Aug. 21, 1962 A. C. PECKHAM 3,050,053

ORTHOPEDIC SUPPORTS

Filed Aug. 26, 1959 2 Sheets-Sheet 1

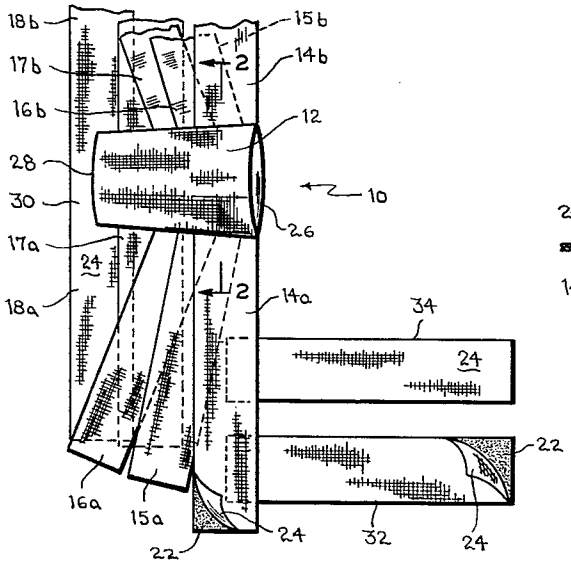


Fig. 1

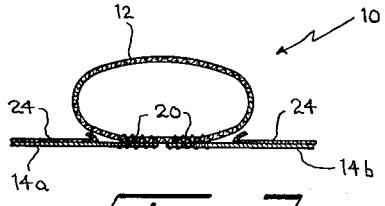


Fig. 2

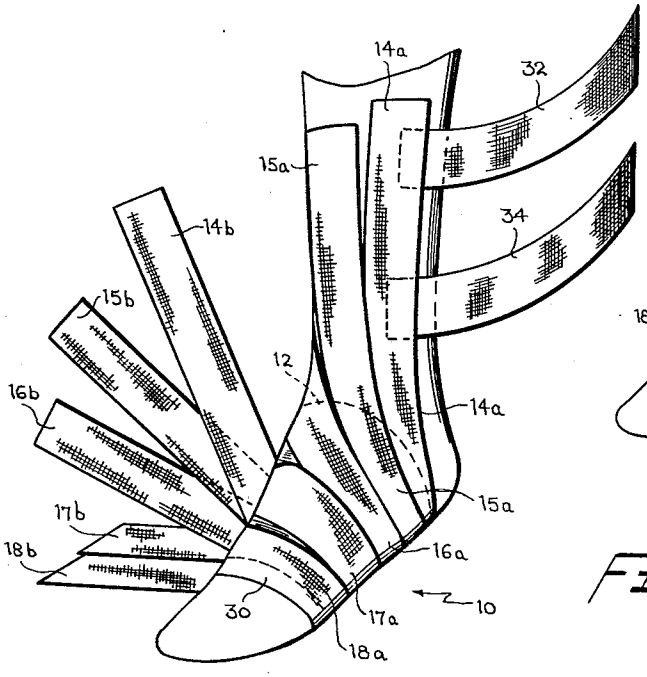


Fig. 3

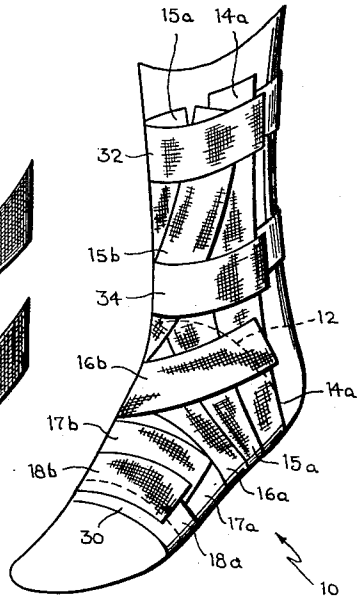


Fig. 4

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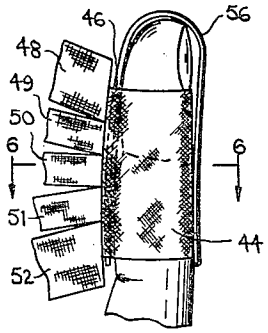


Fig. 5

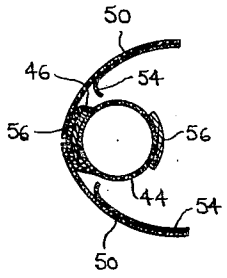


Fig. 6

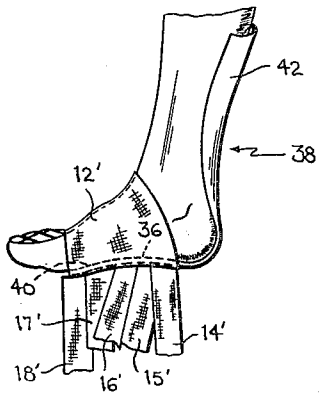


Fig. 7

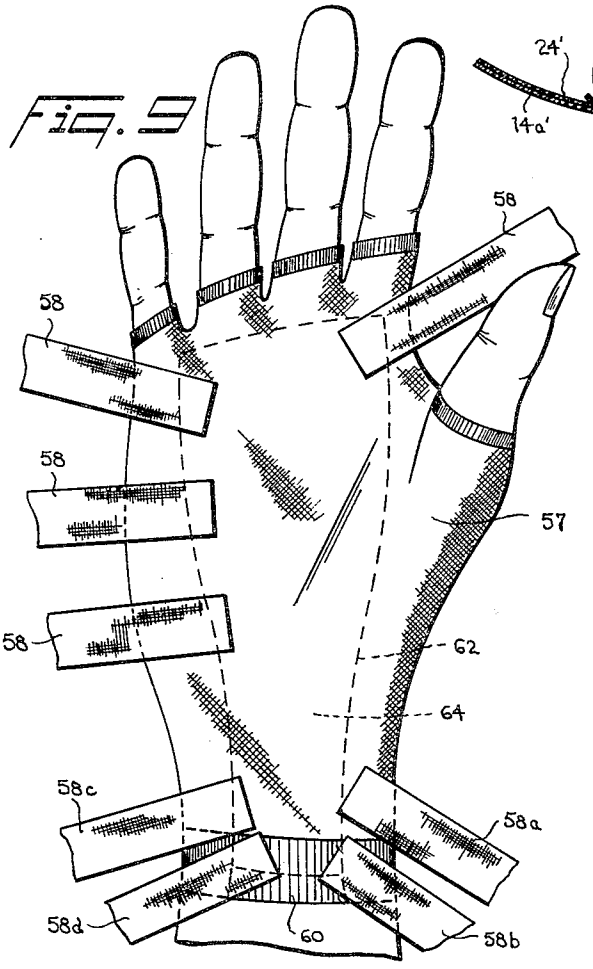


Fig. 9

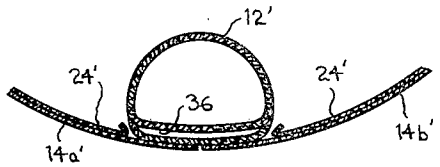


Fig. 8

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3,050,053

ORTHOPEDIC SUPPORTS

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7 Claims. (Cl. 128—80)

This invention relates generally to orthopedic supports or braces, and has particular reference to a novel support for the limbs and joints of the human body, the support being adapted for use in immobilizing parts of the body that have been injured and also in preventing injuries before they occur. The invention thus embraces both the treatment and preventative aspects of injuries, as will be apparent from the description to follow.

Briefly stated, the invention contemplates the provision of a stretchable limb or joint encircling member and a plurality of flexible straps or tapes which project outwardly from the member in a predetermined angular pattern for binding the limb in a specific manner. The limb encircling member, which may be a sleeve of woven fabric, is constructed so as to snugly engage the limb for which it is adapted although its elasticity enables it to readily adjust to different sized limbs of the same type. The straps are provided with adhesive means for retaining them in binding position, and each strap is disposed with respect to the encircling member in such a way that it is automatically directed into proper position for supporting the limb in the best possible manner.

When the support is to be used for immobilizing an injured joint or limb, the basic structure just described is used in connection with a lightweight splint, and to this end, the encircling sleeve is provided with an integral pocket which receives a portion of the splint and properly positions it with respect to the limb. The tapes are then applied as noted above except that they engage both the splint and the limb to firmly hold the splint in position.

In its use for the prevention of injuries, one of the important advantages of the support of the invention is that it can be applied by the wearer himself with complete assurance of obtaining proper protection. In organized football, it is common practice to tape the ankles of the players to minimize the possibility of injury, and with college and high school football squads numbering from 20 to 80 men, this job can be exceedingly time consuming since it is necessary to measure and cut each tape for each individual application. Moreover, while the taping is usually done by the trainer or team physician, it is recognized that a really good taping job is difficult to achieve and that even among trained people relatively few are truly adept at it. With the present invention, on the other hand, each athlete can apply his own support, and since the proper lengths, widths and angular dispositions of the tapes will have been determined by medical research, the athlete need only apply the tapes in the manner in which they are directed to ensure correct support. Equally important, is the fact that the support is applied in the same way every time, which individual doctors or trainers cannot guarantee. In addition to football players and participants in other organized sports, independent athletes such as skiers, skaters, tennis players and workmen in a number of different fields, can utilize the invention to provide protection for a weak ankle, wrist or even finger as will be more apparent from the detailed description to follow.

In its use for the treatment of existing injuries, one of the important advantages of the support of the invention is that it can be used in lieu of a cast in most instances where immobilization of a joint or limb is necessary or desirable. Thus, the support can be used in connection with a splint for the treatment of fractures, dislocations, sprains, etc.; and it is lighter, more comfortable, easier to apply and cleaner than a cast while still providing sufficient rigidity for most applications. In addition, the support disclosed herein greatly simplifies the task of applying splints to joints such as finger joints where casts are not normally used but the present methods of splinting are awkward and difficult to carry out. The easy application and removal of the support of the invention are also advantageous with respect to the present trend in medicine towards early manipulation of joint fractures where the immobilization means or dressing must be changed frequently to enable the manipulation to be accomplished.

With the foregoing and other considerations in view, therefore, it is a general object of the invention to provide a simple yet versatile orthopedic support which is pre-arranged to ensure proper application by any user.

Another object of the invention is to provide a support of the character described which is adapted for use both in the prevention and treatment of injuries.

Another object of the invention is to provide a support of the character described which is sufficiently flexible to readily adjust to different sized limbs of the same type, thus, for example, a single form of the ankle support contemplated by the invention can be used by athletes of different sizes and weights with good results in every case.

A further object of the invention is to provide a support of the character described which ensures that the support will be uniformly applied in every instance and thus that the protection afforded will be uniform.

Still another object of the invention is to provide a support of the character described which is quick and easy to apply and remove, no special training being required to ensure proper application.

A still further object of the invention is to provide a support of the character described which is economical to manufacture, and can be stored for long periods of time without deterioration.

Another object of the invention is to provide a support of the character described which provides superior protection without restricting circulation.

A more specific object of the invention is to provide a support of the character described which, when used in connection with a splint, is lighter, cleaner and easier to apply than a cast; and which is easier to apply and more uniform than other methods of splinting, thus giving the patient a better job. Moreover, the support of the invention simplifies changing the immobilizing structure, and this in turn facilitates early manipulation of fractures when desirable.

Other objects and advantages of the invention will become apparent from the following detailed description thereof read in conjunction with the accompanying drawing which illustrate representative embodiments of the invention for the purpose of disclosure.

In the drawings:

FIGURE 1 is a fragmentary top plan view of an ankle support embodying the invention;

FIGURE 2 is a transverse section through the support taken substantially along line 2—2 of FIGURE 1;

FIGURE 3 is a perspective view illustrating the support of FIGURES 1 and 2 in the process of being applied to an ankle;

FIGURE 4 is a view corresponding to FIGURE 3 with the application of the support completed;

FIGURE 5 is a side elevation of a finger support embodying the invention, used in conjunction with a finger splint;

FIGURE 6 is a transverse section through the finger support and splint taken substantially along line 6—6 of FIGURE 5;

FIGURE 7 is a side elevation illustrating the appli-

cation of an ankle support when used in conjunction with a splint;

FIGURE 8 is a transverse section through the ankle support of FIGURE 7; and

FIGURE 9 is a front elevation of a hand support used in conjunction with a splint.

Referring now to the drawings, wherein like reference numbers designate the same part in each of the views, and with particular reference to FIGURES 1–4, **10** generally indicates an ankle support or brace embodying the invention. This support is essentially comprised of a stretchable foot encircling sleeve **12** and a plurality of non-stretchable straps or tapes **14–18** which project outwardly from opposite sides of the sleeve in a predetermined angular pattern, as shown. The sleeve **12** is preferably formed of woven fabric having resiliently stretchable or elastic characteristics, material of this nature being commonly referred to as stockinette material by physicians. The tapes **14–18** are permanently secured in a precise predetermined manner to the underside of the sleeve **12** as by stitching **20**, FIGURE 2, or by any other permanent method. The upper side of each tape is provided with an adhesive coating **22** or its equivalent, and to prevent the tapes from sticking together or to the sleeve before application of the support, each tape is covered with an easily removable facing strip **24** of a non-adhesive material such as plastic.

In applying the ankle support **10**, the sleeve **12** is drawn onto the foot until the back edge **26** of the sleeve is just forward of the ankle bones, as is best shown in FIGURES 3 and 7. In this position, the sleeve encircles the arch portion of the foot, and the tapes extend outwardly from beneath the arch as indicated. The tapes are then applied in a predetermined sequence with the protective strip **24** being removed from the adhesive surface of each tape just before it is applied.

Thus, the user will remove the strip **24** from tape **14***a* and then pull it up tight to the position shown in FIGURE 3. Tape **14***b* will then be applied in the same manner, these two tapes extending straight up the sides of the ankle and lower leg. In the same fashion, tapes **15***a*, **15***b* and **16***a*, **16***b* will be applied in sequence, these tapes extending angularly up the leg as indicated in FIGURE 3. Thereafter, tapes **17***a*, **17***b* and **18***a*, **18***b* will be applied in sequence, these tapes extending around the foot itself with tape **18** overlapping the forward end **28** of the sleeve as shown at **30** to firmly secure it to the foot and keep it from wrinkling or sliding backwards. It will be noted that a pair of laterally extending tapes **32**, **34** are secured to tape **14***a* and when the above steps have been completed, these tapes are wrapped around the lower part of the leg to help secure the longitudinally extending tapes **14**, **15** and **16** in position.

Where the tapes **14–18** are secured to the underside of the sleeve **12** the latter is comparatively non-elastic, but since the entire upper portion of the sleeve is elastic or stretchable, it can be used by adults having different sized feet and will always conform to the contours of the foot and snugly engage same. It is contemplated that each package containing a support will include directions for applying and, to this end, numbers or letters can be printed right on the tapes to indicate the proper sequence of application. However, as a practical matter, once an athlete or other user has applied a support, he should not have to refer to the directions thereafter since the procedure is the same every time and is actually very simple. Thus, the sleeve is always positioned on the foot just forward of the ankle bones and thereafter the tapes are simply applied in order from back to front, alternating between the tapes on opposite sides. Moreover, if the user applies each tape smoothly, in a wrinkle free manner, he can be assured of proper protection because the pre-arranged angles at which the various tapes extend from sleeve tend to automatically direct them in the proper direction, and the proper angular disposition of each tape for the best possible support can be determined by medical research. In this connection, it will be understood that the number and angular disposition of the tapes illustrated in the drawings is by way of example only, and it is not intended that the invention be limited to the particular number or arrangement of tapes shown. It should also be pointed out that, as used in this application, the term "limb" is intended to include joints; the term "support" means the structure of the invention used either alone or in conjunction with a splint; and that the term "splint" contemplates any type of splint.

FIGURES 7 and 8 illustrate the manner in which the ankle support just described can be used with a splint for the treatment of a fracture, dislocation, sprain or any other traumatic injury or condition in which immobilization is necessary or desirable. For this type of application, the sleeve **12'** is provided at its underside with an integrally formed, longitudinally extending pocket **36** in which a portion of the splint is positioned, and the tapes are secured to the underside of this pocket as shown. For an ankle injury, a molded splint **38** of the type shown in FIGURE 7 may be used, the splint having an arched bottom portion **40** that extends beneath the arch of the foot and a curved upstanding portion **42** which embraces the heel and back of the lower leg.

In accordance with the invention, the bottom portion **40** of the splint is received in the sleeve pocket **36**, the sleeve having first been positioned on the foot as previously described. The sleeve thus serves to properly orient the splint with respect to the limb and to initially hold it in position so that the person applying the support will have both hands free to apply the tapes **14'–18'**. The latter are applied as described above, except that in this instance they will engage the splint as well as the ankle and leg and will rigidly bind the splint in position so that the ankle is immobilized. To this end, when the support is intended for use with a splint, it may be provided with longer tapes to ensure good binding engagement with the splint. The rigidity desired in such case is in contrast with the non-splint application illustrated in FIGURES 1–4 wherein the device is intended to support and protect and yet allow relatively unrestricted movement.

FIGURES 5 and 6 illustrate the support of the invention as provided for use with a finger or thumb, the particular support shown being one that is adapted for use with a splint. For this application, the sleeve **44** is simply a smaller version of the sleeve **12'** and is formed with a similar longitudinally extending integral pocket **46**. Tapes **48–52** are secured to the outer side of the pocket in a predetermined angular pattern and are provided with adhesive coating and removable protective covering strips **54**, all in the manner described above. For finger injuries, and particularly those in the finger joints, an inverted U-shaped splint **56** of wood or plastic is frequently used, the depending legs of the splint being positioned on opposite sides of the joint to prevent movement.

In applying the finger support, the sleeve **44** is drawn onto the finger until its mid-point approximately registers with the joint requiring treatment. A splint of the proper length is then positioned on the finger by inserting one of its legs in the sleeve pocket **46**, the latter serving to maintain the splint in properly oriented position while the tapes are applied. If necessary, suitable padding (not shown) may be inserted between the end of the finger and splint in the conventional manner. The tapes **48–52** are applied sequentially in a predetermined manner after removing the covering strips, and are wrapped tightly around the sleeve and splint to firmly hold the latter in an immobilizing position. The upper and lower tapes **48** and **52** also overlap the upper and lower ends of the sleeve **44** as shown in FIGURE 5 for direct engagement with the finger itself to prevent the sleeve from shifting position longitudinally.

FIGURE 9 illustrates a support for the hand and or wrist, and to this end, the sleeve or encircling member

57 is in the form of a fingerless glove so that it closely conforms to the entire palm and wrist. As in the other modifications of the support, a plurality of tapes, some of which are fragmentarily shown at 58, are secured to the sleeve 57 in a predetermined angular pattern and are provided with an adhesive coating and removable protective covering strips (not shown). In this application, the tapes may be secured to either the front or back of the sleeve, although the arrangement shown is probably preferred. In either case, some of the tapes are arranged to engage the wrist or arm below the end 60 of the sleeve to anchor the latter in position, tapes 58*a*-58*d* performing this function in the embodiment shown.

The hand engaging sleeve 57 can be provided with a longitudinally extending pocket 62 for receiving a molded metal or plastic splint 64 which is shaped to conform to the palm of the hand. This splint can be of the length indicated for immobilizing only the palm portion of the hand or can be long enough to immobilize the wrist also, the tapes 58 being arranged to securely bind the splint in fixed position in either case.

While the invention has been described above with reference to specific portions of the body for the purpose of illustration, it will be apparent that it can be effectively utilized for treatment of other body parts such as the forearm, leg, knee, etc. Moreover, it will be understood that supports having splint receiving pockets can be used for purely preventative purposes by simply omitting the splint since the manner of application is essentially the same in both cases.

From the foregoing description, it will be apparent that the invention provides a truly versatile and practical support means for facilitating both the prevention and treatment of injuries. As will be apparent to those familiar with the art, the invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The embodiments disclosed are therefore to be considered in all respects as illustrative rather than restrictive, the scope of the invention being indicated by the appended claims.

What is claimed is:

1. In a support of the character described: a stretchable sleeve member for encircling a portion of the body, a plurality of non-stretchable strap members having adhesive means on one side thereof, said strap members being fixed to the said sleeve member at one side thereof and extending outwardly therefrom in a predetermined angular pattern for engagement in a preselected manner with the sleeve member and adjacent body portion, and detachable non-adhesive means normally covering said strap member adhesive means prior to the application of the support.

2. A support as defined in claim 1 wherein said sleeve-member is formed of woven fabric and includes a pocket for receiving and positioning a splint, a splint received in said pocket, the splint being adapted to coact with said strap members to immobilize the body portion engaged thereby.

3. In a support of the character described: a stretchable tubular member adapted to snugly engage a limb of the wearer, a plurality of flexible elongated tapes permanently secured to said tubular member along one side thereof, said tapes being of varying lengths and extending outwardly on opposite sides of the member in predetermined angular relation to the longitudinal axis thereof for wrapping engagement with specific areas of the member and limb itself, said tapes having adhesive means on the engaging sides thereof for maintaining them in wrapped position, and protective covering means normally overlying said adhesive means and removable therefrom upon application of the support.

4. A support as defined in claim 3 wherein said tubular member includes a longitudinally extending pocket for receiving and retaining aportion of a splint, a splint having a portion received in said pocket, said splint being adapted to coact with said member and tapes to immobilize the limb engaged thereby.

5. In a support of the character described: a limb encircling member comprising a stretchable woven fabric sleeve adapted to snugly engage the limb, the stretchable sleeve conforming to limbs of varying dimensions for accommodating wearers of different sizes, a plurality of non-stretchable flexible tapes, a portion of each tape being permanently secured in transverse relation to said sleeve along one side thereof with the end tapes partially overhanging the sleeve ends, said tapes being of varying lengths and extending outwardly on opposite sides of the sleeve in predetermined angular relation to the longitudinal axis thereof for binding engagement in a predetermined manner with the sleeve and the limb itself, said tapes having an adhesive coating on the engaging sides thereof for maintaining them in said position of engagement, and protective covering means normally overlying said adhesive coating and removable therefrom upon application of the tapes as aforesaid.

6. A support as defined in claim 5 wherein at least one of said tapes is provided with additional tapes permanently secured in transverse relation thereto.

7. In a support of the character described: a splint, a limb encircling member comprising a stretchable woven fabric sleeve adapted to snugly engage the limb, said sleeve including a longitudinally extending pocket, a portion of said splint being received in said pocket to hold the splint in position adjacent the limb, a plurality of non-stretchable flexible tapes, a portion of each tape being permanently secured in transverse relation to said sleeve along one side thereof, said tapes being of varying lengths and extending outwardly on opposite sides of the sleeve in predetermined angular relation to the longitudinal axis thereof for binding engagement in a predetermined manner with the sleeve, splint and the limb itself, and means on said tapes for retaining them in said position of engagement.

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