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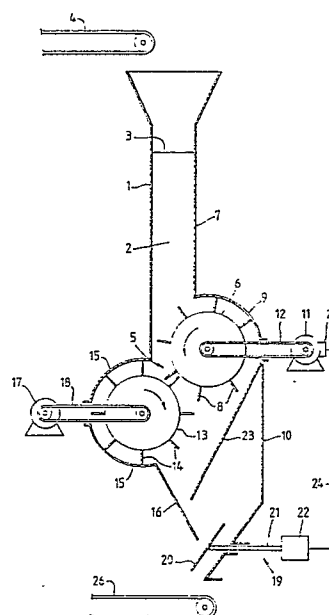
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**(54) Tobacco feed apparatus.**

(57) A tobacco feed apparatus comprising a tobacco reservoir zone (2) from the base of which a stream of tobacco is extracted by a roller (6) driven by a variable speed motor (11). The extracted tobacco is opened and guided onto an impact plate (20) which is connected to determination means (22) capable of producing an electrical signal proportional to the mass flow rate of the tobacco stream, whereby when the detected mass flow rate deviates from a pre-set mass flow rate the speed of the variable speed motor (11) is adjusted to compensate for the deviation.



## Description

## TOBACCO FEED APPARATUS

The invention the subject of the present application relates to the feeding of particulate tobacco.

It is known to extract particulate tobacco from a vertically extending tobacco reservoir zone by means of a pinned roller, or a pair of pinned rollers, located at the lower end of the reservoir zone. Examples of such arrangements are disclosed in French Patent Specification No. 1273931, German Gebrauchsmuster No. 1,900,541 and in United Kingdom Patent Specifications Nos. 1 513 155 and 2 115 681. In such arrangements the volumetric extraction flow rate of the tobacco can be varied by variation of the speed of rotation of the pinned roller(s).

It is an object of the present invention to provide tobacco feed means in the operation of which the feed rate of particulate tobacco can be controlled on a gravimetric basis.

The present invention provides tobacco feed apparatus comprising a tobacco reservoir zone, variable delivery tobacco extraction means at a lower end of said zone, and mass flow determination means operable to determine the mass flow rate of tobacco extracted from said zone by said extraction means and to supply a delivery rate control signal to said extraction means.

The apparatus preferably includes variable speed drive means operable to drive said extraction means, said mass flow determination means being operable to supply a speed control signal to said drive means.

In order that the subject invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the drawing hereof, which shows diagrammatically a tobacco feed apparatus.

The tobacco feed apparatus comprises an upwardly extending container 1 which provides a tobacco reservoir zone 2. In plan view the container 1 is of rectangular configuration, a lesser dimension side of the container 1 being viewed in the drawing. Reference numeral 3 designates the upper surface of a body of particulate tobacco in the reservoir zone 2. A belt conveyer 4 is operable to convey tobacco to the zone 2.

Extraction means, generally designated 5, of the feed apparatus comprises a first horizontally disposed and rotatively mounted cylindrical roller 6. The roller 6 is located at the lower, outlet end of the reservoir zone 2 and the axis of the roller 6 is somewhat to the right, as viewing the drawing, of the plane of a wall 7 of the container 1. The operative lengthwise dimension of the roller 6 is co-terminous with the width of the container 1. Tobacco engaging pins 8 project radially from the peripheral surface of the roller 6.

A curved wall 9, the centre of curvature of which is the axis of the roller 6, extends from the lower end of the wall 7 of the container 1 to a vertically extending wall 10.

A variable speed electric motor 11 and a drive belt 12 extending between motor 11 and the roller 6,

provides variable speed drive means operable to rotate the roller 6 in the direction of the arrow shown thereon.

The extraction means 5 further comprises a second roller 13, which roller 13 may be in construction and dimensions, similar to the roller 6. The roller 13 is rotatively mounted parallel to the roller 6, but at a location somewhat lower than that of the roller 6. The roller 13 comprises tobacco engaging pins 14 which project radially of the peripheral surface of the roller 13. The pins 14 of the roller 13 are offset with respect to the pins 8 of the roller 6, the arrangement being such that the pins 8 and 14 interdigitate.

A curved wall 15, the centre of curvature of which is the axis of the roller 13, extends from the lower end of the container 1 to an inclined wall 16.

An electric motor 17 and a drive belt 18 extending between the motor 17 and the roller 13 provides drive means operable to rotate the roller 13, in the direction of the arrow thereon, at a constant selected velocity significantly greater, suitably at least ten times greater, than the maximum velocity at which the roller 6 is rotated.

Below the rollers 6, 13 is located a mass flow rate meter 19 supplied by Endress & Hauser, Maulburg, F.R. Germany. The meter 19 comprises an impact plate 20 mounted on a shaft 21 extending from a housing 22.

In operation of the tobacco feed apparatus, roller 6 continuously extracts particulate tobacco from the reservoir zone 2, the tobacco being removed from the pins 8 of the roller 6 by the faster moving pins 14 of the roller 13. The interaction of the pins 8 and 14 also serves to open any tangled elongate tobacco fibres so that the tobacco stream which is directed downwardly by the roller 13 is constituted of opened tobacco particles.

The downwardly moving stream of tobacco is directed against the plate 20 of the meter 19 by the inclined wall 16 and a guide plate 23.

The horizontal component of the impact of the tobacco stream on the plate 20 is detected by detection means in the housing 22, the detection means being operable to emit continuously an electrical signal proportional to the mass flow rate of the tobacco stream, which signal is compared by comparator means, also located in housing 22, with a pre-set mass-flow rate value. Any difference between the actual and pre-set mass-flow rate of the tobacco gives rise to an electrical signal from the comparator, which latter signal is indicative of the value of the flow rate difference detected. The difference indicative signal passes, via a line 24, to a speed control unit, designated 25, of the motor 11, whereby the speed of the motor is altered in compensation of the flow rate difference.

The tobacco feed apparatus thus operates in such a manner that the mass flow rate of the stream of tobacco which passes from the plate 20 of the meter 19 to an off-take belt conveyer 26 is, within small

tolerance limits, the pre-set mass flow rate.

The tobacco feed apparatus may be used to provide feeds of gravimetrically metered and opened tobacco in tobacco primary processing or in tobacco article making.

Features of tobacco feed apparatus according to the subject invention may differ from those of the apparatus shown in the drawing hereof. Thus, for example, the extraction means could comprise two pinned rollers as per the roller 6, the two rollers being located at the same level and being counter-rotated by drive means, the rotation directions suitably being such that the rollers act to extract tobacco from the reservoir zone in an extraction path passing between the rollers. Such extraction means may further comprise a picker roller similar to roller 13, the teeth of which picker roller interdigitate with those of the extraction rollers.

Feed apparatus according to the subject invention may comprise mass flow rate determination means which operate on principles other than those appertaining to the operation of the meter 19.

## Claims

1. Tobacco feed apparatus comprising a tobacco reservoir zone, variable delivery tobacco extraction means at a lower end of said zone, and mass flow determination means operable to determine the mass flow rate of tobacco extracted from said zone by said extraction means and to supply a delivery rate control signal to said extraction means.

2. Apparatus according to Claim 1 and further including variable speed drive means operable to drive said extraction means, said mass flow determination means being operable to supply a speed control signal to said drive means.

3. Apparatus according to Claims 1 and 2, wherein said extraction means comprises a first horizontally disposed and rotatively mounted roller having outwardly projecting tobacco engagement means.

4. Apparatus according to Claim 3, wherein said extraction means comprises a second horizontally disposed and rotatively mounted roller having outwardly projecting tobacco engagement means, said second roller being at the same height location as said first roller, said tobacco engagement means of the first and second rollers interdigitating, and said drive means being operable to counter-rotate said first and second rollers such that said first and second rollers act to extract tobacco from said reservoir zone in an extraction path extending between said rollers.

5. Apparatus according to any one of the preceding claims wherein said extraction means comprises a further horizontally disposed and rotatively mounted roller having outwardly projecting tobacco engagement means, and drive means operable to rotate said further roller. said further roller being located downstream, with reference to the direction of tobacco flow from said reservoir zone, of said first roller or said first and second

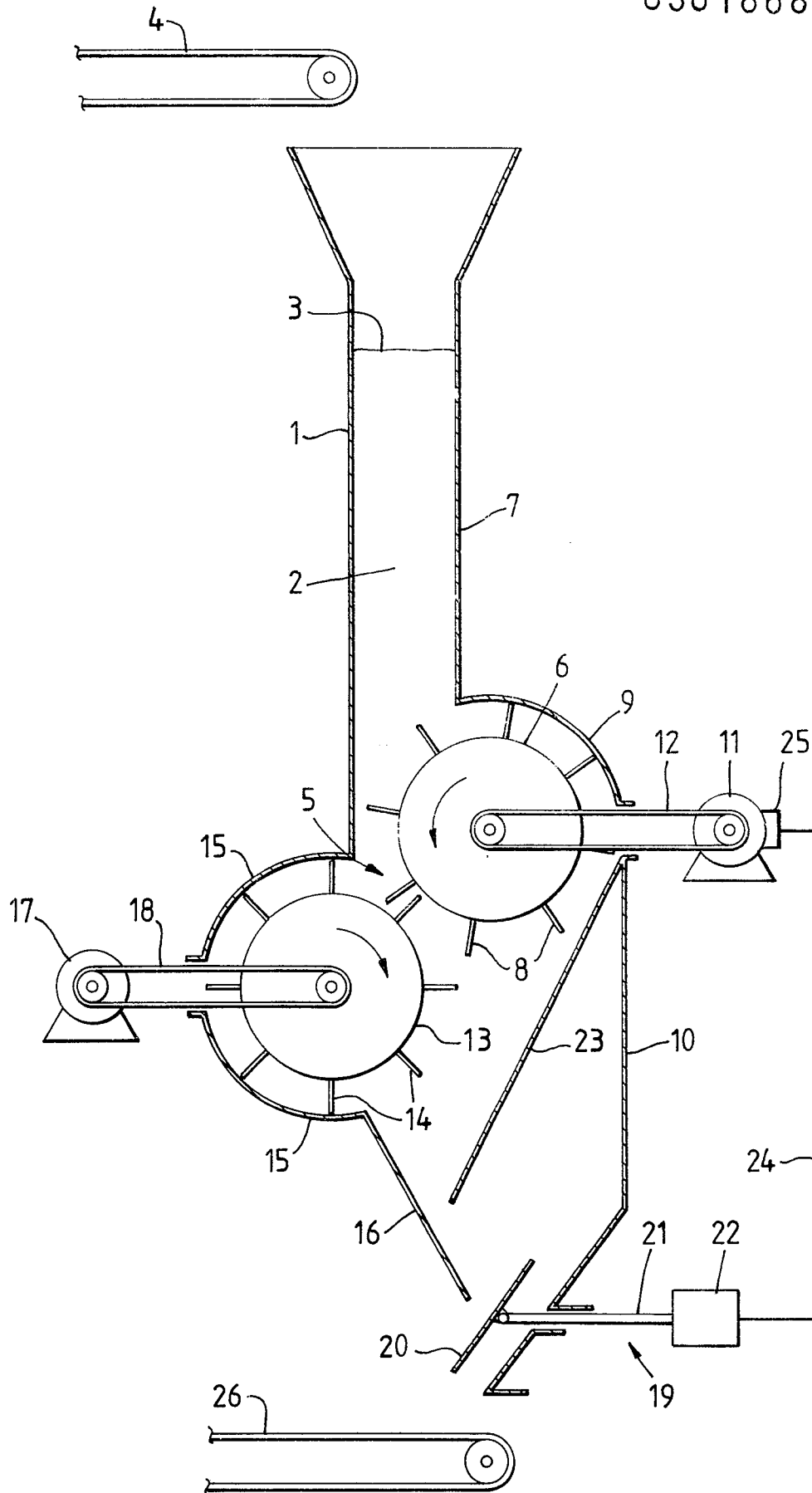
rollers, and the tobacco engagement means of said further roller interdigitating with the tobacco engagement means of the other roller(s).

6. Apparatus according to Claim 5, wherein said drive means is operable to rotate said further roller at a velocity significantly greater than the velocity at which said first roller or said first and second rollers is/are rotatable.

7. Apparatus according to any one of the preceding claims, wherein said mass flow determination means is a mass flow rate meter comprising an impact plate and detection means operable to detect a component of movement of said impact plate and to emit continuously an electrical signal proportional to the mass flow rate of tobacco extracted from said reservoir zone.

8. Tobacco feed apparatus substantially as hereinabove described with reference to the diagrammatic drawing hereof.

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EP 88 30 6975

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US-A-3 903 901 (KÖRBER & CO.) * Figure 6; column 11, line 43 - column 13, line 12 * ---	1-3,5	A 24 C 5/39
X	DE-C- 486 909 (NEUERBURG'SCHE VERWALTUNGSGESELLSCHAFT mbH) * Figure 7; page 2, lines 79-98 * ---	1,7	
A	GB-A- 361 998 (THE IMPERIAL TOBACCO CO.) * Figure 1; page 4, line 39 - page 5, line 106 * ---	1,7	
A	EP-A-0 206 491 (ROTHMANS OF PALL MALL LTDD) * Figures; pages 9-11, line 19 * -----	1-5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			A 24 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 08-11-1988	Examiner RIEGEL R.E.
<b>CATEGORY OF CITED DOCUMENTS</b>			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	