

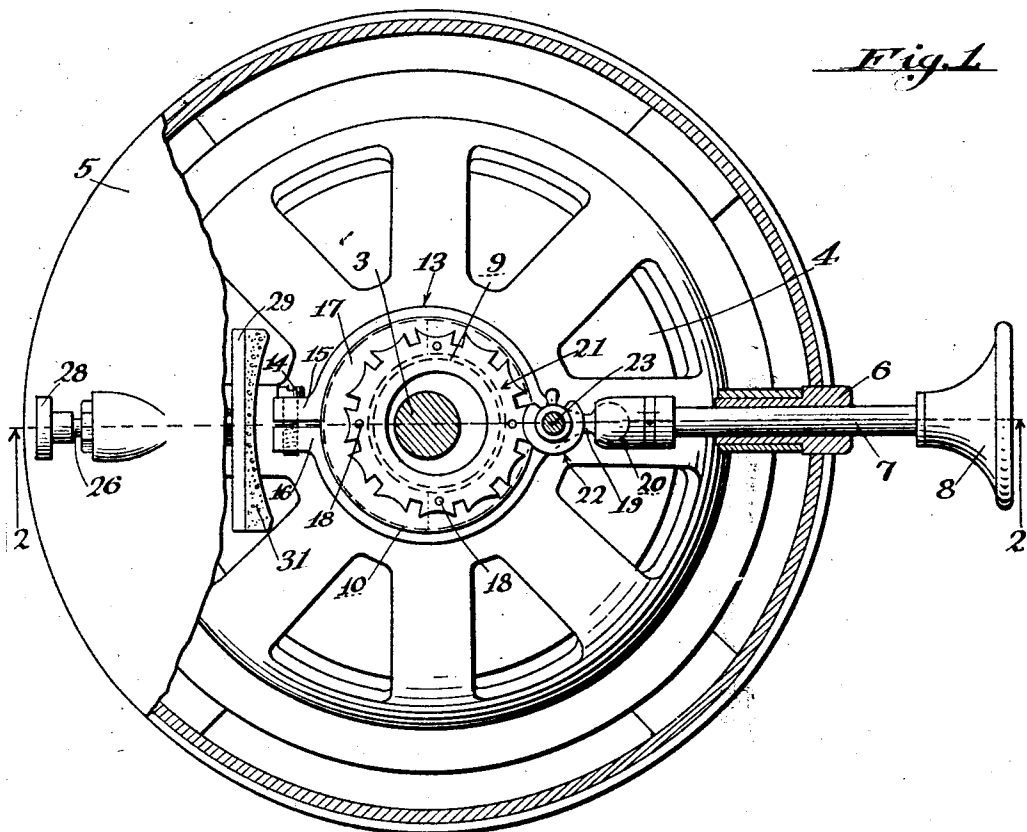
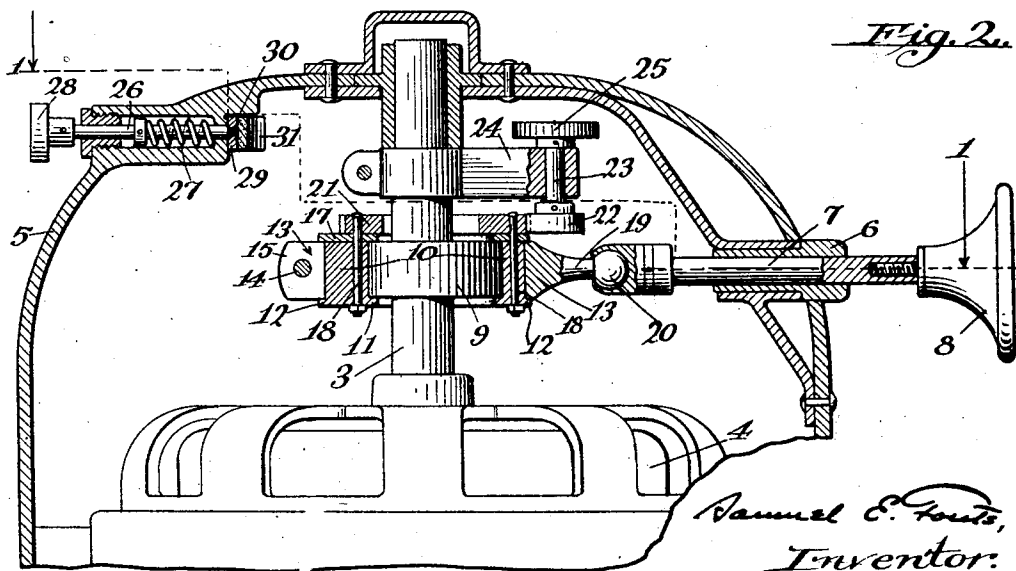
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VIBRATOR

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UNITED STATES PATENT OFFICE.

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VIBRATOR.

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This invention relates generally to devices having vibrating parts and to the means thereof for varying the amplitude of vibration of such parts. Although the invention is not limited thereto, it is designed with special reference and is shown as applied to those devices or instruments which are known as vibrators and which are intended primarily for massaging purposes.

In the ordinary type of vibrator, the applicator is moved by an eccentric which has a definite and unvarying throw. This throw may be sufficient or even excessive for treatment of some of the more sensitive organs of the body and yet be entirely insufficient for some other organs which are more deeply seated.

As applied to vibrators, therefore, it is the object of this invention to make possible the variation of the amplitude of vibration of the applicator at will and in accordance with the nature, sensitiveness and location of the organ undergoing treatment and to effect this variation without stopping the operation of the vibrator. This variation is effected by changing the throw of the eccentric mechanism, the means used for this purpose being of such a nature as will maintain such mechanism locked against further change except as the said means is positively actuated.

While it is realized that the above stated results may be accomplished by various forms of mechanisms, that shown in the accompanying drawings is my present preferred form, although the appended claims are not intended to be limited thereto any farther than their specific terms and the prior state of the art necessitate.

In the drawings, Fig. 1 is a view, partly in elevation and partly in section, on the line 1—1 of Fig. 2, showing the means employed for varying the effective throw of the eccentric mechanism; and Fig. 2 is a section taken on the line 2—2 of Fig. 1.

Taking up a detailed description of the invention by reference to the drawings, 3 is a shaft which may be rotated by any suitable means. In the embodiment shown, it is the shaft of the armature 4 of an electric motor. The drawings show only part of the complete device, it being understood that the casing 5 has a complementary part so as completely to encase the motor and the other actuating mechanisms.

Extending through a suitable bearing 6 in the casing is the operating stem 7 of the

applicator 8, which latter may be any one of the several forms usually furnished with devices of this character. The said stem and applicator are reciprocated by the motor through the variable eccentric mechanism now to be described.

Upon the shaft 3, and preferably integral therewith, is the main eccentric 9; and, surrounding this eccentric, is the auxiliary eccentric 10. The latter is adapted to be turned about the eccentric 9 into any angular position. As shown in Fig. 2, the thickest parts of the eccentrics extend in opposite directions. In other words, the throw of eccentric 9 is to the right while that of the auxiliary eccentric is to the left. When in these relative positions, the two eccentrics tend to neutralize each other; and if the eccentricity of one is exactly equal to that of the other, the neutralization is complete and the eccentricity as a whole is nil. By turning the eccentric 10 about the main eccentric from the position shown, the eccentricity as a whole is gradually increased until, when the throw of both eccentrics is in the same direction, the resultant eccentricity is substantially double that produced by either eccentric alone.

The auxiliary eccentric is preferably provided with integral flanges 11 and 12, the former extending slightly over one end of the main eccentric and the latter flange serving to hold the eccentric strap 13 in position. This strap encircles the auxiliary eccentric and is adjustable about the latter by a screw 14 which passes through a lug 15 on one end of the strap and threads into a similar lug 16 on the other end thereof. On the side of the auxiliary eccentric opposite the flanges 11 and 12 there is an annular plate 17 which overlaps the main eccentric and the strap and holds the parts in position, the plate being secured to the eccentric by pins or rivets 18, as shown. The eccentric strap is provided opposite the lugs 15 and 16 with a stem 19 which has a ball or head 20, the same forming part of a universal joint with the stem 7 of the applicator.

Upon the annular plate 17, and secured thereto by the rivets or pins 18, is the annular driven gear 21 of a Geneva stop, the driving gear 22 of which is secured upon the adjacent end of a short shaft 23. This shaft extends parallel to the motor shaft 3, being carried by the latter through an arm 24 which is clamped or otherwise secured to the motor shaft. The shaft 23 is journaled in the arm

and moves in an orbit about the motor shaft. Thus, the shaft 23 always occupies the same position with respect of the main eccentric 9, the drawings showing the shaft and the 5 thickest part of the eccentric on the same side of the motor shaft, although the arm could be made slightly shorter if it projected in the opposite direction. However, the relative positions of the arm and eccentric are not ma- 10 terial. As will be well understood from the nature of the Geneva stop, one complete rotation of the driving gear 22 serves to turn the annular gear 21 an angular distance cor- responding to the arc between two of its ad- 15 jacent teeth. This movement of the gear 21 is, therefore, slow and intermittent; and it would be intermittent even if the driving gear were continuously rotated. But the latter gear is rotated only when it is desired to 20 change the amplitude of vibration, and its rotation is intermittent also. To rotate the driving gear, the short shaft 23 is provided on that end which is opposite the gear 22 with a small disk or wheel 25, the same being 25 secured to the shaft and being preferably milled or otherwise roughened about its per- imeter. This disk is, therefore, adapted both for rotation with its shaft 23 and for revolu- tion about the motor shaft 3.

30 Mounted for reciprocation in the casing 5 is a device for causing rotation of the disk 25 and consequent adjustment of the eccentric 10. It comprises a plunger 26 which is nor- mally retained in its outer position by a coiled 35 spring 27. On its outer end it is provided with a push button or head 28 and, on its inner end within the casing, with a plate 29. As shown in Fig. 2, this plate moves substan- tially in contact with a shoulder or abutment 40 30 of the casing whereby it is prevented from tipping or the plunger from rotating. This plate is in the plane of the orbit of the disk 25. On its inner side and facing the orbit is a pad 31 of readily compressible material, 45 such as rubber. As will be noted by reference to Fig. 1, the inner surface of the pad is con- caved on a radius which is greater than the radius of the orbit of the outer rim of the disk 25.

50 Normally, the pad is retracted by the spring 27 so as to be out of contact with the rapidly revolving disk. When the plunger is de- pressed slightly, however, the disk is caused to roll against the central part only of the 55 pad and to rotate slightly, thus turning the driving gear 22 of the Geneva stop. If it be desired to adjust the eccentrics more rapidly, the plunger is depressed farther, whereby the disk is caused to roll upon a longer arc of 60 the pad, the latter yielding under the pres- sure of the disk.

By the means thus described, the auxiliary eccentric may be shifted slowly about the main eccentric as the vibrator is operated and 65 the adjusting action may be stopped at any in-

stant by releasing the plunger. The ampli- tude of vibration may thus be regulated and the eccentric may be maintained positively in any position of adjustment, since the Geneva 70 gearing serves to lock the eccentrics against relative movement except as the disk 25 is ro- tated. The annular gear 21 may be provided with as many teeth as may be necessary to cause the same to turn slowly even though the rotation of the armature shaft be rapid. 75 Further exactness of adjustment may be ef- fected by depressing the plunger 26 but slight- ly so as to bring but a short portion of the arc of the pad into position for contact with the disk. Whether the eccentrics be set for 80 small or large amplitude of vibration, the di- rection of thrust applied to the stem 7 of the applicator is substantially radial from the motorshaft at the instant of greatest resist- ance which comes at or near the end of the 85 outer movement of the applicator.

The arm 24, disk 25, shaft 23 and gear 22 are small and light and have but a slight tendency to unbalance the armature as a whole. If exact balance be desired, the same 90 may obviously be secured by counter balanc- ing, as by making the lugs 15 and 16 and the screw 14 heavy enough for that purpose.

I claim:

1. In a vibrator, a rotatable shaft, a main 95 eccentric connected with said shaft, an aux- iliary eccentric mounted upon and encircling the main eccentric, a vibratory part, connec- tions between the auxiliary eccentric and said part for vibrating the latter as the shaft 100 is rotated, a driven member of a Geneva stop secured to the auxiliary eccentric, a driving member of the Geneva stop meshing with the driven member thereof, means for support- ing said driving member from the rotatable 105 shaft, and means for turning the said driving member upon its own axis to adjust the aux- iliary eccentric about the main eccentric.

2. In a vibrator for the purpose described, a rotatable shaft, a main eccentric on said 110 shaft, an auxiliary eccentric encircling the main eccentric, a vibrating applicator con- nected with the auxiliary eccentric, and means operable at will for causing the rota- tion of said shaft to effect movement of the 115 auxiliary eccentric about the main eccentric whereby to regulate the amplitude of vibra- tion of said applicator.

3. In a vibrator for the purpose described, a casing, a rotatable shaft, a main eccentric 120 on said shaft, an auxiliary eccentric encir- cling the main eccentric, a vibratory appli- cator connected with the auxiliary eccentric, means supported from the rotatable shaft for turning the auxiliary eccentric upon the main 125 eccentric, and a device mounted upon the casing and operable at will to cause the said means to operate, whereby the amplitude of vibration of the applicator is regulated.

4. In a vibrator, a casing, a rotatable shaft 130

within the casing, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, a vibrating member connected with the auxiliary eccentric, a Geneva stop device having its driven element connected with the auxiliary eccentric, and means mounted upon the casing and operable at will to cause operation of the Geneva stop device thus to turn the auxiliary eccentric upon the main eccentric to regulate the amplitude of vibration of the vibrating element.

5. In a vibrator, a casing, a rotatable shaft within the casing, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, a vibrating member connected with the auxiliary eccentric, the driven element of a Geneva stop device connected with the auxiliary eccentric, a shaft supported from the rotatable shaft and revoluble in an orbit about the latter, the driving element of the Geneva stop device secured to said revoluble shaft and meshing with the said driven element, and means mounted upon the casing and operable at will to cause the rotation of the revoluble shaft thus to turn the auxiliary eccentric upon the main eccentric, for the purpose specified.

6. In a vibrator for the purpose described, a casing, a rotatable shaft, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, a vibrating applicator connected with the auxiliary eccentric, a device mounted upon the casing and movable at the will of the operator, and connections between said device and the auxiliary eccentric for causing the latter to be adjusted about the main eccentric when said device is moved, whereby the amplitude of vibration of the applicator is varied.

7. In a vibrator, a casing, a rotatable shaft, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, a vibrating member connected with the auxiliary eccentric, a disk supported from the rotatable shaft and revoluble in an orbit about the latter, a device mounted upon the casing and movable at the will of the operator into position to contact the disk as it revolves whereby the latter is turned upon its own axis, and means connecting the disk and the auxiliary eccentric for turning the latter upon the main eccentric, for the purpose specified.

8. In a vibrator, a casing, a rotatable shaft, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, a vibrating member connected with the auxiliary eccentric, a disk supported from the rotatable shaft and revoluble in an orbit about the latter, a shaft to which said disk is non-rotatably secured, a Geneva stop device connecting the latter shaft with the auxiliary eccentric, and means supported from the casing and movable at will into position for contacting the disk as it revolves in its orbit whereby the auxiliary eccentric is adjusted

about the main eccentric, for the purpose specified.

9. In a vibrator, a casing, a rotatable shaft, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, a vibrating member connected with the auxiliary eccentric, a disk supported from the rotatable shaft and revoluble in an orbit about the latter, an element supported from the casing and elongated in the plane of said orbit, means whereby said element may be moved at will into position for contacting the disk as it revolves in its orbit, and means connecting the disk and the auxiliary eccentric for turning the latter upon the main eccentric, for the purpose specified.

10. In a vibrator, a casing, a rotatable shaft, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, a vibrating member connected with the auxiliary eccentric, a disk supported from the rotatable shaft and revoluble in an orbit about the latter, a pad of yieldable material supported from the casing in the plane of said orbit, means whereby said pad may be moved at will into position for contacting the disk as it revolves, and means connecting the disk and the auxiliary eccentric for turning the latter upon the main eccentric, for the purpose specified.

11. In a vibrator, a casing, a rotatable shaft, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, a vibrating member connected with the auxiliary eccentric, a disk supported from the rotatable shaft and revoluble in an orbit about the latter, a pad of yieldable material supported from the casing and elongated in the plane of said orbit, said pad being concaved on its face toward the orbit on a radius greater than the radius of the orbit, means whereby the said pad may be moved at will into position for contacting the disk as it revolves in its orbit whereby the disk is caused to roll upon the pad, and means connecting the disk and the auxiliary eccentric for turning the latter upon the main eccentric, for the purpose specified.

12. In a vibrator for the purpose described, a rotatable shaft, a main eccentric on said shaft, an auxiliary eccentric encircling the main eccentric, an applicator, connections between the auxiliary eccentric and the applicator, and means operable at will for causing the rotation of said shaft to effect an adjustment between the main and the auxiliary eccentrics for varying the amplitude of movement of the applicator.

13. In a vibrator for the purpose described, a casing, a rotatable shaft journaled in said casing, a main eccentric rigidly attached to said shaft, an auxiliary eccentric mounted upon and encircling the main eccentric, an applicator, connections between the auxiliary eccentric and said applicator for moving the

latter as the shaft is rotated, and means extending between the main and auxiliary eccentrics for varying the amplitude of movement of the applicator.

- 5 14. In a vibrator for the purpose described, a casing, a rotatable shaft journaled in said casing, a main eccentric rigidly attached to said shaft, an auxiliary eccentric mounted upon and encircling the main eccentric, an
10 applicator, connections between the auxiliary eccentric and said applicator for moving the latter as the shaft is rotated, a manually operable controlling device extending without the casing, and means connected with the
15 auxiliary eccentric and actuated through the controlling device when it is operated for

causing the auxiliary eccentric to be turned about the main eccentric, whereby the amplitude of movement of the applicator is varied. 20

15. A vibrator as defined in claim 14 in which the means connected with the auxiliary eccentric and actuated through the controlling device when it is operated comprises self-locking gearing, whereby the auxiliary eccentric is thereby positively locked to the main
25 eccentric in all positions to which it may have been moved.

In testimony whereof I have signed my name to this specification. •

SAMUEL E. FOUTS.