

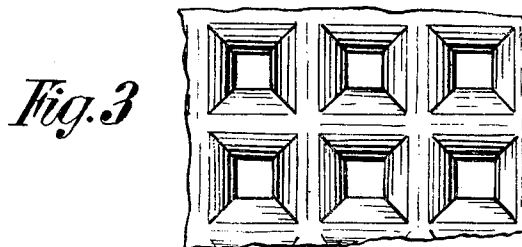
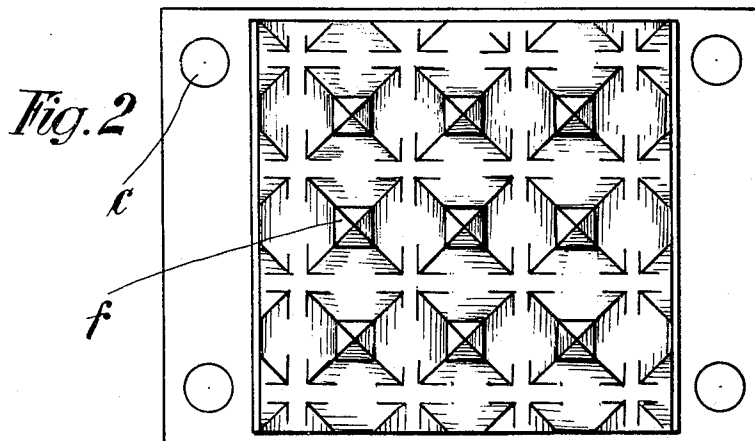
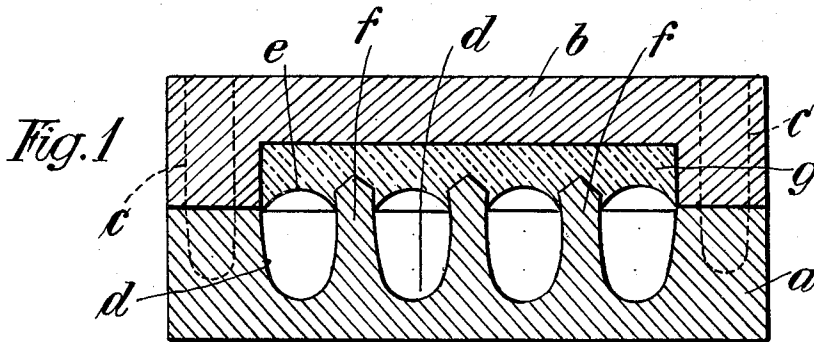
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ELASTIC FORAMINOUS SHEET MATERIAL

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ELASTIC FORAMINOUS SHEET MATERIAL

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This invention relates to a new distensible, elastic, foraminous sheet material, made from materials impervious to water and air, and preferably made from masses containing rubber, and other rubber-like products, and to the manufacturing thereof. Materials of such nature, and more particularly rubber, could not hitherto be used extensively in connection with articles of clothing and apparel, in spite of their other properties rendering them advantageous for such purposes, for the reason that they impose too great a check on the normal perspiration of the body, and also on account of their relative lack of structure which renders them unsuitable for combination with fabrics and the like by sewing in the normal manner.

The present invention provides a product which is free of the above objections, while retaining the technical advantages peculiar to the materials used, such as imperviousness to water, ready suitability for washing, elasticity, and resistance to wear.

The new product according to the invention, which is preferably made from a mass containing rubber, represents a sheet material of gauze-like appearance in which the perforations or apertures are formed by intersecting webs. These perforations are not formed by stamping out material from the sheet, but are produced in the latter by a pressing or shaping process while the initial material, for example a sheet of rubber mass, is still in the plastic state, the strengthening or toughening of the material, for instance by vulcanization, being effected only after the product has assumed its final shape. In this manner gauze-like materials are obtainable which are similar to fabrics, and which can be sewn like the latter.

In place of rubber, there can be employed for the purpose of the present invention, synthetic rubber, and all substances or masses which possess properties similar to those of rubber. It is also possible to employ the various compositions of rubber with filling materials, known in the rubber industry.

As regards the dimensioning of the perforations in the new material, it has been found to be advantageous to arrange the perforations in rows, and to dimension the same in such a manner that the center-to-center distance of one perforation from the next is at the most four times the thickness of the material. It has also proved to be advisable to arrange for the perforations to be tapered in the thickness of the material, that is to say in a direction at right angles to the

surface of the latter, more particularly when the material is intended for use in the making of articles of clothing and the like. In such cases the number of perforations per square centimeter amounts to at least 16, and preferably to 50–150. When material of this nature is employed in the making up of articles of clothing and the like, the side of the material at which the perforations are largest is preferably arranged to be innermost, i. e. towards or touching the body. Where the perforations are tapered the total superficial area of said perforations may amount, in some cases, at least on one side of the material, to at least half the superficial area of the material, as shown for example in Figure 3. In this manner the total superficial area of rubber contacting with the surface of the body is reduced to a minimum, while at the same time the material has sufficient strength and is of suitable thinness. Products of this nature permit of perfectly adequate passage therethrough of air and invisible perspiration.

An essential advantage of the described new material resides in the fact that the same can be sewn like any textile fabric, and can therefore also be combined in a known manner with other materials. It thus becomes possible for the first time to manufacture a technically satisfactory and at the same time extremely cheap rubber sheet material for use, for example, in the production of bandages, knee-caps, rubber stockings, corsets, shoe-uppers, bathing dresses, and for all purposes for which there have hitherto been employed the expensive woven fabrics embodying rubber thread. Further advantages of the new material are that the same is equally extensible in every direction, very durable, and readily capable of being washed or disinfected without being damaged thereby. In certain cases, the products according to the invention can be combined with other materials, for instance fibrous substances.

The sheet thickness of the new material can vary according to the purpose for which it is intended to be used, and amounts as a rule to between 0.2 mm. and 2 mm. For bandages, corsets, and other articles of clothing and the like, for instance, thicknesses of between 0.5 and 1.5 mm. have proved to be advantageous.

For the manufacturing of the material according to the present invention the following method and apparatus, both of which are given and described by way of example, have proved to be particularly well suited.

Sheets of approximately the required thickness

are first produced from a raw rubber mass to which the necessary vulcanizing agents are added in a known manner, formed into the described perforated, gauze-like shape in the apparatus to be described in due course, by being pressed between a matrix and a die, and finally vulcanized in the usual manner. In some cases the forming stage can also be carried out during the vulcanizing process initiated by heating. In some cases, the procedure can also be such that the plastic raw rubber mass is subjected to the pressing without having received the addition of any vulcanizing agent, non-vulcanized rubber material being obtained by mere storage at ordinary temperature. This variation of the manufacturing process can be adopted more particularly in special cases when the material is required to withstand but very slight fluctuations of temperature in the finished state.

The essential parts of a device for the carrying out of the described method are shown, in a form of construction taken by way of example, in the accompanying drawing, in which:

Fig. 1 is a section of the pressing device in the assembled condition.

Fig. 2 is a plan view on the plane indicated by the line II—II of Fig. 1.

Fig. 3 is a plan view of a fragment of the new material in accordance with the invention.

The drawing is on a greatly enlarged scale.

Referring to the drawing, the device consists essentially of a press comprising a bottom die *a* and a top die *b*, which are provided with fitting or registering pins *c* and with the necessary recesses *d*, *e* for the shaping of the material. The bottom die or matrix is made of hard material, preferably steel, and exhibits, between its recesses *d*, upstanding portions *f*, the upper pyramidal or conical pointed ends of which project beyond the upper edge of the recesses *d*. The counter portion of the upper die *b* preferably takes the form of an inserted piece *g* of relatively soft material, for example soft metal, such as lead, in which depressions are formed to correspond to the ends of the upstanding intermediate portions *f* of the lower die member by the impressing of these portions into the material of this piece, on the pressing together of the two parts of the forming device. The rubber sheet is introduced between these two parts, whereupon the latter are pressed together, the pins *f* being thereby caused to pierce the material of the sheet. The material of the sheet which is displaced by these intervening or piercing portions of the bottom die is forced into and fills out the recesses *d* and *e*.

The soft metal of the die counter plate can easily be renewed or regenerated, as required. Instead of soft metal, any other suitable material can be used for this part; the same can also be made of steel, brass, copper, aluminium, or artificial material such as phenolic condensation products or the like.

In certain cases, for instance in the manufacturing of long lengths of sheet material, it is advisable to construct the forming device (upper and lower dies) in the shape of coacting rollers. The vulcanization of the products according to the invention is effected after the formation of the webbed structure, and preferably at least to a certain extent in the pressing or forming device itself. For this purpose the pressing device can be arranged to be heated. The vulcanization can of course also be effected in the cold.

What I claim is:

1. Extensible elastic foraminous sheet material comprising vulcanized sheet rubber having on an average not less than 100 apertures per square inch of the sheet molded therein.

2. Extensible elastic foraminous sheet material comprising vulcanized sheet rubber having on an average between 300 and 1000 apertures per square inch of the sheet molded therein.

3. Extensible elastic foraminous sheet material comprising vulcanized sheet rubber having on an average not less than 100 apertures per square inch of the sheet molded therein, said apertures being tapered in the thickness of the material.

4. Extensible elastic foraminous sheet material comprising vulcanized sheet rubber having on an average not less than 100 apertures per square inch of the sheet molded therein, said apertures being separated by molded rib-like webs.

5. Extensible elastic foraminous sheet material comprising vulcanized sheet rubber having on an average not less than 100 apertures per square inch of the sheet molded therein, said apertures being separated by molded rib-like webs, and being tapered in the thickness of the material.

6. An extensible elastic foraminous sheet material comprising vulcanized sheet rubber having on an average not less than one hundred apertures per square inch of the sheet molded therein, said apertures being separated by molded rib-like webs, the total superficial area of said apertures, at least on one side of the material, being at least half the total superficial area of the material.

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