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(54) **Packing machine and method for producing a rigid packet of cigarettes**

(57) A packing machine (17) and method for producing a rigid packet (1) of cigarettes having an inner package (3) defined by a group (4) of cigarettes wrapped in a sheet (25) of flexible wrapping material; an outer container (2) housing the inner package (3) and formed by folding a rigid blank (42) about the inner package (3); and a collar (13) located between the inner package (3) and the outer container (2) and folded at least into a U about the inner package (3). The packing machine has a first packing wheel (27) having at least one peripheral first

pocket (29); a feed station (30), in which the collar (13) is fed, flat, to the first pocket (29); a transfer station (31) located downstream from the feed station (30) to transfer the inner package (3) into the first pocket (29) while at the same time folding the collar (13) into a U about the inner package (3); and a gumming device (63) located at the transfer station (31) to apply gum to a wall (66) of the inner package (3) that rests on a corresponding wall of the collar (13) when the collar (13) contacts the inner package (3).

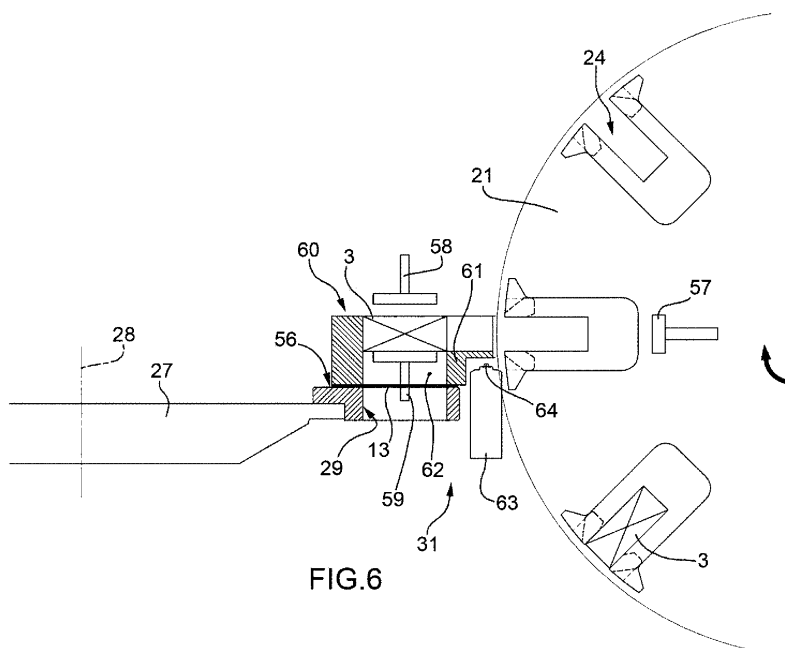


FIG. 6

Description

TECHNICAL FIELD

[0001] The present invention relates to a packing machine and method for producing a rigid packet of cigarettes.

BACKGROUND ART

[0002] Rigid, hinged-lid packets of cigarettes are currently the most widely marketed, by being easy to produce, easy and practical to use, and effectively protecting the cigarettes inside.

[0003] A rigid, hinged-lid packet of cigarettes comprises an inner package (defined by a group of cigarettes wrapped in a sheet of foil); and a rigid outer package housing the inner package. The outer package comprises a cup-shaped container, which houses the group of cigarettes and in turn comprises an open top end, and a cup-shaped lid hinged to the container along a hinge to rotate, with respect to the container, between an open position and a closed position opening and closing the open end respectively. A folded collar is normally connected to the inside of the container to project partly outwards of the open end and engage a corresponding inner surface of the lid when the lid is in the closed position.

[0004] The X2, X3 and X6 packing machines produced by G.D S.p.A. comprise a horizontal packing wheel (i.e. mounted to rotate about a vertical axis of rotation), on which a collar is applied to and then folded into a U about each inner package. The packing wheel comprises a number of peripheral pockets, which are rotated in steps about the axis of rotation and each fed successively through a collar feed station, where the pocket is fed with a flat collar; an inner package feed station, where an inner package is inserted inside the pocket, and the collar supplied previously folds into a U about the inner package; and an unloading station, where the inner package, with the collar folded into a U about it, is expelled from the pocket and transferred to a follow-up packing wheel.

[0005] When necessary, gum is applied between the collar and the inner package to gum a front wall of the collar to a front wall of the inner package; in which case, the X2, X3 and X6 packing machines comprise a gumming station for applying at least one spot of gum to each collar, and which is located along a conveyor for feeding the collars successively to the collar feed station.

[0006] The collar route between the gumming station and the inner package feed station has been found to present extensive gum splatter, which is caused by gum throw-off from the collars as a result of acceleration of the collars as they are manipulated, results in fouling of the packing machine, and must be cleaned off when the machine is stopped, thus increasing maintenance cost.

[0007] Moreover, when the machine is stopped (e.g. for maintenance or cleaning), the gum on all the collars between the gumming station and the inner package feed

station dries, so that, when the machine is started up again, all the collars between the gumming station and the inner package feed station must be rejected, thus resulting in material waste and more complex control procedures. It is important to note that rejects are not always limited to the collars with dried gum. At times, it is also necessary to reject the packets of cigarettes containing these collars at the output of the packing machine, thus resulting in even greater material waste.

DESCRIPTION OF THE INVENTION

[0008] It is an object of the present invention to provide a packing machine and method for producing a rigid packet of cigarettes, designed to eliminate the above drawbacks and which, at the same time, are cheap and easy to implement.

[0009] According to the present invention, there are provided a packing machine and method for producing a rigid packet of cigarettes, as claimed in the accompanying Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which :

Figure 1 shows a front view in perspective of a rigid packet of cigarettes in a closed configuration;

Figure 2 shows a front view in perspective of the Figure 1 rigid packet of cigarettes in an open configuration;

Figure 3 shows a rear view in perspective of the Figure 1 rigid packet of cigarettes;

Figure 4 shows a schematic view in perspective, with parts removed for clarity, of a preferred embodiment of a cigarette packing machine in accordance with the present invention and for producing the packet of cigarettes in Figures 1, 2 and 3;

Figure 5 shows a schematic plan view, with parts removed for clarity, of a collar feed station of the Figure 4 packing machine;

Figure 6 shows a schematic plan view, with parts removed for clarity, of a transfer station between two packing wheels of the Figure 4 packing machine;

Figure 7 shows a larger-scale plan view of a detail in Figure 6;

Figure 8 shows a front view in perspective of an inner package fitted with a collar of the Figure 1 rigid packet of cigarettes.

PREFERRED EMBODIMENTS OF THE INVENTION

[0011] Number 1 in Figure 1 indicates as a whole a rigid packet of cigarettes comprising a cup-shaped cardboard outer container 2, and an inner package 3 housed inside container 2. Inner package 3 encloses a parallel-

epiped-shaped group 4 of cigarettes (shown in Figure 4), and has, at the top and front, a cigarette extraction opening that is torn open when packet 1 of cigarettes in unsealed.

[0012] Outer container 2 has an open top end 5; and a cup-shaped lid 6 hinged to container 2 along a hinge 7 (shown in Figure 3) to rotate, with respect to container 2, between an open position (Figure 2) and a closed position (Figures 1 and 3) opening and closing open top end 5 respectively.

[0013] When lid 6 is closed, outer container 2 is in the form of a rectangular parallelepiped comprising a top wall 8 and an opposite parallel bottom wall 9; a front wall 10 and an opposite parallel rear wall 11; and two opposite parallel lateral walls 12.

[0014] Packet 1 also comprises a collar 13, which is folded into a U and fixed (normally gummed) to the inside of outer container 2 to project partly outwards of open top end 5 and engage a corresponding inner surface of lid 6 when lid 6 is in the closed position. Collar 13 is made of rigid cardboard, and comprises a front wall 14 positioned contacting front wall 10 of outer container 2; and two lateral walls 15 located on opposite sides of front wall 14 and positioned contacting lateral walls 12 of outer container 2.

[0015] In a preferred embodiment, collar 13 has two projections 16, which project laterally to interfere with the lateral walls of lid 6 and keep lid 6 in the closed position.

[0016] Number 17 in Figure 4 indicates as a whole an X2, X3 or X6 cigarette packing machine manufactured by G.D S.p.A.

[0017] Packing machine 17 comprises a known group-forming line 18 (only shown partly) for forming groups 4 of cigarettes; and a first transfer wheel 19 which rotates in steps about a horizontal axis of rotation 20 to successively receive and transfer groups 4 to a second packing wheel 21 at a transfer station 22. Second packing wheel 21 is mounted to rotate in steps about an axis of rotation 23 parallel to axis of rotation 20, and comprises a number of peripheral pockets 24, each for receiving a group 4 of cigarettes together with a respective sheet 25 of flexible foil wrapping material fed to transfer station 22 by a feed line 26. Second packing wheel 21 folds each sheet 25 of wrapping material about respective group 4 of cigarettes to form an inner package 3.

[0018] Packing machine 17 also comprises a third packing wheel 27 which rotates in steps about a vertical axis of rotation 28 crosswise to axis of rotation 20. Third packing wheel 27 comprises a number of peripheral pockets 29, each of which is rotated in steps about axis of rotation 28 and fed successively through a feed station 30 for supplying creased cardboard collars 13, and where pocket 29 is supplied with a flat collar 13; a transfer station 31 for transferring inner packages 3, and where an inner package 3 is inserted inside pocket 29, and the previously supplied collar 13 folds into a U about the inner package; and, finally, a transfer station 32, where inner package 3, with collar 13 folded into a U about it, is expelled from

pocket 29 and transferred to a fourth packing wheel 33.

[0019] Collars 13 are fed to feed station 30 by a feed line 34, and are obtained in known manner from a continuous strip of cardboard unwound off a reel 35.

[0020] Fourth packing wheel 33 rotates in steps about an axis of rotation 36 parallel to axis of rotation 28, is structurally identical to third packing wheel 27, and comprises a number of peripheral pockets 37. In pockets 29 of third packing wheel 27 and pockets 37 of fourth packing wheel 33, each rectangular parallelepiped-shaped inner package 3 is positioned flat, i.e. with a minor lateral surface facing outwards, and with its longitudinal axis (parallel to the axes of the cigarettes) crosswise to axes of rotation 28 and 36, and tangential with respect to the periphery of packing wheel 27, 33.

[0021] Fourth packing wheel 33 and third packing wheel 27 overlap at transfer station 32, and inner packages 3 are transferred from third packing wheel 27 to fourth packing wheel 33 by a vertical movement parallel to axes of rotation 28 and 36.

[0022] Each inner package 3, with a collar 13 folded into a U about it, is transferred from a pocket 37 of fourth packing wheel 33 to a pocket 39 of a fifth packing wheel 40 at a transfer station 38. Fifth packing wheel 40 is mounted to rotate in steps about a horizontal axis of rotation 41 parallel to axis of rotation 20, receives each inner package 3 and respective collar 13 together with a respective rigid blank 42 fed to transfer station 38 by a feed line 43, and folds each blank 42 about respective inner package 3 to form a packet 1 of cigarettes, in which inner package 3 is housed inside an outer container 2 (shown in Figures 1-3) formed by folding blank 42.

[0023] Packets 1 are fed successively from fifth packing wheel 40 to a sixth transfer wheel 44 at a transfer station 45. More specifically, each packet 1 reaching transfer station 45 is positioned on edge on the periphery of fifth packing wheel 40, i.e. with a major lateral surface of packet 1 facing outwards, and with the longitudinal axis of packet 1 (parallel to the cigarettes) parallel to the axis of rotation 41 of fifth packing wheel 40.

[0024] Sixth transfer wheel 44 rotates in steps about a vertical axis of rotation 46 crosswise to axis of rotation 41 of fifth packing wheel 40, and, at transfer station 45, receives packets 1 successively from fifth packing wheel 40, and transfers packets 1 to a drying area 47 (not shown) at a transfer station 48. Drying area 47 constitutes the output of packing machine 17, and feeds packets 1 to a follow-up cellophaning machine (not shown) which applies a transparent plastic overwrapping about each packet 1.

[0025] As shown in Figure 5, feed line 34 for supplying collars 13 comprises a belt conveyor 49 which feeds collars 13 successively to feed station 30, and comprises two parallel belts, on which projections 50 define seats for housing collars 13; and a transfer device 51 at feed station 30 removes a collar 13 off the output end of belt conveyor 49, and places it inside a pocket 29. Transfer device 51 comprises a powered arm 52 mounted to rotate

about a vertical axis of rotation 53 parallel to axis of rotation 28 of packing wheel 27; and a suction grip head 54 fitted to arm 52.

[0026] In actual use, transfer device 51 is rotated cyclically about axis of rotation 53 between a pickup position (shown by the continuous line in Figure 5), in which suction grip head 54 picks up a collar 13, and a release position (shown by the partial dash line in Figure 5), in which suction grip head 54 releases collar 13. In a preferred embodiment, arm 52 is mounted to also rotate about a further, horizontal, axis of rotation 55 perpendicular to axis of rotation 53. In actual use, in the pickup position, arm 52 first rotates about horizontal axis of rotation 55 to extract collar 13, engaged by grip head 54, from the respective seat on belt conveyor 49; and, in the release position, arm 52 rotates about horizontal axis of rotation 55 to deposit collar 13, engaged by grip head 54, inside respective pocket 29.

[0027] As shown in Figure 6, each collar 13 is laid flat on a top wall 56 of a respective pocket 29 of packing wheel 27. To keep collar 13 in the correct position on pocket 29, pocket 29 may comprise projections and/or recesses defining a seat in which to house collar 13, and fixed rails may also be provided between feed station 30 and transfer station 31.

[0028] At transfer station 31, each inner package 3 is expelled from respective pocket 24 on packing wheel 21 into a pocket 29 on packing wheel 27. More specifically, inner package 3 is expelled from pocket 24 horizontally and radially (i.e. perpendicularly to axis of rotation 23 of packing wheel 21) by a pusher 57 to align inner package 3 vertically with pocket 29; at which point, inner package 3 is pushed vertically and axially (i.e. parallel to axis of rotation 28 of packing wheel 27) into pocket 29 by a pusher 58 and a counter-pusher 59 cooperating with pusher 58. Pusher 58 and counter-pusher 59 engage two opposite walls of inner package 3 to grip the inner package (without collar 13 in between), and then move together to insert inner package 3 vertically and axially (i.e. parallel to axis of rotation 28 of packing wheel 27) into pocket 29. It is important to note that counter-pusher 59 is designed to negatively reproduce the shape of collar 13, so as to move up and down alongside, i.e. without touching, collar 13.

[0029] As it is inserted into pocket 29, inner package 3 impacts collar 13 resting on top wall 56 of pocket 29, so collar 13 is folded into a U and inserted into pocket 29 together with inner package 3.

[0030] A supporting and guide body 60 (also shown in Figure 7) is provided at transfer station 31 to support and guide the movement of inner package 3, and comprises a horizontal supporting surface 61, along which inner package 3 slides out of pocket 29; and a vertical channel 62, in which inner package 3 slides into pocket 29.

[0031] A gumming device 63 is located beneath horizontal supporting surface 61 of supporting and guide body 60 at transfer station 31, and comprises at least one nozzle 64 facing upwards to apply gum (typically at

least one line 65 of gum, as shown in Figure 8) to the portion of a front wall 66 of inner package 3 eventually contacting front wall 15 of collar 13, to gum front wall 15 of collar 13 to front wall 66 of inner package 3. To enable gumming device 63 to apply gum to front wall 66 of inner package 3, horizontal supporting surface 61 of supporting and guide body 60 has a central through opening 67 at nozzle 64. It is important to note that central opening 67 is not limited to the area about nozzle 64, but extends as far as vertical channel 62 downstream from nozzle 64, to prevent the line 65 of gum applied by nozzle 64 from smearing and so fouling horizontal supporting surface 61. In other words, to prevent the line 65 of gum on front wall 66 of inner package 3 from smearing any surfaces, central opening 67 must extend downstream from nozzle 64, as far as vertical channel 62.

[0032] Packing machine 17 described has numerous advantages, by enabling gum to be applied between each inner package 3 and respective collar 13 easily and effectively.

[0033] Moreover, gumming device 63 can easily be housed, with no structural alterations required, inside the gap normally existing between packing wheels 21 and 27 at transfer station 31 (which means gumming device 63 can also be installed easily on existing packing machines 17, possibly by simply replacing the existing supporting and guide body 60 with a similar supporting and guide body 60 with a central through opening 67).

[0034] Moreover, inner package 3 is gummed just before it comes into contact with collar 13, which means that, even in the event of unforeseen stoppage of the machine, only one gummed inner package 3 at the most is rejected.

[0035] Moreover, gumming inner package 3 just before it comes into contact with collar 13 minimizes fouling of packing machine 17 with gum splatter from inner package 3. In this connection, it is important to note that the short distance between the point at which inner package 3 is gummed and the point at which inner package 3 comes into contact with collar 13 enables the use of hot-melt, fast-drying glue, which tends to adhere to the wall to which it is applied, and so causes less fouling than cold glue. Using hot-melt, fast-drying glue, collar 13 is already fixed to inner package 3 by the time they reach packaging wheel 40, thus reducing the risk of slippage of collar 13 when folding blank 42, and so enhancing the end quality of packets 1 of cigarettes.

Claims

1. A cigarette packing machine for producing a rigid packet (1) of cigarettes comprising an inner package (3) defined by a group (4) of cigarettes wrapped in a sheet (25) of flexible wrapping material; an outer container (2) housing the inner package (3) and formed by folding a rigid blank (42) about the inner package (3); and a collar (13) located between the

inner package (3) and the outer container (2) and folded at least into a U about the inner package (3); the packing machine (17) comprising:

- a first packing wheel (27) having at least one peripheral first pocket (29);
 a feed station (30), in which the collar (13) is fed, flat, to the first pocket (29); and
 a transfer station (31) located downstream from the feed station (30) to transfer the inner package (3) into the first pocket (29) while at the same time folding the collar (13) into a U about the inner package (3);
 the packing machine (17) being **characterized by** comprising a gumming device (63) located at the transfer station (31) to apply gum to a wall (66) of the inner package (3) that rests on a corresponding wall of the collar (13) when the collar (13) contacts the inner package (3).
2. A packing machine as claimed in Claim 1, wherein the gumming device (63) is located at the transfer station (31), alongside the first packing wheel (27).
3. A packing machine as claimed in Claim 1 or 2, and comprising a second packing wheel (21), which has at least one second pocket (24), produces the inner package (3) by folding the sheet (25) of flexible wrapping material about the group (4) of cigarettes, and transfers the inner package (3) to the first packing wheel (27) at the transfer station (31).
4. A packing machine as claimed in Claim 3, wherein the gumming device (63) is located between the first packing wheel (27) and the second packing wheel (21).
5. A packing machine as claimed in Claim 3 or 4, wherein the first packing wheel (27) rotates in steps about a vertical first axis (28) of rotation, and the second packing wheel (21) rotates in steps about a horizontal second axis (23) of rotation perpendicular to the vertical first axis (28) of rotation.
6. A packing machine as claimed in Claim 5, wherein the transfer station (31) comprises:
 - a first pusher (57) that expels the inner package (3) horizontally and radially from the second pocket (24) to align the inner package (3) vertically with the first pocket (29); and
 a second pusher (58) that pushes the inner package (3) vertically and axially into the first pocket (29).
7. A packing machine as claimed in Claim 6, wherein the transfer station (31) comprises a counter-pusher (59) that cooperates with the second pusher (58) to grip the inner package (3) without the collar (13) in between.
8. A packing machine as claimed in Claim 6 or 7, wherein the transfer station (31) comprises a supporting and guide body (60) for supporting and guiding the movement of the inner package (3), and which comprises:
 - a horizontal supporting surface (61), on which the inner package (3) slides out of the first pocket (29); and
 a vertical channel (62), in which the inner package (3) slides into the first pocket (29).
9. A packing machine as claimed in Claim 8, wherein the gumming device (63) is located beneath the horizontal supporting surface (61) of the supporting and guide body (60), and comprises a nozzle (64) facing upwards to apply gum to a wall (66) of the inner package (3).
10. A packing machine as claimed in Claim 9, wherein the horizontal supporting surface (61) of the supporting and guide body (60) has a central through opening (67) located at the nozzle (64) and extending up to the vertical channel (62) downstream from the nozzle (64).
11. A packing machine as claimed in one of Claims 1 to 10, and comprising a feed line (34) for supplying the collars (13), and in turn comprising a belt conveyor (49) for feeding the collars (13) successively to the feed station (30).
12. A packing machine as claimed in Claim 11, and comprising a transfer device (51) located at the feed station (30), and which removes the collar (13) from an output end of the belt conveyor (49), and places the collar (13) on the first pocket (29) of the first packing wheel (27); the transfer device (51) comprising:
 - a powered arm (52) mounted to rotate about a third axis (53) of rotation parallel to the first axis (28) of rotation of the first packing wheel (27), and about a fourth axis (55) of rotation perpendicular to the third axis (53) of rotation; and
 a suction grip head (54) fitted to the arm (52).
13. A packing method for producing a rigid packet
 - (1) of cigarettes comprising an inner package (3) defined by a group (4) of cigarettes wrapped in a sheet (25) of flexible wrapping material; an outer container
 (2) housing the inner package (3) and formed by folding a rigid blank (42) about the inner package (3); and a collar (13) located between the

inner package (3) and the outer container (2) and folded at least into a U about the inner package (3); the packing method comprising the steps of:

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feeding the collar (13), flat, to a peripheral first pocket (29) of a first packing wheel (27) at a feed station (30); and
transferring the inner package (3) into the first pocket (29), while at the same time fold- 10
ing the collar (13) into a U about the inner package (3), at a transfer station (31) downstream from the feed station (30);
the packing method being **characterized**
by comprising the further step of applying 15
gum, by means of a gumming device (63) at the transfer station (31), to a wall (66) of the inner package (3) that rests on a corresponding wall of the collar (13) when the
collar (13) contacts the inner package (3). 20

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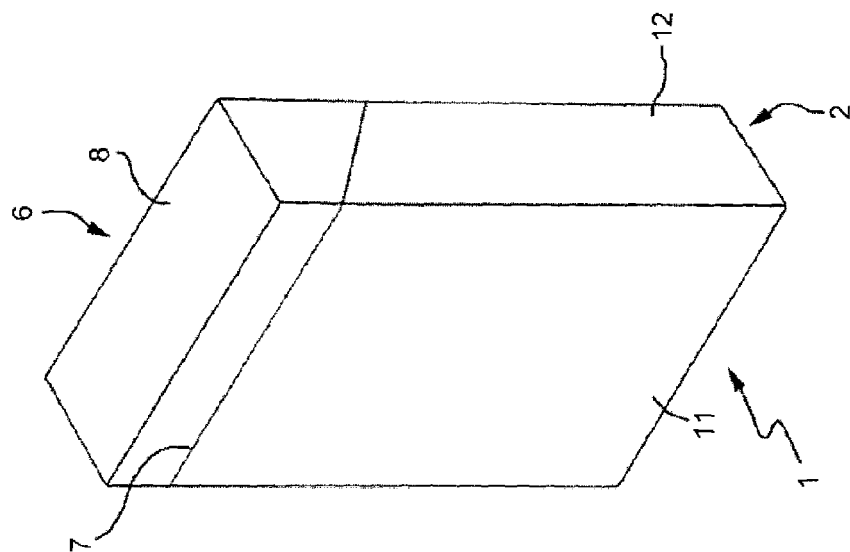
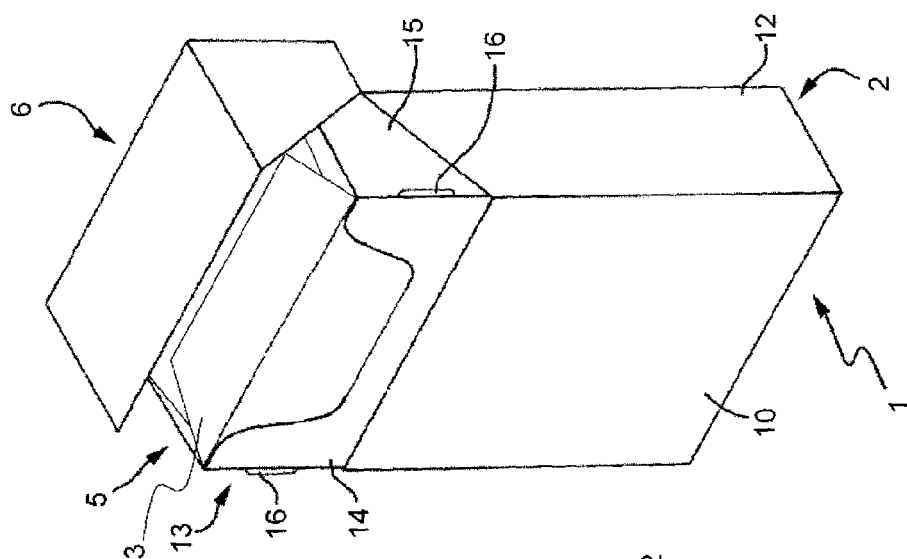
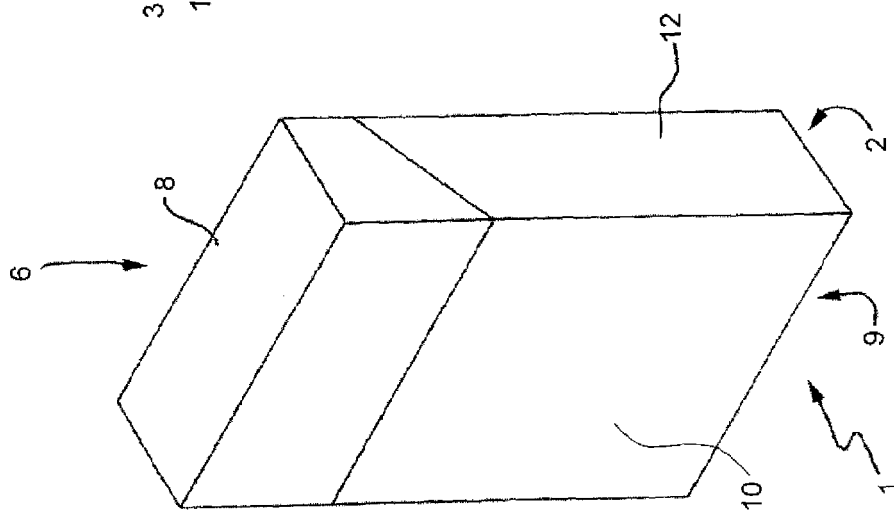


Fig. 4

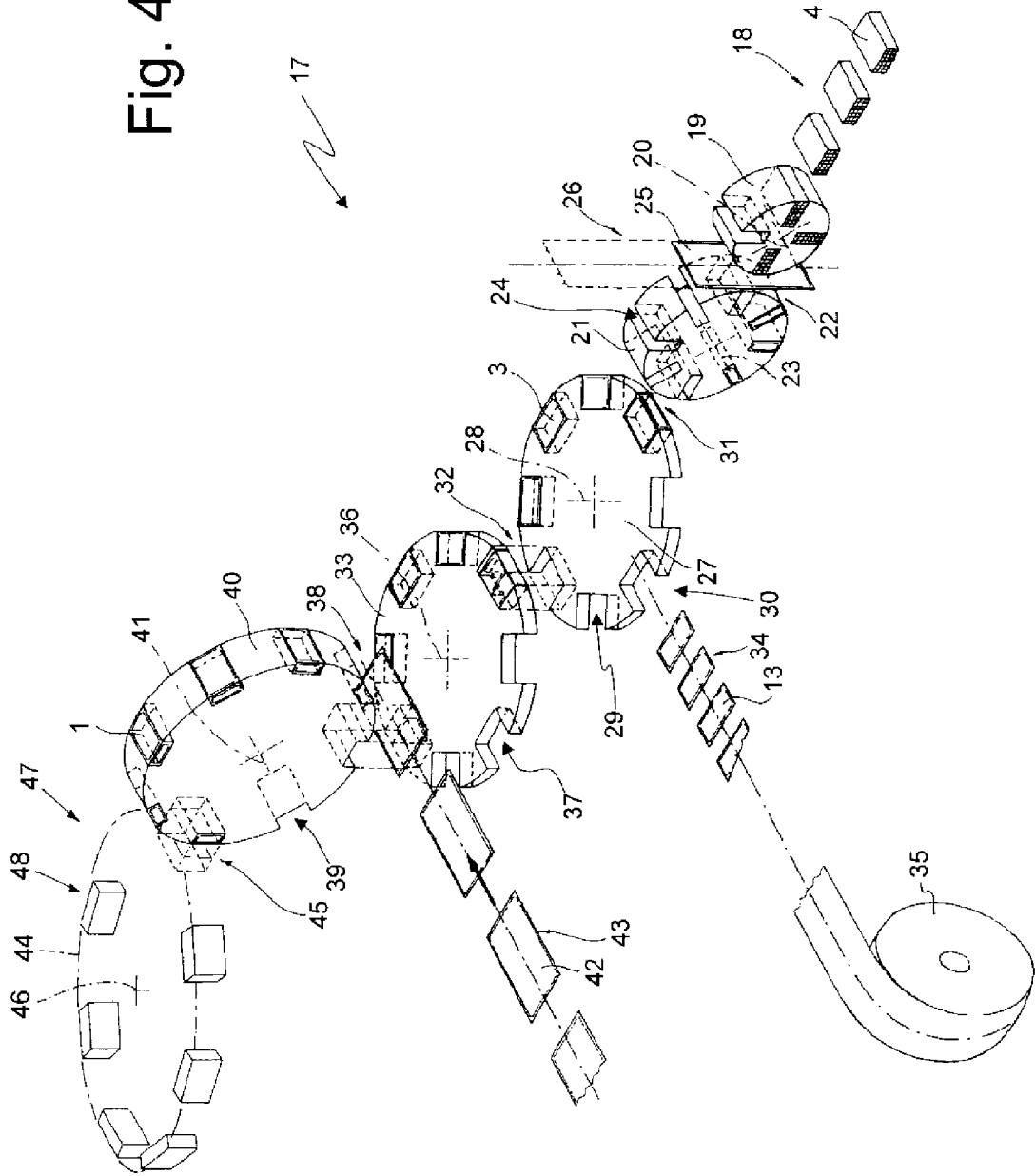
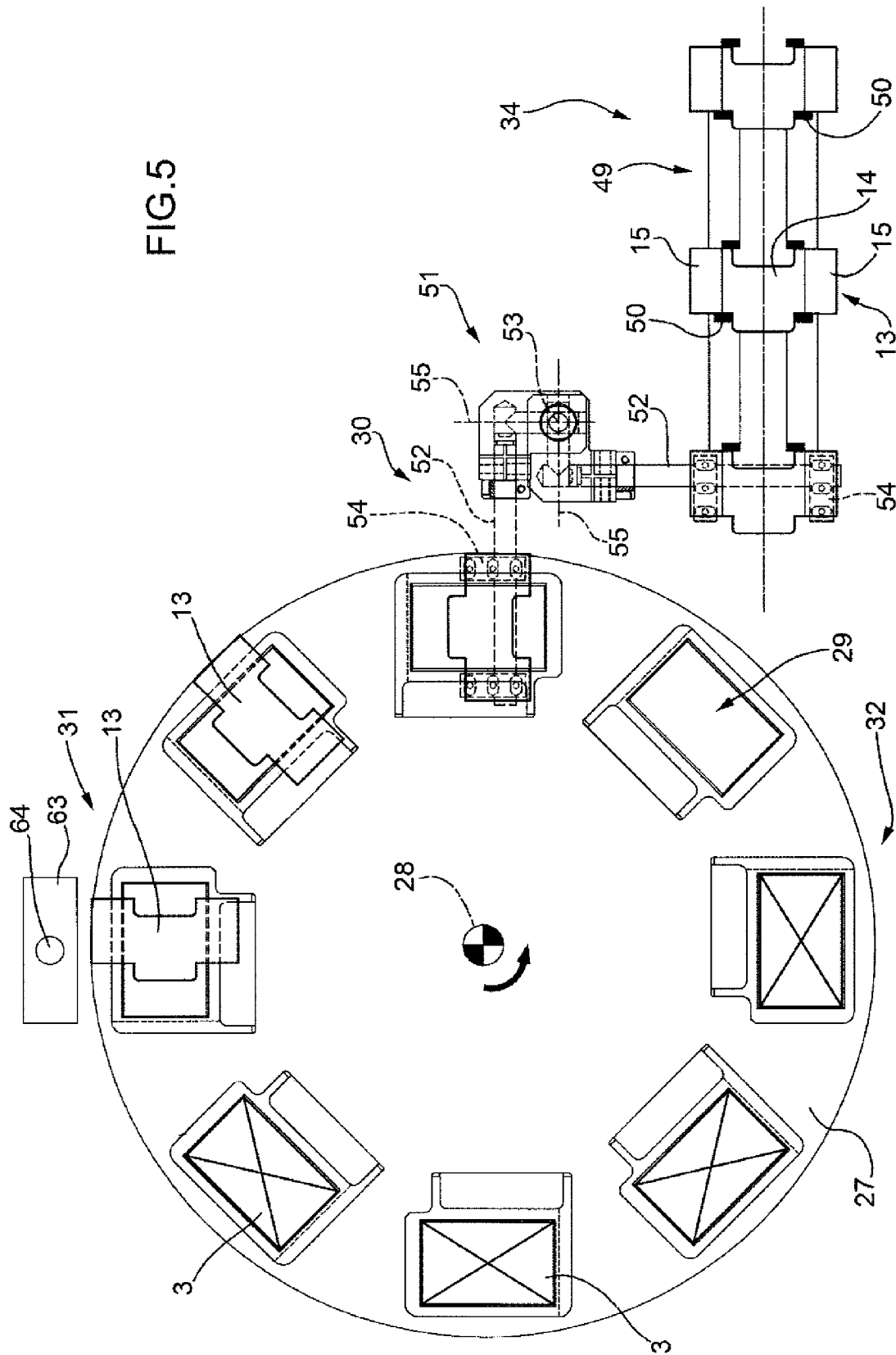
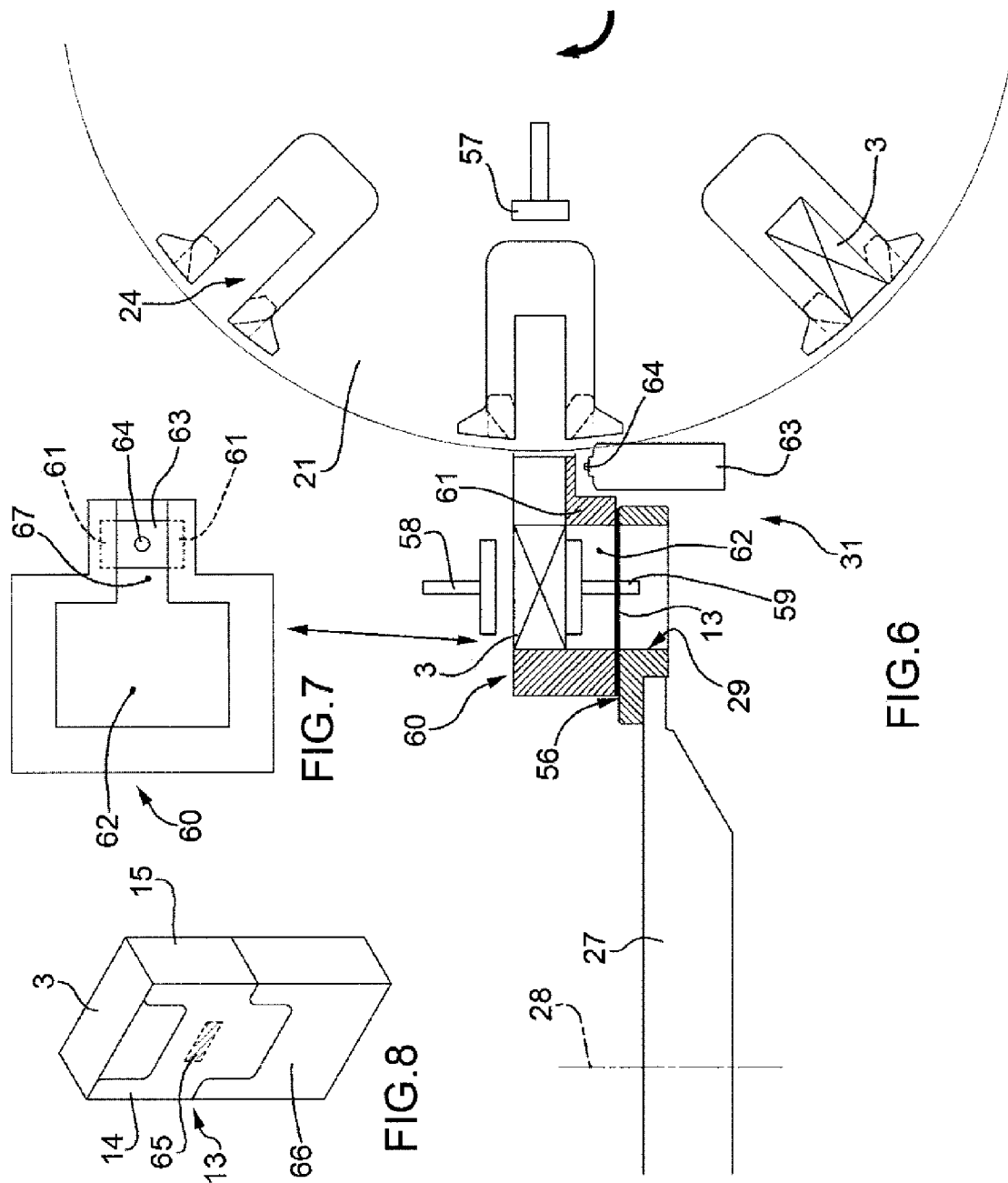


FIG. 5







EUROPEAN SEARCH REPORT

Application Number
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CATEGORY OF CITED DOCUMENTS 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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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