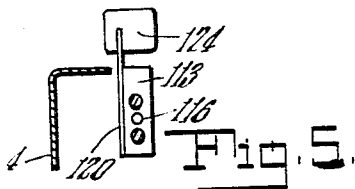
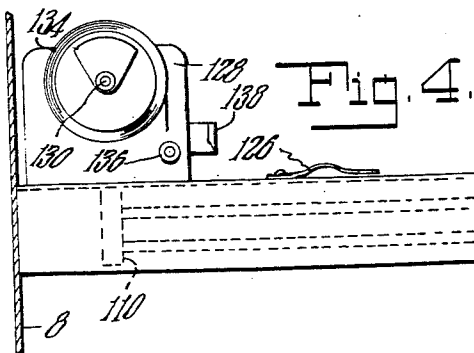
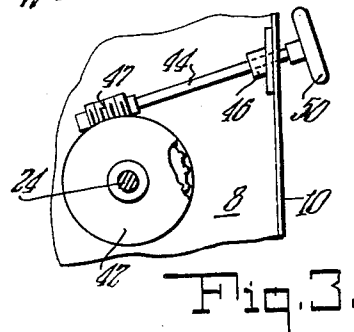
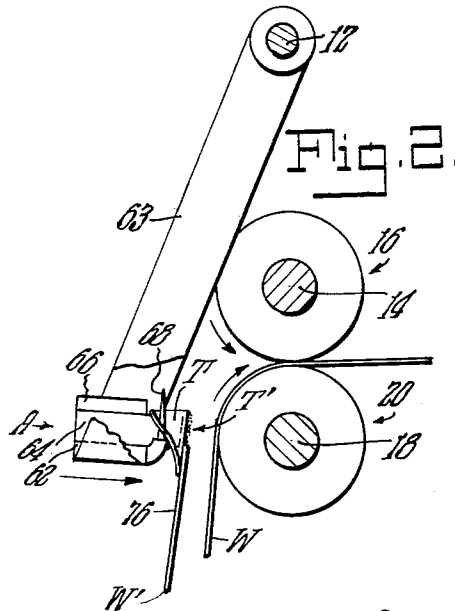


R. A. BUTLER, JR
SPLICING MACHINE

3 Sheets-Sheet 1

Fig. 1.



INVENTOR.
Richard A. Butler, Jr.
BY *Frank Ross, Atty.*

June 14, 1960

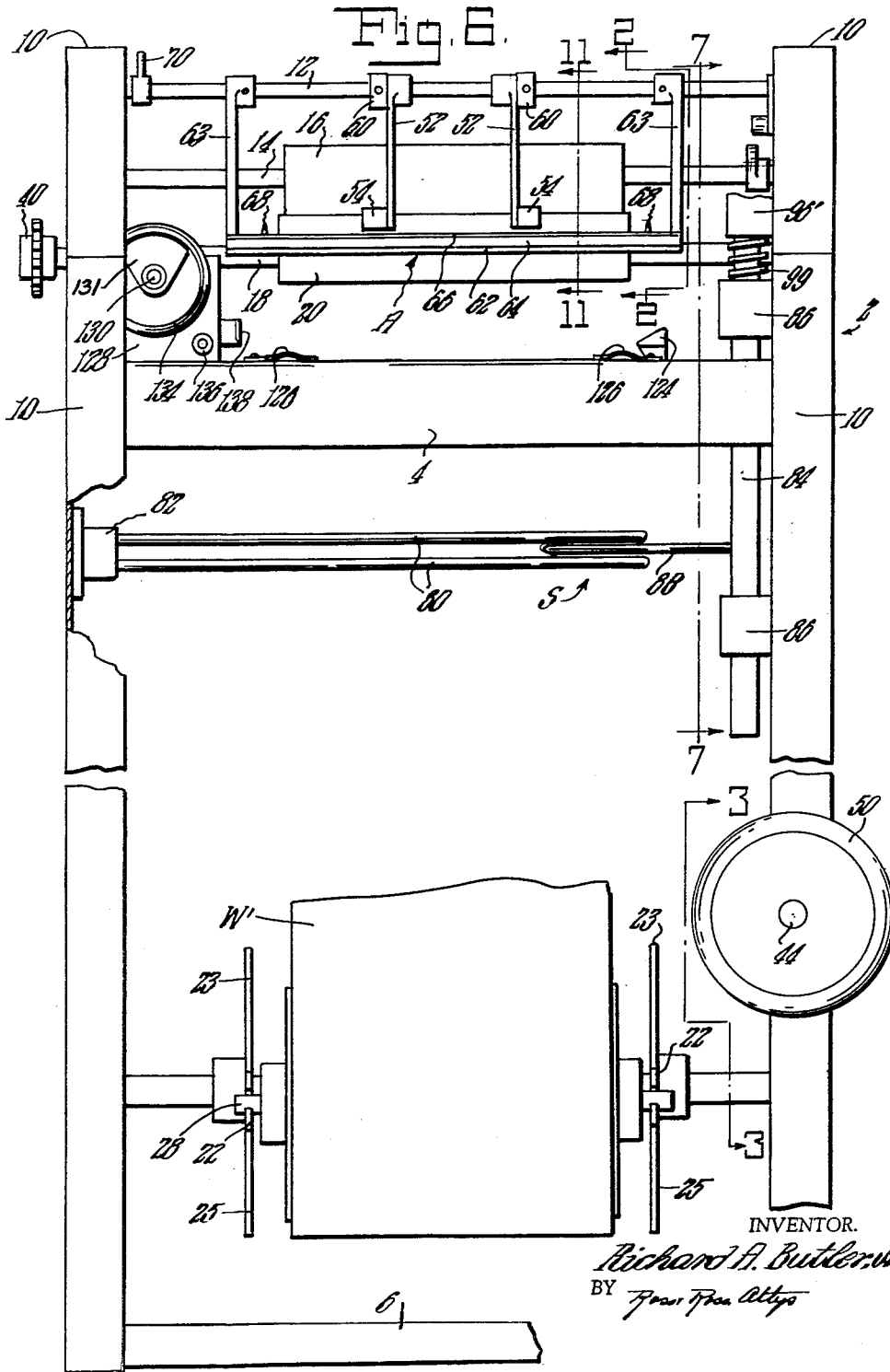
R. A. BUTLER, JR

2,940,507

SPLICING MACHINE

Filed Feb. 6, 1957

3 Sheets-Sheet 2



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2,940,507

SPLICING MACHINE

Richard A. Butler, Jr., Palmer Road, Monson, Mass.

Filed Feb. 6, 1957, Ser. No. 638,613

1 Claim. (Cl. 154—42.3)

My invention relates to new and useful improvements in a splicing machine and is directed more particularly to improvements in the means for preparing a web roll for splicing to a web running to a packaging machine, printing machine, box-making machine, or similar web consuming machine, and to the means for the making of the splice to the roll when thus prepared.

It is the principal object of my invention to provide a novel and improved construction of the type in which a web-renewing mechanism is employed for use in the supply of webs to a web-consuming machine wherein provision is made to enable the web-supply to be maintained without stopping the machine by arranging a replacement web-roll and the running web to engage and adhere to one another so that the web of the replacement roll commences to be drawn from the roll at which time the running and expiring web is severed or depleted, all of which eliminates objectionable inconveniences now present in the known prior art devices and which will operate with a maximum amount of ease and with a minimum degree of effort.

One of the primary purposes of my invention is to provide structural and operational improvements in devices of the class to which reference has been made, which improvements not only simplify the structure as such, but also provide important distinct advantages in strength, durability, efficiency and the like.

Stated otherwise, herein as a mechanism for automatically splicing the leading end of one roll of web to the trailing end of a diminishing or an exhausted web supply as applicable for use in conjunction with web-consuming machines in such manner as to eliminate the necessity of stopping the machinery, removing the exhausted roll, placing a new roll supply in position, and then threading the web through the machinery preparatory to starting same again, all of which operations were time consuming and costly from the point of view of down time.

The paper or other flexible web which is fed to printing presses or other web-consuming apparatus runs from web rolls which must be replaced periodically as they are consumed.

Successful operation of web-consuming machines depends in large measure on the maintenance of a continuous supply of paper thereto.

This invention envisions a high speed web roll replacement involving apparatus in which the web of a new or reserve roll bearing a layer of adhesive at its leading end is brought to a position adjacent the web of a running roll running to the web-consuming apparatus. The leading end of the fresh roll web is then spliced to the running web which thereafter runs out or expires.

The fresh and running web rolls are rotatably carried by movable supports, such as the spider arms of a multi-armed reel which are rotatable to bring successive fresh rolls to the splicing position.

It includes means for effecting a splice of the leading end of the paper on the new or reserve roll to the run-

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ning web as the running web roll is about to expire so that paper supply to the web-consuming machine is uninterrupted.

Herein, the mechanism is provided with a sensing device which automatically sets the mechanism in motion as the trailing end of the diminishing roll from which the web is being fed passes therepast so as to make unnecessary manual intervention to accomplish the desired results.

Herein, a pair of spiders is employed, same having three roll positions, one for a running roll from which the web is drawn, a second for a replacement roll the web of which is joined as described to the web passing from the running roll, and the third for a freshly loaded roll, the various rolls successively being brought into loading, replacement and running positions.

The spiders includes a plurality of angularly spaced arms for receiving the ends of the core shafts projecting from the rolls for the support thereof relative thereto.

These arms are arranged in such spaced relation that when one set of arms is in substantially upright unwinding position to support the roll therein for unwinding, the next successive set of arms is in generally horizontal position to receive a full replenishing roll, and the next successive set of arms is in the unloading position for the automatic release of the core shaft of the exhausted roll.

Other prime objects of my invention include; first, the securing of a higher degree of accuracy and greater degree of variety in the manner of work performed therewith than has heretofore been possible with prior devices known in the art; second, the attainment of a higher speed of construction and assembly of the device due to its simplification of design; third, the attainment of a flexibility or a capability of adjustment by which a large variety of work can be produced by means of the same device; fourth, the achievement of a greater ease in adjustment and repairs; fifth, the provisions of a construction which may be readily installed with respect to the various purposes for which it is intended, and sixth, the provision of such other improvements in and relating to splicing apparatus of the type above referred to as are hereinafter described and claimed.

With the above primary objects in view, it is still another object of my invention to provide a construction of the above described character in which the number of operating parts is greatly reduced and which is compact in accordance with the demands and desires of manufacturers and purchasers alike and which is not only distinctive in its appearance and practical in its value but also reliable in its operation and efficient in its use.

It is still a further object to provide a device which is constructed of relatively simple parts which are adapted to be readily assembled and which when once assembled are positively and securely retained in operative relationship and which cannot be readily separated from each other, either accidentally or otherwise.

In the accompanying drawing, I have illustrated a complete example of a physical embodiment of the invention in which the parts are combined and arranged in accordance with one mode which I have devised for the practical application of the principles of the invention. It will be understood however that changes and alterations are contemplated and may be made in these exemplifying drawings and mechanical structures, within the scope of the claims, without departing from the principles of the invention.

In the drawings:

Fig. 1 is a vertical sectional elevational view, more or less diagrammatic, through the machine of the invention to show the relationship of the important features thereof;

Fig. 2 is a sectional elevational view on the line 2—2 of Fig. 6;

Fig. 3 is a sectional elevational view on the line 3—3 of Fig. 6;

Fig. 4 is a front elevational view of the web cutting device of the machine.

Fig. 5 is a sectional elevational view on the line 5—5 of Fig. 4;

Fig. 6 is a front elevational view of the machine of the invention;

Fig. 7 is a sectional elevational view on the line 7—7 of Fig. 6;

Fig. 8 is a sectional plan view on the line 8—8 of Fig. 7;

Fig. 9 is a sectional plan view on the line 9—9 of Fig. 7;

Fig. 10 is a sectional plan view on the line 10—10 of Fig. 6; and

Fig. 11 is a sectional elevational view on the line 11—11 of Fig. 6.

In the following description and claims, various details will be identified by specific names for convenience. These names however are intended to be as generic in their application as the art will permit.

Referring now to the drawing more in detail, in which similar characters of reference indicate corresponding parts in the several figures and referring more particularly to the preferred form of my invention selected for illustrative purposes, I have shown, in Fig. 1, the general arrangement of the machine in order that the general relation and utility of the various components may be better understood.

The general arrangement of the machine will be described to facilitate a clear understanding of the features of construction subsequently to be described in detail.

Transversely spaced side frames, such as 2, are connected by an upper member 4, and a lower floor member 6. Members 4 and 6 are secured at opposite ends to the walls 8 of the frames, as by rivets, weldments, or the like.

The frames have inwardly turned flanges 10 on the front, rear and upper edges thereof. The forward side or front of the machine is indicated by F.

An upper rock shaft or transfer arm shaft 12 is oscillatable in bearings secured to the walls 8 of the frames 2, as are an upper feed or pull roll shaft 14 having an upper feed or pull roll 16 and a lower feed or pull roll shaft 18 having a lower feed or pull roll 20.

The lower shaft 18 is driven from the web consuming machine, such as a wrapping machine which uses the web of wrapping material fed thereto by the machine hereof.

A pair of spiders, each having a plurality of angularly spaced arms or paper reel carriages 22, 23 and 25 which are fixed to a carriage shaft 24 having its opposite ends journaled in suitable bearings in the walls 8 of the side frames 2.

Outer ends of the arms 22, 23 and 25 are provided with sockets 26, as shown to receive and support opposite ends of arbors 28 and 30 of rolls of web material such as wrapping paper.

The web W from the roll on the arbor 30 is shown as extending upwardly from the arms 23 to the bite of the feed rolls 16 and 20. From the feed rolls, the web W passes to the web consuming machine in the direction indicated by the arrow b. Such web W is identified herein as the running web roll.

The web W' from roll 32 thereof on arbor 28 extends to an applicator or transfer device which is generally indicated by the letter A. Said applicator functions as a web delivery device which is swingable between a non-operative position when it supports the leading edge of the web W' in a ready-to-splice manner to an operative position where it secures the leading edge of the web W' to the trailing end of the web W.

As the final end of the web W arrives at the feed rolls

16 and 20, the applicator A is swung clockwise to serve to attach the leading end of web W' to the final end of web W by means of an adhesive.

Roll 32 as the replenishing supply becomes the new supply for the web consuming machine.

The shaft 24 is thereupon manually rotated counter-clockwise so as to position the arms 22 to the position formerly occupied by the arms 23 and the empty arbor 30 of the now exhausted roll is free to drop away from the arms and onto the wall member 6, it being appreciated that no clamps or the like are employed in connection with the arms so as to hold the arbors relative to the arms. The arms 23 may now be called empty.

The arbor of a new roll of web material meanwhile has been placed in the sockets of the arms 25 which by now has assumed the position formerly occupied by the arms 22 preparatory to the assumption of the replenishing function by the roll 32 thereof.

The leading end of the web of the new roll is first prepared for use by manually bringing same up to the transverse member 4 which may be identified as a preparation table. At said table, the end of the web is prepared by mechanism associated therewith for subsequent releasable attachment to the applicator whereby the leading end may be eventually secured to the trailing end of a web being fed through the feed rolls.

Webbs of material such as paper used in wrapping machines are sometimes printed or are otherwise provided with panels of indicia which are so arranged that when wrapped around an object or article the printed matter or the panels fit the object in a predetermined manner so that the printed matter or the panels register with the sides of the object. Accordingly the webs have printed matter or panels spaced longitudinally thereof in such a manner that they are of a width to correspond with the width of the sides of the object or article being wrapped.

According to this invention, the panels of the leading edge of the web of the new or replenishing roll register with or match the panels of the final end of the old or exhausted web being fed from the machine.

The web W extends through a sensing and paper tension means generally indicated by the letter S which controls the operation of the applicator A.

By preparing the leading edge of the new or replenishing web in a certain way, subsequently to be described, and by driving the machine hereof from the web-consuming machine and in timed relation therewith, the panel of the said leading edge of the new web is applied by the applicator in substantial register with a panel at the end of the web about to become exhausted. The applicator is actuated into operating position as the trailing end of the web W passes through and past the sensing mechanism.

Opposite ends of the rock shaft 12 are journaled in bearings, such as 12', fixed to the walls 8 of the side frames, as will be observed by reference to Fig. 8.

Likewise roll shafts 14 and 18 are rotatable in bearings 14' and 18' respectively fixed to the walls 8. See Figs. 9 and 10.

The shaft 18 is the driven shaft and has fixed thereto a sprocket 40, as shown in Fig. 6, for connection by a chain to the web-consuming machine to be supplied with the web material by the machine hereof.

The shaft 24 is journaled at opposite ends in suitable bearings of the side frames 2 and has a worm wheel or carriage worm gear 42 fixed to one end thereof. See Fig. 3.

A carriage worm drive shaft 44, rotatable in a bearing 46 fixed to the adjacent side frame has a worm or carriage worm pinion fixed thereto which is in mesh with the worm wheel 42.

A hand wheel 50 fixed to the outer end of the shaft 44 facilitates the rotation of the shaft 24 and the counter-clockwise movement of the arms 22, 23 and 25. See Figs. 3 and 6.

Tension arms 52 are loosely mounted on rock shaft 12 and have non-rotatable tension rolls on the lower depending ends thereof for frictionally engaging the web being fed through the feed rolls 16 and 20. See Fig. 11.

The rolls 54 may be of rubber, metal, or other suitable material adapted to keep the web taut.

Pins 56 extend outwardly from the arms 52. Other pins 58 extend outwardly from tension collars 60 fixed to the rock shaft 12. Said pins 56 and 58 are connected by tension springs 61 and function to tension the adjacent arm 52 and to provide the desired drag on the web.

The applicator A includes an elongated lower transfer bar or plate 62 secured to lower ends of relatively spaced levers or transfer arms 63 which are secured to the rock shaft 12.

An elongated presser or transfer cushion 64 which may be formed from a resilient material such as rubber or the like and is secured to the bar 62 by an upper transfer bar or plate 66.

New web support pins 68 are secured to opposite ends of the bar 62 and extend upwardly therefrom as best shown in Figs. 2, 6 and 11.

A spring return arm 70 is fixed to one end of the rock shaft, as shown in Fig. 6, and a spring 72 has one end thereof attached thereto. The opposite end of the spring 72 is attached to an anchor 74 of the frame, as will be observed by reference to Fig. 11. This spring functions to yieldingly hold the applicator A away from the roll 20 in the non operative position substantially as shown in Figs. 2 and 11.

The leading end of the new web W' is represented by 76 in Fig. 2. Across the free edge of the same is secured an adhesive material such as adhesive tape T of suitable type.

Opposite ends of the tape T are caught on the pins 66 so that the end 76 of the web W' is supported by the applicator A. The side T' of the tape adjacent the roll 20 and the portion extending upwardly beyond the end 76 of the web is tacky.

As the rock shaft 12 is swung clockwise, the pad 64 of the applicator presses the tape T against the web W bearing on the roll 20.

Thus the leading end of the web W' is attached to the web W and the panels of the webs are related, as desired.

The applicator is operated as the last end of the web W passes through the sensing mechanism S which operates to bring about this movement of the applicator.

The sensing device includes a pair of parallel, vertically spaced, transversely extending rear sensing rods or arms having their inner ends fixed in a member 82 which is secured to the wall 8 of the adjacent side frame. See Fig. 6.

An elongated tubular, vertically disposed timing shaft 84 is reciprocable and oscillatable in bearings 86 which are fixed to an adjacent side frame, as may be observed by reference to Figs. 7 to 10 inclusive.

A detector or forward sensing rod or arm 88 has an inner end which is adjustably secured along a vertically extending slot 90 in the shaft 84.

The shaft 84 is urged in a clockwise direction, as shown by arrow a in Fig. 10, by a spring 92 having opposite ends attached to anchors 94 and 96 of the shaft 84 and the wall 8 of the adjacent side frame respectively.

Normally the web W being fed by the rolls 16 and 20 passes through the space between the pair of rear sensing rods 80 and 80 and the forward sensing rod 88, as will be observed by reference to Fig. 1. The web W prevents counterclockwise movement of the rod 88 between the spaced rods 80. The rod 88 is swung to a position in juxtaposition with the front side of the web W and functions to provide a tension thereagainst.

As the trailing end of the web W passes upwardly past the rods, spring 92 functions to turn shaft 84 in the direction of arrow a shown in Fig. 10 so that member 88 passes

between the aligned spaced members 80 and 80 to the position therebeyond as shown in dash lines in Fig. 10.

A timing arm or head 96' is fixed to the upper end of the shaft 84 and is provided with a nose 97 having a ledge 98 and a lower cam roll 100.

A timing return spring 99 is disposed around the shaft 84 between the upper bearing 86 and the head 96' and functions to resist the downward movement of the shaft from the normal position shown in Fig. 7 and to return the shaft to said normal position when released as will be shortly observed.

A timing cam 102 is fixed to the upper roll shaft 14 for engaging the cam roll 100 of the head 96' so as to depress the head and the shaft downwardly.

A transfer arm follower or lever 104 is fixed to the rock shaft 12 and has a transfer arm follower cam roll 106 pivoted thereto, as shown.

As the head 96' is depressed downwardly the nose 97 thereof functions to cam the roll 106 as will be observed.

With web W disposed forwardly of the pair of rear sensing rods 80 and 80 and rearwardly of the forward sensing rod 88, the shaft 84 and the head 96' are disposed in the position shown in Figs. 8, 9 and 10. The upper portion of the head 96' is disposed at a side of the cam 102 and the lever 104 or angularly relative thereto. In said position, the head 96' is not engaged by the cam 102 as it rotates with the shaft 14.

As the final end of the web W passes upwardly past the sensing rods, rod 88 is released by said web whereby spring member 92 actuates shaft 84 in a rotary manner so that roll 100 of the head 96' is swung to and through a position in vertical alignment with the cam 102 which is simultaneously being rotated clockwise.

Cam 102 engages the roll 100 so as to cam the head 96' and the shaft 84 downwardly against the action of the spring 99.

As the head is turned as above referred to, the ledge 98 thereof overlies roll 106 of lever 104 fixed to the rock shaft 12.

As the head is depressed as aforesaid, the ledge 98 engages the roll 106 and cams it so as to actuate the lever 104 and in turn to rotate the rock shaft 12 and to swing it through such an angle as moves the applicator A inwardly toward the feed roll 20.

With the tape T attached to the end of the web W', same is pressed against the web W so as to secure the leading edge of the web W' to the web W.

In such operation, the tape slips off from the pins 68 or is ruptured thereby so as to be released therefrom.

The cam 102 quickly impacts the roll 100 of the head 96, and the spring 92 continues to turn the head to a position beyond and alignment of the cam and roll.

Thereafter the shaft 84 or the head 96' are manually grasped for turning counterclockwise, and the web W' is looped outwardly to allow the rod 88 to be swung therepast so as to again be disposed on the outer side of the web. The head or shaft is then released and the rod rides on the outer side of the web which is backed up by the rods 80.

Means for preparing the leading end of a new web, for its attachment to the trailing end of the web being fed, will now be described, with particular reference being made to Figs. 4 and 5.

Longitudinally spaced brackets 110 are secured to and depend from the transverse member 2. Upper and lower guide rods 112 extend between said brackets and have opposite ends secured thereto.

A slide 113 is slidable on said rods and a spring 114 is connected to anchors 116 and 118 of the slide and wall 8 of the right hand frame respectively. A knife 120 is secured to the slide 113 and has a slitting edge 122. A manually engageable member 124 is carried by the knife 120.

Spring clips 126 have outer ends secured to the upper side of the member 4, as by screws or the like, and are

formed at their adjacent inner ends to receive thereunder opposite side portions of the leading end of a new web so as to hold the end of the web on the member 4.

The end of the new web may be shifted so that it will be trimmed squarely by the knife as it is moved to the right, and will be trimmed in the desired relation to the endmost panel of the old web.

A support 128 is fixed to and extends upwardly from the transverse member 4 and carries a spindle 130 for the core 132 of a roll of adhesive tape 134. A plate 131 on the spindle 130 holds the core in place.

The end of the tape is drawn under a roll 136 of the support and to the right for the desired length. A knife 138 is provided for cutting the tape when the desired length has been drawn from the roll.

The tape is applied to the edge of the web at its end, while the web is held by the clips, so that approximately one-half the transverse width of the tape extends beyond the edge of the web end, as in Fig. 2.

While I have illustrated and described the invention as embodied in certain specific arrangements, I do not intend to be limited to the details shown since various modifications and structure changes may be made without departing in any way from the spirit of the invention.

It will be understood by those skilled in the art that the object of the invention may be attained by use of constructions different in certain respects from those disclosed without departing from the underlying principles of the invention.

Without further analysis, the foregoing is intended to so fully reveal the gist of my invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this

invention, and therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims below.

I therefore desire by the following claims to include within the scope of my invention all such variations and modifications by which substantially the results of my invention may be obtained through the use of substantially the same or equivalent means.

Having thus described my invention, what I claim is:

- 10 A machine of the class described for feeding a continuous web of material to a web-consuming machine from successive rolls of web material comprising in combination, a supporting structure, reel means for supporting separate rolls of web material, continuously driven and cooperating feed rolls for feeding a continuous web from one roll supported by said reel means, an applicator releasably holding the leading end of another web from a roll supported by said reel means and being movable between a non-operative position away from and an operative position adjacent the trailing end of the web of said one roll, a resilient pad operatively associated with said applicator and pins thereon on opposite ends thereof for releasably supporting a length of adhesive tape attached to the transverse leading edge of a web of material, sensing mechanism through which a web from said one roll to apply the leading end of the web to the trailing end of a web being fed by said feed rolls, actuating means for said applicator, and connections between said actuating means and sensing mechanism whereby
- 15 the former is under control of the latter.

References Cited in the file of this patent

UNITED STATES PATENTS

1,540,831 Moos June 9, 1925