Nov. 17, 1936. A. NOVICK 2,061,004

MANUFACTURE OF ENVELOPES, BAGS, OR OTHER CONTAINERS

Filed Jan. 30, 1933 2 Sheets-Sheet 1

Fig. 1.

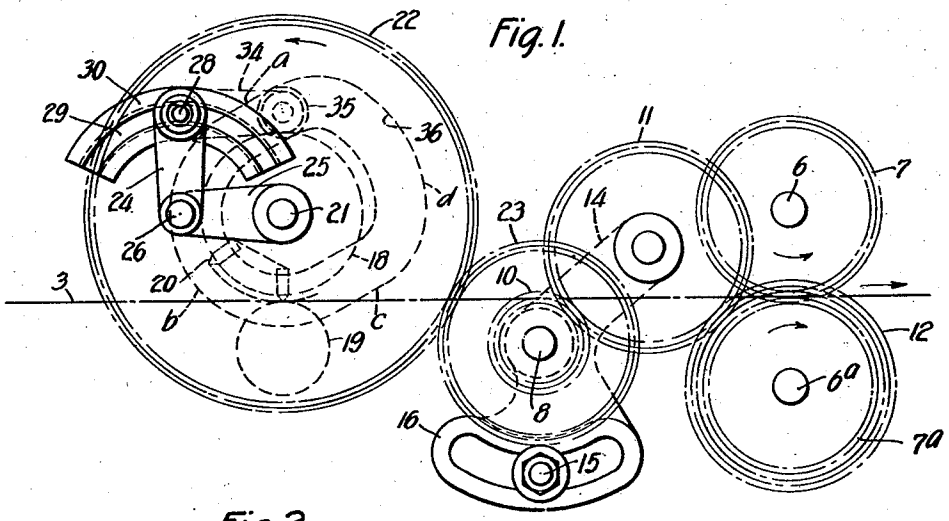
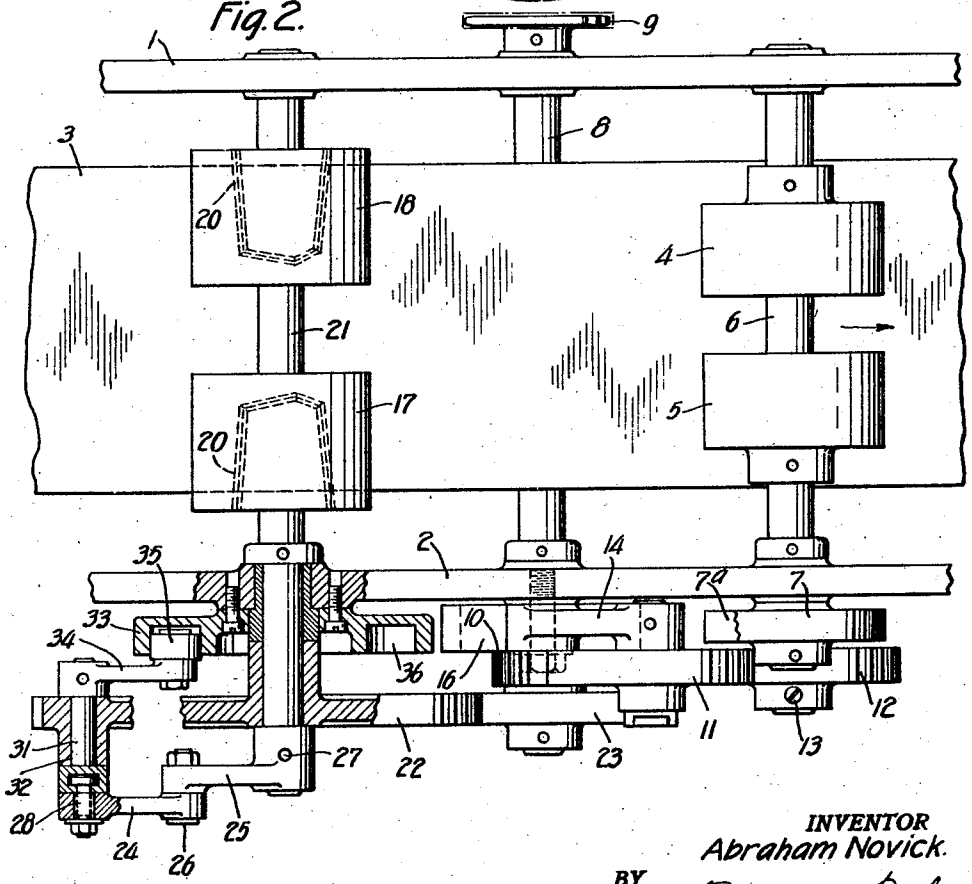


Fig. 2.



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Fig. 3.

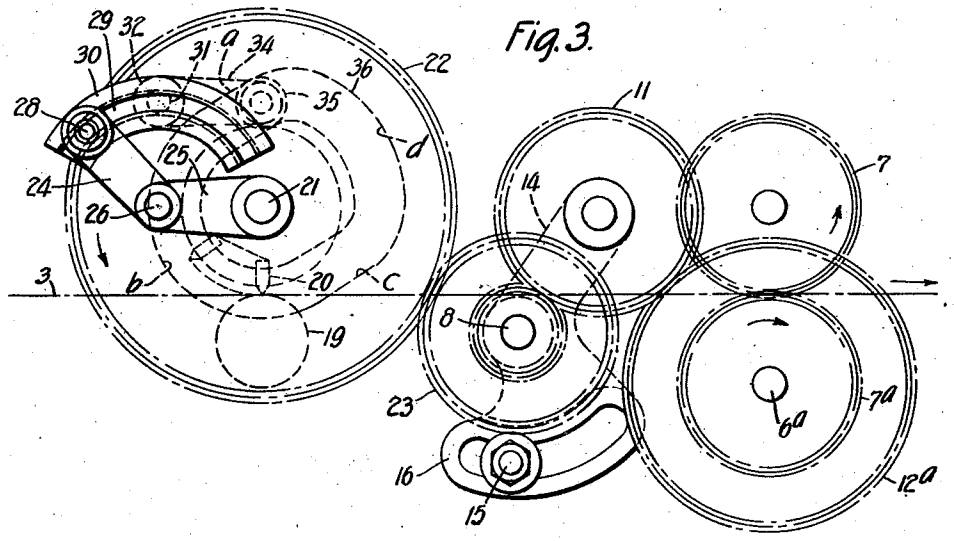


Fig. 5.

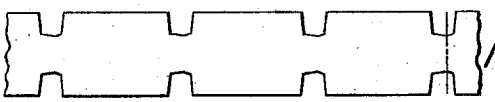


Fig. 6.

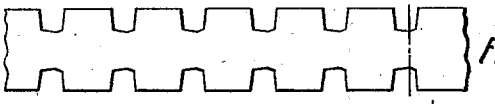


Fig. 7.

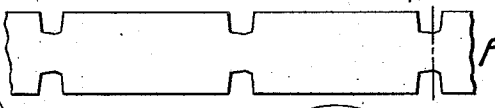


Fig. 4.

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UNITED STATES PATENT OFFICE

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MANUFACTURE OF ENVELOPES, BAGS, OR OTHER CONTAINERS

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Application January 30, 1933, Serial No. 654,121

9 Claims. (Cl. 164—28)

This invention relates to the manufacture of envelopes, bags or other containers from a web of paper, "Cellophane", or other suitable material.

It is concerned particularly with the provision of means for and methods of producing containers of variable lengths from such a web.

According to the illustrated form of the present invention, the variable lengths of containers are produced by running the web at various speeds through the machine and causing the mechanism which severs the web to operate thereon at fixed intervals of time. With this arrangement, different lengths of containers will be obtained depending upon the amount of web that has passed under the severing cutters between successive operations thereof.

Certain of the mechanism, however, which is used to operate on the web, such, for example, as the notching cutters for producing notches in the sides of the web preliminary to the complete severance of the blanks from the web, require to be in engagement with the traveling web for a considerable period of time. It is necessary, therefore, that the linear speed of such mechanism be capable of adjustment so as to be equal to the various linear speeds of the traveling web during actual contact therewith. The present invention, therefore, provides a mechanism which permits the notching cutter or other operating mechanism to operate at a fixed number of revolutions per minute but provides for speed changes during each such revolution so that in that portion of each revolution in which it is in contact with the web its speed will be equal to that of the web.

Other objects and advantages will hereinafter appear.

In the drawings forming part of this specification,

Figure 1 is a side elevation, partly diagrammatic, showing one form of mechanism embodying my invention;

Figure 2 is a plan view of the mechanism of Figure 1 with parts of this mechanism broken away to more clearly show the construction thereof;

Figures 3 and 4 are views similar to Figure 1 showing the mechanisms changed to provide for different lengths of blanks; and

Figures 5, 6, and 7 are diagrammatic views showing webs notched with the spacing between the notchings changed to illustrate the results of the operations of the mechanisms adjusted as in Figures 1, 3 and 4, respectively.

Similar characters of reference designate similar parts throughout.

In Figure 2 reference characters 1 and 2 designate portions of the side frames of an envelope, bag or other container making machine. A web 3 of paper, "Cellophane" or other sheet material from which the containers are to be made, is propelled through the machine by means of pull rolls engaging the blank from above and below, only the upper of these rollers, namely 4 and 5, being shown in the drawings, it being understood that coacting rollers are provided at the underside of the web. Rollers 4 and 5 are mounted on a shaft 6 journaled in the side frames, and the lower pull rolls, not shown, are mounted on a corresponding shaft, shown as 6^a in Figures 1, 3, and 4. The upper and lower sets of pull rolls are caused to rotate in unison with each other by means of spur gears 7 and 7^a mounted on shafts 6 and 6^a respectively.

By means of mechanism which is about to be described, the pull rolls are caused to propel the web at a uniform speed, the rate of this speed, however, being capable of adjustment by the operator of the machine. This mechanism comprises the shaft 8 which is driven at a constant speed from a motor or other source of power operatively connected to a sprocket wheel 9 mounted on shaft 8. The rotation of shaft 8 is transmitted by a gear train 10, 11, and 12 to the shaft 6^a of the lower set of pull rolls, and the rotation of shaft 6^a is transmitted by gears 7^a and 7, to the shaft 6, as above noted. The gear 12 is readily removable from shaft 6^a, being for this purpose provided with a set screw 13, so that gears of various sizes may be substituted for gear 12 by the operator. For the purpose of the present description gear 12 will be referred to as the normal speed gear and the speed of the web when this gear is in place will be termed the normal speed.

In Figure 3 a gear 12^a is shown as having been substituted for gear 12 for the purpose of providing a lower than normal speed for the web, and in Figure 4 a gear 12^b is shown so substituted for the purpose of providing a higher than normal speed of the web. To permit of the substitution of gears of various sizes, such as 12^a and 12^b for gear 12, in the gear train, gear 11 is mounted on a rocker arm 14 pivoted on shaft 8, the angular position of rocker arm 14 being fixed after adjustment by means of a bolt 15 mounted in side frame 2 and in clamping engagement with a slotted segment 16 of rocker arm 14.

It will be understood that although only three

sizes of gear 12 have been shown in Figures 1, 3, and 4, respectively, any number of different gears may be employed and that consequently the speed of travel of the web may be varied by the operator through minute gradations.

For the purpose of cutting notches in the web, I provide a notching cutter comprising cutter rolls 17 and 18 arranged to cooperate with an anvil roll indicated at 19 in Figure 1. The cutter rolls are of a construction usually employed in rolls of this character and comprise the knife edges indicated at 20 in Figures 1 and 2. It should here be noted that for the sake of clarity the cutter rolls 17 and 18 are shown at a slightly different angular position than the corresponding rolls of Figure 1, the purpose of this being to show the shape of the notches which will be cut by the cutter rolls.

The cutter rolls are caused to make a fixed number of revolutions per minute, so that depending upon the speed of travel to which the web has been adjusted different spacings between the notches will be obtained. To obtain a satisfactory cut, it is necessary, however, to have the notching cutter, while in contact with the web, travel at a linear speed which is substantially equal to that of the web. According to the present invention, therefore, provision is made of a mechanism for accelerating and decelerating, or vice versa, the speed of the notching cutter during that portion of its rotation in which it is out of contact with the web. This mechanism is as follows: The cutter rolls 17 and 18 are mounted on a shaft 21 journaled in the side frames 1 and 2. A gear 22 is mounted on shaft 21 to be free to rotate thereon. This gear is driven at a constant speed by gear 23 keyed to constant speed shaft 8. The rotation of gear 22 is transmitted to the cutter roller shaft 21 by means of links 24 and 25 pivotally connected at 26. Link 25 is keyed by a pin 27 to shaft 21. Link 24 is connected to gear wheel 22 by means of a pin 28 capable of sliding adjustment in the slot 29 of a link 30 mounted on a shaft 31 journaled in a bearing 32 provided in gear wheel 22. By a cam mechanism comprising a stationary cam 33 and a link 34 provided with cam roller 35 operating in cam slot 36, link 30 may be rocked about shaft 31. The cam slot 36 comprises two substantially straight portions *a* and *c*, connected by two substantially concentric portions *b* and *d*. At the instant of time indicated in Figure 1, the cam roll is positioned in the straight portion *a* of the cam groove. Rotation of the gear wheel will therefore cause a rocking of link 30 in clockwise direction, which rocking will continue until the roller enters the concentric portion *b* of the cam slot. Thereupon the link will remain stationary in position until the cam roller reaches the straight portion *c* of the cam groove. During this portion of travel the link is rocked in counter-clockwise direction to its original position, in which position it will remain while the roller travels in the portion *d* of the cam groove.

With the pivot of link 24 adjusted in cam slot 29 to the position shown in Figure 1, i. e., with this pivot point in line with the pivot pin 31 of link 30 the rocking of link 30 will have no effect on the speed of rotation of the cutter shaft 21. This shaft and, therefore, the cutter rolls 17 and 18 will be driven from the uniformly rotating gear 22 by links 24 and 25 which will remain in the same angular position with reference to each other in which they are shown in Figure 1 and there will consequently be no angular movement of the cutter rolls with reference to gear 22. The speed so imparted to the cutter rolls is termed herein the normal speed of these rolls, this being the speed at which the linear speed of the notching cutters is equal to the speed of the web with normal speed gear 12 of Figure 1 in place.

With this adjustment of the various parts the notching cutters operate to provide a spacing between the notches such for example as that shown in Figure 5, which spacing I shall refer to herein as the normal spacing.

When, however, the mechanism is adjusted as shown in Figure 3, with the gear 12^a in place, so that the web is propelled at a speed less than normal, the pivot 28 of link 24 is moved from its central position to the left (in Figure 3), of the pivot 31 of link 3. In this position the rocking of link 30 in a clockwise direction causes the cutter roll shaft 21 to rotate clockwise with reference to gear 22, with the net result that the cutter rolls are rotated at a speed less than normal. The amount by which the speed of the cutter rolls is decreased, during the rocking of the link, depends upon the position of pin 28 in slot 29, and an adjustment of this position is made until the resulting speed of the cutter rolls, during the portion of their rotation in which the cam roller rides in part *a* of the cam slot, is equal to that of the web. After the notching cutters have moved out of contact with the web, the cam roller enters the concentric portion *b* of the cam so that during this period of time slotted link 30 remains stationary in its angular position, with the consequence that during this period of time the speed of the cutter rolls is greater than that of the web and equal to normal. During the next portion of the cycle the cam roller rides in the straight portion *c* of the cam slot, so that link 30 is rocked back to its original angular position. As a consequence of this, the cutter roll shaft 21 is rotated counterclockwise with reference to gear 22 and thus caused to rotate at a linear speed greater than normal, with the result that when the next concentric portion of the cam slot, namely, portion *d*, is reached the notching cutters are restored to their original angular position with reference to gear 22. In this position they remain while the rollers ride in the concentric portion *d* of the cam slot and the cycle of operation is thereupon repeated. With the arrangement of Figure 3, therefore, in which the web is moved at a speed less than normal, the cutter rolls are first retarded so that their speed is less than normal during contact with the web, but are then speeded up during the portion of the cycle in which they are out of contact with the web, so that the number of revolutions per unit of time of the cutter rolls remains unchanged. As a consequence of this the spacing between the notches is decreased as indicated in Figure 6, the amount of the decrease being dependent upon the relative size of gear 12^a with reference to gear 12.

In the adjustment of parts shown in Figure 4 in which a gear 12^b is substituted for gear 12 so that the web is caused to move at a speed greater than normal, the pin 28 is moved to a point to the right of pivot 31 of the slotted link 30. With this arrangement of the parts the clockwise rocking of the link 30 during the portion of time when roller 35 rides in the straight portion *a* of the cam slot, brings about a rotation of the cutter rolls at a speed greater than normal so that by proper adjustment of the position of pin 28, a linear velocity of the notch cutter may be obtained equal to that of the web. During the portion of the cycle when the notch cutters are out of contact

with the web, namely, while the roll 35 travels in the straight portion *c* of the cam, a similar decrease in speed of the notch cutters will be obtained, so that the cutter is restored to its angular position with reference to gear wheel 22, similarly as it was with the adjustment of Figure 3. It will thus be seen that with the arrangement of parts as shown in Figure 4, a greater than normal spacing between notches will be obtained (as shown in Fig. 7), the amount of the spacing being dependent upon the size of the gear 12[b] substituted for gear 12.

It will be understood that after the web has been notched as shown in Figures 5, 6, and 7, it is passed through further mechanism for operating thereon, such as mechanism for severing the web into successive blanks by cuts through the notched portions indicated by dotted lines in Figures 5, 6, and 7 and mechanism for operating on the severed blanks to form them into containers of the desired kind and type.

While the invention has been particularly described in connection with a notching cutter it will be understood that it is capable of general application and that other forms of mechanism for operating on a web such, for example, as a printing mechanism may be controlled in a similar manner.

I have described what I believe to be the best embodiment of my invention. I do not wish, however, to be confined to the embodiment shown, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. The method of cutting notches of substantial width at variable distances from each other in a web, the linear continuity of said web being maintained throughout said operation, which consists in propelling the web at one of a plurality of different speeds predetermined with reference to the desired spacing between the notches, propelling a notching cutter through a closed path tangential to the path of the web and varying the speed of movement of said notching cutter in its path by causing an intraphase advance in speed thereof and a corresponding retardation during the same phase, and so effecting said advance and retardation of the cutter that it will be in contact with the web at fixed intervals of time irrespective of the web speed selected and throughout the time of contact will have a substantially uniform speed of travel substantially equal to that of the web.

2. In combination, means for advancing a web at one of a plurality of speeds predetermined with reference to desired spacing between operations to be performed on the web, a rotating member for operating on the web during a substantial portion of each revolution, means for causing said rotating member to operate on the web at fixed intervals of time irrespective of the speed of the web, the linear continuity of said web being maintained throughout said operations, and means operative during each revolution of the rotating member for alternately increasing the speed of the operating member, and for causing an equal retardation thereof in such manner that during contact with the web the linear speed of said rotating member will be substantially uniform and substantially equal to that of the web.

3. In combination, a driving shaft, means driven from said shaft for advancing a web at one of a plurality of speeds predetermined with reference to desired spacing between operations to be performed on the web, a rotating member for operating on the web during a substantial portion of each revolution of said member, the continuity of said web being maintained throughout said operation, and means interposed between said driving shaft and said rotating member for varying the speed of said rotating member during each revolution in such manner that during each such revolution the rotating member is driven for part of the revolution at an increased speed and during another part at a decreased speed, the amount of the increase of speed being equal to that of the decrease of speed, so that at the end of each revolution the rotating member is in the same cyclical position in which it would have been if there had been no change in its speed, the variation of speed during each revolution of the member being such that during contact with the web the linear speed of the rotating member is substantially uniform and substantially equal to that of the web.

4. In combination, a driving shaft, means driven from said shaft for advancing a web at one of a plurality of speeds predetermined with reference to desired spacing between operations to be performed on the web, a rotating member for operating on the web during a substantial portion of each revolution of said member, the continuity of said web being maintained throughout said operation, and means interposed between said driving shaft and said rotating member for varying the speed of said rotating member during each revolution in such manner that during each such revolution the rotating member is driven for part of the revolution at an increased speed and during another part at a decreased speed, the amount of the increase of speed being equal to that of the decrease of speed, so that at the end of each revolution the rotating member is in the same cyclical position in which it would have been if there had been no change in its speed, the variation of speed during each revolution of the member being such that during contact with the web the linear speed of the rotating member is substantially uniform and substantially equal to that of the web, said interposed means comprising a connection from said driving shaft to the shaft of the rotating member, said connection comprising a gear driven from said driving shaft, and a cam for controlling the connection from said gear to said driven shaft in such manner as to advance or retard the shaft with reference to the gear during each revolution of the gear.

5. In combination, means for advancing a web at one of a plurality of speeds predetermined with reference to desired spacing between operations to be performed on the web, a rotating member for operating on the web during a substantial portion of each revolution, means for causing said rotating member to operate on the web at fixed intervals of time irrespective of the speed of the web, and means operative during each revolution of the rotating member for alternately increasing and decreasing the speed thereof in such manner that during contact with the web the linear speed of said rotating member will be substantially uniform and substantially equal to that of the web said apparatus being further characterized by having the means for causing the operation of the member for operating on the web constituted by a uniformly rotating driving member, a first link rockably carried thereby, a cam for rocking said first link as it travels with the driving member, a second link pivotally connected to the first, and a third link pivotally connected to the second and connected to rotate in unison with the

operating member, the pivot connecting the second link to the first being adjustable along the first link through a path concentric with the pivot connecting the second link to the third.

6. In combination, means for advancing a web at one of a plurality of speeds predetermined with reference to desired spacing between operations to be performed on the web, a rotating member for operating on the web during a substantial portion of each revolution, means for causing said rotating member to operate on the web at fixed intervals of time irrespective of the speed of the web, and means operative during each revolution of the rotating member for alternately increasing the speed of the operating member, and for causing an equal retardation thereof in such manner that during contact with the web the linear speed of said rotating member will be substantially uniform and substantially equal to that of the web, said apparatus being further characterized by having the means for causing the operation of the member for operating on the web in the manner described constituted by a uniformly rotating driving member, means for transmitting motion of the driving member to an operating member variably, but always cycle for cycle, and means for adjusting the magnitude of the variations while maintaining unaltered the phase relation of the operating period of the operating member to the driving member.

7. In combination, means for advancing a web at various speeds, a rotating member for operating on an area of said traveling web of substantial extent in the direction of travel, during a substantial portion of each revolution, means for rotating said member at a fixed number of revolutions per unit of time, and means for causing said member to change its speed during each revolution by causing an intraphase advance in speed thereof and a corresponding complemental retardation during the same phase, and so effecting said complemental retardation and acceleration of the operating member as to provide during the portion of rotation in which it is in contact with the web a substantially uniform linear speed equal to that of the web.

8. In a machine of the kind described, in combination, web feeding means adapted to be driven at different selected uniform speeds, means for driving said web-feeding means at various selected uniform speeds, a rotary member for intermittently engaging and operating upon the traveling web throughout a substantial period in each cycle, means for driving said member at various selected uniform average speeds irrespective of the speed of the web, said last-named means including a cam shaped to cause the speed of the operating member to be changed from normal to the speed of the web at a predetermined point in each cycle and to be maintained at the speed of the web throughout the period of its engagement with the web.

9. In a mechanism for operating upon a travelling web; a source of continuous web supply; a rotary means for drawing forward a given length of said web per given unit of time; a rotary means for performing upon said travelling web, at a region thereof between said source and feeding means, a series of operations at a given frequency for each of said time units, each operation in said series involving contact of said rotary means with an area of said web of substantial extent in the direction of travel, the web being maintained continuous from the web source to said feeding means; means to vary the speed of said web travel while maintaining the frequency of operation; means to vary the frequency of operation regardless of said variations in speed; and means to co-ordinate the linear speed of said operating means and web throughout each period of operative contact during each cycle of the rotary operating means, and to provide for appropriate accelerating-decelerating variations of speed ratio between the operating means and the web to compensate for phase changes within said cycle, accompanying variations in the ratio between the speed of web travel and frequency of operation, selectively.

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