March 6, 1956 L. J. STROBINO 2,737,597

PROTECTIVE SHIELD AND METHOD OF MAKING SAME

Filed May 1, 1953

FIG. 1.

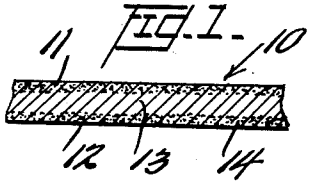


FIG. 2.

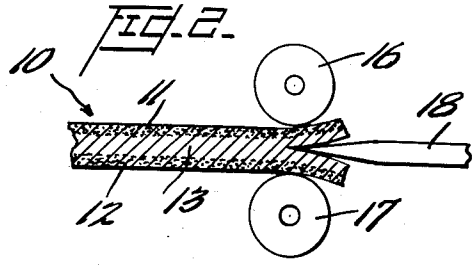


FIG. 3.

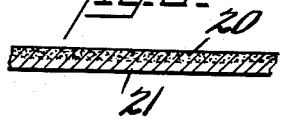


FIG. 4.

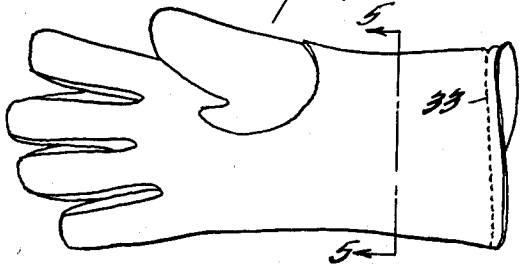


FIG. 5.

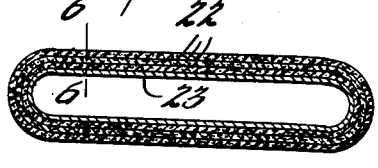
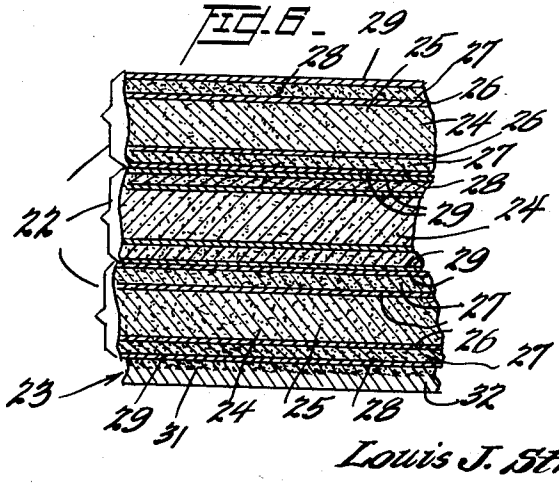


FIG. 6.



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PROTECTIVE SHIELD AND METHOD OF MAKING SAME

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5 Claims. (Cl. 250—108)

This invention relates to improvements in protective leather shields and methods of making same.

In my prior Patent No. 2,367,446 there is disclosed a method of treating leather skins to render them substantially opaque to certain forms of inimical energy such as X-rays, heat rays, and the like. In such method, the skins are impregnated with particles of a finely divided material, such as lead, diatomaceous earth, or the like, selected to stop the particular form of energy against which shielding is desired, the impregnation being carried out by tumbling the skins in a body of liquid containing a suspension of the finely divided material. The skins are then washed and dried and the fat liquoring and other usual steps taken in the manner of tanners, following which they are formed into various articles adapted for use as protective shields.

In my prior patent, the use of the skins is illustrated and described with particular reference to gloves for shielding an X-ray operator's hands. In such use, and, in fact, in any use where a surface of the treated leather comes in contact with the skin or clothing, some of the impregnating material tends to rub off, thereby dirtying the skin or clothing and, in addition, subjecting the operator to the possibility of lead poisoning, where the impregnated material is lead. In order to prevent this, a separate lining is utilized to cover such surface of the leather skin, such lining usually being formed of a soft, thin easy-slipping material such as rayon, nylon or the like to facilitate slipping the glove on and off the hand. While this has proven quite satisfactory in use, it does increase the bulk and cost of the glove without adding to its shielding characteristics.

A principal object of the present invention is the provision of a method of making a protective leather shield of the indicated type which does not require a separate lining for the stated purpose.

Another object of the invention is the provision of a protective leather shield having an impregnated side for protection against inimical forms of energy and a soft unimpregnated side adapted to serve as a lining to prevent the impregnating material from contacting and rubbing off on the skin, clothing or other object with which it comes in contact.

In accordance with the invention, a leather skin, which has previously been tanned in any suitable manner, is impregnated with a finely divided material selected to stop the particular form of inimical energy against which protection is sought. For protection against X-rays, as well as certain rays emanating from an atomic explosion, finely divided lead, preferably of a size such as to pass through a 300 mesh screen, has been found quite satisfactory, although any finely divided material of a similar nature, which constitutes an obstacle to the particular types of rays, may be used. For protection against heat rays, finely divided diatomaceous earth having a size such as to pass through a 600 mesh screen, more or less, or in fact, any similar type of substance which is a poor conducter of heat, may be used.

The materials named herein are merely exemplary of those which may be used to provide protection against various types of inimical rays. The invention, however, is not predicated on the use of any particular material for the purpose and in its broader aspects contemplates the use of any material, in finely divided form, and having the characteristic of stopping or at least, partially stopping any type of inimical form of energy against which protection is sought.

In the impregnation of the skins in accordance with the invention it is essential that the impregnation be carried out in a manner such that the penetration of the finely divided particles of material into the pores of a skin stop short of a plane extending through the center of the skin, midway between the side surfaces thereof. In other words, an inner layer or portion of the skin, intermediate the side surfaces thereof, must be substantially free of the impregnating material, and preferably such unimpregnated portion or layer will be approximately one half the thickness of the skin. In such case the impregnated portions of the skin on each side of the central or middle unimpregnated layer will each be approximately one fourth the thickness of the skin.

The impregnation of the skins may be carried out utilizing the apparatus and procedure set forth in my prior patent referred to hereinabove, the tumbling of the skins in the body of liquid containing the suspension of finely divided material being continued until such material has been worked into the pores of a skin from each side surface thereof to a depth approximately equal to one fourth the thickness of the skin. The skins are then washed and dried and the fat liquoring and other usual steps taken in the manner of tanners.

Following the impregnation of the skins and any subsequent treatment thereof desired, each skin is then split longitudinally thereof along a plane substantially coincident with the middle of the unimpregnated portion to divide the skin in halves. Each half of the skin as thus formed will have an outer portion impregnated with a finely divided material for protection against inimical rays and an inner portion substantially free of the finely divided material, such inner portion in each case being soft and agreeable to the touch and well adapted to serve as a lining.

The leather skins which have been found most suitable for the purposes of the invention are the extra heavy skins having a thickness of at least 8 gage or approximately 5/32". Such skins, when split, form two substantial skins each having sufficient thickness to provide impregnated and unimpregnated layers of substantial thickness.

The invention will now be further described in connection with the accompanying drawing, wherein:

Figure 1 is a cross-sectional view of a leather skin impregnated with finely divided material in accordance with the invention;

Figure 2 is a cross-sectional view showing the splitting of the skin shown in Figure 1;

Figure 3 is a cross-sectional view of one-half of a split skin;

Figure 4 is a view of the palm side of a glove made in accordance with the invention;

Figure 5 is an enlarged cross-sectional view taken on the line 5—5 of Figure 4; and

Figure 6 is an enlarged cross-sectional view taken on the line 6—6 of Figure 5.

Referring to Figure 1 of the drawing, the numeral 10 designates a leather skin having outer impregnated layers 11 and 12 and an inner unimpregnated layer 13. The small dots 14 distributed throughout the outer layers 11 and 12 indicate the presence of small particles of lead or other substances which is opaque to the particular form

of energy against which protection is sought. These particles are thickly dispersed throughout the outer layers to provide maximum protection against such forms of energy. As previously indicated, and as will be apparent from the drawing, each impregnated layer is approximately one fourth the thickness of the skin and the unimpregnated layer approximately one half the thickness of the skin.

In Figure 2 of the drawing, there is diagrammatically illustrated an apparatus for splitting the leather. This may take the form of a pair of cooperating rolls 16 and 17 between which the impregnated skin 10 is fed. A cutting blade 18 is positioned with its cutting edge between the rolls 16 and 17 and serves to split the material down its middle as it passes between the rolls. Such apparatus is merely illustrative of one type of apparatus which may be used for the purpose. It will be appreciated, of course, that other suitable forms of apparatus may be used and that the skins may even be cut by hand, if desired.

Figure 3 shows one half of a skin which has been impregnated and split, as hereinabove described. It will be noted that the impregnated layer 20 and the unimpregnated layer 21 are each substantially one half the thickness of the split half of the skin.

Figures 4, 5 and 6 illustrate the use of leather skins, processed in accordance with the present invention, in a glove. In such application it is preferred to utilize a plurality of plies 22 which may be similar to the corresponding elements described in my prior patent, and an inner ply 23 formed of the split half of a skin, processed as herein disclosed.

Referring to Figure 6, each ply 22 comprises an inner or middle element 24 which is preferably an animal skin although it may be cotton or woolen fabric, or other flexible tissue sheet which is somewhat porous, such element being impregnated with a material, such as finely divided lead, denoted by the numeral 25. Covering each face of the element 24 is a layer 26 of adhesive, which may be latex that has been sprayed upon it. Outside of this layer, on each side, is a layer 27 representing a material such as is used for carrying pigment, for example, a film of drying oil containing glycerine, throughout which are distributed small dots 28 representing further finely divided material, which may be the same as or different from the kind of material represented by the dots 25. Outside of the layers 27 are layers 29 preferably comprising a thin coating of lacquer or other flexible smooth finish applied by spraying or otherwise.

The inner ply 23 is a split half of a skin, processed as herein described, and having an outer impregnated layer 31 and an inner unimpregnated layer 32. The impregnated layer 31 increases the protection afforded by the plies 22 and the inner unimpregnated layer 32 serves as a lining for the glove. The member 23 thus serves a dual purpose, namely, as a lining for the glove and as a protective layer constituting an obstacle against the inimical rays against which protection is sought.

Each ply 22, as well as the ply 23, may be formed as separate gloves and nested successively within each other. Alternatively, the plies 22 may be formed as complete gloves and the ply 23 also formed as a complete glove and secured to the inner ply 22 in any suitable manner. The nested plies may desirably be held together by one or more lines of stitching 33.

While I have illustrated the split and treated skins, herein described, in connection with their use in forming gloves, it will be appreciated that they are adapted for many and varied uses where protective shields are required, such as in aprons, blankets and the like. It will also be appreciated that the treated skins, as herein disclosed, may be used alone or in various combinations with other skins, and/or other materials.

It will thus be seen that the present invention provides an improved product and an improved method of processing leather skins wherein the treated skin is made to serve both as a liner and as a protective ply thereby decreasing the bulk and cost, and increasing the flexibility, of articles made therefrom to serve as protective shields. In addition, the possibility of lead poisoning and the dirtying of clothes and the like, is eliminated, without the necessity of a separate and costly lining for this purpose.

While a preferred embodiment of the invention has been disclosed, the invention is not to be construed as limited to the specific details illustrated and described, except as included in the following claims.

I claim:

1. A method for treating a tanned leather skin to adapt it for use in protective shields which comprises impregnating the pores of the outer layers of the skin with unbonded solid particles of a finely divided material of a nature such as to act as an obstacle to inimical forms of energy against which protection is desired, limiting the depth of penetration of the material into the skin in a manner such that an inner layer thereof is substantially free of impregnating material, splitting the skin into halves along a line substantially centrally of the unimpregnated portion, whereby each half of the skin so formed has an impregnated layer and an unimpregnated layer and laminating another layer of material to the impregnated side of the skin to seal the unbonded particles against loss from the impregnated side, while preserving the unimpregnated side for external contact.

2. A method as set forth in claim 1 wherein the depth of penetration of the material into the skin from each side thereof is limited to approximately one fourth the thickness of the skin.

3. A method as set forth in claim 2 wherein the skin has a thickness of at least $\frac{5}{32}$ of an inch.

4. A leather product comprising split tanned leather having the pores of a layer adjacent its outer surface impregnated with unbonded finely divided particles of lead, and a layer adjacent its inner surface substantially free of the particles of lead.

5. A flexible shield for protection against harmul radiation comprising an article having a plurality of plies of material each impregnated with unbonded solid finely divided particles of a protective material, the inner ply of said article comprising a split leather skin having an outer impregnated protective layer and an inner unimpregnated layer adapted to serve as a liner for said article to provide, adjacent the user, a clean, non-soiling surface without loss of radiation protection in the shield.

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