Oct. 11, 1966 G. GAMBERINI 3,277,897

CIGARETTE WEIGHT CONTROLLER

Filed Aug. 27, 1963 2 Sheets-Sheet 1

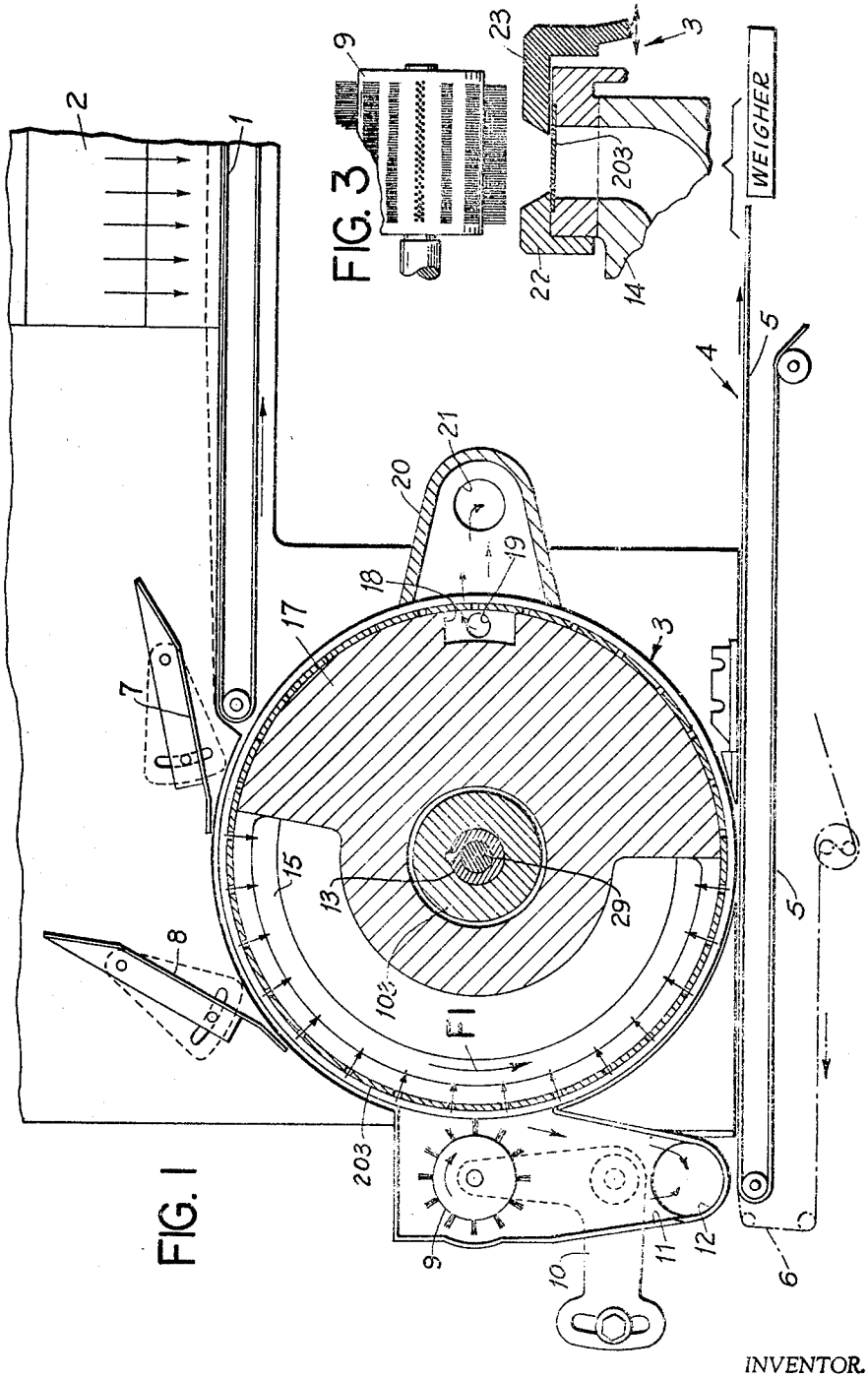



FIG. 1

FIG. 3

INVENTOR.
GOFFREDO GAMBERINI
BY
Murray Schaffer
ATTORNEY

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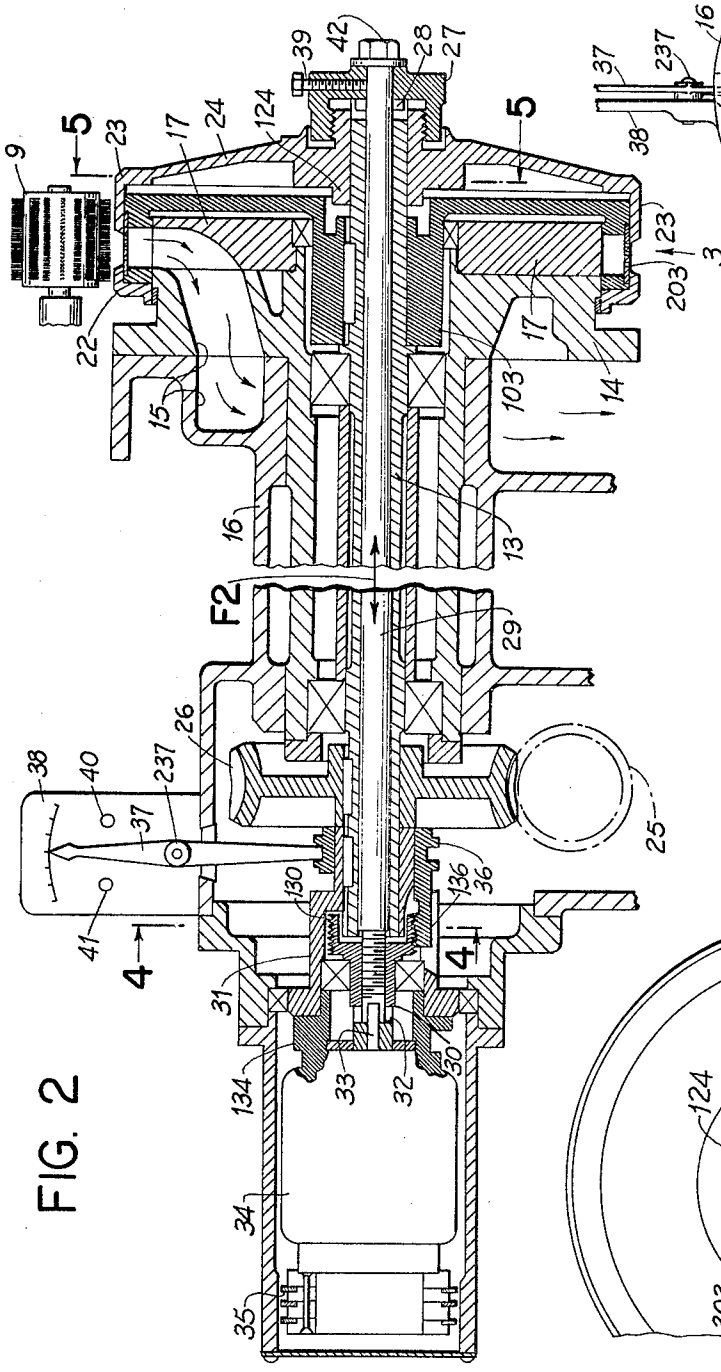



FIG. 2

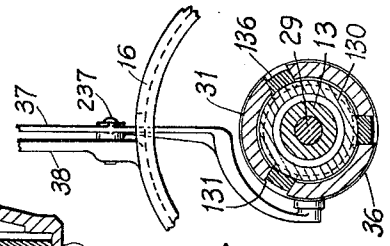



FIG. 4

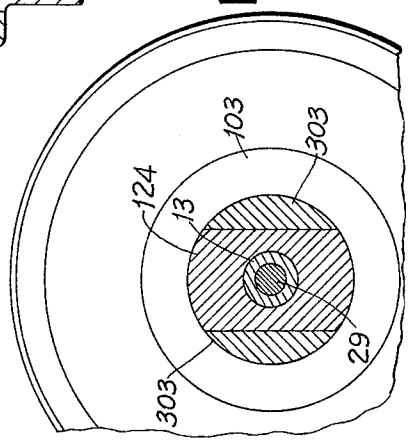



FIG. 5

INVENTOR.
GOFFREDO GAMBERINI

BY

ATTORNEY

United States Patent Office

3,277,897

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3,277,897

# CIGARETTE WEIGHT CONTROLLER

Goffredo Gamberini, Bologna, Italy, assignor to American Machine & Foundry Company, a corporation of New Jersey

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Claims priority, application Italy, Aug. 31, 1962, Patent 674,550
5 Claims. (Cl. 131—22)

The present invention relates to cigarette making machines equipped with a tobacco suction wheel. In particular, the present invention is directed to the construction of a suction wheel for conveying tobacco enabling the formation of a continuous cord of tobacco of uniform cross section and density.

The use and general construction of suction wheel transfer devices are of common knowledge. Briefly, such devices comprise a wheel having a peripheral groove open to the air for carrying tobacco and through which suction is applied to hold the tobacco as well as to compact the same, forming a rough tobacco stream or cord. The stream is then, by usual means, transferred to the rod forming belt and wrapped into a cigarette.

According to the present invention, the weight of the finished cigarettes may be regulated by varying the cross section of the peripheral groove of the suction wheel so as to provide a stream of predetermined weight per unit length. Such regulation may also be used in combination with levelling means to trim the tobacco to a predetermined depth.

According to a preferred embodiment of the invention, the cross section of the peripheral groove of the tobacco pressing wheel is varied by changing the width of the groove either manually or automatically in response to an increase or decrease in the unit weight of the cigarettes produced.

The present invention provides a suction wheel, whose peripheral groove is defined on at least one side by a movable and axially adjustable edge so as to vary the width and hence the cross section of the peripheral groove of the tobacco pressing wheel. The tobacco pressing wheel preferably cooperates with any suitable means for levelling the layer of tobacco adhering to the suction wheel and for example a smoothing wheel having pegs, bristles, or the like. According to a preferred embodiment of the invention, the levelling means, for example the smoothing wheel may be adjusted relative to the tobacco pressing suction wheel, but is maintained in a fixed position during the operation of the machine.

The axial displacement of the edge or edges of the peripheral groove of the tobacco pressing suction wheel is effected during the rotation of the suction wheel by means of a suitable mechanism controlled by any regulating device which is responsive to the mean weight of the cigarettes produced.

These and other characteristics of the invention and the advantages deriving therefrom will become evident from the following description of a preferred form of construction, illustrated by way of non-limitative example in the annexed drawings in which:

FIG. 1 illustrates diagrammatically, in side elevation, with parts in section, a tobacco pressing suction wheel according to the invention;

FIG. 2 is an axial section of the tobacco pressing wheel with the mechanism for the displacement of one of the edges of the peripheral groove of the wheel;

FIG. 3 is a sectional detail of FIG. 2 on a larger scale;

FIG. 4 is a transverse section taken on line 4—4 of FIG. 2;

FIG. 5 is a transverse section along line 5—5 of FIG. 2.



With reference to the figures, the endless belt 1 collects a shower of selected cut tobacco directed onto a belt through the hopper 2. Below the collecting belt 1 is the rod forming line 4. The rod forming line 4 comprises a conveyor belt 5 on which there is superposed the paper strip 6. Along the belt 5 are arranged a series of devices, not shown, but well understood in the art, employed in the formation of the cigarette rod and for severance of the rod into individual cigarettes.

The tobacco suction wheel 3 is disposed between the belt 1 and the rod former 4. The wheel 3 rotates in the direction of the arrow F1. The wheel has a peripheral groove of which the bottom is permeable to air and, for example, perforated and through which suction is applied from the interior. The cut tobacco conveyed by collecting belt 1 is projected from the belt onto the periphery of the tobacco pressing suction wheel 3, filling the peripheral groove of the wheel. The tobacco is held and packed into the groove by the suction which is applied through the bottom of the groove. The packing of the groove is in part effected by two flexible blades 7 and 8 which exert a mechanical compression on the tobacco in the groove. As a result of this, a continuous cord of tobacco uniformly packed is formed in the peripheral groove of wheel 3. This cord is then deposited by the wheel on the paper strip 6 of the cigarette rod forming mechanism 4.

Coacting with the suction wheel 3 is a smoothing wheel 9 which may, for example, be of the peg, bristle, or any other suitable type. The smoothing wheel 9 levels the layer of tobacco adhering to wheel 3, thus smoothing the tobacco cord which is formed on wheel 3. The smoothing wheel 9 is mounted on a support 10. The support 10 is pivotably movable toward and away from the wheel 3. In this manner the smoothing wheel 9 can be adjusted relative to the tobacco pressing wheel 3 in any desired position. For example, the wheel 9 may be disposed in position flush with the edges of the peripheral groove of wheel 3 so as to remove the tobacco projecting above the groove. The tobacco removed by smoothing wheel 9 is collected in a compartment 11 formed in the lower portion of the mechanism supporting the wheel 9. The tobacco which falls into compartment 11 is withdrawn from the compartment by suction through suction tube 12 and is returned to the central source of tobacco supply, not shown, for the hoppers such as 2.

For further details of the mechanism described in the foregoing, reference may be had to my patent application Serial No. 170.765 filed February 2, 1962 now matured into Patent No. 3,173,424 dated March 16, 1965.

In accordance with the present invention, the wheel 3 is provided with arrangements which make it possible to vary the cross section of its peripheral groove, and in particular to vary the width of the groove. The cross section or width of the groove may be varied manually and/or automatically, to regulate the weight of the cigarettes produced by the machine, that is, to compensate the difference between the predetermined weight of the cigarettes and the mean actual weight of the cigarettes which are produced in the mechanism.

In the example illustrated in FIG. 2, the suction wheel 3 is cup shaped or bell shaped and its hub 103 is keyed onto the tubular shaft 13. The shaft 13 is driven by means of endless screw 25 and helicoidal wheel 26. Wheel 3 is provided with a cylindrical rim 203 which is, as mentioned in the foregoing, permeable to air, for example by means of perforations. The open side of the bell shaped wheel 3 is made tight by a fixed disc 14, while the cavity of wheel 3, is maintained under vacuum through corresponding ducts 15 in fixed disc 14 and in the adjacent part of the machine frame 16.

The cavity of wheel 3 is further provided with a shoe

or shutter **17** fastened to disc **14**. Shutter **17** prevents the application of suction over the major portion of the right-hand half of wheel **3** as shown in FIG. 1, thus providing the wheel **3** with active and inactive sectors. The perforations on the active sector of the peripheral rim **203** and the wheel **3** are left open as it rotates. The active sector extends in the direction of arrow F1 from the upper part of wheel **3**, preferably from an intermediate point between the highest point of the wheel and the end of collecting belt **1** to about the point of tangency between wheel **3** and the rod forming mechanism **4** through which strong suction is exerted. Referring to FIG. 1, a small space **18** located at about the right-hand end of the horizontal diameter of the shutter **17** is provided. This space communicates with the exterior of the mechanism through duct **19** and air is drawn through it and thence through a cavity in a projection **20** which communicates through a duct **21** with an aspirator. In this manner a stream of air is projected through the peripheral rim **203** of wheel **3** from the interior through the rim **203** which cleans it of particles of tobacco which may have adhered to the rim after passing the rod forming line **4**.

The perforated rim **203** constitutes the bottom of the peripheral groove of suction wheel **3**. The groove is formed by two rings or edges **22, 23** applied peripherally on wheel **3** and axially spaced one from another. In the example shown, ring **22** is fixed on wheel **3** while ring **23** which rotates together with wheel **3** is axially displaceable thereon for the purpose of varying the width of the peripheral groove and hence the area of its cross section. The displaceable ring **23** is integral with a flange **24**. The hub **124** of flange **24** is integral with flange **24** and is mounted so it is slidable axially on shaft **13** and is coupled for rotation with hub **103** of wheel **3**. As shown in FIG. 5, the hub **124** on flange **24**, carrying ring **23** has two opposed flattened surfaces and is slidably inserted between two opposed flattened axial projections **303** from the hub **103** of wheel **3**. A knob **27** is screwed onto hub **124** on flange **24**. The knob **27** is coupled for rotation with the end of shaft **13** by means of a keyed engagement **28** which permits knob **27** to shift axially in relation to shaft **13** without becoming disengaged therefrom. It should be evident therefore that the assembly consisting of ring **23**, disc **24**, its hub **124** and knob **27** is rotatable with shaft **13** and therefore rotates together with the tobacco pressing suction wheel **3** and is slidable axially in relation thereto.

Knob **27** is adjustably mounted on a rod **29**, which is lodged for axial sliding in tubular shaft **13** with which it is coupled for rotation through knob **27**. Rod **29** projects from the opposite end of shaft **13** and is screwed into a sleeve **30** which is rotatably mounted in a bell shaped projection **31**. The bell is keyed on the end of shaft **13**. A sleeve **30** is coupled for rotation at **32** to shaft **33** of an electric motor **34** of the reversible type. Stator **134** of motor **34** is secured to bell **31** so that the entire motor rotates together with shaft **13**. Current is supplied to motor **34** through contact rings **35**. A collar **36** is slidably mounted on the hub of bell **31**. Collar **36** is provided with peripheral fluting and a number of lugs **136**. As shown in FIG. 4, there may be three lugs **136** for instance which extend axially toward sleeve **30** through corresponding slots **131** formed in the body of bell **31**. Lugs **136** are internally threaded cylindrical sectors and by means of them collar **36** is screwed externally onto an extension **130** of sleeve **30**. A bent lower portion of a lever arm engages in the peripheral fluting of collar **36**. The lever arm is secured for limited rotation about a pin **237** secured to the machine frame and points to a graduated scale **38** secured to frame element.

The cigarette making machine is provided with automatic devices such as that shown in U.S. 3,146,344 dated June 2, 1964 or U.S. 2,729,213 dated Jan. 3, 1956 which control the weight of the manufactured cigarettes. These devices may be of any suitable type as indicated by the "weigher" shown in FIG. 1, and are well known in the art. When the mean weight of the manufactured cigarettes is within the permitted tolerances no current is delivered to motor **34** and the entire assembly described in the foregoing with the exception of the index rotates together with shaft **13** and therefore with the wheel **3** without any relative movement between the various rotating parts. When, however, the devices which control the weight of the cigarettes establish that the difference between the mean weight of the manufactured cigarette and the predetermined weight exceeds the permissible tolerance, current is delivered to motor **34** and the motor is rotated in one or the other direction depending upon whether or not the variation indicates that the cigarettes are lighter or heavier than desired. This establishes relative rotation between motor shaft **33** and motor stator **134**. As a result of this, sleeve **30** is moved to the right or left, as seen in FIG. 2, relative to shaft **13** and rod **29** is screwed in one direction or the other in or out of sleeve **30** and shifts axially in either direction inside tubular shaft **13** as indicated by double arrow F2. Rod **29** slides knob **27** which is integral with rod **29** in or out and therefore shifts ring **23**, which is integral with the knob, axially. This increases or decreases the width and hence the area of the cross section of the peripheral groove of wheel **3**. As a result of this, the quanity of tobacco contained in the groove and the weight per unit length of the cord of tobacco formed in the groove is increased or decreased, thus correcting the weight of the cigarettes. In the example shown, if the cigarettes produced are too light, the rod **29** slides out, that is to the right, as seen in FIG. 2. This displaces the ring **23** also to the right widening the peripheral groove. When, however, the cigarettes are too heavy, the rod **29** and the ring **23** shift inwardly, that is to the left, as seen in FIG. 2. This reduces the width of the peripheral groove of wheel **3**. The driving of the motor **34** and the consequent displacement of the ring **23** continue until the mean weight of the manufactured cigarette agrees with the predetermined value. Then the weight controlling devices cut the current to motor **34**, stopping ring **23** in the adjusted position. Ring **23** can be shifted and adjusted also by hand. This may be done initially for example by loosening screws **39** and **42** to release knob **47** from its control rod **29**. The disengaged knob **27** may then be rotated in the desired direction.

The rotation of sleeve **30**, because of its screw engagement **130–136** with collar **36** also slides collar **36** on the hub of bell **31**. Collar **36** oscillates the index and the index indicates a position relative on graduated scale **38** which indicates the area of the cross section or the width of the peripheral groove of wheel **3**. The graduated scale **38** obviously may be calibrated in other values. For example, it can be arranged to indicate the weight of the cigarettes.

Two micro-switches **40, 41** limit the movement of the index and cut the current to the motor **34** when the area of the cross section or width of the peripheral groove reaches predetermined maximum and minimum values.

Attention is called to the fact that in the embodiment described in the foregoing, the regulation of the weight of the cigarettes is effected by varying only the cross sectional area or width of the peripheral groove of the wheel **3** while the smoothing wheel **9** which cooperates with wheel **3** does not contribute to the regulation of the weight of the cigarettes and remains in the initially adjusted position. The function of wheel **9** is solely to smooth the tobacco cord.

Obviously the invention is not limited to the form of construction described in the foregoing and illustrated in the associated drawings. The invention can be widely varied and modified, especially structurally and can be applied to cigarette making machines having tobacco pressing suction wheels of any kind and of any construc-

tion without departing from the inventive principle set forth hereinbefore.

What is claimed is:

1. In a cigarette manufacturing machine, a suction wheel, having a hollow central shaft defining its central axis and a peripheral groove permeable to air for conveying tobacco through which suction is applied from the interior of said wheel, said peripheral groove having at least one side defined by an annular edge, an annular flange element, said annular edge being carried by said flange element, a supporting element integral and rotatable with said suction wheel, said flange element being mounted on said support element and axially slidable thereon relative to said wheel, means for detecting variations in the weight of cigarettes produced by said machine and for creating a signal indicative thereof, motor means responsive to said signal, and means coupling said flange element to said motor means thereby to shift said annular edge axially of said wheel so as to vary the width of said peripheral groove in response to said signal.

2. The machine in accordance with claim 1 wherein said coupling means comprises a control rod mounted within the hollow central shaft of said wheel.

3. A cigarette machine in accordance with claim 2, having a knob fastened to said control rod and to said flange element, said knob being rotatable with said shaft and axially slidable thereon.

4. A cigarette machine having a tobacco suction wheel in accordance with claim 2, and having a knob fastened to said control rod and to said flange element, said knob being rotatable with said shaft and axially slidable thereon and in which said shaft has an enlarged hollow extension and a sleeve rotatably mounted therein, and the end of said rod opposite from said knob is screwed into said sleeve, and a coupling for coupling said sleeve to said motor, a stator on said motor fastened to said extension.



5. A cigarette machine having a tobacco suction wheel in accordance with claim 2, having a knob fastened to said control rod and to said flange element, said knob being rotatable with said shaft and axially slidable thereon, said shaft having an enlarged hollow extension and a sleeve rotatably mounted within said extension, the end of said rod opposite from said knob being screwed into said sleeve, a coupling for coupling said sleeve to the motor, a stator on said motor fastened to said hollow extension, a collar, said collar being slidably mounted on said shaft, means for sliding said collar axially on said shaft, a graduated scale, an indicating needle coacting with said scale, said collar being coupled with said needle to indicate the position of said collar on said shaft.


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SAMUEL KOREN, *Primary Examiner.*

JOSEPH S. REICH, *Examiner.*