

Oct. 22, 1968

V. E. HEYWOOD

3,407,084

COATING METHOD AND APPARATUS

Filed Oct. 1, 1964

2 Sheets-Sheet 1

FIG. 1

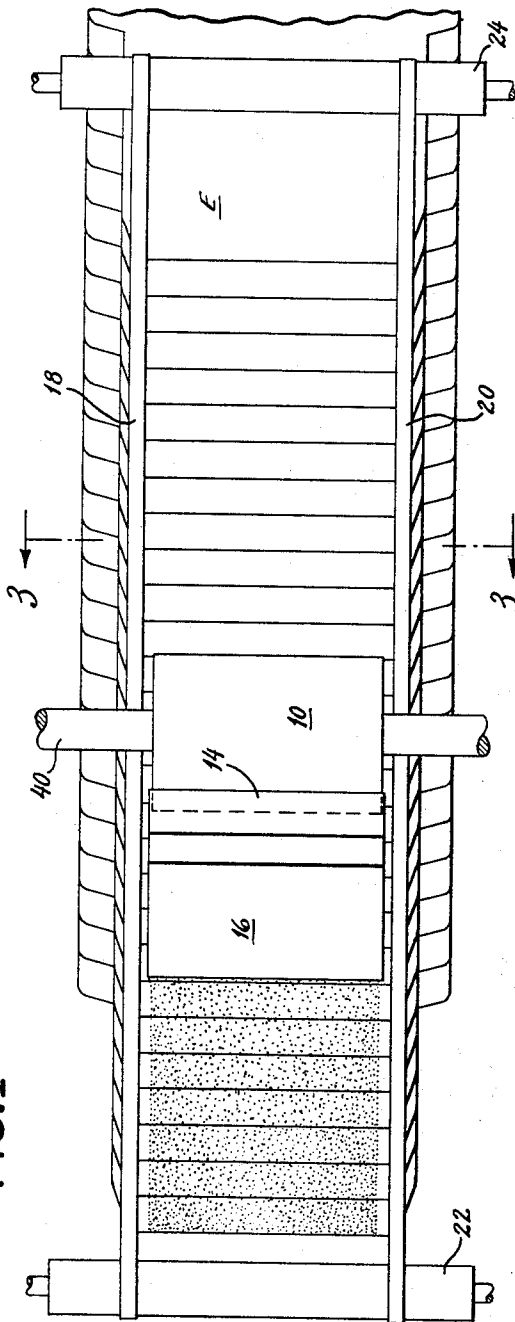
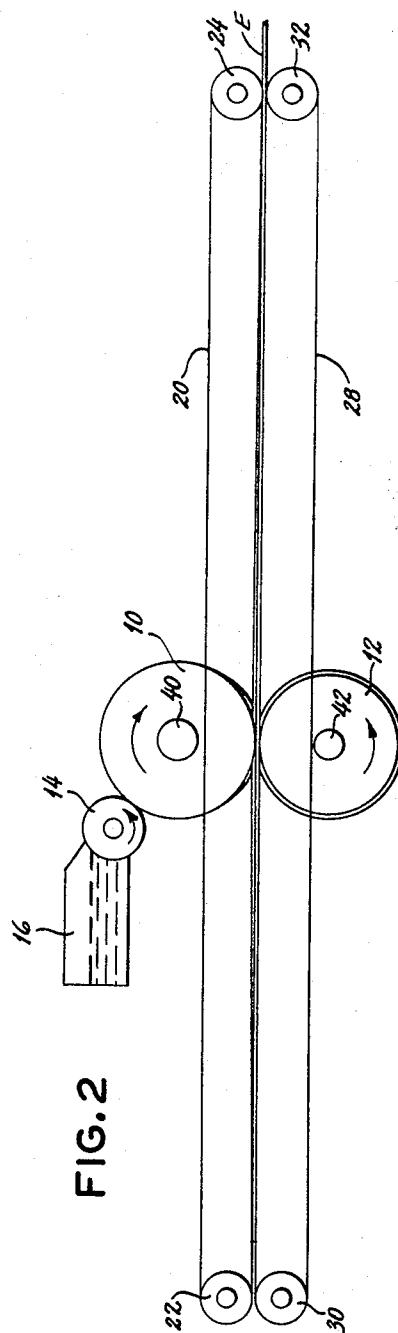


FIG. 2



INVENTOR
VINCENT E. HEYWOOD

BY *John F. Stevens*

AGENT

Oct. 22, 1968

V. E. HEYWOOD

3,407,084

COATING METHOD AND APPARATUS

Filed Oct. 1, 1964

2 Sheets-Sheet 2

FIG. 3

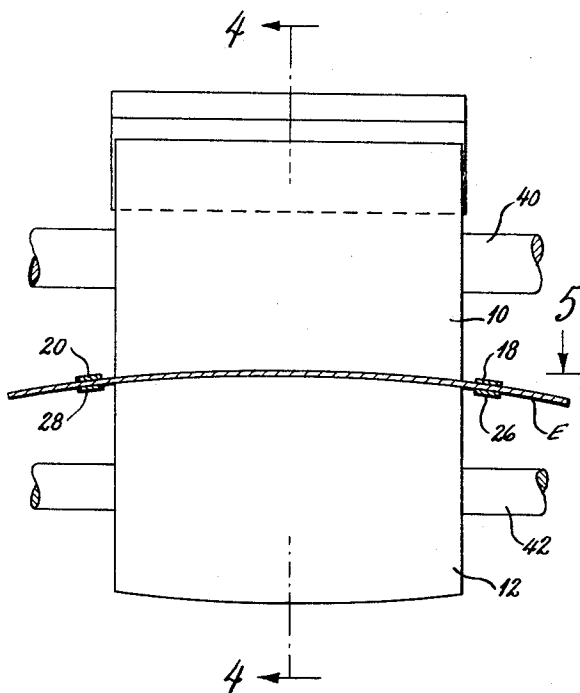


FIG. 4

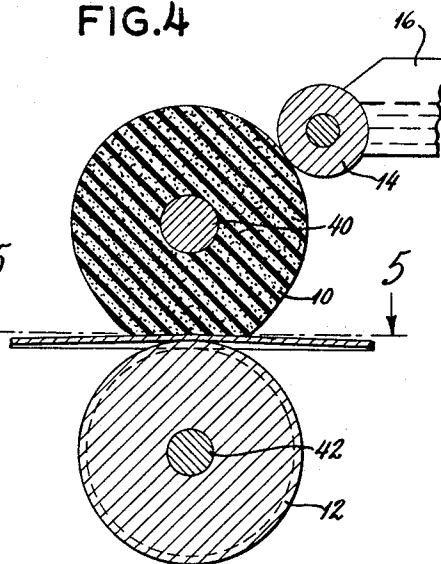
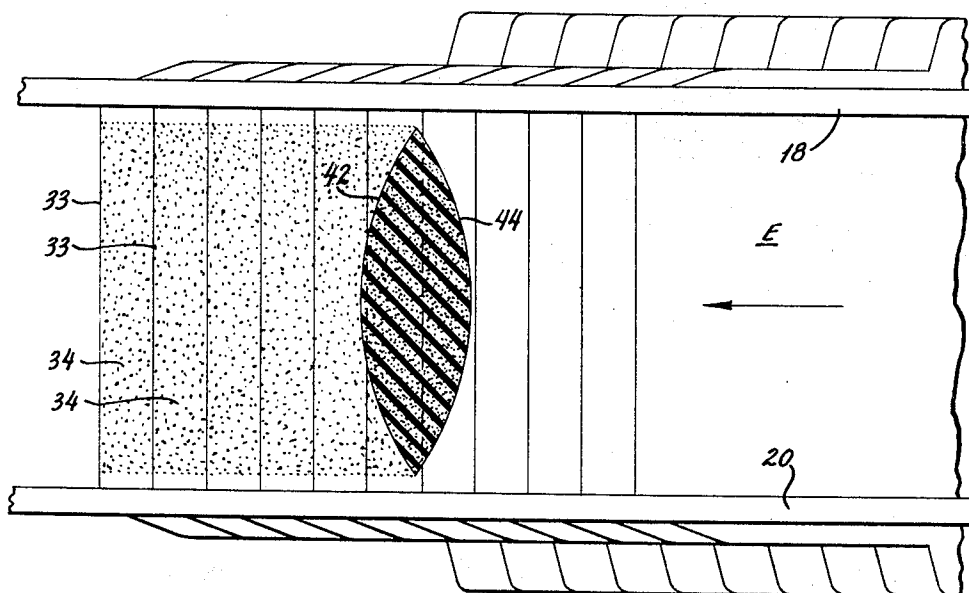


FIG. 5



1

3,407,084

COATING METHOD AND APPARATUS

Vincent E. Heywood, Worcester, Mass., assignor to United States Envelope Company, Springfield, Mass., a corporation of Maine

Filed Oct. 1, 1964, Ser. No. 400,780

7 Claims. (Cl. 117-44)

ABSTRACT OF THE DISCLOSURE

In the application of adhesive or other coating material by roller to the advancing marginal edges of a plurality of shingled blanks, as in an envelope making machine, the tendency of the blanks to adhere to and follow the surface of the applicator roll is overcome by bowing the blanks to add stiffness thereto as they pass the applicator roll. The applicator roll is a deformable, resilient roll backed up by a rigid longitudinally curved backing roll which deforms the applicator roll into a conforming shape along the line of contact between the rolls, the blanks also assuming this shape as they pass between the rolls.

This invention relates in general to a method and apparatus for coating blanks of sheet material, and more specifically, this invention relates to a method and apparatus for applying a coating material such as an adhesive or gum to the exposed leading marginal areas of advancing shingled blanks such as paper envelope blanks.

In the application of strips of adhesive to envelope blanks, it is common practice to orient the blanks in shingled or fanned-out relation, thereby exposing on one side the marginal areas of the trailing portion of the blanks, and on the other side, the marginal areas of the leading portion of the blanks. The exposed marginal area is commonly the width of the desired strip of gum to be applied to each blank. A continuous area to be gummed consisting of the summation of the individual marginal areas is exposed, and the gum may conveniently be applied thereto in a continuous application by a roll.

Gum is most commonly applied by a roll applicator to the side of the shingled blanks exposing the trailing marginal areas. In this manner, the marginal areas which come into contact with the applicator roll are immediately carried free from the applicator roll by the advancement of the blanks breaking contact between the applicator roll and the blanks immediately as the blanks pass from between the rolls. In the manufacture of simple envelopes having only one sealing flap to be gummed, it can normally be arranged to apply the gum to the trailing edges of the blanks. In the manufacture of so-called "two-way" envelopes, the envelope structure is more complex, and there can be two flaps which are required to have a gum coating, thereby necessitating the application of a gum coating to both ends, or opposite marginal areas of the blanks. In the manufacture of such envelopes, it is often desirable to apply a gum coating to leading marginal areas of the blanks as well as the trailing marginal areas.

In the application of the gum coating to these leading marginal areas, difficulty has been experienced in separating this leading marginal area from the periphery of the gum applicator roll. These areas do not immediately pull free of the roll as in the case of trailing marginal area gumming. The leading edges tend to adhere to and follow the applicator roll rather than remain flat in their shingled relation as they should. Following the applicator roll causes a messy and irregular application of gum, as well as misalignment of the blanks.

An attempt has been made to overcome this difficulty experienced in gumming the leading edge of shingled

2

blanks by using one or more stripping members to prevent the leading marginal areas from following the applicator roll. Stripping members are objectionable, however, because objectionable separations must be made in the gum coating to allow the stripping members to contact the blanks. If no separations in the gum coating are provided, a messy and irregular coating will result.

Accordingly it is an object of the present invention to provide a method and apparatus for rolling a coating, such as gum or adhesive, onto the leading edges of the shingled blanks, and preventing the marginal areas from following the applicator roll without the abovementioned disadvantages of the stripping members.

Various other objects and advantages will appear from the following description of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the drawings:

FIGURE 1 is a plan view showing a shingled succession of envelopes being fed through a gumming mechanism.

FIGURE 2 is an elevation view of that which is shown in FIGURE 1.

FIGURE 3 is an enlarged section view taken along line 3-3 of FIGURE 1.

FIGURE 4 is a section view taken along line 4-4 of FIGURE 3.

FIGURE 5 is a plan view taken substantially along line 5-5 of FIGURE 4, illustrating graphically the area of contact of the shingled blanks with the applicator roll.

Referring to the drawings, FIGURES 1 and 2 illustrate generally the shingled envelopes E being carried between gum applicator roll 10 and backing roll 12. Transfer roll 14 picks up gum on its periphery because of its association with the interior of gum box 16, and subsequently transfers it to applicator roll 10, with which it is in peripheral contact. A pair of parallel upper belts 18 and 20, trained over rolls 22 and 24, coact with a pair of lower belts 26 and 28, trained over rolls 30 and 32, to grip the shingled envelope blanks and convey them between applicator roll 10 and the backing roll 12. The blanks are arranged in shingled order before they are fed into the conveyor belts, and maintain this position until they are removed from the other end of the belt conveyor. It will, of course, be understood that various other operations may be performed on the blanks while being conveyed by the belts before and after passing through the coating applicator. Also, other types of conveyors which will hold the blanks in alignment in their shingled relation may be used in lieu of the belt conveyor.

The shingled arrangement of the blanks advancing through the gumming mechanism may be seen by referring to FIGURE 5. The portion of each envelope E which is to receive a coating of gum is exposed in a substantially continuous surface. The coating on each blank extends from the leading edge 33 of that blank to the leading edge 33 of the succeeding blank. The shingled succession of blanks is ordinarily held flat and relatively tight by the conveyor belts 18, 20, 26, and 28, and is moved in the direction of the arrow. The leading marginal areas 34 of the blanks which are to receive the coating are, subject to becoming bent and misaligned by the sticky gum applicator roll 10, even through under normal conditions, the belts 18, 20, 26, and 28 hold them firmly. With these free marginal areas 33 of the blanks moving into the nip between an applicator roll and a backing roll, the ordinary type of right circular cylindrical rolls used in the past would allow these free edges to follow the applicator roll in a circular path, at least partially around the circumference thereof because of the blanks E adhering to the tacky gum applicator roll, resulting in misalignment of the blanks as well as an undesirable, messy application of adhesive.

To remedy this situation, the present invention provides for temporary stiffening of the blanks as they pass through the applicator mechanism, in a manner such that the free marginal edges of the blanks will not bend in the longitudinal direction, or direction of movement. The blanks are thus prohibited from bending to assume the contour of the surface of the applicator roll 10, and following it in a circular path. To accomplish this, the blanks are bowed in the transverse direction as they pass through the gumming apparatus, preferably by the use of a crowned backing roll 12 and a deformable, but resilient, applicator roll 10 which is, in its normal condition, of a right circular cylindrical shape. The roll 10 may be suitably constructed of soft rubber or similar material. As shown best in FIGURE 3, the axis of the applicator roll 10 is spaced from the axis of the backing roll 12 a distance such that the rolls are coacting i.e., having at least tangential contact over the entire axial distance of which the coating is to be applied to the blanks. This being the case, then, in the embodiment of the invention shown in the drawings, the rolls 10 and 12 will be in tangential contact at their ends, represented by the intersection of the shaded area boundary lines in FIGURE 5. Inwardly from the ends, however, the applicator roll 10 will be deformed by the crowned roll 12 so that there will be area contact of the applicator roll 10 and the shingled envelopes E. The applicator roll 10 will bend the blanks to conform to the configuration of the backing roll 12. The blanks will thus be bent, or bowed, in the transverse direction.

The backing roll 12 is illustrated in the drawings as being convex, i.e., having a barrel-like shape. Actually, this backing roll could assume any contour which would result in the blanks being transversely bowed. For example, it could be of a larger diameter at its mid-portion, and taper inwardly towards the ends. Also, it is conceivable that the backing roll 12 might be concave instead of convex. In this case, the roll 12 would be of a smaller diameter in its mid-portion and taper to larger diameters at its ends. In any case, however, it is essential that the distance between the axes 40 and 42 of the rolls 10 and 12 respectively be spaced apart a distance so that the rolls will at least be tangent at the lesser diameter portion or portions of the backing 12 over the cooperating, or working portions of the rolls 10 and 12. The portions of roll 12 of greater diameter will thus depress the resilient applicator roll 10, cooperating therewith by area contact, and bending the shingled blanks E such that they will assume a transversely bowed shape. It will be understood that while the applicator roll 10 and the backing roll 12 are referred to herein as being in contact, actually they are substantially in contact when there are no blanks between them. When in operation, the rolls are, of course, separated by the thickness of the shingled blanks E. The rolls 10 and 12 are ordinarily of sufficient resiliency, or the mounting of the rolls 10 and 12 in the frame (not shown) is spring loaded so that the rolls would be substantially in contact were it not for the shingled blanks E between the rolls.

As the deformable, resilient roll 10 rotates in cooperation with the backing roll 12, it is continuously depressed and relaxed, so that the only portion of the applicator roll 10 which is not of a right circular cylindrical shape is approximately the portion in contact with the crowned backing roll 12 at a given time. The applicator roll 10 has resumed its normal shape by the time it rotates around to the transfer roll 14. Common types of gum box constructions may therefore be utilized because the transfer roll 14 is of the normal, right circular cylindrical design, and difficult, odd-shaped gum boxes and doctor blades are avoided.

It is also conceivable that matching concave and convex applicator and backing rolls might be used to bend the shingled blanks transversely. However, specially designed doctor blades and gum transfer rolls, also having contoured shapes, would be necessary in this case. It is,

of course, desirable to keep away from these more complex designs when possible. Also, cooperating applicator and backing rolls which contact over an area having sloping leading and trailing boundary lines, such as the lines 42 and 44 in FIGURE 5, are desirable because the blanks are initially separated from the applicator roll 10 substantially at a point (in this case, approximately in the center of the roll) and then progressively separated towards the sides as the shingled blanks E advance through the rolls. This substantially reduces the magnitude of the force at any instant tending to cause the blanks to follow the applicator roll 10.

It will be understood that various changes in the details, materials, steps and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims. In these claims the term "longitudinally curved" has been used to designate a backing roll which may be either concave or convex, the word "longitudinally" being used to mean longitudinally or axially of the roll.

I claim:

1. The method of continuously applying coating material to exposed leading marginal areas of advancing shingled blanks which comprises the steps of

(a) advancing the shingled blanks between a pair of cooperating, axially parallel rollers which in the absence of blanks therebetween contact one another along a line of contact curved longitudinally of said rollers, so as to bow the shingled blanks during movement between the rollers, and

(b) applying coating material to the surface of the roll which contacts the exposed leading edges of the advancing shingled blanks, whereby the coating on said roll may be rolled onto said leading marginal areas.

2. The method of continuously applying coating material to exposed leading marginal areas of advancing shingled blanks which comprises the steps of

(a) providing a pair of cooperating axially parallel rolls which contact each other over their entire working portions, one being a deformable, resilient, normally right circular cylindrical applicator roll, and the other being a non-deformable, longitudinally curved backing roller,

(b) advancing the shingled blanks between the rollers so that the exposed leading marginal areas of the blanks will contact the applicator roll, and

(c) applying a coating material to the surface of the applicator roll, whereby the coating may be rolled onto said leading marginal areas of the blanks.

3. The method of continuously applying coating material to exposed leading marginal areas of advancing shingled blanks which comprises the steps of

(a) providing a pair of cooperating, axially parallel rolls, one being a deformable, resilient, normally right circular cylindrical applicator roll and the other being a nondeformable longitudinally curved backing roller extending along the full length of said applicator roll,

(b) maintaining such a spacing between the axes of said rolls that in the absence of any blanks therebetween they contact one another along a line extending along their length with said backing roll deforming said applicator roll to a shape conforming to said backing roll along said line of contact,

(c) advancing the shingled blanks between the rolls so that the exposed leading edges of the blanks will contact the applicator roll, and

(d) applying a coating material to the surface of the applicator roll, whereby the coating may be rolled onto said leading marginal areas of the blanks.

4. The method of continuously applying coating material to exposed leading marginal areas of advancing shingled blanks which comprises the steps of

5

- (a) providing a pair of cooperating, axially parallel rolls, one being a deformable, resilient, right circular cylindrical applicator roll, and the other being a non-deformable longitudinally curved backing roll extending along the full length of said applicator roll, 5
- (b) advancing the shingled blanks between the rolls so that the exposed leading edges of the blanks will contact the applicator roll,
- (c) maintaining such a spacing between the axes of said rolls that as said shingled blanks are advanced therebetween said blanks are pressed between both of said rolls along the full length of said applicator roll, and 10
- (d) applying a coating material to the surfaces of the applicator roll, whereby the coating may be rolled onto said leading marginal areas of the blanks. 15

5. Apparatus for applying coating material to exposed leading marginal areas of advancing shingled blanks comprising

- (a) a deformable, resilient, right circular cylindrical applicator roll, 20
- (b) a non-deformable longitudinally curved backing roll,
- (c) said rolls having substantially parallel axes and cooperating surfaces which contact one another along at least a portion of a line extending along the lengths thereof so that along at least a part of said line said applicator roll is deformed into a shape generally similar to that of said backing roll, 25
- (d) means for providing coating material to the periphery of said applicator roll, and 30
- (e) means for advancing the shingled blanks between the rolls, with the exposed leading edges of the blanks contacting said applicator roll.

6. Apparatus for applying coating material to exposed leading marginal areas of advancing shingled blanks comprising

- (a) a deformable, resilient, right circular cylindrical applicator roll,
- (b) a non-deformable longitudinally curved backing roll, 40
- (c) said rolls having substantially parallel axes and cooperating surfaces which contact one another along at least a portion of a line extending along the lengths

6

thereof so that along at least a part of said line said applicator roll is deformed into a shape generally similar to that of said backing roll,

- (d) means for providing coating material to the periphery of said applicator roll including a right circular cylindrical transfer roll having its axis parallel to that of said applicator roll and cooperating with said applicator roll to transfer coating material thereto along a line spaced a sufficient distance angularly about the axis of said applicator roll from said line of contact between said applicator roll and said backing roll so that the surface of said applicator roll is in a substantially undeformed shape along said line of transfer, and
- (e) means for advancing shingled blanks between said rolls, with the exposed leading edges of the blanks contacting said applicator roll.

7. Apparatus for applying coating material to exposed leading marginal areas of advancing shingled blanks comprising

- (a) a deformable, resilient, right circular cylindrical applicator roll having a working surface,
- (b) a rigid, longitudinally curved backing roll,
- (c) said rolls having substantially parallel axes so spaced from one another that said rolls contact one another along a line of contact extending along substantially the full length of said applicator roll working surface with said backing roll deforming said applicator roll into a shape conforming to said backing roll along said line of contact,
- (d) means for providing coating material to the periphery of said applicator roll, and
- (e) means for advancing shingled blanks between said rolls, with the exposed leading edges of the blanks contacting said applicator roll.

References Cited

UNITED STATES PATENTS

2,573,052	10/1951	Parker	118—249
3,186,315	6/1965	Pahlitzsch	93—62

ALFRED L. LEAVITT, *Primary Examiner.*

C. R. WILSON, *Assistant Examiner.*