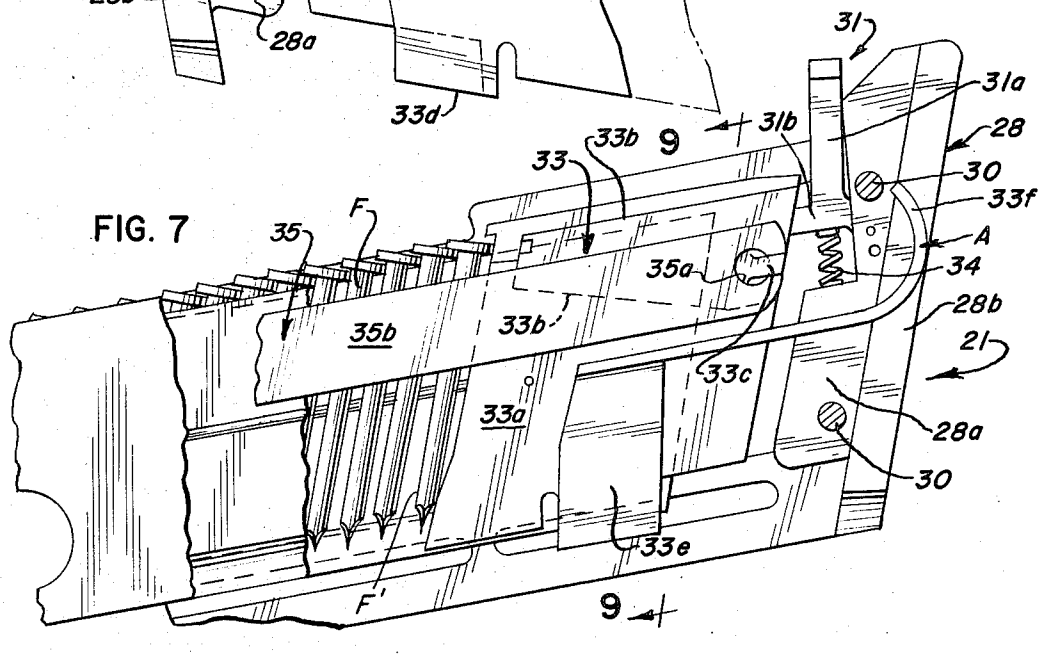


FIG. 8

FIG. 7



FASTENER-DRIVING TOOL

BACKGROUND OF THE INVENTION

Various pneumatically, hydraulically, electrically, or mechanically powered fastener-driving tools have heretofore been provided; however, because of certain design characteristics, they have been beset with one or more of the following shortcomings: (a) the housing for the driving piston and the fastener magazine were separate components joined together by bolts, screws, rivets, and the like and thus, proper and secure assembly of the two components was difficult to maintain because of the severe vibrations to which the tool was subjected during operation; (b) loading of the magazine was a difficult and awkward manipulation; (c) the tool was highly susceptible to jamming; (d) various components of the fastener feed assembly were exposed and susceptible to bending or breakage; (e) the various components comprising the fastener feed assembly were susceptible to excessive wear, causing an inordinate amount of down time for servicing the tool; (f) the tool was of bulky, heavy construction and was awkward to handle; and (g) the tool was incapable of handling a variety of fasteners.

SUMMARY OF THE INVENTION

Thus, it is an object of this invention to provide a powered fastener-driving tool which avoids the aforenoted shortcomings.

It is a further object of this invention to provide a powered fastener-driving tool wherein the housing for the driving piston and the fastener magazine are of unitary construction.

It is a further object of this invention to provide a fastener-driving tool wherein the components of the nose section may be readily disassembled without requiring disassembly of the remainder of the tool.

It is a still further object of this invention to provide a fastener-driving tool having fastener guides mounted within the magazine and which may be readily replaced, when required, so as to accommodate various sizes and types of fasteners.

It is a still further object of this invention to provide a fastener-driving tool having a manually releasable means mounted on the magazine which will automatically interlock with the pusher member when the latter is in an extended position for reloading the magazine.

It is a still further object of this invention to provide a fastener-driving tool wherein the spring bias for the pusher member, which forms a component of the feed mechanism, is of compact design and substantially concealed within the magazine.

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

In accordance with one embodiment of the invention, a powered fastener-driving tool is provided which includes a housing, in which a driving piston is mounted for reciprocatory movement, and a laterally-extending elongated fastener magazine. The housing and magazine are of unitary construction. Secured to the housing and depending therefrom is a nose section which is provided with a chamber in which a fastener is positioned prior to being discharged therefrom by the driving piston. Mounted within the magazine is a fastener guide along which the fasteners move while being successively fed into the chamber. Slidably mounted on the guide is a pusher member which is biased to move in a direction towards the chamber. Mounted on the magazine and remotely disposed relative to the nose section is a manually-releasable latch assembly which is adapted to automatically interlock with the pusher member when the latter is in an extended position, and retain said pusher member in said extended position while the magazine is loaded with fasteners.

DESCRIPTION

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

FIG. 1 is a perspective side view of one form of the improved fastener-driving tool, and showing the pusher member thereof retained in an extended magazine-loading position.

FIG. 2 is similar to FIG. 1, but showing the opposite side of the improved fastener-driving tool.

FIG. 3 is an elevational view of the side of the tool shown in perspective in FIG. 1.

FIG. 4 is a fragmentary top view of the magazine and handle shown in FIG. 3, but with the pusher member omitted.

FIG. 5 is a perspective bottom view of the tool shown in FIG. 1, but with the pusher member disposed in a position adjacent the nose section.

FIG. 6 is an enlarged, fragmentary, perspective view of the nose section, magazine, and pusher member comprising the tool of FIG. 1, but showing the pusher member in its fully retracted position adjacent the nose section.

FIG. 7 is an enlarged, fragmentary, side elevational view of the remote end of the magazine showing a portion of the latter removed so as to reveal the pusher member being held in its extended position by the manually-releasable latch assembly mounted on the magazine remote end.

FIG. 8 is similar to FIG. 7, but of the opposite side of the pusher member and latch assembly; the latter being shown in dotted lines in its release position, and the pusher member being shown in dotted lines in a changed position subsequent to being released.

FIG. 9 is an enlarged sectional view taken along line 9—9 of FIG. 7.

Referring now to the drawings, one form of an improved fastener-driving tool 10 is shown. The illustrated tool is pneumatically powered; however, the invention, to be hereafter described, is not intended to be limited to a pneumatically-powered tool, but may be readily incorporated in hydraulically, electrically, or mechanically powered tools as well.

Tool 10 is portable and is of a type normally used by carpenters and the like in general construction work. Basically, tool 10 includes a one-piece body 11, and a depending nose section 12. The nose section is adapted to accommodate a fastener prior to the latter being discharged therefrom into the work piece, not shown. The tool body 11 includes a head section 13 in which is reciprocally mounted a driver piston, not shown. A cap, or cover 14, is removably mounted on the top of the head section to provide access to the driver piston, when required. The nose section 12 is mounted on the underside of the head section and extends downwardly therefrom.

Extending laterally from the upper portion of the head section, is a hollow handle 15 which may be read-

ily gripped for manipulating the tool. Associated with the handle is a finger-actuated trigger assembly **16**. A hose connection **17** is mounted on the rear end of the handle to facilitate connection of the tool to an air hose, not shown.

The tool body **11** also includes an elongated magazine section **18** which extends angularly outwardly and upwardly from the nose section **12**. The magazine section is disposed beneath the handle section, but is offset slightly with respect thereto, as seen more clearly in FIG. **4**, so that the handle will not obstruct the view of the person utilizing the tool.

As aforenoted, the head section **13**, handle **15**, and magazine **18** are of one-piece construction. Such construction is of utmost importance in minimizing the adverse effect of the severe vibratory forces to which the tool is subjected during operation. Because the vibratory forces generated are of substantial magnitude, the head section, handle, and magazine, if separate components, are highly susceptible to working loose from one another, thereby causing alignment problems and ultimate jamming of the tool. Such a problem has been of real concern with many of the prior tools of this general type.

In the improved tool, the one-piece body **11** is preferably cast from a suitable lightweight, high impact type of metal (e.g. magnesium alloy).

The magazine section **18** is of a predetermined length and will depend upon the type and number of fasteners F to be accommodated therein. The fasteners, illustrated in FIG. **7**, are round-headed nails. Preferably a predetermined number of fasteners F are collated together so as to form a "stick." Each stick is normally rather inflexible and, in the illustrated embodiment, the fasteners thereof are nested together with the head end of the leading fastener being partially disposed beneath the head end of the succeeding fastener. The tilt, or angular disposition of the magazine, relative to the head section **13**, coincides substantially to the stepped relation of the fasteners forming the stick.

A suitable fastener-loading slot **20** is formed in the top portion of the magazine adjacent the remote end thereof, see FIGS. **1–3**. The length of the slot will depend upon the length of the stick being inserted in the magazine. The overall length of the magazine is such that it is capable of accommodating a plurality of sticks arranged in end-to-end relation. As noted in FIG. **9**, the magazine **18** has a substantially inverted U-shape cross-sectional configuration. The outer or remote end of the magazine is open and is adapted to receive a manually-releasable latch assembly **21**, which will be described more fully hereinafter.

Disposed within the magazine, and substantially coextensive with the length thereof, is an elongated fastener track or guide **22**. The track includes a pair of elongated components **22***a* and **22***b* which are disposed in spaced, substantially parallel relation. The spacing between components **22***a* and **22***b* is slightly greater than the diameter of the shank F′ of a fastener accommodated within the magazine. The lower portion of each component, however, is offset outwardly a slight amount so as to compensate for the thickness of the heads of the screws S used to secure the components **22***a* and **22***b* in predetermined fixed positions within the magazine interior. Proper positioning of the components within the magazine interior is provided by a plurality of longitudinally-spaced spacers **23** and **24**. The spacers **23**, disposed on one side of the track **22**, are in staggered relation with respect to the spacers **24** disposed on the opposite side of said track.

To provide access to the screw heads, the sides of the magazine **18** are provided with a plurality of elongated slots **25**. The slots, on one side, are in staggered relation with respect to the slots on the opposite side of the magazine. The lower portions of the components **22***a* and **22***b* are exposed within the slots and such exposed portions, in turn, are provided with openings **26**. The openings **26** in component **22***a* are in registered relation with the slots formed in the adjacent side of the magazine so that the slotted heads of the screws S may be readily turned by a screwdriver or the like when the tool is being initially assembled or the track components are being changed so as to accommodate a different type or size fastener. The leading ends of the screws extend through the track component openings and the spacers **23** or **24** and are threaded into internally threaded holes **27** formed in the portions of the sides of the magazine disposed between the slots **25**, see FIGS. **3** and **6**.

The latch assembly **21**, as aforementioned, is mounted on the outer, or remote end of the magazine **18**. The assembly **21**, in the illustrated embodiment, see FIGS. **7** and **8**, includes a cover piece **28** which is provided with a front portion **28***a* extending into the open remote end of the magazine and between the sides of the magazine, and an enlarged back or exposed portion **28***b* which overlies and closes off the remote end. The cover piece **28** is held in assembled relation with the sides of the magazine by a plurality of screws **30**, or the like, see FIGS. **1**, **3**, and **7**.

Pivotally mounted on the front portion **28**a of the cover piece is a spring-biased latch **31**, see FIGS. **7** and **8**. The latch is substantially L-shaped with the pivotal axis **32** thereof adjacent the juncture of the two legs **31**a and **31***b* of the latch. Leg **31***a* projects upwardly and is adapted to be selectively engaged by the finger of the tool operator to effect release of a pusher member **33** from its extended, or magazine-loading position A, see FIGS. **1**, **3**, **7**, and **8**. The purpose and structure of the pusher member will be described more fully hereinafter.

Leg **31***b* of the latch **31**, on the other hand, extends inwardly towards the nose section **12** and has the distal end thereof formed as a hook H, see FIG. **8**. The hook is adapted to interlockingly engage a tongue T carried by the pusher member and retain the latter in its extended magazine-loading position A. The latch **31** is biased, in a clockwise direction to assume its pusher member-locking position by a coil spring **34**, see FIG. **7**. One end of the spring engages the underside of leg **31***b* and the opposite end resiliently engages a notched ledge **28***c* formed in the front portion **28***a* of the cover piece **28**. In FIG. **8**, the latch **31** is shown in dotted lines in a manually-adjusted position B, wherein the pusher member is released from the latch and is urged towards the nose section **12** by a wound, or spool-type, spring **35**.

The pusher member **33** is slidably mounted on the track **22** and is adapted to resiliently engage the last fastener in the magazine and push all of the accommodated fasteners in a direction towards the nose section. Member **33** has a flat platelike central portion **33***a*, which is disposed between the track components **22***a* and **22***b* and engages the shank of the last fastener, see

FIG. 9. The upper portion 33*b* of central portion 33*a* is bent over the upper edge of the component 22*a* and is provided with a lug, or projection 33*c* which is adapted to be inserted through an opening 35*a* formed adjacent the free end of the spring 35, see FIG. 7.

Extending downwardly from the central portion 33*a* of the pusher member 33 and beyond the lower edges of the track components 22*a* and 22*b* and out the bottom of the magazine 18, is a lower portion 33*d*. Portion 33*d*, as seen in FIG. 9, extends laterally outwardly and subtends the lower edge of one of the magazine sides and then a portion 33*e* extends upwardly along the exposed surface of said magazine side and terminates in an exposed finger pull 33*f*. The pull 33*f* facilitates manual movement of the pusher member to its extended position A.

The biasing spring 35 comprises a resilient metallic band 35*b* which is normally coiled about a spool 36, the latter being mounted on a suitable bracket 37 for rotation about a fixed axis. The bracket 37 is carried by the magazine 18 adjacent the nose section 12, see FIG. 6. As the resilient band 35*b* is unwound from the spool 36, it passes between one side of the magazine and the track component 22*a* and thus, is concealed from view by the side of the magazine, see FIG. 9. The concealed disposition of the unwound band is a safety feature both to the operator and the tool itself. In many prior tools of this general type, the pusher member biasing spring was exposed and susceptible to being accidentally knocked out of adjustment or becoming entangled with various objects, including the clothing of the operator.

The nose section 12 is formed of a pair of flat pieces 12*a* and 12*b* which are secured to one another in face-to-face relation. Piece 12*b*, as seen in FIG. 6, is secured to the underside of the body section 13 and is provided with a passageway P, which is aligned with the lower end of the magazine guide 22. The contacting surfaces of pieces 12*a* and 12*b* cooperate with one another to form a chamber X, into which a single fastener is successively fed by the pusher member and from which the fastener is subsequently discharged by the driver piston into a work piece.

Overlying the exposed surface of piece 12*a*, and slidably mounted thereon, is a safety trip member 38 which is adapted to render the trigger 16 either operative or inoperative. The member 38 is biased to assume an extended position, as seen in FIG. 6, wherein the trigger 16 is inoperative in firing the tool even when the trigger is manually depressed. In order to render the trigger operative, it is necessary for the trip member 38 to be pushed against the exposed surface of the work piece until the trip member has been retracted to its fullest extent. By requiring such a preliminary maneuver by the operator before the tool is in condition to be fired, there is no possibility of dangerous premature firing of the tool. The invention, heretofore described, however, does not involve the trip member or its construction.

Thus, it will be seen that a fastener-driving tool has been provided wherein the body therefor is of unitary construction and includes a housing for the driver piston and a fastener magazine from which the fasteners are successively fed to a chamber for discharge from the tool by the driver piston. The fastener feeding assembly is mounted on the magazine so that substantial portions thereof are concealed and thus, not susceptible to being accidentally knocked out of adjustment. Furthermore, the pusher member of the feed assembly may be readily moved manually to a fastener-loading position and automatically held in said position until released therefrom by the tool operator. The improved tool is of simple construction and may be readily manipulated by the operator. The track components comprising the fastener guiding means disposed within the magazine, may be readily replaced so as to accommodate fasteners which vary over a wide range as to style and size.

We claim:

1. A powered fastener-driving tool comprising an elongated housing having a fastener-driving piston mounted therein for reciprocatory movement, said housing having means for connection to a power source; an elongated hollow fastener magazine disposed at one end of said housing, and being provided with apertured side walls arranged in spaced side-by-side relation, the longitudinal axes of said housing and magazine being angularly disposed relative to one another, said housing and magazine being of unitary construction; a nose section mounted on and protruding from said housing one end and connected to an adjacent discharge end of said magazine, said nose section being provided with a chamber into which fasteners are successively fed from said magazine upon said driving piston moving in one relative direction within said housing and from which fasteners are successively discharged upon said driving piston moving in a second relative direction within said housing; a pair of elongated apertured guide means disposed between said magazine side walls and extending longitudinally thereof for guiding movement of the fasteners longitudinally of and between the side walls of said magazine; means for removably securing said guide means to adjacent opposed surfaces of said magazine side walls, the apertures of a magazine side wall being in registered relation with the apertures of the guide means secured thereto whereby the securing means for one guide means are accessible through the registered apertures of the other guide means and the magazine side wall to which the latter is secured; and a fastener feed assembly disposed within said magazine and including a pusher member mounted for movement only within said magazine and longitudinally of said guide means, said pusher member being biased to move towards said nose section for successively feeding fasteners into said chamber.

2. The powered fastener-driving tool of claim 1 wherein the fastener feed assembly includes a resilient elongated band biased to assume a coil having a fixed axis disposed adjacent said nose section and adjacent one side wall of said magazine, the other end of said band being connected to said pusher member, the segment of said band extending from the coil to the pusher member being disposed between said magazine side walls and adjacent one of said side walls.

3. The powered fastener-driving tool of claim 2 wherein said fastener feed assembly includes a manually releasable means mounted on the end of said magazine remote from said nose section and automatically interlocking with said pusher member when the latter is in a fully extended position with respect to the nose section; said magazine being provided with a top wall having a fastener-loading opening formed therein adjacent the remote end of said magazine, said opening being disposed intermediate said nose section and the

pusher member when the latter is in said fully extended position.

4. The fastener-driving tool of claim 3 wherein said guide means includes a pair of elongated components having opposed, broad, substantially flat surfaces between which a shank portion of each fastener is caused to move intermittently towards said nose section; a substantial segment of each fastener shank portion being sandwiched between said component surfaces whereby said fasteners remain in a predetermined aligned relation while moving towards said nose section.

5. The fastener-driving tool of claim 3 wherein said pusher member is provided with an exposed means for manually moving said pusher member to an extended position for engagement by said releasable means.

* * * * *