No. 775,494. PATENTED NOV. 22, 1904.

J. A. McCONNELL.

METHOD OF MAKING NON-CONDUCTING COVERINGS.

APPLICATION FILED OCT. 9, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

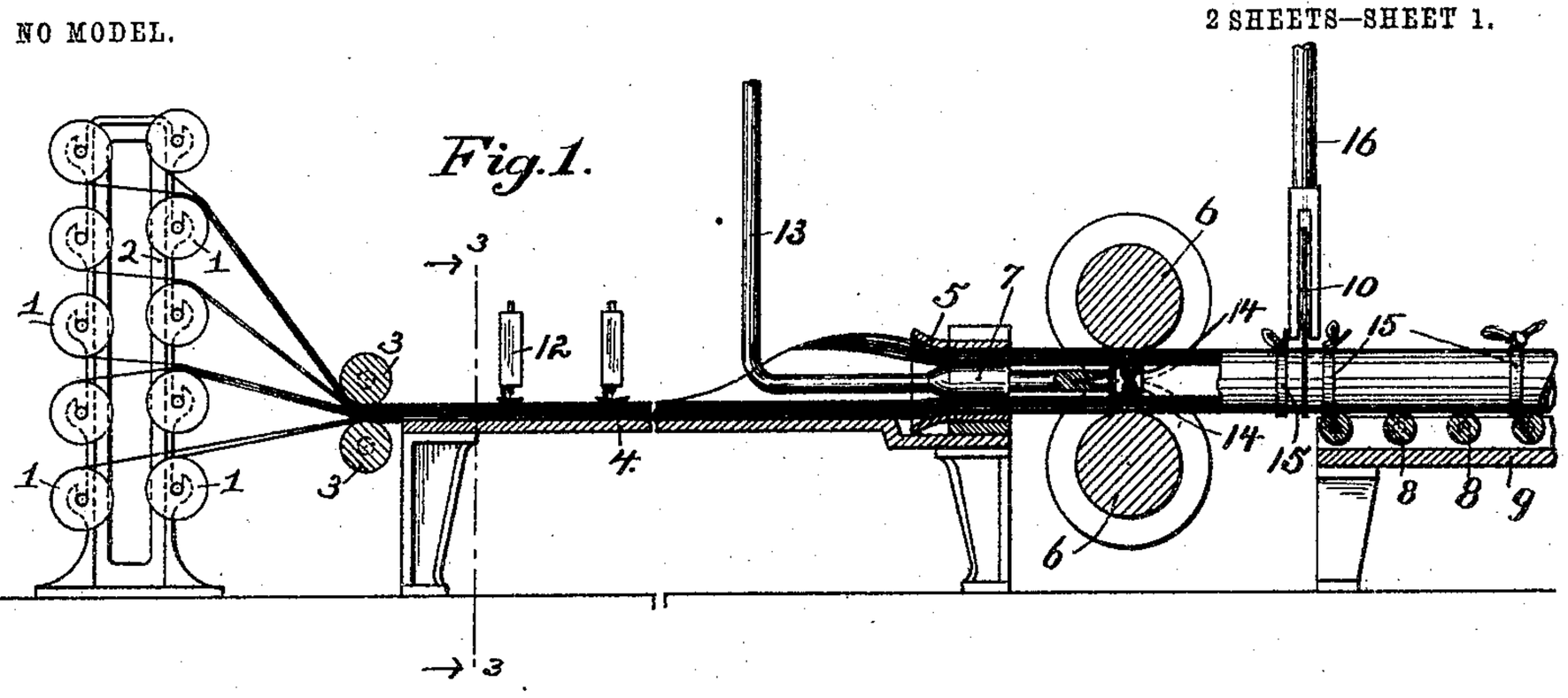


Fig. 2.

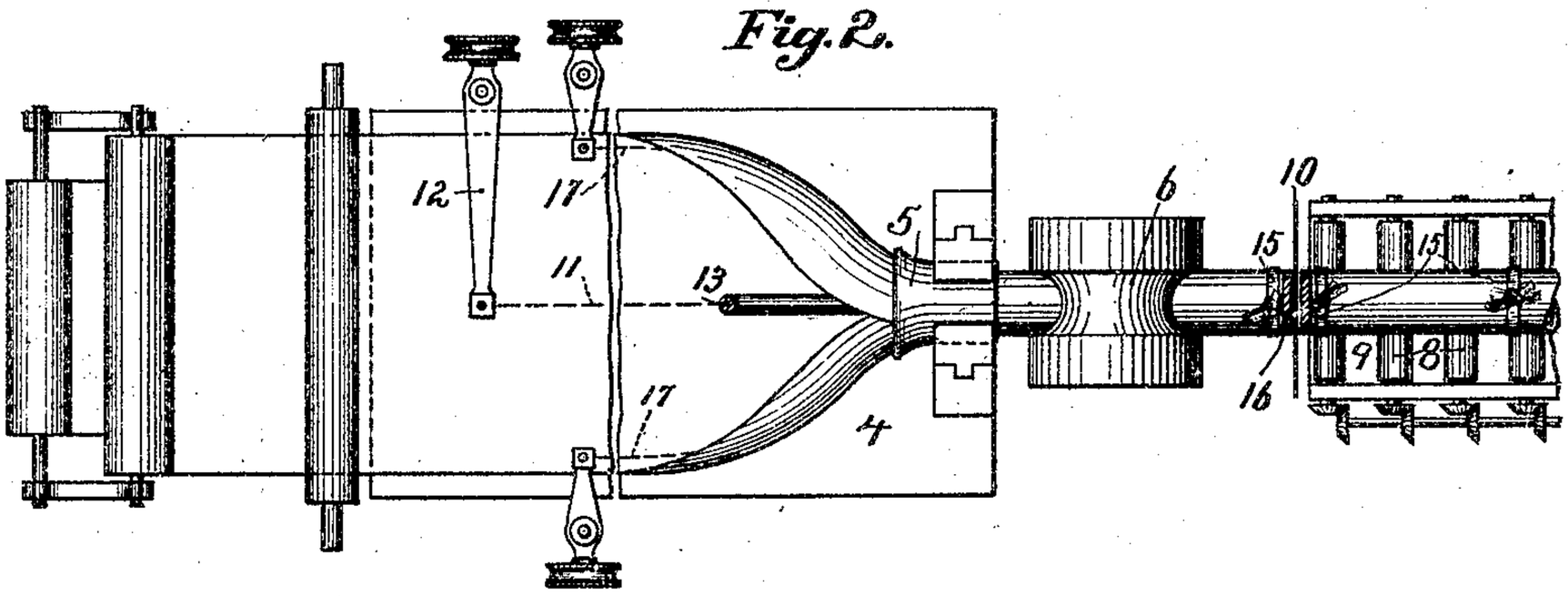


Fig. 3.

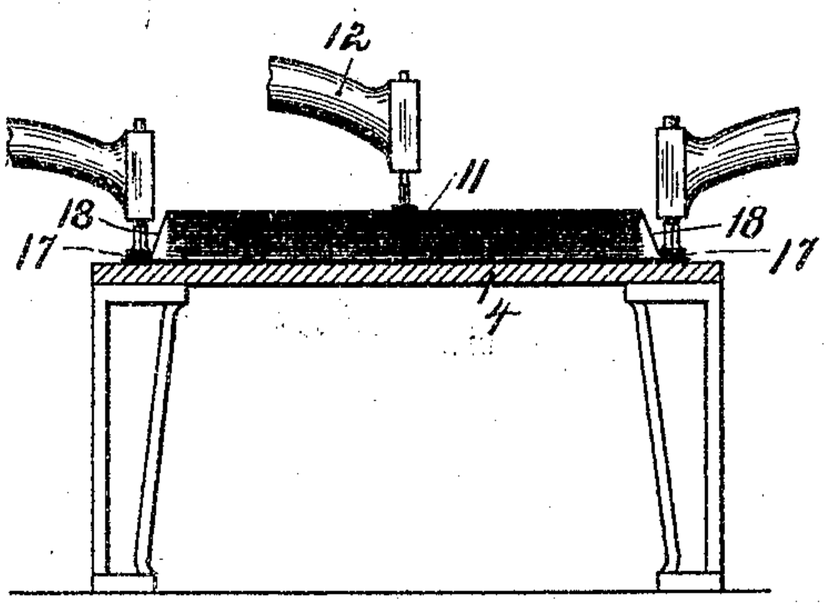
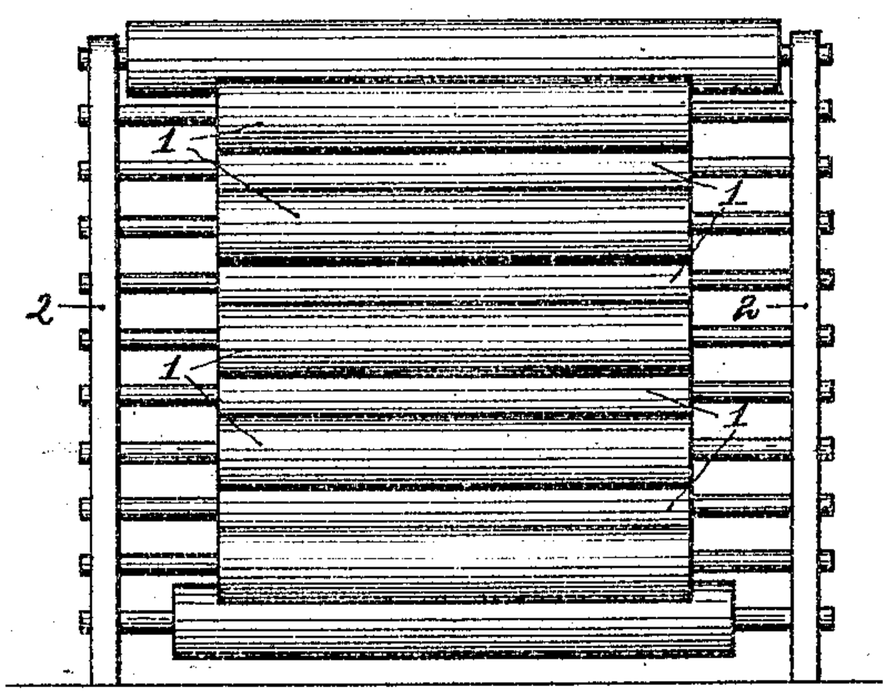


Fig. 4.



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METHOD OF MAKING NON-CONDUCTING COVERINGS.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.

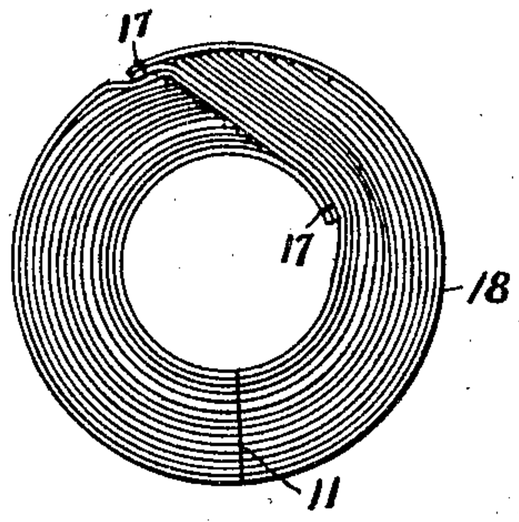
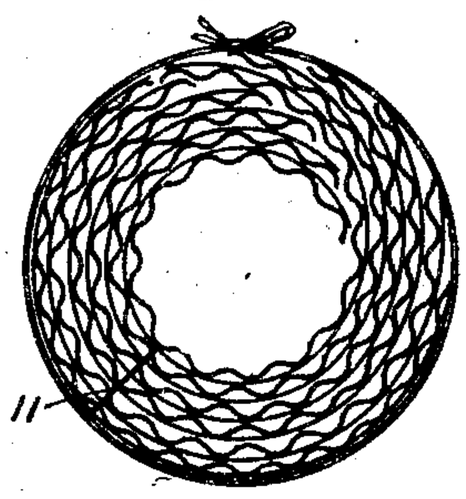


Fig. 6.

Fig. 7.



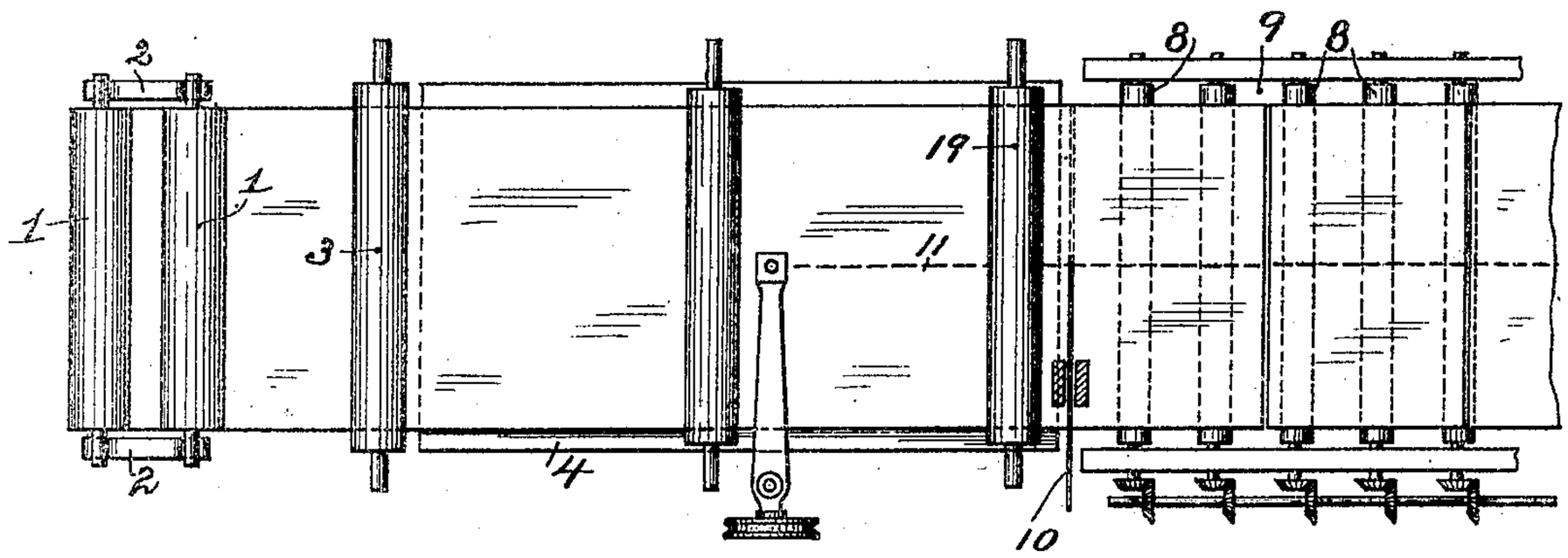


Fig. 8.

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No. 775,494. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

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METHOD OF MAKING NON-CONDUCTING COVERINGS.

SPECIFICATION forming part of Letters Patent No. 775,494, dated November 22, 1904.

Original application filed August 4, 1900, Serial No. 25,907. Divided and this application filed October 9, 1901. Serial No. 78,063.

(No specimens.)

To all whom it may concern:

Be it known that I, JOHN A. McCONNELL, a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Making Non-Conducting Coverings; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to non-conducting coverings for steam-pipes, refrigerator-pipes, boilers, &c., constructed of several independent layers of paper, felt, asbestos, or other suitable non-conducting material.

It also consists in a rapid and continuous process of manufacturing the same.

In the manufacture of tubular non-conducting coverings of this character it is the custom to wrap the paper, felt, or other fibrous sheets around a mandrel until the desired thickness is built up, when it is removed from the mandrel and cut open longitudinally to permit its being placed upon the pipe or other body upon which it is to be used. It has been the custom to make such coverings in sections about three feet long, and it will be apparent that stopping and starting the various wrapping operations upon the mandrel and removing the mandrel to take off each section of tubular covering and then cutting the section open is a slow process, so that with the most improved machines heretofore in use it has been possible for two persons operating such a machine to make not more than one thousand feet per day of covering for small-sized pipes and a very much less quantity of covering of larger sizes. Furthermore, the longitudinal joint in the covering when made by the old process runs directly from the exterior to the interior thereof, thereby forming a short and straight passage for the escape of heat or the admission of cold. When these coverings are made as above stated—that is, by wrapping the layers around a mandrel and cementing them together—it is difficult by reason of the stiffness of the finished tube to open the same to place it about the pipe or other body. Hence it is the custom to cut the tubular sections into halves longitudinally, thus making two longitudinal joints for the escape of heat and destroying the natural elasticity or recoil of the material and making the coverings entirely dependent upon external bindings to hold them in place around the pipe.

In my application filed August 4, 1900, Serial No. 25,907, I described a practically continuous process of making such coverings, by means of which almost an unlimited quantity of covering can be made in a day and whereby it is possible to form such coverings with longitudinal joints which are either overlapping or interlocking, **U**, **V**, and **L** shaped, or circuitous, whereby an out-of-line joint is provided which prevents the escape of heat from the pipe or other body covered thereby. By this process the tubular sections are provided with only a single longitudinal joint, thereby retaining the natural elasticity or recoil of the materials, which may be further increased by wetting the sections and holding them in shape until dry. At the same time the layers composing the covering are so united that it permits said layers to move upon each other, thereby making it easy to open up the section to place it about the pipe without the necessity of cutting said section into halves. The invention as described in said application consists, generally stated, in taking strips of paper, felt, asbestos, or other fibrous sheets or any suitable material whatever and laying said strips one upon the other until the desired thickness of covering is secured and then forming the same into a tube or other suitable shape having a longitudinal joint. The invention furthermore consisted in laying said strips one upon the other until the desired thickness of covering was secured, then suitably securing the same together and drawing them through forming bells, rings, or rolls, whereby they were given the proper form, after which they were cut into sections of suitable length. The invention further consisted in suitably dampening one or more of the said strips, the dampness of which was afterward

communicated to the other strips, and after forming the same into a tube holding the same in the former shape until the same had dried, thereby imparting a permanent set thereto. The invention furthermore consisted in applying to such tubes cloth bands in order to temporarily hold them in form until they dried and had acquired a permanent set and also serving as a permanent fastening means for securing the covering in place. In short, in said application I described a practically continuous and uninterrupted process of forming such coverings which greatly increased the output and produced a pipe-covering having an out-of-line joint. The invention as described in said application was described as using strips which were all of the same width or were of varying widths, as desired, and they might all be laid down in line with each other or out of line with each other, according to the form of covering desired. The preferred modification claimed in said application, however, has strips of varying widths laid out of line with each other.

The purpose of the present application is to specifically claim one of the modifications of said former application—namely, the one wherein the strips are all of the same width and are laid down in line with each other.

This application is a division of my former application above referred to.

To enable others skilled in the art to practice my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view, partly in section, of apparatus suitable for carrying out my process. Fig. 2 is a plan view of the same. Fig. 3 is a cross-section on the line 3 3, Fig. 1. Fig. 4 is an end view of the stand of rollers for holding the strips of material. Fig. 5 is an end view of the finished covering; Fig. 6, an enlarged section showing the manner in which the strips of material are arranged in a slightly-modified form of the invention; Fig. 7, an end view of the finished covering, and Fig. 8 a plan view of apparatus for making the modified form of covering.

The strips of paper, felt, asbestos, or similar material are held in any preferred way—as, for instance, by being wound upon a series of rollers 1 1, held in suitable bearings in the stand 2. These strips of paper or other material are drawn from said rollers through suitable guide-rollers 3 and laid upon a table 4 from which they pass to the forming die or bell 5, by means of which they are coiled into tubular form. They thence pass between suitably-grooved rollers 6 for completing the formation of the tube. A mandrel 7 may be placed in the bell 5 and between the grooved rollers 6, if necessary, for supporting the tube internally. Generally, however, on account of the stiffness of the material composing the walls of the tube such mandrel is not necessary. From the rolls 6 the formed tube passes upon suitable rollers 8, mounted on the table 9 and which may be power-driven, if desired. The continuous tube is there cut into suitable lengths by means of the saw 10, after which the sections are conveyed away.

In the specific modification of my invention claimed in this application the strips of paper, &c., on the rollers 1 are all of the same width except for the two outer or enveloping layers when the latter are used, and said rollers are placed in the stand 2 in line with each other, so that said strips when drawn from the rollers are laid one upon the other in line with each other, as illustrated in Figs. 3 and 6. After being laid upon the table 4 the strips are suitably secured together—for instance, by having a line of stitching 11 at or near the longitudinal middle thereof. This line of stitching is put in place by a suitable sewing-machine or other mechanism, (shown diagrammatically at 12;) but instead of stitching the strips together they may be otherwise suitably secured—as, for instance, by stapling or even by pasting. The strips thus secured together are drawn into the forming bell or die 5, which may be of the flaring open type, as shown, or funnel-shaped, and are therein coiled about the mandrel 7, if the latter is used, said mandrel, as shown, being what is known as the "round" or "ball" type and held in place by the bent arm 13, suitably secured to the ceiling or other suitable place. This mandrel extends forward through the bell or die 5, and the end thereof lies between the grooved rolls 6, so that said rolls firmly compact and shape the tubular covering about said mandrel. To reduce the friction at this point, a pair of elliptical or barrel-shaped rollers 14 are mounted in the end of the mandrel, said rollers being mounted to revolve freely and bearing against the interior of the tube. For large-diameter tubular sections I may use three or four of these revolving elliptical-shaped rollers to form the circumference of the mandrel.

As soon as the formed tube emerges from the rolls 6 I temporarily secure the same in tubular form by means of any suitable fastening means; but I prefer for this purpose strips or bands of cloth 15, preferably tapes, which are suitably permanently attached to the tube, as by means of paste, at suitable intervals thereon. The paste or other adhesive material firmly secures these cloth bands to the tube, so that they make not only temporary ties to hold the formed tube in shape until it becomes thoroughly set, but also serve when the covering is applied to the steam-pipe or other body as permanent ties to secure the same in place. As they do not rust and are not attacked by insects, they provide a strong fastening for the covering on the pipe or other body, so that the covering is not liable to fall off or have its joint-spring open to allow the

escape of heat. These bands, however, are not specifically claimed in this application, but are claimed in my application above referred to.

The saw 10 is preferably mounted in a depending arm 16, which is suitably pivoted at its upper end so that the saw can be swung toward and away from the pipe-covering, and the arm may be so mounted that the saw can travel along with and at the rame rate as the pipe-covering, so that said pipe-covering may be cut into sections without stopping the machine, if desired, and the cut will be perfectly square across the covering.

The strips for which this covering is made may all be plain, or the covering may be formed of alternate plain and corrugated strips—as shown, for instance, in Figs. 6 and 7.

The strips of paper when of the same widths and laid one upon the other, as shown, and stitched at or near their longitudinal middles and then coiled into tubular form result in a covering such as shown in Fig. 7. The strips being unattached to each other except by the central line of stitching 11 are perfectly free to move upon each other, so that the resultant article is exceedingly flexible and easy to apply to the pipe or other body, and the edges of the said strips when the covering is bent into tubular form make beveled or feathered edges, which overlap and form an out-of-line joint. It is not absolutely necessary that the line of stitching be exactly at the longitudinal center of the strips, as said strips can be united along a longitudinal line intermediate its center and one edge, and when coiled into tubular form the edges will also feather, although one edge more than the other. In some of the claims it is stated that the strips are united "along a single longitudinal line;" but I do not intend thereby to exclude a plurality of rows, providing that said rows are sufficiently close together to constitute, in effect, a single uniting line and to permit the feathering of the edges as described.

In the form shown in Figs. 1 to 5 the inner and outer layers of covering are made of greater width than the intermediate layers, and they are stitched together, as at 17, at their edges in order to form an envelop 18 for the intermediate layers. The intermediate layers are therefore inclosed by these enveloping strips, and the latter give a finish to the edge of the covering. The intermediate strips, however, are unattached to each other except by the central line of stiching 11, and are therefore perfectly free to move upon each other, as above described. These enveloping strips, however, are not specifically claimed in this application, but are claimed in my application above referred to.

In order to insure a permanent set to the tube, it may be dampened after it is formed and then allowed to dry while held in such position. This dampening may be done in various ways—as, for instance, by introducing the sections of the pipe after they leave the saw 10 into a closed chamber filled with steam or immersing the said sections in water or by wetting one or more of the said strips before they are laid together, as described in my application aforesaid. This dampening, however, to insure a set is not claimed in this application, but is claimed in my application aforesaid.

In Fig. 8 I have shown the apparatus with the forming-bell 5 and rolls 6 omitted, and in lieu thereof plain-faced rollers 19 hold the assembled strips on the table 4 while they are being stitched together at or near their longitudinal centers, as shown, or at other points and while they are being cut into sections by means of the saw 10. This form of apparatus is suitable for forming the blocks or staves shown in my former application or for forming the sections such as shown in Fig. 6, which sections can be shipped in this form and not bent into tubular form until applied to the pipe or other body, the bands 15 or other fastening means holding the said covering in tubular form on the pipe.

The strips may be drawn from the rolls and through the forming devices without pause or intermittently, as desired or convenient; but in either event the finished articles are formed from the strips in a continuous and progressive manner—that is, one section is not formed complete before another is begun; but the act of forming one section gives a partial form in varying degrees to successive sections.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method of forming non-conducting coverings, consisting in laying strips of fibrous or similar material one on the other until the desired thickness of covering is obtained, suitably uniting said strips along a single longitudinal line, and then cutting the same into sections.

2. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material one on the other until the desired thickness of covering is obtained, stitching the same along a single longitudinal line longitudinally, and then cutting the same into sections.

3. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material of the same width one on the other and in line with each other until the desired thickness of covering is obtained, suitably uniting said strips along a single longitudinal line, and then cutting the same into sections.

4. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material one on the other until the desired thickness of covering is obtained, progressively drawing said assembled strips longitudinally, suitably uniting said strips along

a single longitudinal line, and then cutting the same into sections.

5. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material one on the other until the desired thickness of covering is obtained, uniting said strips along a single longitudinal line, and then bending said strips into a tube, whereby the edges will feather and form a longitudinal out-of-line joint.

6. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material of the same width one on the other until the desired thickness of covering is obtained, suitably uniting said strips at their longitudinal center, and then bending said strips into a tube whereby the edges will feather and form a longitudinal out-of-line joint.

7. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material one on the other until the desired thickness of covering is obtained, uniting said strips by providing the same with a longitudinal row of stitching, and then bending said assembled strips into a tube whereby the edges will feather and form a longitudinal out-of-line joint.

8. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material of the same width one on the other until the desired thickness of covering is obtained, stitching the same longitudinally along a single line, and then bending said strips into a tube whereby the edges will feather and form a longitudinal out-of-line joint.

9. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material one on the other until the desired thickness of covering is obtained, uniting said strips along a single longitudinal line, and then drawing said assembled strips longitudinally and progressively bending the same into a tube, whereby the edges will feather and form a longitudinal out-of-line joint.

10. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material of the same width one on the other until the desired thickness of covering is obtained, suitably uniting said strips along a single longitudinal line, then progressively drawing said strips longitudinally and bending the same into a tube whereby the edges will feather and form a longitudinal out-of-line joint.

11. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material of the same width one on the other until the desired thickness of covering is obtained, suitably uniting said strips, progressively bending said united strips along a single longitudinal line into a tube whereby the edges will feather and form a longitudinal out-of-line joint, and then cutting the same into sections.

12. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material one on the other until the desired thickness of covering is obtained, stitching the same along a single longitudinal line, and then drawing said assembled strips longitudinally and progressively bending the same into a tube having a longitudinal joint.

13. The method of making non-conducting coverings, consisting in laying strips of fibrous or similar material one on the other until the desired thickness of covering is obtained, uniting the same along a single longitudinal line, drawing said assembled strips longitudinally and progressively bending the same into a tube, and then cutting said tube into sections.

14. A non-conducting covering, built up of several independent layers of fibrous or similar material suitably secured together along a single longitudinal line.

15. A non-conducting covering, consisting of several independent layers of fibrous or similar material of the same width suitably secured together along a single longitudinal line.

16. A tubular non-conducting covering, consisting of several independent layers of fibrous or similar material suitably secured together along a single longitudinal line and having a longitudinal out-of-line joint.

17. A tubular non-conducting covering, consisting of several independent layers of fibrous or similar material of the same width suitably secured together at their longitudinal center and having feathered edges forming a longitudinal out-of-line joint.

18. A tubular non-conducting covering, consisting of several independent layers of fibrous or similar material of the same width suitably secured together at their longitudinal center, and inner and outer enveloping sheets therefor united at their edges.

In testimony whereof I, the said JOHN A. McCONNELL, have hereunto set my hand.

JOHN A. McCONNELL.

Witnesses:
ROBERT C. TOTTEN,
F. W. WINTER.