United States Patent

[11] **3,607,515**

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[21] Appl. No. **654,139**
[22] Filed **July 18, 1967**
[45] Patented **Sept. 21, 1971**
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[54] **ASBESTOS PIPELINE FELT**
6 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **156/187,** 156/195, 156/392, 156/431
[51] **Int. Cl.** **B65h 81/04**
[50] **Field of Search** 138/141; 156/187, 392, 188, 195, 431, 432

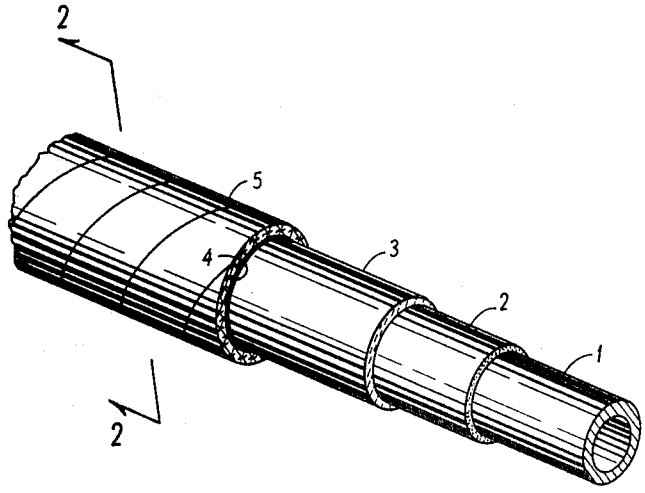
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ABSTRACT: An improved corrosion and stress resistant coating-wrap system for pipelines is made by coating the contacting surface of asbestos felt with a thin coating layer of either coal tar compounds having softening points in the range of about 120° F.–250° F. or natural and synthetic rubber-based coating compounds. Subsequent application of this coated felt to the hot enamel coating on a pipeline results in a void free felt-enamel interface.



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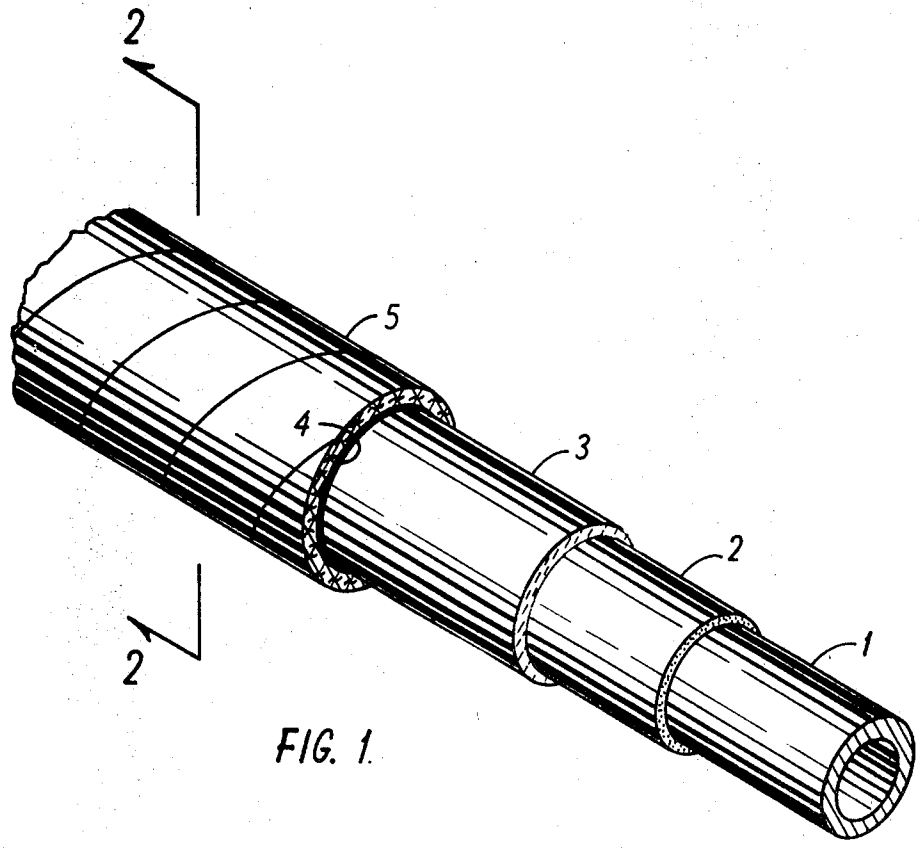


FIG. 1.

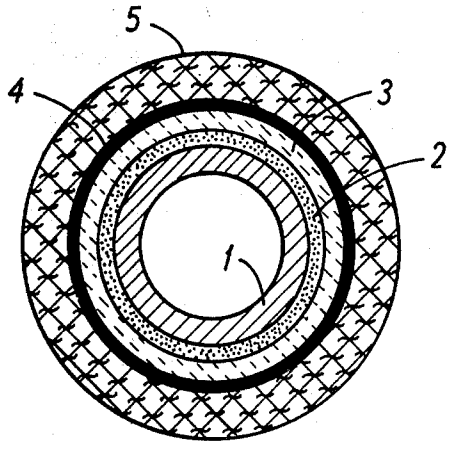


FIG. 2.

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ASBESTOS PIPELINE FELT

This invention relates to an improved process for protecting materials subjected to a corrosive atmosphere and to the article of manufacture resulting therefrom. More particularly, this invention relates to an improved process for applying an outer abrasion and stress resistant wrapping to enameled metallic pipelines so that the resulting wrap-coating interface is void-free, and to the composition of matter which comprises this protective coating.

The problem of corrosion associated with the use of metallic materials has long been a serious and costly industrial problem. It is particularly acute in the pipeline field where iron and steel pipes are placed underground and under water. Such pipes are exposed to chemical, electrochemical, mechanical and bacteriological forces which attack not only the pipe but also many of the protective coatings thereon.

This problem has been minimized to a large extent by the use of certain tar chemicals as protective coatings on the pipe. Especially protective compounds are those derived from various coal tar fractions. The typical coating process involves the thorough cleaning of the pipe surface followed by application of a primer for maximum pipe to coating bond. A primer in common use is a coal tar pitch modified with neutral solvents to provide proper consistency for brushing and spraying. Another type of primer comprises the fast-drying chlorinated rubber-based compounds. These have extended effectiveness thereby permitting coating application weeks after primer application. A coal tar enamel coating is then applied hot over the primer. The resulting coating offers excellent resistance to water penetration, the deleterious effects of soil chemicals and electrochemical effects.

A wrapping material generally comprising asbestos-rag felts impregnated with 125–200 percent by weight of soft coal tar pitch saturants is then applied directly over the hot enamel with application temperatures ranging from about 300 to 400° F. dependent on both the ambient temperature and the time elapsed since coating. The felt forms an integral part of the protective system and shields the coating from mechanical damage. Maximum protection is afforded when the felt-enamel bond is formed without absorption of the enamel into the felt since such absorption decreases the effective coating thickness.

One problem with such coating-wrap systems, however, is the presence of discontinuities or voids at the felt-enamel interface. This bubble defect is the result of a degassing of the felt, a phenomenon associated in part with the absorption into the asbestos felt of atmospheric moisture and in part with the presence of naphthalenic type compounds in the felt. On application of the felt to the hot enamel, localized vigorous boiling of the water or naphthalene-based solvents occurs resulting in the discontinuities at the interface. These bubbles, since they extend into the enamel coating, decrease its effective thickness, and, hence, decrease the corrosion protection afforded the pipes. The boiling water also causes the steam distillation of volatile matter present in the felt saturant, leading to localized areas of embrittlement and the consequent lowering of the impact strength of the felt wrap.

It has been discovered in accordance with this invention that these discontinuities at the enamel-felt interface can be eliminated by the use of either coal tar compounds having softening points in the range of 120°–250° F. or natural and synthetic rubber coating compounds as a thin coating layer on the surface of the felt wrapping material which contacts the enamel coating thereby interposing this said thin coating layer between the felt wrap and the enamel coating. Therefore, this invention is based at least in part on the discovery that the application of the thin coating layer to the enamel contacting surface of the felt wrap will eliminate void formation at the resulting interface.

Other objects and features of my invention will become apparent by reference to the following specifications and drawings.

In the drawings:

FIG. 1 is a perspective view of a pipe showing the various layers applied thereto; and

FIG. 2 is a cross section taken along lines 2—2 of FIG. 1.

A clean pipe 1 is coated with a primer 2. After the primer dries, a coal tar enamel coating 3 is applied. Finally, the felt wrap 5 is placed on the still hot enamel coating so that the thin coating layer 4 is interposed between the enamel coating and the felt wrap.

Coal tar is the black, viscous liquid product resulting from the destructive distillation of coal. The dark brown-to-black amorphorous residue remaining after the distillation of this coal tar is coal tar pitch, the composition of which is dependent on the particular coal tar used. The pitch resulting from the distillation of a coal tar prepared by the high temperature carbonization of bituminous coal is almost completely composed of aromatic, condensed ring-type compounds while the pitch made from a coal tar prepared by the low temperature carbonization of of such coal, or from asphaltic compounds, contains large amounts of napthalenic and paraffinic straight and branched chain compounds.

The coal tar enamels, a series of compounds developed for use as pipe coatings, are derivatives of coal tar pitch and may or may not be compounded with coal tar oils and powdered coal. Commercial products are available for application at temperatures ranging from about 325 to 500° F.

These enamels meet the requirements of the American Water Works Associations as detailed in their specification number C203–57. The physical properties are set forth below:

	Minimum	Maximum
Softening point–ASTM D36–26	220° F.	
Filler (ash) ASTM D271–48	25%	35%
Fineness filler, through 200 mesh –ASTM D546–41	90%	
Specific Gravity at 25° C.–ASTM D71 –52	1.40	1.60
*Penetration–ASTM D5–52 at 77° F. –100 gram wt.–5 sec.	10	20
At 115° F.–50 gram wt.–5 sec.	15	55
High temperature test–at 160° F.– (sag) AWWA C203, Sec. 2.4.4. (1)		2/32 in.
Low temperature test–at –20° F.– (cracking)–AWWA C203, Sec. 2.4.4(2)		None
+Deflection test (Initial Heating) AWWA C203, Sec. 2.4.4. (3)		
Initial Crack	0.8 in.	
Disbonded Area		3.0 sq. in.
+Deflection test (after heating) AWWA C203, Sec. 2.4.4. (4)		
Initial Crack	0.6 in.	
Disbonded Area		5.0 sq. in.
+Impact test–at 77° F.–650 gr. ball—ft. drop–AWWA C203 Sec. 2.4.4. (6)		
Direct Impact–Disbonded Area		10.0 sq. in.
Indirect Impact–Disbonded Area		2.0 sq. in.
Peel Test–AWWA C203, Sec. 2.4.4. (5)	No peeling	

*For anticipated minimum temperature exposures between 20° and –20° F. use enamels with penetration of 15 to 20 at 77° F.

+Choice of Bond Testing Methods A or B by deflection (before heating), by deflection (after heating) or by impact, shall depend upon laboratory equipment available.

The enamels used in the practice of this invention have softening points of about 225 to 235° F and penetration values (77° F—100 gram—5 secs) of 10 to 20

A typical asbestos pipeline felt (90 / 10 asbestos-rag composition) has the following characteristics:

Appearance—Calendered surface free from visible defects.

Weight per 100 sq. ft. (ASTM D146–65)—12.5 to 15.5 lbs. a sq. ft.

Breaking strength (ASTM D146–65)

1. longitudinal—not less than 25 pounds.
2. transverse—not less than 10 pounds.

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Pliability (ASTM D146–65)—no cracking when bent over a 1 inch mandrel at 77° F.

Saturation (ASTM D146–65)—not less than 22 percent or more than 32 percent of saturant by extraction.

Loss of heating—10 percent maximum after 2 hours at 200° F.

Specifications for the coal tar pitch saturants for the felt are:

Float test—55 to 100 secs.

Carbon Disulfide Insoluble—10 percent maximum

Quinoline Insoluble—3.5 percent maximum

Distillation

percent to 235° C.—0

percent to 270° C.—5 maximum

percent to 300° C.—10 maximum

Softening point of residue—30°–50° C. (Ring and Ball Method)

Naphthalenic Content—2 percent maximum

The Float Test is a measure of the viscosity or consistency of a semisolid material.

The Quinoline Insoluble Test is a measure of the inert, nonmineral matter or coke in the pitch.

The Carbon Disulfide Insoluble Test is a measure of the high molecular weight hydrocarbons in the pitch.

The Distillate Test (ASTM D20–56) is a measure of the percent of high boiling material in the pitch.

The Softening Point determination (D36–64 T) is a measure of the temperature at which the pitch changes from a brittle or thick, slow-flowing material to a softer, less viscous liquid. It is the most significant identifying characteristic for pitch.

The preferred thin coating layer materials of this invention include: coal tar pitch with a softening point range of 122°–176° F.; coal tar enamel with a softening point range of 220°–240° F.; a chlorinated rubber-plasticizer-solvent blend having a flash point of 80° F. (ASTMD 1310) and a specific gravity (at 25/25° C.) of 1.15–1.20 such as marketed by Allied Chemical Corporation under the name "Quick-Drying Primer No. 1122;" and natural and synthetic rubber coating compositions. The presently preferred material is coal tar pitch.

These thin coating layer materials, when applied to asbestos felt should form a continuous bond to the felt, readily form an adherent continuous bond when applied to the partially cured coal tar enamel coating, have no deleterious effect on the enamel coating, be unaffected as to both the layer integrity and its bond to the felt by the heat of the enamel, and be a material of nonhydroscopic nature.

The thin coating layer may be applied to the felt by several processes. One method, particularly adapted for use with the coal tar compounds, is to apply the thin coating layer to the asbestos felt by passing the felt over rotating rollers which rotate partially through a molten bath of the layer material maintained about 50° above its softening point. The felt then passes over a doctor blade to meter the coating thickness, cools in air and is rolled for storage. An alternate method, especially recommended for use with the less viscous chlorinated rubber compound, is to apply the layer material using a standard airless spray adjusted to give the proper thickness and good material distribution. The coating thus applied should have a thickness range of from 2 to 15 mils with the preferred range 2 to 4 mils. Too thin a coating would provide inadequate coverage and too thick a coating would result in migration into the enamel with consequent softening of the coating. There are no voids at this felt-layer interface since the layer is too thin to entrap any evolved gases and, as a consequence of the molten conditions during coating, the resulting void is filled by the flow of the material.

The coated felt is applied to the hot enamel coat (300°–400° F.) following the standard practices as described above. No discontinuities are found at the layer-enamel interface. The resulting coating-wrapped pipes have better corrosive, stress and abrasion resistance than coated pipes wrapped with an uncoated felt.

Several examples are set forth below to illustrate the nature of the invention and the manner of carrying it out. However, the invention should not be considered as being limited to the

EXAMPLES 1–3

These examples illustrate the beneficial effect of the use of coated pipeline felt as a wrap over pipeline enamel.

Asbestos pipeline felt, 9 inches wide, was coated on one side with one of the materials listed in the table below. Coating thicknesses were from 2 to 15 mils. The felts were briefly cooled at room temperature, rolled and stored.

An 8 inch diameter pipe was cleaned and the exterior coated with Pipeline Primer, a commercially available coal tar primer sold by Allied Chemical Corporation. The primer was allowed to dry for 12 hours at room temperature and then a 3/32-inch coating of Pipeline Enamel, a commercially available coal tar enamel sold by Allied Chemical Corporation, was machine applied.

While the enamel coating was still hot, the asbestos felt was tightly machine-wrapped around the pipe. One hour was allowed for the normal set of the enamel. The pipeline felt was removed, and the enamel surface of the interface was visually examined. The results are tabulated below.

Example	Felt Coating Compound	Softening Point, °F.	Interface Appearance
1	Roofing Pitch	122–176	No defects
2	Pipeline Enamel	220–240	No defects
3	Quick Drying Primer 01122		No defects

While exemplary embodiments of the invention have been described, the true scope of the invention is to be determined from the following claims. What is claimed is:

1. A method for protecting pipe from corrosive atmospheres comprising the steps of:

applying to one side of a felt wrap coating impregnated with a coal tar pitch saturant, said felt wrap coating containing therein sufficient amounts of naphthalene based solvents forming a part of the saturants and atmospheric moisture such that upon application of heat in excess of 300° F. directly to the felt, localized vigorous boiling occurs, a thin coating layer of a composition of the class consisting of: (a) coal tar pitch having a softening point in the range of 122°–176° F., (b) coal tar enamel having a softening point in the range of 220°–240° F., and (c) synthetic rubber based coating compositions, allowing said felt wrap coating and the thin coating layer to cool to room temperature;

applying a primer to the outer surface of the pipe; applying a hot coal tar enamel to the outer primed surface of the pipe; and

while said hot coal tar enamel is still at a temperature in the range of 300°–400° F., applying said felt wrap coating to the pipe over the coal tar enamel with the thin coating layer being interposed between the enamel and the felt wrap coating, whereby discontinuities at the enamel felt interface due to boiling of the moisture and naphthalene based solvents absorbed in the felt wrap coating are substantially avoided, and a bond is formed between the felt wrap coating and the coal tar enamel on the pipe.

2. The method of claim 1 wherein the thin coating layer is from 2 to 15 mils.

3. The method of claim 2 wherein the thin coating layer is a coal tar pitch having a softening point in the range of 122°–176° F.

4. The method of claim 2 wherein the thin coating layer is a coal tar enamel having a softening point in the range of 220°–240° F.

5. The method of claim 2 wherein the thin coating layer is a synthetic chlorinated rubber based composition.

6. The method of claim 2 wherein the thin coating layer is a chlorinated rubber-plasticizer solvent blend having a flash point of 80° F. and a specific gravity (at 25(25° C.) of

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,607,515 Dated September 21, 1971

Inventor(s) Walter L. Pennie

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 18 - delete "of", second occurrence.

Column 3, line 5 - "of" should read -- on --.

Column 3, line 31 - should read -- 122°-176°F. --.

Column 4, in Table - "Quick Drying Primer 01122" should read -- Quick Drying Primer #1122 --.

Column 4, claim 3, line 2 - should read -- 122°-176°F. --.

Column 4, claim 6, line 3 - "25(25°C." should read -- 25/25°C. --.

Signed and sealed this 25th day of April 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
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