

July 7, 1931.

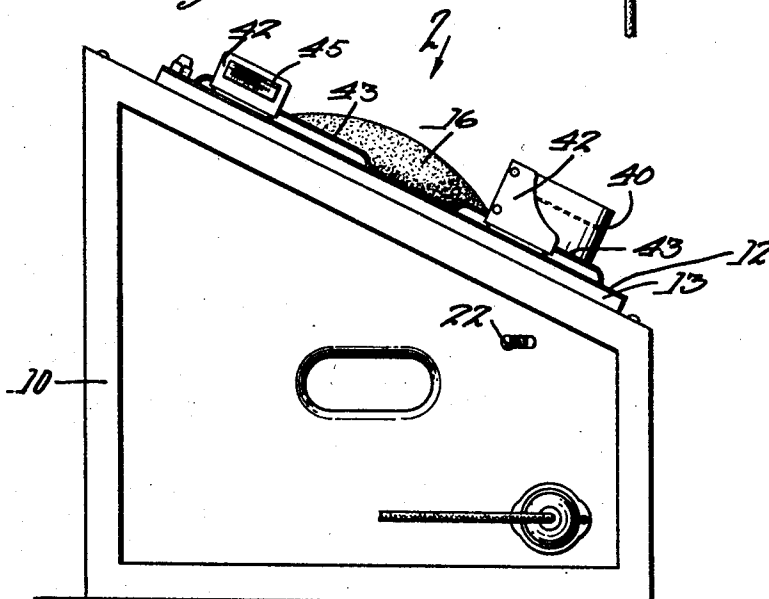
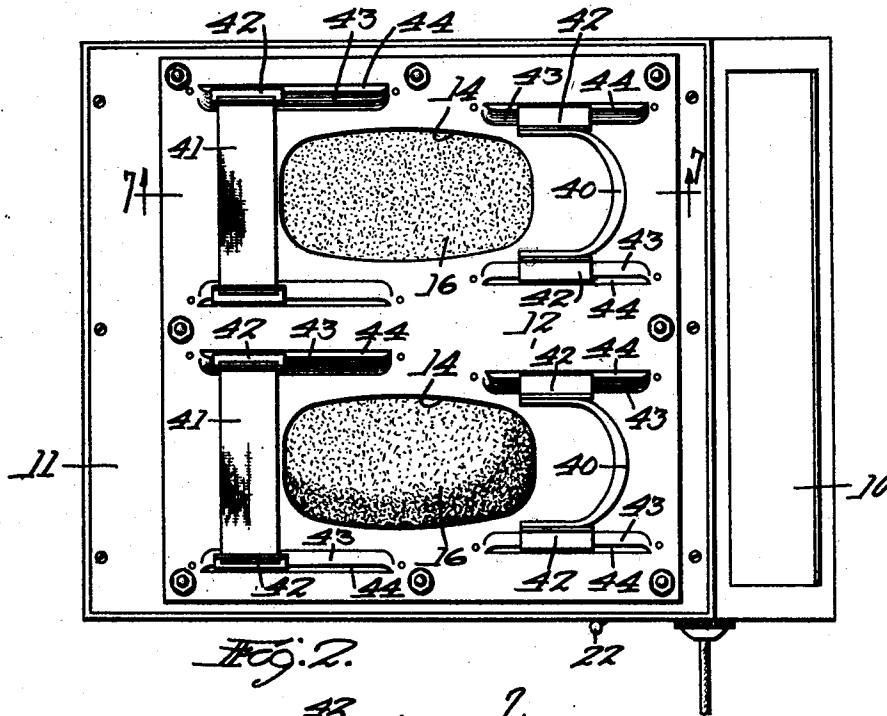
W. D. WHITE ET AL

1,813,006

FOOT EXERCISER

Filed Feb. 5, 1930

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

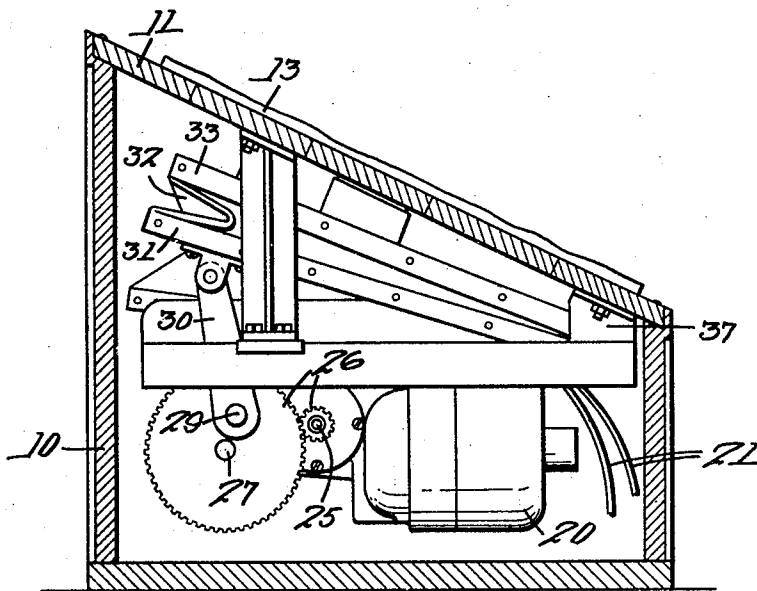


Fig. 3.

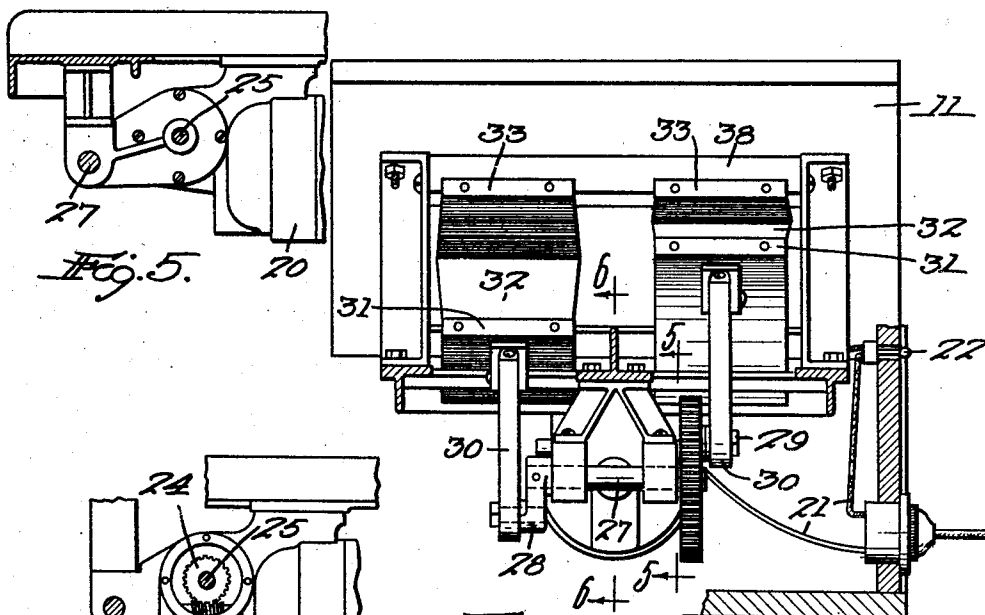


Fig. 4.

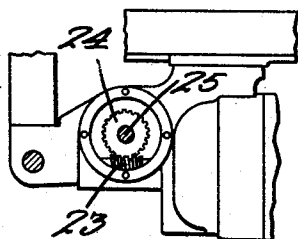


Fig. 5.

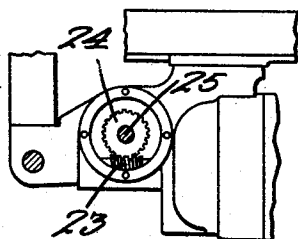


Fig. 6.

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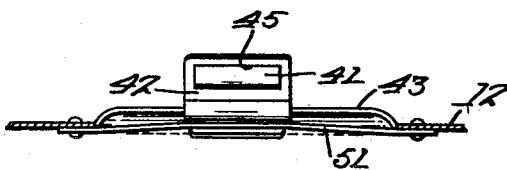
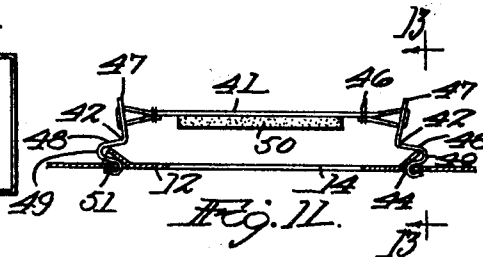
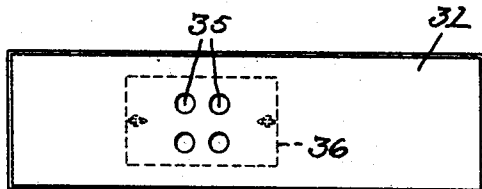
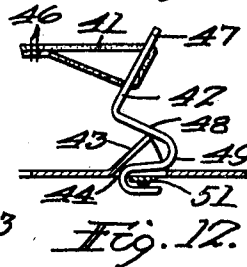
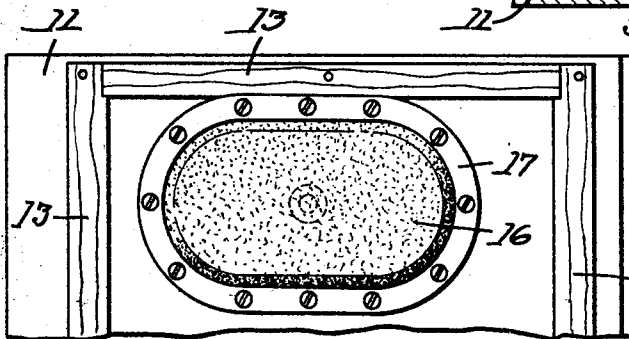
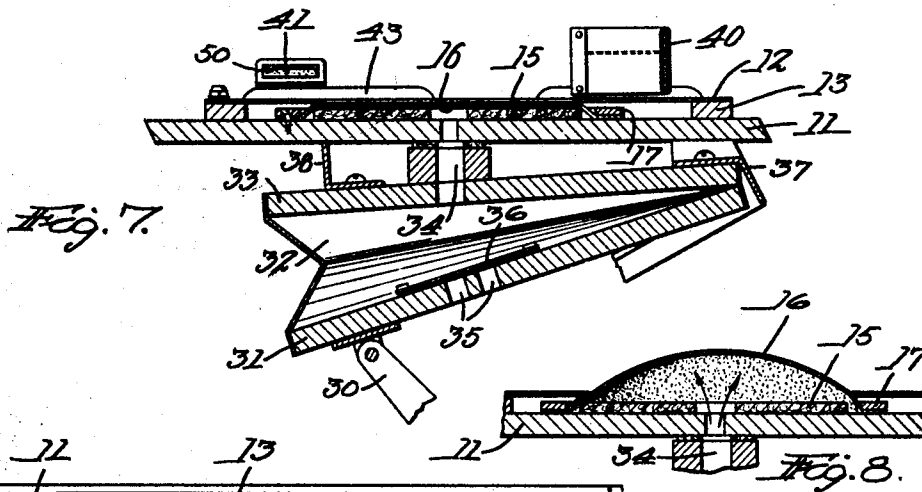
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UNITED STATES PATENT OFFICE

WILLIAM D. WHITE, OF WORCESTER, AND CLIFFORD J. GEEASON, OF LEICESTER, MASSACHUSETTS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO MARCUS A. COOLIDGE, OF FITCHBURG, MASSACHUSETTS

FOOT EXERCISER

Application filed February 5, 1930. Serial No. 426,115.

This invention relates to a device for application to the soles of the feet for exercising the feet and also for restoring a foot to its natural condition in case of flat feet and the like.

The principal objects of the invention are to provide a simplified means for supplying the foot-pad or diaphragm with air and withdrawing it therefrom; to provide a direct connection from a motor for operating the air-supplying means; to provide means in connection with a pad for holding the sole of the foot when the pad is exhausted and preventing the foot from descending to a too low level; and to provide improved means for holding the heel support and the toe strap which is adjustable and easily moved from one position to another and which does not get out of engagement when so moved.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is an end view of a foot exerciser and stimulator constructed in accordance with this invention;

Fig. 2 is a plan of the same taken on an incline as indicated by the arrow 2 in Fig. 1;

Fig. 3 is a sectional view through the extreme edge of the casing showing the machinery inside in elevation;

Fig. 4 is an end view of the machinery showing part of the casing in section;

Fig. 5 is a sectional view on the line 5—5 of Fig. 4, showing the motor casing in elevation;

Fig. 6 is a sectional view on the line 6—6 of Fig. 4, showing the gearing connected with the motor;

Fig. 7 is a sectional view on the line 7—7 of Fig. 2, showing the operation when introducing air into the pad and withdrawing it therefrom, but showing the pad collapsed;

Fig. 8 is a transverse sectional view of the same showing the pad inflated and the air coming into it;

Fig. 9 is a plan of the pad taken underneath the top plate which supports the foot;

Fig. 10 is a bottom plan view of the bel-

Fig. 11 is a transverse sectional view showing one of the toe straps and the holding means therefor in elevation;

Fig. 12 is a similar view of one of these on enlarged scale; and

Fig. 13 is a sectional view on the line 13—13 of Fig. 11.

All the mechanism in this case is shown inside a box or casing 10 having a detachable inclined plate or top 11 on which is set a sheet metal plate 12 spaced from the top 11 by bars or cleats 13, and having two perforations 14 therethrough for a purpose to be described.

On the top 11, which constitutes a supporting plate, is located a pad of thick felt 15. Over this lies a thin flexible and stretchable bag or diaphragm 16, preferably of rubber, held down by an oblong ring 17 secured to the top 11. It may be said at this point that the foot of the patient is intended to be placed over this opening 14 and the inflatable bag or diaphragm 16 expanded and contracted for the purpose of giving the foot exercise. When the foot is placed in position, the sole rests on the plate 12 in the lowermost position. Thus, the operation moves the foot structure all the way from that position to a fully extended condition and back again. This piece of felt is an important feature, as without it the sole of the foot would descend too low, and it should be designed to have enough thickness to hold the diaphragm and the sole of the foot up very close to the plane of the metal plate 12 and not allow it to sink down in any deeper, no matter if suction is applied to the bag. It is to be noted that there is a hole through the piece of felt 15 through which the air is admitted and discharged.

For the purpose of operating the machine, a motor 20 is employed connected with a source of power by lines 21 and with a push button or switch 22 in series, so that the operation of the motor can be controlled. The motor itself is provided with a shaft having a worm 23 thereon operating a worm wheel 24 at reduced speed on a shaft 25. This shaft, through gears 26, operates a second shaft 27 at further reduced speed, and this shaft is

provided with two cranks 28 and 29, one of them on one of the gears 26. Each of these cranks is connected by a link 30 with the lower leaf 31 of a bellows 32. The upper leaf 33 is stationary and is supported from the inside of the casing by brackets 37 and 38. It will be observed that there are two of these bellows, one on the right and one on the left, and that they operate oppositely and intermittently. The connections for driving them from the motor are extremely simple and have very few parts likely to get out of order. The bellows itself is practically without valves. There is a passage 34 through the top 11 and into the opening in the flat cushion 15 without any valve whatever, through which the air enters and exhausts.

The movable leaf 31 of the bellows is provided with openings 35 which also constitute both inlets and outlets. There is a valve 36 which closes these openings when the movable leaf is lifted, so that the air will not come out at that time, but opens at other times so that any air necessary can enter when the leaf has gone down. This constitutes a very simple means for controlling the air and does away with all the valves in the instrument but one.

Each foot is located in the proper position over one of the inflatable bag or diaphragms 16 by a heel rest 40 and a toe strap 41. In order to accommodate the device for feet of all sizes both of these should be adjustable. For that purpose the heel rest is made in the form of a rigid U-shaped structure and the two sides are secured to a pair of latches 42. The toe strap is formed of flexible or elastic material, and its ends are also secured to another pair of latches 42. In the case of the toe strap these latches have two perforations 45 with a bar between them, and the strap passes through one of the perforations to the other side and then back through the other and is secured to itself by a line of stitches 46, thus forming a loop for connection with the two latches.

In both cases the latches are connected with the plate 12 by means of longitudinal integral projections 43 from that plate which extend upwardly at an inclination, and longitudinal slots 44 provided through the plate under these projections. In both cases the latches have a substantially vertical part 47 at the top connected with a substantially horizontal part 48, and then with an S-shaped lower edge 49, the lower part of which passes through the slot 44 and under a flexible plate 51, the upper part of which passes over and around the top of the projection 43. In this way it will be seen that the lower part of the S-curve flexes the plate 51 and holds the latch in upright position wherever it may be placed. It will be seen that by swinging the latches back, the resiliency of the strap 41 and a slight resiliency of the heel rest allow-

ing the same, it is rendered loose and can be moved along the slot. Then simply by letting it go it becomes tight again and the latches are held in that position. Under the strap 41 is a piece of felt or other soft material 50 for engagement with the foot at the proper place near the toes.

This method of holding the heel rest and toe strap makes it easy to adjust either or both of them and after adjustment they are held firmly in position by friction and by the fact that the lower part of the S-curve 49 engages the flexible plate 51 just below the bottom of the cover plate 12, and when in the position shown in Figs. 11 and 12, bends this slightly so that there will be no danger of its creeping along.

It will be seen, therefore, that this is an extremely light, small, compact and simple machine for this purpose; that the power can be transmitted to the bellows from the motor without any great number of parts or gearing; that there is very little that is likely to get out of order; and that the operation is simple and the adjustment very easily accomplished.

Whereas others have sought to produce a mechanical passive massage, we have sought by our invention to wholly avoid the massage effect and to produce rather what we believe to be a vastly more important and beneficial mechanical action, namely; a positive deflation of the arteries and veins. This is done by having the mechanism so function that the arteries and veins have their walls pressed together for a short space of time and then fully released for the same space of time, to give the blood stream a chance to completely fill the channels of circulation again. This repeated action is believed to open up the channels of circulation and re-establish a more normal flow of the blood stream so that those who have used this machine get rid of the disorders that result from poor circulation.

A further very important action, that this mechanical construction is believed to accomplish, is the breaking up of adhesions, exercising the muscles and ligaments so that they strengthen and so that nature is thus assisted to place disarranged bone structure (especially in the feet) back to normal position in the shortest time.

Although we have illustrated and described only a single form of the invention, we are aware of the fact that changes can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore we do not wish to be limited to the exact form shown, but what we do claim is:—

1. In a machine of the character described, the combination of a plate, a bellows having a stationary leaf supported by said plate behind it and a movable leaf, means for op-

erating the movable leaf, the stationary leaf having a port therethrough, a flexible diaphragm covering said port and adapted to be inflated and deflated through said port for the purpose of lifting the arch of a foot over the diaphragm, and a pad on said plate for receiving the diaphragm and preventing its being deflated so far as to bring the foot down to an abnormally low position.

2. In a device of the character described, the combination of a supporting plate or cover, a metal plate spaced above the supporting plate and having an opening therethrough over which the foot of a patient is adapted to be placed to cover the opening, a flexible diaphragm located on the supporting plate and under said opening, means for securing the edge of the diaphragm all around to the supporting plate, a felt pad under the diaphragm projecting up nearly to the level of the metal plate and a bellows under the supporting plate having a port for introducing air into the diaphragm and taking it therefrom, the port extending through the supporting plate, bellows top and pad.

3. In a device of the character described, the combination with a supporting plate and a sheet metal plate spaced therefrom and supported thereby, said sheet metal plate having an opening therethrough, a heel rest and a toe strap carried by the sheet metal plate for holding the human foot in position over said opening, a flexible diaphragm carried by the supporting plate under said opening, means for inflating and deflating the diaphragm and means for yieldingly supporting the heel rest and foot strap at both sides thereof, comprising latches, the sheet metal plate having slits provided with upwardly extending edges around which the lower end of the latches engage.

4. In a device of the character described, the combination with a supporting plate, a thin metal plate spaced therefrom and having an opening therethrough, an inflatable diaphragm under the opening and means for inflating and deflating the diaphragm, said thin plate having opposite slits arranged longitudinally with their edges raised to inclined position, of flexible metal strips underneath the inclined edges, latches having at the bottom an S-shaped portion, the upper part of which extends inwardly over said inclined projection, the bottom part of which extends inwardly through the slit and at the extreme lower edge under said flexible strip, whereby the latches can be moved along the slits if swung backwardly and when pulled forwardly toward said opening, will be frictionally held in position by the engagement of the bottom of the S-shaped portion with said flexible strip.

5. In a device of the character described, the combination with a metal plate having two longitudinal slits therein and a perfora-

tion between them, the outer edges of the metal between the slits being bent upwardly at an inclination to form oppositely inclined projections, a latch extending through each slit and under each projection and extending upwardly and having two parallel slots, and a toe strap of flexible material extending through the two slots at each side and the end secured to the center part at a distance from the slots to form loops, said strap being of elastic material for the purpose described.

In testimony whereof we have hereunto affixed our signatures.

WILLIAM D. WHITE.

CLIFFORD J. GLEASON.

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