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3,305,822

ELECTRICALLY SUPPLIED BARBER CHAIR

Filed Oct. 14, 1963

4 Sheets-Sheet 1

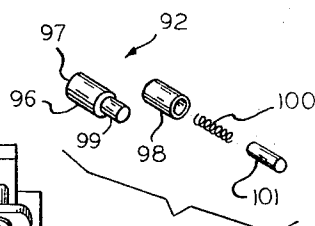
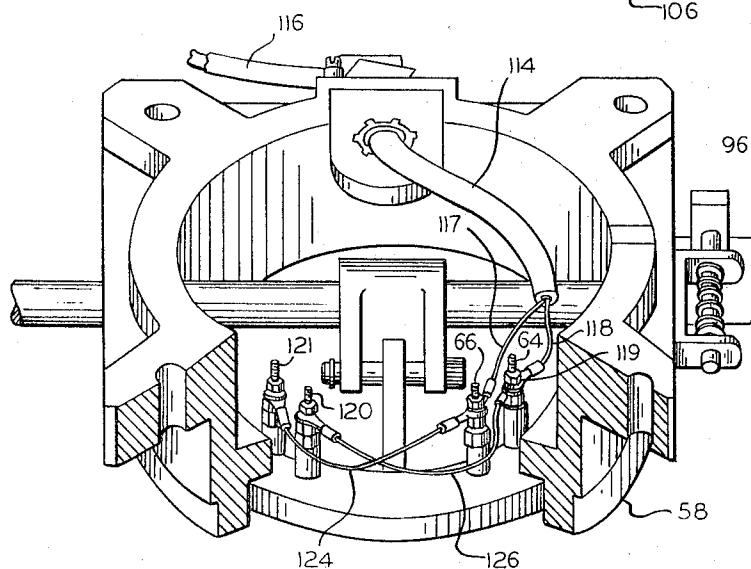
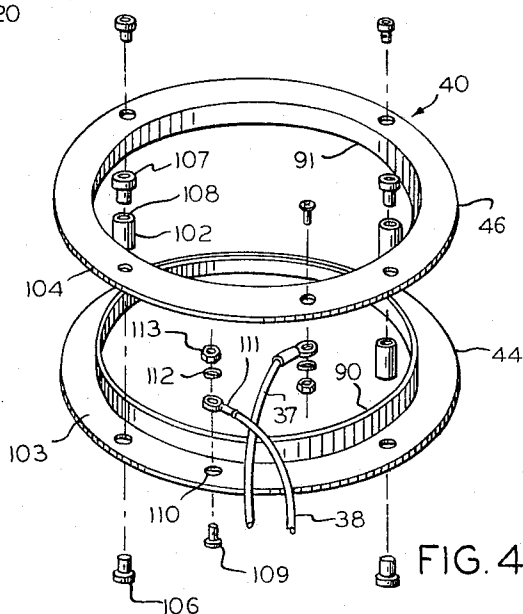
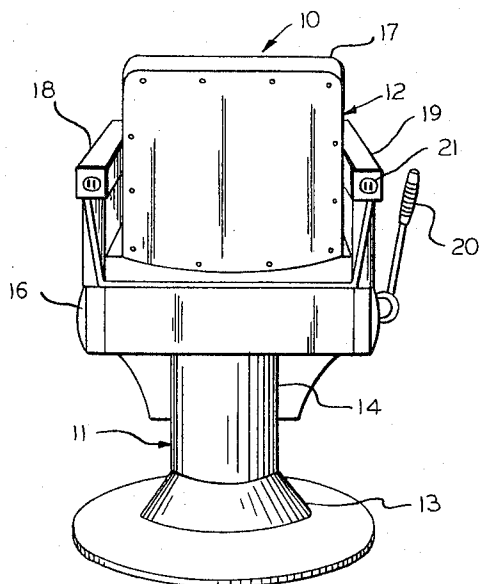


FIG.5

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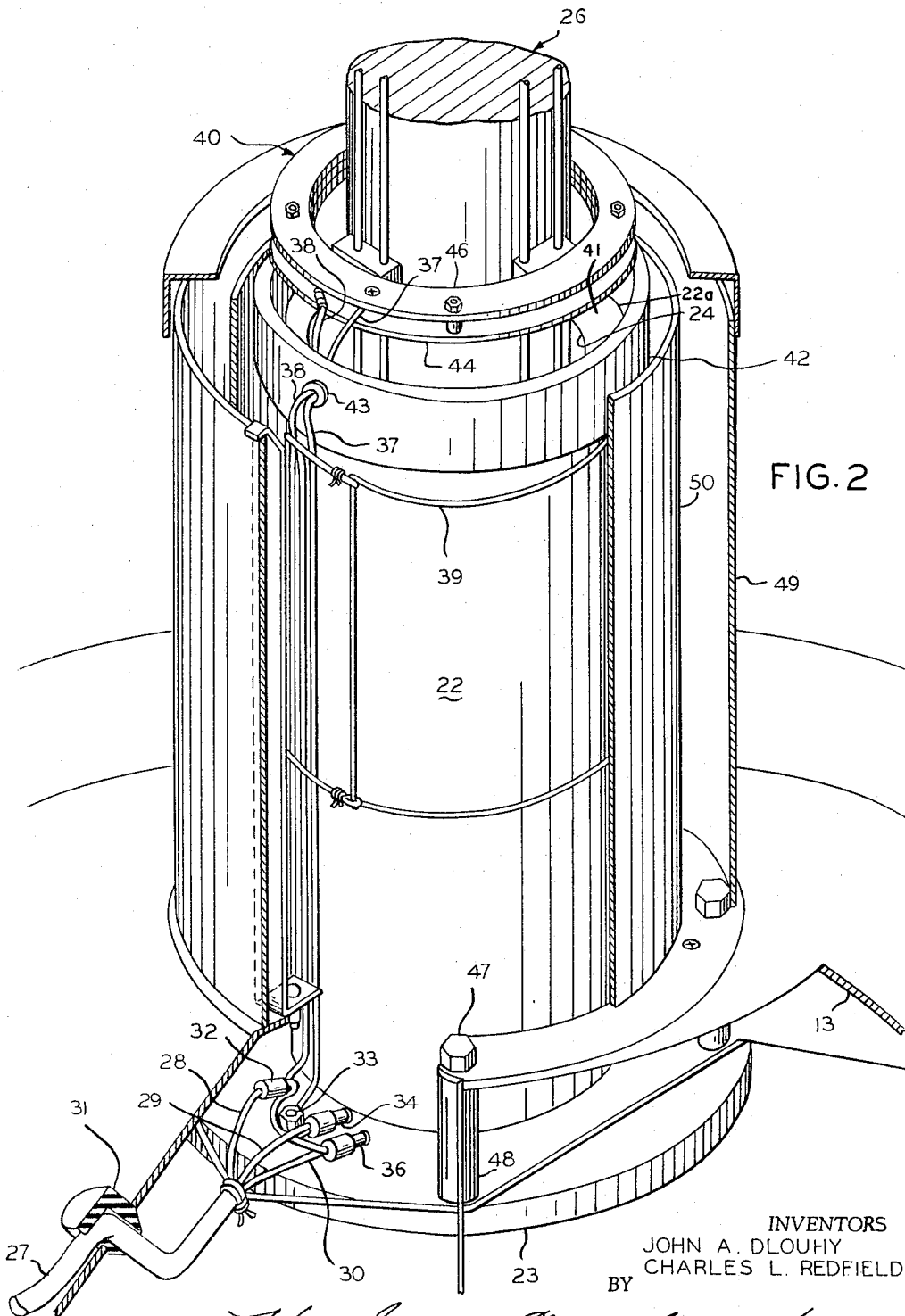
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ELECTRICALLY SUPPLIED BARBER CHAIR

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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

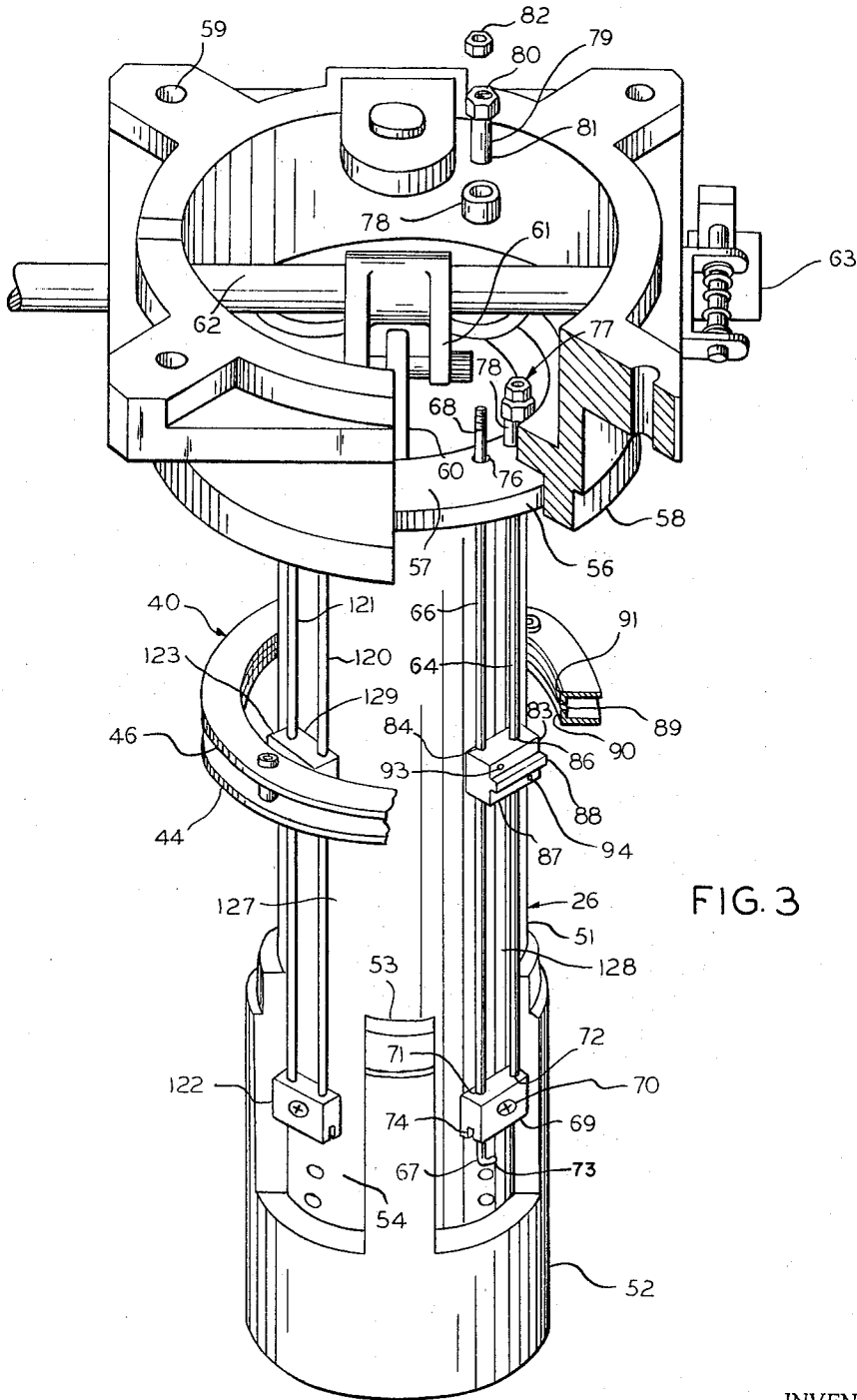


FIG. 3

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4 Sheets-Sheet 4

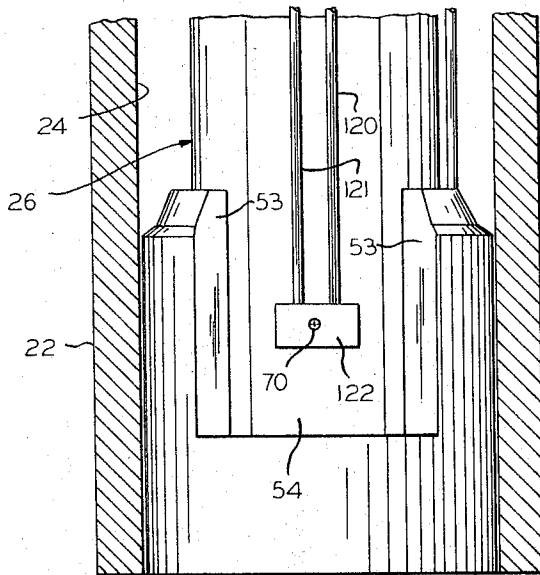
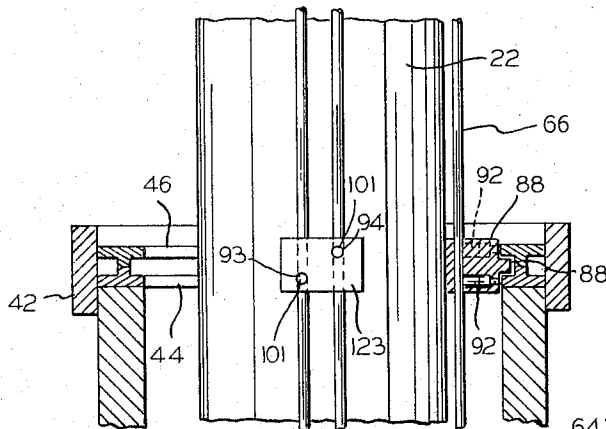


FIG. 7

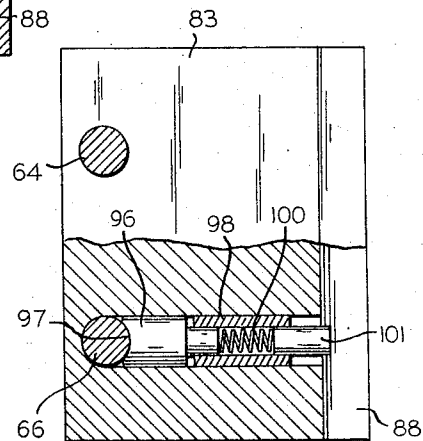


FIG. 8

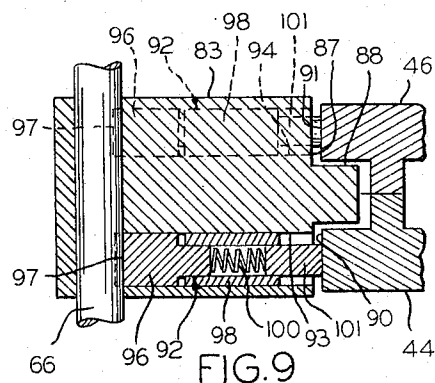


FIG. 9

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3,305,822

ELECTRICALLY SUPPLIED BARBER CHAIR

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Filed Oct. 14, 1963, Ser. No. 315,956
8 Claims. (Cl. 339-5)

The present invention relates to an elevatable and rotatable seating device and more particularly relates to an improved electrical circuitry for a barber chair wherein a first electrical conductor means is connected to an immovable base member and a second electrical conductor means is connected to an elevatable and rotatable chair member for energizing an electrical outlet in the chair member, the first and second electrical conductor means being maintained in electrical engagement regardless of the movement of the chair.

Elevatable and rotatable seating devices may be conveniently utilized in a number of applications. For example, in the treatment of dental patients, beneficial results may be obtained from the mobility of the patient offered by a movable chair, and likewise in the barber industry the cutting of hair can often be more easily accomplished through the use of such a chair.

It is desirable in many instances to provide an electrical outlet in such a chair to which electrical appliances such as lights, shears, clippers, vibrators, and the like, can be connected for energization thereof. Most desirably, the electrical outlet is continually accessible to the operator, and for that reason may be preferably located somewhere on the movable chair rather than on the stationary base. The main connection to an electrical source is preferably made in the stationary base.

Since the chair is preferably elevatably and rotatably movable relative to the stationary base, electric circuitry capable of accommodating relative movement therebetween is required for maintaining an electrical connection between the source of power and the electric outlet.

Generally, movable chairs such as barber chairs are hydraulically operated whether by manual pumps or electric pumps. Accordingly, electrical circuitry constructed to provide for energization of an electric outlet in the movable chair must operate suitably without interference with the hydraulic mechanisms of the chair.

It is, therefore, an object of the present invention to provide a seating device, having an elevatable and rotatable chair member, with an electric outlet conveniently located in the chair member, an electric circuit for electrically connecting the outlet to an electrical conductor in the stationary base member, which is connectable to a source of electric power.

Another object of the present invention is to provide a power operated chair construction including electrical circuitry for energizing an electric outlet on the chair wherein the circuitry is housed within the chair construction and operates without interference from the hydraulic mechanism of the chair.

A further object of the present invention is to provide an improved structure for energizing an electric outlet in a rotatable and elevatable barber chair whereby the outlet is maintained in electrically connected engagement with a suitable source of electric power regardless of the movement of the chair.

Yet another object of the present invention is to provide improved electrical circuitry in a barber chair comprising an immovable base having a cylinder formed therein and a movable chair including a piston slidably carried in the cylinder for elevatable and rotatable movement thereof relative to the base, wherein one electrical conductor means is carried by the piston, another elec-

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trical conductor means is carried by the base and a third electrical conductor means is carried by one of the other two electrical conductor means to maintain electric contact therebetween regardless of movement of the chair relative to the base.

Still a further object of the present invention is to provide improved electrical circuitry in a barber chair having a cylinder member with a piston member slidably carried therein, said circuitry adapted to provide an electrical connection between the piston member and the cylinder member and comprising a pair of conductor rods carried by the piston, a pair of slip rings carried by the cylinder and brush members engageable with the rods and the rings to maintain electrical contact therebetween.

Yet another object of the present invention is the provision of improved electrical circuitry for an elevatable and movable barber chair which is simple in design and construction, requires little or no maintenance while affording a long useful operating life and is particularly adapted to preclude interrupted electric service, i.e., will continue to afford electric energy to the chair with minimum wear of parts and thus being capable of being in service in barber shops for years without requiring servicing.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheets of drawings in which a preferred embodiment of a hydraulically operated barber chair is described in detail by way of illustrative example and by means of which the novel concepts of the present invention may be practiced.

On the drawings:

FIGURE 1 is a perspective view of the back of a rotatably and elevatably movable barber chair illustrating a pair of electrical outlets situated in the arm rests of the chair and energized in accordance with the principles of the present invention;

FIGURE 2 is a fragmentary and partially exploded perspective view of the base member of the chair of FIGURE 1 showing portions cut away for the sake of clarity;

FIGURE 3 is a perspective view of a slidable piston assembly of the present invention including electrical conductor means associated therewith and constructed in accordance with the principles of the present invention;

FIGURE 4 is an exploded view of a slip ring sub-assembly of the present invention;

FIGURE 5 is a perspective view of the top portion of a chair support rest mounted on the piston of FIGURE 3 including certain electrical conductors and connections therebetween;

FIGURE 6 is an exploded view of a brush member assembly constructed in accordance with the principles of the present invention;

FIGURE 7 is a vertical sectional view of the piston assembly of FIGURE 3 slidably carried in an associated cylinder of the base member of the chair with certain parts shown in elevation;

FIGURE 8 is a top plan view of the brush member assembly of FIGURE 6 with a portion thereof shown in section; and

FIGURE 9 is a vertical sectional view of the brush member assembly in its relation to the slip ring sub-assembly of FIGURE 4.

As shown on the drawings:

Referring to FIGURE 1, there is shown a typical barber chair 10 comprising an immovable or stationary base member or base portion indicated generally at 11 and a rotatably and elevatably movable chair member carried

by the base member and indicated generally at reference numeral 12.

The base 11 more particularly includes a dish-shaped base plate 13 adapted to be supported from a floor surface and a cylindrically shaped vertically upwardly extending lower shroud 14.

As illustrated in FIGURE 1, the chair 12 comprises generally a seat 16 having a back rest 17 extending upwardly from the back edge thereof and a pair of arm rests 18 and 19 situated on either side of the back rest 17 and supported from the seat 16. An actuator or pump handle 20 is situated on one side of the seat 16 and is operatively connected to a hydraulic power mechanism for raising and lowering the chair 12 in the usual manner. Located on the back side of the arm rests 18 and 19 are a pair of electrical plug receptacles or sockets 21 for receiving and energizing electrical appliances such as clippers, vibrators and the like from a convenient and easily accessible location.

Although the principles of the present invention find utility in any seating device comprising an immovable base member and a chair member movable relative to the base member, a particularly useful application is made to seating devices wherein a hydraulically operated cylinder-piston arrangement is incorporated for rotatably and elevatably moving the chair. Thus, there is shown in FIGURE 2 a tubularly shaped vertically upwardly extending cylinder 22 having an outer cylinder wall 22a and a circumferentially continuous radially outwardly extending flange support member 23 at the lower end thereof and surrounded at the bottom portion thereof by the base plate 13.

A vertical cylindrical inner wall 24 of the cylinder 22 is machined to receive a reciprocable and rotatable piston assembly 26 which supports the chair 12 (FIGURE 1) in a manner to be described in detail hereinafter.

In order to supply electric power to the barber chair 10, an electrical conduit as at 27 comprising a plurality of insulated electric wires 28, 29 and 30 extends through the base plate 13 to the interior thereof through a sleeve member, for example, a rubber bushing 31. One of the wires, for example, wire 28, may constitute a "ground" connection and may be adapted by means of a lead assembly 32 for connection to a bolt 33 connected in ground to the flange support 23. Wires 29 and 30 may be connected to a suitable source of current and connected at splicing connectors 34 and 36 to a pair of wires 37 and 38 which extend upwardly along the outer surface of the cylinder 22 and are held thereagainst by means of a lacing or cord as at 39.

Situated circumferentially about the piston assembly 26 is an electrical conductor means or slip ring assembly indicated generally at 40 adapted to be immovably supported on a shoulder of the cylinder 22 formed by a top wall thereof as at 41. As illustrated in the partially exploded view of FIGURE 2, the slip ring assembly 40 is in vertically spaced relation to the top wall 41, but in an assembled condition the assembly 40 rests on the top wall 41 and is surrounded at the outer perimeter thereof by an open-ended annularly shaped axially extending cylinder cap 42 extending vertically upwardly from and connected in fixed assembly to the upper end of the cylinder 22.

In order to electrically energize the slip ring assembly 40, the conductor wires 37 and 38 extend through the cylinder cap 42 in a grommet 43 and are connected respectively to lower and upper slip rings 44 and 46 which comprise the assembly 40.

As shown in FIGURE 2, the base plate 13 is attached to the flange support 23 by means of a plurality of circumferentially spaced support bolts as at 47 and associated spacer elements as at 48. For the sake of appearance, a vertically upstanding lower shroud 49 is fixedly connected to the base plate 13 for surrounding the cylinder 22 and spaced radially between the cylinder 22 and the shroud 49 is an inner shroud 50 adapted to be connected to the

lower portion of the chair 12 (FIGURE 1) for vertical movement therewith.

Referring now to FIGURE 3, the piston assembly 26 is particularly characterized by a reduced diameter body portion 51 and an enlarged head portion at the lower end thereof as at 52. The head portion 52 is dimensioned complementarily to the dimension of the inner wall 24 of the cylinder 22 and comprises a plurality of circumferentially spaced axially extending lands or ridges as at 53 which define recesses therebetween as at 54. It will be understood that the head portion 52 including the lands 53 extend axially sufficiently to provide the requisite lateral support for the piston assembly 26 in the cylinder 22 throughout the entire range of vertical travel of the piston 26.

At the top of the body portion 51 is formed an annularly shaped radially outwardly extending flange or rim member 56 having a top wall 57 to which is fixedly connected for co-rotation (rotation together) therewith by suitable means (not shown) a chair support rest 58 which is adapted to support the seat member 16 (FIGURE 1). Any suitable means may be utilized for mounting the seat on the support rest 58, for example, a plurality of bolts (not shown) may be received in complementarily shaped bolt holes as at 59 and in corresponding bolt holes formed in the seat 16 and secured thereto by the usual fastening means, such as threaded nuts.

As illustrated, the usual hydraulic pump shaft 60 for providing pressurized hydraulic fluid to the cylinder 22 extends downwardly through the piston assembly 26 and is pivotally connected at its upper end for reciprocal movement thereof to a rocker arm 61 mounted for corotation on a shaft 62 which is connected at its operating end 63 to the pump handle 20 (FIGURE 1).

In order to supply electric power from the slip ring assembly 40 to the upper end of the piston assembly 26 and thence to the chair 12, another electrical conductor means comprising a pair of axially extending elongated parallel spaced rods 64 and 66 are carried by the piston assembly 26 in spaced relation thereto and extend from a lower end 67 situated in a recess 54 to an upper end 68 which extends through the top wall 57 of the rim 56.

In order to securely mount the rods 64 and 66 to the body portion 51 of the piston assembly 26, a rod support member 69, which is comprised of suitable insulating material, such as plastic, is fixedly secured to the piston by suitable means, for example, a machine screw as at 70.

Extending axially through the rod support member 69 are a pair of parallel spaced apertures as at 71 and 72 for receiving respectively the rods 64 and 66. The lower end portions as at 67 of the rods are returned as at 73 to be housed in a transverse groove 74 when the rods are urged upwardly into assembled position. In this manner rods 64 and 66 are prevented from rotating during operation of the piston assembly.

The top ends of the rods, which extend through oversized apertures as at 76 formed in the rim 56 are securely fastened to the rim by means of fastening assemblies as at 77 which, as illustrated in the exploded view of FIGURE 3, comprise respectively a centrally apertured insulated spacer member 78, a rod spacer 79 centrally apertured as at 80 and having an elongated body portion 81 which extends down through the spacer 78 and into the aperture 76 around the vertical rod and a threaded nut as at 82 to engage the complementarily threaded end portions 68 of the vertical rods 64 and 66.

It will be noted that as a result of the location of apertures 71 and 72 in the rod support member 69 as well as the location of the apertures 76 in the rim 56, rods 64 and 66 are maintained in radially outwardly spaced relation to the body portion 51 of the piston assembly 26.

In order to provide continuous electrical engagement between the slip rings 44 and 46 and the vertical rods 64 and 66 respectively, regardless of elevatable or rotatable movement of the piston assembly 26, an insulated carrier

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83 is slidably carried on rod 64 and 66 for vertical movement relative thereto, and defines a pair of apertures 84 and 86 for receiving the rods therethrough. An outer wall 87 of the carrier 83 forms a radially outwardly projecting rectangularly shaped transverse ridge 88 adapted to be received in a circumferentially continuous slot 89 defined by a pair of interfacing inturned end portions formed respectively on the slip rings 44 and 46. It will be appreciated, therefore, that regardless of vertical movement of the carrier member 83 the ridge 88 will always be maintained in the slot 89 for vertical alignment of the carrier member and the slip ring.

Referring now to FIGURES 3 and 6, in order to maintain the vertical rods 64 and 66 and the slip rings 44 and 46 in electrical engagement a pair of brush assemblies as indicated generally at reference numeral 92 are carried by the carrier 83 within radially extending passages formed therein as at 93 and 94. The passages 93 and 94 are axially and circumferentially spaced for alignment respectively with the vertical rods 64 and 66 and one of the inturned end portions 90 and 91 of the slip rings. Each brush assembly comprises a rod brush 96 having a concavely shaped end wall 97 adapted to abut a vertical rod. A cylindrically shaped tubular sleeve 98 is received on a reduced-diameter portion 99 of the brush 96. The axial length of portion 99 is less than that of the sleeve 98 and inserted into the sleeve is a coil spring 100 and a ring brush 101 which is adapted to engage one of the slip rings. The rod brush 96 and the ring brush 101 are urged into abutting engagement with the vertical rods and the slip rings respectively by means of the spring bias imparted thereto by the spring 100.

In the exploded view of the slip ring sub-assembly 40 (FIGURE 4) it will be noted that the slip rings 44 and 46 are maintained in spaced relation by means of a plurality of insulator space elements as at 102 situated between interfacing walls 103 and 104 and maintained in fixed assembly with the slip rings by means of a pair of suitable fasteners, for example, a pair of threaded screw members 106 and 107 received respectively in a threaded aperture as at 108 formed in the spacer 102. Electric wires 37 and 38 are secured respectively to the walls 103 and 104 by suitable fasteners such as a threaded bolt 109 extending through an aperture 110 and thence through a lead assembly 111 and a washer 112 to be received at the other end thereof by a suitable complementarily threaded nut 113.

Referring now to FIGURE 5, a conduit 114 is mounted on the chair support rest 58 and is adapted to be connected at one end thereof as at 116 to the electric plug receptacles 20 and 21 in the chair member 12 (FIGURE 1). The conduit 116 comprises a pair of insulated electric wires 117 and 118 which are electrically connected respectively to the vertical rods 64 and 66 by means of suitable fasteners such as bolt means as at 119.

In order to reduce maintenance problems and the possibility of interrupted electric service, it will be noted in FIGURE 3 that an additional pair of vertical rods 120 and 121 are mounted on the piston assembly 26 and are supported at the lower end portion thereof by means of rod support member 122, which is identical in all respects to the support member 69, and are electrically connected respectively to the slip rings 44 and 46 by means of a carrier member 123. It will be appreciated, of course, that the carrier member 123 is likewise identical to carrier member 83 which is carried on the vertical rod 64 and 66. At the upper ends thereof, as shown in FIGURE 5, rods 120 and 121 are electrically connected in parallel with rods 64 and 66 respectively by means of electric conductor wires 124 and 126 (FIGURE 5).

It is to be further noted, as best illustrated in FIGURE 3, that those portions of the body 51 of the piston assembly 26 which underlie the vertical electrical conductor rods 64, 66, 120 and 121 are machined to form flat surfaces as at 127 and 128 along the axial length

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thereof from the rim member 56 to the enlarged head portion 52. A back wall as at 129 of the carrier members 83 and 123 likewise forms a complementarily shaped flat surface so as to provide contiguous engagement of the entire back wall 129 of the carrier members with the body portion 51. Thus, the carrier members are adapted to slide freely on the body portion 51 while maintaining complete engagement therewith and precluding rocking or twisting of the carrier members as they are moved vertically relative to the body portion 51.

In operation, electric power for energizing the electric sockets 21 in the elevatably and rotatably movable chair 12 is supplied from the electric wire conductor means as at 29 and 30 (FIGURE 2) situated in the immovable base 11. Wires 29 and 30 enter the base 11 through the bushing 31, extend upwardly on the outer surface of the cylinder 22, through the cylinder cap 42 to connect respectively to and energize the immovable slip ring members 44 and 46.

The electric power is supplied from the slip rings 44 and 46 (FIGURES 2, 3 and 5) to the electric sockets 21 (FIGURE 1) by means of a pair of vertical rods 64 and 66 which are rigidly mounted on the outer surface of the piston 26 on which the chair 12 is mounted. The rods, which are elevatably and rotatably movable relative to the slip rings, are electrically connected to respective slip rings by means of the brush members 93 and 94 which are slidably mounted on the rods by means of the carrier member 83 and which electrically connect one of the rods to one of the slip rings continuously and in all positions of the chair. The contacts of the electric sockets 21 are connected to the vertical rods 64 and 66 by means of wire conductors 117 and 118 (FIGURE 5), and in order to ensure against interrupted service, another pair of rods 120 and 121 are connected similarly to the slip rings and to wires 117 and 118 in parallel connection with the first pair of rods, thereby assuring service regardless of a defective rod, brush member or other conductor means in the circuit.

It will be understood, of course, that the principles of the present invention find utility in any seating device incorporating a chair which is elevatably and rotatably movable relative to an immovable base and in which electric power is supplied from the base member to the chair member, and the illustrated embodiment of the barber chair is meant to be illustrative of only one exemplary embodiment of such a seating device. Further, although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably come within the scope of our contribution to the art.

We claim as our invention:

1. In a barber chair having a base including a cylinder and a piston member slidably carried in the cylinder and supporting a chair thereon for rotational and elevational movement, the combination comprising,

first rigid electrical conductor means carried by the base for connecting to a source of electric power, second rigid electrical conductor means comprising a pair of vertical rods carried by and mounted in fixed assembly on the chair for elevational and rotational movement therewith,

a carrier member mounted on said rods for slidable engagement therewith and having passages therein, each of said passages opening at one end thereof to one of said rods and at the other end thereof to said first electrical conductor means, brush members slidably carried in said passages and engageable with said first electrical conductor means and with one of said rods for providing an electrical connection therebetween, and biasing means in said passages for biasing said brush members into engagement with said first conductor means and said rods,

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said brush members being only elevationally movable relative to one of said electrical conductor means and being only rotatably movable relative to the other of said electrical conductor means.

2. In a barber chair,
 - a first member comprising a base having a cylinder formed therein,
 - a second member comprising a piston slidably carried in the cylinder for rotational and elevational movement relative to the first member and supporting a chair thereon,
 - first electrical conductor means comprising a pair of vertical rods mounted in fixed assembly on one of said members,
 - second electrical conductor means comprising a pair of slip rings carried on the other of said members, one of said electrical conductor means being adapted for connection to a source of power,
 - a carrier member mounted on said rods for slidable engagement therewith and having passages therein, each of said passages opening at one end thereof to one of said rods and at the other end thereof to said first electrical conductor means, brush members slidably carried in said passages and engageable with said second electrical conductor means and with one of said rods for providing an electrical connection therebetween, and biasing means in said passages for biasing said brush members into engagement with said first conductor means and said rod,
 - said brush members being only elevationally movable relative to one of said electrical conductor means.
3. In a barber chair, a first member comprising a base having a cylinder formed therein,
 - a second member comprising a piston slidably carried in the cylinder for rotational and elevational movement relative to the first member and supporting a chair thereon,
 - first electrical conductor means comprising a pair of vertical rods mounted in fixed assembly on one of said members,
 - second electrical conductor means comprising a pair of slip rings carried on the other of said members, one of said electrical conductor means being adapted for connection to a source of power,
 - a carried member mounted on said rods for slidable engagement therewith and having passages therein, each of said passages opening at one end thereof to one of said rods and at the other end thereof to said first electrical conductor means, brush members slidably carried in said passages and engageable with said second electrical conductor means and with one of said rods for providing an electrical connection therebetween, and biasing means in said passages for biasing said brush members into engagement with said first conductor means and said rods, said brush member being only elevationally movable relative to one of said electrical conductor means and being only rotatably movable relative to the other of said electrical conductor means.
4. In a barber chair,
 - a first member comprising a base having a cylinder formed therein,
 - a second member comprising a piston slidably carried in the cylinder for rotational and elevational movement relative to the first member and supporting a chair thereon,
 - first electrical conductor means comprising a pair of vertical rods fixedly carried on one of said members for elevational movement therewith,
 - second electrical conductor means comprising a pair of slip rings carried on the other of said members,

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one of said electrical conductor means being adapted for connection to a source of power,

- a carrier member carried on said vertical rods for slidable engagement and having passages therein, each of said passages opening at one end thereof to one of said rods and at the other end thereof to said first electrical conductor means, brush members slidably carried in said passages and slidably engageable with said first and said second electrical conductor means for providing an electrical connection therebetween and biasing means in said passages for biasing said brush members into engagement with said first and said second electrical conductor means.
5. In a barber chair,
 - a first member comprising a base having a cylinder formed therein,
 - a second member comprising a piston slidably carried in the cylinder for rotational and elevational movement relative to the first member and supporting a chair thereon,
 - first electrical conductor means comprising a pair of vertical rods fixedly mounted on said piston for rotational movement therewith,
 - second electrical conductor means comprising a pair of slip rings mounted on said base, one of said electrical conductor means connected to a source of electric power,
 - a carrier member carried on said vertical rods for slidable engagement and having passages therein, each of said passages opening at one end thereof to one of said rods and at the other end thereof to said first electrical conductor means, brush members slidably carried in said passages and slidably engageable with said first and said second electrical conductor means for providing an electrical connection therebetween and biasing means in said passages for biasing said brush members into engagement with said first and said second electrical conductor means.
6. In a barber chair,
 - a first member comprising a base having a cylinder formed therein,
 - a second member comprising a cylindrical piston slidably carried in the cylinder for rotational and elevational movement relative to the first member and supporting a chair thereon, said piston having a vertically extending flat surface formed thereon,
 - first electrical conductor means comprising a pair of vertical rods fixedly mounted on said piston of elevational movement therewith and situated in overlying relation relative to said flat surface,
 - second electrical conductor means comprising a pair of slip rings mounted on said base,
 - said one of said electrical conductor means connected to a source of electric power,
 - a carrier member carried on said vertical rods for slidable engagement therewith, said carrier member having a flat surface formed thereon for slidably engaging the flat surface of said piston, and
 - brush members carried by said carrier member and slidably engageable with said first and said second electrical conductor means for providing an electrical connection therebetween.
7. In a barber chair,
 - a first member comprising an immovable base having a cylinder formed therein,
 - a second member comprising a cylindrical piston slidably carried in the cylinder for rotational and elevational movement relative to the first member and supporting a chair thereon,
 - first electrical conductor means comprising a pair of vertical spaced parallel rods fixedly mounted on said piston,

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second electrical conductor means comprising a pair of slip rings immovably mounted on said base about said piston,

one of said electrical conductor means being adapted for connection to a source of electric power, a carrier member carried on said vertical rods for slidable engagement therewith and having passages therein, each of said passages opening at one end thereof to one of said rods and that the other end thereof to said first electrical conductor means, and a pair of brush members slidably carried in said passages and engageable with one of said first and one of said second electrical conductor means for providing an electrical connection therebetween and biasing means in said passages for biasing said brush members into engagement with said first and said second electrical conductor means.

8. In a barber chair,

a first member comprising an immovable base and having a cylinder formed therein,

a second member comprising a cylindrical piston slidably carried in the cylinder for rotational and elevational movement relative to the first member and supporting a chair thereon,

said piston having a pair of spaced vertically extending flat surfaces formed thereon,

a first electrical conductor means comprising two pairs of vertical spaced parallel rods fixedly mounted on said piston and adapted for connection to a source of electric power,

said pairs of rods being situated respectively in overlying and in spaced relation relative to said flat surfaces,

second electrical conductor means comprising a pair of spaced slip rings mounted immovably on said base and surrounding said piston in spaced relation to said rods,

a pair of carrier members slidably carried respectively

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on said pairs of rods for slidable engagement therewith,

said carrier members each having a flat back surface formed thereon in abutting engagement respectively with one of the flat surfaces of said piston for sliding engagement therewith,

a pair of radially extending and extensible brush members carried by each of said carrier members and aligned respectively with one of said rods and one of said slip rings,

said brush members each comprising a rod brush engageable with one of said rods, a ring brush engageable with one of said slip rings and a spring interposed between the rod brush and the ring brush for urging said brushes toward their respective rods and slip rings,

third electrical conductor means for connecting one pair of said rods with the other pair of said rods in parallel connection,

a pair of rod support members for supporting respectively the lower ends of each of said pairs of rods in spaced relation to said piston,

said rod support members each having a bottom surface with a groove formed therein, the lower ends of said pairs of rods having inturned portions received respectively in the groove of a corresponding rod support member for preventing rotation of the rods.

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