United States Patent [19]

Kato

[11] **3,922,735**

[45] **Dec. 2, 1975**

[54] **BED FOR PATIENT**

[76] Inventor: **Hisao Kato,** No. 37, 2-Chome, Showa, Nemuro, Hokkaido, Japan

[22] Filed: **May 6, 1974**

[21] Appl. No.: **467,535**

[30] **Foreign Application Priority Data**

May 7, 1973 Japan 48-49690

[52] **U.S. Cl.** ..... **5/91;** 4/7; 4/185 R; 5/90

[51] **Int. Cl.²** **A61G 7/04**

[58] **Field of Search** ..... 4/177, 110, 111, 112, 113, 4/185 R, 6, 7; 5/90, 243

[56] **References Cited**

UNITED STATES PATENTS

686,831 11/1901 Nason 5/90

Primary Examiner—Robert I. Smith

Attorney, Agent, or Firm—Ladas, Parry, Von Gehr, Goldsmith & Deschamps

[57] **ABSTRACT**

A bed for a patient comprising a cover plate and a flush pot for patient's excretion arranged below the bed and adapted to move vertically and horizontally. The cover plate normally closes a hole formed in the bed for a normal use as a bed and when desired the cover plate automatically lowers and horizontally moves away from the position and simultaneously the flush pot moves to the position immediately below the hole of the bed and raise to a position that the upper periphery of the pot is in flush with the upper surface of the bed, so that patient's buttocks comes into closely contact with the pot and are supported thereon to reduce a chamber of stain of the bed. The bed is provided with a pump motor for flushing and injection of cleaning water against the patient's excretory organ after excretion, and a fan motor for ventilation and warm wind injection for drying the organ after cleaned.

5 Claims, 14 Drawing Figures

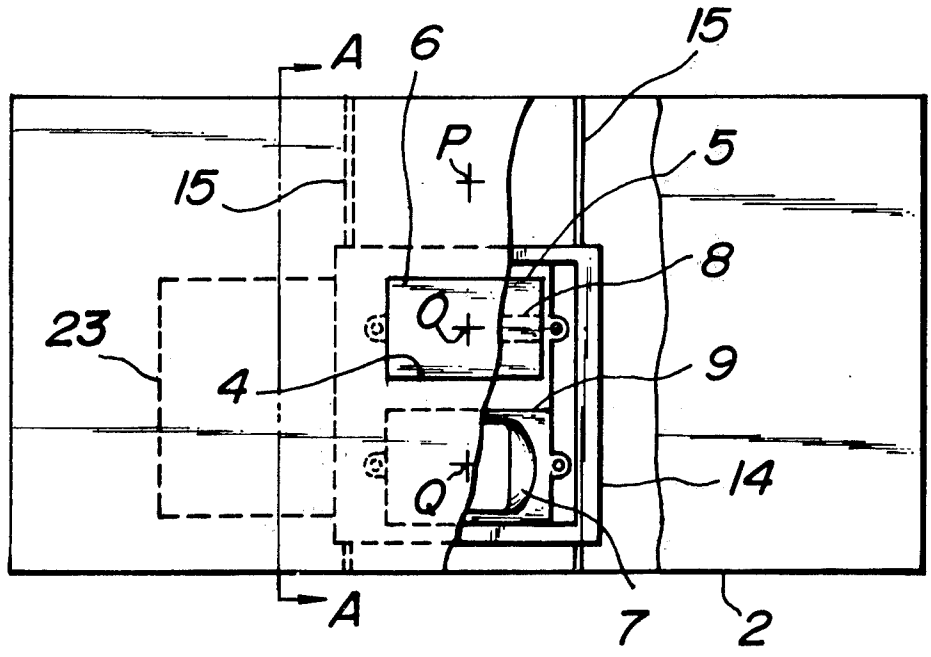


FIG_1

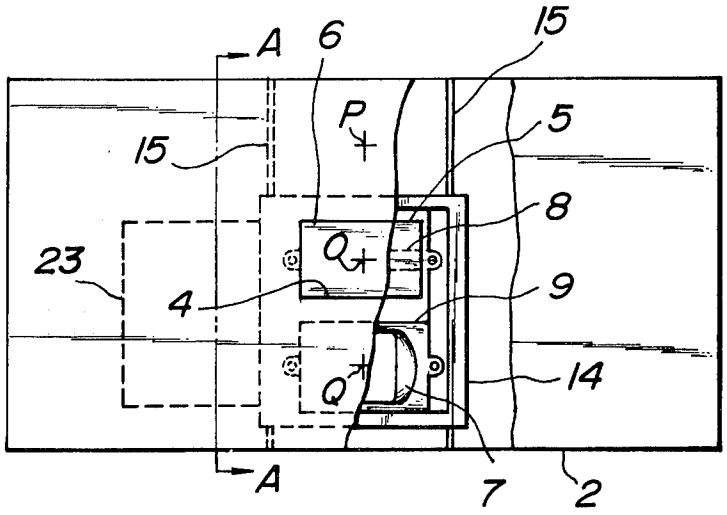


FIG_2

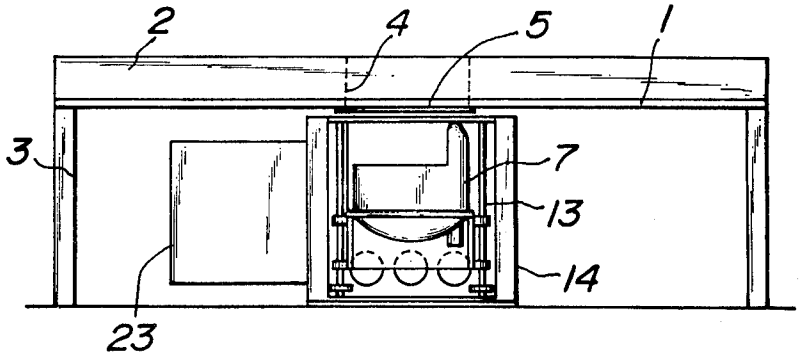


FIG_3

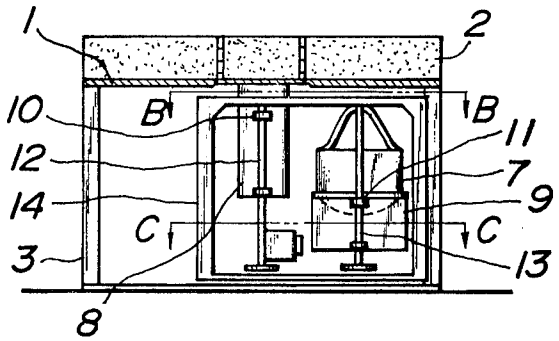


FIG_4

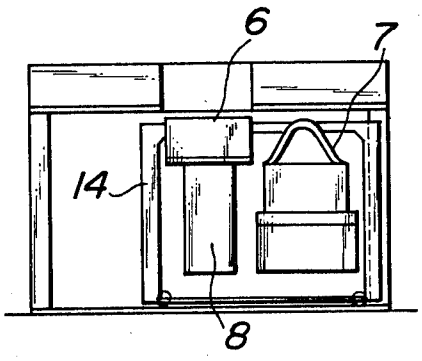


FIG_5

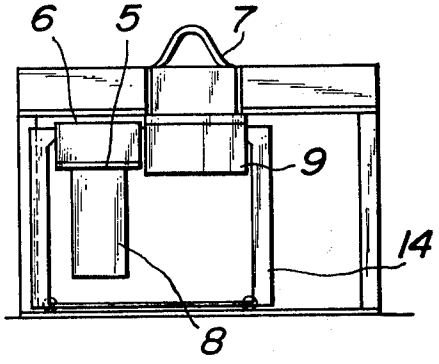


FIG_6

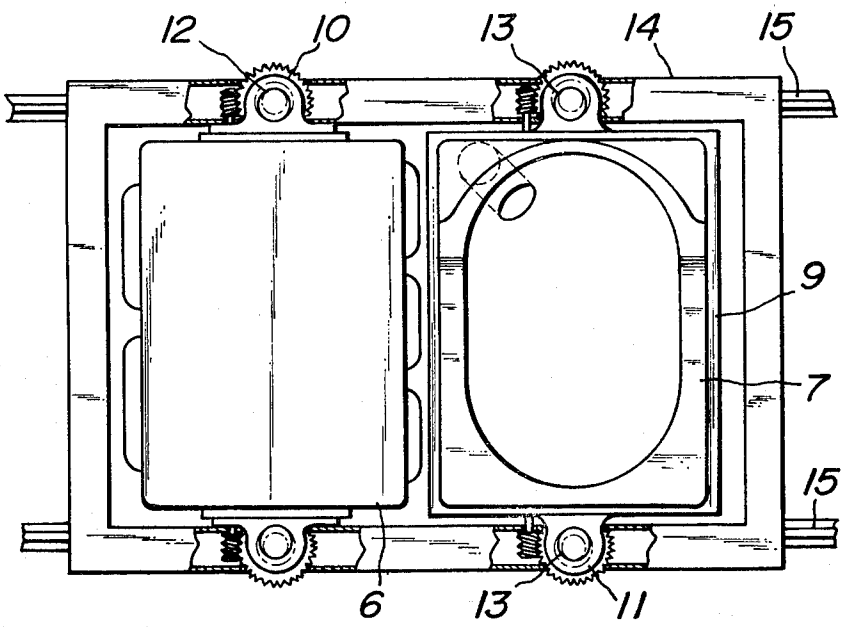


FIG_7

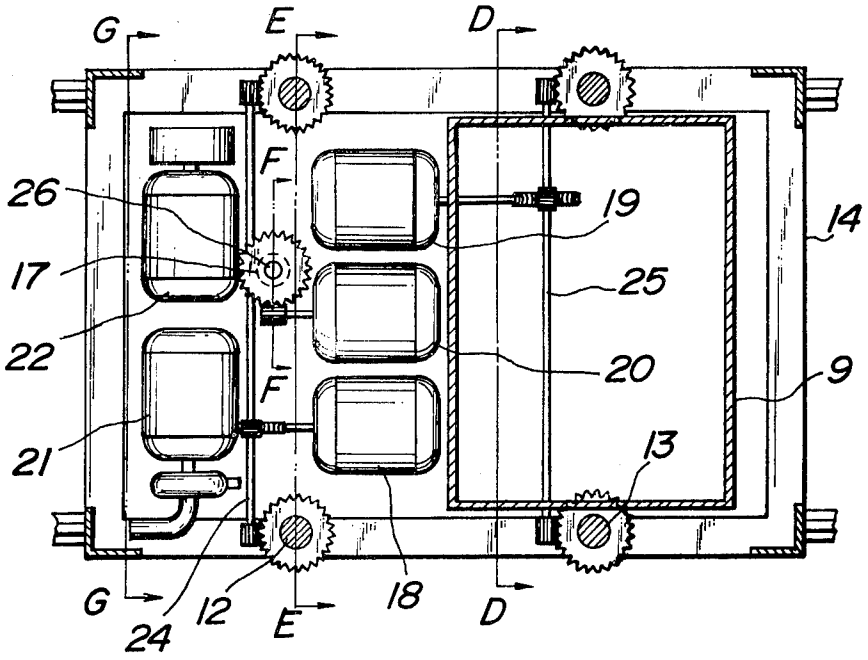


FIG_8

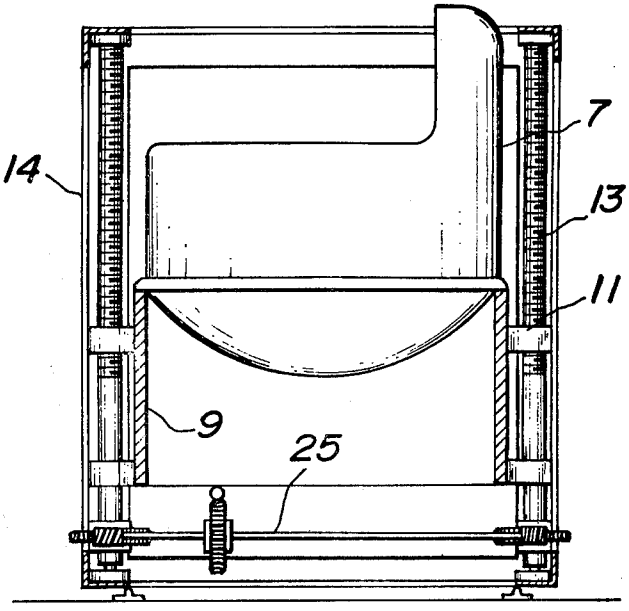


FIG_9

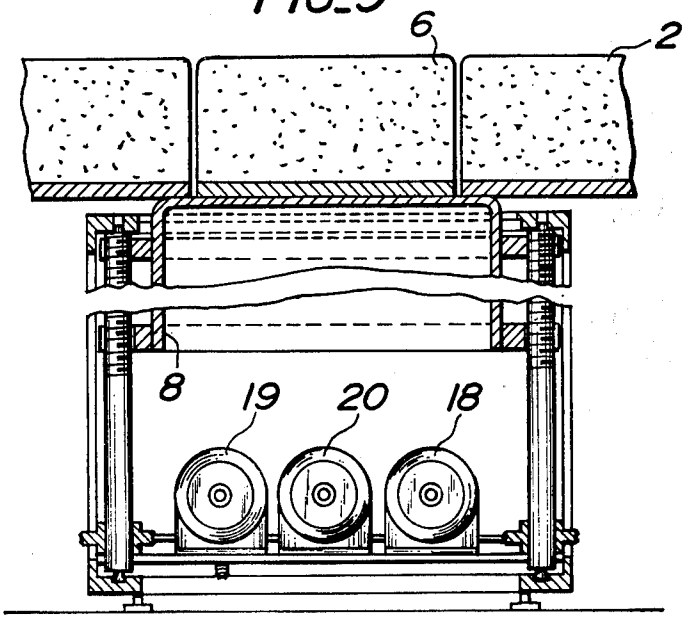


FIG_10

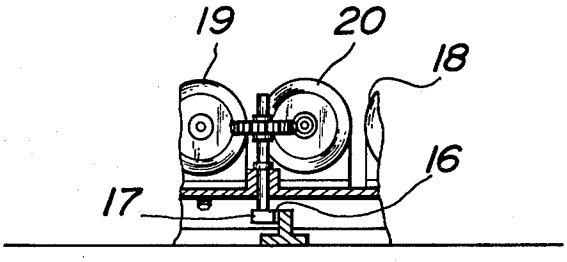


FIG_11

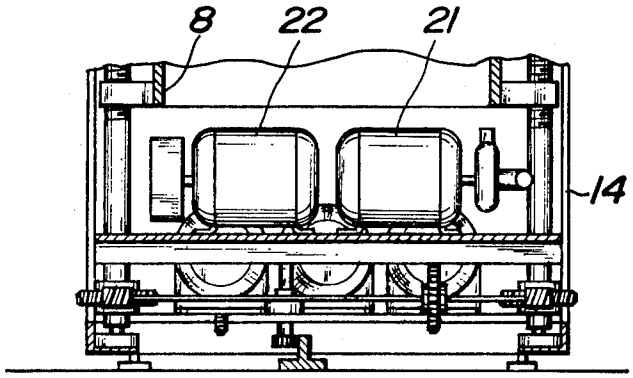


FIG_12

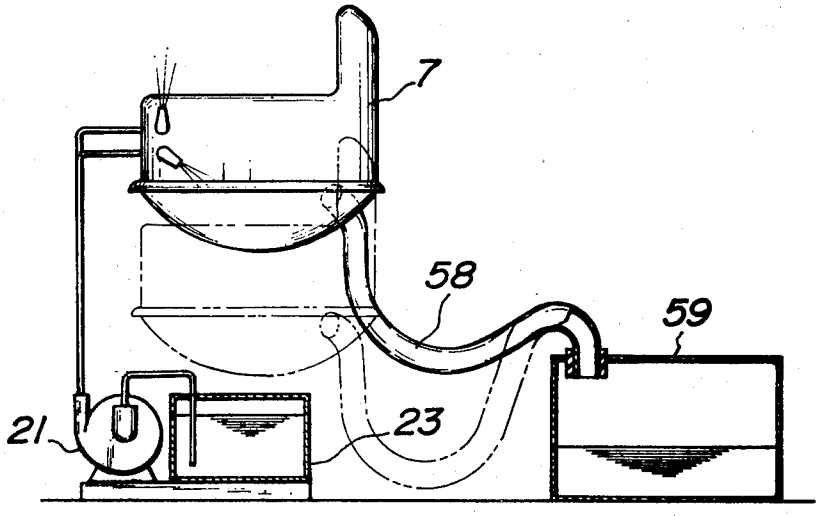


FIG_13

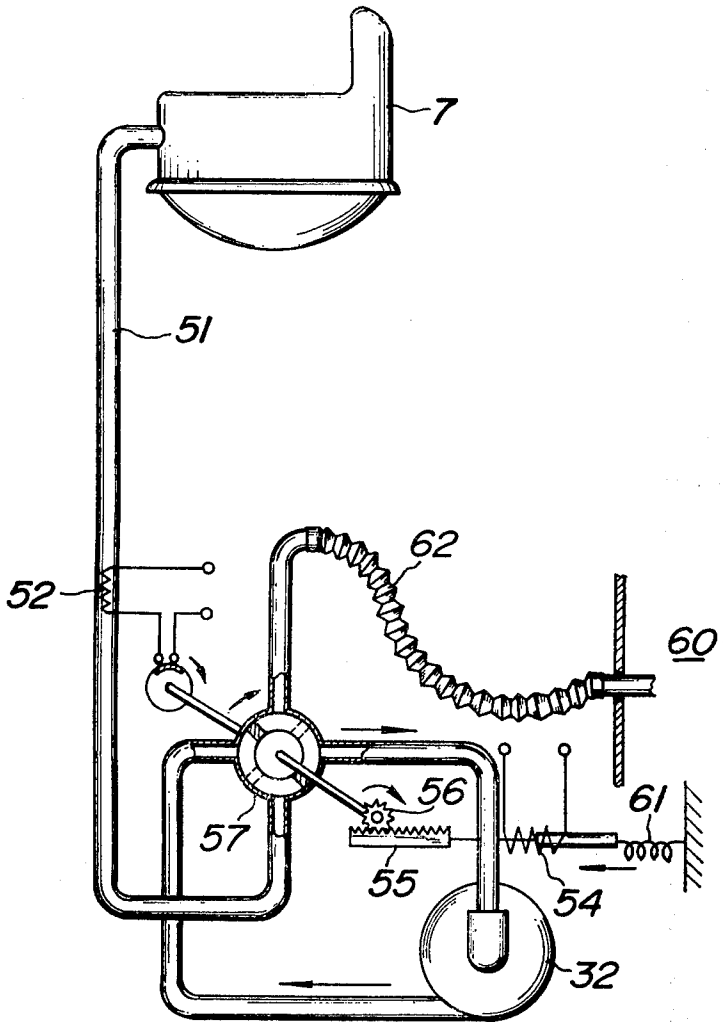
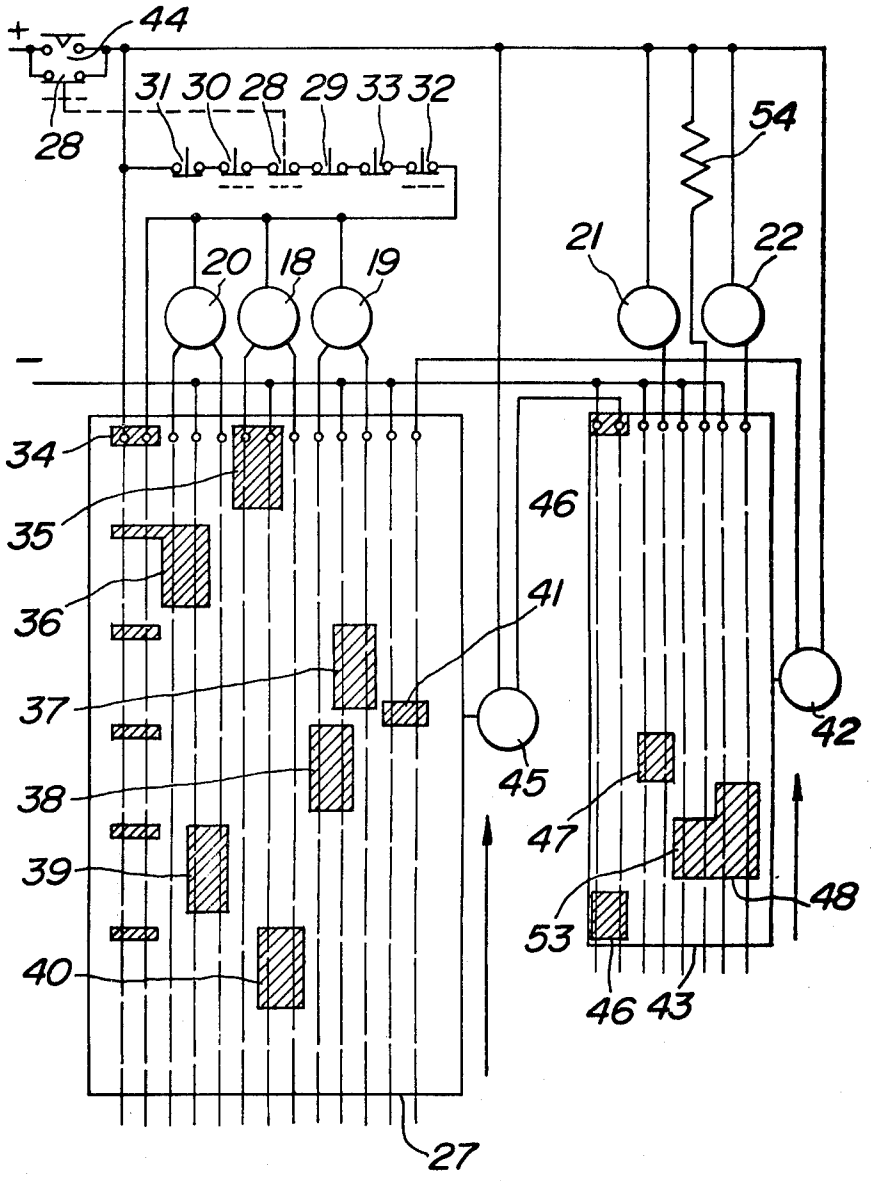


FIG_14


+
44
31 30 28 29 33 32
28
54
21
22
20 18 19
−
34
35
36
37
38
39
40
46
41
42
45
47
48
53
46 43
27

BED FOR PATIENT

BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention relates to a bed provided with a device for treating excretions of a patient or a physically handicapped person and more particularly to a bed in which all treatments required in excretion of a physically handicapped person can be automatically carried out without requiring any help of a nurse.

2. Description of the Prior Art:

There have been proposed various kinds of beds for patients suitable for excretion while they are lying. One of them has disadvantages in that a thick mat may make it difficult to open a hole in the bed for excretion and there is a tendency for a mat to be stained with patient's excretion.

In order to overcome the above disadvantage in the prior art, the bed for a patient according to the invention including a thick mat on a base frame comprising a cover plate with a mat having a thickness the same as that of said mat, which is adapted to move upwardly relative to a hole formed in said first mentioned mat and said base frame to snugly close said hole and downwardly away from the hole to open the same, and a flush pot for patient's excretion adapted to raise vertically into said hole of said mat and base frame to a level that the upper periphery of the pot is in flush with the upper surface of the first mentioned mat and lower away from the underside of said base frame, said cover plate and said pot being supported side by side through separate fittings by means of separate vertically lifting guides, said fittings comprising lifting mechanisms for separately lifting said cover plate and said pot, said lifting guide for said cover plate being provided with a mechanism for horizontally reciprocatively moving said cover plate from a position corresponding to the center of said hole to a position spaced from said position on one side, and said lifting guide for said pot being provided with a mechanism for horizontally reciprocatively moving said pot from a position on the other side to a position corresponding to the center of said hole, bases of said horizontally reciprocating mechanisms being fixed relative to said bed.

An object of the invention is to provide an improved bed for a patient adapted to prevent a mat from being stained with excretion even the mat is thick and snugly close a hole in the bed with a thick cover mat having the same thickness as the main mat to provide a comfortable support for the patient for use as a bed.

Another object of the invention is to provide an improved bed for a patient adapted to be operated by the patient himself for his excretion and any treatment thereafter without requiring any help of a nurse thereby reducing her labor.

A further object of the present invention is to provide an improved bed for a patient which is simple in construction, positive in operation and economical of manufacture in mass-production.

The invention will be more fully understood by referring to the following detailed specification and claims taken in conjunction with the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a preferred embodiment of the bed according to the invention;

FIG. 2 is a front elevation of the bed shown in FIG. 1;

FIG. 3 is a sectional view taken along lines A—A in FIG. 1;

FIG. 4 is a side view of the bed shown in FIG. 1 in a position a cover plate has been lowered from a hole of the bed;

FIG. 5 is a side view similar to FIG. 4, but showing a pot in a used position;

FIG. 6 is an enlarged sectional view taken along lines B—B in FIG. 3;

FIG. 7 is an enlarged sectional view taken along lines C—C in FIG. 3;

FIG. 8 is a sectional view taken along lines D—D in FIG. 7;

FIG. 9 is a sectional view taken along lines E—E in FIG. 7;

FIG. 10 is a sectional view taken along lines F—F in FIG. 7;

FIG. 11 is a sectional view taken along lines G—G in FIG. 7;

FIG. 12 is an elevation showing the pot in a used position while flushing;

FIG. 13 is an explanatory view of devices for drying an organ of a patient and exhausting a smell; and

FIG. 14 is a circuit for controlling the bed according to the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIGS. 1, 2 and 3 showing a preferred embodiment of the invention, there is shown a bed comprising a base frame 1 supported on its legs 3 and having a mat 2 carried thereon. The base frame 1 and the mat 2 lying thereon are formed with a hole 4 for a patient's excretion.

The hole 4 is closed by a cover plate 5 provided with a mat 6 having a thickness the same as that of the mat 2. When the cover plate 5 has been raised from a lower position to its normal position, the mat 6 is snugly fitted within the hole 4 so that the upper surfaces of the two mats are in flush with each other to provide a comfortable support for a patient.

According to the invention, when the hole 4 is opened, the periphery of the hole 4 of the mat 2 is deformed by the weight of the patient causing variations in shape and size of the hole 4, however, the mat 6 of the cover plate 5 can be raised into the hole 4, so that the hole 4 of the mat 2 will regain its original shape which makes it comfortable for the patient after an excretion.

A flushing pot 7 is arranged under the base 1, which can be raised into a used position where the upper surface carrying the patient's body is in flush with the upper surface of the mat 2 on the base 1 so that the patient's buttocks come into closely contact with the pot and are supported thereon to reduce a chance of stain of the mat with the patient's excretions.

The cover 5 is supported through a fitting 8 on a guide for vertically guiding the cover 5 and the pot 7 is supported through a fitting 9 in a separate guide for vertically guiding the pot 7 such that the cover plate and the pot are arranged side by side.

In the embodiment illustrated in the drawings, these guides comprise male screws 12, 13 rotatable and threadedly engaged with female screws 10, 11 formed in the fittings 8, 9 and journally supported at their upper and lower ends in a support frame 14. The male screws are driven in normal and reverse directions to raise and lower the fittings for lifting the cover 5 and the pot 7.

The cover 5 and the pot 7 are arranged side by side spaced a determined distance in the support frame 14 with the fittings 8, 9 and the male screws 12, 13. The support frame 14 is movably arranged on rails 15 located on a floor in a room and is horizontally driven by a pinion 17 journalled in the frame 14, which is driven in normal and reverse directions and in mesh with a rack 16 fixed to the rail in parallel therewith.

The mechanism having a combination of the support frame 14, the rack 16 and the pinion 17 serves to connect the lifting guide for the fitting 8, that is, the male screw 12 in the embodiment with a mechanism for horizontally moving the cover 5 from a position corresponding to the center 0 of the hole 4 to a position P spaced threfrom and to connect the lifting guide for the pot 7, that is, the male screw 13 with a mechanism for horizontally moving the pot 7 from a position Q to the position corresponding to the center 0 of the hole. Furthermore, the mechanism having the combination ensures that the base for the horizontally moving mechanisms, i.e. the rails 15 are positively arranged relative to the bed.

The male screws 12, 13 and the pinion 17 are driven in normal and reverse directions by means of motors 18, 19 and 20 fixed to the frame 14, respectively.

In the embodiment, there are provided with a pump motor 21 for flushing and injection of cleaning water against the patient's excretory organ after excretion, a fan motor 22 for ventilation and warm wind injection for drying the organ after cleaned and a tank 23 for cleaning water, these motors being fixed to the support frame 14. However, these motors may be arranged on the floor in the room.

It can be understood that it is required to operate these motors 18, 19, 20, 21 and 22 automatically in a determined sequence.

The vertically and horizontally moving mechanisms for the cover and the pot according to the invention have advantages in that the cover and the pot can be in powered synchronism with each other to facilitate an automatic control of the bed.

Referring now in particular to FIG. 7, the male screws 12, 13 are driven through worms and worm gears by traverse shafts 24, 25 which are journalled in parallel with each other at the bottom of the frame 14 and rotatably driven by the motors 18, 19. The pinion 17 in mesh with the rack 16 is keyed to the lower end of a vertical shaft 26 rotatably driven by the motor 20 and journalled in the frame 14 as shown in FIGS. 7 and 10.

The pump motor 21 and the fan motor 22 may be arranged in a unit in the frame 14 as shown in FIGS. 7, 9 and 11. Accordingly, the vertically and horizontally moving synchronizing mechanisms and the flushing, drying and ventilation devices are all compactly housed in a relatively small space within the support frame 14.

FIG. 14 illustrates an example of a circuit for an automatic control for the above motors. The circuit includes a drum switch 27 of which segments are shown in development which rotate in a direction of an arrow for controlling the normal and reverse rotations and stops of the motors 18, 19 and 20. Contacts 28–33 are connected, in series with a line between a power source and the motors 18, 19 and 20, which operate at stroke ends of the fittings 8 and 9 and frame 14. The contacts 28, 30 and 32 are opened when the hole 4 is closed by the cover 5. A segment 34 causes all the contacts to short-circuit only upon starting the motors in normal or reverse direction.

Referring to FIG. 14, a starting switch 44 is a timing switch which opens when a determined period of time for closing has elapsed. When the switch 44 is closed, a motor 45 for the drum is energized to rotate the drum 27 so that a segment 35 causes the cover to lower until the cover reaches its lowermost position (FIG. 4) where the contact 29 is opened to stop the motor 18. Then, a segment 36 causes the frame 14 to move the left-hand side as viewed in FIG. 5 until it reaches its stroke end as shown in FIG. 5 when the contact 31 is opened to stop the motor 20. Then, a segment 37 causes the pot 7 to raise until it reaches its uppermost position where the motor 19 is stopped. At the moment a segment 41 energizes a timer motor 42 to rotate a switch drum 43 so that its segment 46 opens a circuit for the drum motor 45 to stop the drum switch 27. In this condition, all the motors 18, 19 and 20 stop so that the pot is ready to be used by the patient. The switch drum 43 for the timer continues its rotation during the use of the pot. When a determined period of time has elapsed or the patient's excretion has completed, a segment 47 energizes the pump motor 21 to effect cleaning and flushing so that the patient's excretion in the pot 7 is exhausted together with the flushed water through a flexible conduit 58 into an excretion reservoir 59 or a drainpipe (not shown). When a segment 47 is brought into contact with a contact as the drum 43 rotates, the pump motor 21 is stopped and a segment 48 energizes a fan motor 32 shown in FIG. 13 and simultaneously supplies current to a heater 52 arranged in a blast pipe 51 to provide a warm wind into the pot for drying the patient's excretory organ and its proximity. When a segment 53 excites a solenoid 54, a rack 55 moves to the left-hand side as viewed in FIG. 13 to rotate a pinion 56 so that a valve member of a valve 57 is rotated 90° as in phantom lines in FIG. 13 to connect the blast pipe 51 to the suction side of the fan and simultaneously to disconnect the circuit for the heater, with the result that an offensive smell within a hood covering the patient on the bed is positively exhausted through the pot, the valve 57 and the flexible conduit 62 to atmosphere 60. After a determined period of time a passage of the segment 48 on a contact causes the fan motor 32 to stop and the solenoid 54 to be deenergized so that the rack 55 is moved to the right-hand side as viewed in FIG. 13 by the force of a tension spring 61 to return the valve 57 to its original position as shown in full lines in FIG. 13. When the segment 46 again energizes the drum motor 45, its segment 41 opens the circuit for the timer motor 42 to stop it.

After that the segments 38, 39 and 40 cause in succession the motors 19, 18 and 20 to energize in reverse directions, so that the pot 7 and the cover 5 return to their positions as shown in FIG. 3. At this time the starting switch 44 is in open position so that the contact 28 adapted to operate at the uppermost position of the cover is actuated to cut off the power source.

The control device above described is mounted on the support frame 14 and is connected by a flexible cord to the power source. The starting switch 44 is controlled by a remote control system.

Though the lifting mechanism for the cover plate and the pot is shown utilizing the movement of a female screw threadedly engaged with a rotating screw and the horizontally moving mechanism is shown utilizing the movement of a shaft of a pinion in mesh with a fixed

rack in the embodiment, any other means may be used for the mechanisms, for example, a combination of links and levers, hydraulic cylinders or the like.

The bed according to the invention has various advantages in that a patient can easily excrete on a thick mat on the bed by himself without staining the mat with his excretion without requiring any help of a nurse thereby reducing her labor and making it possible for the patient to lay himself on a comfortable thick mat. Notwithstanding the thick mat, according to the invention the mechanism for opening and closing the hole of the bed for his excretion and moving the pot is simple in construction and can be automatized with ease, so that the bed according to the invention can be produced in a mass-production with a great industrial advantage.

It is understood by those skilled in the art that the foregoing description is a preferred embodiment of the disclosed bed and that various changes and modifications may be made in the invention without departing from the spirit and scope thereof.

What I claim is:

1. A bed for a patient, comprising a base frame, and a thick first mat on the base frame, the first mat and the base frame being formed with a hole, and the bed further comprising:

a cover plate with a second mat arranged below said first mat and vertically movable upwardly into said hole formed in said first mat and said base frame to snugly close said hole and downwardly away from said hole to open the same, the upper surfaces of said two mats being substantially flush with each other to provide a comfortable support for the patient when said second mat is in said hole of said first mat; a flush pot for the patient's excretion arranged below said first mat and vertically movable upwardly into said hole of said mat and said base frame in place of said second mat to such a level that the rim of said pot is flush with the upper surface of the first mat and downwardly away from said hole;

a support frame for supporting said cover plate with said second mat and said flush pot side by side; lifting guides arranged in said support frame for vertically guiding said cover plate with said second mat and said flush pot, respectively;

lifting mechanisms for separately lifting said cover plate and said pot along said guides, respectively;

rails fixed with respect to said base frame and on which said support frame is movably mounted; and

a driving mechanism for horizontally reciprocatingly moving said support frame along said rails to move said cover plate from a first position corresponding to the center of said hole to a second position spaced from said first position and simultaneously to move said pot from a first position to a second position corresponding to the center of said hole and vice versa.

2. A bed as set forth in claim 1, wherein said guides comprise male screws threadedly engaged with female screws formed in fittings respectively fixed to said cover plate and said pot and journally supported at their upper and lower ends in said support frame, and said lifting mechanisms comprise motors fixed to said support frame for driving said male screws in normal and reverse direction.

3. A bed as set forth in claim 2, wherein said driving mechanism comprises a rack fixed to said bed, a pinion journalled in said support frame and in mesh with said pinion and a motor fixed to said support frame to drive said pinion in normal and reverse directions for horizontally reciprocatingly driving said support frame together with said cover plate and said pot.

4. A bed as set forth in claim 3, further comprising means for flushing and injection of cleaning water against the patient's excretory organ after excretion, means for ventilation and warm air injection for drying the organ after cleaning, and a tank for cleaning water.

5. A bed as set forth in claim 4, comprising an electric circuit for automatically operating said motors, said means for flushing and injection of cleaning water, and said means for ventilation and warm air injection in a determined sequence.

* * * * *