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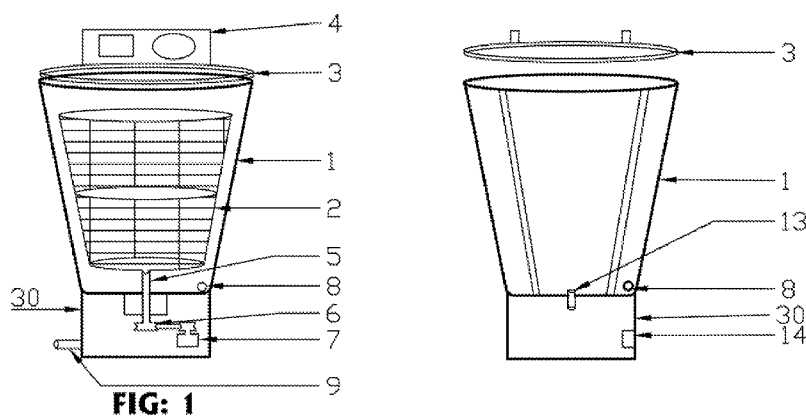
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(54) Title: AN IMPROVED WASHING MACHINE



(57) Abstract: This washing machine comprises of a truncated conical water tank (1) having inside a smaller truncated conical clothes drum (2). Clothes drum (2) has an inside partition (16) with sliding bolts (29) and a top detachable lid (17). Drive shaft (5) driven by an electrical motor (7) rotates the clothes drum (2). Clothes drum (2) has water circulating slots (15). Water tank (1) has valve fitted water inlet (11) and water drain (8). The water tank (1) has reinforcing outside ribs (28). Sensors for water level, temperature, fabric load fitted in the water tank and connected to the electronic control (4) controls the wash cycle. The truncated water tank uses less water. The clothes drum washes small and big clothes separately.

AN IMPROVED WASHING MACHINE

Technical Field:

The invention relates to top loading washing machines for clothes washing & drying with less water and power use for homes and industrial uses.

5 **State of Art:**

There are front loading and top loading washing machines in the market. The front loading machines are costly have a horizontal drum rotated by a motor with the front opening lid. The clothes are loaded in the drum. The drum rotates in a water tub. The drum has a costly stabilising suspension. The front loaders drop the clothes in water producing a tumble washing
 10 of clothes. The maintenance is costly. The front loaders use less amount of water but costly to purchase, use and maintain. Back ache persons do not use this as there is bending to load/unload clothes. Additional spin dryers may be needed. People are willing to change for a better low cost, low water volume device if available to escape larger costs & maintenance.

The top loader have a motor which rotates a vertical clothes drum in a water tank. There is an
 15 upper lid to open, to load or to remove clothes. People with back aches use top loaders. Top loaders are cheaper to maintain, lower in cost, in use and in maintenance. The top loaders can be stopped at any point and restarted unlike the front loaders which starts wash cycle from beginning.

Existing top loaders use more water than front loaders. In both, all the clothes of different sizes
 20 are washed in same chamber. The small clothes often entangle with the bigger clothes needing separation of clothes as a step. There are huge number of washing machine manufacturing companies in the world making these two kinds of washing machines, supplying millions of families with washing machines. There has been no effective separation of small clothes and large clothes, reduction of water volume use in the same machine.

25 **Technical Problem**

The defects in the top loading washing machines are:

1. There is a large water volume use in a water stressed global future.
2. All the clothes -small and big- are loaded in a single chamber clothes drum needing separation of entangled clothes.
- 30 3. The clothes in washing are twisted and untwisted releasing the fibres in the yarns of the clothes forming a lint.

4. The clothes after washing need ironing.
5. The clothes are washed in entangled clumps. There is less water flow between clothes!
6. The big clothes collect near bottom of washing clothes drum with entangled small clothes in washing reducing washing efficiency.

5 Solution to Problem

Our new top loading washing machine has a new, novel different structure and function. The water tank is changed to a truncated cone with less water volume. The water tank has inside a smaller truncated cone clothes drum! This clothes drum has a novel inside partition that divides the clothes drum as small and big clothes compartments. Big clothes may be hung in hangars, all hangers assembled on a cross rod fitted across the large cloth part to allow more water circulation between clothes for better wash! An electric motor rotates the clothes drum.

Accordingly the object of the invention is to identify the solutions for problem associated with the lower water using, better water flow between clothes in washing machines. An extensive search has been carried out using the Internet and related patent specifications were studied for top loading low water washing machines. Since the present invention is radically different, in using the same clothes drum for separate big and small clothes washing, the inventors are unable to site any patent specification out of the available databases. Search of the USPTO, European patent officers, others, known literature, the washing machine supply companies literature do not reveal a top-loading machine like ours. There are no truncated cone based water tub, truncated cone clothes drum with partition for small & big clothes washing. Search in Classification of patent data bases in D06F23, others, markets do not reveal a similar structure, functioning washing machine. We are not able to cite prior art washing machines of near related structure or function. The existing top loaders are cylindrical or near square water tubs with a cylindrical single chambered clothes drum unlike our truncated cone configuration. There are separate twin tub washers with separate wash and drying function – no way similar to our invention. Our top loading machine washes small and big clothes separately in different chambers of the same clothes drum. The water volume is also less in the truncated cone water tank. Global warming affects most cities in most countries with water scarcity. A 20 litre reduction per day is annual 6000 liters reduction per machine. Our top-loading washing machine can reduce the water supply needs of cities to survive the future water shortages.

Summary of the invention:

The washing machine comprises of a novel truncated cone, wider at the top water tank. The water tank has inside a rotatable smaller truncated conical clothes drum. The clothes-drum has a partition for smaller clothes and a larger chamber for the bigger clothes. The bigger clothes
5 can be suspended in hangers and placed on a supporting hanger rod fixed across the top of the clothes-drum for better water flow and washing. The clothes-drum has a drive shaft which is rotatably supported on the floor of the water tank. The drive shaft is rotated by a multi-speed electrical motor with belt on pulleys or gears. An electronic control with washing cycle software parameters runs the washing machine. The washing machine has an upper lid. There
10 are electric valve fitted water inflows and water drain in the water tank. Sensors for water level, water temperature, weight of the clothes can be fitted. Water heating element is incorporated in the water tank to heat the water for the needed temperature. The truncated conical water tank with a smaller truncated conical rotating clothes drum has a lower volume than a cylindrical or polygonal water tanks used in all existing manufacturer models. The clothes drum having an
15 inside partition for small and big clothes, suspending the big clothes in hangers for washing is new and efficient. The motor rotates the clothes drum for circulating the water in the drum (washing) and for removing the water (spin dry) from clean clothes. The electronic control manages the wash cycle.

Statement of Drawings:

20 These and other objects and features of the invention will become more apparent upon perusal of following description taken in conjunction with accompanying drawings wherein:

Figure 1 shows the details of new washing machine.

Figure 2 shows the back view of the washing machine with water, electrical fittings.

Figure 3 shows the exploded view of the parts.

25 Figure 4.shows a hot air clothes dryer attachment.

DESCRIPTION OF PREFERRED EMBODIMENTS

The following specification describes salient features of invention, the method of construction, the method of use and the advantages of the novel invention.

The novel device has a novel truncated water tank to reduce water volumes, easy
30 injection mouldable for strength for years of use and with a different pleasant looks too.

The novel washing machine according to invention is better because the all small and big clothes are separated and washed separately in the truncated cone clothes drum with an inside partition forming a small & big clothes chamber. The invention is easy to set up, run, and use even by illiterates or kids too.

5 The novel device has higher efficiency of washing clothes as the big clothes are washed in a hung mode, with more water flow between the clothes. Increasing global warming with drought and water scarcity needs less water& energy use in washing machines now. The existing washing machines have not been improved for long. The object of the invention is to overcome the inherent defects. To this end the new invention is addressed. Top loaders, if
10 better than front loaders are easy to use, maintain, saving money too.

The device is novel for reducing the water volumes, washing clothes small and big separately in the same clothes drum. For 30 cm height and 30 cm diameter cylindrical water tank, the volume is: $\pi r^2 h$ -21.195 liters. For a square water tank 30 cm each: $l b h$ - 27.000 liters. For a truncated conical : $\pi \times h \times (R^2 + r^2 + R \times r) / 3$; say for a top 30cm diameter, lower 25 cm,
15 height of 30 cm water volume is 17.867 liters- less than cylinder volumes by 3.4 liters 15% approximately.

A truncated conical water tank uses at least 10% less water for each wash /rinse cycle. Leading washing machine manufacturer in all the countries are looking for lower water-volume devices with lesser clumping and entanglement of clothes. The wash cycle time is also lesser reducing
20 the power use. The new washing machine is the need of the hour for water scarcity, energy reduction-a problem in all the countries.

The washing machine comprises of a truncated conical water tank 1, with a narrower lower diameter and a wider upper diameter mounted on a bottom placed motor fixing frame 30. The water tank has an upper transparent plastic lid 3 that can be opened or closed. The water tank
25 inside has a smaller truncated conical clothes-drum.2. The clothes-drum2 has a partition16 dividing the chamber in to a lower small clothes and upper larger clothes preferably. The partition is detachably attached to inside of the clothes drum by two or more sliding bolts29, slide to lock in a matching hole in the clothes drum or slide back to release the partition for loading and unloading small clothes.

30 The top of the clothes drum2 has a detachable lid 17 Fig.3 to keeps the clothes inside the drum while washing. This lid of the clothes drum has bolts19 to fix on the drum in rotation. The lid 17 had a central opening 18 to circulate water. The clothes drum has slots and holes 15, fig 3

on the sides to circulate water. The underside of the clothes drum has a drives shaft⁵. It is fitted rotatably in the driveshaft housing¹³ fig 3 incorporated in the floor of the water tank¹. The drive shaft has pulleys ⁶, Fig 3 and a belt ²⁷ Fig 3 or gears run by the electrical motor⁷. The electrical motor is fixed in a mounting base ¹⁴ Fig 3.

- 5 The water tank sits on a motor chamber³⁰. The motor chamber has ventilating holes to circulate air and cool down motor for long use (not shown). The water tank inside has a water drain outlet ⁸ Fig.3 with an electric valve (not shown) connected to an outlet ⁹ in the lower part of body Fig 1. The water drain valve is connected to the electronic control ⁴ to release wash water.

- There is a water inlet ¹¹ fig 2 on the back to feed the water tank. An electric valve (not shown)
 10 for this water inlet fills the water to the needed volume of water needed for the clothes load washing. The water inlet is connected to home water tap. Water heating elements, water level sensors are fixed as needed. The electronic control ⁴ preferably is in the top. There is a back panel ¹⁰ Fig 2 that covers the wires¹², electrical distribution, and the electrical connections for the sensors and electrical distribution for clean looks. The washing machine lid ³ may be a
 15 transparent plastic for seeing the inside of the washing machine in use.

The water tank has on its outside vertical ribs²⁸ Fig2 to reinforce and add strength.

- Big clothes can be hung on hangars ²³ Fig 3. Each hangar has the cloth hanging part²⁰, an upper projection ²² with a central hole²¹ for the hangar cross rod placed across the clothes drum upper chamber. The cross hangar assembly rod is detachably fixed in two terminal
 20 brackets as in our window screen rods.

For very cold countries an electric hot air blower²⁴ with a blower and heating coil is placed outside the water tank (no contact with water), feeds hot air in a channel²⁵ placed along the inside surface of the water tank with an opening ²⁶ that opens below the clothes drum ². The inlet of the air blower is connected to upper part of water tank for circulating hot air

- 25 The water inlet ¹¹ is connected to the home water tap. The drain ⁹ is connected to home waste water drain circuit. The washing machine wire ¹² is plugged in a home socket.

The electrical motor ⁷ is fixed to a fixing plate ¹⁴ inside the motor housing frame ³⁰. The motor rotates the clothes drum drive shaft by gears or belts. In this a pulley ⁶ and belt ²⁷ Fig .3 is shown. The motor frame has some air circulating holes to cool the motor (not shown).

The water tank, motor frame, clothes drum, lids& separator, hangars, hot air blowers and its channels, can all be moulded of engineering plastics like ABS, etc. The truncated conical water tank with floor drive shaft housing¹³, waste water drain⁸, sensor fittings (not shown in figures) can be single piece moulded. Fitting the motor to plate 8, linking drive shaft by belt on pulleys, water leak preventing seals, bearings for drive shaft in drive shaft assembly housing ¹³ are standard setups. Electrical connections in the back of washing machine with the cover¹⁰, water inlet¹¹, and drain assembly⁹ are standard.

To use, the washing machine lid 3 is opened. The lid 17 of the truncated conical clothes drum is removed by sliding the two bolts¹⁹. The inner partition 16 is removed by sliding the bolts ²⁹, small clothes are put in the bottom, the partition¹⁶ is placed inside the clothes drum 2 and bolt locked ²⁹. The big clothes are put in the upper big chamber of the clothes-drum. Otherwise, the clothes can be hung on the hangers ²³ which are hung on the hanger rod by sliding in hole ²¹ of the hangar²³. The clothes-drum lid 17 is placed and locked²⁸ tight. The lid of the washing machine³ is closed. The electronic control⁴ is set for desired fabric load, type of the fabric. The electronic control 4 opens the water inlet¹¹ (connected to home water tap)-valve and fills the water up to the needed level. The electrical motor⁷ is started. The clothes-drum is rotated. The clothes are better separated from each other, the water runs between the clothes producing faster and cleaner wash. The slots on the clothes drum¹⁵ allows circulation of water efficiently. The motor⁷ is stopped after the required time. The water drain 8 valve is opened and the washed water is drained ⁹ to outside. The water drain valve is closed. The water in-let valve is reopened to fill the water tank for rinsing off the detergents. The water inlet valve closes after the water level is achieved. The electronic control 4 then rotates the clothes drum and washes off the excess detergents from the clothes. The water drain valve is reopened to drain out the water. Then the motor is set for higher revolution and rotated. The clothes are rotated at high speed and they are dried through spinning and dried partly. The waste water is drained out and the water drain valve is closed. In cold countries, the hot air blower²⁴ is switched on. The hot air flows through the channel ²⁵ and the opening ²⁶ feeds hot air below the clothes drum 2. The clothes drum is rotated slowly by the electronic control, blowing hot air below upwards and drying clothes fully and then stopped. The clothes drum lid³ is removed, the large and small clothes are separately removed. The clothes on the hanger rod may be dried in the air for further drying. The device washes clothes using less amount of water and electricity.

The device may be modified. Various sizes for different cultures(different cloth styles) with needed clothes volume, water tank volume, motor size, water inlet, water drain sizes, water

heating elements, air blower capacity can be planned for each size. The motor may be of various speed stepper motors type. Lint collecting traps may be fitted inside the water tank to collect lint.

Clothes-drum and the water tank may be made of engineered plastic or metal. The conical water tank may have polygonal inside configuration like octagonal or more sides, but maintaining truncated cone in vertical axis. The ribs 28 may be decorative on the outside of the water tank 1 to strengthen the water tank. The water tank may be cast as a separate piece and fitted on the motor piece 30. Bottom wheels and vibration damping pads may be incorporated. The sensors for water level, the fabric load, water temperature and detergent may be incorporated in the floor or on the sides of the water tank... The drive shaft is placed in the water tank floor drive shaft housing with a water leak proof seal, bearings for silent long years of use with least vibrations. The clothes drum may be cast as a single piece in engineering plastic with clothes drum partition 16 and top lid 17 fitting margins. The electronic control has a power supply from the electrical distribution box, placed inside the back panel 10. The electronic control has a needed voltage power supply, a chip to control the wash cycles, a touch/button display to set or display of the wash cycle. There is an input touch buttons or knobs to set the electronic controls for the type of clothes, the water temperature, and wash cycle time with a buzzer for alerting/stopping the wash cycle end. The motor may be fitted on the side of the water tank, the clothes drum drive shaft having a geared assembly run by the motor with a leak seal. Two partitions can be used making small, moderate and large clothes separation in bigger models. Large clothes as bedsheets may be placed in upper chamber without hangers and pillow covers in small chambers. The bottom of the clothes drum may be perforated for water circulation. Impellor short blades may be fixed on the outside of the clothes drum to circulate water. The water tank may have inside projecting top rolled in margins to prevent water splash. The water tank with its floor drive shaft housing, sensors, water heating elements and motor housing can be a single piece moulded part. The drive shaft with the clothes drum can be balanced for smooth wobble free rotation. Instead of hanger rods ropes may be used to hang clothes. Noise reduction of moving parts, circulating water mechanisms can be added. The partition may be at the top of the inside of the truncated conical clothes drum forming a bottom large and upper small clothes chamber. Clothes drum partition 16 and lid 17 can be screw type, spring loaded type, snap fit type, etc. for clamping and easy release. The electric hot air blower of rated air flow, has heating coils in the blowing part to feed the hot air channel placed inside the water tank to bottom of the clothes drum.. Suction side of the blower

collects outside and water tank inside air for rapid drying. There is a free gap between the clothes drum and inside of the water tank on all sides for safe clothes drum rotation. The clothes drum may have a top squared profile for fixing hangars. Radiating, spiral supports for hanging clothes directly, instead of hangers can be fitted to top of the clothes drum. Addition floor water pulsators for larger washing machines can be used, with same or different motors. The motor speed may be very slow for soft, clothes or faster for coarse thick clothes.

The present invention can be modified in various embodiments, and the scope of the invention is not limited to the above-described embodiments. Thus, if the modified embodiment includes the structural elements of the claimed scope of the invention, it should be considered as falling within the scope of the claims of the present invention.

Advantages of the new invention:

1. The novel truncated conical clothes drum with the partition makes small and large clothes separation for better washing.
2. The large clothes may be hung on the hangers which after washing and drying may need less ironing.
3. The electrical power used for a wash cycle is also less.
4. This top-loader can be stopped in the middle of wash cycle for adding more clothes.
5. The truncated water tank uses less water volumes with lower wash cycle energy and time.
6. The clothes are easy to separate and use.
7. The hot air blower dries clothes fully.

WE Claim

1. A clothes washing and drying improved washing machine comprising of a vertical truncated conical water tank (1) with the upper wider diameter and narrower lower diameter, the water tank (1) having inside a rotating truncated conical clothes drum (2), the clothes drum having a lower drive shaft (5) rotated by the electrical motor (7), an electronic control (4) integrating sensors, the motor and water circuits runs the washing machine.
2. A clothes washing and drying machine claimed in claim 1, wherein the truncated conical clothes drum has inside a partition (16) forming a small and large clothes chamber, the partition having water circulating holes and two or more sliding bolts (29) for release or fixing.
3. A clothes washing and drying machine claimed in claim 1, where in the electric motor (7) is fixed in the motor frame plate (14), the motor frame having holes for cooling air circulation, the motor shaft engaging and rotating the clothes drum drive shaft (5).
4. A clothes washing and drying machine claimed in claim 1, wherein the clothes drum bottom driveshaft (5) is rotatably fixed in the drive shaft housing (13) in the floor of the water tank fitted with leak proof seal and supporting bearings, the free end of the drive shaft carries pulley and belt for engaging the electric motor shaft.
5. A clothes washing and drying machine claimed in claim 1, where in electronic control (4) with connected sensors for water level, the water inlet valve, water drain valve, fabric and clothes load sensor and water temperature sensor, the electronic control after loading the clothes chamber, closing the lid (17) of the clothes chamber and the lid (3) of the water tank, sequentially opens the water inlet (11) to fill the water tank (1) to the needed level and closes water inlet, the electrical motor (7) is started, the clothes drum (2) is rotated for the needed time to wash and remove the dirt of the fabrics, stops the motor, opens the water drain valve, after emptying the water closes the water drain valve, opens the water inlet valve to fill the water tank to the needed level for the detergent removal cycle, starts the motor to circulate the water to wash off the detergents., stops the motor, opens the water drain, empty the water tank, the motor is restarted for high revolution spin dry and stopped after drying., the alarm raised on wash completion .
306. A clothes washing and drying machine claimed in claim 1, wherein an electric hot air blower (24) fitted outside of the water tank, blows hot air in to a hot air channel (25) placed in the inside surface of the water tank (1), the hot air orifice (26) opening below the clothes drum for air drying of clothes.

7. A clothes washing and drying machine claimed in claim 1, wherein the truncated conical clothes drum(2) has inside across a hangar rod, the hangar rod held in terminal brackets, has a series of hangars (23) with clothes to hold and wash clothes.
8. A clothes washing and drying machine claimed in claim 1, the truncated conical clothes drum
5 (2) has a top lid (17), the lid having water circulating holes and at least two sliding bolts (19) to fix or release the lid. locked
9. .A clothes washing and drying machine claimed in claim 1, the clothes drum (2) has series of water circulating slots and holes (15).
10. 2. A clothes washing and drying machine claimed in claim 1, wherein the truncated
10 conical water tank(1) has multiple reinforcing ribs (28) on its outside.

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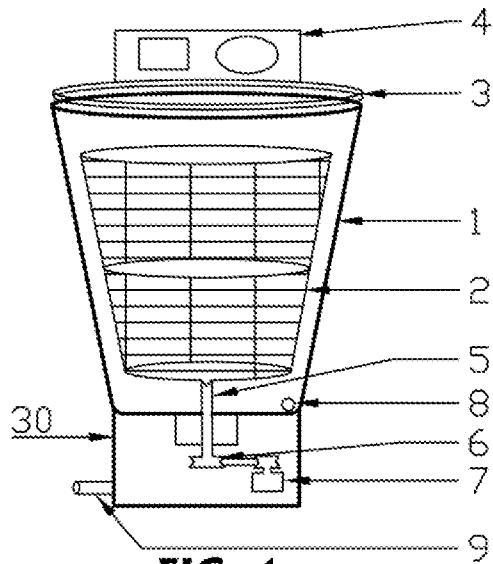


FIG: 1

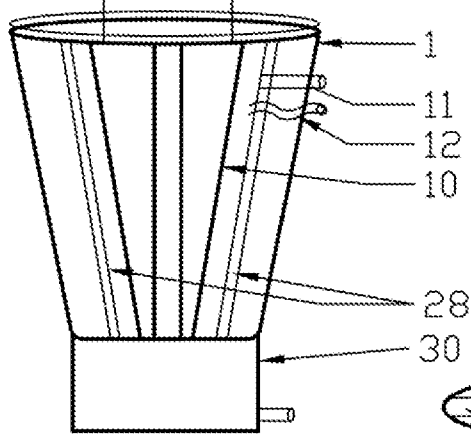
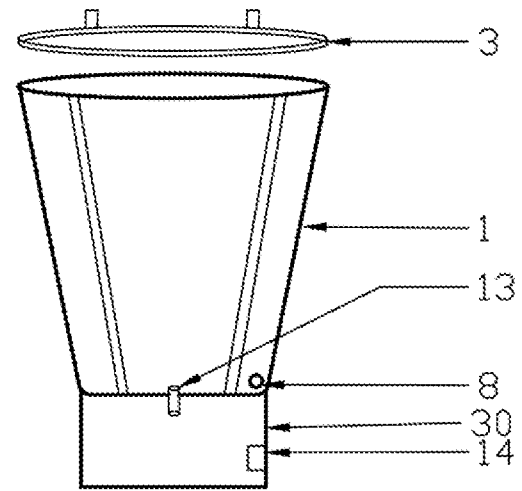


FIG: 2

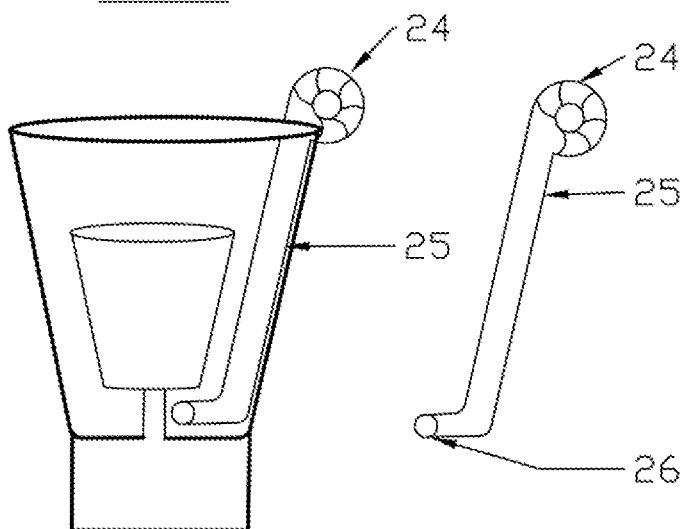
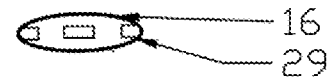
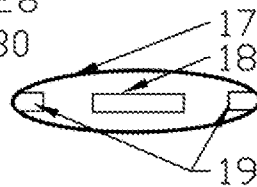
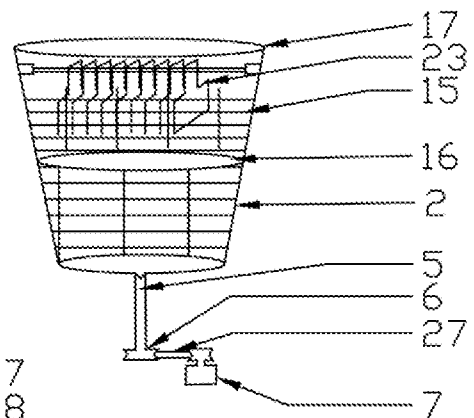


FIG: 4

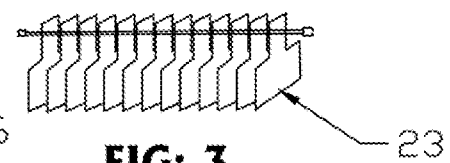
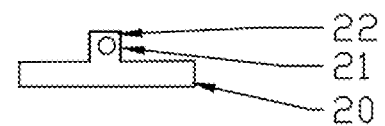


FIG: 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT / IN 2017/050113

A. CLASSIFICATION OF SUBJECT MATTER IPC: D06F 23/04 (2006.01); D06F 25/00 (2006.01); D06F 37/16 (2006.01); D06F 37/26 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) D06F Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, WPIAP		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2328256 A (BRECKENRIDGE FRANK) 31 August 1943 (31.08.1943) abstract; Fig. 1; whole document	1, 3 - 6, 8 - 10
Y		2, 7
X	US 2416405 A (PURPURA AUGUST C) 25 February 1947 (25.02.1947) abstract; Fig. 1; whole document	1, 3 - 5, 8 - 10
Y		2, 7
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Y	JP H10127976 A (SANYO ELECTRIC CO LTD.) 19 May 1998 (19.05.1998) abstract; Figs. 1, 2, 7	7
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INTERNATIONAL SEARCH REPORT
Information on patent family members

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