MACHINE FOR MAKING FILTER AND LIKE TIPS FOR CIGARETTES

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This invention concerns improvements in or relating to machines for making filter and like tips for cigarettes of the kind often termed mouthpiece cigarettes. These filter and like tips and other mouthpieces are frequently termed stubs and this term will be used throughout.

It is already known to produce a paper stub by pressing a cut piece of filter material such as crepe paper between two cheeks, one fixed, the other moving, between which the crepe strip is fed by a sidewise movement, and pushing the resulting stub by a pusher through a slot in a tube of cigarette paper.

This method for reasons given below can only be applied for manufacturing short stubs such as are used for a single cigarette, in which case the tube into which a stub is pushed is also the tube which contains the tobacco of the cigarette. It is common practice nowadays to prepare lengths of stub material encased in cigarette paper for use in assembly machines, that is, machines where stubs are joined to pieces of cigarette rod by adhesive bands and, where multiple length stubs and/or rods are so joined, to cut the resulting composite rod into separate cigarettes. Usually the lengths of stub material are long enough for six individual stubs. If then a pressed stub of such length and made in the above-mentioned manner is to be inserted into a paper tube so as to fill the tube along its whole length, the production would be much too slow and the stubs not perfect in shape, owing to the fact that the cut piece of crepe paper has to be moved by a sideways or lateral movement into the pressing chamber. The wide piece of crepe paper moved in this manner loses its true rectangular shape or its correct position and the result is that the stubs are not of a proper cylindrical shape.

According to the invention there is provided a machine for making stubs for cigarettes comprising a slotted member into the slot of which a piece of crepe paper or the like is fed towards the end of the slot and a presser movable thereafter into said slot and towards the end thereof to form the paper into a stub which is thereafter ejected axially from the pressing chamber formed by the neighbouring ends of the presser and slot.

The slot may be formed in a rotatable member, for example radial to the axis of the member and the paper may be fed into the slot at one position of the member and after a predetermined rotary movement of the member the presser may move into said slot to press the paper into a stub. The member may be in the form of a rotatable drum and be provided with a number of slots so that paper may be fed into and pressed, in each slot in turn. The drum may be rotatable intermittently. Where a drum is employed it may rotate on a fixed shaft which is slotted transversely to its axis said slot comprising a fixed presser member with a suitably shaped end so disposed that a pressed stub is coaxial with the shaft.

A stub ejected from the member or drum may pass through a slot into a paper tube in the known manner said tube being held on the spoon by a clamping device which is relaxed towards the end of the movement whereby the tube is stripped from the spoon by the continued movement of the stub. Stubs encased by a paper tube in this manner may be conveyed to a trimming device where the ends are trimmed by knives to reduce the stubs to the proper length with square next ends.

The invention will be more fully described with reference to the accompanying drawings in which:

Figure 1 is a plan of the whole machine excluding the crepe feeding reel and trimming device.

Figure 2 is an enlarged view of the middle of Figure 1, where the most important parts are situated.

Figure 3 is a section of Figure 2 on the line III—III.

Figure 4 is a section on line IV—IV Figure 2 showing a few parts.

Figure 5 is a side elevation of a reel feeding and trimming device.

Referring to the drawings a web of crepe paper or the like 1 Figure 3, is fed from a reel 2. Figure 5 by serrated or knurled feed rollers 3 and 4 towards a drum 5. The web passes over a sloping guide plate 6. A piece of crepe of the required length is cut by a cutting device comprising a fixed blade 7 and a rotating blade 8, the cut taking place when the leading end of the web has been fed by further feed rollers 9 and 10 into a slot 11 in the drum 5. The crepe passes over a guide plate 12 during the feeding movement.

The drum 5 rotates intermittently so that each of its ten slots is presented in turn to the crepe feeding position. For this purpose the drum is supported on a rotatable sleeve 13 to which is fixed a wormwheel 14. Beneath the wormwheel is a worm which has a thread consisting partly of a helix and partly of portion of zero lead. This worm device is well known and as the worm rotates the drum is moved when the helical part of the thread is engaging the wormwheel and is stationary when the portion
of the thread which has zero lead is passing through the teeth of the wormwheel.

Inside the rotatable sleeve is a fixed shaft 16 which, as shown in Figure 3, has a slot 17 in it of the same width as a drum slot and disposed 180° from the crepe feeding position. A reciprocating presser plate 18 is provided which enters a drum slot 11 when the latter is in alignment with the slot 17 in the fixed shaft 16. The inner end of the presser plate has a concave groove in it, see Figure 3, so that when the plate has moved into the fixed shaft to its final position a circular hole is formed of a diameter equal to that of a finished stub. It will be seen then that a piece of crepe fed into the drum slot is eventually squeezed by the presser plate into a stub.

Before the presser plate 18 moves out again a pusher rod 19 pushes the formed stub axially through a spoon 20 into a paper tube, for example of cigarette paper, which is brought on to the outside of the spoon and held firmly in position during the pushing operation by a cam operated pad 21 which grips the tube by pressing it against the wall of the spoon. As the drum has an even number of the slots, crepe paper feeding and stub pressing can take place on the same horizontal plane and at opposite sides of the drum. Thus each time the drum moves crepe paper is fed to a fresh slot.

The paper tubes are formed in the usual way from a web 22 by means of a former or mandrel 23 fitted with appropriate known means for folding and closing a web of paper to a round shape and securing the seam by glue or by crimping. As illustrated, the seam is made by crimping between a female crimping wheel 24 and a small male crimping wheel (not shown) but which is held inside the paper tube 25 in the usual manner. The endless formed tube 25 is cut by a scissors device 26 into the required lengths. As soon as a tube of cigarette length is cut, from the endless tube it is pushed aside, that is out of line with the endless tube by a cam operated device 27 and brought into alignment with the spoon 28. Another pusher 29 in alignment with the spoon then pushes the cigarette tube endwise on the spoon and the previously mentioned clamping pad 21 moves down and holds the tube tight on to the spoon during the period taken by the pusher rod 19 to push the formed stub through the spoon and into the cigarette tube until the front edge of the stub is level with the front edge of the tube. The clamping pad then lifts to release the tube and as the stub is still being ejected by the rod 19 and the paper tube is now freed, the stub takes the tube with it until both components are clear of the spoon.

By means of an extension 29 of the device 27 that positions the cigarette tube prior to its being pushed on to the spoon, the completed stub is pushed down a sloping plate 30 on to a conveyor 31 and transported thereby to a trimming unit which will be described later with reference to Figure 5.

Figure 4 shows the arrangement of the parts 27 and 28. As the device moves forward a completed stub is pushed along until it falls down the plate 30 and simultaneously a fresh tube is brought into alignment with the spoon. As soon as this tube is pushed on to the spoon the device 27-28 is lifted by a cam as explained later and returns until the part 27 is again in line with the paper tube 25 when it drops to receive the next tube.

As the devices for forming and cutting the paper tubes and the method of inserting a stub through a spoon are well known it is thought that the following brief description of the apparatus is all that is necessary. The machine has two cam shafts 40 and 41 and is driven by a pulley or the like on the shaft 40. The shafts are geared together by bevel gear wheels 42 and 43. On the shaft 40 is a cam 44 which reciprocates the stub pusher rod 19 through a suitable lever. At the end of the shaft 40 is a spiral gear wheel 45 which drives a similar wheel 46 fixed to a shaft 47 at the other end of which is fixed a roller 48 which drives the conveyor 31.

A large gear wheel 49 drives a small one 149 on a shaft 50 which has a worm 51 on it which drives a worm-wheel 52. This wormwheel is fixed on a shaft 53 on which the feed rollers 4 are carried and a gear wheel on it (not shown) drives an equal gear wheel 54 on a shaft 55 to which the feed rollers 3 are fixed. At one end of the shaft 50 is a spiral gear wheel 56 which engages a similar wheel 57 fixed to a shaft 58 which carries the feed rollers 10. A gear wheel (not shown) engages with an equal gear wheel 59 on the shaft 60 which carries the feed rollers 9.

The worm which drives the wheel 14 is driven from the shaft 41 through bevel gear wheels 61 and 62, the latter being fixed on a shaft 63 which carries the worm.

On the shaft 41 is a cam 64 which reciprocates the presser 18 through a suitable lever which engages an extension 65 of the presser, slidable in a guide 66. A further cam 67 on the same shaft rocks a lever 68 on a pivot 69 so as to move the clamp 21 in and out of engagement with a cigarette tube on the spoon. Just beyond the cam 67 is a further cam 70 which reciprocates the device 27 through a suitable lever and a rod 71. This rod is also lifted and lowered by a lever 72 pivoted at 73 and rocked by a cam 74 on the same cam shaft 41.

Another cam 75 on the shaft 41 reciprocates a rod 76 through a suitable lever. The rod is guided at 77 and at its forward end has two pins, one of which marked 78 is shown. These rods in conjunction with a spring (not shown) oscillate the blades of the scissors 26 about a pivot 79 to effect cutting of the paper tube 25 in the known manner. The stub is then pushed through the spoon and into the cigarette tube until the front edge of the stub is level with the front edge of the tube. The clamping pad then lifts to release the tube and as the stub is still being ejected by the rod 19 and the paper tube is now freed, the stub takes the tube with it until both components are clear of the spoon.

By means of an extension 29 of the device 27 that positions the cigarette tube prior to its being pushed on to the spoon, the completed stub is pushed down a sloping plate 30 on to a conveyor 31 and transported thereby to a trimming unit which will be described later with reference to Figure 5.

The tube is supported in a guide 84 which as shown, is stationary, though it may be attached to the block 85 so as to move with the scissors. The tube pusher 28 is loosely pivoted at 85 to an arm 86 of a bellcrank lever pivoted at 87. The other arm 88 of the lever has a roller 89 which engages with a cam 90. This cam is fixed on a shaft 91 having a spiral gear wheel 92 at its other end which meshes with a similar wheel 93 on the end of the cam shaft 41. The crank disc 82 the crimping wheel 24 and the usual devices for printing on the paper web (omitted from the drawing) are all driven from the shaft 91 by suitable gearing.

On the cam shaft 40 is a cam 94 which through a suitable lever and a link 95 reciprocates a rod 96. This rod extends beyond the drum and is provided with a plate 97 at its end, see also Figure 3, which operates to press the crepe back into a slot, should the crepe tend to emerge from the right hand side of the drum, as is sometimes the case when the machine is operating. An-
other cam, not previously mentioned, is shown on the camshaft 41. This cam 99 is used to operate an auxiliary presser device shown in Figure 3. Referring to Figure 3 the presser marked 99 is similar in construction to the presser 18 and is operated to give a preliminary crushing or compressing of the crepe in a slot. It will be seen from Figures 1 and 2 that the presser plate 18 is slotted. These slots are merely provided to clear guides 100, supported by a plate 101, which embrace part of the drum and prevent crepe from emerging from the ends of the slots which it tends to do, due to its springy nature, after being cut from the tobacco web. The rotary blade 8 of the crepe cutting device is driven by a sprocket wheel 102 fixed on the end of a spindle 103 and connected by a chain 104 to a further sprocket wheel 105. This is fixed to a gear wheel 106 driven from an equal gear wheel 107 on the camshaft 40.

Referring now to Figure 5 which shows the crepe feeding device, it is most essential on machines for the production of filter stubs and the like that all stubs should have the same weight because it is the practice to weigh finished cigarettes to check the uniformity of filling. The weight is determined by the length of the material cut off from the paper web as it is pulled off from the bobbin or reel. Slight variations caused by the irregularity of the material cannot be avoided, but it has been found that large variations occur as the diameter of the bobbin alters. The weights of the stubs when the bobbin is large are much different from the weights when the bobbin is small, say nearly at its end. The machine is therefore provided with a special tension device which will now be described. An arm or support 108 extends from the spindle 109 on which the bobbin or reel 2 rotates, the arm being longer than the maximum radius of the bobbin and fixed in position. At the free end of the support arm is a pivot pin 110 on which is pivoted a curved arm 111 having an end, such as a flat spring 112, suitably constructed to rest on the periphery of the bobbin and act as a feeler. Another arm 113 is fixed to the curved arm at the pivot and so that it turns on the pivot with the curved arm. This second arm or lever is short and slotted to take a bolt or pin 114 and it extends from the pivot on the same side as the curved arm.

The bobbin has a brake drum 115 fixed to it so that the drum rotates as the web of material is pulled off the bobbin. A brake band 116 engages the drum and one of its ends is attached to a spring 117 which is in turn attached to a fixed pin 118 which is conveniently fixed in the aforesaid fixed support arm. The attachment to the fixed pin may be adjustable as by an adjusting screw 119 passing through the pin. The other end of the band is attached to a pin which is fixed in the slot of the slotted arm. The slot provides adjustment for the brake tension and further adjustment is possible by the adjusting screw. The tension is adjusted to suit the kind of reels being handled.

When the bobbin is of the large diameter the feeler arm is raised up. In these conditions the above mentioned slotted lever is also moved up and tightens the brake band, increasing the braking effect. As the bobbin diminishes in diameter the feeler arm moves down thus loosening the band and reducing the braking effect. Therefore this type of brake regulates the braking effect according to the diameter of the bobbin.

The trimming unit also shown in Figure 6, consists of a rotatable drum 121 the width of which is determined by the length of finished stubs required, and it has flutes or grooves on its periphery. These grooves receive the stubs from the conveyor 31 and the stubs on the drum are positioned by suitable guides 122 so that the parts of the stubs to be trimmed off, overhang the edges of the drum on either side. As this drum rotates it passes between two rotating knives (such as the knife 123) which trim both ends of the stubs. The sides of the drum constitute ledgers or counter knives. Then as the drum continues to rotate, each stub in turn becomes off on to a conveyor 125 which transfers it to a collecting container or the like.

The waste ends of the stubs which have been trimmed off, drop into a chute 124 which has been extended at each side of the drum and are collected into a container for later disposal. The reel is carried on a bracket 126 shown broken away in Figure 5.

What I claim is:

1. A machine for making filter stubs comprising a drum, means supporting the same for rotation on its long axis, the drum having a plurality of longitudinally extending slots opening radially outwardly through its periphery and closed at their inner ends, means for imparting intermittent rotation to the drum, means for feeding stub forming material into a slot radially of the drum when the drum is in one stationary position, a reciprocable presser element positioned to move radially of the drum to enter the material carrying slot when the drum has been turned to locate said slot in a second position whereby to compress the material in the inner end of the slot, actuating means for said presser element, and a reciprocable pusher positioned to enter the slot at the inner end thereof and along a path parallel to the drum axis to eject the compressed stub forming material from the slot.

2. The invention according to claim 1, with guide means engaging the drum between the position of the slot when receiving the material and said second position for preventing escape of the material from the radial outer end of the slot.

3. The invention according to claim 1, wherein said slots open through both ends of the drum, a plate supported to extend across an end of the drum in a radial direction, and means for moving the plate toward the adjacent end of the drum to prevent the escape of the stub forming material from its slot.

4. The invention according to claim 1, with a guide spoon positioned to receive the stub as it is ejected from the drum slot, a paper tube former adjacent to the end of the drum from which the stub is ejected and on the side of the spoon remote from the drum, means for moving a formed paper tube, said drum along a path parallelizing but to one side of the path of movement of the ejected stub, means for receiving the advancing end of the tube, means for cutting the tube between the receiving means and the former to provide a tube section, and means for locating and holding the tube section in the spoon to receive the ejected stub.

5. The invention according to claim 4, wherein the said means for receiving the advancing end of the tube comprises an elongate semi-cylindrical element, means beneath said element forming a supporting surface for the tube and toward which the open side of the semi-cylindrical element is directed, the supporting surface being
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inclined in a direction transversely of the semi-cylindrical element, means for lifting said semi-cylindrical element to permit the tube section to escape and move down said incline, means for catching and retaining the tube section when it has moved down the incline to a predetermined position, and said means for locating and holding the tube section including a pusher for moving the tube section from the last named position toward the spoon.

6. A machine for making filter stubs for cigarettes comprising a drum having a plurality of radially directed, longitudinally extending slots opening through the periphery thereof, a fixed shaft extending axially through the drum, means for turning the drum around the shaft, the shaft having a longitudinal slot extending from its axis to and through its surface, means for imparting intermittent turning motion to the drum to successively bring the drum slots into stationary register with the shaft slot, means for feeding filter stub forming material into a slot at one stationary position of the drum, a presser plate supported for reciprocable movement in the plane of and with respect to the open outer side of the shaft slot whereby the plate enters the shaft slot by way of the material carrying drum slot when the last named slots are in register to compress the material in the bottom of the shaft slot, means for effecting timed reciprocation of the presser plate and intermittent turning of the drum for movement of the plate into the registered slots when the drum is stationary, a reciprocable pusher positioned to move along the axis of the shaft in the shaft slot, and means timed to move the pusher into the shaft slot to eject the formed stub before the presser plate is withdrawn from the slots.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,908,798</td>
<td>Lerner</td>
<td>May 2, 1933</td>
</tr>
<tr>
<td>2,307,906</td>
<td>Ahne</td>
<td>Jan. 12, 1943</td>
</tr>
</tbody>
</table>