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(11) **EP 1 228 997 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.08.2002 Bulletin 2002/32

(51) Int Cl.7: **B67C 3/26**

(21) Application number: **02075410.7**

(22) Date of filing: **01.02.2002**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

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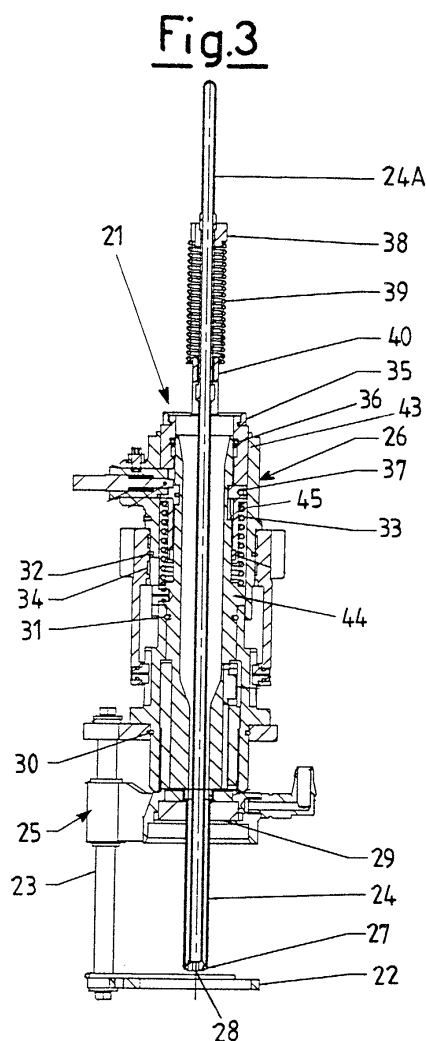
(30) Priority: **06.02.2001 IT MI010232**

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(54) **Device for filling containers, in particular bottles**

(57) A machine for filling containers, in particular bottles, comprising a series of filling groups (21), each of which includes one thin internal tube or cannula (24A), which effects the preloading of a gasket (27) situated in the outlet nozzle (28) by using a spring (39); each filling group (21) also comprises one adduction cannula (24) for the passage of the liquid to the container, concentric with the internal cannula (24A).



Description

[0001] The present invention relates to an improved machine for filling containers and in particular for the filling of bottles.

[0002] Filling operations of containers such as bottles, phials or cans, with food products, cosmetics, chemical and pharmaceutical products, creams, glues, paints, detergents or others, comprise various operations depending on the product used.

[0003] More specifically, in the wine industry, there are a series of preliminary washing, rinsing and sterilization operations of the bottles to be filled; the filling operations are subsequently effected in various ways, depending on the filling product.

[0004] For example, isobaric machines can be used for filling containers with gasified or sparkling wines, whose functioning ensures that the pressure of the container is equal to that of the vessel containing the wine to be introduced and the air contained in the bottle is expelled.

[0005] These machines essentially comprise a horizontal cylindrical tank, below which there is a series of filling taps; the taps usually consist of a combination of two fixed concentric cannulae inserted one inside the other, one terminating near the bottom of the container tank and the other positioned so as to pass through the liquid in the tank, into a chamber containing inert gas, which is used for discharging the air contained in the bottle.

[0006] The external cannula is used for transferring the liquid down into the bottle, whereas the air contained inside rises along the internal cannula.

[0007] Filling machines under vacuum, are also known for the treatment of wines, liquors, syrups, fruit juices, oils or liquid chemical products, shampoos, cosmetics; these machines operate under slight vacuum, creating a more or less forced vacuum, in the container from which the product, arriving from the machine tank assembled above a filling group, is aspirated.

[0008] Other traditional filling machines consist of volumetric or gravity machines, in which the filling is effected by free fall and with constant dosage; in this case, the product, aspirated from a container, is sent to a series of loading trays which distribute it into the containers.

[0009] In all cases, the current state of the art is characterized by the use of gravity or slight vacuum taps, comprising two cannulae of which the internal cannula is fixed; in these taps, the discharge closure of the liquid is obtained by means of a spring, attached to the external body of the machine, which acts directly on the external cannula.

[0010] An illustrative example of the taps in question is provided in figure 1, wherein 10 indicates a nozzle of a filling group 12 of a filling machine; the nozzle 10 is situated at the lower end of a tubing comprising two concentric cannulae, indicated with 13 and 14, inside which

the liquid to be introduced into the container to be filled and the air externally charged from the container, flow respectively in opposite directions.

[0011] The air is aspirated from the container by means of a vacuum pump, which is connected to an upper chamber of a tank 15 into which the cannula 13 passes; the tank 15 also comprises a collection zone of the liquid, facing the cannula 13, which is fixed in correspondence with the stop 16.

[0012] The container to be filled is hermetically held against the nozzle 19 directed by a centering cone 17, movable by means of the rod 20, so that the air present inside is slowly expelled as the vacuum is applied along the cannula 13.

[0013] The upward movement of the container lifts the cannula 14, which moves away from the gasket 11, making the liquid flow down into the container through the nozzle 10.

[0014] A spring 18, is also used, which, under rest conditions, keeps the tap closed, by holding the external cannula 14 against the gasket 11 of the filling group 12.

[0015] The portion 12 of the tap additionally comprises a sliding body 19, equipped with a hermetic seal, which rests against the bottle neck during the filling operation.

[0016] Finally, it is possible to correlate the tap to the movement of a cam, which transmits the movement to a supporting plate of the bottle base so that the entrance of the liquid into the bottle is controlled by the rotation of the cam, which has various functioning positions.

[0017] In this case, the upper end of the cannula 13 passes through the tank 15 and reaches a valve, commutable between three different functioning positions and suitable for alternatively connecting said end with a first chamber filled with inert gas, a second chamber in which there is a slight vacuum and a third high vacuum chamber.

[0018] In this way, it is possible to effect the pre-evacuation of the air contained in the bottle and insufflation of inert gas into the neck, avoiding however the contamination of oxides in the liquid.

[0019] The hermetic seal provided in correspondence with the nozzle 10 is determined, however, by the pressure force of the external cannula 14, which forms a mechanical seal on the gasket 11, against the pressure of the spring 18; under these conditions, the frequent movement of the cannula 14, which is raised and lowered with each filling, normally causes a rapid deterioration of the gasket 11 with a consequent loss of liquid with the nozzle 10 closed.

[0020] It is evident, moreover, that any slight deterioration or malfunctioning of the spring 18 creates defects in the seal, which can become additionally faulty between an opening movement and closing phase, due to the inevitable tolerances of the mechanical components.

[0021] An objective of the present invention is therefore to overcome the drawbacks mentioned above and,

in particular, to indicate an improved machine for the filling of containers, which allows an extremely forced hermetic seal to be maintained during all the filling phases.

[0022] Another objective of the invention is to produce an improved machine for the filling of containers, in particular, bottles, which allows both standard slight vacuum taps and also low oxygen absorption taps to be used.

[0023] A further objective of the present invention is to indicate an improved machine for the filling of containers, which enables the opening and closing phases of the tap to be effected in sequence, without creating particular problems relating to coupling between the parts and seal in the closing phase.

[0024] Last but not least, another objective of the present invention is to indicate an improved machine for the filling of containers, which is easy and economic to produce, using known components and at limited costs, as a result of the advantages provided.

[0025] These and other objectives are achieved by an improved machine for filling containers, in particular bottles, according to claim 1 to which reference is made for the sake of brevity.

[0026] Use is advantageously made of an internal cannula which effects the preloading of the gasket by means of the action of an internal spring; the cannula is therefore movable during the opening operations of the tap.

[0027] In the case of a standard or low oxygen absorption tap, there can also be a mechanical stop seal of the movable tap body which ensures that the spring applied to the cannula is particularly soft as the force created by the closing spring is released onto the mechanical seal.

[0028] In this way, the closing operations of the tap are particularly effective and create a constant, safe and long-lasting hermetic seal.

[0029] Additional objectives and advantages will be further clarified by the following description and enclosed drawings, referring to an illustrative but non-limiting embodiment, wherein:

- figure 1 shows a partial cross section, of a filling group used in filling machines of containers, in particular bottles, of the traditional type;
- figure 2 shows a partial top view of a filling group used in filling machines, comprising a series of taps of the standard or slight vacuum type, according to the present invention;
- figure 3 is a partial cross section, along the line III-III of figure 2, according to the present invention;
- figure 4 is a partial perspective view of the filling group according to figures 2 and 3, in accordance with the present invention;
- figure 5 shows a partial top view of a filling group used in filling machines, comprising a series of low oxygen absorption taps, according to the present invention;
- figure 6 is a partial cross section, along the line VI-VI

of figure 5, according to the present invention;

- figure 7 is a partial perspective view of the filling group according to figures 5 and 6, in accordance with the present invention;
- figure 8 is a partial cross section, of the whole filling group according to figure 6, in accordance with the present invention.

[0030] With particular reference to figure 3, 22 indicates a supporting plate of a centering cone (not shown in the figure) of the filling group 21, 23 a guiding rod of the cone, 24 a first external cannula where the liquid flows, 24A a second cannula, situated inside the first cannula 24, 25 a sliding body containing a choke ring gasket 29, 26 a coupling sleeve of the tap, 27 a lower gasket, in correspondence with the outlet nozzle 28 of the liquid coming from the external cannula 24, whereas 30 and 31 indicate two concentric choke rings of the external cannula 24.

[0031] Furthermore, 32 indicates an additional elastic protection ring of the spring 33, 34 indicates a guide ring of the filling group 21, 35 a gasket situated on the top of the tap in correspondence with the upper level of the external cannula 24, 36 indicates an O-ring to protect the elastic ring 31, whereas 38 indicates a mechanical stop of the internal cannula 24A and 39 a spring inside the group 21.

[0032] More specifically, according to the illustrative but non-limiting embodiment, of the standard slight vacuum tap, shown in detail in figure 3, it is possible to distinguish an external fixed body 43, an internal movable cylinder 44, attached to the first external cannula 24, and a second internal cannula 24A.

[0033] According to the present invention, a spring, indicated with 39, constrained to the internal cannula 24A and fixed body 43, respectively, is positioned.

[0034] In an initial rest phase, when the container to be filled is removed from the group 21, the fixed body 43 and movable cylinder 44 are connected to each other and the spring 39 is compressed, whereas the spring 33 is released; the elastic force of the spring 39 then tends to extend it upwards, so that the stress thus accumulated contributes to keeping it in a shortened compression position.

[0035] The elastic force of the spring 39 tends to push the cannula 24A upwards, firmly holding the gasket 27 against the external cannula 24 where the filling liquid of the containers flows.

[0036] In this way, the internal cannula 24A effects the preloading of the gasket 27, by means of the internal spring 39; the cannula 24A therefore moves during the subsequent opening operation of the nozzle 28 caused by the lifting of the external cannula 24 in a vertical direction and parallelly to the concentric cannula 24A.

[0037] In a subsequent phase, in which the container to be filled rests on the centering cone and gasket 29, this pressure causes the opening of the tap, due to the lifting of the movable cylinder 44, which, in turn, is con-

nected to the fixed body 43, by means of the spring 33; a relative movement, in fact, is established between the movable cylinder 44, associated with the internal cannula 24A, and the fixed body 43, up to a certain compression position of the spring 33.

[0038] The external cannula 24, containing the filling liquid, consequently rises, causing a lengthening of the spring 39, which, in the upward movement, entrains the internal cannula 24A, which remains in contact with the cannula 24 near the nozzle 28.

[0039] In practice, in the first part of the opening movement of the tap, the spring 39 is lengthened, whereas the spring 33 continues to push downwards, maintaining the seal on the gasket 27; once the internal cannula 24A reaches a vertical stop position, in correspondence with the shoulder 40 situated under the spring 39, with the continual pressure movement of the container on the gasket 29, the tap is opened, as the cannula 24A is stopped by a mechanical seal positioned in correspondence with the stop 40, the spring 33 is partially released and the external cannula 24 moves away from the gasket 27 so that the liquid can fall freely into the container.

[0040] In a further distancing phase of the container, once the filling is completed, the external cannula 24 redescends, in order to effect the closing of the nozzle 28 on the gasket seal 27; the downward movement of the cannula 24 consequently causes the internal cannula 24A to be entrained downwards with a new compression of the spring 39, before starting a new filling cycle.

[0041] In illustrative but non-limiting embodiments of the present invention, when filling groups 21A of the type indicated with 21 in figure 3, are used in machines comprising low oxygen absorption taps (this tap embodiment is schematized in figure 5-8, in which a supplementary equilevel device is also illustrated), the cannula 24A moves inside an upper collector 41, which forms part of the multifunctional valve element 42, situated on the lid 43 of the filling liquid adduction tank 15.

[0042] In this case, the internal cannula 24A slides along a guide ferrule 44, made of antifriction plastic material, so that the movement of the cannula 24A is guided inside a seal gasket creating a telescopic connection with the collector 41, during the upward and downward movements following the subsequent absence of the container to be filled and the filling phase of a new container which is positioned in correspondence with the tap.

[0043] Finally, both in the case of a standard slight vacuum tap (figures 2-4) and a low oxygen absorption tap (figures 5-8), there may also be a mechanical stop seal 45 of the movable cylinder 44 of the tap on a stop pin 37, which allows the use of a particularly elastic and soft spring 39, applied to the cannula 24A, as all the force created by the closing spring 33 is discharged onto the mechanical seal 45.

[0044] The characteristics of the improved machine for the filling of containers, object of the present inven-

tion, as also the advantages, are clearly illustrated in the description.

[0045] In particular, a long-lasting efficient, safe and continuous seal is ensured in correspondence with the bottle neck, during the filling phase, together with a substantial reduction in problems relating to rapid wear of the gasket caused by the continuous movement of the cannulae during the entire functioning cycle of the machine.

[0046] Numerous variations can obviously be applied to the machine for filling containers in question, without excluding any of the novelty principles which characterize the inventive idea illustrated, and it is also evident that, in the embodiment of the invention, the materials, forms and dimensions of the details illustrated can vary according to the demands and can be substituted with other technically equivalent alternatives.

Claims

1. A machine for filling containers, in particular for the filling of bottles, of the gravity or slight vacuum or low oxygen absorption type, comprising a series of filling groups (21, 21A) driven by synchronizing devices, suitable for transferring the liquid into the container at the moment when said container is in correspondence with at least one outlet nozzle (28) of the liquid, each filling group (21, 21A) also comprising a tap, which includes at least one adduction cannula (24, 24A) for the passage of the liquid and/or the discharge of air from said container, **characterized in that** said adduction cannula (24) for the passage of the liquid to said container effects a preloading of a gasket (27) situated in correspondence with said outlet nozzle (28) of the liquid, by means of at least a first spring (39), suitable for moving said adduction cannula (24) for the passage of the liquid during the opening operations of said tap.
2. The machine for filling containers according to claim 1, **characterized in that** said filling group (21, 21A) comprises at least one supporting plate (22) of a centering cone and guide rod (23) of said cone, said cannulae (24, 24A) for the adduction of liquid and air discharge being concentric and inserted one inside the other.
3. The machine for filling containers according to claim 1, **characterized in that** it comprises an external fixed body (43) and an internal movable cylinder (44), attached to said adduction cannula (24) for the passage of the liquid.
4. The machine for filling containers according to claim 3, **characterized in that** said first spring (39) is constrained to said cannula (24A) for the discharge of air and to said fixed body (43), respectively.

5. The machine for filling containers according to claim 3, **characterized in that** in an initial rest phase, when said container to be filled is removed from the filling group (21, 21A), said fixed body (43) and said movable cylinder (44) are connected to each other and said first spring (39) is compressed, whereas a second spring (33), situated between the external body (43) and said movable cylinder (44) is preloaded with a minimum load, so that said first spring (39) is maintained in a shortened compression position. 5
6. The machine for filling containers according to claim 5, **characterized in that** said first spring (39) tends to push said air discharge cannula (24A) upwards, maintaining said gasket (27) firmly sealed to the adduction cannula (24) for the passage of the liquid. 10
7. The machine for filling containers according to claim 6, **characterized in that**, in subsequent phases, in which said container is rested and pressed onto said gasket (29), the opening of said tap is effected due to the rising of said movable cylinder (44), up to a certain compression position of said second spring (33) and consequently said adduction cannula (24) for the passage of the filling liquid rises and causes the lengthening of said first spring (39), which, in its upward movement, entrains said air discharge cannula (24A), which remains in contact with said adduction cannula (24) for the passage of liquid close to the outlet nozzle (28). 15 20 25 30
8. The machine for filling containers according to claim 7, **characterized in that** said air discharge cannula (24A) has at least one vertical stop point, in correspondence with at least one shoulder (40) situated below said first spring (39). 35
9. The machine for filling containers according to claim 8, **characterized in that**, in a further removal phase of said container from the gasket (29), when the filling is complete, said adduction cannula (24) redescends causing a hermetically sealed closure of said nozzle (28) and consequently resulting in the downward entrainment of said air discharge cannula (24A) and a new compression of said first spring (39), which is freshly loaded, before beginning a new filling cycle. 40 45
10. The machine for filling containers according to claim 1, wherein at least one filling group (21A) is used, comprising at least one low oxygen absorption tap, **characterized in that** said air discharge cannula (24A) moves, at least partially, inside an upper collector (41) which forms part of a multifunction valve element (42), situated on the lid (43) of a tank (15) for the adduction of the filling liquid. 50 55
11. The machine for filling containers according to claim 10, **characterized in that** the moving of said air discharge cannula (24A) takes place along at least one guide ferrule (44), forming a telescopic connection with said collector (41), during the upward and downward movements subsequent to the absence of the container to be filled and filling phase of a new container which arrives in correspondence with said tap.
12. The machine for filling containers according to claim 1, wherein at least one filling group (21, 21A) is used, comprising at least one standard slight vacuum tap or low oxygen absorption tap, **characterized in that** said movable body (44) has at least one mechanical stop seal (45) on at least one stop pin (37), which makes said first spring (39) particularly elastic and soft, as all the force created by said second closing spring (33) is discharged onto the mechanical seal (45).

Fig.1
PRIOR ART

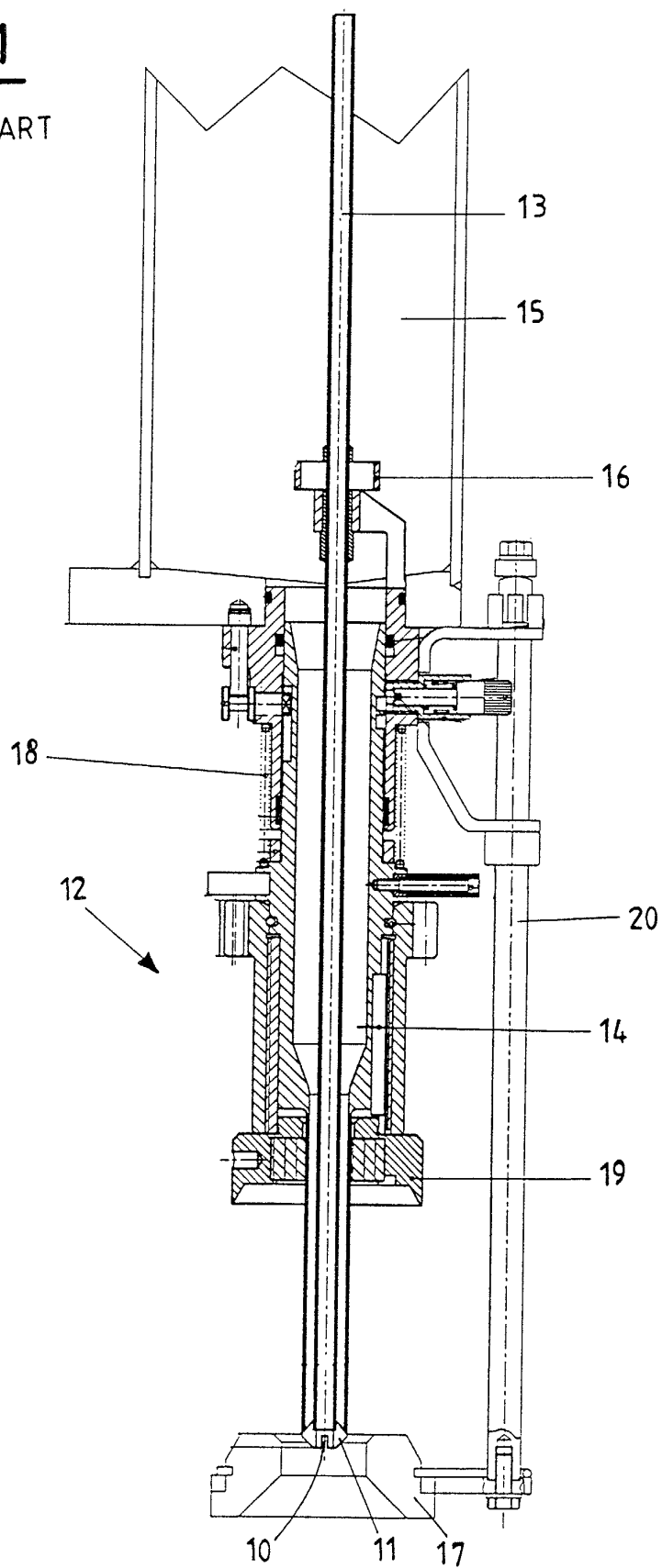


Fig.3

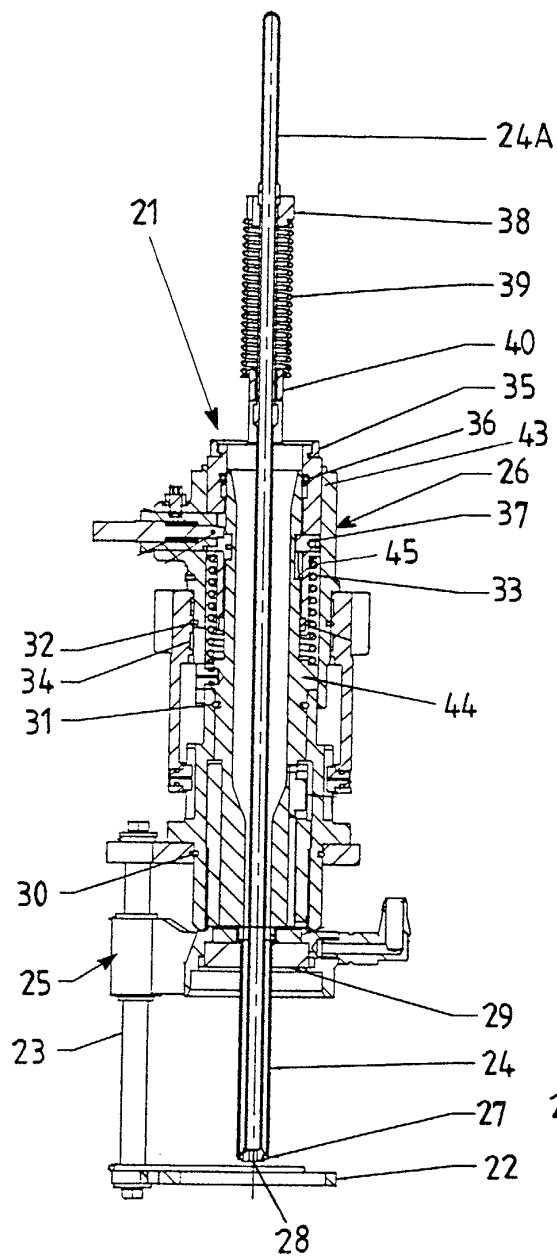


Fig.4

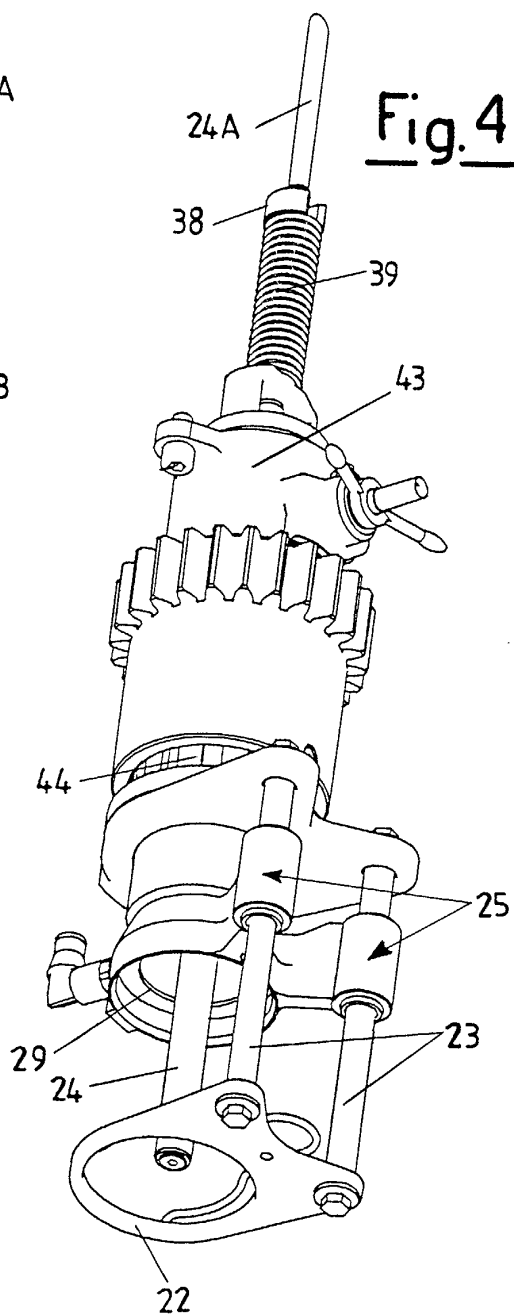
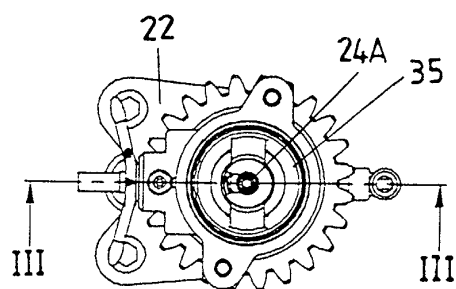


Fig.2



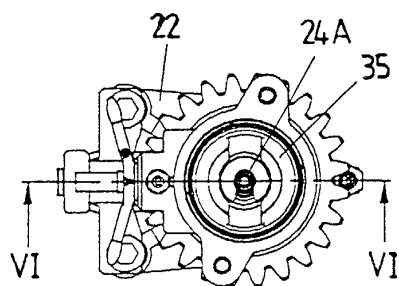
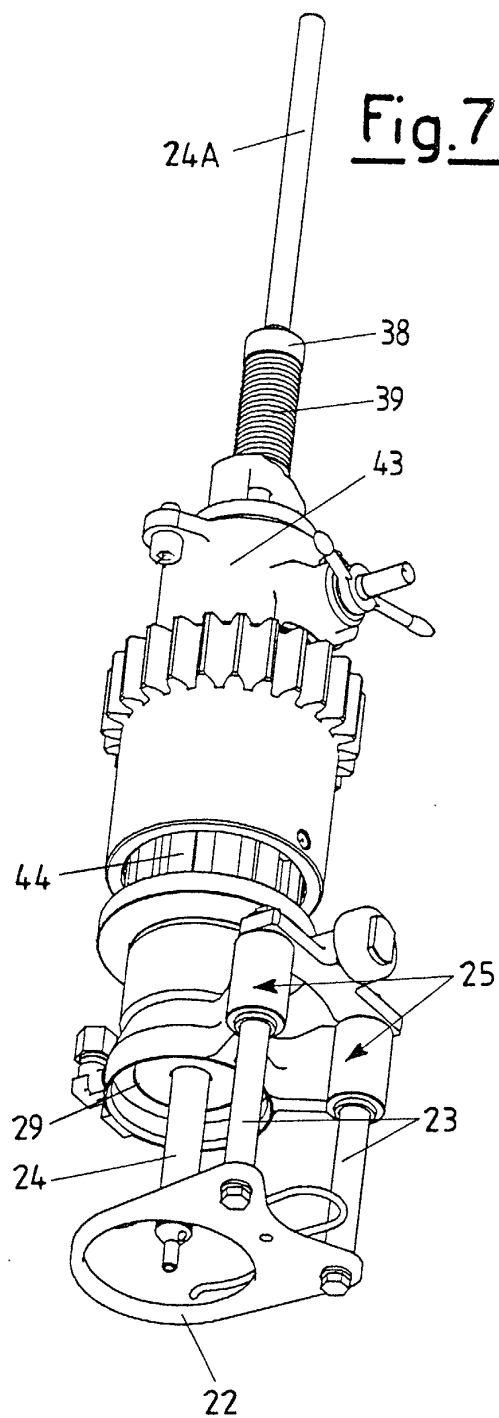
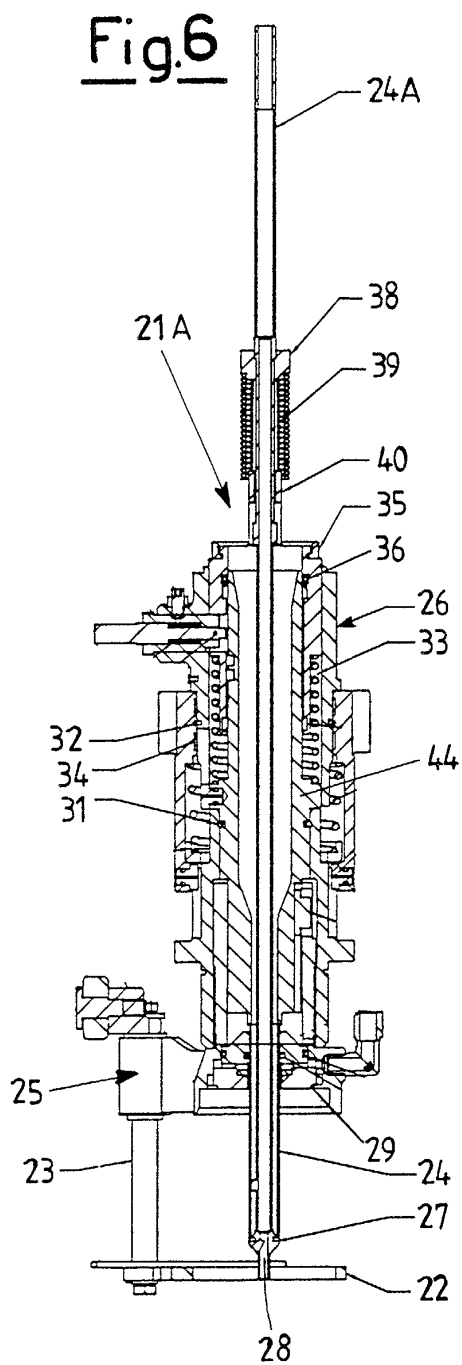
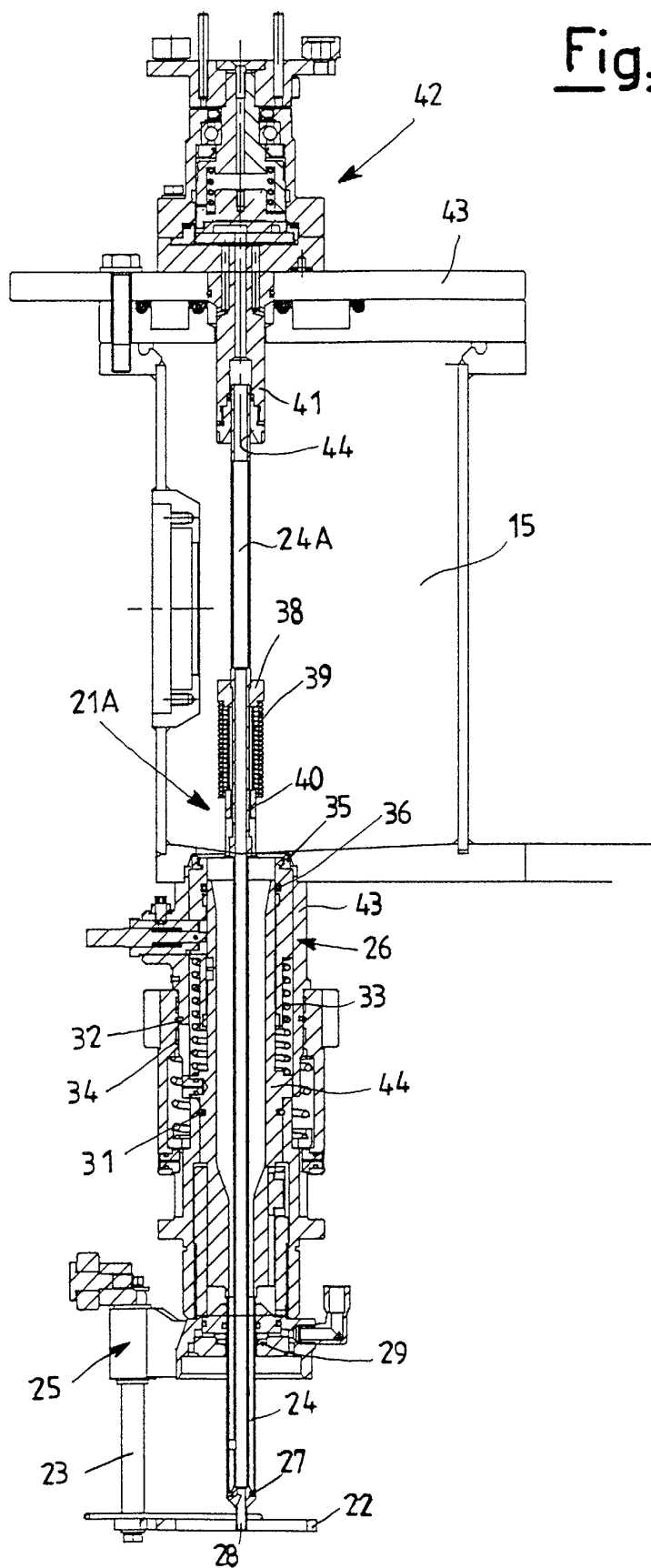


Fig.8





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 02 07 5410

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 2 154 583 A (F. RODGERS) 18 April 1939 (1939-04-18)	1,2	B67C3/26
A	* page 1, right-hand column, line 16 - page 2, left-hand column, line 34 * * figure 1 *	3-9	
X	US 2 243 463 A (C. KERR) 27 May 1941 (1941-05-27)	1	
A	* page 2, left-hand column, line 29 - page 3, left-hand column, line 53 * * figures 1-5 *	2-9	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B67C
Place of search		Date of completion of the search	Examiner
THE HAGUE		30 May 2002	Smolders, R
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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EP 02 07 5410

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30-05-2002

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2154583	A	18-04-1939	NONE	

US 2243463	A	27-05-1941	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82