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APPARATUS FOR FEEDING TOBACCO TO CIGARETTE-MAKING MACHINES

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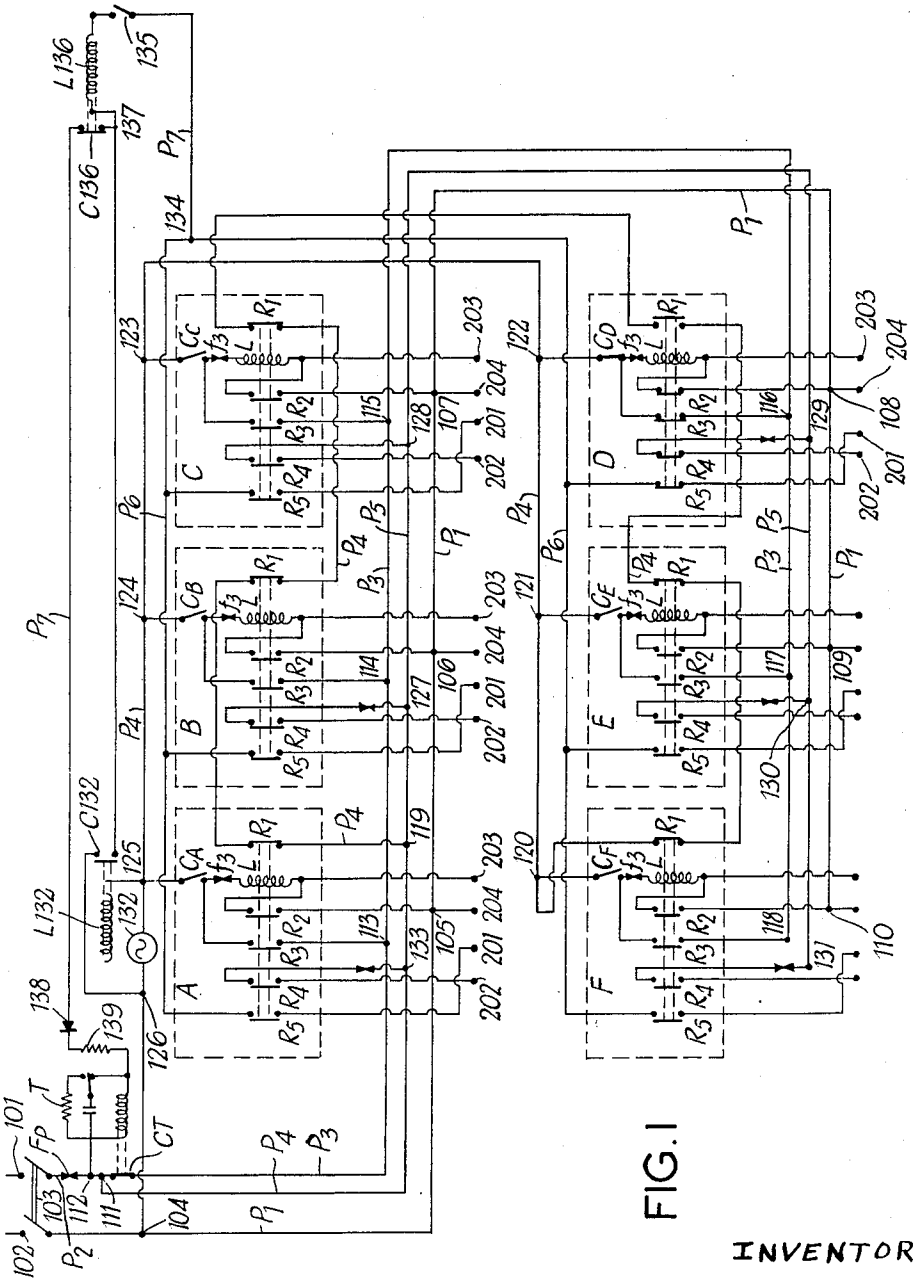


FIG. 1

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FIG.2

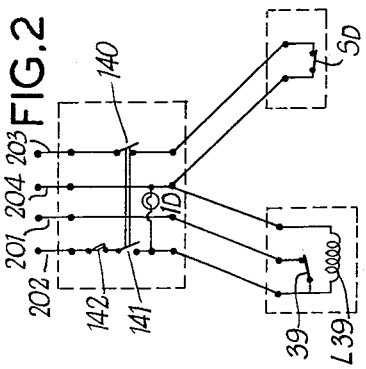


FIG.3

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APPARATUS FOR FEEDING TOBACCO TO CIGARETTE-MAKING MACHINES

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This invention concerns improvements in apparatus for feeding cut tobacco (rag) from a single feed-in point to several tobacco utilising machines.

In the pneumatic conveying of tobacco to cigarette-making machines it is accepted practice to employ a discharger at each machine which, when it is filled by separation of rag from the air stream to a desired level, opens to allow its contents to fall into the feed hopper of the machine.

It is now common to employ a single exhaust fan to draw tobacco from the single feed-in point (normally hand-fed) to one or more of the several cigarette-making machines. In such known systems maximum efficiency is reached only when the exhaust fan is operating at maximum capacity; and, since there are times when none of the machines is being fed and when supply conduits must be emptied to ensure effective conveyance of rag upon a resumption of feed, a considerable waste of time is involved.

It is the object of the invention to provide a tobacco-feeding system and automatic control therefor which will increase efficiency and cut down time wastage.

According to the invention I provide a tobacco feeding system for a number of tobacco-utilising machines in which there is an intermittent demand for tobacco from each machine wherein a pneumatic suction operated feeding system is employed to draw tobacco from a single feeder device through one or more conduits to dischargers associated with each machine characterised by the provision of control mechanism including searching means by which an immediate demand for feed is signalled from any one discharger to the feeder device and means including a starter for the feeder and feed-diverting means operated upon conclusion of feed to a discharger operable either to stop the feeder device or to divert its output to another machine signalling a demand.

In preferred forms of feeding systems a sensing device and switch associated with a hopper of each tobacco utilising machine are employed to signal a demand for feed to that individual machine. A multi-way cam timer rotated several times a minute searches contactors of control circuits associated with each utilising machine. When it makes connection with a contactor of an individual control circuit signalling a demand electric circuits are completed for operating a flap causing pneumatic feed to the discharger in question and for starting the feeder device if this is not already in operation.

Further in preferred forms of the invention a contact operated when an individual discharger is ready for emptying completes a circuit which closes an air-trip valve at the feeder device ensuring the emptying of the initial section of the feeder conduit.

A time-delay switch permits actual emptying of the individual discharger (by the closing of a flap valve isolating it from suction) and operation of the feeder device starter is deferred until such time as that individual discharger has operated correctly.

The following example of one form of the invention is given by way of example with reference to the accompanying drawings in which:

FIG. 1 is a circuit diagram of the general control system,

FIG. 2 is a circuit diagram of that part of the control system associated with one individual feed point, and

FIG. 3 is a diagrammatic plan view of a feed system to which the control is applied.

The system illustrated in the drawings for controlling a pneumatic feed system such as that shown in FIG. 3 involves six tobacco utilising machines 1 to 6, each fed from a separate hopper 7 to 12 through an opening covered by a flap 13 to 18. There is a switch S_A, S_B, S_C, S_D, S_E, S_F in each hopper 7 to 12, which closes when the hopper is empty.

The individual hoppers 7 to 12 are fed from a main feeder 19 with tobacco drawn by suction along a main conduit 20, and branch conduits 21 to 26, one conduit leading to each hopper.

The other end of each hopper is connected to a suction pipe 27 to 32, which pipes join in a main suction conduit 33 which has a suction unit 34 at its other end.

There is an air trip 35 in the conduit 20 and each of the suction pipes 27 to 32 can be sealed off from suction by a flap 36 to 41.

These flaps 36 to 41 are controlled by solenoids L_{36} to L_{41}, which form part of a subsection A_{10}, B_{10}, C_{10}, D_{10}, E_{10}, F_{10} of the control system which is associated with each hopper 7 to 12 (see FIG. 2).

The main part of the control system (see FIG. 1) which is common to all hoppers 7 to 12, is located in a main control panel 42.

The part of the control circuit associated with the main control panel 42 has its input through a live terminal 101 and a neutral terminal 102 and an input switch 103.

A neutral line P_1 links the neutral part of the switch 103 to the junction points 104 to 110.

A single live line P_2 joins the live part of the switch 103 to the junction point 111 and this line includes a power fuse F_p and the junction point 112.

Two live lines P_3 and P_4 originate from junction point 111. Line P_3 includes contacts C_T associated with a delay circuit T and links the junction points 113 to 118. Line P_4 forms a loop line to junction point 104 and includes junction points 119 to 125, 126 and 133. A line P_5 originating at junction point 119 links junction points 127 to 131.

A timer motor 132 is connected in line P_4 between points 125 and 126 in parallel with the coil L_{132} of a relay having a single set of contacts C_{132} which are normally closed.

Six five contact make and break relays A, B, C, D, E, F are included in the circuit, one associated with each control A_{10} to F_{10}.

Each relay has a coil L and five contacts R_1, R_2, R_3, R_4, R_5, of which R_1 is in opposition to R_2, R_3, R_4 and R_5 which are normally open.

A path can be established between one end of each coil L and the appropriate junction point 121 to 125 through one of the contact switches C_A, C_B, C_C, C_D, C_E, C_F operated by the timer motor 132.

The contacts R_1 of all six relays are in the loop line P_4 and the energising of any one coil L will break this loop line. This would result in the coil being de-energised but for the establishing of a holding circuit including contacts R_2 and R_3, the coil L and a fuse f_3 (as shown in relay D of the drawing from point 108 in the neutral line P_1 to point 116 in the live line P_3).

One end of each contact R_4 is connected to line P_5 save for the contact R_4 of relay A which is connected to junction point 133 in line P_4 but since no contact R_1 lies between point 133 and point 119, it is the same as if it were connected to line P_5.

One end of each contact R_5 is connected to a common line P_6 which contains junction point 134.

From point 134 a line P_7 including the contacts of an air trip 135, a starter coil L_{136} (actuating contacts C_{136}), point 137 and the contacts C_{132}, leads to point 126.

A line P_7 including contacts C_{136}, a sensing device 138, resistance 139 and the delay circuit T links points 137 and 112.

Four conductors lead from each relay A to F, to the corresponding control A_{10} to F_{10}. They originate at the free ends of contacts R_5 and R_4, the end of the coil far from the contact C_A to C_F, and one of the points 105 to 110 in the neutral line P.

The conductors are shown as 201, 202, 203, 204 in all six cases in FIG. 1 and the one set appearing in FIG. 2 are numbered in the same way.

In that part of the control circuit shown in FIG. 2, say that associated with relay D, there is a circuit between conductors 203 and 204 which includes one arm 140 of a double isolating switch and the hopper switch S_D.

There is a circuit from conductor 204 to conductor 202 through the solenoid L_{39}, the other arm 141 of the isolating switch and a thermal trip 142. An indicator I_D is connected in parallel with the solenoid L_{39} and there is a connection from the solenoid L_{39} through the tobacco flap 39 to conductor 210.

Assuming the control system is at rest and switches 103, 140 and 142 are closed, and a hopper switch, say S_D, is closed indicating a demand, a circuit is formed when the timer 132 closes contact C_D. The coil L of the relay D is energised and the switch R_1 breaks the loop P_4. The contacts R_2, R_3 of the relay D make the hold circuit and the coil L remains energised.

At the same time these two contacts R_2, R_3 put switch S_D into a neutral circuit to the point 108 so that the contact C_D is independent of further movements of S_D.

The closing of contact R_4 energizes L_{39} and the closing of contact R_5, flap 39, and contact R_4 puts the contacts 135 of the air trip 35 in a live cricuit. The air trip 35 operates and energises the feeder starter coil L_{136} immediately the air velocity in the conveying pipe 20 has reached a satisfactory level for feed. At the termination of feed, the tobacco flap 39 opens to break the circuit.

The system for controlling the feeder starter 34, and for disconnecting the solenoid valves 36 to 41, includes the feeder starter 34 itself with one pair of normally closed auxiliary contacts C_{136}, a normally closed contact C_{132} of a single pole relay, and a delayed action relay T with a single set of normally closed contacts C_T.

In the action of the main control panel 42, it will be seen that once a contactor C_A to C_F is engaged the time motor 132 must stop when the particular cam breaks its contact. The coil L_{132} of the single pole relay is coupled across the timer motor 132 so that when this occurs its contacts C_{132} complete a neutral circuit to the feeder starter coil L_{136}, the live circuit having previously been explained.

The starter coil L_{136} will then energise and break its normally closed auxiliary contacts C_{136} thus preventing the delayed relay T from operating. At termination of feed the discontinuance of the live circuit to the feeder starter coil L_{136} will release this, completing the neutral circuit to delayed relay T which will energise after four seconds, disconnecting C_T and breaking the live holding line P_3 to the contacts R_2, R_3 and the coil L will deenergise, releasing the solenoid valve 39 and allowing material to feed into the receiving hopper 4. It will be seen that should the air trip 35 not close, indicating that there is a fault in the pneumatic circuit, or in the solenoid L_{39} operation in this circuit, the feeder 34 will not be started and the neutral circuit to the delayed relay T will be maintained completed until the relay D functions to release the contactor C_{136} and solenoid L_{39} as before.

It will be appreciated that the principle of the invention is not restricted to the features enumerated in the above exemplary system and that modifications of circuit and supply connections achieving similar results will occur to those conversant with the design of electrical controls.

I claim:

1. A tobacco feeding apparatus including a bulk storage hopper, a number of tobacco-utilizing machines each having an intermittent demand for tobacco, signaling means associated with each machine for signaling such a demand, a discharger including a hopper associated with each machine, a single mechanical feeder device including at least one conduit connecting said feeder device to said dischargers for drawing tobacco from the bulk hopper, and pneumatic suction means for conveying tobacco through said conduits, in combination with a fully automatic control mechanism comprising scanning means for continuously scanning the demand signaling means by which an immediate demand for feed is signaled from any one tobacco utilizing machine to the feeder device, and feeder control means including a starter for the feeder and feed-diverting means operable upon conclusion of feed to a discharger either to stop the feeder device or to divert its output to another machine signaling a demand.

2. An apparatus according to claim 1 wherein said signaling means comprises a sensing device and a switch associated with a hopper of each tobacco-utilizing machine.

3. An apparatus according to claim 2 wherein said scanning means comprises a multi-way cam timer rotated several times a minute, said signaling means includes control circuits having contactors associated with each utilizing machine, said feed diverting means includes a flap associated with each hopper, and said feeder control means includes electric circuits for operating said flaps, said timer being so connected and arranged that when it makes connection with a contactor of an individual machine control circuit signaling a demand the associated flap operating circuit is closed causing pneumatic feed to the associated machine discharger and energizing the starter for the feeder device when not already in operation.

4. An apparatus according to claim 2 wherein an air trip valve is provided in said conduit near said feeder device and each of said dischargers is provided with a contact operated when the individual discharger is ready for emptying, said contact completing a circuit which closes said air trip valve at the feeder device ensuring the emptying of that portion of the conduits connecting the feeder to the said individual discharger.

5. A system according to claim 3 wherein said control mechanism includes a time-delay switch for closing said flaps to isolate the dischargers from suction permitting emptying of the individual dischargers and deferring operation of the feeder device starter until such time as an individual discharger has operated correctly.

6. A tobacco feeding apparatus including a bulk storage hopper, a number of tobacco-utilizing machines each having an intermittent demand for tobacco, a hopper on each machine, signaling means associated with each of said hoppers for signaling, such a demand including a sensing device and a switch, a single mechanical feeder device drawing tobacco from the bulk hopper, at least one conduit connecting said feeder device to said hoppers, and pnuematic suction means to draw tobacco through said conduits to said hoppers, in combination with a fully automatic control mechanism comprising scanning means for continuously scanning the demand signaling means, feeder control means including a starter for the feeder and feed-diverting means including flaps operatable upon conclusion of feed to a hopper either to stop the feeder device or to divert its output to another machine signaling a demand, control circuits including a contactor associated with each utilizing machine, said scanning means including a multi-way cam timer rotated several times a minute to search said contacts, the timer being arranged so that when it makes connection with a contactor of an individual control circuit signaling a demand, electric circuits are completed for operating said flap associated with the feed diverting means causing pneumatic

feed to the demand signaling hopper and for starting the feeder device if this is not already in operation, and an air trip valve in said conduit near the feeder arranged to close when a contact operated when an individual hopper is ready for emptying completes an appropriate circuit, thus ensuring the emptying of the section of the said conduit between the feeder and said demand signaling hopper.

7. An apparatus according to claim 6 in which each hopper is provided with a flap valve isolating it from suction and said control mechanism includes a time delay switch to permit actual emptying of each individual hopper by closing said isolating flap valves and to defer operation of the feeder device starter until such time as an individual hopper has operated correctly.

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