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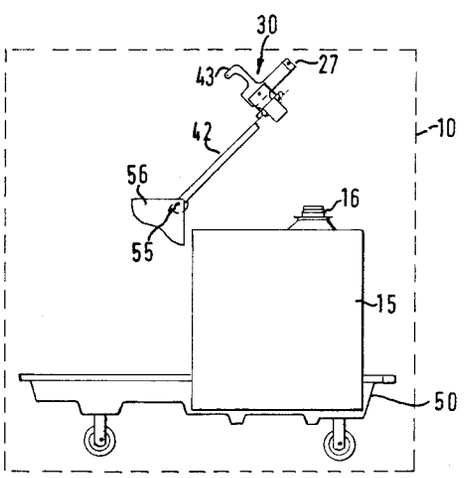
(54) Photographic processing apparatus.

(57) Apparatus (10) for processing photographic material and which comprises a process bath filled with a liquid delivered from a storage container (15), the storage container (15) being placed on a trolley (50) and connected to the bath by a push-in/pull-out cap (30) engagable with the mouth of said container and having a passageway connected by conduits to the process bath (12, 13), the cap (30) and conduits connected thereto being mounted on a support plate (42) pivoted to a frame (46) of the apparatus so that the cap - (30) can be raised and lowered into and out of the mouth of the container (15).

FIG.6B



EP 0 654 710 A1

1. Field of the invention.

This invention relates to apparatus for processing photographic material, comprising a process bath connected to a storage container for process liquid.

The application is particularly relevant to storage containers for photo-chemical products for use with apparatus for processing photographic materials.

Background of Invention

Photographic processing apparatus will typically comprise a developing section, a fixing section, a wash section and a drier.

The process liquids for the developing section and the fixer section are typically provided in containers having an opening closed by a screw threaded cap. Such containers can be in the form of rigid moulded polyethylene containers, or collapsible containers consisting of a collapsible plastic cube insert within a corrugated board outer support.

The apparatus supply conduit from the container to the respective section of the apparatus are normally coupled to the container by means of a screw threaded coupling to which a supply conduit is attached. This makes coupling and uncoupling the container to the apparatus cumbersome since either the supply conduits become twisted, or the container has to be rotated during coupling. Furthermore such a cumbersome coupling system may lead to messy spills and wastage.

Object of Invention

It is object of the invention to provide an improved processing apparatus incorporating a simple push-in construction of cap which permits quick coupling and uncoupling of containers without spillage.

Statements of Invention

According to one aspect of the invention there is provided an apparatus for processing photographic material and which comprises at least one process bath, the or each bath being filled with a liquid delivered to the bath from a storage container, the storage container being connected to the bath by a push-in/pull-out cap having a radially expandable and contractible resilient seal engagable with the mouth of said container and having a passageway connected by conduits to the respective process bath, said cap and conduits connected thereto being mounted on a support plate pivoted to a frame of the apparatus so that the cap can be raised and lowered into and out of the mouth of the container.

Connection caps having a radially expandable and contractible resilient seal engagable with the mouth of a holder are known, e.g. from US-A 4,759,462, WO-A 91 02684 and US-A 2 079 049. These caps do not constitute a handy system for connecting a container with fresh processing liquid, e.g. a jerrycan or a cubitainer with a contents of 20 l, to the supply conduit of a photographic processor, bearing in mind that suchlike container is usually at floor level and must be inserted completely into a corresponding opening of the apparatus which provides not always sufficient finger space for mounting and removing the cap.

Preferably the resilient seal is expanded to engage inner surfaces within the mouth of the container by axial compression of the seal. The seal may be expanded and contracted through operation of a handle mounted on the cap body and having a cam surface thereon.

Suitably, the apparatus according to the invention comprises on the support plate an electrical switch which is operated by a portion of said handle when the handle is in the 'cap sealed' position. The cap can have two fluid passageways therein communicating with a delivery conduit leading to a bath and with a return conduit from the bath, respectively.

According to a further suitable embodiment of the invention, a delivery pump for delivery of liquid from the container to the bath, and a return pump for discarging liquid from the bath to the container are mounted on said support plate and connected into said delivery and return conduit.

Still further, the apparatus can comprise a trolley onto which a new full container can be loaded, the arrangement of the trolley being such that the cap fits into the mouth of said loaded container as the trolley has been inserted in the apparatus and the support plate bearing said cap is pivoted downwardly.

The apparatus according to the invetntion is preferably for use with collapsible storage containers especially of photographic processing liquids.

Description of Drawings

The invention will be described by way of example and with reference to the accompanying drawings in which:-

Fig. 1 is a schematic drawing of a photographic processing apparatus according to the invention,

Fig. 2 is a section through a cap according to the invention in the pushed-in condition whilst being disengaged,

Fig. 3 is similar section to that in Fig. 2 but in the sealed condition.

Fig. 4 is a side elevation of an apparatus including a container and cap as shown in Figs. 2 and 3,

Fig. 5 is a plan view of the container and cap as shown in - Fig. 4, and

Figs. 6a-6d shows the stages of installing and connecting a container into an apparatus for processing photographic material.

Detailed Description

With reference to Fig. 1 of the drawings there is illustrated in schematic form a process apparatus 10 for processing photographic material and in particular for producing off-press colour proofs for accessing the quality of colour separations and colour rendition in printing.

The photographic proof will in the course of its development pass through a liquid developer which develops the silver image, a liquid bleachfixer which removes silver from the proof, a wash to remove non hardened parts and a drier. A proof will have to make four such passes to build up a full colour picture.

The process apparatus 10 has a housing 11 which encloses a development bath 12 and a fixing bath 13. The development bath, in particular, is as enclosed as possible to prevent oxidation of the liquid developer in the bath 12.

Essentially the supply and regeneration of process liquid to both baths 12 and 13 is similar.

The process photo-chemical liquids are each supplied in a respective collapsible container 15. Containers known as cubitainers which consist of a collapsible plastic cube inside a corrugated board outer are suitable. The mouth 16 of each container is sealed by a cap 30 through which a supply conduit 17 and a return conduit 18 pass. The process liquid is delivered to the respective bath 21 or 13 through the supply conduit 17 by means of a delivery pump 19 located in the supply conduit between the respective bath and container. The delivery pump 19 has a motor 22 connected to a controller 21 which controls the operation of the pump.

A liquid level sensor 23 monitors the presence of liquid in each bath 12 or 13 and is connected to the controller 21 to cause the respective delivery pump 19 to supply the respective process liquid to the bath until the liquid level therein has reached a predetermined minimum level. This will automatically compensate for loss of process liquid caused by evaporation and carry over.

A discharge means in the form of an exit pump 25 is located in the return conduit 18 of each respective bath 12,13. Each exit pump 25 is preferably a peristaltic type pump which gives a good shut off when the pump is inoperative. The controller 21 causes each exit pump 25 to operate for a predetermined time period after predetermined time intervals so that used liquid from the baths 12, 13 is regularly removed and returned to the respective container 15. This removes process liquid which may degenerate due to both oxidation and use. The time interval between operations of the exit pump, and/or the time period for which the pump is operational may be controlled by a timer control 27. However, said time intervals may also be based on the throughput (i.e. m2) of the processed material.

In order to reduce oxidation of the process liquid in the storage containers 15, especially of the developer, the mouth 16 of the container is hermetically sealed by the cap 30 which is shown in Figures 2 and 3.

With reference to fig. 2 and fig. 3, each cap 30 comprises an annular cap body 31 which is shown located in an aperture 41 of a support plate 42. A stepped piston 32 has a large diameter head 33 and a smaller diameter stem 34 which extends axially through the centre of the annular body 31 in which it is slidingly supported. An annular elastomeric seal ring 35 is fitted around the portion of the stem 34 extending beyond the cap body 31 and is held in place by a retainer 36 fitted to the inner axial end of the stem 34 (that is inner with respect to the container).

A handle 37 is pivoted to the head 33 of the piston by a pin 38, the handle in use has a cam surface portion 39 in contact with the cap body 31 so that as the handle 37 is pivoted about the pin 38 from the horizontal position shown in Fig. 2 to the vertical position shown in fig. 3 the cam surface 39 acts against the cap body 31 to relatively displace piston 32 upwardly. The two flat surface portions 44, 45 either side of the cam surface 39 provide a 'lock out' facility with the handle 37 in the horizontal and vertical positions respectively.

As the handle 37 displaces piston 32 upwardly, the seal ring 35 is compressed axially between the retainer 36 and the cap body 31 causing the seal ring to expand radially outwardly.

The handle 37 has an extension 43 thereon which is substantially normal to the handle and which in use can operate a warning device for alerting a user to a state of the cap, e.g. sealed or unsealed.

In use the piston stem 33 of the cap is inserted into the mouth 16 of the container 15 and the handle 37 is pivoted about the pin 38 to cause the seal to expand radially and engage the inner surfaces of the mouth 16 to hermetically seal the cap to the container and retain the cap in position.

The piston 32 has two liquid passageways 44 (one only shown in Fig. 3) therethrough for the connection of the container 15 to the supply and

return conduits 17 and 18.

Now with reference to Figs. 4 and 5 there is shown a cap 30 of the type described with reference to Figs. 2 and 3, mounted on a support plate 42 which is in turn pivoted by a hinge 45 to a frame 46 of the process apparatus 10. The frame 46 may optionally include a fixture plate 47 which fits over the neck of the container 15 to hold the container in position.

Mounted on the support plate 42 are portions of the supply conduit 17 and return conduit 18 which lead to the passageways 44 in the cap.

A switch 47 is also mounted on the support plate 42 and can be activated by the extension 43 of the handle so as to operate a warning device such as a light or buzzer to indicate to the user of the aparatus 10 the condition of the cap 30, i.e. open or sealed.

The delivery pump 19 and exit pump 25 may also be mounted on the plate 42 connected to the respective conduits 17, 18. The pump 19, 25 may be connected to the respective baths 12,13 by flexible conduits 17, 18, allowing for pivoting of the support plate.

All connections may be of the leak proof snap-fit type.

Figures 6a - 6d show the steps of locating a new container 15 into a process apparatus 10. The plate 42 is in a raised position with handle 27 of the cap 30 -in a horizontal condition. The new full container 15 is loaded onto a wheeled trolley 50.

The trolley is pushed into the processor 10 and arranged so that its mouth 16 is positioned to receive the cap 30 when the plate 42 is pivoted downwards around the hinge 45.

The plate 42 is then pivoted downwards to place the cap 30 into the mouth 16 of the container (Fig. 6c) and is coupled to the container when the handle 27 is caused to move from the vertical to horizontal condition thereby expanding the sealing ring 35 to seal the cap to the container and hold the cap within the mouth 16. To change the container when the process fluid is exhausted,thereverse sequence of events takes place.

Claims

1. Apparatus (10) for processing photographic material and which comprises at least one process bath (12, 13), the or each bath (12, 13) being filled with a liquid delivered to the bath from a storage container (15), the storage container (15) being connected to the bath by a push-in/pull-out cap (30) having a radially expandable and contractible resilient seal (35) engagable with the mouth of said container and having a passageway (44) connected by conduits (17, 18) to the respective process bath (12, 13), said cap (30) and conduits (17, 18) connected thereto being mounted on a support plate (42) pivoted to a frame (46) of the apparatus so that the cap (30) can be raised and lowered into and out of the mouth of the container (15).

2. Apparatus according to claim 1, wherein the resilient seal (35) is expanded to engage inner surfaces within the mouth (16) of the container (15) by axial compression of the seal.

3. Apparatus according to claim 2, wherein the cap has a cap body (31), and the seal (35) is expanded and contracted radially through operation of a handle (37) mounted on the cap body (31) and having a cam surface (39) thereon, the handle (37) also providing a means for lifting the container (15).

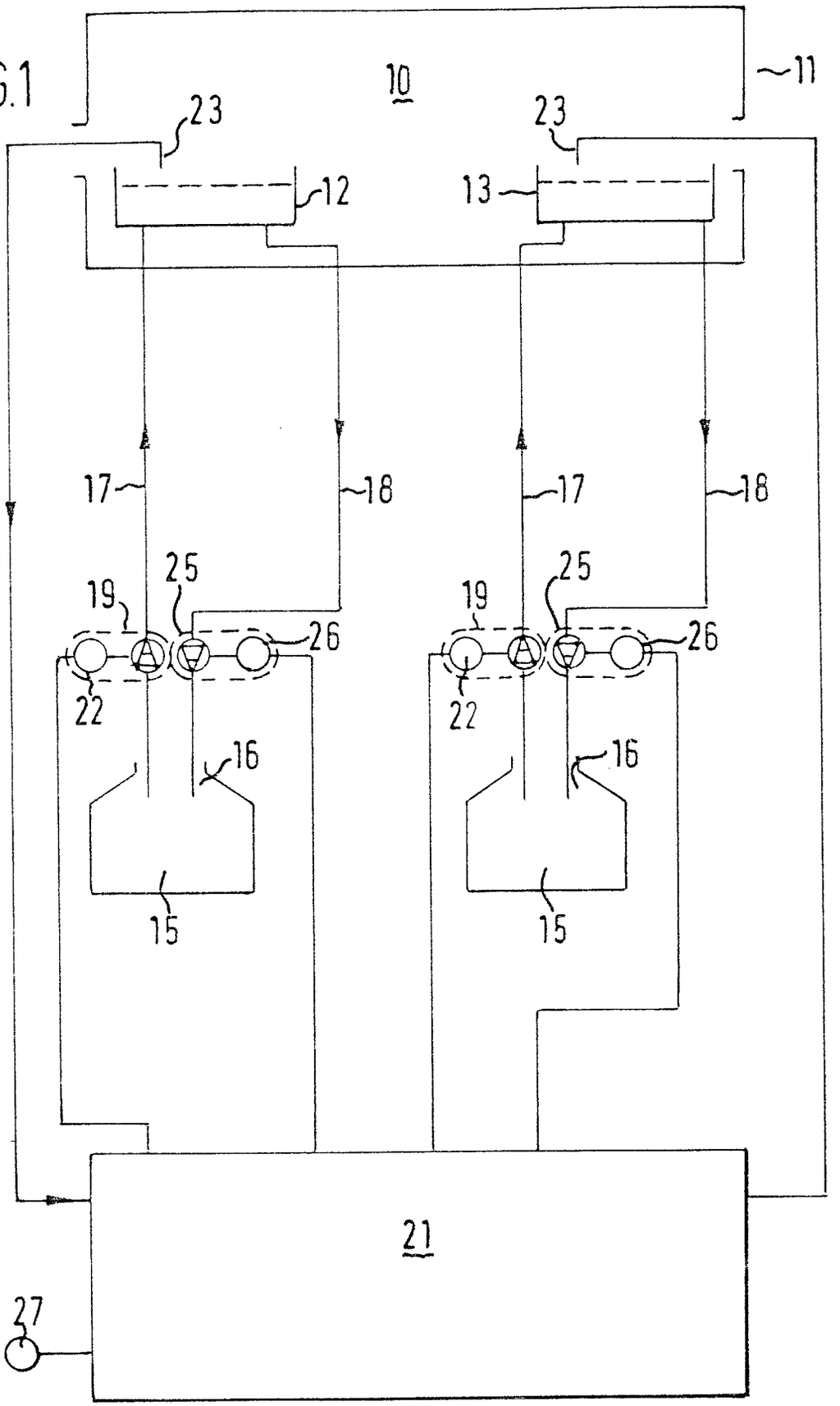
4. Apparatus according to claim 1, wherein there is further provided on the support plate (42) an electrical switch (47) which is operated by a portion (43) of said handle (37) when the handle is in the 'cap sealed' position.

5. Apparatus according to any of claims 1 to 4, wherein the cap (30) has two fluid passageways (44) therein communicating with a delivery conduit (17) leading to the bath (12, 13) and with a return conduit (18) from the bath (12, 13), respectively.

6. Apparatus according to claim 5, wherein a delivery pump (19) for delivery of liquid from the container (15) to the bath (12, 13), and a return pump (25) for discarging liquid from the bath (12, 13) to the container (15) are mounted on said support plate (42) and connected into said delivery and return conduit.

7. Apparatus according to any of claims 1 to 6, which comprises a trolley (50) onto which a new full container (15) can be loaded, the arrangement of the trolley being such that the cap fits into the mouth of said loaded container as the trolley has been inserted in the apparatus and the support plate (42) bearing said cap is pivoted downwardly.

FIG.1



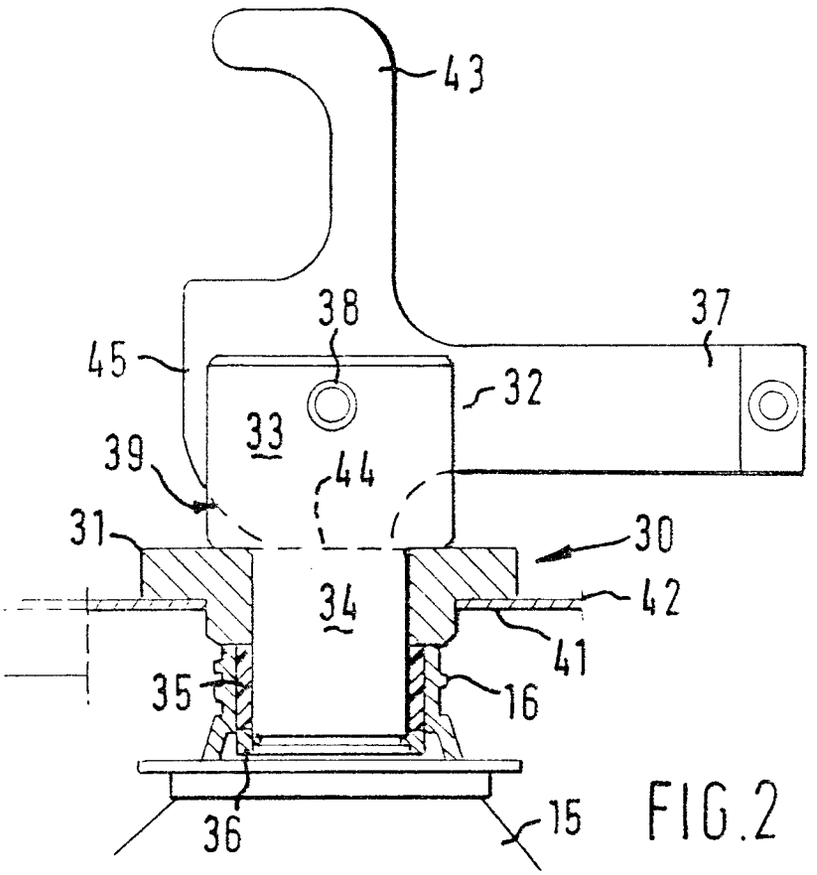

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FIG.2

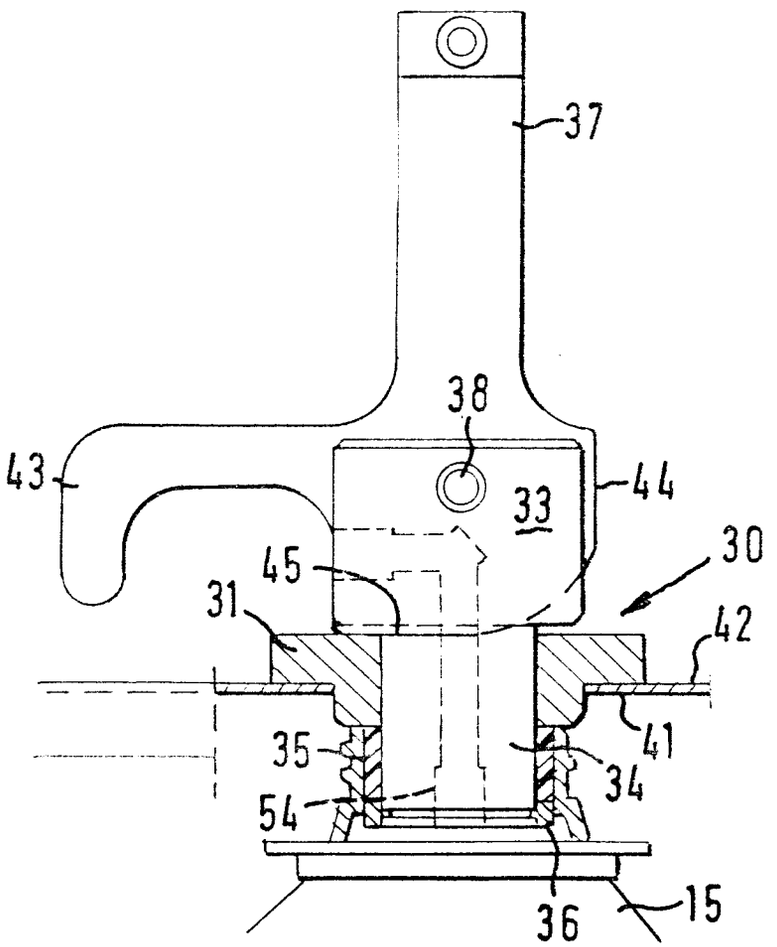
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FIG.3

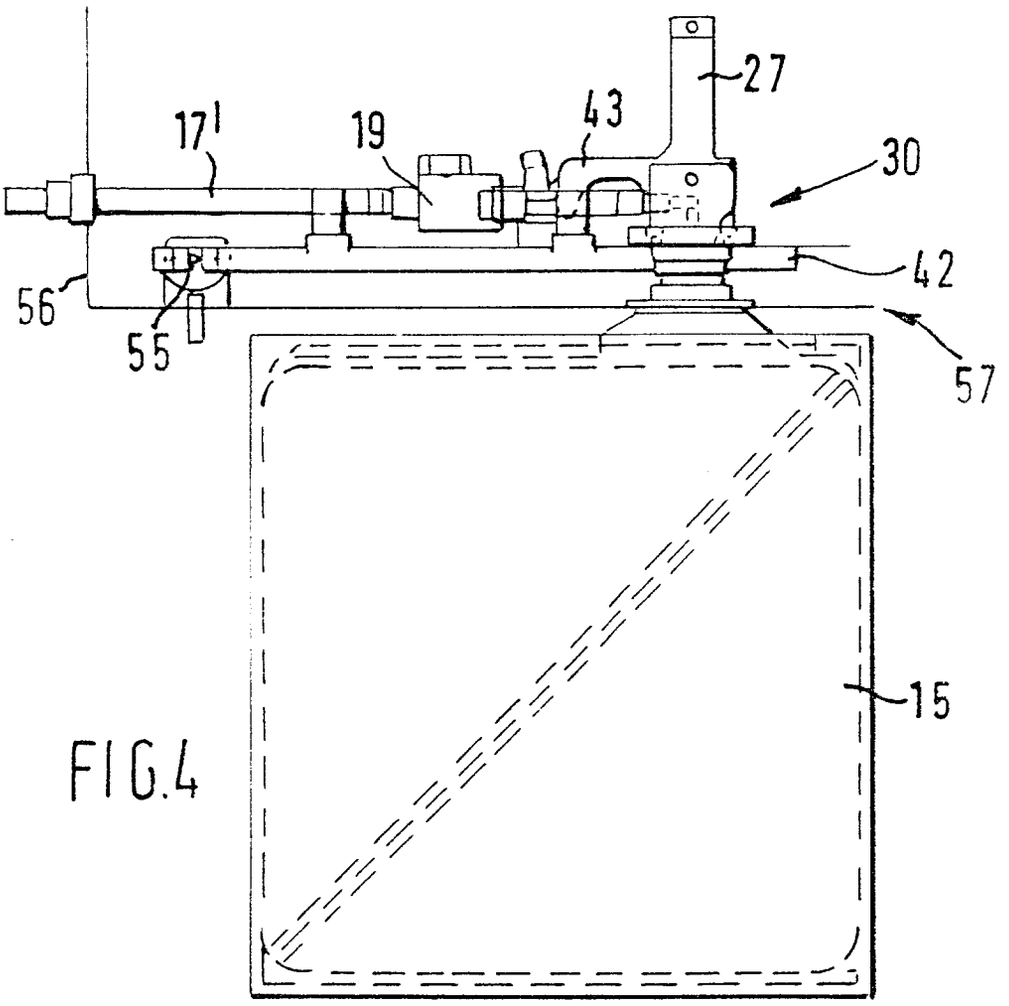

FIG.4

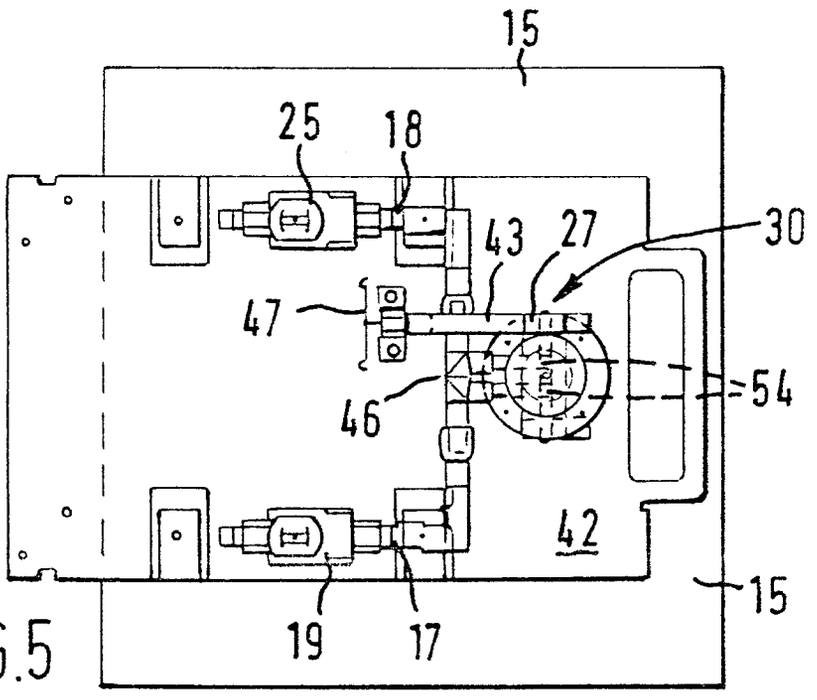

FIG.5

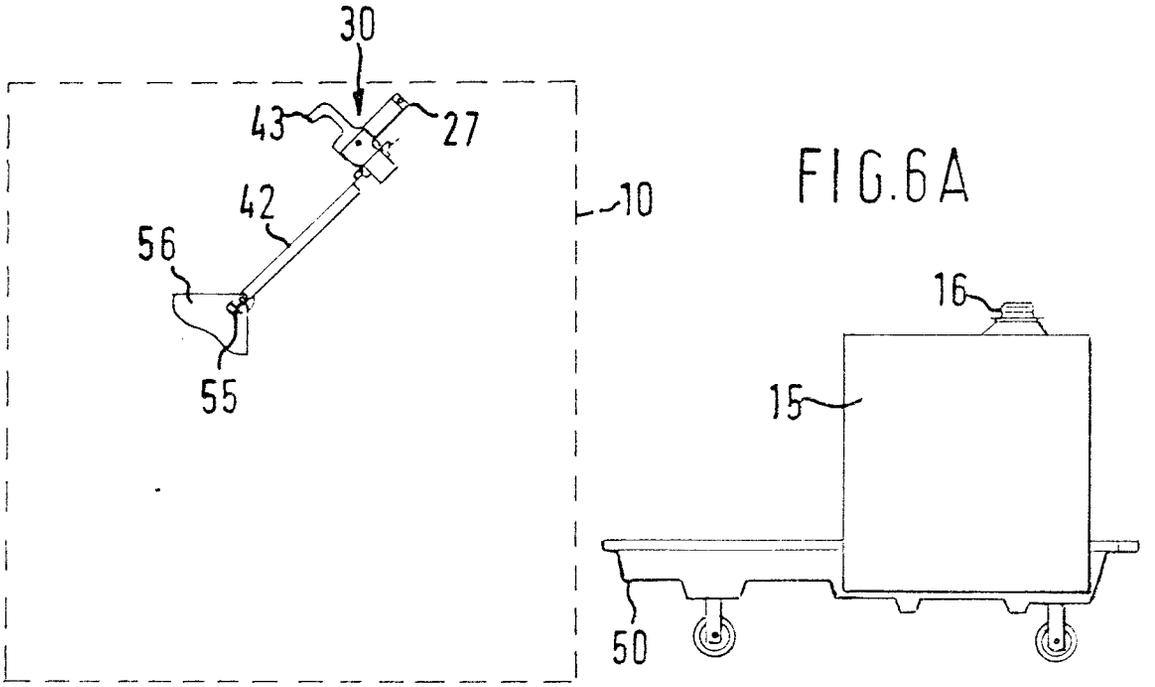

FIG.6A

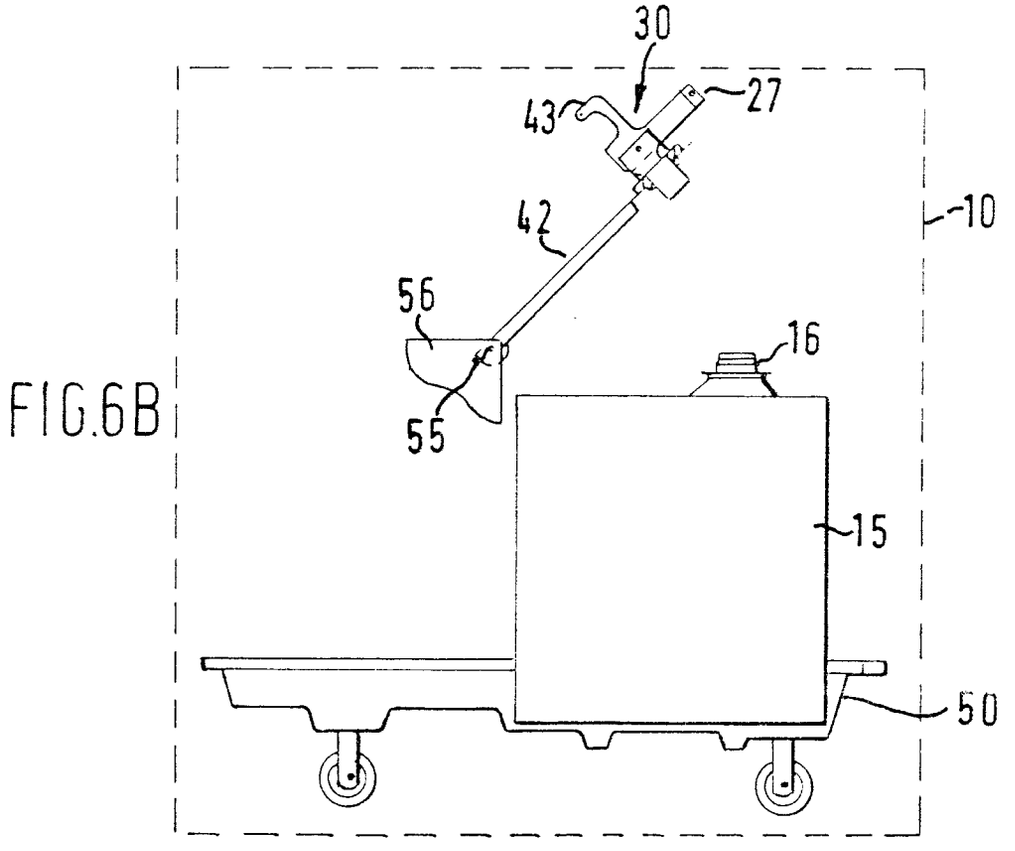

FIG.6B

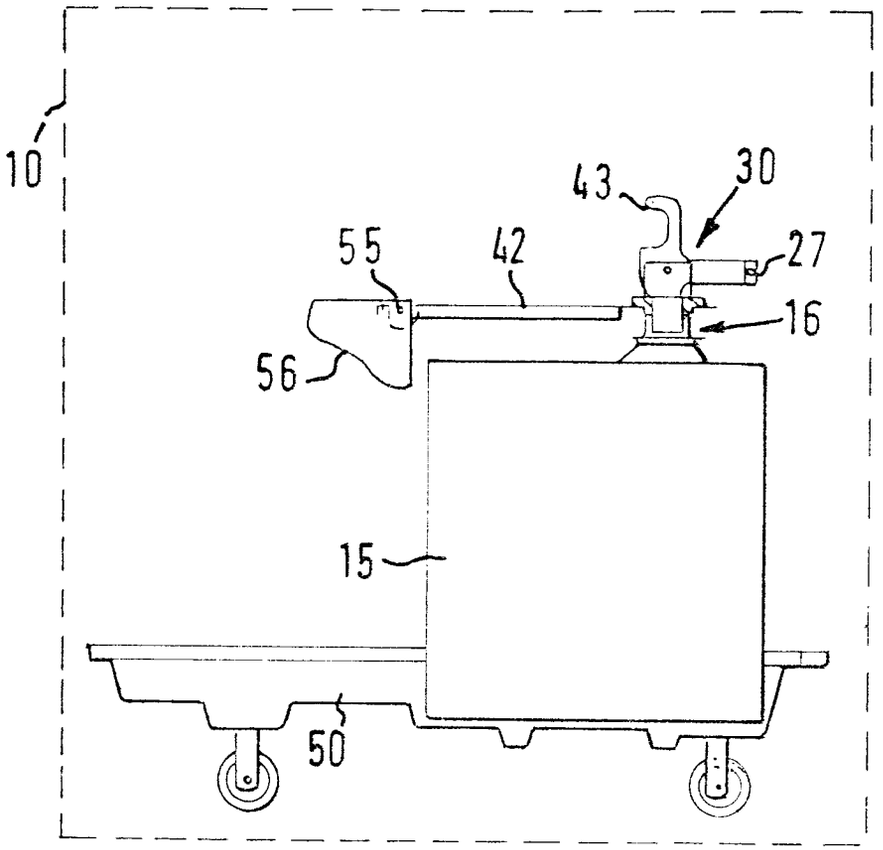

FIG.6C

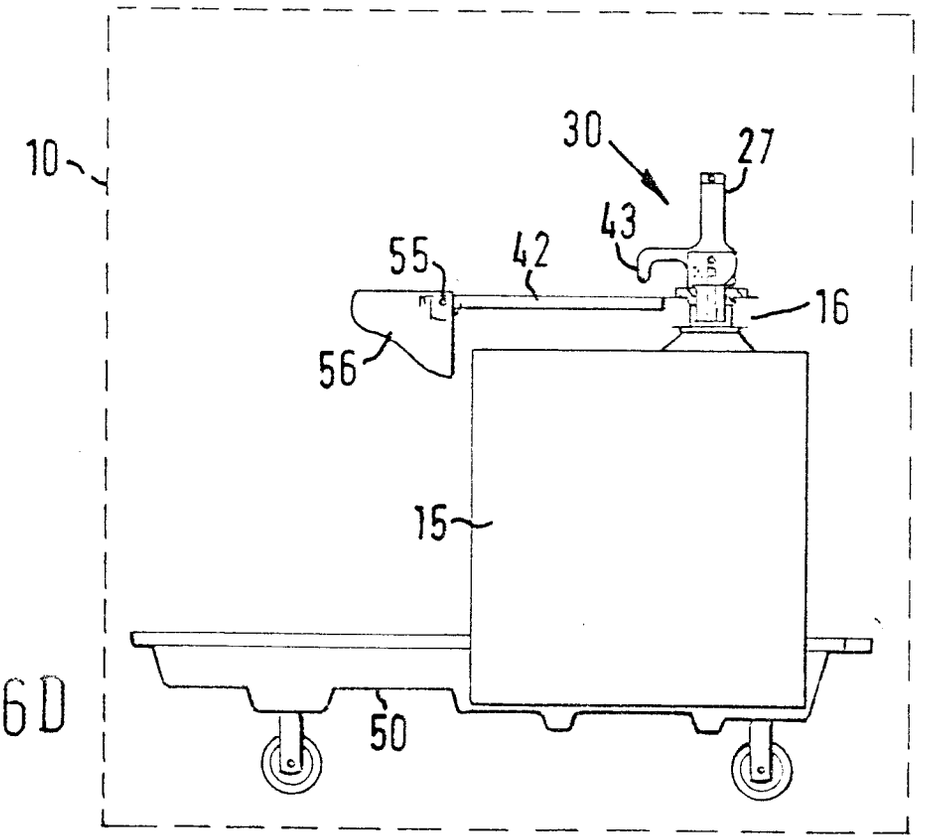

FIG.6D

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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 3042

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.6)
D,A	US-A-4 759 462 (NEGLIO) * abstract; figure 3 *	1,2,5	G03D3/06
A	FR-A-2 345 357 (LEXCELLENT) * claim 1; figures 1-3 *	1,3	
A	US-A-5 148 208 (KLOSTERBOER ET AL.) * abstract; figure 2 *	1,5,6	
A	EP-A-0 440 973 (AGFA-GEVAERT) * claim 1; figure 4 *	1	
A	DE-A-32 46 127 (BOSCH-SIEMENS HAUSGERÄTE) * abstract; figures 2,3 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

G03D
D06F
B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 March 1995	Romeo, V

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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