

(19)



(11)

EP 1 813 357 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

01.08.2007 Bulletin 2007/31

(51) Int Cl.:

B08B 9/08 (2006.01)

B65F 7/00 (2006.01)

(21) Application number: **07250271.9**

(22) Date of filing: **23.01.2007**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**

Designated Extension States:

AL BA HR MK YU

(30) Priority: **28.01.2006 GB 0601753**

(71) Applicant: **Berry, Raymond Anthony**

Kidderminster

Worcestershire

DY10 3AW (GB)

(72) Inventor: **Berry, Raymond Anthony**

Kidderminster

Worcestershire

DY10 3AW (GB)

(74) Representative: **Jackson, Derek Charles**

Derek Jackson Associates

The Old Yard

Lower Town

Claines

Worcester WR3 7RY (GB)

(54) Washing apparatus

(57) A washing apparatus includes a turntable (1, 49) adapted to receive a container (51), such as a waste container or bin, to be washed in an inverted orientation

and to rotate the container. A spray head (9, 55, 57) is adapted to be positioned within the container on the turntable so as to direct a spray of cleaning fluid against an internal surface of the container.

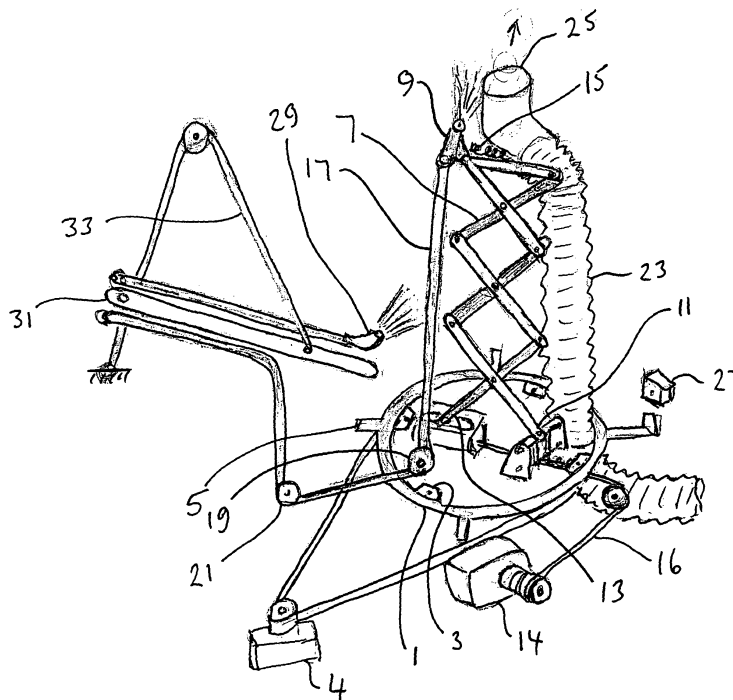


Fig. 1

EP 1 813 357 A2

Description

[0001] The present invention relates to a washing apparatus, for example for washing the interior and optionally the exterior of a container for waste.

[0002] Waste containers, or bins, are generally cleaned with the aid of a spraying mechanism which includes a spray head that is manipulated by a user so as to spray water or water incorporating a detergent or other cleaning agent onto the internal surface of the container and removing the soiled water or the like from the interior of the container. The external surface of the container may similarly be cleaned with the spraying mechanism.

[0003] The size of such waste containers, for example about 1 m tall, is such that it is not straightforward for the user of the spraying mechanism to wash the internal surface of the containers in an effective manner and to remove the soiled water or the like from the container in order to leave the waste container clean and relatively dry for re-use.

[0004] It is therefore an object of the present invention to provide a washing apparatus which is effective for cleaning the interior of a container.

[0005] According to the present invention there is provided a washing apparatus comprising a turntable adapted to receive a container to be washed in an inverted orientation and to rotate the same, and a spray head adapted to be positioned within the container on the turntable so as to direct a spray of cleaning fluid against an internal surface of the container.

[0006] The turntable may be annular.

[0007] In one embodiment of the invention the spray head is movable upwardly and downwardly within the container. The spray head may be provided on an elevating mechanism. The spray head may be mounted in a pivotable manner on the elevating mechanism whereby the spray head rotates towards the upper end of its upward movement so as to spray the base of the inverted container. Return means may be provided to return the orientation of the spray head towards a side of the container.

[0008] The elevating mechanism may comprise a scissor lift. The scissor lift may have one free lower end mounted in a pivotable manner and another free lower end mounted to be movable towards and away from the one free end.

[0009] The washing apparatus may include means for directing a flow of air against an internal surface of the container.

[0010] The means for directing a flow of air may be provided on an elevating mechanism. The means for directing a flow of air may be mounted in a pivotable manner on the elevating mechanism whereby the air flow directing means rotates towards the upper end of its upward movement so as to direct air towards the base of the inverted container. Return means may be provided to return the orientation of the air flow directing means towards a side of the container.

[0011] The air flow directing means may be actuated substantially only when the air flow directing means is moving downwardly within the container.

[0012] A further spray head may be provided adapted to be positioned externally of the container so as to direct a spray of cleaning fluid against an external surface of the container. The external spray head may be movable upwardly and downwardly and may move in an opposite direction to the internal spray head.

[0013] The or each spray head may be actuated substantially only when the internal spray head is moving upwardly within the container.

[0014] Alternatively, in another embodiment of the invention the turntable may be freely rotatable and the spray head may be inclined relative to the internal surface of the container such that the cleaning fluid impinges on the internal surface of the container in a manner which causes the container to rotate with the turntable. A plurality of spray heads may be provided within the container, at least one spray head directed primarily towards an internal side wall of the container and at least another spray head directed primarily towards a base of the container.

[0015] If desired, one or more further spray heads may be provided externally of the container. At least one external spray head may be directed towards an external side wall of the container such that the cleaning fluid impinges on the external side wall in a manner which causes the container to rotate with the turntable.

[0016] For a better understanding of the present invention and to show more clearly how it may be carried into effect reference will now be made, by way of example, to the accompanying drawings in which:

Figure 1 is a schematic perspective view of one embodiment of part of a washing apparatus according to the present invention;

Figure 2 is a schematic view of a further part of a washing apparatus shown in Figure 1; and

Figure 3 is a schematic perspective view of another embodiment of a washing apparatus according to the present invention.

[0017] Figure 1 shows an annular turntable 1 which is rotatably mounted on a base (not shown) by way of a plurality of rollers (not shown), such as four rollers, and maintained in position by way of a plurality of guides 3, such as four guides, which may be located, for example, on the internal periphery of the turntable. The base may be in the form of a plastics tray on which a base plate of suitable material, such as steel, is provided for supporting the turntable. A track is formed in a suitable manner, for example by means of nylon blocks, for determining the axis about which the turntable rotates. An electric motor 4 is provided for rotating the turntable 1 by way of a toothed belt which extends around the periphery of the

turntable. It should be noted that the motor need not be electrically powered, but could, for example, be a pneumatic or hydraulic motor.

[0018] A plurality of radial arms 5, for example four, extend from the external periphery of the turntable 1 for supporting a container of well-known type to be washed (not shown) in an inverted orientation. The container is not shown in order that the construction and operation of the washing apparatus can be readily appreciated. One or more locking mechanisms may be provided to secure the container to the turntable during the washing operation.

[0019] Mounted within the annular turntable 1 is an elevating mechanism 7 on which is provided a spray head 9. The elevating mechanism 7 is illustrated as being in the form of a scissor lift, but alternative lifting mechanisms can be employed. The scissor lift 7 operates by mounting one of the free lower ends 11 in a pivotable manner and by mounting the other of the free lower ends 13 in a manner which allows movement towards and away from the pivotably mounted end 11. Movement of the free ends towards each other causes the scissor lift to extend, while movement of the free ends away from each other causes the scissor lift to contract. The free lower end 13 is slidably mounted in an elongate slot formed in a mounting plate and is connected to an electric motor 14 by way of a cable 16 such that operation of the motor can move the lower end 13 towards the lower end 11 so as to cause the scissor lift to extend or can allow the lower end 13 to move away from the lower end 11 due to the weight of the scissor lift and other components mounted thereon to allow the scissor lift to contract.

[0020] If desired, operation of the scissor lift may be controlled in the following manner. The pivotably mounted lower end 11 may be provided with a pair of lever arms, a lower lever arm and an upper lever arm. An operating cable is connected to the upper of the lever arms and extends towards and beyond the movable lower end 13 to a pulley. The cable extends around the pulley and returns past both the movable and pivotable lower ends of the scissor lift and passes around a pulley mounted on the motor 14 to return towards the pivotable lower end 11. The cable is secured to the lower lever arm of the pivotable lower end 11 by way of a spring which maintains the cable in tension. In this way, rotation of the motor in a first direction draws the lower lever arm in a direction away from the movable lower end 13 so as to draw the movable lower end 13 towards the pivotable lower end 11 and to extend the scissor lift. Rotation of the motor 14 in the opposite direction correspondingly causes the scissor lift to contract.

[0021] The spray head 9 is pivotably mounted on the scissor lift 7 in such a way that the spray is directed generally horizontally as the scissor lift is raised and lowered so as to wash the sides of the container, but is pivoted upwardly (as shown in Figure 1) as the scissor lift reaches its maximum extension so as to spray the base of the container. A linked series of arms (not shown for clarity)

may be pivotably mounted on the scissor lift and connected to the spray head 9 so as to cause the spray head to pivot as the arms reach their maximum extension. A return spring 15 may return the spray head to its generally horizontal orientation when the scissor lift is not substantially at its maximum extension. The spray head 9 is connected to a source of water or the like by way of a flexible hose 17 which passes over rollers 19, 21.

[0022] A plurality of sensors may be mounted in the region of the lower ends of the scissor lift. A first sensor may detect the arrangement of the scissor lift for use with a relatively shallow container, a second sensor may detect the arrangement of the scissor lift with a relatively deep container, that is, when the scissor lift should be extended further, and a third sensor may detect the arrangement of the scissor lift when the lift has contracted so as to indicate the end of a washing cycle.

[0023] Also mounted on the scissor lift 7 is a flexible hose 23 for conducting air or the like to the region of the spray head 9. The flexible hose 23 has an outlet nozzle 25 which, as with the spray head 9, is directed generally horizontally as the scissor lift is raised and lowered so as to direct air towards the sides of the container, but is pivoted upwardly (as shown in Figure 1) as the scissor lift reaches its maximum extension so as to direct air towards the base of the container.

[0024] A sensor 27 is provided to detect rotation of the turntable 1.

[0025] The external surface of the container is washed by a separate spray head 29 which is mounted on a rotatable arm 31, for example of nylon or aluminium. The flexible hose 17 carrying water to the spray head 9 is also secured to the rotatable arm 31 such that, as the scissor lift is extended and the flexible hose is correspondingly extended, upward movement of the spray head 9 results in downward movement of the spray head 29. A return mechanism 33, such as a length of elastomeric material, causes the spray head 29 to be raised as the scissor lift 7 is retracted.

[0026] Other arrangements may be provided for the spray head 29. For example the spray head 29 may be mounted on an upright arm so as to be movable upwardly and downwardly. Alternatively, a plurality of stationary spray heads 29 may be mounted so as to be adjacent to the container and may be angled such that the momentum of the spray causes the container to rotate with the turntable 1, thereby eliminating the need for the motor 4.

[0027] In order to accommodate containers of differing heights, a sensor may be provided to determine the height of the container and may control the extension of the scissor lift 7 and the rotation of the spray head 9 accordingly.

[0028] Moreover, although not shown a flexible hose may be provided externally of the container for conducting air or the like to the region of the spray head 29, the flexible hose having an outlet nozzle which is directed generally horizontally so as to direct air towards the external sides of the container. Alternatively, air may be

directed at the external surface of the container by way of an upright elongate slot.

[0029] If desired a further spray mechanism may be provided internally of the container so as to direct a spray of a disinfectant or like fluid at the internal surface of the container after it has been cleaned.

[0030] Water and air are provided by means of an internal combustion engine 35, although other means for providing water and air will readily be apparent. The engine 35 is coupled to a water pump 37 for providing pressurised water to the spray heads 9 and 29. A further pump (not shown) may be provided, if desired, to convey soiled water to a waste tank (not shown). Alternatively, the waste water may be recycled for re-use.

[0031] All or part of the exhaust gas from the engine 35 is conveyed to a turbofan 39 and is employed to produce a stream of hot air which is conveyed to the outlet nozzle 25. A gate valve 41 may be provided in the outlet of the turbofan 39 in order to control the flow of air to the nozzle 25. The turbofan 39 is connected to the engine 35 by way of a sprag clutch 43 in order to prevent the fan turning the engine when the engine is switched off. It should be noted, however that the turbofan 39 may be connected to the engine 35 by way of a belt and pulley arrangement. Also connected to the engine 35 is an alternator 45 which generates electricity in order to power the motors 4, 14, a programmable logic controller 47 for controlling operation of the apparatus and valves for controlling the supply of water to the spray heads 9, 29.

[0032] The washing apparatus according to the present invention is readily portable and may, for example, be mounted in a van or other suitable vehicle, with the spray heads being provided in a spray booth or cubicle which is separated from the engine and the electrical controls.

[0033] In use of the washing apparatus, a container to be washed is inverted, placed on the turntable 1 and secured in position. The washing apparatus can then be actuated and can follow a selected washing cycle. The cycle essentially includes energising the motor 4 to cause the container to rotate and energising the motor 14 to elevate the scissor lift 7. At the same time, water is supplied to the spray heads 9, 29, with spray head 9 rising with the scissor lift and the spray head 29 descending. Consequently, the spray head 9 washes the internal surface of the container as the container rotates and the spray head 29 washes the external surface of the container as the container rotates. As the spray head 9 reaches the inverted base of the container, the spray head rotates upwardly so as to wash the base of the container.

[0034] Once the container has been washed, the supply of water to the spray heads 9, 29 is terminated and gate valve 41 is opened so as to allow the passage of heated air to the outlet nozzle 25 of the flexible air hose 23. Heated air is directed initially towards the inverted base of the container and thereafter towards the sides of the container as the scissor lift 7 is lowered and the container rotates.

[0035] In practice, the heated air causes little evaporation of the water remaining on the internal surface of the container, but generally tends to blow water off the surface of the container. As the nozzle 25 descends, the spray head 9 also descends, while the spray head 29 ascends, returning the spray heads to their starting positions.

[0036] The apparatus shown in Figure 3 differs from that shown in Figures 1 and 2 in that the turntable 49 is not powered, but is freely rotatable. Consequently, when the turntable 49 rotates, the container 51 which is mounted on the turntable in an inverted configuration rotates with the turntable. A hose 53 extends upwardly within the container 51 and is provided with two nozzles 55, 57. The nozzles are inclined to the side wall of the container in such a manner that water or the like exiting the nozzles impinges upon the container in such a manner as to cause the container to rotate. One nozzle 55 extends generally horizontally so as to wash the internal side wall of the container, while the other nozzle 57 is inclined upwardly such that the spray therefrom impinges upon the base of the container to wash the base region.

[0037] A further possibility is to provide a hose 59 which extends in an upright manner externally of the container and is provided with one or more nozzles 61 which are directed onto the external surface of the container 51 so as to wash the external surface. The nozzle or nozzles 61 are also inclined relative to the external surface of the container such that the spray therefrom impinges against the external surface in a manner which contributes to the rotation of the container.

Claims

1. A washing apparatus **characterised by** a turntable (1, 49) adapted to receive a container (51) to be washed in an inverted orientation and to rotate the same, and a spray head (9, 55, 57) adapted to be positioned within the container on the turntable so as to direct a spray of cleaning fluid against an internal surface of the container.
2. An apparatus as claimed in claim 1, **characterised in that** the turntable (1, 49) is annular.
3. An apparatus as claimed in claim 1 or 2, **characterised in that** the spray head (9) is movable upwardly and downwardly, for example on an elevating mechanism (7), within the container.
4. An apparatus as claimed in claim 3, **characterised in that** the spray head (9) is mounted in a pivotable manner whereby the spray head rotates towards the upper end of its upward movement so as to spray the base of the inverted container.
5. An apparatus as claimed in claim 3 or 4, **character-**

ised in that the spray head (9) is movable upwardly and downwardly by means of a scissor lift (7) which optionally has one free lower end (11) mounted in a pivotable manner and another free lower end (13) mounted to be movable towards and away from the one free end (11).

6. An apparatus as claimed in any preceding claim and including means (23) for directing a flow of air against an internal surface of the container. 10
7. An apparatus as claimed in claim 6, **characterised in that** the means (23) for directing a flow of air is provided on an elevating mechanism (7). 15
8. An apparatus as claimed in claim 6 or 7, **characterised in that** the means (23) for directing a flow of air is mounted in a pivotable manner whereby the air flow directing means rotates towards the upper end of its upward movement so as to direct air towards the base of the inverted container. 20
9. An apparatus as claimed in claim 6, 7 or 8, **characterised in that** the air flow directing means (23) is actuated substantially only when the air flow directing means is moving downwardly within the container. 25
10. Apparatus as claimed in any preceding claim, **characterised in that** a further spray head (29) is provided adapted to be positioned externally of the container so as to direct a spray of cleaning fluid against an external surface of the container. 30
11. Apparatus as claimed in claim 10, **characterised in that** the external spray head (29) is movable upwardly and downwardly and optionally moves in an opposite direction to the internal spray head (9). 35
12. An apparatus as claimed in any preceding claim, **characterised in that** the or each spray head (9, 29) is actuated substantially only when the internal spray head (9) is moving upwardly within the container. 40
13. Apparatus as claimed in any preceding claim, **characterised in that** the turntable (49) is freely rotatable and the spray head (55, 57) is inclined relative to the internal surface of the container (51) such that the cleaning fluid impinges on the internal surface of the container in a manner which causes the container to rotate with the turntable. 45 50
14. Apparatus as claimed in claim 13, **characterised in that** a plurality of spray heads (55, 57) are provided within the container (51), at least one spray head (55) directed primarily towards an internal side wall of the container and at least another spray head (57) 55

directed primarily towards a base of the container.

15. Apparatus as claimed in claim 13 or 14, **characterised in that** one or more further spray heads (61) are provided externally of the container (51). 5
16. Apparatus as claimed in claim 15, **characterised in that** at least one external spray head (61) is directed towards an external side wall of the container (51) such that the cleaning fluid impinges on the external side wall in a manner which causes the container to rotate with the turntable (49). 10

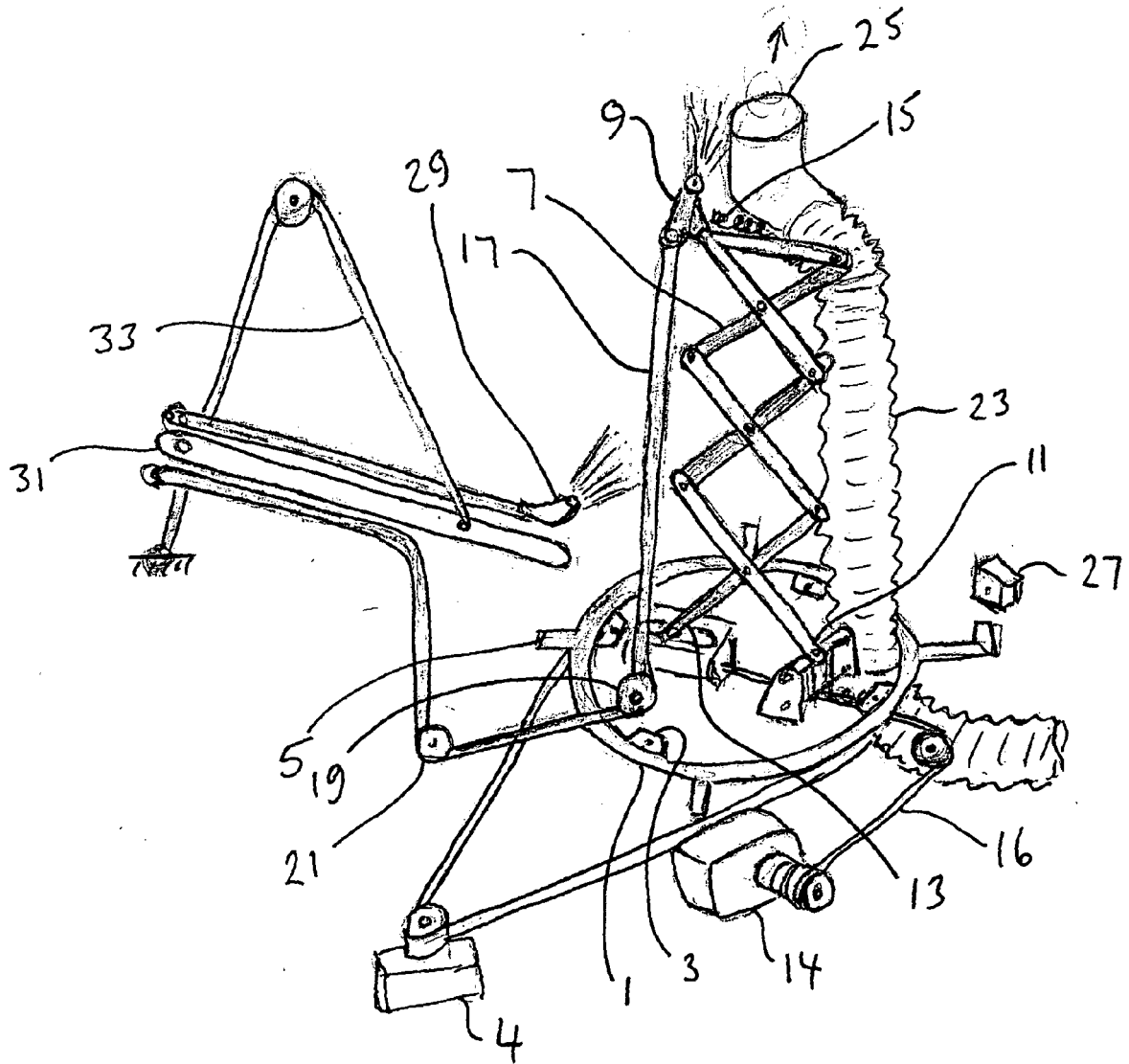


Fig. 1

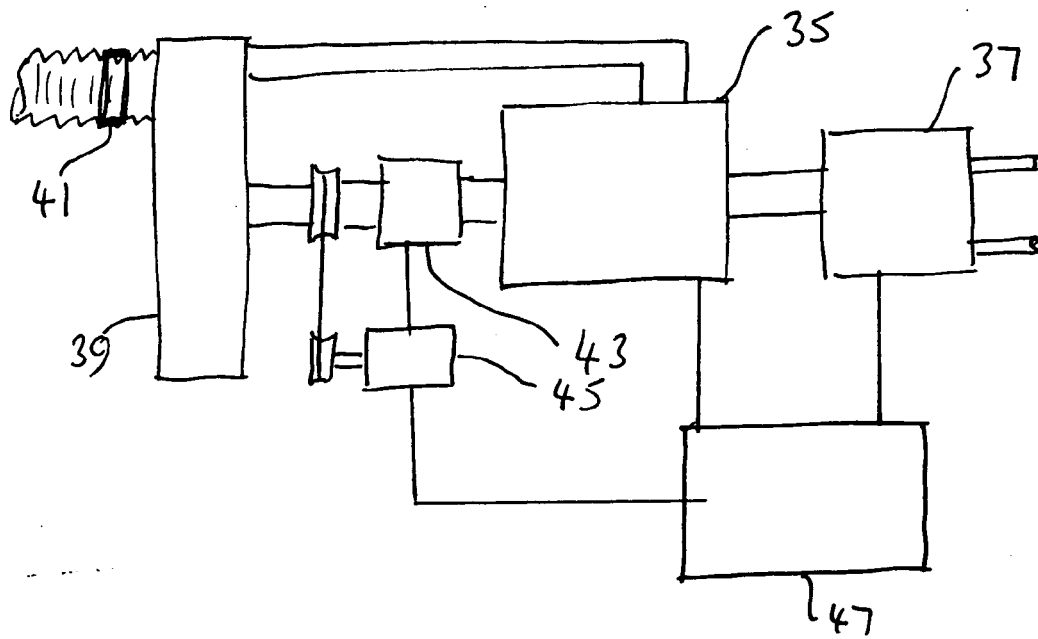


Fig. 2

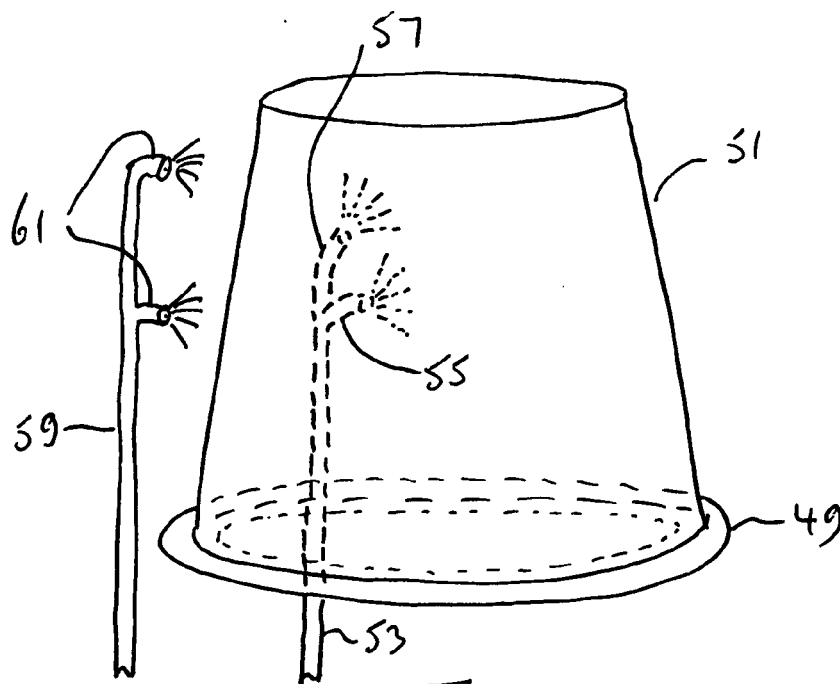


Fig. 3