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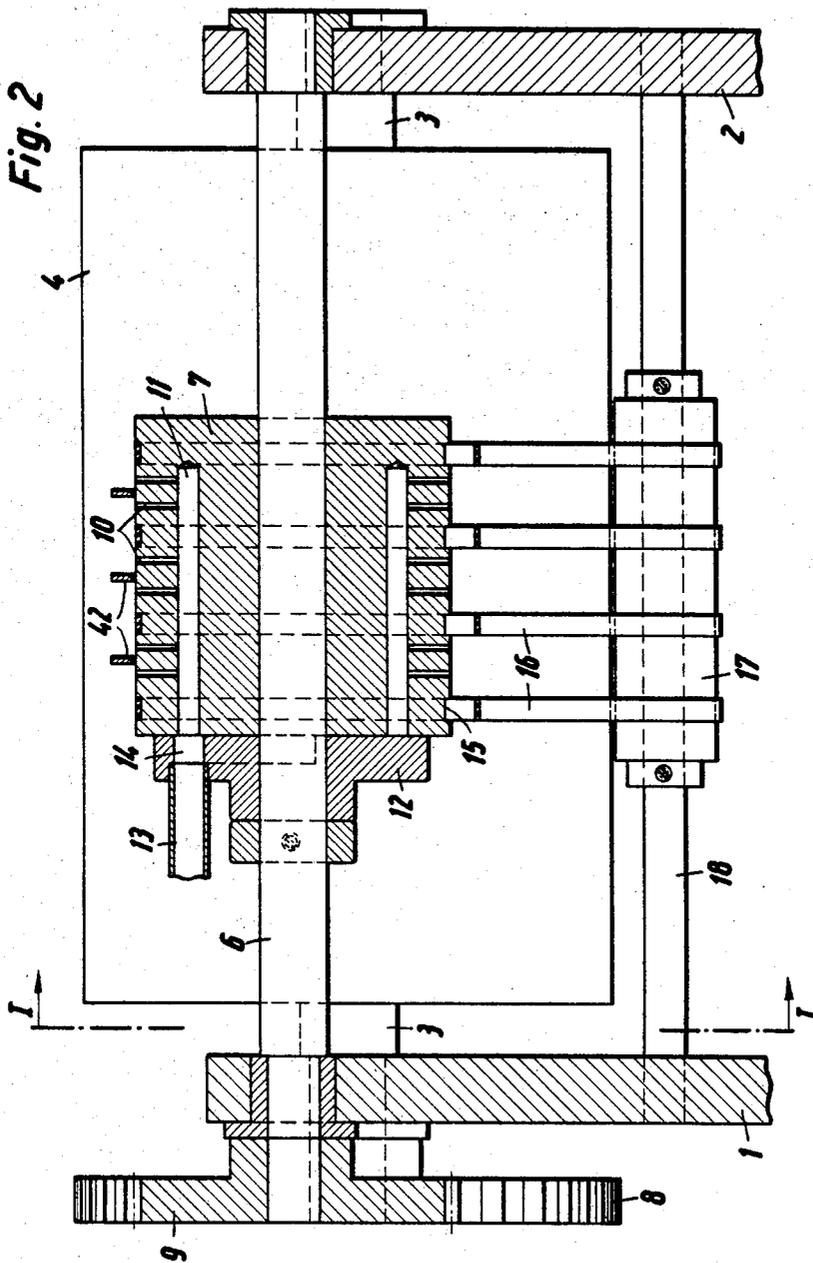
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APPARATUS FOR APPLYING WINDOW MATERIAL TO WINDOW
CUTOUTS IN THE MANUFACTURE OF WINDOW
ENVELOPES AND THE LIKE

Filed Oct. 27, 1964

3 Sheets-Sheet 2



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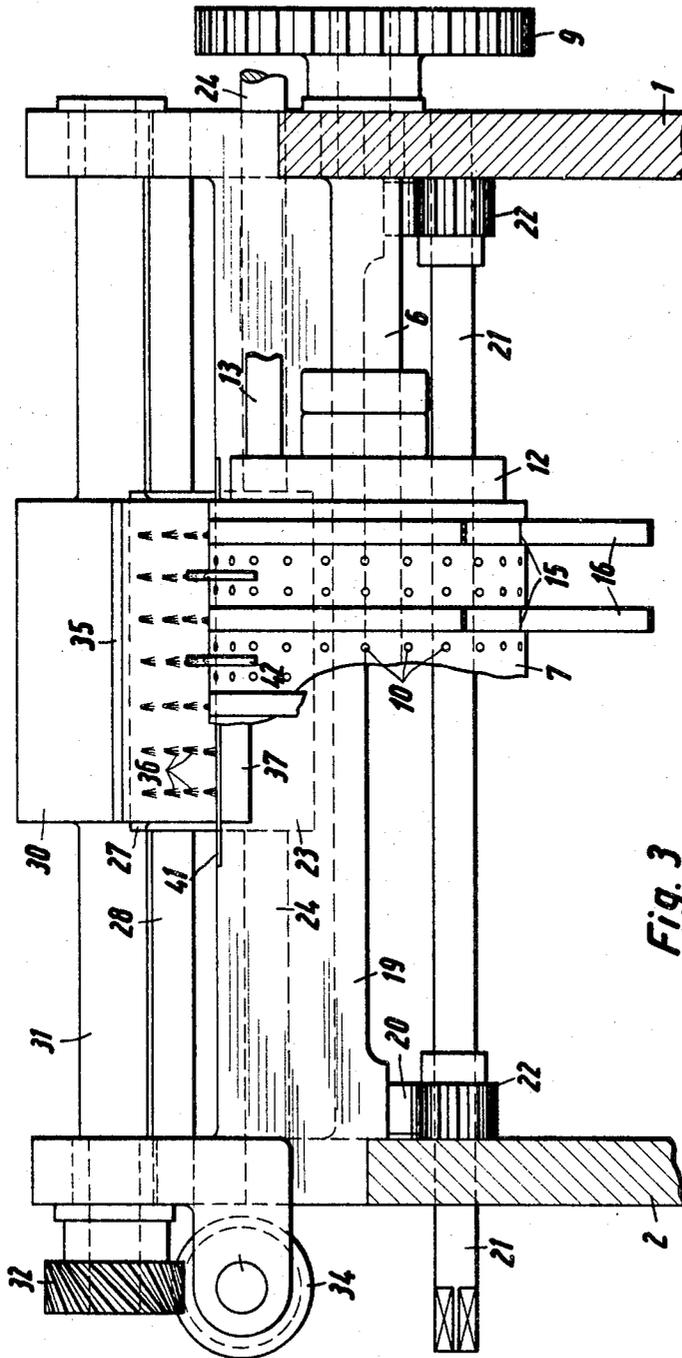
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APPARATUS FOR APPLYING WINDOW MATERIAL TO WINDOW CUTOUTS IN THE MANUFACTURE OF WINDOW ENVELOPES AND THE LIKE

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7 Claims. (Cl. 93—61)

ABSTRACT OF THE DISCLOSURE

An apparatus for applying transparent window pieces over window openings provided in webs or blanks of material adapted for the production of envelopes and the like. The apparatus is especially adapted for high speed production of window envelopes and involves a special relationship between a conveyor roll for conveying material having window cutouts to which transparent window covering pieces are to be applied, a suction roller cooperating with the conveyor roll and adapted to transport window covering material into engagement with the envelope making material carried by the conveyor roll, the window covering material being adhesively applied to the area in which the window opening is provided. Also included in the apparatus are means for feeding window covering material from a suitable source to a cross-cutter for cutting individual window covering pieces from a strip of such material, these window covering pieces being delivered to the suction roller and by the latter to the material being carried by the conveyor roll. An important feature is the adjustability of the cross-cutter in a direction toward and away from the axis of the suction roller to enable adjustment of the size of the window covering pieces to be applied over the window openings provided in the envelope forming material. Another aspect of the apparatus, which adapts it for high speed operation, is the provision of a cross-cutter which includes a continuously rotating blade arranged to cooperate with a fixed blade in providing the desired cross-cuts. Further contributing to the reliability of the operation of the apparatus at high speeds is the provision of a rotating brush arrangement for retaining the window covering material in a desired plane or path and for advancing the severed sections of the covering material to the suction roller in properly timed relation to the movement of the envelope forming material by the conveyor roll.

This invention relates to an apparatus used for the manufacture of window envelopes and the like, wherein strips of material are cut into individual pieces and the cut pieces are applied to webs, blanks or other applicable structures used for the production of window envelopes. The term "blank" as used herein generally refers to a structure having a main body portion, a pair of side flaps extending therefrom for folding inward, a bottom flap that can be folded over and bonded to the side flaps, and a closure flap that can be folded over the bottom flap and adhesively united to the bottom flap after the desired contents have been placed in the envelope. In the preparation of window envelopes, the material strips to be applied over the windows are of a transparent plastic or other suitable material while the material of the structures to which the transparent strips are applied are of paper or other suitable material.

More particularly, the invention is concerned with a machine for the production of envelopes and the like wherein a strip of window covering material is cut to de-

sired sizes and the resultant individual pieces of window covering material are conveyed onto a moving web or directly onto successively moving individual blanks.

A feature of the invention is the manner in which the cut pieces of window covering material are precisely aligned over the window cutouts in the web or in the individual blanks with a resultant bonding to the gummed edges of the window cutouts.

It is generally customary in manufacturing envelopes and the like to cut a strip of window material, unwinding from a feed roll, to standard desired lengths and to apply the cut pieces to the gummed edges of window cutouts in moving blanks or in a moving web of paper which is subsequently cut into blanks. Today, however, with the demand for different sized windows in relation to the size of envelopes and with the increase in machine capacity for processing the number of envelopes per minute, the machines heretofore known for applying window covering material to window cutouts in moving webs or blanks are inadequate.

An object of the present invention is to provide an improved apparatus for applying window covering material to window cutouts in uniformly moving envelope blanks or continuous webs.

A further object of the invention is to provide an apparatus for the manufacture of window envelopes and the like which meets today's requirements in envelopes and the like, both with regard to the sizes of the windows desired and the speed with which pieces of window covering material can be applied to window cutouts.

An additional object of the invention is to provide an apparatus for the manufacture of window envelopes and the like which has an unusually large adjustment range with respect to the size and position of window cutouts desired, but which is yet of extremely simple construction, thus assuring as few errors as possible in the application of window covering sections over the openings in the high capacity of envelope material being treated.

Other objects of the invention will appear as the description proceeds.

It has been found that the foregoing objectives can be accomplished by using an apparatus which has a single rotatable suction roller for conveying the cut window covering pieces into proper relationship to window cutouts in a moving web or in uniformly successively moving individual blanks.

The apparatus comprises, in combination, feed rolls for supplying a continuous strip of window covering material, a cross-cutter for cutting the strip of window covering material coming from the feed rolls into individual pieces, a single rotatable suction roller for conveying the window covering pieces, and a rotatable conveyor roller for carrying the moving web or individual blanks in proper relation to the pieces of window covering material. The suction roller is arranged between the conveyor roller and the cross-cutter, and the distance between the cross-cutter and the suction roller is adjustable in accordance with the desired sizes of window covering pieces. A plurality of belts may be provided which surround a major portion of the periphery or the circumference of the suction roller and which, guided over one or more guide rollers, surround a lower portion of the periphery or the circumference of the web or blank carrying conveyor roller.

Such belts cooperate with grooves around the circumference of the suction roller, and upon emerging therefrom cooperate with the conveyor roller over a suitable arc, say about 90°, to hold the window covering pieces firmly against the web or blanks carried by the conveyor roller. The timing of the delivery of the window covering pieces is such that the latter are accurately applied over the window openings in the web or blanks.

The cross-cutter for the strip of window covering material, advantageously a rotary cross-cutter, and the rollers which feed the window covering material to the cross-cutter are both mounted on a carriage which is movable transversely to the longitudinal axis of the suction roller which conveys the pieces of window covering material. The cross-cutter may suitably comprise two knives, viz. one stationary knife directly attached to the carriage and a second knife, rotatable about an axis above the stationary knife. Said second knife is brought into cooperation with the stationary knife upon rotation of the second knife to cut the strip material into pieces of appropriate size to cover the window openings in the web or blanks. Advantageously the second knife, on the rotating part of the cross-cutter, has brushes associated therewith which are arranged in rows on this rotating part behind said knife. Such brushes serve to hold the front end of the window covering strip and the window covering pieces cut therefrom in substantially tangential alignment with the periphery of the suction roller, thus allowing the window pieces to pass directly to, and find support on, the suction roller.

My invention will be better understood by reference to the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawings disclosing in detail a preferred embodiment of the invention. Certain of the features therein shown, however, may be modified without departing from the general principles of the invention.

In said annexed drawings:

FIGURE 1 is a side elevational view partly in section, of the apparatus taken along line I—I of FIGURE 2, in the direction of the arrows (but without showing the supporting side structure) and illustrates the relative position of the conveyor roller, the single suction roller, the cross-cutter and other parts of the apparatus;

FIGURE 2 is a cross-sectional view through the suction roller carrying the window covering pieces and is taken along line II—II of FIGURE 1, in the direction of the arrows;

FIGURE 3 is a cross-sectional view taken between the suction roller carrying the window covering pieces and the conveyor roller which carries the paper web or blanks and is taken along line III—III of FIGURE 1, in the direction of the arrows, with a portion of the suction roller partially omitted.

General construction

Referring now to FIGURES 1, 2 and 3, the embodiment of my invention there illustrated comprises an apparatus having sidewalls 1 and 2, and a conveyor roller 4 for carrying a paper web 5 and a suction roller 7 for carrying individual window covering pieces, the window covering piece, shown at 43, FIGURE 1, being carried downwardly intermediate the sidewalls 1 and 2. Conveyor roller 4 is rotatably supported by and fixed to a shaft 3, having its end portions journaled in the side frames 1 and 2, while suction roller 7 is rotatably supported by and fixed to a shaft 6. The distance between conveyor roller 4 and suction roller 7 is made adjustable in accordance with the thickness of both the web or blanks and the window covering pieces. This adjustment may be made in any suitable manner, as by mounting reduced end portions of shaft 3 in bearing members that are laterally adjustable in openings through side walls 1 and 2 of the frame, with means for firmly retaining the bearing members in adjusted position. Gear 8 (FIGURE 2) fastened to shaft 3 and gear 9 fastened to shaft 6 are so interengaged, to impart to the outer surfaces of rollers 4 and 7 the same circumferential velocity in the directions indicated by the arrows within rollers 4 and 7 in FIGURE 1. The intermeshing teeth on the gears are of such form as to permit the small adjustment of the position of shaft 3 for the purpose above indicated.

Suction roller 7 has distributed around its entire periphery suction holes 10 which are arranged in rows extending across the surface of the roller and which are connected with a vacuum source via boreholes 11 (FIGURE 2). A control member 12 secured against rotation with the shaft 6 is connected by a suction conduit 13 with the vacuum producing source. Conduit 13 may be of either flexible or rigid material. Communicating with the end of conduit 13 is an arcuate control slot 14 within the control member 12. The arcuate control slot 14 begins in a region where the window covering pieces first meet the suction roller for carrying said pieces into cooperation with roller 4 and terminates in a region where the window covering pieces are transferred to the web or the envelope blanks.

In addition to the suction holes 10, suction roller 7 has on its periphery a plurality of grooves 15 (FIGURE 2) for belts 16. Belts 16 travel between suction roller 7 and a roller 17, which is rotatably mounted on a shaft 18, in such a manner that the belts rest tightly against a lower portion of the periphery of conveyor roller 4 along an arc of about 90°.

A carriage 19 is slidably mounted on horizontally extending surfaces provided on sidewalls 1 and 2 and its position can be adjusted in the direction indicated by the double arrow in FIGURE 1, i.e. in a direction transverse to the longitudinal axis of the suction roller, by means of two racks 20 fastened to the bottom of carriage 19 and two pinions 22 fastened on a spindle 21. The latter may be manually turned by any suitable means to adjust the position of the carriage.

The feed roller 23 for the strip of window material is rotatably mounted on shaft 24 in carriage 19 and driven in a readily understood manner, as by a flexible connection from a suitable drive source that enables the shifting of carriage 19, (said connection not being shown in the drawings) in the direction shown by the arrow of rotation (FIGURE 1) with a circumferential speed which can be varied in accordance with the desired length of window piece to be cut off from strip 26. Rubber roller 27 arranged on shaft 28 above strip feed roller 23 presses strip 26 firmly against roller 23.

The rotating portion 30 of the cross-cutter has the ends of its shaft 31 rotatably mounted in carriage 19. It is driven at a speed related to that of the envelope making machine by means of a worm gear 32 (FIGURE 3) fixed on shaft 31 and a worm gear 34 having a slidable, splined connection with a shaft 33 that is mounted on the main frame and connected with a suitable driving source, not shown. This allows for the displacement of carriage 19 along the direction of shaft 33. The driving connections are such that the rotary cross-cutter makes one full revolution for each window opening provided in the web or blanks traveling around the conveyor roller 4. The rotating cross-cutter knife 35, rotating in the direction of the curved arrow (FIGURE 1), as well as several rows of brushes 36 are fastened to the main body of the cross-cutter 30. Stationary cross-cutter knife 37 is fixed firmly on carriage 19 for cooperation with blade 35 as the latter rotates. There are also provided on carriage 19 guides 39 and 40 (FIGURE 1) for guiding the strip 26 of window material coming from a supply roll (not shown in the drawings) and also a guide 41 for guiding the forward end of the strip below arcuate guides 42 and onto suction roller 7. In the space between guides 40 and arcuate rollers 42, the window covering material is held down in alignment with the top portion of roller 7 by brushes 36 as it is advanced toward guides 42. Upon an increase in the distance between the cross-cutter knife 37 and suction roller 7 correspondingly longer guides 41 and 42 should be used, or these guides may be adjusted in length and position to insure proper delivery of the window covering material.

General operation

The apparatus described in the foregoing operates as follows: Referring to the drawings, strip 26 of window material unrolling from the supply roll of said material (not shown in the drawings) is fed by rollers 23 and 27 to a crosscutter, the rotating part of which is shown at 30. The rate of feed of the strip is adjusted to correspond with the desired length of window covering piece, the rotary cross-cutter making one full revolution for each window opening in the web traveling around an arc of conveyor roller 4. The cross-cutter knife 35 cooperating with stationary cross-cutter knife 37 cuts the forward portion of the window strip to the desired size of the window covering piece. Then the window piece, held down by brushes 36 against guide 41 is advanced to the suction roller 7 and is drawn toward the latter by the suction applied at holes 10. Initially the piece will slide on the surface of the suction roller which is rotating at a higher speed than the speed of delivery of the material from the supply roll. The window material of course can only assume the circumferential speed of the suction roller after it has been severed from the strip by cross-cutter knives 35 and 37. The distance away from the suction roller 7 that is provided for the carriage 19, with its feed rollers 23 and 27 and the cross-cutter comprising knives 35 and 37, is so selected that the window piece 43, moving with suction roller 7 between belts 16 and the paper web 5, is alined precisely over the gummed edges of the cutout openings in the paper web with a resultant bonding to the gummed edges. In no event is the distance between suction roller 7 and carriage 19 selected such that the forward edge of the strip of window material 25 reaches the point of contact between suction roller 7, of the belt 16, with the paper web 5 on the conveyor roller 4 before a window covering piece has been cut off from the strip by the cross-cutter.

If individual blanks having window openings are to be employed, instead of a continuous paper web provided with window openings as shown in FIGURE 1, then conveyor roller 4 must be provided with suction means or other means for holding the blanks fast to the periphery of the conveyor roller 4, from their point of delivery thereto to their point of discharge therefrom.

The present invention relates primarily to the application of transparent window material to window openings. However, the invention is not limited to that purpose of use, but includes the application of other types of cut pieces to webs or blanks in the manufacture of envelopes and like articles.

What is claimed is:

1. Apparatus for the production of envelopes and the like, wherein a strip of window covering material is fed from a supply roll and a piece of the desired length of window covering material is separated from the strip and applied to window cutouts in material such as moving webs or uniformly and successively moving individual envelope blanks and the like, which comprises in combination feed rollers for the strip of window covering material, a cross-cutter comprising a rotating blade for cutting individual window covering pieces from the strip of window material, a single suction roller for conveying the window covering pieces and a conveyor roll for conveying the material having window cutouts to which the window covering pieces are to be applied, said single suction roller being arranged between the conveyor roller and the cross-

cutter, the distance between the cross-cutter and the suction roller being adjustable in accordance with the desired size of the window covering pieces, said suction roller having a plurality of grooves in its periphery, a plurality of belts gripped in said grooves and passing therefrom to a portion of the periphery of the conveyor roller, thus causing the window covering pieces to be firmly held against the window cutout material on said portion of the conveyor roller.

2. Apparatus according to claim 1 wherein said plurality of belts arranged on the single suction roller are guided over at least one guide roller, after being wrapped around a portion of the periphery of the conveyor roller.

3. Apparatus according to claim 2 wherein the feed rollers for the strip of window material are arranged in a carriage which is movable transversely to the longitudinal axis of the suction roller.

4. Apparatus according to claim 1 wherein the feed rollers for the strip of window material are arranged in a carriage which is movable transversely to the longitudinal axis of the suction roller.

5. Apparatus according to claim 1 wherein the cross-cutter includes a rotatable member which carries a rotating knife, said rotatable member of the cross-cutter carrying behind said rotating knife a plurality of brushes arranged in rows to hold the front end of the strip of window material in place.

6. Apparatus for the production of envelopes and the like, wherein a strip of window covering material is fed from a supply roll and a piece of the desired length of window covering material is separated from the strip and applied to window cutouts in material such as moving webs or uniformly and successively moving individual envelope blanks and the like, which comprises in combination feed rollers for the strip of window covering material, a cross-cutter for cutting individual window covering pieces from the strip of window material, a single suction roller for conveying the window covering pieces and a conveyor roll for conveying the material having window cutouts to which the window covering pieces are to be applied, said single suction roller being arranged between the conveyor roller and the cross-cutter, the distance between the cross-cutter and the suction roller being adjustable in accordance with the desired size of the window covering pieces, said cross-cutter including a rotatable member which carries a rotating knife, said rotatable member of the cross-cutter carrying behind said rotating knife a plurality of brushes arranged in rows to hold the front end of the strip of window material in place.

7. Apparatus according to claim 6 wherein the feed rollers for the strip of window material are continuously operated and arranged in a carriage which is movable transversely to the longitudinal axis of the suction roller.

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