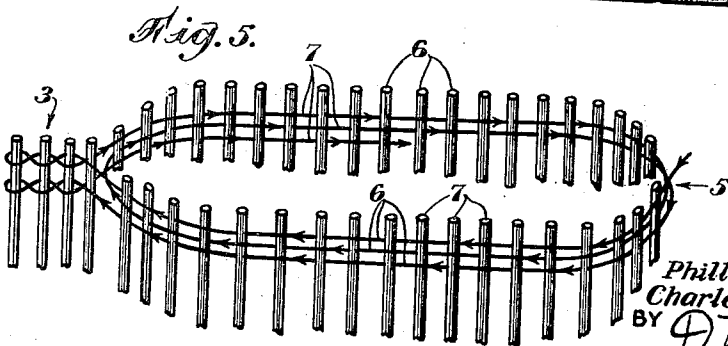
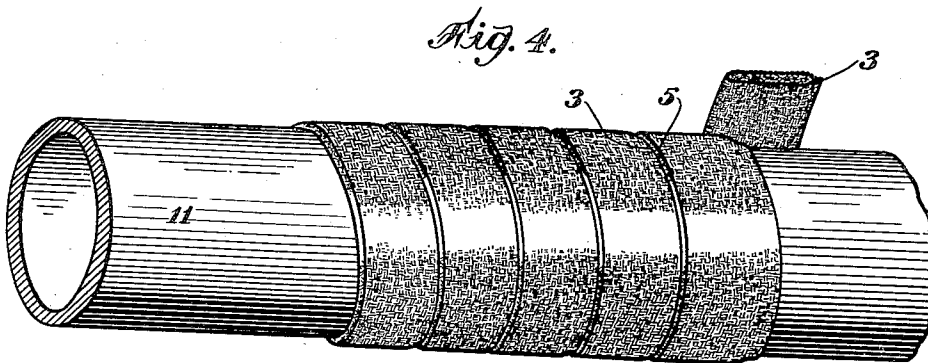
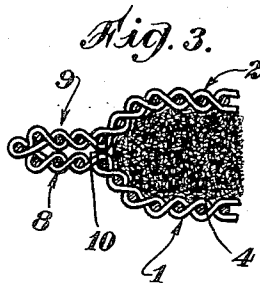
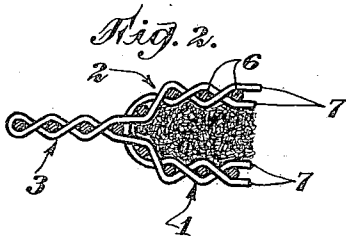
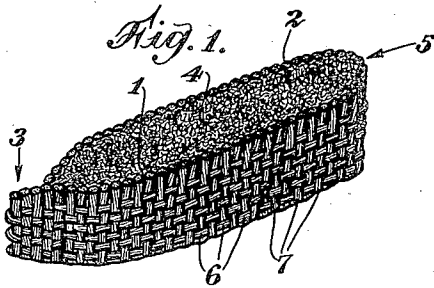


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THERMAL INSULATING TAPE

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THERMAL INSULATING TAPE

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1 Claim. (Cl. 28—1)

This invention relates to a thermal insulating tape and method of making the same and particularly to one that is adapted to be made economically, to be wrapped relatively smoothly, in a plurality of overlapping turns, around a pipe that is to be insulated, and to minimize heat transfer.

Briefly stated, the invention comprises a woven sheath or flattened tube provided with a flange constituting a longitudinal integrally woven edge of the article and suitable thermal insulating material disposed within the tubular part of the sheath. The invention comprises also a method of making the sheath and edge portion integrally united therewith, which includes weaving simultaneously and integrally the tubular part of the sheath and the flange and causing strands of yarn to extend from face to back of the said flange portion, at positions removed from the outer border thereof, in such manner as to restrict or prevent the movement into the edge portion of insulating material disposed within the tubular portion. More specifically, the invention comprises the production of a sheath, of the type and adapted for the purpose described, including a flange portion of one-ply thickness integral with both the face and back portions of the sheath and suitably containing approximately the same number of warp and filling strands per unit of area as either the face or back portion of the tube considered singly.

The invention is illustrated in the drawing in which:

Fig. 1 shows a perspective view of the preferred embodiment of the invention;

Fig. 2 shows a cross sectional view of the edge portion at the left side of the article illustrated in Fig. 1;

Fig. 3 shows a cross section of a corresponding edge portion of a modification in which the flange portion consists of face and back webs joined together by binder threads at positions removed from the outer border of the flange;

Fig. 4 shows a perspective view of thermal insulating tape of preferred form wrapped spirally around a part of a cylindrical object that is to be insulated; and

Fig. 5 shows a perspective, diagrammatic view illustrating in more detail the sheath of the form shown in Fig. 1.

In the various figures like reference characters denote like parts.

There is shown a thermal insulating tape comprising a sheath or tube having a flattened form and described, for convenience, as having a face

portion 1, a back portion 2, and a flange 3 constituting a thin, longitudinal, edge portion. The tubular portion of the sheath is filled with suitable thermal insulating material 4 and has a thick edge portion 5 opposite the said thin edge or flange.

Referring to the sectional view of the edge portion shown in Fig. 2, it will be seen that the sheath comprises warp strands 6 and filling strands 7. Some filling strands are continuous from the face portion 1, into the edge or flange portion 3 and into the back portion 2. Also the filling strands, in certain shots or passes, by-pass the edge or flange portion and go directly from the face portion through the thick edge, to the back portion, or vice versa, as will be described later. It will be observed also that the density or number per unit area of filling strands or warp strands in the flange is the same as in the face or back portions considered singly. In other words, the number of warp strands per unit of width or filling strands per unit of length is the same in the one-ply flange as in the web of either the face or back of the tubular portion.

In the embodiment illustrated in Fig. 3, which embodiment is satisfactory for certain purposes in which it is allowable to use a sheath of thicker flange than illustrated in Figs. 1 and 2, the flange is 2-ply and contains a web portion 8 continuous with the face of the tube, and another web 9 that is continuous with the back portion of the tube. These two said web portions are united by binder threads 10 extending through the flange from face to back, at positions somewhat removed from the outer border. These binder threads prevent the movement into the flange of the insulating material 4.

When tape of the type described is wrapped around an object, as, for example, pipe 11 in Fig. 4, in a plurality of spirally applied turns, the thin edge 3 of one turn and the thick edge 5 of another turn are disposed in overlapping relationship, the result being an outer surface of the wrapping that is relatively smooth and a thickness of insulating layer of minimized unevenness of thickness, with no open joints between adjacent turns.

Before being wrapped around the object to be insulated, the tape may be moistened. Such moistened tape may then be wrapped tightly around the object, held taut, and allowed to dry.

The type of insulating core that is preferred is a flexible, homogeneous or unitary bat of heat-resistant fibrous material. Thus, there may be used an asbestos ribbon lap, formed from asbes-

tos in conventional equipment, by passing asbestos through a breaker carding machine, forming a very thin, loose sheet of asbestos fibers and then lapping this very thin sheet on itself to form a ribbon of desired width, in which the several laps felt into each other, to give a homogeneous, practically non-laminated structure that is particularly effective in thermal insulation. The integral union of the fibers in the lap is increased by subjecting the lap to moderate compression and shaping, to form a unit of approximately the size and shape illustrated by the core member 4. This ribbon is reserved for insertion into the sheath, as will be described later.

In forming this lap of asbestos fibers or the like and also in the weaving operations that are now to be described, there is used conventional equipment manipulated in a manner that, from the following description, will be obvious to one skilled in the art, without illustration of the complicated carding or loom equipment used.

The yarn used is one adapted for thermal insulating, is heat resistant, and is suitably asbestos yarn.

The loom equipment comprises the usual bobbin carrier which supplies the filling strands, harnesses, including heddles for shifting the plurality of strands that are to constitute the warp strands in both the tubular part of the sheath and the flange thereon, and accessories and driving means. In making an article of the type illustrated in Figs. 1 and 2, there may be used a total of six harnesses, two for the warp threads of the face web, two for the warp threads of the back web, and two for the web that is to constitute the flange. When the loom is started, the harnesses are manipulated so that the warp strands being drawn through the heddles are woven with the filling strands. More specifically, the warp strands are shifted in such a manner that the strands that are to constitute the flange portion are placed alternately in registration with the strands that are to constitute the face web and the strands that are to constitute the back web. Furthermore, the filling strand as it passes between the warp threads, transversely to the direction thereof, in some of its shots (passages) and suitably on two out of every four shots, by-passes the warp threads constituting the flange. Thus, in a preferred embodiment, the bobbin may pass, from what is to be the thick edge of the tube, through the warp strands of the face web and flange, back through the flange and back web, then through the face web and (by-passing the flange) back through the back web, then back through the face web, flange, and back web, etc., in the course illustrated in Fig. 5. On every other pick (round-trip) the filling strand by-passes the flange.

The result of this is that there is formed the sheath of the type illustrated. Half of the fill-

ing strands, shown in the face web of Fig. 1, for example, return through the back without passing through the flange.

The course of the yarns is illustrated diagrammatically in Fig. 5, the arrows indicating the direction of movement of the bobbin at any point, during the weaving. It will be seen in this figure how the filling strands, on alternate picks, by-pass the flange and that the yarn follows the course stated above.

Once the sheath is formed it is cut to desired lengths, say 20 to 30 feet, and an asbestos lap of the type illustrated is inserted therewithin.

This insertion is made suitably by hand, the lap being placed between two long, rigid metal guide strips adapted to be inserted within the sheath. The lap, with its guide members, is inserted into the tubular part of the sheath and the guide members then removed one at a time.

In the modification of this general method, to make the product of the type illustrated in Fig. 3, conventional loom equipment and operation are resorted to, and a flattened tube is woven with a binder thread inserted at a position removed from an outer edge, say $\frac{1}{8}$ of an inch therefrom. This binder thread ties the face and back of the edge portion of the tube together and prevents the entrance into this edge portion of the insulating core material.

The convenience of the method of manufacture and of wrapping such an insulating tape around a cylindrical object needs no further statement. The whole article is flexible, and such flexibility is obtained without the slippage, on each other, of a plurality of discrete units of insulating material and without the provision of joint openings parallel to the direction of flow of heat when the article is in use.

The details that have been given are for the purpose of illustration and not restriction. Many variations therefrom may be made within the scope of the appended claim.

What we claim is:

A thermal insulating tape comprising a core of flexible insulating material, a woven sheath disposed around the insulating material and filled thereby, an edge flange of one-ply thickness extending laterally from the filled sheath that is thin and integrally woven and that is continuous with both the face and back of the sheath, and an opposite edge that is thick, whereby the tape is adapted to be wrapped around an object, in a plurality of turns, with the thin edge of one turn and the thick edge of another turn in overlapping relationship, the said thin edge containing approximately the same number of interwoven strands for a given area as the face or back portion of the sheath taken singly.

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