July 30, 1940. A. NOVICK 2,209,347

ENVELOPE MAKING MACHINE

Original Filed Jan. 6, 1937 4 Sheets-Sheet 1

Fig. 1.

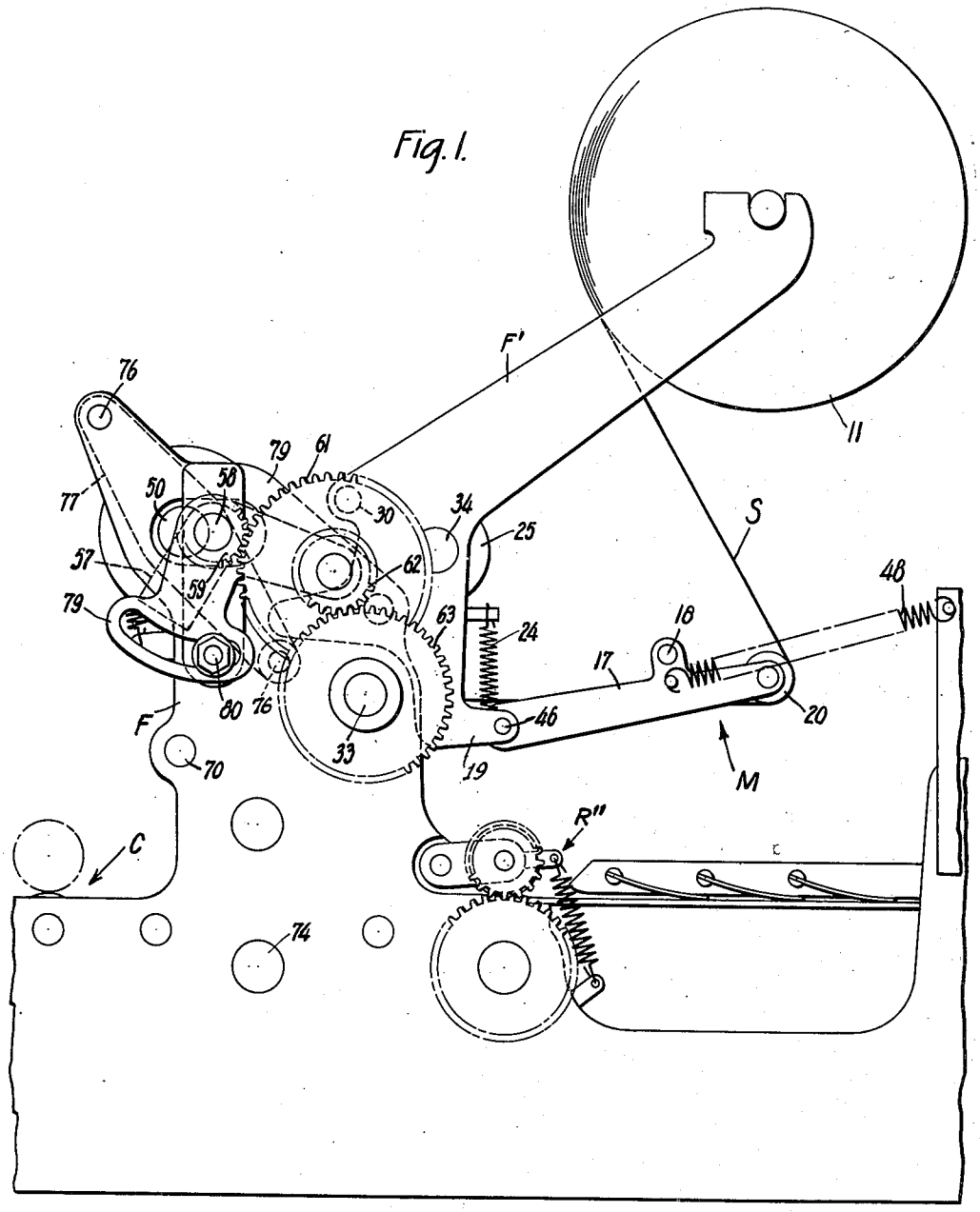

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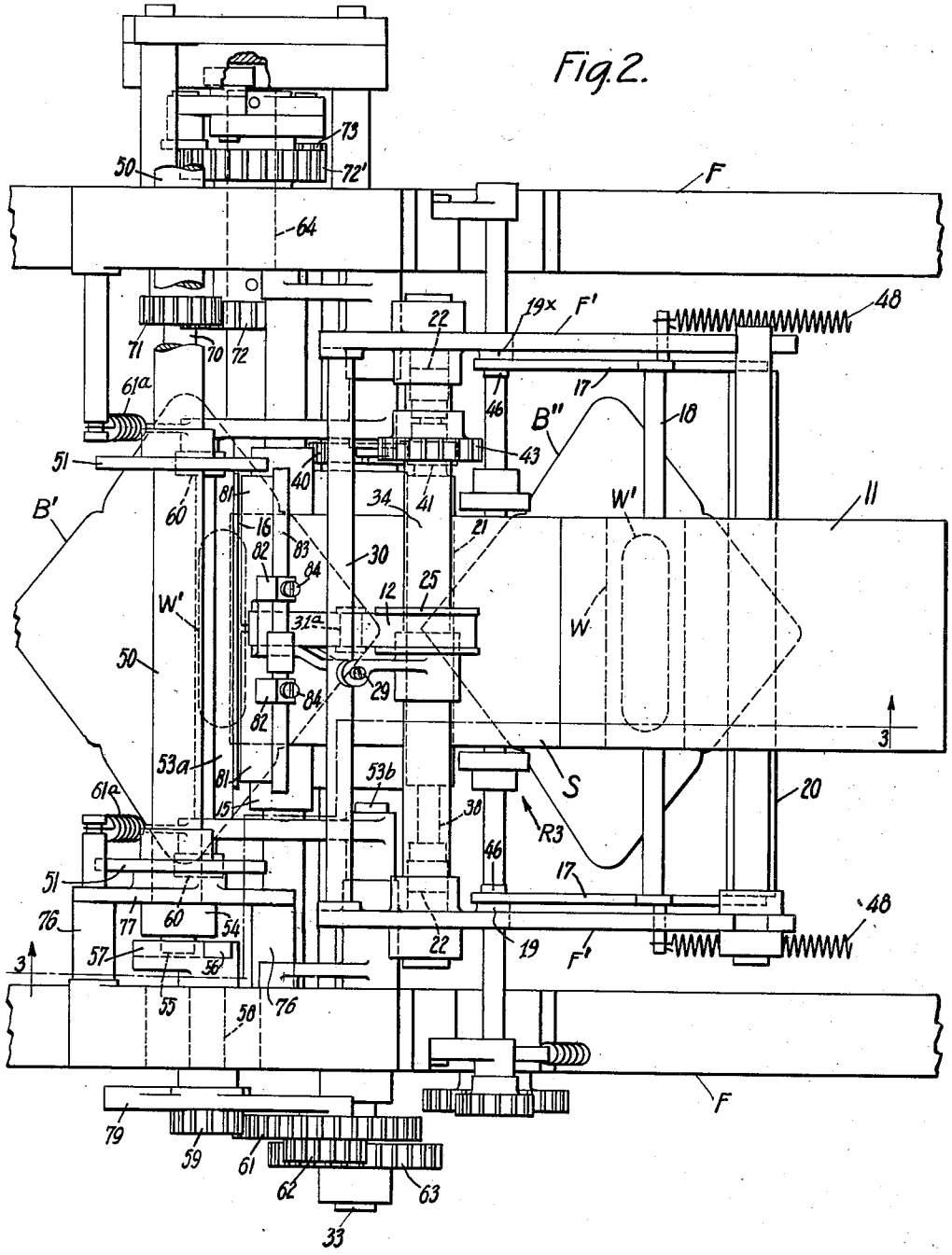
Fig. 2.



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ENVELOPE MAKING MACHINE

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Fig. 3.

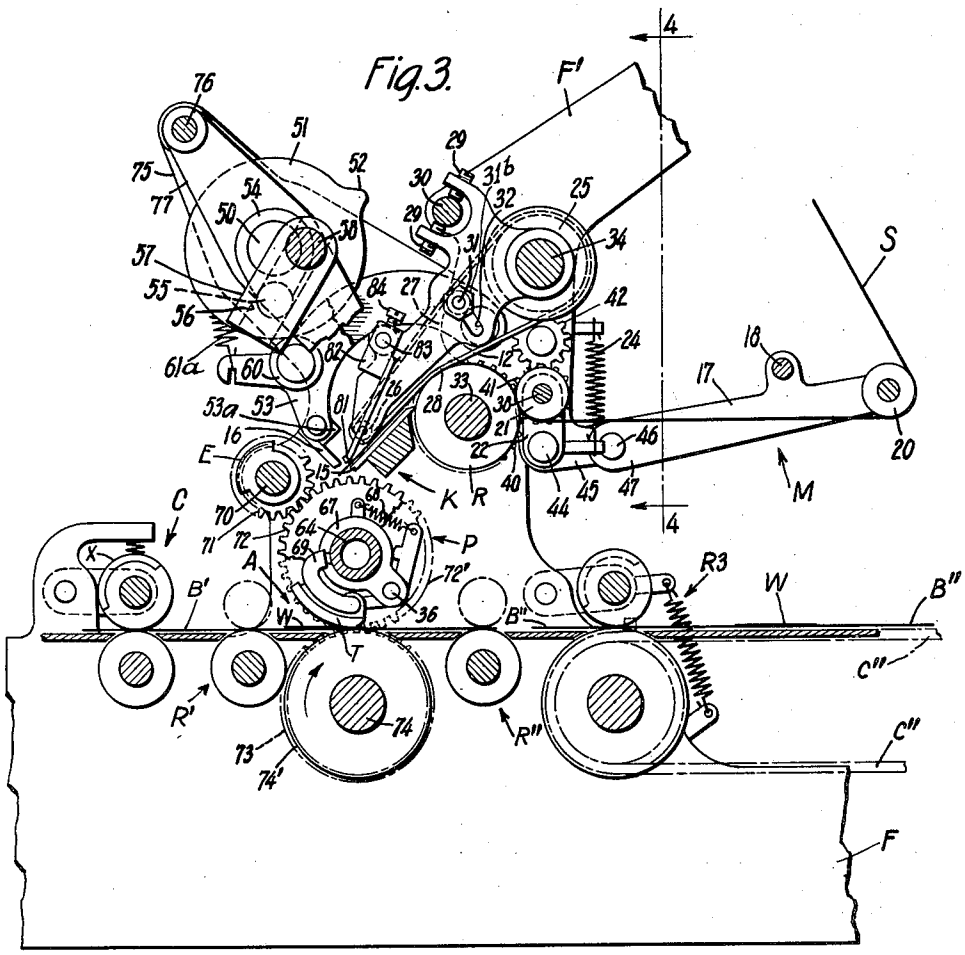
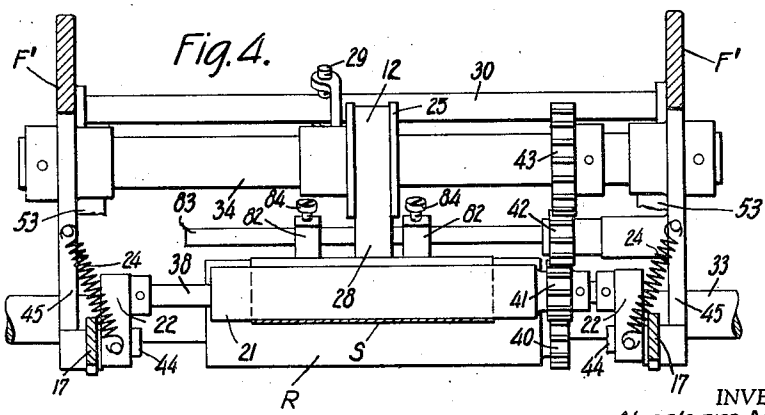


Fig. 4.



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Original Filed Jan. 6, 1937 4 Sheets-Sheet 4

Fig. 5.

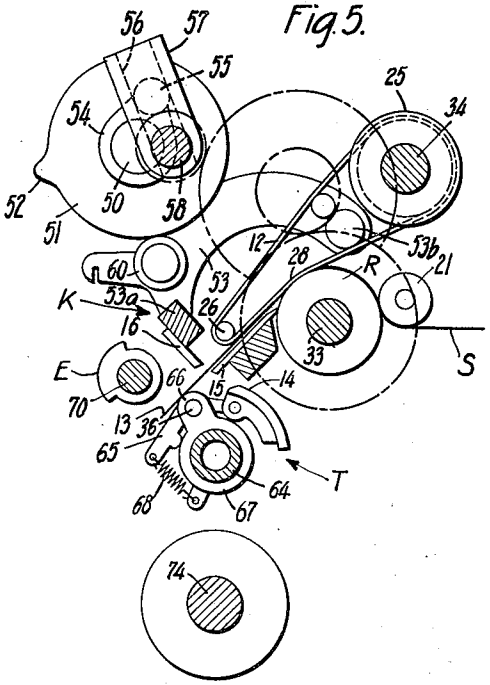


Fig. 6.

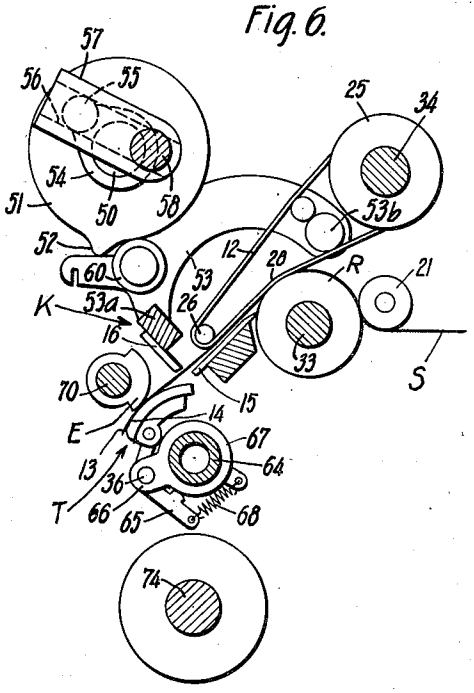
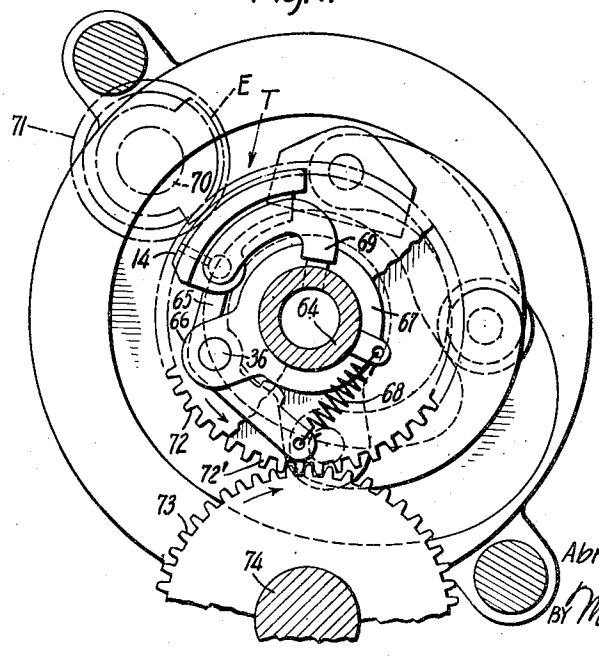


Fig. 7.



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Patented July 30, 1940

2,209,347

UNITED STATES PATENT OFFICE

2,209,347

ENVELOPE MAKING MACHINE

Abraham Novick, Flushing, N. Y., assignor to F. L. Smithe Machine Co., Inc., New York, N. Y., a corporation of New York

Application January 6, 1937, Serial No. 119,200
Renewed April 22, 1940

9 Claims. (Cl. 93—61)

This invention relates to envelope making machines, especially to a machine for making windowed envelopes, and more particularly to a machine of the type in which a supply of strip material is advanced into position to be severed into patches, and applied to the window openings of a series of envelope blanks fed at uniform speed past the patch-applying mechanism.

The present mechanism has for an object the provision of means for advancing such a patch-supply strip past a reciprocating severing device to a rotary, sectional patch feeding and applying means adapted to exert what may be designated a slip-tension upon the leading portion of the patch-supply strip to draw it taut in advance of severance, such tension preferably being exerted suctionally, as by the means disclosed in a copending application Serial No. 734,978, although the invention of the present application is capable of use in conjunction with other means for advancing the strip from the severing point. Such feeding means is desirably rotated at variable speed, being caused to come substantially to rest at the moment of severance and thereafter to accelerate the severed patch to the speed of the envelope blanks and to travel uniformly at that speed while pressing the patch against a blank.

A more particular object of the invention is to provide a mechanism for advancing the patch-supply strip continuously but at variable speed, to cause the web feeding means to be momentarily slowed down to a minimum speed substantially below its average speed at the time of patch severance, and thereafter to be accelerated.

It is a further object to provide means for facilitating readjustment of the total extent of operation of the patch web feeding means in a cycle.

Another object of the invention is to provide a novel means, cooperating with the suctional mechanism for feeding the patch under tension by which is avoided the possible failure in delivery of a patch sheet to the patch-applying mechanism, or failure to deliver the successive patch-sheets in proper alignment, by preventing displacement of the patch while severing it from the strip.

Other objects and features of the invention will appear as the description of the particular physical embodiment selected to illustrate the invention progresses.

In the accompanying drawings, like characters of reference have been applied to corresponding parts in the several views which make up the drawings, in which:

Fig. 1 is a view in side elevation of an envelope fabricating mechanism in which patches are applied to windowed envelope blanks in accordance with the present invention;

Fig. 2 is a view in plan of the mechanism shown in Fig. 1;

Fig. 3 s a view in vertical sectional elevation on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary detail view in vertical section, taken on the line 4—4 of Fig. 3, in the direction indicated by the arrows at the end of the section line;

Fig. 5 is a fragmentary detail view in vertical section showing in somewhat schematic fashion certain of the parts illustrated in Fig. 3, but in a different operative position;

Fig. 6 is a similar view of said parts in an advanced stage of operation; and

Fig. 7 is a fragmentary, detail view in vertical section, on an enlarged scale, of the rotary suctional mechanism for transferring the patch sheets successively from the severing mechanism to the patch-applying station, and this figure also shows the means whereby displacement of the patch is prevented..

Before entering into a detailed description of the structural features of the mechanisms, a brief summary of the various operations which characterize the invention will be given, to permit a ready understanding of the general succession of the operations in their coordinated relation.

The supply of windowed blanks B', B'', etc., enters the machine, in the instance illustrated, from the left-hand side, when viewed as shown in Fig. 3, being advanced in individualized relation through a means (not shown) for applying adhesive to the margins of the windows, each blank being then advanced by a set of receiving rolls C, suitably relieved peripherally at X to clear the adhesive and thence to a set of rolls R' (Fig. 3) which feeds the blanks seriatim to the patch-applying station A, where a rotor P presses each patch W into place. Thence each blank as B'', provided with its patch, as W, is delivered through suitable sets of rolls R'' and R3 to suitable aligning means including a pair of conveyor chains C'' by which they are advanced positively in proper alignment for further treatment, as for example to a suitable gumming mechanism and folding mechanism, not shown.

The supply strip S of patch material is derived from a roll 11 thereof (see Fig. 1) and passes around a tensioning means M (see Fig. 3) and

over a feeding rotor R with which a positively driven endless apron 12 cooperates to drive the strip past the severing station K at a rate of travel which is at a minimum at the moment of severance, in pursuance of the invention, and accelerates after transfer therefrom of each patch sheet W.

The leading end 13 of the latch strip S (see Fig. 5), is advanced beyond the severing station to a position where it is presented for tensioning and feeding by the suctional area 14 of a sector T which rotates counterclockwise and thereby draws the leading end 13 of the patch strip taut, exerting thereon a slip-frictional bias to maintain the taut condition of the strip over the stationary shear member 15 when the reciprocating shear member 16 descends to sever the strip. A segment E cooperates with the suction surface 14 to hold the leading end 13 of the patch strip positively at a dwell of these cooperating segmental parts at the moment of severance.

The individualized patch W, being still held suctionally upon the periphery 14 of sector T, is carried around to the patch-applying station A, (see Fig. 3) and is there adhered under pressure to the gummed margin of the window W' in the blank B'', (see Fig. 2), the alignment of the patch during transfer from the severing station being assured by rotary engagement of the patch sheet W by a sector E (see Figs. 5 and 6) co-acting with the sector T until the suctional effect is fully established, after severance.

Bearing in mind the above sequence of operations, the structure of the several mechanisms will now be described in detail, in the order of their operation.

The tension mechanism M, (see Figs. 1, 2 and 3) which acts upon the stretch of patch-supply strip S as it comes from the supply roll 11, comprises a pair of rocker arms 17 connected through a tie rod 18 and mounted pivotally, as at 46, upon adjacent parts 19 and 19x, of a frame unit F' of the machine, (see Figs. 2 and 4), the rockers carrying at their free ends an idler roll 20 around which the strip S runs to a driven roll 21 carried upon a shaft 38 journalled in arms 22 extending from studs 44, the arms being biased by one or more coil springs 24, under tension, to turn counter clockwise and press the roll 21 yieldingly against the feeding rotor R, with the strip embraced therebetween. The roll 21 is of substantial breadth and the strip is therefore driven accurately between it and the rotor R.

The strip is bound partially around the rotor R by the pressure thereagainst of the endless apron 12, which runs around a driving pulley 25, and around an idler roll 26 carried by the free end of an arm 27 mounted co-axially with the pulley 25, the intermediate stretch 28 of the apron being bent over the periphery of rotor R by setting the arm suitably, as by the set screws 29 which bear adjustably against a cross-rod 30 of the frame. A stub shaft 31 having a head at one end and a reduced, threaded portion at the other is adjustably mounted on the arm 27 for supporting a flanged, belt tightening roller 31a. The reduced, threaded end portion of the shaft 31 is passed through a slot 32 of the arm 27, and a nut is threaded onto the protruding end of the shaft for clamping the shaft to the arm 27 in different adjusted positions along the shaft.

The rotor R is fixed upon a shaft 33, and the roll 21 is geared to it and to the driving shaft 34 for apron pulley 25 by a train of gears 40, 41, 42 and 43, (see Fig. 4) the gear 40 being secured to and driven by the shaft 33, and driving in turn the gear 41 fixed on the shaft 38 of roll 21, while an intermediate gear 42 is driven by gear 41 and drives the gear 43 which actuates the apron shaft 34 and its pulley 25 (see Fig. 3).

A pair of coil springs 48 (see Fig. 1) is provided to exert a yielding tension on the rocker arms 17.

In pursuance of an important stated object of the invention which provides for timing the severing stroke in such fashion as to have this event occur at an instant of substantial dwell in the rotary movement of the rotor R and the co-acting apron 12 and consequently of the strip S, without however interrupting the constant speed of the driving mechanism, the shaft 50 which carries the cams 51 having projections 52 for periodically energizing the levers 53 to impart the cutting stroke to movable shear member 16 is rotated at constant speed, but this rotation is translated into a variable speed for the strip-advancing mechanism by the following means, (see Figs. 2 and 3). The arms 53 are joined at their free end by a cross bar 53a to which is secured the knife 16. Said arms are pivotally supported by studs 53b secured to the brackets F'.

On the drive shaft 50 a crank 54 has a pin 55 which enters a channel 56 in an arm 57 on a short shaft 58 carrying a pinion 59 which thus rotates upon an axis eccentric to the axis of shaft 50, and when the cam projection 52 is about to engage the anti-friction roller 60 on the shear lever 53, as in Fig. 6, to operate the shear 16 against the retractive bias of the spring 61a, the pin 55 is nearing alignment with the axes of the shafts 50 and 58, and hence such engagement occurs during a period when the arm 57 and the shaft 58 are rotating at their minimum speed.

The shaft 50 is supported at one end in the frame F, but at the end adjacent the arm 57, the shaft 50 is supported in a bridge 77. The bridge 77 is supported by spacer posts 76 mounted on the frame F.

As the shaft 33 for the rotor R, and the shaft 34 of the apron pulley 25 are intergeared with each other, and are both driven at reduced speed from the pinion 59 by intermediate reducing gears 61, 62 and 63, (see Fig. 1) it will be evident that the linear motion of the strip S will be at the instant of severance so small as to be negligible in its effect upon the cutting stroke.

It will also be apparent that between two cutting strokes there will be first an acceleration in speed of the shaft 58 due to increased angular displacement of the arm 57 from the line joining the axes of shafts 50 and 58, and then a deceleration, so that the net average linear feeding movement communicated to the patch-supply strip S will correspond to the constant speed of rotation of the shaft 50.

Fig. 5 illustrates a phase of this feeding movement of the strip S when the leading end 13 of the same has reached a point where it will be subject to suctional draft exerted by the rotating sector T as the latter revolves about the axis of its hollow shaft 64 (see Fig. 7) the latter being in communication with a source of suction by a connection not shown in the present application, as it is fully disclosed and claimed in a co-pending application for United States Letters Patent Serial No. 734,978, to which reference may be had for a more detailed description.

The sector T is carried by a rocker 65 mounted pivotally upon a shaft 36 supported upon lugs 66 projecting from collars 67 fast on the shaft 64, and is biased yieldingly outward by a tension spring 68. It derives suction from the hollow shaft 64 through a flexible tube 69, and when suction is thus applied to the under surface of the leading end 13 of the strip, as at the moment illustrated in Fig. 6, the sector exerts a suctional and frictional slip drag upon the free end of the strip which draws the latter taut for the severing action of the shear 16. The sector T is brought to a stop at the time of severance by the provision of a variable speed mechanism which includes a cam and crank constituting a device forming the subject of a complete disclosure and claims in a co-pending application, Serial No. 734,978.

In order to avoid any possibility of failure of the suctional feed to hold the leading end 13 of the patch strip firmly for severance, a complemental sector E is provided, on a shaft 70, as a novel feature of the present invention, and this sector co-acts with the sector T, at the same linear circumferential speed, to grip the patch strip positively and to hold it for severance.

The sector E shares in the variable rotation of the sector T, and also in its dwell at the moment of severance, because the sectors T and E are geared together as indicated at 71 and 72 in Figs. 2, 3 and 7. A gear 72' of the same size as gear 72, rotatably mounted on the hollow shaft 64, is uniformly driven by a gear 73 fast on the shaft 74, suitably driven from the main driving shaft by a train of gears (not shown). The shaft 74 has secured thereto a roller 74' with which the rotor T cooperates. Provision is made for interrupting the suctional effect to release the patch sheet after the latter has been transferred to the patch-applying station, as shown in Fig. 3, where contact is illustrated as being established between the patch W and the underlying windowed portion of the envelope blank B'. In this figure, and Fig. 2, a blank is shown at B'' with the window patch W in place, and on the chain conveyor C'' by which it is being delivered for completion of the envelope, or for further treatment.

It will be noted (see Fig. 1) that provision is made for desirable adjustments in the speed of feeding the patch material, in accordance with various lengths of patches, by substituting gears of different sizes for the gear 63. For this purpose the shaft which carries the gear 62 is, itself carried by a bell crank lever 79 mounted pivotally upon the shaft 58 and having a slotted sector in which is provided a setting bolt 80 of known form.

Suitable means may desirably be provided to hold down the leading end of the supply strip after severance, and to assure its proper initial passage between the shears, said means acting to strip the leading end from the movable shear member 16 if the strip tends to adhere thereto. Such means are shown at 81 (see Fig. 3) in the form of plates carried by blocks 82 clamped adjustably upon a cross-rod 83 carried by the arms 27 set-screws 84 being provided to hold the fingers in adjusted position. These and various other desirable adjustments may be utilized where needed to accommodate the various elements to operations upon envelope blanks of different dimensions, and in general to coordinate the action of the several instrumentalities.

I have described what I believe to be the best embodiments 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. In an envelope machine of the class described, the combination with means adapted to provide a continuous supply strip of patch material and a reciprocating severing device, of rotary means to feed the leading end of said supply strip and variable speed operating means for said rotary feeding means constructed and arranged to cause the rotary feeding means to feed the strip continuously past the severing station at a variable speed ranging from a minimum speed substantially below the average speed at the instant of severance to a speed which is at first in excess of the average constant speed of rotation of said rotary feeding means, and then below said average speed, whereby in each feeding cycle a constant mean average feeding speed is maintained.

2. A patch-applying mechanism as claimed in claim 1, which includes an endless apron device coacting with the rotary strip feeding means in opposed relation thereto, and means for causing the apron device to partake of the variable acceleration, deceleration and minimum speed phases of each cycle of the rotary strip feeding means in the advancement and severance from the supply strip of a patch sheet.

3. A patch-applying mechanism of the class described, comprising a feeding rotor and an endless feed apron opposed to the rotor and having extensive bearing thereagainst to co-act frictionally with the rotor upon an interposed supply strip of patch material, and a roll adapted to press said strip yieldingly against said rotor prior to engagement thereof by said apron and to co-act therewith in advancing said strip under said apron, a variable speed driver, and means connecting said driver with the rotor, the apron and the roll, to drive all of them at widely variable speeds but constantly in unison with one another.

4. A patch-applying mechanism of the class described, comprising a feeding rotor and an endless feed apron opposed to the rotor and adapted to co-act frictionally with the rotor upon an interposed supply strip of patch material, and a roll adapted to press said strip yieldingly against said rotor prior to engagement thereof by said apron and to co-act therewith in advancing said strip under said apron, and means to press said roll yieldingly against the rotor.

5. In a patch-applying mechanism of the class described, a rotor and an endless apron adapted to co-act upon an intervening stretch of patch-supply-strip, and means to gear said rotor and apron to travel at the same peripheral speed, said means including a driving shaft for said apron and said mechanism being further characterized by having said apron carried by an arm mounted for rotative adjustment about the axis of said shaft, and screw devices to provide for accurate angular adjustment of said arm toward and away from said rotor.

6. A strip feeding mechanism comprising the elements combined and cooperating as set forth in claim 5, and further characterized by having a set of fingers mounted upon said arm, and sharing in the general adjustment thereof, said fingers being adjustable independently of said general adjustment, both rotatively toward and away

from the plane of said apron, and laterally thereof.

7. A patch-applying mechanism as claimed in claim 1, in which the variable speed operating means comprises a constant speed shaft, a crank device having a crank pin, and a shaft geared to the strip feeding means and provided with an arm having a slot in which said crank pin works to produce a complete cycle of said strip feeding means for each complete revolution of the constant speed shaft.

8. A patch-applying mechanism as claimed in claim 1, in which the variable speed operating means comprises a constant speed shaft, a crank device having a crank pin, and a shaft geared to the strip feeding mechanism and provided with an arm having a slot in which said crank pin works to produce a complete cycle of said strip feeding means for each complete revolution of the constant speed shaft, and which includes a cam on the constant speed shaft for actuating the severing device periodically.

9. In an envelope making machine, in combination, means for feeding envelope blanks, a rotary, cyclical patch applying member, means for feeding a web of patch material to said member, means for periodically severing a patch from the leading end of said web, driving means for driving the patch applying member at variable speed to cause the patch applying member to be momentarily slowed down substantially to a state of rest at the time of patch severance, but to be accelerated thereafter and to travel substantially at the speed of the blank feeding means when applying a patch to a blank, and means for driving the patch web feeding means constantly but at variable speed to cause the web feeding means also to be momentarily slowed down to a minimum speed substantially below its average speed at the time of patch severance and thereafter to be accelerated, including means for facilitating readjustment of the total extent of operation of the patch web feeding means in a cycle.

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