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Xiaoshun Town, Jindong District, Jinhua City, Zhejiang Province (CN).

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PCT/US2010/057041(74) Agents: **DOBROWITSKY, Joshua B.** et al.; Harness, Dickey & Pierce, P.L.C., P.O. Box 828, Bloomfield Hills, Michigan 48303 (US).(22) International Filing Date:
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12/947,952 17 November 2010 (17.11.2010) US(71) Applicant (for all designated States except US): **BLACK & DECKER INC.** [US/US]; 1207 Drummond Plaza, Newark, Delaware 19711 (US).

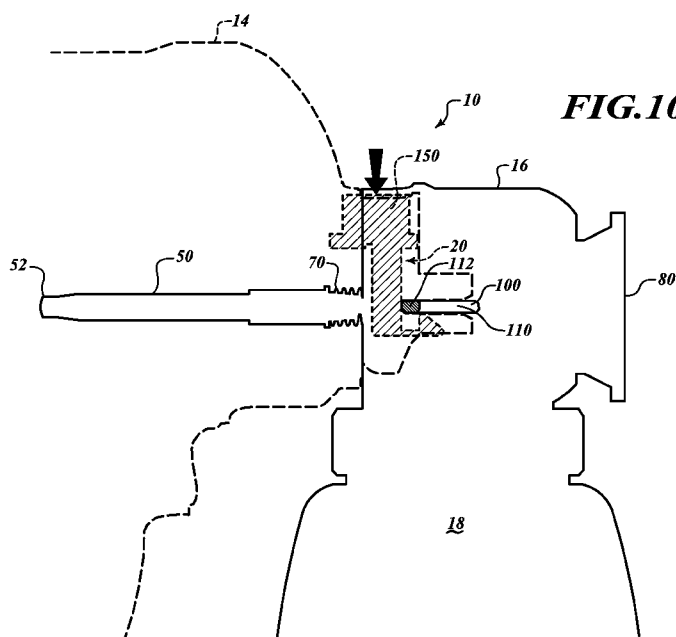
(72) Inventors; and

(75) Inventors/Applicants (for US only): **MUNN, Jamie S.** [CA/CA]; 20 Cedar Street, Maitland, Ontario K0E 1P0 (CA). **CRAWLEY, Graeme** [GB/GB]; 19 Oakridge, Fellside Park, Whickham, Newcastle upon Tyne NE16 5YD (GB). **ZHOU, SuHu** [CN/CN]; Jinshan Street, Xiaoshun Town, Jindong District, Jinhua City, Zhejiang Province (CN). **YE, GenZhang** [CN/CN]; Dong shangye,

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[Continued on next page]

(54) Title: QUICK RELEASE MECHANISM FOR PAINT SPRAYER



(57) Abstract: A sprayer (10) generally includes a tool housing (12) have a wet housing portion (16) that disconnects from a dry housing portion (14). A solenoid motor (30) is contained in the dry housing portion. An arm member (32) is connected to the dry housing portion (14). The solenoid motor is operable to move the arm member relative to the dry housing portion. A spray nozzle (76) is connected to a chamber (66) member in the wet housing portion. A piston member (50) extends from the wet housing portion and terminates with a tip portion operable to engage the arm member. A catch member (20) is movably connected to the dry housing portion having an extended condition and a retracted condition. The catch member in the retracted condition is operable to release the wet housing portion from the dry housing portion and disconnect the piston member from the solenoid motor. The catch member in the extended condition is operable to lock the wet housing portion to the dry housing portion and keep the piston member engaged with the arm member.



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QUICK RELEASE MECHANISM FOR PAINT SPRAYER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Application No. 12/947952, filed on November 17, 2010, which claims the benefit of U.S. Provisional Application No. 61/261,953, filed on November 17, 2009. This application also claims the benefit of U.S. Patent Application No. 12/898,535, filed on October 5, 2010, which has been converted to U.S. Provisional Application No. 61/_____ on _____. The entire disclosure of the above applications are incorporated herein by reference.

FIELD

[0001] The present disclosure relates to a sprayer for spraying fluids including paints and stains, and specifically relates to a sprayer having a housing where a wet side can be disconnected from a dry side with a quick release mechanism.

BACKGROUND

[0002] Typically, when changing paint in a paint sprayer, a reservoir of paint is emptied and cleaned before different paint is introduced. Cleaning the reservoir can expose the sprayer body and pump to the cleaning process. In certain examples where portions of the housing detach with the reservoir, the process to separate the housings can be relatively complex and require two hands to perform.

SUMMARY

[0003] This section provides a general summary of the disclosure, and is not a comprehensive disclosure of its full scope or all of its features.

[0004] The present teachings generally include a sprayer that includes a tool housing have a wet housing portion that disconnects from a dry housing portion. A solenoid motor is contained in the dry housing portion. An arm member is connected to the dry housing portion. The solenoid motor is operable to move the arm member relative to the dry housing portion. A spray nozzle is connected to a chamber member in the wet housing portion. A piston member extends from the wet housing portion and terminates with a tip portion operable to engage the arm member. A catch member is

movably connected to the dry housing portion having an extended condition and a retracted condition. The catch member in the retracted condition is operable to release the wet housing portion from the dry housing portion and disconnect the piston member from the solenoid motor. The catch member in the extended condition is operable to
5 lock the wet housing portion to the dry housing portion and keep the piston member engaged with the arm member.

[0005] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the
10 present teachings.

DRAWINGS

[0006] The drawings described herein are for illustrative purposes only of selected aspects of the present teachings and not all possible implementations, and are
15 not intended to limit the scope of the present teachings.

[0007] FIG. 1 is a side view of an exemplary sprayer constructed in accordance with the present teachings.

[0008] FIG. 2 is a partial exploded cross-sectional perspective view of the sprayer of FIG. 1 illustrating a housing of the sprayer where a wet housing portion is separated from a dry housing portion in accordance with the present teachings.
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[0009] FIG. 3 is similar to FIG. 2 and shows a partial cross-sectional side view.

[0010] FIG. 4 is a partial cross-sectional perspective view of the sprayer of FIG. 1 illustrating a piston member of the wet housing portion inserted in a channel member on the dry housing portion in accordance with the present teachings.
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[0011] FIG. 5 is similar to FIG. 4 and shows protrusions with wing members and post members on opposite sides of the chamber member that connect to the channel member constructed in accordance with the present teachings.

[0012] FIG. 6 is a partial perspective view of the sprayer of FIG. 1 illustrating
30 the wet housing portion locked to the dry housing portion to connect the piston member with an engagement portion on an arm member constructed in accordance with the present teachings.

[0013] FIG. 7 is a diagram of the sprayer of FIG. 1 showing a knob of a spray adjuster that can adjust a position of a stopper to limit range of motion of the arm member imparted by the solenoid motor that in turn limits the motion of the piston member as it reciprocates in the channel member in accordance with the present teachings.

[0014] FIG. 8 is a diagram of an exemplary knob of a spray adjuster for the sprayer of FIG. 1 that can be rotated relative to task descriptive icons to limit paint flow for specific applications in accordance with the present teachings.

[0015] FIG. 9 is a diagram of the sprayer of FIG. 1 showing a catch member in an extended condition that locks the wet housing portion to the dry housing portion in accordance with the present teachings.

[0016] FIG. 10 is similar to FIG. 9 and shows the catch member in a retracted condition that permits the wet housing portion to be unlocked from the dry housing portion in accordance with the present teachings.

[0017] FIG. 11 is a diagram similar to FIG. 9 and shows the wet housing portion released from the dry housing portion and the piston member in the extended condition in accordance with the present teachings.

[0018] FIG. 12 is a partial cross-sectional side view of the sprayer of FIG. 1 showing a position of the solenoid motor relative to the handle that can be shown to improve balance of the sprayer in accordance with the present teachings.

[0019] FIG. 13 is a partial cross-sectional perspective view of the sprayer of FIG. 1 and shows a supporting boss that receives the piston member and supports it during reciprocation in accordance with the present teachings.

[0020] FIG. 14 is similar to FIG. 13 and shows a recessed sleeve in the piston member to slidably engage a supporting boss sleeve in the supporting boss located in the channel member that is constructed in accordance with the present teachings.

[0021] Corresponding reference numerals indicate corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0022] Example aspects of the present teachings will now be described more fully with reference to the accompanying drawings.

[0023] With reference to FIG. 1 of the drawings, a sprayer constructed in accordance with the present teachings is generally indicated by reference numeral 10. The sprayer 10 can have a tool housing 12 including a dry housing portion 14 and a wet housing portion 16. The wet housing portion 16 can be disconnected from the dry housing portion 14. A reservoir body 18 can connect to and disconnect from the wet housing portion 16.

[0024] With reference to FIGS. 1, 2, and 3, the dry housing portion 14 can include a catch member 20 that is configured to permit the wet and dry housing portions 14, 16 to be locked to and uncoupled from one another. The dry housing portion can be formed of a pair of clam shell housing halves, and can define a housing body 22 and a handle 24. The wet housing portion 16 can also be formed of a pair of clam shell housing halves.

[0025] With reference to FIGS. 2, 3, 4, and 5, a solenoid motor 30 can be contained in the dry housing portion 14. In this example, the solenoid motor 30 can include an armature that can reciprocate to drive an arm member 32. The arm member 32 can pivot about a pin member 34. The arm member 32 can have an engagement portion 36. The engagement portion 36 on the arm member 32 can be disposed at an aperture 38 in a channel member 40 that can be connected to the dry housing portion 14. The channel member 40 can extend toward the wet housing portion 16 and can facilitate connection of the wet housing portion 16 with the dry housing portion 14. The channel member 40 can be disposed in the dry housing portion 14 and can be adjacent to the solenoid motor 30. The channel member 40 can have a receiving aperture 42 opposite the aperture 38 (FIG. 3) that can accept a piston member 50 that extends from the wet housing portion 16.

[0026] With reference to FIGS. 3, 4, 5, and 6, the wet housing portion 16 can include the piston member 50 that can extend toward the dry housing portion 14. The piston member 50 can include a tip portion 52. The tip portion 52 can extend through the channel member 40 on the dry housing portion 14 and can connect with the engagement portion 36 on the arm member 32. In doing so, the solenoid motor 30 can be engaged with the piston member 50 and when the solenoid motor 30 is initiated it can cause the reciprocation of the piston member 50.

[0027] With reference to FIG. 12, a center of mass of the solenoid motor 30 is indicated by reference numeral 30a at an intersection of axes A and B and a center balance point of the handle 24 is indicated by reference numeral 24a at an intersection of axes A and C. The center of mass 30a of the solenoid motor 30 can be configured to be in line with the center balance point 24a of the handle 24, i.e., arranged on axis A. In this manner, the balance of the sprayer 10 can be improved, which can be shown to increase comfort of a user during operation of the sprayer 10. Furthermore, a support casting isolator 56 can be coupled to the channel member 40 and the solenoid motor 30 and can be shown to reduce vibration of the sprayer 10 during operation. Arrangement of the support casting isolator 56 along the axis A can also be shown to reduce vibration of the solenoid motor 30 during operation of the sprayer 10.

[0028] In certain examples, the positioning of the center of mass 30a of the solenoid motor 30 to be in line with the center balance point 24a of the handle 24 can result in an increased length of the piston member 50. The piston member 50 can reciprocate with the channel member 40 as the sprayer 10 operates. As the length of the piston member 50 increases, however, the bending stress exerted on the piston member 50 can also increase. With reference to FIGS. 13 and 14, a supporting boss 58 can be arranged within the channel member 40 in order to reduce the propensity of the piston member 50 bending while reciprocating in the channel member 40. The supporting boss 58 can define a supporting boss aperture 60 in which the piston member 50 is received. The supporting boss 58 can provide support to, and can be shown to inhibit bending of, the piston member 50 during operation of the sprayer 10.

[0029] During operation of the sprayer 10, heat can be generated due to the friction between the piston member 50 and the supporting boss 58 as the piston member 50 reciprocates within the supporting boss aperture 60 of the supporting boss 58. In order to among other things reduce the heat generated, the supporting boss 58 can be formed of a material having a low coefficient of friction such as TeflonTM manufactured by E.I. Du Pont de Nemours & Company.

[0030] Additionally or alternatively, a supporting boss sleeve 62 having a low coefficient of friction can be arranged within the supporting boss aperture 60, as shown in FIG. 14. In another example, the piston member 50 can include a band member 64 that can be positioned on the piston member 50 to slidingly engage the supporting boss

sleeve 62 on the supporting boss 58. The band member 64 can be an annular unitary structure or made from a multi-piece construction. The band member 64 can be recessed in the piston member 50 so as to be flush (or almost flush) with an outer periphery of the piston member 50. The supporting boss sleeve 62 or the band member 64 or both can be
5 formed of a material having a low coefficient of friction such as Teflon™.

[0031] With reference to FIGS. 2, 3, 4, and 5, the piston member 50 can extend from and can connect to a chamber member 66 in the wet housing portion 16. An elastic member 70 can be disposed between a surface 72 formed on the chamber member 66 and a surface 74 formed on the piston member 50. The elastic member 70 can urge
10 the tip portion 52 of the piston member 50 away from the chamber member 66 and into an extended condition. In this regard, the piston member 50 can reciprocate against the elastic member 70 and relative to the chamber member 66 between a retracted condition (FIG. 9) and the extended condition (FIG. 11). When the piston member 50 reciprocates, paint can be pumped out of the reservoir body 18 and into the chamber member 66.
15 From the chamber member 66, the piston member 50 can pump the paint out of a spray nozzle 76. In doing so, the piston member 50 can actuate a pump 78 in the chamber member 66. In one example, the pump 78 can operate in a positive displacement fashion to pump paint from the reservoir body 18 to the spray nozzle 76.

[0032] When the wet housing portion 16 is locked to the dry housing portion
20 14 and the tip portion 52 of the piston member 50 is engaged with the engagement portion 36 on the arm member 32, the elastic member 70 can be in the retracted condition and further compressed between the chamber member 66 and the piston member 50. When the wet housing portion 16 is released from the dry housing portion 14, the elastic member 70 can urge the surfaces 72, 74 further apart to increase the
25 spacing between the chamber member 66 and the tip portion 52 of the piston member 50.

[0033] The wet housing portion 16 can have a guard member 80 that can hold the spray nozzle 76, which can be fluidly connected to the chamber member 66 on a side opposite of the piston member 50. The spray nozzle 76 can include an orifice portion from which the paint can be directed out of the chamber member 66 and on to a
30 workpiece. The spray nozzle 76 and the orifice portion can be fluidly connected to the chamber member 66 and can deliver a spray of paint in a pattern. The orifice portion can be a separate component from the spray nozzle 76, so that the spray nozzle 76 can rotate

relative to the orifice portion. The orifice portion can atomize the paint and the spray nozzle 76 can impart the pattern. In other examples, a single component can atomize the paint and can impart the pattern on the spray of paint.

5 **[0034]** The guard member 80 can be disposed around the spray nozzle 76 and can have a multitude of finger depressions 90. The multitude of finger depressions 90 can be used to rotate the guard member 80 that is fixed for rotation with the spray nozzle 76. By rotating the guard member 80, the rotation of the spray nozzle 76 can provide different orientations of the pattern of the spray that is emitted from the spray nozzle 76. In one example, the spray nozzle 76 can produce a flat, planar spray pattern. By rotating
10 the guard member 80, the plane of the spray pattern can be rotated. In doing so, it can be shown that the paint can be more easily directed in more specific and relatively harder to reach locations.

[0035] With reference to FIGS. 4 and 5, a protrusion 100 and a protrusion 102 can be connected to the chamber member 66. The protrusions 100, 102 can be on
15 opposite sides of the chamber member 66. The protrusion 100 can have a leading edge 104, a trailing edge 106 and a tip 108. As such, the protrusion 100 can include a wing member 110 that can form at least a partial rectangular shape. The tip 108 of the protrusion 100 can include a post member 112. In this arrangement, the leading edge 104 can be longer than the trailing edge 106 and can terminate at the post member 112.

20 **[0036]** The protrusion 102 can have a similar structure and can have a leading edge 120, a trailing edge 122 and a tip 124. As such, the protrusion 102 can include a wing member 126 that can form at least a partial rectangular shape. The tip 124 of the protrusion 102 can include a post member 128. Similarly, the leading edge 120 can be longer than the trailing edge 122 and can terminate at the post member 128. The wing
25 members 110, 126 can extend longitudinally in the same direction as the piston member 50. In this regard, the protrusions 100, 102 can engage with the channel member 40.

[0037] The channel member 40 can include a groove 130 and a groove 132. The grooves 130, 132 can be formed on opposite sides of the channel member 40 and can be configured to receive the protrusions 100, 102. The grooves 130, 132 can be
30 formed at the receiving aperture 42 of the channel member 40. As the piston member 50 is inserted into the channel member 40, the grooves 130, 132 can receive the protrusions 100, 102. The leading edge 104 of the protrusion 100 can abut a stop 134 formed in the

groove 130 opposite the receiving aperture 42. Similarly, the leading edge 120 can abut a stop 136 formed in the groove 132 opposite the receiving aperture 42. When the protrusions 100, 102 are held in the grooves 130, 132 and up against the stops 134, 136, the wet housing portion 16 can be in the proper position to be locked to the dry housing portion 14. Moreover, the tip portion 52 of the piston member 50 can be positioned to be in contact with the engagement portion 36 of the arm member 32.

[0038] The groove 130 can define a pair of walls 140 and the groove 132 can define a pair of walls 142 that can extend between the receiving aperture 42 and the stops 134, 136, respectively. The pair of walls 140 can hold the wing member 110 and the pair of walls 142 can hold the wing member 126. When the protrusions 100, 102 are secured in the grooves 130, 132, the complementary partial rectangular shapes can be configured to be shown to limit movement of the piston member 50 in the channel member 40 but for its reciprocating movement. By limiting the movement as described above, the tip portion 52 can be aligned with and engaged to the receiving portion of the arm member 32. The limiting of the movement can also be shown to reduce the motion of the wet housing portion 16 relative to the dry housing portion 14. Put another way, to properly align the tip portion 52 with the engagement portion 36, the user need only insert the piston member 50 into the channel member 40 so that the protrusions 100, 102 are accepted by the grooves 130, 132. It can also be shown that the vibration experienced by the wet housing portion 16 that can affect the pattern of the spray can be reduced or eliminated, when the protrusions 100, 102 are seated in the grooves 130, 132, respectively.

[0039] With reference to FIGS. 2, 3, 4, and 5, the dry housing portion 14 includes the catch member 20. In one example, the catch member 20 can include a clasp member 150 disposed between an elastic member 152 and a button member 154. The button member 154 can have a surface 156 that can extend out of and be accessible from an exterior 158 of the dry housing portion 14. A surface 160 of the button member 154 opposite the surface 156 can connect to a top portion 162 of the clasp member 150. The clasp member 150 can also include a first leg member 164 opposite a second leg member 166. The first leg member 164 can be disposed far enough from the second leg member 166 so that the clasp member 150 can be disposed over the channel member 40 in the dry housing portion 14.

[0040] With reference to FIG. 2, the first leg member 164 of the clasp member 150 can include a pocket 170 that is adjacent a ramp 172. The second leg member 166 can also include a pocket 174 that is adjacent a ramp 176. The elastic member 152 can be further compressed when the catch member 20 is pushed from the extended condition into the retracted condition. From the retracted condition, the elastic member 152 can extend and push the catch member 20 from the retracted condition into the extended condition. The catch member 20 can move along an axis 180 (FIGS. 2 and 3) between the extended and retracted conditions. With reference to FIGS. 2 and 3, the axis 180 can be disposed transverse to an axis 182 along which the piston member 50 can reciprocate in the longitudinal direction. In one example, the axes 180, 182 can be perpendicular.

[0041] With reference to FIGS. 2, 3, 9, 10, and 11, the pockets 170, 174 on the catch member 20 in the extended condition can hold the post members 112, 128 on the protrusions 100, 102, respectively, that extend from the chamber member 66. In doing so, the wet housing portion 16 can be locked to the dry housing portion 14 and the tip portion 52 of the piston member 50 can be held in contact with the engagement portion 36 on the arm member 32 in the dry housing portion 14.

[0042] With reference to FIGS. 2, 3, and 10, the button member 154 can be pushed to drive the clasp member 150 toward the channel member 40 and into the retracted condition. As such, the elastic member 152 between the channel member 40 and the clasp member 150 can be compressed further and the legs 164, 166 of the clasp member 150 can travel downward and move the ramps 172, 176 of each leg member 164, 166 out of obstruction with the post members 112, 128 on each side of the chamber member 66. With the obstruction removed from the post members 112, 128, the elastic member 70 between the chamber member 66 and the piston member 50 can extend and increase the space between the chamber member 66 and the piston member 50, as shown in FIG. 11. This can result in the wet housing portion 16 being pushed away from the dry housing portion 14 to begin the process of disconnecting the wet housing portion 16 from the dry housing portion 14. In doing so, the piston member 50 can be withdrawn from the channel member 40 and the engagement between the wet housing portion 16 and the dry housing portion 14 can be broken. In this arrangement, the wet housing

portion 16 and the reservoir body 18 can be cleaned and washed without exposing the dry housing portion 14 to such a cleaning process.

[0043] The wet housing portion 16 can be unlocked from the dry housing portion 14 by pressing the button member 154 perpendicular to the direction along which
5 the wet housing portion 16 separates from the dry housing portion 14.

[0044] With reference to FIGS. 2, 3, 9, 10, and 11, the wet housing portion 16 can be connected to the dry housing portion 14, when the catch member 20 is in the extended condition. In this regard, the piston member 50 can be inserted into the channel member 40 and the wet housing portion 16 can be pushed against the dry housing portion
10 14. When the post members 112, 128 on the chamber member 66 encounter the ramps 172, 176 on the leg members 164, 166 of the catch member 20, the post members 112, 128 can drive the ramps 172, 176 downward, thus moving the catch member 20 from the extended condition to the retracted condition (or at least partially).

[0045] The wet housing portion 16 can be further pushed into locking
15 engagement with the dry housing portion 14 and the post members 112, 128 on the chamber member 66 can move over the ramps 172, 176 and into the pockets 170, 174 formed on the leg members 164, 166. Once the post members 112, 128 on the chamber member 66 seat into the pockets 170, 174 on the leg members 164, 166 of the clasp member 150, the catch member 20 can move from the retracted condition back to the
20 extended condition. In this position, the tip portion 52 of the piston member 50 can be held in contact with the engagement portion 36 and the solenoid motor 30 can cause the reciprocation of the piston member 50. The ramps 172, 176 can also be square shaped (i.e., not ramped), and therefore require that the user move the catch member 20 to the retracted condition to permit connection and locking of the wet housing portion 16 to the
25 dry housing portion 14.

[0046] With reference to FIGS. 2, 3, and 4, it will be appreciated in light of the disclosure that the sprayer 10 need only be tipped on its side and a cap 184 can be removed to permit access to a cavity 186 defined by the reservoir body to fill or empty the reservoir body 18 as desired. The reservoir body 18 may be manufactured in various
30 ways, including blow molding or a combination of injection molding and blow molding.

[0047] Additionally or alternatively, a connection bore 188a can be included on the dry housing portion 14 and a connection bore 188b can be included on the wet

housing portion 16. The connection bores 188a, 188b can be pinned to lock the wet housing portion 16 to the dry housing portion 14.

[0048] With reference to FIGS. 1, 2, 7, and 8, a spray adjuster 190 can be configured to control the solenoid motor 30. The spray adjuster 190 can comprise a knob 192 that can be rotated into one of a multitude of positions as selected by the user of the sprayer 10. Moreover, a system of indicia can be employed to communicate to the user information concerning the placement of the knob 192. In a basic form, the system of indicia can include words or numbers that relate to the volume of paint that is dispensed when the sprayer 10 is operated and the knob 192 is in a particular position. For examples, a series of words (e.g.: very small, small, medium, large, extra large) or a series of numbers (e.g.: 1, 3, 7, 11, 19) could be employed.

[0049] As another example, the system of indicia can comprise a multitude of icons 194 that illustrate one or more tasks that could be performed satisfactorily when the knob 192 is placed in a specific position. The icons 194 can include a chair project 196a, a door project 196b, a picnic table project 196c, a shed door project 196d, and a gate project 196e, where the projects can require increasing paint flow from the sprayer 10, as the knob is rotated clockwise relative to FIG. 8. By way of this example, the gate project 196e can require the largest magnitude of paint flow relative to chair project 196a.

[0050] With reference to FIG. 7, a stopper member 198 can be configured to selectively retract into or extend from the knob 192, as the knob 192 is rotated relative to the tool housing 12. The stopper member 198 can be disposed within the tool housing 12 of the dry housing portion 14. The stopper member 198 can be in engagement with the arm member 32 upon which the solenoid motor 30 imparts a pivoting motion. In this regard, the pivoting motion of the arm member 32 can be limited by obstruction with the stopper member 198. As the knob 192 is rotated to a certain position that requires less volume of paint to be emitted from the sprayer 10 (e.g.: the door project 196b), the stopper member 198 can limit the pivoting motion of the arm member 32 relative to an application that requires relatively larger volumes of paint (e.g.: the gate project 196e) to be emitted from the sprayer 10. It will be appreciated in light of the disclosure that the spray adjuster 190 can mechanically limit (in contrast to electronically limiting) the

amount of paint that the solenoid motor 30 causes the piston member 50 to pump from the reservoir body 18.

[0051] With reference to FIGS. 2, 3, 4, and 5, a control module 200 can be included in the dry housing portion 14. A switch 202 can be connected to the control module 200 and can be accessible on the exterior 158 of the tool housing 12. The user can use the switch 202 to limit the output of the solenoid motor 30. In doing so, the solenoid motor 30 can be switched, for example, between a low mode and a high mode. In this example, the rate at which the solenoid motor 30 reciprocates can be reduced to provide relatively less pumping action. A trigger 204 can be arranged in the tool housing 12 of the dry housing portion 14 near the handle 24. The trigger 204 can be electrically connected to the control module 200 and can be configured to move in an aperture 206 between an extended condition and a retracted condition. The trigger 204 in the retracted condition can actuate the solenoid motor 30.

[0052] The foregoing description of the exemplary aspects of the present teachings has been provided for purposes of illustration and description. Individual elements or features of a particular aspect of the present teachings are generally not limited to that particular aspect, but, where applicable, are interchangeable and can be used in other aspects, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the present teachings, and all such modifications are intended to be included within the scope of the present teachings.

[0053] The terminology used herein is for the purpose of describing particular example embodiments only and is not intended to be limiting. As used herein, the singular forms "a," "an," and "the" may be intended to include the plural forms as well, unless the context clearly indicates otherwise. The terms "comprises," "comprising," "including," and "having," are inclusive and therefore specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. The method steps, processes, and operations described herein are not to be construed as necessarily requiring their performance in the particular order discussed or illustrated, unless specifically identified

as an order of performance. It is also to be understood that additional or alternative steps may be employed.

[0054] When an element or layer is referred to as being "on," "engaged to", "connected to," or "coupled to" another element or layer, it may be directly on, engaged, 5 connected or coupled to the other element or layer, or intervening elements or layers may be present. In contrast, when an element is referred to as being "directly on," "directly engaged to", "directly connected to," or "directly coupled to" another element or layer, there may be no intervening elements or layers present. Other words used to describe the relationship between elements should be interpreted in a like fashion (e.g., "between" 10 versus "directly between," "adjacent" versus "directly adjacent," etc.). As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0055] Although the terms first, second, third, etc. may be used herein to describe various elements, components, regions, layers and/or sections, these elements, 15 components, regions, layers and/or sections should not be limited by these terms. These terms may be only used to distinguish one element, component, region, layer, or section from another region, layer, or section. Terms such as "first," "second," and other numerical terms when used herein do not imply a sequence or order unless clearly indicated by the context. Thus, a first element, component, region, layer, or section 20 discussed below could be termed a second element, component, region, layer, or section without departing from the aspects of the present teachings.

[0056] Spatially relative terms, such as "inner," "outer," "beneath," "below", "lower", "above", "upper," and the like, may be used herein for ease of description to describe one element or feature's relationship to another element(s) or feature(s) as 25 illustrated in the figures. Spatially relative terms may be intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as "below" or "beneath" other elements or features would then be oriented "above" the other elements or features. Thus, the example term "below" can encompass both an 30 orientation of above and below. The device may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein interpreted accordingly.

CLAIMS

What is claimed is:

1. A sprayer (10) characterized in that it includes:

5 a tool housing (12) have a wet housing portion (16) that disconnects from a dry housing portion (14);

a solenoid motor (30) contained in a the dry housing portion (14);

an arm member (32) connected to the dry housing portion (14), the solenoid motor (30) operable to move the arm member (32) relative to the dry housing portion (14);

10 a spray nozzle (76) connected to a chamber member (66) in the wet housing portion (16);

a piston member (50) that extends from the wet housing portion (16) and terminates with a tip portion (52) operable to engage the arm member (32); and

15 a catch member (20) movably connected to the dry housing portion (14) having an extended condition and a retracted condition, the catch member (20) in the retracted condition is operable to release the wet housing portion (16) from the dry housing portion (14) and disconnect the piston member (50) from the solenoid motor (30), the catch member (20) in the extended condition is operable to lock the wet housing portion (16) to the dry housing portion (14) and keep the
20 piston member (50) engaged with the arm member (32).

2. The sprayer (10) of claim 1 further characterized in that the catch member (20) moves between the extended condition and the retracted condition along an axis (180) that is transverse to an axis (182) along which the piston member (50) on
25 the wet housing portion (16) reciprocates in the channel member (40) on the dry housing portion (14).

3. The sprayer (10) of claim 2 further characterized in that the axes (180, 182) are perpendicular.
30

4. The sprayer (10) of claim 1 further characterized in that it includes a protrusion (100, 102) that extends from the chamber member (66) and a groove (130, 132)

formed on the channel member (40) that receives the protrusion (100, 102) when the tip portion (52) of the piston member (50) is inserted in the channel member (40) and engages the arm member (32).

- 5 5. The sprayer (10) of claim 4 further characterized in that it includes a post member (112, 128) that extends from the protrusion (100, 102) on the chamber member (66) and a pocket (170, 174) defined by the catch member (20) that holds the post member (112, 128) when the catch member (20) is in the extended condition.
- 10 6. A sprayer (10) characterized in that it includes:
- a tool housing (12) having a wet housing portion (16) that disconnects from a dry housing portion (14);
- a channel member (40) connected to a solenoid motor (30) in the dry housing portion (14), the channel member (40) defining a receiving aperture (42);
- 15 a spray nozzle (76) connected to a chamber member (66) in the wet housing portion (16);
- a piston member (50) supported for reciprocating movement on the chamber member (66), the piston member (50) extends from the wet housing portion (16) and terminates with a tip portion (52); and
- 20 a catch member (20) movably connected to the dry housing portion (14) having an extended condition and a retracted condition, the catch member (20) in the retracted condition is operable to release the wet housing portion (16) from the dry housing portion (14).
- 25 7. The sprayer (10) of claim 1 and 6 further characterized in that it includes an elastic member (70) disposed between a surface (74) on the piston member (50) and a surface (72) on the chamber member (66), the elastic member (70) is at least partially compressed between the surfaces (72, 74) when the wet housing portion (16) is locked to the dry housing portion (14) but pushes the surfaces (72, 74) further apart when the catch member (20) is in the retracted condition to
- 30 separate the wet housing portion (16) from the dry housing portion (14).

8. The sprayer (10) of claim 1 and 6 further characterized in that it includes a trigger member (204), the dry housing portion (14) defines an aperture (206) through which the trigger member (204) is movable from an extended condition to a retracted condition, the trigger member (204) in the retracted condition is operable to initiate the solenoid motor (30) and reciprocate the piston member (50) when the wet housing portion (16) is locked to the dry housing portion (14).
9. The sprayer (10) of claim 1 and 6 further characterized in that the dry housing portion (14) of the tool housing (12) includes a handle portion (24).
10. The sprayer (10) of claim 1 and 6 further characterized in that the catch member (20) moves between the extended condition and the retracted condition along an axis (18) that is perpendicular to an axis (182) along which the piston member (50) reciprocates in the channel member (40) on the dry housing portion (14).
11. The sprayer (10) of claim 1 and 6 further characterized in that the catch member (20) includes a clasp portion (150) disposed between a button member (154) and an elastic member (152), the button member (154) seats in the dry housing portion (14) and defines a surface (156) accessible from an exterior of the tool housing (12) of the sprayer (10), the elastic member (152) is connected to the channel member (40) and is at least partially compressed when the catch member (20) moves from the extended condition to the retracted condition.
12. The sprayer (10) of claim 11 further characterized in that the clasp portion (150) includes a first leg member (164) and a second leg member (166), the first leg member (164) is disposed on an opposite side of the channel member (40) from the second leg member (166), the first leg member (164) includes the pocket (170) to hold the post member (112) that extends from the protrusion (100).
13. The sprayer (10) of claim 1 and 6 further characterized in that the dry housing portion (14) of the tool housing (12) includes a handle portion (24) defining a

center balance point (24a) that is disposed in line with a center of mass (30a) of the solenoid motor (30).

14. The sprayer (10) of claim 1 and 6 further characterized in that it includes a
5 supporting boss (58) in the channel member (40) that receives the piston member (50), the supporting boss (58) including a sleeve member (62), the piston member (50) including a band member (64) at least partially recessed in the piston member (50), the sleeve member (62) operable to be in sliding engagement with the band member (64).
- 10
15. The sprayer (10) of claim 1 and 6 further characterized in that it includes a reservoir body (18) that connects to the wet housing portion (16), the reservoir body (18) defines an opening to which a cap member (184) connects, the opening provides access to a cavity (186) in the reservoir body (18) in addition to where
15 the reservoir body (18) connects to the wet housing portion (16).

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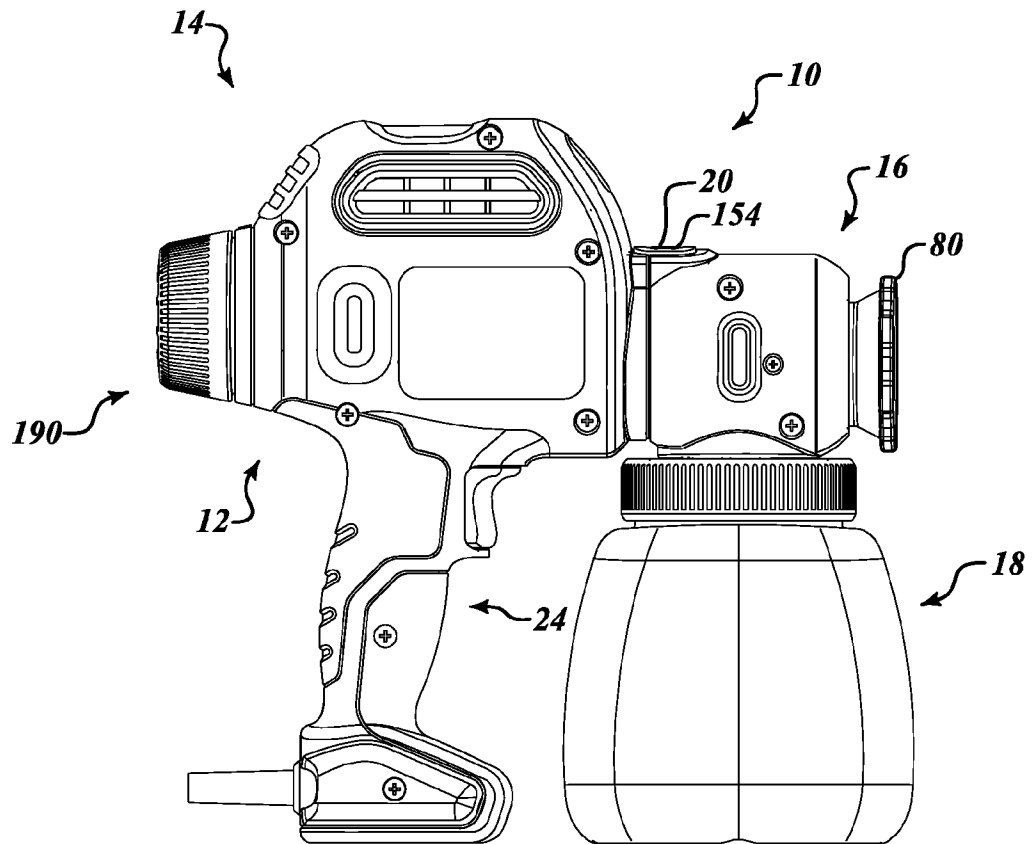
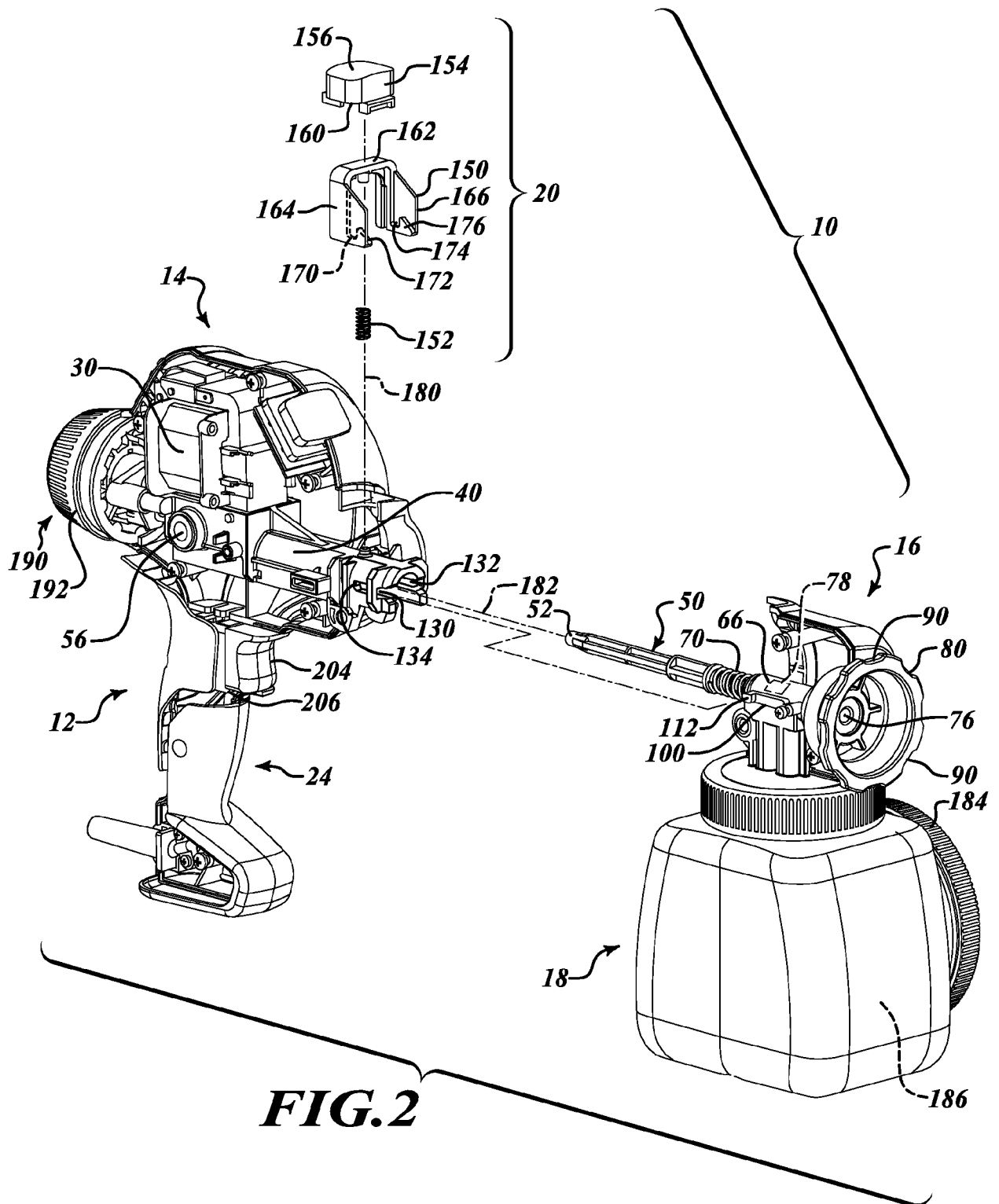


FIG. 1

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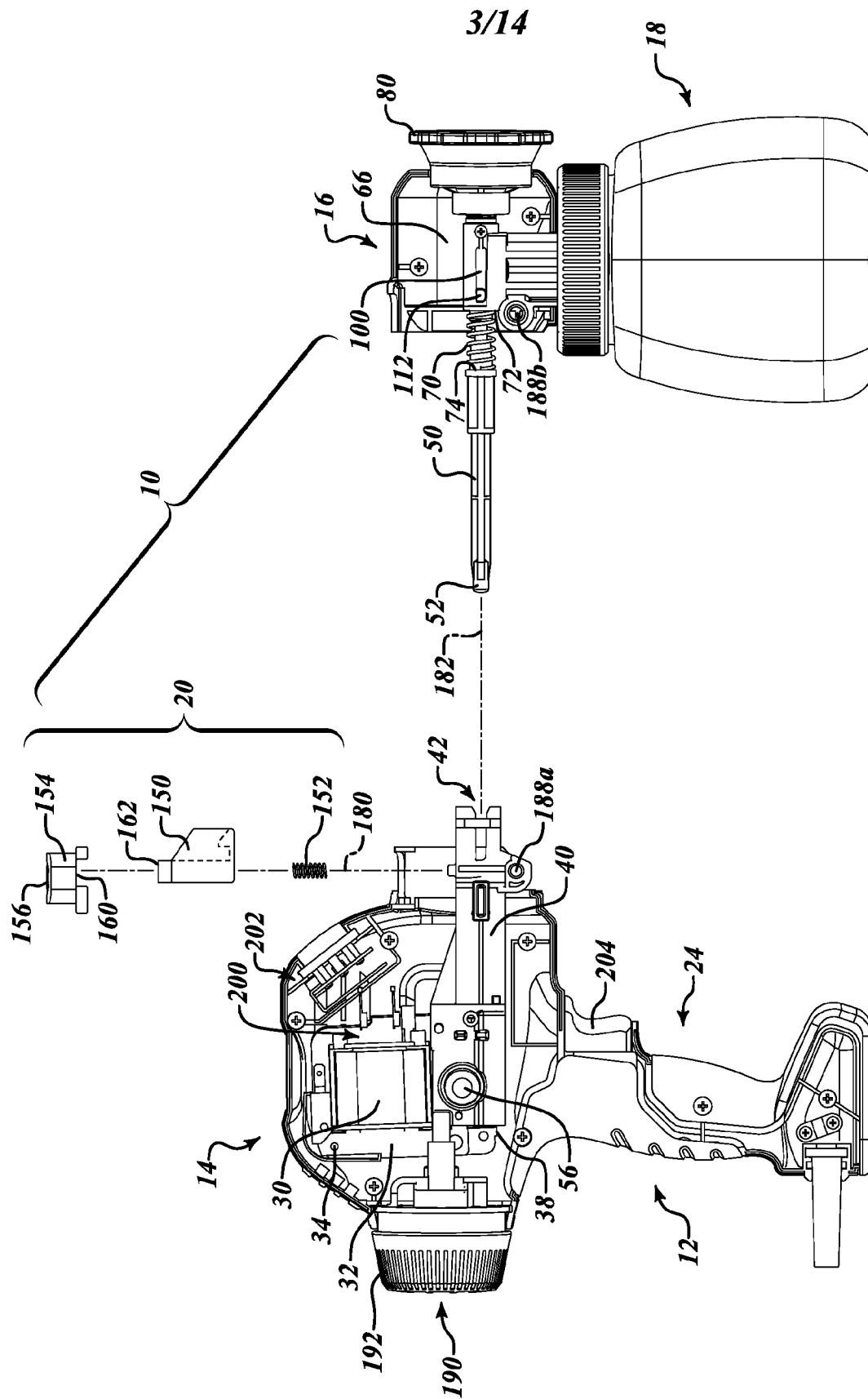
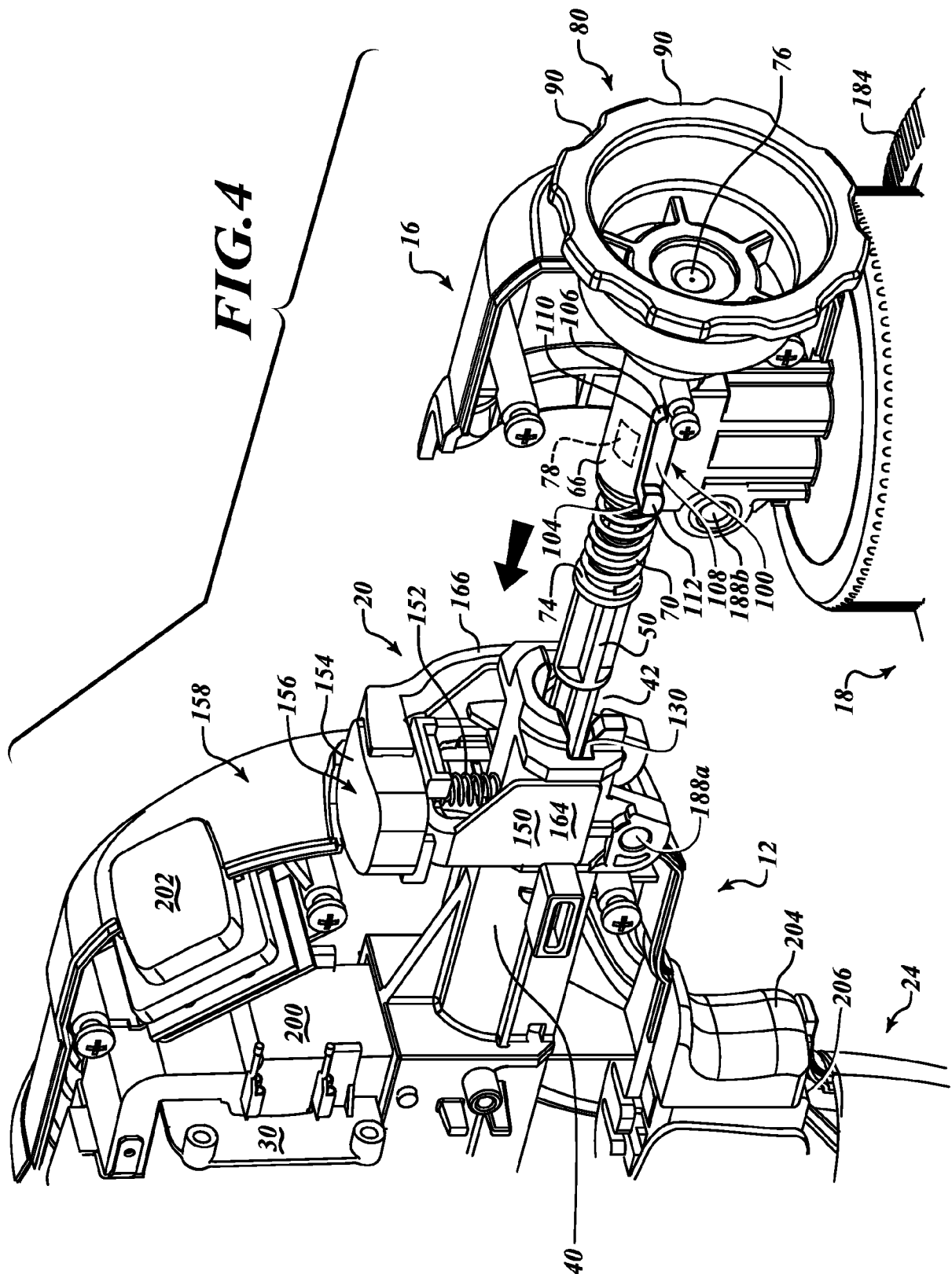
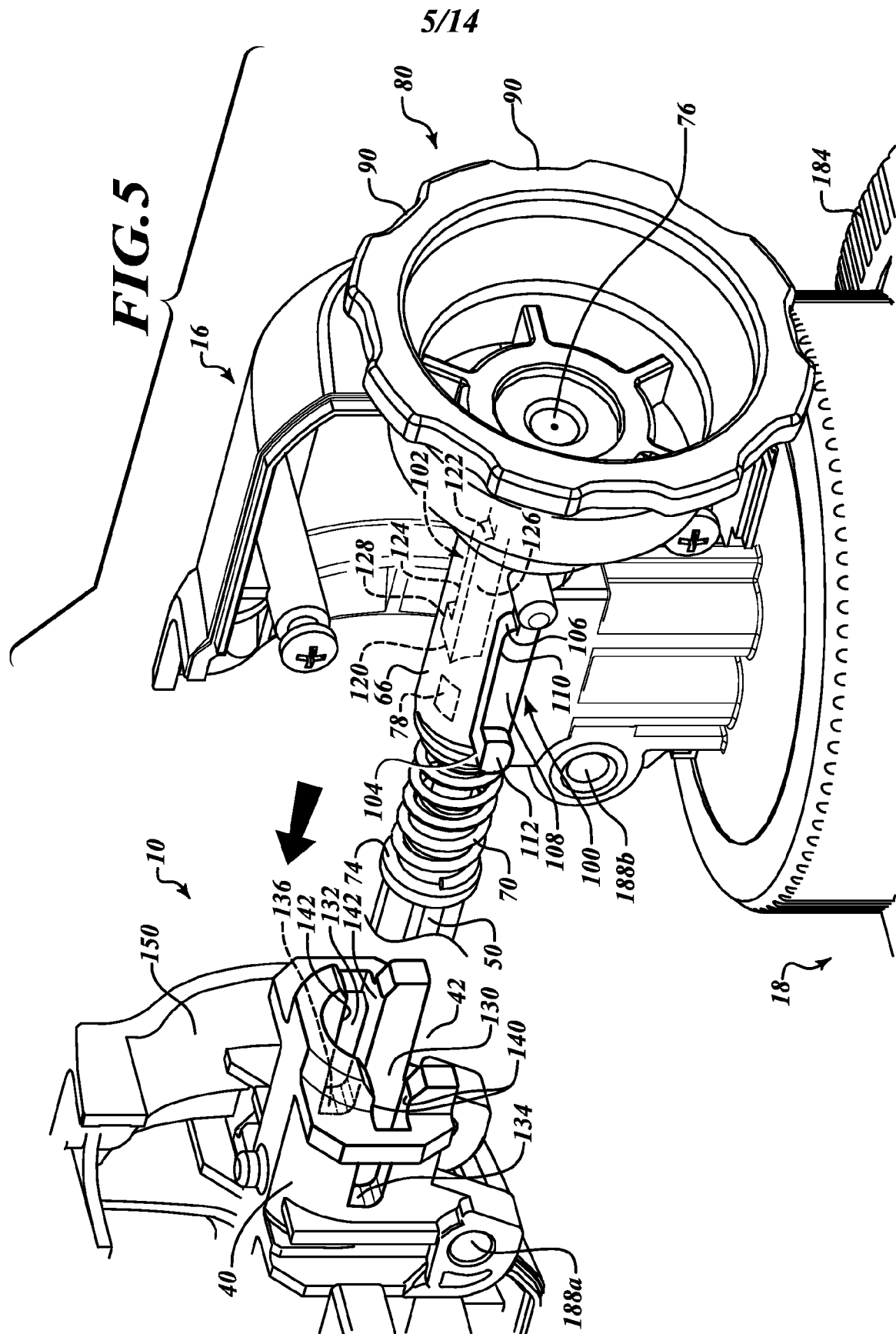


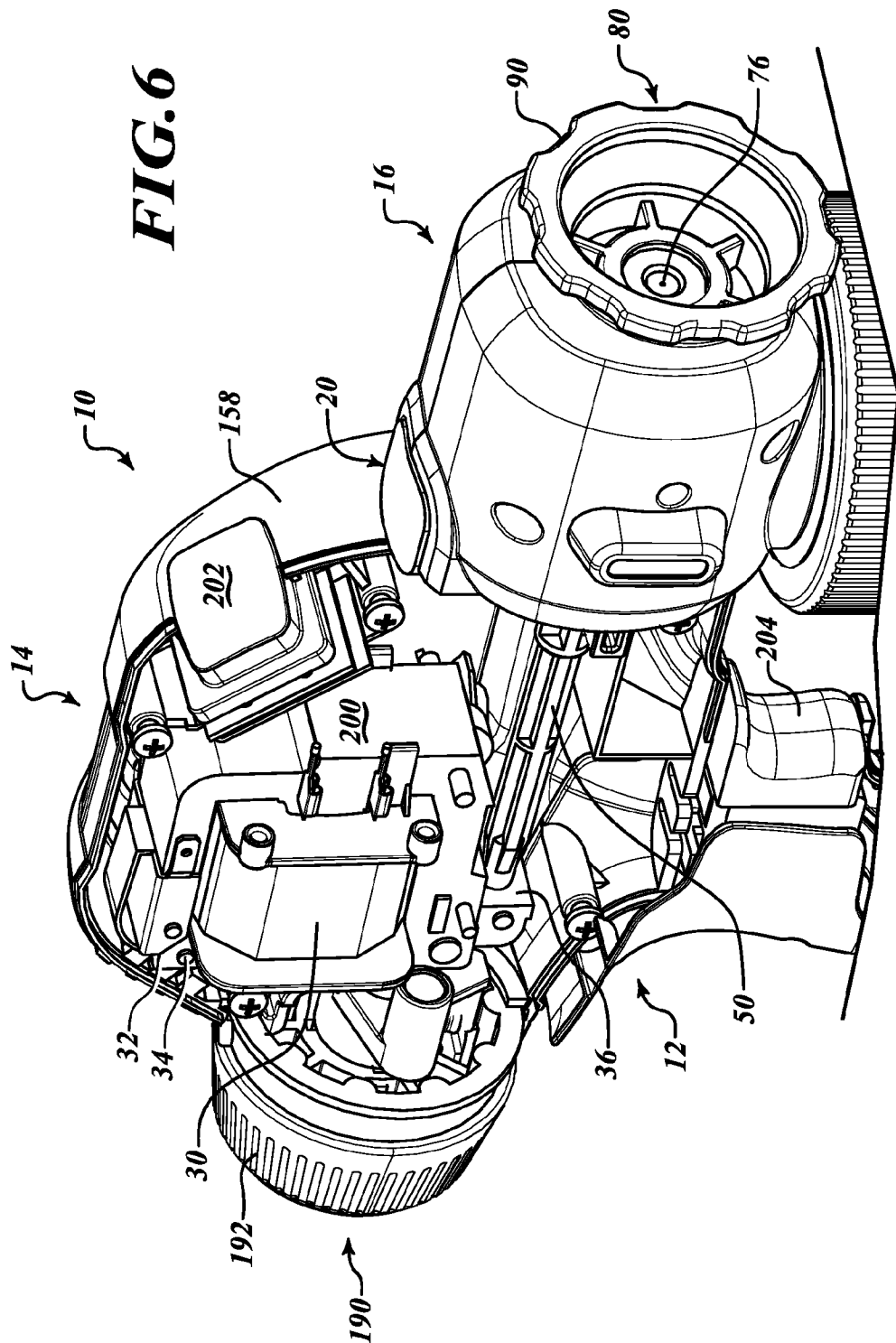
FIG. 3

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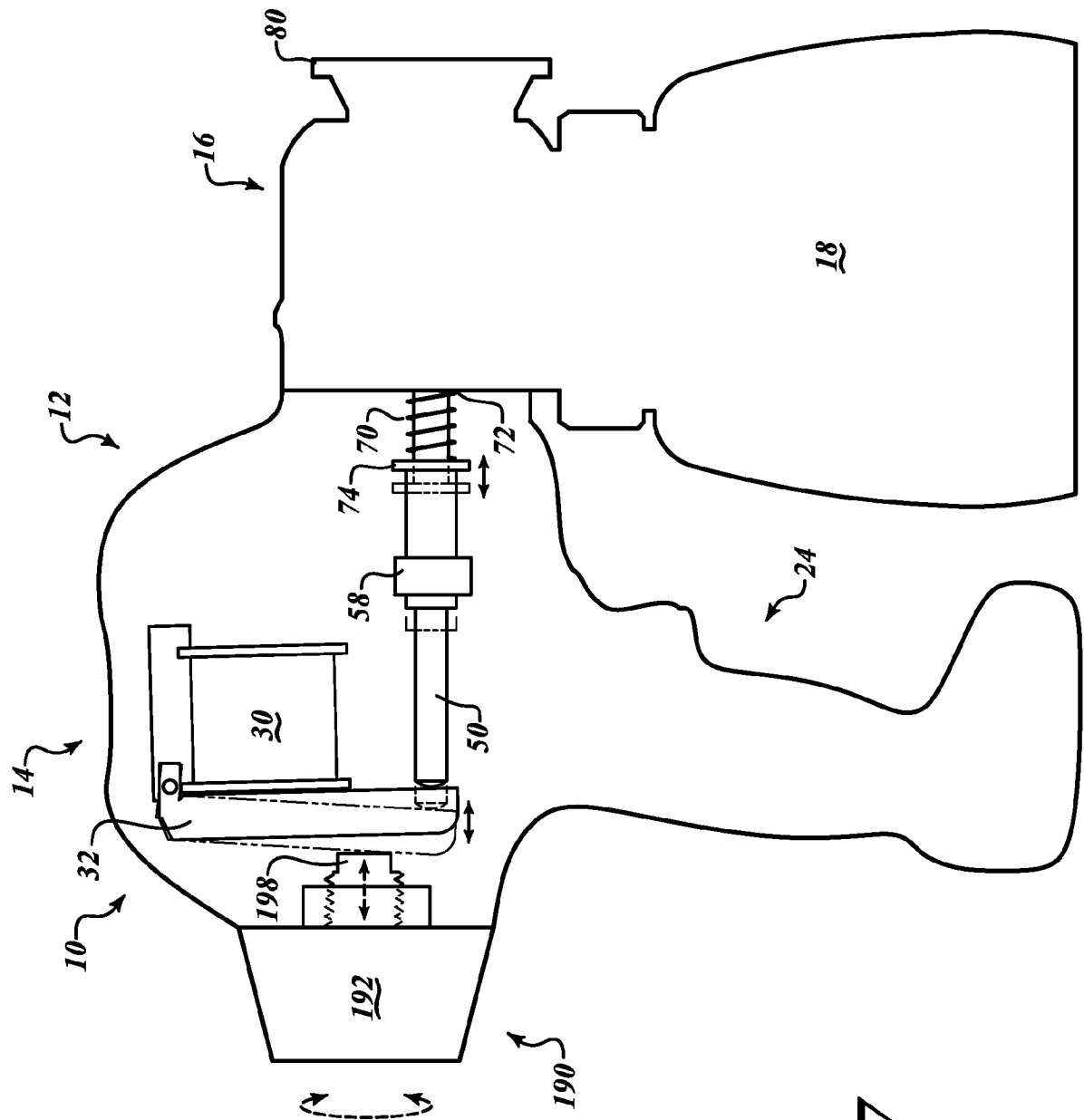


FIG. 7

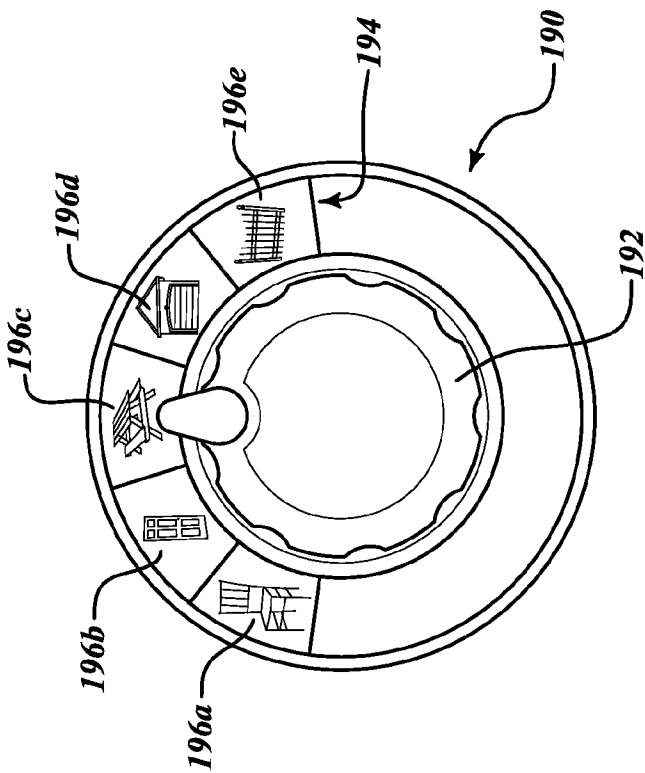
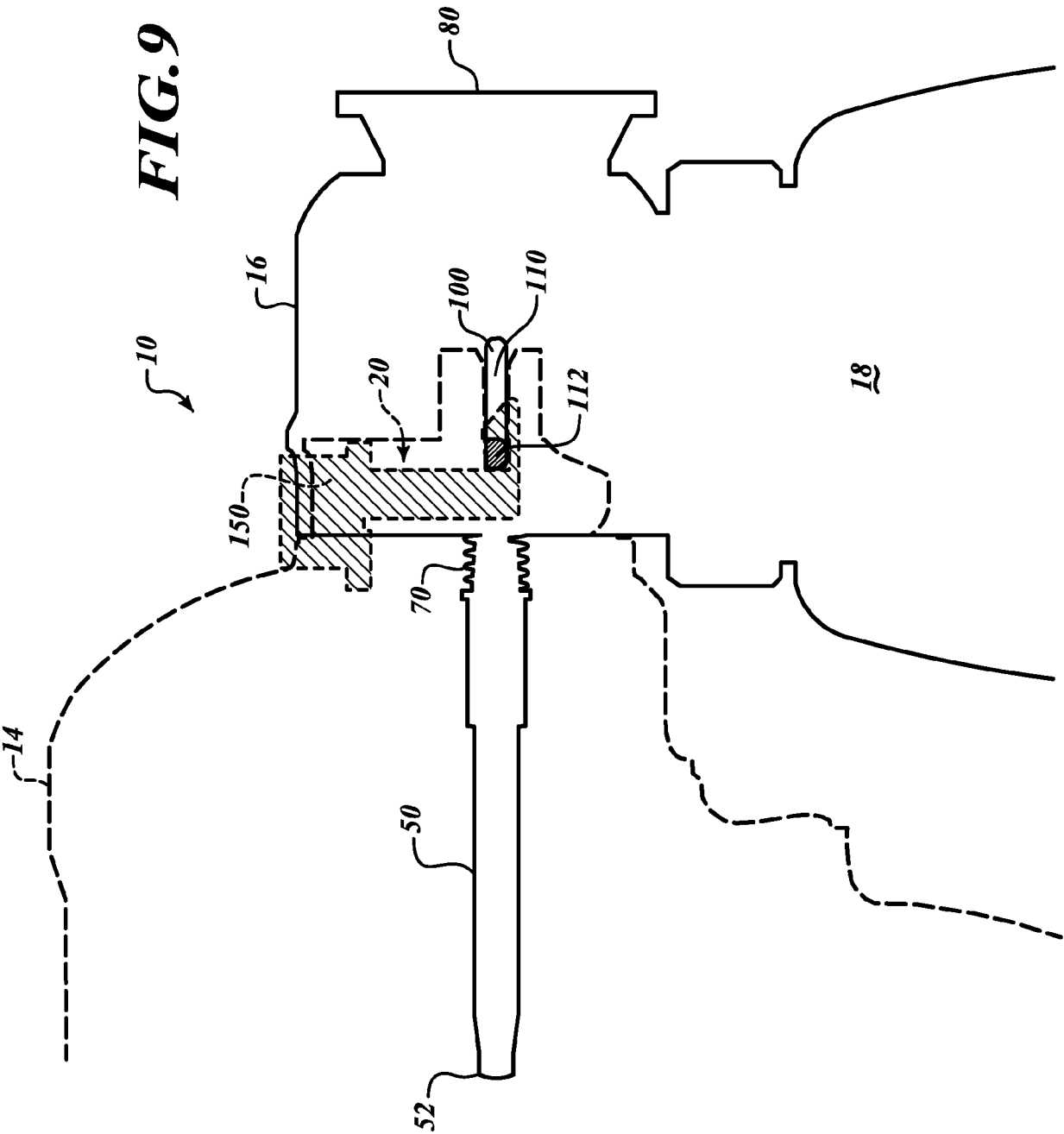
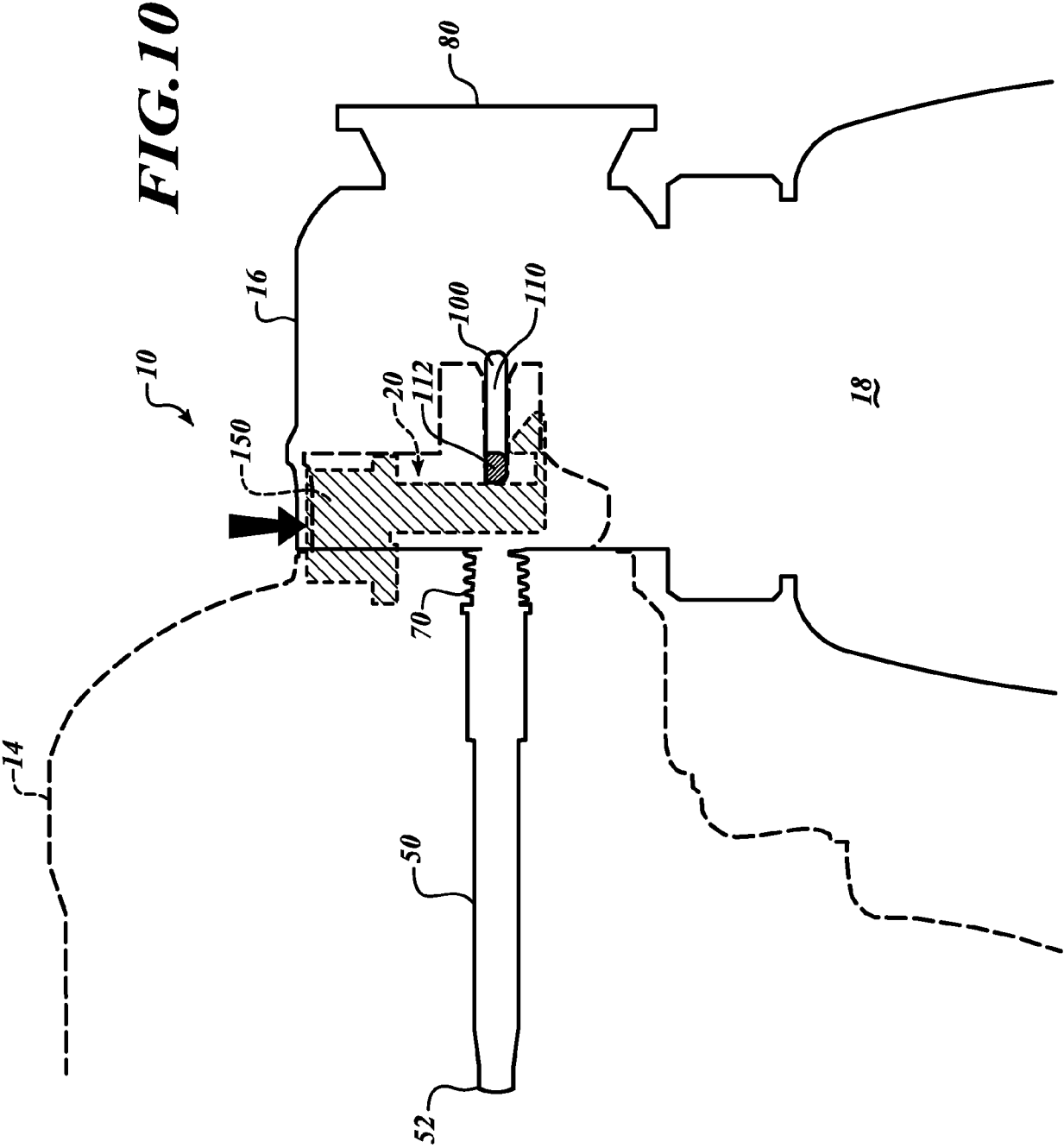
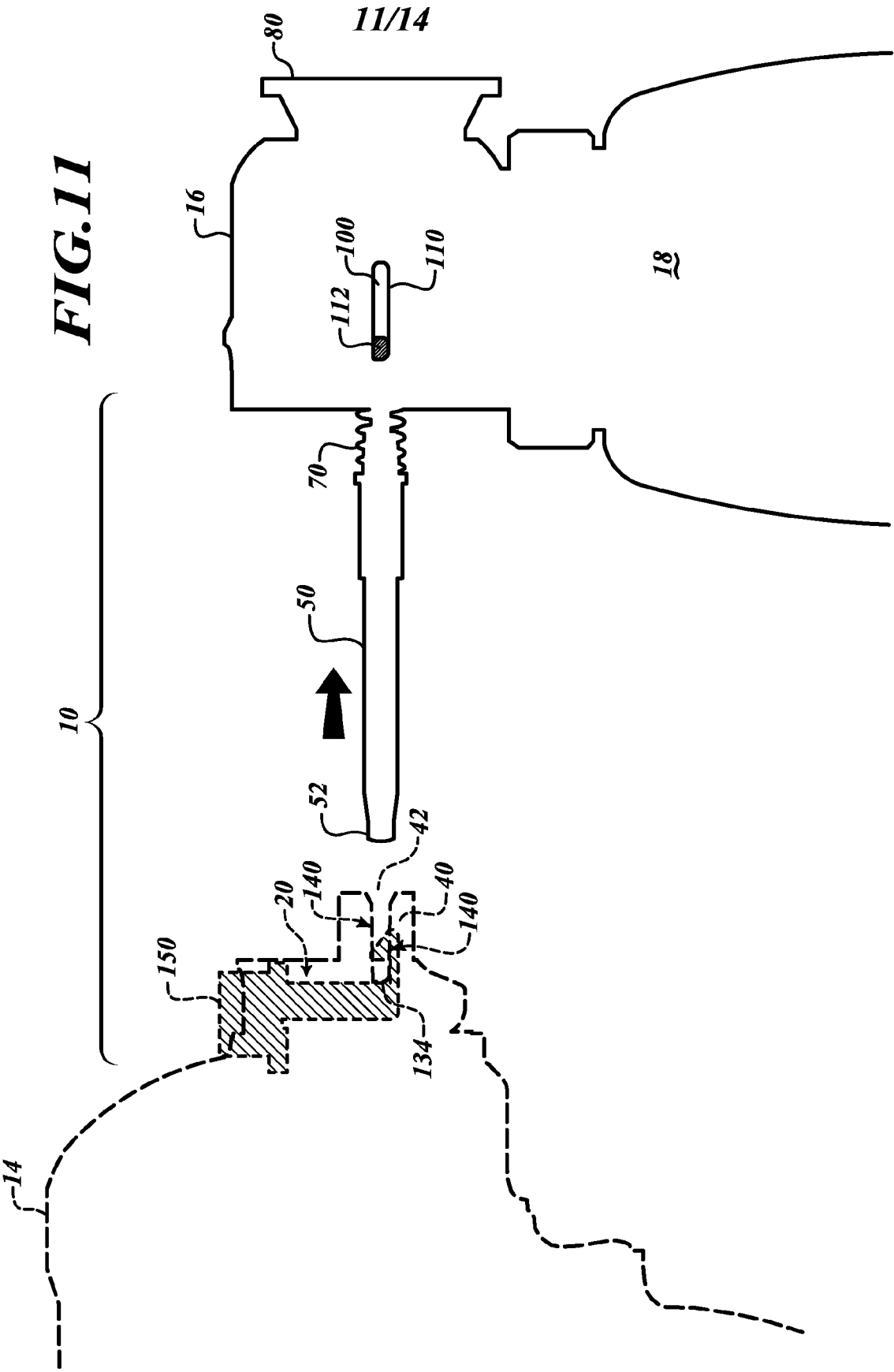


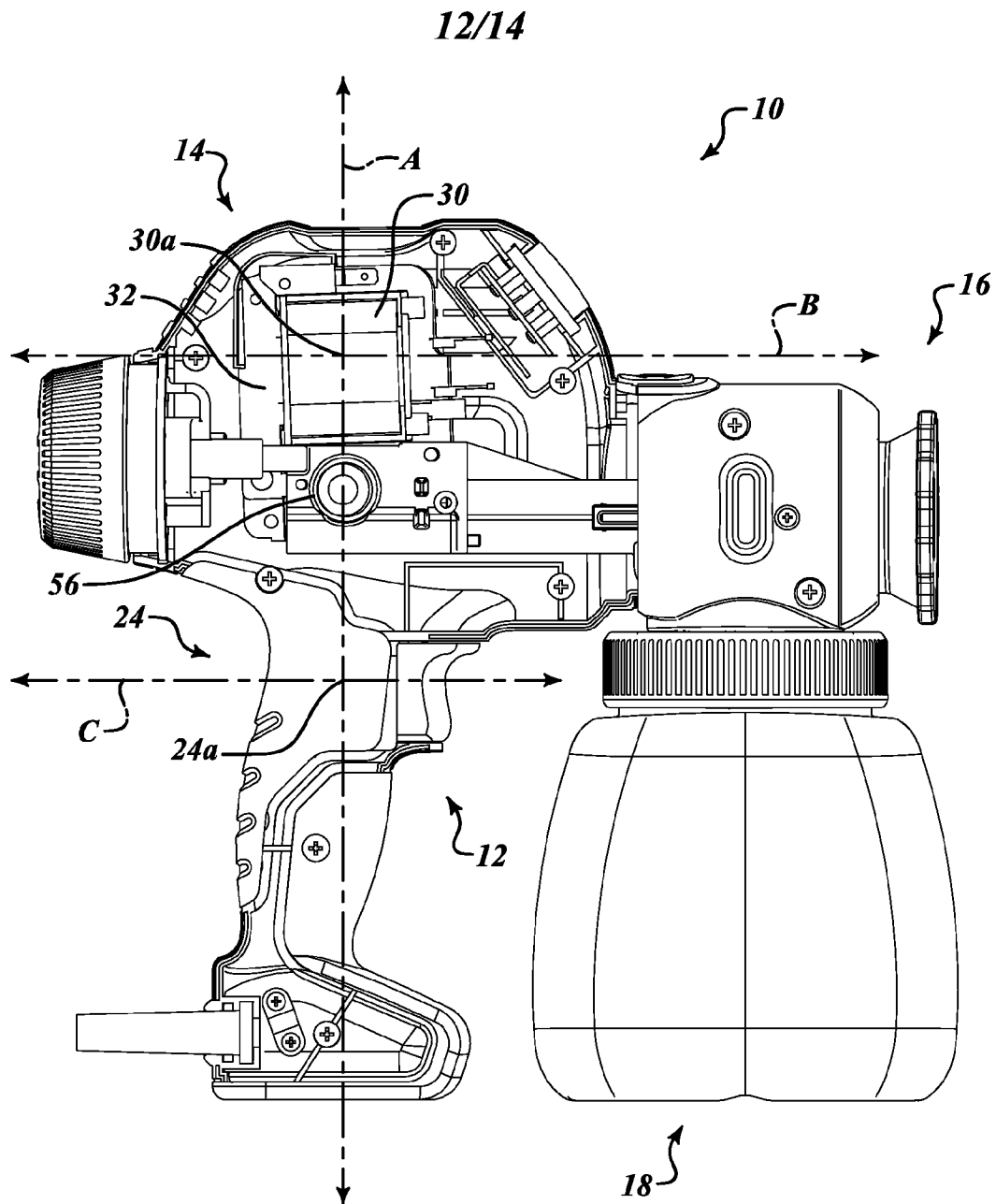
FIG. 8

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**FIG. 12**

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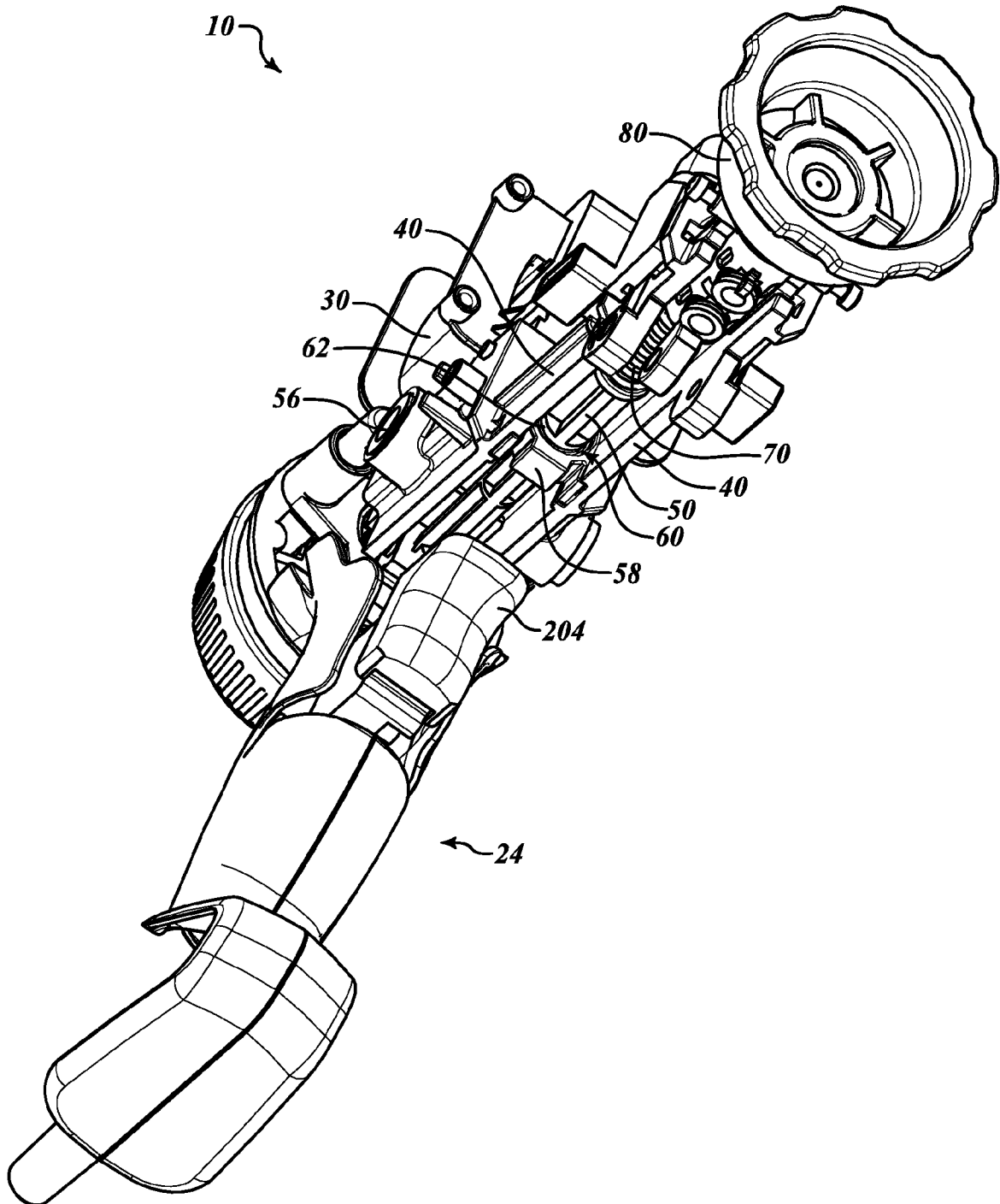


FIG.13

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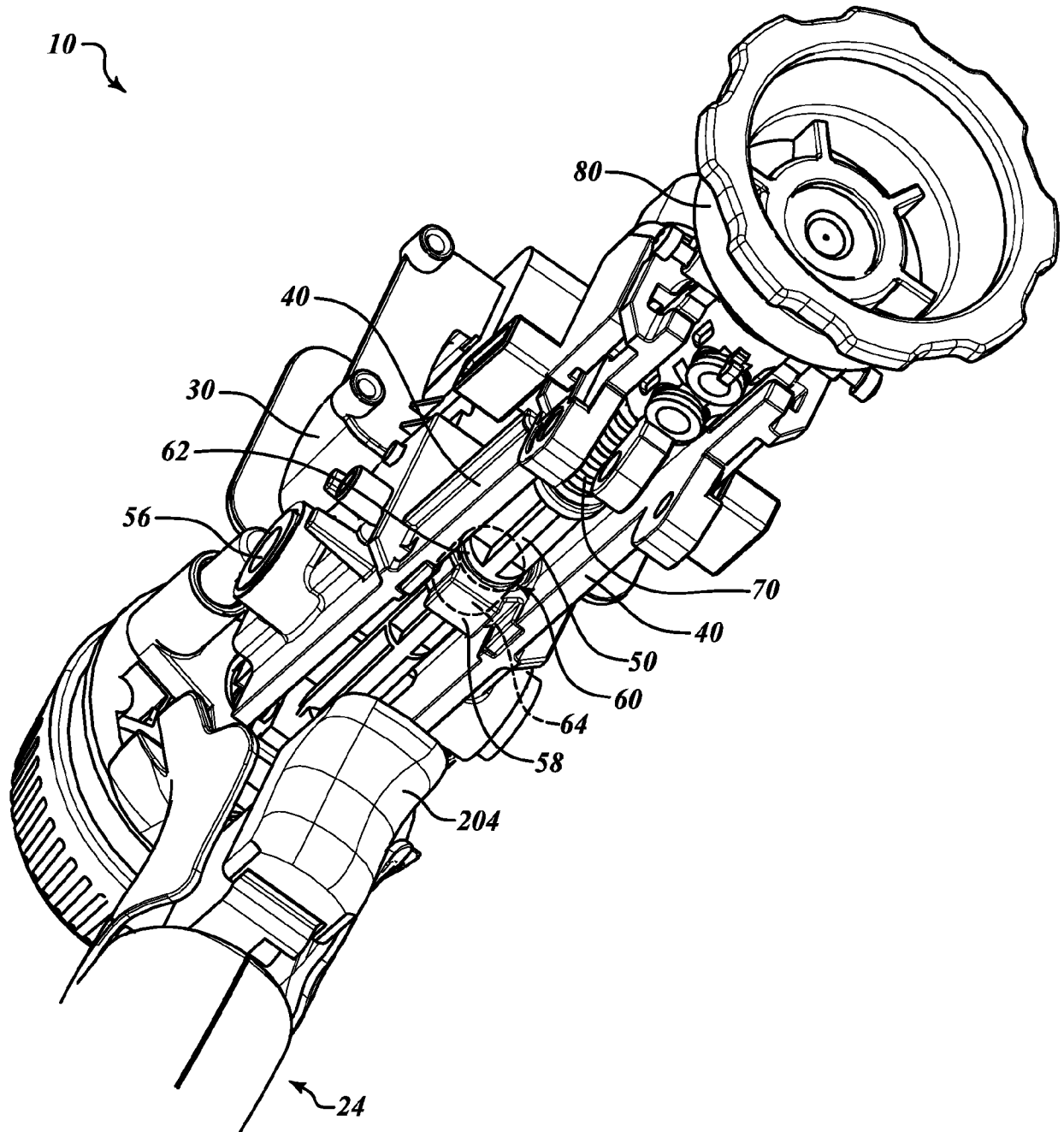


FIG.14

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/057041

A. CLASSIFICATION OF SUBJECT MATTER

INV. B05B9/08

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2008 009203 U1 (TSUNG MAO IND CO LTD [TW]) 4 September 2008 (2008-09-04)	1-4, 6-11, 13-15
A	paragraph [0015] - paragraph [0019] figures	5,12
X	US 2002/166905 A1 (HUANG JUNG-KUN [TW]) 14 November 2002 (2002-11-14)	1-3, 6-11, 13-15
A	paragraph [0020] - paragraph [0003] figures	5,12
X	US 6 805 306 B1 (HUANG JUNG-KUN [TW]) 19 October 2004 (2004-10-19)	1-4, 6-10,13, 15
A	paragraphs [0015], [0016], [0018], [0019] figures	5,11,12
	----- -/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

9 March 2011

Date of mailing of the international search report

17/03/2011

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Roldán Abalos, Jaime

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/057041

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 056 717 A (KOIDE TAKANORI [JP]) 15 October 1991 (1991-10-15) column 5, line 66 - column 6, line 36 figures -----	1-3, 6-10,13, 15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/057041

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 2002166905 A1	14-11-2002	NONE	
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US 5056717 A	15-10-1991	NONE	