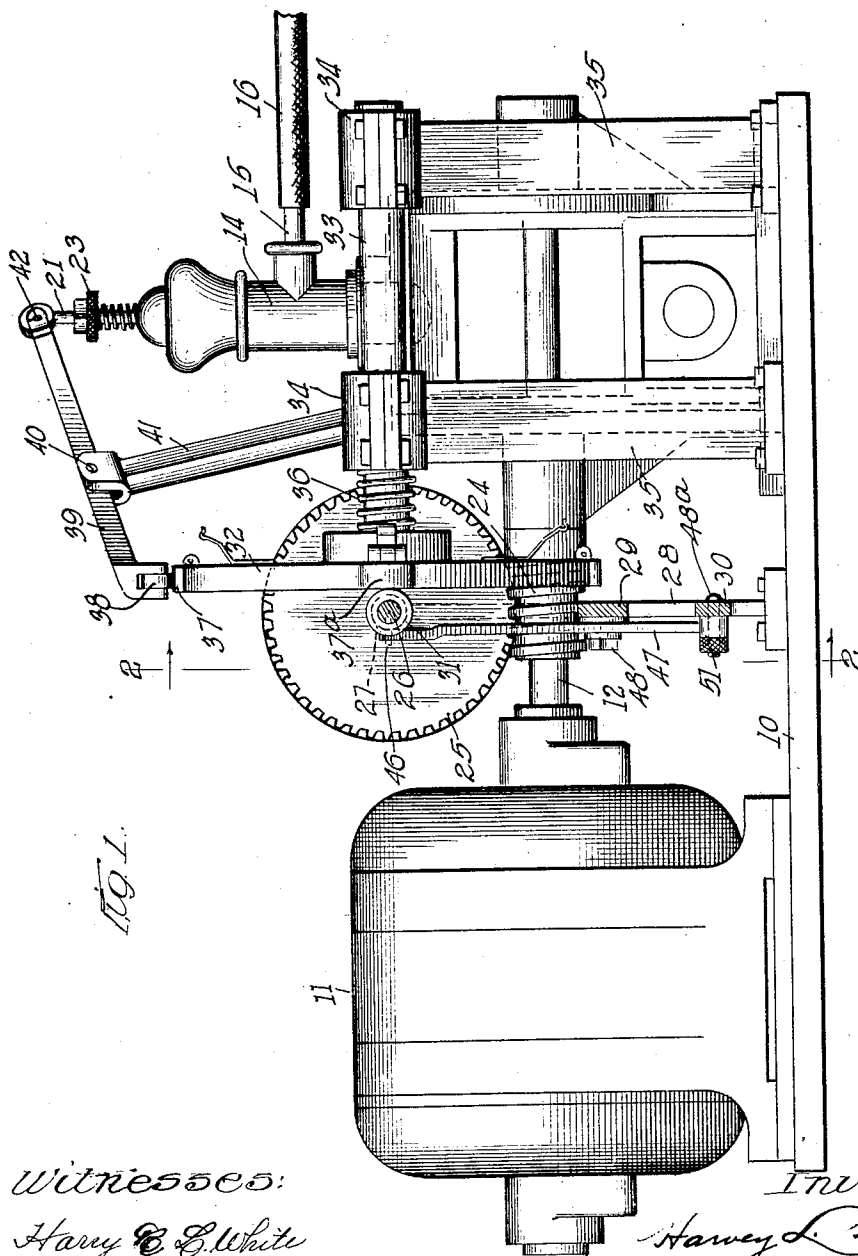


H. L. HOPKINS.
POWER OPERATED VACUUM MASSAGE APPARATUS.
APPLICATION FILED NOV. 14, 1918.

1,364,500.

Patented Jan. 4, 1921.

2 SHEETS—SHEET 1.



Witnesses:
Harry E. White
W. P. Kilroy

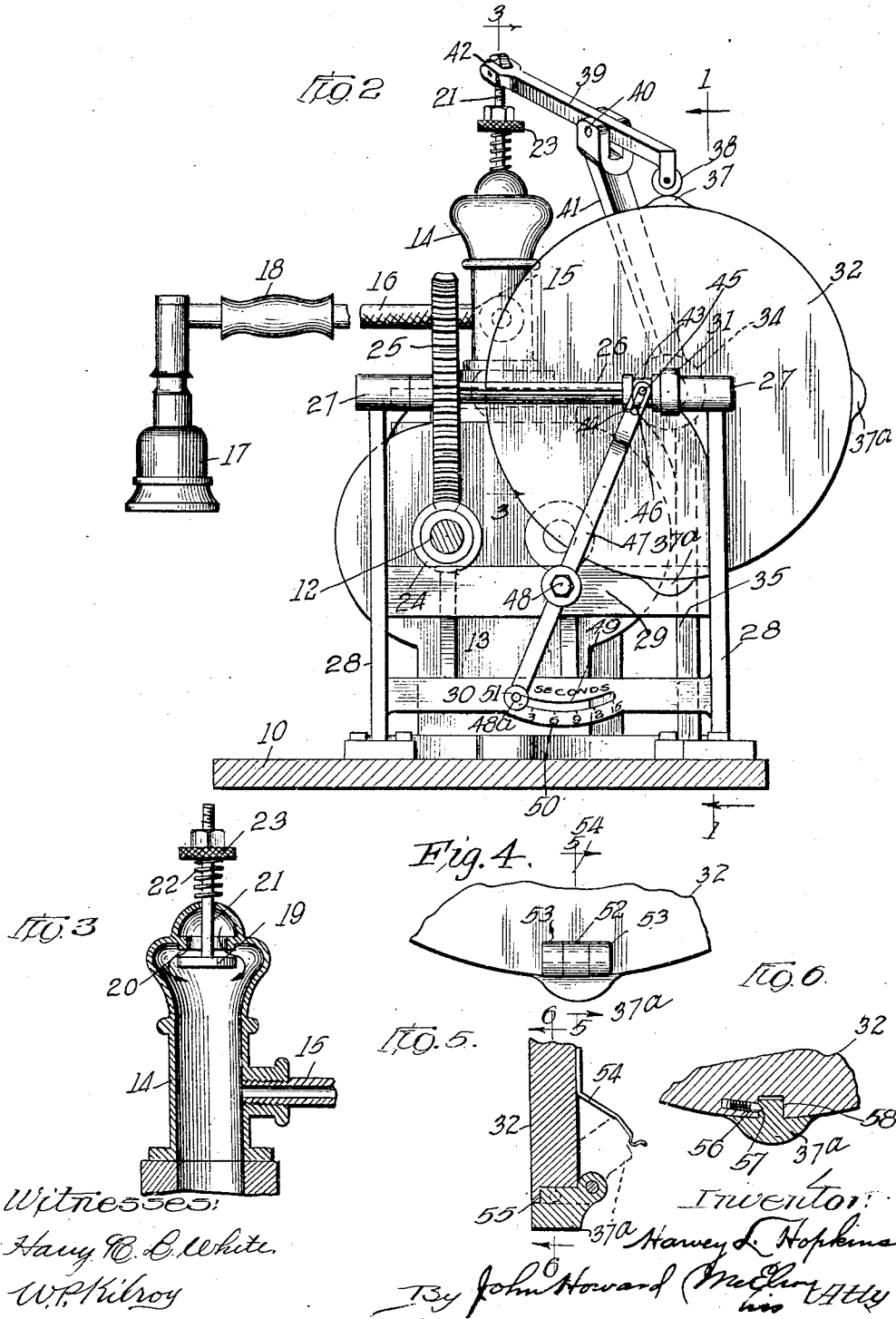
Inventor:
Harvey L. Hopkins,
By John Howard McElroy,
his Atty.

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UNITED STATES PATENT OFFICE.

HARVEY L. HOPKINS, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-THIRD TO GUSTAVUS A. SMITH, OF MARSHALLTOWN, IOWA, AND ONE-THIRD TO GEORGE E. GIBEAULT, OF CHICAGO, ILLINOIS.

POWER-OPERATED VACUUM MASSAGE APPARATUS.

1,364,500.

Specification of Letters Patent.

Patented Jan. 4, 1921.

Application filed November 14, 1918. Serial No. 262,522.

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 Power-Operated Vacuum Massage Apparatus, of which the following is a full, clear, and exact specification.

My invention is concerned with certain new and useful improvements in power operated vacuum massage apparatus, and is designed to produce an apparatus of the class described, operated by power, which shall have all the capacity and effectiveness that are inherent in similar hand operated devices, such for instance as that shown in my Patent 1,217,886, dated February 27, 1917, yet which shall not necessitate the laborious hand manipulation inherent in the hand operated devices.

In power operated vacuum massage apparatus heretofore used or proposed, with which I am familiar, the vacuum has always been produced by reciprocating piston pump, driven continuously, with the result that the duration of the vacuum pull was always limited by the length of time consumed by the motor in moving the piston in one direction, as the vacuum was necessarily released at each reciprocation. Furthermore, it took a very considerable portion of the suction stroke to produce the vacuum, so that the effective pull of the vacuum was necessarily very short and always intermittent. In my improved apparatus I substitute for the reciprocating pump, a rotary pump and arrange to release the constant and continuous vacuum produced thereby by a mechanism which preferably automatically opens the valve and releases the vacuum at desired intervals. This mechanism is preferably adjusted so that the vacuum can be released say every second, or held as long as say fifteen seconds, which I consider the longest time that is desirable to hold it without release, as a longer period tends to bruise the tissues and discolor the skin, or it may be held indefinitely, if desired.

To illustrate my invention, I annex hereto two sheets 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 an apparatus employing my invention, the same being partly in section on the line 1—1 of Fig. 2;

Fig. 2 is a view in section on the line 2—2 of Fig. 1;

Fig. 3 is a detail in section on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged detail of a portion of a cam disk illustrating a construction employing a plurality of cams some or all of which may be thrown out of action when desired;

Fig. 5 is a detail on the line 5—5 of Fig. 4; and

Fig. 6 is a detail on the line 6—6 of Fig. 5.

In carrying out my invention in its preferred form, I mount upon the common base 10, an electric motor 11, which may be of any desired rotary type, and I connect its armature shaft directly to or form it integral with the driving shaft 12 of a rotary pump 13, which may be of any desired type capable of producing a constant suction upon the intake tube 14, which will be provided with a nipple 15 upon which is secured a flexible, but non-collapsible tube 16, of the desired length so that the customary vacuum cup 17 located at the outer end of the same may be readily moved as is needed with relationship to the patient being treated by the handle 18. Such apparatus will, with the motor running, produce a constant vacuum in the cup 17, and in order to release the vacuum, I provide the valve 19 adapted to cooperate with the valve seat 20 formed near the top of the intake tube 14. This valve is provided with a stem 21 extending upward through an aperture in the top of the tube or standard 14, and held with the valve 19 against the seat 20 by a helically coiled expanding spring 22 cooperating with the set-nut 23 threaded on the valve stem 21 so as to regulate the pressure of the valve 19 on the seat, and likewise determine the degree of vacuum at which the valve will automatically release, as it is desirable to prevent the vacuum being forced beyond a certain degree.

While I might operate this release valve manually, I prefer to release it automati-

cally at any desired interval, and for this purpose I employ the automatic release mechanism to be described.

On the shaft 12, I secure a worm 24 which
 5 drives a worm gear wheel 25 secured upon the shaft 26 journaled in bearings 27 in the standards 28 secured to the base 10 and connected by a pair of cross-pieces 29 and 30. Upon the shaft 26 is splined a friction disk
 10 31, which coöperates with the friction surface of a cam disk 32 secured on the end of a shaft 33 journaled in bearings 34 secured on the pump casing or upon a pair of auxiliary standards 35. A helically
 15 coiled expanding spring 36 surrounding the shaft 33 between the hub of the cam disk 32 and the adjacent bearing 34 serves to press the cam disk 32 into the desired frictional engagement with the friction disk
 20 31. Upon the periphery of the disk 32 I locate one or more cams 37 which are adapted to engage the anti-friction roller 38 carried by the lever 39 fulcrumed at 40 in the standard 41 which may be formed integral
 25 with the upper half of the bearing 34. The other end of the lever 39 is pivotally connected at 42 with the upper end of the valve stem 21 so that, if a single cam projection 37 is employed, the vacuum will be released
 30 once at each rotation of the disk 32. As the speed of rotation of the disk 32 is governed by the position of the disk or roller 21 on the shaft 26, I have thus provided means for securing a very effective regulation of
 35 the length of the intervals between the release of the valve, always providing the motor is operating at a constant speed. To adjust and hold the disk or roller 31 in the desired positions, I preferably provide
 40 it with a hub 43 having an annular channel therein in which is located a sleeve 44 carrying a pair of radially projecting pins 45 extending into the slots 46 of the forked end of the lever 47 fulcrumed at 48 on the
 45 cross-piece 29. The other end of the lever 47 is provided with a bolt 48^a extending through a slot 49 in the cross-piece 30, which slot is curved about the fulcrum 48 as a center and is provided on one edge with the
 50 graduations 50 which may indicate the approximate duration in seconds of the intervals between the releases when a single cam lug is employed. A nut 51 threaded on the end of the bolt serves as a means of clamp-
 55 ing the lever 47 in any desired position of adjustment.

While the adjusting apparatus furnishes a wide range of adjustment, I may add thereto an additional range by providing
 60 additional cam lugs 37^a, which are arranged so as to be thrown into and out of operative position. For this reason, each of the lugs 37^a and preferably the lug 37, is provided with an ear 52, pivoted between the ears
 65 53 on the rear face of the disk 32 and a leaf

spring 54 is secured on the rear face of the disk in the same radial line with but toward the center from the lug 37^a so that the end of the spring 54 may coöperate with the recess 55 formed in the side of the lug 37^a for
 70 for that purpose. To hold the lug 37^a in its operative position against the centrifugal force tending to displace it, I locate in the disk adjacent it a spring-pressed plunger 56 which coöperates with the recess 57
 75 in the shank 58 of the lug 37^a.

The operation of my improved device will be readily apparent to those skilled in the use of vacuum massage apparatus, and it will be apparent that I can secure an almost
 80 instantaneous vacuum after each release and hold the same for whatever interval is desirable. By adjusting the nut 23, the extent of the vacuum can be controlled and thus no danger of injuring the tissues is present if
 85 the machine is properly manipulated.

I have herein shown and described a generic invention, but the claims herein are specific, the generic claims being found in my application No. 353,863, filed January
 90 24, 1920, which I expect to have issued on the same date as the present application.

While I have shown and described my invention as embodied in the form that I at present consider best adapted to carry out
 95 its purposes, it will be understood that it is capable of modifications, and 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.
 100

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

1. In a vacuum massage apparatus, the combination with a rotary pump adapted to be driven continuously in one direction,
 105 of a cup connected by a passage with the intake of the pump, a worm on the pump shaft, a worm wheel driven thereby, a shaft for the worm wheel, a friction wheel on the worm wheel shaft, a cam disk engaged by
 110 said friction wheel, and a lever connected to the relief valve and engaging the cam disk.

2. In a vacuum massage apparatus, the combination with a rotary pump adapted to
 115 be driven continuously in one direction, of a cup connected by a passage with the intake of the pump, a worm on the pump shaft, a worm wheel driven thereby, a shaft for the worm wheel, a friction wheel splined on the
 120 worm wheel shaft, a cam disk engaged by said friction wheel, a lever connected to the relief valve and engaging the cam disk, and means for adjusting and securing said friction wheel longitudinally on the shaft.
 125

3. In a vacuum massage apparatus, the combination with a rotary pump adapted to be driven continuously in one direction, of a cup connected by a passage with the intake of the pump, a worm on the pump
 130

shaft, a worm wheel driven thereby, a shaft
for the worm wheel, a friction wheel splined
on the worm wheel shaft, a cam disk en-
gaged by said friction wheel, a lever con-
5 nected to the relief valve and engaging the
cam disk, a lever engaging at one end an
annular groove in the friction wheel and at
the other end an index sector, and means for
securing the lever in any adjacent adjust-
10 ment.

4. In a vacuum massage apparatus, the
combination with a rotary pump adapted to
be driven continuously in one direction, of
a cup connected by a passage with the intake
15 of the pump, a worm on the pump shaft, a

worm wheel driven thereby, a shaft for the
worm wheel, a friction wheel on the worm
wheel shaft, a cam disk engaged by said
friction wheel, a lever connected to the relief
valve and engaging the cam disk, a plu- 20
rality of cams on the periphery of the disk,
and means for throwing some of said cams
out of operation.

In witness whereof, I have hereunto set
my hand and affixed my seal, this fourth day 25
of November, A. D. 1918.

HARVEY L. HOPKINS. [L. s.]

Witness:

JOHN HOWARD McELROY.