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FLEXIBLE INSULATION AND PROCESS OF MAKING SAME

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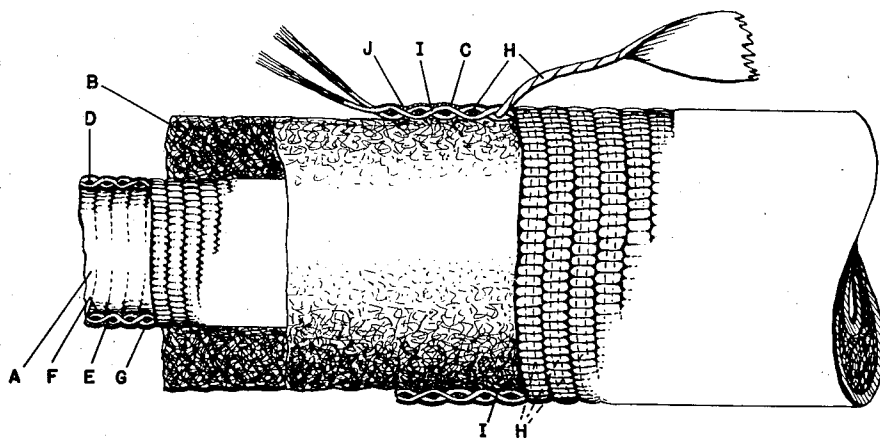


FIG. 1.

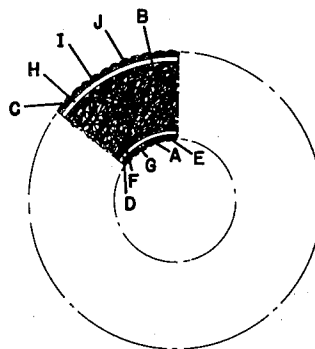


FIG. 2.

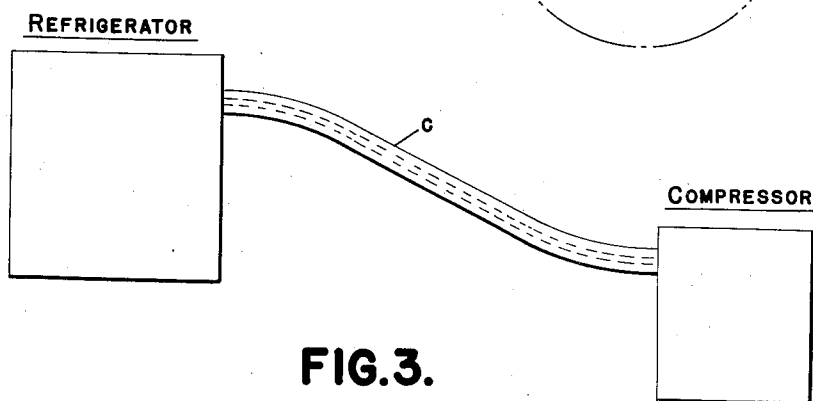


FIG. 3.

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FLEXIBLE INSULATION AND PROCESS OF
MAKING SAME

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8 Claims. (Cl. 154—28)

The invention relates to flexible insulating conduit and the process of manufacturing the same.

The object of the invention is to provide a new type of flexible conduit capable of being manufactured in long length and rolled into coils for shipping purposes and at the same time providing a composite tubing having good insulating properties and being resistant to fire and moisture. Another object is to produce such a material at low cost thereby making it commercially available for a wide variety of uses.

In the drawing

Figure 1 is an elevation of a portion of the composite tubing having portions broken away to reveal the inner structure;

Figure 2 is a cross section thereof; and

Figure 3 shows a refrigerant conducting conduit utilizing the composite insulating tubing of my invention.

My improved composite tubing comprises an inner tubular lining A, a layer of insulating material B and an outer jacket C. The inner lining A is a seamless woven fabric preferably made on a circular loom in which the weft threads are wound circularly and consist of twisted strands of paper or cotton or other suitable material having sufficient tensile strength. The warp threads are preferably of finer thread such as cotton or other suitable material for making a flexible fabric. The inner lining after being woven is impregnated with material adapted to give a certain body to the lining and to render the same fireproof and moisture-proof.

The inner lining after being impregnated is covered with a layer of insulating material formed into a tube B. For convenience, this may be made from a flat pad of felt of sufficient width to make a full circular layer when wrapped around the inner lining.

The outer jacket C is preferably placed on the insulating layer by passing the inner lining and insulating layer structure through a circular loom adapted to weave the outer jacket onto the insulating material and to compress the same during the operation. The circular weft threads of the outer jacket are also preferably formed of a material of sufficient tensile strength to compress the insulating material and may preferably be made of a twisted paper strand. The warp threads are again of finer material and are preferably cotton.

The conduit as it emerges from the second loom then comprises the inner and outer seamless tubular fabric with compressed insulating material therebetween. The jacket is then impreg-

nated with a material for imparting a body to the same and to render it fireproof and moisture-proof. Any suitable materials for imparting these properties may be used but I prefer that an impregnating bath be made up with asphaltum or pitch which may be cut with naphtha, gasoline or other suitable solvent to give the desired fluidity. The tube is then run through the impregnating bath to coat the outer surface of the same and then carried over suitable drying rolls until the solvent has evaporated.

Referring to the illustration of the composite tubing in the drawing, the inner lining A comprises the circular weft threads D and the warp threads E, while the impregnating material forms an inner surface F and an outer surface G. The outer jacket C comprises the circular weft threads H and the warp threads I. The impregnating material forms an outer coating J, penetrating to the inner surface thereof.

The conduit above described may be manufactured continuously in a circular loom and it is therefore seamless and endless. It can be rolled into coils of suitable size for shipping purposes. It is strong, flexible, fireproof, moisture-proof and has good insulating properties. One of its principal uses is for covering metal pipes which are used for conducting fluids at high or low temperatures where it is desired to insulate the same. One of the advantages of my product is that it may be cut to the desired length, inserted over the tube and moved lengthwise along the tube following such bends as may be present in the line. An illustration of its use may be found in the insulation of the conduits of a refrigerating system where ammonia or other refrigerant is being conducted. This is shown in Figure 3.

My invention is susceptible of various modifications and instead of having the inner and outer tubular fabrics made on a circular loom, they may be made on a braiding machine. In the preferred embodiment however the circular loom material is found superior because the circular weft strands are more suited for compressing the insulating material. It should also be noted that the weft threads while preferably formed of twisted paper, may in some instances be composed of folded paper, cotton, hemp, jute, sicle or other suitable material of sufficient strength.

The insulating material may be hair felt, although other insulating materials such as wool, cotton, asbestos, mineral wool, magnesia or other composition having insulating properties may be substituted therefor.

The finished product is a useful article of commerce because of its insulating properties combined with the fact that it is fireproof, moisture-proof and fluid-tight. It may be manufactured in various sizes having the required inner and outer diameters to suit the purpose intended. One practical embodiment of the invention has an inner diameter of $1\frac{1}{4}$ inches and an outer diameter of $2\frac{5}{8}$ inches, the thickness of the woven fabric being approximately $\frac{1}{8}$ of an inch and the thickness of the felt lining being approximately $\frac{1}{2}$ of an inch. In manufacturing this particular size of tubing the hair felt before being compressed by the outer jacket is desirably a material commercially designated as one-inch felt.

What I claim as my invention is:

1. Composite tubing comprising a woven inner tubular lining, a relatively thick layer of insulating material surrounding said lining, said insulating material being of the class consisting of hair felt, wool, cotton, asbestos, mineral wool and magnesium and an outer jacket having circular weft threads binding said insulating material.

2. Composite tubing comprising a woven inner tubular lining having circular weft threads of material adapted to impart rigidity thereto, a relatively thick layer of insulating material surrounding said lining and an outer woven tubular jacket impregnated with material rendering the same fireproof and moisture-proof.

3. Composite tubing comprising a seamless woven inner tubular lining having circular weft threads of twisted paper, a relatively thick layer of insulating material surrounding said lining and an outer jacket having circular weft threads of twisted paper and having cotton warp threads.

4. Composite tubing comprising a woven inner tubular lining having circular weft threads of twisted paper, a relatively thick layer of insulating material surrounding said lining, an outer jacket having circular weft threads binding said insulating material and having warp threads interwoven with said weft threads and

asphaltum pitch on said jacket and impregnated therein.

5. Composite tubing comprising a woven inner tubular lining, a layer of felt surrounding said lining and of a thickness more than twice as great as the thickness of said lining, an outer jacket having circular weft threads binding said felt and a layer of asphaltum pitch impregnating said jacket.

6. Composite tubing comprising an inner tubular lining having circular weft threads of paper and woven warp threads, said lining being impregnated with material rendering the same fireproof and moisture-proof, a layer of insulating material surrounding said lining, an outer jacket having circular weft threads of paper binding said insulating material and having warp threads woven therewith and an impregnating layer of material on said outer jacket for rendering the same fireproof and moisture-proof.

7. Composite tubing comprising a seamless woven inner tubular lining having circular weft threads of twisted paper and cotton warp threads woven therewith, said inner lining being impregnated with asphaltum pitch, a layer of felt surrounding said lining, an outer woven jacket having circular weft threads of twisted paper and having cotton warp threads interwoven therewith and a layer of asphaltum pitch on the outer surface of said jacket and impregnated therein.

8. The method of manufacturing flexible composite tubing comprising weaving a tubular fabric with circular weft strands of twisted paper and cotton warp threads, impregnating said tubular fabric with asphaltum pitch, surrounding said tubular fabric with a relatively thick layer of insulating material weaving around said impregnated tubular fabric without internal support a jacket having circular weft threads of twisted paper and cotton warp threads, conducting the jacketed conduit through a bath of asphaltum pitch, drying the impregnated tubing and forming the tubing into coils.

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