Feb. 16, 1943. A. H. REYNOLDS 2,311,572

MATERIAL FOR WRAPPING PIPES AND FOR COVERING METALLIC SURFACES

Filed May 4, 1940

Fig. 1.

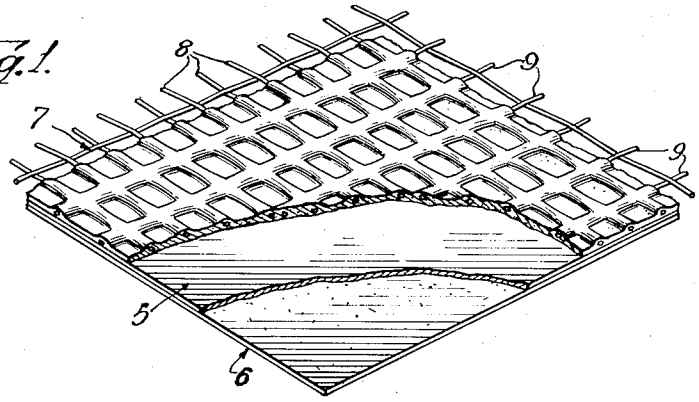


Fig. 2.

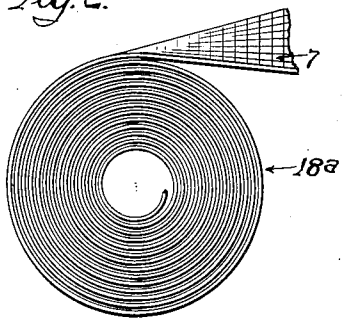


Fig. 3.

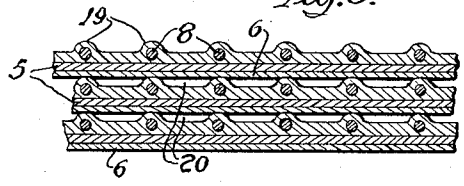
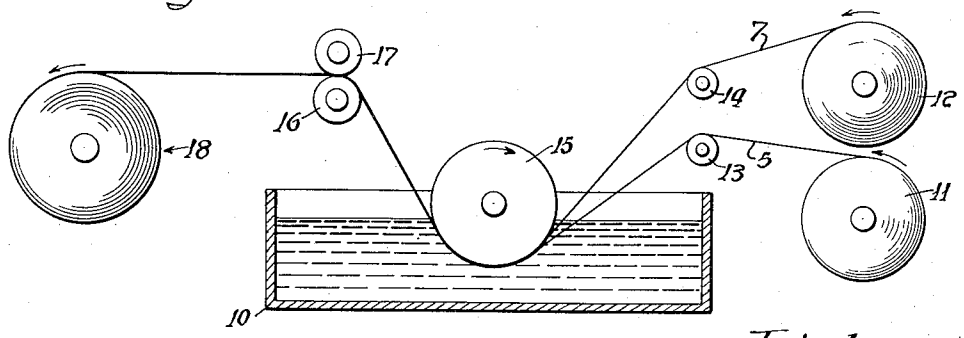


Fig. 4.



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MATERIAL FOR WRAPPING PIPES AND FOR COVERING METALLIC SURFACES

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5 Claims. (Cl. 154—44)

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

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 bacterial action, stray electrical currents and for the exclusion of moisture and oxygen from the previously coated or the uncoated surface of the pipe. Also, the use of the several plies in the 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 thereof, such material has not met with extensive favor.

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 the wrapping material to moisture and gases as well as to the resistance to electrical, soil and bacterial actions which induce corrosion of such surfaces. 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 surface it is desired to protect.

Material of this kind is made in strip form and is wound into rolls for better storage and shipment, as well as for handling when the material is wound helically about a pipe, either by hand or by machine. The diameter of such rolls is, of course, limited by certain factors met with in handling. When the material in strip form is applied by hand, the roll must be of such diameter and weight as to be convenient for handling and unwinding the strip for application in overlapping, helical convolutions upon said pipe. When applied by machine, the rolls are limited as to size, by the structure of the machine. When material of the composite type is wound in roll form, it is apparent that due to the thickness of the material not so much footage or length is possible in a roll of a given diameter as is possible with a thinner material.

When the wrapping material is of the kind having an elastic protective coating of an adhesive character that is pressure sensitive, it is desired that successive convolutions in a roll, readily free or release themselves for a clean unwinding of the material as a strip from the roll. It is pointed out that the coating of a wrapping material of this kind is sensitive to temperature changes. When rolls of such material are stored in a place having a cool or low temperature, prior to application to a pipe or other metallic surface, previously coated or uncoated, such rolls give substantially no trouble due to the sticking together of their convolutions in an unwinding of the strip from the roll.

Often, however, such rolls are stored in the open, at the field of operation, in the direct rays of the sun for appreciable lengths of time and when outside temperature is high, the temperature of the rolls becomes high. This high temperature of the rolls, together with the "pressure" or tightness with which the roll is wound, in connection with the suction action of the engaged surfaces of the successive convolutions therein, may cause said convolutions to "stick." If the unwinding of the strip is "forced" when the roll is in this condition, the strip either tears or certain areas of the coating in parts of one convolution pull away therefrom and adhere to the adjacent one. This pulling away of areas of coating material exposes portions of the body of the strip to those actions which the coating is intended to prevent. As is apparent, a torn strip or one from which areas of the coating have been pulled away from the body is not satisfactory for use.

Among the objects of the present invention is to provide a coated material of this kind which is relatively thin for high footage in a roll of conventional diameter, which has high dielectric strength and which unwinds easily under adverse temperature conditions with a clean separation between the successive convolutions without a tearing of the material and without damage to the coating thereof.

Another object of the invention is to provide a coated material of this kind which though relatively thin, has sufficient strength to resist tearing under the pull imposed upon it in a wrapping operation and which will not curl or wrinkle but will remain flat, thus avoiding much trouble in the application of the material to the surface to be protected.

Also, it is an object of the invention to provide material of this kind which may be produced from relatively inexpensive substances, each of which in itself may not have much mechanical

strength, arranged in a manner whereby they mutually coact in reenforcing each other so that their conjoint action makes it possible to produce a relatively thin, yet mechanically strong material for this purpose.

Also, it is a further object of the invention to provide a coated material for this purpose that includes as a part thereof, a woven textile fabric embedded in the coating of the material, the fabric being of such mesh that the open areas or spaces between the threads thereof have a greater dimension than the thickness of the threads embodied in the fabric, to provide a better releasing action in unwinding a strip of the material from a roll thereof, as will later appear.

The above mentioned objects of the invention, as well as others, together with the several 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 view in side elevation of a roll of the improved material.

Fig. 3 is a transverse section through several thicknesses or convolutions of the improved material, on an enlarged scale, and shows more particularly the manner in which one side of one thickness or convolution of the material, when in roll form, has a plurality of point-like engagements with the other side of an adjacent thickness or convolution, whereby an easier separation is afforded between said thicknesses or convolutions in an unwinding or unrolling of the roll.

Fig. 4 is a diagrammatic view of an apparatus for producing the improved material.

One form of the improved wrapping material, which is preferably produced in strip or sheet form, includes a base or body 5 and a coating 6 preferably on both sides thereof and an open mesh reenforcing material 7 which will be described in more detail later. The base is preferably constituted by a relatively thin, pliable imperforate sheet which may be cellulosic material or substance selected from a group embodying a regenerated cellulose, a cellulose acetate, cellulose acetate butyrate and cellulose nitrate. Material in sheet form made from or containing casein or vinylite may also be used for the base or body. Material such as "Cellophane" (regenerated cellulose in sheet form) or "Kodopak" (cellulose acetate in sheet form) and the other materials mentioned are obtainable in strip and in sheet form, in the open market, and either one well serves the purpose of the base for the improved material. Such material, which has a smooth surface on both sides, has a considerable dielectric and tensile strength but it is not totally vapor or moisture-proof.

The material for the coating is of a plastic or somewhat elastic nature made with a petrolatum base and is of a heavy grease or wax-like consistency. It is of a non-drying or permanently wet, normal pressure sensitive adhesive character and requires no moistening or wetting to energize the same in this respect. The coating will "stick" to the surface to which the material is applied and the intensity of the sticking action of the material in this respect is dependent upon the temperature of the material. 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° F. for five seconds.

Another form of satisfactory coating material consists 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 paraffin wax having an A. S. T. M. melting point of from 140° to 160° and an A. S. T. M. penetration of 5 to 15 seconds using 100 grams at 77° F.

A third satisfactory coating material 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 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 or other surface under normal application pressure, for an indefinite period of time and has good dielectric properties. At the same time, it may be thinned for application to the base sheet either by the use of heat or by the use of a hydro-carbon solvent such as kerosene, naptha or oleum spirits. After application, if solvents are employed, the same evaporate leaving a firm elastic wax-like film. This film which is highly resistant to moisture permeation, also has dielectric qualities and will retain its adhesiveness, thus providing a tight, permanent seal at the overlap when the finished material is wrapped about either a previously coated or an uncoated pipe or laid as a covering upon any other surface to be protected. When such a coating material includes a chemical inhibitor, it maintains the inhibitor in intimate contact with the surface being protected in those instances where the wrapping material directly engages the metal.

The adherence of the coating is affected by temperature, being of a greater intensity in a high temperature and of a lesser intensity in a lower temperature. However, at a normal medium temperature, the adherence of the coatings of the thicknesses or plies in adjacent convolutions in a roll is such that said coatings will release or separate from each other. The release or separation of said coatings, however is with some resistance or difficulty in unwinding a strip of the material from a roll without pulling away or separating from the base of the material that carries the same.

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

The reenforcing material 7 is constituted by a relatively fine thread, cotton fabric having relatively large open mesh and includes warp threads 8 and weft threads 9. I find that a so-called

"tobacco" cloth well fills the purpose and the cost thereof is such as to make its use practical. Such cloth has approximately 20 warp threads and 12 weft threads to the inch and the spacing between said threads in both directions of the fabric has dimensions several times the diameter of said threads. In itself, it has very little strength but when combined with a cellulosic or other sheeted substance as mentioned herein, the fabric and said substance mutually coact to provide a strong composite material. In the finished material, the cellulosic or other substance employed imparts a body to the fabric and the fabric reenforces the substance against tearing. At the same time such fabric produces spaced areas in its coating material for engagement by the coating of the next convolution engaged therewith when the finished material is in roll form so that the various convolutions readily separate even under relatively high temperature conditions, in the unwinding or unrolling of the finished material from a roll as will later be described.

The coating material is preferably applied to both the substance 5 and to the fabric 7 simultaneously with the application of said fabric to said substance. One convenient way of performing this operation is shown in Fig. 4 and wherein 10 indicates a tank for holding a quantity of coating material 6 made liquid for application purpose either by the use of heat or by the addition of a solvent.

Supply rolls 11 and 12 of the substance 5 and the fabric 7 respectively, are disposed at one end of the tank at two different elevations. Strips of the substance 5 and fabric 7 lead off from the respective rolls to pass over vertically spaced idler rolls 13 and 14 respectively and then under a roll 15 at least a portion of which is disposed in the bath of liquid coating material in the tank 10.

By reason of the arrangement of the rolls 13 and 14 it is apparent that the substance 5 and the fabric 7 are coated on both sides before they reach the roll 15 to pass under the same and wherein the fabric is laid in operative engagement upon said substance. The two strips, disposed in operative relation then pass out of the bath of liquid 6 in the tank and then between a pair of squeeze rolls 16 and 17 respectively. These rolls express the excess of the coating material from said strips, insure a proper evening of the coating material, and also produce a smooth surface for the coating on the underside of the substance 5. After the two strips leave said rolls, they are wound in successive convolutions into a roll 18. It is pointed out that the roll 18 is located at such a distance away from the rolls 16 and 17 that the coating has time to set. When the material thus made is relatively wide, the roll 18 is slit into narrow strips which are wound into rolls 18a such as appears in Fig. 2, for convenient application to the surface to be covered.

It is pointed out and it is illustrated in Fig. 3 in an exaggerated form, that the warp and weft threads of the fabric do not bear directly upon the substance 5 but are embedded in and covered by the coating material. It is further pointed out that the thickness of the coating on the fabric side of said substance between the warp and weft threads 8 and 9, is such as to be spaced below the top surface of the coating at the intersection of said warp and weft threads. Thus when the flat bottom surface of the coating on the underside of the substance 5 in one convolution engages the coating material at the intersection of the coated threads 9 and 10 of the preceding convolution, the intersections provide spaced points or areas of engagement or contacts 19 for said bottom surface. With this arrangement of said points or areas of engagement 19, the coating materials of both convolutions, between said threads, form themselves into depressed surface portions and which portions when covered by the next succeeding convolution, define closed air cells or spaces 20, between said convolutions that have dimensions in the plane of the substances, several times the diameter of said threads.

Thus the area of contact between the convolutions of the roll is not a continuous one wherein all air is expressed from between the same to produce the suction or intimate seizure between said surfaces, but it is one made up of innumerable spaced areas of contacts with air cell or space forming depressions, of relatively large area, therebetween. Thus as a strip of the finished material is being unwound from the roll 18a in the helical application of said material (either by hand or machine) to the surface to be protected, the convolutions separate quite readily even though the temperature of the material in the roll be quite high.

In the application of a strip of the material from a roll 18a to a pipe, which may or may not be covered with the coating material before mentioned, said strip is wound helically upon the surface of the pipe with a marginal overlap, with either surface thereof in engagement with said surface of the pipe. In this winding of the material in strip form upon said surface of the pipe, a considerable tension is present in the material so as to avoid the formation of wrinkles or blisters in the applied material. However, as the fabric 7 is intimately bonded to the substance 5 by means of the coating, the material will not easily tear transversely or otherwise when being applied.

While the substance 5 has a high tensile strength in itself, this strength is increased by the fabric. As the substance 5 also has a high dielectric strength and as the coating has a high dielectric strength and is also impervious to vapor or moisture penetration, the coating adds its dielectric strength to that of the other substance. It also acts to prevent the penetration of vapor or moisture through said substance. As the coating surrounds each thread of the fabric, it protects them from moisture which would soon make them deteriorate.

In certain soils, bacteria of a type which uses the carbon of petroleum products for partial sustenance are present. It is, therefore, important that such bacteria be at least kept from contact with that part of the coating which is in engagement with the metal surfaces to be protected. In the present material, the substance 5 acts as a filter against such bacteria.

The improved material is of a high dielectric strength and is of a high resistance not only to tearing but to vapor and moisture penetration. It is relatively thin so that it is possible to provide a large footage thereof in a roll convenient for handling in applying the same to the surface to be protected.

Again, the construction of the material is such that while it will seal itself upon the surface to be protected, because of the adhesive character of the coating, it will unroll more readily in high temperatures and this without causing offsetting of the coating from one side of one convolution to that side of the next convolution with which it is engaged.

As the improved material will unwind more readily from a roll in the presence of a relatively high temperature, the application of said material to a pipe or other metallic surface, either coated or uncoated, is greatly facilitated.

While in describing the invention I have referred in detail to the arrangement of the parts involved as well as to the material or substance of which they are composed, 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.

I claim as my invention:

1. A composite material for use in protecting metallic surfaces and embodying therein a relatively thin pliable, non-fibrous imperforate sheet having considerable dielectric and tensile strength but not in itself totally vapor and moisture proof, selected from a group consisting of cellulose derivatives, vinyl resins and casein, a heavy grease-like petrolatum base protective coating that is vapor and moisture proof and has a non-drying adhesive character as well as a high dielectric strength on both sides of said sheet and providing a surface on one side of the material, and a relatively open mesh textile fabric of warp and weft threads enclosed in the coating on the other side of said sheet for reinforcing the same against tearing and coacting therewith in strengthening the material as a whole and forming a surface for the other side of the material having raised portions following the pattern of said threads that will stick to surfaces such as on the first mentioned side of the material when engaged therewith but will release therefrom when said surfaces are being manually separated.

2. A composite material for use in protecting metallic surfaces and embodying therein a thin pliable plastic strip, a strip of open mesh textile fabric of relatively fine warp and weft threads on one side of said first strip and reinforcing the same against tearing, and a heavy grease like hydrocarbon base protective coating that is vapor and moisture proof and has a non-drying adhesive character as well as a high dielectric strength covering both sides of both strips and uniting them together, the warp and weft threads of said fabric being so spaced apart as to impart an open mesh pattern for the fabric, said threads being entirely enclosed in said coating and producing on the fabric side of the material an indented and ridged pattern for the surface thereof that corresponds to that of said threads and which surface will stick to surfaces such as on the other side of the material when engaged therewith but will release therefrom when said surfaces are being manually separated.

3. A composite material for use in protecting metallic surfaces and embodying therein a thin pliable non-fibrous imperforate strip having considerable dielectric and tensile strength but not in itself totally vapor and moisture proof, selected from a group consisting of cellulose derivatives, vinyl resins and casein, a strip of open mesh textile fabric of relatively fine warp and weft threads on one side of the first strip and reinforcing the same against tearing, and a heavy grease-like hydrocarbon base protective coating that is vapor and moisture proof and has a non-drying adhesive character as well as a high dielectric strength covering both sides of both strips and uniting them together, said threads producing on the fabric side of said material a surface that will stick to surfaces such as on the other side of the material when engaged therewith but will release therefrom when said surfaces are being manually separated.

4. A wrapper for pipes and the like adapted to be wound into rolls comprising a length of thin flexible cellulose acetate sheeting, a heavy grease-like petrolatum base protective coating that is vapor and moisture proof and has a non-drying adhesive character as well as a high dielectric strength on both sides of said sheeting, and an open mesh textile fabric of warp and weft threads embedded in and covered by the coating on one side of said acetate sheeting for reinforcing the same against tearing and coacting therewith in strengthening the material as a whole and forming on the corresponding side of the material, an indented and ridged surface therefor that will stick to surfaces such as on the other side of the material when engaged therewith but will release therefrom when said surfaces are being manually separated.

5. A wrapper for pipes and the like adapted to be wound into rolls comprising a length of thin flexible cellulose acetate butyrate sheeting, a heavy grease-like petrolatum base protective coating that is vapor and moisture proof and has a non-drying adhesive character as well as a high dielectric strength on both sides of said sheeting, and an open mesh textile fabric of warp and weft threads embedded in and covered by the coating on one side of said acetate sheeting for reinforcing the same against tearing and coacting therewith in strengthening the material as a whole and forming on the corresponding side of the material, an indented and ridged surface therefor that will stick to surfaces such as on the other side of the material when engaged therewith but will release therefrom when said surfaces are being manually separated.

ALBERT H. REYNOLDS.