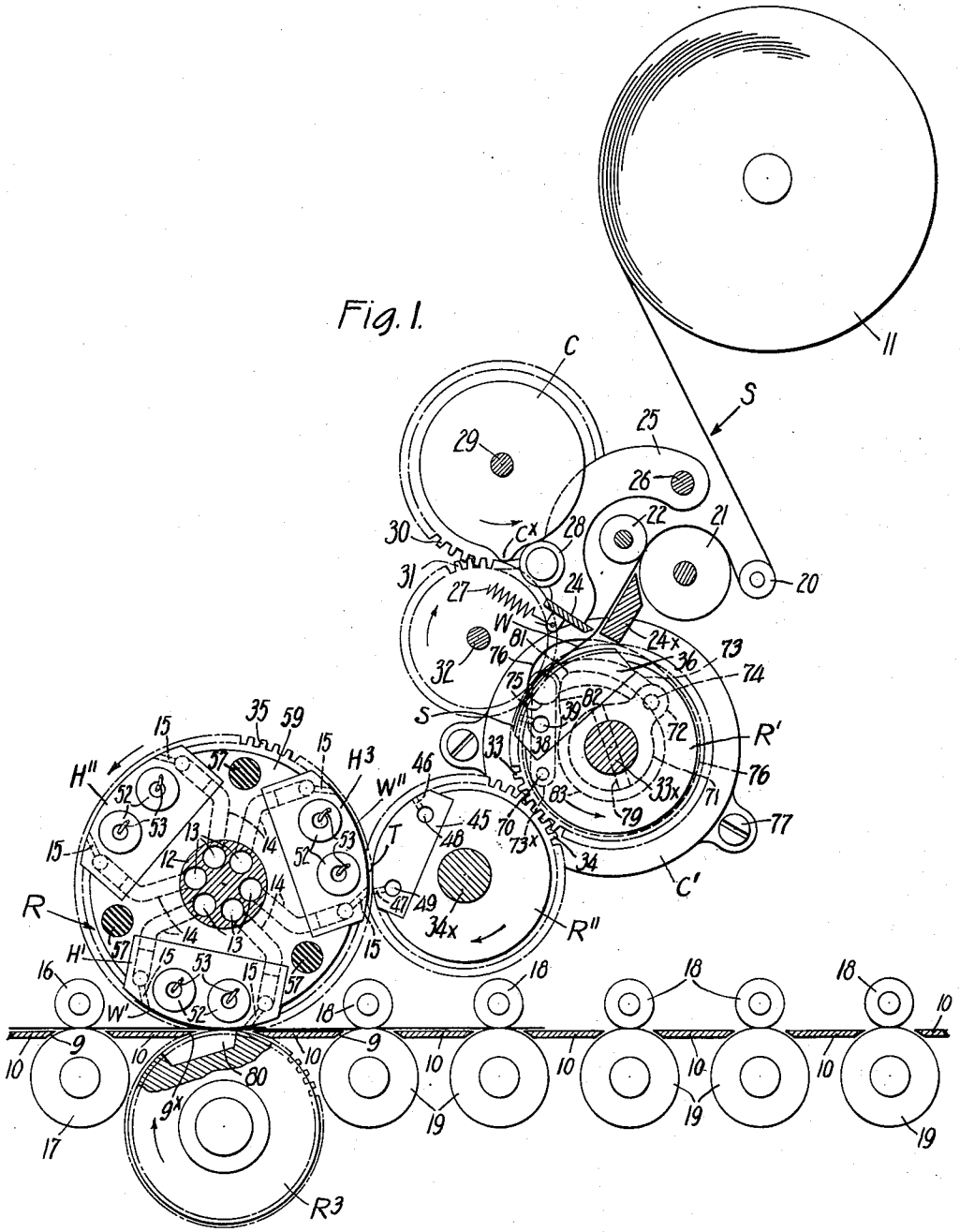
July 2, 1940. A. NOVICK 2,206,043

ENVELOPE MAKING MACHINE

Filed Oct. 20, 1936 3 Sheets-Sheet 1

Fig. 1.



INVENTOR.
Abraham Novick.

BY Moses & Wolfe
ATTORNEYS

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ENVELOPE MAKING MACHINE

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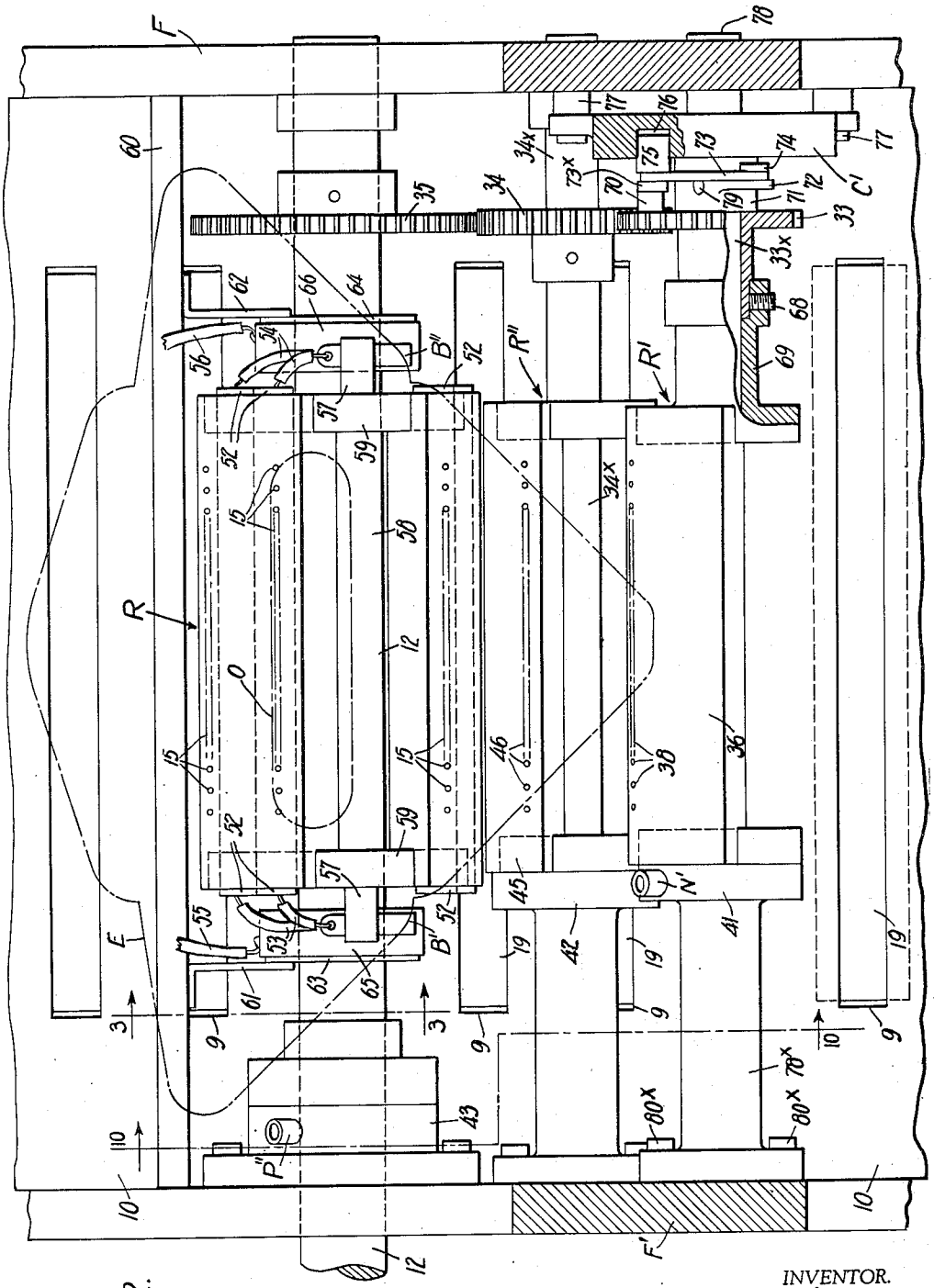


Fig. 2.

INVENTOR.
Abraham NOVICK.

BY Moses & Holte
ATTORNEYS

July 2, 1940. A. NOVICK 2,206,043

ENVELOPE MAKING MACHINE

Filed Oct. 20, 1936 3 Sheets-Sheet 3

Fig. 3.

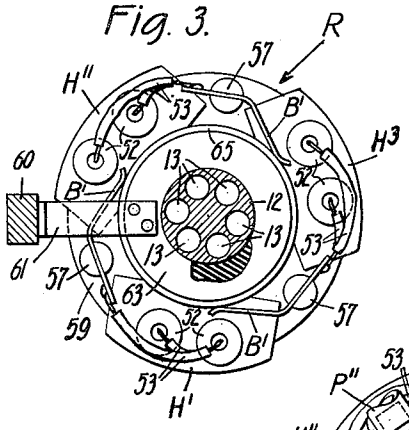


Fig. 4.

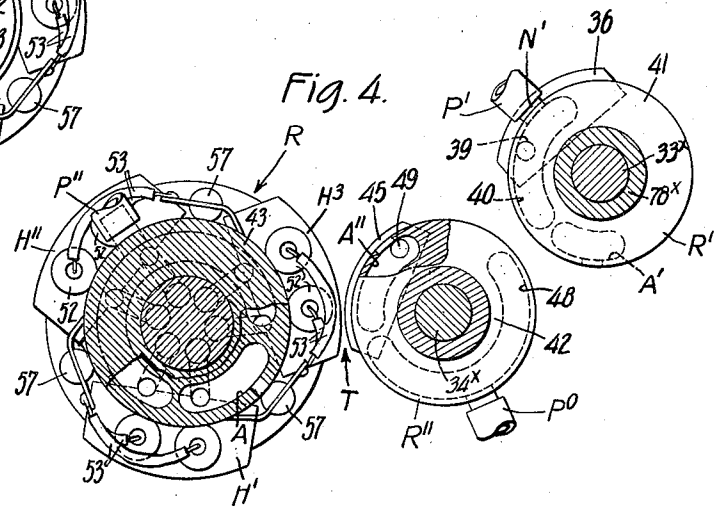
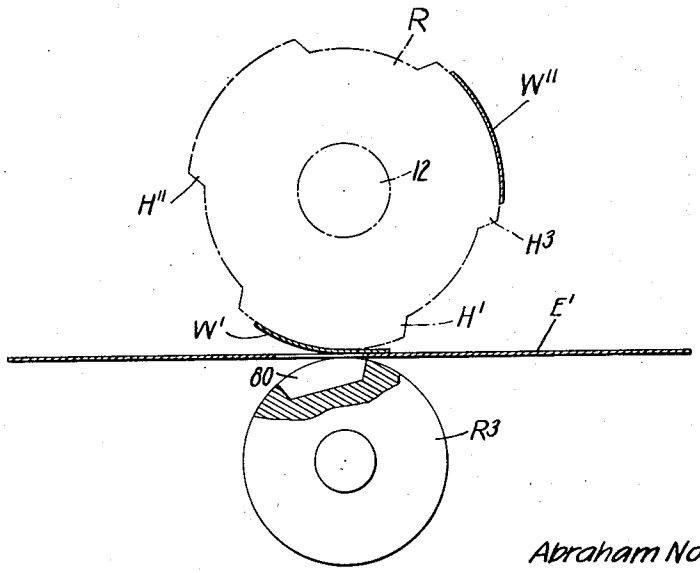


Fig. 5.



INVENTOR.
Abraham Novick.

BY Mosco + Nolte.
ATTORNEYS

Patented July 2, 1940 2,206,043

UNITED STATES PATENT OFFICE

2,206,043

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 October 20, 1936, Serial No. 106,498

8 Claims. (Cl. 93—61)

This invention relates to a mechanism for applying patches to planiform articles, such as windowed envelope blanks, especially to a mechanism of the rotary type for applying patches made of strip material having a component adapted inherently to be rendered tacky by the application of heat during the patch-applying operation, and more particularly to such a mechanism characterized by the provision of means for effecting the heating of the patch while travelling through the patch-applying and pressing devices.

An object of the invention is to provide an improved mechanism of the above type in which the various steps of the patch-applying operation, etc., are accomplished with an unusual degree of despatch, so that the patches can be severed, heated and applied continuously at a relatively rapid speed as compared with existing machines for the same purpose.

Another object is to provide a rotary patch-applying mechanism with self-contained, combined suction devices and electric heating devices arranged in series upon the periphery of a rotor of relatively large radius, and so co-ordinated with the feeding device that suitable intervals elapse within the cycle of operation of the mechanism to permit the severing and heating steps to be accomplished effectively, without interfering with continuous rotation of the mechanism.

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

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

Fig. 1 is a view of a somewhat schematic character, in vertical sectional elevation, of a patch-applying mechanism in the construction of which the present invention has been embodied;

Fig. 2 is a view of the same character, showing in plan some of the parts illustrated in Fig. 1;

Fig. 3 is a fragmentary detail view in vertical section of the main patch-applying motor, taken on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary detail view in sectional elevation on the line 4—4 of Fig. 2, showing the main rotor and associated rotary transfer members; and

Fig. 5 is a fragmentary sectional view of a diagrammatic character illustrating the operation of the patch-applying cycle.

In a now-preferred embodiment of the invention, the part designated by the reference character 11 is a supply-roll of suitable strip material, such as a strip S of material of the nature of "Cellophane," having the desired transparent quality and the capacity to become tacky upon the application thereto of a given degree of heat; or the material may be a strip of suitable character provided with a coating of adhesive also having the capacity to be rendered tacky by the application of heat, in pursuance of the object of the present invention as above stated.

The reference character R designates what will be herein termed the main rotor of the mechanism, which may be described briefly at first as having a hub or shaft 12 with a series of bores 13, disposed in parallelism with the axis of the rotor, and arranged in pairs, there being, in the instance illustrated, three pairs of bores, each pair being in communication, through channels 14, with suction ports 15 formed in three heater-suction devices H', H'' and H^3.

These suction-heaters are disposed at distances of 120 degrees apart around the circumference of the rotor, and as the rotor turns on its axis the suction-heaters are brought successively into peripheral engagement with a complemental rotor R^3, in a novel manner to be hereinafter described more at length.

Feed rolls 16 and 17 advance windowed envelope blanks E into the bight of the roll couple R and R^3 in succession, and as the envelopes are provided seriatim with their appropriate window patches while in transit between said last-named rolls, they emerge over a table 10 for further advancement by the conventional action of a series of feeding couples 18 and 19. The table 10 has apertures 9 to clear the rolls.

In further pursuance of the present invention, the stock strip S is led from the supply roll 11 over a guide roll 20 and between a pair of feed rolls 21 and 22, of which the smaller roll is driven positively, as by a gear (not shown) being pushed thereby over a stationary shear member 24x into position to be severed into desired lengths by the action of a reciprocating shear member 24 which is carried by arms 25 each mounted to swing around a pivot 26 on the supporting frame F of the mechanism.

These arms and their shear 24 are like those shown in my application Serial No. 734,978, filed July 13, 1934, being biased to retracted position by a suitable coiled spring 27, and one of the arms is provided with an antifriction roller 28 which is biased, by the spring 27, against the periphery of a disc cam C, mounted on a shaft 29 which carries also a gear 30 in mesh with a gear

31 on a shaft 32, and driven by a gear 33 on the shaft 33x of rotor R', the gear 33 forming part of a train of gears including also those designated 34 and 35, the last-named being the actuating gear for the main rotor R, and the gear 34 being fixed on the shaft 34x of an intermediate rotor R''. The patch-applying members are thus co-ordinated in suitably timed relation with the strip-feeding and severing devices, to carry into effect the various steps of the operation now to be described.

The leading end s of the strip S, before severance, is advanced by the action of the rolls 21 and 22 into the position shown in Fig. 1, extending over a peripheral sucker block 36 upon a sucker rotor R' which will be called herein the first sucker rotor, this block having a sucker orifice 38 which is in communication with a suitable source of suction (not shown) by a bore or channel 39 opening at an end of the aforesaid first sucker rotor block 36 into an arcuate slot 40 (see Fig. 4), in a valve member 41 mounted alongside of the first sucker rotor and provided with a nozzle N' and a suction pipe P' leading to the source of suction, which it will be understood is connected, as by suitable other pipes P^0, P'', etc., with similar members 42 and 43, by which severally the necessary suction service is carried to the main rotor R and to the intermediate sucker roll R''.

In each of the sucker devices there is a channel of arcuate form in communication with a port leading to the atmosphere, and as such channels and relief ports operate in known fashion they are designated generally by the common reference characters A, A', A'', etc., and reference will only be made to them in passing, for the sake of brevity.

In pursuance of a stated object of the invention, it is intended that the main rotor R shall only apply one patch to a blank at each two-thirds of a revolution of the rotor, and to this end it will be observed that as the main rotor and the intermediate sucker roll run at the same peripheral speed, the latter roll is of suitable diameter to have a periphery only two-thirds that of the main rotor, and it has a suction block 45 with two rows of suction ports 46 and 47 energized by suction from pipe P^0 through end block 42 and channels 48 and 49. It operates in known fashion to pick the patches W', W'' etc., in their proper order, from the first sucker rotor and to carry each patch around to the region T of cooperation with the main rotor, where the patch is picked off the intermediate rotor and drawn around the main rotor R, under the action of the suction-heater element that registers at the appropriate time. (See H', Fig. 1.)

Each heater comprises a plurality of electrical resistor elements 52 provided with electrical terminal conductors 53 and 54 by which electrical current is led thereto from a suitable source of such energizing current (not shown).

Each pair of conductors 53 at one end of the rotor R is connected electrically with a contact brush B' mounted on one of a set of three posts 57 of insulating material carried by a head 59 into which the suction-heater elements H', H'' and H^3 are inset, there being a like head 59 at the other end of the main rotor R, provided with brushes B'' connected to the conductors 54.

Upon the supporting frame member 60 are brackets 61 and 62, each supporting a collar 63, 64, of insulation material, surrounded by a commutator ring 65, 66 of copper or other good electrically conductive metal, at each end of the rotor, to which collars the conductors 55 and 56 lead from the usual wall plug, or other source of electrical current. The path of the heating current may be traced as follows, viz., conductor 55 to ring 65, to brush B', to conductors 53, to resister-heaters 52, to conductors 54, to brushes B'', to ring 66, to conductor 56, to other side of current source.

The first sucker roll R' is provided with a means for causing a dwell of the strip-feed, at the time of each severance of the strip by the shears 24 and 24x, to cut off a patch, and for this purpose the sucker block 36 is given a differential decelerating and accelerating movement relatively to, and within each cycle constituted by a complete rotation of, the shaft 33x, which rotates constantly in the direction of feed, viz., counterclockwise in Figs. 1 and 4.

As a convenient means, which may be like that disclosed in my above mentioned application, for accomplishing this differential movement, a crank pin 74 on a crank arm 72 integral with a collar 71 fixed by a pin 79 upon the shaft 78 is connected by toggle-links 73, 73x with a crank-pin 76 set in the face of the gear 33, which is fixed to the hub 69 by a set-screw 68 of rotor R'.

At the knuckle of the toggle, a pivot pin with anti-friction roller 75 runs in a face-cam groove 76 of a fixed cam C' mounted by screw studs 77 on the frame member F. One end of the shaft 33x rotates in a suitable bearing in the frame member F, and the other end of the shaft 33x has a bearing in the other frame member F' and extends through a hollow sleeve 78x secured, as by cap screws 80x to the frame side F', the valve member 41 being fixed on the inner end of the sleeve 78x.

The contour of the cam groove 76 causes the pin 75 to travel in a substantially elliptical orbit, and at its region of greatest eccentricity, 81, the pin permits a certain travel of the crank 72 without corresponding rotative progress of the gear 33. In other words, the collar 71 lags, or is decelerated, with its arm 72, while passing the high point 81 in Fig. 1; and it then accelerates, after passing the high point, where it enters upon a stretch 82 of the cam groove which emerges into the concentric portion 83.

During the travel in this concentric cam-groove portion the gear 33 rotates at the same speed as the shaft 33x, with the result that the sucker port 38 draws the patch W rapidly down to the region where the sucker block 36 of the first sucker rotor R', and the sucker block 45 of the intermediate or second sucker rotor R'', are in peripheral contiguity, and the transfer of each patch W is accomplished at a uniform linear speed by and between the peripheries of the blocks 36 and 45.

It will be understood that the bleeding-channel A' of the member 41, and the bleeding-channel A'' of the member 42, are so disposed that the vacuum effect at sucker port 38 is broken by its registration with channel A' at the instant of entry of the leading end s of the patch W between the blocks 36 and 45, the port 46 in the intermediate sucker rotor R'' thus picking up the said leading end of the patch while the port 47 is still closed, so that suction becomes effective at the port 38, and continues effective, until the port 47 also becomes effective, and the patch is there held at both its leading end and its trailing end when the leading end has been carried around

to the transfer point T, (see Fig. 4), the suction port 15 of the main rotor block H^3 takes hold, and then the vacuum in both of the ports 46 and 47 of the intermediate rotor R'' may be broken by registration of the port 49 (see Fig. 4) with the bleeding-channel A''. The control of the patch is then shifted to the leading port 15 of the block H^3, and thereafter is shared by both ports 15 thereof.

To summarize the above description, the web S of window patch material is drawn from the supply roll 11 around idler 20 and between feed rolls 21 and 22 and therefrom between the movable and stationary shears 24 and 24x to a point at which the suction port 38 picks up control of the leading end s of the patch, drawing the portion W of the strip taut against the edge of the shear member 24.

This is effected at the time when forward rotation of the first sucker rotor R' dwells for an instant while the high spot Cx of the cam C engages roller 28 to actuate the lever 25 and shear 24 to sever the web, thus cutting off the trailing end of the patch, which is carried on around the periphery of the block 36 of rotor R', the speed of the latter being accelerated rapidly by action of the toggle arms or links 73 and 73x. The angle between them increases rapidly as the pin 75 moves in the groove 76 into the concentric portion thereof which lies nearer to the shaft 36x, and causes the block 36 to revolve at the same peripheral speed as the block 46 on rotor R''.

The patch is then carried by rotor R'' around clockwise to the transfer point T where it is picked up by the appropriate suction heater device, as for example that designated H^3.

The patch, thus engaged by the device H^3 in Fig. 1, is then carried around with the rotor R until it reaches the position occupied in Fig. 1 by the patch W', which is there shown as being applied to the window section of the blank E', in cooperation with the rotor R^3. It may be noted at this point that the rotor R^3 has its periphery cut away at 80 so that pressure is only applied at a suitable marginal portion of the circumference of the window opening O (see Fig. 2), to press said marginal portion against the edge of the window opening throughout its entire circumference. Otherwise the tacky patch would be pressed through the window opening against a circumferential portion of the rotor R^3, to which it would adhere and be distorted and destroyed.

As the rotor R continues to turn, at a constant speed, the blank E', with the patch W' in place, is advanced to the first couple of rolls 18—19, where the pressure is again applied and thence the patched window blank is advanced progressively through each of the series of roll couples 18 and 19 for further treatment and/or storage.

It is to be noted that the device H'' is free from any patch, so that the peripheral spacing between two successive patches, as W' and W'', is equal to 240 degrees of angular displacement and this corresponds to the distance between a window opening of one blank E' and the succeeding blank E''.

During this rotative progress of the patch, ample time elapses for the heating effect of the resistors to cause the desired tackiness of the patch, and the latter is therefore in suitable condition for adhesion to the blank envelope as already described.

It has been found in practise, however, that whether operated according to this intermittent, stagger system or operated in such fashion that the rotor R receives patches in proper timing for each of the devices H', H'' and H^3 to pick one up at each revolution, so that three patches are applied per turn of the rotor R, the mechanism can be run at very high speeds, much higher than in existing envelope machines for applying patches to the windowed portions of envelopes.

The self-contained heater-suction arrangements upon the periphery of the rotor, served by electrical current and by suction derived from sources exterior to the rotor, constitute the latter an unusually compact and serviceable instrumentality for the intended use, as herein disclosed, and it will be clear to those skilled in the art that the invention is capable of utilization in connection with other feeding instrumentalities than those illustratively disclosed herein.

As an example of a desirable modification which can be made advantageously in the illustrated embodiment, it is within the scope of the invention to substitute a rotor provided with variable speed mechanism of the kind described in connection with the first sucker rotor R', but which in the instance will be embodied in a rotor occupying the position of the rotor R'' in Fig. 1, this replacing both of the rotors R' and R'', so that the patch material S will be run directly from the cutters 24 and 24x around this substituted rotor and thence to the main rotor R, where the patches will be taken over, heated and pressed on to the windowed blanks just as heretofore described, the rest of the associated mechanism being retained.

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 a mechanism of the class described; means for juxtaposing a planiform article, such as an envelope blank, and a patch to be united therewith by a component of said patch adapted to be rendered tacky by heat, said means including a single patch applying pressure rotor provided on its periphery at equal space intervals with a plurality of spaced apart self-contained heating means and self-contained means acting constantly and progressively to hold a patch in continuous contact with the rotor for said heating and pressure operations during rotation of said rotor, means to advance a series of said planiform articles individually in appropriate patch-receiving position successively at identical linear speed with the periphery of said rotor, and at uniform time intervals corresponding to rotation of the pressure rotor through a whole number of such space intervals less than the total number thereof, and means for delivering patches to the patch holding means on the rotor in predetermined sequence and at uniform time intervals equal in extent to the time intervals between the delivery of successive planiform articles in patch receiving position, and means to advance the patched articles away from patch receiving position.

2. Mechanism for prolonging the period of time during which a patch is subjected to heat prior to its application to a planiform articles such as an envelope blank, comprising a plurality of patch heating and applying members, and means for causing these members to move in series through a cyclical path, including a patch applying and a patch transferring station whereby the patch carried by one of such members is subjected to heat during the time that another of

said members is transferring the patch material applied thereto to such planiform article.

3. In a machine for applying patches to envelope blanks, in combination, means for advancing the blanks at uniform speed and in definitely timed relation, a patch applying rotor having an odd number of equally spaced patch heating and carrying segments for receiving, holding, heating and applying the patches, and rotary means for delivering patches to the segments comprising a rotary member whose periphery is equal in extent to a whole number of heating segment spaces less than the total number thereof.

4. In a mechanism of the class described, the combination of means for juxtaposing a planiform article, such as an envelope blank, and a patch to be united therewith by a component of said patch adapted to be rendered tacky by heat, said means including a pressure rotor provided with a plurality of equally spaced heater-suction devices arranged at spaced intervals around the periphery of said rotor, each of said devices being provided with self contained heating means and acting constantly on the patch to hold it in position to be heated during rotation of the rotor.

5. A pressure and heating rotor, as claimed in claim 4, in which each of said heater-suction devices comprises a unitary metallic heat-retaining body in which a resistor is embedded and through which suction is made effective by means of channels terminating in peripheral suction ports.

6. A pressure and heating rotor, as claimed in claim 4 in combination with means to deliver a series of patches thereto seriatim, and in such a manner that at least one of said heater suction devices is free from a patch during each complete revolution thereof, said delivery means including a second rotor to receive, hold peripherally, and deliver, a patch during each rotation of said delivery rotor, said second rotor running peripherally in unison with the pressure rotor and having a periphery which bears a ratio to the periphery of the pressure rotor which is less than one and which is represented by an irreducible fraction having a whole number other than one for the numerator and the total number of heater-suction devices for the denominator thereby to effect delivery of said patches successively in said intended intermittent sequence.

7. In a machine for applying patches to envelope blanks, the combination of means for advancing the blanks in definitely timed relation, a platen rotor, a patch applying rotor having a plurality of segments disposed at equal spaces upon the periphery of the rotor and arranged to press the blanks against said platen rotor, each of said segments having a resistor heating element and a suction means to hold the patch against its peripheral portion and rotary means cooperating with the segments to deliver patches thereto in timed relation, said platen roller and patch delivering rotary means being each equal in peripheral extent to a whole number of said segments.

8. In a mechanism of the class described, the combination of cyclical means for applying a patch having a component adapted to be rendered tacky by heat to an envelope blank in each cycle, said means comprising a pressure rotor provided with an internal heating means and a self contained means acting constantly upon said patch to hold it in contact with the heated rotor, means for rotating said rotor, means for transferring the patch to the self contained holding means at a predetermined position of said rotor and means for transferring the patch to the envelope blank under pressure after rotation with the rotor for a period equal at least to the full duration of the patch applying cycle.

ABRAHAM NOVICK.