March 12, 1963 D. W. MOLINS ET AL 3,080,871

MANUFACTURE OF COMPOSITE CIGARETTES

Filed April 5, 1960 4 Sheets-Sheet 1

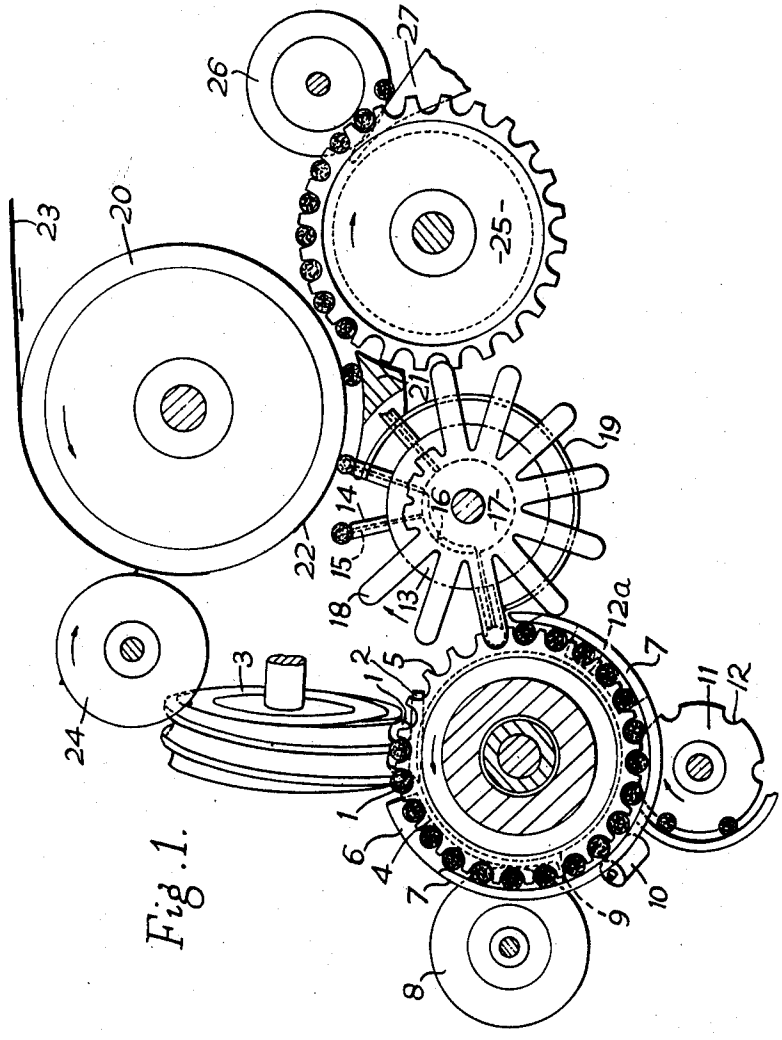


Fig. 1.

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MANUFACTURE OF COMPOSITE CIGARETTES

Filed April 5, 1960 4 Sheets-Sheet 2

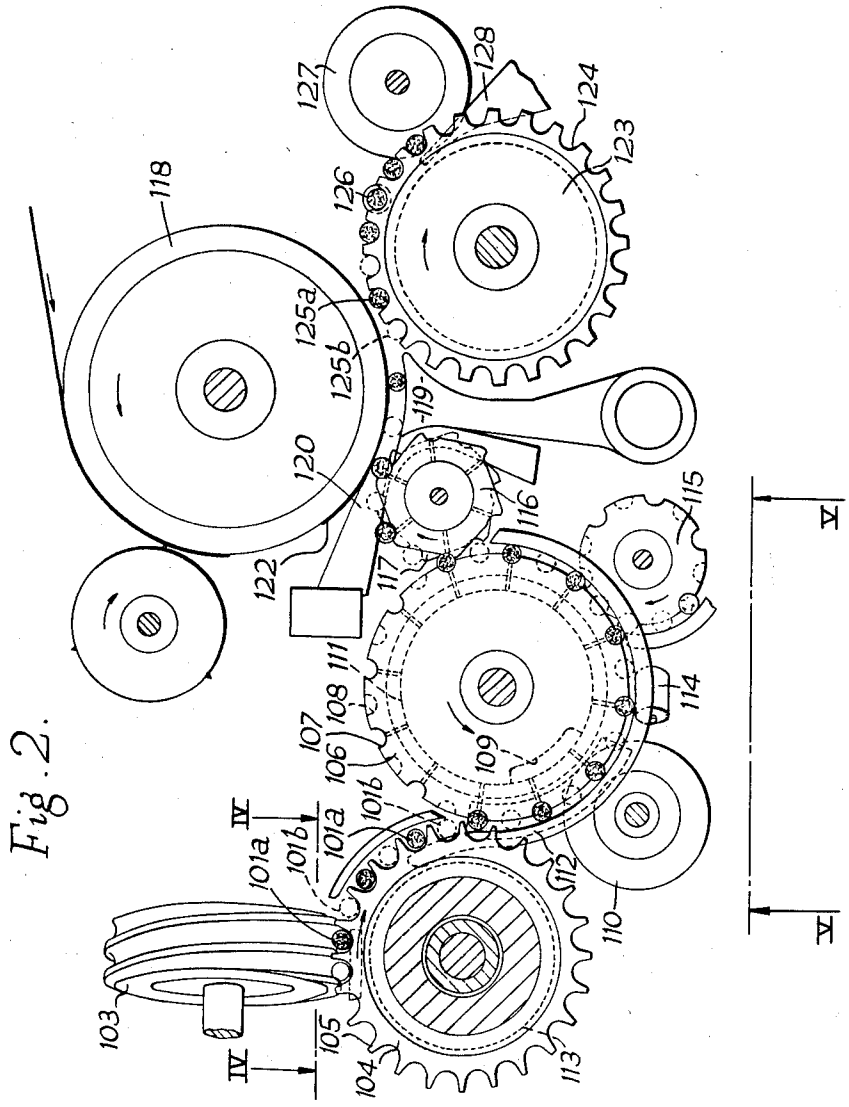


Fig. 2.

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MANUFACTURE OF COMPOSITE CIGARETTES

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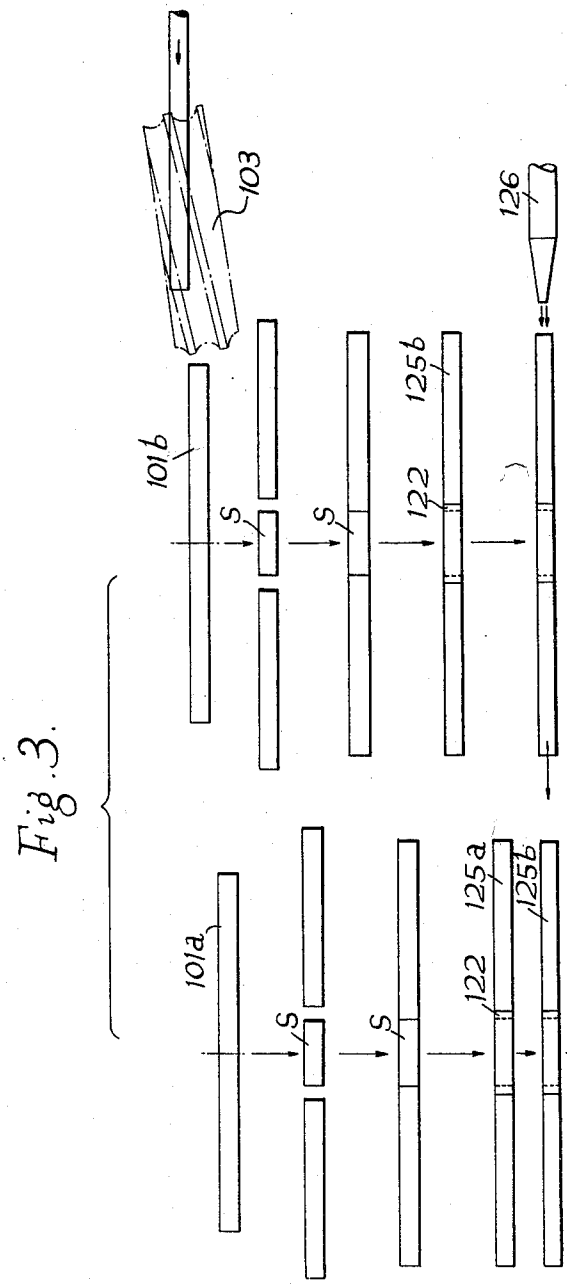


Fig. 3.

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MANUFACTURE OF COMPOSITE CIGARETTES

Filed April 5, 1960 4 Sheets-Sheet 4

Fig. 4.

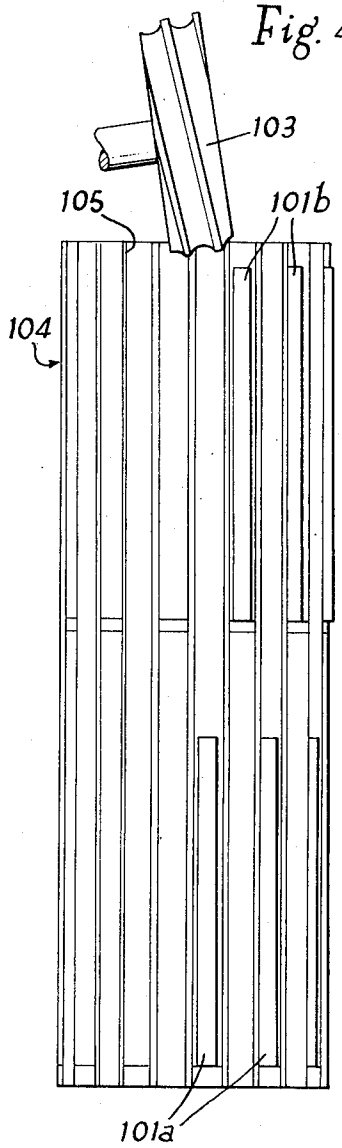
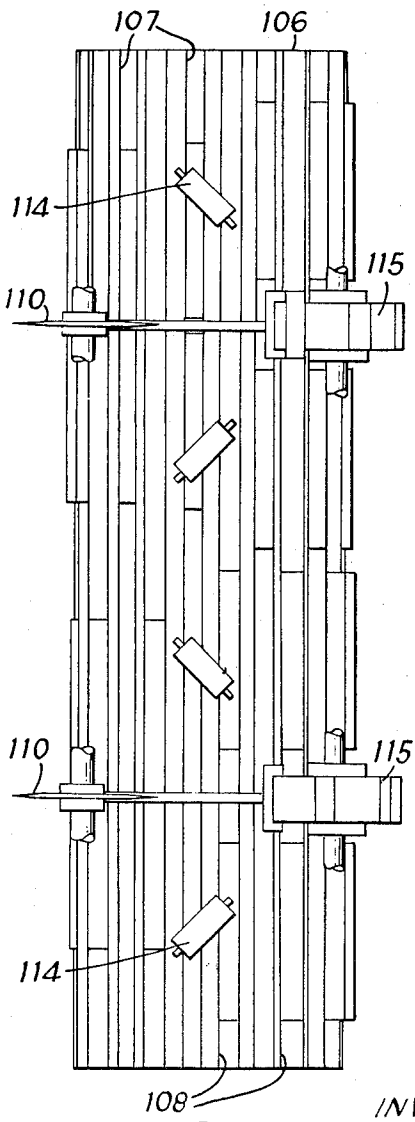


Fig. 5.



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3,080,871

MANUFACTURE OF COMPOSITE CIGARETTES

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Claims priority, application Great Britain Apr. 13, 1959
3 Claims. (Cl. 131—94)

This invention concerns improvements in or relating to the manufacture of composite cigarettes, such as mouthpiece cigarettes, each of which has a component such as a stub or other mouthpiece portion at the mouthpiece end of the cigarette.

According to the present invention there is provided a method of producing composite cigarettes on a continuous rod cigarette-making machine, which comprises the steps of forming and feeding endwise a continuous cigarette rod, severing the rod into lengths each of which is double the length of the tobacco portions of an individual composite cigarette, deflecting the said double lengths sideways, severing the double lengths while they are moving sideways, separating the severed parts endwise, inserting mouthpiece portions between the opposed ends of the separated parts, uniting the said parts with the said mouthpiece portions to form assemblages, and subdividing the assemblages to form individual composite cigarettes.

The double lengths may be deflected sideways in such a way that they form two side-by-side rows, the lengths contained in the two rows being then severed and formed into assemblages while continuing to move in side-by-side rows.

Further according to the invention there is provided apparatus for making composite cigarettes on a continuous rod cigarette-making machine, comprising means to form a continuous rod and move it endwise, means to sever the rod into lengths each of which is double the length of the tobacco portion of an individual composite cigarette, deflector-means to deflect the said double lengths sideways, means to sever the double lengths while they are moving sideways, means to separate the severed parts endwise, means to insert mouthpiece portions between the opposed ends of the separated parts, uniting means to unite the said parts with the said mouthpiece portions to form assemblages and cutting means to subdivide the assemblages to form individual composite cigarettes.

The deflector-means may be arranged to deflect the double lengths sideways into two side-by-side rows, in which case separate means may be associated with each row for severing and separating the lengths, inserting mouthpiece portions, and uniting the separated parts with the mouthpiece portions. For example the deflector-means may comprise a fluted drum having peripheral flutes each arranged to receive an endwise-moving double length, and means associated with the drum to arrest the endwise movement of the said lengths in such a way that alternate lengths entering alternate flutes have their endwise movement arrested sooner than do the other lengths, whereby the said double lengths are formed into two rows in the flutes of the drum, successive lengths in each row being laterally spaced apart by two flute pitches of the drum.

The assemblages formed from the double lengths in one of the said rows may be moved endwise e.g. by an air jet, so as to position them in alternation with the assemblages in the adjacent row, thereby forming a single row of sideways-moving assemblages to be presented to a single disc knife which subdivides them into individual mouthpiece cigarettes.

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

FIGURE 1 is an end view of one construction;

FIGURE 2 is an end view of an alternative construction;

FIGURE 3 illustrates diagrammatically the operation of a construction in which two side-by-side rows of assemblages are formed,

FIGURE 4 is a plan view on the line IV—IV, FIGURE 2, and

FIGURE 5 is a bottom plan view on the line V—V, FIGURE 2.

The apparatus according to the present invention is similar to that disclosed in the specification and drawings of United States patent application No. 5,933 in that lengths severed from a continuous cigarette rod are engaged one after the other by a suction wheel provided with helical grooves whereby each such length is accelerated endwise in order to separate it from the rod, and at the same time moved sideways, and is fed endwise into a flute of a fluted drum by which its sideways movement is continued while its endwise movement is arrested.

Referring to FIGURE 1, a continuous cigarette rod formed on a cigarette-making machine is severed by suitable cut-off mechanism (not shown) at intervals such as to provide double-lengths **1**—that is, lengths each double the length of rod which is required for an individual mouthpiece cigarette. The double lengths **1** pass over a plate **2**. Above the plate **2** is a helically grooved wheel **3** having a hollow interior which contains an air valve around which the wheel rotates, and provided with a suction pipe whereby suction is exerted at appropriate times through suction ports, not shown, in the grooved rim of the wheel. The wheel **3** is similar to the grooved wheel disclosed in the above-mentioned provisional specification and drawings, but has a two start helix and is somewhat larger.

The wheel **3** rotates with a peripheral speed a little in excess of the speed of the continuous rod so as to separate the double lengths endwise from the rod.

A fluted drum **4**, having peripheral flutes **5**, is positioned beyond the wheel **3** and is rotated in the direction shown by the arrow at a suitable speed for successive flutes **5** to receive successive lengths **1** from the helical wheel **3**. The length of the drum **4** may be equal to the length of a double length **1**.

A fixed guide **6** is located adjacent that end of the drum nearest the wheel **3**, and a similar guide, not shown, is mounted adjacent the opposite end of the drum and extends further to the right (as viewed in FIGURE 1) than the guide **6** so as to act as an end stop for lengths **1** moving along the flutes **5**. The guide **6** also acts as an end stop to check rebounding of the lengths **1**. An arcuate guide **7** extends around the lower part of the drum and is suitably slotted to accommodate a rotating disc knife **8**, which extends through the guide into a groove **9** extending around the drum midway along its length. The knife is provided in order to sever the double lengths **1** into single lengths.

Two small rollers **10**, only one of which is visible in FIGURE 1, are mounted adjacent the drum **4**, being located in apertures in the guide **7**. These rollers are oppositely inclined to the axis of the drum **4** and are arranged to engage cylindrical surfaces of cigarette rod lengths in the flutes **5**, and to rotate in opposite directions such that their peripheral surfaces urge the severed single lengths apart from each other along the flutes **5**.

A stub-inserting wheel **11** is located midway along the length of the drum **4** and projects through a further aperture in the guide **7**. The wheel **11** has peripheral flutes

12, which receive double-length stubs orother mouthpiece portions from any suitable source and from which the stubs are transferred into the flutes 5 between the separated single-lengths of cigarette rod. A stripper element (not shown) extends into a peripheral groove in the wheel 11, to ensure that the stubs remain in the flutes 5. Alternatively, the wheel 11 may be narrower than the length of the stubs, and the aperture in the guide 7 may be wide enough at the entry end to enable stubs to be carried through it by the wheel 11, but too narrow at the other end to enable them to move away from the drum 4 with the wheel 11, so that they are stripped from the wheel by the guide 7.

Just beyond the wheel 11 are two guides 12*a* (only one of which is shown in FIGURE 1) arranged at opposite ends of the drum 4 and converging so as to engage opposite ends of the rod lengths and cause them to move towards each other and into endwise abutment with the centrally positioned stubs.

A rotatable transfer wheel 13 provided with radial suction arms 14 is mounted adjacent the drum 4 and is rotated in the direction shown by the arrow so as to receive groups of cigarette rod lengths and stubs from the drum. The arms 14 have suction ports 15 communicating with a fixed suction chamber 16 which is so arranged that suction is applied through the ports 15 at desired times. At opposite ends of the wheel 13 and rotatable therewith are mounted two discs 17 having radial spring fingers 18 which are biassed inwardly, that is towards each other, and are held outwardly by cams 19 which extend just short of the position where a suction arm 14 first comes into engagement with a cigarette and stub group in a flute 5. At that position, as can be seen from FIGURE 1, the suction port 15 of that particular arm 14 is not yet in communication with the chamber 16. Thus the cigarette lengths in the flute 5 are free to move endwise under the influence of the spring fingers 18 which are at that point released from the cams 19 and move inwardly. This enables a final endwise abutment of the cigarette lengths and stub to be effected just before they are suctionally gripped by the arms 14 and carried away from the fluted drum 4.

The arms 14 and the guide 7 are suitably slotted to enable the arms to pass the guide.

The arms 14 carry the abutted groups towards a suction drum 20 and a fixed plate 21 having a concave surface opposed to the surface of the drum 20. The plate 21 is slotted as shown to allow the arms 14 to pass through it while transferring the groups into the space between the plate and the suction drum. At the position of transfer, the cam 19 urges the spring fingers outwardly to release the ends of the groups.

The suction drum 20 carries on its surface spaced uniting bands 22 which are severed from an adhesive-coated web 23 by a knife roller 24. The drum 20 rotates with a peripheral speed in excess of the linear speed of the web so that the web slips on the drum and the cut portions are thus spaced apart. The parts are timed so that each group is fed into the space between the drum 20 and the plate 21 a little ahead of a band 22. The relative movement between the drum surface and the surface of the fixed plate 21 causes each group to roll over a band 22, which thus becomes wrapped around and unites the group, forming an assemblage.

The united group, or assemblages, are transferred into flutes of a wheel 25 which is grooved to receive a disc knife 26. The knife severs the assemblages through their mouthpiece portions, thus producing individual mouthpiece cigarettes, which are stripped from the flutes of the drum by a ramp 27, and are delivered to a conveyor of any suitable kind.

An alternative construction is illustrated in FIGURES 2 and 3.

In this construction, the drum 104 is arranged to rotate in the opposite direction to that in which the corresponding drum 4 rotates in the arrangement described above. Consequently the helically grooved wheel 103 is arranged to deflect the double lengths towards the right as viewed in FIGURE 2, so that they move sideways with the drum.

The drum 104 is at least twice as long as a double length severed from the rod, and every second flute 105 is provided with a stop member about halfway along its length, while the intermediate flutes have stop members in the region of their ends remote from the wheel 103. Thus as double lengths of rod are fed into successive flutes 105 of the rotating drum 104, one length will move endwise substantially to the end of its flute, while the next length is brought to rest halfway along the flute. Thus the drum 104 conveys the double lengths in two side-by-side rows, the lengths of one row being staggered relatively to those of the other row. This is illustrated diagrammaticaly in FIGURE 3, where a length 101*a* is shown occupying one row, while the succeeding length 101*b* to come from the wheel 103 occupies an adjacent row and is laterally offset from the length 101*a*.

The stop members in the flutes 105 are not illustrated in FIGURE 2 but they are similar to the stop members disclosed in the provisional specification and drawings mentioned above. The double lengths 101*a* are illustrated in FIGURE 2 in full line while the lengths 101*b* are shown in dotted lines.

Adjacent the long drum 104 are mounted two coaxial fluted drums 106 having peripheral flutes 107 and 108. These two drums are identical in construction but are angularly positioned so that the flutes 107 are offset from the flutes 108 as shown, the flutes 107 being arranged to register with lengths 101*a* while the flutes 108 register with lengths 101*b*.

The drums 106 have suction ports extending inwardly from the flutes 107 and 108 to fixed suction chambers 109 within the drums so that as the latter rotate, suction is exerted for a short period through the ports. Opposite these chambers are two side-by-side rotating disc knives 110 extending into peripheral grooves 111 in the drums 106.

The lengths 101*a*, 101*b* respectively are transferred from the flutes 105 into flutes 107, 108 respectively by strippers or guides 112 which project into peripheral grooves 113 in the drum 105. As they approach the knives 110 suction is applied through the ports communicating with their respective flutes and they are thus securely held while being severed. The suction is cut off after the severing operation, and the severed pairs of lengths are then engaged by two pairs of inclined rollers 114, one of which is visible in FIGURE 2, and which are identical with the rollers 10 shown in FIGURE 1 and act to separate lengthwise the two severed parts of each double length 101*a* and 101*b*.

A pair of stub-inserting wheels 115, similar to the wheel 11 in FIGURE 1, are arranged adjacent the drums 106, and feed stubs S, see FIGURE 3, into the flutes 107 and 108 between the severed and separated parts of the double lengths 101*a*, 101*b*.

Two transfer wheels 116, 117, having suction ports extending as shown from peripheral flutes to internal suction chambers, remove groups of cigarette lengths and stubs from the flutes 107 and 108 respectively, and convey them towards a pair of suction drums 118, each of which is identical with the drum 20, FIGURE 1. A member 119, corresponding in function to the member 21, FIGURE 1, has a concave surface opposed to the drum surface. The groups are delivered between the drums 118 and member 119 and are immediately gripped therebetween and caused to roll. Since these groups roll along between the drums 118 and member 119 at half the peripheral speed of the drums, the latter are arranged to rotate with a peripheral speed more than twice that of the transfer wheels 116, 117 so that the groups will move away from the latter as soon as they start to roll.

Suction is cut off from the groups just before they are delivered between the drums **118** and member **119**. End pressers **120** engage the opposite ends of each group as soon as the suction is cut off and move towards each other so as to bring the component parts of each group into close endwise abutment just before they are gripped between the drums **118** and member **119**.

The rolling action imparted to the groups of cigarette lengths and stubs causes them to roll over adhesive uniting bands **122** carried by the drums **118**, and the bands are thus wrapped around the groups and unite them.

The united groups, or assemblages, are delivered from the member **119** into successive flutes of a further long fluted drum **123** having flutes **124**. The assemblages are staggered or offset in the flutes **124** just as the double lengths **101***a* and **101***b* were in the flutes **105** of the drum **104**. For convenience in illustration these assemblages are indicated as assemblages **125***a* (corresponding to lengths **101***a*) shown in full line in flutes **124** just beyond the member **119**, and as assemblages **125***b* (corresponding to lengths **101***b*) shown in dotted lines.

A nozzle **126** located close to one end of the drum **123** is arranged to discharge a jet of air lengthwise along the flutes **124** as the latter moves past the nozzle. The air jet blows the assemblages **125***b* lengthwise along their flutes and thereby lines them up with the assemblages **125***a*, thus producing a single row of assemblages. For this reason in FIGURE 2 all the assemblages shown from the position of the nozzle **126** onwards are shown in full lines.

A rotary disc knife **127** severs these assemblages through their mouthpiece portions, thus forming individual mouthpiece cigarettes which are stripped from the flutes **124** by guides **128** projecting into grooves in the drum **123**, and roll down the guides on to a conveyor (not shown) or are dealt with in any other desired way.

The sequence of the operations just described is diagrammatically illustrated in FIGURE 3.

The construction described above with reference to FIGURE 2 may be modified by employing a relatively short drum **104**, as in FIGURE 1, and feeding the double lengths in a single row instead of in two side-by-side rows. In that case only a single drum **106** is required, and only one stub-inserting wheel **116** and a single suction drum **118**, and the relative speeds of the drum **104** and **106** are suitably adjusted to enable lengths to be transferred from successive flutes **105** into successive flutes **107**.

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

1. Apparatus for making composite cigarettes on a continuous rod cigarette-making machine, comprising means to form a continuous rod and move it endwise, means to sever the rod into endwise moving lengths each of which is double the length of the tobacco portion of an individual composite cigarette, means to move the said double lengths sideways in two side-by-side rows, said last named means including deflector means to deflect the endwise moving double lengths sideways and to arrange them in said rows, means to sever the double lengths in both rows while they are moving sideways, means to separate the severed parts endwise, means to insert mouthpiece portions between the opposed ends of the separated parts, uniting means to unite the said parts with the said mouthpiece portions to form assemblages and cutting means to subdivide the assemblages to form individual composite cigarettes.

2. Apparatus as claimed in claim 1, wherein the deflector-means comprises a fluted drum having peripheral flutes each arranged to receive an endwise-moving double length, and means associated with the drum to arrest the endwise movement of the said lengths in such a way that alternate lengths entering alternate flutes have their endwise movement arrested sooner than do the other lengths, whereby the said double lengths are formed into two rows in the flutes of the drum, successive lengths in each row being laterally spaced apart by two flute pitches of the drum.

3. Apparatus as claimed in claim 2, wherein the assemblages formed from the double lengths in one of said rows are moved endwise, so as to position them in alternation with the assemblages in the adjacent row, thereby forming a single row of sideways-moving assemblages to be presented to a single disc knife which subdivides them into individual mouthpiece cigarettes.

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