No. 720,865. PATENTED FEB. 17, 1903.

R. WATSON.

PNEUMATIC MASSAGE APPARATUS.

APPLICATION FILED MAY 26, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

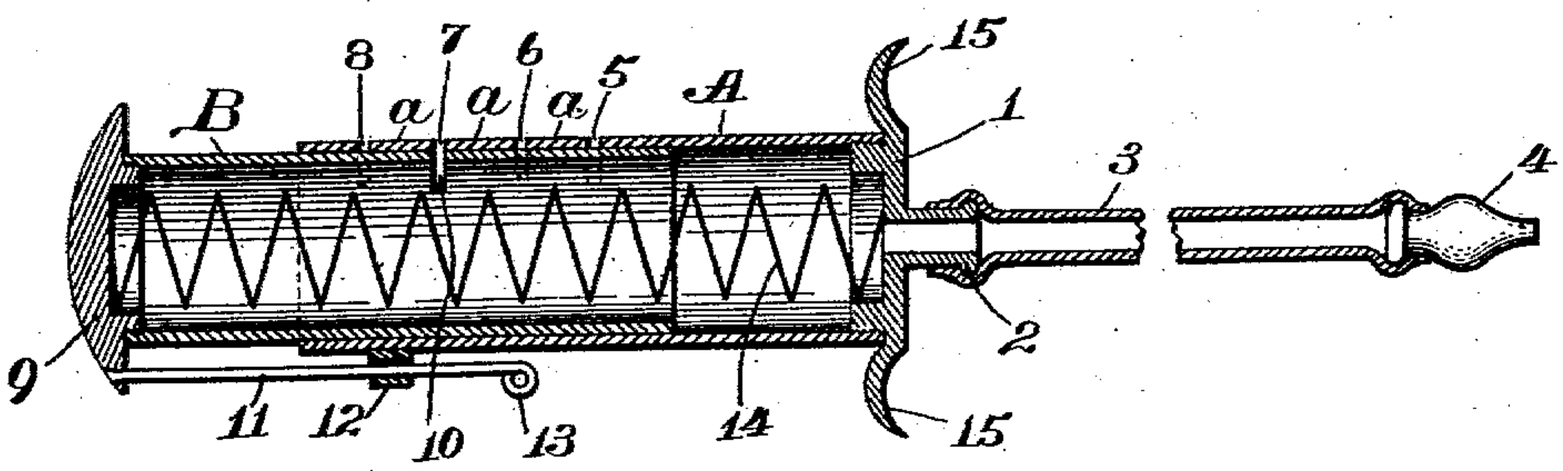


Fig. 2.

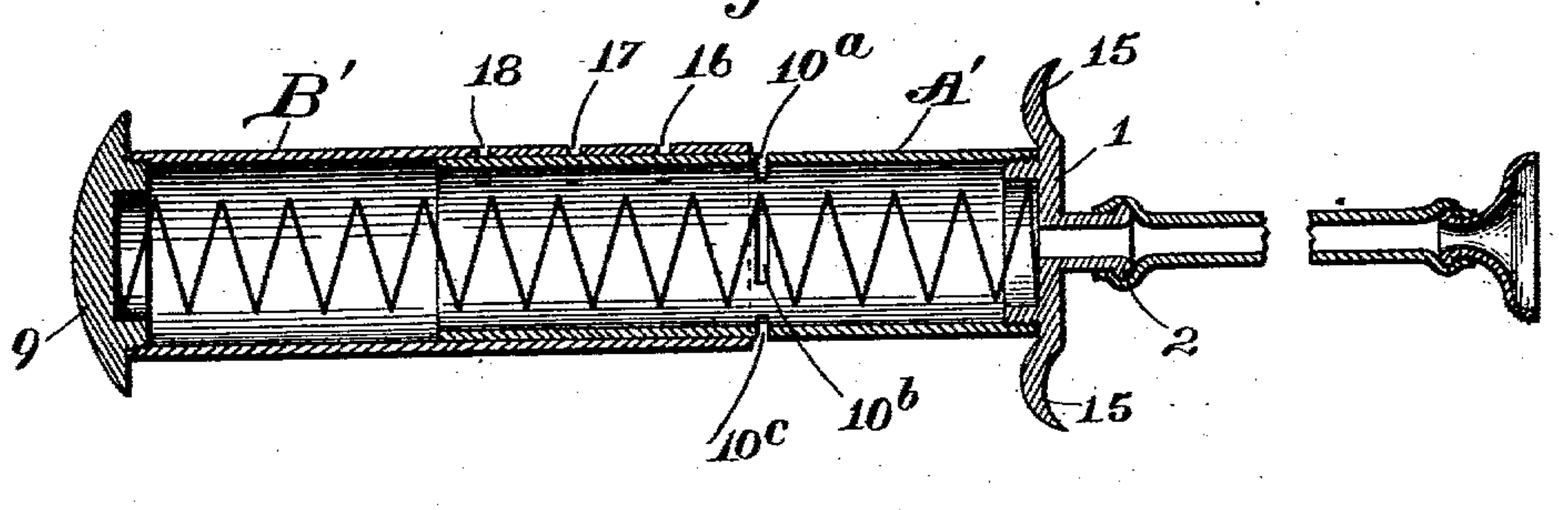
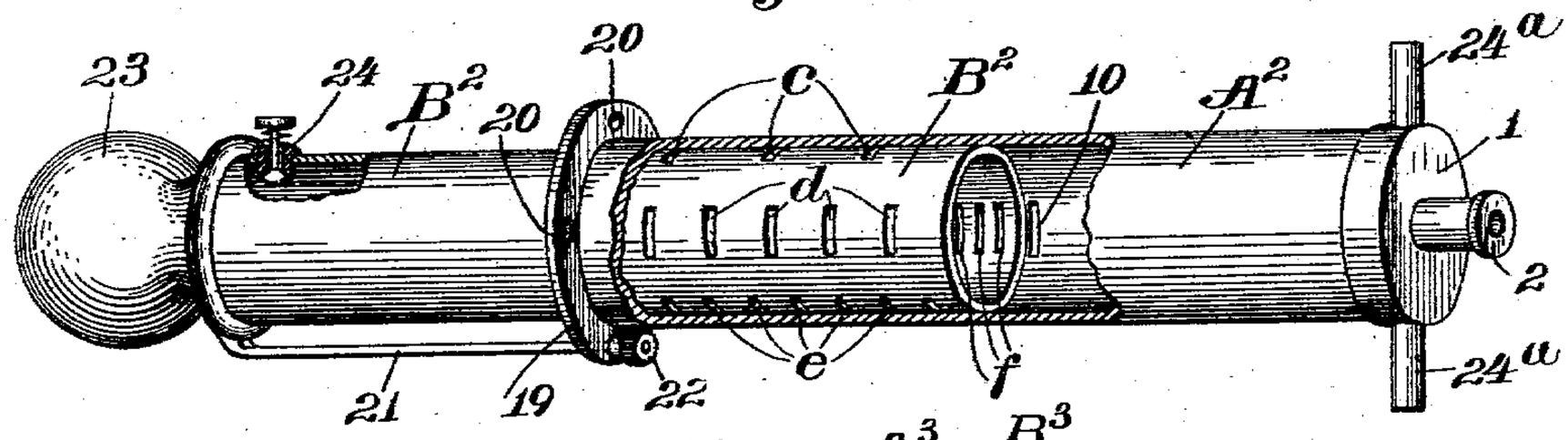


Fig. 3.



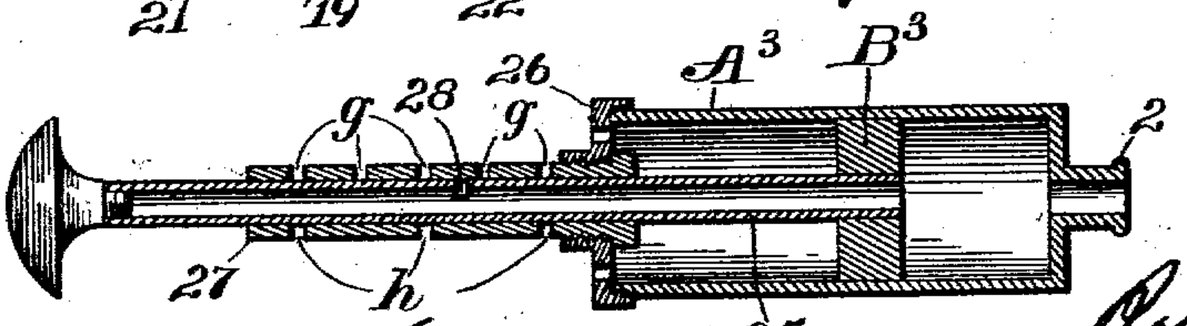


Fig. 4.

Witnesses

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Arthur L. Bryant

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PNEUMATIC MASSAGE APPARATUS.

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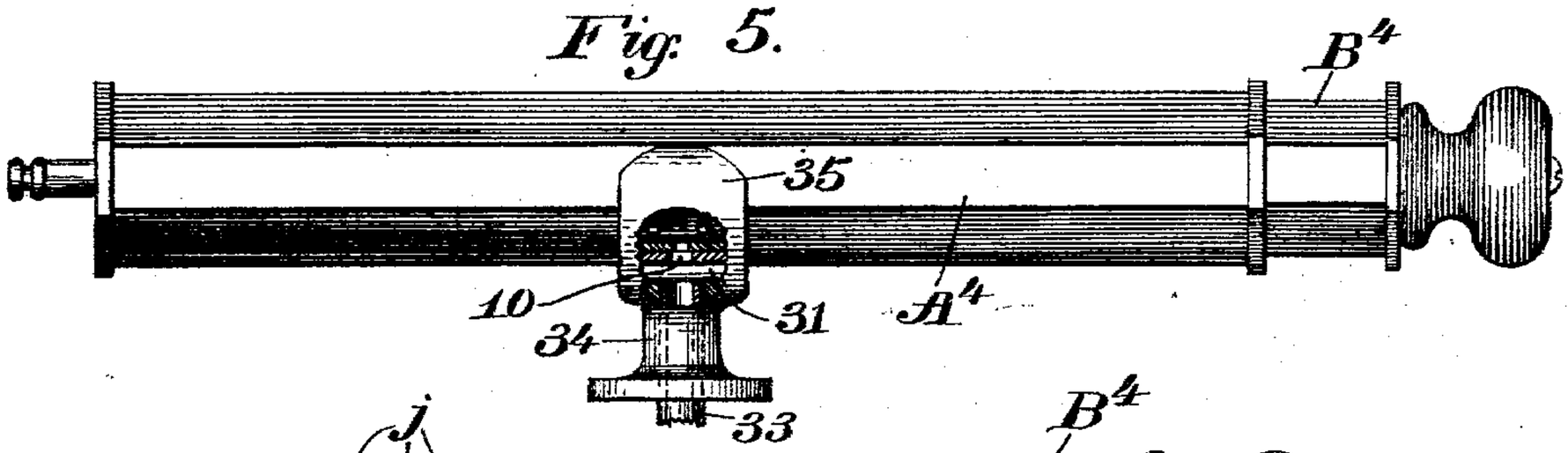
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.



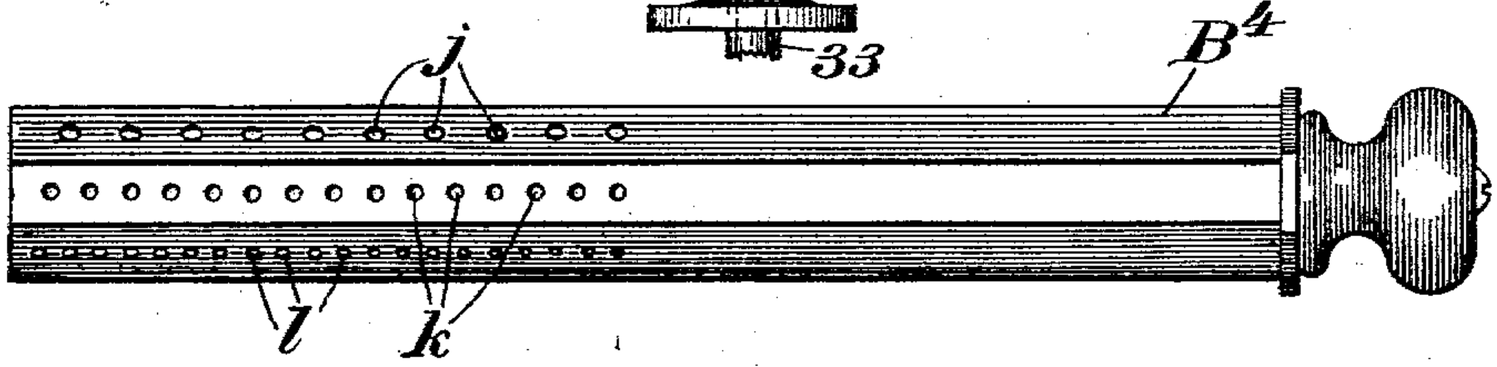


Fig. 6.

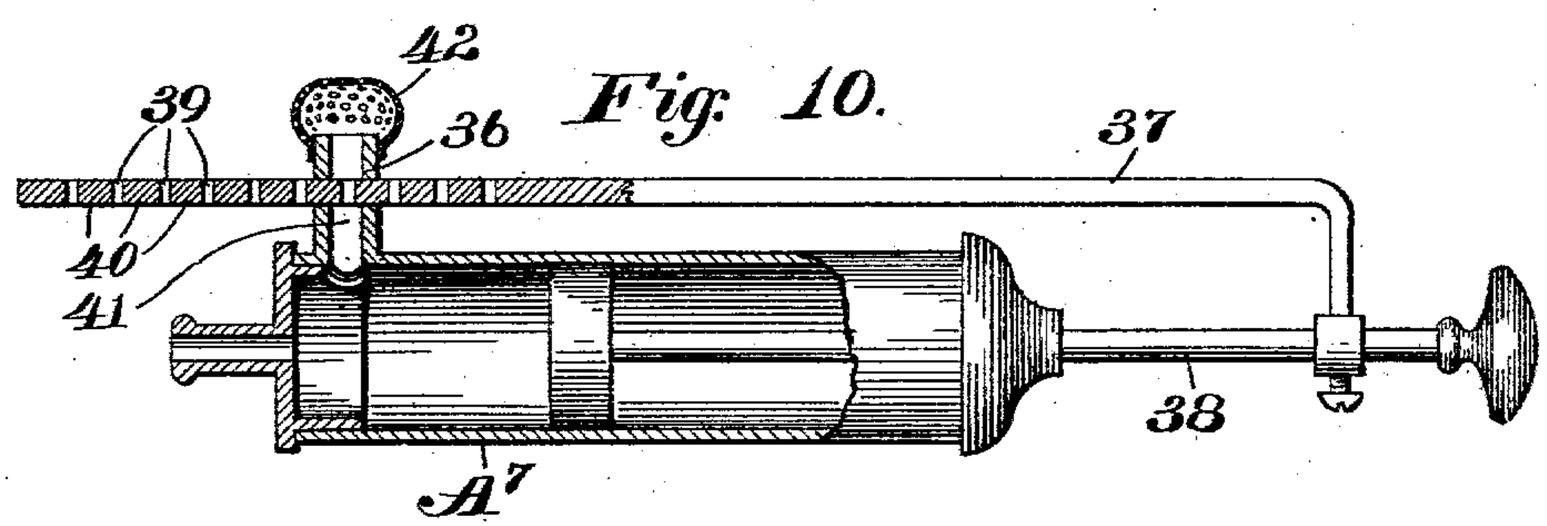


Fig. 10.

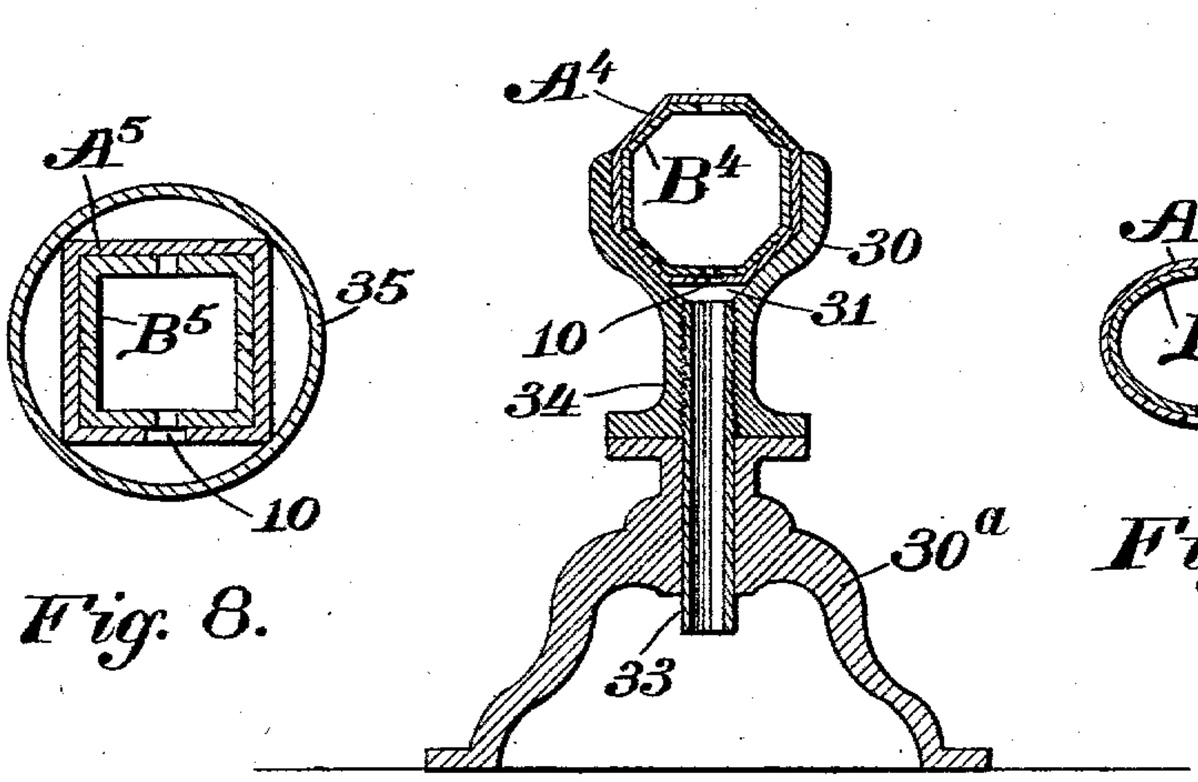


Fig. 8.

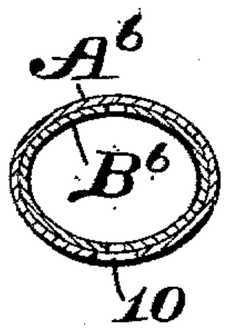


Fig. 9.

Fig. 7.

Witnesses
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UNITED STATES PATENT OFFICE.

ROBERT WATSON, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-HALF TO CHARLES A. KRAM, OF WASHINGTON, DISTRICT OF COLUMBIA.

PNEUMATIC MASSAGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 720,865, dated February 17, 1903.

Application filed May 26, 1902. Serial No. 108,967. (No model.)

To all whom it may concern:

Be it known that I, ROBERT WATSON, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Pneumatic Massage Apparatus, of which the following is a specification.

This invention comprises improvements in apparatus for the local treatment of disease by air-pressure and vacuum, and it includes an air-chamber having an opening adapted to be closed by the part of the body to be treated and having an air inlet and exit port, a reciprocative plunger for compressing and rarefying air within the cylinder, and means for automatically opening said port a number of times during the stroke of the plunger, thereby permitting the internal and external air-pressures to equalize and causing a series of compressions or rarefactions of the air within the chamber at each stroke of the plunger.

The invention also comprises means for opening the port a greater or less number of times during the stroke of the piston, as desired, thereby varying the degree of rarefaction or compression and the frequency of said operations and other features of construction.

In the accompanying drawings, Figure 1 is a central longitudinal section through a hand-pump embodying my improvements, the plunger being arranged within the cylinder. Fig. 2 is a similar view, the plunger being upon the outside of the cylinder. Fig. 3 is a perspective view, partly broken away, showing a pump arranged for causing various degrees of suction and compression during each stroke of the plunger and for varying the number of pulsations during each stroke. Fig. 4 is a longitudinal section through a pump of different construction adapted for the same purpose. Fig. 5 is a side view of a pump in which both members are octagonal in cross-section. Fig. 6 is a similar view of the perforated member of the pump shown in Fig. 5. Fig. 7 is a section on the line 7 7 of Fig. 5, showing also the stand. Fig. 8 shows in section two square tubular parts with a guard surrounding said parts. Fig. 9 is a similar view in which the parts are elliptical; and Fig. 10 shows, partly in side view and partly in section, a modified form of pump for the same purpose.

Referring to Fig. 1 of the drawings, A indicates a hollow cylinder or tubular member having a head 1 at its outer end, upon which is a tubular projection 2, to which may be attached a flexible tube 3, having a hollow tip 4, the outer end of which is adapted to be applied to and closed by the part of the body to be treated. The cylinder A is provided with a transverse slot or opening 5 at a point intermediate of its ends and with similar openings 6, 7, and 8, spaced at suitable distances apart and forming a longitudinal series of openings extending from the center toward the open end of the cylinder A. Within the cylinder A is arranged a plunger B, consisting of a cylinder or tubular member, open at its inner end and having a cap 9, closing its outer end. This plunger is provided with a port 10 intermediate of its ends, which port is adapted to register with the ports in the cylinder A when the plunger is moved longitudinally within the cylinder. The plunger is held against rotation by a guide-rod 11, connected to the cap 9 and passing through a guide-opening in a projection 12 upon the side of the cylinder A. The end 13 of the guide-rod is enlarged or bent, as shown, to form a stop which limits the outward movement of the plunger by its engagement with the projection 12. Within the space inclosed by the cylinder A and plunger B is a compression-spring 14, tending to force said cylinder and plunger apart. Suitable finger-pieces 15 are formed upon the cylinder A, so that the plunger may be forced inward against the action of the spring by placing the fingers upon the finger-pieces and pressing upon the cap 9 with the thumb. In the outermost position of the plunger the port 10 registers with the opening 8, and as the plunger is moved inwardly said port will register successively with the ports 7, 6, and 5, the port being closed while passing between the openings by parts *a* of the outer cylinder, which serve as valves for the port. Assuming the air-chamber formed by the cylinder and plunger and tubular parts leading up to the piece 4 to be closed by the application of said piece 4 to the

part of the body which is to be treated, it will be seen that as the plunger moves inward the port 10 will be opened several times during the stroke of the plunger, allowing the internal and external air-pressures to equalize, thus compressing the air within the chamber a number of times during the stroke of the piston. When the plunger is returned to its outward position by the spring, the port 10 is successively brought into register with the openings in the outer cylinder, and the air within the chamber is therefore rarefied a number of times during the stroke of the plunger.

In Fig. 2 the plunger B′ is arranged upon the outer side of the cylinder A′ and is provided with an opening 18 near its central portion and openings 17 and 16, arranged in a series extending from said opening 18 toward the open end of the plunger. The cylinder A′ is provided with a port 10^a 10^b 10^c at a point intermediate its ends, with which the openings 16, 17, and 18 register in succession as the plunger moves inward and in the inverse order as the plunger moves outwardly. In this instance the port in the pump-cylinder consists of the several slots 10^a 10^b 10^c, &c., arranged in the same plane around the cylinder at short distances apart, so that the slots in the plunger B′ must register with some part of the port when reciprocated without the necessity of holding the plunger against rotation by a guide-rod.

In Fig. 3 the plunger B^2 is provided with several longitudinal series of openings in its walls, the openings of the several series being spaced different distances apart and each series occupying a different position circumferentially of the cylinder. As shown, three openings *c*, composing one series, are arranged at a considerable distance apart; five openings *d*, arranged closer together in a different circumferential location, compose a second series; openings *e*, greater in number and closer together, form a third series, and openings *f*, still greater in number and closer together, form a fourth series of openings. The cylinder A^2 is provided with a port 10 intermediate of its length, and when any series of openings in the member B^2 is brought in line with the port 10 and said member is reciprocated the degree of compression and suction and the number of such operations during a complete stroke of the piston depends upon the number and proximity of the openings composing the series of openings in line with the port 10.

In order to maintain any desired series of openings in line with the port 10, the member A^2 is provided with a flange 19 at its open end, which flange is provided with openings 20, which form guides for a guide-rod 21, attached to the outer end of the plunger and having a nut 22 at its free end, which forms a stop to limit the outward movement of the plunger. By removing the nut the guide-rod may be inserted into the appropriate opening to bring any desired series of openings in line with the port.

It will be evident that the plunger cannot be operated when a series of openings is not in line with the port, as the flange serves as a guard against which the guide-rod will abut when the rod is not line with one of the openings 20.

As shown, the plunger B^2 is provided with a knob or handle 23, which closes the outer end of the plunger, and a normally closed spring-pressed valve 24 is arranged in the wall of the plunger adjacent to the handle. If it is desired to create suction only within the pump, the spring-pressed valve may be held open by the finger during the inward stroke of the plunger and released during the outward stroke, this operation being reversed if it is desired to produce compression without suction. The cylinder A^2 is also provided with trunnions 24^a, by means of which it may be supported in suitable brackets.

In Fig. 4 the plunger B^3 consists of a piston having a central opening, within which is fitted a tubular piston-rod 25, having a closed outer end. The cylinder A^3 has a perforated cap 26, which supports the piston-rod, and arranged centrally within this cap is a long sleeve 27, forming a close-fitting bearing for the piston-rod, said sleeve having a longitudinal series of openings *g* therein at suitable distances apart and a series of openings *h* at its opposite side differently spaced apart. A port 28 in the tubular piston-rod is adapted to pass the openings *g* in succession as the rod is moved backward and forward or the openings *h* when given a semi-rotation, the operation being substantially the same as in the previously-described figures.

In the figures heretofore described the tubular members of the pump are circular in cross-section, and where the openings in one member are located in different circumferential positions it is necessary to employ auxiliary guide means for the purpose of guiding the members to maintain the desired opening or openings in line with the port. In Figs. 5 to 9, inclusive, however, the tubular members of the pump are not circular in cross-section, and therefore cannot be turned relatively while fitting one within the other.

In Figs. 5, 6, and 7 the tubular members A^4 and B^4 are octagonal, the member B^4, which in this instance forms the plunger, having in each face a series of openings, as indicated by the letters *j k l*. Any series of openings may be brought into line with the port 10 in the member A^4 by simply removing the plunger, turning it about, and reinserting in the outer member, no auxiliary guiding device being necessary to keep the openings in line with the port.

It is desirable to prevent the port 10 from being closed accidentally by the hand in working the pump, as such closure would prevent the ingress and egress of air, and the pump

would compress or rarefy the air continually without interruption during the stroke of the plunger. This is accomplished in Figs. 5 and 7 by mounting the pump in a yoke 30, which embraces the tube A^4 laterally, but is cut away, as shown, opposite the port 10, leaving a space 31 open to the atmosphere at the sides of the yoke. This opening could not become closed except by design; but in order to provide further against accidental closing or sealing of the port a tubular spindle 33 extends through the base of the yoke and through an opening in the top of a stand 30^a, which pivotally supports the pump. The tubular spindle is open at both ends and cannot be accidentally closed.

In Fig. 8 the members A^5 and B^5 are shown square in cross-section, and the port 10 is guarded by a circular tube 35, which surrounds the outer member.

In Fig. 9 the parts A^6 and B^6 are elliptical in cross-section, the latter being provided with openings in its opposite sides, either of which may be brought into line with the port 10.

In Fig. 10 the cylinder A^7 is provided with a tubular projection 36, having an opening through which a valve-rod 37, connected to the piston-rod 38, extends. This valve-rod has a series of openings 39 and intermediate valve portions 40, and these openings are brought successively into register with the opening 41 in the tube 36 as the piston is reciprocated. The outer end of the tube 36 is protected against accidental closure by a perforated guard 42.

It will be evident that the air-chamber may be opened and closed at various times during a stroke of the piston by various means, and I do not wish to limit myself to the devices herein shown.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An apparatus for the local treatment of disease by air pressure or vacuum, comprising a laterally-inclosed air-chamber having an opening adapted to be closed by the part of the body to be treated, and having an air-port, a reciprocative plunger for compressing or rarefying the air within the chamber and means connected with said parts for automatically opening and then closing said port during the stroke of the plunger.

2. An apparatus for the local treatment of disease by air pressure or vacuum, comprising a laterally-inclosed air-chamber having an opening adapted to be closed by the part of the body to be treated, and having an air-port, a reciprocative plunger for compressing or rarefying the air within the chamber and means connected with said parts for automatically opening and then closing said port a plurality of times during the stroke of the plunger.

3. An apparatus for the local treatment of disease by air pressure or vacuum comprising two tubular members, one member having a port in its wall at an intermediate portion of its length, and the other member fitting telescopically therewith and having longitudinal series of openings in its wall arranged to pass said port successively when said members are reciprocated, one of said members being closed at its outer end and the other member having an opening adapted to be closed by the part of the body to be treated.

4. In an apparatus for the local treatment of disease by air pressure or vacuum, an air-chamber having an opening adapted to be closed by the part of the body to be treated, said chamber comprising two tubular members, one having a port in its wall at an intermediate portion of its length, and the other member fitting telescopically therewith and having several longitudinal series of openings in its wall, the several series of openings occupying different positions circumferentially of said latter member.

5. In an apparatus for the local treatment of disease by air pressure or vacuum, an air-chamber having an opening adapted to be closed by the part of the body to be treated, said chamber comprising two tubular members, one having a port in its wall at an intermediate portion of its length, and the other member fitting telescopically therewith and having several longitudinal series of openings in its wall, the openings of the several series being spaced different distances apart, and the several series of openings occupying different positions circumferentially of said latter member.

6. In an apparatus for the local treatment of disease by air pressure or vacuum, an air-chamber having an opening adapted to be closed by the part of the body to be treated, said chamber comprising two tubular members, one having a port in its wall at an intermediate portion of its length and the other member fitting telescopically therewith and having several longitudinal series of openings in its wall, the openings of the several series being spaced different distances apart, and the several series of openings occupying different positions circumferentially of said latter member, and guiding means for holding the members with any desired series of openings in line with the port.

7. An apparatus for the local treatment of disease by air pressure or vacuum comprising two tubular members, both angular in cross-section, one member having a port in its wall at an intermediate portion of its length and the other member fitting telescopically therewith and having one or more openings in its wall arranged to register with said port when said members are reciprocated, one of said members being closed at its outer end and the other member having an opening adapted to be closed by the part of the body to be treated.

8. An apparatus for the local treatment of disease by air pressure or vacuum comprising

two tubular members, both angular in cross-section, one member having a port in its wall at an intermediate portion of its length and the other member fitting telescopically therewith and having longitudinal series of openings in its wall arranged to pass said port successively when said members are reciprocated, one of said members being closed at its outer end and the other member having an opening adapted to be closed by the part of the body to be treated.

9. In an apparatus for the local treatment of disease by air pressure or vacuum, an air-chamber having an opening adapted to be closed by the part of the body to be treated, said chamber comprising two tubular members, both angular in cross-section, one having a port in its wall at an intermediate portion of its length, the other member fitting telescopically therewith and having openings in its walls arranged in different positions circumferentially of said latter member.

10. In an apparatus for the local treatment of disease by air pressure or vacuum, an air-chamber having an opening adapted to be closed by the part of the body to be treated, said chamber comprising two tubular members, both angular in cross-section, one having a port in its wall at an intermediate portion of its length, the other member fitting telescopically therewith and having several longitudinal series of openings in its walls, the several series of openings occupying different positions circumferentially of said latter member.

11. An apparatus for the local treatment of disease by air pressure or vacuum comprising two tubular members, one member having a port in its wall at an intermediate portion of its length and a guard, having openings therein, extending over said port, and the other member fitting telescopically therewith and having a longitudinal series of openings in its wall arranged to pass said port successively when said members are reciprocated, one of said members being closed at its outer end and the other member having an opening adapted to be closed by the part of the body to be treated.

12. An apparatus for the local treatment of disease by air pressure or vacuum comprising two tubular members, one member having a port in its wall at an intermediate portion of its length and a guard, having openings therein, extending over said port, and the other member fitting telescopically therewith, and having one or more openings in its wall arranged to register with said port when said members are reciprocated, one of said members being closed at its outer end and the other member having an opening adapted to be closed by the part of the body to be treated.

13. An apparatus for the local treatment of disease by air pressure or vacuum comprising two tubes fitting telescopically together and having heads at their outer ends and having ports in their walls adapted to register with one another when the tubes are reciprocated, one of said tubes having an opening adapted to be closed by the part of the body to be treated, and a compression-spring arranged within said tubes and adapted to force said tubes apart.

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

ROBERT WATSON.

Witnesses:
C. A. NEALE,
C. W. CLEMENT.