

United States Patent

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[54] APPARATUS FOR MAKING CIGAR BUNCHES

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131/81 A, 177/123

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131/22 A, 39, 41, 44; 177/122, 123

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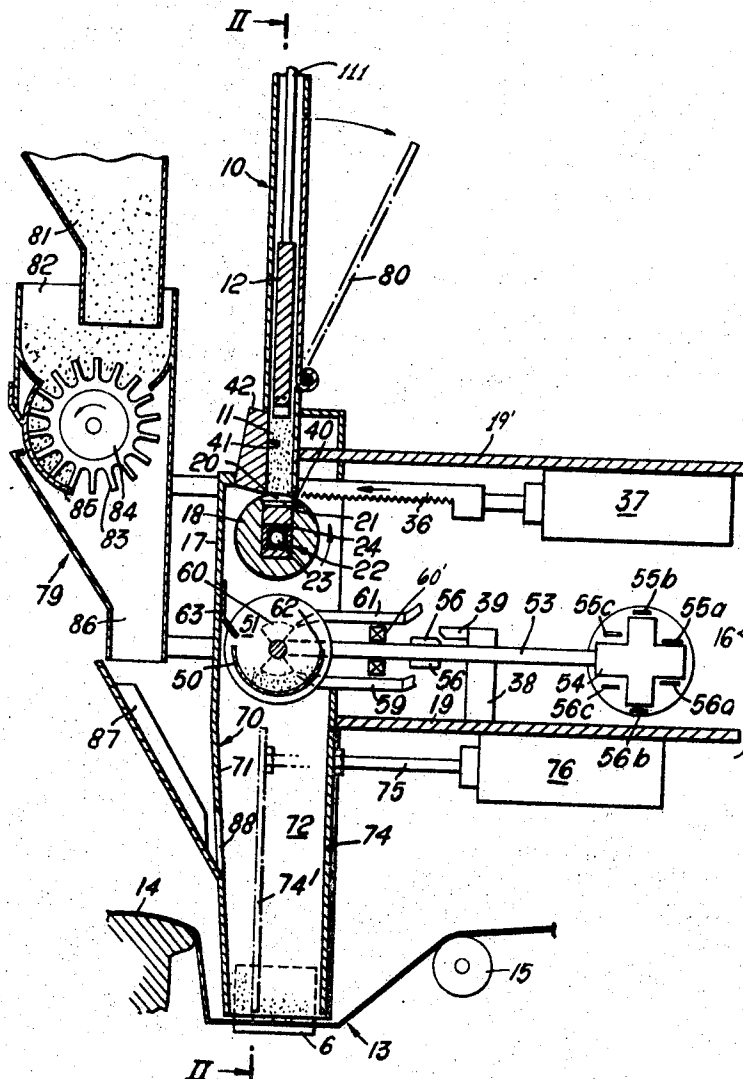
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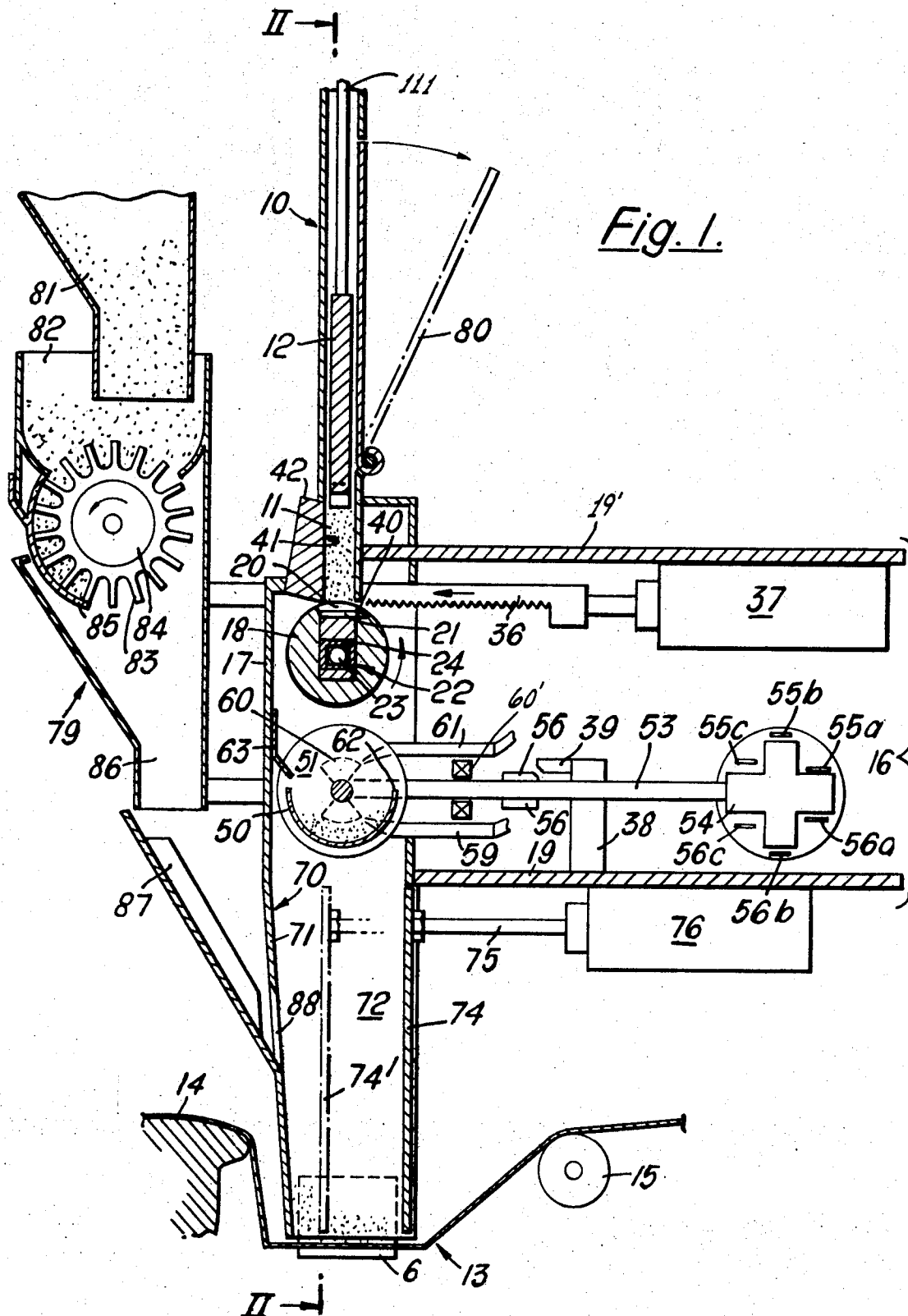
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[57] ABSTRACT

An apparatus for making cigar bunches including means for preparing charges of filler tobacco which fall short of the target weight, means for determining how short the charges are, and means for adding a number of topping up units of tobacco of predetermined size according to the amount by which the charge is short of the target weight.

6 Claims, 12 Drawing Figures





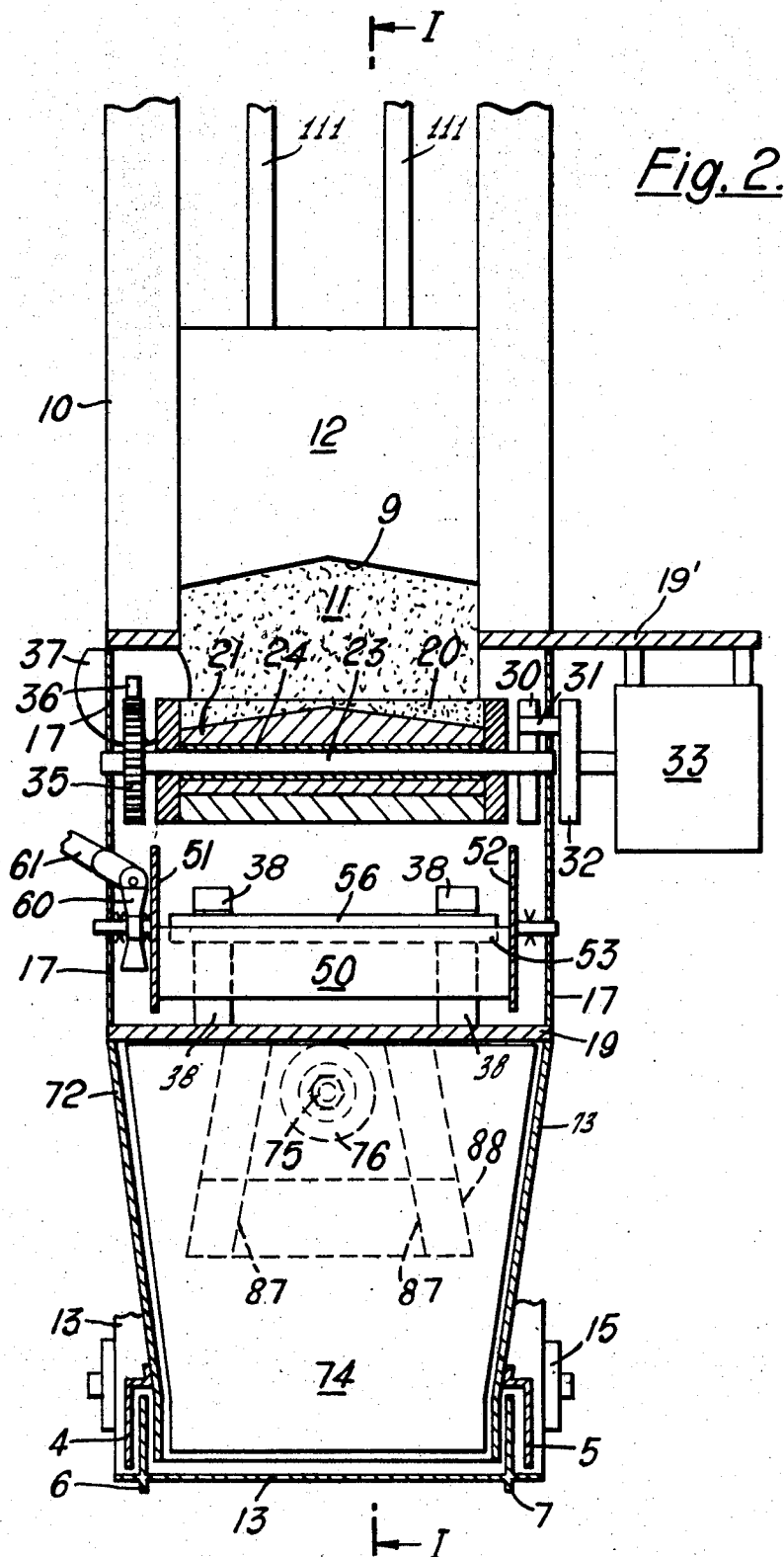
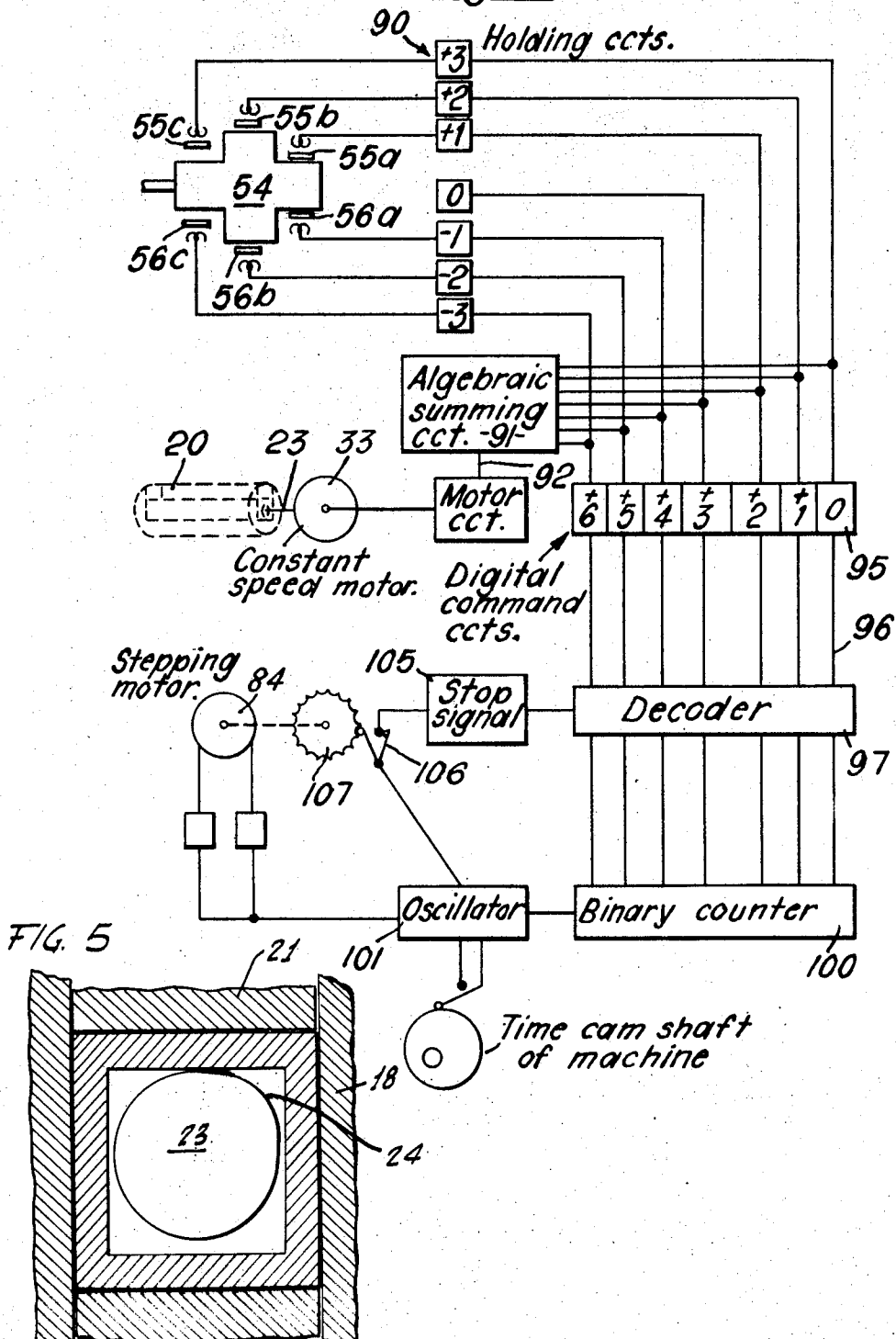
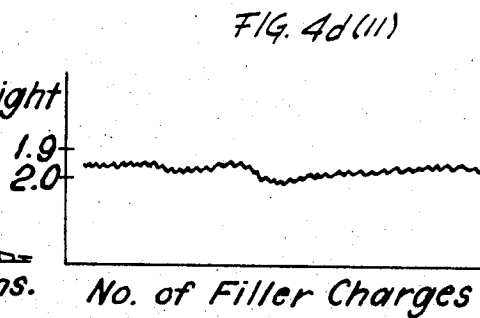
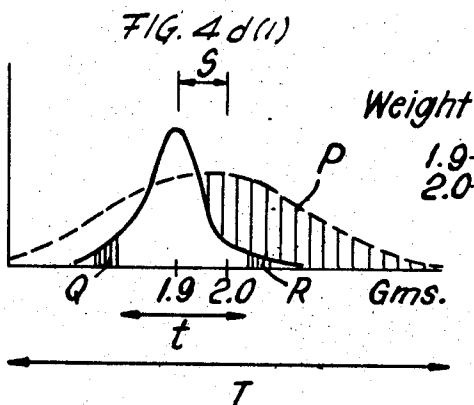
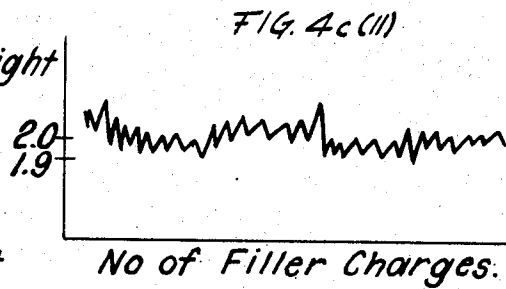
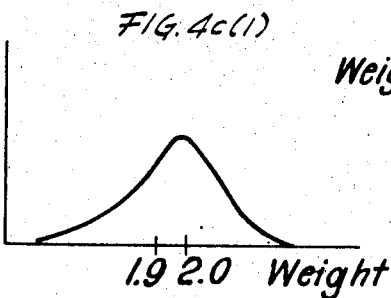
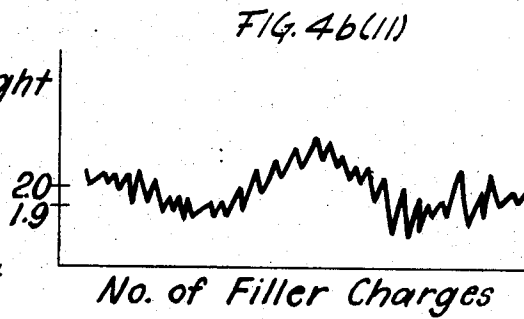
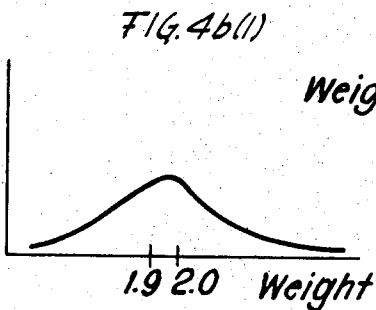
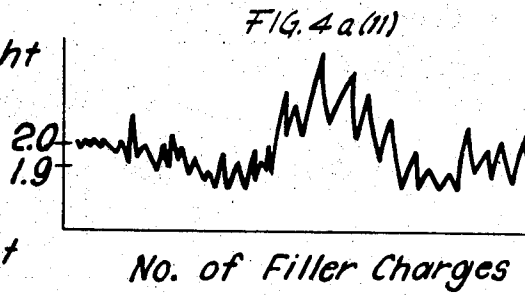
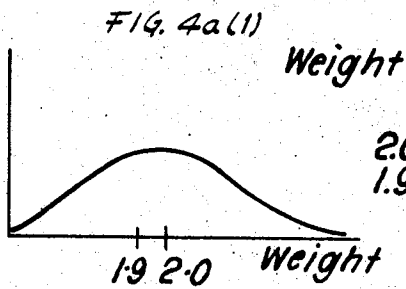


Fig. 3.





APPARATUS FOR MAKING CIGAR BUNCHES

This invention relates to a method of and apparatus for making cigar bunches.

According to one aspect of the present invention there is provided apparatus for making cigar bunches comprising means for making charges of filler tobacco which fall short of the target weight of the total filler, means for determining by how much the light weight charges fall short of the target weight, a supply of topping up tobacco stored in units of predetermined size and means for adding to each light weight charge, a number of units of topping up tobacco proportional to the amount by which the charge is short of the target weight.

The apparatus preferably includes a balancing device set to balance at a predetermined weight which is below said target weight, and indicator means for indicating the amount by which any given charge of tobacco departs from said predetermined weight. Preferably the indicator means provides an electrical signal indicative of the degree of imbalance of any charge, said signal being used to control the addition of said units of topping up tobacco to the filler.

A preferred embodiment includes means for volumetrically metering the filler tobacco before weighing it to provide said light-weight charges. The means may comprise a chamber of variable volume, means being provided for altering the volume according to the degree of imbalance determined from the sequential weighings of previous tobacco charges. The degree of imbalance is preferably determined from the cumulative results of a number of successive weighings.

According to another aspect of the present invention, there is provided apparatus for making cigar bunches comprising a tobacco magazine, a volumetric metering device, a weighing device and a bunch rolling apron all disposed in vertical alignment, and a control causing metered volumes of tobacco from the magazine to fall into a weigh pan of the weighing device, and, after the degree of imbalance has been determined causing the metered and weighed charge to fall from the weigh pan onto the apron, means for adjusting the volume of the metering device in accordance with the degree of imbalance of the weighing device and a topping-up device for adding to the charge of tobacco on the apron an amount of tobacco determined by the degree of imbalance of said weighing device.

The invention is illustrated merely by way of example in the accompanying drawings in which:

FIG. 1 is a cross sectional view through apparatus according to the present invention being taken on the section line I—I of FIG. 2,

FIG. 2 is a part cross sectional elevation of the apparatus shown in FIG. 1 taken on the line II—II of that FIG.

FIG. 3 is a schematic arrangement of some of the control circuitry of the apparatus,

FIG. 4a is (i) a histogram and (ii) a graph illustrating weights of filler tobacco charges made on a conventional (i.e. uncontrolled) bunch making machine,

FIG. 4b is (i) a histogram and (ii) a graph illustrating weights of filler tobacco charges made on the same conventional machine but modified by employing an improved cut off and volume metering device according to the present invention,

FIG. 4c is (i) a histogram and (ii) a graph similar to FIG. 4b but further modified by including filler weighing and feedback to the volume control,

FIG. 4d is (i) a histogram and (ii) a graph similar to FIG. 4c but further modified to include a 'fine' tobacco additive device to top up light weight filler charges, and

FIG. 5 is an enlarged sectional view taken along lines I—I of FIG. 2 and showing details of eccentric 24 on shaft 23.

Referring to the drawings there is shown part of a conventional cigar bunch making machine including a magazine 10 substantially vertically disposed and in which a charge of tobacco 11 is maintained in a compressed state by a weight 12 slidably mounted within the magazine 10. Also illustrated in FIG. 1 is the apron 13 of the bunch making machine together with part of the perforate table 14 on which cigar binder is disposed and over which the filler deposited upon apron 13 is rolled by movement of the apron actuating mechanism including roller 15. In conventional cigar bunch making machines the magazine 10 and associated equipment is normally disposed adjacent the apron 13 whereby tobacco issuing from the lower end of the magazine 10 is deposited directly onto the apron 13. However, in the illustrated apparatus there is disposed between the lower end of the magazine 10 and the apron 13 apparatus, indicated generally at 16, which is designed to meter the charges of tobacco employed in each bunch filler (a) volumetrically and (b) by weight.

The apparatus 16 comprises a housing 17 and two platens 19', 19 parallel one to the other and spaced vertically apart. Housed within housing 17 adjacent the lower end of the magazine 10 is a cylindrical body 18 having formed therein a channel 20 which, in the relative position of the components as illustrated in FIG. 1, is aligned with the lower end of the magazine 10 and receives tobacco therefrom. It will be noted that channel 20 tapers from each end towards the middle and that the lower face 9 of weight 12 is of 'V' section. The effect of these co-operating shapes is to distribute the tobacco towards the ends of the cigar bunches thus encouraging more dense ends.

The base of the channel 20 is defined by a tapered block 21 which is mounted for vertical movement within a slot 22 cut in the cylindrical body 18. The body 18 and block 21 are mounted on a central shaft 23 provided with an eccentric 24 (see FIG. 5) such that rotation of the shaft 23 and corresponding rotation of the eccentric 24 will cause the block 21 to reciprocate vertically within the channel 22. Such vertical movement of the block 21 will vary the depth of the channel 20 and thus its capacity. In the illustrated embodiment, the channel 20 has a maximum capacity of 5 cubic centimeters, a minimum capacity of 4 cubic centimeters and thus a mean capacity of 4.5 cubic centimeters, which is designed to hold 1.7 gms of threshed cigar filler. The shaft 23 is provided with circumferentially spaced lugs 30 adapted to be engaged by a peg 31 on a wheel 32 itself rotated by an electric motor 33 via gears. The electric motor 33 is a constant speed motor adapted to be actuated for predetermined accurately timed intervals of 0.1 seconds in a manner described below. Each rotation of 0.1 seconds results in a variation in the capacity of channel 20 of 0.1 cubic centimeters.

Connected to the opposed end of shaft 23 is a pinion 35 which co-operates with a reciprocal rack 36 operated by an air cylinder 37 mounted on plate 19'. Actuation of cylinder 37 will cause rotation of the cylindrical body 18.

From the position illustrated in FIG. 1, the cylinder 18 is adapted to rotate in an anti-clockwise direction. Reversal of the illustrated direction of motion of rack 36 causes the cylinder 18 to rotate in a clockwise direction. The following or rearward side wall of channel 20 is provided by an hardened insert 40 of helical formation. The insert 40 is spaced from the opposed wide wall of channel 20 as illustrated in FIG. 1 but the spacing varies, being a maximum at the right hand end of body 18 (as viewed in FIG. 2) and decreasing along the length of the cylindrical body 18 towards the pinion 35. Thus the edge of insert 40 is disposed along a helical path. The opposed wall member of magazine 10 indicated in FIG. 1 at 41 also has at its lowermost end an hardened but linear shear edge. This is provided by the lower edge of an hardened block 42. This hardened linear shear edge co-operates with the hardened helical shear edge of insert 40 to provide a shearing action during relative rotation between cylinder 18 and the magazine 10. This shear action separates the tobacco within channel 20 from the tobacco within the magazine 10.

When the channel 20 is spaced from the magazine 10, the remainder of the surface of cylinder 18 will obturate and blank off the lower end of magazine 10, thus preventing tobacco falling therefrom.

Also housed within housing 17 is a semi-cylindrical weigh-pan 50. The weigh-pan 50 is provided with circular end discs 51, 52 and is pivotally supported at one end of a pair of parallel balance arms 53. The balance arms are pivotally mounted to support posts 38 by pairs of crossed linear leaf springs 39 mounted between the posts 38 and a cross beam 56. A clamp 60' is provided for clamping the arms 53 when the weigh pan is not in use. Mounted on the end of one of the arms 53 is a mask 54 in the shape of a cross and disposed to each side of the mask 54 are three slits 55a, b, and c and 56a, b and c respectively cut in another, stationary mask and providing light paths between a light source (not shown) and six photo-cells (not shown). The spaces between the mask 54 and the three pairs of slits 55a, 56a and 55b, 56b and 55c, are progressively greater whereby movement of the mask 54 vertically upwardly or downwardly causes progressive masking of the slits in the order a, b, c. This provides an indication of the amount by which the material being weighed in the weigh pan 50 departs from a preset value at which value the arms 53 are in balance.

It will be noted that weigh pan 50 is vertically below the cylindrical body 18. Upon rotation of the body 18 through substantially 180° the charge of tobacco from within channel 20 will fall by gravity into the pan 50. Upon releasing clamp 60' for a fraction of a second the tobacco within the pan can be weighed in that, using mask 54 and the associated photo-electric devices, it can be determined whether the weight of tobacco is heavier or lighter than a preset value.

Mounted on one end of the weigh pan 50 are vanes 60 mounted in the path of air jets 59 and 61. After weighing the tobacco within weigh pan 50 an air blast

through the jet 61 forces vane 60 to rotate the weigh pan 50 anticlockwise (as viewed in FIG. 1). The weigh pan is adapted to spin through substantially 180° until the edge 62 of the pan collides with a stop 63 on housing 17 at which stage the tobacco within the weigh pan will fall by gravity out of the pan. A blast through air jet 59 then returns the pan to its rest position as indicated in FIG. 1.

Tobacco falling from weigh pan 50 will fall by gravity onto the apron 13. To prevent the tobacco from being spread unduly during this fall it is channelled in its fall by channelling 70 comprising a face plate 71 and two side plates 72, 73. The fourth wall of the channelling is provided by a plate 74 mounted for movement relative to plates 71, 72, 73 between the position illustrated in full lines in FIG. 1 at 74 and that illustrated by broken lines at 74'. The plate 74 is connected by a rod 75 to an air cylinder 76 adapted to move it between its extreme positions.

Each of the plates 71 to 74 terminates adjacent the upper surface of apron 13. Projecting upwardly through the apron on either side of the channelling 70 are two plates 6, 7 which hold the tobacco filler on the apron when the channelling 70 is lifted immediately before the bunch rolling operation. Plates 4, 5, attached to plates 72, 73, ensure that the apron fits over the plates 6, 7, after the bunch rolling operations.

In the manner described below, the apparatus so far described is adapted to deposit sufficient tobacco upon the apron 13 to produce a light weight filler i.e. the target weight of the tobacco tipped from pan 50 is, say, 1.7 gms when a total filler weight of 1.9 gms is desired. The difference of 0.2 gms is arranged to be dispensed from a carefully controlled "fines" dispenser 79. The dispenser 79 comprises a hopper 81 from which fine tobacco drops into a chamber 82 the lower exit from which is obturated by a rotary bucket wheel 83 in the form of a cylinder having twelve elongate channels or 'buckets' cut in its periphery. Each 'bucket' is designed to hold 0.070 gms of fine tobacco. The wheel 83 is driven anticlockwise (as viewed in FIG. 1) by a stepping motor 84. Each stepwise movement of the motor 84 is adapted to move the wheel 83 by the angular equivalent of one bucket. Each bucket is filled with tobacco at its uppermost position, in passing through chamber 82, and the tobacco falls from each bucket as that bucket leaves an obturating plate 85. The tobacco falls down chutes 86 and 87 and through an aperture 88 in wall 71 to mix with the tobacco upon the apron 13. As viewed in FIG. 2 the chute 87 is shown in broken line to illustrate the spreader plate's divergent form intended to spread the fine tobacco across the full width of the channelling 70. Since each bucket holds 0.070 gms of tobacco, a light weight charge of 1.7 gms falling from weigh pan 50 will require 3 bucket loads of 0.070 gms to make up the charge to its target weight of 1.9 gms.

Operation of the apparatus will now be described with reference to FIGS. 1 and 2 and also FIG. 3 which is a diagrammatic illustration of some of the control circuitry of the apparatus, assuming it is desired to weigh and dispense filler tobacco to a target weight of 1.9 gms.

Tobacco is fed to the magazine 10 from a hopper in conventional manner by depositing the charges of

tobacco through a trap door 80 in the magazine 10. During this tobacco feeding operation the weight 12 is in its uppermost position above the trap door 80 such that it does not hinder the flow of tobacco into the magazine 10. After each charge of tobacco enters the magazine 10, the trap door 80 is closed to the full line position shown in FIG. 1 and weight 12 descends upon the tobacco fed into the magazine to compress it and urge it vertically downwardly through the magazine to its lowermost end. With cylinder 18 in the position illustrated in FIG. 1 the tobacco urged downwardly through the magazine will enter the channel 20 and become compressed therein due to the weight 12. A control signal passed to air cylinder 37 will reciprocate rack 36 to rotate pinion 35 thereby rotating cylinder 18 through 180° and back again to the position shown in FIG. 1. In rotating the cylinder 18 through 180°, the charge of tobacco within the channel 20 will be cut off by shearing action between members 40 and 42 and this charge of tobacco within the enclosed chamber defined by channel 20 will fall by gravity into weigh pan 50. When recharging the magazine 10, weight 12 is withdrawn by means of shafts 111 connected to a suitable lifting means not shown.

When the tobacco has settled within pan 50, the clamp 60' is released to determine whether the charge of tobacco received within the pan 50 is above or below a preset value of, say, 1.7 gms at which the arms 53 would balance. Movement of the mask 54 over one, two or even three photo-cell slits 55a, b or c or 56a, b or c, will indicate the degree of imbalance of the charge of tobacco within the pan 50. Electrical control apparatus including holding circuits 90 is arranged to receive signals from the photo-cells associated with each of the six slits adjacent mask 54 whereby as each slit becomes masked and thus light to the photo-cells is obscured, a signal from the associated photo-cell will pass to the holding circuits 90. An algebraic summing circuit 91 adds algebraically the signals from the holding circuits 90. Thus for example the signals from photo-cells 55a, 55b and 55c can be equivalent to plus one unit, plus two units and plus three units respectively. The signals from photo-cells 56a, 56b and 56c can be equivalent to minus one unit, minus two units and minus three units respectively. The algebraic summing circuit is arranged to provide a control signal in line 92 when, for example, the algebraic sum of the signals from the photo-cells reaches a predetermined value e.g. five units. Thus if four consecutive weighings provide signals from the photo-cells equivalent to plus three units, minus one unit, plus two units, and plus one unit, the algebraic sum of these signals will be plus five and thus a control signal will be provided in line 92. Similarly if four consecutive readings are minus three units, plus one unit, minus two units and minus one unit respectively the algebraic sum is minus five and again a control signal will be created in line 92. The signal in line 92 is used to control operation of electric motor 33 via a motor circuit which is set such that for each control signal received the constant speed motor 33 is operated for a predetermined time of 0.1 seconds. The motor 33 will thus rotate shaft 23 by a predetermined amount for each control signal received, i.e. adjusting the volume of channel 20 by 0.1 cubic centimeters for each signal

received. Clearly if the control signal in line 92 indicates a "trend" of heavy weighings the size of channel 20 will be reduced and if the control signal indicates a "trend" of light weighings the size of channel 20 will be increased. By this means the volume of tobacco received in channel 20 will be adjusted such that the weight of tobacco received in the pan 50 will be maintained at substantially the value at which the weighing pan mechanism has been preset e.g. 1.7 gms. Adjustments are provided in the control circuitry whereby the degree of rotation of motor 33 for each control signal is readily variable. This adjustment ensures that the same apparatus can be used for cigars having totally different target weights, where the degree of control is thus quite different from that discussed here.

After weighing the tobacco in the pan 50, an air blast through jet 61 will rotate the pan thus tipping the tobacco onto apron 13. Impact between the edge 62 of pan 50 and stop 63 will jar the pan to dislodge any tobacco remaining in the pan after rotation. Thus the pan will be cleared after each weighing. During the rotation the clamp 60' has of course been reapplied and upon return of the pan 50 to its reset position the pan is ready to receive the next charge of tobacco from cylinder 18.

The individual signals from the holding circuits 90 pass to a set of digital command circuits 95 which control the operation of stepping motor 84 by passing control signals to a binary counter 100 through a decoder 97. The motor 84 is actuated stepwise by signals received from an oscillator 101 under the control of counter 100. A stop signal for stopping the motor is passed to the oscillator 101 from decoder 97 through a line 105. For any given command signal it is essential that an exact number of buckets on wheel 83 be rotated past obturator 85 to ensure that an accurate weight is maintained in the cigar filler, and that the wheel 83 is correctly set to handle the next rotation upon command from decoder 97. To ensure that the wheel 83 always comes to rest after an exact number of buckets have been emptied (i.e. not whilst a bucket is being emptied), a switch 106 in line 105 is provided with a cam follower which co-operates with cups in the periphery of a cam wheel 107 attached to the shaft on which motor 84 and wheel 83 are mounted. The number of cups on the wheel 107 is the same as the number of buckets on wheel 83, and these cups and buckets are aligned. The arrangement is such that the motor 84 can be stopped only when switch 106 is engaged in a cup on wheel 107 (i.e. when a bucket on wheel 83 has just passed obturator 85 and has been emptied. Thus the motor 84 will never stop the wheel 83 between bucket loads.

If a target weight of 1.7 gms of filler has been dispensed from pan 50, there will be a command signal from circuit 95 indicating that the weigh pan has balanced, thus the final filler weight is 0.2 gms. short and the 'normal' addition of 0.2 gms of 'fines' is required. This signal, indicated as "+3 buckets" in the digital command circuit 95 will pass a signal to the binary counter to cause the wheel 83 to be rotated by three buckets. Since each bucket contains 0.070 gms of tobacco, a total of 0.21 gms will be dispensed through chute 87 to mix with the 1.7 gms of filler already present on apron 13, thus providing a total filler weight

of 1.91 gms, being the closest approximation possible to the desired 1.90 gms.

Should the filler weighed in pan 50 be overweight by, say, "+2" units as indicated in the holding circuits 90, the digital command circuit 95 will command rotation of motor 84 to the equivalent of one bucket only (+1 in circuit 95) thereby to dispense 0.070 gms of fines onto apron 13. If the filler is "-3" units underweight, the motor 84 will be caused to rotate for six buckets of fines, thus dispensing 0.42 gms of fines onto apron 13.

It will be appreciated that the relationship between the "imbalance units" indicated in the holding circuit 90 and the digital commands from circuits 95 can be varied at will whereby the amount of fine tobacco added to the filler for each unit of imbalance is varied accordingly.

The tobacco falling upon apron 13 from pan 50 and wheel 83 will be scattered between the plates 71, 72, 73 and 74. A signal to air cylinder 76 will then cause plate 74 to move from its full line position to the broken line position at 74' whereby the tobacco which has fallen upon the apron 13 will be swept into a more dense arrangement adjacent the plate 71. The plate 74 is then returned to its rest position as illustrated in FIG. 1. The whole of the apparatus so far described including the magazine 10, housing 17 and the equipment therein, the plates 19', 19 and its associated equipment, the channelling provided by plates 71, 72, 73 and 74 the 'fines' equipment 79 including hopper 81 all move vertically for a distance substantially equivalent to the spacing between plates 19' and 19. This vertical lifting may be provided by any suitable lifting means, not shown, suitably connected to the apparatus such as at plate 19'. In this raised position of the equipment the roller 15 and associated 'roll up' mechanism is actuated to roll the charge of tobacco on the apron 13 over the perforate table 14 on which there is situated the binder for the filler and thus a cigar bunch is manufactured in the conventional manner. Following movement of the bunch apron, the apron and roller 15 return to the position shown in FIG. 1 and the remainder of the equipment from the magazine 10 to the guide 71-74 and 'fine' equipment 79 returns from its elevated position to the position illustrated in FIG. 1.

It will be appreciated that the sequence of operations described above will overlap in that the next charge of tobacco to form the filler for the next cigar bunch will be passing through the equipment whilst the previous bunch is being made. Indeed the cycle is so arranged that whilst the equipment is in its elevated position during which two second period a bunch is being rolled up on the apron 13, and during the rest position of a few seconds at this upper or elevated position, the charge of tobacco for the next cigar bunch to be made is being weighed in the pan 50. The clamp 60' is adapted to be released at the upper, rest position of the equipment and is reapplied before the equipment returns to its lowermost position illustrated in FIG. 1. Thus the weighing operation using pan 50 is effected during the two second rest period whereby the actual weighing will not be adversely affected by movements of the machine. The remainder of the operations overlap one another correspondingly.

With the apparatus described above the manner in which the tobacco filler for cigar bunches is prepared

in discrete charges is improved considerably by (a) having improved cut-off arrangement by which the tobacco is removed from the magazine in discrete quantities (b) a more accurate volumetric metering of the tobacco by employing the close tolerance channel 20 which is effectively closed once it leaves its alignment with the lower end of the magazine 10 (c) metering of the charge by weight through the weigh pan 50 and associated equipment (d) very close supervision of weight of the charge for each filler using a 'topping-up' method of fines by e.g. equipment 29 through shute 87.

An indication of the way in which these features improve the weight distribution of cigar bunches is provided by FIG. 4. Referring to FIG. 4 the histograms and graphs (a) illustrate the weight distribution for uncontrolled i.e. conventional cigar bunch machine without the new equipment described above, (b) illustrates the histogram and graph for weight distribution employing only the cylinder 18 i.e. the improved cut off arrangement using shear elements 40 and 42 and the more closely controlled volumetric metering of channel 20. It will be seen from comparing (a) with (b) that the weight distribution has been improved and the "trend" indicated by FIG. 4a has been reduced and thus the "trend" of the weight variations has been improved. The diagrams (c) indicate the weight distribution employing the cylinder 18 and the weigh pan 50 with its corresponding feed back controlling the volume of channel 20. It will be seen from this that a considerable improvement has been achieved. The "trend" has been virtually eliminated and the only substantial variation now present is the variation between the weights of individual cigar bunches. The "trend" quite apparent in FIGS. (a) and (b) has been virtually removed. Referring now to the diagrams (d) this indicates weight distribution using the whole of the apparatus described i.e. cylinder 18 for volumetric metering, weigh pan 50 for weight control and the fines equipment 79 which employs the fines added through shute 87. It will be seen from this that the discrepancy in the weights of successive cigar bunches has been brought under control and is not excessive.

It is useful to compare the histograms from (a) and (d) since they provide an indication of the savings produced employing the apparatus described above. Superimposed upon histogram (d) is histogram (a) from which it will be seen that the shaded area P indicates the amount of ingredient i.e. tobacco filler saved on the batch of cigars measured (in this particular case a batch of two hundred cigar bunches). Area Q indicates the light rejects and area R the heavy rejects.

With the apparatus described above, an electrical signal indicative of the weight of individual cigar bunches can be used to trigger an accept or reject mechanism for heavy and light bunches. This will be used to reduce the spread of the histogram by the areas Q and R as indicated in the histogram 4(d). It will be particularly noted by comparison of histograms of the uncontrolled and the fully controlled bunches that the mean weight has been reduced Considerably by an amount S the spread has been considerably reduced from T to t and thus a considerable saving in material employed in bunches is achieved as well as more consistent bunches.

It is to be expected that, with the apparatus described above, a saving of 5 percent in the tobacco used in the bunch filler can be achieved. It is estimated that a 2 percent saving can be achieved using the combined volumetric and weighing apparatus described above i.e. cylinder 18 and weigh pan 50 with their associated components and a further 3 percent saving can be achieved by employing the fines equipment 79 whereby light bunches are made and their weight is made up to a preset value. It will be appreciated that a 5 percent saving in material can provide significant savings in bunch manufacture.

It will be appreciated that many variations on the basic design can be affected. Thus the weight and face 9 and channel 20 could be plane rather than 'V' shaped, there need be only one air puff pipe 61, the pan 50 returning to its rest position without the need for pipe 59. There could be more or less 'bunches' on wheel 83.

What we claim is:

1. Apparatus for making cigar bunches with a predetermined target weight of filler tobacco wherein there are provided:

- a. a variable volume chamber in which filler tobacco is contained;
- b. weighing apparatus for weighing the filler tobacco from the variable volume chamber;
- c. a control device for varying the volume of the chamber, the control device comprising,
- d. an eccentric shaft on which a movable base of the chamber is mounted so that rotation of the shaft causes movement of the base of the chamber; and an electric motor for rotating the eccentric shaft in accordance with control signals determined by the difference in weight determined by the weighing apparatus and the predetermined target weight.

2. Apparatus for making cigar bunches with a predetermined target weight of filler tobacco, comprising:

- a. a magazine for holding filler tobacco;
- b. a rotatable cylinder disposed at the lower end of the magazine;
- c. a variable volume chamber formed in the periphery of the cylinder providing an extension to the lower end of the magazine, the volume of the chamber being such that the weight of tobacco therein is not more than the target weight;

d. a weight slidably mounted within the magazine for maintaining in compression a column of tobacco within the chamber;

e. means for rotating the cylinder about its axis, thereby

- i. rotating the chamber out of alignment with the
- ii. obturating the lower end of the magazine with the cylinder;

iii. when the chamber is filled with tobacco, providing for a cigar bunch a charge of filler tobacco;

f. means for weighing the charge of filler tobacco;

g. means for determining by how much the charge is lighter than the target weight;

h. means for storing a supply of topping-up tobacco stored in units of predetermined size;

i. means for adding to each light weight charge a number of units of topping-up tobacco proportional to the amount by which the charge is short of the target weight;

j. means for varying the volume of the chamber in accordance with control signals determined by the difference in weight between the weight of the charge of filler tobacco and the predetermined target weight.

3. Apparatus as claimed in claim 2 wherein the variable volume chamber is a channel tapering from each of its ends towards its middle.

4. Apparatus as claimed in claim 2 wherein the lower face of the weight is of "V" section.

5. Apparatus as claimed in claim 2 wherein said chamber volume varying means comprises

a. a movable chamber base, being movable in a direction perpendicular to the axis of rotation of the rotatable cylinder;

b. an eccentric shaft on which said movable base of the chamber is mounted; and

c. an electric motor for rotating the eccentric shaft in accordance with control signals determined by the degree of imbalance of the weighing operations.

6. Apparatus as claimed in claim 2 wherein there are provided;

a. a common chute to receive the charge from the weighing means and to receive the units of topping-up tobacco; and

b. means for transferring the charge from the weighing means to the common chute.

* * * * *