Oct. 23, 1962 G. GAMBERINI 3,059,650

CIGARETTE MAKING MACHINE

Filed Jan. 6, 1959 4 Sheets-Sheet 1

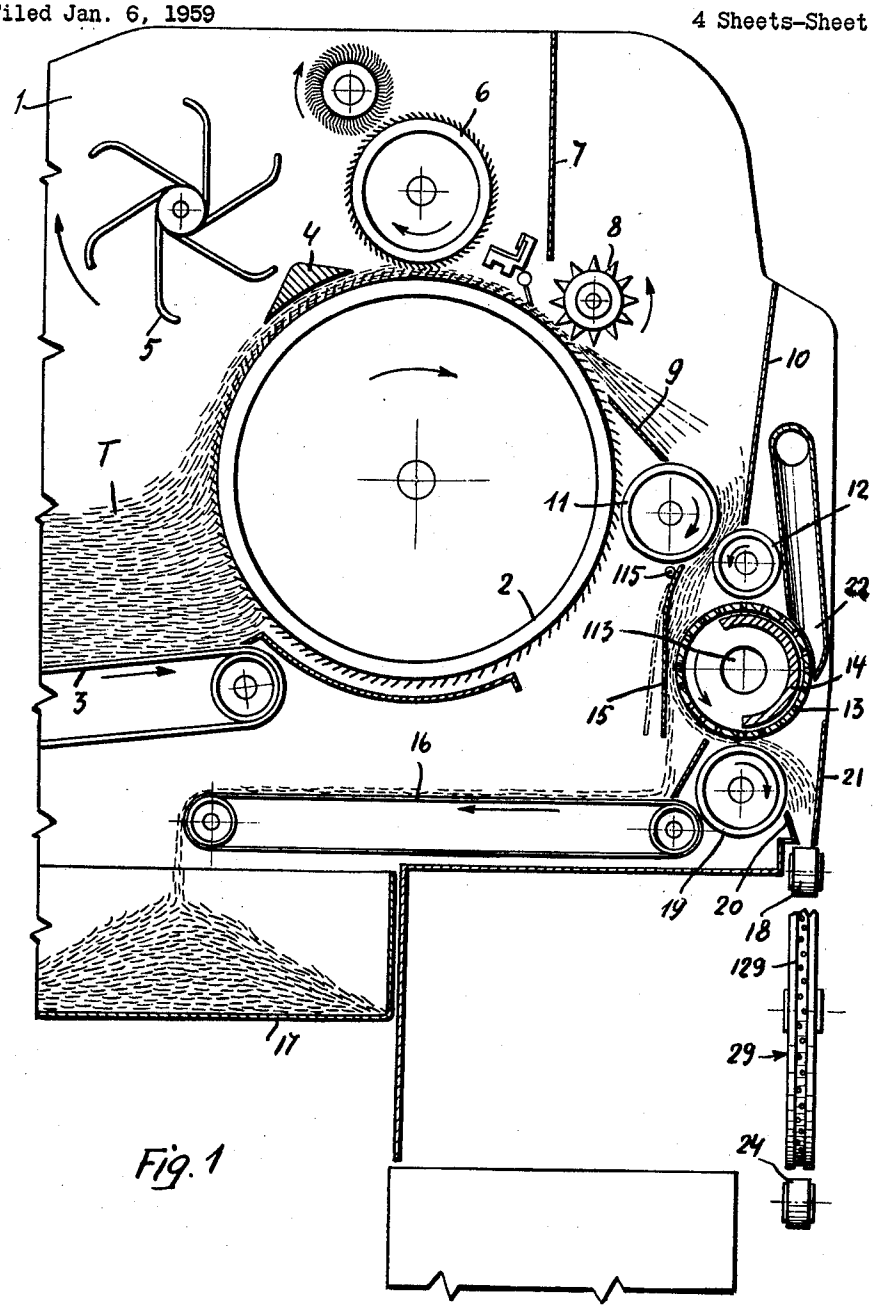


Fig. 1

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CIGARETTE MAKING MACHINE

Filed Jan. 6, 1959 4 Sheets-Sheet 2

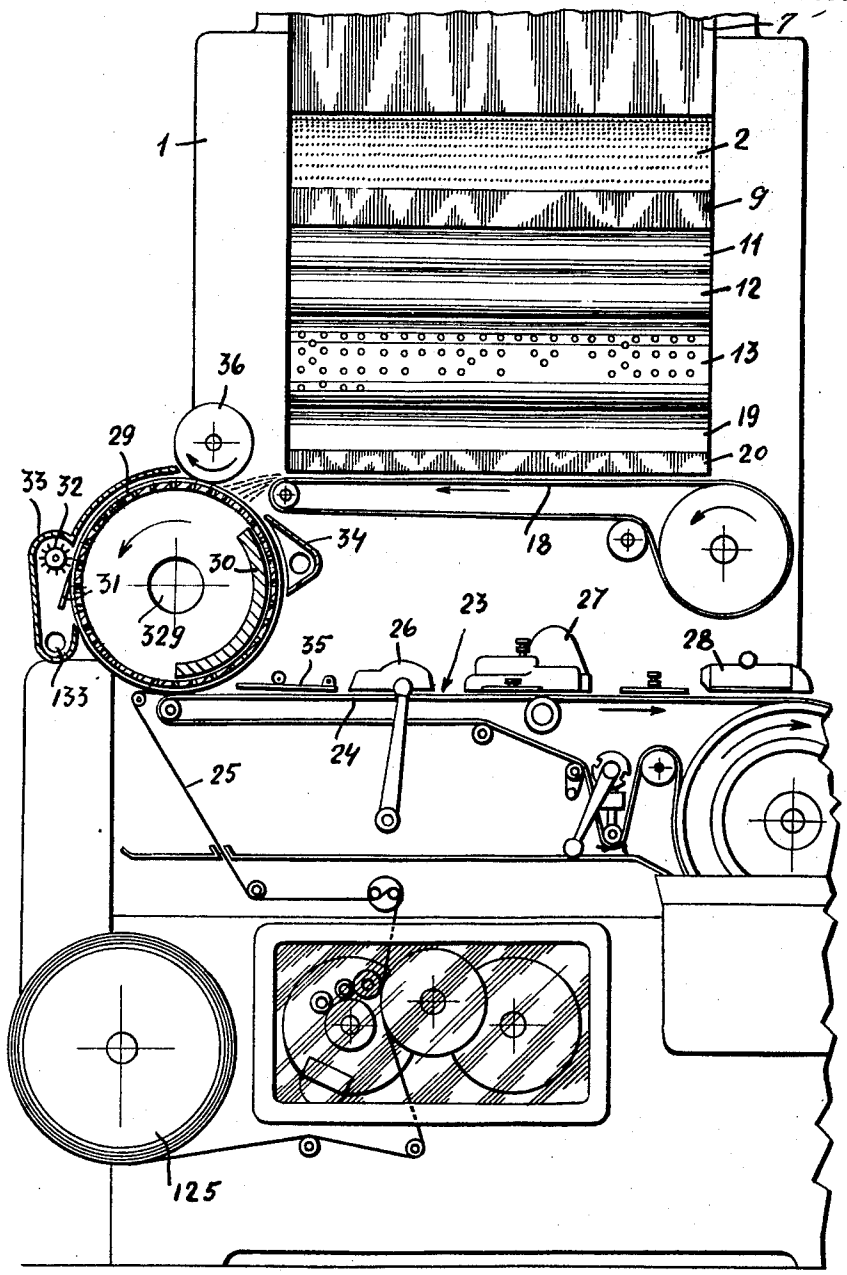


Fig. 2

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Oct. 23, 1962 G. GAMBERINI 3,059,650

CIGARETTE MAKING MACHINE

Filed Jan. 6, 1959 4 Sheets-Sheet 3

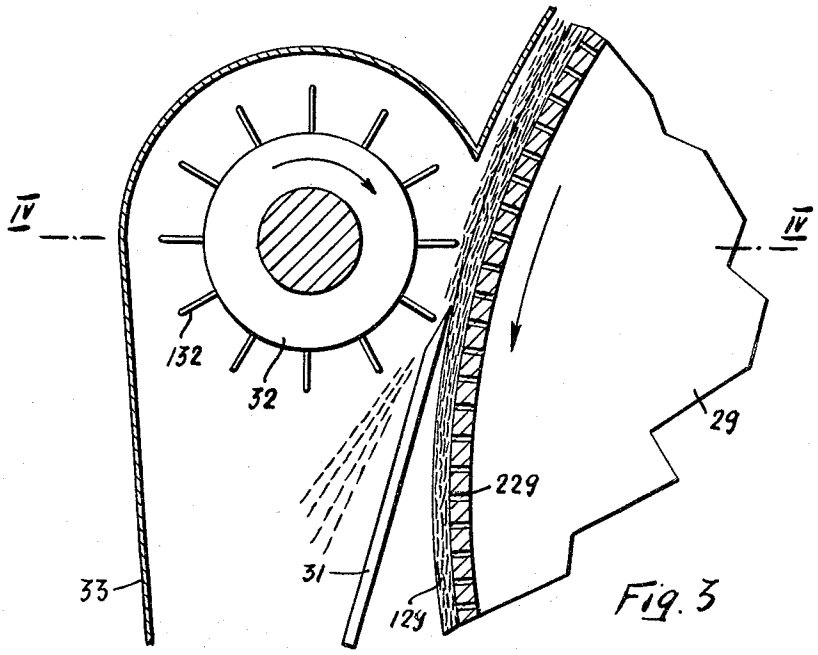


Fig. 3

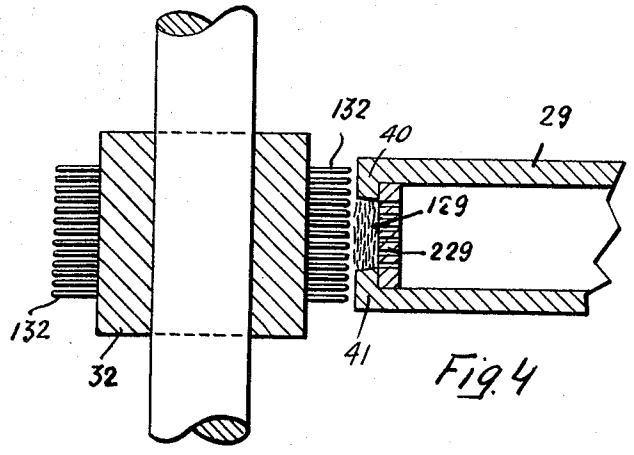


Fig. 4

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Filed Jan. 6, 1959 4 Sheets-Sheet 4

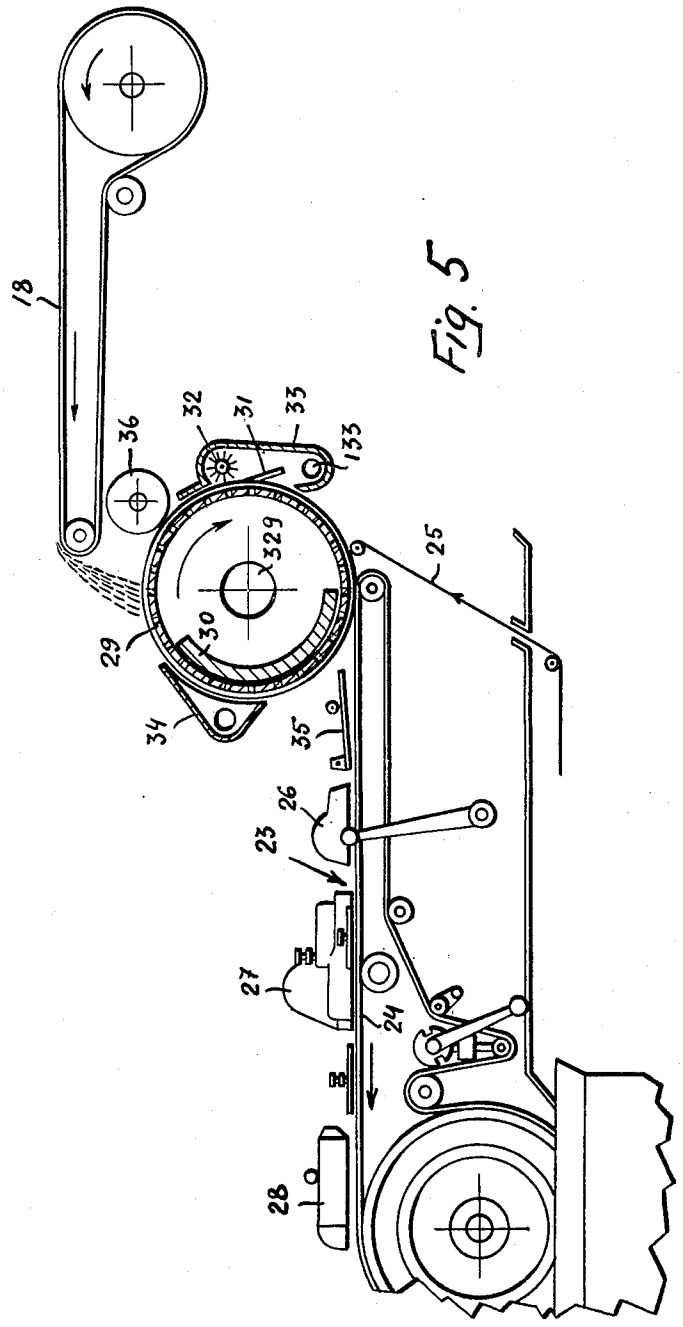


Fig. 5

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United States Patent Office 3,059,650 Patented Oct. 23, 1962

3,059,650

CIGARETTE MAKING MACHINE

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Filed Jan. 6, 1959, Ser. No. 785,251
14 Claims. (Cl. 131—66)

The present invention relates to a method and apparatus for making cigarettes in continuous rod form from which cigarettes are severed from the leading end of the rod.

Most cigarettes on the market today are made on what is known as continuous rod machines. These machines shower tobacco fed from a hopper onto a tape. This tape conveys the stream of tobacco so collected through the rod-forming mechanism of a cigarette making machine. This stream or rope of tobacco is formed into a rod by folding the paper around the tobacco as it passes through the rod-forming mechanism.

One of the disadvantages of conventional cigarette making machines is that the uniformity of the tobacco in the rod is not as great or as consistent as is desired by the cigarette manufacturer or by the public. Cigarettes formed on such machines have varying degrees of light and heavy density and such variations can be noticed from cigarette to cigarette and sometimes in the individual cigarette itself. To overcome this deficiency of conventional cigarette making machines, it is sometimes the practice of manufacturers to overfeed tobacco into the rod so that the less dense portions will not be so noticeable, but this is objectionable because not only is it a waste of tobacco, but the smoking qualities of the cigarette are lessened in that the cigarettes do not draw as well. If on the other hand, cigarettes are made less dense, then the hollow spots appear more noticeable and where a hollow spot appears at the end of the cigarette the tobacco can more readily fall out of the cigarette.

It is therefore a purpose of this invention to provide a new method and an improved machine for forming cigarettes wherein the density of which can be more accurately controlled and wherein the density of the tobacco will be more uniform throughout the length of the rod and individual cigarette.

The object of this invention is therefore to provide a method for making cigarettes which will involve employing the use of suction to remove and gather a portion of the shower of tobacco which will be of uniform density and then forming the tobacco so removed into a cigarette rod.

Another object of this invention is to provide a method for employing suction to remove tobacco shreds falling in one direction and to employ suction for receiving and conveying the shredded tobacco removed by the first suction step in a different direction to even out any variations in density that may exist in the tobacco stream.

A further object of this invention is to provide an apparatus employing suction drums for collecting shredded tobacco and forming and delivering said collected tobacco to the rod-forming mechanism of a cigarette making machine.

Another object of this invention is to provide cylindrical rotating members having tobacco conveying areas which are foraminous, for holding gathered tobacco particles thereagainst while transferring and conveying said gathered tobacco through the rod-forming mechanism of the cigarette making machine.

A further object of this invention is to provide a wheel having a trough containing a foraminous base for receiving and supporting an elongated stream of tobacco and

delivering said stream of tobacco to the rod-forming mechanism of a cigarette making machine.

Another object of this invention is to provide a trough around the periphery of a tobacco conveying wheel wherein pneumatic means are provided for holding the tobacco in said trough while it is being conveyed and wherein means are provided for removing tobacco extending a pre-determined distance above the trough of said wheel before the remaining tobacco is delivered to the rod-forming mechanism of the cigarette making machine.

Other objects and features of the invention will appear as the description of the particular physical embodiment selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification, like characters of reference have been applied to corresponding parts throughout the several views which make up the drawings.

FIGURE 1 is a schematic view in vertical section of the feed group of a continuous cigarette-making machine, made according to the invention.

FIGURE 2 is a partial front elevation view of the cigarette making machine with some parts of the feed group omitted for simplicity of representation.

FIGURE 3 illustrates on a larger scale a detail of FIGURE 2.

FIGURE 4 is a section along line IV—IV of FIG. 3.

FIGURE 5 illustrates in partial front elevation a modified form of the invention.

In FIGURES 1 and 2, there is shown a feed box or hopper 1 of a continuous cigarette making machine. The tobacco deposited in this hopper 1 is withdrawn by means of a carded drum 2, against which it is pushed by a conveyor carpet 3 travelling at the bottom of box 1 in the direction indicated by the arrow. The layer of tobacco engaged with the pin facing of the carding drum 2 is rendered uniform by a fixed smoothing sector 4. A rotating rake 5 pushes any excess tobacco away from drum 2. The upper carded refuser cylinder 6 cooperates with said drum 2 to trim off any tobacco extending above the carding on drum 2. The shield 7 is provided to avoid any undesirable air turbulence. The tobacco picked up by the carding drum 2 is removed by means of a spiked picker roll 8 (FIG. 1), and is discharged onto the lower shield 9 and front shield 10, in a continuous flow between the two rotating cylinders 11 and 12.

Under the cylinders 11 and 12 and parallel thereto there is disposed a rotating cylinder 13, a so-called selector, made of suitable material permeable to air as for example of porous sintered metal, or one or more layers of fine wire gauze, or the like. This selector drum 13 is connected, for example through a coaxial duct 113 in its shaft, to the suction side of an air pump so as to produce in said drum 13 a vacuum which manifests itself in a peripheral sucking action of the drum. Inside drum 13 is arranged any desired vacuum-distributing device, laid out with a fixed shutter sector 14 coaxial to drum 13 and adhering against its inner wall. This vacuum-distributing device, or said fixed shutter sector 14, limits the peripheral sucking action of drum 13 to a fraction of its angle of rotation.

The tobacco which passes between the two cylinders 11 and 12 is directed toward the rotating selector drum 13 at its suction sector. The showered tobacco is directed toward the drum 13 by an opposite deflector 15 which is substantially tangential to the selector drum and is adjustable to various distances therefrom, through its fulcrumed mounting 115. In this way, all or nearly all the lighter parts of the tobacco shower remain attracted by suction on the selector drum 13, together with those heavier tobacco parts which come directly into contact with drum 13 or which pass very close to it. That frac-

tion of the heavier tobacco parts which are retained by suction on the selector drum 13 can be varied at will, by adjusting the deflector 15 to different distances from drum 13, so as to condense the tobacco shower more or less on drum 13, or to make it pass more or less close to the latter, that is, so as to cause a greater or smaller fraction of the heavy parts of tobacco to be directed into contact with said section drum 13 or to pass very close to it.

The other heavy parts of the tobacco which are not attracted by the selector drum 13 because they are too heavy or because they pass too far from it through a field of insufficient suction force fall on an underlying conveyor carpet 16 which may either discharge them into a collecting bin 17 or return them to the feed hopper 1.

In this way there is retained on the rotating selector drum 13 by suction a uniform layer of tobacco which comprises light and heavy parts, in the proportion desired for the type of cigarettes to be made, and which corresponds to the adjustment of the deflector 15. This layer of tobacco is discharged from the selector drum 13 by gravity and centrifugal force at the end of its suction sector and falls, passing over a rotating cylinder 19 and through a hopper 20, 21, in a uniform layer onto a collecting conveyor belt 18 which is substantially horizontal and extends on the front of the cigarette-making machine parallelwise to the selector drum 13 over the full length thereof.

The selector drum 13 is cleaned from any particles of tobacco by an external suction mouth 22 provided at the non-suction sector of said drum 13, that is, at the fixed internal shutter sector 14.

The rod forming mechanism designated generally by the reference character 23 may be of a conventional design, and consists generally of the following: A rod forming tape 24 travelling in the direction indicated by the arrow supports on its upper surface a paper web 25 which travels along with the tape 24. The paper web 25 is continuously drawn off from a reel 125 in a manner well-known in the art. The tobacco discharged from the suction drum 29 is deposited on top of the paper tape 25 and from there the tobacco passes suitable compressing means which reduce the tobacco stream to the shape of a rope. The rope web and paper then pass through suitable guides which turn the paper and web upwardly and around the rope so as to form a rod with the lap edge of the paper extending upwardly.

Paste is applied to the upwardly extending paper web after which it passes the next forming process wherein the lap edge is pressed down over the other edge of the paper and from there it passes under an ironer which dries the pasted seam.

Thereafter, the rod passes through a suitable cut-off which severs desired lengths of rod from the leading end and a suitable collecting mechanism receives and accumulates the severed lengths side by side.

This general description is, of course, brief and it will be appreciated many mechanisms have been devised for forming a stream of tobacco into a rod which may very readily be used for forming any tobacco stream into a rod. These devices have been generally designated by the reference characters 26, 27 and 28 and may be of the type referred to in U.S. Patent 2,729,213, granted to William C. Broekhuysen and Samuel Gilman on January 3, 1956.

In the embodiment of the invention shown in FIG. 1, the collecting belt 18 runs in an opposite direction to the belt 24 of the underlying rod-forming mechanism 23 and hence in opposite direction to the movement of the continuous strip of paper 25. Means are provided which receive the tobacco from the collecting belt 18 and transfer it, changing the direction of its movement, onto and along the underlying rod-forming mechanism 23, depositing it in the form of a continuous cord or rope on the strip of paper 25.

For that purpose, there is disposed at the beginning of the rod-forming mechanism 23, over the conveyor belt 24 thereof and between said belt and the terminal end of the upper collecting belt 18, a hollow wheel 29 which is driven in the direction corresponding to the opposite running directions of the two belts 18, 24 and which presents a peripheral groove 129, preferably of a slightly trapezoidal section. Two flanges 40 and 41 on wheel 29 form the side walls of peripheral groove or trough 129. The bottom 229 of this groove 129 is made of material permeable to air and preferably of porous sintered metal or of one or more layers of fine wire gauze, or the like, and the hollow wheel 29 is connected for example through a coaxial duct 329 in its shaft to the suction side of an air pump. In this way, analogously to what has been described for the selector drum 13, there is imparted to the wheel 29 a peripheral suction power, limited at the botom of its circumferential external groove 129, and also, for example by means of a fixed internal shutter sector 30 or other equivalent vacuum means, to a fraction of the angle of rotation of wheel 29, extending in the direction of rotation of the latter from the upper collecting belt 18 to the underlying rod forming line 23.

The tobacco, deposited by the selector drum 13 on the collector belt 18, is caused to fall from the latter onto wheel 29 at its suction sector, being attracted and retained by suction on that wheel 29 and filling its peripheral groove 129, in which it is lightly compressed by a pressure roll 36 or equivalent means. At the suction sector of wheel 29 is provided a knife 31 substantially tangential to said wheel and turned with its cutting edge against the direction of rotation thereof, in contact or almost so with the edges of its peripheral groove 129 (see FIGURES 3 and 4). With knife 31 there cooperates a roll 32 provided with radial vanes 132, each formed of so many fine blades which pass very close to the cutting edge of knife 31, in the direction of rotation of the suction wheel 29. In this way, the excess tobacco, projecting from groove 129 of the suction wheel 29 is lifted by the scraping knife 31 and cut on the cutting edge thereof by means of the vaned roll 32, 132. This removed part of the tobacco is collected in a hood 33 in which are enclosed the knife 31 and the roll 32 and from which the tobacco is removed by suitable means such as by suction through a mouth 133.

The tobacco which remains attached to the suction wheel 29 and which exactly fills the peripheral groove 129 thereof is deposited at the end of the suction sector of said wheel, that is, at the beginning of the rod-forming mechanism 23, in the form of a continuous rope of tobacco on the strip of paper 25. The suction wheel 29 is cleaned from any tobacco particles by an outer suction mouth 34, provided at the non-suction section of said wheel 29, that is, at its inner shutter sector 30.

The above described arrangement and in particular the inverse movements of the tobacco on the upper collecting belt 18 and on the underlying rod-forming mechanism 23 results in a considerable reduction of the total length of the cigarette-making machine, as is evident in FIGURE 2. To the accomplishment of this advantage there contributes also the suction wheel 29 which reverses the movement of the tobacco, transferring it from the collecting belt 18 to the underlying rod-forming apparatus. While this feature is desirable, the principal feature of the invention comprises the conveying suction wheel 29 which has the main task of forming the rope of tobacco by means of its peripheral groove 129, by slightly compressing it in cooperation with the roll 36, and of correcting it by means of the levelling devices 31, 32 so that the rope of tobacco which is deposited on the rod-forming line presents a constant compactness and a uniform section, that is, presents a constant weight per unit of length.

For the latter purpose, the tobacco rope forming suction wheel 29 may be used to advantage also in other cigarette-making machines, of a type other than that described above, whether or not in combination with

the selector suction drum **13**. Such a possibility of application is illustrated by way of non-limitative example in FIGURE 5 which illustrates a variant of the cigarette-making machine as per FIGURE 2, similar parts being indicated with the same reference numbers as used before.

A modification of the arrangements shown in FIGURE 2, has been shown in FIGURE 5 wherein the collecting belt **18** runs in the same direction as the continuous paper strip **25** in the rod-forming line **23**. The tobacco is fed in a uniform layer onto the collecting belt **18**, by means of any desired device and preferably by means of the selector suction drum **13**, and it is transferred without reversing its direction to the rod-forming mechanism **23** by the suction wheel **29** to form the tobacco rod. This wheel **29** is made and operates in the same manner as already described, but rotates in the opposite direction to that in FIGURE 2. In this case while no substantial shortening of the cigarette-making machine is obtained, a uniform and compact rod of tobacco is nevertheless obtained by means of my improved tobacco feed wheel **29**.

The tongue of the rod-forming mechanism **23** may be vibrated relative to the running belt **24**, to limit the effect of friction due to the adhesion on the fixed parts which compose the formation of the rod.

While I have shown how my machine may be made very compact by positioning the tobacco feeding mechanism over the rod-forming mechanism, equally desirable rod-forming results could be obtained with my improved feed and the rod-forming mechanism if they were arranged side by side.

The invention hereinabove described may therefore be varied in construction within the scope of the claims, for the particular device selected to illustrate the invention is but one of many possible embodiments of the same. The invention, therefore, is not to be restricted to the precise details of the structure shown and described.

What is claimed is:

1. In a cigarette making machine, a tobacco feed hopper, a carded feed drum extending across one portion of said feed hopper for removing tobacco from said hopper, a carded refuser drum for removing all tobacco extending above a certain height from said carded feed drum, a picker for removing the tobacco remaining on said carded feed drum after it has passed beyond the refuser drum, a drum having a foraminous surface positioned adjacent to the path of discharge of the tobacco removed by said picker, a guide adjustable toward and from said foraminous surface for controlling the relative amount of light and heavy particles in the layer of tobacco adhering to the foraminous surface of said drum, and suction means for drawing a pre-determined amount of said tobacco against the surface of said foraminous drum and a collecting tape travelling in a horizontal direction for collecting the tobacco picked up by said foraminous drum, and rod forming mechanism for forming said tobacco into a cigarette rod.

2. An automatic cigarette making machine comprising a tobacco hopper, a chute, a collecting tape running lengthwise along the bottom of said chute, a metering device for removing a controlled and uniform quantity of shredded tobacco from said feed hopper and showering it downwardly through said chute on to said collecting tape, a metering wheel having two flanges forming a foraminous trough for receiving tobacco from said collecting tape and a source of suction for holding the tobacco so received in said foraminous trough while the tobacco travels with said metering wheel and rod forming mechanism for receiving from said metering wheel the metered tobacco carried thereby and enclosing the same in a paper tape to form a cigarette rod.

3. A cigarette making machine comprising a hopper for shredded cigarette tobacco, a feed for continuously removing a uniform quantity of tobacco from said hopper and showering said tobacco, a chute for receiving

said showered tobacco, and an elongated collecting tape travelling along the bottom of said chute and collecting the showered tobacco on the surface thereof, a wheel having a foraminous trough formed around the periphery thereof and positioned to receive the collected tobacco stream from said tape, a source of suction acting on said foraminous trough for retaining said tobacco stream in the foraminous trough on said periphery and rod forming mechanism for receiving the tobacco stream from said wheel and forming said stream into a cigarette rod.

4. A cigarette machine having the features provided for in claim 3 wherein a refuser is positioned adjacent the foraminous trough of said wheel for removing tobacco in excess of a pre-determined amount from said wheel to provide a uniform quantity of tobacco in said trough.

5. A continuous cigarette making machine comprising a feed hopper for holding a quantity of shredded cigarette tobacco, a feed for continuously removing a substantially uniform quantity of tobacco from said feed hopper and conveying the same in a continuous stream to a discharge station, a wheel having a foraminous stream receiving trough formed around the periphery thereof for receiving the tobacco discharged at said discharge station, a compactor member for compressing the discharged tobacco into said trough, a source of suction for holding said tobacco in said trough as it travels therewith, a levelling device for removing all tobacco extending above a predetermined height of said trough, and a conveyor for receiving said removed tobacco and conveying it away to a discharge area, and rod forming mechanism for forming the tobacco shaped in said trough into a cigarette rod.

6. A continuous cigarette rod making machine having the features provided for in claim 5 wherein means are provided for cutting off the suction from that portion of the trough immediately in advance of the point where tobacco is delivered to said rod forming mechanism, and means for removing any tobacco particles which cling to the trough prior to its returning to the station where tobacco is delivered into said trough.

7. The method of forming a cigarette rod which comprises continuously removing a uniform quantity of tobacco from a source of supply, showering said removed tobacco on to a drum having a suction surface, removing a portion of the tobacco adhering to said drum from said showered tobacco, showering the quantity of tobacco so re-metered on to a second trough-shaped foraminous suction member, compacting the tobacco in the trough of said second foraminous member, removing tobacco from the second foraminous member which extends above the trough of said second foraminous member and then forming the tobacco remaining on said second foraminous member into a cigarette rod.

8. Mechanism for forming a continuous cigarette rod comprising a source of supply of shredded cigarette tobacco, a feed for removing continuously a uniform quantity of tobacco from the source of supply, a suction wheel having a trough with a foraminous bottom extending around the periphery of said wheel for receiving the tobacco so removed from said source of supply, a compactor for compacting tobacco in said trough, a refuser for removing tobacco in excess of a given amount from said trough, and rod forming mechanism for forming the tobacco remaining in said trough into a cigarette rod.

9. A continuous cigarette making machine comprising means for creating and showering tobacco continuously, a rotating suction drum having a peripheral surface, permeable to air, positioned adjacent the path of said showered tobacco, means for controlling the relative distance between the body of said shower-tobacco and the peripheral surface of said suction drum so as to control the amount of tobacco brought into contact with the peripheral surface of said suction drum, and a source of suction acting on a portion of said peripheral surface

so as to attract and retain a portion of said showered tobacco on the periphery of said drum and means for cutting off suction from the peripheral surface of said drum so as to cause the tobacco attracted thereto to be discharged at a pre-determined discharge station.

10. A continuous cigarette making machine comprising, apparatus for forming and discharging a continuous shower of tobacco, a drum having a permeable surface positioned along the path of a portion of said shower, a source of suction acting on said permeable surface to cause said shower of tobacco to be attracted to the permeable surface of said drum, a long narrow chute, a suction control device for cutting off suction from the permeable surface of said drum at a tobacco discharge station so as to cause the tobacco adhering thereto to be discharged into said chute, a collecting tape running along the bottom of said chute for receiving said tobacco and conveying the same along the length of said chute, a wheel having a trough with a smooth permeable base positioned at the end of said collecting tape to receive the collected tobacco therefrom, a source of suction acting on said permeable base to attract and retain the tobacco received from said tape in said trough, and a means for cutting off suction from the permeable base of said trough to effect a release of the tobacco therefrom at a pre-determined station, and a rod forming mechanism for receiving tobacco from said trough and forming the same into a rod.

11. A cigarette making machine having the features provided for in claim 10 wherein means are provided for compressing tobacco in said trough and for removing tobacco in excess of a pre-determined amount from that supported in said trough.

12. A cigarette making machine having the features provided for in claim 10 wherein means are provided for cleaning out the trough after the tobacco stream has been discharged before the trough returns to tobacco receiving position.

13. A cigarette making machine having the features provided for in claim 10 wherein means are provided for severing tobacco extending above the trough a predetermined height and removing said severed tobacco therefrom.

14. A cigarette making machine comprising a hopper for shredded cigarette tobacco, mechanism for continuously removing tobacco in a uniform quantity from said hopper, means for showering the tobacco so removed in a generally downward direction, a smooth foraminous drum positioned in the vicinity of said showered tobacco, a source of suction acting on said foraminous drum to remove a predetermined quantity of tobacco from said shower, regulating means coacting with said drum comprising a guide chute adjacent said shower adjustable toward and away from said foraminous drum to deflect said shower of tobacco against said foraminous drum so as to control the relative distribution of heavy and light particles of tobacco held thereon by suction and a collecting tape for receiving the tobacco removed from said drum and a rod forming mechanism for forming said tobacco into a cigarette rod.

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