United States Patent

Rowlands

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[54] **APPARATUS FOR FEEDING ROD-LIKE ARTICLES SUCH AS CIGARETTES**

[72] Inventor: **Tom Rowlands**, London, England

[73] Assignee: **Molins Limited**, Deptford, London, England

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[30] **Foreign Application Priority Data**

Oct. 9, 1968 Great Britain.....47,822/68

[52] **U.S. Cl.**.....**214/302**

[51] **Int. Cl.**.....**B65f 3/02**

[58] **Field of Search**.....214/302, 307, 17.62, 8.5 G; 198/58, 53, 54, 56, 57

[56] **References Cited**

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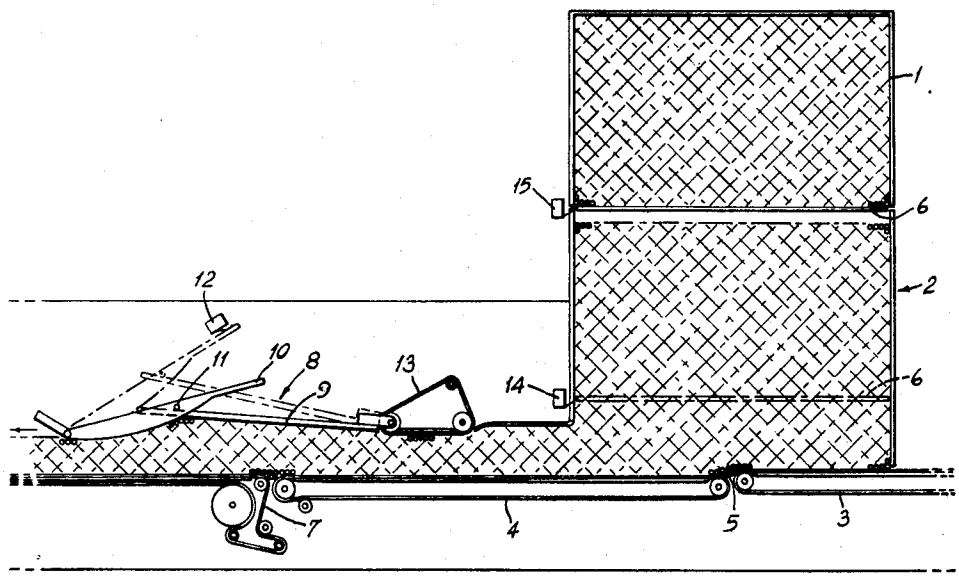
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Primary Examiner—Robert G. Sheridan
Assistant Examiner—John Mannix
Attorney—Emory L. Groff and Emory L. Groff, Jr.

[57] **ABSTRACT**

Cigarettes discharged from successive trays into a hopper, and lowered by a platform which is then withdrawn, are received on a conveyor at the bottom of the hopper which feeds them out of the hopper. To facilitate proper feeding, this conveyor is stopped while the platform is withdrawn, raised, and repositioned to receive further cigarettes. A further conveyor outside the hopper moves continuously, at relatively low speed; while cigarettes are being fed out of the hopper at a relatively high speed, some are stored in a reservoir which expands to receive excess, and when the feed from the hopper is stopped, the continuously moving conveyor is able to maintain a continuous flow of cigarettes by drawing from the reservoir.

10 Claims, 2 Drawing Figures



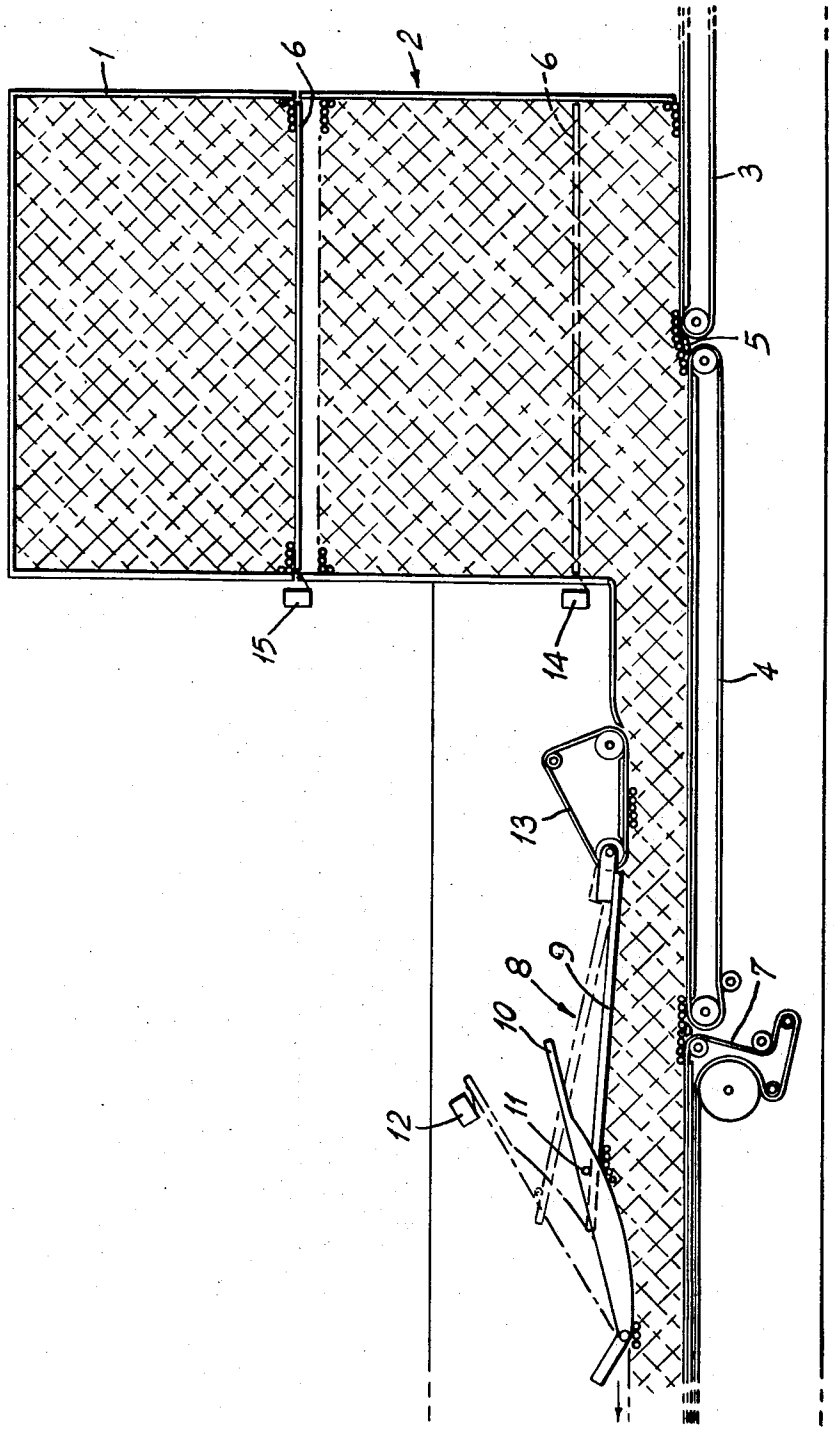


FIG. 1.

INVENTOR.
TOM ROWLANDS
BY Emory L. Groff Jr. ATTY

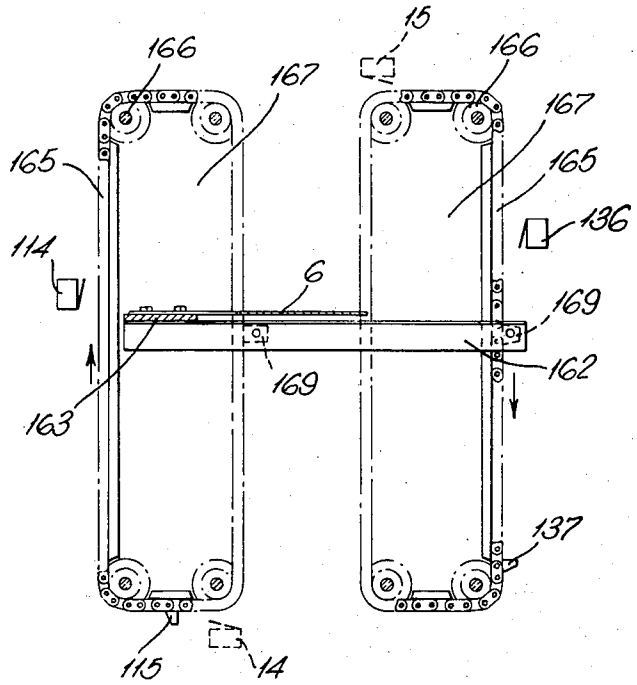


Fig. 2.

APPARATUS FOR FEEDING ROD-LIKE ARTICLES SUCH AS CIGARETTES

This invention concerns improvements in or relating to apparatus for feeding rod-like articles such as cigarettes, and concerns in particular an improvement in an apparatus such as that disclosed in U.S. Pat. No. 3,595,413 dated July 27, 1971 in which cigarettes are discharged from successive trays into a vertical hopper through which they descend as a stack and from which they are removed laterally as a continuous stream. In that apparatus, cigarettes are lowered through the hopper by a descending platform, which on reaching its lowest position is withdrawn from the hopper, raised, and reinserted ready to support the contents of the next tray. If during that period cigarettes are being continuously withdrawn from the hopper, the top level of the descending stack may become uneven, so that cigarettes can roll and may become skewed.

In accordance with one aspect of the invention, in such apparatus for feeding rod-like articles such as cigarettes, the feed of cigarettes away from the hopper is discontinued during the period while the platform is being withdrawn, raised and reinserted. However, it is desirable to maintain a continuous flow of articles taken from the hopper. For this purpose a first conveyor means, which supports the articles at the bottom of the hopper, and which operates intermittently, is arranged to transfer the articles it removes from the hopper on to a further, continuously moving conveyor means; the first conveyor means is arranged to move faster (when operating) than the further conveyor means; and a reservoir is provided in which articles can accumulate while the first conveyor means is operating, and from which they can be drawn while the first conveyor means is stationary.

According to a further aspect of the invention there is provided apparatus for feeding rod-like articles such as cigarettes, comprising a hopper, a platform to lower successive batches of articles through the hopper while acting on the upper level of articles below it in the hopper to control the said level, the platform being retractable sideways from the hopper to be raised and reinserted in the hopper to receive a further batch, and a conveyor to support articles beneath the platform, the conveyor being arranged to convey articles out of the hopper and to stop for a period whenever the platform is retracted.

Apparatus according to the invention will now be described with reference to the accompanying drawings. In the drawings

FIG. 1 shows diagrammatically apparatus according to the invention; and

FIG. 2 is a diagrammatic sectional view showing in more detail the mounting of the platform in FIG. 1.

Referring to FIG. 1, cigarettes are deposited from successive trays 1 into a vertical hopper guide means 2 from which they are withdrawn by a conveyor means comprising two endless conveyors 3 and 4 linked by a short bridge 5. The conveyors carry cigarettes out of the hopper towards the left as viewed in the drawing. A platform 6 receives cigarettes from successive trays 1 and moves downwardly through the hopper to lower the cigarettes. When it reaches the position shown in chain-dotted lines it stops, is withdrawn sideways out of the hopper, is raised, and is reinserted into the hopper ready to receive cigarettes from a further tray 1. The apparatus so far described is similar to what is disclosed in the aforementioned application.

Beyond the conveyor 4 is a further endless conveyor 7 linked to it by a short bridge. Cigarettes are transferred to the conveyor 7 which conveys them as a continuous stream.

A reservoir generally indicated by the reference numeral 8, is located above the conveyors 4 and 7 at the region of transfer. The reservoir is defined by pivoted arms 9 intercalated with other pivoted arms 10; these arms can be moved upwardly by cigarettes accumulating beneath them, and then provide a storage space for cigarettes. The arms 9 engage beneath projections 11 on the arms 10. A stop 12 embodies a first sensor in the form of a microswitch which if engaged by the arms 10 causes the conveyors 3 and 4 to stop, so as to avoid over-filling the reservoir.

A short overhead conveyor 13, arranged to move at the speed of the conveyor 4, assists the forward feed of the cigarettes.

The conveyors 3 and 4 are arranged to move intermittently. Conveyor 3 is run at a much slower speed than conveyor 4, such as one-quarter of the speed thereof. When moving, they feed cigarettes out of the hopper 2 at a rate in excess of the rate at which the conveyor 7 continues their feed and comprises means for withdrawing the cigarettes from the reservoir 8. The conveyor 7 moves continuously.

In operation, when the platform 6 reaches its lowest position, shown in chain-dotted lines, it is withdrawn sideways, and at the same time trips a second sensor in the form of a microswitch 14 to cause the conveyors 3 and 4 to stop. The platform 6 is then withdrawn from the hopper, is raised to its uppermost position, and is inserted into the hopper ready to support the contents of the next tray 1. During this period the conveyors 3 and 4 remain stationary and no cigarettes are fed out of the hopper. When the platform again starts to descend, the conveyors 3 and 4 again start to move owing to the fact that a third sensor in the form of a microswitch 15 is tripped.

Referring to FIG. 2, the platform 6 is carried on a frame comprising two side struts 162 and a cross-strut 163. This frame is carried for movement along a rectangular path in a vertical plane by two pairs of chain conveyors each of which comprises an endless chain 165 running over a set of four pulleys 166 mounted at the corners of a rectangular plate 167. Each side strut 162 is mounted at each end on a lug 169 on each chain 165 of one of the pairs of chains. The arrangement operates to move the platform 6 along a rectangular path by travelling down inside the hopper 2, returning externally of the hopper and moving transversely between these two positions. As the platform is withdrawn from the hopper it operates the switch 14 and as it is reinserted into the top of the hopper it operates the switch 15. The return movement of the platform 6 is controlled by means of a switch 114 which is actuated by a striker 115 on one of the chains 165. As the platform 6 reaches its uppermost position a switch 136 is actuated by a lug 137 to cause the platform 6 to be slowed down.

A more detailed disclosure of this operation will be found in our aforementioned application.

During the period while the conveyors 3 and 4 are stationary, the conveyor 7 continues to feed cigarettes, drawing cigarettes from the reservoir 8, where a store of cigarettes accumulates during the period while the conveyors 3 and 4 are moving and supplying cigarettes at a higher rate than the rate at which they are carried away by the conveyor 7. Thus the supply to the conveyor 7 comes alternately from the hopper and from the reservoir 8. The arms 9 and 10 are pushed upwardly by the accumulating cigarettes while the conveyors 3 and 4 are feeding, and move down again as the store of cigarettes diminishes while conveyors 3 and 4 are stationary.

By the arrangement described, the feeding of the cigarettes through and from the hopper in an orderly way is facilitated, since it is possible to exercise better control over the level of the top of the stack than would be the case if the cigarettes were withdrawn continuously. By the present arrangement, in which downward movement of the stack ceases while the platform 6 is being repositioned, and does not start again until the platform is positioned above it and is able to control its level (as described in the aforementioned application) there is less risk of the top level becoming uneven, with possible skewing of cigarettes as a result of such unevenness.

I claim:

1. Apparatus for feeding rod-like articles comprising:
a. guide means comprising separate substantially vertical walls to accommodate rod-like articles loaded into it;
b. a first conveyor positioned to remove the rod-like articles from the guide means;
c. a variable volume reservoir located downstream of the first conveyor to accommodate rod-like articles fed into it by the first conveyor, and comprising two members each of which is pivotally mounted at one of its ends and the other end of each of which intercalates with the other end of the other member so that pivotal movement of the two members results in a change in the internal volume of the reservoir formed thereby; and
d. means for withdrawing rod-like articles from the reservoir.

2. Apparatus as claimed in claim 1, in which:
a. a first sensor is positioned to be energized when at least one of the said pivoted members reaches a predetermined position representative of a predetermined volume of the reservoir;
b. the first sensor is operable to control the movement of the first conveyor so that when the first sensor is actuated by the said member reaching the said predetermined position it causes the said first conveyor to stop.

3. Apparatus as claimed in claim 2 including:
a. a support movable in the guide means between an upper and a lower position to carry the rod-like articles down towards the outlet of the guide means;
b. means to drive the support between its upper and lower position;
c. means operable to withdraw the support from the lower position and reposition it at the upper position;
d. a second sensor connected to control the said first conveyor so that when the said second sensor is operated it causes said first conveyor to be stopped; and
e. a third sensor positioned to be energized by the reinsertion of the support into its upper position to cause the said first conveyor to be started.

4. Apparatus as claimed in claim 3 including a second conveyor to also support the rod-like articles in the said guide means, the second conveyor being upstream of the first conveyor, means to drive the second conveyor at a speed slower than the first conveyor and means to drive said first and second conveyors at a speed faster than the said withdrawing means.

5. Apparatus as claimed in claim 4 including a third conveyor positioned above the said first conveyor downstream of the guide means and upstream of the said reservoir, and means to drive the said third conveyor to assist in the forward feed of the said rod-like articles toward the said reservoir.

6. Apparatus for receiving rectangular batches of cigarettes or similar rod-like articles and for feeding the articles transversely to their lengths, comprising guide means having separated substantially vertical side walls parallel to the axes of the articles to accommodate the rectangular batches of articles successively, with the bottom surface of each batch substantially horizontal; substantially horizontal conveyor means positioned to remove a continuous stack of the articles from the guide means: a reservoir located downstream of the conveyor means to accommodate articles fed into it by the conveyor means, said conveyor means carrying the stack towards the variable capacity reservoir; receiving means for carrying articles transversely to their lengths from the downstream end of the conveyor means; and means to stop the conveyor means while a new batch is being brought into position on top of the articles remaining from the previous batch, during which time the receiving means receives and conveys articles from a surplus of articles in the reservoir.

7. Apparatus according to claim 6 in which the receiving means comprise a substantially horizontal conveyor.

8. Apparatus according to claim 6 in which a flat horizontal plate contacts the top surface of each batch of articles as it passes downwards through the guide means to maintain the top surface of the batch substantially flat and horizontal.

9. Apparatus according to claim 6 in which the receiving means for carrying articles from the downstream end of the conveyor means comprises means for carrying the articles as a continuous stack.

10. Apparatus for receiving batches of rod-like articles and for feeding the articles transversely to their lengths, comprising guide means having separated substantially vertical side walls to accommodate batches of articles; a conveyor positioned to remove the articles from the guide means; a reservoir located downstream of the conveyor to accommodate articles fed into it by the conveyor; means for withdrawing articles from the reservoir; means to stop the conveyor while a new batch is being brought into position on top of the articles remaining from the previous batch; and a flat horizontal plate which contacts the top surface of each batch of articles as it passes downwards through the guide means to maintain the top surface of the batch substantially flat and horizontal.

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