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(54) Auto-filling assembly for a refillable sprayer

(57) An auto-filling assembly for a refillable sprayer has a base device (10), a controlling device (20) and a filling device (30). The base device (10) has a base (11), an oil tank (12) and a connecting jacket (13). The connecting jacket (13) is mounted on the base (11) and has a connecting disk (131), a switch (14) and an engaging mount (15). The controlling device (20) is connected to the base device (10) and has an inlet valve (21), a first linking valve (22), a gas-controlling valve (23), a second linking valve (24) and a triple valve (25). The filling device (30) is mounted on the base device (10), is connected to the controlling device (20) and has a storage bottle (31), a release valve (32) and a mechanical valve (33).

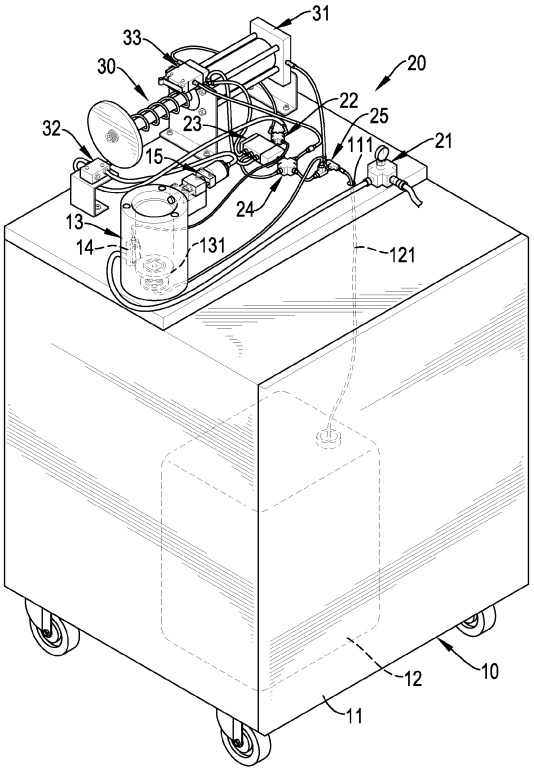

FIG.1

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Description

1. Field of the Invention

[0001] The present invention relates to an auto-filling assembly, and more particularly to an auto-filling assembly for a refillable sprayer; the auto-filling assembly can be operated to fill oil and gas in a refillable sprayer conveniently and automatically.

2. Description of Related Art

[0002] A conventional sprayer has pressurized gas and oil at a suitable ratio, such that the oil can be uniformly sprayed out of the conventional sprayer by the pressurized gas. However, the conventional sprayer is not refillable and therefore is not environmentally friendly, and once the pressurized gas is completely discharged, oil remaining in the sprayer is useless and wasted.

[0003] According to the above-mentioned problem of the conventional sprayer, a refillable sprayer is developed. When the pressurized gas of the refillable sprayer is completely discharged, a quantitative stuffer and a gas-filled tube can be used to fill the pressurized gas and oil into the refillable sprayer manually to maintain the pressurized gas and oil that are filled into the refillable sprayer at a specific ratio. However, the user needs the quantitative stuffer and the gas-filled tube to fill the pressurized gas and oil into the refillable sprayer, and the quantitative stuffer cannot be used again and this will increase the cost of using the refillable sprayer. In addition, the user needs to fill the pressurized gas and oil into the refillable sprayer manually and this is inconvenient in use.

[0004] To overcome these shortcomings, the present invention provides an auto-filling assembly for a refillable sprayer to mitigate or obviate the aforementioned problems.

[0005] The primary objective of the present invention is to provide an auto-filling assembly for a refillable sprayer; the auto-filling assembly can be operated to fill oil and gas in a refillable sprayer conveniently and automatically.

[0006] The auto-filling assembly for a refillable sprayer in accordance with the present invention has a base device, a controlling device and a filling device. The base device has a base, an oil tank and a connecting jacket. The connecting jacket is mounted on the base and has a connecting disk, a switch and an engaging mount. The controlling device is connected to the base device and has an inlet valve, a first linking valve, a gas-controlling valve, a second linking valve and a triple valve. The filling device is mounted on the base device 10, is connected to the controlling device and has a storage bottle, a release valve and a mechanical valve. The auto-filling assembly can be used to fill pressurized gas and oil into a refillable sprayer conveniently and automatically.

[0007] Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

IN THE DRAWINGS:

[0008]

Fig. 1 is a perspective view of an auto-filling assembly for a refillable sprayer in accordance with the present invention;
Fig. 2 is an enlarged perspective view of the auto-filling assembly for a refillable sprayer in Fig. 1;
Fig. 3 is an enlarged perspective view of an engaging mount of a base device of the auto-filling assembly for a refillable sprayer in Fig. 1;
Fig. 4 is an operational perspective view of the auto-filling assembly for a refillable sprayer in Fig. 1 filling oil into a refillable sprayer;
Fig. 5 is an enlarged and operational side view in partial section of the auto-filling assembly for a refillable sprayer in Fig. 4 engaging with a refillable sprayer;
Fig. 6 is an operational perspective view of the auto-filling assembly for a refillable sprayer in Fig. 1 filling pressurized gas into a refillable sprayer; and
Fig. 7 is an enlarged and operational side view in partial section of the auto-filling assembly for a refillable sprayer in Fig. 4 disengaging from a refillable sprayer.

[0009] With reference to Figs. 1 to 3, an auto-filling assembly for a refillable sprayer in accordance with the present invention comprises a base device 10, a controlling device 20 and a filling device 30.

[0010] The base device 10 has a base 11, an oil tank 12 and a connecting jacket 13. The base 11 may be rectangular and has a top face and a through hole 111. The through hole 111 is formed through the top face of the base 11. The oil tank 12 is mounted in the base 11 to store oil and has a transfer pipe 121 extending out of the top face of the base 11 via the through hole 111.

[0011] The connecting jacket 13 is hollow, is securely mounted on the top face of the base 11 and has a bottom end, a top end, an external surface, a connecting disk 131, a switch 14 and an engaging mount 15. The connecting disk 131 is movably mounted in the connecting jacket 13 at the bottom end of the connecting jacket 13 and has a spring mounted in a bottom of the connecting disk 131 to enable the connecting disk 131 to move upwardly relative to the connecting jacket 13. The switch 14 is mounted on the external surface of the connecting jacket 13 near the bottom end of the connecting jacket 13 and has a touching leg extending into the connecting jacket 13.

[0012] The engaging mount 15 is securely mounted on the external surface of the connecting jacket 13 near the top end of the connecting jacket 13 and has an inner side, an outer side, a pressure cylinder 152 and an engaging

rod 151. The inner side of the engaging mount 15 abuts the external surface of the connecting jacket 13. The pressure cylinder 152 is securely mounted on the outer side of the engaging mount 15. The engaging rod 151 is connected to the pressure cylinder 152 to be movably mounted in the engaging mount 15 and extends into the connecting jacket 13 via the inner side of the engaging mount 15 and the external surface of the connecting jacket 13.

[0013] The controlling device 20 is connected to the base device 10 and has an inlet valve 21, a first linking valve 22, a gas-controlling valve 23, a second linking valve 24 and a triple valve 25.

[0014] The inlet valve 21 is mounted on the top face of the base 11, is connected to an air compressor and has an air pipe 211 connected to the switch 14. The first linking valve 22 is mounted on the top face of the base 11, is connected to the switch 14 and has a first inlet-connecting pipe 221 and a first outlet-connecting pipe 222. The first inlet-connecting pipe 221 is connected to the switch 14 and communicates with the air pipe 211 of the inlet valve 21 via the switch 14.

[0015] The gas-controlling valve 23 is mounted on the top face of the base 11, is connected to the first linking valve 22 and has an inlet controlling pipe 231 and an outlet controlling pipe 232. The second linking valve 24 is mounted on the top face of the base 11, is connected to the outlet controlling pipe 232 of the gas-controlling valve 23 and has a second inlet-connecting pipe 241 and a second outlet-connecting pipe 242. The triple valve 25 is mounted on the top face of the base 11, is connected to the second outlet-connecting pipe 242 of the second linking valve 24 and the transfer pipe 121 of the oil tank 12, and has an oil entrance pipe 251 and an oil-gas filling pipe 252. The oil-gas filling pipe 252 is connected to a center of the connecting disk 131 via the bottom end of the connecting jacket 13. Preferably, the controlling device 20 has multiple reverse valves 26 respectively mounted on the second inlet-connecting pipe 241, the second outlet-connecting pipe 242 and the transfer pipe 121.

[0016] The filling device 30 is mounted on the base device 10, is connected to the controlling device 20 and has a storage bottle 31, a release valve 32 and a mechanical valve 33.

[0017] The storage bottle 31 is transversally mounted on the top face of the base 11 by a mounting frame 34, is connected to the oil entrance pipe 251 and the inlet controlling pipe 231 of the controlling device 20, and is used to store oil for filling into a refillable sprayer. The storage bottle 31 has a distal end, a proximal end, an extruding shaft 311, a touching panel 312 and a returning spring 313. The extruding shaft 311 is movably connected to the distal end of the storage bottle 31 and has a free end opposite to the storage bottle 31. The touching panel 312 is connected to the free end of the extruding shaft 311 and has an inner side and an outer side. The returning spring 313 is mounted around the extruding shaft 311 and abuts the inner side of the touching panel 312 and the distal end of the storage bottle 31.

[0018] The release valve 32 is securely mounted on the top face of the base 11, is connected to the first outlet-connecting pipe 222 of the first linking valve 22 and selectively abuts the outer side of the touching panel 312 of the storage bottle 31. The release valve 32 has a release pipe 321 connected to the pressure cylinder 152 of the engaging mount 15 to enable the engaging rod 151 to move relative to the connecting jacket 13.

[0019] The mechanical valve 33 is mounted on the mounting frame 34 above the storage bottle 31, is connected to the second inlet-connecting pipe 241 of the second linking valve 24 and selectively abuts the inner side of the touching panel 312. The mechanical valve 33 has a linking pipe 331 communicating with the first linking valve 22.

[0020] With reference to Figs. 2 to 4, the auto-filling assembly for a refillable sprayer in accordance with the present invention is used to fill oil and gas into a refillable sprayer 40 with an engaging ring 41. First, the inlet valve 21 is connected to an air compressor to provide pressurized gas and oil stored in the storage bottle 31. A refillable sprayer 40 is mounted in the connecting jacket 13 to abut against the connecting disk 131 to compress the spring of the connecting disk 131 and to enable the engaging ring 41 of the refillable sprayer 40 to be mounted into the connecting jacket 13 near the top end of the connecting jacket 13. With reference to Fig. 5, when the engaging ring 41 of the refillable sprayer 40 is moved into the connecting jacket 13, the engaging rod 151 of the engaging mount 15 will engage the engaging ring 41 of the refillable sprayer 40 to hold the refillable sprayer 40 securely in the connecting jacket 13. In addition, when the refillable sprayer 40 is held securely in the connecting jacket 13, a bottom of the refillable sprayer 40 communicates with the oil-gas filling pipe 252 of the triple valve 25.

[0021] When the refillable sprayer 40 is mounted and held in the connecting jacket 13, the refillable sprayer 40 will abut the touching leg of the switch 14 to actuate the switch 14. Then, the pressurized gas that is provided by the air compressor flows into the gas-controlling valve 23 via the air pipe 211 of the inlet valve 21, the first inlet-connecting pipe 221 and the first linking valve 22. The pressurized gas flows into the storage bottle 31 via the inlet controlling pipe 231 of the gas-controlling valve 23 to enable the extruding shaft 311 to move toward the storage bottle 31. Then, the oil that is stored in the storage bottle 31 is extruded out of the storage bottle 31 and is filled into the refillable sprayer 40 via the oil entrance pipe 251, the triple valve 25 and the oil-gas filling pipe 252.

[0022] When the oil is filled into the refillable sprayer 40, the extruding shaft 311 is moved toward the storage bottle 31 to enable the touching panel 312 to move close to the mechanical valve 33. When the inner side of the touching panel 312 abuts and actuates the mechanical valve 33, the pressurized gas in the first linking valve 22

will flow into the gas-controlling valve 23 via the linking pipe 331, the second inlet-connecting pipe 241 and the second linking valve 24. As the pressurized gas flows into the mechanical valve 33, the pressurized gas will flow and be filled into the refillable sprayer 40 via the outlet controlling pipe 232, the second linking valve 24, the triple valve 25 and the oil-gas filling pipe 252.

[0023] Furthermore, when the pressurized gas is filled into the refillable sprayer 40, the pressurized gas that originally flows in the inlet controlling pipe 231 will flow into the second linking valve 24 via the outlet controlling valve 232. Then, the extruding shaft 311 cannot be driven by the pressurized gas to move relative to the storage bottle 31, and the touching panel 312 can be pushed back to the original position by the returning spring 313 as shown in Fig. 6. When the touching panel 312 moves back to the original position with the extruding shaft 311, the oil that is stored in the oil tank 12 will flow and be filled into the storage bottle 31 via the transfer pipe 121, the triple valve 25and the oil entrance pipe 251 by an extruding force that is provided by the returning spring 313. Then, the storage bottle can be used to fill oil into another refillable sprayer 40.

[0024] Additionally, when the pressurized gas is filled into the exhausted refillable sprayer 40, the extruding shaft 311 and the touching panel 312 move back to the original position by an elastic force of the returning spring 313 to enable the outer side to abut and actuate the release valve 32. Then, the pressurized gas will flow into the pressure cylinder 152 via the first outlet-connecting pipe 222 of the first linking valve 22, the release valve 32 and the release pipe 321 to drive the engaging rod 151 to move and to disengage from the engaging ring 41 of the refillable sprayer 40 as shown in Fig. 7. At this time, the spring that is compressed below the connecting disk 131 will provide an elastic force to the refillable sprayer 40 to enable the refillable sprayer 40 to move upwardly relative to the connecting jacket 13 as shown in Fig. 6. Finally, the refillable sprayer 40 has been filled up with the pressurized gas and oil by the auto-filling assembly for a refillable sprayer in accordance with the present invention automatically.

[0025] According to the above-mentioned features and operations, the user only needs to mount a refillable sprayer 40 into the connecting jacket 13, then the auto-filling assembly for a refillable sprayer in accordance with the present invention can be used to fill the pressurized gas and oil into the refillable sprayer 40 conveniently and automatically. In the operation of filling pressurized gas and oil, the oil that is stored in the storage bottle 31 can flow and be filled in the refillable sprayer 40 by the pressurized gas driving the extruding shaft 311 to move relative to the storage bottle 31. After filling the oil in the refillable sprayer 40, the mechanical valve 33 can be switched to control the flowing direction of the pressurized gas to enable the pressurized gas to flow and be filled in the refillable sprayer 40 and to enable the extruding shaft 311 and the touching panel 312 to move back to the original position by the returning spring 313. Then, the oil that is stored in the oil tank 12 can be drawn to fill in the storage bottle 31 and the storage bottle 31 can be used to fill oil into another refillable sprayer 40. After filling oil into the refillable sprayer 40, the spring of the connecting disk 131 can provide an elastic force to the refillable sprayer 40 to enable the refillable sprayer 40 to move upwardly relative to the connecting jacket 13. Consequently, the pressurized gas and oil can be filled into the refillable sprayer 40 by the auto-filling assembly for a refillable sprayer in accordance with the present invention conveniently and automatically.

[0026] Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

Claims

1. An auto-filling assembly for a refillable sprayer, **characterized in that** the auto-filling assembly comprises:

    a base device (10) having:

        a base (11) having a top face;
        an oil tank (12) mounted in the base (11); and
        a connecting jacket (13) securely mounted on the top face of the base (11) and having:

            a bottom end;
            a top end;
            an external surface;
            a connecting disk (131) movably mounted in the connecting jacket (13) at the bottom end of the connecting jacket (13);
            a switch (14) mounted on the external surface of the connecting jacket (13) near the bottom end of the connecting jacket (13) and having a touching leg extending into the connecting jacket (14); and
            an engaging mount (15) securely mounted on the external surface of the connecting jacket (13) near the top end of the connecting jacket (13);

    a controlling device (20) connected to the base device (10) and having:

an inlet valve (21) mounted on the top face of the base (10) and having an air pipe (211) connected to the switch (14);
a first linking valve (22) mounted on the top face of the base (11), connected to the switch (14) and having:

a first inlet-connecting pipe (221) connected to the switch (14) and communicating with the air pipe (211) of the inlet valve (21) via the switch (14); and
a first outlet-connecting pipe (222);

a gas-controlling valve (23) mounted on the top face of the base (11), connected to the first linking valve (22) and having:

an inlet controlling pipe (231); and
an outlet controlling pipe (232);

a second linking valve (24) mounted on the top face of the base (11), connected to the outlet controlling pipe (232) of the gas-controlling valve (23) and having:

a second inlet-connecting pipe (241); and
a second outlet-connecting pipe (242); and

a triple valve mounted on the top face of the base, connected to the second outlet-connecting pipe of the second linking valve and having:

an oil entrance pipe; and
an oil-gas filling pipe connected to a center of the connecting disk via the bottom end of the connecting jacket; and

a filling device (30) mounted on the base device (10), connected to the controlling device (20) and having:

a storage bottle (31) transversally mounted on the top face of the base (11), connected to the oil entrance pipe (251) and the inlet controlling pipe (231) of the controlling device (20) and having:

a distal end;
a proximal end;
an extruding shaft (311) movably connected to the distal end of the storage bottle (31) and having a free end opposite to the storage bottle (31);
a touching panel (312) connected to the free end of the extruding shaft (311) and having an inner side and an outer side; and
a returning spring (313) mounted around the extruding shaft (311) and abutting the inner side of the touching panel (312) and the distal end of the storage bottle (31);

a release valve (32) securely mounted on the top face of the base (11), connected to the first outlet-connecting pipe (222) of the first linking valve (22) and selectively abutting the outer side of the touching panel (312) of the storage bottle (31); and
a mechanical valve (33) mounted on the storage bottle (31), connected to the second inlet-connecting pipe (241) of the second linking valve (24) and selectively abutting the inner side of the touching panel (312) and having a linking pipe (331) communicating with the first linking valve (22).

2. The auto-filling assembly for a refillable sprayer as claimed in claim 1, wherein
the base (11) has a through hole (111) formed through the top face of the base (11);
the oil tank (12) has a transfer pipe (121) extending out of the top face of the base (11) via the through hole (111);
the triple valve (25) is connected to the transfer pipe (121) of the oil tank (12).

3. The auto-filling assembly for a refillable sprayer as claimed in claim 1 or 2, wherein
the engaging mount (15) has

an inner side abutting the external surface of the connecting jacket (13);
an outer side;
a pressure cylinder (152) securely mounted on the outer side of the engaging mount (15); and
an engaging rod (151) connected to the pressure cylinder (152) to be movably mounted in the engaging mount (15) and extending into the connecting jacket (13) via the inner side of the engaging mount (15) and the external surface of the connecting jacket (13); and

the release valve (32) has a release pipe (321) connected to the pressure cylinder (152) of the engaging mount (15) to enable the engaging rod (151) to move relative to the connecting jacket (13).

4. The auto-filling assembly for a refillable sprayer as claimed in claim 2 or 3, wherein the controlling device (20) has multiple reverse valves (26) respectively mounted on the second inlet-connecting pipe (241),

the second outlet-connecting pipe (242) and the transfer pipe (121).

5. The auto-filling assembly for a refillable sprayer as claimed in claim 1 or 4, wherein
the storage bottle (31) is transversally mounted on the top face of the base (11) by a mounting frame (34); and
the mechanical valve (33) is mounted on the mounting frame (34) above the storage bottle (31).

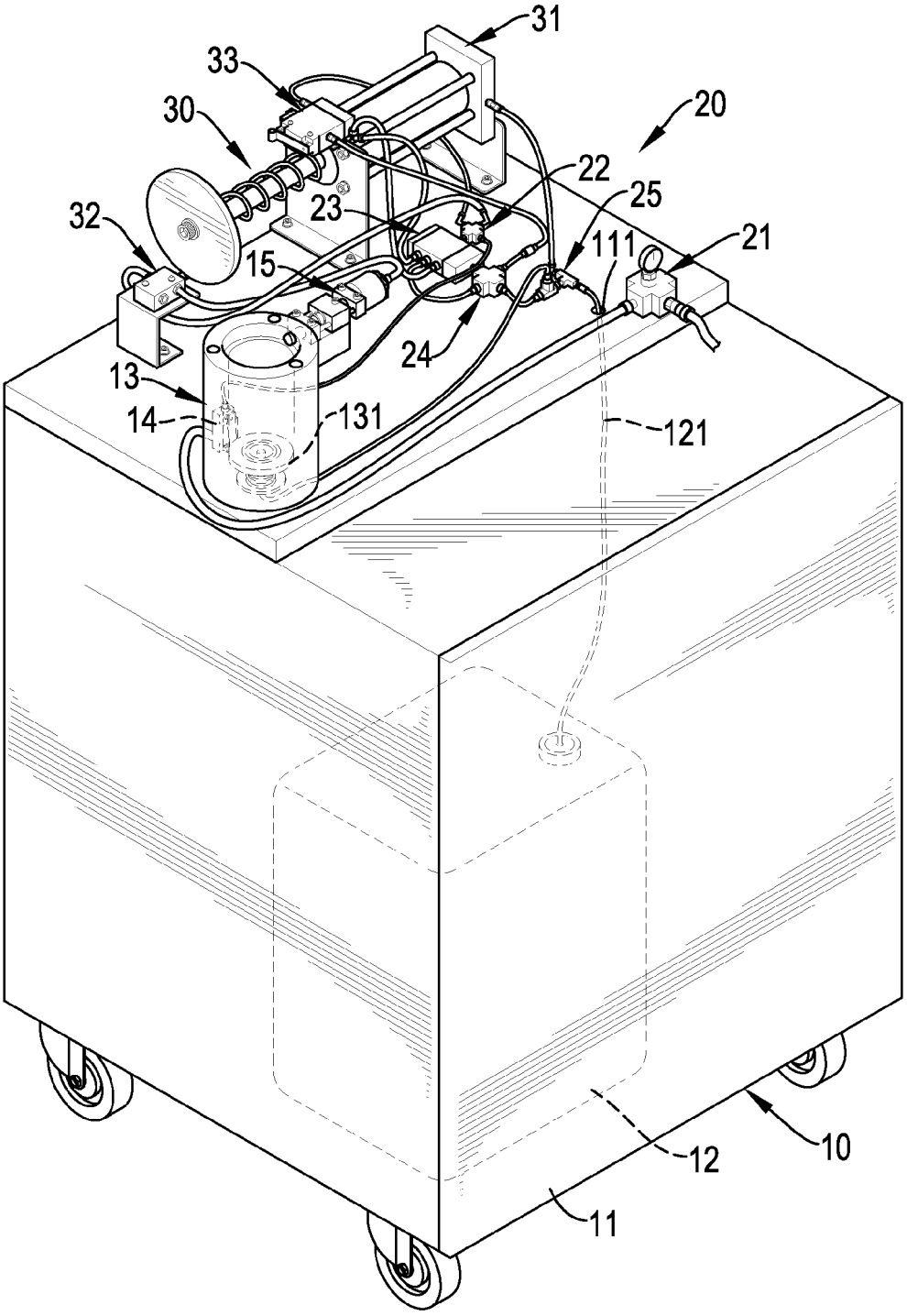

FIG.1

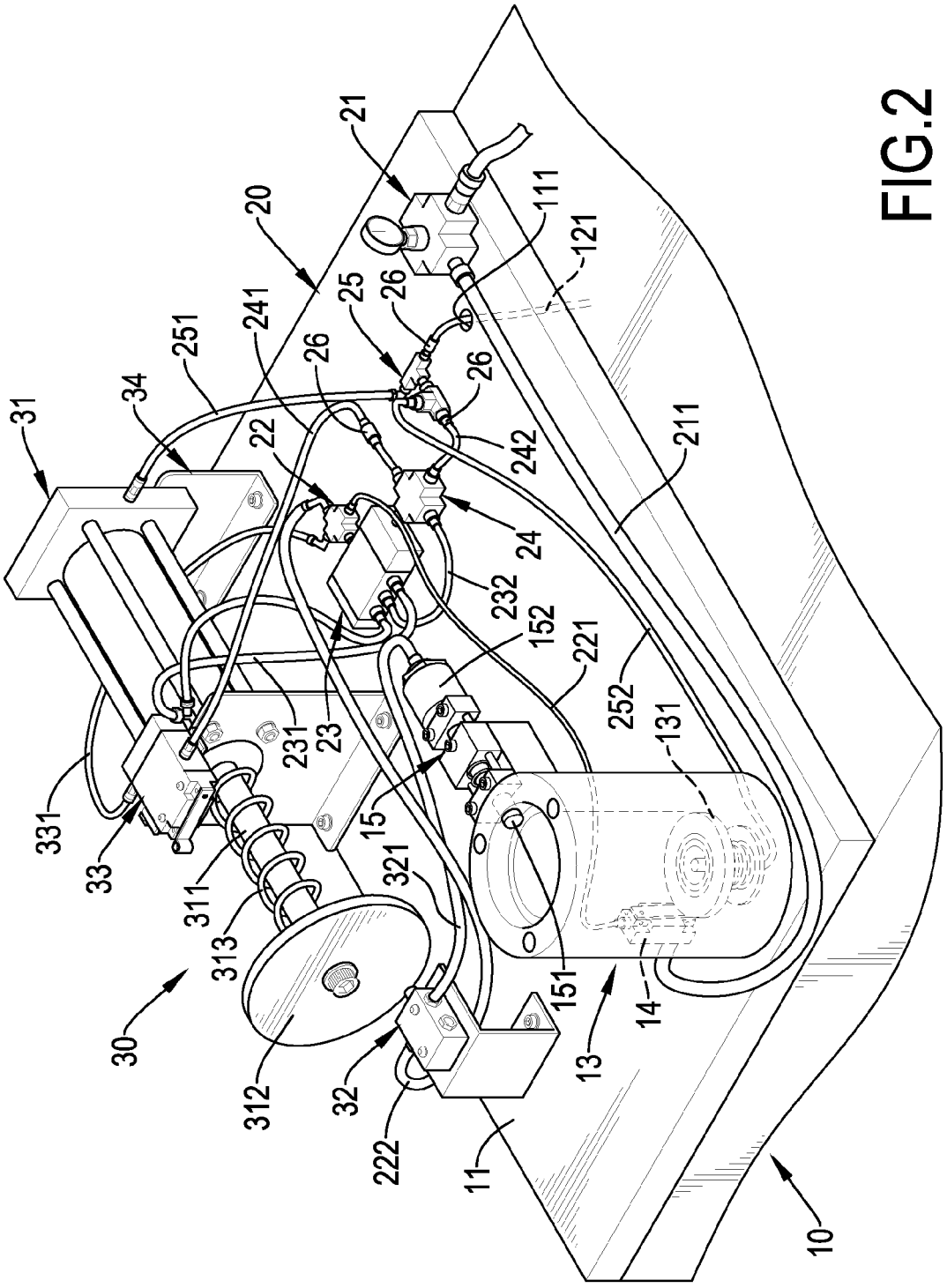
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FIG.2

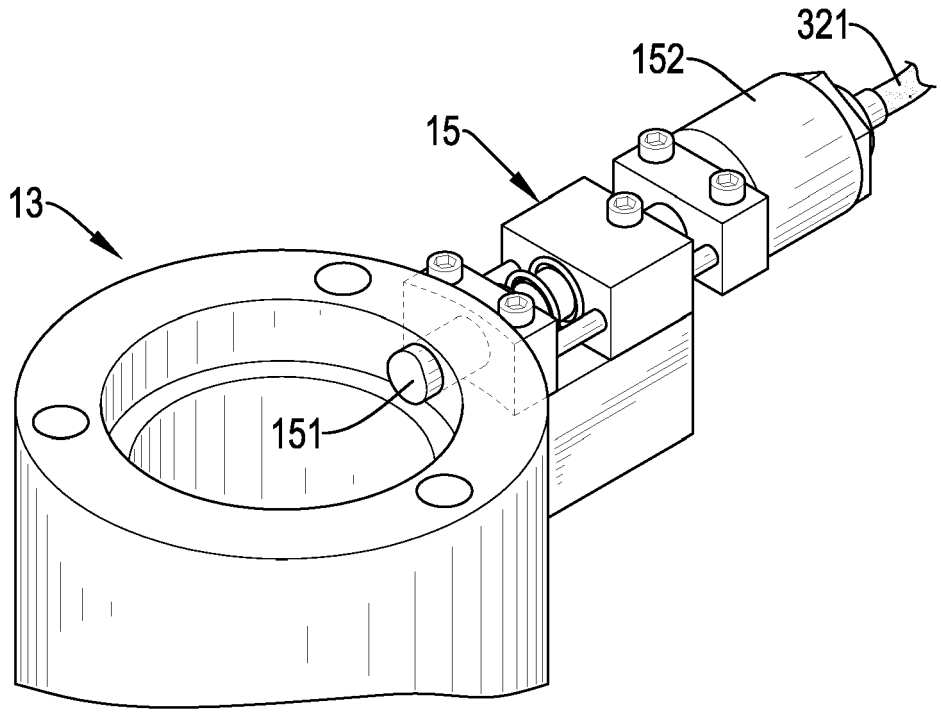

FIG.3

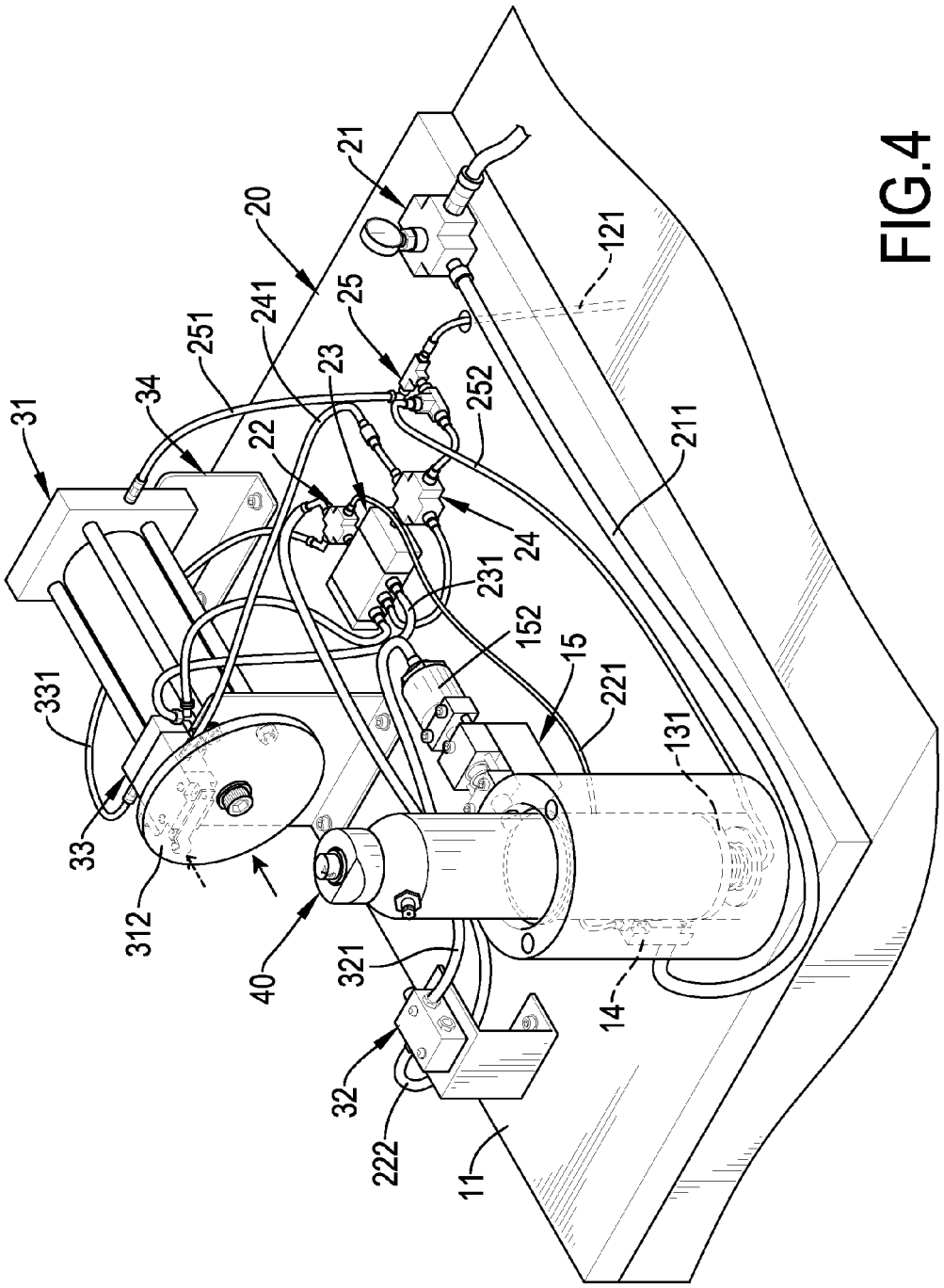
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FIG.4

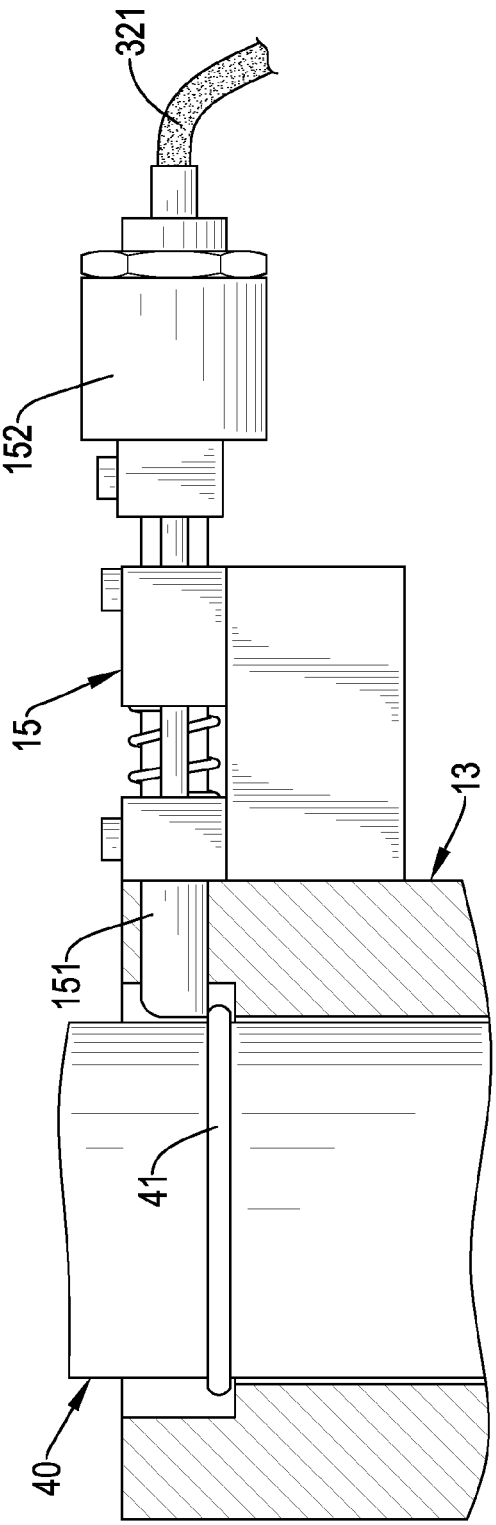

FIG.5

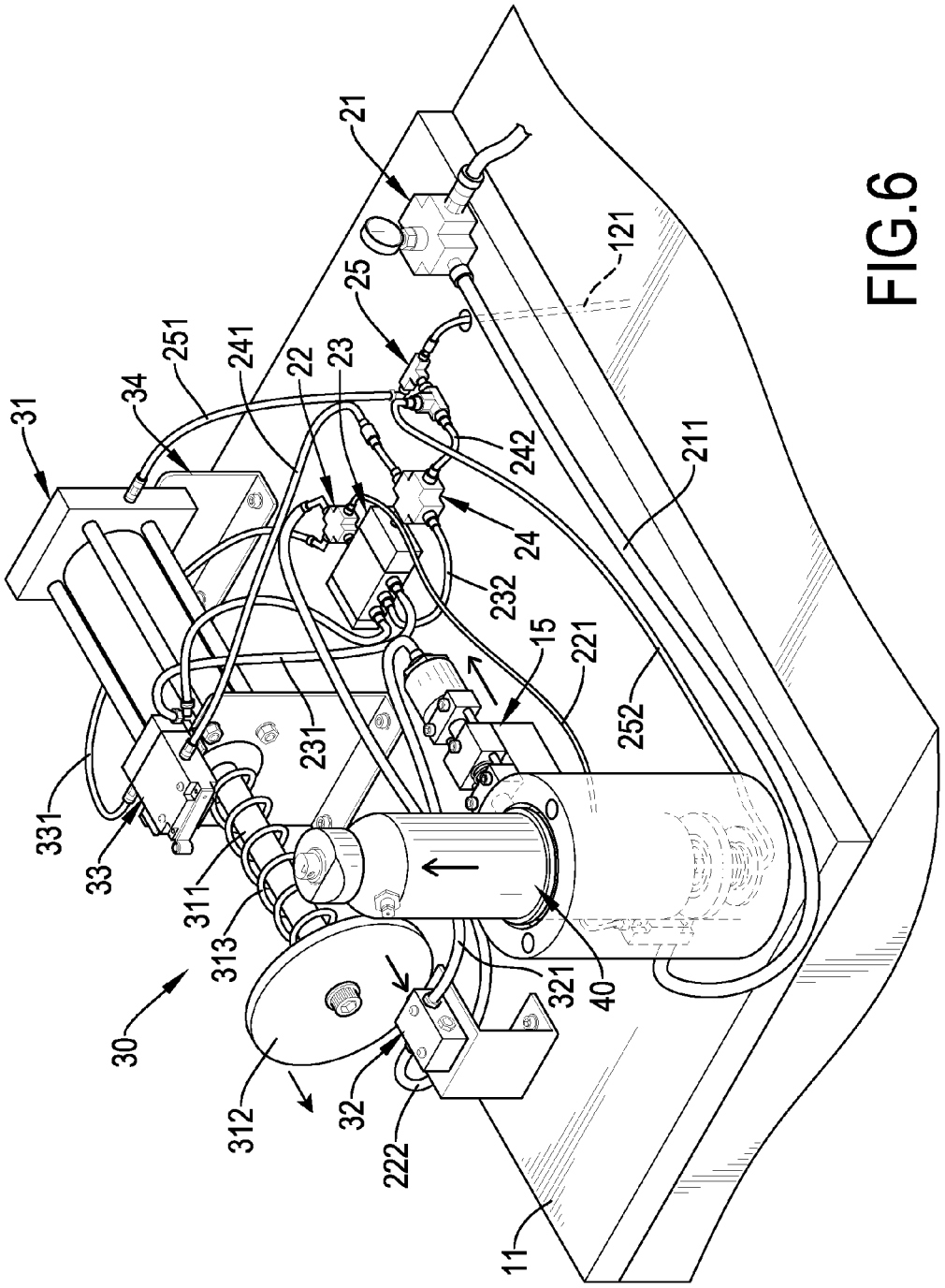
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FIG.6

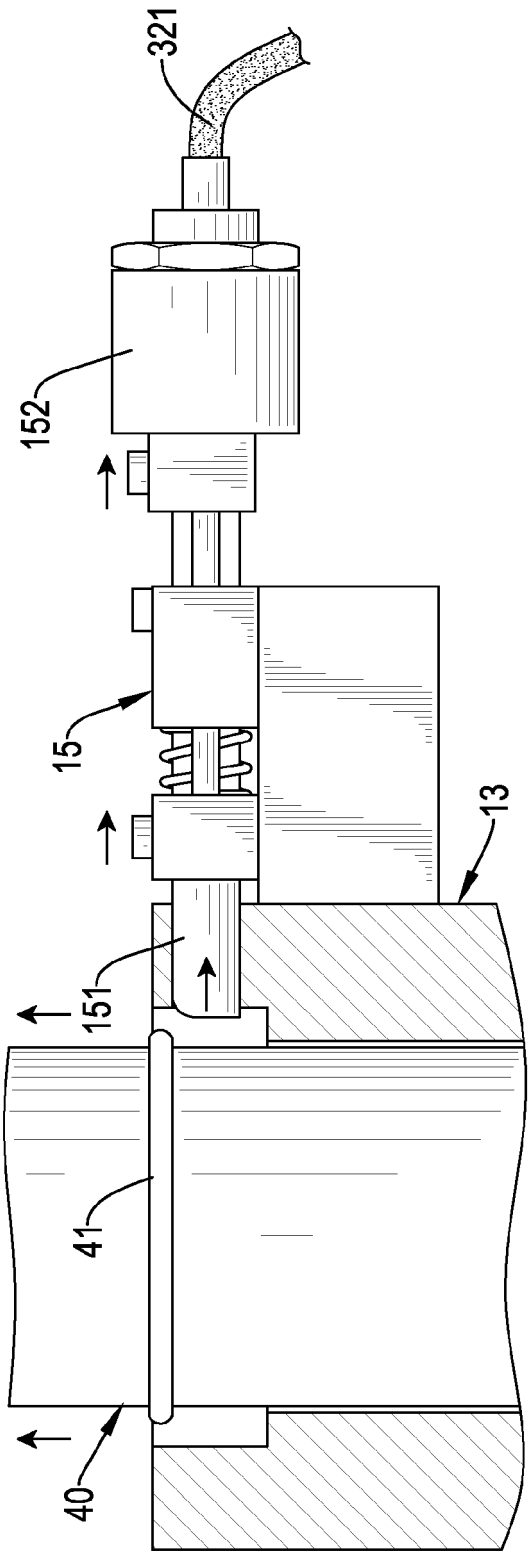

FIG.7

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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 3631

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 6 116 296 A (P. TURUNEN) 12 September 2000 (2000-09-12) * column 3, line 11 - column 4, line 65; figures * -----	1	INV. B65B31/00
A	US 2010/307634 A1 (P. FICAI) 9 December 2010 (2010-12-09) * page 7, column 2, line 40 - page 8, column 2, line 44; figures * -----	1	
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A	US 5 645 113 A (S. HUMM) 8 July 1997 (1997-07-08) * claims; figures * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC) B65B B65D

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 September 2013	Jagusiak, Antony

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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