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APPARATUS FOR FEEDING AND LAMINATING STRIP MATERIAL IN DESIRED SPACED RELATIONSHIP

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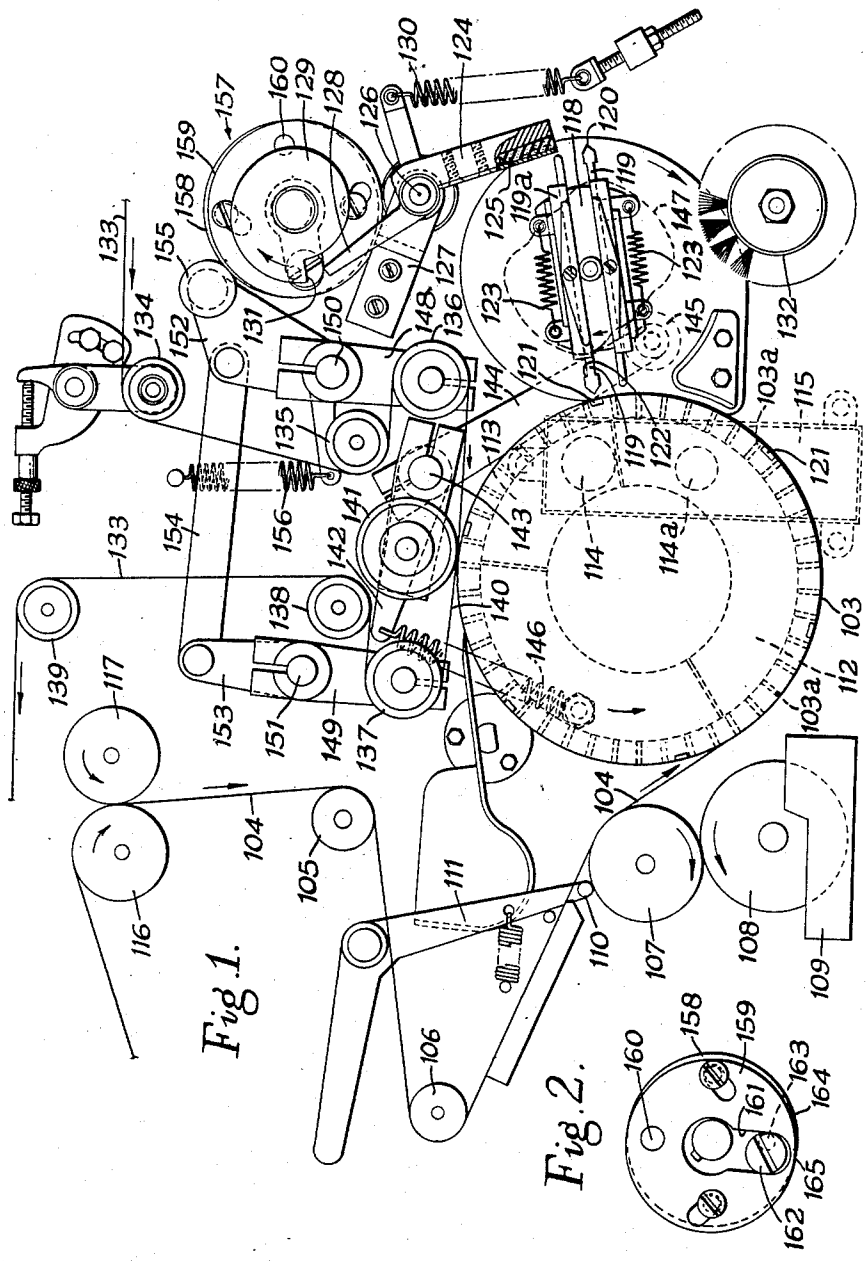


Fig. 1.

Fig. 2.

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APPARATUS FOR FEEDING AND LAMINATING STRIP MATERIAL IN DESIRED SPACED RELATIONSHIP

Desmond Walter Molins, London, England, and Félix Frédéric Ruau, deceased, late of London, England; by Caroline Marie Ruau, executrix, Purley, England, assignors to Molins Machine Company Limited, London, England, a British company

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4 Claims. (Cl. 154—36)

This invention concerns improvements in or relating to apparatus for applying portions of material to a continuous web at spaced intervals along the web (e.g., applying tips to a web of cigarette-paper) and is a division from our co-pending application Serial No. 407,032, filed January 29, 1954, now abandoned.

The invention provides apparatus whereby portions of material may be applied at different required spaced intervals along the length of the web. Means are provided to feed the portions of material at a constant speed, and at constant spaced intervals, and when they are to be applied to the web at those intervals, the web is fed at the said constant speed. To apply the portions at greater or smaller intervals along the web, the web is fed faster or slower as the case may be. In order to equalize the speed of the web with that of the portions which are to be applied to it, at the moment of application, the web is passed over guides which can be moved, by adjustable control means, either in or against the direction of movement of the web during application of a portion of material, so as momentarily to increase or reduce, to the said constant speed at which the portions are fed, that part of the web to which the portions are applied.

The control means for moving the cam may include a variable cam comprising a rotatable carcular disc with a further disc eccentrically pivoted thereon and rotatable therewith. The eccentrically mounted disc whose edge is engaged by a cam follower connected with the guide means, can be arranged concentrically with the first said disc (in which case it imparts no movement to the guide means) or swung to one side or the other so as to project beyond the first said disc.

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

Figure 1 is a side elevation of apparatus for applying tips to a continuous web of cigarette-paper, and

Fig. 2 shows a detail of Figure 1.

Referring now to Figures 1 and 2, these illustrate apparatus for applying tips, for example cork tips, to a web of cigarette paper, for example in a cigarette-making machine for the production of cork-tipped cigarettes.

The apparatus comprises a suction drum **103**, which acts as a conveyor for a web of cork tipping material **104** which is fed towards the drum **103** over guide rollers **105** and **106** and over an adhesive-applying roller **107**, which latter is arranged to rotate with its periphery in contact with the periphery of a roller **108** which passes through an adhesive bath **109**. A pin **110** on a lever **111** is arranged behind the web **104**, and the lever **111** is arranged to be moved at desired times to cause the pin to push the web out of contact with the roller **107**. This

is done when the apparatus is not operating, so as to prevent the web from sticking on the roller **107**.

The suction drum **103** is provided with two suction chambers **112** and **113**, with suction conduits **114** and **114***a* communicating with a common source of suction **115**. The chamber **112**, as seen in Figure 1, is the larger of the two and the suction in that chamber is therefore weaker than the suction in the chamber **113**. Suction ports **103***a* are provided around the periphery of the drum **103**, and these communicate with the chambers **112** and **113**.

The web **104** is fed to the guide roller **106** by a pair of cooperating guide rollers **116** and **117** which grip the web and control the speed with which it is fed, and these feed rollers are arranged to rotate at such a speed that they feed the web considerably slower than the peripheral speed of the drum **103**. The web is held on the surface of the drum **103** by means of the suction, but due to the difference in speed between the web and the peripheral surface of the drum, the drum slips beneath the web. This slipping is made possible by the relatively weak suction in the chamber **112**.

Cutting apparatus is provided to cut the web of tipping material on the suction drum into separate portions. This apparatus comprises a rotatable knife carrier **118** arranged to rotate in the direction shown by the arrow, Figure 1, and carrying a pair of knives **119** which are slidably mounted in guides **119***a* so as each to be capable of sliding lengthwise relatively to the carrier. Each knife has a cutting edge **120** which, when the knife moves forwardly relatively to the carrier, can engage a hardened inset **121** on the suction drum **103**. The knives are provided with shoulders **122** which engage edges of the guides **119***a* to limit the rearward movement of the knives.

Each of the knives is urged rearwardly by a spring **123**, one end of which is fixed to the knife and the other end of which is fixed to the knife carrier as shown.

The carrier **118** is arranged to rotate in the direction shown by the arrow, and at a speed such that the knife edges, when they are closest to the drum **103**, move at the same speed as that of the periphery of the drum.

Due to the action of the spring **123** the knives are, for the greater part of each revolution of the carrier **118**, held retracted, so that if they were controlled entirely by the springs **123** their cutting edges would never engage the drum **103**.

A lever **124** having at one end a metal-faced rubber pad **125** is pivotally mounted at **126** on a bracket **127**, and has a tail **128** arranged to ride on the periphery of a cam **129** arranged to rotate in the direction shown by the arrow. A spring **130** urges the lever **124** in a direction such as to cause the pad **125** to strike the rear end of a knife **119** when such movement of the lever is permitted by the cam **129**. This occurs when the tail **128** of the lever reaches the edge **131** of the cam and can drop on to the lower surface of the cam. The cam is so timed as to permit this sudden movement of the lever **124** only when a knife **119** is in register with one of the hardened insets **121** on the drum **103**, or in other words, at a time when it is desired that the knife should cut the web **104** and the knife is in the correct position to do so if struck and pushed forward by the pad **125**.

The spring **130** is stronger than each of the springs **123**, and the padded end of the lever **124** striking the rear end of the knife thus pushes the knife forwardly and the cutting edge **120** strikes the web of material on the drum and cuts it against the drum. On further rotation of the carrier, the rear end of the knife slips away from the lever **124** and the knife is then immediately retracted by the spring **123**.

It is found that a relatively light blow on the knife is sufficient to cause the knife to make a satisfactory cut.

By means of this arrangement the knife can be given a very rapid movement towards the drum while at the same time moving in the same general direction as that of the web and at the same speed, thus making it possible to cut the web practically instantaneously.

A rotated brush **132** is provided to brush against the cutting edges of the knives in order to remove any adhesive which might be deposited on the knives during cutting of the gummed web.

A continuous cigarette-paper web **133** passes over guide rollers **134**, **135**, **136**, **137**, **138** and **139**. The rollers **135**, **136**, **137**, and **138** are arranged to maintain a loop in the paper web **133**, the part **140** extending between the rollers **136** and **137** being the part of the paper web to which the tips are applied. For this purpose the length **140** of the paper web is held in light contact, or just out of contact, with the surface of the drum **103**.

The rollers **136** and **137** are adapted to be moved as will shortly be described, but when these rollers are stationary, the speed of the part **140** of the paper web (which of course is the same as the speed of the whole of the paper web **133**) is the same as the peripheral speed of the drum **103**.

A dabber roller **141** is mounted above the web **140** on a pivoted arm **142**, which is arranged to be rocked about its pivot **143** by a lever **144** which has a cam-following roller **145** which is held by a spring **146** in engagement with a cam **147**. This cam causes the roller **141** to be moved up and down at such intervals that the roller moves down and presses against the paper web whenever a separated tip, or portion of tipping material, is brought beneath the roller by the drum **103**, so as to press the paper firmly against the adhesive-coated tip and cause the latter to adhere to the paper.

The rollers **136** and **137** are mounted on arms **148** and **149** which are fixed on shafts **150** and **151** respectively. Levers **152** and **153** fixed to these shafts are connected by a link **154**. The lever **152** has mounted on it a roller **155** which is urged by a spring **156** against a composite cam **157**. Rocking movement of the lever **152** about the shaft **150** will, as can be seen from Figure 1, cause the rollers **136** and **137** to be moved to and fro in and against the direction of movement of the length **140** of the paper web.

The cam **157**, which is also shown in Figure 2, comprises a rotatable disc **158** on which is mounted a further disc **159** which is pivoted at **160** on the disc **158**. The disc **159** has a slot **161** which accommodates the head **162** of an eccentric pin **163** which passes through a corresponding hole in the disc **158**. Rotation of the head **162** causes the disc **159** to swing about its pivot **160** in one direction or the other.

The roller **155** is arranged to engage only the edge of the disc **159**.

If the disc **159** is swung into a position in which it is concentric with the disc **158**, the cam **157** is thereby made inoperative, since its rotation does not cause the roller **155** to move. Therefore the rollers **136** and **137** remain in the position shown, and the length **140** of the paper web will move at the same speed as that of the paper web **133** as a whole.

When however the eccentric pin **162** is turned so as to swing the disc **159** to an eccentric position, the cam **157** acts to move the roller **155** to and fro, and thus the rollers **136** and **137** are caused to move to and fro, and will carry the length **140** of the paper web bodily backwardly and forwardly.

The purpose of this movement is to enable the paper web **133**, as a whole, to be run at different speeds over the guide rollers **134** and **139**, and also of course through the cigarette-making machine, without altering the effective or resultant speed of the length **140** of the paper web, which is passing from the roller **136** to the roller **137**, relatively to the drum **103** and the portion of tipping material carried by the drum for application to the paper web.

It will be seen that if, for example, the speed of the paper web as a whole is greater than the peripheral speed of the drum **103**, the rollers **136** and **137** can be moved backwards (that is, in the opposite direction to the direction of movement of the length **140** of paper) so as to reduce, during such movement, the resultant speed of the length **140** to that of a portion of tipping material carried by the drum to be applied to the paper web during that movement. Similarly if the cigarette-paper web is moving through the machine slower than the peripheral speed of the drum, forward movement of the rollers **136** and **137** can increase, during such movement, the resultant speed of the length **140** of paper to that of the tip which is to be applied to it at that time.

The disc **159** can thus be swung in one direction or the other to alter the eccentricity of the composite cam and thereby to cause the rollers **136** and **137** to move forwardly or backwardly, as required, during the application of a tip to the length **140** of paper web.

The cam is arranged to perform one revolution for each application of a tip to the paper web. As six tips are applied during each revolution of the drum **103**, the cam therefore rotates at six times the speed of the drum **103**.

In operation, the drum **103** is rotated at a speed such that its peripheral speed equals the speed of the paper web **133** when it is desired to apply tips at certain predetermined intervals to make tipped cigarettes of a certain length, which length is chosen between the greatest and the smallest length of cigarette which it might at various times be desired to produce on the machine. For example the cigarette length chosen as a "normal" length may be 78 mm. In that case, the drum is rotated at a speed so that its peripheral speed equals equals the paper web speed for making 78 mm. cigarettes, and the discs **158** and **159** are arranged concentrically, thus making the composite cam **157** inoperative.

If now it is desired to make longer cigarettes, for example 86 mm. long, the disc **159** is swung about its pivot to its full extent in one direction so as to cause the rollers **136** and **137** to move backwardly (i.e. against the direction of movement of the length **140** of paper) during the time that the tip is being applied to the paper. The paper web as a whole is of course fed at an increased speed such that the tips will be spaced apart at increased intervals along its length so as to position the tips suitably for the manufacture of 86 mm. tipped cigarettes. The throw of the cam **52** is sufficient to ensure that at the moment when a tip is applied to the length **140** of paper, the latter has a resultant forward movement (due to the backward movement of the rollers **136** and **137**) equal to that of the tip.

Similarly, if 70 mm. cigarettes are to be made, the disc **159** is swung to its full extent in the reverse direction, and the paper web is fed at a suitably reduced speed. The operation of the cam in this case moves the rollers **136** and **137** forwardly at the moment of application of a tip, so that the resultant speed of the length **140** of paper is increased to the speed of the tips on the drum **103**.

The speeds of the drum **103**, the knife carrier **118**, and the web of tipping material, remain constant throughout.

The disc **158** has three lines engraved on its edge, one of which marked **164**, is seen in Figure 2. A similar line **165** is engraved on the movable disc **159**, and can be brought into register with the middle one of the three lines on the disc **158** (at which position the two discs are concentric) or with one or other of the two outer discs, which represent the outermost positions of the disc **159**. The disc **158** can be suitably graduated between the two outermost lines to indicate suitable positions with which the line **165** should register for a variety of cigarette lengths between the extremes. The extremes referred to above (namely 70 mm.–86 mm.) are merely given by way of example, as is the "normal" length of 78 mm., and it will be understood that if desired a wider range of cig-

arette lengths could be included by increasing the amount by which the disc **159** can be swung relatively to the disc **158**, thus increasing the possible throw of the cam **157**.

What is claimed as the invention and desired to be secured by Letters Patent is:

1. Apparatus for applying portions of material to a continuous web at spaced intervals along said web, comprising means to feed portions of material at a constant speed and at constant spaced intervals, for application to the web, web-feeding means arranged to feed the web as a whole at the said constant speed for application of the portions thereto at the said spaced intervals, and at greater or lower speeds for application of the portions thereto at greater or smaller spaced intervals, guide means about which the web is passed and control means capable of moving the said guide means and adjustable so as to move said guide means in the direction of movement of the web during application of a portion to the web when the web is being fed at a speed lower than the said constant speed, and in the opposite direction during such application when the web is being fed at a speed greater than the said constant speed, so as momentarily to increase and to decrease, respectively, to the said constant speed the part of the web to which a portion is being applied.

2. Apparatus as claimed in claim 1, wherein the means to move the said guide means comprises a variable cam, which latter comprises a rotatable circular disc and a further disc eccentrically pivoted thereon and rotatable therewith, said further disc being movable in either direction about its pivot so as to project beyond the edge of the first said disc, and a cam follower arranged to ride on the edge of said further disc, said cam follower being operatively connected to the said guide means whereby the latter can be moved according to the position of the said movable dics.

3. Tipping apparatus for applying tips to a continuous web of cigarette-paper comprising means to feed said paper web forwardly, movable guide means about which said paper web is looped, means to feed tips for application to the looped part of said paper web between said guide means, and to cause said tips to move, during application, at a substantially constant speed which is substantially the same as that of the paper web when the latter is fed at a predetermined speed, and means capable of moving said guide means and adjustable so as to move said guide means and the said part of the paper web bodily in the direction of movement of the paper web about said guide means during application of a tip when the speed of the paper web as a whole is decreased below the said constant speed, and against the said direction when the speed of the paper web is increased above said constant speed, to cause a resultant speed of said the web is being fed at a speed lower than the said constant part, due to movement of the guide means, substantially the same as the said constant speed of the tips during application of the latter.

4. Apparatus for applying tips or other portions of material to a continuous paper web at spaced intervals along said web, comprising a conveyor having suction ports on its conveying surface, web feeding means arranged to feed positively a continuous web of tipping material to said conveyor at a slower speed than the speed of the conveyor surface of the conveyor so that the latter slips beneath the web, the said conveyor surface being arranged to move at a constant speed which is the same as that of the paper web when the latter is fed at a predetermined speed, means to sever the web of tipping material into separate portions while the web is in contact with the conveyor whereby said portions are caused to move with, and at the speed of, the conveyor and are thereby spaced apart from the uncut web, suction means to effect suction through said ports and arranged to register with the web both in front of and behind the position where the web is severed, guide means about which the paper web is passed to maintain a loop in the paper web, a part of which loop makes contact with said separated portions whereby the latter are applied to the paper web, and means capable of moving said guide means and adjustable so as to move said guide means during such contact in the direction of movement of the paper web when the latter is fed at a speed less than said predetermined speed, and against said direction when the paper web is fed at a speed greater than said predetermined speed, to cause the said part of the loop in the paper web to move at substantially the same speed as the separated portion of tipping material with which it makes contact, irrespective of the speed of the paper web as a whole.

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