Nov. 12, 1963 T. E. HAMILTON 3,110,307

SPLINT

Filed July 6, 1962

Fig. 1.

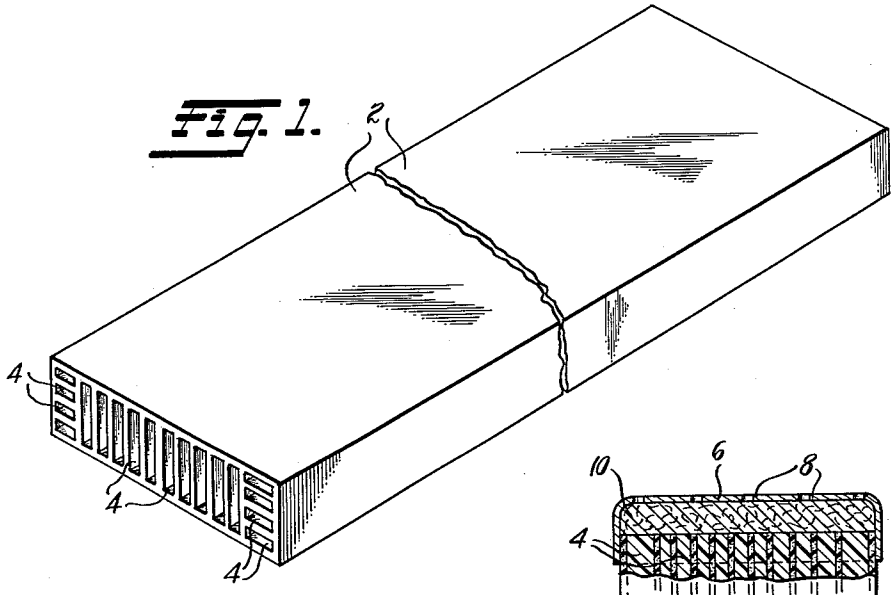


Fig. 3.

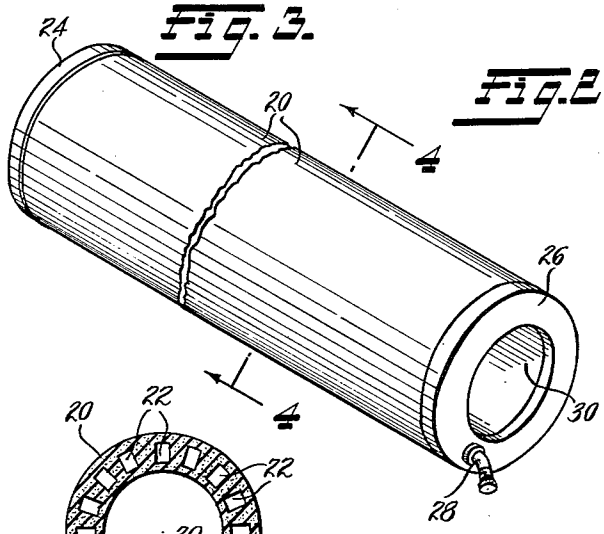
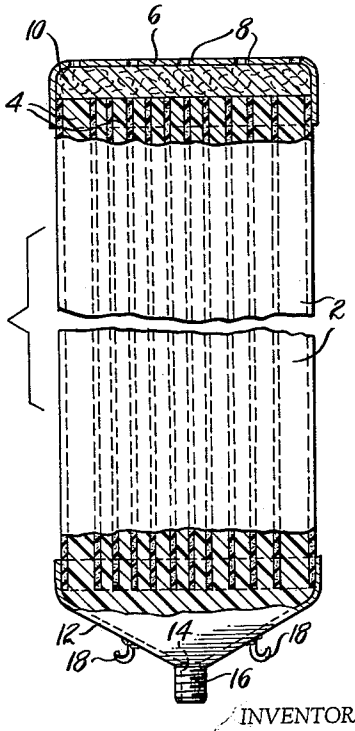


Fig. 4.

Fig. 2.



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United States Patent Office 3,110,307 Patented Nov. 12, 1963

3,110,307

SPLINT

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Filed July 6, 1962, Ser. No. 207,935
5 Claims. (Cl. 128—89)

This invention relates to splints for use in immobilizing limbs or other parts of a patient's body.

In brief, the invention comprises a solid body of flexible material, for example, a foamed, plastic or rubber-like material having a multiplicity of longitudinal passages extending therethrough. The material of the splint is preferably of a soft but flexible nature so that it will serve as a cushion and yet be flexible enough to be conformed intimately with the exterior of the limb to be immobilized.

In use, a fluent and extrudable but self-hardening material is forced into the passages to fill the same and while the material is somewhat fluent, the splint is wrapped or otherwise conformed about the limb of the patient and held in that condition until the material filling the passageways has set to a sufficiently hard condition, at which time the splint is complete and the limb effectively immobilized.

Throughout this description, the term "limb" will be used to include arms and legs, or any other portion of a patient's body.

It is, therefore, an object of this invention to provide a pre-formed splint adaptable for use with any limb to immobilize the same without the necessity of using bulk or loose moldable material, and without the necessity of molding those materials about a limb to form a cast.

It is another object of the invention to provide a splint of the kind set forth capable of rapid application with uniformly dependable and efficient results.

Still another object is to provide a pre-formed standard splint adaptable to any limb or part of a patient's body.

A further object of the invention is to provide a novel method of immobilizing a limb.

Further and additional objects and advantages will become apparent to those skilled in the art as the description proceeds with reference to the accompanying drawings wherein:

FIG. 1 is a perspective view of one preferred form of the invention;

FIG. 2 is a broken top plan view of the structure of FIG. 1 with certain parts shown in section and showing end caps applied to prepare a splint for use;

FIG. 3 is a perspective view of another preferred embodiment of different configuration; and,

FIG. 4 is a transverse sectional view taken substantially along the line 4—4 of FIG. 3.

Referring first to FIG. 1, the splint is shown as a body or slab 2 of any suitable material that is freely flexible but self-supporting, yet of a soft nature capable of serving as a cushion. Preferably, the material comprises a molded, foamed plastic material which may be plasticized sufficiently to give it flexibility of the desired degree.

The body or slab 2 is formed with a multiplicity of longitudinal passageways 4 therethrough. The passages extend parallel to each other, from end to end of the slab, and extend through opposite ends thereof. It is to be noted that the walls of the material of slab 2 between the passageways and around the exterior of the slab are relatively thin. In other words, the total cross-sectional area of the passageways 4 is a major portion of the total sectional area of the slab 2. In the preferred form, the total area of the passageways closely approaches the cross-sectional area of the slab itself.

In preparing the slab of FIG. 1 for use as a splint, an end cap 6 (FIG. 2) is applied in embracing relation to one end of the slab and is preferably so configured and dimensioned that it embraces the end of the slab very snugly. It is contemplated that in some instances it will be desirable to prepare a supply of splints by cementing or otherwise temporarily securing the end cap 6 to the body 2. As shown, the cap 6 is formed of sheet metal or the like and is provided with a plurality of openings 8 communicating with the hollow interior of the cap. The cap is filled with a packing 10 comprising any suitable fibrous material through which air can freely flow. It is to be noted that the interior of the cap 6 communicates with the adjacent open ends of all of the passageways 4.

The other end of the splint body 2 is provided with a hollow filled cap 12 which may be affixed to the splint in the same manner as the cap 6. The filler cap 12, however, is provided with an inlet port 14 defined by a fitting 16. Preferably, the fitting 16 is externally threaded. The hollow interior of the filler cap 12 is in communication with the adjacent ends of all of the passageways 4. When the splint is to be used, a suitable extrudable material is forced through the fitting 16 to fill the interior of cap 12 and then to be forcibly extruded through the passageways 4 to fill the same. During this step, air within the passageways is readily vented through the packing 10 and openings 8, but once the passageways are filled with the fluent material, the packing 10 offers sufficient resistance thereto to prevent the material from flowing out of the upper ends of the passageways. The material forced into the passageways is a self-hardening material that begins to stiffen within a very few minutes and will set to a hard, rigid condition in ten minutes or so. During the interval of time, after filling the passageways and before complete hardening of the material, the splint may be wrapped around the limb to be immobilized and held in conforming relation thereto until the fluent material completely sets. After the material sets, it will obviously rigidify the splint and immobilize the limb against unwanted movement. If desired, the slab 2 may be made of sufficient width to be wrapped transversely around the limb to completely encompass the same in one convolution or may be of a narrower width and wrapped helically around the limb. In either case, the hardened material in the passageways will completely encompass and rigidify the limb.

Just prior to complete setting of the fluent material, the end cap 6 and the filler cap 12 may be removed or they may be left in place.

The fluent self-hardening material to be used to fill the passageways 4 may be any suitable resin or cement capable of being extruded in the manner described and which will set to a solid substantially rigid state within a few minutes. Many such resinous materials are available on the market, some of which require the addition of a second constituent just prior to use, and it is not deemed necessary to further describe or identify such materials. The material may be forced into the filler cap 12 by any suitable means having a threaded connection to the fitting 16. For example, a situable resinous material may be supplied in a tube having a threaded neck which may be threadedly attached to the fitting 16, after which the tube may be "rolled up" in the usual manner to force the contents thereof through the fitting 16 under substantial pressure. The filler cap 12 is shown as provided with hooks 18 to which the rolled up tube may be secured to prevent inadvertent unrolling thereof under whatever pressure exists at that time in the cap 12.

An alternative form of splint is shown in FIGS. 3 and 4 wherein the pre-formed splint comprises a hollow, tubular, cylindrical body 20 having an annular wall of sub-

stantial thickness. A multiplicity of longitudinal passageways 22 extend through the wall 20, from end to end thereof. Preferably, the body 20 is provided with an annular end cap 24 similar to the cap 6 previously described to provide means for escape of air and yet retain the extrudable material. At its other end the body 20 is provided with an annular cap 26 constituting a filler cap like that described in connection with FIG. 2, and which is provided with a fitting 28 serving the same purpose as the fitting 16. It is to be noted that both the end caps 24 and 26 are annular in shape, thus exposing the open ends of the hollow interior 30 of the body 20. In use, after the passageways 22 have been filled with the fluent material and while the same is still soft, the splint of this embodiment is applied by extending the same telescopically over the limb to be immobilized. Since the body 20 is of uniform cylindrical section, it will usually not conform to the surface of the limb.

If desired, the material of the body 20 be slightly stretchable so as to at least partially conform to the limb, but in any event portions of the limb smaller than the opening 30 are snugly supported by twisting the body 20 thereover. By twisting the flexible cylinder, its diameter is reduced in an amount proportional to the amount of twist applied, and the body is forced to a conical shape snugly conforming to the contours of the limb. In this embodiment also the caps 24 and 26 may optionally be removed or left in place as desired.

While a limited number of specific embodiments of the invention have been shown and described, it is to be understood that the same are merely illustrative, and the invention encompasses other embodiments falling within the scope of the appended claims.

I claim:

1. A splint comprising: an elongated body of flexible material having a multiplicity of peripherally closed passageways extending longitudinally therethrough and opening through the ends thereof, an extrudable and self-solidifying material filling said passageways whereby said splint may be flexibly conformed to a limb until said material solidifies to rigidify said splint and immobilize said limb.

2. A splint as defined in claim 1, wherein said flexible material comprises a foamed plastic.

3. A splint as defined in claim 1, including a cap covering one end of said body and being pervious to air but substantially impervious to said self-solidifying material.

4. A splint as defined in claim 3, wherein said cap comprises a hollow housing of sheet material having perforations therethrough, the interior of said housing being substantially filled with air pervious fibrous material.

5. A splint comprising: an elongated body of flexible material having a multiplicity of peripherally closed passageways extending longitudinally therethrough and opening through the ends thereof; a hollow cap embracing one end of said body with the hollow interior of said cap communicating with the adjacent ends of all said passageways; and an inlet port through said hollow cap, communicating with the interior thereof whereby a self-solidifying material may be forced through said inlet port and extruded into each of said passageways to fill the same.

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