Aug. 14, 1945. L. HOFFMAN ET AL 2,381,955

ENVELOPE MACHINE

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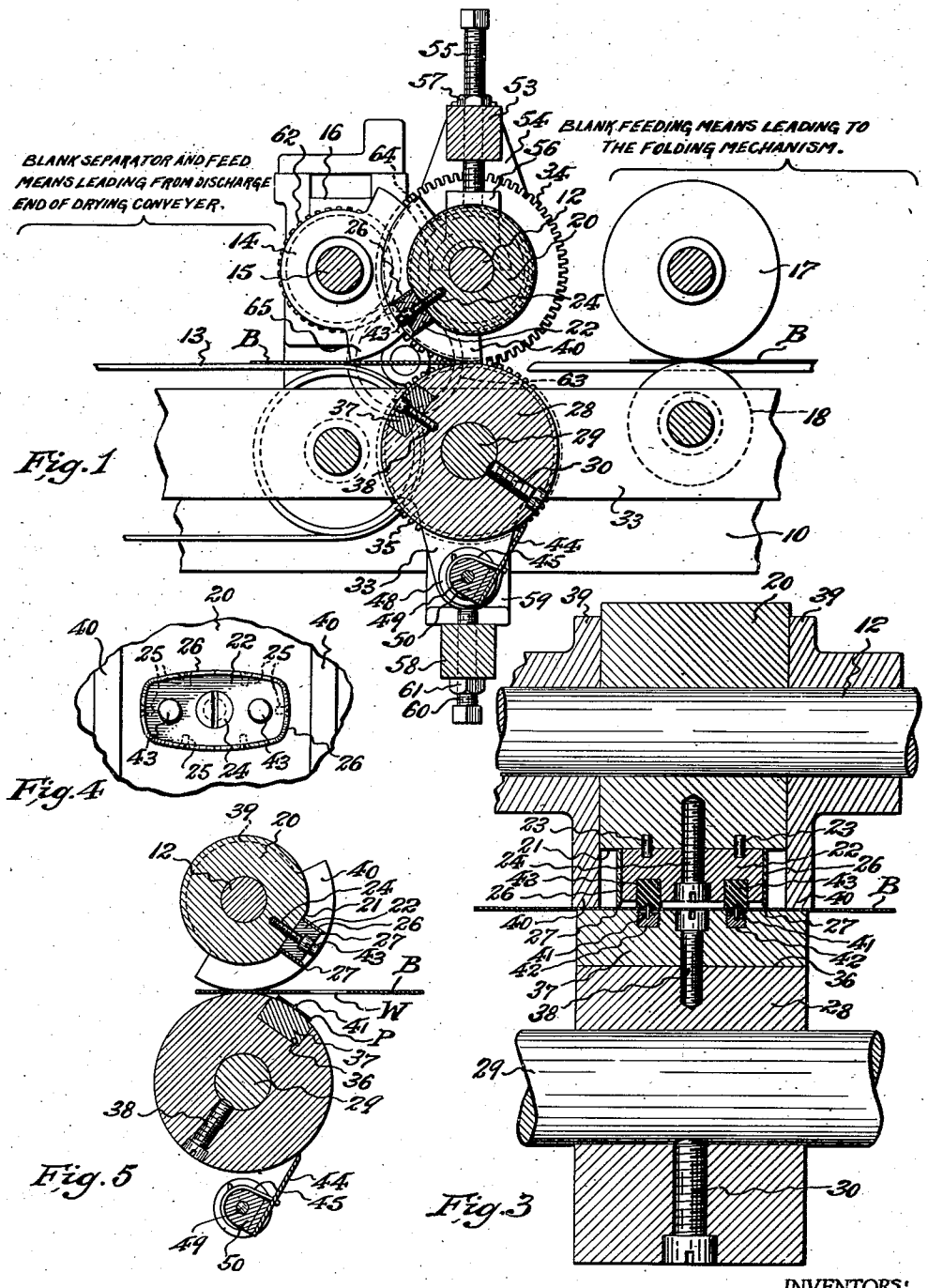



Fig. 1



Fig. 4



Fig. 5



Fig. 3

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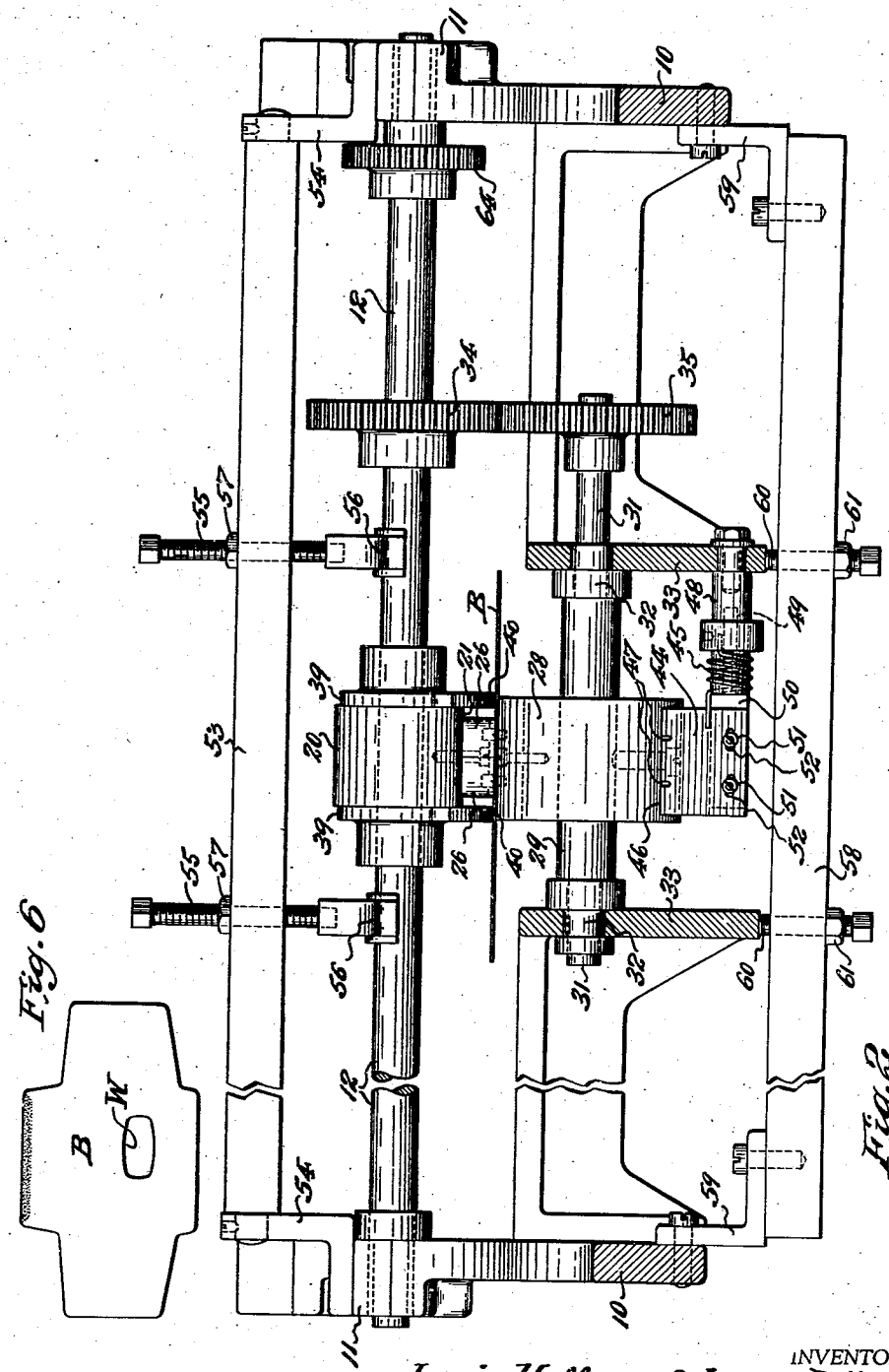


Fig. 2

Fig. 6




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## ENVELOPE MACHINE

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5 Claims. (Cl. 164—28)

This invention relates to improvements in machines for manufacturing envelopes; and the invention has reference, more particularly, to improvements in machines for manufacturing window type envelopes.

In the manufacture of window type envelopes, it has heretofore been the practice to punch the windows in the envelope blanks, as a separate operation by means of separate punch press mechanism, preparatory to delivery to and passing the blanks successively through a machine by which the same are gummed and folded into completed envelopes. This procedure not only involves necessity for use and maintenance of separate punch presses, but also involves much additional labor, loss of time, and handling of the envelope blanks before the same can be stacked and deposited in the envelope manufacturing machine for movement therethrough; furthermore, due to the presence of the window in the pre-punched blanks, the bodies of the latter are weakened and more easily subject to distortion, when handled by the feeding mechanism by which they are automatically and successively fed into the envelope manufacturing machine, and, after gumming of the closure flaps of the blanks, to the drying conveyer of the machine, and consequently the pre-punched blanks are frequently torn by said feeding and transfer mechanism, and have to be removed from the machine, thus increasing waste and slowing down and reducing production.

Having these facts in view, it is an object of this invention to provide novel window cutting mechanism for incorporation in an envelope manufacturing machine, and so combined therewith that after the closure flaps of the envelope blanks are first gummed and dried, and before movement of the blanks through the folding mechanism of the machine, said blanks are caused to successively pass through the novel window cutting mechanism, so that each blank is provided with the desired window cut-out while it is in flat unfolded condition, and preparatory to manipulation thereof by the folding mechanism of the machine; thus assuring high speed production of window type envelopes with minimum risk of waste or interruption of the machine operations.

The invention has for another object to provide a novel construction of rotary envelope window cutting mechanism which successively operates on individual envelope blanks at high speed.

A further object of this invention is to provide a rotary envelope window cutting mechanism which is adapted to be arranged in an envelope manufacturing machine between the blank separator and feed means leading from the discharge end of its drying conveyer and the blank feeding means leading to its folding mechanism.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which—

Fig. 1 is a longitudinal vertical sectional view of the rotary envelope window cutting mechanism according to this invention as arranged in an envelope gumming and folding machine between the blank separator and feed means leading from the discharge end of its drying conveyer and the blank feeding means leading to its folding mechanism; and Fig. 2 is a transverse vertical sectional view through said window cutting mechanism, the cutting and bed rolls being shown in elevation.

Fig. 3 is a transverse sectional view through the cutting and bed rolls, the same being drawn on an enlarged scale.

Fig. 4 is a fragmentary elevational face view of the cutting die carried by the cutting roll.

Fig. 5 is a fragmentary longitudinal vertical section through the cutting and bed rolls, the window cutting operation thereof having been performed.

Fig. 6 is an inside face view of an envelope blank in which a window has been cut by the rotary cutting mechanism preparatory to the folding and completion of the envelope therefrom.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

In the drawings, the reference character 10 indicates the opposite side frames of an envelope gumming and folding machine. Journaled in bearings 11, with which the machine side frames 10 are provided, is a transverse cutting roll shaft 12. This cutting roll shaft 12 is mounted adjacent to the discharge end of the blank separating and feed mechanism which leads from the discharge end of a drying conveyer by which the blanks are carried from the closure flap gumming mechanism of the machine for drying of the gum applications and subsequent delivery to the folding mechanism of the machine, and said cutting roll shaft 12 is also disposed in advance of the means by which the blanks are fed toward and

passed through the folding mechanism of the machine. Said blank separating and feed mechanism and said means for feeding the blanks toward and through the folding mechanism are mechanisms well known as characteristic features of automatic envelope making machinery, and may vary considerably in detail design and construction in different makes of such envelope manufacturing machinery. Merely for purposes of generally illustrating the intermediate relation thereto of the window cutting mechanism according to this invention, but parts of these mechanisms are somewhat schematically shown in Fig. 1 of the accompanying drawings.

In Fig. 1, the reference character 13 indicates a blank separating and feed conveyer means, cooperative with the discharge end of which is a rotary feed wheel means 14, each revolution of which advances a blank to and for engagement by and movement through the window cutting mechanism. Said feed wheel means 14 is mounted on a transverse shaft 15 which is journaled in and between bearings 16 with which the machine side frames 10 are provided. This shaft 15 is driven by suitable power transmission means (not shown) in a well known manner.

As the blanks issue from the window cutting mechanism, the same are engaged by any well known means adapted to advance them toward the folding mechanism for passage therethrough. By way of illustration, as shown in Fig. 1, this means may include a pair of cooperating propeller rolls 17—18, which receive and pass the blanks to a folding mechanism conveyer means (not shown) by which they are successively carried through the folding devices by which they are formed into completed envelopes.

The window cutting mechanism according to this invention comprises a cutting roll 20 which is fixed on the cutting roll shaft 12. A portion of the circumference of said cutting roll 20 is cut away to provide a flat seat 21, and mounted on said seat is a radially projecting cutting die means suitably shaped to cut from an envelope blank B a window opening W of desired dimensions and peripheral shape. In a preferred form thereof, said cutting die means comprises a die block 22 provided on its underside with spaced projecting dowel pins 23 which engage in sockets entering the cutting roll body beneath its seat 21, whereby to hold said die block 22 against shifting displacement from its proper operatively assembled position on said cutting roll. The thus positioned die block 22 is securely affixed to the cutting roll body by a countersunk fastening screw 24 which passes therethrough to screw into the latter. Affixed to and surrounding the periphery of the die block 22 is a cutting die, the same being secured to the die block by fastening screws 25 which pass therethrough to screw into the latter. Preferably, said cutting die is made in halves providing U-shaped knife or blade sections 26 having sharpened cutting edges 27 which project beyond the exterior face of the die block 22. The open ends of said knife or blade sections are opposed when applied to the die block, so as to girdle the latter in meeting relation, thus providing a continuous cutting edge of peripheral shape conforming to the peripheral shape of window opening W desired to be cut out of an envelope blank B.

Cooperative with the cutting roll 20 and its cutting die means is a bed roll 28 carried by a shaft 29 and affixed thereto in suitably adjusted position by a countersunk set-screw 30, which extends through the bed roll body to bind against said shaft. Said bed roll 28 and its shaft 29 is located beneath and parallel to the cutting roll 20 and its shaft 12. The bed roll shaft 29 is provided with extensions 31, preferably of reduced diameter; the latter being journaled in bushings or bearings 32 which are affixed to bracket means 33 forming part of the framework of the envelope making machine. The cutting roll shaft 12 drives the bed roll shaft 29 by means of intermeshing gearing comprising the gears 34 and 35, whereby to cooperatively rotate the cutting and bed rolls.

Said bed roll 28 is provided across its circumferential face with a countersunk seat 36 in which is fixed a hardened steel bed block 37 adapted to cooperate with the cutting die means of said cutting roll 20. Said bed block is securely affixed to the bed roll body by a countersunk fastening screw 38 which passes therethrough to screw into the latter.

Suitably secured to the cutting roll shaft 12 respectively adjacent opposite ends of the cutting roll 20, are blank propeller wheels 39, portions of the peripheries of which are cut away to leave propeller sectors 40. These propeller sectors 40 cooperate with the peripheral surface of the bed roll 28, whereby to grip and advance an envelope blank between the latter and the cutting roll 20 subject to the window cutting operation of the cutting die means and thereafter to discharge the window supplied blank for engagement by propeller rolls 17—18 for movement thereby to the blank folding mechanism of the machine.

The bed roll 28 is provided with means for engaging and carrying away from a blank B the cutout portion P which is cut away therefrom by the cutting die means to form the desired window opening W. This means comprises a pair of picker pins 41 which project radially from the bed block 37. Said picker pins 41 are mounted in screw-threaded holder elements 42, which are adapted to be screwed into internally threaded sockets provided in the bed block for their reception. The die block 22 of the cutting roll 20 is provided with a pair of yieldable cushion elements 43 to oppose said picker pins 41, whereby to support the cut out portion P so that it will be pierced by and impaled upon the picker pins 41, whereby to be thus carried away from the blank body by the movement of the bed roll 28 after being severed from said blank body. Preferably said cushion elements 43 comprise plugs of soft rubber or equivalent yieldable material, which are affixed in sockets provided in the die block 22 for their reception; said plugs being arranged to project from the surface of said die block 22, so that their outer ends lie substantially in the plane of the cutting edges 27 of the knife or blade sections 26 of the cutting die means.

Means is provided for removing impaled cutout portions P from the picker pins 41, the same comprising a pivoted doctor blade 44, which is urged by spring means 45 toward the bed roll 28 so that its free edge 46 bears against the underside of the latter. Said free edge 46 of the doctor blade 44 is provided with indented slots or notches 47 to provide clearance for the picker pins 41, when the latter are carried past the doctor blade. Said doctor blade may be operatively supported in any convenient manner, e. g., as by a carrier stud or arm 48 secured to the bracket means 33, the free end portion of said stud or arm 48 being formed to receive the piv-

oting spindle 49 by which the doctor blade base block 50 is supported. Preferably the doctor blade 44 is adjustably mounted on said base block 50 by means of fastening screws 51 which engage through slots 52 with which the doctor blade body is provided. By this arrangement, the doctor blade may be shifted relative to its base block, whereby to align the slots or notches 47 of its edge in the path of travel of the picker pins carried by the bed roll.

Means is provided for bracing the cutting roll 20 and its shaft 12 against reaction or yielding play relative to the bed roll, and, similarly, means is also provided for bracing the bed roll 28 and its shaft or support against reaction or yielding play relative to said cutting roll, whereby the cutting and bed rolls are firmly held in their cooperative working relation so as to assure proper meeting of the cutting die means and bed block, and consequently a clean cutting penetration of the cutting edges 27 of the blade or knife sections 26 through a blank B engaged by and passed between said cutting and bed rolls. To this end a transverse tension or brace bar 53 is supported by and between attachment brackets 54 which are affixed to the bearings 11 which support the cutting roll shaft 12, thereby disposing said tension or brace bar to extend, from side to side of the machine framework, above and parallel to said cutting roll shaft 12. Carried by adjustable jack screws 55 which are threaded downwardly through said tension or brace bar 53 are thrust bearing blocks 56 which thrust down upon the cutting roll shaft 12, respectively adjacent to each end of the cutting roll assembly. Said jack screws 55 are provided with lock-nuts 57 for securing the same in adjusted relation to the tension or brace bar 53. Similarly, a transverse tension or brace bar 58 is supported by and between attachment brackets 59 which are affixed to the machine side frames 10. This tension or brace bar 58 is disposed to extend, from side to side of the machine framework, below and parallel to the bed roll shaft and its supports. Threaded upwardly through said tension or brace bar 58 are jack-screws 60, the free ends of which thrust upwardly against the framework bracket means 33 by which the bed roll shaft 29 is supported. Said jack-screws 60 are also provided with lock-nuts 61 for securing the same in adjusted relation to the tension of brace bar 58.

The feed wheel means 14 and the propeller wheels 39 of the cutting roll assembly are cooperatively driven in the same direction (anti-clockwise as shown in Fig. 1); and to this end the cutting roll shaft 12 may be driven from the shaft 15 of the feed wheel means by gearing, comprising a drive gear 62 on said shaft 15 which drives, through an interposed idler gear 63, the driven gear 64 on said cutting roll shaft 12.

Portions of the peripheries of the feed wheel means 14 are cut away to leave propeller sectors 65. Said feed wheel means 14 is so disposed relative to the cutting roll propeller wheels that, in operation, a blank B is first engaged by the propeller sectors 65 of the feed wheel means 14 and advanced until the leading portion thereof is engaged by the propeller sectors 40 of the propeller wheels 39 of the cutting roll assembly. Thereafter, while the blank moves through the cutting and bed rolls, rotation of the feed wheel means 14 carries its propeller sectors 65 around into position to grasp and advance a succeeding blank, so that after the preceding blank is discharged from the cutting and bed rolls, the propeller sectors 40 move around ready to receive the succeeding blank from said feed wheel means. Since these parts are in continuous rotation, the blanks are successively handled thereby by accurately timed cooperative movements so as to assure continuous high speed progression of successive blanks through the window cutting mechanism and thence to the folding mechanism of the machine.

We are aware that various changes could be made in the above described constructions, and that widely different embodiments of this invention could be made without departing from the scope thereof as defined in the following claims. It is therefore intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. Window cutting mechanism for envelope manufacturing machines comprising a rotatable cutting roll, a rotatable bed roll opposed to said cutting roll, means to cooperatively drive said rolls, cutting die means radially projecting from the periphery of said cutting roll adapted to be moved by rotation of the latter into and out of contact with said bed roll, said cutting roll having means cooperative with the bed roll periphery to engage and successively propel blanks through said rolls subject to the window cutting operation thereof, said bed roll having radially projecting picker pin means adapted by rotation of the bed roll to oppose the interior of said cutting die means, whereby to impale window cut out portions and carry them away from the blanks, said cutting die means having thrust cushion means of yieldable material to oppose said picker pin means, and a doctor blade means cooperative with the bed roll periphery adapted to strip the window cut out portions from said picker pin means for discharge from the machine.

2. In window cutting mechanism for envelope manufacturing machines, a rotatable cutting roll, a rotatable bed roll opposed to said cutting roll, means to cooperatively drive said rolls, cutting die means radially projecting from the periphery of said cutting roll, said die means comprising a die block affixed to said cutting roll, cutting blade sections of U-shape embracing the periphery of said die block from opposite points and affixed thereto with their opposed open ends in abutment and with sharpened outer marginal edges thereof projecting beyond the outer face of said die block, said bed roll having radially projecting picker pin means adapted by rotation of said bed roll to oppose said die block, whereby to impale window cut out portions and carry them away from the blanks, said die block having thrust cushion means of yieldable material to oppose said picker pin means, and a doctor blade means cooperative with the bed roll periphery adapted to strip the window cut out portions from said picker pin means for discharge therefrom.

3. Rotatable window cutting mechanism for envelope manufacturing machines comprising a cutting roll having a radially projecting window cutting die, a driven cutting roll shaft journaled transversely in the machine framework, a bed roll cooperative with the window cutting die of said cutting roll, a bed roll shaft also journaled transversely in the machine framework, gearing for driving said bed roll shaft from said cutting roll shaft, said cutting and bed rolls having means to successively propel blanks therebetween subject to the window cutting operation, a tension

bar affixed to and transversely of the machine framework in parallel spaced relation to said cutting roll shaft, thrust bearing means engaging said cutting roll shaft on opposite sides of said cutting roll whereby to thrust the latter toward said bed roll, adjustable jack-screws engaged through said tension bar to thrustingly support said thrust bearing means, a second tension bar affixed to and transversely of the machine framework in parallel spaced relation to said bed roll shaft, and adjustable jack-screws engaged through said second tension bar to thrustingly support said bed roll shaft whereby to thrust the bed roll toward the cutting roll.

4. Rotatable window cutting mechanism for envelope manufacturing machines comprising a cutting roll having a radially projecting window cutting die, a driven cutting roll shaft journaled transversely in the machine framework, a bed roll cooperative with the window cutting die of said cutting roll, a bed roll shaft also journaled transversely in the machine framework, gearing for driving said bed roll shaft from said cutting roll shaft, said cutting and bed rolls having means to successively propel blanks therebetween subject to the window cutting operation, means supported from the machine framework for thrustingly urging said cutting and bed rolls one toward the other, said bed roll having picker pin means to engage the window cut out portions and carry them away from the blanks, and means cooperative with the bed roll adapted to remove the carried away cut out portions from the picker pin means for discharge from the machine.

5. Rotatable window cutting mechanism for envelope manufacturing machines comprising a cutting roll having a radially projecting window cutting die, a driven cutting roll shaft journaled transversely in the machine framework, a bed roll cooperative with the window cutting die of said cutting roll, a bed roll shaft also journaled transversely in the machine framework, gearing for driving said bed roll shaft from said cutting roll shaft, said cutting and bed rolls having means to successively propel blanks therebetween subject to the window cutting operation, a tension bar affixed to and transversely of the machine framework in parallel spaced relation to said cutting roll shaft, thrust bearing means engaging said cutting roll shaft on opposite sides of said cutting roll whereby to thrust the latter toward said bed roll, adjustable jack-screws engaged through said tension bar to thrustingly support said thrust bearing means, a second tension bar affixed to and transversely of the machine framework in parallel spaced relation to said bed roll shaft, and adjustable jack-screws engaged through said second tension bar to thrustingly support said bed roll shaft whereby to thrust the bed roll toward the cutting roll, said bed roll having radially projecting picker pin means adapted by rotation of the bed roll to oppose the interior of said cutting die means, whereby to impale window cut out portions and carry them away from the blanks, said cutting die means having thrust cushion means of yieldable material to oppose said picker pin means, and a doctor blade means cooperative with the bed roll periphery adapted to strip the window cut out portions from said picker pin means for discharge from the machine.

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