United States Patent [19]

Rudszinat et al.

[11] **3,812,950**

[45] **May 28, 1974**

[54] **METHOD OF TRANSPORTING CIGARETTES OR THE LIKE**

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[21] Appl. No.: **46,623**

Related U.S. Application Data

[62] Division of Ser. No. 744,995, July 15, 1968, Pat. No. 3,535,003.

[30] **Foreign Application Priority Data**

July 21, 1967 England 33791/67

[52] **U.S. Cl.** ..... **198/31 AA**, 198/211, 302/31

[51] **Int. Cl.** **B65g 29/00**, B65g 47/30

[58] **Field of Search**..... 198/22 C, 31 AA, 209, 211, 198/25; 302/2 R, 29, 31

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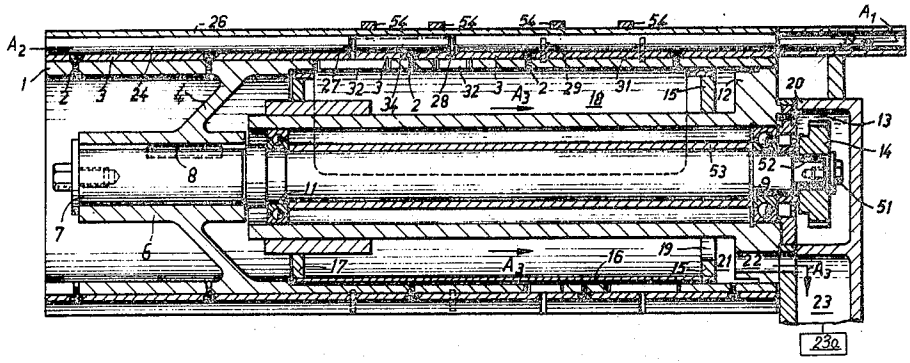
[57] ABSTRACT

Cigarettes which are discharged lengthwise from the cutoff of a rod cigarette machine are fed into successive flutes of a revolving drum and are arrested and located in predetermined axial positions by forces produced by two or more streams of compressed air and/or suction air. The resultant of forces acting upon a cigarette in predetermined position is zero. A stationary shroud seals from the atmosphere the outer sides of those flutes which receive cigarettes from the cutoff and while the cigarettes in such flutes are acted upon to assume predetermined positions. Each cigarette can be biased against the adjoining surface of the respective flute by atmospheric air which is admitted through openings provided in the shroud.

3 Claims, 9 Drawing Figures



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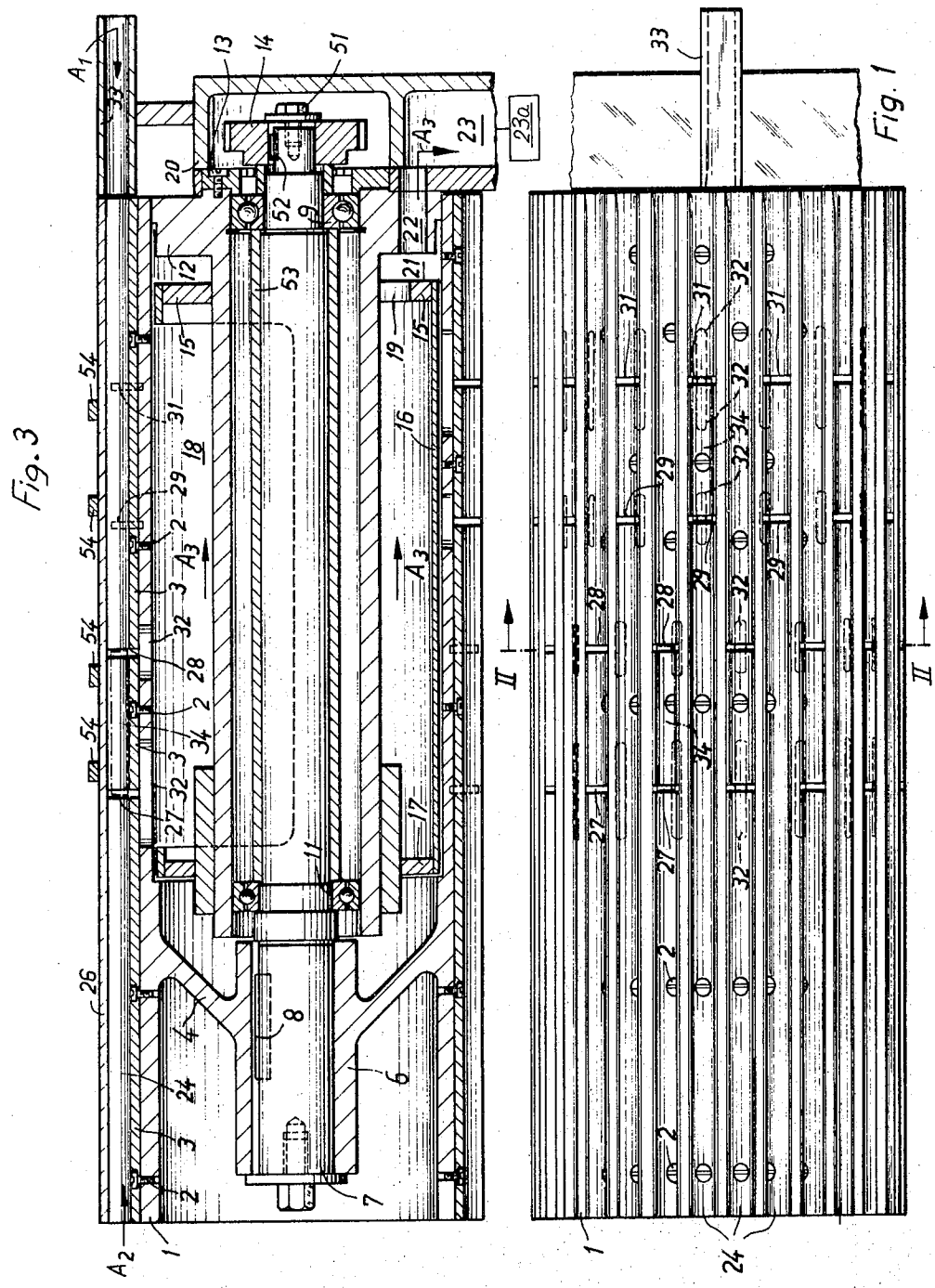

Fig. 3

Fig. 1

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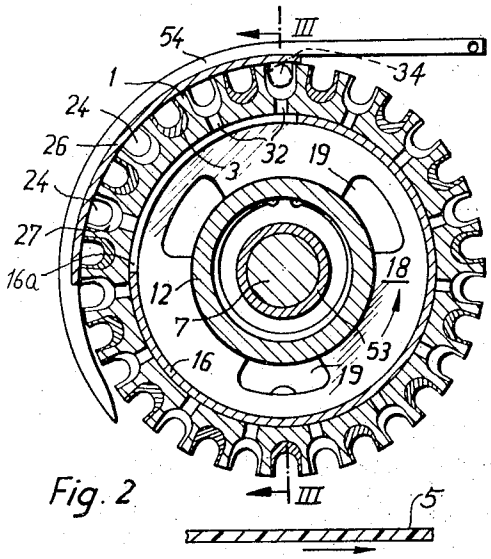

Fig. 2

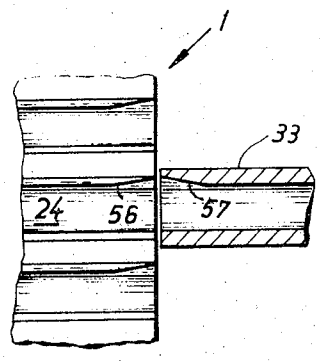

Fig. 4

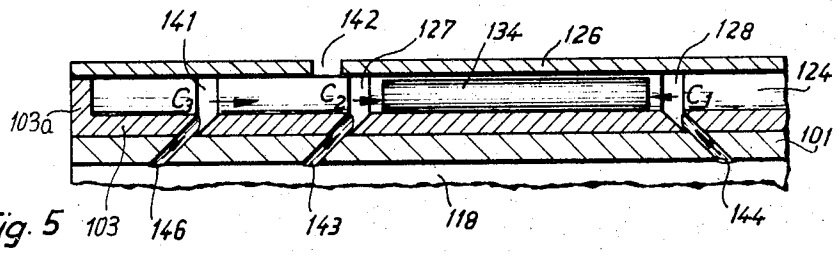

Fig. 5

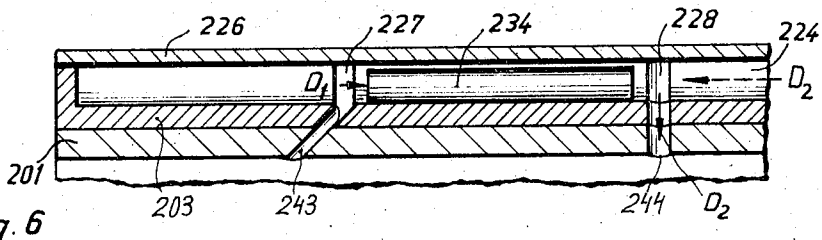

Fig. 6

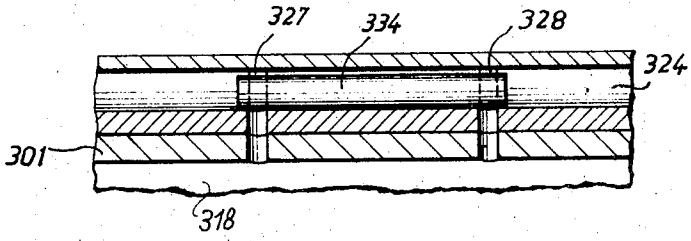

Fig. 7

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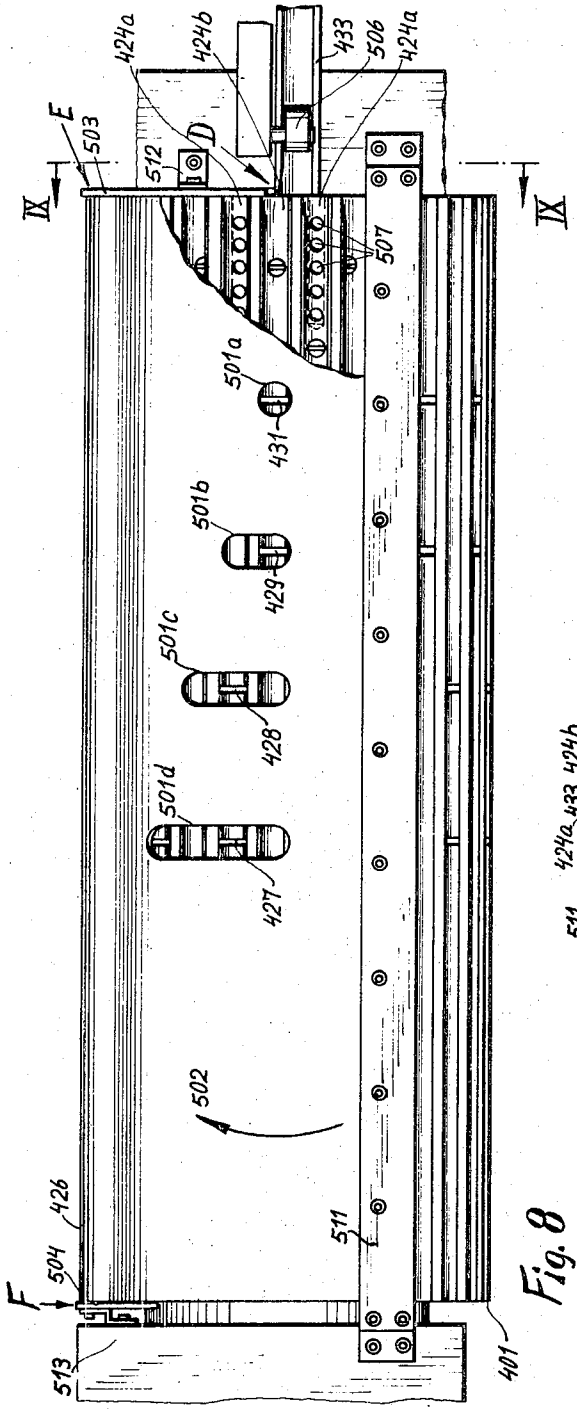

Fig. 8

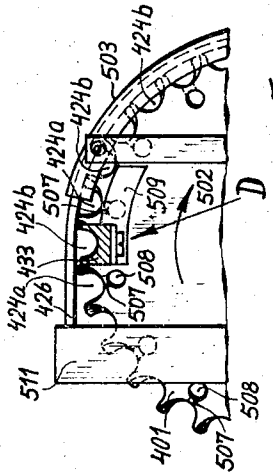

Fig. 9

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METHOD OF TRANSPORTING CIGARETTES OR THE LIKE

CROSS-REFERENCE TO RELATED APPLICATION

This is a division of our copending application Ser. No. 744,995 filed July 15, 1968 now U.S. Pat. No. 3,535,003 granted Oct. 20, 1970 and assigned to the same assignee.

BACKGROUND OF THE INVENTION

The present invention relates to a method of transporting cigarettes or other types of rod-shaped commodities, either singly or in groups of two or more, for example, packs which contain predetermined numbers of cigarettes, cigars, cigarillos or other tobacco-containing rod-shaped commodities.

Modern cigarette machines are designed to produce several thousand cigarettes per minute. Such high-speed machines can be operated at maximum rate of speed only if they are equipped or combined with mechanisms or apparatus which can properly accept, transport and position cigarettes at the same rate at which the cigarettes issue from the cut-off, i.e., from that part of a cigarette machine which severs a continuous cigarette rod into sections of unit length or multiple unit length. As a rule, apparatus which accept cigarettes from the cutoff are designed to convert a single file of cigarettes which move lengthwise (axially) into one or more rows of cigarettes which travel sideways. Such apparatus comprise a fluted drum whose flutes receive cigarettes from the cutoff and move the cigarettes sideways by simultaneously causing each cigarette to assume a predetermined position prior to being transferred onto a catcher belt or into the flutes of a further drum.

The main problem which is encountered in presently known apparatus is to properly locate cigarettes in the flutes of the drum so that the cigarettes are properly aligned and form one or more rows before they reach the catcher band. The flutes of conventional drums are normally provided with mechanical stops which arrest the cigarettes in predetermined axial positions. This proposal is not satisfactory when the cigarettes enter the flutes at a high speed because they are caused to impact against the stops with a force which results in deformation and/or rebounding so that the final axial positions of cigarettes cannot be determined in advance with a requisite degree of accuracy. More recent proposals (see U.S. Pat. No. 3,039,590 to Best) include the provision of mechanical brakes which arrest the cigarettes before they reach the stops, and the provision of nozzles which produce streams of suction air or compressed air to shift the cigarettes (whose axial movement was terminated in response to mechanical braking action) all the way into abutment with the respective stops. It was found that the stops are still likely to deform the wrappers and/or the fillers of cigarettes and that the cigarettes are still likely to rebound when they are either blown or sucked into actual abutment with the stops. Furthermore, the mechanical braking devices often damage, smudge and/or deform the wrappers.

British Pat. No. 651,679 to Dank discloses a drum wherein a suction chamber draws air through orifices provided in the stops so that the cigarettes are caused to adhere to and are prevented from rebounding on impact against the respective stops. This proposal failed to find wide-spread acceptance because the streams of suction air which pull cigarettes against the stops must be very strong when the drum receives cigarettes at rapidly following intervals so that the cigarettes are invariably damaged or at least deformed when they impact against the respective stops.

Additional problems arise during acceleration of a cigarette machine to normal operating speed when the cigarettes enter the flutes at different speeds.

SUMMARY OF THE INVENTION

It is an object of our invention to provide a method of transporting cigarettes or other types of rod-shaped commodities in such a way that the axial or lengthwise movement of commodities can be terminated without resorting to mechanical brakes and/or stops and with a high degree of accuracy.

Another object of the invention is to provide a method according to which cigarettes or analogous rod-shaped commodities can be transported and properly located by resorting exclusively to streams of compressed air and/or suction air.

A further object of the invention is to provide a method according to which the commodities can be properly located and transported at the same rate at which they issue from a modern cigarette machine when such machine operates at a maximum rate of speed.

An additional object of the invention is to provide a method according to which the commodities are treated gently and which can be employed to convert a single file of axially moving commodities into one or more rows of commodities which move sideways and wherein each commodity of either row is properly aligned with all other commodities of the same row.

The improved method comprises the steps of conveying each of a series of commodities (e.g., each of a single file of cigarettes which advance past the cutoff of a rod cigarette machine) lengthwise in a direction toward a predetermined position; and subjecting such commodities to the action of forces produced by a plurality of gas which act on the commodities in and counter to the aforementioned direction to locate each commodity in the respective predetermined axial position. The arrangement is preferably such that the resultant of forces acting upon the commodities in the respective predetermined positions is zero, i.e., the resultant of forces acting upon a commodity which is outside of or remote from the respective predetermined position imparts to the commodity a movement toward the predetermined position.

In accordance with a presently preferred embodiment of our invention, each commodity is moved along an elongated path which is at least substantially sealed from the surrounding atmosphere. For example, the two gas streams may be two suction air streams which enter the respective path lengthwise from opposite ends and leave such path by flowing substantially transversely of the direction of movement of the respective path lengthwise from opposite ends and leave such path by flowing substantially transversely of the direction of movement of the respective commodity toward its predetermined position. Alternatively, the two streams may be streams of compressed air which flow along the respective path in opposite directions. It is also within

the purview of our invention to employ a suction air stream which enters the respective path from the atmosphere in the direction of movement of the corresponding commodity and leaves the path by flowing substantially transversely of the moving commodity, and a stream of compressed air which flows lengthwise of the path counter to the direction of movement of the commodity so that the first stream pulls the commodity toward and propels it beyond the predetermined position and the second stream opposes the movement of the commodity to such position.

At least one of the streams can leave the respective path by flowing transversely of and along at least a substantial portion of the circumference of the commodity. The conveying step may comprise moving the commodities along guide surfaces and the method may include the additional step of increasing friction between the commodities and the corresponding guide surfaces to thereby brake the commodities on their way toward ultimate axial positions. The friction increasing step may include subjecting the commodities to air pressure acting thereon transversely of the direction of movement toward predetermined positions to bias the commodities against the guide surfaces. The conveying step is preferably carried out by resorting to a drum whose flutes define elongated paths for successive commodities and wherein the commodities move sideways, at least during travel toward predetermined positions.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The transporting apparatus itself, however, both as to its construction and its mode of operation, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a plan view of a portion of a transporting apparatus for cigarettes which can be employed in the practice of our method;

FIG. **2** is a transverse vertical sectional view as seen in the direction of arrows from the line II—II OF FIG. **1**;

FIG. **3** is an axial sectional view as seen in the direction of arrows from the line III—III of FIG. **2**;

FIG. **4** is an enlarged partly sectional view of a detail in the structure of FIG. **1**;

FIG. **5** is a fragmentary axial sectional view of a second transporting apparatus;

FIG. **6** is a fragmentary axial sectional view of a third apparatus;

FIG. **7** is a similar fragmentary axial sectional view of a fourth apparatus;

FIG. **8** is a plan view of a fifth apparatus with portions of certain parts broken away; and

FIG. **9** is a fragmentary transverse vertical sectional view as seen in the direction of arrows from the line IX–IX of FIG. **8**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **1** to **4** illustrate the essential parts of an apparatus which is utilized to convert a single file of axially moving cigarettes **34** into two rows of cigarettes wherein the cigarettes travel sideways. Such apparatus may be used with advantage in combination with or in a rod cigarette machine, or as a link between a rod cigarette machine and a filter cigarette machine.

The apparatus comprises a conveyor in the form of a drum **1** which rotates about a horizontal axis and carries an annulus of equidistant axially parallel inserts **3** secured thereto by screws **2** or analogous fasteners. The drum **1** resembles a hollow cylinder and has an internal annular flange **4** which is integral with a hub **6** fitted onto one end of a drive shaft **7** and secured thereto for rotary movement by a key **8**. The shaft **7** is rotatable in antifriction bearings **9, 11** which are mounted in a stationary bearing sleeve **12** and are held apart by a distancing sleeve **53**. The bearing sleeve **12** is secured to a stationary frame member **20** of a conventional rod cigarette machine by screws **13**. The drive for the drum **1** further comprises a gear **14** which is secured to the shaft **7** by a key **52** and a bolt **51**. The gear **14** derives motion from the motor of the cigarette cutoff in the rod cigarette machine, for example, by way of a gear train or by way of an endless chain. Walls **15, 16** and **17** which are affixed to the bearing sleeve **12** define with the latter a stationary annular suction chamber **18** which communicates with a second annular suction chamber **21** by way of openings **19** provided in the wall **15**. The second suction chamber **21** communicates with a suction channel **23** of the frame member **20** by way of an opening **22** in a flange of the bearing sleeve **12**. The channel **23** is connected to a suction fan, a suction pump or another suitable suction generating device **23***a*.

The inserts **3** on the periphery of the drum **1** define elongated flutes or channels **24** in which the cigarettes **34** advance lengthwise while simultaneously moving sideways. The depth of each flute **24** approximates or slightly exceeds the diameter of a cigarette. The open outer sides of certain flutes **24** are sealed from the surrounding atmosphere by a shroud **26** which extends along an arc of approximately 90°, see FIG. **2**. It will be noted that the shroud **26** has been omitted in FIG. **1**; this shroud also seals the adjoining flutes **24** from each other. Stationary guides or shields **54** are secured to the shroud **26** and/or to the frame member **20** and extend beyond both ends of the shroud, as considered in the circumferential direction of the drum **1**. These shields **54** serve to hold cigarettes **34** in the respective flutes **24** in the region downstream of the shroud **26**.

Each insert **3** comprises several aligned sections or portions which define between themselves arcuate recesses or ports **27, 28** or **29, 31**. These ports serve to permit evacuation of air from the respective flutes **24**, i.e., to draw two suction air streams from opposite axial ends of the passages defined by those flutes **24** which travel along the shroud **26**. It will be noted that the ports **27, 28** alternate with ports **29, 31**, as considered in the circumferential direction of the drum **1** and are axially staggered with reference to each other. This is best shown in FIG. **1** wherein the ports **27, 28** in alternate flutes **24** are located in a first pair of parallel planes making a right angle with the axis of the drum **1**, and the ports **29, 31** are located in a second pair of parallel planes which also make a right angle with the drum axis. Each flute **24** which communicates with a pair of ports **27, 28** is flanked by two flutes which communicate with a pair of ports **29, 31**, and vice versa. It will be noted that each of the ports **27, 28, 29, 31** extends all the way around the circumference of the respective flute **24** so that a cigarette **34** which extends

across one of these ports can be subjected to suction which acts on its wrapper along an arc of at least 180°. The cylindrical wall of the drum 1 is formed with elongated axially parallel slots or cutouts 32 each of which communicates with one of the ports 27, 28, 29, 31 and each of which also communicates with the suction chamber 18 while advancing along the inner side of the shroud 26. The distance between a pair of ports 27, 28 or 29, 31 equals or approximates the length of a cigarette 34; such distance is measured from the remotest point of a port 27 or 29 to the remotest point of the corresponding port 28 or 31. The cutoff of the rod cigarette machine comprises a tubular outlet 33 which consitutes a feed for cigarettes 34 and registers with the intake ends of successive flutes 24 when the drum 1 rotates. FIG. 4 shows that the discharge end of the outlet 33 is provided with an internal chamfer 57 and that the intake ends of the inserts 3 are also provided with chamfers 56 to facilitate the travel of cigarettes 34 from the outlet or feed into the respective flutes 24.

As illustrated in FIG. 2, the wall 16 of the suction chamber 18 has an arcuate window or opening 16*a* whose circumferential length approximates that of and which registers with the shroud 26 to permit communication of adjoining ports 27, 28, 29 and 31 with the chamber 18. Thus, suction is effective only in those ports and in those slots 32 which are adjacent to the inner side of the shroud 26.

The operation is as follows:

The gear 14 drives the shaft 7 and drum 1 in synchronism with the cutoff of the rod cigarette machine. As is known from the art of rod cigarette machines, the cutoff servers a continuous cigarette rod which issues from the machine to form a single file of discrete cigarettes 34 of unit length of multiple unit length.

The suction generating device 23a evacuates air from the chamber 18 and produces two suction air streams A1 and A2 the first of which flows through the outlet 33, into the registering flute 24 and port 28 or 31 to pass through the respective slot 32 and to ultimately enter the chamber 18 whence it is withdrawn by way of openings 19, chamber 21, opening or openings 22 and channel 23. The other air stream A2 enters at the open left-hand end of each flute 24 which registers with the shroud 26 and flows along the flute 24, through the port 27 or 29, through the corresponding slot 32 and into the suction chamber 18 to be withdrawn from this chamber by way of openings 19, 22, chamber 21 and channel 23. The streams A1 and A2, which flow in opposite directions, are combined into a composite or main stream A3 on entry into the chamber 18 which is evacuated by way of the channel 23. When a cigarette 34 enters the intake end of a flute 24 by way of the outlet 33, it is immediately subjected to the action of the air stream A1 which draws or pulls it toward the center of the corresponding flute 24. Such cigarette is then also subjected to the action of the second air stream A2 and the resultant of forces produced by these air streams is zero when the cigarette 34 comes to rest between the corresponding ports 27, 28 or 29, 31. Such position of a cigarette 34 is shown in FIG. 3. If the flutes 24 are sufficiently long, the initial speed at which the cigarettes 34 advance toward the drum 1 under the action of the rod cigarette machine is of no consequence because the air stream A1 determines the speed at which a cigarette advances into and along the respective flute 24 toward its ultimate position. Therefore, the cutoff of the rod cigarette machine need not be provided with a kicker, e.g., an eccentric roller or wheel (shown at 506 in FIG. 8) which is normally required in connection with delivery of cigarettes from the cutoff to conventional transporting apparatus. Since the ports 29, 31 are staggered with reference to the ports 27, 28, the drum 1 automatically assembles the cigarettes in two rows which advance sideways, first along the inner side of the shroud 26 and thereupon along the guides 54, to be discharged or otherwise transferred onto a customary catcher belt 5 a portion of which is shown in FIG. 2. The axial spacing of the ports 28, 29 is such that the two rows of cigarettes 34 on the catcher band 5 are separated from each other by a distance which suffices to permit insertion of filter rod sections of double unit length.

Each cigarette 34 which enters a flute 24 in communication with a pair of ports 27, 28 is followed by a cigarette which enters a flute 24 in communication with a pair of ports 29, 31. It is clear that the catcher band 5 can be replaced by a transfer drum which delivers two rows of cigarettes to the assembly drum of a filter cigarette machine or to another destination.

FIG. 5 illustrates a portion of a second apparatus wherein the drum 101 carries an annulus of inserts 10 forming axially parallel flutes 124 (only one shown). The shroud 126 is mounted in the same way as in the apparatus of FIGS. 1 to 4 but is provided with an opening 142. The chamber 118 is a plenum chamber, i.e., it is connected to a compressor or another suitable source of compressed air, and communicates with the flutes 124 by way of three inclined slots 143, 144, 146 machined into the drum 101 and ports 127, 128, 141 provided in the inserts 103. The inclination of slots 143, 144 is such that the streams of compressed air which issue from the chamber 118 and pass through the corresponding ports 128, 127 have components C1, C2 acting upon cigarettes 134 in the longitudinal direction of the respective flutes 124. The components C1, C2 flow in opposite directions. The left-hand ends of the flutes 124 are sealed from the atmosphere by suitable lids or flanges 103a of the respective inserts 103. The slots 146 discharge into successive ports 141 air streams having components C3 acting in the longitudinal direction of the respective flutes 124 and escaping through the opening 142 of the shroud 126. The ports in alternate flutes 124 of the drum 101 can be staggered in the same way as shown for the ports 27, 28 and 29, 31 of FIG. 1, i.e., the drum 101 can also form two rows of cigarettes 134 which travel sideways along and beyond the shroud 126.

When the outlet (not shown) of a cutoff in a rod cigarette machine delivers a cigarette 134 into the flute 124 shown in FIG. 5, preferably by resorting to an eccentric accelerating wheel of the type shown at 506 in FIG. 8, the leading end of the cigarette 134 travels beyond the ports 128, 127 so that it enters the path of the air stream issuing from the port 141 and flowing toward the opening 142. Such cigarette then seals or nearly seals the ports 127, 128 so that it is subjected mainly to the action of the component C3 which pushes it back toward the intake end of the flute 124 until the thus returned cigarette permits air to flow from the port 141 into the opening 142. The communication between the port 141 and opening 142 is established when the cigarette moves to the right beyond the discharge end of the slot 143 so that it is then acted upon by the compo-

nents C1, C2 of air streams which issue from the ports **127, 128.** The resultant of forces produced by components C1, C2 is zero when the cigarette **134** assumes the final or predetermined position which is shown in FIG. **5.** The component C3 cannot exert undue influence on the final position of the cigarette **134** when the latter permits air to flow from the port **141** into the opening **142.** In its final position, the cigarette **134** is located substantially midway between the ports **127, 128.**

FIG. **6** shows a portion of a third apparatus having a drum **201** with inserts **203** which define flutes **224** travelling along a shroud **226.** The slots **243, 244** of the drum **201** (and hence the corresponding ports **227, 228** in the flutes **224**) are respectively connected to a plenum chamber and a suction chamber so that the stream of compressed air issuing from the port **227** has an axially oriented component D1 which flows toward the intake end of the flute and the suction chamber draws a stream D2 of air flowing from the intake end of the flute and thereupon radially inwardly through the port **228** and slot **244.** Air entering by way of the intake end of the flute **224** is drawn from the atmosphere.

The cigarette **234** is propelled into the flute **224** by an accelerating device of the cutoff and advances beyond the port **228** so that it moves toward the port **227** and is subjected to the braking action of the air stream issuing from the plenum chamber. Such air stream pushes the cigarette **234** back and its force is balanced by the force of the stream D2 when the cigarette moves substantially midway between the ports **227, 228.**

It will be seen that the distance between the ports **127, 128** of FIG. **5** and ports **227, 228** of FIG. **6** exceeds the length of a cigarette **134** or **234.** In FIGS. **1–4** the distance between a pair of ports **27, 28** or **29, 31** approximates the length of a cigarette **34.** FIG. **7** illustrates a fourth apparatus wherein the distance between the ports **327, 328** in the flute **324** of the drum **301** is less than the length of a cigarette **334.** The ports **327, 328** are connected to a suction chamber **318** and the forces produced by suction air streams which are drawn through these ports balance each other when the center of the cigarette **334** is located substantially midway between the ports.

Referring now to FIGS. **8** and **9,** there is shown a further transporting apparatus which comprises a conveyor in the form of a rotary drum **401** having flutes **424** and being rotatable adjacent to the inner side of an arcuate shroud **426.** The transfer station where the cigarettes enter the intake ends of passages defined by successive flutes **424** is shown at D; such cigarettes are propelled into the flutes from a trough-shaped outlet or feed **433** of the cutoff in response to impulses received from an eccentric accelerating wheel **506.** The shroud **426** has four openings **501***a*, **501***b*, **501***c*, **501***d* which are spaced from each other in the axial direction of the drum **401.** The length of the openings **501***a*–**501***d* (as seen in the circumferential direction of the drum **401**) increases in a direction away from the outlet **433.** The arrow **502** indicates the direction in which the drum **401** rotates. Lids **503, 504** are respectively adjacent to the longitudinal ends E, F of those flutes **424** which advance from the transfer station D and along the shroud **426** in the direction indicated by arrow **502.** The lid **503** extends close to the station D but the lid **504** begins to seal the left-hand ends of flutes **424** only after such flutes advance through a predetermined angle beyond a position of registry with the outlet **433.** The lids serve to influence the flow of air in the adjoining flutes. The accelerating wheel **506** is rotated in synchronism with the cutoff.

The flutes **424** of the drum **401** include two groups of alternating flutes **424a, 424b,** and the flutes **424a** are formed with radial ports or ducts **507** which communicate with axially parallel bores **508** of the drum. The bores **508** are free to communicate with the atmosphere excepting in the region of the transfer station D which accommodates a stationary sealing member **509** shown in FIG. **9.** The shroud **426** is mounted on a carrier **511** and the lids **503, 504** are respectively secured to a stationary frame member by brackets **512, 513.** The flutes **424a** are provided with ports **427, 428** and the flutes **424b** are provided with ports **429, 431.** The distance between the ports **427, 428** and outlet **433** exceeds that between the outlet and ports **429, 431.**

Cigarettes are propelled into successive flutes by the wheel **506** whose operation is synchronized with the operation of drive for the drum **401** so that each cigarette finds its way into the intake end of one of the flutes. Full transfer of cigarettes into the flutes **424** is assisted by streams of suction air which are being drawn through the ports **427, 428** or **429, 431.** The openings **501***a*–**501***d* of the shroud **426** admit atmospheric air which exerts a pressure on the wrappers and hence a braking action by urging the cigarettes into frictional engagement with the surfaces of respective flutes **424.** The lids **503, 504** insure proper distribution of air pressure in elongated passages defined by the flutes **424** and shroud **426** while the flutes travel along the inner side of the shroud. Such desirable distribution of air pressure will develop despite the fact that the disposition of ports **427, 428** and **429, 431** is not symmetrical with reference to the drum **401.** Proper distribution of air pressure is further assisted by ducts **507** and bores **508** which compensate for differences in pressure arising due to the fact that the ports **427, 428** are staggered with reference to the ports **429, 431** and are more distant from the outlet **433.** The bores **508** admit additional atmospheric air as soon as they advance beyond the sealing member **509.**

Since the flutes of the drums shown in FIGS. **1** to **9** are not provided with mechanical stops for the cigarettes, the cigarettes are not likely to lose tobacco at the ends. Furthermore, the apparatus can arrest each cigarette in a predetermined position irrespective of the speed of oncoming cigarettes, and the air streams which brake and locate the cigarettes in their flutes can also assist the cigarettes during entry into the flutes. When the cigarettes are sucked into the flutes, the accelerating device which is used in conventional cutoffs can be dispensed with. Friction between the cigarettes and their flutes can be enhanced by air (openings **501***a*–**501***d*) to insure rapid and accurate positioning of cigarettes without any damage to their wrappers. It was found that air streams which act upon the cigarettes to locate them in desired positions cause the cigarettes to lose much less tobacco at the ends than in conventional apparatus which are equipped with mechanical stops and/or wherein the cigarettes are mechanically braked during movement toward stops and are thereupon sucked or blown into actual abutment with the stops.

It is further clear that the method of the present invention can be practiced with equal advantage in con-

nection with the transportation and positioning of filter rods, filter rod sections, filter cigarettes, cigarillos, cigars, cheroots or other rod-shaped articles as well as for transportation and positioning of cigarette packs and/or other commodities. When the illustrated apparatus is used in connection with filter rods or filter rod sections, it can be arranged to transport rods which issue from filter rod machines or to transport rods or rod sections which issue from pneumatic tubes or the like. Of course, the configuration of flutes is different when the apparatus is used to transport packs or analogous commodities which do not resemble rods or sections of rods. Finally, the inserts can form integral parts of the respective drums, i.e., the flutes can be machined directly into the peripheral surfaces of such drums. Also, the drums can be replaced by other types of conveyors, for example, by chains or belts which carry annuli of flutes. Each of the illustrated apparatus is preferably provided with valves or other suitable means for regulating the flow, pressure and/or other characteristics of the air streams.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of our contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A method of transporting cigarettes or analogous commodities, comprising the steps of conveying successive commodities of a series of commodities lengthwise in a direction toward predetermined positions on a guide surface which moves substantially at right angles to the direction of lengthwise movement of commodities, said conveying step comprising moving each of the commodities along an elongated path which is at least substantially sealed from the surrounding atmosphere; subjecting successively conveyed commodities to the braking and positioning action of forces produced by a plurality of gas streams which act on the commodities in and counter to said direction to thus locate each commodity in the respective predetermined position while the commodity moves sideways with the guide surface, said gas streams including two suction air streams which enter said paths lengthwise and leave the respective paths by flowing substantially transversely of said direction; holding the thus located commodities in said predetermined positions while the commodities continue to move sideways; and separating the commodities from the guide surface by moving the commodities sideways while maintaining such commodities in the respective predetermined positions.

2. A method of transporting cigarettes or analogous commodities, comprising the steps of conveying successive commodities of a series of commodities lengthwise in a direction toward predetermined positions on a guide surface which moves substantially at right angles to the direction of lengthwise movement of commodities, said conveying step comprising moving each of the commodities along an elongated path which is at least substantially sealed from the surrounding atmosphere; subjecting successively conveyed commodities to the braking and positioning action of forces produced by a plurality of gas streams which act on the commodities in and counter to said direction to thus locate each commodity in the respective predetermined position while the commodity moves sideways with the guide surface, said gas streams including two streams of compressed air which flow along the respective paths in opposite directions; holding the thus located commodities in said predetermined positions while the commodities continue to move sideways; and separating the commodities from the guide surface by moving the commodities sideways while maintaining such commodities in the respective predetermined positions.

3. A method of transporting cigarettes or analogous commodities, comprising the steps of conveying successive commodities of a series of commodities lengthwise in a direction toward predetermined positions on a guide surface which moves substantially at right angles to the direction of lengthwise movement of commodities, said conveying step comprising moving each of the commodities along an elongated path which is at least substantially sealed from the surrounding atmosphere; subjecting successively conveyed commodities to the braking and positioning action of forces produced by a plurality of gas streams which act on the commodities in and counter to said direction to thus locate each commodity in the respective predetermined position while the commodity moves sideways with the guide surface, said gas streams including a suction air stream which enters the respective path from the atmosphere in said direction and leaves the path by flowing substantially transversely of such direction and a stream of compressed air which flows lengthwise of the respective path; holding the thus located commodities in said predetermined positions while the commodities continue to move sideways; and separating the commodities from the guide surface by moving the commodities sideways while maintaining such commodities in the respective predetermined positions.

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