

H. S. WILSON.
MACHINERY FOR PRODUCTION OF LIQUID AND MOISTURE PROOF PACKAGES.
APPLICATION FILED OCT. 11, 1909.

1,070,933.

Patented Aug. 19, 1913.

2 SHEETS—SHEET 1.

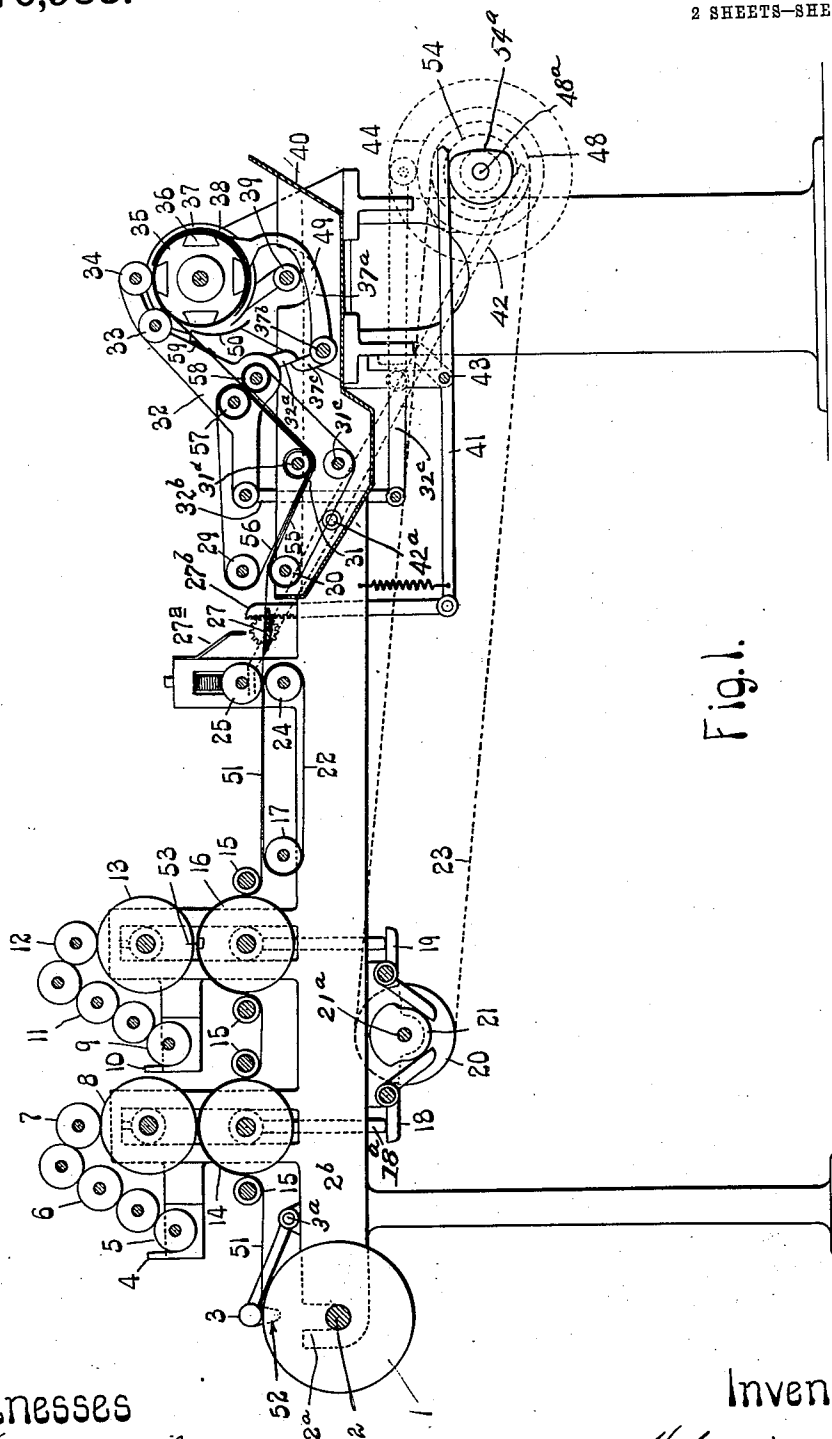


Fig. 1.

Witnesses

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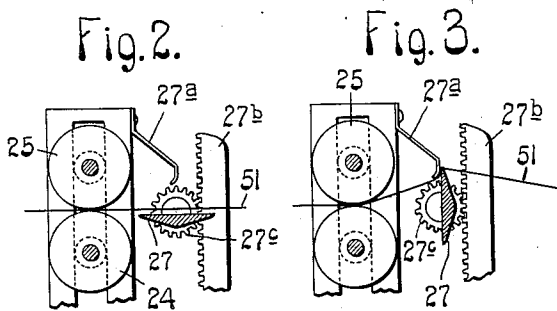
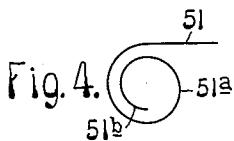
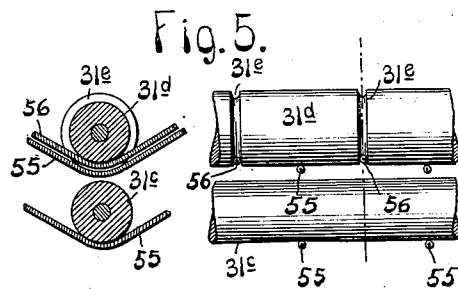
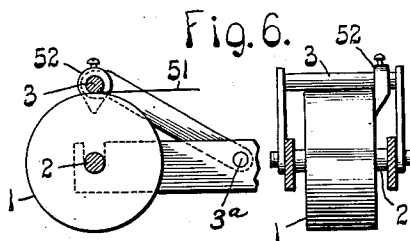
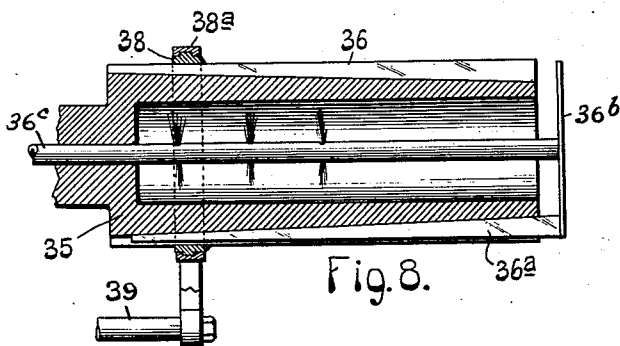
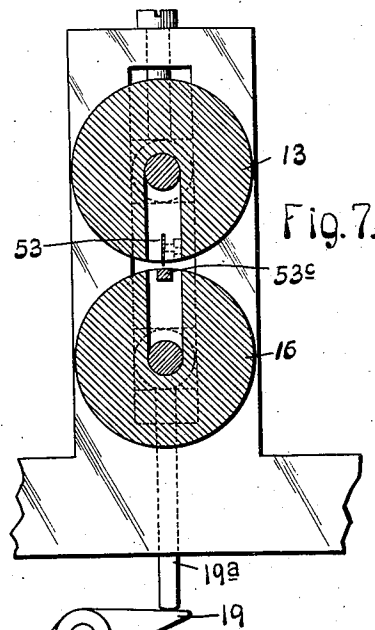
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UNITED STATES PATENT OFFICE.

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MACHINERY FOR PRODUCTION OF LIQUID AND MOISTURE PROOF PACKAGES.

1,070,933.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HERBERT S. WILSON, a citizen of the United States, residing in the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Machinery for Production of Liquid and Moisture Proof Packages, of which the following is a specification.

This invention relates or pertains to that class of machines or appliances in which a roll of paper, cloth, or fibrous material is converted into shells or tubes adapted to form the outer walls or sides of packages and a machine embodying this invention ordinarily consists of elements or parts which, while performing different operations, co-act and are combined in one machine which operates as a whole and is to all intents and purposes a single machine.

The various elements or portions of the machine among others to be provided for are; first, a friction device or retarder to prevent racing or too rapid unrolling of the paper roll or other material; second, one or more printing devices in order that the paper may be printed in one or several colors; third, means to cut or sever the paper or fabric into suitable lengths; fourth, means to transfer the web or feed the same through the machine; fifth, means to permanently curl or bend the web or strip of paper for a part or the whole of its length; sixth, means to apply a liquid or moisture proof adhesive to the paper; seventh, rolls or other suitable means to remove the surplus coating of such material; eighth, a chuck or winding mandrel capable of contracting and expanding whereby the finished or wound shell may be loosened thereon; ninth, a stripping ring or ejector adapted to discharge the shells from the mandrel; tenth, a receiver to catch the completed shell, and; eleventh, a suitable connecting mechanism to operate the various coöperating elements of the machine.

In order that a full and complete understanding of this invention may be had I have illustrated a desirable embodiment of the same in the accompanying drawings which form a part of this specification and throughout the various views of which like reference characters refer to the same parts.

In these drawings; Figure 1 is a diagrammatic elevation of a machine incorporating the features of this invention; Figs. 2 and 3 illustrate on an enlarged scale the details of

construction of the curling device; Fig. 4 indicates the manner in which the strip of paper is curled; Fig. 5 shows in section and fragmentary elevation the features of construction of the grooved rollers and coöperating belts; Fig. 6 comprises two views at right angles to one another showing the roll of paper and the retarding mechanism; Fig. 7 illustrates the features of the last or final set of printing rollers which also combine the cutting or separating knife; Fig. 8 is a longitudinal sectional view of the mandrel or winding head and indicates the manner of loosening the finished shell and the means to eject the same from the mandrel.

By referring to these drawings it will be noticed that the roll of paper 1, of suitable and desirable width, is supported on a central arbor 2, the protruding ends of which are rotatably supported in bearings or notches 2^a in the frame 2^b of the machine, a brake, weight, or friction device 3 hinged to the frame of the machine at 3^a, bearing on the top of the roll of paper and being designed to provide a continuous and uniform tension on the paper web 51, such element 3 acting, as will be readily understood, to prevent racing or too rapid unrolling of the paper. A gage 52 is mounted, as shown in Figs. 1 and 6, on the bar or member 31, and is designed to act as a guide to hold the roll in the same, or proper position at each renewal.

Two cylinder printing presses are mounted on the machine frame, the former comprising an ink well 4 and ink distributing rollers or devices 5, 6, and 7, which, as will be readily understood, are adapted to apply the ink to the printing cylinder 8. The companion printing press has its cylinder 13 supplied with ink of the same or any other suitable color by means of the ink well or container 10, and the coöperating distributing rollers 9, 11, and 12. Beneath the two printing rollers 8 and 13 I mount two companion rollers 14 and 16 capable of vertical movement toward and from the upper rollers, and operated by means of a cam 21 on a shaft 21^a, such cam co-acting with a pair of suitably fulcrumed bell-crank levers 18 and 19 coöperating by means of proper connecting mechanism with the two rollers 14 and 16, over which the web of paper 51 passes, the same being held in suitable contact with such rollers by the additional

guide rollers 15, 15. As clearly shown in Fig. 7, the roller 16 is given a vertical movement by means of a rod 19^a cooperating with the bell-crank lever 19. The roller 14 is similarly lifted through the medium of a rod 18^a cooperating with the bell-crank lever 18. As is indicated diagrammatically the cam 21 and its shaft 21^a are rotated by means of a chain belt 23 passing around a sprocket wheel or pulley 20 on the shaft 21^a and a similar sprocket wheel or pulley 48 on the main-drive shaft 48^a. The printing cylinder 13 is recessed as indicated in Fig. 7 to accommodate a knife blade 53, which is adapted to partially sever the web of paper into individual blanks, the blanks being attached to one another preferably by a small un-severed portion at the center of the cut. The vertically-reciprocatory companion impression roller 16 is provided with a relatively soft-block 53^c with which the knife blade is adapted to co-act in its severing or cutting operation, the knife and block being brought into register during the rotation of the rollers as is clearly illustrated in Fig. 7.

Beyond roller 16 the machine is provided with a pair of rotatably mounted drums 17 and 24 encircling which is an endless traveling belt or conveyer 22 adapted to conduct the web of paper from the printing mechanism to the curling portion of the structure. Above the roller 24 I employ a similar revolvable roller or drum 25, capable of vertical movement toward and from the roller 24, and spring pressed downwardly, such roller being lifted at intervals by any suitable form of mechanism, such for example as by a lever 42 fulcrumed at 42^a, such lever being in cooperative relation at its upper end with the roller and its lower end co-acting with an actuating cam 54. Rollers or drums 24 and 25 are driven in any approved manner at a speed such as to cause the paper between them to travel faster than it does through the printing mechanism hereinabove described, such accelerated movement of these feed rollers acting to separate the partially severed blanks from the remainder of the web.

At one side of the feed rollers 24 and 25 an intermittently-operated curling mechanism is located, comprising a stationary bent bar or blade 27^a fastened or secured to the standard carrying the feed roller 25. Below the depending end of such bar I provide an oscillatory curling bar or blade 27, having a relatively or comparatively sharp edge adapted to be swung into juxtaposition to the lower edge of the bar or blade 27^a, in which position it is adapted to curl the strip or band of paper drawn over the same. In Fig. 2 this curling bar or blade is shown in inoperative position the web or strip of paper 51 passing above the same and below the bar 27^a, no curling of the same in these

positions of the parts taking place, but when the bar or blade 27 is swung into substantially vertical position as indicated in Fig. 3 the drawing of the paper across such top edge occasions or brings about a permanent curling of the same. In order to secure the proper timed oscillation of the bar or blade 27 the same is equipped with a pinion or gear 27^c the teeth of which mesh with those of a substantially-vertically disposed rack 27^b connected at its lower end to a spring-drawn lever 41 fulcrumed at 43 and adapted to be rocked by a suitable cam 54^a on the main drive shaft 48^a.

On the frame of the machine adjacent to the curling mechanism I employ a receptacle or pan 40 adapted to contain the coating liquid, which is preferably though not necessarily a water or moisture-proof adhesive, such for example as paraffin, which water-proofs the strips of paper and acts when set to cause the adhesion together of the various convolutions of the paper shells or tubes. This receptacle may be heated in any approved manner to maintain the paraffin or other coating material in a liquid state, the level of such liquid being indicated by the dotted line.

In order to feed or convey the preliminarily-curved strips or sections of paper through the melted paraffin bath contained in the receptacle 40 I provide the six rotatable rollers 29, 31^a, 57, 58, 31^c, and 30. A plurality of endless preferably elastic metallic conveyers 55 pass around the rollers 58, 31^c, and 30 and co-act with the roller 31^a. Similar bands or conveyers 56 pass around the rollers 29, 57, and 31^a, traveling in grooves 31^c in the latter roller so that as the strip of paper passes beneath the roller 31^a between the conveyer bands 55 and 56 it will not be injured or crumpled. The rollers 29 and 30 are also preferably grooved to hold the conveyers 55 and 56 in proper spaced relation, the other rollers 57 and 58 being similarly grooved if found to be desirable or necessary.

A hollow rotatable mandrel 35 is mounted on the top portion of one end of the machine and is provided on its cylindrical periphery with a plurality, (in the present instance four) of longitudinal tapered undercut grooves accommodating a corresponding number of reciprocatory dovetailed wedge or tapered bars 36^a connected together by a common member 36^b on the end of a slidable hollow rod or shaft 36^c perforated or apertured inside of the mandrel or form to permit, if necessary, the heating of the mandrel from its interior by means of steam or other heating element fed to the rod 36^c and escaping through its apertures against the inner surface of the form. Slidable lengthwise thereon the mandrel has a round stripper or ejector 38, revo-

lable with the mandrel and contained within a non-rotary ring or support 38^a attached to an operating rod 39 adapted to be shifted at proper intervals by means of an appropriate mechanism, such for example as a cam actuated device. Partially surrounding the mandrel or winding head 35 is a curved guide or shoe 37 carried on the upstanding end of an arm 37^a fulcrumed at 37^b and equipped with a finger 37^c co-acting with a similar finger 32^a on a frame 32 fulcrumed or hinged co-axially with the roller 58, said frame at one end carrying a pair of rotatable rollers 33 and 34 between which and the mandrel the strip of paper is adapted to pass to the curved guide or shoe 37. The revoluble roller 57 is also mounted in the frame 32 and the latter is rocked at intervals by means of a link 32^b pivoted thereto and also pivoted to the end of a lever 32^c, which is rocked by means of a cam 44.

50 represents a fixed guide, which also assists in properly winding the paper on the mandrel, and between the latter and the rollers 57 and 58 I place a grating or guide 59 to provide a means of conducting the sheet to the chuck and to the rollers 33 and 34.

Concisely stated, the operation of the machine takes place substantially as follows: The web of paper is unwound from the roll (1) and passes through the printing presses by which any suitable or desirable printing, either in one or more colors, may be placed thereon. The knife 53 partially or almost entirely severs the strip or web of paper into individual blanks or pieces, and while still connected they pass to the feed belt 22 which conducts the paper to the feed rollers 24 and 25. When the roller 25 descends, an accelerated movement is given to the blank between rollers 24 and 25 which separates it from the web. The separated blank is fed forwardly to the feeding mechanism in and above the pan 40, and at the proper time the curling blade 27 is swung up, causing a curling of the rear portion of the blank by the drawing of the same over the edge of blade 27 as is shown in Fig. 3. In its further travel the paper blank or strip passes through the bath of hot melted paraffin, being coated therewith, and then is conducted to the winding head or mandrel, the rollers 33 and 34 rising automatically to receive the front end of the paper and then descending to direct the paper beneath guide 37, which also backs away from the mandrel during the insertion of the first portion of the paper, subsequently moving up to the mandrel as will be readily understood. Ordinarily about four convolutions of the paper are used for each tube or shell, and as soon as the same has been wound on the mandrel, rollers 33 and 34 and guide 37 retract, per-

mitting the sliding ejector 38 to at once discharge the shell endwise off of the mandrel, the latter contracting slightly by the simultaneous shifting of the tapered bars or sections 36^a.

It should be noticed that the portion of the paper blank forming the inner convolutions is not preliminarily permanently set or curled, but that the other portion constituting the outer convolutions or windings is initially curled as at 51^a and 51^b, Fig. 4. The result is that in the discharged or ejected shell or tube the inner convolutions tend to expand and the outer convolutions to contract, thereby holding the windings in contact during the setting or hardening of the paraffin coating, which when hot has substantially no adhesive qualities. The paraffin when cold, however, acts to cement the windings together; and the shell or tube is water proof throughout its entire thickness. I believe that I am the first person to provide a machine which first curls the strip of paper, then coats it, then winds it up into cylindrical form and then discharges it at once, depending upon the resiliency of the paper itself to hold it in shape during the setting of the adhesive coating.

The term "curl" as used herein means the giving of a permanent set to the paper or tendency to curl or wind up upon itself if permitted to do so but, as will be readily understood, the feeding or conveying mechanism in the machine prevents the paper from responding freely to this bias or tendency until the strip is wound on the mandrel or winding head.

I have not deemed it necessary or attempted to show in detail all of the minute mechanical features of the particular machine hereinabove described, because they may be varied within wide limits without departure from my invention, and one skilled in the art will experience no difficulty in constructing a machine in accordance with the principles of this invention from the disclosure herein made.

I claim:

1. In a machine for making laminated paper tubes, the combination of means to preliminarily permanently curl a strip of paper, a mandrel, means to wind said curled strip on said mandrel into tubular laminated form, and means to discharge the tube from said mandrel practically as soon as the tube is wound thereon, whereby the preliminary curling of the paper causes the convolutions of the discharged tube to hug one another and the tube to maintain the shape and size given to it by the mandrel, substantially as described.

2. In a machine for making laminated paper tubes, the combination of means to preliminarily permanently curl a strip of paper, means to coat such strip, a mandrel, 130

means to wind said curled coated strip on said mandrel into tubular laminated form, and means to discharge the tube from said mandrel practically as soon as the tube is wound thereon, whereby the preliminary curling of the paper causes the convolutions of the discharged tube to hug one another and the tube to maintain the shape and size given to it by the mandrel, substantially as described.

3. In a machine for making laminated paper tubes, the combination of means to preliminarily permanently curl a strip of paper, means to coat said strip with an adhesive, a mandrel, means to wind said curled coated strip on said mandrel into tubular laminated form, and means to discharge the tube from said mandrel practically as soon as the tube is wound thereon, whereby the preliminary curling of the paper causes the convolutions of the discharged tube to hug one another during the setting of the adhesive and the tube to maintain the shape and size given to it by the mandrel, substantially as described.

4. In a machine for making laminated paper tubes, the combination of means to curl a strip of paper by drawing the same over an edge, means to subsequently wind said strip into tubular laminated form, and means to feed the strip, substantially as described.

5. In a machine for making laminated paper tubes, the combination of means to curl a strip of paper by drawing the same over an edge, means to apply an adhesive coating to said strip, means to subsequently wind said strip into tubular laminated form, and means to feed said strip, substantially as described.

6. In a machine for making laminated paper tubes, the combination of means for curling a portion only of a strip of paper, means to subsequently wind said strip into tubular laminated form with the uncurled portion innermost, and means to feed said strip of paper, substantially as described.

7. In a machine for making laminated paper tubes, the combination of means for curling a portion only of a strip of paper, means to apply a coating to said strip, means to subsequently wind said strip into tubular laminated form with the uncurled portion of the strip innermost, and means to feed said strip of paper, substantially as described.

8. In a machine for making laminated paper tubes, the combination of means for curling a portion only of a strip of paper, means to apply an adhesive coating in liquid form to said strip, means to subsequently wind said strip into tubular laminated form with the uncurled portion of the strip innermost, and means to feed said strip of paper, substantially as described.

9. In a machine for making laminated paper tubes, the combination of means for curling a portion only of a strip of paper, means to apply an adhesive waterproof coating to said strip, means to subsequently wind said strip into tubular laminated form with the uncurled portion of the strip innermost, and means to feed said strip of paper, substantially as described.

10. In a machine for making laminated paper tubes, the combination of means to feed paper blanks, curling mechanism, means to intermittently operate said curling mechanism whereby to curl a portion only of each blank, means to coat said blanks, and means to wind said coated paper blanks into tubular laminated form with the uncurled portions innermost, substantially as described.

11. In a machine for making laminated paper tubes, the combination of means to feed paper blanks, a curling mechanism, means to intermittently operate said curling mechanism whereby to curl a portion only of each blank, means to apply an adhesive waterproof coating to said blanks, and means to wind said coated paper blanks into tubular laminated form with the uncurled portions innermost, substantially as described.

12. In a machine for making laminated paper tubes, the combination of means to feed a strip of paper, means to sever said strip into blanks, means to preliminarily permanently curl said blanks, a mandrel, means to wind the curled blanks on said mandrel into tubular laminated form, and means to discharge the tubes from said mandrel practically as soon as the tubes are wound thereon, whereby the preliminary curling of the paper causes the convolutions of the discharged tubes to hug one another and the tubes to maintain the shape and size given to them by the mandrel, substantially as described.

13. In a machine for making laminated paper tubes, the combination of means to feed a strip of paper, means to sever said strip into blanks, means to preliminarily permanently curl said blanks, means to coat said blanks with a moisture-proof adhesive, a mandrel, means to wind the coated curled blanks on said mandrel into tubular laminated form, and means to discharge the tubes from the mandrel before the adhesive has had an opportunity to set, whereby the preliminary curling of the paper causes the convolutions of the discharged tubes to hug one another and the tubes to maintain the shape and size given to them by the mandrel, substantially as described.

14. In a machine for making laminated paper tubes, the combination of means to partially sever a strip of paper into blanks, means to tear said blanks apart, means to

curl said blanks, and means to wind said curled blanks into laminated tubular form, substantially as described.

15. In a machine for making laminated paper tubes, the combination of means to partially sever a strip of paper into blanks, means to tear said blanks apart, means to curl said blanks, means to coat said curled blanks, and means to wind said coated curled blanks into laminated tubular form, substantially as described.

16. In a machine for making laminated paper tubes, the combination of means to partially sever a strip of paper into connected blanks, means to tear said blanks apart, means to curl a portion only of each blank, means to coat the curled blanks, and means to wind said coated curled blanks into laminated tubular form with the uncurled portions innermost, substantially as described.

17. In a machine for making laminated paper tubes, the combination of means to curl paper blanks, means to coat said blanks, an expansible and contractible mandrel, means to wind said coated blanks in laminated tubular form on said mandrel, means to subsequently contract said mandrel, and an ejector to discharge said tubes from the mandrel, substantially as described.

18. In a machine for making laminated paper tubes, the combination of means to curl paper blanks, means to coat said blanks, a mandrel, means to wind said coated blanks in laminated form on said mandrel, an ejector to discharge the wound tubes from said mandrel, and one or more guides movable toward and from said mandrel, substantially as described.

19. In a machine for making laminated paper tubes, the combination of means to curl paper blanks, means to coat said blanks, a mandrel, means to wind said coated blanks in laminated tubular form on said mandrel, one or more guides movable toward and

from said mandrel, an ejector working lengthwise of said mandrel to discharge said tubes therefrom, and means to move said guides away from said mandrel during the discharging action of said ejector, substantially as described.

20. In a machine for making laminated paper tubes, the combination of a fixed blade, a movable blade, means for intermittently shifting said movable blade into operative relation with said fixed blade, and feeding mechanism for drawing the paper across the edge of said movable blade when in such operative position, substantially as described.

21. In a machine for making laminated paper tubes, the combination of a fixed blade, a movable blade, means for shifting said movable blade into operative relation with said fixed blade, feeding mechanism for drawing the paper across the edge of said movable blade when in such operative position to curl the paper, a mandrel on which the curled paper is wound, and means to coat said paper between said blades and mandrel, substantially as described.

22. In a machine for making laminated paper tubes, the combination of a fixed spring blade arranged at one side of the path of travel of the web of paper, a movable blade arranged at the other side of such path of travel of the web of paper, means for shifting said movable blade into operative relation with said fixed blade, feeding mechanism for drawing the paper across the edge of said movable blade when in such operative position to curl the web of paper, a mandrel on which the curled paper is wound, and means to coat the paper between said blades and mandrel, substantially as described.

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