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Worcester, Mass.

[50] Field of Search..... 271/27, 28,
 29, 36, 74, 80, 51; 198/33.2 R

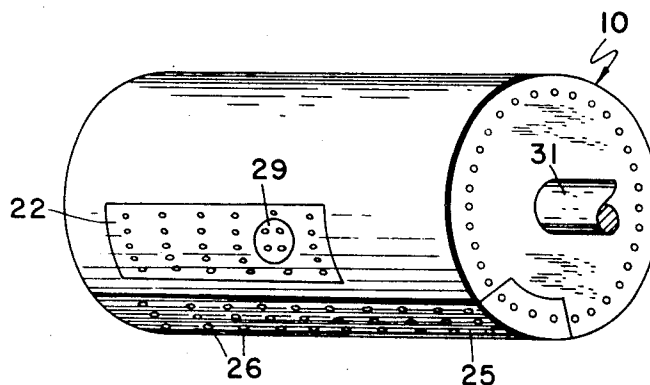
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[54] **TRANSFER APPARATUS FOR A SMALL PIECE OF**
SHEET MATERIAL
 3 Claims, 8 Drawing Figs.

[52] U.S. Cl..... **271/51,**
198/33 AB, 271/74
 [51] Int. Cl..... **B65h 5/06,**
B65h 5/08

ABSTRACT: The present invention relates to an article transfer apparatus and, more particularly, to a roller for moving a sheet of paperlike material and, at the same time, turning it at a substantial angle to its original aspect.



SHEET 1 OF 2

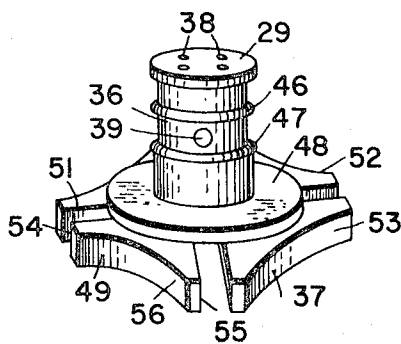
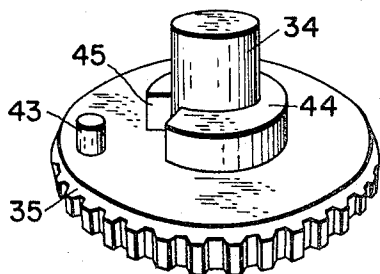
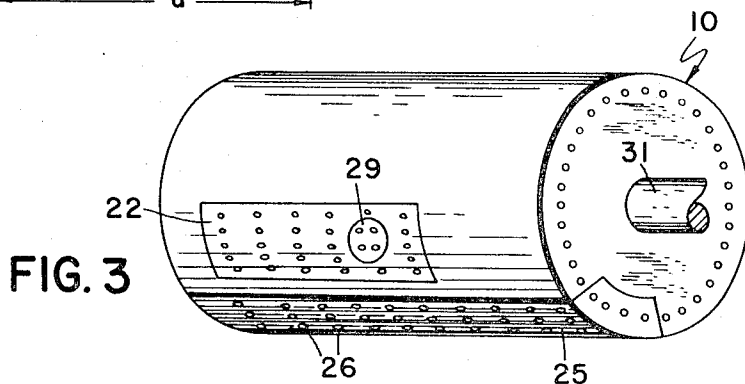
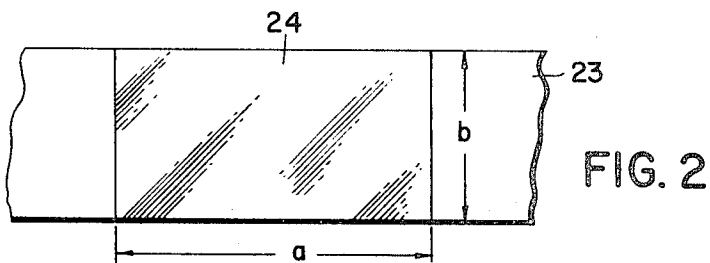
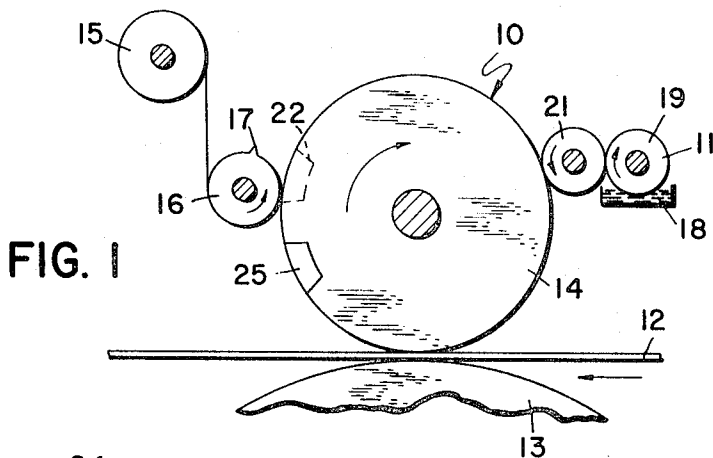


FIG. 6

FIG. 7

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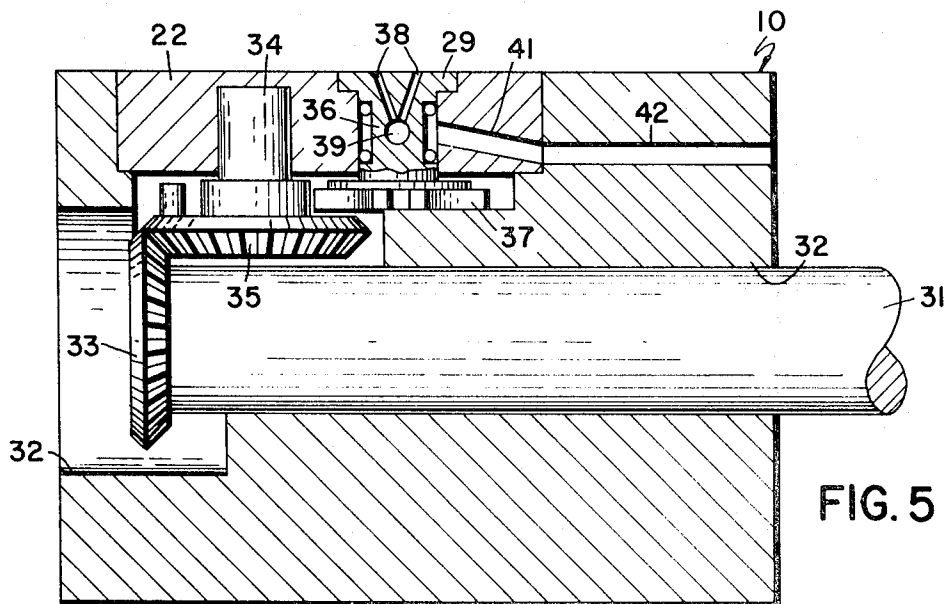


FIG. 5

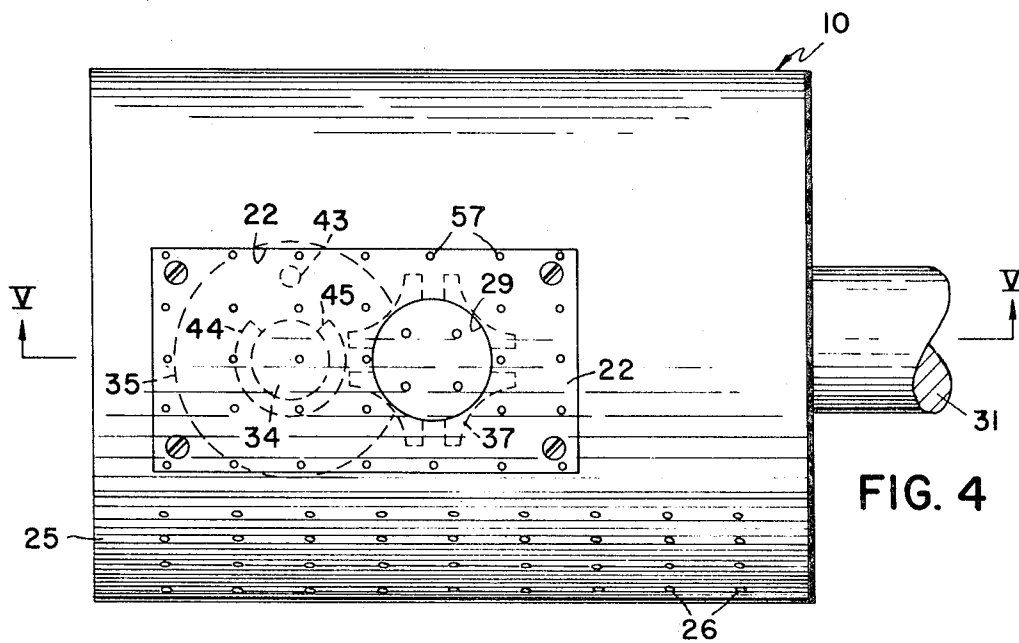


FIG. 4

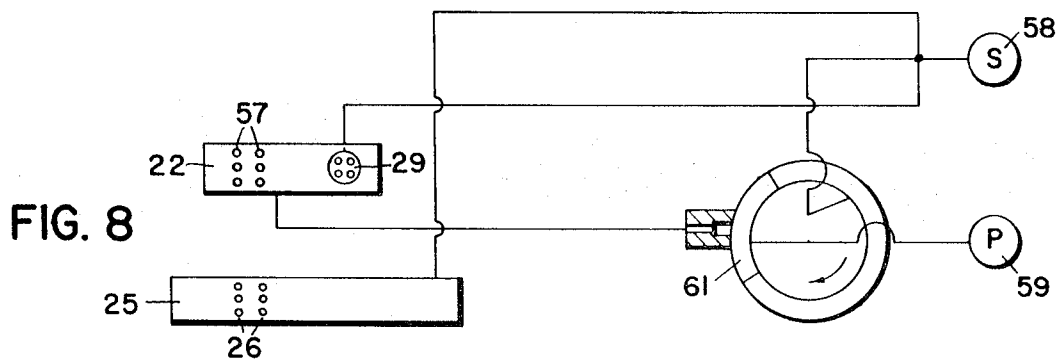


FIG. 8

TRANSFER APPARATUS FOR A SMALL PIECE OF SHEET MATERIAL

BACKGROUND OF THE INVENTION

In the operation of machines for manufacturing articles from sheet material, one of the greatest problems has to do with changing the aspect of a piece of the material while continuing its forward motion. In no field is this more true than in envelope making. For instance, it is common practice to furnish envelopes with transparent windows. This is usually accomplished by gluing a glassine patch over an opening in the moving envelope blank; however, the only practical method of presenting the glassine material to the machine is in the form of a strip provided from a roll. In the past, this strip has been sheared laterally of the strip and applied to the envelope opening in that aspect; i.e., with the longitudinal direction of the glassine strip extending in the direction of movement of the envelope blank. However, the glassine material has the characteristic of expanding and contracting with increase and decrease of heat and humidity in an amount which is approximately 20 times as much in the direction transversely of the strip than in the lengthwise direction. When an elongated rectangular patch is cut from the strip with the long dimension transversely of the strip, the patch will wrinkle and pull the envelope out of shape when subjected to changes in heat and humidity. Attempts to overcome this difficulty by using a thin strip, cutting the patch with the long dimension longitudinal of the strip, and turning the patch 90° before applying it to the envelope have been less than successful. An envelope window patch which has its direction of greatest expansion and contraction crosswise of the rectangle will cause substantially less distortion of the envelope. One of the problems that must be overcome by such an apparatus would be in the failure of the patch to register with the envelope window. These and other difficulties experienced with the prior art devices have been obviated in a novel manner by the present invention.

It is, therefore, an outstanding object of the invention to provide an article transfer apparatus which will turn a patch of sheet material through a predetermined angle.

Another object of this invention is the provision of an article transfer apparatus for turning successive pieces of sheet material through an accurately repeatable angle.

A further object of the present invention is the provision of an article transfer apparatus for sheet material patches, which apparatus is simple in construction, inexpensive to manufacture, and capable of a long life of useful service with a minimum of maintenance.

It is another object of the instant invention to provide apparatus for cutting a rectangular patch of glassine from a coil of strip with the long dimension of the rectangle extending longitudinally of the strip, and turning the patch 90° while moving toward a position of application to an envelope.

A still further object of the invention is the provision of apparatus for applying a glassine patch to an envelope window in such a way as to reduce distortion of the envelope due to dimensional changes in the patch.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

SUMMARY OF THE INVENTION

In general, the invention relates to an article transfer apparatus comprising a roller having a cylindrical surface, which roller is rotatable about the axis of the surface, a plug having a surface lying close to the said cylindrical surface, and means rotating the plug about an axis extending from the plug to the axis of the roller. A Geneva mechanism connects the plug to an actuator to rotate the plug through a predetermined angle. A plurality of passages open on the surface of the plug and suction is applied to the passages to hold a piece of sheet material so that it is rotated with the plug while being carried by the roller as it rotates. More specifically, openings are provided on

the cylindrical surface around the plug that, at the time of plug rotation, are provided with positive air pressure to assist in the rotation of the piece of sheet material.

BRIEF DESCRIPTION OF THE DRAWINGS

The character of the invention, however, may be best understood by reference to one of its structural forms, as illustrated by the accompanying drawings, in which:

FIG. 1 is a somewhat schematic view of an envelope-manufacturing machine embodying the principles of the present invention,

FIG. 2 is a plan view of a strip of glassine used in envelope windows,

FIG. 3 is a perspective view of a roller forming part of the machine,

FIG. 4 is an elevational view of the roller,

FIG. 5 is a sectional view of the roller taken on the line V—V of FIG. 4,

FIG. 6 is a perspective view of an element of the apparatus,

FIG. 7 is a perspective view of a still further element, and

FIG. 8 is a schematic view of the air and suction connections to the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, which best shows the general features of the invention, the article transfer apparatus, indicated generally by the reference numeral 10, is shown as forming part of an envelope-manufacturing machine 11. An envelope blank 12 approaches and is supported on a large roller 13. Overlying this roller lies the article transfer apparatus comprising a conveyor element, such as a roller 14, which is rotated so that its lower peripheral speed exactly matches the linear speed of the envelope blank and the lower roller.

The roller 14 receives patches of glassine initially taken in strip from a roll 15 and guided by a roll 16 having a crush cut blade 17. At the other side of the roller is located apparatus for applying adhesive, the apparatus consisting of a tray 18 in which lies the lower periphery of a pickup roller 19 against which is rotated a transfer roll 21. This transfer roller operates to apply a pattern of adhesive to the glassine patches as they lie on the surface of the roller 14. The roller is provided with an insert 22 having means for holding and rotating the patch as the roller rotates.

FIG. 2 shows a portion of a typical strip 23 of glassine from which a patch 24 is cut by the blade 17. It is the nature of glassine to have different characteristics in the longitudinal and the transverse direction. More specifically, the expansion and contraction in the direction *b* is greater by a factor of as much as 20:1 compared with that in the direction *a*. In the past, a wide strip of glassine was used in envelope manufacturing and it was cut transversely, so that a window patch was formed having its long dimension in the transverse direction *b* and the short dimension in the longitudinal direction *a*; when the patch is cut in this way, the patch can then be moved in the direction *a* and applied to the envelope blank without it being necessary to turn it. When applied in this way, however, the long dimension of the patch is also the direction *b* of greatest dimensional change when variations of temperature or humidity take place. The worst possible situation existed, therefore, for wrinkling and distortion of the window and the envelope.

When, in accordance with the present invention, a narrow strip of glassine is used and the patch 24 is formed (as shown in the drawing) with the narrow dimension in the transverse direction *b* and the long dimension in the longitudinal direction *a*, the patch turned 90° and presented to the envelope blank by moving it sideways. The window patch formed, rotated, and applied in this way has its dimension of greatest dimensional change extending in the narrow direction; thus, when natural changes of temperature or humidity taken place, the changes in the two transverse directions tend to be the same, so that the finished envelope is

not twisted out of shape. That is to say, even though that change per unit length is still greater in the width direction of the patch than in the length direction, nevertheless, it operates through a much smaller total length, so that the total change in the two directions is much the same.

Referring to FIG. 3, the roller 14 is provided, in addition to the insert 22, with a holding insert 25 having a large number of suction openings 26 which can grasp the intermediate portion of the strip for cutting. The insert 22 is located closer to one end of the roll than the other and is of generally rectangular configuration with the longer dimension extending axially. Located at the inner end of the insert 22 and, therefore, located adjacent the center of the roll is a plug 29 which is rotatable about an axis passing through the axis of the roll at a right angle thereto. The surface of the plug is provided with a slightly spherical form to reduce indentation and protuberance to a minimum as the plug is rotated.

FIGS. 4 and 5 show the details of construction of the roller 14 and the drive for rotating the plug 29. A shaft 31 enters one end of the roller and is rotatably mounted in an axial bore 32. A counterbore 32 enters the other end of the roller and the inner end of the shaft extends into the counterbore and has keyed to it a bevel gear 33. Mounted in the insert 22 is a stub shaft 34 which is capable of rotation about a radial axis; to its inner end is keyed a bevel gear 35 that meshes with the gear 33.

Extending inwardly from the plug 29 is a shaft 36 at the other end of which is formed a radially extending escapement 37. Suction openings 38 on the outer surface of the plug are connected by inclined passages to a transverse passage 39. This passage has access to a passage 41 through the insert 22 and, in turn, connects to a passage 42 extending axially through the roller to the radial end surface.

FIG. 6 shows the stub shaft 34 in perspective. A single upwardly directed peg 43 is mounted adjacent the periphery of the gear. A disc 44 is located at the base of the stub shaft and a wedge-shaped portion is removed to provide a slot 45 which faces toward the peg.

FIG. 7 shows in perspective the plug 29 and the associated elements. Around a reduced central portion of the shaft are two O-rings 46 and 47. The escapement 37 consists of a radially extending flange 48 to the lower surface of which is attached four segments 49, 51, 52, and 53. The segment 49 is typical in that it has a straight side 54, a straight side 55 at a right angle to the first side, and a concave side 56 joining them and facing outwardly.

In FIG. 8 is can be seen that the openings 26 of the insert 25, the openings 38 on the plug 29, and openings 57 on the insert 22 are connected in various ways to a source 58 of suction and to a source 59 of positive air pressure. The openings 38 and 26 are always connected to the suction source 58. The openings 57 are connected to both sources 58 and 59 by a commutator 61, so that it is usually connected to suction, but sometimes to positive pressure.

The operation of the invention will now be readily understood in view of the above description. The envelope blank 12 passes horizontally between the rolls 13 and 14. The blank

has a rectangular window whose long dimension extends across the blank, i.e., in the direction of the axes of the rolls. As the window passes under the roll 14, it receives a patch 24 of glassine.

The strip 23 leaves the roll 15 and passes under the roll 16 where the blade 17 cuts it into patches. The leading edge of the strip sticks to the surface of the roll 14 because of suction in the openings 57 in the insert 22 and because of other suction holes located all over the surface of the roll. This produces a tension in the strip that pulls the strip tightly over the insert 25; the blade 17 crush cuts the glassine as it is stretched over the insert. The patch 24 when cut has its long dimension extending around the drum. The patch is held in this position by suction at the openings 57 in the insert 22 as well as the openings 38 in the plug 29. To rotate the patch, positive pressure is supplied to the openings 57, while suction is maintained at the openings 38. Then, the roll is rotated relative to the gear 33. The gear 33 drives the gear 35 on the shaft 34. As the gear 35 rotates, the pin 43 enters the slot between two of the segments 49, 51, 52, and 53. This rotates the plug 90° and the patch is similarly rotated. The patch then lies on the surface of the roll 14 with its long dimension extending axially of the roll. As the roll continues its rotation, the patch is carried under the roll where it receives a pattern of adhesive by the offset process from the roll 19. The patch with its adhesive is carried further around the roll until it comes into contact with the envelope blank 12 overlying the window.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, however, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

The invention having been thus described, what is claimed as new and desired to secure by Letters Patent is:

1. Transfer apparatus for a small piece of sheet material, comprising
 - a. a roller having a cylindrical surface and rotatable about the axis of the surface,
 - b. a plug having a surface lying flush with the said cylindrical surface, a plurality of passages opening onto the surface of the plug, and
 - c. means connected to the passages to apply suction to the passages on occasion,
 - d. means rotating the plug about an axis extending from the plug to the axis of the roller, a plurality of passages opening on the surface of the roller surrounding the plug and positive air pressure and suction being alternatively applied to these last-named passages, positive air pressure being applied to the last-named passages when the suction is applied to the passages in the plug.
2. Article transfer apparatus as recited in claim 1, wherein means is provided to rotate the plug through a predetermined angle.
3. Article transfer apparatus as recited in claim 2, wherein a geneva mechanism connects the plug with an actuator.

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