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Description

This invention relates to leg exercisers, and has particular although not exclusive application for use by persons who suffer from circulatory ailments in legs, but as the description of the invention proceeds, it will be seen that the device can be used for any person wishing to maintain a good physical condition, particularly in the legs.

The invention was conceived resulting from the medical complaint of poor circulation in the legs. Good circulation of the body and the legs is maintained by regular exercise, in particular the exercise of walking, because the muscles in the calf during the act of walking act as what is known as a "muscle pump" or "blood pump" maintaining good circulation of blood in the veins in the leg, especially maintaining good circulation of blood to the foot. In a person who however takes little exercise during his life and in particular if he has a job which does not involve any physical movement, there is a danger that such a person in later life will develop severe leg circulatory problems leading to decay of the tissue of the legs, particularly in the feet area or in extreme cases gangrene in the legs.

Western society has developed modes of life and work which tend to promote a way of life which does not involve much physical exercise, and indeed the most common pastime certainly in the United Kingdom is probably watching television. As a result more and more cases of leg ailments resulting in poor circulation are being reported, and therapy units in hospitals are becoming larger or at least are receiving more patients.

The difficulty with taking walking exercise for older persons is that they must inevitably go out of doors which means that they must go out in all weathers, or in the alternative they would have to purchase an exercise machine such as a treadmill machine which is rather expensive on the one hand, and on the other hand is somewhat strenuous to operate.

Leg exercisers are known from U.S. Patents 3,526,220 and 4,501,421. The leg exerciser disclosed in U.S. Patent 3,526,220 is for use by a hospital patient when lying on his back. His feet are placed in swinging buckets which are moved in rocking movements in order to exercise the user's legs. On the other hand, the U.S. Patent 4,501,421 discloses a leg exerciser which comprises a pair of pedals which are adapted to be rocked back and forth by the user's feet, and a friction device between the pedals creates resistance so that the user has to drive the pedals back and forth in order to exercise the legs.

There is therefore a need for a new form of leg exerciser which can be used at home, but which is not strenuous to operate, and can be used by the user whilst he or she is in a seated position, and watching television. In accordance with the invention there is provided a leg exerciser comprising:

(a) a casing which is open at the top to enable the user whilst seated to lower his feet into the casing;

(b) a pair of elongated side-by-side foot boards mounted inside the casing at a height above the bottom of the casing, said boards having feet receiving surfaces and each board having a toe end and a heel end said boards serving to support the weight of the user's legs;

(c) drive means inside the casing; and

(d) a linkage inside the casing connecting the drive means and the foot boards so that the foot boards will be caused to be rocked about a pivot axis out of phase, as disclosed in the US—A— 3 526 220, and further characterised in that the leg exerciser is specifically designed for use by a user when the user is sitting in a chair, whereby each board pivots between a minimum acute angle position of no less than 15° to the horizontal and a maximum acute angle position of no more than 50° to the horizontal, and said axis is located at a position in relation to the boards so that it will be under the arches of the user's feet and the said pivoting of the boards causes stretching and contracting of the user's calves.

General advantages of the invention in its preferred form are that the walking movement of the foot is carried out, working the muscle blood pump without the weight of the body on the ankle joints, giving nature's lubrication of the working of the ankle ball joints without the body weight, which in my case removed stabbing pains, thought to be a form of arthritis, in the ankle.

Also, the strain of making walking movements during exercise periods, without the use of assisted force, twice a day, would require too much strain, and therefore the use of power to give assistance for blood-circulation of the lower limbs is a benefit.

Another advantage of the invention in its preferred form is, that the forces in use while the foot is being exercised are compensating from one foot board to the other. This makes the cost of operating the machine through the use of electricity a very minor consideration.

The exerciser according to the invention causes the users' legs to be exercised, preferably simulated walking exercise, whilst the user is not required to put in strenuous effort.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, wherein:-

Fig. 1 is a side elevation of an exerciser according to an embodiment of the invention, when in the in-use position.

Fig. 2 shows the essential components of the drive mechanism of the exerciser as shown in Fig. 1;

Fig. 3 is an end view of the mechanism shown in Fig. 2; and

Fig. 4 is a plan view of the exerciser shown in Fig. 1.

Referring to the drawings, an exerciser as shown in Fig. 1 comprises a casing 10 housing a pair of boards, platforms or the like and specifically in the form of two foot pedals 12 and 14 which are mounted for rocking movement about the

common axis 16. The pedals 12, 14 as shown in Fig. 4 are arranged to be the bases of cavities 18 and 20 into which the user places his feet respectively as shown in Fig. 1, whilst for example seated in a conventional chair 22.

The pedals 12 and 14 are of rectangular construction and the axis 16 extends transversely of the length direction of each of the pedals, but is located closer to the heel ends 12A, 14A of the pedals and the toe ends 12B, 14B so that the axis will be located under the hollows of the feet and rocking back and forth of the pedals 12 and 14 will cause the feet to articulate and simulate as closely as possible the action of walking. Arrow 24 indicates how the toe ends of the pedals 12 and 14 rock, and during this rocking movement the user's legs 26 will be exercised in that the feet 28 and 30 will be rocked back and forth hinging the legs at the ankle region whereby the calf muscles indicated by numeral 32 will be alternately contracted (leg 27 in Fig. 1) constricting internal blood vessels and pumping blood to the body and relaxed (leg 26 in Fig. 1) to improve circulation throughout the leg. At the bottom of the casing to the rear thereof, are provided wheels 34 and inside the casing is a handle 36 which can be pulled out of the front of the casing as shown in Fig. 4 and by gripping the handle 36 and tipping the casing on its wheels 34 it can be rendered highly manipulable and mobile and therefore it can be moved around a room easily and can also be stored easily.

The pedals 12 and 14 are arranged in the casing 10 to prevent any trapping of the fingers between the pedals and the casing, and to this end the toe ends 12B and 14B sweep close to a curved guide 38, whilst the heel ends 12A are provided with curtain members 40 which overlap the front of the casing. The sides of the pedals as shown in Fig. 4 lie close to the walls of the cavities 18 and 20. The exerciser is therefore rendered safe for use by such features.

Figs. 2 and 3 show the drive mechanism for the exerciser, and referring to these Figs. it will be seen that the drive mechanism is an electric motor 42 whose output shaft 44 forms the input of a gearbox 46. On the output shaft of the gear box is a pulley or sprocket 48 around which is trained a chain or belt 50. The chain or belt 50 is trained round a pulley on a main crank shaft 52 which carries at the ends thereof a pair of cranks 54 and 56. The drive shaft 52 is mounted on the casing by means of mountings illustrated in Fig. 3.

The cranks 54 and 56 carry crank pins 60 and 62 on which are mounted connecting rods 64 and 66. At the outer ends the connecting rods are bifurcated to provide two bearings receiving the pivot shafts 68 and 70 which are mounted on the underside of the respective pedals 12 and 14 at the toe ends 12B and 14B thereof.

The cranks 54 and 56 are arranged out of phase, and it will be clearly understood that upon rotation of the motor 42 which receives electrical power through a lead and plug 72 shown in Fig. 1, for example by throwing an on/off switch 55 at the

front of the machine, the output pulley 48 is driven which in turn drives the chain belt 50, which in turn rotates the main crank shaft 52 turning the cranks 54 and 56 which in turn drives the connecting rods 64 and 66, resulting in out of phase, rocking of the pedals 12 and 14.

As the pedals move out of phase the drive system is in substantial balance, making the requirement for power low. In fact the motor in use draws as little as 0.3A.

All of the bearings used in the drive mechanism are preferably of Nylon and require no oiling or greasing and the mechanism may include rubber isolating bushes to cut down noise during operation.

The transmission may be made adjustable so that the frequency of operation of the pedals can be adjusted and all electrical connections will be earthed.

The machine may have a steel frame or the like supporting the drive mechanism and pedals, and the casing is defined simply by side and rear panels which are screwed or otherwise secured to the frame so that the panels can be removed easily for examination and repair of the mechanism. One of the panels, say the rear panel, may co-operate with a switch which is included in the electrical supply circuit so that if the said panel is removed, the switch automatically breaks the circuit and the motor cannot be started, which adds to the safety of the machine.

In alternative arrangement instead of using the motor 42, gearbox 46 and drive chain or belt 50, there may be a fly wheel 74 shown in dotted lines in Fig. 3 mounted on the main crank shaft 52. The initial motor power for rocking the pedals is supplied by the user, but the fly wheel maintains the kinetic energy of the system whereby the user is not required to apply any more energy than is necessary to keep the pedals rocking.

The transmission system is typically designed to give a rocking frequency of the pedals 12 and 14 of the order of 60 to 80 cycles per minute and more specifically 64 to 72 cycles per minute.

It is possible to arrange for the drive system to be of variable speed if it is required to have different frequencies of rocking, and this may be done by making the motor 42 a variable speed unit.

Any suitable material may be used for the fabrication of the exerciser such as plastics, metal or wood. The surface of the pedals are preferably covered with non-slip material such as rubber having a ribbed or other embossed pattern.

The apparatus of the embodiment described has a considerable advantage in that the user may use same whilst in a seated position, and therefore it is usable whilst working at a desk or watching television, and therefore it will require little discipline or effort on the part of the user to make regular use of the exerciser. Regular use is of course most desired in order to keep the muscle pump well exercised to improve the blood circulation.

The expression out of phase as used herein is

intended to mean at some time during use of the exerciser one pedal is moving in one direction whilst the other pedal is moving in the opposite direction rather than the specific operational meaning that one pedal is 180° out of phase with the other at all times although this meaning clearly is to be included.

Claims

1. A leg exerciser comprising:

(a) a casing (10) which is open at the top to enable the user whilst seated to lower his feet into the casing (10);

(b) a pair of elongated side-by-side foot boards (12, 14) mounted inside the casing (10) at a height above the bottom of the casing, said boards (12, 14) having feet receiving surfaces and each board (12, 14) having a toe end (12B, 14B) and a heel end (12A, 14A) said boards (12, 14) serving to support the weight of the user's legs;

(c) drive means (42, 54, 56) inside the casing; and

(d) a linkage (64) inside the casing connecting the drive means (42) and the foot boards (12, 14) so that the foot boards (12, 14) will be caused to be rocked about a pivot axis (16) out of phase, characterised in that the leg exerciser is specifically designed for use by a user when the user is sitting in a chair, whereby each board (12, 14) pivots between a minimum acute angle position of no less than 15° to the horizontal and a maximum acute angle position of no more than 50° to the horizontal, and said axis (16) is located at a position in relation to the boards (12, 14) so that it will be under the arches of the user's feet and the said pivoting of the boards (12, 14) causes stretching and contracting of the user's calves.

2. A leg exerciser according to Claim 1, characterised in that the drive means (42, 54, 56) is adapted to drive the foot boards (12, 14) at a frequency in the region of 60 to 80 cycles per minute.

3. A leg exerciser according to Claim 1 or 2 characterised in that the boards (12, 14) have curtain members (40) at the heel ends thereof which overlap at the front of the casing to prevent trapping of the fingers between the heel ends of the boards (12, 14) and the casing (10).

4. A leg exerciser according to any preceding claim characterised in that the casing (10) has wheels (34) and a manipulating handle (36) whereby it can be manipulated and wheeled over the ground.

5. A leg exerciser according to Claim 1, characterised in that the drive means includes a fly wheel.

Patentansprüche

1. Ein Übungsgerät für die Beine mit:

(a) einem Gehäuse (10), welches an der Oberseite offen ist, um es einem sitzenden Benutzer

zu ermöglichen, seine Füße in das Gehäuse (10) zu stecken;

(b) einem Paar von langgestreckten seitlich nebeneinander liegenden Fußbrettern (12, 14), welche innerhalb des Gehäuses (10) in einer Höhe oberhalb des Bodens des Gehäuses angeordnet sind, wobei die Bretter (12, 14) fußaufnehmende Oberflächen haben und jedes Brett (12, 14) ein zehenseitiges Ende (12B, 14B) und ein fersenseitiges Ende (12A, 14A) hat, wobei die Bretter (12, 14) dazu dienen, das Gewicht der Beine des Benutzers aufzunehmen;

(c) Antriebsvorrichtungen (42, 54, 56) innerhalb des Gehäuses; und

(d) einer Verbindung (64) innerhalb des Gehäuses, welche die Antriebsvorrichtungen (42) und die Fußbretter (12, 14) so verbindet, daß die Fußbretter (12, 14) veranlaßt werden, phasenversetzt um eine Schwenkachse (16) zu schwenken, dadurch gekennzeichnet, daß das Übungsgerät für die Beine speziell für die Verwendung durch einen Benutzer ausgelegt ist, wenn der Benutzer in einem Stuhl sitzt, wobei jedes Brett (12, 14) zwischen einer minimalen spitzwinkligen Position von nicht weniger als 15° zur Horizontalen und einer maximalen spitzwinkligen Position von nicht mehr als 50° zur Horizontalen schwenkt und die Achse (16) in einer Lage relativ zu den Brettern (12, 14) so angeordnet ist, daß sie unter den Risten der Füße des Benutzers liegt und wobei das Schwenken der Bretter (12, 14) ein Dehnen und Zusammenziehen der Waden des Benutzers verursacht.

2. Ein Übungsgerät für die Beine nach Anspruch 1, dadurch gekennzeichnet, daß die Antriebsvorrichtungen (42, 54, 56) in der Lage sind, die Fußbretter (12, 14) mit einer Frequenz im Bereich von 60 bis 80 Zyklen pro Minute anzutreiben.

3. Ein Übungsgerät für die Beine nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Bretter (12, 14) schürzenartige Bauteile (40) an ihren fersenseitigen Enden aufweisen, welche an der Vorderseite des Gehäuses überlappen, um zu verhindern, daß Finger zwischen den fersenseitigen Enden der Bretter (12, 14) und dem Gehäuse (10) eingeklemmt werden.

4. Ein Übungsgerät für die Beine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Gehäuse (10) Räder (34) und einen Handgriff (36) aufweist, mittels denen es gehandhabt und auf dem Boden verfahren werden kann.

5. Ein Übungsgerät für die Beine nach Anspruch 1, dadurch gekennzeichnet, daß die Antriebsvorrichtungen ein Schwungrad aufweisen.

Revendications

1. Appareil d'exercice pour les jambes comprenant:

(a) une caisse (10) qui est ouverte sur le dessus pour permettre à l'utilisateur, assis, de descendre ses pieds dans la caisse (10);

(b) une paire de planches repose-pieds côte à côte allongées (12, 14), montées à l'intérieur de la caisse (10) plus haut que son fond, lesdites planches (12, 14) ayant des surfaces pour recevoir les pieds et chaque planche (12, 14) ayant un bout orteil (12B, 14B) et un bout talon (12A, 14A), lesdites planches (12, 14) servant à supporter le poids des jambes de l'utilisateur;

(c) un moyen d'entraînement (42, 54, 56) à l'intérieur de la caisse; et

(d) une liaison (64) à l'intérieur de la caisse reliant le moyen d'entraînement (42) et les planches repose-pied (12, 14) de manière à les faire basculer autour d'un axe de pivotement (16), en opposition de phase, caractérisé en ce que l'appareil d'exercice pour les jambes est conçu spécifiquement pour être utilisé par un utilisateur assis sur une chaise de manière que chaque planche (12, 14) pivote entre une position minimale selon un angle aigu de 15° à l'horizontale et une position maximale selon un angle aigu de 50° à l'horizontale, et ledit axe (16) est situé selon une position relative aux planches (12, 14) de manière qu'il se trouve sous les voûtes des pieds de

l'utilisateur et que ledit pivotement des planches (12, 14) fasse s'étirer et se contracter les mollets de l'utilisateur.

2. Appareil d'exercice pour les jambes selon la revendication 1, caractérisé en ce que les moyens d'entraînement (42, 54, 56) sont adaptés pour entraîner les planches repose-pied (12, 14) à une fréquence d'environ 60 à 80 cycles par minute.

3. Appareil d'exercice pour les jambes selon la revendication 1 ou 2, caractérisé en ce que les planches (12, 14) ont des éléments rideaux (40), à leur bout talon, qui recouvrent à l'avant de la caisse pour éviter un coincement des doigts entre les bouts talons des planches (12, 14) et la caisse (10).

4. Appareil d'exercice pour les jambes selon l'une des revendications précédentes, caractérisé en ce que la caisse (10) comporte des roues (34) et une poignée de manutention (36) avec lesquelles elle peut être manipulée et roulée sur le sol.

5. Appareil d'exercice pour les jambes selon la revendication 1, caractérisé en ce que le moyen de transmission comprend un volant.

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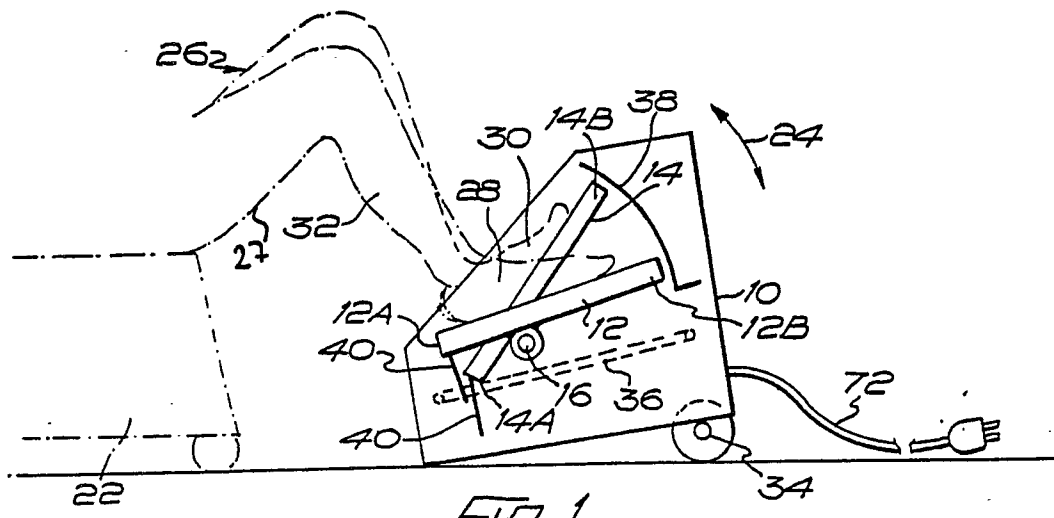


FIG. 1

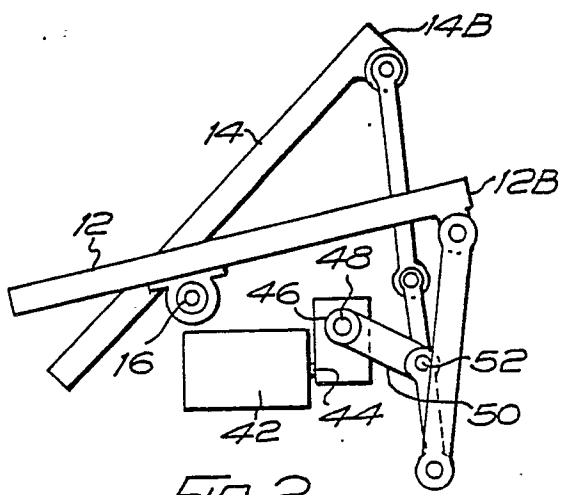


FIG. 2

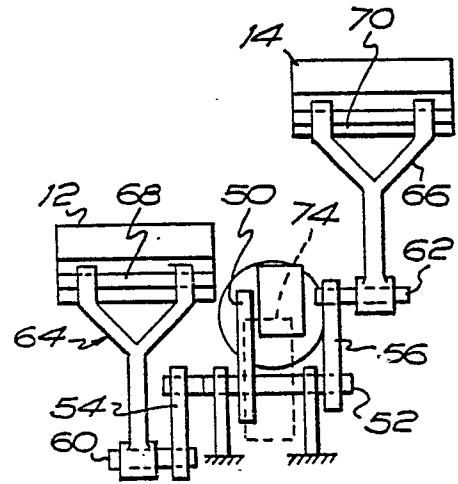


FIG. 3

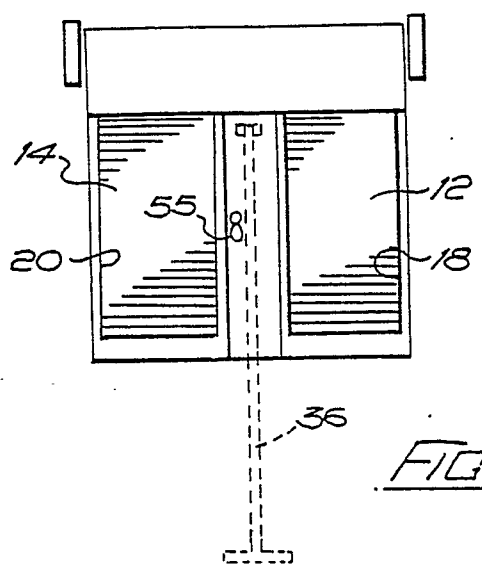


FIG. 4