Feb. 21, 1961 A. ESENWEIN 2,972,500

AUTOMATIC CONTROL MEANS FOR TOBACCO FEEDING MEANS IN CIGARETTE MACHINES

Filed June 8, 1959 3 Sheets-Sheet 1

Fig. 1

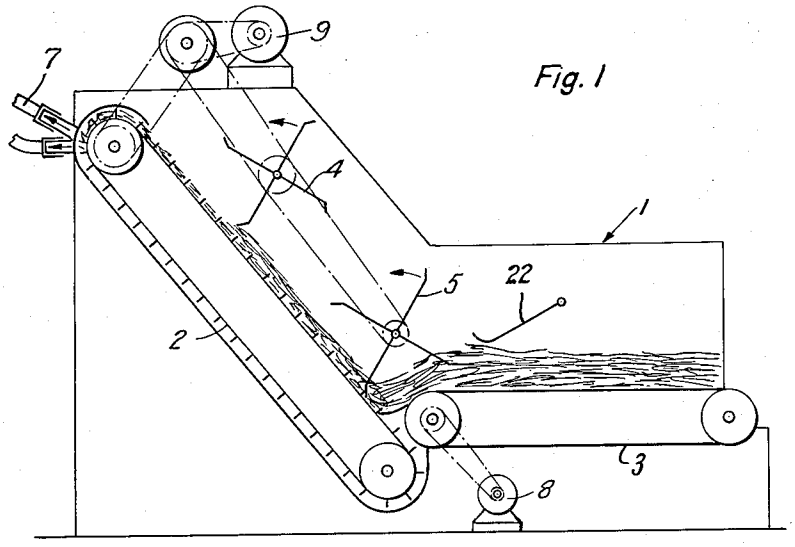
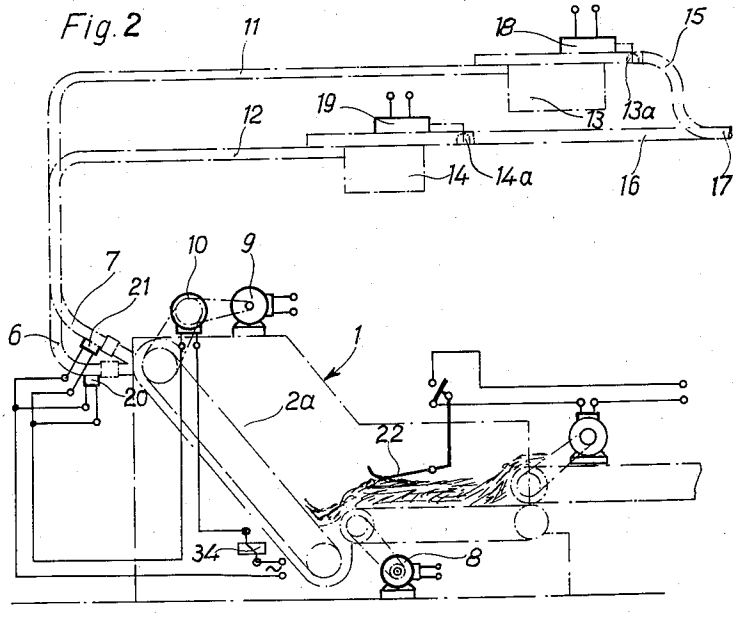


Fig. 2



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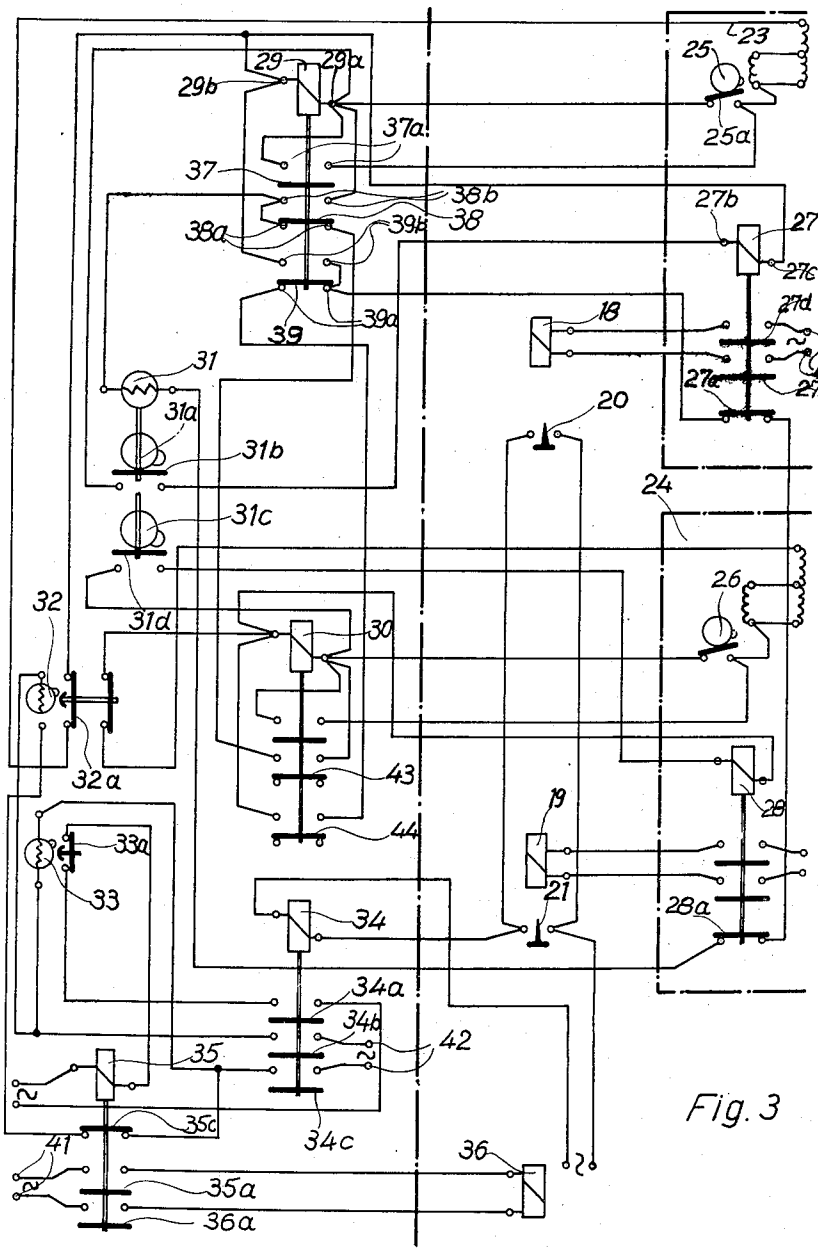


Fig. 3

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AUTOMATIC CONTROL MEANS FOR TOBACCO FEEDING MEANS IN CIGARETTE MACHINES

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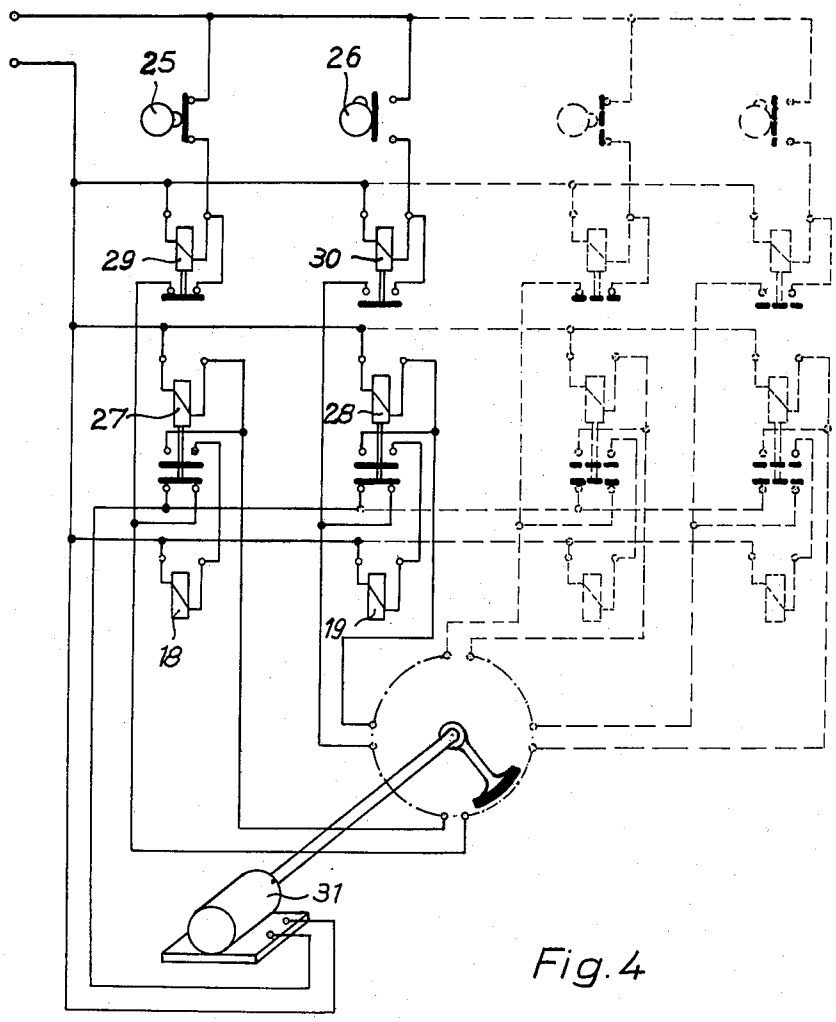


Fig. 4

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2,972,500

AUTOMATIC CONTROL MEANS FOR TOBACCO FEEDING MEANS IN CIGARETTE MACHINES

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3 Claims. (Cl. 302—28)

The invention relates to a new and improved method of pneumatic feeding of several cigarette making machines alternatively with cut tobacco.

For supplying cigarette making machines with cut tobacco pneumatic feeder plants are known in which several cigarette making machines connected to a common suction pipe fed from a single extractor can be fed alternately so that during the tobacco feeding cycle to one cigarette machine the supply to the other is cut off by means of a time switch or by a distributor device. The control of such equipment is effected in such manner that a time switch device is provided on each cigarette making machine which periodically operates a delivery box control magnet on the delivery box concerned, which in turn initiates the feed operation and simultaneously by this time switch mechanism, the regulating mechanism for the feed pipes leading to the remaining delivery boxes is cut off by electrical methods.

The time cycle required for a new delivery by the time switch mechanism after one cigarette making machine has been supplied depends in the first place on the time which the cigarette making machine occupies in handling the amount of tobacco fed to it. Furthermore, minor disturbances in the manufacturing operations result in a modification of the empirically determined delivery procedure. Therefore, in the supply of individual cigarette machines according to a definite cycle idle periods occur in which no cigarette machines are being supplied despite the fact that they may require tobacco.

The object of the present invention is to improve the pneumatic feeding of cigarette making machines or the control thereof in such manner that with the minimum expenditure of constructional components and of operating energy a large number of cigarette making machines can be fed automatically with cut tobacco with the greatest possible avoidance of idle periods.

This object is attained according to the invention by the fact that according to the requirements of the cigarette making machines and through the time switch mechanisms associated therewith, signals are applied to a switch mechanism common to all the machines and from this switch mechanism the control impulses are transmitted to the switching elements pertaining to the delivery procedures for the cigarette making machines concerned, said switch mechanisms including for example the control relays for the delivery box magnets, and such signals are controlled and/or delayed in such manner that at every moment only one cigarette machine is being supplied.

One constructional example of the invention is shown by way of example on the accompanying drawing as applied to a structure comprising individually controllable elevator belt sections, each feeding two or more cigarette making machines.

Fig. 1 shows an elevator for a delivery plant seen in side elevation,

Fig. 2 shows the electrical components relevant to the apparatus of Fig. 1, the latter being indicated in chain-dot lines,

Fig. 3 is a circuit diagram for the control of one section of a pneumatic delivery plant according to the invention, and

Fig. 4 is a general outline partial circuit diagram of sections of a complete delivery plant, indicating in full lines the components shown in Fig. 3, and in dotted lines the connection of other sections or units.

The elevator conveyor shown in Figs. 1 and 2 comprises a plurality of carding or prong-bearing belts 2*a* arranged side-by-side, only one of said belts being shown on the drawings, all said belts being adapted to be individually controlled. A supply container 1 for the tobacco to be delivered is provided, the bottom wall of which is formed by a feeder belt 3. The latter is driven by a motor 8 and the carding belts 2*a* are driven by a motor 9. In the region of the upper reversal point of the carding belts 2*a* there is located in each case two (or more) connections for delivery pipes 6 and 7 which extract the tobacco carried upwardly on the surface of the carding belts 2*a*. As shown on the drawings the connection leading to the feed pipe 6 is disposed approximately horizontally while the other connection for the suction pipe 7 is arranged above it at an angle of about 30° to the horizontal. If for example five carding belts 2*a* are arranged one beside the other it is possible to supply ten cigarette machines with the plant shown on the drawings by reason of the presence of two suction connections for each belt, but, of course, three suction connections can be used if desired.

The delivery pipes 6 and 7 are associated with feeder pipes 11, 12 and lead into delivery boxes or trunks 13, 14 including screen devices to extract the tobacco from the suction stream. These boxes 13, 14 are connected to suction pipes 15, 16 fed from a common suction pipe 17. The delivery boxes 13, 14 thus extract the tobacco carried from the conveyor 2*a* through the pipes 6, 7 respectively for delivery to cigarette making machines receiving the tobacco from time to time from the delivery boxes 13, 14, thus providing a simple and efficient means for conveying the tobacco from the supply point represented by the elevator belts 2*a* to delivery points represented by the delivery boxes 13, 14.

All the carding belts 2*a* of the elevator are driven from the motor 9 through respective clutches or other suitable couplings 10 and the suction operative upon the suction feed pipes 6, 7, 11, 12 is controlled by means of throttle valves 13*a*, 14*a* on the downstream side of the delivery boxes 13, 14. The operation of the throttle valves is effected by means of delivery box control magnets 18, 19. Air pressure operated switches 20 and 21 are provided on the suction intake pipes 6 and 7, which switches are closed when a sufficient degree of suction is operative in the region of the suction connections. Since the coupling 10 must in each case be closed when either of the two delivery boxes 13 and 14 require tobacco the two air operated switches 20 and 21 are connected in parallel one with the other. The motor 9 for driving the carding belts 2*a* is in continuous operation. The feed of tobacco to the carding belts is cut off by feeler means 22 when the level of the tobacco on the bottom belt 3 feeding all the carding belts has exceeded the desired amount.

In Fig. 3 a switching diagram for two cigarette making machines is shown in detail, these being the two machines shown or indicated in full lines in more generalized outline form in Fig. 4. Each machine has a switch box 23, 24 respectively, embodying a timing mechanism 25, 26 with an associated relay switch 27, 28. The timing mechanisms 25, 26 are adjusted for a definite supply time corresponding to the consumption of tobacco by the

cigarette making machines concerned and which may be of the order of 100 to 110 seconds. The delivery box control magnets 18, 19 are connected to the relay switches 27, 28.

A storage relay 29 or 30 is provided for each cigarette machine and a common distributor, for example a rotary selector switch 31 changes over from one cigarette machine to the other under the control of the relay switches 27, 28, the operating time being only about 1.5 to 2 seconds. A delay action relay 32 ensures that the delivery box control magnet 18, 19 only closes the respective throttle valve 13*a* or 14*a* (see Fig. 2) when there is no longer any tobacco in the feed pipes 11, 12. A further delay action relay 33 replaces the feeler means previously provided in the delivery boxes and determines the operating period for supplying these delivery boxes. A relay 34 responds to the switches 20, 21 and closes the protective switches 35 for the magnet 36 operating the respective coupling 10. The two air-operated switches 20 and 21 of one pair of machines are connected in parallel to the circuit of the relay 34.

The switching diagram of Fig. 3 taken in conjunction with the general outline circuit arrangement of Fig. 4 shows in detail the method of operation of the apparatus and it should be noted that the circuit diagram of Fig. 3 is shown under the condition that neither of the two cigarette machines are being supplied. When the timing mechanism 25 closes the two associated contacts by the associated switch arm 25*a* the feed terminal 29*a* of the storage relay 29 is connected to a source of current at the machine concerned. The terminal 29*b* is returned through the closed contact of the delay action relay 32 to the other terminal of the supply source. In this way the relay 29 is energized as long as the contact arm 32*a* of the delay action relay 32 is closed. On energization of the storage relay 29 the moving contact member 38 opens the contacts 38*a* and closes the contacts 38*b* and the contact member 39 opens the contacts 39*a* and closes the contacts 39*b*. By opening of the contacts 38*a* and 39*a* the connections to the storage relay 30 and to the distributor mechanism 31 are broken. By the closing of the contacts 38*b* the distributor mechanism 31 is energized from the terminal 29*a*. The other terminal of the mechanism 31 is connected to the terminal 29*b* through the switch member 28*a* of the switch relay 28, the switch member 27*a* of the relay 27, switch member 39 and contacts 39*b* of the storage relay 29.

In this way the distributor mechanism is operated and the cam disc 31*a* rotates and operates the switch arm 31*b* so that the terminal 27*b* of the operating coil of relay 27 is connected to the terminal 29*a*. Since the terminal 29*b* is already connected to the terminal 27*c* of the switch relay 27 the latter is energized and through the switch arms 27*d* and 27*e* connects the delivery box magnet 18 to the source terminals 40. At the same time the switch arm 27*a* is lifted from the associated contacts and the circuit to the distributor mechanism 31 is broken. The delivery box magnet 18 opens the throttle valve 13*a* and connects the suction to the feed pipe 11 concerned and when there is sufficient vacuum in the region of the connection point of the suction pipe 6, the air switch 20 closes. This closes the circuit of the relay switch 34 which is energized and through the contact lever 34*a* it closes the circuit of the control switch 35 for the coupling magnet 36 concerned so that the latter is connected for energization through switch arms 35*a* and 35*b* from the source terminals 41.

Now the carding belt 2*a* concerned is connected as shown in Fig. 2 through the coupling 10 with the driving motor 9 and tobacco is fed to the suction connection 6 and is delivered therefrom to the feed pipe 11 and to the delivery box 13. At the same time as the closing of the switch arm 34*a* operates, the switch arms 34*b* and 34*c* connect the delay action relay 33 to the feed terminals 42 and prepare a circuit for relay 32. After a predetermined time the delay relay 33 lifts the switch arm 33*a* and thus breaks the circuit for the protective switch for the coupling magnet so that the track or feeder 2*a* is stopped. Since the protective switch 35 is no longer energized the contact arm 35*c* completes the circuit to the delay acting relay 32. The operating disc of the delay action relay 32 moves for a predetermined period and then opens the circuit for the magnets of the switch relay 27 and the storage relay 29. Thereby the delivery box magnet 18 is de-energized and the throttle valve 13*a* cuts off the suction from the pipe 15. The delay period is so proportioned that the tobacco still remaining in the feed pipe 11 is sucked into the delivery box. The changeover contacts of the storage relay 29 revert to the position shown in Fig. 3. Now the distributor mechanism 31 is connected on the one hand through the switch arm 38 and on the other hand through the switch arms 28*a*, 27*a* and 39 to the storage relay 30 and is energized through the switch arms 43 and 44 when the relay 30 is operated by the timing mechanism 26. The timing cam disc 31*c* of the switch mechanism now moves on and actuates the switch arm 31*d* whereby the operating circuit for the magnets on switch relay 28 for the delivery box operating coil 19 is closed. The circuit then continues to operate in a manner which will be obvious and similarly to that previously described, but now feeds the second machine of the pair—and a further machine if each carding belt feeds three machines and so on.

Fig. 4 of the drawings shows a generalized view of a complete delivery plant according to the invention in diagrammatic form from which not only the control cooperation of the individual parts but also the further possibilities of including other equipment connected to a single suction fan is indicated by dotted lines.

By the invention it is possible to connect to one elevator with several carding belts 2*a* up to 15 cigarette making machines, and by the improved control procedures it is possible for the individual cigarette machines to be fed rapidly and reliably with tobacco in sequence according to requirements.

What I claim is:

1. Automatic control means for a system for feeding cut tobacco from a source of supply alternatingly to each of a plurality of cigarette machines through individual pneumatic suction conduits, comprising feed means for said tobacco, electromagnetic control means for said feed means, a valve in each of said conduits to control the application of pneumatic suction thereto, electromagnetic operating means for each of said valves, electric circuit means interconnecting said electromagnetic control and operating means, timing means connected in said electric circuit means, electric distributor means controlled by said timing means for alternatingly actuating said electromagnetic operating means, delay switch relays in said circuit means for delaying the disabling of said electromagnetic means and pressure operated switches in said conduits responsive to a reduced pressure in said conduits to control said delay switch mean.

2. Automatic control means for a system for feeding cut tobacco alternately to each of a plurality of cigarette machines through individual pneumatic suction conduits, comprising feed means for said tobacco, electromagnetic control means for said feed means, a valve in each of said conduits to control the application of pneumatic suction therethrough, electromagnetic operating means for each of said valves, electric circuit means for said electromagnetic control and operaitng means, a timed controlled relay for each of said cigarette machines in said circuit means to control the respective electromagnetic valves in said conduits, electric distributor means in said circuit controlled by said timing means for alternately actuating said relay circuits, delay switch relays in said circuit means for delaying the operation of said electromagnetically operated valves, and pressure operated switch means at the intake end of each of said conduits responsive to a decreased pressure in said conduit to control said switch delay means.

3. Automatic control means for a system for feeding cut tobacco from a source of supply alternately to each of a series of cigarette machines through individual pneumatic suction conduits, comprising feed means for said cut tobacco, motor means for driving said feed means, electromagnetic control means for said motor means, a valve in each of said conduits adjacent their discharge ends to control pneumatic suction therein, electromagnetic operating means for each of said valves, electric circuits for said electromagnetic control and operating means, time controlled relay circuits for each of said cigarette machines adapted to control said electromagnetic valve operating means, relay circuits for said time controlled relay circuits, a selector switch for alternately

energizing said relay circuits and altrenately operate said control valves, time delay means in said relay circuits to permit delayed functioning of said control valves in said conduits and to intetrrupt the motor drive means at predetermined intervals.

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