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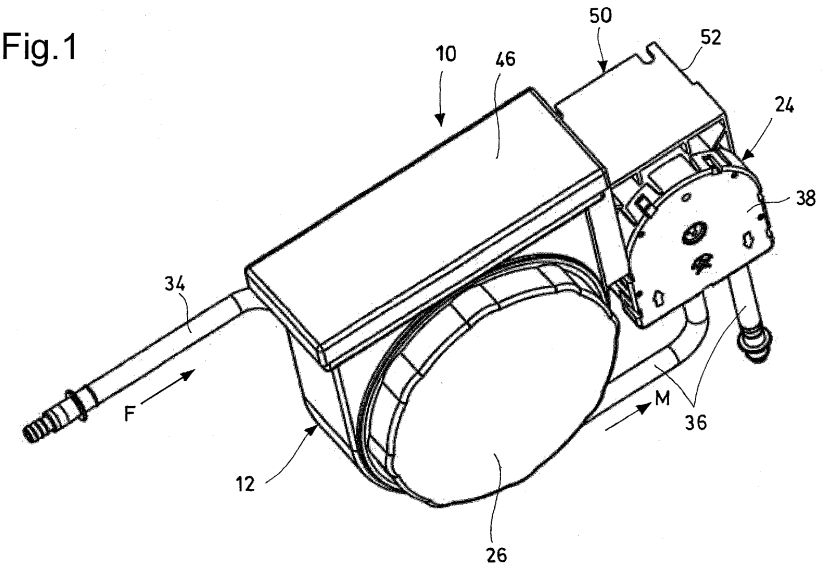
(54) APPARATUS FOR DISPENSING A WASHING AGENT, IN PARTICULAR FOR A WASHING MACHINE

(57) Apparatus (10; 110; 210) comprising a hollow structure (12) internally defining a receptacle (14) intended to contain a washing mixture (M) comprising a quantity of washing agent (A) and a quantity of washing fluid (F), whereby the hollow structure (12) has an inlet opening (16) for the insertion of the quantity of washing agent (A), said hollow structure (12) has also a supply opening (18) for receiving the quantity of washing fluid (F) inside the receptacle (14) and an outlet opening (20) configured for letting the washing mixture (M) flow out of the hollow structure (12); the apparatus further comprises a mixer assembly (22; 122; 222) configured for mixing the washing mixture (M) contained in the receptacle (14), wherein the inlet opening (16) faces directly towards the receptacle (14) to allow the insertion of the quantity of washing agent (A) into the receptacle (14) through the inlet opening (16) and there is a pumping device (24) configured for delivering, in a dosed manner, the washing mixture (M) through the outlet opening (20).

Fig.1



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Description

Technical field

[0001] The present invention relates to an apparatus for dispensing a washing agent, in particular for a washing machine.

Background art

[0002] In the field of electric household appliances, it is known to use systems for dispensing a washing agent. Such type of systems suffer from a number of drawbacks.

[0003] In such systems, washing agents tend to be adversely affected by the presence of moisture, as is typically the case in the environment of the washing machine. For example, washing agents persisting in such systems will tend to agglomerate, thus impairing their correct delivery into the wash chamber of the washing machine during the wash cycle.

Summary of the invention

[0004] It is one object of the present invention to provide an apparatus improved over the prior art, which in particular can receive a quantity of washing agent while considerably reducing the adverse effects of humidity.

[0005] According to the present invention, this and other objects are achieved through an apparatus having the technical features set out in the appended independent claim.

[0006] It is understood that the appended claims are an integral part of the technical teachings provided in the following detailed description of the present invention. In particular, the appended dependent claims define some preferred embodiments of the present invention that include some optional technical features.

[0007] The advantages that can be attained with the present invention include providing an apparatus which, according to exemplary embodiments, can receive a quantity of washing agent dispensable in a plurality of doses, wherein each dose can be dispensed during wash cycles executed at successive times by the washing machine in which such apparatus has been installed.

[0008] Such advantages also include providing an apparatus which, according to exemplary embodiments, can be installed in substantially any position in the associated washing machine, so as to ensure reliable dispensation of the washing agent. In particular, the release of the washing agent is not limited to dispensation by gravity.

[0009] Further features and advantages of the present invention will become apparent in light of the following detailed description, provided merely as a non-limiting example and referring, in particular, to the annexed drawings as summarized below.

Brief description of the drawings

[0010]

Figure 1 is a perspective view of a dispenser apparatus obtained in accordance with a first exemplary embodiment of the present invention.

Figure 2 is an exploded perspective view of the apparatus shown in Figure 1.

Figure 3 is a top view of the apparatus shown in the preceding figures.

Figure 4 is a longitudinal sectional view of the apparatus shown in the preceding figures. Such view is obtained along line IV-IV of Figure 3.

Figures 5 and 6 are exploded perspective views of a dispenser apparatus obtained in accordance with a second exemplary embodiment of the present invention.

Figure 7 is a cross-sectional perspective view of the apparatus visible in Figures 5 and 6.

Figures 8 and 9 are exploded perspective views of a dispenser apparatus obtained in accordance with a third exemplary embodiment of the present invention.

Detailed description of the invention

[0011] With reference to the drawings, 10 designates as a whole an apparatus for dispensing a washing agent. Such apparatus 10 is realized in accordance with a first exemplary embodiment of the present invention.

[0012] The washing agent used in the apparatus may be, by way of non-limiting example, a powder, flake, liquid or gel detergent. In further embodiments, such washing agent may also be a rinse aid or another additive.

[0013] Advantageously but not necessarily, said washing agent may be in compact form, i.e. made of cohesive and united, or anyway integral, material. In particular, the compact form of the washing agent may be obtained in numerous different ways. In this regard, the compact washing agent may be provided not only in solid form or as compacted powder, but also in other manners. By way of example, the washing agent in compact form may also be provided as a capsule or envelope internally containing a powder, gel or liquid substance, which is retained and kept cohesive and integral by said capsule or envelope. Typically the capsule or envelope is made of soft material, or anyway of a material that can be torn when dispensation occurs in the washing machine, and is optionally transparent and/or water-soluble.

[0014] Apparatus 10 is intended for use in a washing machine, e.g. a dishwasher.

[0015] As particularly visible in Figures 1 and 2, apparatus 10 comprises a hollow structure 12 internally defining a receptacle 14.

[0016] Receptacle 14 is intended to contain a washing mixture M comprising a quantity of said washing agent A and a quantity of washing fluid.

[0017] Hollow structure 12 has an inlet opening 16 directly facing towards receptacle 14 and configured for the insertion of a quantity of washing agent A, e.g. in compact form, into receptacle 14. In particular, inlet opening 16 is intended to allow a user to directly insert a quantity of washing agent A into receptacle 14.

[0018] Hollow structure 12 also has a supply opening 18 configured for receiving the quantity of washing fluid F, in particular water, inside receptacle 14. The quantity of washing agent A and the quantity of washing fluid F are intended to form a solution that realizes said washing mixture M, which in turn is intended to be delivered from receptacle 14 of apparatus 10.

[0019] As will be further described below, receptacle 14 is configured for containing washing mixture M, which preferably comprises a plurality of doses to be dispensed, wherein each one of such doses is intended to be dispensed, for example, during a single wash cycle.

[0020] Furthermore, hollow structure 12 also has an outlet opening 20 configured for letting washing mixture M flow out of receptacle 14.

[0021] Apparatus 10 further comprises a mixer assembly 22 configured for mixing washing mixture M contained in receptacle 14 and realized by dissolution of the quantity of washing agent A in the quantity of washing fluid F. Therefore, as will be more clearly described below, by means of mixer assembly 22 it is possible to keep washing mixture M in substantially homogeneous conditions.

[0022] Furthermore, apparatus 10 comprises a pumping device 24 configured for delivering, in a dosed manner, at least a part of washing mixture M contained in receptacle 14 through outlet opening 20.

[0023] In the illustrated embodiment, mixer assembly 22 is situated inside receptacle 14.

[0024] In the illustrated embodiment, by way of example, particularly in the case wherein the quantity of washing agent A comprises a substance contained within a capsule or envelope, mixer assembly 22 can also - in operation - tear and open said capsule or envelope. In this way, the substance contained in the capsule or envelope is released and, when the quantity of washing fluid F is introduced into receptacle 14, it is possible to obtain the solution that constitutes washing mixture M.

[0025] In the illustrated embodiment, hollow structure 12 includes a hollow body, e.g. having a substantially box-like shape. In particular, inlet opening 16, supply opening 18 and outlet opening 20 are formed on the faces of the hollow body that realizes hollow structure 12.

[0026] Preferably, apparatus 10 comprises a closing cover 26 configured for sealingly close inlet opening 16. In particular, closing cover 26 is mounted in a removable manner relative to inlet opening 16. For example, closing cover 26 can be screwed around a neck 27 (visible in Figure 2 only) protruding from hollow structure 12 and having an edge that delimits inlet opening 16.

[0027] In the illustrated embodiment, as visible in Figure 2, between closing cover 26 and inlet opening 16 a sealing gasket 29, e.g. an annular gasket ("O-ring"), is interposed. In particular, said sealing gasket 29 is closed between closing cover 26 and neck 27.

[0028] Preferably, mixer assembly 22 comprises a rotary element 28 supported in rotation by hollow structure 12 about an axis of rotation X-X within receptacle 14. In particular, rotary element 28 is provided with a plurality of blades (designated by reference numerals 30 and 31 and described more in detail below) oriented in a substantially radial direction. Such blades are configured for mixing the quantity of washing agent A and the quantity of washing fluid F to form washing mixture M and keep it homogeneously mixed.

[0029] In the illustrated embodiment, the blades comprise a series of internal blades 30 arranged in a radially internal position, and a series of external blades 31 arranged in a radially external position.

[0030] Preferably, internal blades 30 are angularly equidistant.

[0031] Preferably, external blades 31 are angularly equidistant.

[0032] In particular, internal blades 30 and external blades 31 are angularly equidistant from each other, the distribution of external blades 31 being angularly offset relative to the distribution of internal blades 30.

[0033] In the illustrated embodiment, rotary element 28 comprises a disk 32 from which blades 30, 31 project axially. In particular, blades 30, 31 are formed as raised parts protruding from axially opposite sides of disk 32. For example, blades 30, 31 realize a pair of sunburst arrays or patterns situated on axially opposite faces of disk 32.

[0034] In particular, rotary element 28 comprises a central hub 33 supported in rotation in receptacle 14, within hollow structure 12. For example, central hub 33 is formed on disk 32, in particular in a central position relative to internal blades 30.

[0035] Preferably, inlet opening 16 faces towards receptacle 14; in particular, inlet opening 16 faces towards mixer assembly 22. In the illustrated embodiment, inlet opening 16 faces axially towards rotary element 28. For example, inlet opening 16 faces towards blades 30, 31, in particular towards one of the sunburst arrays or patterns of such blades, situated on one face of disk 32.

[0036] In the illustrated embodiment, inlet opening 16 is substantially coaxial to mixer assembly 22, in particular to the axis of rotation X-X of rotary element 28.

[0037] In the illustrated embodiment, supply opening 18 ends into receptacle 14 and is situated on hollow structure 12 on the side opposite to inlet opening 16.

[0038] In particular, supply opening 18 ends into receptacle 14 towards that face of disk 32 which is opposite to the disk face facing towards inlet opening 16.

[0039] For example, supply opening 18 is located in a laterally offset position relative to the axis of rotation X-X of rotary element 28.

[0040] Conveniently, supply opening 18 can be connected to a supply duct 34 configured for receiving the quantity of washing fluid F, in particular in a controlled

manner, e.g. from a pump (not shown). Preferably, said pump is configured for delivering washing fluid F in a dosed manner by taking in a quantity thereof compatible with the quantity of washing agent A introduced into receptacle 14 through inlet opening 16. In this way, it is possible to obtain a washing mixture M contained in receptacle 14 having the desired concentration, to be subsequently dispensed by dispenser device 14. For example, the quantity of washing fluid F may be either predetermined or adjustable as a function of operating washing parameters, in particular through a control unit of the machine. Preferably, as will be described below, washing mixture M contains a plurality of doses intended to be dispensed into the wash chamber of the washing machine during successive wash cycles.

[0041] In the illustrated embodiment, outlet opening 20 is situated in a lateral position on hollow structure 12 relative to the position of inlet opening 16 and of supply opening 18. In particular, outlet opening 20 is oriented in a substantially radial direction relative to mixer assembly 22, e.g. radially relative to the axis of rotation X-X of rotary element 28.

[0042] In the illustrated embodiment, apparatus 10 further comprises an outlet duct 36 connected downstream of outlet opening 20 and intended to deliver washing mixture M outside hollow structure 12, e.g. into a wash chamber of the washing machine.

[0043] Preferably, pumping device 24 is configured for delivering, in a dosed manner, washing mixture M contained in receptacle 14. In particular, the quantity of washing agent A inserted by a user through inlet opening 16 and the quantity of washing fluid F taken in, in a controlled manner, through supply opening 18 are intended to form a plurality of doses of washing mixture M contained in receptacle 14. Advantageously, such doses of washing mixture M are to be dispensed by pumping device 24 at successive times of the wash cycle of the washing machine with which apparatus 10 is associated. Even more advantageously, such doses of washing mixture M are to be dispensed by pumping device 24 in successive wash cycles of the washing machine with which apparatus 10 is associated.

[0044] In the illustrated embodiment, pumping device 24 comprises a peristaltic pump 38 of a *per se* known type. Such peristaltic pump 38 is configured for dosed delivery of washing mixture M contained in receptacle 14. In particular, peristaltic pump 38 is mounted to outlet duct 36.

[0045] With particular reference to the exemplary configuration of Figure 4, the peristaltic pump internally comprises a deformable tube 39, which is connected, on an input side, to an inflow tract or fitting 36a of outlet duct 36, and is respectively connected, on the other output side, to an outflow tract or fitting 36b of outlet duct 36. In a *per se* known manner, peristaltic pump 38 includes a rotor 40 configured for effecting a compression along outlet duct 36, thus causing the intake of a predetermined quantity of washing mixture M from outlet opening 20, in order to dispense such quantity outside apparatus 10. For example, rotor 40 comprises a pair of rollers 42 arranged in diametrically opposite positions and configured for compressing deformable tube 39, thereby creating a pair of bottlenecks which, as they rotate, drag between them said predetermined quantity of washing mixture M.

[0046] In the illustrated embodiment, hollow structure 12 also includes an inspection opening 44, through which receptacle 14 is accessible. Said inspection opening 44 is conveniently located in a lateral position relative to mixer assembly 22, in particular allowing access in a radial direction relative to the axis of rotation X-X.

[0047] In the illustrated embodiment, inspection opening 44 can be sealingly re-closed by means of an inspection lid 46, e.g. through interposition of a further sealing gasket 48 between the edge of hollow structure 12 that defines inspection opening 44 and inspection lid 46.

[0048] In the illustrated embodiment, apparatus 10 comprises an actuation device 50 configured for controlling mixer assembly 22, in particular for controlling the rotation of rotary element 28. For example, actuation device 50 comprises a motor 52 (in particular, an electric motor) of a *per se* known type, configured for controlling the rotation of rotary element 28. In particular, motor 52 can impart a rotation to disk 32 through central hub 33.

[0049] In the illustrated embodiment, actuation device 50 (in particular, motor 52) is also configured for controlling pumping device 24, e.g. for controlling the rotation of rotor 40 of peristaltic pump 38. Therefore, actuation device 50 (in particular, a motor 52) is configured for controlling both mixer assembly 22 and pumping device 24.

[0050] In the illustrated embodiment, between motor 52, mixer assembly 22 and pumping device 24 a transmission (not shown) is interposed, which is configured for selectively controlling the activation of mixer assembly 22 (in particular, the rotation of rotary element 28) and the activation of pumping device 24 (in particular, the rotation of rotor 40). For example, motor 52 may be a two-way motor, and the transmission may comprise a set of one-way couplings, so that:

- when motor 52 imparts a rotation in one direction, said set of one-way couplings permits the transmission of motion to mixer assembly 22 and does not permit the activation of pumping device 24;
- when motor 52 imparts a rotation in the opposite direction, vice versa, said set of one-way couplings permits the transmission of motion to pumping device 24 and does not permit the activation of mixer assembly 22.

[0051] The following will summarize an exemplary mode of operation of apparatus 10.

[0052] A phase of loading washing agent A, through which an initial preparation of the apparatus can be carried out, will be described first.

[0053] The operation of apparatus 10 envisages that washing agent A must be manually loaded by a user into

receptacle 14 through inlet opening 16.

[0054] Subsequently, when the washing machine with which the apparatus is associated is turned on to execute a wash cycle, the quantity of washing fluid F is admitted into receptacle 14 through supply opening 18, in a controlled manner (e.g. by the control unit of the washing machine). This provides washing mixture M, which stays contained within receptacle 14. In particular, receptacle 14 can contain a plurality of doses of washing mixture M, each dose being - for example - intended to be dispensed by apparatus 10 during a single wash cycle. The following will describe a wash cycle that follows the above-described loading phase.

[0055] Prior to dispensing a dose of washing mixture M through outlet opening 20 during the wash cycle, actuation device 50 controls the operation of mixer assembly 22 so as to mix the solution that realizes washing mixture M. This provides a more homogeneous composition of washing mixture M, before it is delivered through the outlet opening.

[0056] After the activation of mixer assembly 22, pumping device 24 is controlled - for example, by means of the same actuation device 50 - in such a way as to deliver, through outlet opening 20, a dose of washing mixture M contained in receptacle 14, once mixer assembly 22 has mixed the solution that realizes washing mixture M.

[0057] It is thus possible to carry out a plurality of wash cycles after a single phase of loading apparatus 10 with the quantity of washing agent A. In fact, the action of mixer assembly 22 that precedes the delivery executed by pumping device 24 permits making washing mixture M, at each wash cycle, more homogeneous. This considerably reduces the risk that the moisture that is present in receptacle 14 might create solid agglomerates of washing agent A, which might jeopardize the regular and proper operation of apparatus 10.

[0058] With reference to Figures 5 to 7, the following will describe an apparatus 110 realized in accordance with a second embodiment of the present invention.

[0059] Those parts and elements which are similar to, or which perform the same function as, those of the above-described embodiment have been assigned the same reference numerals. For simplicity, the description of such parts and elements will not be repeated below, and reference should be made to the above description.

[0060] Apparatus 110 too comprises a rotary element 128, which however shows some differences compared to rotary element 28 described with reference to the first embodiment of the present invention.

[0061] Rotary element 128 is removably mounted relative to hollow structure 12 through inlet opening 16. In particular, rotary element 128 is removably mounted relative to actuation device 50. For example, rotary element 128 is removably mounted relative to a transmission mechanism (not numbered), which extends and co-operates with motor 52 to impart a rotary motion to said rotary element 128.

[0062] In particular, rotary element 128 is configured for internally receiving the quantity of washing agent A, e.g. in compact form.

[0063] Such an embodiment makes it possible, every time apparatus 110 is loaded, to extract said rotary element 128. Subsequently, rotary element 128 is filled with the quantity of washing agent A. Afterwards, rotary element 128 containing the quantity of washing agent A is introduced, through inlet opening 16, into hollow structure 12, directly within receptacle 14. In this embodiment, therefore, when apparatus 110 is loaded rotary element 18 and the quantity of washing agent A are introduced into receptacle 14 as a single unit.

[0064] In the second embodiment illustrated herein, rotary element 128 comprises a cup-shaped element 154 configured for receiving, within its walls, the quantity of washing agent A.

[0065] Preferably, cup-shaped element 154 has a base 156 that carries a plurality of protrusions 159 facing towards the inside of cup 154. In the second embodiment illustrated herein, protrusions 159 are tapered pegs, e.g. having a conical or truncated conical shape.

[0066] In the second embodiment illustrated herein, cup 154 has a central pin 155 which can be removably fitted into the transmission mechanism of motor 52, in order to couple actuation device 50 to rotary element 128.

[0067] In the second embodiment illustrated herein, cover 26 is provided with a pusher assembly 157 configured for pushing the quantity of washing agent A towards rotary element 128. In this manner, any residues of the quantity of washing agent A are effectively mixed by mixer assembly 22.

[0068] Preferably, pusher assembly 157 comprises an abrader element 158, e.g. shaped substantially like a plate, configured for abrading the quantity of washing agent A. This provides an abrasion of the quantity of washing agent A, in particular during the phases of loading apparatus 110; such abrasion, combined with the mixing ensured by rotary element 128, improves the homogeneity of washing mixture M to be delivered into the wash chamber of the washing machine with which apparatus 110 is associated.

[0069] Furthermore, pusher assembly 157 preferably includes an elastic member 160 configured for pushing abrader element 158 towards rotary element 128. In this manner, elastic member 160 contributes to keeping abrader element 158 in contact with or against the quantity of washing agent A, so as to facilitate the mixing of the quantity of washing agent A with the respective quantity of washing fluid F.

[0070] Preferably, elastic member 160 is a compression-preloaded spring interposed between cover 26 and abrader element 158.

[0071] In the second embodiment illustrated herein, abrader element 158 comprises a plurality of prominences 162 facing towards rotary element 128. For example, prominences 162 are tapered pegs, e.g. having a conical or truncated conical shape.

[0072] In the second embodiment illustrated herein,

protrusions 159 and prominences 162 are mutually offset transversally or radially relative to the axis of rotation X-X, so that, when abrader element 158 approaches base 156 of cup 154, they will not meet each other. In particular, protrusions 159 and prominences 162 are arranged on circumferences having different radii relative to the axis of rotation X-X.

[0073] In the second embodiment illustrated herein, pusher assembly 157 is mounted guidedly movable relative to cover 26. Preferably, cover 26 comprises a plurality of guiding pins 164 received in, and co-operating with, a plurality of matching guiding holes 165 in pusher assembly 157 (in particular, in abrader element 158).

[0074] Preferably, rotary element 128 is also supported in rotation by cover 26 and/or by pusher assembly 157. In particular, cover 26 and/or pusher assembly 157 can be removably coupled with freedom of rotation to rotary element 128, so as to support the rotation of rotary element 128 about axis X-X. For example, cover 26 is provided with a central peg 166 which can be inserted into central pin 155 of cup 154, and/or central pin 155 of cup 154 can in turn be inserted into a central ferrule 168 carried by pusher assembly 157. In particular, central pin 155 is mounted with freedom of rotation relative to central peg 166 and/or central ferrule 168. In this way, when loading apparatus 110 with the quantity of washing agent A, the correct positioning of all components is ensured.

[0075] In the second embodiment illustrated herein, cup 154 is mounted within hollow structure 12 in a manner such that spaces and paths are provided to allow draining the fluid contained in the region delimited by the cavity of cup-shaped element 154. Furthermore, in order to promote the outflow of fluid from such region, it may be envisaged that the side walls and/or bottom 156 of cup-shaped element 154 have one or more holes. This further facilitates the delivery of washing mixture M from receptacle 14 through outlet opening 20, preventing any fluid from getting "trapped" in cup-shaped element 154.

[0076] With reference to Figures 8 to 9, the following will describe an apparatus 210 realized in accordance with a third embodiment of the present invention.

[0077] Those parts and elements which are similar to, or which perform the same function as, those of the above-described embodiments have been assigned the same reference numerals. For simplicity, the description of such parts and elements will not be repeated below, and reference should be made to the above description.

[0078] Apparatus 210 comprises a mixer assembly 222 that, unlike the previously illustrated embodiments, is situated outside receptacle 14.

[0079] Preferably, mixer assembly 222 comprises a circulation pump 270 configured for circulating the fluid within receptacle 14.

[0080] In the third embodiment illustrated herein, mixer assembly 222 comprises a hydraulic circuit 272 that extends outside hollow structure 12 and crosses, in both directions, receptacle 14. Circulation pump 270 is mounted in hydraulic circuit 272.

[0081] In this way, unlike what occurs in the previously illustrated embodiments, the mixing of the quantity of washing agent A with a corresponding quantity of washing fluid F in receptacle 14 is not effected by mechanical agitation occurring in receptacle 14. On the contrary, in the third embodiment such mixing occurs by fluidic-only agitation through receptacle 14, in that the mixer assembly 222 (and in particular circulation pump 270 and the associated mechanisms) is situated outside receptacle 14.

[0082] Of course, without prejudice to the principle of the invention, the forms of embodiment and the implementation details may be extensively varied from those described and illustrated herein by way of non-limiting example, without however departing from the scope of the invention as set out in the appended claims.

[0083] In particular, the technical characteristics that differentiate the various embodiments and variants thereof described and illustrated herein are freely interchangeable, whenever compatible.

[0084] For example, pusher assembly 157 associated with cover 26 has been described herein with particular reference to the second embodiment of the present invention. Nevertheless, a similar pusher assembly may also be adopted in the first embodiment of the present invention.

[0085] As a further example, inspection opening 44 has been described herein with particular reference to the first embodiment of the present invention. Nevertheless, a similar inspection opening may also be adopted in the second and third embodiments of the present invention.

[0086] In addition, in a further exemplary variant embodiment of the present invention it may be envisaged that the apparatus is equipped with a mixer assembly situated inside the receptacle and an additional mixer assembly situated outside the receptacle.

Claims

1. Apparatus (10; 110; 210) for dispensing a washing agent (A), in particular for a washing machine; said apparatus (10) comprises a hollow structure (12) internally defining a receptacle (14) and having:

   - an inlet opening (16) directly facing towards said receptacle (14) and configured for the insertion of a quantity of washing agent (A) into said receptacle (14),
   - a supply opening (18) configured for receiving a quantity of washing fluid (F) inside said receptacle (14), so as to form, together with said quantity of washing agent (A), a washing mixture (M) intended to be contained in said receptacle (14), and
   - an outlet opening (20) configured for letting said washing mixture (M) flow out of said receptacle (14);

said apparatus further comprising:

- a mixer assembly (22; 222) configured for mixing said washing mixture (M) contained in said receptacle (14);
- a pumping device (24) configured for delivering, in a dosed manner, at least a part of said washing mixture (M) through said outlet opening (20).

2. Apparatus (10; 110) according to claim 1, wherein said mixer assembly (22; 122) is located in said receptacle (14).

3. Apparatus (10; 110) according to claim 2, wherein said mixer assembly (22; 122) comprises a rotary element (28; 128) supported in rotation about an axis of rotation (X-X) within said receptacle (14) by said hollow structure (12).

4. Apparatus (10; 110) according to claim 3, wherein said inlet opening (16) is substantially coaxial to said axis of rotation (X-X).

5. Apparatus (10; 110) according to claim 3 or 4, wherein said inlet opening (16) faces directly towards said rotary element (28; 128).

6. Apparatus (10; 110) according to claim 5, wherein said rotary element (28, 128) is mounted in a manner such that it can be removed from said hollow structure (12) through said inlet opening (16).

7. Apparatus (10) according to any one of claims 3 to 6, wherein said rotary element (28) is provided with a plurality of blades (30, 31) oriented in a substantially radial direction.

8. Apparatus (10) according to claim 7, wherein said blades comprise a series of internal blades (30) arranged in a radially internal position, and a series of external blades (31) arranged in a radially external position.

9. Apparatus (10) according to any one of claims 7 to 8, wherein said rotary element (28) comprises a disk (32), from which said blades (30, 31) protrude axially.

10. Apparatus (10) according to any one of claims 7 to 9, wherein said blades (30, 31) are formed as raised parts protruding from axially opposite sides of said disk (32).

11. Apparatus (110) according to claim 6, wherein said rotary element (128) is configured for internally receiving said quantity of washing agent (A).

12. Apparatus (110) according to claim 11, wherein said rotary element (128) comprises a cup-shaped element (154) supported in rotation by said hollow structure (12).

13. Apparatus (110) according to claim 12, wherein said cup-shaped element (154) has a base (156) that carries a plurality of protrusions (159) facing towards the inside of the cup-shaped element (154).

14. Apparatus (110) according to any one of claims 2 to 13, further comprising a closing cover (26) configured for sealingly and removably closing said inlet opening (16).

15. Apparatus (110) according to claim 14, wherein said closing cover (26) comprises a pusher assembly (157) configured for pushing said quantity of washing agent (A) towards said mixer assembly (122).

16. Apparatus (110) according to claim 15, wherein said pusher assembly (157) comprises an abrader element (158) configured for abrading said quantity of washing agent.

17. Apparatus (110) according to claim 16, wherein said pusher assembly (157) comprises an elastic member (160) configured for pushing said abrader element (158) towards said mixer assembly (122).

18. Apparatus (110) according to claim 16 or 17, wherein said abrader element (158) comprises a plurality of prominences (162) facing towards the mixer assembly (122) and configured for abrading said quantity of washing agent (A).

19. Apparatus (10; 110) according to any one of the preceding claims, further comprising an actuation device (50) configured for controlling said mixer assembly (22).

20. Apparatus (10; 110) according to claim 19, wherein said actuation device (50) is configured for controlling both said mixer assembly (22; 122) and said pumping device (24).

21. Apparatus (10; 110) according to claim 20, wherein said actuation device (50) is configured for selectively controlling said mixer assembly (22; 122) and said pumping device (24).

22. Apparatus (10; 110; 210) according to any one of the preceding claims, wherein said outlet opening (20) faces directly towards the receptacle (14) to allow said quantity of washing agent (A) to flow out of said receptacle (14) through said outlet opening (20).

23. Washing machine comprising an apparatus (10; 110; 210) according to any one of the preceding claims.

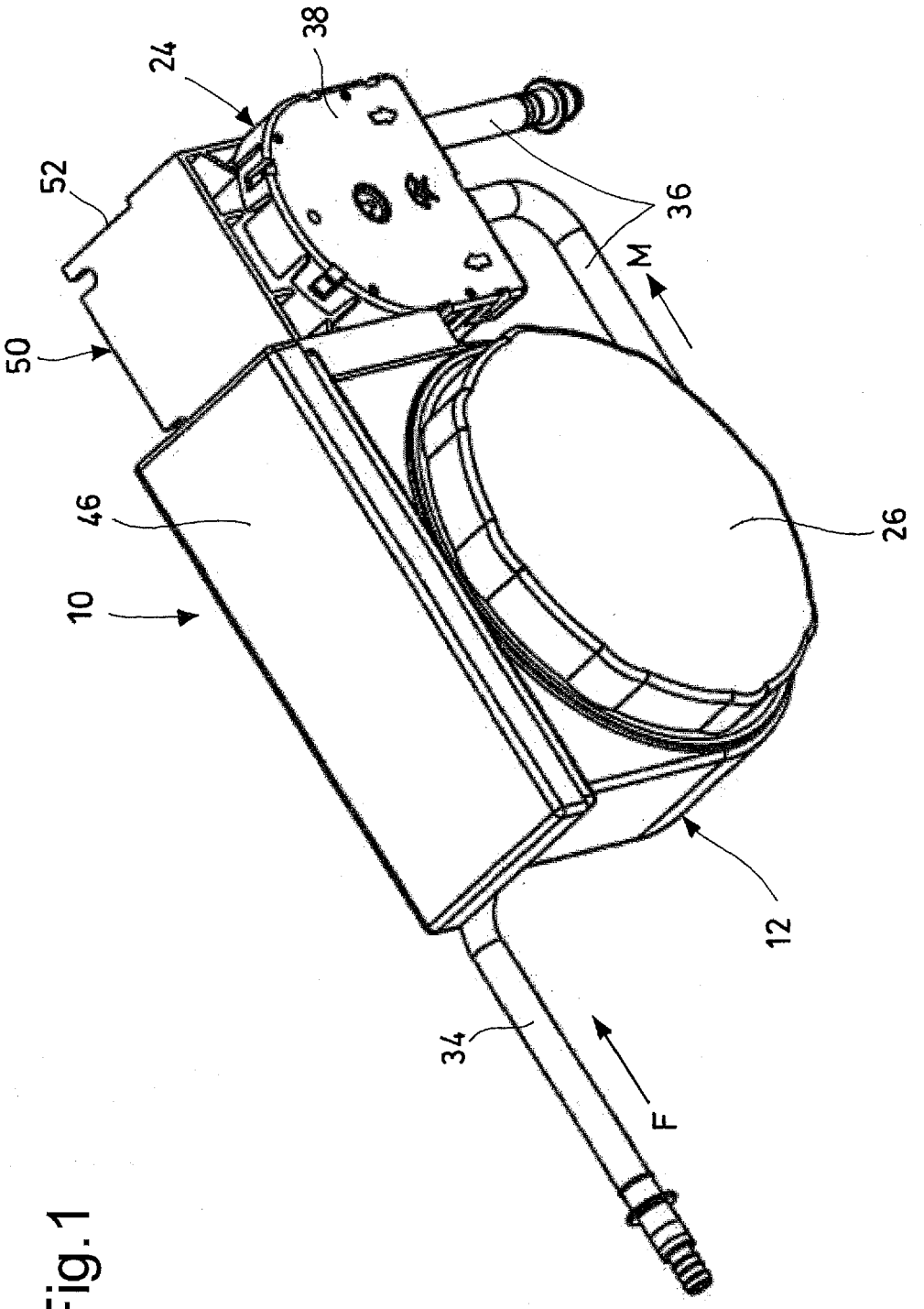

Fig. 1

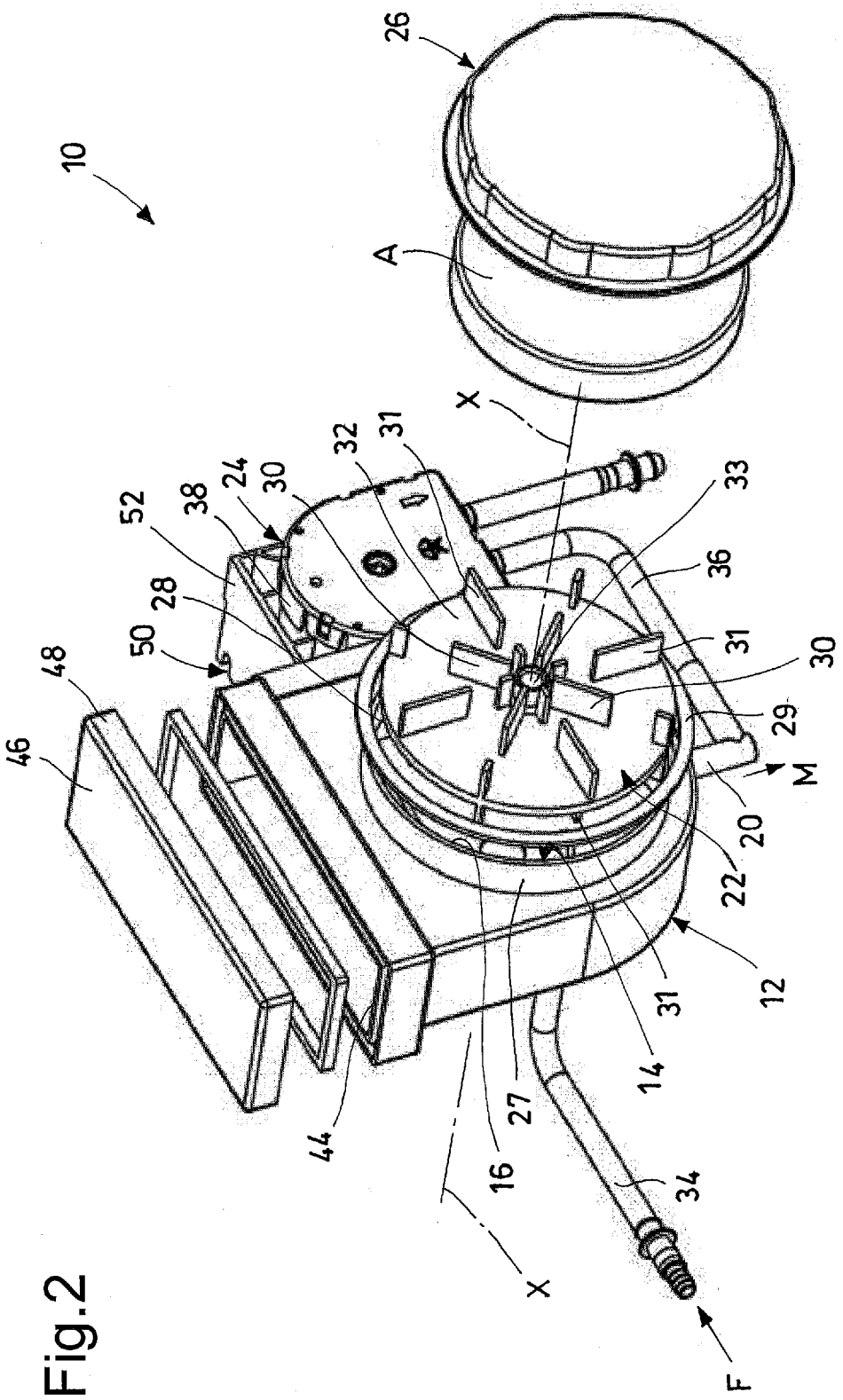
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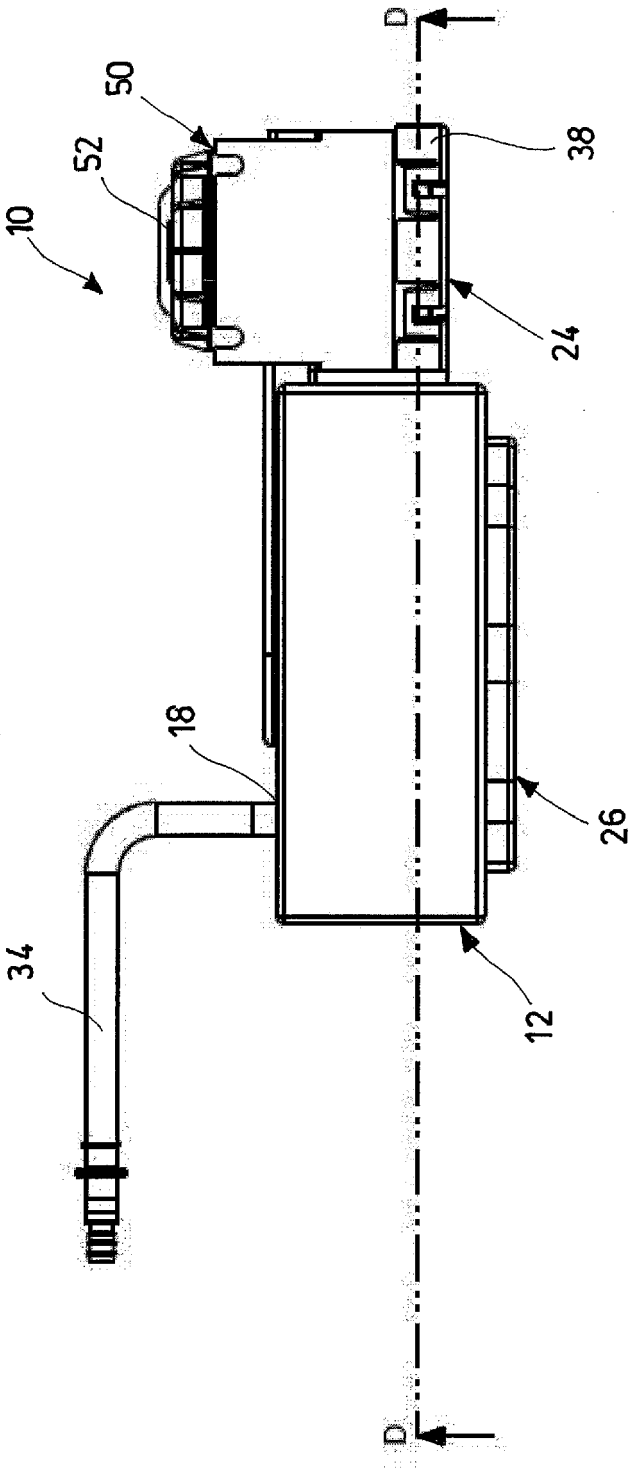
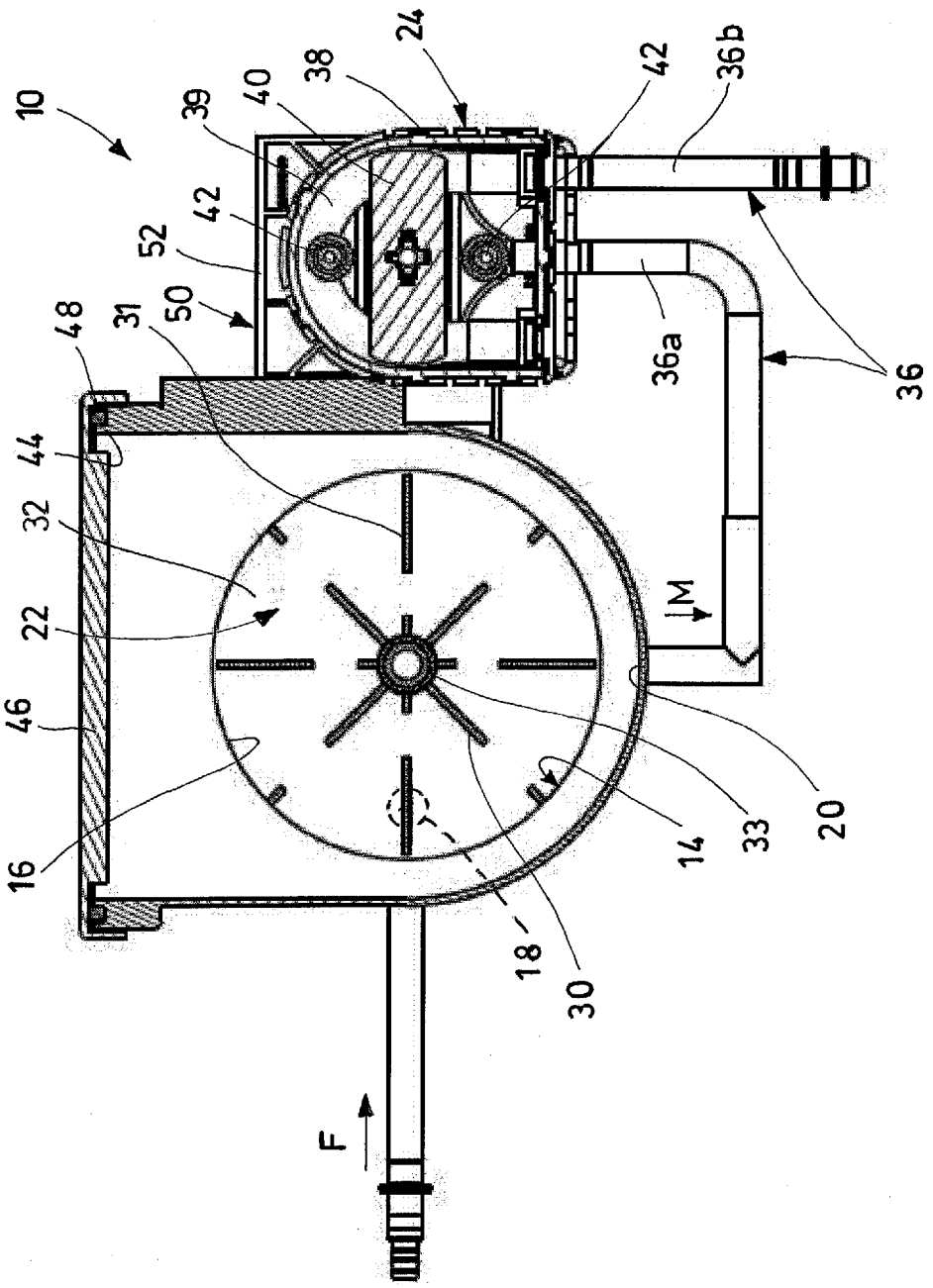
Fig.2

Fig.3

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20
14
18
30
F

Fig.4

Fig.6

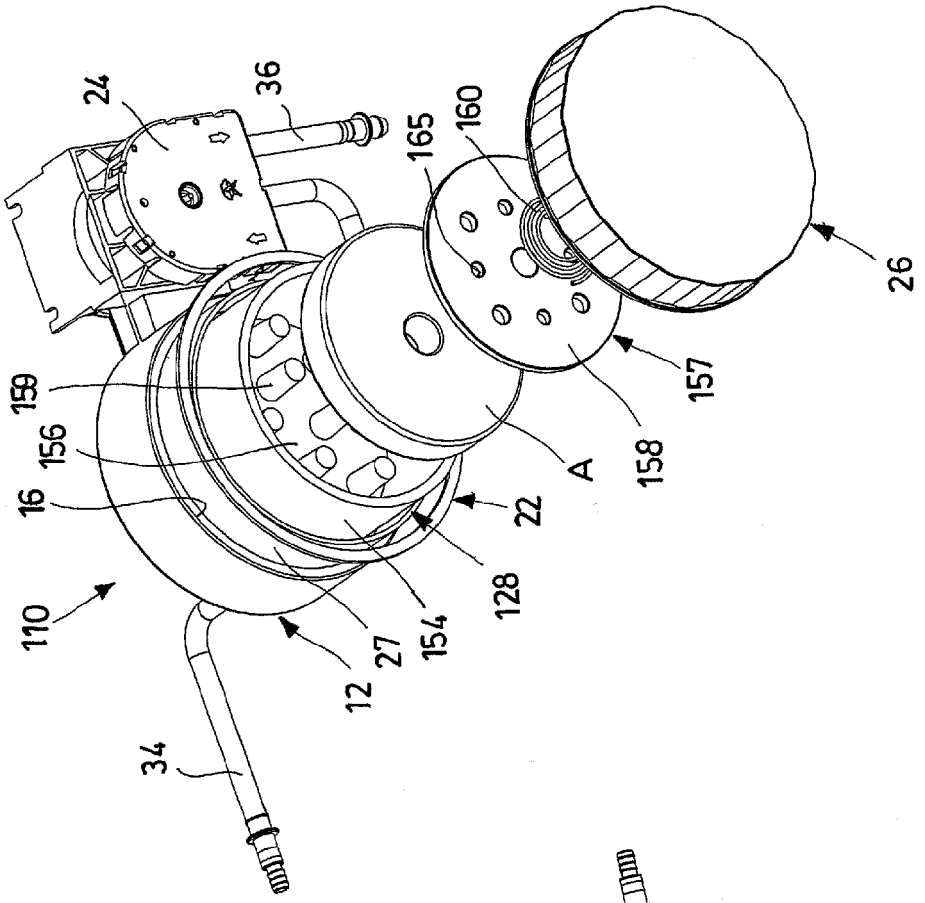
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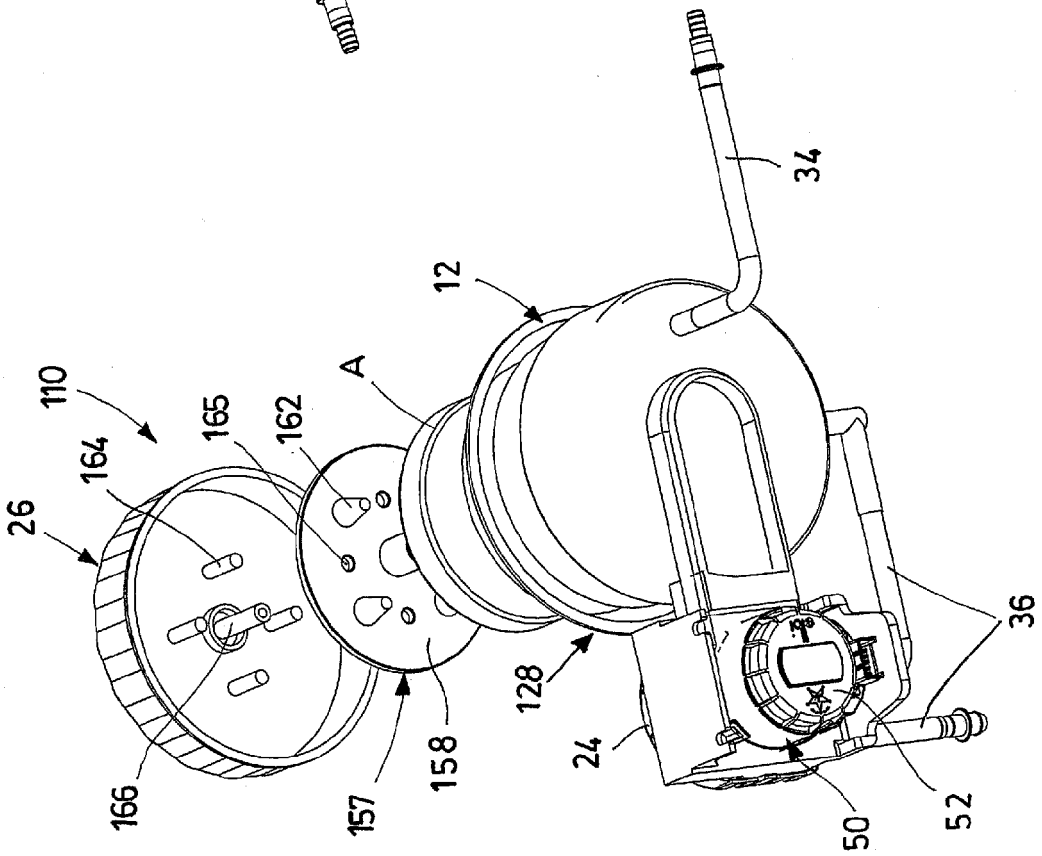
Fig.5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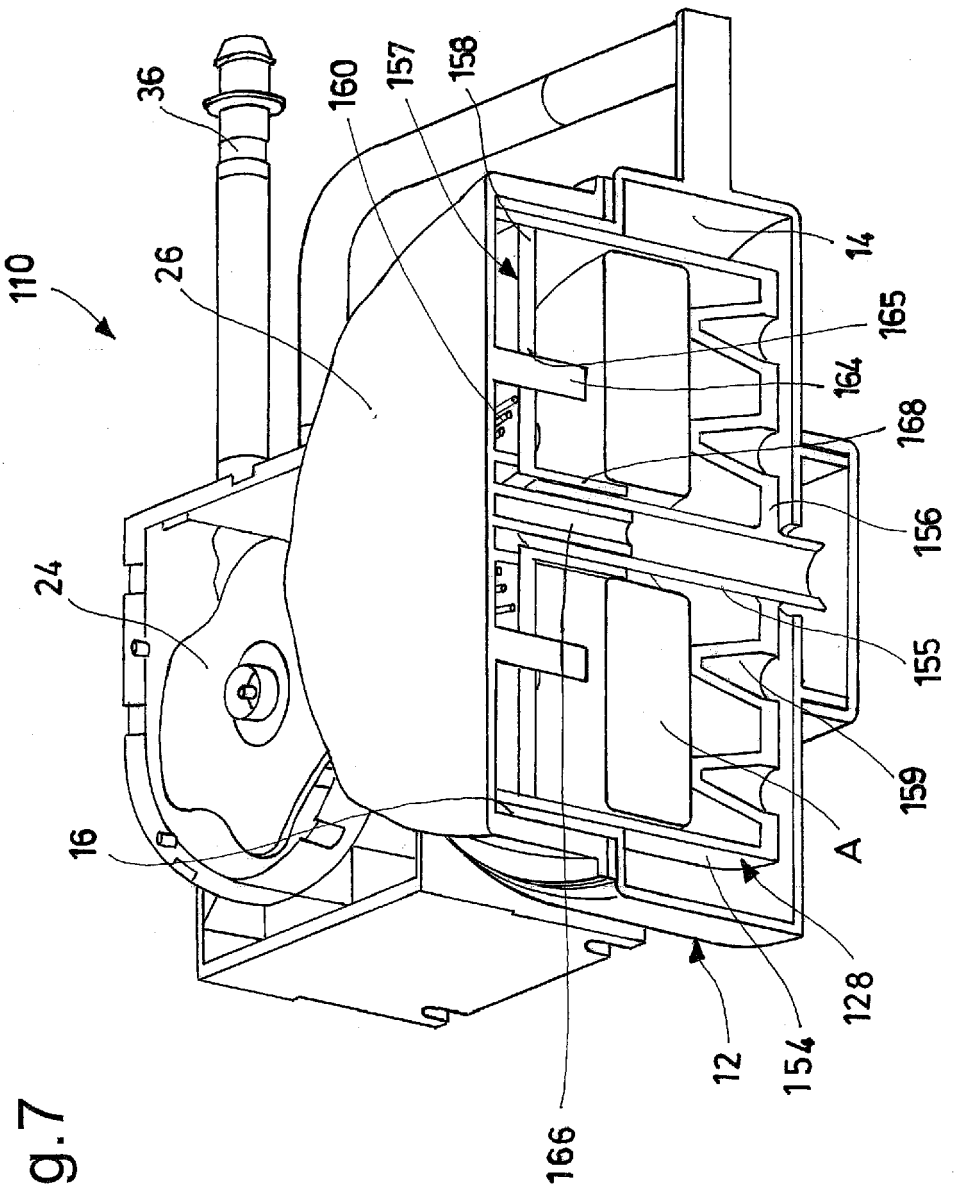
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Fig.7

Fig.9

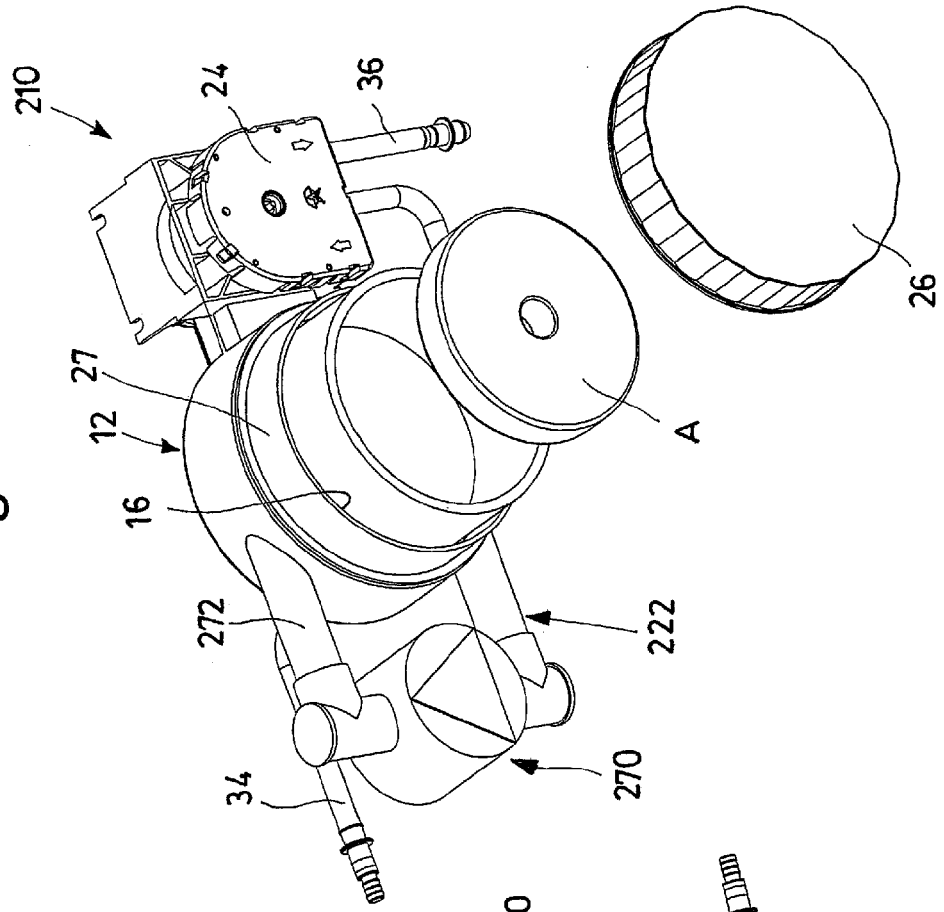
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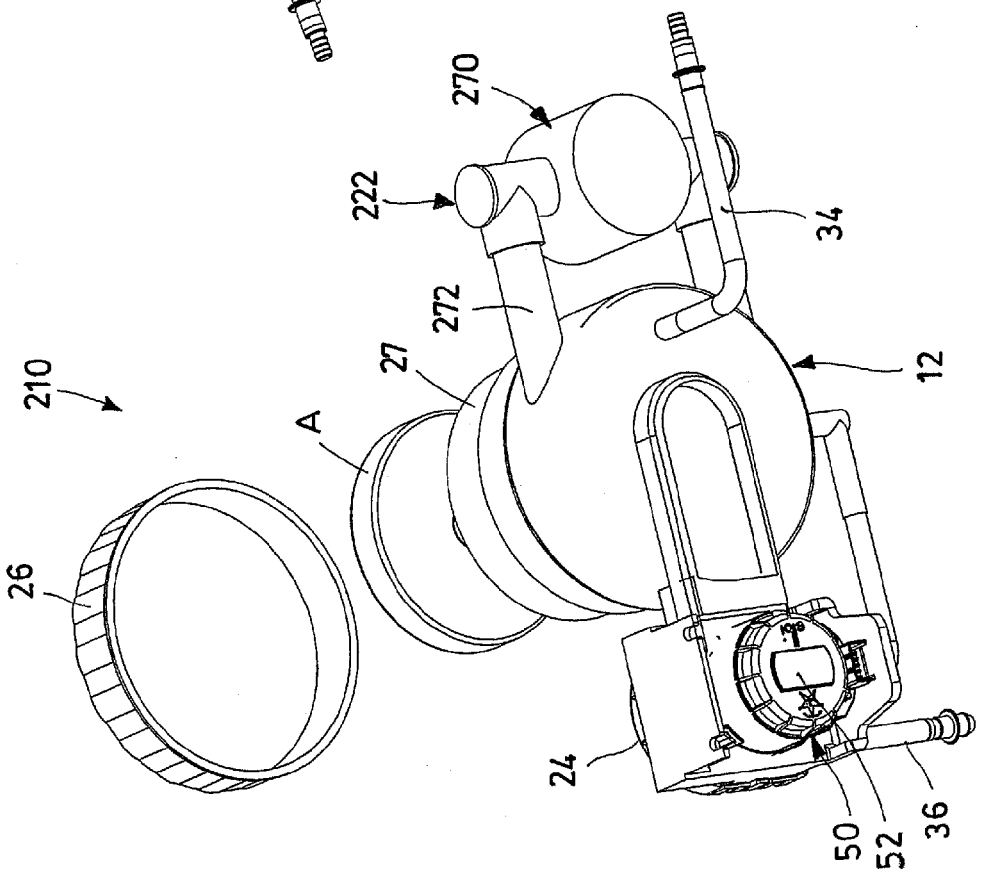
Fig.8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EUROPEAN SEARCH REPORT

Application Number
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D06F
A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 May 2020	Clivio, Eugenio

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