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Yatrides

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[54] **APPARATUS FOR PRODUCING BLIND CONDUITS IN CIGARETTES**

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[51] **Int. Cl.** **A24c 05/48**

[58] **Field of Search** ..... 131/11, 12, 13, 83 A, 82, 131/253, 254, 255, 93, 94

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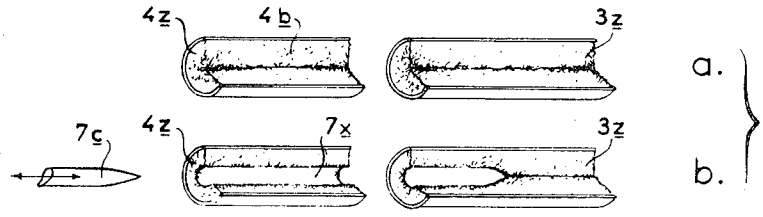
Primary Examiner—Joseph S. Reich

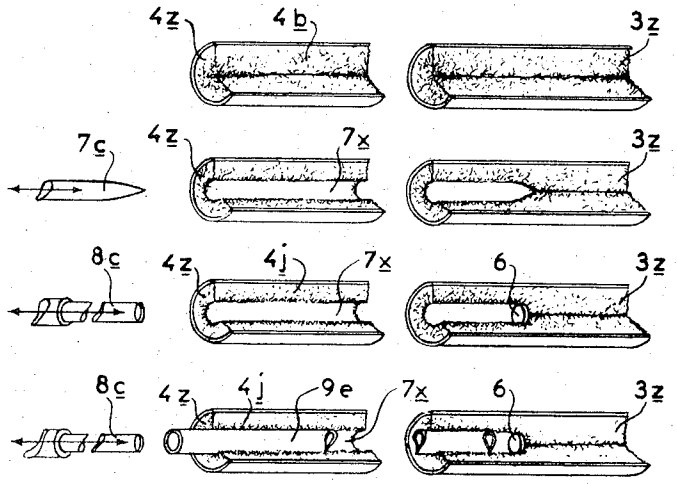
Attorney, Agent, or Firm—Young & Thompson

[57] **ABSTRACT**

Apparatus for treating cigarettes in which a blind conduit is formed in the lighting extremity of the cigarette and terminates in an air-tight wall, placed in position at the bottom of the conduit so formed by punching means, the apparatus comprising essentially a ring provided with a plurality of radial grooves, each groove intended to house a cigarette, a plurality of successive conduit-punching devices and devices for introducing the air-tight bottom walls, and also provided with tubes and ejector devices on the outside periphery of said ring, while on the inside periphery of said ring is provided an evacuation passage for the cigarettes ejected towards an evacuation ramp, and above said ring a plurality of narrow, vertically elongated hoppers supply at least some of said grooves, said ring being rotated so as to bring a groove alternately in front of a punching and introducing device and an ejector device or vice-versa.

7 Claims, 31 Drawing Figures





a.
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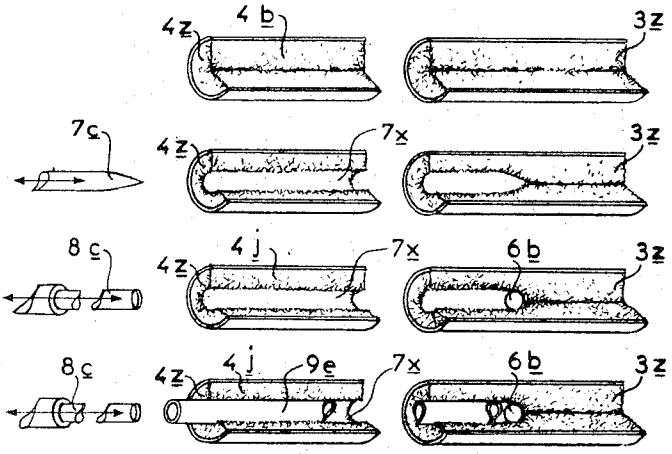
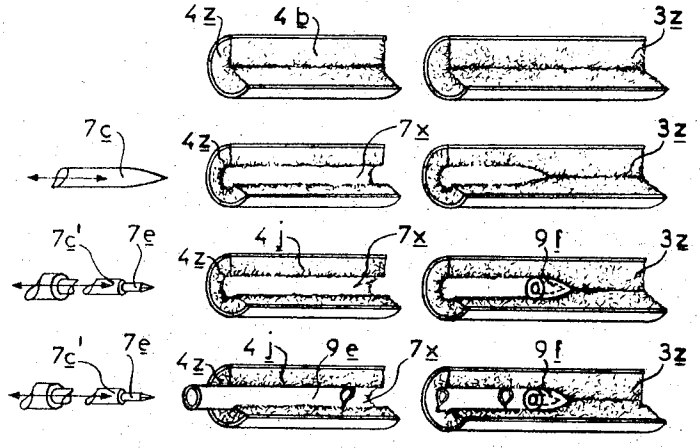
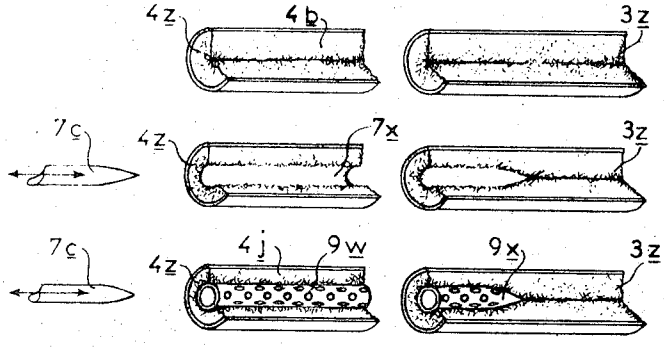
Fig_1
c.
d.
Fig_2



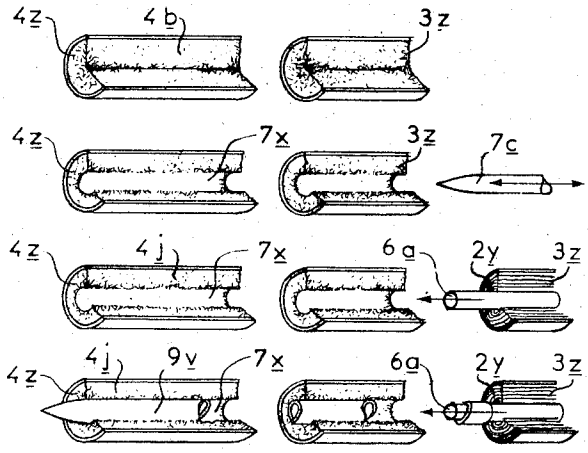
a.
b.
Fig_3
c.
d.
Fig_4



a.
b.
Fig_5
c.
d.
Fig_6



a.
b.
Fig. 7
c. Fig. 8



a.
b.
Fig. 9
c.
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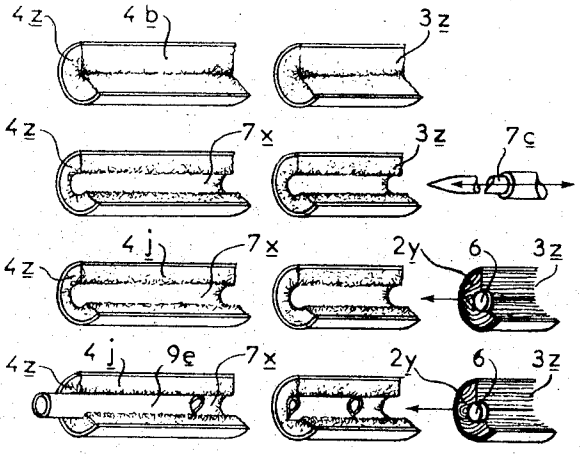
Fig. 10



a.
b.
Fig. 11
c.
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Fig. 12

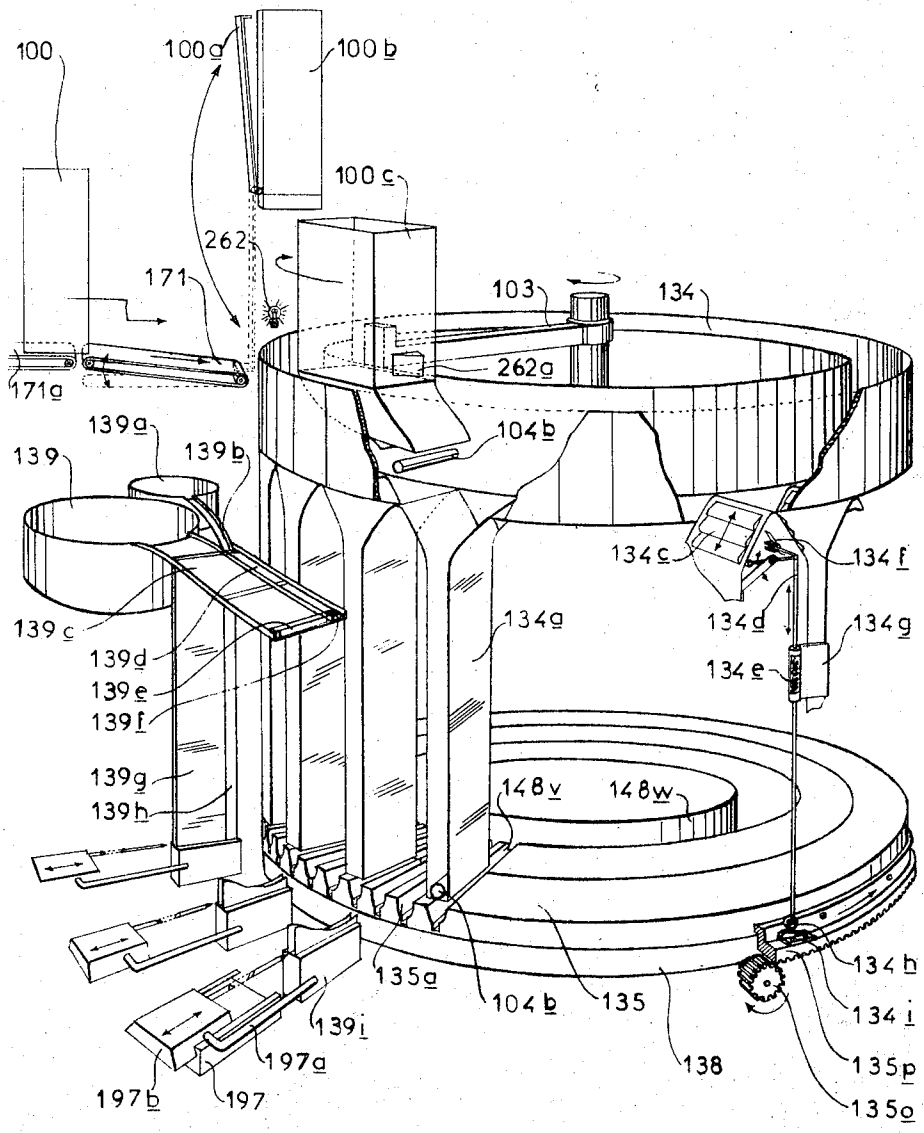
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Fig_13

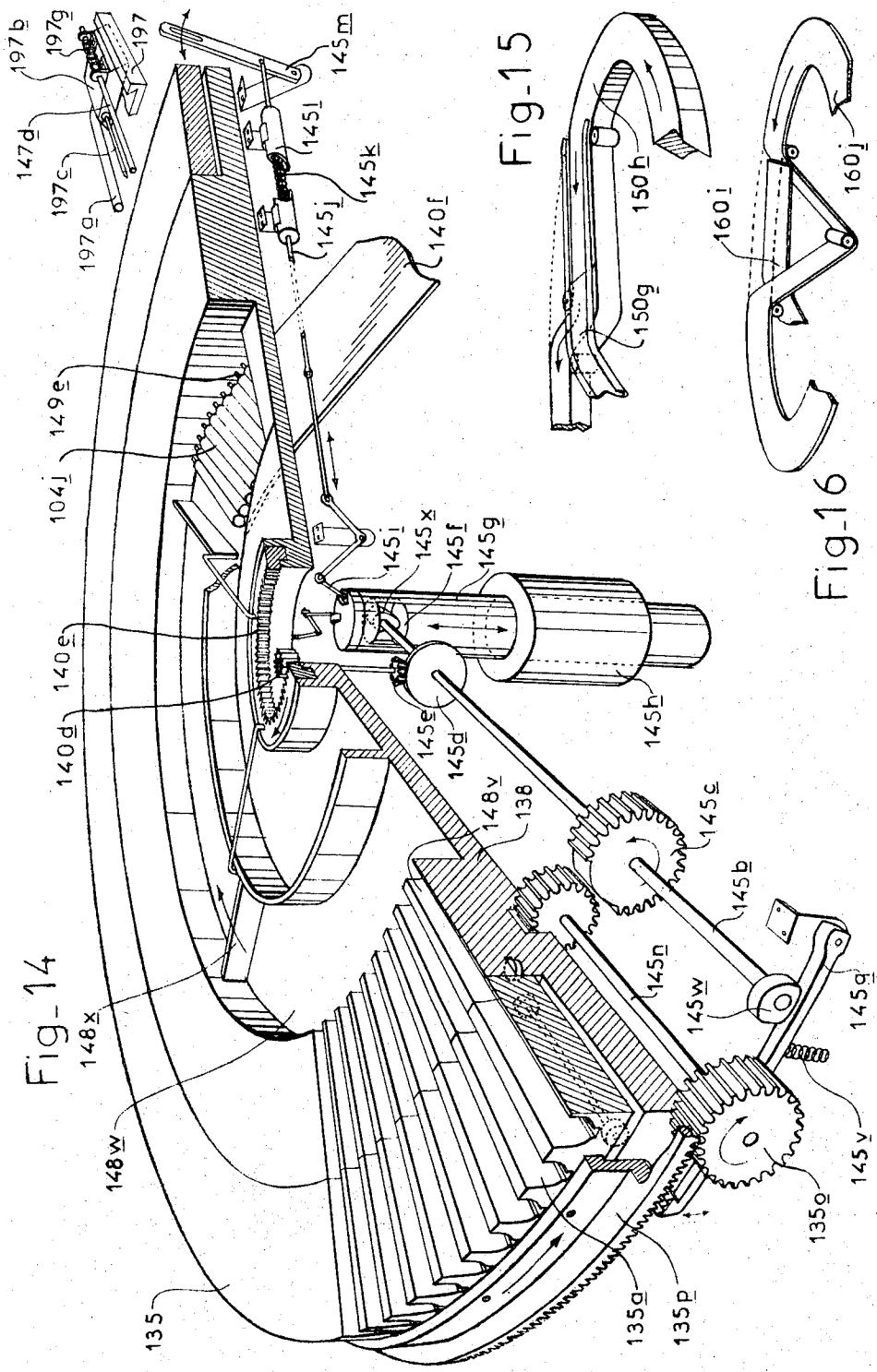

Fig-14

Fig-15

Fig-16

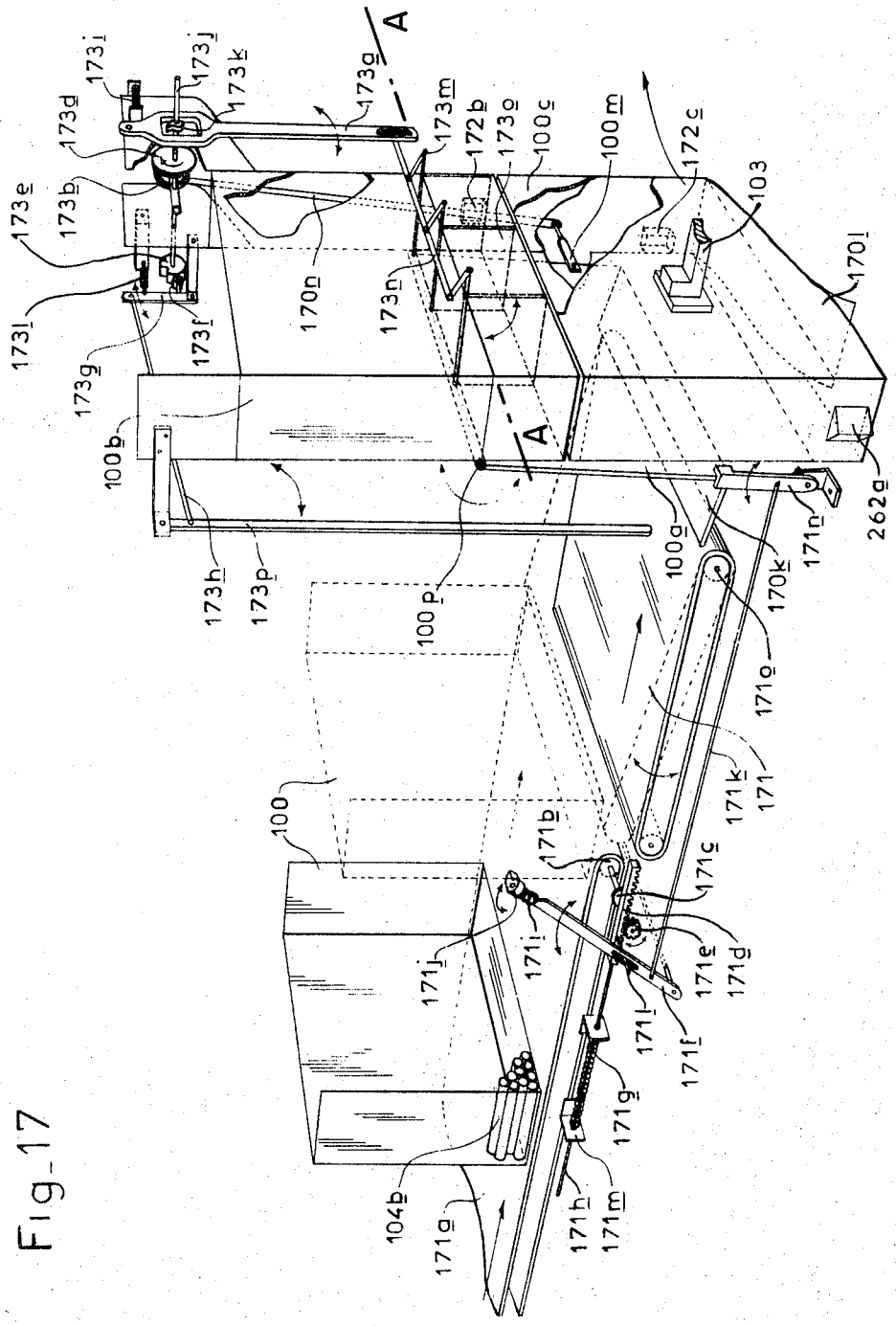
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Fig_17

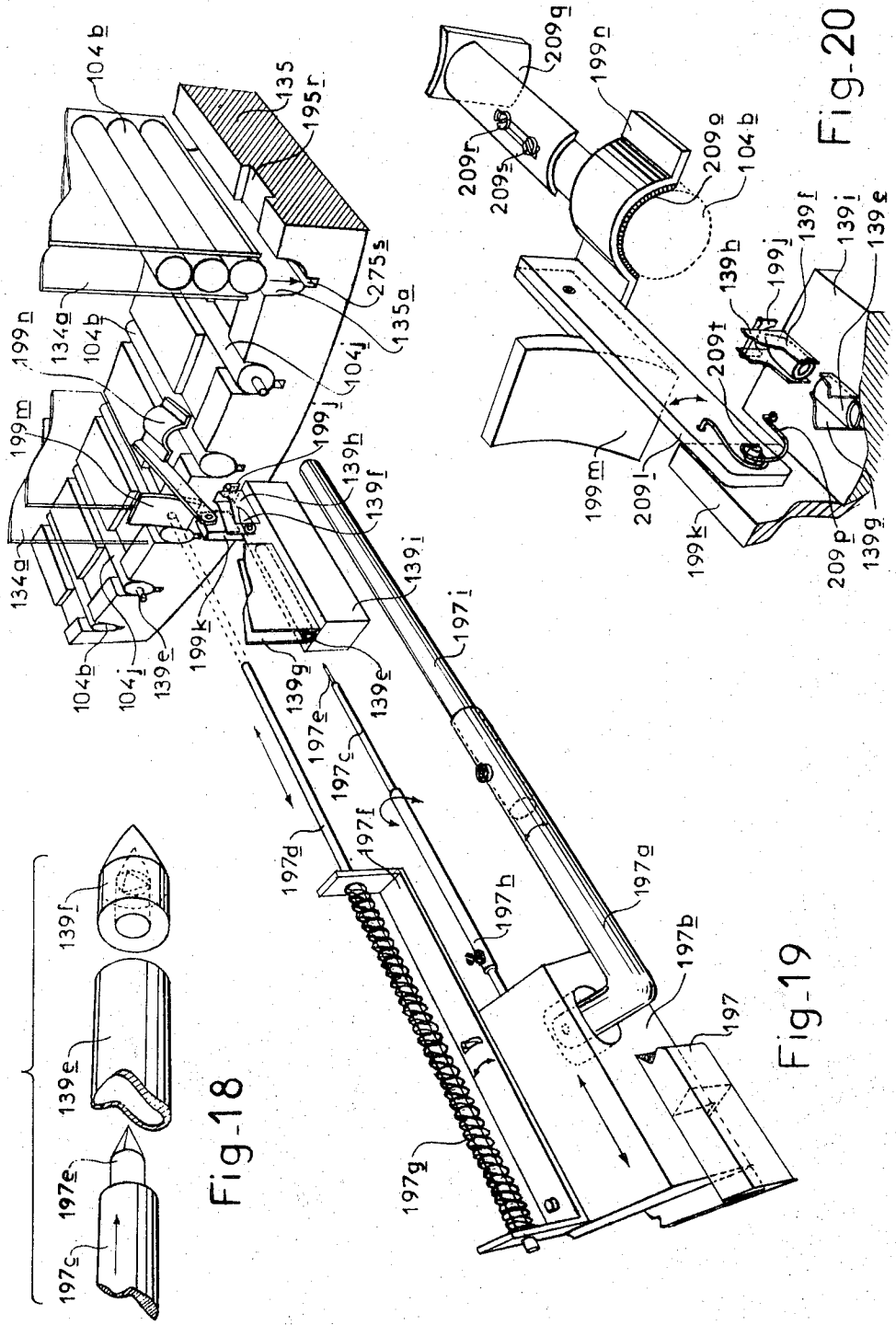


Fig-18

Fig-19

Fig-20

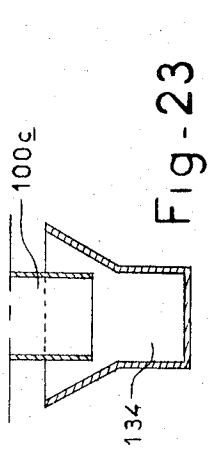


Fig-23

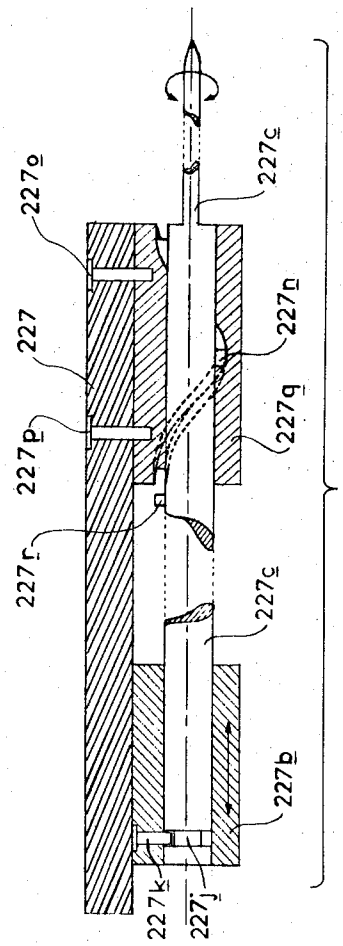


Fig-22

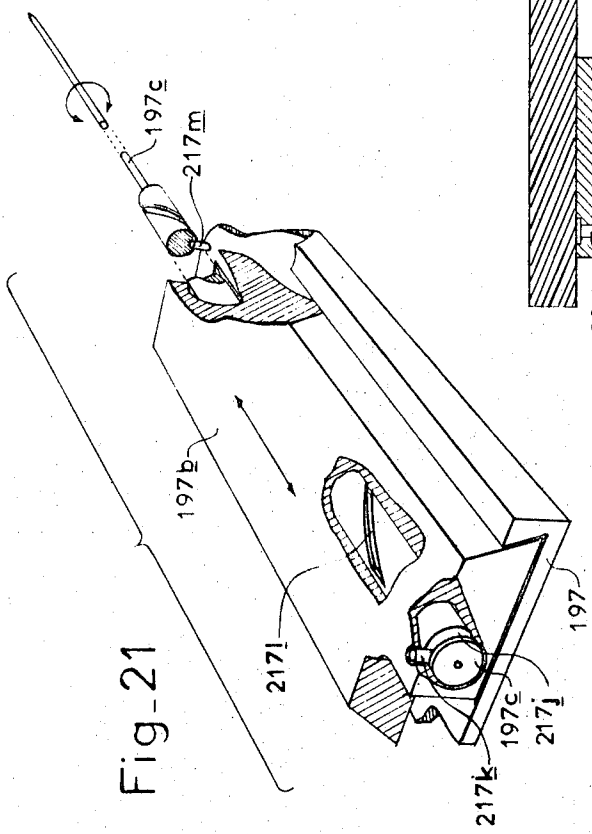


Fig-21

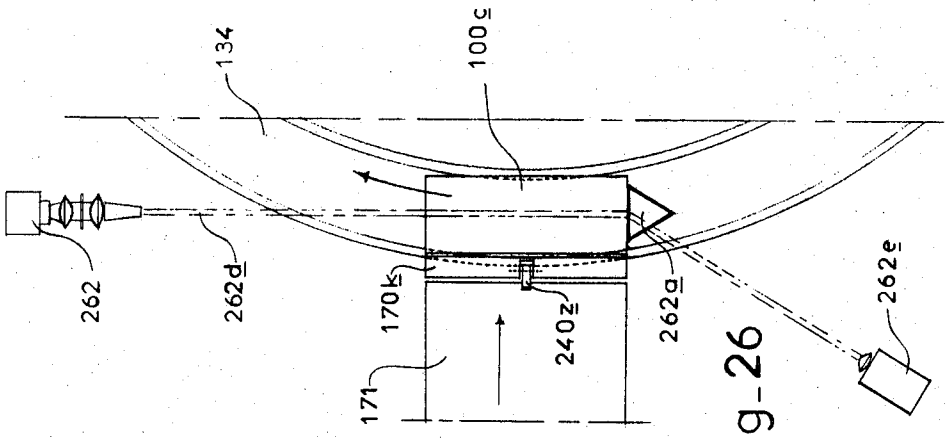


Fig_26

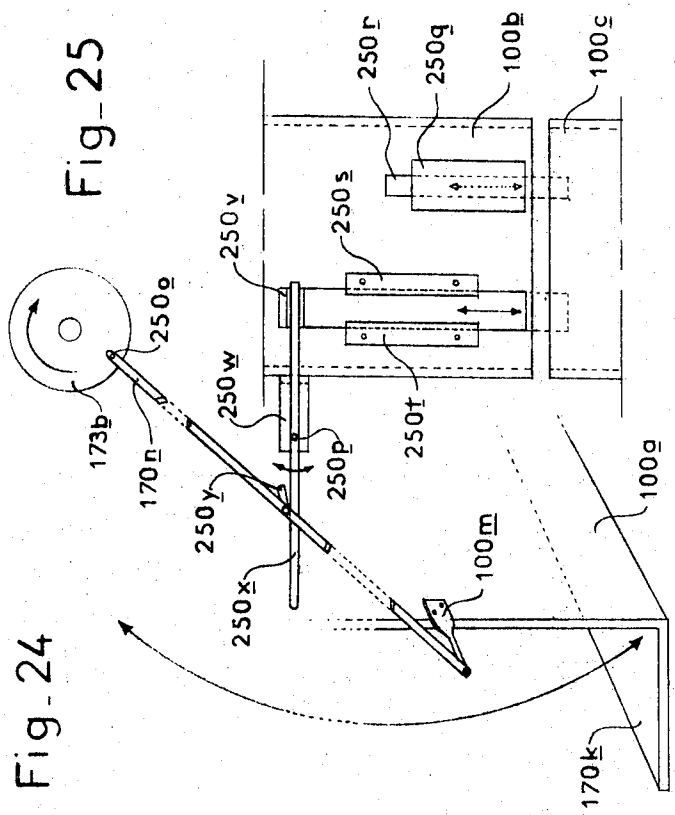


Fig_25

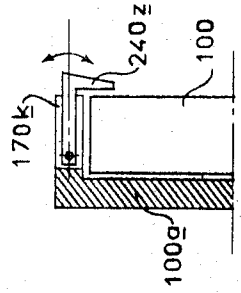
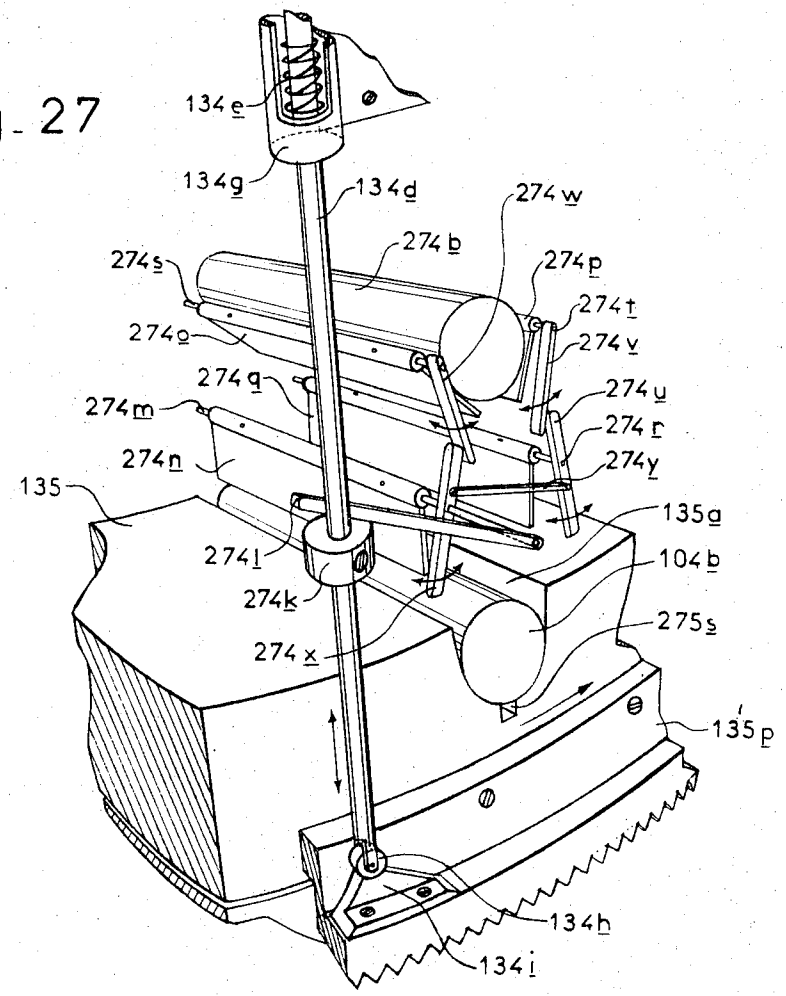


Fig_24

Fig. 27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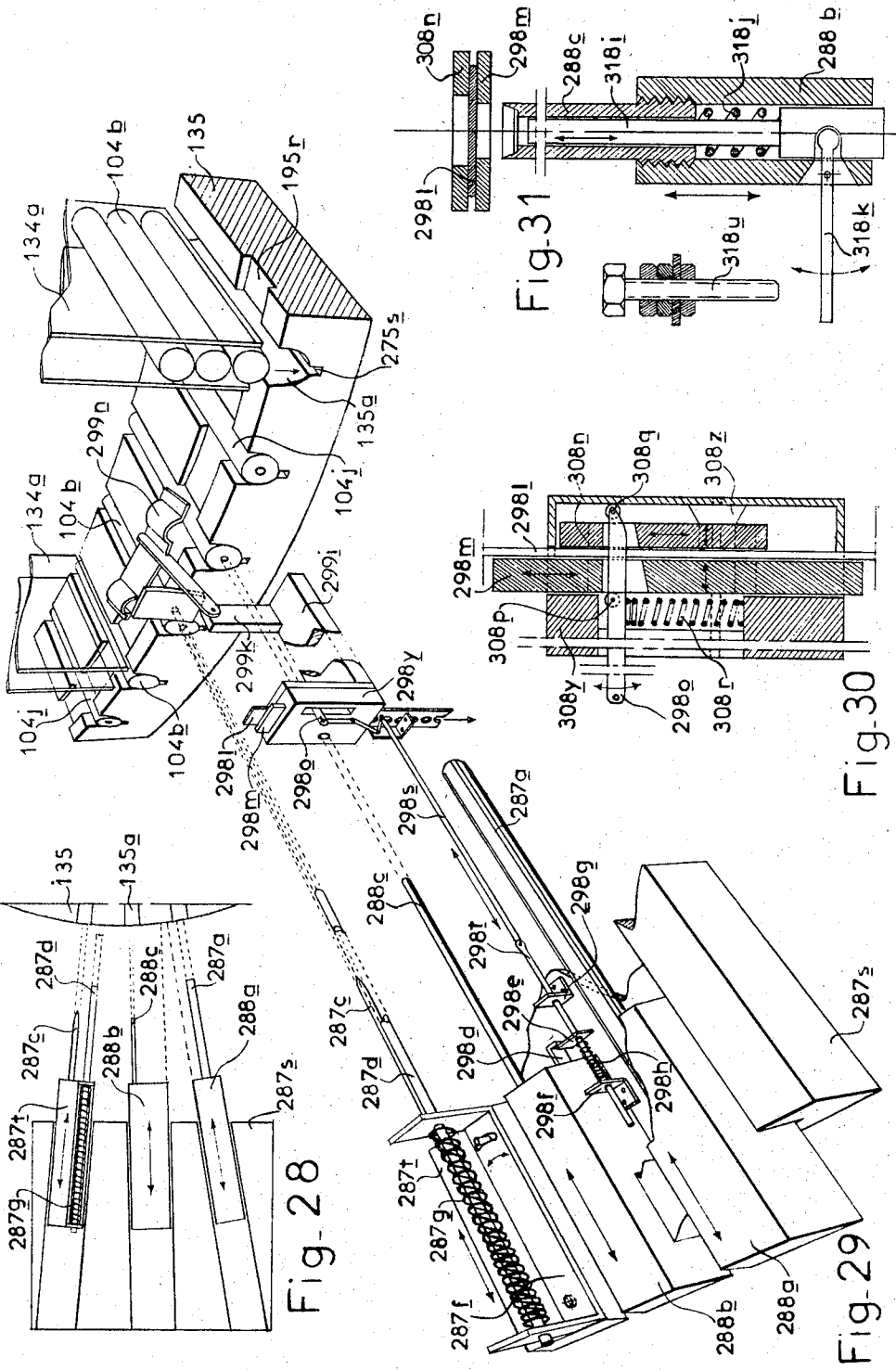
Fig-28
Fig-29
Fig-30
Fig-31

APPARATUS FOR PRODUCING BLIND CONDUITS IN CIGARETTES

The present invention relates to an automatic machine permitting the formation in any cigarette, provided or not with a filter tip and irrespective of its length and its diameter, of an air-admission conduit permeable to air and extending from an opening in the initial lighting extremity at which it opens to the free air, towards a suction-extremity zone at which the said conduit has a bottom wall impermeable to gases, and known hereinafter as the air-tight bottom wall.

The air-tight bottom wall is formed by means such as disks, conical or round hoods, spheres, full cylinders or the like, forming an obstacle to the indrawn gases and the smoke.

In accordance with one form of construction, the air-admission conduit is formed either by a simple agglomeration of tobacco or by a permeable or perforated sheath of paper, tobacco or more or less rigid material. This sheath may or may not be combustible. According to one alternative form, when this sheath is not combustible, the smoker can remove it before consuming the cigarette.

The fluid-tight bottom wall is preferably constituted by a hood, the introduction of which into the body of tobacco is facilitated by its conical shape. Furthermore, a hollow cylinder may be associated therewith in order to keep intact the conduit thus formed, this hollow cylinder being removed by the smoker before consuming the cigarette.

According to the invention, the arrangement of a conduit with a fluid-tight bottom wall in ordinary cigarettes is carried out following manufacture of these cigarettes by a conventional machine, and before they are packeted.

Certain characteristic features and advantages of a practical form of the invention will be more clearly understood from the description which follows below, given by way of example only, with reference to the accompanying drawings, in which:

FIGS. **1** and **2**, **3** and **4**, **5** and **6**, **7** and **8**, **9** and **10**, **11** and **12** are partially exploded sectional views schematically showing six procedures whereby blind conduits may be produced in cigarettes according to the present invention;

FIG. **13** is a view in perspective, partly in cross-section, of the main parts of the machine according to the invention;

FIG. **14** is a view in perspective, partly in cross-section, of the rotating ring, of the central supporting plate, of the evacuation device and of the controls located underneath the said central supporting plate of the machine according to the invention;

FIGS. **15** and **16** are fragmentary views in perspective, partly in cross-section, similar to the evacuation device of FIG. **14**, representing alternative forms of evacuation, according to the invention;

FIG. **17** is a view in perspective, partly in cross-section, of the receptacle device with its emptying device and of the mobile distributor device according to the invention;

FIG. **18** is an exploded view in perspective with parts in cross-section and parts broken away, of a piercing punch and a tube associated with a conical hood according to the invention;

FIG. **19** is a view in perspective, partially in cross-section, of the vertical hoppers supplying the grooved rotating ring and of a piercing device according to the invention;

FIG. **20** is a view in perspective, partly in cross-section, showing in enlarged detail the blocking device for ordinary cigarettes during their treatment, shown in FIG. **19**, according to the invention;

FIG. **21** is an exploded view in perspective, partly in cross-section, of the slide of a piercing device according to the invention;

FIG. **22** is an exploded view in cross-section with parts broken away, showing an alternative form of the arrangement of FIG. **21**;

FIG. **23** is a view in cross-section of the mobile distributor for untreated cigarettes above the reservoir ring, according to the invention;

FIG. **24** is a partial view in cross-section of the emptying device in the return position of the emptied collector, according to the invention;

FIG. **25** is a view partly in perspective of the blocking device of the mobile distributor underneath the emptying device of the receptacle as shown in FIG. **17**;

FIG. **26** is a partial plan view of the photo-electric cell device which acts on the blocking device fixed on the distributor device and intended to block the mobile distributor, according to the invention;

FIG. **27** is a view in perspective, partly in cross-section, of one of the dispensing devices depositing the untreated cigarettes one by one in the grooves of the rotating ring, according to the invention;

FIG. **28** is a plan view similar to that of FIG. **19**, showing an alternative form of construction comprising a pre-piercing device facilitating the introduction of disks, according to the invention;

FIG. **29** is an enlarged view in perspective of the piercing device partly shown in FIG. **28**, in accordance with the invention;

FIG. **30** is a view in cross-section of the device for driving the band of a more or less flexible material, shown in FIG. **29**, this band being intended to supply the material of the disks in accordance with the invention;

FIG. **31** is a view in cross-section of the cutter-punch device for introducing the disks, in accordance with the invention.

Referring now to FIGS. **1** and **2**, it can be seen that an untreated cigarette (FIG. **1***a*) having a full body of tobacco **4***b* with a suction extremity **3***z* and an initial lighting extremity **4***z*, is subjected to a pre-piercing operation (FIG. **1**b) by means of a pre-piercing punch **7***c* which may be rotatable and which forms, from the initial lighting extremity **4***z*, a conduit **7***x* extending to a small distance from the suction extremity **3***z*.

After this, as shown in FIG. **2***c*, a cutter-punch **8***c* cuts out a disk **6** and places it at the bottom of the conduit **7***x*. The cigarette **4***j* thus treated can be provided with a tube **9***e*, as shown in FIG. **2***d*, ensuring the maintenance of the conduit **7***x* over a period of time, this tube being removed if it is not combustible. The introduction of this tube may be effected by the cutter-punch **8***c*. This tube **9***e* may be introduced at the same time as the disk **6**.

FIGS. **3***a* and **3***b* and **4***c* and **4***d* are similar to FIGS. **1** and **2**, with the sole difference that the disk **6** has been replaced by a sphere **6***b* and that the tool **8***c* is only required to extract the spheres in succession from a storage device.

FIGS. 5*a* and 5*b* and 6*c* and 6*d* are also similar to FIGS. 1 and 2, with the difference that the disk 6 is replaced in this case by a conical hood 9*f* which has a housing adapted to receive the pyramidal extremity 7*e* of the rotating punch or 7*c'*, permitting rotation of the hood 9*f* during its introduction.

In accordance with FIGS. 7*a* and 7*b* and 8*c*, the conduit 9*e* and the pastille 6 of FIGS. 1 and 2 are replaced in this case by a single introduction element 9*w*, with a perforated body terminating in a non-perforated point 9*x*. In this case, the body 9*w* is preferably combustible.

In accordance with FIGS. 9*a* and 9*b* and 10*c* and 10*d*, the pre-piercing (FIG. 9*b*) is effected right through from the suction extremity 3*z* and in this extremity 3*z* there is fixed a filter tip 2*y* having a cylindrical section 6*a*. A tube 9*v* can be placed in position before fixing the filter tip 2*y*.

According to FIGS. 11 and 12, a cigarette 4*b* (FIG. 11*a*) is pierced through from the suction end (FIG. 11*b*), and a disk 6 is fixed to the filter 2*y*. Filter 2*y* may be fixed on the cigarette either immediately so as to close the tobacco conduit 7*x* (FIG. 12*c*) or after having introduced the tube 9*e* so as to close said tube 9*e* (FIG. 12*d*).

Referring now to FIG. 17, there are shown on the one hand the driving controls of the collectors 100, filled with untreated cigarettes 104*b*, and on the other hand the controls of the receptacle 100*b* which receives the cigarettes and feeds them into the mobile distributor 100*c*.

The travelling band 171 can carry out alternate pivotal movement with a limited travel about shaft 171*o* which is coupled to an electric motor (not shown) which provides the forward movement of the travelling band 171. A collector 100 filled with untreated cigarettes causes by its weight a downward pivotal movement of the travelling band 171 through a few degrees between 1° and 20° and preferably about 2°, about the shaft as an axis 171*o*.

The travelling band 171 by pivoting acts on the multiple contactor 172*c* which can on the one hand prevent this travelling band 171 from working as long as the mobile distributor 100*c* is moving in the direction of the arcuate arrow in the lower right portion of FIG. 17, in a manner to be described later, and on the other hand, it can re-establish an electric contact.

The closure of this latter contact starts-up the electric motor (not shown) which causes a forward movement of the band 171, thus placing a collector 100 onto a shelf 170*k* which extends horizontally from the vertical cover 100*a*. The cover is pivotally mounted by means of a hinge 100*p* on the upper end portion thereof and is capable of being rotated through 180° as shown by the double headed arrow shown in FIG. 17. This cover being pushed by this action against the receptacle 100*b*, operates by means of the multiple contactor 172*c* the stopping of the travelling band 171. The collector 100 being held on the shelf 170*k* and being no longer supported on the travelling band 171, enables this latter to pivot again under the action of a spring (not shown) which has been compressed by the collector 100 during its forward movement on the said travelling band.

This travelling band, thus freed from the weight of the collector is then restored to its upper initial position, in which it establishes a contact to start-up the electric motor which drives and actuates the emptying device. A driving shaft 173*j* rotates and acts through the bevel pinion 173*d* on the bevel pinion 173*b* which actuates the crank-arm 170*n*. The crank-arm 170*n* acts on the cover 100*a* through the intermediary of the finger 100*m* which is rigidly fixed to this cover, and causes the latter to pivot through about 180° on its hinge 100*p*. The cover 100*a* causes the collector 100 to pivot with it, and thus enables it to empty the untreated cigarettes which it contains, into the waiting receptacle 100*b*.

FIG. 25 shows details of the controls which block the mobile distributor 100*c* under the receptacle 100*b*, and permits a clearer understanding of FIG. 17. It is shown in FIG. 25 that the crank-arm 170*n* at the mid-point of its travel, is no longer supported with its stud 250*y* on the lever 250*x*, permitting this latter to rock about its axis 250*p* which is fixed by the bearing 250*w* secured on the receptacle 100*b*. By rocking, the lever 250*x* enables a bolt 250*v* to slide in its bearings 250*s* and 250*t*. As it moves down, the bolt 250*v* prevents the mobile distributor 100*c*, driven by the lever 103 (FIGS. 13 and 17) from moving under the receptacle 100*b* before the collector 100 (FIG. 17) has emptied the untreated cigarettes into this receptacle.

Referring again to FIG. 17, it is seen that, during the travel of the cover 100*a* in order to reach its uppermost position, the cam 173*k* acts on the lever 173*a* which pivots on its axis, compressing the spring 173*i*, and actuates the lever 173*n*. This latter acts through the levers 173*m* on the shafts of the shutters 173*c* which causes these shutters to pivot about the axis A shown in FIG. 17. These thus close the bottom of the receptacle 100*b*, in which are collected the cigarettes emptied out of the collector 100.

FIG. 24, in correlation with FIG. 17, shows the cover 100*a* in its uppermost position, in which a free hook 240*z* which is housed in the shelf 170*k* of the cover, rocks on its axis and engages the edge of the empty collector 100, forcing this latter to return with the cover 100*a* to its lower position.

Again referring to FIG. 17, a cam 173*e* rotates at the same time as the cover 100*a*, returns to its bottom position and enables the roller 173*f* to enter the hollow portion of this cam, which causes the lever 173*g* to pivot on its axis. The lever 173*g* is pulled by the spring 173*l* and acts through the intermediary of the rod 173*h* on the lever 173*p*, causing it to pivot on its shaft which is fixed on its support. By pivoting counter-clockwise as seen in FIG. 17, this lever 173*p* ejects the emptied collector 100 from the shelf 170*k* of the cover 100*a*.

The emptied collector 100 which has been ejected to the side of the emptying device will move along rails (not shown) so as to rejoin the evacuation device for treated cigarettes, which is located underneath the general support of the machine, in which the collector 100 is filled with treated cigarettes.

The cover 100*a* arriving at its bottom position again acts on the multiple contactor 172*c*, breaking the electric current to the motor which actuates the shaft 173*j*, bringing this latter to a stop. The multiple contactor 172*c* establishes the contact which starts-up the motor of the travelling band 171.

According to FIG. 26, this motor can operate only if the band 171 has rocked into its bottom position and if the photo-electric cell 262*e* which is located at the side of the ring reservoir 134, is illuminated by the beam of light 262*d*. This beam comes from the source

of light 262, passes through the transparent mobile distributor 100c and the prism 262a carried by this latter and strikes photo-electric cell 262e. The purpose of this photo-electric cell 262e and of the corresponding devices subjected to its action will be explained later.

Continuing the description of FIG. 17, the cover 100a, while it pivots so as to return to its bottom position, acts on the lever 171n which pivots about its shaft, this latter being fixed on its support. The lever 171n acts through the rod 171k on the lever 171f. This latter pivots on its shaft which comprises, on the other side of the travelling band 171, a lever (not shown) which is of the same design as the lever 171f. This latter lever is provided with a ratchet 171j to which is applied the pressure of the spring 171i; this ratchet 171j can pivot by 90° about a shaft which is formed on the end of the lever 171f. As it pivots on its shaft, this lever causes a forward movement of a collector 100 by pushing it with its ratchet 171j.

The collector 100 thus passes from the travelling band 171a to the band 171. At the same time, it acts on the toothed rack 171d by the stud 171L. The toothed rack 171d is in engagement with the pinion 171e which acts on a ratchet wheel 171c driving the roller 171b of the travelling band 171a. Thus the toothed rack 171d causes the travelling band 171a to advance at the same time that the lever 171f pushes a collector 100 from the travelling band 171a on to the pivoting band 171, namely for a distance sufficient for the said lever to return and again hook a collector 100, which follows.

The toothed rack 171d comprises a rod 171h which slides in its bearings 171m and which works under the pressure of the spring 171g. This toothed rack compresses the said spring at the same time that is causes the travelling band 171a to move forward. This spring 171g as it expands, re-sets the toothed rack 171d for a fresh advance of the travelling band 171a and brings back the lever 171n into a position which enables it again to be subjected to the thrust of the cover 100a.

After the ejection of the emptied collector 100, the cam 173k no longer acts on the lever 173a, by the pressure of its spring 173i, and so the lever 173a immediately opens the shutters 173o by vertical swinging movement about axis A, thus permitting the cigarettes to fall into the vertical compartments (not shown) of the mobile distributor 100c.

According to FIGS. 25 and 26, this mobile distributor 100c is made of transparent material, and in particular it comprises a prism 262a. As soon as the cigarettes are emptied from the collector 100b and have fallen into the mobile distributor 100c, they prevent the beam of light 262d from reaching the prism 262a and from being refracted by it, so as to excite the photo-electric cell 262e. This latter actuates the electro-magnetic bolt 250r in its coil 250q. The positions of this bolt thus correspond to the level of cigarettes in the mobile distributor 100c.

The blocking position of the bolt 250r corresponds to the mobile distributor emtpy, while the unlocked position of this bolt corresponds to the mobile distributor full of cigarettes. This mobile distributor 100c which is driven by a mechanism with a friction clutch (not shown) carries out its circular travel in one direction only (see FIG. 13). The distributor 100c, blocked underneath the receptacle 100b by the mechanical bolt 250v and by the electro-magnetic bolt 250r, can resume its travel only when the hinged cover 100a is in its lower position and when the mobile distributor 100c is not emptied to the point that it may contain or receive the volume of cigarettes from a full collector.

The mobile distributor 100c filled with cigarettes can continue to its circular travel while distributing the cigarettes along the whole length of this travel by allowing them to pass out through its emptying orifice 170L (FIG. 17) into the bottom of the ring 134, this latter serving as a reservoir for untreated cigarettes.

FIG. 13 represents a general view of the main components of the machine according to the invention and their successive or simultaneous action, from the reception of the untreated cigarettes at the top of the machine to their treatment (formation of a conduit with an airtight bottom wall). Vertical reservoirs 134a in the form of slender hoppers interconnect the bottom of the ring reservoir 134 with the rotating ring 135 with grooves 135a located below, and which they supply with untreated cigarettes 104b. These reservoirs or hoppers are transparent and are preferably provided with widened upper spouts which communicate with the bottom of the ring reservoir 134.

The cigarettes deposited in the ring reservoir 134 fill the vertical hoppers 134a, thus permitting a reserve of cigarettes to be formed which ensures a constant feed of the rotating ring 135. The upper portions of the vertical hoppers comprise stirring devices 134c which are actuated by rods 134d all arranged around the rotating ring 135. These rods 134d act on rocking levers which in turn act through the levers 134f on the slots of the stirring devices 134c. These latter bring the cigarettes down to the bottom of the ring 134 in the vertical hoppers 134a.

The rods 134d slide in their bearings 134g which are fixed on the walls of the vertical hoppers 134a. Each bearing 134g comprises a spring 134e which brings back the rod 134d into its position of rest. It carries out vertical to-and-fro movements under the action of the spring 134e and the cam 134i fixed on the rack 135p which is in mesh with pinion 135o over its whole periphery. The said cam acts on the roller 134h of the rod 134d. The rack 135p in the form of a toothed ring is fixed on the rotating ring 135. The toothed ring is driven by the pinion 135o which thus causes the grooved rotating ring 135 to rotate.

Grooves 135a are arranged along the radii of the rotating ring 135. These grooves receive the cigarettes 104b which are to be treated. Hoppers 139g and hoppers for fluid-tight bottom walls 139h are distributed around the ring 135. They contain tubes 139e and conical hoods 139f, these tubes and hoods being intended to be introduced into the untreated cigarettes 104b. They are thrown in bulk into different vibrator bowls, one of which is shown respectively at 139 and 139a. These bowls supply the tube reservoirs 139g with tubes 139e and conical hoolds 139f by directing them into circular gutters 139c and 139d. The vibrating bowl 139a orientates the hoods 139f and causes them to slide along the slope 139b before directing them by its gutter 139d.

The tubes 139e and the conical hoods 139f follow the slope of the circular gutters 139c and 139d and fall through openings in these latter into their respective reservoirs.

FIG. 27 shows the detail of the controls of the dispensing device which enables the vertical reservoirs 134*a* to supply the grooves 135*a* of the rotating ring 135 with untreated cigarettes 104*b* and deposits these cigarettes one by one.

The vertical tube reservoirs 134*a*, for untreated cigarettes supplying the grooves 135*a* of the rotating ring 135 comprise at their lower portions a dispensing device comprising shutters 274*n*, 274*o*, 274*p*, 274*q* pivoting on their shafts, 274*m*, 274*r*, 274*s*, 274*t* by the action of the levers 274*u*, 274*v*, 274*w*, 274*x*, 274*y*.

These levers are actuated by an abutment 274*k* with an adjustable height, which acts on the rod 274*l* fixed to the shaft 274*m*. The vertical to-and-fro movement of the rod 134*d* which ensures the operation of the dispensing device, is obtained by the cam 134*i*, through the intermediary of the roller 134*h* of the rod 134*d*. It can be seen that this dispensing device deposits the cigarettes one by one in the groove 135*a*. A groove 275*s* extending the whole length of the groove 135*a* permits the evacuation of the scraps of tobacco which may have fallen from the cigarettes.

In FIG. 14 are shown the controls of the rotating ring 135 located on the machine support on the one hand, and on the other hand those of devices for the treatment of untreated cigarettes, and finally those of the evacuation device. The rotating ring 135 rotates on the supporting plate 138 by means of a number of rollers, of which three have been shown. This rotating ring is rigidly fixed to a toothed crown wheel 135*p*, driven by a pinion 135*o* on its shaft 145*n* and by the pinion 145*c* with interrupted teeth, on its shaft 145*b*.

The crown wheel 135*p* thus marks stopping times at equal intervals during its rotation. The blocking lever 145*q* is subjected to the action of a cam 145*w* located at the outer extremity of the shaft 145*b*, compresses a spring 145*v* and liberates the crown wheel 135*p*, thus permitting the rotating ring 135 to travel over a distance equal to that separating two grooves 135*a* from each other. When the lever 145*q* is no longer subjected to the action of the cam 145*w*, it pivots under the pressure of its spring 145*v* and again locks the crown wheel 135*p*, while adjusting its new position with respect to its previous position.

According to FIGS. 14 and 19, and referring more particularly to FIG. 19 which shows in detail the control of the piercing and ejection devices for the treated cigarettes, it is seen that these devices, of which one has been shown, are distributed around the rotating ring 135, each of them facing a tube reservoir 139*g* and a hood reservoir 139*h*.

These reservoirs are carried and retained by bases 139*i* screwed in turn on to the fixed circular supporting plate 138 (FIG. 14). This plate ensures certain functions: it serves as a mounting base for a number of elements constituting the machine according to the invention. In addition, its grooves 148*v* and its circular passage 148*w* permit the evacuation of the treated cigarettes 104*j*.

A slide 197*b* serves as a support for the piercing punch 197*c*, for the rod 197*a*, and for the bearing 197*f* of the push-rod 197*d* which comprises a spring 197*g*. The slide 197*b* reciprocates in the support 197 and the piercing punch 197*c* carries out rotating and to-and-fro movements, since it is driven by the movements of this slide 197*b*, in a manner decribed below. This latter moves forward towards the cigarette 104*b* located in the groove 135*a* of the ring 135, in which cigarette there is to be introduced a tube 139*e* and a hood 139*f*.

In fact, the punch 197*c* passes in its movement into a tube 139*e* and penetrates with its pyramidal point 197*e* into the hood 139*f*. This punch thus provided with a tube and a hood, pierces the cigarette 104*b* along its axis and introduces into it the tube 139*e* associated with the hood 139*f*. The non-return stop 199*j* prevents the punch 197*c* from eventually bringing back in its return movement the tube and the hood which it has just introduced and deposited in the cigarette.

FIG. 18 shows an enlarged view of the punch 197*c* comprising a pyramidal point 197*e* driving a hood 139*f* associated with a tube 139*e*. It is seen that the hood similarly possesses a pyramidal housing in which the extremity of the above punch fits closely, which compels the hood to rotate with the punch when it is carried in the forward movement of this latter.

According to FIG. 14, a conventional electric motor (not illustrated) with a conventional speed reduction gear (not illustrated) drives the shaft 145*b* which, in addition to the pinion 145*c*, comprises a bevel pinion 145*d* together with a cam 145*x* rotating in the opening 145*f* of the piston 145*g*. This latter is housed in the cylinder 145*h* in which this piston carries out reciprocating vertical movements. The piston 145*g* comprises on its upper circular surface, fixing bases arranged along the radii of this circular surface, for crank-arms 145*i*. By pivoting on their shafts, these crank-arms act on the rods 145*j* through the intermediary of crank-rods coupled to elbowed levers, the shaft of which is held by supports. The rod 145*j* is encircled by a spring 145*k* and is arranged to slide in its bearing 145*l*. The vertical reciprocating movements of the piston 145*g* are thus transmitted to the lever 145*m* which actuates the slide 197*b* so as to give it to-and-fro movements.

Again referring to FIG. 19 with reference to FIG. 14, the piercing punch 197*c* passes through the tube 139*e*, and penetrates into and drives the hood 139*f* as it moves towards the cigarette 104*b*. The slide 197*b* which drives the piercing punch brings the rod 197*a* towards the treated cigarette 104*j* so as to eject it from the groove 135*a* of the rotating ring 135.

At the same time, the rod 197*d* moves forward and acts on an abutment 199*m* which operates a lever 199*n*. This latter presses on the cigarette 104*b*, holding it in the groove 135*a* in order to prevent it from turning or sliding. A slot 195*r* cut in the rotating ring 135 permits the lever 199*n* to penetrate partly into the rotating ring 135 and thus also to block cigarettes of relatively small diameter.

It should be noted that the piercing punch 197*c* mvoes forward while rotating its pyramidal point 197*e*, driving the hood 139*f* which it compels to rotate with it and thus to pierce the cigarette 104*b*, at the same time introducing into the cigarette this hood and the tube 139*e* which is associated therewith.

The difference in travel of the piercing punch 197*c* and the ejection rod 197*a* with respect to the rod 197*d* acting on the abutment 199*m*, is compensated by this latter which slides in its bearing 197*f*, at the same time compressing its spring 197*g*. On the return of the slide 197*b* which thus moves away from the ring 135, the rod 197*d* is brought back to its initial position by the expansion of its spring 197*g*. The ejection rod 197*a* passes out of the groove 135*a* and finally the punch 197*c*

passes out of the cigarette **104***j*, passing into the non-return abutment **199***j* which prevents the punch **197***c* from carrying with it, as it moves back, the tube **139***e* associated with the hood **139***f*.

In order to be able to regulate the length of the ejection rod **197***a* which may be constituted by a hollow cylinder housing a rod **197***i* retained in the hollow cylinder by a clamping screw, the total length of the said ejection rod **197***a* may thus be regulated. In addition, a hollow cylinder **197***h* is fixed on the piercing punch **197***c* by a clamping screw which also enables its position on this piercing punch to be adjusted. By means of the shoulder represented by its thickness, this hollow cylinder drives the tube **139***e* while holding it closely associated with the hood **139***f*.

Referring now to FIG. **14**, the treated cigarettes **104***j*, ejected by the rod **197***a* from the grooves **135***a*, slide in the grooves **148***v* of the supporting plate **138** and fall into the circular evacuation passage **148***w*. A number of blades **148***x* rotate in the passage **148***w* in a continuous movement in order to direct the treated cigarettes towards the evacuation ramp **140***f*. Through this opening, the cigarettes fall into collectors (not shown) such as collectors **100**, which are arranged under the machine.

The blades **148***x* are rigidly fixed on the toothed crown wheel **140***e* which is actuated by the pinion **140***d* fixed by its shaft to the bevel pinion **145***e* which is in turn engaged with the bevel pinion **145***d* which drives it. This driving device causes the blades **148***x* to rotate with a continuous movement.

Rings (not shown) are provided and housed in the central evacuation passage **148***w* and more precisely against the large circumference of this passage, the outline of which they follow. They are provided with grooves identical with the grooves **148***v* which precede them and which are cut in the supporting ring **138**, these grooves being in turn associated with those of the rotating ring **135**. The said rings of variable thickness are intended to permit the treatment of cigarettes of different lengths.

They in fact compensate for variations in the distance represented by a number of cigarettes arranged end to end in the associated grooves **135***a* and **148***v* of the rings **135** and **138**, so that the treated cigarettes fall without tilting during their ejection, into the central evacuation passage **148***w*. Simple adjustments may be utilized for the piercing devices and especially the ejection device **197***a*.

FIGS. **15** and **16**, similar to portions of FIG. **14**, represent alternative forms of the evacuation device with blades shown in FIG. **14**. It can be seen from FIG. **15** that a flexible band **150***h* of adequate thickness rotates in the evacuation passage **148***w* (FIG. **14**). Vertical rollers guide the band **150***h* so as to deflect the cigarettes carried away by this band, in order that they may be evacuated by the evacuation ramp **150***g* which causes them to slide towards the centre of the machine and underneath this latter along a more or less steep slope. This flexible band **150***h* thus effects a lateral displacement on its circular travel, but this lateral displacement should be a minimum.

In the second alternative form shown in FIG. **16**, it can be seen that the band **160***j* carries out in its circular travel a displacement in depth determined by horizontal rollers. The cigarettes are evacuated on the evacuation ramp **160***i* having a more or less steep slope. This latter ramp evacuates the cigarettes and carries them away from the centre of the machine.

Referring now to FIG. **20** showing details of the operation of the abutment **199***m* (FIG. **19**), it is seen that the cigarette **104***b* is held during its piercing, by the locking lug (lug **199***n*) which is lined with an anti-slip material **209***o*. This locking lug is rigidly fixed to the lever **209***l* and to the abutment **199***m*. An abutment extension **209***q* is carried by to the lug **199***n* in order to complete the operation of blocking the cigarette **104***b*. This abutment extension **209***q* is fixed by screws **209***r* and **209***s* on the lug **199***n*, these screws enabling the distance between this lug **199***n* and the said abutment **209***q* to be adjusted and varied.

The variation of this distance makes it possible to treat cigarettes of different lengths. The lever **209***l* is fixed by its shaft **209***t* on the support **199***k* which is in turn fixed on the base **139***i*. Referring to FIG. **19**, it can be seen that this base **139***i* also serves as a support for the tube reservoir **139***g* and the hood reservoir **139***f*. The lever **209***l* is brought back into its free position by its spring **209***p*.

Referring now to FIG. **21**, in order to cause rotation of the piercing punch **197***c*, this latter is housed in the slide **197***b* which serves as its support and in which it can rotate on its shaft while being maintained in position in its housing by a stud **217***k* fixed to the slide **197***b*. This stud **217***k* slides in into the circular groove **217***j* of the piercing punch **197***c*. This latter is further provided with a helicoidal groove **217***l* in which slides a stud **217***m* fixed to the support **197** of the slide **197***b*. When the slide moves in its support, the stud **217***m* causes rotation of the piercing punch. This rotation is reversible, depending of whether the slide, (with the punch) is moving forward or returning.

Referring now to FIG. **22** which shows an alternative form of FIG. **21**, a stud **227***r* is rigidly fixed to the piercing punch **227***c*. This latter is housed in the slide **227***b* which serves as its rear support and in which it can rotate on its axis by the same means as those employed for the piercing punch **197***c*.

The front support **227***q* of the piercing punch **227***c* is fixed by screws **227***o* and **227***p* to the support **227** of the slide **227***b*. A helicoidal groove **227***n* is cut in the housing of this support.

When the slide **227***b* is displaced, driving the piercing punch **227***c*, the stud **227***r* fixed to this latter is moved in the helicoidal groove **227***n* which guides it in such manner as to cause rotation of the piercing punch **227***c*. This rotation is reversible, depending on whether the slide (with the punch) is advancing or retracting.

According to FIG. **28** which is a partial view from above of FIG. **29**, each support **287***s* fixed on the supporting plate **138** of the machine (FIG. **14**), comprises three slides **288***a*, **288***b* and **287***t* actuated by the levers **145***m* shown in FIG. **14**. It can be seen that the ejection rod **287***a* is rigidly fixed on the slide **288***a* and that the slide **287***t* comprises on the one hand the piercing punch **287***c* and on the other hand the locking rod **287***d* with its spring **287***g*.

The slide **288***b* comprises a hollow rod **288***c* which acts as a cutting punch. This alternative form is intended to produce disks **6** (FIG. **2***c*) serving as an airtight bottom wall. Conduits may be associated with these disks and in this case the same reservoirs **139***g* as those of FIG. **19** would be used. The cutting punch **288***c* may introduce its disk **6** into the cigarette through

a tube **139***e* which has been put in position by the prepiercing punch **287***c*.

Referring now to FIG. **29**, the support **287***f* of the locking rod **287***d* with its spring **287***g* can pivot about a shaft fixed on the slide **287***t*, as already shown in FIG. **19**.

This pivotal movement is limited by a stud fixed to the slide **287***t* and passing through a slot cut-out in the support **287***f*. The slide **288***b* comprises the cutting-out punch **288***c*. An abutment **298***d* rigidly fixed on the slide **288***b* acts on the abutment **298***e* fixed on the rod **298***t* which slides in its supports **298***f* and **298***g*. When retracting, the slide **288***b* carries with it the rod **298***t* and compresses the spring **298***h* housed on the said rod between the abutment **298***e* and the support **298***f*. When the said slide moves forward, the spring **298***h* expands and pushes back to the rod **298***t*.

This reciprocating movement is transmitted to the crank-arm **298***s* associated with the rod **298***t*. The said crank-arm acts on the lever **298***o* which carries out vertical to-and-fro movements through the intermediary of an elbowed lever fixed on its support.

The cutting-out punch **288***c* penetrates into a casing **298***y* of a band driving device which comprises the lever **298***o*. This device is fixed on a base **299***i* which holds the mounting base **299***k* of a double locking lever **299***n*.

This latter lever blocks two cigarettes simultaneously in grooves **135***a* of a ring **135**. The casing **298***y* is traversed vertically by a strip or band from which the disks are cut out by the cutter punch **288***c*. This band of more or less flexible material may be taken from a reel located at the top of the casing **298***y* and can be rewound after perforation on a second reel located under the said casing.

The to-and-fro movement of the slide **288***b* may ensure the winding on a reel of the perforated band passing out of the casing **298***y*, acting by a toothed rack and ratchet wheel on this reel. These reels have not been shown. The plate **298***m* is housed in a mobile manner in the casing **298***y* and belongs to the device for driving the band **298***l* through the intermediary of the lever **298***o*.

According to FIG. **30**, which shows the detail of the device contained in the casing **298***y*, the band **298***l* can move down between the plates **298***m* and **308***n* which are housed in the said casing, and in which they are movable. The casing constituted by two shells assembled together serves as a mounting base for the lever **298***o* which carries the rollers **308***p* and **308***q*. This lever is held in its upper position by the pressure of the spring **308**r.

The frusto-conical matrix **308**z is interchangeable. By actuating the lever **298***o*, the latter compresses the spring **308***r* and causes a clamping effect by its rollers **308***p* and **308***q*, which enables the plates **298***m* and **308***n* to press the band **298***l*.

By pulling still further on the lever **298***o*, this latter further compresses the spring **308***r* and drives the two rollers **308***p* and **308***q* downwards, together with the band **298***l* down to the bottom of its vertical travel, which corresponds to the distance required for the cutter punch to be able to cut-out disks from the virgin band **298***l*. The cutter punch passing through the band **298***l* prevents the spring which, in expanding brings back the lever **298***o* and the plates **298***m* and **308***n* into their upper position, from bringing back the band **298***l* at the same time into its previous position, that is to say towards the top.

According to FIG. **31**, it can be seen that the punch **288***c*, screwed into the slide **288***b*, is hollow and comprises an ejection rod **318***i* with its spring **318**j and a lever **318***k* which actuates the rod **318***i*.

As it moves forward, the cutting punch **288***c* passes through the plate **298***m* and then the band **298***l*, from which it cuts out a disk **6** (FIG. **2***b*) which it introduces into the cigarette and deposits it there. This latter operation is effected by the ejection rod **318***i* when the lever **318***k* abuts against the nut **318***u* which compels it to pivot on its shaft fixed to the slide **288***b*, thus giving a forward sliding movement to the ejection rod **318***i* in the cutting punch **288***c*. The said ejection rod thus expels the disk **6** from the cutting punch **288***c*.

The production capacity of the machine according to the invention depends on the diameter of the rotating ring, which determines the number of grooves and also the number of devices concerned with the treatment of untreated cigarettes. By way of example, a rotating ring having a diameter of approximately 1.5 metres can carry out the treatment according to the invention of 3,600 untreated cigarettes per minute.

The distance between the reservoir ring at the top of the machine and the supporting plate may remain constant irrespective of the diameter of the rotating ring **135**, and may for example have a value of about 0.40 metre.

What I claim is:

1. Apparatus for producing blind conduits in cigarettes, comprising a substantially horizontally disposed ring having a plurality of radial grooves in its upper surface for the reception of cigarettes, a plurality of successive conduit-punching devices on the outer periphery of said ring for punching blind conduits in the tobacco of cigarettes carried in said grooves, means on the outer periphery of the ring for introducing airtight disks into the bottoms of said blind conduits, evacuation means for removing cigarettes disposed on the inside of said ring, ejector means for moving cigarettes from said grooves to said evacuation means, means for rotating said ring so as to bring the groove initially facing said punching and introducing means in front of said ejector means, a plurality of hoppers disposed above said ring to supply cigarettes to said grooves, means defining an annular passage above said hoppers, a mobile distributor movable above said annular passage to supply cigarettes to said passage, loading apparatus for said mobile distributor comprising a member pivotable between lower and inverted upper horizontal positions, a conveyor belt for cigarettes terminating substantially in said horizontal position, and receptacle means adapted to receive cigarettes from said loading apparatus and disposed above said mobile distributor, said receptacle means having lower closure shutters for releasably retaining cigarettes therein.

2. Apparatus as claimed in claim **1**, said hoppers having articulated flaps adapted to dispense one cigarette into each groove, said flaps being mounted on shafts which are coupled with each other by levers and to a main lever, and a vertical rod actuating said main lever and a cam carried by said ring and adapted to engage the lower end of said rod for actuating the same.

3. Apparatus as claimed in claim **1**, and a plurality of devices disposed radially outwardly of said ring for introducing tubes into said blind conduits.

4. Apparatus as claimed in claim 1, and means associated with each of said punching devices for holding a cigarette in one of said grooves during punching.

5. Apparatus as claimed in claim 1, said means for introducing an airtight disk comprising a cutting-out punch for cutting out said disks and means to supply a band of the material of said disks to said cutting-out punch.

6. Apparatus as claimed in claim 1, and slides on which said punching devices and disk-introducing means are mounted and means for reciprocating said disk-introducing means radially of said ring.

7. Apparatus as claimed in claim 6, and means mounting said slides for rotation about axes constituted by their paths of radial reciprocation.

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