July 9, 1957 D. W. MOLINS 2,798,495

MANUFACTURE OF MOUTHPIECE CIGARETTES

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Fig. 1.

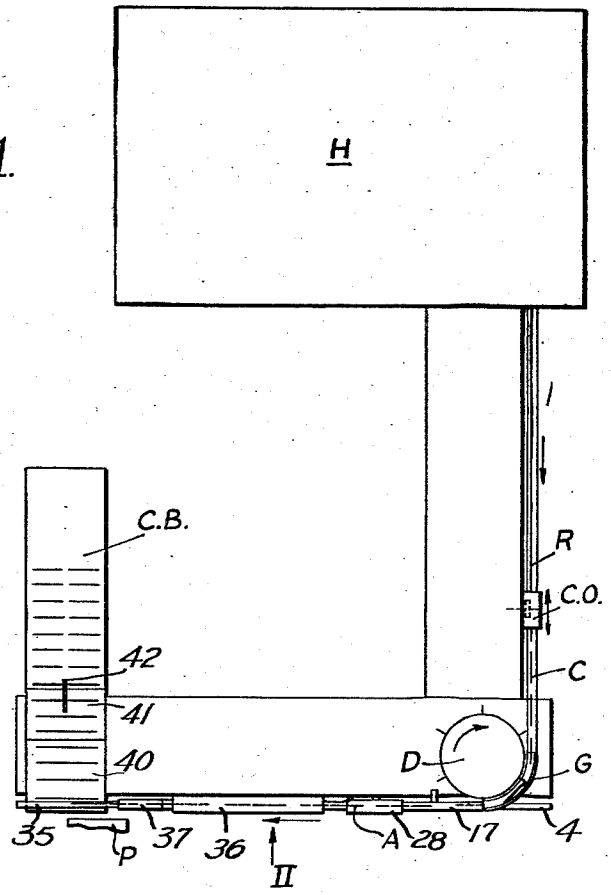
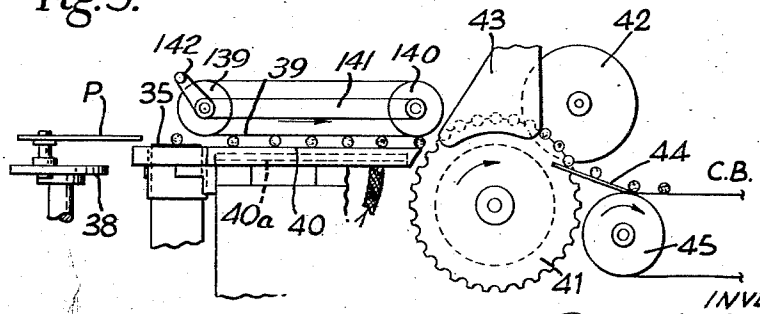


Fig. 3.



INVENTOR
DESMOND W. MOLINS
BY
Watson, Cole, Grindle & Watson
ATTORNEYS

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MANUFACTURE OF MOUTHPIECE CIGARETTES

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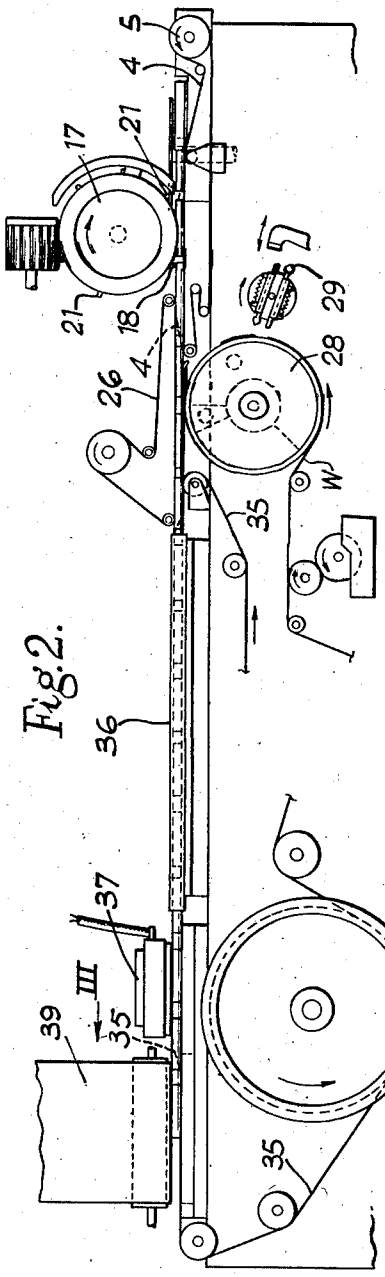

Fig. 2.

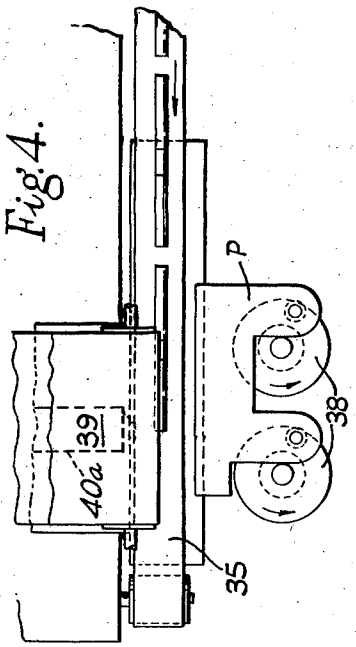

Fig. 4.

INVENTOR
DESMOND W. MOLINS
BY
Watson, Cole, Grindle & Watson
ATTORNEYS

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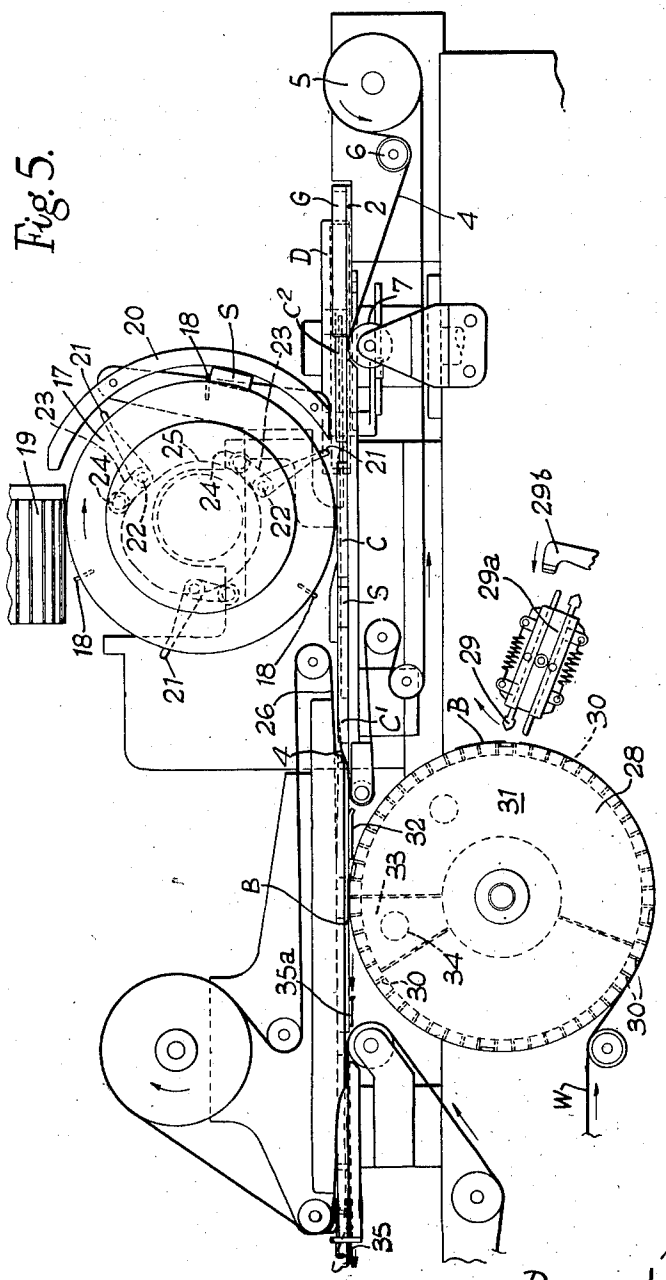
Fig. 5.



INVENTOR
DESMOND W. MOLINS
BY
Watson, Cole, Grindle & Watson
ATTORNEYS

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MANUFACTURE OF MOUTHPIECE CIGARETTES

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Fig. 7.

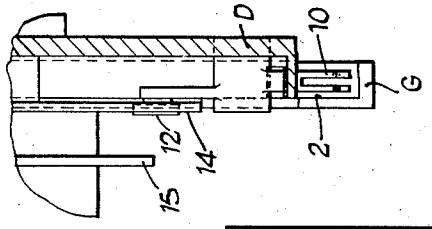
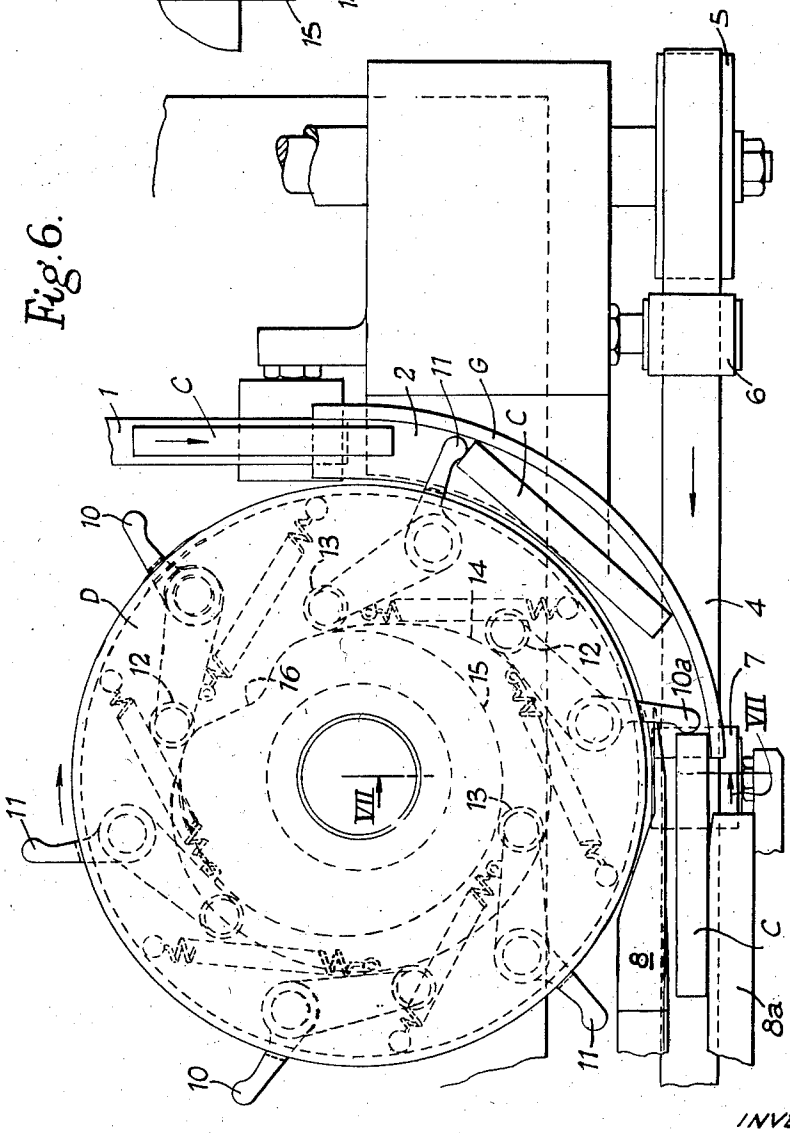


Fig. 6.



INVENTOR
DESMOND W. MOLINS
BY
Watson, Cole, Grindle & Watson
ATTORNEYS

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2,798,495

MANUFACTURE OF MOUTHPIECE CIGARETTES

Desmond Walter Molins, Deptford, London, England, assignor to Molins Machine Company Limited, London, England, a British company

Application July 11, 1955, Serial No. 521,285

Claims priority, application Great Britain July 15, 1954

16 Claims. (Cl. 131—94)

This invention concerns improvements in or relating to the manufacture of mouthpiece cigarettes which are made by uniting lengths of wrapped cigarette rod with lengths of mouthpiece material by means of a uniting band which is wrapped and secured around the parts to be united.

For convenience a mouthpiece portion will hereinafter be referred to as a "stub," which word shall be understood as including any portion (whether of the length required in a finished cigarette or double that length) of mouthpiece material that is suitable for incorporation in a mouthpiece cigarette, and may consist of a piece of filtering material, or a hollow tube, or any other suitable piece of material (including tobacco) that is different from the tobacco contained in the remainder of the cigarette, or any combination of the foregoing. Well-known examples of stubs are those often known as "filter-tips," which are intended to filter the smoke. Stubs are often made of folded or bunched wads of paper enclosed in a wrapper.

Lengths of wrapped cigarette rod suitable for uniting with stubs, and each of a length suitable for an individual mouthpiece cigarette, will be referred to herein as "cigarette lengths."

A group consisting of a double-length stub arranged between, and in axial alignment and endwise abutment with, two cigarette lenghts, and united to those cigarette lengths by a uniting band, will for convenience be referred to herein as an "assemblage." The expression "double-length stub" is to be understood as meaning a stub which is double the length required in an individual mouthpiece cigarette.

According to the present invention there is provided a method of making mouthpiece cigarettes, comprising the steps of forming a continuous wrapped cigarette rod and moving it endwise, severing the rod into separate cigarette lengths and spacing the latter apart endwise, inserting a double-length stub into the sace behind every second cigarette length and causing endwise abutment between each said stub and the two cigarette lengths between which it lies, wrapping a gummed uniting band about each said stub and the cigarette lengths which abut it, so as to form assemblages, deflecting successive assemblages laterally, and subdividing them, while they are moving laterally, to form individual mouthpiece cigarettes.

By the expression "gummed uniting band" is meant a uniting band supplied with any suitable adhesive material.

The cigarette lengths may be spaced apart endwise in such a way that every second cigarette length has behind it a space large enough to receive a double-length stub, and is larger than the space immediately in front of the said length. The cigarette lengths may first be fed in succession with substantially equal spaces between their ends, the enlarged spaces intended to receive double-length stubs then being formed by causing relative endwise movement between every second cigarette length and the two cigarette lengths between which it lies (e. g. by advancing every second cigarette length to enlarge the space behind it). In any case, after insertion of a stub, one of the two cigarette lengths between which it lies may be moved relatively to the other of the said two cigarette lengths to cause abutment between the stub and the said two cigarette lengths (e. g. the cigarette length immediately following a stub may be advanced).

The said assemblages may be formed while the cigarette lengths and stubs are moving axially.

Heat may be applied to the assemblages while they are moving axially, or while they are moving laterally, or both while they are moving axially and while they are moving laterally. During lateral movement the assemblages may be subjected to rolling action between two opposed surfaces, one of which may be heated.

Further according to the invention there is provided apparatus for making mouthpiece cigaretes, comprising means to form a continuous wrapped cigarette rod and move it endwise, means to sever the rod into cigarette lengths, means to space said lengths apart endwise, means to insert a double-length stub into the space behind every second cigarette length, means to cause endwise abutment between each said stub and the two cigarette lengths between which it lies, means to wrap a gummed uniting band about each said stub and the cigarette lengths which abut it, so as to form an assemblage, deflector-means to deflect successive assemblages laterally, and cutting means to subdivide each said assemblage while it is moving laterally, so as to provide individual mouthpiece cigarettes.

The apparatus may include means to advance every second cigarete length so as to enlarge the space behind it sufficiently to enable a double-length stub to be inserted into the enlarged space. The means to cause endwise abutment between each double-length stub and the two cigarette lengths between which it lies may comprise means to advance each cigarette length which immediately follows a stub.

In order to save floor space, the apparatus may be arranged so that the cigarette lengths when cut from the rod change their direction of movement while still moving endwise. For this purpose means may be provided to cause the cigarette lengths to turn from a path in line with the rod into a path transverse to the rod line, for example at 90° to the rod line. The said means may comprise a rotatable member having fingers each adapted to engage a cigarette length and push it endwise over a stationary surface in a curved path. One finger may be arranged to move in said curved path faster than the finger immediately following it, so as to cause a cigarette length to move faster than the next succeeding cigarette length.

The means to insert stubs may comprise a rotatable element provided with a stub-pusher to push a stub endwise into a space behind a cigarette length. The said element may further be provided with a further pusher, angularly spaced behind said stub-pusher, and movable relatively to the latter, and arranged to engage a cigarette length immedaitely following a stub and to move faster than the stub pusher in such manner as to cause the cigarette length to abut against the stub and to cause endwise abutment between the said stub and the two cigarette lengths between which it lies. The said further pusher may consist of a pivoted finger, cam means being provided to swing it about its pivot at desired times.

In apparatus according to the invention, cigarette lengths issuing from a cigarette-making machine can be fed endwise and stubs inserted endwise between them, and groups each consisting of a double-length stub and two cigarette lengths abutting the stub can thus be united and formed into assemblages while moving axially. As these assemblages are at all times quite separate from each other, they can be deflected bodily sideways from their line of axial movement, and then subdivided while moving sideways. This avoids the necessity of providing a cutting device alongside the path of endwise movement

of the cigarette lengths and stubs, to subdivide the assemblages while they are still moving axially. Accordingly the path of endwise movement of cigarette lengths and stubs is considerably shortened, which saves a good deal of floor space, an important consideration in factory practice. Moreover it makes it possible to subdivide the assemblages by a simple disc knife, rotating in a single plane, instead of a relatively complicated and expensive cutting device as would be necessary for cutting axially moving assemblages. Such a device, it will be appreciated, would have to be such that the knife moves in the direction of axial movement of the assemblage while cutting through it, as in cut-off mechanism used in continuous rod cigarette-making machines. When cutting in this way, the actual time available for cutting is necessarily very short, and there is always the problem of accurate timing so as to try to cut exactly halfway through the stub, and errors in timing may be cumulative. Moreover it has been found very difficult to cut certain kinds of stubs satisfactorily by the very fast cutting action which is necessary with such cut-off devices.

When the assemblages are deflected and moved sideways towards and at right angles to the knife, however, they can be centralised so as to ensure that the cut occurs exactly midway along the length of the double-length stub, and there is no question of having to time the cut in order to perform it at the right place. Thus there can be no cumulative error. Moreover, the cutting action can be quite slow for each assemblage, and the whole arrangement enables a much better, clearer, squarer and more accurate cut to be made.

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 small scale diagrammatic plan view of a machine for making mouthpiece cigarettes;

Figure 2 is a view, looking in the direction of the arrow II, Figure 1, illustrating some of the mechanism;

Figure 3 is a view looking in the direction of the arrow III, Figure 2, showing further mechanism;

Figure 4 is a plan view of part of the apparatus shown in Figure 3;

Figure 5 is a view, on a larger scale, of some of the apparatus shown at the right-hand side of Figure 2;

Figure 6 is a plan view of some of the parts not fully shown in Figure 5; and

Figure 7 is a fragmentary sectional view along the line VII—VII, Figure 6.

Referring to Figure 1, this shows diagrammatically in plan the general layout of a machine in which a continuous cigarette rod is made and cut into separate cigarette portions, in the same way as that in which plain cigarettes are ordinarily produced on a continuous rod cigarette-making machine, and in which stubs are fed into spaces between cigarette portions and are united to cigarette portions to form assemblages, which are deflected laterally and subdivided into individual mouthpiece cigarettes.

The machine comprises a hopper, represented by the rectangle marked H, from which cut tobacco is showered in any suitable known way on to a moving conveyor surface in a trough to form a continuous tobacco filler. As is usual on cigarette-making machines, a cigarette-paper web is wrapped and secured about the tobacco filler to form a continuous cigarette rod. The path of the filler and rod is indicated in Figure 1 by the thick line marked R.

A cut-off device, indicated by the reference C. O. is provided to cut the rod into separate cigarette lengths, which are represented by the reference C in Figure 1 and the other figures of the drawings. Suitable means are provided to space these cigarette lengths apart endwise, similar to the means provided in a cigarette-making machine for spacing cigarettes apart.

A curved guide G is provided for guiding the cigarette lengths in a curved path through 90° as diagrammatically shown in Figure 1. A pusher device is also provided to push cigarette lengths through this curved path. The pusher device as diagrammatically illustrated in Figure 1 comprises a rotatable disc D which has radial fingers which engage the rear ends of successive cigarette lengths.

The purpose of this arrangement of changing the direction of axial movement of the cigarette lengths is to avoid making the machine inconveniently long. The length of the machine (considered in the line of the cigarette rod) need not be greater, and can even be less, than that of an ordinary cigarette making machine. This is an important consideration in connection with factory use of the machine.

The apparatus from the disc D onwards is illustrated in Figures 2 to 7, and it is sufficient to say, in connection with Figure 1, that stub-inserting means is provided just beyond the disc, and that means for causing abutment between stubs and cigarette lengths, means for wrapping uniting bands about these abutting portions to form assemblages, and heating means for heating the uniting bands, are all arranged in sequence along the line generally indicated by the lines A in Figure 1, which represent assemblages each consisting of two cigarette lengths and an intermediate stub. Figure 1 also illustrates diadrammatically a pusher P which deflects the assemblages laterally at right angles to the direction in which they travel axially, and a catcher band C. B. on which individual mouthpiece cigarettes are conveyed in two rows.

Cigarette lengths C coming from the cut-off C. O. of the cigarette-making machine (Figure 1) are carried lengthwise in succession by a conveyor band **1** (Figure 6) travelling in the direction shown by the arrow thereon. The band **1** travels faster than the cigarette rod, so that the cut lengths are spaced apart. From the band **1** they are transferred on to the surface of a stationary, arcuate bridge **2** (see also Figure 5) which has an arcuate side wall, constituting the arcuate guide G, to guide them in a curved path along the bridge. From the bridge **2** they are transferred to a further conveyor band **4** which travels, in the direction indicated by the arrow thereon, over a roller **5**, under a guide roller **6**, and over a guide roller **7**. Side guides **8** and **8***a* are provided to confine the cigarette lengths to the central portion of the band **4**.

After the cigarette lengths have been transferred on to the band **4**, double-length stubs are inserted into every alternate space between two cigarette lengths, or in other words into the space behind every second cigarette length. The two cigarette lengths between which a stub is to be inserted must therefore be spaced far enough apart from each other endwise to allow the stub to be inserted cleanly. The space required may vary according to the length of stub used, but as an example the required space may be 33 mm. Thus the cigarette lengths could if desired all be spaced apart by this distance by the band **1** as they issue from the cut-off. In that case, however, the intermediate spaces (i. e. those which are not to receive stubs) would be unnecessarily large, and it will be apparent that the further apart the cigarette lengths are spaced, the faster must they be moved if the output of the machine is to be maintained at a desired level.

Accordingly all the cigarette lengths are, after leaving the cut-off, originally spaced apart by the band **1** by a smaller distance (e. g. 23 mm.) than that required for inserting a stub, and then every second cigarette length is accelerated so as to enlarge the space behind it, while at the same time, of course, reducing the space in front of it. This is done by mechanism which will now be described.

The rotatable disc D, Figures 1, 5 and 6, carries two groups of fingers **10** and **11** (see Figure 6) formed as levers which are pivotally mounted on the disc and have cam-following rollers **12** and **13** respectively. The cam rollers **12** on the fingers **10** run on the edge of a fixed cam **14**, while the rollers **13** on the fingers **11** run on a

fixed cam 15. As can be seen in Figure 6, all the fingers extend over the surface of the bridge 2, and the disc D rotates in the direction indicated by the arrow, so as to cause the fingers to sweep cigarette lengths along the bridge 2 in a curved path. The cams 14 and 15 each have a recess at 16 which causes all the fingers to swing rearwardly as they are about to enter the path of cigarette lengths on the band 1. This is to enable the fingers to move in between two cigarette lengths without fouling either of them. The fingers then swing forwardly into engagement with the rear ends of cigarette lengths which have just moved off the band 1 on to the bridge 2.

The fingers 10 are then caused by the cam 14 to swing further forwardly so as to push cigarette lengths forward at increased speed. This is illustrated in Figure 6, where a finger 10*a* is shown having swung forwardly while pushing a cigarette length C over the bridge 2 and on to the conveyor 4. The fingers 11, on the other hand, merely move around with the disc as they pass over the bridge, because their cam-rollers 13 are in engagement with a part of the cam 15 which is concentric with the disc 9. Consequently the fingers 11 merely push cigarette lengths over the bridge 2 at constant speed, while the cigarette lengths engaged by the fingers 10 are advanced so as to enlarge the spaces behind them.

The distance by which the alternate cigarette lengths are advanced by the fingers 10 is 10 mm. so that the original space of 23 mm. behind each such length is increased to 33 mm. and the space immediately in front of it is reduced to 13 mm. The fingers 10 and 11 are slotted, as shown in Figure 7, to enable them to pass the side guide 8, Figure 6.

The cigarette lengths pass from the bridge 2 on to the conveyor 4, which carries them beneath a rotatable stub-wheel 17 (see Figures 2 and 5) provided at its periphery with three pusher-pins 18. Above the stub wheel is a fluted drum 19 which forms part of a stub-feeding device. The flutes of the drum 19 each contain a double-length stub, and the drum rotates intermittently so as to bring successive flutes, each containing a stub, into line with each pusher-pin 18 in turn, so that each of the pusher-pins in turn removes a stub and feeds it down towards the conveyor 4, as illustrated in Figure 5, where a stub marked S is shown being fed downwardly by a pusher 18. An arcuate shield 20 is provided to guide the stubs and hold them on the rim of the wheel 17.

The stub-wheel 17 is so timed in relation to the conveyors 1 and 4 and the fingers 10 and 11 that a stub is inserted into the enlarged space behind every second cigarette length. Preferably the stub is pushed by the pusher 18 against the rear end of the cigarette length, as illustrated in Figure 5.

The double-length stubs may for example be 26 mm. long. In any case they must be shorter than the spaces into which they are inserted, and accordingly there will be gaps between a stub and the two cigarette lengths between which it lies immediately after insertion. To close these gaps and bring the stub and two cigarette lengths into endwise abutment, the stub-wheel 17 is provided with three fingers 21 pivoted at 22 and provided with tails 23 each carrying a cam-roller 24 which runs on a fixed cam 25. The cam is so shaped that each finger 21 in turn, as it enters the path of the cigarette lengths on the conveyor 4, is swung forwardly. The finger enters the space behind the cigarette length that immediately follows a stub, and as it swings forwardly it engages that cigarette length and pushes it forward against that stub. Figure 5 shows a finger 21 about to engage a cigarette length C so as to push it forwardly against a stub S, which has already been pushed (by the pusher 18) against the preceding cigarette length C1. It will be seen that the space between the length C and the following length C2 is relatively small. If on the other hand the stub S has not already been pushed into abutment with the cigarette length C1, it will be moved forward by the cigarette length C, so that the three pieces are brought into endwise abutment. While the finger 21 is still pushing against the cigarette lengh C, the foremost cigarette length C1 of this group is gripped between the conveyor band 4 and an upper band 26, which prevent it from being displaced forwardly relatively to the conveyor 4.

The band 26 co-operates with a device for applying uniting bands to the double-length stubs and the cigarette lengths which abut them. This device comprises a suction drum 28 arranged to rotate as shown by the arrow and to carry gummed uniting bands B of cork tipping material at spaced intervals so as to apply them to the stubs and cigarette lengths passing over the drum. The uniting bands are cut from a web W by a knife 29, which is one of a pair of knives slidably mounted on a rotating knife carrier 29*a* and operated by a hammer 29*b* which strikes against the rear end of each knife in turn. The web W is held on the surface of the drum by suction, the drum having suction ports 30 on its peripheral surface, communicating with a suction chamber 31.

A guide or bridge 32 is provided to guide the cigarette lengths and stubs on to the drum 28. A further chamber 33 in the drum is supplied through a conduit 34 with air under pressure, which is therefore forced out through the ports 30 which at any moment are in register with the chamber 33. Thus a number of air jets are directed upwardly against the cigarette lengths and stubs passing from the drum towards the left as viewed in Figure 1, and these air jets support the cigarette lengths and stubs as they move towards a conveyor 35 which continues their forward movement. A guide 35*a* is provided to lead them on to the conveyor 35. The air jets also tend to urge a uniting band B upwardly so as to cause it partly to wrap itself about the cigarette lengths and stubs.

The conveyor 35, which is an endless tape arranged beyond and partly overhung by the band 27, passes through folding mechanism 36, Figure 2, similar in construction and operation to that generally used on cigarette-making machines of the continuous rod type. Its purpose in the present apparatus is to fold or wrap the uniting bands completely about the stubs and cigarette lengths. Thus each group consisting of two single-length cigarette lengths and an intermediate double-length stub is united by a band wrapped about the stub and the ends of the cigarette lengths that abut the stub, thus forming an "assemblage." From the foregoing description it will be seen that successive assemblages are spaced somewhat apart from one another endwise.

Beyond the folding mechanism is an electrical heater 37, Figure 2, beneath which the united assemblages pass, with the seams of the uniting bands engaging the heater.

The band 4 and tape 35 are represented in section in Figures 2 and 5 and are both supported in the usual manner in grooves or troughs which form them to U shaped cross-section. Beyond the heater 37, however, the tape 35 flattens out as shown in Figure 2 so that the part of the tape to the left of the heater, as viewed in Figure 2, is flat.

Beyond the heater 37 is a deflecting device or pusher P, Figure 1, for causing successive assemblages to be moved sideways in a direction transverse to their axes. The deflecting device may be of any suitable kind as used in continuous rod cigarette-making machines for deflecting cigarettes out of the rod line on to a catcher band. In Figures 3 and 4 of the accompanying drawings the deflecting device is of a known kind and the pusher P consists of a plate which is mounted on a pair of rotating crank discs 38 and arranged to engage each assemblage as the latter is brought into position opposite the pusher, and to push it sideways, i. e. to the right as viewed in Figure 3.

To the right of the tape 35, as viewed in Figure 3, is a further endless band 39, arranged to move in the direction shown by the arrow. The band 39 passes

above a stationary plate 40 and is spaced apart from the upper surface of the plate by a distance such that the band 39 and plate 40 can accommodate and grip between them assemblages which are deflected laterally by the pusher 38. The band 39 causes the assemblages to roll along the plate 40. The plate 40, or the central part of it, is heated by a heater 40a in order to apply heat to the gummed uniting bands on the assemblages and thus continue the drying process which is commenced by the heater 37. It will be appreciated that the rolling movement of the assemblages over the heated plate brings the whole outer surface of each of the encircling uniting bands into firm engagement with the hot surface of the plate 40 and thus enables the adhesive to be evenly and effectively dried.

To ensure that the assemblages roll over the plate 40 without slipping, part at least of the upper surface of the plate 40 may consist of a suitable material which provides sufficient friction for this purpose. Preferably either the plate 40 or the band 39 is arranged to be movable bodily one away from the other when the machine is stopped, so that any assemblages which may be between the band and the plate can be removed. For example the band 39 may pass over rollers 139 and 140 connected by an arm 141 pivoted about the axis of the roller 140 and movable by a handle 142.

To the right of the plate 40, Figure 3, is a fluted drum 41 arranged to rotate in the direction shown by the arrow. This drum is slotted to receive a circular rotating disc knife 42. Side guides 43 are provided at the ends of the fluted drum. Assemblages pass from the plate 40 into individual flutes of the drum 41, which carry them between the side guides 43, the latter acting to align the assemblages before they are engaged by the knife 42. The knife 42 is so located as to cut through the double-length studs midway along their lengths, thus subdividing each assemblage into two individual mouthpiece cigarettes.

The cigarettes so produced leave the flutes of the drum 41 to roll down a ramp 44 on to the catcher band C. B. which moves in the direction indicated by the arrow in the roller 45 over which the catcher band passes. The cigarettes may then be collected in any suitable and convenient way from the catcher band.

What I claim as my invention and desire to secure by Letters Patent is:

1. A method of making mouthpiece cigarettes, comprising the steps of forming a continuous wrapped cigarette rod and moving it endwise, severing the rod into separate cigarette lengths and spacing the latter apart endwise, inserting a double-length stub endwise into the space behind every second cigarette length and causing endwise abutment between each said stub and the two cigarette lengths between which it lies while the said lengths are moving lengthwise, wrapping a gummed uniting band about each said stub and the cigarette lengths which abut it, so as to form assemblages, feeding successive assemblages laterally, and subdividing them, while they are moving laterally, to form individual mouthpiece cigarettes.

2. A method as claimed in claim 1, wherein the cigarette lengths are spaced apart endwise in such a way that every second cigarette length has behind it a space large enough to receive a double-length stub, and is larger than the space immediately in front of the said length.

3. A method as claimed in claim 2, wherein the cigarette lengths are first fed in succession with substantially equal spaces between their ends, the enlarged spaces intended to receive double-length stubs then being formed by causing relative endwise movement between every second cigarette length and the two cigarette lengths between which it lies.

4. A method as claimed in claim 2, wherein after insertion of a stub, one of the two cigarette lengths between which it lies is moved relatively to the other of the said two cigarette lengths to cause abutment between the stub and the said two cigarette lengths.

5. A method as claimed in claim 1 wherein the said assemblages are formed while the cigarette lengths and stubs are moving axially.

6. A method as claimed in claim 1 wherein heat is applied to the assemblages while they are moving axially and while they are moving laterally.

7. Apparatus for making mouthpiece cigarettes, comprising means to form a continuous wrapped cigarette rod and move it endwise, means to sever the rod into cigarette lengths, means to space said lengths apart endwise, means to feed said lengths endwise, means to insert a double-length stub endwise into the space behind every second cigarette length while said lengths are moving endwise, means to cause endwise abutment between each said stub and the two cigarette lengths between which it lies, means to wrap a gummed uniting band about each said stub and the cigarette lengths, which abut it, so as to form an assemblage, means to feed successive assemblages laterally, and cutting means to subdivide each said assemblage while it is moving laterally, so as to provide individual mouthpiece cigarettes.

8. Apparatus as claimed in claim 7, including means to advance every second cigarette length so as to enlarge the space behind it sufficiently to enable a double-length stub to be inserted into the enlarged space.

9. Apparatus as claimed in claim 7, wherein the means to cause endwise abutment between each double-length stub and the two cigarettes between which it lies comprises means to advance each cigarette length which immediately follows a stub.

10. Apparatus as claimed in claim 7 and arranged so that the cigarette lengths when cut from the rod change their direction of movement while still moving endwise.

11. Apparatus as claimed in claim 10, wherein means is provided to cause the cigarette lengths to turn from a path in line with the rod into a path transverse to the rod line.

12. Apparatus as claimed in claim 11, wherein the said means comprises a rotatable member having fingers each adapted to engage a cigarette length and push it endwise over a stationary surface in a curved path.

13. Apparatus as claimed in claim 12, wherein one finger is arranged to move in the said curved path faster than the finger immediately following it, so as to cause a cigarette length to move faster than the next succeeding cigarette length.

14. Apparatus as claimed in claim 7, wherein the means to insert stubs comprises a rotatable element provided with a stub-pusher to push a stub endwise into a space behind a cigarette length.

15. Apparatus as claimed in claim 14, wherein the said element is provided with a further pusher, angularly spaced behind said stub pusher, and movable relatively to the latter, and arranged to engage a cigarette length immediately following a stub and to move faster than the stub pusher in such manner as to cause the cigarette length to abut against the stub and to cause endwise abutment between the said stub and the two cigarette lengths between which it lies.

16. Apparatus as claimed in claim 15, wherein the said further pusher consists of a pivoted finger, and cam means provided to swing it about its pivot at desired times.

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