

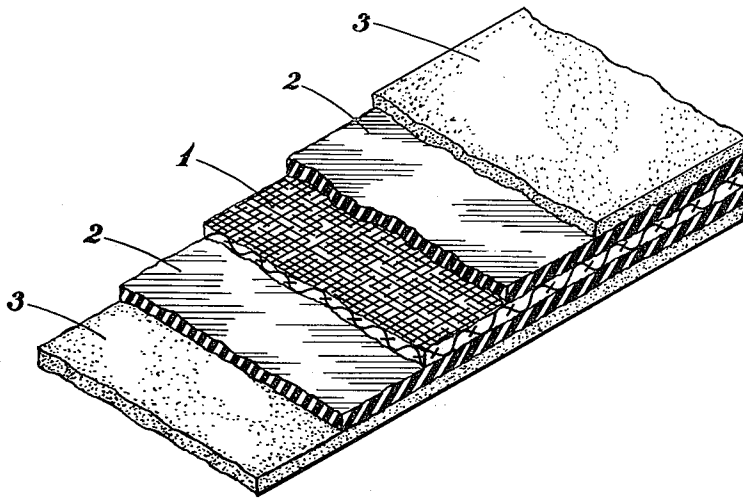
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SEALING TAPE

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SEALING TAPE

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This invention relates to a gasket or caulking material capable of withstanding the action of sea water, and more particularly to flexible sheet material suitable for use as a sealing or insulating means in the joint between the metal plates in seaplane hulls.

Seaplane travel has very rapidly increased in recent years. In keeping pace with the increase in traffic, the operating companies have been forced to build larger and larger seaplanes. At the present time, an ordinary passenger seaplane weighs in excess of 20 tons. Since landing speeds of 60 miles an hour or more are not uncommon with these heavy machines, the laps or joints of the metal plates of which the hulls are constructed are subject to tremendous forces with the result that there is a constant tendency for the hulls to spring leaks. In the ordinary ocean liner, a certain amount of leakage is expected and provisions are made for removal of the resultant bilge water by pumps. Because of the necessity of decreasing the weight of airships, bilge water and heavy pumps for its removal cannot be tolerated. Various schemes to make the joints in seaplane hulls waterproof and leakproof have heretofore been tried without more than temporary success. Specific mention may be made of fabric strips covered with marine glue which have been found to be economically valueless because of their short period of effectiveness.

This invention had for an object the preparation of a gasket or insulating sheet material that would satisfactorily seal the riveted joints or seams in metal (usually aluminum or its alloys) seaplane hulls. Another object was to provide an insulating strip or tape that could be easily applied to metal plates about to be riveted and which would have sufficient adherence for the same so as not to be displaced during the piercing (drilling, punching, etc.) and riveting operation. Still further objects were to produce a gasket material not easily deleteriously affected by sunlight, salt water, gasoline, oils, cleaning agents, and oxidizing agents and capable of remaining in contact with metal surfaces for long periods of time without inducing corrosive effects. A general advance in the art and other objects which will appear hereinafter are also contemplated.

The foregoing objects and related ends are accomplished by the present invention. In the following description and specific examples are disclosed certain embodiments of the invention as well as details of what is believed to be the best mode for carrying out the invention. The

quantities are given in parts by weight throughout the application.

Specifically, one method for accomplishing the aforementioned objects is to thoroughly impregnate and coat a fabric with neoprene, completely cure (polymerize) the same, and coat the resultant sheet material with an adhesive.

In the drawing the single figure is a diagrammatic plan view showing the parts of the invention. In the figure, 1 represents a fabric base; 2 is a neoprene coating; and 3 is an adhesive containing an anti-corrosion agent.

Example I

A light weight sheeting cotton fabric commonly known as 5.35 print cloth was impregnated with a cement made by churning approximately 25 parts of a mixture comprising:

	Parts by weight	
Chloroprene plastic polymer (neoprene)	48	20
Pine tar	1½	
Rosin	2	
Carbon black	5	
Whiting	33	25
Light calcined magnesia	5	
Zinc oxide	4	
Phenyl-beta-naphthyl-amine	1	
Zinc chromate	5	

with 75 parts of coal tar naphtha (commonly referred to as industrial xylol). The solid ingredients tabulated above were mixed on a rubber mill before being churned with the solvent. The milling and churning were carried out in the manner well known in the rubber compounding art. The neoprene used in the above mixture had a plasticity in the range 80-110 with a regain of 2 to 8 as measured at 80° C. on a Williams parallel plate plastometer. This plastometer is described in the Journal of Industrial and Engineering Chemistry, volume 16, page 362 (1924).

After the fabric was impregnated, the solvent was evaporated and both sides of the sheet material spread with a cement of the same composition. The proportion of solvent in the spread composition was decreased from that in the impregnation composition to the extent necessary to produce a spreadable cement. The lowering of the percentage of solvent in the coating composition gave a product having a slightly higher viscosity than that of the impregnating composition. Specifically, the proportions of solvent and coating composition mixture were 60 and 40 respectively. When 8 spread coats had 55

been applied to each side of the sheet material, the fabric was found to be thoroughly covered and waterproof. At this stage, the total weight of the material was approximately 10 to 12 ounces per square yard. The surface of the material was then dusted with mica. Thorough curing of the neoprene was then accomplished by heating the material while it was festooned in an oven. The temperature within the oven was raised from ordinary normal room temperature to 260° F. (127° C.) in one hour and maintained at that temperature for three more hours.

The material was then removed from the oven and coated on both sides with a coat of adhesive consisting of:

	Parts by weight
Rubber	100
Balata	100
20 Burgundy pitch	200
Roſin	200
Cumarone-indene resin	200
Zinc chromate	100
Benzol	425

on a spread type coating machine. The solvent in the adhesive was then removed by evaporation and the surface dusted with mica to remove all traces of remaining tack. The dried adhesive coat weighed approximately 2 ounces per square yard (on each side).

Example II

An impregnated and coated sheet material was prepared according to the processes described in Example I. After curing of the neoprene product, the sheet material was coated on one side with a very thin film (weighing approximately 3 to 4 ounces per square yard) of a cement consisting of:

	Parts by weight
Rubber	40
Gum elemi	2
Cumarone-indene resin	4
45 Castor oil	1
Zinc oxide	10
Whiting	25
Zinc chromate	16

on a calendering machine. The finished product was then dusted with powdered mica in order to avoid tackiness.

The type of fabric used as a base for the caulking material will vary with the specific use to which the finished product is to be put. Any type of fabric or felted fibrous material capable of being impregnated with a cement may be used. For some purposes the presence of a fabric is undesirable and in such cases the caulking compound may be manufactured by calendering into a plain sheet.

Neoprene is a plastic polymer of chloroprene and may be prepared by polymerizing chloroprene according to United States Patent 1,950,436 issued March 13, 1934, to Williams. Chloroprene is chloro-2-butadiene-1:3, a liquid whose preparation is described by Carothers, Williams, Collins and Kirby in the Journal of the American Chemical Society, volume 53, page 4203 (1931).

Any neoprene which is capable of being converted into elastic, essentially non-plastic material may be used. The preferred product has a plasticity in the range 60 to 125. The intermediate range 80 to 110 is especially advantageous. The plasticity of the starting polymer is gov-

erned largely by the operating conditions desired. Polymerized material having a plasticity below 60 or above 125 may be used at the expense of efficiency and economy of operation. A product having a plasticity in the neighborhood of 125 is fairly rigid and would not be used under ordinary circumstances.

There are practically no limitations other than the physical properties of the final product which determine the mixture used for the impregnating and coating compositions. The compounding of chloroprene plastic polymer in various manners is understood by those skilled in the art of compounding rubber. Specific technique is described in the "Duprene" manual issued August 21, 1934, by E. I. du Pont de Nemours and Company, of Wilmington, Delaware, and in an article by Bridgewater & Krisman in the Journal of Industrial and Engineering Chemistry, volume 25, page 280 (1932).

In the specific examples, zinc chromate has been included as an anti-corrosion agent. The corrosion inhibitor may in some instances be omitted, and in others different corrosion inhibiting material may be used. In selecting a corrosion inhibitor, such features as compatibility with the impregnating and coating composition, compatibility with the adhesive used, and action upon the specific metal to be insulated must be taken into consideration.

The composition of the adhesive applied to the gasket material is subject to wide variation. In the preferred embodiment of the invention an adhesive which, when dried and dusted, is without tack and can be easily handled and which develops its adhesive properties upon wetting with gasoline or other activating solvent, is used. In some circumstances, it may be desirable to use an adhesive which retains its tack when it is not wet. In such a case, protection of the surface and facility of handling is accomplished by omitting the dusting agent in Example II and covering the sheet material with Holland cloth or the like, which may be stripped off just prior to use.

The weight of the material applied as a coating is influenced by such factors as the specific coating composition being applied, the method of its application and the use to which the material is to be put. The proper value can readily be determined empirically.

The sheet material described above is especially satisfactory as a sealing tape at the overlapping edges of aluminum plates in seaplane hull construction. The adhesive on the tape holds the edges of the plates in position during riveting and the preliminary operations such as punching. If desired, the herein described sealing tape may be inserted after the piercing but before the riveting of the overlapping plates. After the plates have been riveted and the seaplane placed in operation, the tape in addition to caulking the seams affords cushioning value to absorb shocks and vibration. The ability of the product of this invention to diminish noises due to chafing of metal on metal when under strain and to hold the plates in position while the lapping edges are drilled and riveted renders the material of appreciable value in the construction of landplane bodies. Other uses include the sealing and insulating of seams in railroad cars, tanks and the like. Since there is no fluid exuded from the seams when the new material is used for gasket purposes, painting of the finished construction may take place at once.

While we have illustrated our invention in the examples by a method in which the neoprene is cured, it is to be understood that for some purposes it is advantageous to omit the curing of one or more of the coatings of the neoprene. For example, in sealing angular joints as in metal tanks, it may be advisable to use uncured material.

As indicated above, the invention is not limited to any specific anti-corrosion agent. For example, in place of zinc chromate we may use any of the alkali metal salts of chromic or dichromic acid, and the proper selection of such an agent will be apparent to those skilled in the art.

The present invention is particularly satisfactory in joining plates of dissimilar metals since electrolysis is greatly retarded by the use of the herein disclosed tape. This is particularly important in hulls used in salt water. It is to be understood, however, that the invention is not limited to such use, but may be employed in land planes, amphibians, land vehicles such as tank cars, automobiles, and in fact, almost anywhere that two metals are joined whether for the purpose indicated above or for a widely different purpose such as to prevent squeaks.

Another advantage of the material prepared according to the present invention is its inherent cleanliness. Heretofore tar or other marine ce-

ment was used which usually exuded from the joint, thereby requiring considerable time and cleaning agent for the removal of the exuded material. Such a practice also resulted in soiling the workman's hands and clothing. In contrast to this, the present invention provides for a method in which there is little or no waste of exuded material, and therefore it is much more economical to use.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that we do not limit ourselves to the specific embodiments thereof except as defined in the appended claims.

We claim:

1. A sealing tape consisting of a fabric base, a coating of neoprene thereon and an adhesive on the neoprene coating, the said adhesive coating containing zinc chromate.

2. A sealing tape comprising a fabric base, a coating of neoprene thereon, and an adhesive on the neoprene coating containing a salt of a chromic acid.

3. The tape of claim 2 in which the chromium salt is an alkali metal salt.

4. The tape of claim 2 in which the salt is one of dichromic acid.

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