Oct. 30, 1962 J. GAGG ET AL 3,061,220

WEB-SPLICING MECHANISM

Filed March 6, 1961 5 Sheets-Sheet 1

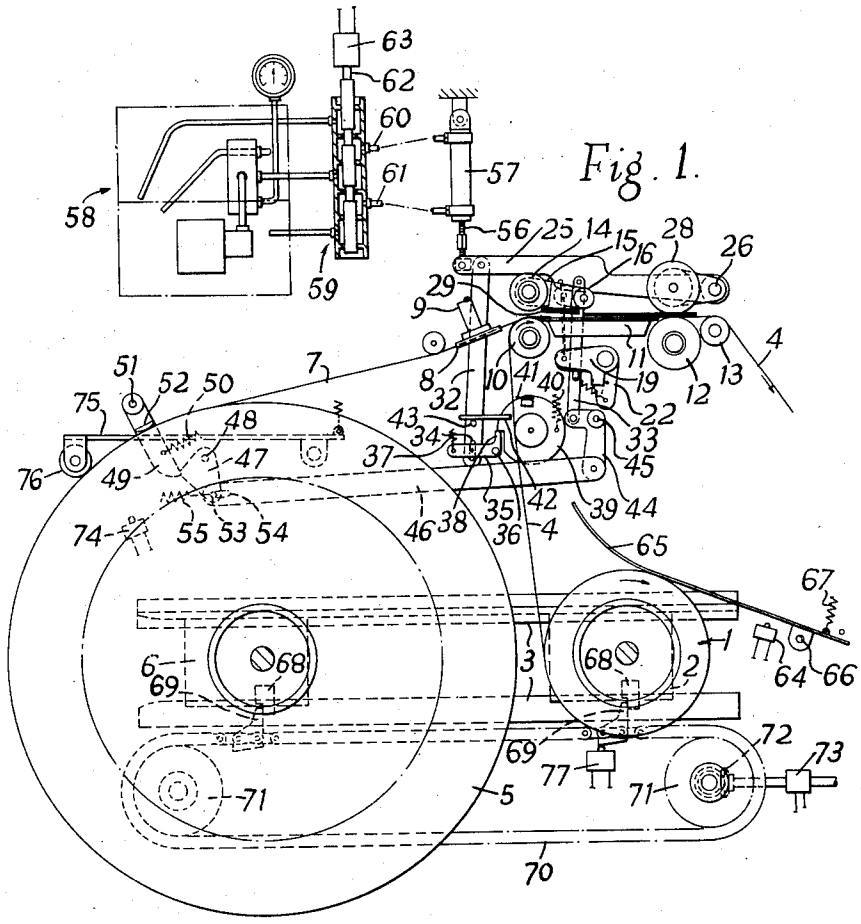


Fig. 1.

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WEB-SPLICING MECHANISM

Filed March 6, 1961 5 Sheets-Sheet 2

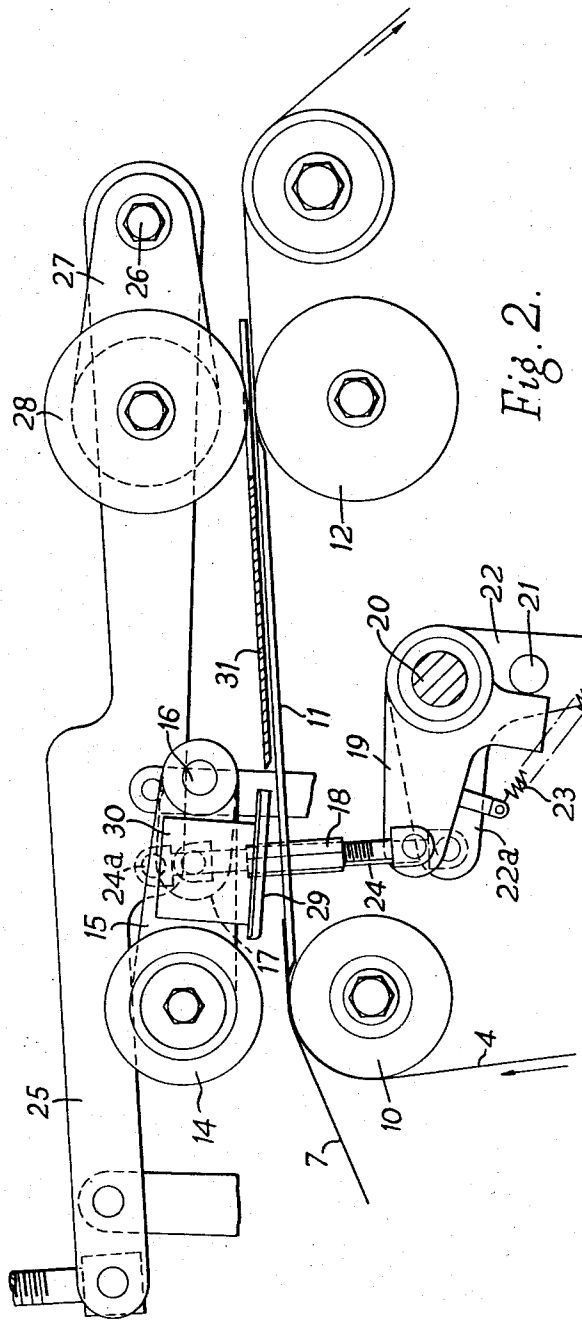


Fig. 2.

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WEB-SPLICING MECHANISM

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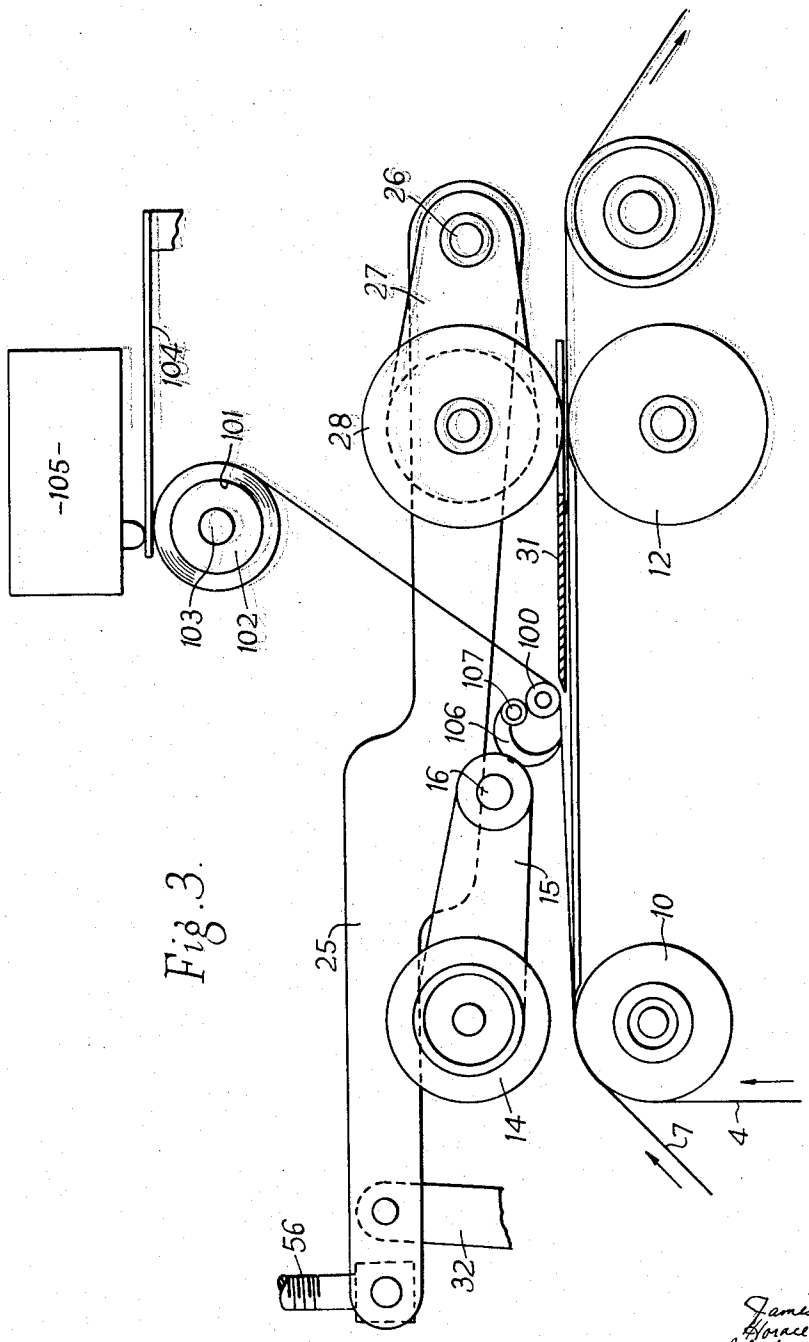


Fig. 3.

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WEB-SPLICING MECHANISM

Filed March 6, 1961 5 Sheets-Sheet 4

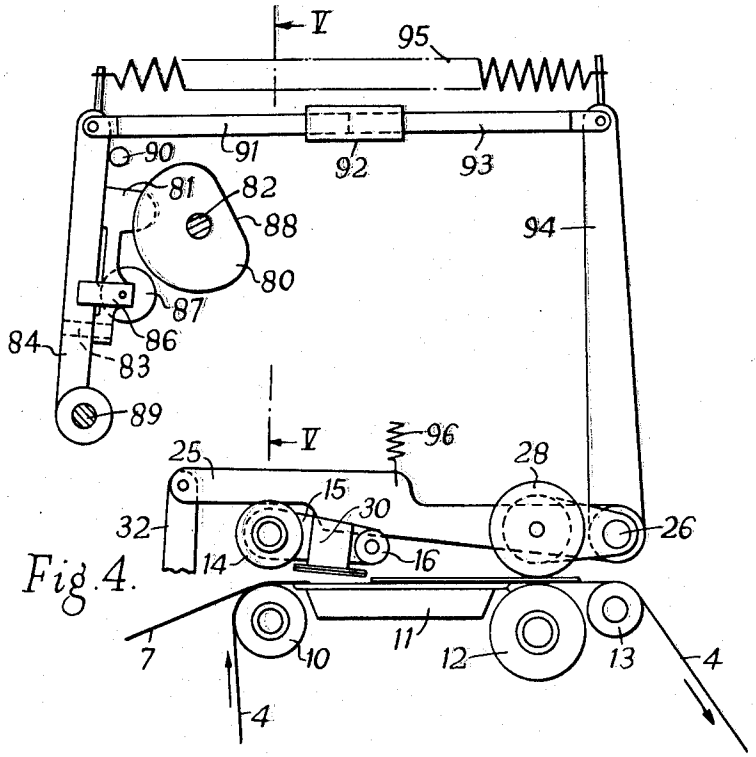


Fig. 4.

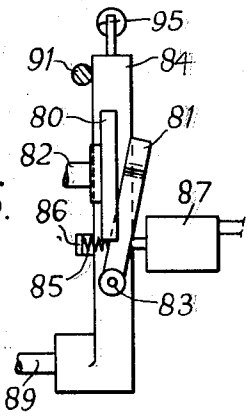


Fig. 5.

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WEB-SPLICING MECHANISM

Filed March 6, 1961 5 Sheets-Sheet 5

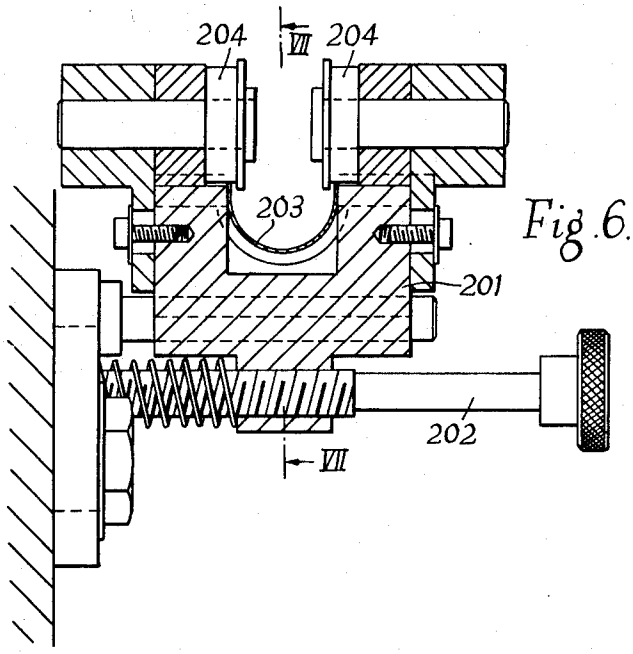


Fig. 6.

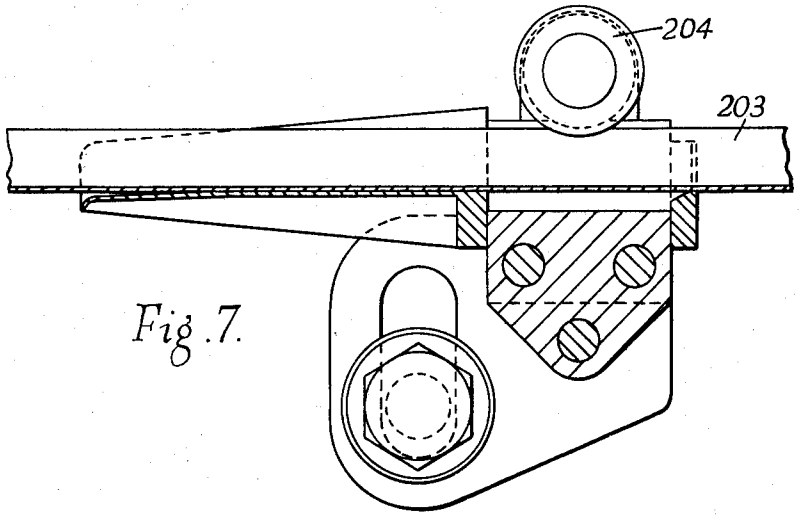


Fig. 7.

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United States Patent Office 3,061,220 Patented Oct. 30, 1962

3,061,220

WEB-SPLICING MECHANISM

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Filed Mar. 6, 1961, Ser. No. 93,731
Claims priority, application Great Britain Mar. 16, 1960
9 Claims. (Cl. 242—58.4)

This invention concerns improvements in or relating to web splicing mechanism, and in particular, mechanism for splicing webs of cigarette-paper on a continuous rod cigarette-making machine.

The cigarette-paper web in a cigarette-making machine is normally fed from a bobbin or reel, and after passing through printing devices (where these are provided) is led on to a conveyor-tape which carries it through folding and gumming apparatus so that the paper is folded and sealed about the tobacco filler which is carried on it, and a continuous cigarette rod is thereby formed. When a bobbin is exhausted or nearly so, it must be replaced by a fresh bobbin. Sometimes the machine is stopped for this operation, and the paper web from the new bobbin is either threaded through the various guiding and other devices into position so that a new rod can be started, or, to save time, the new web is joined, usually by adhesive, to the trailing end of the outgoing paper web. In either case the outgoing web is usually cut before the bobbin is entirely exhausted.

For convenience the expression "web splicing" is used herein as including any operation of joining an outgoing paper web to an incoming web in a machine in which a paper web is fed continuously, a continuous rod cigarette-making machine being one example of such a machine. Further, the expression "outgoing web" is intended to mean a web which is moving through the machine (whether the bobbin or like source is nearly exhausted or whether it still has some time to run) and the expression "incoming web" means a web which is to be spliced to the outgoing web.

According to the present invention there is provided a machine in which a paper web is fed continuously from a bobbin or like source (e.g. in a continuous rod cigarette-making machine) a web-splicing device comprising means to feed an incoming web forwardly in lapped relationship with a moving outgoing web, presser means, including a roughened surface, arranged to press the said webs into sufficiently intimate contact with each other to create an effective joint between them, detector means operative on the outgoing web, and means responsive to said detector means, when all but a predetermined quantity of the outgoing web is exhausted, to actuate means to impart forward movement to the incoming web and means to operate the said presser means.

The presser means may include a knurled roller cooperating with an opposed roller (e.g. having a relatively yielding surface), the lapped webs being passed between the two rollers. The apparatus may comprise cutting means operative in timed relationship with the presser means to cut the outgoing web behind the part which is joined to the incoming web. Where the incoming web is fed from a bobbin, the means to impart forward movement to the incoming web may include a friction pad arranged to engage the periphery of said bobbin to urge the latter to rotate.

The apparatus may comprise a suction device arranged to hold the leading end portion of the incoming web by suction over the outgoing web, prior to the forward movement of the incoming web.

The means to feed the incoming web in lapped relationship with the outgoing web may comprise anchorage means to secure the leading end portion of the web and hold the incoming web in lapped relationship with the outgoing web, the anchorage means being movable to draw the incoming web in the direction of travel of the outgoing web, thereby to rotate the bobbin carrying the incoming web. The anchorage means may be spaced from the outgoing web, severing means being provided to sever the length of incoming web extending away from the outgoing web when the splice is to be made. The anchorage means may be a rotatable member such as a bobbin to which the leading end of the incoming web is secured, the anchorage means being rotated to wind the incoming web thereon. Means may be provided to operate the severing means and the presser means when a predetermined amount of the incoming web has been drawn by the anchorage means. The apparatus may comprise a top guide beneath which the outgoing web passes, the incoming web being guided towards said anchorage means in a direction away from said top guide, the said severing means being so located and shaped as to direct the severed end of the incoming web to pass under the top guide in lapped relationship with the outgoing web. The severing means may include a curved part arranged to be moved, during severance of the incoming web, in the direction of movement of the latter.

The means responsive to the said detector means may comprise a hydraulic servo mechanism including a double-acting hydraulic cylinder and piston, hydraulic fluid being supplied selectively to one end or the other of the hydraulic cylinder under control of a valve device.

Alternatively, the means responsive to the said detector means may include a cam-operated device comprising a cam arranged to be continuously driven, and a movable part operatively connected to the said presser means and carrying a movable cam follower arranged to be moved, in response to said detector means, into operative engagement with the said cam and thereby to cause movement of the said movable part.

In any apparatus referred to above, there may be provided means for mounting two bobbins one behind the other so as to be bodily movable, said means comprising carriers for said bobbins, guides along which said carriers are movable, a conveyor having a projection arranged to engage a carrier and move it along the guides when the conveyor is moved, a detector device arranged to detect the decrease in diameter of a bobbin, and operative when the bobbin is reduced to a predetermined diameter to actuate means to move the conveyor whereby the carrier for the said bobbin is moved along the guide to be replaced by a further carrier carrying a new bobbin.

Apparatus in accordance with the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a front elevation, partly diagrammatic,

FIGURE 2 is an enlarged view of some of the mechanism shown in FIGURE 1,

FIGURE 3 is a view similar to FIGURE 2 but showing a modified arrangement for feeding an incoming web,

FIGURE 4 illustrates a further modification of the apparatus shown in FIGURES 1 and 2,

FIGURE 5 is a view taken on the line V—V, FIGURE 4,

FIGURE 6 is a sectional end view of a guide for a cigarette-paper web, and

FIGURE 7 is a section on the line VII—VII, FIGURE 6.

The apparatus is part of the equipment of a continuous rod cigarette-making machine.

Referring to FIGURE 1, a bobbin 1 is mounted on a slide 2 supported in guides 3. A cigarette-paper web 4 is wound on the bobbin 1 and extends from it through splicing mechanism shortly to be described.

A further bobbin 5 is mounted in a slide 6 also supported in the guides 3. A cigarette-paper web 7 extends from the bobbin 5 and is engaged, near its leading end portion, by a suction head 8 through which air is drawn by way of a pipe 9 to apply light suction to the web 7 so as to hold it in position.

The web 4, which is moving through the machine, is the outgoing web. When the bobbin 1 is nearly exhausted the web 4 will be spliced to the web 7, which will then be drawn through the machine from the bobbin 5. Thus up to and including the time when the two webs are spliced, the web 7 is the incoming web.

The web 4 passes from the bobbin 1 to a roller 10 about which it passes, over a plate 11, and over two further rollers 12 and 13. From there it passes through further devices, including the rod forming mechanism which folds the paper about a tobacco filler to form the continuous cigarette rod, but as these devices may be of any suitable desired nature it is unnecessary to illustrate them.

Above the roller 10 is a rubber-covered roller 14 which is mounted so as to be movable down towards the roller 10 so that these two rollers can grip between them both the moving web 4 and the leading end portion of the incoming web 7, which as shown is resting on the web 4 as the latter moves past it.

As best seen in FIGURE 2, the roller 14 is mounted on an end of a lever 15 pivoted at 16 and movable about its pivot by a crank 17 to which is pivoted a link 18 whose other end is pivoted on one arm of a bell-crank lever 19 pivoted at 20. The other arm of the lever 19 bears against a pin 21 on one arm of a future bell-crank 22 also pivoted at 20. The two levers are connected by a spring 23 which urges the lever 19 against the pin 21. Pivoted on an arm 22*a* of the lever 22 is a further link 24 whose other end is pivoted on a long lever 25 at 24*a*. The lever 25 is pivoted at 26.

A short arm 27 movable with the lever 25 carries a roller 28 located above the roller 12. The roller 28 has a knurled or otherwise roughened metal peripheral surface, while the roller 12 is provided with a surface of plastic material (which may be that known under the registered trademark "Perspex") or other slightly yielding material.

A top guide 29 is carried by a bracket 30 fixed to the lever 15.

The parts just described are so arranged that when the lever 25 is swung downwardly, the link 24 swings the bell-crank 22 anti-clockwise as viewed in the drawings, and by reason of the spring 23 connecting the two bell-cranks, the bell-crank 19 is also turned anti-clockwise until the roller 14 presses against the web 7 and presses it and the web 4 against the roller 10. Thereafter the bell-crank 22 continues to turn as the lever 25 continues to move downwardly, and thus spring-loads the bell-crank 19 so that the roller 14 is resiliently pressed against the webs on the roller 10.

The top guide 29 moves downwardly at the same time to a suitable position spaced from the plate 11.

Continued downward movement of the lever 25 moves the knurled roller 28 down to the roller 12. A fixed upper guide 31 is forked to allow the roller 28 to pass downwardly.

Two further links 32 and 33 (FIGURE 1) are pivoted on the lever 25. The link 32 has a slot 34 at its lower end which accommodates a pin on a lever 35 pivoted at 36. A spring 37 urges the lever 35 in a clockwise direction (as viewed in FIGURE 1). An end 38 of the lever is arranged to engage a notch in a disc 39 which is urged by a spring 40 to turn anti-clockwise, such movement being prevented by the part 38 of the lever 35 when the latter is in the position shown. The disc 39 carries a knife 41 which can sever the web 4 when the disc 39 is allowed to rotate. Also mounted on the disc is an arm 42 arranged to engage a pin 43 on the link 32. The arrangement is such that if the link 32 moves downwardly, the pin 43 is carried away from the arm 42, and then the pin on the lever 35 is engaged by the link 32 at the upper end of the slot 34 and is pushed downwardly, thus turning the lever 35 anti-clockwise. This movement swings the part 38 of the lever away from the notch in the disc 39 and allows the latter to turn anti-clockwise so that the knife 41 cuts the web 4.

If the link 32 is then pulled upwardly, the pin 43 again engages the arm 42 and thereby rotates the disc 39 clockwise, while at the same time the lever 35 is swung clockwise to engage the notch again.

The link 33 is connected to an arm of a bell-crank lever 44, pivoted at 45, and connected to one end of a further link 46 whose other end is connected to a catch member 47 pivoted at 48. The member 47 has a nose arranged to engage the end of a pivoted arm 49 to restrain it against swinging movement under the influence of a spring 50. The arm 49, which is pivoted at 51, carries a friction pad 52 which, in the position shown in FIGURE 1, is in engagement with the periphery of the bobbin 5 of cigarette-paper. The arrangement is such that if the link 33 is pushed downwardly, the link 46 is pulled to the right (as viewed in FIGURE 1) and swings the catch member 47 so as to release the arm 49, which is then immediately swung anti-clockwise by the spring 50. Accordingly the pad 52 moves to the right, and in so doing urges the bobbin 5 to rotate clockwise, that is, in the direction indicated by the arrow.

This arrangement is provided in order to assist in overcoming the inertia of the bobbin 5 when it is desired to start feeding the web 7, as will be described later.

If the link 33 is again raised to the position shown, the catch member 47 is returned to its illustrated position. In order to allow the arm 49 to be swung back to the position shown, the catch member 47 is connected to the link 46 by a pin 53 on the catch member projecting into a slot 54 in the link, the catch member being urged clockwise by a spring 55. When the catch member has returned to the position illustrated, it can therefore be turned by hand, against the spring 55, to allow the arm 49 to be swung past it and returned to the position shown.

The long lever 25 is swung by a hydraulically operated piston rod 56 pivotally connected to the free end of the lever, and extending from a hydraulic cylinder 57. An oil unit 58 supplies oil to the cylinder through a valve device 59, which directs oil to one side or the other of the piston within the cylinder 57 through one or other of the pipes 60, 61. For this purpose a valve piston device 62 is moved up or down by a solenoid 63. In the position shown, oil has been directed through the pipe 61 to maintain the rod 56 in its upward position.

The solenoid 63 is controlled by a switch device 64 arranged to be engaged at certain times by a detector flap 65 pivoted at 66 and urged by a spring 67 against the periphery of the bobbin 1. When the bobbin has been reduced to a predetermined diameter the flap 65 engages the switch and the solenoid 63 is thereby energised to depress the valve piston 62, and accordingly the piston rod 56 is forced downwardly, swinging the lever 25 downwardly about its pivot. A suitable delay device is provided to limit the period during which the solenoid 63 is energised to depress the valve piston, so that after a predetermined time the latter returns to the position shown.

As stated above, the bobbins 1 and 5 are mounted on slides 2 and 6. Each of these slides has a projection 68 which can be engaged by a lug 69 on a chain conveyor 70. The conveyor passes about sprockets 71, one of which is arranged to be driven by bevel gearing 72 through a clutch 73. This clutch is operated to cause the conveyor to be driven by means of a switch 74 so positioned as to be contacted by a detector arm 75 which carries a roller 76 arranged to ride on the periphery of the bobbin 5. Thus the switch is actuated only when the diameter

of the bobbin 5 has become small enough to enable the arm 75 to contact the switch.

The rollers 10, 12, 14 and 28 are positively driven by suitable gearing, not shown.

The operation of the apparatus so far described is as follows:

With the parts in the positions shown in FIGURE 1, the outgoing web 4 is being fed through the machine from the bobbin 1. The lever 25 is in its raised position and the rollers 14 and 28 and guide 29 are also raised. Both the knife disc 39 and the arm 49 carrying the friction pad 52 are cocked. The leading end portion of the incoming web 7 from the bobbin 5 is resting on the moving web 4, above the roller 10, and is maintained in that position by the suction head 8.

As the bobbin 1 gradually decreases in size, the flap 65 falls with it and eventually engages the switch 64. This actuates the solenoids 63, by which the hydraulic valve 59 is operated to cause the piston rod 56 to swing the lever 25 downwardly about its pivot 26.

This causes the roller 14 to press down on the leading end portion of the incoming web 7, pressing it against the moving web 4 so that the two webs are gripped and urged forwardly together by the two rollers 10 and 14. At the same time the link 46 is moved so as to trip the catch member 47, thus releasing the arm 49, and the pad 52 is thus jerked forward to impart movement to the bobbin 5. As soon as the leading end of the web 7 has reached the roller 28, the latter comes down into contact with it, and at the same time the lever 35 is swung to release the disc 39 which thereupon turns anti-clockwise and the knife 41 cuts the outgoing web 4.

The knurled roller 28 presses firmly against the moving incoming web 7, pressing it into close contact with the web 4. It is found that by squeezing the two lapped parts of the two webs together in this way between the knurled roller 28 and the relatively yielding plastic surface of the roller 12, these two parts can be brought into sufficiently intimate contact with each other to create an effective joint between them, sufficiently strong to resist shearing as the two spliced webs proceed through the machine.

As mentioned above, the solenoid 63 operates only for a predetermined period, which is sufficient for the lapped parts of the two webs to pass beneath the knurled roller. Thereafter the valve 59 is returned to the position shown, with the result that the lever 25 is raised again and the web 7 (which is now the web passing through the machine) is released from the rollers 10 and 14, 12 and 28.

The slide 2 carrying the old bobbin 1 is then removed by hand. As paper is fed from the bobbin 5, the latter gradually decreases in size until the arm 75 contacts the switch 74, thus actuating the clutch 73, and the conveyor 70 starts to move slowly towards the right, FIGURE 1, so that the bobbin 5 is gradually pushed by a lug 69 towards the position formerly occupied by the bobbin 1. This movement is sufficiently slow that by the time the bobbin has reached its final position, its diameter has been reduced sufficiently to enable a new bobbin to be put in position behind it. A switch 77 is positioned to be engaged by the lug 69 when the latter reaches the desired position, and this switch when operated causes the clutch 73 to be disengaged so that the conveyor 70 stops.

A further slide carrying a new bobbin is then placed in the position in which the bobbin 5 is illustrated in FIGURE 1, and the leading end portion of the web from this new bobbin is placed in position as illustrated, ready to be spliced at the appropriate time to the outgoing web.

Referring now to FIGURE 3, this illustrates a modification whereby the leading end portion of the incoming web, instead of being held by a suction head over the outgoing web in readiness for a splicing operation, is fastened to an anchorage means which can be moved at an appropriate time so as to draw the incoming web forwardly, thereby rotating the bobbin which carries the incoming web.

In this construction the leading end portion of the incoming web 7 extends under a roller 100 and has its leading end 101 secured to an anchorage means constituted by a bobbin 102. The bobbin 102 is mounted for rotation on a shaft 103. The shaft 103 is driven by a motor under the control of the micro switch 64 (shown in FIGURE 1) so that the bobbin 102 starts to rotate when the micro switch 64 is made, indicating that the quantity of paper web 4 left on the bobbin 1 has fallen to a predetermined level. The micro switch 64 is not in this modified construction, connected to operate the solenoid 63 controlling the hydraulic valve 59 as described above in connection with FIGURES 1 and 2. Instead, above the bobbin 102 a spring blade 104 is provided and above the spring blade 104 a micro switch 105 is mounted, the arrangement being such that when a predetermined amount of paper web 7 is wound on the bobbin 102 the micro switch 105 is operated, which in turn operates the solenoid 63, FIGURE 1.

Adjacent the roller 100 a curved knife 106 is provided which is mounted for anticlockwise movement on a spindle 107. Such movement of the knife 106 is arranged to sever the web 7 i.e. to cut off the length of the web which extends away from the web 4 and the length which is wound around the bobbin 102. The knife 106 cuts against the tension in the web 7 and is shaped to direct the severed end of the web 7 under the fixed guide 31.

The apparatus just described operates as follows.

The leading end of the incoming web 7 is taken over the roller 10 on top of the outgoing web 4, under the roller 100 and is secured to the bobbin 102 by the operator. The micro switch 64 is made when the quantity of outgoing web 4 on bobbin 1 falls to a predetermined level thus causing the bobbin 102 to rotate and wind the web 7 around it and draw the web 7 over the web 4 and thus rotate the bobbin 5 carrying the bulk of the incoming web 7. When a predetermined amount of the web 7 has been wound on the bobbin 102 the spring blade 104 operates the micro switch 105 which operates the solenoid 63 (FIGURE 1) so that the lever 25 commences to move anticlockwise. The knife 106 is operated in any convenient manner after the solenoid 63 has been operated so that the web 7 is severed at the same time as the rollers 10 and 14 press the two webs 4 and 7 between them. The knife 106 guides the severed end of the web 7 under the fixed guide 31 and the two webs 4 and 7 are spliced by the rollers 12 and 28 as described above.

The apparatus shown in FIGURE 1 for causing the bobbin 5 to rotate is omitted from this construction.

A further modification is illustrated in FIGURES 4 and 5, which show a cam-operated mechanism which replaces the hydraulic servo mechanism shown in FIGURE 1.

A cam 80 is mounted on a shaft 82 which is driven continuously in any convenient manner. A cam follower 81 is pivoted at 83 on a lever 84 and is normally held out of engagement with the cam 80 by means of a compression spring 85 sandwiched between the cam follower 81 and a lug 86 provided on the lever 84. The cam follower 81 is brought into engagement with the cam 80 by a solenoid 87 which overcomes the spring 85 and pushes the cam follower into line with the cam. Should the solenoid 87 be energised when the cam 80 is in the position shown in FIGURE 4 the side face of the nose of the cam follower will ride against the side face of the cam until the latter has rotated sufficiently for the follower to move into line with it, i.e. when the flat 88 on the cam comes opposite the cam follower.

The lever 84 is pivoted to fixed structure at 89 and therefore further rotation of the cam 80 after the cam follower 81 has engaged with the flat 88 causes the lever 84

initially to move in an anticlockwise direction and then after a dwell to move clockwise until the cam follower is at the flat **88**. When the cam follower is disengaged from the cam a stop **90** limits the clockwise movement of lever **84**.

At its upper end the lever **84** is pivotally connected to a rod **91** which carries at its other end a sleeve **92** in which a further rod **93** is an easy fit. The rod **93** in turn is pivotally connected to the upper end of a lever **94**. The upper ends of the levers **84** and **94** are connected by a tension spring **95**. The lever **94** forms a bell crank with the lever **25** and the rest of the apparatus is as shown in FIGURE 1 except for the addition of a tension spring **96** which loads the lever **25** in the clockwise direction.

The operation of the apparatus is as follows. The solenoid **87** is energised by means which indicate when the quantity of the outgoing paper web remaining has dropped to a predetermined value. In this case it is energised by the micro switch **64**, FIGURE 1. The solenoid **87** pushes the cam follower **81** into engagement with cam **80**. As explained above the cam follower can come into line with the cam **80** only when the flat **88** is adjacent the nose of the follower. As the cam rotates the lever **84** moves anti-clockwise and the spring **95** pulls the lever **94** anti-clockwise, thus moving the lever **25** downwards and the splicing operation commences as described with reference to FIGURES 1 and 2.

After a predetermined time when the splicing operation is completed the cam **80** has rotated to a position at which the lever **84** starts to move clockwise back to the position at which the lever **25** is lifted and the rollers **14** and **28** are lifted from the paper web.

The rods **91**, **93** and the sleeve **92** pre tension the spring **95** and allow the lever **84** to continue its anticlockwise motion when the paper webs **4** and **7** are being pressed between the rollers **12** and **28** and **10** and **14**. The spring **96** acts as a return spring to load the cam follower **81** onto the cam **80** when the rod **93** contacts the rod **91**, and holds the lever **84** on to the stop **90** as shown in FIGURE 4.

The two modifications described above, with reference to FIGURE 3 and to FIGURES 4 and 5 respectively, can be used jointly to modify the apparatus shown in FIGURES 1 and 2.

In a continuous rod cigarette-making machine the paper web may be passed through fixed guide means to be turned temporarily into a U formation to assist in guiding it through printing apparatus for example. Where the edges of the paper web contact the fixed guide an extra load may be imposed on the splice. The fixed guide may therefore have anti-friction means such as rollers carried on ball bearings against which the edges of the paper web bear.

This arrangement is illustrated in FIGURES 6 and 7, in which a guide **201**, adjustable by means of a screw **202**, has a U-shaped trough through which the paper web **203** is passed. The edges of the web bear against the cylindrical surfaces of freely rotatable rollers **204** which are carried on ball bearings. Thus the surfaces against which the edges of the web bear are free to move with the web and friction between the edges of the web and the paper guide is reduced. This is of particular value where the web has been spliced, since the extra load imposed on the splice by friction between the edges of the web and a fixed guide might cause the spliced portions to part.

It will be seen that by means of the apparatus described, an outgoing and an incoming web can be spliced without stopping the machine and without the necessity of providing a length of slack in the outgoing web, since the whole operation is performed while the web continues to move at its normal speed.

While the apparatus described and illustrated forms part of a cigarette-making machine, similar apparatus could be used to splice paper webs of suitable character on other machines in which this need arises, for example machines in which webs comparable in thickness with cigarette paper are fed.

The roller **28** has been described as having a knurled surface, but it will be understood that various forms of roughened surface may be used with satisfactory results.

What we claim as our invention and desire to secure by Letters Patent is:

1. In a machine in which a web is drawn continuously from a bobbin through the machine during operation, a web splicing device to splice the web wound on a new bobbin to the old web passing through the machine, comprising a first pair of rollers, one roller of which has a roughened surface, which effect the splice when the new and old webs are pressed together between them, a second pair of rollers spaced from the first pair upstream relative to the direction of travel of the webs, one roller of each pair being driven, an actuating member carrying one roller of each pair, actuating means to move the actuating member to bring the rollers of each pair into contact when the splice is to be made, and resiliently yieldable mounting means supporting the roller of the second pair from the actuating member, the resilience of the mounting means and the spacing between the rollers being such that initial movement of the actuating member brings the rollers of the second pair together to press the two webs together before the rollers of the first pair come together, continued movement of the actuating member causing yielding of the mounting means to increase the pressure exerted by the second pair of rollers on the two webs to equalize their speeds and finally bringing the first pair of rollers together to effect the splice.

2. A web splicing device as claimed in claim 1 wherein the actuating member is a first lever and the resiliently yieldable mounting means and the roller of the first pair are carried spaced apart along the length of the lever, the lever being pivotally mounted at one end adjacent the roller of the first pair for swinging movement to bring the two pairs of rollers together and to separate them, and further comprising a hydraulic servo mechanism including a double acting hydraulic cylinder and piston and a valve device to supply hydraulic fluid selectively to one end or other of the hydraulic cylinder.

3. A web splicing device as claimed in claim 1 wherein the actuating member is the first arm of a first bell crank and the resiliently yieldable mounting means and the roller of the first pair are carried spaced apart along the length of the arm, the bell crank being pivotally mounted adjacent the roller of the first pair for pivotal movement of the first arm to bring the two pairs of rollers together and to separate them, the actuating means comprising a cam device including a rotatable cam and a cam follower to engage the cam and cause pivotal movement of the bell crank.

4. A web splicing device as claimed in claim 3 wherein the actuating means further comprises a second lever pivoted at one end for pivotal movement in the plane of pivotal movement of the first bell crank and carrying the cam follower for pivotal movement in a direction at right angles to the pivotal movement of the second lever, a first spring operative on the cam follower to move it out of line with the cam, a solenoid device to move the cam follower into line with the cam against the opposition of the first spring when the splice is to be made, a second spring connected at its ends to the other end of the second lever and to the other end of the second arm of the first bell crank to cause pivotal movement of the bell crank on pivotal movement of the second lever in the direction to bring the rollers together, a stop member to limit movement of the second lever in the direction to carry the cam follower toward the cam, spacing means to separate the second lever and said other end of the second arm of the bell crank to pretension the second spring, and a third spring operative on the bell crank to separate the

rollers when the cam has rotated to the non-splicing position.

5. A web splicing device as claimed in claim 1 and further comprising a friction pad arranged to engage the new web wound on the new bobbin, a fourth spring loading the friction pad in the direction to rotate the new bobbin to feed the new web forwardly, a pivoted catch member to hold the friction pad against the loading of the fourth spring, and a mechanical linkage connected at one end to the catch member and at its other end to the actuating member carrying the rollers, whereby movement of the actuating member to bring the rollers together pivots the catch member to release the friction pad to urge the new bobbin to rotate.

6. A web splicing device as claimed in claim 1 wherein the resiliently yieldable mounting means comprises a third arm pivoted at one end to the actuating member and carrying at the other end of the roller of the second pair, second and third bell cranks pivotally mounted to swing about a common axis, a first link pivotally connected at one end to one arm of the second bell crank and pivotally connected at its other end to the actuating member, a second link pivotally connected at one end to one arm of the third bell crank and pivotally connected at its other end to the third arm carrying the roller of the second pair, and a fifth spring connected at one end to the said arm of the second bell crank and at its other end to the other arm of the third bell crank.

7. A web splicing device as claimed in claim 1 and further comprising a driven bobbin arranged to have the leading end of the new web wound around it to draw the new web forwardly to urge the new bobbin to rotate when the splice is to be made, the leading end of the new web passing between the second pair of rollers, and severing means to sever the leading end of the new web between the driven bobbin and the second pair of rollers.

8. A web splicing device as claimed in claim 7 and further comprising a top guide preceding the first pair of rollers and above the old web, the severing means being curved and having a cutting edge at one end and pivoted at its other end so that pivotal movement in the cutting direction is in the direction of travel of the old web, the severing means being arranged for the leading end of the new web to pass under it and preceding the top guide so that pivotal movement of the severing means severs the new web and directs it under the top guide to pass between the first pair of rollers.

9. Apparatus according to claim 1, comprising means for mounting the old and the new bobbins one behind the other so as to be bodily movable, said means comprising carriers for said bobbins, guides along which said carriers are movable, a conveyor having a projection arranged to engage a carrier and move it along the guides when the conveyor is moved, a detector device arranged to detect decrease in diameter of the new bobbin after the splice has been made and some of the new web has been consumed, and operative when the bobbin is reduced to a predetermined diameter to actuate means to move the conveyor whereby the carrier for the new bobbin is moved along the guide to the position previously occupied by the old bobbin to be replaced by a further carrier carrying a new bobbin.

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