May 4, 1971 E. K. RITTERHOFF 3,577,293

METHOD OF LABELLING CYLINDRICAL OBJECTS

Original Filed Sept. 19, 1962 2 Sheets-Sheet 1

FIG. 1

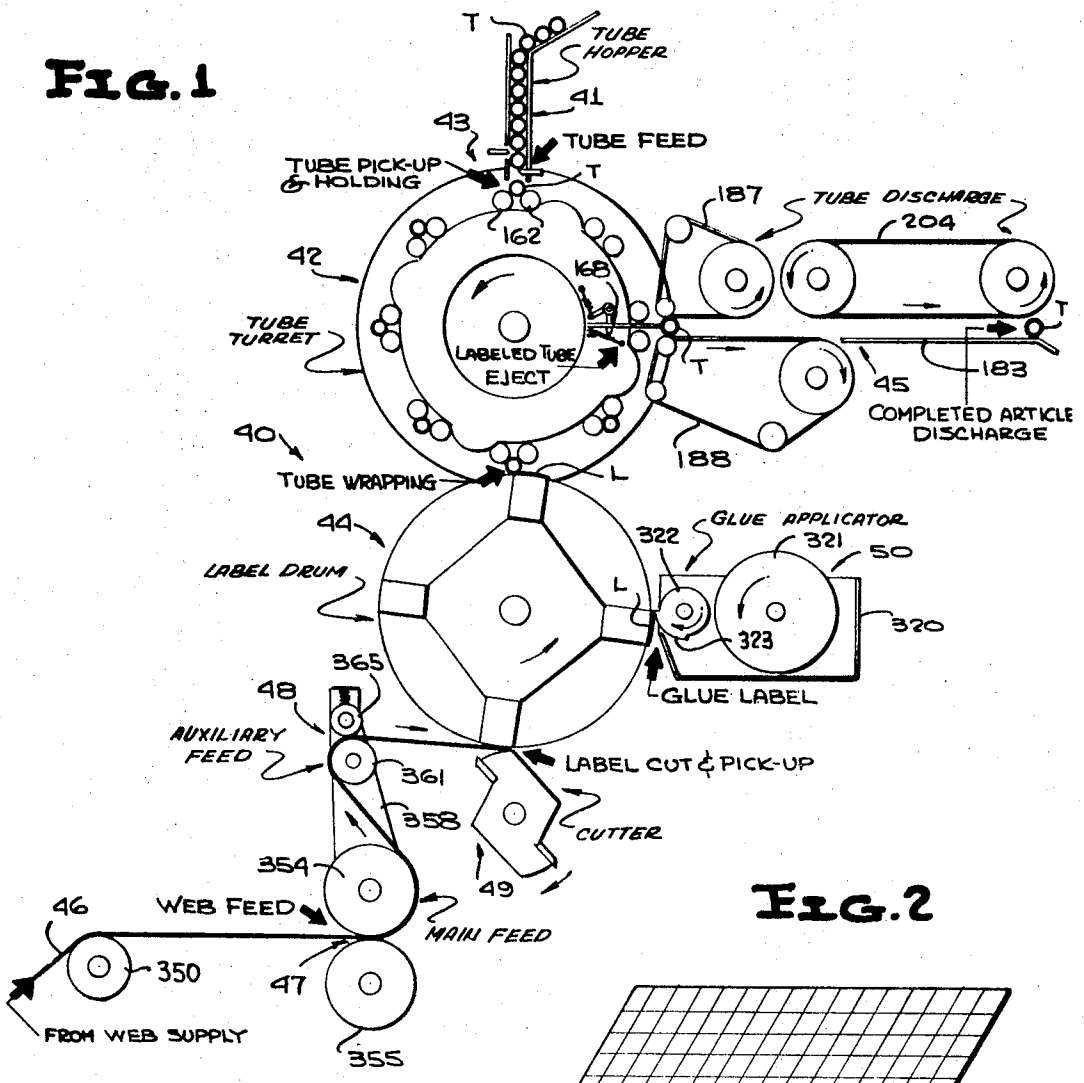


FIG. 2

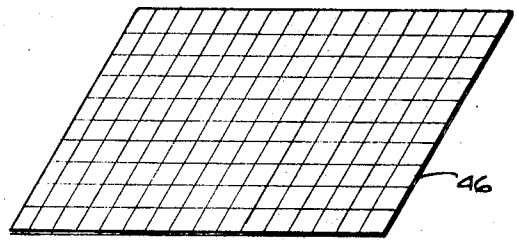


FIG. 3

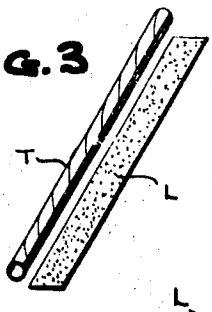
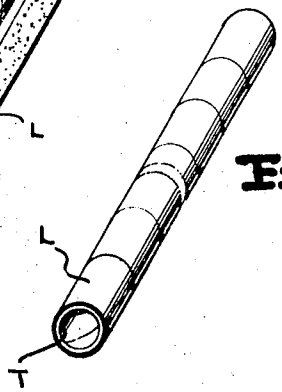


FIG. 4



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METHOD OF LABELLING CYLINDRICAL OBJECTS

Original Filed Sept. 19, 1962 2 Sheets-Sheet 2

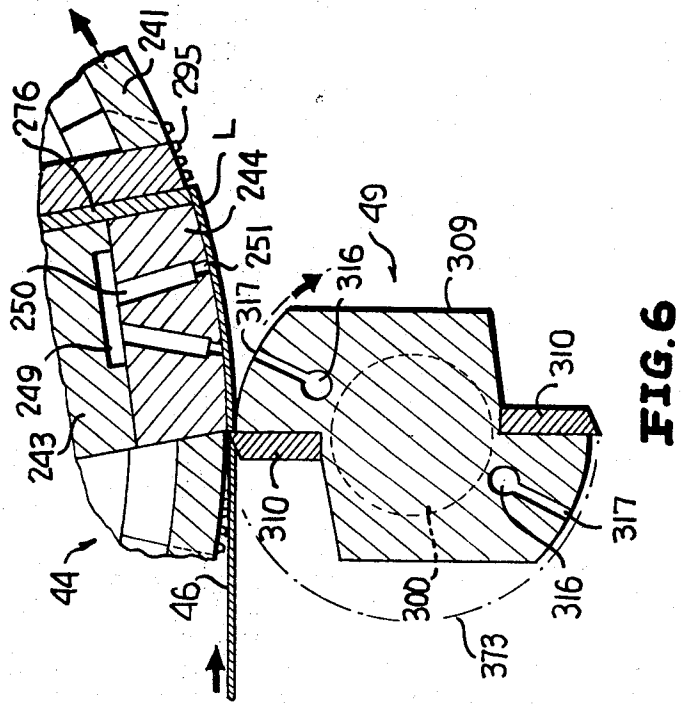

FIG.6

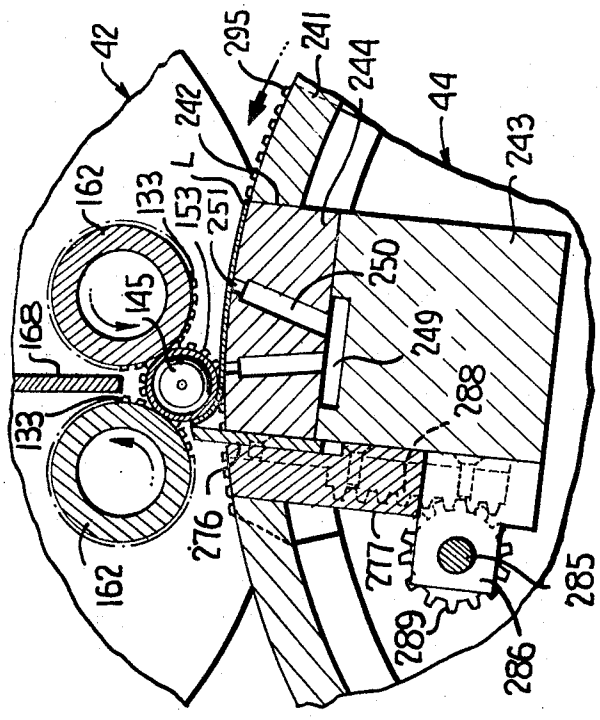

FIG.5

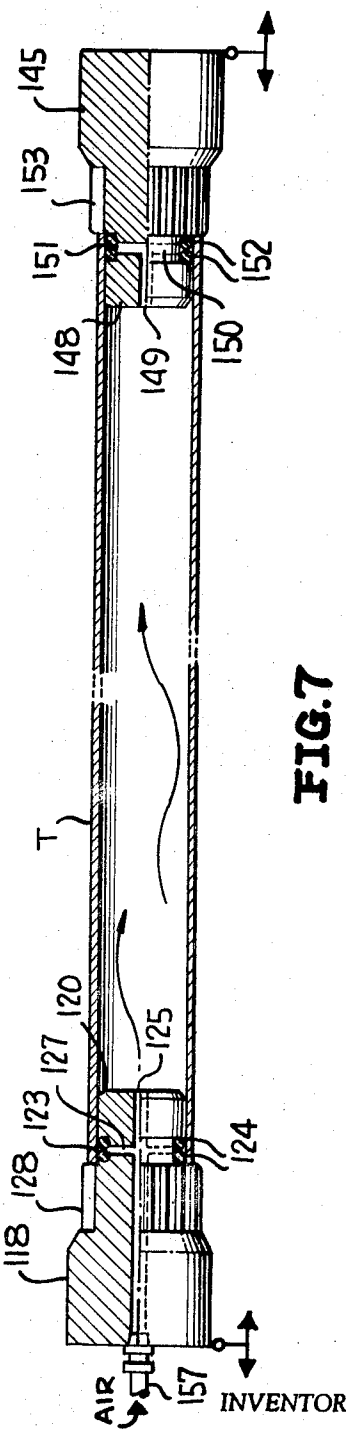

FIG.7

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METHOD OF LABELLING CYLINDRICAL OBJECTS

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Original application Sept. 19, 1962, Ser. No. 224,660, now Patent No. 3,404,059, dated Oct. 1, 1968. Divided and this application Aug. 9, 1968, Ser. No. 751,439
Int. Cl. B32b 31/20; B65c 3/12
U.S. Cl. 156—156 4 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a method of labelling cylindrical objects wherein the objects are primarily in the form of tubes which are flexible. The label is supplied in web form and initially a correct length of the web is cut off and carried by a drum past an adhesive applicator after which the section of the web is applied to a tube. The tube is carried by a turret and is pressurized at the time the web is being applied thereto. The tube is rotated during the application of the label with the two being rotated at the same speed as the labels being fed. The labelled tube is later cut into individual sections.

This application is a division of my copendng application Ser. No. 224,660, filed Sept. 19, 1962, now Pat. No. 3,404,059 and granted Oct. 1, 1968.

This invention particularly relates to the application of a label to a thin wall flexible tube which has insufficient rigidity to be supported in a normal manner for the reception of a label. A typical tube is that used as a casing for small diameter flashlight batteries, such as penlight cells. In accordance with this invention, it is proposed to supply labels in the form of a continuous web which is directed to a label applying drum and which is cut into strips extending transversely of the web, after which each strip is wrapped around a tube followed by the later cutting off of the tube into lengths corresponding to the label arrangement.

A primary object of this invention is to provide a novel method of applying labels to thin flexible tubes wherein the labels are furnished in the form of a continuous web, which web is cut into elongated strips extending transversely of the web and at the same time are received by a label applying drum, after which adhesive is applied to the label strips and the label strips wound around tubes.

Another object of this invention is to provide a novel method of wrapping a thin wall tube from material of a continuously moving decorated web wherein the web is engaged by a rotating cutter moving at a greater rate than the web to sever a transverse strip from the web and simultaneously advancing that portion of the web engaged by the cutter at the same speed as the cutter, thereby preventing relative movement between the web and the cutter during the severing operation.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by a reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings:

In the drawings:

FIG. 1 is a schematic elevational view showing generally the details of the apparatus which is the subject of this invention.

FIG. 2 is a fragmentary perspective view of a web of labels which is to be applied in accordance with this invention.

FIG. 3 is a schematic view showing a tube to be wrapped with a label and an associated label strip.

FIG. 4 is an enlarged perspective view showing a labelled tube formed in accordance with this invention.

FIG. 5 is an enlarged fragmentary sectional view showing a label section being applied to a tube.

FIG. 6 is an enlarged fragmentary sectional view showing a cutter cooperating with a label drum for severing a section from the constantly moving web.

FIG. 7 is a fragmentary sectional view taken through a tube and shows the manner in which the tube is engaged and pressurized by a pair of opposed chucks.

Referring now to the drawings in detail, reference is first made to FIG. 1 wherein there are shown the over-all details of the label applying apparatus, which apparatus is generally referred to by the numeral **40**. In accordance with the invention, tubes to which labels are to be applied, which tubes are generally referred to by the letter T, are supplied from a tube hopper **41**. The tubes T are delivered to a tube turret, generally referred to by the numeral **42**, as the tube turret **42** is indexed by means of a hopper discharge control or gate mechanism, generally referred to by the numeral **43**. The tubes T supported by the tube turret **42** are indexed therewith and a label applying drum, generally referred to by the numeral **44**, applies a strip label L to the tube with the label L being wrapped around the tube T. As the tube turret **42** continues to rotate in the indexing thereof, the labelled tube is ejected into a tube discharge unit, generally referred to by the numeral **45**.

The label L which is wrapped about each tube is obtained from a continuous web **46** which is pre-decorated. The web **46** is fed by a main web feed **47** and an auxiliary web feed **48** of a conventional type with the web feed **47** being driven in a manner to provide for registration of the web **46**. It is to be understood that the alignment of web **46** is periodically adjusted during feeding thereof by the web feed **47** with the adjustments being made by a suitable conventional mechanism so as to obtain the desired web registration. The properly registered web **46** passes beneath and into engagement with the label applying drum **44** where a transverse section of the web **46** is cut as it is fed by means of a cutter generally referred to by the numeral **49**. The cut-off label L is retained on the label applying drum **44** and adhesive or glue is applied thereto by means of an adhesive applicator, generally referred to by the numeral **50**. It is this label with the adhesive or glue applied to the outer facing surface thereof which is wrapped about each tube carried by the tube turret **42**.

Reference is now made to FIG. 3 wherein the general details of a tube T are illustrated. The tube T may be of any construction although the illustrated tube is a spirally wound tube. It is to be understood that the tube T is normally an elongated flexible tube of small diameter which is incapable of being self-supporting. However, there is no reason why the invention could not be utilized to apply labels to rigid tubes. After the label L is applied to the tube T, the labelled tube appears as is shown in FIG. 4.

It is to be understood that the tube turret **42** has a plurality of stations at which a tube T is supported. Each tube T is supported by a pair of opposed chuck members **118** and **145** in the manner best illustrated in FIG. 7. Each chuck member **118** has a rounded end **120** adapted to be engaged within a tube T. Each chuck member **118** is provided adjacent the rounded end thereof with an annular groove **123** in which there is seated a pair of spaced apart O-rings **124**. The chuck member **118** has a longitudinal bore **125** therethrough which opens through the right end thereof into the associated tube and the left end thereof is associated in any desired manner with an air supply line **157**. The chuck member **118** is provided with a transverse bore **127** which intersects the

bore 125 and which opens into the recess 123 intermediate the O-rings 124 so as to provide air under pressure to the O-rings 124 for the purpose of effecting a positive seal between the O-rings 124 and the tube T.

The chuck member 145 also has a rounded end 148 which is adapted to be received within the tube T. An axial bore 149 opens through the left end of the chuck member 145 and a transverse bore 150 intersects the axial bore 149. The transverse bore 150 opens into an annular recess 151 in which there is seated a pair of O-rings 152. In this manner air is supplied to the O-rings 152 to assure a proper seal with the tube T.

It is to be noted that the chuck members 118 and 145 are provided with gear portions 128 and 153, respectively, which are utilized in the rotation of the chuck members and the tube during the application of a label to the tube.

Referring now to FIG. 5 in particular, it will be seen that there is associated with each pair of chuck members 118, 145 a pair of back-up rolls 162. The back-up rolls 162 extend parallel to the general position of a tube T carried by the chuck members 118, 145 and are provided with gear rings 133 which are meshed with the gear rings 128 and 153 of the chuck members. In this manner, the back-up rolls 162 not only serve to support the central portion of a tube T, but also cooperate with the chuck members 118 and 145 to rotate a tube carried by the chuck members.

As is best shown in FIGS. 1 and 5, the label applying drum 44 includes a drum element 241. The drum element 241 is interrupted at four circumferentially spaced points by openings 242 which extend the full length of the drum element 241. A bar 243 is disposed in alignment with each of the openings 242 and inwardly thereof.

A label engaging plate 244 overlies each of the bars 243. The plates 244 may be considered vacuum plates in that vacuum means are provided in the plates 244 for the purpose of releaseably holding a label strip in place on the label applying drum 44. Each of the bars 243 is provided with an elongated chamber 249 in the outer face thereof. The overlying portion of the respective plate 244 is provided with radiating bores 250 which open inwardly into the chamber 249 and which terminate at their outer ends in reduced diameter orifices 251. Thus, when a vacuum is drawn in the chamber 249, a label strip engaging the outer surface of the plate is held in place by a vacuum drawn through the orifices 251. It is to be understood that suitable valving, not a part of this invention, will control the application of a vacuum to the chamber 249.

It is also pointed out at this time that it is desired to direct an air blast to the chamber 249 of each of the bars 243 and thus the valving (not shown) will also be arranged to provide such an air blast at the appropriate time.

In accordance with the invention, a label strip is applied to each of the plates 244 in its respective turn in a manner to be described hereinafter, after which the label strip is held in place on the respective plate 244 by vacuum being drawn through the orifices 251 until such time as the label applying drum 44 has rotated to position the label strip L against a tube T held by the tube turret 42, as is best shown in FIG. 5. As the label strip rotates with the label applying drum 44, an adhesive is normally applied thereto by means of the glue applicator 50. As the label strip approaches the tube T to which it is to be applied, it is necessary that the leading edge of the label be forced into engagement with and partially around the tube T which is rotating to ensure the wrapping of the label strip around the tube. To this end, there is provided adjacent each of the plates 244 a tucker plate 276. The tucker plate 276 is disposed along the advancing edge of the associated plate 244 and also bears against an associated bar 243. Each bar 243 also carries an elongated guide 277. It is to be noted that while the tucker plate 276 moves inwardly and outwardly, the movement thereof is not quite radial and such to provide for the proper movement of the leading edge of the label strip L around the associated tube T.

For each of the tucker plates 276 is a shaft 285 which extends along the inner part of the respective tucker plate 276. The shaft 285 is supported in bearing brackets 286 carried by the adjacent bar 243. The bearing brackets 286 are spaced longitudinally of the shaft 285.

At this time it is pointed out that the shaft 285 is periodically rotated first counterclockwise and then clockwise so as to effect the projection and retraction of the tucker blade 276 in timed relation to the rotation of the label drum 44. In order that the rotation of the shaft 285 may be imparted to the tucker blade 276, the tucker blade 276 has secured thereto a rack 288 which meshes with a gear 289 carried by the shaft 285 for rotation therewith.

At this time it is pointed out that the chuck members 118 and 145 are rotated by the rotating label applying drum 44. In order to accomplish this, for each of the plates 244 there is a pair of gear segments 295. The gear segments 295 are positioned at the ends of the plates 244. The gear segments 295 are aligned with the gears 128 and 153 of the chuck members 118 and 145, respectively.

The general details of the cutter assembly 49 and the function thereof are best shown in FIG. 6. The cutter assembly 49 includes a shaft 300 which is suitably mounted for rotation. The shaft 300 includes an elongated central hub portion 309 which is specifically configurated for the reception of two knives 310. The knives 310 are disposed in diametrically opposite relation and are suitably secured to the hub 309. It is to be understood that the knives 310 contact a hardened surface on the label applying drum 44 and cooperate therewith to effect the cutting of the label strip L from the web 46.

In order to assure the movement of the leading edge of the web 46 against a respective plate 244 of the label applying drum 44 whereby the cut off label strip L may be retained on the label applying drum 44, the cutter assembly 49 also includes a suitable air blast unit. This air blast unit includes a pair of longitudinally extending passages 316 formed in the hub 309. Suitable means (not shown) are provided for supplying air under pressure to the passages 316 in timed relation to the rotation of the cutter assembly 49. A plurality of longitudinally spaced, radially extending passages 317 open through the peripheral surface of the hub 309 for the purpose of directing air against the underside of the web 46 in the manner generally shown in FIG. 6.

Referring once again to FIG. 1, it will be seen that the adhesive applicator 50 includes a conventional type of glue pot 320 in which there is mounted for rotation a glue pick-up roll 321. The glue pick-up roll 321 applies glue to a glue applying roll 322 which has a raised segment 323. The raised segment 323 corresponds approximately in peripheral length to the width of the label strip L and is the only portion of the glue applicator roll which is engaged by the glue pick-up roll 321 and to which the glue is transferred.

It is to be understood that as the label applying drum 44 rotates and presents a label strip L to the glue applying roll 322, the projecting portion 323 of the glue applying roll 322 comes into contact with the exposed surface of the label strip and applies the desired adhesive thereto.

It is to be understood that the web 46 is continuously printed with the printing being so spaced on the web whereby the label strip L which is to be cut therefrom will be of a proper width for wrapping around a tube T. The web 46 enters the label applying apparatus 40 over an idler roll 350. The web 46 passes from the idler roll 350 around a main feed roll 354. The main feed roll 354 is backed up by a feed roll 355.

A pair of arms 358 extend upwardly at opposite ends of the feed roll 354 with the arms 358 being journalled on the shaft of the feed roll 354 for pivotal movement. The

arms 358 carry an auxiliary feed roll 361. The web 46 passes around and over the feed roll 361 after it passes over the feed roll 354.

The arms 358 also carry a web engaging roll 365 which is resiliently urged towards the roll 361 and which clamps the web against the feed roll 361.

It is pointed out at this time that the peripheral speed of the label applying drum 44 and the knife blade 310 is much greater than the linear speed of the web 46. Accordingly, it is desirable that the portion of the web 46 engaged by the blades 310 momentarily speed up during the cutting operation so that there will be no relative movement between the blades and the web during the cutting operations. This is accomplished by having the upper ends of the arms 358 moved to the right at the time a label strip L is being cut from the web 46.

The rocking movement of the arms 358 in timed relation to the operation of the blades 310 is effected by means of cams 373 carried by the shaft 300 and engaged by followers 372 carried by projecting ears 371 on the arms 358. It will be understood that the arms 358 are resiliently urged towards the cams 373 in a manner not shown.

In accordance with the invention, and the operation of the label applying apparatus 44, a previously printed continuous web 46 is supplied. The web 46 is delivered to the cutter assembly 49 by the web feed 48. The leading edge of the web 46 underlies the label applying drum 44 and an air blast from the cutter assembly 49 urges the leading portion of the web 46 up into engagement with an associated vacuum plate 240 for the label applying drum 44.

As the respective vacuum plate 244 comes into alignment with the leading portion of the web 46, a vacuum is drawn through the orifices 251 of the vacuum plate 244 and the leading portion of the web 46 is accurately oriented with respect to the label applying drum 44.

As the label applying drum 44 rotates and the leading portion of the web 46 begins to adhere to the vacuum plate 244, the cutter assembly 49 cooperates with the label applying drum 44 to sever the leading portion of the web 46. That portion of the web 46 which is severed is a predetermined portion which is to be wrapped around a tube T and is in the form of a plurality of longitudinally aligned labels, the labels extending transversely across the web 46. That portion of the web 46 removed by the cutter assembly 49 and adhering to the respective vacuum plate 244 of the label applying drum 44 is considered a label strip L, as has been described before.

The label strip L is carried by the label applying drum 44 in a counterclockwise direction, as is viewed in FIG. 1. As the label strip L passes the adhesive applicator 50, adhesive is applied to the outer face thereof by the glue applying roll 322 in the manner previously described. The label strip L, with glue or adhesive applied thereto, is then continued to be moved upwardly in a counterclockwise direction by the label applying drum 44 to a position underlying the tube turret 42.

The tube turret 42 recieves tubes T from the tube hopper 41. As the tube turret 42 is automatically indexed in timed relation to the rotation of the label applying drum 44, the tube feed mechanism 43 is automatically dripped so as to drop a tube T down onto a pair of the back-up rolls 162 underlying the tube hopper 41. As the tube turret 42 begins to index, the chuck members 118 and 145 enter the opposite ends of the tube T. As the chuck member 118 enters into the tube T, air is supplied therethrough into the interior of the tube T so that the tube T is internally pressurized.

As the tube turret 42 is indexed, a tube T is brought into register with the label applying drum 44 as the label strip L carried by the label applying drum approaches the tube. When the label applying drum 44 reaches the position illustrated in FIG. 1, the vacuum source to the respective vacuum plate 244 is discontinued and the shaft 285 of the respective tucker plate 276 is rotated to effect the outward movement of the tucker plate. As the label applying drum 44 passes beneath the tube T to which a label strip L is being applied, the tucker plate 276 continues to project outwardly from the label applying drum 44 to wrap the leading edge of the label strip L around the tube T, as is best shown in FIG. 5. At the same time, the respective gears 295 and the label applying drum 44 rotate the chuck member 118 and 145 and the back-up rolls 162 to rotate the tube carried thereby. Once the label strip L has been initially soldered on the tube T, as is shown in FIG. 5, the continued rotation of the tube T will result in the complete wrapping of the label strip L therearound, with the back-up rolls 162 cooperating in pressing the label strip L against the surface of the tube T.

It is to be understood that the label applying drum 44 moves in the same direction as the tube turret 42, a counterclockwise direction as the drum and turret are viewed in FIG. 1, with the result that adjacent portions of the label applying drum 44 and the tube turret 42 move in opposite directions, the label applying drum 44 moving to the left and the tube turret 42 moving to the right.

After the initial application of the label strip L to the tube T, the respective tucker plate 276 is withdrawn. As the label applying drum 44 continues to rotate, a pressurized air supply is communicated with the cavity 249 of the respective vacuum plate 244 to clean the surface thereof and to remove a label strip therefrom in the event the label strip is not transferred to a tube.

As the tube turret 42 continues to rotate, the label tube is indexed into alignment with the tube discharge assembly 45. At this point, the chuck members 118 and 145 have been withdrawn, and as they are withdrawn, an ejector blade 168 at the particular station forces the labelled tube into the tube discharge assembly between the conveyor belts 187 and 188 thereof for eventual discharge of the label tube by the tube discharge assembly. A labelled tube is delivered by the conveyor belt 188 onto a tube support plate 183 beneath a third endless conveyor belt 204 which rolls the tube along the plate 183 and off the sloping end thereof.

Although only a preferred embodiment of the method of applying labels to tubes has been specifically illustrated and described, it is to be understood that minor modifications may be made therein within the spirit of the invention.

I claim:

1. The method of providing decorated strips comprising the steps of providing a continuously moving decorated web, engaging the web with a rotating cutter moving at a greater rate than the web to sever a transverse strip from the web while simultaneously advancing a limited portion only of the web including all of that portion of the web engaged by the cutter at the same speed as the cutter, to prevent relative movement between the web and the cutter during the severing operation.

2. The method of claim 1 together with the step of engaging a leading edge of the web by a strip removing member moving at the same peripheral speed as the cutter and cooperating with the cutter in the severing of the strip while holding the severed strip, and wherein a severed strip is applied to a tube by the strip removing member.

3. The method of claim 1 together with the step of engaging a leading edge of the web by a strip removing member moving at the same peripheral speed as the cutter and cooperating with the cutter in the severing of the strip while holding the severed strip, and wherein a severed strip is applied to a tube by the strip removing member while the tube is being rotated by the strip removing member.

4. A method of wrapping a thin walled tube comprising the steps of inserting chuck members into opposite ends of the tube, internally pressuring the tube through one of the chuck members, and then while rotating the

tube moving a wrapper adjacent the tube and positively moving a leading edge of the wrapper partially around and into positive contact with the tube.

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U.S. Cl. X.R.

53—211; 83—924; 156—187, 265, 363, 450, 481, 521, 566