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MOBILE DENTAL UNIT

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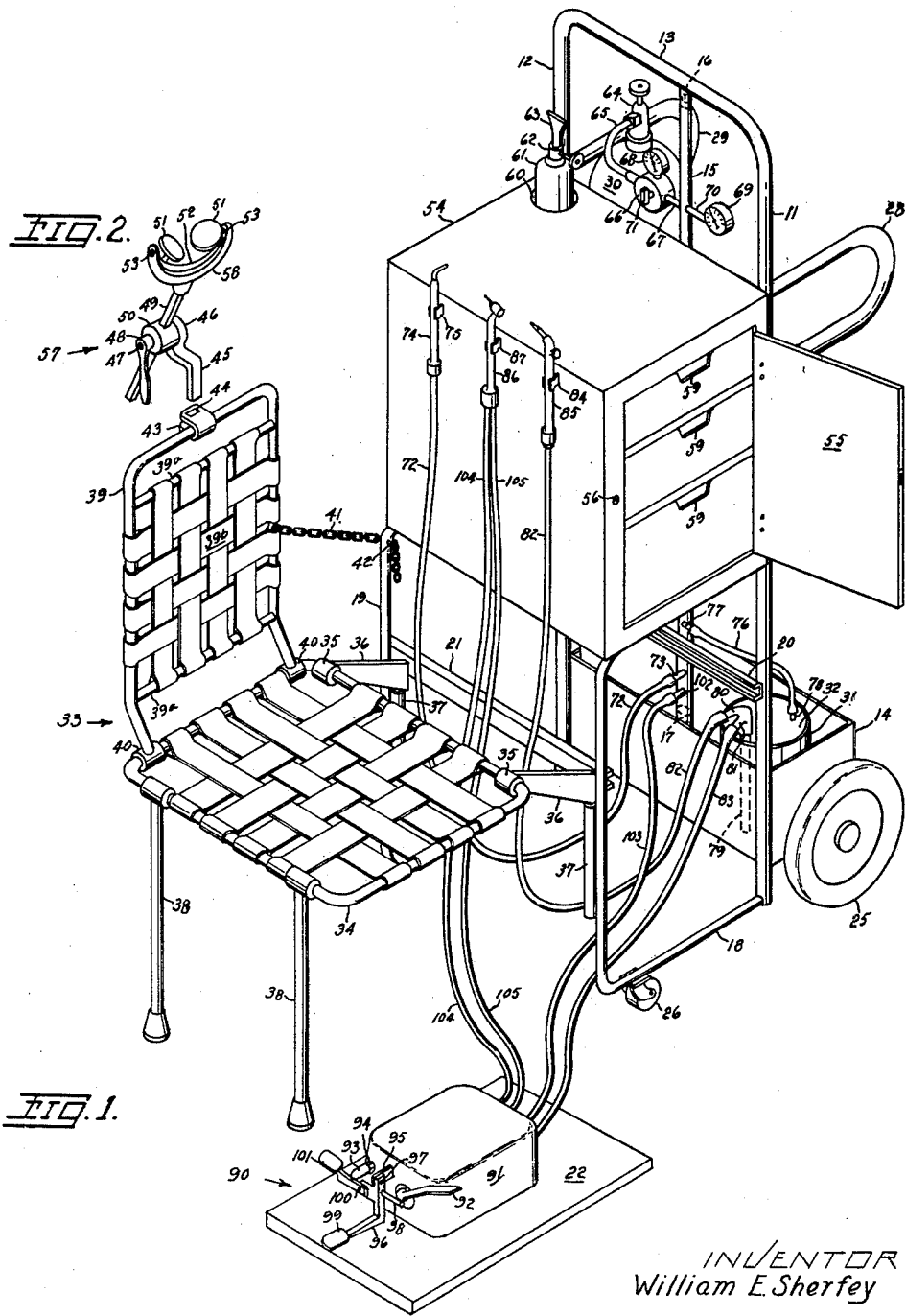


FIG. 1.

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MOBILE DENTAL UNIT

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This invention relates generally to power driven equipment required for the practice of dentistry and surgery and more particularly to an equipment system required for such practice when such utilities as electricity, compressed air, water under pressure and fuel gas are not readily available at the point of use.

It is the primary purpose of this invention to provide the dental profession with a mobile dental unit complete with chair, air under pressure, power means for driving a dental drill, water under pressure, and fuel gas together with means for storage of the required equipment and supplies during transportation from one temporary working position to another.

It is understood that the term "dental unit" in the dentist's office is the utility supply stand which is permanently installed alongside the patient's chair and which is permanently supplied with such public utilities as electricity, fuel gas, compressed air and water.

The present invention provides the dentist or surgeon for specialized operating equipment which can be taken to the patient when the patient cannot go to the professional office or where there is no office to go to. Such conditions are found in military field hospital emergencies, foreign missionary work and hospital rooms or homes where the patient is confined.

A preferred form in which this invention may be practiced will be explained in the following description referring to the attached drawing in which

FIG. 1 is a perspective view of the complete system of the invention without the head rest for the patient's chair.

FIG. 2 is a perspective view of the head rest of the chair of FIG. 1.

Like reference numerals refer to like parts in the several parts of the drawing.

Referring now to the drawing; the frame of the dental unit of this invention comprises a pair of laterally spaced parallel vertical metal tubes 11, 12 terminating at their tops in rounded corners connected in the plane of tubes 11 and 12 by transverse handle bar 13. Open topped rectangular metal box 14 is secured between tubes 11, 12 near their lower ends, as shown, and hollow vertical tube 15, plugged at 16, 17 near its respective ends to be airtight therebetween, is welded at its ends to handle bar 13 and box 14 as shown. U-shaped metal tubing side supports 18, 19 each made of a single piece of metal tubing are welded respectively to vertical tubes 11, 12, as shown, to extend forwardly from tubes 11, 12 in parallel planes perpendicular to the plane of tubes 11, 12. Parallel shelf guiding metal channels 20, 21 are welded respectively between tubes 11, 12 and tubes 18, 19 and add bracing strength to the frame.

Secured one each to the outer lateral sides of box 14 are a pair of journal plates, not shown, from each of which an axle, not shown, extends outwardly in transverse horizontal alignment to support the dental units on two coaxial wheels 24, 25 of which only 25 is shown. When the unit is upright the front end thereof is supported on caster wheels 26, 27 of which only 26 is shown, mounted respectively on the lower legs of side supports 18, 19.

Small position changes as required will be made of the unit when it is resting on wheels 24, 25 and caster wheels 26, 27 but if longer movements of the dental unit are required it will be grasped by handle bar 13 and tilted into balance over wheels 24, 25 and wheeled in that posi-

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tion like a common hand truck. Like the similar parts of a common hand truck, legs 28, 29 are each made of a U-shaped piece of tubing with its ends welded respectively to vertical tube frame pieces 11, 12 to extend rearwardly therefrom with the planes of legs 28, 29 parallel and both perpendicular to the plane of tubes 11, 12. For handling like a hand truck legs 28, 29 are useful handles for hand truck type of movement and useful supporting legs when the unit is in prone position with the other end resting on wheels 24, 25.

Resting in a circular depression of proper size formed in the bottom plate of open topped box 14 is a commercially available steel bottle 30 of standardized size of compressed air. Near its upper end bottle 30 is secured to frame tubes 12 and 15 by a webbing belt not shown. At the other end of box 14 from air bottle 30 is a stainless steel water bottle 31 of about two quarts capacity threaded to a sealing top closure 32 so that the bottle may be unscrewed from the top and sterilized and filled.

The patient's chair, 33, as here shown comprises a seat with a rectangular frame 34 of tubular metal laced with fabric webbing. The left side of frame 34 is journalled in spaced bearings 35, 35, forming the respective free ends of the horizontal legs of L-shaped brackets 36, 36 of which the vertical cylindrical legs are removably supported in tubular sockets 37, 37 welded respectively, as shown, to side supports 18, 19. The right side of frame 34 is independently journalled in the upper bearing ends of normally vertically free swinging spaced parallel legs 38, 38. The U-shaped tubular frame 39 of the back of chair 33 has its free ends finished with bearing members 40 freely rotatably positioned on the rear side of seat frame 34 and held in position by chain 41 linked between back frame 39 and hook 42 secured in side support 19 as shown. Note that the vertical side legs of chair back frame 39 together with horizontal cross members 39a form the supporting frame for back comfort webbing 39b.

A supporting socket 43 for head rest 57 is welded to the top of back frame 39 and formed with vertically aligned rectangular holes 44 removably to receive the supporting leg 45 of clamping head 46. Bolt 47 and handle nut 48 secure head rest stem 49 and clamp washer 50 to clamping head 46 to position head rest yoke 58 as desired. The soft rubber cup head support pads 51 are secured to cradle 52 which in turn is rockably secured to yoke 58 by swivel screws 53. When handle nut 48 is loosened on bolt 47 head rest stem 49 can be rotated with clamp washer 50 about bolt 47 and moved endwise through clamp washer 50 as desired and then fixed in the desired position by tightening handle nut 48 on bolt 47.

Removably secured on tubing side supports 18, 19 to rest against vertical tubes 11 and 12 is a three drawer cabinet 54 with an end opening closable, as shown, by side hinged door 55 and securable by lock 56 when desired. For practical reasons the depth of the bottom drawer is about three times the depth of the top drawer and the depth of the second drawer is about twice the depth of the top drawer. The internal arrangement of the drawers is as found to be desired and includes room in the lower drawer for storing the head rest 57 when it is not being used.

The front panel of each of the drawers is cut away along its top edge as at 59 to admit a finger to move the drawer in or out of the cabinet. The top drawer is shortened to admit the construction behind it of an air and water tight receptacle 60 open through the top of the cabinet to receive a metal butane bottle 61 fitted at the top with a fuel control valve 62 topped with a Bunsen type burner 63.

As above noted hollow vertical tube 15 is hermetically plugged near its top at 16 and near its bottom at 17 and

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forms a manifold for compressed air supplied thereto through main valve 64, flexible air hose 65, adjustable pressure regulator 66 and metal pipe nipple 67 which supports regulator 66 on pipe 15 as shown. Air pressure indicator 68 connected to the air inlet side of regulator 66 indicates the air pressure in bottle 30 when valve 64 is open. Air pressure indicator 69 connected to pipe 15 by pipe nipple 70 indicates at all times the air pressure therein as determined by the desired setting of the front adjusting knob 71 of pressure regulator 66.

Flexible air tube 72 is seen to connect outlet nipple 73 with syringe type valved air hand piece 74 conveniently supported by clip 75 on the side of cabinet 54 nearest the patient.

Flexible air tube 76 is seen to connect outlet nipple 77 from tube 15 to inlet nipple 78 formed through screw-on cover 32 of water bottle 31 to put air pressure on the top of the water in bottle 31 to put water under the air pressure of indicator 69 into tube 79 sealed into cover 32 to deliver water from near the bottom of bottle 31 through the outlets 80, 81 of tube 79 to flexible water tubes 82, 83, respectively. Water tube 82 connects water outlet 80 with syringe type valved water hand piece 85 supported by clip 84 on the side of cabinet 54, as shown.

The contra-angle dental drill hand piece 86 shown supported by clip 87 on cabinet 54 is a most modern apparatus having an air driven turbine in the head and capable of being driven at any speed desired up to about 100,000 r.p.m. by varying the air pressure impressed on the turbine as desired. The small quantity of air discharged from the turbine is emitted into the patient's mouth along the drill to keep the work area clear. In this high speed drilling art it is found that both the drill and the work being drilled require cooling so a water conduit in the drilling handpiece leads from the handle end thereof to the drilling end thereof to discharge cooling water onto the work at the drilling area as required. Both the rate of air supply to the drill driving turbine and the rate of cooling water supply must be both simultaneously and independently variable. For this purpose, the apparatus shown generally at 90 is provided and includes an open bottomed hollow cover 91 secured to a shelf 22 whereby when not in use the device 90 may be stored on shelf 22 with the shelf 22 supported at its opposite edges between the channels 20 and 21 secured respectively between tubes 11, 12 and tubes 18, 19, as shown.

The device 90 is an essential part of a combination of this invention but, per se, is the invention of Mr. Norman C. Williams disclosed in his U.S. Pat. Application S.N. 760,754 filed September 12, 1958, now Patent No. 3,039,193 on a "Control System" and assigned to the manufacturer, Power Brake Equipment Co. of 1632 S.E. 11th Avenue, Portland, Oregon, by whom the device is merchandised under their trademark "Varitrol." The operation of the device 90 in the present combination is sufficiently explained as follows:

To the underside of cover 91 is secured a special type of air pressure modulating valve having an operating stem adjustable to a minimum air flow position by a pedal lever 92 and pushable inwardly to increase the air flow proportionately. Thus if pedal 92 is rotated on its stem axis to point upwardly the air flow will be cut off unless the valve stem including lever 92 is pushed inwardly, in which case the air flow will be substantially proportional to the inward movement of the stem and when the inward pressure on the stem of lever 92 is released the valve will shut the air off entirely. But in many cases the operator will want to have his drill operate above a certain speed all the time and only occasionally increase the speed for a short time. By rotating lever 92 clockwise this desired minimum speed is set without interfering with the increasing of the speed above the set minimum speed by pushing the stem of lever 92 inwardly.

Also to the underside of cover 91 a water valve is secured with an operating stem 93 extending forwardly through a hole 94 in cover 91. At the center of the front

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of cover 91 a boss 95 is formed and an angle shaped lever 96 is pivoted thereon by pin 97. Lateral arm 98 is formed across lever 96 and when pedal 99 of lever 96 is pressed downwardly, arm 98 strikes the stem of lever 92 and pushes lever 92 with its stem inwardly to increase the air flow as desired.

Pivoted on the left end of arm 98 at 100 is a pedal lever 101 which when positioned to the left as shown brings water valve stem 93 into its line of travel when pedal 99 is pressed downwardly. But if lever 100 is rotated clockwise it leaves water valve stem 93 out of its line of travel when it moves with the movement of pedal 99.

It is seen that when the operator is using his air turbine driven drill he controls the drill speed with his foot pressure variation of pedal 99 and if he wants to use water as he drills he rotates lever 101 to cause it to strike water valve stem 93 whenever pedal 99 is moved to cause bar 98 to strike the stem of lever 92. With one pedal lever for operating control and two levers 92 and 101 to be occasionally foot positioned it is seen that the operator has complete control of his drilling unit. Of course it is understood that the air control valve in device 90 is fed with air from outlet nipple 102 of pipe 15 by flexible air tube 103 and feeds air at modulated pressures to hand piece 86 through air tube 104. In like manner the device 90 water control valve operated by stem 93 is fed with water from outlet nipple 81 of pipe 79 in water bottle 31 through flexible tube 83 and feeds water at a controlled rate through flexible tube 105 to hand piece 86.

To one skilled in the art the many uses for the essential parts and combinations thereof here disclosed will be apparent. The top of the cabinet 54 becomes the operator's work table. If the patient is bed-ridden the chair can be removed from the unit as previously described and placed flat on the surface of the bed with the patient prone thereon. Then the back of the chair can be elevated and held at a sufficient elevation to use the head rest in its regular way for safe use of the tools in the mouth of the patient.

Having recited the primary object of the invention; illustrated and described a preferred form in which the invention may be practiced and explained its use, I claim:

1. A mobile dental unit for use where the public utilities like electric power, gas fuel, water under pressure, and compressed air are not available, comprising in combination a handpiece for a dental drill, means for providing air under a controlled pressure to said handpiece, means for providing water under a controlled pressure to said handpiece and means for controlling as required the supply of said air and said water to said handpiece; said handpiece comprising a hollow handle including an air driven turbine therein, said turbine including a stator, a rotor carried concentrically in said stator to include a holder for said dental drill, air conduit means for conducting air through said handle and said turbine to the exterior of said drill and water conduit means for conducting water through said handle to the exterior of said drill; said means for providing air under a controlled pressure to said handpiece including a metal bottle for air under pressure, a manifold for air under a controlled pressure, means including a main air shut off valve and an adjustable pressure air pressure regulator in series connecting said air bottle to said air manifold and a flexible air line connected between said air manifold and said air conduit means of said handpiece, the speed of said turbine being responsive to the air flow therethrough; said means for providing water under a controlled pressure to said handpiece including a metal water bottle including a removable air and water tight cover therefor, said bottle cover including an air inlet nipple sealed therethrough and a water outlet pipe sealed through said cover to a position near the bottom of said water bottle, a flexible air line connecting said air inlet nipple with said air manifold to put air under pressure on the top of the water in said water bottle and

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a flexible water line connected between said water outlet pipe and said water conduit means for said handpiece; and said means for controlling as required the supply of said air and said water to said handpiece including in a single portable assembly of floor mounting and foot operation thereof, an air valve connected into said flexible air line to modulate as desired the rate of air flow from said air manifold to said air conduit in said handpiece and a water valve connected into said flexible water line to permit when desired a flow of water from said water outlet pipe to said water conduit in said handpiece, said air valve of said assembly including an air valve stem longitudinally movable between a full open and a full closed position of said air valve and a first pedal operated lever adjustable to permit a desired minimum air flow through said air valve, said assembly including a second pedal operated lever to variable position said air valve stem to modulate the flow of air to said handpiece to modulate the speed of said turbine, said water valve including a water valve stem longitudinally movable between a full open and a full closed position of said water valve and said second pedal operated lever including a third pedal positionable lever operable between positions of no interference and full interference with said water valve stem whereby when said third pedal is in its interference position the water flow through said flexible pipe will be a function of the position of said second lever.

2. The combination of claim 1 including a hand truck including space provisions thereon for transporting the elements recited in claim 1 without disconnecting any of said elements from the other of said elements to which they are usefully connected, said truck including a frame element in a transverse vertical plane, a laterally extending tray secured to the rear of said frame element near the bottom thereof for supporting said air bottle and said water bottle, a pair of transversely spaced parallel axially aligned supporting wheels for said truck rotatably positioned on opposite sides of said tray, a transversely extending cabinet support structure secured to said frame element to extend forwardly therefrom and upwardly therealong about half the height of said air bottle, a storage cabinet supported on said cabinet support structure to extend upwardly therefrom, the top of said cabinet forming a work table for the operator of the dental unit, and a pair of laterally spaced wheels supported in castered relation about vertical axes on the under side of said cabinet support structure to support said truck with said frame element in said vertical plane, whereby for small movements to position said truck in one work area on a floor the frame element can remain vertical and all four of said wheels will be used but for greater movement to move said truck from one work area to another said frame element can be tipped rearwardly on said laterally spaced axially aligned wheels and said truck can be moved on said last mentioned wheels.

3. The combination of claim 2 including a base plate on which said portable assembly for floor mounting and foot operation is secured and spaced parallel open facing channel means secured on said cabinet support structure for receiving said base plate for storage under said cabinet near said air and water bottles so that said portable assembly can be moved between its use position on said floor and its storage position under said cabinet without interfering with its said air and water flexible line connections.

4. The combination of claim 3 including a chair for a patient to position said patient during dental operation thereon, said chair including a rectangular seat member, a back member hingedly secured at its bottom edge to the rear edge of said seat member, a normally dependent leg structure hingedly secured to one side of said seat member to support said chair on said floor on said side, an additional leg structure hingedly secured to the other side of said seat member, said cabinet support structure

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including a pair of transversely spaced vertical socket members secured thereto and said additional leg structure including a pair of legs each having one end thereof hinged to said chair and the other end thereof positioned in one of said sockets, each of said legs of said additional leg structure being bent near its middle to space said chair from said cabinet support structure and support said other side of said seat structure at the same elevation above said floor as said dependent leg structure supports said one side of said seat member.

5. The combination of claim 4 including flexible means secured to said chair for positioning the back of said chair as required by the work being done on the patient and for securing said chair to said truck in storage position thereon when said chair has been folded on its hinges up against said cabinet.

6. The combination of claim 5 including a head rest for said patient, a clamping support therefor, said clamping support including a stem extending parallel to the upwardly extending direction of said chair back and socket means secured on said chair back in said upwardly extending direction thereof for engagement of said clamping support stem therein or disengagement therefrom without the use of tools.

7. A mobile dental unit for use where the public utilities like electric power, water under pressure and compressed gas are not available, comprising in combination a movable hand truck having a frame in a substantially vertical plane, a pair of laterally spaced rear wheels secured to said frame near one end thereof to support said frame on the floor for movement thereover perpendicularly to said plane, a handling arm for said truck secured to said frame near the other end thereof to extend from said frame to support said frame on the floor when said frame is rotated rearwardly about the axis of said wheels to strike said floor with said arm, said truck including a forward extension of said frame on its side opposite said arm, said forward extension including a caster mounted wheel at its lower end to support said truck with said frame in a substantially vertical position when the center of gravity of the load on said rear wheels is on the caster wheel side of said rear wheels, a dental patient chair seat hinged to said frame extension on an axis parallel to said rear wheel axis to swing away from said frame extension to a normal sitting level, a non sliding chair supporting leg secured to said chair seat on its side opposite its frame hinging side to support said seat with said patient thereon to anchor said truck and said chair to the floor in a selected work position.

8. A mobile dental unit for use where the public utilities like electric power, water under pressure and compressed gas are not available, comprising in combination a hand truck having a frame in a generally vertical plane, a pair of laterally spaced supporting wheels rotatably secured on said frame near the lower end thereof to rotate on a horizontal axis parallel with said plane, said frame including an extension thereof on its side opposite said wheels, said extension including a castered wheel secured on said extension to support said frame in its normal upright position when its center of gravity with load is on the caster wheel side of said wheel axis, said frame including near its upper end a rigid handling arm extending on its side away from said extension to maintain said frame supported on the floor substantially parallel thereto when the center of gravity of said loaded truck is on the handling arm side of said wheel axis, said dental unit including a dental equipment cabinet with a level working surface supported on said extension at a desired working height when all three of said wheels are supporting said unit and said unit including, carried removably thereon, a metal container for gas under pressure, a container for water, a dental hand piece requiring simultaneously water and gas under pressure for its operation, a first gas conduit connecting said gas container with said hand piece, a second conduit connecting

said gas container with said water container to put the water in said water container under pressure, a third water conduit connecting said water container with said hand piece and a pedal operated valve means operable simultaneously to open said first conduit and said third conduit to said hand piece. 5

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