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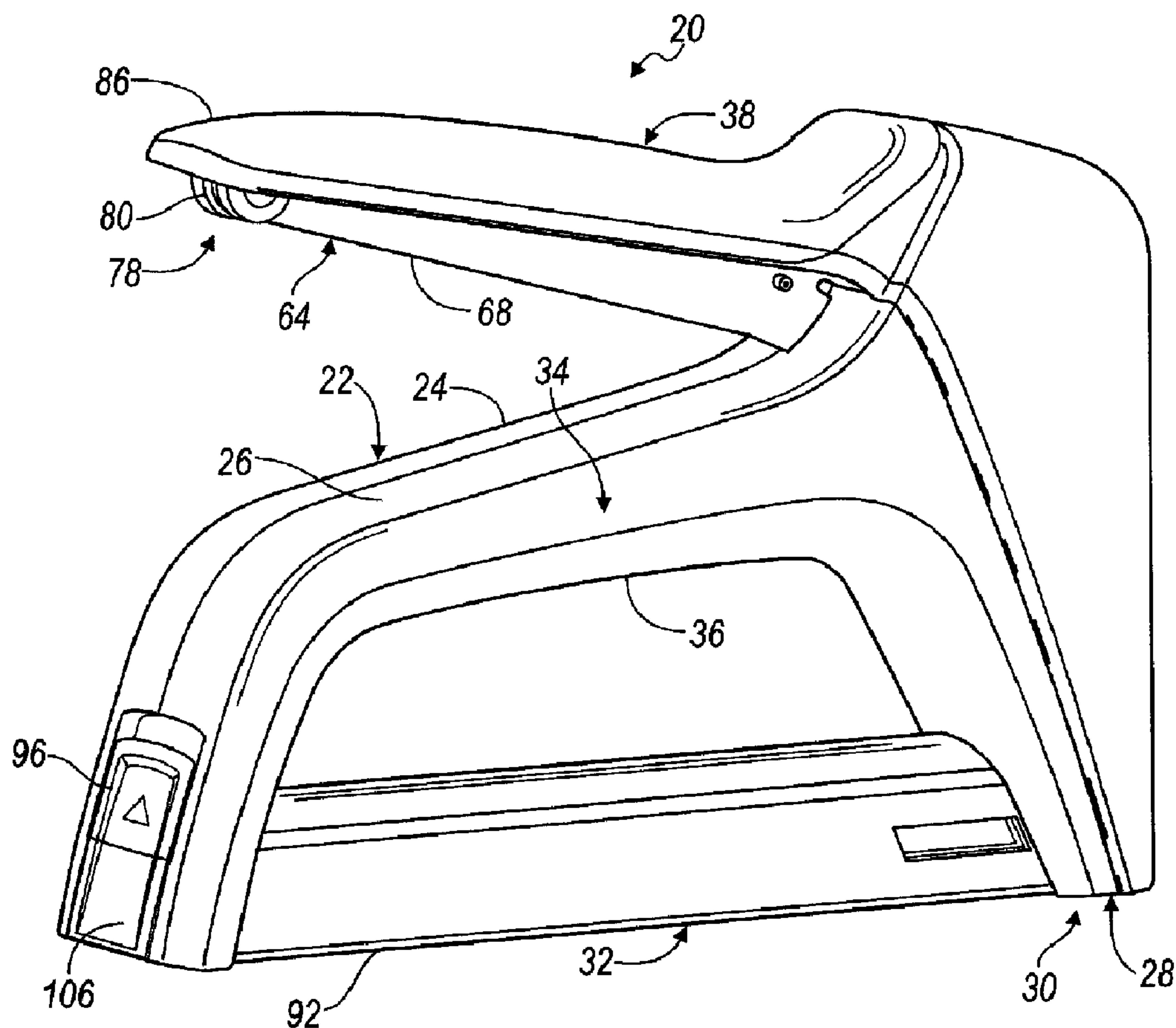
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(54) Title: FASTENING TOOL ASSEMBLY



(57) Abrégé/Abstract:

A fastening tool assembly has a magazine body in a sleeve to convey fasteners to a housing outlet. Pivoting a lever relative to the housing, translates a knife to a loaded position, thereby disengaging from the knife, permitting a spring to return the knife to an



(57) **Abrégé(suite)/Abstract(continued):**

unloaded position to drive a fastener through the outlet. A handle is pivotally connected to the housing. A roller is directly connected to the lever and the handle for permitting translation of the lever relative to the handle as the lever and the handle are pivoted relative to the housing. A spring-loaded bracket is operably connected to the magazine body for translation and rotation relative to the body. A latch is mounted to the housing to engage the bracket and maintain the magazine body in a retracted position, and is movable to a disengaged position wherein the bracket extends from the magazine body.

ABSTRACT

A fastening tool assembly has a magazine body in a sleeve to convey fasteners to a housing outlet. Pivoting a lever relative to the housing, translates a knife to a loaded position, thereby disengaging from the knife, permitting a spring to return the knife to an unloaded position to drive a fastener through the outlet. A handle is pivotally connected to the housing. A roller is directly connected to the lever and the handle for permitting translation of the lever relative to the handle as the lever and the handle are pivoted relative to the housing. A spring-loaded bracket is operably connected to the magazine body for translation and rotation relative to the body. A latch is mounted to the housing to engage the bracket and maintain the magazine body in a retracted position, and is movable to a disengaged position wherein the bracket extends from the magazine body.

FASTENING TOOL ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. provisional Application No. 61/606,002 filed March 2, 2012, the disclosure of which is incorporated in its entirety by reference herein.

TECHNICAL FIELD

[0002] Various embodiments relate to fastening tool assemblies.

BACKGROUND

[0003] Prior art fastening tool assemblies that load and release a spring for driving a fastener often employ a lever for loading the spring, and a handle for actuating the lever. The handle is often connected to the lever with a linkage. Prior art fastening tool assemblies often employ a magazine body for retaining fasteners. The magazine body is often retained to a tool housing via a latch mechanism that is mounted upon the magazine body.

SUMMARY

[0004] According to at least one embodiment, a fastening tool assembly is provided with a housing having a contact surface to contact a workpiece, and a fastener outlet provided through the contact surface to dispense fasteners from the outlet. A magazine is mounted in the housing to store fasteners and to convey the fasteners to the fastener outlet. A knife is mounted in the housing for translation relative to the outlet for a loaded position and an unloaded position to drive a fastener from the magazine through the outlet during translation to the unloaded position. A biasing member is mounted in the housing and operably connected to the knife to bias the knife to the unloaded position. A lever is pivotally connected to the housing. The lever has a proximal end operably engaged with the knife in the unloaded position, and a distal end extending from the housing. Application of an external force to the distal end towards the housing pivots the lever relative to the housing, thereby translating the knife from the unloaded position to the loaded position, whereby the proximal end disengages from the knife permitting the biasing member to return the knife to the

unloaded position to consequently drive a fastener through the outlet. Rotation of the distal end away from the housing reengages the proximal end with the knife. A handle is pivotally connected to the housing and operably engaged with the lever distal end, such that rotation of the handle towards the housing rotates the lever towards the housing. A roller is directly connected to the lever and the handle for permitting translation of the lever relative to the handle as the lever and the handle are pivoted relative to the housing.

[0005] According to at least another embodiment, a fastening tool assembly is provided with a housing having a contact surface to contact a workpiece, and a fastener outlet provided through the contact surface to dispense fasteners from the outlet. A magazine sleeve is fixed longitudinally within the housing. A magazine body has a proximal end and a distal end spaced apart from the proximal end. The magazine body is received within the magazine sleeve to translate longitudinally to a retracted position whereby the proximal end is adjacent the housing outlet to store fasteners within the sleeve and to convey the fasteners to the fastener outlet, and to translate to an extended position whereby the body extends at least partially out of the sleeve and external of the housing for receipt of fasteners to the body. A bracket is operably connected to the magazine body distal end for longitudinal translation and partial rotation relative to the body. A biasing member is connected to the bracket and the magazine body for biasing the bracket longitudinally away from the magazine body distal end. A latch is mounted to the housing to engage the bracket in the retracted position of the magazine body to lock the bracket to the housing, and consequently to maintain the magazine body in the retracted position. The latch is movable to a disengaged position wherein the bracket is biased away from the magazine body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIGURE 1 is a perspective view of a fastening tool assembly according to an embodiment;

[0007] FIGURE 2 is a fragmented side view of the fastening tool assembly of Figure 1;

[0008] FIGURE 3 is another fragmented side view of the fastening tool assembly of Figure 1, illustrating a handle in a depressed position;

- [0009] FIGURE 4 is an elevation end view of a knife of the fastening tool assembly of Figure 1;
- [0010] FIGURE 5 is a perspective view of a trigger lever assembly of the fastening tool assembly of Figure 1;
- [0011] FIGURE 6 is a section view of the handle of the fastening tool assembly of Figure 1;
- [0012] FIGURE 7 is a bottom plan view of the handle of the fastening tool assembly of Figure 1;
- [0013] FIGURE 8 is an elevation back end view of the fastening tool assembly of Figure 1;
- [0014] FIGURE 9 is a fragmented perspective view of the fastening tool assembly of Figure 1 illustrating a latch in an unlocked position;
- [0015] FIGURE 10 is another fragmented perspective view of the fastening tool assembly of Figure 1, illustrating a magazine body partially extended; and
- [0016] FIGURE 11 is a fragmented side view of the fastening tool assembly of Figure 1, illustrating the magazine body fully extended.

DETAILED DESCRIPTION

[0017] As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale; some features may be exaggerated or minimized to show details of particular components. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for teaching one skilled in the art to variously employ the present invention.

[0018] Referring to Figures 1 and 2, a fastening tool, such as a manual staple gun is illustrated and referenced by numeral 20. Although the fastening tool is illustrated and described as a staple gun, the invention contemplates any fastening tool that drives a fastener into a workpiece.

[0019] The staple gun 20 has a housing 22, which may be formed from a pair of housing portions 24, 26. The housing 22 has a workpiece contact surface 28 for engaging a workpiece. A fastener outlet 30 is provided through the contact surface 28 for egress of fasteners from the staple gun 20. A magazine assembly 32 is also provided in the housing 22 for storing fasteners, and conveying the fasteners to the outlet 30.

[0020] The housing 22 also provides a grip 34 spaced apart from the magazine assembly 32 with an opening, or finger well 36, between the grip 34 and the magazine assembly 32, for receipt of a user's fingers when grasping the grip 34. A handle 38 is pivotally connected to the housing 22 for manual actuation for driving a fastener from the outlet 30. In operation, a user inserts her or his fingers into the finger well 36 for contact with the grip 34. The user wraps her or his thumb about the handle 38 so that the user's palm engages the handle 38. By squeezing the grip 34 and handle 38, or by pressing the handle 38 toward the housing 22, the user actuates the staple gun 20 thereby driving a staple out of the staple outlet 30.

[0021] According to at least one embodiment, a mid-range staple gun 20 is depicted. In other words, a staple gun 20 is depicted for driving staples of a range of gauges that is in a middle of an entire range of staples that are commercially available. A mid-range staple gun can be marketed for use with mid-range staples only and therefore does not require the driving force of a high-range staple gun, i.e. a staple gun that drives staples of a high range of gauges of staples that are commercially available. By reducing the driving force that is required, a reduction in structure, function, mechanism, and consequently weight and cost can be achieved.

[0022] The magazine assembly 32 receives a strip of fasteners that are typically adhered collectively in a linear array by an adhesive. Referring to Figures 2 and 3, a driver, commonly referred to as a knife 40, is retained within a slot 42 in the housing 22 for translation between an unloaded position of Figure 2 and a loaded position of Figure 3. The slot 42 is aligned with the fastener outlet 30 for driving a fastener from the magazine assembly 32 out of the outlet 30. The knife 40 separates the driven fastener from the fastener strip by applying a shear force to the driven fastener that separates the adhesive from the driven fastener to the remaining strip, and subsequently drives the fastener into the workpiece. Accordingly, the driver is commonly referred to as a knife 40 in the art.

[0023] A biasing member, known as a power spring, is collectively provided by a pair of leaf springs 44, 46, retained in the housing 22. The leaf springs 44, 46 each include a fixed end 48, 50 with a pair of recesses 52, 54 formed therein. Each of the housing portions 24, 26 has a rib 56 formed in the grip 34 for extending into the recesses 52, 54 of the leaf springs 44, 46 for fixing the fixed ends 48, 50 relative to the housing 22. The leaf springs 44, 46 extend from the grip 34 into the slot 42. Driving ends 58, 60 of the leaf springs 44, 46 engage the knife 44 driving the knife 40 to the unloaded position of Figure 2. Referring to Figure 4, the knife 40 has an aperture 62 formed therethrough for receiving the driving and 58, 60 of the leaf springs 44, 46. Of course, various power spring arrangements are contemplated, as are known in the art.

[0024] A trigger lever assembly 64 is illustrated pivotally connected to the housing 22 at a pin 66 in Figures 2 and 3. The trigger lever assembly 64 is also illustrated removed from the staple gun 20 in Figure 5. The trigger lever assembly 64 includes a lever 68 that is mounted to the pin 66. A proximal end 70 of the lever 68 may directly engage a trigger aperture 72 (Figure 4) of the knife 40. As depicted, a trigger slider 74 may be mounted to the proximal end 70 for sliding relative to lever 68 within a limited range. A compression spring 76 is provided on the lever 68, engaging the trigger slider 74 for biasing the trigger slider 74 into engagement with the trigger aperture 72 of the knife 40.

[0025] A distal end 78 of the lever 68 extends from the housing 22. A roller assembly 80 is provided on the distal end 78 of the lever 68. Figures 2 and 3 illustrates that the handle 38 is pivotally connected to the housing 22 at a pin 82 that is spaced apart from the pin 66 for the trigger lever assembly 64.

[0026] Referring now to Figures 6 and 7, a follower path 84 is formed underneath the handle 38 for engagement with the roller assembly 80. Thus, as the user pivots the handle 38 toward the grip 34 of the housing 22, the roller assembly 80 rolls along the follower path 84 thereby minimizing friction between the handle 38 and the lever 68. By providing a rolling connection between the handle 38 and the lever 68, a mechanical advantage is provided at the initial actuation of the handle 38, wherein much displacement of the driving ends 58, 60, and consequently, much deflection of the leaf springs 44, 46 occurs. As the handle 38 becomes fully pivoted, as illustrated in Figure 3, the roller assembly 80 is received near a distal end 86 of the handle 38 wherein less spring deflection per rotation occurs and consequently less mechanical advantage is employed. Although the roller

assembly 80 is illustrated on the lever 68, with a ramp or follower path 84 on the handle 38, the invention contemplates providing a roller assembly upon the handle 38 for engagement with a ramp or follower path upon the lever 68 according to at least one embodiment. By providing the roller assembly 80 in direct connection between the lever 68 and the handle 38, an additional link or linkage is eliminated in comparison to the prior art.

[0027] A fastener driving operation is now described with reference to Figures 2 and 3. Manual rotation of the handle 38 toward the grip 34 from Figure 2 to Figure 3, consequently rotates the trigger lever assembly 64 from the position of Figure 2 to Figure 3. The trigger slider 74 raises the knife 40 upward within the slot 42 to the loaded position of Figure 3. By removal of the knife 40 from a region of the slot 42 adjacent the magazine assembly 32, the magazine assembly 32 actuates the fastener strip into the slot 42. As the knife 40 is raised in Figure 3, the leaf springs 44, 46 are deflected against a fulcrum 88 in the housing to a loaded position illustrated in phantom in Figure 3. Once the handle 38 is fully depressed, the lever 68 is rotated to a position whereby the trigger slider 74 is retracted out of the trigger aperture 72 as illustrated in Figure 3. The release of the trigger slider 74 from the trigger aperture 72 of the knife 40 causes the leaf springs 44, 46 to drive the knife 40 toward the fastener outlet 30. The knife 40 strikes a leading fastener on the fastener strip and drives the fastener from the outlet 30. A bumper 89 is provided in the housing 22 for damping an impact from the leaf springs 44, 46 to the housing 22.

[0028] A torsion spring 90 is provided in the housing 22 and engages the housing 22 and the lever 68 for returning the lever 68 into engagement with the knife 40. Thus, once the user releases the force upon the handle 38, the torsion spring 90 pivots the lever 68 from the position in Figure 3 to the position in Figure 2. Consequently, the rotation of the lever 68 from the position of Figure 3 to the position of Figure 2 also returns the handle 38 to the extended position of Figure 2. As the lever 68 rotates away from the grip 34, the trigger slider 74 engages the knife 40. The trigger slider 74 retracts upon the lever 68 until alignment with the trigger aperture 72 whereby the compression spring 76 extends the trigger slider 74 into the trigger aperture 72 thereby re-engaging the trigger lever assembly 64 with the knife 40.

[0029] Referring again to Figures 1-3, the magazine assembly 32 includes a magazine sleeve 92 that is fixed longitudinally to the housing 22. A magazine body 94 is received within the sleeve 92 to translate longitudinally for extension from the housing 22 for reloading of fasteners to the

magazine body 94. The prior art has provided various mechanisms for unlatching the magazine body 94 from the magazine sleeve 92. In order to increase the ease for unlatching the magazine body 94, an intuitive latch switch 96 is provided on the housing 22 spaced apart from the outlet 30. The latch switch 96 is mounted to the housing 22 to slide relative to the housing 22. See Figures 1-3, and also Figure 8. Indicia 98 (Figure 8) may be provided upon the latch switch 96 to inform the user of a direction to actuate the switch 96 to the position depicted in Figure 9, for accessing the magazine body 94. A coil spring 100 is provided between the latch switch 96 and the housing 22 to bias the latch switch 96 into engagement with the magazine body 94.

[0030] Referring to Figures 2, 10 and 11, a distal end 102 of the magazine body 94 has a longitudinal slot 104 formed therethrough. A bracket 106 is pivotally connected to the magazine body 94 by a slider 105 within the slot 104. A coil spring 108 is provided between the bracket 106 and the magazine body 94 for biasing the bracket 106 longitudinally away from the distal end 102 of the magazine body 94.

[0031] Once the latch switch 96 is slid out of engagement from the bracket 106 as illustrated in Figure 9, the coil spring 108 extends the bracket 106 from the magazine body 94 as depicted in Figure 10. At this position, the bracket 106 is more readily accessible for grasping by the user for extending the magazine body 94 from the housing 22 is illustrated in Figure 11. Additionally, by permitting the coil spring 108 to extend the bracket 106 in the position illustrated in Figure 10, it is more readily apparent to the user how to access the magazine body 94.

[0032] In the extended position of Figure 11, the user places another strip of fasteners upon or within the magazine body 94. To reload the magazine assembly 32, the user presses the bracket 106 toward the housing 22. The bracket 106 includes a leading-edge 110 that upon engagement with the latch which 96 urges the latch switch 96 upward as illustrated in Figure 9. Once the leading-edge 110 is pressed past the latch switch 96, the latch switch 96 retracts to the latched position illustrated in Figures 1-3 and 8. Referring again to Figures 2 and 3, a proximal end 112 of the magazine body 94 is presented adjacent to the knife slot 42 for delivering a leading fastener to be driven by the knife 40 out of the outlet 30.

[0033] While various embodiments are described above, it is not intended that these embodiments describe all possible forms of the invention. Rather, the words used in the

specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention. Additionally, the features of various implementing embodiments may be combined to form further embodiments of the invention.

WHAT IS CLAIMED IS:

1. A fastening tool assembly comprising:
 - a housing having a contact surface to contact a workpiece, and a fastener outlet provided along the contact surface through which to dispense fasteners ;
 - a magazine mounted in the housing to store fasteners and to convey the fasteners to the fastener outlet;
 - a knife mounted in the housing for translation relative to the outlet between a loaded position and an unloaded position to drive a fastener from the magazine through the outlet during translation to the unloaded position;
 - a biasing member mounted in the housing and operably connected to the knife to bias the knife to the unloaded position;
 - a lever pivotally connected to the housing, the lever having a proximal end operably engaged with the knife in the unloaded position, and a distal end extending from the housing, so that application of an external force to the distal end towards the housing pivots the lever relative to the housing, thereby translating the knife from the unloaded position to the loaded position, whereby the proximal end disengages from the knife permitting the biasing member to return the knife to the unloaded position to consequently drive a fastener through the outlet, wherein rotation of the distal end away from the housing reengages the proximal end with the knife;
 - a handle pivotally connected to the housing and operably engaged with the lever distal end, such that rotation of the handle towards the housing rotates the lever towards the housing;
 - and
 - a roller directly connected to the lever and the handle for permitting translation of the lever relative to the handle as the lever and the handle are pivoted relative to the housing.
2. The fastening tool assembly of claim 1 wherein the roller is pivotally connected to the lever.
3. The fastening tool assembly of claim 2 wherein the handle includes a follower path formed underneath the handle for engagement with the roller.

4. The fastening tool assembly of claim 3 wherein the engagement of the roller and the follower path provides a mechanical advantage at initial actuation of the handle.

5. The fastening tool assembly of claim 1 wherein the lever and roller in engagement with the handle eliminates an additional link.

6. The fastening tool assembly of claim 1 wherein a pivotal connection of the lever and the housing is spaced apart from a pivotal connection of the handle and the housing.

7. The fastening tool assembly of claim 1 further comprising a trigger slider mounted for translation upon the proximal end of the lever for engagement with a trigger aperture formed in the knife.

8. The fastening tool assembly of claim 7 further comprising a compression spring in cooperation with the lever and the trigger slider for translating the trigger slider into engagement with the trigger aperture, whereby engagement of the trigger slider with the knife translates the trigger slider away from the knife while compressing the compression spring.

9. A fastening tool assembly comprising:
a housing having a contact surface to contact a workpiece, and a fastener outlet provided through the contact surface to dispense fasteners from the outlet;
a magazine sleeve fixed longitudinally within the housing;
a magazine body having a proximal end and a distal end spaced apart from the proximal end, the magazine body being received within the magazine sleeve to translate longitudinally to a retracted position whereby the proximal end is adjacent the fastener outlet to store fasteners within the sleeve and to convey the fasteners to the fastener outlet, and to translate to an extended position whereby the body extends at least partially out of the sleeve and external of the housing for receipt of fasteners to the body;
a bracket operably connected to the magazine body distal end for longitudinal translation and partial rotation relative to the body;

a biasing member connected to the bracket and the magazine body for biasing the bracket longitudinally away from the magazine body distal end; and

a latch mounted to the housing to engage the bracket in the retracted position of the magazine body to lock the bracket to the housing, and consequently to maintain the magazine body in the retracted position, wherein the latch is movable to a disengaged position such that the bracket is biased away from the magazine body.

10. The fastening tool assembly of claim 9 further comprising indicia provided upon the latch to indicate a direction to actuate the latch to access the magazine body.

11. The fastening tool assembly of claim 9 wherein the biasing member is further defined as a first biasing member; and

wherein the fastening tool assembly further comprises a second biasing member cooperating with the latch and the housing to bias the latch into engagement with the bracket.

12. The fastening tool assembly of claim 11 wherein actuation of the latch out of engagement from the bracket causes the first biasing member to extend the bracket from the magazine body for external access for manual gripping of the bracket.

13. The fastening tool assembly of claim 12 wherein the bracket includes a leading edge to engage the latch and retract the latch as the bracket is translated into the housing so that as the bracket is translated past the latch, the latch extends into engagement with the bracket thereby retaining the bracket.

14. A fastening tool assembly comprising:

a housing having a contact surface to contact a workpiece, and a fastener outlet provided through the contact surface to dispense fasteners from the outlet;

a magazine sleeve fixed longitudinally within the housing;

a magazine body having a proximal end and a distal end spaced apart from the proximal end, the magazine body being received within the magazine sleeve to translate longitudinally to a retracted position whereby the proximal end is adjacent the housing outlet to store

fasteners within the sleeve and to convey the fasteners to the fastener outlet, and to translate to an extended position whereby the body extends at least partially out of the sleeve and external of the housing for receipt of fasteners to the body;

a bracket operably connected to the magazine body distal end for longitudinal translation and partial rotation relative to the body;

a biasing member connected to the bracket and the magazine body for biasing the bracket longitudinally away from the magazine body distal end;

a latch mounted to the housing to engage the bracket in the retracted position of the magazine body to lock the bracket to the housing, and consequently to maintain the magazine body in the retracted position, wherein the latch is movable to a disengaged position wherein the bracket is biased away from the magazine body;

a knife mounted in the housing for translation relative to the outlet for a loaded position and an unloaded position to drive a fastener from the magazine body through the outlet during translation to the unloaded position;

a biasing member mounted in the housing and operably connected to the knife to bias the knife to the unloaded position;

a lever pivotally connected to the housing, the lever having a proximal end operably engaged with the knife in the unloaded position, and a distal end extending from the housing, so that application of an external force to the lever distal end towards the housing pivots the lever relative to the housing, thereby translating the knife from the unloaded position to the loaded position, whereby the lever proximal end disengages from the knife permitting the biasing member to return the knife to the unloaded position to consequently drive a fastener through the outlet, wherein rotation of lever distal end away from the housing reengages the lever proximal end with the knife;

a handle pivotally connected to the housing and operably engaged with the lever distal end, such that rotation of the handle towards the housing rotates the lever towards the housing; and

a roller directly connected to the lever and the handle for permitting translation of the lever relative to the handle as the lever and the handle are pivoted relative to the housing.

15. The fastening tool assembly of claim 14 wherein the roller is pivotally connected to the lever.

16. The fastening tool assembly of claim 15 wherein the handle includes a follower path formed underneath the handle for engagement with the roller.

17. The fastening tool assembly of claim 16 wherein the engagement of the roller and follower path provides a mechanical advantage at initial actuation of the handle.

18. The fastening tool assembly of claim 14 further comprising indicia provided upon the latch to indicate a direction to actuate the latch to access the magazine body.

19. The fastening tool assembly of claim 14 wherein the biasing member is further defined as a first biasing member; and

wherein the fastening tool assembly further comprises a second biasing member cooperating with the latch and the housing to bias the latch into engagement with the bracket.

20. The fastening tool assembly of claim 19 wherein actuation of the latch out of engagement from the bracket causes the first biasing member to extend the bracket from the magazine body for external access for manual gripping of the bracket.

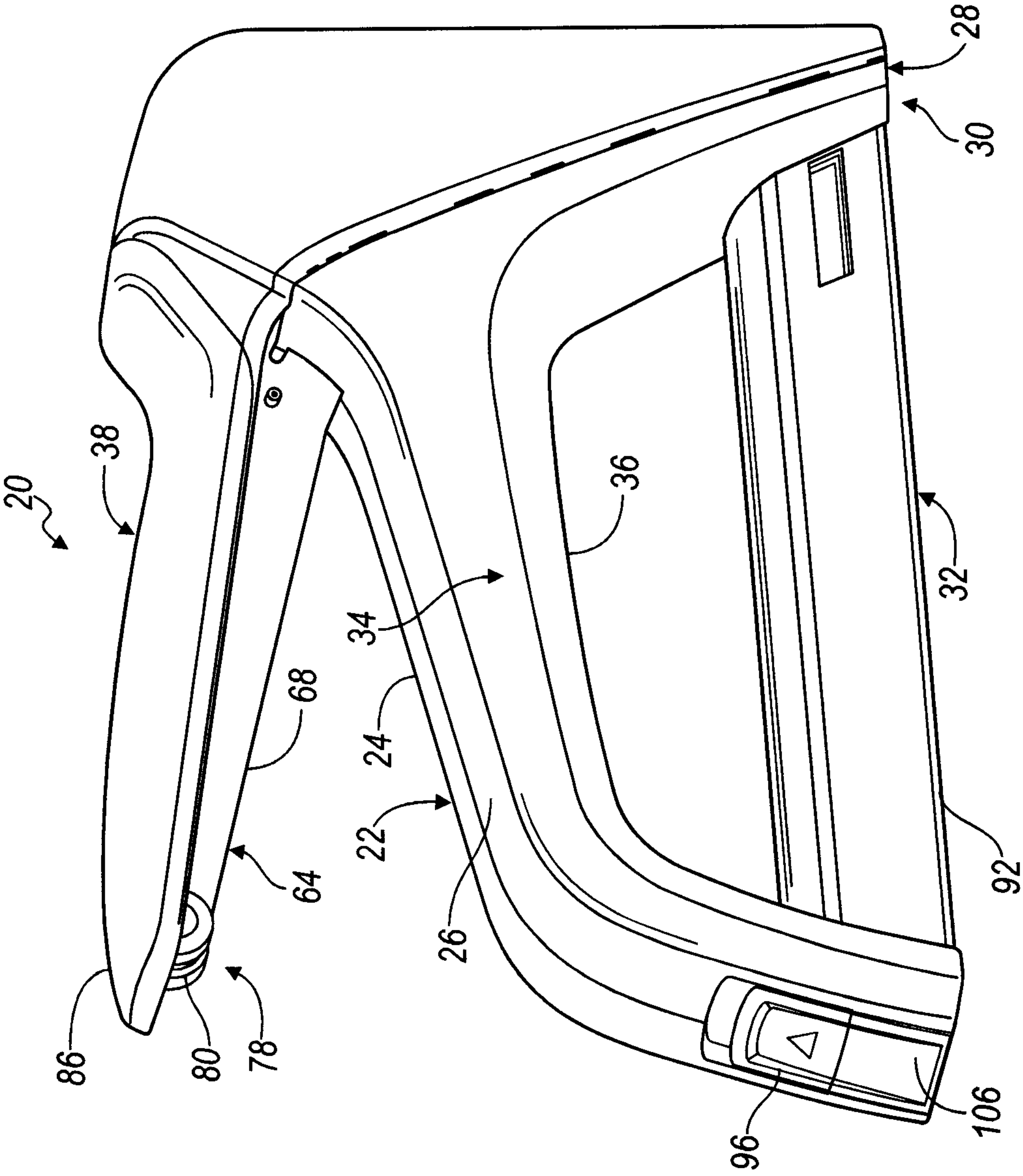
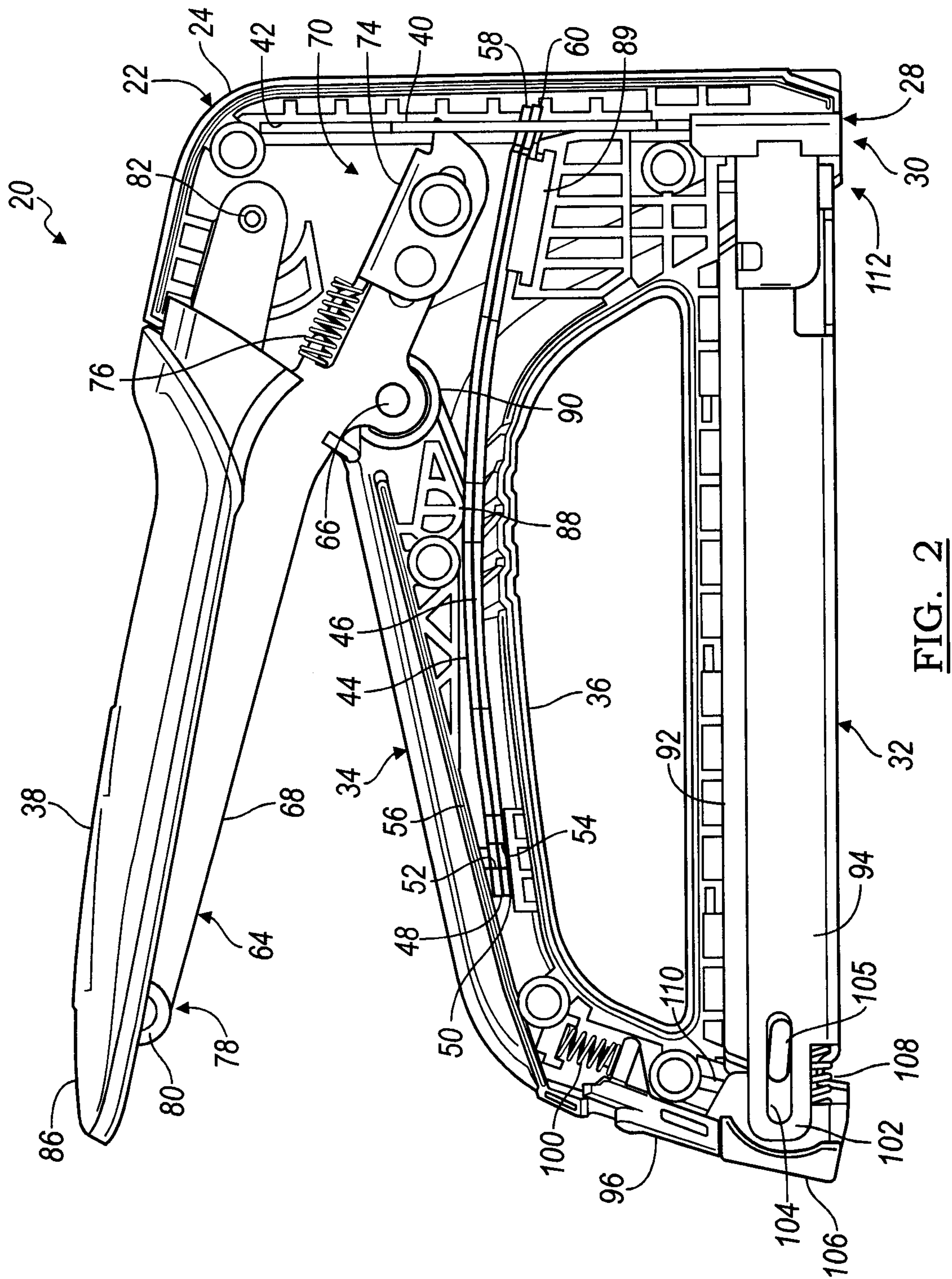


FIG. 1

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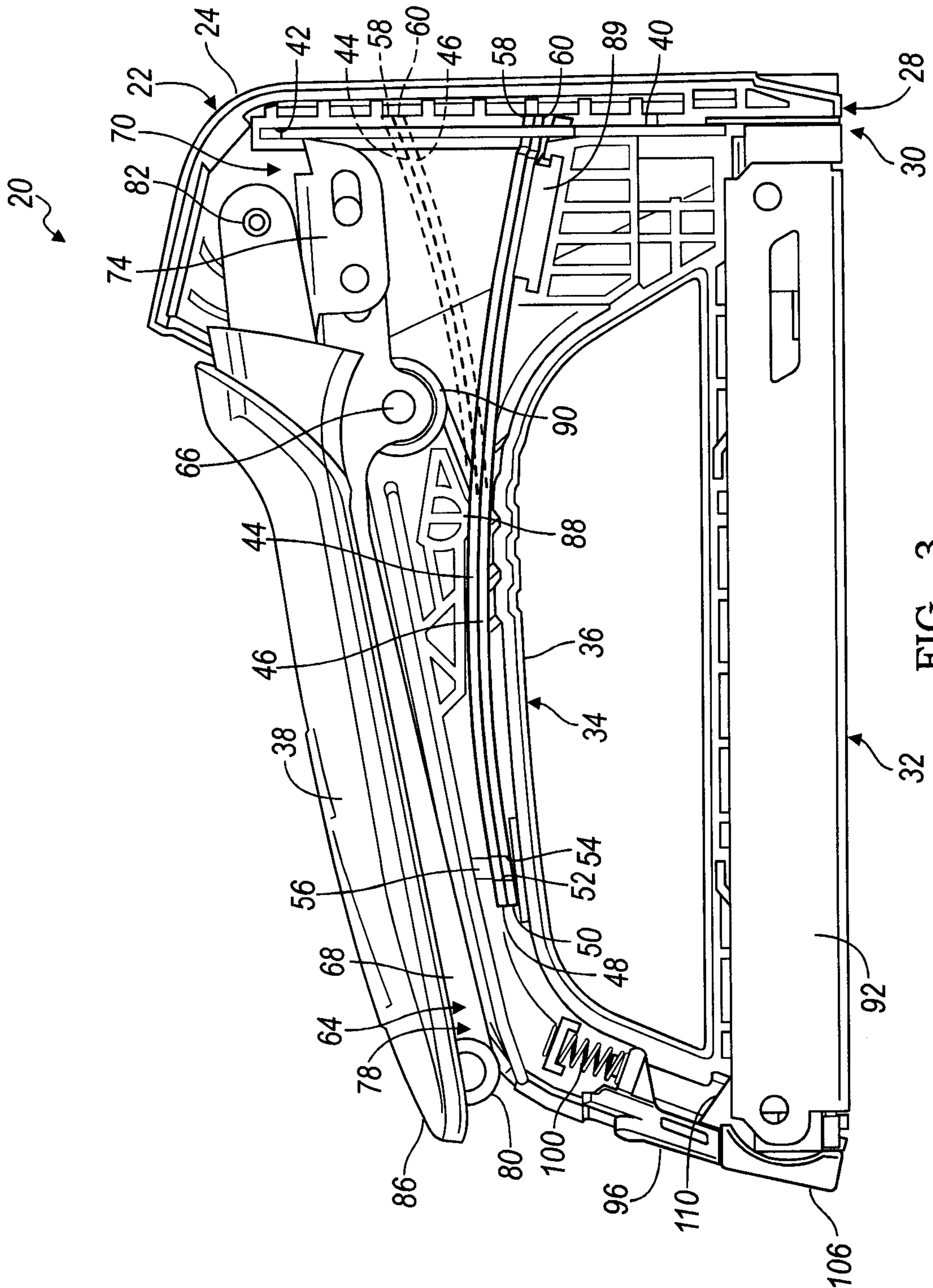


FIG. 3

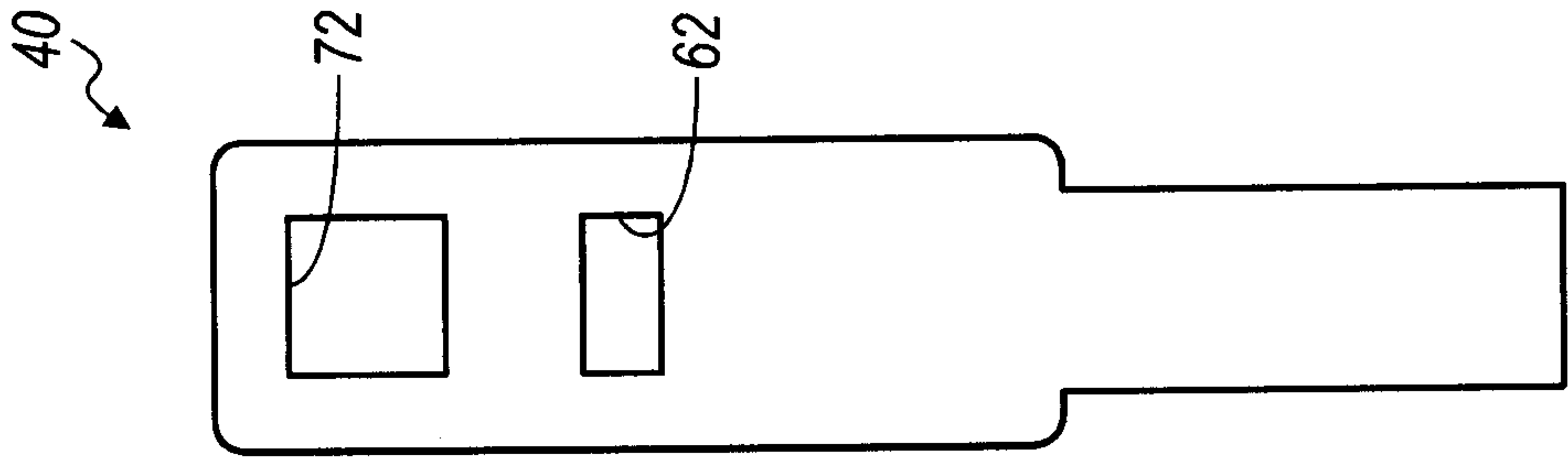


FIG. 4

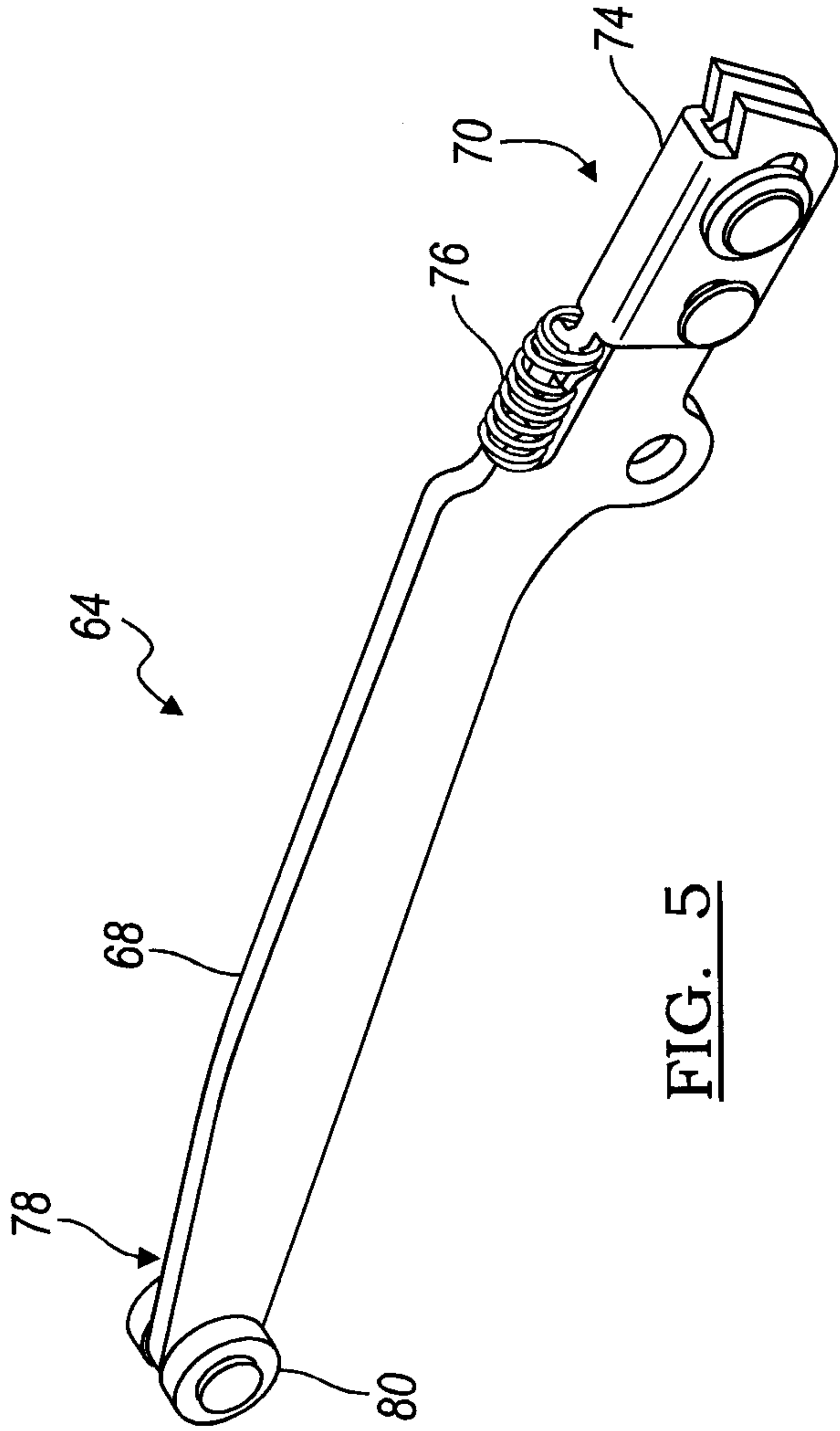
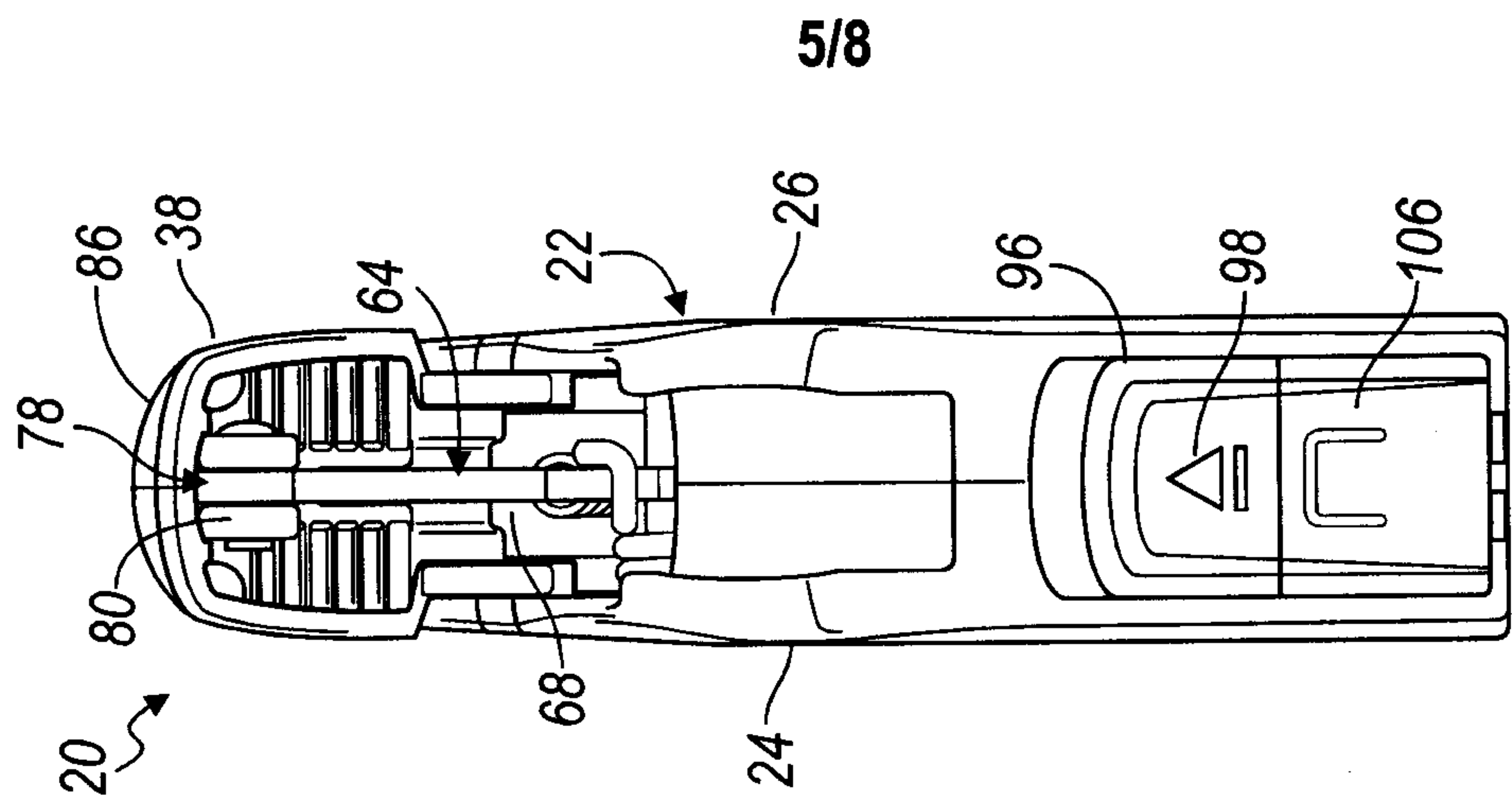
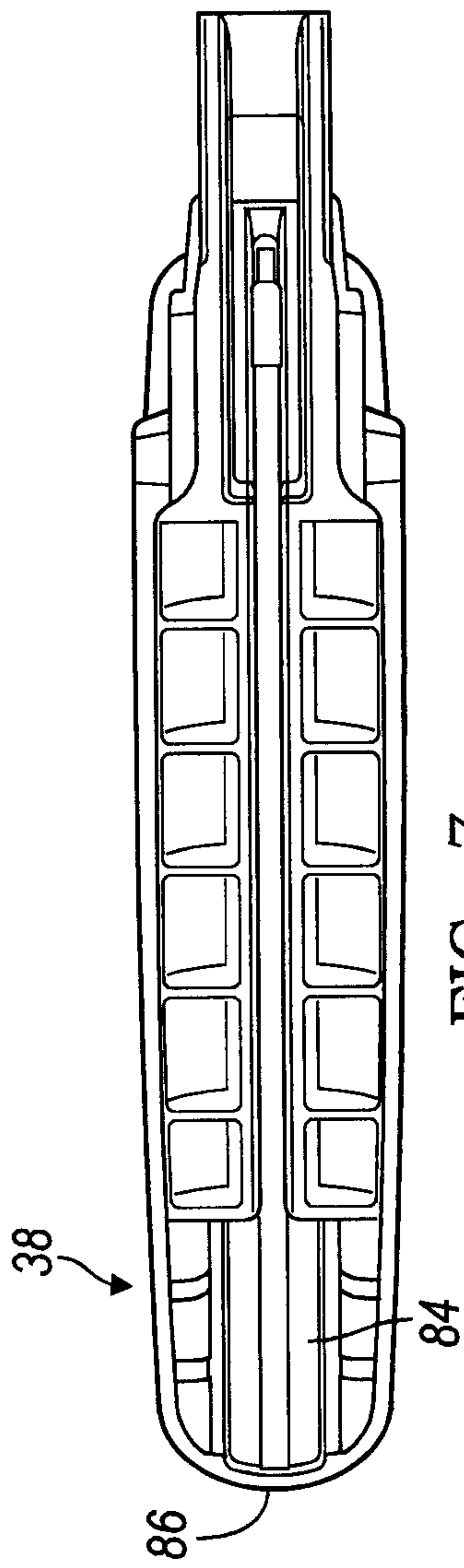
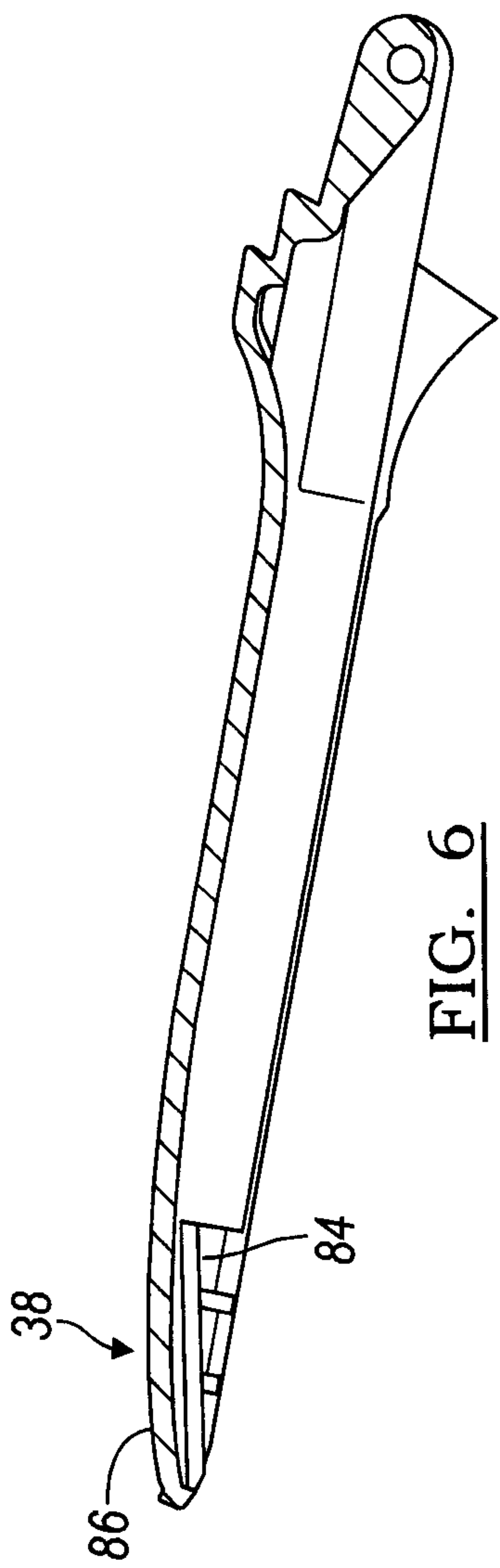
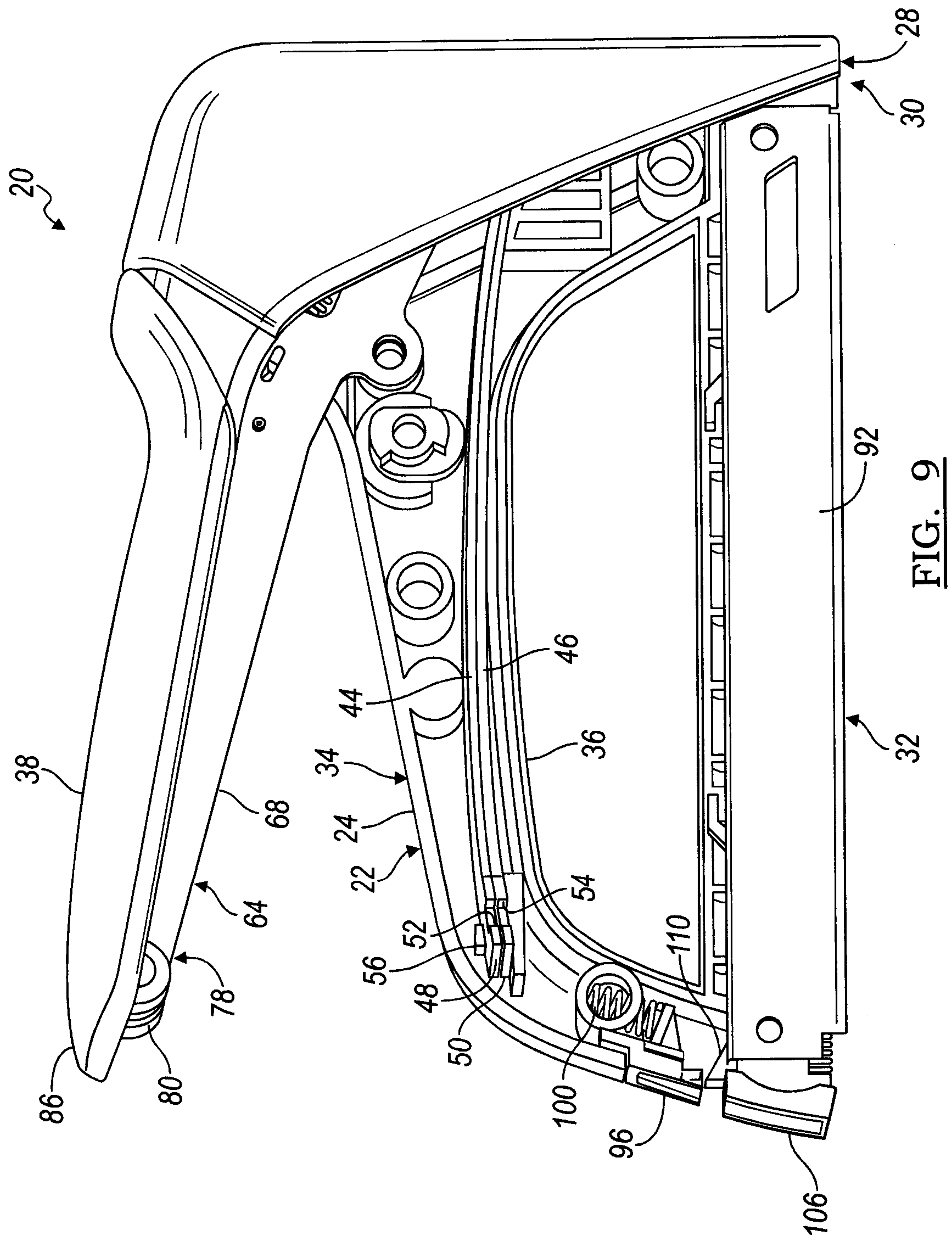
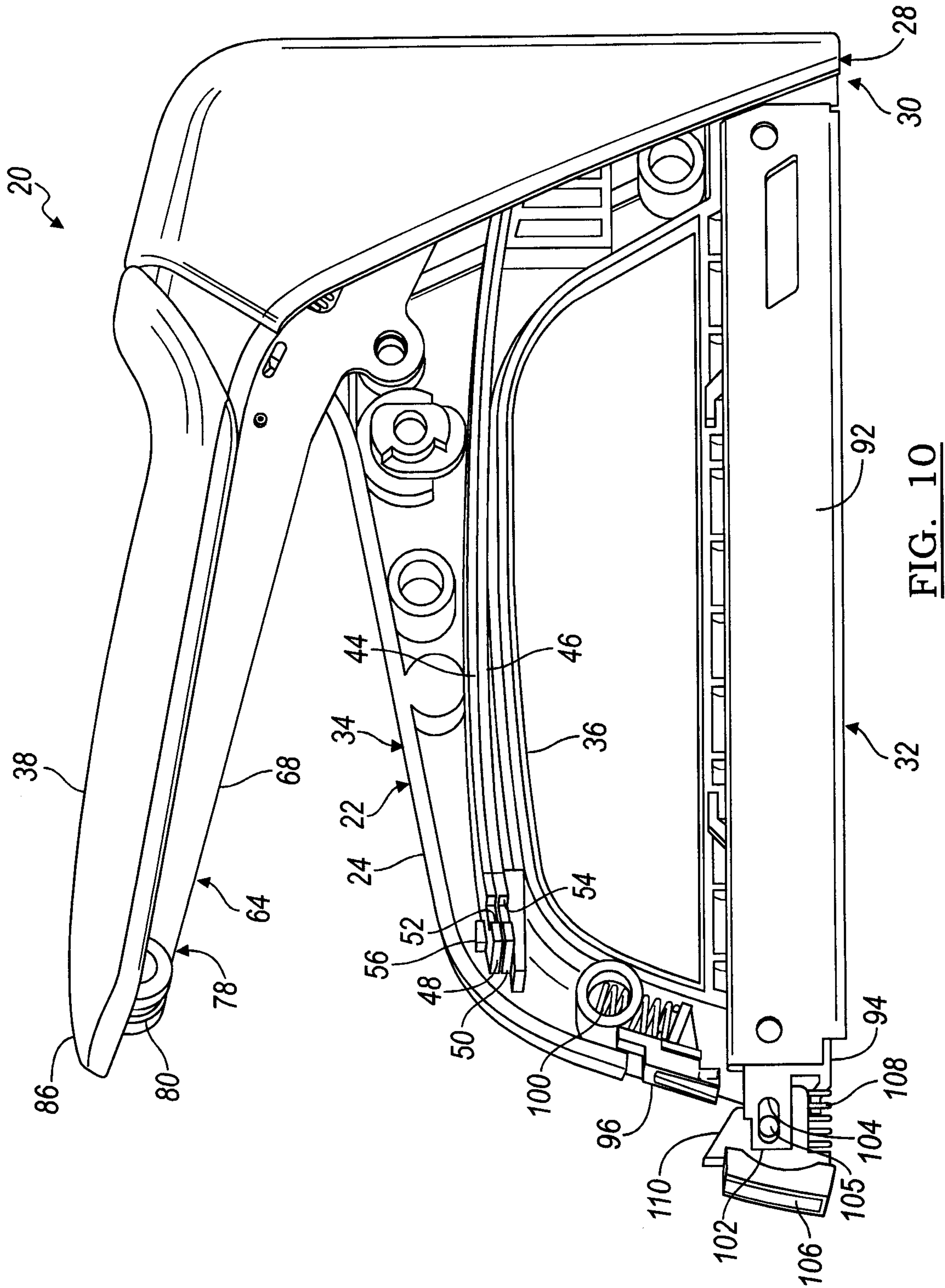


FIG. 5







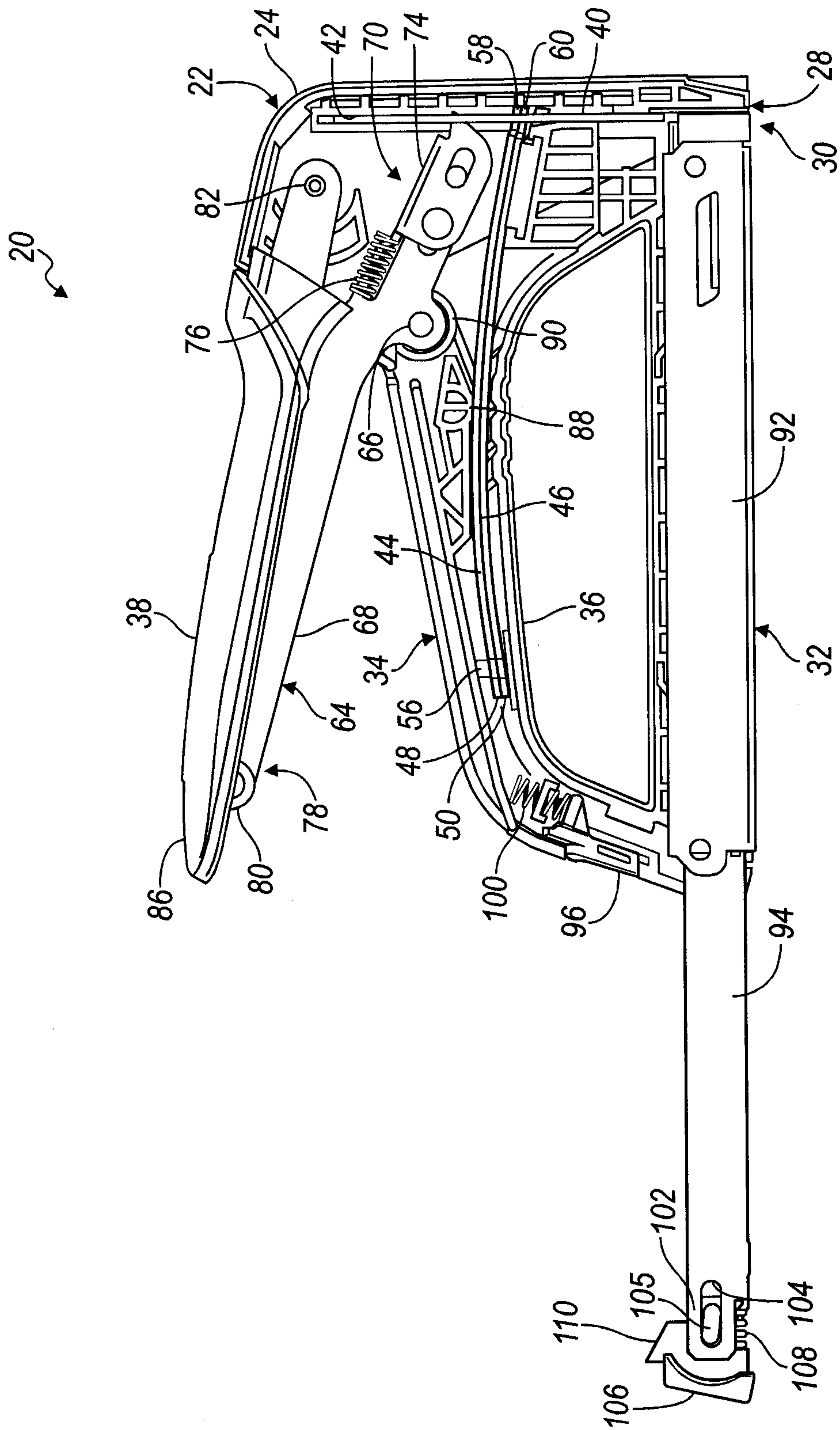


FIG. 11

