The present invention relates to thermal insulating material for application to enclosures, such as pipes, conduits, tanks, vessels, or other equipment utilized in conveying or storing fluids, such as steam, gases, hot or cold water, or refrigerants, such as dichlorodifluoromethane (Freon 12), or for conduits for electrical conductors. It also relates to an improved process of preparing such insulation and of applying it to such enclosures.

In thermally insulating enclosures for conveying or storing fluids of the type mentioned, it has been the practice to apply a coating of a rigid insulating material to the insulation to the wall of the enclosure or to wrap insulation composed of a facing sheet to which trapezoidal segments of the insulation are adhesively secured around the enclosure. When insulation of such type is applied, it has been the practice to hold the insulation in place by wires or clamps or when a facing sheet is utilized, one end of the facing sheet may be extended beyond one of the terminal segments to provide a flap to which an adhesive is applied during the installation of the insulation and to press the flap with the freshly applied adhesive thereon in overlapping relation with a terminal segment at the opposite end of the insulation. Such methods of applying the insulation to pipes or conduits, however, not only require the use of expensive accessories, such as wires, clamps, or adhesive and brushes, but the application of such accessories, or the use of brushes and adhesive at the location at which the insulation is being installed, is time consuming and increases the final cost of the insulation.

Another difficulty experienced when insulation of such type is applied to an enclosure is that the segments of the insulation frequently do not meet in abutting relation, thus leaving a small space or void between adjacent segments, which voids not only increase the labor required to apply the insulation but they adversely affect the insulating properties of the insulation and are particularly objectionable when the insulation is applied to enclosures in which cold water or refrigerants are being conveyed or stored because in such case, sweating of the enclosure may occur at the place where the segments of the insulation are not in proper abutting relation. The improper fitting of the insulation upon the enclosure may be due to various reasons, such as atmospheric conditions, or the enclosure to which the insulation is to be applied may vary from a nominal size, or the insulation may be slightly imperfect in manufacture, or the enclosure may have a foreign coating thereon of considerable thickness as might occur when a line is being reinsulated and the old covering has not been carefully removed in which case the increased circumference of the outer surface of the enclosure to which the insulation is to be applied may prevent segments of the insulation from being brought into abutting engagement with each other.

In accordance with the present invention, the insulation may be formed integral with or bonded or adhesively secured to a flexible facing sheet, or flexible strips of a suitable material may be applied to overlap adjacent segments of an insulating material to which they may be bonded or adhesively secured to provide joints between the segments when the insulation consists of a plurality of segments. In either case, however, at one end of the insulation, the facing sheet or a strip applied to the insulation or to a terminal segment extends beyond the insulation to form a flap to which a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, is applied at the factory to a controlled thickness and means are provided to protect the adhesive upon the flap from adhering to other layers of insulation or to other objects or material during packing and transportation of the insulation to the location at which it is to be applied to the enclosure which is to be insulated. According to the invention, the protective means is applied to the adhesive on the flap in such a manner that an adhesive on the inner portion of the flap may be first easily exposed so that when the insulation is to be applied to or wrapped around the enclosure, a backing strip is provided which may be applied over the opposite end of the insulation or over a terminal segment thereof to form a temporary bond. The means for protecting the adhesive on the remainder of the flap is also formed in such a manner that the adhesive may be exposed upon the remainder of the flap, or at least the intermediate portion thereof, may be easily exposed so that the remainder of the flap or the intermediate portion thereof with the exposed adhesive thereon may be applied over a substantial area of the opposite end of the insulation or over a terminal segment thereof to provide a firm bond. In the event that intermediate and outer protective strips are provided for protecting the adhesive on those

1. The present invention relates to thermal insulating material for application to enclosures, such as pipes, conduits, tanks, vessels, or other equipment utilized in conveying or storing fluids, such as steam, gases, hot or cold water, or refrigerants, such as dichlorodifluoromethane (Freon 12), or for conduits for electrical conductors. It also relates to an improved process of preparing such insulation and of applying it to such enclosures.

2. In thermally insulating enclosures for conveying or storing fluids of the type mentioned, it has been the practice to apply a coating of a rigid insulating material to the insulation to the wall of the enclosure or to wrap insulation composed of a facing sheet to which trapezoidal segments of the insulation are adhesively secured around the enclosure. When insulation of such type is applied, it has been the practice to hold the insulation in place by wires or clamps or when a facing sheet is utilized, one end of the facing sheet may be extended beyond one of the terminal segments to provide a flap to which an adhesive is applied during the installation of the insulation and to press the flap with the freshly applied adhesive thereon in overlapping relation with a terminal segment at the opposite end of the insulation. Such methods of applying the insulation to pipes or conduits, however, not only require the use of expensive accessories, such as wires, clamps, or adhesive and brushes, but the application of such accessories, or the use of brushes and adhesive at the location at which the insulation is being installed, is time consuming and increases the final cost of the insulation.

3. Another difficulty experienced when insulation of such type is applied to an enclosure is that the segments of the insulation frequently do not meet in abutting relation, thus leaving a small space or void between adjacent segments, which voids not only increase the labor required to apply the insulation but they adversely affect the insulating properties of the insulation and are particularly objectionable when the insulation is applied to enclosures in which cold water or refrigerants are being conveyed or stored because in such case, sweating of the enclosure may occur at the place where the segments of the insulation are not in proper abutting relation. The improper fitting of the insulation upon the enclosure may be due to various reasons, such as atmospheric conditions, or the enclosure to which the insulation is to be applied may vary from a nominal size, or the insulation may be slightly imperfect in manufacture, or the enclosure may have a foreign coating thereon of considerable thickness as might occur when a line is being reinsulated and the old covering has not been carefully removed in which case the increased circumference of the outer surface of the enclosure to which the insulation is to be applied may prevent segments of the insulation from being brought into abutting engagement with each other.

4. In accordance with the present invention, the insulation may be formed integral with or bonded or adhesively secured to a flexible facing sheet, or flexible strips of a suitable material may be applied to overlap adjacent segments of an insulating material to which they may be bonded or adhesively secured to provide joints between the segments when the insulation consists of a plurality of segments. In either case, however, at one end of the insulation, the facing sheet or a strip applied to the insulation or to a terminal segment extends beyond the insulation to form a flap to which a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, is applied at the factory to a controlled thickness and means are provided to protect the adhesive upon the flap from adhering to other layers of insulation or to other objects or material during packing and transportation of the insulation to the location at which it is to be applied to the enclosure which is to be insulated. According to the invention, the protective means is applied to the adhesive on the flap in such a manner that an adhesive on the inner portion of the flap may be first easily exposed so that when the insulation is to be applied to or wrapped around the enclosure, a backing strip is provided which may be applied over the opposite end of the insulation or over a terminal segment thereof to form a temporary bond. The means for protecting the adhesive on the remainder of the flap is also formed in such a manner that the adhesive may be exposed upon the remainder of the flap, or at least the intermediate portion thereof, may be easily exposed so that the remainder of the flap or the intermediate portion thereof with the exposed adhesive thereon may be applied over a substantial area of the opposite end of the insulation or over a terminal segment thereof to provide a firm bond. In the event that intermediate and outer protective strips are provided for protecting the adhesive on those
portions of the flap, after a temporary bond is provided by the application of the inner portion of the flap to the opposite end of the insulation or a terminal segment thereof, the intermediate strip may be removed to expose the adhesive on the intermediate portion of the flap, and the intermediate portion of the flap with the adhesive thereon is applied over a substantial portion at the opposite end of the insulation or a terminal segment thereof, and the outer strip is retained in place so that the insulation can be readily removed when desired, or the outer portion of the flap may be left free from adhesive in which case the outer strip may be omitted.

It is therefore an object of the present invention to provide an improved thermal insulation for application to enclosures that may be quickly applied without the use of accessories.

Another object of the invention is to provide an improved thermal insulation for application to enclosures in which the insulation includes a facing sheet which is formed integral with or is adhesively secured or bonded to the insulation or in which segments of the insulation are bonded or adhesively secured to strips and in which the facing sheet or a strip secured to one end of the insulation or to a terminal segment thereof is provided with a flap which extends beyond the end of the insulation to which a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, is applied at the exposed thickness and in which means are provided for protecting the adhesive during handling and transportation in such a manner that when the insulation is to be applied to or wrapped around an enclosure, the adhesive on the inner portion of the flap may be first quickly exposed so that the insulation portion of the flap may be applied over the marginal edge of the other end of the insulation or over a portion of a terminal segment thereof to provide a tacking strip for forming a temporary bond and in which the means for protecting the adhesive on the outer or intermediate portion of the flap may then be easily removed to expose the adhesive thereon so that at least the intermediate portion of the flap with the exposed adhesive thereon may be applied over the opposite end portion of the insulation or over a terminal segment thereof to provide a strong bond for holding the insulation in place.

A further object of the invention is to provide an improved insulating material for application to an enclosure in which the insulation or segments thereof are formed integral with or are bonded or adhesively secured to a facing sheet or to spaced strips and in which the facing sheet or a strip secured to the insulation or to a segment thereof extends beyond one end of the insulation to provide a flap having a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive thereon, and in which such insulation includes one or more filler strips composed of an insulating material which strips are arranged between the ends of the insulation or between the terminal segments of the insulation and are held in place by the adhesive when the insulation is to be wrapped around an enclosure having a circumference which is somewhat larger than the inner surface of the insulation which is to be applied to the enclosure in which one of such strips is applied over the opposite end of the insulation or a terminal segment thereof when the flap bearing the adhesive is applied over the filler strip or strips and is pressed in overlapping relation with the other end of the insulation or over at least a portion of the other terminal segment.

An object of the invention is to provide insulating material provided with or formed integral with a facing sheet, or insulating material composed of segments in which the segments are provided with or are formed integral with a facing sheet or are bonded or adhesively hinged together by spaced strips, and in which one end of the facing sheet or a strip secured to the insulation or a segment thereof, is provided with a flap extending beyond one end of the insulation to which a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, is applied at the factory to a controlled thickness and which is protected by inner and outer removable strips, the inner strip of which when removed provides a sufficient area of exposed adhesive to provide a temporary bond when the insulation is wrapped around an enclosure and the inner portion of the flap having the exposed adhesive thereon is applied over the marginal edge of the other end of the insulation or over a terminal segment thereof and in which the outer strip is easily removable to expose the remainder of the adhesive on the flap so that the outer portion of the flap may be applied over a substantial portion of the other end of the insulation or over the other terminal segment to provide a firm bond for holding the insulation in place.

Another object of the invention is to provide an improved insulation in which the insulating material is formed integral with or is adhesively secured or bonded to a facing sheet or spaced strips and in which a portion of the facing sheet or a strip secured to the insulation or a terminal segment of the insulation extends beyond the insulation to provide a flap which is coated with a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, which adhesive is protected by inner and outer easily removable strips, the inner strip of which when removed provides an exposed area of the adhesive of sufficient width to enable one or more filler strips to be pressed against the adhesive adjacent one end of the insulation or between adjacent terminal segments and to provide a tacking strip to form a strong bond when the insulation is applied to an enclosure and in which the outer protective strip when removed exposes a sufficient area of the adhesive on the outer portion of the flap to provide a strong bond for holding the insulation in place when the outer portion of the flap is pressed against the outer face of the opposite end portion of the insulation or over the outer face of the other terminal segment.

A still further object of the invention is to provide an improved process of preparing insulating material and of applying it to an enclosure by means of which the insulation may be quickly applied to an enclosure without the use of tools, brushes, or other accessories.

Other objects and advantages of the invention will be apparent as the specification proceeds.

The invention will be better understood by reference to the accompanying drawings in which:

FIG. 1 is a perspective view of one form of the insulation showing inner and outer strips for protecting the adhesive on a flap extending from the insulation;

FIG. 2 is a side elevational view of the insulation shown in FIG. 1 with parts broken away and showing the inner protective strip removed and two filler strips applied to the exposed portion of the adhesive;

FIG. 3 is a perspective view with parts broken away showing modified means for protecting the inner portion of the adhesive on the flap, the flap being shown in dotted lines when it is in its extended position;

FIG. 4 is a perspective view with parts broken away of a segmental filler strip showing the flap in full lines in its extended position and in dotted lines when it is in a position to protect the inner portion of the adhesive on the flap;

FIG. 5 is a perspective view of a strip of insulation in which three strips are provided to protect the adhesive on the flap;

FIG. 6 is a cross sectional view of the insulation shown in FIG. 1 after it has been applied to a pipe;

FIGS. 7 and 8 are end views of the insulation shown in FIGS. 2 and 5, respectively, after the insulation has been applied to a pipe;

FIG. 9 is a side elevational view of the end portions
of two adjacent sections of the insulation after they have been applied to a pipe and showing a strip of protective tape arranged to overlap abutting ends of the sections;

FIG. 10 is an end view showing another modification of the insulation after it has been applied to a comparatively large pipe with two filler strips shown in place;

FIG. 11 is an end view of another form of the insulation with two filler strips in place and the insulation being shown applied to a pipe;

FIG. 12 is an end view of the insulation shown in FIG. 11 with the filler strips omitted and in which modified means are provided to hold the insulation in place;

FIG. 13 is an end view of another form of the insulation, showing it applied to a pipe;

FIG. 14 is a view similar to that shown in FIG. 12 in which an additional layer of a flexible material is shown wrapped around the insulation;

FIG. 15 is a view similar to that shown in FIG. 1 in which elongated segments are secured to a facing sheet and in which the segments are shaped to provide a strip of insulation which is rectangular in cross section when it is applied to a pipe or conduit;

FIG. 16 is an end view of the insulation shown in FIG. 15 after it has been applied to a pipe or conduit;

FIG. 17 is an end elevational view of another modification of the insulation including a plurality of rectangular segments which when applied to a pipe or conduit provide an insulation having a rectangularly-shaped cross section;

FIG. 17a is an end elevational view of the insulation shown in FIG. 17 with the segments and flap arranged in a compact state for shipment;

FIG. 18 is an end view of the insulation shown in FIG. 17 after it has been applied to a conduit of rectangular cross section;

FIG. 19 is an end elevational view of a section of insulation including two segments, two sections of which may be applied to a pipe or conduit and secured together by an overlapping flap on each section;

FIG. 20 is an end view of the insulation shown in FIG. 19 when applied to a pipe and showing two filler strips in place;

FIGS. 21 and 22 are end views of segments of other forms of the insulation;

FIG. 23 is an end view of two segments of the insulation as shown in FIG. 21 when applied to a pipe;

FIG. 24 is a view similar to that shown in FIG. 23 in which the segments are provided with an outer facing sheet;

FIG. 25 is a perspective view of a layer of flexible insulation provided with a facing sheet which extends beyond one end of the insulation to provide a flap having an adhesive thereon which is protected by inner and outer strips;

FIG. 26 is an end view of the insulation shown in FIG. 25 applied to a pipe and showing a filler strip in place;

FIG. 27 is a perspective view of another form of the insulation;

FIG. 28 is a side elevational view of a plurality of sections of the insulation shown in FIG. 27 when applied to a pipe;

FIG. 29 is a perspective view, looking upwardly, of another form of the insulation and;

FIG. 30 is a side elevational view of another form of the insulation.

While the insulating material of the present invention may be composed of any desired insulating material and may be fabricated in various shapes as will be apparent as the invention proceeds, one of the principal characteristics that distinguish it from prior insulation is the ease with which it may be applied to enclosures without the necessity of providing wires or clamps, or brushes and adhesive, and which when applied provides an efficient insulation which is substantially free of voids. For instance, the insulation may consist of a single layer, or it may be formed of trapezoidal, semicylindrical, or rectangularly-shaped segments composed of foamed, fibrous, or cellular material, such as fibre or foamed glass, asbestos, polyurethane, polyethylene, or polymerized styrol. Polymerized styrol which is held under the trade name of "Styrofoam" has proven especially suitable for use in insulating pipes, conduits, tanks, vessels, and other equipment in which cold water or refrigerant fluids are conveyed or stored. For thermally insulating hot water or steam pipes, the insulation may be composed of fibre or foamed glass, asphalt, urethane, or foamed plastics.

When the insulation is composed of segments, they may be formed integral with each other or they may be secured together in any desired manner. For instance, the segments may be bonded to a facing sheet, such as by applying a solvent to the facing sheet or to the segments to provide a bond between the facing sheet and the segments, or as shown, the segments may be applied to a facing sheet having an adhesive thereon, such as glue, or a resinous adhesive, such as a phenolic, urea-formaldehyde, acrylic, or vinyl resin, or a combination of glue and one or more of such resins, or the adhesive may be of the pressure sensitive type, such as polystyrene ether, or a mixture of a pressure sensitive adhesive and a thermally setting adhesive, such as one or more of the resins mentioned. A facing sheet, however, is not essential because the segments may be bonded to the facing sheet itself, or to strips which overlap adjacent portions of the segments. When the insulation is composed of a large number of small segments as shown in FIGS. 1 to 6, however, it is desirable to form the facing sheet integral with the insulation or to bond the segments to the facing sheet, or to provide a facing sheet having an adhesive thereon and to apply the base portions of the segments to the sheet and when the insulation consists of trapezoidal segments, the base portions of the segments are secured in side by side relation to the facing sheet and their sides are inclined at such an angle to the facing sheet so that when the insulation is applied to a tubular enclosure of a nominal size, the adjacent segments of the insulation will be in abutting relation. For instance, when the insulation consists of eight trapezoidal segments as shown in FIG. 1 for application to a pipe having an inside diameter of one inch, the sides are inclined at an angle of approximately 22½° to the facing sheet.

The strips or facing sheet to which the insulation or segments thereof are secured, may be formed of any suitable flexible material, such as kinkled craft paper, canvas, polyethylene, or polyvinyl chloride. Facing sheets or strips formed of polyvinyl chloride are especially suitable because they are flexible and are impervious to water or water vapors. As shown in FIGS. 1 to 4, the segments 1 are trapezoidal in shape and are secured to a facing sheet 2 provided with an adhesive 3, the thickness of which for purpose of illustration is exaggerated, but which in practice is approximately three mils in thickness.

In accordance with the present invention, the facing sheet or strip secured to the insulation or to one of the terminal segments of the insulation extends beyond the insulation to provide a flap 4 as shown in FIGS. 1 to 4 to which a pressure sensitive adhesive or a mixture of a pressure sensitive adhesive and a thermal setting adhesive 3¢ is applied. The pressure sensitive adhesive may be any of the well known types which is capable of retaining the temperature to which it is subjected in service. It may, for instance, be composed of polystyrene ether, a mixture of low and high molecular weight polyisobutylene, a copolymer of approximately 75 parts by weight of 2 ethyl hexyl acrylate and 25 parts by weight of 2 ethyl hexyl acrylate and methyl methacrylate, or it may be a pressure sensitive adhesive having a natural or synthetic rubber base which is plasticized with resin or a synthetic resin alone or in the presence of a small amount of zinc oxide, or it may be of the silicone type, or an adhesive containing organopolysiloxanes as described in Patents 2,732,318 and 2,744,079. The thermal
setting adhesive, if present should be of a type which sets at the temperature at which the insulation is subjected in service. It may, for instance, be a phenolic condensate, a urea-formaldehyde resin, a resorcinol formaldehyde resin, a melamine formaldehyde resin, or a furan resin.

The pressure sensitive adhesive, or a mixture of the pressure sensitive adhesive and the thermal setting adhesive, may be applied to the flap at the factory to a controlled thickness and means are provided to protect the adhesive to prevent it from adhering to other sections of the insulation or other objects or material during handling and transportation. To enable the insulation to be easily applied to the object to be insulated, it has been found desirable to protect the adhesive in such a manner that the adhesive on the inner portion of flap 4 may be exposed first and to apply a separate protecting strip to the pressure sensitive adhesive on the outer portion of the flap. Various means may be provided for this purpose. As shown in FIG. 3, a portion of the flap adjacent terminal segment 1a with the pressure sensitive adhesive thereon is first bent downwardly as indicated by the numeral 5 and is then provided with a reverse bend 6 to force the adhesive on the remainder of the portion of the flap into engagement with the adhesive on the face of the portion of the flap 4 at which time the outer portion of flap 4 extends upwardly at an angle to terminal segment 1a and is provided with a protective strip 8 having a portion 8a extending beyond one side of the flap, or the adhesive on the inner portion of flap 4 may be pressed into engagement with the adjacent side of terminal segment 1a as shown in dotted lines in FIG. 4 at which time the outer portion of flap 4 which is also shown in dotted lines extends upwardly from the terminal segment and the pressure sensitive adhesive thereon is protected by a strip 8 having an end portion 8a which extends beyond one side of the flap.

Another method of protecting the adhesive includes applying an inner strip 9 having an upwardly and outwardly extending portion 10 and an outer strip 8 having a portion 8a extending outwardly beyond one side of the flap. The protective strips 8 and 9 may be formed of any suitable material, such as thin strips of Kraft paper having a wax or silicone coating on the side which engages the adhesive. In such instances, the inner and intermediate strips 9 and 12 may each be provided with an outwardly inclined portion 10 and 13 respectively, and when the insulation is to be applied to the body to be insulated, the inner strip 9 is first removed and if one or more filler strips are required, they may be applied to the inner portion of flap 4 and will be held in place by the adhesive 3a. The insulation is then wrapped around the enclosure and while one end of the inner strip 9 is engaged to pull the ends of the insulation in abutting engagement with each other or with a filler strip if one or more filler strips are present, and the inner portion of flap 4 with the exposed adhesive thereon is applied over the opposite marginal edge of the other terminal segment to provide a temporary bond in the manner previously specified. The outwardly inclined portion 13 of the intermediate strip may then be grasped to pull the strip 11 from the flap to expose the adhesive on the intermediate portion of flap 4 and the intermediate portion of the flap with the exposed adhesive thereon is pressed into engagement with a substantial area of the opposite edge of the insulation or the outer face of the other terminal segment. In this modification, it is not necessary that the strip 8 be provided with a portion extending beyond one side of the flap because strip 8 is not removed but is left intact as shown in FIG. 6 to provide a strong bond for holding the insulation in place.

In accordance with the present invention, means are provided which substantially reduces the presence of voids and which enables the insulation to be easily applied to an enclosure which is somewhat larger in diameter than a nominal size or has a foreign coating thereon, or when the insulation is slightly smaller than said body to which the insulation is to be applied. For this purpose, a number of strips composed of an insulating material is packed with the insulation so that when the inner portion of the adhesive is exposed as shown in FIGS. 3 and 4 or the inner strip 9 as shown in FIG. 1 is removed, one or more of the strips 11 may be applied adjacent one end of the insulation or adjacent terminal segment 1a with their lower edges adhesively secured to flap 4 so that the ends of the insulation or the segments thereof will engage the filler strips in abutting relation when the insulation is applied to an enclosure as shown in FIG. 7. Strips 11 are comparatively thin and are preferably rectangular in shape and this is particularly true when the insulation is somewhat flexible. When the inner portion of the relatively flexible material and the insulation is to be applied to a tubular enclosure, the filler strips may be trapezoidal in shape. For purposes of illustration, two rectangularly-shaped strips 11 are shown secured to flap 4 by the adhesive 3a. The area of the adhesive on the inner portion of flap 4 which is exposed when the insulation is to be applied should therefore be of sufficient width to enable at least two of such filler strips to be adhesively secured to the flap adjacent to one end of the insulation, or adjacent to terminal segment 1a, and to provide a temporary bond between the ends of the insulation or the terminal segments when the inner portion of the exposed adhesive thereon is applied over the strips and the opposite end of the insulation or over the strips and a small portion of the other terminal segment 1b to provide a temporary bond.

In applying the insulation to an enclosure, it is sometimes desirable to provide means by which the insulation may be easily removed, such as when the insulation is to be temporarily applied to the body to be insulated. Under such circumstances, the pressure sensitive adhesive, or mixture of pressure sensitive adhesive and thermal setting adhesive, on the flap may be protected by an inner protective strip 9, an intermediate protective strip 12, and an outer protective strip 8, each of which may be formed of a thin sheet of Kraft paper having a wax or silicone coating on the side which engages the adhesive. In such a case, the inner and intermediate strips 9 and 12 may each be provided with an outwardly inclined portion 13, respectively, and when the insulation is to be applied to the body to be insulated, the inner strip 9 is first removed and if one or more filler strips are required, they may be applied to the inner portion of flap 4 and will be held in place by the adhesive 3a. The insulation is then wrapped around the enclosure and while one end of the inner strip 9 is engaged to pull the ends of the insulation in abutting engagement with each other or with a filler strip if one or more filler strips are present, and the inner portion of flap 4 with the exposed adhesive thereon is applied over the opposite marginal edge of the insulation or as shown over a marginal edge of the other terminal segment to provide a temporary bond in the manner previously specified. The outwardly inclined portion 13 of the intermediate strip may then be grasped to pull the strip 11 from the flap to expose the adhesive on the intermediate portion of flap 4 and the intermediate portion of the flap with the exposed adhesive thereon is pressed into engagement with a substantial area of the opposite end of the insulation or the outer face of the other terminal segment. In this modification, it is not necessary that the strip 8 be provided with a portion extending beyond one side of the flap because strip 8 is not removed but is left intact as shown in FIG. 6 to provide a strong bond for holding the insulation in place.

It will of course be understood that the strips of insulation shown in the drawings are merely illustrative and...
that the width of the insulation when it is in the flat state will range from approximately one to three feet so that when a section of the insulation is wrapped around an enclosure, such as a pipe or conduit, it will cover a substantial length of the enclosure. When sections of the insulation are applied to a tubular body, the joint formed at the adjacent ends of the two sections are arranged in abutting engagement with each other as shown in FIG. 9 and a tape 14 formed of a suitable material may be applied over the joint between the two sections. The tape 14 may be composed of wrinkled kraft paper, canvas, or polyvinyl chloride having a pressure sensitive adhesive thereon, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, so that it may be easily applied. When the insulation is to be applied to a tubular body of larger or smaller size than a pipe having an inside diameter of one inch, the length of the insulation or the size and number of segments may be varied and if the segments are in accord with shape, the angle at which the faces of the segments are inclined relative to the facing sheet will vary so that when the insulation is wrapped around a tubular body of nominal size, the faces of adjacent segments will be in abutting engagement with each other. In the event, however, that the tubular body to which the insulation is to be applied is slightly larger than a nominal size or the insulation is somewhat smaller than a nominal size, one or more filler strips composed of a suitable insulating material may be applied to the flap adjacent a terminal segment in the manner previously described.

When the insulation is to be applied to a comparatively large enclosure, such as a large pipe or tubular shaped tank, it is frequently desirable to combine two or more standard sections to form the final insulation as shown in FIG. 10. For instance, two sections of insulation as shown in FIG. 1 which have been designated generally by the numerals 15 and 16 in FIG. 10, may be used, section 16 being provided with a flap 4 extending from its facing sheet 2 and in a like manner section 15 is provided with a flap 4 extending from its facing sheet 2, although it will be understood that the flap of each section may extend from a strip secured to its terminal segment 1a. A pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, is applied to each of the flaps at the factory to a controlled thickness and is protected during handling and transportation in the manner shown in FIGS. 1, 3 or 4, and if it is found that the tubular body to which the insulation is to be applied is above the nominal size, or if the section of insulation is below a nominal size, one or more filler strips may be applied to flap 4 adjacent terminal segment 1a of section 16, or one or more filler strips may be applied to the flap of each section adjacent its terminal segment 1a when the adhesive on its inner portion is exposed. When it is necessary to utilize two filler strips, it is desirable, however, to apply one filler strip designated 11 to the flap 4 of layer 16 adjacent its terminal segment 1a and the other filler strip designated 11a to the flap 4a on the layer 15 adjacent its terminal segment 1a as shown in FIG. 10 of the drawing.

In combining and applying the two sections of insulation as shown in FIG. 10 to a tubular body, the adhesive on the inner portion of flap 4 of section 16 may be exposed in the manner previously specified and if necessary, the longitudinal edge of a filler strip 11 is applied to the inner portion of flap 4 adjacent terminal segment 1a of layer 16 so that the exposed adhesive strip 11 is moved into abutting engagement with the terminal segment 16 of section 15. The inner portion of flap 4 with the exposed adhesive thereon may then be applied over filler strip 11, if present, and the marginal edge of terminal segment 16 of section 15 to form a temporary bond. The strip 8 on flap 4 of section 16 is then removed by grasping the extending portion 8a as shown in FIG. 1 and pulling the strip 8 from flap 4 and the remainder of flap 4 with the exposed adhesive thereon is then applied over an extended portion of terminal segment 16 of section 15. The adhesive on the inner portion of flap 4a may then be exposed, and if necessary a second filler strip 11c is applied to flap 4a adjacent terminal segment 1a of section 15 and when the insulation is wrapped around the tubular body by holding the terminal segment 16 of section 16 in place and applying a portion of the outer portion of flap 4a and strip 8 to move segment 1a of section 15 or filler strip 11c, if present, into engagement with the terminal segment 16 of section 16 and to apply a portion of flap 4a over segment 16 of section 16 to form a temporary bond. The strip 8 on the outer portion of flap 4a is then removed in the manner previously specified and the remainder of flap 4a with the pressure sensitive adhesive or a mixture of a pressure sensitive adhesive and a thermal setting adhesive thereon, is applied over terminal segment 1a of section 16 to provide a firm bond for holding the insulation in place. If the tubular body to which the insulation is to be applied and the insulation are of nominal sizes, the filler strips 11 and 11c may of course be omitted.

While in FIGS. 1 to 10, the segments have been shown as being trapezoidal in shape, this is not essential because elongated segments may be provided which are square, rectangular, or semicylindrical in cross section. For instance, in the modification shown in FIG. 11, the insulation is in the form of semicylindrical segments 17 and 18, each of which has an arcuate portion on its inner face to enable it to be applied to a pipe or conduit and as shown a facing sheet is bonded or adhesively secured to each segment and is extended to form flaps 4 and 4a, respectively, and each flap is provided with a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive thereon which is applied at the factory to a controlled thickness and is protected during handling and shipment in the manner shown in FIG. 1, 3 or 4. As shown in FIG. 11, segment 17 is provided with a flap 4 and when the adhesive on the inner portion of flap 4 is exposed, if the pipe to which the insulation is to be applied is somewhat larger than nominal, a filler strip 11 may be applied to the flap adjacent one end of segment 17 and the inner portion of the flap with the exposed adhesive thereon is applied over the filler strip 11, if present, and a marginal edge of segment 18. The strip 8 on the outer portion of flap 4 is then removed and the remainder of the flap 4 with the exposed adhesive thereon is also removed over segment 18. The adhesive on the inner portion of flap 4a may then be exposed in the manner previously specified, and if necessary, an additional filler strip 11a may be applied to flap 4a adjacent one end of segment 18. The flexible flap 4 after it is applied over segment 18 serves as a hinge to permit the segments to be applied around the tubular body and while segment 17 is held in place with one hand, the outer portion of flap 4a with the protective strip 8 thereon may be pulled with the other hand to cause the abutting faces of the segments or the filler strip 11a to engage segment 17, and the inner portion of flap 4a with the exposed adhesive thereon is then applied over the filler strip 11a, if present, and the marginal edge of segment 17 to provide a temporary bond. Strip 8 is then removed from flap 4a to expose the adhesive on the outer portion of the flap which is then applied over the outer face of segment 17.

It will of course be understood that both segments may be bonded to or adhesively secured to a facing sheet at any facing sheet in which case the adhesive on the inner portion of flap 4 may be first exposed at which time the facing sheet acts as a hinge to enable the segments to be applied around the tubular body, and the flap 4 with the exposed adhesive on its inner portion may then be applied over a filler strip, if present, and the marginal edge of segment 18 to form a temporary bond, after which the outer strip
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S is removed, and the remainder of the flap with the adhesive thereon, is applied over a substantial area of segments 6, 7, 9 and 10. When the tubular body to which the insulation is to be applied and the insulation are each of a nominal size, the filler strip may of course be omitted.

As previously stated, however, it is not necessary to provide a facing strip because the segments may be secured together by flexible strips, gum, polyethylene, or polyvinyl chloride. In such case, the semicylindrical sections may be hinged together along one of the joints by a strip 19 of the type mentioned which overlaps and is bonded or adhesively secured to both segments. One of the segments, such as segment 17, is also provided with an additional strip 20 which is bonded or adhesively secured thereto and which extends beyond segment 17 to provide a flap 4 to which a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, is applied at the factory to a controlled thickness and which is protected during shipping and transportation in the manner shown in FIG. 1, 3 or 4 and when the insulation is to be applied to a tubular body, the adhesive on the inner portion of flap 4 is first exposed by one of the methods previously specified and strip 19 which acts as a hinge enables the semicylindrical sections 17 and 18 to be applied to the tubular body held in place and flap 4 with the outer protective strip thereon is engaged to move the segments into abutting relation and the inner portion of flap 4 with the exposed adhesive thereon is then applied over the other segment 18 to provide a temporary bond. The outer protective strip 3, not shown in this modification, but which is similar to strip 8 as shown in FIGS. 1 to 4, may then be removed in the manner previously specified to expose the adhesive on the remainder of flap 4 which may then be applied over segment 18 to provide a firm bond for holding the insulation in place.

When the insulation is composed of flexible material, it is not necessary, however, to provide separate semicylindrical segments because the insulation may be fabricated in the form of a cylinder having a central opening and provided with a longitudinal slit 21 which extends diametrically from a line on the surface of the cylinder to a longitudinal line spaced a short distance from the surface on the opposite side of the cylinder to provide segments 17 and 18 which are integral with each other. When the insulation is formed in this manner, a strip 19 is secured to one of the segments, such as segment 17, and is provided with a flap 4 having an adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, thereon which may be protected during handling and shipment by a protective strip 8 as shown in FIG. 1 having a portion 8a extending from one side of the flap and when the insulation is to be applied to a tubular enclosure, such as a pipe or conduit as shown, segments 17 and 18 may be pulled apart a sufficient distance to permit the insulation to be applied around the tubular body. The strip 8 may then be removed from flap 4 and flap 4 with the exposed adhesive thereon may be applied over an extended portion of segment 17. In this form of the invention, the inner protective strip on flap 4 may be omitted because after the insulation is applied to the enclosure, segments 17 and 18 will have sufficient resiliency to return to their original positions.

While the insulation as described has proven satisfactory in practice, its appearance and insulating properties may be improved by applying a metal foil, such as zirc or aluminum, over the insulation. In such case, the zinc or aluminum foil may be provided with a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, on its inner face to enable it to be easily applied and held in place. When the segments are connected together by means of a pair of strips as shown in FIG. 12 or a single strip as shown in FIG. 13, such a layer which is designated by the numeral 24 in FIG. 14 is particularly desirable.

The insulation as so far described has been shown as engaging or substantially engaging the enclosure to which it is applied. This is not essential, however, because when air spaces are provided around the enclosure to be insulated, the air thus enclosed provides a good insulator.

For instance, a construction may be formed of a plurality of elongated segments which when wrapped around an enclosure is square or rectangular in cross section. One form of this type of insulation is disclosed in FIGS. 15 and 16 of the drawings in which the insulation consists of four elongated segments 1b, 1c, 1d and 1e. As shown in FIG. 15, segments 1b and 1d are larger in cross section than segments 1c and 1e although it will be understood that all segments may be of the same size. In previous modifications, the segments may be formed integral with or may be bonded or adhesively secured to a facing sheet and as shown the faces of the segments are inclined at an angle of 45° to the facing sheet so that when the insulation is wrapped around an enclosure, insulation having a square or rectangular cross section is provided as shown in FIG. 16. As shown in FIG. 15, a flap 4 extends from the facing sheet in the same manner as shown in FIG. 1. If desired, however, the segments may be bonded. Segment 1d is shown in FIGS. 12 and 14 in which case a strip secured to one of the terminal segments extends beyond the insulation to provide the flap 4. As in previous modifications, a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, is applied to flap 4 to a controlled thickness at the factory and while the adhesive may be protected during handling and transportation in the manner shown in FIGS. 3 and 4, as shown in FIG. 15, the inner portion of the flap is protected by a strip 9 having a projection 10 inclined outwardly therefrom, and when the insulation is applied over an insulation, the adhesive on the inner portion of the flap 4 is first exposed by grasping the projection 10 and removing the inner strip 9 while segment 1b is held in place, a pull is exerted on flap 4 and the strip 9 to cause the segments to firmly abut each other and the inner portion of the flap with the exposed adhesive thereon is applied over a small portion of terminal segment 1b to provide a temporary bond. The outer strip 8 is then removed by grasping the extension 8a and pulling strip 8 from the flap 4 to expose the adhesive on the outer portion of the flap and the remainder of the flap with the remaining adhesive in the configuration shown in FIG. 1b to provide a strong bond for holding the insulation on the body to be insulated.

In preparing insulation of a form which is rectangular or square in cross section, however, it is not necessary that the segments shall be of a trapezoidal shape. For instance, the elongated segments may be square or rectangular in cross section. This form of the invention is shown in FIGS. 17, 17a and 18 in which the terminal segments are designated by the numerals 1b and 1a and the intermediate segments by the numerals 1c and 1d and although the segments may be bonded or adhesively secured to a facing sheet by an adhesive of any desired type, to provide the structure shown in FIG. 17, they are preferably secured to facing sheet 2 by a pressure sensitive adhesive or a mixture of a pressure sensitive adhesive and a thermal setting adhesive. As shown in FIG. 17, sheet 2 extends beyond segment 1e to provide a flap 4 which is coated to a controlled thickness with a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, that is protected during handling and shipment in the manner shown in FIG. 3 or 4, or as shown by an inner strip 9 having an outwardly extending projection 10 and an intermediate strip 8 extending beyond the side of flap 4 as indicated by the numeral 8a in FIG. 15.
To conserve space and to protect the adhesive between the spaced segments during shipment, the portion of the facing sheet and the insulated section that is to be provided with a reverse bend 23 as shown in FIG. 17c and in a like manner, the portions of the facing sheet between segments 1c and 1d and segments 1d and 1e may be provided with reverse bends 24 and 25 and flap 4 with the protective strips 9 and 8 thereon may be arranged over segment 1d and with the insulated section that is to be enclosed, segments 1b and 1d are moved upwardly to the positions shown in FIG. 17 at which time facing sheet 2 is removed from the sides of segments 1d and is applied to the adjacent sides of segments 1c and 1a and flap 4 is extended to the position shown in FIG. 17. If desired, however, the segments may be arranged in the same horizontal plane during shipment and an easily removable protective strip, such as strip 9 having an outwardly and upwardly extending portion as shown in FIG. 1, may be applied over the adhesive between the respective segments, and prior to application the segments may be arranged in the positions shown in FIG. 17.

In applying the insulation shown in FIG. 17 to an enclosure as shown in FIG. 18, the adhesive on the inner portion of flap 4 may be exposed in the manner shown in FIG. 3 or 4, or in FIG. 17. protective strip 9 is removed and segment 1c is applied to one side of the enclosure at which time segment 1b of segment 1c is arranged by the numerals 26 and 27 in FIG. 20 to an enclosure, the adhesive on the inner portion of flap 4 of section 26 is exposed in the manner previously described by removing strip 8 as shown in FIG. 19 and segment 1b is arranged so that its lower end engages a portion of segment 1a and if the size of the enclosure to be insulated is above nominal, or if the sections of the insulation are below a nominal size, a filler strip 11 may be applied to ensure engagement of its inner portion of flap 4 with adjacent segment 1a of section 26. The outer strip 8 on flap 4 is then removed and the remainder of flap 4 is applied over segments 16 of section 27 to provide a firm bond. The adhesive on the inner portion of flap 4c of section 27 is then exposed in the manner previously described and if required an additional filler strip 11a may be applied to flap 4c. The segments of section 27 may then be arranged so that segment 1d engages one side of the enclosure to be insulated and segment 1a is arranged above the enclosure. Flap 4c and strip 8 of section 27 are then engaged to move filler strip 11a into engagement with segment 1b of section 26 and the inner portion of flap 4c with the exposed adhesive thereon is applied over segment 1b of section 26 to provide a temporary bond. The outer strip 8 of flap 4c is then removed and the remainder of flap 4c is applied over an extended portion of segment 1b of section 26. It will of course be understood if the insulation shown in FIG. 16 or FIG. 18 is exposed to an enclosure above a nominal size, one or more filler strips may be applied to the facing sheet adjacent segment 1a and in a like manner if the enclosure to be insulated and the insulation shown in FIG. 20 are of nominal size, filler strips 11 and 11a may be omitted. It will also be apparent that instead of providing two sections to form the insulation shown in FIG. 20 spaced strips may be bonded or adhesively secured to adjacent segments or all of the segments may be bonded or adhesively secured to a single facing sheet.

Another modification of the invention is shown in FIGS. 21 to 23. As shown in FIG. 21, an elongated semicylindrical segment 28 is provided with an arcuate-shaped inner face having a pressure sensitive adhesive or a mixture of a pressure sensitive adhesive and a thermal setting adhesive 29 therein which is applied at the factory to a controlled thickness and is protected during transportation and handling by a strip 30 which may be composed of a thin sheet of kraft paper having a wax or silicone coating on the side which engages the adhesive and which protects outwardly a short distance to provide an extension 31. Two elongated segments are of course provided and when the insulation is to be applied to a tubular enclosure, the protective strip 30 is removed from each segment by grasping the extension 31 and pulling the protective strip from the segment and two semicylindrical segments 28 are arranged in opposed relation to each other around the tubular enclosure and may be pressed into engagement therewith as shown in FIG. 22 to retain the insulation in place. Instead of applying the adhesive to only the arcuate-shaped portion of the inner face of each segment, the entire inner face of each segment including the arcuate central portion may be coated with a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, or to protect the adhesive on the facing sheet during transportation and handling, segment 1b may be arranged in alignment with segment 1a and the arcuate portion of the facing sheet between the two segments may be provided with a reverse bend in the manner shown in FIG. 17a, or segments 1b and 1a may be arranged in the same longitudinal plane during shipment and an easily removable protective strip having an upward and outwardly extending protective strip 34 to expose its inner portion may be applied over the adhesive between the segments. When the insulation is to be applied to the enclosure, however, the segments on the sections are arranged in the manner shown in FIG. 19 with a portion of facing sheet 2 engaging one side of segment 1a and with flap 4 extending from its opposite side.

In applying two of such sections which have been design-
of its inner face for maintaining the insulation on the pipe. If the elongated segments shown in Fig. 22, with the exposed adhesive thereon are applied to a tubular enclosure, the adhesive will extend over the inner face of the segments as well as the arcuate central portion. As shown in Fig. 24, an outer wrapper 36 is applied around the insulation. The wrapper may be composed of crinkled Kraft paper, canvas, polyethylene, or polyvinyl chloride or it may consist of metal foil, such as aluminum or zinc, and the wrapper preferably has a layer of a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, on its inner face so that it may be readily applied to the insulation.

As previously stated, it is not necessary that the insulation of the present invention shall be formed of a plurality of segments. For instance, the insulation may be formed of a flexible fibrous material 37, such as fibre glass, as shown in Fig. 25 which may be bent around an enclosure to be insulated. In such case, the insulation may be formed integral with, or bonded or adhesively secured to a facing sheet 2 having a flap 4 extending beyond one end of the insulation, or a strip may be provided which is bonded or adhesively secured to one end portion of the insulation and which is extended outwardly from the insulation to provide the flap. As in previous modifications, the flap is provided with a pressure sensitive adhesive and a thermal setting adhesive, thereon which is applied to a controlled thickness at the factory and which may be protected during handling and transportation in the manner shown in Figs. 3 or 4, or as shown in Fig. 25, it may be protected by an inner strip 9 having an outwardly extending portion 10 and an outer strip 8 having a portion 8a extending outwardly beyond one side of the flap and when the insulation is to be applied to an enclosure, the outwardly extending portion 10 is engaged to pull strip 9 from the flap to expose the adhesive on the inner portion of the flap. In applying the insulation to the enclosure, one end of the insulation is held in place and the flap 4 with the strip 8 thereon is pulled around the enclosure to arrange the end portions of the insulation in abutting relation at which time the inner portion of flap 4 with the exposed adhesive thereon is extended over and pressed against the marginal edge of the opposite end of the insulation to provide a tacking strip which forms a temporary bond. The portion 8a of strip 8 may then be grasped to pull strip 8 from the outer portion of the flap and the outer portion of the flap with the exposed adhesive thereon is also extended outwardly over the opposite end of the insulation. In this case the inner face of the insulation will be wrinkled during application to provide dead air spaces which also have thermal insulating properties. As in the other modifications previously described, if the insulation shown in Figs. 25 and 26 is to be applied to an enclosure which is slightly larger than a nominal size or if the insulation is slightly smaller than a nominal size, after the adhesive on the inner portion of flap 4 is exposed, the lower longitudinal edge of one or more filler strips may be applied to the flap 4 adjacent to one end of the insulation to form the insulation shown in Fig. 26. It will be understood that the insulation of the present invention may be fabricated in various shapes to the like may be applied to an enclosure of any desired type. For instance, it may be fabricated to cover T-joints, reducing valves, and other shaped pipe fittings. As an illustration of this factor, a portion of insulation shown in Figs. 27 and 28 is fabricated in such a manner that it may be applied to the bend of a pipe. As shown in Fig. 28, the insulating sections 39 may be of the type shown in Figs. 1 to 4 and are applied to the pipe in the manner previously described.

In providing insulation for covering the bend in the pipe, a plurality of sections 40 may be provided, each of which comprises a plurality of segments which may be formed integral with, or bonded to or adhesively secured to a facing sheet 2 extending beyond the segments to provide a flap or the segments may be bonded to or adhesively secured to spaced strips and a strip secured to one of the terminal segments may be provided which extends beyond the insulation to provide the flap 4. Flap 4 is coated with a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, which may be applied at the factory to a controlled thickness and the adhesive on the inner portion of the flap may be protected during handling and shipment in the manner shown in Fig. 3 or Fig. 4, or as shown in Fig. 24, it may be protected by a strip 9 having an outwardly extending portion 10. As shown in Fig. 27, in the sections of the insulation for covering the bend of the pipe, the terminal segments 1a and 1b are comparatively long and the segments gradually decrease in length to the shortest segments 1f which is arranged at substantially the central portion of the insulation, and when the insulation is to be applied to the bent portion of the pipe, the outwardly extending portion 10 of strip 9 is grasped to remove strip 9 and expose the adhesive on the inner portion of flap 4. The insulation is then wrapped around the bent portion of the pipe with the smallest segments 1f arranged at that portion having the smallest radius and while section 1b is held in place, a plug is exerted upon the flap 4 and the protective strip 8 to cause the segments to abut each other at which time the inner portion of flap 4 with the exposed adhesive thereon is applied over segment 1b to form a temporary bond. The outer is then removed in the usual manner by grasping extension 8a of strip 8 and pulling strip 8 from the outer portion of the flap and the remainder of flap 4 with the adhesive thereon is applied over a substantial portion of segment 1b. If the pipe is slightly larger than a nominal size, the protective strip 8 is removed or filler strips formed of a suitable insulating material may be applied to the inner portion of flap 4 adjacent terminal segment 1a and held in place by the adhesive. A tape formed of a suitable material, such as polyvinyl chloride or polyethylene having a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive on its inner face, may of course be applied over the joints formed at the junction of the sections in the manner shown in Fig. 9.

Another modification of the invention is shown in Fig. 29 which discloses a plurality of trapezoidal sections and while the segments are formed integral with each other or bonded or adhesively secured to spaced strips, as shown, the segments are secured by an adhesive 3 of any desired type to a facing sheet 2 which extends beyond the segments to form a flap 4 having a pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive 3a applied to its inner portion which may be protected during handling and transportation in the manner shown in Fig. 3 or Fig. 4, or as shown in Fig. 29 with a protective strip 9 having an outwardly extending portion 10 which may be grasped to easily remove the strip 9. A pressure sensitive adhesive, or a mixture of a pressure sensitive adhesive and a thermal setting adhesive, is also applied to the outer face of sheet 2 at a spaced distance from its opposite end which is protected during transportation and handling by a strip 8 having a portion 8e extending outwardly beyond the facing sheet.

In applying the insulation shown in Fig. 29 to an enclosure, the insulation on the inner portion of flap 4 may be exposed and while segment 1b is held in place, flap 4 is engaged to wrap the insulation around the enclosure to be insulated and flap 4 with the exposed adhesive on its inner face is applied over the marginal edge of the terminal segment 1b or sheet 2 to provide a temporary bond. Strip 8 is then removed to expose the adhesive on the opposite end of the facing sheet and the outer portion of flap 4 is applied over a substantial por-
tion of the terminal segment 1b or the facing sheet and is held in place with the exposed adhesive on the facing sheet to provide a firm bond. In this modification, if desired, the outer portion of flap 4 may be coated with a contact adhesive, such as latex, and the same or a similar adhesive may also be applied to the base portion of segment 1b or to the facing sheet 2 at a spaced distance from terminal segment 1b in which case strip 8 may be omitted. In applying insulation of this type to an enclosure, however, the strip 9 is removed and after the insulation has been wrapped around an enclosure and a temporary bond is formed, the contact adhesive on the outer portion of flap 4 may be applied over the contact adhesive on the outer surface of sheet 2 at a spaced distance from segment 1b as shown in FIG. 29.

When the insulation is composed of segments, it is not necessary that the segments be formed separately. For instance, as shown in FIG. 30, the segments are formed integral with each other and if desired a strip may be secured to the insulation which extends therefrom to form the flap 4 in the manner shown in FIG. 1 and although the segments may be bonded to the strip or facing sheet, as shown in FIG. 30, the insulation is secured to the facing sheet by the exposed adhesive such as one or more of those previously mentioned, and the facing sheet is extended to provide a flap 4 which is coated with a pressure sensitive adhesive or a mixture of a pressure sensitive adhesive and a thermal setting adhesive 34 which may be protected in any desired manner during handling and transportation, such as in the manner shown in FIG. 3 or FIG. 4 or as shown by an inner protective strip 9 having a projection 10 and an outer protective strip 8 having a portion 8e extending beyond the flap as shown in FIG. 1. The insulation shown in FIG. 30 may be applied to an enclosure in the same manner as the shown shown in FIG. 1.

When a mixture of a pressure sensitive adhesive and a thermal setting adhesive is applied to the flap or to the outer surface of the insulation or to a facing sheet or a strip thereon or to a covering for the insulation, the mixture should consist of a major proportion of the pressure sensitive adhesive so that a firm bond will be obtained when the insulation is applied. In such mixtures, the thermal setting adhesive improves the durability of the bond that is provided when the adhesive sets and may be present in effective amounts ranging from approximately 2% to 5% up to approximately 25% to 48% of the mixture. It will of course be apparent that the thermal setting adhesive should be of a type that will set at the temperature to which the insulation is exposed in service. It may, for instance, be of a type that will set at raised, normal or low temperatures. Thermal setting adhesives of such type are now well known in the art and are described in the literature. See, for instance, the publication entitled "Adhesion and Adhesive Fundamentals and Practices," published by John Wiley and Son, New York, in 1954.

What is claimed is:

1. In the method of applying to an enclosure an insulating material having a flap secured to and extending outwardly from one end of the insulation which has a coating thereon comprising a pressure sensitive adhesive and in which separate means are provided to protect the adhesive on the inner and outer portions of said flap during handling and transportation including a removable strip which covers an outer portion of the flap and which has a portion extending outwardly from the flap, the steps which comprise first displacing the protective means on the inner portion of the flap to expose the adhesive on the inner portion of the flap, holding one end of the insulation in place on the enclosure while exerting a pull on said strip and the outer portion of the flap and then wrap the insulation around the enclosure to arrange the ends of the insulation in abutting engagement, pressing the inner portion of the flap with the exposed adhesive thereon into engagement with a marginal edge of the opposite end of the insulation to provide a temporary bond, grasping that portion of the protective strip which extends from the flap and pulling the outer strip from the adhesive on the outer portion of the flap, and then pressing the outer portion of the flap with the exposed adhesive thereon into engagement with a substantial portion of the opposite end of the insulation to provide a permanent bond.

2. In the method of applying an insulating material to an enclosure which is somewhat larger than the inner face of the insulating material that is to be applied thereto and in which the insulating material has a flap secured to and extending outwardly from one end portion of the insulation which has a coating comprising a pressure sensitive adhesive thereon and in which separate means are provided to protect the adhesive on the inner and outer portions of the flap including a removable strip which covers an outer portion of the flap, the steps which comprise displacing the protective means on the inner portion of the flap to expose the pressure sensitive adhesive thereon, applying the lower longitudinal edge of a filler strip to the adhesive-coated flap adjacent one end of the insulation, holding one end of the insulation in place on the sheet of course and grasping the outer portion of the flap and the protective strip thereon to pull the insulation around the enclosure to arrange the ends of the insulation in abutting engagement with the filler strip, pressing the inner portion of the flap with the exposed adhesive thereon into engagement with the outer edge of the filler strip and the marginal edge portion of the insulation at the opposite end to form a temporary bond, pulling the outer strip from the adhesive on the outer portion of the flap, and then pressing the outer portion of the flap with the exposed adhesive thereon into engagement with a substantial portion at the opposite end of the insulation to provide a permanent bond.

3. In the method of applying first and second sections of an insulating material to an enclosure, each section of which has a flap secured to and extending outwardly from its first end portion and which has a coating thereon comprising a pressure sensitive adhesive and in which separate means are provided for protecting the adhesive on the inner and outer portions of each flap including a removable strip on each flap which covers an outer portion of the flap, the steps which comprise displacing the protective means for the adhesive on the inner portion of the flap of the first section to expose the pressure sensitive adhesive thereon, applying the inner portion of the flap with the exposed adhesive thereon over the margin of the second end portion of the insulation of the second section to provide a temporary bond, removing the strip on the outer portion of the flap of the first section to expose the pressure sensitive adhesive on the outer portion of the flap and applying the outer portion of the flap of the first section with the exposed adhesive thereon over an extended area of the second end portion of the second section to provide a permanent bond, displacing the protective means on the inner portion of the flap of the second section to expose the adhesive on the inner portion of the flap of the second section, holding the second end portion of the first section in place on the enclosure and wrapping the insulation around the enclosure to arrange the first end portion of the second section in abutting engagement with the second end portion of the first section, applying the inner portion of the flap of the second section with the exposed adhesive thereon over the margin of the second end portion of the first section to provide a temporary bond, removing the outer strip on the flap of the second section to expose the adhesive on the outer portion of the flap of the second section, and then applying the outer portion of the flap of the second section with the exposed adhesive thereon over an extended area of the second end portion of the first section to provide a permanent bond for holding the insulation in place.
4. In the method of applying first and second sections of an insulating material to an enclosure that is somewhat larger than the inner face of the insulation which is to be applied thereto, and in which each section is first applied to the outer portion of each end and a flap secured to and extending outwardly from the first end of each section and of said flaps having a coating thereon comprising a pressure sensitive adhesive and in which separate means are provided for protecting the adhesive on the inner and outer portions of said flaps and providing for removal of the said flaps when desired, and said facing sheet having a flap extending from the first terminal segment having a coating comprising a pressure sensitive adhesive thereon and in which separate means are provided for protecting the adhesive on the inner and outer portions of said flap, the steps which comprise raising the second terminal segment from the first terminal segment and the third segment above the first terminal segment and the fourth segment, displacing the protective means for the adhesive on the inner portion of the flap, placing the fourth segment along one side of the enclosure to cause the second terminal segment to extend above the enclosure and the third segment to extend below the enclosure, moving the first terminal segment upwardly along the opposite side of the enclosure to arrange its free end portion in butting engagement with the second terminal segment, applying the inner portion of the flap with the exposed adhesive thereon to the second terminal segment to form a temporary bond, removing the protective means from the adhesive on the outer portion of said flap, and then applying the outer portion of the flap with the exposed adhesive thereon over a substantial portion of the second terminal segment to form a permanent bond.

7. A covering for an enclosure including an insulating material, means secured to a surface of the insulating material and extending therefrom to provide a said flap, said flap having a coating comprising a pressure sensitive adhesive on the inner portion of its face, means adherent to the adhesive on the inner portion of the flap for protecting the adhesive thereon from adhering to other articles during handling and transportation, said protective means being removable to expose the adhesive on the inner portion of said flap and the width of the area on the inner portion of the flap when exposed being sufficient to form a temporary bond when an adhesive is applied around an enclosure and the inner portion of the flap with the exposed adhesive thereon is pressed over a marginal edge portion at the opposite end of the insulation, and means for protecting the adhesive on an outer portion of said flap from adhering to articles during handling and transportation including a removable strip which is adherent to the adhesive on the outer portion of said flap and which has a portion extending from the flap which is free from adhesive.

8. A covering for an enclosure including an insulating material, means secured to the insulating material and extending therefrom to provide a said flap, said flap having a coating comprising a pressure sensitive adhesive on the inner portion of its face, means adherent to the adhesive on the inner portion of the flap for protecting the adhesive thereon from adhering to other articles during handling and transportation, said protective means being removable to expose the adhesive on the inner portion of said flap and the width of the area on the inner portion of the flap when exposed being sufficient to form a temporary bond when the insulation is applied around an enclosure and the inner portion of the flap with the exposed adhesive thereon is pressed over a marginal edge portion at the opposite end of the insulation to form a temporary bond, a pressure sensitive adhesive on the outer face of the insulation at a spaced distance from the end opposite to that from which the flap extends, means for protecting the pressure sensitive adhesive on the outer face of the insulation by means of the insulating material which protects the adhesive and is easily removable so that after a temporary bond is formed between the adhesive on the inner portion of the flap and the opposite end of the insulation, the remainder of the flap may be pressed into engagement with the exposed adhesive on the outer face of the insulation to provide a permanent bond.

9. A covering for an enclosure to be insulated includ-
ing a main body of insulation which is somewhat smaller than that required to cover the enclosure, means secured to the main body of insulation having a flap extending therefrom, said flap having a coating thereon comprising a pressure sensitive adhesive, the inner portion of which is exposed, and said insulation also including a thin filler strip having its lower longitudinal edge secured to the exposed adhesive on the inner portion of the flap adjacent to one end of the main body of insulation and the width of the exposed adhesive on the inner portion of the flap being sufficient to form a temporary bond when the insulation is wrapped around the enclosure to move said filler strip into abutting engagement with the second terminal segment and the inner portion of the flap with the exposed adhesive over the outer longitudinal edge of said filler strip and the marginal edge portion of the second terminal segment, and means for protecting the pressure sensitive adhesive on the outer portion of said flap during handling and shipment of the insulation which protecting means may be easily removed to expose the adhesive on the outer portion of the flap so that the outer portion of the flap with the exposed adhesive thereon may be applied over a substantial area of the terminal segment at the opposite end of the insulation to provide a permanent bond after a temporary bond is formed between the inner portion of the flap and the opposite edge portion of the main body of insulation.

10. A covering for an enclosure including an insulating material consisting of a plurality of elongated segments having inner and outer faces, means overlapping the outer faces of the segments for securing them together, a flap secured to and extending outwardly from the outer face of one of the terminal segments, said flap having a coating on its inner face comprising a pressure sensitive adhesive, means adherent to the adhesive on the inner portion of the flap for providing engagement with the opposite portion of the flap from adhering to other articles during handling and transportation, said protecting means being displaceable to expose the adhesive on the inner portion of the flap and the area on the inner portion of the flap with the exposed adhesive thereon being sufficient to form a temporary bond when the insulation is wrapped around the second terminal segment and the flap with the exposed pressure sensitive adhesive on its inner face into engagement with the second terminal segment, and means for protecting the adhesive on the outer portion of said flap from adhering to other articles during handling and transportation including a removable strip which is adherent to the adhesive on the outer portion of the flap.

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