This invention is for improvements in or relating to the manufacture of cigarettes, and refers to a machine for making cigarettes, provided with filter plugs, mouthpieces or the like.

The mouthpieces shall for convenience be referred to herein as stubs, and the term “stub” shall include mouthpieces in the form of tubes of paper or other material which may be empty, or filled entirely or partly with filtering or flavouring material or tobacco. It will be appreciated that where the tubes are not filled they should have sufficient rigidity to enable them to remain open when the cigarettes are being smoked.

The term “stub” shall also be deemed to include a composite mouthpiece constituted in part by a length of wrapped cigarette rod, and in part by a length of filter or flavouring material wrapped in a tubular wrapper or by a tubular piece which is either hollow or partly filled with filter or flavouring material. The term “stub” shall also be deemed to include a mouthpiece comprising a length of tobacco filter in a wrapper, which tobacco is of a different kind of tobacco from that forming the main body of the cigarette.

Cigarettes provided with stubs will, for convenience, be referred to herein as “mouthpiece cigarettes.”

It has recently been proposed to manufacture mouthpiece cigarettes by uniting aligned adjacent stubs and cigarettes by securing wrapping material to or around said adjacent stubs and cigarettes whilst said stubs and cigarettes are moving axially, and in which lengths of stub material are fed by stub feeding means to a stub conveyor which feeds the stubs towards a line of axially moving cigarettes or between adjacent spaced cigarettes in said line.

According to the present invention there is provided in a machine for manufacturing mouthpiece cigarettes by uniting aligned adjacent stubs and cigarettes by securing wrapping material to or around said adjacent stubs and cigarettes whilst said stubs and cigarettes are moving axially, and in which lengths of stub material are fed by stub feeding means to a stub conveyor which feeds the stubs towards a line of axially moving cigarettes or between adjacent spaced cigarettes in said line, said stub feeding means and stub conveyor being operative to move in paths transverse to the other in the region where the stubs are transferred from the stub feeding means to the stub conveyor, control means intermediate the feeding means and conveyor and movable between the feeding means and conveyor to position the stubs relatively to the conveyor.

The control means may comprise a stub arresting surface or surfaces disposed above the path of the conveyor and movable into and out of the path of the stubs being delivered to the conveyor, and the means to engage the stubs and position them on the conveyor may comprise a stub engaging element or elements disposed above the conveyor at the plate or plates at which the stubs are delivered thereto, said element or elements being movable towards and away from the conveyor in timed relationship with the control means.

The invention will be more particularly described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a side elevation of stub feeding mechanism constructed in accordance with the invention.

Fig. 2 is a side elevation partly in section and drawn to an enlarged scale, showing a portion of the stub feeding mechanism illustrated in Figure 1.

Fig. 3 is a view of Fig. 2 looking in the direction of the arrow “A”.

Figures 4 is a side elevation of the mechanism illustrating gearing for driving the various rotating parts.

Figure 5 is a fragmentary sectional view on the line 5—5 of Figure 4, and

Figure 6 is a sectional view on the line 6—6 of Figure 2.

Like references refer to like parts throughout the various figures of the drawings.

Referring to the drawings, comparatively long lengths of stub material are contained in a hopper 1, from which the lengths of stub material are fed by stub feeding means. The stubs are supported in the hopper by a fixed plate 108 and an oscillating plate 101. The plate 101 is pivoted at 103, and is oscillated by a cam 103. A cam follower 104 is carried by one arm on a bell crank lever 105 which is pivoted at 106 to the frame of the machine. The cam follower is maintained against the cam 103 by a spring, not shown. To the other arm of the bell crank lever 105 there is connected a link 107 which link is also connected to the plate 101. The action of the plate 101 is to vibrate the stubs in the hopper 1 in order to facilitate the feeding of the stubs through the space 108 formed between the end of the plate 101 and the surface of the stationary support 100. It is found that if such a plate as 101 is not used there is sometimes a tendency for the
stubs to become jammed in the hopper, and not freely to pass through the opening 108. The stubs feeding means comprises a rotatable drum 3 provided with flutes 2 into which the lengths of stub material are deposited one at a time. The drum 3 is divided to enable knives 4 to sever the comparatively long stubs, as seen clearly in Fig. 3, into three stubs of double the length required in the finished cigarettes. The knives 4 are circular rotating knives carried by arms 5, adjustably mounted on a spindle 6. The knives are rotated in any suitable manner from the main drive of the machine, and the grinders 7 are provided to sharpen both sides of the knives 4.

Guides 8 and 9 are provided to retain the stubs in the flutes 2 of the conveyor, that is, the drum 3, and the inner surfaces of the guides are so arranged that they are disposed at varying distances from the periphery of the drum. It will be seen from Fig. 2 that the inner surface of the guide 9 is closer to the periphery of the drum 3 than is the inner surface of the guide 8. The guide 9 is positioned above the middle severed stub, as can be seen from Fig. 3, and as the drum 3 rotates, the outer stubs fall partly out of the flutes 2 and are engaged by the guide 8. The end faces of the outer stubs are engaged by the guide 8, the edges 50 of which are formed as cam faces, and as the drum 3 continues to move the stubs past the cam faces and the guide 9, the outer stubs are moved away from the central stub so that the three stubs are spaced apart from each other in the direction of their longitudinal axes. This permits the stubs to fall quite independently of one another and facilitates the transfer from the flutes 2 to further stub feeding means as described below.

The stubs which have been spaced apart are deposited in the flutes 10 of a rotatable wheel 11, and in order to ensure that each stub is placed in the flutes 10, fork members 12 project through slots in the drum 3 and engage with and ensure that three aligned stubs are removed from a flute 2 of the drum 3 and deposited in a flute 10 of the drum 11 which in turn delivers the stubs to further stub feeding means which comprises a rotatable drum 16 having flutes 15 in which the stubs are deposited.

It is found that when the stubs are being spaced apart in the manner just described, there is sometimes a portion of material projecting from an end of a stub, the projecting portion being entangled with the end of the adjacent stub. When such is the case, the stubs, when being spaced apart in the direction of their longitudinal axes, are sometimes caused to be moved out of alignment with respect to the path through which they are intended to be carried by the drum 3, and in such cases it is necessary to realign the stubs with the path through which the drum 3 is arranged to carry them, otherwise when they are placed upon a conveyor which moves the stubs into alignment with cigarette lengths, it is found that the stubs are not correctly deposited on the conveyor. In order to avoid this difficulty, the stubs in the flutes 15 are moved in the direction of their longitudinal axes and towards the central point of their combined overall length, the central point being considered when the stubs are correctly aligned with respect to the path through which the drum 3 is arranged to carry the stubs. The means to effect this operation comprises a pair of guides 13 and 14 which are bell-mouthed where the stubs first engage with the guides, and the guides 13 and 14 gradually converge towards each other until they are in alignment with the drum 3, and are spaced apart in the direction of the length of the stubs. The stubs are held together so that they abut end to end and are again conveyed in the same general path as that through which the drum 3 previously conveyed the stubs.

After the stubs being conveyed by the drum 16 have been closed together, they are again spaced apart in the direction of their longitudinal axes whilst being controlled by guides 17, 18 and 19. The guides 17 and 19 being disposed at a distance from the periphery of the drum 16 which is greater than the distance between the periphery of the drum and the guide 18. The guide 18 is provided with edges 55 formed as cam faces as above described with respect to the guide 9, and the inner end faces of the outer stubs which stubs are controlled by the guides 17 and 19 respectively are engaged by the cam faces of the guide 18, the outer stubs being thereby moved in the direction of their longitudinal axes so that the stubs are spaced apart. This second separation serves to facilitate the transfer of the stubs from the stub feeding means as in the previous case, and also more accurately locates the stubs and spaces them apart axially.

It will be appreciated that if desired the separation of the stubs may be effected in a plurality of stages by suitably modifying the shape of the cam faces 59 and 50.

The stubs are delivered from the stub feeding means 16 to a stub conveyor which in the region where the stubs are transferred from the stub feeding means to the stub conveyor, is movable in a path transverse to that of the stub feeding means. As the stubs leave the flutes 15 they roll over inclined surfaces 21 and 22, the surface 22 which engages with the central stub, being arranged slightly in advance of the surfaces 21 over which the outer stubs pass, the arrangement being clearly shown in Fig. 2 and such as to obtain the free delivery of the stubs from the feeding means 16 to a conveyor 23.

The conveyor 23 is shown in the drawings as a rotatable disc provided with pusher pieces 24, 25 each of which engages with a stub to move the stub above a trough 25 in which the stub is deposited and inserted into the space between successive cigarette lengths which are to be assembled with the stub in order to form mouthpiece cigarettes.

The conveyor 23 and drum 16 may be driven in any convenient manner. For example, the sprocket a shown in Figures 1 and 4 is driven by gearing from the main shaft of the machine 55 which drives the spindle on which sprocket a is mounted. Sprocket a is connected by a chain with a sprocket b to which a gear c is fixed, the gear c intermeshing with a gear d mounted on the spindle e. To the near end of the spindle e is secured a gear f, Figure 4; the gear f intermeshes with a gear g to which is secured a smaller gear h which in turn intermeshes with a large gear j carried on the spindle k on which the drum 3 is mounted.

A smaller gear m is mounted on a shaft n and intermeshes with the large gear j, and another gear p is also mounted on the spindle n, this gear p is intermeshes with a gear q mounted on the spindle r of the fluted drum 16. A gear s is mounted on the spindle t of the fluted drum 11 and intermeshes with the gear q.

The conveyor 23 is also driven from the shaft carrying the sprocket a, and is driven by intermeshing gears u and v, the gear v being...
mounted on the same shaft as the sprocket $a$. The gear above described is so arranged that the three drums $3$, $11$, and $16$ each move a distance of one flute.

An annular space $26$ is provided between the conveyor $23$ and an outer wall $27$, the stubs being moved through this space by the pusher pieces $24$. The outer wall $27$ is carried on a stationary supporting plate $28$. The supporting plate $28$ forms a bottom to the space $26$ between the conveyor $23$ and the wall $27$, except at a place directly above the trough $25$, a space being provided in the plate $28$ at this point to enable the stubs to be deposited in the trough $25$. The speed of the conveyor $23$ is such that whilst one flute $15$ is passing over the space $26$, three pusher pieces $24$ will move past the place at which the three stubs are transferred from a flute $15$ to the conveyor $23$.

Intermediate the feeding means $16$ and the conveyor $23$ there is provided control means which is operative to position the stubs relatively to the conveyor $23$. In the example of the invention shown in the drawings the control means comprises three stub arresting surfaces $29$, one for each of the stubs derived from a flute $15$ of the feeding means $16$, and three stub engaging elements $32$ each of which co-operate with an arresting surface as described below.

The stubs as they fall towards the conveyor $23$ from a flute $15$ are arrested by the arresting surfaces $29$, and in order to allow each of the stubs to be fed in turn on to the supporting plate $28$, each of the arresting surfaces is withdrawn in turn. The arresting surfaces $29$ are moved into and out of the path of the stubs by means of levers $29$ which are operated by cams $30$, a spring $31$ being provided to maintain the parts in their working position.

Above the stubs supported by the stub arresting surfaces $29$, there are provided three stub engaging elements $32$, each of which is arranged to engage with one of the stubs delivered by one of the flutes $15$. The engaging elements $32$ are pivoted at $33$, and are operated in timed relationship with the stub arresting surfaces $29$. The engaging elements $32$ are provided with tail-pieces $36$, which protrude through slots in the arresting surfaces $29$, and the tail-pieces are engaged by stops $35$ secured to the arresting surfaces. As the levers $51$ of the cams $30$ cause the arresting surfaces $29$ to be withdrawn out of the path of the stubs so as to allow them to be deposited upon the supporting plate $28$, each of the stops $35$ engages with the corresponding tail-piece $36$, and causes the respective stub engaging element $32$ to be pivoted about the point $33$ so that it moves downwardly and engages with the stub upon the supporting plate $28$, and ensures that the stub is positioned on the supporting plate before the stub is engaged by the pusher piece $24$. The stub engaging element $32$ ensures that the stub is in position on the supporting plate $28$, and that it does not rebound after falling on to the plate, thereby tending to assume an undisturbed position.

When three stubs are positioned above the space $28$, they are allowed to fall at predetermined intervals so that they are engaged in succession by one of the pusher pieces $24$, and in the example shown in the drawings, the central stub is the first to be deposited upon the plate $28$, whereafter the two outer ones are deposited one after the other.

The mechanism shown in the drawings for feeding the stubs to the elements $32$ is described and claimed per se in U. S. patent Serial No. 97,707 of even date, which issued on March 14, 1939, as Patent No. 2,150,596.

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

1. In a stub feeding mechanism, the combination with a conveyor to receive stubs, at predetermined intervals, of means to feed batches of stubs, each batch containing a predetermined number of stubs substantially in axial alignment toward said conveyor, a member for each stub of a batch, said member being movable into and out of the path of the stubs being fed to the conveyor to arrest the stubs, and an element for each stub of a batch, said element being movable between said means and conveyor and in timed relationship with said members to permit one stub at a time to be delivered to the conveyor and to position the stubs relatively to the conveyor.

2. In a stub feeding mechanism, the combination with a conveyor to receive stubs, at predetermined intervals, of means to feed batches of stubs transversely to their longitudinal axes, each batch containing a predetermined number of stubs substantially in axial alignment toward said conveyor, means operative in a plurality of stages to space the stubs apart from each other in the direction of the longitudinal axes of the stubs, means operative between successive stages to move the stubs in the direction of their longitudinal axes and toward the central point of their combined over-all length, a member for each stub of a batch, said member being movable into and out of the path of the stubs being fed to the conveyor to arrest the stubs, and an element for each stub of a batch, said element being movable between said means and conveyor and in timed relationship with said members to permit one stub at a time to be delivered to the conveyor and to position the stubs relatively to the conveyor.

3. In a stub feeding mechanism, the combination with a conveyor to receive stubs, at predetermined intervals, of means to feed a plurality of stubs transversely to their longitudinal axes and substantially in axial alignment toward said conveyor, means operative in a plurality of stages to space the stubs apart from each other in the direction of the longitudinal axes of the stubs, means operative between successive stages to move the stubs in the direction of their longitudinal axes and toward the central point of their combined over-all length, and control means operable between said means and conveyor to permit one stub at a time to be delivered to the conveyor and to position the stubs relatively to the conveyor.

4. In a stub feeding mechanism, a support on which stubs are deposited, at predetermined intervals, a conveyor to engage a stub on the support and move the stub relatively to the support, means to feed batches of stubs, each batch containing a predetermined number of stubs substantially in axial alignment toward said support, means operative in a plurality of stages to space the stubs apart from each other in the direction of the longitudinal axes of the stubs, means operative between successive stages to move the stubs in the direction of their longitudinal axes and toward the central point of their combined over-all length, and an element.
for each stub of a batch, said elements being movable between said means and support and movable in timed relationship one with the other to permit one stub at a time to be delivered to the support and to position the stub on the support and in the path of the conveyor.

5. In a stub feeding mechanism, the combination with a conveyor to receive stubs, at predetermined intervals, of a rotatable drum having peripheral flutes substantially parallel with the axis of rotation of the drum to feed a plurality of stubs transversely to their longitudinal axes and substantially in axial alignment toward said conveyor, a guide for each of the stubs contained in a flute of said drum and conforming substantially to the path through which the drum moves the stubs, said guides being disposed at varying distances from the periphery of the drum whereby the end faces of the stubs controlled by the guides disposed at the greatest distance from the periphery of the drum are engaged by the edges of the remaining guide, the edges of said remaining guide being so shaped as to space the stubs so engaged, apart in the direction of their longitudinal axes, and control means operable between said drum and conveyor and movable between said drum and conveyor to permit one stub at a time to be delivered to the conveyor and to position the stubs relatively to the conveyor.

6. In a stub feeding mechanism, a support on which stubs are deposited, at predetermined intervals, a conveyor to engage a stub on the support and to move the stub relatively to the support, means to feed batches of stubs, each batch comprising a predetermined number of stubs substantially in axial alignment toward said support, and control means operable between said means and support and movable between said means and support to permit one stub at a time to be delivered to the support and by positive engagement with a stub on the support to position the stub thereon and in the path of the conveyor.

7. In a stub feeding mechanism, a support on which stubs are deposited, at predetermined intervals, a conveyor to engage a stub on the support and move the stub relatively to the support, means to feed a plurality of stubs transversely to their longitudinal axes and substantially in axial alignment toward said support, and control means operable between said means and support and movable between said means and support to permit one stub at a time to be delivered to the support and by positive engagement with a stub on the support to position the stub thereon and in the path of the conveyor.

8. In a stub feeding mechanism, a support on which stubs are deposited, at predetermined intervals, a conveyor to engage a stub while the latter is wholly supported by the support and move the stub relatively to the support, means to feed batches of stubs, each batch containing a predetermined number of stubs substantially in axial alignment toward said support, and an element for each stub of a batch, said elements being movable between said means and support and movable in timed relationship one with the other to permit one stub at a time to be delivered to the support and by positive engagement with a stub on the support to position the stub thereon and in the path of the conveyor.

9. In a stub feeding mechanism, a support on which stubs are deposited, at predetermined intervals, a conveyor to engage a stub on the support and move the stub relatively to the support, means to feed a plurality of stubs transversely to their longitudinal axes and substantially in axial alignment toward said support, and control means operable between said means and support and movable between said means and support to permit one stub at a time to be delivered to the support and by positive engagement with a stub on the support to position the stub thereon and in the path of the conveyor.

10. In a stub feeding mechanism, a support on which stubs are deposited, at predetermined intervals, a conveyor to engage a stub on the support and move the stub relatively to the support, means to feed batches of stubs transversely to their longitudinal axes, each batch containing a predetermined number of stubs substantially in axial alignment toward said support, and an element for each stub of a batch, said elements being movable between said means and support and movable in timed relationship one with the other to permit one stub at a time to be delivered to the support and by positive engagement with a stub on the support to position the stub thereon and in the path of the conveyor.

11. In a stub feeding mechanism, a support on which stubs are deposited, at predetermined intervals, a conveyor to engage a stub on the support and move the stub relatively to the support, a rotatable drum having peripheral flutes substantially parallel with the axis of rotation of the drum to feed a plurality of stubs transversely to their longitudinal axes and substantially in axial alignment toward said support, and control means operable between said drum and support and movable between said drum and support to permit one stub at a time to be delivered to the support and by positive engagement with a stub on the support to position the stub thereon and in the path of the conveyor.

12. In a stub feeding mechanism, a support on which stubs are deposited, at predetermined intervals, a conveyor to engage a stub while the latter is wholly supported by the support and move the stub relatively to the support, means to feed a plurality of stubs substantially in axial alignment toward said support, means to space the stubs apart from each other in the direction of the longitudinal axes of the stubs, and control means operable between said means and support and movable between said means and support to permit one stub at a time to be delivered to the support and by positive engagement with a stub on the support to position the stub thereon and in the path of the conveyor.

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