Aug. 21, 1956 H. VAN SWAAY 2,759,475

FORM FOR MAKING SPLINTS AND THE LIKE

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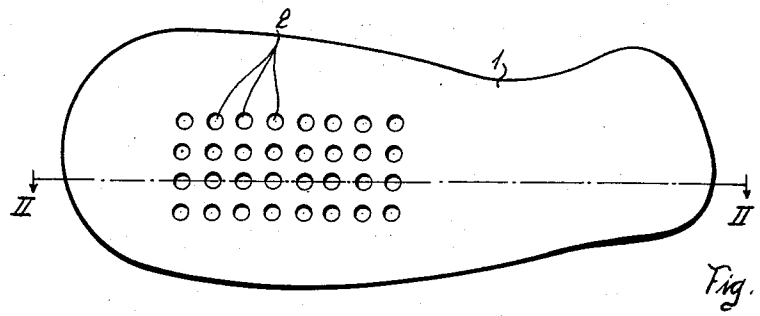


Fig. 1.



Fig. 2

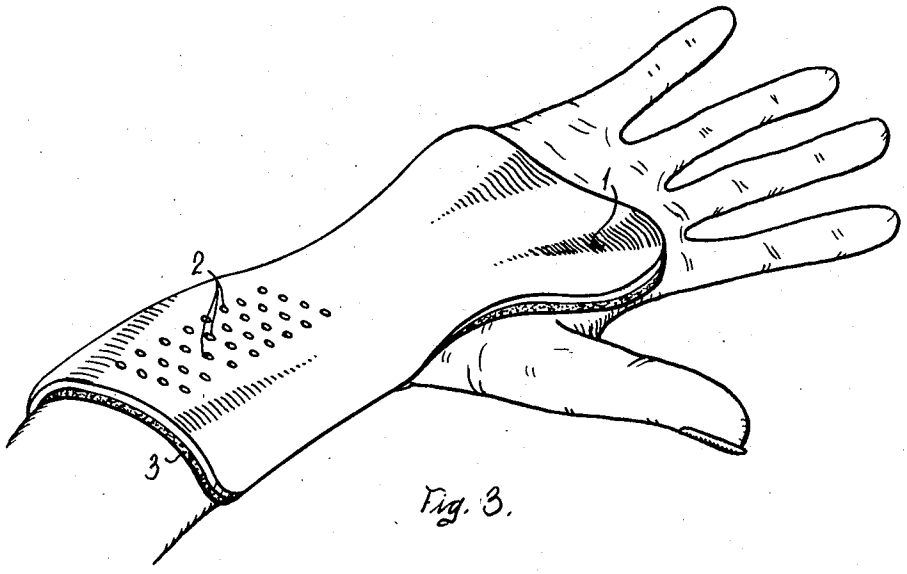


Fig. 3.

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FORM FOR MAKING SPLINTS AND THE LIKE

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8 Claims. (Cl. 128—90)

The invention relates to a form or a blank for making splints and other orthopedic or surgical supports. The devices concerned are partly of the type used in fixation in the case of treatment of fractures, but mainly splints for forcing joints of the human body into a certain desired position, as is necessary when these joints are affected by certain rheumatic or other complaints.

The splints and supports in question preferably should be of light material and readily applied, for example with the aid of bandages, slings or other means and also removed again. Plaster of Paris is no doubt a suitable material for this, but has the drawback of being heavy and voluminous, and easily crushed, so that the splinting has to be repeated again and again, which is unpleasant for the patient. Moreover it is difficult to clean.

It is better to make the splints or supports from sheet material. When they are to be made by beating and bending from metal or other sheet material, this calls for great manual dexterity, so that the medical practitioner always has to be assisted by a specialist, which makes the application of the splints and supports difficult and considerably raises their cost.

For this reason measures have been taken to make the splints from thermoplastic material. When a cast in plaster of Paris has then been made of the member or joint concerned, the medical practitioner himself will have little difficulty in making the splint, or an assistant will usually make it by starting from a preformed flat piece of thermoplastic material, heating this to a temperature at which it becomes sufficiently plastic, and then moulding this form on the plaster cast. It is also easy to make any subsequent corrections in the shape.

This invention aims at producing a further improvement of this process, and specifically aims at making the use of the plaster cast superfluous, which implies a considerable simplification of the process.

According to the invention the starting material is also a blank of flat or at most slightly curved sheet material, which is thermoplastic and can be moulded into the desired splint or the like by plastic three-dimensional transformation. According to the invention the sheet material consists of one or more—possibly perforated—layers of a solid thermoplastic material and a layer of foam-, sponge- or cell-plastics firmly fixed thereon, at least on the side coming into contact with the part of the body to be splinted, which foam plastics retains its foam character at the temperature necessary for the plastic deformation of the solid layer and can be likewise deformed, and whose heat conductivity and heat capacity is so slight that it acts as an insulator and, when brought into contact at this temperature with the human skin, the latter is not appreciably injured by it.

The blanks in question are therefore preformed pieces, which can be marketed in series and are suitable for different joints, parts, and members of the human body, and which in medical practice itself need only be heated and can then be moulded in the right shape on the human body itself, without any other treatment.

With reference to the drawing this will be explained more in detail.

Fig. 1 is a small scale illustration of a flat blank suitable for splinting the wrist of a man's right hand.

Fig. 2 is a cross-section on the line II—II in Fig. 1.

Fig. 3 is a perspective illustration of the result to be attained by the medical practitioner with the use of the form according to Figs. 1 and 2.

The blank consists of a layer 1 of solid thermoplastic material, for example of the type of the transparent Plexiglas (e. g. methyl methacrylate). Non-transparent materials, such as polyethylene, may naturally also be used. This layer 1 is provided with plentiful perforations 2, which promote evaporation of the perspiration moisture produced underneath the splint and moreover reduces the weight of the splint to be subsequently moulded from it.

The entire surface of the layer 1 is covered with a layer of foam plastics 3 (e. g. polyurethane foam), which is thoroughly fixed on to it, in general by glueing. This foam plastics should at any rate be pliable and soft, and resistant to the plasticizing temperature (as a rule not higher than about 170° C.) of the layer 1, without losing its distinctive character of foam plastics, its insulating capacity, and its elasticity.

When the medical practitioner wishes to splint the wrist of a man's right hand, he need only heat the blank according to Figs. 1 and 2 in a suitable manner to the desired plasticizing temperature. Upon this he can apply the perfectly soft blank immediately upon the wrist to be splinted, and attach it with a few bandages or the like. The foam plastics 3 can be so chosen that it insulates the heat absorbed by the blank in such a way from the human skin that the latter is not injured by the application of the hot blank, at most only becomes slightly red.

Very shortly after the application the blank has cooled again, has assumed the desired shape and the desired rigidity, and can serve, in the manner illustrated in Fig. 3, as a splint, fixed by means of a bandage, sling or the like. In some cases the splint may have such a shape that any fixation is superfluous, for example when the splint is "circular" (surrounding the joint).

I claim:

1. A blank for making splints and other orthopedic supports, consisting of thermoplastic sheet material which can be softened and molded into the desired splint or the like at temperatures from about 57° C. to 170° C. by plastic three-dimensional deformation, said thermoplastic sheet material consisting of at least one layer of a solid thermoplastic material and a layer of foam plastic firmly fixed thereon, on the side coming into contact with the part of the body to be splinted, said foam plastic retaining its foam character at the temperature necessary for the plastic deformation of the said thermoplastic sheet material and being likewise deformable, the heat conductivity and heat capacity of said foam plastic being such that, when brought into contact with the human skin at the molding temperature of said thermoplastic material, the said skin is not appreciably injured by the heat of said heated thermoplastic material.

2. A blank as claimed in claim 1, in which at least one layer of the solid thermoplastic material is perforated.

3. A blank for making splints and the like consisting of solid thermoplastic sheet material which can be softened and molded into the desired splint at temperatures between 57° C. and 170° C., said thermoplastic sheet having a layer of foam plastic fixed thereto which retains its foam character at the temperature at which the sheet can be molded, said foam plastic layer having a heat conductivity and heat capacity such that when brought into contact wiith the human skin when the sheet of

thermosplastic material is at molding temperature, said foam plastic layer will not burn the skin.

4. A blank for making splints and the like consisting of a plurality of layers of solid thermoplastic sheet material which can be softened and molded into the desired splint, said thermoplastic sheet having a layer of foam plastic fixed thereto which retains its foam character at the temperature at which the sheet can be molded, said foam plastic layer having a heat conductivity and heat capacity such that when brought into contact with the human skin when the sheet of thermoplastic material is at molding temperature, the heated splint blank will not burn the skin.

5. A blank as claimed in claim 4 in which at least one of said layers of thermoplastic sheet material is perforated.

6. As an article of manufacture a thermoplastic moldable splint comprising, a sheet of thermoplastic moldable material and a covering of heat insulating foam plastic fixed thereto said foam plastic insulating the human skin from the heat of said thermoplastic material at the molding temperature for said thermoplastic material.

7. As an article of manufacture a thermoplastic moldable splint made of thermoplastic moldable material having an insulating foam layer attached thereto, of a thickness sufficient to protect the human skin against injury when the thermoplastic moldable material is heated to

moldable temperature and applied and shaped to a portion of the human body.

8. The method of forming a molded splint on a portion of the human body which comprises providing a thermoplastic moldable splint blank having an insulating foam layer attached thereto, heating the splint blank to molding temperature between 57° C. and 170° C. and applying the heated blank to the portion of the human body to be splinted, with the insulating foam layer next to the skin, shaping the heated blank to the portion of the body to the splinted, insulating the portion of the body to be splinted from the heat of said blank by said insulating foam layer and allowing the blank to cool in its shaped form while in contact with the portion of the body to be splinted.

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