Sept. 21, 1937. F. J. FARRELL 2,093,910

SURGICAL DRESSING, BANDAGE, ELECTRICAL INSULATING BINDING, AND OTHER WRAPPINGS

Filed Oct. 23, 1935

Fig. 1.



Fig. 2.

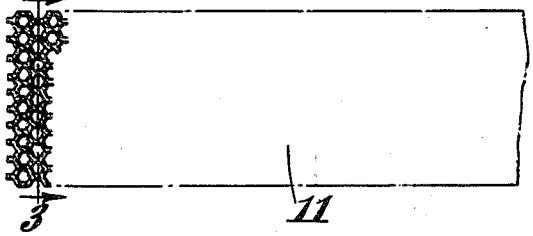


Fig. 3.

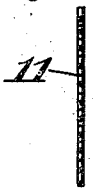


Fig. 4.

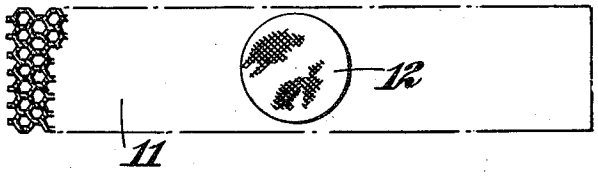


Fig. 5.

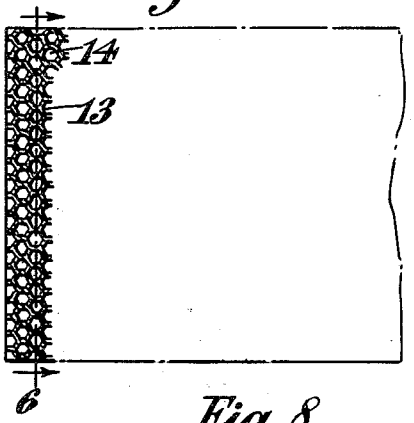


Fig. 6. Fig. 7.

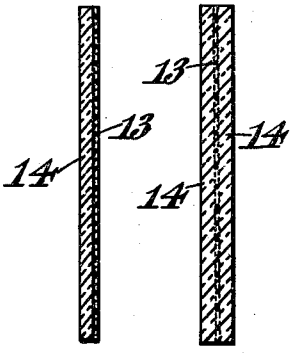
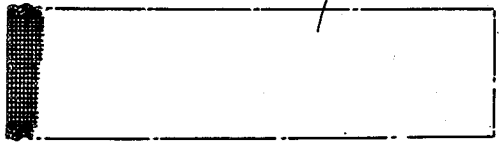


Fig. 8.



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UNITED STATES PATENT OFFICE

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SURGICAL DRESSING, BANDAGE, ELECTRICAL INSULATING BINDING, AND OTHER WRAPPINGS

Frank James Farrell, Beccles, England

Application October 23, 1935, Serial No. 46,330
In Great Britain July 20, 1935

8 Claims. (Cl. 154—43)

This invention is for improvements in or relating to protective wrappings such as surgical dressings, bandages, electrical insulating bindings and other wrappings, and has for an object to provide a wrapping which is particularly suitable for use as a surgical bandage or for electrical insulation purposes, and which is of such a nature that when wrapped round skin, hair, fabric or other material, it will not adhere thereto, but the overlapping portions of the wrapping will adhere firmly to one another.

According to one feature of the present invention, there is provided a protective wrapping comprising an extensible textile fabric impregnated with rubber which is substantially free from gummy constituents and is in a tacky condition. The extensible textile fabric is rubberized by impregnating and coating either the fabric itself or the textile yarn used to form the fabric with a dispersion of unvulcanized rubber, and the major portion of the gummy constituents of the latter are removed and the extensible fabric so treated then heated to bring the rubber into a tacky condition. The expression "extensible textile fabric" is herein used to mean a textile fabric which, by reason of the type of yarn employed in making it and/or the way in which the yarn is disposed in the fabric, is capable of being stretched either in the direction of its length or in the direction of its width or in both directions. Such a fabric may be a woven or knitted fabric, that is to say it may be formed by a loom, or by a knitting or lace-making or net-making machine. It will usually be a fabric in which the length of the yarn employed from boundary to boundary of a given portion of the fabric in the direction of extensibility is greater than the normal distance between said boundaries of the portion of the fabric, and in which the excess length of yarn is taken up in such manner as to permit the portion of the fabric to be stretched to a dimension approaching the length of the yarn.

The "electrical insulating bindings" referred to herein comprise electrical insulating wrappings arranged to be readily applied to conductors or other fittings including handles, and the "other wrappings" also included within the scope of this invention comprise rings, loops and fastenings, either made and applied in situ or made separately.

When using a woven fabric as the extensible fabric an ordinary plain woven fabric which has been cut "on the cross" in relation to the length of the wrapping may be employed. It is preferred, however, to use what is known as a "crepe-weave" fabric or a "georgette-weave" fabric. In a "crepe-weave" fabric the warp threads or the weft threads have imparted to each of them a high degree of twist before the fabric is woven, each thread being twisted about its own axis. After weaving the twisted threads are caused to shrink so as each to occupy a zig-zag formation. This permits the fabric to be stretched in the direction of the length of the twisted and shrunk threads. Similarly in a "georgette-weave" fabric both the warp threads and the weft threads are twisted and shrunk as aforesaid so that stretch is possible both in the direction of the length and in the direction of the width of the fabric. In these cases the fabric is of course cut "on the straight" in relation to the length of the wrapping.

If a knitted fabric is used stretch can be eliminated in one direction by incorporating in it warp threads or weft threads interlocked with the remainder of the fabric without being knitted; or in the case of a fabric produced on a circular knitting machine a continuous weft thread may be incorporated so as to be interlocked with the remainder of the fabric without being knitted. In one preferred form of wrapping a net fabric, such as a lace-net produced on a lace-making machine, is employed as the extensible fabric. The net fabric must be so formed that it is permitted to stretch by reason of the threads being disposed in sinuous courses so that a pull on the threads tends to straighten them and cause elongation of the meshes of the fabric.

The invention also includes a surgical dressing, bandage or other wrapping, comprising the combination with a rubberized fabric, as set forth above, of a sheet of crepe rubber which is united to the rubberized fabric on one side thereof and which has had the major portion of its gummy constituents removed and has been subsequently heated to bring it into a tacky condition.

In addition, the invention provides the combination with a rubberized net fabric, as set forth above, of a pair of sheets of crepe rubber which are united to one another and to the fabric with the fabric between them and which have had the major portion of their gummy constituents removed and have been subsequently heated to bring them into a tacky condition.

In carrying out the invention the gummy constituents are removed from the rubber by treatment with a suitable solvent which conveniently comprises a liquid consisting of, or containing, a ketone, such as acetone, for example, an aqueous

mixture of acetone and water containing at least 25% of acetone. After the extraction of the gummy constituents, the solvent is removed from the rubber and the rubber is usually heated to between 65° C. and 100° C. for a period of the order of one hour to bring it to the tacky condition. The aforesaid dispersion of unvulcanized rubber conveniently consists of rubber latex, and the latex will be coagulated after treatment of the fabric but before the gummy constituents are dissolved from the rubber.

The extracting solvent may conveniently constitute a vehicle for the introduction of antiseptics, e. g. tannin, dyes, pigments, or stabilizers, e. g. tricresyl phosphate. Sudsidiary agents, such as anti-oxidants may also be introduced into the rubber.

The invention further comprises the combination with a roll, strip or sheet of surgical bandage, as aforesaid, of a piece or pieces of surgical dressing material secured to the bandage by an appropriate adhesive material.

The wrapping in the form in which it is to be used—e. g. as a bandage—and of suitable width and length may be rolled in a cotton lint or gauze or other suitable interlayer, so that the wrapping cannot touch itself before it is actually used. The roll is then usually placed in the final container, whether a cardboard carton, paper wrapper or other wrapper, such as one formed from the material sold under the registered trade-mark "Cellophane" and the whole is heated as aforesaid. This avoids any necessity for handling the bandage or other wrapping after the rubber has become tacky and, if treated with an antiseptic as aforesaid, also sterile. The most satisfactory interlayer for this purpose is one which keeps moisture from the rubber and, while ordinary cotton lint may be employed, it is preferred to employ material sold under the registered trade-mark "Cellophane" or other transparent cellulosic wrapper or wax paper or greaseproof paper. Cellulose acetate film and benzyl cellulose film have been found to give the best results.

The invention also includes the employment, instead of the extensible fabric, of a textile ribbon or tape which is inextensible.

Certain preferred ways of carrying the invention into effect will now be described with refence to the accompanying drawing, in which:—

Figure 1 represents a surgical bandage prepared on a fabric which is extensible in one direction only;

Figure 2 represents a wrapping prepared from a network fabric extensible in two mutually perpendicular directions;

Figure 3 is a sectional view on the line 3—3 of Figure 2;

Figure 4 is a view similar to Figure 2 of a wrapping prepared from a network fabric expressly adapted for use as a surgical bandage;

Figure 5 represents a pad of crepe rubber combined with a network fabric;

Figure 6 is a side view of the pad shown in Figure 5;

Figure 7 is a side view of a modified form of crepe rubber pad combined with an extensible fabric, and

Figure 8 represents a wrapping or binder prepared from inextensible ribbon or tape.

The example shown in Figure 1 comprises a "crepe-weave" fabric which is woven with each of its warp threads twisted and shrunk as referred to above, the twisting of the threads being such that alternate pairs of threads have twist in the opposite direction to that imparted to the remaining pairs of threads. The warp threads are arranged to extend along the length of the bandage 9 shown in the figure, and the weft threads accordingly extend across the width of the bandage. The weft threads have no twist. The fabric is impregnated with rubber latex in such a way that it is not only permeated by the latex rubber but also coated with latex rubber and the latex is coagulated. The resins are then dissolved from the rubber by treating the rubberized fabric with a mixture of acetone and water, containing preferably 50% and not less than 25% of acetone, at normal temperature. The acetone is decanted from the fabric and traces of the solvent are removed by heating or in any other suitable manner. The rubberized fabric which is then free from the major portion of its content of resins, is cut to a suitable width and rolled in an interlayer consisting of a film formed from material sold under the registered trade-mark "Cellophane" or other transparent cellulosic film and placed in the cardboard carton which it is to occupy until it is used. The whole assembly is then heated to between 65° C. and 100° C. for one hour. At the end of that time the rubberized fabric is tacky and will adhere tenaciously to itself while not adhering appreciably to other substances.

If desired, a piece of surgical dressing material 10 such as lint, cotton gauze or other suitable fabric may be stuck onto the rubberized fabric by rubber solution. The piece of surgical dressing material is conveniently of circular form when the bandage is intended to serve as a finger bandage.

The surgical dressing material may be medicated or not as desired, and in the preparation of a finger bandage the pad of dressing material may be secured to the bandage before the fabric is heated to bring the rubber to a tacky condition. By this means the strip of bandage complete with dressing material can be inserted, before the heating operation is performed, into an envelope of cellulosic material which it is to occupy until it is used. The envelope may be shaped to receive the strip of bandage in a flat condition.

Instead of having seperate strips of the bandage, each with a pad of dressing material secured to it, the bandage may be formed into a continuous roll of suitable width having pads of dressing material secured to it at suitable points spaced apart along its length. In this case, the pads of dressing material may be secured, as before, prior to the heating operation and the bandage may be subsequently rolled in an interlayer consisting of a strip of transparent cellulosic material and placed in the final container before being heated to bring the rubber into a tacky condition.

The bandage may also be provided in sheet form in addition to the roll or strip form already described. Each form of bandage may be provided or not with surgical dressing material attached thereto as desired.

Figures 2 and 3 illustrate a net fabric 11 which is formed on a lace-making machine so as to have hexagonal meshes bounded by threads of yarn which are intertwined and which separate the meshes from one another. The meshes are thus formed in rows and there are rows extending in three directions at angles of approximately 60° to one another. There may be approximately eleven meshes to the inch along each row. The

fabric is treated precisely as described in referring to the bandage shown in Figure 1. In the present case when the fabric is impregnated with the latex, the meshes are not filled up but remain open. When cutting the fabric to a suitable width, it may be cut at right angles to the rows of meshes extending in one direction.

Figure 4 shows a strip of fabric similar to that described with reference to Figures 2 and 3, but provided with a circular piece 12 of lint or similar surgical dressing so that Figure 4 illustrates a finger or like bandage similar to that shown in Figure 1 but having a net fabric in place of the "crepe-weave" fabric utilized in the example shown in Figure 1.

Figures 5 and 6 show a rubberized lace-net fabric described with reference to Figures 2 and 3 combined with a thin sheet of crepe rubber, the fabric being indicated at 13 and the crepe rubber at 14 in the two figures. The crepe rubber before being combined with the rubberized lace-net fabric has the major portion of its natural resins extracted by treatment with acetone, and the combined rubber and fabric are rolled in a cellulosic interlayer. In order to ensure a firm union between the fabric and the crepe rubber, their surfaces which are to be combined are previously moistened with a rubber solvent such as solvent naphtha. Pressure is applied to the assembly in order to bring about adhesion of the fabric and the crepe rubber and the composite sheet is then rolled in a transparent cellulosic interlayer, as aforesaid, packed in its container and heated to between 65° C. and 100° C. for about one hour.

Instead of using a single sheet of crepe rubber, two similar sheets which have both been treated for the extraction of resins may be employed and brought together one on each side of the rubberized fabric to produce a pad as seen in side view in Figure 7 which has the rubber and fabric indicated by references 14 and 13 respectively. In this case, the subsequent application of pressure will be arranged to bring about adhesion of the two sheets of crepe rubber (the surfaces of both having previously been softened with solvent) through the meshes in the rubberized fabric.

Figure 8 represents a length of ordinary ribbon or tape 15 treated in a manner similar to the treatment described as applied to the fabric base of the bandage shown in Figure 1. The treatment of ordinary tape in this manner renders it particularly suitable for electrical insulation purposes, and it can conveniently be used in place of ordinary insulating tape.

In all cases the wrappings described are particularly suitable for use as surgical dressings or bandages, whilst the two products described wtih reference to Figures 1 and 5 to 8 are also particularly useful as insulating wrappings for electrical purposes. For surgical use it is preferred in some cases to employ a relatively wide mesh fabric (whether woven or knitted) without the crepe rubber, and the rubberizing is effected so as not to close the meshes of the fabric. This has the advantage of allowing air to reach the skin of a bandaged finger or other member. For electrical insulation purposes, a fabric having a finer mesh is preferably used and the rubber impregnation or crepe rubber sheet is caused to close the meshes of the fabric. If a net fabric having a fine mesh is employed, and the rubber is caused to close the mesh, the product may be used for insulation purposes.

The extensible wrappings described are particularly useful in surgical work as dressings or bandages for treating cuts and abrasions on a knuckle or other joint, for the dressing or bandage will remain in place without interfering seriously with the normal movement of the joint. Furthermore, the extensibility of the bandage in the direction of its length avoids restriction of the blood circulation. Their extensibility also enables the said wrappings to be employed as electrical insulation, say, in place of ordinary insulating tape, for covering movable joints of jointed members, angularly shaped members and members whereof the contour varies along their length. The improved insulating wrapping can be made to lie snugly against the member which it covers, so as to form a neat covering and one which has good insulating properties.

A further advantage of the improved wrapping when used for a finger bandage or the like, is that it can be washed with the bandaged finger or other bandaged member without being damaged. Moreover, the improved bandage does not become sodden when dipped in water as would an ordinary bandage, and it can be secured firmly in place by the wearer without assistance.

It is to be understood that, in addition to the fabrics mentioned above, the invention includes ordinary elastic tape, such as garter elastic or the like having elastic rubber warp threads bound with yarn, when treated as set forth above.

The invention also includes extensible fabrics, ribbon and tape when treated as aforesaid but having substituted for the whole or part of the rubber, a rubber substitute which possesses similar properties but is of course free from the natural resin which occurs in raw rubber. Thus, the latex referred to above may be mixed with a proportion of latex produced from synthetic rubber or rubber substitutes such as olefine-polysulphide compounds.

I claim:—

1. A protective wrapping which includes an electrical insulating binding and other wrappings, comprising an extensible textile fabric impregnated with rubber which is substantially resin-free and is in a tacky condition combined with a sheet of crepe rubber which is united to the impregnated textile fabric on one side thereof, and which is substantially resin-free and is in a tacky condition.

2. A protective wrapping according to claim 1, comprising a second sheet of crepe rubber which is united to the impregnated textile fabric on the other side thereof and which is substantially resin-free and is in a tacky condition.

3. A protective wrapping according to claim 1, in which the extensible textile fabric is constituted by a net fabric.

4. A protective wrapping comprising an extensible textile fabric impregnated with rubber which is substantially resin-free and is in a tacky condition combined with at least one piece of surgical dressing material secured to the wrapping by an appropriate adhesive material.

5. A protective wrapping which includes a surgical dressing, bandage, electrical insulating binding and other wrappings, comprising an extensible textile fabric having its threads impregnated with unvulcanized rubber which is substantially resin-free and is in such a tacky contion that overlapping portions of the wrapping will adhere to one another while the wrapping is substantially non-adherent to non-rubber materials.

6. A protective wrapping comprising a porous extensible textile fabric impregnated with un-

vulcanized rubber which is substantially resin-free and is in a tacky condition whereby overlapping portions of the wrapping will adhere to one another while the wrapping is substantially non-adherent to non-rubber material.

7. A wrapping in the form of a surgical dressing or bandage comprising a "crepe-wave" textile fabric which is extensible in the direction of its length and which is impregnated with substantially resin-free unvulcanized rubber in a condition of tackiness such that overlapping portions of the wrapping will adhere to one another while the wrapping is substantially non-adherent to hair or skin.

8. A protective wrapping comprising an extensible open-weave textile fabric having its threads impregnated with unvulcanized rubber which is substantially resin-free and is in a condition of tackiness such that it will adhere to itself but will not adhere appreciably to non-rubber materials.

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