April 17, 1962 P. L. LOSSE 3,030,250

THERMAL PIPE COVER

Filed Sept. 18, 1957 2 Sheets-Sheet 1

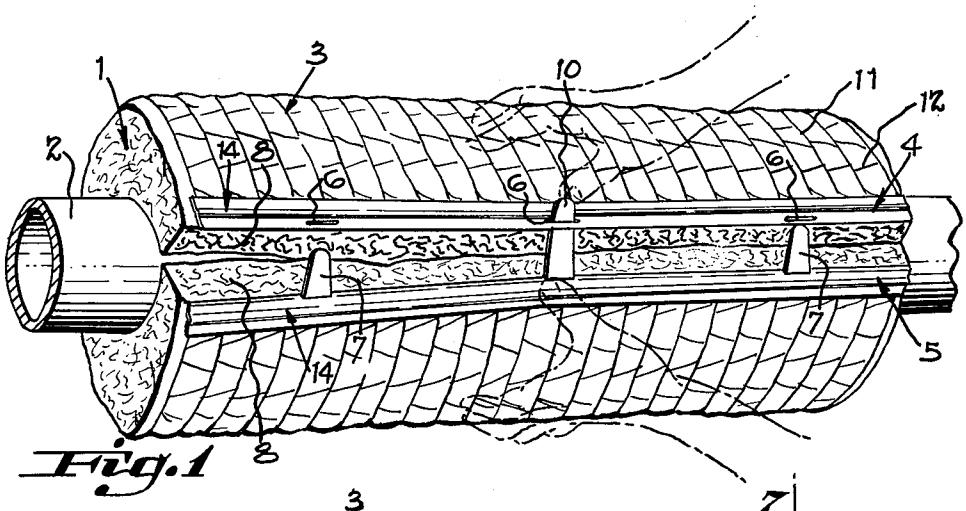


Fig. 1

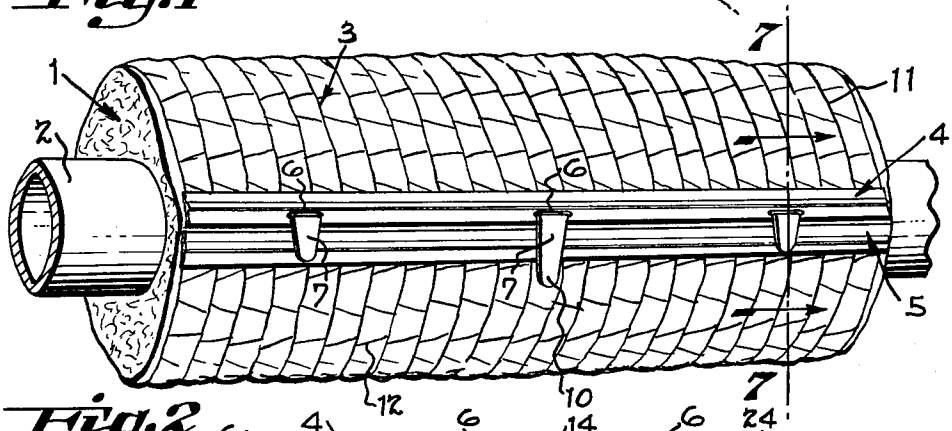


Fig. 2

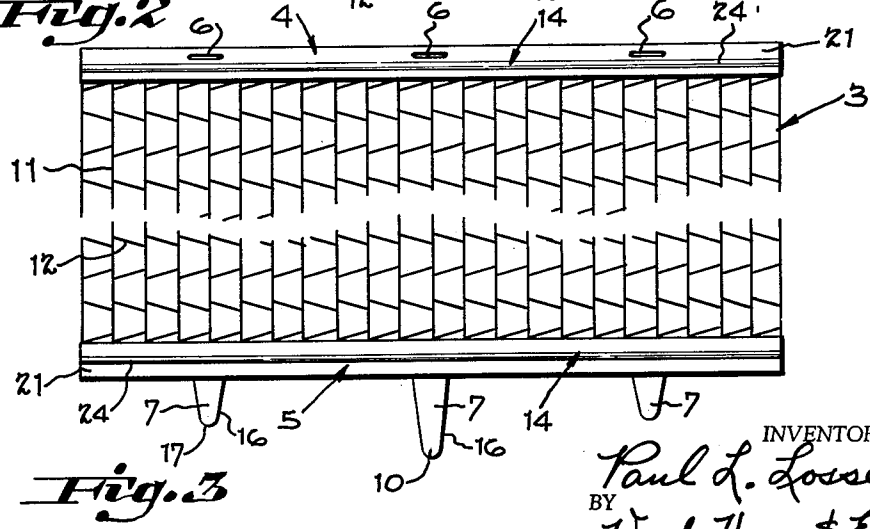


Fig. 3

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THERMAL PIPE COVER

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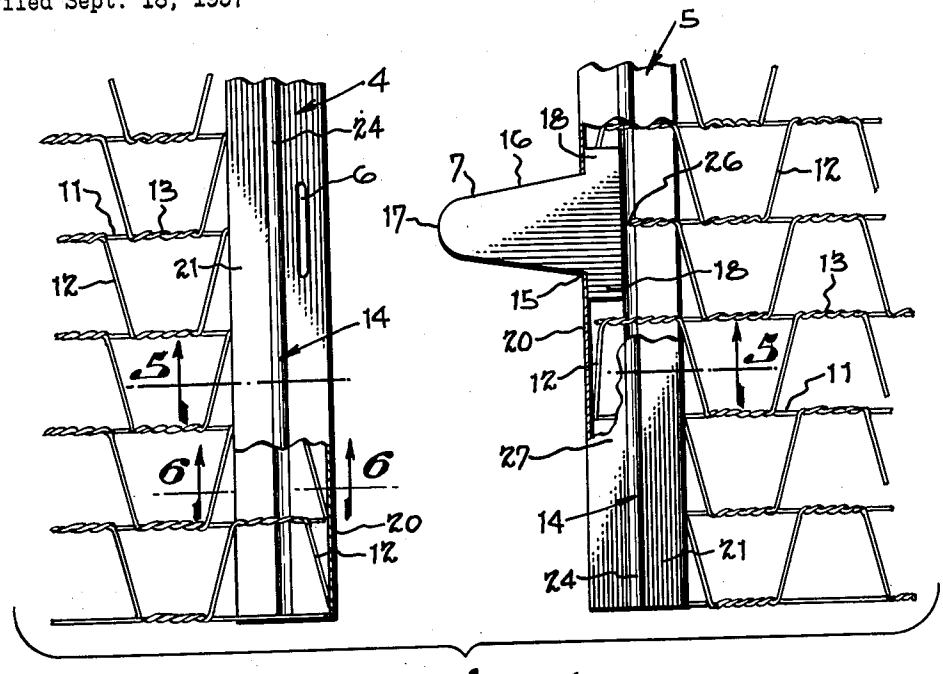


Fig. 4

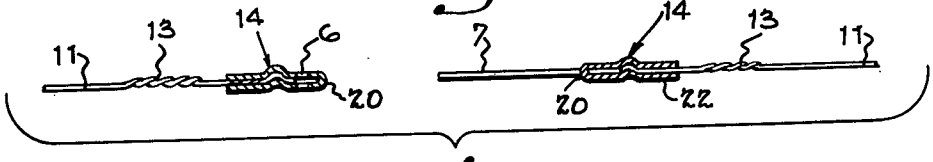


Fig. 5

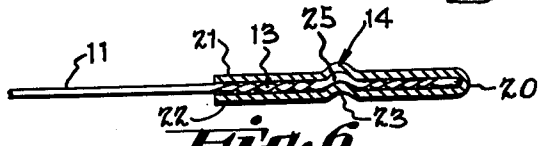


Fig. 6

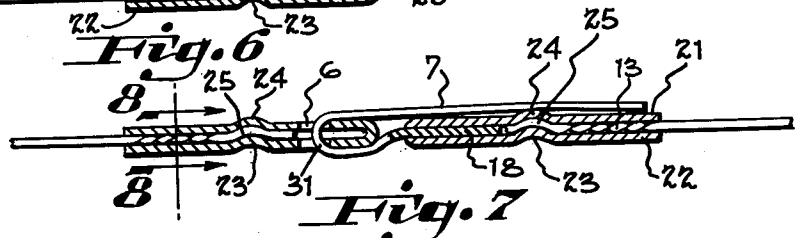


Fig. 7

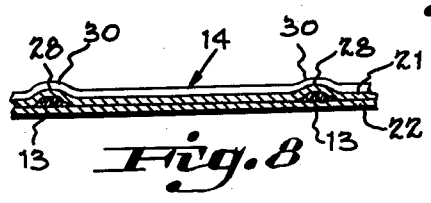


Fig. 8

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THERMAL PIPE COVER

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Filed Sept. 18, 1957, Ser. No. 684,688
8 Claims. (Cl. 154—44)

This invention relates to thermal insulation for pipes and is directed particularly to a jacket structure which secures the covering about the periphery of the pipe. Coverings of this character are installed extensively on pipes and conduits which are used for heat or steam transmission, particularly where high temperatures are involved.

One of the primary objectives of the invention has been to provide a prefabricated pipe insulating sleeve which is quickly and easily installed about the bare piping in the field without requiring fitting or other alterations and without the use of tools.

Another objective has been to provide a metallic jacket structure which confines a soft fibrous insulating material under controlled pressure at all points along the length and about the periphery of the pipe, thereby to hold it firmly in position and to increase its thermal insulating efficiency.

In general, the pipe insulating sleeve to which the invention is addressed comprises a relatively thick envelope or blanket of felted mineral wool or similar material, an external reinforcement jacket formed of pliable wire fabric for confining the mineral wool blanket in compression about the periphery of the pipe, and binder strips permanently attached to the edges of the wire fabric. These strips distribute the tension forces uniformly along the edges of the wire fabric at installation. For rapid convenient installation, one of the binder strips includes a series of spaced tongues formed of ductile sheet metal and projecting outwardly, while the adjacent binder strip is provided with a series of slots in registry with the tongues.

At installation, the blanket and its jacket are wrapped about the pipe, bringing the binder strips in proximity to one another, then the tongues are inserted through the slots and the binder strips are drawn toward one another to apply tension and thereby contract the wire jacket and its blanket about the pipe. Thereafter, the tongues are bent over upon themselves to clinch the abutting binder strips to one another, thus permanently securing the cover about the pipe. The mineral wool blanket has limited tensile strength but has good thermal insulating qualities; hence, the wire fabric jacket, which supplies the tensile strength, make it possible to use the mineral wool for pipe insulating purposes.

A further objective has been to provide a simple but reliable attachment of the binder strips to the edges of the wire fabric, such that there is no possibility of the strips becoming detached under the tension forces which are imparted to the wire fabric at installation.

For this purpose, the binder strips are fabricated from sheet metal which is doubled over the edge portion of the wire fabric at opposite ends. To secure the strips in positive connection with the fabric, a longitudinal corrugation or bead is impressed into each double strip, such that the edge portion of the fabric jacket is clinched in interlocking engagement with the binder strips.

The deformable tongues, which project outwardly from the edge of one of the binder strips, are in the form of separate stampings to conserve material. Before the metal fabric is attached, the strip is partially bent to a V-shape along its longitudinal center line, the tongues are slipped endwisely through slots formed in the strip, then the strip is clinched over the wire fabric, thus securing the tongues in place at the same time the strip is mounted. The mineral wool blanket in the form of a bat is attached to the wire fabric in any well known manner, such as by wires or staples passing through the mineral wool and anchored to the metal fabric; the assembled units are furnished to the user in flat condition ready for installation.

The various features and advantages of the invention are disclosed in greater detail in the following description, taken in conjunction with the drawings:

In the drawings:

FIGURE 1 is a perspective view showing a length of pipe covering being installed upon a pipe or conduit.

FIGURE 2 is a view similar to FIGURE 1, showing the pipe covering clinched permanently in place about the pipe.

FIGURE 3 is a fragmentary plan view diagrammatically illustrating the metal fabric or poultry netting and its metal binder strips.

FIGURE 4 is an enlarged fragmentary plan view detailing the binder strips and metal fabric.

FIGURE 5 is a sectional view taken along line 5—5 of FIGURE 4, further detailing the metal fabric and its binder strips.

FIGURE 6 is an enlarged sectional view taken along line 6—6 of FIGURE 4, detailing the slotted binder strip.

FIGURE 7 is an enlarged fragmentary sectional view taken along line 7—7 of FIGURE 2, detailing the clinched connection of the binder strips after installation about the pipe.

FIGURE 8 is a sectional view taken along line 8—8 of FIGURE 7, detailing the attachment of the binder strip to the metal fabric.

As best shown in FIGURE 1, the assembled pipe cover is installed about the pipe without the use of tools, simply by placing the flat unit against one side of the pipe and then bending it about the pipe to bring the abutting edges together for attachment, as shown in FIGURE 2. Described generally with reference to FIGURES 1 and 2, the envelope or blanket of thermal insulating material is indicated at **1**, and the pipe about which the blanket is wrapped is indicated at **2**. The metal fabric, which jackets the insulating material, is indicated at **3** and the adjoining edges of the fabric are provided with the binder strips **4** and **5**. The slotted strip **4** is provided with spaced oblong slots **6** to receive the tongues or locking tabs **7** which project endwisely from the tongued strip **5**.

The insulating blanket **1** preferably is formed of a fibrous material, such as felted mineral wool. This material, which is well known in the art, comprises a mass of fine filaments or fibers matted in the form of a bat which has sufficient adhesion to withstand a moderate tension force. The blanket is compressible and has sufficient thickness to create an efficient heat barrier.

For a given pipe size, the blanket has sufficient width to encircle the pipe, as indicated in FIGURE 1, and the metal fabric **3**, as measured across the binder strips **4** and **5**, has a width to encircle the blanket under moderate tension. Thus, as viewed in FIGURE 1, the adjoining ends **8**—**8** of the mineral wool blanket reside in slightly spaced relationship when the blanket initially is wrapped about the pipe. The central tongue, as indicated at **10**, has greater length then the endwise tongues, such that the longer tongue may preliminarily be inserted through its slot. Thereafter, the metal jacket **3** is tightened about the blanket by forcing the binder strips toward one another with the hands, as indicated in broken lines in FIGURE 1. When the two binding strips are approximately in contact with one another, the central tongue is folded over upon itself, thus holding the two strips together. The endwise tabs **7** may then be slipped through their mating slots and bent over. In this condition, the metal fabric **3** is confined under moderate tension about

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the blanket, thus compressing the blanket about the pipe and bringing its ends 8 into contact with one another.

It will be understood that the prefabricated insulating units are furnished in widths (as measured across the binder strips) to fit various standard pipe sizes, such that the units may be installed quickly in the field without cutting or fitting. For convenient handling and installation, the units are furnished in individual length sections, for example 24 inches long, each section being provided with three tabs and matching slots as shown in FIGURE 1. The units are installed individually in end-to-end abutment along the pipe.

Described in detail, the metal fabric 3 preferably comprises conventional poultry netting which is pliable and easily bent about the pipe. According to the type illustrated in FIGURE 4, the poultry netting consists of longitudinal wires 11 connected by transverse wires 12 which are wrapped about the longitudinal wires as at 13. The fabricated netting conventionally is galvanized or otherwise treated to prevent corrosion, since it is intended for outdoor use. The netting is attached by clips or the like (not shown) to the external face of the mineral wool blanket and thus imparts tensile strength to the assembly.

As detailed in FIGURES 4–8, the metal binder strips are fabricated from sheet metal, preferably galvanized, each strip being folded upon itself over an opposite edge of the poultry netting. The strips are permanently clinched to the netting by pressing into each doubled strip a longitudinal corrugation indicated at 14, the corrugation being formed by suitable dies after the strips are partially bent and placed upon the edge of the poultry netting.

In fabricating the tongued strip 5, the strip is first blanked out, and oblong slots 15, to mount the tongues, are punched along the longitudinal center line of the strip. Thereafter, the strip is partially folded over upon itself along its center line to a V-shape (not shown) as viewed end-wisely. In this formation, the partially formed strip is ready to be attached to the metal fabric which is cut according to the pipe size for which it is intended.

It will be noted in FIGURE 4, that the locking tongues 7 are in the form of inserts formed of ductile sheet metal. Each tongue is tapered longitudinally as at 16, having a rounded outer end 17 and a pair of shoulder 18—18 at its inner end. The oblong slots 15 have a length which corresponds to the width of the tapered tongue at its base so as to snugly interfit the slot, with the shoulders 18 engaging the bend line 20 of the folded strip. During assembly, the tongues are inserted endwisely through the slots from the rearward or open side of the partially formed V-shaped strip.

After the tongues are inserted through their slots, the partially formed strip is placed in overlapping position upon the edge of the poultry netting, then the parts are placed between suitable dies which press the two limbs 21 and 22 of the strip in pressure engagement with the edge portion of the netting (FIGURE 7). The dies preferably press into the strip the longitudinal corrugation 14 at the same time the strip is pressed upon the netting. As shown in FIGURE 7, the corrugation consists of a concave bead 23 pressed into the limb 22 and a mating convex bead 24 pressed into the upper limb 21, the twisted portion 13 of the netting, which passes across the corrugation being similarly deformed as at 25 and thus clinched within the binder strip. As best shown in FIGURE 4, the corrugation passes along the rearward edge of the shoulders 18 of the tongues; accordingly, the tongue is locked between the fold line 20 and corrugation.

The longitudinal wire 13 at the tab area may be trimmed off as at 26 (FIGURE 4) to accommodate the shoulder portion 18 of the tongue for clearance or may be left intact in which event the tab is deformed around the wire. The remaining edge portion of the netting is left intact, such that the transverse wires 12 extend along the bight portion 27 of the strip between the bend line 20 and corrugation 14. The corrugation thus clinches the wrapped wires 13 securely to the strip and the transverse wires 12 further strengthen the connection.

In order to increase the purchase of the strip to the netting, one or both of the die surfaces may be made of slightly yieldable material to impress into the strip, at least partially, the configuration of the wire netting which the strip embraces. Thus, as seen in FIGURE 8, the upper limb 21 is deformed as at 28 about the twisted wires 13 and the corrugation is similarly deformed as at 30 about the wire at the points of intersection of the longitudinal wires with the corrugation.

The slotted strip 4 for the opposite edge of the netting is applied in substantially the same manner, being preliminarily bent to a V-shape, then placed in position over the edge portion of the netting and forced under high pressure into clinching engagement with it. The corrugation 14 is stamped into the upper and lower limbs 21 and 22 in the same manner. After the pressing operation, the strip is placed between suitable punching dies and the oblong slots 6 (FIGURE 7) are formed. The poultry netting in the slot area is thus severed in the punching operation.

It will be noted with reference to FIGURES 1 and 2, that the binder strips 4 and 5 distribute the tension uniformly along the poultry netting at all points along the length of the binder strips. This holds the mineral wool blanket in contact with the periphery of the pipe at all points along its length. Although the strips 4 and 5 are fabricated from light weight sheet metal, the longitudinal corrugations 14 impart longitudinal stiffness to the strips, thus resisting any tendency for the strips to bulge outwardly in those portions which extend between the attachment tongues.

The mineral wool blanket is attached to the netting as noted earlier, preferably after the binder strips are installed, with the netting and blanket in flat condition for convenient handling. At installation, the netting bends readily as the unit is wrapped about the pipe. After inserting the tongues through their slots, the tongues are bent over preferably by applying force against the outer portion of the tongues to take advantage of the lever effect at the slots, thereby to create the return bend 31 (FIGURE 7) which anchors the two strips firmly together.

Structures manufactured in accordance with the present invention possess remarkably high holding power. For example, 24-inch assemblies fabricated according to the preferred disclosure withstood a pull of 315 pounds before failure and even then failure resulted from unbending of the tab rather than from separation of the wire from the binder strip. Further testing showed that the connection of the wire to the binder strips sustained a tensional pull of over 600 pounds before failure at the crimp joint. From these tests, it is obvious that the structure is capable of withstanding tensional loads far greater than any encountered in installation or use.

As an alternate form of the invention, thin aluminum sheeting is utilized in some instances as jacketing material in place of the poultry netting shown in the drawings. In this case, the binder strips, including the slots and tongues, are applied to the edgewise portions of the aluminum sheet in the same manner as disclosed in FIGURE 7, such that the longitudinal corrugation clinches the binder strips in interlocking engagement with the edges of the sheet to distribute the tension force uniformly. This allows the jacket sheet to be drawn under the necessary tension at installation about the pipe without danger of tearing the sheet. The aluminum sheet presents a neat, trim appearance, and, by its heat reflecting capacity, adds to the thermal efficiency of the unit.

Having described my invention, I claim:

1. A prefabricated thermal insulating cover for pipes comprising, an insulating blanket formed of soft fibrous material, a reinforcing jacket facially engaging the ex-

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ternal surface of the blanket, a pair of binder strips attached to the opposite longitudinal edges of said reinforcing jacket, one of said strips having spaced openings along the length thereof, the other of said strips having a series of tongues spaced apart along the length thereof and projecting outwardly in positions to be inserted respectively through said openings and folded over to lock said strips together, whereby said blanket and reinforcing jacket may be wrapped about the periphery of the pipe with the said binder strips extending in parallelism with the pipe and locked together by said tongues, and with said reinforcing jacket drawn externally about said insulating blanket and holding the same in compression about the periphery of the pipe.

2. A prefabricated thermal insulating cover for pipes comprising, an insulating blanket formed of compressible mineral wool, a reinforcing jacket facially engaging the external surface of said blanket, said jacket formed of pliable metal fabric, a pair of binder strips attached to the longitudinal edges of said metal fabric, said strips distributing tension forces uniformly along the longitudinal edges of the metal fabric, one of said strips having a slot formed therein, the other of said strips having a ductile tongue projecting outwardly in a position to be inserted through said slot and folded over to lock said strips together, said blanket and jacket adapted to be wrapped about the periphery of a pipe with the binder strips extending in parallelism with the pipe and locked together by said tongue, thereby securing the jacket under tension about the blanket and compressing the blanket into intimate contact with the periphery of the pipe.

3. A prefabricated thermal insulating cover for pipes comprising, an insulating blanket formed of compressible mineral wool, a reinforcing jacket facially engaging the external surface of said blanket, said jacket formed of pliable metal fabric, a pair of binder strips attached to the longitudinal edges of said metal fabric, each of said binder strips comprising, a length of sheet metal bent along the longitudinal center thereof and folded over in clinching engagement upon the edgewise portion of said metal fabric, one of said strips having a series of slots spaced along the length thereof, the other of said strips having a series of ductile tongues spaced along the length thereof and projecting outwardly in positions to be inserted respectively through said slots and folded over to lock said strips to one another, said jacket adapted to be wrapped about the periphery of a pipe with the binder strips extending in parallelism with the pipe and locked together by said tongues, thereby securing the jacket under tension about the blanket and compressing the blanket into intimate contact with the periphery of the pipe.

4. A prefabricated thermal insulating cover for pipes comprising, a blanket formed of compressible insulating material, a reinforcing jacket formed of pliable metal fabric, said jacket facially engaging the external surface of said blanket, a pair of binder strips attached to the opposite longitudinal edges of said metal fabric, each of said binder strips comprising a strip of metal doubled over along the longitudinal center thereof and folded over upon the edgewise portion of said metal fabric, said folded strips each having a longitudinal corrugation impressed therein, said corrugation clinching the metal fabric to said folded strip, one of said binder strips having a series of open slots spaced apart from one another along the length thereof, the other of said binder strips having a series of tongues spaced apart from one another along the length of the strip and projecting outwardly therefrom in positions to be inserted respectively through said slots, and folded over to lock said strips together, said blanket and reinforcing jacket adapted to be wrapped about the periphery of the pipe with the binder strips extending adjacent one another longitudinally of the pipe and locked together by said tongues, thereby securing the jacket under tension about the blanket and compressing the blanket into intimate contact with the periphery of the pipe.

5. A prefabricated insulating cover for pipes comprising, a blanket formed of compressible insulating material, a reinforcing jacket formed of pliable metal fabric, said jacket facially engaging the external surface of said blanket, a pair of binder strips attached to the opposite longitudinal edges of said metal fabric, each of said binder strips comprising a strip of metal doubled over along a longitudinal fold line and folded over in clinching engagement upon the edgewise portion of said metal fabric, one of said binder strips having ductile locking tongues residing along the length thereof, each of said tongues comprising a sheet metal insert having a shoulder projecting laterally along one end portion thereof, said shoulder residing within said folded strip adjacent said fold line, said tongue projecting outwardly through said fold line, the other of said binder strips having respective slots residing along the length thereof, said tongues positioned to be inserted endwisely through said respective slots and folded over to lock the binder strips together, said blanket and jacket adapted to be wrapped about the periphery of a pipe with the binder strips extending parallel therewith adjacent one another and locked together by said tongues, thereby securing the jacket under tension about the blanket and compressing the blanket into intimate contact with the periphery of the pipe.

6. A prefabricated insulating cover for pipes comprising, a blanket formed of compressible insulating material, a reinforcing jacket formed of pliable metal fabric, said jacket facially engaging the external surface of said blanket, a pair of binder strips attached to the opposite longitudinal edges of said metal fabric, each of said binder strips comprising a strip of metal doubled over along a longitudinal fold line and folded over upon the edgewise portion of said jacket, said folded strips each having a longitudinal corrugation pressed therein clinching the jacket to said binder strip, one of said binder strips having a series of locking tongues residing along the length thereof, each of said tongues comprising a sheet metal insert having a shoulder projecting laterally along one end thereof, said shoulder residing within said folded strip and confined between said fold line and said longitudinal corrugation, said tongue projecting outwardly from said shoulder through the fold line of the binder strip, the other of said binder strips having respective slots formed along the length thereof, said tongues positioned to be inserted endwsely through said respective slots and folded over to lock the binder strips together, said blanket and jacket adapted to be wrapped about the periphery of a pipe with the binder strips extending lengthwise of the pipe adjacent with one another and locked together by said tongues, thereby securing the jacket under tension about the blanket and compressing the blanket into intimate contact with the periphery of the pipe.

7. A prefabricated thermal insulating cover for pipes comprising, a blanket formed of compressible insulating material, a reinforcing jacket facially engaging the external surface of said blanket, said jacket formed of pliable material, a pair of binder strips attached to the longitudinal edges of said jacket, one of said strips having an opening formed therein, the other of said strips having a tongue projecting outwardly, said jacket being wrapped about the periphery of a pipe with said blanket confined between the jacket and pipe, said binder strips extending lengthwise of the pipe and adjacent one another, said tongue passing endwisely through the said slot and doubled over, thereby locking said binder strips together and drawing the jacket under tension about the blanket and compressing the blanket into intimate contact with the periphery of the pipe.

8. A prefabricated thermal insulating cover for pipes comprising, a blanket fabricated from compressible insulating material, a reinforcing jacket formed of pliable metal fabric, said jacket facially engaging the external

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surface of said blanket, a pair of binder strips attached to the opposite longitudinal edges of said metal fabric, each of said binder strips comprising a strip of metal doubled over along a longitudinal fold line and folded over in clinching engagement upon the edgewise portion of said metal fabric, one of said binder strips having an open slot, the other of said binder strips having a tongue projecting outwardly therefrom, said blanket and reinforcing jacket being wrapped about the periphery of the pipe with the binder strips extending lengthwise of the pipe and adjacent one another, said tongue passing endwisely through said slot and clinched over, thereby locking the binder strips together and drawing the jacket under

tension about the blanket and confining the blanket under compression about the periphery of the pipe.

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