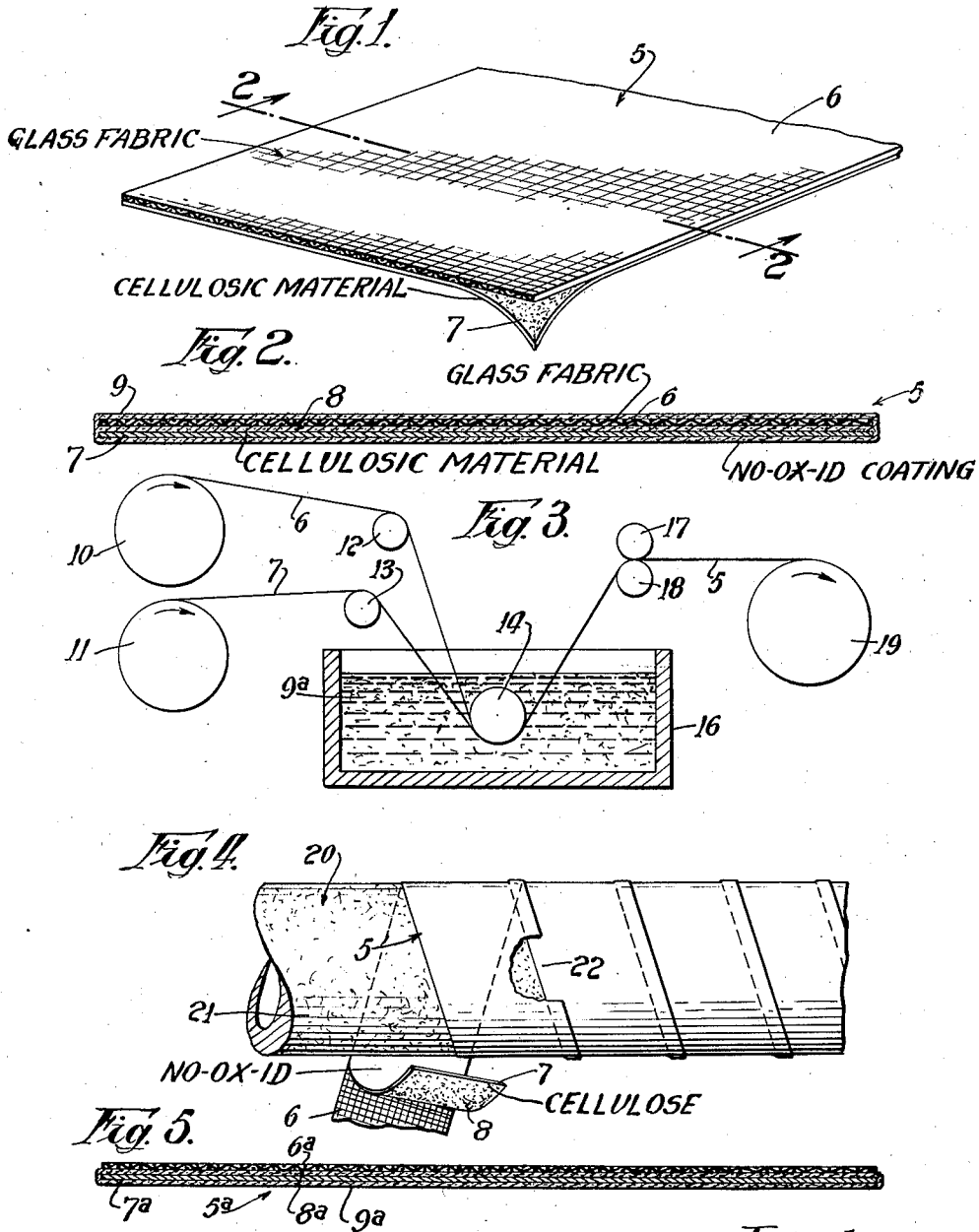


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PIPE WRAPPING MATERIAL

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PIPE WRAPPING MATERIAL

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5 Claims. (Cl. 138—64)

This invention relates to improvements in pipe wrapping material and the like for use as a protection against corrosion and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The electrochemical theory is now generally accepted as the one which best explains the action in the rusting of iron. Iron, like all other elements has a definite inherent tendency to go into solution when placed in contact with water. However, it can enter solution only by displacing some other element already in solution. In the ordinary case of iron immersed in water, hydrogen is the element plated out. This hydrogen gathers on the surface of the iron in the form of an invisible film.

The presence of this film tends to obstruct the progress of the reaction by insulating as it were, the metal from the solution. This interference may become so effective in natural water as to stop corrosion altogether. Thus, the first stage of corrosion comes to a stop so quickly that no appreciable damage is done to the metal if the process goes no further.

In order that corrosion may proceed, the film of hydrogen must be removed. This may happen in two ways: either it may combine with the oxygen in solution and form water or it may escape as a gaseous hydrogen. Dissolved oxygen is usually present in water solutions and removes the hydrogen film by reacting with it to form water. The process is then free to continue, that is to say, more iron can go into solution, more hydrogen can plate out and the process can continue at a rate determined by the speed with which the oxygen removes the hydrogen. This is the second stage of corrosion and accounts for the continuation of the process in the great majority of cases.

In acids, the same action takes place, but the tendency for the hydrogen to plate out is much greater and so much of it gathers on the metal surface that it is forced off in the form of hydrogen gas bubbles. Corrosion is, therefore, proportionately more rapid in acid solutions than in natural waters.

Ordinarily the iron, which goes into solution is immediately thrown down as rust. After a time the rust, together with the insoluble material from the water may form a protective coating on the surface, which interferes with the corrosive reaction by insulating the metal from the solution.

It will be apparent from the above that all material has a tendency to dissolve to a certain

extent when in the presence of an electrolyte. As iron goes into solution, some material is plated out on some part of the metal surface. The area where the iron continues to go into solution is considered the anodic area. The area where the hydrogen or other material is plated out is known as the cathodic area. The rate at which corrosion progresses is dependent upon the electrical potential between these two areas.

10 Dissimilar metals, when immersed in an electrolyte will, in many cases, form a wet battery with the production of a noticeable current. By the same action, dissimilar metals in electric contact are an active cause of corrosion. It is possible, however, in the same piece of metal to have areas with different electrical potentials and these areas will result in the formation of an electric cell in the same manner as dissimilar metals. The result is corrosion.

20 When the metal is in underground use, such as for pipe line use, soil action is also important and such action varies with the condition of the soil as to its being wet or dry, as to its composition and as to its pH value. Soil action tends to break down any protective coatings that might be formed, thereby allowing corrosive elements in the soil to contact the metal and at the same time permitting the ground water to contact the metal of the pipe to provide the electrolyte whereby the above mentioned corrosive action is permitted. Thus, underground corrosion of iron and steel is due to electro, chemical and soil action.

30 When a protective coating is applied to a pipe for underground use, the coating is often covered by a wrapper of some kind, which while acting to increase resistance to corrosion, also acts as a protective shield for the material of the coating against actions that occur in such underground use and which tend to break down said coating.

40 Heretofore wrapping material employed for protecting underground pipe lines against corrosion, when of the composite type, relied upon the combined thickness of the various plies not only for mechanical strength but also for the resistance to soil and bacteria action, stray electrical currents and for the exclusion of moisture and oxygen from the surface of the pipe. Also, the use of the several plies in a material of this kind, required in many instances the application of each ply separately to the pipe being wrapped. This, of course, not only increased the cost of the material used but also increased the cost of application so that by reason of the expense there-

of, such material has not met with as extensive favor as should be the case.

The exclusion of moisture and oxygen from exposed metallic surfaces is one of the primary considerations for a material of this kind. Another consideration is the permeability of wrapping material to moisture and gases as well as the resistance to electrical, soil and bacteria actions. It is known that the hardest or apparently the most resistant coatings may not effectively retard the destructive action of corrosion because many times they are easily and readily attacked, thus allowing corrosive elements to be carried to the surfaces it is desired to protect.

One of the objects of the present invention is to provide a wrapping or covering material for metallic surfaces which has a high electrical resistance, has ample mechanical strength so as to guard or shield the usually coated surface against earth pressures and is also unaffected by acids, vapors and bacteria.

Another object of the invention is to provide a material of this kind having an outer ply of woven fabric made from fibers other than vegetable or animal fibers and which fabric in itself has such mechanical strength as amply to resist earth pressure in small localized areas, which may be produced by the action of clods, stones and the like when the metallic surface is underground.

A further object of the invention is to provide a wrapping material of this kind which embodies a woven glass fabric.

A further object of the invention is to provide a composite wrapping material of this kind which includes a woven glass fabric, as one of its plies.

A further object of the invention is to provide a wrapping material of this kind which includes among the plies thereof, a woven glass fabric and a thin sheeted cellulosic substance.

A further object of the invention is to provide a material of this kind which may be readily made and formed into rolls for storage and transport and which will unroll evenly for application to the surface to be protected.

The above mentioned objects of the invention, as well as others, together with the advantages thereof, will more fully appear as the specification proceeds.

In the drawing:

Fig. 1 is a perspective view of a piece of wrapping material embodying the preferred form of the invention.

Fig. 2 is a transverse sectional view on an enlarged scale through the piece of material of Fig. 1, as taken on the line 2—2 thereof.

Fig. 3 is a diagrammatic view illustrating one method by which the improved material may be made.

Fig. 4 is a view in elevation of a piece of pipe to which the improved wrapping material is shown as being applied.

Fig. 5 is a view similar to Fig. 2, showing a modified form of the improved material.

Referring now in detail to that embodiment of the invention appearing in Figs. 1 and 2 of the drawing, 5 indicates a piece of the material as a whole which is made in strip form and includes the two plies 6 and 7 respectively.

The outer ply 6 is a fabric woven from a warp and a weft of strands made of fibers other than vegetable or animal fibers. One fabric which has the desired characteristics for this purpose is the so-called "woven glass fabric." Such a fabric has considerable mechanical strength, has a high elec-

trical resistance and is unaffected by soil, chemical, bacteria and other actions which occur underground.

The inner ply 7 is preferably made from a strip of sheeted cellulosic substance, preferably selected from a group thereof consisting of a regenerated cellulose, cellulose acetate and cellulose nitrate. A regenerated cellulose such as "Cellophane" or a cellulose acetate such as "Kodapak" well serves the purpose. Such cellulosic material, which is smooth surfaced on both sides, in itself is dielectric and is unaffected by actions met with underground.

The two plies are preferably united together, face-to-face, by the use of an elastic adhesive layer 8 appearing in Fig. 2 and the exposed surfaces of the plies 6 and 7 are preferably covered with an elastic coating 9 having petrolatum as a base. Such a coating, in the nature of a film, is somewhat of an adhesive character, is non-drying so as to have a permanent wetting effect and preferably includes an inhibitor that chemically prevents corrosion.

The material for the coating 9 is of a plastic or somewhat elastic nature made with a petrolatum base and is of a heavy grease or wax-like consistency. Preferably the material for the adhesive layer 8 is the same as that of the coating 9.

One form of satisfactory coating material is made from a petrolatum or mixture of petrolatums having an A. S. T. M. melting point of from about 140° to 175° F. and an A. S. T. M. penetration of from 30 to 45 seconds using 100 grams at 77° for five seconds.

Another form of satisfactory coating consists of a mixture of a petrolatum having an A. S. T. M. melting point of from 125° to 160° F. and an A. S. T. M. penetration over 35 seconds using 100 grams at 77° for 5 seconds, with paraffin wax having an A. S. T. M. melting point of from 140° to 160° F. and an A. S. T. M. penetration of 5 to 15 seconds using 100 grams at 77° F.

A third satisfactory coating consists of a mixture of a petrolatum having an A. S. T. M. melting point of from 125° to 160° F. and an A. S. T. M. penetration over 35 seconds using 100 grams at 77° F. for 5 seconds with a wax such as a paraffin wax having an A. S. T. M. melting point of from 120° to 135° F. and having present a small amount of a material selected from the following group, to cause a hardening of the product: rosin, carnauba wax, candelilla wax and montan wax. To any one of the examples above set forth, a chemical inhibitor may be added.

Any one of the above mentioned coating materials in film form, is vapor or moisture proof, remains permanently plastic, has a permanent wetting effect so that it will maintain contact with a metal surface for an indefinite period of time and has dielectric properties. At the same time, it may be thinned for application purposes either by the use of heat or by the use of a hydrocarbon solvent such as kerosene, naphtha or oleum spirits. After application, if solvents are employed, the same evaporate leaving a firm, but wax-like film. This film, which is highly resistant to moisture permeation, also has dielectric qualities and will retain its adhesiveness thereby providing a tight seal at the overlap when the finished material is wrapped about a pipe or laid as a covering upon a metallic surface. At the same time it permits separation between engaging surfaces of succeeding convolutions when the finished material is being unrolled or unwound from a supply roll such as used in a pipe wrapping

machine for example. When such a coating material includes a chemical inhibitor, it maintains the same in intimate contact with the surface being protected in those instances when the coating directly engages the metal.

One coating material which I find satisfactory for the purpose and contains a chemical inhibitor is a proprietary product obtainable in the open market under the trade name of NO-OX-ID. It is a hydrocarbon base material consisting of proportioned amounts of petroleum products and having incorporated therein certain chemicals for the purpose of inhibiting corrosion.

In Fig. 3 is illustrated diagrammatically one method by which the two plies are brought together to produce the finished material. In said Fig. 3, 10 indicates a supply roll of woven glass fabric 6 and 11 indicates a supply roll of the sheeted cellulosic substance 7. The two plies leading from the rolls 10 and 11 each passes over guide rolls 12 and 13 and then pass in superposed relation under a coating material applying roll 14 arranged in a tank 16 for holding a supply of coating material 9a in fluid form. As the two plies approach the roll 14 they pass through a portion of the material 9a so that such material adheres to both surfaces of both plies. As the two plies in the superposed relation leave the roll 14, they pass between a pair of pressure and eveners 17 and 18 to there pass on to the rewind roll 19.

As the two plies with the coating material thereon pass between the rolls 17 and 18, they are pressed tightly together with a rolling action to provide the finished composite material shown in Fig. 2. After leaving the rolls 17 and 18, the finished material 5 is wound into the roll 19. Due to the adhesive character of the material constituting the coating 9, the successive convolutions are not too tightly wound in the roll 19 so that the finished material 5 may be readily unrolled when the same is being applied to a metallic surface.

In Fig. 4, 20 indicates the means providing the metallic surface to be covered and which means in this instance is a pipe. If desired, the pipe may be treated with a priming coat 21 of paint or such a coat may be made of the same material as the coating 9 of the finished material. As the coating 9 has petrolatum as a base, it may be thinned down for application by the use of a hydro-carbon such as kerosene.

The material 5 is then wound helically about the pipe 20, with the coating 9 in engagement with the pipe, the margins of adjacent convolutions having a relative overlapping as appears in Fig. 4 at 22. This disposes the woven glass fabric on the outside and the coating 9 on the inside of the wrapper with the cellulosic material 7 and the adhesive 8 therebetween. By reason of the coating 9 having the adhesive character before mentioned, it clings snugly to the surface of the pipe and as said coating includes a chemical inhibitor, surface moisture on the pipe is rendered non-corrosive.

In Fig. 5 I have illustrated a slightly modified form of strip construction indicated as a whole by the numeral 5a. The woven glass fabric is indicated at 6a and the sheeted cellulosic substance is indicated at 7a. In this instance, coating material is applied to both sides of the cellulosic strip 7a so as to inclose the same and such material is indicated at 8a and 9a respectively, but no such material is applied to the woven glass fabric 6a which adheres to the coated cellulosic

strip through that part 8a of the coating material between said glass fabric strip 6a and the cellulosic strip 7a.

Covering material of this construction may be readily made on apparatus shown diagrammatically in Fig. 3 by threading the glass fabric strip over the roll 12 and then in between the rolls 17 and 18 where it meets the cellulosic strip which bears coating material on both sides by reason of its passing under the roll 14. When the two strips pass between the rolls 17 and 18 in superposed relation, they are pressed together, parts of the coating material being forced into the interstices of the glass fabric to provide a good adhesive bonding or uniting effect between the glass fabric and the cellulosic strip.

When the finished strip of Fig. 5 is applied to a metal surface, the coating material 9a is engaged with said surface and this exposes one surface of the glass fabric as will be apparent.

The improved material comprising only the two plies and the coating and adhesive layer mentioned is relatively thin and therefore a large footage thereof may be included in the roll 19 so that it is especially adapted for machine wrapping upon pipes. The glass fabric has a high tensile and mechanical strength in itself and acts as a protection for the cellulosic ply and both have a high resistance to electric and chemical actions met with underground. The glass fabric is resistant to such bacteria in the soil that easily destroy textile fabric when used in coverings for underground pipe lines and like.

Heretofore, it has often been necessary to place a final coating on the exterior of the pipe after the wrapper sheet has been applied. Since the pipe is, in the field adjacent a ditch or trench at that time, application of the final coating is slow and laborious. Furthermore, there is considerable wastage of coating material because of the inconvenience of application. With the present material no exterior coating is necessary. Hence there is a considerable saving of time, labor and materials.

The improved wrapper, when on a coated pipe, not only acts to increase the resistance to corrosion, but it also acts as a protective shield for the material of the coating against actions that occur in such underground use and which tend to break down said coating.

While in describing the invention I have referred in detail to the form and arrangement of the parts as well as to the material of which they are made and the manner in which they are brought into operative relation, the same is to be considered only in the illustrative sense so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

By the term "sheeted cellulosic substance" in certain of the following claims, is meant a thin pliable imperforate sheet of such substance as distinguished from a fabric of cellulosic strands made by weaving, knitting, knotting, netting or braiding.

I claim as my invention:

1. A covering material for use with and adapted to adhere to a metallic surface and embodying therein a pliable strip of woven glass fabric and a relatively thin pliable non-fibrous substance in strip form selected from the group consisting of regenerated cellulose and cellulose derivatives adhesively united to at least one side thereof, and an elastic vapor and moisture-proof composition having a high dielectric strength consisting

essentially of petrolatum and having an A. S. T. M. melting point of from 125° to 175° F. and an A. S. T. M. penetration of 30 to 45 using 100 grams at 77° F. for five seconds on the exposed side of said non-fibrous substance in strip form and forming a coating therefor which is of a sufficient tackiness to provide a surface for the coating which is self-sealing.

2. A covering material for use with and adapted to adhere to a metallic surface and embodying therein a pliable strip of woven glass fabric and a relatively thin pliable non-fibrous substance in strip form selected from the group consisting of regenerated cellulose and cellulose derivatives adhesively united to at least one side thereof and an elastic vapor and moisture-proof composition having a high dielectric strength consisting essentially of petrolatum and having an A. S. T. M. melting point of from 125° to 175° F. and an A. S. T. M. penetration of 30 to 45 using 100 grams at 77° F. for five seconds on the exposed sides of said woven glass strip and said non-fibrous substance in strip form and forming a coating for the covering material which is of sufficient tackiness to provide surfaces for the coating which is self-sealing.

3. A covering material for use with and adapted to adhere to a metallic surface and embodying therein a pliable strip of woven glass fabric and a relatively thin pliable, non-fibrous substance in strip form selected from the group consisting of regenerated cellulose and cellulose derivatives, and an elastic vapor and moisture-proof composition having a high dielectric strength consisting essentially of petrolatum and having an A. S. T. M. melting point of from 125° to 175° F. and an A. S. T. M. penetration of 30 to 45 using 100 grams at 77° F. for five seconds adhesively uniting and covering both said woven glass fabric strip and said non-fibrous substance in strip form and forming a coating for the material which is of sufficient tackiness to provide a surface for the coating which is self-sealing.

4. A covering material for use with and adapted

to adhere to a metallic surface and embodying therein a pliable strip of woven glass fabric and a relatively thin pliable non-fibrous substance in strip form selected from the group consisting of regenerated cellulose and cellulose derivatives and an elastic vapor and moisture-proof composition having a high dielectric strength consisting essentially of petrolatum and having an A. S. T. M. melting point of from 125° to 175° F. and an A. S. T. M. penetration of 30 to 45 using 100 grams at 77° F. for five seconds impregnating the woven glass fabric strip and adhesively uniting and covering both of said strips and providing an outer protective coating for the finished material which is of sufficient tackiness to provide surfaces for the covering which are self-sealing.

5. In combination with a metallic pipe having a rust preventive coating thereon, a covering adhered thereto and wrapped thereon and embodying therein a pliable strip of woven glass fabric and a strip of relatively thin pliable non-fibrous substance selected from a group consisting of regenerated cellulose and cellulose derivative, and an elastic vapor and moisture-proof composition having a high dielectric strength consisting essentially of petrolatum and having an A. S. T. M. melting point of from 125° to 175° F. and an A. S. T. M. penetration of 30 to 45 using 100 grams at 75° F. for five seconds, on both sides of said strip of non-fibrous substance, the composition on one side of the strip of non-fibrous substance adhesively uniting the same to said strip of woven glass fabric and the composition on the other side of said strip of non-fibrous substance containing a rust inhibitor and adhesively uniting the covering as a whole to the rust preventing coating on the pipe, said woven glass fabric being separated from said rust preventing coating on the pipe by said strip of non-fibrous substance and the composition on both sides thereof.

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