

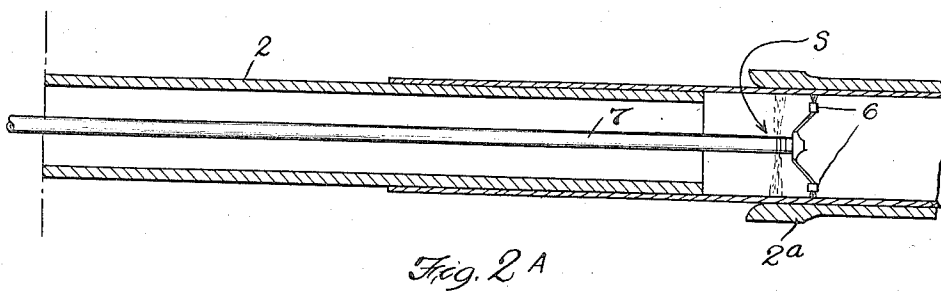
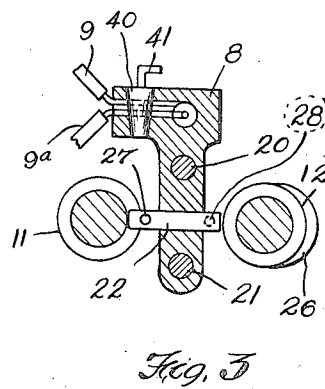
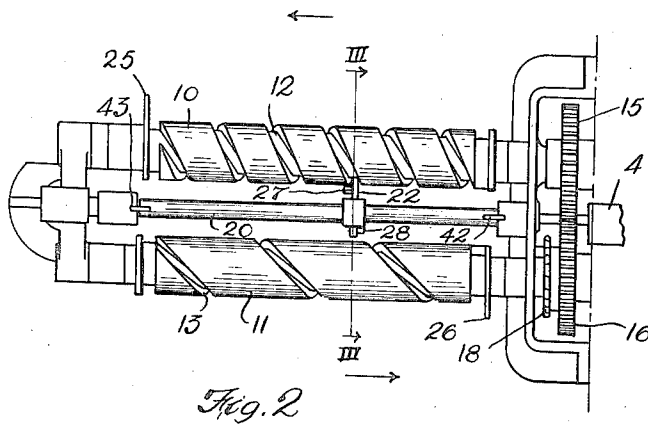
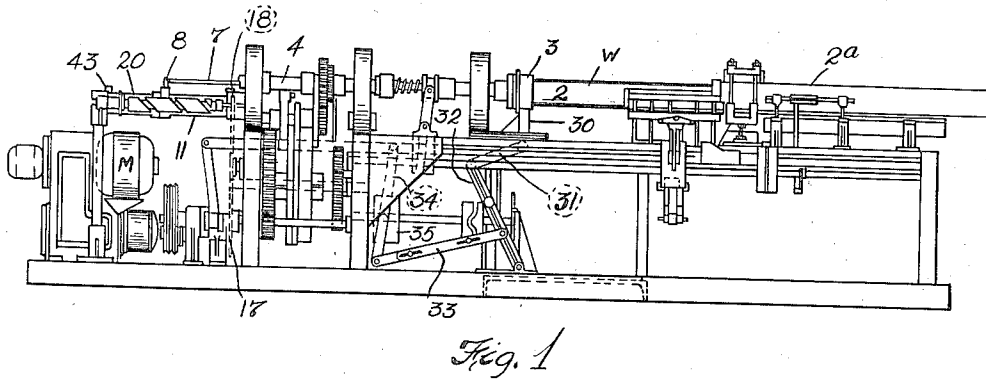
Jan. 31, 1939.

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2,145,279

COATING TUBES INTERIORLY

Filed July 30, 1937



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UNITED STATES PATENT OFFICE

2,145,279

COATING TUBES INTERIORLY

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Application July 30, 1937, Serial No. 156,557

10 Claims. (Cl. 91—25)

This invention relates to coating, and more particularly the coating of the interior surfaces of tubular structures, such as pipes and paper-containers and the like; and it is among the objects of the invention to accomplish such coating effectively and with expeditious rate of throughput. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:—

Fig. 1 is a side elevational view of an embodiment of the invention; Figs. 2 and 2A, both, are broken plan views, on enlarged scale, showing the operating portions of the mechanism; and Fig. 3 is a vertical section taken on a plane substantially indicated by line III—III, Fig. 2.

Referring more particularly to the drawing, there is shown a mandrel 2 for supporting the tube, and in connection with the production of paper-container tubular structures for instance this may be associated with a means for winding the tube to form thereon, if desired, as need not be here detailed; and with the completion of the winding operation, as in convolute forming, a tube-forwarding collar 3 may be employed to advance the tube along one step, to the right as represented in Fig. 1; and with formation of succeeding tube units and forwarding the same stepwise, the internal coating mechanism herein more particularly referred to comes into operation. The mandrel 2 may be rotatively driven by the shaft 4 receiving drive from a motor M through gearing as need not be detailed. The mandrel is preferably in two sequential sections, the first section 2 being that upon which the tube is formed, the diameter being such that the tube can slide therealong, then the section 2a is of sufficiently larger diameter that the tube slides into, and through it to discharge. Thus at the coating point the tubes have their interior surfaces exposed to a spray head S, which may be provided with orifices directing the coating liquid outwardly to contact with the interior wall of the tube, and in close association is a brush 6 serving to smooth out the liquid applied. The spray head S is carried by a conduit 7 which extends back through the mandrel to a reciprocating head 8,

whereby the sprayer receives a reciprocating motion back and forth, and a connection is provided to the conduit from a source of liquid supply. For instance, a flexible tube 9 may lead to a pump or liquid supply reservoir feeding the coating liquid under suitable pressure to accomplish distribution. For reciprocatively moving the head 8, one illustrative suitable means may involve rotatable spiral cams 10, 11, having cam grooves 12, 13, and being mounted in the frame work of the machine in general alignment with the shaft 4 carrying the mandrel, and preferably slightly therebelow. The cams are rotated by suitable means, as for instance gears 15, 16, and sprockets 17, 18, and a sprocket chain thereon. The reciprocating head 8 is slidably mounted on guide rails 20, 21, Fig. 3; and carried by the reciprocating head and slidably mounted therein is a cam-traveler 22, which is of a size to engage in one or the other of the cam grooves 12, 13, alternately, the traveler as impelled by the spiral 10 causing the reciprocating head to slide along its guide rail until the traveler reaches the end of the groove. At this juncture, in order to shift the traveler from one cam to the other and assure uniform and smooth transfer, shifting-rims 25, 26, are provided, there being one at each end of the traveler excursion, and such rims being secured to the cams 10, 11, to rotate therewith in accurate timing. Coacting with the shifting-rims are projections 27, 28, which outstanding from the traveler 22 are engaged in turn at the appropriate time by the shifting-rims 25, 26.

In the coating operation, the tubular paper body, assumed for example to have been formed by winding on the mandrel at position w, is moved along the mandrel to the right as represented in the drawing, and in due course comes opposite the spray head S. The moving of the tubular paper-body on the mandrel may be accomplished in any desirable way, for instance the collar 3 which is carried on the slide 30 being thrust forwardly by a link 31, on lever 32 which is pivoted to the framing at its lower end and by a link 33 receives motion from a cam lever 34 whose cam-traveler is operated by a cam 35 driven by the gearing. Coming opposite the spray head S, the latter makes a reciprocative movement to advance and return so as to cover the inner surface of the tube as it is exposed here, and the timing being such that the cam-traveler 22 is set in the cam groove 13 by the shifting-rim 25 engaging the traveler-projection 27 at appropriate times. The traveler 22 is carried along as the spiral groove coacts with it, and the reciprocating head

8 is correspondingly carried forward, to the right as illustrated in the drawing. Arriving at the end of the cam groove 13, the shifting-rim 26 engages the traveler-projection 28 and pushes the traveler over into the beginning of the cam groove 12, whereupon the head 8 is carried thereby on the return journey. The conduit 7 and the spray head 8 move correspondingly. Preferably, the cam groove 13 is of higher pitch and gives a faster movement. Thereby, the coating liquid is applied to the wall of the tube, and on return the brush 6 smooths it. Desirably, the liquid conduit may have a valve 40 whose lever 41 strikes an actuating lug 42, 43, at the respective ends of the general reciprocating movement, so that the valve is opened for the flow of liquid during the forward movement and is closed for the return. If a sprayer head of the type having an air feed, for instance centrally thereof, is preferred, the valve may also control an air supply connection 9a as well. The precise character of the coating liquid may vary, depending upon the particular result to be accomplished whether water-proofing, oil-proofing, or a combination of results, and the applied coating may be set by the action of rapid evaporation of the solvent in short exposure or for other kinds of coating, drying or heating may be applied.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In mechanism for interiorly coating tubes, a mandrel for supporting the tube, means for forwarding the tube along and from the mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a spray head to apply liquid on the interior tube wall, a brush in association for smoothing the applied liquid, a conduit through said mandrel and carrying said spray head, a connection from a source of liquid supply to said conduit permitting axial reciprocation of the conduit, another connection from a source of fluid under pressure, and means for reciprocating the conduit, including a reciprocating head to which the conduit is attached, guide rail means for said head, a pair of rotatable spiral cams along said guide rail means, a cam-traveler slidably mounted on said reciprocating head to engage said cams alternately, projections on said cam-traveler, and a shifting-rim on each said cam for shifting the traveler at the end of the run of each cam, one of said cams rotating for a rapid advance of said head and the other rotating for a slower return.

2. In mechanism for interiorly coating tubes, a mandrel for supporting the tube, means for forwarding the tube along and from the mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a spray head to apply liquid on the interior tube wall, a brush in association for smoothing the applied liquid, a conduit through said mandrel and carrying said spray head, a connection from a source of liquid supply to said conduit permitting axial reciprocation of the conduit, and means for reciprocating the conduit, including a reciprocating head to which the conduit is attached, guide rail means for said head, a pair of rotatable spiral cams along said guide rail means, a cam-traveler slidably mounted on said reciprocating head to engage said cams alternately, projections on said cam-traveler, and

a shifting-rim on each said cam for shifting the traveler at the end of the run of each cam, one of said cams rotating for a rapid advance of said head and the other rotating for a slower return.

3. In mechanism for interiorly coating tubes, a mandrel for supporting the tube, means for forwarding the tube along and from the mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a spray head to apply liquid on the interior tube wall, a brush in association for smoothing the applied liquid, a conduit through said mandrel and carrying said spray head, a connection from a source of liquid supply to said conduit permitting axial reciprocation of the conduit, and means for reciprocating the conduit, including a reciprocating head to which the conduit is attached, guide rail means for said head, a pair of rotatable spiral cams along said guide rail means, a cam-traveler slidably mounted on said reciprocating head to engage said cams alternately, projections on said cam-traveler, and a shifting-rim on each said cam for shifting the traveler at the end of the run of each cam.

4. In mechanism for interiorly coating tubes, a mandrel for supporting the tube, means for forwarding the tube along and from the mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a spray head to apply liquid on the interior tube wall, a conduit through said mandrel and carrying said spray head, a connection from a source of liquid supply to said conduit permitting axial reciprocation of the conduit, and means for reciprocating the conduit, including a reciprocating head to which the conduit is attached, guide rail means for said head, a pair of rotatable spiral cams along said guide rail means, a cam-traveler slidably mounted on said reciprocating head to engage said cams alternately, projections on said cam-traveler, and a shifting-rim on each said cam for shifting the traveler at the end of the run of each cam.

5. In mechanism for interiorly coating tubes, a mandrel for supporting the tube, means for forwarding the tube along and from the mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a conduit through said mandrel for applying liquid to the interior of the tube, a connection from a source of liquid supply to said conduit permitting axial reciprocation of the conduit, and means for reciprocating the conduit, including a reciprocating head to which the conduit is attached, guide rail means for said head, a pair of rotatable spiral cams along said guide rail means, a cam-traveler slidably mounted on said reciprocating head to engage said cams alternately, projections on said cam-traveler, and a shifting-rim on each said cam for shifting the traveler at the end of the run of each cam.

6. In mechanism for interiorly coating tubes, a mandrel for supporting the tube, means for forwarding the tube along and from the mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a conduit through said mandrel for applying liquid to the interior of the tube, a connection from a source of liquid supply to said conduit permitting axial reciprocation of the conduit, and means for reciprocating the conduit, including a reciprocating head to which the conduit is attached, a pair of rotatable spiral cams, a cam-traveler slidably mounted on said reciprocating head to engage said cams alternately, projections on said cam-traveler, and a shifting-rim on each said cam for shifting the traveler at the end of the run of each cam.

7. In mechanism for interiorly coating tubes,

a mandrel for supporting the tube, means for forwarding the tube along and from the mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a conduit through said
5 mandrel for applying liquid to the interior of the tube, a connection from a source of liquid supply to said conduit permitting axial reciprocation of the conduit, and means for reciprocating the conduit, including a reciprocating head to which
10 the conduit is attached, and cam means for reciprocating said head in alternate directions.

8. In mechanism for interiorly coating tubes, a mandrel for supporting the tube, means for forwarding the tube along said mandrel, an interruption in said mandrel wherein the tube is
15 exposed interiorly, a spray head to apply liquid on the interior tube wall, a conduit through said mandrel and carrying said spray head, a connection from a source of liquid supply to said conduit,
20 another connection from a source of fluid under pressure, and means for reciprocating the conduit in alternate directions.

9. In mechanism for interiorly coating tubes,

a mandrel for supporting the tube, means for forwarding the tube along said mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a spray head to apply liquid
5 on the interior tube wall, a conduit for supplying liquid from a source of liquid supply to the interior of the tube, and cam means for reciprocating said conduit in alternate directions.

10. In mechanism for interiorly coating tubes, a mandrel for supporting the tube, means for
10 forwarding the tube along said mandrel, an interruption in said mandrel wherein the tube is exposed interiorly, a spray head to apply liquid on the interior tube wall, a conduit for supplying
15 liquid from a source of liquid supply to the interior of the tube, means for reciprocating said conduit in alternate directions, a valve communicating with said conduit and controlling the flow of
20 liquid therethrough, and means operated by the reciprocation of said conduit for actuating said valve.

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