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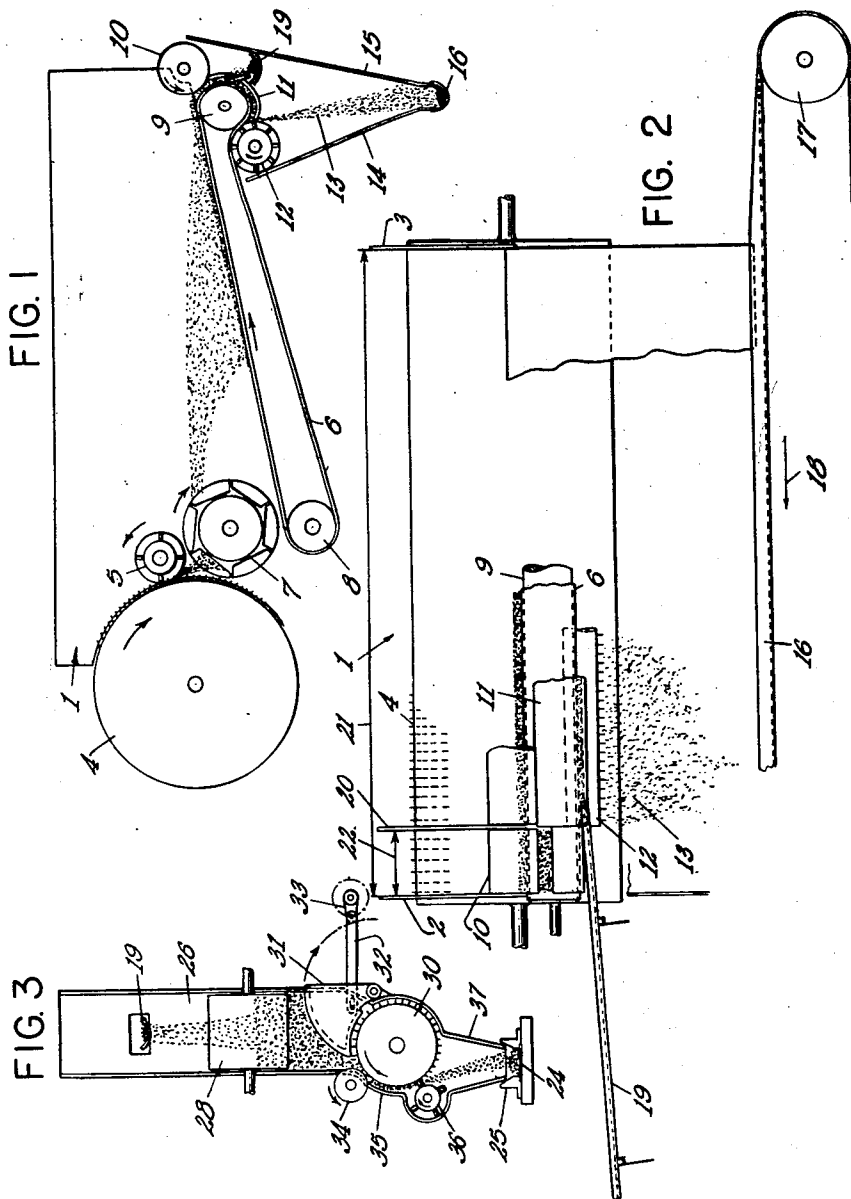
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3,113,576

CIGARETTE MAKING MACHINE

Filed Feb. 3, 1958

2 Sheets-Sheet 1



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FIG. 4

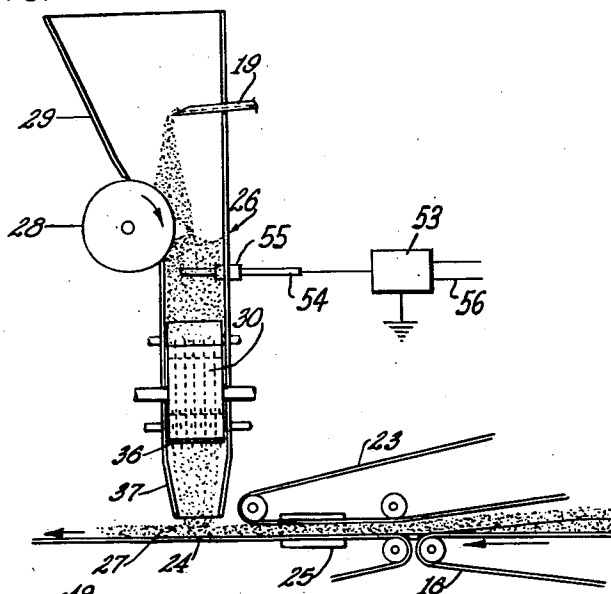
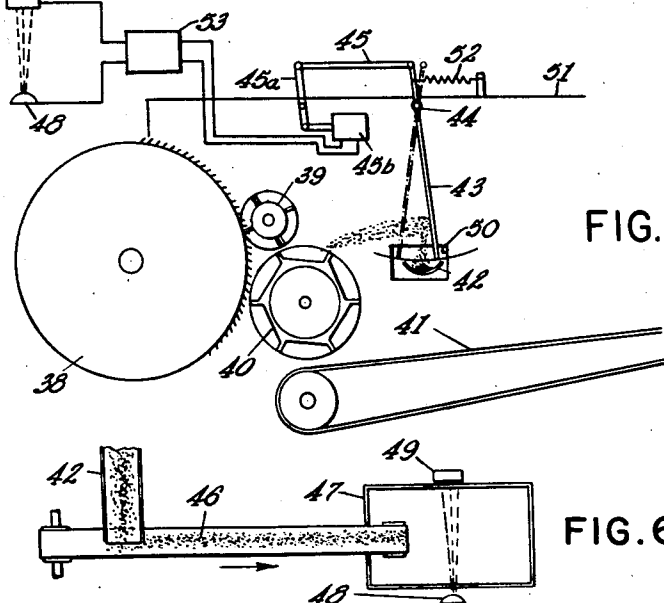
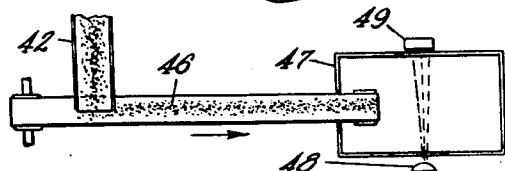


FIG. 6



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CIGARETTE MAKING MACHINE

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4 Claims. (Cl. 131-21)

This invention relates to the control of the weight of individual cigarettes produced by a cigarette making machine of the continuous rod type. Many devices have hitherto been proposed for this purpose and it is the object of the present invention to provide an improved method and means which achieves closer uniformity in the weight of individual cigarettes produced than has hitherto been possible.

The invention comprises feeding tobacco to the cigarette making machine in two stages and controlling or regulating the rate of feed of one of said stages in accordance with a detected deficiency or excess in the feed of the other feed stage. Preferably the feed comprises a main stage and a subsidiary stage the feed of which is a desirable small proportion of that of the main feed stage. Thus, for example, the main feed may be arranged to supply 80% plus or minus 10% of the total amount required for the finished cigarette rod.

The invention also consists in means for feeding tobacco to a cigarette making machine comprising a main tobacco feed, means for detecting variations in the weight of said feed as by measuring the weight or mass of tobacco, a subsidiary tobacco feed, and means controlled by said detecting or measuring means for varying the rate of subsidiary feed to compensate for such variations.

In a preferred arrangement, tobacco from the main feed which has the form of a shower or stream of picked tobacco is passed through a measuring or detecting device, and the subsidiary feed is arranged to add a further shower or stream of picked tobacco immediately following the measuring or detecting step.

In the preferred arrangement the main stream of tobacco delivered by the main feed or shower is formed by suitable means, such as pressure belts, rollers, or other forming devices, into a uniform cross section for measurement or detection purposes. The measuring or detecting device may be of a known kind capable of affording an electrical signal corresponding to feed variations which is utilized to control a variable speed motor or variator which regulates the rate of a subsidiary feed.

According to a convenient arrangement the main and subsidiary feeds may be derived from the same source, for example the main drum and picker rolls of a conventional tobacco feed, a proportion of the supply from said source being suitably diverted to a separate feed hopper or the like to provide the subsidiary feed.

In the accompanying drawings,

FIGURE 1 is an end view, more or less diagrammatic, of a tobacco feeding and controlling arrangement in accordance with the invention;

FIGURE 2 is a front view of the arrangement of FIGURE 1;

FIGURE 3 is an end view, more or less diagrammatic, of a supplementary feed hopper for use with the arrangement of FIGURES 1 and 2;

FIGURE 4 is a front view of FIGURE 3;

FIGURE 5 is an end view, more or less diagrammatic, of a modified form of tobacco feeding arrangement in accordance with the invention;

FIGURE 6 is a plan view, more or less diagrammatic, of a supplementary hopper feed for use in conjunction with the arrangement of FIGURE 5.

In carrying the invention into effect according to one

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convenient mode as shown in FIGURES 1 to 4, intended to be applied to a cigarette making machine of the continuous rod type, there is provided a main feeding hopper of well known construction indicated generally at 1 having end plates 2 and 3 and a main carded roll or drum 4. Tobacco is removed from the drum 4 by a first picker roll 5 and is showered upon a travelling band 6 by means of a rotating pin wheel or winnower 7. The travelling band 6 is supported upon rollers 8 and 9 and is driven in the direction of the arrow in FIGURE 1. The layer of tobacco on the band 6 is delivered by a rotary compression roller 10 to a supporting concave plate 11 from which it is delivered by a second picker roll 12 to form a narrow shower 13 which falls between lateral guides 14 and 15 upon a conveyor belt 16. The belt 16 is supported upon rollers, one of which is shown at 17, and is driven in the direction of the length of the shower as shown by the arrow 18 for conveying the tobacco thereon to the cigarette forming mechanism (not shown). The arrangement so far described is conventional in cigarette making machines of the continuous rod type, e.g. as described and shown in U.S. Patent issued to J. W. Leary—2,175,404. The main tobacco feeding hopper of the machine is modified to provide two separate streams of showered tobacco, one being a main stream and the other a subsidiary stream which can be related to the former in any desired proportion, for example the subsidiary stream may be one quarter of the main stream. Diversion of a subsidiary stream of tobacco is effected by providing at the delivery end of the hopper a downwardly inclined vibrator chute 19 which extends under a short end portion of the delivery end of the band 6, in conjunction with a suitably shaped diverter or division plate 20 so that a relatively narrow portion of the main tobacco stream on the band 6 is carried outside the hopper. In FIGURE 2 the full hopper feed width is shown at 21 and the proportion diverted to the chute 19 is shown at 22. It is to be understood that instead of a vibrator chute 19 a conveyor belt or pneumatic or other conveyer means may be provided.

The main stream of showered tobacco received by the conveyer belt 16 is conventionally passed through a device which forms the tobacco into a uniform cross section which may be rectangular or otherwise. Such forming means may comprise converging compression belts, compression rollers or fixed guides either separately or in conjunction and may be of the type described in U.S. patent issued to W. A. Whitaker—2,357,860. The section of tobacco so formed is passed through a detecting or measuring device arranged in a known manner to produce an electrical signal corresponding to any variation in the weight or mass of tobacco in the device from a determined or standard value.

Referring to FIGURES 3 and 4, there is shown a forming belt 23 for the tobacco delivered from the belt 16 to a belt 24, and a measuring head is indicated at 25. This latter may comprise, for example, a radiation gauge or a dielectric gauge, or a combination of both gauges, and may be of the general kind described in U.S. patents issued to J. W. Leary—2,175,404; W. A. Whitaker—2,357,860; or U.S. patent issued to W. C. Broekhuysen—2,932,391. A subsidiary feed hopper 26 supplied with tobacco from the diversion chute 19 (or other diversion means) of the main feed hopper 1 is arranged to deliver a shower of tobacco upon the main tobacco stream 27 as the latter issues from the measuring or detecting device 25. The upper part of the subsidiary hopper 26 includes a driven smooth roller 28 forming part of the hopper wall 29, and the tobacco from the chute 19 is delivered or showered upon the roller surface. The hopper part below the roller 28 forms a reservoir for tobacco and below this the hopper walls are shaped to accommodate

a rotatable pin wheel or carded wheel 30. A part 31 of the hopper wall above the pin wheel 30 comprises an oscillatory section or plate driven by a link 32 from a continuously rotating crank 33 and adapted to act as a tamper. Tobacco conveyed by the pin wheel 30 is controlled by a continuously rotating refuser roll 34 and passes behind a concave wall section 35 to a continuously rotating picker roll, pin wheel, or carded roll 36 which showers the tobacco into a lower part or outlet 37 of the hopper so that the showered tobacco falls upon the main stream of tobacco on its conveyer belt 24. The picker roll or pin wheel 30 is driven by a variable speed motor or through a speed varying device or variator whereby the rate of the subsidiary tobacco feed from the hopper 26 can be regulated as desired. The speed control of the drive of the pin wheel 30 is effected through suitable electrical means (not shown) from the measuring device 25, which may be as shown and described in U.S. Patent 2,357,860, and the arrangement is such that an electrical signal from the said device effects an alteration in the speed of the pin wheel 30 to increase or decrease the subsidiary feed so as to compensate for any deficiency or excess detected in the main feed. The outlet 37 of the subsidiary hopper 26 is arranged so that tobacco therefrom is added to the main stream on the belt 24 at a distance from its outlet from the measuring device 25 such that the time factor in any change in the rate of subsidiary feed is closely related to the initiating signal, or in other words the addition of more or less tobacco to the main feed stream is made to that portion of the stream in which a deficiency or excess has previously been detected.

An alternative arrangement for diverting a desired proportion of tobacco from the main feed hopper as a subsidiary stream is shown in FIGURES 5 and 6. The main carded roll or drum 38 of a conventional feed hopper has a rotary picker roll 39 and a pin wheel or winnower 40 which showers the tobacco upon a travelling belt 41 from which it is delivered as a shower upon a travelling conveyer as in the previous example. A vibratory conveyer device or belt 42 extends the full length of the main feed hopper and associated therewith is a vertical deflector plate 43 pivoted at 44 and also extending the full width of the main hopper. The position of the deflector plate 43 can be adjusted by means of a link 45, connected by a lever 45a to a solenoid 45b, between the full and broken line positions shown in FIGURE 5. The vibratory chute 42 is positioned in relation to the winnower 40 so that the stream of tobacco thrown upwardly and outwardly from the latter is intercepted by the deflector plate 43, and according to the position of the latter more or less of the total amount of showered tobacco falls upon the chute 42. Thus in the extreme left hand position of the plate 43 as shown in broken lines the whole of the showered tobacco will fall upon the travelling belt 41 and none will reach the vibratory chute 42. The latter chute 42 extends through an opening 50 in an end wall 51 of the main hopper and tobacco conveyed thereon is delivered to a conveyer belt or a vibratory conveyer 46 which delivers it to a subsidiary hopper 47 which may be similar to that described in the preceding example. The upper end of the deflector plate 43 is loaded by a spring 52. Means is provided for detecting the level of tobacco in the hopper 47 comprising a light sensitive device including a light source 48 and a light sensitive cell 49. This light sensitive device is connected to a suitable electronic control arrangement 53 to control the solenoid 45b for actuating the link 45 connected to the deflector plate 43, the arrangement being such that when the level in the hopper 47 rises above a predetermined maximum the deflector plate 43 is adjusted automatically so that a lesser proportion of the total tobacco feed is diverted to the vibratory chute 42. The contrary action occurs when the level in the hopper 47 falls. Otherwise the arrangement operates as in the pre-

viously described example to add more or less tobacco to the main feed stream according to the deficiency or excess of tobacco in said stream as detected by the measuring device. Instead of the light sensitive device for detecting changes in level of tobacco in the subsidiary hopper 47, other means such as a capacity probe may be employed which detects the level of tobacco as a consequence of the latter's difference in dielectric characteristic relative to air. A suitable capacity probe is shown in FIGURE 4 and comprises a metal rod 54 mounted in a bushing 55 in the hopper wall and connected to the electronic control arrangement or circuit 53. Capacity variation due to tobacco level changes causes the circuit to actuate the solenoid 45b to which the leads 56 are connected.

It is to be understood that the invention is not restricted to the examples described above since the means for producing a shower of tobacco both for the main and subsidiary tobacco feeds may be widely varied. Where reference is made to a pin wheel or its equivalent, for example, this may include a suitably carded drum associated with a comb from which the tobacco is picked in a manner well known in cigarette making machines.

What I claim is:

1. A system for controlling the relative density of individual cigarettes produced by a cigarette making machine of the continuous rod type comprising, a conveyor, a main tobacco feed for showering tobacco on to said conveyor, a subsidiary feed hopper disposed adjacent said conveyor for showering tobacco thereon to form a composite stream of tobacco, means interposed between said main feed and said subsidiary feed hopper for detecting relative variations in the density of successive increments of said tobacco supplied by said main feed, means associated with said detecting means and operative in response to said relative variations in the density of said successive increments for varying the rate of tobacco showered by said subsidiary feed hopper to compensate for relative variations in the density of individual cigarettes being made by said machine, and means operatively associated with said main tobacco feed for diverting a portion of the unfed tobacco of said main feed to said separate feed hopper to provide a tobacco supply for the subsidiary feed.

2. The invention defined in claim 1 wherein said diverting means includes a vibratory chute positioned to intercept and divert a desired portion of said main feed shower to said subsidiary feed hopper.

3. The invention defined in claim 1 wherein said diverting means includes an adjustable deflector disposed within said main feed and an intercepting conveyor means for conveying diverted tobacco from said main feed to said subsidiary feed hopper, said deflector means being adjustably positioned to divert a predetermined portion of said main feed tobacco shower to said intercepting conveyor means.

4. A system for controlling the relative density of individual cigarettes produced by a cigarette making machine of the continuous rod type comprising, a conveyor, a main tobacco feed for feeding tobacco to said conveyor, a subsidiary feed hopper disposed adjacent said conveyor for showering tobacco thereon to form a composite stream of tobacco, means interposed between said main feed and said subsidiary feed hopper for detecting relative variations in the density of successive increments of said tobacco supplied by said main feed, means associated with said detecting means and operative in response to said relative variations in the density of said successive increments for varying the rate of tobacco showered by said subsidiary feed hopper to compensate for relative variations in the density of individual cigarettes being made by said machine, and means operatively associated with said main tobacco feed for diverting a portion of the tobacco of said main feed to said separate feed hopper to provide a supply of tobacco therefor, said hopper having level adjusting means operatively associated with

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said diverting means for varying the amount of diverted tobacco in order to maintain a constant tobacco level in said subsidiary feed hopper.

References Cited in the file of this patent

5

UNITED STATES PATENTS

2,162,443	Muller	June 13, 1939
2,175,404	Leary	Oct. 10, 1939
2,357,860	Whitaker	Sept. 12, 1944

10

2,519,089
2,729,214
2,800,131
2,832,352
2,932,391

6

Whitaker	Aug. 15, 1950
Broekhuysen et al.	Jan. 3, 1956
Molins et al.	July 23, 1957
Powell	Apr. 29, 1958
Broekhuysen	Apr. 12, 1960

FOREIGN PATENTS

Great Britain	Jan. 27, 1930
Great Britain	July 3, 1930