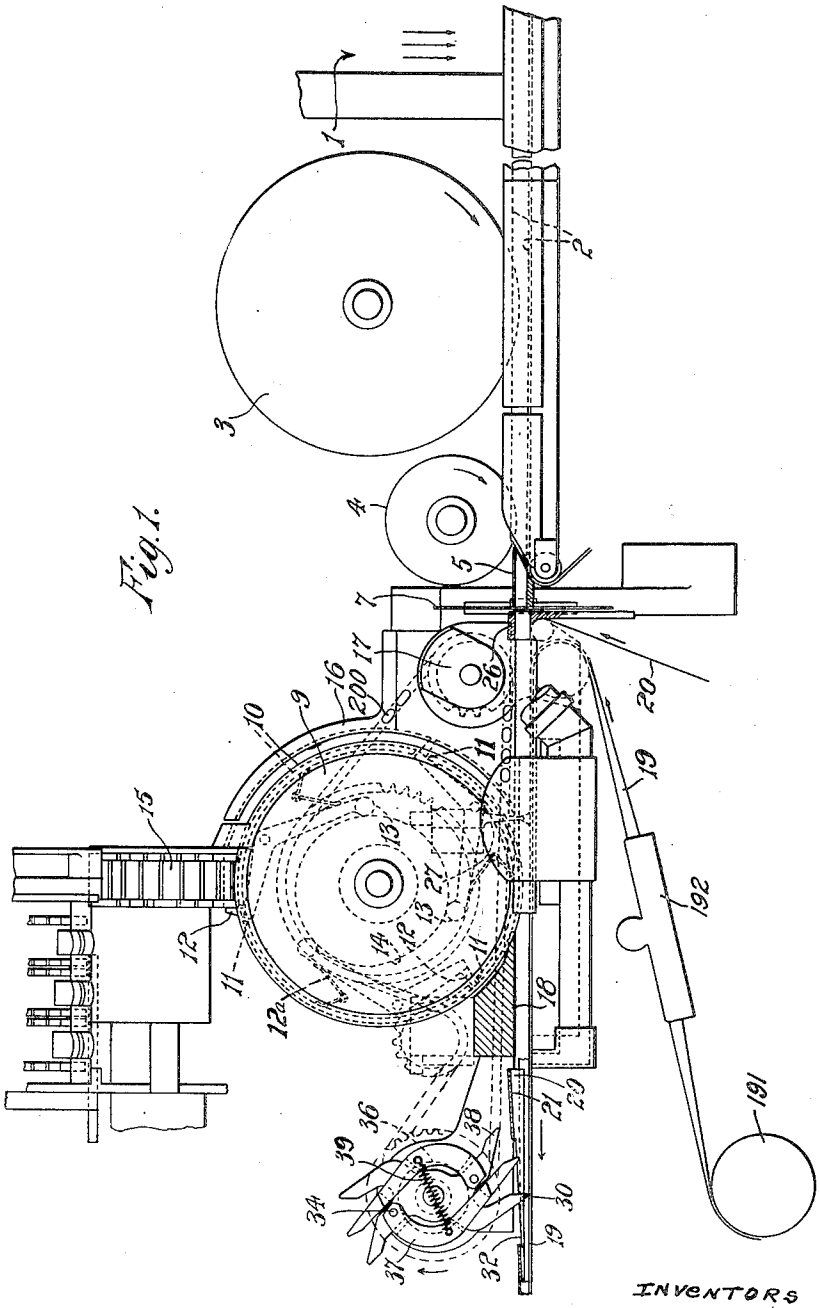
Dec. 23, 1952 D. W. MOLINS ET AL 2,622,602

APPARATUS FOR MAKING MOUTHPIECE CIGARETTES

Filed June 25, 1951 2 SHEETS—SHEET 1

Fig. 1.



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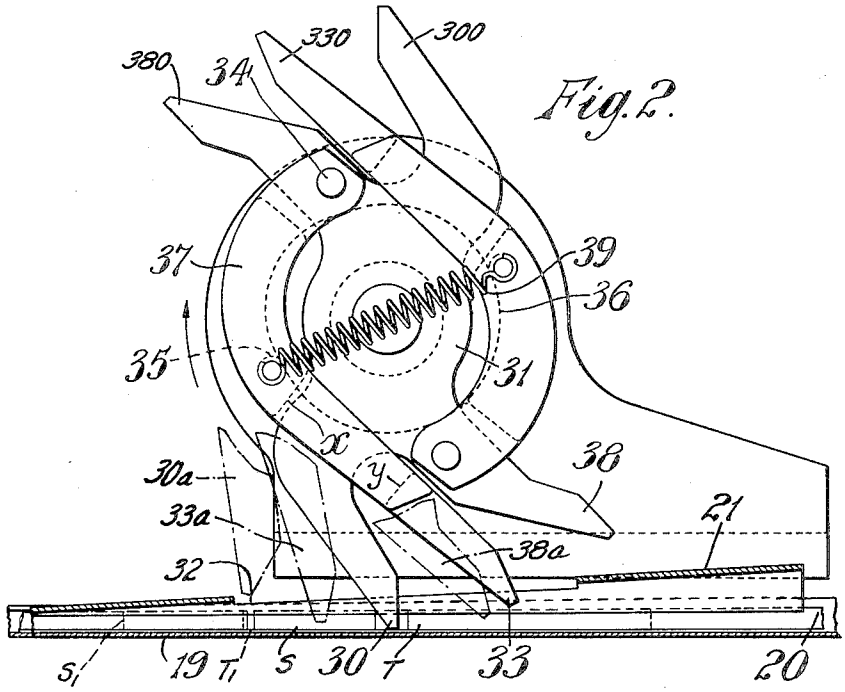


Fig. 2.

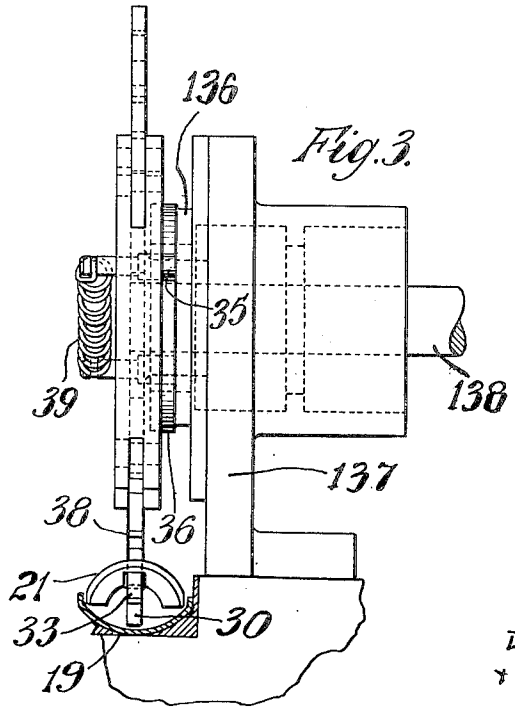


Fig. 3.

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APPARATUS FOR MAKING MOUTHPIECE CIGARETTES

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3 Claims. (Cl. 131—61)

1

This invention concerns improvements in or relating to apparatus for making mouthpiece cigarettes.

One way of making mouthpiece cigarettes consists in feeding spaced lengths of unwrapped tobacco, with mouthpiece portions between successive lengths of unwrapped tobacco so as to form a continuous composite filler, which is enclosed in a paper wrapper to form a continuous composite rod, the rod being then severed at suitable intervals to produce mouthpiece cigarettes. The present invention is concerned with the manufacture of mouthpiece cigarettes by this general method, and cigarettes so manufactured will for convenience be referred to herein as "cigarettes of the kind described." For convenience, all mouthpiece portions (which are often made of paper and are sometimes known as "filter plugs" or "filter tips") suitable for incorporation in mouthpiece cigarettes will be referred to hereinafter as "stubs."

When making mouthpiece cigarettes by the system referred to above, one problem is to obtain a good join between stubs and lengths of tobacco. If the tobacco and stubs do not abut closely in the composite filler and the composite rod, the cigarettes produced will be unsatisfactory in that they are soft at the region adjacent the stub.

A further problem is the correct longitudinal positioning of the stubs in the composite filler, so as to ensure that the stubs in the finished cigarettes are all of a reasonably consistent length, since in normal practice the composite filler has stubs and tobacco sections of double length, and the composite rod is cut through the middle of each stub and through the middle of each tobacco section.

According to the present invention there is provided in apparatus for manufacturing mouthpiece cigarettes of the kind described, means to feed lengths of unwrapped tobacco and stubs endwise in desired sequence to form a continuous composite filler, an adjusting element adapted to enter the path of the said filler behind a stub and to move forwardly faster than the said filler so as to accelerate a stub which is insufficiently advanced, and a tobacco-advancing element adapted to enter said path so as to engage tobacco in the leading end part of a length of tobacco and to move forwardly so as to accelerate tobacco in the said leading end part, the tobacco-advancing element being arranged to move forward faster than the adjusting element so as to tend to advance the accelerated tobacco relatively to

2

the stub and thereby cause the tobacco and stub to abut.

By this arrangement the stubs can be accurately positioned in the composite filler, since the adjusting element can be arranged to enter the path of the filler so closely behind a stub that if there is a sufficient gap behind the stub or if the tobacco immediately behind the stub is so loose or sparse that the element can pass through it, the adjusting element can engage the stub itself, or in a case where the tobacco between the stub and the element is too dense to penetrate, the adjusting element acts on the stub through a quantity of tobacco so small as to be substantially unyielding. In addition the tobacco-advancing element, by moving faster than the adjusting element, causes tobacco in the leading end part of the tobacco length to move faster than the stub in all cases, and thus to close up any gap which may exist, and at the same time, ensures that the tobacco closely abuts the rear end of the stub and is adequately dense in the region of the stub.

A further element may be arranged to engage tobacco behind the tobacco engaged by the tobacco-advancing element and to move forward faster than the composite filler but slower than the tobacco-advancing element (e. g. it may move at the same speed as that of the adjusting element) in order to advance tobacco so as partially to compensate for the longitudinal displacement of tobacco by the said tobacco-advancing element. In this way any pronounced sparseness caused by advancing tobacco towards the stub can be reduced and the consistency of the tobacco along the length of the tobacco section partially restored.

Apparatus according to 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 in section, of apparatus for forming and cutting a tobacco filler and incorporating stubs therein to make a composite rod.

Figure 2 is a much enlarged view of part of Figure 1.

Figure 3 is an end elevation of Figure 2.

Referring first to Figure 1 of the drawing tobacco is showered from a hopper indicated diagrammatically at 1 on to a moving conveyor 2, consisting of an endless band, which conveys the showered tobacco lengthwise as a loose stream or filler of unwrapped tobacco. One or more compression rollers, such as 3 and 4, are provided which compress the stream laterally so as to

impart to it a suitable cross-sectional size and shape, and also sufficient rigidity to enable it to pass from the end of the conveyor into and through a short guide tube 5 which is located just beyond the compression rollers.

A cutting device 7 is located adjacent the end of the guide tube and is adapted at intervals to cut across the tobacco filler as it issues from the guide tube. The cutting device comprises a relatively narrow knife blade which is caused to cut across the filler at high speed, so that the guide tube is blocked only for a very short time, and thus there is very little holding up of the tobacco filler in the guide tube.

Beyond the knife is a short outlet guide tube 26.

A paper web 20 is supported on a conveyor belt 19 and moves in the direction of the arrow at a higher speed than that of the uncut filler and of the conveyor 2.

The conveyor belt 19 is led over a roller 191 and through a guide 192 in which it is bowed as shown to facilitate lateral adjustment.

Arranged above the paper web 20 is a wheel, also referred to as a "stub wheel," which is arranged to cause stubs to be placed at intervals on the paper web between successive portions of the tobacco filler. This stub-wheel, whose axis of rotation lies across the direction of movement of the filler, consists of a large disc 9 having a concave rim 10, like some compression wheels. The periphery is perforated at, for example, three equally spaced positions 11, and retractable stub pushing devices 12 are provided which consist of levers pivotally mounted within the body of the disc and whose ends move in and out of the holes as the disc rotates, when cam followers 13 attached to the levers rotate about a fixed cam 14, against which they are urged by springs 12*a*.

A suitable stub feeding device comprising a fluted drum 15 is provided to feed stubs to the wheel at the top thereof, and these are carried round in turn by the pushers 12. The fluted drum and the mechanism for feeding stubs into its flute are constructed and operated in any suitable and convenient known manner.

At the side of the wheel where the stubs pass, a shield 16 is arranged to prevent stubs from leaving the concave rim, and at the bottom of the wheel each stub is delivered into a space between two filler portions. As a stub is delivered in this manner the pusher 12 is retracted by the cam 14.

A small drive roller 17 is provided above the paper web near the outlet guide tube 26. The roller 17 is in the nature of a sector whose arcuate part is so arranged that it is clear of the tobacco just prior to the cut, and immediately after the cut engages the tobacco to cause the latter to travel at the faster speed of the paper web. This drive roller is so shaped as to move out of engagement with the tobacco which has not been cut. In this way, the tobacco, before being cut, is allowed, as far as possible, to slip on the faster moving paper web 20. The stub wheel 9 also has the further function of engaging the tobacco filler at desired times so as to cause the tobacco to be pressed down against the paper web after the tobacco has been cut, so as to ensure that the cut portion travels at the speed of the paper web. This may be at the moment that the roller 17 engages the tobacco to accelerate it, or at a time when the cut-off length has passed beneath the roller 17.

Just beyond the stub wheel, and located above the second conveyor, is a scraper shoe 18 to remove any tobacco which tends to move up with the wheel after the delivery of a stub and which may act also as a compression shoe beneath which the stubs and separated portions of tobacco filler pass as a composite stream. This shoe is arranged with one end in contact, or nearly so, with the edge of the wheel so as to ensure that the stubs and the tobacco are properly stripped from the wheel.

The cutting of the unwrapped filler occurs when an appropriate length of filler is already on the paper web. Immediately after cutting, the rotatable sector 17 referred to above is caused to engage the cut length of tobacco to press it against and move with the paper web and thereby cause the cut length to move forward quickly with the speed of the paper web. In this way the cut portions are accelerated and spaced apart. Stubs are inserted in the gaps so formed, by the stub-wheel as above described.

The speed ratio of the first conveyor 2 to the paper web 20 is so chosen that the gaps formed between the tobacco portions on the paper web (which moves at the faster, and final, speed) are no greater than necessary for the accommodation of stubs.

In order to insert the stubs into these gaps, the stub-wheel 9 is arranged to rotate at a faster (e. g. 10%–20% faster) peripheral speed than the speed of the paper web conveyor 19. Thus a stub, while being delivered from the stub wheel into a gap between tobacco portions on the paper web, moves faster than the tobacco portions. As the stub moves forwardly and downwardly into the gap, its leading end engages the rear end face of the preceding tobacco portion, and due to its greater speed (since the stub is still being pushed by a pusher 12 on the stub-wheel) pushes the tobacco forward a little and thus compacts and compresses the tobacco in the region of the rear end of that tobacco portion. This widens the gap slightly and leaves enough room for the stub to fit in between the two tobacco portions.

Thus a continuous composite filler of tobacco portions and stubs in alternation is formed on the paper web 20.

With the apparatus so far described it is found that in the resulting composite filler, although there is good abutment between the leading ends of stubs and the rear ends of preceding tobacco portions, gaps tend to occur behind the rear ends of the stubs. In addition the stubs for various reasons sometimes tend to lag behind their correct positions in the filler. Back pressure may be exerted on a stub by the preceding tobacco section as the latter passes beneath and is compressed by the usual tongue, with the result that the stub is displaced rearwardly.

In order to correct or prevent any such displacement, an adjusting element is provided, see also Figures 2 and 3, consisting of a finger 30 mounted on the periphery of a rotatable wheel 31 which is arranged above the tongue 21, the tongue being suitably slotted at 32 to allow the finger to pass through and into the path of the composite filler. On rotation of the wheel the finger moves down into the path of the filler a short distance (e. g. 3 mm.) behind a stub, although this distance will of course depend on the longitudinal position of any individual stub at that moment. Further rotation of the wheel causes the finger 30 to move forwardly in the path of the composite filler, but faster than the filler, the difference in speed being such that by the time the finger withdraws from the path of

the filler it has, during its period of travel in the said path, moved about 6 mm. further than has the filler in the same period. Thus it will be seen that any stub which is less than 6 mm. in advance of the finger when the latter enters the path of the filler will be overtaken and advanced by the finger to its correct position. If there should be a gap between the rear end of the stub and the leading end of the following tobacco section, the finger **30** may be able to engage the rear end face of the stub itself, while if there is no gap or a relatively small one, the finger may engage and press forwardly a small quantity of tobacco against the rear end face of the stub and advance the stub in that way. In the latter case the stub would of course be advanced a slightly greater distance than if there were no tobacco between it and the finger **30**, but as the quantity of tobacco is extremely small and would moreover be somewhat compressed by the finger, the difference in positioning of the stub would be negligible.

In either case, however, the advancing of the stub leaves behind it a gap, or in some cases a sparsely filled portion of tobacco section. In order to fill this gap or sparsely filled portion and to cause close abutting of the stub and tobacco, and a desirable degree of density in the tobacco immediately behind the stub, a tobacco-advancing element is provided. This consists of a further finger **33** projecting from the wheel, and formed as one end of a curved arm **37** whose other end is pivoted at **34** on the wheel. The curved arm has a projection **35** on it which acts as a cam follower and rides on the edge of a fixed cam **36** which is arranged centrally of the wheel, the arm being urged by a spring **39** against the cam and being fixed on a boss **136** on a bracket **137** so as to encircle the shaft **138** of the wheel **31**. The cam is so shaped as to cause the arm **37**, once on each revolution of the wheel, to move about its pivot **34** so that the finger **33** at its free end moves in the general direction of rotation of the wheel and thus advances relatively to the wheel. This occurs when the finger enters the path of the composite filler. The tobacco-advancing finger **33** is about 20 mm. behind the adjusting finger, and therefore enters the tobacco well behind a stub. Due to the increased speed of the tobacco-advancing finger **33**, the latter causes tobacco to be advanced a greater distance than it is possible for the adjusting finger **30** to advance the stub, and this extra movement is sufficient to close up any gap between the stub and the tobacco, and to cause lengthwise compacting and densifying of the tobacco immediately behind the stub. Thus it will be seen that even if the preceding stub has been advanced by the adjusting finger **30**, the tobacco will be advanced by the finger **33** by a greater amount and will thus be brought into close abutment with the stub. The stub itself is already located and is travelling at the same speed as the paper web as the stub is at this position trapped by the tongue against the moving paper web. Thus it keeps its position.

When tobacco is advanced as just described, a portion of reduced density remains in that part of the tobacco section from which tobacco has been displaced forwardly. In order to compensate for this displacement and to avoid unduly sparse portions in the cigarettes, a further element **38** is provided and arranged to enter the tobacco behind the tobacco engaged in the manner just described, and to move forward so as to accelerate the tobacco and advance it. This element also consists of a further finger mounted on the wheel **31** behind the tobacco-advancing finger **33**, and being fixed on the wheel it moves at the same speed as that of the adjusting finger **30**. Thus it will be seen that this third finger **38** advances tobacco a smaller amount than does the tobacco-advancing finger **33** described above, and therefore effects less displacement of tobacco, with the result that the sparsely filled portion from which tobacco has been displaced by the tobacco-advancing finger **33** is partially refilled or redensified by the action of this third finger **38**.

In order to enable the operating ends of the fingers **30**, **33** and **38** to be arranged one behind the other, the pivoted arm **37** is slotted as indicated by the references *x*, *y*, in Figure 2, and the finger **30** extends through the slot, which is made long enough to allow the arm **37** to move about its pivot relatively to the finger **30**.

Preferably two sets of fingers as described above are provided on the wheel, as shown, the two sets being diametrically opposite so that the operations described are performed twice for each revolution of the wheel.

The fingers of the second set are indicated in Figure 2 by the reference numerals **300**, **330** and **380**.

The composite filler then passes through the usual garniture in which the cigarette paper web is folded and secured around it to form a continuous composite rod.

In Figure 2 a stub, indicated by the reference **5**, is shown diagrammatically in full lines in a position at which it is being engaged by the finger **30**. Behind the finger **30** is shown diagrammatically, also in full lines, a part of a tobacco portion, indicated by the reference T, and part of a further tobacco portion T is also shown in advance of the stub S.

Figure 2 also diagrammatically illustrates the positions assumed by the fingers **30**, **33** and **38**, and corresponding positions which may be assumed by the stub S and tobacco portions T, after the wheel **31** has rotated a small angular distance beyond the position shown in full lines in Figure 2. Fragments of the fingers **30**, **33** and **38** are shown in dot-and-dash lines and indicated by reference numerals **30***a*, **33***a*, and **38***a*. It will be seen that in the latter position the finger **33** has advanced relatively to the other fingers by reason of the arm **37** being moved about its pivot by the fixed cam **36**.

The positions of the stub S and tobacco portions T corresponding to the dot-and-dash line positions of the fingers is indicated by dotted lines in which the stub is indicated by the reference S1 and the tobacco portion behind the stub is shown abutting against the rear end of the stub S1, and is indicated by the reference T1.

The tongue **21** and the garniture above referred to, and indeed all subsequent parts of the machine, follow orthodox continuous rod cigarette making machine practice, so no further detailed description is necessary.

The stub wheel **20**, the drive-roller **17**, and the wheel **31** are driven in timed relationship by means of a chain **200** which passes over sprocket wheels as shown in Figure 1.

The continuous composite rod passes to the usual cut-off device which cuts the rod so as to produce mouthpiece cigarettes. The stubs and the tobacco portions of the composite rod are double the length of the corresponding portions in a finished mouthpiece cigarette, and therefore the cut-off is timed to cut the rod in the middle

of each stub portion and each tobacco portion to produce individual mouthpiece cigarettes.

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

1. In apparatus for manufacturing mouthpiece cigarettes of the kind described, means to feed lengths of unwrapped tobacco and stubs endwise in desired sequence to form a continuous composite filler, an adjusting element adapted to enter the path of the said filler behind a stub and to move forwardly faster than the said filler so as to accelerate a stub which is insufficiently advanced, and a tobacco-advancing element adapted to enter said path so as to engage tobacco in the leading end part of a length of tobacco and to move forwardly so as to accelerate tobacco in the said leading end part, the tobacco-advancing element being arranged to move forward faster than the adjusting element so as to tend to advance the accelerated tobacco relatively to the stub and thereby cause the tobacco and stub to abut.

2. Apparatus as claimed in claim 1 comprising a further element arranged to engage tobacco behind the tobacco engaged by the tobacco-advancing element and to move forward faster than

the composite filler but slower than the tobacco-advancing element in order to advance tobacco so as partially to compensate for the longitudinal displacement of tobacco by the said tobacco-advancing element.

3. Apparatus as claimed in claim 2 comprising a rotatable wheel and a fixed cam, wherein the adjusting element and further element comprise fingers mounted on the periphery of the said rotatable wheel and the tobacco-advancing element comprises a finger formed on an arm pivoted to said wheel and engaging the said fixed cam during rotation of the wheel whereby the said last-named finger is caused to advance relatively to the wheel during rotation of the latter.

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NORMAN WALTER JACKSON.

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