

May 25, 1937.

H. MUELLER ET AL

2,081,365

FOOT VIBRATOR

Filed Nov. 16, 1934

2 Sheets-Sheet 1

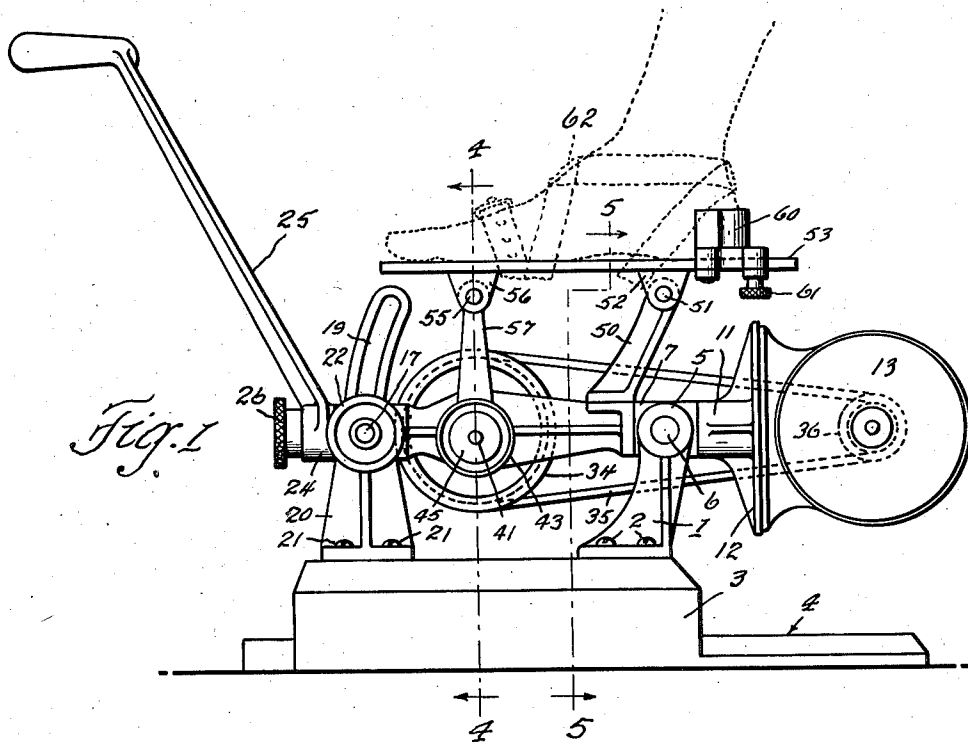
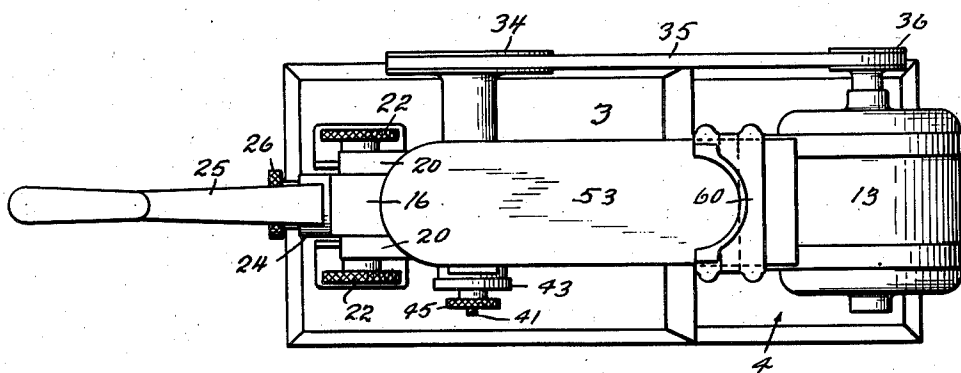


Fig. 2

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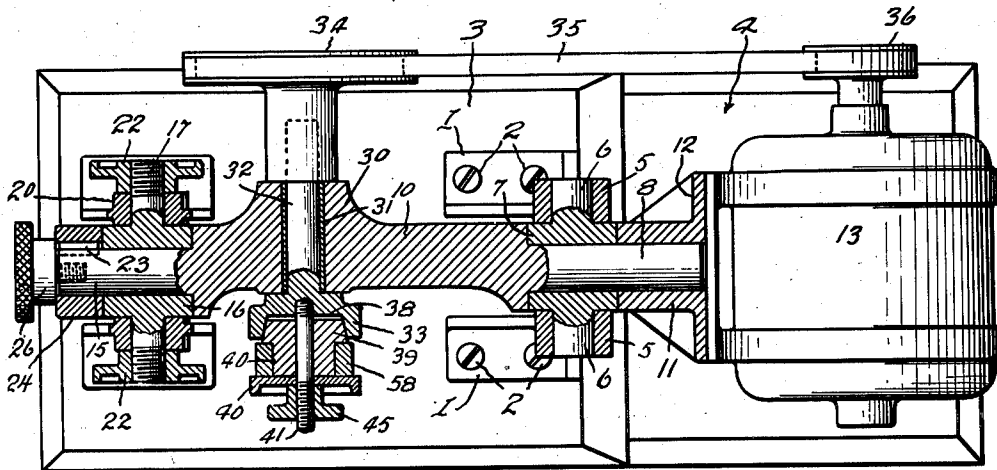


Fig. 3

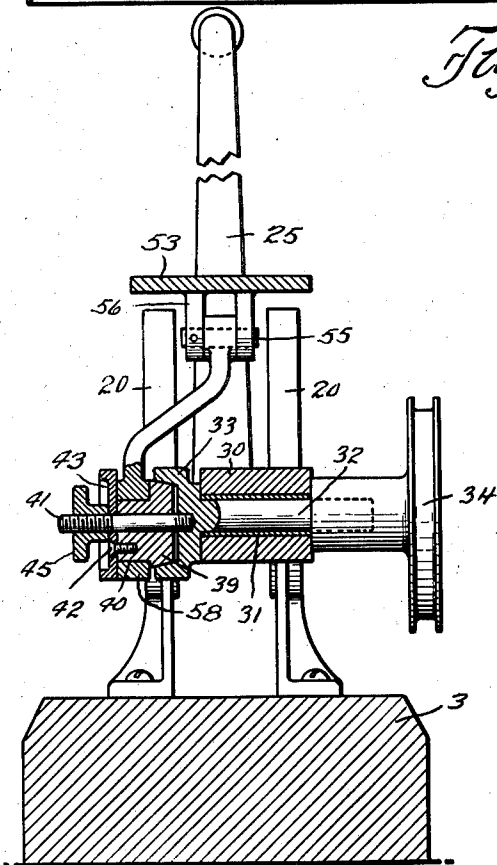


Fig. 4

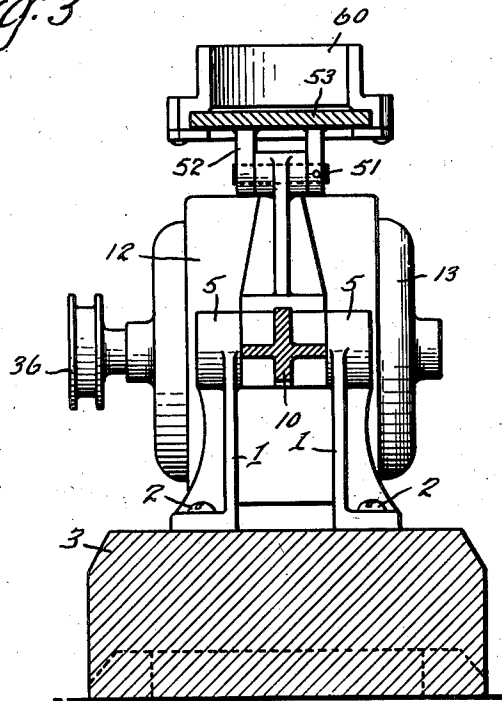


Fig. 5

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2,081,365

FOOT VIBRATOR

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16 Claims. (Cl. 128—25)

This invention relates generally to that class of machines or apparatus used for massaging or exercising parts of the human body, and more particularly to a device for imparting vibratory motion to a person's foot, or to the foot and lower leg, in the treatment of joint stiffness, strained ligaments, and other common foot ailments; in the correction of minor deformities due to bone dislocations or undeveloped muscles or tendons; for stimulating circulation, and relieving muscular and nervous fatigue.

The benefits derived from vibratory treatment are too well known to require a review thereof in this connection. However, from the following disclosure, the nature and the extent or range of the remedial treatment possible of attainment through the use of the invention will be evident to those acquainted with the subject involved.

Among the fundamental objects of the invention are the provision of a machine for imparting vibrations to the foot, or to the foot and adjacent portion of the leg, at the same time permitting the foot to be rocked in various directions so as to distribute the effects of the vibrations according to the requirements of the particular case under treatment; to provide means for changing and controlling the magnitude of the vibratory reciprocations; to provide means for rocking the foot to any desired extent in different directions within reasonable limits while the foot is being vibrated; and to provide further means for holding the foot in any angular position of adjustment during vibration.

Another object of fundamental nature is to provide apparatus incorporating power driven means for vibrating the foot, and manually operated means for rocking the foot, whereby the application of the mechanical vibrations to a patient's foot may be carefully and accurately controlled by a physician in accordance with his knowledge of how best to effect remedial therapy. In other words, it is an object of the invention to provide a machine of the character set forth that is semi-automatic and semi-manual so that rhythmic vibratory motion of desired force is assured and an intelligent application of it made possible.

A more limited object of the invention is to provide a power driven foot vibrator incorporating an adjustment for varying the magnitude of the vibrations to any desired degree between zero and a practical maximum length of stroke; to provide, in such a device, means for accommodating the machine to feet of different sizes; to provide means for holding the foot in different posi-

tions with respect to the center of vibration so as to change the effect of the vibratory action; and to include means by which the foot may be rocked independently of but simultaneously with the vibratory motion in directions vertically and transversely of the foot so that the effect of the vibrations may be distributed to selected parts of the foot, as to certain ligaments, muscles, tendons, joints, etc.

Other objects comprehended by the invention, and which relate more to structural features, are the provision of a relatively simple and inexpensive mechanism that is compact, durable and efficient, and that is convenient of use and may be adjusted to the requirements of the individual patient so as to obviate any discomfort.

The foregoing objects, with others hereinafter appearing, are attained in the embodiment of the invention illustrated in the accompanying drawings wherein Fig. 1 is a side elevation of our improved foot vibrator; Fig. 2 is a plan view thereof; Fig. 3 is a horizontal section substantially on the center line of the frame; and Figs. 4 and 5 are vertical sections on the respective lines 4—4 and 5—5 of Fig. 1.

Turning to a detailed description of the invention by the use of reference numerals, 1 designates standards that are secured, as by screws 2, to one end of an elevated portion 3 of a base 4. Journaled within bearings 5 of the standards 1 are trunnions 6 of a support 7 within a central bore of which is mounted for oscillation a cylindrical extension 8 of a frame 10. The extension 8 projects a material distance beyond the rear end of the support 7 and there has fastened to it a boss 11 of a bed plate 12 to which an electric motor 13 is secured with its shaft disposed transversely of the machine.

Journaled upon a cylindrical extension 15, that projects from the forward end of the frame 10 in axial alignment with the before mentioned extension 8, is an adjusting head 16 having laterally extending threaded studs 17 that project through slots 19 of guides 20. These guides are mounted upon the forward end of the base and are shown as secured thereto by screws 21. It is evident from the description thus far that the frame 10 may be rocked on the axis of the trunnions 6 a distance permitted by the length of the slots 19 of the guides 20, and it may be locked in any position within this range of movement by nuts 22 that are applied to the studs 17 and between which and the head 16 the guides 20 are adapted to be clamped. Secured, as by a key 23, to the portion of the extension 15 that projects beyond the adjusting

head 16 is the hub 24 of a handle 25; and screwed into a tapped hole in the end of the extension 15 is the threaded shank of a clamping screw 26, preferably formed with a knurled head. With the previously mentioned nuts 22 loose upon the studs 17, the forward end of the frame 10 may be raised and lowered to any desired position by means of the handle 25 and, as already pointed out, locked in such position by said nuts 22. The handle 25 also serves as a means for rocking the main frame 10 in a transverse direction on the common axis of its extensions 8 and 15, and the frame may be secured in any position to which it is thus rocked by tightening the screw 26, thereby to clamp the frame, through the intervention of the hub 24, to the head 16.

Near its forward end the frame 10 is formed with a transverse bearing 30 shown as equipped with a bushing 31 and in which is journaled a shaft 32. One end of the shaft carries a disk 33 and to the opposite end of the shaft is keyed or otherwise secured a pulley 34. A belt 35 is engaged about the pulley 34 and a smaller pulley 36 that is fastened to the corresponding end of the shaft of motor 13. The disk 33 is formed with a conical recess 38 for the reception of a similarly shaped head 39 of an eccentric 40, said recess being off center with respect to the shaft 32 the same distance that the eccentric is off center with respect to the head 39. The eccentric has a bore that is central of the head 39 for the reception of a stud 41 that projects from the disk 33 centrally of the recess 38. Fastened, as by a screw 42, to the eccentric 40 is an eccentric adjusting hand wheel 43 provided with an aperture for the passage of the stud 41, and operating upon the threaded outer end of said stud is a knurled lock nut 45. By loosening said nut the hand wheel 43 may be rotated about the stud to swing the eccentric 40 between a position in which it is in axial alignment with the shaft 32 and wherein its throw is nil and a position 180° therefrom wherein its throw is greatest. It is evident from this that the eccentric is susceptible to an exceedingly fine adjustment between these two limits.

Secured to the frame 10 immediately in front of the support 7 is a bracket 50. This bracket extends upwardly and rearwardly so that its upper end is well spaced toward the rear of the frame, and carried by the upper end of said bracket is a transversely disposed pivot pin 51 whose ends occupy holes in laterally spaced lugs 52 that depend from a foot support 53. Journaled upon a wrist pin 55 supported by and between laterally spaced lugs 56 that depend from the forward end of the foot support is the eye of a connecting rod 57 whose lower end is formed with a bearing 58 that is journaled on the eccentric 40. Adjustable along the rear end of the foot support 53 is a heel rest 60, and the same is adapted to be clamped to the support, in any position to which it is adjusted, by a set screw 61.

In the use of the machine, the patient's foot is placed upon the support 53, as indicated in dotted lines in Fig. 1, and, if desired, or the nature of the treatment to be rendered requires it, the foot may be secured to the support by a strap 62, also shown in dotted lines. The foot is positioned longitudinally of the support 53, through a proper adjustment of the heel rest 60, according to the kind of treatment desired. Any shifting of the foot in the direction aforesaid,

thereby to change the relation between the ankle and the axis on which the support vibrates (such axis being that of the pivot pin 51) will change the character of the treatment, as will be readily understood. The electric motor 13 is of any approved variable speed type and may be controlled through the usual means provided for such purpose, the same being omitted from the drawings. With the motor in operation, the shaft 32 will be driven to operate the eccentric 40 so as to vibrate the foot support through the intervention of the connecting rod 57. It is evident that the magnitude of the vibratory reciprocations may be changed by loosening the nut 45 and adjusting the eccentric through the medium of the hand wheel 43, as above explained. Also, by loosening the screw 26, the frame 10 may be rocked toward the right or left by means of the handle 25, thereby to distribute the effects of the vibrations to different parts of the foot. The frame may be locked in any position to which it is thus rocked by the screw 26. Again, by loosening the nuts 22, the forward end of the frame 10 may be raised and lowered by the handle 25 to further change the character of the action upon the foot, and then by means of said nuts 22, it may be locked in any position to which it is thus moved.

From the foregoing it will be seen that our invention provides a device by which rhythmic vibratory motion of controlled variable speed and magnitude may be imparted to a foot, and the effects thereof intelligently distributed according to the needs of the particular case.

Having thus described our invention, what we claim is:

1. A foot vibrator including a foot support capable of simultaneous vibration and oscillation, means for vibrating the foot support, and means for rocking said support independently of its vibratory motion while the vibrator is in assembled relation.

2. A foot vibrator including a foot support capable of simultaneous vibration and oscillation, means for vibrating the foot support, means for rocking said support while the vibrator is in assembled relation, and means for locking said support in a position to which it is rocked while leaving it free to vibrate.

3. A foot vibrator including a foot support capable of simultaneous vibration and oscillation, power means for vibrating the foot support, and manually operated means for rocking said support independently of its vibratory motion while the vibrator is in assembled relation.

4. A foot vibrator including a foot support sustained for vibration on an axis disposed transversely of said support and capable of oscillation in a transverse direction independently of its vibratory motion, means for vibrating the foot support, and further means for rocking the support in said transverse direction while the vibrator is in assembled relation.

5. A foot vibrator including a foot support sustained for vibration on an axis disposed transversely of said support and capable of oscillation independently of its vibratory motion in a direction vertically of the support, means for vibrating the foot support, and further means for rocking the support in said vertical direction while the vibrator is in assembled relation.

6. A foot vibrator including a foot support sustained for vibration on an axis disposed transversely of said support and capable of oscillation

in a transverse direction, means for vibrating the foot support, means for rocking the support in said transverse direction while the vibrator is in assembled relation, and means for locking the support in positions to which it is rocked while leaving it free to vibrate.

7. A foot vibrator including a foot support sustained for vibration on an axis disposed transversely of said support and capable of oscillation in a direction vertically of the support, means for vibrating the foot support, means for rocking the support in said vertical direction while the vibrator is in assembled relation, and means for locking the support in positions to which it is rocked while leaving it free to vibrate.

8. A foot vibrator comprising a frame that is supported for oscillation on its longitudinal axis, a foot support movably sustained by said frame for vibration on an axis at substantially right angles to the former axis, a prime mover carried by the frame, driving connections between the prime mover and the foot support whereby vibrations are imparted to said support when the prime mover is in action that are independent of any movements of the frame, and means for rocking the frame while the vibrator is in assembled relation.

9. A foot vibrator comprising a frame that is supported for oscillation on its longitudinal axis, a foot support movably sustained by said frame for vibration on an axis at substantially right angles to the former axis, a prime mover carried by the frame, driving connections between the prime mover and the foot support whereby vibrations are imparted to said support when the prime mover is in action, means for rocking the frame while the vibrator is in assembled relation, and means for locking the frame in any position to which it is rocked.

10. A foot vibrator comprising a base, a member pivotally connected thereto on a substantially horizontal axis, a frame supported by said member for oscillation on an axis at substantially right angles to the former axis, means for holding the frame in any position to which it may be tilted by virtue of the pivotal support of said member, means for rocking the frame on its axis of oscillation while the vibrator is in assembled relation, a foot support pivotally connected to the frame on a transversely disposed axis, a prime mover carried by the frame, and driving connections between the prime mover and the foot support for imparting vibrations to the latter when the prime mover is in action.

11. A foot vibrator comprising a frame supported for oscillation, a foot support pivotally sustained thereby, a shaft journaled in the frame, an eccentric member on the shaft, con-

nections between said member and the foot support, power means carried by the frame, and driving connections between the power means and said shaft.

12. A foot vibrator comprising a frame that is pivotally supported intermediate its ends for oscillation, an electric motor carried by the rear end of the frame, a shaft journaled within the frame toward the forward end thereof, driving connections between said motor and shaft, means for raising and lowering the front end of the frame, a foot support pivotally sustained by the frame, an eccentric member on the aforesaid shaft, and a connecting rod having one of its ends journaled on said eccentric member and its opposite end pivotally connected to the foot support remote from the latter's pivotal axis.

13. A foot vibrator comprising a frame that is pivotally supported intermediate its ends for oscillation, an electric motor carried by the rear end of the frame, a shaft journaled within the frame toward the forward end thereof, driving connections between said motor and the shaft, means for raising and lowering the front end of the frame, means for locking the frame in any position to which it is thus moved, a foot support pivotally sustained by the frame, an eccentric member on the aforesaid shaft, and a connecting rod having one of its ends journaled on said eccentric member and its opposite end pivotally connected to the foot support remote from the latter's pivotal axis.

14. A foot vibrator comprising a frame supported for oscillation, a foot support pivotally sustained thereby, a shaft journaled in the frame, an eccentric member on the shaft adjustable toward and from the axis thereof to vary its throw, connections between the eccentric member and foot support, a motor carried by the frame, and driving connections between the motor and the shaft.

15. A foot vibrator including a foot support sustained for two independent vibratory motions, and means for producing in said support one of said motions at a relatively high speed while permitting, simultaneously therewith, the other of said motions at any speed desired while the vibrator is in assembled relation.

16. A foot vibrator including a foot support sustained for independent vibration in two directions, and power means for rapidly vibrating the foot support in one of said directions while permitting simultaneous vibration thereof in the other direction and at any desired speed while the vibrator is in assembled relation.

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