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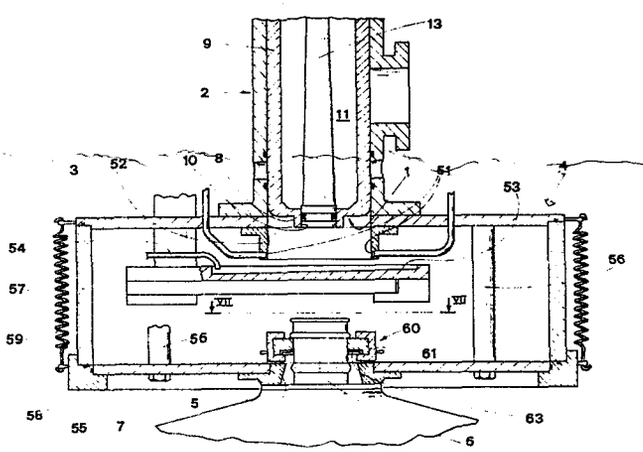
(54) **Apparatus designed for filling containers with liquid/paste substances under sterile conditions.**

(57) The invention relates to apparatus for filling containers with liquid/paste substances under sterile conditions, and comprises a filler-valve (1) located adjacent to an enclosed sterile chamber (4) whose bottom opening (5) affords access to the neck (6) of a container (7) to be filled. Provision is made for a device (24) which lays hold on the container neck (6) when inserted into the opening (5), thus keeping it in vertical alignment beneath the valve (1), and for at least one plate whose function is that of closing the opening (5) automatically whenever there is no such container offered thereto for the purpose of being filled.



EP 0 088 735 A1

Apparatus designed for filling containers with liquid/paste substances under sterile conditions.

The invention described herein refers to apparatus for filling containers with substances in liquid or paste state, under sterile conditions.

Its envisaged —though not exclusive— application is that in which special bag-type containers are filled with foodstuffs in liquid state, or of a paste-like consistency, such as tomato-pulp &c.

These bag-type containers are provided with an opening located in a cylindrical neck-portion of the bag, to which a plug or cap is subsequently fitted in order to create the necessary hermetic seal.

The main problem connected with the filling of such containers —especially where foodstuffs are concerned— is that of ensuring that the filling operation itself is brought about under genuinely sterile conditions.

A further problem is that of allowing for cleaning of such parts of the apparatus as are used in filling, valves &c, during the actual work-cycle.

An additional problem as touching the embodiment of such apparatus is that of permitting ready and easy access to its principal working parts.

The main object of the invention described herein is that of solving the problems aforementioned, by providing apparatus which is both simple in construction, and functional and efficient in operation.

These and other objects besides are arrived at by the invention described herein, which relates to apparatus designed for filling containers with liquid or paste substances under sterile conditions, and which is characterised in that it comprises:

- a filler-valve capable of movement through a vertical path and provided at bottom with an outlet orifice whose projecting spout inserts to a tight fit within the mouth of a container to be filled;
- an enclosed sterile chamber located beneath said filler-valve and having an opening at bottom into which the neck of said container may be introduced; provision being made for a device which lays hold on said container-neck, thereby keeping it aligned vertically with said filler-valve; provision being made further for means bringing about closure of said opening in automatic fashion whenever no such container is offered thereto.

A number of embodiments of the invention will now be described, by way of example, with the aid of the accompanying drawings, in which:

fig 1 is an overall view seen in vertical elevation, and part cutaway;

fig 2 & fig 3 are two sections through the same vertical plane, which show the invention in two different working positions;

fig 4 & fig 5 show respective sections through I-I in fig 1 of the device in open and closed working positions, seen in enlarged scale;

fig 6 is an overall view in cutaway of a second embodiment of the invention, again in vertical elevation;

fig 7 shows the section through a further embodiment of the invention, in vertical elevation and on enlarged scale;

fig 8 & fig 9 show two working positions of a detail of the apparatus on enlarged scale, and seen in section through VII-VII;

fig 10 & fig 11 are enlarged scale drawings in part-section through further embodiments of the invention, seen in vertical elevation.

With reference to the drawings, 1 denotes the entire filler-valve, which is capable of movement through a vertical path within a cylindrical, fixed tube 2. The tube 2 itself is fixed at right-angles to the flat top side 3 of an enclosed sterile chamber 4 having

an opening 5 at bottom designed to admit the neck 6 of a container 7 to be filled, and comprises: a cylindrical core 9 having an inner cavity 11 and an inlet 12 at one side through which to admit the foodstuff; a movable obturator 13 disposed coaxially within cylindrical core 9 and designed to block off the valve's outlet orifice 10. The pair formed by cylindrical core 9 and tube 2 is sterilised by means of pressurised vapour injected between the inner surface of tube 2 and the outer surface of cylindrical core 9 at two separate points located between the seals denoted 46 and 47.

The vapour is introduced by way of side entry-points 14 and 44, and flows out through respective side exit holes 15 and 45. The same system is adopted for sterilising both the rod 16 working obturator 13 and the seating 17 accommodating said rod. Pressurised vapour enters by way of a radially-disposed inlet duct 18 into the annular chamber 20 existing between two end seals 21 and 22 for the purpose.

The liquid or paste foodstuff being batched enters into said cavity 11 by way of an inlet 12 whenever this last is lined up with an entry port 23 located at the side of said cylindrical tube 2, this being brought about whenever a predetermined position is assumed, axially, by cylindrical core 9 with respect to cylindrical tube 2.

A grip device 24 is envisaged within sterile chamber 4 by means of which to lay hold on each single container-neck 6 offered to said bottom-opening 5. The grip-device 24 is disposed in such a way as to close around the single container-neck 6 and keep it aligned coaxially with cylindrical core 9. The grip-device 24 itself comprises a pair of jaws 25a and 25b swivelling about respective vertical axes, and disposed symmetrically so as to rotate in opposite directions with respect to the plane passing vertically through the centre of bottom-opening 5, when operated. Said jaws exhibit a semi-circular recess each, denoted 26a and 26b, these symmetrically disposed and designed to close around the single container-neck 6 when the latter is offered to bottom-opening 5 in such a way as to protrude upwards therefrom.

When no container-neck 6 is present within bottom-opening 5, the latter is kept shut automatically by means of two plates 28a and 28b, these disposed symmetrically and pivoted about vertical axes at points on respective jaws 25a and 26b of said grip-device 24 in such a way as allows freedom of rotation through a horizontal plane. When in the closed position, said plates remain in mutual contact through their rectilinear edges 30a and 30b, provision being made for a spring 32 whose function is to draw the

the one plate 28a against the other 28b. With said grip-device 24 in the open position, plates 28a and 28b are likewise drawn apart by virtue of their being carried outwards with said jaws 25a and 25b whose outer edges engage with respective detents 33a and 33b projecting downwards from each of said plates, which are associated with the jaws of said grip-device 24 as aforesaid by hinging. Thus, it becomes possible to keep enclosed chamber 4 sealed tight even when no container-neck 6 is present within bottom-opening 5.

With the introduction of a container-neck 6 into said bottom-opening 5, grip-device 24 is caused to open up, and the two jaws 25a and 25b draw apart. At the same moment nozzles located with chamber 4 send jets of disinfectant toward said opening 5. The drawing apart of said detents 33a and 33b cause said plates 28a and 28b to be drawn back in similar fashion together with jaws 25a and 25b, thereby leaving said bottom-opening 5 free for a container-neck 6 to enter.

This done, jaws 25a and 25b are drawn together once again so as to close tight around container-neck whilst the two plates 28a and 28b come up against the container neck, remaining apart inasmuch as their

rectilinear edges 30a and 30b are unable to make contact, obstructed by the latter. With the neck 6 of the container firmly held, a conventional device denoted 35 provides for removal of the plug/cap which hitherto closes off the mouth of the container 7.

At this point, the filler-valve is caused to descend to the point where its spout 8 mates with the mouth of container-neck 6, this movement bringing about alignment of inlet 12 aforementioned with the foodstuff entry-port 23 such that the foodstuff itself may flow freely into cavity 11. This done, the obturator 13 is lifted, permitting flow of the foodstuff down into container 7. With the batching stage completed, the obturator 13 is brought down once more so as to close the filler-valve 1, which is itself then raised. Device 35 aforesaid then replaces the plug/cap in/on the container mouth 6, whereupon the latter is released by grip-device 24. Throughout the entire sequence as described above, an atmosphere of inert gas is maintained within said enclosed chamber 4 —whose sterilisation is brought about beforehand— thus enabling filling of the containers 7 to be carried out under sterile conditions.

A second embodiment of the invention envisages the direct connection of inlet 12 to a flexible feed

line 43 fixed to cylindrical core 9, through which the foodstuff is propelled. The feed 43 in this case is able to slide vertically by pairing with a longitudinal slot located in said cylindrical tube 2.

In the embodiment illustrated in figs 7 and 10, nozzles 51 are envisaged, coaxially disposed, and set a slight distance from filler-valve 1 itself. The function of said nozzles is that of jetting steriliser fluid at the bottom end of said valve 1 once the latter is in "raised" position —i.e. no longer in contact with said container-neck 6. The nozzles are located in a bell-housing 52, this disposed coaxially with and at the bottom end of said cylindrical core 9 within which said valve 1 is caused to raise and lower. At a slight distance beneath said bell-housing 52 one has a drip-tray 53 which will gather up both the steriliser and any traces of the foodstuff removed from the valve's bottom end by the jets from said nozzles 51. A suction pump not shown in the drawing makes provision for removal of the waste from drip-tray 53, this being drawn off through suction-tube 54.

The drip-tray 53 is located in the top of the device 35 aforesaid which makes provision for removal and subsequent replacement of the plug/cap from and into/onto the container-neck 6 offered thereto

through said bottom-opening 5 into chamber 4 for the filling operation. The inclusion of the bell-housing 52 in the embodiment permits wash-down of the valve 1 bottom-end by fluid-jet (vapour, for instance) for sterilising purposes, in isolation from the rest of said enclosed chamber 4. Bell-housing 52 in fact provides a side-baffle whose function is that of ensuring that both steriliser and waste particles removed from the valve bottom will be kept within the space allowed by the housing and thus drop nicely into the drip-tray 53 beneath.

Access to the interior of enclosed chamber 4 is made extremely simple in this embodiment thanks to the way the chamber itself is constructed. The flat top 3 is united with its parallel opposite number at the chamber bottom 55 by way of studs 56. A cylindrical side wall 57 —fashioned from a transparent material if so desired— creates the sterile enclosure that is chamber 4 and may be slid out coaxially from the bottom with respect to top and bottom components 3 and 55. The side wall 57 thus embodied is kept in position by association with top 3 and bottom 55 and by the addition of a hoop 58 located axially about the lower edge of said wall 57 itself and urged thereagainst by means either of springs 59, or tie-bolts, anchored to top side 3.

In any event, removal of the side wall 57 is made simple dismantling hoop 58 and thus leaving it freedom to slide off.

In the embodiment in fig 7, alignment and steadying of the single container-neck 6 with respect to the vertical axis of valve 1 when introduced into bottom-opening 5 may be accomplished by a device 60 which comprises an element 61 that may be made to traverse back and forth along an axis at right-angles to that of bottom-opening 5. The element 61 itself exhibits a recess 62 at one end, shaped so as to make contact with the neck 6 of a single container 7 offered to bottom-opening 5 by sliding across to embrace that portion which projects upwards when inserted.

In this way, element 61 urges against said container-neck 6, locking it fast against the opposing side of bottom-opening 5.

In order to keep the opening closed during those intervals when no container-neck 6 is brought to bear for filling purposes, one has a plate 63 disposed parallel with and at a short distance from the chamber-bottom 55, at right-angles to the axis of bottom-opening 5. Plate 63 thus positioned is rendered movable by sliding with respect to the element 61 itself, being associated therewith by elastic means in such a way that bottom-opening 5

may be kept closed off during those intervals aforesaid when no container-neck 6 is inserted for the purposes of filling. When, on the other hand, one has a container-neck 6 inserted, said plate 63 in no way hinders the approach of element 61 toward the neck of the container, nor location of its recess 62 thereabout, since the plate itself —once having made contact with the outside wall of said container-neck 6, is able to slide with respect to element 61 in the opposite direction to that along which element 61 approaches opening 5, overcoming the resistance of a return spring 64 in so doing.

A further embodiment of the invention is envisaged, wherein one has a widening-out of cavity 11 at the point where this joins with outlet orifice 10. This detail of valve 1, denoted 65 in the drawings, (fig 10) is incorporated with the end in view of easing the outflow of particularly dense types of foodstuff during the batching stage proper.

A further embodiment still eases said outflow by the incorporation of an independent duct 66, in place of the inner cavity 11 aforesaid, located within cylindrical core 9 to one side of obturator 13, and able to slide axially in its own seating 67. After turning through a double bend, said duct 66 gives out through orifice 10 which is located coaxially with the sliding obturator 13, as aforementioned.

Claims

1) Apparatus designed for filling containers with liquid/paste substances under sterile conditions, characterised in that it comprises:
- a filler-valve (1) capable of movement through a vertical path and provided at bottom with an outlet orifice (10) whose projecting spout (8) inserts to a tight fit within the mouth of a container (7) to be filled; and
- an enclosed sterile chamber (4) located beneath said filler-valve (1) and having an opening (5) at bottom into which the neck (6) of said container (7) may be introduced;
provision being made for a device (24) which lays hold on said container-neck (6) when offered to said opening (5), thereby keeping it in vertical alignment with said filler-valve (1);
provision being made further for means which will close off said opening (5) automatically whenever no such container-neck (6) is offered thereto.

2) Apparatus as in claim 1 characterised in that said filler-valve (1) comprises:
- a cylindrical core (9) having an inner cavity (11) terminating at bottom in an outlet orifice (10) and provided at one side with an inlet (12);

and an obturator (13) capable of axial movement with respect to said cylindrical core (9) and designed to block off said orifice (10); said cylindrical core (9) capable in turn of movement within a cylindrical tube (2) provided to one side with an entry port (23) affording passage to the foodstuff flowing in.

3) Apparatus as in preceding claims, characterised in that a sterile atmosphere is maintained within said enclosed chamber (4) by means of inert gas and/or pressurised vapour.

4) Apparatus as in preceding claims, characterised in that the grip-device (24) comprises a pair of jaws (25a and 25b) swivelling about respective vertical axes and disposed symmetrically so as to rotate in opposite directions with respect to the plane passing vertically through the centre of said bottom-opening (5) when operated; said jaws (25a and 25b) exhibiting respective semicircular recesses (26a and 26b), disposed symmetrically and designed to close around the single container-neck (6) inserted into said bottom-opening (5) and protruding upwards therefrom.

5) Apparatus as in preceding claims, characterised in that said means for closing off opening (5) comprise

two plates (28a and 28b) disposed symmetrically with respect to the vertical plane aforesaid which passes through the centre of the chamber bottom-opening (5), and pivoted about vertical axes at points on respective jaws of said grip-device (24) in such a way as allows their freedom of rotation;
each said plate being provided with a detent which engages with the respective jaw to which the plate itself is hinged, thus enabling their being drawn apart during opening of the device (24) proper;
provision being made further for a spring (32) which will maintain one said plate (28a) united with the other (28b).

6) Apparatus as in claim 1 characterised in that provision is made for a number of nozzles (51) disposed coaxially around and set apart at a distance from the main body of said valve (1), and designed to jet steriliser fluid at the bottom end of said valve (1) when in raised position —that is, no longer in contact with the neck (6) of a container once filled; provision being made for such nozzles (51) to be located within a bell-housing (52) disposed coaxially with and at the bottom end of said cylindrical tube (2) within which the valve (1) itself is caused to slide vertically; provision being made further, beneath said bell-housing (52), for a drip-tray (53) designed to gather in both used steriliser and such particles of foodstuff as are removed from the bottom end of said valve (1), and for a means of suction which will draw off such waste from the drip-tray (53) itself.

7) Apparatus as in claim 6 characterised in that the drip-tray (53) is located in the top of a device making provision for removal and subsequent replacement —following filling— of the plug from/into the neck of each container (7) offered to the bottom opening (5) of said sterile chamber (4)

8) Apparatus as in claim 6 characterised in that the device (60) designed to lay hold on the neck (6)

of single containers (7) introduced into said bottom-opening (5) comprises an element (61) that may be made to traverse back and forth along an axis at right-angles to that of the bottom-opening (5) itself; said element (61) exhibiting a recess (62) at one end shaped so as to make contact with the neck (6) of a single container (7) offered to said bottom-opening (5) and protruding upwards therefrom by sliding across to embrace that portion thus presented; provision being made further for a plate (63) disposed at right-angles to the bottom-opening (5) and able to slide with respect to the element (61) with which it is associated by elastic means.

9) Apparatus as in claim 6 characterised in that the enclosed sterile chamber (4) comprises a top side (3) united by way of studs with a bottom side (55) lying parallel thereto; and a cylindrical side wall (57) embodied in transparent material, which may be slid away downwards coaxially with respect to said top and bottom (3 and 55), and which is held in position by means of a hoop (58) located axially about the lower edge of the side wall (57) itself and urged fast thereagainst by elastic means anchored to the top-side (3) aforesaid of said chamber (4).

10) Apparatus as in claim 6, characterised in that said valve (1) incorporates a widened-out portion (65)

of the inner cavity (11) aforementioned, located at the point of its association with orifice (10).

11) Apparatus as in claim 1 characterised in that the inner cavity (11) aforementioned is embodied as a duct (66) located within said cylindrical core (9) and to one side of the movable obturator (13); it being envisaged that said duct (66), after making a given bend away from vertical, terminate in the orifice (10) aforesaid with respect to which said obturator is caused to move in coaxial fashion.

Fig. 1

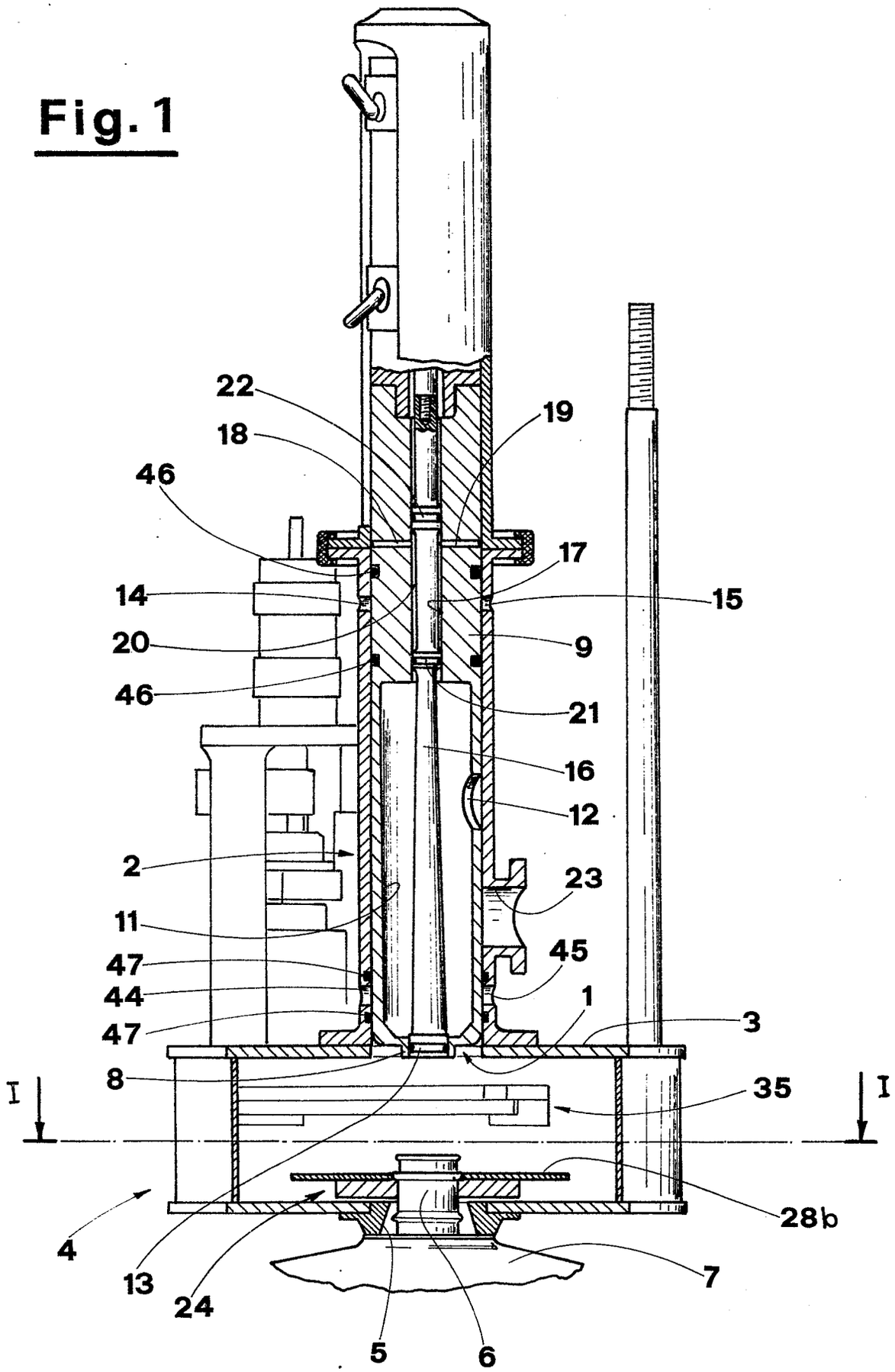

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Fig.4

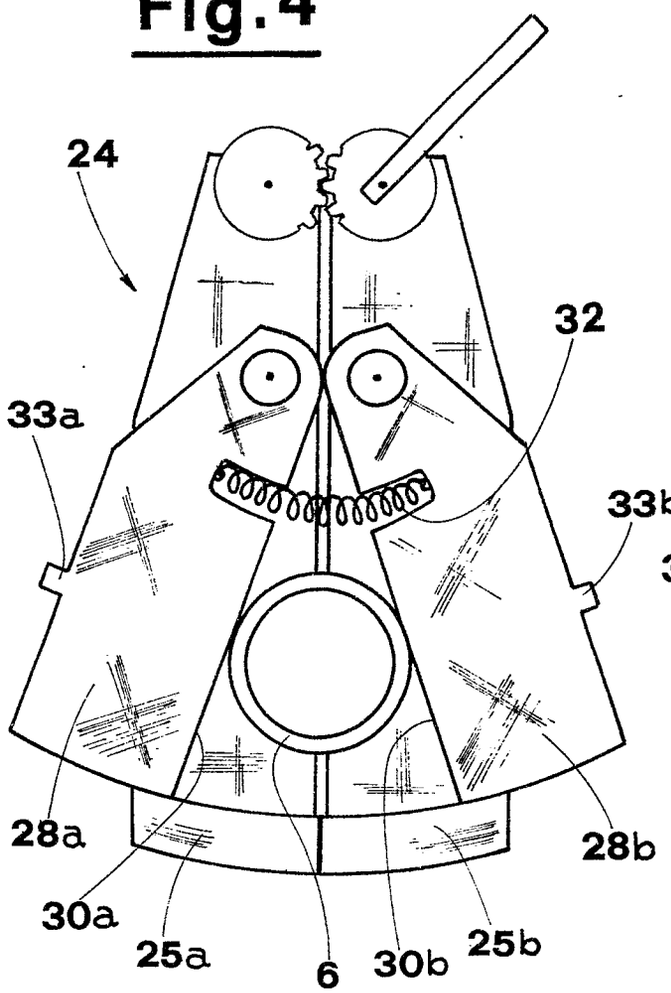
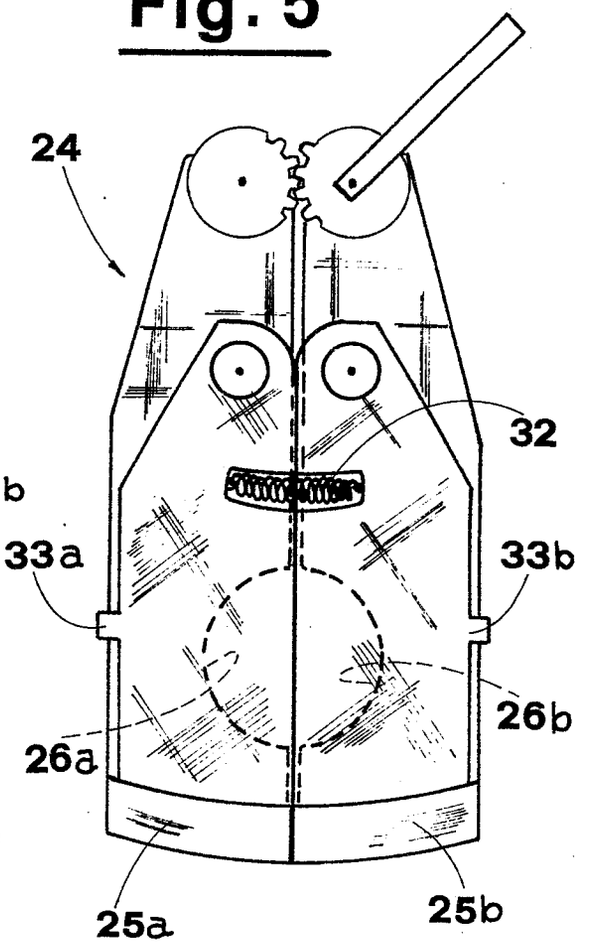


Fig. 5



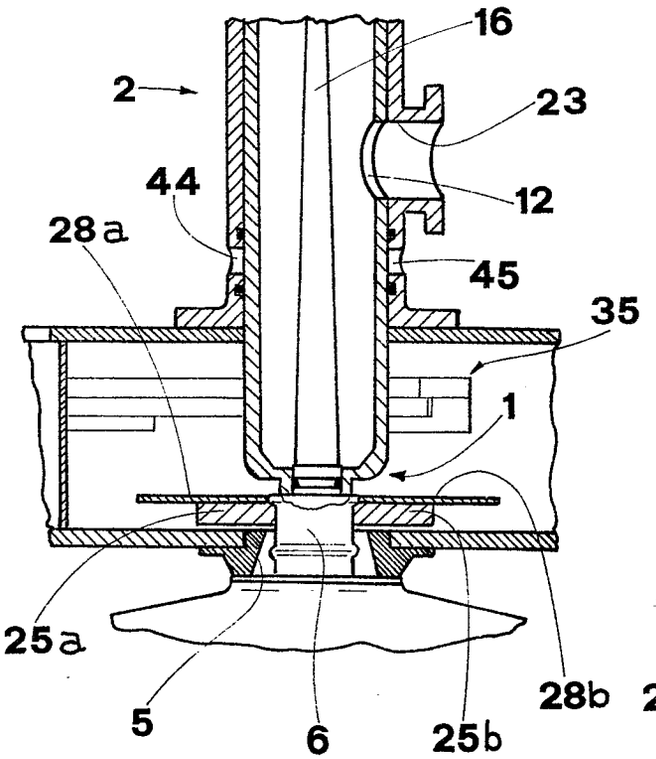


Fig. 2

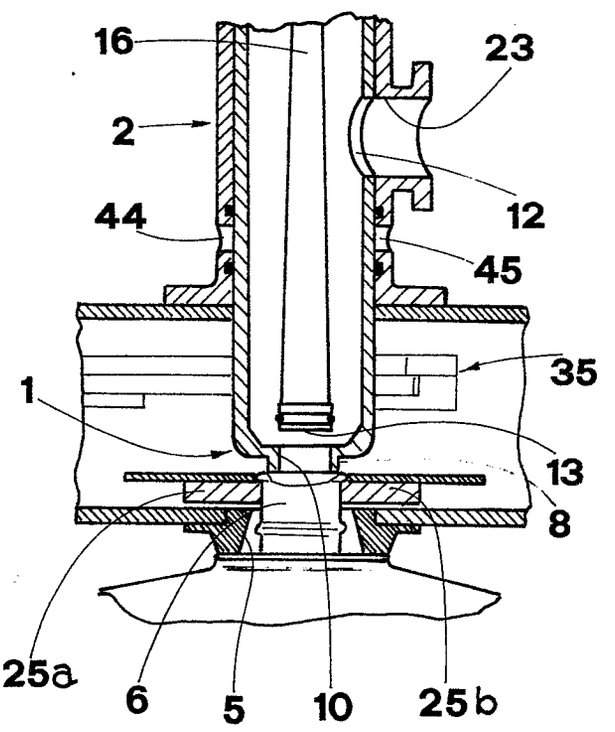


Fig. 3

Fig. 6

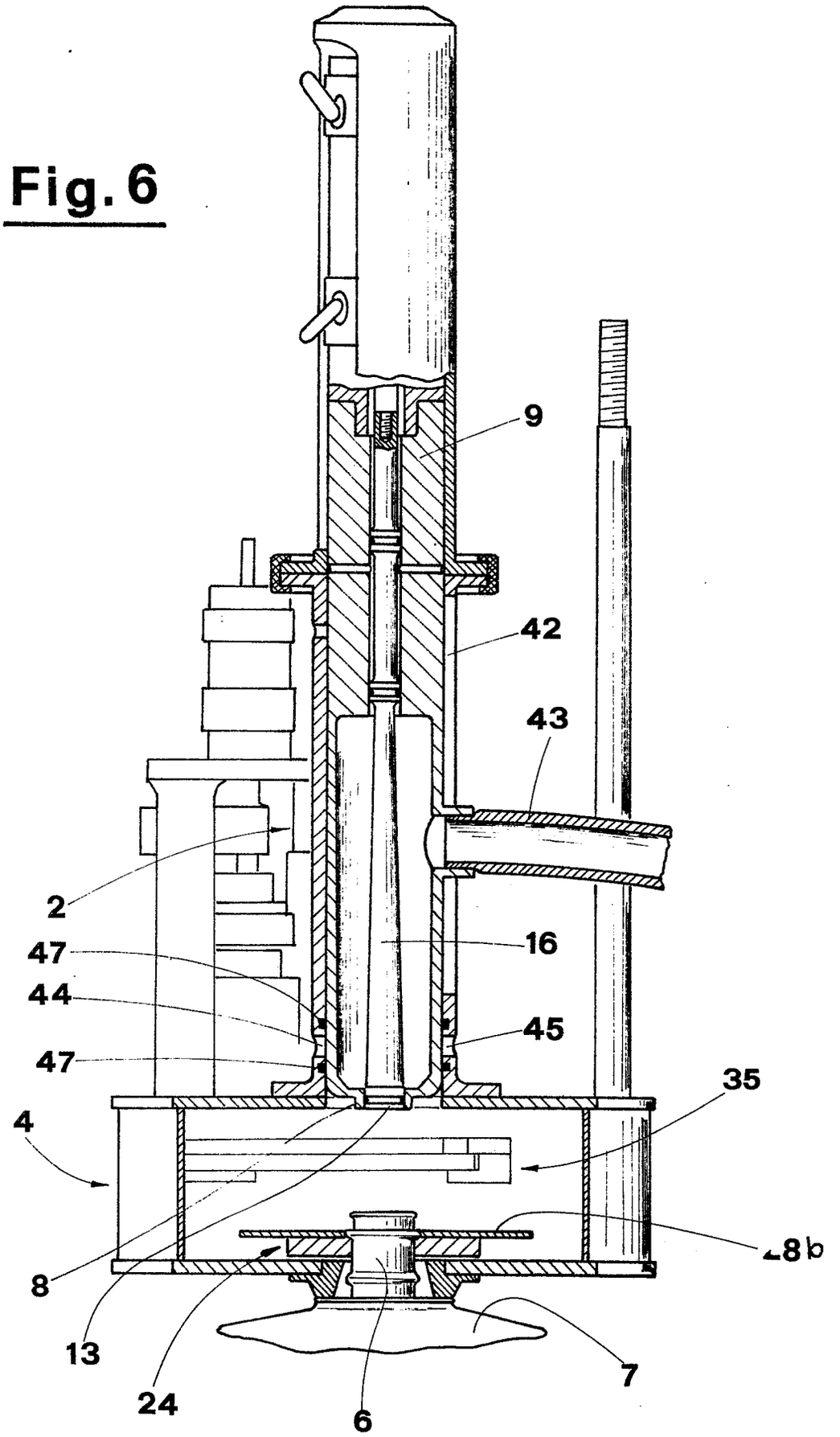
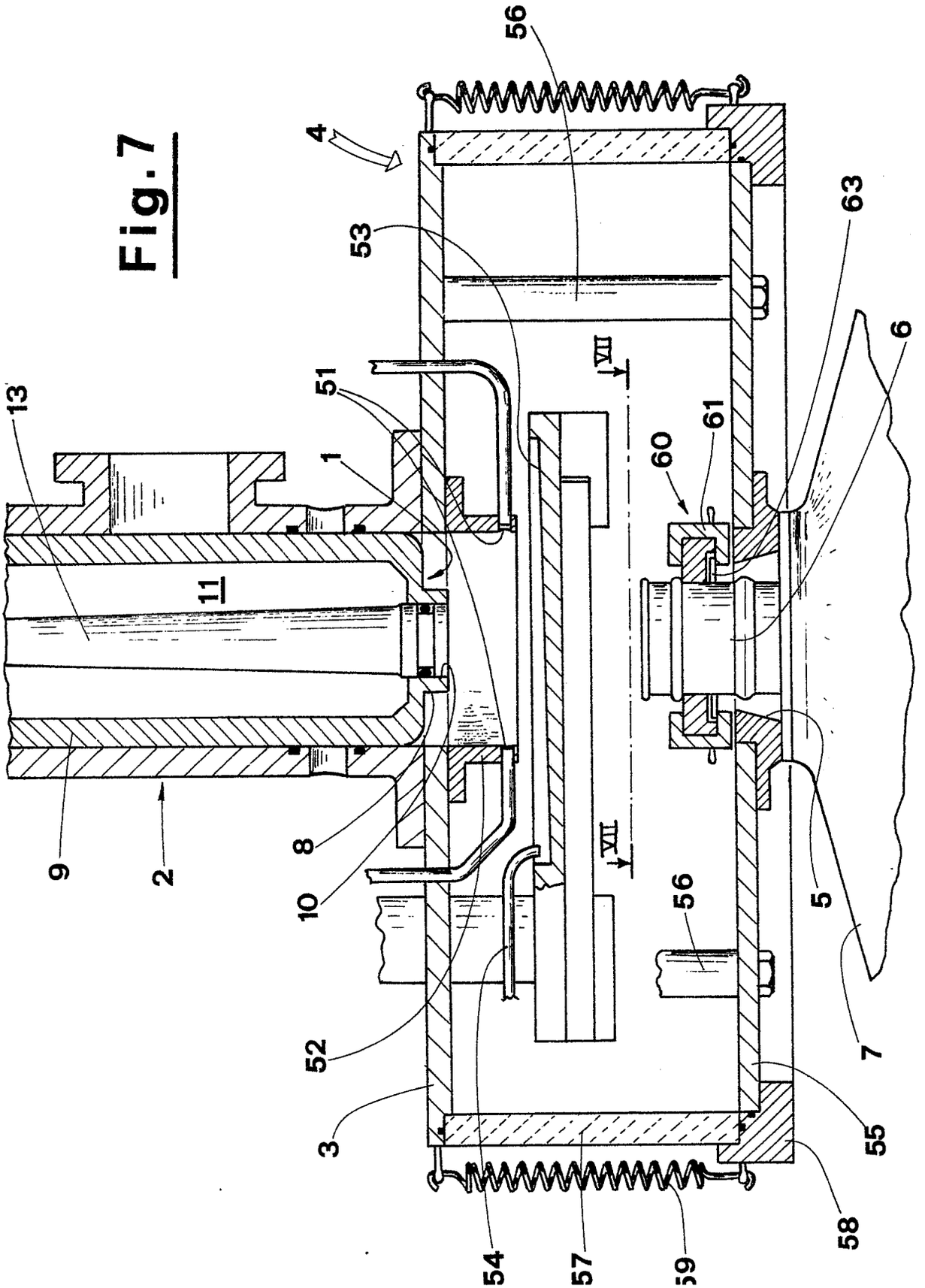


Fig.7



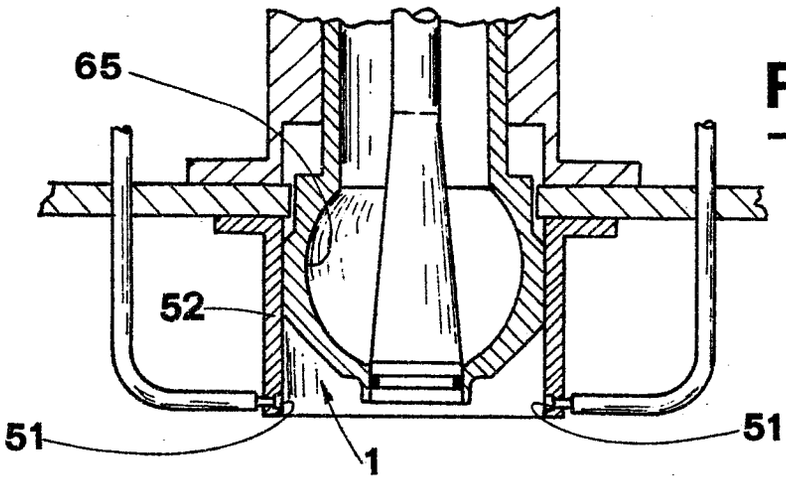


Fig. 10

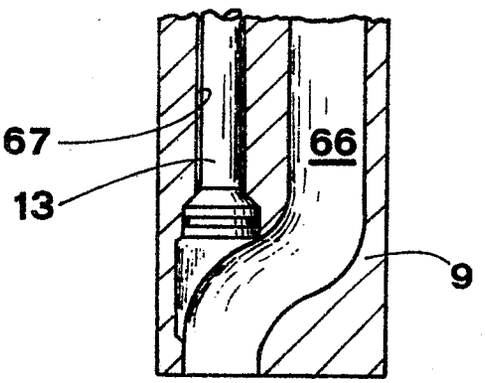


Fig. 11

Fig. 8

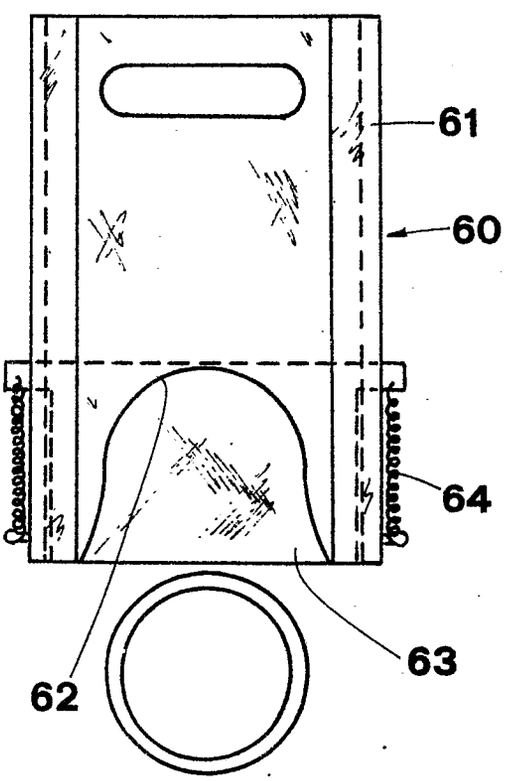
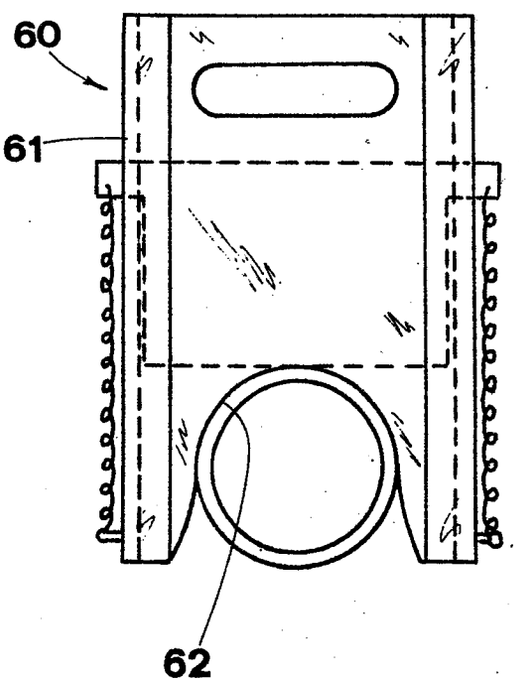


Fig. 9



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EUROPEAN SEARCH REPORT

Application number

EP 83 83 0047

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. ³)
A	FR-A-1 329 563 (REMY) *Page 2, column 1, last paragraph - page 3, column 2, paragraph 4; figure 1*	1,3,8	B 65 B 39/00 B 65 B 55/02
A	GB-A-2 058 729 (BROWN) *Page 2, line 19 - page 3, line 25; figures 1-9*	1,2	
A	US-A-3 052 269 (MANAS) *Column 4, lines 25-44; figures 8-10*	4	
A	US-A-2 787 875 (JOHNSON) *Column 3, lines 12-37; figure 1*	6	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 65 B
B 67 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21-06-1983	CLAEYS H.C.M.

CATEGORY OF CITED DOCUMENTS

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