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(54) **PUSHPIN INSTALLER**

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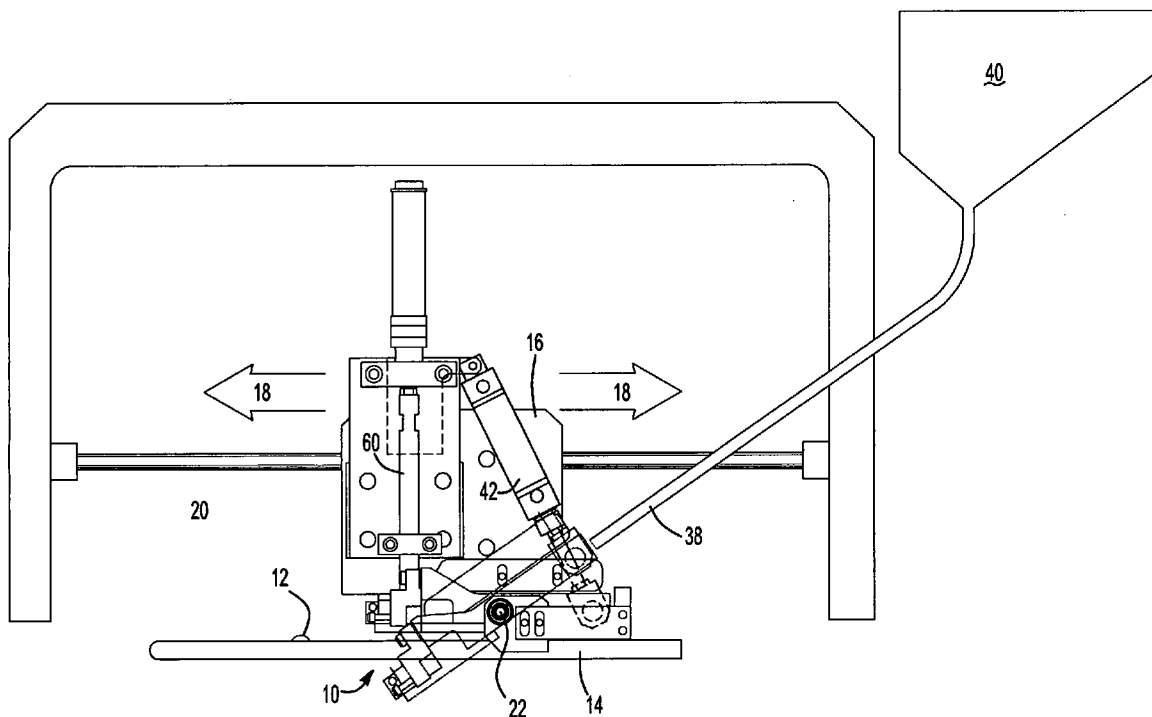
(57) **ABSTRACT**

A pushpin installer having a housing and a pushpin receiver having a track adapted to receive a plurality of aligned pushpins. An escapement is secured to the receiver adjacent one end of the track and this escapement is movable between a retracted position in which the escapement is laterally displaced from the track and an extended position in which the escapement extends across the track and separates two pushpins. A plunger is aligned with one pushpin after separation by the escapement so that, upon actuation, the plunger drives a pushpin from the track in a direction transverse with respect to the direction of the track and into a workpiece.

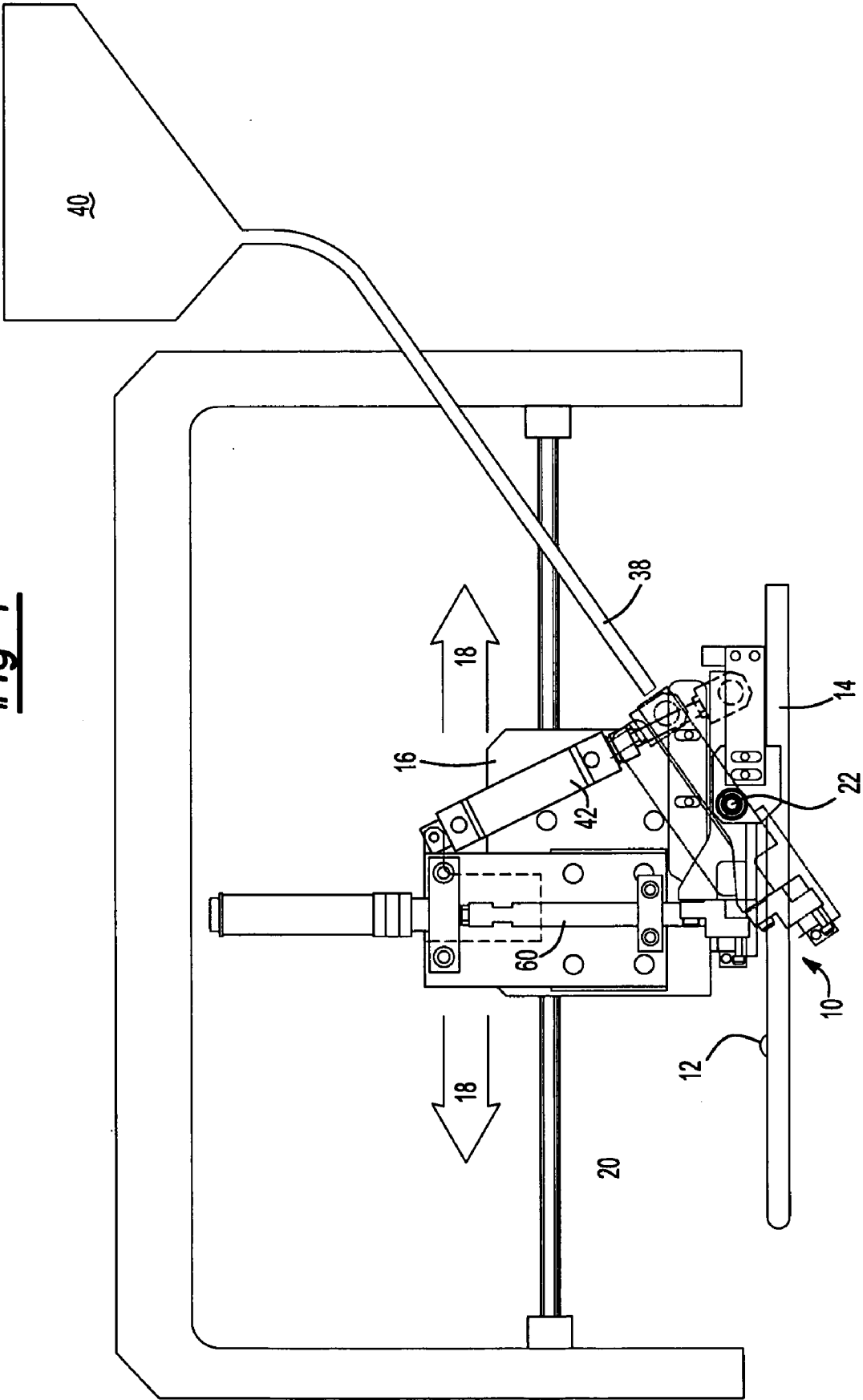
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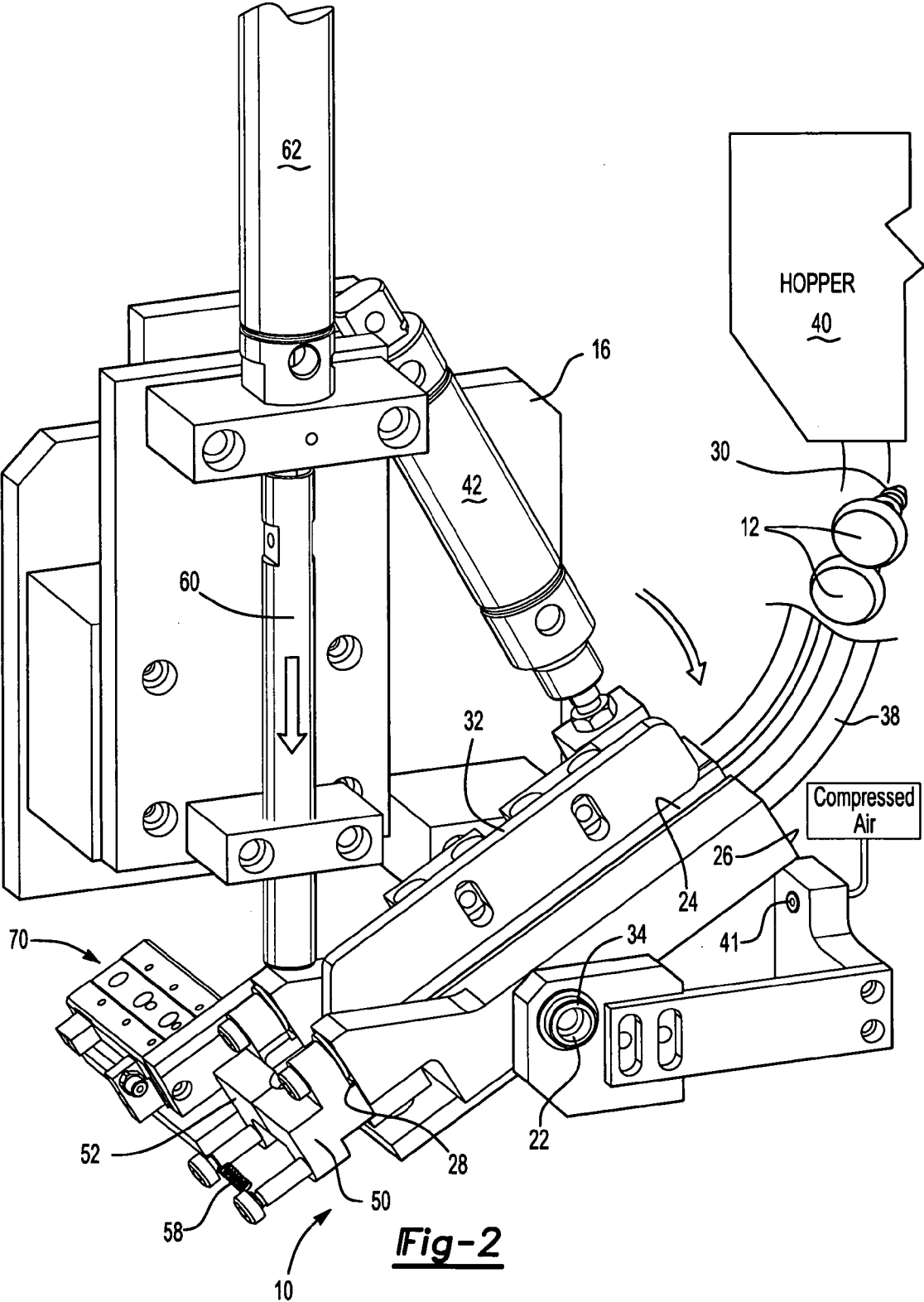
**Related U.S. Application Data**

(60) Provisional application No. 60/670,158, filed on Apr. 11, 2005.

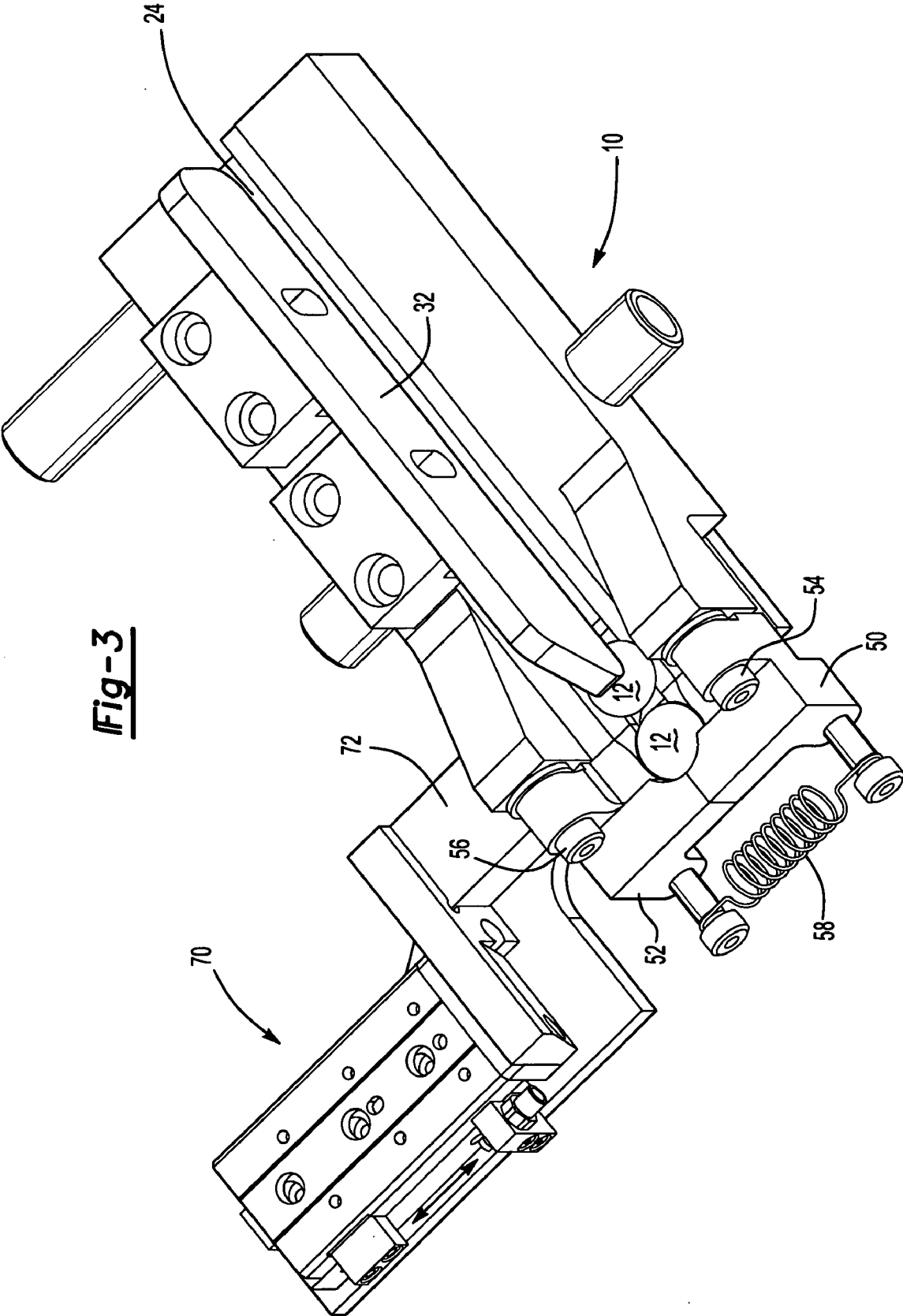


**Fig-1**



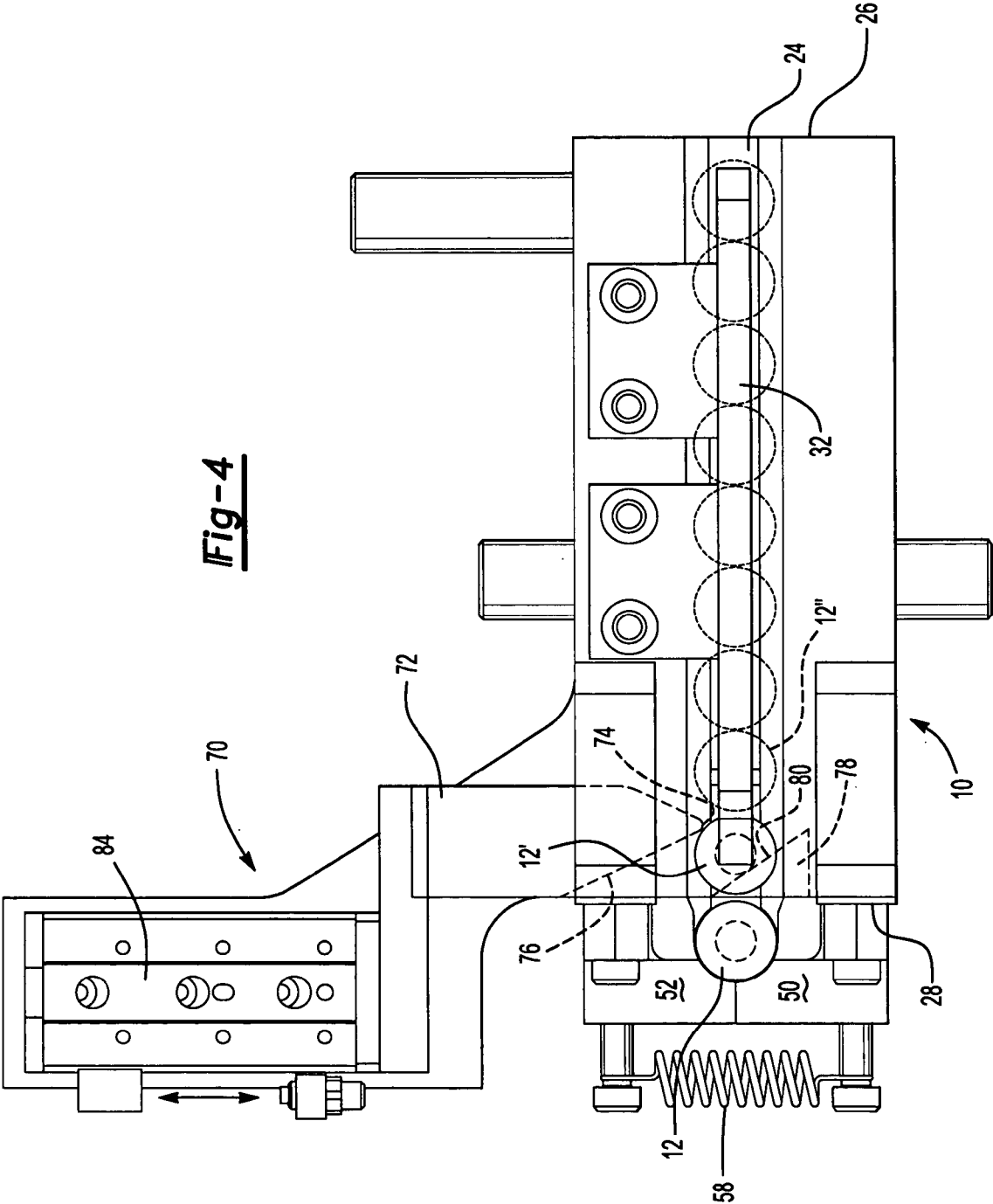


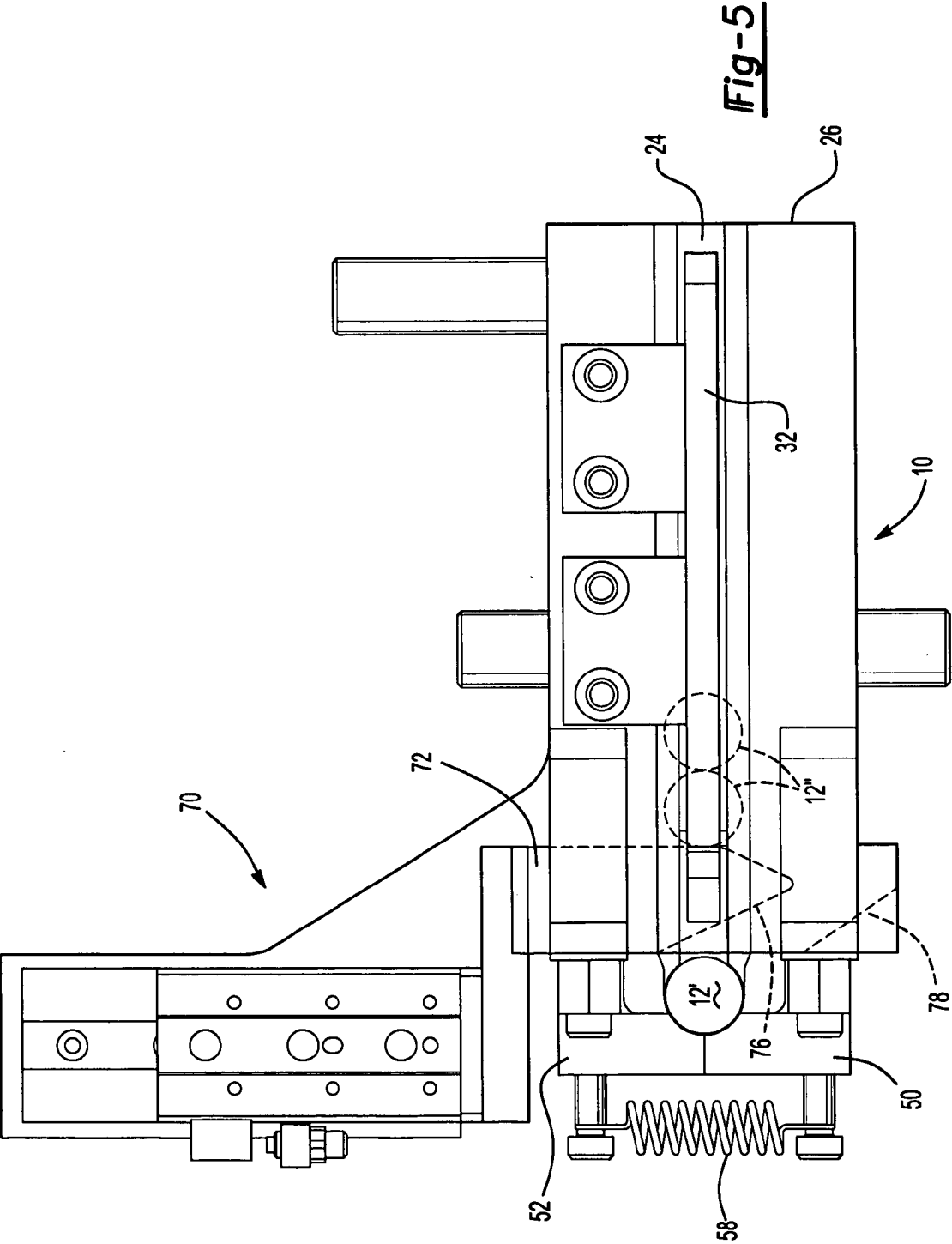
**Fig-2**

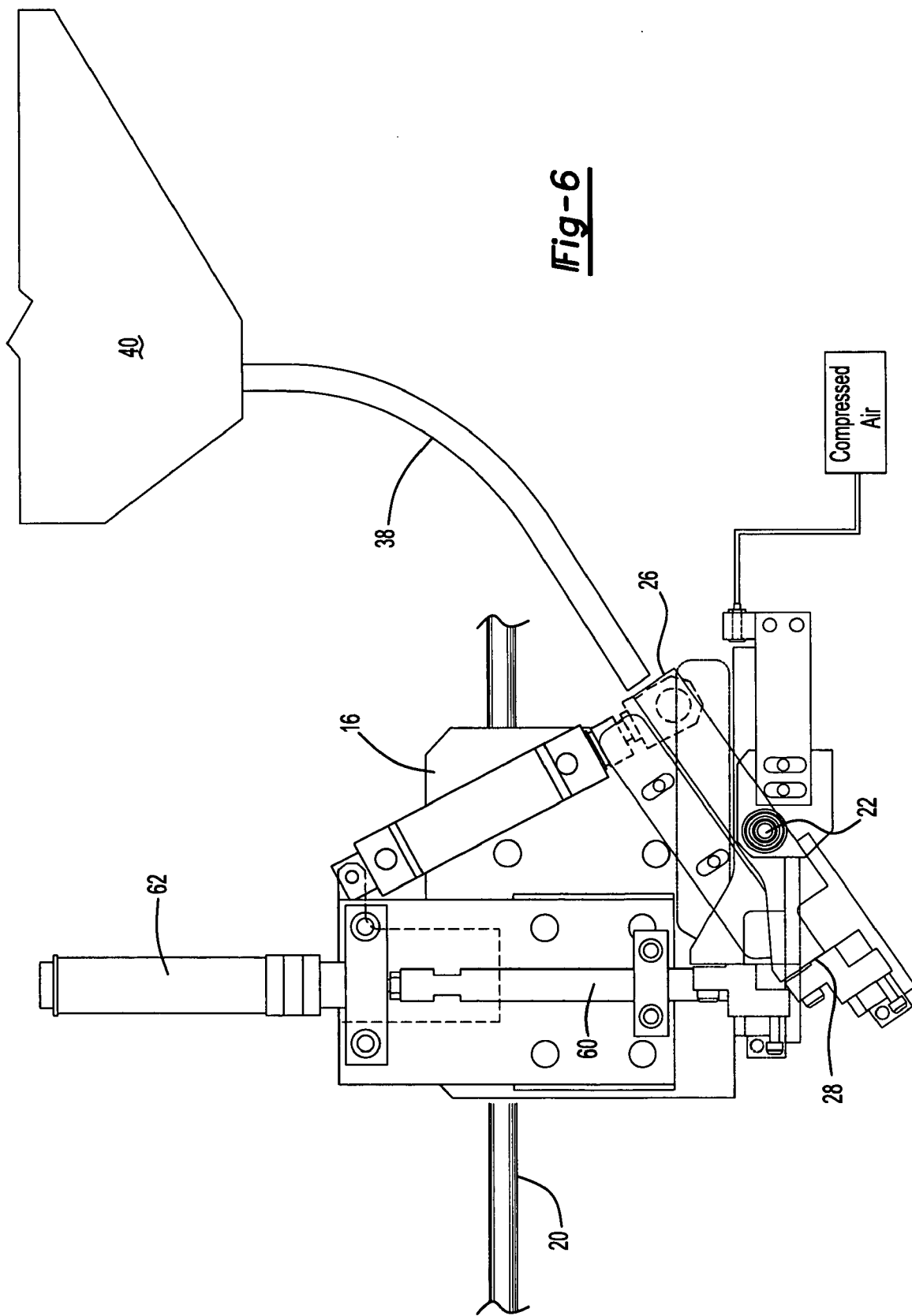


**Fig-3**

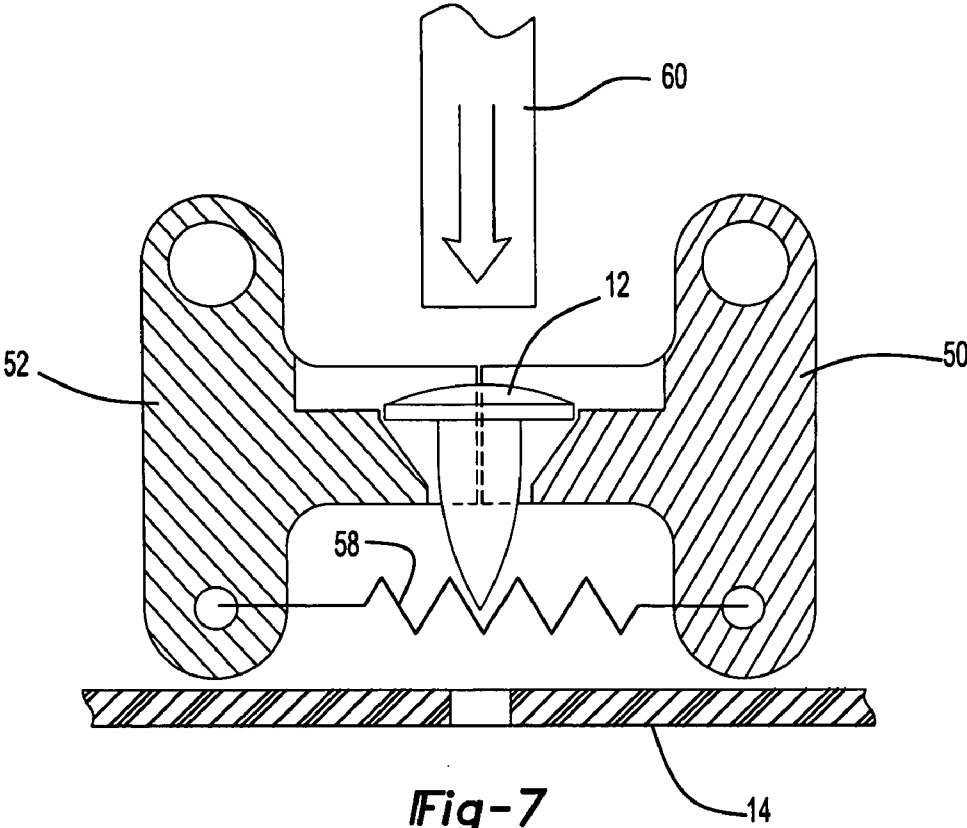
**Fig-4**



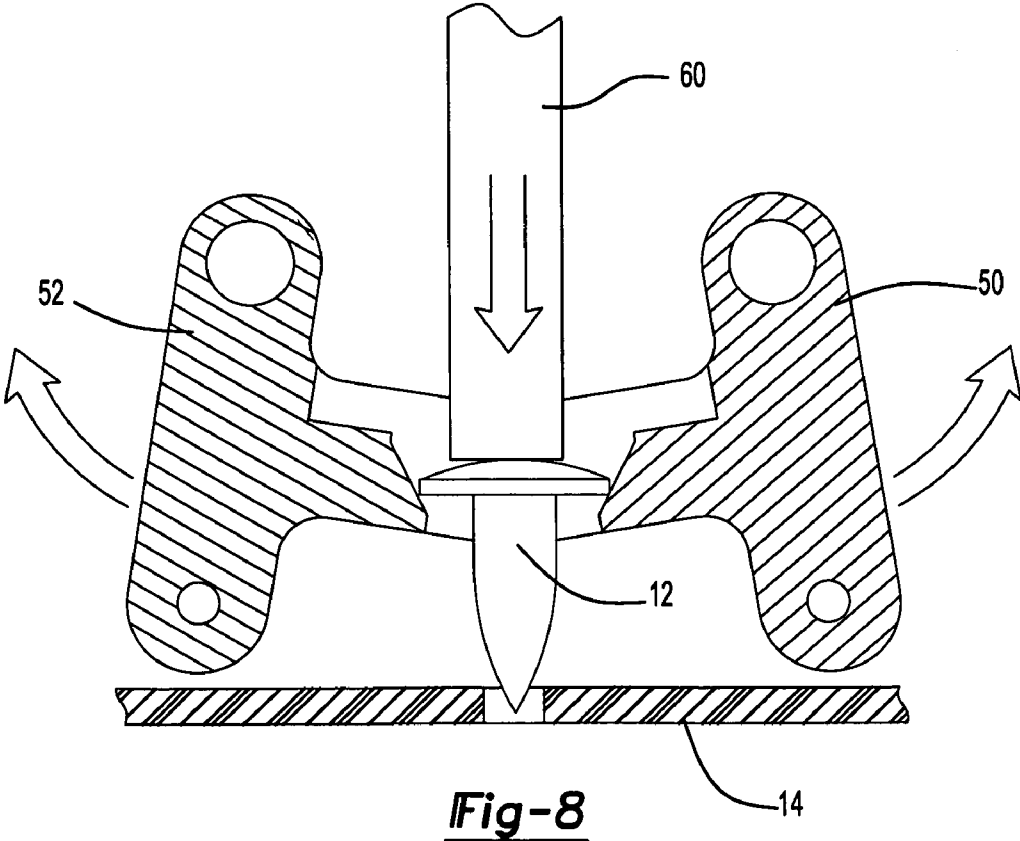




**Fig-6**



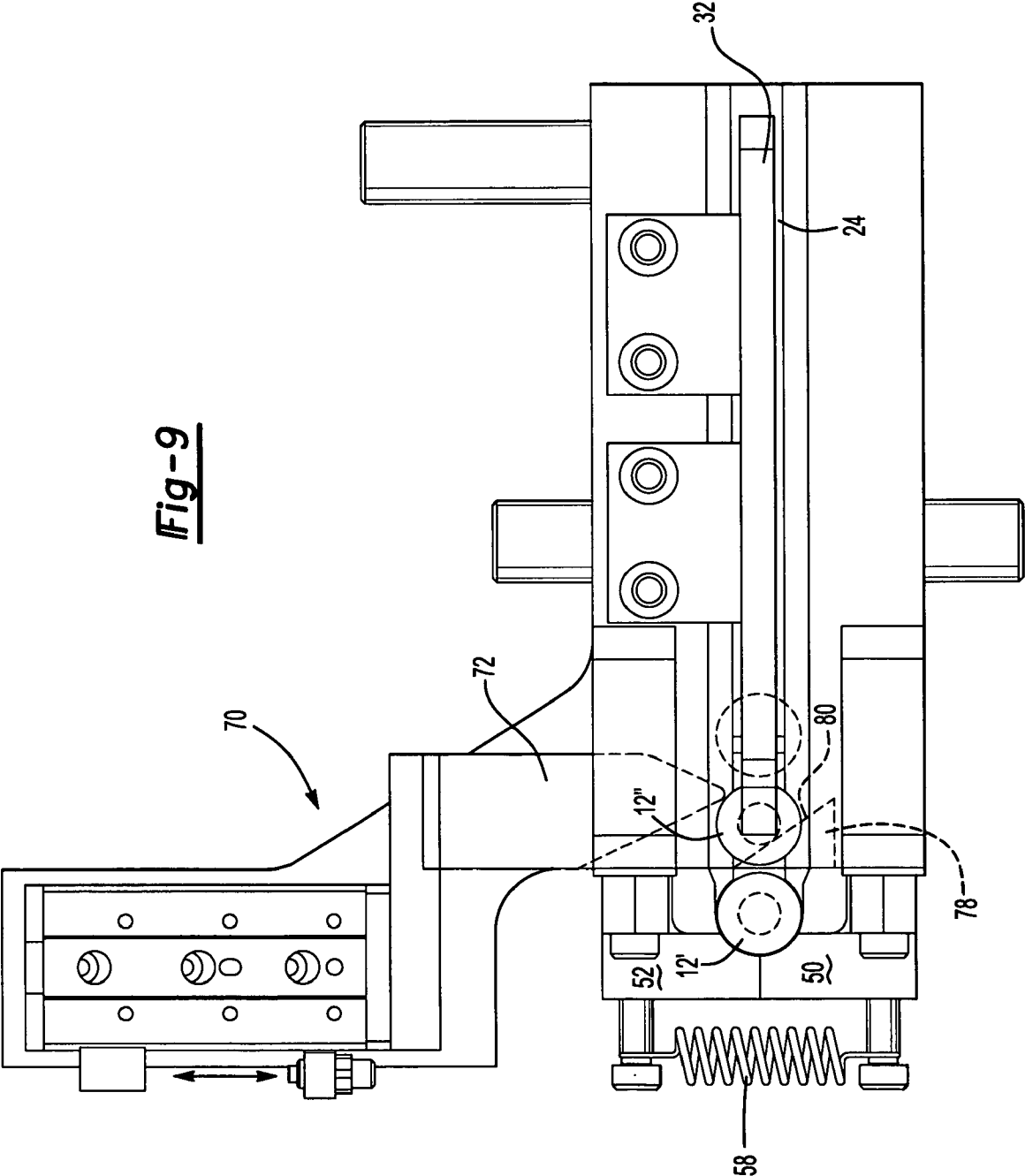
**Fig-7**



**Fig-8**



**Fig-9**



**PUSHPIN INSTALLER**

**CROSS-REFERENCE TO RELATED APPLICATION**

[0001] This application claims priority of U.S. Provisional Patent Application Ser. No. 60/670,158 filed Apr. 11, 2005, which is incorporated herein by reference.

**BACKGROUND OF THE INVENTION**

[0002] I. Field of the Invention

[0003] The present invention relates generally to devices to install pushpins.

[0004] II. Description of Related Art

[0005] Pushpin installers are conventionally used to install pushpins in weather strips and similar components in the automotive industry as well as other industries. These pushpins are typically installed at predetermined locations in the weather strip so that, when the weather strip is aligned on the vehicle at the installation position, each pushpin registers with a hole in the vehicle. Thereafter, the weather strip is attached to the vehicle by simply pushing each pushpin into its registering hole.

[0006] There are many previously known pushpin installers that have been used by the automotive industry and other industries. Typically, these pushpin installers include an elongated tube extending from a hopper full of pushpins and to the desired installation position on the weather strip. Individual pushpins are then conveyed through the tubes pneumatically.

[0007] These previously known pushpin installers perform adequately where the height of the pushpin is greater than the diameter of the pushpin head. Conversely, these previously known pushpin installers do not work satisfactorily where the height of the pushpin is equal to or less than the diameter of the pushpin head. When that occurs, the pushpins tumble within the tubes as they are pneumatically propelled from the hopper and to the weather strip. Consequently, these previously known pushpin installers cannot guarantee the proper orientation of the pushpin once the pushpin reaches the weather strip.

[0008] A still further disadvantage of these previously known pushpin installers is that the heads of the pushpins tend to overlap one another. When this occurs, it is possible to convey two pushpins to a single location in the weather strip where only a single pushpin is desired. When this occurs, improper insertion of the pushpin into the weather strip results.

**SUMMARY OF THE PRESENT INVENTION**

[0009] The present invention provides a pushpin installer which overcomes all of the above-mentioned disadvantages of the previously known pushpin installers.

[0010] In brief, the pushpin installer of the present invention comprises a pushpin receiver. The pushpin receiver includes a track adapted to receive a plurality of aligned pushpins.

[0011] An escapement is secured to the receiver adjacent one end of the track. This escapement is movable between a retracted position in which the escapement is laterally

displaced outwardly from the track, and an extended position in which the escapement extends across the track and separates two pushpins. Preferably, the escapement includes a blade having a rounded nose that is aligned between the stems of two pushpins just prior to moving the escapement from its retracted and to its extended position.

[0012] Following actuation of the escapement, a single pushpin is supported by two jaws pivotally mounted to one end of the receiver. The jaws are pivotal between a closed position, in which the jaws support a single pushpin, and an open position in which the jaws pivot away from each other as a pushpin is driven downwardly through the jaws.

[0013] A plunger is mounted to the receiver, either directly or indirectly, so that the plunger is aligned with the pushpin supported between the jaws at the end of the receiver. Upon actuation, the pushpin engages and drives the pushpin through the jaws simultaneously pivoting the jaws to their open position and inserting the pushpin into the weather strip or other workpiece.

**BRIEF DESCRIPTION OF THE DRAWING**

[0014] A better understanding of the present invention will be had upon reference to the following detailed description, when read in conjunction with the accompanying drawing, wherein like reference characters refer to like parts throughout the several views, and in which:

[0015] **FIG. 1** is a diagrammatic front plan view illustrating the preferred embodiment of the present invention;

[0016] **FIG. 2** is an elevational view illustrating a portion of the preferred embodiment of the present invention;

[0017] **FIG. 3** is a top elevational view illustrating the preferred embodiment of the present invention;

[0018] **FIG. 4** is a top plan view illustrating the preferred embodiment of the present invention;

[0019] **FIG. 5** is a view similar to **FIG. 4**, but illustrating the escapement in an extended position;

[0020] **FIG. 6** is a side fragmentary view of a portion of the preferred embodiment of the present invention;

[0021] **FIG. 7** is a front view of the preferred embodiment of the present invention;

[0022] **FIG. 8** is a view similar to **FIG. 7**, but illustrating the installation of the pushpin; and

[0023] **FIG. 9** is a view similar to **FIGS. 4 and 5**, but illustrating a further step of the pushpin installation.

**DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE PRESENT INVENTION**

[0024] With reference first to **FIG. 1**, a preferred embodiment of a pushpin installer **10** according to the present invention is shown for installing pushpins **12** at predetermined locations along a workpiece **14**, such as a weather strip. The pushpin installer **10** is preferably mounted to a slide **16** which, in turn, is slidably mounted as indicated by arrow **18** to a frame **20**. Any conventional means may be utilized to displace the slide **16** along the frame **20** and thus vary the horizontal position of the pushpin installer **10** relative to the workpiece **14**. Similarly, any conventional

conveyor means may be utilized to position the workpiece 14 relative to the pushpin installer 10.

[0025] With reference now particularly to FIGS. 2 and 6, the pushpin receiver 10 is pivotally mounted to the slide 16 by a pivot bolt 22 and pivotal between a loading position, illustrated in solid line in FIG. 6, and an operational position, illustrated in phantom line in FIG. 6. The pushpin receiver 10 includes an elongated track 24 extending from its rear end 26 and to its front end 28. This track 24 is dimensioned to receive the pushpins 12 such that the caps of the pushpins 12 slide along top of the pushpin receiver 10 while the pushpin stems 30 are positioned within the track 24. Furthermore, an elongated rail 32 is secured to the receiver 10 and extends along the top of the track 24. The rail 32 functions to retain the pushpins 12 within the track 24.

[0026] With reference still to FIGS. 2 and 6, the pushpin receiver 10 is pivotally mounted to the slide 16 by pivot arms 34 (only one illustrated in FIG. 2). The pushpin receiver 10 is pivotal from a loading position, illustrated in solid line in FIG. 6, and an operational position, illustrated in phantom line in FIG. 6. In its loading position, the pushpin receiver 10 floats upwardly from its front end 28 and to its rear end 26. In its loading position, the track 24 is aligned with a chute 38 from a hopper 40 containing pushpins 12. Thus, in its loading position, pushpins from the chute 38 slide under the force of gravity onto the track 24 on the pushpin receiver 10.

[0027] Conversely, in its operational position, the pushpin receiver 10 is generally horizontally oriented between its front end 28 and rear end 26. When in its operational position, an air jet 41 (FIG. 2) in the pushpin receiver 10 is aligned with the track and urges the pushpins along the track 24 from the rear end 26 of the receiver 10 and towards the front end 28 of the receiver 10. Any conventional actuator, such as a pneumatic actuator 42, is employed to pivot the pushpin receiver 10 between its loading and operational positions.

[0028] With reference now to FIGS. 3, 7 and 8, a pair of jaws 50 and 52 are respectively pivotally mounted to the front end 28 of the pushpin receiver 10 by pivot bolts 54 and 56, respectively. The jaws 50 and 52 are movable between a closed position, illustrated in FIGS. 3 and 7, and an open position, illustrated in FIG. 8. A tension spring 58 has one end connected to the jaw 50 and its other end connected to the jaw 52 such that the tension spring 58 urges the jaws 50 and 52 towards their closed position.

[0029] As best shown in FIGS. 3 and 7, in their closed position, the jaws 50 and 52 support a single pushpin 12 in between the jaws 50 and 52. Conversely, in their open position, the jaws 50 and 52 release the pushpin 12 from the jaws 50 and 52 as shown in FIG. 8.

[0030] Still referring to FIGS. 2, 7 and 8, a plunger 60 is mounted to the pushpin receiver 10, either directly or indirectly through the slide 16 as shown. The plunger 60 is movable between a retracted position, illustrated in FIG. 7, and an extended position, illustrated in FIG. 8. In its retracted position, the plunger 60 is aligned with the single pushpin 12 supported in between the jaws 50 and 52. Conversely, in its extended position, the plunger 60 contacts and drives the pushpin 12 supported between the jaws 50

and 52 through the jaws thus pivoting the jaws 50 and 52 to their open position and simultaneously installing the pushpin 12 in a receiving hole in the workpiece 14. Upon retraction of the pushpin 68 to its retracted position (FIG. 7), the spring 58 (FIG. 3) returns the jaws 50 and 52 to their closed position. Furthermore, any conventional means, such as a pneumatic actuator 62, may be used to move the plunger 60 between its retracted and extended position.

[0031] With reference now to FIGS. 4 and 5, an escapement 70 is mounted to the pushpin receiver 10 to separate individual pushpins 12 at the front end 28 of the pushpin receiver 10. The escapement 70 includes a separator blade 72 having a rounded nose 74 and an inclined forwardly facing surface 76. The escapement further includes a stop blade 78 having an inclined rearwardly facing surface 80. The surface 80 is substantially parallel to the surface 76 of the separator blade 72 and is positioned forwardly of the separator blade 72.

[0032] Both the separator blade 72 and stop blade 78 are slidably mounted to the receiver 10 and movable between a retracted position, illustrated in FIG. 4, and an extended position, illustrated in FIG. 5. Any conventional means, such as a pneumatic actuator 84, may be used to move the escapement blades 72 and 78 between their extended and their retracted positions.

[0033] With reference now particularly to FIG. 4, with the escapement 70 in its retracted position, one pushpin 12 is positioned between and supported by the jaws 50 and 52 in the previously described fashion. Simultaneously, a pushpin 12' positioned immediately behind the pushpin 12 supported between the jaws 50 and 52 has its forward end in abutment with the inclined surface 80 of the stop blade 78. Simultaneously, the rounded nose 74 of the separator blade 72 is positioned in between the pushpin 12' and a pushpin 12" immediately behind it. The stop blade 78 ensures that the rounded nose 74 of the separator blade 72 is positioned in between the pushpins 12' and 12" even if the tops of the pushpins 12' and 12" overlap each other.

[0034] The pushpin 12' supported between the jaws 50 and 52 is then installed in the workpiece 12 in the previously described fashion. Thereafter, the escapement 70 is moved to its extended position, illustrated in FIG. 5. In doing so, the stop blade 78 simultaneously releases the pushpin 12', formerly immediately behind the pushpin 12, while the inclined surface 76 longitudinally displaces the pushpin 12' out of the track 24 and in position between the jaws 50 and 52. As such, the pushpin 12' is ready for installation into the workpiece 14 by the plunger 60.

[0035] With reference now to FIG. 9, upon the subsequent movement of the escapement 70 to its retracted position, the escapement separator blade 72 allows the pushpin 12" to advance along the track 24 while the stop blade 78 retains the pushpin 12" in the track 24 until after the installation of the pushpin 12' by the plunger 60. When that occurs, the escapement 70 is again moved between its extended and its retracted position thus positioning the pushpin 12" between the jaws 50 and 52 whereupon the above-identified process is repeated.

[0036] From the foregoing, it can be seen that the escapement 70 ensures that only a single pushpin is positioned in between the jaws 50 and 52 prior to installation of that

pushpin into the workpiece 14 by the plunger 60. Furthermore, in practice, the escapement 70 effectively separates pushpins from each other along the track 24 even where the caps of the pushpins 12 overlap each other.

[0037] Although the pushpin installer of the present invention has been described for use in conjunction with an automatic mechanism in which the pushpin installer is mounted to a slide in turn mounted to a frame, for automatic installation of the pushpins in the workpiece 14, it will be understood that alternatively the pushpin installer may be operated manually. In this event, the pushpin installer 10 would be manually positioned relative to the workpiece 14 and actuated by the operator.

[0038] From the foregoing, it can be seen that the present invention provides a pushpin installer which is not only simple in construction but also effective in use. Having described my invention, however, many modifications thereto will become apparent to those skilled in the art to which it pertains without deviation from the spirit of the invention as defined by the scope of the appended claims.

I claim:

1. A pushpin installer comprising:

a pushpin receiver having a track adapted to receive a plurality of aligned pushpins,

an escapement secured to said receiver adjacent one end of the track, said escapement being movable between a retracted position in which said escapement is laterally displaced from said track and an extended position in which said escapement extends across said track and separates two pushpins,

a plunger which, upon actuation, drives a pushpin at said one end of said track from said track in a direction transverse with respect to the direction of said track.

2. The invention as defined in claim 1 wherein said escapement comprises a separation blade having a rounded nose, said nose being aligned between two adjacent pushpins in said track immediately prior to movement of said escapement from said retracted position and to said extended position.

3. The invention as defined in claim 2 wherein said escapement comprises a stop blade having a surface which

abuts against one pushpin in said track when said escapement is in said retracted position.

4. The invention as defined in claim 3 wherein said separation blade includes a surface which positions one pushpin in position for installation as said escapement is moved from said extended position to said retracted position.

5. The invention as defined in claim 4 wherein said one pushpin is entrapped between said separator blade and said stop blade as said escapement is moved from said retracted and to said extended position.

6. The invention as defined in claim 1 and comprising a pair of jaws pivotally mounted to said housing and movable between a closed and an open position, wherein in said closed position said jaws support a single pushpin in alignment with said plunger and wherein said plunger, upon actuation, moves said jaws to said open position thereby releasing said single pushpin.

7. The invention as defined in claim 6 and comprising a spring which biases said jaw toward said closed position.

8. The invention as defined in claim 1 and comprising a hopper which, upon activation, loads pushpins into an inclined chute, and an actuator which pivots said housing between a loading position in which said track is aligned with said chute, and an operational position in which said track is substantially horizontal.

9. The invention as defined in claim 1 and comprising means for moving the pushpins along said track.

10. The invention as defined in claim 9 wherein said moving means comprises an air jet mounted to said housing and directed along said track.

11. The invention as defined in claim 1 and comprising a frame, a slide horizontally movably mounted to said frame and said receiver being mounted to said slide.

12. The invention as defined in claim 11 wherein said receiver is pivotally mounted to said slide between an inclined loading position and a substantially horizontal operational position.

13. The invention as defined in claim 1 and comprising a pneumatic actuator for moving said escapement between said retracted position and said extended position.

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