

No. 841,146.

PATENTED JAN. 15, 1907.

S. HASBROUCK.
PNEUMATIC MASSAGE APPARATUS.

APPLICATION FILED APR. 10, 1903.

5 SHEETS—SHEET 1.

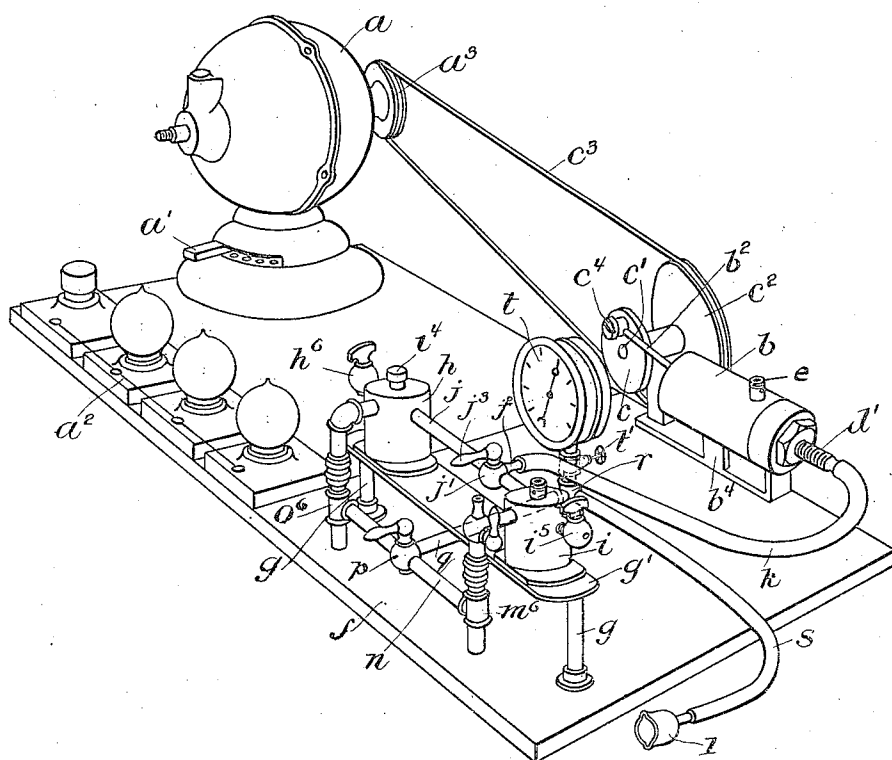


Fig. 1.

Witnesses:

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P. W. Pezzetta.

Inventor:

Sayer Hasbrouck
by Wright Brown & Dumbay
his attys

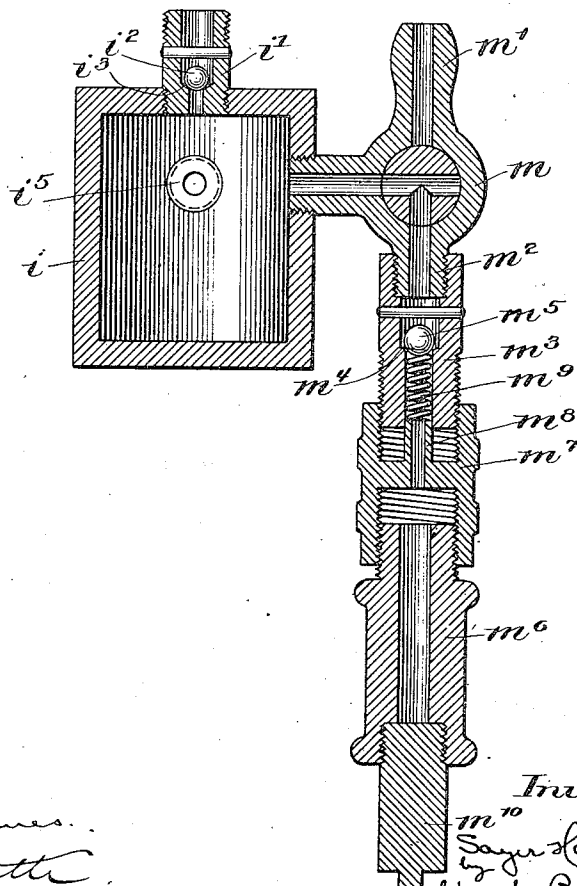
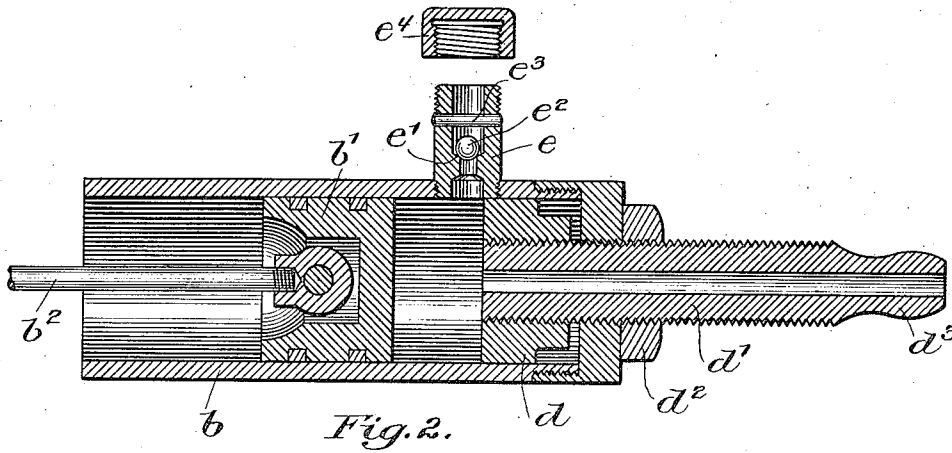
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5 SHEETS—SHEET 2.



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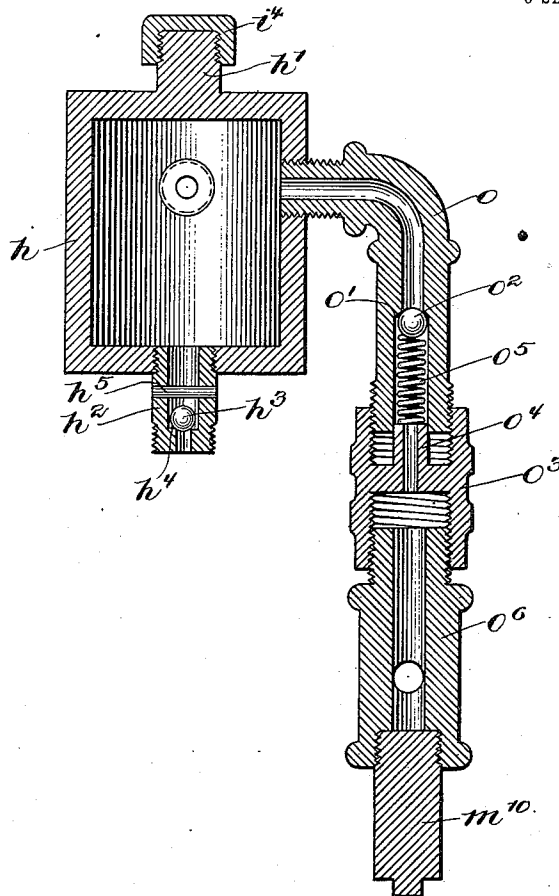


Fig. 4.

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Fig. 5.

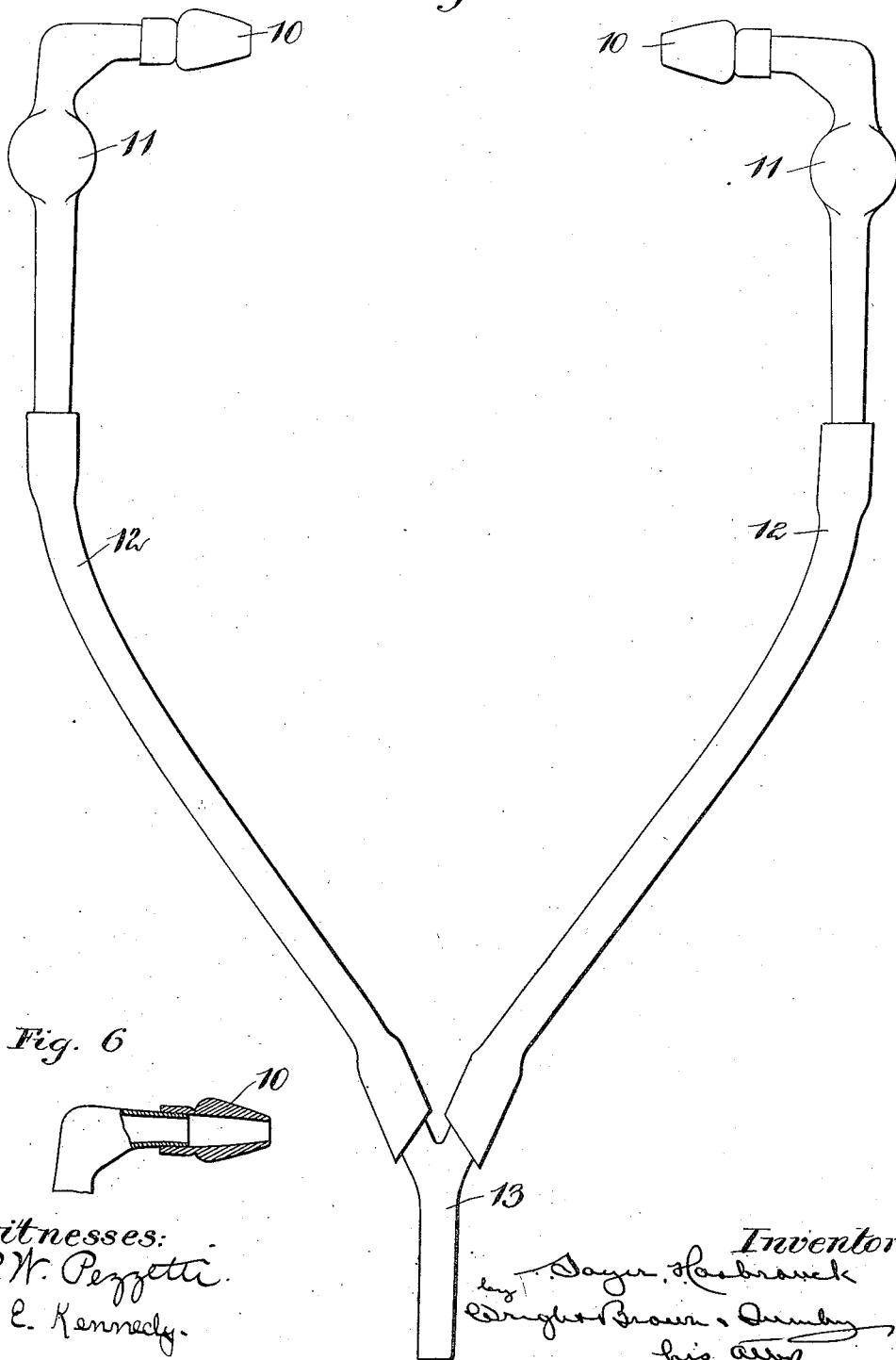
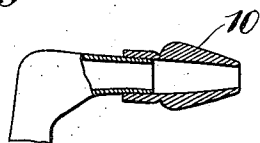


Fig. 6.



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5 SHEETS—SHEET 5.

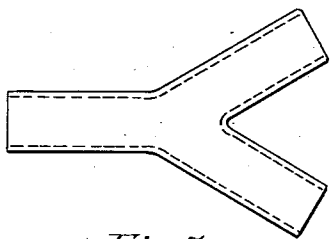


Fig. 7.

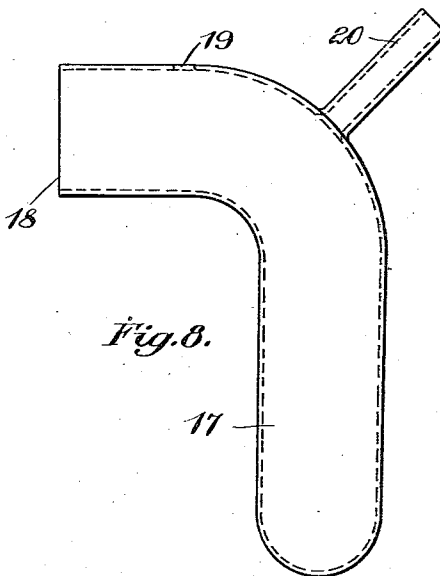


Fig. 8.

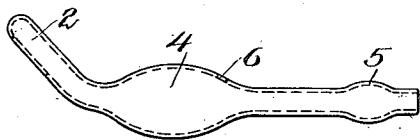


Fig. 9.

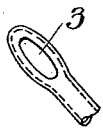


Fig. 10.

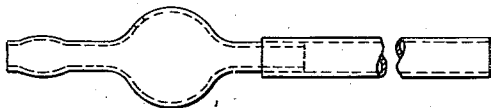


Fig. 11.

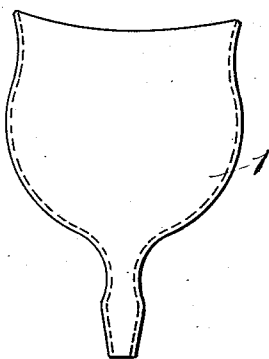


Fig. 12.

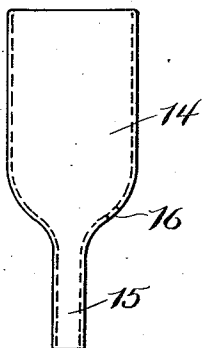


Fig. 13.

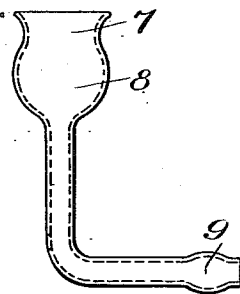


Fig. 14.

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UNITED STATES PATENT OFFICE.

SAYER HASBROUCK, OF PROVIDENCE, RHODE ISLAND.

PNEUMATIC MASSAGE APPARATUS.

No. 841,146.

Specification of Letters Patent.

Patented Jan. 15, 1907.

Application filed April 10, 1903. Serial No. 151,962.

To all whom it may concern:

Be it known that I, SAYER HASBROUCK, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Pneumatic Massage Apparatus, of which the following is a specification.

This invention has relation to pneumatic massage apparatus, and has for its object to provide certain improvements therein by means of which the pneumatic massage can be definitely and accurately controlled by the operator in such way that his treatment of a patient may be definite and accurate, to be repeated or changed at will.

A further object of the invention is to control separately or conjointly the two forces which for the purposes of this specification may be termed "suction" and "pressure," so that the operator may secure at will under accurate control either continuous suction, oscillatory or vibratory suction, continuous pressure, or oscillatory or vibratory pressure, and may also vary the amount of suction or pressure in accordance with the requirements of the case.

To these ends the invention consists of a massage apparatus having certain novel features which are described in the following specification and are illustrated on the accompanying drawings.

In carrying out my invention I have found it to be desirable, if not essential, to provide between the generator and the therapeutic appliance or at the point of application of the appliance an air-cushioning chamber by which the forces may be controlled or modified with accuracy. In actual practice two air-cushions may be provided, one being a relatively large chamber, forming a part of the controlling apparatus, and the other a smaller cushioning-chamber located as near as possible to the point of application. Further, the larger cushioning-chamber may be located between the controlling mechanism and the generator, whereas the smaller chamber may be located between the point of application and the controlling apparatus and for best results as near as possible to the exact point of application.

For convenience in phraseology the appliances which are directly applied to the various portions of the human anatomy may be termed "cups," and it will be understood that by this term I mean to include each and every form of appliance whether "cup-

shaped" or not that may be coupled to the massage apparatus or that may be used for utilizing the forces generated and controlled by the apparatus.

Referring to the accompanying drawings, Figure 1 represents in perspective view a massage apparatus embodying the invention. Fig. 2 is a longitudinal section through the piston and cylinder, which are hereinafter termed the "generator." Fig. 3 represents a section through the suction-chamber and the parts adjacent thereto. Fig. 4 represents a similar section through the pressure-chamber and the controlling mechanism adjacent thereto. Figs. 5 and 6 represent ear-cups, which are employed for massaging the ear. Fig. 7 represents a Y, which may be used for coupling two cups when desired. Fig. 8 represents the leeching-cup, which may be employed in connection with the apparatus. Figs. 9 and 10 represent the muscle-cup, which is used for massaging various individual muscles of the eye. Fig. 11 represents an aspirating-cup. Fig. 12 represents an eye-cup. Fig. 13 represents a dry-cupping cup. Fig. 14 represents a corneal cup.

It will be understood that in describing the best form of the invention now known to me I do not limit myself, except where specifically claimed, to any details of construction or arrangement of parts, that portions of the apparatus may be replaced by their equivalents, and that the phraseology employed in the specification is for the purpose of description and explanation and not of limitation.

Referring to Figs. 1 to 4, inclusive, the apparatus there shown includes a suitable motor, such as an electric motor, (indicated at *a*.) Preferably a shunt-wound electric motor is employed, as it provides a more uniform and better-controlled force. The speed of this motor may be varied in the usual manner by the lever *a'* and, further, by lamps or other resistance, the lamps being indicated at *a''*.

The generator consists of a cylinder *b* and a piston *b'* for effecting the compression or rarefaction of the air in the cup. The piston-rod *b''* is connected with a crank-disk *c* on a shaft *c'*, said shaft being provided with a grooved pulley *c''*, connected by a belt *c'''* with the reducing-pulley *a'''* on the motor-shaft.

The piston-rod *b''* is adjustably mounted upon the crank-disk *c*, so that the crank-pin *c''* may be moved radially of the disk for varying the length of stroke of the piston. To cooperate with the piston and render the

charge of air moved thereby definite in volume, the cylinder is provided with an adjustable end or head d , mounted upon a threaded tube d' , passed through the stationary cylinder-head and secured in position by a set-nut d^2 .

Screwed into the side of the cylinder is a release-valve mechanism consisting of a tube e , having a valve-seat e' for a ball-valve e^2 . The movement of the valve away from the seat is limited by a pin or stop e^3 . This valve mechanism is employed only for continuous suction, such as when the apparatus is used for dry-cupping, leeching, or as an aspirator; as will be subsequently explained, and therefore the valve-casing e is externally threaded at its ends to receive a cap e^4 , by means of which it may be closed when other appliances are used.

The cylinder is supported upon a suitable frame, (indicated at b^4), this frame, the motor, the resistance or rheostat, and the other parts of the apparatus to be hereinafter described all being firmly affixed upon a base f , which is preferably metallic for the purpose of holding the various parts in accurate predetermined position.

The tube d' in addition to adjusting the cylinder b also operates to connect the cylinder with the cushioning and controlling appliances. It will be seen that when the cap e^4 is in place and the piston b' is reciprocated it operates to alternately force the air outward through the tube d' and to draw it inward therethrough. When the cap e^4 is removed, however, the air escapes through the release-valve as the piston moves toward the end d ; but as the piston moves away from it the valve seats and the air is drawn inward through the tube d' . The end of the tube d' is in the shape of a nipple d^3 to receive the connecting-tube k , leading to the cushioning and controlling apparatus.

Referring now to Fig. 1, it will be observed that secured upon uprights or columns g , rising from the base, there is a shelf or table g' , upon which are supported two cushioning-chambers h i , which are respectively the chambers for the two forces "pressure" and "suction." Between these two chambers is a conduit j , provided with a three-way valve j' , the inlet j^2 of which is connected by a flexible tube k with the tube d' of the cylinder or generator. By shifting the valve-handle j^3 to point backward or forward either chamber h or i may be directly connected with the generator b . Each of these two chambers provides means for cushioning the suction or pressure, as will be subsequently explained.

Referring to Fig. 3, which illustrates in detail the suction-chamber, it will be observed that it is provided at its top with a release-valve casing i' , having a ball-valve i^2 , adapted to seat itself by gravity against the seat i^3 . In the event of this chamber being used for

both pressure and suction the valve-casing is exteriorly threaded to receive a cap i^4 , which under ordinary circumstances to prevent its being lost is screwed upon a lug h' on the top of the chamber h , as shown in Figs. 1 and 4. Projecting laterally from the chamber i is a release-cock i^5 for the purpose of varying the extent of the suction or vacuum in the chamber i .

The chamber h is substantially similar to that at i , (see Fig. 4,) except that the release-valve casing h^2 projects downwardly from the bottom of the chamber and the ball-valve h^3 is normally seated by gravity against a seat h^4 . The valve is limited in its movement away from the seat by a pin or stud h^5 . This chamber is likewise provided with a valve-cock h^6 for varying the extent of pressure in the chamber. Connected with the chamber i is a three-way-valve casing m . This casing is formed with a nipple m' for the reception of a conduit and with a threaded nipple m^2 , to which is screwed the valve-casing m^3 , having a seat m^4 for the reception of a ball-valve m^5 .

m^6 indicates a pipe which is connected by a suitable coupling with a second pipe n , which will be subsequently described in detail. Interposed between the valve-casing m^3 and the pipe m^6 is an adjustable sleeve or coupling m^7 , having an annulus m^8 projecting into the valve-casing m^3 . Between the end of the annulus and the ball-valve m^5 is interposed a helical spring m^9 . The function of this spring and adjustable coupling will be explained after the balance of the apparatus is described.

The pressure-chamber h has connected to it an elbow o , the lower portion of which is formed into a valve-casing to provide a seat o' for a ball-valve o^2 . The extremity of the casing is externally threaded to receive an adjustable coupling o^3 , similar to that at m^7 , and having an annulus o^4 , between which and the valve o^2 is located a helical spring o^5 . In threaded engagement with the coupling there is a pipe o^6 , both pipes o^6 and m^6 being closed at their lower ends by plugs m^{10} , seated in apertures and secured to the base f . The pipe n extends from the pipe o^6 to the pipe m^6 . It is provided with the three-way valve p , from which leads a conduit q to a coupling r . This coupling is provided with a nipple (not shown) for the reception of a flexible conduit s , to the end of which may be attached the various cups to be applied directly to the body. Projecting upwardly from the coupling r is a pipe leading to the gage t , said pipe being provided with the valve t' , by means of which the gage may be cut out. By means of the valves p and j' either chamber may be connected with the generator and the cup, each of said valves being provided with a suitable handle for the purpose of turning it to proper position.

From this description it will be seen that by connecting the pressure-chamber *h* with the generator a predetermined quantity of air may be delivered to the chamber, so as to increase the pressure therein to a predetermined number of pounds or ounces, and that when the suction-chamber *i* is connected to the generator the atmospheric pressure in the chamber may be reduced to a predetermined number of pounds or ounces, according to the charge of air which is intermittently withdrawn therefrom by the piston of the generator. By means of the valve-cocks *i*⁵ and *h*⁵ the extent in pounds and ounces of the pressure and the suction in the two chambers *h* and *i* may be varied by the operator as circumstances require.

Assuming that continuous pressure or continuous suction is desirable, by adjusting the valves last referred to, the operator may secure any desired suction or pressure—as, for instance, six ounces or two pounds, more or less. The purpose of the valve-adjusting couplings *o*⁵ *m*⁷ is to change the continuous suction or pressure to oscillating or intermittent suction or pressure, as may be desired, without varying the extent in pounds or ounces of such suction or pressure. To explain this, reference may be had to Fig. 3, and it should be remembered always that the cup on the end of the conduit *s* is assumed to be in contact with the body, so that it is closed.

It may be further assumed that the valves *p* and *j*⁷ are set to connect the generator with the suction-chamber *i* and the suction-chamber *i* with the conduit *s*. Now if the parts be in the position shown in Fig. 3 the reciprocation of the piston *b*⁷ of the generator will tend to withdraw the air from the suction-chamber *i*, and in turn this will exhaust the air from the pipe *m*⁵ and the conduit *s*. Each time the air is withdrawn the valve *m*⁵ will raise from its seat. Upon the return stroke of the piston the valve will immediately seat itself, so that the suction on that portion of the body to which the cup is applied will be continuous.

Assuming now that it be desired to have a gradually-increasing extent of suction, the cap *e*⁴ may be removed from the generator, so that as each charge of air is withdrawn from the suction-chamber and the conduit *s* it will be expelled upon the return stroke through the release-valve *e*. Assuming, again, that the operator may desire to secure an oscillating or vibratory suction, he may adjust the coupling *m*⁷ so as to lift the valve *m*⁵ slightly from its seat and place the cap *e*⁴ upon the casing *e*. It will be observed from this that as the piston *b*⁷ reciprocates a charge of air will be withdrawn from the chamber *i* and from the conduit *s* and will be permitted to return to the chamber *i*; but the valve *m*⁵ will be in such position as to cut off a part of the charge from returning to the conduit *s*.

The reciprocation of the piston is necessarily rapid, so that a charge will be again withdrawn before it has time to fully work past the valve *m*⁵. In this way although there will be a suction or a partial vacuum in the cup at all times the extent of that vacuum or suction will vary or "oscillate," as it is termed, for each reciprocation of the piston in the generator. This described action is precisely the reverse of that which occurs in the pressure apparatus as shown in Fig. 4. Where a continuous pressure is desired, the valve *o* is held yielding against its seat by the spring *o*⁵, so that the air contained between the valve and the cup is prevented from escaping, and the atmospheric pressure in the cup is therefore increased to a predetermined extent; but where the oscillating pressure is desired the coupling *o*³ is screwed downward so as to permit the valve to drop slightly from its seat and permit the escape of a portion of the air contained in the cup when the piston in the generator moves outward.

It is seldom desired to provide for an air-pressure greater than that effected by the compression of the air contained in the cylinder of the generator, and therefore no inlet-valve is shown as applied to the generator; but it will be readily understood that such a valve may be employed if found desirable or necessary.

It has hereinbefore been briefly stated that the apparatus includes a gage *t*, and I desire now to call attention to its location and its importance in the therapeutic employment of said apparatus. It has a dial and pointer and is located in front of the operator at some point between the cup and the cushioning-chambers, so that the pointer moves in one direction or the other for each fluctuation of the air-pressure in the cup. Consequently by watching the pointer the operator may know the increase or decrease of pressure in the cup above or below the normal atmospheric pressure and the extent of such increase or decrease and can tell where or when to begin and to terminate the treatment. The gage further serves as a telltale and instantly conveys to the operator a perfect knowledge of the working condition of the controlling mechanism.

It has already been stated that in connection with the appliance may be provided a plurality of cups for a variety of purposes. On Fig. 1 the conduit *s* is provided at its end with an eye-cup, as shown in Fig. 12. This cup is indicated at 1 and it is adapted to fit closely around the eye. It is large enough to provide a cushioning-chamber between the conduit *s* and the eyeball. This cup may be used for either continuous suction, continuous pressure, oscillating or vibratory pressure, or oscillatory or vibratory suction. The employment of this cup is for the pur-

pose of massaging the entire eye to strengthen the muscles and increase the circulation.

In Figs. 9 and 10 is illustrated another eye-cup which is particularly adapted for the 5 massage of separate muscles of the eye. It consists of a small relatively flat bulb 2, having an aperture 3, which may be placed over any desired muscle and between the lid and the eyeball. The bulb 2 communicates with 10 a chamber 4, from which extends the nipple 5 for attachment to the tube or conduit *s*. In the chamber 4 is an aperture 6, which may be closed by the operator's finger, so that the operator may by opening or closing the aperture 15 vary the extent of suction or pressure upon the muscles. This eye-cup is generally employed with oscillatory suction for the massage of the eye-muscles.

In Fig. 14 is illustrated what may be 20 termed a "corneal" cup for the correction of astigmatism. This cup, as indicated at 7, is adapted to fit on the front of the eyeball and to approximate the shape of the cornea. By concaving the mouth of the cup in any axis 25 and using continuous suction the cornea may be drawn to proper shape to overcome corneal distortion, and thus correct the eye to normal. This corneal cup is enlarged sufficiently to provide a cushioning-chamber, as 30 at 8. It is provided with the nipple 9 for connection with the conduit or tube *s*.

In Figs. 5 and 6 are illustrated cups to be 35 used for the massage of the ear, each of which consists of a rubber nipple 10 for insertion in the outer ear. Each of these nipples is placed upon an angular tube having at 11 a cushioning-chamber. The tube is preferably formed of glass, as are the other cups 40 hereinbefore described, and it may be used as a Siegle's otoscope, for it is apparent that the operator may see through the tube and the nipple into the ear, so as to watch the effect of the massage upon the tympanum. These cups are connected by flexible tubes 45 12 12 with a hard rubber or glass Y 13, by which they may be attached to the tube or conduit *s* or can be connected without the Y and used separately. Each of the cups is 50 thus flexibly secured to the tube, and may be adjusted by the operator of the patient to effect the best results. By means of an apparatus of this character oscillating or continuous suction or pressure may be used in 55 massaging the ear, or else continuous pressure may be employed for effecting the evacuation of fluid or matter contained in the middle ear through the Eustachian tube.

In Figs. 8 and 13 are shown cups which are 60 employed for the operation known as "dry-cupping" or "leeching." These two cups may be formed of glass or other suitable material. The dry-cup is illustrated at 14 in Fig. 13. It has a nipple 15 for attachment to the tube *s* and is formed with an aperture 65 16, by means of which the operator may con-

trol the extent of the vacuum or suction in the cup. This cup, like the eye-cup in Fig. 12, is large enough to provide a cushioning-chamber.

In Fig. 8 a leeching-cup is illustrated, which 70 is bent in angular form to provide a receptacle 17 for the blood and a mouth 18 to be pressed against the flesh. At 19 this cup is formed with an aperture for controlling the suction or vacuum in the cup. The cup is 75 further provided with a nipple 20 for attachment to the conduit *s*.

Direct suction is utilized for the last two 80 mentioned cups, and it is for this purpose that the valve *m* is provided with the nipple *m'*, so that a flexible conduit *k* may be connected directly therewith, so as to cut out the suction or vacuum-chamber *i*. As the 85 suction may be increased to a considerable extent, it is usual in this case to cut out the gage *t* by means of the cut-off valve; Fig. 1.

It is apparent that in the apparatus in 90 lieu of the two chambers *h* and *i* a single chamber may be employed, in which case it would be provided with two valves similar to those at *i'* and *h'*, with a cap that could be used to throw either valve out of action as 95 pressure or suction should be required.

The chamber *h* or *i*, with its escape-cock, 100 provides a convenient means for regulating the extent of pressure or suction or vacuum, as the case may be; and the adjustable coupling or sleeve provides for changing the character of the force from direct to oscillating or vibratory, or vice versa. Each cup 105 may be formed with an aperture, as shown in Figs. 9 and 10, so that the operator can still further directly control the application of the forces to the organs of the body by opening or closing the aperture. It seems 110 from experience that an air-chamber at the point of application is desirable in order to prevent the formation of a "dead end" in the tube *s*, particularly when the amount of pressure and suction is slight, since the end 115 of the tube is closed when the cup is applied to the body and the friction of the walls of the tube against the air tends to check its movement at the end of the tube unless there be a relatively large body of air at said end which responds to the action of the air in the 120 tube.

Having thus explained the nature of the invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I declare that what I claim is—

1. A pneumatic massage apparatus, comprising a generator for creating the forces of 125 pressure and suction; a cup, and controlling apparatus, for changing each of said forces from continuous to oscillating, or vice versa.
2. A pneumatic massage apparatus, comprising a pressure-generator, a cup, and con- 130

trolling mechanism having provisions for varying the pressure from continuous to oscillating, or vice versa.

3. A pneumatic massage apparatus comprising a generator for creating a suction or vacuum, a cup, and controlling mechanism for changing the suction from continuous to oscillating, or vice versa.

4. A pneumatic massage apparatus comprising a generator, a cup connected to the generator, means for varying the extent of the force created by the generator, whether it be suction or pressure, and means for changing the character of the force to render it continuous, or else intermittent.

5. A pneumatic massage apparatus comprising a generator, a cup connected to the generator, and a chamber located between the cup and the generator and through which the air must pass from the generator to the cup, and vice versa, and having a valve-cock, whereby the extent of the force may be varied.

6. A pneumatic massage apparatus comprising a generator, a cup connected to the generator, a check-valve mechanism, and means for adjusting the valve with relation to its seat, to change the force from continuous to intermittent, or vice versa.

7. A pneumatic apparatus comprising a generator, a cup connected to the generator, a chamber located between the cup and the generator and having a valve-cock, and an adjustable check - valve mechanism interposed between said chamber and said cup.

8. A pneumatic massage apparatus comprising a generator, a chamber having a regulating-valve, a conduit connecting said chamber to said generator independently of said valve, and a cup connected to said chamber.

9. A pneumatic massage apparatus comprising a generator, a pair of independent chambers, having oppositely-acting check-valves, means for connecting each of said chambers with said generator, a cup, and means for connecting each of said chambers with said cup.

10. A pneumatic massage apparatus comprising a generator, a pair of independent chambers having oppositely-acting check-valves, means for connecting each of said chambers with said generator, a cup, means for connecting each of said chambers with said cup, and an adjustable check-valve for each of said chambers interposed between each chamber and said connecting means.

11. A pneumatic massage apparatus comprising a cylinder having an adjustable head, a piston, means for reciprocating said piston, and means for varying the stroke of said piston, in combination with a cup, a connection between said cup and said cylinder, and means whereby the pulsating charges of air caused by the reciprocation of the piston effect similar pulsations in the cup, or are changed to positive suction or positive pressure.

12. A pneumatic massage apparatus comprising a generator, a cup, an air-chamber intervening between the generator and the cup, and conduits connecting said air-chamber with said generator, and said cup respectively.

13. A pneumatic massage apparatus comprising a generator, a cup, an air-chamber intervening between the generator and the cup, conduits connecting said air-chamber with said generator, and said cup respectively, said air - chamber having an independent valve.

14. A pneumatic massage apparatus comprising a cup, a conduit leading to said cup, and a generator for compressing or rarefying air in said cup, said generator consisting of a piston, and a cylinder having an adjustable head and also having the conduit communicating with its interior.

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

SAYER HASBROUCK.

Witnesses:

C. C. STECHER,
P. W. PEZZETTI.