Dec. 3, 1963 W. J. HEIN ETAL 3,112,680

DEVICE FOR PRODUCING WINDOWED PACKAGES

Filed July 24, 1961 5 Sheets-Sheet 1

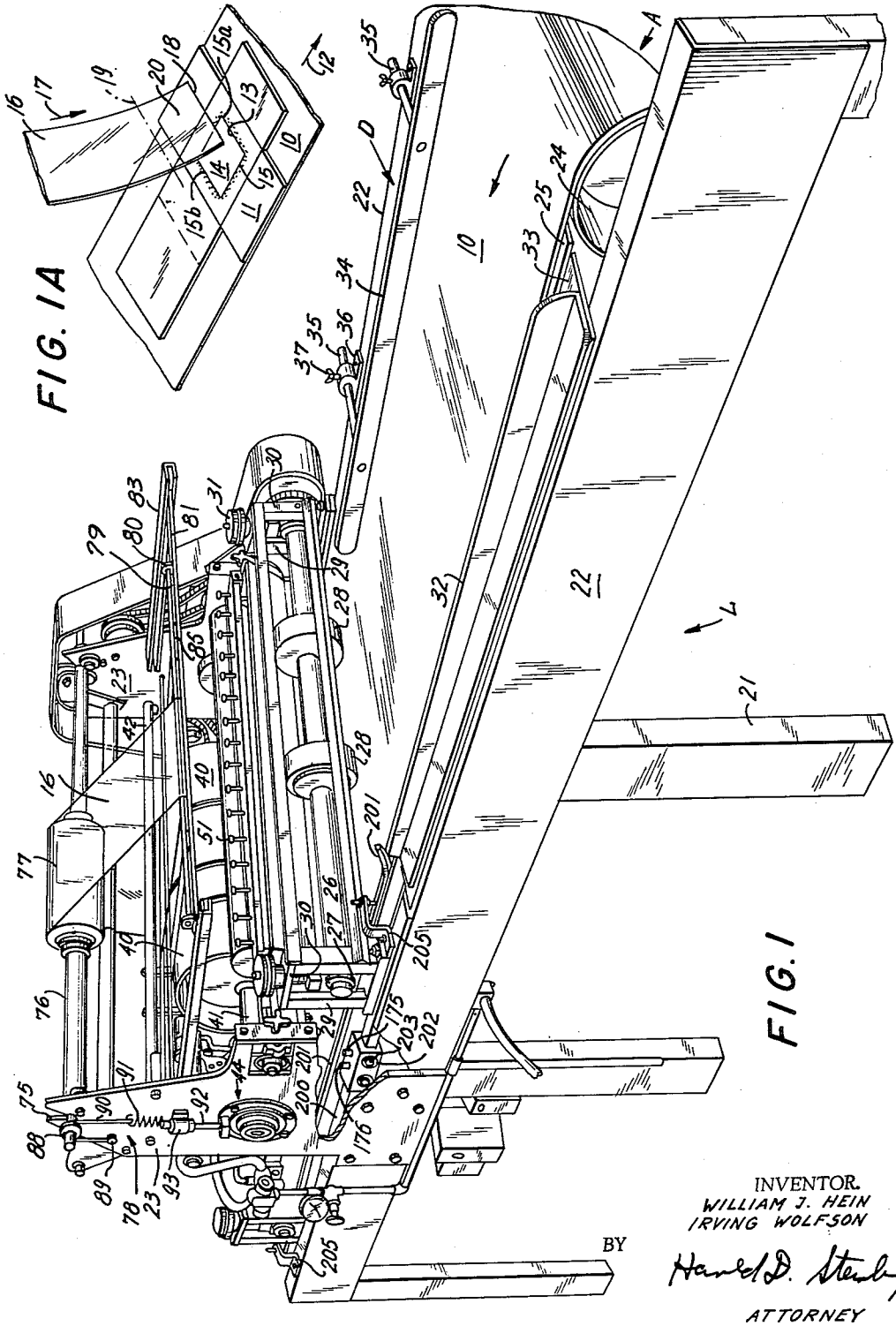


FIG. 1A

FIG. 1

INVENTOR.
WILLIAM J. HEIN
IRVING WOLFSON

BY Harold D. Stanley

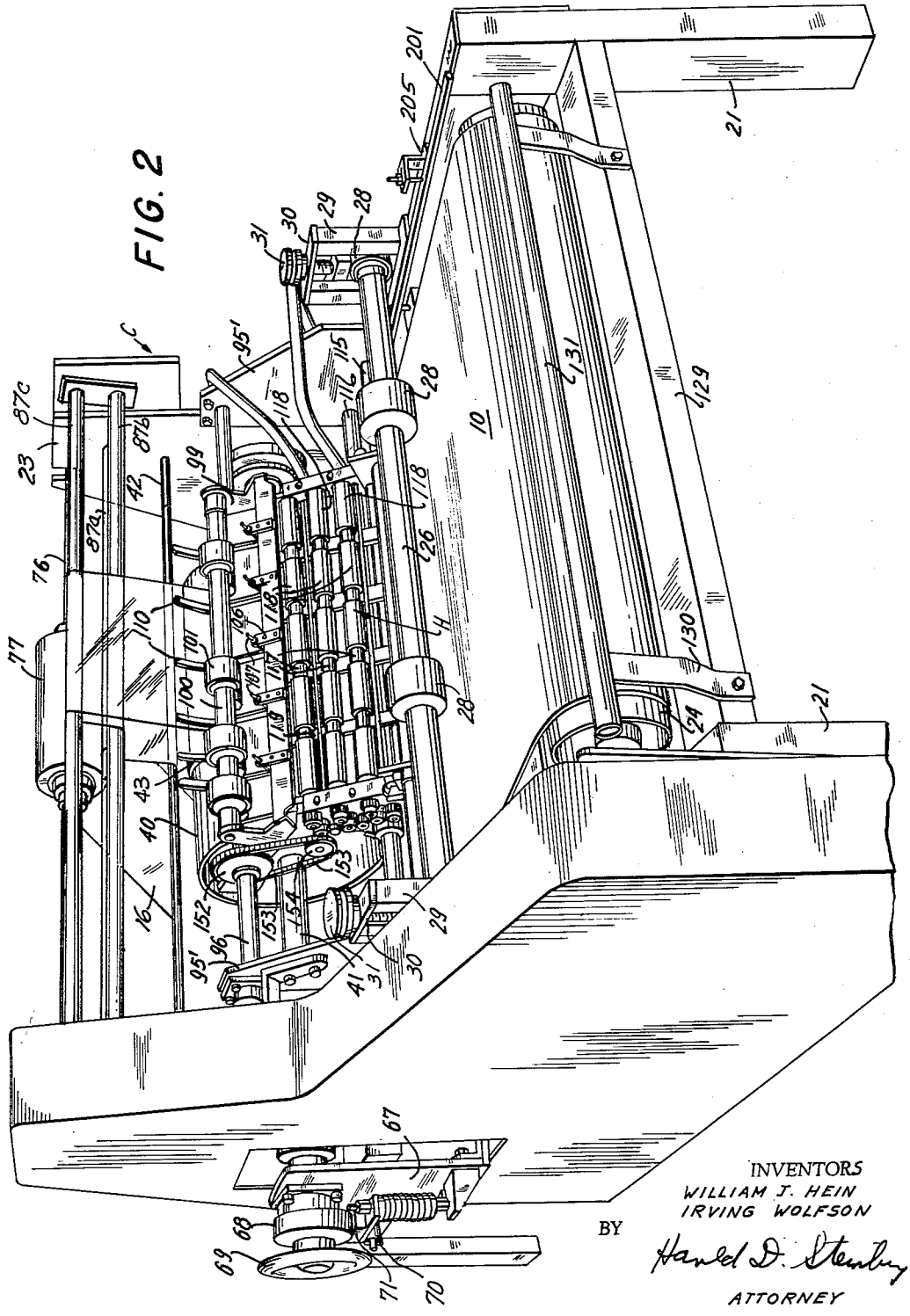
ATTORNEY

Dec. 3, 1963 W. J. HEIN ETAL 3,112,680

DEVICE FOR PRODUCING WINDOWED PACKAGES

Filed July 24, 1961 5 Sheets-Sheet 2

FIG. 2



INVENTORS
WILLIAM J. HEIN
IRVING WOLFSON

BY Harold D. Stenberg
ATTORNEY

Dec. 3, 1963 W. J. HEIN ETAL 3,112,680

DEVICE FOR PRODUCING WINDOWED PACKAGES

Filed July 24, 1961 5 Sheets-Sheet 3

FIG. 4

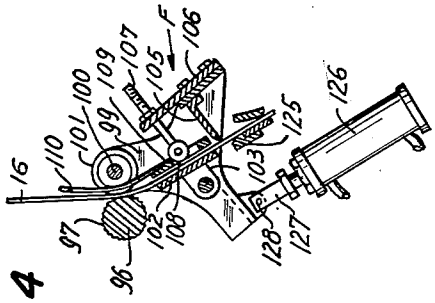


FIG. 3

INVENTORS
WILLIAM J. HEIN
IRVING WOLFSON

BY Harold D Steinberg
ATTORNEY

Dec. 3, 1963 W. J. HEIN ETAL 3,112,680

DEVICE FOR PRODUCING WINDOWED PACKAGES

Filed July 24, 1961 5 Sheets-Sheet 4

FIG. 5

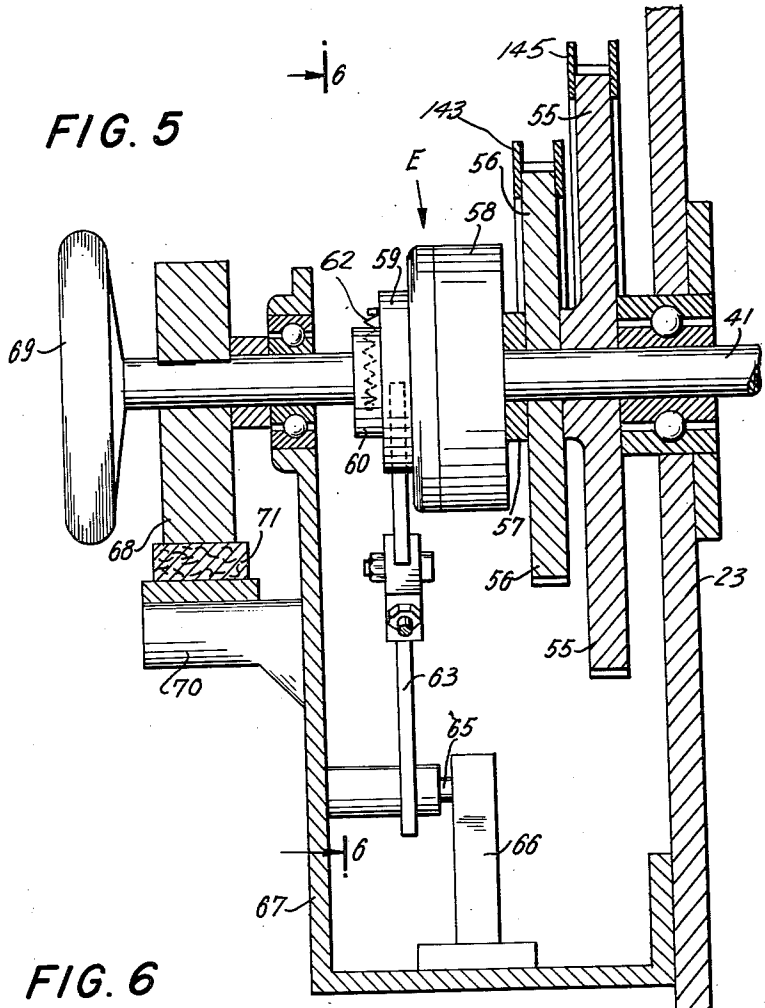
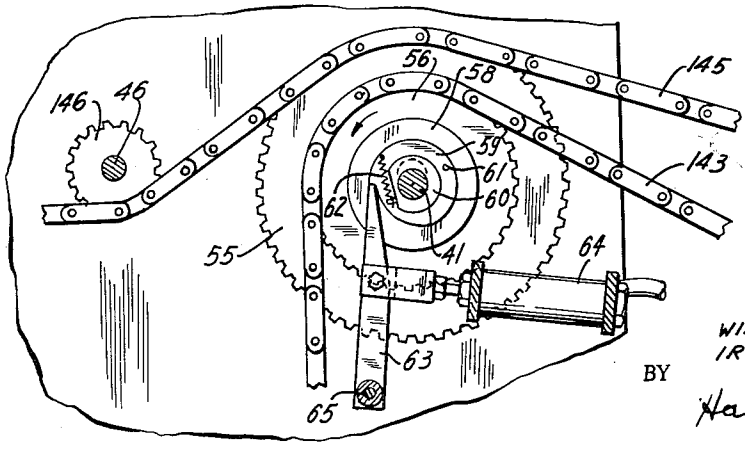


FIG. 6



INVENTORS
WILLIAM J. HEIN
IRVING WOLFSON

BY Harold D. Stanley

ATTORNEY

Dec. 3, 1963 W. J. HEIN ETAL 3,112,680

DEVICE FOR PRODUCING WINDOWED PACKAGES

Filed July 24, 1961 5 Sheets-Sheet 5

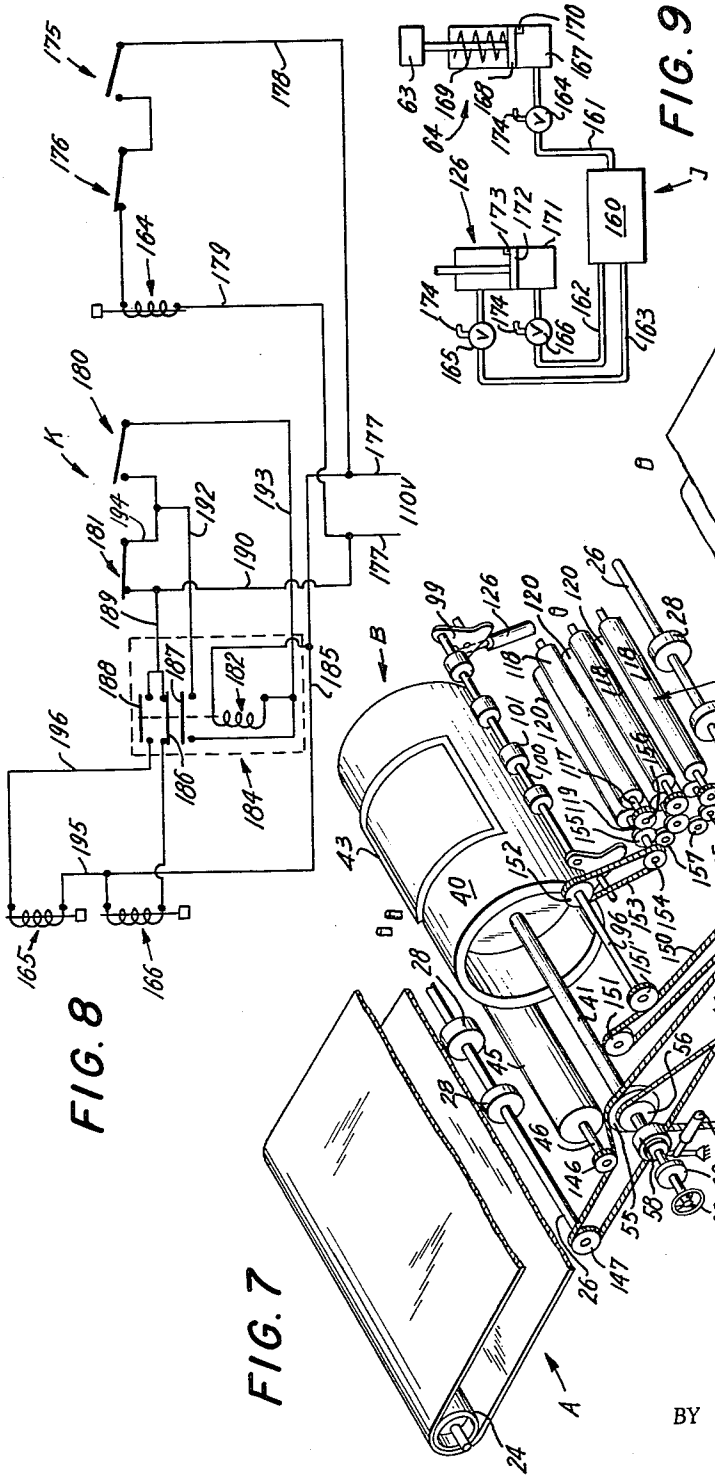


FIG. 7

FIG. 8

FIG. 9

INVENTORS
WILLIAM J. HEIN
IRVING WOLFSON

BY Harold D. Steinberg

ATTORNEY

United States Patent Office 3,112,680 Patented Dec. 3, 1963

3,112,680

DEVICE FOR PRODUCING WINDOWED PACKAGES

William J. Hein, 97 Ocean Ave., Massapequa, N.Y., and Irving Wolfson, 63 Frank St., Valley Stream, N.Y.

Filed July 24, 1961, Ser. No. 126,060
5 Claims. (Cl. 93—36)

The present invention relates to packaging.

More particularly, the present invention relates to an apparatus which is capable of providing a container blank with a transparent window through which it is possible to see the article or articles which are contained within the container.

At the present time, although it is known to provide relatively heavy cardboard boxes with transparent windows, such boxes must be manually worked on in order to be provided with such windows, and as a result the costs of relatively heavy containers of this type which are provided with windows is quite high.

It is accordingly a primary object of the present invention to provide a machine capable of producing on a container blank a transparent window through which, when the blank is set up so as to form a container, the interior of the container may be seen.

Another object of the present invention is to provide an apparatus of this type which is fully automatic with the exception of the feeding of the blanks to the apparatus. Thus, all that is required with the apparatus of the invention is for a single attendant to stand at the apparatus and feed blanks thereto. If desired another attendant may be located at another part of the machine to remove from the machine the blanks after they have been automatically worked on by the machine. However, this is not essential since the completed blanks may simply drop from the machine, as will be apparent from the description below.

A further object of the present invention is to provide an apparatus of the above type which will very rapidly provide a container blank with a window so that when an attendant feeds the blanks to the apparatus there will be no possibility of the blanks being located too close to each other as they move through the machine.

An additional object of the present invention is to provide an apparatus of the above type which is capable of being easily, quickly, and accurately adjusted so as to handle blanks of all sizes and shapes and so as to be able to provide the blanks with windows within a large range of sizes.

A still further object of the present invention is to provide a machine of the above type which will accurately cut from a supply of transparent window material a portion which is of just the right length to provide the blank with a window of the desired size and which will also automatically apply the window to the blank in a manner which will produce accurate synchronization between the window material and a blank, while the blank is moving, so that the blank and the window will precisely meet each other in the required manner to have a blank with a window properly and accurately located thereon.

It is also an object of the present invention to provide an apparatus of the above type which will reliably maintain the flexible, transparent window material under tension at all times so that undesirable sags or slack in the material will be avoided.

The objects of the present invention also include a machine of the above type which will reliably prevent glue, for joining the window to the blank, from being applied to the blank more than once, irrespective of the particular configuration of the blank and the rate with which it moves through the apparatus.

The objects of the present invention also include the

provision of a structure which can operate continuously over a long period of time without requiring any particular maintenance, the only interruptions being caused, for example, by mounting on the apparatus a new supply of transparent window material.

With these objects in view, a machine constructed according to the invention will include a conveyor means for conveying a blank which is to be provided with a window along a predetermined path. A glue-applying means cooperates with the conveyor means for applying to the blank which is conveyed thereby, during movement of the blank along the above path, glue along an endless area which is located adjacent to and which surrounds the portion of the blank which is to be provided with the window. A feeding means cooperates with the conveyor means for feeding to the blank while it is conveyed along the above path by the conveyor means a sheet of window material with the leading end portion of the sheet meeting the leading end of the endless area to which glue has been applied to the above glue-applying means, and this feeding means continuously feeds the window material to the area of the blank to which glue has been applied simultaneously with the movement of the blank along the above path, so that the sheet of window material engages the glue. A cutting means automatically cuts the sheet and terminates the feeding thereof by the above feeding means when the length of the sheet fed to the blank corresponds substantially to the length of the part of the blank which is to be provided with the window, and in this way the trailing end of the portion cut from the sheet of window material will meet the trailing end of the endless area of the blank to which glue has been applied.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantage thereof, will be best understood from the following description of the specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a partly fragmentary perspective illustration of one possible embodiment of a machine according to the present invention, the machine being shown in FIG. 1 as it appears from the front end of the machine to which the blank is supplied so as to be worked upon by the machine;

FIG. 1A diagrammatically illustrates the operations performed, in part, by the machine of the invention;

FIG. 2 is a perspective illustration of the machine of FIG. 1 as it appears when being viewed from the rear;

FIG. 3 is a fragmentary sectional side elevation of the machine showing, on an enlarged scale as compared with FIG. 1, the structure which applies glue to the blank, which feeds the window material to the blank, and which cuts the sheet of window material so that a window of proper size will be automatically fed to the moving blank;

FIG. 4 is a side elevation, partly in section, of part of the feeding means and the cutting means of FIG. 3, the structure being shown in FIG. 4 in a position different from that in which it is illustrated in FIG. 3;

FIG. 5 is a fragmentary transverse sectional illustration, also on an enlarged scale as compared to FIG. 1, of that part of the structure of the invention which limits the rotation of a glue-applying die to a single revolution for each blank;

FIG. 6 is a fragmentary sectional view of part of the structure of FIG. 5 taken along line 6—6 of FIG. 5 in the direction of the arrows;

FIG. 7 is a schematic perspective illustration of the transmission of the machine of the invention which transmits the drive to the various driven parts of the machine;

FIG. 8 is a wiring diagram illustrating the electrical structure of the machine of the invention; and

FIG. 9 is a diagrammatic illustration of the pneumatic structure which is controlled by the electrical structure of FIG. 8 and which actuates parts of the machine so that they will be set into operation.

Referring to FIG. 1A, some of the operations performed by the machine of the invention are indicated diagrammatically. Thus, the structure of the invention includes a conveyor means part of which is formed by an endless belt the upper run of which is fragmentarily illustrated in FIG. 1A. This endless belt **10** is continuously operated so that a blank **11** which rests on the upper run thereof will be conveyed along a predetermined path in the direction indicated by the arrow **12** in FIG. 1A. This blank **11** is of a relatively heavy cardboard which, when properly folded, will provide a fairly heavy, relatively rigid container. Before the blank **11** is placed by the operator on the moving belt **10**, the blank **11** has already been provided with a score line **13** which defines an area **14** of the blank, this area **14** being shown in FIG. 1A as of a rectangular configuration. When the blank is folded up so as to form a container the portion **14** of the blank is removed so as to form an opening which will have a configuration determined by the score line **13**. The score line **13** provides the blank **11** with an easily removable portion which will be removed when the container is used. An endless area **15** is located adjacent and surrounds the blank portion **14** which is eventually removed along the score line **13**, and before the blank **11** reaches the point illustrated in FIG. 1A, glue has been applied, in a manner described below, to the endless area **15**. Simultaneously with the movement of the blank **11** by the belt **10** of the conveyor means along the path determined by the machine in the direction of the arrow **12**, a feeding means feeds a sheet **16** of transparent window material in the direction indicated by the arrow **17**, and the movement of the blank **11** is synchronized, in a manner described below, with the feeding of the sheet **16** in such a way that the leading edge **18** of the sheet **16** will meet the leading edge **15***a* of the endless area **15** to which glue has already been applied, so that in this way the sheet **16** will engage the glue and will thus be joined with the blank **11** covering the portion **14** thereof which is later on removed. The width of the sheet **16** is somewhat larger than the width of the area **14** and the blank and sheet are aligned with each other so that the side edges of the sheet **16** while it is automatically fed in the direction of the arrow **17** will fall along the side portions of the endless area **15** where the glue is located. Simultaneously with the movement of the blank **11** and with the movement of the sheet **16**, a cutting means is automatically actuated at precisely the right instant so as to cut across the sheet **16** along the line **19**, and the operation of this cutting means, which is described below, will simultaneously terminate the feeding of the sheet **16** which trails the line **19**. The length of the sheet between its leading edge **18** and the trailing edge of the portion cut from the sheet along the line **19** is such that the trailing edge of the cut portion of the sheet meets the trailing end **15***b* of the endless area **15** to which the glue has been applied. After the sheet **16** has been cut along the line **19**, the cut portion of the sheet which is located ahead of the line **19** continues to be fed to the moving blank so that there will be provided in this way a window which engages the glue all along the endless area **15**, and in this way the blank is provided with a window. The endless area **15** need not be provided with a continuous strip or layer of glue. Instead the glue may be applied in closely spaced localized areas distributed along the endless area **15**, so that, for example, a row of glue spots extends along the endless area **15** to hold the window securely to the blank. It is unnecessary to press the window against the blank since the simple resting of the window on the blank is sufficient to securely join the window to the blank. Moreover, the blanks with the windows applied thereto are automatically stacked as they leave the machine of the invention, so that the weight of the stack contributes to the efficient adhesion of the windows to the blanks. The sheet **16** may be any flexible transparent material such as cellophane, polyethylene, polystyrene, polyvinylchloride, or any suitable flexible sheet of transparent plastic material.

The machine of the invention includes various assemblies. Thus, the machine includes a conveyor means A shown in FIGS. 1 and 7, this conveyor means A including not only the endless belt **10** but also the structure described below which supports and moves the belt, as well as additional elements referred to below. A glue-applying means B shown most clearly in FIG. 3 and described in greater detail below applies glue to the endless area **15** referred to above simultaneously with the continuous movement of the blank through the machine. Also shown in FIG. 3 are the supply of transparent window material **16** and the feeding means for feeding this window material, this feeding means being generally indicated at H. A 1-revolution clutch structure E shown in FIG. 5 guarantees that the glue-applying die referred to below applies glue along the endless area **15** only once for each blank. FIG. 3 also shows a cutting means F (shown also in FIG. 4) which cooperates closely with the sheet feeding means H, and in addition there is shown in FIG. 3 a tensioning means G which maintains the sheet **16** at all times under tension so that there will be no undesirable slack in the sheet material. FIG. 7 shows the drive means I which serves to transmit the drive to the various driven parts of the machine, and in FIG. 9 is shown the pneumatic arrangement J which actuates various components. The electrical structure K indicated in FIG. 8 actuates the pneumatic structure J so as to bring about operation of the machine elements in the proper sequence and in the proper timing with respect to each other. All of the structure is carried by a suitable framework L.

Referring to FIG. 1, this framework L includes a plurality of legs **21** which are connected to and support a pair of elongated side members **22** which are parallel to each other and extend horizontally along the entire length of the machine. These side members **22** carry side plates **23**, respectively, and these elements as well as additional elements referred to below form a rugged, rigid framework which supports the various components of the machine of the invention.

The conveyer means A includes in addition to the endless belt **10** a pair of rollers **24** located at the front and rear ends of the machine and round which the endless belt **10** is guided. In addition, there is supported between the side frame members **22** a rigid plate **25** part of which may be seen in FIG. 1, and this plate **25** is located directly beneath the upper run of the endless belt **10** so as to support this upper run **10** and prevent undesirable sagging thereof. In this way the upper run of the belt **10** will move along the upper surface of the rigid plate **25** so as to be maintained in a substantially horizontal plane while the upper run moves continuously from the front end toward the rear end of the machine. The rollers **24** are carried by shafts which extend coaxially therethrough, as shown diagrammatically in FIG. 7, and these shafts are supported for rotation by suitable bearings carried by the framework L. The conveyer means A also includes a pair of rotary shafts **26** supported at their ends by bearings **27** (FIG. 1), and these rotary shafts **26** extend horizontally across the machine, are parallel to the rollers **24**, and each fixedly carry a pair of relatively short rollers **28** which are positioned so as to engage the upper surface of each blank as it moves through the machine. The rollers **28** may have an outer layer of rubber, for example, to engage the blanks as they move through the machine on the upper run of the

endless belt 10. In order to adapt the conveyer means to blanks of different thicknesses, the bearings 27 at the ends of the shaft 26 are capable of having their elevation adjusted, and for this purpose each bearing is guided in a pair of vertical guides 29 carried by a side frame member 22, and the guides 29 are interconnected by an upper wall 30 through which extends a screw the bottom end of which is fixed to the bearing 27. A manually turnable nut 31 is threadedly carried by each screw member which passes through the wall 30 and is connected to the bearing 27, so that the operator can turn the nut 31 so as to control the elevation of each shaft 26 and thus control the distance between the rollers 28 and the upper run of the belt 10, and in this way the machine can be adjusted to blanks of different thicknesses.

A guide means D cooperates with the conveyer means A so as to guide each blank through the machine while it is conveyed by the conveyer means A, and this guide means D is adjustale so as to fit the width of the blank. The guide means includes a stationary elongated guide member 32 carried by the left side frame member 22 shown in FIG. 1, and including a vertically extending flange along which the left edge of the blank will slide, as viewed in FIG. 1, as the blank moves to the left, as viewed in FIG. 1, from the front end of the machine shown at the right end of FIG. 1 to the left through the machine, and the upwardly extending elongated flange of element 32 extends upwardly from a horizontal element 33 mounted directly on the side frame member 22. An adjustable guide member 34 cooperates with the guide member 32 for guiding the blank so it cannot shift laterally with respect to the belt 10, and in this way the lateral position of the blank as it moves through the machine is precisely determined. The adjustable guide 34 is in the form of an elongtaed bar aligned with and substantially coextensive with the elongated guide member 32, and it will be noted that this bar 34 has a blank-engaging face visible in FIG. 1 and located in a vertical plane parallel to the vertical plane of the upwardly directed flange of the guide 32. The bar 34 is fixedly carried by a pair of rods 35 which freely extend through a pair of sleeves 36 which are fixed to the right side frame member 22 of FIG. 1, and wing screws 37 are threadably carried by the sleeves 36 and extend through upper portions thereof so that these screws may be turned to fix the axial positions of the rods 35 and thus fix the distance between the guides 32 and 34 of the guide means D. The screws 37 may be manually loosened at any time so as to change the distance between the guides 32 and 34 when the configuration and size of the blank changes. Of course, a series of blanks of the same sizes and configuration will be successively fed to the machine at the right end thereof shown in FIG. 1 by the attendant, so that once the adjustable guide bar 34 is set, it will remain in the adjusted position for the entire run of a particular size and configuration of blank. The guide means D guides the blanks so that they will be properly engaged by the rollers 28 which cooperate with the belt 10 to continue the movement of the blanks beyond the elements 32 and 34 of the guide means D.

After the blank is moved by the conveyer means 10 beyond the first set of upper rolls 28, the right of these rolls one of which is visible at the left in FIG. 3, the glue-applying means B will automatically provide the glue along the endless area 15 referred to above in connection with FIG. 1A. As may be seen from FIG. 3, the glue-applying means includes a die roll 40 fixedly carried by a rotary shaft 41 which is supported by suitable bearings carried by the pair of opposed plates 23 of the frame L. As is apparent from FIG. 3 rods 42 extend between and are connected to the plates 23 so as to render the framework L relatively rigid. The die roll 40 carries a die 43 shown most clearly in FIG. 7, and this die 43 may simply be an endless strip of rubber, neoprene, or the like, having a configuration conforming to the endless area 15 shown in FIG. 1A. This endless die 43 is simply stapled to the exterior surface of the die roll 40. The roll 40 may be made of wood and thus it is a simple matter to staple the die 43 to the die roll 40, and the staples may be spaced from each other so as to compress portions of the die 43 to leave between the staples portions which will receive the glue and apply the glue in localized areas, as described above, along the endless area 15.

As may be seen from FIG. 1, there is provided on the left plate 23 a suitable adjusting means 44 for adjusting the elevation of the left bearing which supports the shaft 41 for rotation, and the right plate 23 of FIG. 1 carries a similar adjusting means, so that in this way it is possible to adjust the elevation of the shaft 41 and thus of the die roll 40.

Referrng to FIG. 3, it will be seen that the glue is delivered to the die 43 by a roll 45 which is fixedly carried by a rotary shaft 46 which is also supported at its ends in suitable bearings which are respectively carried by the walls 23, one of which is visible in FIG. 3. This glue-transferring roll 45 extends partly into a bath of glue which is located in the reservoir 47, so that the rotating roll 45 will carry a layer of glue at its exterior surface. A rigid horizontal plate 48 extends between plates 23 and is carried by plates fastened to the bearings which support shaft 46, and an elongated bar 49 is fixed to the plate 48. A flexible doctor blade 50 is clamped between the bar 49 and the plate 48 in the manner shown most clearly in FIG. 3, and the doctor 50 serves to wipe glue from the roll 45. It will be noted that the right edge of the doctor 50, as viewed in FIG. 3, is located above the horizontal section of the roll 45 which is of largest diameter. In order to limit the application of glue to that axial portion of the roll 45 which is aligned with and of substantially the same transverse length as the die 43, a plurality of manually turnable screw members 51 extend through threaded openings of the doctor 50 into engagement with the upper face of the plate 48. The operator can manually turn those screws 51 which are in alignment with the transverse area of the die roll 40 where the die 43 is located, and in this way the portion of the blade 50 which is aligned with the die 43 can be raised away from the surface of the roll 45 while the remainder of the doctor 50 will engage the roll 45, and in this way glue will remain on the roll 45 only at a portion thereof which is aligned with the die 43.

A means is provided to limit the die-carrying roll 40 to 1-revolution during the movement of a single blank 11 by the conveyor means through the machine, and this means for limiting the die-carrying roll 40 to one revolution is shown in detail in FIG. 5 and 6. Referring to FIG. 5, it will be seen that the shaft 41 which fixedly carries the roll 40 extends through and is supported for rotation by a suitable bearing carried by the wall or plate 23 which is shown in FIG. 5, and this shaft 41 also extends through a pair of sprockets 55 and 56 which are fixed to each other for rotation together and which are freely turnable with respect to the shaft 41. The sprockets 55 and 56 are continuously rotated, during operation of the machine, in a manner described below, and the sprocket 56 is fixed to the hub 57 of an element which extends from a conventional 1-way drive assembly 58. These assemblies are well known and include, for example, rotary driving and driven elements one of which is formed with wedge-shaped recesses in which rollers are located so that when the elements have a certain angular position with respect to each other a drive can be transmitted between these elements as long as the rotation of one of the elements with respect to the other is in a certain direction, while when one of the elements is turned back with respect to the other in the opposite direction the rollers which transmit the drive become located at the deeper part of the recesses so as to stop the transmission of the drive and thus provide a 1-way transmission as is

well known. The hub 57 of one of these rotary elements is fixed to the sprocket 56 to rotate therewith. The structure for limiting the drum or die carrier 40 to one revolution includes a cam member 59 which is located on the shaft 41 between the assembly 58 and a disc 60 which, as is shown in FIG. 6, is flattened at one side, this being the left side, as viewed in FIG. 6. The disc or ring 60 is fixed to the shaft 41 for rotation therewith, and the cam 59 is pivotally connected to the assembly 58 by a pin 61. A spring 62 is fixed at one end to a pin which is carried by the flattened portion of the ring 60 and at its opposite end to a pin which is carried by the cam 59, and the cam 59 is formed with an elongated recess or cutout through which the shaft 41 passes, this cutout or opening being shown in dotted lines in FIG. 6. It will be noted that the cam 59 has a step or shoulder which is engaged by a pivotal finger 63. When this finger 63 is turned about its pivotal support 65 upon being actuated by a pneumatic piston-and cylinder device 64 (FIG. 6) the spring 62 will immediately turn the cam 59 in a counter-clockwise direction, as viewed in FIG. 6, about the pivot 61, and this turning of the cam 59 will place the assembly 58 in an operative position so that the drive will now be transmitted to the shaft 41 which will now commence turning through a single revolution. Thus, the instant that the pneumatic means 64 is actuated to turn the finger 63 in a counter-clockwise direction, as viewed in FIG. 6, about the pivot pin 65, the spring 62 will immediately turn the cam 59 in a counter-clockwise direction, as viewed in FIG. 6, about the pin 61 with respect to the assembly 58, in order to place this assembly 58 in an operative position in a manner which is well known in the art for starting the rotation of the shaft 41 and the drum 40 therewith, and this rotation will continue until the shoulder or step at the perphery of the cam 59 again engages the top end of the finger 63, as viewed in FIG. 6. After the initial engagement between the step of the cam 59 and the finger 63 the turning of the shaft 41 will continue while slowing down and coming to a stop, and during this continued turning the finger 63 acts on the cam 59 to turn it about the pivot 61 in a clockwise direction, as viewed in FIG. 6, so as to tension the spring 62 and so as to move the opening in the central portion of the cam 59 upwardly with respect to the shaft 41 until the parts again reach the rest position shown in FIG. 6 where one revolution has been completed.

As may be seen from FIG. 5, the pin 65 which pivotally supports the finger 63 is supported between a pedestal 66 and a wall of an additional supporting structure 67 which is carried by the wall 23 shown in FIG. 5. Suitable spacers on the pivotal support 65 properly locate the finger 63 along the axis of the pivot 65. The additional supporting structure 67 is also formed with an opening in which is housed a bearing through which the shaft 41 freely extends, and on the outside of the support 67 the shaft 41 is fixedly connected with an eccentric disc 68 which cooperates with a brake shoe 71 made of a suitable material for cooperating frictionally with the outer periphery of the eccentric disc 68. At its left end, as viewed in FIG. 5, the shaft 41 fixedly carries a hand wheel 69 so that when setting up the machine the operator can turn the shaft 41 manually so as to provide proper alignment and synchronization of the elements. The brake shoe 71 is carried by a bracket 70 which is fixedly carried by the support 67. When the parts are in their position of rest shown in FIGS. 5 and 6 the part of the disc 68 which is of greatest eccentricity presses with the greatest frictional force against the brake shoe 71. In this position of the parts the outer peripheral portion of the disc 68 which is at the greatest distance from the axis of the shaft 41 will be located in its lowermost position pressing against the brake shoe 71. Thus, when one revolution of the shaft 41 and the die-carrying roll 40 therewith has almost been completed the portion of greatest eccentricity of the disc 68 is slowly approaching its lowermost position pressing against the brake shoe 71 so as to gradually bring the parts to a stop, and the setting is such that when the spring 62 shown in FIG. 6 has been tensioned and the lowest part of the opening of the cam 59 engages the lower part of the shaft 41, as viewed in FIG. 6, the portion of greatest eccentricity of the disc 68 is in its lowermost position pressing with the greatest force against the brake shoe 71 and thus the parts are stopped gradually and come precisely to a predetermined angular position at the end of a single revolution. Of course, as the cam 59 is turned in a clockwise direction about the pivot 61, as viewed in FIG. 6, during tensioning of the spring 62 at the end of the single revolution, this cam 59 serves to place the one-way drive assembly 58 in an inoperative position where the drive from the gear 56 will no longer be transmitted to the shaft 41.

The structure for supplying window material 16 to the feeding means described below is shown most clearly in FIG. 3. Referring first to FIG. 1, however, it will be seen that the upper ends of the plates 23 of the frame L are respectively formed with notches 75 so as to form a cradle for supporting an elongated shaft 76 at its ends in the manner shown most clearly in FIG. 1. This shaft 76 is supported for rotation in the notches 75 and carries a supply roll 77 of the sheet of window material 16. A brake means 78 described below acts on the shaft 76 to retard the rotation thereof so that due to inertia the shaft 76 cannot turn freely and provide undesired slack in the sheet 16. Referring now to FIG. 3, it will be seen that the sheet 16 is drawn from the roll 77 around a bar 79 of circular cross section, and this bar 79 extends between and is carried by a pair of ears 80 which are fixed to and extend upwardly from a horizontal bar 81 of rectangular cross section. The ends of the bar 81 are respectively slidable in elongated horizontal grooves 82 which are formed at the inner sides of a pair of elongated rigid bars 83 which are fixed to and extend rearwardly from the plates 23. The ends of the bar 81 which extend into the grooves 82, respectively, carry forwardly extending portions 84 which slide in the grooves 82, and a spring 85 is connected at one end to one of these forwardly extending portions 84, as shown in FIG. 3, and at its opposite end to a pin which is fixed to the bar 83 shown in FIG. 3 at the left end of the bar 83, so that the spring 85 constantly urges the bar 81 and thus the rod 79 to the left, as viewed in FIG. 3, and thus serves to maintain the sheet 16 under tension, as will be apparent from the description below. The sheet 16 passes over the rods 42 which extend between and are fixed to the plates 23. A pair of elongated supporting strips 86 made of a suitable metal and being fairly rigid extend at their right ends, as viewed in FIG. 3, freely around the left rod 42 shown in FIG. 3, so that these supporting strips 86 are freely turnable on this rod 42 and are axially shiftable therealong so that it is possible for the operator to shift the strips 86 to locate them beneath the sheet 16 so as to support the latter. The left free ends of these supporting strips 86 rest on the bar 81 beneath the rod 79. As a result, if there should be any slack in the sheet 16, this sheet will nevertheless be supported by the supporting strips 86 at the portion of the sheet which is located over the glue-applying means B, and thus the possibility of any glue reaching the sheet of window material 16 is reliably prevented. The sheet 16 extends around the right rod 42 of FIG. 3 and then as shown around rolls 87*a*, 87*b*, 87*c*.

Referring now to FIG. 3, there are located behind the plates 23 of the frame L, also mounted on the side members 22 of the frame, a pair of additional frame plates 95', and the upper ends of these additional plates 95' serve to support for rotation an elonagted shaft 96 which has an exterior knurled surface 97 and which rotates continuously during operation of the machine as will be apparent from the description below. The plates 95' also serve to fixedly support cross bars 116 and 116 which extend between and are fixed at their ends on the plates 95'.

Bars 115 and 116 as well as shaft 96 extend through and support frame plates 95 between plates 95' and knurled portion 97 of shaft 96 is between plates 95. Plates 95 are fixed to cross plates 102 and 125 as well as plates 121 and 123 described below to form a rigid subframe therewith. Coaxial pivot pins 98 are fixed to and extend from plates 95 to support beyond plates 95 rocker plates 99 which are provided at their upper ends with suitable bearings for supporting for rotation a shaft 100 which fixedly carries a plurality of rolls 101 which are respectively aligned with and which are adapted to cooperate with the shaft 96, in a manner described below, for initiating the feeding of the sheet 16. The stationary plate 102 is fixedly carried by the plates 95 and has a pair of ears 103 which reinforce the pins 98, and the sheet 16 on passing downwardly through the space between shaft 96 and rolls 101 engages and rests against the stationary plate 102. The pair of rocker plates 99 are fixed to each other by a rigid plate 104 which extends between and is fixed to the rocker plates 99, and fixed to the plate 104 is an elongated cutting blade 105 which forms part of the cutting means and serves to cut the sheet 16, the blade 105 being shown in its rest position in FIG. 3 just after it has cut the sheet, and the leading or lower end of the sheet 16 is located at the upper surface of the blade 105 in the position of the parts shown in FIG. 3. The blade 105 is shown in FIG. 4 in the position it takes during feeding of the sheet 16, and it will be noted that in this position the blade 105 is out of the path of movement of the sheet 16. Extending between and fixed to the rocker plates 99 is also a rigid plate 106 which adjustably carries at its upper edge portion a plurality of elongated members 107 which carry at their left free ends, as viewed in FIGS. 3 and 4, the spring-pressed rolls 108 which are urged in a known way to the left, as viewed in FIGS. 3 and 4, through a limited distance. The structure which acts on the spring-pressed rolls 108 yields when the parts are in the position shown in FIG. 3 so that the sheet 16 is at this time pressed against by the rolls 108 since the springs are at this time compressed, and these rolls 108 may be made of rubber or the like and serve to press the sheet against the stationary plate 102, so that this construction in connection with the spring 85 and the above-described structure of FIG. 3 which includes the rod 79 serves to maintain the sheet 16 tensioned when the feeding means is not operating. When the parts are in the position shown in FIG. 4, the spring-pressed rolls 108 are spaced from the stationary plate 102 as well as the sheet 16 so that they do not in any way interfere with the movement of the sheet. Thus, when the rocker plates 99 turn from the position of FIG. 4 to that of FIG 3, the blade 105 will cut the sheet and simultaneously the spring-press rolls 108 will press the sheet against the stationary plate 102, and the feeding of the sheet will stop. It will be noted that when the plates 99 turn about the shaft 98 from the position of FIG. 3 to that of FIG. 4 the rolls 101 move toward the shaft 96 and nip the sheet 16 between the shaft 96 and rolls 101 so that the feeding of the sheet 16 starts, this movement of course being accompanied by a simultaneous movement of the spring-press rolls 108 and the blade 105 away from the path of movement of the sheet 16. As was pointed out above the shaft 96 rotates continuously, so that the movement of the rolls 101 toward the rolls 97 serves to nip the sheet between the rotating shaft 96 and the rolls 101 which now turn as a result of rotation derived from the movement of the sheet 16.

A bar 109 also extends between and is fixed to the plates 95, and this bar 109 is formed with suitable openings through which the several spring-pressed rolls 108 freely pass. This bar 109 fixedly carries a plurality of curved upwardly extending fingers 110 which, when the rocker plates 99 turn to the position of FIG. 4 serve to guide the sheet 16 smoothly from the roll 87c into the nip between the cooperating shaft 96 and rolls 101.

The rollers 101, which are normally stationary, are of course aligned with the spaces between the fingers 110. The shaft 96 continuously rotates in a manner described below and the rollers 101 start to rotate only when the parts have the position shown in FIG. 4.

As is shown in FIG. 2, bars 115 and 116 extend between and are fixed to the plates 95', and plates 95 serve to support for rotation a plurality of shafts 117 which respectively carry the rollers 118 which turn with the shafts 117. The framework 95, 102, 125, 121, 123 and all parts carried thereby are laterally shiftable on bars 115 and 116 to be aligned with the window. Plates 95 also carry in alignment with the shafts 117 a plurality of shafts 119 which are also supported for rotation by the plates 95, and these shafts 119 fixedly carry in alignment with the rollers 118 a plurality of rollers 120. The rollers 120 may be made of rubber or may be rubber-covered while the rollers 118 may be made of metal. All of these rollers 118 and 120 together with their shafts 117 and 119 respectively, continuously rotate in a manner described below. The pair of horizontal bars 121 extend between and are fixedly carried by the plates 95, and it will be noted that the bars 121 are located beneath a pair of shafts 117. These cross bars 121 fixedly carry a plurality of inclined guide bars 122 which are curved at their top and bottom ends, as shown most clearly in FIG. 3. A pair of cross bars 123 similar to the bars 121 are fixedly carried by the plates 95 in alignment with but forwardly of the bars 121, and it will be noted that the bars 123 are respectively located beneath a pair of shafts 119. These cross bars 123 fixedly support the plurality of inclined guide bars 124 which are respectively located in alignment with the guide bars 122 to form therewith gaps which are located in the plane occupied by the sheet 16 during its movement toward the belt 10. The guide bars 122 and 124 are respectively located between the rollers 118 and 120, in the manner shown most clearly in FIG. 2, and as the sheet 116 moves downwardly toward the belt 10 it is advanced by the rotating rollers 118 and 120 which continuously rotate and which continuously engage each other so that when a sheet 16 is presented into the nip between these rollers they will immediately engage the sheet and advance it downwardly in the direction indicated in FIG. 3. Thus, the rollers 118 and 120 serve to advance the sheet even after it has been cut across by the serrated edge of the blade 105 when this blade moves from the position of FIG. 4 to that of FIG. 3, and thus after the blade 105 has cut across the sheet 16 the rollers 118 and 120 form a feeding means for continuing the feeding of the cut portion of the sheet down onto the blank which is now moving beneath and past the lower ends of the guide bars 122 and 124, and the parts are so synchronized that the trailing end of the cut portion of the sheet which moves downwardly beyond the blade 105 when the latter has reached the position shown in FIG. 3 will meet the trailing end of the endless area 15 which has had glue applied thereto, this trailing end being indicated at 15b, as described above in connection with FIG. 1A. It will be noted that to the right of the feeding means H shown in FIG. 3 is located a pair of supports 29, 30 for the rear rolls 28 which are fixedly carried by the shaft 26 to rotate therewith, and these rolls 28, shown also in FIG. 2, are always spaced far enough from each other so that they do not engage the sheet of window material which contacts the glue and is joined to the blank by the time the blank reaches the rear rollers 28 which engage the blank to hold it against the belt 10. The rocker plates 99 are tilted between the position shown in FIG. 3 and 4 by a double-acting pneumatic cylinder and piston means 126 which forms part of the pneumatic means J and which is described below in connection with FIG. 9. The piston of the pneumatic means 126 is pivotally connected at 128 to the right rocker plate 99, as viewed in FIG. 2.

The upper ends of the bars 124 are interconnected by cross bar 125, so that these bars 124 and 125 form a network supporting the sheet as it moves down between the gaps formed by the bars 122 and 124, while being forwardly by the cooperating rollers 118 and 120.

As may be seen from FIG. 2, a cross bar 129 forms part of the framework L which supports the entire machine, this cross bar 129 extending between and being fixed to the rear legs 21 of the framework L, and a pair of upstanding straps 130 are fixed to and extend upwardly from the cross bar 129 and carry at their upper end a protective bar 131. The completed blanks with the windows attached thereto simply move from the belt 10 over the bar 131 and drop onto a stack.

Referring to FIG. 7, it will be seen that the drive means I includes an electric motor 133 which operates continuously as long as the machine is switched on, this motor 133 being connected to the lines from which the electricity for the entire plant is derived, and the switch which switches the entire machine on energizes the motor 133 so that it operates continuously. A sprocket 134 is fixed to the shaft of the motor 133 to rotate continuously during operation of the motor 133, and this sprocket 134 drives an endless chain 135 which passes around a sprocket wheel 136. The sprocket wheel 136 is fixed to a shaft 132 which is supported for rotation in suitable bearings and which fixedly carries a pair of additional sprockets 138 and 139. The sprocket 138 drives an endless chain 140 which passes around a second sprocket which is fixed to a gear 141 coaxially with the latter, and this second sprocket and gear 141 are supported for rotation by any suitable bearing carried by the frame L. The gear 141 meshes with the gear 142 which is fixed to the shaft which carries the rear roll 24 which supports and drives the belt 10 at its rear end. The front roll 24 of the belt 10 is simply supported for free rotation by bearings carried by the opposite side walls of the framework L. Thus, it will be seen that the drive means I continuously drives the belt 10 which moves continuously as long as the machine is turned on.

The sprocket 139, which thus rotates continuously as long as the machine is turned on, drives a chain 143 which passes around an idler sprocket 144 and then passes around the sprocket 56 which is also shown in FIG. 5. As was described above, the sprockets 55 and 56 are fixed to each other for rotation as a unit and they turn freely on the shaft 41 which is only constrained to rotate with these sprockets 55 and 56 when the one-way drive is energized upon moving of the finger 63 away from the step or shoulder of the cam 59 upon actuation by the pneumatic cylinder and piston means 64. In this way the pair of sprockets 55 and 56 rotate continuously. The sprocket 55 drives an endless chain 145 which passes beneath and meshes with a sprocket 146 which is fixed to the shaft 46 which fixedly carries the glue-transferring roll 45, so that this latter roll continuously rotates as long as the machine is turned on. The endless chain 145 passes around a sprocket 147 which is fixed to the front shaft 26 which carries a pair of rolls 28 which engage the upper face of the blank as described above, and the endless chain 145 also passes around the rear sprocket which is fixed to the rear shaft 26 so that the latter also continuously rotates together with the rear pair of rolls 28. This rear shaft 26 fixedly carries a sprocket 149 which continuously rotates, and this sprocket 149 drives an endless chain 150 which passes around an idler sprocket 151 supported for rotation by a suitable bearing carried by the framework, and then the endless chain 150 passes beneath and meshes with a sprocket 151′ which is fixed to the shaft 96 so that this latter shaft continuously rotates as long as the machine is turned on. Thus, it will be seen that in this manner the shaft 96, described above in connection with FIGS. 3 and 4, continuously rotates as long as the machine is turned on. The shaft 96 fixedly carries an additional sprocket 152 which drives an endless chain 153 which passes around a second sprocket 154 which is fixed to the uppermost shaft 119. The several rolls 118 and 120 are shown diagrammatically in FIG. 7 carried by the shafts 117 and 119 as described above in connection with FIG. 3. Thus, by way of the sprocket 154 the uppermost shaft 119 and the rolls 120 carried thereby continuously rotate. The uppermost shaft 119 also carries a gear 155 which meshes with a gear 156 carried by the uppermost shaft 117, so that in this way the upper rolls 118 rotate continuously together with the upper rolls 120 but in an opposite direction, and the direction of rotation of these rolls is such that when they engage the sheet 16 they move the sheet 16 downwardly. The uppermost gear 155 meshes with an intermediate gear 157 which transmits the drive to the next lower gear 155 which is connected to the next lower shaft 119, so that in this way the next lower set of rolls 120 are continuously rotated, and this second lower gear 155 meshes with another gear 156 which is carried by the next lower shaft 117 so that in this way the following set of rolls 118 are driven, and in this manner the drive is transmitted throughout all of the several rolls 118 and 120 so that these rolls continuously rotate. The lowermost gear 157 shown in FIG. 7 transmits the drive to the next lower gear 155 which is not shown in FIG. 7 and which drives the lowermost shaft 119 indicated in FIG. 3.

It is thus apparent that with the apparatus of the invention all of the parts, with a few exceptions, are driven continuously. The exceptions are the rolls 101 carried by the rocker plates 99, these rolls turning only when the pneumatic means 126 is actuated to move the rocker plates 99 from the position of FIG. 3 to that of FIG. 4, and of course the die-carrying roll 40 rotates only when the one-way drive 58 is released by actuation of the pneumatic means 64. Thus, the shaft 41 together with the die-carrying roll 40 and the rolls 101 together with the shaft 100 will be stationary when the machine is turned on, but all of the other elements shown in FIG. 7 are driven continuously in the manner described above.

Referring now to FIG. 9, the pneumatic means J includes a source 160 of compressed air. This may be in the form of a tank which is supplied with air under pressure from a suitable compressor which is kept in a known way at all times filled with air having a predetermined pressure. A conduit 161 connects the tank or the like 160 of compressed air to the pneumatic piston and cylinder means 64 which actuates the finger 63 which releases the 1-revolution clutch 58 which causes the die-carrying roll 40 to turn through one revolution. A pair of conduits 162 and 163 provide communication between the source of compressed air 160 and the piston and cylinder means 126 which actuates the rocker plates 99. The conduit 161 carries a valve 164 which, when open, provides communication between the tank 160 of compressed air and the interior of the cylinder 167 of the pneumatic means 64. The valve 164 is of a known type which is electrically actuated and which, when it is closed, connects the interior of the cylinder 167 beneath the piston 168 therein to the outer atmosphere through a discharge 174. The piston 168 which slides in the cylinder 167 is urged against a stop 170 by a spring 169. Thus, when the valve 164 is open, in a manner described below, the exhaust to the outer atmosphere 174 is closed and the air under pressure flows into the cylinder 167 so as to advance the piston 168 in opposition to the spring 169, and in this way the finger is moved so as to initiate the single revolution of the die-carrying roll 40. When the valve 164 is closed, in a manner described below in connection with FIG. 8, the spring 169 returns the piston 168 to the stop 170, and at the same time the exhaust 174 opens so that there is no resistance to the return of the piston 168 to its rest position indicated in FIG. 9. Of course, as was described above in connection with FIG. 6, the spring 169 shown in FIG. 9 will actually not be able to

return the piston 168 all the way to the stop 170 until the cam 59 has almost turned through one revolution so that the end of the finger 63 can move behind the step on the cam 59 in the manner described above.

The conduit 162 communicates through a valve 166 which is identical with the valve 164 with one end of a cylinder 171 of the pneumatic means 126, and this valve 166 is normally open so that its exhaust 174 is normally closed, and thus when the parts are in the position shown in FIG. 3 with the feed of the sheet 16 stopped and the blade 105 extending across the bottom end of the sheet 16, the valve 166 is open and air under pressure is in the cylinder 171 urging the piston 172 therein against the stop 173 shown diagrammatically in FIG. 9, and in this way the parts are maintained in the position shown in FIG. 3 where the rocker plates 99 have the position spacing the rollers 101 from the shaft 96 in the manner described above, and of course at this time the spring-pressed rollers 108 press the sheet 16 against the stationary plate 102. By way of the electrical circuit shown in FIG. 8 and described below, at a predetermined time which is controlled by the blank 11 itself the valve 166 is closed and the valve 165 which is carried by the conduit 163 is opened. The closing of the valve 166 will place the interior of the cylinder 171 beneath the piston 172, as viewed in FIG. 9, in communication with the outer atmosphere through the discharge 174, while the opening of the valve 165 will close its exhaust 174 and will admit air under pressure into the cylinder 171 on the other side of the piston 172 which now moves downwardly so as to turn the plates 99 in a counter-clockwise direction, as viewed in FIG. 3, from the position of FIG. 3 to that of FIG. 4 so that the feeding of the window material 16 will now commence, and it will be noted that when the parts have moved to the position of FIG. 4 the blade 105 as well as the spring-pressed rolls 108 are spaced from the sheet which now moves down so as to be engaged and advanced by the rolls 118 and 120 in a manner described above. When a predetermined length of the sheet 16 has moved past the blade 105 while this blade is in the position of FIG. 4 the blank will automatically actuate the electrical structure so as to close the valve 165 and open the valve 166, and in this way the cylinder 171 at its portion above the piston 172 will exhaust to the outer atmosphere through the discharge 174 of the valve 165, while the air under pressure will now move through the conduit 162 into the cylinder 171 so as to return the piston 172 to the position shown in FIG. 9, and in this way the plates 99 will be turned in a clockwise direction from the position of FIG. 4 to that of FIG. 3, and thus the blade 105 will cut across the sheet and the feeding of the sheet will terminate. Of course, the rolls 118 and 120 which are continuously driven will continue to advance the sheet down to the blank in the manner described above, but the portion of the sheet which is above the blade 105 will no longer be fed.

Referring now to FIG. 8, the electrical structure is supplied with current from the lines 177 which also serve to energize the motor 133 described below. The electrical control structure includes, as shown at the right portion of FIG. 8, a pair of microswitches 175 and 176. As the blank is moved by the belt 10 it will first engage and close the normally open microswitch 175 and immediately thereafter it will engage and open the normally closed microswitch 176. As is apparent from FIG. 8, these microswitches are connected in series, a conductor 178 connecting one of the lines 177 to the microswitch 175 which is connected in series with the microswitch 176, and this microswitch is in turn connected in series with the valve 164 which is shown diagrammatically in FIG. 8. The valve 164 in turn is connected by the conductor 179 to the other of the lines 177. Thus, with the parts in the position shown in FIG. 8 the valve 164 is unenergized and is therefore closed, this valve being closed in its unenergized position, and thus the spring 169 can hold the piston 168 in the position shown in FIG. 9 against the stop 170. As soon as the blank closes the microswitch 175 the circuit through the valve 164 is completed, and this valve now automatically opens so that the air under pressure will move the piston 168 in the manner described above. Immediately after the valve 164 is energized the blank engages and opens the switch 176 so that the valve becomes immediately unenergized and the spring 169 can now return the piston 168 toward the stop 170. Referring to FIG. 6, it will be seen that the finger 63 need only be moved in a counter-clockwise direction, as viewed in FIG. 6, for an instant, since the spring 62 will immediately turn the cam 59 so as to move the step of the cam beyond the tip of the finger, and thus the fact that the pneumatic means 64 is immediately unenergized after it is energized simply means that the finger 63 engages the outer periphery of the cam 59 and is immediately ready to move back to the position shown in FIG. 6 after the cam 59 has turned through almost one revolution. The advantage of the immediate opening of the circuit by opening of the switch 176 after the switch 175 is closed is that in this way there is an absolute guarantee that the die-carrying roll 40 will not turn a second time while the same blank is moving beneath the die-carrying roll 40. Thus, for example, it may be that certain blanks have such a configuration that one projection will engage a switch such as the switch 175, and this projection of the blank will leave the switch and there will be an empty space and a second projection of the same blank could engage the switch 175, so that with a blank of such a configuration it is possible that there might be more than one actuation of the die-carrying roll. This cannot happen with the arrangement shown because the opening of the switch 176 will prevent the circuit from being closed for a second time even if the switch 175 should be actuated twice by the same blank. Of course, when a blank moves beyond the switch 176 so that it again closes, the switch 175 will have opened and the circuit will thus remain open until the next blank repeats these operations.

The lines 177 are also connected to the valves 165 and 166 in the manner shown in FIG. 8. These valves are controlled by a normally open microswitch 180 and a normally closed microswitch 181. The circuit includes a switch assembly 184, and this assembly includes a coil 182 which when energized will move the bank of switches 186–188 shown in FIG. 8. The switch assembly 184 is connected to a conductor 185 which extends from one of the lines 177 and is connected not only to the switch assembly 184 in the manner shown in FIG. 8 but also to the valve 166 which is connected by the conductor 195 to the valve 165. The valve 166 is connected to the switch 186 and the valve 165 is connected by the conductor 196 to the switch 188 which is in turn connected by the conductor 189 to the lead 190 which also serves to connect the microswitch 181 to the lines 177. The switches 180 and 181 are connected in series by a conductor 194, and it will be noted that the end of the coil 182 which is not connected to the line or lead 185 is connected by the lead 193 to the switch 180. The line 194 which connects the switches 180 and 181 in series is connected by the conductor 192 to the switch 187 which is in turn connected to the conductor 193. It will be seen that when the coil 182 is unenergized an unillustrated spring maintains the bank of switches 186–188 in the position illustrated in FIG. 8 where the switch 186 is closed while the switches 187 and 188 are open.

Thus, in the rest position of the parts shown in FIG. 8, the current, as long as the machine is turned on, will move from the right line 177 of FIG. 8 through the conductor 185 to the valve 166 which by way of the switch 186, which is now closed, is connected through the lead 189 to the conductor 190 and thus to the other of the lines 177, and in this way when the parts are at rest with the machine turned on the valve 166 is energized and is thus open so that the air under pressure is delivered to

the underside of the piston 172 to maintain it against the stop 173, and in this way the rocker plates 99 are maintained in the position indicated in FIG. 3. After the blank has moved beyond the glue-applying means B the blank will engage and close the microswitch 180. As a result the coil 182 will become energized since the conductor 193 is now connected by the closed switch 180 to the normally closed switch 181 which is connected through the lead 190 to the other of the lines 177, and the energizing of the coil 182 upon closing of the switch 180 will cause the bank of switches 186–188 to move downwardly, as viewed in FIG. 8, with the result that the switch 186 opens while the switches 187 and 188 close. The opening of the switch 186 results in immediate unenergizing of the valve 166 which now closes so that the space in the cylinder 171 beneath the piston 172 communicates with the outer atmosphere through the exhaust 174 of the valve 166. At the same time the closing of the switch 188 immediately energizes the valve 165 since through the switch 188 this valve becomes connected to the lead 189 and through the conductor 190 to the other lines 177, this valve 165 being permanently connected to the right line 177 through the conductors 195 and 185. The coil and the switch 187 enables this switch to act as a holding relay to maintain the coil 182 energized even if the switch 180 opens by movement of the blank beyond the switch 180. Thus, even if the switch 180 is open the coil 182 will be connected through the switch 187 to the normally closed switch 181 which is connected through the conductor 190 to the left line 177 of FIG. 8, and thus even if the switch 180 should open the coil 182 will remain energized and thus the valve 165 will remain open and the rocker plates 99 will remain in the position shown in FIG. 4.

It is only when the blank engages and opens the normally closed microswitch 181 that the parts return to their rest position. The opening of the microswitch 181 of course opens the circuit to the coil 182 so that the unillustrated spring of the switch assembly returns the bank of switches to the position indicated in FIG. 8. As a result the switch 188 opens while the switch 186 simultaneously closes, and thus the valve 165 closes while the valve 166 opens, and in this way the parts return to the positions indicated in FIGS. 8 and 9.

The positions of the several microswitches are shown most clearly in FIG. 3. As the blank moves to the right, as viewed in FIG. 3, it will first engage and close the microswitch 175 so as to energize the valve 164 and thus cause the finger 63 to turn and thus set into operation the structure for rotating the drum through one revolution. It will be seen that the switch 176, which is normally closed, is carried by the same carriage which carries the switch 175, and thus the switch 176 will be immediately opened by the blank once the switch 175 has been closed. The microswitch 180 is located approximately in the position indicated so that when it is closed it will initiate the feeding of the sheet in such a way that its leading edge will meet the leading edge 15*a* of the endless area 15 to which glue has been applied. The switch 181 is located some distance from the switch 180 in the manner shown in FIG. 3 so that when this switch 181 is opened the parts will return to their rest position and the blade 105 will of course cut across the sheet 16, the rolls 118 and 120 serving to continue to feed the sheet so that its trailing edge will meet the trailing portion of the endless area to which the glue has been applied. The pair of microswitches 175 and 176 are mounted on a carriage 202 which is freely slidable along a rectangular bar 200 fixedly carried by the left side plate 22, as viewed in FIG. 1, and this carriage is freely accessible to the operator who can see it just inside of the side plate 22 of the frame L. A pair of manually operable set screws 203 are accessible to the operator so that he can releasably fix the carriage 202 along the bar 200 at any desired location. As the blank is moved by the belt 10 to the left, as viewed in FIG. 1, the edge of the blank which engages the portion 32 of the guide 33 enters beneath the front upwardly curved end of a bar 201 which extends all the way along the machine over the bar 200 which carries the carriage 202. The upper side of the blank by its engagement with the bar 201 cannot move upwardly and therefore the pressing of the blank against the microswitches 175 and 176 to actuate them in a reliable positive manner is guaranteed. Brackets 205 are carried by the framework to support the upper bar 201 which maintains the left edge of the blank, as viewed in FIG. 1, at such an elevation that it will reliably actuate all of the microswitches. The microswitch 180 is carried by a carriage 206 similar to the carriage 202 while the microswitch 181 is carried by a carriage 207 similar to the carriage 202. All of these carriages are capable of being releasably fixed by manually operable set screws to a desired location along the bar 200. When setting the machine up to handle a particular series of blanks, the positions of the carriages 202, 206 and 207 is approximated for the first blank, and then as the first blank runs through it is seen how the various elements are actuated so that the necessary adjustments can be made. In this way after only a few blanks have passed through the machine it is possible empirically, to very precisely determine the positions of the carriages 202, 206 and 207 and thus determine the instant when the blank itself will actuate the several microswitches so as to bring about the above operation. Thus, the switch 175 will determine the instant when the 1-revolution clutch 58 is actuated so as to initiate the turning of the die-carrying roll 40. The position of the switch 176 is immaterial since it is only a safety switch to prevent a second actuation of the die-carrying roll, and it is only required to be close to the switch 175 so as to immediately open the circuit, and thus it is mounted on the same carriage 202 as the switch 175. The closing of the switch 180 will cause the rocker plates 99 to turn from the position of FIG. 3 to that of FIG. 4, and thus this switch is so positioned that the feeding of the sheet 16 will start at such a time that the leading end of the sheet will exactly meet the leading portion 15*a* of the endless glued area 15 shown in FIG. 1A. The switch 181 is so located that it will be opened by the blank at such a moment that when the blade 105 cuts across the blank the cut portion of the blank which continues to be fed by the rolls 118 and 120 will have a trailing end which will meet the trailing portion 15*b* of the endless area 15 which has received the glue from the die 43. Any inaccuracies in these operations are immediately noted on the first few blanks and are immediately corrected, so that the machine can be set up very quickly to provide a precise synchronization in the operation of all of the parts.

The supply roll can have its position adjusted along the bar which carries the supply roll so that the window material can be aligned with the opening of the blank.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of glue-applying machines differing from the types described above.

While the invention has been illustrated and described as embodied in adjustable-applying machines, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a machine for providing a container blank with a window, in combination, a conveyer means for conveying along the given path a container blank which is to be provided with a window; a bath located over said conveyer means and adapted to contain glue; a transfer roll cooperating with said bath for transferring a layer of glue therefrom; a rotary die carrier located adjacent said transfer roll and carrying a die to receive glue from said transfer roll, said die being endless and corresponding to an endless area of the blank which is located adjacent and surrounds the part thereof which is to receive the window; means cooperating with said die carrier for turning the same through only one revolution during movement of said blank along said path and in timed relation to the movement of the blank to apply the glue thereto from the die along said endless area of the blank; a plurality of feed rolls located along said path subsequent to said die carrier for feeding to the blank a sheet of window material; means cooperating with said plurality of feed rolls and moveable between a starting position for starting the feeding of a sheet of window material to the rolls to be fed thereby and an end position where said last-mentioned means cuts the sheet and terminates the feeding thereof to the feed rolls, said means which starts the feeding of the sheet and cuts the sheet providing a sheet to said feed rolls which will have a leading end which meets the leading end of the area to which glue has been applied and a trailing end which meets the trailing end of the area of the blank to which glue has been applied; and drive means cooperating with said conveyer means, said transfer roll, and said feed rolls for continuously driving said conveyer means, said transfer roll, and said feed rolls during operation of the machine; and means responsive to movement of the blank along said path by said conveyer means for initiating the operation of the means which limits the rotation of the die carrier to one revolution and means which initiates the operation of the means for initiating the feeding of the window material to the feed rolls and the cutting of the sheet of window material.

2. In a machine for providing a container blank with a window, in combination, a conveyer means for conveying along the given path a container blank which is to be provided with a window; a bath located over said conveyer means and adapted to contain glue; a transfer roll cooperating with said bath for transferring a layer of glue therefrom; a rotary die carrier located adjacent said transfer roll and carrying a die to receive glue from said transfer roll, said die being endless and corresponding to an endless area of the blank which is located adjacent and surrounds the part thereof which is to receive the window; means cooperating with said die carrier for turning the same through only one revolution during movement of said blank along said path and in timed relation to the movement of the blank to apply the glue thereto from the die along said endless area of the blank; a plurality of feed rolls located along said path subsequent to said die carrier for feeding to the blank a sheet of window material; means cooperating with said plurality of feed rolls and moveable between a starting position for starting the feeding of a sheet of window material to the rolls to be fed thereby and an end position where said last-mentioned means cuts the sheet and terminates the feeding thereof to the feed rolls, said means which starts the feeding of the sheet and cuts the sheet providing a sheet to said feed rolls which will have a leading end which meets the leading end of the area to which glue has been applied and a trailing end which meets the trailing end of the area of the blank to which glue has been applied; and drive means cooperating with said conveyer means, said transfer roll, and said feed rolls for continuously driving said conveyer means, said transfer roll, and said feed rolls during operation of the machine; means responsive to movement of the blank along said path by said conveyer means for initiating the operation of the means which limits the rotation of the die carrier to one revolution and means which initiates the operation of the means for initiating the feeding of the window material to the feed rolls and the cutting of the sheet of window material, said means which is responsive to the movement of the blank along said path being electrical; and pneumatic means actuated by said electrical means and cooperating with said means for turning the die carrier through only one revolution and with said means for initiating the feeding of the window material and the cutting thereof for actuating the same.

3. In a machine for providing a container blank with a window, in combination, conveyer means for conveying a container blank along a predetermined path; glue-applying means for applying to the container blank glue along an endless area which is located adjacent and surrounds the part of the blank which is to be provided with a window, said glue-applying means including a rotary die carrier which is adapted to carry a die conforming to the configuration of said endless area and a 1-revolution clutch; feeding means located along said path subsequent to said glue-applying means for feeding a sheet of window material to the blank to be joined thereto at said endless area in a position covering the part of the blank which is to be provided with a window, said feeding means joining the leading end of the sheet of window material to the leading end of the endless area of the blank to which glue has been applied; cutting means for cutting the sheet when the length thereof corresponds to the length of the part of the blank which is to receive the window so that the cut portion of the sheet will have a trailing end which will meet the trailing end of the area to which glue has been applied; and adjustable electrical means cooperating with said 1-revolution clutch and with said feeding and cutting means for initiating the operation of this 1-revolution clutch to provide coincidence between the glue-carrying die and the endless area to which glue is to be applied and for providing coincidence between the leading and trailing ends of the cut portion of the sheet of window material and the leading and trailing ends respectively, of the endless area to which glue has been applied, said adjustable electrical means including an elongated stationary bar extending along said conveyer means generally parallel to the path of movement of the blank and a plurality of electrical switches shiftable along said bar and capable of being fixed at selected locations therealong by the operator so as to control the initiation of the operation of the 1-revolution clutch and said feeding and cutting means according to the location of the blank along said path.

4. In a machine for providing a container blank with a window, in combination, conveyer means for conveying a container blank along a predetermined path; glue-applying means for applying to the container blank glue along an endless area which is located adjacent and surrounds the part of the blank which is to be provided with a window, said glue-applying means including a rotary die carrier which is adapted to carry a die conforming to the configuration of said endless area and a 1-revolution clutch; feeding means located along said path subsequent to said glue-applying means for feeding a sheet of window material to the blank to be joined thereto at said endless area in a position covering the part of the blank which is to be provided with a window, said feeding means joining the leading end of the sheet of window material to the leading end of the endless area of the blank to which glue has been applied; cutting means for cutting the sheet when the length thereof corresponds to the length of the part of the blank which is to receive the window so that the cut portion of the sheet will have a trailing end which will meet the trailing end of the area to which glue has been applied; and adjustable electrical means cooperating with said 1-revolution clutch and with said feeding and cutting means for initiating the oper-

ation of this 1-revolution clutch to provide coincidence between the glue-carrying die and the endless area to which glue is to be applied and for providing coincidence between the leading and trailing ends of the cut portion of the sheet of window material and the leading and trailing ends respectively, of the endless area to which glue has been applied, said electrical means including, for the initiation of the operation of the 1-revolution clutch, a pair of switches one of which initiates the operation of the 1-revolution means and the other which prevents a second operation of the 1-revolution clutch during the movement of a single-blank along said path.

5. In a machine for providing a container blank with a window, in combination, a conveyer means for conveying a blank which is to be provided with a window along a predetermined path; glue-applying means cooperating with said conveyer means for applying glue to the blank along an endless area which surrounds and is located adjacent the part of the blank which is to be provided with the window, said glue-applying means including a rotary die carrier and a 1-revolution clutch for turning the die carrier through the 1-revolution during movement of the blank along said path; feeding means cooperating with said conveyer means and located along said path subsequent to said glue-applying means for feeding to the blank a sheet of window material with the leading end of the sheet meeting the leading end of the area of the

blank to which glue has been applied; cutting means for cutting the sheet when the length thereof corresponds to the length of the part which is to be provided with a window so that the cut portion of the sheet of window material will have a length corresponding to the part of the blank which is to be provided with a window and will have a trailing end which meets the trailing end of the area of the blank to which glue has been applied, said feeding means terminating its operation when said cutting means operates to cut the blank; single-acting pneumatic piston-and-cylinder means cooperating with said 1-revolution clutch for intiating the operation thereof; and double-acting piston-and-cylinder means cooperating with said feeding and cutting means for first initiating the operation of said feeding means and rendering said cutting means inoperative and for then initiating the operation of said cutting means and rendering said feeding means inoperative.

References Cited in the file of this patent

UNITED STATES PATENTS

1,827,539	Novick	Oct. 13, 1931
2,021,327	Phinney	Nov. 19, 1935
2,202,496	La Bombard	May 28, 1940
2,209,347	Novick	July 30, 1940
2,408,363	Beckman et al.	Oct. 1, 1946
2,766,666	Vergobbi	Oct. 16, 1956