



(11)

EP 1 632 622 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.03.2006 Bulletin 2006/10

(51) Int Cl.:
E04H 4/12 (2006.01)

(21) Application number: **04020785.4**

(22) Date of filing: **01.09.2004**

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

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(54) One-compartment filtration unit for a swimming pool

(57) One-compartment filtration unit for a swimming pool, which comprises

- (i) wall means (A) for delimiting a filtration compartment (J) in said filtration unit,
- (ii) a first opening (D) in said wall means for receiving pool water from the swimming pool into said filtration compartment for filtering said pool water, said first opening being a skimmer,
- (iii) a second opening (B) in said wall means for releasing filtered water into the swimming pool,
- (iv) an occludable third opening (K) in said wall means for receiving pool water by by-passing said filtration element;

said filtration compartment containing:
a device (Z) for measuring the water level in the swimming pool, said device being capable of regulating a valve controlling water afflux into the swimming pool from an external source, and, for submersion below the water level of the swimming pool,
a filtration element (J) for filtering pool water received through said first opening and one or more pumps (P) for receiving filtered water and for pumping the filtered water into the swimming pool through said second open-

ing.

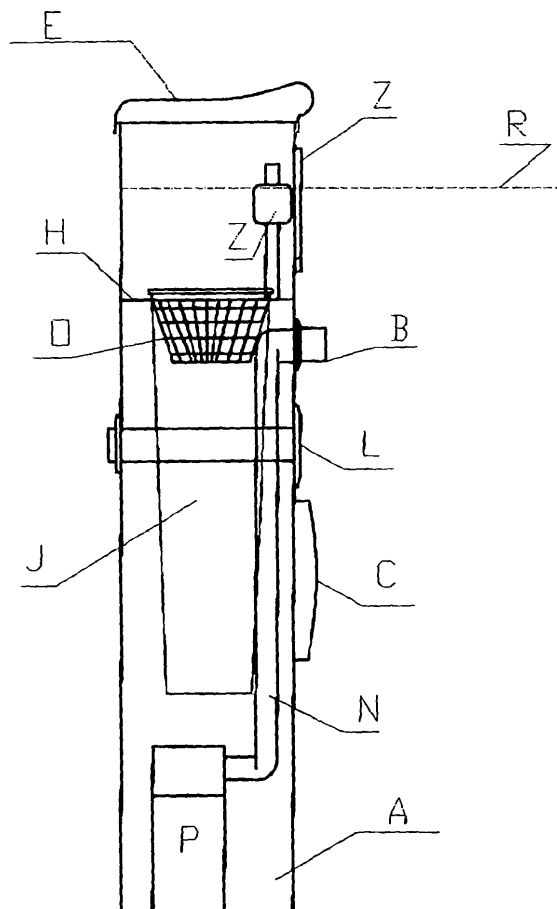


Fig. 3

Description

[0001] This invention relates to a one-compartment filtration unit for a swimming pool. The invention further relates to a wall element for a swimming pool containing the filtration unit of the invention. The invention further relates to a swimming pool having a filtration unit according to the invention. The invention also relates to a method of removing impurities floating in the water of a swimming pool or impurities floating on the water of a swimming pool, said method comprising the use of the filtration unit of the invention.

[0002] Filtration units for a swimming pool are known and are described e.g. in US 3,864,263; US 5,879,547; US 4,801,378; DE 295 01 221; US2002/0040869; WO00/47843.

[0003] Maintenance and servicing of a swimming pool requires extensive equipment, e. g. for cleaning the pool water and for conditioning the temperature of the pool water. Cleaning the pool water is usually done using filtration units containing a filter and a pump for circulating the pool water through the filtration unit. Filtration units usually have at least two compartments, one compartment for the filtration element and a separate compartment for the pump, which allows to keep the electromotor of the pump separate from pool water for safety reasons. Further equipment usually required for maintaining and servicing a swimming pool are heating devices, devices for disinfecting the pool water, devices for illuminating the pool for use in the dark etc. All this equipment is expensive and labour intensive to install, requires a lot of space, and is difficult to service.

[0004] It is an object of the invention to provide a filtration unit for a swimming pool that solves the above problems. Notably, it is an object of the invention to provide a filtration unit that requires minimum space, is cheap and simple to install and to service, and contains all water treatment facilities in one unit.

[0005] This object is solved by the one-compartment filtration unit for a swimming pool as defined in claim 1. The inventors have surprisingly found a filtration unit that combines the necessary water treatment and water afflux facilities in one unit. The filtration unit of the invention is thus compact and requires little space. Further, the filtration unit can be essentially prefabricated and can easily be installed with a swimming pool, notably if it is integrated into a wall element. Integration into a wall element allows to have as many filtration units as required in a swimming pool and provides for simple installation of the filtration unit in a swimming pool. Further filtration units can be easily installed by replacing a wall element of a preexisting swimming pool by a wall element according to the invention that contains the one-compartment unit of the invention. Further, the filtration unit of the invention contains a device for measuring the water level in the swimming pool, allowing automatic refilling of water from an external source into the swimming pool. Thus, the filtration unit of the invention contains a filtration unit, a

pump, a device for automatic refilling of water, and all ducts required therefore in a single unit. Preferably, the filtration unit of the invention does not contain separate compartments for pool water filtration and water pumping. Instead, the filtration element and said pump(s) are present in one compartment.

[0006] The one-compartment filtration unit for a swimming pool comprises wall means for delimiting a filtration compartment in said filtration unit. Said wall means may coincide with the walls of the wall element of the invention in which said filtration unit may be integrated. Said wall means have various openings for allowing efflux and afflux of water out of or into, respectively, said swimming pool. These openings are preferably located on one side of said filtration unit, namely the front side of said filtration unit (cf. Fig. 1). Further openings may be present at other sides of said filtration unit, preferably the back side opposite of the front side, e.g. for connecting additional water treatment devices or for connecting an external water source. The filtration unit of the invention has at least the following openings:

- a first opening in said wall means for receiving pool water from the swimming pool into said filtration compartment for filtering said pool water, said first opening being a skimmer,
- a second opening in said wall means for releasing filtered water into the swimming pool, and
- a third opening in said wall means for receiving pool water by by-passing said filtration element.

[0007] In one embodiment, pool water having been received through said third opening may be conducted to a water treatment device like a heater or a disinfecting device through a duct.

[0008] Said water treatment device may be located inside said filtration compartment or outside said filtration compartment. If said water treatment device is located outside said filtration compartment, there will be a duct leading from said third opening through said filtration compartment to a further opening e.g. on the rear side of said filtration unit (cf. Fig. 3), where said water treatment device may be connected. A water treatment device located outside of said filtration compartment will have an outlet and an outlet duct leading back into the swimming pool. This outlet duct may lead through said filtration compartment and may release treated water into the swimming pool through a fourth opening of said filtration unit. Therefore, the filtration unit preferably has a fourth opening in said wall means in this embodiment.

[0009] Alternatively, pool water entering said third opening may, optionally after having passed a water treatment device like a heater or a disinfecting device, enter the filtration compartment and mix in the filtration compartment with filtered water. Pool water having been received by said third opening may then be removed from the filtration compartment together with filtered water by said pump(s) through said second opening. Also in this

case, the water received by said third opening will by-pass said filtration element.

[0010] Said third opening is preferably occludable (e.g. via a valve) for regulating water influx into said third opening.

[0011] Said filtration compartment preferably contains a device for measuring the water level in the swimming pool, said device being capable of regulating a valve controlling water afflux into the swimming pool from an external source. Said device may comprise a float that may be similar to a cistern float. Said float may be capable of actuating a valve controlling water afflux to the swimming pool from said external source. Said valve is preferably located in said filtration unit. Said water from said external source may be released into the swimming pool e.g. through said second opening, through said fourth opening, or through a further opening in the wall means of said filtration unit.

[0012] The filtration unit of the invention further contains, for submersion below the water level of the swimming pool, a filtration element for filtering pool water received through said first opening and one or more pumps for receiving filtered water and for pumping the filtered water into the swimming pool through said second opening.

[0013] Said filtration compartment inside said filtration unit may have a lid (H) with an opening serving as an inlet to said filtration element. Said lid, said opening of said lid, and said filtration element may be arranged such that mixing of (unfiltered) pool water with filtered water in said filtration compartment are prevented, i.e. all pool water entering at said first opening has to pass said filtration element for reaching the pump inside said filtration compartment. Said filtration element may comprise or consist of a filtration bag made of a fabric, said filtration bag being removably mountable at the opening of said lid. Said filtration element may further have a pre-filter optionally equipped with water treatment chemicals. Said pre-filter may have a wider mesh size than said filtration bag for filtering off coarse material like leaves from trees or grass. The mesh size of the filtration bag is smaller and may be in the range of 1 to 500 μm , preferably, 4 to 100 μm , most preferably 5 to 50 μm . The mesh size of the pre-filter may be between 100 and 5000 μm , preferably between 300 and 3000 μm , most preferably between 500 and 2000 μm .

[0014] The filtration unit of the invention may have a device capable of determining the pollution level of said filtration element and capable of switching off said pump if the pollution level of the filtration element is determined to be high. Said device may be a relay system. If the pollution of the filtration element is high, the pump(s) may determine an increased resistance for pumping water. If the resistance exceeds a predetermined level, a signal may be generated leading to switching off of the pump(s). Further, a signal may be sent to service personnel indicating that the pre-filter or the filtration bag have to be exchanged. Filtration bags or pre-filters are known in

the art of the present invention.

[0015] The filtration compartment of the filtration unit contains one or more pumps for receiving filtered water and for pumping the filtered water into the swimming pool through said second opening. Said pump(s) are preferably mounted below said filtration element e.g. at the bottom of said filtration compartment. For security reasons, said pumps are driven by low-voltage electromotors, preferably by 12 V electromotors. The electromotor (s) of said pump(s) have a water-proof body. Typical pumping capacities are 5 to 50 m^3/h . The power of each pump may exceed 200 W. Due to the low voltage, no danger exists in case an electrical wire of said pump(s) comes in direct contact with water in the filtration compartment. The capacity of the pump(s) may be changed by changing the voltage of the electrical power supplied to said pump(s). The pumping capacity may be increased as desired by increasing the number of pumps. Multiple pumps may be operated in parallel or sequentially, whereby parallel mode is preferred. In this way, the pumping capacity may be adjusted to size of the swimming pool. Typically, there will be provided a duct connecting the outlet(s) of said pump(s) with said second opening. In the case of multiple pumps, said duct preferably receives the outlets from all pumps. Electrical wires leading to said pump(s) should not have connectors at locations that are submerged in water when the swimming pool is filled with water. Electrical high-voltage parts should be located at places that cannot be reached by water.

[0016] Preferably, the filtration unit of the invention does not have a duct or pipe connecting the filtration element and the pump(s), which saves duct material.

[0017] The filtration unit of the invention may further comprise a device for aerating water leaving the filtration unit at

- said second opening or
- at another opening allowing release of water into the swimming pool.

Said device may comprise a duct with an opening located above the water level of the swimming pool. Said duct may lead to said second opening or another opening where air from said device is mixed with water ejected at said second or said another opening.

[0018] The filtration unit of the invention may further comprise water treatment devices such as automatic dosing devices, ozonators, electrolysis devices, UV light sources, solar heating devices, heat exchangers, electrical heaters, heat pumps etc. These water treatment devices may receive pool water from said third opening and may release treated water at said fourth opening or into said filtration compartment as described above in connection with said third and said fourth opening.

[0019] Said filtration unit preferably comprises, a device (e.g. a spot light) for illuminating the pool water. Said device should be mounted on an outer side, preferably

at the front side, of said filtration unit for allowing illumination of the swimming pool. Said device is preferably mounted below the water level of the swimming pool.

[0020] Herein, water entering said filtration unit from the reservoir of the swimming pool is called "pool water". Pool water can pass the filtration element and is thereby filtered. Water having passed the filtration element is designated "filtered water". Filtered water is then present inside the filtration compartment and can be pumped back into the swimming pool by said pump(s).

[0021] In a preferred embodiment of the invention, said filtration unit of the invention is integrated into a wall element according to the invention. The filtration unit may then be installed in a swimming pool by using one or more wall elements containing the filtration unit and other wall elements not containing a filtration unit.

The invention also relates to a swimming pool having lateral wall elements, said swimming pool having at least one wall element containing a filtration unit according to the invention.

[0022] The invention also relates to a swimming pool having a filtration unit outside the basin of said pool and integrated into a wall portion of said pool such that said filtration unit and said swimming pool share a common side wall.

[0023] In one embodiment, the filtration unit according to the invention has means for releasably mounting said filtration unit at a side wall of a swimming pool. In this embodiment, the filtration unit may be hung up at said side wall, whereby the body of the filtration unit may be inside the basin of the swimming pool and can be immersed into the pool water.

[0024] The invention also provides a method of removing impurities floating in the water of a swimming pool or impurities floating on the water of a swimming pool, said method comprising use of the filtration unit of the invention.

Brief description of the drawings

[0025] Figure 1 shows an external view on a one-compartment filtration unit of the invention integrated into a wall element (A) of a swimming pool. The filtration unit has a cover (E), a skimmer as a first opening (D), a second opening (B), a third opening (K) for receiving pool water e.g. for conducting said pool water to a heating device, a fourth opening (L) allowing release of water coming e.g. from said heating device into said swimming pool. The filtration unit further comprises a spot light as a device (C) for illuminating the water in the dark. Cover (E) may be easily removed for giving access to the filtration element and to other devices inside the filtration unit.

[0026] Figure 2 shows three wall elements of a swimming pool. The middle wall element contains the one-compartment filtration unit according to the invention. The water level of the swimming pool is indicated by the line marked by (R).

[0027] Figure 3 is a side view into a filtration unit ac-

cording to the invention. The water level in the swimming pool is indicated by the line designated by (R). Pool water may enter the filtration unit at skimmer (D) and may flow into the filtration element having a pre-filter (O) and a filtration bag (J). The filtration compartment inside the filtration unit has a lid (H) with an opening that serves as an inlet to said filtration element. The opening of the lid can receive the filtration element consisting, in this case, of filtration bag (J) and pre-filter (O). Water having past the filtration element fills up the inside of the filtration compartment and is taken up by pump (P) mounted at the bottom of the filtration compartment inside that filtration compartment. There is not pipe or duct connection between the filtration element and the pump. Water ejected by said pump is conducted by duct (N) to said second opening (B) in that wall means (A). The filtration unit has a device for measuring the water level in the swimming pool (Z), said device being capable of regulating a valve controlling water afflux into the swimming pool from an external source. A fourth opening (L) in said wall means (A) allows ejecting water received from an external water treatment device into the swimming pool. A spotlight (C) is provided on the outside of the filtration unit. Cover (E) may be removed, thereby allowing access to all elements inside the filtration unit, e.g. for servicing.

[0028] Figure 4 shows a view on another embodiment of a filtration unit having a filtration compartment with two filtration elements (J). The filtration unit has a device (Z) for measuring the water level in the swimming pool and a device (M) for aerating water that leaves the filtration unit at second opening (B). Device (M) has an opening above the water level allowing entry of air and a duct system for conducting said air to second opening (B). The filtration unit has an occludable third opening (K) as well as a fourth opening (L) for taking up and ejecting, respectively, water treated in a water treatment device into the swimming pool. Such a water treatment device may be located behind the rear wall means of the filtration unit and take up pool water to that third opening (K) and a duct going through that filtration compartment. Water leaving said water treatment device is conducted back into the pool by a duct leading to fourth opening (L). Cover (E) may be removed, thereby allowing access to all elements inside the filtration unit, e.g. for servicing.

[0029] Figure 5 shows an embodiment similar to that shown in Fig. 4. Thick arrows indicate the direction of water flow under normal operation of the filtration unit. Arrow (1) indicates water entering said first opening (D). Arrow (2) indicates water passing said filtration element (J). Arrow (3) indicates water uptake by said pump (P). Arrow (4) indicates water ejection by said second opening (B). Arrow (5) indicates water uptake by a third opening (K). Arrow (6) indicates water ejection by a fourth opening (L).

Claims

1. One-compartment filtration unit for a swimming pool, which comprises

(i) wall means for delimiting a filtration compartment in said filtration unit,
 (ii) a first opening in said wall means for receiving pool water from the swimming pool into said filtration compartment for filtering said pool water, said first opening being a skimmer,
 (iii) a second opening in said wall means for releasing filtered water into the swimming pool,
 (iv) an occludable third opening in said wall means for receiving pool water by by-passing said filtration element;

said filtration compartment containing:

a device for measuring the water level in the swimming pool, said device being capable of regulating a valve controlling water afflux into the swimming pool from an external source, and, for submersion below the water level of the swimming pool,
 a filtration element for filtering pool water received through said first opening and one or more pumps for receiving filtered water and for pumping the filtered water into the swimming pool through said second opening.

2. The filtration unit according to claim 1, said filtration unit comprising a device for aerating water leaving the filtration unit at

- said second opening or
 - at another opening allowing release of water into the swimming pool.

3. The filtration unit according to any one of claims 1 to 2, said filtration compartment having a lid with an opening serving as an inlet to said filtration element, whereby said lid, said opening of said lid, and said filtration element being arranged such that mixing of pool water with filtered water in said filtration compartment can be prevented.

4. The filtration unit according to claim 3, said filtration element comprising a filtration bag made of a fabric, said filtration bag being removably mountable at the opening of said lid.

5. The filtration unit according to any one of claims 1 to 4, said filtration element having a pre-filter optionally equipped with water treatment chemicals.

6. The filtration unit according to any one of claims 1 to 5, comprising a device capable of determining the

pollution level of said filtration element and capable of switching off said pump if the pollution level of the filtration element is determined to be high.

7. The filtration unit according to any one of claims 1 to 6, said pump(s) being mounted below said filtration element and having a 12 V electromotor.

8. The filtration unit according to any one of claims 1 to 7, comprising a duct connecting the outlet of said pump and said second opening.

9. The filtration unit according to any one of claims 1 to 8, further comprising water treatment devices such as automatic dosing devices, ozonators, electrolysis devices, UV light sources, solar heating devices, heat exchangers, electrical heaters, heat pumps etc.

10. The filtration unit according to any one of claims 1 to 9, further having

- a duct for conducting pool water received through said third opening to a water treatment device located inside or outside of said filtration compartment,
 - a fourth opening in said wall means for ejecting water treated in said water treatment device into the swimming pool, and
 - a duct for conducting water treated in said water treatment device to said fourth opening.

11. The filtration unit according to any one of claims 1 to 10, having means for releasably mounting said filtration unit at a side wall of a swimming pool.

12. Wall element for a swimming pool, having the filtration unit according to any one of claims 1 to 10 integrated in said wall element.

13. Swimming pool having lateral wall elements, said swimming pool having at least one wall element as defined in claim 12.

14. Swimming pool having a filtration unit according to any one of claims 1 to 10 outside the basin of said pool and integrated into a wall portion of said pool such that said filtration unit and said swimming pool share a common side wall.

15. Swimming pool having a filtration unit according to any one of claims 1 to 11 mounted at an inner side of a side wall of said swimming pool such that said filtration unit can be immersed in the pool water.

16. A method of removing impurities floating in the water of a swimming pool or impurities floating on the water of a swimming pool, said method comprising use of the filtration unit according to any one of claims 1 to 11.

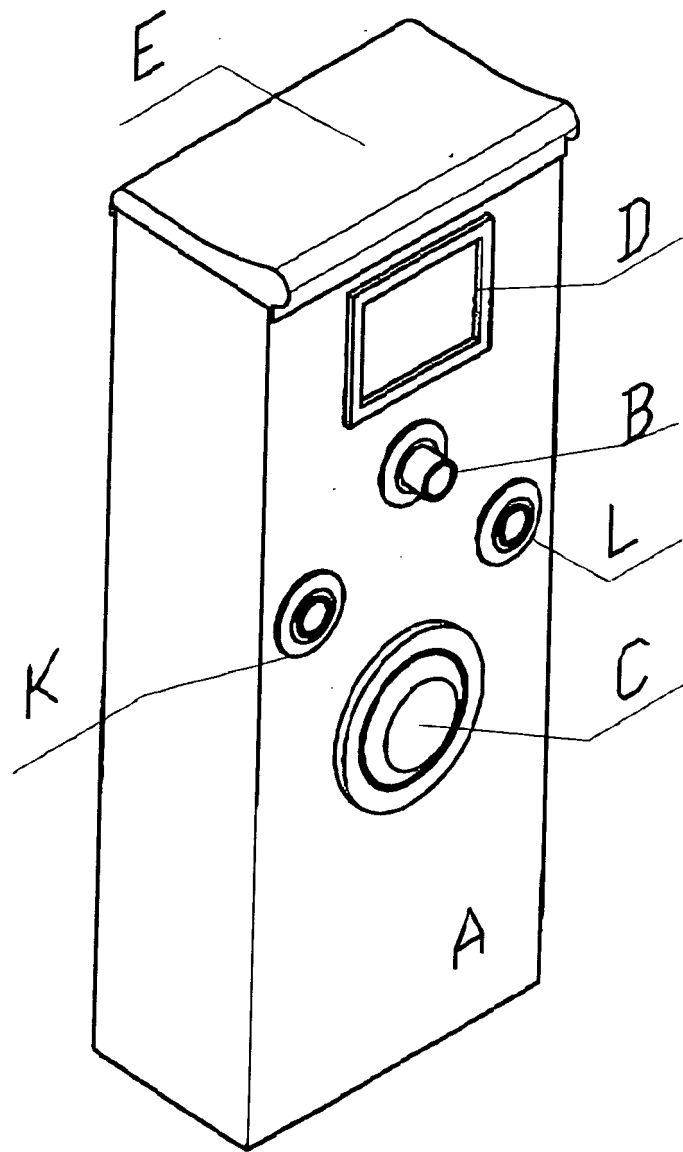


Fig. 1

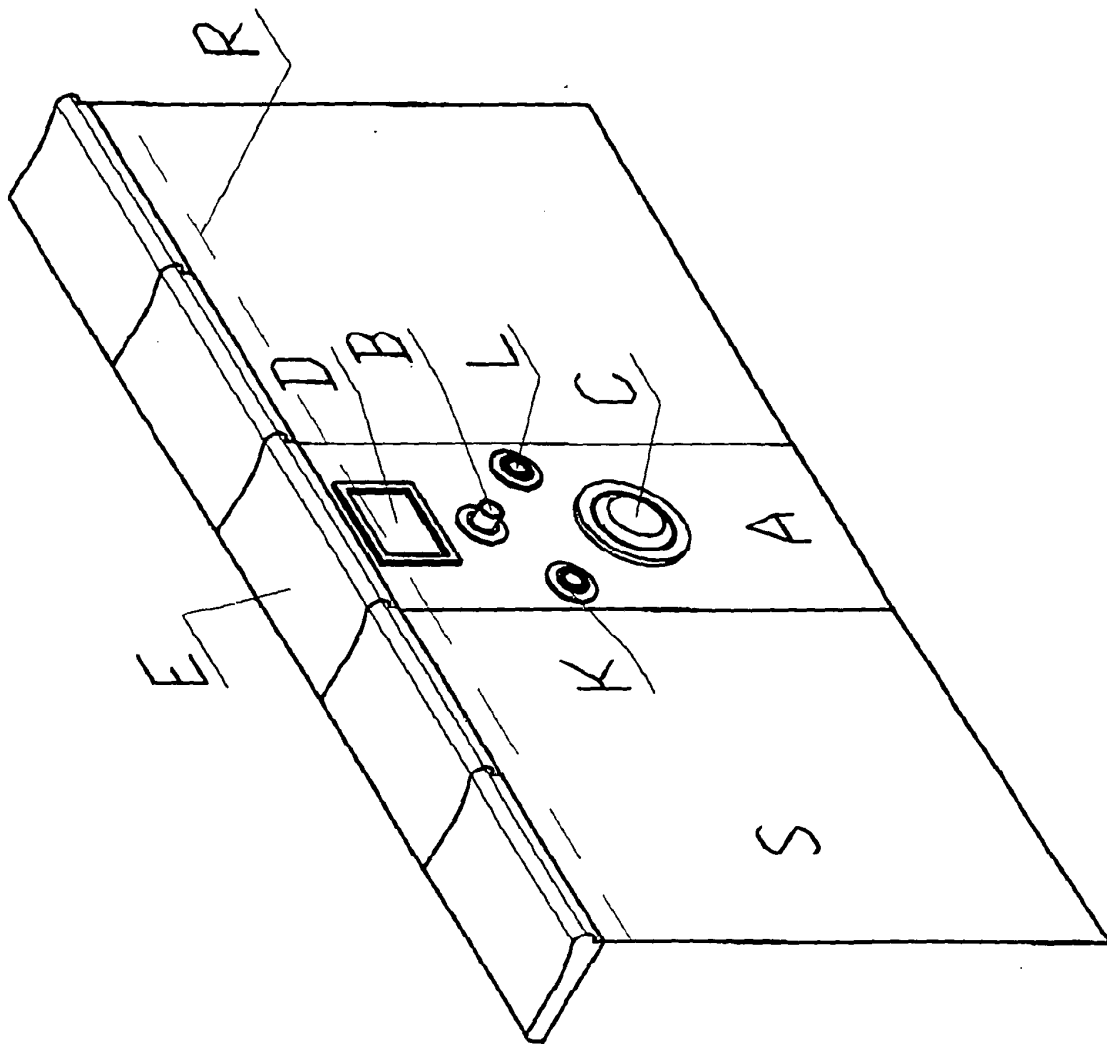


Fig. 2

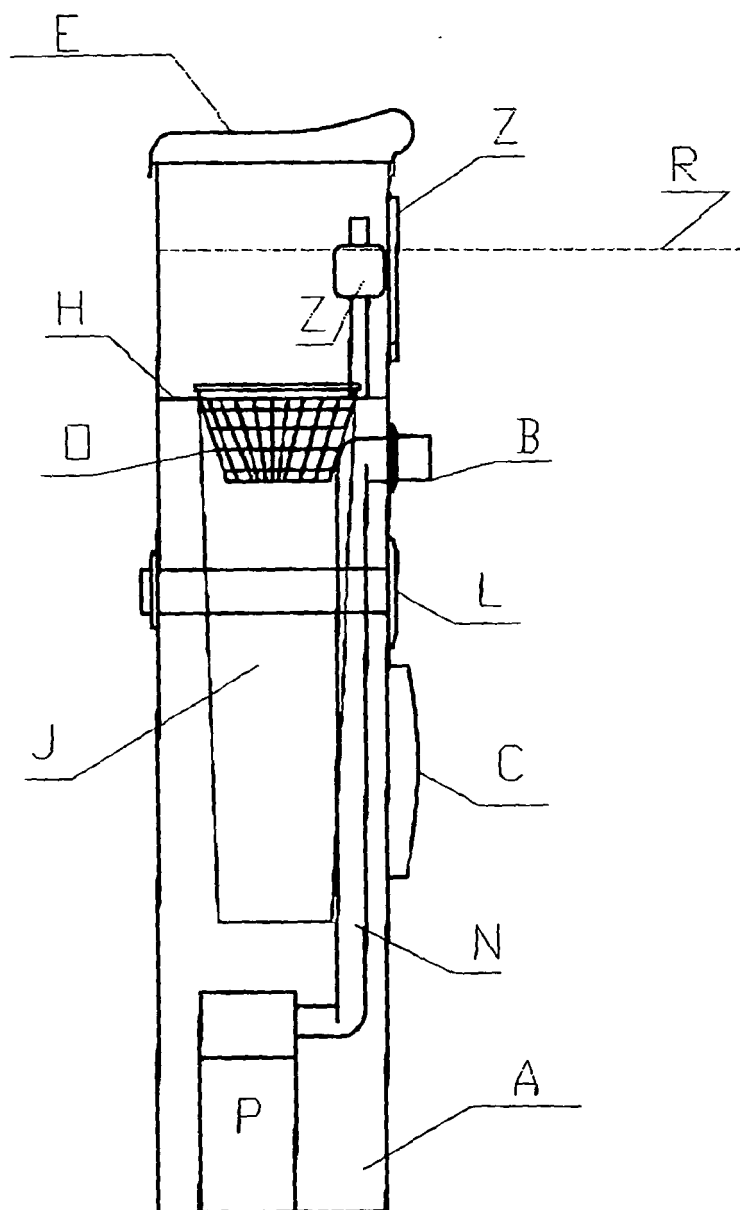


Fig. 3

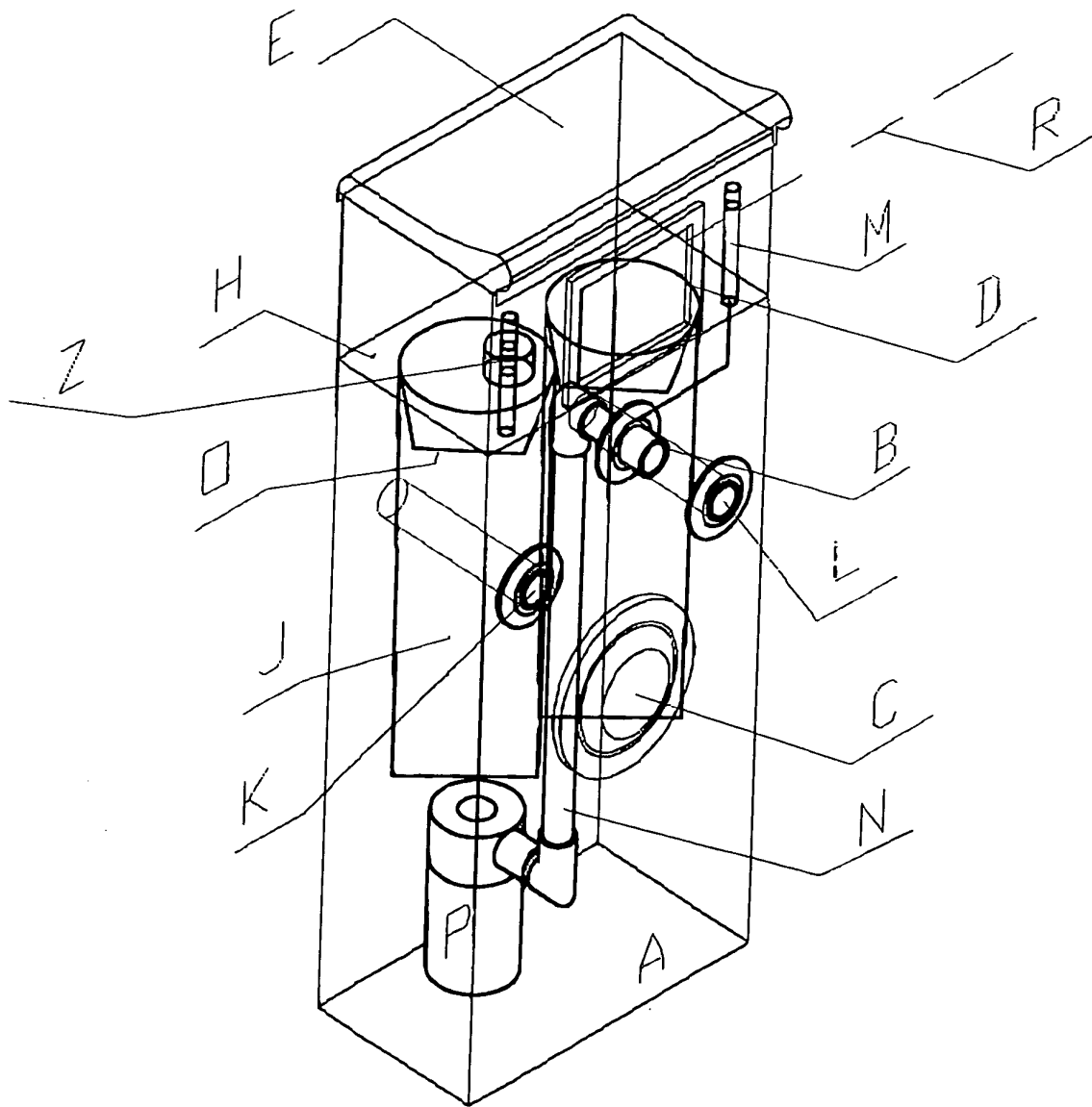


Fig. 4

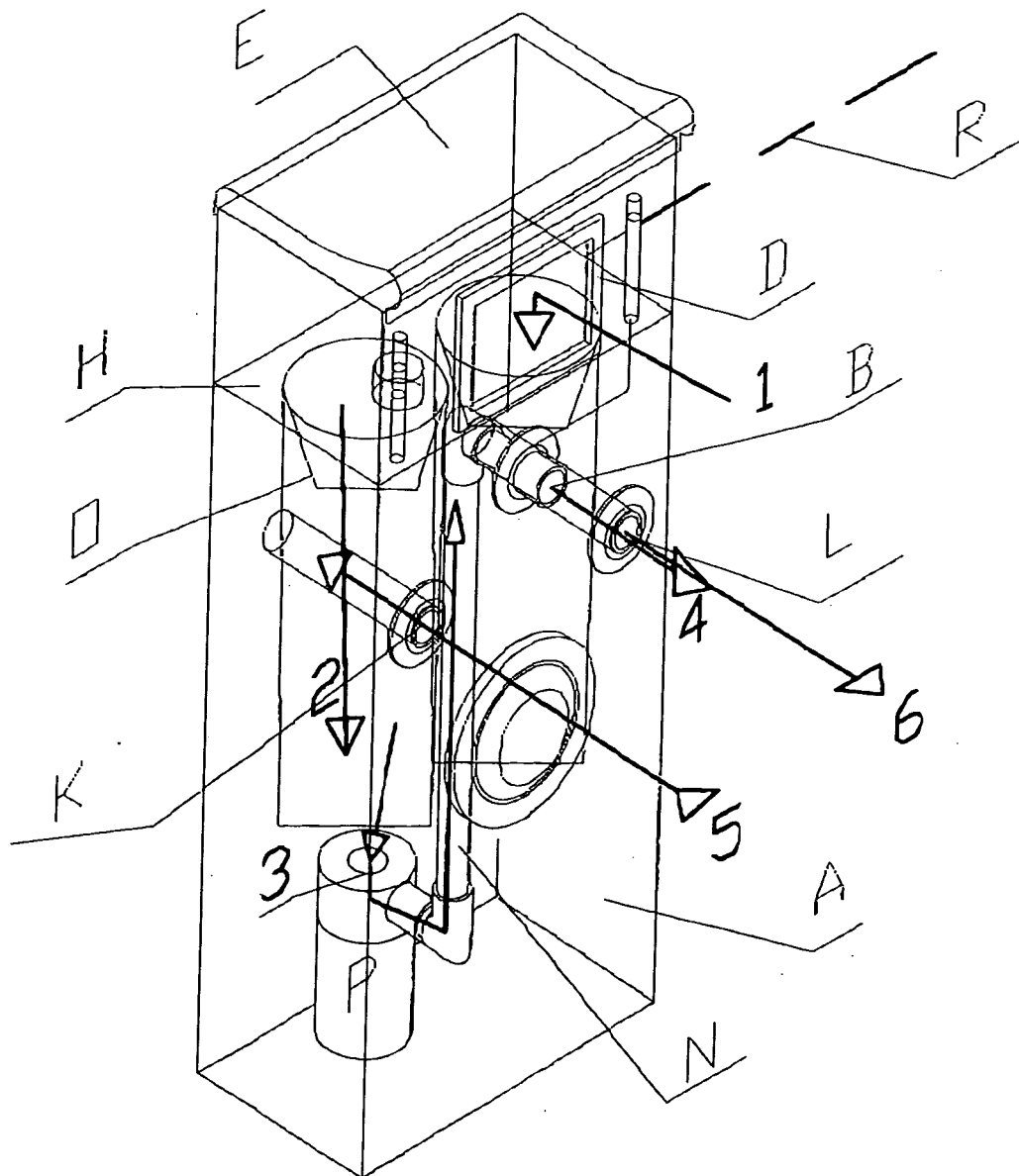


Fig. 5



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Application Number
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 February 2005	Examiner Stefanescu, 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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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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