Sept. 27, 1966 G. EHLSCHEID 3,274,871

WINDOW-CUTTING DEVICE FOR ENVELOPES AND BAG-MAKING MACHINES

Filed Jan. 19, 1965

2 Sheets-Sheet 1

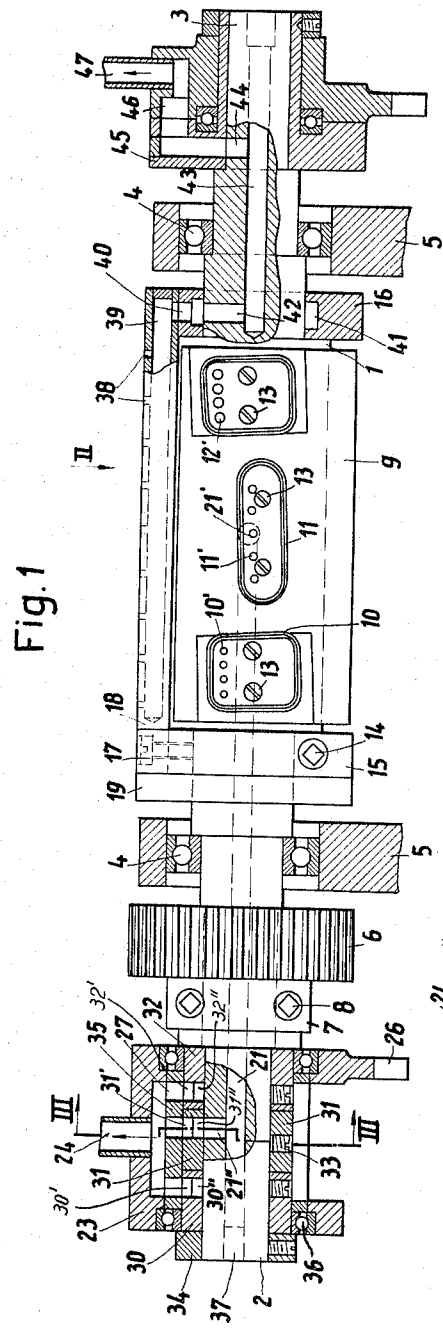


Fig. 1

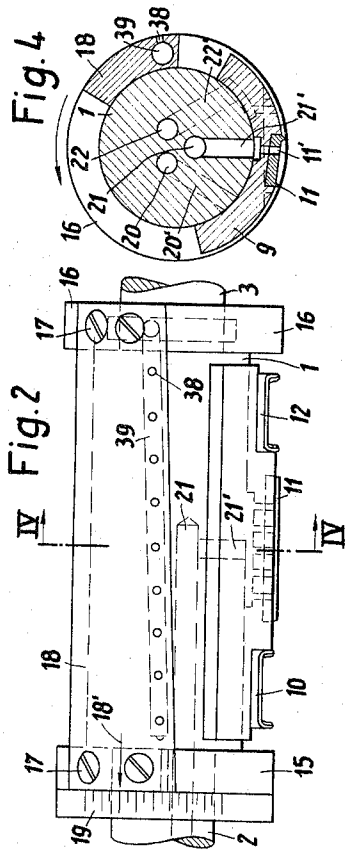


Fig. 2



Fig. 4

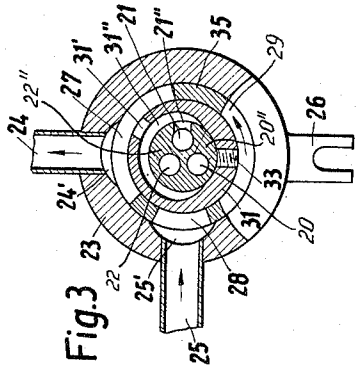


Fig. 3

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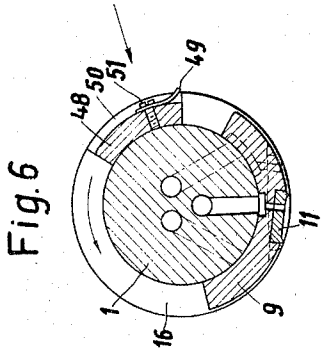



Fig. 6

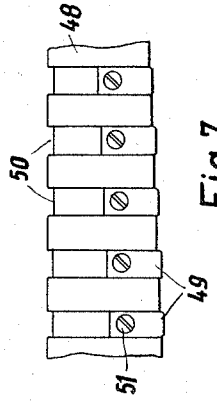



Fig. 7

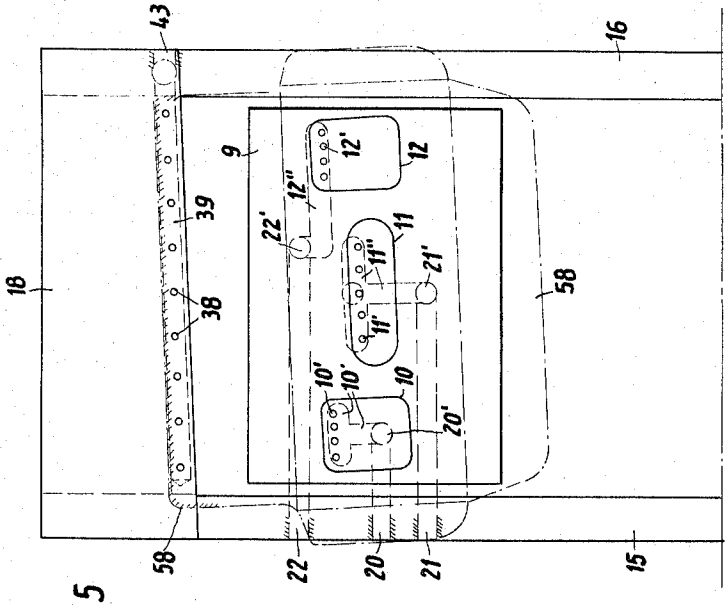



Fig. 5

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3,274,871

# WINDOW-CUTTING DEVICE FOR ENVELOPES AND BAG-MAKING MACHINES

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The present invention relates to a window-cutting device of a machine for making envelopes, flat bags, etc. with several windows from stocks of blanks in the form of individual blanks or in the form of a continuous web of paper or of other suitable material. More particularly, the invention relates to a window-cutting device including a cutting roller mounting several knives which coact with a hard surfaced counter roller, the blanks to be cut being guided between the rollers to effect the cutting of the windows.

There are now known three principal types of window-cutting devices using a cutting roller of the general type above referred to. According to one type of cutting device, a suction roller disposed anterior of the direction of travel of the blank transfers the blank to the cutting roller which grips the leading edge of the blank by the action of the ports of the suction roller. The blank is carried along by the cutting roller for part of one revolution and transferred to a posterior suction roller after the cutting of the window.

According to the second type of cutting device, the blank, which may be an individual blank or a web, is guided between the cutting roller and the hard counter roller along a rectilinear tangential path in reference to the rollers. In such an arrangement, suction ports for gripping and carrying the leading edge of the blank may be omitted.

According to the third type of cutting device, the leading edge of the blank is gripped and carried along by the action of suction ports in the hard counter roller. In such an arrangement, the rotational speeds of the cutting roller and the counter roller must be synchronous.

It has been found that the cutting of several windows spaced apart in the direction of travel of windows with window-cutting devices as hereinbefore described, presents considerable difficulties with respect to the control of the suction and the pressure supply. In particular, the control of the suction and the pressure for the ports associated with the first window-cutting knife is unsatisfactory since the ports associated with the second and third window-cutting knives are not yet covered by the blanks, especially when the blank is rectilinearly guided or wrapped about the counter roller. Such difficulties with respect to the suction and pressure control are of great practical importance since the use of envelopes and bags with several windows is rapidly increasing.

It is an object of the invention to provide a novel and improved window-cutting device of the general kind above referred to, the control means of which controlling the suction and the pressure to effect the removal of the cutouts and to retain the blanks in position, function in a reliable and timely manner for blanks of different sizes and shapes and for different window locations.

Another object of the invention is to provide a novel and improved window-cutting device of the general type above referred to which can be conveniently and rapidly adjusted for different sizes and shapes of blanks to be processed.

Still another object of the invention is to provide a novel and improved window-cutting device which includes, preferably, adjustable deflecting means for deflecting the leading edge of the blanks away from the window-cutting roller of the device. Such deflecting means effectively prevents jamming of the blanks.



The above mentioned objects, features and advantages of the invention and other objects, features and advantages which will be pointed out hereinafter, are attained by providing within the areas bounded by closed cutting knives ports alternately connected at predetermined intervals of time, preferably adjustable for each port, with a supply of suction air or pressure air, or with neither supply. The ports act upon the leading edge of the blank and the connections for the ports are controlled by the rotation of the cutting roller. The locations of the ports with respect to the locations of the cutting knives on the rotary cutting roller are adjustable in accordance with the size of the blanks to be cut so that the suction air and the pressure air will always act upon the leading edge of the blanks. To permit independent control of the suction air and the pressure air acting upon the several window-cutting knives, a common control head is provided which includes several control rings, one for each knife. These rings rotate in unison with the cutting roller so that each ring alternately connects the ports for the respective cutting knife with a suction conduit and a pressure conduit at predetermined time intervals or disconnects the ports from the conduits.

The control rings are preferably independently adjustable with respect to the respective window-cutting knife by individually turning the ring on bearing trunnions or journals of the cutting roller.

To grip the leading edge of the blank, a shell or sleeve segment pivotal about the rotational axis of the cutting roller and including suction ports may be provided. Such segment permits a convenient varying of the spacing between the ports and the respective cutting knife. A scale coacting with a pointer may also be provided to facilitate an accurate setting of said spacing.

In arrangements in which the blank is tangentially guided past the cutting roller, the shell or sleeve segment, including suction ports, may be replaced by a shell or sleeve segment mounting springy deflectors for guiding the leading edge of each blank. This segment may also be pivotal about the center axis of the cutting roller and be equipped with a scale and a pointer to vary the spacing between the deflectors and the cutting knives.

Instead of varying the spacing between the knives and the suction ports or deflectors by pivoting the segments carrying the deflectors or including the ports, the knives themselves may be pivotal or a member supporting the knives may be pivotal.

In the accompanying drawing, several embodiments of the invention are shown by way of illustration and not by way of limitation.

In the drawing:

FIGURE 1 is an elevational side view, partly in section, of a cutting roller of a window-cutting device, said roller mounting three closed or continuous cutting knives and carrying a blank for part of one revolution, which blank is then transferred to a posterior suction roller;

FIGURE 2 is a fragmentary plan view of the middle portion of the cutting roller as seen in the direction of arrow II in FIGURE 1;

FIGURE 3 is a cross section taken on line III—III of FIGURE 1;

FIGURE 4 is a cross section taken on line IV—IV of FIGURE 2;

FIGURE 5 is a development of the portion of the cutting roller shown in FIGURE 2;

FIGURE 6 is a section similar to FIGURE 4 of a modification of the cutting roller providing for a rectilinear

tangential guidance of the blanks between the cutting roller and the counter roller; and

FIGURE 7 is a plan view in the direction of the arrow in FIGURE 6.

To simplify the illustration, only those components of the window-cutting device are illustrated which are essential to the understanding of the invention. In particular, the counter roller of the device and the guide means for feeding the blanks to the device are not illustrated.

Referring now to FIGS. 1 to 4 in detail, there is shown a cutting roller 1 having journals or trunnions 2 and 3 which are journalled in roller or ball bearings 4. The bearings are mounted in the side walls 5 of the frame structure of the window-cutting device which should be visualized as part of an envelope or bag-making machine. The machine itself is now shown as it does not constitute part of the invention. Roller 1 is driven by means of a gear 6. The hub 7 of the gear is slotted or provided with a clamping cover so that after loosening of set screws 8, the entire window-cutting roller may be rotated for adjusting the positions of the window-cutting knives with respect to the blanks fed through the envelope making machine.

Roller 1 mounts a shell or sleeve segment 9 secured to the roller by suitable fastening means such as screws (not shown). Three closed or continuous window-cutting knives 10, 11 and 12 are secured upon segment 9 by screws 13, or other fastening means. A slotted ring 15 is seated on journal 2 closely adjacent to the roller and is secured in position by a screw 14. A ring 16 is seated on journal 3 and is rotatable on the same without play. Both rings 15 and 16 mount a segmental member 18, which is secured to the rings by screws 17. As it is apparent, segment 18 can be turned on journals 2 and 3 in reference to segment 9 after loosening screws 17 and can be secured in any selected angular position by re-tightening of screws 17. A scaled or calibrated ring 19 is fixedly secured on journal 2 and coacts with a pointer 18' on segment 18 to facilitate the setting of segment 18 for a selected angular position.

Each of the window-cutting knives has in its area bounded by the cutting edges of the knives a row of ports 10', 11' and 12'. These bounded areas are recessed in the roller and the ports in these areas are located near the forward edge of the knives as seen in the rotational direction of the roller. The ports extend through the wall of shell segment 9 and issue in grooves 10'', 11'' and 12'' formed in the inner peripheral wall of the shell segment (see FIG. 5). Journal 2 has three axial bores 20, 21 and 22 which are connected through cross bores 20', 21' and 22' which the grooves 10'', 11'', and 12'' and the ports 10', 11' and 12'.

On the outer end of journal 2 there is rotatably seated a control head for controlling the flow of suction air and the pressure air acting upon the ports within the areas defined by the window-cutting knives. The control head comprises a stationary casing 23 with a suction air connector 24 and a pressure air connector 25. The casing is secured against rotation by a pin engaged with a fork 26. A sleeve 35 and a ball bearing 36 are fixedly mounted within the casing. The sleeve is provided with three suction air slots 27, three pressure air slots 28 and further with a circumferentially elongated opening 29. Journal 2 mounts three control rings 30, 31, and 32, which are fixedly held in position by set screws 33 threaded through sleeve 35 and accessible through opening 29. The control rings have ports 30', 31' and 32' each located in registry with the respective suction air slot 27 and arcuate circumferentially extended grooves 30'', 31'', 32''. These grooves are open only on the side facing the opening of the control head in which journal 2 is seated. Radial bores 20', 21'', and 22'' connect arcuate grooves 30'', 31'' and 32'' to axial bores 20, 21 and 22. Accordingly separate air conduits are provided: leading from the ports 10' within the area defined by window-cutting knife 10 through a duct 10'' and the bores 20', 20 and 20'' to port 30' in control ring 30; from the ports 11' within the area defined by window-cutting knife 11 through a duct 11'' and the bores 21', 21 and 21'' to the port 31' in control ring 31; and also from ports 12' within the area defined by window-cutting knife 12 through a duct 12'' and the bores 22', 22 and 22'' to the port 32' in control ring 32.

The entire control head is secured on journal 2 against axial placement by a locking ring 34. The axial bores 20, 21 and 22 are closed by plugs 37 at the end of journal 2. When the cutting roller rotates, the control rings 30, 31 and 32 secured on journal 2 also rotate in the direction of the arrow within the stationary sleeve 35. Slots 27 of this sleeve are connected with suction air connector 24 through groove 24' and slots 28 of sleeve 35 are connected with the pressure air connector 25 through the groove 25'.

FIG. 3 shows that port 31 and the ports 11' of cutting knives 11 connected therewith receive suction air for sucking on window cutouts when and while the port 31' travels below the respective slot 27 of stationary sleeve 35 and receive pressure air for removing the previously sucked on window cutouts as soon as port 31' passes below slot 28. By turning control ring 31 on journal 2 after loosening screw 33, the moment of time at which the suction air and the pressure air respectively begin to take effect may be accurately adjusted in accordance with the position of the cutting knife on the cutting roller. The arrangement is substantially the same for the two other cutting knives 10 and 12 and ports 10' and 12' thereof.

Sleeve segment 18 includes a number of suction ports 38 which are connected through an axial bore 39 and a radial bore 40 with a circular groove 41 formed in the wall of the opening for receiving mounting ring 16 seated on journal 3. Circular groove 41 is connected through a radial bore 42, an axial bore 43 and a radial bore 44 with a member 45 fixedly seated on journal 3 for rotation in unison thereof and constituting part of a control head of conventional design and not described in detail. The control head further comprises a stationary member 46 and a suction air connector 47 for periodically connecting ports 38 for each revolution of the cutting roller with the suction air to grip a blank 58 at its leading edge and carry it along and disconnecting the ports from the suction air to release the gripped blank.

Instead of varying the circumferential distance between the row of suction ports 38 of shell segment 18 and the cutting knives 10, 11 and 12 by turning segment 18 together with its mounted rings 15 and 16, the setting of the distance can also be effected by mounting 18 fixedly on roller 1 and rotating sleeve 9. Both these arrangements are within the scope of the invention.

Turning now to the embodiment of the invention shown in FIGS. 6 and 7 which is particularly suitable for cutting windows out of blanks which are guided along a rectilinear tangential path, this second embodiment is distinguished from the previously described embodiment primarily by the different structural configuration of shell segment 18 and the omission of suction ports 38 and the means 39 to 47 required for controlling the suction air supply to ports 38. Segment 18 is replaced by a shell segment 48 which is mounted on rings 15 and 16 similar to segment 18 and is adjustable in accordance with the dimensions of the blanks to be cut. A pointer and a scale similar to the one described in connection with the previous figures are preferably provided.

Segment 48 mounts a row of springy deflectors 49 which may be in the form of leaf springs seated in grooves 50 and secured therein by suitable fasteners such as screws 51.

The free ends of deflector springs 49 protrude slightly beyond the peripheral outline of cutting roller 1 to prevent a sticking of rectilinearly traveling blanks along the leading edge thereof on the cutting roller. Such sticking

tends to deflect the blanks out of the rectilinear path. The same purpose could be obtained by supplying pressure air to the ports 38 of the embodiment according to FIGS. 1 through 5 instead of suction air as described. However, such an arrangement is considerably more expensive and more complex than the above described and illustrated provision of suction ports and springy deflectors.

As it is evident, the number of the knives, the structural design and mounting of the knives and also the structural arrangement of the control means for controlling the suction air and the pressure air supply to the ports associated with the knives can be changed in several respects without departing from the concept of the invention.

While the invention has been described in detail with respect to certain now preferred examples and embodiments of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

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

1. A window-cutting device for cutting several windows into blanks for envelopes and flat bags, said cutting device comprising, in combination, a rotary cutting roller and a counter roller for successively feeding blanks to be cut therebetween, several closed cutting knives mounted on said cutting roller, said cutting roller including ports in each of the surface areas bounded by said knives, ducts for connecting the ports of each knife with a supply of suction air and ducts for connecting said ports with a supply of pressure air, control means actuated by said rotary cutting roller and controlling said ducts for sequentially connecting said ports at predetermined time intervals with said suction ducts and said pressure ducts and for disconnecting said ports at said predetermined time intervals from said ducts, timing means coacting with said control means for varying said time intervals independently for the ports of each of the said knives, guide means supported on the peripheral wall of said cutting roller for guiding the leading edge of each blank to be cut, and setting means for varying the circumferential position of said guide means in reference to said cutting knives.

2. A window-cutting device according to claim 1 wherein said control means comprise a control head having a stationary casing, several control rings, one for each cutting knife, rotatably mounted within said casing and coupled with said cutting roller for rotation in unison therewith, each of said control rings alternately connecting said suction and pressure ducts to the ports of the respective cutting knife and disconnecting the same therefrom at said predetermined time intervals.

3. A window-cutting device according to claim 2 wherein said cutting roller has a bearing journal and said control rings are seated on said journal, and setting means coacting with said control rings for varying the angular position thereof in reference to the respective cutting knife.

4. A window-cutting device according to claim 1 wherein said guide means comprise a member including suction ports, conduit means for connecting said ports to a source of suction, said ports being positioned to grip the leading edge of the blank to be cut, and mounting means supported by said member pivotal about the rotational axis of the cutting roller for varying the spacing of the suction ports of said member in reference to the cutting knives.

5. A window-cutting device according to claim 4 and comprising a calibrated element and an indicating element coacting with the said calibrated element, one of said elements being stationary and the other element being movable with said pivotal member for indicating the angular position of said member on said calibrated element.

6. A window-cutting device according to claim 1 wherein said guide means comprises a member pivotal about the rotational axis of said cutting roller, and springy deflector means mounted on said member for deflecting the leading edge of a blank to be cut away from said cutting roller.

7. A window-cutting device according to claim 1 wherein said guide means comprises a member including suction ports, conduit means for connecting said ports to a source of suction, said suction ports being positioned to grip the leading edge of the blank to be cut, and means for pivoting said cutting knife about the rotational axis of said cutting roller to vary the angular position of said cutting knives in reference to the suction ports of said member.

8. A window-cutting device according to claim 1 wherein said guide means comprises a support member, springy deflector means mounted on said member for deflecting the leading edge of a blank to be cut away from said cutting roller, and means for pivoting the cutting knives about the rotational axis of said cutting roller to vary the angular positions of said knives in reference to the suction ports of said member.

**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,302,855 | 11/1942 | Hallman | 83—100 |
| 2,383,523 | 8/1945 | Thornburgh | 83—98 |
| 3,106,121 | 10/1963 | Novick | 83—152 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 946,734 | 1/1964 | Great Britain. |

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