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PERCUSSOR AND VIBRATOR

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This invention relates to an instrument that is adapted for the treatment of human beings; and especially to a device that operates by impact against various portions of the body.

Of late years, it has been quite common to relieve or cure ailments by the application of mechanical forces or vibrations; and in fact many physicians make a specialty of this form of treatment, that is conveniently designated as mechano-therapy. One form of a mechanical device that is used for such purposes is known as a vibrator; this instrument produces rapid, although somewhat gentle, blows upon the body. In many instances, it is advantageous to produce more violent or forceful blows, or percussions. It is one of the objects of our invention to make it possible to adjust the force of the vibrations at will, and in a very simple manner; in fact, with the aid of our invention, the degree of vibration can be adjusted while the apparatus is in use, and in a gradual manner.

It is another object of our invention to improve in general vibrators or percussors of this character, and to make them light and readily portable.

Our invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of one embodiment of our invention. For this purpose we have shown a form in the drawings accompanying and forming part of the present specification. We shall now proceed to describe this form in detail, which illustrates the general principles of our invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of our invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is an external front view of a vibrator and percussor constructed in accordance with our invention;

Fig. 2 is a side view, mainly in section, of the apparatus shown in Fig. 1;

Fig. 3 is a fragmentary sectional view, taken along plane 3-3 of Fig. 2;

Fig. 4 is a sectional detail view, taken along plane 4-4 of Fig. 2; and

Fig. 5 is a view of an alternative form of attachment that may be used in our instrument.

The motive power for the instrument is shown in this instance as a small electric motor 11, substantially entirely enclosed, and having the electric leads 12 by the aid of which it can be connected to an appropriate source. This motor is operatively connected with a train of gearing or the like, whereby its speed may be translated to the desired value, for imparting rapid axial movement to a rod or shaft 12. This gearing in the present instance is supported in a housing 13 which is appropriately fastened to the motor 11.

The pinion 14, fastened to the shaft 15 of the motor 11, extends through a wall of the housing 13, and meshes with a gear 16, fastened to shaft 17. This shaft is journaled in frame 18, and also carries a pinion 18, which is rigidly fastened to the shaft. This pinion is in mesh with a large gear 19, fastened to the main operating shaft 20. This shaft is journaled in frame 13, and extends through the wall thereof. At its free end, or extended, it carries a double arm 21, at each end of which is fastened a roller shaft 22, as by riveting. Each of these shafts has journaled thereon a roller 23. It is evident that as the motor 11 rotates, both rollers 23 will be given a planerary motion about the axis of shaft 20. These rollers can be made from durable material, such as steel, and serve to impart, in a manner to be hereinafter described, the axial movement to shaft 12.

Before proceeding further with the mechanism whereby this result is obtained, it is advisable to describe the manner in which shaft 12 is supported. For this purpose, the frame 13 has a tubular extension 24, extending upwardly, and another tubular extension 25, extending downwardly. This extension serves as a sliding guide for the bottom portion of shaft 12. The top portion of the shaft 12 is also guided, as by the aid of an aperture 26 in the shaft, which slides over a relatively stationary post 27. This post is formed in this instance integrally with a screw 28, adjustably threaded in a cap 29, in turn thread-
ed over the tubular extension 24, permitting it to be readily set at any desired position, for a purpose to be hereinafter explained. Furthermore the cap 29 has a corrugated handle portion 31 by the aid of which the instrument can be held in operative position. A hanger or strap 32 is indicated for mechanically supporting the device when necessary.

In Fig. 2, the shaft 12 is shown as in its uppermost position, it being lifted against the force of a spring 33 by one of the rollers 23. The lower end of this spring rests in a groove 34 (Fig. 4) formed on a collar 35, fastened as by set screws 36 to shaft 12.

The degree of compression of spring 33 can be adjusted by the aid of thumbscrew 28, which carries a collar 37 at the end of its threaded portion, and which has a groove in its lower face for seating the upper end of spring 33. The rollers 23 are arranged to operate against a member 38 of resilient or fibrous material. This member is fastened in a groove in the lower face of projection 39 shown in this instance as integral with collar 35 (Figs. 3 and 4). It is evident that as the rollers 23 rise, they urge collar 35 upwardly, and store energy in spring 33 by compressing it against collar 37. As the rollers 23 fall, this energy is released, and shaft 12 is forced rapidly to its lowest position, indicated in Fig. 3. By varying the spring compression by screw 28, the force exerted on shaft 12 can be adjusted.

A cover plate 40 is screwed over a front opening in frame 13. A projection 41 on member 39 is used to contact with the inner surface of this plate and to keep the member 39 in proper alignment with the rollers 23.

The lower end of shaft 12 is provided with a head 42, adapted to contact with an attachment or applicator 43, made of soft rubber or the like, and adapted to contact with that portion of the body which is to be treated. This attachment is threaded into a hollow tube 44 telescoping over tube 25. The impact from head 42 drives attachment 43 downwardly. The extent of motion is limited by the aid of a slot, 45 in tube 44, which coacts with the head of the stationary screw 46 in tube 25. Furthermore a compression spring 47 is interposed as a buffer between collar 48 on tube 44 and the bottom of frame 13.

In order to prevent too great a travel of shaft 12, a collar 49 is provided, through which this shaft operates. It is adjustably supported on the inside of cover 40, as by the aid of a thumbscrew 50 and a washer 51. This screw can fasten the collar 49 in any desired vertical position, within the limits of a slot 52 in cover 40. The collar carries one or more buffer washers 53 of fibrous or resilient material, arranged to muffle the impact of collar 53 in case it should move too far down. Ordinarily, however, these washers are not brought into use, since they are provided only as a safety measure to insure against improper excessive movement.

The attachment 43 can be made of any desired form; in fact, several different attachments can be used with each device. For example, in Fig. 5, we illustrate a cylindrical attachment that can be substituted for member 43.

The fact that the attachment 43 is capable of independent vertical movement, by the aid of its telescopic support 44, is of importance. When comparatively weak vibrations are desired, the attachment is urged strongly against the body, spring 47 is compressed, and the amount of free movement of shaft 12 is relatively small, the head 42 impacting upon the top of the attachment with little lost motion. When percussive effects are desired, the spring 47 is allowed to expand, and shaft head 12 gains momentum before it hits attachment 43, thereby giving a strong blow. It is thus seen that merely by manually varying the pressure with which the instrument is applied, a ready and instant variation in the force of the blows or vibrations can be secured. This is due to the variation in the relative position of the attachment and the reciprocatory rod or shaft 12. This adjustment of pressure is capable of fine variation, so that all classes of service can readily be taken care of. Furthermore, tube 44 has considerable clearance over extension 25, so that instrument 43 is permitted a limited lateral freedom. This is important, for the device can then easily adjust itself to the requirements of the treatment.

We claim:
1. A vibrator comprising a source of motion, a projection driven in a planetary path by said source, a reciprocatory rod, a member fastened to said rod and in the path of planetary movement of said projection, a spring for urging the rod in a direction opposite to that which it is moved by the projection, one end of said spring resting on said member, a screw for adjusting the compression of the spring at its other end, an extension for the screw acting as a guide for the rod, a tubular guide for the other end of the rod, an adjustable stop for limiting the movement of the rod, a telescopic member movable over the tubular guide and arranged to receive impacts from the rod, and resilient means for urging the telescopic member in the same axial direction as the movement of the rod when acted on by the compression spring, whereby upon urging said telescopic member with variable pressure against the part treated, the extent of free movement of the rod before it strikes the telescopic member is controlled.
2. A vibrator comprising a casing having
a tubular extension, a reciprocatory rod slidable in said extension, a telescoping tubular device arranged over the extension, an applicator carried by said device, and arranged to be struck by the rod, a compression spring arranged between the casing and the telescoping device for resiliently urging said device away from the rod, and means for reciprocating said rod.

3. A vibrator comprising a casing, a reciprocatory rod slidably supported by said casing, a spring urging said rod in one axial direction, an applicator also movably supported by said casing in line with the rod, the spring urging said rod toward the applicator to strike it, means for alternately moving the rod against the action of the spring to move the rod away from the applicator for storing energy in the spring, and to release said rod, and resilient means acting on the applicator urging it away from the rod, for providing axial adjustment of said applicator with respect to said rod.

4. A vibrator comprising a casing, a reciprocatory rod slidably supported by said casing; a spring urging said rod in one axial direction, means in said casing providing a source of rotary motion, means whereby said motion alternately causes the spring to be compressed by moving the rod against the action of the spring, and to release said rod, an applicator also movably supported by said casing in line with the rod, the spring urging said rod toward the applicator to strike it, and means resiliently acting on the applicator for providing axial adjustment of said applicator with respect to said rod, said resiliently acting means urging the applicator away from the rod.

5. A vibrator comprising a reciprocatory rod, a spring urging said rod in one axial direction, means acting axially on the rod alternately to compress and to release said spring, an applicator arranged to be struck by said rod when the spring is released, and resilient means acting on the applicator urging it away from the rod, for providing axial adjustment of said applicator with respect to said rod.

6. In a vibrator comprising a reciprocatory rod, a spring urging said rod in one axial direction, means acting axially on the rod alternately to compress and to release said spring, an applicator arranged to be struck by said rod when the spring is released, means providing a loose guide for the applicator to permit lateral motion, and resilient means acting on the applicator urging it away from the rod, for providing axial adjustment of said applicator with respect to said rod.

In testimony whereof we have hereunto set our hands.

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