March 18, 1941. W. F. FISCHER 2,235,630

METHOD OF MAKING TUBULAR INSULATION

Filed July 23, 1936

Fig. 1.

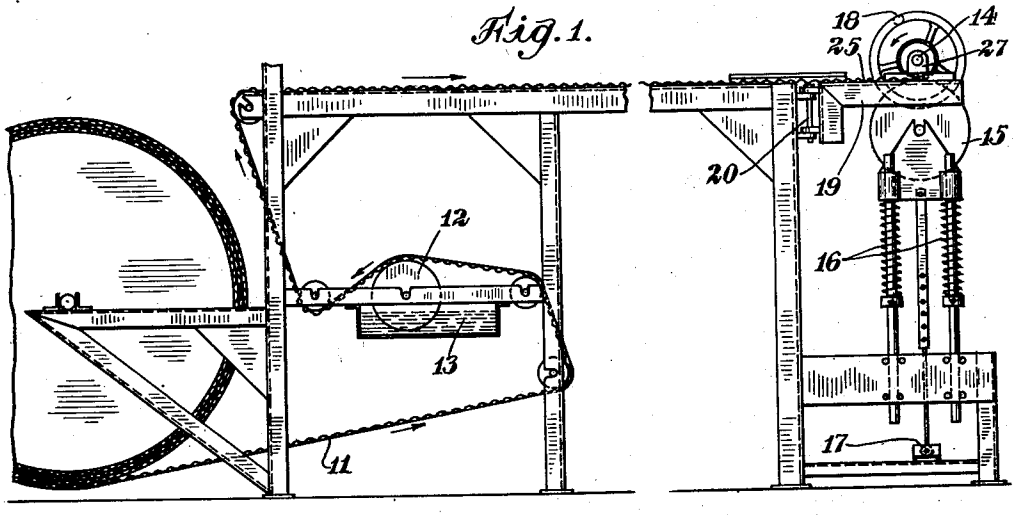


Fig. 2

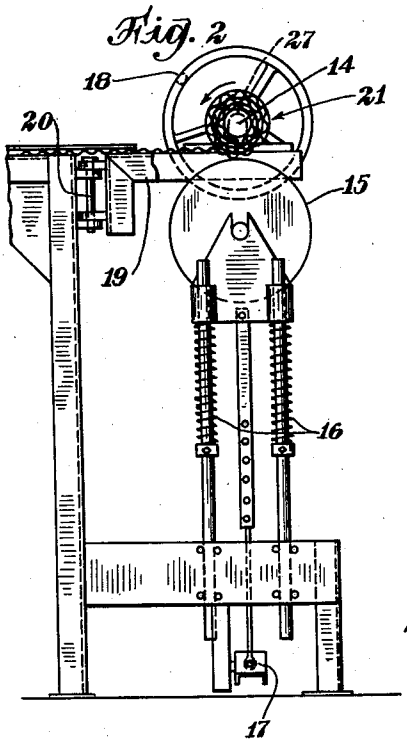
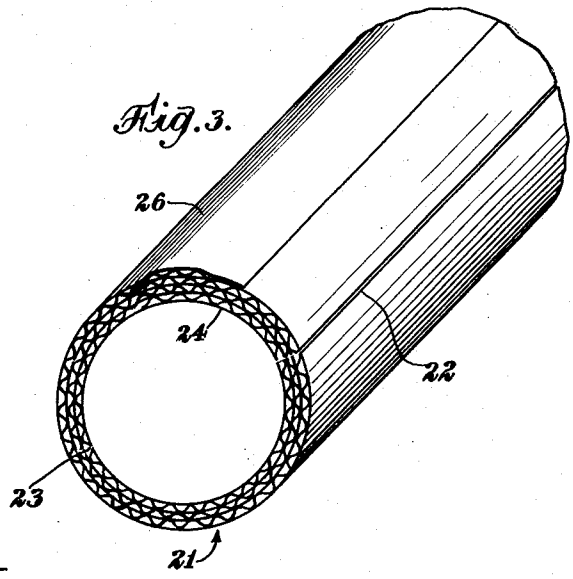


Fig. 3.



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METHOD OF MAKING TUBULAR INSULATION

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1 Claim. (Cl. 154—28)

This invention relates to a method and machine for winding sheet material into a tube and to the resulting tubular product.

Because the invention is particularly useful in making sectional pipe covering including composited alternating sheets of plane and corrugated surface, respectively, the invention will be illustrated by reference particularly to making such pipe covering.

The invention comprises the novel features of the machine, method and product herein described and relates especially to decreasing the lack of symmetry in the tubular product and maintaining the corrugations in the product in firm and supporting contact with the plane sheets adhered over or under the said corrugations.

A preferred embodiment of the invention is illustrated in the attached drawing and will be described for the purpose of exemplification in connection therewith.

Fig. 1 is a side view, partly diagrammatic, of the machine for forming my improved tubular product.

Fig. 2 is a side view, on a scale somewhat enlarged as compared with the scale of Fig. 1, of a portion of the said machine.

Fig. 3 is a perspective view of finished sectional pipe covering made in accordance with the invention.

Referring to Fig. 1, a suitable source of supply is shown for a cellular material 11. This material may be corrugated asbestos paper formed of a sheet of corrugated paper adhered on one side to a sheet of plane paper. In such paper the corrugations are adapted to be appreciably flattened by being subjected to slight compression, applied to their tops, and to return approximately to their original form after the compression is released. In other words, the corrugations are appreciably resiliently deformable.

The one-ply composite 11 may be made in the conventional manner, as by the application of a fluent hardenable adhesive composition over the tops of the corrugations of one sheet, pressing the thus coated tops of the corrugations against the plane sheet, and hardening the adhesive composition. In the composite so made, the bases of the several corrugations are adhered firmly to the sheet of plane surface at approximately fixed spacings between the several corrugations.

The composite is then coated on one face thereof with additional fluent hardenable adhesive, as by means of the roller 12 extending at its lower portion into the pan containing the adhesive 13 and at its top portion contacting with the corrugated face of the composite.

The adhesive used in making the one-ply composite or as the said additional adhesive may consist of an aqueous solution of sodium silicate, an aqueous casein adhesive, or a solution of a suitable resin in a volatile solvent or extender. The hardening is effected at an elevated temperature, to cause evaporation of volatile material and/or polymerization, in case a polymerizable resin is used.

The thus treated composite then is drawn as illustrated, to the winding machine. During this drawing, the sheet material is subjected to a braking or retarding action, in direction opposite that of the said drawing, due to the friction in the various rolls illustrated or otherwise, so that the sheet of plane paper in the composite is maintained in taut condition as it is laid upon an underlying turn upon the mandrel.

The winding mechanism includes a mandrel 14 and means for rotating the mandrel, as, for example, a manually operated handle 18. The mandrel 14 is supported at one end by a fixed bearing and at the opposite end by a bearing 27 carried by an arm 19 hinged at 20 to the frame of the mechanism to enable the bearing 27 to be swung away from the mandrel 14.

A drum or roller 15 is carried by a support which is guided on vertical rods carried by the mechanism frame, and supported on these rods by coil springs 16 interposed between the bottom of the guided support and collars carried by the guide rods. This mounting arrangement causes the roller 15 to be resiliently urged towards the mandrel 14. A treadle 17 is connected by means of a link with the guided support for the roller 15 and enables the roller 15 to be moved away from the mandrel by an operator pressing downwardly upon the treadle 17.

It will be understood that an inner liner 24 of plane paper coated with an adhesive may be applied around the mandrel before the winding of the one-ply composite is begun, so that the liner becomes adhered to the composite applied thereover.

It will be understood, also, that the said retarding action is exerted in direction opposite to that of movement of the sheet material at the time of its being first laid upon an underlying turn of the said material or upon the inner liner.

In the actual winding operation, the one-ply composite, with its corrugated side towards the mandrel is laid with its end edge against the mandrel or against the coated liner of plane

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paper previously applied thereto. While the edge of the composite is held down firmly, the mandrel is rotated in the direction of the arrow, so that the composite is wound therearound, the operator's hand suitably being held against the outside or plane surface of the composite, as the mandrel is rotated, so that the hand exerts a braking and smoothing effect upon the composite.

The one-ply composite at the moment of being laid upon the mandrel or upon an underlying previously formed turn of the said composite is subjected to slight compression directed towards the mandrel by the roller 15.

As a result there may be slight compression and appreciable flattening of the said corrugations, at the moment that any one of them is being laid upon an underlying element of the tube. There results a tight assembly. Any slightly flattened corrugation, once it passes the zone of compression, tends to return to its original form. When this is the case, there is produced an inner expansion effect, the expanding force being directed outwardly and radially; under the influence of this force, the plane paper tends to assume the form of turns of the largest possible area of cross section, in proportion to the length of a given turn, namely, turns of approximately regular curvature, as distinguished from the lopsided nature of the turns heretofore produced. When the resulting tube is subjected to treatment to harden the adhesive, as will be described later, there is produced a tube in which the corrugations contact firmly with sheets of plane surface and in which the corrugations may be under radial compression to such degree that there is increased resistance of the tube to deformation by light loading thereof.

When the composite has been wrapped upon itself, to give a tube of approximately the wall thickness desired, the tube is severed from the oncoming composite 11, as by stopping the rotation of the mandrel and cutting the said composite with a knife at position 25. The free end thus left integral with the material of the tube is smoothed down and adhered to the tube.

If desired, an outer wrapper 26 of paper of plane surface may be adhered around the tube.

Then, the drum 15 is lowered from the operating position, as by the operator pressing upon the treadle 17, and the arm or gate 19, which supports the mandrel bearing 27 at one end, is swung on the hinge 20, away from the mandrel.

The tube 21 is then slipped from the mandrel, over the end thereof that was formerly supported by the bearing pivotally mounted on arm 19, and is subjected to drying to harden the additional adhesive supplied by the roller 12. The tube is then sawed longitudinally at position 22 and scored on the opposite side, as at 23.

It will be understood that the details given are for the purpose of illustration, not restriction, and that variations within the spirit of the invention are intended to be included in the scope of the appended claim.

What I claim is:

A method of making pipe covering comprising coating a web of composited plies of plane and corrugated sheets of flexible, thermal-insulating material with an adhesive, tightly wrapping said coated material spirally upon itself while continuously applying sufficient pressure against the face of said material near the point of initial wrapping to slightly compress the corrugations of the corrugated sheets and thereby create stress within the material acting to force the convolutions tightly together and into a compact, regularly formed body, and hardening the adhesive while the body is in its stressed condition.

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