April 1, 1969 M. NEUNKIRCHEN 3,435,739

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

Filed Dec. 8, 1966 Sheet 1 of 4

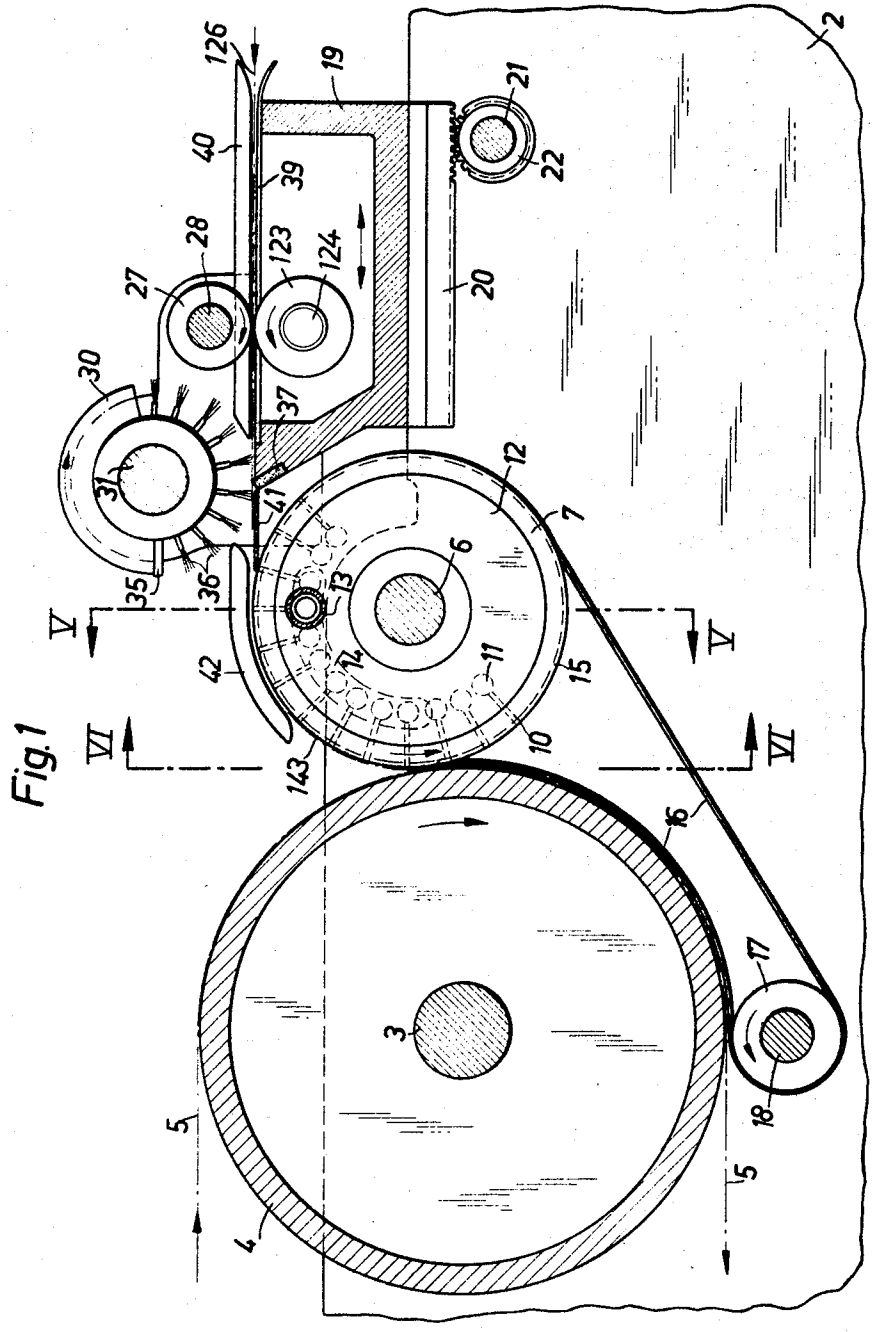
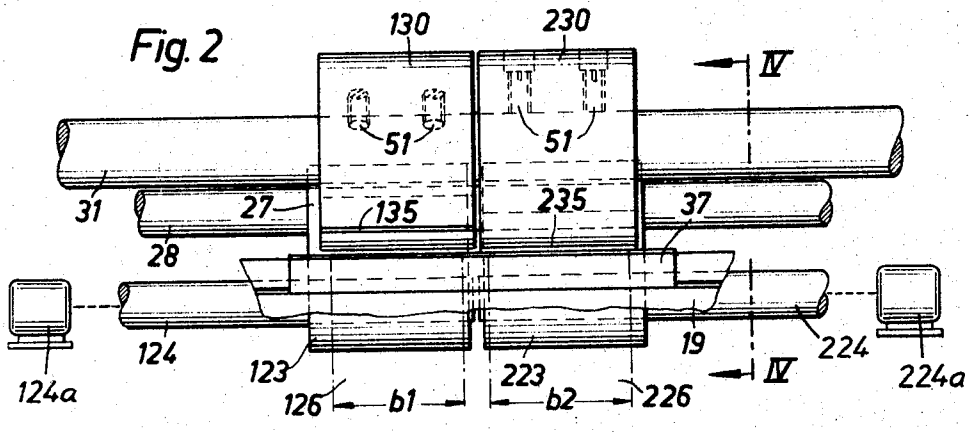


Fig. 1

Fig. 2



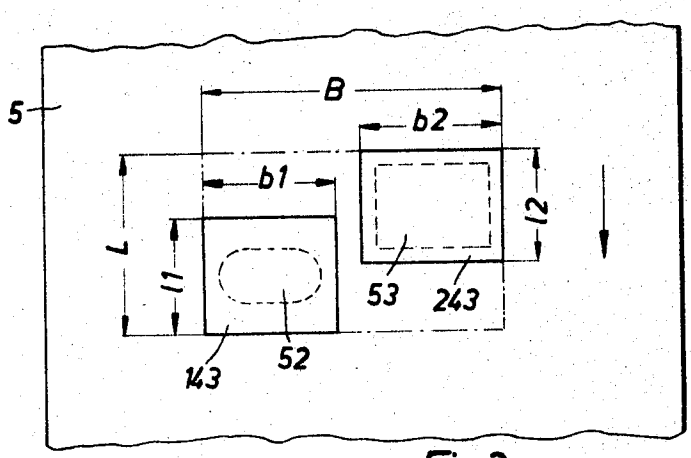
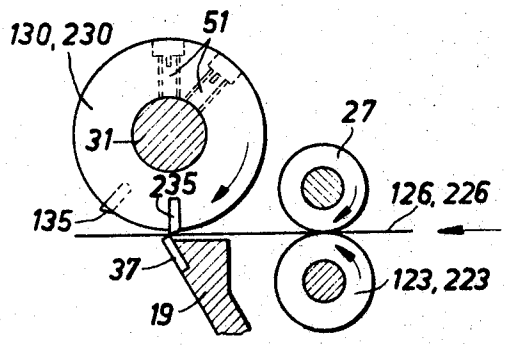


Fig. 3

Fig. 4

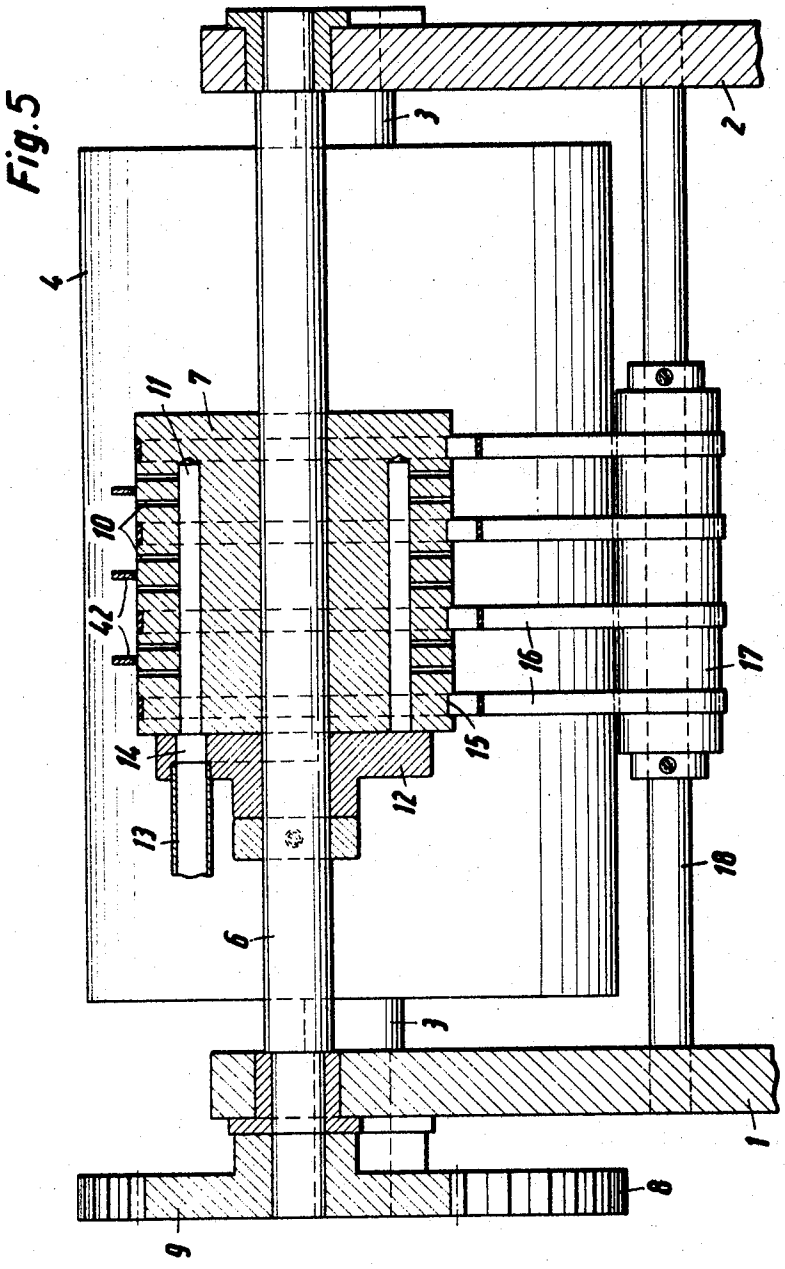


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Filed Dec. 8, 1966 Sheet 3 of 4

Fig.5



April 1, 1969 M. NEUNKIRCHEN 3,435,739
APPARATUS FOR APPLYING WINDOW MATERIAL TO WINDOW CUTOUTS IN THE MANUFACTURE OF WINDOW ENVELOPES AND THE LIKE
Filed Dec. 8, 1966 Sheet 4 of 4

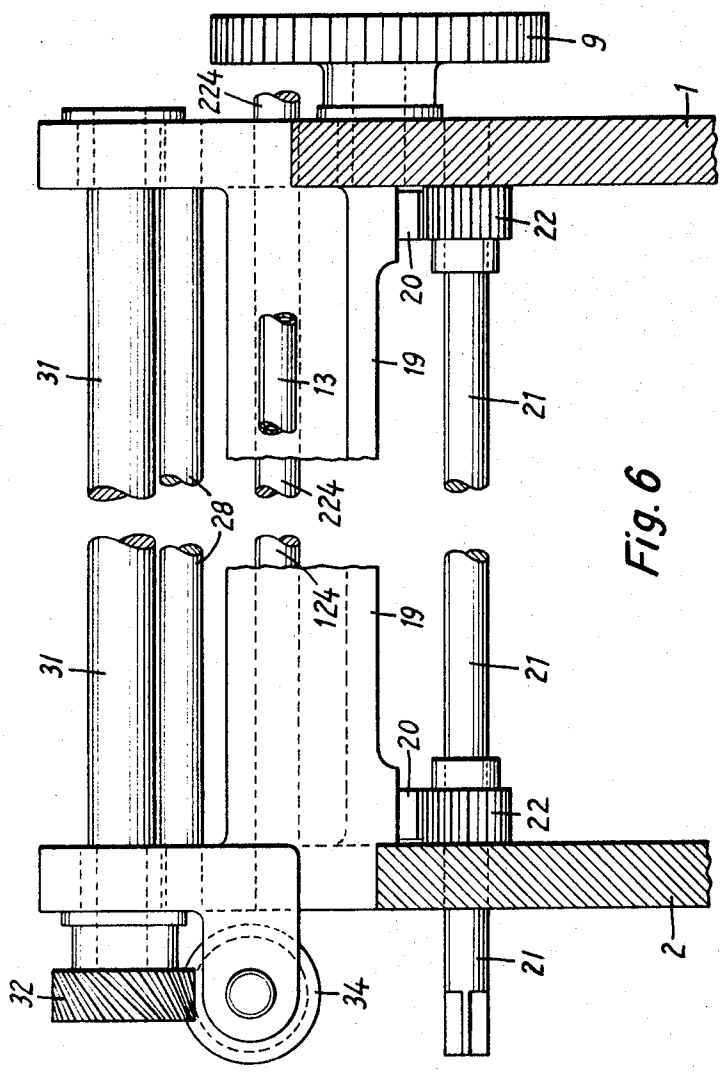


Fig. 6

United States Patent Office 3,435,739 Patented Apr. 1, 1969

3,435,739

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

Max Neunkirchen, Irlich, near Neuwied, Germany, assignor to Richard Winkler, Rengsdorf uber Neuwied, and Kurt Dunnebier, Gladbbach, Germany

Filed Dec. 8, 1966, Ser. No. 600,121
Claims priority, application Germany, Dec. 22, 1965, W 40,563
Int. Cl. B31b *1/00, 49/04;* B32b *31/00*
U.S. Cl. 93—61 4 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for feeding a plurality of strips of transparent material, cutting such fed strips into pieces of predetermined length, and properly positioning such cut pieces over openings or cutouts in a moving web or blanks, such as, a web or blanks for making window envelopes.

This invention relates to an apparatus used for the manufacture of window envelopes, and the like, wherein strips of transparent 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 and, more particularly, to an apparatus wherein a pluarlity of strips are cut and so applied.

As used herein, the term "blank" generally refers to a structure having a main mody portion, a pair of side flaps extending therefrom for folding inward, a bottom flap that can be folded over the main body portion and side flaps, and bonded to the side flaps, and a closure flap that can be folded over the main body portion and the side flaps and sealed after the desired contents have been placed in the envelope. The material of the blank may be paper, or other suitable material, and the strips which, when applied to the blanks, make up the windows may be of a transparent plastic, or other suitable transparent material.

In U.S. patent application Ser. No. 406,688, filed Oct. 27, 1964, there is described a machine for the production of window envelopes wherein a strip of window covering material is cut to desired size and conveyed onto a moving web, or directly onto successively moving individual blanks. The present invention is concerned with a similar machine but for the production of envelopes, and the like, wherein a plurality of strips of window covering material are cut to desired sizes and simultaneously conveyed onto a moving web, or directly onto successively moving individual blanks.

A feature of the instant invention is the manner in which a plurality of strips of the transparent material are fed along parallel paths, each strip is cut into a precise length and the individual cut pieces are simultaneously fed and precisely assembled over the window cutouts in the web, or in the individual blanks, and bonded to the gummed edges of each cutout.

It is generally customary in manufacturing envelopes, and the like, having a plurality of windows, to cut a single strip of window material, unwinding from a supply 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. Because the window cutouts are transversely spaced, and may also be axially offset, the length and width of single strips of window material required to cover the window cutout openings substantially exceeds the size of the openings. This excess material is wasted, increases the cost of window envelopes and substantially limits the spacing, and offsetting, of the windows. Furthermore, with the demand for different sized

windows in relation to the size of envelopes, with the increase in machine capacity for processing the number of envelopes per minute and the demand for different spacing and offseting of windows in envelopes, the machines heretofore known for applying window covering material to a plurality of 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 a plurality of 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 envelopes and the like, having a plurality of windows which meets the requirements of envelopes and the like, with respect to the sizes and spacings of the windows desired and the speed with which pieces of window covering material can be applied to the plurality of window cutouts.

An additional object of the invention is to provide such an apparatus for the manufacture of envelopes, and the like, having a plurality of windows, which has an unusually large adjustment range with respect to the size and spacing of the individual window cutouts desired and which is of extremely simple construction thus assuring as few errors as possible in the application of window covering sections over the individual openings at high speed capacity of material being treated.

These and other objects of the invention will be apparent from the following description and the attached drawings.

It has been discovered, in the instant invention, that the foregoing objectives can be accomplished by using an apparatus, similar to the apparatus of U.S. application No. 406,688, and having a single rotatable suction roller for conveying the cut window covering pieces. In the apparatus of the instant invention, spaced feeders and cutters feed and cut window covering pieces from a plurality of strips of material and the individually cut window covering pieces are fed, in proper relationship, to the spaced window cutouts.

The apparatus comprises, in combination, a plurality of feed rolls, spaced adjustably and transversely across the feed path of a moving web, or moving blanks, for supplying continuous strips of window covering material, a cross cutter for each continuous strip for cutting such strip of window covering material, coming from the feed rolls, into individual pieces, a single rotatable suction roll for receiving the cut strip of 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 cut from the continuous strips and conveyed by such rotatable suction roller. The suction roller is arranged between the conveyor roller and the cross cutters, and the distance between the cross cutters and the suction roller, is adjustable in accordance with the desired size of window covering pieces. The speed of the feed rollers for supplying each of the continuous strips of window covering material are each adjustable to adjust the relative amount of window covering supplied to each of the cross cutters. The cross cutters are adjustable, relative to each other, so that the window covering pieces cut and fed from one continuous strip of window covering material is adjustable relative to the window covering pieces cut and fed from another continuous strip of window covering material. The adjustment of the cross cutters relative to each other permits the window covering pieces cut and fed from one continuous strip to be offset relative to such pieces cut and fed from another of the continuous strips.

A plurality of belts may be provided which pass in grooves around a major portion of the periphery, or the circumference, of the suction roller and which, guided

over one or more guide rollers, surrounds a lower portion of the periphery or circumference of the web or blank carrying conveyor roll. Such belts, in cooperation with the conveyor roller over a suitable arc, say about 90°, hold the window covering pieces firmly against the web or blank carried by the conveyor roller. The timing of the delivery of each of the window covering pieces from the transversely spaced feed rolls and cross cutters is such that the window covering pieces are accurately fed to the suction roller and, from the suction roller, are accurately applied over, and registered with, the window openings in the web or blank.

The cross cutter for each of the strips of window covering material, advantageously rotary cross cutters, and the rolls which feed each of the strips of window covering material to each of the cross cutters, respectively, are mounted on a carriage which is movable transversely to the longitudinal axis of the suction roller that conveys the pieces of window covering material to the web or blank.

The cross cutter for each of the strips of window covering material may suitably comprise two knives, one stationary knife fixed to the carriage and a second knife, rotatable about an axis above the stationary knife. The cutting edges of the two knives are brought into cooperation to cut the strip material passing therebetween by the rotation of the second knife and cut the strip material into pieces of desired length to cover the window opening in the web or blank. Advantageously the rotating part of the cross cutter, carrying the second, or rotary, knife, has brushes associated therewith, arranged in rows on the rotating part behind the knife. Such brushes hold the window covering material in substantial alignment with the periphery of the suction roller. Rather than brushes, the rotating part of the cross cutter may be of a size that, the clearance between the carriage and rotating part, is at a minimum and maintains the alignment of the covering material.

As will be described in detail later, the stationary knives and the axis of rotation of the rotatable knives are aligned but the rotatable knives are each adjustable about the axis of rotation. Thus, the strips of transparent material fed along the parallel paths may be cut simultaneously by aligning the rotatable knives on the axis of rotation or, by positioning the rotatable knives out of alignment, one strip may be cut before the other.

Each strip of window covering material is fed by a pair of feed rolls. Each such pair of feed rolls is driven, preferably by a variable speed drive, independent of the drive of the other pair of feed rolls. Thus, by adjusting the relative speed of each such pair of feed rolls relative to the other pair of feed rolls, the length of the strip of window covering material fed to and cut by one rotary cross cutter can be varied relative to the length fed to and cut by another rotary cross cutter.

Referring to the annexed drawings shown, in detail, preferred embodiments of the invention:

FIGURE 1 is a side elevational view, partly in section, illustrating the relative position of the conveyer roller, the single suction roller, the cross cutter and other parts of the apparatus and in which the section, at the cross cutter is taken intermediate the cross cutters;

FIGURE 2 is a front elevational view of the cross cutters and feed rolls, showing a modified form of cross cutter, with the feed roll drives shown diagrammatically;

FIGURE 3 is a top plan view of a web, with window opening covers, applied in accordance with the invention;

FIGURE 4 is a side elevational view, partly in section, taken along line IV—IV of FIGURE 2, in the direction of the arrows;

FIGURE 5 is a cross-sectional view through the suction roller taken along line V—V of FIGURE 1, in the direction of the arrows; and

FIGURE 6 is a cross-sectional view taken along line VI—VI of FIGURE 1, in the direction of the arrows, and broken to omit the suction roller and feed roll assemblies, but showing the drives.

Referring to FIGURES 1, 5 and 6, 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 **143**, the window covering pieces being carried downwardly intermediate sidewalls **1** and **2**. Conveyor roller **4** is rotatably supported by, and fixed to, a shaft **3**, having its end portions journaled in side frames **1** and **2**, while suction roller **7** is rotatably supported by, and fixed to, shaft **6**. The distance between conveyor roller **4** and suction roller **7** is adjustable in accordance with the combined thickness of the web, or blank, 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 walls **1** and **2** of the frame, with means for firmly retaining the bearing members in adjusted position. Gear **8** (FIGURE 5), 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 direction 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 5). A control member **12** secured against rotation with the shaft **6** is connected by 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 come 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 5) for belts **16**. Belts **16** travel between suction roller **7** and a roller **17**, which is rotatably mounted on a shaft **18**, in such 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 spindle **21**. The latter may be manually turned by any suitable means to adjust the position of the carriage.

Feed roll **123** for the strip of window material **126** is rotatably mounted on shaft **124** in carriage **19** and driven, in a readily understood manner, as by a flexible connection from a suitable variable speed drive source **124*a*** (the flexible connection and drive source are shown diagrammatically in FIGURE 2) that enables the shifting of carriage **19**, in the direction shown by the arrow of rotation (FIGURE 1) with circumferential speed which can be varied in accordance with the desired length of window piece to be cut off from strip **126**. Rubber roll **27** arranged on shaft **28** above strip feed roll **123** presses strip **126** firmly against roll **123**.

Feed roll **223** (FIGURE 2) for the strip of window material **226** is rotatably mounted on shaft **224** in carriage **19** and driven, in a readily understood manner, as by a flexible connection from a suitable variable speed drive source **224*a*** (the flexible connection and drive

source are shown diagrammatically in FIGURE 2) that enables the shifting of carriage **19**, in the direction shown by the arrow of rotation (FIGURE 1) with circumferential speed which can be varied in accordance with the desired length of window piece to be cut off from strip **226**. Rubber roll **27** arranged on shaft **28** above strip feed roll **223** presses strip **226** firmly against roller **223**.

The cross cutter **30**, of which there are two, in the embodiment of FIGURE 1, or cross cutters **130, 230**, in the embodiment of FIGURES 2 and 4, are fixed to shaft **31**, in a manner to be described, and the ends of shaft **31** are rotatably mounted in carriage **19**. Shaft **31** is driven at a speed related to that of the envelope making machine by means of worm gear **32** (FIGURE 6), fixed on shaft **31** and a worm gear **34** having a slidable, splined connection with a shaft **33** mounted on the main frame and connected with a suitable driving source, not shown. This allows the displacement of carriage **19** along the direction of shaft **33**. The driving connections are such that the rotary cross cutters make one full revolution for each set of window openings provided in the web or blanks travelling around the conveyor roller **4**. The rotating cross cutters rotate in the direction of the curved arrow (FIGURE 1). Stationary cross cutter knife **37** is fixed firmly on carriage **19** for cooperating with the cross cutter blades as the cross cutter rotates.

In the embodiment of the invention shown in FIGURE 1, there are two cross cutters, mounted in axial alignment, each having an enlarged body portion **30** extending circumferentially partially around the cross cutter, a cutter knife **35** and several rows of brushes **36** fastened to the main body of portion **30**. Each of the cross cutters **30** is fixed to shaft **31** by setscrews, such as setscrews **51** in the embodiment of FIGURES 2 and 4, with the relative position of the cutter knives **35**, with respect to each other, fixed for reasons more apparent later herein.

In the embodiment shown in FIGURES 2 and 4, cross cutters **130, 230**, each having an enlarged body portion extending around the full circumference of the cutter, are each fixed to shaft **31** by setscrews **51** and, as the setscrews are tightened, fixing cross cutter **130** and cross cutter **230**, to shaft **31**, the respective position of cross cutter knife **135** of cross cutter **130**, and the cross cutter knife **235** of cross cutter **230**, to each other, is fixed.

Strips **126, 226** of window covering material are fed, in parallel paths, from supply rolls, not shown, and are guided through guides **39, 40** mounted on carriage **19** and guide **41** mounted at the forward end of carriage **19**. Upon an adjustment of carriage **19** relative to suction roller **7**, the distance between the forward end of carriage **19** and suction roller **7** changes. With such changes in distance, longer or shorter guides may be substituted for guide **41**.

In operation, strips **126, 226** of window covering material are unrolled from supply rolls, not shown, and are fed, along parallel paths, to the cross cutter. Strip **126** is fed to the cross cutter, in its feed path, by feed roll **123** and strip **226** is fed to the cross cutter, in its feed path, by feed roll **223**. The speed of feed roll **123** and the speed of feed roll **223** are each adjusted so that the desired length of window covering piece will be cut from each of the strips **126, 226**. As is obvious, when the speed of feed roll **123, 223** is adjusted so that both rotate at the same speed, the length of window covering material cut from both strips **126, 226** will be the same length. When one feed roll rotates at a higher speed than the other, the length of window covering piece fed for cutting from the strip by such higher speed feed roll will be longer than that fed for cutting by the slower speed feed roll.

Both of the rotatable cutter knives, be they of the type of rotatable cutter knife **30**, or **130, 230**, rotate at the same speed and, in each complete revolution, cut one length of window covering material from each of the strips **126, 226**. When the rotatable cutter knives are aligned, the length of window covering material is cut from each strip simultaneously. When the rotatable cutter knives are now aligned, one length is cut before the other.

The window covering material advances along guide **41** to suction roller **7** and is drawn toward suction roller **7** by the suction applied at holes **10**. Initially the pieces fed from strips **126, 226** will slide on the surface of the suction roller, rotating at a higher speed than the speed of delivery of the strips from the supply rolls, and will assume the circumferential speed of suction roller **7** after it has been severed from the strips **126, 226** by the cross cutter knives. The distance between suction roller **7** and carriage **19**, and the speed of rotation of feed rolls **126, 226** is selected so that the pieces of window covering material severed from strips **126, 226** will be of the desired length. The relative position of the rotating cutter knives, relative to each other, is selected and the knives are fixed to shaft **31** in the selected relative position so that the pieces cut from strips **126, 226** will be severed from the strips and released to suction roller **7** relative to the alignment of the cutouts in the web or blanks.

As shown in FIGURES 2, 3 and 4, cutter knives **135, 235** are not aligned. Thus, as shown in FIGURE 3, window covering piece **143** is cut from strip **126** and released to suction roller **7** before piece **243**. Window cutouts **52, 53** in web **5** are offset, cutout **52** being offset, in the direction of travel of web **5**, and ahead of cutout **53**. Window covering piece **143** is released to suction roller **7** and is positioned on cutout **52** before piece **243**. Because the length of cutout **52** is shorter, in the direction of web travel, than cutout **53**, the speed of feed roll **123** might be reduced relative to the speed of feed roll **226**, thereby supplying to cutout **52** a window covering piece of shorter length than the piece supplied to cutout **53**.

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.

In the foregoing description, two strips of window covering material, two sets of feed rolls and two rotatable cutter-knives are employed. It is to be understood, however, that the instant invention is not limited to this arrangement and additional strips, feed rolls and rotatable cutter-knives may be added where it is desired to cut and feed more than two strips, simultaneously.

The terms and expressions that have been employed in the specification are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, since it is recognized that various modifications are possible within the scope of the invention claimed.

What is claimed is:

1. Apparatus for the production of envelopes and the like, wherein a plurality of strips of window covering material are fed, simultaneously, from supply rolls and a piece of window covering material of the desired length is separated from each strip and applied to window cutouts in moving material, such as, webs or uniformly and successively moving individual blanks, and the like, which comprises, in combination, feed rollers for feeding each of said plurality of strips of window covering material, said feed rollers for feeding one of said plurality of strips being independent of said feed rollers for feeding the other of said plurality of strips, means for driving the feed rollers for feeding each of said plurality of strips, said means for driving the feed rollers for feeding one of said plurality of strips being independent of said means of driving the other of said plurality of strips, a cross-cutter for each of said strips for cutting individual window covering pieces from each of said strips of win-

dow covering material, means for adjusting the cross-cutter for each of said strips relative to the cross-cutter for the other of said strips, a suction roller for receiving and conveying said cut pieces and a conveyer roll for conveying the material having window cutouts to which said pieces are to be applied, said suction roller being positioned in the path of said strips between the conveyer roller and the cross-cutter, the length of the path of travel of said strips between the cross-cutter and the suction roller being adjustable to the desired size of the window covering pieces.

2. Apparatus according to claim 1 wherein said feed rollers for each of said strips is provided with means for regulating the feed speed of the feed rollers for one strip relative to the feed speed of the feed rollers for other strips.

3. Apparatus according to claim 2 wherein said means for regulating the feed speed is a variable speed drive.

4. Apparatus according to claim 2 in which said cross-cutters for said strips are axially aligned and said cross-cutter for each of said strips is adjustable on such axis to adjust the angular position about said axis of the cross-cutter for one of said strips relative to the angular position of the cross-cuter for the other of said strips.

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WAYNE A. MORSE, JR., *Primary Examiner.*

U.S. Cl. X.R.

93—35; 156—514