April 5, 1966 K. PETRŮ 3,244,184

ARRANGEMENT FOR FORMING AND CONVEYING OF A TOBACCO FILLER

Filed Aug. 22, 1963 2 Sheets-Sheet 1

Fig. 1.

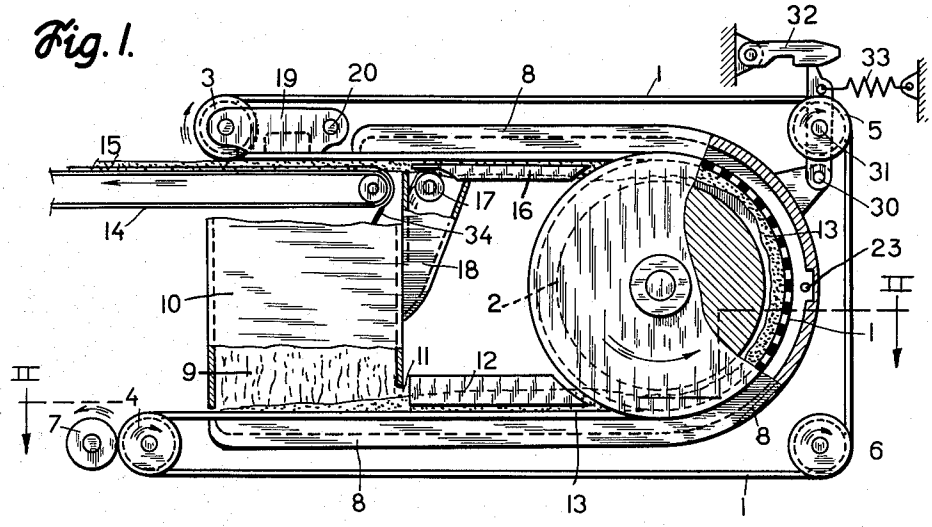


Fig. 2.

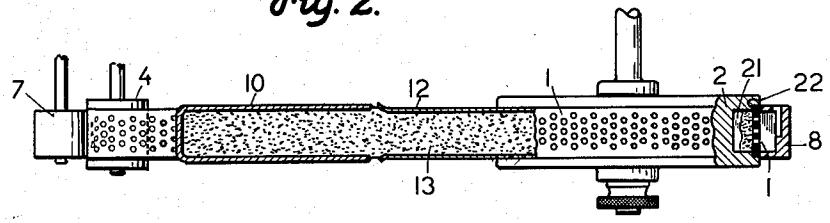


Fig. 4.

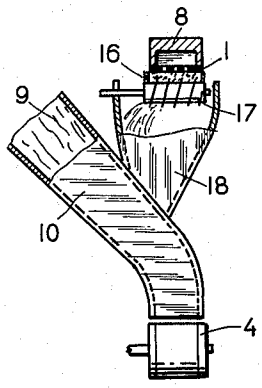
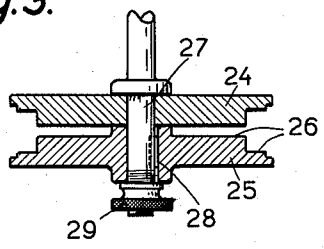


Fig. 3.



INVENTOR.
Karel Petrů
BY
Richard Chvatal
Atty

April 5, 1966 K. PETRŮ 3,244,184

ARRANGEMENT FOR FORMING AND CONVEYING OF A TOBACCO FILLER

Filed Aug. 22, 1963 2 Sheets-Sheet 2

Fig. 5.

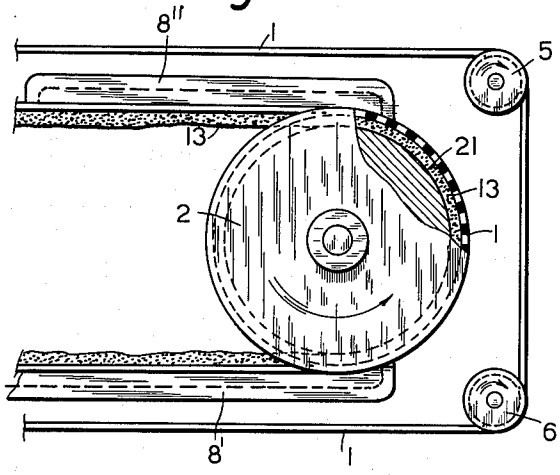


Fig. 7.

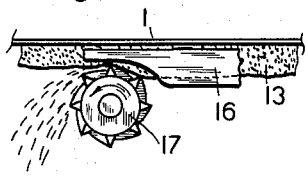


Fig. 6.

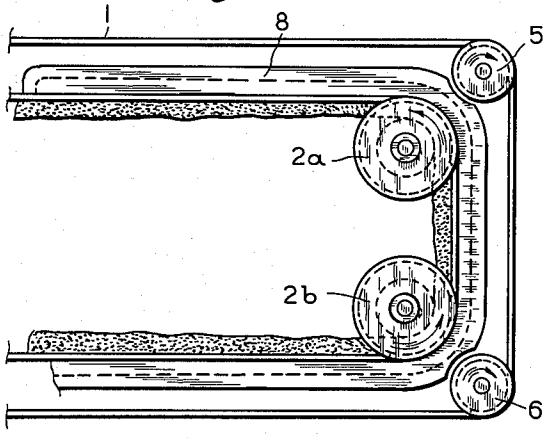
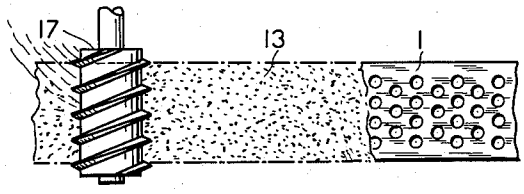


Fig. 8



INVENTOR.
Karel Petrů
BY
Richard Good
Agt

United States Patent Office

3,244,184

Patented Apr. 5, 1966

3,244,184

ARRANGEMENT FOR FORMING AND CONVEYING OF A TOBACCO FILLER

Karel Petrů, Prague, Czechoslovakia, assignor to Zavody V.I. Lenina Plzen, narodni podnik, Plzen, Czechoslovakia

Filed Aug. 22, 1963, Ser. No. 303,864
Claims priority, application Czechoslovakia, Nov. 19, 1962, 6,508/62
4 Claims. (Cl. 131—84)

This invention relates to cigarette making machinery and particularly to an arrangement in a cigarette machine for forming loose tobacco shreds into a continuous strand or stream, and for conveying the strand to a wrapping station.

A primary object of the invention is the provision of a tobacco forming and conveying arrangement which permits the bulk, and particularly the height of a cigarette machine to be reduced as compared to similar machines known prior to this invention.

The invention, in one of its aspects, provides an endless perforated belt member having an inner face and an outer face, the perforations extending between these faces. The belt is moved and guided in a U-shaped path which has two vertically spaced horizontally extending portions connected by a vertically extending portion. In the lower one of the two horizontal path portions, the inner belt face faces upwardly, and it faces downwardly in the upper horizontal path portion. The guide and drive means for the belt include a circumferentially grooved pulley over which the belt is trained in the vertically extending connecting path portion. The inner belt face and the bottom of the groove in the pulley define a cavity which extends circumferentially relative to the pulley.

Loose tobacco shreds are continuously fed to the inner belt face in the lower horizontal path portion, whereby a strand or stream of tobacco is formed on the belt face. Suction means engage the outer belt face over at least two parts of the path, namely, a first part overlapping the lower horizontal portion and the connecting path portion, and a second part overlapping the connecting path portion and the upper horizontal portion. The suction holds the tobacco stream to the inner belt face while the belt moves in the aforementioned first and second parts of its path, and the stream moves circumferentially through the afore-described cavity. It is ultimately transferred from the inner belt face in the upper horizontal path portion to a continuous paper band for wrapping in a manner which may be entirely conventional.

The exact nature of this invention as well as other objects and advantages thereof will be readily apparent from consideration of the following detailed description of preferred embodiments relating to the annexed drawings in which:

FIG. 1 shows as much of a cigarette machine as is necessary for an understanding of this invention, the view being in side elevation, and portions of the structure being broken away to reveal internal detail;

FIG. 2 shows a part of the device of FIG. 1 in partly sectional plan view substantially on the line II—II;

FIG. 3 shows a modified pulley for the device of FIG. 1 in axial section;

FIG. 4 shows a detail of the device of FIG. 1 in front elevation and partly in section;

FIG. 5 shows a modification of the device of FIG. 1 in a corresponding fragmentary view;

FIG. 6 illustrates yet another modification in a view corresponding to that of FIG. 5;

FIG. 7 shows a detail of FIG. 1 on an enlarged scale; and

FIG. 8 is a bottom plan view of certain elements in the detail of FIG. 7.

Referring now to the drawing in detail, and initially to FIG. 1, there is seen an endless perforated conveyor belt **1** which is trained over a pulley **2** in such a manner that the belt **1** extends substantially tangentially from the pulley **2** in respective upper and lower straight horizontal portions of its path to small guide pulleys **3**, **4**. One portion of the belt **1** travels counterclockwise in a vertically extending direction about the axis of the pulley **2**, and reverts from the pulley **3** to the pulley **4** over a tension pulley **5** and a guide pulley **6**, the arrangement being such that the path of the belt has the shape of two connected U's of different size, the smaller U being enveloped by the larger U, as illustrated. Movement of the belt in its path is actuated by a driven pressure roller **7** which engages the portion of the belt trained over the pulley **4**.

A shower of tobacco shreds **9**, produced in a conventional manner not further illustrated, is continuously dropped on the upper face of the belt **1** in the horizontal path portion between the pulleys **4** and **2**. This belt face will be referred to hereinafter as the "inner face." The tobacco shower **9** is guided toward the belt face by a feed hopper **10** whose horizontal cross section is elongated in the direction of horizontal belt travel, as best seen in FIG. 2. A layer or stream **13** of tobacco shreds whose thickness increases in the direction of belt movement is thereby deposited on the inner belt face and is moved out of the hopper **10** by the belt **1** through an outlet **11** at the bottom of a narrow hopper wall.

Stationary vertical guide walls **12** on either side of the moving belt **1** extend from the outlet **11** toward the pulley **2**, and define a laterally tapering channel with the inner belt face to reduce the width of the stream **13**. A U-shaped suction chamber **8**, which is concentric with the smaller U defined by the belt **1** and of U-shaped cross section, engages the outer face of the belt **1** over a continuous length thereof from the bottom of the hopper **10** along the horizontal lower path portion of the belt, around the circumference of the pulley **2**, and almost to the pulley **3**. The open side of the suction chamber communicates with the perforations in the belt, and the suction in the chamber holds the tobacco stream **13** to the inner belt face.

An imperforate endless conveyor belt **14** includes a portion which travels under the upper horizontal path portion of the belt **1** in the same direction. In that path portion, the tobacco stream **13** is further laterally compressed between stationary guide walls **16** to a rod **15** in the manner described with reference to the guide walls **12**.

Upon leaving the channel between the walls **16**, and while still suspended from the downwardly facing inner face of the belt **1** by the suction in the chamber **8**, the rod **15** is trimmed to uniform thickness by a rotary trimmer **17**. As better seen in FIGS. 4, 7, and 8, the trimmer is a cylinder carrying two coaxial helical cutter blades of equal pitch which selectively discharge the trimmings in a direction that has an axial component, as is evident, from FIGS. 4 and 8. This arrangement prevents the trimmings from being drawn back to the tobacco rod **15** by the suction in the chamber **8**.

A chute **18** is arranged under the trimmer **17** to catch the trimmings and to guide them into the hopper **10** with which the chute communicates.

A pressure chamber **19** is normally located at the outer face of the belt **1** between the end of the suction chamber **8** and the pulley **3**. The chamber **19** is pivotally attached to the machine frame by a pin **20** at one end of the chamber, and the pulley **3**, is journaled in lugs integral with the chamber **19** at the other end of the

same. Clockwise displacement of the chamber 19 from the operative position illustrated in FIG. 1 shifts the belt 1 for facilitating replacement or cleaning of the belt 14. Springs, not shown, normally hold the chamber 19 in the illustrated operative position.

As best seen in FIG. 2, a circumferential groove 21 in the pulley 2 has stepped side-walls with shoulders 22. The width of the belt 1 is such that it is held by the shoulder 22 at a distance from the bottom of the groove 21. The circumferentially elongated cavity thus formed accommodates the tobacco stream 13 which is held against the inner face of the belt 1 and away from the bottom of the groove 21 by the suction in the chamber 8. The chamber is connected to a non-illustrated vacuum apparatus by a conduit 23.

The modified pulley shown in FIG. 3 consists of two coaxial disks 24, 25 axially juxtaposed on a common rotary shaft 27. The opposite faces 26 of the disks are shaped to provide the groove and shoulders described with reference to FIG. 2. The disk 24 is fixed on the shaft 27. The disk 25 is secured on the shaft against rotation by a key 28, and is releasably secured against axial movement by a knurled nut 29 threadedly mounted on a free end of the shaft 27.

The belt 1 is readily removed for replacement or cleaning when the disk 25 is axially withdrawn from the shaft 27 after removal of the nut 29.

As shown in FIG. 5, the U-shaped suction box 8 may be replaced by two boxes 8', 8'' which extend only along respective tangential portions of the belt path and partly envelope the vertically extending portion of the path about the circumference of the pulley 2. The tobacco stream 13 is retained between the belt and the pulley groove by friction and by centrifugal force as it ascends from the lower suction box 8' to the upper suction box 8''.

Whereas the tobacco stream 13 travels in an arc of 180° about the pulley 2, in the device illustrated in FIG. 1, it travels in two respective arcs of 90° about two grooved pulleys 2*a*, 2*b* which replace the pulley 2 and perform the same function in the modified embodiment of the invention illustrated in FIG. 6.

Reverting now to FIG. 1, it is seen that the shaft 31 of the pulley 5 is mounted on a rocker arm pivotally attached at 30 to the machine frame. The arm is biased by a spring 33 in a clockwise direction, as viewed in FIG. 1, for tensioning the belt 1. When the arm is tilted counterclockwise from the illustrated position, it may be secured by a catch 32 hingedly attached to the machine frame, and the relaxed belt 1 may be conveniently removed or replaced.

The apparatus described with reference to FIG. 1 is operated as follows:

The shower of tobacco shreds 9 which drops through the hopper 10 is attracted to the belt 1 by the suction in the chamber 8, and a stream 13 of tobacco is carried by the belt through the outlet 11 whose cross section limits the corresponding dimensions of the tobacco stream. These dimensions are further modified by the guide walls 12, and the stream is then inverted by travel of the belt 1 over a 180° portion of the pulley 2 while being held to the belt 1 by suction and centrifugal force.

The tobacco stream is further shaped by the guide walls 16 and the trimmer 17 into a rod 15 which ultimately is released from the belt 1 by gravity assisted by slightly superatmospheric air pressure from the chamber 19 when it has traveled beyond the end of the suction chamber 8.

A continuous band of cigarette paper 34 is applied to the conveyor 14 in a conventional manner, not illustrated in detail, and the tobacco rod 15 is transferred from the belt 1 to the paper band 34. The paper band 34 with the rod 15 deposited thereon travels on the conveyor 14 to the wrapping station of the cigarette machine, not itself shown.

If the belt 1 is to be serviced or replaced, its tension is released by tilting the pulley 5, and it may then be removed. Belt removal is even easier with the modified belt reversing pulley shown in FIG. 3.

The tobacco forming and conveying arrangement of the invention converts loose tobacco shreds to a tobacco rod in a simple manner. In the several embodiments of the invention shown and described, there is no transfer of the tobacco from one conveyor belt to another during the conversion. The diameter of the reversing pulley 2 does not affect the shaping of the tobacco stream, and the entire arrangement may therefore be made of very small vertical height.

It should be understood, of course, that the foregoing disclosure relates only to preferred embodiments of the invention, and that it is intended to cover all changes and modifications of the examples of the invention herein chosen for the purpose of the disclosure which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

I claim:

1. A cigarette rod making machine including means for feeding shredded tobacco in excess of that required in the finished cigarette rod, an elongated and endless conveyor for receiving said fed tobacco on a first face thereof and for forming a filler stream thereon containing said tobacco therein, said conveyor being foraminous, means for driving and guiding said conveyor such that it traverses a path having a U-shaped portion, means defining a suction chamber having a U-shaped parallel to said path portion and contingent with a second face of said belt opposite said first face, said chamber having a U-shaped section and being arranged so that the free ends of the legs providing said U-shaped section are contingent to said second face whereby suction prevailing in said chamber causes a stream of air to pass through the tobacco filler on the first face of the foraminous conveyor causing said tobacco stream to adhere thereto.

2. A cigarette rod making machine as defined in claim 1, wherein said guide means includes a pulley having a peripheral groove having a generally U-shaped section and having shoulder means in said U-shaped groove adjacent the free ends of the legs thereof whereby the said foraminous belt engages said shoulder means providing space in said peripheral groove of sufficient size to accommodate said stream and to provide means for the access of air to said space whereby said suction means may continue to cause said stream to adhere to the first face of the conveyor, said pulley being arranged to rotate in a vertical plane about a horizontally disposed axis and having a portion thereof forming the bight of said U-shaped path portion.

3. A cigarette rod making machine as defined in claim 2, wherein the portion of the conveyor in said U-shaped path portion has its relatively inner surface defined by said first face, the U of said path portion being disposed in a vertical plane whereby the discharge end of the filler stream is disposed below the upper portion of that part of said belt forming said inner surface, trimming means below said filler stream adjacent the discharge end portion thereof and adjacent to the feeding means for said machine, said trimming means including means to deflect the excess tobacco trimmed from said filler stream into means adapted to guide the same to said feeding means.

4. A cigarette rod making machine as defined in claim 3, wherein said trimming means comprises a cylindrical member having its longitudinal axis arranged horizontally below, across, and adjacent to said filler stream, said deflecting means comprising a helical flange arranged on and along the external wall of the cylindrical member, said helical flange extending radially outwardly from said external wall so as to enter a portion of said stream to remove and deflect said excess tobacco therefrom and to direct the same toward said guide means.

(References on following page)

References Cited by the Examiner

UNITED STATES PATENTS

2,660,177	11/1953	Rault	131—84
2,660,178	11/1953	Rault	131—84
2,911,980	11/1959	Richter et al.	131—84
3,039,474	6/1962	Korber	131—84

FOREIGN PATENTS

1,217,800	12/1959	France.
1,235,245	5/1960	France.
1,245,309	9/1960	France.
255,193	12/1912	Germany.
1,105,322	4/1961	Germany.
511,013	8/1939	Great Britain.
719,743	12/1954	Great Britain.
764,551	12/1956	Great Britain.

SAMUEL KOREN, *Primary Examiner.*

JOSEPH S. REICH, MELVIN D. REIN, *Examiners.*