Nov. 13, 1928.

1,691,783

O. F. MOTTWEILER ET AL

INSULATING STRUCTURE

Filed Nov. 25, 1927

2 Sheets-Sheet 1

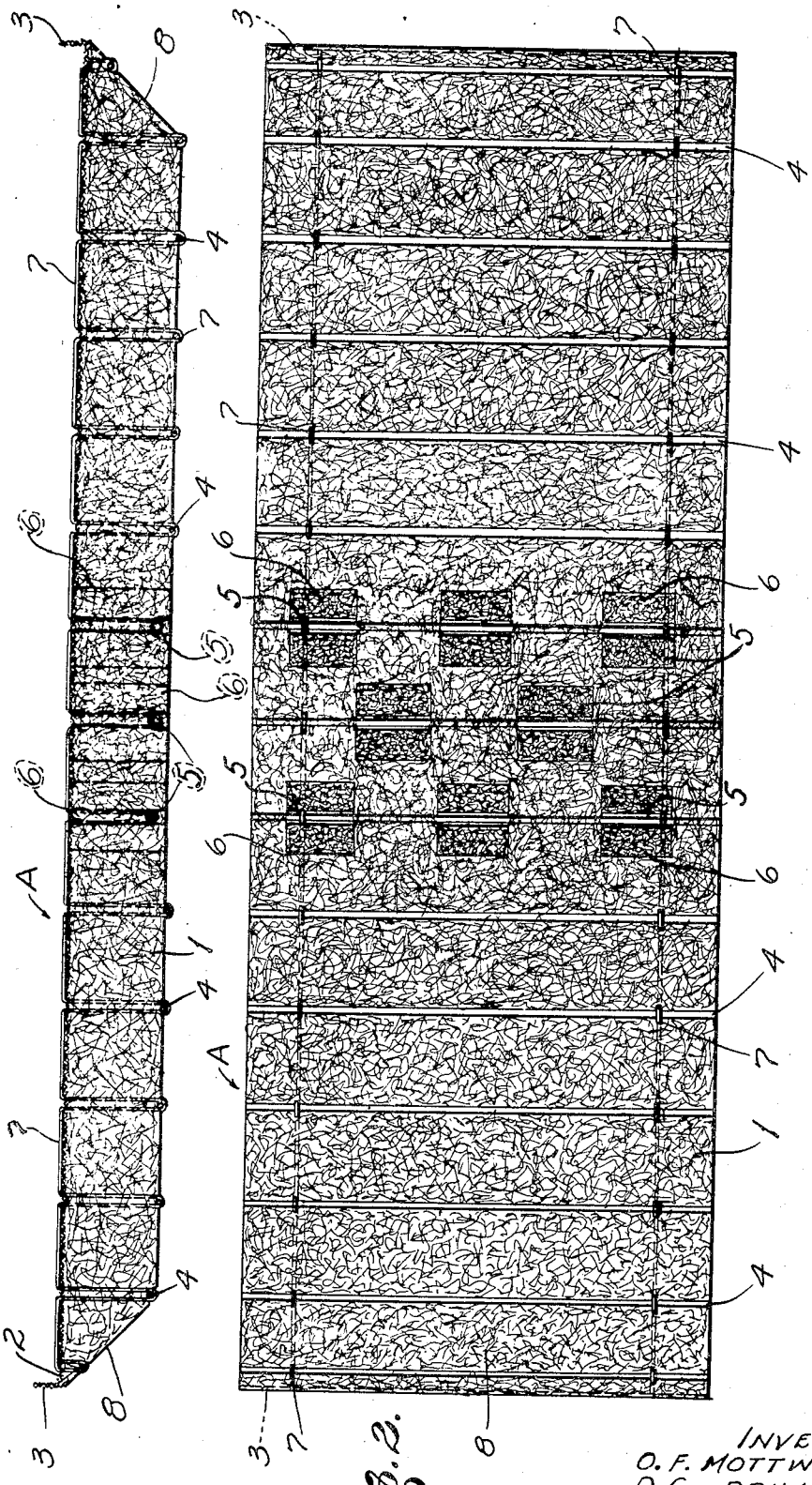


Fig. 1.

Fig. 2.

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2 Sheets-Sheet 2

Fig. 3.

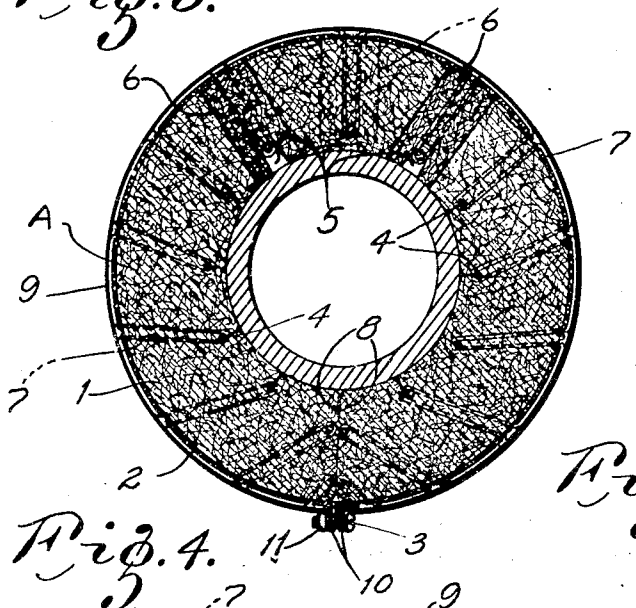


Fig. 5.

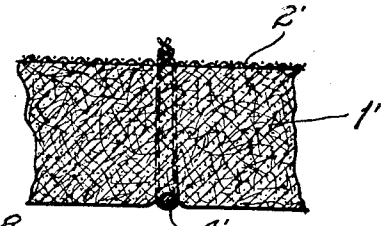


Fig. 6.

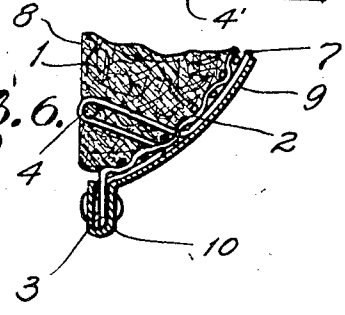


Fig. 4.

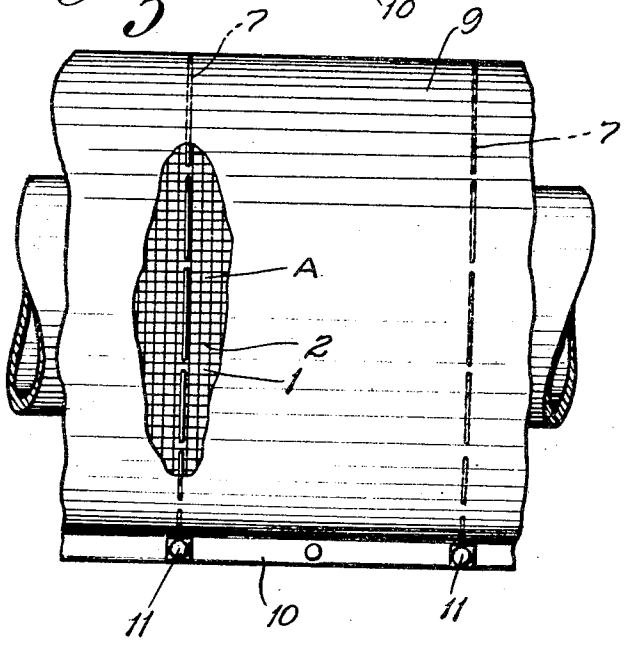


Fig. 8.

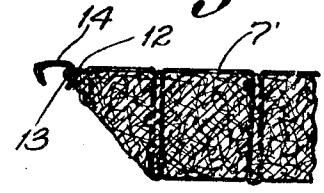
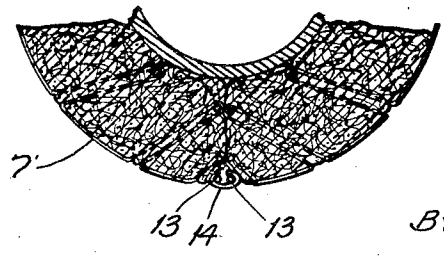


Fig. 7.



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UNITED STATES PATENT OFFICE.

OLIVER F. MOTTWEILER AND DANIEL C. DRILL, OF ALEXANDRIA, INDIANA, ASSIGNORS TO GENERAL INSULATING AND MANUFACTURING COMPANY, OF ALEXANDRIA, INDIANA, A CORPORATION OF INDIANA.

INSULATING STRUCTURE.

Application filed November 25, 1927. Serial No. 235,552.

This invention relates generally to insulating structures, and particularly to insulating structures of the type adapted to be used for insulating purposes in connection with circular or cylindrical elements, such as pipes, boilers, and the like, the predominant object of the invention being to produce an insulating structure of the type mentioned which is so constructed that there is an entire absence in said structure of "through metal", that is, metal which extends from the face of the element being insulated to the outer surface of the insulating structure, whereby interchange of heat between the face of the element being insulated and the outer atmosphere is prevented.

Prior to this invention, insulating structures of the type disclosed herein were provided with metallic anchor members which secured together the various elements of which the structures were composed. Ordinarily, these metallic anchor members were extended entirely through the insulating structures from the inner surfaces thereof, which were in contact with the elements being insulated, to the outer faces of the structures, and as a result of this arrangement, the anchor members referred to acted as conductors along which heat was transmitted or reduced temperature produced, whereby the insulating efficiency of the structure was seriously affected.

In accordance with the present invention, the anchor members which attach the various elements of the insulating structure together are spaced apart from the element being insulated when the structure is in use in a manner to cause portions of the insulating material to be interposed between said anchor members and the element being insulated, whereby transmission of heat or production of reduced temperature along said anchor members is prevented.

Figure 1 is a side elevation of our improved insulating structure with the outer metallic covering thereof removed;

Figure 2 is a plan view of the structure shown in Fig. 1;

Figure 3 is a cross-section of our improved insulating structure as same will appear when in use in association with a pipe or other circular element;

Figure 4 is a fragmentary side elevation of the insulating structure and pipe shown in Fig. 3;

Figure 5 is a fragmentary detail showing a modified form of the means for securing together the various elements of which the insulating structure is composed;

Figure 6 is an enlarged fragmentary sectional detail showing the construction of the preferred form of our improved insulating structure at the attaching flanges thereof;

Figure 7 is a fragmentary section showing a modified form of our improved insulating structure;

Figure 8 is a fragmentary detail showing an end portion of the insulating structure illustrated in Fig. 7 when said structure is in a flat condition.

In the drawings, which illustrate one embodiment of our invention, A designates the jacket of our improved insulating structure, said jacket being in the form of an insulating strip composed of a body portion 1 made up of an amount of rock wool or similar insulating material which has been subjected to compression to give to said material the required density. The body portion 1 is preferably rectangular in plan and may be of any desired dimensions with respect to length, breadth and thickness, and the density of the rock wool of which said body portion is comprised is substantially uniform throughout so that the insulating value of said body portion will be substantially uniform at all points thereof.

Arranged in contact with the face of the body portion 1 which is remote from the element being insulated when the insulating structure is in use is a layer of material 2 which is intended to confine the rock wool of the body portion 1 at that face thereof. The layer of material 2 may be of any material which may be found to be suitable, such as canvas, tar-paper, cheese-cloth, burlap, etc., but we prefer to use, and we show in the drawings, this layer of material being in the form of wire mesh. The side edges of the layer of wire mesh 2 coincide with the side edges of the body portion 1 of the jacket, and said layer of wire mesh extends entirely across said body portion 1. Also, the layer of wire mesh extends longitudinally of the body portion 1 over the entire face thereof, the length of the layer of wire mesh being

slightly greater than that of the adjacent face of the body portion 1 and the extreme edge portions of said layer of wire mesh at the ends thereof, which edge portions are designated by the reference character 3 in the drawings, being bent outwardly from the face of the body portion 1 at an approximate right angle with respect thereto, as shown in Fig. 1.

Arranged transversely of the body portion 1 at the face thereof which is remote from the face with which the layer of wire mesh 2 is associated is a plurality of rods 4. The length of the rods 4 corresponds approximately with the width of the body portion 1, so that the opposite ends of said rods terminate at the opposite side edges of said body portion, as shown in Fig. 2, and said rods are spaced from each other longitudinally of said body portion from end to end thereof.

Extended through the body portion 1 of the jacket is a plurality of re-inforcing posts 6. These posts are of such length that the opposite end faces thereof are flush with the inner and outer faces of the body portion, respectively, and as shown clearly in Fig. 2, each of said posts is provided with an elongated notch 5 which extends entirely across the lower face of the post and is open at its ends. The notches 5 at the lower faces of the posts 6 are adapted to receive certain of the transversely arranged rods, each individual rod of the rods which support the posts 6 passing longitudinally through the notches of several of said posts, so that said posts are supported by said rods. The reinforcing posts are formed in a manner to give them more rigidity and greater resistance than the body portion 1, and in this connection, we prefer to employ for the production of these posts the same material of which the body portion is formed, but which is more firmly compressed and perhaps has been treated with a stiffening agent so that greater rigidity is obtained.

The body portion 1 and transverse rods 4 are secured together to produce a unitary structure by lengths of wire or other suitable material 7, which extend longitudinally of the jacket from end to end thereof, as shown in Fig. 2. There may be any desired number of these lengths of wire spaced transversely of the jacket, and said lengths of wire are passed through the thickness of the jacket alternately from one to the other face thereof, each wire being extended through the layer of wire mesh 2 and passed through the body portion 1 to the opposite face thereof, where said wire is turned about one of the rods 4 and is then returned through the body portion to the face at which the wire mesh 2 is located, where said wire is again passed through said wire mesh. The wire 7 is then extended along the layer of wire mesh a short distance in contact with the outer face thereof, where it is again passed through the wire mesh and extended through the body portion to another of the rods 4 about which it is turned in the manner described, after which said wire is returned through the body portion to the layer of wire mesh 2 through which it is passed. This procedure is followed until the various wires have been extended from one to the other end of the jacket, thus connecting all of the rods 4 to the layer of wire mesh 2 by loops of wire which pass through the body portion 1, thereby confining the insulating material of which said body portion is comprised between said rods 4 and said wire mesh 2.

As will be seen by referring to Fig. 1, the end walls of the jacket, which are designated by the reference character 8, are arranged at an angle other than a right-angle with respect to the inner and outer surfaces of the jacket, and in consequence of this arrangement, the loops of wire which extend downwardly to the outermost rods 4 are much shorter than the loops of wire extending downwardly to the other rods. The inclined end walls of the jacket have important functions to perform, which will be hereinafter described.

In the preferred form of our invention, we employ a sheet metal outer casing 9 in which the jacket A is arranged. This outer casing is of approximately the same length as the jacket, so that the ends of said jacket and the ends of said outer casing approximately coincide, and said outer casing is bent in approximately circular form so that it may be arranged about a pipe or other circular or cylindrical element to be insulated. The action of bending the sheet of metal of which the outer casing is formed to produce a structure approximately circular in cross-section brings the end edges of said sheet of metal together, and the portions of the sheet of metal at these edges are bent outwardly from the wall of the outer casing and are then bent rearwardly upon said outwardly-bent portions to provide outwardly-extended attaching flanges 10 of double thickness, which flanges extend longitudinally of the outer casing from end to end thereof.

Previous to assembling the jacket A within the outer casing 9, the plies of metal forming each of the flanges 10 are spaced from each other a slight distance, and on assembling the jacket within the outer casing, said jacket is so arranged therein that the extended portions 3 of the layer of wire mesh 2 are extended into the spaces between the plies of metal forming the flanges 10. The flanges 10 are then compressed so that the extended portions 3 of the layer of wire mesh 2 are confined between the plies of

metal of the flanges, and rivets or other suitable fastening devices are passed through each of the flanges 10 whereby the extended portions of said layer of wire mesh are tightly gripped within the flanges. The result of this is that the jackets A are securely attached to the outer casings 9, thus preventing relative movement between said parts.

When our improved insulating structure is to be arranged in place about a pipe, for instance, the flanges 10 are spread apart so as to permit the structure to be passed over the pipe. The flanges then are drawn together, thereby drawing the meeting edges of the jacket together and bolts 11 are passed through openings formed in the flanges 10 to connect said flanges together. It is obvious that the surface of the jacket A which provides the inner face thereof necessarily must be of less length than the surface of said jacket which provides the outer face thereof, due to the greatly less diameter of the jacket at the inner face thereof when same is arranged in circular form, and as the loops of wire which pass around the rods 4 are of fixed lengths, and, furthermore, because said rods are in fixed relation along said inner face of the jacket, the action of bending the insulating structure about the pipe will draw the rods 4 through the insulating material forming the body portion 1 of the jacket away from the face of the element being insulated, and as the insulating material is relatively soft, it will fill the spaces between the rods 4 and the face of the element being insulated, as suggested in Fig. 3. In consequence of this arrangement, there are no anchor members which extend entirely through the jacket from the inner face to the outer face thereof, and, therefore, there will be no opportunity for the transfer of heat along said anchor members between the insulated element and the outer surface of the insulating structure.

The function of the post 6 is to resist crushing strains caused by the weight of the insulating structure where the thickness thereof is great in comparison to the surface being covered. These posts, as already stated, have sufficient strength to support the structure at the top thereof, and hence the compressible insulating material of which the body portion 1 is formed is not required to carry the weight of the insulating structure as it would in the absence of said posts.

The form of the invention illustrated in Figs. 7 and 8 is designed particularly for use with an outer casing of canvas, tar-paper, cheese-cloth, burlap, or other suitable flexible material. In this form of the invention, the lengths of wire 7′ are provided with eyes 12 at the opposite ends thereof in which rods 13 are arranged, and in arranging this form of the invention about a pipe or other circular element, the rods 13 which are at the opposite ends of the jacket when same is in a flat condition are brought into close proximity to each other, as shown in Fig. 7. The rods 13 are then connected firmly together by hog rings 14 or similar devices which embrace said rods 13, as shown in Fig. 7, whereby the meeting ends of the jacket are closely connected together and said jacket is maintained in position about the element being insulated.

In Fig. 5, we illustrate a modified form of the means for connecting the rods 4′ to the layer of wire mesh 2′. In accordance with this modification of our invention, individual anchor members are associated with each rod 4′ instead of employing a continuous piece of wire which is bent to connect a number of rods to the layer of wire mesh, as in the preferred construction of the invention. As shown in Fig. 5, a piece of wire is looped over the rod 4′ and is passed through the body portion 1′ of the jacket and then is extended through the layer of wire mesh 2′. The ends of the anchor members are then twisted, as suggested in Fig. 5, to connect said ends together.

While we prefer that our improved insulating structure shall be rectangular in plan when used for insulating straight lengths of pipe or other circular elements, said structure may have other shapes when intended for use with bent pipes or other circular elements having forms other than straight.

We claim:

1. An insulating structure adapted for use in circular form comprising a body portion formed of insulating material, a layer of material arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion, and anchor means extending through said body portion and connecting said layer of material and said rods together, said rods being movable when the structure is arranged in circular form to points removed inwardly from the inner face of said body portion.

2. An insulating structure comprising a body portion formed of insulating material, a layer of material arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion, and anchor means extended through said body portion and connecting said layer of material and said rods together, the portions of said rods being fixed in a longitudinal direction with respect to the surface of said body portion with which said rods contact, and said anchor means being of fixed lengths to as to cause said rods to be drawn

through the insulating material of the body portion and away from the inner face of said body portion when the structure is arranged in circular form.

3. An insulating structure adapted for use in circular form comprising a body portion formed of insulating material and having inclined meeting edges, a layer of material arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion, and anchor means extended through said body portion and connecting said layer of material and said rods together, the positions of said rods being fixed in a longitudinal direction with respect to the surface of said body portion with which they contact and said anchor means being of fixed lengths so as to cause said rods to be drawn through the insulating material of the body portion and away from the inner face of said body portion when the structure is arranged in circular form to cause the inclined edges thereof to meet.

4. An insulating structure adapted for use in circular form comprising a body portion formed of insulating material, a layer of material arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion, and anchor means extending through said body portion and connecting said layer of material and said rods together, said anchor means comprising a strip of metallic material bent to produce a plurality of loops which pass through said body portion and embrace said rods and said rods being movable when the structure is arranged in circular form to points removed inwardly from the inner face of said body portion.

5. An insulating structure comprising a body portion formed of insulating material, a layer of material arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion, re-inforcing elements having greater resistance than said body portion extended through said body portion from one to the opposite surface thereof, said reinforcing elements being supported by certain of said rods, and anchor means extending through said body portion and connecting said layer of material and said rods together.

6. An insulating structure adapted for use in circular form comprising a body portion formed of loosely compressed insulating material, a layer of material arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion, re-inforcing elements having greater resistance than said body portion extended through said body portion from one to the opposite surface thereof, and anchor means extending through said body portion and connecting said layer of material and said rods together, said rods being movable when the structure is arranged in circular form to points removed inwardly from the inner surface of said body portion.

7. An insulating structure adapted for use in circular form comprising a body portion formed of loosely compressed insulating material, a layer of material arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion and re-inforcing members having greater resistance than said body portion extended through said body portion from one to the opposite surface thereof, said re-inforcing members being provided with notches which receive certain of said rods to provide supports for said re-inforcing members and said rods being movable when the structure is arranged in circular form to points removed inwardly from the inner surface of said body portion.

8. An insulating structure adapted for use in circular form comprising a body portion formed of insulating material, a layer of material arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion, anchor means extending through said body portion and connecting said layer of material and said rods together, an outer casing of approximately circular cross-section, said outer casing being split longitudinally and having longitudinally extended flanges of double thickness at the meeting edges of the wall thereof, a portion of said layer of material being interposed between the portions producing the double thickness of each of said flanges to attach said outer casing and said layer of material together, and means engaging said flanges for securing the meeting edges of said structure together.

9. An insulating structure adapted for use in circular form comprising a body portion formed of insulating material, a layer of wire mesh arranged in contact with one surface of said body portion, a plurality of rods arranged in spaced relation in contact with the opposite surface of said body portion, anchor means extending through said body portion and connecting said layer of wire mesh and said rods together, an outer casing of approximately circular cross-section, said outer casing being split longitudinally and the material of which same is formed being bent to produce longitudinally extended and outwardly projected flanges

of double thickness at the meeting edges of the wall of said outer casing, portions of said layer of wire mesh being interposed between the portions of said flanges which produce the double thickness of said flanges to attach said outer casing and said layer of wire mesh together, and means engaging said flanges for securing the meeting edges of said structure together.

In testimony whereof, we have hereunto set our hands.

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