

July 28, 1942.

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2,290,896

DENSE END MECHANISM FOR CIGARETTE MACHINES

Filed Oct. 29, 1938

3 Sheets-Sheet 1

FIG. 1

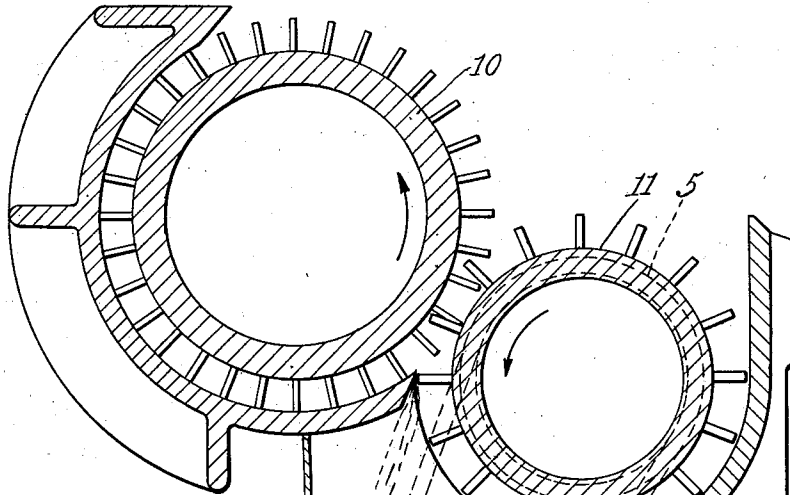
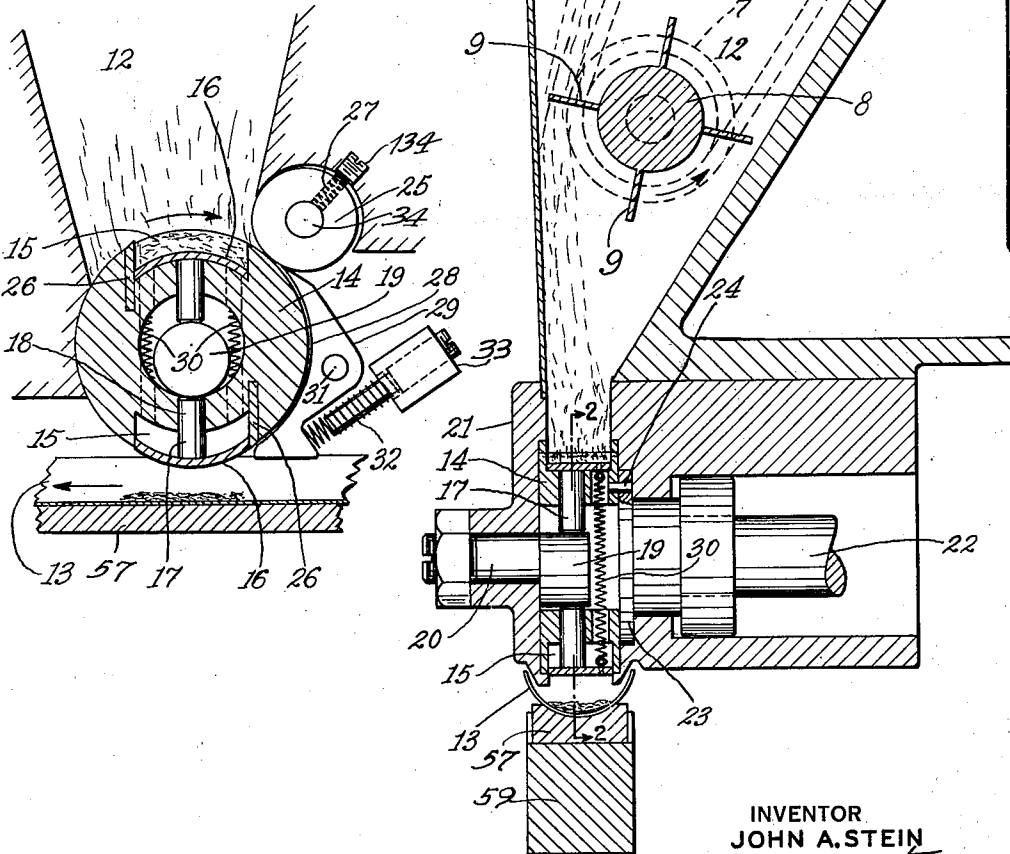


FIG. 2



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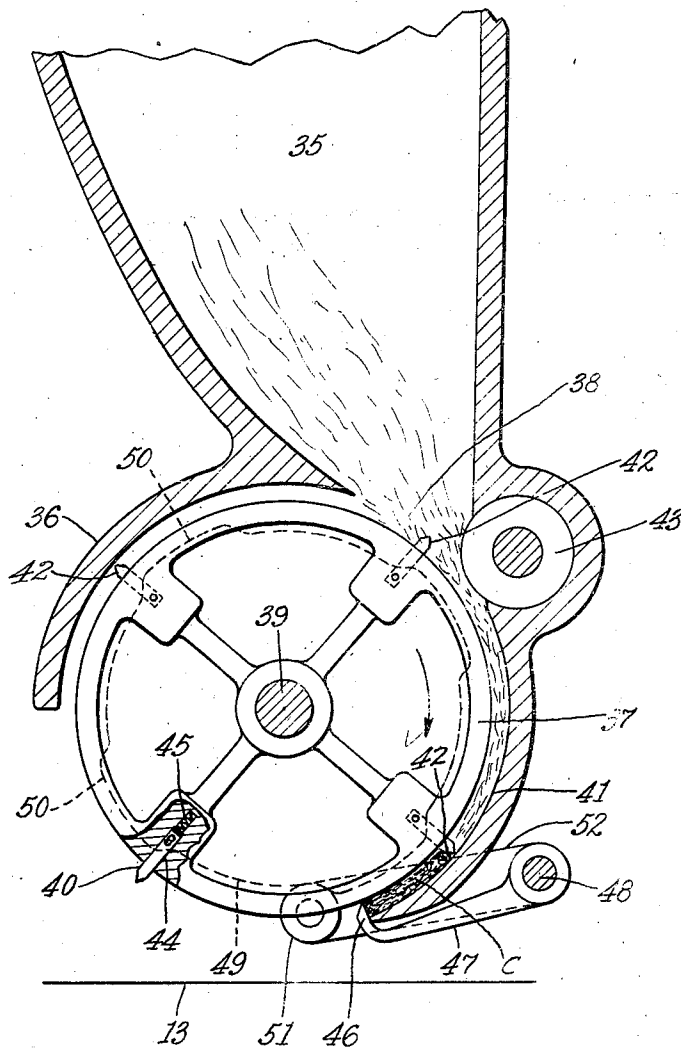
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FIG. 3



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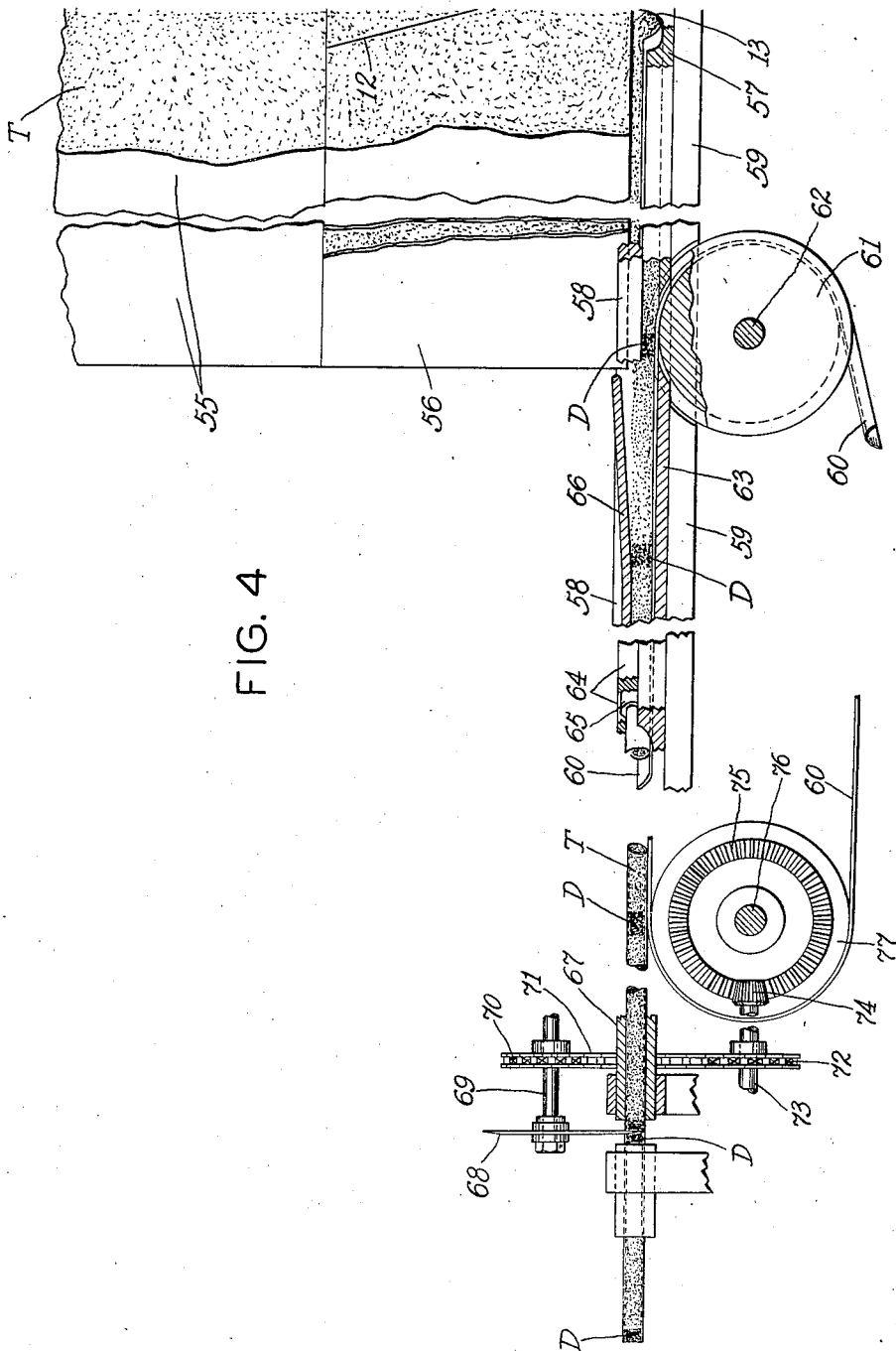
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DENSE END MECHANISM FOR CIGARETTE MACHINES

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3 Sheets-Sheet 3



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## UNITED STATES PATENT OFFICE

2,290,896

## DENSE END MECHANISM FOR CIGARETTE MACHINES

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Application October 29, 1938, Serial No. 237,645

8 Claims. (Cl. 131—61)

This invention relates to the fabrication of cigarettes, especially to continuous-rod cigarette machines, and more particularly to the manufacture of cigarettes having dense ends, that is to say, cigarettes made with at least the mouth end so densified as to retain its integrity during the operation of smoking.

In the fabrication of so-called dense end cigarettes, of the above character, under modern conditions, in order to satisfy existing requirements as to speed and accuracy, a number of conditions must be met if a cigarette machine of the continuous rod type shall be qualified to produce an output of cigarettes, with densified ends, of the order of say 1000 c. p. m. (cigarettes per minute) or 60,000 per hour, viz:

(1) Devices must be provided of a type adapted to supply to the cigarette rod forming mechanism charges of tobacco, in quantities, and at intervals, adequate to furnish at the regions of the rod to be severed a series of spaced auxiliary charges by which the rod is "loaded" suitably to afford reliably dense mouthpiece ends for the desired purpose, when the rod is severed at the middle of the region occupied by each such charge, thereby forming adjacent mouthpiece ends for two cigarettes.

(2) As against the earlier experience derived from the operation of such pioneer tobacco feeds for making dense end cigarettes as the feeds disclosed in the Letters Patent granted to Charles Arelt, No. 1,968,018, dated July 31, 1934, and that granted to Arthur Podmore on October 23, 1934, No. 1,977,998 for the manufacture of cigarettes, both issued to the assignee of the present application, applicant has discovered that it is highly desirable that the auxiliary charges should be compressed to a substantial extent individually preparatory to their application respectively to the cigarette paper, or to a conventional endless web, forming part of the feed, or to the filler tobacco which has been showered thereon to form the rod.

(3) It is desirable that the charges should be fed in the form of successive increments, separately from one another, rather than as portions of the general shower of tobacco supply from which the successive increments are derived.

(4) It is desirable that the compressive or densifying action shall be exerted positively upon each charge, while the action of means to retract the compression devices after compression of the charge may be effected by a spring action, preferably by one or more tensioned coil springs.

(5) It is of considerable importance that the intermittent action desirable to accomplish the spaced introduction of the charges to the rod shall be effected while the rod formation proceeds without interruption, and at the high speeds characteristic of cigarette fabrication as now practised.

Existing auxiliary feeds for densifying tips, while successful in operation, are not altogether satisfactory from the standpoint of speed in production, and under such conditions an object of the present invention is to provide a densifying feed for cigarette machines which will be so organized with the other mechanisms of a high speed cigarette machine, and so coordinated with the associated instrumentalities thereof, that the feed will cooperate with such instrumentalities to fabricate dense end cigarettes without substantially diminishing the speed of the machine.

A more particular object of the invention is to combine in a compact appliance for such a machine the respective means requisite for receiving a charge of loosely associated filler tobacco suitable in kind and bulk for addition to the regular charge for the purpose intended, then compacting the charge, and ejecting it upon the cigarette paper, prior to formation of the full rod charge, and finally associating the charge with the rod and advancing the densified rod to the severing device.

Another object of the invention is to provide an auxiliary tobacco feed, for the intended purpose, which can be added readily to the existing feeds of a known type of continuous operation cigarette machine while preserving the numerous advantages of machines of said type.

Still another object of the invention is to provide a compressing device which moves a stop intermittently into the path of paddles which feed the tobacco along a concave, and to construct and arrange the stop with relation to the paddles and the chute in which they operate so that when the dense end increment of tobacco is compressed to the desired amount, the stop will be withdrawn and the paddle, in its continued movement, will eject the compressed, sized and densified end increment and will deposit it upon the paper at either end of the feed, or at both ends thereof.

Among other objects of the invention, mention may be made of the arrangement in the shape of the chute so that the tobacco will be showered between the knife-carrying wheel and a cutting roller with which the appliance is provided.

A further refinement is the mounting of the

knives for outward spring movement by spring pressure.

Another object is to provide a modification according to which one or more operating devices, operating radially of the wheel, compress the end charges laterally.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be hereinafter fully described, and then specifically set forth in the claims hereunto appended.

Fig. 1 is a view in vertical sectional elevation of part of a tobacco feed for a cigarette machine in the construction of which the present invention has been embodied;

Fig. 2 is a fragmentary detail view in vertical section taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary detail view, in vertical sectional elevation, similar to Fig. 1, of a modification of the invention; and

Fig. 4 is a view in side elevation of a schematic character showing the mechanism illustrated in Figures 1 and 2, in association with means for making the full cigarette charge, forming the rod and severing cigarettes with predensified densifying charges.

In a now preferred embodiment of the invention, selected for illustration and description, the parts designated by the reference characters 10 and 11 are respectively a feed roll and a pin wheel which cooperate to feed shredded tobacco suitable for inclusion in a cigarette, the chute being identified by the reference character 12, while 13 designates the traveling web of cigarette paper to which the successive charges of filler tobacco are delivered, and 14 is a rotor having oppositely disposed pockets 15, in which are arranged slides 16, each constituting a movable wall of its pocket, and adapted to be moved outwardly by a cam 19 which acts on posts 17, the coiled springs 30 aiding to pull the slides 16 inward radially when the charges in the pockets 15 are respectively discharged.

The picker wheel 11, it will be understood, extends not only over the chute 12, to supply the increments of tobacco required for the formation of auxiliary charges in the chamber 15, but extends also past the wall on which the reference character 12 appears in Fig. 1 to that portion of the chute through which the main filler charge (not shown) is showered onto the web 13. This lies in the direction of the arrow, in Fig. 2, above the web 13, and the web thus laden with a full supply stream of filler tobacco, on top of the spaced and compressed auxiliary charges already deposited, as indicated in Figs. 1 and 2, will be advanced in known fashion to the rod former and severing devices (not shown) which may desirably be of known or other suitable form, not requiring detailed description. Reference is made to the drawings in the above mentioned U. S. Patent to Podmore, No. 1,977,998, for a suitable arrangement of the means by which the tobacco is showered.

As the rotor 14 is turned, as by the shaft 22, the forward end flange 23 of which is pinned at 24 to the rotor, while the cam 19 is fixed in a face plate 21, one of the slides 16 is moved outward radially of the cam 19 during the rotation of the rotor through its lower orbit, and that slide is thereafter moved radially inwardly of the cam during the rotation of the slide 16 through the upper part of its orbit, this retractive movement being effected by the coiled tension springs 30.

In operation, tobacco thus fed into the chamber 15, through the chute 12, passes under a roller 25 which tends to even down the charge, and a knife, 26, at the far end of the chamber, cuts off any overlapping strands, in substantially known fashion. As the rotor 14 turns further, the slide is pushed outward by the cam to compress the charge against the curved inner surface 28 of a pawl 29, the latter being mounted in arcuate circumjacent relation with the periphery of the rotor 14 at a distance suitable to regulate the thickness of the strip of tobacco therebetween.

A coiled compression spring 32 serves to bias the lower end of the pawl toward the rotor 14, and its tension can be regulated by a set screw 33, while the upper end of the pawl acts as a stripper against the periphery of roll 25, the journal 34 of which may be set up more or less by the screw 34, acting against a spring 27.

When the slide reaches its lowest position the ejection of the charge takes place and the charge drops to the position indicated in Fig. 2, upon the cigarette paper band 13 in the instance illustrated, in advance of the full charge of filler tobacco, which is thereupon showered upon the band and forms the full rod charge, with densified portions at cigarette space intervals in the manner set forth.

The spacing of the densifying increments is preferably such that a densified charge serves to make the dense ends of two cigarettes which abut at the region of severance.

In Fig. 3 is illustrated a modified tobacco feed for use in the fabrication of dense end cigarettes, in which modification a rotor 37 is journaled to rotate about an axis 39 extending transversely of a housing 36, in communication, through a throat 38, with a chute 35 into which tobacco is showered from a suitable source thereof. The bore in the housing has a wall 41 which is defined by a curve, suitably disposed relatively to the rotor to constitute a concave, open at the top to admit tobacco derived from the throat 38, and also having an opening at the bottom to permit each successive densified charge, as C, to be delivered onto the moving web 13 of cigarette paper, or onto a stream of tobacco showered or otherwise deposited on said web.

A series of blades, as 40, 42, each mounted in a radial slot, as 44, form peripheral pockets at spaced distances around the circumference 37 of the rotor, corresponding in linear displacement to the length of a cigarette, and each blade acts as a wall of one of the pockets, tending to advance the tobacco, in cooperation with the concave wall 41, from the throat 38 to the discharge at the lower end of the concave, where progress of the tobacco is arrested intermittently by means suitable to aid in densifying each charge, and the last-named means is constituted by a stop finger or abutment 46, formed at the free end of an arm 47 carried by a pivot stud 48 around which the arm 47 is arranged to be swung normally into the full line position illustrated in Fig. 3.

When in this position, the stop 47 acts normally to cause a charge C to be built up by forward rotation of any blade, as 42, revolved in its orbital path by rotation of the rotor 37, and when compactment of the charge, as C, is completed, substantially as indicated in Fig. 3, the stop 46 is swung bodily downward by rotation of the arm 47, or by bodily depression of the arm 52, together with the arm 47 and said stop 46, releasing the densified charge C which is then

ejected, directly onto a traveling surface 13, which may be an endless web or tape of known or other suitable form, or a web of cigarette paper, or the charges may be discharged onto any stream of filler tobacco showered upon said web, if the charge of filler tobacco proper shall have been first deposited upon the web. Preferably the densified charges will be deposited prior to the showering of the full charge upon the web, and the shredded tobacco for each densified charge may, and preferably will be, provided by diverting to the chute 35 a suitable portion of the main shower which is utilized to feed the cigarette rod former. Such diversion may be accomplished, as in the above mentioned patent to Podmore, No. 1,977,998, by having the wall of the chute 35 on which the reference character 35 appears in Fig. 3 of the present application, constitute a wall common to the main chute where the main filler charge is showered onto the cigarette paper, as at 6 in Fig. 2 of the Podmore patent. The stop lever 52 is operated by connections with a suitable cam, as at 50, fixed upon the rotor shaft 39, and its movements are thus coordinated with the main cycle of the machine, so that as each blade 42 moves through the concave it propels positively a measured charge of tobacco and densifies it progressively until it reaches a point the determined length of the charge away from the stop.

At this point, the stop is retracted, its finger 46 moving away from the periphery of the rotor, and the densified charge is propelled forward and delivered to the cigarette paper or onto the full cigarette charge, at rod speed.

It will be noted that the knives 40, 42 are arranged to cooperate with the roller 43 in cutting any overlapping strands of the tobacco shreds, in order to even down the charges as each is formed.

Provision may be made desirably of suitable means to supplement the gravitational bias of the showered material in the chute 12 by applying to the showered material a positive force tending to drive it into the pockets 15 as they are successively brought into registry with the discharge opening from the chute.

As an example of such provision, Fig. 1 shows a paddle wheel 8, confined in the chute 12, being located below the pin wheel 10 and picker roll 11, and so disposed that the shower of tobacco from said members 10 and 11 issues into the path of the rotating blades 9 of the member 8. The blades 9 thus are adapted to drive the tobacco down, giving a positive impetus which does not depend on gravity but supplements it, thereby making sure that the pockets 15 of the dense end device are filled. Without the paddle it may be uncertain, especially at high speeds of the machine, whether or not the pockets 15 will be filled by the gravity bias alone.

The picker roll 11 is shown as equipped with a sprocket wheel 5 driving a sprocket chain 6 running over a sprocket wheel 7 secured to the paddle wheel 8, the arrangement of the drive being such preferably that the paddle blades 9 travel at a relatively higher peripheral speed than that of the picker roll 11 and are in substantial correspondence with the speed of the member 14.

A like provision may be made in connection with the modification of Fig. 3.

Referring to Figure 4, the main tobacco feed 55 showers the tobacco T into a feed chute 56 and into chute 12. The chute 12 directs the tobacco into the pockets of the spool 14 (Figure

2) whereby as hereinbefore described, the increments D of tobacco, as measured by the spool, are delivered in spaced relation corresponding to cigarette lengths upon the cigarette rod wrapper strip 13 and then the running wrapper strip receives the normal supply of tobacco issuing from feed chute 56.

The wrapper strip 13 travels in a trough formed by a support bar 57 and by side bars 58 mounted thereon, said trough being supported by a table 59 of the cigarette machine. The wrapper 13 rests on and is propelled through the rod forming mechanism, which will now be described, by an endless tape belt 60 running from a pulley 61 on a shaft 62 into the channel of a bar 63 adjoining the trough. Side bars 64 mounted on bar 63 hold between them the rod former tube 65 into which the wrapper 13, with its tobacco layer T, is guided by a rod former tongue 66 inserted between the bars 58, and from which it emerges in the form of a continuous cigarette rod, ready to be sealed and finally cut into individual cigarettes.

As shown in Figure 4, the cigarette rod cut-off, which in this instance is of the oblique rotary type such as disclosed in United States Letters Patent to Rundell, No. 1,888,774, is provided with a ledger plate 67 and an eccentric wafer blade 68 mounted for rotation obliquely to the cigarette rod on a shaft 69. The shaft 69 is driven through members 70, 71, 72, 73 and 74 from a gear 75 on a drive shaft 76 which also carries the tape wheel 77, supporting tape belt 60, so that the rod is forwarded in timed relation to the operation of the cut-off. This shaft 76 is suitably geared for operation in timed relation to the same drive shaft as the shaft 22 (Figure 1) from which the auxiliary feed is driven. Thus the operation of the auxiliary feed, the forwarding belt and the cut-off knife is timed to cause the knife to cut through the center of the dense portion D of the rod to produce dense end cigarettes.

It is to be understood that the foregoing disclosure of a plurality of embodiments of the invention is merely illustrative and does not exhaust the possible physical embodiments of the basic idea of means which underlies the invention.

What is claimed is:

1. In a cigarette machine of the type having cigarette rod forming mechanism, including a traveling surface, and means to supply thereto a stream of cigarette tobacco for forming thereon a full cigarette rod charge, means adapted to derive from said supply a moiety thereof and to form said moiety into segregated densifying charges, and means to densify said charges individually, and then to deliver them successively at spaced intervals to said traveling surface for compaction with said full cigarette rod charge by said rod forming mechanism to form a full cigarette rod of uniform diameter having densified areas at spaced intervals.

2. In a cigarette machine of the type having cigarette rod forming and cutting mechanism, a tobacco feed for use in the fabrication of dense-end cigarettes, comprising devices for feeding cigarette filler tobacco from a source thereof, including a travelling surface and means to move the same toward said rod forming mechanism, means to form segregated densifying charges of said cigarette filler tobacco, including a rotary cylindrical transfer element having a pocket, a concentric non-rotative element constituting an outer wall of said pocket, means to

impart rotation to said cylindrical element whereby each charge of cigarette densifying filler tobacco is pre-densified as the cylindrical member rotates, and means to cause movement of one pocket wall relatively to another, to aid discharge of each of said pre-densified charges adjacent to said cigarette filler feeding devices for embodiment in a cigarette end portion to constitute an integral part of said rod.

3. The method of fabricating dense-end cigarettes, which includes the step of showering loose filler tobacco, the step of segregating suitable quantities thereof to form individual auxiliary end charges, the step of densifying said individual auxiliary charges to preform them for inclusion in cigarettes, the step of advancing a wrapper web to a cigarette former station, the step of delivering said preformed dense auxiliary charges to said web, the step of applying a full charge of filler tobacco to said web in addition to and partially on said auxiliary end charges, the step of completing said rod with said preformed auxiliary charges included therein at predetermined intervals, and the step of severing the rod at intervals suitable for including a predetermined part of each of said preformed auxiliary charges in densifying position in each cigarette.

4. The method of claim 3 in which the step of introducing each preformed auxiliary end charge to said web precedes the feeding thereto of the full charge of filler tobacco.

5. A tobacco feed, having the features claimed in claim 2, in which said charge segregating means is provided with a plurality of pockets, each having means to compress an auxiliary charge and eject a charge after compression during each such cyclical movement of the tobacco feed.

6. A tobacco feed having the features claimed in claim 2, in which said charge segregating means is provided with a plurality of pockets, and each pocket has therein a slide or plunger adapted to be moved toward the mouth of the pocket to compress and eject the charge therein.

7. In a cigarette machine of the type having cigarette rod forming and cutting mechanism and a moving element constructed and arranged to feed a continuous stream of filler tobacco to said rod forming and cutting mechanism, a tobacco feed for use in the fabrication of dense end cigarettes in said cigarette machine comprising, means to form a shower of filler tobacco, means to form segregated auxiliary charges from said shower of filler tobacco, and means to densify said segregated charges individually and then to deliver them successively into the range of action of said moving element to be fed thereby with said continuous stream of filler tobacco to said rod former, said continuous stream of filler tobacco being provided in entirety by said shower.

8. The method of forming dense end cigarettes which consists in the continuous feeding of cigarette filler tobacco to form a uniform and continuous stream of cigarette filler tobacco, then adding to said stream at spaced intervals pre-densified charges of tobacco, then compressing said added predensified charges with said stream of tobacco and folding a paper wrapper around the same to form a cigarette rod of uniform size, and then cutting said cigarette rod into sections at substantially the middle of said densified regions to form dense end cigarettes.

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