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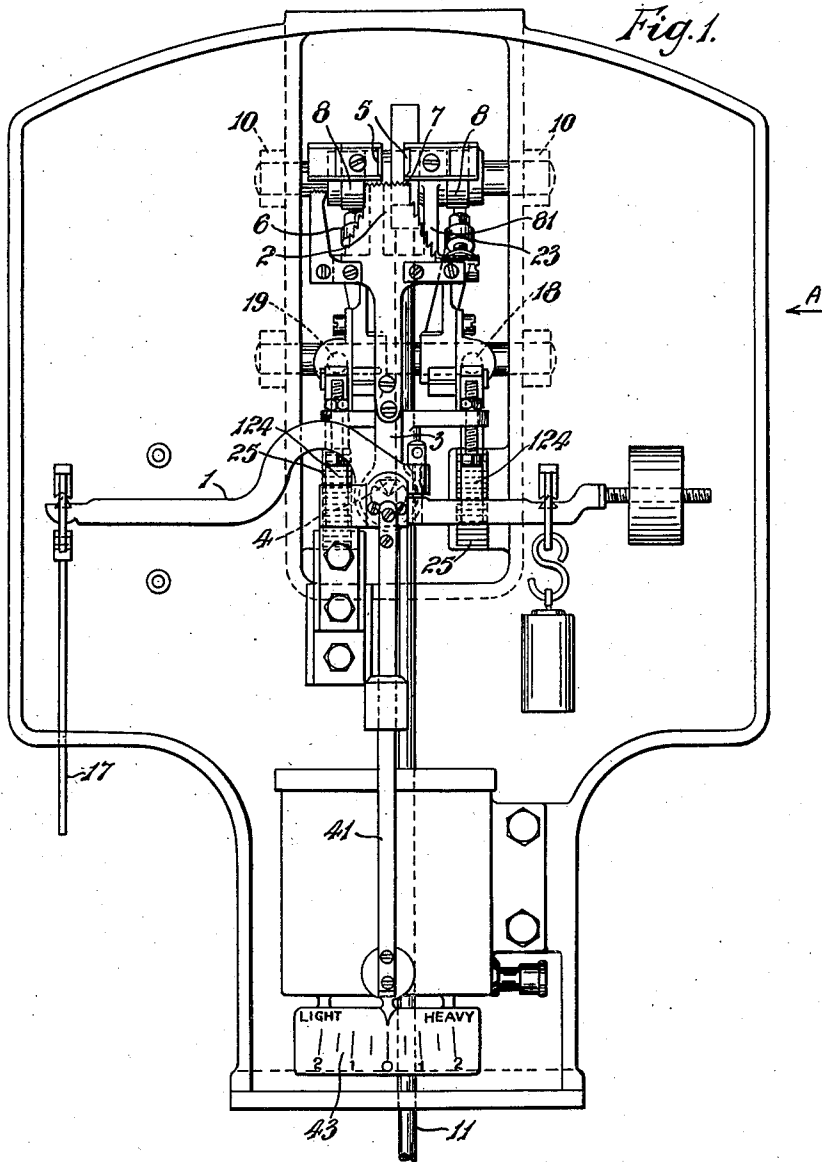
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2,083,173

APPARATUS FOR CONTROLLING TOBACCO FEEDING MECHANISM

Filed May 26, 1934

4 Sheets-Sheet 1



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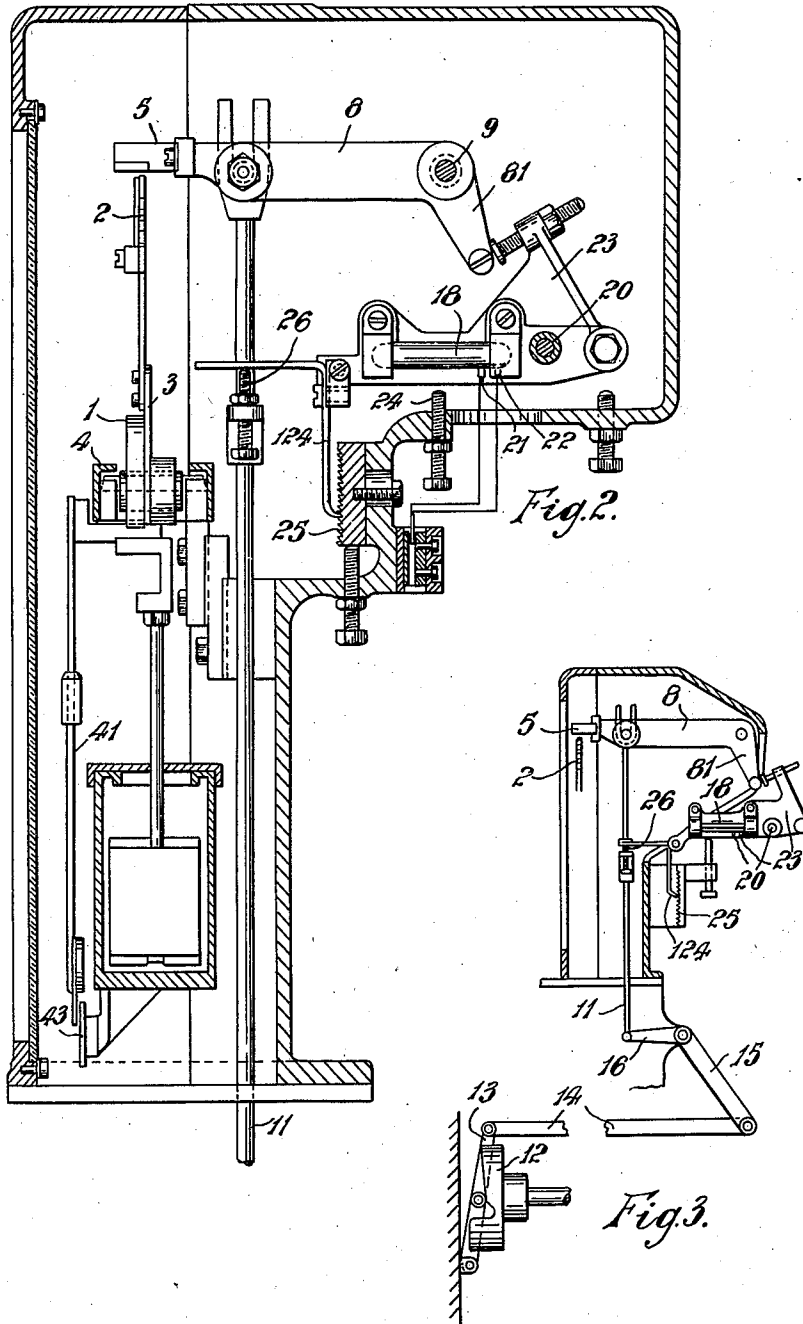
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4 Sheets-Sheet 2



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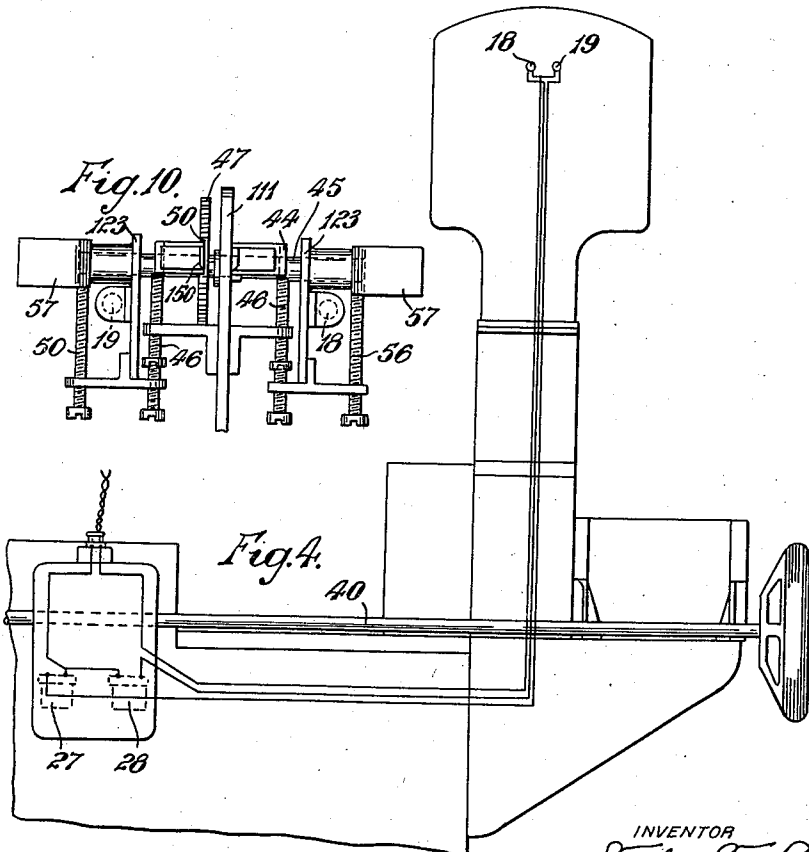
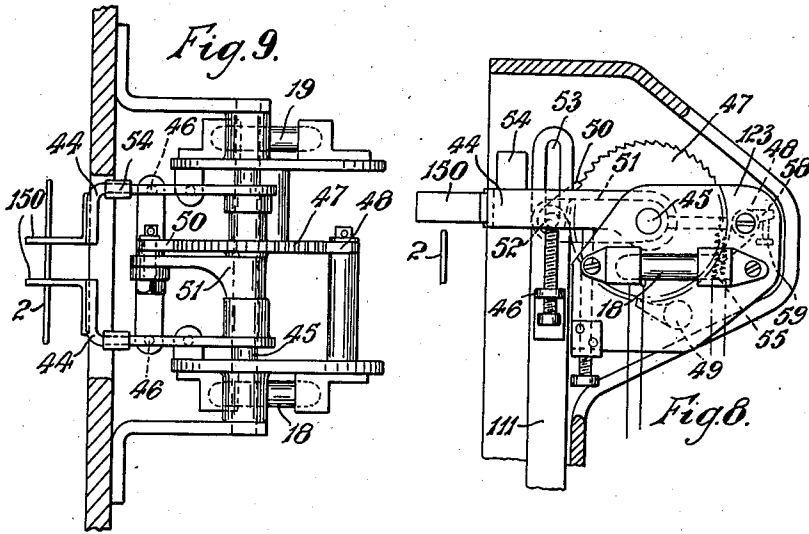
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APPARATUS FOR CONTROLLING TOBACCO FEEDING MECHANISM

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4 Sheets-Sheet 3



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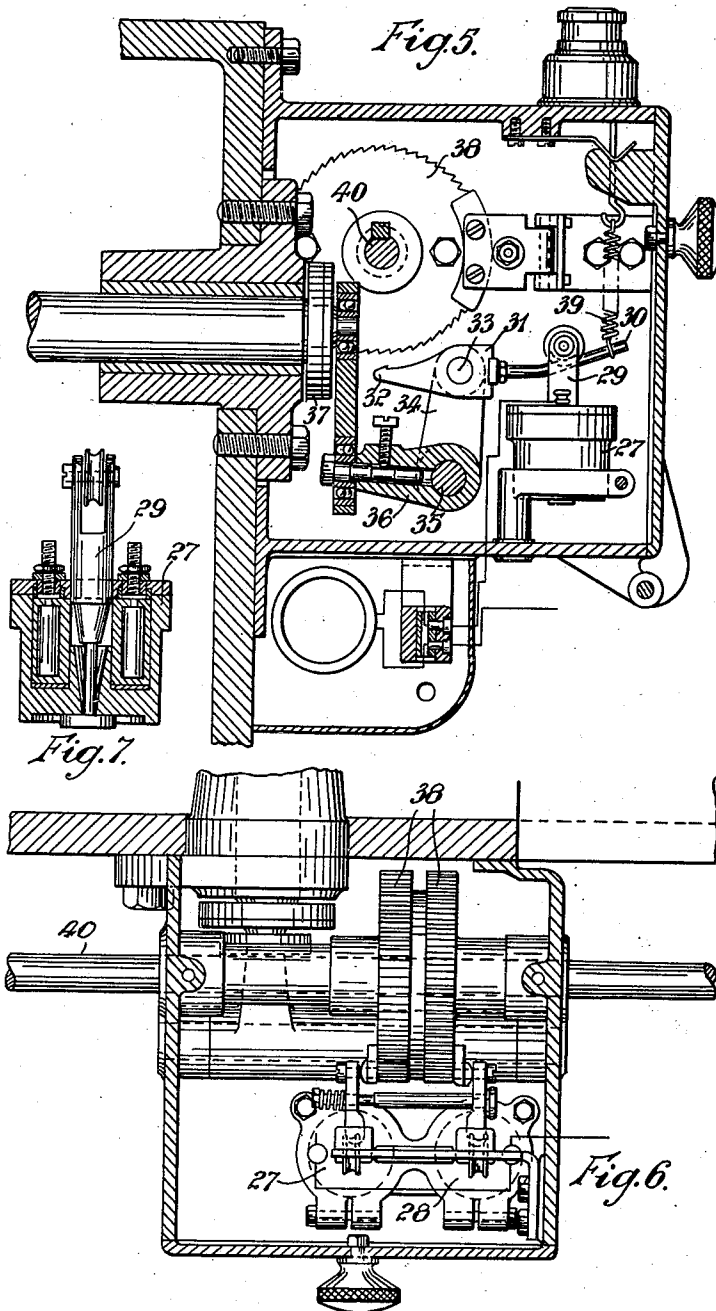
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APPARATUS FOR CONTROLLING TOBACCO FEEDING MECHANISM

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4 Sheets-Sheet 4



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# UNITED STATES PATENT OFFICE

2,083,173

## APPARATUS FOR CONTROLLING TOBACCO FEEDING MECHANISM

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Application May 26, 1934, Serial No. 727,787  
In Great Britain June 7, 1933

10 Claims. (Cl. 131—39)

This invention is for improvements in or relating to apparatus for controlling tobacco feeding mechanism, and refers more particularly to an improved device for automatically controlling the tobacco feed of a cigarette making machine so as to ensure that cigarettes of consistent weight are produced.

It has previously been proposed to provide apparatus for use on a cigarette making machine wherein means operable to vary automatically the feed of tobacco to the cigarette making machine, is operatively connected to weighing mechanism in such a manner that variations in the weight of the cigarettes produced by the machine automatically ensure variations in the feed of the tobacco. However, in such apparatus the regulation of the tobacco feed has been effected in such a manner that the amount of regulation each time the mechanism is operated is the same in spite of variations in the weights of successive quantities of cigarettes.

It will be seen that in view of the time interval between the manufacture of the cigarettes, and the subsequent regulation of the tobacco feed, when the said cigarettes are weighed, that if, for example, a number of cigarettes which are too light have been produced, it is necessary to correct the machine as speedily as possible, and as the amount of regulation is always the same even when the cigarettes have a weight which differs considerably from the desired weight, it requires several successive weighings and corresponding movements of the regulating mechanism before the machine is corrected.

To overcome this drawback, the object of the present invention is to provide means whereby the amount of regulation imparted to the tobacco feeding apparatus is proportional to the difference in weight of any given batch of cigarettes from the normal weight.

According to the present invention there is provided apparatus in or for use with a tobacco feeding mechanism (e. g., for a cigarette making machine) for controlling the quantity of tobacco supplied, comprising a weighing mechanism, detector means co-operating with the weigh beam thereof, and movable in proportion to the amount of deflection of the weigh beam and means operatively connected to the detector means to regulate the tobacco feeding mechanism proportionately to the movement of the detector means.

Further, according to the present invention there is provided apparatus in combination with or for use with tobacco feeding mechanism, the said apparatus comprising a weighing device,

movable detector means co-operating with the weigh beam of the weighing device and movable in proportion to the amount of deflection of the weigh beam, means movable with the weigh beam to determine the amount of movement of the detector, regulating means to regulate the tobacco feeding mechanism, stopping means operative to stop the regulating means after a time interval, said stopping means being operatively coupled to the detector means so that the duration of operation of the regulating means is determined by the position of the detectors after a weighing operation.

The invention will be more particularly described with reference to the accompanying drawings, in which:—

Figure 1 is a front elevation of apparatus constructed in accordance with the invention.

Figure 2 is a sectional elevation of Figure 1 taken in the direction of the arrow "A".

Figure 3 is a diagrammatic view showing the operation of certain parts of the apparatus.

Figure 4 is a diagrammatic view showing the electrical wiring connections used with the apparatus.

Figure 5 is a sectional elevation of a portion of the apparatus.

Figure 6 is a plan of Figure 5, the figure being turned round in the drawings for the sake of convenience.

Figure 7 is a sectional view on an enlarged scale showing a detail of Figure 5.

Figure 8 is a side elevation showing a modified form of the invention.

Figure 9 is a plan of Figure 8.

Figure 10 is a front elevation of Figure 8.

Like reference numerals refer to like parts throughout the specification and the several figures of the drawings.

Referring to Figures 1 to 7 of the drawings, the weigh beam 1 of the apparatus has fixed relatively to it a plate 2 by means of which the deflection of the beam after a weighing operation has taken place may be readily registered. This plate 2 will be referred to hereafter as the "deflection plate". The upper edge 7 of the deflection plate 2, which is preferably formed at the top of an arm 3 projecting upwardly from the weigh beam, may be shaped to any suitable curve which may or may not be concentric with the knife edge 4 of the weigh beam so that detectors 5, hereinafter termed "feelers" which are lowered at predetermined intervals on to the deflection plate 2, will take up varying positions according to the deflection of the beam 1. Pref-

erably the deflection plate 2 is provided with a number of small steps 6, the steps being in two groups, one on each side of the plate, as shown clearly in Figure 1. The upper edge 7 of the plate 2 may be formed as a plain edge or may be serrated as shown in Figure 1.

The feelers 5 are arranged to rest upon this top portion of the plate 2 if the deflection of the plate (i. e., the weight of the cigarettes) is normal. The feelers 5 are fixed to the ends of bell crank levers 8 pivoted at 9 in bearings 10 in the machine frame. The feelers are controlled by a vertical rod 11 operated by a rotating cam 12 through the medium of levers 13, 14, 15 and 16 (see Figure 3) so that the feelers 5 are lowered on to the deflection plate as soon as the weighing operation is completed and the beam comes to rest. The cam 12 is driven in synchronism with the cigarette making machine and the cigarettes being weighed are automatically deposited at intervals in batches into the scale pan (not shown) of the weighing mechanism, the scale pan being supported by the rod 17. In United States Patent No. 1,921,317, there is shown mechanism for delivering cigarettes from the cigarette making machine into the scale pan of a weighing device. When a weighing operation is completed, the mechanism is caused to tilt the pan so as to empty the pan of cigarettes. Mechanism such as that disclosed in the prior United States patent may be employed in conjunction with the present invention, and the feelers 5 are synchronized with the weighing mechanism so that the feelers are lowered when the deflection plate 2 has come to rest. The feelers and deflection plate are synchronized by means of gearing which is arranged both to operate to empty the scale pan and to operate the shaft which carries the cam 12, shown in Figure 3 of the drawings accompanying the present specification.

The levers 8 to which the feelers 5 are attached are, as previously stated, pivoted at 9 and are arranged so that they normally occupy a position whereby the feelers are held away from the deflection plate.

A pair of mercury switches 18 and 19 of the type comprising a glass tube with two or more contacts therein are mounted on carriers 23 pivoted to the frame of the machine at 20. The switches 18 and 19 are provided with contacts 21 and 22 and the carriers 23 on which the switches 18 and 19 are mounted are arranged to rest on adjustable stops 24 which are movable to such a height so that when the carriers are resting on the stops, the mercury in the switches is at the end of the tubes opposite the contacts and the electric circuits are broken.

The arms 31 of the levers 8 are arranged to engage with the carriers 23 or with parts connected to them and turn them about the pivot 29 for a distance which is determined by the position taken up by a feeler 5 after a weighing operation.

Only one of the feelers 5 is arranged to operate a switch at any time, as the other feeler will be arrested by the serrated edge 7 of the deflection plate. The rod 11 is slotted at its upper end as seen in Figure 2 in order to permit the continued downward movement of the rod when a feeler or both of the feelers is or are arrested by the edge 7 of the deflection plate. If the weight of a batch of cigarettes is normal, both feelers 5 will be arrested by the edge 7 and the carriers 23 will not be operated.

To the free end of each of the carriers 23 there is pivoted a pawl 124 which is arranged to engage with a rack 25 fixed to the frame of the machine. The pawls are weighted so as to tend to engage with the racks by gravity. When the cam 12 operates to raise the feelers 5 from plate 2 to reset the apparatus, the levers 8 are swung about the pivot 9 and if a carrier 23 has been operated by one of the arms 31 after the last weighing operation, this arm 31 now moves away from the carrier so operated and the carrier remains in the set position, being held there by the contacting members 124 and 25 until a projection 26 shown in the drawings as a screw carried by the rod 11 rises and trips the pawl 124 out of engagement with the rack 25. When the pawl is tripped the carrier 23 returns by gravity to its normal position on the stop 24 and the circuit which was energized is thus broken.

Referring to Figure 4 of the drawings, it will be seen that the mercury switches are arranged in parallel, and they are connected to a pair of solenoids 27, 28 shown more clearly in Figures 5 and 6.

The armature 29 of each solenoid is connected to one arm 30 of a bellcrank lever 31, the other arm of which constitutes a pawl 32. The levers 31 are further connected by bearings formed at the angle of the bell crank by pivots 33 to a pivoted lever 34. The pivoted lever 34 is oscillated about its pivot 35 by a link 36 attached to an eccentric 37, see Figure 5, which is driven from the main drive of the cigarette making machine.

By means of this eccentric the pawls 32 are constantly vibrated in the neighborhood of the ratchet wheels 38 and when one of the solenoids 27 or 28 is energized, the armature 29 is pulled downwardly against the action of the spring 39 and causes the corresponding pawl 32 to engage with a ratchet wheel 38. The wheels 38 are arranged so that one causes the shaft 40 to be rotated in one direction whilst the other causes the shaft to be rotated in the reverse direction. The shaft 40 is connected with the control shaft or the shaft 40 may be the control shaft of the tobacco feeding apparatus through a variable speed gear with the main drive of the tobacco feeding apparatus, and when the shaft 40 is rotated in one direction or the other, the tobacco feeding apparatus operates at a faster speed or slower speed according to the direction in which the shaft is rotated.

The weighing mechanism is arranged so that some cigarettes as they issue from the cigarette machine are delivered into the weighing pan. This may be effected by the mechanism described in prior British patent specification No. 375,463.

The operation of the apparatus is as follows: Supposing for example, a batch of cigarettes has just been weighed and the pointer 41 has moved to the left of Figure 1, thus indicating that the cigarettes are lighter than normal weight, the deflector plate 2 will move to the right of the drawings, and when the cam 12 allows the feelers 5 to descend the left-hand feeler as seen in Figure 1, will come into engagement with one of the steps 6 on the deflector plate 2.

The other feeler will rest on the top of the deflection plate, and by this means the mercury switch operated by this feeler will not be operated during this cycle of operations.

The mercury switch 19, however, will be tilted upwardly and the circuit will be made, thereby

energizing the solenoid 27. When this occurs, the armature 29 is drawn downwardly and the bellcrank 31 is pulled against the action of the spring 39 so that the pawl 32 is brought into engagement with the ratchet wheel 38 shown in Figure 5. The eccentric 37 causes the pawl 32 to continuously operate the ratchet wheel 38 whilst the solenoid 27 remains energized. In this way, the control shaft 40 of the tobacco feeding apparatus will be operated as long as the circuit is made and the length of time during which this occurs is determined by the position which the feeler 5 has assumed with respect to the deflection plate 2.

After the circuit has been made and the parts just described set in operation, the cam 12 again raises the rod 11 and lifts the feelers 5 out of engagement with the deflection plate 2 and causes the arm 81, see Figure 2, of the bellcrank lever 8 to be moved away from the stop on the carrier 23. The carrier 23 does not immediately return to its normal position, as shown in Figure 2, but is held in the inclined position to which it was set by the initial movement of the lever 8 by the pawl 24 engaging with the rack 25. As the rod 11 rises, the stop 26 comes into engagement with the tail of the pawl 124 and causes the pawl to be disengaged from the rack 25. When this happens the carrier 23 drops back to the position shown in Figure 2 and the circuit is broken and the pawl 32 ceases to operate the ratchet wheel 38.

It will be seen that the time during which the pawl 32 and ratchet 38 co-operate to alter the control shaft 40 of the tobacco feeding mechanism is determined by the length of time during which the circuit remains completed, and this is determined by the angle of inclination of the carrier 23 which causes the circuit to be made. This angle is in turn determined by the position of the feelers 5 after a weighing operation and the time which elapses before the circuit is again broken is determined by the position the pawl 124 assumes with respect to the rack 25, as when the pawl 124 assumes a position towards the upper part of the rack 25, it will be appreciated that a longer time interval elapses before the pawl is tripped by the stop 26 than when it occupied a lower position.

It will be seen, therefore, that the time during which the control shaft 40 is being operated by one of the ratchets 38 is proportional to the variation in weight of a batch of cigarettes from the weight of a predetermined or normal batch of cigarettes.

Referring to the modified form of the invention shown in Figures 8 and 9 the feelers 159 are fixed to arms 44 carried on a spindle 45. The switch carriers 123 are also mounted on the spindle 45 and are arranged to be tilted downwardly by the arms 44 engaging with stops 46 as the feelers assume a position with respect to the deflecting plate 2 after a weighing operation.

In place of the racks 25 previously described, a ratchet wheel 47 is provided and pawls 48 and 49 fixed or resiliently mounted on the carriers 123 are arranged to engage with the teeth of the ratchet wheel 47. A further pawl 50 is provided and is mounted on an arm 51 provided with a pin 52 which co-operates with a slot 53 in the rod 111. The pawl 50 serves to set back the ratchet wheel when parts are returned to the normal position after the tobacco feed controlling apparatus has been operated.

The operation of the apparatus constructed in accordance with the modified form of the invention is similar to that previously described so that when a feeler assumes a position similar to that previously described with reference to Figure 1 of the drawings, the arm 44 moves downwardly and is assisted in this movement by a counterweight 54. The movement of the arm 44 tilts the carrier 123 downwardly so that the mercury in the switch causes a circuit to be made. The continued downward movement of the rod 111 after the feeler has engaged with the deflection plate 2 causes the top of the slot 53 to engage with the pin 52 and draws the pawl 50 downwardly over the tops of the teeth of the ratchet wheel 47. A spring 55 is provided to balance the counterweights 54.

As the rod 111 again moves upwardly to return the various parts to their normal positions, the pin 52 is not engaged by the bottom of the slot 53 until the rod has moved a distance equal to the length of the slot and during this period the carrier 123 remains in the operative position whereby the circuit is completed. The carrier is held in this position by the corresponding pawl 48 or 49 being in engagement with the teeth of the ratchet wheel 47, the wheel being frictionally held against rotational movement by suitable means (not shown). When, however, the rod 111 has moved a distance equal to the length of the slot 53, the pin 52 is engaged by the bottom of the slot and the continued movement of the rod 111 causes the ratchet wheel 47 to be rotated in a clockwise direction as viewed in Figure 8, and the carrier 123 is similarly rotated as the weight of the carrier 123 is holding the pawl 48 in engagement with the teeth of the ratchet wheel 47.

Just before the stop 56 carried by the carrier 123, engages with the bracket 57 the tail 58 of the pawl 48 contacts with a trip stop 59 fixed to the frame of the apparatus. The trip stop 59 disengages the pawl 48 from the ratchet and the carriage then falls by gravity to its normal position thus breaking the circuit with a snap action similar to that previously described.

It will be seen that the construction shown in Figures 8 and 9 is merely a modified form of that shown in the remaining figures of the drawings, and that the operation of the apparatus is precisely similar.

It will be appreciated that the term "weigh beam" as employed herein is used broadly to refer to any element of a scale or weighing mechanism which is displaced to an extent proportional to the weight of the article or articles being measured. Thus the element in question may partake of rocking movement as is most customary, or may be supported for linear reciprocation. It is only necessary that the extent of displacement of the detector member vary in accordance with the extent of displacement of the element in question.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a cigarette making machine, the combination with electrically operated means to control the quantity of tobacco supplied to the machine, of weighing mechanism having a weigh beam, a deflection plate cooperating with the weigh beam, an electrical circuit for the control means, at least one detector member being movable to engage the deflection plate after a weighing operation and operable after said weighing operation to close the said circuit and regulate

the control means, said circuit remaining completed for a period of time determined by the extent of movement of said member.

2. In a cigarette making machine, the combination with electrically operated means to control the quantity of tobacco supplied to the machine, of a weighing mechanism having a weigh beam, a deflection plate cooperating with the weigh beam, an electrical circuit for the control means, at least one detector member movable to engage the deflection plate after a weighing operation and operable after said weighing operation to close the said circuit and regulate the control means, means to actuate the detector member, and means to reset the detector member and to break said circuit after a time interval determined by the extent of movement of the detector member.

3. In a cigarette making machine, the combination with electrically operated means to control the quantity of tobacco supplied to the machine, of a weighing mechanism having a weigh beam, a deflection plate cooperating with the weigh beam, an electrical circuit for the control means, two detector members movable to engage the deflection plate after a weighing operation, a pivotally mounted switch for each member actuated by said members to close the said electric circuit and regulate the control means, said control means being operative by one of said switches to retard the tobacco feed and by the other switch to accelerate the feed, means to actuate the detector members, and means to reset a detector member after a detecting operation and to break said circuit after a time interval determined by the extent of movement of the detector member.

4. In a cigarette making machine, the combination with electrically operated means to control the quantity of tobacco supplied to the machine, of a weighing mechanism having a weigh beam, an electrical circuit for the control means, a deflection plate cooperating with the weigh beam, two detector members movable to engage the deflection plate after a weighing operation, a pivotally mounted switch for each member actuated by said members to close said electric circuit and regulate the control means, said control means being operative by one of said switches to retard the tobacco feed and by the other switch to accelerate the feed, a ratchet and pawl to retain a switch in the operative position, means to actuate the detector members, and means to reset a detector member after a detecting operation and disengage said ratchet and pawl to break said circuit after a time interval determined by the extent of movement of the detector member.

5. In a cigarette making machine, the combination with electrically operated means to control the quantity of tobacco supplied to the machine, of a weighing mechanism having a weigh beam, a deflection plate cooperating with the weigh beam, an electrical circuit for the control means, two detector members movable to engage the deflection plate after a weighing operation, a pivotally mounted switch for each member actuated by said members to close the said electric circuit, ratchet wheels on the control shaft of the tobacco feeding mechanism, pawls to engage said wheels, one of the wheels being operated by one of said switches to accelerate the tobacco feed and the other operated by the other switch to retard the tobacco feed, a ratchet and pawl to retain one of said switches in the op-

erative position, means to actuate the detector members, and means to reset a detector member after a detecting operation and disengage said ratchet and pawl to break the circuit after a time interval determined by the extent of movement of the detector member.

6. In a cigarette making machine, the combination with electrically operated means to control the quantity of tobacco supplied to the machine, of a weighing mechanism having a weigh beam, a deflection plate cooperating with the weigh beam, an electrical circuit for the control means, two detector members movable to engage the deflection plate after a weighing operation, a pivotally mounted switch for each member actuated by said members to close the said electric circuit, a solenoid connected with each switch, a ratchet and pawl to retain the switch in the operative position, ratchet wheels on the control shaft of the tobacco feeding mechanism, pawls operated by said solenoids to engage said wheels, one of the wheels being operated by one of said solenoids to accelerate the tobacco feed and the other operated by the other solenoid to retard the tobacco feed, means operative to actuate the detector, and means operative in timed relationship with said actuating means to break the circuit while the detector is being reset, said circuit breaking means being operative at a point and after a time interval determined by the position of the detector with respect to the deflection plate after a weighing operation.

7. In a cigarette making machine, the combination with electrically operated means to control the quantity of tobacco supplied to the machine, of a weighing mechanism having a weigh beam, a deflection plate cooperating with the weigh beam, an electrical circuit for said control means, two detector members movable to engage the deflection plate after a weighing operation, a pivotally mounted switch for each member actuated by said members to close the said electric circuit, a solenoid connected with each switch, a ratchet and pawl to retain the switch in the operative position, ratchet wheels on the control shaft of the tobacco feeding mechanism, continuously oscillating pawls operated by said solenoid to engage said wheels, one of the wheels being operated by one of said solenoids to accelerate the tobacco feed and the other operated by the other solenoid to retard the tobacco feed, means operative to actuate the detector, and means operative in timed relationship with said actuating means to break the circuit while the detector is being reset, said circuit breaking means being operative at a point and after a time interval determined by the position of the detector with respect to the deflection plate after a weighing operation.

8. In a cigarette making machine, the combination with means to control the quantity of tobacco supplied to the machine, of a weighing mechanism having a weigh beam, at least one detector member movable to engage the beam after a weighing operation, and means connected with said member and operative to regulate said control means to either increase or decrease the quantity of tobacco supplied to the machine to extents proportioned to the extents of movement of the detector member.

9. In a cigarette making machine, the combination with control means for varying the quantity of tobacco supplied to the machine, of weight responsive mechanism including a member displaceable from a neutral position to an extent



determined by the weight of the product of the machine, detector means movable to engage said member while the latter is displaced, said member having a portion engageable by said detector means and so formed that the latter moves to an extent determined by the weight of the machine product, whereby the extent of movement of the detector means affords a measure of the weight of the product, and operative connections between said detector means and said control means for causing the latter to increase or decrease the quantity of tobacco supplied to the machine to extents proportioned to the extents of movement of the detector means.

15 10. In a cigarette making machine, the combination with control means for varying the quantity of tobacco supplied to the machine, of weight responsive mechanism including a member

displaceable from a neutral position to an extent determined by the weight of the product of the machine, detector means movable to engage said member while the latter is displaced, said member having a portion engageable by said detector means and so formed that the latter moves to an extent determined by the weight of the machine product, whereby the extent of movement of the detector means affords a measure of the weight of the product, and operative connections between said detector means and said control means for effecting operation of the latter during periods of time determined by the extents of movement of the detector member, whereby the quantity of tobacco supplied to the machine is varied in proportion to variation in weight of the product.

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