

July 30, 1940.

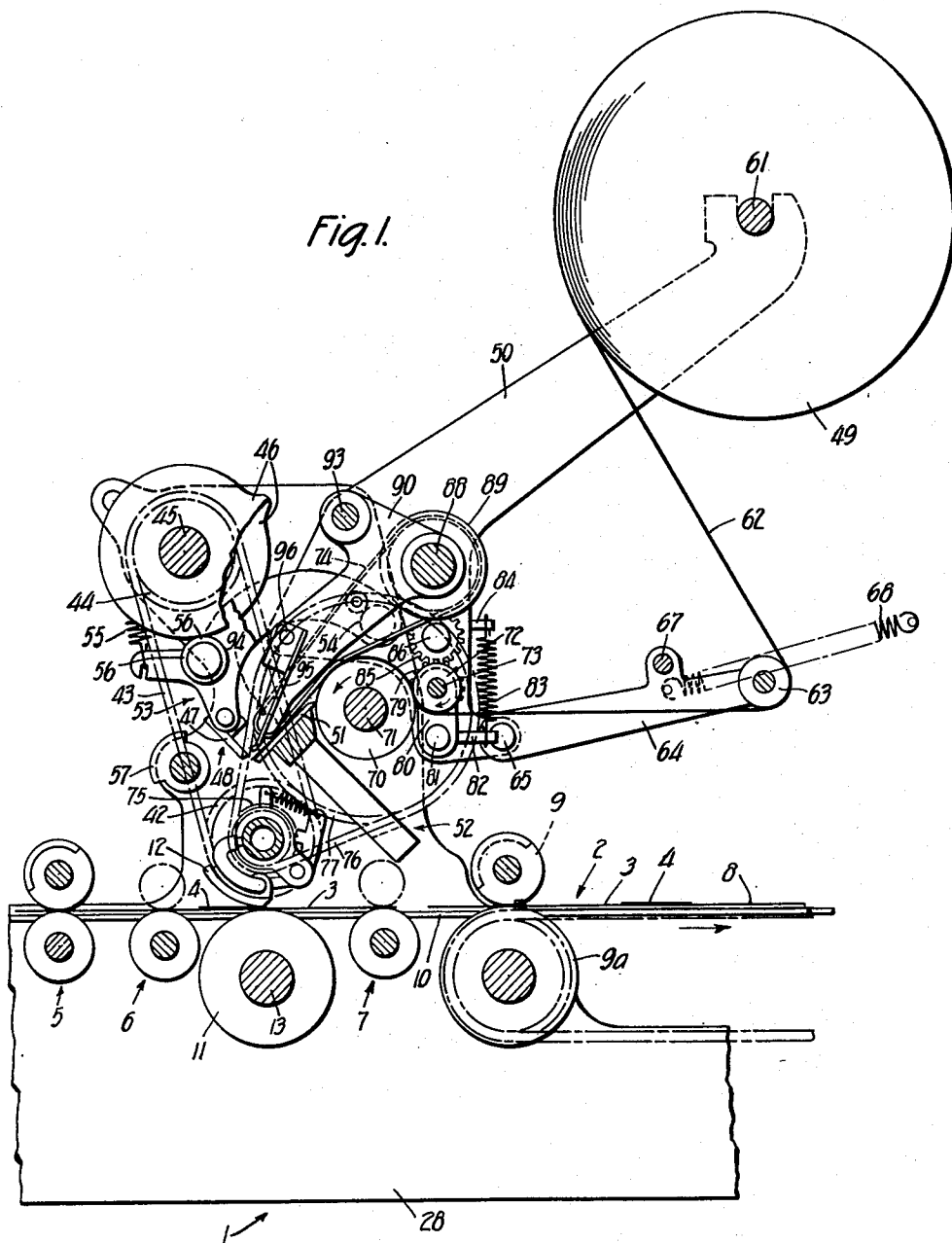
A. NOVICK

2,209,348

PATCH SEVERING AND APPLYING MECHANISM

Filed Sept. 21, 1938

3 Sheets-Sheet 1



INVENTOR.
Abraham Novick
BY *Moses & Nolte*
ATTORNEYS

July 30, 1940.

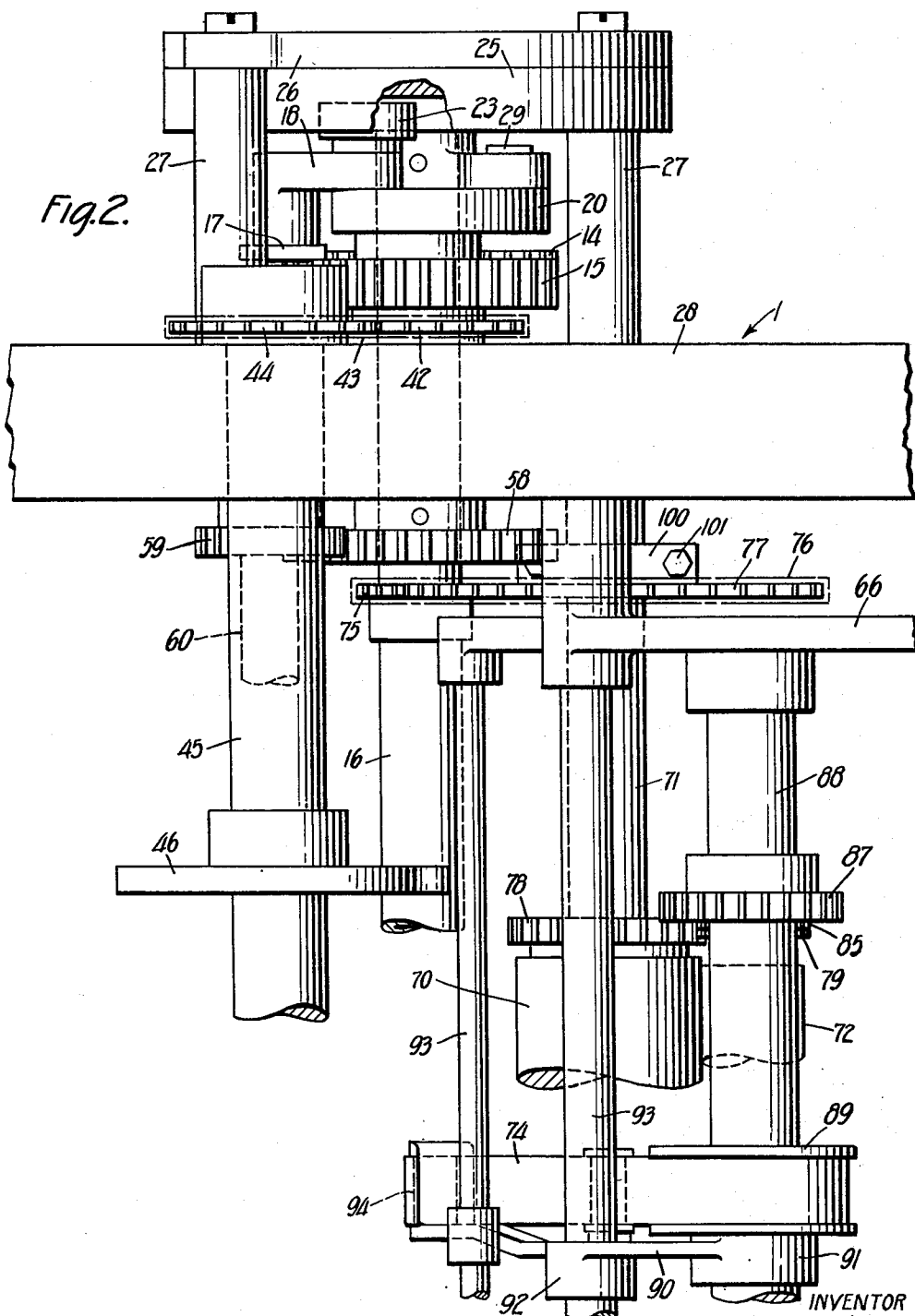
A. NOVICK

2,209,348

PATCH SEVERING AND APPLYING MECHANISM

Filed Sept. 21, 1938

3 Sheets-Sheet 2



INVENTOR
Abraham Novick
BY *Moses & Nolte*
ATTORNEYS

July 30, 1940.

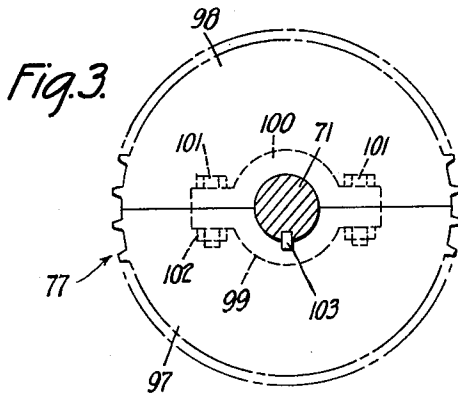
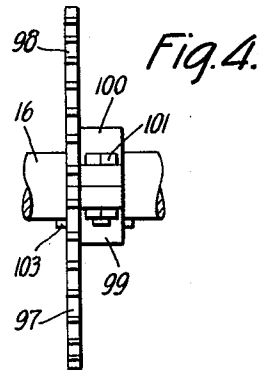
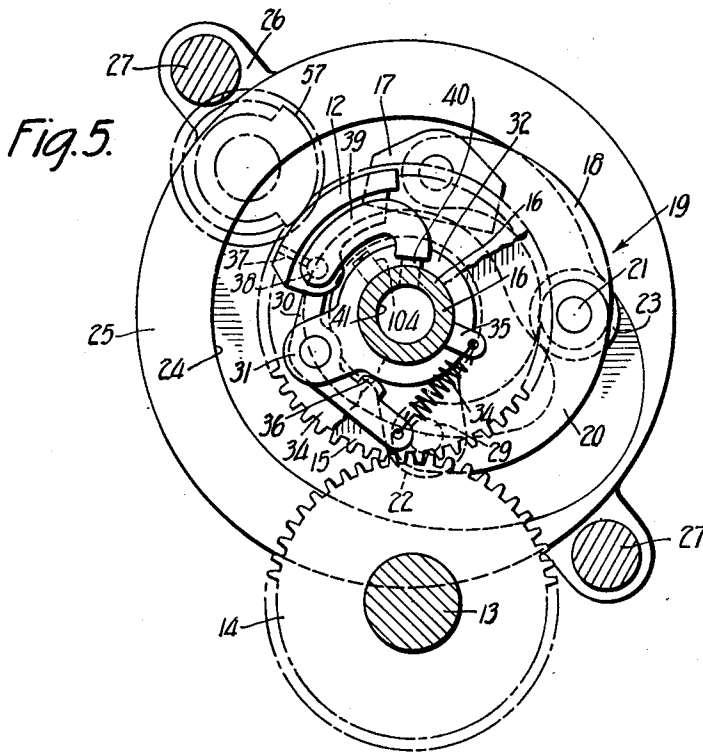
A. NOVICK

2,209,348

PATCH SEVERING AND APPLYING MECHANISM

Filed Sept. 21, 1938

3 Sheets-Sheet 3



INVENTOR.

Abraham Novick

BY

Moses & Nolte

ATTORNEYS

UNITED STATES PATENT OFFICE

2,209,348

PATCH SEVERING AND APPLYING
MECHANISMAbraham Novick, Flushing, N. Y., assignor to
F. L. Smithe Machine Co., Inc., New York,
N. Y., a corporation of New York

Application September 21, 1938, Serial No. 230,902

8 Claims. (Cl. 93—61)

This invention relates to mechanism for feeding a web of patch material, for severing patches of uniform length from the web, and for applying the patches to sheet material such as envelope blanks. The invention is disclosed herein as embodied in an illustrative machine for applying window patches to window envelope blanks, but the invention is not to be regarded, because of such illustration, as confined to that particular utility.

In envelope machines it has been a common practice in the past to provide mechanism for advancing uniformly spaced window envelope blanks at a uniform speed, and to provide a variable speed, rotary, patch applying member which accelerates a patch from a state of rest to the speed of blank travel and then travels at the speed of the envelope blank while pressing the patch against the blank.

It has also been the practice in the past to provide a patch severing cutter together with patch web feeding mechanism for advancing the patch material past the cutter. Such cutter has been timed to cut one patch for each cycle of the rotary patch applying member and to effect such cutting during a brief period in the cycle in which the rotary patch applying member is at rest.

It is desirable that the patch web be held stationary and taut at the cutting operation. To this end provision has heretofore been made for causing the patch web material to be advanced intermittently or at variable speed involving substantially a dwell at the period of severance, together with means for causing the rotary patch applying member to exert a slip tension upon the leading end of the web in advance of and during the cutting operation so that the web will be drawn and held taut for cutting.

One form of intermittent web feeding means which has been utilized has consisted of a crank operated pawl and ratchet mechanism whose advancing stroke is confined to half of an operating cycle. It is desirable, however, that the advancing step of the patch web feeding means be spread out over as much of the operating cycle as possible, since this tends to minimize the liability of slipping of the web with reference to the feeding means. The necessity for guarding against such slipping has been accentuated in recent years by the fact that such smooth, anti-friction patch material as "Cellophane," "Kodopak" and the like have become popular as window patch material because of their high transparency. Although the patch web never has to be advanced more than a fraction of the height

of an envelope blank in a cycle, it does nevertheless have to be accelerated from a state of rest to a substantial speed, and it is supplied from a reel of substantial diameter having considerable inertia, so that the problem of slipping is a really serious one, and the desirability of spreading out the web feeding period is important.

One proposed method of solving this difficulty is disclosed in my pending application Serial No. 119,200, filed January 6, 1937, for Envelope making machine, and consists in operating a drive shaft for the web feeder by means of an eccentrically mounted crank, to cause the drive of the web feeder to be varied in accordance with a law of variation which is substantially the same as the law of variation of the rotary patch applying member. The outer end of the crank arm is arranged to pass close to the center of the shaft at one point in its rotation so as to bring the shaft nearly to rest.

It is a salient feature of the present invention that the patch web advancing means is operated less than, but in exact proportion to, the variable speed of the rotary patch applying member at all times.

In accordance with a practical and desirable way of practicing the invention, and as illustrated herein, provision is made of a variable speed driver for the rotary patch applying member which causes the patch applying member to come to rest very briefly, and then causes the patch applying member to be accelerated to the speed of the envelope blanks for application of a severed web to a blank. For this purpose the patch applying member and the driving mechanism therefor are desirably the same as the corresponding elements disclosed in my pending application, Serial No. 119,200, referred to above. The driving means for the patch web feeder is geared directly to the variable speed driver of the rotary patch applying member through a speed reducing train. The consequence is, as stated above, that the patch web feeder partakes of the variations of speed of the rotary patch applying member, the effect upon the patch web being that it is driven at all times in proportion to, but less than, the peripheral travel of the variable speed, rotary patch applying member.

With this kind of arrangement, the rotary patch applying member can never be at rest while the patch web is being advanced. At all times when the patch web is being advanced the rotary patch applying member will be traveling more rapidly than the patch web. The tendency

of the slip tension exerted upon the leading end of the patch web by the rotary patch applying member will be constantly to create tension in the patch web or, when the rotary patch applying member comes to rest, to maintain the tension previously created.

The operating cycle is such that both the rotary patch applying member and the unsevered web are smoothly accelerated from a state of rest to their maximum speed and are thereafter smoothly slowed down again to a state of rest, the periods of rest being co-extensive and very brief.

Other objects and advantages will hereinafter appear.

In the drawings forming part of this specification and illustrating a practical and desirable embodiment of the invention;

Fig. 1 is a fragmentary, sectional, side view of an envelope making machine illustrating features of the invention;

Fig. 2 is a fragmentary, top plan view of a portion of the mechanism illustrated in Fig. 1;

Fig. 3 is a view in sectional, side elevation illustrating particularly a split sprocket which is employed in order to enable the gear ratio between the rotary patch applying member and the patch web feeder to be altered by the substitution of sprockets;

Fig. 4 is a fragmentary view in front elevation of the sprocket illustrated in Fig. 3; and

Fig. 5 is a sectional, side view illustrating particularly the mechanism for variably driving the rotary patch applying member.

The illustrative machine comprises a main frame 1 in which feeding mechanism 2 for advancing envelope blanks 3 continuously and at uniform speed is provided. The envelope blanks are definitely timed in their movements so that timed window patch applying mechanism will be effective to apply a patch 4 to a predetermined area of each traveling blank.

The envelope blanks are advanced from left to right in Fig. 1 by means of a series of rotary feed couples 5, 6 and 7, and by a pin and chain conveyor 8 in cooperation with a feed segment 9 and a roller 9a. The blank engaging elements of the feed couples 5, 6 and 7 are all driven at the same peripheral speed. The blanks are supported upon a table 10 and are advanced over a bed cylinder or roller 11 which is driven uniformly at the same peripheral speed as the elements of the feeding couples.

In approaching the roller 11, the envelope blanks pass a gumming mechanism (not shown) for gumming the marginal area of a window envelope blank which borders the window opening of the blank. A rotary patch applying sector 12 operates cycle for cycle with the envelope blank feeding and timing mechanism. The sector 12 acts as a rotary patch carrier to carry a patch from the point of severance into association with each envelope blank and, in cooperation with the roller 11, to press the patch firmly against the gummed margin of the blank which surrounds the window opening.

The patch applying sector 12 is driven at variable speed, having a brief period of rest at one point in the cycle but traveling at the same speed as the periphery of the roller 11, and as the engaged envelope blank, throughout the period of the cycle in which the sector bears against the roller 11.

The sector 12 and all of the other mechanism to be described which has to do with the feeding, severing and delivering of patch material up to

the point of application of a patch to an envelope blank is driven from a uniformly rotating shaft 13 upon which the roller 11 is made fast.

The shaft 13 has fast upon it a gear 14 which drives a gear 15 of equal diameter, the gear 15 being revolvably mounted upon a shaft 16. The uniformly rotated gear 15 carries a block 17 which is pivotally connected to a link 18 forming one element of a toggle 19. A second link 20 is connected by means of a pivot pin 21 to the link 18 at one of its ends, and is pivotally connected at its other end to a crank arm 22 fast upon the hollow shaft 16. The links and associated cam mechanism to be described constitute variable speed driver for the shaft 16 and parts driven by said shaft. The hollow shaft 16 drives all of the variably driven patch and patch web feeding mechanism to be described. The pivot pin 21 carries a cam follower roller 23 which travels in a track 24 of a track cam 25. The track cam 25 is affixed to a plate 26 which is mounted on posts 27 carried by a member 28 of the frame 1. The cam track 24, throughout the major portion of its length, is arcuate in form, the arc being concentric with the shaft 16. So long as the cam follower 23 is running in this portion of the cam track, the shaft 16 runs at uniform speed and in unison with the shaft 13. The cam track also includes a portion, however, (shown as engaged by the follower 23 in Fig. 5), which is concentric with a point in the path traversed by the axis of the pivot pin 29 which connects the link 20 with the arm 22. This arcuate portion has a radius equal to the effective length of the link 20. As the follower is drawn by the link 18 through this portion of the cam track, the pin 29 is caused to remain stationary so that the rotation of the shaft 16 is briefly arrested.

The rotary patch applying sector 12 is fixed upon one arm of a lever 30 pivotally mounted on an arm 31 which extends from a collar 32 fast upon the hollow shaft 16. The tail of the lever is normally drawn inward by a spring 34 connected to the tail of the lever and to a pin 35 fast on the shaft 16. The inward movement of the tail of the lever which tends to project the segment 12 outward is limited by engagement of an abutment 36 formed on the lever tail, with the collar 32. It will be seen that the patch applying sector 12 is made free to yield toward the axis of the shaft 16, but that outward movement of the sector 12 away from the axis of the shaft 16 is limited by the abutment 36 and the collar 32. The sector 12 is rotated by, and in unison with, the shaft 16.

The sector 12 is provided with suction passages 37 in its forward margin which communicate with a suction bore 38. The bore 38 is connected through a flexible rubber tube 39 with a nipple 40. The nipple 40 is affixed to the shaft 16 and communicates with the internal bore 41 of the shaft. Provision is made for controlling the alternate admission of suction and atmospheric air to the bore 41 of the shaft 16 as disclosed in Serial No. 734,978, so as to cause the suction to be on from the instant when the passages 37 first come opposite the leading end of the patch web until the parts reach the position illustrated in Fig. 1. At the latter point the suction is broken and atmospheric air is admitted so as to avoid any tendency of the passages 37 to hold the patch and cause it to be separated from the envelope blank.

The uniformly rotating gear 15 has fast with it a sprocket 42 which, through a chain 43, drives at uniform speed a sprocket 44 fast upon a shaft

45. The shaft 45 has fast upon it two identical knife operating cams 46 which act at the appropriate point in the cycle to project downwardly one shear blade 47 of a cutter 48.

The patch web material is drawn off of a patch web reel 49 mounted in frame arms 50 by means of patch web feeding mechanism which will be described presently. The patch web is advanced across a plate 51 whose forward portion constitutes a shear block for cooperation with the blade 47. The plate 51 is mounted upon a supporting frame 52.

The parts are so constructed and timed that the blade 47 is thrust downward when a leading end portion of the patch web of just the proper length constituting a patch has been advanced beyond the leading edge of the plate 51. This occurs during the brief period of rest of the sector 12.

The blade 47 is carried by a swing frame 53 which is pivotally mounted upon studs 54. The swing frame 53 is drawn upward by a spring 55 connected to the swing frame and to a stationary part of the frame of the machine. The swing frame carries a pair of cam follower rollers 56 which cooperate with the respective cams 46.

As the patch web is advanced beyond the cutting edge of the plate 51 before severance the leading end dangles into the path of the sector 12.

The suction passages 37 draw the leading end of the web frictionally against the surface of the sector. The sector, as will appear when the web feeding means is described, is always traveling faster than the patch web except during the brief period when both the sector and the patch web are at rest. The sector, therefore, slides along underneath the suction-held leading end of the web and draws the leading end of the web taut. The sector 12 comes to rest with the suction passages underneath the extreme forward margin of the patch web. After the patch has been severed, the suction passages hold the patch to the sector 12 so that the patch is carried to the envelope blank by the sector.

In order to avoid any possible slipping of the patch at the severing operation or when the sector starts up from a state of rest following the patch severing operation, provision is made of a cooperating patch feeding sector 57 which runs at all times at the same peripheral speed as the sector 12 and which comes into engagement with the web just as the sector 12 comes to rest for the severing operation. The web is, therefore, positively gripped at the severing operation, and the patch is positively advanced after severing during the critical period when acceleration of the patch is in progress.

The shaft 16 has fast upon it a gear 58. The gear 58 drives a gear 59 of half its own size which is fast upon a shaft 60. The sector 57 is fast upon the shaft 60 and has a radius equal to one-half the radius of the sector 12. The sector 57 is caused, therefore, to travel at all times at the same peripheral speed as the sector 12.

The parts thus far described are all the same as the mechanism directly disclosed in application Serial No. 119,200, or as incorporated in the disclosure of that application by reference to my pending application Serial No. 734,978.

The patch web feeding mechanism to be described is also like the patch web feeding mechanism of Serial No. 119,200, but the salient feature of difference resides in the manner and means of driving the patch web feeding mechanism.

The patch web reel 49 is mounted upon a shaft

61 which is set in bearings of frame arms 50. The patch web 62 is led from the reel 49 around a roller 63 mounted upon a pair of arms 64 which are pivoted upon a shaft 65. The shaft 65 is mounted upon sub-frame members 66 of which the arms 50 form parts. The arms 64 are connected to one another by a tie rod 67 so that the arm 64 and the rod 67 jointly form a swing frame for carrying the roller 63. Springs 68 connected to the arms 64 and to stationary pins 69 tend to hold the arms 64 in the position illustrated in Fig. 1. When the web is started forward, however, the arms 64 swing upward against the force of gravity and of the springs 68, so that the inertia of the reel 49 does not have to be suddenly overcome.

From the roller 63 the web passes between a feed roller 70 fast on a shaft 71, and a cooperating feed roller 72 fast on a shaft 73. It passes thence around a substantial arc of the roller 70 and beneath the lower stretch of a feed belt 74 which bears against the roller through the web which is being delivered across the plate 51 and thrust past the cutting point.

The variably driven shaft 16 has fast upon it a sprocket 75 which through a chain 76 drives a sprocket 77 fast on the shaft 71. It will be noted that the sprocket 77 is of much greater diameter than the sprocket 75 so that the rotation of the shaft 71, though proportional to the rotation of the shaft 16 at all times is at a much slower speed. The drive ratio together with the relation of the radii of the sector 12 and the roller 70 is so chosen that the peripheral rate of travel of the sector 12 will bear to the peripheral rate of travel of the roller 70, the same ratio which the distance between corresponding points of successive envelope blanks bears to the length of a patch.

The shaft 71 has fast upon it a gear 78, Fig. 2, which meshes with and drives a pinion 79 fast upon the shaft 73. The gear ratios are such that the roller 72 is caused to travel at the same peripheral speed as the roller 70.

The shaft 73 has secured thereto arms 80 which are pivoted on studs 81. One of the arms 80 has a pin 82 affixed to it. A spring 83 is connected at one end to the pin 82 and at its opposite end to a stationary pin 84, and causes the roller 72 to bear firmly against the roller 70. The pinion 79 drives a pinion 85 fast on a shaft 86, and the pinion 85 in turn drives a gear 87, Fig. 2, fast upon a shaft 88. The shaft 88 has fast upon it a pulley 89 which drives the belt 74. The driving train is so chosen that the belt is caused to travel at the same peripheral speed as the roller 70.

A frame or bracket 90 is formed with collars 91 and 92 for embracing, respectively, the shaft 88 and a fixed supporting rod or shaft 93. The frame 90 extends over the plate 51 and rotatably supports a roller 94 upon which the belt 74 is trained. The roller 94 supports the forward end of the belt 74 in position to bear frictionally against the patch web on the plate 51.

Fingers 95 affixed to a shaft 96 extend downward over the leading margin of the plate 51 adjacent to the blade 47 and serve to prevent lifting of the forward edge of the patch web by the blade 47 as the blade 47 moves upward after severing a patch.

It will be seen that all of the patch web feeding members 70, 72 and 74, are driven at the same peripheral speed from the shaft 16. They are all driven in proportion to, but slower than, 75

the sector 12. At all times when the sector 12 is in motion, therefore, the sector will be traveling at a higher rate of speed than the patch web feeding elements, so that there can be no question that tension will be exerted upon the leading end of the patch web right up to the instant when the sector 12 comes to rest. Neither can there be any question of relative timing because the rest periods of the sector 12 and of the patch web feeding elements are caused to coincide precisely.

When it becomes desirable to increase the length of patch fed and cut in a cycle, this may be accomplished by substituting a larger sprocket for the sprocket 75.

The sprocket 75 is one of a series of sprockets which are identical in all respects save as to the matter of diameter and number of teeth. Details of the sprocket construction are illustrated in Figs. 3 and 4. It will be observed that the sprocket 75 is made in two equal segments 97 and 98, formed, respectively, with bearings 99 and 100. The bearings 99 and 100 are adapted to be removably clamped to the shaft 16 by means of bolts 101 passed through opposed ears of the bearings and nuts 102 threaded on the bolts. The bearing member 99 is formed with a keyway for receiving a key 103 fixed to the shaft 16.

When a sprocket substitution is to be made, the chain 76 is opened and removed from the sprockets 75 and 76. The sprocket substitution is then effected and a new chain of proper length is applied. It will be evident that the sprocket and chain replacement does not in any way affect the coordination and relative timing of the rotary patch applying member and the patch web feeder, but that it only affects the ratio of the drives to cause a greater or lesser length of patch web to be fed in a cycle as desired. The knife will still cut off the web at the same point in the cycle, and both the rotary patch applier and the patch web feeder will come to rest at that point.

If it be assumed that the readjustment was one which increased the length of patch web feeding in a cycle, however, it will be evident that the leading end of the patch web will extend farther past the severing point at the instant of severance than before. Since it is desirable that the suction passages 37 shall be engaged with the leading margin of the patch web at the instant of severance, provision is made for adjusting the sector 12 relative to the shaft 16. To this end, the arms 31 which carry the sector are arranged so that they may be adjusted rotatively with relation to the shaft 16. The arms 31 include collar portions 32 which encircle the shaft 16, and provision is made of set screws 104 threaded through the collar portions 32 for enabling the arms to be rotatably adjusted. When such adjustment is required the set screws are loosened, the arms are readjusted and the set screws are again turned to cause them to bind against the periphery of the shaft 16.

Obviously, a shortened web feed calls for adjustment of the arms 31 in the reverse direction.

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

I claim:

1. A patch-applying mechanism comprising, in combination, a rotary patch carrier, a variable

speed driver for driving the patch carrier at variable speed to cause the carrier to come to rest briefly at one period of its cycle and to travel at predetermined speeds in other periods, means for feeding the leading end of a patch web to said carrier, means for driving said feeding means slower than, but constantly in synchronism with, the patch carrier, severing means interposed between said feeding means and the carrier for severing a patch from the leading end of the patch web, and means for operating the severing means to sever a patch while the feeding means and the patch carrier are at rest.

2. A patch-applying mechanism comprising, in combination, a rotary patch carrier, a variable speed driver for driving the patch carrier at variable speed to cause the carrier to come to rest briefly at one period of its cycle and to travel at predetermined speeds in other periods, means for feeding the leading end of a patch web to said carrier, means connecting the variable speed driver to drive said feeding means slower than, but constantly in synchronism with, the patch carrier, severing means interposed between said feeding means and the carrier for severing a patch from the leading end of the patch web, and means for operating the severing means to sever a patch while the feeding means and the patch carrier are at rest.

3. A patch-applying mechanism as set forth in claim 1 which further includes means for applying suction through the forward marginal portion of the patch carrier to cause such forward marginal portion as it slides along the leading end of the web in advance of the severing operation to make the web taut for severing.

4. A patch-applying mechanism as set forth in claim 1 which further includes means for applying suction through the forward marginal portion of the patch carrier to cause such forward marginal portion as it slides along the leading end of the web in advance of the severing operation to make the web taut for severing, a patch feeding sector cooperative with the carrier to grip the severed patch and advance it positively immediately after the severing operation, and means connecting the variable speed driver to drive the sector in unison with the carrier.

5. A patch-applying mechanism as set forth in claim 1 which further includes means for applying suction through the forward marginal portion of the patch carrier to cause such forward marginal portion as it slides along the leading end of the web in advance of the severing operation to make the web taut for severing, a patch feeding sector cooperative with the carrier to grip the severed patch and advance it positively immediately after the severing operation, and means connecting the variable speed driver to drive the sector in unison with the carrier, the sector being timed to engage the web just as it comes to rest for the severing operation.

6. A patch-applying mechanism comprising, in combination, means for feeding window envelope blanks at constant speed, a rotary patch-applying sector, a driver for driving the sector at variable speed to cause the sector to travel at the speed of the blank feeding means when in engagement with a blank, but to come to rest at another point in the cycle, means for feeding the leading end of the patch web to said sector, means connecting the variable speed driver to drive said feeding means slower than, but in synchronism

with, the patch-applying segment, severing means interposed between the feeding means and the segment for severing a patch from the leading end of the patch web, and means for operating the severing means to sever a patch while the feeding means and the patch-applying sector are at rest.

5 7. A patch-applying mechanism as set forth in claim 6 which further includes means for facilitating readjustment of the driving ratio be-
10

tween the variable speed driver and the web feeding means.

8. A patch-applying mechanism as set forth in claim 6 which further includes means for facilitating readjustment of the driving ratio between the variable speed driver and the web feeding means, and means for adjustably securing the sector in selected rotative positions relative to the driver.

ABRAHAM NOVICK. 10