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(54) **Valve and method for the supply of a compact flow of fluids for a filling machine**

(57) Valve (10) for supplying a compact flow of fluids

(11) for a filling machine comprising:

- a tubular element (12) defining an inner channel (16) for the passage of the fluid to be supplied, said tubular element (12) being on one side associated with a filling machine and on the other side having a free supply end (13) provided with a supply opening (14) from which said fluid to be supplied exits;
- means (15) for the selective opening and closing of said supply opening (14);

wherein the valve further comprises means for the selective heating (17) of said supply opening (14) associated with said free supply end (13).

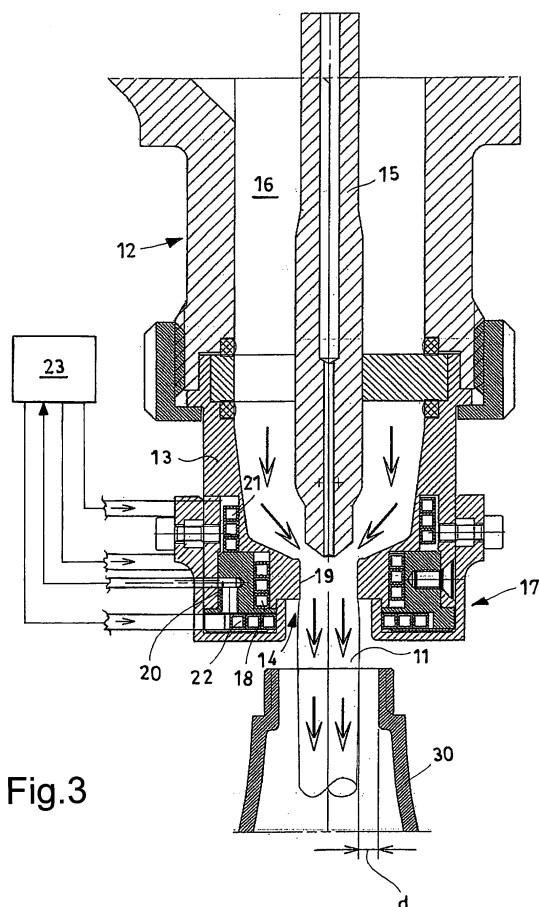


Fig.3

Description

[0001] The present invention refers to a valve for supplying a compact flow of fluids for a filling machine.

[0002] In this industry, i.e. the fluids filling machine industry, the expression supply valve is used to indicate the end part of the machine for supplying the fluid, otherwise known as supply nozzle, where therewithin there is provided a mobile stem for selectively stopping and allowing the supply of the product.

[0003] The supplied fluid is then collected in bottles or containers arranged at a position facing the valve and the fluid being supplied by the filling machine.

[0004] The fluids to be supplied may be more or less creamy food products, such as for example milk or beverages in general, but also oils for human consumption or other types of industrial fluids such as lubricant oils, detergents or other products.

[0005] An example of a currently known supply valve 10' is shown in figure 1 during the step of filling a container or bottle 30'.

[0006] Such known valves 10' comprise:

- a tubular element 12' defining an inner channel 16' for the passage of the fluid to be supplied and provided with a free supply end 13' provided with a supply opening 14' from which the fluid to be supplied exits; and
- a stem element 15' mobile within said inner channel 16' between a closing position by occlusion and a supply opening position 14' to allow the dispensing of the product.

[0007] In the industrial process for filling containers or bottles of fluids it is desirable to be able to fill the containers in the less possible time.

[0008] With the aim of attaining such object, the fluid being supplied does not exit from the machine just by gravity, but it is pushed under the action of a supply pressure.

[0009] This pressure is obviously a function of the type of fluid to be supplied.

[0010] In such condition, i.e. with the fluid being supplied being pushed or under pressure, mostly with some types of fluids, a physical phenomenon occurs, according to which the supplied fluid, immediately downstream of the supply opening 14', expands beyond the supply opening 14' itself.

[0011] This condition, outlined in figure 1, is due to the viscosity of the fluid which, more or less depending on the type of fluid, remains partially "attached" to the edge of the supply opening 14' generating a flow component substantially orthogonal to the supply direction.

[0012] This phenomenon of unwanted widening of the flow section of the supplied fluid reduces upon the increase of the distance from the supply opening 14' and substantially finishes at a distance equivalent to five diameters of the supply opening 14'.

[0013] In other words, at a determined distance from the supply opening 14', the flow section of the supplied liquid becomes again the desired one.

[0014] The term "desired" is used to indicate a section such to be able to enter into the hole of the container without dirtying the container and simultaneously allowing the exit of air from the container itself. According to the aforementioned, a possible solution could be that of arranging the bottle at a distance from the supply opening 14' such to intercept the supplied flow only when it is back to the desired section.

[0015] However, such solution is not functional to the currently known filling machines, given that the latter are mounted on rotary turntables.

[0016] In such conditions, i.e. increasing the distance between the bottle and the supply opening 14', the supplied and not yet collected flow would actually be subjected to "diversions" due to the inertial rotary forces operating thereon which make it difficult to control.

[0017] Starting from such problems of the prior art, the object of the present invention is to provide a supply valve for filling machines which is alternative to the known ones, particularly efficient and capable of contrasting, if not eliminating, the phenomenon of widening the section of the fluid as soon as it is supplied.

[0018] In other words, an object of the present invention is to provide a technical solution which, with the same supply, allows to approach the bottle to the valve without dirtying the bottle and allowing the exit of air from the container.

[0019] According to a more general aspect of the invention, the valve of the present invention innovatively provides means for the selective heating of the supply opening externally associated with the free supply end of the fluid.

[0020] Thus, the localised heating of the supply opening, which is clearly less expensive with respect to directly thermally conditioning the fluid to be supplied, temporarily modifies the viscosity of the fluid, and only locally at the crown outside the exit of the valve, thus reducing the widening phenomenon of the supplied section.

[0021] Thus, figures 1 and 3 schematically show the step of supplying the same fluid with the same thrust or pressure and distance of the bottle and it can be observed that due to the present invention, with the same supply, the interference of the fluid with the opening of the container is avoided.

[0022] Optimising the invention, the presence of a temperature sensor of the supply opening can be provided for correctly controlling the selective heating means, which can also be obtained in form of several resistances which can be selectively and independently activated.

[0023] Innovatively, such means for the selective heating may be integrated in the machine but they may also be provided in a device, for example of the ring type, which can be associated with the valves currently in use.

[0024] Further characteristics of the invention shall be outlined by the dependent claims and the preferred em-

bodiment shown in the figures.

[0025] The characteristics and advantages of a valve according to the present invention shall be more apparent from the following exemplifying and non-limiting description with reference to the attached schematic drawings wherein:

- figure 1 shows a section of a valve according to the prior art;
- figures 2 and 3 show an embodiment example of a valve of the present invention in the closing and supplying conditions; and
- figures 4-6 show details of the specific means of the valve of the present invention which allow to attain the required results.

[0026] With reference to the figures, a valve for supplying a compact flow of fluids for a filling machine according to the present invention is shown with 10.

[0027] This valve 10 for the supply of a compact flow of fluids 11 for a filling machine comprises:

- a tubular element 12 defining an inner channel 16 for the passage of the fluid 11 to be supplied, where the tubular element 12 is on one side associated with a filling machine and on the other side it is provided with a free supply end 13 provided with a supply opening 14 from which the fluid to be supplied exits; and
- means 15, preferably in form of a stem-shutter, for the selective opening and closing of the supply opening 14.

[0028] According to two alternative embodiments, the opening may occur by moving the stem 15 with the valve being stationary, or lowering the body of the stationary stem-valve 15.

[0029] Such last embodiment, which actually approaches the supply opening to the container 30, is particularly functional in the present invention which, as observable from the description, allows to control and "compact" the section of the fluid being supplied making it safely penetrate into the container which have been approached.

[0030] On the contrary, with the currently known technique, approaching the container could cause unwanted exits of the fluid from the container itself.

[0031] The free end 13 may be integral with the tubular element 12 or, as shown in the figures, an independent element associated therewith.

[0032] According to the invention, the valve comprises means for the selective heating 17 of the supply opening 14 associated with the free supply end 13.

[0033] Such means 17 may be integrated at the free end 13 or be per se a device selectively associable to the supply opening 14 and, thus, also mountable on valves currently in use.

[0034] As shown, such selective heating means 17 are

associated and operate externally, i.e. not in the channel 16, with respect to the free end 13 substantially at the supply opening 14.

[0035] Thus, as necessary, these means heat the supply opening 14 thus locally modifying the viscosity of the fluid 11 to be supplied at the exit 14 of the valve 10.

[0036] An effect of such heating is shown in figure 3 wherein the phenomenon of widening the supplied section of the fluid 11 is reduced, if not eliminated, leaving a portion "d" free for the insertion of the fluid 11 into the bottle 30.

[0037] By the present invention it is thus possible to provide a technical solution which allows to approach the bottle to the valve and, with the same supply, i.e. the same fluid and supply pressure, to obtain an efficient filling without dirtying the bottle 30 and allowing the exit of air from the container itself.

[0038] In order to optimally control and avoid wasting energy, the valve 10 further comprises a temperature sensor 20 associated with the free end 13 substantially at the supply opening 14.

[0039] Such sensor 20 is connected to a control unit 23 of the selective heating means 17.

[0040] Figures 4-6 show a possible embodiment of the aforementioned selective heating means 17.

[0041] In particular, these means 17 may provide a first resistance 18 associated with the free end 13 substantially at the supply opening 14, as well as the possible presence of a second 21 and a third 22 resistance.

[0042] The supply opening 14 usually comprises a vertical supply portion 19 and the first resistance 18 let the latter to be at least partially wrapped, vertically externally.

[0043] In order to maintain the supply opening 14 at the desired temperature, the second resistance 21 is arranged, still vertically, upstream of the supply opening 14. The function of such second resistance 21 is that of slowing the natural migration of the heat from the heated supply opening 14 to the rest of the upstream conduit 12.

[0044] Lastly, the third resistance 22 is arranged horizontally downstream of the supply opening 14, which maintains the supplied fluid 11 partially heated.

[0045] The three resistances 18, 21, 22 can be independently activated.

[0046] The operation of the valve 10 of the present invention further provides, additionally to the normal operation of the currently known analogous valves, the step of selectively heating the supply opening 14, where such heating is controlled by a control unit according to a temperature signal of the supply opening 14 measured by special sensors, for example of the thermocouple type. It has thus been observed that a valve for supplying a compact flow of fluids for a filling machine according to the present invention attains the previously outlined objects.

[0047] Actually, the present invention provides a supply valve for filling machines representing an alternative to the known ones, the valve being particularly efficient and capable of contrasting, if not eliminating, the phe-

nomenon of widening the section of the fluid as soon as supplied.

[0048] In other words, the valve of the present invention provides a technical solution which, with the same supply i.e. the same fluid and supply pressure, allows to approach the bottle to the valve without dirtying the bottle and allowing the exit of air from the container itself.

[0049] The valve of the present invention thus conceived can be subjected to many modifications and variants, all falling within the same inventive concept; furthermore, all details can be replaced by technically equivalent elements. In practice, the materials used, as well as the dimensions, may vary according to the technical requirements.

Claims

1. A valve (10) for supplying a compact flow of fluids (11) for a filling machine comprising:

- a tubular element (12) which defines an inner channel (16) for the passage of the fluid (11) to be supplied, said tubular element (12) being on one side associated with a filling machine, and on the other side having a free supply end (13) provided with a supply opening (14) from which said fluid to be supplied exits;

- selective opening and closing means (15) for opening and closing said supply opening (14);

characterized in that it comprises means for the selective heating (17) of said supply opening (14) associated with said free supply end (13).

2. The valve (10) according to claim 1, **characterized in that** said selective heating means (17) are externally associated with said free end (13) substantially at said supply opening (14).

3. The valve (10) according to any of the previous claims, **characterized in that** it comprises a temperature sensor (20) associated with said free end (13) substantially at said supply opening (14), said sensor being connected to a control unit (23) for controlling said selective heating means (17).

4. The valve (10) according to any of the previous claims **characterized in that** said selective heating means (17) comprise a first resistance (18) associated with said free end (13) substantially at said supply opening (14).

5. The valve (10) according to claim 4, **characterized in that** said supply opening (14) comprises a vertical supply section (19), said first resistance (18) at least partially wounding said vertical supply section (19) externally and vertically.

6. The valve (10) according to claim 5, **characterized in that** it comprises a second resistance (21) associated with said free end (13) upstream of said supply opening (14).

7. The valve (10) according to claim 6, **characterized in that** it comprises a third resistance (22) associated with said free end (13) downstream of said supply opening (14).

8. The valve (10) according to claim 6, **characterized in that** said resistances (18,21,22) can be independently activated.

9. A method for the supply of a compact flow of fluids (11) for a filling machine, of the type comprising:

- a tubular element (12) which defines an inner channel (16) for the passage of the fluid (11) to be supplied, said tubular element (12) being on one side associated with a filling machine, and on the other side having a free supply end (13) provided with a supply opening (14) from which said fluid to be supplied exits;

- selective opening and closing means (15) for opening and closing said supply opening (14);

said method being **characterized in that** it provides the step of selectively heating said supply opening (14).

10. The method according to claim 9, **characterized in that** it comprises the steps of measuring the temperature of said supply opening (14), transmitting said temperature signal to a control unit (20) and commanding said heating step according to said measured temperature signal.

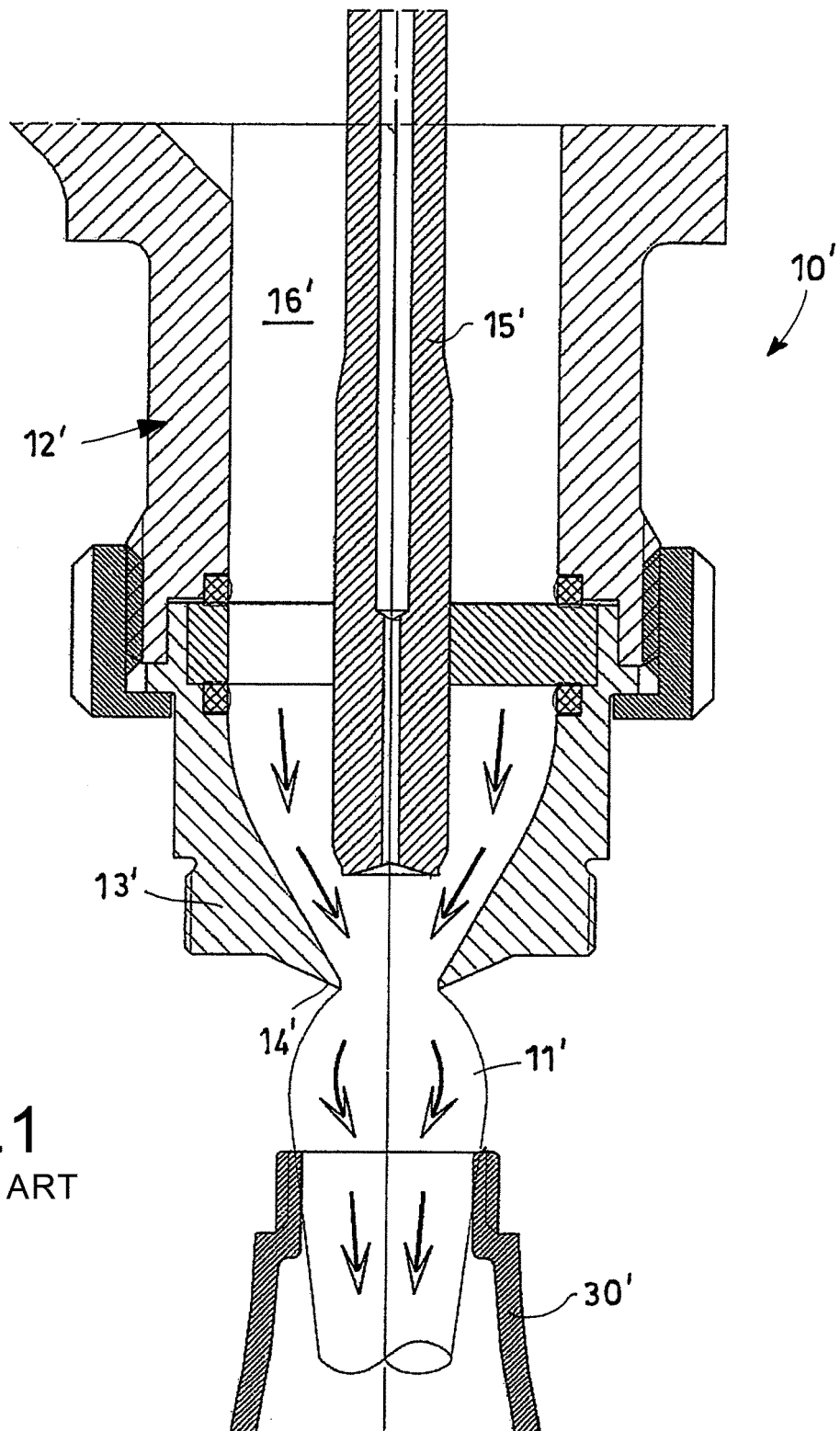


Fig.1
PRIOR ART

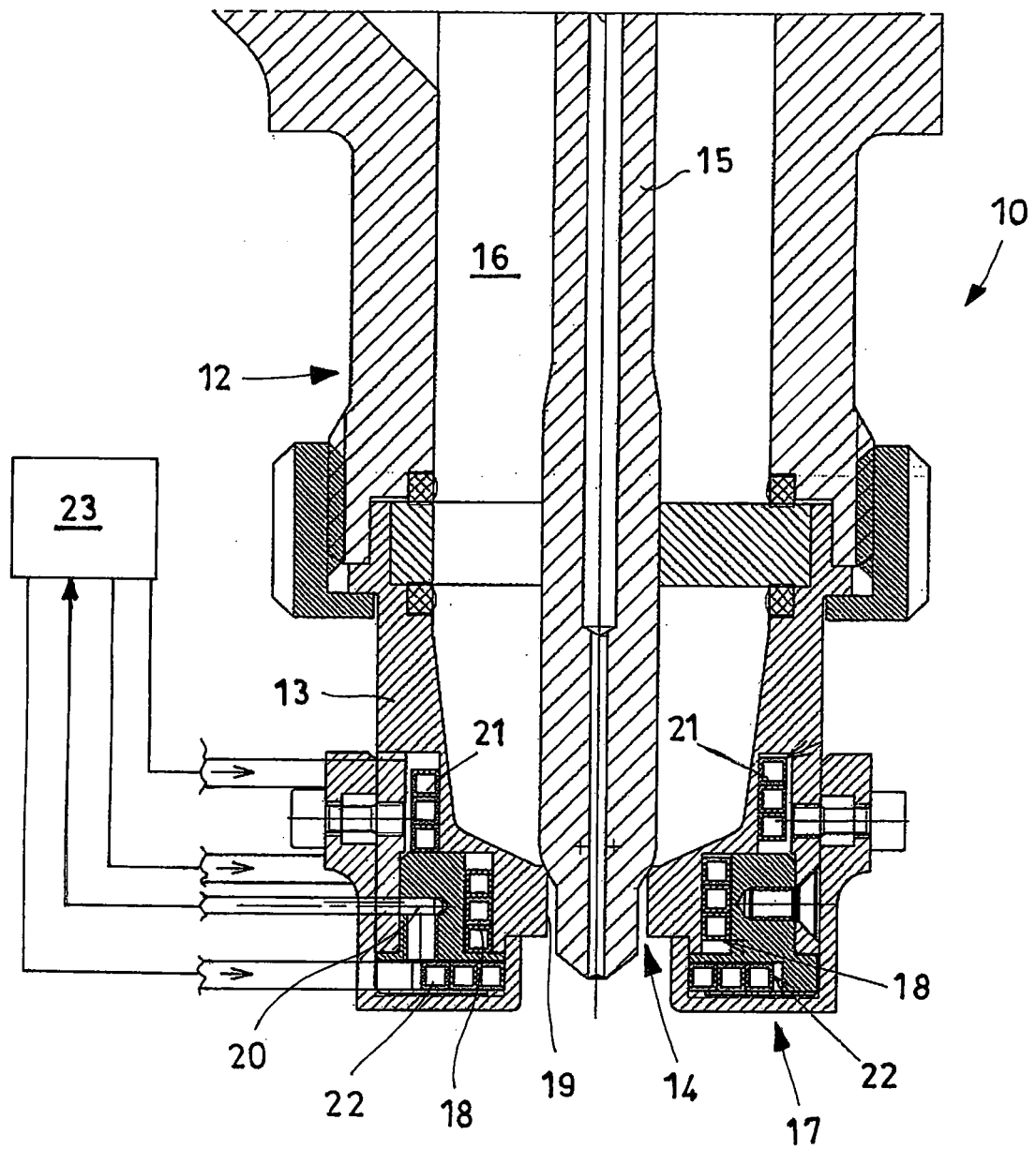


Fig.2

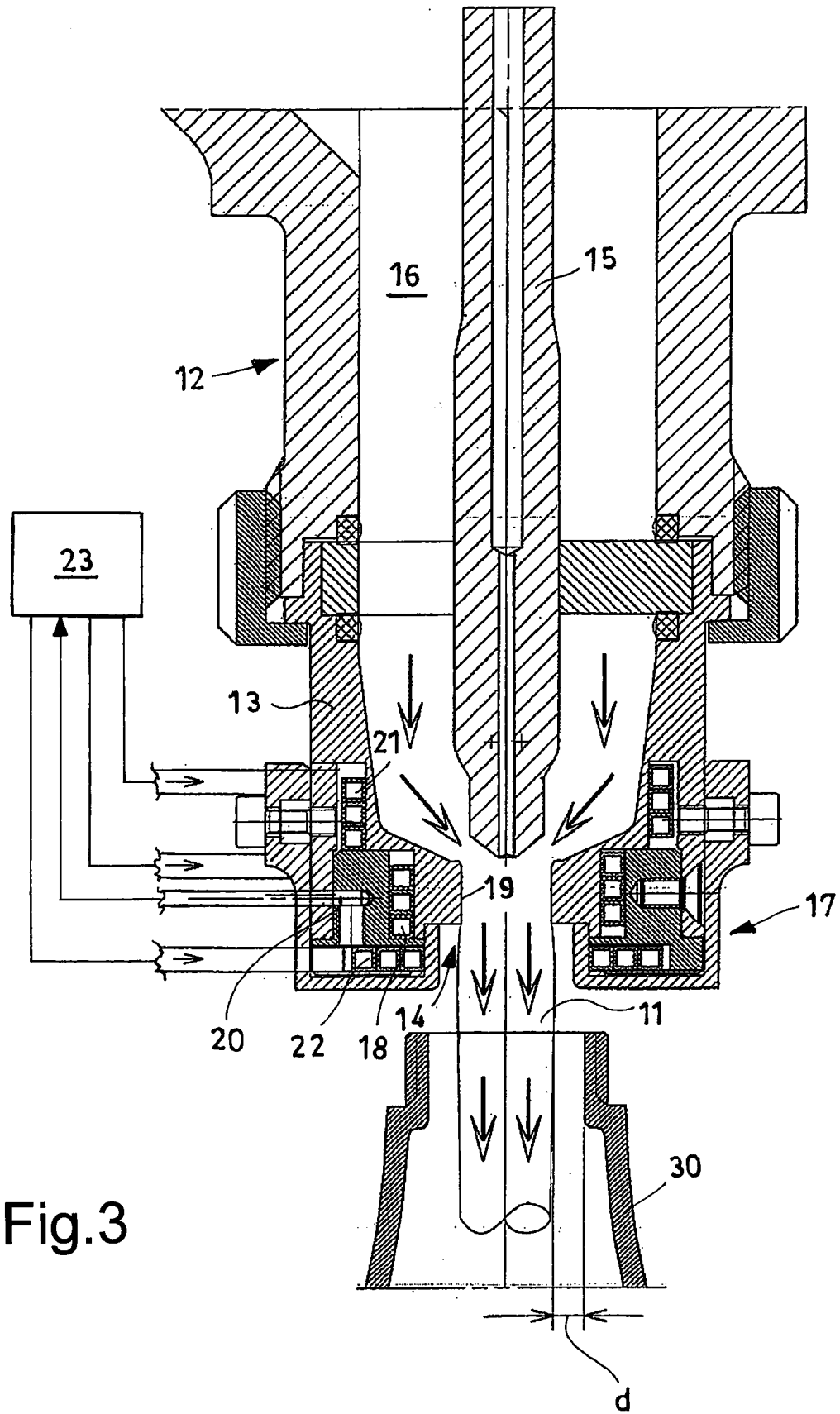


Fig.4

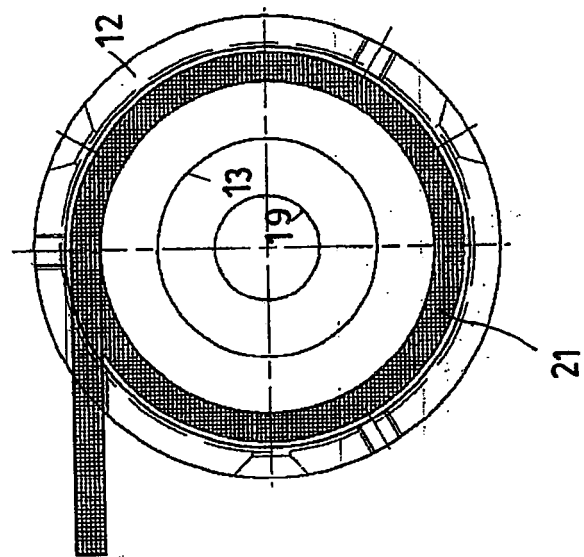


Fig.5

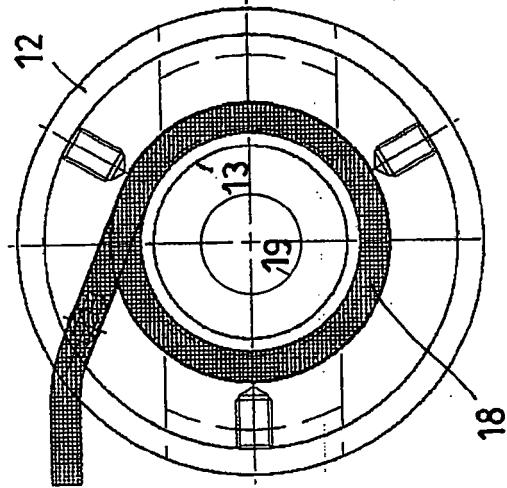
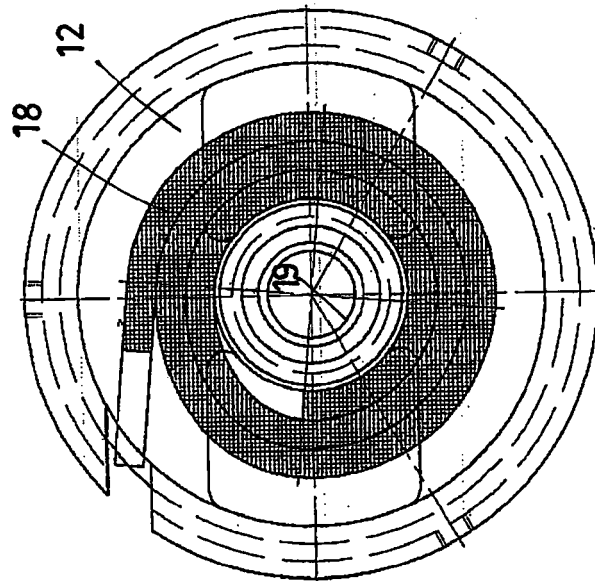


Fig.6





EUROPEAN SEARCH REPORT

Application Number
EP 14 16 6257

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 August 2014	Examiner Wartenhorst, Frank
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82