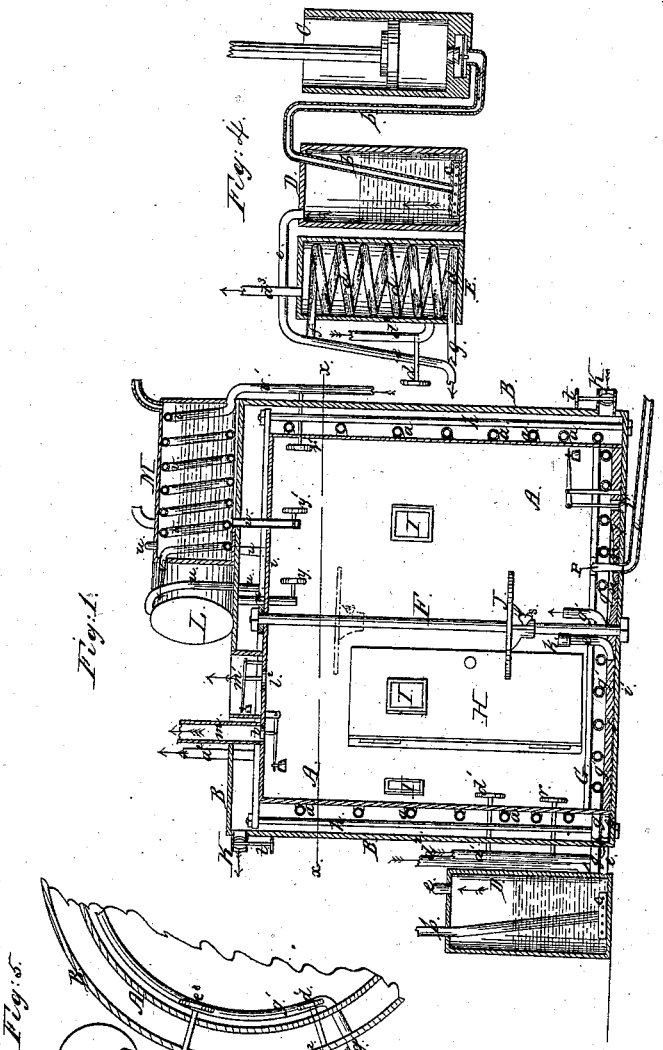
Sheet 1- 2 Sheets.

P. T. Ware,

Vapor Bath.

No. 54,655. Patented May 8, 1866.



Witnesses;
Jay Keyser,
J. C. Cook.

Inventor;
P. T. Ware,
by J. Wasker Hey, Attys.

Sheet 2-2 Sheets.

P. T. Ware,

Vapor Bath,

No. 54,655. Patented May 8, 1866.

Fig: 3.

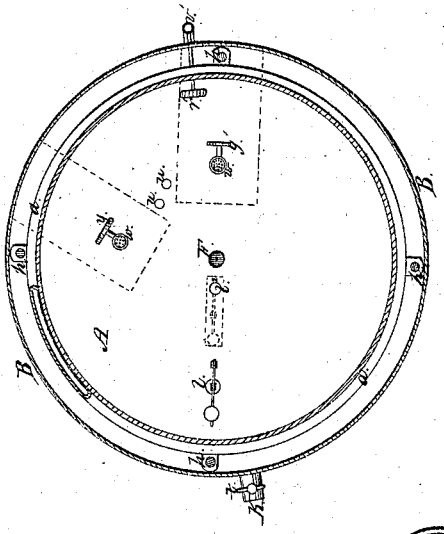
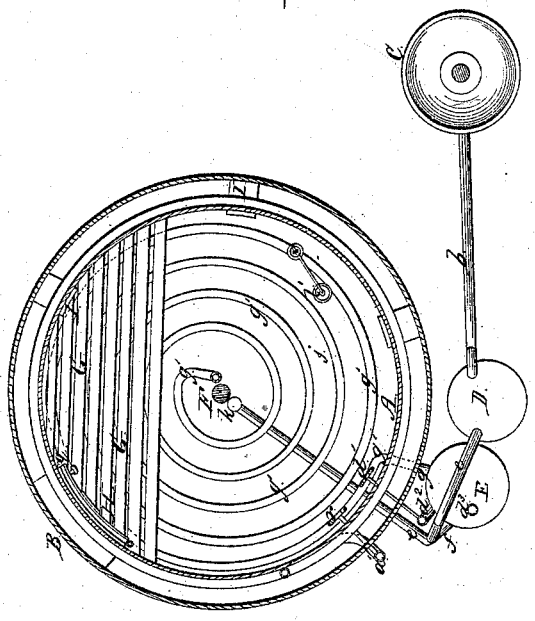


Fig: 2.



Witnesses;
Jay Hayatt,
J. C. Cook.

Inventor;
P. T. Ware,
by J. Fraser & Co, Attys.

UNITED STATES PATENT OFFICE.

PAUL T. WARE, OF TORONTO, CANADA.

IMPROVEMENT IN COMPRESSED-AIR BATHS.

Specification forming part of Letters Patent No. **54,655,** dated May 8, 1866.

To all whom it may concern:

Be it known that I, PAUL T. WARE, of Toronto, in the county of York and Province of Canada, have invented certain new and useful Improvements in Compressed-Air Baths for the Treatment of Diseases; and I do hereby declare that the following is a full, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a central vertical section of a bathing-apartment with my surrounding case or jacket and other improvements. Fig. 2 is a horizontal section of the same in the plane of line *x x*, Fig. 1, showing a plan of the bottom, the air-heating and air-purifying cylinders, and condenser or force-pump. Fig. 3 is a section made by the same plane, but looking in an opposite direction, representing a plan of the under side of the ceiling or top of the bathing-apartment. Fig. 4 is a central vertical section of the heating and purifying cylinders and condensing-pump. Fig. 5 is a diagram showing a different arrangement of the pipes with the purifying steam and ice cylinders.

Like letters of reference designate corresponding parts in all the figures.

My invention relates to the method of administering compressed-air baths as patented by O. Stone, October 24, 1865; and it consists of the following improvements: first, the warming of the compressed-air chamber by means of a steam or hot-air coil, or its equivalent, surrounding the same and inclosed within a non-conducting case or jacket for the equal and uniform diffusion of warmth throughout the apartment occupied by the patient; second, heating the compressed air before it is introduced into the bath-chamber by means of a coil passing through a steam-chest condenser; third, the arrangement and employment of cocks or valves, which are accessible only to the patient, by which he can regulate the temperature to adapt it to his comfort and requirements, thereby avoiding the miscalculations and errors of outside attendants, which might result fatally by raising the temperature two high; fourth, the arrangement of a safety-valve which is inaccessible to the patient, so that the pressure of the condensed air cannot be made to exceed a certain safe limit, whereby the possibility of bursting the chamber is prevented; fifth, the method of introducing water against the pressure of the condensed air in the chamber, to administer a shower-bath to the patient while taking the warm bath; sixth, introducing artificially-heated air into the bath-chamber, and also artificial heat around the exterior wall of the same by means of the heating-coil *a*, or by other means of radiation and absorption, simultaneously with the act of relieving the bath-chamber from the pressure of condensation, in order to counteract the reduction of the temperature within said chamber by the heat becoming latent in consequence of the sudden rarefaction of the air.

As represented in the drawings, A is the compressed-air chamber or bathing-apartment, constructed of iron or other metal, and preferably of cylindrical form. B is a similarly-formed non-conducting case or jacket surrounding the apartment A, and leaving an air-space between the two cylinders.

a a is a steam or hot-air coil surrounding the compressed-air chamber, for the purpose of heating the sides of the same and the surrounding space, and thereby preventing the radiation of heat from the former.

C is the air-condenser or force-pump, which may be of any suitable construction. From this pump the compressed air is forced through the eduction-pipe *b* into the purifier D, which consists of an air-tight cylinder partially filled with lime-water or other absorbent of carbonic-acid gas and other deleterious properties present in the air employed. From this cylinder it emerges by pipes *e e*, through which, when used cold, it passes directly into the bath-chamber; but if required to be warmed the passage through this pipe is closed at its termination by the cap *k*, which causes the air to diverge through the pipe *f* into the coil *d d*, which is situated in a heating-cylinder, E, provided with steam exit and entrance pipes d^2 d^3, by which the coil is kept surrounded by the exhaust-steam of the engine which drives the pump. From the heater the air enters the bath through the pipe *g g*. The valve *d'*, by which the heat is regulated by the amount of steam permitted to enter the heater E, is under the control of the patient in the bath, as will be hereinafter described.

The compressed-air apartment A may be constructed in any suitable manner so as to be air-tight. It is secured against expansion by means of a central bar, F, and four or more rods connecting the upper and lower base-

plates, *i i'*. In the bottom is spread a stratum, *j*, of plaster-of-paris, lime, or other porous material, through which passes the cold-air pipe *e* to the center of the chamber, where it terminates, and is provided with a screw-cap, *k*, for closing the same when required.

The hot-air pipe *g* is formed in a coil, *g' g'*, resting on the stratum *j*, which also terminates at the center, where it has a thread cut on its end for screwing on cap *k*.

At the top and bottom of the apartment are two valves or stop-cocks, *l l'*, of any suitable construction, and both accessible to the patient or occupant of the chamber, the upper one, *l*, opening into a pipe, *m*, through which the air may be discharged into the chimney or other main flue, or directly into the open air. l^2 is a safety-valve of similar construction, inaccessible to a person within, but accessible from without by means of the passage *m'* from the jacket B. The valves *l l'* are accessible to the occupant of the bath, so that he may regulate the amount of air-pressure in the chamber according to his sensations, which cannot be known by an attendant outside of the bath. As the compressed air from the pump is constantly entering to supply that which is consumed in breathing, the regulation of the escape-valves determines the pressure maintained in the bath, which may be that of two or three atmospheres, or more or less, according to the strength and condition of the patient; but as the sensation from inhaling the condensed air is usually agreeable and exhilerating, patients are liable to produce too great a pressure by keeping the escape-valves too much closed, and thereby incur danger from the bursting of the bath-chamber. To prevent this the safety-valve l^2 is made inaccessible to the occupant, and is loaded so that it will open before the pressure of air within the chamber reaches a point that might be dangerous.

A depression, *n*, is formed in the stratum *j*, through which and the bottom plate, *i*, is an opening, *n'*, having a pipe, *o*, leading therefrom, through which the water, in bathing, is discharged, the hole *n'* being closed by a plug, *p*, or other suitable means.

G is a floor of wood or other suitable material above the coil *g' g'*, perforated or formed of slats, with spaces between them for the passage of the water and air, as shown in Fig 2.

Ingress and egress is had into and from the apartment A through a door, H, and a suitable inclosed passage through the surrounding air space and jacket B. The door swings inward, and is made tight by the air within the room pressing the same against a rubber or other suitable packing, *q*, Fig. 2.

The bath-chamber is properly lighted by windows I I, also provided with inclosed passages opening into the space outside of the jacket.

The pipe *a'*, which supplies steam to the coil *a a*, is provided with a stop-cock, *r*, by which the flow through the same, and consequently the heat, may be regulated by the patient, the coil terminating in a pipe, a^2, through which the steam escapes.

J is a center-table secured to a sleeve-bracket, which, being provided with a set-screw, *s*, enables the table to be raised out of the way when required for the entrance of a bed or stretcher, as shown in red lines, Fig. 1.

K K are two openings or pipes, provided with suitable stop-cocks *t t*, for the entrance into and escape of air from the non-conducting space when it is required to cool the central compartment for administering a cold-air bath.

L and M are two water-reservoirs, represented of cylindrical form, resting on the top of jacket B, the former being designed for cold and the latter for warm water. The water in M may be heated by means of a steam-coil, *v v*, connected by a pipe, *v'*, with the exhaust-pipe of the engine. The degree of heat is regulated by a stop-cock, *r'*, in pipe *v'*, which is operated by the occupants of the apartment A, as shown in Figs. 1 and 2. Pipes *w w* extend downward from the reservoirs into the bathing-apartment, and are provided at their lower ends with perforated plates or other device, and stop-cocks *y y'* for administering shower-baths, hot and cold, whenever desired. Communication is made from the compressed-air chamber to the top of the reservoirs L M by means of pipes *u u*, so as to equalize the pressure of the air, and thereby cause the water to flow through the pipes *w w* when required.

At the conclusion of a cold-air bath, as the pressure is let off the bath the heat is absorbed by the rarefaction of the atmosphere, which so lowers the temperature as to condense the moisture and produce vapors in the bath-chamber. The respiration and circulation of the patients having been so increased by the condensed air that they have breathed as to produce a glow of warmth, the sudden reduction of the temperature from this cause is attended with very unpleasant effects, and with rigors and chills that are pernicious to those of enfeebled condition. Hence some provision adequate to restore the amount of caloric that has become latent or insensible by the expansion of the air when relieved from pressure becomes necessary. To counteract this effect the air is blown through the heater, so as to deliver warm air into the bath-chamber, and thus prevent the patient becoming chilled. This may be done through the same pipe by turning it through the heater, or by another pipe for the purpose. When but one pipe is used it passes in a coil through the steam-heater; but the steam is not let on to heat it until the pressure is being let off the bath, producing the condition which requires an elevation of the temperature to protect the patient from injurious chilling. The heated air may also be made to circulate through the heating-coil *a* surrounding the exterior of the bath-chamber simultaneously with the letting off of the pressure within the bath, so as to aid in maintaining the uniform temperature at the close

of the operation which is so essential to the comfort and welfare of the patient.

In warm weather it may be desirable to cool the air by passing it through an ice-cylinder before it enters the bath-chamber. Fig. 5 represents an arrangement for this purpose, in which Q represents the ice-cylinder, and e' a branch pipe, which, diverging from e soon after the latter leaves the purifier, opens into the ice-cylinder. At the bottom of this cylinder a pipe, e^2, conducts the cooled air into pipe g, with which it forms a junction before the latter enters the bath-chamber. Near the junction of the pipes e e', and in the same, is a double valve or stop-cock, operated by the handle e^3 within the bath-room, and so arranged that when the valve in one pipe is open that in the other will be closed, and vice versa. By this means the purified air from D may be made to pass through either the ice or steam cylinder, or through both, by turning the handle e^3 so as to leave both valves partially open. This arrangement renders it necessary for only one pipe, g, to enter the bath-chamber, and thereby dispenses with the use of pipe e and cap k within the same.

The operation of my improvements, constructed as before described, is as follows: The safety-valve is first adjusted so that the pressure within the bath-chamber cannot exceed a certain safe limit. The patient or patients then enter the apartment through door H and the condensing-pump C is set in motion. Then, if a cold bath is required, the occupant closes the hot-air pipe g by the means of the screw-cap k, leaving the cold-air pipe e open. The air which has been forced through pipe b escapes through the perforations in c into the lime-water or other preparation in the purifier D, when, in rising through the same, as shown by arrow, Fig. 4, the greater affinity of the lime attracts and retains the impurities in it, the now purified air being forced through pipe e into the apartment, where it is discharged through the open end of the same. The patient can now regulate the degree of compression of the air by means of either or both of the valves l l', adjusting the same according to the pressure required, the employment of both being preferable, as it effects a better ventilation by allowing an escape, from both the top and bottom, of the vitiated air. He can modify the temperature of the room to suit his requirements by means of the handle d' of the steam-valve, as heretofore described.

When a warm bath is required the patient transfers the cap k to pipe e, leaving the hot-air pipe g' open, which compels the air to pass through the heating-cylinder, pipe g, and coil g', from whence it escapes into the bath-chamber. The temperature of the air and room are regulated by the handle d', as before stated, and by the handle r of the valve which regulates the flow through the surrounding steam-coil a a.

The water shower-baths can be taken at any time during either of the air-baths by the patient merely turning the cocks y or y', as a warm or cold one is required, the temperature of the warm one being regulated by the valve r'.

The advantages of these improvements are obvious when it is considered that the effect of subjecting patients differently constituted to the inhalation of compressed air is widely different, producing variations in the circulation varying with the vital energy and plethoric condition of the patient. As he is for the time isolated from all communication outside, it is highly important that there should be provided the most perfect and complete means of adapting the temperature to his wants, both in respect to the whole apartment and to the air which is supplied by the pump. Thus, as the treatment produces a sense of chilliness in some, while in others of a more plethoric habit great heat prevails as a natural consequence of the increased amount of carbon consumed in the system, the only means of making the treatment safe and agreeable is to place all of the valves which control the temperature and quantity of air under the patient's own control. Provided with suitable instructions before entering, he may then safely and easily go through the various processes and conditions of the treatment, modifying it from hot to cold, as he may require, by simply manipulating the valves, and taking a shower-bath of water (cold or warm) while breathing air of two or three fold density.

The improvements which I claim as my invention, and desire to secure by Letters Patent, are—

1. In combination with the compressed-air chamber A and exterior jacket, B, the heating-coil a, or its equivalent, for radiating warmth equally through the metallic sides or walls of said bath-chamber, substantially as set forth.

2. The combination and arrangement of the steam-chest E and compressed-air coil d d and valve d' within the bath-chamber A, for warming and regulating the temperature of the condensed air before it enters the bath, substantially as shown and described.

3. In combination with a closed chamber or vessel for condensing air-baths and the pipes for the induction and eduction of air, water, &c., into and from the same, the employment of valves r r' and d', arranged within the bath-chamber so as to be controlled and operated exclusively by the patient confined therein, substantially as and for the purposes shown and described.

4. In combination with a compressed-air bath chamber, the safety-valve l^2, so arranged as to be inaccessible to the occupant of the bath, substantially as and for the purpose described.

5. In combination with the air-chamber A and water-reservoirs L and M, the pipes u u, or their equivalent, for the purpose of maintaining within said reservoirs a pressure corresponding with that within the air-bath, as and for the purposes set forth.

6. In connection with the cold-air bath, the

introduction or application of artificial heat into or in contact with the compressed-air bath simultaneously with the letting off of the condensed air, for the purpose of restoring the caloric which becomes latent by the sudden rarefaction of the air in the bath-chamber, thereby preventing the formation of vapor and the chilling of the patient, substantially as herein set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

PAUL T. WARE.

Witnesses:
JAY HYATT,
J. C. COOK.