Sept. 1, 1936. G. CHRISTENSON 2,052,603

ARTICLE OF MANUFACTURE

Filed Sept. 9, 1932

Fig. 1.

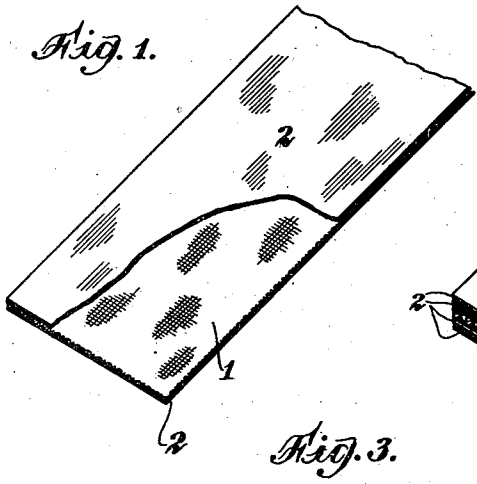


Fig. 2.

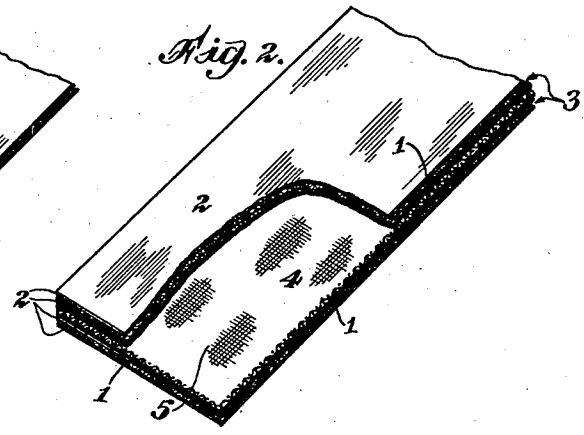


Fig. 3.

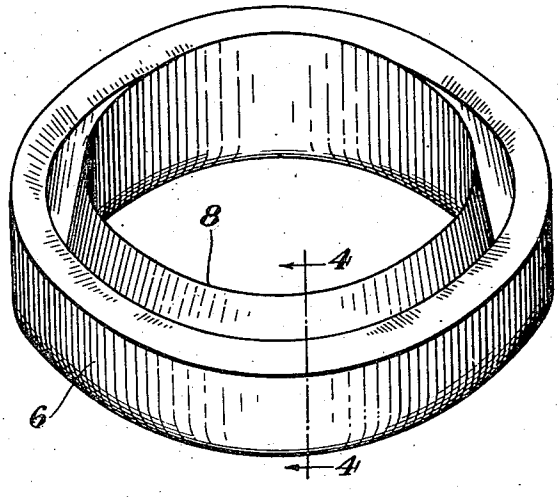


Fig. 4.

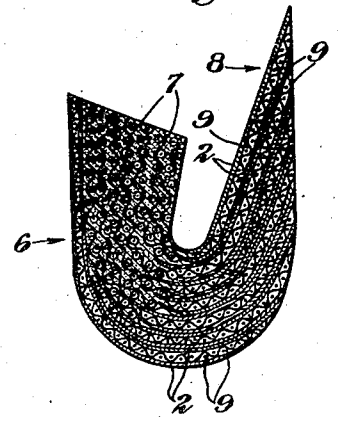
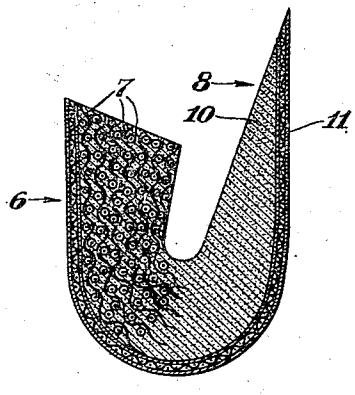


Fig. 5.



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ARTICLE OF MANUFACTURE

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Application September 9, 1932, Serial No. 632,332

3 Claims. (Cl. 288—1)

This invention relates to an article of manufacture comprising a fabric base and chloroprene impregnated therein, particularly to a composite article including a chloroprene-impregnated fabric integrally united to another element containing a resilient material of properties different from those of chloroprene, and to a method of making the same.

The invention comprises an article including a woven fabric, such as asbestos cloth, and chloroprene impregnated into the cloth and then hardened in situ by polymerization. In the preferred embodiment of the invention, the chloroprene-impregnated fabric is integrally united to a rubber composition simultaneously with the hardening of the chloroprene and rubber.

An article to which the invention is applicable is packing for stuffing boxes or similar devices described in U. S. Patent 885,405, issued to Trist on April 21, 1908. The packing members there described are essentially U-shaped in cross section and have a thick heel on one side, that engages the inside of the stuffing box in the packed assembly, and a tapering, flexible lip or flange extending upwardly, on the other side of the U, that contacts with a moving surface, such as the plunger rod of a pump.. In such a packing assembly, the lip which contacts with the moving part becomes warmer than the heel or outer portion of the ring packing. The temperature of the lip may become sufficiently elevated to cause softening of conventional packing compositions, particularly in the presence of the usual lubricating oil. The softening is thereby caused to occur in the particular part of the packing in which the maintenance of proper packing contact with the moving surface and absence of tackiness or stickiness is especially to be desired. If, on the other hand, the packing is made so hard throughout that the lip portion is of desired properties when very hot, then the other, cooler portions may be of hardness greater than desirable.

The present invention provides a ring packing, for example, in which the portion contacting with the moving surface has a lower susceptibility to change in consistency and better frictional characteristics at elevated temperatures than the backing portion and the said contacting portion of conventional packing.

The invention is illustrated in the drawing in which,

Fig. 1 shows a perspective view of a sheet adapted for use as packing or friction material, with parts removed for clearness of illustration.

Fig. 2 is a similar view of a modified form of sheet material comprising, in the intermediate portion, a resilient material or binder different from that in the outer facing layers.

Fig. 3 is a perspective view of packing in the form of a ring, essentially U-shaped in cross section, that constitutes the embodiment of the invention that is preferred at this time.

Fig. 4 shows a cross sectional view, somewhat enlarged, on line 4—4 of Fig. 3.

Fig. 5 shows a similar cross sectional view of a modified form of ring packing.

In the various figures like reference characters denote like parts.

Thus, reenforcing material 1, suitably a heat-resistant fabric woven of fibers having capillary attraction for oil or water, such as asbestos cloth that may contain reenforcing wires within the various strands of yarn, is impregnated with a material or binder 2 which is then hardened in situ. The impregnating material which I have found to have outstanding merit for the purpose of the invention, particularly when reenforced by asbestos cloth, is incompletely polymerized chloro-2-butadiene-1,3, of the formula

$$CH_2{:}CCl.CH{:}CH_2,$$

herein referred to as chloroprene, and made as described by Carothers and others in the Journal of the American Chemical Society, vol. 53, pages 4203–6, 1931. In the incompletely polymerized state in which it is initially used, the material has a consistency approximating that of raw rubbed.

The structure illustrated in Fig. 2 comprises, in combination, facing portions 3 of chloroprene-impregnated fabric of the type described and an intermediate portion 4 including fabric-reenforced rubber, the face and intermediate portions being in the condition of having been integrally united and of having been hardened simultaneously, whereby thorough and intimate union is obtained, particularly since the binder (rubber) in the intermediate portion is initially miscible with chloroprene. Under such circumstances there is formed an intermediate zone in which the binder of the face portion and the binder of the intermediate portion are blended. The fabric 5 in the intermediate portion is suitably reenforced. Preferably this cloth is woven from asbestos yarn containing inwardly disposed reenforcing wires of brass or the like. The composite structure illustrated is petroleum resistant, even though the binder in the intermediate portion is petroleum soluble, that is, is slowly softened by contact with petroleum. The facing portions 3 containing the petroleum insoluble chloroprene 2

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and suitably also reenforcing fabric 1, prevent the entrance, through the faces, of petroleum to which the article may be exposed. Also, the edges of the sheet may be sealed, as by coating with a solution of chloroprene and allowing the solvent therein to evaporate, before the impregnating materials in the sheet are hardened.

The ring packing illustrated in Figs. 3 and 4 comprises a rigid upstanding heel or backing portion 6 comprising rubber reenforced by asbestos cloth 7 or the like embedded in the rubber and provided, preferably, with reenforcing metal wires within the yarn. The ring comprises also an upwardly projecting tapered flange or lip 8 comprising polymerized chloroprene reenforced by asbestos cloth 9 embedded therein. Because of the degree of flexibility and pliability required in the flange portion, the cloth therein is preferably free from metallic reenforcement. The flange and the heel are integrally united at their bases, that is, at the base of the U-shape.

In the modification shown in Fig. 5 the lip portion 8 of the ring packing includes a relatively very pliable portion 10 that contains chloroprene without reenforcing fabric. The lip may be faced with sheet material 11 comprising fabric-reenforced chloroprene. This lip is united to a stiff heel or backing portion 6, as described above, comprising a binder of selected properties and reenforcing and stiffening means, suitably wire-reenforced asbestos cloth 7.

The general method of making the products of the present invention includes compressing and densifying and then hardening the impregnating or binder materials, in situ, suitably while in compressed and densified condition. The method is illustrated by the following specific examples, which are each a modification of the general method.

Example I

In making products of the type illustrated in Fig. 1, comprising woven fabric impregnated with chloroprene, chloroprene of rubber-like consistency and preferably blended with a small proportion of a plasticizer such as 6% of pine oil, dibutyl phthalate or other substantially non-volatile softener or solvent for the chloroprene, is dispersed in sufficient benzol to form a solution of viscosity suitable for use in the impregnation of cloth. This solution is then applied to a fabric base, as by immersing the fabric therein, for a short period of time. The volatile solvent is then allowed to evaporate. If it is desired to have a thicker coating than formed by the impregnation step, additional chloroprene compound may be calendered upon the surface of the cloth. The choloroprene impregnated cloth is then subjected to a hardening process, as by being compressed and maintained for approximately one hour in a die at a temperature above 130° C., as, for example, at a temperature corresponding to a steam pressure of 70 lbs. gauge.

During this hardening process there is produced polymerization of the chloroprene in addition to that of the chloroprene as used initially. Also, the pressure forces the binder into the meshes in the cloth and also into interstices associated with the asbestos fibers. It will be understood that asbestos fibers are an aggregation of smaller elongated forms or crystals.

When the cholorprene-impregnated fabric is to be used for a relatively pliable packing, then the fabric therein may contain no reenforcing wires. When, on the other hand, the sheet is to be used as a friction material, say as the lining of an automobile brake, the fabric therein is preferably reenforced, that is, is provided with small flexible metal wires within the various strands of yarn.

Example II

In making an article of the type illustrated in Fig. 2, the facing members are first formed by impregnating chloroprene into woven fabric as described above. There is then made rubberized cloth, by a conventional process, including impregnating the woven fabric with a solution or calendering on of rubber and a usual vulcanizing agent. After the volatile solvent has been evaporated, the sheets containing chloroprene that are to constitute the facing portions of the finished product and the sheet containing rubber that is to be the intermediate portion, are assembled in proper relationship. The various sheets in the assembly are then integrally united and simultaneously hardened, as by compression in a steam heated die. This treatment vulcanizes the rubber and polymerizes the chloroprene.

Example III

In making the ring packing of the type illustrated in Figs. 3 and 4, there are formed several strips of chloroprene-impregnated fabric and also of rubberized cloth. These strips are then composited by being laid side by side, the chloroprene material on the side that is to correspond to the lip or flange of the packing ring, and the rubber material on the other side, the sheets of the two kinds alternating with and overlapping each other at an edge, say, in the portion that is to constitute the base of the U-shape in the finished packing. The bottom sheet of the assembly and also the top sheet may be of the same kind of material from one side to the other. When these facing sheets consist of chloroprene-impregnated fabric, oil-proofness of the facing layers of the finished product is obtained.

As the several layers of material are assembled, it is desirable that they should adhere to each other, for convenience in subsequent handling during the fabrication of the article. For this reason, the surfaces of the various layers may be softened with a solvent or made sticky with a cement before the surfaces are placed together in the assembly. Thus, the rubberized cloth may be rendered tacky over its surfaces by the application thereto of a rubber cement or a solvent for rubber. Likewise, the chloroprene sheets may be softened or made tacky by the application thereto of a volatile solvent, such as benzol, or by being coated with a rubber cement, that is, with a solution of a rubber compound in a volatile solvent therefor.

After the assembly has been completed, it is transferred to a steam-heated die provided with a shape of interior to form the desired ring of approximately U-shaped cross section. The material is then pressed and formed at a temperature of, say, 150° C. for approximately 1 hour, after which it is removed from the die, is smoothed over any surface irregularities, and is trimmed at the edges. In this manner there is formed a packing ring including, at its base portion, a zone of blended rubber and chloroprene.

It will be understood that the width of the strips used in making the assembly originally are so selected that after being bent to the U-shape they will form the desired shapes of surfaces, as, for example, a plane upper surface of the heel and a tapered flange, as illustrated. In

laying up these strips in the original assembly, the edges of the strips that are to form the edges of the heel are laid approximately flush with each other, whereas the edges at the other side of the stack are stepped off, to obtain the proper taper of the flange of the finished article.

With the present invention, it is possible to produce an article comprising a fabric base and chloroprene binder impregnated into the said base and integrally united to another element comprising a binder of properties different from those of the chloroprene and so selected as to provide, for example, different frictional characters and different susceptibility to the effect of temperatures upon rigidity or consistency in the two elements.

The articles described may be given a coating of graphite over the outer surface, to decrease friction of a packing surface with a moving part.

The details that have been given are for the purpose of illustration and not restriction, and many variations therefrom may be made without departing from the spirit and scope of the invention.

What I claim is:

1. A ring packing including two concentric, upstanding, circular portions integrally united at the bases thereof to form an upturned heel or ring support and an upwardly projecting packing flange, the said support including reenforced and vulcanized rubber, the packing flange including a shaped and then hardened composition comprising chloroprene, and the base of the ring packing including blended rubber and chloroprene.

2. An article comprising facing portions including chloroprene, an intermediate portion, including rubber, integrally united to the said facing portions, and a seal comprising chloroprene applied to the edges of the article and integrally united thereto.

3. An article of manufacture including a member comprising fibers of asbestos and chloroprene impregnated thereinto and hardened in situ and an element, integrally united to the said member, comprising a resilient rubber binder compound of greater susceptibility to change in consistency with moderate rise of temperature and lesser susceptibility to change in resiliency on use at elevated temperatures than the said chloroprene.

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