March 9, 1965 E. SCHRADER 3,172,321

ADJUSTABLE ANVIL FOR CUTTING WINDOW APERTURES AND LIKE OPENINGS IN BLANKS

Filed Aug. 20, 1962 3 Sheets-Sheet 1

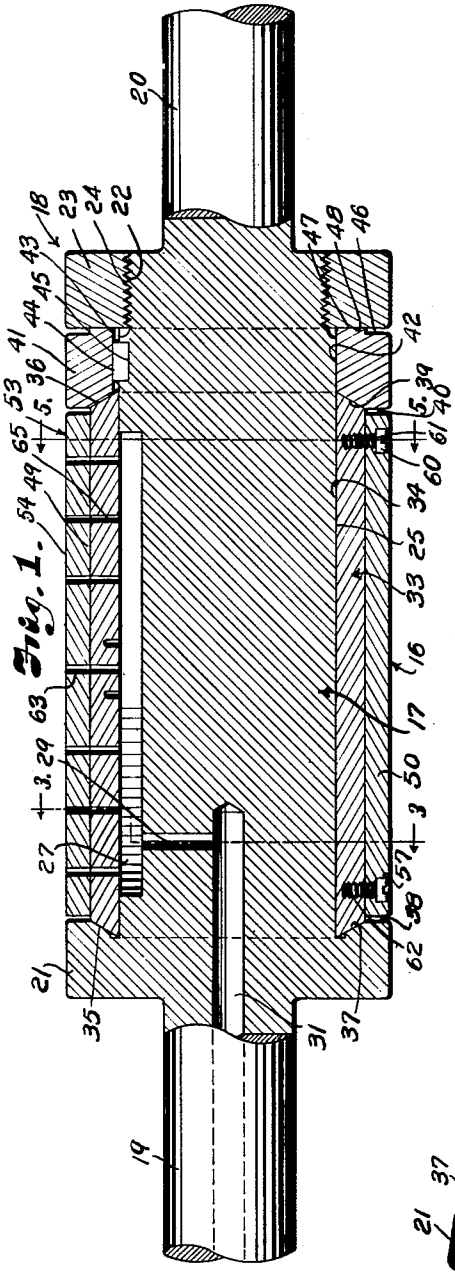


Fig. 1.

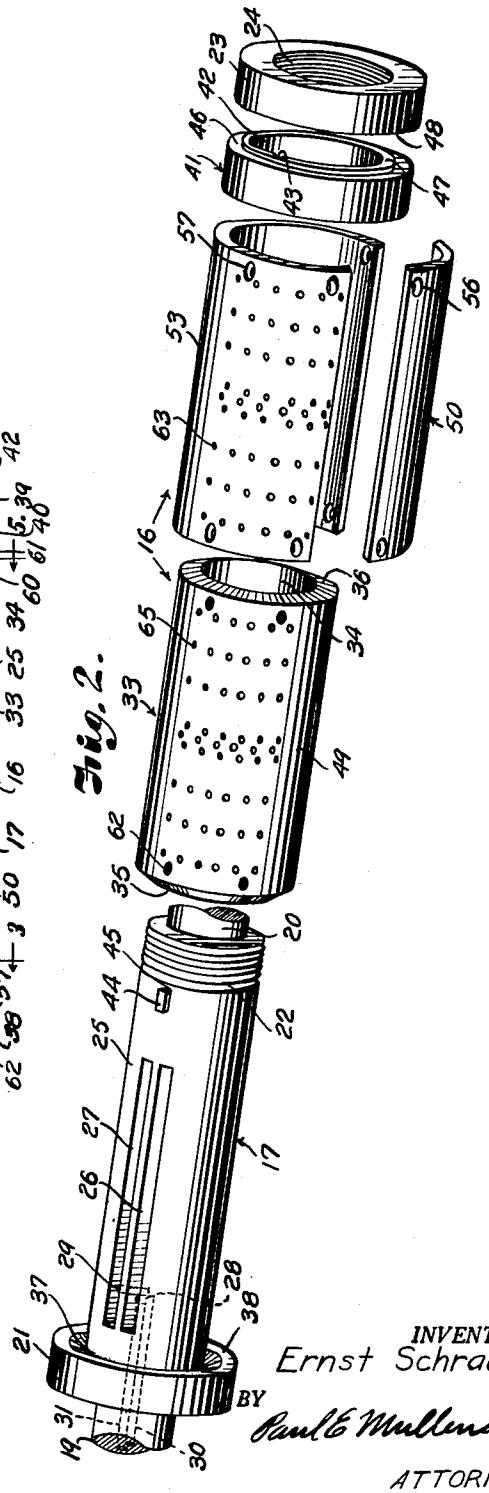


Fig. 2.

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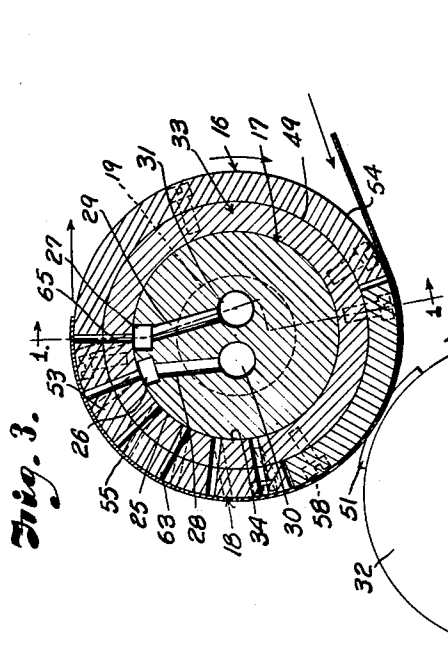


Fig. 3.

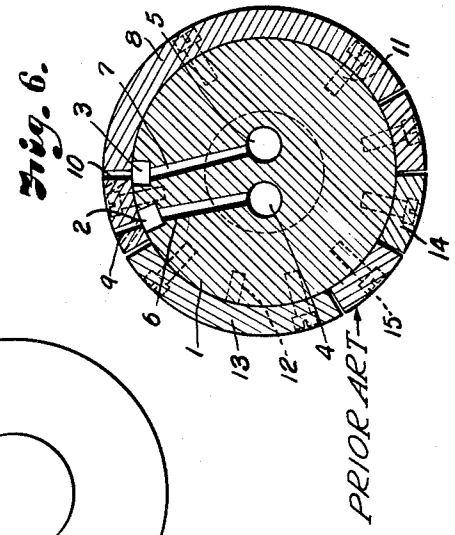


Fig. 6.

PRIOR ART

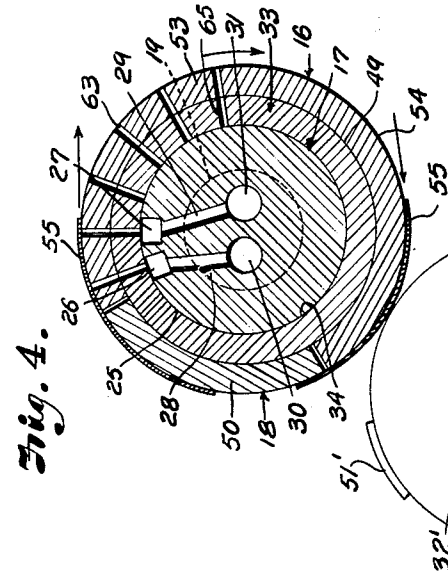


Fig. 4.

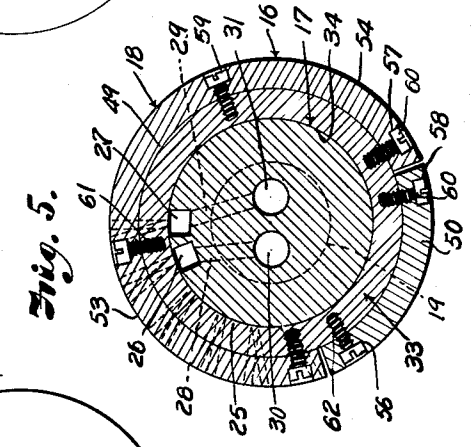


Fig. 5.

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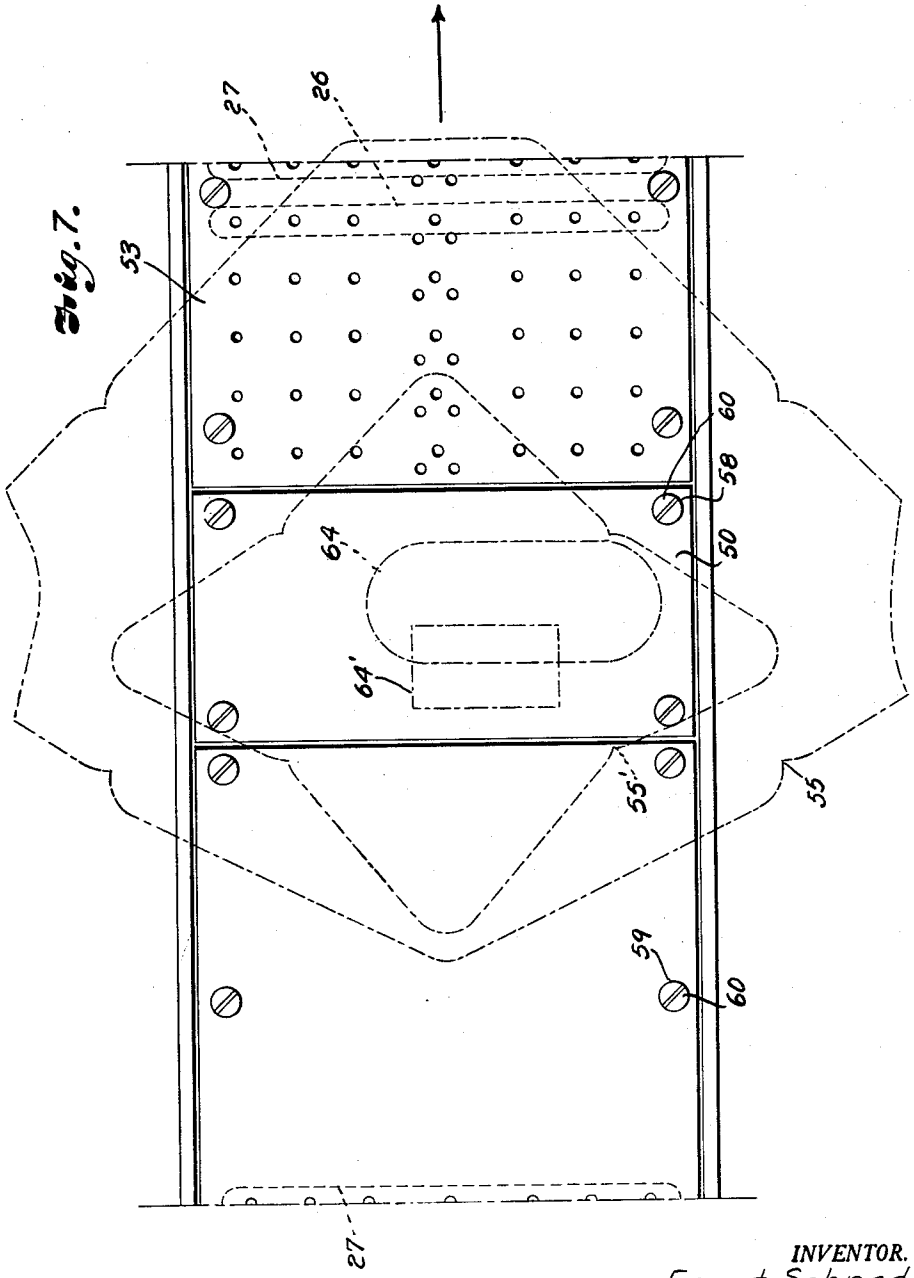
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Fig. 7.



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ADJUSTABLE ANVIL FOR CUTTING WINDOW APERTURES AND LIKE OPENINGS IN BLANKS

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3 Claims. (Cl. 83—100)

This invention relates to rotary mechanisms for cutting window apertures and like openings in envelope blanks, and particularly to the counter roller of such devices that serves simultaneously for conveying the blanks and backing up the cutting roller that is associated therewith.

Such counter rollers usually have suction holes which are periodically connected to a source of vacuum, to take hold of an individual blank and carry it over a hard segment on the roller that cooperates with the cutting roller in cutting through the blank. In some instances the cutting roller will have a cutting knife outlining the window aperture; in others, two cutting mechanisms may be employed for cutting, respectively, the longitudinal and side edges of a window opening, in which case a separate counter roller will be associated with each cutting device. In any event, the counter rollers are of the same general construction.

The hard segments, formerly made of nitriding steel, are now often made of metal carbide, in order to obtain a long life despite the considerably increased machine output in blanks per minute. Because of the high cost and risk of crack formation with large size segments, the metal carbide segments are kept as small as possible.

Since the suction holes must grip the blank by the leading edge, and since the envelope making machine utilizes blanks of different sizes and the location of the window openings changes with different design of envelopes, means must be provided for adjusting the distance of the hard metal segment circumferentially from the suction holes of the roller. For this reason, the hard metal segment is generally made detachable, and filler segments provided to fill in the spaces at the respective ends of the hard metal segment.

The hard metal segment and the filler segments are secured by screws engaging in threaded holes provided in the periphery of the roller. It is obvious that this method of fastening not only requires the filler segments, but also requires considerable time to remove the screws, position the hard metal segment, arrange the filler segments, and reinsert the screws.

It is, therefore, a principal object of the present invention to provide an improved counter roller construction which eliminates the necessity of the filler segments and provides a more rapid adjustment of the spacing of the hard metal segment and the suction holes of the roller. This object is achieved by providing a segment containing a plurality of rows of suction holes, with the rows of suction holes arranged at fixed distances from the hard metal segment, in which case the hard metal segment and the segment having the suction holes complete the circumference of the counter roller without the filler segments; that is, the segment having the suction holes, being made of less expensive metal and not subject to cracking, is large enough to engage the respective front and rear ends of the hard segment. The metal segment and suction hole segment are then permanently mounted on the periphery of a sleeve having apertures registering with the suction holes of the suction hole segment to provide a tubular unit. When mounted on the body or core of the suction roller, the tubular unit is adapted to be turned circumferentially to register the desired suction holes with suction passageways in the core.

It is also an object of the present invention to provide a simple mechanism for locking the tubular unit in adjusted position upon the core of the roller.

In accomplishing the objects of the invention, improved structure has been provided, the preferred form of which is illustrated in the accompanying drawings, wherein:

FIG. 1 is a longitudinal section through the completely assembled counter roller constructed in accordance with the present invention, the section being taken on the line 1—1 of FIG. 3.

FIG. 2 is a perspective view of the parts of the counter roller, shown in disassembled, spaced relation to better illustrate the construction thereof.

FIG. 3 is a cross section through the counter roller on the line 3—3 of FIG. 1, and showing the counter roller in association with a cutting roller having a relatively large cutter and showing the tubular unit adjusted for a blank wherein the window opening is located at a substantial distance from the leading edge of the blank.

FIG. 4 is a similar view showing the tubular unit adjusted to accommodate a smaller blank, in which the window opening is located at a shorter distance from the leading edge of the blank. The cutting roller is also provided with a cutting element of smaller size, to cut a smaller window opening in the blank.

FIG. 5 is a cross section on the line 5—5 of FIG. 1, particularly illustrating the attachment of the segments to the mounting sleeve.

FIG. 6 is a cross section through a roller, showing the former construction which employs filler segments.

FIG. 7 is a development view of the counter roller, showing different size blanks in dotted lines, and having different shaped window openings to be cut therein.

Referring more in detail to the drawings, and first to the construction illustrated in FIG. 6 that was in use prior to the present invention:

It will be noted in FIG. 6 that such rollers have a cylindrical body or core 1, provided with spaced apart grooves 2 and 3 extending longitudinally of the axis of the roller and which were connected with suction supply ducts 4 and 5 through radial passages 6 and 7. Secured on the periphery of the core was a segment 8, having two rows of suction holes 9 and 10 connected with the grooves 2 and 3. The segment 8 was secured to the core of the roller by fastening devices such as screws 11, so that it became in effect a unitary part of the counter roller. The core of the roller was provided on the opposite diametrical side with many threaded openings 12 for attaching the hard metal segment 13 and the filler segments 14 by means of screws 15 in the various adjusted positions thereof. In adjusting the hard segment 13, it was positioned about the periphery of the core 1 so that it was located to make contact with the knife on the cutting roller at a distance from the rows 9 and 10 of suction holes so that the blank was seized and the window opening was formed in proper position. After positioning and attaching the hard segment 13, the spaces that were left between the ends thereof and the ends of the segment 8 were filled in by small segments 14 and secured

by the screws 15. It is thus obvious that with every adjustment, the screws 15 must be removed to free the segment 13 and the small segments 14 so that they might be rearranged in the new position. After repositioning of the segments 13 and 14, the screws 15 must be reinserted to retain the segments 13 and 14 in the new position. Consequently, to make an adjustment the envelope making machine had to be shut down for a considerable period of time in order to remove the screws 15, reposition the segments 13 and 14, and reinsert the screws 15.

In accordance with the present invention, the metal carbide or other hard metal segment and the segment having the suction holes are carried as a tubular assembly 16, adjustable as a unit on a modified core 17 of the roller 18, whereby any selected rows of suction holes are connected with the suction supply ports of the core simply by turning the tubular assembly 16 thereon and fixing it to the core.

In the preferred embodiment of the invention, the core 17 of the roller 18 has shafts or journals 19 and 20 extending from the respective ends thereof for rotatable mounting thereof in the envelope making machine as in the case of previous rollers. The core 17 includes a fixed collar 21 at one end thereof having a diameter substantially corresponding to the diameter of the roller 18. The opposite end of the core 17 is externally threaded as at 22 for mounting a collar 23 having internal threads 24 for engaging the external threads 22. Extending longitudinally in the cylindrical face 25 of the core are spaced apart parallel grooves 26 and 27 that are, respectively, connected through radial ports 28 and 29 with longitudinal ducts 30 and 31 extending on opposite sides of the axis of the shaft 19 to connect with a source of vacuum through a control valve, not shown in that it forms no part of the present invention. The grooves 26 and 27, radial ports 28 and 29, and ducts 30 and 31 correspond with the grooves 2 and 3, ducts 4 and 5, and radial passageways 6 and 7 of the previously used roller above described and illustrated in FIG. 6.

One of the shafts 19 or 20 carries a gear wheel (not shown) that meshes with a corresponding gear, also not shown, on the shaft of the cutting roller 32, and which is driven from the envelope making machine in the same manner as previous rollers.

The tubular unit 16 includes a sleeve 33, having an inner cylindrical face 34 freely slidable and turnable on the cylindrical face 25 of the core 17. In order to anchor the tubular unit on the core, the ends of the sleeve 33 are tapered, as indicated at 35 and 36, to engage, respectively, in a tapered annular recess 37 in the inner side face 38 of the fixed collar 21, and a correspondingly tapered recess 39 in the inner side face 40 of a ring 41.

The ring 41 has an inner cylindrical face 42 that is also slidable on the cylindrical face 25 of the core 17, and the outer diameter corresponds with the outer diameter of the fixed collar 21. The ring 41 has a keyway 43 in the inner face 42 to accommodate a key 44 that is mounted in a key slot 45 at the threaded end of the core. The outer face side 46 of the ring has an annular shoulder 47 thereon for contact with the inner face 48 of the threaded collar 23.

Mounted on the cylindrical face 49 of the sleeve is a hard segment 50 that is of ample size to back the knife edge 51 of the cutting roller 32, and a suction segment 53 which cooperates therewith to encircle the sleeve and provide a roller surface 54 over which the blank 55 is drawn, as later described.

The segment 50 is formed of hard metal, such as metal carbide. The segments 50 and 53 have openings 56 and 57 at the side margins thereof for passing fastening devices, such as cap screws 58 and 59 (FIG. 5). The cap screws 58 and 59 have the heads 60 thereof recessed below the outer surface of the segments, as shown in FIGS. 1 and 5. The shanks 61 of the screws, after passing through the segments, are turned in internally threaded sockets 62 of the sleeve. The suction segment 53 has a plurality of rows of suction holes 63, with each row spaced a greater distance from the hard metal segment 50 than the preceding row, to assure that one of the rows is in position to be covered by the forward marginal edge of a blank 55 when the portion of the blank to be provided with a window opening 64 is properly positioned on the hard metal segment 50 to be contacted with the knife 51 of the cutting roller. The sleeve 33 also has holes 65 registering with the holes in the segment 53, to be connected selectively with the grooves 28 and 29, as later to be described.

The counter roller is assembled by applying the segments 50 and 53 to the mounting sleeve 33 so that the suction holes 63 in the segment 53 register with the suction holes 65 in the mounting sleeve. The segments are then secured to the mounting sleeve 33 by inserting the shanks 61 of the screws 58 and 59 through the openings 56 and 57 of the segments, and turning them into the threaded sockets 62 until the heads are drawn tightly against the segments. The segments 50 and 53 are now in effect a unitary part of the mounting sleeve, and need not be removed except for repair or replacement thereof.

The tubular assembly 16 thus formed is sleeved over the core 17 with the tapered end 35 of the mounting sleeve 33 entering the tapered recess 37 of the collar 21. The ring 41 is then applied by sliding it over the threaded end of the core, so that the keyway 43 therein slides over the key 44, to bring the tapered recess 39 of the ring 41 into engagement with the tapered end 36 of the mounting sleeve. The collar 23 serves as a nut and is mounted on the threaded end of the core 17 with the threads 24 on the collar engaging the threads 22 on the core. The counter roller is then completely assembled, and is ready to be installed in the envelope making machine in accordance with the usual mounting procedure of counter rollers along with the cutting rollers 32.

When the rollers are in place in the envelope making machine, the tubular assembly 16 is easily adjusted without removal of any of the parts or movement of the segments on the mounting sleeve. The only adjustment that is necessary is to loosen the threaded collar 23 so that the ring 41 may be slid on the key 44 to disengage the tapered recess 39 from the tapered end 36 of the mounting sleeve 33. The mounting sleeve 33 can now be disengaged from the tapered recess 37 by sliding it upon the core 17. The tubular assembly may now be freely turned on the core 17 to bring the desired rows of suction holes 63 into connection with the suction grooves 26 and 27 of the core.

For example, if large envelope blanks 53 (FIG. 7) are to be run through the machine to cut a window opening positioned in a blank as indicated at 64, the suction holes farthest away from the hard metal segment 50 will probably be the suction holes to engage and seize the forward marginal edge of the blank, as indicated in the developement view of the segments as shown in FIG. 7, the first two rows of suction holes being located in connecting relation with the grooves 26 and 27. All the other openings are closed by the cylindrical surface of the core. The tubular unit 16 is now fixed to the core 17 of the roller by shifting it so that the tapered end 35 again engages in the tapered recess 37 of the collar 21. The ring 41 is then shifted on the key 44 to bring the tapered recess 39 into engagement with the tapered end 36 of the sleeve. The mounting sleeve is now clamped in gripping relation with the collars by tightening the collar 23 so that the side face 48 thereof moves into engagement with the rib 47 until the sleeve is firmly clamped between the collars, whereupon the tubular unit will retain its adjusted connection with the grooves 26 and 27.

With the blanks 53 being conveyed in successive order through the machine and the cutting rollers timed with movement of the blanks, the leading marginal edge of

a blank 55 will be engaged by the suction holes that are in connection with the suction grooves 26 and 27, to seize the forward portion of the blank thereto and carry the blank around the circumference of the counter roller and in rotative relation with the cutting roller 32, with the knife 51 arriving in properly timed relation with the blank to cut the window opening against the hard metal segment, as shown in dotted lines 64, FIG. 7. After the window opening has been cut and the forward edge of the blank is ready to be released, the suction will be broken by the suction timing valve, not shown but which forms a part of the conventional envelope making machine.

If smaller blanks 55' are to be run through the machine, the window opening 64' will be located a shorter distance from the marginal portion of the leading edge of the blanks, consequently, in order to maintain the point of cut over the hard metal segment 50, it will be necessary to adjust the tubular unit on the core to make the desired suction holes effective. With the smaller blank, these rows of suction holes will be the ones nearest the hard metal segment. With intermediate blanks, the effective openings will be the intermediate rows of suction holes, as will be readily noted in FIG. 7.

In order to effect a new adjustment of the tubular unit, the collar 23 is merely backed off from the ring 41 a sufficient distance to free the tapered ends of the mounting sleeve, whereupon the mounting sleeve may be turned upon the core of the counter roller to bring the desired rows of suction holes into position to engage the forward marginal portion of the blank to be run through the machine and still maintain the location of the window opening over the hard metal segment. After retightening the collar 23, the adjustment is complete.

From the foregoing, it is obvious that a counter roller has been provided wherein adjustment for different sizes of blanks is easily and quickly made, so that it is not necessary to disassemble or replace any part of the counter roller, as is the case of the usual counter rollers as illustrated in FIG. 6.

What I claim and desire to secure by Letters Patent is:

1. A counter roller for cooperating with a roller having a cutting element to cut window openings in envelope and like blanks which are fed in successive order between the rollers, wherein said counter roller includes

a cylindrical core having threads at one end and a fixed collar at the opposite end encircling the cylindrical face of said core,

said core having a groove extending longitudinally in the cylindrical face of the core from near the collar and terminating short of said threaded end of the core,

a tubular assembly rotatably adjustable on the cylindrical surface of the core in covering relation with said groove,

journals extending axially from the ends of the core for rotatably mounting said counter roller and one of said journals having a suction duct connected with said groove for establishing a suction in the groove,

said tubular assembly having a plurality of longitudinally extending rows of suction holes successively registrable with said groove when the assembly is turned on the core to select a row of holes to be effective for gripping the blanks, and

means on the core and having threads engaging the threads of the core to cooperate with the fixed collar for clamping the assembly immovably on the core.

2. A counter roller for cooperating with a roller having a cutting element to cut window openings in envelope and like blanks which are fed in successive order between the rollers, wherein said counter roller includes

a cylindrical core having a fixed collar at one end provided with a seat in encircling relation with the core and said core having a threaded portion at its opposite end,

said core having a groove extending longitudinally in the cylindrical face of the core from near the collar and terminating short of the threaded end of the core,

a cylindrical sleeve on the cylindrical core and adjustable circumferentially thereof in covering relation with said groove and having one end seated on the seat of the fixed collar,

said sleeve having a plurality of circumferentially spaced apart rows of suction holes extending longitudinally of the groove in the core,

a ring member movable longitudinally on the core and having a seat seating the other end of said sleeve,

means securing the ring member from turning movement on the core,

a clamping collar having internal threads engaging the threaded portion of the core for urging the ring member in a direction to clamp the sleeve immovably between said seats,

journals extending axially from the ends of the core for mounting said counter roller with one of said journals having a suction duct connected with said groove for establishing a suction in the groove,

a hard segment having an inner arcuate face seating on the outer cylindrical face of the sleeve to cooperate with the cutting element in cutting window openings in said blanks,

a suction segment on the sleeve for gripping the blanks and having an inner arcuate face seating on the outer cylindrical surface of the sleeve and having suction holes registering with corresponding suction holes in the sleeve, and

means for securing said segments on the sleeve to provide a unitary tubular assembly turnable on the core to register any one of the rows of suction holes with the suction groove in said core after the clamping collar is backed away from the ring member.

3. A counter roller for cooperating with a roller having a cutting element to cut window openings in envelope and like blanks which are fed in successive order between the rollers, wherein said counter roller includes

a cylindrical core having a fixed collar at one end provided with an annular inwardly tapering recess in a side thereof in encircling relation with the core and said core having a threaded portion at its opposite end,

said core having a groove extending longitudinally within the cylindrical face of the core from near the collar and terminating short of the threaded end of the core,

a cylindrical sleeve on the cylindrical core and adjustable circumferentially thereof in covering relation with said groove and having tapering ends one of which is seated in the tapering recess in the side of the fixed collar,

said sleeve having a plurality of circumferentially spaced apart rows of suction holes extending longitudinally of the groove in the core,

a ring member movable longitudinally on the core and having a tapering recess engaging the other tapered end of said sleeve,

means securing the ring member from turning movement on the core,

a clamping collar having internal threads engaging the threaded portion of the core for urging the ring member in a direction to clamp said sleeve immovably on the core,

journals extending axially from the ends of the core for mounting said counter roller and one of said journals having a suction duct connected with said groove for establishing a suction in the groove,

a hard segment having an inner arcuate face seating on the outer cylindrical face of the sleeve to cooperate with the cutting element in cutting window openings in said blanks,

a suction segment on said sleeve for gripping said blanks and having an inner arcuate face seating on

the outer cylindrical surface of the sleeve and suction holes registering with corresponding suction holes in the sleeve, and

means for securing said segments on said sleeve to provide a unitary tubular assembly turnable on the core to register any one of the rows of suction holes with the suction groove in said core after the threaded collar is backed away from the movable collar.

References Cited in the file of this patent

UNITED STATES PATENTS

2,203,496	La Bombard	May 28, 1940
2,830,656	Welsh	Apr. 7, 1959