APPARATUS FOR CUTTING THE STRIP AT THE TOPS OF BAGS

FIG. 2

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APPARATUS FOR CUTTING THE STRIP AT THE TOPS OF BAGS

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Application September 30, 1954, Serial No. 459,303
Claims priority, application Switzerland October 1, 1953
2 Claims. (Cl. 164—42)

The present invention relates to apparatus for closing bags which are moved in succession along a predetermined path as well as to a process for closing such bags. More particularly, the present invention relates to that type of bag whose top end is closed by an elongated strip which extends beyond the bag and is bent backwardly upon itself at its free ends, this strip housing within itself a wire or the like which may be torn from the strip to open the bag.

One of the objects of the present invention is to provide a process and apparatus according to which the strip at the top of a bag is automatically cut.

Another object of the present invention is to provide a process and apparatus according to which an elongated strip extending across a plurality of bags is automatically cut between each pair of successive bags to separate the latter from each other.

A further object of the present invention is to provide a process and apparatus according to which a strip extending across a row of bags is automatically cut at a predetermined distance in front of and behind each bag.

Also, it is an object of the present invention to provide an apparatus capable of accomplishing the above objects and being actuated by the bags themselves.

An additional object of the present invention is to provide an exceedingly simple cutting means for cutting such a strip as well as a very simple control means actuated by the bags for controlling this cutting means.

With the above objects in view the present invention mainly consists of a process which includes the step of arranging the bags along a predetermined path, closing the top ends of the bags with an elongated strip extending continuously along the thus arranged bags, transporting the bags together along the path, and cutting completely across the strip at least once between each pair of successive bags during movement of the bags along a predetermined path by a stationary cutting apparatus which is located in the path of movement of the strip.

Furthermore, with the above objects in view the present invention mainly consists of an apparatus which includes a transporting means for transporting along a predetermined path a row of bags whose top ends are closed by a single continuous strip extending along and attached to the row of bags. Cutting means is located next to the path for cutting completely across the strip at least once between each pair of successive bags while the latter are moved along the path by the transporting means, and an actuating means is located in the path of the bags to be successively engaged by the latter for actuating the cutting means.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. This invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description when read in connection with the accompanying drawing, in which Fig. 1 shows in a fragmentary, schematic perspec-
The flow of current through the thyratron energizes the winding of the solenoid 11, operating the cutting blade 6 and associated with the same. When the alternating current applied to the anode of the thyratron becomes negative, the thyratron is no longer conductive, and the solenoid 11 will be deenergized. Accordingly, the cutting blade will be returned to its inoperative position by the return spring 12.

As is shown in the drawing, the switch 17 has a plate 25 fixed thereto, and a spring 26 is fixed at one end to the plate 25 and at its opposite end to the lever 15 for urging the latter to a rest position extending substantially normally across the path of movement of the bag. Elements identical with elements 25 and 26 are fixed to the switch 18 and lever 16 for urging the latter to a position also extending substantially normally across the path of movement of the bags. The switch 17 is opened when the switch operating member 15 extends across the path of movement of the bags and the switch 18 is closed when the switch operating member 16 extends across the path of movement of the bags, switch 17 becoming closed when feeler 15 is moved by the bags to the position shown in the drawing and switch 18 becoming opened when feeler 16 is moved by the bags to a position out of the path of movement thereof. Thus, switch 17 is opened when the feeler member 16 is returned to its rest position extending across the path of movement of the bags. Each time one of the switches 17 and 18 is closed the apparatus 14 completes a circuit to the magnet 11 for pulse energizing the latter to actuate the cutting blade 6. As is shown in the drawing, the leads 20 connect the control apparatus 14 electrically with the solenoid 11 and with the switches 17 and 18 while the lines 21 are electrically interconnected with the control apparatus 14. It is to be noted that the operation of control apparatus 14 is well known and does not, in itself, constitute a part of the present invention.

Another example of the electrical control means and its performance will be described below.

The above described structure operates as follows, in accordance with the process of the invention:

The bags 2 are arranged on the transporting means 4 in the manner shown in the drawing and an uninterrupted closing strip 19 is folded along a central line and surrounds at the top edge of the strip 19 a wire 22. This strip 19 is folded and joined by guiding and pressure rollers to the bags 2 so that the strip 19 covers the top end of each bag and closes the same, the strip 19 being joined to the bags by glue or the like. The strip 19 moves together with the bags 2 through the slot 5 of the support 4. As soon as a bag 2 engages the first feeler 15, the latter is turned by the bag itself from its switch opening position against the action of the relatively light spring 26 to the switch closing position which closes the switch 17 to pulse energize solenoid 11. In this way the blade 6 is turned to cut completely through the strip 19 being instantaneously returned, under the action of spring 12 to its initial open position. The location of switch 17 and lever 15 with respect to the support 4 is such that the strip 19 is not cut off next to a bag but instead is cut at a predetermined distance ahead of each bag to provide each bag with a strip portion 19' extending forwardly therefrom. The length of portion 19' can be varied by adjusting the distance between feeler 15 and blade 6.

During the further movement of the bag the latter turns the feeler 16, but the switch 18 controlled thereby is closed only when the feeler 16 returns to its starting position and this happens only when the trailing edge 2' of each bag has moved beyond the feeler 16. Thus, upon return of feeler 16 to its starting position the switch 18 is closed and the magnet 11 is again pulse energized so that the strip 19 is then cut between a pair of successive bags. Through properly choosing the distance between feeler 16 and the blade 6 it is possible to provide each bag with a strip portion 19'' extending rearwardly therefrom. These portions 19' and 19'' are bent backwardly upon the strip of the bag and the wire 22 serves to retain the strip 19 in its thus folded position. The wire 22 serves in a known way to open the bag after a part of the strip is torn away from the wire 22.

A very simple arrangement of electric control means is described now with reference to Fig. 2. This arrangement uses exclusively conventional electric components including switches and relays.

The relay diagram of Fig. 2 shows the switches 17 and 18 and with their pertaining feelers 15 and 16 respectively, in their positions of rest, switch 17 being normally open and switch 18 being normally closed. Besides this diagram contains five relays R₁-R₅. These relays are of conventional type and show their respective contacts in their normally open or normally closed position as the case may be.

In operation this circuit and control system works as follows:

Phase a: No bag has yet contacted the feelers 15 or 16, the switch 17 is in open position and switch 18 is in closed position. Now the main switch z is closed. Relay R₁ is then energized and the contact e closes and held in this position. At the same time the solenoid 11 is energized via the contact d of relay R₁. The armature of solenoid 11 closes the contact b of relay R₂. This energizes the relay R₂. Solenoid 11 is de-energized by the opening of contact d of relay R₂ while the closing of contact c of the same relay establishes a circuit via contact e of relay R₁ and the closed contact f of relay R₁ so as to keep the relay R₂ energized. In this manner the solenoid has been placed in a condition of inoperativeness for the rest of the duration of phase a. The knife 6 has actually carried out a cutting operation but this was cutting air because there is no strip yet in the position to be cut. Otherwise, this would have been a cut at the trailing edge of a bag at 19°.

Phase b: The edge of the first bag contacts feeler 15 and thereby closes contact 17. Relay R₄ is energized and thereby opens the contact f. This interrupts the holding circuit that was established for relay R₂. Relay R₃ is de-energized and contact d closes. Thus the armature 11 is again energized via the still-closed switch 18. The knife blade 6 makes a trim cut at 19'. The closing of contact b energizes relay R₂, interrupts the circuit of solenoid 11 at contact d and establishes the holding circuit via contact c. However, since the closing of switch 17 has also energized the relays R₃ and R₄, the holding circuit for relay R₃ is now established via contact f but via the contact h of relay R₅. At the same time a holding circuit for relay R₄ is established via contact a of relay R₂ and contact g of relay R₃. Thus relay R₅ remains energized and the armature of solenoid 11 remains in its position of rest. This condition remains unchanged up to the end of phase b.

Phase c: The front edge of the traveling bag now actuates lever 16 and thereby opens contact 18. This has only the effect of de-energizing relay R₁ and thereby opening contact e. But this contact is at present not active. Therefore nothing changes in the condition of the whole apparatus. Relay R₂ is still held energized as before. This prevails up to the end of phase c.

Phase d: The rear end of the traveling bag releases feeler 15 and thereby causes opening of switch 17. Since now both switches 17 and 18 are in open position, the whole system is without electric current. All relays are deenergized. The armature of the solenoid 11 is in position of rest. This practically completes the phase d and thereupon one complete cycle of operation. At the end of this phase and cycle the rear end of the bag releases the feeler
of movement of the bags, to a switch opening position where said second switch operating means has been engaged by a bag and moved thereby out of said path; and means connected to said second switch operating means for returning the same to said switch closing position thereof when said second switch operating means is not engaged by a bag so as to impulse energize said control means with said second switch when said second switch operating means extends across the path of movement of the bags.

2. In a bag closing apparatus, in combination, transporting means for transporting along a predetermined path a row of bags whose top ends are closed by a single continuous strip extending along and attached to the row of bags; cutting means located next to said path for cutting completely across said strip at least once between each pair of successive bags while the latter are moved along said path by said transporting means; a single electromagnetic operating means operatively connected to said cutting means for operating the same; electrical control means electrically connected to said operating means for controlling the latter with energizing impulses; a first switch located adjacent said path and connected electrically to said control means for impulse energizing the latter when said first switch is closed; first elongated switch operating means connected to said first switch for movement from a switch opening position, where said first switch operating means extends across the path of movement of the bags, to a switch closing position where the switch operating means has been engaged by a bag and moved thereby out of said path, whereby said control means is impulse energized by movement of said first switch operating means out of said path by a bag; a second switch located after said first switch along said path and connected electrically to said control means for impulse energizing the latter when said second switch is closed; a second elongated switch operating means connected to said second switch for movement from a switch closing position, where said second switch operating means extends across the path of movement of the bags, to a switch opening position where said second switch operating means has been engaged by a bag and moved thereby out of said path, whereby said control means is impulse energized by movement of said second switch operating means.

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