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(71) Applicant and
(72) Inventor: **KANG, Doo-Bong** [KR/KR]; Jaehyun Building 3rd Floor, 655-26 Yeoksam-dong, Kangnam-gu, Seoul 135-080 (KR).

(74) Agent: **HANYANG INTERNATIONAL PATENT AND LAW FIRM**; 10th Floor, Dacom Building, 706-1, Yeoksam-dong, Gangnam-gu, Seoul 135-987 (KR).

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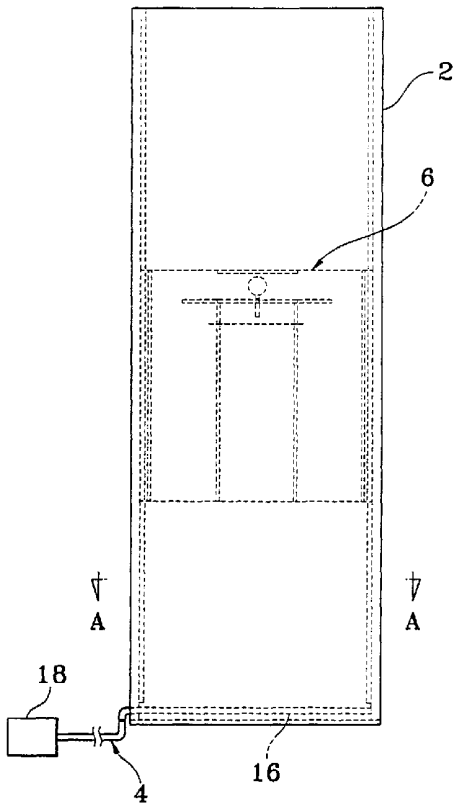
(54) Title: AN AQUATIC ELEVATOR



(57) Abstract: An acquatic elevator, the elevator including a water tub in which water is contained, bubble generating means for generating bubbles rising in the water tub and moving body elevating in the water tub in response to actions of the bubbles, wherein the moving body comprises: a bubble catching unit for capturing and storing the bubbles; a bubble discharge outlet formed above the bubble catching unit for the bubbles captured in the bubble catching unit to slip therethrough; and a valve for opening and closing the bubble discharge outlet, such the moving body, vertically movable with ease in response to bubble movement, can be applied to household goods, advertisements, props for interiors and the like with inexpensive cost.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SPECIFICATION

TITLE OF THE INVENTION

AN AQUATIC ELEVATOR

RELATED TECHNICAL FIELD AND PRIOR ART THEREOF

The present invention relates to an aquatic elevator.

A device for vertically moving objects in the water is such that objects are vertically moved by driving a motor through power transmission means.

TECHNICAL SUBJECT TO BE ACCOMPLISHED

There is a problem in the vertically moving device in the water according to the prior art thus described in that driving force from a motor is used to make the device complication in structure thereof, and when the motor is installed in the water, a water motor or the like should be used to increase the installation cost. The present invention is disclosed to solve the aforementioned problems and it is an object of the present invention to provide an aquatic elevator.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 schematically illustrates an aquatic elevator according to one embodiment of the present invention;

Figure 2 is a sectional view taken along arrow A-A in Figure 1;

Figure 3 is plan of a moving body in Figure 1;

Figure 4 is a sectional view taken along arrow B-B of Figure 3;

Figure 5 is a sectional view taken along arrow C-C of Figure 3;

Figure 6 is a detailed sectional view of a valve of Figure 4;

Figure 7(a) (b) (c) are operational constitutional diagrams of the present invention; and

Figure 8 is a detailed sectional view of valve at the aquatic elevator according to another embodiment of the present invention.

CONSTRUCTION OF THE INVENTION

The elevator including a water tub in which water is contained comprises bubble generating means for generating bubbles rising in the water tub and a moving body elevating in the water tub in response to actions of the bubbles, wherein the moving body comprises:

a bubble catching unit for capturing and storing the bubbles;

a bubble discharge outlet formed above the bubble catching unit for the bubbles captured in the bubble catching unit to slip therethrough; and

a valve for opening and closing the bubble discharge outlet.

It is preferred that the valve is coupled thereon with a floating body for raising the valve in the water.

It is also preferred that the bubble catching unit is formed with an outwardly-protruding flange in order to generate a resistance in response to bubbles and water.

Now, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings.

As illustrated in Figures 1 and 2, a water tub 2 is coupled thereunder with bubble generating means 4 while the tub 2 is coupled therein with a moving body 6 elevating in response to actions of the bubbles.

The water tub 2 is a low square container with its top side opened while

a front plate 8 and a rear plate 8' thereof are mad of transparent material. A left plat 12 and a right plate 12' of the water tub 2 are preferred to be made of transparent and thicker material than the front and rear plate 8 and 8' in order to increase force withstanding the water pressure. The left and right plates 12 and 12' are coupled at inner surfaces thereof with vertically arranged rail members 14 and 14' for guiding the moving body 6.

The bubble generating means 4 includes a bubble pipe 16 horizontally disposed at a lower inner side of the water tub 2 and an air pump 18 for generating air supplied to the bubble pipe 16 through a guide pipe.

The bubble pipe 16 is lengthwise formed with air holes 16a, each at a predetermined interval therebetween while the air pump 18 is installed outside of the water tub 2.

Furthermore, the bubble generating means 4 may be equipped with a check valve or a solenoid valve to prevent the water in the water tub 2 from being infused into the air pump 18.

As illustrated in Figures 3, 4, 5 and 6, the moving body 6 is arranged with front and rear plate 20 and 20' in parallel therewith, each at a predetermined interval therebetween, and is also coupled at both sides thereof, each at a position distanced at a predetermined length (L) with lateral plates 22 and 22' to form recess spaces (R). The moving body 6 is disposed therein with a bubble catching unit 24 for catching and storing the rising bubbles while the bubble catching unit 24 is formed thereon with a bubble discharge outlet 26 for allowing the bubbles caught in the bubble catching unit 24 to escape upwards.

The bubble discharge outlet 26 is formed with a valve 28 for opening and closing the bubble discharge outlet 26. The valve 28 is coupled thereon to a

floating body 30 for raising the valve 28 in the water. The front and rear plate 20 and 20' is formed at an upper midsection thereof with a handle plate 32 for easily catching or taking out the moving body rising to the water surface.

The front and rear plates 20 and 20' are attached at outside surfaces thereof with various water-resistant advertisements by way of silk screen printing, cutting sheet attachment and the like for promotion of ornamental and advertising effects while the recess spaces (R) are slid into the rail members 14 and 14' to allow the moving body 6 to perform vertical reciprocating movement.

The bubble catching unit 24, being interposed between the front and rear plates 20 and 20' and surrounded by left and right plates 34 and 34', has an air space (D) with an opening thereunder while the bubble discharge outlet 26 is centrally formed at the upper plate 36.

The upper plate 36 is mounted with outwardly-protruding flanges 36a for generating resistance by way of bubbles and water. The flanges 36a may be constructed with separate flange plates to adjust horizontally protruding lengths thereof. The horizontally protruding lengths of the flanges 36a are determined in consideration of weight of the moving body 6 when the flanges are manufactured.

The valve 28 includes a body unit 28a situated in the air space (D) for taking up a greater part of the valve weight, a rod unit 28b protruded upwards from the body part 28a for passing through the bubble discharge outlet 26, a semi-spherical valve surface unit 28c formed between the body unit 28a and the rod unit 28b for initially blocking the bubble discharge unit 26, and a flap unit 28d for secondly blocking the air passing through the bubble discharge outlet 26.

The body unit 28a is guided by a guide member 38. The valve 28 is preferred to be made of silicon. Weight of the body unit 28a is determined in consideration of buoyance of the floating material 30 when the boidy unit 28a is manufactured. The floating material 30, a projectile with its interior emptied, is inserted into an upper end of the rod unit 28b.

In the aquatic elevator thus constructed according to the present invention, as illustrated in Figure 7(a), when the air is discharged through air holes at the bubble pipes in response to operation of an air pump (not shown) while the water (W) is stored in the water tub 2 and the moving body 6 is positioned at a lower side of the water tub 2 and mingles with the water to rise and to fill the air space (D), the moving body 6 is raised in response to rising tendency of the air (bubbles).

At this time, the moving body 6 is further promoted in rising tendency thereof because of the flange 36a which blocks the rising air bubbles.

Meanwhile, while the moving body 6 is in the water, the valve 28 is raised up by buoyance of the floating body 30 to cause the valve surface unit 28c of the valve to block the bubble discharge outlet 26 whereby the flap unit 28d secondly blocks the air, such that the air in the air space (D) is not allowed to slip out upwards, thereby enabling the moving body 6 to maintain the rising tendency.

The guide member 38 prevents the valve from slanting when the valve 28 is raising up while the rail members 14 and 14' at the water tub 2 obviates the inclination of the moving body 6 when moving body 6 is rising up.

As illustrated in Figure 7(b), when the moving body 6 is positioned at an upper side of the water tub 2 to cause the floating body 30 to be exposed out of

the water surface, the valve surface unit 28c and the flap unit 28d are detached from the bubble discharge outlet 26 by the weight of the body unit 28a at the valve 28 because no buoyance is worked on the valve 28, and the air in the air space (D) is slipped upwards. The moving body 6 is then moving downwards by the intrinsic weight as illustrated in Figure 7(c). At this time, the air is kept being discharged through the bubble pipes 16. The moving body 6 keeps descending because of its weight but rises at a predetermined point because the moving body 6 rises when the air space (D) is filled up with bubbles beyond a predetermined quantity.

Meanwhile, air pump for generating air supplied to the bubble pipes 16 can be activated by a timer in consideration of moving speed of the moving body 6 or can be turned on or off by a sensor (not shown) in response to detected position of the moving body 6. This kind of operation is controlled by control means (not shown) of prior art. At this time, a check valve or solenoid valve so controls as to avoid the water from being infused into the air pump.

As described in the above, advertisement and ornamental effects can be promoted by the ascending and descending operations of the moving body 6 according to advertisement or ornamental pictures printed on the front plate 20 and the rear plate 20' of the moving body 6.

Meanwhile, the moving body 6 can be taken out of the water tub 2 by holding a handle plate 32 while the moving body 6 is positioned at an upper side of the water tub 2.

Figure 8 is a detailed sectional view of valve at the aquatic elevator according to another embodiment of the present invention. The valve according to another embodiment of the present invention has a structure as in Figure 6 but removed of a floating body while the valve is attached with a flange.

As illustrated in Figure 8, the valve 128 includes a body unit 128a situated in the air space (D) and covering a large portion of valve weight, a rod unit 128b protruded upwards from the body unit 128a to pass through the bubble discharge unit 26, a semi-spherical valve surface unit 128c formed between the body unit 128a and the rod unit 128b for initially blocking the bubble discharge outlet, a flap unit 128d for secondly blocking the air passing through the bubble discharge outlet 26 and a flange 128e externally protruded from an upper side of the body unit 128a for allowing the air raised by the bubble pipes to hit and to push the valve upwards. The body unit 128a is guided by guide member 38. It is preferred to have the valve 128 made of in silicon.

In the present embodiment, air is continuously supplied through the bubble pipes while the moving body 6 is raised up lest the valve should be opened by the weight of the valve 128. The air (bubbles) keeps hitting the flange 128e to provide a rising power to the valve, such that the valve surface unit 128c is not fallen from the bubble discharge outlet 26.

In the aquatic elevator according to the present invention, the moving body and the water tub may be manufactured in cylindrical shape but it should be understood that various changes and modifications thereto may be effected without departing from the scope or spirit of the invention.

EFFECT OF THE INVENTION

As apparent from the foregoing, there is an advantage in the aquatic elevator thus described according to the present invention in that the moving body, vertically movable with ease in response to bubble movement, can be applied to household goods, advertisements, props for interior and the like as moving structure in the water with inexpensive cost.

WHAT IS CLAIMED IS:

1. An aquatic elevator, the elevator including a water tub in which water is contained, bubble generating means for generating bubbles rising in the water tub and a moving body elevating in the water tub in response to actions of the bubbles, wherein the moving body comprises:

a bubble catching unit for capturing and storing the bubbles;

a bubble discharge outlet formed above the bubble catching unit for the bubbles captured in the bubble catching unit to slip therethrough; and

a valve for opening and closing the bubble discharge outlet.

2. The elevator as defined in claim 1, wherein the valve is coupled thereon with a floating body for raising the valve in the water.

3. The elevator as defined in claim 1, wherein the bubble catching unit is formed with an outwardly-protruding flange in order to generate a resistance in response to bubbles and water.

FIG.1

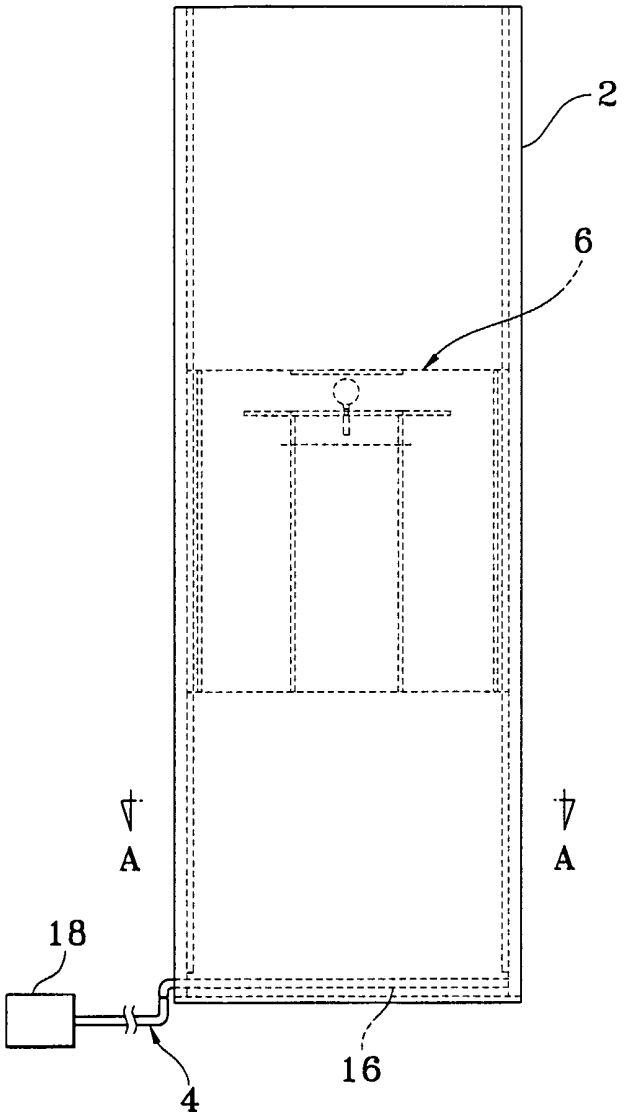


FIG.2

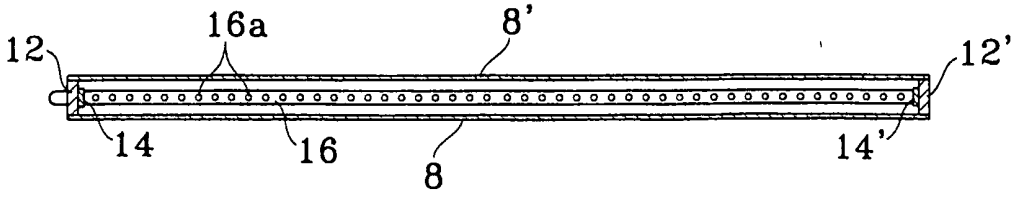


FIG.3

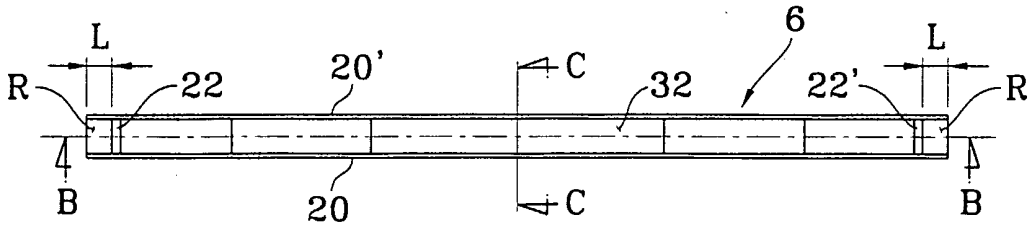


FIG.4

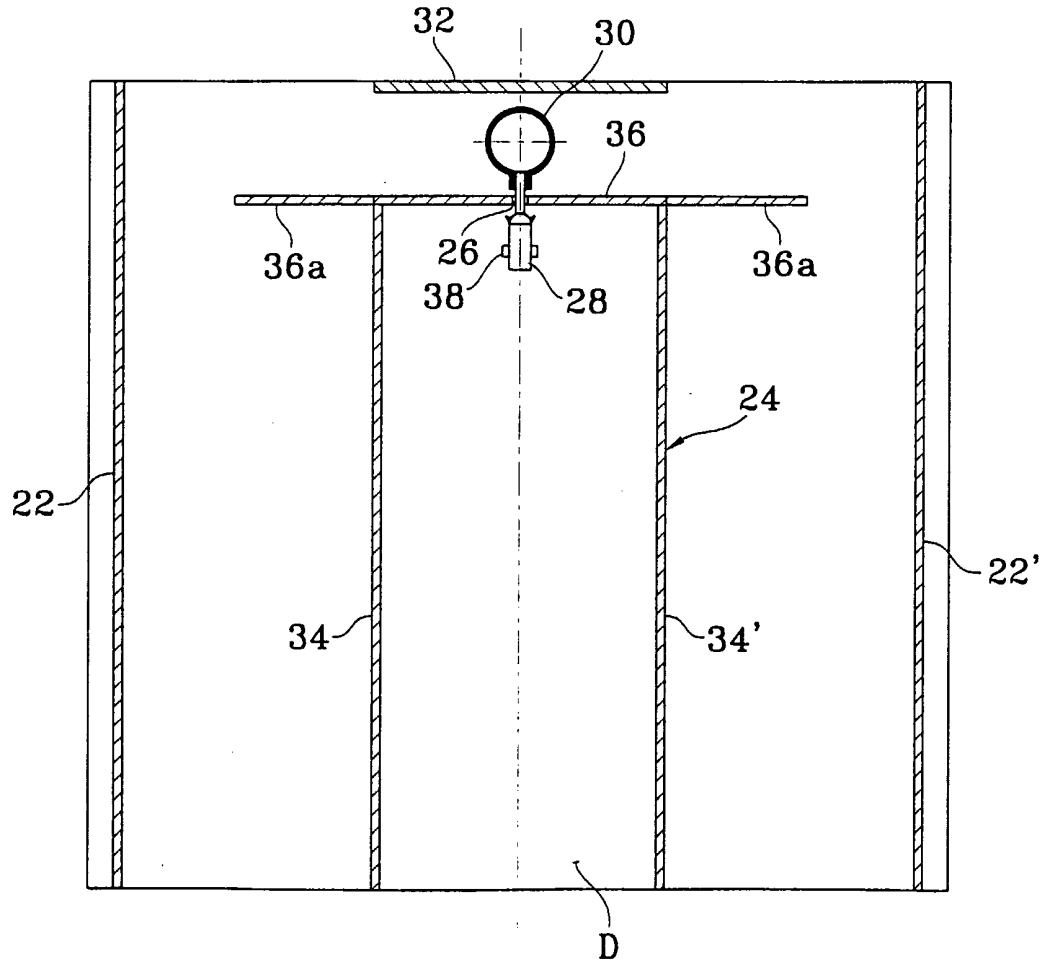


FIG.5

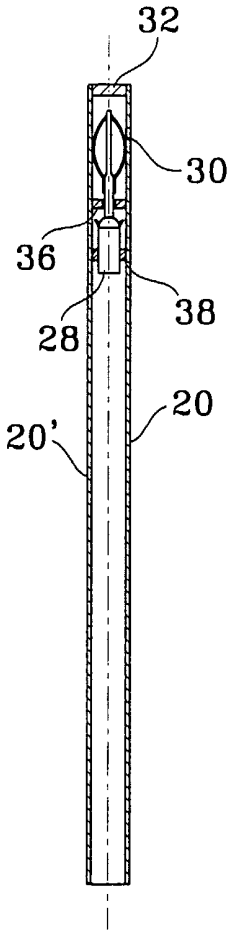


FIG.6

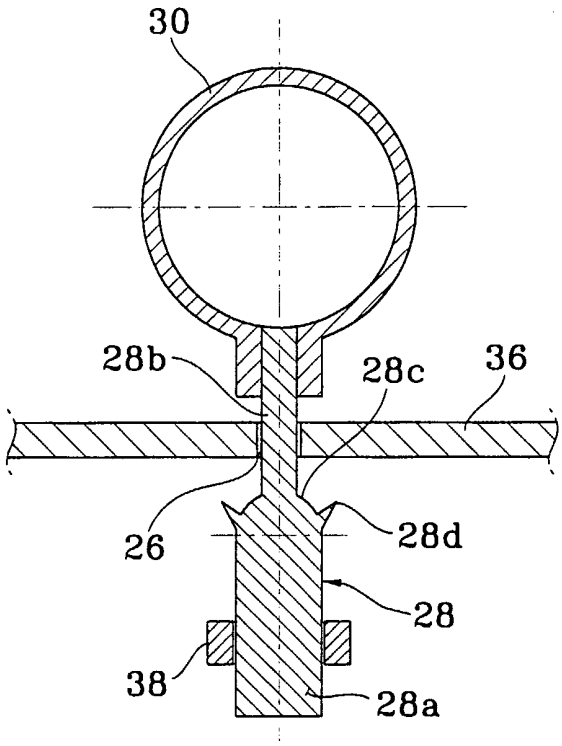


FIG.7

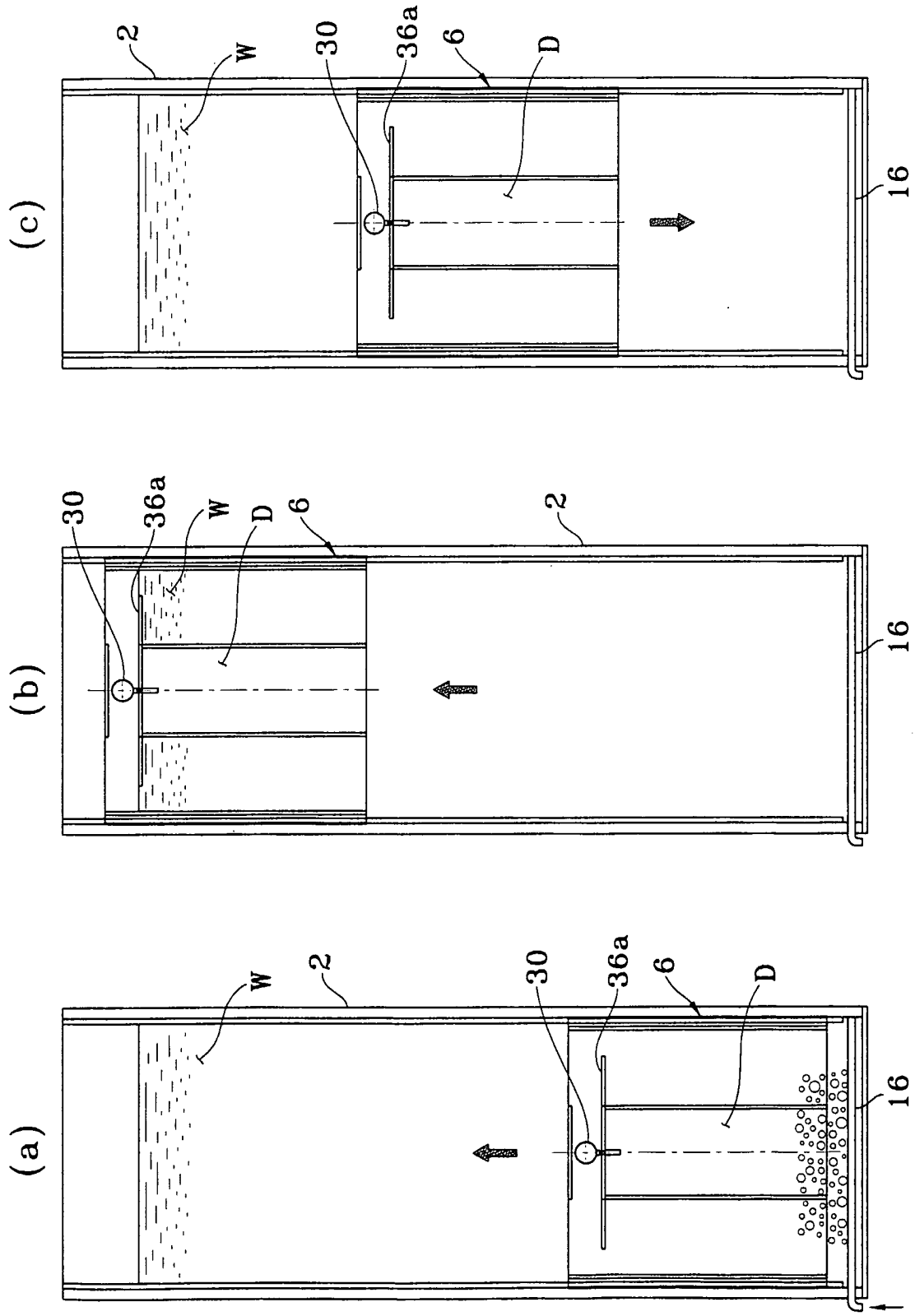
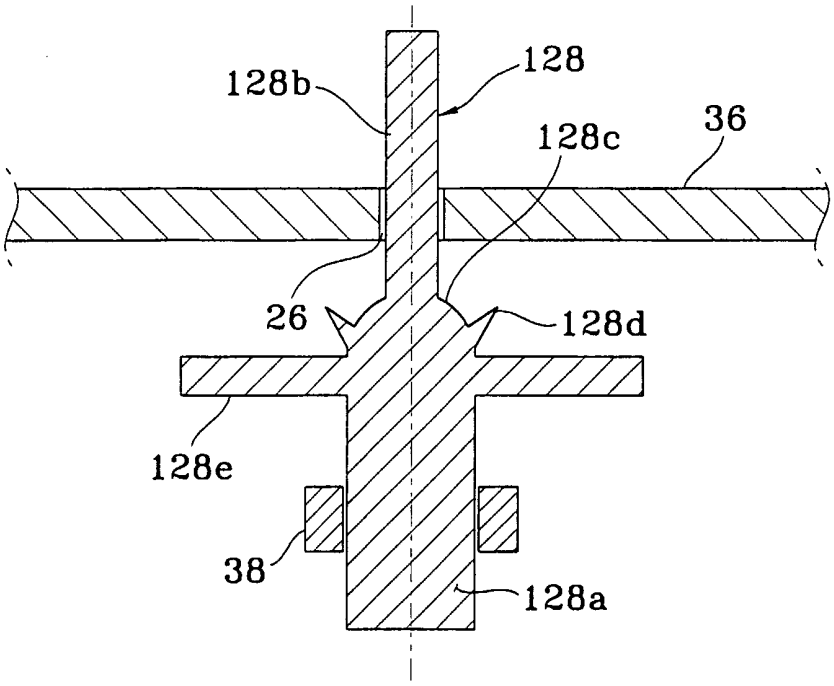


FIG.8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR01/00340

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 G09F 19/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimun documentation searched (classification system followed by classification symbols)
IPC7 G09F

Documentation searched other than minimun documentation to the extent that such documents are included in the fileds searched
Korean Patents and Applications for inventions since 1975 , Korean Utility models and Applications for Utility models since 1975.
Japanese Utility models and application for Utility models since 1975.

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search trerms used)
NPS, PATROM .

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 1999-64803 A (KWUN,OH JIN) 05 August 1999 See the hole document	1,2
A	JP 52 - 15780 U (KAWA I YOU SEKI) 05 February 1977 See the whole document	1,2
A	JP 9 - 265268 A (KAWA MURA CO, . LTD) 07 October 1997 See the whole document	1,2
A	JP 55 - 179900 U (HYKU TA SHOU KO) 24 December 1980 See the claim 1 ; Figures 1 - 2	1,2
A	US 5,341,820 A (Anthony Hammett) 30 August 1994. See the whole document	1,2

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"Y" document of particular relevence; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 OCTOBER 2001 (10.10.2001)	12 OCTOBER 2001 (12.10.2001)

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, Dunsan-dong, Seo-gu, Daejeon Metropolitan City 302-701, Republic of Korea	JEONG, Il Young
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-5515

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP 600572 A3	07 - 09 - 1994
		DE GB IT	
		EP 600572 B1	02 - 05 - 1997