United States Patent

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[31] 16188

[54] **DEVICE FOR CIGARETTE CONTAINERS**
10 Claims, 4 Drawing Figs.

[52] U.S. Cl. 221/10, 131/21, 131/25
[51] Int. Cl. G07f 11/00
[50] Field of Search 221/9, 10, 64, 68, 156, 171, 174; 222/56; 131/21, 22, 25; 198/84

[56] References Cited

UNITED STATES PATENTS

2,592,642	4/1952	Bardet	221/9 X
3,297,138	1/1967	McCombie	198/84
3,305,128	2/1967	Dearsley	221/9

FOREIGN PATENTS

102,830	9/1962	Netherlands	221/9

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ABSTRACT: A variable capacity cigarette container or feed hopper provided with motor-driven, flexible sidewalls for varying the volume of the container. A thin, flexible strip is attached to a feed-in conveyor positioned at the top of the container and is adapted to constantly lie on top of the uppermost layer of cigarettes in the container. As the level of the top layer of cigarettes changes in response to the feed-in/feed-out ratio, the strip bends slightly and such movement is detected by an electrical proximity sensor whose output actuates the drive motor to vary the container volume accordingly. This arrangement ensures that incoming cigarettes have no drop to the top layer, which could result in unwanted misalignments.

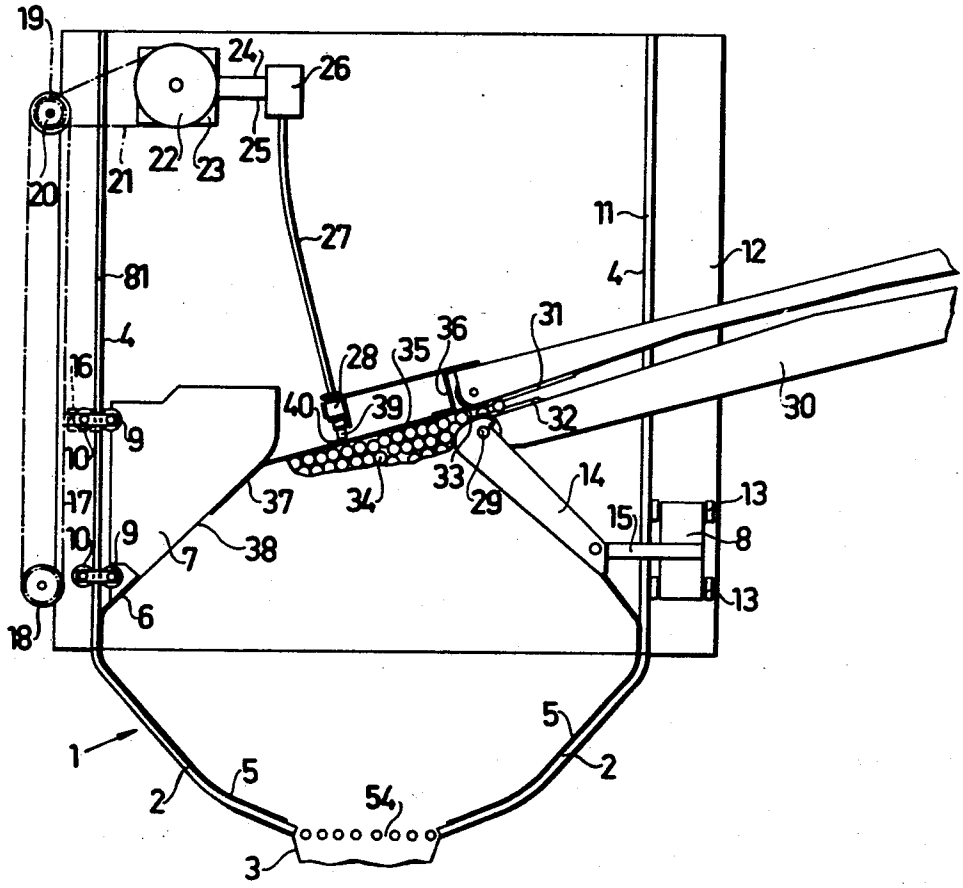

Fig.1

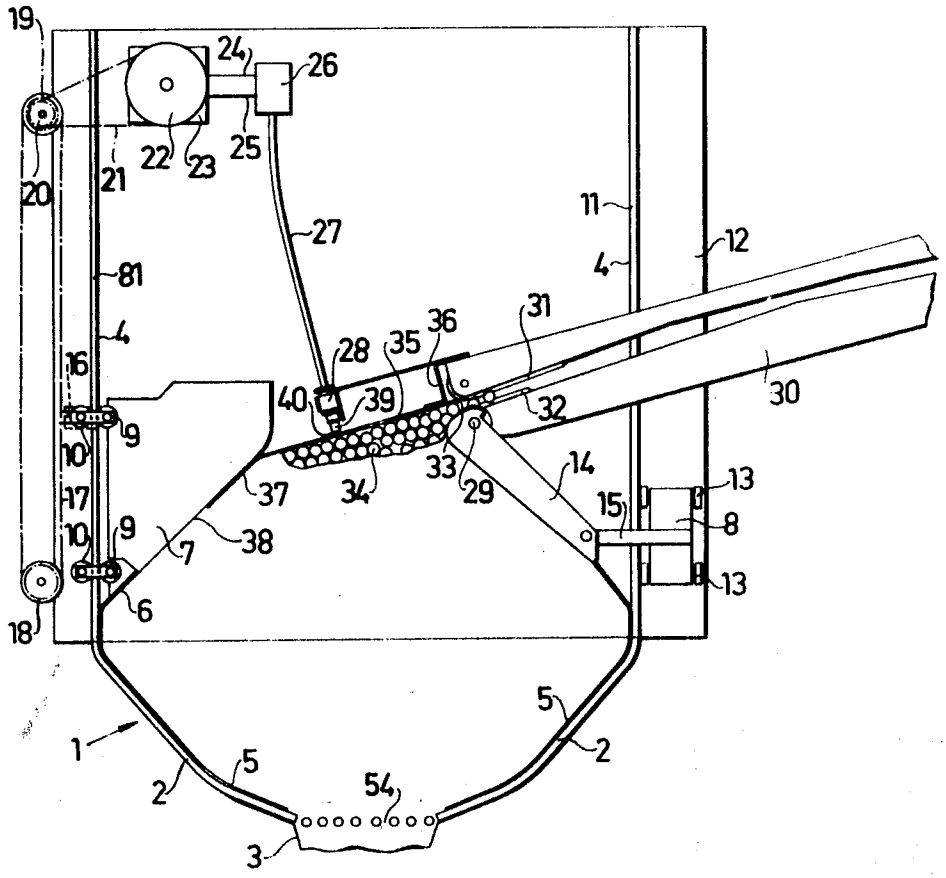
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Fig.2

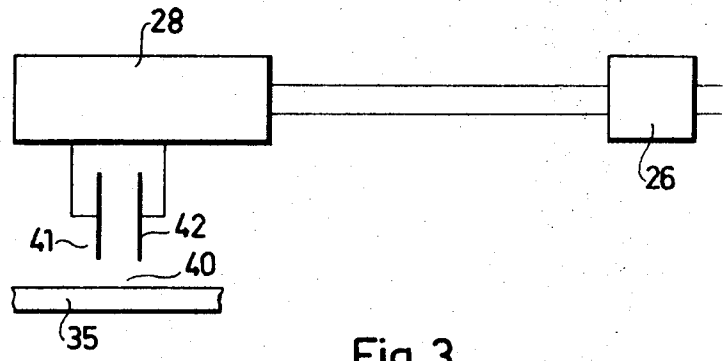


Fig.3

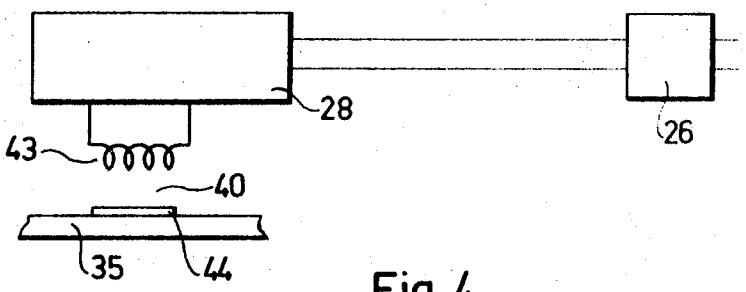
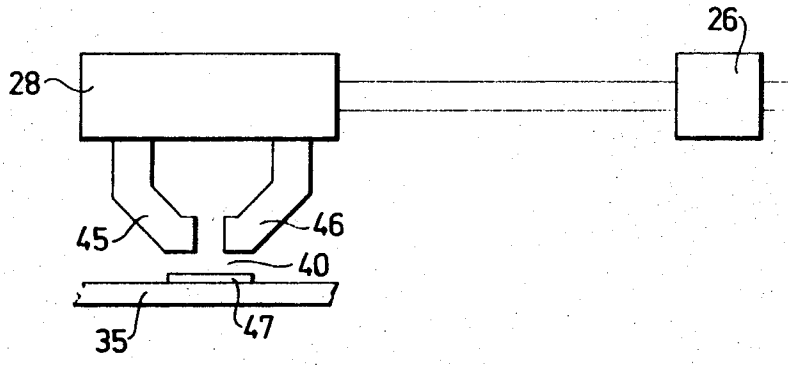


Fig.4



DEVICE FOR CIGARETTE CONTAINERS

The invention relates to a device for cigarette containers of the type having an upper feed-in opening and a lower feed-out opening for cigarettes and the storage capacity of which is variable depending on alterations in the ratio between cigarettes fed in and cigarettes fed out, at least one wall part of the container being displaceable by means of a driving motor and the feed-in opening being limited by at least one strip-shaped, flexible-covering member arranged to rest on the top layer of cigarettes in the container.

Cigarette containers of the type described are already known, for example through German Pat. No. 1,103,838 and U.S. Pat. No. 3,341,036. When the cigarettes are fed in through the upper opening difficulties arise because they do not lie parallel with each other. This problem is particularly noticeable if the cigarettes are allowed to fall some way to the top layer of cigarettes in the container. Attempts have been made to solve the problem by feeding the cigarettes towards the upper layer by means of a feeding means comprising two belt conveyors, cigarettes being held between the belts and fed at an adjustable speed directly to the upper layer of cigarettes. Although this has proved satisfactory in most cases, it is impossible to avoid a cigarette sometimes displacing an adjacent cigarette so that this lies obliquely in relation to the rest of the cigarettes. Order is rapidly disturbed in the container and the cigarettes will lie with their longitudinal axes pointing in arbitrary directions. Operations must then be ceased and the contents of the container rearranged.

The object of the invention is to provide a cigarette container in which the cigarettes in the upper layer are moved by the supply of new cigarettes, but in spite of this are prevented from lying crooked with respect to a certain direction.

This is made possible since the covering member is light and freely movable and that its movements due to alterations in the upper layer of cigarettes are sensed by means of an electric sensing member which is stationary in relation to the feed-in opening and is arranged to be influenced by alterations in an air gap between the upper surface of the covering member and the sensing member, and when influenced, regulates the driving motor so that the air gap is kept substantially constant.

In a preferred embodiment of the invention the container is arranged to receive a slightly greater number of cigarettes than the number fed out and consequently the flexible strip or sheet covering the cigarettes near the feed-in opening will be raised a little after a while since the number of cigarettes in the container increases. The air gap is thus reduced and the sensing member starts the driving motor, thereby increasing the capacity of the container due to movement of the movable parts of the container. During operation the covering strip is always in contact with the upper layer of cigarettes and keeps the cigarettes parallel. When, due to the increased volume of the container, the strip has fallen to the predetermined level so that the width of the airgap is, for example 5 mm., the output signal from the sensing member to the motor ceases and movement of the container parts ceases. The covering strip, which must be light, may consist of fabric, rubber, foam plastic or the like and may not be subjected to any external spasmodic forces which might affect the cigarettes in the upper layer. It has been found during experiments that even the negligible pressure from the arm of a microswitch on the covering strip causes a certain retardation of one or more cigarettes beneath so that these swing about an axis perpendicular to the longitudinal axis and the cigarettes quickly become disordered.

An example of a cigarette container according to the invention is described in the following with reference to the accompanying drawings in which:

FIG. 1 is a simplified view of a container, showing the essential parts; and

FIGS. 2—4 show the principles of a number of different types of sensing members.

The simplified view of the device shown in FIG. 1 comprises a known cigarette container 1 having a stationary part in communication with a cigarette packer 3, not shown in detail, at a feed-out opening 54. The stationary part consists of sidewalls 2 converging towards the feed-out opening 54 and becoming at the top vertical sidewalls 4. The width of the sidewalls 2 and 4 only slightly exceeds the length of the cigarettes to be packed. The sidewalls 2 and 4 are joined at the edges to front and rear walls not shown in the drawings. The movable part of the container comprises sidewalls 5 consisting of thin, stainless steel, for example, and arranged to glide on the inside of the stationary wide walls 2, 4. The movable sidewalls 5 are preferably the same width as the walls 2 and 4. The upper ends 6 of the sidewalls 5 are rigidly connected to trolleys 7 and 8 respectively, which are vertically movable along the sidewalls 4. The left-hand sidewall 4 is provided with a flange 81 on the upper side of which run rollers 9 on the trolley 7. On the lower side of the flange 81 run wheels 10 which are connected to the trolley 7 in a manner not shown in detail here, whereby the trolley is guided in vertical direction. The right-hand wall 4 is provided with a flange 11 and a flange 12 perpendicular thereto. The trolley 8, driven together with the trolley 7, is provided with rollers 13 running on the flange 12 and is guided laterally to the flange 11. The right-hand movable wall 5 is joined to the trolley 8 via a link 14 and a link 15 pivotally connected to the link 14.

The left-hand trolley 7 is connected via a connection member 16 to an endless chain 17 running on two chain wheels 18 and 19 arranged vertically one above the other. The chain wheel 19 is rigidly connected to a chain wheel 20 driven by means of a chain 21 from a chain wheel 22 on a driving motor 23. This driving motor 23 is regulated both by a mechanism, not shown in the drawings, which operates in coordination with the packer 3 and a machine, not shown here, for feeding in cigarettes, and also through conduits 24, 25 from a control equipment 26 which receives control signals via a cable 27 from a sensing member 28 which is further described later.

The link 14 connected to the trolley 8 is joined by a pivot 29 to a pivoting conveyor 30 for the cigarettes, which is of conventional design. The conveyor 30 has two belt conveyors 31, 32 between which cigarettes are fed laterally from a continuous machine, not shown here. The conveyor belts 31 and 32 of the feeder 30 are of flexible material such as, for example, foam rubber or foam plastic, so that the cigarettes are firmly held during transport without the risk of being damaged. The cigarettes are carried via the feeder 30 to the inlet opening 33 of the container and are piled onto the upper layer of cigarettes or lined up in this layer. The opening 33 in the embodiment shown has a width approximately corresponding to the width of two cigarettes, but it may have any width depending on the feeder used.

In order to avoid the cigarettes in the upper layer becoming disarranged due to their axes being displaced from the parallel position, i.e., a position with their axes perpendicular to the plane of the drawing, according to the invention at least one light and flexible sheet or a covering member 35 is arranged in direct connection with the inlet opening 33 and rests freely movably on the upper layer 34 of the container. The covering member 35 in the embodiment shown consists of a strip having one end joined to a bracket 36 on the feeder 30, this bracket also carrying the sensing member 28. This stationary end of the covering strip 35 is immediately adjacent to one longitudinal edge of the opening 33. The strip 35 preferably has a width corresponding to the length of the cigarettes, but it may even be narrower. The free end 37 of the covering strip 35 is in gliding contact with an inner wall 38 of the trolley 7, this wall 38 being a continuation of the flexible sidewall 5 of the container.

Between the tip 39 of the sensing member 28 and the upper surface of the covering strip 35 is an airgap 40.

Upon alterations in the airgap 40, the sensing member 28 is arranged to emit a signal to the equipment 26 which, in

response to this signal, activates the motor 23, thereby actuating the trolley 7 via the chain 17 for alteration of the capacity of the container. In the example selected, the rate at which the cigarettes are supplied to the feed-in opening 33 is slightly greater than that at which the cigarettes are fed out of the outlet opening 54 to the packer 3. FIG. 1 shows the covering strip 35 in its normal position, there being a certain airgap 40 and the sensing member 28 being inoperative. Since the feed-in rate of the cigarettes is slightly greater than the feed-out rate, as mentioned, the covering strip 35 will be raised by the increased number of cigarettes in the container as the upper layer 34 is raised, and the airgap 40 will thus be reduced. As soon as the airgap 40 falls below the width determined for it, the sensing member 28 will emit a signal to the equipment 26, thus activating the motor 23 and the trolley 7, together with the trolley 8 cooperating with it, will be moved slowly vertically upwards. During this movement the feeder is pivoted clockwise via the link 14 and the sensing member 28 is thus also moved upwards, always assuming a specific position in relation to the opening 33. During this upward movement the capacity of the container 1 increases and the covering strip 35, which is resting all the time on the upper layer 34 of cigarettes, is lowered. The airgap 40 thus increases until the predetermined width of the gap is achieved, whereupon the sensing member 28 becomes inoperative and the slowly operating motor 23 is cut out. Consequently, during the movement of the displaceable part of the container, irrespective of how great this movement is, the upper layer of cigarettes will be in constant contact with the covering strip 35 and the cigarettes will not be pivoted from the parallel position.

When the movable part of the container has reached its uppermost position and the capacity of the container has thus reached a maximum, a switch may be arranged to be actuated by the equipment 26, for example, so that the movement of the motor 23 in response to signals from the sensing member 28 is reversed, and when the airgap 40 decreases the trolley 7 will be moved downwardly. At the same time the supply of cigarettes to the opening 33 is interrupted for a certain period of time. This period may last until, for example, the minimum capacity of the container has been reached, after which a lower switch activated, for example, by the trolley 8, once again initiates the supply of cigarettes to the inlet opening 33 and influences the equipment 26 so that the original process is repeated.

FIG. 2 shows schematically an emitter 28, the output signals of which are dependent on the field between two capacitor plates 41 and 42, and more exactly, on alterations in dielectric constant of the capacitor formed by the plates 41 and 42. This is also affected by the covering strip 35 by way of the airgap 40 and when this airgap 40 reaches a certain minimum value the capacitance of the capacitor is altered so that the circuit (not shown in detail here) in the emitter 28 of which the capacitor is a part has its Q-value altered so that an output signal is effected in the equipment 26.

FIG. 3 shows a simplified view of another type of emitter having a coil 43 which is included in a resonance circuit in the emitter 28, the Q-value of which is altered in response to the movement of the covering strip 35. In this case the covering strip 35 is provided with an area 44 which is coated with a layer of material which can be magnetized limiting one side of the airgap 40. The layer 44, which may extend over the entire covering strip 35 or only within the area near the airgap, may consist of a thin metal foil, a thin, light metal sheet or the like.

FIG. 4 shows a simplified view of a third type of emitter having magnetic pole shoes 45, 46 lying on one side of the airgap 40 and a metal layer or sheet of metal 47 arranged on the other side of the gap. When this airgap 40 is decreased due to the movement of the covering strip 35 towards the pole shoes, the magnetic field in the airgap of the pole shoes will be altered and thus the flux through the pole shoes. This flux alteration activates a circuit (not shown in detail) in the emitter 28 and the desired output signal to the equipment 26 is effected so that the motor 23 starts.

All the sensing means described above, which sense the movement of the covering strip without any mechanical activation from the strip, are known per se and besides the sensing members illustrated in FIGS. 2—4 there are many other known types which operate in response to alterations in an airgap between the sensing member and the object to be sensed.

The cigarette container described above has only been selected as an example of one of many suitable cigarette containers in which the invention can be used. The invention is therefore only limited by the claims.

What I claim is:

1. Device in cigarette containers of the type having an upper feed-in opening and a lower feed-out opening for cigarettes and the storage capacity of which is variable depending on alterations in the ratio between cigarettes fed in and cigarettes fed out, at least one wall part of the container being displaceable by means of a driving motor and the feed-in opening being limited by at least one strip-shaped, flexible covering member arranged to rest on the top layer of cigarettes in the container, characterized in that the covering member is light and freely movable and that its movements due to alterations in the upper layer of cigarettes are sensed by means of an electric sensing member which is stationary in relation to the feed-in opening and is arranged to be influenced by alterations in an airgap between the upper surface of the covering member and the sensing member and, when influenced, regulates the driving motor so that the airgap is kept substantially constant.

2. Device according to claim 1, characterized in that the sensing member is arranged to generate an electric field in the airgap and, upon alteration of the airgap, a corresponding alteration is effected in the electric field, which then influences the output signal of the sensing member to the driving motor.

3. Device according to claim 1, characterized in that the feed-in of the cigarettes is greater than the feed-out and that the sensing member is arranged to be activated when the width of the airgap falls below a predetermined value.

4. Device according to claim 2, characterized in that the airgap is part of a magnetic circuit in the sensing member.

5. Device according to claim 2, characterized in that the covering strip, at least within a limited area, has a coating of metallic material, said coating limiting one side of the airgap.

6. Device according to claim 5, characterized in that the coating consists of a material which can be magnetized and the covering strip of a nonmagnetic material.

7. Device according to claim 4, characterized in that the coating consists of a thin metal foil applied on the covering strip.

8. Device according to claim 6, characterized in that the covering strip consists of rubber having a thin metal sheet connected to the airgap.

9. Device according to claim 2, characterized in that the feed-in of the cigarettes is greater than the feed-out and that the sensing member is arranged to be activated when the width of the airgap falls below a predetermined value.

10. Device according to claim 5 characterized in that the coating consists of a thin metal foil applied on the covering strip.