Feb. 3, 1970 R. MARRADI 3,492,874

SAMPLING DEVICE PARTICULARLY SUITABLE FOR FILTER TIP CIGARETTES

Filed Jan. 29, 1968 3 Sheets-Sheet 1

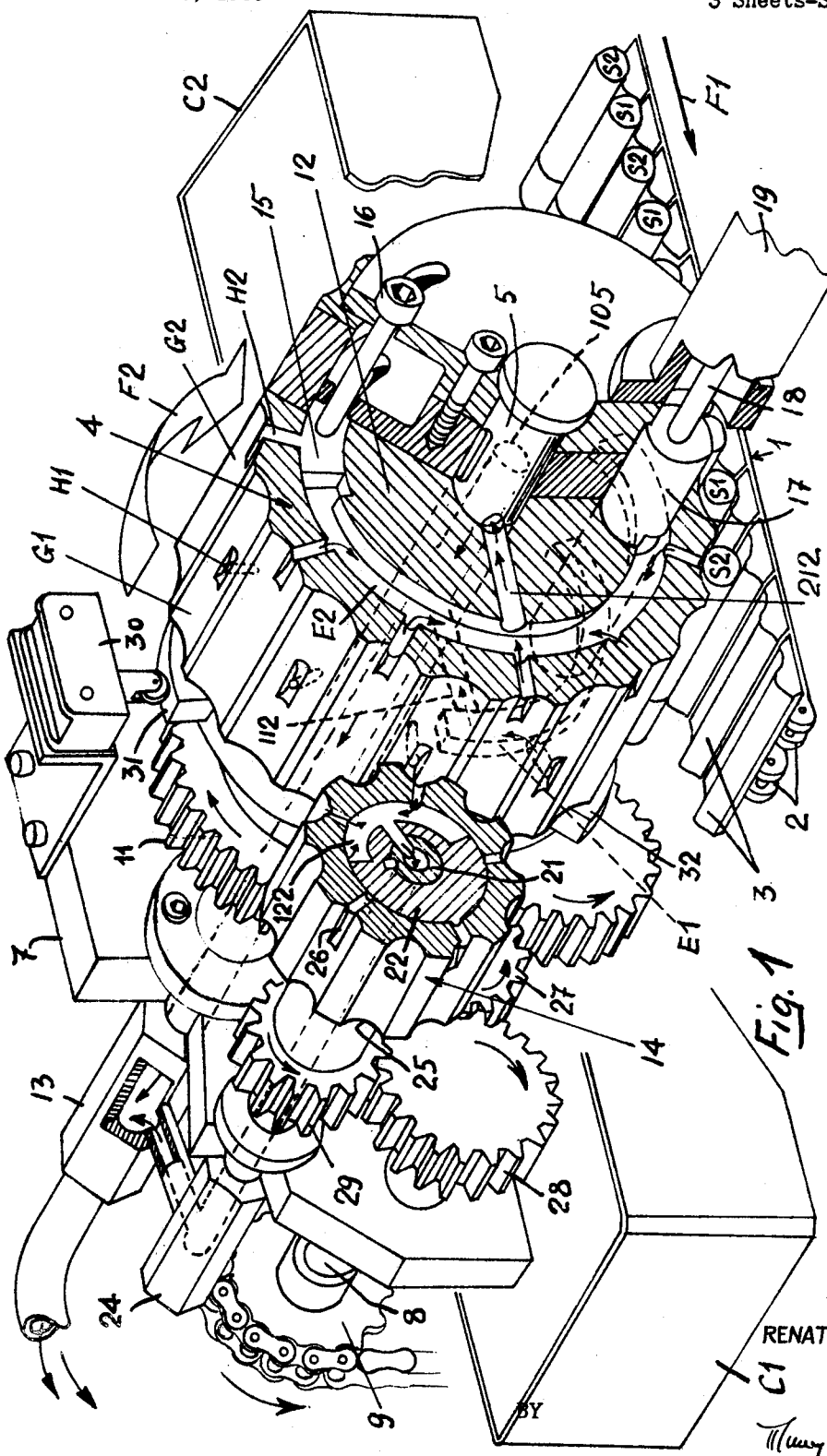


Fig. 1

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Filed Jan. 29, 1968 3 Sheets-Sheet 2

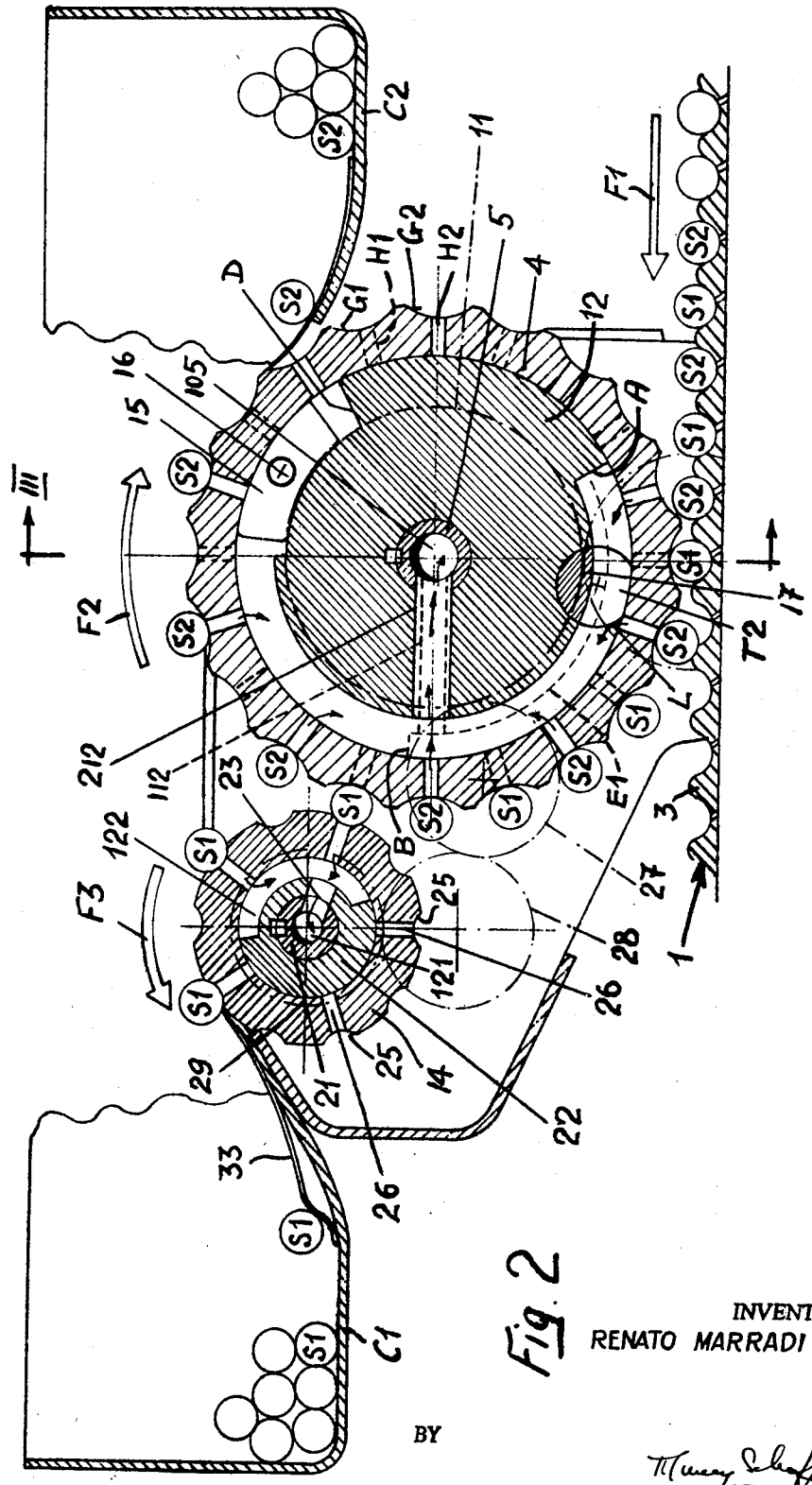


Fig. 2

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Filed Jan. 29, 1968 3 Sheets-Sheet 3

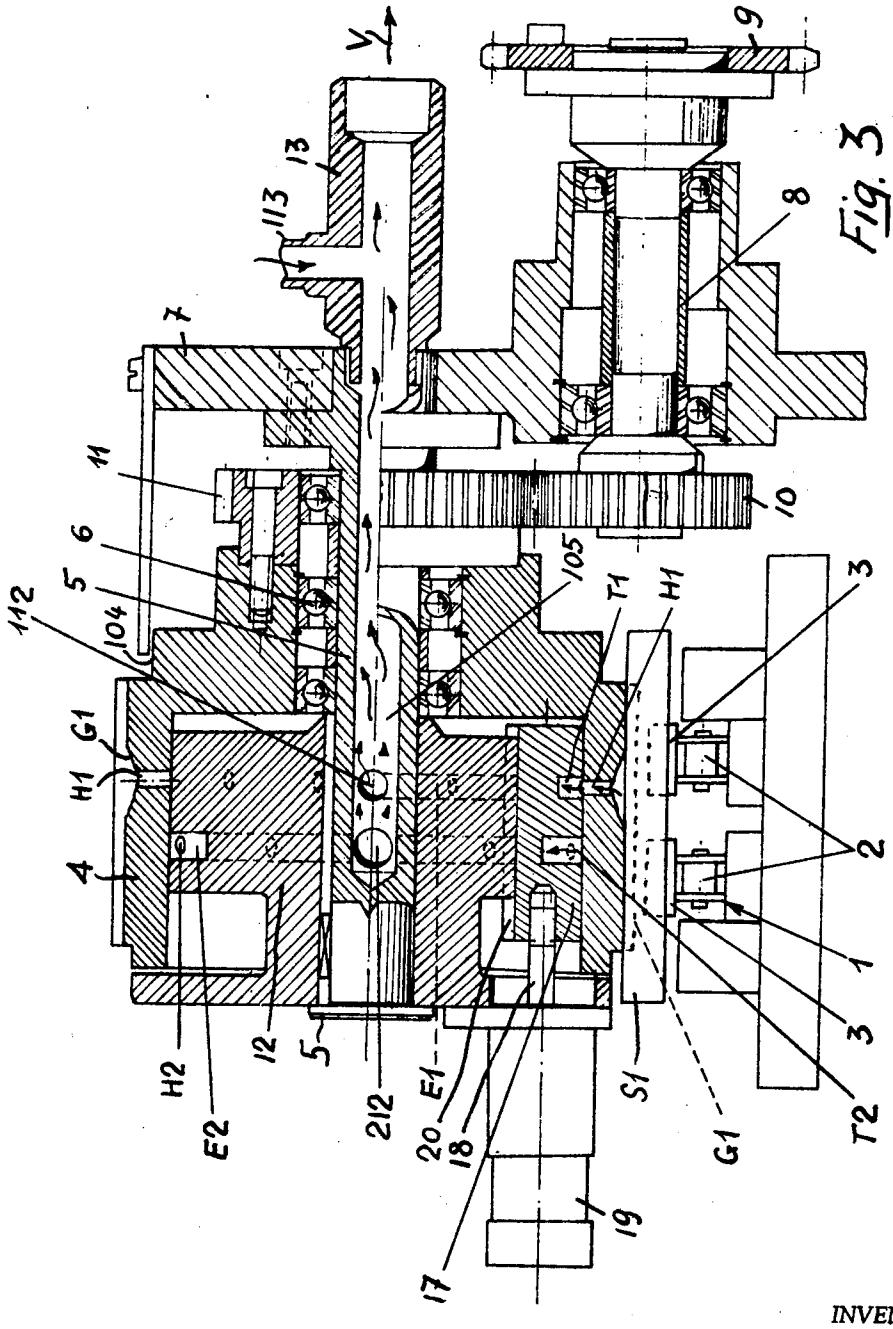


Fig. 3

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SAMPLING DEVICE PARTICULARLY SUITABLE FOR FILTER TIP CIGARETTES

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U.S. Cl. 73—424 7 Claims

ABSTRACT OF THE DISCLOSURE

A sampling device for filter tip cigarettes comprising a revolving drum, associated to the delivery conveyor of a cigarette-making machine, which drum collects by suction a certain number of successive cigarettes from the delivery conveyor, transfers said cigarettes away from the delivery conveyor and alternately releases same at two angularly spaced delivery stations or boxes.

This invention relates to a sampling device for the inspection of the cigarettes produced by an automatic cigarette-making machine.

Specific problems connected with the sampling of cigarettes for inspection purposes arise in the case of filter cigarettes being manufactured by the so-called assembling method, according to which a double-length filter piece is inserted between two aligned cigarette lengths in abutting end-to-end relation; the said three pieces being united together by means of a uniting band coated with adhesive, and the so formed double filter-cigarette being severed into two simple filter cigarettes by cutting same intermediate its ends. By this method, two rows of filter-tipped cigarettes are obtained, the cigarettes of one of these row being turned, with their filter tip ends towards the corresponding filter tip ends of the cigarettes of the second row, whereafter the cigarettes of one of these rows are rotated by 180° around a transversal axis so as to turn same with their filter tips pointing in the same direction as the filter tips of the cigarettes of the second row. The filter-tipped cigarettes of either row are thereafter interposed between the filter-tipped cigarettes of the other row, so as to form a single row of filter tip cigarettes, and are discharged from the cigarette-making machine, onto an endless conveyor.

For the checking up of the filter tip cigarettes produced according to the aforementioned method there arises the problem of surely and quickly individuating to which of either initial row belong the cigarettes picked up at the delivery conveyor of the cigarette-making machine in order to proceed to the required adjustments, in the case that defects or irrigularities are detected in the thus manufactured cigarettes. Thus for example, in the case of a defective centering of the uniting band, the filter tips of one row of cigarettes result to be of a length which is different from that of the filter tips of the cigarettes of the other row, and in order to be able to effect the required adjustments it is necessary to establish for instance to which row the longer-tipped cigarettes belong.

The present invention aims to solve the aforementioned problem and has for its object an automatic device adapted to periodically sample a number of filter tip cigarettes from the single row on the delivery conveyor of the machine and to separate the picked-up cigarettes into two groups corresponding to the two rows from which the same cigarettes come from.

The sampling device according to the invention substantially comprises a revolving drum, associated to the

delivery conveyor of the machine, which drum collects by suction a certain number of successive cigarettes from the delivery conveyor, transfers said cigarettes away from the delivery conveyor and alternately releases same at two angularly spaced delivery stations or boxes.

The above and other characteristic features of the invention and the advantages arising from it will be apparent from the following specification of a preferred embodiment, shown by way of non-limiting example in the accompanying drawings, in which:

FIG. 1 is a perspective view, with parts in section, of a filter tip cigarette-sampling device according to the invention;

FIG. 2 is a transversal vertical section through the filter tip cigarette-sampling device shown in FIGURE 1; and

FIG. 3 is a vertical longitudinal section on the plane at right angles to the plane of FIGURE 2, passing through line III—III.

Referring to the drawings, **1** denotes an endless fluted delivery conveyor of a filter-tip cigarette-making machine formed, as clearly shown in FIGURE 2, by a pair of parallel endless chains **2** connected by transversal parallel ridged laths **3** forming together said fluted conveyor by which each fluting or trough formed by a pair of adjoining laths **3** is designed for containing one cigarette **S1** or **S2**.

The filter tip cigarettes **S1** and **S2** are discharged onto said conveyor **1** by a conventional device forming part of the filter tip cigarette-making machine by the aforementioned assembling method and originate from double cigarettes provided with an intermediate double filter tip, cut into two single filter cigarettes **S1** and **S2** by means of a transversal cut through the middle of the incorporated double filter so as to obtain two rows of cigarettes provided with abutting filter ends, whereafter the cigarettes forming part of one of said cigarette rows are rotated transversally each cigarette for example **S1** of one of the rows is then inserted between two cigarettes **S2** of the adjacent row, so as to form a single row of cigarettes **S1**, **S2** having their filters pointing in the same direction, but originating alternately from two opposite halves of said double-tipped cigarettes.

In order to permit of taking, from time to time, samples of these cigarettes and automatically divide the cigarettes **S1** originating from one end of a double tip cigarette from those **S2** originating from the opposite double cigarette end, so as to check their length and, if necessary to adjust the cut so as to have exactly equal tipped cigarettes **S1** and **S2**, the following sampling device is provided:

Above said fluted endless conveyor **1** a hollow cantilever shaft **5** is fastened by one of its ends to the machine frame **7** so as to project horizontally transversely above said conveyor. On said shaft **5** a bell-shaped fluted drum **4** is rotatably mounted on bearings **6** inserted in an axial bore formed at the closed bell end and rotatably supporting said drum **4** on the fixed shaft **5**.

The drum is so dimensioned that the flutings **G1**, **G2** at its periphery are spaced like the flutings formed between two adjacent laths **3** of the endless conveyor **1** and the ridges of the drum flutings, when they come in their lowermost position (see FIGURE 2) face with a certain gap the corresponding ridges of the underlying conveyor **1**.

The conveyor **1** is driven at a predetermined speed in the direction of arrow **F1** while the drum **4** is driven at a peripheral speed which is equal to the linear speed of conveyor **1** and in the same direction (arrow **2**).

To this purpose, as clearly shown in FIGURES 1 and 3, onto the bottom end of bell-shaped drum **4** a gear wheel **11** is fastened. This meshes with a pinion **10** keyed

on one end of a countershaft 8 supported on bearings by the machine frame 7 and carrying on its opposite end a sprocket wheel 9 driven in a conventional manner by a chain (not shown).

The flutings G1, G2 of the drum are provided with through openings or holes H1, H2 which form aligned rows in alternate flutings but are offset in adjoining flutings, as clearly shown in FIGURES 1 and 2.

Inside the hollow revolving drum 4 a fixed cylindrical intercepting valve 12 is tightly fitted against the inside wall of the revolving drum 4, of which it constitutes also the front closure member, as clearly shown in FIGURE 3. In correspondence of the two rows of suction openings H1 and H2 the valve is provided with circumferential grooves E1, E2 which extend for a certain angle on the said valve body 12. In said grooves E1, E2 open radial ducts 112, 212 which put said grooves E1, E2 in communication with the interior of the fixed hollow shaft 5 which may be connected through an end nipple 13 either with a conventional source of suction (arrow V, FIGURE 3) or through a valved branch pipe 113 with the outside air.

Both circumferential grooves E1, E2 of valve 12 originate in a point A, FIGURE 2, little before the lower section of the cylindrical valve 12, but they end at different points: groove E1 extends up to point B, for an arc of circle of approximately 90 to 100° in the direction of rotation up to the left-hand side of drum 4, while groove E2 extends up to point D, i.e. for more than 90–100° farther, to the right-hand side of the same drum 4. The end of this groove E2 can be adjusted at a smaller angle by means of a valve sector 15 which may be fastened in the selected angular position by means of a bolt 16.

By the aforedescribed arrangement, when the suction is applied to the nipple 13 and the openings H1, H2 are in communication with the interior of the drum 4, the cigarettes S1 and S2 are picked up by suction from the conveyor 1 and are retained in the flutings of the drum 4 until they are under suction, viz up to point B for the cigarettes S1 and up to the point D for the cigarettes S2, whereafter the cigarettes are no longer retained adherent to drum 4 and may fall sidewise of this drum.

As regards the cigarettes S1, when they are left free beyond the position B, FIGURE 2, they are picked up by a transfer drum 14, provided with peripheral grooves or flutings in like manner as drum 4 and rotatably mounted in the direction of arrow F3, as will be seen hereinafter, on a fixed hollow shaft 21, on which a cylindrical sector valve 22 is mounted, provided with a recessed section facing the side of drum 14 tangent to drum 4. The grooves or flutings of drum 14 are alternately blind and provided with through openings 26 which, when they come to be in correspondence of the facing flutings of drum 4 and the interior of drum 14 is under suction, pick up by suction the cigarettes S1 from drum 4 (see FIGURE 2) and carry same along in the corresponding flutings of transfer drum 14 until the sector valve 22 intercepts the inlet to the corresponding opening and permits the falling of the cigarettes S1 along a guide blade 33 ending in a collecting container or box C1.

The other cigarettes S2, when they pass in front of the blind flutings of said transfer drum 14 are still under suction due to the fact that the groove E2 connected to the suction duct 212 extends past the left-hand side and even past the top of drum 4. When however the flutings containing the cigarettes S2 come past the end of groove E2, they are allowed to fall down along a deflecting blade leading to the inlet of a collecting container or box C2.

Thus, when the through openings H1 and H2 in the lowermost position of drum 4 are not intercepted and are under suction, the cigarettes passing on the underlying conveyor are picked up in adjoining drum flutings and are discharged sorted respectively into the collecting boxes C1 and C2, respectively, from which they may be taken for checking purposes and adjustment, if necessary, of the cutting device of the cigarette-making machine.

This checkup is effected at intervals.

Whenever no checkup is desired, the drum 4 is allowed to run idle, i.e. without picking cigarettes from the underlying conveyor 1, which is made by intercepting the communication between the through openings H1, H2 in their lowermost position and the interior of the drum 4.

In the embodiment as shown these intercepting means comprise a small piston 17 which is slidably but non-rotatably housed within a corresponding cylindrical seat formed in the valve 12. The piston 17 extends through the outer grooves E1, E2 of the intercepting valve 12 and presents in correspondence of these two grooves E1, E2, two transversal notches T1, T2, having preferably the same width and depth as the respective grooves E1, E2. The piston 17 can be axially shifted by means of an electromagnetic actuating device 19, acting on a connecting rod 18 against the action of a spring (not shown) and can assume two opsitions. In one of these opsitions, or opening position, the notches T1, T2 of the piston 17 come to be aligned with the grooves E1, E2 of the valve 12 so that also the initial section A–L of these grooves is put in communication with the suction conduits 112, 212, 105, as shown into the figures. In the other position, or closure position, of piston 17, the notches T1, T2 thereof come to be axially offset with respect to the grooves E1, E2 so that the communication between the section A–L of the same grooves E1, E2, and the suction conduits 112, 212, 105 is intercepted.

It is to be noted that the piston 17, housed within the corresponding cylinder the intercepting valve 12 projects out of this seat and tightly bears against the inner wall of drum 4. The outer surface of piston 17, which comes in contact with drum 4, therefore presents a curvature corresponding to the curvature of the outer cylindrical surface of the intercepting valve 12. This prevents the rotation of piston 17 around its own axis. In addition, axial slide guides 20, between the piston 17 and the intercepting valve 12, are provided as shown in FIG. 3.

The transfer drum 14 is provided with an intercepting valve 22 keyed on shaft 24, and tightly bears against the inner wall of drum 14. Said valve 22 is provided with a groove 122 angularly extending substantially from the point in which the cigarettes S1 are transferred from drum 4 to drum 14 up to the point in which these cigarettes S1 are transferred from drum 14 into the container C1. The groove 122 communicates with a suitable suction source by means of a radial conduit 23 formed through the intercepting valve 22 the fixed shaft 21, and through a longitudinal bore 121 of shaft 21. As said, transfer drum 14 is externally provided with longitudinal flutings 25 provided at their bottoms with suction holes 26 communicating with the groove 122 of the intercepting fixed valve 22. The drum 14 is operated from gear 11 of the drum 4, by means of a train of two idle gears 27 and 28, in mesh with a gear 29 fastened onto the said drum 14.

The device furthermore comprises a microswitch 30 carried by a fixed part of the machine frame, and which may be actuated by two cams 31, 32 carried by the collecting drum 4 and offset by 180° between them. This microswitch 30 and the electromagnetic device 19 for actuating the slide valve 17 form a part of an electrical control circuit, comprising a programmer unit which can be so adjusted as to determine the operation cycle of the just described sampling device.

The operation of the afore-described sampling device is the following:

Assuming the slide valve 17 to be in its closure position. The operative cycle is started by applying a vacuum to the connections 13, 14 thus applying suction to the sections B–L of the groove E1, and 15–L of the groove E2 of valve 12. The initial part A–L of both grooves E1, E2 is, on the contrary, not under suction because of the fact that valve 17 is in its closure position. The cigarettes S1, S2 are thus not sucked by the collecting drum 4 and continue to travel onto the conveyor 1.

With the collecting drum 4 in motion, as soon as one of the cams 31, 32, for example the cam 31 actuates the microswitch 30, the electromagnetic device 19 is energized thus shifting slide valve 17 in its opening position. As a consequence, vacuum is admitted also the initial sections A–L of the grooves E1, E2 of valve 12 so that the drum 4 sucks the successive cigarettes S1, S2 from the conveyor 1. More precisely, the cigarettes S1, coming from one of the rows, formed at the time of the cigarette manufacturing, are transferred into the fluting G1 of the drum 4, in which they are maintained because of the suction applied through holes H1, while the cigarettes S2 are inserted into the flutings G2 of the collecting drum 4, in which they are maintained by the suction applied through holes H2.

At the end B of the groove E1 of valve 12, the suction through holes H1 of the flutings G1 ceases, and therefore the cigarettes are released from drum 4 and transferred onto the flutings 25 of drum 14 by the suction applied through holes 26 of said drum. This suction ceases at the end of groove 122 of the valve 22, so that the cigarettes S1 are discharged from drum 14 onto sliding guide 33 and into the container C1.

The cigarettes S2, on the contrary, remain within the flutings G2 of the collecting drum 4 up to the end of the groove E2 of the intercepting valve 12, where the suction through holes H2 ceases, In this point, also the cigarettes S2 are discharged from drum 4 into container C2.

After a half turn of the collecting drum 4, the switch 30 is again acutated by cam 32, thus de-energizing relay 19. The valve 17 is therefore automatically returned in its starting position, thus intercepting the suction in the section A–L of grooves E1, E2 of valve 12. The collection of the cigarettes S1, S2 from the conveyor 1 is thus discontinued. It is therefore apparent that at the end of an operational cycle of the sampling device a number of subsequent cigarettes S1, S2, equal to the number of the flutings G1, G2, which are located upon one half of the drum 4 are collected, and that these collected cigarettes have been automatically separated into two groups corresponding to the cigarettes S1, laid down into the container C1 and the cigarettes S2, collected within the container C2.

The number of the cigarettes S1, S2 being collected for sampling purposes from the conveyor 1 can be varied and adjusted within wide limits by causing slide valve 17 to close again after any predetermined number of half turns of the collecting drum 4.

The number of half turns effected by the collecting drum 4 can be recorded and transmitted to the electrical control circuit in any suitable manner and for instance by recording the electrical pulses generated by the microswitch any time the same is actuated by the cams 31, 32.

These pulses can actuate for example a pulse meter of the telephonic type which is so set as to promote, after a predetermined number of pulses, the re-closure of the slide valve 17.

Having thus described my invention, what I claim as new is:

1. An automatic sampling device for the periodical collection of cigarettes from a cigarette-making machine, and comprising an endless cigarettes feed conveyor for carrying a row of equally spaced cigarettes on said conveyor, said row of cigarettes comprising a first set of cigarettes from a first cigarette-making source alternated with a second set of cigarettes from a second cigarette-making source of the said cigarette-making machine, in alternate positions interposed between those occupied by the cigarettes of said first set; a revolving drum, provided with peripheral flutings spaced like the cigarettes on the said conveyor, and rotatably supported on its closed end and extending above said conveyor so as to permit to the said cigarettes on said conveyor to travel beneath said drum; means for revolving said drum at a peripheral speed which is equal to the traveling speed of said conveyor; means for generating vacuum at the interior of said drum; first duct means in said drum for connecting each first flute on said drum to the vacuum space inside said drum so as to generate a suction for picking up a cigarette from the underlying conveyor; second duct means on said drum for connecting each second flute on said drum to the vacuum space inside said drum, so as to generate a suction for picking up a cigarette from the underlying conveyor; a first fixed valve means inside said drum for intercepting the suction to the lower section of said drum facing the said conveyor; control means for controlling the operation of said first valve means; a first and a second collecting boxes disposed at opposite sides of said drum; second fixed valve means inside said drum cooperating with the said first duct means in said drum for intercepting the suction to the said first ducts in correspondence of said first collecting box, thus permitting the release of the corresponding cigarettes and third fixed valve means inside said drum for intercepting the suction to said second ducts in correspondence of said second collecting box, so as to permit each cigarette carried by said first flutes to be collected inside said first box, and each cigarette carried by said second flutes to be collected inside said second box.

2. An automatic sampling device according to claim 1, in which said conveyor is provided with grooves or flutes forming individual seats for the cigarettes being conveyed, said flutes being alternately occupied by cigarettes originating from two distinct sources.

3. An automatic sampling device according to claim 1, in which the said first duct means on said drum are aligned around said drum along a circular path which is axially offset with respect to the circular path along which the said second duct means are aligned.

4. An automatic sampling device according to claim 1, in which the control means for the operation of the said first fixed valve are in the form of an electromagnet, switch means being provided, controlled by said drum, for energizing said electromagnet after a predetermined number of revolutions of said drum.

5. An automatic sampling device according to claim 1, in which between said fluted cigarette pick-up drum and at least one of said collecting boxes a fluted transfer drum is provided, for transferring the cigarettes from said drum to at least one of said boxes.

6. An automatic sampling device according to claim 1 in which between the said fluted cigarette pick-up drum and one of said collecting boxes a transfer drum is mounted provided with flutings spaced like those of said pick up drum, perforations in each alternate fluting, suction means generating a vacuum at the interior of said transfer drum and a suction in the drum side facing the pick-up drum and valve means for intercepting the suction at the drum side facing the said collecting box.

7. An automatic sampling device for selectively collecting a sampling of cigarettes from a cigarette making machine, comprising a conveyor for carrying a substantially endless row of cigarettes from said making machine with their longitudinal axes parallel to each other, a suction drum having a plurality of receiving means located about its periphery, each for retaining an individual cigarette, means for rotating said drum in proximity to said conveyor and with its receiving means disposed in parallel relationship to the cigarette on said conveyor, first and second means for applying suction to selected receiving means as said drum passes said conveyor to remove cigarettes therefrom and transfer the same to a delivery station, at least a pair of delivery stations angularly spaced about said drum for collecting said cigarettes so removed and means for regulating the operation of said first and second suction means to sequentially remove predeter-

mined spaced cigarettes from said conveyor and transfer the same to a selected one of said delivery stations.

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