Jan. 2. 1945. O. J. RUDOLPH 2,366,291

INSULATING TAPE

Filed June 13, 1942

Fig. 1.

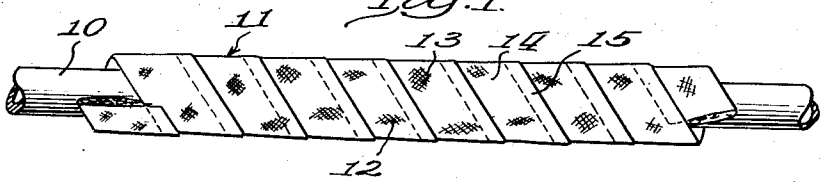


Fig. 2.

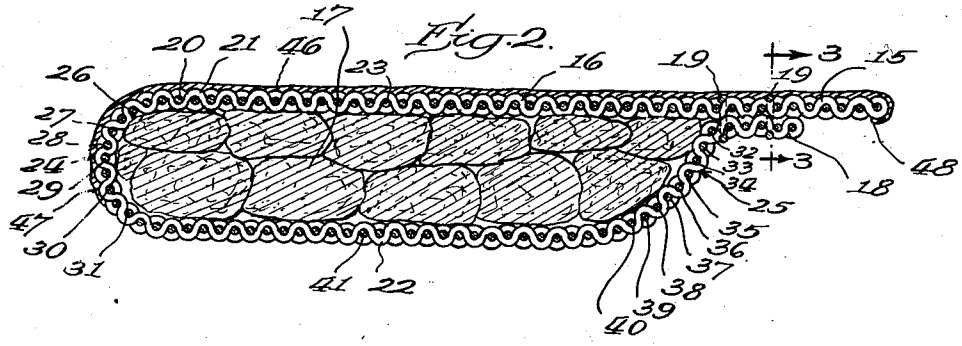
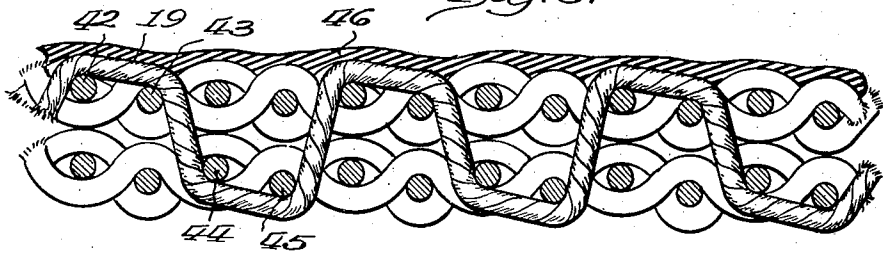


Fig. 3.



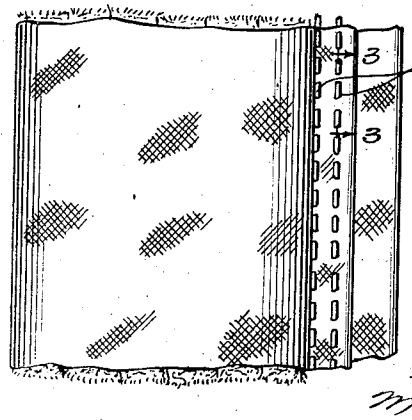


Fig. 4.

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INSULATING TAPE

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3 Claims. (Cl. 139—387)

The present invention relates to insulating tape, and it particularly concerns that type of insulating tape consisting of a woven insulating sheath and a filler of soft, loose, fibrous insulating material such as asbestos or spun glass.

One of the objects of the invention is the provision of an improved type of insulating tape of the characteristics described which is adapted to be spirally wrapped upon a pipe with a minimum amount of compression of the soft, loose, insulating filler of the tape.

Another object of the invention is the provision of an insulating tape of the class described which is provided with an improved structure by means of which the successive spiral turns of the tape overlap each other at the outside of the finished assembly thereby providing a more effective protection of the joint between the spiral wrappings of the tape.

Another object of the invention is the provision of an improved waterproof insulating tape of the class described which is adapted to be more effectively waterproofed when the tape is assembled by being spirally wrapped upon a steam pipe or the like.

Another object of the invention is the provision of an improved insulating tape of the class described which is adapted to be spirally wrapped upon a pipe more smoothly and with less irregularity than any of the tapes of the prior art.

Another object of the invention is the provision of an improved construction of insulating tape of the class described which is adapted to be manufactured more economically than any of the insulating tapes of the prior art, and which therefore may be sold at a lower price and placed within the range of a larger number of purchasers.

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

Referring to the single sheet of drawings accompanying this specification,

Fig. 1 is a side elevational view of a fragment of a pipe covered with an insulating tape constructed according to the invention;

Fig. 2 is a transverse sectional view taken through the insulating tape of the invention on a plane at right angles to the length of the tape;

Fig. 3 is an enlarged fragmentary sectional view taken on the plane of the line 3—3 of Figs. 2 and 4, looking in the direction of the arrows, and showing the mode of weaving and of securing the two adjacent edges of the sheath together;

Fig. 4 is a bottom plan view of a fragment of the tape showing the details of construction of the insulating tape.

Referring to Fig. 1, 10 indicates a steam pipe such as a pipe on a locomotive which is to be covered with the spiral wrapping of insulating tape indicated in its entirety at 11. The wrapping tape 11 comprises a plurality of turns of the insulating tape, such as those indicated at 12, 13 and 14, and the successive turns of insulating tape have their adjacent edges in contacting engagement with each other, but are provided with an overlapping portion indicated at 15 which overlaps the next adjacent turn on the outside of the assembly.

The insulating tape, the structure of which is best shown in Fig. 2, preferably comprises the insulating sheath indicated at 16 and the soft, fibrous insulating filler indicated at 17. The sheath 16 is preferably woven upon a weaving machine which is adapted to simultaneously weave the sheath and to place the filler 17 inside of the sheath as it is woven. Thus the machine is adapted to form the sheath in the form of a member of U-shaped cross section.

As the sheath of U-shaped cross section progresses through the weaving machine it is next filled with the insulating filler 17, and then the two adjacent edge portions 15 and 18 are stitched together by one or more lines of stitching 19.

The sheath 16 is preferably woven out of warp thread 20 and weft thread 21 which are made of heat-resistant insulating material such as asbestos or chrysotile. The asbestos fibers may include a small portion of cotton fibers in order to give the asbestos fibers a better spinning quality.

In addition to the overlapping portions 15 and 18, the sheath 16 preferably comprises the inside wall 22, the outside wall 23, the edge wall 24 and edge wall 25.

As the inside wall 22 is located immediately adjacent the pipe, and the outside wall 23 is located at a distance from the outer surface of the pipe determined by the thickness of the filler 17, the outside wall is preferably made of greater length than the inside wall 22. The amount of this additional length appears in the warp threads 20 of the outer wall which are longer than the warp threads of the inner wall 22 by an amount equal to the circumference of the outer wall when it is applied to the pipe. These longer warp threads are present not only in the outer wall 23 but also in the overlapping flange 15, and in a lesser measure in the overlapping flange 18. In the same way the threads 26 to 31 of the end wall 24, and the threads 32 to 40 in the end wall 25 are also preferably made of such predetermined length as is determined by their position on the pipe 10 when the tape is wrapped on the pipe.

This means that the threads 26 to 31 and warp threads 32 to 40 have a length which is intermediate between that of the warp threads 23 on the outer wall and the warp threads 41 on the inner wall. The warp threads at each edge are suc-

cessively longer depending upon their position in a radial direction from the center of the pipe 10.

Thus the insulating sheath 16 has all of its parts so formed that the outer walls do not tend to place a compression upon the soft, fibrous filler 17 when the material is wrapped upon a pipe.

The present insulating sheath structure should be carefully distinguished from structures of the prior art in which only the outer wall 22 was provided with greater length as evidenced by a puckered condition. The present insulating sheath may be actually so shaped that it has a tendency toward curvature of the sides of the pipe 10. The fibrous filler 17 preferably comprises a plurality of soft, loose fibrous members of asbestos, such as the sliver as it comes from the carding machine, in which there are immersed or wrapped one or more threads of asbestos in order to give its insulating members sufficient tensile strength so that they can be carried through the weaving machine.

For example, the insulating members shown in Fig. 2 comprise twelve in number, and they are generally arranged so that those above overlap the joints of those below. Due to the loose and soft character of the sliver as it comes from the carding machine, these insulating filling members actually conform to the inside of the sheath. In some embodiments of the invention the filler may comprise a pre-formed flat member of asbestos sliver of the chrysotile type or spun glass insulating fibers.

Referring to Fig. 3, this is an illustration of the mode of securing the two overlapping flanges 15 and 18 together. The two laterally projecting and overlapping flanges are secured together by two lines of stitching such as that formed by warp thread 19, the course of which is illustrated in Fig. 3. Thus the warp thread 19 stitches the flanges 15 and 18 together, passes over two of the upper weft threads 42, 43, and then downward through the two flaps 15 and 18 and under two of the lower weft threads 44, 45 and so on throughout the full length of the tape.

The outer wall 23 of the insulating sheath is preferably provided with a waterproofed layer 46 of waterproofing material such as an initially plastic compound of asphaltum or rubber latex. This waterproofing layer preferably extends from the point 47 on the end wall 24 to the point 48 over the edge of the flap 15 so that the waterproofing layers of successive spiral wrappings will come into engagement with each other.

The lower side of the flaps 15 and 18 is preferably not waterproofed because there might be a tendency at this point for the waterproofing to stick to the upper surface of the adjacent turn of the insulating tape which would prevent the removal of the tape.

The mode of application of the present insulating tape to the pipe is illustrated in Fig. 1. It will be seen there that the spiral wrapping begins at the right-hand end, and proceeds spirally toward the left-hand end. The end wall 25 of the next spiral turn is brought into contacting engagement with the end wall 24 of the next turn, and the overlapping flanges 15 and 18 lie over on the outside of the waterproofing layer 46 of the next turn.

Thus there is no crack visible from the outside or leading directly to the inside through which any water or any other material may penetrate. The overlapping flange on the outside serves to positively prevent the separation of the two adjacent turns of the spiral tape on the pipe, and provides a better and closer waterproofing layer.

As the outer wall of the present tape is of sufficient length to make a periphery which is equal to the periphery of the wrapping at that point, and as the inner wall has its length of warp threads of a lesser dimension fitting around the pipe 10, there is no compression of the filler 17 by the tensioning of the outer wall. The edge walls 24 and 25 also have their warp threads of predetermined proper length for their positions in the assembly, and thus the shape of the insulating tape is maintained at all times. The insulating filler is thus kept in a looser and more fluffy condition in which it has its maximum of insulating value.

While I have illustrated and described a specific embodiment of my invention, I do not wish to be limited to all of the details 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 Letters Patent of the United States is:

1. In a heat insulating tape the combination of a sheath of heat resistant and heat insulating material forming a substantially tubular housing, said sheath being provided with an outer wall, side walls and an inner wall having warp threads of predetermined length, the warp threads of the inner wall being shortest and the warp threads of the outer wall being longer than those of the inner wall by an amount corresponding substantially to the circumference of that portion of the housing when applied spirally to a pipe without substantial compression of the tape, and the warp threads of the side walls gradually increasing in length by increments, depending upon their location with respect to the inner wall and outer wall so that the warp threads of the side walls are of proper length corresponding to the circumferential distance about the pipe at the points of their respective locations, and a filler of large, loose, soft rovings of heat insulating and heat resistive material located in predetermined position in said sheath.

2. In a heat insulating tape the combination of a sheath of heat resistant and heat insulating material forming a substantially tubular housing, said sheath being provided with an outer wall, side walls and an inner wall having warp threads of predetermined length, the warp threads of the inner wall being shortest and the warp threads of the outer wall being longer than those of the inner wall by an amount corresponding substantially to the circumference of that portion of the housing when applied spirally to a pipe without substantial compression of the tape, and the warp threads of the side walls gradually increasing in length by increments, depending upon their location with respect to the inner wall and outer wall so that the warp threads of the side walls are of proper length corresponding to the circumferential distance about the pipe at the points of their respective locations, and a filler of large, loose, soft rovings of heat insulating and heat resistive material located in predetermined position in said sheath, the said sheath being formed of a strip of woven fabric provided with overlapping laterally projecting edges stitched together.

3. In a heat insulating tape the combination of a sheath of heat resistant and heat insulating material forming a substantially tubular housing, said sheath being provided with an outer wall, side walls and an inner wall having warp

threads of predetermined length, the warp threads of the inner wall being shortest and the warp threads of the outer wall being longer than those of the inner wall by an amount corresponding substantially to the circumference of that portion of the housing when applied spirally to a pipe without substantial compression of the tape, and the warp threads of the side walls gradually increasing in length by increments, depending upon their location with respect to the inner wall and outer wall so that the warp threads of the side walls are of proper length corresponding to the circumferential distance about the pipe at the points of their respective locations, and a filler of large, loose, soft rovings of heat insulating and heat resistive material located in predetermined position in said sheath, the said sheath being formed of a strip of woven fabric provided with overlapping laterally projecting edges stitched together and the said sheath having its outer wall and edge portion covered with a waterproofing compound extending sufficiently over the edges thereof to effect a water-tight contact when the tape is spirally wrapped on a pipe.

OSCAR J. RUDOLPH.