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THERAPEUTICAL APPARATUS.

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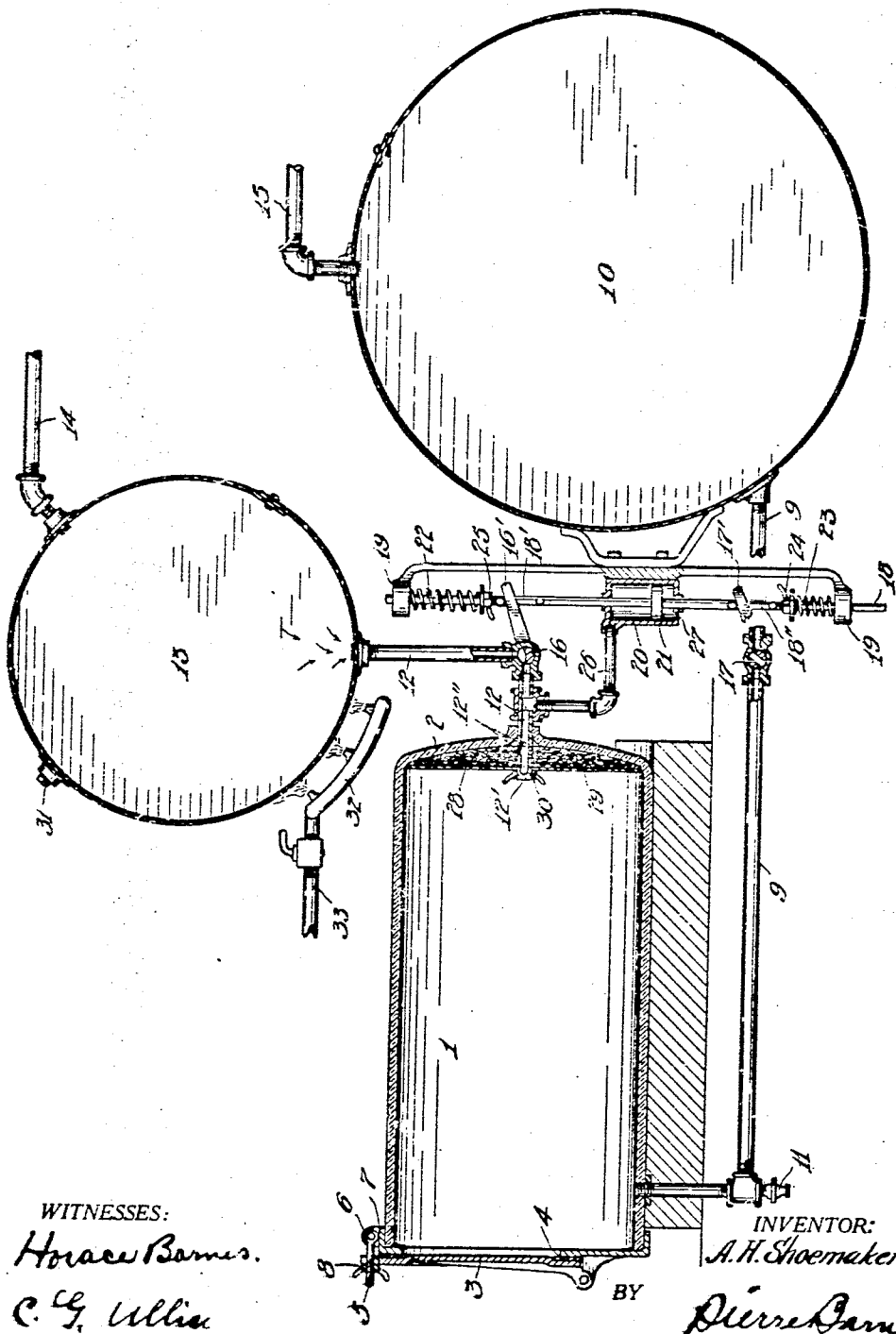
911,528.

Patented Feb. 2, 1909.



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THERAPEUTICAL APPARATUS.

No. 911,528. Specification of Letters Patent. Patented Feb. 2, 1909.

Application filed December 30, 1907. Serial No. 408,648.

To all whom it may concern:

Be it known that I, ALVIN HENRY SHOEMAKER, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Therapeutical Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to therapeutical apparatus; and its object is the provision of devices of this character through the medium of which the curing of diseases which have hitherto been beyond the skill of the medical practitioner may be accomplished.

The invention consists in means or apparatus in a manner as hereinafter set forth whereby a patient is subjected to external or atmospheric pressure to a predetermined amount reproducing under selected conditions and to greater degrees an approximation to the varying densities of the atmosphere at different elevations.

It further consists in the means in a manner hereinafter set forth whereby such artificial conditions, or air pressures, are intermittently varied as to intensity, together with controllable means whereby such results may be regulated as to duration.

In the drawing, I illustrate apparatus embodying my invention in which the parts are shown partly in section and partly in elevation as to best disclose the construction and operation of the same.

The reference numeral 1 designates a receptacle of any suitable size to accommodate a patient to be treated, which receptacle may be made of glass and of any suitable shape. Said receptacle is closed at one end, as at 2, and has an opening for the opposite end for a door 3 which may be swung on hinges and is adapted to make an air-tight joint with the receptacle casing, as by a gasket 4. Said door is desirably arranged to swing downwardly when opening so that convenient access is had to the interior of the receptacle for the admission of a hospital litter upon which the patient is introduced, or the removal thereof after treatment. The door may be secured when closed by a bolt 5 which is hinged to lugs 6 provided upon an attachment 7 of the receptacle and adapted to extend between ears provided in the periphery of the door and against which a fastening-nut 8 is brought to bear by manipulating the same. Adjacent of the door, and in the bottom of the receptacle, is an opening from which leads a pipe 9 to a tank 10 hereinafter designated as the exhauster. This pipe has an outlet valve 11 through which the receptacle may be drained of fluid collected while operating the apparatus and also of water used to cleanse the interior of the receptacle between successive operations.

Leading from an opening in the receptacle, preferably at the closed end 2, is a pipe 12 which communicates with a tank 13, hereinafter designated as a reservoir, in which is a supply of air under pressure somewhat greater than that of the atmosphere and which is maintained from a suitable compressor, not shown, connected by a charging pipe 14. Said exhauster is evacuated, as much as may be, of its gaseous contents by a suitable air-pump, not shown, through a connecting pipe 15. The pipes 9 and 12, leading respectively to the exhauster and the reservoir from the receptacle, are provided with valves 16 and 17 for controlling the flow of gases therethrough. These valves may be of that class known as plug-cocks and are regulated by arms 16′ and 17′, but are set in such relation that one of them will be open when the other is closed and vice versa. Said valve arms extend through elongated apertures 18′ and 18″ in a rod 18 which is mounted for reciprocation in guides 19 and axially extends through a valve cylinder 20. Interiorly of said valve cylinder 20 is a piston 21 rigidly connected to or formed integral with said rod. Upon the rod are springs 22 and 23 which are regulated by adjustment nuts 24 and 25 engaging with screw-threads provided therefor on the rod. Communication is had between one end of the cylinder 20 and the receptacle 1 by a pipe 26 which may be connected with the pipe 12 intermediate such receptacle and the valve 16. The opposite end of the cylinder is provided with a small leak-hole 27 whereby through the air is alternately admitted and discharged as the piston recedes or approaches that end of the cylinder.

Within the receptacle is desirably employed a quantity of foraminous material 28, such as cotton gauze and which may be treated to render the same antiseptic. The function of this material is to form a means through which the air from the reservoir percolates to diffuse the same and likewise

extract mechanically, and where the material has been treated chemically, as hereinafter stated, certain foreign substances carried by the air. The material is secured in place in any suitable or convenient manner, as by a plate 29 through which the end of the pipe 12 extends to receive a securing nut 30 for the plate. Where such devices are used the extremity of pipe 12 is closed as at 12' and perforations 12'' are provided in the pipe to allow of the escape of the air therefrom and so disposed that the same will be caused to pass through the interstices of the material 28 before it can enter the chamber to the other side of the plate 29.

In the shell of the reservoir is an opening with a removable plug 31 for the introduction of chemicals which would be used in conjunction with the compressed air in certain cases.

32 represents a burner which is supplied with fuel gas through a pipe 33 leading from a source of supply. The purpose of this burner is to heat the contents of the reservoir prior to its delivery to the receptacle, either for overcoming the cooling effect due to the expansion which would ensue in entering the receptacle, or to cause the temperature to be raised to any extent appropriate to the case under treatment.

The operation of the invention is as follows: After the patient is within the receptacle and the latter hermetically sealed by the closing of the door, the apparatus is put in operation by manually moving the rod 18 whereupon the spring 22 is compressed and the valve 16 is opened to permit the flow of air from the reservoir to the receptacle and which will occur through the higher pressure prevailing in the reservoir. When the pressure in the receptacle is thus built up, or during such operation, the air from the pipe 12 will enter the cylinder 20 to cause the piston therein to be actuated to move the rod and against the retarding effect due to the air at the opposite side of the piston which resists compression and can only escape through the leak-hole, 27. The spring 22 which was previously compressed asserts itself to assist in this action and overcome the opposing spring 23 compressing the latter to conserve the force thereof for accomplishing the reverse movement of the rod. By reason of the slots 18' and 18'' being provided in the rod, it is impelled a certain distance before the valve arms 16' and 17' are engaged to close the valve 16 and open the valve 17. When the said valves 16 and 17 have been thus affected communication is closed between the receptacle and the reservoir and the compressed air from the receptacle is withdrawn through the pipe 9 into the exhauster 10 where the pressure is considerably less than atmospheric. This action is continued while the spring 23 is operating first, to move the rod, 18 against the resisting effect of the air upon the opposite side of the piston 21 and thereafter until the rod operatively engages the valve-arms to close the valve 17 against further flow to the exhauster, and the valve 16 to reëstablish communication with the reservoir. This completes a cycle of operation and further cycles are attained through the offices of the valves and their controlling means, as above explained.

Having described my invention, what I claim, is—

1. In apparatus of the class described, the combination with a receptacle, a tank for storage of compressed air, a tank from which the air is exhausted, and pipe connections between the receptacle and the respective tanks, of valves in each of said pipe connections, means for controlling the action of said valves so that the communication through the respective said pipe connections are alternately opened and closed, such means serving to retard the valve actions whereby the duration of the flow of air through each of said pipe connections may be regulated.

2. A therapeutical apparatus comprising a receptacle for a patient, a pair of tanks containing fluid under different pressures and adapted to alternately communicate with said receptacle, means whereby the fluid from the tank containing fluid under the higher pressure will be supplied to the receptacle to increase the pressure in the latter, and means for automatically establishing communication between the other tank and said receptacle to reduce the pressure in the latter when it reaches a predetermined stage and for shutting off communication between the first tank and the receptacle.

3. A therapeutical apparatus comprising a receptacle for a patient, a tank containing compressed air, a vacuum tank, a pipe connection between the compressed air tank and the receptacle, a valve in said connection, a valved pipe connection between the vacuum tank and the receptacle, and mechanism for alternately opening said valves for establishing communication alternately between the tanks and the receptacle.

4. A therapeutical apparatus comprising a receptacle for a patient, a tank containing compressed air, a vacuum tank, a pipe connection between the compressed air tank and the receptacle, a valve in said connection, a valved pipe connection between the vacuum tank and the receptacle, a pressure actuated mechanism for opening the valve in the vacuum tank pipe connection and for closing the valve in the air tank pipe connection whereby the air tank is closed to the receptacle and the vacuum tank opened to the receptacle, and means to operate said mechanism to close the valve in the vacuum pipe

connection and to open the valve of the air tank pipe connection when the pressure in the receptacle has been reduced.

5. A therapeutical apparatus comprising a receptacle for a patient, a tank containing compressed air, a vacuum tank, a pipe connection between the compressed air tank and the receptacle, a valve in said connection, a valved pipe connection between the vacuum tank and the receptacle, mechanism for alternately opening said valves for establishing communication alternately between the tanks and the receptacle, and means for heating the compressed air.

6. A therapeutical apparatus comprising a receptacle for a patient, a tank containing compressed air, a vacuum tank, a pipe connection between the compressed air tank and the receptacle, a valve in said connection, a valved pipe connection between the vacuum tank and the receptacle, a pressure actuated mechanism for opening the valve in the vacuum tank pipe connection and for closing the valve in the air tank pipe connection whereby the air tank is closed to the receptacle and the vacuum tank opened to the receptacle, means to operate said mechanism to close the valve in the vacuum pipe connection and to open the valve of the air tank pipe connection when the pressure in the receptacle has been reduced, and means for heating the compressed air.

7. A therapeutical apparatus comprising a receptacle for a patient, a pair of tanks containing fluid under different pressures and adapted to alternately communicate with said receptacle, means whereby the fluid from the tank containing fluid under the higher pressure will be supplied to the receptacle to increase the pressure in the latter, means for automatically establishing communication between the other tank and said receptacle to reduce the pressure in the latter when it reaches a predetermined stage and for shutting off communication between the first tank and the receptacle, and means for heating the fluid prior to the supply thereof to said receptacle.

In testimony whereof I affix my signature in presence of two witnesses.

ALVIN HENRY SHOEMAKER.

Witnesses:
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