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MOLDABLE TEMPORARY SPLINT

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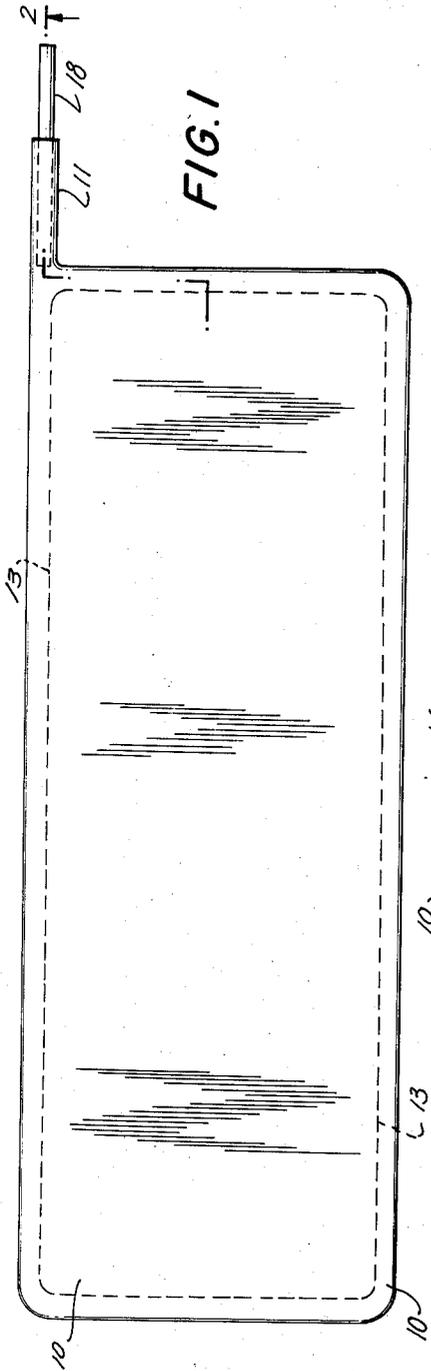


FIG. 1

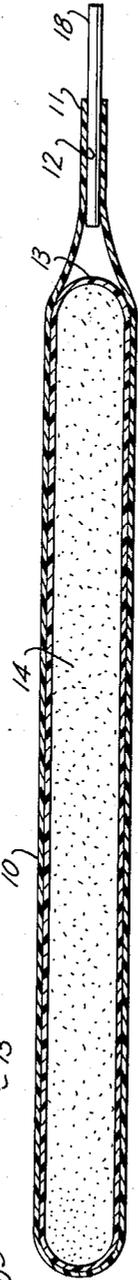


FIG. 2

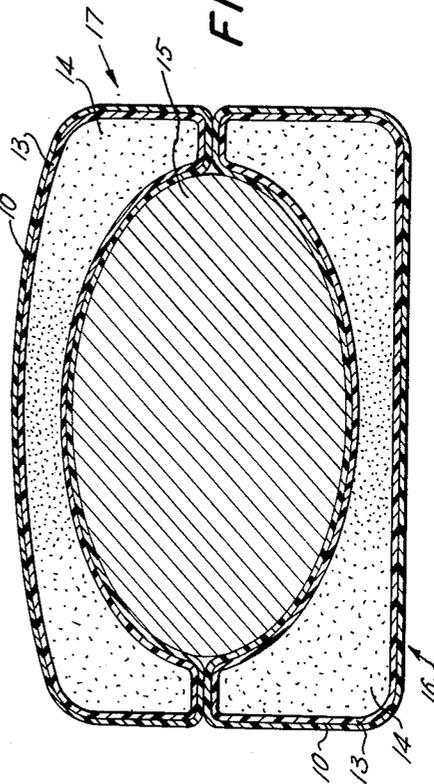


FIG. 3

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This invention relates to medical aids, and more particularly to a device for temporarily restraining a portion of the human body.

It is often necessary during the performance of a medical operation, e.g., surgery, X-raying, intravenous injections, to hold a portion of the body being operated upon perfectly still.

It is therefore an object of the present invention to provide a device adapted to form a temporary cast about any desired portion of the body.

It is another object to provide such a device which may be applied to the selected body portion quickly and easily, and which may be removed with the same ease and speed.

It is a further object to provide such a device which is simple and yet thoroughly reliable.

It is yet another object to provide such a device capable of long life despite repeated use and handling.

To accomplish these objectives, the invention provides a flexible bag of impervious material. A mass of tiny discrete particles are permanently enclosed with the bag, and an outlet is provided through which the air in the bag can be exhausted. In use, the portion of the body to be restrained is surrounded by the bag. In the alternative, two bags, one above and one below the body portion, may be employed. As a result, the mass of particles flows around and becomes molded into conformity with the contours of the body portion. The bag is then evacuated to draw the particles into compacted relation and to draw the bag walls tightly against the particles to hold them in their molded condition. When the need for restraining the body portion terminates, the bag may readily be removed.

According to an important feature of the invention, a woven fabric bag is provided within the impervious bag, and the mass of particles is placed within the fabric bag. The weave of the fabric is close enough to prevent the particles from passing through it, but the inner bag is nevertheless pervious. The purpose of the inner bag is twofold: since it is relatively non-stretchable, it prevents the mass of particles, during its movements, from stretching the outer bag which may be susceptible to such distortion, and it acts to keep the particles within the bag when suction is applied to it.

Other objects and features of the invention will be apparent from the following description in which reference is made to the accompanying drawings.

In the drawings:

FIG. 1 is a plan view of a restraining bag according to this invention;

FIG. 2 is a side elevational view of the bag; and

FIG. 3 is a cross-sectional view showing two such bags in use.

The restraining device chosen for illustration includes an outer bag 10 of flexible, impervious sheet material, such as rubber or polyvinyl chloride. At one end, the bag 10 presents a neck 11 surrounding an outlet opening 12. Except for the opening 12, the bag 10 is completely air-tight.

Within the outer bag 10 is a woven fabric bag or lining 13. The fabric may be woven of 112 x 80 x 70 denier Dacron having a thin coating of polyvinyl butyral, and the weave is made tight enough so that the interstitial spaces are too small to permit passage through them of

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the particles to be placed in the bag. The fabric, however, does permit the passage of air through it. It is understood that any fabric woven tight enough to hold the particles, but which nevertheless allows the passage of air may be used. The inner bag 13 is completely closed.

Within the bag 13 is a mass of tiny solid discrete particles 14, the size of these particles being about the same as the size of very fine sand. The particles preferred are #1 polystyrene crystals made by Seamless Rubber Co., New Haven, Connecticut. One reason for this preference is that these crystals are pervious to X-rays, hence a bag containing them and used to restrain a particular body portion will not prevent the X-raying of that body portion. The particles should be of such character that they flow readily within the bag when the latter is applied to a body portion to be restrained.

As mentioned above, the material from which the outer bag 10 is fabricated may be susceptible to stretching under the distorting effects of the movements of the mass of particles within it. However, the inner, relatively non-stretchable, woven bag 13, within which all the particles are retained prevents the mass of particles from straining the outer bag beyond its elastic limit. In addition, the inner bag 13 acts as a filter to hold the particles within the bag 10 when it is evacuated.

The device described may be of any desired size to suit the purpose for which it is intended. For example, a bag which will provide successful results is one 3 feet long, 1 foot wide, 3 inches thick, and filled with 9 pounds of the polystyrene crystals mentioned above. The dimensions of the bag and the quantity of particles within it may, of course, be varied to suit the particular requirements the bag is to meet.

FIG. 3 shows the way in which the illustrative restraining bags may be used to form a temporary cast around a portion of the human body, such as an arm 15. Although two separate bags 16 and 17 are shown in FIG. 3, a single large bag doubled over to form two layers between which the arm may be inserted, could be used. The lower bag 16 is rested on a flat surface (not shown) and the arm 15 is placed upon it so that the arm extends along the length of the bag. Due to the weight of the arm, the particles in the bag directly below it tend to flow laterally and build up on both sides of the arm as illustrated. The upper bag 17 is then used to cover the arm, and of course the particles within it also tend to flow laterally due to gravity. It is important that the bags 16 and 17 be wide enough so that their longitudinal edges meet, as shown.

It will be seen that the masses of particles within the bags have, due to their flowable nature, become molded into substantial conformity to the contours of the arm. At this point, both bags are evacuated by any well-known means (not shown) which may be connected to a piece of tubing 18 within the neck 11 of each bag. As a result of the evacuation, the particles within the bag become compacted and the bag walls are drawn tightly against the compacted mass of particles. Consequently, each mass of particles is held firmly in its molded condition and thereby forms a temporary cast for the arm. At any desired time, the cast may be removed by simply lifting the bag 17 off the arm 15. Air is then permitted to re-enter the bags to ready them for further use.

It is to be emphasized that any strain which would ordinarily be placed on the outer bag 10 by the movements of the particles within it is prevented by the presence of the inner woven bag 13. Employment of the inner woven fabric bag, therefore, adds greatly to the useful life of the device.

The invention has been shown and described in preferred form only, and by way of example, and many

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variations may be made in the invention which will still be comprised within its spirit. It is understood, therefore, that the invention is not limited to any specific form or embodiment except insofar as such limitations are included in the appended claims.

What is claimed is:

1. A restraining bag adapted to define a temporary cast, comprising a flexible impervious bag, a mass of solid discrete particles within said bag, an outlet through which the air in the bag can be evacuated, and a lining of woven material within said bag, said particles all being disposed within said lining, the weave of said lining material being tight enough to prevent passage of said particles through it, but loose enough to permit passage of air through it.

2. A device for forming a temporary cast comprising an outer flexible bag of impervious material susceptible

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to stretching, a closed bag of closely woven non-stretchable material within said outer bag, a flowable mass of tiny discrete particles within said inner bag, the interstitial spaces in said woven material being too small to permit said particles to leave said inner bag but said particles being completely free to migrate within said inner bag, and an outlet on said outer bag and connectable to means for evacuating said bags.

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