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EUROPEAN PATENT APPLICATION

⑫ Application number: 78200391.7

⑤ Int. Cl.²: **B 65 G 65/66**

⑫ Date of filing: 22.12.78

③ Priority: 03.01.78 GB 5478

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④ Date of publication of application: 11.07.79
Bulletin 79/14

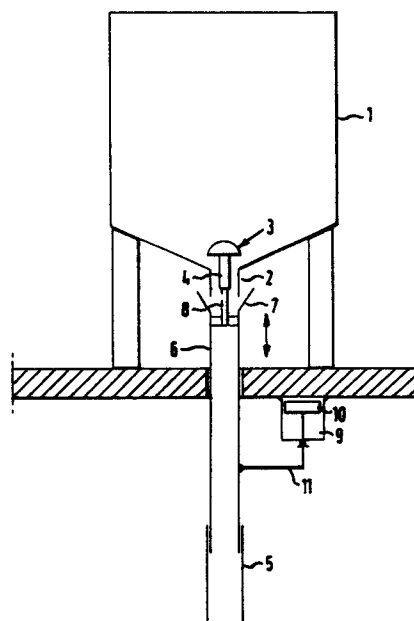
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④ Designated Contracting States: CH DE FR GB NL SE

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⑤ A method for the removal of a fluid material from a container and a container provided with a valve of special construction for carrying out the method.

⑤ A method for the removal of a fluid material from a container (1) and a container (1) for carrying out the method, wherein the container is provided at its lowest part with a self-closing valve (3) adapted to be opened by an upward thrust and wherein a drain tube (5) is provided below the valve, at least a section of the drain tube (6) being adapted to move upwardly so as to co-operate with the valve (3), a striking means (8) being provided on the drain tube (5) and adapted to provide an upward thrust to the valve body (3) of the valve as the striking means (8) moves upwardly. The method comprises moving the striking means (8) upwardly so as to open the valve (3), thereby causing the fluid material to flow out of the container (1) and into the drain tube (5).



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A METHOD FOR THE REMOVAL OF A FLUID MATERIAL FROM
A CONTAINER AND A CONTAINER PROVIDED WITH A VALVE
OF SPECIAL CONSTRUCTION FOR CARRYING OUT THE METHOD

The present invention relates to a method for the removal of a fluid material from a container by the action of gravity. The invention further provides an apparatus adapted for use with the method.

5 Among the many fluid materials moved daily in large quantities are liquid petroleum products, acids and alkalis and powdered solid materials, such as coal, salt, flour and even chocolate and milk. In general, on arrival at their point of delivery such materials are removed from their
10 containers either by gravity discharge through openings in the containers or by the attachment of pipes or hoses and the application to the system of either a pressure or a vacuum. With the latter method it is usual to employ a gate- or butterfly valve on the container operated either by hand
15 or mechanically, for example hydraulically.

 The introduction of automation into industrial processes has brought about a need to move a wider variety of fluid materials from one location to another in mobile containers or vessels. These locations are often quite short
20 distances apart and the containers relatively small. Sometimes due to the nature of the process involved it is necessary to remove the contained fluid material therefrom as swiftly and completely as possible once a container has

reached its destination.

The present invention therefore provides a method for the removal of a fluid material from a container, wherein the container is provided at its lowest part with a self-closing valve adapted to be opened by an upward thrust and wherein a drain tube is provided below the valve, at least a section of the drain tube being adapted to move upwardly so as to co-operate with the valve, a striking means being provided on the drain tube and adapted to provide an upward thrust to the valve body of the valve as the striking means moves upwardly, which method comprises moving the striking means upwardly so as to open the valve, thereby causing the fluid material to flow out of the container and into the drain tube.

The invention further provides an apparatus adapted for use with the method according to the invention, comprising a container adapted to contain a fluid material, provided at its lowest part with a self-closing valve adapted to be opened by an upward thrust and a drain tube provided below the valve, at least a section of the drain tube being adapted to move upwardly so as to co-operate with the valve, a striking means being provided on the drain tube and adapted to provide an upward thrust to the valve body of the valve as the striking means moves upwardly, thereby causing the valve to open.

In a particular embodiment of the invention the container can be a mobile container. The drain tube can be fixedly positioned. The mobile container with its contents can be brought to a location such that the drain tube is positioned below the valve. The drain tube, or at least a section thereof, can then be moved upwardly causing the valve to open and the contents to be removed therefrom.

For ease and accuracy of action the movement of the mobile container from one location to another and the movement of the drain tube can be controlled by a computer.

This invention will be further described with reference to one specific process, but it will be understood that the method of the invention can be employed in a much wider range of situations whenever it is desired to remove a fluid material from a container as swiftly and completely as possible.

In order to automate the production of blended petroleum products, such as lubricating oils, it is envisaged to employ installations wherein blending vessels or containers, of for example about 1 ton capacity, are moved automatically through a number of locations. At these locations various different operations are performed. Single components are metered into the vessels and transferred therein from one location to another or the different components of blends are metered into the vessels and the resultant mixtures heated and/or mixed as required. At various times it is necessary to remove the fluid materials from the vessels, for example when blending is complete and it is desired to deliver the product into dispatch containers. The movements of the blending vessels, the metering of the single components and the various other stages of the process are all controlled by computer so that a minimum of supervision is necessary. It is advantageous to remove the fluid materials from the vessels whilst still warm, whilst their viscosities are lowest and drainage is most efficient, as swiftly and completely as possible as soon as the vessels reach their final destination. There is a further requirement at various times to flush out a used vessel before re-use. This necessitates the introduction of a suitable fluid flushing material and then subsequently the complete as possible removal thereof.

The invention will be further described with reference to the attached drawings, wherein:

Figure 1 shows a cut away schematic side view of an apparatus comprising a container, a self-closing valve and

a drain tube according to the invention;

Figure 2 shows more detailed cut-away view of a self-closing valve and a drain tube according to the invention, with the valve in the closed position and the drain tube
5 lowered;

Figure 3 shows the same view with the valve in the open position and the drain tube moved upwardly.

Referring to Figure 1, a blending vessel or container 1, for easy and complete drainage is provided at its lowest
10 part with a self-closing valve, comprising a hollow tubular valve housing 2, through which passes vertically a valve body 3 which has an extension member 4, extending vertically downwards therefrom through the valve housing 2. A drain
15 tube positioned below the valve comprises a fixed section 5 and a movable section 6. The movable section 6 having at the uppermost end thereof an end section 7 adapted to surround the valve housing 2 and centrally mounted thereon a striking member 8 adapted to contact the extension member 4 of the
20 valve as the movable section 6 is moved upwardly. The movable section 6 is moved vertically by means of a pneumatic cylinder 9 and piston 10 acting together to displace a bracket 11 attached to the movable section 6. Activation of the pneumatic cylinder 9 by means not shown causes the vertical displacement of the movable section 6 of
25 the drain tube. Starting from its lowest rest position, as the movable section 6 is displaced upwardly the centrally mounted striking member 8 contacts the extension member 4 causing the valve body 3 to be displaced upwardly. In this position the end section 7 of the movable section 6
30 surrounds the valve housing 2. The displacement of the valve body 3 causes the valve to open and any fluid material contained in the blending vessel 1 flows by the action of gravity, past the valve body 3, through the hollow tubular valve housing 2 and downwardly through the movable section
35 6 and the fixed section 5 of the drain tube into some

further receptacle not shown.

Referring to Figure 2, a self-closing valve according to the invention is shown in more detail in the closed position and comprises a hollow tubular valve housing 20, a circular disc-like valve closure member 21, a central rod-like extension member 22 attached to the valve closure member 21 by means of a cap 39 and a pin 40. The extension member 22 is adapted to move vertically within a central axial bore 23 within the valve housing 20. Furthermore, the valve comprises a coiled spring 24 adapted to encircle the extension member 22 within the bore 23 and further adapted to be compressed between a groove 25 in the extension member 22 and a horizontal face 26, in the valve housing 20, when the extension member 22 is moved vertically within the bore 23 to open the valve. The valve housing 20 is secured to an annular adapter 43 which is incorporated in the bottom wall 44 of the vessel or container. For obtaining a good seal between the valve housing 20 and the adapter 43, a sealing ring 41 is provided in the valve housing 20. The circular disc-like valve closure member 21 is provided with a sloping peripheral sealing face 27 adapted, when the valve is closed as shown in this Figure, to sealingly engage with a similar sealing face 28, provided on the upper extremity of the hollow tubular valve housing 20. A compressible sealing ring 29 is provided in the sealing face 28 of the valve housing 20 to improve the seal between the two sealing faces 27 and 28. Pressure equalization ducts 30 and 42 are provided within the rod-like extension member 22 connecting the space 31 between the valve housing 20 and the extension member 22 with the outside of the valve.

A number of axially arranged ducts 32 are provided through the hollow tubular valve housing 20 to facilitate the passage therethrough of fluid material when the valve is open. Figure 2 also shows a small section of a movable drain tube section 35 having attached thereto, by a series of vane-

like radially arranged ribs 36, a centrally mounted striking member 37 adapted to contact the central rod-like extension member 22 at its lower end 38 as the striking member 37 is moved in a vertically upwards direction by means not shown.

5 Figure 3 shows the same parts as in Figure 2 numbered similarly after the movable drain tube section 35 has been moved vertically upwards by the means not shown, to open the valve. The vertical displacement of the movable drain tube section 35 has brought the centrally mounted striking
10 member 37 into contact with the lower end 38 of the central rod-like extension member 22. The extension member 22 has been displaced vertically upwards compressing the coiled spring 24 between the groove 25 in the extension member 22 and the horizontal face 26 in the bore 23, and displacing
15 the circular disc-like valve closure member 21 vertically upwards. The vertical displacement of the valve closure member 21 has broken the seal between the sealing face 27 on the valve closure member 21 and the sealing face 28 of the hollow tubular valve housing 20. Fluid material present in
20 the space above the valve closure member 21 in the vessel or container (not shown), is free to pass downwardly over the sealing face 28 of the valve housing, through the axially arranged ducts 32 therein and into the drain tube 35, the vane-like radially arranged ribs 36 offering a minimal
25 resistance to its flow.

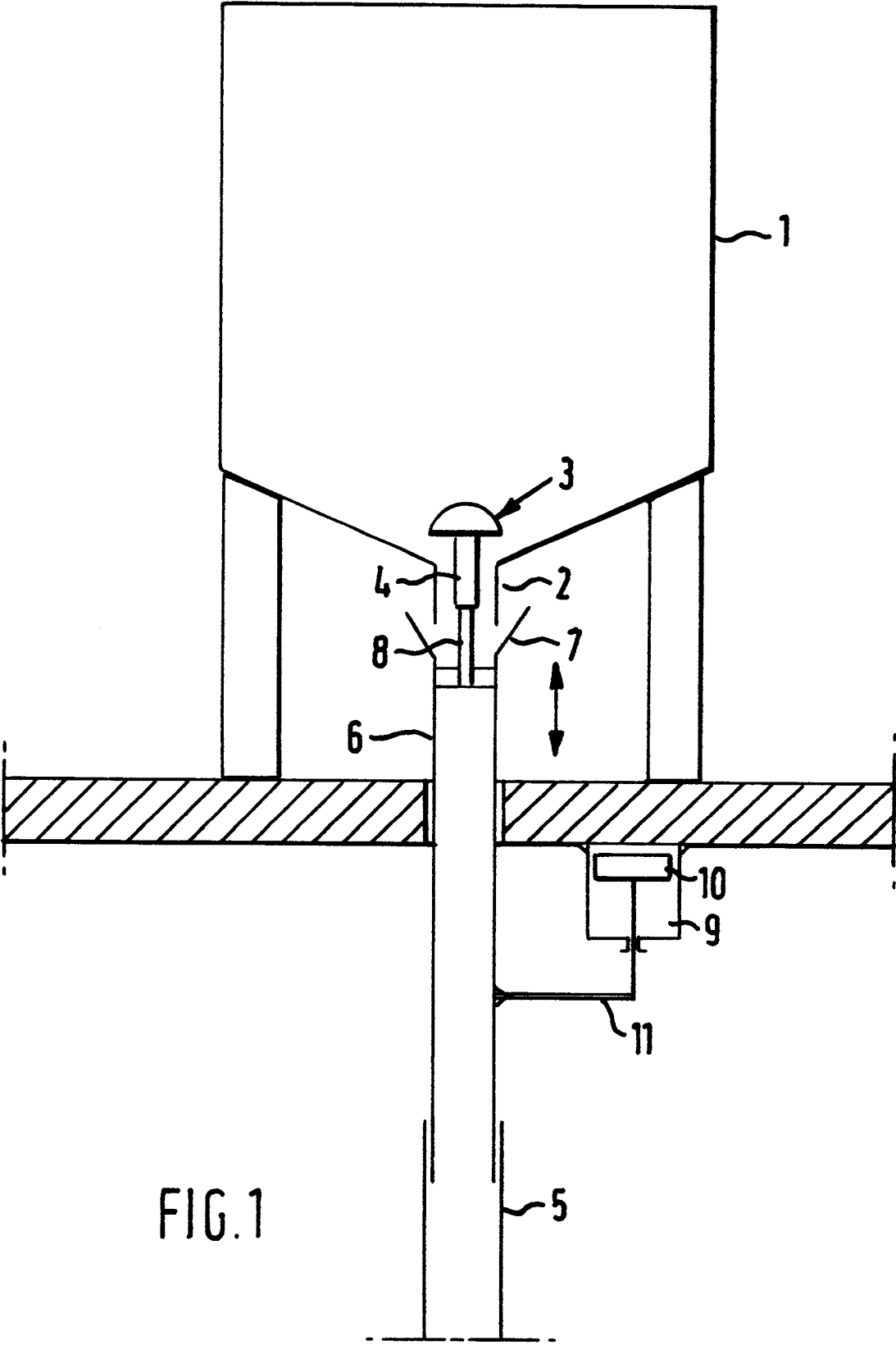
It will be appreciated that the invention is not restricted to a circular disc-like valve closure member 21 and a rod-like extension member. Instead, it is also possible to use for example a spherical closure member,
30 which can co-operate with a striking member provided with a disc-like upper end.

If desired, a suitable gas-tight annular sealing member (not shown), for example made of foam rubber, can be arranged between the drain tube 35 and the valve housing 20.

C L A I M S

1. A method for the removal of a fluid material from a container, characterized in that the container is provided at its lowest part with a self-closing valve adapted to be opened by an upward thrust and wherein a drain tube is
5 provided below the valve, at least a section of the drain tube is adapted to move upwardly so as to co-operate with the valve, a striking means is provided on the drain tube and adapted to provide an upward thrust to the valve body of the valve as the striking means moves upwardly, which method
10 comprises moving the striking means upwardly so as to open the valve, thereby causing the fluid material to flow out of the container and into the drain tube.
2. The method as claimed in claim 1, characterized in that the container is adapted to be moved from one location to
15 another.
3. The method as claimed in claim 2, characterized in that the drain tube is fixedly positioned and the container is moved to a location such that the drain tube is below the valve.
- 20 4. The method as claimed in either claim 2 or claim 3, characterized in that the movement of the container is controlled by a computer.
5. The method as claimed in any one of the foregoing claims, characterized in that the operation of the drain
25 tube is controlled by a computer.

6. An apparatus adapted for use with the method as claimed in claim 1, characterized in that it comprises a container adapted to contain a fluid material, provided at its lowest part with a self-closing valve adapted to be
5 opened by an upward thrust and a drain tube provided below the valve, at least a section of the drain tube being adapted to move upwardly so as to co-operate with the valve, a striking means being provided on the drain tube and adapted to provide an upward thrust to the valve body of the
10 valve as the striking means moves upwardly, thereby causing the valve to open.
7. The apparatus as claimed in claim 6, characterized in that the container is mobile.
8. The apparatus as claimed in claim 7, characterized in
15 that the drain tube is fixedly positioned and the mobile container is adapted to be moved to a location such that the drain tube is below the valve.
9. The apparatus as claimed in any one of the claims 6 to 8, characterized in that the movable section of the drain
20 tube is adapted to be moved pneumatically.
10. The apparatus as claimed in any one of the claims 6 to 9, characterized in that the movement of the container and of the movable section of the drain tube is controlled by a computer.



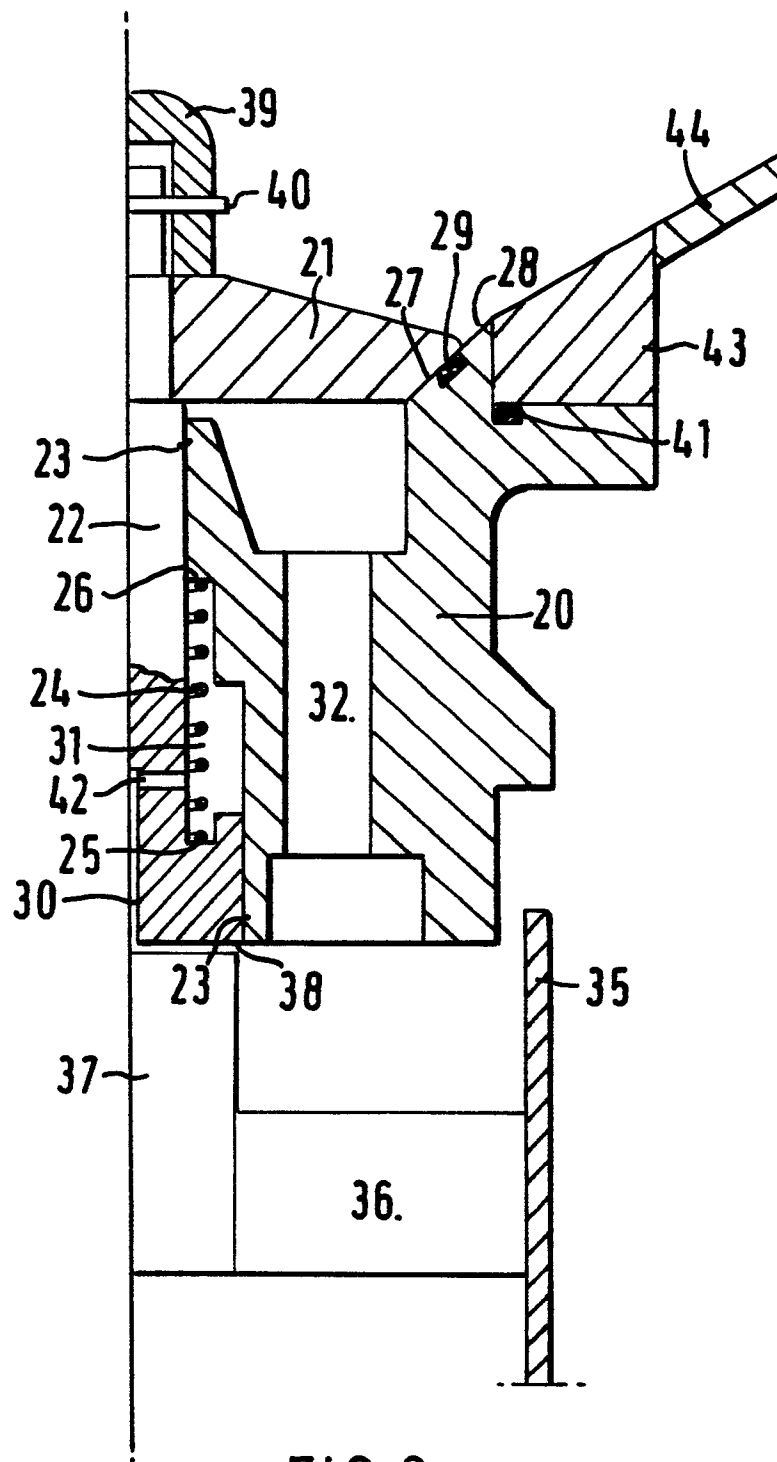
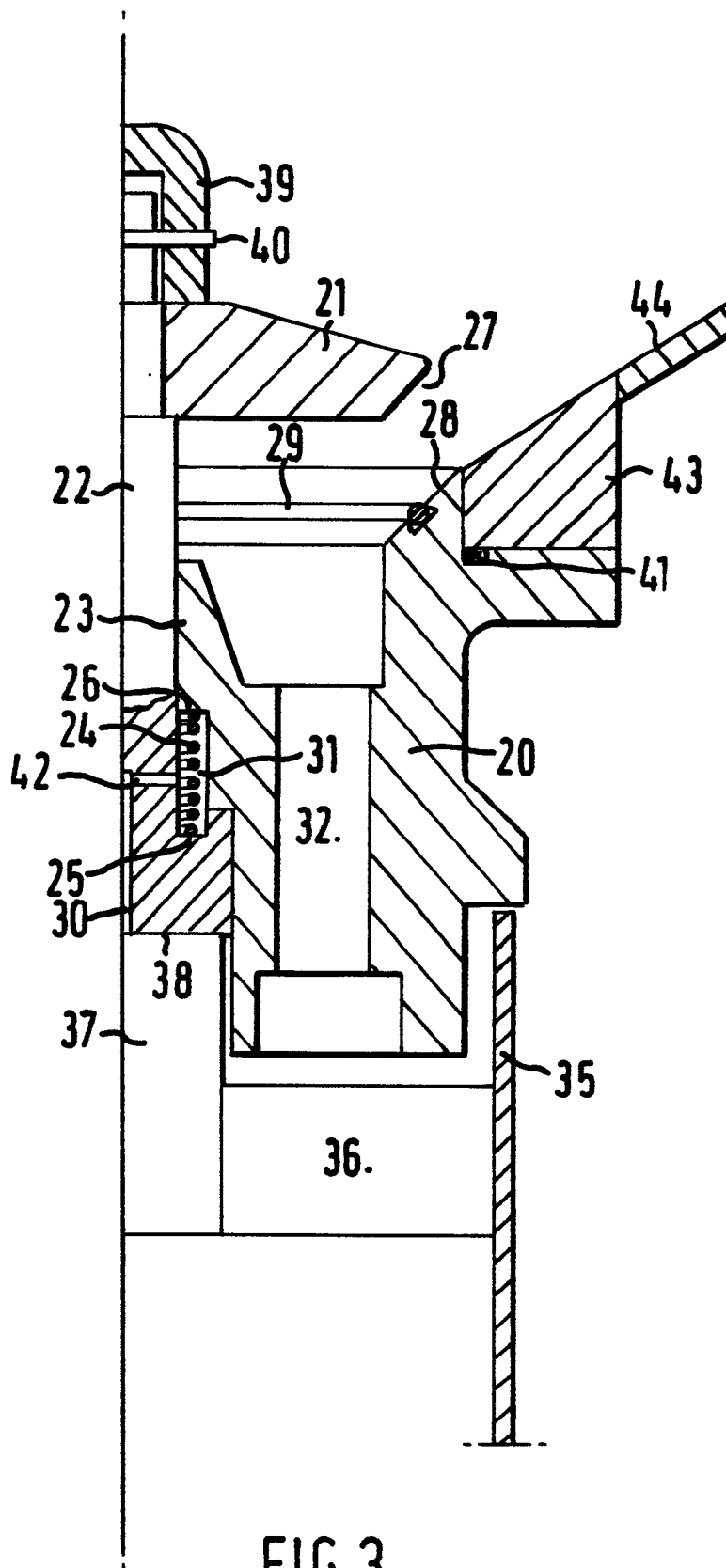


FIG. 2





European Patent
Office

EUROPEAN SEARCH REPORT

0002874
Application number
EP 78 20 0391

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>US - A - 2 788 809 (PATON)</u> * Entire document *	1,6	B 65 G 65/66

	<u>FR - A - 2 324 540 (SIMON-SOLITEC)</u> * Entire document *	1,2,3, 6,7,8	

			TECHNICAL FIELDS SEARCHED (Int. Cl.)
			B 65 G B 65 D F 16 K
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
☒ The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 26-03-1979	Examiner OSTIJN