United States Patent [19]

Ludszeweit et al.

[11] **3,896,820**

[45] **July 29, 1975**

[54] **APPARATUS FOR SPLICING WEBS OF CIGARETTE PAPER OR THE LIKE**

[75] Inventors: **Dieter Ludszeweit,** Hamburg, Germany; **Joachim Buchegger,** Richmond, Va.

[73] Assignee: **Hauni Werke Korber & Co. KG,** Hamburg, Germany

[22] Filed: **Dec. 18, 1972**

[21] Appl. No.: **316,295**

[30] **Foreign Application Priority Data**

Dec. 17, 1971 Germany 2162707

[52] **U.S. Cl.** ..... **131/21 R;** 242/58.4; 156/504

[51] **Int. Cl.** **B65h 19/10;** A24c 5/34

[58] **Field of Search** ..... 242/58.1, 58.2, 58.3, 58.4; 156/502, 504, 505, 506; 131/21 R

[56] **References Cited**

UNITED STATES PATENTS

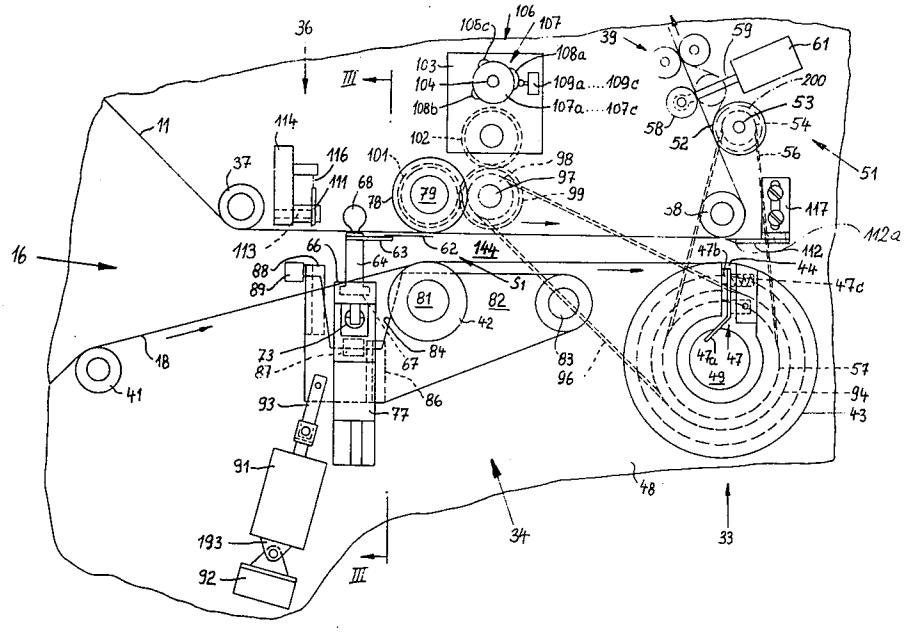
3,089,661	5/1963	Phillips et al.	242/58.4
3,223,339	12/1965	Justus et al.	242/58.3
3,388,874	6/1968	Kishioka	242/58.2
3,516,617	6/1970	Haner et al.	242/58.2
3,749,634	7/1973	Krause	156/505
3,753,834	8/1973	King	242/58.4 X

Primary Examiner—John W. Huckert
Assistant Examiner—John M. Jillions
Attorney, Agent, or Firm—Michael S. Striker

[57] **ABSTRACT**

The leading end of a fresh web of convoluted cigarette paper or analogous strip material of low tensile strength is accelerated prior to being spliced to a running web which is converted into wrappers of cigarettes or the like. The accelerating device for the fresh web derives motion from the running web and further serves to drive a programming drum which causes the generation of a series of signals to initiate the splicing operation as well as the ejection of those cigarettes whose wrappers embody portions of the splice. The delay with which the cigarettes whose wrappers embody portions of the splice are being ejected is proportional to the speed of travel of the running web so that the ejection of defective cigarettes takes place in a predetermined portion of their path.

11 Claims, 4 Drawing Figures



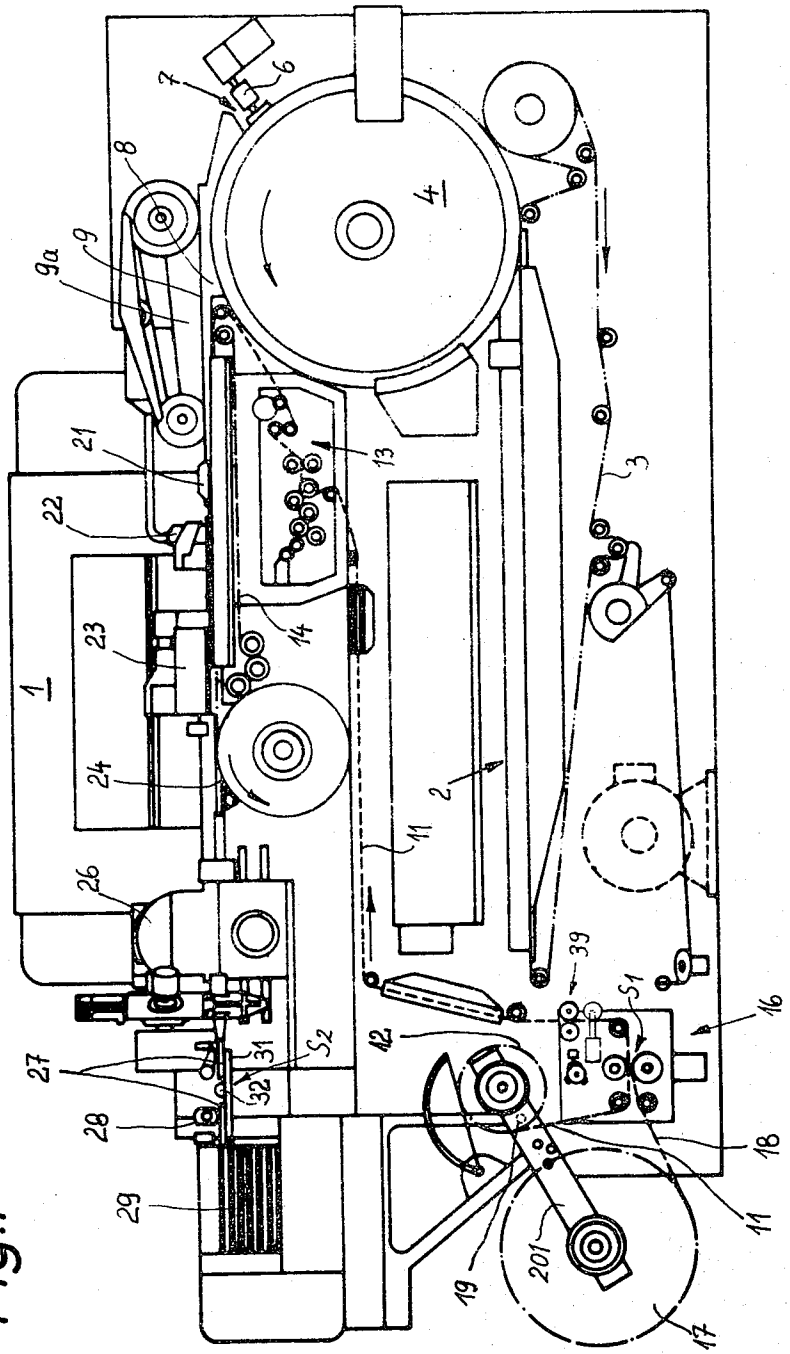

1
2
3
4
6
7
8
9
9a
11
12
13
14
16
17
18
19
21
22
23
24
26
27
28
29
31
32
39
201
S1
S2

Fig.1

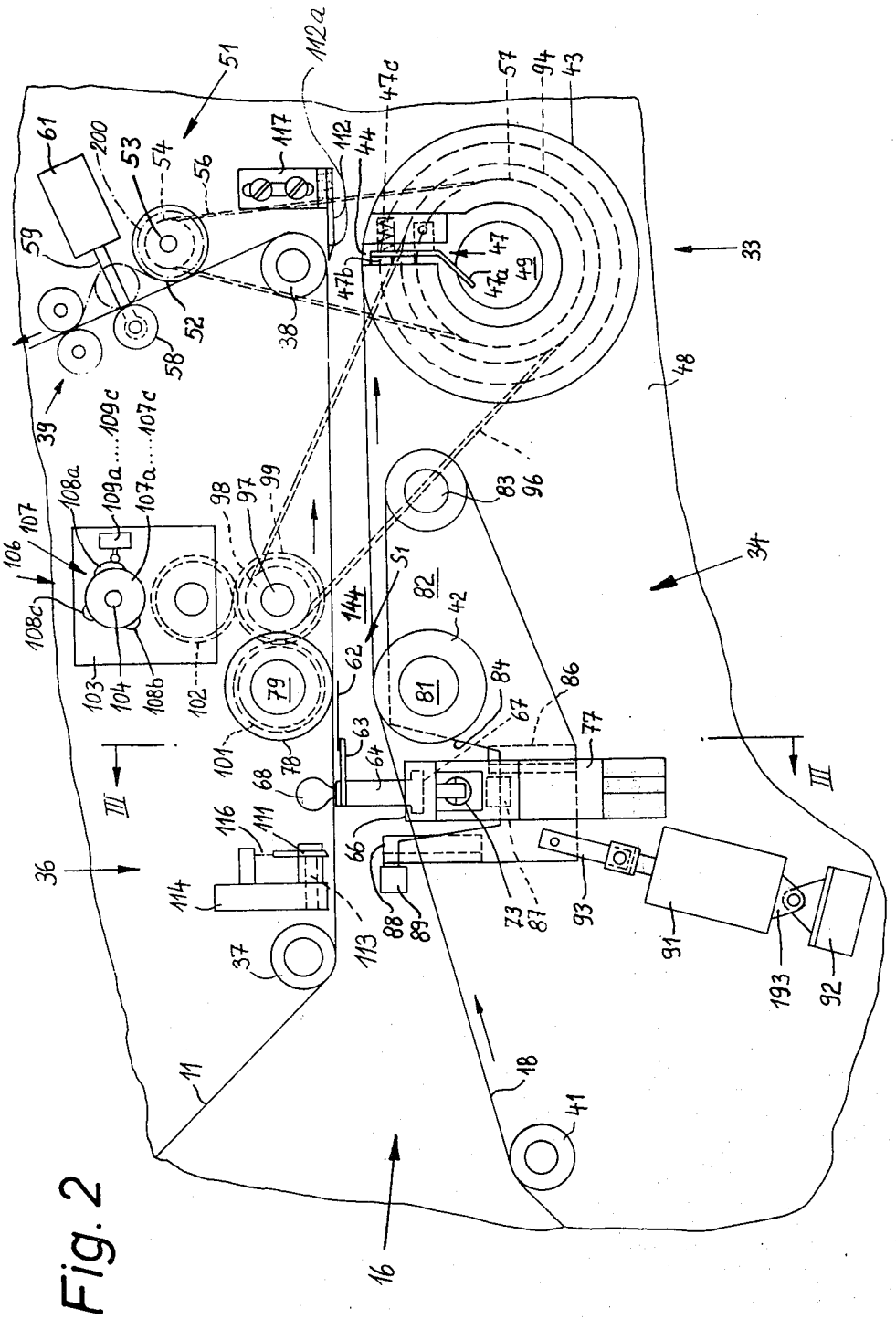

51
112a
47c
57
94
43
61
200
53
54
56
117
112
44
59
47
47a
49
33
52
58
38
47b
48
39
109c
109a....
107c
107a....
108a
106
107
98
97
99
83
96
34
108c
51
144
82
42
103
104
108b
102
79
62
81
84
86
101
63
67
77
78
64
68
III
III
116
111
66
36
114
88
89
73
87
93
91
193
92
37
113
11
18
41
16

Fig. 2

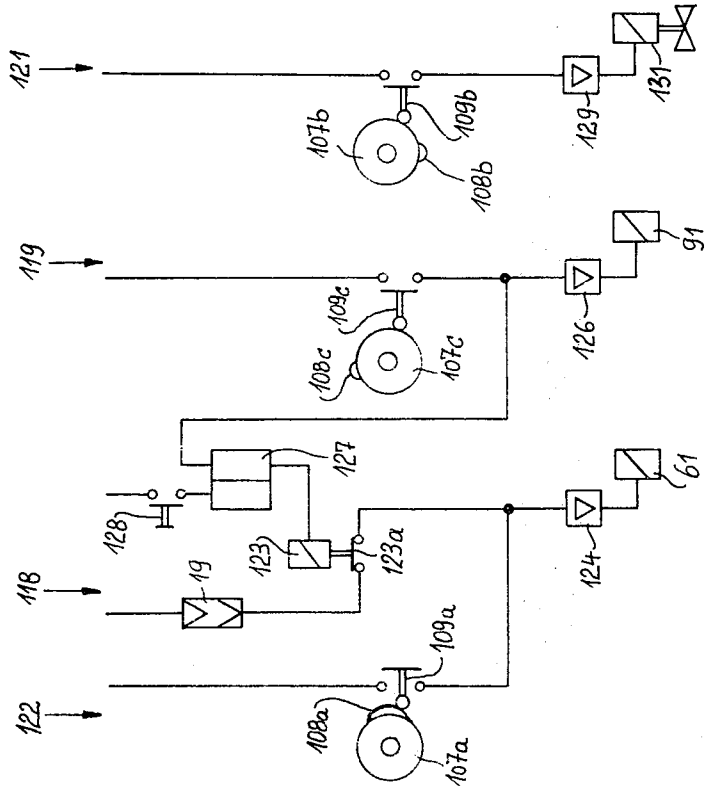

121
107b
109b
108b
129
131
119
91
109c
108c
107c
126
127
128
123
123a
61
118
19
124
109a
122
108a
107a

Fig. 4

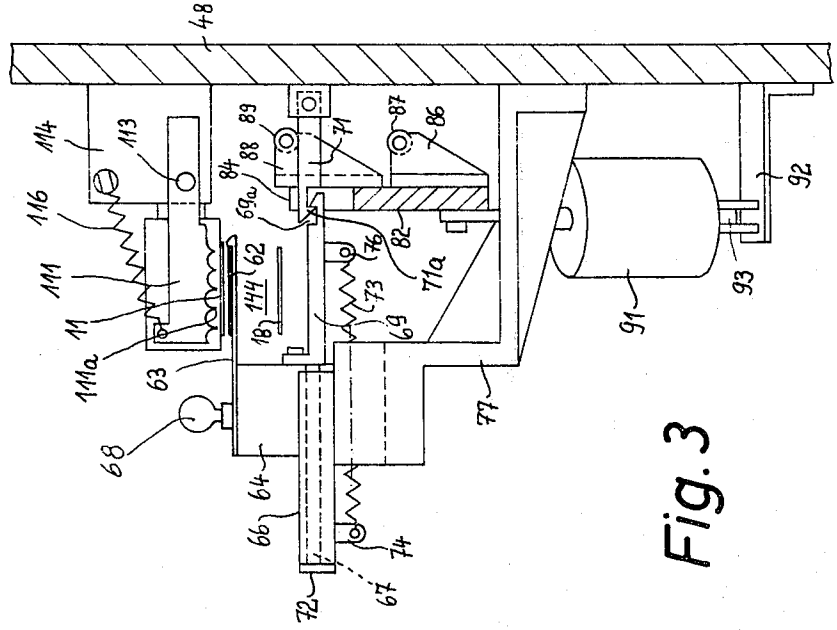

48
114
113
89
88
84
87
86
92
116
69a
82
111
62
76
71a
11
144
73
18
69
91
93
111a
63
77
68
64
66
74
72
67

Fig. 3

APPARATUS FOR SPLICING WEBS OF CIGARETTE PAPER OR THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for forming splices between running and fresh webs, especially between webs consisting of cigarette paper or analogous strip-shaped material of relatively low tensile strength which are utilized for the manufacture of plain or filter cigarettes, cigars, cigarillos, filter rod sections, or similar rod-shaped products in machines wherein the running web is converted into wrappers surrounding rod-like fillers of tobacco and/or filter material. More particularly, the invention relates to improvements in apparatus for forming splices between a running web and a fresh web which has been accelerated prior to being connected to the running web.

It is already known to utilize in a cigarette or filter rod making machine a splicing apparatus which can be operated to attach the leading portion of a fresh web to a running web while the running web is being paid out by an expiring roll. It is also known to accelerate the fresh web prior to its attachment to the running web in order to reduce the likelihood of breakage of the running and/or fresh web due to relatively large inertia of the roll of fresh web. Such inertia must be overcome by the running web if the fresh web is being attached thereto while the relatively large and heavy roll of fresh web is at a standstill. It is further known to employ in such machines an ejecting device which is intended to automatically segregate those cigarettes or filter rod sections whose wrappers contain portions of the splice between the running and fresh webs. Such articles are considered defective due to their appearance as well as because they cannot be readily introduced into packs, trays or other receptacles owing to the fact that portions of united webs normally extend beyond the splice and occupy additional room. Also, the articles whose wrappers embody portions of splices are likely to adhere to adjacent articles because many types of splices are being made by resorting to uniting bands with adhesive layers at both sides. The webs which are used in such machines consist of paper, cork, reconstituted tobacco and/or similar materials and exhibit a relatively low tensile strength so that the splicing operation must be carried out with great care in order to avoid breakage of the running and/or fresh web with attendant losses in output. As a rule, the tearing of a web necessitates prolonged stoppage of the machine and can cause losses of thousands of articles since a modern high-speed machine is capable of turning out up to and in excess of 70 articles per second.

Not too many years ago, the splicing of an expiring web to a fresh web in a cigarette making or like machine necessitated complete stoppage of the machine in order to allow for manual connection of the expiring and fresh webs to each other. This practice is being discontinued due to aforementioned substantial losses which arise in response to each stoppage of a high-speed machine. The losses are compounded due to the fact that the articles which are being produced during deceleration from as well as during renewed acceleration to normal operating speed are likely to be defective for a number of reasons, such as drying of adhesive paste on the web in the rod forming station, drying of tobacco which forms the filler of a cigarette rod, and/or many other factors.

Recent types of splicing apparatus for cigarette paper webs or the like are designed to allow for the making of splices (either by rolling or by resorting to adhesive-coated uniting bands) while the machine operates at a normal speed or at a reduced speed. To this end, it is necessary to accelerate the fresh web prior to splicing so as to reduce the likelihood of tearing. The acceleration of fresh webs involves several problems, especially as concerns the selection of speed of the fresh web during splicing, the trimming of the splice (i.e., the removal of those portions of the running and fresh webs which extend beyond the splice) and the actual making of splices between two rapidly moving webs. The prevention of breakage or tearing is the all-controlling factor in such types of splicing apparatus which are normally equipped with suitable time delay means to trigger the splicing operation in response to acceleration of the fresh web to a predetermined optimum speed. Since the speed of the accelerated fresh web must be proportional to the speed of the running web, the time delay means must be adjusted for splicing under most adverse circumstances, for example, during acceleration of the machine from zero speed. This holds true for nearly all types of presently known splicing apparatus, also for those wherein the roll of fresh web is being accelerated by means of an auxiliary strip which is attached to the leader of the fresh web and must advance beyond the splicing station prior to start of the splicing operation or wherein the roll of fresh web is accelerated by means of travelling rubber bands which engage the periphery of the roll. When the splice is being formed while the machine operates at full speed, a substantial length of the fresh web is wasted because the timing of the signal which is furnished by the time delay means to initiate a splicing operation is selected with a view to insure satisfactory splicing while the running web advances at the lowest of a wide range of speeds.

Additional problems arise in connection with proper timing of ejection of those articles whose wrappers embody portions of the splices. In order to invariably insure segregation of all defective articles from satisfactory articles, it is customary to eject not only those articles whose wrappers contain portions of a splice but also all neighboring articles with the result that each splicing operation entails substantial losses in valuable material even if the fresh web is in motion during attachment to the running web. Proper synchronization of the splicing operation with the ejecting operation cannot be achieved with presently known splicing apparatus because the length of intervals which elapse while one or more articles whose wrappers contain the splice advance from the splicing to the ejecting station of a cigarette rod making or like machine varies within a wide range due to aforementioned factors, particularly the fixed length of the delay between the start of acceleration of a fresh web and the start of the splicing step.

In many presently known cigarette rod making or like machines, the uniting bands which are used to connect fresh webs to running webs are provided with characteristic indications in the form of holes, colorations, magnetizable or magnetic inserts or others to facilitate detection of splices in the wrappers of articles for the purpose of segregating the respective articles. The articles are monitored by a detector which produces a signal in response to detection of a splice, and such signal is transmitted with a given delay to a pneumatic or me-

chanical ejecting device which segregates the defective article or articles from satisfactory articles. In order to insure segregation of defective articles when the machine is running at a high speed (i.e., when the interval of time which elapses while a splice travels from the detector to the ejecting device is very short), the delay in transmission of signals to the ejecting device is as short as necessary for operation at the maximum speed. On the other hand, the ejecting device must remain in operation long enough to insure the ejection of defective articles when the machine is operated at the lowest speed. Therefore, the ejecting device invariably segregates an extremely large number of satisfactory articles. Moreover, the detector is likely to miss a splice so that the ejecting device is not actuated at all.

SUMMARY OF THE INVENTION

An object of the invention is to provide a novel and improved apparatus for automatically splicing the leading end of a fresh web to a running web in a machine wherein the running web is being converted into wrappers of discrete articles, such as cigarettes or filter rod sections, which can perform a splicing operation without any appreciable risk of tearing the running and/or fresh web and with minimal losses in the material of the webs.

Another object of the invention is to provide a splicing apparatus which is operated in such a way that it allows for ready determination of those articles whose wrappers embody the splice so that the segregation of such defective articles from the immediately preceding and immediately following satisfactory articles can be effected with a high degree of reproducibility and at an accurately selected location to allow for convenient accumulation of segregated articles.

A further object of the invention is to provide a novel splicing apparatus which can be used with advantage in cigarette or filter rod making machines and is capable of invariably pinpointing those articles whose wrappers and/or other portions are defective due to the fact that they embody portions of splices.

An additional object of the invention is to provide the splicing apparatus with novel and improved means for manipulating the running and fresh webs prior to, during and following a splicing operation.

Still another object of the invention is to provide the splicing apparatus with novel and improved means for monitoring or tracking the progress of splices in a cigarette rod making, filter rod making or analogous machine.

An additional object of the invention is to provide novel and improved means for synchronizing the operation of article ejecting and web splicing means in a cigarette rod making or like machine.

One feature of the invention resides in the provision of an apparatus for forming splices between fresh webs which are stored in the form of first rolls and running webs which are being withdrawn from expiring rolls in a machine wherein successive webs are converted into wrappers of rodshaped articles, such as cigarettes or filter rod sections. The apparatus comprises the means for transporting a running web lengthwise along a predetermined path extending toward, through and beyond spaced apart first and second stations, means for converting the running web into wrappers of successive rodshaped articles not later than at the second station, means for generating a series of signals at timely spaced intervals in synchronism with the speed of transport of the running web along the predetermined path so that the generation of a first signal coincides with the movement of a portion of the running web through the first station and the generation of a second signal coincides with the transport of at least one rod-shaped article whose wrapper embodies such portion of the running web through the second station, means for accelerating the leading end of a fresh web prior to generation of the first signal, means for uniting a portion of the accelerated leading end of the fresh web with the aforementioned portion of the running web in response to the first signal so that such portions of the running and fresh webs are united at the first station and travel along the predetermined path at the speed of the running web whereby the fresh web is being withdrawn from the respective first roll, and means for expelling the article or articles embodying the united portions of the running and fresh webs from the predetermined path in response to the second signal signal so that the expulsion of such article or articles invariably takes place at the second station.

Since the first and second signals are generated in synchronism with the speed of the running web, the generation of the second signal invariably coincides with arrival at the second station of that article or those articles whose wrappers embody the united portions of the running and fresh webs. This insures that only that article or only those articles which are in fact defective can be ejected from the path with attendant increase in the output of the machine.

The apparatus preferably further comprises means for severing the running web between the aforementioned portion of such web and the expiring roll in response to one of the first and second signals, preferably in response to the first signal or immediately or shortly following the generation of first signal.

Still further, the apparatus may comprise means for monitoring the expiring roll, for generating a third signal in response to depletion of the expiring roll to a predetermined minimum diameter, and for initiating the accelerating step in response to the third signal.

The uniting means may comprise means for connecting the aforementioned portions of the running and fresh webs to opposite adhesive-coated sides of a uniting band.

The accelerating means may comprise means for increasing the speed of the leading end of the fresh web from zero speed to an elevated speed which is slightly less than the speed of transport of the running web along the predetermined path, and the apparatus then preferably further comprises step of transporting the thus accelerated leading end of the fresh web along a second path which is adjacent to the first station so that the uniting step can be carried out by deflecting the aforementioned portion of the accelerated fresh web into the first path at the first station, or vice versa.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved splicing apparatus itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic elevational view of a cigarette rod making machine which embodies the improved splicing apparatus;

FIG. 2 is an enlarged elevational view of the splicing apparatus;

FIG. 3 is a sectional view as seen in the direction of arrows from the line III—III of FIG. 2; and

FIG. 4 is a diagram of the control circuit for the splicing apparatus and for the ejecting means of the cigarette rod making machine.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIG. 1, there is shown a cigarette rod making machine of the type known as GARANT produced by Hauni-Werke of Hamburg-Bergedorf, Western Germany. The machine comprises a distributor 1 which showers tobacco shreds onto the upper stretch of an endless conveyor belt 3. The upper stretch of the belt 3 constitutes the bottom wall of an elongated tobacco stream forming channel 2 wherein the growing tobacco stream advances in a direction to the right, as viewed in FIG. 1, and is introduced into the circumferential groove of a suction wheel 4 which is driven to rotate in a counterclockwise direction. The circumferential groove of the suction wheel 4 surrounds a stationary suction chamber, and the bottom wall of the circumferential groove is perforated so that the tobacco stream is attracted thereto during transport with the suction wheel 4 past a trimming station 7 where a customary equalizing device 6 removes the surplus of tobacco so that the stream is converted into a filler rod which is thereupon transferred onto the upper stretch of a garniture belt 14 by means of a foraminous conveyor belt 9 having a lower stretch which travels below a stationary suction chamber 9*a*. The reference character 8 denotes a stripping device in the form of a tongue which cooperates with the foraminous belt 9 to transfer the tobacco filler from the circumferential groove of the suction wheel 4 onto the upper stretch of the belt 14.

The splicing station of the cigarette rod making machine is shown in the lower left-hand portion of FIG. 1. This splicing station accommodates an expiring roll 12 which pays out a running web 11 consisting of cigarette paper and being caused to travel through a splicing apparatus 16 and thereupon through an imprinting mechanism 13 before it reaches and is advanced by the upper stretch of the garniture belt 14. Prior to complete exhaustion of the roll 12, the running web 11 is spliced to the leading portion of a fresh web 18 which is stored at the splicing station in the form of a roll 17. A detector 19, here shown as a photosensitive scanning device, forms part of the splicing apparatus 16 and is located at the splicing station to monitor the diameter of running web 11 on the expiring roll 12.

Successive increments of the filler rod which leaves the circumferential groove of the suction wheel 4 are transferred onto successive increments of the running cigarette paper web 11 on the upper stretch of the belt 14. This belt forms part of a wrapping mechanism which converts the running web 11 and the filler rod into a continuous wrapped cigarette rod 24. The wrapping mechanism further comprises a device 21 which drapes the web 11 around the filler rod during travel with the upper stretch of the belt 14. The device 21 is followed by a conventional paster 22 which coats one marginal portion of the partially draped running web 11 with a film of adhesive before the thus coated marginal portion is caused to overlap the other marginal portion so as to form therewith a seam which is heated by a sealer 23. The cigarette rod 24 then advances to a conventional cutoff 26 which subdivides it into a single file of plain cigarettes 27 of unit length. Successive cigarettes 27 are accelerated by a rotary cam 28 which propels them into successive flutes of a rotary drum-shaped transfer conveyor 29. The path for plain cigarettes 27 between the cutoff 26 and the accelerating cam 28 is defined in part by a trough 31. The upper side of the trough 31 is open and the cigarettes 27 which move in this trough lengthwise advance past a nozzle 32 which forms part of an ejecting device for defective or presumably defective plain cigarettes. The nozzle 32 can be connected to a source of compressed air or another suitable gaseous fluid which can be utilized to expel selected cigarettes 27 from the path between the cutoff 26 and the cam 28. The ejected cigarettes are intercepted by a suitable receptacle, not shown. The station at which the nozzle 32 of the ejecting device is located is shown at S2.

The transfer conveyor 29 forms one or two rows of plain cigarettes 27 which travel sideways and can be introduced into storage, into a conventional tray filling device or directly into a filter cigarette making machine, not shown.

Referring to FIGS. 2 and 3, the splicing apparatus 16 of the cigarette making machine of FIG. 1 further comprises an accelerating device 33 for the fresh web 18, a splicing or uniting device 34 which connects the trailing end of the running web 11 to the leading end of the accelerated fresh web 18, and a severing device 36 which can sever the running web 11 behind the splice so that the preceding part of the web 11 is separated from the portion which remains convoluted on the core of the expiring roll 12. That portion of the running web 11 which is about to enter the station S1 accommodating the splicing or uniting device 34 is trained about a guide roller 37 and thereupon advances along a straight portion of its path to be deflected by a further guide roller 38 prior to entering the nip of two advancing rolls 39 which introduce the web 11 into that portion of the path which extends between the splicing apparatus 16 and the imprinting mechanism 13. The advancing rolls 39 actually draw the running web 11 from the expiring roll 12.

The leading portion of the fresh web 18 is trained around a guide roller 41 and thereupon around a splicing roller 42 which forms part of the uniting device 34 at the station S1. Still further, the leading portion of the fresh web 18 is introduced into a radial slot 44 of a wheel 43 forming part of the accelerating device 33. The positions of the guide rollers 37, 38 for the running web 11 on the one hand and the splicing roller 42 and accelerating wheel 43 for the fresh web 18 on the other hand are selected in such a way that the webs 11 and 18 are separated from each other by a gap 144. This gap 144 begins at the splicing station S1 and its width is reduced to zero when the leading portion of the fresh web 18 is to be connected to the trailing portion of the running web 11. The radial slot 44 of the accelerating wheel 43 accommodates a clamping device 47 including a lever 47*a*, a clamping plate 47*b*, and a spring 47*c*.

The clamping device 47 serves to detachably but firmly secure the foremost part of the leading portion of the fresh web 18 to the accelerating wheel 43. As shown in the lower righthand portion of FIG. 2, the plate 47*b* is provided at the radially outermost end of the lever 47*a* and the latter is biased by the spring 47*c*. That portion of the fresh web 18 which is placed between the plate 47*b* and the adjacent surface flanking the slot 44 is pressed against the accelerating wheel 43 and is compelled to rotate therewith when the wheel 43 is set in motion. The wheel 43 is mounted on a shaft 49 which is secured to a frame member or wall 48 of the cigarette rod making machine. The drive means 51 for rotating the accelerating wheel 43 is installed between the guide roller 38 and the advancing rolls 39 and comprises an input member here shown as a roller 52 the periphery of which is coated with a layer of elastomeric material (such as rubber). The roller 52 is mounted on a shaft 53 which in turn is mounted on the frame member 48. The roller 52 can rotate on the shaft 53 together with a pulley 54 for an endless belt 56. The belt 56 is further trained over a pulley 57 which is secured to and drives the accelerating wheel 43 in response to rotation of the roller 52. The drive means 51 for the accelerating wheel 43 further comprises a device which can cause the running web 11 to rotate the roller 52. This device comprises an electromagnet 61 having a reciprocable armature 59 connected with a roller 58 which can be moved between the solid-line and phantom-line positions of FIG. 2, i.e., transversely of the path of the running web 11. When the electromagnet 61 is energized, it attracts the armature 59 whereby the roller 58 moves from the solid-line to the phantom-line position to thereby cause a requisite length of the rapidly moving running web 11 to be trained around the elastic peripheral portion of the roller 52 so that the roller 52 is set in rotary motion (in a clockwise direction, as viewed in FIG. 2) and drives the accelerating wheel 43 in a clockwise direction through the intermediary of pulleys 54, 57 and endless belt 56.

The uniting or splicing device 34 of the splicing apparatus 16 comprises a shiftable platform 63 which can support a uniting band 62. This uniting band is coated with adhesive at both sides and can be placed into the gap 144 between the webs 11 and 18 prior to start of a splicing operation. The platform 63 for uniting bands 62 is mounted on a reciprocable carriage 64 which is slidable in a stationary base 66 and has a T-shaped lower end portion received in a complementary T-shaped groove 67 of the base 66. A handgrip member or knob 68 is secured to the carriage 64 to facilitate the movement of platform 63 (with the carriage 64) between the operative position shown in FIG. 3 and in an inoperative position (located to the left of the position shown in FIG. 3) in which latter position the platform 63 is accessible for attachment of a fresh uniting band 62.

The detent means for releasably locking the platform 63 and carriage 64 in the operative positions shown in FIG. 3 comprises an arm 69 which is attached to the carriage 64 and has a notch 69*a* for a reception of a tooth 71*a* provided on a locking lever 71 pivotally secured to the frame member 48. When the locking lever 71 is disengaged from the detent arm 69, the carriage 64 can be automatically retracted to its inoperative position by a helical spring 73 one end of which is attached to a downwardly extending lug 76 secured to the arm 69. The other end of the spring 73 is attached to a similar lug 74 secured to the base 66. As shown, the spring 73 extends through an opening provided in a bracket 77 which carries the base 66 and is mounted on the frame member 48. The base 66 is provided with a stop 72 against which the carriage 64 abuts when the platform 63 assumes its inoperative position in which it is ready to be connected with a fresh adhesive-coated uniting band 62.

The splicing device 34 comprises the aforementioned splicing roller 42 (which further serves as a guide means for the fresh web 18) and a similar splicing roller 78 which is located opposite the splicing roller 42. When the platform 63 assumes the operative position of FIG. 3, the uniting band 62 which is attached to this platform is located in that portion of the gap 144 which extends between the splicing rollers 78 and 42 of the splicing device 34. The upper splicing roller 78 is rotatable about the axis of a shaft 79 mounted in the frame member 48. The splicing roller 42 is mounted on a shaft 81 which is supported by a pivotable holder 82. The fulcrum 83 for the holder 82 is secured to the frame member 48. The splicing operation takes place when the splicing roller 42 is lifted so as to move toward the splicing roller 78 and to thereby reduce the width of the corresponding portion of the gap 144 to zero. This results in pressing of the fresh web 18 against the adhesive-coated underside of the uniting band 62 on the platform 63 while the adhesive-coated upper side of the uniting band 62 adheres to the expiring web 11 whereby the band 62 is automatically separated from the platform 63 and advances with the webs 11 and 18 at the speed of the web 11.

The holder 82 for the shaft 81 of the lower splicing roller 42 has a cutout or recess 84 which is large enough to prevent the holder 82 from interfering with the detent arm 69 and locking lever 71 when the roller 42 is caused to move upwardly toward the uniting band 62 on the platform 63. The holder 82 is further provided with a plate-like support 86 which is located below the cutout 84 and supports a small roll 87. The purpose of the roll 87 is to engage and pivot the locking lever 71 in response to upward movement of the lower splicing roller 42 whereby the roll 87 expels the tooth 71a of the lever 71 from the notch 69a of the detent arm 69 so that the spring 73 is free to contract and to move the carriage 64 into abutment with the stop 72. The holder 82 further carries a second support 88 for a second small roll 89 which can actuate a movable severing element or knife 111 pivotally mounted on a pin 113 secured to a plate 114 of the frame member 48 at a level above the support 88. The means for pivoting the holder 82 about the axis of the fulcrum 83 comprises an electromagnet 91 which is pivotally secured to a bracket 92 of the frame member 48, as at 193, and has a reciprocable armature 93 articulately connected to the holder 82 at a level below the cutout 84 and to the left of the support 86, as viewed in FIG. 2.

The lower splicing roller 42 is an idler roller, i.e., it is not driven to rotate about the axis of the shaft 81. In contrast thereto, the upper splicing roller 78 is rotatable by a drive which derives motion from the wheel 43 of the accelerating device 33. Thus, the drive for the upper splicing roller 78 derives motion from the drive means 51 for the accelerating wheel 43. The shaft 49 for the wheel 43 carries a further pulley 94, and a pulley 99 is mounted on a shaft 97 secured to the frame

member **48** adjacent to the shaft **79** for the splicing roller **78.** An endless belt **96** is trained around the pulleys **94** and **98.** The pulley **98** is rigid with a gear **99** which meshes with a gear **101** secured to the splicing roller **78.** The belt **96** is preferably provided with teeth mating with teeth on the pulleys **94** and **98** so that the gear **99** is driven in exact synchronism with the accelerating wheel **43.** The transmission ratio of the drive for the upper splicing roller **78** is selected in such a way that the peripheral speed of this roller equals the speed of lengthwise movement of the running web **11.** On the other hand, the peripheral speed of the accelerating wheel **43** (and hence of the fresh web **18**) is preferably a little less than the speed of the running web **11.**

The gear **99** on the shaft **97** further meshes with a gear **102** which forms part of a step-down transmission **103.** The output shaft **104** of the transmission **103** carries a regulating device **106** here shown as including a rotary programming drum **107** having a series of circumferentially spaced protuberances or lobes **108***a*, 108*b*, 108*c*. As shown in FIG. **4,** the programming drum **107** is composed of three discrete disks **107***a*, 107*b*, 107*c* which respectively carry the lobes **108***a*, 108*b*, 108*c*. The lobes **108***a*, 108*b*, 108*c* respectively serve as trips or actuating means for three discrete signal generating elements here shown as electric switches **109***a*, **109***b*, 109*c*. The parts **107***a*–**107***c*, 108*a*–**108***c* and **109***a*–**109***c* together constitute a signal generating device or unit a portion (parts **107***a*–**107***c* and **108***a*–**108***c*) of which can receive motion from the advancing rolls **39** by way of the running web **11** to thereby cause the elements **109***a*–**109***c* to generate signals in a predetermined sequence and at intervals depending from the speed of the web **11.** The purpose of the switches **109***a*–**109***c* is to actuate certain devices of the splicing apparatus **16** in a predetermined sequence. The disks **107***a*, 107*b*, 107*c* are adjustable relative to each other in the circumferential direction of the output shaft **104.**

The aforementioned knife **111** of the severing device **36** is mounted adjacent to the guide roller **37** for the running web **111.** This is best shown in FIG. **2.** The knife **111** is spaced apart from a stationary second knife **112** which is installed between the guide roller **38** for the running web **11** and the accelerating wheel **43** for the fresh web **18.** The cutting edge **111**a of the movable knife **111** is serrated as best shown in FIG. **3.** The idle or retracted position of the movable knife **111** is determined by a helical spring **116** which is attached to the plate **114** and urges the knife **111** against a suitable stop, not shown. The shorter arm of the knife **111** is located at a level above the aforementioned roll **89** which can pivot the knife **111** so that the serrated portion **111***a* then severs the expiring web **11** behind the platform **63.**

The stationary knife **112** has a cutting edge **112***a* which is located almost directly below the lowermost point of the guide roller **38** for the running web **11.** The knife **112** is secured to a vertically adjustable support **117** on the frame member **48.**

FIG. **4** illustrates the electric control circuit for the splicing apparatus **16.** This control circuit further regulates the operation of the ejecting device including the nozzle **32** shown in the upper left-end portion of FIG. **1.** The control circuit comprises a first control unit **118** which serves to activate the drive means **51** for the wheel **43** of the accelerating device **33** for the fresh web **18.** When the control unit **118** starts the drive means **51,** the wheel **43** begins to rotate in a clockwise direction, as viewed in FIG. **2,** so that the fresh web **18** is accelerated to a speed which is preferably slightly less than the speed of the running web **11.** Also, when the control unit **118** starts the drive means **51,** the latter starts the transmission **103** which in turn rotates the output shaft **104** so that the disks **107***a*–**107***c* of the programming drum **107** are set in rotary motion and their lobes **108***a*–**108***c* respectively actuate the electric signal generating switches **109***a*–**109***c* at predetermined intervals.

The control circuit further comprises a second control unit **119** which can activate the splicing or uniting device **34** of the splicing apparatus **16.** This results in pivoting of the holder **82** so that the splicing rollers **42,** 78 cooperate to attach the webs **11** and **18** to opposite sides of the uniting band **62** on the platform **63.** At the same time, or shortly thereafter, the control unit **119** causes the severing device **36** including the movable knife **111** to sever the running web **11** behind the freshly formed splice.

The control circuit of FIG. **4** further comprises a third control unit **121** which controls the ejecting device including the nozzle **32** so as to expel from the trough **31** those plain cigarettes or that plain cigarette **27** which includes(s) portions of the splice between the webs **11** and **18.** The control circuit stil further comprises a fourth control unit or resetting unit **122** which serves to arrest the programming drum **107** in its initial or starting position upon completion of a splicing operation. It will be noted that, for the sake of clarity, the disks **107***a*, 107*b*, 107*c* of the programming drum **107** are shown in FIG. **4** one adjacent to the other rather than in axial alignment.

The control unit **118** includes the aforementioned photoelectric detector **19** which monitors the supply of running web **11** on the expiring roll **12.** The signals from the photoelectric detector **19** are transmitted to one stationary contact of a switch **123***a* forming part of a relay **123.** The control unit **118** further comprises an amplifier **124** which amplifiers the signals furnished by the detector **19** and transmits the amplified signals to the electromagnet **61** for the roll **58** of the drive means **51.**

The second control unit **119** is connected with the electric switch **109***c* and includes an amplifier **126** which amplifies signals furnished to the electromagnet **91.** The latter serves to pivot the holder **82** for the movable splicing roller **42.** The control unit **119** further comprises a logic circuit **127** of the type known as flip-flop with a manually operable switch **128.** One input of the flip-flop **127** is connected with the switch **128.** The output of the flip-flop **127** is connected with the relay **123** which is normally deenergized. The switch **128** is closed by hand for a short period of time when the operator wishes to erase the output signal from the flip-flop **127** to the relay **123.** The relay then disconnects the output of the photoelectric detector **19** from the amplifier **124.**

The control unit **121** is connected with the switch **109***b* and comprises an amplifier **129** and an electromagnetic valve **131** which can connect a suitable source of compressed gas with the nozzle **32** of the ejecting device at the station S2 shown in FIG. **1.**

The control unit **122** is connected with the switch **109***a*. The signal which is produced in response to clos-

ing of the switch **109***a* by the lobe **108***a* is transmitted by control unit **122** to the input of the amplifier **124.**

The operation is as follows:

It is assumed that the cigarette rod making machine of FIG. **1** operates normally, i.e., that the advancing rolls **39** draw the running web **11** from the expiring roll **12** and that the pivotable holder **82** of the splicing unit **34** dwells in the inoperative position of FIG. **2.** The supply of running web **11** on the expiring roll **12** is nearly exhausted so that the start of a splicing operation is imminent. The foremost end of the leading portion of the fresh web **18** has been trained over the guide roller **41** and splicing roller **42** and extends into the slot **44** so that it is clamped by the device **47** to the accelerating wheel **43.** Also, a uniting band **62** has been attached to the platform **63** which dwells in the operative position of FIGS. **2** and **3** so that the unattached portion of the uniting band **62** (both sides of which are coated with adhesive) extends into that portion of the gap **144** which is located between the splicing rollers **42** and **78,** i.e., the uniting band **62** is located between but is spaced apart from the webs **11** and **18.** It will be noted that the leading portion of the fresh web **18** is located in a path which is adjacent to the station S1 and is substantially parallel to the nearest portion of the path for the running web **11.**

When the supply of running web **11** on the expiring roll **12** is exhausted to such an extent that the beam of light issuing from the light source of the detector **19** can impinge on the photosensitive element of this detector, the photosensitive element transmits a signal by way of the closed switch **123***a* of the relay **123** of FIG. **4** (this relay is assumed to be deenergized) and to the amplifier **124.** The latter amplifies the signal to energize the electromagnet **61** which attracts its armature **59** so that the roller **58** moves from the solid-line position to the phantom-line position of FIG. **2** and drapes a requisite length of the running web **11** around the roller **52** of the drive means **51** for the accelerating wheel **43,** splicing roller **78** and gear **102** of the transmission **103.** The roller **52** begins to rotate in a clockwise direction, as viewed in FIG. **2,** and rotates the accelerating wheel **43** by way of the pulleys **54, 57** and endless belt **56.** The accelerating wheel **43** drives the shaft **97** which in turn drives the splicing roller **78** and the programming drum **107.** The wheel **43** accelerates the fresh web **18** from zero speed to a speed which is slightly less than the speed of the running web **11.** Thus, the leading portion of the fresh web **18** is being convoluted onto the wheel **43** so that the web **18** rotates the fresh roll **17** of FIG. **1** in a counterclockwise direction. The length of that portion of the running web **11** which engages the peripheral surface of the roller **52** determines the rate of acceleration of the fresh web **18** in response to energization of the electromagnet **61** upon transmission of a signal from the detector **19** to the amplifier **124.** Thus, a simple adjustment of the extent of movement of the roller **58** from the solidline position of FIG. **2** will enable the operator to select such acceleration of the fresh web **18** which is not likely to result in tearing of this web, especially during the initial stage of acceleration when the web **18** must overcome the inertia of the relatively large fresh roll **17.**

The rotating programming cam **107** causes the lobe **108***a* on the disk **107***a* to effect a closing of the switch **109***a* which activates the control unit **122** so that the latter maintains the electromagnet **61** in energized condition irrespective of the condition of the relay **123,** i.e., the relay **123** can open its switch **123***a* to disconnect the detector **19** from the amplifier **124** but the roller **58** continues to remain in the phantom-line position of FIG. **2** because the holding circuit of the electromagnet **61** is completed by the switch **109***a*.

The fresh web **18** is rapidly accelerated to the desired speed which is preferably somewhat less than the speed of the running web **11.** The interval which is required for such acceleration of the fresh web **18** is considered in the selection of initial angular position of the lobe **108***c* on the disk **107***c* of FIG. **4.** Thus, the lobe **108***c* closes the switch **109***c* for the control unit **119** with a delay which is sufficient to insure satisfactory acceleration of the fresh web **18** whereby the amplifier **126** receives a signal which is amplified and energizes the electromagnet **91.** The latter expels its armature **93** so that the holder **82** is pivoted in a clockwise direction, as viewed in FIG. **2,** whereby the splicing roller **42** rises and presses the adjacent portion of the running web **18** against the underside of the uniting band **62** on the platform **63.** At the same time, the splicing roller **42** presses the upper side of the uniting band **62** against the underside of the adjacent portion of the running web **11** to thus connect the web **18** to the web **11** whereby the web **18** is accelerated to the exact speed of the web **11** and the uniting band **62** is automatically detached from the platform **63.**

The electromagnet **91** further causes the roll **89** on the support **88** of the holder **82** to pivot the movable knife **111** in a counterclockwise direction, as viewed in FIG. **3,** so that the serrated portion **111***a* of the knife **111** severs the running web **11** behind the splice (i.e., behind the uniting band **62**) so that the remainder of the practically expired roll **12** is disconnected from the preceding portion of the running web **11** as well as from the running fresh web **18.**

Still further, the electromagnet **91** causes the roll **87** on the support **86** of the holder **82** to pivot the locking lever **71** so that the tooth **71***a* is expelled from the notch **69***a* and the spring **72** is free to contract so as to move the platform **63** to the exposed position in which the carriage **64** abuts against the stop **72.** The operator then attaches a fresh uniting band **62** to the platform **63** prior to manually returning the carriage **64** to the operative position by way of the knob **68.**

When the switch **109***c* is closed by the lobe **108***c*, a signal is transmitted to the right-hand input of the flip-flop **127** whereby the output of the flip-flop **127** transmits a signal to the relay **123** which is energized and opens its switch **123***a* to disconnect the detector **19** from the amplifier **124.** The electromagnet **61** remains energized because the amplifier **124** receives a signal by way of the closed switch **109***a*.

As the splice between the webs **11** and **18** advances toward the deflecting roller **38** of FIG. **2,** the leading portion of the web **18** (namely, that portion which extends between the splice and the still rotating accelerating wheel **43**) travels at a speed which is less than the speed of the portion of web **18** behind the splice. Such leading portion is severed by the edge **112***a* of the stationary knife **112** after the splice advances beyond the roll **38.**

By properly selecting the initial angular position of the lobe **108***c* on the disk **107***c*, the operator of the splicing apparatus insures that the input member or roller **52** is driven without any slippage (by the running

web 11) during a splicing operation and by the fresh running web 18 upon completion of the splicing operation. Thus, once the splicing operation is completed, the programming drum 107 rotates in exact synchronism with the advancing rolls 39 for the web 18. Consequently, the angular displacement of the lobe 108*b* upon completion of the splicing operation is exactly proportional to the distance which the splice between the webs 11 and 18 covers during travel through the cigarette rod making machine of FIG. 1. By properly selecting the initial angular position of the lobe 108*b* relative to the switch 109*b* and lobe 108*c*, the operator can insure that the electromagnetic valve 131 is opened in response to a signal from the amplifier 129 at the 3exact moment when the plain cigarette or cigarettes 27 whose wrappers embody portions of the splice travel in the trough 31 so that such cigarette or cigarettes are expelled by the blast of compressed gas issuing from the nozzle 32. The amplifier 129 receives a signal in response to closing of the switch 109*b* by the lobe 108*b* of the disk 107*b*.

As the drive means 51 continues to rotate the programming drum 107, the lobe 108*a* of the disk 107*a* completes a little less than one revolution and reaches and opens the switch 109*a* so that the electromagnet 61 becomes deenergized and allows a suitable spring (not shown) to return the roller 58 to the solid-line position of FIG. 2. This results in disengagement of the running web 18 from the roller 52 so that the drive means 51 is arrested. Thus, the accelerating wheel 43 comes to a standstill to thus arrest the programming drum 107 and the splicing roller 78. Eventual minor angular displacement of the programming drum 107 due to inertia of moving parts of the drive means 51 is taken into consideration by proper selection of the length of the lobe 108*a* (as considered in the circumferential direction of the disk 107*a*) so that the switch 109*a* remains open when the programming drum comes to a standstill. If desired, the opening of switch 109*a* may result in actuation of a brake 200 (indicated in FIG. 2 by phantom lines) which arrests the roller 52 in immediate response to opening of the switch 109*a* so that the inertial of drive means 51 cannot bring about substantial changes in angular position of the programming drum 107 subsequent to opening of the switch 109*a*. The splicing apparatus 16 is then ready for the next operation which is initiated as soon as the supply of running web 18 on the expiring roll 17 has been depleted to a predetermined minimum value at which the detector 19 furnishes a signal which results in energization of the electromagnet 61. FIG. 1 shows that the rolls 12 and 17 are mounted on two arms of a supporting lever 201. When the remnant of the expired roll 12 is removed, the roll 17 can be shifted to the position previously occupied by the roll 12 so that the detector 19 can monitor the supply of running web 18 on the thus transferred expiring roll 17. The operator then places onto the supporting lever 201 a fresh roll (not shown) which occupies the position shown as being occupied by the roll 18. The leading portion of the web on such fresh roll is placed over the rollers 41 and 42 of FIG. 2 and is introduced into the slot 44 to be temporarily attached to the accelerating wheel 43 by the clamping device 47 subsequent to removal from the wheel 43 of the separated portion of running web 18. The operator also closes the switch 128 for a short interval of time so as to transmit an erasing signal to the left-hand input of the flip-flop 127 whereby the signal at the output of the flip-flop disappears and the relay 123 is deenergized to close its switch 123*a*. This prepares the control circuit for a fresh splicing operation because the photosensitive element of the detector 19 is then connected with the amplifier 124 and can energize the electromagnet 61 as soon as it receives light from the light source of the detector 19, i.e., as soon as the supply of running web 18 on the expiring roll 17 is depleted to the extent which warrants the start of a fresh splicing operation.

An important advantage of the splicing apparatus 16 is that its control circuit invariably insures the expulsion of those products (plain cigarettes 27) whose wrappers embody portions of the splices, i.e., portions of the uniting bands 62 and the adjacent portions of the respective webs. The reliability of the ejecting action is not affected by the speed of the expiring and fresh webs prior, during and subsequent to splicing because the angular position of the lobe 108*b* relative to the lobe 108*c* can be readily selected in such a way that the valve 131 opens at the exact moment when a splice (whose making is initiated by the lobe 108*c*) reaches the trough 31 so that the respective cigarette or cigarettes 27 are in the range of the nozzle 32. The length of the interval during which the nozzle 32 receives compressed gas can be readily selected in such a way that the ejecting device expels a minimal number of cigarettes 27 without, however, risking that a defective cigarette would reach the transfer conveyor 29 and the next-following processing station. The length of the interval during which the valve 131 remains open depends on the length of the lobe 108*b* (as considered in the circumferential direction of the disk 107*b*) and on the ratio of the transmission 103 which drives the programming drum 107.

The control circuit of FIG. 4 insures that the travel of the splice between the webs 11 and 18 from the splicing station S1 (rollers 42, 78) to the ejecting station S2 (trough 31) is reproduced by the selected angular position of the lobe 108*b* relative to the lobe 108*c* so that the ejection of products which are defective due to the formation of a splice invariably takes place at the most opportune moment, namely, when the defective article or articles are in the range of the stream of compressed gas issuing from the nozzle 32.

The provision of drive means 51 which derives motion from the advancing rolls 39 by way of the expiring web 11 and serves to accelerate the fresh web 18 as well as to drive the programming drum 107 constitutes a very simple and effective solution of the problem of insuring that the signal for activation of the ejecting device is delayed as a function of the speed at which the splice and therefore the defective articles or article travel or travels to the ejecting station. It will be noted that eventual slippage of input member or roller 52 relative to the expiring web 11 during acceleration of the fresh web 18 does not adversely influence the accuracy of the ejecting operation because such ejecting operation is started in dependency on the angular positions of lobes 108*b*, 108*c* relative to each other, i.e., the ejecting operation cannot be influenced by the rate at which the web 18 is being accelerated prior to splicing. This, in turn, renders it possible to select the rate of acceleration of the fresh web 18 with a view to invariably prevent the web from tearing prior to energization of the electromagnet 91, i.e., prior to start of the actual splicing operation. All that can happen if the rate of ac-

celeration of the web **18** is very low is that the programming drum **107** is rotated at a low speed but the angular positions of the lobes **108***b*, 108*c* relative to each other remain unchanged. The position of the detector **19** relative to the axis of the expiring roll **12** can be readily selected in such a way that this detector furnishes a signal which initiates an acceleration of the fresh web **18** in good time before the supply of running web on the expiring roll **12** is exhausted to thus insure that the web **11** is still running even if the acceleration of the fresh web **18** takes up a relatively long interval of time.

An advantage of the drive means **51** is that it can effect an acceleration of the fresh web at any selected rate to thus avoid tearing of the web just prior to splicing. In addition, the drive means **51** is much simpler and more reliable than presently known devices which are used to transmit motion to web accelerating units. Still further, the drive means **51** occupies little room and need not be provided with a discrete prime mover so that a splicing apparatus embodying such drive means can be installed in existing cigarette rod making or analogous machines which are not provided with a power take-off in the region where the splicing apparatus is to be installed.

The improved apparatus is susceptible of many additional modifications. For example, the signal generating means including the programming drum **107** and the switches **109***a*–**109***c* can be replaced with a signal recording and transmitting system which utilizes magnetic tape or a film having encoded information which is detectable by photoelectric means.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of our contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is:

We claim:

1. In a cigarette rod making or analogous machine wherein a running web of cigarette paper or the like which is being withdrawn from an expiring roll is transported lengthwise along a predetermined path extending toward, through and beyond spaced-apart first and second stations and is converted into wrappers of discrete rod-shaped articles not later than at said second station, and wherein the leading end of a fresh web which is stored in the form of a fresh roll is maintained in readiness at said first station, a combination comprising means for advancing the running web along said path and a splicing apparatus, said splicing apparatus including means for accelerating the leading end of the fresh web and signal generating means having a first portion, drive means for transmitting motion to said first portion from said advancing means in response to acceleration of the leading end of the fresh web and a second portion for furnishing a plurality of signals in response to movement of said first portion, said signals including a first signal and said splicing apparatus further comprising means for uniting portions of the running web and the accelerated fresh web in response to said first signal so that said portions of the running and fresh webs form at said first station a splice which is thereupon transported along said path at the speed of the running web, said splicing apparatus also comprising means for severing the running web between said splice and the expiring roll in response to one of said plurality of signals to thereby separate the splice from the expiring roll, said severing means being adjacent to said path.

2. A combination as defined in claim **1**, further comprising means for monitoring the supply of running web on said expiring roll and including means for generating a signal in response to depletion of the supply of running web on said expiring roll to a predetermined minimum value, said accelerating means comprising means for setting the leading end of the fresh web in motion in response to said last mentioned signal.

3. A combination as defined in claim **1**, wherein said signals include a second signal which is generated when at least one rod-shaped article whose wrapper embodies said splice travels through said second station, and further comprising means for efecting from said path articles whose wrappers embody said splice in response to said second signal so that the ejecting of such articles takes place at said second station.

4. A combination as defined in claim **3**, wherein said second portion of said signal generating means comprises a plurality of discrete signal generating elements, one for each of said plurality of signals and said first portion of said signal generating means comprises mobile means for actuating said discrete signal generating elements in a predetermined sequence and in synchronism with the speed of transport of the running web along said path.

5. A combination as defined in claim **4**, wherein said accelerating means derives motion from said advancing means.

6. In a cigarette rod making or analogous machine wherein a running web of cigarette paper or the like which is being withdrawn from an expiring roll is transported lengthwise along a predetermined path extending toward, through and beyond spacedapart first and second stations and is converted into wrappers of discrete rod-shaped articles not later than at said second station and wherein the leading end of a fresh web which is stored in the form of a fresh roll is maintained in readiness at said first station, a combination comprising means for advancing the running web along said path and a splicing apparatus, said splicing apparatus including means for accelerating the leading end of the fresh web and signal generating means having a rotatable first portion, drive means for transmitting rotary motion to said first portion from said advancing means in response to acceleration of the leading end of the fresh web and a second portion for furnishing a plurality of signals in response to rotation of said first portion, said signals including a first signal which is produced by said second portion in a first predetermined angular position of said first portion, said splicing apparatus further comprising means for uniting portions of the running web and the accelerated fresh web in response to said first signal so that said portions of the running and fresh webs form at said first station a splice which is thereupon transported along said path at the speed of the running web and said splicing apparatus also comprising means for arresting said first portion of said signal generating means in a second predetermined angular position so that repreated rotation of said first portion of said signal generating means from said second

predetermined angular position to said first predetermined angular position necessitates rotation of said first portion through angles of substantially identical magnitude.

7. A combination as defined in claim 16, further comprising means for actuating said arresting means in response to a second signal of said plurality of signals.

8. In a cigarette rod making or analogous machine wherein a running web of cigarette paper or the like which is being withdrawn from an expiring roll is transported lengthwise along a predetermined path extending toward, through and beyond spacedapart first and second stations and is converted into wrappers of discrete rod-shaped articles not later than at said second station, and wherein the leading end of a fresh web which is stored in the form of a fresh roll is maintained in readiness at said first station, a combination comprising means for advancing the running web along said path and a splicing apparatus, said splicing apparatus including means for accelerating the leading end of the fresh web, said accelerating means comprising a drive having a rotary input member receiving motion due to frictional engagement with the running web and means for setting the leading portion of the fresh web in motion in response to rotation of said input member, said splicing apparatus further comprising signal generating means having a first portion, drive means for transmitting motion to said first portion from said advancing means in response to acceleration of the leading end of the fresh web and a second portion for furnishing a plurality of signals in response to movement of said first portion, said signals including a first signal and said splicing apparatus also comprising means for uniting portions of the running web and the accelerated fresh web in response to said first signal so that said portions of the running and fresh webs form at said first station a splice which is thereupon transported along said path at the speed of the running web.

9. A combination as defined in claim 8, wherein said drive further comprises means for moving the running web into frictional engagement with said rotary input member.

10. A combination as defined in claim 9, wherein said means for moving the running web into frictional engagement with said input member comprises a roller and means for moving said roller transversely of the path of said running web.

11. In a cigarette rod making or analogous machine wherein a running web of cigarette paper or the like which is being withdrawn from an expiring roll is transported lengthwise along a predetermined path extending toward, through and beyond spaced-apart first and second stations and is converted into wrappers of discrete rod-shaped articles not later than at said second station, and wherein the leading end of a fresh web which is stored in the form of a fresh roll is maintained in readiness at said first station, a combination comprising means for advancing the running web along said path and a splicing apparatus, said splicing apparatus including means for accelerating the leading end of the fresh web and signal generating means including a first portion having a rotary programming device with a plurality of actuating elements, drive means for transmitting rotatary motion to said programming device from said advancing means in response to acceleration of the leading end of the fresh web, and a second portion for furnishing a plurality of signals in response to rotation of said programming device, said second portion including a plurality of discrete signal generating elements each actuatable by one of said actuating elements in predetermined angular positions of said programming device, said signals including a first signal and said splicing apparatus further comprising means for uniting portions of the running web and the accelerated fresh web in response to said first signal so that said portions of the running and fresh webs form at said first station a splice which is thereupon transported along said path at the speed of the running web.

* * * * *