H. L. HOPKINS.

PNEUMATIC MASSAGE APPARATUS.

APPLICATION FILED SEPT. 5, 1908. RENEWED JULY 5, 1916.

1,217,886. **Patented Feb. 27, 1917.**

Fig. 1.

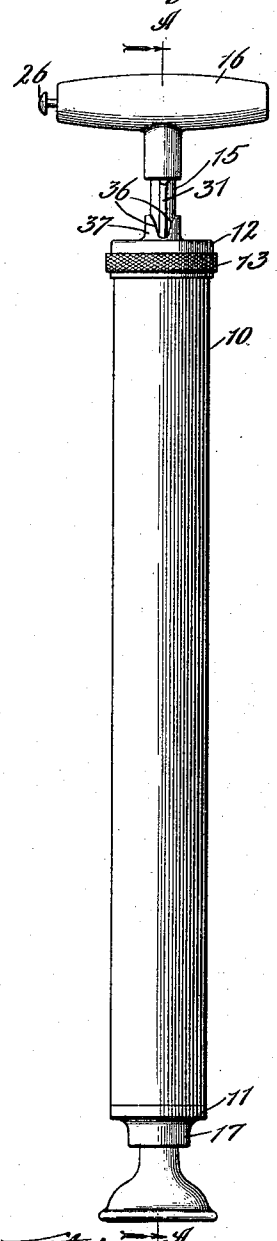


Fig. 2.

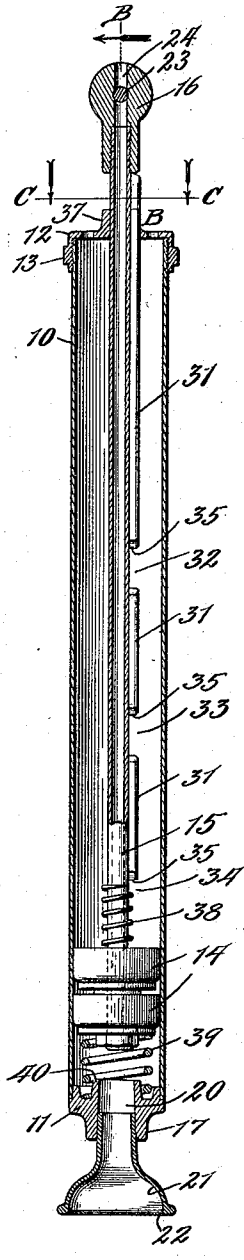


Fig. 3.

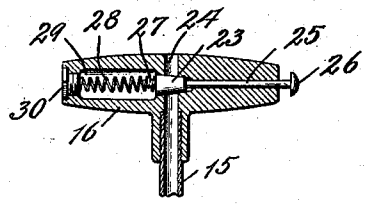


Fig. 5.

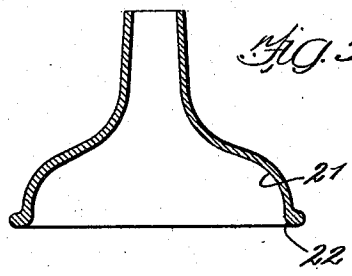


Fig. 4.

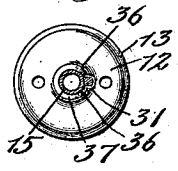


Fig. 6.

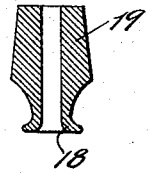
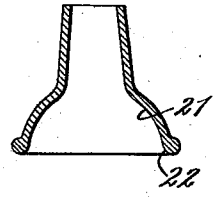


Fig. 7.



Witnesses:

Ira D. Perry

Robert H. Weir

Inventor:

Harvey L. Hopkins

by John Howard McElroy

his atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HARVEY L. HOPKINS, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO LORAN A. STILLMAN, OF CHICAGO, ILLINOIS.

PNEUMATIC MASSAGE APPARATUS.

1,217,886. Specification of Letters Patent. Patented Feb. 27, 1917.

Application filed September 5, 1908, Serial No. 451,816. Renewed July 5, 1916. Serial No. 107,694.

To all whom it may concern:

Be it known that I, HARVEY L. HOPKINS, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic Massage Apparatus, of which the following is a full, clear, and exact specification.

It is generally known and recognized by the medical profession that artificial hyperemia is a healing agent for many human affections, and the object of my invention is to provide an apparatus for producing artificial hyperemia in diseased parts of the human organism by suction and by a deep vacuum massage, the latter being caused by creating a vacuum and quickly releasing it over the affected part, which massages or churns the congested tissue cells, promoting an influx of fresh blood and producing transudation of leucocytes and liquor sanguinis to establish normal conditions.

In carrying out my invention, I preferably employ an apparatus as illustrated in the accompanying sheet of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which—

Figure 1 is a side elevation of the complete apparatus;

Fig. 2 is a vertical section on line A—A of Fig. 1;

Fig. 3 is a section on line B—B of Fig. 2;

Fig. 4 is a section on line C—C of Fig. 2; and

Figs. 5, 6 and 7 are sectional views through different forms of the cups which I employ in connection with my apparatus.

The appartaus is preferably constructed with a cylinder 10 which is closed at the lower end by the piece 11 permanently secured therein and at the top by the cap 12 which may be screwed thereon, a milled portion 13 being preferably employed to facilitate the unscrewing of the cap when it is desired to get at the piston. The piston 14 may be of any desired construction, provided that it is air tight in the cylinder, and I have preferably shown it as double to insure its more nearly perfect action. It is secured on the end of the hollow piston rod 15, which projects through a suitable aperture in the cap 12 and has secured thereon the T-shaped handle 16, by which the piston is drawn back and forth in the cylinder.

The cups which I employ are of different sizes, depending upon the area of the surface to be treated, Fig. 6 showing a cup of the minimum size, and the cup of the next size is preferably formed integral with the piece 11 by the flange 17, which has its edges rounded, as shown, so as not to cut the flesh to which it is applied. The third size is illustrated in Fig. 7, the fourth size is shown in position in Figs. 1 and 2, and the largest size is shown in Fig. 5. All of these detachable cups consist of the bell-shaped cup portion proper 18, and the neck or securing portion 19, the exterior surface of which is ground on a slight conical taper, substantially one-eighth of an inch to the foot, and coöperates with the correspondingly ground interior 20 on the end piece 11, so that the cups can be readily inserted and secured air tight in the end. I have found by experiment that the taper mentioned is practically the only one that is satisfactory, as if the taper is greater, it will not hold, and if it is less, it wedges so tightly that it is difficult to remove the cups after they have been used. In the larger sized cups shown in Figs. 2, 5 and 7, where there is sufficient area for a considerable quantity of the flesh to be pulled into the cup, I make the cups with the shallow portion 21 and the rounded edge 22, so that when the high vacuum is produced the flesh can be drawn into the cup only a certain distance, and in such shape that there is no danger of the flesh being bruised or cut by its being drawn into the cup. This shape also provides for the instantaneous return of the flesh to its normal position when the vacuum is released.

As it is an essential feature in the use of my apparatus that the vacuum can be released instantaneously so that a thorough massage of the part being treated can be produced by rapidly repeating the formation of a vacuum and releasing it, I provide means for releasing the vacuum at any point in the stroke, and for this purpose I employ the valve 23 shown in Fig. 3, which will be seen to be a conical valve body coöperating with a correspondingly tapered valve seat crossing the transverse aperture 24 in the handle, which aperture is a continuation of the handle in the piston rod 15. A valve stem 25 extends to the end of the handle and is preferably provided with the button 26 by which it is manipulated, and on the other

end of the body 23 is a lug 27 with which cooperates the helically coiled expanding spring 28, which is secured in the hollow 29 in the handle by the screw 30. With the construction shown, it will be apparent that when the valve is seated, and the piston is withdrawn, a vacuum will be produced in the cylinder, and that the farther the piston is withdrawn, the greater will be the vacuum in the cup and the more the flesh beneath the cup will be pressed into it by the external pressure of the atmosphere. At the end of the stroke, or sooner, if desired, the button 26 is pressed inward, thereby opening the valve and causing an instant release of the vacuum. This instant release of the vacuum permits the flesh to fall instantly and the alternate rising and falling of the flesh as the vacuum is formed and broken produces what may be called an internal or deep massage of the flesh that is very efficient in producing the artificial hyperemia desired.

It is desirable to regulate the extent of the vacuum, and this may be done by holding the valve open until the piston has been withdrawn a certain distance, then allowing the valve to close, and then withdrawing the piston as far as possible. Or the extent of the vacuum may be regulated in connection with the locking mechanism I have shown to hold the vacuum without the necessity of holding on to the handle, and for this purpose I provide on the hollow piston rod 15 a rib 31, which is shown as interrupted at three points, 32, 33 and 34. The ends of these interrupted portions of the rib are preferably rounded off, as seen at 35, and they coöperate with the inclined surfaces 36 on the collar 37 of the cap 12, so that when the handle is withdrawn until one of the interrupted portions is substantially in register with the cap 12, by turning the handle, the rib 31 will have the rounded end portion 35 turned over the collar 37 so as to hold the piston in position.

As the apparatus will be held firmly against the part treated, it is desirable to reduce any possible jar as much as possible, as inflammation often causes the parts treated to be very tender, and accordingly I preferably provide springs interposed between the piston and cylinder to cushion the stroke at either end. To cushion the outward stroke, I preferably employ the helically coiled expanding spring 38, surrounding the piston rod and interposed between the piston and the lowermost end of the rib 31. To cushion the downward stroke, I preferably employ the helically coiled expanding spring 39, which surrounds and is secured to the inwardly projecting portion 40 of the end piece 11, which portion constitutes an inward extension, as it were, of the flange 17.

The operation of the apparatus will be readily understood from the foregoing description, and I have found by actual test of the same that it is extremely efficient in curing such disorders as are benefitted by artificial hyperemia.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out the purposes, it will be understood that it is capable of modifications, and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. In a device of the class described, the combination with a cylinder, of a suitable cup associated therewith, a piston in said cylinder positively moved in both directions, a rod connected to the piston, a handle, and locking means between said piston rod and cylinder for locking said cylinder and rod from relative longitudinal movement, said means being operated by turning one relative to the other.

2. In a device of the class described, the combination with an elongated cylinder having imperforate sides, of a suitable cup associated therewith, a piston in said cylinder, a rod connected to the piston longer than the cylinder, a handle connected to the piston rod, and a valve for the piston adapted to be operated from the handle at any desired relative position of the piston and cylinder so that a high degree of vacuum due to a complete stroke of the piston, or a partial vacuum of any degree, may be obtained at will.

3. In a device of the class described, the combination with an elongated cylinder having imperforate sides, of a suitable cup rigidly connected to one end thereof, a piston adapted to be reciprocated in the cylinder, a hollow piston rod, a handle connected to the piston rod, and a valve in the handle adapted to normally close the hollow through the rod.

4. In a device of the class described, the combination with an elongated cylinder having imperforate sides and having a suitable cup associated therewith, of a piston adapted to be reciprocated in the cylinder, a hollow piston rod, a handle connected to the piston rod, a valve in the handle adapted to normally close the hollow through the rod, said valve consisting of the conical body portion coöperating with a similar seat in the handle, a stem for the valve extending to the exterior of the handle, and a spring coöperating with the valve to hold it close.

5. In a device of the class described, the combination with a cylinder having a suitable cup directly associated with one end, of a piston sliding in said cylinder positively moved in both directions, a piston rod

movable freely through the other end and along the axis of the cylinder, and locking means between said piston rod and cylinder for locking the piston rod from longitudinal movement in the cylinder, said means being operated by turning the piston rod.

6. In a device of the class described, the combination with a cylinder, of a piston cooperating therewith, a piston rod, a cap on one end through which the piston rod is drawn freely and means for locking the piston rod in different positions in the cylinder, said means consisting of a rib on the piston rod interrupted at different points and adapted to coöperate with the cap through which it is drawn and in which it may be turned at an interrupted point.

7. In a device of the class described, the combination of a cylinder having the apertured end with the flange 40, a suitable cup fitted in said end, a piston adapted to be reciprocated therein to produce a vacuum, and a helically-coiled expanding spring surrounding said flange and extending toward the piston for the purpose described, and a piston rod extending from the other end of the cylinder.

8. In a device of the class described, the combination of a cylinder having the apertured end with the flange 40, a suitable cup fitted in said end, a piston adapted to be reciprocated therein to produce a vacuum, and a helically-coiled expanding spring surrounding said flange and extending toward the piston for the purpose described, a piston rod extending from the other end of the cylinder, and a helically-coiled expanding spring surrounding the piston rod between the piston and said other end.

9. In a device of the class described, the combination with a cylinder having imperforate sides, of a suitable cup directly secured to one end thereof, a piston adapted to reciprocate therein to produce a vacuum due to the movement of the piston throughout the length of its entire stroke, a handle for reciprocating said piston and holding it in any position to which it may be moved, and means associated with the handle for instantly releasing the vacuum while the piston is retained in any desired position.

10. In a device of the class described, the combination of a cylinder having the apertured end provided with a suitable cup, with a piston adapted to be reciprocated therein to produce a vacuum, a helically coiled expanding spring held in said end and extending toward the piston for the purpose described, a piston rod extending from the other end of the cylinder, and a handle attached to said piston rod.

In witness whereof, I have hereunto set my hand and affixed my seal, this 2nd day of September A. D. 1908.

HARVEY L. HOPKINS. [L. S.]

Witnesses:
JOHN HOWARD MCELROY,
M. G. FITZSIMMONS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."