

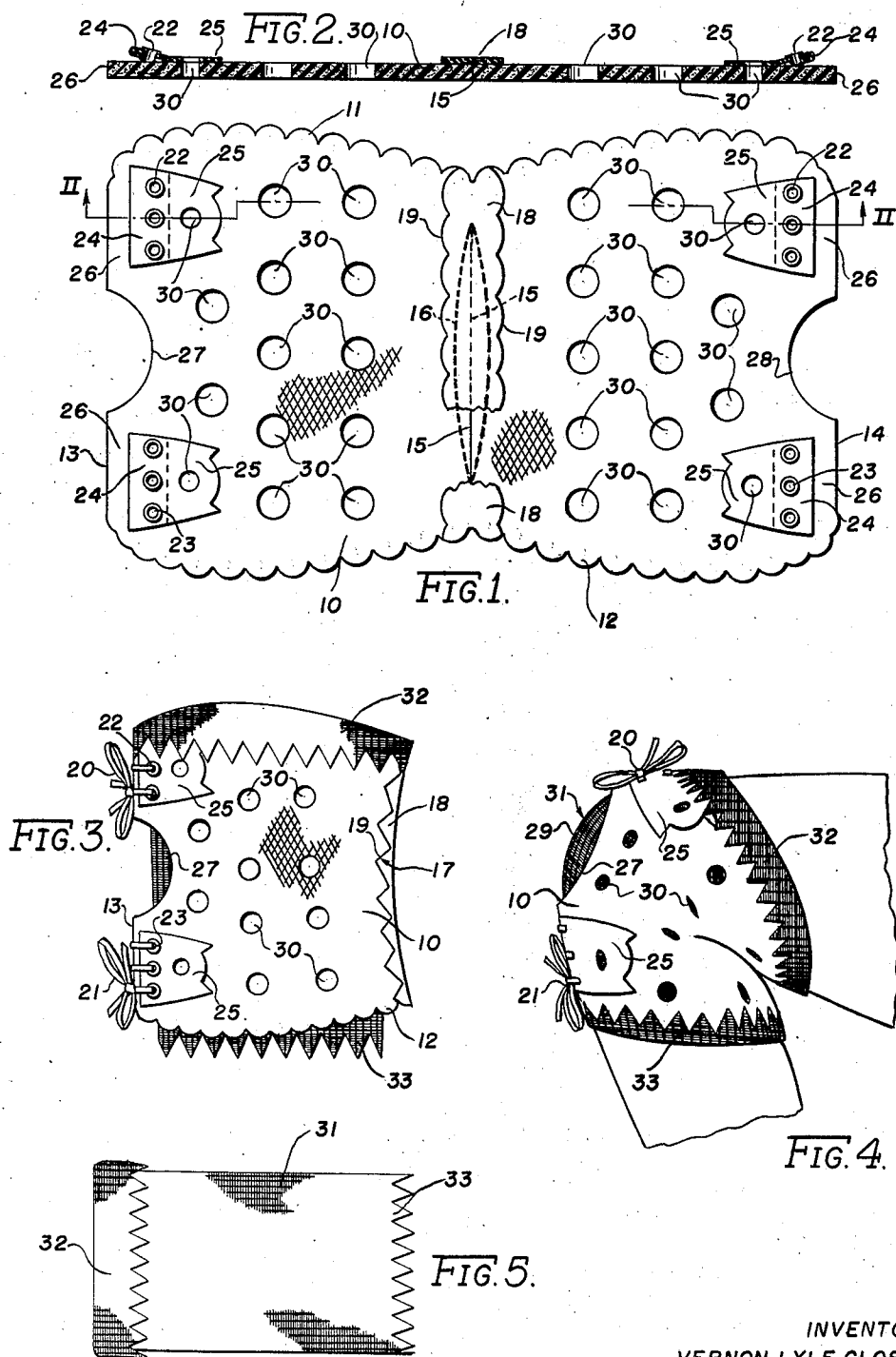
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KNEE APPLIANCE

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KNEE APPLIANCE

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5 Claims. (Cl. 128—62)

This invention relates to limb exercising devices and more particularly to therapeutic knee exercising appliances, although certain features thereof may be employed with equal advantage for other purposes.

It contemplates more especially the provision of an elastic knee embracing appliance to impart muscular massage action in a longitudinal, transverse and circular direction in the region of the knee to bring about therapeutic results to the entire human system.

It is believed that many ills of the human body are existent or brought about by a lack of proper blood circulation and such may be materially improved by massaging the muscles in the region of the knee while walking with the aid of a knee appliance that imparts longitudinal, transverse and circular muscular massaging action. Elastic bands have heretofore been proposed for this purpose, but these are merely elastic in a transverse direction and do not materially impart a massaging action that is sufficient to bring about a substantially improved circulation of the blood throughout the human body. In fact, these devices have been primarily resorted to as a means of reducing swelling rather than to impart any massaging or blood circulating action during the operation of walking.

One object of the present invention is to improve the operation and construction of devices of the character mentioned.

Another object is to provide a knee appliance having an elastic rigid body that imparts a muscular massaging action in a longitudinal, transverse and circular direction to improve the blood circulation.

Still another object is to provide a knee appliance with a comparatively thick elastic rubber body for snug embracing action with sufficient freedom to afford greater elasticity in a transverse rather than a longitudinal direction in order to impart the desired massaging action while walking.

A further object is to provide a knee appliance with a comparatively thick elastic rubber body for snug embracing action with sufficient freedom to afford greater elasticity in a transverse rather than a longitudinal direction and longitudinally reinforced to impart a buckling reaction while walking to improve the therapeutic efficacy thereof.

A still further object is to provide a knee appliance with a comparatively thick elastic rubber body for snug embracing action with sufficient freedom to afford greater elasticity in a trans-

verse rather than a longitudinal direction with a longitudinal arcuate configuration properly reinforced to impart a buckling reaction while walking to improve the therapeutic efficacy thereof.

Still a further object is to provide a knee appliance with a comparatively thick elastic rubber body for snug embracing action with sufficient freedom to afford greater elasticity in a transverse rather than longitudinal direction with a longitudinal curved configuration properly reinforced in the rear region thereof to impart a buckling reaction while walking to improve the therapeutic efficacy thereof.

An additional object is to provide an adjustable knee appliance with a comparatively thick elastic rubber body for adjustable snug embracing action with sufficient freedom to afford greater elasticity in a transverse rather than longitudinal direction with a longitudinal curved configuration properly reinforced in the rear region thereof to impart a buckling reaction while walking to improve the therapeutic efficacy thereof.

Other objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

In the drawing:

Figure 1 is a view in elevation of a knee appliance in its extended flat form with a portion of the rear longitudinal area broken away to clarify the showing.

Figure 2 is a sectional view taken substantially along line II—II of Figure 1.

Figure 3 is a side view in elevation of the knee appliance shown in Figure 1 as it appears in its knee embracing relation.

Figure 4 is a side view in elevation of the knee appliance shown in Figure 3 in embracing position while the leg is flexed in the customary manner incident to walking.

Figure 5 is a side view in elevation of an assembly liner used in conjunction with the knee appliances shown in the previous figures.

The structure selected for illustration comprises a sheet of sponge rubber 10 of sufficient thickness to define an elastic and self-supporting body member. For the present purpose, the sponge rubber 10 may be anywhere from three-sixteenths to one-quarter of an inch in thickness; however, this may be varied within a wide range depending upon the dictates of commercial practice and the requirements of any individual wearer. The sponge rubber sheet 10 is preferably though not essentially of an intermediate type having characteristics between that of live sponge rubber and

dead sponge rubber, but this may vary in grade and characteristics to meet individual requirements and new teachings resulting from a wider experience in the use thereof to meet different conditions and persons.

In the main, the sheet 10 is of substantially rectangular configuration and is wider transversely than its vertical longitudinal length to encircle the knee region of the human leg and extend for a distance that is somewhat beyond three inches above and three inches below the knee pivotal point or joint. Obviously, the vertical longitudinal extent thereof may be varied depending upon individual leg formations and the defects to be remedied in the use thereof; however, for ordinary purposes in increasing blood circulation and imparting effective muscular action, it has been found that the general longitudinal dimensions thereof need not exceed seven inches. There is, of course, no limitation in size and the specifications set forth herein are illustrative rather than essential requirements.

In the present embodiment, the top and bottom edges 11 and 12 are serrated to impart an attractive appearance. Further, the edges 11 and 12 are convexly arcuate intermediate the side edges 13-14 and the longitudinal median line 15 that is equally distant from the side edges 13 and 14. Such a configuration more perfectly embraces the knee region of the human leg to conform with the external contour of the joint and adjacent leg and thigh regions that are connected to the knee cap or patella.

In order to control and more or less define the degree of buckling that occurs along the rear longitudinal median line of the sheet 10 while it is applied to the knee, the sheet 10 is slitted as at 15 for its entire length or the major portion of its length along the longitudinal rear median line so as to define a preferably diamond-shaped opening 16 (shown in dotted outline in Figure 1). Then the longitudinal arcuate lines of the slit 15 are brought together and adhesively joined to define the line 15 (Figure 1), thereby imparting a concavely arcuate configuration 17 (Figure 3).

A reinforcing strip 18 is adhesively and externally applied to the joined slits 16 to conceal as well as to reinforce the longitudinal median line to increase the buckling action and rigidity of the body 10 in a longitudinal direction. The side edges of the reinforcing edges are serrated as at 19 to enhance the appearance thereof and the strip 18 may be stamped or otherwise shaped from thin rubber material having considerably lesser stretch than the body 10 imparting longitudinal and massaging action in conjunction with the concavely arcuate line of curvature 17.

The degree of the concavely arcuate configuration controls the buckling action which should be less on persons having fat legs than those who are characteristically lean. A thin person not having any excess flesh above or below the knee should wear a knee appliance wherein the rubber sheet 10 has an almost straight longitudinal rear median line so that during the flexing of the knee in walking there will be more of a buckling reaction that will impart an increased "kick" brought about by the flexing of the rubber sheet 10 while embracing the knee region of the leg. In stout persons who have considerable flesh above and below the knee, the sheet 10 is substantially curved along the rear longitudinal median line (Figure 3) so that the buckling reaction and "kick" is considerably less than it

otherwise would be in the absence of such contouring, thereby controlling the massaging as well as stretching reaction imparted to the muscles in the leg. In consequence thereof, the kicking reaction imparted by the body 10 can be controlled so that it is the same in all persons regardless of their leg formation by concavely curving the rear longitudinal region of the body 10 to compensate for variations in leg shape characteristics that influence the buckling action.

In order to enable the rubber sheet 10 to snugly embrace the knee region of the leg without being tightly applied, thereby affording complete walking freedom and yet effecting massaging action on the limbs, the adjacent side edges 13 and 14 are provided with suitable fastening expedients such as the laces 20 and 21 that extend through a series of vertically arranged eyelets 22 and 23 on both adjacent edges 13 and 14 of the knee appliance body 10. The eyelets 22 and 23 are preferably disposed through the free edge region 24 of the reinforcing tabs 25 that are adhesively applied to the exterior corner regions of the body 10 proximate to but removed from the side edges 13 and 14 to define overlaps 26 to compensate for the variations in the circumference of the knee regions after continued use of the knee appliance 10. The reinforcing tabs 25 may consist of thin rubber sheets that possess substantially the same characteristics as the reinforcing strip 18.

Other forms of fastening expedients may be substituted for the laces 20 and 21 depending upon the dictates of commercial practice, but such should preferably allow for adjustment of the circular embracing extent of the body 10 when snugly but not tightly applied to the knee region of the leg for full walking freedom and effect flexing of the body 10 during the act of normal walking motion. It may be desirable in some instances to provide complementary semi-circular cut-outs or openings 27 and 28 in the side edges 13 and 14, respectively, intermediate the top and bottom edges 10 and 11 so as to receive the knee cap 29 rather than impart an embracing influence thereon where such would not be desired in any individual case. This also tends to retain the knee appliance 10 in its proper position on the leg and permits additional freedom.

A plurality of apertures 30 are stamped or otherwise uniformly provided throughout the area of the body 10 so as to increase the elasticity thereof as well as provide proper air exposure to the skin therebeneath. A fabric such as a knitted tubular liner 31 of cylindrical configuration is disposed interiorly of the body 10 so as to preclude direct contact between the skin and the rubber body 10 as well as afford the substitution of the liner 31 in the interests of sanitation and cleanliness. The tubular or cylindrical liner 31 has its top and bottom peripheral edges 32 and 33 preferably though not essentially serrated to improve the appearance thereof, it being desirable to fold the peripheral edges 32 and 33 over the top and bottom edges 11 and 12 to retain such in the proper position relative to the rubber body 10.

It is important to note that the sponge rubber sheet 10 is cut with the grain so as to provide far greater transverse than longitudinal stretch to the body 10. In other words, the body 10 is more elastic and easily stretched transversely or in a horizontal direction (viewed from Figure 1) than in a longitudinal or vertical direction. This

gives a greater transverse massaging action to compensate for the longitudinal movements of the leg that would normally give a greater longitudinal than a transverse massaging action.

5 Owing to this variation in the directional elasticity of the body 10, there is effective longitudinal, transverse and combined longitudinal-transverse (that is circular) motion imparted to the muscles while walking with the knee appli-
10 ance 10 in position. Then, too, the knitted tubular liner 31 similarly has greater transverse than longitudinal stretch to conform with the elastic characteristics of the body 10. The liners 31 are washable and readily replaced to retain the knee
15 appliance 10 in a refreshed and clean condition.

With a device embodying teachings of the present invention, it will be apparent that the comparatively thick body 10 affords such rigidity as to enable the device to be worn snug without
20 being too tight and yet provide an effective massaging without interfering with walking or sitting freedom. Then, too, the characteristics of the materials and the contour thereof provides a definite buckling reaction which provides longi-
25 tudinal kick and a transverse stretch affording a circular massaging action to materially improve the blood circulation in the human body as well as strengthen the muscles surrounding the knee region that are important to the well
30 being of every person. These functional effects coupled by the heat generated in the knee region beneath the body 10 of the appliance, creates a definite therapeutic effect upon the entire human system. The appliance body 10 massages
35 and tends to drive the heat into the knee and produces an increased beneficial therapeutic effect in conjunction with the massaging action.

With the continued use of the device the knee region of the leg will diminish in size so that the adjustable fasteners 20 and 21 may be drawn
40 tighter to either create an overlap of the adjacent side region 26 or to permit such to be sheared off so that the body 10 will continue to be perfectly fitting during the continued use over
45 an extended period. Various changes may be made in the embodiment of the invention herein specifically described without departing from or sacrificing any of the advantages of the invention or any features thereof, and nothing herein shall
50 be construed as limitations upon the invention, its concept or structural embodiment as to the whole or any part thereof except as defined in the appended claims.

I claim:

55 1. A knee appliance comprising a rectangular sheet of flexible material to define a knee jacket having more transverse than longitudinal stretch for enveloping the knee region of the leg, fasten-
60 ing means on adjacent edges of said flexible jacket to effect the snug embracing attachment

of said flexible material around the knee leg region, and a reinforcing strip disposed longitudinally of said jacket intermediate the transverse edges to impart a buckling action during leg walking movement.

2. A knee appliance comprising a rectangular sheet of flexible material to define a knee jacket having more transverse than longitudinal stretch for enveloping the knee region of the leg, fasten-
5 ing means on adjacent edges of said flexible jacket to effect the snug embracing attachment of said flexible material around the knee leg region, a reinforcing strip disposed longitudinally of said jacket intermediate the transverse
10 edges to impart a buckling action during leg walking movement, and a tubular fabric liner detachably associated with the interior of said tubular knee jacket.

3. A knee appliance comprising a rectangular sheet of flexible sponge rubber to define a knee jacket having more transverse than longitudinal stretch for enveloping the knee region of the leg, adjustable fastening means on adjacent edges of
20 said flexible jacket to effect the snug embracing attachment of said flexible material around the knee leg region, and a reinforcing strip disposed longitudinally of said jacket intermediate the transverse edges to impart a buckling action during
25 leg walking movement.

4. A knee appliance comprising a comparatively thick rectangular sheet of flexible sponge rubber to define a knee jacket having more transverse than longitudinal stretch for enveloping the knee region of the leg, there being a plurality
30 of perforations distributed uniformly over the area of said jacket, adjustable fastening means on adjacent edges of said flexible jacket to effect the snug embracing attachment of said flexible material around the knee leg region, and a re-
35 inforcing strip disposed longitudinally of said jacket intermediate the transverse legs to impart a buckling action during leg walking movement.

5. A knee appliance comprising a rectangular sheet of flexible material to define a knee jacket for enveloping the knee region of the leg, fasten-
45 ing means on adjacent edges of said flexible jacket to effect the snug embracing attachment of said flexible material around the knee leg region, there being complementary portions of a knee hole aperture in the adjacent transverse
50 edges of said jacket intermediate said fastening means, a reinforcing strip disposed longitudinally of said jacket intermediate the transverse edges to impart a buckling action during leg
55 walking movement, and a tubular fabric liner detachably associated with the interior of said tubular knee jacket.

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