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3,554,829

METHOD OF SPLICING A WEB OF A RUNNING ROLL TO THE LEADING
EDGE OF A NEW ROLL

Filed Sept. 30, 1966

3 Sheets-Sheet 1

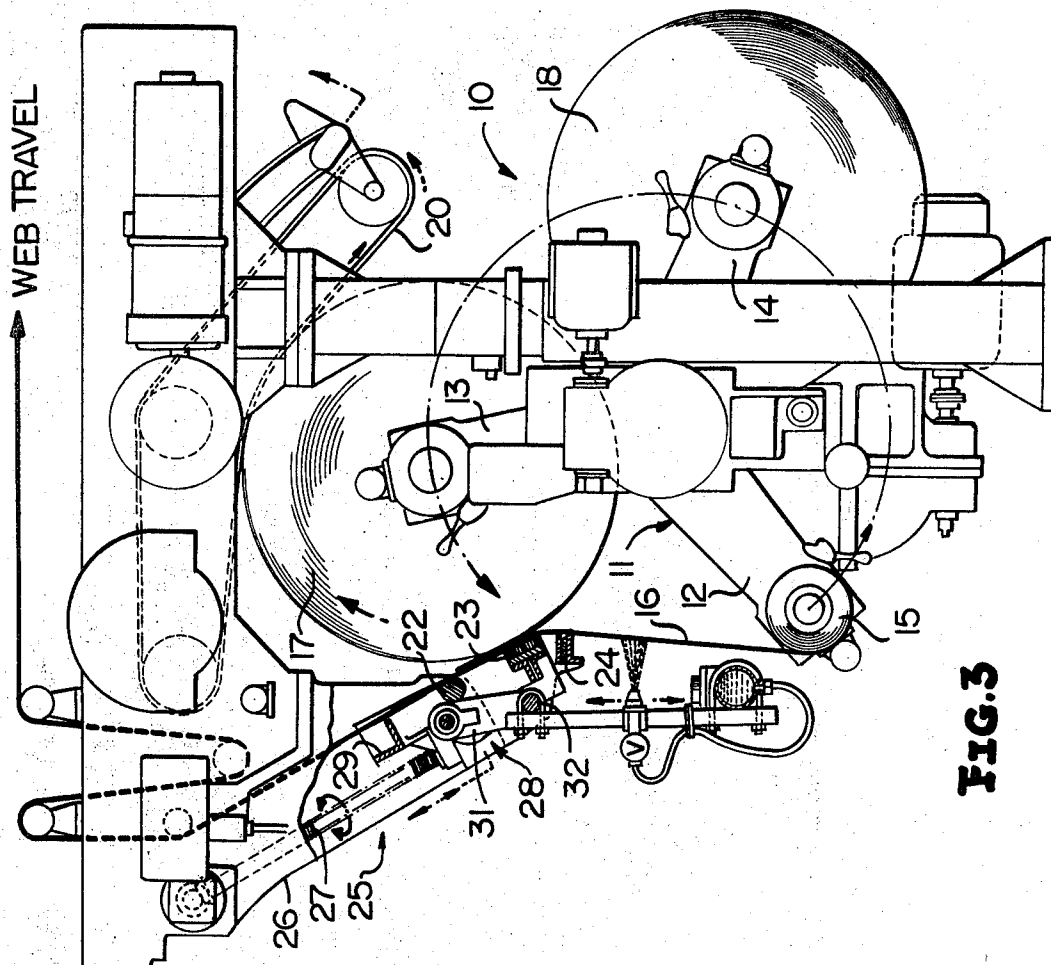


FIG. 3

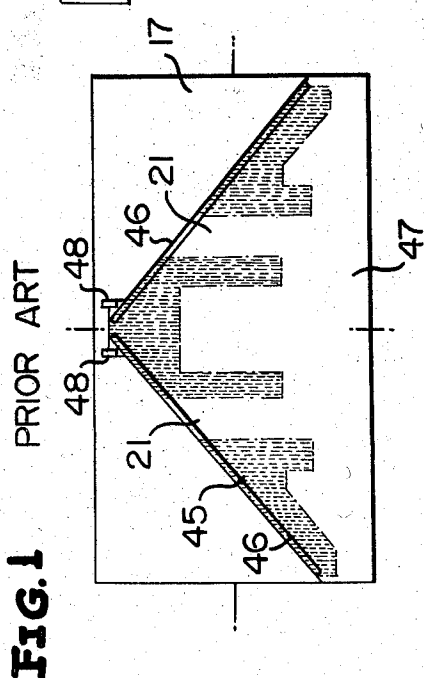


FIG. 1

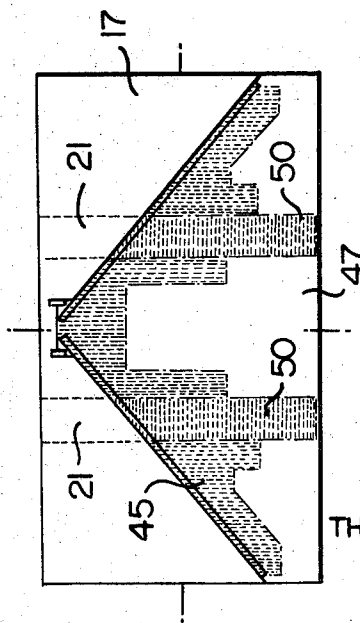


FIG. 2

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FIG. 4

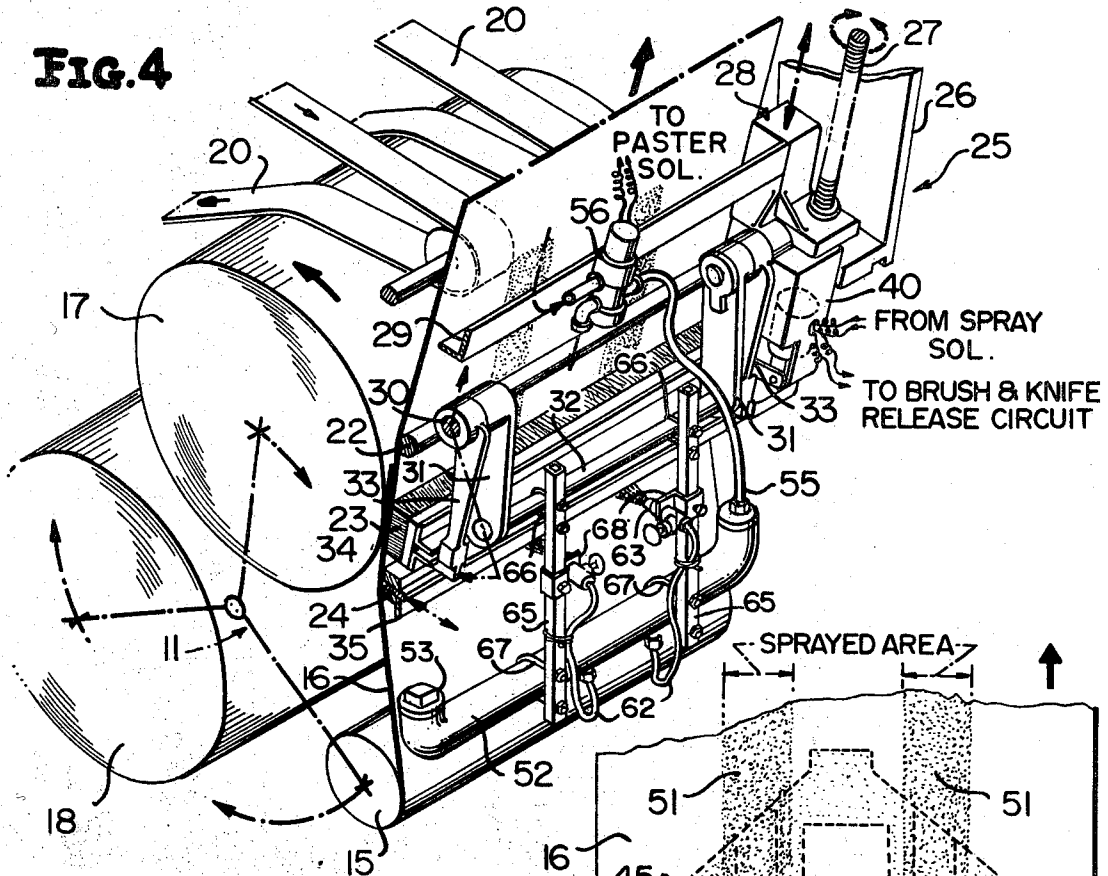


FIG. 5

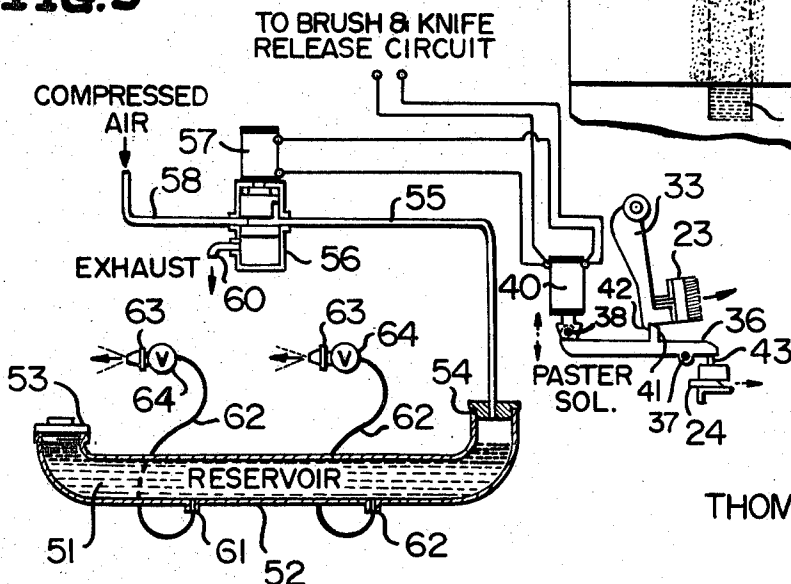
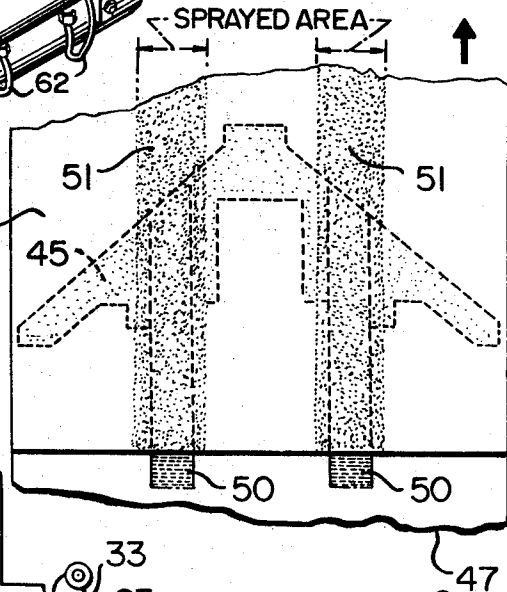


FIG. 6



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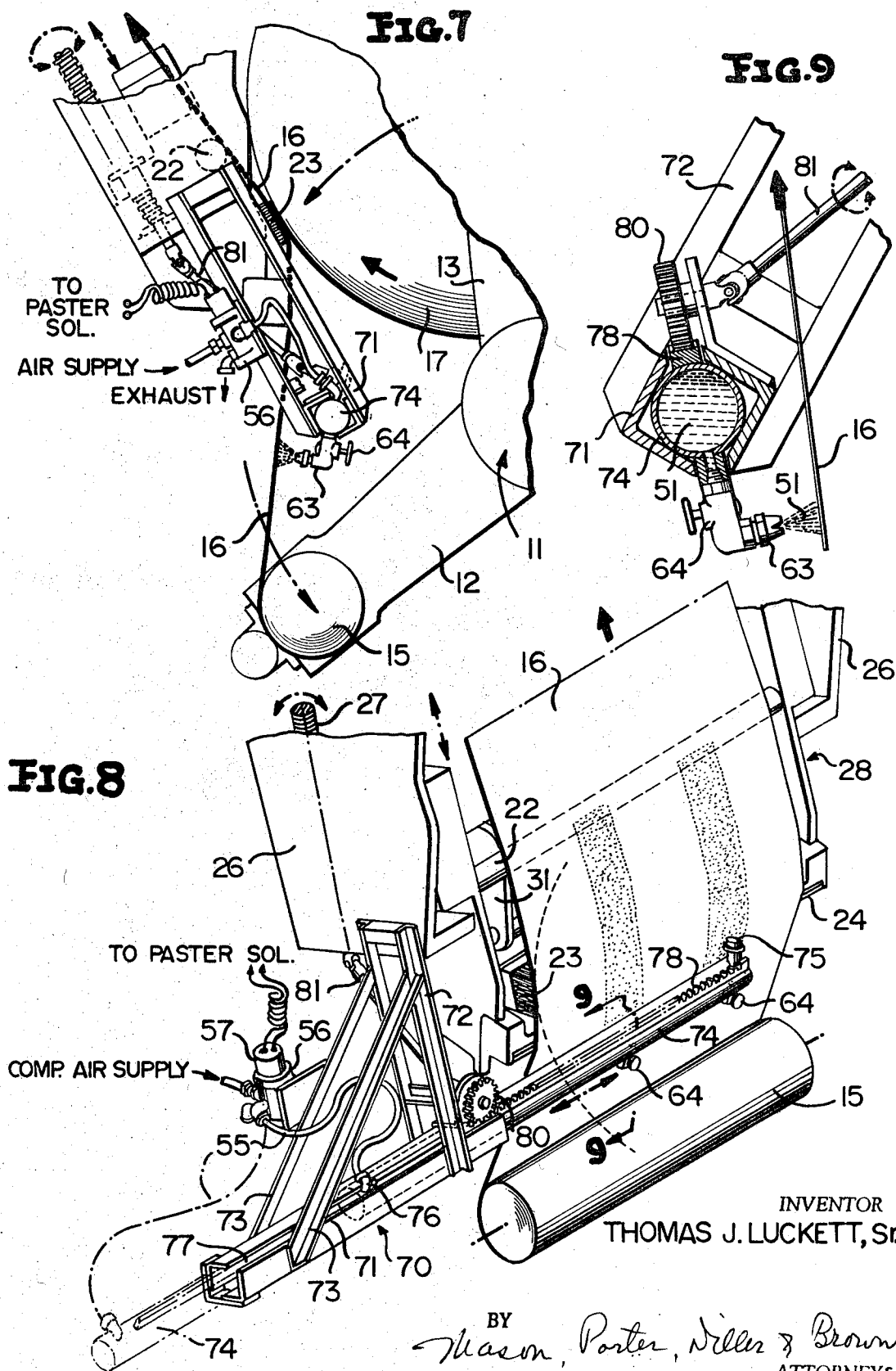
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5 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates in general to new and useful improvements in the splicing of webs and more particularly relates to the high speed splicing of the web of a running roll to the leading end of a new roll as the running roll nears the end thereof, applying a first paste to the leading edge of the new roll in a prescribed pattern, applying a second inactive paste to fill in the vacant spaces of the pattern, bonding the leading edge to the expiring roll and activating the second paste to obtain a continuous bond across the sheet.

The splicing of a new roll of web material to the web material of a running roll in high speed equipment, such as printing presses, while having been solved to a certain degree, requires many improvements. With particular reference to the forming of a splice between the webs of paper rolls in conjunction with high speed printing presses, the splices which are more frequently formed have numerous deficiencies among which are the following:

- (1) A complete seal is not formed across the webs.
- (2) There is frequently a cross wrinkle which forms at the open track of the customary drive belt area which results in the breakage of the web in the folder.
- (3) There is an open pocket in the splice due to the unsealed drive belt area, which open pocket blows out in the high velocity oven and hangs in mechanical trip detectors or on safety bars.
- (4) Due to the fact that only the leading edge of the new web is bonded to the running web, when the running web is cut off after the formation of splice, there exists an unsealed tail which may hang into the equipment and effect a jamming thereof.

In accordance with this invention, it is proposed to provide a new web with a conventional wet paste arrangement which includes an uncoated area which may be freely contacted by the customary drive belt to effect the acceleration of the new roll up to the web speed of the running roll. In addition, a dry paste is applied to the drive belt area, which dry paste may be contacted by the drive belt without the coating of the drive belt by the dry paste. At the time the web of the running roll is being brought into engagement with the web of the new roll, a solvent for the dry paste is applied to the running web in alignment with the drive belt area whereby after the initial splice has been effected by means of the wet paste, the solvent carried by the running roll will activate the dry paste and result in a complete sealing of the splice between the two webs as the webs pass over certain of the guide rolls of the equipment.

Another object of this invention is to provide a novel apparatus for applying the solvent for the dry paste, which

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apparatus is readily mountable on the existing equipment and which is movable to an out of the way position by means of the same apparatus which effects the movement of the conventional pusher brush and cutoff knife to an out of the way position.

Another object of this invention is to provide a novel solvent applicator in accordance with the foregoing object wherein the spraying of the solvent is controlled by the means for controlling the positioning of the pusher brush and the actuation of the cutoff knife.

Still another object of this invention is to provide a novel spray apparatus for the solvent wherein there is provided a spray nozzle to which there is connected a reservoir having a solvent level disposed below the plane of the spray nozzle, and the solvent reservoir being of a sealed construction and having selectively coupled thereto a source of compressed gas which will effect the flow of the solvent out through the spray nozzle and when the reservoir is vented to the atmosphere, will result in the immediate cutoff of the spray fluid.

A further object of this invention is to provide a novel method of pasting together two webs along the usual drive belt area wherein the application of the paste and/or solvent requires no critical timing.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a plan view of a roll of paper wherein the leading edge of the paper has applied thereto a wet paste in a well known pattern for the formation of a splice.

FIG. 2 is a plan view similar to FIG. 1 and shows the arrangement of the paste applied to the paper roll in accordance with this invention.

FIG. 3 is a side elevational view with parts being broken away and shown in section of a conventional reel and paster which has applied thereto the pasting apparatus of this invention.

FIG. 4 is a fragmentary, partially schematic, rear perspective view of the reel and paster of FIG. 3 and shows in more detail the structure and position of the paster apparatus of this invention.

FIG. 5 is a schematic view showing generally the details of the solvent applicator and the manner in which the operation thereof is controlled.

FIG. 6 is a plan view of two webs spliced together in accordance with this invention.

FIG. 7 is a fragmentary elevational view similar to FIG. 3 and shows the details of a modified form of pasting apparatus.

FIG. 8 is a fragmentary rear perspective view showing further the details of the pasting apparatus in FIG. 7.

FIG. 9 is an enlarged fragmentary vertical sectional view taken along the line 9—9 of FIG. 8 and shows more specifically the details of the pasting apparatus.

Referring now to the drawings in detail, it will be seen that there is illustrated in FIGS. 3 and 4 a conventional reel and paster which is generally referred to by the numeral 10. Only those portions of the reel and paster 10 which are directly involved with respect to this invention will be described.

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The reel and paster 10 includes a reel which is generally referred to by the numeral 11 and has three pairs of arms, which pairs of arms are referred to by the numerals 12, 13 and 14. In the illustrated position of the reel 11, the arms 12 carry a running roll 15, the web 16 of which is suitably guided for movement along a predetermined path.

The arms 13 carry a new roll 17 which is to be spliced to the running roll 15. The new roll 17 is in an uppermost position. The arms 14 are disposed in a position for receiving a third roll 18. It is to be understood that the roll 18 is applied while the web 16 of the running roll 15 is paying out. The reel 11 indexes in a counterclockwise direction, as viewed in FIG. 3, so as to present the various rolls in their proper sequence.

It is to be understood that when the new roll 17 is spliced to the running roll 15, the speed of web travel is not too diminished. Accordingly, it is necessary to bring the web speed of the new roll 17 up to the speed of the web 16 of the running roll. This is accomplished by one or more roll accelerator belts which are disposed slightly above the new roll 17 and which, when brought into engagement with the roll 17 and driven at the proper speed, will bring the speed of the web of the roll 17 up to the speed of the web 16. The roll accelerator belts 20 engage the rolls 17 along areas which are identified as the drive belt areas 21 best shown in FIG. 1.

In FIG. 3 it is clearly shown that normally the web 16 passes from the running roll 15 around a guide roll 22 in spaced relation to the new roll 17. However, when the splice is to be formed, the running web 16 is brought into engagement with the web of the new roll 17 by means of a pusher element in the form of a brush 23. Also, after the proper elapse of time, the running web 16 is severed by means of a knife 24.

Referring now to FIG. 4 in particular, it will be seen that the brush 23 and the knife 24 are carried by a suitable support assembly which is generally referred to by the numeral 25. The support assembly 25 includes a pair of transversely aligned frame members 26 of which only one is shown. The frame members 26 carry a pair of positioning screws 27, of which only one is shown. The positioning screws, in turn, carry a suitable frame 28 for vertical movement to an out of the way position with respect to the path of movement of the reel 11 and the rolls carried thereby in the manner generally shown in FIG. 3. The frame 28, among other elements, includes a transverse bar 29. The frame also carries a guide roll 22.

A pair of transversely aligned shafts 30 extend towards each other from opposite sides of the frame and have mounted thereon depending arms 31 which are connected together at their lower ends by a bar 32. Immediately adjacent the arms 31 are arms 33 which are mounted on the shafts 31 for pivotal movement and which support the brush 23. It is to be understood that the arms 33 are spring loaded, in a manner not shown, to urge the brush 23 towards the roll 17.

The frame 28 also supports a pair of bars 34 and 35 which form guides for the knife 24.

Referring now to the right-hand part of FIG. 5, it will be seen that there is illustrated schematically the mechanism for controlling the operation of the brush 23 and the knife 24. A latch member 36 is pivotally mounted as at 37 and is coupled to an arm 38 of a solenoid 40. The latch member 36 has a finger 41 which is normally engaged behind a shoulder 42 on at least one of the arms 33. When the finger 41 releases the arms 33, the brush 23 is automatically spring urged to bring the running web 16 into engagement with the new roll 17.

After the brush 23 has been released and the running web 16 is brought into engagement with the new roll 17, the solenoid 40 is further actuated to depress a catch member 43 for the knife 24 and permit the knife 24 to

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be released and brought into a web shearing engagement with the running web 16. At this time it is pointed out that the manner in which the brush 23 and the knife 24 are reset is not a part of this invention and no details thereof will be given here. It is also pointed out that the solenoid 40 is suitably mounted on the frame 28 in the manner shown in FIG. 4.

Returning now to FIG. 1, it will be seen that inasmuch as the paste used in forming the splice between the running web 16 and the new web must be activated at the time the webs are brought together, it is necessary that the paste be wet at the time of engagement. Accordingly, it is customary to apply paste, preferably wet paste, to the free end of the web of the new roll 17 in the pattern shown in FIG. 1, the paste being identified by the numeral 45. It is to be noted that the paste 45 is not applied along the drive belt areas 21. Incidentally, while the paste pattern is a pointed one, in the case of narrow rolls, the paste pattern could be diagonal in one direction only.

It is also pointed out here that the leading edge or edges of the web of the new roll, which web is identified by the numeral 47, is defined by a strip or strips of tape 46, the exposed surface of which is nontacky and which facilitates the tearing off of end portions of the new web 47. Also, the extreme leading part of the new web 47 is releaseably bonded to the underlying portion of the roll 17 by means of small tabs 48 which are immediately pulled from the remainder of the roll 17 upon the bonding of the wet paste 45 to the running web 16.

The pattern of the wet paste 45, which is in conventional pattern, has many obvious deficiencies. These deficiencies were listed at the beginning of this disclosure and will not be discussed in detail here. However, it is obvious that due to the voids in the pattern of the wet adhesive 45 along the drive belt areas 21, an incomplete splice is formed. Secondly, it is obvious that it is impossible to sever the running web 16 exactly in alignment with the trailing part of the adhesive pattern 45. It is the purpose of this invention to overcome these deficiencies of the pasting operation.

In accordance with this invention, dry paste 50 is applied to the drive belt areas 21 in the manner clearly shown in FIG. 2. The dry paste 50 is applied in a greater circumferential extent than the wet paste 45 with the extent of the dry paste 50 being such so as to assure that the dry paste extends beyond the tail of the running web 16 after it has been severed by the knife 24. It is to be understood that the dry paste 50 will not come off on the roll accelerator belts 20 nor will it in any way affect the driving of the roll 17 by the accelerator belts 20.

The dry paste 50 has no function whatsoever in the initial formation of the splice between the running web 16 and the new web 47. The wet paste 45 alone performs the initial splice. However, in accordance with this invention, a suitable solvent for the dry paste 50 is applied to the running web 16 generally in alignment with the drive belt areas 21 and after the webs 16 and 47 have been initially spliced by the adhesive action of the wet paste 45, the solvent applied to the running web 16 will activate the dry paste 50 and the dry paste 50 will adhesively secure the two webs together along the drive belt areas 21.

It is to be understood that while a certain amount of timing of the spraying must be effected in order to reduce the use of the solvent for the dry adhesive 50 to a minimum, the timing is not critical and the solvent, which is identified by the numeral 51 will be applied to the running web 16 in advance of the point where the new web 47 is spliced thereto to assure that sufficient solvent will be applied. The spraying of the solvent 51 will continue until the running web 16 is severed by the knife 24, thereby assuring that the solvent 51 will be sprayed to the full extent of the trailing edge of the running web 16. In this manner, the usual loose tail of the running web 16 will

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be bonded to the new web 47 along the drive belt areas 21 in the manner clearly shown in FIG. 6. It is to be noted that the dry adhesive 50 is applied to the new web 47 beyond the trailing edge of the running web 16.

Referring now to FIG. 5, it will be seen that there is illustrated a typical solvent spraying apparatus which includes a reservoir 52. The reservoir is constructed with a filler 53 at one end and a second portion 54 elevated above the filler 53. To the portion 54 there is connected a line 55 which leads to a valve 56 actuated by means of a solenoid 57. The valve 56 has connected thereto a compressed gas line 58 and an exhaust line 60.

The bottom of the reservoir 52 is provided with one or more outlets 61 to which there are connected solvent supply lines 62 which lead to spray nozzles 63. Each of the nozzles 63 has incorporated therein a shutoff valve 64 so that the spray nozzle may be rendered inactive. The spray nozzles 63 are of conventional types and are preferably of the spring loaded pressure actuated type so as to restrict dripping to a minimum.

It will be seen that inasmuch as the line 55 is coupled to the reservoir 52 above any possible level of the solvent therein, there is no possibility whatsoever of the solvent running back through the line 55 into the valve 56 when the valve is moved from its pressure position to its exhaust position. Thus, there is no possibility of valve choke.

Referring now to FIG. 4 in particular, it will be seen that the adaptation of the solvent spray mechanism to the reel and paster 10 is an extremely simple one. A pair of support bars 65 are adjustably clamped in depending relation to the bar 32 by means of simple U clamps 66. Other U clamps 67 carried by the lower portions of the bars 65 support the reservoir 52. Suitable support brackets 68 are adjustably carried by the bars 65 and support the nozzles 63. It will be readily apparent that the nozzles 63 are both transversely and vertically adjustable.

The solenoid controlled valve 56 is suitably mounted on the bar or frame member 29 with the line 55 extending therefrom down to the reservoir 52. It is also pointed out at this time that most printing presses are provided with a source of compressed air and therefore, the compressed gas delivered to the valve 56 may be from the conventional compressed air source of the printing press.

It is further pointed out here that the solenoid 57 is wired in with the solenoid 40 so that spraying of the solvent onto the running web 16 will commence at the same time as the brush 23 is released and will discontinue when the knife 24 is actuated. Thus, there is an assurance that the solvent is sprayed onto the running web 16 in advance of the application of the leading edge of the new web 47 to the running web and that the spraying of the solvent 51 will continue to the trailing edge of the running web 16.

It is also to be noted that all of the spray equipment, being mounted on the support structure for the brush and the cutoff knife, is movable therewith to an out of the way position automatically. Thus, the mounting of the spraying equipment presents no problem whatsoever. Incidentally, at this time it is pointed out that although the solvent is sprayed on that surface of the running web 16 remote from the surface contacted by the new web 47, the solvent will penetrate the running web and still activate the dry paste 50.

Although it is preferred that the solvent be sprayed on the rear surface of the running web 16, in some cases it will be desirable to spray the solvent on the surface of the running web 16 which is contacted by the new web of the roll 17. To this end, there is provided in FIGS. 7, 8 and 9 a solvent applicator arrangement which will provide for such spraying of solvent. In this arrangement, there is rigidly mounted on one of the supports 26 a frame structure which is generally identified by the numeral 70. This frame structure includes a horizontally positioned guide 71 which is disposed in an out of the way position at one

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side of the reel and paster 10. The guide 71 is suspended from the support 26 by a vertical frame unit 72 and braced therefrom by diagonal frame members 73.

In this form of the invention, the reservoir, which is identified by the numeral 74, is in the form of an elongated support member. At one end, the reservoir 74 is provided with a filler 75 and the opposite end thereof is provided with a fitting 76 to which the line 55 is connected. The guide 71 has a slot 77 therein in which a rack bar 78 carried by the reservoir 74 is guided. This prevents the turning of the reservoir 74 within the guide 71.

As is best shown in FIG. 9, one or more of the spray nozzles 63 depends from the underside of the reservoir 74. Each spray nozzle 63 has associated therewith a shutoff valve 64 to permit each of the spray nozzles 63 to be selectively rendered inoperative. If desired, the reservoir 74 may have a plurality of tapped openings in the underside thereof which are normally plugged whereby the spacings of the spray nozzles 63 may be selectively varied.

In FIG. 8 the reservoir 74 is illustrated in its projected position in full lines and in its retracted position in phantom lines. Except at the time a splice is being made, the reservoir 74 is retracted to an out of the way position. The projecting and retracting of the reservoir 74 is accomplished by means of a pinion 80 which constantly meshes with the rack bar 78. The pinion 80 is suitably mounted on the frame unit 72 for rotation and is driven by an auxiliary drive shaft 81 which is coupled to the lower end of an adjacent feed screw 27. The relationship of the feed screw 27, the pinion 80 and the rack bar 78 the reservoir 74 is retracted; and as the brush 23 and the cutoff knife 24 is in an elevated out of the way position, the reservoir 74 is retracted; and as the brush 23 and the cutoff knife 24 are lowered to their operative positions, the reservoir 74 and the spray nozzles 63 carried thereby are moved to their operative positions.

The operation of the spray nozzle 63 is controlled by the solenoid operated valve 56 which is, in turn, controlled by the control for the solenoid 40.

At this time it is pointed out that although only one reservoir 74 has been illustrated, and the reservoir is mounted at one side only of the reel and paster 10, it is to be understood that there may be two reservoirs with one of the reservoirs being mounted on each side of the reel and paster 10 for simultaneous operation.

It is also pointed out here that while the term paste has been utilized throughout to describe the adhesive utilized in forming the splice, it is not intended to restrict the invention to the strict sense of the term. The term paste is utilized in the printing industry to cover all types of suitable adhesives utilized in splicing together webs under the general conditions of this invention.

Although only two preferred embodiments of the invention have been specifically illustrated and described herein, it is to be understood that minor variations may be made in the invention without departing from the spirit and scope of the invention, as defined by the appended claims.

I claim:

1. A method of pasting a free end of a new roll of paper to a running roll of paper wherein the periphery of the new roll is accelerated to the web speed of the running roll prior to pasting by means of an accelerator belt which engages a predetermined drive area on the new roll, said method comprising the steps of applying a tacky operative first paste to the paper of said new roll along a pattern transversely thereof with the exception of said drive area, applying an initially inoperative second paste to the paper of said new roll along said drive area, accelerating said new roll with an accelerator belt which engages said drive area including said second paste, securing the paper of said new roll to the paper of said running roll utilizing said first paste, and applying a solvent to said second paste to render said second paste operative to form a complete splice across the paper of said rolls.

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2. The method of claim 1 wherein said solvent is applied to the paper of said running roll and transferred to said second paste thereby.

3. The method of claim 1 wherein said solvent is applied to the paper of said running roll and transferred to said second paste thereby, said solvent being applied to the paper of said running roll in advance of the contacting thereof by the paper of a new roll.

4. The method of claim 1 wherein said solvent is applied to the paper of said running roll and transferred to said second paste thereby, said solvent being applied to that surface of the paper of said running roll contacted by the paper of said new roll.

5. The method of claim 1 wherein said solvent is applied to the paper of said running roll and transferred to said second paste thereby, said solvent being applied

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to that surface of the paper of said running roll remote from the surface contacted by the paper of said new roll.

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