

Oct. 4, 1938.

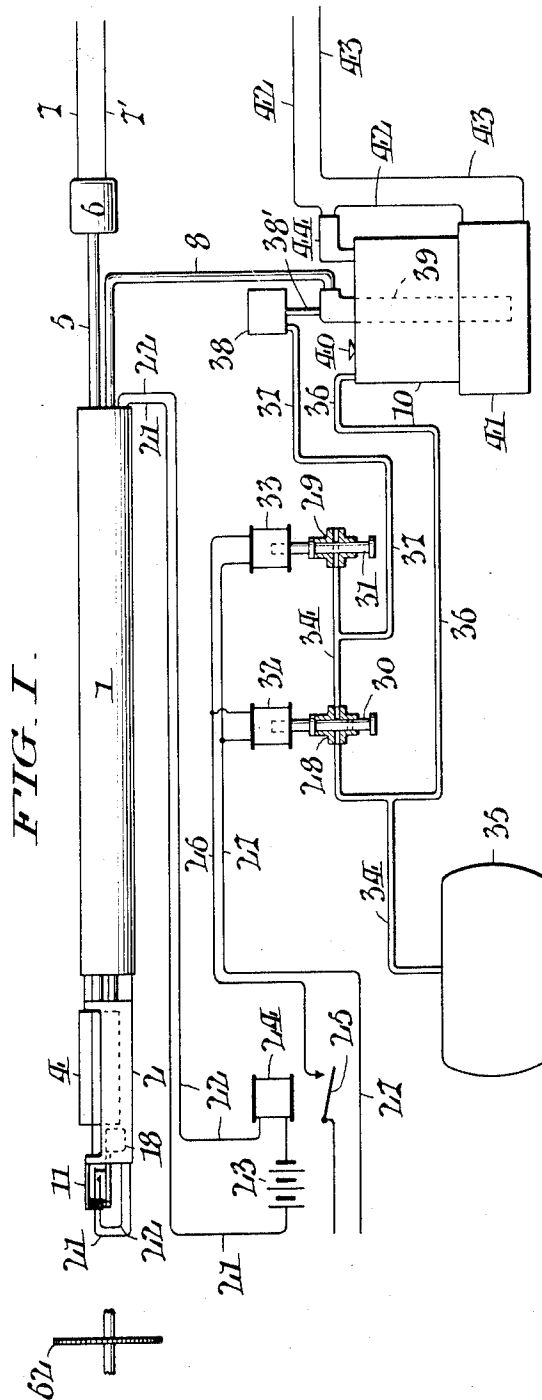
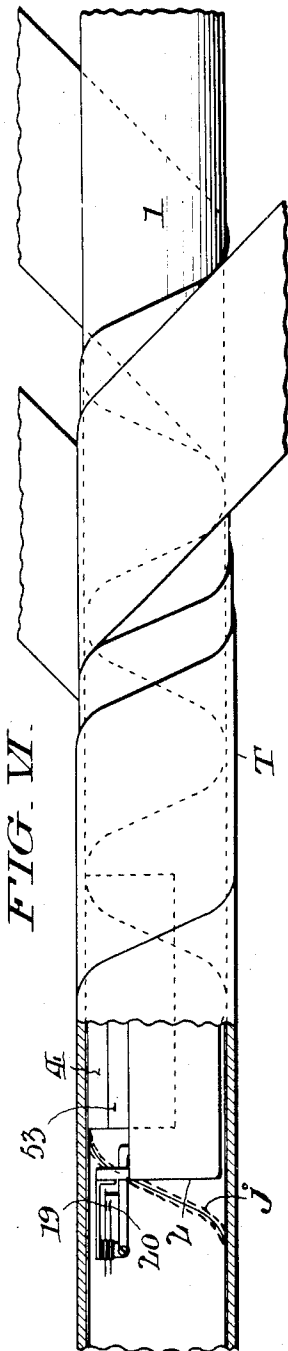
J. K. M. HARRISON

2,132,239

APPLICATOR MEANS FOR PAPER TUBE WINDERS

Filed March 20, 1936

2 Sheets-Sheet 1



WITNESSES:

John A. Weidler
William Bell, Jr.

INVENTOR:

INVENTOR.
John H. M. Harrison,
BY *Tracy Paul*
ATTORNEYS.

Oct. 4, 1938.

J. K. M. HARRISON

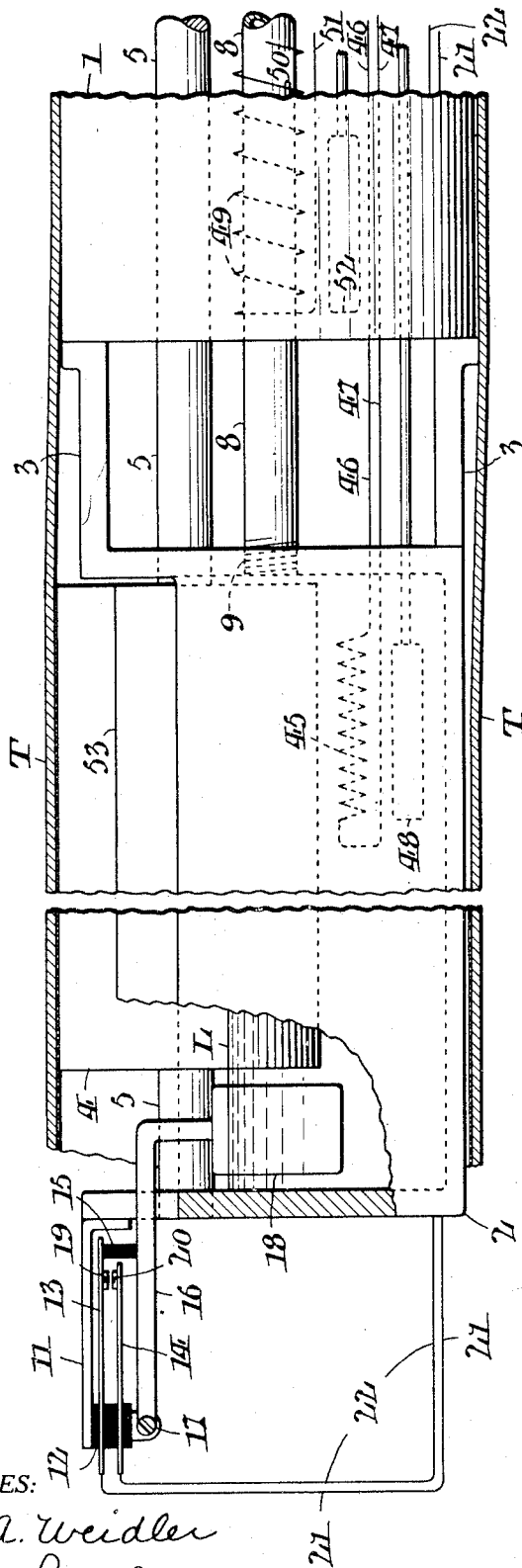
2,132,239

APPLICATOR MEANS FOR PAPER TUBE WINDERS

Filed March 20, 1936

2 Sheets-Sheet 2

FIG. II.



WITNESSES:

John A. Weidler
William Beebe, Jr.

FIG. III.

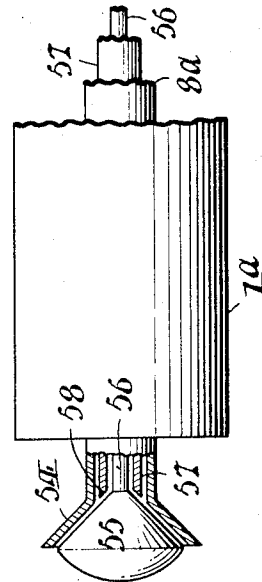


FIG. IV.

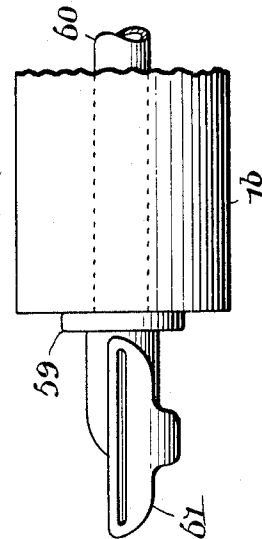
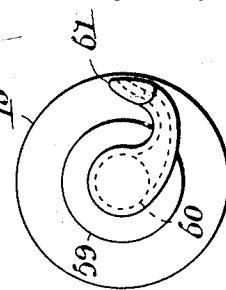


FIG. V.



INVENTOR:

John K. M. Harrison,
BY *Frally Paul*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,132,239

APPLICATOR MEANS FOR PAPER TUBE
WINDERS

John K. M. Harrison, Ogontz, Pa.

Application March 20, 1936, Serial No. 69,806

12 Claims. (Cl. 91—51)

This invention has general reference to means whereby paper, fiber or analogous material, tubes are produced for severance into units and fitment with ends to constitute containers of predetermined capacity.

More particularly the present invention aims fundamentally to provide a novel means for applying a suitable interior coating to spirally-wound paper, fiber or analogous material tubes, incidental to their fabrication, for subsequent severance into units and the insertion of ends under application of heat to effect fusion of the coating about said ends, whereby the resultant containers are rendered leak-proof, sanitary, impenetrable to the ravages of exposure, or the despoiling tendencies of shipment.

Another object of this invention is to provide a novel automatically-controlled applicator means more particularly adapted for association with standard types of paper tube winders, whereby a coating of suitable thermoplastic, a synthetic resin, lacquer or other desirable substance, is evenly applied around the interior surface of the tube as it leaves the forming mandrel, while the spiral seam is supplied with a surplus of the thermoplastic pushed ahead of said applicator means.

Other objects and advantages, more or less ancillary to the foregoing, and the manner in which they are realized will become apparent from a more complete examination of the following description, which considered in connection with the accompanying drawings sets forth a practical coordination of the inventive features.

Generally stated this invention consists of the novel devices, combinations of means, and arrangements of parts hereinafter disclosed, illustrated by the drawings, and more definitely expressed in the claims at the conclusion hereof.

In the drawings:

Fig. I is a somewhat diagrammatic view illustrative of one practical form of apparatus convenient for carrying out the essentials of this invention.

Fig. II is a broken enlarged detail view of the tube forming mandrel and one type of applicator means suitable for coating the interior surface of the tube with a thermoplastic as it passes off said mandrel.

Fig. III is a fragmentary detail view, partly in section, of a modified form of the applicator means.

Fig. IV is a side view of a further form of applicator.

Fig. V is an end elevation of the same, or look-

ing toward the right-hand of the preceding illustration; and,

Fig. VI is a fragmentary view of the mandrel end showing how the tube is formed from ply material and interiorly coated in accordance with this invention.

Referring more particularly to Figs. I and II, the numeral 1 comprehensively designates the tubular stationary mandrel of a conventional paper tube winder adapted for the production of spirally-wound multi-ply paper tubes, said mandrel being operated and the strip paper fed thereto according to known practice.

The mandrel 1, in accordance with the present invention, is provided at the tube leaving end with a cross-sectionally conformative trough or container 2, preferably supported in spaced relation thereto by rigid sustaining members 3. The container 2, as best understood from Fig. II, is conveniently, although not essentially, of a cross-sectional depth slightly in excess of half the diameter of the associated mandrel 1, and it has journaled therein a lengthwise disposed applicator roll 4, adapted for rotation by a drive shaft 5 extending longitudinally through the bore of said tubular mandrel, and operatively coupled, preferably, to an electric motor 6 furnished with current from any convenient source by conductors 7, 7'. The applicator roll 4 of less diameter than the mandrel 1 is, preferably, positioned to project slightly beyond the circumferential confines of the mandrel 1 so as to positively ensure engagement with the bore of the tube "T" as it leaves said mandrel.

Also extending longitudinally through the mandrel 1 is a feed pipe 8 connecting into the container 2 at 9, and serving to supply heated thermoplastic, such as a synthetic resin or the like, from a pressure tank 10, or a gravity supply, to said container as later on hereinafter set forth.

Attached to the outer end of the container 2 is a bracket 11 affording support for a float control conveniently in the form of an insulating material block 12 having spaced flexible and rigid conductors 13, 14, the former of which carries a non-conductive stop 15 adapted for co-action with a lever 16, or said stop may be supported by said lever. The lever 16 is pivoted at 17 to the block 12 and has, at its free end, a float 18 subject to influence by the level "L" of thermoplastic in the container 2. The conductors 13, 14 are provided with contact points 19, 20, respectively, which when moved into engagement by lowering of the float "L" close a circuit through wires 21, 22 to a battery 23 and control

relay 24; the latter of which when energized functions to close a switch 25 for completing an electric circuit through wires 26, 27 to a pair of magnetically-controlled air valves 28, 29, as later on explained.

The air valves 28, 29 have stems 30, 31 respectively operative by associated electromagnets 32, 33, and they are inserted in a pipe line 34 from an automatically controlled air compressor 35, said line 34 having a conduit connection 36 into the top of the pressure tank 10. A branch pipe 37 from intermediate the valves 28, 29 communicates into a suitable valve device 38 for automatically controlling supply of the thermoplastic from the pressure tank 10, by way of the feed pipe 8 to the container 2, said device including a down pipe 39 extending into proximity with the bottom of the tank 10; and 40 indicates a conventional relief valve for said tank.

In order to heat the thermoplastic in the pressure tank 10, the latter is provided with a surrounding electric heater 41 having wires 42, 43 connecting with a source of current, and interposed in one of said wires, 42 for instance, is a thermo-control device 44 extending into said tank, whereby the thermoplastic can be automatically maintained at the proper degree of fluency for feeding to the container 2.

A suitable heater 45 is provided, in the container 2, having wires 46, 47 in circuit with a thermostatic control bulb 48 whereby the thermoplastic in said container can be maintained at the proper temperature for filmy application to the inner surface of the tube "T". A mandrel heating coil 49 conveniently encircles the feed pipe 8 near the free end of the mandrel 1, said coil having wires 50, 51 connecting with a convenient source of current, and included in the circuit is a thermostatic control bulb 52, whereby the temperature of the mandrel 1 is automatically maintained at the requisite degree to prevent the thermoplastic passing therethrough from solidifying, and also to aid drying of the tube plies prior to application of the interior coating of said thermoplastic.

In order to control the thickness of the film of thermoplastic to be applied interiorly of the tube "T", by the applicator roll 4, there is provided a variably adjustable scraper 53, which serves to evenly distribute the thermoplastic, while the surplusage or overrun wiped off the roll 4 at its forward end forms a streak in the progressing tube "T" which is arranged to register with and be pressed into the spiral joint in said tube where the confronting edges of the inner "ply" come together during the winding operation, as typically indicated by the dotted lines "J" in Fig. 1; whereby a permanent leak-proof joint is positively obtained thereat.

Instead of employing the applicator roll 4 and container 2, the spraying means of Fig. III may be used. In this form of the invention the hollow mandrel reed pipe 8a projects beyond the free end of the mandrel 1a and is provided with a stationary head or flare 54, with which is adapted to coat a conical valve member 55 adjustable by a longitudinal rod 56 extending axially through an air supply pipe 57 suitably supported lengthwise within the feed pipe 8a, said pipe 57 having its free end tapered at 58 in substantial alignment with the flare 54. Thus it will be readily understood that by moving the valve member 55 relative to the flare 54, the thickness of the film of thermoplastic sprayed on the inner surface of

the tube "T" can accurately be determined as well as continuously applied.

In the further modified form of the invention shown by Figs. IV and V, I make use of a revolving head 59 at the end of the mandrel 1b, said head being rotatable by a shaft 60, and having a longitudinal nozzle 61, whereby the thermoplastic coating is applied lengthwise to the inner surface of the tube "T", in an obvious manner.

Having outlined the structural features and arrangement of the various items and devices involved in the invention, the operative cycle may be briefly described as follows. Assuming that multiply paper, fiber or analogous strip material is arranged for spiral winding on the mandrel 1, in accordance with known practice, to form tube "T", the pressure tank 10 is first supplied with the desired thermoplastic for coating the interior of said tube. It may be here noted there are many thermoplastics which can be employed with more or less satisfactory results, but those of a synthetic resinous character have been found by actual experimentation as preferable. The several heater units 41, 45 and 49, are now switched "on", while the air valve 28 is in open position and the valve 29 closed, in consequence of the relay switch 25 being closed and the contacts 19, 20 in engagement, as will be clear to those conversant with electrical matters. With the parts just referred to in the noted relation, it will be apparent that air under pressure will be forced from the compressor 35 by way of the pipe line 34, 36 into the head of the pressure tank 10; and that concurrently therewith air will also pass from the pipe 34 through the open valve 28, and branch pipe 37, into the bottom of the valve device 38, thereby lifting its stem 38' and opening flow communication through the down pipe 39 and pipe 8 for forced-feed of heated thermoplastic from said tank to the container 2. As the supply of thermoplastic into the container 2 continues, it will be evident that the float 18 will "rise" and, as the predetermined level "L" of said thermoplastic is attained, the float lever 16 will impact the stop 15 and separate the contacts 19, 20 as shown in Fig. II. Opening of the circuit through the control relay 24 and switch 25 results in de-energization of the electromagnets 32, 33, and automatic closure of the valve 28 with concurrent opening of the valve 29. Incident to opening of the valve 29, it will be seen that the air pressure influencing the valve device 38 will be opened to exhaust or relief by way of the pipe 37 and said open valve 29 in an obvious manner. Now it will be apparent that as the winding of the tube "T" is commenced, and said tube spirally progresses off the mandrel 1 into frictional engagement with the applicator roll 4, the latter being revolved in the thermoplastic by the motor 6, applies a filmy coating thereof continuously to the interior surface of the tube "T" as it advances to the cutter means, conventionally indicated at 62 in Fig. I, for severing the coated tube "T" into desired lengths. It is to be particularly remarked that as the tube "T" passes from the mandrel 1 onto the applicator roll 4, the inner spiral seam thereof first contacts the end of said roll at the start and receives a preliminary coating of the thermoplastic. The tube seam on leaving the applicator roll 4, will receive an additional coating from the surplus or "overrun" of the thermoplastic being constantly pushed ahead of the roll 4 incident to its rotation. As a result the tube inner spiral seam is not only more effectively sealed than heretofore, but it is also rein-

forced by the additional coating of thermoplastic "spanning" said seam.

From the preceding paragraph, the operation of the modified forms of Figs. III, and IV, V, will be self-evident without elaboration herein, further than to state the former sprays a regulatable film, while the latter rotatively applies a filmy stream, as the tube "T" passes over the nozzle 61.

It will, furthermore, be apparent as the coating operation progresses, descent of the float 18 in the container 2, that the latter will be automatically replenished with the thermoplastic so long as the winding-formation of the tube "T" continues, or until the apparatus is stopped.

While the foregoing description is necessarily of a detailed character in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining; and it is also to be further borne in mind that various other arrangements of parts and modifications of structural detail may be resorted to without departing from the scope or spirit of the invention as hereinafter claimed.

Having thus described my invention, I claim:

1. In winders for paper tubes and the like, the combination with the mandrel on which the tube is formed, of a driven applicator roll projecting slightly beyond the circumferential confines of said mandrel and adapted to apply a thermoplastic coating to the interior surface of said tube incidental to its production, an electric heater below the applicator roll, and a thermo-control means associated with said heater whereby the coating is maintained at the requisite fluency for application.

2. In winders for paper tubes and the like, the combination with the mandrel on which the tube is formed, of a positively driven roller projecting slightly beyond the circumferential confines of said mandrel and adapted to apply a thermoplastic coating to the interior surface of said tube as it leaves said mandrel thermo-control means associated with said roller whereby the coating is maintained at the requisite fluency for application, and automatically-controlled means for feeding said coating to the applying means as required by the latter.

3. In winders for paper tubes and the like, the combination with the mandrel on which the tube is formed, of a positively driven roller of less diameter than and positioned to project slightly beyond the circumferential confines of the mandrel, said roller being adapted to apply a thermoplastic coating to the interior surface of said tube as it leaves said mandrel, thermo-control means associated with said roller whereby the coating is maintained at the requisite fluency for application, a container for the coating at the tube delivering end of the mandrel, and automatically-actuated means for feeding said coating from the storage to the applying means as it becomes exhausted from the latter.

4. In winders for paper tubes and the like, the combination with the mandrel on which the tube is formed, of a positively driven roller of less diameter than the mandrel and positioned to project slightly beyond the peripheral confines of the mandrel, said roller serving to apply a thermoplastic coating to the interior surface of the tube as it passes from off said mandrel, thermo-control means associated with said roller whereby the coating is maintained at the requisite fluency for application, a container for the coating at

the delivery end of the mandrel with associated thermo-control means to maintain said coating at a desirable temperature, and electromagnetically-actuated means controlling feeding of the coating from the storage to the applying roller as it is used-up by the latter.

5. In winders for paper tubes and the like, the combination with the mandrel on which the tube is formed, of a positively driven roller of relatively smaller diameter positioned to project slightly beyond the peripheral surface of the mandrel, said roller serving to apply a thermoplastic coating to the interior surface of said tube as it passes from off the mandrel, thermo-control means whereby the coating is maintained at the requisite fluency for application, a container for the coating at the delivery end of the mandrel with associated thermo-control means to maintain said coating at a desirable temperature, means for supplying the thermoplastic coating under pressure to the container aforesaid, and automatically-actuated valve means controlling feeding of the coating from supply to the container as it is used-up by the latter.

6. In machines for making tubes from spirally-wound paper and the like strip material, the combination with the mandrel on which the tube is formed, of an applicator for coating the interior surface of the tube with a film of thermoplastic incidental to its passage from off the mandrel, thermo-control means by which the coating is maintained at the requisite degree of fluency, a source of supply of the thermoplastic with associated thermo-control means to keep said thermoplastic fluent, electromagnetically-actuated valve means governing flow of the thermoplastic from supply to the applicator, a similarly-actuated valve for relief of pressure from the just mentioned valve when the supply of thermoplastic in the applicator attains a predetermined level, and means associated with the applicator to effect automatic operation of the flow-control and pressure relief valve means.

7. In machines for making tubes from spirally-wound paper and the like strip material, the combination with the mandrel on which the tube is formed, of an applicator device for coating the interior surface of the tube with a film of thermoplastic incidental to its passage from off the mandrel, thermo-control means by which the coating is maintained in the zone of application at the requisite degree of fluency, a tank of the thermoplastic with associated thermo-control means to sustain said thermoplastic at a desirable temperature, a valve device governing flow of the thermoplastic from the tank to the applicator device, a compressor and branched conduit for supply of pressure air to the tank and valve device aforesaid, an electromagnetically actuated valve automatically controlling flow of the pressure air through the conduit to the valve device to effect feeding of the thermoplastic to the applicator device, an associated similarly-actuated valve for relief of the air pressure from the valve device when the supply of thermoplastic in the applicator device attains a predetermined level, and float means associated with the applicator device adapted to open and close a relay circuit through the control and relief valve electromagnets to effect their operation.

8. In machines for making tubes from spirally-wound paper and the like strip material, the combination with the mandrel on which the tube is formed, of an applicator device including a positively driven roller of smaller diameter and

projected slightly beyond the peripheral confines of the mandrel for coating the interior surface of the tube with a film of thermoplastic incidental to its passage from off the mandrel, thermo-control means by which the coating is maintained in the zone of application at the requisite degree of fluency, a tank of the thermoplastic with associated thermo-control means to sustain said thermoplastic at a desirable temperature, a valve device governing flow of the thermoplastic from the tank to the applicator device, and float means associated with the applicator device to control said valve device and thereby maintain a predetermined level of the thermoplastic.

9. The combination of claim 8 wherein the applicator device consists of a positively driven rotary head at the mandrel tube let-off end, and said head is provided with a lengthwise nozzle disposed longitudinally parallel to the rotary axis of said head and in juxtaposition to the tube inner surface, whereby the thermoplastic coating is applied to the inner surface of the tube.

10. The combination of claim 8, wherein the applicator device includes a normally-open switch in circuit with a battery and a control relay, and a second switch closable by the relay when energized for completing an electric circuit to suitable means operative to govern flow of the thermoplastic to said applicator device.

11. The combination of claim 8, wherein the applicator device comprises an elongate trough-like container for aligned attachment to the mandrel free end, the positively driven roller is rotatively journaled longitudinally in said container, a switch in circuit with an electric control relay is supported by and in advance of the container, and a lever is pivotally carried by the switch with a float portion in the container whereby said switch is automatically opened when the float is elevated to a predetermined level and closed as the flow recedes from said level.

12. In machines for making tubes from spirally-wound paper and the like strip material, the combination with the mandrel on which the tube is formed, of a positively driven applicator roll of less diameter than the mandrel and an associated scraper, said roll being positioned in advance of the mandrel delivery end and mounted to project slightly beyond the peripheral confines thereof, for longitudinally coating the interior surface of the tube with a film of thermoplastic incidental to its passage from off the mandrel, while the "overrun" from said scraper is directed into the inner spiral joint of the tube incident to predetermined positioning of the applicator roll relative to the end of the tube forming mandrel.

JOHN K. M. HARRISON.