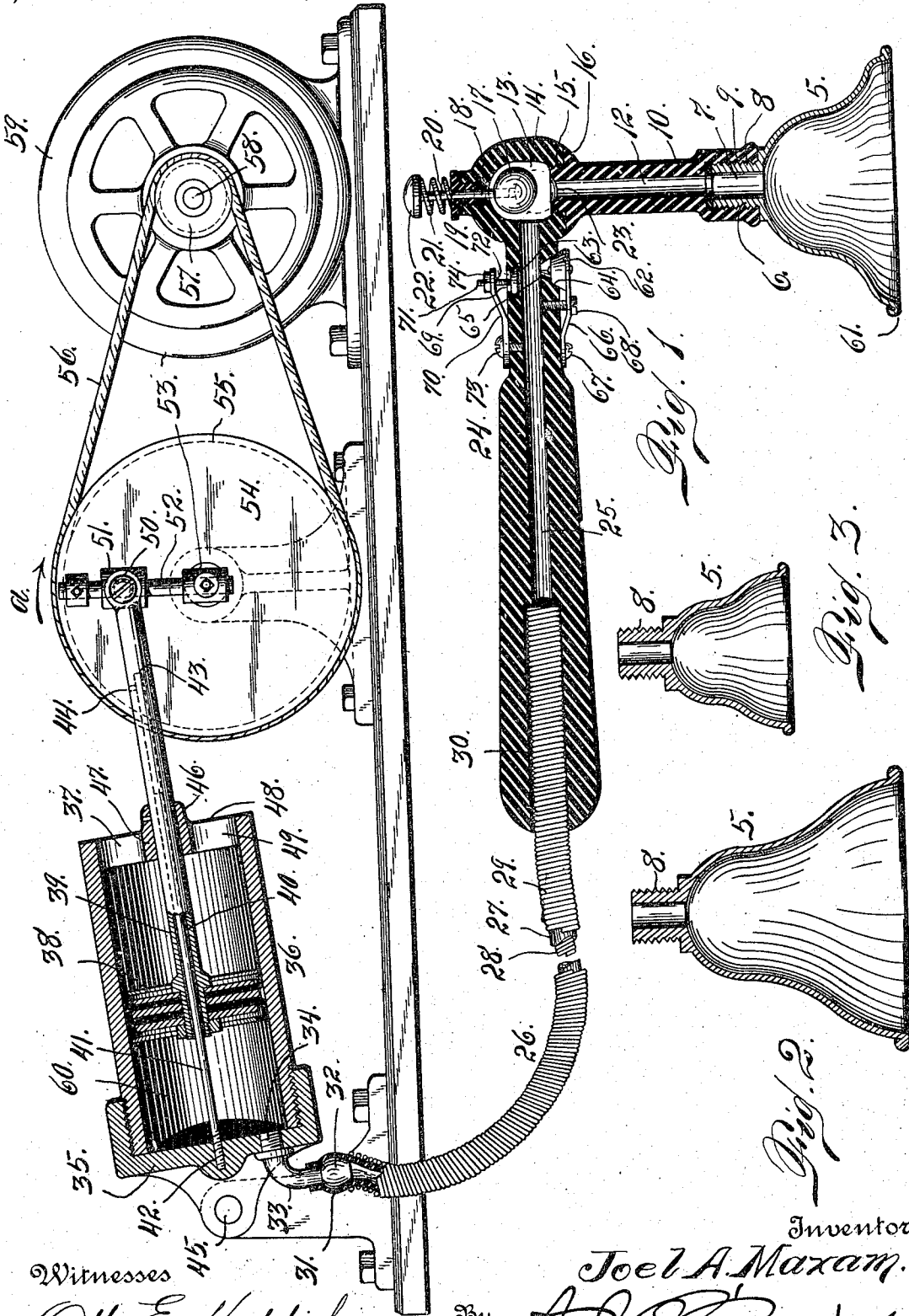


J. A. MAXAM.
 SUCTION AND COMPRESSION CUPPING APPARATUS.
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1,179,129.



Witnesses

Otto E. Hoddick.
 John B. Wade.

By

Inventor
 Joel A. Maxam.
 A. J. [Signature]
 Attorney

UNITED STATES PATENT OFFICE.

JOEL A. MAXAM, OF IDAHO SPRINGS, COLORADO, ASSIGNOR OF ONE-HALF TO CHARLES W. SMITH, OF DENVER, COLORADO.

SUCTION AND COMPRESSION CUPPING APPARATUS.

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To all whom it may concern:

Be it known that I, JOEL A. MAXAM, a citizen of the United States, residing at Idaho Springs, county of Clear Creek, and State of Colorado, have invented certain new and useful Improvements in Suction and Compression Cupping Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in therapeutic apparatus in which the body of the patient is subjected alternately to suction and compression through the medium of a cup applied to the body.

Having briefly outlined my improvement, I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a side view of the instrument, the principal parts of which are longitudinally sectioned. Figs. 2 and 3 are sections illustrating different styles of cups which are adapted to be employed in connection with the instrument.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a cup which may be of any desired size. This cup is provided at its smaller extremity with a nipple 6 having a passage 7. This nipple is exteriorly threaded as shown at 8 to enter a correspondingly threaded socket 9 formed in the adjacent extremity of a tube 10, preferably composed of hard rubber but which may consist of any suitable material. This tube is provided with a passage 12 which registers with a passage 9 in the nipple at one extremity, its opposite extremity communicating with a small chamber or cavity 13 formed in a bulb or oval shaped member 14 with which one extremity of the tube 10 is connected, the tube having an exteriorly threaded extremity adapted to enter a corresponding opening formed in the bulb as indicated at 15, the tube having a shoulder 16 which abuts against the adjacent extremity of the bulb. Within this bulb is

located a ball valve 17 having a stem 18 which passes through a stuffing box 19 with which the bulb is equipped. This stem is exposed beyond the bulb as shown at 20. The valve is normally held in the unseated position shown by full lines in Fig. 1, by means of a spiral spring 21 which surrounds the exterior portion of the stem, one extremity engaging the stuffing box end of the bulb while its opposite extremity engages a cap or disk 22 applied to the outer extremity of the stem. Directly below the valve the extremity of the tube 10 is provided with a seat 23 which the valve engages when in the closed position or that indicated by dotted lines (see Fig. 1).

As illustrated in the drawing, the bulb 14 is formed integral with one extremity of a handle member 24 which is provided with a longitudinal passage 25, one extremity of which communicates with the chamber 13 of the bulb, while its opposite extremity registers with a flexible tube 26, which is threaded into the handle member, which is open at the extremity opposite the bulb for the purpose, this portion of the handle member being interiorly threaded as shown at 30, to receive the exterior threads 29 formed by a closely wound wire armor which surrounds a flexible tube member 27 composed of rubber or other suitable material. This rubber tube is also reinforced interiorly by a wire coil 28. In this way, the flexible tube is armored both interiorly and exteriorly, whereby it is protected against injury due either to suction or compression acting there-through.

The extremity of the flexible tube 26 opposite the handle member 24 is connected as shown at 31 with the oval extremity 32 of an elbow-shaped nipple 33 which is connected as shown at 34 with the head 35 of a cylinder 36. The adjacent extremity of the flexible tube 26 is slipped over and caused to tightly embrace the extremity 32 of the nipple in such a manner that an air tight joint is formed. The elbow shaped nipple is open at both extremities, one extremity communicating with the chamber of the cylinder 36, while the other extremity communicates with the passage through the tube 26, the cap 35 of the cylinder tightly closing the chamber of the latter at one end, the said chamber being open

at the opposite end, as shown at 37. Within this cylinder is located a closely fitting piston 38 which is mounted on a stem 39 which is provided with a longitudinal passage 40 which is entered by a guide rod 41, one extremity of which is threaded into a recess formed in the cylinder head as shown at 42. The opposite extremity of this guide rod enters the hollow or longitudinal perforation of the piston stem, which is closed as shown at 43 before reaching the outer extremity of the stem. Hence, a vent port 44 is formed in the stem communicating with the longitudinal perforation 40 to allow the air to enter and escape from this perforation during the reciprocating movement of the piston stem when the machine is in operation. This is found necessary, since the guide rod 41 fits closely within the stem's perforation. The cylinder is pivoted at its head extremity as shown at 45, thus making it practicable to use a rigid piston stem rather than a jointed stem or a stem composed of a stem member proper and a pitman pivotally connected therewith. It must, of course, be understood that the invention is not limited to any particular construction or arrangement in this regard, except as may be defined by the appended claims. The piston stem passes through an opening 46 formed in the central hub 47 of a spider member 48 which is composed of the hub 47 and radial webs 49 connecting the hub with the surrounding wall of the cylinder.

The outer extremity of the piston stem is pivotally connected as shown at 50, with a sleeve 51 adjustably connected with a crank arm 52 with which a shaft 53 is provided. This shaft is journaled in suitable bearings and is equipped with a wheel 54 which is fast on the shaft and as illustrated in the drawing, has a grooved periphery 55 adapted to be engaged by a belt or cable 56 which also engages a relatively small wheel or pulley 57 fast on the shaft or spindle 58 of a motor which is preferably of the electric type. The shaft 58 is equipped with a balance wheel 59.

When the instrument is in use, the motor serves to rotate the shaft 58, from which motion is transmitted to the crank shaft 53 through whose agency the piston 38 is reciprocated within the chamber of the cylinder.

Now, if it is desired to interrupt either the suction act or the compression act and successively cause the one or the other to act upon the body cumulatively instead of independently, as heretofore explained, this may be accomplished or brought about by utilizing the valve 17 and for this purpose, the instrument is equipped with two valves designated 62 and 63, respectively. The valve 62 is an outwardly opening valve and

engages a seat 64 surrounding a port 65 with which the handle member 24 is provided, the said port when open, placing the passage 25 through the handle in communication with the atmosphere. This valve is normally held in the seated position by a leaf spring 66, to one extremity of which the valve is attached, its opposite extremity being secured to the handle by a screw 67 or other suitable fastening device. In order to increase the tension of this spring, a regulating screw 68 may be employed, the said screw passing through a perforation in the spring between the valve and the screw 67 and being threaded into the handle. By means of this screw, the tension of the spring may be regulated as desired.

The valve 63 is an inwardly opening valve and normally engages a beveled seat surrounding a port 69 which places the passage 25 of the handle 24 in communication with the atmosphere. This valve however, is normally held in the closed position by a leaf spring 70, one extremity of which is connected with the stem 71 of the valve as shown at 72, while the opposite extremity is connected with the handle 24 by means of a screw 73 or other suitable fastening. The tension of this spring is regulated by means of a nut 74 which is screwed on the outer portion of the stem, which is threaded for the purpose. As this nut is moved inwardly on the stem toward the tube, the tension of the spring 70 is increased, while the movement of the nut in the opposite direction diminishes such tension. By virtue of this valve construction, it will be understood that if after the completion of the suction stroke of the piston 38, whereby the body is subjected to the sucking or cupping effect heretofore described, the valve 17 be moved to its seated position (see dotted lines in Fig. 1), communication between the forward compartment of the cylinder and the cup will be interrupted, and as the piston moves forwardly through its compression stroke as heretofore described, the air forced through the conduit will be caused to escape at the port 65 by the opening of the valve 62. Assuming that the valve 17 is still held closed until the suction stroke of the piston commences, and then released, it will be understood that the suction will again act upon the portion of the body inclosed by the cup and produce an additional increased or cumulative cupping effect or condition. It is also evident that this condition may be augmented to any extent desired by interrupting the communication between the cup and cylinder during the compression stroke of the piston and opening such communication during the suction stroke. Again, if it is desired to apply the compression act cumulatively to the body of the patient, the valve 17 will be closed as soon as the com-

pression or forward stroke of the piston is completed, and kept closed until the corresponding stroke again commences, when the valve 17 will be released and allowed to open. During such interruption of the communication between the cup and cylinder, the suction will be broken during the suction stroke by the opening of the valve 63 which moves inwardly in response to the suction conduit and allows the atmosphere to enter and break the suction, thus practically preventing any retarding influence upon the piston during the suction stroke. Again, if it is desired for any reason to cut off communication between the piston chamber and the cup without stopping the machine, the valve 17 may be pressed downwardly and held in the closed position, the suction and compression strokes being exhausted, so to speak, by the opening of the valves 63 and 62 respectively. This use of the valve 17 may be made, if it should be desired to move the cup 5 from one part of the body to the other without stopping the movement of the piston. Hence, if the apparatus is to be employed for applying either suction or compression cumulatively the timing of the operation of the valve 17 with the piston is necessary. However, when the valve 17 is used to completely cut off communication between the piston cylinder and the cup, of course, no timing of the said valve with the piston is necessary. This is an important use for the said valve, since, by closing the latter the cup 5 may be moved from one part of the body of the patient to another part without stopping the travel of the machine and without allowing air to be forced outwardly or sucked inwardly through the cup. When the machine is running at the ordinary rate of speed it is practicable to properly time the opening and closing of the valve 17 for producing either suction or compression cumulatively as described. This is true for the reason that the suction and compression strokes of the piston are clearly distinguishable audibly from each other and there is an appreciable interval between the two strokes, that is to say, between the completion of one stroke and the beginning of the next stroke. For instance, referring to Fig. 1 of the drawing, while the outer extremity of the crank 52 or the axis or center of the pivot pin connecting the crank with the rear end of the piston stem, is traveling from front to rear through approximately the upper quarter of its circular path, the rearward or suction stroke of the piston is practically completed; and during the next or downward quarter of the travel of the same point, the piston remains practically stationary. Again, the forward or compression stroke of the piston is practically completed while the said point is traveling through the lower quarter of its cir-

cular path, the said piston being practically stationary during the travel of the same point through the upward quarter of its circular path.

The sounds produced by the air during the suction and compression strokes of the piston are different and therefore these strokes are clearly distinguishable audibly from each other by the operator, and there is a sufficient interval between the strokes to give him an opportunity to manipulate the valve 17 and properly time its opening and closing movements to produce either suction or compression cumulatively as may be desired. This has been demonstrated during the actual operation of a full size machine.

The tension of the spring acting on the valve 62 may be so regulated that if the compression is abnormal or greater than required, this valve will open to relieve such compression, on the principle of a safety valve. Again, the tension of the spring carrying the valve 63 may be so regulated that in case the suction through the conduit is abnormal, or greater than required in order to produce the proper suction or vacuum condition within the cup, this valve will open inwardly and relieve such suction to the extent desired, this valve in that event also acting as a safety valve.

Having thus described my invention, what I claim is,—

1. An instrument of the class described comprising a cup, a cylinder, a conduit connecting the chamber of the cylinder with the cavity of the cup, a piston mounted to reciprocate in the cylinder, and means for interrupting the communication between the cylinder chamber and the cup cavity at the end of either the compression or suction producing movement of the piston.

2. In an instrument of the class described, the combination of a cup, a conduit connected therewith at one extremity, means connected with the opposite extremity of the conduit for producing suction and compression conditions alternately within the cup, a cut-off valve mounted on the conduit, and an outwardly opening check valve mounted on the conduit between the cut-off valve and the extremity of the conduit opposite that connected with the cup, the said check valve being normally spring-held to close a port in the conduit, the passage through the conduit being in communication with the atmosphere when the valve is open.

3. In an instrument of the class described, the combination of a cup, a conduit, one extremity of which is connected with the cup, means connected with the opposite extremity of the conduit for alternately producing vacuum and suction conditions within the cup, a cut-off valve mounted on the conduit and normally spring-held in the open position to allow the suction and com-

pression to operate freely through the conduit, and an inwardly opening check valve normally spring-held to close a port in the conduit, which when the valve is open, 5 places the conduit passage in communication with the atmosphere so that after the cut-off valve is closed at the termination of the compression act, and during the suction pull through the conduit beyond the cut-off 10 valve, the suction will be broken by the opening of the said valve.

4. In an instrument of the class described, the combination of a cup, a conduit connected therewith at one extremity, means 15 connected with the opposite extremity of the conduit for alternately producing suction and compression conditions within the conduit, a cut-off valve mounted on the conduit and normally spring held in the open position, whereby the passage through the conduit 20 is uninterrupted, and two check valves normally spring-held to close ports in the conduit between the cut-off valve and the end of the conduit connected with the suction and compression producing means, one 25 of said valves opening outwardly to relieve

compression, while the other valve opens inwardly to relieve or break the suction.

5. An instrument of the class described comprising a cup, a cylinder, a conduit connecting the chamber of the cylinder with the 30 cavity of the cup, a piston mounted to reciprocate in the cylinder, and means for relieving either the suction or the compression when necessary at the end of the respective 35 strokes of the piston.

6. An instrument of the class described comprising a cup, a cylinder, a conduit connecting the chamber of the cylinder with the 40 cavity of the cup, a piston mounted to reciprocate in the cylinder, and means mounted upon the instrument for relieving either the suction or the compression when necessary at the end of the maximum suction and compression strokes respectively of the piston. 45

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

JOEL A. MAXAM.

Witnesses:

TOM SMITH,
W. T. CAIN.