July 1, 1924. 1,499,774

F. A. HEADSON

PROCESS OF MAKING HEAT INSULATING COVERINGS FOR PIPES OR SIMILAR ARTICLES AND COVERING MADE THEREBY

Filed Aug. 26, 1922

Fig. 1.

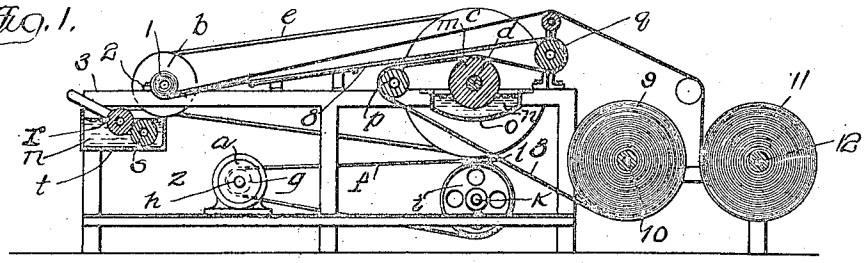


Fig. 2.

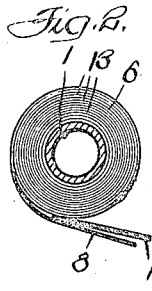


Fig. 3.

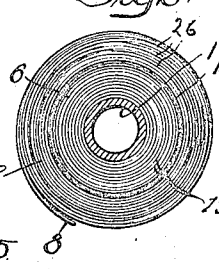


Fig. 4.

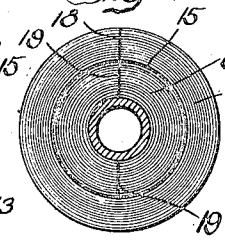


Fig. 5.

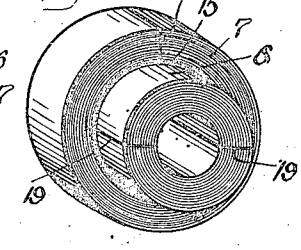


Fig. 6.

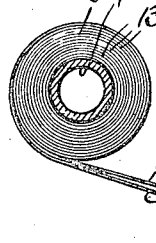


Fig. 7.

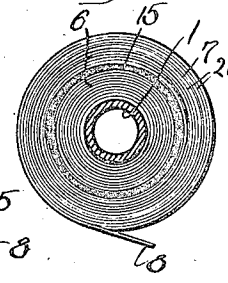


Fig. 8.

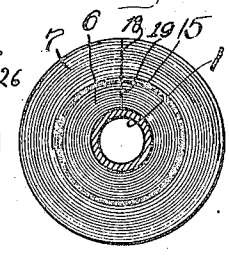


Fig. 9.

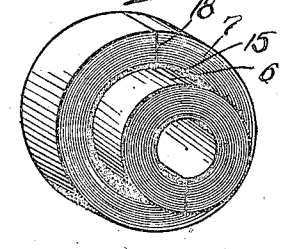


Fig. 10.

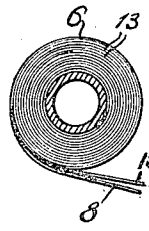


Fig. 11.

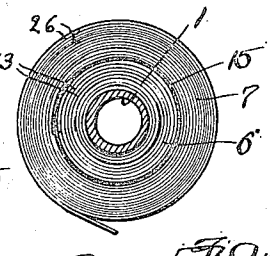


Fig. 12.

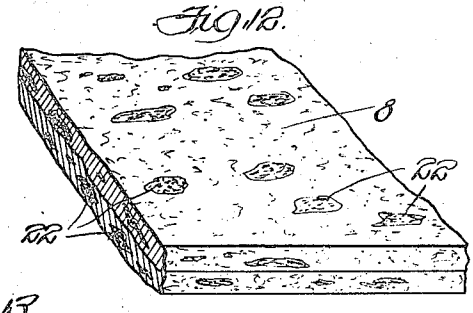
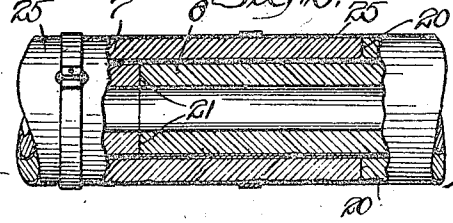


Fig. 13.



Witness:

Inventor:
Frank A Headson
By Harry Irwin Cramer
Atty

Patented July 1, 1924.

1,499,774

UNITED STATES PATENT OFFICE.

FRANK A. HEADSON, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO JOHNS-MANVILLE, INCORPORATED, A CORPORATION OF NEW YORK.

PROCESS OF MAKING HEAT-INSULATING COVERINGS FOR PIPES OR SIMILAR ARTICLES AND COVERING MADE THEREBY.

Application filed August 26, 1922. Serial No. 584,534.

To all whom it may concern:

Be it known that I, FRANK A. HEADSON, a citizen of the United States, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Processes of Making Heat-Insulating Coverings for Pipes or Similar Articles and Coverings Made Thereby, of which the following is a specification.

This invention relates to heat-insulating coverings for pipes or similar articles and to an improvement in processes for making the same.

It relates particularly to an improvement in processes of making heat-insulating pipe coverings, comprising a sheet or sheets of heat-insulating material wound in such a manner as to form a plurality of separable sections one of which is wound upon and encircles the other, each section consisting of or comprising a multiplicity of annular or spiral layers, plies or laminations.

Heretofore it has been customary to wind the separate concentric sections of different diameters, which are placed one over the other (nested together) on the pipe to be covered, in separate operations, on separate mandrils of proper diameters. These two operations have increased costs, and involved the disadvantage that these separately formed sections did not always fit together properly when assembled, and were liable to be injured when the sections were assembled and the smaller was forced into the larger one. I have found that two separate sections can be formed in one winding operation by inserting at the proper point in the winding a dry, uncemented sheet, sheets or section in the coil of material being wound up on one mandril. Then, when the completed tube is slit or cut longitudinally, to enable it to be sprung or snapped over the pipe to be covered, all connection is severed between the portion of the coil inside said dry sheet or section, and the portion outside thereof, so that the two, separated, concentric sections thus formed may be slid one on the other, both longitudinally and circumferentially, to break joints in the manner desired.

In the accompanying drawings, Figure 1 is a view in longitudinal vertical section of a machine of ordinary and well known form, suitable for use in the practice of my improved process of making heat-insulating coverings by and in accordance with my improved process and invention; Fig. 2 is a detail view in transverse vertical section of a rotative support or mandrel, and of a partially completed insulating pipe covering in process of being wound thereon, showing an inner section completely wound, and a plurality of dry intermediate separating layers of sheet material being inserted between the separable inner and outer sections; Fig. 3 is a similar view, showing the winding of the outer section practically completed, with the intermediate separating dry layers between the inner and outer separable sections; Fig. 4, is a similar view, showing the inner and outer separable sections slitted longitudinally from end to end thereof; Fig. 5 is a perspective view showing the longitudinal side slits or margins and the end margins of the inner and outer sections in offset relation. Fig. 6 is an end view showing an inner section and a single intermediate dry separating sheet being wound thereon. Fig. 7 is a similar view of the covering shown in Fig. 6, with the winding of the inner section and intermediate separating sheet completed, with two complete spirals of a coil of the separating sheet between the inner and outer separable sections. Fig. 8 is a similar view of the same covering slitted longitudinally from end to end. Fig. 9 is a view in perspective showing the covering illustrated in Fig. 8, with the inner and outer sections adjusted so that the side and end margins are in offset relation.

Fig. 10 is an end view of an inner section, showing a dry separating sheet being wound thereon, to form a single separating complete spiral of a coil between the inner and outer sections.

Fig. 11 is a similar view showing the outer section being wound around the inner section and dry separating layer of Fig. 10.

Fig. 12 is an enlarged fragmentary detail view of a plurality of sheets of fibrous asbestos having particles of sponge therein.

Fig. 13 is a side view partly in section,

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with parts broken away to show the dry separating layers between the inner and outer sections, and showing the margins of the inner and outer sections in offset relation.

Throughout the drawings like reference characters indicate like parts.

A rotative mandrel or core 1 is provided and rotatively mounted in suitable journal bearings 2 in a supporting frame 3, or other suitable support, which may be of any desired ordinary and well known form adapted to enable the heat-insulating sheet material to be wound upon and removed from the mandrel in such a manner as to form snugly fitting inner and outer separable sections, in accordance with my improved process and invention.

The mandrel 1 is operatively connected with a suitable source of power, such, for example, as a motor *a*, by any desired ordinary and well known means. In Fig. 1 of the drawings is shown a simple and efficient machine suitable for use in the practice of my improved process and invention, in which a belt pulley *b* is fixed to the rotative mandrel 1; a belt pulley *c* is fixed to a rotative shaft *d*; a belt *e* is mounted on and operatively connects the pulleys *b* and *c*; and the shaft *d* is operatively connected with the motor *a* by any suitable connecting and driving means, such, for example, as a belt *f* leading from a pulley *g* fixed to the motor shaft *h* and in operative engagement with a pulley wheel *i* fixed to an intermediate shaft *k*, which is in turn operatively connected with the shaft *d* by a sprocket chain *l* and sprocket wheels—not shown—fixed to the shafts *k* and *d*.

A coating roll *m* for applying adhesive material to the web or sheet 8 of heat-insulating sheet material, is fixed to the shaft *d*, or other convenient support, and in position to coat the desired surface of the sheet 8 with adhesive material *n* deposited on the surface of said roll *m* from a container *o*. Idler rolls *p* and *q* support the web 8 in position to present the moving surface of the said web in position to progressively engage the surface of the coating roll *m*. Another coating roll *r* is provided, for coating the opposite side of the sheet or web 8, or other sheet of heat-insulating material, when desired. The coating roll *r* engages a roll *s* in a container *t* which, like the container *o* is provided with a supply of adhesive material *n*. And the roll *r* is movable into and out of position to engage the desired adjacent surface of a web 8 or other heat-insulating sheet material to be coated while being wound around the mandrel or support *l*.

In making heat-insulating coverings having separable inner and outer sections 6 and 7 each comprising a series of adhesively connected layers of heat-insulating sheet material, which may be of any desired suitable material, such for example as asbestos paper, with or without particles of sponge imbedded therein, wool felt, or asbestos paper waterproofed or saturated with waterproofing material, or otherwise, in accordance with my improved process and invention, I provide a supply of heat-insulating material which may be in the form of a supply roll 9 mounted on a spool or other suitable support 10. And, in case more than one sheet is to be wound at one time, or more than one kind of sheet material is to be wound together or employed in the making of all or any desired part or parts of the heat-insulating covering, any desired number of additional supply rolls 11 of sheet material are provided and one such is shown mounted upon a spool 12 or other suitable support. (See Fig. 1.) Any desired ordinary or suitable means may be employed for rotating the mandrel 1 to cause the web or sheet material to be wound thereon.

The web or sheet 8 of heat-insulating material, such, for example, as asbestos paper, asbestos paper having particles of sponge imbedded therein, (such as shown at 22 in Fig. 12) wool felt or other suitable heat-insulating sheet material, is wound upon and around the rotative mandrel or support 1, and progressively coated on one or both sides or on any desired portions of the surface of such sheet or sheets 8, during the operation of winding the same around the mandrel, with a coating *n* of adhesive material which, by preference, consists of or comprises silicate of soda or water-glass. The coating of adhesive material *n* may be applied by causing the web to pass over or in contact with the coated surface or surfaces of one or more coating rolls *m*, *r*, one or both of which may be in position to engage the web or any desired surface portion of the web or sheet 8 as it is wound from the supply roll 9, or other support, onto or around the mandrel 1.

The winding of the adhesively coated web or sheet 8 is accomplished with facility by rotating the mandrel 1, after first detachably securing or removably connecting the end of the web with the mandrel, and the winding of the web or sheet 8 around the mandrel is continued, with the adhesive material in a moist or plastic condition, and until the inner section 6, comprising a series of adhesively connected continuous spiral or annular layers or laminations 13 of heat-insulating sheet material, is completed, or is of the desired diameter.

To separate this first and inner section from a second outer section 7 to be later

wound upon said inner section 6, I now insert a sheet of flexible material with both surfaces devoid of cement and then continue to wind on section 7 in the form of an outer coil 26 of the same web 8. Then when the outer section 7 is slit longitudinally at 18, and the inner section 6 is similarly slit at one or more points 19, separate sections composed of coils 13 and 26 of the web 8 will be formed which can be shifted, the inner on the outer one, as indicated in Figs. 5, 9 and 13.

The introduction of this dry separating sheet may be accomplished in any one of several ways. Two thicknesses of such sheet 15 may be introduced and wound in between the successive coils of web 8, which has paste applied by roll r only on one side, until there is a complete loop of one of these sheets 15 in contact with the dry side of the next loop of web 8. The outer dry sheet 15 is then between the dry side of the next outer convolution of web 8 and the other, or inner, dry sheet 15. Such outer dry sheet therefore forms a loose, dry septum between the inner and outer sections 6 and 7. This is shown in Figs. 2 to 5. If, however, the paste so applied by means of roll r (roll m being out of commission) is temporarily interrupted, roll r being also swung out of commission for one revolution of the mandril. A single sheet 15 long enough to go once around to form one complete spiral (as shown in Figs. 10 and 11) is sufficient if it is fed in so as to register with the dry portion of web 8. To make a perfect job by this method the longitudinal slits 18, 19 must cut through exactly at the slightly overlapping ends of the unpasted convolution of web 8 and sheet 15 must register exactly with said dry portion of web 8. To avoid this requirement of extreme accuracy it is better to lengthen the dry section of web 8 and of the inserted, single thickness sheet 15, up to, say, two convolutions, as shown in Figs. 7 to 9.

If the unpasted section of web 8 is thus increased to slightly more than two convolutions and the slits 18, 19 are cut through the overlapping portions of the dry section, the separate sheet 15 may be omitted altogether, the second dry convolution of web 8 itself then forming the dry, separating sheet floating between sections 6 and 7, after the slitting. If this dry section of web 8 is lengthened to three or more convolutions the slits 18, 19 may be cut at any point of the circumference and still leave a complete dry convolution of web 8 floating between a dry outer surface on section 6 and a dry inner surface on section 7.

The object of the invention is accomplished when the nested sections 6 and 7 formed by any of the above described three methods, or otherwise, with an intervening separating sheet of section are shifted radially and longitudinally as shown in Figs. 5, 9 and 13 to break joints at all points.

In Fig. 13, the butt joint 20 between adjacent sections 7, 7 is best shown thus shifted out of line from the butt joint 21 between adjacent inner sections 6, 6 and at 25 is there shown any suitable outer wrapping applied to outer sections 7, 7.

It is obvious that by my invention but one mandril is required for winding each set of nested sections of covering, the operations of winding the several sections are continuous, no assembling of separate sections is required and a perfect fit between the sections of each set is assured.

While I have shown means for applying cementing material to both sides of the web 8 it is rarely necessary to apply it on more than one side. If it be applied to both sides then three thicknesses of dry separating sheets 15 would be needed when the modification of my method illustrated in Figs. 2 to 5 is employed, if one of them is to be left floating between the two sections 6 and 7 of the completed covering. Similarly, in the modification where a single separating sheet is employed, or the dry sheet is formed of a section of the web 8 itself, extra spirals of the coil would need to be left free from paste to secure such result.

I claim:

1. A process of making heat insulating coverings having separable inner and outer sections, which comprises winding heat insulating sheet material around a rotary support, thereby forming an inner section, then wrapping an intermediate separating layer of sheet material around said inner section to provide means for separating said inner section from an outer section to be wound around the same, and then winding heat insulating sheet material around said inner section and around and in contact with said intermediate separating layer, thereby forming an outer section surrounding said inner section and separated from the inner section by said intermediate separating layer.

2. A process of making heat insulating coverings having separable inner and outer sections, which comprises winding heat insulating sheet material around a rotary support, thereby forming an inner section having a plurality of connected layers of sheet material, then wrapping an intermediate separating layer of sheet material around said inner section in position to separate said inner section from an outer section to be wound thereon, and then winding heat insulating sheet material upon and around said intermediate layer, thereby forming an outer section having a plurality of connected layers of sheet material surrounding said intermediate separating layer and said inner section and separated from said inner

section by said intermediate separating layer.

3. A process of making heat insulating coverings having separable inner and outer sections, which comprises winding heat insulating sheet material around a rotary support, thereby forming an inner section having a plurality of connected layers of sheet material, then wrapping around said inner section an intermediate separating layer of sheet material having a dry surface to separate said inner section from an outer section to be wound thereon, and then winding heat insulating sheet material upon and around said intermediate layer and around said inner section by rotating said inner section, thereby forming an outer section having a plurality of connected layers of sheet material surrounding said intermediate separating layer and said inner section and separated from said inner section by said intermediate separating layer.

4. A process of making heat insulating coverings having separable inner and outer sections, which comprises winding heat insulating sheet material provided with adhesive material thereon, around a rotary support thereby forming an inner section having a plurality of adhesively connected layers, then wrapping around said inner section an intermediate separating layer having a dry surface to provide means for separating said inner section from an outer section to be wound around the same, and then winding heat insulating sheet material having adhesive material thereon around said inner section and around and in contact with said intermediate separating layer thereby forming an outer section which surrounds said intermediate separating layer and said inner section and is separated from the inner section by said separating layer.

5. A process of making heat insulating coverings having separable inner and outer sections, which comprises winding heat insulating sheet material having adhesive material thereon around a rotary support, thereby forming an inner section having a plurality of adhesively connected layers of sheet material, then wrapping around said inner section an intermediate separating layer having a dry surface to separate said inner section from the outer section to be wound thereon, then winding heat insulating sheet material coated with adhesive material upon and around said intermediate layer and around said inner section by rotating said inner section, thereby forming an outer section surrounding said intermediate separating layer and said inner section and separated from said inner section by said intermediate separating layer, and then slitting through a side of each of said inner and outer sections longitudinally from end to end thereof.

6. A process of making heat insulating coverings having separable inner and outer sections, which comprises winding heat insulating sheet material around a rotary support, thereby forming an inner section having a plurality of connected layers of sheet material, then wrapping around said inner section an intermediate separating layer having a dry surface, for separating said inner section from an outer section to be wound thereon, then winding heat insulating sheet material upon and around said intermediate layer and around said inner section by rotating said inner section, thereby forming an outer section having a plurality of connected layers of sheet material surrounding said inner section and separated from the same by said intermediate separating layer, then slitting said inner and outer sections from end to end thereof longitudinally, and then adjusting the inner and outer sections with respect to each other to position the margins thereof in offset relation.

7. A process of making heat insulating coverings having separable inner and outer sections, which comprises winding heat insulating sheet material having adhesive material thereon around a rotary support, thereby forming an inner section having a plurality of adhesively connected layers of sheet material, then wrapping around said inner section an intermediate separating layer having a dry surface, for separating said inner section from an outer section to be wound thereon, then winding heat insulating sheet material coated with adhesive material upon and around said intermediate separating layer and around said inner section by rotating said inner section, thereby forming an outer section having a plurality of adhesively connected layers of sheet material surrounding and adapted to fit around the periphery of said inner section and separated from the same by said intermediate separating layer, then slitting said inner and outer sections longitudinally, and then adjusting the inner and outer sections endwise and circumferentially with respect to each other to position the end margins and side margins in offset relation, to provide broken joints in the structure.

8. A heat insulating covering of the class described, comprising an inner section formed of a series of adhesively connected layers of heat insulating sheet material, an outer section comprising a series of adhesively connected layers of heat insulating sheet material surrounding said inner section, and an intermedate separating layer of sheet material having a dry surface interposed between said inner and outer sections.

9. A heat insulating covering of the class described, comprising a cylindrical inner

section formed of a series of adhesively connected layers of heat insulating sheet material, an outer cylindrcial section comprising a plurality of adhesively connected layers of heat insulating sheet material surrounding said inner section, and a detached intermediate separating layer of sheet material having a dry surface interposed between said cylindrical inner and outer sections.

10. A heat insulating covering of the class described, comprising a cylindrical inner section formed of a series of adhesively connected layers of heat insulating sheet material and having a longitudinal slit through the side of said inner section from end to end thereof, an outer section comprising a plurality of adhesively connected layers of heat insulating material surrounding said inner section and having a longitudinal slit through the side of said outer section in offset relation to said slit in said inner section, and an intermediate separating layer of sheet material having a dry surface interposed between said inner and outer sections.

11. A heat insulating covering of the class described, comprising a cylindrical inner section formed of a series of adhesively connected layers of heat insulating sheet material, an outer cylindrical section comprising a series of adhesively connected layers of heat insulating sheet materal surrounding said inner section, and an intermediate separating layer of sheet material having a dry surface interposed between said inner and outer sections, said inner and outer sections having longitudinal side slits in offset relation to each other and forming offset longitudinal side joints between said inner and outer sections.

12. A heat insulating covering of the class described, comprising an inner section having a series of adhesively connected layers of sheet material containing fibrous asbestos, an outer section comprising a series of adhesively connected layers of sheet material containing fibrous asbestos surrounding said inner section, and an intermediate separating layer of sheet material having a dry surface interposed between the outer layer of said inner section and the inner layer of said outer section and separating said inner and outer sections.

13. A heat insulating covering of the class described, comprising a cylindrical inner section having a series of adhesively connected layers of sheet material containing fibrous asbestos, an outer cylindrical section comprising a series of adhesively connected layers of sheet material containing fibrous asbestos surrounding said inner section, said inner and outer sections having their end margins in offset relation and having longitudinal side slits in offset relation to each other and forming offset longitudinal side joints between said sections, and an intermediate separating layer of sheet material having a dry surface interposed between and in detached relation to said inner and outer sections.

14. A heat insulating pipe-covering comprising an inner section formed of adhesively connected spirals of a coil of a web of heat insulating fabric, an outer section similarly formed from a web of the same material but severed therefrom, and an intermediate separating layer of sheet material having dry surfaces interposed between said first mentioned inner and outer sections and free from attachment to either thereof, whereby said sections may be shifted in relative position to break joints.

Signed at Chicago in the county of Cook and State of Illinois this 8th day of August, 1922.

FRANK A. HEADSON.

Witness:
HARRY I. CROMER.