June 16, 1925. 1,542,427

H. R. WARDELL

NONHEAT CONDUCTING COVERING

Filed Oct. 16, 1923

FIG 3

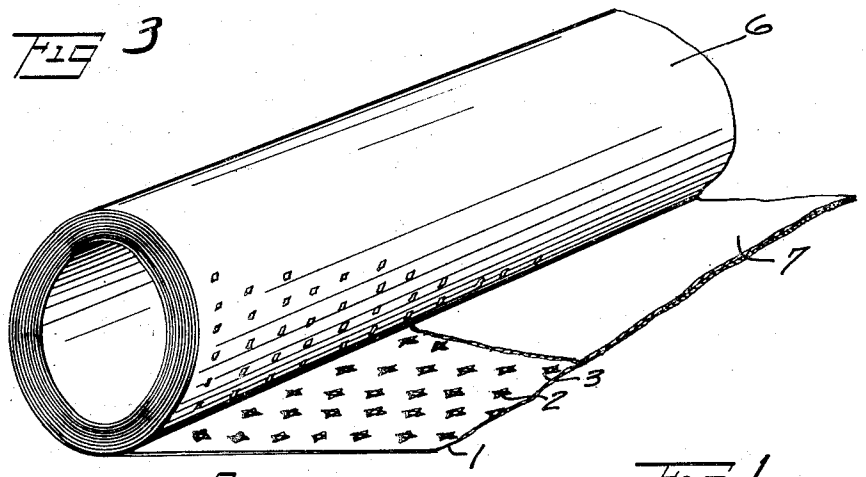


FIG 5

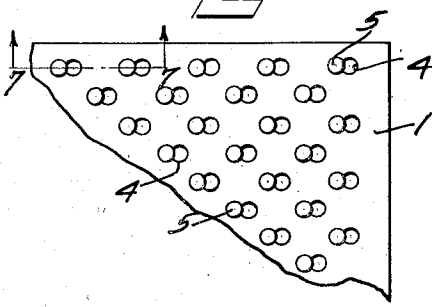


FIG 1

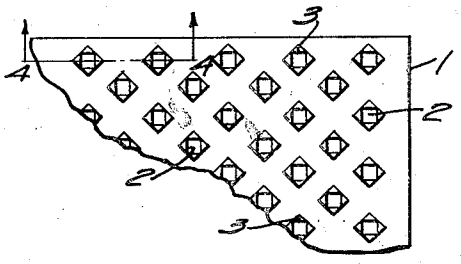


FIG 6

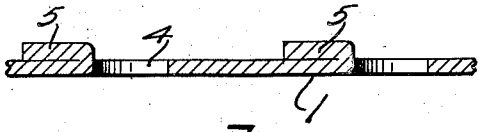


FIG 2

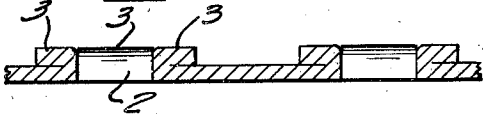


FIG 7

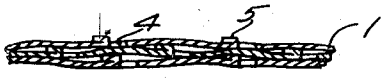


FIG 4



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UNITED STATES PATENT OFFICE.

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NONHEAT-CONDUCTING COVERING.

Application filed October 16, 1923. Serial No. 668,793.

To all whom it may concern:

Be it known that I, HENRY R. WARDELL, a citizen of the United States of America, residing at New York city, in the county and State of New York, have invented certain new and useful Improvements in Nonheat-Conducting Coverings, of which the following is a specification.

My invention relates to the prevention or reduction of any undesired transfer of heat by radiation or conduction, and comprises an improved structure which may be used as a covering for pipes and other articles which have heated surfaces, the loss of heat from which is to be kept at a minimum, or which have cool surfaces, the transmission of heat to which is to be prevented as far as possible. Accordingly my invention may be used on steam pipes to reduce the loss of heat in the contained steam, or on brine pipes to prevent the atmosphere from unduly warming the artificially cooled liquid in said pipes.

The object of the invention is to secure an efficient covering of this kind, i. e., one of low heat conductivity, which shall also be low in cost of manufacture as a result of the simplicity of its construction and process of manufacture, and low in first cost of raw materials.

The best form of structure embodying my invention at present known to me, together with certain modifications thereof, are illustrated in the accompanying sheet of drawings in which:

Fig. 1, is a detail plan view of a sheet of paper prepared for use in my invention, parts being broken away.

Fig. 2, is a detail cross section of a sheet such as shown in Fig. 1, but shown on an exaggerated scale and in a somewhat diagrammatic manner.

Fig. 3, is a perspective view of a section of pipe covering in a process of manufacture employing the paper shown in Figs. 1 and 2.

Fig. 4, is a detail cross section of a portion of a structure such as will be formed by piling up the sheets of Figs. 1 and 2 with intermediate unperforated sheets between.

Figs. 5 and 6 are views similar to Figs. 1 and 2 but illustrating a modification, and Fig. 7 is a detail cross section of a structure formed by superposing sheets such as are shown in Figs. 5 and 6.

Throughout the drawings like reference characters indicate like parts. 1 represents a sheet of asbestos paper or felt in which a plurality of holes 2, 2, have been formed by partly severing small portions of the paper to form tabs, or flaps 3, which are bent away from the plane of the main sheet.

These tabs or flaps may be bent through angles of 180 degrees as illustrated in Fig. 2, but it is only necessary that they be bent far enough so that when subjected to compression along lines at right angles to the plane of sheet 1, they will not bend back into holes 2, 2.

If a series of such sheets as above described are superposed with interspersed unperforated sheets 7, as indicated in Fig. 4, a cellular mass will be formed containing a multitude of closed air spaces 8 formed by the holes 2, and others, 9, formed by the spacing away of proximate portions of an adjacent sheet 7, by the tabs 3, of any particular perforated sheet 1. Such a built up mass can also be formed by rolling a perforated sheet 1, and an unperforated sheet 7, into a tube 6, as shown in Fig. 3. Such tube can then be further dealt with in the manner usual in making commercial pipe covering.

In forming a plurality of tabs 3, around each opening or hole 2, as illustrated in Fig. 1, (where the holes are shown square) it is advisable to make the holes polygonal in shape, a tab being bent up from each side of the polygon, but if only one tab or flap 5, is to be formed from each hole 4, as shown in Figs. 5 and 6, the outlines of the holes may be approximately circular, the sheet being uncut along a small arc of each circle so that the cut portion forming the tab may be bent on that uncut portion as on a hinge.

Sheets having perforations with tabs outwardly bent therefrom of the form shown in Figs. 1 or 5, or otherwise, may be rolled up, or piled up to form a cellular mass without the use of intermediate, or interspersed, unperforated sheets 7, so long as the holes in adjacent sheets, or adjacent coils of the same sheet, are kept out of register one with another. Such a cellular mass formed of sheets perforated as shown in Figs. 5 and 6 is illustrated in cross section in Fig. 7. In such construction each hole 4 and the space surrounding its corresponding tab, or flap 5, would form one closed cell.

While I prefer to use asbestos paper, or

thin asbestos felt cut as shown in the drawings, and with the tabs formed as described, as the main element of my non-conducting covering, it is obvious that sheets of other material might be used and that the manner of forming and bending the tabs or flaps here illustrated could be further modified so long as the principles of operation here outlined are retained.

In any case where the underlying principles of my invention are employed there will be formed a body which is a poor conductor of heat both because of the low conductivity of the material used and the great number of closed air cells existing in said body,—air being a very good heat insulator. The sheets of the type illustrated in Figs. 1 and 5, can be rapidly and cheaply made by passing plain sheets of paper through proper rolls, and the formation of the cylindrical pipe covering by winding up such sheets on a mandril is also a rapid, simple and cheap operation. Consequently my invention produces an efficient non-heat-conducting covering at a low cost.

Having described my invention I claim:

1. A non-heat-conducting covering comprising, in combination, a plurality of superposed sheets of material of relatively low heat conductivity, which said sheets have a plurality of portions partly severed from the main body to form a plurality of small tabs which are bent away from the planes of the sheets far enough to form means of spacing apart from said perforated sheets proximate portions of adjacent sheets.

2. A non-heat conducting covering consisting of the combination of a plurality of superposed sheets of material of relatively low heat conductivity, some of which sheets have a plurality of portions partly severed from the main body to form a multiplicity of small tabs which are bent away from the planes of said sheets, while other sheets interspersed between those first mentioned are devoid of such tab formations, whereby a multiplicity of closed air cells are produced in the structure so formed.

3. As an element in a structure for use as a non-heat conducting covering, which structure is composed of a multiplicity of superimposed sheets of material of relatively low heat conductivity and substantially co-extensive in relative positions, a sheet of material of the character described having a plurality of holes formed therethrough by partial severance of small portions of the material from the main body of the sheet and the bending of such partially severed portions away from the plane of the sheet, said holes being distributed with substantial uniformity throughout said sheet.

HENRY R. WARDELL.