May 15, 1923.

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P. W. HOFFMANN

THERAPEUTIC VIBRATOR

Filed Aug. 24, 1921

Fig.1.

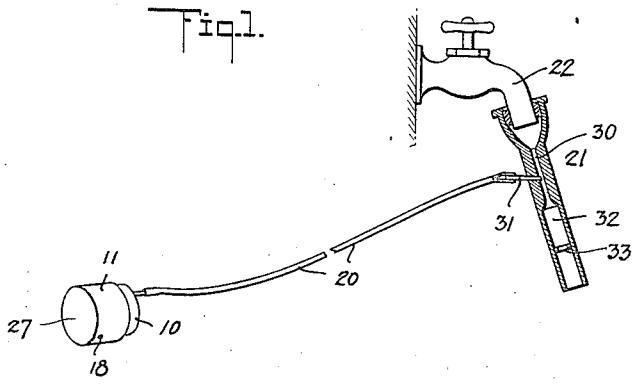


Fig.2.

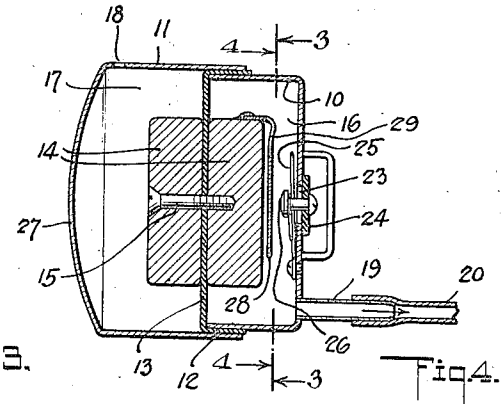


Fig.3.

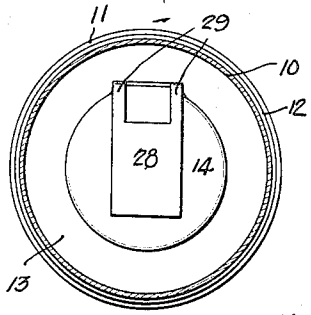


Fig.4.

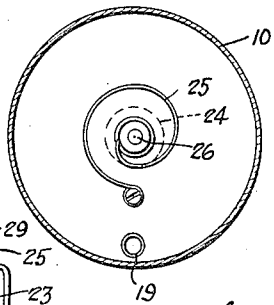
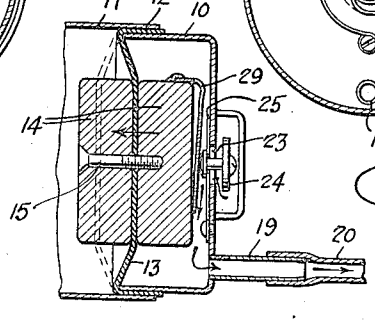


Fig.5.



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UNITED STATES PATENT OFFICE.

PAUL W. HOFFMANN, OF NEW YORK, N. Y.

THERAPEUTIC VIBRATOR.

Application filed August 24, 1921. Serial No. 494,819.

To all whom it may concern:

Be it known that I, PAUL W. HOFFMANN, a citizen of Germany, but having declared my intention of becoming a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Therapeutic Vibrators, of which the following is a specification.

This invention relates to surgical or therapeutic apparatus or instruments, and has particular reference to vibrators calculated for the relief of various nervous or other ailments or disorders.

Among the objects of this invention is to provide a vibrator of the character set forth that is of relatively simple mechanical construction and one which may be manufactured and sold at a reasonable price, and one which moreover is most effective in therapeutic action and which is practically indestructible.

A further object of the invention is to provide therapeutic vibrator of such a nature as to be adapted for use in practically any home as well as in the office of the average practitioner, because of the nature of the means for causing the vibratory movements or impulses of the contact member.

With the foregoing and other objects in view the invention consists in the arrangement and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed or suggested herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings, in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a diagram indicating my improved device in operative connection with an ordinary water faucet.

Fig. 2 is a vertical longitudinal section of the main part of my improvement, the parts being shown in normal or idle position.

Fig. 3 is a vertical transverse section on the line 3—3 of Fig. 2.

Fig. 4 is a view taken from the same plane as Fig. 3 but looking in the opposite direction.

Fig. 5 is a fragmentary view corresponding to Fig. 2, but indicating the valve open and with the weight at about its extreme position toward the valve.

Referring now more specifically to the drawings I show my improved vibrator as comprising a casing composed of inner and outer telescopic shell members 10 and 11, between the overlapping edges of which is gripped the edge 12 of an elastic diaphragm or weighted member 13. This diaphragm is practically imperforate and is weighted at its central portion by means of a heavy mass 14, shown as composed of two relatively thick disks of metal clamped to the opposite sides of the central portion of the diaphragm as by means of a screw 15 and whereby the weight is held suspended by the free portion of the diaphragm out of contact with any part of the casing. The weight is free to vibrate and reciprocate to and fro along the central axis of the casing so far as permitted by the resiliency of the free part of the diaphragm. When the weight thus reciprocates within the interior of the casing its momentum as it approaches the limit of movement in either direction causes a cushioned impulse to be imparted to the casing. Since the weight does not strike the casing at any time this impulse imparted to the casing is of a practically noiseless nature and causes the casing to vibrate with sufficient force for its purpose and yet without objectionable or dangerous pounding or hammering.

The interior of the casing is divided by the diaphragm 13 into two distinct chambers, a vacuum chamber 16, subject to successive variations in atmospheric pressure, and the chamber 17 in which there is practically a constant atmospheric pressure, this chamber being open to the atmosphere through any suitable port 18. This port may conveniently be regulated in size by the operator's finger or thumb while the device is in use, and hence with the variation in size of the port or the closing thereof the force of the vibration may be varied or reduced so as to make it materially milder than is ordinarily desired. In other words when the port 18 is closed the apparatus is adapted for practical operation but with a therapeutic manifestation much milder than when the port 18 is open.

Attached to and leading from any desired portion of the member 10 is a nozzle 19 for the attachment of any suitable flexible tube 20 whose other end is attached to a tubular extension 21 adapted to be detachably secured to any suitable water flow device such as an ordinary water faucet 22, and through

which extension 21 the flow of water from the open faucet 22 will cause the air suction toward the water flow and the creation of a partial vacuum or reduced atmospheric pressure within the vacuum chamber 16.

Except as above indicated the vacuum chamber is normally closed from the atmosphere, but I provide a vent 23 in the casing part 10, preferably in the axis of the device, and at 24 I provide a valve outside of said vent normally closing the same by a light spiral spring 25 secured on the inside of the casing and acting normally inward on the valve, bearing against the interior head 26 attached to the valve. This head 26 thus lies in the path of the weight, but the parts are so designed that it is never actually engaged directly by the weight. It is intended however for the valve to be opened by direct action of the weight while the weight is approaching the valve or moving toward the right as shown in the drawings.

As the mechanism is thus far described, the action may be briefly summarized as follows: The two chambers 16 and 17 both have the same condition of atmospheric pressure when idle. When the vacuum forming means is operated however the normal pressure in the chamber 16 is suddenly reduced causing the weighted diaphragm 13 to be drawn to or toward the position of Fig. 5, the port 18 being large enough to not materially interfere with such movement. This movement of the weight toward the right causes the free portion of the rubber diaphragm to be stretched, and the diaphragm is so designed as to strength as to cause the weight to be checked in its movement toward the right before it strikes the casing member 10. This action however is dependent upon the fact that before the weight can strike the casing the valve 24 will be opened, admitting atmospheric air into the chamber 16, breaking instantly and momentarily the suction therein caused by the suction mechanism, and permitting the tension of the diaphragm to throw the weight in the opposite direction toward the contact surface 27 of the casing, the surface intended to be held in contact with patient. When the weight thus travels away from the valve the valve will again be closed, as by the action of the spring 25, and, secondly, more firmly seated by the renewed vacuum impulse set up quickly after the valve is closed.

For the best results the valve head is not desired to be struck directly by the weight, among the reasons for which are the following: first, the valve should be as short as possible, and, secondly, the valve must be held open for the best results for a longer time than could be possible if the weight struck the valve head directly. I therefore provide what I term a valve opener 28 in the form of a flat strip resiliently connected at 29 to the weight. The normal position of the plate 28 is as shown in Fig. 2, slightly spaced from the end of the weight and also spaced from the valve head 26. When the suction impulse moves the weight suddenly toward the right the valve is opened by the valve opener striking the head 26 before the weight is brought to a stop by the tension of the diaphragm, and during the return reciprocation or movement of the weight toward the left immediately thereafter the valve is held open by the member 28 as much longer than it could be held open by direct contact of the weight as is represented by the relative movement between the weight and the plate 28, thus effecting the complete breaking of the vacuum and reducing the pressume in the chamber 16 while the weight is moving toward the left. Thus the successive reduction in the chamber 16 does not become effective until the weight approaches the contact surface 27 when it will be checked by the tension of the diaphragm in connection with the then effective vacuum.

Thus it will be understood that I have produced a relatively simple and reliable mechanical therapeutic vibrator adapted for practical operation and which may be operated successfully for a long period of time without requirement for readjustment or renewal, and also that the device is of a most pleasant nature therapeutically and one that may be readily varied in strength or effectiveness by the regulation of air flowing into one of the casing chambers.

The tubular member 21 for causing a partial vacuum in the chamber 16 is preferably made substantially as indicated, with a restricted bore 30 into about the center or axis of which a small air tube 31 projects at an angle of about 80° from said axis of the bore. Thus the end or point of the tube 31 is practically surrounded by the water as it flows through the restricted passage or bore 30. Below the restriction 30 the tube 21 is enlarged forming a cavity 32 of suitable capacity and this is restricted preferably by an annular member 33 about midway between the bore 30 and the lower end of the tube 21.

I claim:

1. In a therapeutic vibrator, the combination of a casing, an elastic rubber diaphragm extending across the interor of the casing, a two-part weight supported upon opposite sides of the diaghragm and movable with the diaphragm relatively to the casing, and means acting upon the diaphragm to cause such relative movement of the weight and diaphragm in one direction, the weight and diaphragm being movable subsequently in the other direction by the resiliency of the diaphragm.

2. In a therapeutic vibrator, the combination with a casing comprising two parts telescopically connected, an elastic imperforate diaphragm whose periphery is gripped between the two parts of the casing and thereby held extending across the interior of the casing dividing the casing into two chambers, one of which chambers is open to the atmosphere, a weight supported upon the diaphragm in spaced relation to the casing and movable relatively thereto to cause the casing to vibrate, and means to reduce the air pressure in the chamber not open to the atmosphere to initiate the movement of the diaphragm and weight in one direction, the weight being returned in the opposite direction by the inherent resiliency of the diaphragm.

3. In a therapeutic vibrator, a casing, an elastic rubber diaphragm stretched across the same between its ends, a weight attached to the diaphragm and held thereby from all contact with the casing, and means to reciprocate the weight in one direction from the plane of the diaphragm, such reciprocation being cushioned by the elasticity of the diaphragm and whereby the weight is reciprocated in the opposite direction in alternation causing vibration of the casing.

4. A device as set forth in claim 2 in which the latter mentioned chamber not normally open to the atmosphere is fitted with a normally closed valve opened by the weight as it approaches the end of its movement in one direction.

5. A device as set forth in claim 2 in which the latter mentioned chamber is provided with a normally closed valve and the weight carries a resilient valve opener, whereby the valve is held open longer than if engaged directly by the weight.

In testimony whereof I affix my signature.

PAUL W. HOFFMANN.