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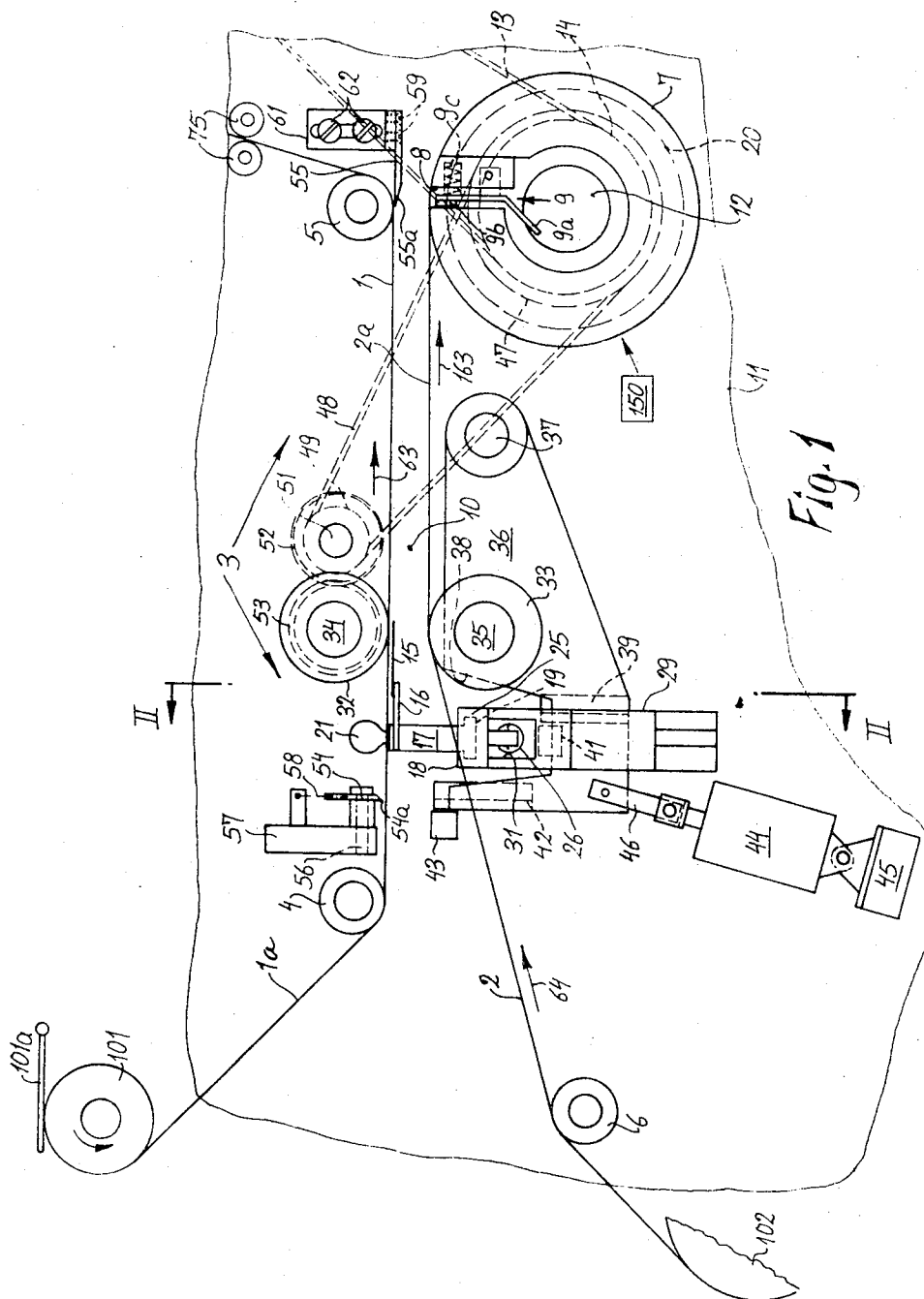
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3,749,634

APPARATUS FOR SPLICING CIGARETTE PAPER WEBS

Filed May 14, 1971

2 Sheets-Sheet 1



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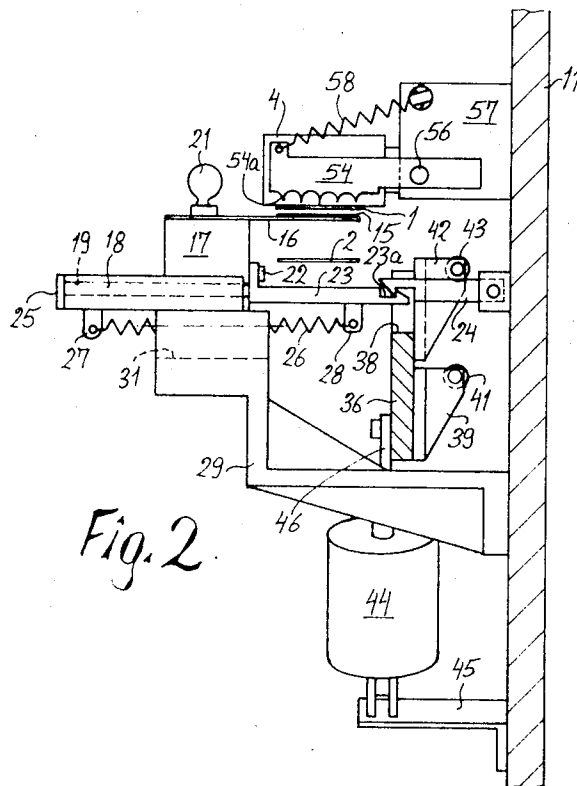
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APPARATUS FOR SPLICING CIGARETTE PAPER WEBS

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16 Claims

ABSTRACT OF THE DISCLOSURE

A fresh cigarette paper web is connected with a travelling expiring web by accelerating the fresh web to a speed which is slightly less than the speed of the expiring web, by guiding the accelerated fresh web along a path which is spaced from an adjacent portion of the path for the expiring web, by placing between the two paths a uniting band which is coated with adhesive at both sides, by thereupon moving the travelling fresh web sideways to press it against the respective side of the uniting band while simultaneously pressing the other side of the band against the expiring web, and by thereupon severing the trailing portion of the expiring web behind the uniting band and the leading portion of the fresh web in front of the uniting band.

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for connecting expiring webs to fresh webs, especially in machines for the production and/or processing of smokers' products. More particularly, the invention relates to improvements in apparatus for splicing a travelling expiring web to a travelling fresh web.

British Pat. No. 936,138 discloses a splicing or web uniting apparatus wherein the fresh web is accelerated prior to splicing with the expiring web. An adhesive-coated uniting band which is attached to the leading end of the fresh web is thereupon caused to contact an auxiliary web or band which must be properly threaded into the splicing apparatus. The auxiliary web is advanced with the expiring web and entrains the fresh web into the path of movement of the expiring web. A knife is actuated to sever the leading portion of the fresh web and a portion of the auxiliary web when the fresh web already advances in the path for the expiring web to enter the consuming machine. In the next step, a uniting band is caused to connect one side of the forward end of the trimmed fresh web to one side of the trailing end of the expiring web. Such operation is followed by the application of a further uniting band to the other side of the trimmed front end of the fresh web and to the other side of the trailing end of the expiring web.

A drawback of the just described splicing apparatus is that it comprises a substantial number of complicated parts and requires the utilization of an auxiliary band or web which must be properly threaded prior to connection with the fresh web. Another drawback of the patented apparatus is that it occupies too much room and also that it is not suited for the splicing of very thin webs, such as those consisting of cigarette paper which is used to form tubular wrappers for plain cigarettes or for the tobacco-containing portions of filter-tipped cigarettes. Furthermore, the severed portions of webs and the separated uniting bands are likely to accumulate in and to contaminate the splicing apparatus. Thin webs are likely to form loops and folds and cannot be properly attached to each other even if the operator follows the operating instructions.

The automatically operated parts of the patented apparatus are controlled by a complicated programming system which contributes to the bulk, initial cost and maintenance cost of such apparatus.

SUMMARY OF THE INVENTION

An object of the invention is to provide a novel and improved apparatus for connecting a rapidly advancing expiring web of cigarette paper or the like with a fresh web.

Another object of the invention is to provide an apparatus wherein the splicing or connecting operation can be carried out automatically and wherein the fresh web can be made ready for splicing by semiskilled or unskilled workmen.

A further object of the invention is to provide a splicing apparatus which does not cause excessive stressing or tearing of webs, even if the webs consist of extremely thin and weak material, such as cigarette paper or other types of web material which is used in connection with the production and/or processing of smokers' products.

An additional object of the invention is to provide an apparatus, which occupies little room, which can be installed in or on or combined with existing machines for the production and/or processing of smokers' products, which comprises a small number of simple parts, which allows for convenient preparation of a fresh web for the splicing operation, and which is more reliable and less expensive than many presently known splicing apparatus for connecting a travelling expiring web with a travelling fresh web.

An additional object of the invention is to provide a uniting or connecting apparatus wherein a fresh web can be connected or spliced directly to an expiring web without necessitating the utilization of reservoirs for intermediate webs which occupy additional room and contribute to complicatedness of conventional connecting apparatus.

One feature of the present invention resides in the provision of an apparatus for making a connection or splice between an expiring web and fresh web, particularly in a machine for the production or processing of smokers' products. The apparatus comprises means for advancing the expiring web lengthwise along a first path, means for advancing the fresh web along a second path which is spaced from the first path, means for placing between the two paths a uniting band which is adhesive at both sides, means of moving at least one of the webs sideways toward the path for the other web to thus place the webs into contact with the respective sides of the uniting band whereby the band connects the webs to each other and the trailing and leading portions of the expiring and fresh webs respectively extend rearwardly and forwardly from the uniting band, and means for severing such trailing and leading portions from the respective webs.

The first advancing means preferably comprises means for moving the expiring web lengthwise at a predetermined speed, and the second advancing means preferably comprises means for moving the fresh web lengthwise at a speed which at most equals the speed of the first web. As a rule, and in order to simplify the manipulation of the uniting apparatus, the uniting band is preferably held at a standstill prior to sidewise movement of the one web so that the uniting band is accelerated from zero speed in response to contact with the webs.

The means for severing the trailing portion from the expiring web is preferably actuated substantially simultaneously with sidewise movement of the one web, i.e., substantially simultaneously with attachment of the webs to the opposite sides of the uniting band. The improved apparatus preferably further comprises means for moving the expiring web and the leading portion of the fresh web apart forwardly of the uniting band and subsequent to moving of the one web sideways to thereby increase the angle between the expiring web and the leading portion of the fresh web. The means for severing the leading portion of the fresh web is preferably actuated when the

magnitude of the angle between the expiring web and the leading portion of the fresh web reaches a predetermined value, preferably a predetermined maximum value. The arrangement is preferably such that the path for the expiring web includes two mutually inclined portions and the means for severing the leading portion of the fresh web is preferably located in the proximity of the region where the two mutually inclined portions of the path for the expiring web meet. In a presently preferred embodiment of the apparatus, the two paths include substantially parallel portions and the uniting band can be placed into the space between such parallel portions of the two paths.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved uniting 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 diagrammatic side elevational view of an apparatus which is used for uniting webs of cigarette paper and is constructed and assembled in accordance with the present invention; and

FIG. 2 is a section as seen in the direction of arrows from the line II—II of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The web uniting or connecting apparatus which is illustrated in FIGS. 1 and 2 comprises basically first advancing means for an expiring web 1, second advancing means for a fresh web 2, splicing means which is actuable to contact portions of the webs 1 and 2 with opposite sides of a uniting band 15 which is placed between the paths of the webs 1 and 2, and severing means or knives one of which serves to sever the trailing portion 1a of the expiring web 1 behind the uniting band 15 and the other of which serves to sever the leading portion 2a of the fresh web 2 ahead of the uniting band 15.

In the illustrated embodiment, the webs 1 and 2 consist of cigarette paper and the expiring web 1 is fed into the wrapping mechanism of a conventional cigarette rod forming machine including a pair of driven advancing or feeding rolls 75 which form part of the advancing means for the web 1. The web 1 is draped around a continuous filler rod (not shown) consisting of shredded tobacco and the overlapping marginal portions of the web are thereupon connected to each other to form a seam as is customary in the manufacture of cigarettes. The resulting rod is thereupon subdivided into sections of unit length or multiple unit length. Sections of unit length can constitute plain cigarettes which can be immediately transported into a packing machine or which can be fed into a filter cigarette making machine of conventional design. The expiring web 1 is being withdrawn from a bobbin 101 the diameter of which is scanned by a conventional detector 101a serving to produce signals which initiate a splicing operation resulting in connection of the expiring web 1 with the fresh web 2. The fresh web 2 is stored on a second bobbin 102.

The advancing means for the expiring web 1 includes the aforementioned advancing or feeding rolls 75 of the cigarette rod making machine and a pair of spaced guide members or rolls 4, 5 which are disposed between the bobbin 101 and the advancing rolls 75. The path for the expiring web 1 is indicated by the arrow 63. It will be noted that this path includes a first straight portion which extends between the bobbin 101 and the guide roll 4, a second straight portion which extends between the guide rolls 4 and 5, and a third straight portion which extends between the guide roll 5 and the nip between the driven advancing or feeding rolls 75. The second and third portions of the path for an expiring web are inclined with

reference to each other and meet in the region of the guide roll 5.

The splicing or connecting station wherein the expiring web 1 can be connected with the fresh web 2 is shown at 3. The fresh web 2 is trained over a guide roll 6 which is located downstream of the bobbin 102 and the web 2 thereupon contacts the peripheral surface of a splicing member 33 here shown as an idler roller which is mounted on a carrier or shifting means in the form of a lever 36 pivotable at 37 with reference to a stationary frame member 11 of the uniting apparatus. The leading portion 2a of the fresh web 2 which extends forwardly of the splicing member 33 is separably connected to a drum-shaped conveyor 7 by a clamping mechanism 9. The path for the fresh web 2 is indicated by the arrows 64 and 163. That portion of the path for the fresh web 2 which extends between the splicing member 33 and the conveyor 7 is spaced from and parallel to the second portion of the path for the expiring web 1. Such portions of the two paths are separated from each other by a clearance or gap shown at 10. The guide roll 6 and the conveyor 7 constitute component parts of the advancing means for the fresh web 2. Such advancing means is designed to accelerate the fresh web 2 from zero speed to a speed which is preferably slightly less than or equal to the speed of the expiring web 1 prior to connection of the web 2 to the web 1.

The conveyor 7 is provided with a radially inwardly extending slot 8 for reception of the tip of the leading portion 2a of the fresh web 2. The aforementioned clamping mechanism 9 for the tip of the leading portion 2a comprises a lever 9a which is mounted in the conveyor 7, a spring 9c which biases the lever 9a in a clockwise direction as viewed in FIG. 1, and an anvil or back support 9b. The tip of the leading portion 2a is placed between the anvil 9b and the free end of the lever 9a and the lever is thereupon released to the action of the spring 9c which biases it against the fresh web 2. Consequently, when the fresh web 2 is properly connected with the conveyor 7, rotation of the conveyor 7 in a clockwise direction, as viewed in FIG. 1, will cause the web 2 to advance in the directions indicated by arrows 64 and 163. The conveyor 7 is rotatable on a shaft 12 which is mounted in the frame member 11 of the uniting apparatus. This frame member 11 can form part of the housing of the aforementioned cigarette rod making machine. The means for rotating the conveyor 7 in a clockwise direction, as viewed in FIG. 1, in response to a signal from the detector 101a which scans the diameter of the bobbin 101 includes a conventional electric motor (not shown) whose output shaft drives a toothed pulley, not shown. This pulley drives an endless toothed belt 13 which is trained over a toothed pulley 14 for the conveyor 7. The pulley 14 can drive the conveyor 7 through the intermediary of a friction clutch 20 which is indicated by a broken-line circle. Though FIG. 1 illustrates a mechanical detector 101a which is an arm biased against the periphery of a supply of expiring web 1 on the bobbin 101, it is equally possible to employ a photoelectric detector including a light source and a photosensitive element which latter produces a signal when it is exposed to the light beam issuing from the light source. The exact construction of this detector forms no part of the present invention; it suffices to say that the detector can start the motor which drives the pulley 14 when the diameter of the expiring web on the bobbin 101 decreases to a predetermined minimum value.

The uniting band 15, which is used to connect portions of the webs 1 and 2 to each other when the diameter of the bobbin 101 decreases to a predetermined minimum value, is coated with adhesive at both sides and is separably attached to a supporting means including a holder or platform 16 located in the gap 10 between the paths for the webs 1 and 2. The platform or holder 16 is mounted on a carriage 17 which is reciprocable at right angles to the plane of FIG. 1 in order to move the plat-

form 16 to and from the illustrated operative position in which the uniting band 15 is located in the gap 10. The carriage 17 is reciprocable along a base or bed 18 which is secured to the frame member 11 and is provided with suitable ways 19 for one or more complementary rails of the carriage. The carriage 17 is further provided with a handgrip portion 21 which can be grasped by fingers to shift the platform 16 from an inoperative position to the operative position of FIGS. 1 and 2. The uniting apparatus further comprises releasable or disengageable detent means which is designed to yieldably hold the platform 16 and the uniting band 15 thereon in the operative position. The detent means comprises a pawl 23 which is secured to the carriage 17 by means of one or more screws 22 or similar fasteners and has a hooked end portion 23a which can engage a complementary hooked end portion of a pivotable pawl 24 mounted on the frame member 11. A biasing means, here shown as a helical spring 26, is provided to urge the holder 16 to its inoperative position in which the carriage 17 abuts against a stationary stop 25 on the bed 18. One end of spring 26 is attached to a post 28 of the pawl 23 and its other end is attached to a post 27 provided on the bed 18. The spring 26 extends through an opening or cutout 31 provided in a stationary bracket 29 which is secured to the frame member 11. The bracket 29 serves as a support for the aforementioned bed 18.

The splicing device of the uniting apparatus is mounted at the station 3 and comprises the aforementioned splicing member 33 and a similar splicing member 32 mounted on the frame member 11 at a level above the path for the expiring web 1. It will be noted that the splicing members 32 and 33 flank the paths for the webs 1, 2 at the opposite sides of the uniting band 15 on the holder 16. The shaft for the splicing member 32 is shown at 34; this shaft is secured to the frame member 11. The shaft 35 for the splicing member 33 is mounted on the carrier 36 which is pivotable on the pin 37. The carrier 36 is pivotable by actuating means here shown as including an electromagnet 44 having an armature 46 which is pivotally connected to the carrier 36. The electromagnet 44 is pivotally secured to a bracket 45 on the frame member 11. The carrier 36 is formed with a cutout 38 which provides room for the bed 18 and carriage 17. Thus, the carrier 36 can pivot without interfering with movements of the carriage 17 along the ways 19 of the bed 18.

The carrier 36 further serves to support a disengaging roller 41 which is mounted on a support 39 and can disengage the pawl 24 from the pawl 23 upon completion of a splicing operation. The spring 26 is then free to retract the platform 16 from the operative position shown in FIG. 2 so that the platform is exposed and the operator can readily attach thereto a fresh uniting band 15. The carrier 36 further mounts a second support 42 for a roller 43 which serves to engage the pawl 24 with the pawl 23 when the platform 16, with a fresh uniting band 15 thereon, is returned by the handgrip portion 21 to the operative position of FIG. 2 and the electromagnet 44 is deenergized so that the splicing member 33 returns to the retracted or idle position of FIG. 1 in which it is spaced from the splicing member 32. The roller 43 further serves to actuate a severing device or knife 54 which is employed to separate the trailing portion 1a from the remainder of the web 1 subsequent to connection of the webs 1 and 2 to the respective adhesive-coated sides of the uniting band 15.

As mentioned before, the splicing member 33 is an idler roller whereas the splicing member 32 comprises a gear 53 meshing with a gear 52 on a shaft 51 of the frame member 11. The gear 52 is rigid with a pulley 49 which can be driven by a belt 48, preferably a belt having teeth meshing with similar teeth of the pulley 49 and with the teeth of a further pulley 47 which is coaxial with the conveyor 7. The splicing member 32 is rotated in response to rotation of the conveyor 7 which then drives the gears

52, 53 by way of pulleys 47, 49 and endless belt 48. The ratio of the transmission between the conveyor 7 and splicing member 32 is preferably such that the splicing member 32 can be driven at a peripheral speed which equals or closely approximates the forward speed of the expiring web 1 whereas the conveyor 7 advances the fresh web 2 at a speed which at most equals but can be slightly less than the forward speed of the expiring web 1.

The rotating splicing member 32 insures that the tension in the expiring web 1 downstream of the uniting band 15 cannot exceed the tension of the web 1 behind the uniting band. This prevents excessive stretching of the expiring web.

The aforementioned severing device or knife 54 for the trailing portion 1a of the expiring web 1 is a two-armed lever which is pivotable on a pin 56 secured to a bracket 57 of the frame member 11. The left-hand arm of the knife 54, as viewed in FIG. 2, is provided with a serrated cutting edge 54a and is biased by a helical spring 58 which is connected to the bracket 57. The spring 58 tends to pivot the knife 54 in a direction to maintain the cutting edge 54a away from the path for the trailing portion 1a of the expiring web 1. When the electromagnet 44 is energized and causes the carrier 36 to pivot in a clockwise direction, as viewed in FIG. 1, the roller 43 engages the right hand arm of the knife 54, as viewed in FIG. 2, and causes the cutting edge 54a to sever the trailing portion 1a behind the uniting band 15.

A second severing device or knife 55 is fixedly but adjustably mounted in the region of the guide roll 5 for the expiring web 1. This knife has a cutting edge 55a and is mounted on a plate 61 which is adjustably secured to the frame member 11 by screws or similar fasteners 62. The means for securing the knife 55 to the plate 61 includes one or more screws 59. The adjustment of the knife 55 is preferably such that its cutting edge 55a is closely adjacent to the path of the expiring web 1 in the region of the guide roll 5.

The operation:

When the diameter of the bobbin 101 for the expiring web 1 is reduced to a predetermined minimal value, the detector 101a transmits a signal which completes the circuit of the aforementioned motor of the drive means for the conveyor 7 and splicing member 32. The motor drives the belt 13 which drives the conveyor 7 by way of the pulley 14 and friction clutch 20. At the same time, the pulley 47 drives the belt 48 which drives the pulley 49 and the gear 52. The gear 52 meshes with the gear 53 and thus drives the splicing member 32 in a counterclockwise direction, as viewed in FIG. 1, at the exact speed of the advancing expiring web 1. The speed of the expiring web 1 is determined by the advancing or feeding rolls 75. As mentioned before, the speed of the conveyor 7 is preferably such that the fresh web 2 is accelerated to a speed which is slightly less or at most equal to the forward speed of the expiring web 1. The fresh bobbin 102 pays out the web 2 in the direction indicated by arrows 64 and 163, whereas the bobbin 101 continues to pay out the expiring web 1 in the direction indicated by the arrow 63.

The control system of the uniting apparatus further comprises a centrifugal governor or a similar scanning device which is schematically shown at 150 and serves to determine the rotational speed of the conveyor 7. When such rotational speed reaches a predetermined value, namely, when the forward speed of the fresh web 2 is satisfactory for splicing to the expiring web 1, the scanning device 150 energizes the electromagnet 44 which pivots the carrier 36 in a clockwise direction, as viewed in FIG. 1. At the same time, the scanning device 150 arrests the motor for the conveyor 7. The stroke of the armature 46 of the electromagnet 44 is selected in such a way that the carrier 36 can cause the splicing member 33 to move the adjacent portion of the travelling fresh web 2 sideways, namely, across the gap 10 and against the respective adhesive-coated side of the uniting band 15 which is supported by the platform 16. The latter is assumed to be held in

the operative position shown in FIG. 2 in which the pawl 23 engages the pawl 24. The splicing member 33 also causes the upper adhesive-coated side of the uniting band 15 on the holder 16 to adhere to the adjacent portion of the travelling expiring web 1. Consequently, the band 15 connects the fresh web 2 with the expiring web 1 and is forcibly detached from the platform 16 to be accelerated from zero speed to the exact speed of the expiring web 1. The expiring web 1 also accelerates the fresh web 2 if the rotational speed of the conveyor 7 is selected in the manner as mentioned above, namely, that the peripheral speed of the conveyor 7 at the time when this conveyor rotates at the maximum speed is slightly less than the forward speed of the expiring web 1. There is no likelihood of tearing of the fresh web 2 because the latter is in motion and the connection of this web with the expiring web 1 by means of the uniting band 15 merely involves a slight further acceleration of the fresh web.

The energization of electromagnet 44 further results in upward movement of the roller 43 on the carrier 36 into engagement with the shorter arm of the knife 54 for the trailing portion 1a of the expiring web 1. The knife 54 is then pivoted on the pin 56 in a counterclockwise direction as viewed in FIG. 2, so that the spring 58 is stressed and the cutting edge 54a severs the trailing portion 1a from the preceding major part of the web 1 practically simultaneously with attachment of the uniting band 15 to the webs 1 and 2. Thus, the length of the web which remains on the expiring bobbin 101 is disconnected or separated from the web which travels into the cigarette rod making machine.

The energized electromagnet 44 further causes the roller 41 to move upwardly, as viewed in FIG. 2, and to pivot the pawl 24 in a clockwise direction so as to disengage the hook-shaped end portion of the pawl 24 from the end portion 23a of the pawl 23. Consequently the spring 26 is free to contract and to withdraw the platform 16 (without a uniting band 15 thereon) from the operative position shown in FIG. 2. The platform 16 is then exposed and a fresh uniting band 15 can be readily attached thereto by the operator while the carriage 17 abuts against the stationary stop 25 of the bed 18. When a fresh uniting band 15 is properly attached to the platform 16, the latter can be returned to the operative position of FIG. 2 by engaging the handgrip portion 21 and pushing the handgrip portion in a direction to the right, as viewed in FIG. 2. This operation takes place subsequent to deenergization of the electromagnet 44, i.e., when the carrier 36 returns to the position shown in FIG. 1.

The conveyor 7 continues to rotate due to inertia subsequent to attachment of the fresh web 2 to the respective adhesive-coated side of the uniting band 15. Therefore, as the uniting band 15 advances forwardly with the expiring web 1, the angle between the leading portion 2a and the expiring web 1 increases. The magnitude of such angle increases to a predetermined maximum value substantially at the moment when the uniting band 15 reaches and travels along the guide member 5. The leading portion 2a of the fresh web 2 is then automatically severed by the cutting edge 55a of the properly adjusted severing device or knife 55. Thus, the leading portion 2a of the fresh web 2 is severed ahead of the uniting band 15 and the trailing portion 1a of the expiring web 1 is severed behind the uniting band 15. The fresh web 2 then travels around the guide member 5 and into the nip between the advancing or feeding rolls 75 to be drawn into the cigarette rod making machine and to form a wrapper around successive increments of the tobacco filler rod.

The operator is then free to prepare the uniting apparatus for the next splicing operation. In the first step, the operator may wish to unwind the severed leading portion 2a of the fresh web 2 from the periphery of the conveyor 7 and to disconnect the tip of such leading portion from the clamping mechanism 9. The bobbin 101 is thereupon removed and its position is taken by the bobbin 102 which

pays out the fresh web 2. This web is now the expiring web because it travels along the path indicated by the arrow 63. The space previously occupied by the bobbin 102 is then ready to receive a fresh bobbin, not shown, the leading portion of which is thereupon guided over the roll 6, over the splicing member 33, along the path indicated by the arrow 163, and is attached to the conveyor 7 by the clamping mechanism 9 in a manner as described above for the leading portion 2a. The uniting apparatus is then ready for the next splicing operation which takes place as soon as the detector 101a detects that the diameter of the bobbin 102 (in the position shown in FIG. 1 as being occupied by the bobbin 101) has decreased to a predetermined minimum value which warrants the starting of motor for the conveyor 7 and splicing member 32 and the energization of electromagnet 44 as soon as the scanning device 150 detects that the conveyor 7 has been accelerated to the desired speed. The next splicing operation then takes place in a manner as described above. The supports for the bobbins 101 and 102 shown in FIG. 1 can be mounted on a pivotable or turnable holder so that a simple rotation of such holder through 180° can result in movement of the bobbin 102 to the position occupied by the bobbin 101 and in placing of the holder for the bobbin 101 to the position shown and being occupied by the bobbin 102. The remainder of the bobbin 101 is then removed from its holder and such holder is free to receive a further fresh bobbin, not shown. It is to be noted that the pawls 23, 24 of the detent means automatically retain the platform 16 in the operative position of FIG. 2 as soon as the platform is moved to such position by handgrip portion 21 while the electromagnet 44 is deenergized, namely, while the carrier 36 for the splicing member 33 dwells in the position shown in FIG. 1.

The improved uniting apparatus exhibits a number of important advantages. First of all, the splicing device of the uniting apparatus is extremely simple, compact and not prone to malfunction. This is due to the fact that a uniting band 15 can be properly attached to its holder or platform 16 while the latter is fully exposed and is thereupon insertable into the gap 10 between the parallel portions of the paths for the expiring web and the leading portion of the fresh web while the uniting apparatus is in use. Proper attachment of a fresh uniting band 15 to the platform 16 can be readily entrusted to a semiskilled or unskilled person. Also, the movement of the bobbin 102 to the position shown in FIG. 1 as being occupied by the bobbin 101 and the placing of a fresh bobbin into the position shown in FIG. 1 as being occupied by the bobbin 102 requires little skill and can be performed by semiskilled or unskilled workmen.

Secondly, the uniting apparatus of FIGS. 1 and 2 will operate properly even if the speed of the fresh web 2 upon acceleration of the conveyor 7 is not exactly synchronized with the speed of the expiring web 1. This is due to the fact that the peripheral speed of the conveyor 7 can be readily selected in such a way that it at least closely approximates the forward speed of the web 1 so that any difference between the speed of the expiring web 1 and the leading portion 2a of the fresh web 2 at the time when the electromagnet 44 is energized can be readily compensated for by the uniting band 15 which is automatically detached from the platform 16 and connects the fresh web 2 to the expiring web 1 so that the fresh web 2 is compelled to advance at the exact speed of the web 1.

Furthermore the improved uniting apparatus does not require any means for accelerating the uniting band 15 to the speed of the fresh web 2 or the expiring web 1. As mentioned above, this uniting band can be attached to the platform 16 which is stationary at the time when the splicing operation begins and the uniting band is thereupon accelerated from zero speed to the speed of the expiring web 1 in response to movement of the splicing member 33 toward the splicing member 32. Even a semiskilled or unskilled person is highly unlikely to improperly connect

the webs 1 and 2 to each other because a uniting band 15 which is properly attached to the platform 16 will automatically assume an optimum position for attachment of the web 2 to the web 1 as soon as the detent means including the pawls 23, 24 is placed into the operative position shown in FIG. 2. It was found that the improved uniting apparatus is particularly suited for properly splicing extremely thin and relatively weak webs, such as webs or tapes consisting of cigarette paper or like webs which are customarily employed in machines for the production and/or processing of smokers' products. The improved uniting apparatus is sufficiently compact to be installed in or on or combined with existing cigarette rod making or like machines.

A further important advantage of the uniting apparatus is that the speed of the conveyor 7 can be readily selected in such a way that it does not exceed the forward speed of the expiring web 1. Therefore, the tension of the fresh web 2 ahead of the uniting band 15 can never exceed the tension of the trailing portion 1a of the expiring web 1 or of the main part of the fresh web 2 behind the uniting band. This insures that the webs 1 and 2 are not likely to tear in the course of a splicing operation. Such mode of regulating the speed of the conveyor 7 further insures that the web 1 or 2 is not subjected to excessive tensional stresses.

It is clear that the improved uniting apparatus is susceptible of many additional modifications without departing from the spirit of the present invention. For example, the splicing device can comprise two shiftable or movable splicing members; thus, the splicing member 32 of FIG. 1 can be mounted for movement toward the splicing member 33 in response to energization of the electromagnet 44. It is further clear that the positions of the splicing members 32, 33 can be reversed, i.e., that the member 33 can be mounted for rotation about a stationary axis and that the member 32 can be mounted on the carrier 36 or an analogous carrier to move the expiring web 1 sideways toward the adjacent portion of the fresh web 2. Still further, the drive means for the conveyor 7 of the advancing means for the fresh web 2 need not comprise a discrete electric motor or a similar prime mover. The conveyor 7 can be driven by a transmission which receives motion from the main motor of the cigarette rod making machine or another machine into which the expiring web 1 is being fed. A discrete motor for the conveyor 7 is normally provided where it is inconvenient or too complicated to establish a driving connection between the main motor of the consuming machine and the advancing means for the fresh web.

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 my 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 set forth in the appended claims.

I claim:

1. Apparatus for connecting an expiring web to a fresh web by means of a uniting band having two adhesive sides, particularly for connecting webs in machines for the production or processing of smokers' products, comprising first advancing means for moving an expiring web lengthwise along a first path; second advancing means for moving the fresh web along a second path which is spaced from said first path; supporting means for positioning a uniting band between said paths; and splicing means actuatable to move at least one of said webs sideways with reference to the respective path so as to place the uniting band into contact with both webs whereby the uniting band moves with and connects the webs to each other.

2. Apparatus as defined in claim 1, wherein said splicing means comprises a pair of rotary splicing members each outwardly adjacent to one of said paths and flanking the uniting band on said supporting means, and shifting means for moving at least one of said splicing members sideways toward the other splicing member.

3. Apparatus as defined in claim 2, wherein said other splicing member is rotatable about a fixed axis.

4. Apparatus as defined in claim 3, wherein said other splicing member is outwardly adjacent to said first path and further comprising drive means for rotating said other splicing member at a peripheral speed which at least closely approximates the speed of lengthwise movement of the expiring web under the action of said first advancing means.

5. Apparatus as defined in claim 2, wherein said one splicing member is an idler roller and said shifting means comprises a carrier movable to and from an operative position in which said idler roller presses the respective web against the uniting band on said supporting means, and an actuating device for moving said carrier to and from said operative position.

6. Apparatus as defined in claim 1, wherein said supporting means comprises a holder which is movable with a uniting band thereon to and from an operative position between said paths.

7. Apparatus as defined in claim 6, further comprising detent means for releasably maintaining said holder in the operative position thereof.

8. Apparatus as defined in claim 7, further comprising means for disengaging said detent means from said holder in response to actuation of said splicing means.

9. Apparatus as defined in claim 6, further comprising biasing means for urging said holder away from said operative position.

10. Apparatus as defined in claim 1, wherein said second advancing means comprises a rotary conveyor located downstream of said supporting means and clamping means for securing the leading end of the fresh web to said conveyor.

11. Apparatus as defined in claim 1, further comprising severing means for severing the expiring web behind the uniting band.

12. Apparatus as defined in claim 1, further comprising severing means for severing the fresh web ahead of the uniting band subsequent to actuation of said splicing means.

13. Apparatus as defined in claim 1, further comprising severing means for severing the expiring web behind the uniting band in response to actuation of said splicing means.

14. Apparatus as defined in claim 13, wherein said splicing means comprises a first splicing member outwardly adjacent to one of said paths and a second splicing member outwardly adjacent to the other of said paths, said splicing members flanking the uniting band on said supporting means and said splicing means further comprising a carrier for one of said splicing members and actuating means for moving said carrier to an operative position in which the one splicing member is close to the other splicing member and maintains the webs in contact with the respective sides of the uniting band on said supporting means, and further comprising means for actuating said severing means in response to movement of said carrier to the operative position thereof.

15. Apparatus as defined in claim 1, wherein said first advancing means comprises a guide member located downstream of said supporting means as considered in the direction of movement of the expiring web, and further comprising severing means for severing the fresh web ahead of the uniting band in the region of said guide member subsequent to actuation of said splicing means.

16. Apparatus as defined in claim 15, wherein said second advancing means comprises a rotary conveyor adjacent to said guide member, said guide member and said

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conveyor being respectively outwardly adjacent to said
first and second paths.

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