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ADJUSTABLE LAVATORY

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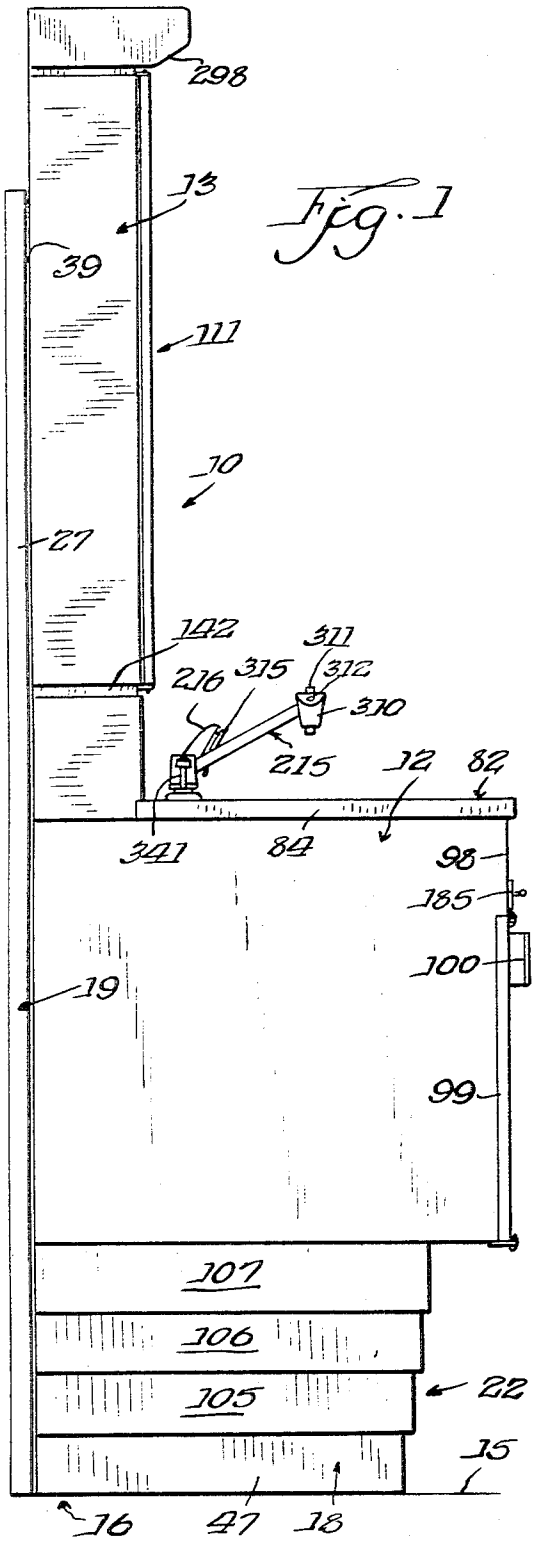

Fig. 1

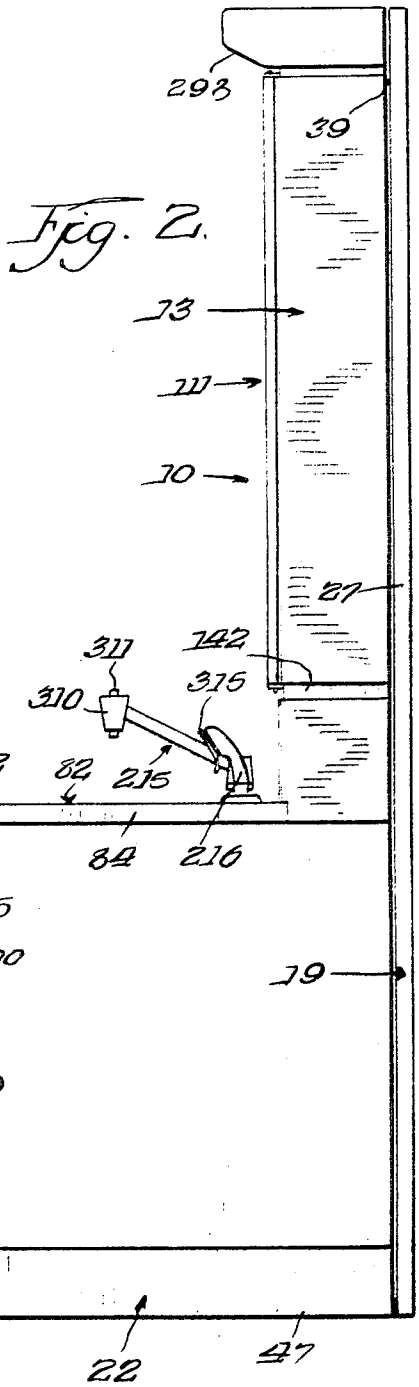

Fig. 2

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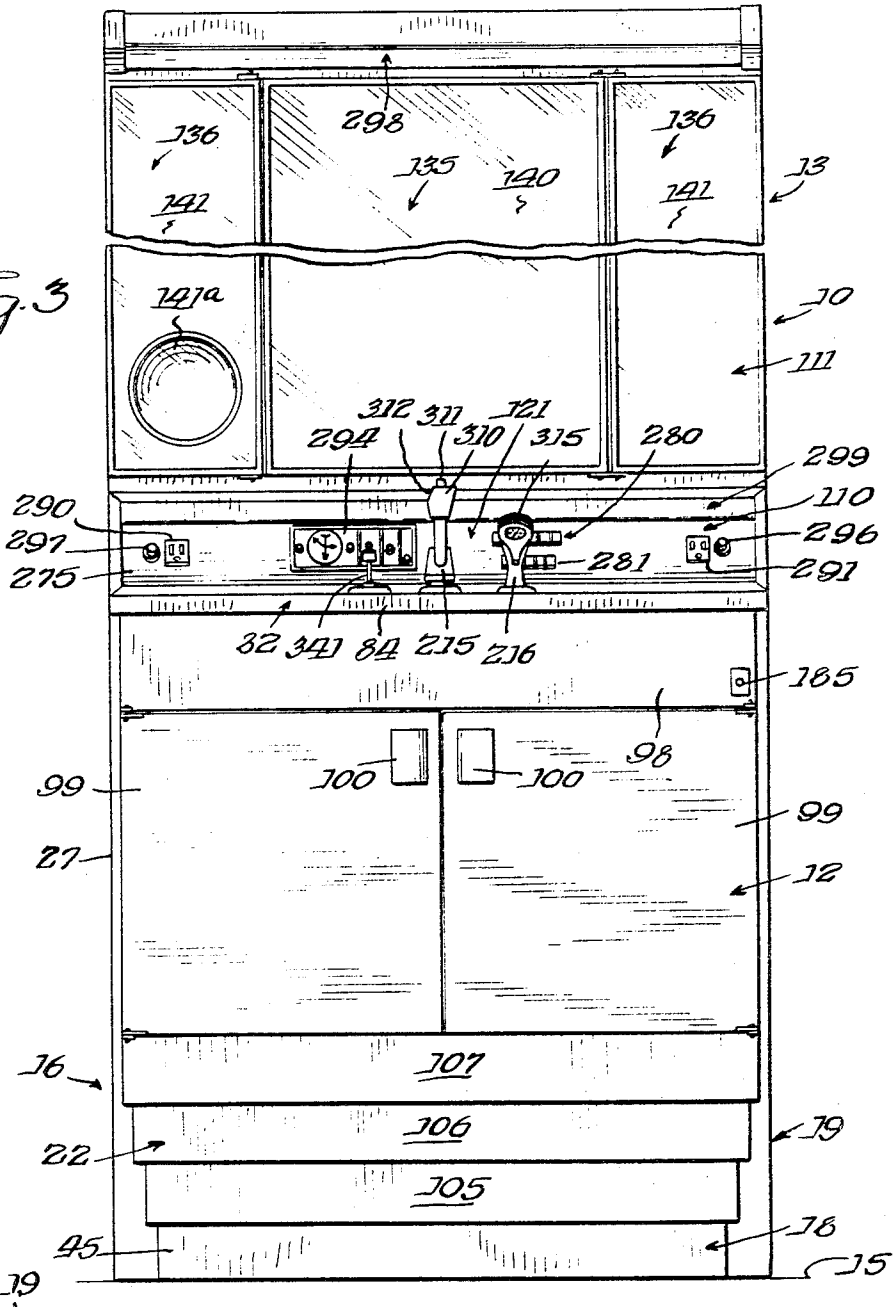
Fig. 3



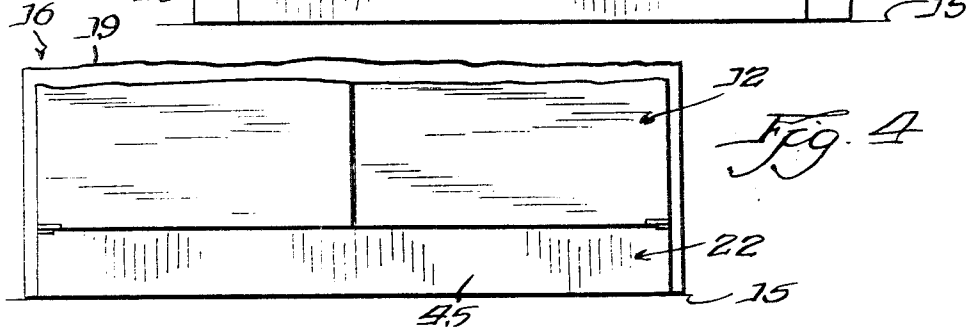


Fig. 4

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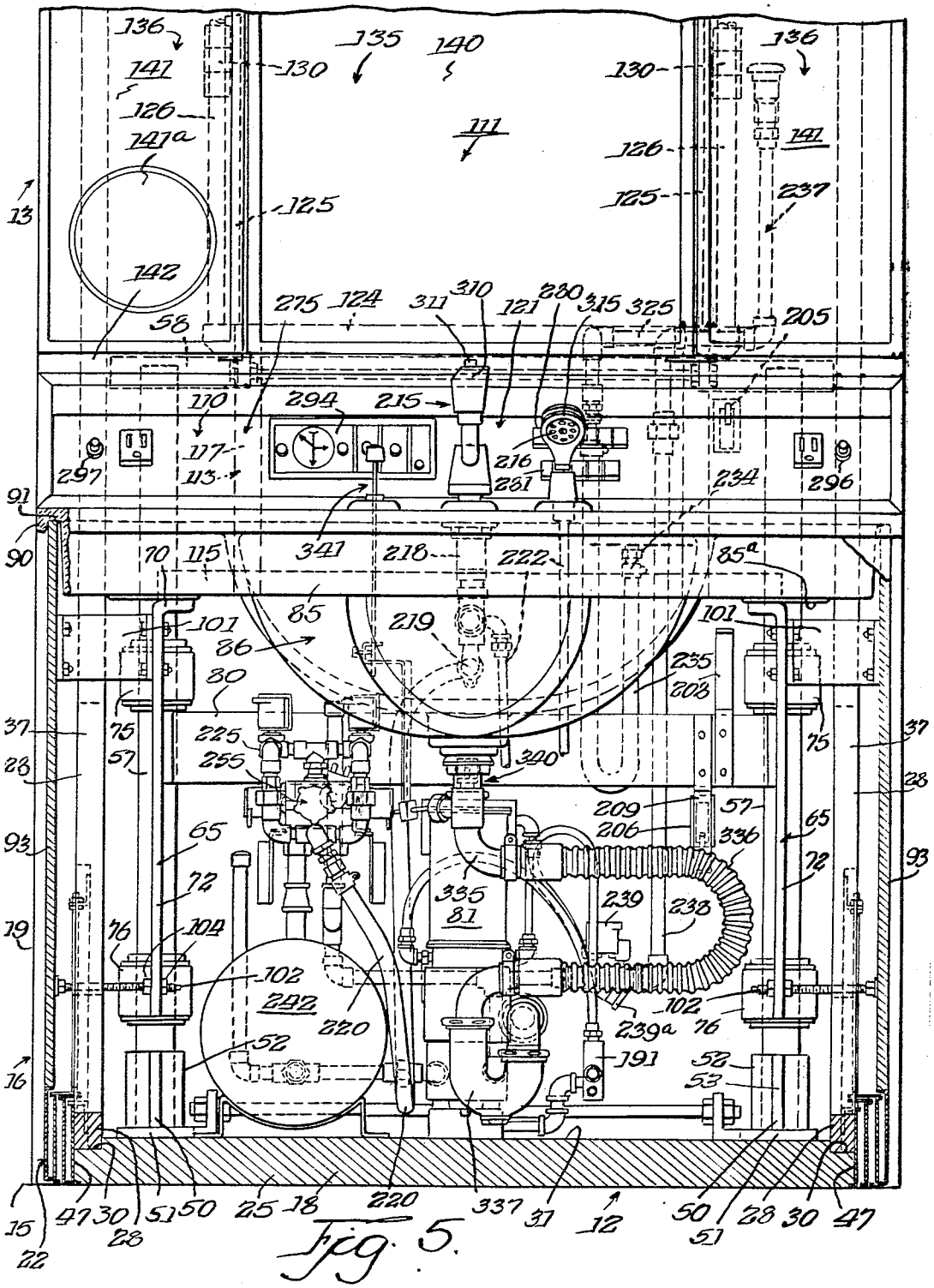

Fig. 5.

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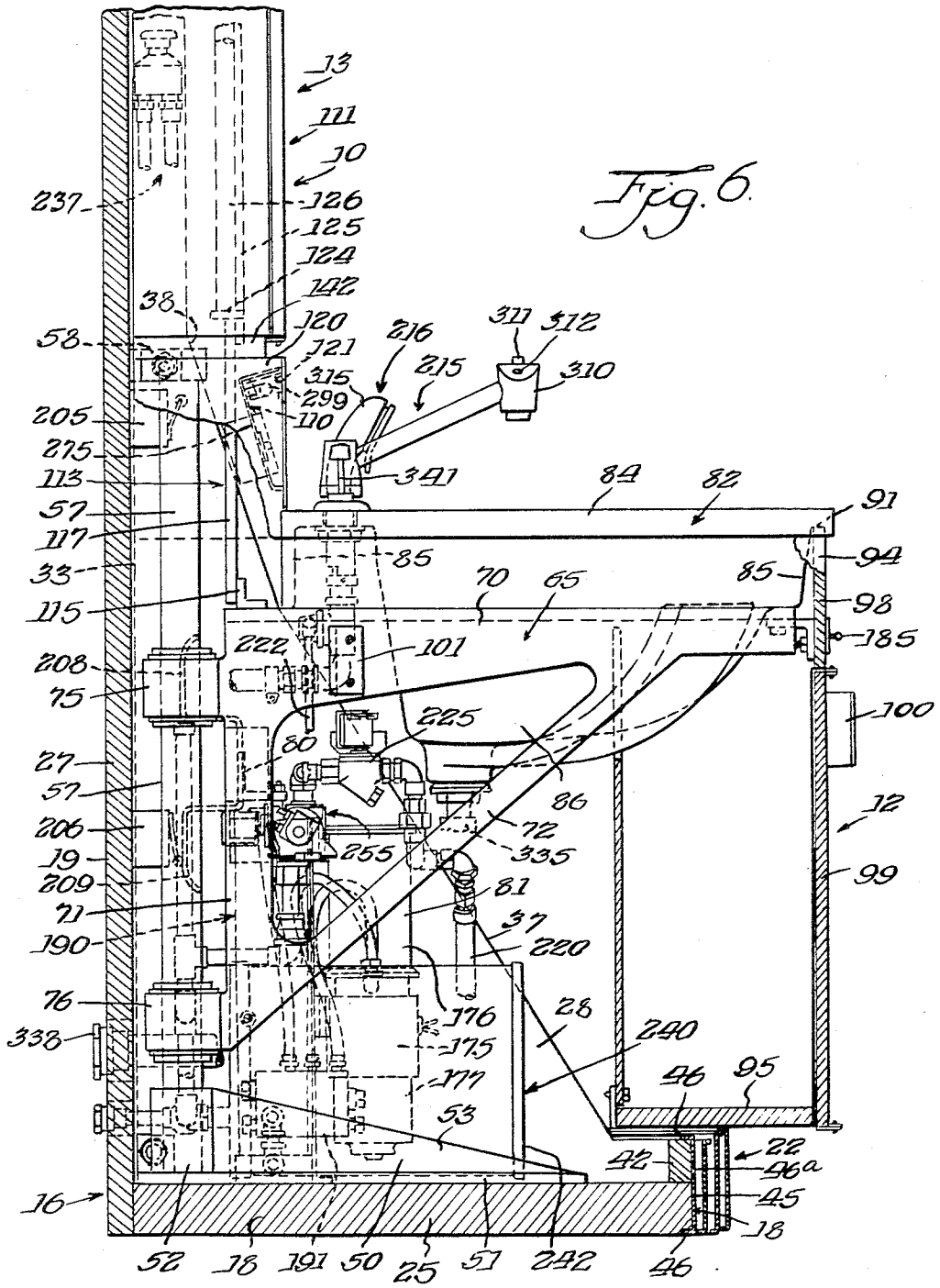

Fig. 6.

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ADJUSTABLE LAVATORY

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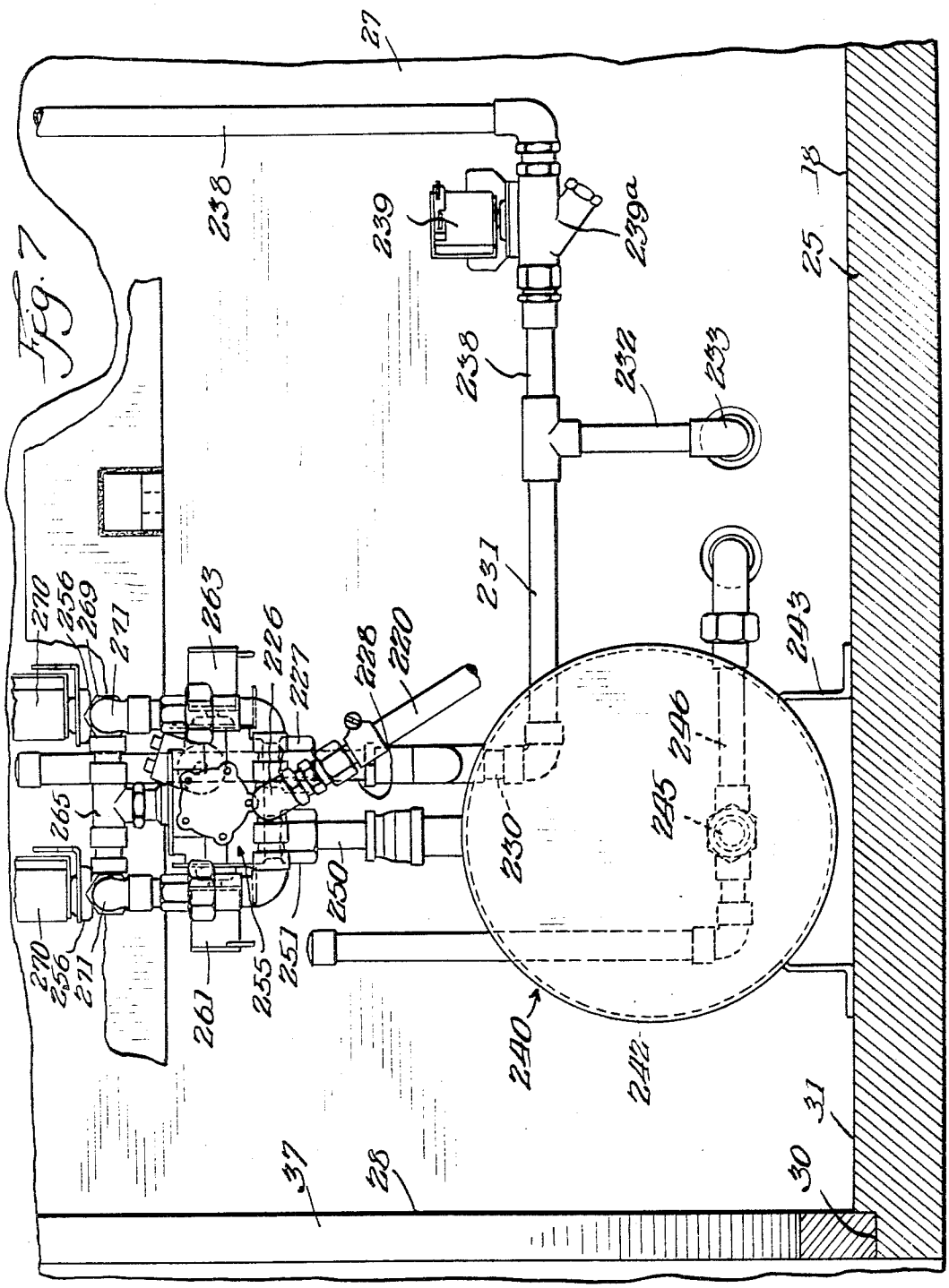

Fig. 7

ADJUSTABLE LAVATORY

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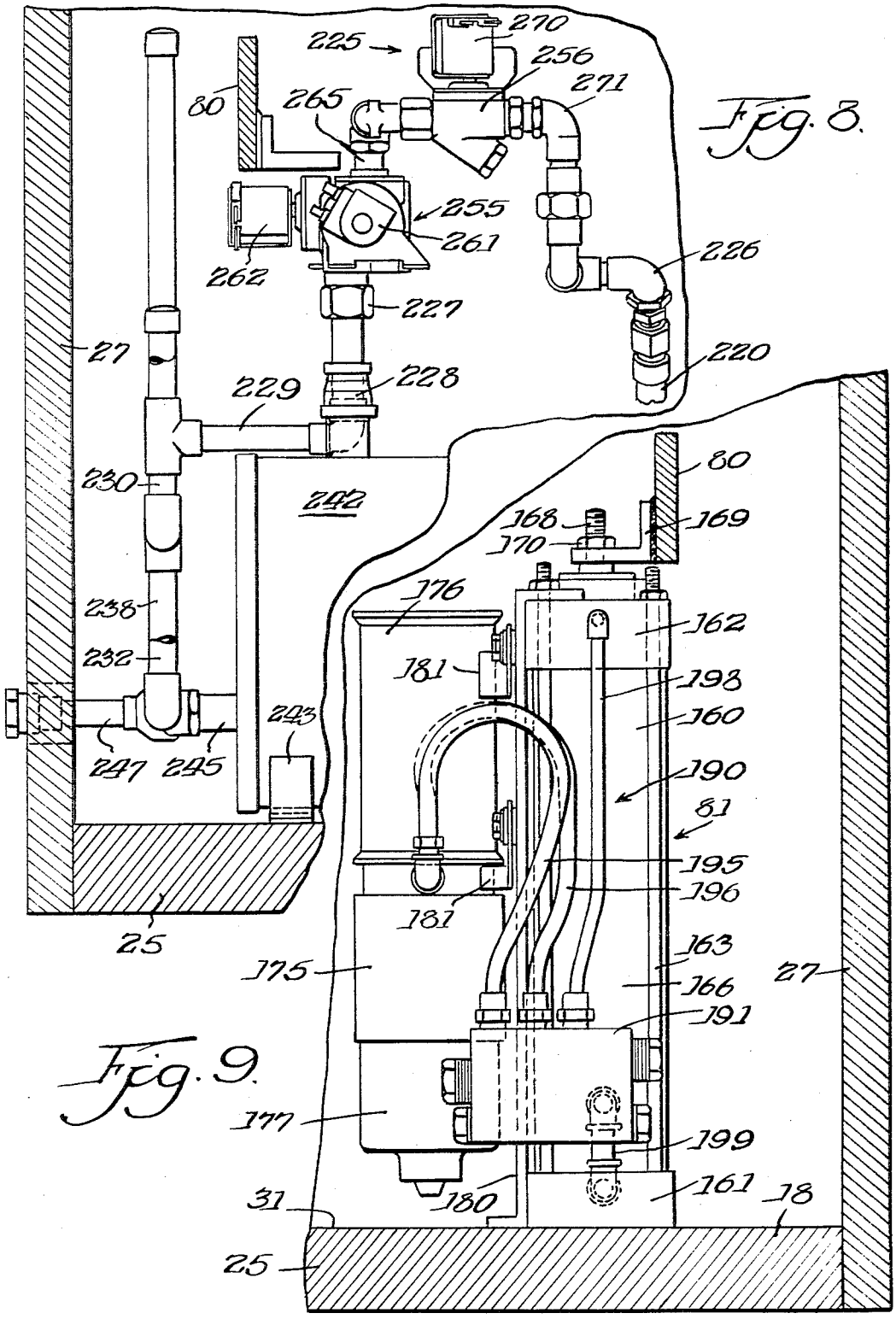

Fig. 8.

Fig. 9.

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ADJUSTABLE LAVATORY

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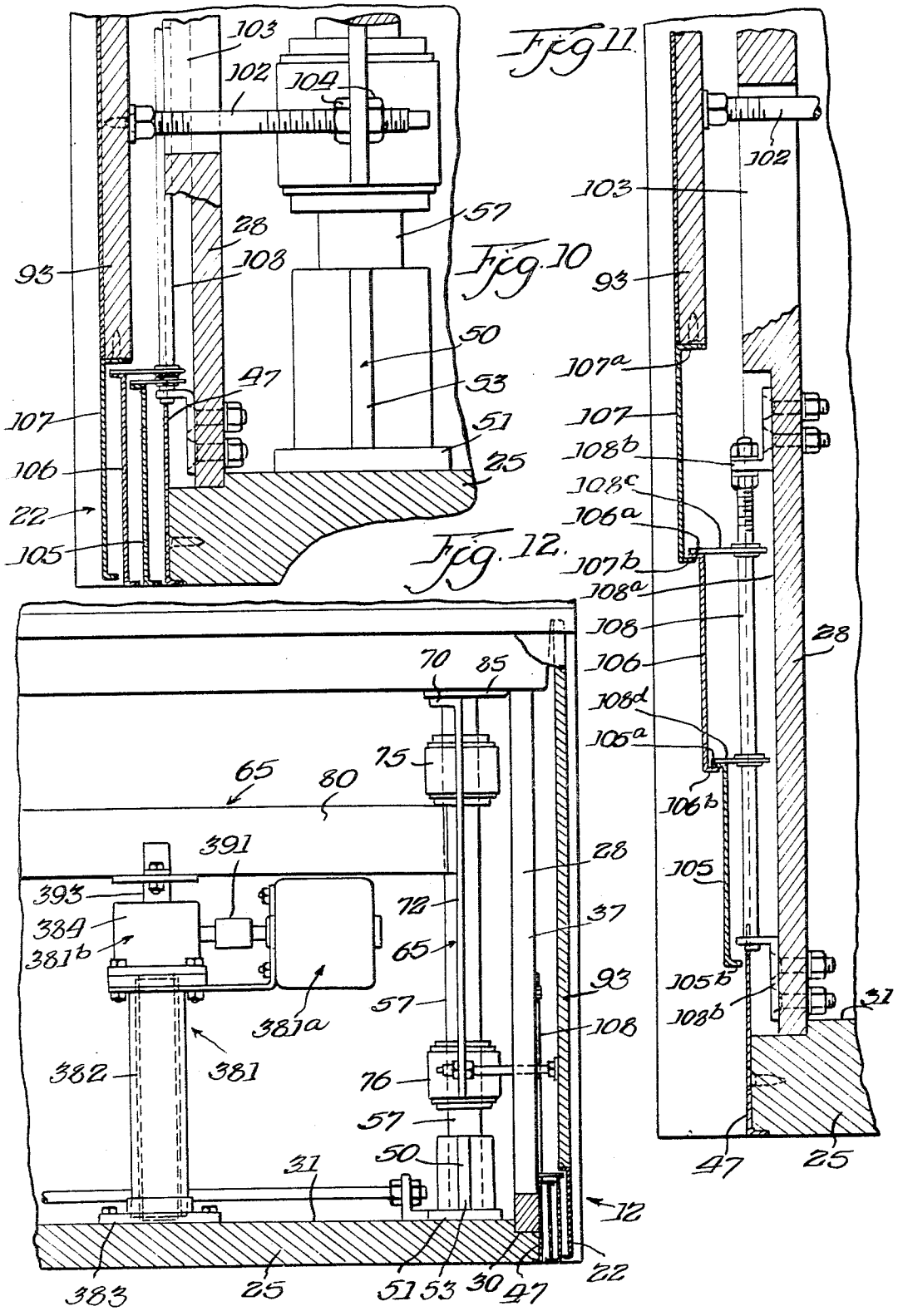

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ADJUSTABLE LAVATORY

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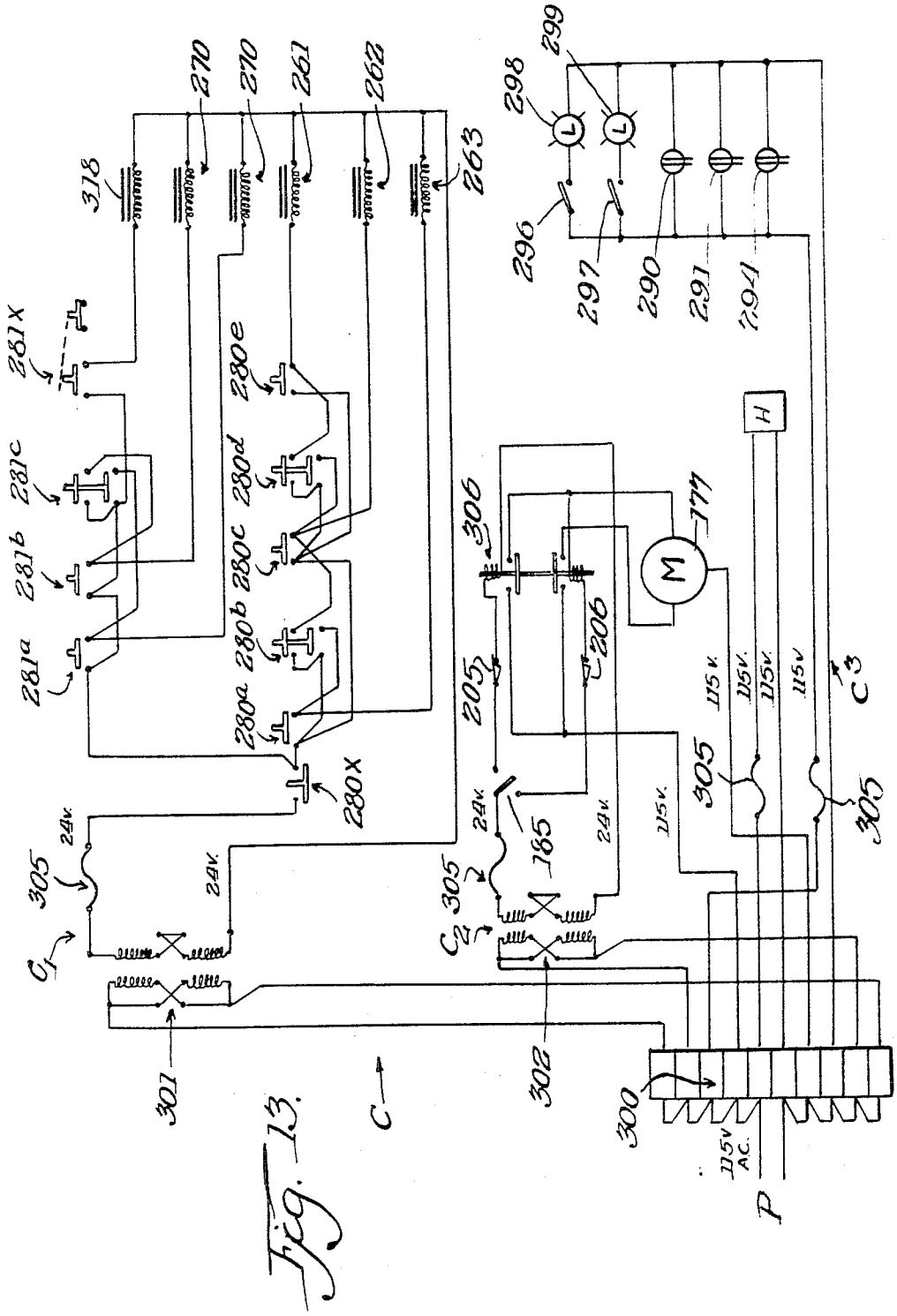

Fig. 13.

United States Patent Office 3,473,173 Patented Oct. 21, 1969

3,473,173

ADJUSTABLE LAVATORY

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Int. Cl. A47k 1/04
U.S. Cl. 4—170 24 Claims

ABSTRACT OF THE DISCLOSURE

Vertically adjustable lavatory including base cabinet assembly surmounted by upright cabinet assembly. Cabinet assemblies are raised and lowered relative to base frame on bearing shafts by power unit in base cabinet assembly. Expandable skirt maintains cabinet enclosure. Water supply and control provide instant hot water and remote temperature and flow control.

Background—Summary—Prior art

This invention relates to lavatories, and in particular, to lavatories which are adjustable in height.

Lavatories of fixed height have conventionally been installed in bathrooms to ideally accommodate the person of medium stature. Only in recent years have lavatories which are vertically adjustable to accommodate persons of varying height become reasonably well known. Lavatories of this type are exemplified by the disclosures in U.S. patents issued to Eriksson No. 2,716,757 and Haughey No. 3,011,177.

Presently known lavatories of the vertically adjustable type are notably lacking in acceptable features. Apparatus for raising and lowering the lavatory basin and related equipment is antiquated and inefficient, as well as being bulky and cumbersome to install. Such lavatories do not provide an adequate enclosure for sub-basin equipment in their various raised and lowered positions. In addition, no vertically adjustable lavatory presently known permits the use of a tall, upright cabinet and mirror assembly surmounting the base cabinet assembly, which includes the basin. A lavatory without such a convenience stands little chance of commercial success in this day.

Other areas where present day vertically adjustable lavatories are wanting include their water supply systems. Water supply control has not improved much since the first modern, vertically adjustable lavatories became available.

The invention is embodied in a greatly improved vertically adjustable lavatory. As such, an object of the invention is to provide a vertically adjustable lavatory which includes an upright cabinet assembly with an associated mirror unit.

Another object of the invention is to provide a vertically adjustable lavatory wherein improved power height adjustment means are employed in a novel and effective manner.

It is still another object to provide a vertically adjustable lavatory including a new and improved expandable enclosure for the sub-basin equipment in the lavatory, wherein a protective and decorative structure is assured regardless of the adjusted height of the lavatory.

It is yet another object to provide improved water supply and control systems, including a facility for providing an instantaneous supply of hot water to the user upon demand.

The foregoing and other objects are realized in accord with the invention by providing a lavatory including a base cabinet assembly surmounted by an upright cabinet assembly and mounted on vertically disposed support

shafts for vertical sliding movement on bearing sleeves. The shafts are mounted on the base platform of the lavatory frame and braced from the upright back panel of the frame.

In one aspect of the invention, a closed-circuit hydraulic power unit raises and lowers the cabinet assemblies on their mounting shafts. The power unit includes an axial fluid motor which interconnects the frame base and the base cabinet assembly. A unitary, motor-pump-fluid reservoir provides fluid under pressure to actuate the axial fluid motor at the instance of the user. In another aspect of the invention, an electrically actuated screw-jack type power unit provides the lifting force.

Water control is through remote control valve assemblies which provide a wide range of selected temperatures and flow rates for normal hand and hair ablutions. A remote controlled rim wash for the basin is also provided. These functions are remotely controlled from a panel unit immediately above the basin by the user.

Brief description of the drawings

The invention, including its construction and method of operation, along with other objects and advantages thereof, is illustrated more or less diagrammatically in the drawings, in which:

FIGURE 1 is a side elevational view of the adjustable lavatory embodying features of the invention, in its raised position;

FIGURE 2 is a side elevational view of the lavatory, in its lowered position;

FIGURE 3 is a front elevational view of the lavatory, in its raised position, with parts broken away;

FIGURE 4 is a partial front elevational view of the base of the lavatory, in its lowered position;

FIGURE 5 is an enlarged front elevational view, partially in section, of the base cabinet assembly and a portion of the upright cabinet assembly in the lavatory;

FIGURE 6 is a side elevational view, partially in section, of that portion of the lavatory shown in FIGURE 5;

FIGURE 7 is a further enlarged front elevational view of the water control system in the base cabinet assembly;

FIGURE 8 is a further enlarged side elevational view of the water control system in the base cabinet assembly;

FIGURE 9 is a further enlarged side elevational view of one form of the power adjustment unit for the lavatory;

FIGURE 10 is a greatly enlarged front elevational view of a portion of the cabinet assembly support and skirt structure;

FIGURE 11 is also a greatly enlarged front elevational view of the cabinet assembly skirt structure;

FIGURE 12 is a front elevational view of another form of the power adjustment unit for the lavatory; and

FIGURE 13 shows a diagram of the electrical circuit for the power unit and controls for the lavatory.

Referring now to the drawings, and particularly to FIGURES 1–4, a lavatory embodying features of the present invention is illustrated generally at **10**. The lavatory **10** includes a base cabinet assembly **12**, upon which is mounted an upright cabinet assembly **13**. The rigidly connected base and upright cabinet assemblies **12** and **13** are supported from the floor **15** on a frame **16**. The frame **16** includes a horizontal base **18** resting on the floor **15** and an upright **19** rigidly connected to the base **18**.

The rigidly interconnected base and upright cabinet assemblies **12** and **13** are adapted to move vertically relative to the frame **16**. According to the invention, a skirt assembly or enclosure means **22** provides a telescoping enclosure and connection between the base cabinet assembly **12** and the base **18**, regardless of whether the cabinet assemblies **12** and **13** are in a raised, intermediate, or

lowered position. In this light, FIGURES 1 and 2 illustrate the lavatory **10** in its uppermost postion with the skirt assembly **22** forming an enclosure means, for items housed within, fully extended, while FIGURES 2 and 4 illustrate the lavatory in its lowermost position, with the skirt assembly **22** collapsed.

Turning now to FIGURES 5–11, the base **18** comprises a generally rectangular platform member **25**. The platform member **25** is adapted to rest flush on the floor **15** of a bathroom, for example. The upright **19** includes a back panel member **27** extending upwardly from the platform member **25**. The back panel member **27** is generally rectangular in configuration, vertically elongated. It is fastened to the back of the platform member **25** at the base of the panel member **27** by suitable fastening means (not shown).

The platform member **25** and the back panel member **27** are rigidly braced in perpendicular relationship to each other by generally triangular shaped side panel members **28**. As seen in FIGURE 5, the base of each side panel member **28** is seated in a recess **30** formed in the upper surface **31** of the platform member **25** along a side edge thereof. The side panel members **28** are secured to the platform member **25** in their respective recesses **30** by suitable fastening means (not shown).

Referring to FIGURE 6, the rear edge **33** of each side panel member **28** extends into flush engagement with the back panel member **27** where each side panel member is also secured to the back panel member by suitable fastening means (not shown). The side panel members **28** have front edges **37** which are inclined rearwardly from adjacent the platform member **25** to a point **38** immediately above the base cabinet assembly **12** in the upright cabinet assembly **13**. Above this point **38**, the side panel members **28** have a constant width to their upper ends **39** spaced slightly below the upper end of the back panel member **27**.

Completing the frame **16** is a narrow front panel member **42**. The member **42** extends between the side panel members **28** adjacent the front edge of the platform member **25** and is secured by suitable means (not shown) to both.

Fastened to the outer surface of both the platform member **25** and the narrow front wall member **42** is a facing element **45**. The facing element **45** has a shallow channel configuration so that its flanges **46** extend over the top of the member **42** and under the bottom of the platform member **25**, while its web **46***a* is secured to the front surface of each of these members by suitable means (not shown).

Referring to FIGURES 10 and 11, side facing elements **47** broadly similar to the front facing element **45** extend along each side of the platform member **25**, from the front to the back thereof. These side facing elements **47** are fastened to the side faces of both the platform member **25** and the side panel members **28** by suitable means (not shown). Unlike the front facing element **45**, the side facing elements **47** do not have an upper flange.

The facing elements **45** and **47** actually form components of the skirt assembly **22** for the base cabinet assembly **12**. When the base and cabinet assemblies **12** and **13** are in a raised position, as viewed in FIGURE 1, for example, these facing elements **45**, **47** form the visible lower portion of the frame **16**. The construction and operation of the skirt assembly **22** will hereinafter be discussed.

The base cabinet assembly **12** and the upright cabinet assembly **13** are supported from the frame **16** for vertical movement between a raised position and a lowered position, as has been pointed out. To this end, a pair of horizontally elongated support feet are fastened to the upper surface **31** of the platform member **25** in spaced relationship along each side edge of the platform member **25**, immediately inside corresponding side panel members **28**. Each support foot **50** comprises a base plate **51** having a cylindrical socket **52** welded to its uppermost surface adjacent its rear end. The base members **51** are secured to the platform member **25** by suitable fastening means (not shown). The sockets **52** are positioned immediately in front of the back panel member **27**. A triangular web **53** is welded to each base member **51** and corresponding socket **52** to provide support for the sockets.

Seated in each socket **52** and extending upwardly therefrom in parallel relationship with the back panel member **27** is a shaft **57**. As seen in FIGURE 6, the shafts **57** terminate immediately above the base cabinet assembly **12** (in its lowered position) and are fastened to the back panel member **27** by conventional bracket means **58**. The bracket means **58** encircle corresponding shafts **57** and are fastened to the upright back panel member **27** by suitable fastening means (not shown).

Mounted for vertical sliding movement on the shafts **57** is a cantiliver arm assembly **65**. The base cabinet assembly **12** is mounted on the cantilever arm assembly **65** for vertical movement relative to the frame **16**. The upright cabinet assembly **13** is also supported from the cantilever arm assembly **65** for simultaneous vertical movement relative to the frame **16**.

The cantiliver arm assembly **65** comprises a pair of horizontally disposed, parallel cantilever arms **70**. Each arm **70** has a vertically extending leg **71** formed unitarily with it at its inner end. The free ends of corresponding arms **70** and legs **71** are interconnected by unitarily formed diagonal braces **72**.

Each leg **71** has a pair of vertically displaced sleeve bearings **75** and **76**, of conventional construction, welded to it. The upper sleeve bearing **75** is disposed adjacent the inner end of a corresponding arm **70** in each arm assembly **65**, while the lower sleeve bearing **76** is disposed adjacent the juncture of a corresponding leg **71** and brace **72**. The sleeve bearings **75** and **76** slidably engage a corresponding shaft **57** in a well-known manner for vertical movement on the shaft.

The cantilever arm assembly **65** further includes a cross bar **80** which extends between the legs **71** and is welded thereto in a conventional manner. A hydraulic power unit **81** mounted on the platform member **25** is operatively connected to the bar **80** and, according to the invention, is effective to raise and lower the cantilever arm assembly **65** and, accordingly, the base and upright cabinet assemblies **12** and **13**. The construction and operation of the hydraulic power unit **81** will hereinafter be discussed in detail.

As has been pointed out, the base cabinet assembly **12** is mounted on the cantilever arm assembly **65**. The cabinet assembly **12** includes a table and lavatory basin member **82** which is nested between the horizontally disposed arms **70** of the arm assembly **65**. The table and lavatory bowl member **82** is preferably fabricated in one piece. It includes a relatively large, rectangular table top **84** having flange **85** depending therefrom. Inside the flange **85** are two elongated "pads" **85***a* which rest on and are secured to the arms **70** of the cantilevered arm assembly **65** by suitable means (not shown). Depending from the table top **84** between the arms **70** is the lavatory basin **86** itself.

The basin **86** is, of course, adapted to receive, and retain, water at the instance of the user. The lavatory **10** has various means for providing controlling, and dispensing this water. Water dispersing and control will hereinafter be discussed in detail.

Depending from the periphery of the table top **84** in slightly spaced relationship from the flange **85** is an outer lip **90**. The lip **90** actually depends only from the sides and front of the table top **84** so as to define an upwardly extending slot **91** around these three sides. Referring again to FIGURES 1–4, as well as FIGURES 5 and 6, the identical side walls **93** and the front wall **94** of the base cabinet assembly **12** extend upwardly into and are seated in corresponding segments of the slot **91**.

The side walls **93** are generally rectangular in configuration. Their rear edges extend into adjacent relationship with the back panel member **27**. At their forwardmost edges they support between them the front wall **94** and a floor segment **95**. The front wall **94** comprises an elongated upper wall panel **98** rigidly secured to the side walls **93**, and a pair of door panels **99** pivotally connected to the corresponding side walls **93** and adapted to be pulled open outwardly with the handles **100**. Opening the doors **100** provides access to a space beneath the basin **86** on the floor segment **95** for storage or the like.

To retain the side walls **93** and, accordingly, the front wall **94** and floor segment **95** snugly seated against the periphery of the table top **84**, the side walls **93** are also rigidly secured to the cantilever arm assembly **65**. As seen in FIGURE 5, support brackets **101** extending laterally from the arms **70** of the cantilever arm assembly **65** are secured to the side walls **93**.

To provide lateral support for each side wall **93**, as seen in FIGURES 5, 10 and 11, a pin **102** is rigidly seated in each side wall **93** on a mounting screw and extends inwardly therefrom through a vertical slot **103** in the corresponding side panel member **28** of the frame **16**. Each pin **102** has a threaded inner end secured to the lower end of a corresponding leg **71** in the cantilever arm assembly **65** by conventional nuts **104**.

It will now be seen that when the hydraulic power unit **81** raises and lowers the cantilever arm assembly **65**, it moves the entire base cabinet assembly **12**, including the table and lavatory basin member **82**, side walls **93**, front wall **94** and floor segment **95** upwardly or downwardly.

As the base cabinet assembly **12** is raised and lowered, a functional and decorative enclosure is maintained by the skirt assembly **22**, as has been pointed out. The skirt assembly **22** includes the facing elements **45**, **47**, extending around the platform **25** to form a lower skirt element, and three additional skirt elements **105**, **106** and **107**.

The skirt elements **45**, **47**, **105**, **106** and **107** are all fabricated of sheet metal but may be made of other compositions. The skirt element formed by the facing elements **45** and **47** is fastened to the periphery of the frame platform member **25** in the manner hereinbefore discussed, intermediate skirt elements **105** and **106** are slidably fastened to the side panel members **28** of the frame **16**, and the upper skirt element **107** is fastened to the lower periphery of the cabinet side walls **93** and the bottom of the floor segment **95**.

The upper skirt element **107** is channel-shaped in cross-section and defines three sides of a rectangle. Its upper flange **107***a* underlies and is fastened to the lower periphery of the cabinet side walls **93** and the bottom of the floor segment **95** by any conventional fastening means. Its lower flange **107**b underlies the outwardly extending upper flange **106***a* of the intermediate skirt element **106**.

The intermediate skirt element **106** also defines three sides of a rectangle and is mounted for sliding movement on a pair of guide rods **108** affixed to corresponding side frame panel members **28** in vertical recesses **108***a* adjacent corresponding rear edges of the panel members by L-brackets **108***b* and suitable fastening bolts. The rods **108** carry sliding brackets **108***c* which extend outwardly and are fastened to the upper flange **106***a* of the intermediate skirt element **106** by welding.

The inwardly extending lower flange **106***b* of the skirt element **106**, in turn, underlies the outwardly extending upper flange **105***a* of the intermediate skirt element **105**. The skirt element **105** is identical in shape to the skirt element **106**, but is slightly smaller in width and depth so as to facilitate telescoping within the skirt element **106**, as the skirt element **106** does with the upper skirt element **107**.

The skirt element **105** is mounted for sliding movement on the guide rods **108** in a manner identical to the mounting of the skirt **106**. Each rod **108** carries another

sliding bracket **108***d* which extends outwardly and is fastened to the upper flange **105***a* of the skirt element **105** by welding.

The skirt element **105** also has an inwardly extending lower flange **105***b*. When the base cabinet assembly **12** is in its lowered position, as best seen in FIGURES 5 and 6, this lower flange **105***b* of the skirt element **105** rests on the floor **15**.

As the base cabinet assembly **12** is moved upwardly by the hydraulic power unit **81**, the flange **107***b* on the upper skirt element **107**, upon reaching the upper flange **106***a* on the skirt element **106**, lifts this entire intermediate skirt element with it. The skirt element **106** is guided in its upward travel by the guide rods **108** and the guide brackets **108***c*. When the skirt element **106** reaches a point in its upward travel where the lowermost flange **106***b* engages the upper flange **105***a* on the intermediate skirt element **105**, the skirt element **105** is also lifted. The guide rods **108** and guide brackets **108***b* guide the skirt element **105** in its upward travel. The full travel of the cabinet assembly **12** upwardly is approximately 10 inches. This places the lower flange **105***b* of the skirt element **105** immediately below the upper edge of the skirt element formed by the facing elements **45**, **47** on the platform **25**.

Also fixed to the cantilever arm assembly **65** for vertical movement therewith is the upright cabinet assembly **13**, as has previously been pointed out. The upright cabinet assembly includes a horizontally elongated control panel unit **110** surmounted by a large, generally rectangular cabinet and mirror unit **111**. Both the control panel unit **110** and the cabinet and mirror unit **111** are supported from the cantilever arm assembly **65** by a vertically arranged sub-frame **113** mounted on the cantilever arm assembly **65**.

The sub-frame **113** includes an angle member **115** mounted between the arms **70** of the cantilever arm assembly **65** adjacent their rear ends and fastened thereto in a suitable manner (not shown). Bolted to the vertical flange of the angle member **115** at a short distance inwardly of each opposite end of the angle member is a rigid, vertically extending support bar **117**. Each support bar **117** extends upwardly through the control panel unit **110** to a point immediately above the unit **110**.

The control panel unit **110** comprises a box-like structure having generally square end walls **120** and connecting stringers (not shown) which support a front panel **121**. It is from the panel **121** that the user manipulates controls for various functions of the lavatory **10**. The use of the control panel **121** in operation of the lavatory **10** will hereinafter be discussed in detail.

Suitable means (not shown) are provided within the control panel unit **110** for securing it to the vertically extending support bars **117**. In addition, the entire unit **110** rests on the rear upper edges of the side walls **93** in the base cabinet assembly **12**. As such, the unit **110** is rigidly secured to and movable with the base cabinet assembly.

Further in the sub-frame **113**, bolted between the upper ends of the vertical support bars **117** immediately above the control panel unit **110** is another angle member **124**. An upright rectangular bracket **125** is welded to the angle member **124** and extends upwardly through the cabinet and mirror unit **111**. The bracket **125** includes side posts **126** which are slidable in sleeve assemblies **130** affixed to the back panel member **27** by suitable means (not shown).

The cabinet and mirror unit **111** actually comprises a central mirror section **135** bracketed by identical medicine cabinet sections **136**. The unit **111** is mounted on the bracket **125** by suitable attachment means (not shown) in the conventional framework of the sections **135**, **136** so that the unit moves vertically with the panel unit **110** and the base cabinet assembly **12**.

The central mirror section **135** mounts a large mirror **140** while the cabinet sections **136** mount smaller side mirrors **141**. The mirrors **141** are pivotally mounted in

a conventional manner on the cabinet sections **136** so that they can swing inwardly to face each other. A concave shaving mirror **141***a* may be mounted in one of the mirrors **141** if so desired. A spacer member **142** is inserted between the units **110** and **111** to close the space between them.

Turning now to FIGURES 5, 6 and 9, the hydraulic actuator unit **81** is employed according to the invention to raise and lower the base and upright cabinet assemblies **12** and **13**, as has been pointed out. The unit **81** comprises a conventional axial hydraulic motor **160** mounted in upright relationship on a base **161** secured to the platform member **25** immediately below the cross brace member **80** of the cantilever arm assembly **65**. The fluid motor is retained between the base **161** and a cap **162** with tie rods **163**.

The fluid motor **160** is conventional in comprising a cylinder **166** in which a piston assembly (not shown) is mounted for reciprocating movement. The piston assembly terminates in a piston rod extension **168** protruding from the upper end of the closed cylinder **166**. The extension **168** is threaded and secured to an L-bracket **169** mounted on the cross member **80** by a nut **170**.

The fluid motor **160** is energized to raise and lower the cantilever arm assembly **65** and, accordingly, the entire base and upright cabinet assembly **12** and **13**, by means of a conventional rotary hydraulic pump **175**. The pump **175** is mounted on the lower end of a hydraulic fluid reservoir tank **176** in sealed relationship therewith. A conventional 115 volt, alternating current, reversible motor **177** is mounted on the bottom of the pump **175** and drives the pump in a well known manner.

The pump **175**, reservoir **176** and reversible motor **177** unit is mounted on a vertical plate **180** secured between the base **161** and cap **162** on the fluid motor **160**. Suitable brackets **181** connect the reservoir **176** to the bracket **180**.

The power unit **81** is operated by the lavatory user to raise or lower the cabinet assemblies **12** or **13** by merely actuating a toggle switch **185** on the right front of the base cabinet assembly **12**, either up or down. The switch **185** is effective, through the control circuit C (FIGURE 13), to supply power to the motor **177** for driving it in one direction or another, thus directing fluid under pressure to one end or the other of the motor **160** and raising or lowering the cantilever arm assembly **65**. The circuit C, which is broadly conventional, will hereinafter be discussed in some detail.

The pump **175** is operatively connected to the motor **160**, for operation of the motor when the toggle switch **185** is moved up or down from a neutral position, by a hydraulic fluid conduit complex **190** containing a conventional blocking valve **191**. The pump **175** forces hydraulic fluid under pressure through either the conduit **195** or the conduit **196**, depending upon the direction of the operation of the pump **175**, to the blocking valve **191**. Depending upon which of the conduits **196** or **195** delivers fluid to the blocking valve **191**, the valve **191** shunts the fluid to either the conduit **198** leading to the rod end of the cylinder **166**, or the conduit **199** leading to the base end of the cylinder **166**.

If the switch **185** is moved up, fluid under pressure is directed through the conduit **199** to the base end of the cylinder **166** and the piston assembly is driven upwardly, forcing the cantilever arm assembly **65** upwardly with the base and upright cabinet assemblies **12** and **13**. Fluid is exhausted from the cylinder **166** through the conduit **198** and the blocking valve **191** to the conduit **196**, whereby it is returned to the reservoir **176**.

If the switch **185** is moved down, a flow of fluid under pressure is directed from the pump **175** through the conduit **198** to the rod end of the cylinder **166** in precisely the opposite flow path. The piston assembly is caused to retract, drawing the cantilever arm assembly **65** downwardly, with the base and upright cabinet assemblies **12** and **13**.

When the toggle switch **185** is centered, operation of the pump **175** stops and the blocking valve assembly **191**, through its conventional arrangement of check valves (not shown), locks the fluid motor **160**. The base and cabinet assemblies **12** and **13** are fixed at whatever height is selected by the user.

Referring specifically to FIGURES 5 and 6, the limits of vertical movement of the cantilever arm assembly **65** and, accordingly, the base and upright cabinet assemblies **12** and **13**, as driven by the power unit **81**, are defined by an upper limit switch **205** and a lower limit switch **206** secured in a conventional manner to the back panel member **27** of the frame **16** in vertically displaced relationship. The limit switches **205** and **206** are suitably arranged in the circuit C to open the power circuit to the motor **175** upon being engaged by corresponding operator fingers **208** and **209** mounted on the cross brace member **80** of the cantilever arm assembly **65**. The fingers **208** and **209** are of an identical, leaf-spring construction (see FIGURE 6) and extend upwardly and downwardly, respectively, from the cross brace member **80**.

Turning now to the water supply system of the lavatory **10**, it includes a faucet assembly **215** which has swingable spout and a hair spray assembly **216**, mounted on the table top **84** behind the basin **86** in a conventional manner. A fitting **218** extends downwardly from the faucet assembly **215** through the table top **84** to where it terminates in a connection **219** with a flexible water supply hose **220**. The hair spray assembly **216** is connected by a flexible tube **222** to the base of the fitting **218** so that it too can receive water from the supply hose **220**.

Referring particularly to FIGURES 5–8, the supply hose **220** is joined to a control valve arrangement **225** by a conventional elbow fitting **226**. The control valve arrangement **225** is, in turn, connected to the cold water service pipe in a residence, for example, through the fitting **227** and supply pipe sections **228**, **229**, **230**, **231**, **232**, **233**, with appropriate elbow and T-joints. The pipe section **233** extends through the back panel member **27** of the frame **16** to connection with the service line.

Also connected to the cold water service pipe at the pipe section **233** is a basin rim wash nozzle **234**. A flexible tube **235** connects the nozzle **234** to a conventional vacuum release valve in an upstanding pipe assembly **237**. The pipe assembly **237** is, in turn, connected by pipe sections **238** containing a solenoid **239** operated control valve **239***a* to the aforementioned service line connection through the pipe section **233**.

The valve **239***a* is a standard S–25 valve manufactured by the Dole Valve Company of Morton Grove, Ill. The Dole S–25 series valves are single solenoid shut-off valves having one of several selected flow rates. The valve solenoid **239** is operated from the control panel unit **110** through the circuit C in a manner hereinafter discussed.

The valve arrangement **225** is also connected to the normal hot water service line in the residence through an instant hot water system **240**. According to the invention, the instant hot water system supplies hot water immediately upon being called for without the lapse normally expected in conventional systems.

The instant hot water system **240** comprises a cylindrical tank **242** mounted on its side on suitable supports **243** secured to the platform member **25** of the frame **16**. The tank **242** has a conventional heating element and thermostat mounted in its confines. The heating element, which is schematically illustrated at H in FIGURE 13, maintains the temperature in the normally full tank **242** at 180° F., as regulated by the thermostat.

The tank **242** is connected from its back wall to the normal hot water service line in a residence, for example, through the pipe sections **245**, **246**, and **247**, and suitable elbow and T-fittings. The stepped pipe section **250** and the fitting **251** connect the valve arrangement **255** to the tank **242**.

The valve arrangement **225** comprises a temperature control valve **255** and two flow rate control valves **256**. Each of the valves **255** and **256** is solenoid operated from the control panel unit **110** through the circuit C, in a manner hereinafter discussed.

The temperature control valve **255** is a standard M–26 style valve manufactured by the Dole Valve Company. As such, it is a three solenoid **261, 262, 263** thermostatic valve incorporating a hot inlet at the fitting **251**, a cold inlet at the fitting **227**, and a single outlet at the T-joint **265**. Five water temperatures are furnished by energizing a combination of the solenoids **261–263** from the control panel unit **110** through the circuit C, in a manner hereinafter discussed.

The rate of water flow to the faucet assembly **215** through the supply hose **220** is controlled by the two flow control valves **256**. Each valve **256** is a standard S–25 valve manufactured by the Dole Valve Company. They are mounted in parallel in a loop **271** fabricated of pipe sections and connected on one side of the loop to the T-joint **265** extending from the valve **255** and on the other side to the elbow fitting **226** on the supply hose **220**.

The solenoids **270** are energized from the panel unit **110** through the circuit C to open one or the other or both of the valves **256**. One valve **256** provides a low flow rate, the other a moderate flow rate, and both together a high flow rate. Control through the circuit C from the panel unit **110** will hereinafter be discussed in greater detail.

Turning now to the control panel unit **110** itself, and referring to FIGURES 4–6, the unit includes a rearwardly inclined face panel **275**. Suitably mounted on the face panel **275** are various control and service features of the lavatory **10**.

Immediately behind the hair spray assembly **216** is a horizontal row **280** of push button switches which control the solenoids **261–263** and, accordingly, the temperature control valve **255**. Below the row **280** of switches is another row of push button switches which control the solenoids **270** and, accordingly, the flow control valves **256**.

Referring to the circuit C in FIGURE 13, the upper row **280** of push button switches includes an off button switch **280***x* for the entire temperature and flow control function. Five other switches **280***a*, **280***b*, **280***c*, **280***d* and **280***e* provide water temperature adjustment in ranges defined as hot, medium hot, warm, medium cold, and cold, respectively, through control of the solenoids **261–263**.

The lower row **281** of push button switches includes three switches **281***a*, **281***b*, and **281***c*, which provide flow adjustment in low, medium and high flow rates through control of the solenoids **270**. As will be recognized, another push button switch **281***x* is also provided in the row **281**. The switch **281***x* controls the rim wash solenoid **239**.

Also mounted on the face panel **275** (see FIGURES 4 and 5) are a pair of conventional electrical outlets **290** and **291**. These outlets **290** and **291** are integrated into the circuit C in the manner seen in FIGURE 13. In addition, an electric clock radio **294** is suitably mounted on the face panel **275** and also integrated into the circuit C.

The panel **275** also carries a pair of light switches **296** and **297**. The light switch **296** controls an overhead fluorescent light **298** mounted on top of the upright panel assembly **13** and extending across its width. The switch **297**, on the other hand, controls a fluorescent panel light **299** mounted immediately above the rearwardly inclined panel face **275** and extending across its width. The switches **296, 297** and lights **298, 299** are integrated into the circuit C in the manner shown in FIGURE 13.

Referring particularly to FIGURE 13, the circuit C actually comprises three sub-circuits C_1, C_2, and C_3. Each of these sub-circuits C_1–C_3 receives power from a common power source P through a suitable buss arrangement **300**. The sub-circuit C_1, which is the flow and temperature control circuit, transforms 115 volt, alternating current at a transformer **301** to 24-volt, alternating current for operation of the sub-circuit. A transformer **302** performs the same function for the sub-circuit C_2 which controls the motor M (**177**) and, accordingly, the raising and lowering of the base and upright cabinet assemblies **12** and **13**. The sub-circuit C_3 employs 115-volt, alternating current to operate the motor M (**177**), the heater H, and the lights **298** and **299**, as well as provide power to the clock radio **294** and the outlets **290** and **291**. Circuit breakers **305** are employed in a conventional manner in each of these sub-circuits.

To operate the lavatory **10** according to the invention, the base and upright cabinet assemblies **12** and **13** are first adjusted to a selected height by manipulating the toggle switch **185** upwardly or downwardly. If the switch is toggled upwardly, a conventional two-way solenoid **306** in the sub-circuit C_2 causes the motor M to begin operating in a forward direction. Fluid under pressure is pumped through the blocking valve **191** and the conduit **199** to the base of the fluid motor **190**, forcing the cantilever arm assembly **65** and, accordingly, the base and cabinet assemblies **12** and **13**, upwardly. At a selected height, the toggle switch is neutralized, neutralizing the solenoid **306** and stopping the motor M. The upright and base cabinet assemblies **12** and **13** are retained in the selected position by a fluid lock at the blocking valve **191**.

To initiate water flow, a selected water temperature switch button is pressed. The button switches **280***a*–**280***e* and **280***x* are interconnected mechanically in a conventional manner so that pressing one of the temperature control switches automatically closes the master switch **280***x*. Also, of course, pressing the switch **280***x* automatically opens any closed temperature control switch (only one can be closed at a time). The valve **255** is manipulated by one or more of the solenoids **261–263** to select a desired mixing of cold and hot water (unless either cold or hot is selected).

Next a desired flow rate is selected and the appropriate button switch **281***a*–**281***c* is pressed to operate one or more of the solenoids **270**. Normally water at a selected temperature and flow rate is emitted through the nozzle **310** of the faucet assembly **215**. As will be noted, the nozzle **310** is provided with a water fountain diverter button **311** and orifice **312**. Pressing the button **311** diverts water upwardly and out the orifice **312** to form a drinking fountain, if desired.

The lavatory **10** embodying features of the invention also incorporates a hair spray unit **216**, as has been pointed out. Water flow may be directed out of the hair spray head **315** by pressing a suitably arranged button control (not shown) on the head **315**. Water then flows from the fitting **218** of the faucet assembly **215** through the flexible hose **222** to the head **315**.

The basin **86** into which water from the faucet arrangement **215** or hair wash arrangement **216** is directed can also be rinsed out automatically according to the invention by manipulation of the rim wash button **281***x* on the panel face **275**. Pressing the button switch **281***x* causes the solenoid **239** in the sub-circuit C_1 of the circuit C to open the valve **239***a*. A jet of cold water is ejected from the rim wash nozzle **234** around the rim of the bowl, thus rinsing out soap suds, etc.

Waste water is removed from the bowl through a conventional drain fitting **335**, a flexible hose coupling **336**, a drain trap **337**, and a fitting **338**, to a suitable waste line (not shown). A conventional drain plug assembly **340** is manipulated in a well known manner from the table **84** with a stopper control rod **341**.

After use, the lavatory **10** can again be adjusted to any height desired, of course, within its aforedescribed limits. As the lavatory **10** moves up or down, the flexible hoses and tubes **220, 222, 235,** and **336,** accommodate this movement in a well known manner.

Turning now to a modification of the lavoratory **10**, it

has been described as being raised and lowered by a self-contained hydraulic power unit **81**. However, it is conceivable that an alternate system might be employed within the purview of the invention. In this light, attention is directed to FIGURE 12 where an alternate power unit **381** is illustrated.

FIGURE 12 actually illustrates a portion of the base cabinet assembly **12**, partially in section. In this modification of the invention, the cantilever arm assembly **65** and, accordingly, the cabinet assemblies **12** and **13**, are raised and lowered relative to the platform **25** and the shafts **57** by a mechanical power unit **381**.

The power unit **381** comprises a conventional electric motor **381***a* and a conventional worm gear screw-jack **381***b* of the Simplex type manufactured by the Templeton, Kenly Company of Broadview, Ill. The jack includes a cylindrical jack body **382** mounted in a base plate **383** on the base platform **25**. The cylindrical body **382** mounts a conventional worm gear housing **384**. The screw-jack **381***b* is actuated from the control panel unit **110** by energizing the reversible AC electric motor **381***a* which, through its output shaft **391** extending into the housing **384**, selectively drives the jack shaft **393** up or down. The shaft **393** is suitably connected to the cross brace **80** of the cantilever arm assembly **65**.

While the several embodiments described herein are at present considered to be preferred, it is understood that various modifications and improvements may be made therein, and it is intended to cover in the appended claims all such modifications and improvements as fall within the true spirit and scope of the invention.

What is desired to be claimed and secured by Letters Patent of the United States is:

We claim:

1. A vertically adjustable lavoratory, comprising:
- (a) base means;
- (b) cabinet means mounted on said base means;
- (c) said cabinet means including a base cabinet assembly having a basin therein and an upright cabinet assembly having mirror means therein;
- (d) said base means including back panel means extending upwardly behind said base cabinet assembly and said upright cabinet assembly;
- (e) means supporting said cabinet means for vertical movement relative to said base means;
- (f) said support means extending upwardly into said upright cabinet assembly;
- (g) enclosure means between said base cabinet assembly and said base means; said base means including a platform means and power means mounted on said platform means for raising and lowering said support assembly.

2. The vertically adjustable lavoratory of claim **1** further characterized in that:
- (a) said enclosure means comprises an expandable skirt connecting said base cabinet assembly with said base means.

3. The vertically adjustable lavatory of claim **1** further characterized in that:
- (b) said support means being mounted on said platform means and braced from said back panel means.

4. The vertically adjustable lavatory of claim **3** further characterized in that:
- (a) said support means is secured to said back panel means above said base cabinet assembly in said upright cabinet assembly.

5. The vertically adjustable lavatory of claim **3**, further characterized in that:
- (a) said support means comprises vertical shaft means mounted on said platform means;
- (b) a support assembly slidably mounted on said shaft means for vertical movement relative thereto;
- (c) said cabinet means being mounted on said support assembly for vertical travel therewith.

6. The vertically adjustable lavatory of claim **5** further characterized by and wherein:
- (a) said power means includes a closed circuit axial fluid motor, fluid pump and fluid reservoir, and motor means for driving said fluid pump to supply fluid to said axial motor.

7. The vertically adjustable lavatory of claim **6** further characterized in that:
- (a) said vertical shaft means comprises a transversely spaced pair of shafts;
- (b) said support assembly comprising a cantilever arm extending from each shaft and connected by cross brace means;
- (c) said axial fluid motor being connected to said cross brace means.

8. The vertically adjustable lavatory of claim **5** further characterized in that:
- (a) said support means comprises a sub-frame mounted on said support assembly and extending upwardly into said upright cabinet assembly;
- (b) said upright cabinet assembly being secured to said sub-frame.

9. The vertically adjustable lavatory of claim **8** further characterized in that:
- (a) said sub-frame includes vertically extending guide post means;
- (b) means connecting said guide post means to said back panel member in vertically slidable relationship;
- (c) whereby said upright cabinet assembly is fixed for movement only in a vertical direction relative to said base means.

10. The vertically adjustable lavatory of claim **9** further characterized in that:
- (a) said upright cabinet assembly includes a control panel unit surmounted by a mirror and cabinet unit;
- (b) said mirror and cabinet unit being secured to said sub-frame;
- (c) said control panel unit being mounted on vertically extending support posts connecting said support assembly with said sub-frame.

11. The vertically adjustable lavatory of claim **9** further characterized in that:
- (a) said sub-frame is rectangular in configuration;
- (b) said guide post means comprising a pair of guide posts comprising side elements in said sub-frame.

12. A vertically adjustable lavatory, comprising:
- (a) base means;
- (b) cabinet means mounted on said base means for vertical movement relative thereto;
- (c) said cabinet means including a base cabinet assembly having a basin therein;
- (d) said base means including platform means and back panel means extending upwardly therefrom behind said cabinet means;
- (e) enclosure means between said base cabinet assembly and said base means and power means mounted on said base means for raising and lowering said base cabinet assembly.

13. The vertically adjustably lavatory of claim **12** further characterized by and wherein:
- (a) said enclosure means comprises expandable skirt means including a plurality of nested skirt elements adapted to expand in telescoping relationship when said assembly is raised and contract in telescoping relationship when said assembly is lowered so as to enclose said power means at all times.

14. The vertically adjustable lavatory of claim **13** further characterized in that:
- (a) said base means comprises a platform;
- (b) said cabinet assembly includes enclosure wall means;
- (c) the outermost of said telescoping skirt elements being fixed to said wall means and the innermost of said skirt elements being fixed to said platform.

15. The vertically adjustable lavatory of claim **14** further characterized by and including:

(a) guide means mounted on said base means in vertically extending relationship;

(b) said skirt means including at least one intermediate skirt element slidably mounted on said guide means.

16. The vertically adjustable lavatory of claim 15 further characterized in that:

(a) said outer skirt element has a horizontally disposed, inwardly extending flange formed around its lower periphery;

(b) said outer skirt element adapted to raise said intermediate skirt element when said wall means is raised by engagement of said lower flange with a horizontally disposed, outwardly extending flange formed around the upper periphery of said intermediate skirt element.

17. The vertically adjustable lavatory of claim 13 further characterized in that:

(a) said power means comprises hydraulic power means mounted on said platform means;

(b) said hydraulic power means including a closed-circuit axial fluid motor, fluid pump, and fluid reservoir, and motor means for driving said fluid pump to supply fluid to said axial motor for raising and lowering said cabinet means.

18. The vertically adjustable lavatory of claim 17 further characterized by and including:

(a) means on said base means supporting said cabinet means for vertical movement relative to said base means;

(b) said support means comprising vertical shaft means;

(c) a support assembly slidably mounted on said shaft means for vertical movement relative thereto;

(d) said cabinet means being mounted on said support assembly;

(e) said axial fluid motor being connected to said support assembly.

19. The vertically adjustable lavatory of claim 18 further characterized in that:

(a) said motor means in an electric motor controlled through circuit means;

(b) upper and lower limit switch means mounted on one of said back panel member and said support assembly for breaking said circuit means to stop said motor means when said cabinet means has been raised or lowered to a predetermined extent;

(c) and means on one of said back panel member and said support assembly for engaging said limit switch means to break said circuit.

20. The vertically adjustable lavatory of claim 19 further characterized in that:

(a) said support assembly carries an upper limit switch contact arm and a lower limit contact arm;

(b) said contact arm adapted to engage and actuate said limit switches on said back panel member when said cabinet means has been raised or lowered to a predetermined extent.

21. A vertically adjustable lavatory, comprising:

(a) base means;

(b) cabinet means mounted on said base means for vertical movement relative thereto;

(c) said cabinet means including a base cabinet means having a basin therein;

(d) said base means including platform means and back panel means extending upwardly therefrom behind said cabinet means;

(e) skirt means between said base cabinet assembly and said base means;

(f) water dispensing means mounted on said cabinet means adjacent said basin;

(g) water supply means connected to said base means;

(h) conduit means containing control valve means connecting said water supply means to said water dispensing means; power means mounted on said platform means for raising and lowering said base cabinet assembly.

22. The vertically adjustable lavatory of claim 21 further characterized in that:

(a) said water supply means includes a hot water tank having a self-contained electrical heating unit and thermostat;

(b) said valve means including a plurality of solenoid valves;

(c) circuit means connecting said valve solenoids with remote control means;

(d) said remote control means being mounted on said cabinet means for controlling said circuit to energize and de-energize said solenoids to control water temperature and flow rate from said water dispensing means.

23. The vertically adjustable lavatory of claim 22 further characterized in that:

(a) said conduit means includes three solenoid valves;

(b) two of said solenoid valves being arranged in parallel with each other and in series with a third of said solenoid valves;

(c) said third valve having inlet means from both said hot water tank and cold water supply means and adapted to mix hot and cold water according to a predetermined valve setting to obtain a selected water temperature and dispensed said selected temperature said solenoid valves;

(d) said two valves controlling flow rate of said selected temperature water to said dispensing means according to predetermined settings of said two valve means.

24. The vertically adjustable lavatory of claim 23 further characterized in that:

(a) said water dispensing means includes basin rim wash means;

(b) said rim wash means being connected to water supply means by conduit means including a solenoid valve.

References Cited

UNITED STATES PATENTS

1,446,509	2/1923	Koprowicz	4—167
1,595,791	8/1926	Lantieri	4—167
2,009,225	7/1935	Farrar	4—166
2,065,952	12/1936	Trautmann	4—170
2,716,757	9/1955	Eriksson	4—170 XR
2,810,917	10/1957	Rhoades	4—170
2,817,094	12/1957	Lessley	4—170
2,958,871	11/1960	Eskenazi	4—170
3,118,147	1/1964	Larkin	4—170

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