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(54) **COUPLING METHOD AND UNIT TO COUPLE AN INSERT TO A GROUP OF CIGARETTES IN A PACKAGING MACHINE**

(57) Coupling method and unit (26) to couple an insert (18) to a group (14) of cigarettes in a packaging machine (24); the group (14) of cigarettes is fed into a tubular spindle (31), which is internally hollow and has the shape of a parallelepiped; the insert (18) is laid on an outer

surface of the spindle (31); and the group (14) of cigarettes and the insert (18) are extracted from the spindle (31) together by means of a single common extracting device (32) so as to cause the insert (18) to rest against the group (14) of cigarettes.

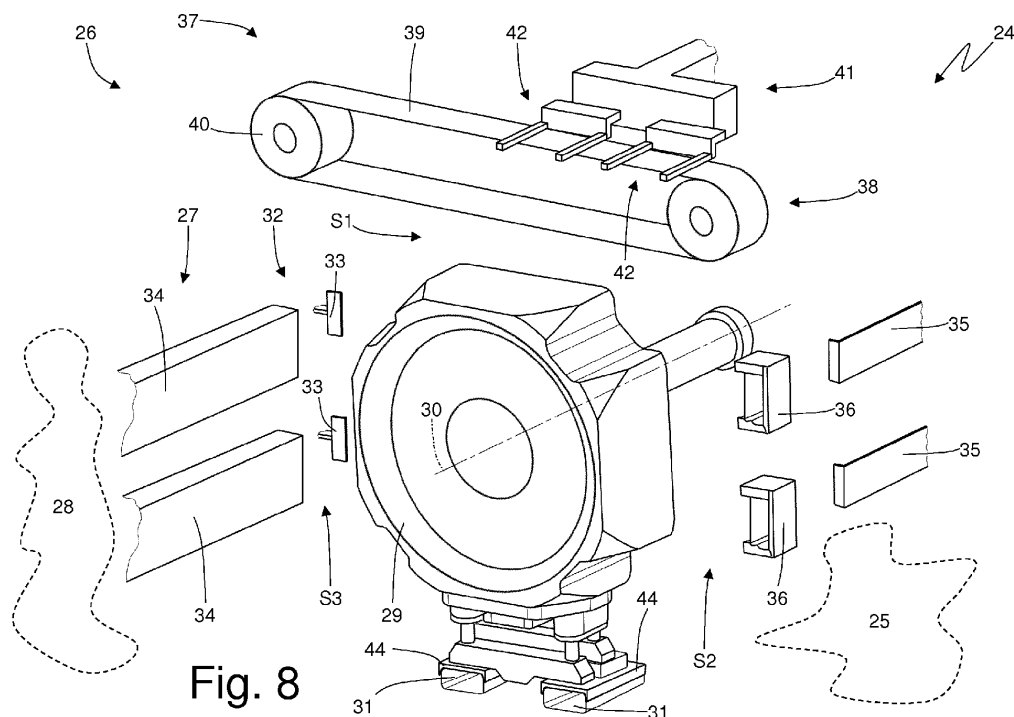


Fig. 8

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102017000129189 filed on 13/11/2017.

TECHNICAL FIELD

[0002] The present invention relates to a coupling method and unit to couple an insert to a group of cigarettes in a packaging machine.

PRIOR ART

[0003] A packet of cigarettes generally comprises an inner wrap, which is formed by a group of cigarettes wrapped in an inner sheet of wrapping material, and an outer casing, which encloses the inner wrap and can be formed by a outer sheet of wrapping material folded around the inner wrap and cup-shaped (soft type packet of cigarettes), or it can be formed by a rigid box with a hinged lid obtained by folding a rigid blank around the inner wrap (rigid type packet of cigarettes).

[0004] In a packet of cigarettes, an insert can also be provided, which is arranged inside the inner wrap (typically a protection element or a collar) or arranged between the inner wrap and the outer casing (typically a collar and/or a coupon). The feeding of an insert is complex as the insert must be arranged and kept in a precise position in contact with the group of cigarettes (above or below the inner wrapping sheet) without being glued to the group of cigarettes itself; only the subsequent folding of the outer casing (insert arranged between the inner wrap and the outer casing) or of the inner wrapping sheet (insert arranged inside the inner wrap) around the group of cigarettes stabilizes the position of the insert.

[0005] The feeding of an insert is particularly complex when the insert has to be inserted inside the inner wrap, which is in direct contact with the group of cigarettes, since the group of cigarettes does not provide a uniform support surface and does not have a stable shape.

[0006] Patent application EP2008935A1 describes a wrapping method to couple an insert to a group of cigarettes. The group of cigarettes is fed to a first seat of a pocket (the first seat is shaped to contain only the group of cigarettes) while the insert is fed to a second seat of the pocket (the second seat is shaped to contain only the insert and is separated and beside the first seat); subsequently, the group of cigarettes and the insert are extracted together from the pocket (i.e. from the respective seats of the pocket) by means of a single common extracting device so as to couple the insert to the group of cigarettes.

[0007] However, the wrapping method described in the patent application EP2008935A1 does not allow to operate at a very high speed (expressed by the number of packets of cigarette produced per time unit) while ensuring

perfect folding (i.e. with precise and squared folding angles) of the insert around the group of cigarettes.

DESCRIPTION OF THE INVENTION

[0008] The object of the present invention is to provide a coupling method and unit to couple an insert to a group of cigarettes in a packaging machine, which coupling method and unit are easy and inexpensive to produce and allow an effective and efficient feeding of an insert to a group of cigarettes even when operating at a very high speed.

[0009] According to the present invention, a coupling method and unit are provided to couple an insert to a group of cigarettes in a packaging machine, as set forth in the appended claims.

[0010] The claims describe preferred embodiments of the present invention forming an integral part of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention will now be described with reference to the accompanying drawings, which illustrate an example of non-limiting embodiment, wherein:

- Figure 1 is a front perspective view and in a closed configuration of a packet of cigarettes made according to the present invention;
- Figure 2 is a rear perspective view of the packet of cigarettes of Figure 1 in a closed configuration;
- Figure 3 is a front perspective view of the packet of cigarettes of Figure 1 in an open configuration;
- Figure 4 is a front perspective view of an inner wrap of the packet of Figure 1 in a closed configuration;
- Figure 5 is a perspective view of a group of cigarettes enclosed in the inner wrap of Figure 4;
- Figure 6 is a perspective view of a reinforcing element coupled to the group of cigarettes of Figure 5 and enclosed in the inner wrap of Figure 4;
- Figure 7 is a plan view of a heat-sealable wrapping sheet used to make the inner wrap of Figure 4;
- Figure 8 illustrates a perspective and schematic view of a cigarette packaging machine which is adapted to produce the inner wrap of Figure 4 and is provided with a coupling unit made according to the present invention;
- Figure 9 is a perspective view of a detail of the coupling unit of Figure 8; and
- Figures 10-15 are a series of schematic views illustrating the coupling of an insert to a group of cigarettes in the coupling unit of Figure 8.

PREFERRED EMBODIMENTS OF THE INVENTION

[0012] In Figures 1, 2 and 3 number 1 denotes, as a whole, a rigid packet of cigarettes. The packet 1 of cig-

arettes comprises an outer container 2 formed by a rigid and cup-shaped cardboard or paperboard and a sealed wrap 3 (better illustrated in Figure 8) housed inside the container 2.

[0013] The outer container 2 has an open upper end and is provided with a lid 4, which is cup-shaped and is hinged to the outer container 2 along a hinge 5 (illustrated in Figure 2) so as to rotate, with respect to the outer container 2, between an open position (illustrated in Figure 3) and a closed position (illustrated in Figures 1 and 2) of the open upper end. The outer container 2 has a substantially rectangular parallelepiped shape orientated in a prevalently vertical development direction, is cup-shaped, and has an upper open end, a lower wall 6 opposite the upper open end, a front wall 7 and a rear wall 8 (in which the hinge 5 is formed) parallel and opposite to one another, and two side walls 9 parallel and opposite to each other.

[0014] The lid 4 has a substantially rectangular parallelepiped shape, is cup-shaped, and has an open lower end (facing the upper open end of the outer container 2 when the lid 4 is in the closed position), an upper wall 10 (which is parallel and opposite to the lower wall 6 of the outer container 2 when the lid 4 is in the closed position), a front wall 11 (which is parallel to and aligned with the front wall 7 of the outer container 2 when the lid 4 is in the closed position), a rear wall 12 (which is parallel to and aligned with the rear wall 8 of the outer container 2 when the lid 4 is in the closed position and is hinged to the rear wall 8 of the outer container 2 along the hinge 5), and two side walls 13 parallel and opposite to each other (which are parallel to and aligned, in particular coplanar and adjacent, to the side walls 9 of the outer container 2 when the lid 4 is in the closed position).

[0015] The wrap 3 encloses a group 14 of cigarettes (partially illustrated in Figure 3 and fully illustrated in Figure 5) having a parallelepiped shape; moreover, the wrap 3 has an extraction opening 15 for the cigarette, at the top and at the front, closed by a reusable closing label 16.

[0016] The closing label 16 is fixed to the wrap 3 by means of the non-dry re-stick glue 17, which is applied to the inner surface of the closing label 16 (i.e. the surface of the closing label 16 facing the wrap 3) and is arranged all around the extraction opening 15 so as to allow the closing label 16 to be partially separated (i.e. at each opening of the packet 1 of cigarettes) from the wrap 3 several times and then again fixed to the wrap 3 (at each closing of the packet 1 of cigarettes).

[0017] The closing label 16 is provided with a connecting tab 17, which is permanently glued in a non-separable manner to the inner surface of the front wall 11 of the lid 4 by means of the permanent glue which is applied to the outer surface of the closing label 16 (i.e. the surface of the closing label 16 facing outwards, that is, from the opposite wall of the wrap 3). In this way, by opening or closing the lid 4, the closing label 16 is also simultaneously opened and closed.

[0018] The inner wrap 3 comprises a reinforcing ele-

ment 18 (illustrated in Figure 6), which is made of cardboard or rigid paperboard (totally similar to the cardboard or rigid paperboard forming the outer container 2), is "U"-shaped and it is arranged inside the inner wrap 3 in contact with the group 14 of cigarettes. The reinforcing element 18 comprises a rectangular-shaped front wall 19, which is arranged in contact with a front wall of the group 4 of cigarettes and a pair of side walls 20, which are connected to the opposite sides of the front wall 19 and are arranged in contact with the side walls of the group 4 of cigarettes. The front wall 19 has a window which is arranged at the top, is delimited by an edge 21, is "U"-shaped, and facilitates the extraction of the cigarettes from the group 4 of cigarettes as it leaves an upper area of the front wall of the group 4 of cigarettes exposed.

[0019] The function of the reinforcing element 18 is to provide greater rigidity and greater shape stability to the sealed wrap 3 so as to prevent the sealed wrap 3 from collapsing in on itself after having extracted a part of the cigarettes contained in the sealed wrap 3 itself thus making the extraction of the remaining cigarettes complicated and in particular making the opening and the subsequent closing of the closing label 17 extremely complicated. A further function of the reinforcing element 18 is to provide adequate mechanical protection to the cigarettes during the forming and handling of the sealed wrap 3. Finally, another function of the reinforcing element 10 is to keep the lid 4 in the closed position, as in order to pass from the closed position to the open position (and vice versa) the lid 4 must slightly elastically deform the upper and front part of the reinforcing element 18.

[0020] As illustrated in Figure 7, the wrap 3 is obtained by folding a heat-sealable wrapping sheet 22, which has a rectangular shape, is folded around the group 14 of cigarettes and, once folded, is stabilized by heat-sealing (i.e. overlapping portions of the wrapping sheet 22 are connected to one another in a stable manner by heat-sealing). The wrapping sheet 22 has an incision 23 which is "U"-shaped and defines the extraction opening 15 of the wrap 3; moreover, the closing label 16 is glued to the wrapping sheet 22 which completely covers the incision 23 (i.e. the extraction opening 15). Between the closing label 16 and the wrapping sheet 22 the pressure-sensitive re-stick glue (i.e. which does not dry) is interposed, which also allows, even after a long period of time has passed and for a high number of times, to separate the closing label 16 from the wrapping sheet 22 and then to re-join the closing label 16 to the wrapping sheet 22.

[0021] In Figure 8, number 24 denotes, as a whole, a packaging machine which makes the packet 1 of cigarettes described above.

[0022] The packaging machine 24 comprises a forming unit 25 (of a known type and schematically illustrated in Figure 8) in which the groups 14 of cigarettes are formed in succession, a coupling unit 26 in which, to each group 14 of cigarettes, a corresponding reinforcing element 18 is coupled, which is folded in a "U"-shape around the group 14 of cigarettes, a wrapping unit 27 (of a known

type and only partially illustrated in Figure 8) in which around each group 14 of cigarettes a respective wrapping sheet 22 is wrapped and heat-sealed for making a corresponding inner wrap 3, and a wrapping unit 28 (of a known type and schematically illustrated in Figure 8) in which a blank is folded around each inner wrap 3 so as to form an outer container 2 and a lid 4 to complete the producing of a packet 1 of cigarettes. It is important to underline that the wrapping machine 24 could comprise only the forming unit 25, the coupling unit 26 and the wrapping unit 27 (in this case each inner wrap 3 is a marketable finished product).

[0023] The coupling unit 26 comprises a coupling wheel 29 which is mounted so as to rotate around a horizontal rotation axis 30 and supports four pairs of spindles 31 (only one of which is illustrated in Figure 8 for clarity). According to a different embodiment not illustrated, the coupling wheel 29 could be replaced by a different type of conveyor, for example by a closed loop conveyor belt. Each spindle 31 is tubular, has a parallelepiped shape, and is internally hollow to receive a group 14 of cigarettes on the inside thereof; in particular, the group 14 of cigarettes axially enters through an end of the spindle 31 and axially exits from the opposite end.

[0024] The coupling wheel 29 rotates with intermittent motion (i.e. cyclically alternating moving steps and stopping steps) to cyclically move each pair of spindles 31 along a circular coupling path which crosses: a feeding station S1 in which a group 14 of cigarettes is fed inside each spindle 31 of a pair of spindles 31, a subsequent feeding station S2 in which an insert 18 is laid on an outer surface of each spindle 31 of a pair of spindles 31 (therefore on the opposite side of the group 14 of cigarettes which is arranged inside the spindle 31), and finally an extraction station S3 in which from each spindle 31 of a pair of spindles 31 the group 14 of cigarettes and the insert 18 are extracted together by means of a single common extracting device 32 so as to cause the reinforcing element 18 to rest against the group 14 of cigarettes.

[0025] Accordingly, up to the extraction station S3, each reinforcing element 18 is separated from the corresponding group 14 of cigarettes, and therefore does not touch the corresponding group 14 of cigarettes, as a spindle 31 is interposed between the reinforcing element 18 and the corresponding group 14 of cigarettes. In fact, up to the extraction station S3, each reinforcing element 18 is laid on the outer surface of a spindle 31 whereas the corresponding group 14 of cigarettes is arranged inside the spindle 31.

[0026] In the embodiment illustrated in the attached figures, the coupling unit 26 operates on a double line, i.e. two spindles 31 coupled to each other and arranged side-by-side (a pair of spindles 31) simultaneously receive two corresponding inserts 18 in the feeding station S1, simultaneously receive two corresponding groups 14 of cigarettes in the feeding station S2, and simultaneously release the two groups 14 of cigarettes together with

the inserts 18 in the extraction station S3. According to an alternative, and perfectly equivalent embodiment, the coupling unit 26 operates in a single line, i.e. a single spindle 31 receives, at a time, a corresponding insert 18 in the feeding station S1, receives a corresponding group 14 of cigarettes in the feeding station S2, and releases the group 14 of cigarettes together with the insert 18 in the extraction station S3.

[0027] In the embodiment illustrated in the accompanying figures, each reinforcing element 18 is laid flat (i.e. without any type of folding) on the outer surface of the corresponding spindle 31 and is then folded in a "U"-shape around the spindle 31 after being laid flat on the spindle 31; in particular, each reinforcing element 18 is laid flat on the outer surface of the corresponding spindle 31 in the feeding station S1 and is folded in a "U"-shape around the spindle 31 in the feeding station S2 after having inserted the group 14 of cigarettes inside the spindle 31.

[0028] According to alternative embodiments, each reinforcing element 18 could be laid flat (i.e. without any type of folding) on the outer surface of the corresponding spindle 31 and then folded in a "U"-shape around the spindle 31 before the feeding station S2 (directly in the feeding station S1 or in transit from the feeding station S1 to the feeding station S2), in the feeding station S2 and during the feeding of the group 14 of cigarettes, or downstream from the feeding station S2 (i.e. between the feeding station S2 and the extraction station S3). According to a further embodiment, each reinforcing element 18 could be placed already folded in a "U"-shape around the spindle 31 in the feeding station S1, i.e. each reinforcing element 18 could be folded in a "U"-shape against the spindle 31 in the feeding station S1 when the reinforcing element 18 is laid against the outer surface of the spindle 31.

[0029] In the embodiment illustrated in the accompanying figures, the feeding station S1, in which the reinforcing elements 18 are laid on the outer surface of the corresponding spindles 31, is arranged upstream of the feeding station S2 in which the groups 14 of cigarettes are inserted inside the corresponding spindles 31; according to an alternative embodiment not illustrated, the feeding station S1, in which the reinforcing elements 18 are laid on the outer surface of the corresponding spindles 31, is arranged downstream of the feeding station S2 in which the groups 14 of cigarettes are inserted inside the corresponding spindles 31.

[0030] The extracting device 32, arranged in the extraction station S3, comprises two twin pushers 33, each of which is movable with reciprocating motion and is inserted inside a corresponding spindle 31 for axially pushing both the group 14 of cigarettes (which is arranged inside the spindle 31), and the corresponding reinforcing element 18 (which is folded in a "U"-shape and is laid on an outer surface of the spindle 31) away from the spindle 31. According to a preferred embodiment illustrated in the attached figures, the wrapping unit 27 comprises two

twin folding tunnels 34 and the pushers 33 of the extracting device 32 insert the two groups 14 of cigarettes, coupled to the corresponding reinforcing elements 18, into the two folding tunnels 34; immediately downstream of the entrance of the folding tunnels 34, the wrapping sheets 22 (not illustrated for clarity in Figure 8) are fed, which are intercepted by the two groups 14 of cigarettes entering the folding tunnels 34.

[0031] The feeding station S2 comprises two twin pushers 35, each of which is movable with reciprocating motion and pushes a corresponding group 14 of cigarettes inside a spindle 31 standing still in the feeding station S2. In particular, the forming unit 25 cyclically arranges a pair of groups 14 of cigarettes in the feeding station S2 and in front of the pair of spindles 31 which is standing still in the feeding station S2; in this way, the two pushers 35 can push the two groups 14 of cigarettes into the corresponding spindles 31. According to a preferred embodiment, two compressing bodies 36 are arranged immediately upstream of the pair of spindles 31 standing still in the feeding station S2, each of which is (internally) shaped like a funnel, is arranged in front of one end of the corresponding spindle 31 and elastically compresses the group 14 of cigarettes so as to reduce the size of the cross section of the group 14 of cigarettes. In other words, beforehand, each group 14 of cigarettes is passed through a corresponding compressing body 36 which elastically compresses the group 14 of cigarettes so as to reduce the size of the cross section of the group 14 of cigarettes and thus facilitate the entry of the group 14 of cigarettes in the corresponding spindle 31 that is standing still. Alternatively, the compressing bodies 36 could be integrated into the spindles 31, each of which has the inlet end shaped like a funnel.

[0032] A feeding device 37 is arranged in the feeding station S1, which cyclically feeds two reinforcing elements 18 to a pair of spindles 31 standing still in the feeding station S1. The feeding device 37 comprises a feeding conveyor 38 which receives the reinforcing elements 18 from the bottom of a hopper (not illustrated) containing a stack of flat reinforcing elements 18 and feeds the flat reinforcing elements 18 near the pair of spindles 31 standing still in the feeding station S1. In the embodiment illustrated in the attached figures, the feeding conveyor 38 comprises a suction belt 39 wound in a loop around two end pulleys 40 (at least one of which is motorized); according to an alternative embodiment not illustrated, the feeding conveyor 38 comprises a wheel mounted in a rotary manner.

[0033] The feeding device 37 comprises a transfer device 41 which is movable for withdrawing a pair of reinforcing elements 18 from the suction belt 39 of the feeding conveyor 38 and subsequently release the pair of reinforcing elements 18 to the corresponding two spindles 31 standing still in the feeding station S1. The transfer device 41 comprises two suction holding heads 42, each of which is adapted to capture (by suction) a reinforcing element 18 from the feeding conveyor 38, is adapted to

hold the reinforcing element 18 during the movement from the feeding conveyor 38 to a corresponding spindle 31 and is adapted to release the reinforcing element 18 at the spindle 31. According to what is better illustrated in Figure 9, each holding head 42 is shaped like a fork and has two tines 43, which engage opposite ends of the insert 18 and are arranged at a distance from one another that is greater than the corresponding cross size of the spindle 31; consequently, the two tines 43 of each holding head 42 embrace the corresponding spindle 31 from opposite sides and engage the two side walls 20 of the reinforcing element 18 (as clearly illustrated also in Figures 11 and 12).

[0034] According to the preferred (but non-binding) embodiment illustrated in Figure 9, to each spindle 31 a folding element 44 is coupled, which is "U"-shaped, is adapted to embrace the spindle 31 to enable the "U"-folding of a reinforcing element 18 against the spindle 31, and is mounted in a movable manner on the coupling wheel 29 to move radially with respect to the spindle 31 itself; in particular, each folding element 44 is movable radially (for example under the thrust of a cam actuated system which is set in motion by the rotation movement of the coupling wheel 29 around the rotation axis 30) between a receiving position (illustrated in Figures 10-14) in which the folding element 44 is relatively far away from the spindle 31 to allow a holding head 42 to feed a reinforcing element 18 to the spindle 31, and a folding position (illustrated in Figure 15) in which the folding element 44 is pressed against the spindle 31 thus embracing the spindle 31 and therefore enabling the "U"-folding of a reinforcing element 18 against the spindle 31 (in other words, the reinforcing element 18 is "moulded" into a "U"-shape by using the folding element 44 and the spindle 31 as a "mould" and "counter-mould", respectively).

[0035] According to the preferred (but non-binding) embodiment illustrated in Figure 9, a locking element 45 is coupled to each spindle 31 the which is adapted to lock a reinforcing element 18 against the spindle 31 and is mounted in a movable manner on the coupling wheel 29 to move radially with respect to the spindle 31 itself (independently of the corresponding folding element 44); in particular, each locking element 45 is radially movable (for example under the thrust of a cam actuated system which is set in motion by the rotation movement of the coupling wheel 29 around the rotation axis 30) between a receiving position (illustrated in Figures 10-12) in which the locking element 45 is relatively far away from the spindle 31 to allow a holding head 42 to feed a reinforcing element 18 to the spindle 31, and a locking position (illustrated in the figures 13-15) in which the locking element 45 is pressed against the spindle 31 by clamping the reinforcing element 18 against the spindle 31.

[0036] As better illustrated in Figure 9, each folding element 44 is arranged beside the corresponding locking element 45 and has a shape complementary to the shape of the locking element 45 so that both the folding element 44 and the locking element 45 can come into contact with

the corresponding spindle 31 in a completely independent way. In particular, each folding element 44 is larger than the corresponding locking element 45 and has a through opening, on the inside of which the locking element 45 is arranged. As previously stated, the radial movement of the folding element 44 is independent of the radial movement of the locking element 45 to allow the two elements 44 and 45 to move radially with differentiated laws of motion.

[0037] As illustrated in Figure 9, each pair of folding elements 44 is rigidly mounted on a single common support bar 46, which is mounted radially movable on the coupling wheel 29, each pair of locking elements 45 is rigidly mounted on a single common support bar 47, which is mounted radially movable on the coupling wheel 29 and is arranged beside the support bar 46, and each pair of spindles 31 is rigidly mounted in a cantilever fashion on a single common support wall 48 (radially orientated), which is rigidly mounted on the coupling wheel 29 (as the spindles 31 do not perform any type of movement with respect to the coupling wheel 29). In the feeding station S1, each support wall 48 is arranged between the two corresponding spindles 31 (i.e. the two spindles 31 mounted in a cantilever fashion on the support wall 48) and the feeding device 37; to allow each holding head 42 to feed a reinforcing element 18 to a corresponding spindle 31, the support wall 48 has, for each spindle 31, a through opening 49 which is arranged under the spindle 31 and allows the passage of a holding head 42.

[0038] With reference to Figures 10-15, the feeding of a reinforcing element 18 and of a group 14 of cigarettes to a spindle 31 is described in the following.

[0039] Initially and as illustrated in Figure 10, the rotation of the coupling wheel 29 around the rotation axis 30 brings the spindle 31 into the feeding station S1.

[0040] Once the spindle 31 is standing still in the feeding station S1 and as illustrated in Figure 11, a holding head 42 places the reinforcing member 18 under the spindle 31 passing through the through opening 49 (illustrated in Figure 9) obtained through the support wall 48 of the spindle 31.

[0041] As illustrated in Figure 12, the holding head 42 lays the reinforcing element 18 on the locking element 45 (arranged in the receiving position) by moving radially downwardly and then releases the reinforcing element 18 on the locking element 45 thus moving away from the spindle 31.

[0042] As illustrated in Figure 13, once the holding head 42 has moved away from the spindle 31 leaving the reinforcing element 18 laying on the locking element 45 (arranged in the receiving position), the locking element 45 itself moves from the receiving position to the locking position by clamping (pushing, pressing) the reinforcing element 18 against the spindle 31.

[0043] Once the locking element 45 has locked the reinforcing element 18 against the spindle 31, the rotation of the coupling wheel 29 around the rotation axis 30 brings the spindle 31 from the feeding station S1 to the

feeding station S2 (as illustrated in Figure 14), in which, on the inside of the spindle 31, the group 14 of cigarettes is axially inserted (in the manner described above). Obviously, at this step, the group 14 of cigarettes does not touch, in any way, the reinforcing element 18 as the group 14 of cigarettes is arranged inside the spindle 31 whereas the reinforcing element 18 is arranged outside the spindle 31 and therefore the spindle 31 is interposed between the group 14 of cigarettes and the reinforcing element 18.

[0044] Once the group 14 of cigarettes has been axially inserted and as illustrated in Figure 15, the folding element 44 (which until now has remained in the receiving position) moves radially to the folding position in which the folding element 44 is pressed against the spindle 31 by embracing the spindle 31 and then enables the "U"-folding of the reinforcing element 18 against the spindle 31 (i.e. the two side walls 20 of the reinforcing element 18 fold by 90° with respect to the front wall 19 of the reinforcing element 18).

[0045] In the embodiment described above, to each group 14 of cigarettes, the coupling unit 26 couples an insert formed by the reinforcing element 18; according to a different embodiment, not illustrated, to each group 14 of cigarettes, the coupling unit 26 couples an insert formed by a coupon (in this case generally the coupon could also not be subjected to a "U"-folding, i.e. the coupon could also not be subjected to any kind of folding).

[0046] The embodiments described herein can be combined without departing from the scope of protection of the present invention.

[0047] The wrapping method described above has several advantages.

[0048] Firstly, the wrapping method described above enables a simple, precise and reliable coupling of an insert (in particular a reinforcing element 18) to a group 14 of cigarettes; in this way, it is possible to operate at a very high speed (expressed as the number of packets 1 of cigarettes produced per time unit), thus ensuring, at the same time, a perfect folding (i.e. with precise and squared folding angles) of the insert (i.e. of the reinforcing element 18) around the group 14 of cigarettes.

[0049] Moreover, the wrapping method described above can be implemented in a relatively simple and inexpensive manner in a packaging machine as it does not require particularly complex movements or parts having a large number of different movements.

Claims

1. A coupling method to couple an insert (18) to a group (14) of cigarettes in a packaging machine (24); the coupling method comprises the steps of:

feeding the group (14) of cigarettes into a tubular spindle (31), which is internally hollow and has the shape of a parallelepiped;
laying the insert (18) on an outer surface of the

- spindle (31); and
 extracting the group (14) of cigarettes and the insert (18) together from the spindle (31) by means of one single common extracting device (32), so as to cause the insert (18) to rest against the group (14) of cigarettes;
 the coupling method is **characterized in that** it comprises the further step of locking the insert (18) against the spindle (31) by pushing, against the spindle (31), a locking element (45) which clamps the insert (18) against the spindle (31).
2. The coupling method according to claim 1 and comprising the further step of folding the insert (18) around the spindle (31) at least in a "U"-shape by moving a "U"-shaped folding element (44) towards the spindle (31) which pushes the insert (18) against the spindle (31).
 3. The coupling method according to claim 2 and comprising the further steps of:
 - laying the insert (18) flat on an outer surface of the spindle (31); and
 - folding the insert (18) around the spindle (31) in a "U"-shape after having laid the insert (18) flat on the spindle (31).
 4. The coupling method according to claim 1, 2 or 3 comprising the further steps of:
 - laying the insert (18) flat on an outer surface of the spindle (31);
 - locking the insert (18) flat against the spindle (31) by means of the locking element (45); and
 - folding the insert (18) around the spindle (31) in a "U"-shape after having laid the insert (18) flat on the spindle (31) and by means of a folding element (44), which is different from and independent of the locking element (45).
 5. The coupling method according to one of the claims from 1 to 4 and comprising the further step of folding the insert (18) around the spindle (31) in a "U"-shape by moving a "U"-shaped folding element (44) towards the spindle (31), which pushes the insert (18) against the spindle (31), is arranged beside the locking element (45) and has a shape that is complementary to the shape of the locking element (45).
 6. The coupling method according to claim 5, wherein the folding element (44) has a through opening, where the locking element (45) is arranged.
 7. The coupling method according to one of the claims from 1 to 6, wherein the step of feeding the group (14) of cigarettes into the spindle (31) comprises causing the group (14) of cigarettes to pass through a compressing body (36), which is shaped like a funnel, is arranged in front of an end of the spindle (31) and elastically compresses the group (14) of cigarettes so as to reduce the size of the cross section of the group (14) of cigarettes.
 8. The coupling method according to one of the claims from 1 to 7 and comprising the further step of feeding a coupling conveyor (29), which supports the spindle (31), along a coupling path and through a first feeding station (S1), in which the insert (18) is laid on the outer surface of the spindle (31), through a second feeding station (S2), which is arranged downstream of the first feeding station (S1) and in which the group (14) of cigarettes is fed into the spindle (31); and finally through an extraction station (S3), in which the group (14) of cigarettes and the insert (18) are extracted from the spindle (31) together.
 9. The coupling method according to claim 8 and comprising the further step of folding the insert (18) around the spindle (31) at least in a "U"-shape at the second feeding station (S2).
 10. The coupling method according to claim 8 or 9, wherein two spindles (31), which are side-by-side and coupled to each other, simultaneously receive two corresponding inserts (18) in the first feeding station (S1), simultaneously receive two corresponding groups (14) of cigarettes in the second feeding station (S2), and simultaneously release the two groups (14) of cigarettes together with the inserts (18) in the extraction station (S3).
 11. The coupling method according to one of the claims from 1 to 10 and comprising the further steps of:
 - feeding, by means of a feeding conveyor (38), an insert (18) close to the spindle (31);
 - engaging the insert (18) carried by the feeding conveyor (38) by means of a sucking holding head (42); and
 - moving the sucking holding head (42) from the feeding conveyor (38) to the spindle (31) so as to lay the insert (18) on the spindle (31).
 12. The coupling method according to claim 11, wherein the sucking holding head (42) is shaped like a fork and has two tines (43), which engage opposite ends of the insert (18) and are arranged at a distance from one another that is greater than the corresponding cross size of the spindle (31).
 13. The coupling method according to claim 11 or 12, wherein the spindle (31) is mounted in a support wall (48) which is orientated perpendicularly to the spindle (31) and has a through opening (49), which is arranged under the spindle (31) and allows the pas-

sage of the holding head (42).

14. The coupling unit (26) to couple an insert (18) to a group (14) of cigarettes in a packaging machine (24); the coupling unit (26) comprises: 5

a tubular spindle (31), which is internally hollow and has the shape of a parallelepiped;
 a coupling conveyor (29), which supports and feeds the spindle (31); 10
 a first feeding station (S1), where the group (14) of cigarettes is fed into the spindle (31);
 a second feeding station (S2), where the insert (18) is laid on an outer surface of the spindle (31); and 15
 an extraction station (S3), where the group (14) of cigarettes and the insert (18) are extracted together from the spindle (31) by means of one single common extracting device (32), so as to cause the insert to rest against the group (14) 20
 of cigarettes;
 the coupling unit (26) is **characterized in that** it comprises a locking element (45) which is pushed against the spindle (31) to clamp the insert (18) against the spindle (31) and therefore 25
 lock the insert (18) against the spindle (31).

15. The coupling method to couple an insert (18) to a group (14) of cigarettes in a packaging machine (24); the coupling method comprises the steps of: 30

feeding the group (14) of cigarettes into a tubular spindle (31), which is internally hollow and has the shape of a parallelepiped;
 laying the insert (18) on an outer surface of the spindle (31); and 35
 extracting, from the spindle (31), the group (14) of cigarettes and the insert (18) together by means of one single common extracting device (32) so as to cause the insert (18) to rest against 40
 the group (14) of cigarettes.

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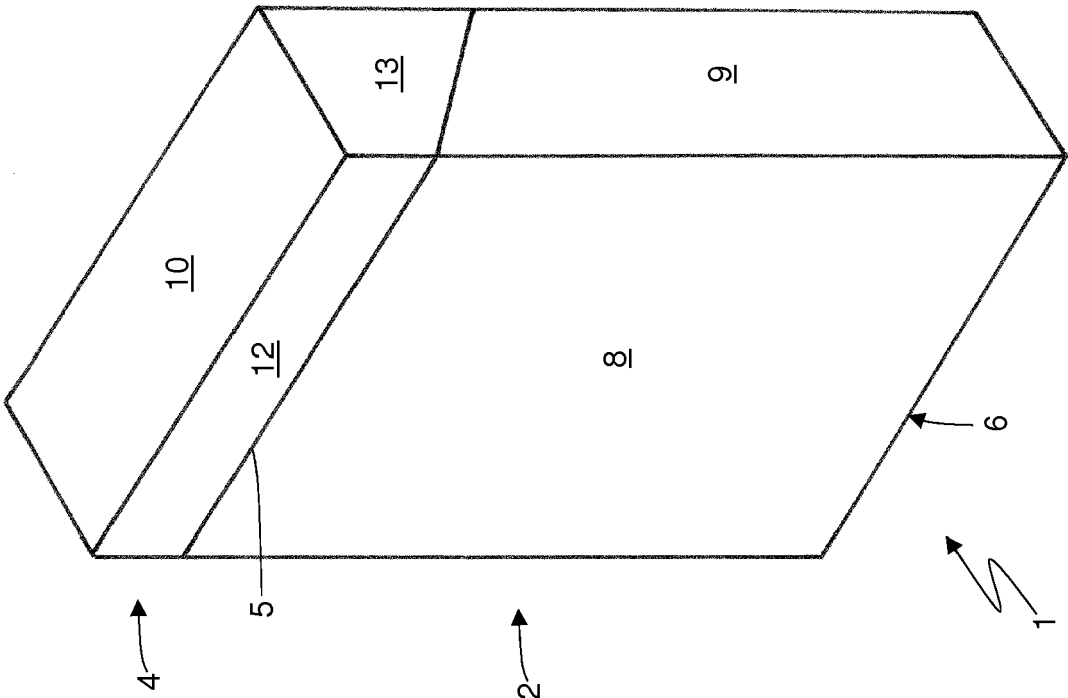


Fig. 1

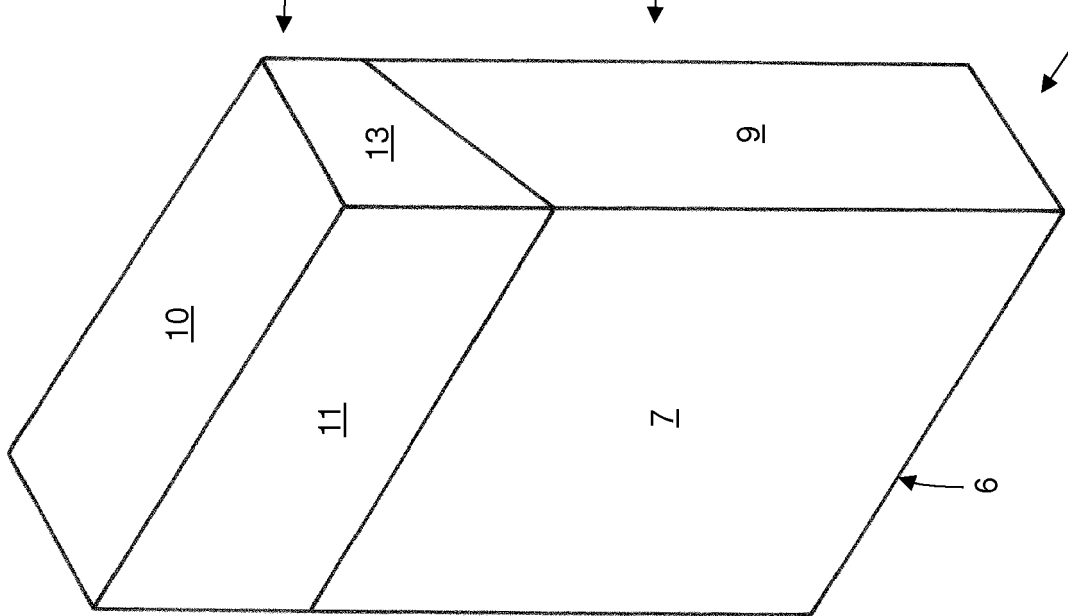
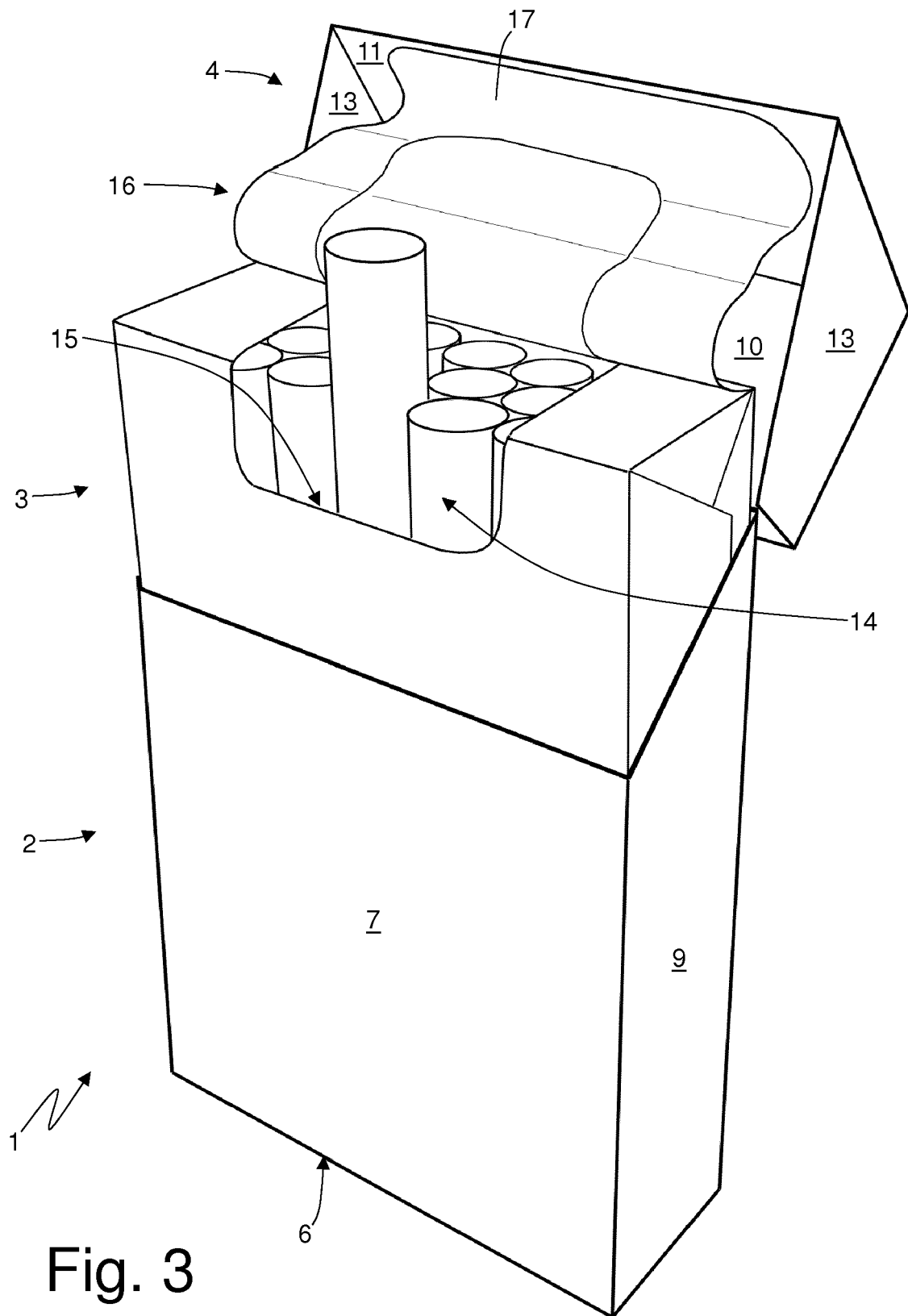


Fig. 2



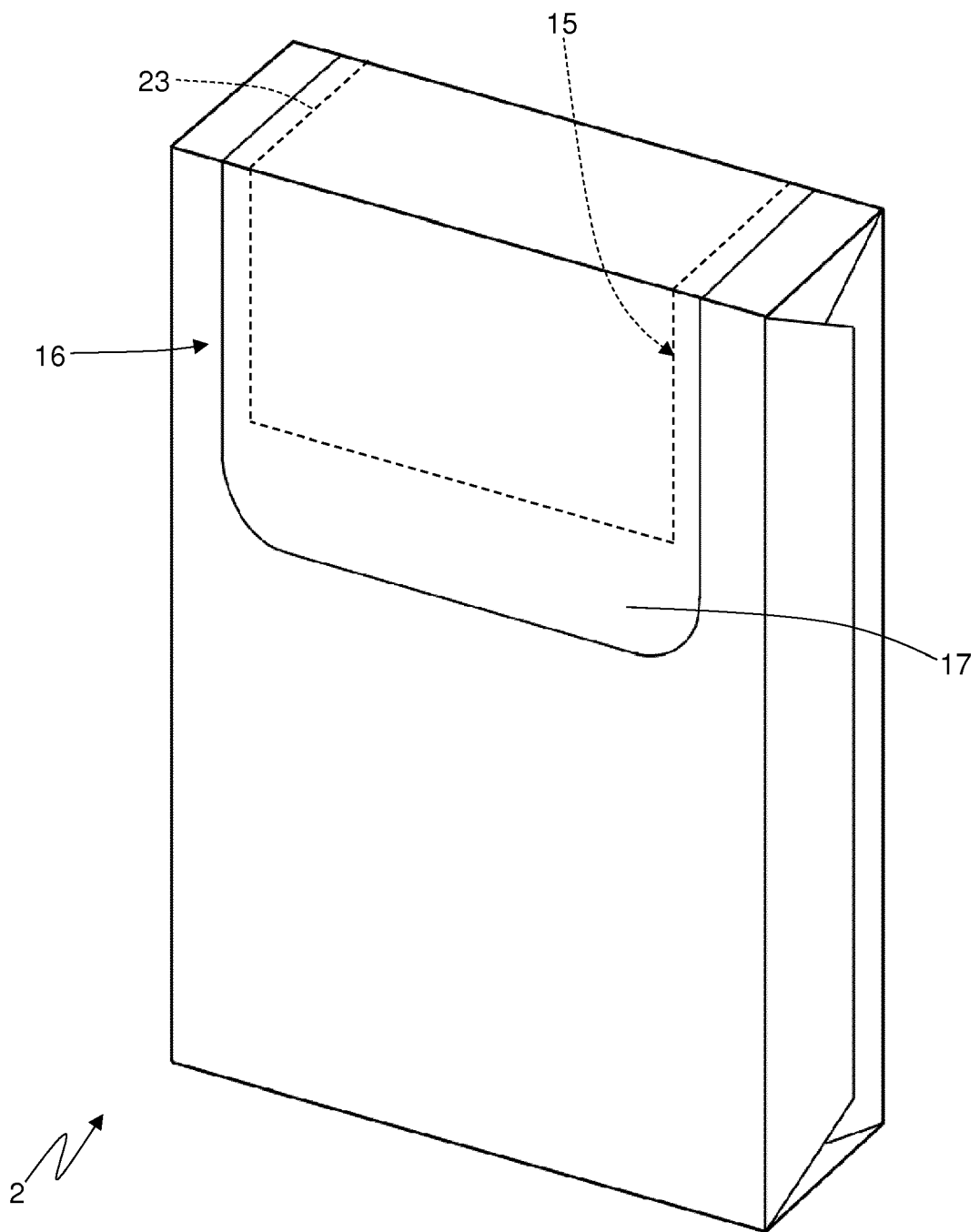


Fig. 4

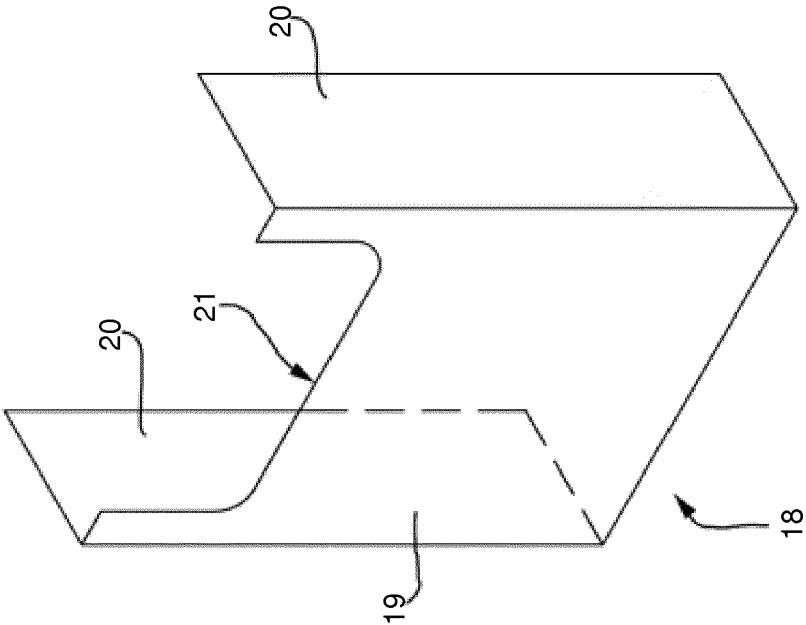


Fig. 6

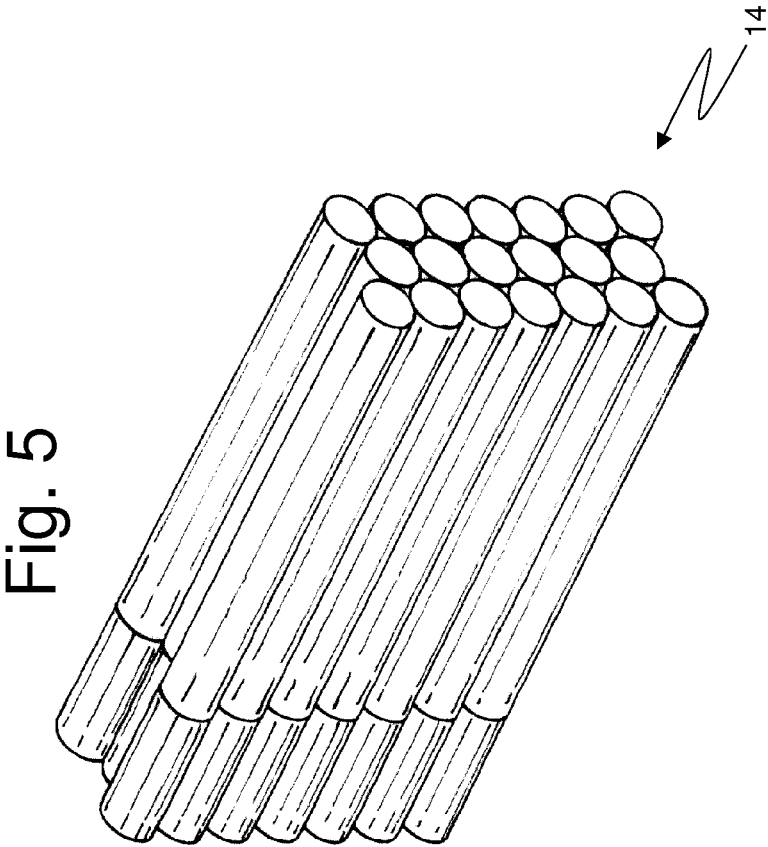


Fig. 5

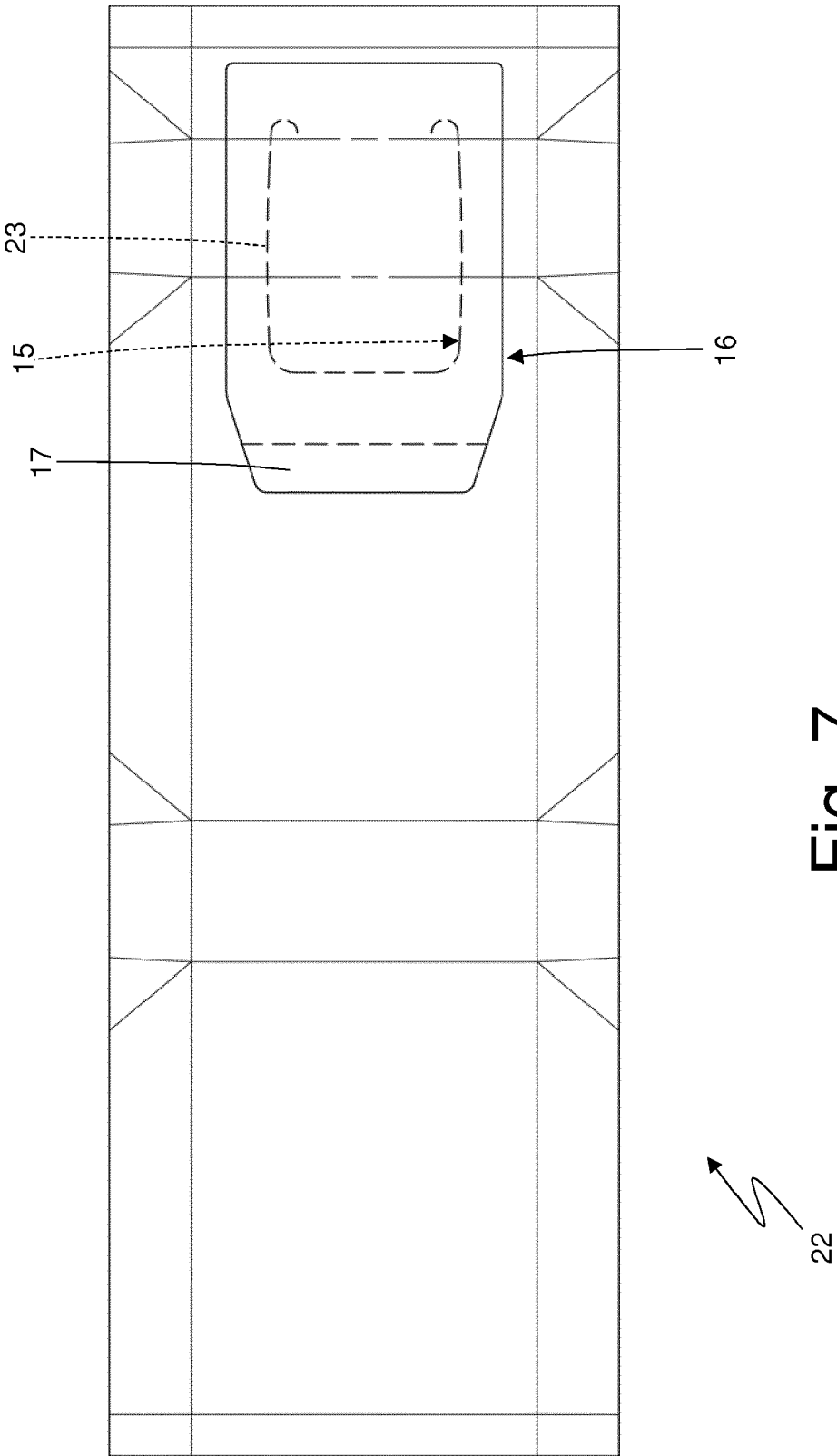


Fig. 7

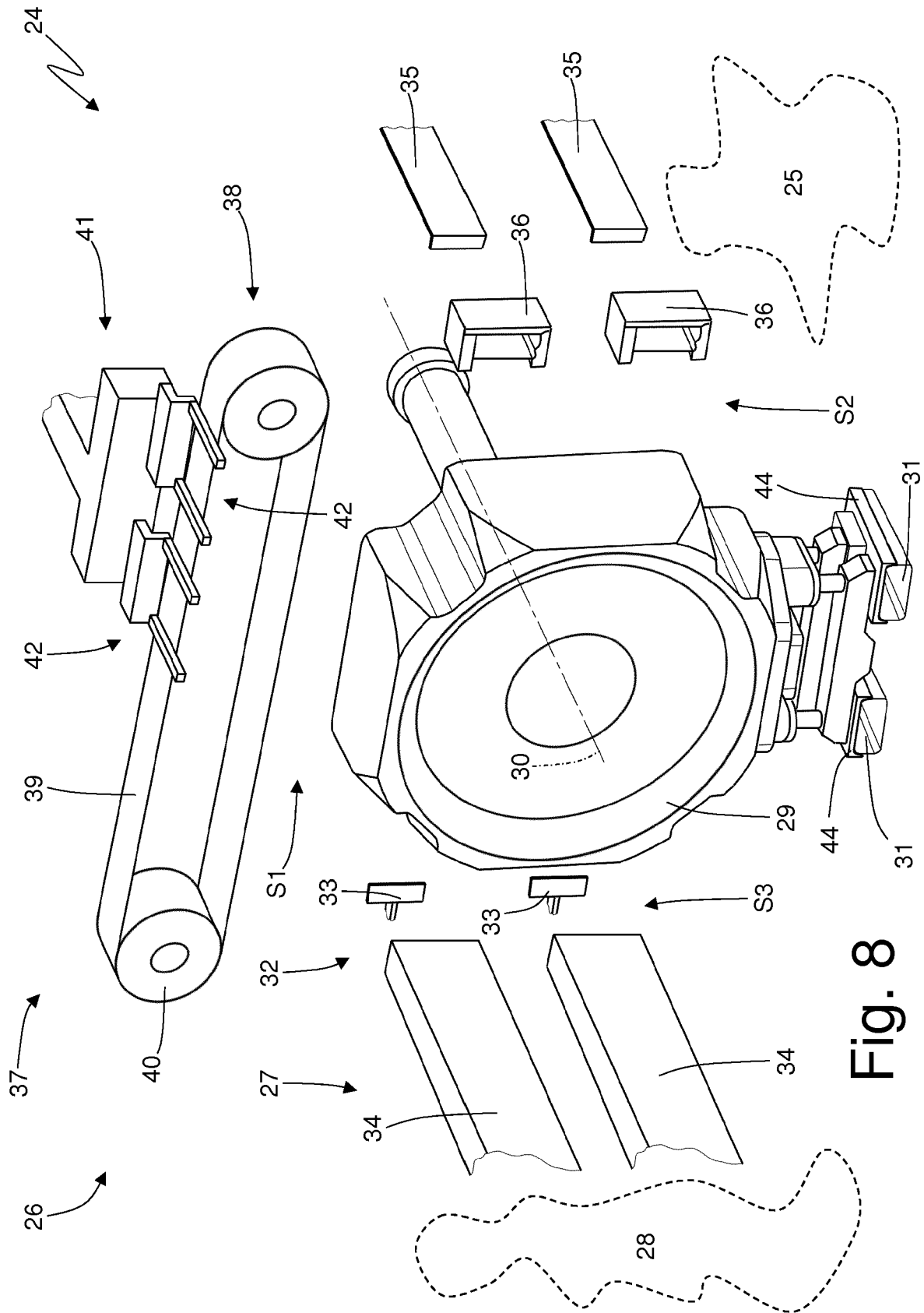
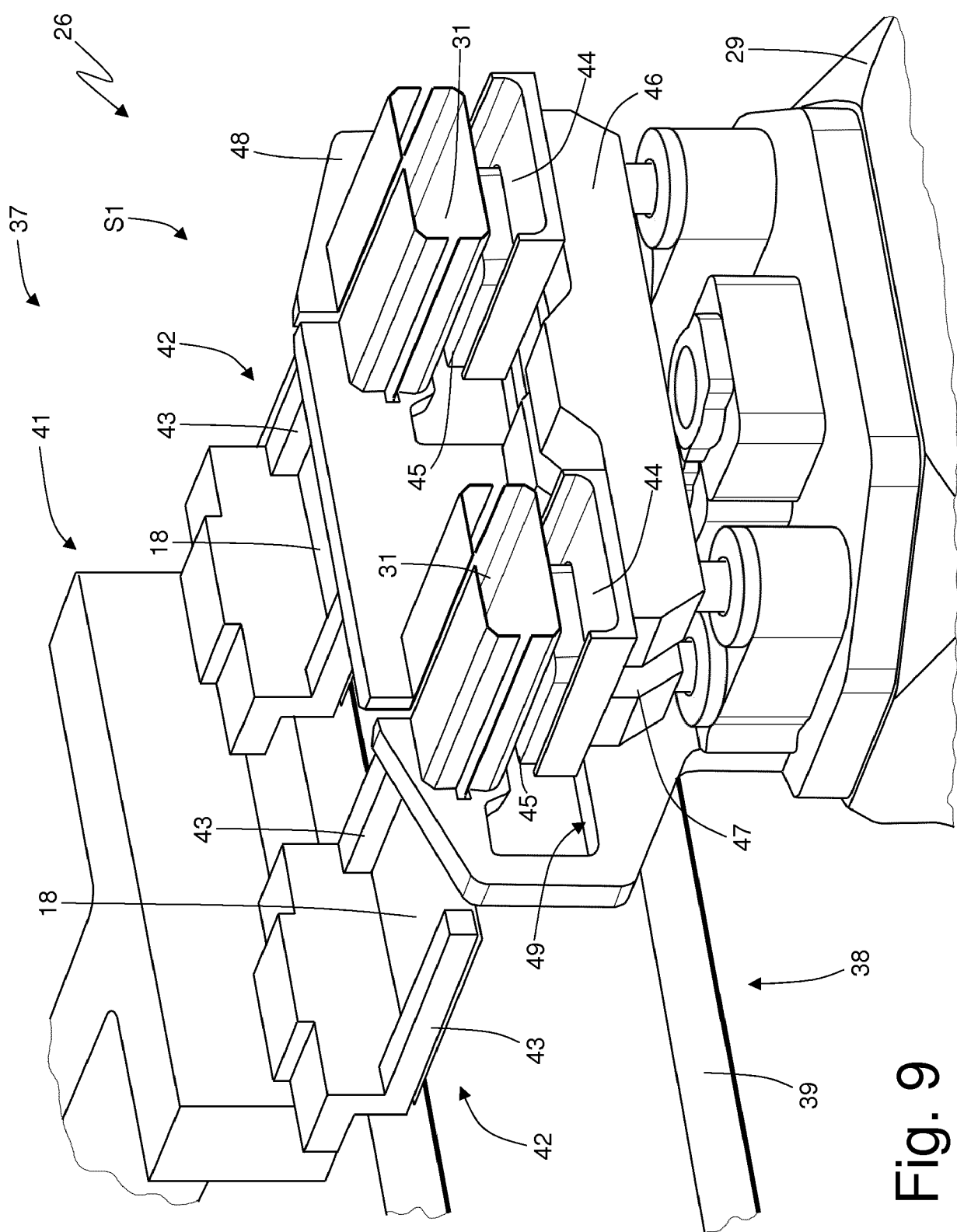


Fig. 8



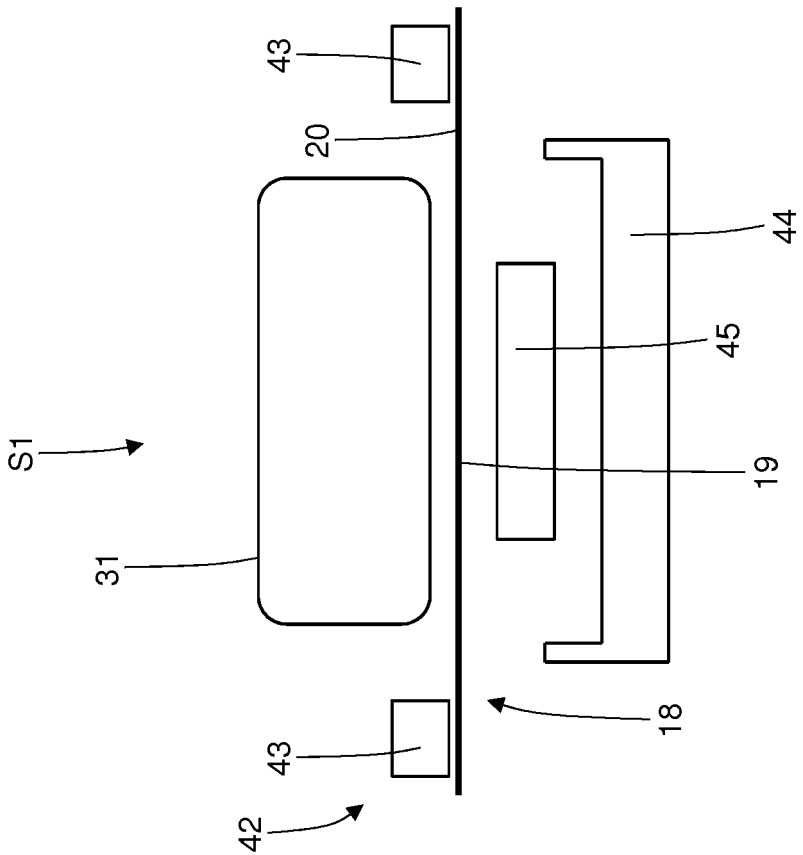


Fig. 11

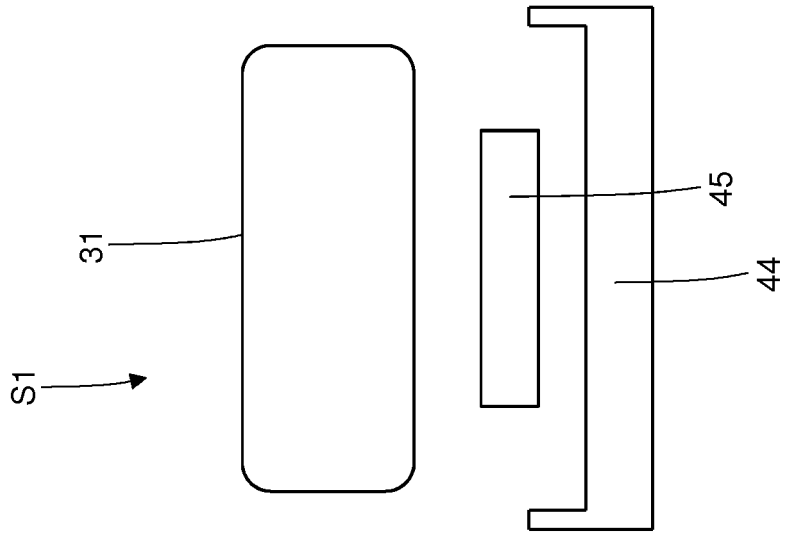


Fig. 10

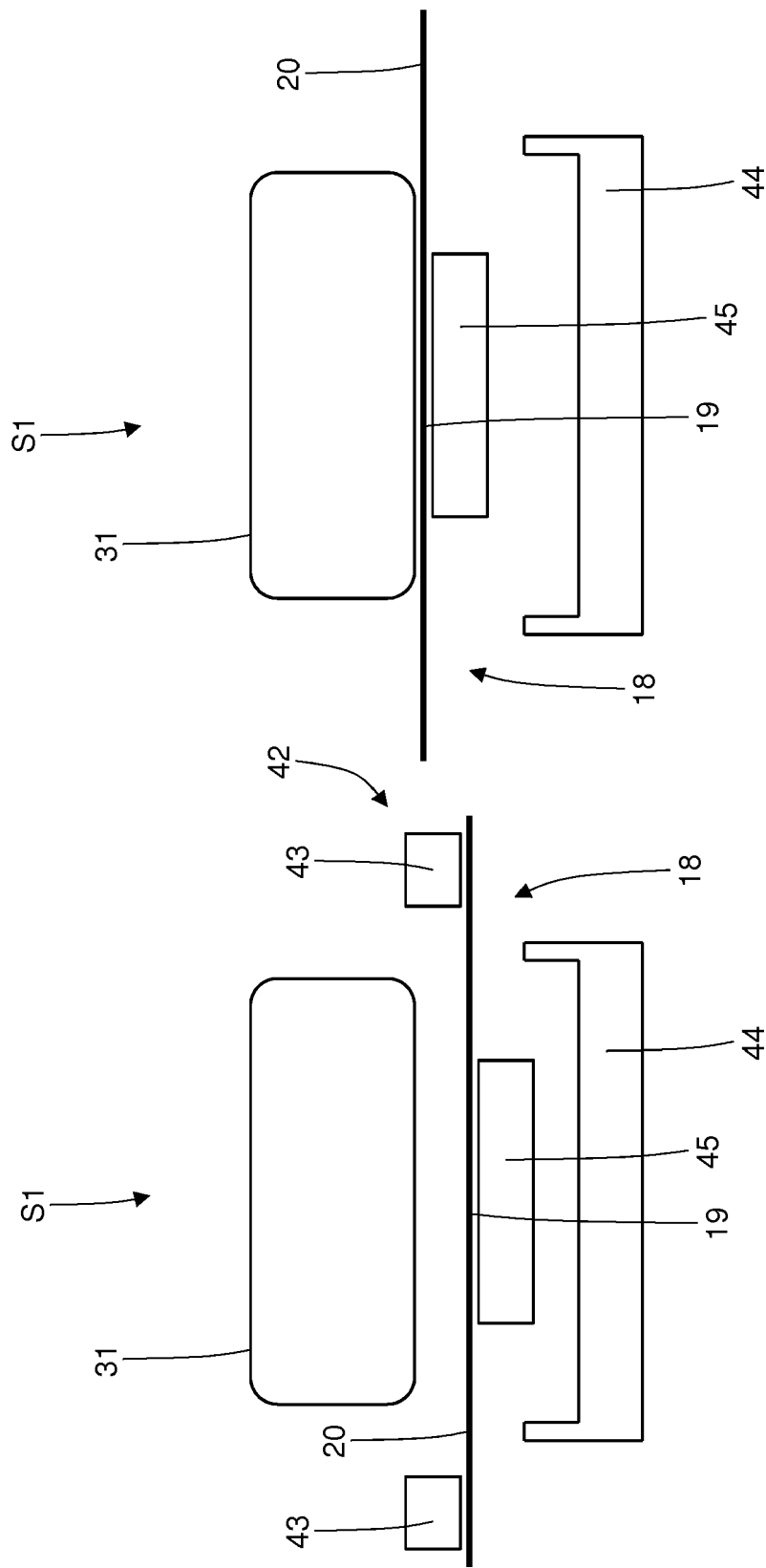


Fig. 13

Fig. 12

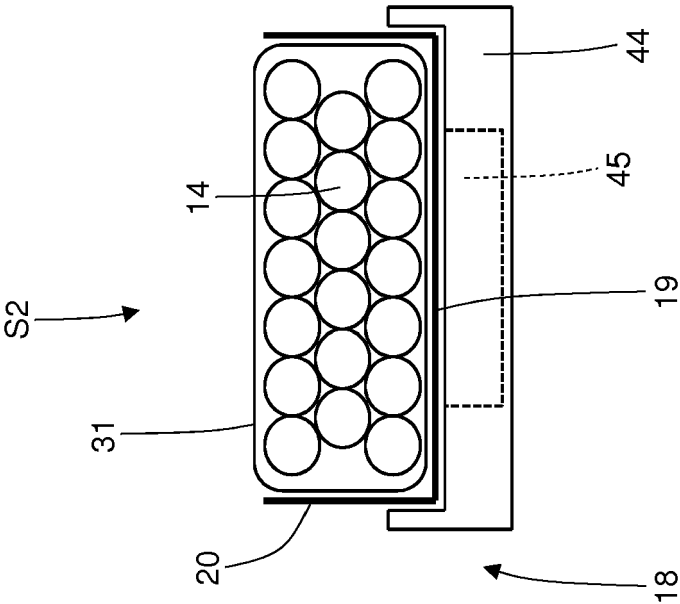


Fig. 14

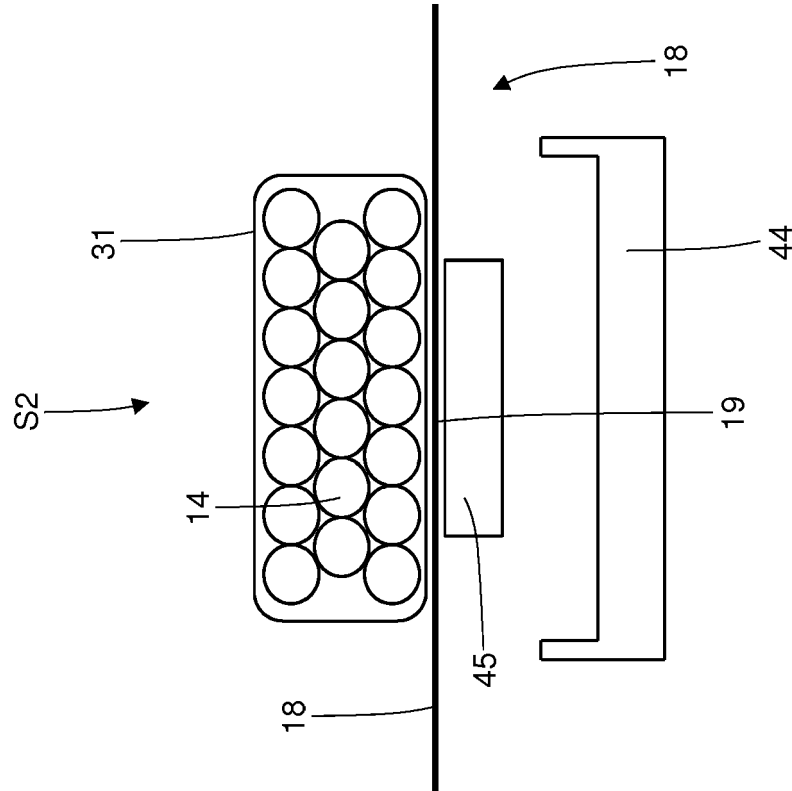


Fig. 15



EUROPEAN SEARCH REPORT

Application Number
EP 18 20 5659

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 101 337 590 A (GD SPA [IT]) 7 January 2009 (2009-01-07)	15	INV. B65B19/24 B65B61/20
A	* page 10, line 13 - page 17, line 15; figures 6-8 *	1-14	

A	DE 10 2014 010422 A1 (FÖCKE & CO [DE]) 21 January 2016 (2016-01-21)	1-15	
	* paragraph [0044] - paragraph [0045] *		

			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 February 2019	Examiner Yazici, Baris
CATEGORY OF CITED DOCUMENTS		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	
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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25-02-2019

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