

June 20, 1939.

C. S. STEPHANO

2,163,415

REGULATOR AND INDICATOR FOR CIGARETTE MAKING MACHINES

Filed May 11, 1937

2 Sheets-Sheet 1

Fig. 1.

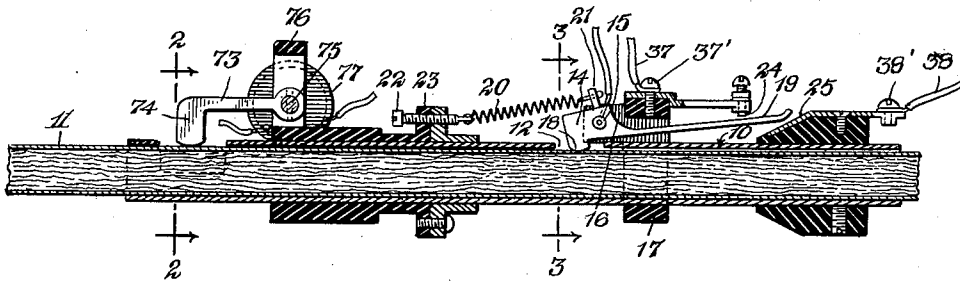


Fig. 2.

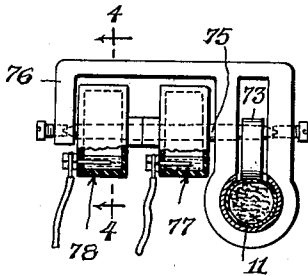


Fig. 3.

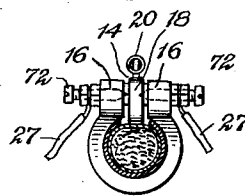
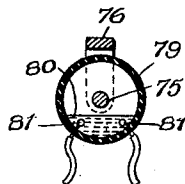


Fig. 4.



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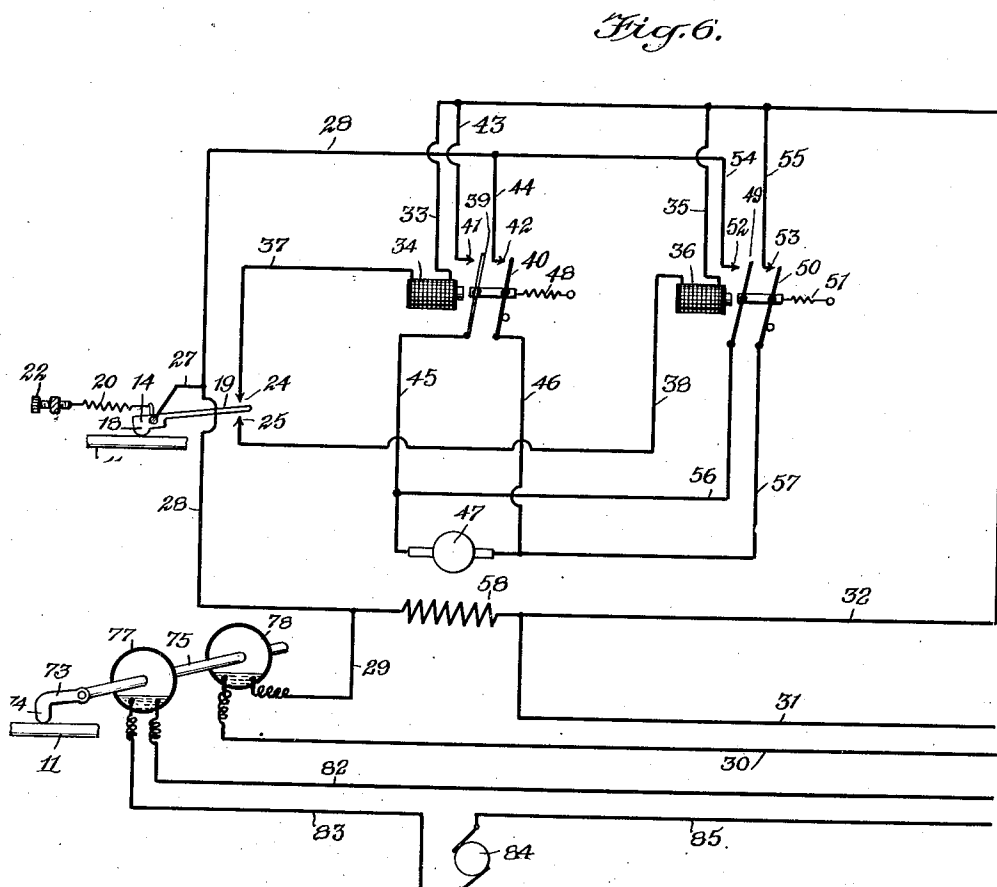
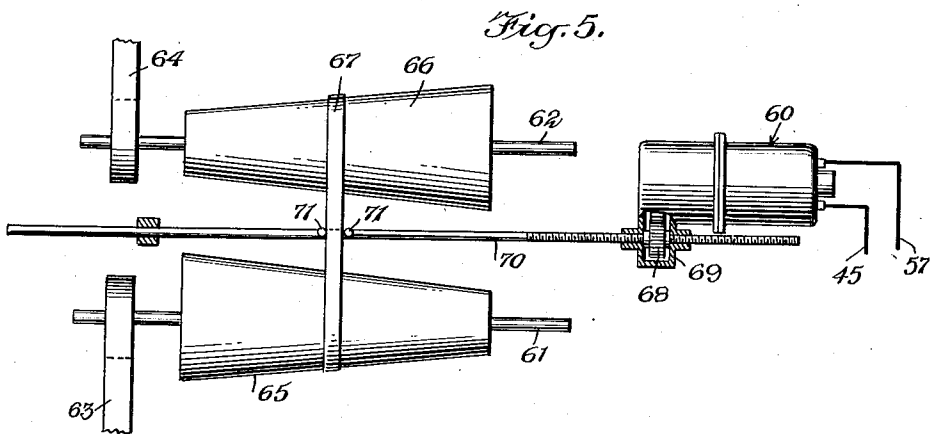
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REGULATOR AND INDICATOR FOR CIGARETTE MAKING MACHINES

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2 Sheets-Sheet 2



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REGULATOR AND INDICATOR FOR CIGARETTE MAKING MACHINES

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1 Claim. (Cl. 131—39)

This invention relates to an improved regulator and indicator for continuous rod cigarette making machines.

In continuous rod cigarette making machines the tobacco particles are fed on to a moving strip of cigarette paper and then passed under a rod forming tongue which shapes and compresses the particles of cigarette into a cylindrical rod of slightly smaller circumference than the conventional cigarette. As the particles of tobacco are thus formed into a rod, the cigarette paper is partially wrapped around the rod and shortly after the tobacco rod emerges from the end of the tongue, paste is applied to one edge of the cigarette paper. The edge of the paper with the paste applied thereto is then wrapped about the rod until it overlaps the other edge of the paper forming a complete paper encased rod. The rod then passes through a suitable dryer causing the paste to properly adhere and it is then cut into short sections of the proper length to form cigarettes.

In spite of the fact that the paper feeding and tobacco feeding mechanism of the machine are caused to operate at uniform rates of speed, the rod frequently is not of uniform character. Portions of the rod will have soft spots, that is, there will be insufficient tobacco and the tobacco will not be of the proper compactness. Other portions of the rod will have too much tobacco producing hard spots with the tobacco of such compactness as to prevent the passage of smoke beyond that point when the rod is formed into cigarettes. There are numerous factors which contribute to the uneven character of the cigarette rod, the principal factor being variations in the coefficient of friction between the tobacco and the rod forming tongue. Variations in the coefficient of friction result from numerous causes such as differences in the blend of the tobacco or differences in the size of the tobacco particles in various portions of the blend, or variations in the moisture content of the tobacco. In spite of great precautions in trying to control these various factors, variations in the compactness and mass of the rod continue to exist causing considerable trouble in the manufacture of cigarettes.

It is an object of this invention to provide an improved device which will overcome these difficulties and will indicate variations in the character or compactness of the rod thereby enabling manual adjustment of the tobacco feeding mechanism of the machine, and which may be employed to automatically regulate the relative

speed of the tobacco feeding mechanism as compared with the paper feeding mechanism and primary operating mechanism of the machine.

A further object is the provision of an improved device of the above character which also embodies mechanism for automatically cutting off the operation of the machine when the cigarette rod breaks as the result of a hang-up or choke-up beneath the rod forming tongue, or for some other reason.

I accomplish the desired results by disposing adjacent the finished continuous cigarette rod before it is severed into cigarettes a shiftable feeler which is pressed under predetermined adjustable force into engagement with the rod. When a rod of the desired compactness and size is engaged by the feeler, the feeler assumes one position. When the rod is too soft the feeler will be caused to assume another position, while when the rod is too hard the feeler will be shifted to a different position. The feeler will thus indicate to the operator whether a rod of the desired uniform character is being formed by the machine. If desired, so as to cause the automatic adjustment of the machine, switches or contact points may be located adjacent the feeler so as to cause the closing of electrical circuits when variations in the character of the rod occur and thereby set into operation electrical mechanism for automatically adjusting the speed of operation of the tobacco feeding mechanism relative to the speed of the primary operating mechanism of the machine.

For a fuller understanding of the invention reference should be had to the accompanying drawings in which—

Fig. 1 is a longitudinal sectional view of a regulator and indicator embodying my invention and showing a continuous cigarette rod passing therethrough;

Fig. 2 is a sectional view in the direction of the arrows on the line 2—2 of Fig. 1, showing the mechanism for automatically shutting off the operation of the machine when the cigarette rod breaks;

Fig. 3 is a sectional view in the direction of the arrows on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view in the direction of the arrows on the line 4—4 of Fig. 2;

Fig. 5 is a view of one type of speed control that may be used in association with my invention; and

Fig. 6 is a diagrammatic representation of the wiring circuits which may be employed with my invention.

My mechanism preferably includes a housing such as the tube 10 through which the completed continuous cigarette rod 11 is fed prior to being severed into cigarettes. The housing or tube 10 should be attached to the machine at a convenient position between the point where the rod emerges from the heater and dryer and the point where the rod is severed into individual cigarettes. The tube is provided as shown with an opening or cut-out 12 adjacent which the feeler, preferably in the form of a lever 14, is pivotally mounted as at 15 to the lugs 16 preferably formed of insulating material and which is carried by the bushing 17 disposed around the housing or tube 10. The lever 15 is provided with an enlarged smooth head 18 for engaging the continuous cigarette rod while the other end of the lever indicated at 19 projects upwardly at an angle to the tube or housing 10 serving as an indicator to indicate the compactness and character of the cigarette rod and also as an actuator for the contact members or switches for controlling the relative speed of operation of the tobacco feeding mechanism of the machine.

Suitable means are provided for pressing the head 18 of the lever into engagement with the continuous cigarette rod at a predetermined pressure, and for this purpose I prefer to use a spring 20 connected between the projecting member 21 formed on the top of the lever 14 above the pivotal point and the adjusting screw 22 carried by the housing 23 formed of insulating material and which is disposed around the tube 10. The tension of the spring 20 and as a result the force with which the head 18 of the lever is pressed into engagement with the continuous rod 11 may be adjusted by means of the screw 22.

It will be seen that the pivotal position of the lever 14 depends upon the force exerted by the spring 20 and also the counter-acting force or resistance offered by the cigarette rod passing beneath the lever and in engagement with the head 18 thereof. Since the spring 20 is adjusted to a predetermined tension, the lever 14 will remain in a stationary position as long as a rod of uniform character is passing beneath the lever. When a portion of the rod having insufficient tobacco therein or tobacco of insufficient compactness passes beneath the lever, the resulting decrease in the resistance offered to the head 18 of the lever will cause it to pivot downwardly with the result that the end 19 thereof shifts upwardly. Likewise, when a portion of the rod having too much tobacco therein passes beneath the lever, the resistance offered by the rod will be sufficient to overcome the force exerted by the spring 20 to the extent of causing the head 18 of the lever to pivot upwardly to a slight degree with the result that the opposite end 19 of the lever will shift downwardly. Having set the spring 20 at a predetermined adjustment, the operator can, by observing the relative position of the end 19 of the lever, determine whether the rod 11 is of the desired character. When the end 19 shifts upwardly indicating insufficient tobacco in the rod, the operator can manually adjust the machine so as to increase the rate of tobacco feed relative to the speed of operation of the paper feed mechanism. If, on the other hand, the end 19 of the lever pivots downwardly, it indicates that there is too much tobacco in the continuous rod and the operator can reduce the speed of operation of the tobacco feed mechanism relative to the speed of operation of the paper feed mechanism of the machine.

Preferably the device is provided with mechanism for automatically controlling the relative speed of operation of the tobacco feed mechanism. Thus a pair of contacts 24 and 25 may be provided in spaced relation above and below the end 19 of the lever so that when the lever 14 shifts slightly from its normal position due to variations in the character of the tube, it will engage one or the other of the contacts. The tension of the spring 20 is so adjusted that when the rod 11 feeding through the tube 10 is of the desired character, the end 19 of the lever will be disposed midway between the contacts 24 and 25. When the rod, however, becomes undesirably soft and has too little tobacco therein, the end 18 of the lever will be forced downwardly by the spring 20 with the result that the end 19 of the lever engages contact 24. On the other hand, when the rod 11 becomes undesirably hard and there is too much tobacco therein, the head 18 of the lever will be pivoted upwardly against the force exerted by the spring 20 with the result that the end 19 of the lever will engage contact 25. Slight variations in the character of the rod will cause slight pivoting of the lever without the portion 19 engaging either contact. The lever 14 and the contacts 24 and 25 are connected in circuit with suitable apparatus for automatically adjusting the speed of the tobacco feed mechanism relative to the speed of the paper feed and primary operating mechanism of the machine.

One satisfactory type of wiring circuit that may be employed is illustrated in Fig. 6, in which the lever 14 is shown as connected by wire 27 and lead 28 to wire 29 which leads through a switch, which will be later described, to lead 30 and thence to one side of a source of current supply. The other side of the source of current supply is connected by leads 31, 32 and 33 to one end of the winding of relay 34 and also by leads 31, 32 and 35 to one end of the winding of relay 36. The other end of the winding of relay 34 is connected by lead 37 to contact 24 while the other end of the winding of relay 36 is connected by lead 38 to contact 25.

Thus it will be seen that when the end 19 of lever 14 engages contact 24 the circuit of relay 34 is closed, while when the end 19 of lever 14 engages contact 25 the circuit of relay 36 is closed. Each of the relays 34 and 36 controls a double pole switch and both of the switches are disposed in circuits of a universally wound series motor, one of the switches causing the motor to operate in one direction and the other switch causing the motor to operate in the opposite direction. Thus it will be seen that associated with the relay 34 are the two shiftable contacts 39 and 40 normally held in open position by a spring 43, but when the circuit of relay 34 is closed they are caused to shift into engagement with contacts 41 and 42 which are connected by leads 43 and 44, respectively, to leads 32 and 28. The shiftable contacts 39 and 40 are connected by leads 45 and 46, respectively, to the two ends of the winding of the rotor or armature 47 of the universally wound motor.

Associated with the relay 36 are the shiftable contacts 49 and 50 which are normally held in open position by a spring 51 but which when the circuit of relay 36 is closed are caused to shift into engagement with fixed contacts 52 and 53 which are connected by leads 54 and 55, respectively, to the leads 28 and 32. The shiftable contacts 49 and 50 are connected by leads 56 and 57 to the two ends of the winding of

rotor or armature 47 of the universally wound motor. Thus it will be seen that the operation of relay 34 and the closing of the contacts 39 and 40 causes the current to flow through the winding of rotor 47 in one direction while the closing of contacts 49 and 50 causes the current to flow through the winding of the rotor in the opposite direction. The field coil or winding indicated at 58 is connected into the circuit so that the current flow will always be in one direction. Thus one side of the coil is connected to lead 31 through lead 32 and the other side of the coil through leads 28 and 29 to lead 30, the leads 30 and 31 leading to the two poles of the source of current supply.

It will be seen from Fig. 6 and from the circuits just described that when the continuous rod 11 is of the desired character and compactness, the end 19 of the lever will be disposed midway between the two contacts 24 and 25 with the result that the circuit of both relays 34 and 36 will be open and the double pole switches controlled by the relays will likewise be open. As a result of this the circuit of rotor 47 will be open and the motor will not operate. When, however, there is insufficient tobacco in the rod 11, the end 19 of the lever will engage contact 24 closing the circuit to relay 34 with the result that contacts 39 and 40 will shift into engagement with contacts 41 and 42 closing the circuit of rotor 47 and causing the motor to operate in one direction. If, on the other hand, there is too much tobacco in the rod 11, the end 19 of the lever will engage contact 25 closing the circuit of relay 36 with the result that contacts 49 and 50 will shift into engagement with contacts 52 and 53 closing the circuit to rotor 47 in a reverse direction to the relay 34 and thereby causing the motor to operate in the opposite direction.

In Fig. 5 the reversible universally wound series motor embodying rotor or armature 47 and field coil 58 and which is thus controlled by the relays 34 and 36 is indicated at 60. This motor may be connected to the operating mechanism for the tobacco feed of the machine so as to control the speed of operation thereof. Thus in Fig. 5 a drive shaft is indicated at 61 and a driven shaft at 62, the drive shaft being connected by a belt 63 to a suitable motor and the driven shaft 62 being connected by a belt 64 to the tobacco feed mechanism of the machine. On the two shafts 61 and 62 are the oppositely tapered belt pulleys 65 and 66 having a belt 67 connected therebetween. It will be seen that when the belt is at the extreme lefthand end of the pulleys, the tobacco feed mechanism will be operated at a greatly increased speed while when it is at the extreme righthand end it will be operated at a greatly reduced rate of speed.

The rotor of the motor 60 is geared to a spur gear 68 disposed in the casing 69 secured to the frame of the motor and the gear 68 is threaded to the externally threaded shaft 70 so that rotation of the motor in one direction will cause shifting of the shaft 70 to the left, while rotation of the motor in the opposite direction will cause shifting of the shaft to the right, suitable means being provided to prevent rotation of the shaft 70. Projecting from the side of the shaft 70 are the fingers 71 which engage the belt 67 so that when the shaft 70 is shifted by the motor 60 the belt 67 will likewise be shifted.

The gearing and the electrical circuit is such that when the end 19 of the lever engages con-

tact 24 and the relay 34 is operated, the motor 60 will cause the shaft 70 to shift to the left, as viewed in Fig. 5, and this shifting or feeding of the shaft 70 towards the left which thereby progressively increases the speed of operation of the tobacco feed mechanism, will continue until the portion of the rod 11 passing beneath the end 18 of lever 14 becomes sufficiently hard to cause the end 19 of the lever to shift out of engagement with contact 24 thereby opening the circuit of relay 34 which in turn opens the circuit of the rotor or motor 60, stopping further operation thereof. The tobacco feed mechanism will thereafter continue to operate at the adjusted rate of speed until a further variation occurs in the character of the rod.

When the rod becomes too hard or has too much tobacco therein causing the end 19 of the lever to engage contact 25 and close the circuit to relay 36, the motor will be caused to operate in the opposite direction shifting or feeding the shaft 70 towards the right, as viewed in Fig. 5, thereby progressively decreasing the speed of operation of the tobacco feed mechanism. The feeding of shaft 70 towards the right with the resultant progressive decrease in the speed of operation of the tobacco feed mechanism continues until the amount of tobacco in the rod decreases sufficiently to permit the end 19 of the lever under the action of spring 20 to shift out of engagement with the contact 25, breaking the circuit of relay 36 which in turn breaks the circuit of the rotor or motor 60 causing cessation of the operation thereof. Thus it will be seen that when a variation occurs in the character of the continuous rod 11, the relative speed of operation of the tobacco feed mechanism is progressively changed until the rod assumes the normal uniform character which is desired. The speed of operation then remains at the adjusted rate in which the desired uniform character is obtained. The motor 60 should operate at a relatively low rate of speed so that the adjustment will not take place too rapidly. If desired reduction gearing may be employed to connect the motor to gear 68.

In Fig. 3, I illustrate the manner in which the lever 14 may be connected in the circuit, thus two leads 27 connect with the pointed pins or screws 72 which form the pivotal mounting at the point 15 for the lever 14. For convenience only one of the leads 27 is indicated in the diagram, Fig. 6. Contact 24 is located at the end of a contact strip which is connected to lead 37 by means of screw 37'. Contact 25 is in the form of a strip connected by screw 38' to lead 38. Contacts 24 and 25 are insulated from housing 10 and from lever 14 and from each other as shown.

In addition to the mechanism heretofore described I also provide a switch for automatically shutting off operation of both the tobacco feed and the primary operating mechanism when the continuous rod breaks. This mechanism consists of a crank or lever 73 having an enlarged relatively heavy head 74 which is forced by gravity into engagement with the rod 11, the lever being keyed to a shaft 75 journaled in a bracket 76 carried by the tube or housing 10. Mounted on and keyed to the shaft 75 are a pair of mercury switches 77 and 78, both of the switches being of similar construction and being arranged so as to be in closed position when the head 74 of lever 73 is in engagement with the continuous rod 11, as shown in Fig. 1. When the rod 11 breaks, however, as when the tobacco becomes choked up beneath the rod forming tongue with the result

that no rod is fed through the housing 10, the end 74 of the lever 73 pivots downwardly causing the switches 77 and 78 to rock, thereby opening the switches which in turn open the circuits of the motor 60 and of the primary operating motor of the machine.

Each of the switches 77 and 78 are of similar construction having a cylindrical casing made of insulating material indicated at 79 with a small amount of mercury 80 disposed therein, as shown most clearly in Fig. 4. Projecting into the casing and in a position to be engaged by the mercury when the switch is in upright position are the contacts 81. The two contacts of the switch 78 are connected to the leads 30 and 29, respectively, as indicated in the diagram, Fig. 6, while the two contacts of switch 77 are connected, respectively, to lead 82 leading to one side of a source of current supply and to lead 83 leading to the primary operating motor 84 of the cigarette making machine. The primary operating motor is connected by lead 85 to the other side of the source of current supply. Thus it will be seen that when the rod 11 breaks or for some reason or other is not fed through the housing or tube 10, the lever 73 will pivot downwardly tilting switches 77 and 78 and opening the circuits of motors 60 and 84, thereby causing cessation in the operation of the primary feed mechanism of the machine and also preventing further operation of the tobacco feed speed regulating mechanism.

It will be seen from the mechanism herein described and illustrated that I have provided an improved regulator and indicator for continuous rod cigarette making machines which automatically indicates when the continuous rod is not of the desired uniform character, and which also automatically changes the speed of operation of the tobacco feed mechanism relative to the primary feed mechanism of the machine to the desired amount to overcome any defect in the compactness of the rod or in the amount of tobacco in the rod.

My invention also provides improved mechanism for automatically shutting off the operation of the machine when the continuous rod breaks.

It should be understood that many modifications may be made in the illustrated and described embodiment of my invention without departing from the invention as set forth in the accompanying claim. Thus the contacts 24 and 25 may be connected in circuit with readily visible indicators such as electric lights or with sound producing indicators, so that when any variation in the rod occurs it will immediately be brought to the operator's attention. The lights or other indicators may be substituted for the

relays 34 and 36 in the circuits controlled by contacts 24 and 25 or may be connected in parallel therewith where both are used. Also in the present description it has been assumed that the speed of operation of the primary feed mechanism of the machine is uniform and that the motor 60 merely causes variations in the speed of operation of the tobacco feed mechanism. The important feature in this connection is that the speed of the tobacco feed mechanism relative to the speed of the primary feed mechanism should be varied by the motor 60, thus instead of increasing the speed of operation of the tobacco feed mechanism, the speed of operation of the primary feed mechanism may be decreased and vice versa. Also my device may be used without the relays 34 and 36 and the motor 60 merely as an indicator to indicate to the operator any variation in the uniform character of the continuous rod. The automatic shut-off mechanism may also be formed as a separate unit or if desired may be eliminated altogether.

I claim:

In apparatus for use with a continuous rod cigarette making machine for progressively varying the speed of operation of the tobacco feed inversely with the density of the cigarette rod, a control device comprising a tubular member formed with an aperture in the side thereof positioned in the path of the cigarette rod so that the rod passes through the central bore of the member, a lever having pivotal connection with the member, the pivotal connection being nearer one end of the lever and the lever being positioned so that the shorter end may enter through the aperture in the member and engage the cigarette rod with the longer end projecting outwardly from the tubular member, tension means for urging the shorter end of the lever into engagement with the cigarette rod under predetermined pressure, and a pair of contacts positioned on opposite sides of the longer end of the lever in the arcuate path thereof, so that the said contacts may be engaged by the end of the lever when the density of the rod varies more than a predetermined amount, a drive shaft, a driven shaft, connected to the tobacco feed mechanism, a variable speed ratio operating connection between the drive shaft and driven shaft, an electric motor connected to the variable speed ratio operating connection so as to vary the speed ratio thereof, and a pair of electric circuits each connected to one of said contacts and to the lever for causing the operation of the electric motor, when the lever engages a contact.

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