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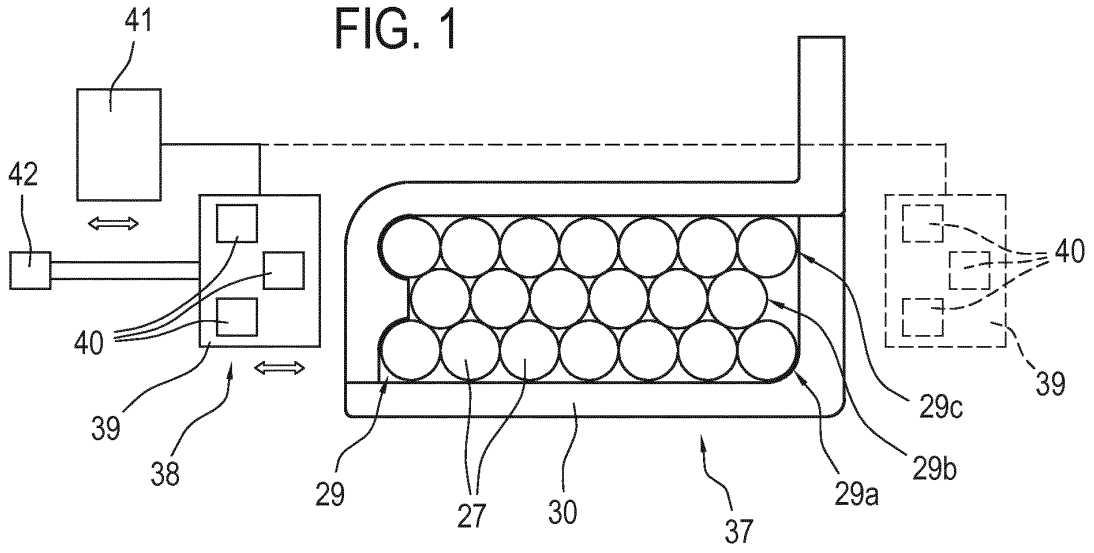
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(54) Apparatus for transferring and checking groups of smoking articles

(57) An apparatus for transferring and checking groups (29) of smoking articles (27) comprises a conveyor (31) which moves with intermittent motion to transfer the groups (29) partly housed in respective compartments (30) which are arranged on the conveyor (31) in such a way that the groups (29) are moved perpendicularly to the planes defined by the at least one layer (29a, 29b and 29c) making up the groups; there is provided a checking station (37) where the compartments (30) of the conveyor (31) are brought to a stop in succession, and there is provided a checking device (38) operating at the checking station (37) and comprising a detecting head (39) which, during a relative movement between the selfsame detecting head (39) and each group (29) of smoking articles (27) housed in a compartment (30), checks all the smoking articles (27) making up the selfsame group (29); actuating means (42) are provided for moving the detecting head (39) in both directions between two positions situated on opposite sides of the compartment (30) which has stopped in the checking station (37) and for imparting to the detecting head (39), each time a compartment (30) of the conveyor (31) stops at the checking station (37), a translational movement such that the detecting head (39) moves to the zone opposite to the zone where it is when the conveyor (31) stops.

FIG. 1



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Description

[0001] This invention relates to an apparatus for transferring and checking groups of smoking articles.

[0002] More specifically, the invention relates to an apparatus for transferring and checking groups of cigarettes in a cigarette packing line and this description refers to an apparatus used for this purpose without thereby limiting the scope of the inventive concept.

[0003] In cigarette packing lines, it is common practice to form the cigarettes to be packed into groups in succession and to check the number and quality of the cigarettes in the groups. The groups of cigarettes to be checked usually comprise one or more superposed layers of cigarettes, often three layers. The checks are preferably carried out by optical devices which direct rays of light at the ends of the cigarettes and analyse the properties of the reflected rays in order to obtain information which indicates missing or poorly filled cigarettes. In state-of-the-art, high-speed packing lines, these optical checks are performed on groups of cigarettes which are in motion relative to the checking devices which direct the light rays at the cigarettes in pulsed manner in suitable phase relationship. Carrying out the checks while the cigarettes are in motion is imperative in continuous packing lines and preferable in intermittent packing lines because it means the operating speed of the packing lines does not need to be changed with relatively lengthy stops to allow the checking devices to monitor the cigarettes correctly.

[0004] When the groups of cigarettes move in a direction parallel to the planes defined by the layers making up the groups, the checks are very easy to carry out because it is sufficient to mount a small number of light ray emitter-receivers, equal to the number of layers making up the groups, at respective fixed positions along the path followed by the respective layers in order to acquire information about all the cigarettes in transit.

[0005] Apparatuses of this are described in detail, for example, in patent US4511045A and in patent application DE19642793A1.

[0006] On the other hand, when the groups of cigarettes are moved perpendicularly to the planes defined by the layers making up the groups, as for example in patent EP0481305B1, the checks carried out by devices of the type described in the above mentioned patent documents may be problematical, if not impossible, because each sensor no longer "sees" moving past it a layer with cigarettes identically arranged therein. In effect, the cigarettes in the groups normally have a quincuncial arrangement, which means that if the groups move in a direction perpendicular to the planes defined by the layers, the cigarettes moving past the cigarette sensors are not all aligned with each other or arranged in the same way relative to the sensors.

[0007] This invention has for an aim to provide an apparatus for transferring and checking groups of smoking articles which can be effectively used in a relatively inexpensive manner to check groups of cigarettes moving perpendicularly to the planes defined by the layers making up the groups.

[0008] The invention is described below with reference to the accompanying drawings, which illustrate a non-limiting embodiment of it, and in which:

Figure 1 schematically illustrates a front view of details of a cigarette packing machine equipped with the transfer and checking apparatus of this invention;
Figure 2 shows a portion of the packing machine of Figure 1 in a perspective view; and
Figure 3 is a schematic front view of a portion of the packing machine of Figure 2.

[0009] With reference to Figure 1, the numeral 25 denotes a packing machine (only partly illustrated) designed to make the cigarette packets, not illustrated.

[0010] The packing machine 25 has many components in common with the machine illustrated and described in patent EP481305B1, which is incorporated herein by reference for completeness of description, and comprises a hopper 26 for feeding cigarettes 27 and equipped at the bottom of it with three outlet openings 28 placed side by side in pairs and able to deliver in succession groups 29 of cigarettes 27 into respective, angularly equispaced peripheral compartments 30 of a wheel 31 rotatable stepwise in an anticlockwise direction (in the example illustrated) about a horizontal axis. The hopper 26, in combination with the wheel 31, constitutes what is also defined herein in its entirety as "apparatus for transferring and checking groups of cigarettes".

[0011] Each time the wheel 31 completes three rotational steps, each having an amplitude corresponding to the angular step of two consecutive compartments 30 of the wheel 31, three pusher elements (not illustrated and of essentially known type) which move intermittently in a horizontal direction parallel to the axis of rotation of the wheel 31 itself and each of which is able to be inserted into a bottom portion of a respective outlet opening 28, axially extract a respective group 29 of cigarettes 27 and insert it into a compartment 30 of the wheel 31. During the action of each of the pusher elements, the same number of counterpushers, not illustrated, which move with reciprocating motion in a direction parallel to the axis of rotation of the wheel 31, slide inside the compartments 30 into which respective groups 29 are being inserted in order to align the axial ends of the groups 29 being inserted by aligning the ends of the selfsame groups 29 opposite to those adjacent to the pusher elements.

[0012] Each time it rotates by one step, the wheel 31 brings in succession a group 29 of cigarettes 27 towards a station 32 for transferring the groups 29 into respective hollow mandrels 33, which are substantially in the shape of a parallelepiped and which are spaced at equal angular intervals around the periphery of a wrapping wheel 34 rotating stepwise in a clockwise direction about a horizontal axis parallel to the axis of rotation of the wheel 31.

[0013] The transfer of each group 29 into a mandrel 33 is effected, during a dwell of the wheels 31 and 34, by pusher elements not illustrated, of essentially known type, which push the group 29 axially in order to extract it from a compartment 30 of the wheel 31 and insert it into a respective mandrel 33.

[0014] The wheel 34 is equipped with twelve radial spokes, each of which mounts one of the mandrels 33 in cantilever fashion. Each mandrel 33 is open at the ends of it and is oriented with its longitudinal axis parallel to the axis of rotation of the wheel 34. The cigarette packets are formed by folding respective sheets 36 of metallized paper or foil, and then blanks, not illustrated, around each mandrel 33, a group 29 of cigarettes 27 being fed into the mandrel 33 after the respective blank has been folded around it.

[0015] The operating steps of the wheel 31 are also identifiable in the schematic representation of Figure 3, which shows the management of the groups 29 of cigarettes 27 on the wheel 31, and in Figures 2 and 3 it may be noticed that the groups 29 of cigarettes 27 housed in the compartments 30 of the wheel 31 are moved perpendicularly to the planes defined by the straight layers 29a, 29b and 29c of cigarettes 27 making up the selfsame groups (Figure 1).

[0016] As illustrated in particular in Figures 1 and 3, at a station 37 where the wheel 31 successively brings its compartments 30, each containing a group 29 of cigarettes 27, to a stop, there is a checking device, labelled 38 in its entirety, which checks that all the cigarettes 27 in each group 29 are present and that each cigarette 27 in the group 29 is properly formed and filled. The checking device 38 might, however, be situated at each position where the wheel 31 brings a compartment 30 containing a group 29 to a stop.

[0017] The checking device 38 comprises a detecting head 39 of essentially known type and fully described in patent US4511045A, which, for completeness of description, is incorporated herein by reference. The operating modes of the detecting head 39 in terms of electronics are not described since they are well known from patents US4511045A and DE19642793A1.

[0018] The detecting head 39 comprises three emitter-sensors 40 positioned at levels substantially coincident, respectively, with those of the three layers 29a, 29b and 29c making up each group 29 stopped in the checking station 37. The number of emitter-sensors 40 is equal (at least) to the number of layers making up the group 29. As illustrated in particular in Figure 1, the detecting head 39 is connected to a linear actuating device 42 which, each time the wheel 31 stops, imparts to the detecting head 39 a translational movement directed along a direction parallel to the planes defined by the layers 29a, 29b, 29c, in such a way as to cause the respective emitter-sensors 40 to pass substantially in front of the central zones of all the ends of the cigarettes 27 making up the layers 29a, 29b and 29c. The actuating device 42 is able to move the detecting head 39 in both directions between two positions situated on opposite sides of the compartment 30 which has stopped in the checking station 37, that is to say, between two zones in the proximity of the two opposite sides of the compartment 30 itself relative to a diametric direction of the wheel 31. Each time the wheel 31 stops, the actuating device 42 causes the detecting head 39 to move translationally in such a way as to carry it to the zone opposite to the zone where the detecting head 39 is when the conveyor 31 stops, and thus, with reference to Figures 1 and 3, the detecting head 39 alternates translational movements from left to right with translational movements from right to left during successive stops of the wheel 31. During each of these translational movements, the detecting head 39, while in motion, carries out the check on the cigarettes 27 making up the group 29 contained in the compartment 30 which has stopped in the station 37.

[0019] Similarly to what is known and described in detail in patent US4511045A, the emitter-sensors 40 are activated cyclically, during a translational movement of the detecting head 39, each time they move in front of the substantially central zone of a cigarette 27 of a respective layer 29a, 29b, 29c and at each detection they send to a processing unit 41 of known type a respective electrical signal indicating whether the cigarette 27 checked is acceptable or not and whether it is present or absent. If one or more defective or missing cigarettes 27 are detected in a group 29, the processing unit 41 activates in known manner an ejecting device, not illustrated, which expels the defective group 29 from the packing machine 25.

[0020] Thanks to the detecting head 39 which is movable in both directions, the cigarettes 27 present in the groups 29 moving perpendicularly to the planes defined by the layers 29a, 29b and 29c making up the groups can be checked quickly and easily, thus overcoming the disadvantages described above with reference to the prior art.

Claims

1. An apparatus for transferring and checking groups of smoking articles, associable with a packing machine (25) for the selfsame smoking articles (27), comprising a conveyor (31) which moves with intermittent motion to transfer the groups (29) partly housed in respective compartments (30), each group (29) comprising at least one straight layer (29a, 29b and 29c) of smoking articles (27) and the compartments (30) being arranged in such a way that the groups (29) of smoking articles (27) are moved perpendicularly to the laying planes defined by the at least one layer (29a, 29b e 29c) making up the groups; there being provided a checking station (37) where the compartments (30) of the conveyor (31) are brought to a stop in succession, and there being provided a checking device (38) operating at

the checking station (37) and comprising a detecting head (39) which, during a mutual movement between the selfsame detecting head (39) and each group (29) of smoking articles (27) housed in a compartment (30), checks all the smoking articles (27) making up the at least one layer (29a, 29b and 29c) of the selfsame group (29); **characterized in that** it comprises actuating means (42) for imparting to the detecting head (39), immediately after each compartment (30) stops in the checking station (37), a translational movement directed along a direction parallel to the laying plane defined by the at least one layer (29a, 29b, 29c) housed in the selfsame compartment (30) and such as to cause the detecting head (39) to pass substantially in front of the central zones of the ends of the smoking articles (27) making up the at least one layer (29a, 29b, 29c); the actuating means (42) being able to move the detecting head (39) in both directions between two positions situated on opposite sides of the compartment (30) which has stopped in the checking station (37); and each time a compartment (30) of the conveyor (31) stops at the checking station (37), the actuating means (42) imparting to the detecting head (39) a translational movement such that the detecting head (39) moves to the zone opposite to the zone where it is when the conveyor (31) stops.

2. The apparatus according to claim 1, **characterized in that** each compartment (30) is able to partly house at least two straight, superposed layers (29a, 29b and 29c) of smoking articles (27).

3. The apparatus according to claim 1 or 2, **characterized in that** the conveyor comprises a wheel (31) which rotates stepwise about an axis; the compartments (30) being spaced at equal angular intervals round the periphery of the wheel (31).

4. The apparatus according to any one of the preceding claims 1 to 3, **characterized in that** the detecting head (39) comprises emitter-sensors (40) in a number at least equal to the number of layers (29a, 29b and 29c) present in each group (29) and positioned at levels substantially coincident, respectively, with those of the layers (29a, 29b and 29c) making up each group (29) of smoking articles (27) stopped in the checking station (37).

5. The apparatus according to any one of the preceding claims 1 to 4, **characterized in that** the emitter-sensors (40) are activated cyclically, during a translational movement of the detecting head (39), each time they move in front of the substantially central zone of a smoking article (27) of a respective layer (29a, 29b, 29c) stopped in the checking station (37), and at each detection they send to a processing unit (41) a respective electrical signal indicating whether the smoking article (27) checked is acceptable or not and whether it is present or absent.

6. The apparatus according to any one of the preceding claims 1 to 5, **characterized in that** when at least one defective or missing smoking article (27) is detected in a group (29), the processing unit (41) activates an ejection device able to move the selfsame group (29) away from the packing machine (25).

FIG. 1

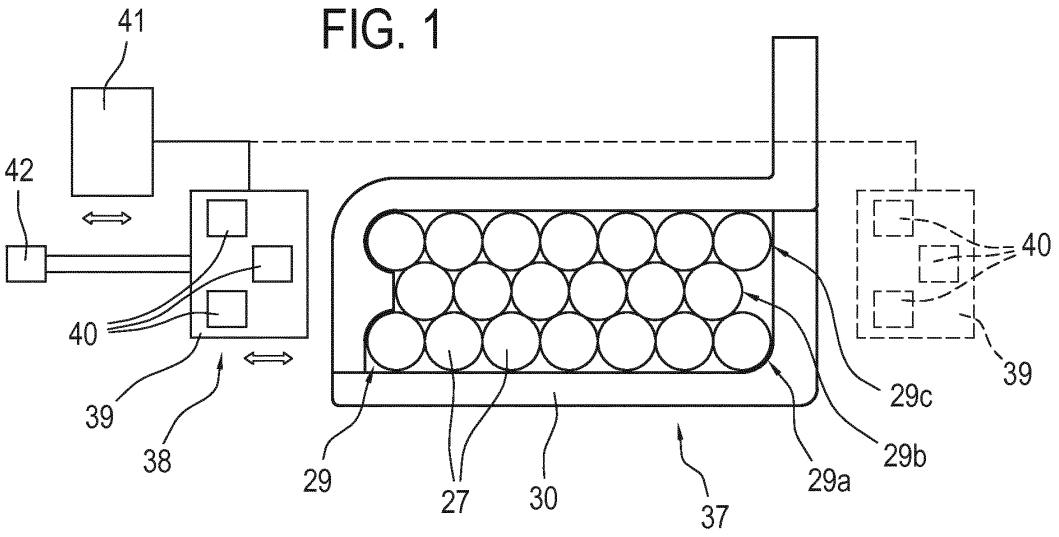

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FIG. 2

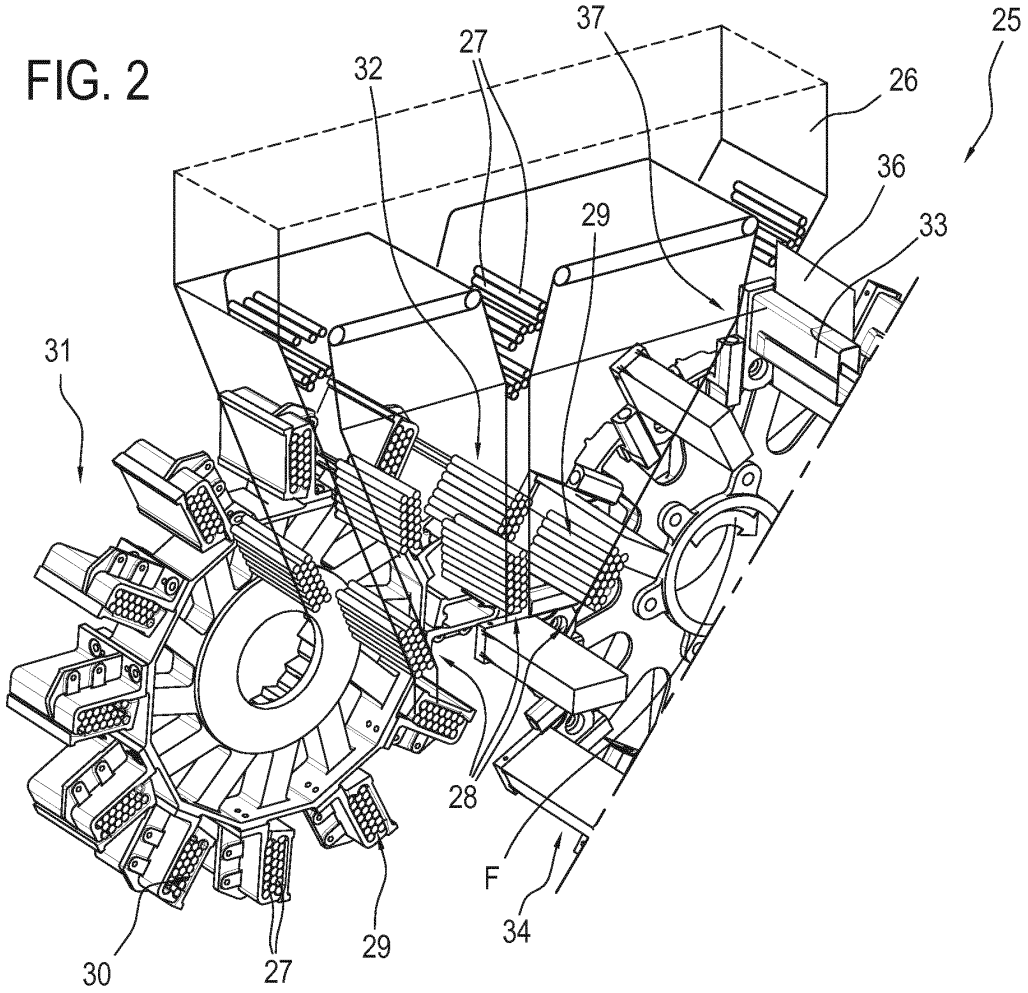
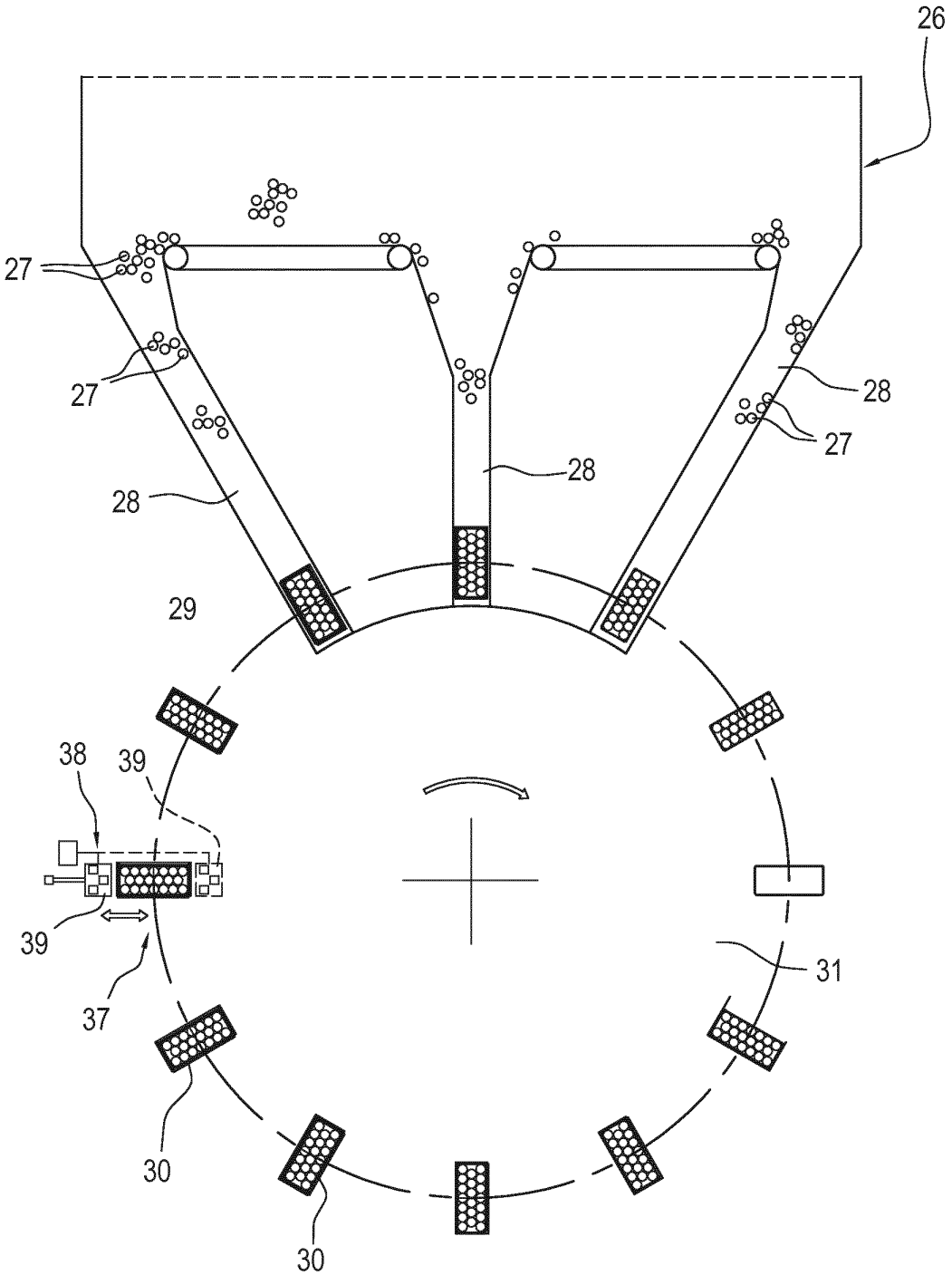

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FIG. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 13 19 5698

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 February 2014	Schelle, Joseph

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