(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 105 377**
A1

(12) # EUROPEAN PATENT APPLICATION

published in accordance with Art. 158(3) EPC

(21) Application number: 83900960.2

(51) Int. Cl.³: E 03 D 9/08

(22) Date of filing: 16.03.83

Data of the international application taken as a basis:

(86) International application number:
PCT/JP83/00082

(87) International publication number:
WO83/03274 (29.09.83 83/23)

(30) Priority: 17.03.82 JP 38405/82 U
17.03.82 JP 38406/82 U

(43) Date of publication of application:
18.04.84 Bulletin 84/16

(84) Designated Contracting States:
DE FR

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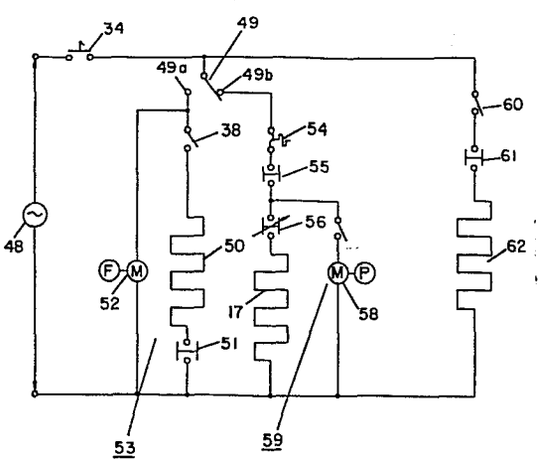
(54) **TOILET DEVICE.**

(57) A toilet device cleans an article after use with cleaning water and dries the article thereafter with a drying unit (53). The drying unit (53) is composed of a drying heater (50) and a motor fan (52). Electric power is supplied to the heater (50) through a series connector of a drying switch (49) held at a switching position and a gravity switch (38) turned on when the user sits on a toilet seat (3), thereby providing a toilet device which is very usable and safe.

FIG. 5



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TOILET APPARATUS

TECHNICAL FIELD

This invention relates to a toilet apparatus designed to rinse the part of a user's body after the use of the toilet and then dry said part by a drying device comprised of a drying heater and a motor fan, wherein the convenience for use is improved and the safety is increased.

BACKGROUND ART

The electric circuit of this type of conventional toilet apparatus was arranged in the manner shown in Fig. 8. A power source 71 has connected thereto a power switch 72 and a single-pole, double-throw type drying switch 73. And, a terminal 73a of this drying switch 73 is connected to a drying device 77 comprised of a drying heater 74, thermostat 75 and a motor fan 76, while the other terminal 73b is connected through a thermal fuse 78 and a thermostat 79 to a rinsing device 84 comprised of a hot water temperature adjusting thermostat 80, a heater 81, a pump energizing switch 82 and a motor pump 83. Numeral 85 denotes a toilet seat switch connected in series with the power switch 72, which is connected to a toilet seat heater 87 through a thermostat 86.

However, since the drying switch 73 in the aforesaid conventional toilet apparatus is of the type in which said switch, when pressed by the user's hand, is switched to the terminal 73a and when released it is automatically switched

to the other terminal 73b, it is necessary for the user to keep pressing the drying switch 73 for connection to the terminal 73a; thus, the conventional toilet apparatus has been very inconvenient to use. In order to improve its operability, if the drying switch 73 is replaced by a switch of the type in which when manually switched to the terminal 73a, it is held in that position and upon the lapse of a predetermined period of time it is automatically switched to the other terminal 73b by the action of a timer, then the need for keeping the drying switch 73 during drying may be eliminated. However, during the operation of the timer, the drying heater 74 and motor fan 76 remain energized even if the user leaves the toilet, which causes great waste of energy. Further, if the operation time of the timer is long, the temperature of the drying heater 74 will abnormally rise to a dangerous level.

DISCLOSURE OF THE INVENTION

Accordingly, this invention provides a toilet apparatus which, in view of the aforesaid drawback of the prior art, is designed to save the need of keeping pressing the drying switch during the drying time, thereby to be convenient to use, and in which even if the user forgets to turn off the drying switch, it is automatically turned off after a predetermined period of time and hence the safety can be promoted.

An embodiment of this invention will now be described with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of the entire arrangement of a toilet apparatus according to an embodiment of the invention; Fig. 2 is a perspective view showing the internal arrangement of the toilet apparatus; Fig. 3 a and b show a top sectional view and a front view of a toilet seat; Fig. 4 is a side sectional view showing the relation between a driver and a gravity switch; Fig. 5 is an electric circuit diagram of the toilet apparatus; Fig. 6 is an electric circuit diagram of another embodiment; Fig. 7 is an electric circuit diagram of a further embodiment; and Fig. 8 is an electric circuit diagram of a conventional toilet apparatus.

BEST MODE FOR CARRYING OUT THE INVENTION

Removably attached to a main toilet body 1 shown in Fig. 1 is an main apparatus body 2. Over the main toilet body 1, a toilet seat 3 is turnably attached to the main apparatus body 2, and over the toilet seat 3, a toilet lid 4 is turnably disposed. Installed inside the toilet seat 3 is a toilet seat heater 62 shown in Fig. 5.

Fig. 2 shows the internal arrangement of the main apparatus body 2, which comprises a base 5 having various components mounted thereon, and a cover 6 shown in Fig. 1 removably attached to the base 5 and covering various components. Various components mounted on the base 5 will now be described with reference to Fig. 2.

A rinsing nozzle 7 attached to the back of the base 5 substantially in the middle thereof communicates through hoses 8 and 9 with a hot water tank 10, which communicates through a hose 11 with a solenoid valve 12, which communicates through a hose 13 with a pump 15 driven by a motor 14, the pump 15 communicating through a hose 16 with a water supply port (not shown). The hot water tank 10 is equipped with a heater 17 for heating rinsing water supplied into the hot water tank 10, a thermostat 18 for detecting the temperature of the hot water in the hot water tank 10, and a float switch 19 for detecting the level of the hot water in the hot water tank 10. Attached to a switch block 20 positioned forwardly of the hot water tank 10 and secured to the base 5 are a knob 21 for adjusting the temperature of the toilet seat 3 and a knob 22 for adjusting the temperature of the hot water. A wind tunnel 23 positioned above the rinsing nozzle 7 and attached to the base 5 is partitioned by a partition plate 24 into two air supply passages. Thus, it has deodorizing suction ports 25, a drying air blowoff port 26, a drying air suction port 27 and an deodorizing exhaust port 28, so that the odors in the main toilet body 1 are sucked through the deodorizing suction ports 25 and discharged through the deodorizing exhuast port 28, while the drying air is sucked through the suction port 27 and blown off through the blowoff port 26. A damper 29 attached to the wind tunnel 23 and adapted to alternately open and close the drying air suction port 27 and deodorizing exhaust

port 28 is operated by a drying switch lever 31 mounted on a switch block 30 positioned on the side opposite to the switch block 20 and attached to the base 5. Besides the drying switch lever 31, the switch block 30 is equipped with a drying power adjusting switch 32, an deodorizer switch 33, a power switch 34, a power indicator lamp 35, and a knob 36 for adjusting the pressure of water for rinsing. A deodorant (not shown) will be put in through a deodorant charging port 37 communicating with the odor passage in the wind tunnel 23. A gravity switch 38 attached to the base 5 adjacent to the switch block 20 is adapted to be driven by the vertical movement of a driver 39 vertically movably held by a holder 5a which is integral with the base 5.

Fig. 3 a and b show the toilet seat 3 attached to the main apparatus body 2 through a rotary shaft 40. When the toilet seat 3 is attached to the main apparatus body 2 by the rotary shaft 40, the latter is pushed in from outside the main apparatus body 2 through a through hole 41 in the toilet seat 3, a through hole 42 in the toilet lid 4 and an elongated hole 43 in the main apparatus body 2, as shown in Fig. 3 a and b, whereby the front end of the rotary shaft 40 is elastically locked in position by an engaging portion 44 disposed on the driver 39, thus completing the attaching operation. The aforesaid driver 39 is constantly upwardly urged by a spring 45, so that when the user sits on the toilet seat 3, the driver 39 is pushed down against the force of the spring 45

and, as shown in Fig. 4, a taper surface 39a formed on the lower portion of the driver 39 presses a roller 46 in a clockwise direction and pushes an actuator pin 47 to turn on the gravity switch 38.

Fig. 5 shows an electric circuit, wherein a power source 48 has connected thereto a power switch 34 and a single-pole, double-throw type drying switch 49. A terminal 49a of the drying switch 49 is connected through the gravity switch 38 to a drying heater 50 and thermostat 51 and is connected directly to a motor fan 52. The drying heater 50, thermostat 51 and motor fan 52 constitute a drying device 53. The other terminal 49b of the drying switch 49 is connected through a thermal fuse 54 and a thermostat 55 to a rinsing device 59 comprised of a hot water temperature adjusting thermostat 56, a heater 17, a pump energizing switch 57 and a motor pump 58. Further, a toilet seat switch 60 connected in series with the power switch 34 is connected to a toilet seat heater 62 through a thermostat 61.

The operation will now be described.

First, the rinsing operation will be briefly described. The rinsing water heated by the heater 17 in the hot water tank 10 is emitted, being pressed by the rinsing water which is forced into the hot water tank 10 by the pump 15, from the rinsing nozzle 7 via the hoses 8 and 9 against the part of the user's body after the use of the toilet.

When the part of the user's body is dried, the

drying switch 49 is switched from the terminal 49b in Fig. 5 to the terminal 49a to energize the drying heater 50 and motor fan 52 so as to blow off hot air through the blowoff port 26 into the main toilet body 1.

In this case, since the present embodiment is designed so that the drying switch 49, once switched to the terminal 49a, is held in that position even if the user's hand is removed from the switch, the apparatus is very convenient for use.

Further, the drying switch 49 is electrically connected in series with the gravity switch 38 which will be turned on when the user sits on the toilet seat 3 thereby to energize the drying heater 50 of the drying device 53. Thus, when the user manually switches the drying switch 49 to the terminal 49a, i.e. switches so that the drying device 53 is energized to perform drying after rising and, upon completion of drying, the user forgets to manually switch the drying switch 49 to the other terminal 49b (or to turn it off), the gravity switch 38 will be turned off when the user leaves the toilet seat 3, so that power supply to the drying heater 50 of the drying device 53 is cut off and hence the safety becomes very high.

Further, since the motor fan 52 of the drying device 53 continues to rotate even if the gravity switch 38 is turned off, the user, hearing the sound of the operation of the motor fan 52, will be reminded that he has forgotten to turn off the drying switch 49. Moreover, since the rotation of the motor fan 52 acts

to cool the remaining heat in the drying heater 50, the safety is further increased.

While the drying switch 49 in the above embodiment has been described as of the type designed so that when it is manually operated for the switching between the on- and off-positions, it is held in the respective positions, the same function and effect of the above embodiment can be attained by employing a switch designed so that when it is manually switched to the on-position, it is held in that position and will be turned off upon the lapse of a predetermined time.

In another embodiment shown in Fig. 6, the drying switch 49 has the terminal 49a thereof connected through the gravity switch 38 to the drying device 53 comprised of the drying heater 50, thermostat 51 and motor fan 52, and the other terminal 49b connected through the thermal fuse 54 and thermostat 55 to the rinsing device 59 comprised of the hot temperature adjusting thermostat 56, heater 17, pump energizing switch 57 and motor pump 58. The toilet seat switch 60 connected in series with the power switch 34 is connected to the toilet seat heater 62 through the termostat 61.

Thus, in the embodiment shown in Fig. 6, the gravity switch 38 cuts off power supply to the drying heater 50 and motor fan 52 of the drying device 53, thereby preventing the temperature of the drying heater 50 from abnormally rising or avoiding waste of energy.

Fig. 7 shows a further embodiment, which differs

from Fig. 5 in that the drying switch 49 is of the single-pole, double-throw type and in that a rinsing switch 63 is separately provided for independently operating the rinsing device 59.

INDUSTRIAL APPLICABILITY

As described above, the toilet apparatus of this invention is arranged so that when the drying switch is manually switched so that the drying device is energized, the drying switch is held in that position; thus, there is no need to keep pressing the drying switch during the drying operation. Thus, it is very convenient to use.

Further, since electric power is supplied to the drying heater of the drying device through the series combination of the drying switch and the gravity switch which is adapted to be turned on when the user sits on the toilet seat, even if the user forgets to turn off the drying switch, the gravity switch will be turned off when he leaves the toilet seat, thereby cutting off power supply to the drying heater of the drying device. As a result, the temperature of the drying heater does not abnormally rise thereby to assure safety, and thus waste of energy is avoided.

CLAIMS:

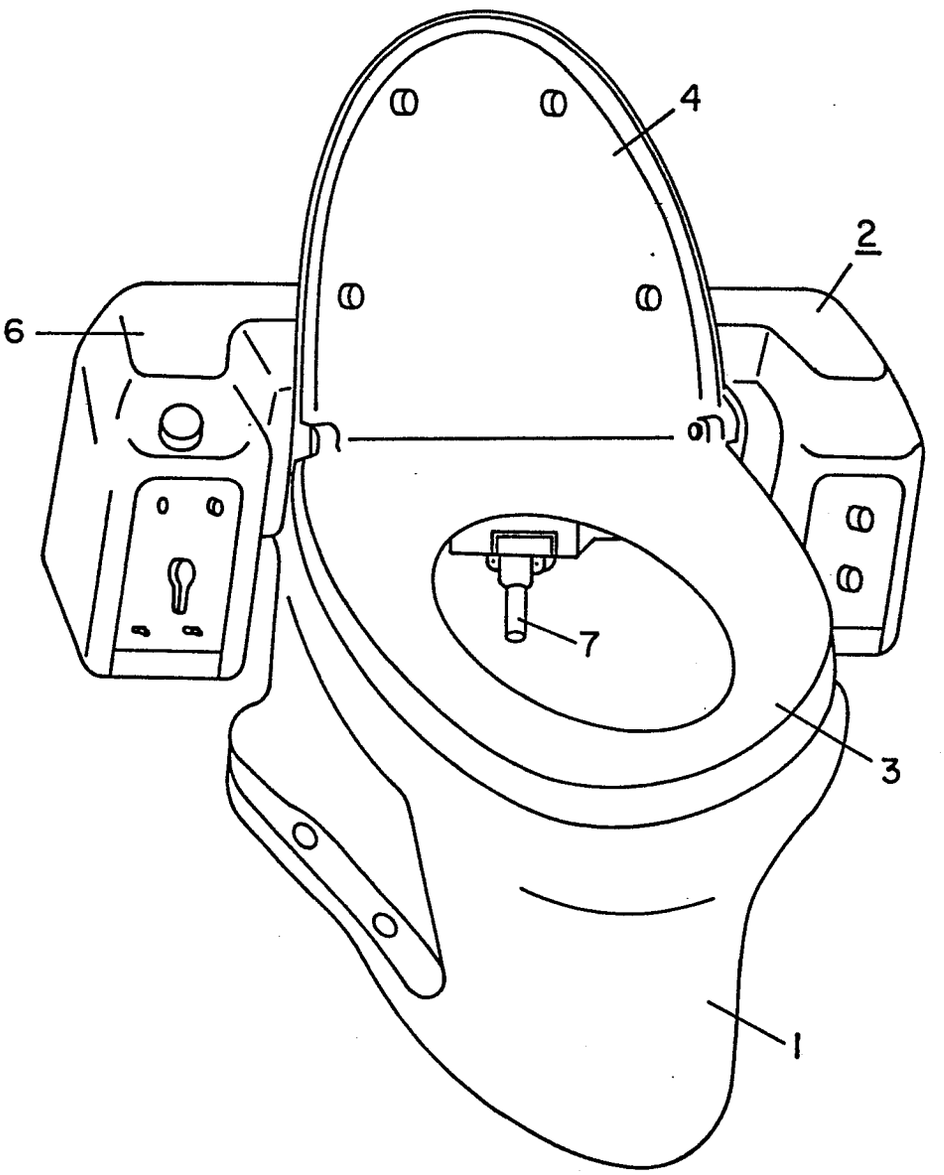
1. A toilet apparatus comprising a drying device composed of a drying heater and a motor fan, a drying switch operated to energize or de-energize said drying device and held in an operated position thereof, and a gravity switch adapted to be turned on when a user sits on a toilet seat of said toilet apparatus, wherein electric power is supplied to said drying heater of said drying device through a series connection of said drying switch and gravity switch.

2. A toilet apparatus as set forth in Claim 1, wherein electric power is supplied to said drying heater and motor fan of said drying device through the series connection of said drying switch and gravity switch.

3. A toilet apparatus as set forth in Claim 1 or 2, wherein said drying switch is constructed so that, when it is operated manually to be turned on and off, it is held in respective operated positions thereof.

4. A toilet apparatus as set forth in Claim 1 or 2, wherein said drying switch is constructed so that, when it is switched manually, it is held in the switched position and then it returns to the original position thereof upon the lapse of a predetermined time.

FIG. 1



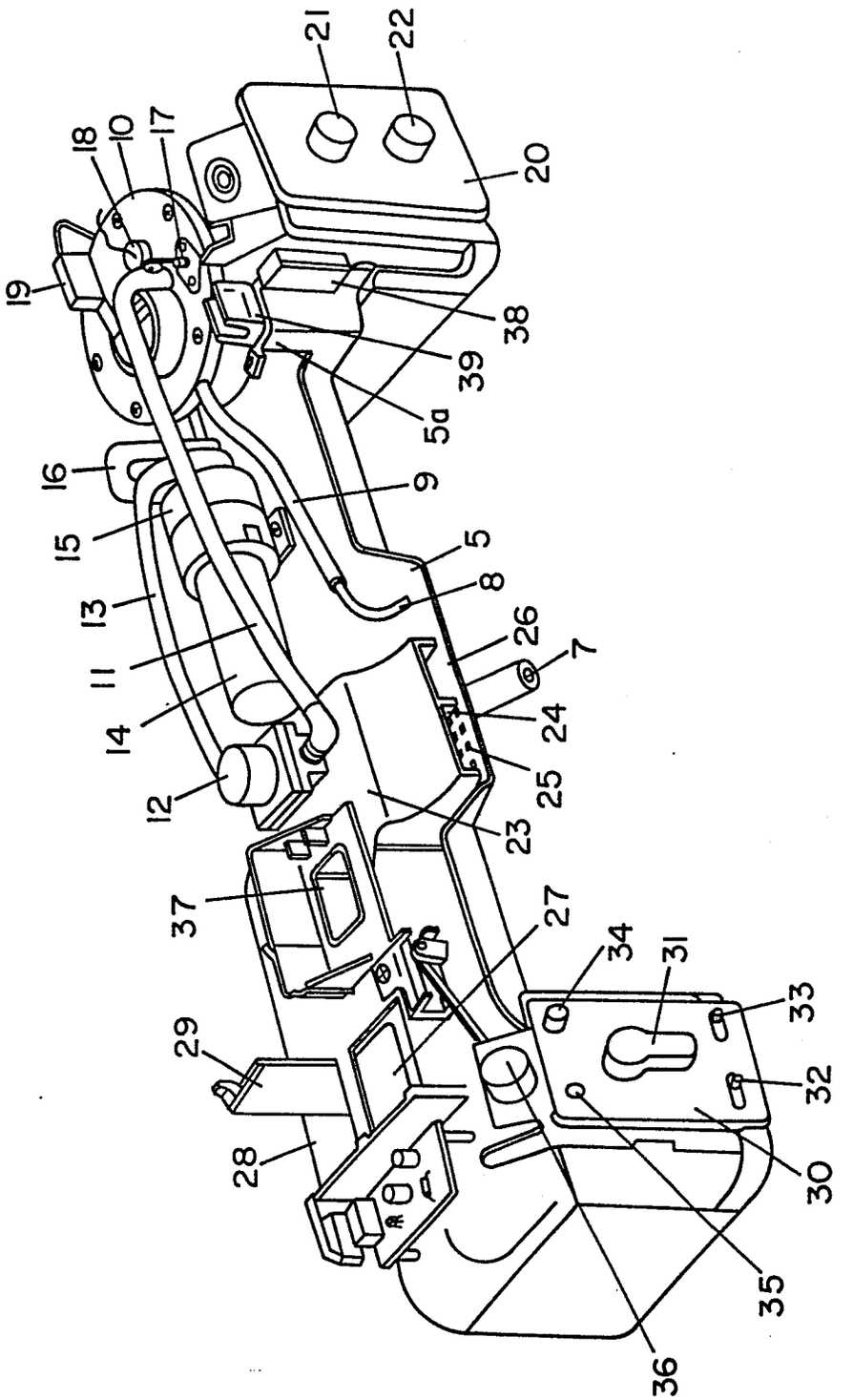

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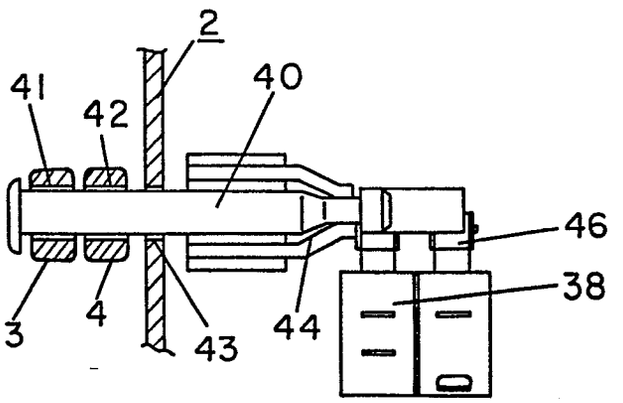
FIG. 2

FIG. 3

(a)



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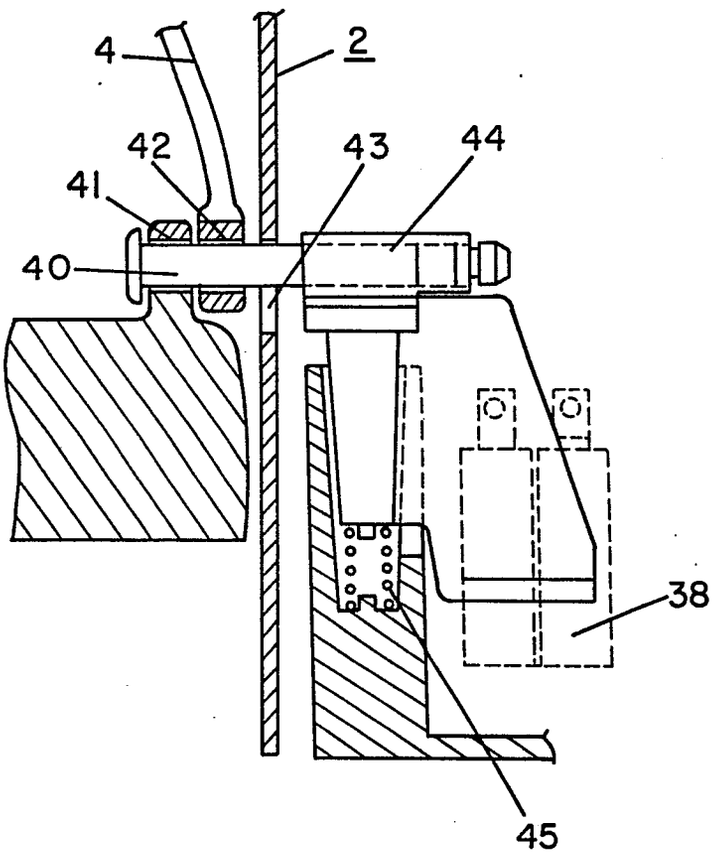

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FIG. 4

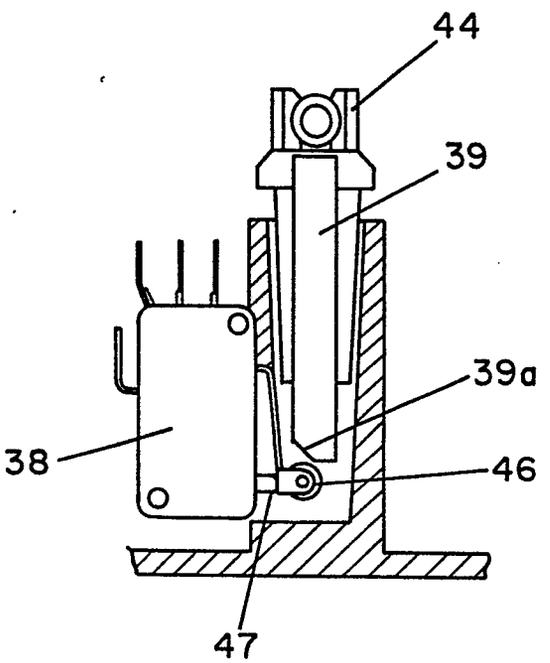


FIG. 5

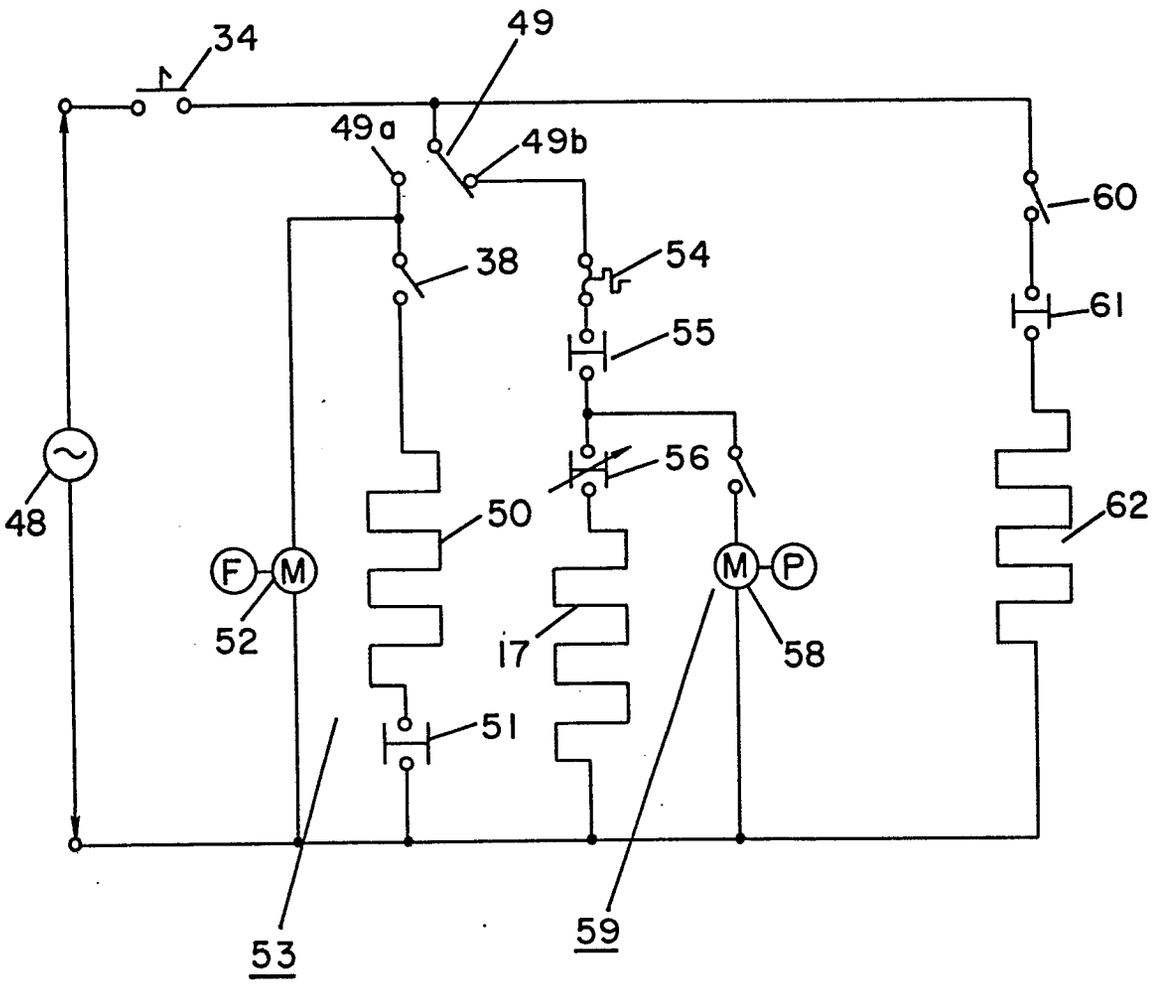


FIG. 6

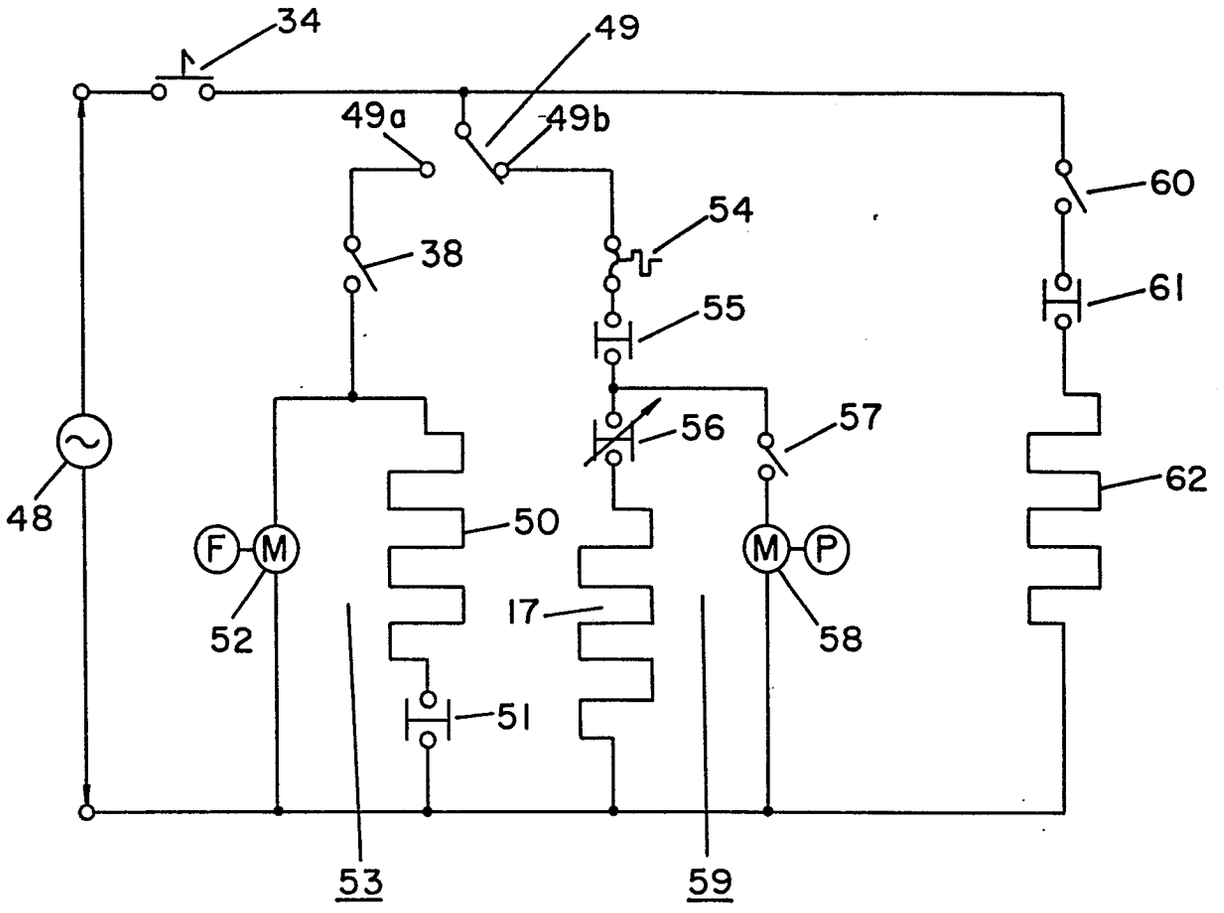


FIG. 7

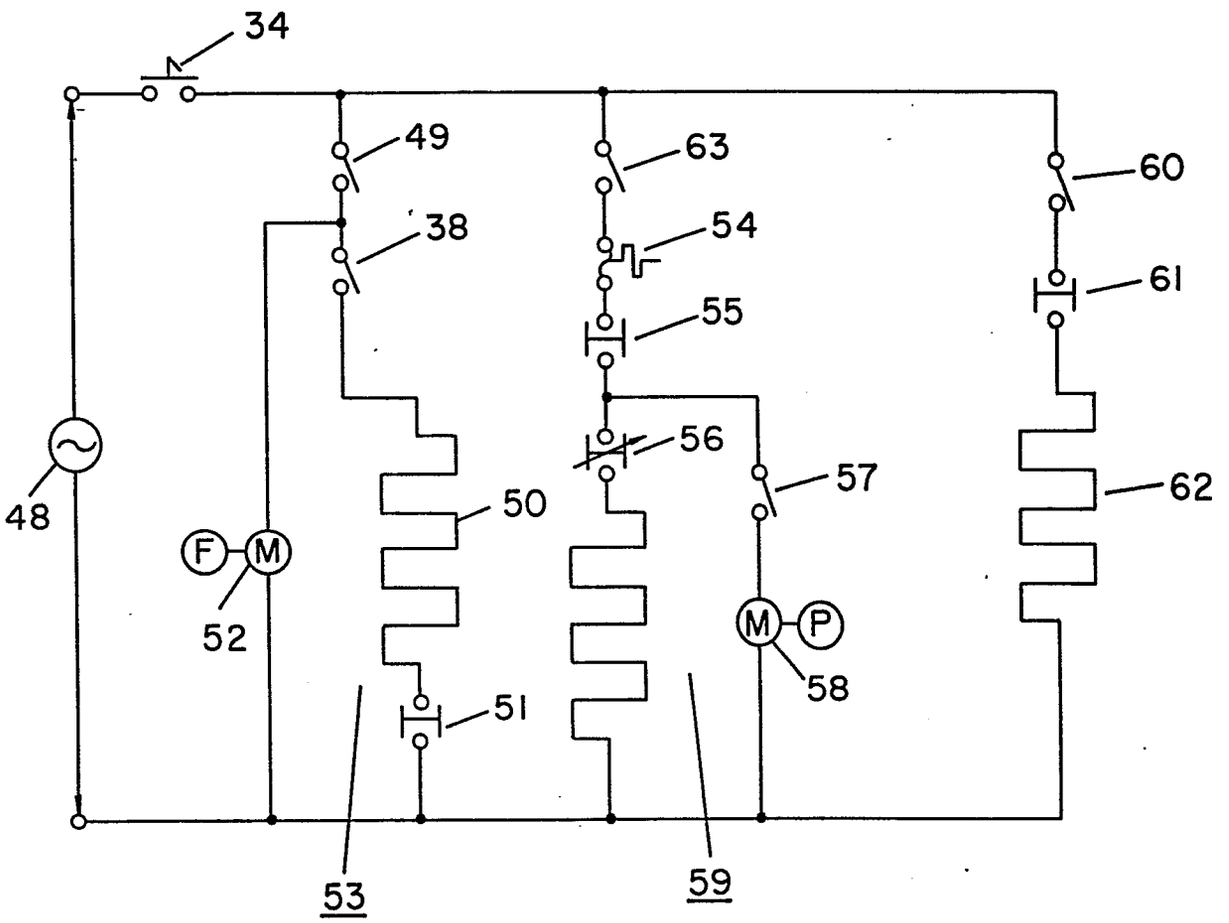
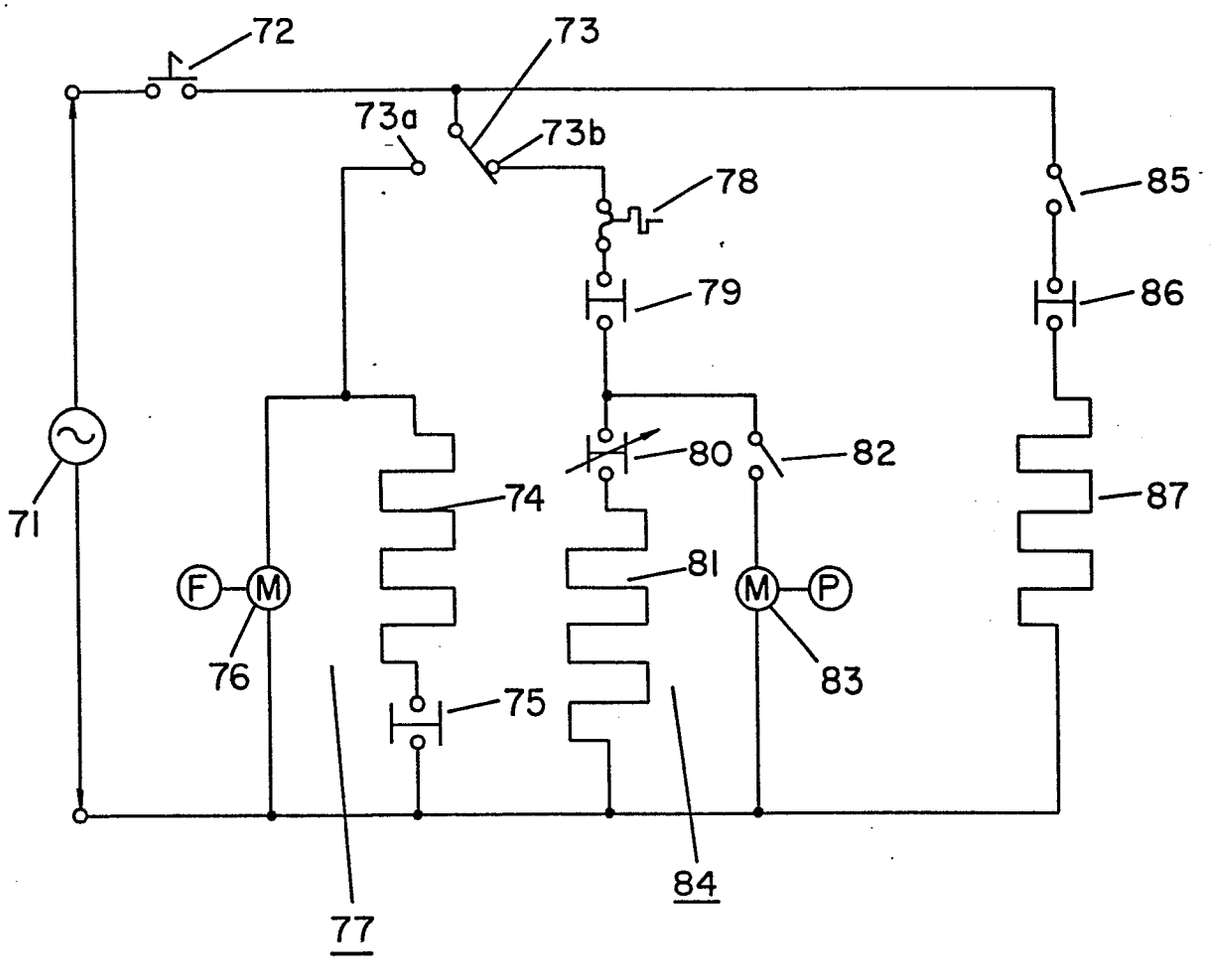


FIG. 8



LIST OF REFERENCE NUMERALS IN THE DRAWINGS

1 .... main toilet body

2 .... main apparatus body

3 .... toilet seat

4 .... toilet lid

5 .... base

6 .... cover

7 .... rinsing nozzle

8 .... hose

9 .... hose

10 ... hot water tank

11 ... hose

12 ... solenoid valve

13 ... hose

14 ... motor

15 ... pump

16 ... hose

17 ... heater

18 ... thermostat

19 ... float switch

20 ... switch block

21 ... knob

22 ... knob

23 ... wind tunnel

24 ... partition plate

25 ... deodorizing suction port

26 ... blowoff port

27 ... suction port

28 ... deodorizing exhaust port

29 ... damper

30 ... switch block

31 ... drying switch lever

32 ... drying power adjusting switch

33 ... deodorizer switch

34 ... power switch

35 ... power indicator lamp

36 ... water pressure adjusting knob

37 ... deodorant charging port

38 ... gravity switch

39 ... driver

39a .. taper surface

40 ... rotary shaft

41 ... through hole

42 ... through hole

43 ... elongated hole

44 ... engaging portion

45 ... spring

46 ... roller

47 ... actuator pin

48 ... power source

49 ... drying switch

49a .. terminal

49b .. terminal

50 ... drying heater

51 ... thermostat

52 ... motor fan

//

53 ... drying device

54 ... thermal fuse

55 ... thermostat

56 ... hot water temperature adjusting thermostat

57 ... pump energizing switch

58 ... motor pump

59 ... rinsing device

60 ... toilet seat switch

61 ... thermostat

62 ... toilet seat heater

63 ... rinsing switch

71 ... power source

72 ... power switch

73 ... drying switch

73a .. terminal

73b .. terminal

74 ... drying heater

75 ... thermostat

76 ... motor fan

77 ... drying device

78 ... thermal fuse

79 ... thermostat

80 ... hot water temperature adjusting thermostat

81 ... heater

82 ... pump energizing switch

83 ... motor pump

84 ... rinsing device

85 ... toilet seat switch

86 ... thermostat

87 ... toilet seat heater

INTERNATIONAL SEARCH REPORT

0105377

International Application No. PCT/JP83/00082

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] E03D 9/08

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
I P C	E03D 9/08

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

Jitsuyo Shinan Koho	1928 - 1983
Kokai Jitsuyo Shinan Koho	1971 - 1983

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category*	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

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"Y" document of particular relevance; 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

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
June 15, 1983 (15.06.83)	June 27, 1983 (27.06.83)
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Japanese Patent Office	