

[54] **CONVEYING APPARATUS**

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198/76; 214/8.5 H

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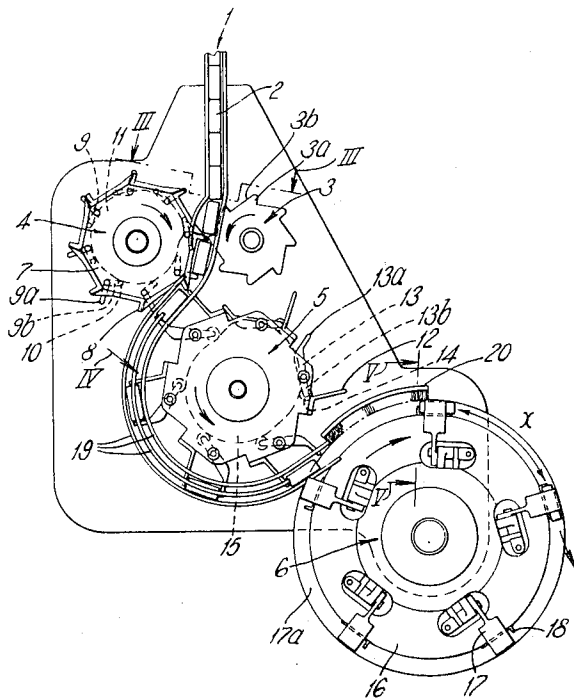
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[57]

ABSTRACT

Apparatus for accelerating and spacing apart the articles, e.g. cigarette packets, in a uniformly-moving stream. A toothed rotor adjacent the stream is driven at uniform speed, each tooth on the rotor in turn displacing laterally the foremost article in the stream, and inserting itself behind the article to displace it from the succeeding article and act as a moving stop for the latter.

6 Claims, 5 Drawing Figures



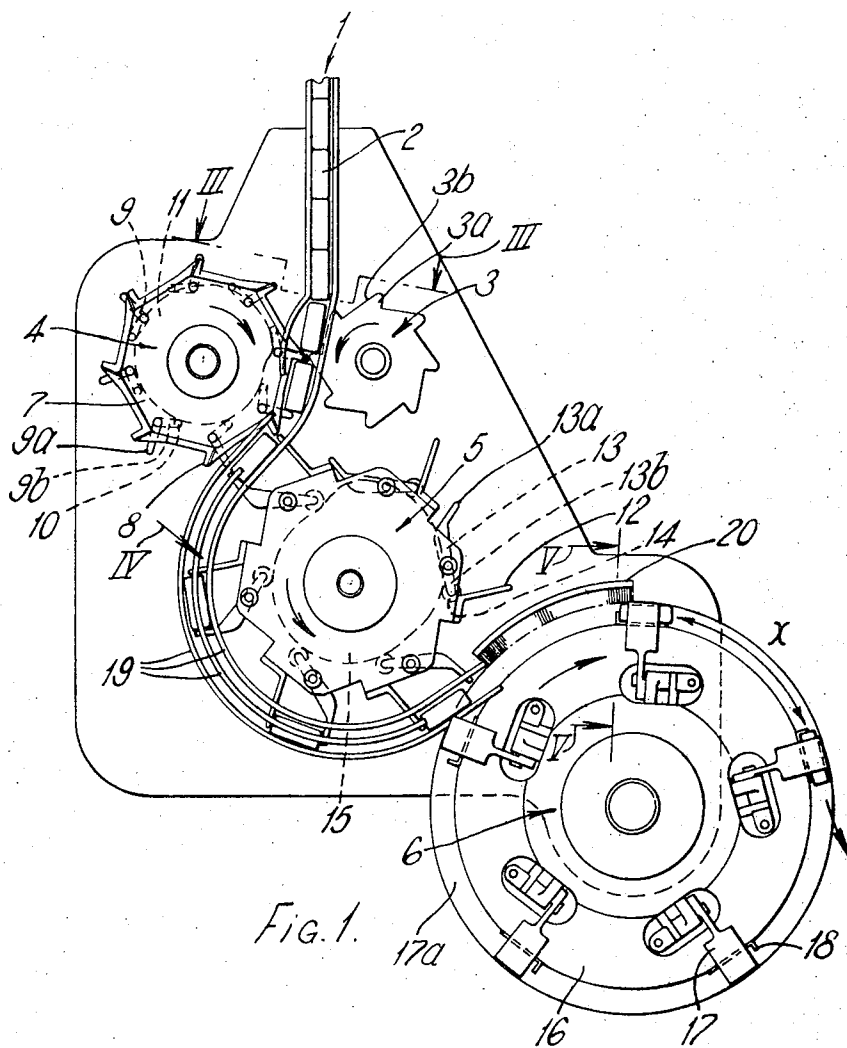


Fig. 1.

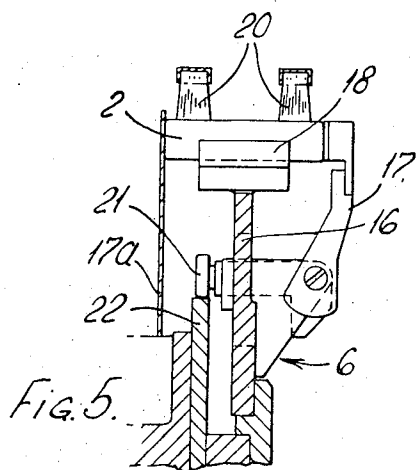


Fig. 5.

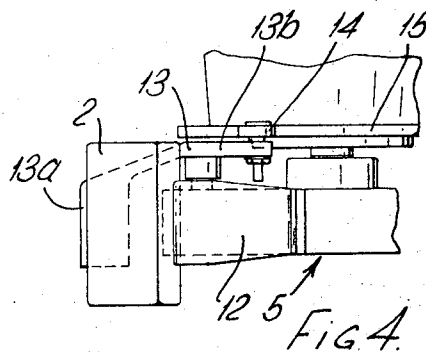
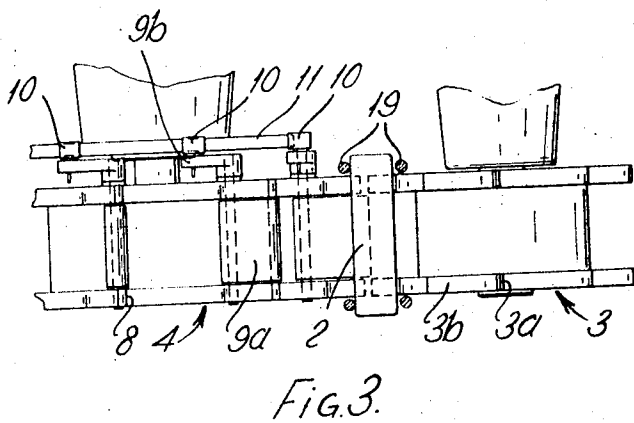
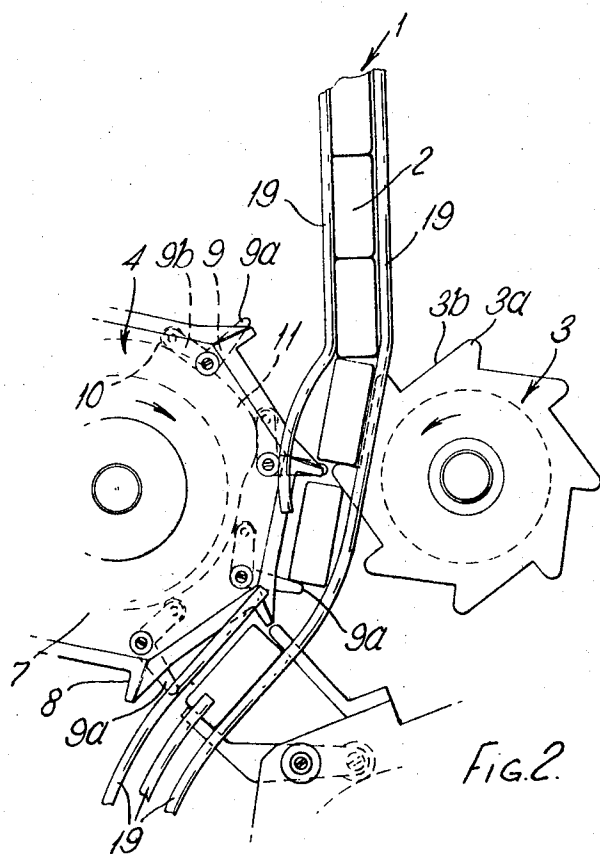


Fig. 4.

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CONVEYING APPARATUS

The present invention relates to conveying apparatus and is more particularly concerned with conveying apparatus for feeding articles to be packed or wrapped, such as cigarette packets, to a packing or wrapping machine.

In a packing or wrapping machine, such as that disclosed in U.S. Pat. No. 3,380,227 issued Apr. 30, 1968, it is necessary in feeding the articles to be packed or wrapped into the machine to do so at a predetermined speed and with a predetermined distance between adjacent packets in the stream. The present invention is concerned with providing apparatus which will do this.

It is also concerned with providing apparatus which can be used generally where it is desired to displace the leading article from a stream of articles in order to enable the article to be handled individually. The term "stream" is intended to cover a stack of articles or a substantially horizontal row of articles where adjacent articles are in contact with one another.

According to the present invention there is provided apparatus for displacing each successive foremost article from the succeeding article in the direction of travel of a uniformly moving stream of abutting articles, comprising a continuously driven rotor adjacent the stream to which the stream is generally tangential, the rotor having deflecting and spacing means to deflect each successive foremost article transversely of the direction of travel of the stream and to enter the stream between the foremost article and the next succeeding article to accelerate the leading article and space it from the succeeding article.

The rotor may have a plurality of similar equi-angularly spaced teeth each of which constitutes a deflecting and spacing means, each tooth having a generally tangential flank which on rotation of the rotor bears against the foremost article to displace it transversely, a crest which, on further rotation of the rotor, enters the stream behind the foremost article and accelerates it to space it from the succeeding article, and a generally radial flank which, on the preceding tooth in the direction of rotation, and on further rotation, forms a stop for the foremost article.

There may be a second rotor on the opposite side of the stream from the first rotor, the second rotor having its axis of rotation parallel with the axis of rotation of the first rotor, and being continuously driven in the opposite direction, the second rotor having a plurality of stationary stop members equi-angularly disposed around the rotor and an equal plurality of pivoted arms equi-angularly disposed around the rotor, a cam follower on each arm, and a stationary cam against which the cam followers bear to move each pivoted arm towards the adjacent stop member as they pass the first rotor to receive the foremost article therebetween from the first rotor.

How the invention may be carried out will now be described, by way of example only, with reference to the accompanying drawing of which:

FIG. 1 is a side elevational view of one embodiment of the invention,

FIG. 2 is a part of FIG. 1 to a greater scale,

FIG. 3 is a sectional view on the line III—III of FIG. 1,

FIG. 4 is a view in the direction of the arrow IV in FIG. 1, and

FIG. 5 is a sectional view on the line V—V of FIG. 1.

The stream of articles, generally indicated by the reference numeral 1, comes from a packing machine (not shown), and in this embodiment the packets 2 are in fact packets of cigarettes. These packets have then to be transferred to a wrapping machine, for example of the kind disclosed in the aforementioned patent, where each packet will be wrapped in a cellophane wrapper.

The apparatus illustrated comprises four rotary members 3, 4, 5 and 6 respectively which together serve to accelerate the packets 2 and thus form a second stream of packets in which the packets are travelling at a higher speed than those in the first stream 1 and in which adjacent packets are spaced from one another by a predetermined distance x .

The first rotary member 3 comprises a wheel having teeth 3a which are designed to support the packets 2 as they leave the stream 1 under the influence of gravity. The rotary member 3 rotates in a counterclockwise direction and in so doing urges each packet 2 slightly to the left as viewed in FIGS. 1 and 2, i.e., laterally towards the second rotary member 4. The top of the packet 2 is pushed to the left by the surface 3b while the bottom of the pocket is urged to the left by a guide 19. In other words the first rotary member 3 serves to displace each packet 2 from the stream 1 and present it to the second rotary member 4. The second rotary member 4 rotates in a clockwise direction and comprises a rotor 7 which carries a number of fixed stops 8 and a corresponding number of pivoted arms 9 each of which has a portion 9a adapted to engage and locate a packet 2 against the associated fixed stop 8, and a second portion 9b which carries a cam follower 10, in the form of a wheel, which engages a fixed cam 11. The cam follower 10 and cam 11 cooperate to change the attitude of the arms 9 as the rotor 7 rotates so that the portion 9a will move away from the fixed stop 8 to enable a packet 2 to be inserted therebetween and will then move towards the fixed stop 8 in order to grip the packet 2 between itself and the fixed stop 8 and carry the packet 2 through an arcuate path. The rotary members 3 and 4 cooperate to form successively a series of pockets to contain each successive leading packet from the stream and to accelerate it relative to the stream.

The packet 2 is then transferred from the second rotary member 4 to the third rotary member 5 which has a peripheral speed greater than the rotary member 4 and will thus further accelerate the packet. The rotary member 5 is of a similar construction to the rotary member 4 in that it has a plurality of fixed stops 12 which cooperate with pivotal arms 13 each of which has a packet locating portion 13a and a cam follower portion 13b which carries the cam follower 14. The cam follower 14, in the form of a wheel, contacts a fixed cam 15.

The rotary member 5 then transfers the packet to a fourth and final rotary member 6 which has a peripheral speed greater than that of the rotary member 5 and thus further accelerates each packet 2.

The construction of the rotary member 6 is somewhat different from that of the rotary members 5 and 4. The rotary member 6 comprises a rotor 16 which carries a plurality of pivotal arms 17 which are adapted to hold a packet in position on the periphery of the rotor 16 against a plate 17a, after each packet has

first been dragged back against a stop 18 by stationary brushes 20.

The packets 2 leave the rotary member 6 having a predetermined speed, dictated by the speed of rotation of the rotor 16, and spaced apart from one another a distance x . The second stream thus formed is fed directly into a wrapping machine of the kind disclosed in the aforementioned patent.

The guides 19 are in the form of metal rods or tubes and terminate at the periphery of the rotary member 6. However, associated with the rotary member 6 are the stationary brushes 20 which act as guides. The arms 17 move towards the plate 17a to grip a packet at a point substantially half-way along the length of the brush 20. The arms 17 are pivoted by means of cam followers 21 which bear on a stationary cam 22.

While the invention has been described with reference to an example which has three stages of acceleration for the packets 2, i.e., by means of the rotors 4, 5 and 6, clearly any suitable number of stages of acceleration could be employed depending on the particular environment in which the invention is to be used. Furthermore, although the accelerating devices in the embodiment comprise rotary members, endless belts or conveyors could be used instead. Variations could also be made in the kinds of guide which are employed to contain the packets in the desired path. For example the guides 19 could be replaced by brushes similar to the brushes 20. In this event the frictional force between the packets and the brushes could be sufficient to render the provision of the elements 9a and 13a unnecessary since the driving members 8 and 12 would drive the packets against the frictional force, the latter being sufficient to prevent the packets from falling away from contact with the members 8 and 12.

Other means may be used to displace the leading packet laterally from the stream 1. For example the rotor 3 could be provided with plungers which operate to push the packet laterally towards the rotor 4. The necessary radially outward movement of the plungers could be effected by means of a fixed cam, substantially concentric with the rotor 3, engaged by cam followers carried by the plungers; alternatively the plungers could be moved by a suitable linkage.

What I claim as my invention and desire to secure by Letters Patent is:

1. Apparatus for displacing each successive foremost article from the succeeding article in the direction of travel of a uniformly moving stream of abutting articles, comprising a continuously driven rotor adjacent the stream and to which the stream is generally tangential, the rotor having deflecting and spacing means to deflect each successive foremost article transversely of the direction of travel of the stream and to enter the stream between the foremost article and the next succeeding article to accelerate the leading article and space it from the succeeding article, a second rotor on the opposite side of the stream from the first rotor, the second rotor having its axis of rotation parallel with the axis of rotation of the first rotor, and being continuously driven in the opposite direction, the second rotor having a plurality of stationary stop members equi-angularly disposed around the rotor and an equal plurality

of pivoted arms equi-angularly disposed around the rotor, a cam follower on each arm, and a stationary cam against which the cam followers bear to move each pivoted arm towards the adjacent stop member as they pass the first rotor to receive the foremost article therebetween from the first rotor.

2. Apparatus as claimed in claim 1 and comprising a third rotor similar to the second rotor to receive each successive foremost article from the said rotor and accelerate it and space it from the succeeding article.

3. Apparatus as claimed in claim 1 and comprising a further rotor to receive the articles and accelerate them and space them further apart, the rotor having a plurality of stop members equi-angularly spaced round the rotor, a stationary brush to hold the articles against the stop members, a plate member on one side of the stop members, an arm pivoted to be movable transversely of the direction of travel of the article adjacent each stop member and having a cam follower, and a stationary cam cooperating with the cam followers to move each arm towards the plate to hold an article therebetween.

4. Apparatus for displacing each successive foremost article from the succeeding article in the direction of travel of a uniformly moving stream of abutting articles, comprising a continuously driven rotor adjacent the stream and to which the stream is generally tangential, said rotor having only a plurality of similar equi-angularly spaced teeth fixed thereto, each tooth having a generally tangential flank which on rotation of the rotor bears against the foremost article to displace it transversely, a crest which on further rotation of the rotor enters the stream behind the foremost article to space it from the succeeding article, a generally radial flank which on further rotation forms a stop for the succeeding uniformly moving article, a second rotor on the opposite side of the stream from the first rotor, the second rotor having its axis of rotation parallel with the axis of rotation of the first rotor, and being continuously driven in the opposite direction, the second rotor having a plurality of stationary stop members equi-angularly disposed around the rotor and an equal plurality of pivoted arms equi-angularly disposed around the rotor, a cam follower on each arm, and a stationary cam against which the cam followers bear to move each pivoted arm towards the adjacent stop member as they pass the first rotor to receive the foremost article therebetween from the first rotor.

5. Apparatus as claimed in claim 4 and comprising a third rotor similar to the second rotor to receive each successive foremost article from the said rotor and accelerate it and space it from the succeeding article.

6. Apparatus as claimed in claim 5, and comprising a further rotor to receive the articles and accelerate them and space them further apart, the rotor having a plurality of stop members equiangularly spaced round the rotor, a stationary brush to hold the articles against the stop members, a plate member on one side of the stop members, an arm pivoted to be movable transversely of the direction of travel of the article adjacent each stop member and having a cam follower, and a stationary cam cooperating with the cam followers to move each arm towards the plate to hold an article therebetween.

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