Sept. 9, 1941. E. Q. LAMB 2,255,066

FOOT MANIPULATING DEVICE

Filed Oct. 20, 1939 2 Sheets-Sheet 1

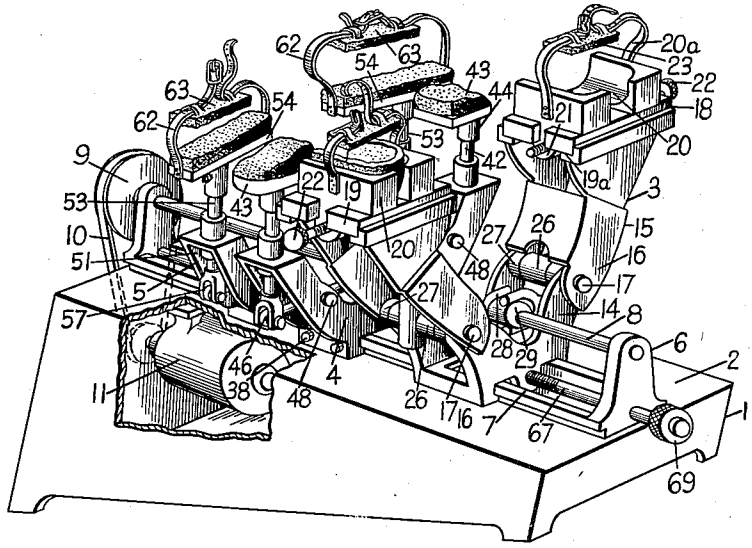


Fig. 1

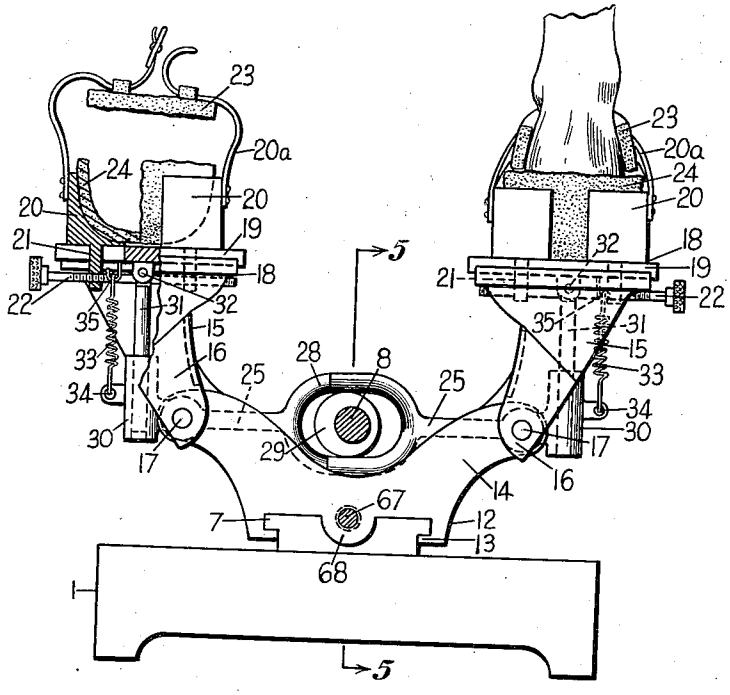


Fig. 2

INVENTOR
Edgar Q. Lamb.
BY Corbett & Maloney
ATTORNEYS

Sept. 9, 1941. E. Q. LAMB 2,255,066

FOOT MANIPULATING DEVICE

Filed Oct. 20, 1939 2 Sheets-Sheet 2

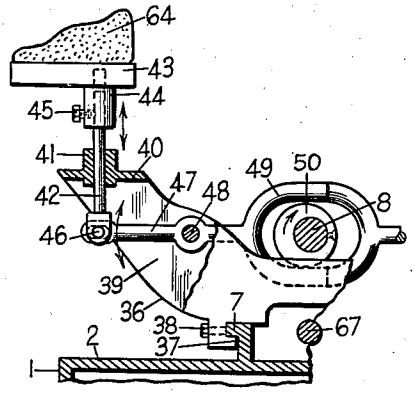


Fig. 3

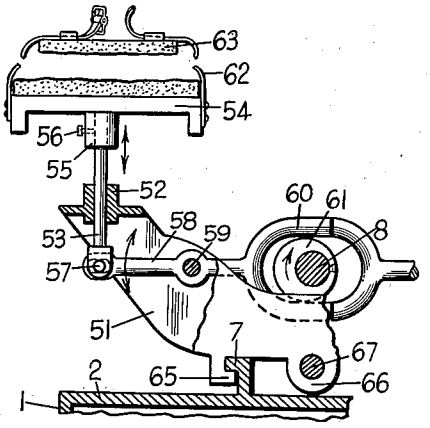


Fig. 4

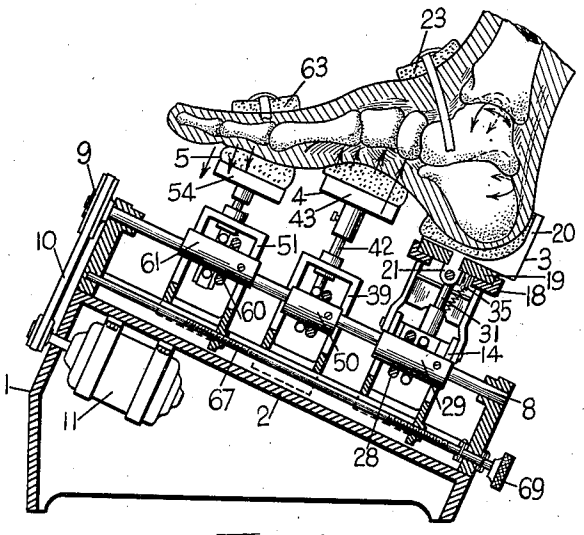


Fig. 5

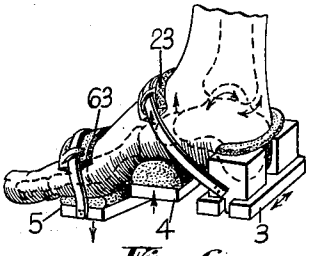


Fig. 6

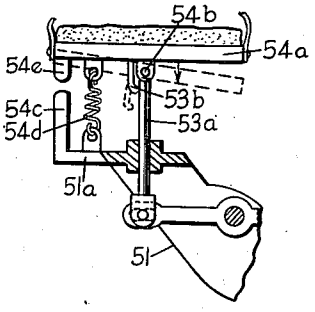


Fig. 9

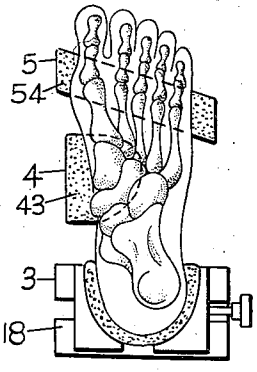


Fig. 7

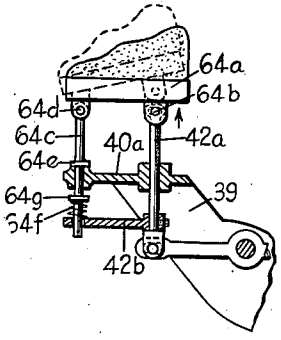


Fig. 8

INVENTOR
Edgar Q. Lamb.
BY Corbett & Mahoney
ATTORNEYS

Patented Sept. 9, 1941

2,255,066

UNITED STATES PATENT OFFICE

2,255,066

FOOT MANIPULATING DEVICE

Edgar Quinn Lamb, Columbus, Ohio

Application October 20, 1939, Serial No. 300,416

1 Claim. (Cl. 128—25.2)

My invention relates to a foot manipulating device. It has to do, more particularly, with a device for manipulating the joints of the feet in order to stretch the ligaments, muscles and facia around the joints so as to restore normal motion to various joints of the feet and ankles.

In the past, several different types of devices have been provided for treating the feet to overcome abnormalities thereof. One type of device has consisted in means for vibrating the entire foot. Obviously, this would not produce proper manipulation of the joints of the foot. Other devices have consisted of means for massaging the foot, particularly the arch thereof, and usually embody rollers for operating on the arch to massage it. Obviously, this method also will not result in the proper manipulation of all of the joints of the foot and ankle. Another device has been provided which exerts a vertically directed pressure on the arch of the foot and a vertically directed pressure on the toes of the foot. This also does not produce the necessary manipulation of all of the joints of the foot.

I have found in actual practice that one of the most common ailments of the foot is what is known in the profession as pronation of the foot. I have also found that in order to properly treat the foot to overcome this abnormality and to restore the foot to normal condition, it is necessary to apply simultaneously at intervals an upward pressure on the arch, a downward pull on the toes and a lateral outward pull on the heel. This overcomes pronation of the foot and restores normal motion to the various joints of the foot and ankle. I have found in attempts to treat this condition that it is impossible for the practitioner to manipulate the foot of the patient by hand in order to obtain the required movements.

One of the objects of my invention is to provide a foot manipulating device which is of such a nature that the foot may be manipulated, particularly in the manner indicated in the preceding paragraph, to restore it to normal condition.

Another object of my invention is to provide a device of the type indicated which is of a very simple and inexpensive structure but which is still very effective.

Another object of my invention is to provide a device of the type indicated which may be easily and quickly adjusted for treating feet of various sizes.

Another object of my invention is to provide a device of the type indicated which is of such a nature that when the foot is positioned on the device, no further attention by the operator is required to produce the desired manipulation.

The preferred embodiment of my invention is illustrated in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a perspective view, partly broken away, of a device made according to my invention.

Figure 2 is a view partly in end elevation and partly in section of the structure shown in Figure 1.

Figure 3 is a detail, partly in section and partly in elevation, illustrating the arch manipulating means.

Figure 4 is a similar view illustrating the manipulating means for the toes.

Figure 5 is a vertical sectional view taken substantially along line 5—5 of Figure 2.

Figure 6 is a perspective view illustrating how my device acts on the foot.

Figure 7 is a diagrammatic view illustrating how the foot is positioned on my device.

Figure 8 shows an arch manipulating unit of a modified form.

Figure 9 shows a modified form of a unit for manipulating the toes.

With reference to the drawings, I have illustrated my machine as comprising a base 1 which has an inclined top plate 2. This top plate 2 carries a heel manipulating unit 3, an arch manipulating unit 4, and a unit 5 for manipulating the toes which are disposed in longitudinally spaced relationship from the lower end to the top end of the plate. Each of these units embodies a pair of similar means for acting on both feet. However, it is to be understood that the device could be so constructed that it would act on one foot only.

The plate 2 carries a longitudinally extending unit 6 which is suitably secured thereto and which extends throughout the length thereof. The lower portion of this unit 6 has a guide portion 7 formed thereon. This unit 6 has upstanding portions at each end in which a shaft 8 is rotatably mounted. This shaft extends from one end to the other of the unit 6. At its upper end it is provided with an extension on which a pulley 9 is keyed. This pulley 9 is driven by a belt drive 10 from an electric motor 11 disposed beneath the plate 2 and suitably secured thereto. The unit 6 is adapted to carry the various units 3, 4 and 5.

The unit 3 comprises a substantially U-shaped base member 12. This member 12 has portions 13

for cooperating with the guide portion 7 of the unit 6. Thus the member 12 will be slidably mounted on the base plate 2 for movement longitudinally thereof. At each side the member 12 has a pair of spaced upwardly and outwardly extending arms 14. A bracket member 15 has similarly spaced downwardly extending portions 16 which are pivotally connected to the portion 14 by a pivot pin 17. Each of the members 15 carries on its upper end a heel receiving and clamping unit 18.

The unit 18 consists of a base plate 19 which is slidably disposed in guide ways 19a carried by the upper portions of the bracket 15. A pair of members 20, adapted to cooperate with each other to form a socket for receiving the heel, are mounted on plate 19 in such a manner that they may be adjusted towards and from each other. Each of these members has a depending lug 21 extending downwardly through a slot in the plate 19. A screw member 22 is threaded through openings formed in these lugs. It will be apparent that by operating this screw 22, the members 20 can be adjusted towards and from each other. Members 20 carry a set of straps 20a which may pass around the back part of the foot to hold the heel in position in the member 20. As indicated in Figure 2, the straps may carry a felt portion 23 and the members 20 may be lined with felt 24 to prevent injury to the foot.

Each of the pins 17 carries a substantially horizontally disposed lever 25. This lever 25 has a bushing portion 26 through which the pin extends. Spacers 27 are provided between the ends of the bushing and the depending portions 16 of bracket 15 in order to keep the lever in its proper position substantially midway between the portion 16. On its inner end, this lever is provided with a yoke 28 which embraces a cam 29 that is keyed to or formed on the shaft 8. The outer portion of the lever 25 carries a cylindrical socket 30. This socket 30 receives a vertically disposed pin 31 which is free to move vertically therein. The upper end of this pin is pivoted at 32 to a lug depending from the plate 19 of the heel clamping unit 18. In order to keep the plate 19 seated in the guide portions 19a a spring 33 is provided. This spring is connected to the socket portion 30, as at 34, and to a hook 35 depending from the plate 19. The spring will exert a downward pull on the plate 19 and hold it in position.

It will be apparent that when the cam 29 is rotated, both of the levers 25 will be swung about their respective pivot points 17. This, in turn, will cause lateral swinging of the pins 31 which will produce lateral movement of the units 18 on the upper ends of the brackets 15. During this lateral movement of the units 18 on the brackets 15, the brackets will also swing to a limited extent about the pivot points 17. Thus, it will be apparent that with this structure lateral movement and very slight vertical movement of the heel receiving and clamping units 18 will be produced.

The arch manipulating unit 4 comprises a U-shaped bracket 36. This bracket is provided on its lower end with portions 37 which cooperate with the guide portion 7 of the unit 6. The bracket 36 may be moved along the guide portion 7 but is held in a predetermined position by means of the bolts 38. The bracket 36 (Figure 3) has outwardly and upwardly extending leg portions 39. These portions are joined together at their upper ends by a horizontal portion 40 which carries a sleeve 41. In this sleeve is disposed a pin 42 which is free to move vertically therein. An arch-engaging member 43 is mounted on the upper end of this pin. This member 43 is provided with a socket 44 on its lower surface which receives the pin and a set screw 45 is provided for maintaining the member 43 in proper position on the upper end of the pin. The lower end of the pin 42 is pivotally connected by a pin and slot connection as at 46 to the outer end of a substantially horizontally disposed lever 47. This lever is pivotally carried by the leg portions 39 of the bracket 36. The inner end of this lever is provided with a yoke 49 which engages a cam 50 keyed to or formed on the shaft 8. It will be apparent that when the cam 50 is rotated, vertical movement of both of the arch engaging members 43 will be produced. This movement will be caused by the lever 47 swinging about the pivot points 48 and moving the pins 42 vertically in the sleeves 41. The pin 42 and socket portion 44 are relatively adjustable telescoping members so that the height of member 43 may be adjusted to suit different patients.

The unit 5 for manipulating the toes comprises a U-shaped bracket 51 which is substantially identical with the bracket 36. Each of these brackets 51 (Figure 4) extends outwardly and upwardly and carries a sleeve 52 at its upper end. This sleeve 52 receives a pin 53 which is free to move vertically therein. The upper end of the pin 53 carries a toe-receiving and clamping unit 54. This unit 54 has a depending socket member 55 which receives the upper end of the pin and which is provided with a set screw 56 for maintaining the unit 54 in position on the pin. The lower end of the pin 53 is pivotally connected by a pin and slot connection 57 to the outer end of a substantially horizontally disposed lever 58. This lever 58 is pivotally carried by a pin 59 supported on the bracket 51. The inner end of this lever has a yoke 60 formed thereon which embraces an elongated cam 61 carried by or formed as a part of the shaft 8. It will be apparent that when the cam 61 is rotated the levers 58 will be swung about the pivot points 59 and will produce vertical movement of the pins 53 in the sleeves 52.

Each of the units 54 is provided with a set of straps 62 by means of which the toes or the forward part of the foot may be clamped in position. Suitable felt pads 63 are provided on this unit to prevent injury to the foot. The arch engaging units 43 may also be provided with pads 64.

The brackets 51 of the unit 5 is provided with guide portions 65 on its lower edge which cooperate with guide portion 7 of the unit 6. Thus bracket 51 will be mounted for sliding movement longitudinally of the base plate 2. The bracket 51 is provided with a depending portion 66 substantially at the middle thereof which is provided with a threaded opening through which the threaded portion of a shaft 67 is passed. This shaft 67 extends longitudinally of the unit 6 and its ends are rotatably mounted in the upstanding portions at each end thereof. As indicated in Figure 3, the shaft 67 does not engage the bracket 36 but passes beneath this bracket. The member 12 of the unit 3 is provided with a depending portion 68 which is provided with a threaded opening through which a threaded portion of the shaft 67 passes. The threaded portion of shaft 67 which engages member 12 and the threaded portion which engages the bracket

51 are of opposite pitch so that when the shaft 67 is rotated the units 3 and 5 will be moved towards or away from each other longitudinally of the base plate 2. The shaft 67 may be rotated by means of a knurled knob 69. The unit 3 will be adjusted to a predetermined position and will not be affected by rotation of the shaft 67. The cams 29 and 61 are elongated to permit the longitudinal adjustment of the units 3 and 5 without disturbing the engagement of the yokes 28 and 60 with these respective cams.

In the treatment of the patient with this machine, the feet are positioned thereon and the units 3 and 5 are properly adjusted relative to each other. Then the feet are fastened in position by the various straps. A motor 11 is then energized which will produce rotation of the shaft 8. This will cause rotation of cams 29, 59 and 61. Consequently, the heel engaging units 18 will be moved laterally and vertically to a slight extent, the arch engaging members 43 will be moved vertically and the units 44 for engaging the forward portions of the feet will also be moved vertically. I prefer to have the various cams separate from the shaft 8 so that they may be rotated thereon to various positions relative to each other and held in adjusted position by suitable set screws. In this manner, the various movements may be timed or regulated relative to each other.

The position of the foot on my device is illustrated in Figures 5, 6 and 7. I prefer to have the cams so adjusted that simultaneously at intervals the members 43 will provide upward pressure on the arches, the units 54 will produce a downward pull on the forward portion of the feet and the units 18 will produce a lateral outward pull on the heels. This treatment overcomes pronation of the feet and restores normal motion to the various joints of the foot and ankle.

In Figure 8, I show a somewhat modified type of arch manipulating unit. This unit is for the left foot but the unit for the right foot will be the same except it will be reversed. In this instance, the arch-engaging member 64*a* is pivoted as at 64*b*, to the upper end of the vertically reciprocable pin 42*a*. At a point spaced laterally outwardly from the pivot point 64*b*, adjacent the outer edge of member 64*a*, a pin 64*c* is pivotally connected, as at 64*d*, to member 64*a*. The pin 64*c* passes downwardly through an opening formed in an extension 40*a* of the bracket 39. This pin 64*c* carries a stop 64*e* which engages member 40*a* to limit the lowermost position of pin 64*c*. The lower end of this pin freely passes through an opening in an arm 42*b* which is secured to pin 42*a*. Pin 64*c* is provided with a spring 64*f* surrounding it and disposed between a stop 64*g*, carried by it, and the arm 42*b*. With this structure when the pin 42*a* moves upwardly, the pin 64*c* will also move therewith until stop 64*g* engages member 40*a*, when the member 64*a* will be swung outwardly around the pivot point 64*b*, due to the fact that pin 42*a* will continue to move upwardly while pin 64*c* will not. Thus, the member 64*a* not only moves vertically into engagement with the arch but, at the time it engages the arch, it is also rocked outwardly at an angle. This results in additional manipulation of the arch which is very desirable.

In Figure 9, I show a slightly modified form of unit for manipulating the toes. This unit is for the left foot but the unit for the right foot will be the same except it will be reversed. In this instance, the toe clamping unit 54*a* is pivoted at 54*b* to the upper end of the pin 53*a*. A stop 53*b* limits pivotal movement of the unit 54*a* in one direction. A stop 54*c* is provided for engaging a similar stop 54*e* on member 54*a* adjacent the outer edge thereof. The stop 54*c* is carried on an extension 51*a* of the bracket 51. A spring 54*d* is connected to members 54*a* and 51*a*. When the rod 53*a* moves downwardly, the stop 54*e* carried by member 54*a* will strike the stop 54*c*. This will cause the member 54*a* to tilt inwardly about the pivot point 54*b*. Thus, the member 54*a* will move downwardly and will simultaneously tilt inwardly. This will produce a twisting of the forward part of the foot.

The units illustrated in Figures 8 and 9 are preferably used together so that as the member 64*a* moves upwardly and swings outwardly, the member 54*a* will move downwardly and will swing inwardly. However, either of these units may be employed with the other units illustrated in Figure 1.

It will be apparent from the preceding description that I have provided a foot manipulating machine which will manipulate the joints of the feet in order to stretch the ligaments, muscles and facia around the joints so as to restore normal motion to the various joints of the feet and ankles. Although my device is very simple, it is very effective. It may be readily adjusted for different patients. Furthermore, it is of such a nature that little or no attention is required from the operator.

Various other objects and advantages will be apparent from the preceding description, the drawings, and the following claim.

Having thus described my invention what I claim is:

A foot manipulating device comprising a base member, a unit for engaging the forward portion of the foot, said unit being supported on a vertically disposed pin, means for moving said pin vertically, said means comprising a lever pivoted intermediate its ends and having one end connected to said pin, the other end of said lever having a portion engaging a cam, said cam being supported on a shaft rotatably mounted on said base, a unit for engaging the arch of the foot, said unit being supported on a vertically disposed pin, means for moving said pin vertically, said means comprising a lever pivoted intermediate its ends and having one end connected to said pin, the other end of said lever having a portion engaging a cam carried by said shaft, a unit for engaging the heel of the foot, said unit including a heel supporting member mounted for lateral movement, means for producing said movement, said means comprising a lever operatively connected to said member, said lever being pivoted intermediate its ends and having a portion engaging a cam carried by said shaft.

EDGAR Q. LAMB.