March 22, 1927. 1,622,211

F. SHEEHAN

KNEE BRACE

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Fig. 1.

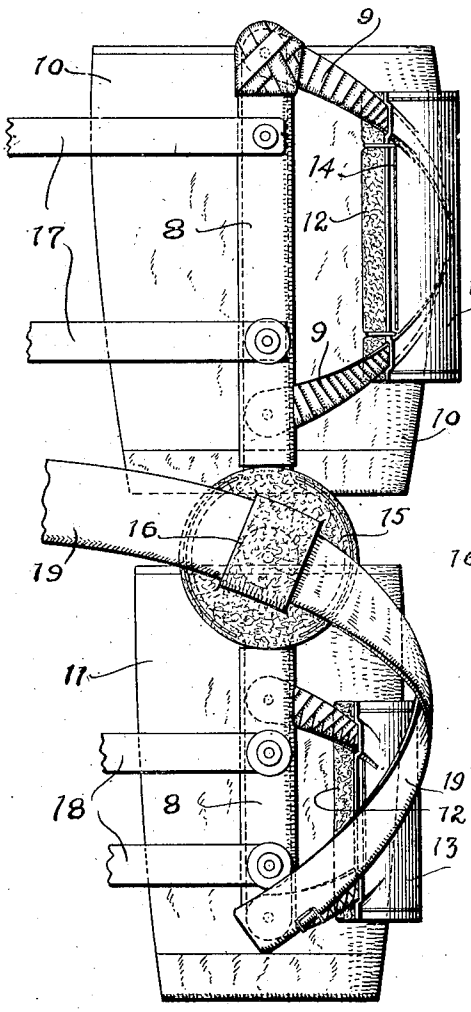

Fig. 2.

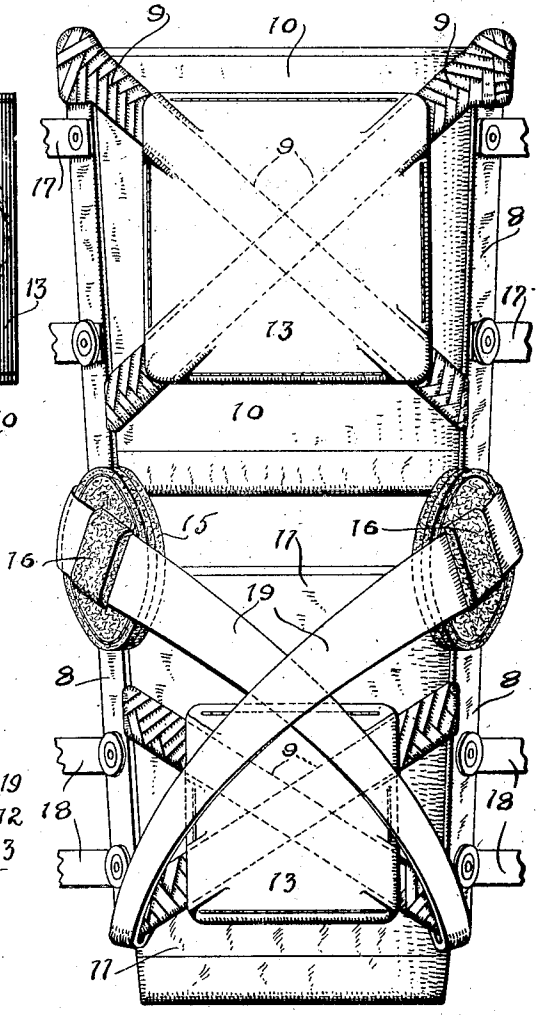

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Fig. 3.

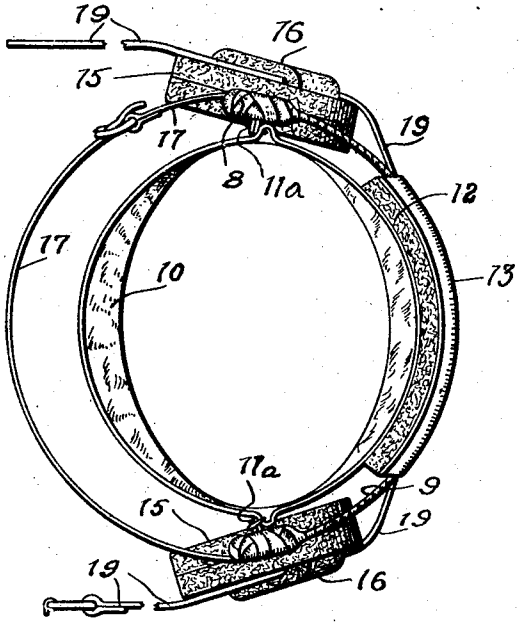


Fig. 4.

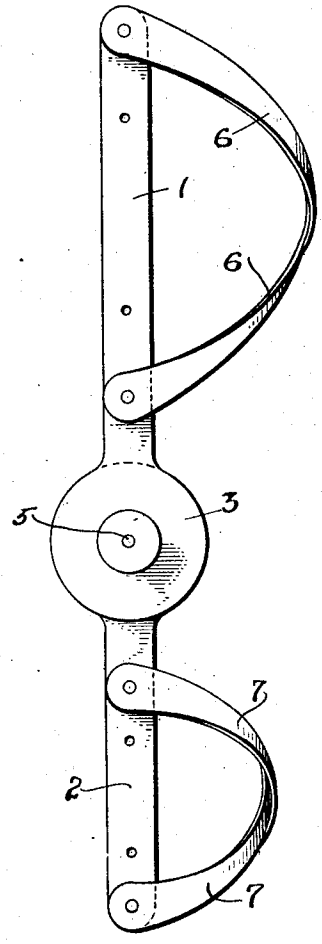
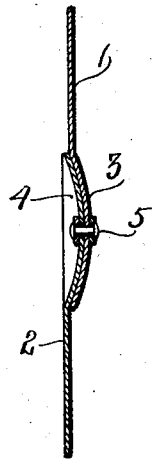


Fig. 5.



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Patented Mar. 22, 1927. 1,622,211

UNITED STATES PATENT OFFICE.

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KNEE BRACE.

Application filed March 18, 1926. Serial No. 95,618.

This invention relates to certain new and useful improvements in knee braces of the type especially designed for use by athletes and has for its primary object to provide a brace that will permit free bending movement of the leg at the knee joint and wherein the brace is constructed in a manner for snug and intimate contact with the knee joint for more effectively bracing the same.

Another object of the invention is to provide a knee brace embodying a skeleton frame constructed of a light material, such as aluminum or the like and further including connected side bars pivotally connected together at their meeting ends at the inner and outer sides of the knee joint for pivotal movement in the direction of the bending movement of the knee and in such manner that the side bars and the pivotal connections therefor at the opposite sides of the knee joint are caused to move toward each other during bending movement of the knee for increasing the pressure of the knee brace when most desired.

With the above and other objects in view that will become apparent as the nature of the invention is better understood, the same consists of the novel form, combination and arrangement of parts hereinafter more fully described, shown in the accompanying drawings and claimed.

In the drawings, wherein like reference characters designate corresponding parts throughout the several views,

Figure 1 is a side elevational view of a knee brace constructed in accordance with the present invention, the attaching straps therefor being broken away,

Figure 2 is a front elevational view of the knee brace showing the hinge connection between the upper and lower sections thereof,

Figure 3 is a top plan view of the knee brace,

Figure 4 is a side elevational view of the metallic skeleton frame of the knee brace with the fabric covering therefor removed and showing the disk hinge connections between the upper and lower sections of the brace, and

Figure 5 is a detail sectional view showing the disk hinge connection between the upper and lower sections as of dished formation.

As shown in Fig. 4, the metallic skeleton framework of the knee brace embodies upper and lower side bars 1 and 2 respectively, the adjacent ends of said bars being provided with disk heads 3 and 4 of dished formation as shown in Fig. 5 that are pivotally connected together by the pins 5. A pair of side bars 1 and 2 is positioned at each side of the leg with the disk connections 3—4 alined with the knee joint, and the upper side bars 1 are connected by forwardly curved resilient metallic strips 6 crossing each other and respectively connected to the upper and lower ends of the upper side bars, while similar metallic strips 7, also crossing each other, are connected to the upper and lower ends of the lower side bars 2 at opposite sides of the legs.

As shown in Figs. 1 to 3, the side bars 1 and 2 are preferably covered by leather strips 8 while the cross connecting strips 6 are covered by a frabric lacing 9.

An elastic leg band section or bandage is carried by the upper and lower side bars 1 and 2 of the knee brace, the upper elastic leg band or bandage 10 enclosing a part of the thigh being stitched or otherwise secured at its opposite sides as at 11ª to the strap covering 8 on the upper side bars, while the lower elastic band or bandage 11 is similarly secured to the leather covering 8 upon the lower side bars 2, the elastic leg band sections 10 and 11 being spaced from each other as shown in Figs. 1 and 2.

To prevent rubbing contact between the crossed strips 6 and 7, at the forward side of the brace, and the leg of the person, a pad is carried by each pair of connecting strips for the side bars and are disposed at the intersecting points thereof, each pad comprising a cushion body 12 positioned inwardly of the connecting strip with a leather covering 13 positioned outwardly of the connecting strip and secured to the cushion body 12 as at 14. The pivotal connecting disks 3 and 4 between the upper and lower side bars 1 and 2 are also covered by cushioning pads 15 to prevent injury to the opposite sides of the knee, the outer sides of the joint pads 15 having offset portions 16 providing guides for elastic frame-contracting straps to be described.

Attaching straps 17 and 18, preferably arranged in pairs and respectively carried by the upper and lower side bars 1 and 2 of the brace, are adapted to be secured at the rear sides of the leg above and below the knee with the leg extended through the elastic band sections 10 and 11. A pair of crossed straps 19, preferably elastic, are attached at

their lower ends to the lower ends of the side bars 2, cross each other forwardly of the lower section of the knee brace and then pass through the offset guide portions 16 of the joint pads 15 to again cross each other rearwardly of the upper section of the brace and to be detachably connected together at their meeting ends forwardly of the upper section of the brace.

The side bars 1 and 2 at opposite sides of the brace and the pivotal disk connections 3 and 4 therebetween, are normally in planes which diverge upwardly and rearwardly so that said opposed side bars and pivotal disk connections are moved toward each other during bending movement of the leg to increase the pressure on the knee joint. The resiliency of the cross connecting strips 6 and 7 for the side bars 1 and 2 and the relative angular positions of the opposed side bars and their hinge joints causes the knee brace normally to assume an extended position with the upper and lower sections thereof alined as shown in Fig. 1, and the elastic straps 19 insure yielding intimate contact between the pads of the inner pivot disks 4 at the sides of the knee brace and the knee joint of the wearer. The movement of the opposed side bars toward each other or contraction of the frame when the knee is bent is due to the cam action had by arranging the opposed pairs of hinge-joint members or disks in rearwardly diverging planes, in the presence of the connection of the upper bars 1 by the strips 6 so as to prevent material relative separating movement of said bars 1. As the bars diverge upwardly, and are connected by strips 6 which are resilient, the latter will give slightly and allow slight separation of the upper ends of bars 1 when the knee is bent, thus exerting a force to normally yieldingly return the frame sections to the aligned relation illustrated in Fig. 1. By the use of dished and padded hinge joint members 3 and 4, the latter may be drawn snugly against opposite sides of the knee joint without causing discomfort and the straps 19 are primarily adapted to so draw them together for insuring maximum bracing effect at all times, thus acting considerably more than for mere attaching purposes, as is the case with the straps 17 and 18.

While there is herein shown and described the preferred embodiment of the present invention, it is, nevertheless, to be understood that minor changes may be made therein without departing from the spirit and scope of the invention as claimed.

What is claimed is:—

1. A knee brace comprising two elastic bandages adapted to encompass the leg above and below the knee respectively, resilient flexible frame sections supported by the elastic bandages and pivotally connected at the sides of the knee joint, and elastic means passing across the pivotal connections of the frame sections to draw the same into intimate contact with the opposite sides of the knee joint.

2. A knee brace comprising two elastic bandages adapted to encompass the leg above and below the knee respectively, resilient flexible frame sections supported by the elastice bandages and pivotally connected at the sides of the knee joints, said frame sections consisting of pairs of pivotally connected side frame bars disposed at the sides of the leg, said bars and their pivotal connections being arranged in upwardly and rearwardly diverging planes.

3. A knee brace comprising two elsatic bandages adapted to encompass the leg above and below the knee respectively, resilient flexible frame sections supported by the elastic bandages and pivotally connected at the sides of the knee joint, and elastic means passing across the pivotal connections of the frame sections to draw the same into intimate contact with the opposite sides of the knee joint, the pivotal connections of the frame bars embodying nested outwardly dished disks adapted to fit the sides of the knee joint.

4. A knee brace comprising two elastic bandages adapted to encompass the leg above and below the knee respectively, resilient flexible frame sections supported by the elastic bandages and pivotally connected at the sides of the knee joint, and elastic means passing across the pivotal connections of the frame sections to draw the same into intimate contact with the opposite sides of the knee joint, the pivotal connections of the frame bars embodying nested outwardly dished disks adapted to fit the sides of the knee joint, and pads on the inner surfaces of the inner disks.

5. A knee brace comprising two elastic bandages adapted to encompass the leg above and below the knee respectively, and resilient flexible frame sections supported by the elastic bandages and consisting of frame members disposed at the sides of the leg and pivotally connected at the sides of the knee joint, the pivotal connections of the frame members being arranged in upwardly and rearwardly diverging planes to have a cam action for contracting the side frame members against the sides of the leg when the frame sections are moved from an aligned relation to an angular relation.

In testimony whereof I affix my signature.

FRANK SHEEHAN.