March 28, 1933. W. R. GILLIES 1,903,106

WATERPROOF HEAT INSULATING TAPE

Filed Aug. 7, 1931

Fig. 1.

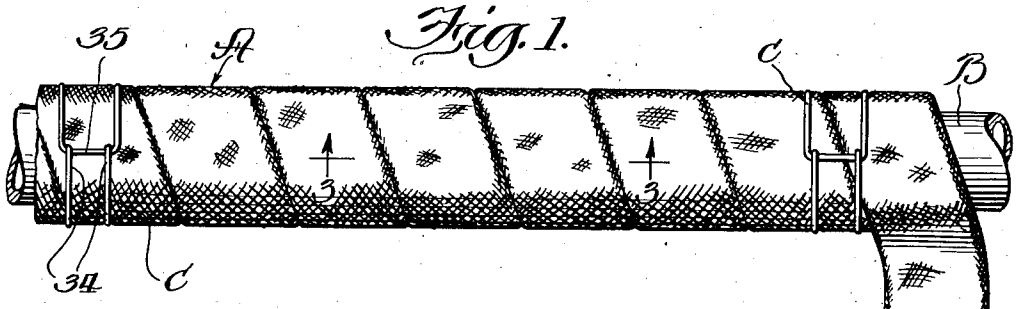


Fig. 2.

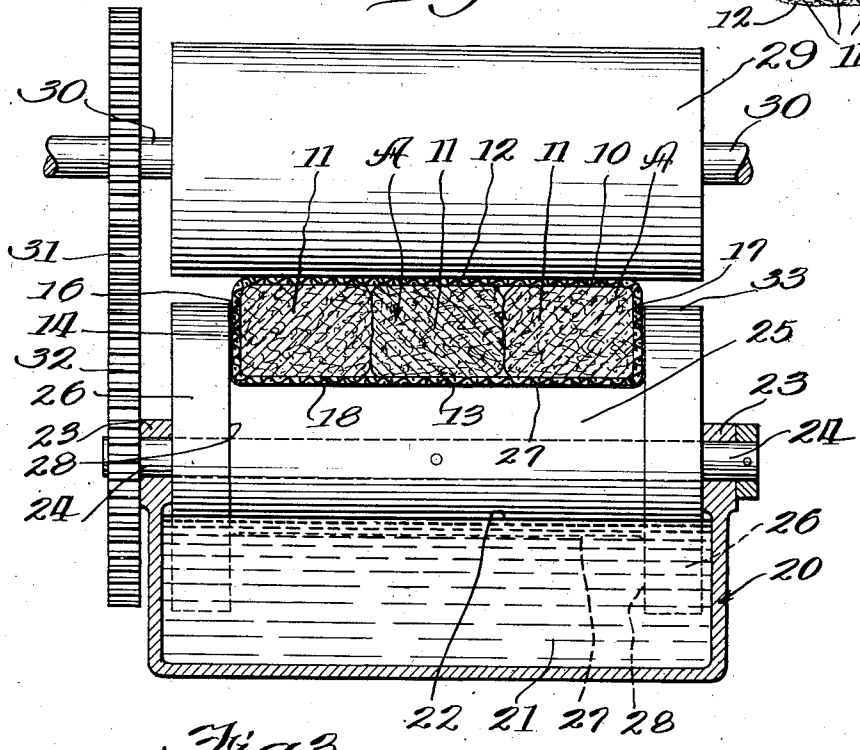
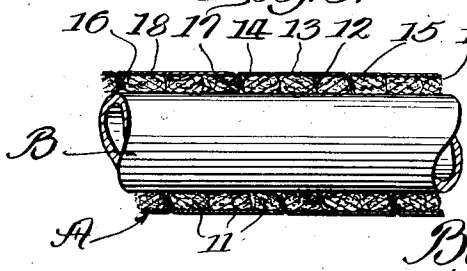


Fig. 3.



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UNITED STATES PATENT OFFICE

WILLIAM R. GILLIES, OF CHICAGO, ILLINOIS, ASSIGNOR TO UNION ASBESTOS & RUBBER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

WATERPROOF HEAT INSULATING TAPE

Application filed August 7, 1931. Serial No. 555,738.

The present invention relates to waterproof heat insulating tape and is particularly concerned with heat insulating tape of a type adapted to be spirally wrapped about a pipe or other part intended to be insulated, such as the high temperature steam pipes of locomotives or boilers.

The present invention relates to an improvement in the heat insulating tape disclosed in my prior Patent No. 1,370,723, issued October 16, 1923.

Heat insulating coverings of this type, preferably consisting of an asbestos fabric sheath and an asbestos filler, perform their functions most efficiently when the heat insulating material is maintained in a dry and porous condition on account of the heat insulating property of the air spaces or interstices between the asbestos fibers.

When such a heat insulating covering becomes wet its heat insulating properties are greatly reduced and it requires a long time for the material to dry out again on account of the thickness of the covering and the inaccessibility of the inner parts of the material to air.

Furthermore, the wetting of the asbestos insulating material tends to compact and pack the fibers, and it will be evident that it is highly desirable to maintain such insulating material in its original condition.

One of the objects of the present invention is the provision of an improved waterproof covering for heat insulating tape of the class described by means of which the spirally wrapped pipe may be waterproofed as well as insulated against loss of heat.

Another object of the invention is the provision of an improved waterproof insulating tape comprising a protecting sheath, an insulating filling of high heat conducting value, and a covering of waterproofing material which protects the insulating material, but does not materially detract from its heat insulating properties.

Another object of the invention is the provision of a waterproof and heat insulating covering for pipes, by means of which the heat insulation characteristics of the covering are materially increased and improved by forming an air tight enclosure for the air which is located between the fibers and in the interstices of the heat insulating material so as to form a dead air space between the outer layer of the covering and the pipe.

Another object of the invention is the provision of an improved method of waterproofing heat insulating tape of the type covered by my prior application and other similar types.

Another object of the invention is the provision of an improved waterproof covering for pipes, in which the waterproofing is so located that it effects a complete waterproof covering for the insulating material, but the insulating material protects the waterproof covering from the high temperatures which are present in the pipes to which this material is usually applied.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawing, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the single sheet of drawing:

Fig. 1 is a fragmentary elevational view of a pipe covered with heat insulating material constructed according to the present invention;

Fig. 2 is a diagrammatic elevational view of one form of apparatus which may be used for waterproofing the present tape, with the tape shown in cross section; and

Fig. 3 is a fragmentary sectional view taken on the plane of the line 3—3 of Fig. 1 looking in the direction of the arrows.

In the drawing the insulating tape is indicated in its entirety by the reference character A, the pipe by the reference character B and the securing devices by the reference character C. The tape A preferably consists of a flattened tube or sheath 10 which is preferably formed of a heat insulating and heat resisting material such as a textile fabric, the woof and warp of which are in the form of threads of asbestos fiber.

The threads of which the sheath fabric is woven may consist of relatively long asbestos fibers, in which case it may not be necessary

or desirable to employ any other fibers, but in order to make this fabric out of cheaper short fiber asbestos it is often desirable to include a small percentage of long animal or vegetable fiber such as cotton, to give the threads greater tensile strength.

The sheath shown in Fig. 10 is woven in tubular form, but in some embodiments of the invention the sheath may consist of a strip of fabric, the edges of which are sewed together in any convenient manner to form a tube. The tape shown in the present drawing is to be regarded as exemplary of one of the many forms of my insulating tape and various forms of weave may be used in making the sheath 10 such as the ordinary conventional weave, a diagonal weave, etc.

The width of the sheath 10 is preferably greater than its thickness and the sheath is preferably filled with a multiplicity of independent ropes or rovings 11 comprising large soft ropings of asbestos fibers which are disposed side by side in the sheath and extend continuously and longitudinally through the sheath. Each of the ropes or rovings 11 may consist of twisted asbestos fibers or a number of asbestos cords twisted together to form a rope or roving. In some of the cheaper embodiments of the invention the filling may consist of a continuous flat strip of asbestos fibers, but the asbestos ropes or rovings present many advantages over a single flat asbestos filling.

The tape so constructed comprises a substantially flat insulating member, the filling of which provides a layer of heat insulating material of substantially uniform characteristics and the sheath of which provides a protective covering. The material is ordinarily applied to pipes B by wrapping the tape spirally about the pipe in such manner that the lower side 12 of the tape engages the pipe, the upper side 13 of the tape being visible and the edges 14 and 15 of the tape engaging each other to form a substantially continuous covering for the pipe, of substantially uniform thickness and heat insulating value.

Referring to Fig. 3, the waterproof insulating tape constructed according to the present invention preferably has a layer of waterproofing material extending from a point 16 between the edges 14, 15 along the outer side 13 of the tape to a point 17 between the opposite edges 14 and 15. This waterproof layer preferably covers only the outside of the fabric sheath 10 in such manner as to render the outside of the covering waterproof without impregnating any of the filler 11 or affecting the heat insulating qualities of the inside of the sheath 10.

Referring to Fig. 3, it will be observed that the waterprof layer not only extends across the outside of the sheath but over the edge of the sheath to a point so located that the adjacent edges of the tape have their waterproof layers in contacting engagement with each other to provide the outside of the pipe with a substantially continuous layer of waterproofing material without any cracks.

In some embodiment of the invention practically three sides of the tape may be covered with waterproofing, but the waterproofing preferably does not cover more than half of the tape because it is desirable to maintain the waterproof layer at a distance from the hot pipe even at the edges of the tape. For this purpose the waterproof layer should preferably not extend down between the edges 14 and 15 more than one-half or two-thirds the thickness of the tape.

The waterproofing material employed upon the present tape preferably consists of a material which is adapted to effect a substantially waterproof joint between the edges of the tape when the adjacent waterproof layers on the edges are brought into contacting relation.

Furthermore, the waterproofing should preferably be of a type adapted to cover the outside of the sheath and effect a relatively permanent air tight and waterproof covering without being absorbed into the interior of the sheath and without impregnating any more of the asbestos material than is absolutely necessary. I prefer to use a relatively thick composition having a rubber latex base so as to provide a rubber covering for the outside of the insulated pipe and a composition of this type is adapted to accomplish the results desired in a most efficient manner.

A suitable composition may be made and applied as follows:

The latex is preferably made alkaline and vulcanized in the presence of sulphur and a suitable accelerator, by the application of heat at a lower temperature than the usual vulcanization temperature. The vulcanized product is then applied to the tape as described, and the evaporation of the liquid from the composition deposits the vulcanized rubber on the tape.

The waterproof layer 18 of rubber merely covers and is attached to the outermost fibers of asbestos and the inside of the sheath is not impregnated as would be the case if a relatively thin liquid covering were sprayed on the asbestos covering. The adjacent edges 16 and 17 of the waterproof covering 18 engage each other and such a rubber covering has the property of effecting a substantially water tight joint between the turns of spirally wrapped tape by means of the rubber to rubber contact of these edges. It should also be noted that the rubber is kept out of contact with the pipe B since pipes to which it is applied are often at very high temperatures, such as pipes that are used for conveying superheated steam, and if the rubber covering were applied to both sides of the tape the rubber would be burned by contact with the hot

pipe, whereas in the present case the rubber is protected by the intervening layer of asbestos insulating material.

The asbestos insulating material has its heat insulating value greatly increased by the presence of air spaces between the respective fibers, as air is a very good heat insulating medium, and when the tape is arranged upon a pipe, as described, there is a layer of asbestos insulating material having a large number of air spaces and an outer layer of rubber.

Furthermore, the rubber layer forms an air tight and waterproof covering over the entire length of the pipe, thereby forming a dead air space between the rubber and the pipe which greatly enhances the insulating value of the tape covering and the insulating properties of the tape are continuously maintained in the same condition because the tape cannot become wet with water, oil or any other liquid.

In some embodiments of the invention other waterproofing compounds may be used in the same way but the preferred embodiment is made as described in detail herein.

Referring to Fig. 2, this is a diagrammatic view of an apparatus for waterproofing tape of this type. The apparatus may consist of a reservoir 20 having a supply of waterproofing compound 21 with a free surface such as is shown at 22. Reservoir 20 may be provided with bearings 23 for receiving the trunnions 24 of a substantially cylindrical roller 25 having radially projecting flanges 26. The roller 25 has its cylindrical surface 27 dipping in the rubber latex composition 21 and the annular surface 28 on the flanges 26 also dips in the composition.

The roller 25 is adapted to cooperate with a cylindrical roller 29 which is rotatably supported upon trunnions 30 and the two rollers may be geared together by gears 31, 32. The roller 29 is preferably spaced from the peripheral surfaces 33 of the flanges 26 to prevent the roller 29 from becoming covered with rings of waterproofing composition and the roller 29 is intended to maintain the tape A in proper engagement with the roller 25 without causing the waterproofing to be applied to the side 12 of the tape A.

It will be observed that the flanges 26 extend upward on the edges of the tape to a point slightly past the center of the tape and as the tape is fed between the rollers 29 and 25 the thick rubber latex composition 21 will be applied to the side 13 and the edges 14 and 15 up to the points 16 and 17. The composition is adapted to dry to form a waterproof rubber covering upon these portions of the tape and the tape may be wrapped about the pipe B to provide a continuous waterproof covering as well as a heat insulating covering.

The tape is preferably secured to the pipe B by a plurality of peripheral bands, such as, for instance, the U-shaped wire securing device C which has its two ends 34 inserted under the yoke 35 of the U-shaped wire and bent over to secure the wire tightly about the tape. It will thus be observed that I have invented an improved waterproof heat insulating tape and an improved method of making tape of the class described. The waterproofing might be applied in many different ways and the present apparatus is merely exemplary of one of the forms of apparatus that may be used.

It will be evident that the waterproofing may also be applied by hand, if desired, but the present tape is preferably supplied to the trade with the waterproofing already applied, as described, in such manner as to waterproof the insulation most effectively when it has been applied to the pipe.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. In a heat insulated pipe, the combination of a member to be insulated with a spirally wrapped tape of asbestos insulating tape and a layer of waterproofing material protected from said member by said insulating tape and carried by said tape, said waterproofing material extending across one side of the tape and over the edges sufficiently to engage the waterproofing material on adjacent turns of tape with the edges of said waterproofing material in contacting relation to form a substantially continuous waterproof layer with a dead air space between said member and said waterproof layer.

2. In a heat insulated pipe, the combination of a member to be insulated with a spirally wrapped tape of asbestos insulating tape and a layer of waterproofing material protected from said member by said insulating tape and carried by said tape, said waterproofing material extending across one side of the tape and over the edges sufficiently to engage the waterproofing material on adjacent turns of tape with the edges of said waterproofing material in contacting relation to form a substantially continuous waterproof layer with a dead air space between said member and said waterproof layer, and a plurality of clamping members about said member tape and waterproof layer for maintaining said tape upon said pipe.

3. A method of waterproofing and insulating pipe which comprises applying an initially viscous waterproofing material to a tape upon the outside thereof, and the ad-

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jacent edges forming a distinct outer layer on said tape, and spirally wrapping the tape upon said member in such manner as to bring the edges of the waterproof layer into contacting engagement with each other, to form a continuous layer of water-proofing material spaced from said pipe by heat insulating material.

4. A heat insulating tape comprising a sheath, a filler of large loose soft asbestos fiber filling material, and a waterproofing layer applied to one side of said sheath but not impregnating the filler of said insulating tape.

5. A heat insulating tape comprising a sheath, a filler of large loose soft asbestos fiber filling material, and a waterproofing layer applied to one side of said sheath but not impregnating the filler of said insulating tape, said waterproofing material extending across one of the flat sides of said tape and over the edges of said tape.

6. A heat insulating tape comprising a sheath, a filler of large loose soft asbestos fiber filling material, and a water-proofing layer applied to one side of said sheath but not impregnating the filler of said insulating tape, said waterproofing material comprising a thick viscous composition having a rubber latex base, said water-proofing material covering one of the sides of said sheath, and extending to the edges thereof sufficiently to engage the water-proofing material on adjacent sections of tape.

7. A heat insulating tape comprising a sheath, a filler of large loose soft asbestos fiber filling material, and a waterproofing layer applied to one side of said sheath but not impregnating the filler of said insulating tape, said waterproofing material comprising a thick viscous composition having a rubber latex base, said waterproofing material extending across one of the flat sides of said tape and over the edges of said tape.

8. A heat insulating tape comprising a fabric sheath, a filler of heat insulating fiber filling material, and a waterproofing layer applied to one side of said sheath, but not impregnating the filler of said insulating tape, said waterproofing material extending across one of the flat sides of said tape to a sufficient width to contact the water-proofing material carried by adjacent sections of insulating tape to form a continuous water-proofing layer over adjacent sections of tape.

9. The method of water-proofing and insulating pipe which comprises applying water-proofing material to the sheath of an insulating tape upon one of the sides thereof, said water-proofing extending toward the edges sufficiently to engage the water-proofing on adjacent sections of tape and applying said tape to said pipe, with the edges of said tape in contacting relation to form a heat insulating layer, and with the boundary portions of the water-proofing material in contacting engagement with each other between the sections of tape to provide a substantially continuous water-proof layer spaced from said pipe by the insulating material of said tape.

10. A sheath for heat insulating tape comprising a woven fabric tubular member adapted to assume a substantially flat shape, and a water-proof layer of initially viscous water-proof composition applied to one of the flat sides of said sheath and covering the outer fibers of said side of said sheath without impregnating the major portion of said sheath, said water-proofing material extending to a sufficient width to cover one side of the tape and extending over the edges of said flat tape sufficiently to contact the water-proofing layers on adjacent pieces of similar tape, and form a substantially continuous water-proofed layer spaced from the other side of the sheath by insulating material.

11. A sheath for heat insulating tape comprising a woven fabric tubular member adapted to assume a substantially flat shape, and a water-proof layer of initially viscous water-proof composition applied to one of the flat sides of said sheath and covering the outer fibers of said side of said sheath without impregnating the major portion of said sheath, said water-proofing material extending to a sufficient width to cover one side of the tape and extending over the edges of said flat tape sufficiently to contact the water-proofing layers on adjacent pieces of similar tape and form a substantially continuous water-proofed layer spaced from the other side of the sheath by insulating material, and a filler of substantially flat shape comprising a large, loose soft member of asbestos material in said sheath and adapted to protect said water-proofing material from excessive heat applied to the non-water-proofed side of said tape.

12. A heat insulating tape comprising a woven fabric sheath, including asbestos fibers, a filler comprising a multiplicity of asbestos fibers associated to form a substantially flat filler body, and a water-proofing layer comprising an initially thick viscous composition having a rubber latex base, said composition being applied to the outside of said sheath on one side of said flat tape, but not impregnating the filler or under side of said sheath, and said water-proofing material extending across one of the flat sides of said tape and over the edges of said tape sufficiently to contact the water-proofing layer on adjacent spiral turns of the insulating tape.

In witness whereof, I hereunto subscribe my name this 31st day of July, 1931.

WILLIAM R. GILLIES.