

- [54] **ROTARY ENTRY FASTENER DRIVING TOOL**
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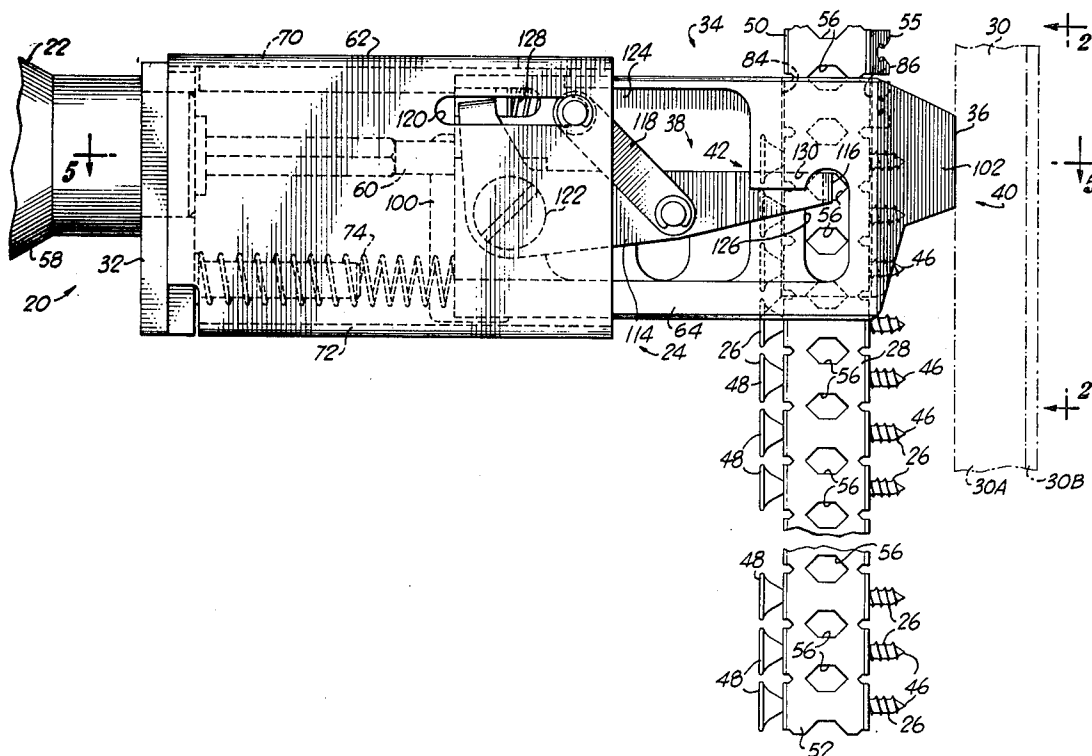
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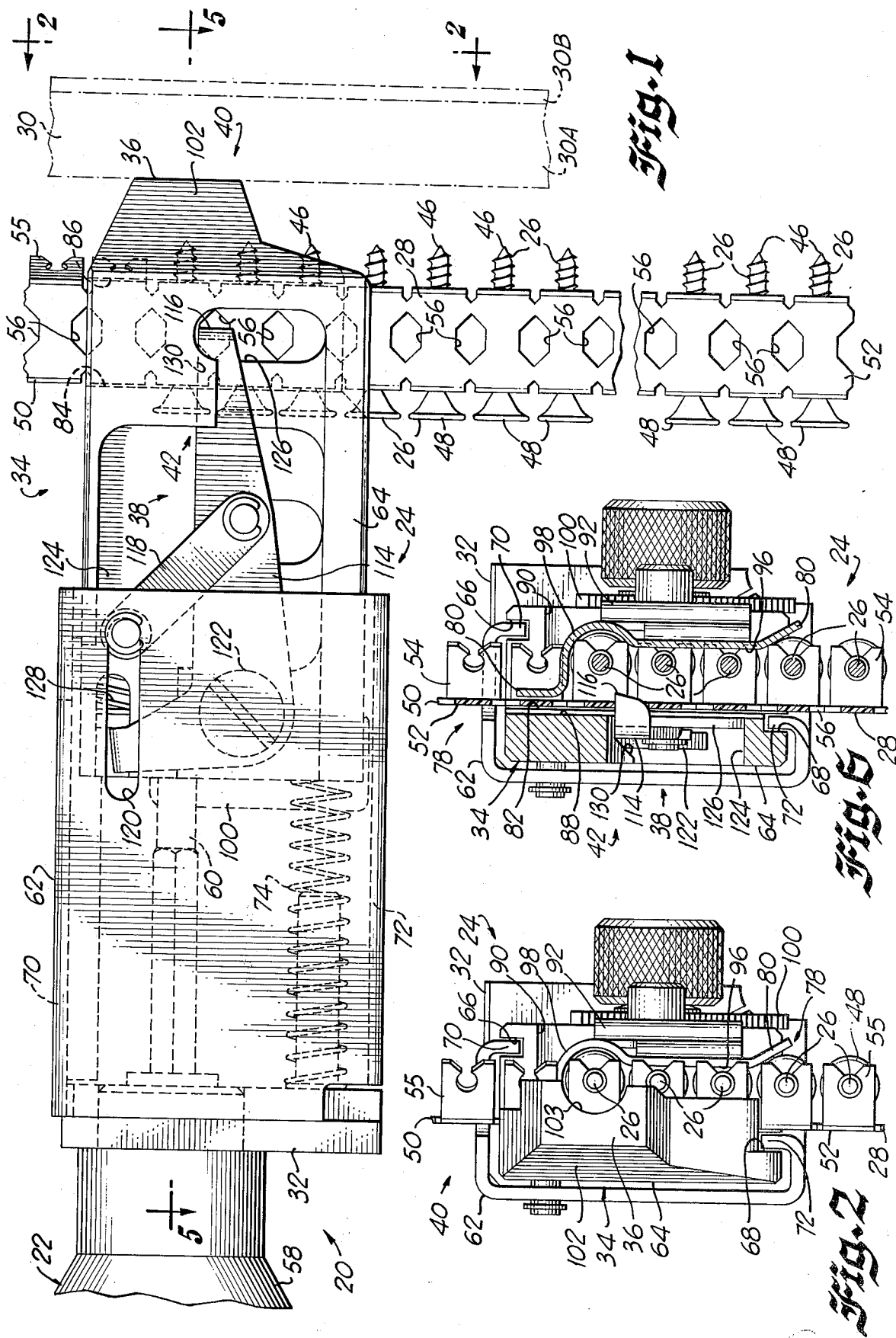
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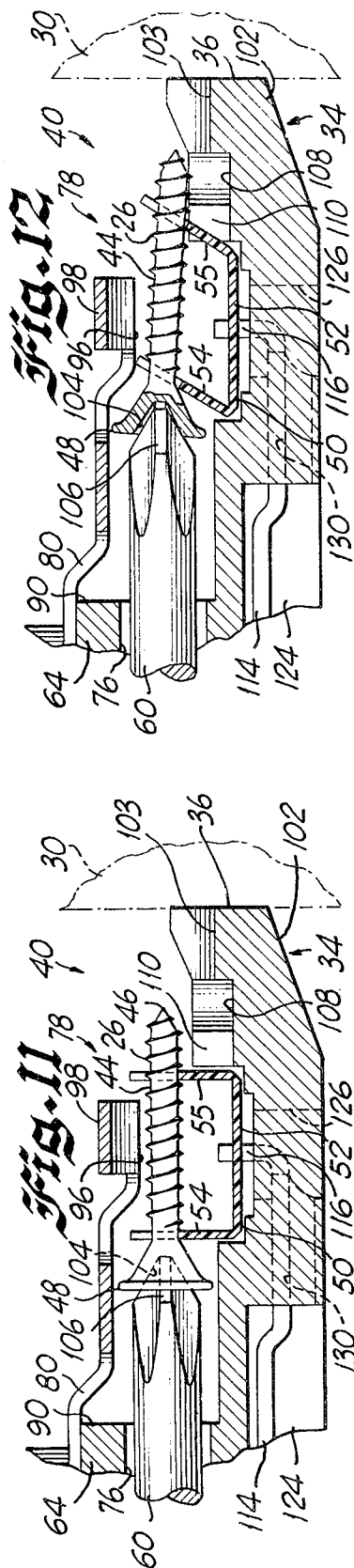
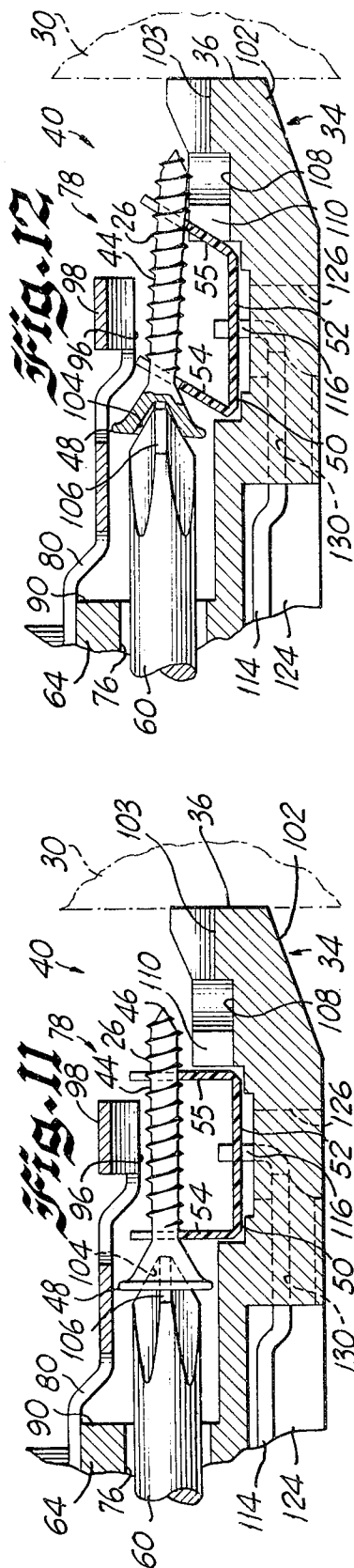
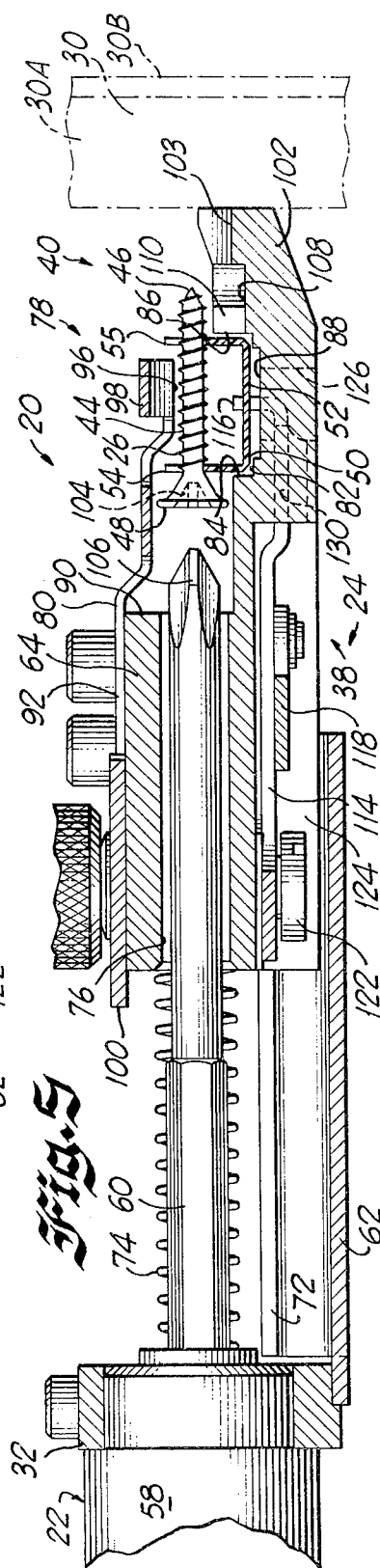
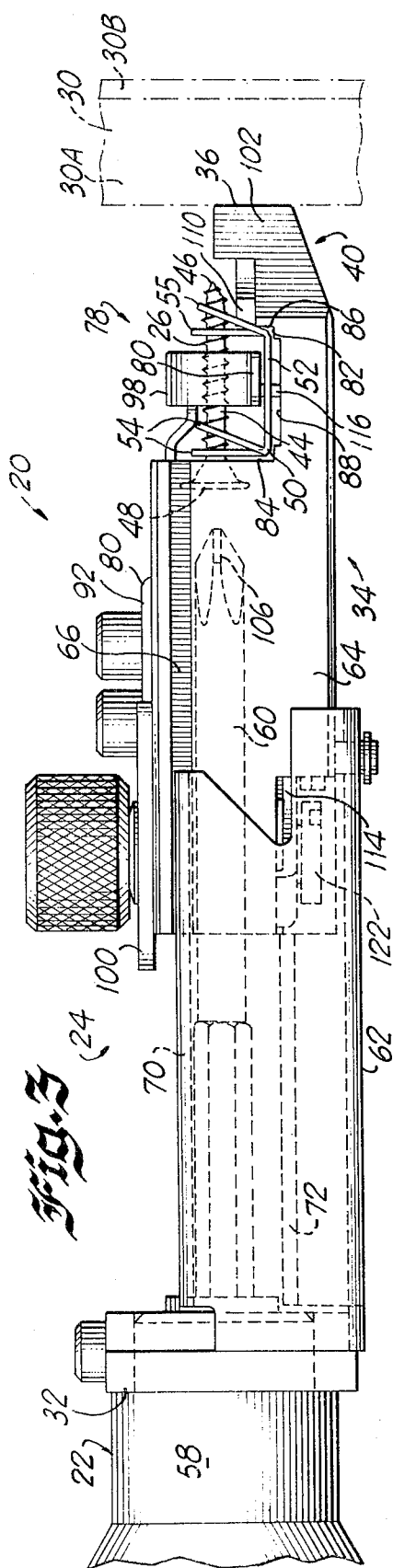
[57] **ABSTRACT**

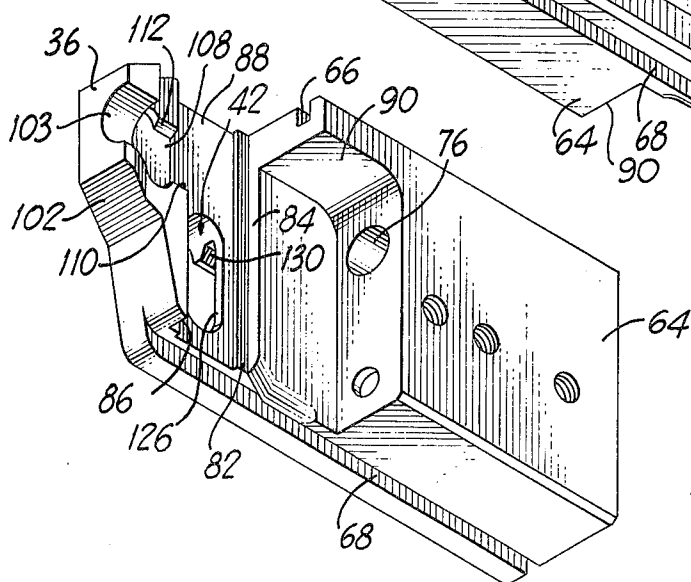
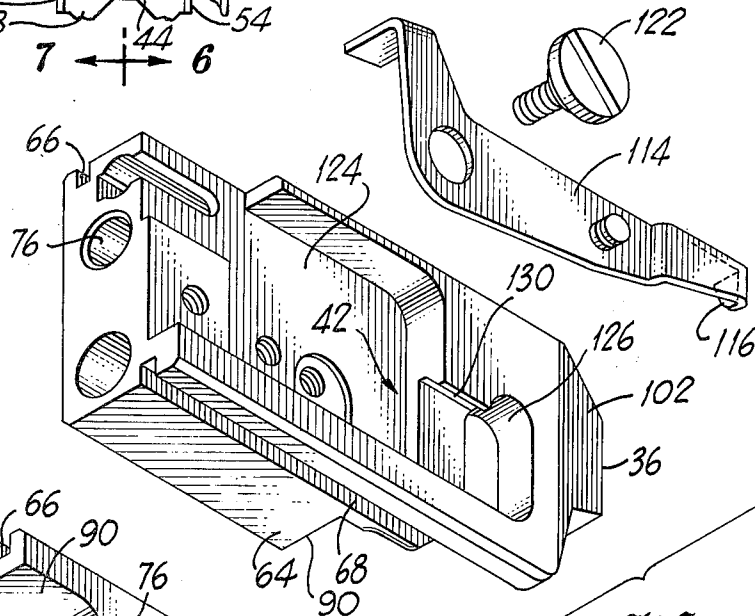
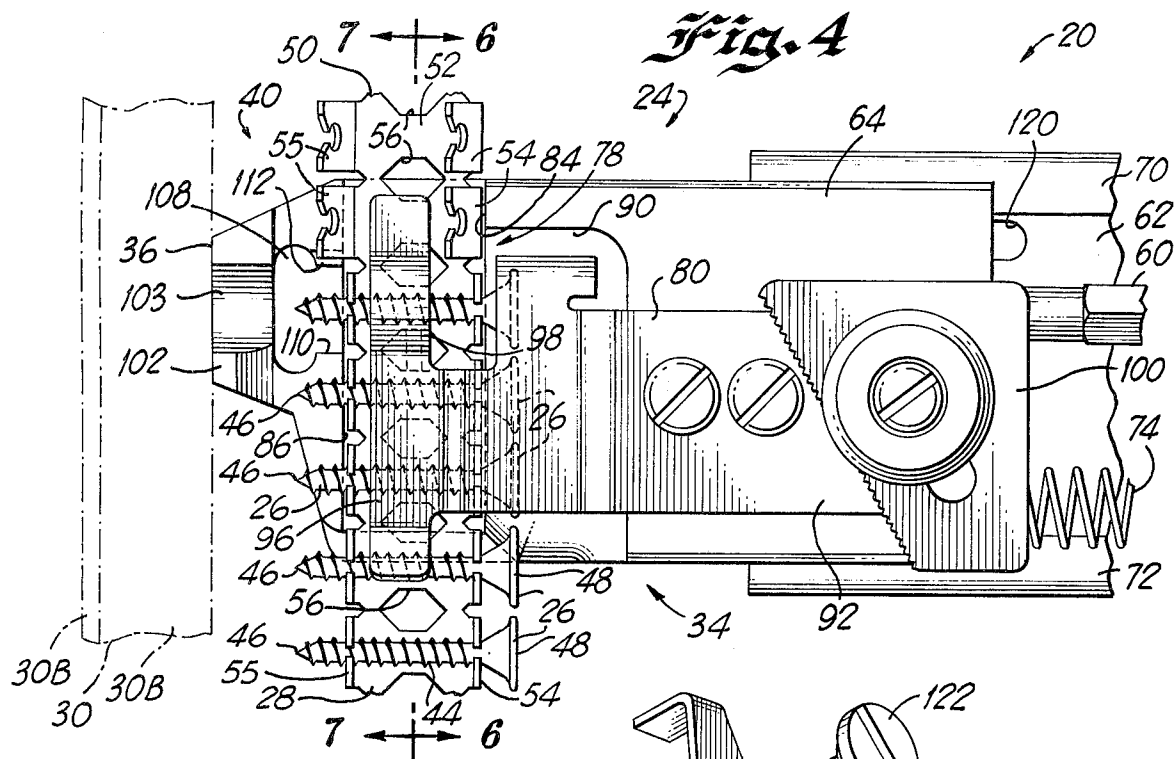
A rotary entry fastener driving tool includes a nose assembly defining a feed path for a carrier strip along which a series of threaded fasteners are frictionally retained. A driver is movable along a drive channel through the nose assembly in a drive stroke wherein it engages a fastener held in a drive position, removes the fastener from the strip, and drives the fastener into a workpiece. The fastener is displaced out of alignment with the driver during release from the strip, and in order to prevent driving of the fastener while misaligned, the nose assembly is provided with a workpiece engaging projection. The projection prevents engagement of the fastener with the workpiece until after the fastener is released from the carrier strip and is realigned with the driver. A pawl lever advances the strip in increments between drive strokes in order to advance fasteners in sequence to the drive position. A cam surface on the nose assembly prevents the lever from releasing the strip before each fastener is properly positioned. The strip is provided in a relatively short length and is supported entirely by its engagement with the nose assembly.

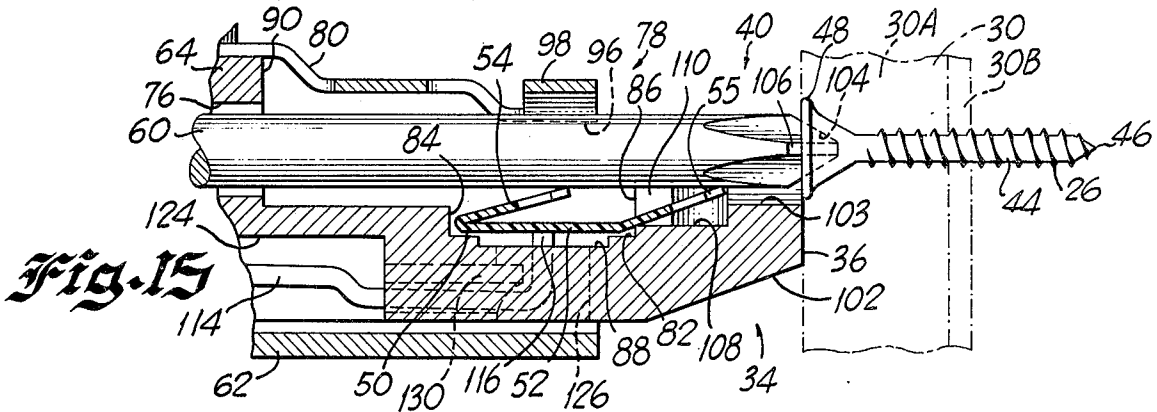
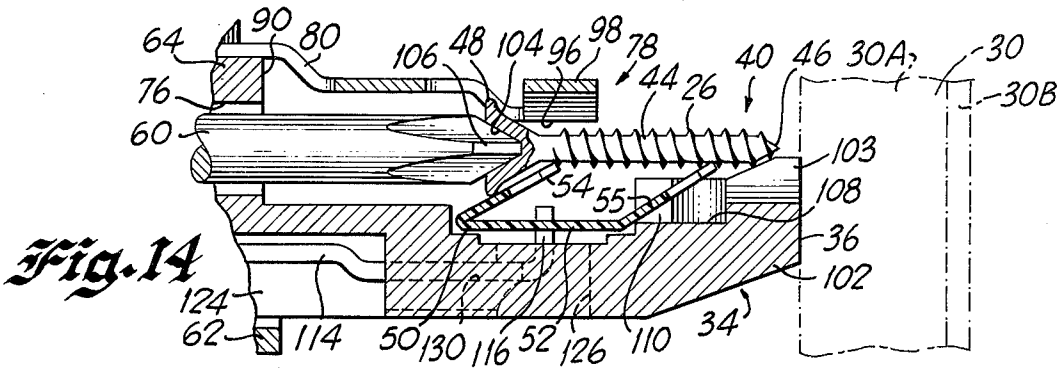
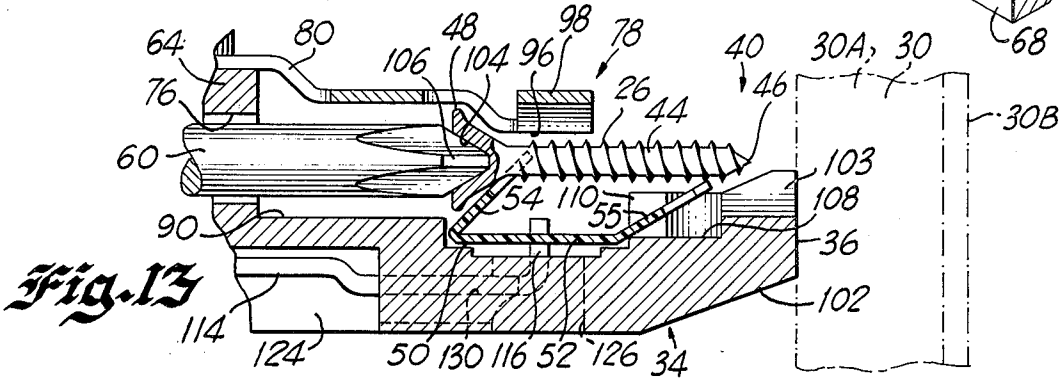
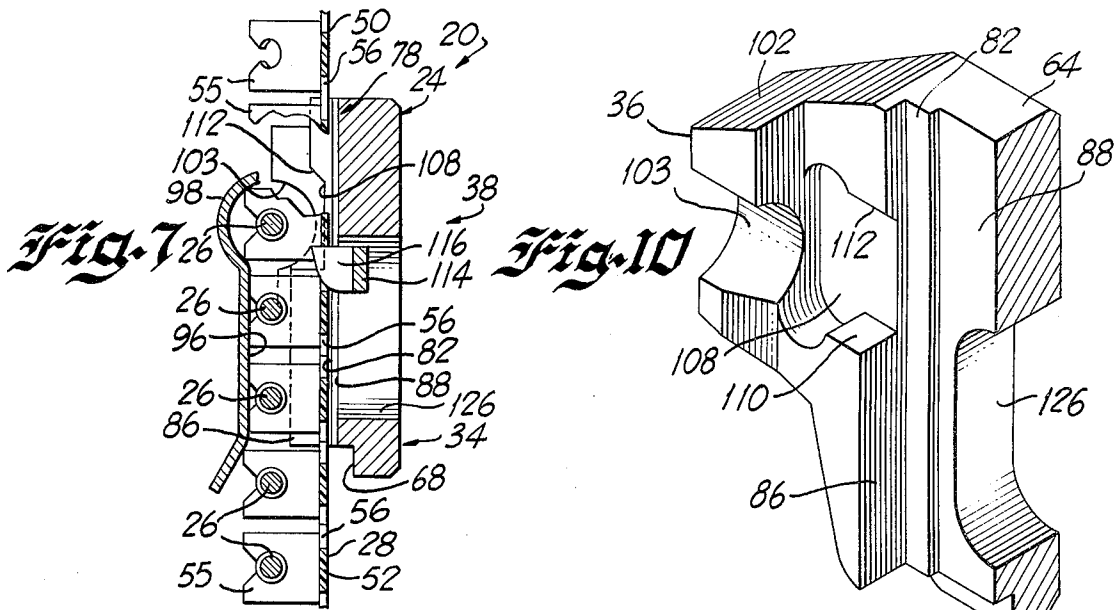
19 Claims, 15 Drawing Figures











ROTARY ENTRY FASTENER DRIVING TOOL

The present invention relates to fastener driving apparatus, and more particularly to improvements in apparatus for feeding rotary entry fasteners from a strip and driving them into a workpiece.

In a copending United States patent application of Frank R. Potucek and Allen R. Obergfell, Ser. No. 412,684, filed on Nov. 5, 1973 and entitled "Fastener Feed Apparatus And Method," there is disclosed a feed assembly for supplying rotary entry fasteners for sequential driving by a power screwdriver tool. The feed assembly intermittently advances threaded fasteners releasably retained in a carrier strip and locates them in a drive position. The carrier strip may be of the type disclosed in a United States patent application of Frank R. Potucek, filed contemporaneously herewith and entitled "Rotary Entry Fastener Carrier And Strip."

The apparatus disclosed in the above designated Potucek and Obergfell application is a readily portable device and thus has important advantages, for example, in the mounting of drywall or other panels in modern building construction. When used for this or similar purposes, the tool may not always be positioned perpendicular to the panel surface during driving of a fastener. A possible result of holding the tool at an angle to the workpiece with the apparatus disclosed in the Potucek and Obergfell application is that when the fastener is started into the workpiece it may be out of alignment with the driver bit. This is undesirable and may result in improper or incomplete driving of the fastener.

An object of the present invention is to provide a fastener driving apparatus wherein proper alignment of each fastener with the driver member is assured even when the tool is not held in a predetermined position relative to the workpiece. Another object is to provide a fastener driving apparatus wherein a fastener may be displaced out of proper alignment when removed from a fastener strip, but wherein the fastener is realigned prior to its engagement with a workpiece.

The feed mechanism disclosed in the Potucek and Obergfell application, and more particularly that illustrated in FIGS. 1-18 thereof, includes a pawl lever movable between cocked and home positions for advancing the carrier strip to locate individual fasteners in a drive position. During movement of the strip, the pawl lever is biased by a spring into engagement with the carrier strip. Under some conditions it may be possible for dirt or debris to interfere with proper operation of the lever and to cause the pawl to become disengaged from the strip prior to complete movement of the strip through the desired increment of movement.

Another object of the present invention is to provide a fastener feeding assembly wherein complete advancement of a strip of fasteners through a desired increment of movement is reliably carried out. Another object is to provide for mechanical and positive engagement of the feeding mechanism with a fastener strip during a fastener feeding operation.

In the apparatus disclosed in the Potucek and Obergfell application identified above, the strip of fasteners is provided in the form of a coil contained in a magazine from which the strip is fed to a nose assembly of the fastener feeding apparatus. Under some circumstances, the weight and size of the magazine and coil of fasteners may be undesirably large. In addition, for

some purposes fewer fasteners may be required than the relatively large number included in a coil.

Another object of the present invention is to provide a novel arrangement for supplying fasteners to a fastener driving tool characterized by light weight and ease of handling.

A more general object of the present invention is to provide improvements in rotary entry fastener driving apparatus, and more particularly to the apparatus disclosed in the above designated Potucek and Obergfell patent application.

In brief, in accordance with the above and other objects of the present invention, there is provided a fastener driving apparatus for driving fasteners from a strip of the type including hinged tabs having slots for releasably retaining fasteners in the strip. A housing, for example the housing of a power screwdriver or the like, supports a fastener driver member. A nose assembly is supported on the housing and defines a drive channel for movement of the driver member. The nose assembly defines a feed path for the fastener strip including a feed position located in the drive path wherein a fastener is held by the tabs in alignment with the driver member. During a drive stroke, the driver member engages the fastener, removes it from the strip, and drives it into a workpiece.

In accordance with the invention, the nose assembly is provided with a projection having a workpiece engaging surface. The driver member is provided with a drive bit engageable with the head of the fastener, and the bit and fastener head are contoured so that the fastener head cannot move laterally relative to the bit, and so that the bit urges the fastener into alignment with the driver member. Although during removal of the fastener from the tabs the fastener may become misaligned, the projection prevents engagement of the fastener with the workpiece until after the fastener is properly realigned relative to the driver member.

The nose assembly is mounted for reciprocal movement toward and away from the housing as the tool is moved toward the workpiece in a drive stroke and is then withdrawn from the workpiece. A pawl mounted on the nose assembly is engageable with the strip and is moved between cocked and home positions in response to relative movement of the nose assembly and the housing. A cam is provided for positively and mechanically holding the pawl in engagement with the strip as the strip is moved to advance a fastener to the drive position.

In accordance with a feature of the invention, the fastener strip is provided in a relatively short length rather than in an elongated coil. The strip is supported exclusively by its engagement with the nose assembly, and that portion of the strip extending from the nose assembly is otherwise unsupported.

The invention together with the above and other objects and advantages thereof may be best understood from consideration of the embodiment of the invention illustrated in the drawings, wherein:

FIG. 1 is a side elevational view of a rotary entry fastener driving tool constructed in accordance with the present invention;

FIG. 2 is an end elevational view taken from the line 2-2 of FIG. 1;

FIG. 3 is a top elevational view of the tool of FIG. 1;

FIG. 4 is a fragmentary side elevational view of the tool taken from the side opposite that illustrated in FIG. 1;

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 1;

FIG. 6 is a sectional view taken along the line 6—6 of FIG. 4;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 4;

FIG. 8 is an exploded perspective view illustrating the nose block and pawl lever of the tool of FIG. 1;

FIG. 9 is a perspective view of the nose block illustrating the side opposite that shown in FIG. 8;

FIG. 10 is an enlarged fragmentary perspective view of the front end portion of the nose block; and

FIGS. 11—15 are sectional views on an enlarged scale similar to a portion of FIG. 5 and illustrating components of the tool in the positions assumed at sequential times during a fastener driving operation.

With reference now to the accompanying drawings and initially to FIGS. 1—6, there is illustrated a rotary entry fastener driving tool designated in its entirety by the reference numeral 20 and constructed in accordance with the principles of the present invention. The tool 20 includes a rotary entry fastener driving apparatus 22 which may comprise a power screwdriver or the like of conventional construction, and of which only a fragment is illustrated. Associated with the power screwdriver 22 is a fastener feed assembly generally designated as 24 serving to feed individual fasteners 26 from a fastener strip 28 into driving position relative to the power screwdriver 22 whereupon the fasteners 26 are driven by the tool 22 into a workpiece, such as the workpiece 30 illustrated in broken lines in FIGS. 1, 3—5 and 11—15.

The present invention relates to improvements in the fastener driving apparatus disclosed in copending application Ser. No. 412,684, filed Nov. 5, 1973 of Frank R. Potucek and Allen R. Obergfell entitled "Fastener Feed Apparatus And Method." In many respects the tool 20 is similar to the apparatus shown in FIGS. 1—18 of the Potucek and Obergfell application. During the ensuing description of the tool 20 of the present invention, certain elements of the tool not essential to an understanding of the present invention are not described in detail. For a more detailed description of the structure and operation of these portions of the tool, reference may be had to that copending application.

In general, the feed assembly 24 includes a base member 32 adapted to be mounted to the power screwdriver 22 in order to support the assembly 24 in position. A nose assembly 34 includes a workpiece engaging surface 36, and the base 32 and nose assembly 34 are movable relative to one another as the tool 20 is moved toward and then withdrawn from the workpiece during and following a fastener driving operation. A feed mechanism generally designated as 38 operates in response to relative movement of the nose assembly 34 and the base 32 for incrementally advancing the fastener strip 28 in order to locate individual fasteners in sequence for driving by the power screwdriver 22.

In accordance with one aspect of the present invention, the nose assembly 34 is provided with a positioning structure generally designated as 40 providing important advantages in the use of the tool 20. The structure 40 assures that each fastener 26 is properly aligned and properly driven into the workpiece 30 even when

the tool 20 is not held perpendicular to the workpiece 30. Moreover, the structure 40 assists the user of the tool 20 in applying each fastener 26 to the desired point and also permits use of the tool 20 in a tilted or inclined position without interference between the strip 28 and the surface of the workpiece 30.

In accordance with another feature of the present invention, the feed mechanism 38 is provided with a positive and mechanical holding arrangement generally designated as 42 for insuring that the strip 28 is fed properly prior to each fastener driving operation. The holding structure 42 prevents interference with the feed mechanism 38 which might otherwise result from the presence of construction debris, dirt or other foreign material.

Another feature of the present invention resides in the configuration of the fastener strip 28 in combination with the tool 20. More specifically, in the above identified Potucek and Obergfell application, fasteners are provided in a strip of considerable length formed into a coil and held in a magazine supported below the base 32. This construction results in substantial weight and may produce undesirable operator fatigue, particularly when the tool is used in an overhead position or the like. In addition, this arrangement adds to the overall size of the tool and limits its usefulness in confined areas.

In order to avoid excessive weight and size, in accordance with the present invention the strip 28 is provided in a relatively short length. For example, the strip may be provided in a length capable of supporting in the range of perhaps one dozen or a few dozen fasteners 26. In addition, in accordance with the invention, the strip 28 is supported only by its engagement with the feed assembly 24, and the portions of the strip extending from the nose assembly 34 are otherwise unsupported.

In the illustrated arrangement, each fastener 26 is a rotary entry fastener of the type commonly known as a drywall screw and includes a shank portion 44 at least a portion of which is threaded, a tip 46 at the entry end of the shank 44, and a head 48 at the opposite end of the shank. The strip 28 includes a carrier member 50 in the form of an elongated strip of flexible plastic material including a base or web portion 52. Upper and lower tab members 54 and 55 are resiliently hinged to the opposite edge of the web 52 for pivotal movement relative thereto. Each tab 54 and 55 is provided with a slot structure and each pair of one tab 54 and one tab 55 frictionally retains a fastener 26 in position along the strip 28.

The web 52 is provided with a series of openings 56, one corresponding with each pair of tab members 54 and 55. As appears below, the strip 28 is advanced by engagement of the feed mechanism 38 with the openings 56. The carrier 50 and strip 28 may be of the construction disclosed in a copending United States patent application of Frank R. Potucek entitled "Rotary Entry Fastener Carrier And Strip," filed contemporaneously with the present application. Reference may be had to the Potucek application for a further description of the structure of the carrier 50 and the strip 28.

The power screwdriver 22 may take any conventional form. In the illustrated arrangement, the device 22 is a power screwdriver adapted for the driving of fasteners to attach drywall panels 30A to metal studs 30B. The tool includes a housing 58 containing a suitable

motor coupled by a conventional depth sensitive clutch assembly to a driver member 60 extending from the housing 58. The depth sensitive clutch assembly functions in known manner to couple the driver member 60 to the tool motor for rotation of the driver member in response to pushing of the driver member and fastener against the workpiece 30. Moreover, the clutch assembly uncouples the driver member from the motor when the fastener is driven to a desired depth. One example of a tool of this character provided with a depth sensitive clutch is the Model 2035 screwdriver manufactured and sold by the Black & Decker Manufacturing Company, Towson, Md. 21204, illustrated in its catalog No. PE-3 (7/73 Supplement) BP. Proceeding now to a more detailed description of the structure of the feed assembly 24, the base member 32 comprises a block-like body adapted securely to be fastened to the housing 58 of the power screwdriver 22. Fixed to the base member 32 is a slide member 62 supporting the nose assembly 34 for movement toward and away from the base member 32 and power screwdriver 22. The major structural component of the nose assembly 34 is a nose block 64. The nose block 64 includes a pair of grooves or slots 66 and 68 for slidably receiving a pair of runners or flanges 70 and 72 of the slide member 62. In order to bias the nose block 64 away from the base member 32, a return spring 74 is held in compression between these elements.

In order to engage and drive a fastener 26 from the nose assembly 34, the driver member 60 extends through the base member 32 in the direction of the nose block 64. Movement of the driver member through the block 64 is accommodated by means of an opening or drive channel 76 extending through the nose block 64.

In order to permit feeding of the fastener strip 28 through the nose assembly 34 for registration of the fasteners 26 in sequence with the driver member 60, a feed path 78 is defined by the nose assembly 34, and more specifically by the nose block 64 and by a guide member 80 mounted on the block 64. As best appears in FIGS. 3 and 5, the feed path 78 comprises a recess or opening extending through the block 64 in a direction transverse to and intersecting the drive channel 76. The web 52 and tab members 54 and 55 of the carrier 50 are slidably received and retained in the path 58 by means of a base wall 82 and a pair of side walls 84 and 86, the base wall 82 being cut away as indicated by the reference numeral 88 in FIGS. 9 and 10 to provide clearance beneath the web 52. A recess 90 is provided to permit entry of the fastener heads 48 into the nose block 64.

Guide member 80 cooperates with the nose block 64 in defining the feed path 78, and functions to guide the fastener strip 28 into the feed path and to retain the strip in the path. The guide member 80 includes a foot portion 92 fastened to the block 64, together with a guiding and shielding structure serving to guide the strip 28 along the path 78 and to cover the recess 90. As appears best in FIG. 6, the guide 80 includes a guide surface 96 overlying the fastener shanks 44 and holding the carrier 50 in place against the walls 82, 84 and 86.

Upon insertion of the strip 28 into the feed path 78, a first fastener 26 of the strip is located in a drive position in line with the driver member 60 and with the drive channel 76. A generally rounded segment 98 of the guide member 80 surrounds the drive position and

provides a path for movement of the fastener head from the block 64 and into the workpiece 30.

After the strip 28 has been inserted into the feed path 78 with a fastener 26 in the drive position aligned with the driver member 60, a fastener driving operation may be carried out. During this driving operation, the workpiece engaging surface 36 is placed against the workpiece 30, and the screwdriver 22 is pressed in order to move the base member 32 toward the nose assembly 34. The driver member 60 moves through the drive channel 76 into engagement with the fastener 26. The fastener 26 is removed from the carrier 50 and is moved into engagement with the workpiece 30. Axial force against the driver member 60 operates the depth sensitive clutch of the screwdriver 22 to produce rotation of the driver member. The fastener 26 is driven to a predetermined depth at which time an adjustable stop member 100 mounted on the nose block 64 engages the base member 32 and the depth sensitive clutch is disengaged. At this point the screwdriver 22 is withdrawn away from the workpiece 30, the return spring 74 causing the nose assembly 34 and the base member 32 to separate.

In accordance with the present invention, the positioning structure 40 is provided for assuring that the fastener 26 is driven completely and properly into the workpiece 30. During the driving operation, as the fastener 26 is removed from the carrier 50, the fastener 26 is displaced to a nonaligned position relative to the driver member 60. Were the tool 20 consistently to be held perpendicular to the workpiece 30, the arrangement illustrated in the above designated Potucek and Obergfell application would maintain the fastener 26 in proper alignment since the fastener tip in that construction enters the workpiece almost immediately upon engagement by the driver member. However, in use of a tool such as the tool 20, the tool commonly is held in a tilted or inclined orientation relative to the work surface. The novel positioning structure 40 of the present invention assures that the fastener 26 is aligned properly with the bit prior to driving in any position of the tool 20.

In the illustrated arrangement, the positioning structure 40 takes the form of a projection 102 formed on the forward end of the nose block 64 and providing a space or clearance through which the fastener 26 moves from the drive position before it engages the workpiece 30. The workpiece engaging surface 36 is defined on the end of the projection 102, and in accordance with the invention, the projection 102 is generally symmetrically arranged around the path through which the fastener 26 moves into the workpiece. As a result, the operator can visually align the tool with the workpiece and drive the fastener 26 into any desired point on the workpiece. To assist in guiding the fastener 26 and driver member 60 during a drive stroke, the projection 102 includes a semi-cylindrical recess 103 aligned with and functioning as a part of the drive channel 76.

Also in accordance with the invention, the projection 102 is somewhat tapered making it possible to drive a fastener into a confined area such as a corner or crevice. Another important function of the projection 102 is that it results in a space, as can be seen in FIG. 1, between the tips 46 of the fasteners 26 along the strip 28 and the workpiece engaging surface 36. As a result, if the tool 20 is tilted or tipped in use, the strip 28 and fas-

teners 26 are not interfered with or dislodged by engagement with the workpiece 30.

The function of the positioning structure 40 in a fastener driving operation best appears with reference to FIGS. 5 and 11-15. In FIG. 5, a fastener 26 is illustrated in the drive position prior to the beginning of movement of the driver member 60 through a drive stroke along the drive channel 76. In this position, the shank 44 of the fastener 26 is frictionally held in slots in one pair of tab members 54 and 55 of the carrier 50.

As the screwdriver 22 is pressed toward the workpiece 30, the return spring 74 is compressed and the nose assembly 34 moves toward the base assembly 32. The driver member 60 moves into engagement with the fastener 26 as illustrated in FIG. 11. The head 48 of the fastener 26 is provided with a drive structure 104, and the driver member 60 is provided with a complementary drive structure 106. The drive structures 104 and 106 may be of any suitable type, and should be of such a nature that after engagement of the driver member 60 with the fastener head 48, the head is prevented from moving laterally with respect to the driver member 60. The structures 104 and 106 should also be of such a nature that the fastener shank 44 is urged by interengagement of the drive structures into axial alignment with the driver member 60. For example, the structures 104 and 106 may respectively comprise any desired type of drive socket and complementary projection, and in the illustrated arrangement the drive structure 106 of the driver member 60 comprises a Phillips driver bit while the structure 104 comprises a complementary Phillips head recess or socket.

With reference now to FIG. 12, as the driver member 60 advances further into the drive position initially occupied by the fastener 26, the fastener is forced toward the workpiece. Since the shank of the fastener is frictionally retained in the tab members 54 and 55, the tab members are each caused to pivot. The head 48 of the screw is held on the drive tip 106 of the driver member 60, but the point 46 of the fastener 26 is deflected downwardly by pivoting of lower tab 55, and the shank 44 is tilted or inclined out of axial alignment with the driver member 60. During this movement, as the tab 55 adjacent the tip 44 pivots downwardly pulling the shank out of alignment, the portion of the shank adjacent the head 48 is being pulled out of the other tab 54.

After further movement of the driver member 60 relative to the fastener 26, as illustrated in FIG. 13, the forwardmost tab 55 abruptly releases the shank 44. At this time, the rearward tab 54 still maintains some retention of the portion of the shank 44 adjacent the head 48. This retention serves to hold the drive structures 104 and 106 in engagement.

As best seen in FIG. 14, subsequently both of the tabs 54 are released. The resilient nature of the tabs and the manner in which they are pivoted causes them to continue to exert a resilient holding force maintaining the head 48 in engagement with the driver member 60. Interaction of the drive structures 104 and 106 on the fastener head 48 and driver member 60 after release of the tab 55 causes the fastener 26 to become realigned with the driver member 60 as can be seen in FIGS. 13 and 14. The projection 102 provides a sufficient path of movement of the fastener 26 for this realignment to take place prior to engagement of the fastener tip 46 with the workpiece 30. Further, this realignment takes place in any position of the tool 20 relative to the work-

piece 30. In FIG. 15 the fastener 26 is illustrated fully driven into the workpiece 30, and it can be seen that due to axial alignment of the fastener 26 in the driver member 60, the fastener is driven properly and completely.

In order to accommodate pivotal movement of the forwardmost tab member 55, the nose block is provided with a recess 108 best illustrated in FIG. 10. This recess permits the tab 55 to be pivoted as the fastener 26 is extracted, and is defined in part by a stop surface 110 over which the tab 55 lies after being pivoted. This stop surface 110 prevents retrograde movement of the carrier 50 in the feed path 78 during operation of the feed mechanism 38.

Opposite the stop surface 110, the recess 108 is provided with an inclined cam surface 112. This surface functions to engage the pivoted tab member 55 upon further feeding of the strip 28 and moves the tab member 55 back to a generally upright position for movement through the feed path 78.

Turning now to a description of the feed mechanism 38, for the most part this mechanism is similar to that incorporated in the apparatus illustrated in FIGS. 1-19 of the above referenced Potucek and Obergfell application. The feed mechanism includes a pawl lever 114 carrying a pawl 116 engageable with the openings 56 in the web 52 for advancing the strip 28 in increments along the feed path 78. A drive link 118 causes the pawl 116 to move between a home position illustrated in the drawings and a cocked position as the base member 32 is moved toward the nose assembly 34. Conversely, when the base member 32 moves away from the nose assembly 34, the pawl 116 is returned in the opposite direction to the home position in order to advance the fastener strip 28 through one increment of movement. A lost motion drive slot 120 in slide 62 (FIG. 1) is associated with the drive link 118 in order to insure that operation of the feed mechanism 38 does not interfere with the driving of a fastener 26 by the driver member 60.

The pawl lever 114 is mounted somewhat loosely for pivotal movement on the nose block 64 by means of a shoulder screw 122. The screw 122 and lever 114 are located in a recess 124 defined in a side wall of the block 64. A slot 126 extends between recess 124 and the feed path 78 to enable engagement of the pawl 116 with the carrier 50. Clearance is provided beneath the head of the shoulder screw 122 to permit movement of the pawl 116 out of the plane of the carrier web 52 during movement from the home to the cocked position. A pawl return spring 128 (FIG. 1) serves both to bias the pawl 116 toward the home position and also to bias the pawl 116 into the plane of the carrier web 52 so that after movement to the cocked position the pawl enters the next adjacent opening 56.

In operation, during driving of a fastener the movement of the nose assembly 34 toward the base member 32 causes the drive link 118 to rotate the pawl lever 114, thus to move the pawl 116 to a cocked position. The lost motion connection 120 prevents movement of the pawl lever until after fastener 26 is securely started into the workpiece 30.

After driving of the fastener 26, the separation of the nose assembly 34 from the base member 32 releases the pawl lever 114. The return spring 128 urges the pawl 116 into the next adjacent web opening 56, and also rotates the pawl lever 114 in the opposite direc-

tion. Consequently, the pawl 116 is returned to its illustrated home position and advances the strip 28 through one increment of movement.

The tool 20 is adapted to be used in various types of construction operations where dust, dirt and debris may abound. It is possible for the fastener strip 28, and particularly one or more of the openings 56, to become fouled in such an environment. In addition, it is also possible for the recess 124 in the region of the pawl lever 114 to become clogged.

In order to prevent these adverse conditions from interfering with driving of the strip 28, in accordance with the present invention, the holding structure 42 is provided. In the illustrated arrangement this holding structure 42 comprises a cam surface 130 defined along the recess 124 and engageable with the pawl lever 114. As best appears in FIG. 6, as the pawl lever returns toward its home position, it is positively and firmly engaged by the cam surface 130 so that the pawl 116 is securely held within an opening 56 in web 52.

It should be noted that the presence of the cam surface 130 does not materially affect the initial loading of fastener strip 28 into the feed path 78. Since the carrier 50 is formed of somewhat resilient plastic material, the web 52 is able to deform sufficiently to permit entry of the pawl 116 into the first opening 56 even though outward movement of the pawl 116 is prevented by the cam surface 130.

Although the present invention has been described with reference to details of the illustrated embodiment, such details should not be taken to limit the invention as defined in the following claims.

I claim:

1. Fastener driving apparatus for driving headed fasteners from a strip of the type wherein fasteners are releasably held by hinged tabs extending from a web portion, said apparatus comprising:

housing means supporting a fastener drive member for movement of said drive member in a drive stroke toward a workpiece;

nose means supported on said housing means defining an unrestricted drive path for said drive member and defining a feed path for said strip including a drive position along said drive path wherein a fastener is held by the tabs in alignment with said drive member;

projection means on said nose means having a work engaging surface adapted to engage the workpiece; bit means on said drive member constructed and arranged to prevent lateral movement of a fastener head relative to said bit while urging said fastener into axial alignment with said drive member; and the distance between a fastener in said drive position and said work engaging surface being larger than the distance required to release the fastener from the tabs.

2. The apparatus of claim 1, said drive path being defined in part by said projection means.

3. The apparatus of claim 2, said projection means being generally tapered toward the point of entry of a fastener into the workpiece.

4. In combination:

a fastener having a head and a shank;

holding means for frictionally and releasably supporting said fastener in a predetermined drive position;

a drive member axially aligned with said fastener in said drive position and movable through a drive

stroke through said drive position for releasing said fastener from said holding means;

bit means on said drive member engageable with said head to effect driving of said fastener, said bit means and said head cooperating to prevent lateral movement of said head relative to said bit means and to urge said fastener into axial alignment with said drive member; and

spacer means for preventing the engagement of said fastener with a workpiece until after said shank is released from said holding means.

5. The combination of claim 4, said fastener including thread means on said shank, said bit means and said head including mating drive structure for imparting rotation of said drive member to said fastener.

6. The combination of claim 5, said drive structure comprising interfitting socket means and projection means.

7. The combination of claim 6, said drive structure comprising a Phillips head and driver.

8. The combination of claim 4, said holding means comprising tab means normally disposed generally transverse to the fastener axis and pivotable about a line disposed to the side of the fastener axis.

9. The combination of claim 8, said tab means including a pair of tabs, and slots in said tabs frictionally engaging said shank at spaced points.

10. The combination of claim 9, resilient hinge means mounting said tabs for pivotal movement and urging said tabs toward their normal position.

11. In a tool for driving headed rotary entry fasteners from a carrier strip wherein the fastener shanks are frictionally retained in slotted tab members resiliently hinged to a web portion extending throughout the length of the strip, the combination comprising:

housing means supporting an elongated driver member extending from said housing means;

a nose structure mounted for sliding movement toward and away from said housing means;

a drive channel defined in said nose structure for movement of said driver in a drive stroke through said nose structure as said housing means moves toward said nose structure;

return means for separating said housing means and said nose structure following said drive stroke;

a feed path extending through said nose structure and intersecting said drive channel at a drive position whereat a fastener is held in alignment with said driver with its head presented toward said driver; feed means operable in response to relative movement between said housing means and nose structure for incrementally advancing the carrier strip along said feed path between drive strokes to position successive fasteners in said drive position; and the improvement characterized by:

said driver including bit means drivingly engageable with the fastener head and being constructed and arranged to hold the head against lateral movement across the bit while tending to urge the fastener shank into alignment with the driver;

said nose structure including recess means extending from said drive position along the drive channel in the direction of the drive stroke for permitting the carrier strip tab members to pivot during release of the fastener shank in a drive stroke; and

a workpiece engaging projection extending from said nose structure for preventing engagement of a

driven fastener until after release of the fastener from said tab members.

12. In a tool for driving headed rotary entry fasteners from a carrier strip wherein the fastener shanks are frictionally retained in slotted tab members resiliently hinged to a web portion extending throughout the length of the strip, the combination comprising:

housing means supporting an elongated driver member extending from said housing means;

a nose structure mounted for sliding movement toward and away from said housing means;

a drive channel defined in said nose structure for movement of said driver in a drive stroke through said nose structure as said housing means moves toward said nose structure;

return means for separating said housing means and said nose structure following said drive stroke;

a feed path extending through said nose structure and intersecting said drive channel at a drive position whereat a fastener is held in alignment with said driver with its head presented toward said driver;

feed means operable in response to relative movement between said housing means and nose structure for incrementally advancing the carrier strip along said feed path between drive strokes to position successive fasteners in said drive position; and the improvement characterized by:

said carrier strip being supported exclusively by said feed path and said feed means and extending unsupported from said nose structure.

13. Apparatus for feeding a strip of fasteners in increments for sequential driving by a rotary entry fastener driving tool, said apparatus comprising:

base means adapted to be mounted on the tool;

a nose assembly having a workpiece engaging surface;

means mounting said nose assembly for movement relative to said base means so that said base means moves in one direction relative to said nose assembly when the tool is pressed toward the workpiece during a fastener driving operation;

return means for moving said base means in the opposite direction relative to said nose assembly as the tool is withdrawn from the workpiece after a fastener driving operation;

means defining a feed path through said nose assembly for supporting said strip with a fastener in the drive position;

pawl means mounted on said nose assembly and engageable with said strip, said pawl means being movable between cocked and home positions in response to movement of said base means relative to said nose assembly; and

cam means for holding said pawl means in engagement with said strip as said pawl means approaches

said home position.

14. The apparatus of claim 13, a pawl lever mounted for pivotal movement on said nose assembly, said pawl means comprising a portion of said lever.

15. The apparatus of claim 14, a pawl return spring connected between said lever and said nose assembly for biasing said pawl means toward said home position.

16. The apparatus of claim 15, said pawl lever being mounted for movement of said pawl transverse to said feed path out of engagement with said strip, and said pawl return spring biasing said pawl means into engagement with said strip.

17. The apparatus of claim 16, a recess in said nose assembly containing said pawl lever, said cam means comprising a cam surface formed in a wall of said recess.

18. In a tool for driving headed rotary entry fasteners from a carrier strip wherein the fastener shanks are frictionally retained in slotted tab members resiliently hinged to a web portion extending throughout the length of the strip, the combination comprising:

housing means supporting an elongated driver member extending from said housing means;

a nose structure mounted for sliding movement toward and away from said housing means;

a drive channel defined in said nose structure for movement of said driver in a drive stroke through said nose structure as said housing means moves toward said nose structure;

return means for separating said housing means and said nose structure following said drive stroke;

a feed path extending through said nose structure and intersecting said drive channel at a drive position whereat a fastener is held in alignment with said driver with its head presented toward said driver;

feed means operable in response to relative movement between said housing means and nose structure for incrementally advancing the carrier strip along said feed path between drive strokes to position successive fasteners in said drive position.

and the improvement characterized by:

said feed means including pawl means movable along said feed path and engageable with said carrier strip for advancing said strip;

resilient means urging said pawl means toward said strip throughout its range of movement; and

holding means mechanically forcing said pawl means against said strip when a fastener is in said drive position.

19. The combination of claim 18, said pawl means including a lever pivotally and loosely mounted on said nose structure and a cam surface defined on said nose structure and engageable by said lever as a fastener nears the drive position.

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