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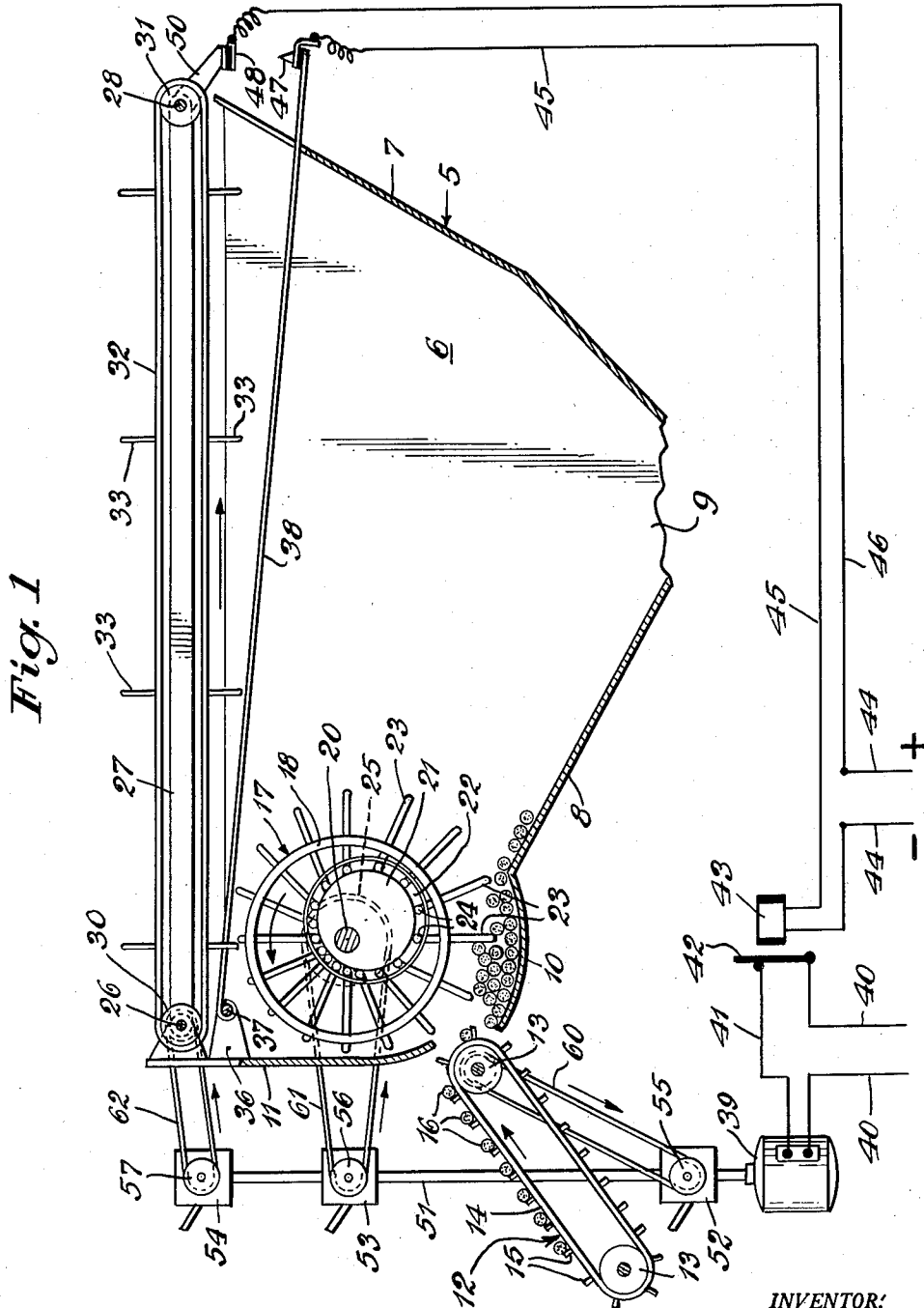
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HOPPER CONTROL MECHANISMS

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2 Sheets-Sheet 1



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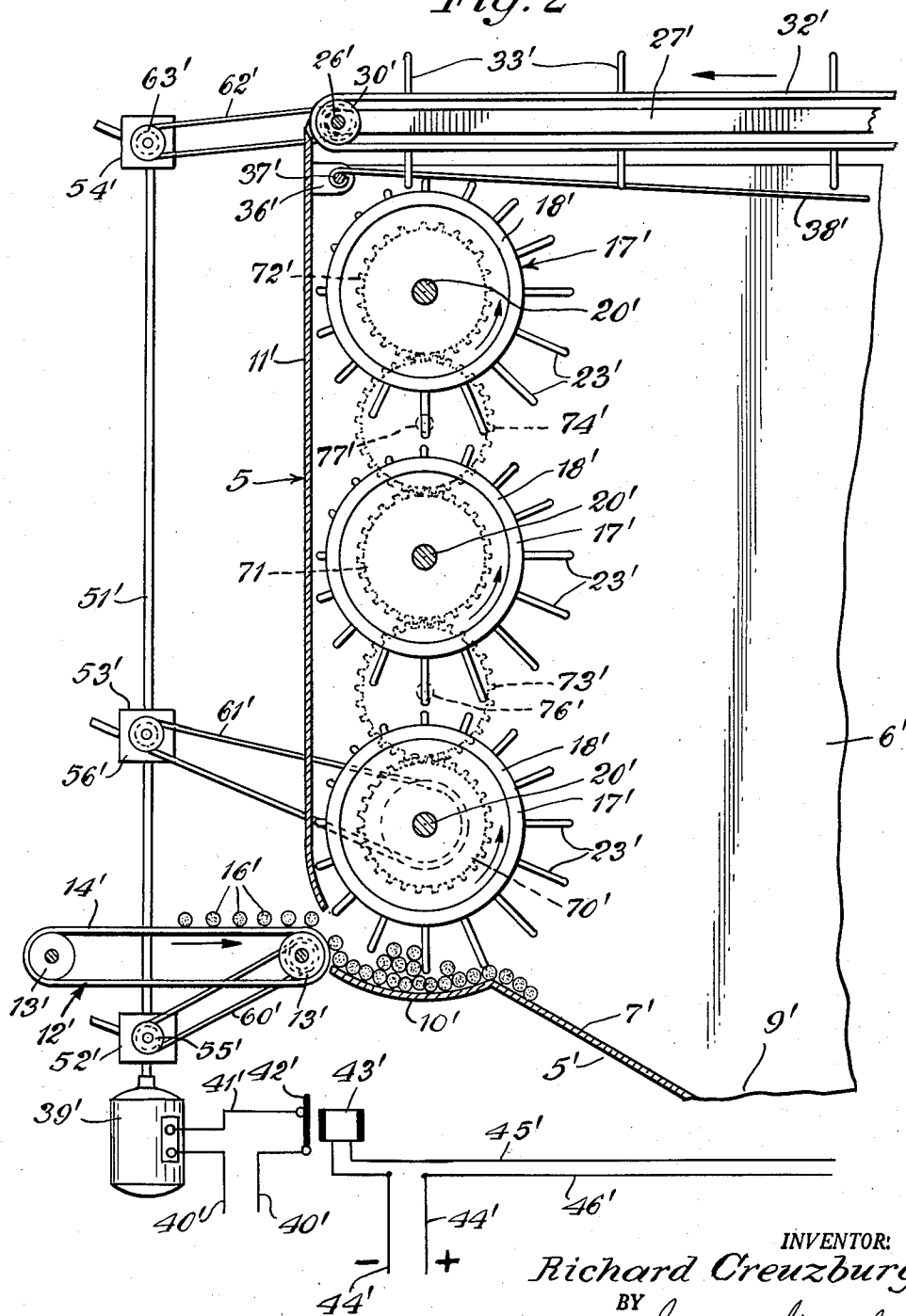
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2 Sheets-Sheet 2

Fig. 2



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1

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HOPPER CONTROL MECHANISMS

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7 Claims. (Cl. 214—17)

The present invention relates to improvements in hopper control mechanisms, and more particularly to a hopper feed mechanism for cigarettes and similar elongated elements.

One object of the invention is to provide a hopper feed mechanism in which the articles such as cigarettes and the like are evenly distributed throughout the hopper magazine in such a manner that they will be deposited in the hopper uniformly with their longitudinal axis extending in the same direction.

Another object is to provide a hopper feed control mechanism which will automatically cut off the hopper feed when the articles or material in the hopper reaches a predetermined height.

Another object is to provide a hopper feed mechanism having a distributing wheel provided with a series of radially arranged circumferentially spaced pegs which are projected during 180° rotational movement of the wheel and retracted for substantially the remainder of the rotational movement such that the articles or material such as cigarettes fed to the hopper will be picked up by the projected pin and moved toward the center of the hopper in a direction upwardly so that they may slide off the pins by gravity and be evenly distributed across the entire area of the hopper.

Another object is to provide a hopper feed mechanism for cigarettes and the like having means for maintaining the hopper level constant which includes an endless conveyor extending across the top of the hopper having a series of teeth which engage the uppermost cigarettes or the like and remove them from the hopper at the top thereof a small instant before the cut-off member has moved upwardly sufficiently to interrupt operation of the feed mechanism.

Hitherto, in the manufacture of cigarettes it has been customary to remove the cigarettes from the cigarette machine and deposit the same in a container or hopper magazine so that they may be supplied to other operating mechanisms for cigarettes such as for instance, packing machines or machines for applying filter tips to the ends of the cigarettes. In order to obtain maximum production and to increase the output, it is advisable to connect the cigarette machine with the packaging or filter tip applying mechanisms by means of suitable automatic conveyors. Also, in prior art devices cigarettes have been delivered from the cigarette machine and dropped into suitable magazines from the top of the magazine.

The above prior art devices are disadvantageous due to the fact that considerable time is lost and required to handle cigarettes manually, and in the prior devices where the cigarettes are conveyed to the top of a hopper or magazine they fall a considerable distance which causes tobacco to be dislodged from the ends and frequently, the cigarettes falling at random have a tendency to more readily clog the delivery opening and thus prevent the normal uniform feeding and delivery of the cigarettes

2

to other machines, such as wrapping and filter applying apparatus.

The present invention eliminates the above-mentioned disadvantages and feeds the cigarettes uniformly without dropping the same from a conveyor, and permits the cigarettes to be fed to the hopper in such a manner that the height is maintained substantially constant thus insuring continuous flow or discharge from the hopper at a uniform rate of speed. In addition the cigarettes when delivered to the hopper are fed upwardly toward the surface of the stack and in addition urges the cigarettes in a horizontal direction across the hopper such that the hopper will be filled with the level of the cigarettes substantially horizontal along the top portions thereof in the hopper.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawing wherein:

Figure 1 is a vertical cross-sectional view through a hopper magazine showing the feed mechanism and illustrating the various mechanisms and controls for the feed mechanism, and

Figure 2 is a fragmentary vertical cross-sectional view showing a modified form of the invention in which three distributing wheels are employed.

In the drawings, and more in detail, attention is first directed to Figure 1 wherein the reference character 5 will generally be employed to designate a hopper or magazine for cigarettes or similar items and said hopper includes a pair of side walls 6, a downwardly sloping wall 7 connecting the side walls 6 and a downwardly sloping side wall 8 likewise connecting the walls 6, and said sloping walls 7 and 8 converge toward a discharge opening 9 which may be fitted with a suitable discharge chute for conveying cigarettes or the like to a cigarette wrapping machine or to a machine for applying filter tips.

The downwardly sloping wall 8 connects with an arcuately curved portion 10 which extends between the side walls 6 and extending downwardly between the side walls 6 is a wall 11 which has its lower end arranged in spaced relation from the end of the wall 10, thus providing a space for filling the hopper with material such as cigarettes or the like.

An endless conveyor generally designated 12 includes a pair of sheaves 13 arranged in spaced relation, and one of which is shown presented to the space between the arcuately curved portion 10 and the end wall 11. An endless belt 14 is trained over the pulleys 13 and is provided with a series of spaced flights 15 which are adapted to receive cigarettes or the like 16 and convey the same upwardly through the opening between the walls 10 and 11 and into the hopper 5.

Rotatably mounted within the hopper 5 and arranged adjacent the opening between the walls 10 and 11 is a rotary drum generally designated 17 which forms a so-called cell wheel for conveying cigarettes through the opening between the walls 10 and 11 and horizontally across the conveyor. The cell wheel 17 includes a drum 18 which is rotatably mounted on a shaft 20 which is secured to the side walls 6 of the hopper in any approved manner. Secured to the shaft 20 is an eccentric disc 21 having a circular track 22. A series of circumferentially spaced retractable pins 23 are slidably mounted in the drum 17 in suitable openings therein, and said pins 23 are provided with transversely extending guide pins 24 which are arranged to be received in the circular trackway 22 such that when the drum 17 is rotated in the direction of the arrow, the pins 23 will engage the cigarettes fed between the wall portions 10 and 11 by the conveyor 12 and carry said cigarettes in a horizontal direction toward the center of the hopper. It is intended to employ three sets of pins 23 which would be guided by three

sets of trackways 22 mounted on the shaft 20 in spaced relation, one from the other axially along said shaft. Thus, the cigarettes will be engaged adjacent their ends and intermediate portions and will not be bent or broken during their travel through the space between the drum 17 and wall 10. One end of the drum 17 is provided with a pulley 25 which is adapted to be driven in a manner which hereinafter be fully described so that the drum 17 will rotate in the direction of the arrow and the pins 23 will be projected during their travel through their lower portion of the drum 17, and will be retracted during their travel through the upper portion of the drum.

Mounted between the side walls 6 adjacent the upper end thereof is a shaft 26 to which is pivotally secured a pair of bars 27 which have their outer ends connected by means of a shaft 28. Conveyor rollers 30 and 31 are mounted on the shafts 26 and 28, and an endless belt 32 is trained thereover for rotation in the direction of the arrow. A series of teeth 33 are arranged in spaced relation on the endless belt 32, and said teeth are adapted to engage surplus cigarettes and convey them from the hopper when the hopper fills above a predetermined height and thus maintain the height of the cigarettes in the hopper constant. A pulley is secured to one end of the conveyor roller 30 in any approved manner.

Secured to the wall 11 adjacent the upper end is a pair of inwardly projecting lugs 36 to which is pivoted as at 37 a control bar 38 which is provided with an elongated central slot (not shown) for accommodating the passage of the teeth 33. The bar 38 is urged upwardly by the cigarettes in the hopper 6 to control the feed of cigarettes to the hopper.

In order to drive the conveyor 12, cell wheel 17 and endless conveyor 32 there is provided an electric motor 39 which is connected in circuit with a source of electrical energy supplied through lines 40. Also in the circuit 41 of the motor 39 is a normally closed switch 42 which is adapted to be actuated by means of a relay solenoid 43. The solenoid 43 is in circuit with a source of electrical energy supplied to lines 44, and said lines are connected to a circuit including lines 45 and 46. The line 45 is connected to a contact point 47 on the end of the control bar 38, and said contact is adapted to engage a contact member 48 connected to the line 46 when the cigarettes in the hopper 6 rise to a predetermined height and cause the control bar 38 to move upwardly. The contact 48 is mounted on the end of an arm 50 which is an extension of the bars 27 and thus, said contact and arm will be raised and lowered depending upon the position of the control bar 38. The sloping wall 7 is provided with a slot to permit the control bar 38 to move downwardly away from the conveyor 32, but the upper end of the hopper 7 engages the arm 50 and prevents the conveyor 32 from swinging downwardly on top of the cigarettes below a predetermined level.

The electric motor 39 has its armature shaft 51 connected to a series of reduction gear units 52, 53 and 54 which are provided with suitable control handles and outlet shafts fitted with pulleys 55, 56 and 57. The pulley 55 is drivingly connected to a pulley on the conveyor roller 13 by means of a drive belt 60 and the pulley 56 is connected to the pulley 25 on the drum 17 by means of a drive belt 61. Similarly, the pulley 57 is drivingly connected to a pulley on the roller 30 by means of a drive belt 62. Thus, when the motor 39 is energized the conveyor 12 will be operated, the cell wheel will rotate to feed cigarettes into the hopper 5 and the endless conveyor 32 will be operated such that when the control bar 38 is partially raised so that the pins 33 pass through the slots therein to remove excess cigarettes just prior to engagement with the contacts 47 and 48. The cigarette level in the hopper will in this manner be maintained constant. When the cigarettes move beyond the upper level limit in the hopper the control bar 38 likewise moves upwardly to engage the contacts 47 and 48. When

this occurs, the relay 43 is energized and the normally closed switch 42 is opened, thereby breaking the circuit through the power lines 40 to the motor 39. When the motor 39 is de-energized, rotation of the shaft 51 is arrested which stops the conveyor 12, cell wheel 17 and conveyor 32. When the level of the cigarettes in the hopper drops from normal discharge through the outlet 9 the contacts 47 and 48 are separated, which causes the relay 43 to be de-energized so that the spring pressed plunger or armature thereof may again close the switch 42.

In the modified form of the invention shown in Figure 2 the hopper 5' is substantially the same as before, and includes a pair of side walls 6' having sloping bottom walls 7'. The end wall 11' is substantially the same as before and is spaced from the end of the arcuately curved wall 10'. An endless conveyor generally designated 12' includes a pair of rollers 13' in spaced relation having a conveyor belt 14' for feeding cigarettes 16' through the space between the ends of the arcuately curved wall 10 and the wall 11'.

Mounted in the hopper 6' is a series of shafts 18' which are arranged in superposed relation, and said shafts are adapted to rotatably support cell wheels generally designated 17'. The cell wheels include drums 20' having a series of retractable and projectable pins 21' which are operated in substantially the same manner as described in connection with the form of the invention shown in Figure 1, except that the lowermost cell wheel 20' is provided on one end with gear wheels 70', 71' and 72' which are adapted to be inter-driven by means of gear wheels 73' and 74' mounted on suitable pivot pins 76' and 77' supported on the hopper on one of the side walls 6' thereof. The cell wheels are adapted to be driven by an electric motor 39 which has a power shaft 51' connected to reduction gear units 53' and 54'. The reduction gear unit 53' is provided with a driving belt 61' adapted to drivingly engage a pulley on one end of the lowermost cell wheel 17' so as to drive the superposed drive wheels at the same speed. Thus, cigarettes 16' fed to the hopper are moved upwardly and across the hopper 5' by the cell wheels 17', and when the control bar 38' is moved upwardly about its pivot 37' contacts on the end thereof will engage a contact carried by the extension of the side bars 27' and energize the control circuit including lines 45' and 46' which are in circuit with a source of electrical energy supplied through power lines 40' for supplying current to the electric motor 39'.

The endless conveyor 32' is the same as before and is mounted on a pulley 26' or roller rotatably mounted on the arm 27'. The shaft 30' is secured to the walls 6' of the hopper as before, and the endless conveyor 32 is provided with cigarette engaging pins 33'. The endless conveyor 33' is driven from the reduction gear box 54' by means of an endless belt 62' which is trained over a pulley 63' on the reduction gear box and the roller 30' of the conveyor 32'.

Thus, cigarettes conveyed to the hopper 6' by the conveyor 14' from a cigarette making machine are moved upwardly and across the hopper 6' to uniformly fill the hopper and as the cigarettes reach various levels in the hopper opposite the cell wheels 17' the pins 21' are projected during their travel through the lower revolution of the drum 20' and are retracted during their travel through the upper revolution of the drum. Thus, the fingers 21' continually move the cigarettes upwardly across the hopper so that the hopper level will remain constant and of uniform distribution to permit cigarettes to be discharged through the discharge opening 9' without bridging or the like so that they may be fed to a cigarette wrapping machine or filter mouthpiece applying machine.

The forms of the invention herewith shown and described are to be taken as preferred embodiments thereof and various changes in the shape, size and arrange-

ment of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

What I claim is:

1. A device for feeding cigarettes to a hopper or the like comprising conveyor means for feeding cigarettes through an opening of said hopper below the upper walls thereof, a distributing wheel rotatably mounted in said hopper adjacent said opening, a series of retractable pins mounted on said wheel adapted to move the cigarettes across said hopper, and means for causing said pins to be projected during their lowermost travel about said wheel and to be retracted during their travel about the upper portion of said wheel.

2. In a device for feeding cigarettes from a cigarette making machine to filter tip applying and wrapping machines comprising a hopper having a feed opening in one of its side walls and a discharge opening in its bottom wall, conveyor means for conveying cigarettes through said feed opening, a distributor wheel located within the hopper adjacent the feed opening, a series of cigarette engaging pins carried by said distributor wheel for engaging the cigarettes passing through said feed opening and continually moving said cigarettes into said hopper, and means for projecting said pins into cigarette engaging positions during their lowermost travel about said wheel and feed cigarettes into the hopper laterally.

3. In a machine for feeding cigarettes from a cigarette machine to a wrapping machine, a hopper having a discharge opening, an endless conveyor adjacent one end of the hopper for conveying cigarettes through a feed opening in said hopper, at least one distributor wheel in said hopper, a series of retractable and projectable pins in said wheel adapted to be projected while traveling through the lowermost portion of their revolution to engage the cigarettes being fed to said hopper and move the same across the hopper, and means for causing said pins to be retracted and projected.

4. In a feed control mechanism, a hopper having a feed opening in one side wall thereof and a discharge opening in its lower wall portion, conveyor means for feeding material upwardly and into said feed opening, a distributor wheel within said hopper adjacent said feed opening, a series of circumferentially spaced pins on said distributor wheel adapted to engage material passing into said hopper through said feed opening and move the same horizontally toward the discharge opening the pins on said wheel being movable into material engaging relation during their lowermost travel about said distributor wheel.

5. In a feed control mechanism, a hopper having a feed opening in one of its side walls and a discharge opening in its bottom, conveyor means for feeding material

to said side wall feed opening, a distributor wheel within said hopper adjacent said feed opening, a series of circumferentially spaced pins on said distributor wheel adapted to engage material passing into said hopper and move the same horizontally toward the discharge opening, motor means for rotating said distributor wheel, and means in said hopper adapted to be actuated by the level of material therein for controlling the last named means, said pins being movably mounted in said wheel and adapted to project radially therefrom during their lower travel about said distributor wheel for engaging the material passing through said feed opening and directing the same horizontally toward the center of the hopper.

6. In a feed control mechanism, a hopper having feed and discharge openings with the feed opening arranged in one of the side walls thereof, means for feeding material to said feed opening, a distributor wheel within said hopper adjacent said feed opening, a series of circumferentially spaced pins on said distributor wheel adapted to engage material and move the same toward the opposite side of said hopper, means for rotating said distributor wheel, means within the hopper actuated by the level of material therein for controlling said last named means, and a conveyor arranged horizontally above said hopper to remove excess material therefrom said pins being movable into engagement with the material being fed to said hopper during their lowermost travel about said distributor wheel.

7. In a feed control mechanism, a hopper having feed and discharge openings, means for feeding material to said feed opening, a distributor wheel rotatably mounted in said hopper adjacent said feed opening, a series of pins adapted to be projected from said wheel to engage material during the lower portion of their travel and move the material across said hopper, an endless conveyor having one end pivoted to the upper end of the hopper so that the free end will swing upwardly away therefrom, motor means for driving said distributor wheel and endless conveyor, a control member mounted in said hopper and movable upwardly in response to the level of material in said hopper, a circuit for said motor means having a source of electrical energy, and a switch contact on the endless conveyor adapted to be engaged by the control member when the level of material in the hopper reaches a predetermined height to interrupt the circuit in said motor means.

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