March 14, 1933. E. H. BERGER 1,900,904

FLEXIBLE WEAR RESISTING SEALING FABRIC AND METHOD OF MAKING THE SAME

Filed April 18, 1929

Fig.1.

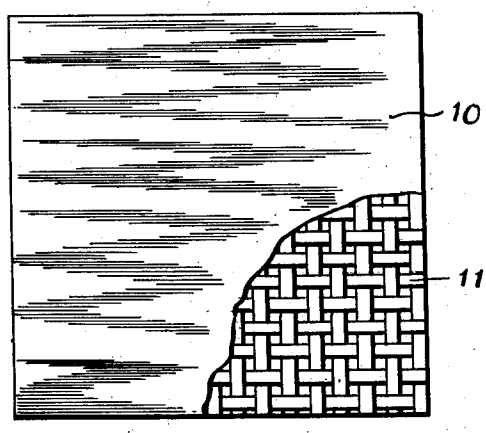


Fig.2.

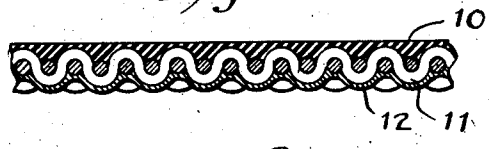


Fig.3.

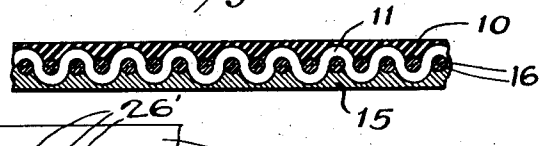


Fig.4.

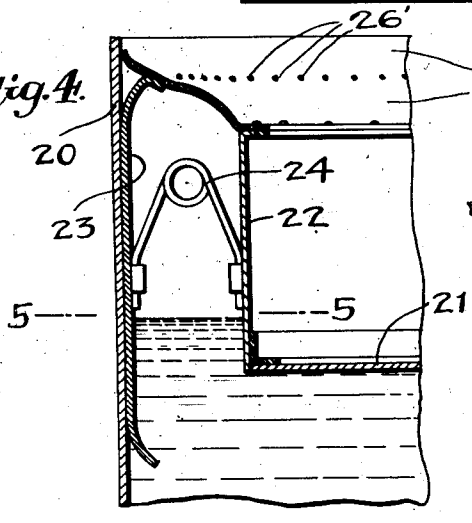
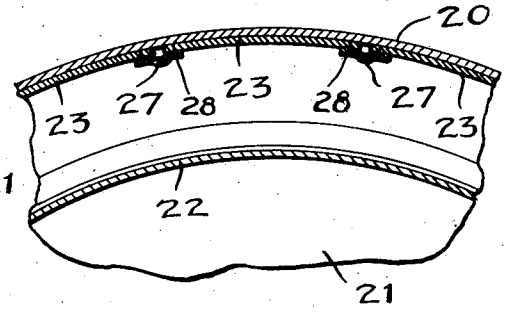


Fig.5.



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Published by AsbestosClaims.Law
asbestosclaims.law/library/22344/1

Patented Mar. 14, 1933 1,900,904

UNITED STATES PATENT OFFICE

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FLEXIBLE WEAR-RESISTING SEALING FABRIC AND METHOD OF MAKING THE SAME

Application filed April 18, 1929. Serial No. 356,243.

This invention relates to a flexible wear-resisting sealing fabric, and the method of making and treating the same to render it vapor and fluid-proof.

One of the primary objects of this invention is to provide a semi-flexible treated fabric adapted to be used as a sealing and covering medium, and which is not only gas and vapor proof, but also waterproof, and one that can be subjected to long continued use in the presence of chemical fluids and gases without deterioration.

Another important object of this invention is to provide a durable and pliable fabric of a sufficient wear-resisting nature to withstand long continued flexing service.

This invention not only contemplates the provision of a strong wear-resisting flexible fabric which is both water and gas-proof, but one that will resist fire and withstand high temperature.

This invention involves the treating of a suitable fabric to give it the above and other desired characteristics. The fabric, briefly stated, consists of an interwoven cloth made of a fire-resisting cord or yarn which is preferably reenforced with strands or cords of a metallic or textile nature. This fabric is treated with a rubber compound of a suitable nature to produce a waterproof side, and the other side is coated with a special compound to render it gas and chemical resisting.

The fabric made in accordance with this invention has not only the characteristics as stated above, but others which particularly adapt it to be used as an apron to seal the space between a floating roof and the guides therefor; also, to seal the spaces between the shoes which form the guiding means for floating roofs.

With the above and other objects in view, this invention consists of novel constructions, combinations and arrangement of parts and materials which will be fully set forth in the following specification and claims, and illustrated in the accompanying drawing, in which:

Fig. 1 discloses a top perspective view of section of the fabric with a portion of the waterproofing compound removed.

Fig. 2 is a cross sectional view of Fig. 1 on an enlarged scale.

Fig. 3 is a similar view of a slightly modified form of the invention; and

Figs. 4 and 5 are broken-away sectional views of a portion of a tank and its floating top showing the application of the fabric in several of its uses for which it is particularly adapted.

The drawing is only indicative of the embodiment of the invention, and referring to Figs. 1 and 2, reference numeral 11 designates a fabric which has a rough coarse finish in view of the heavy cord or yarn used. As shown, the fabric appears to be loosely woven, but in actual construction it is more or less closely woven, and the rough finish is due to the coarse yarn used. This rough coarse finish is advantageous, as it enables the coatings upon application to become more thoroughly locked or incorporated into the body of the fabric.

As hereinabove stated, the fabric comprises a fire-resisting material preferably made of an asbestos cord or yarn, which is reenforced, as indicated at 16, Fig. 3, with a strand of a textile or metallic nature, preferably the latter in the form of fine wires which are spun or twisted with the asbestos yarn or roving to make a very strong cord or strand. These cords or strands are then woven into a fabric or cloth by the usual methods of weaving.

A fabric of the above nature is coated on one side to render it waterproof, as indicated at 10, and then on the other side with a specially prepared compound 12 to render it gas and vapor-proof.

The waterproof coating 10 comprises a rubber compound, and may either be applied to the asbestos fabric 11 in the form of a thin mastic sheet and then rolled and friction calendered, or else in the form of a liquid-like cement compound by means of a brushing process, after which it may be rolled and calendered. These applications may or may not be cured; however, in the preferred form they are cured and vulcanized by the application of heat and pressure in the usual manner.

After the waterproof coating has been completed, the reverse side of the fabric is coated with a compound 12, which resists the action of chemical fumes, oil vapors, liquid petroleum and its derivatives. This compound is in the form of a paste or solution, and comprises either glue casein or gum-arabic, a softening agent such as glycerine, glucose, or castor oil, and a setting agent, such as dicromate or formaldehyde mixed in water, in proportions suitable to produce the proper consistency for coating. When formaldehyde is used as a setting agent, it may either be mixed along with the other ingredients, or else omitted, and with the latter method the fabric is subsequently treated, before drying as hereinafter described, with a formaldehyde solution or exposed to the vapors thereof to set the compounds. After coating with a compound having a setting agent therein, the fabric may also be exposed to formaldehyde vapors so as to further set the compound and make it more resistive.

A paste or solution of this nature may be applied by a brushing and a drying process which is repeated several times to impregnate the fabric and to give a coating of sufficient thickness, after which it is thoroughly dried. This coating application may also be accomplished by a preliminary brushing and drying process to impregnate the fabric, after which it is subjected to a dipping process, which comprises the dipping of the fabric into a solution contained in a tank and then drying upon a rack, this being repeated several times if desired and then subjected to a final drying. The fabric may also be coated by the dipping process alone. These steps may be repeated a sufficient number of times to produce a coating of any desired thickness, as will be seen in Fig. 3 disclosing a modified form of the invention in which the gas or vapor-resisting coating 15 is of a substantial thickness.

The fabric made in accordance with this invention has a wide range of uses, particularly in the oil industry where the gas and vapors given off quickly deteriorate roofing materials with their usual waterproofing compounds. When used as a roof covering, the fabric is applied with its gas or vapor-proof coating on the under side, which prevents the petroleum vapors from penetrating the coatings or applications used for rendering roofs waterproof.

The fabric is particularly adapted for sealing aprons in tank constructions of the type having floating roofs to prevent breathing losses. To enable a better understanding of the importance of this invention, broken-away cross sectional views of such a tank are disclosed by Figs. 4 and 5, in which 20 is the cylinder wall of the tank, 21 the floating top having an upstanding cylindrical wall 22 with an inwardly extending flange at its upper edge. As will be seen, the floating top is spaced a substantial distance from the wall of the tank for the purpose of allowing for unrestricted up-and-down movement. Guiding the floating top are shoe-like members 23 held in engagement with the walls of the tank by means of springs 24. Covering the space between the float and the shoe members is a flexible apron-like member 26 having its inner portion connected to the flange of the float and its outer portion connected to the upper turned-over edges of the shoes by any suitable means, as indicated at 26′. It will be noted that the flexible seal extends beyond the upper edges of the shoe members and contacts with the sides of the tank to form a rain-proof shedding arrangement.

This fabric is also particularly adapted to form a flexible seal and joint arrangement between the adjacent vertical edges of the shoe members 23, as will be seen at 27, Fig. 5. These pieces of fabric extend the full length of the shoes and are attached thereto by suitable means, as indicated at 28. It will be noted that these pieces of fabric as shown have slight bulges, which allows for extension and contraction of the sliding guide members away from and towards each other. In this use the fabric is not only subjected to considerable mechanical wear, but also, inasmuch as it extends down into the petroleum, it is subjected to an unusual amount of chemical and vapor deterioration.

In the application of this fabric to the above uses, the waterproof coated side is placed on the outside, and the vapor and gas-proof side on the inside, facing the gas chamber.

In view of the unusual wear and deterioration, both physically and chemically, it has been very difficult to find a sealing fabric which would withstand any long continued use in these types of structures. Having in mind these difficulties to be overcome, a fabric has been produced by this invention which will withstand long and continued use, and one that is not only water, petroleum and vapor-proof, but also strong, durable and with high tear and wear-resisting qualities. Along with the above characteristics, the fabric is also heat and fire-resisting, which is very important in view of the fire hazards connected with the oil industry.

What I claim is:

1. An article of manufacture comprising a base member having coatings thereon, said base member consisting of a woven fabric made from strands of fire-resisting fibrous material, one of said coatings consisting of a water-insoluble gum and the other consisting of an oil and vapor-resisting material.

2. An article of manufacture of a flexible, wear-resisting nature, comprising a body member made of reenforced strands of asbestos fibre, the body member being coated

on one side with a water-insoluble gum, the other side being impregnated and coated with a petroleum and vapor-proofing compound.

3. A flexible membrane for sealing oil tanks and similar containers wherein one side of the membrane is exposed to the weather and the opposite side is exposed to the action of fumes from the stored liquid, said membrane comprising a flexible fire-resisting fabric coated on one side with a rubber compound to render it waterproof and coated on the other side with a compound consisting of glue, glycerine and a setting agent.

4. A flexible membrane for sealing oil tanks and similar containers wherein one side of the membrane is exposed to the weather and the opposite side is exposed to the action of fumes from the stored liquid, said membrane comprising a reenforced fire-resisting fabric coated on one side with a vulcanizable rubber compound, and impregnated and coated on the other side with a compound consisting of glue, glycerine and a setting agent.

5. A flexible membrane for sealing oil tanks and similar containers wherein one side of the mebrane is exposed to the weather and the opposite side is exposed to the action of fumes from the stored liquid, said membrane comprising a reenforced asbestos fabric coated on one side with a rubber compound to render it waterproof, the other side being impregnated and coated with a compound to render it petroleum and vapor-resisting.

6. A flexible membrane for sealing oil tanks and similar containers wherein one side of the membrane is exposed to the weather and the opposite side is exposed to the action of fumes from the stored liquid, said membrane comprising a wire-reenforced asbestos fabric coated on one side with a rubber compound to render it waterproof, the other side being coated with a compound consisting of glue and glycerine treated with formaldehyde to render it oil and vapor-resisting.

7. A method of manufacturing a water and vapor-proof sealing fabric, which consists in applying a rubber compound to one side of a fabric and then curing, after which the other side is impregnated and coated with a petroleum vapor-resisting compound by a series of brushing and drying applications.

8. A method of manufacturing a water, oil and vapor-proof flexible sealing fabric, which consists in applying a thin coating of rubber compound to one side of an asbestos fabric and then curing, after which a petroleum vapor-resisting compound is applied to the other side by a series of brushing and drying applications, the fabric being treated with a setting agent before drying.

9. A method of manufacturing a water, oil and vapor-proof flexible sealing fabric, which consists in applying a thin layer of a rubber compound to one side of an asbestos fabric and then calendering and curing, after which the other side is impregnated with a protein compound by a series of brushing and drying applications, and then subjected to a series of dipping and drying applications in a hardening solution to give a coating of substantial thickness.

10. An article of manufacture comprising a fire-resisting fabric coated on one side with a gum that is relatively impermeable to water and on the other with a protein, a softening agent, and a setting agent for the protein.

11. An article of manufacture comprising a fire-resisting fabric coated on one side with a gum that is relatively impermeable to water and on the other with a protein, glycerine, and a setting agent for the protein.

12. An article of manufacture comprising a fire-resisting fabric coated on one side with a gum that is relatively impermeable to water and on the other with a protein, glycerine, and formaldehyde.

Signed at New York, in the county of New York and State of New York this 17th day of April A. D. 1929.

EDWARD H. BERGER.