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(54) **WRAPPING METHOD AND PACKER MACHINE TO FOLD A HEAT-SEALABLE SHEET OF WRAPPING MATERIAL AROUND A GROUP OF TOBACCO ARTICLES**

(57) Wrapping method and packer machine (15) to fold a sheet (11) of wrapping material around a group (2) of tobacco articles; the sheet (11) of wrapping material is caused to rest against an upper wall (3) of the group (2) of tobacco articles; the sheet (11) of wrapping material is "U"-folded around the group (2) of tobacco articles so that the "U"-folded sheet (11) of wrapping material has two ends (13, 14) that protrude from the larger side walls (5, 6) of the group (2) of tobacco articles; the two ends (13, 14) are overlapped to one another, thus giving to the sheet (11) of wrapping material a tubular shape; and the overlapping portions of the two ends (13, 14) of the sheet

(11) of wrapping material are heat-sealed so as to stabilize the tubular shape of the sheet (11) of wrapping material and form a sealing fin (F); the two ends (13, 14) are overlapped and heat-sealed to one another while the group (2) of tobacco articles coupled to the sheet (11) of wrapping material is housed in a pocket of a wrapping conveyor (21), which is fed along a wrapping path (P2); and the pocket of the wrapping conveyor (21) is oriented so that the sealing fin, i.e. the overlapping portions of the two ends of the sheet (11) of wrapping material, is arranged parallel to the wrapping path (P2) at least until the heat-sealing process has ended.

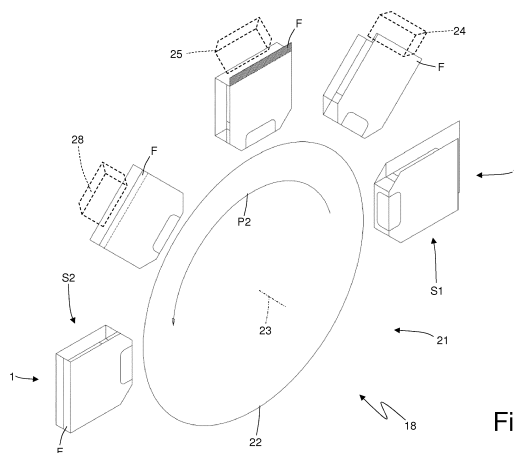


Fig. 12

Description

TECHNICAL FIELD

[0001] The present invention relates to a wrapping method and to a packer machine to fold a heat-sealable sheet of wrapping material around a group of tobacco articles.

[0002] The present invention finds advantageous application in the folding of a heat-sealable sheet of wrapping material around a parallelepiped-shaped group of cigarettes to produce a sealed wrap, to which the following description will make explicit reference without implying any loss of generality.

PRIOR ART

[0003] Over the last several years rigid packets of cigarettes of the type described in Patent US4300676A1 have been proposed on the market, wherein the inner wrap is impermeable and is formed by a sheet of wrapping material made of impermeable and heat-sealable material having a cigarette pull-out opening, which is closed by a reusable closing tab

[0004] Patent application WO2010136869A1 describes a wrapping method to produce a sealed wrap according to which are provided the steps of: feeding the group of cigarettes and the sheet of wrapping material inside a pocket of a wrapping drum so that the sheet of wrapping material is arranged "U"-folded inside the pocket and has an outer flap which protrudes from the pocket and an inner flap that rests on a side wall of the group of cigarettes; folding the inner flap by 90° relative to the side wall of the group of cigarettes so as to arrange the inner flap perpendicular to the side wall itself; folding the outer flap in an "L"-shape inside the pocket, against the side wall of the group of cigarettes and against the inner flap arranged perpendicular to the side wall so as to overlap the outer flap and the inner flap one over the other, thus giving to the sheet of wrapping material a tubular shape; and heat-seal the outer flap and the inner flap to one another. In patent application WO2010136869A1 a wrapping drum is used provided with a plurality of pockets, each of which comprises a lower wall and two side walls that are parallel and opposite to one another; a side wall of each pocket has a reduced size relative to the opposite side wall so as to leave the inner flap of the sheet of wrapping material uncovered and ends with a transverse support element, which is arranged perpendicular to the side wall and is provided with suction so as to attract and hold the inner flap of the sheet of wrapping material by means of suction. Each transverse support element performs a contrast function both when folding the outer flap against the inner flap, and during the subsequent heat-sealing of the outer flap to the inner flap.

[0005] The fact that the contrast used during the heat-sealing (i.e. the transverse support element) is mounted on the drum and belongs precisely to each pocket (i.e.

each pocket has its own contrast, i.e. its own transverse support element) makes the setup step more complex (therefore a longer execution) as it is necessary to finely adjust the position of each contrast (i.e. of each transverse support element) so as to cooperate in an optimal manner with at least one moveable sealing device that is on the outside of the wrapping drum and is common to all the pockets; i.e. it is necessary to repeat the fine adjustment of the position of each contrast (i.e. of each transverse support element) with respect to the common moveable sealing device. In addition, the fact that the contrast used during the heat-sealing (i.e. the transverse support element) is mounted on the drum means that it is necessary to replace a greater number of parts due to wear and/or size change because each pocket has a corresponding contrast. Lastly, the fact that the contrast used during the heat-sealing process (i.e. the transverse support element) is mounted on the drum gives a lower repeatability of the product quality (since the sealing process may change from pocket to pocket); in other words, the same wrapping drum can produce both perfectly sealed wraps, and unsatisfactory sealed wraps.

[0006] It is important to note that the aforementioned drawbacks are accentuated by the increase in the hourly productivity of the packer machine, as increasing the hourly productivity decreases the time available to perform the heat-sealing process and hence the heat-sealing process itself is of good quality only if the common moveable sealing device is mechanically coupled with the corresponding contrast (i.e. with the corresponding transverse support element) in an optimal manner. Consequently, the packer machine described in patent application WO2010136869A1 is not suitable for operating at a very high hourly productivity rate.

[0007] Patent application WO2015128812A1 describes a packer machine comprising: a forming station in which groups of cigarettes are formed in succession, a preliminary folding station in which a corresponding sheet of wrapping material is "U"-folded around each group of cigarettes, a longitudinal folding station in which each sheet of wrapping material is longitudinally folded in the area of the smaller side walls of the respective group of cigarettes so as to form and heat-seal a couple of opposing longitudinal fins, and a transverse folding station in which each sheet of wrapping material is transversely folded in the area of the smaller wall of the respective group of cigarettes so as to form and heat-seal a transverse fin.

DESCRIPTION OF THE INVENTION

[0008] The object of the present invention is to provide a wrapping method and a packer machine to fold a heat-sealable sheet of wrapping material around a group of tobacco articles, which wrapping method and packer machine allow to operate quickly (i.e. with a high hourly productivity rate) while guaranteeing a high and above all constant production quality and, at the same time, being

easy and inexpensive to implement.

[0009] According to the present invention a wrapping method and a packer machine is provided to fold a heat-sealable sheet of wrapping material around a group of tobacco articles, according to what is claimed in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention will now be described with reference to the accompanying drawings, which illustrate some examples of non-limiting embodiments, wherein:

Figure 1 illustrates a front perspective view of a cigarette wrap made according to the wrapping method of the present invention;

Figure 2 illustrates a perspective view of a group of cigarettes contained in the wrap of Figure 1;

Figure 3 illustrates a perspective view of a reinforcing element which can be contained in the wrap of Figure 1;

Figure 4 illustrates a plan view of a sheet of wrapping material used to make the wrap of Figure 1;

Figures 5-10 illustrate some steps of the wrapping method of the present invention to fold the sheet of wrapping material of Figure 4 around the group of cigarettes of Figure 2 in order to obtain the cigarette wrap of Figure 1;

Figure 11 is a schematic and perspective view of a packer machine which produces the wrap of Figure 1 and is made according to the present invention;

Figure 12 is an enlarged scale view of a wrapping drum of the packer machine of Figure 11;

Figure 13 is a schematic and perspective view of an alternative embodiment of a packer machine made according to the present invention;

Figure 14 is an enlarged scale view of a wrapping drum of the packer machine of Figure 13;

Figure 15 is a schematic and perspective view of a further embodiment of a packer machine which produces the wrap of Figure 1 and is made according to the present invention; and

Figure 16 is a schematic and perspective view of another embodiment of a packer machine made according to the present invention.

PREFERRED EMBODIMENTS OF THE INVENTION

[0011] In figure 1, number 1 denotes, as a whole, a sealed cigarette wrap for example of the type described in patent US4300676A1.

[0012] As illustrated in Figure 2, the wrap 1 for cigarettes encloses a group 2 of cigarettes with a parallelepiped shape having an upper wall 3 and a lower wall 4, which are formed by the tips of the cigarettes and are parallel and opposite to one another, two larger side walls 5 and 6, which are formed by the cylindrical side walls of

the cigarettes and are parallel and opposite to one another, and two smaller side walls 7 and 8, which are formed by the cylindrical side walls of the cigarettes and are parallel and opposite to one another. According to a preferred embodiment, the upper wall 3 of the group 2 of cigarettes is arranged in the area of the cigarette filters, while the lower wall 4 of the group 2 of cigarettes is arranged in the area of the tips of the cigarettes (i.e. the ends of the cigarettes with the tobacco in view).

[0013] As illustrated in Figures 1 and 4, the wrap 1 has, at the top and in front, a cigarette pull-out opening 9 (shown in Figure 4), which is delimited by a pre-weakened tear-open line, is closed by a reusable closing tab 10 and involves a portion of a front wall of the wrap 1 and a portion of an upper wall of the wrap 1. According to a preferred embodiment, the closing tab 10 is fixed to the wrap 1 for cigarettes by means of a repositionable non-drying adhesive which is applied to the lower surface of the closing tab 10 and is arranged all around the pull-out opening 9 so as to allow the closing tab 10 to be repeatedly partially separated from the wrap 1 and then again fixed to the wrap 1.

[0014] The wrap 1 is made by folding a rectangular-shaped sheet 11 of wrapping material (illustrated in Figure 4) around the group 2 of cigarettes (illustrated in Figure 2). Before folding the sheet 11 of wrapping material around the group 2 of cigarettes, the sheet 11 of wrapping material is centrally pre-incised to define the pull-out opening 9; thereafter, to the sheet 11 of wrapping material a closing tab 10 is applied, which is gummed on the lower part, i.e. provided with the repositionable adhesive on its lower surface that inside the pull-out opening 9 causes the permanent gluing of the inner portion of the sheet 11 of wrapping material to the closing tab 10 and on the outside of the pull-out opening 9 causes a detachable gluing of the sheet 11 of wrapping material to the closing tab 10.

[0015] As illustrated in Figure 3, the wrap 1 can comprise a reinforcing element 12, which is made of cardboard or rigid paperboard, is "U"-shaped and is arranged inside the wrap 1 in contact with the group 2 of cigarettes. The function of the reinforcing element 12 is to provide greater stiffness and greater stability to the shape of the wrap 1 so as to prevent the wrap 1 from collapsing upon itself after extracting a portion of the cigarettes contained in wrap 1 thus complicating the extraction of the remaining cigarettes and in particular making the opening and subsequent re-closing of the closing tab 10 extremely complicated. An additional function of the reinforcing element 12 is to provide a mechanical protection for the cigarettes during the folding of the sheet 11 of wrapping material, a mechanical and thermal protection for the cigarettes during the heat-sealing process of the overlapping portions of the sheet 11 of wrapping material, and a mechanical protection for the cigarettes during the handling of the wrap 1.

[0016] Figures 5-8 illustrate the folding steps of the sheet 11 of wrapping material around the group 2 of cig-

arettes, which has the two larger side walls 5 and 6 that are opposite to one another and are formed by the cylindrical side walls of the cigarettes, and the two upper and lower walls 3 and 4 that are opposite to one another and are formed by the tips of the cigarettes.

[0017] Initially, the group 2 of cigarettes is coupled to the flat sheet 11 of wrapping material by bringing the upper wall 3 of the group 2 of cigarettes in contact with the sheet 11 of wrapping material (Figure 5); subsequently, the sheet of wrapping material is folded in a "U"-shape around the group 2 of cigarettes (Figure 6) so that the "U"-folded sheet 11 of wrapping material is arranged in the area of the upper wall 3 and of the two larger side walls 5 and 6 of the group 2 of cigarettes and has two ends 13 and 14 which are parallel to the larger side walls 5 and 6 and protrude from the larger side walls 5 and 6 (i.e. continue beyond the larger side walls 5 and 6) it is important to note that the sheet 11 of wrapping material is asymmetrically fed in front of the group 2 of cigarettes (i.e. the sheet 11 of wrapping material is caused to asymmetrically rest against the upper wall 3 of the group 2 of cigarettes) to define the two ends 13 and 14 which both protrude from the group 2 of cigarettes and have a different length (i.e. the end 13 is longer than the end 14 and the difference in length between the end 13 and the end 14 is equal to the width of the lower wall 4 of the group 2 of cigarettes). As illustrated in Figure 6, the end 13 is parallel to the larger side wall 6 of the group 2 of cigarettes and protrudes from the lower wall 4 of the group 2 of cigarettes continuing beyond the larger side wall 6; likewise, the end 14 is parallel to the larger side wall 5 of the group 2 of cigarettes and protrudes from the lower wall 4 of the group 2 of cigarettes, continuing beyond the larger side wall 5. As illustrated in Figure 7, the end 13 is folded by 90° relative to the larger side wall 6 of the group 2 of cigarettes and against the lower wall 4 of the group 2 of cigarettes and, at the same time, a final part of the end 13 is folded by 90° to give the end 13 an "L"-shape and, hence, arrange the final part of the end 13 parallel and resting on the end 14 (which does not undergo any folding, in this step, i.e. it remains parallel to the larger side wall 5) thus giving the sheet 11 of wrapping material a tubular shape; in other words at the same time (i.e. with the same folding action) the end 13 is folded by 90° into two distinct points: a first folding by 90° around the edge between the larger side wall 6 and the lower wall 4 and a second folding in the area of the edge between the larger side wall 5 and the lower wall 4 (i.e. near the end 14) so as to give the end 13 an "L"-shape and to support the final part of the end 13 against the end 14. When the end 13 is folded in an "L"-shape and rests (in its final part) on the end 14, to the sheet 11 of wrapping material a tubular shape is given having two open side edges in the area of the smaller side walls 7 and 8 of the group 2 of cigarettes. At this point, as illustrated in Figure 8, the overlapping portions of the ends 13 and 14 are heat-sealed to one another so as to stabilize the tubular shape of the sheet 11 of wrapping material and form a

sealing fin F. Finally, the ends 13 and 14 overlapped and heat-sealed to one another (i.e. the sealing fin F) are folded by 90° against the lower wall 4 of the group 2 of cigarettes (as illustrated in Figure 9) and with the interposition of part of the sheet 11 of wrapping material; alternatively, the ends 13 and 14 overlapped and heat-sealed one to the other (i.e. the sealing fin F) are folded by 180° against the larger side wall 5 of the group 2 of cigarettes (as illustrated in Figure 10) and with the interposition of part of sheet 11 of wrapping material.

[0018] In Figure 11, number 15 denotes, as a whole, a packer machine to produce the wrap 1 for cigarettes illustrated in Figure 1 following the wrapping steps illustrated in Figures 5-9.

[0019] It is important to note that the packer machine 15 can comprise only the components illustrated in Figure 11 (in this case each wrap 1, described above, is a finished product and can be directly marketed); alternatively, the packer machine 15 can comprise further components of a known type to wrap, around each wrap 1, a respective outer casing which encloses the wrap 1 and can be formed by an outer sheet of wrapping material folded around the wrap 1 and cup-shaped (soft type packet of cigarettes), or it can be formed by a rigid box with a hinged lid formed by folding a rigid blank around the wrap 1 (rigid type packet of cigarettes).

[0020] The packer machine 15 comprises a forming unit 16 in which the group 2 of cigarettes are formed in succession, a preliminary folding unit 17 in which a corresponding sheet 11 of wrapping material is "U"-folded around each group 2 of cigarettes, a transverse folding unit 18 in which each sheet 11 of wrapping material is transversely folded in the area of the bottom wall 4 of the respective group 2 of cigarettes so as to form a tubular wrap, and a longitudinal folding unit 19 in which each sheet 11 of wrapping material is longitudinally folded in the area of the smaller side walls 7 and 8 of the respective group 2 of cigarettes to complete the forming of the wrap 1.

[0021] The packer machine 15 comprises a wrapping conveyor 20, which comprises a plurality of pockets (known and not illustrated) that are suited to house corresponding groups of cigarettes and are step-fed (that is, with a law of motion which cyclically alternates a movement step and a rest step) along a wrapping path P1 throughout the forming unit 16 and the preliminary folding unit 17. Preferably, the pockets project outwards from the wrapping conveyor 20, i.e. each pocket is fixed to the wrapping conveyor 20 only in the area of a first end, and a second end opposite the first end is free of constraints from the wrapping conveyor 20 and relatively set apart from the wrapping conveyor 20 itself. In the non-limiting embodiment illustrated in the accompanying figures, the wrapping conveyor 20 comprises a belt wound around end pulleys (one of which is motorized) and moves by-step along a closed loop path; alternatively, the wrapping conveyor 20 comprises a drum which is mounted so as to rotate around a central rotation axis. The forming unit

16 for the groups 2 of cigarettes comprises a hopper (schematically illustrated) provided with three outlet mouths to simultaneously feed three groups 2 of cigarettes to respective pockets of the wrapping conveyor 20 which advances by-step along the wrapping path P1.

The preliminary folding unit 17 is arranged along the wrapping conveyor 20 (i.e. along the wrapping path P1) downstream of the forming unit 16. In the preliminary folding unit 17, each group 2 of cigarettes carried by a pocket is coupled to the corresponding flat sheet 11 of wrapping material by resting the sheet 11 of wrapping material against the upper wall 3 of the group 2 of cigarettes (as illustrated in Figure 5); subsequently, the sheet 11 of wrapping material is folded in a "U"-shape around the group 2 of cigarettes (as illustrated in Figure 6).

[0022] In the preliminary folding unit 17, the sheet 11 of wrapping material can immediately take the shape illustrated in Figure 6 (i.e. in which both sides of the sheet 11 of wrapping material adhere to the larger side walls 5 and 6 of the group 2 of cigarettes thus forming folding angles of 90°), or (as illustrated in Figure 11) the sheet 11 of wrapping material can initially assume a more open shape wherein one side of the sheet 11 of wrapping material is raised relative to the larger side wall 5 or 6 of the group 2 of cigarettes thus forming a folding angle greater than 90° and therefore can take the final shape illustrated in Figure 6 (i.e. in which both sides of the sheet 11 of wrapping material adhere to the larger side walls 5 and 6 of the group 2 of cigarettes thus forming folding angles of 90°) when the group 2 of cigarettes leaves the corresponding pocket of the wrapping conveyor 20 together with the sheet 11 of wrapping material.

[0023] The transverse folding unit 18 comprises a wrapping conveyor 21, which receives in succession the wraps 1 (each formed by a sheet 11 of wrapping material "U"-folded around a corresponding group 2 of cigarettes) from the wrapping conveyor 20 in a transfer station S1 and feeds in succession the wraps 1 along a folding path P2 which is circular. In particular, the wrapping conveyor 21 comprises a wrapping drum 22 which rotates by-step (that is, with a law of motion which cyclically alternates a movement step and a rest step) around a central rotation axis 23 and is provided with a plurality of peripheral pockets each suited to house a corresponding partially formed wrap 1 (i.e. a group 2 of cigarettes partially wrapped in a sheet 11 of wrapping material).

[0024] In other words each group 2 of cigarettes, wrapped in the "U"-folded sheet 11 of wrapping material, is inserted into a pocket of the wrapping drum 22 (i.e. into a pocket of the wrapping conveyor 21), which is fed along the wrapping path P2 to perform the folding of the two ends 13 and 14 and thus to perform the heat-sealing process which forms the sealing fin F. When the group 2 of cigarettes is arranged in a pocket of the wrapping drum 22 (i.e. in a pocket of the wrapping conveyor 21), the sealing fin F, i.e. the final part of the end 13 and the end 14, are arranged parallel to the wrapping path P2 (at least until the heat-sealing process has ended, i.e. at

least until the sealing fin F is completely formed). In other words, when the group 2 of cigarettes is arranged in a pocket of the wrapping drum 22 (i.e. in a pocket of the wrapping conveyor 21), the two larger side walls 5 and 6 of the group 2 of cigarettes are arranged parallel to the wrapping path P2, the two smaller side walls 7 and 8 of the group 2 of cigarettes are arranged perpendicular to the wrapping path P2, and the upper wall 3 and the lower wall 4 of the group 2 of cigarettes are arranged parallel to the wrapping path P2.

[0025] As illustrated in Figure 12, along the wrapping conveyor 21, i.e. along the wrapping path P2, and a folding device 24 is arranged immediately downstream of the transfer station S1, which performs the double folding of the end 13 of the sheet 11 of wrapping material illustrated in Figure 7 and described above, which gives the end 13 an "L"-shape; in other words, the folding device 24 folds the end 13 by 90° relative to the larger side wall 6 of the group 2 of cigarettes, and at the same time, folds the final part of the end 13 in an "L"-shape so as to arrange the final part of the end 13 against the end 14 which does not undergo any type of folding, at this step. According to a preferred embodiment, the folding device 24 is of a passive type (i.e. is completely devoid of moving parts) and comprises only fixed folding helixes.

[0026] As illustrated in Figure 12, along a wrapping conveyor 21, i.e. along the wrapping path P2, and immediately downstream of the folding device 24, a sealing device 25 is arranged, which performs the heat-sealing of the overlapping portions of the ends 13 and 14 (i.e. forms the sealing fin F) so as to stabilize the tubular shape of the sheet 11 of wrapping material as illustrated in Figure 8. According to a preferred embodiment illustrated in Figure 8, the sealing device 25 comprises a sealing gripper 26 with two moveable and heated jaws 27: during the advancing step of the wrapping conveyor 21, the sealing gripper 26 is opened (i.e. the two jaws 27 are relatively far apart one from the other) so as to allow the ends 13 and 14 of the sheet 11 of wrapping material (i.e. the sealing fin F) to pass through the sealing gripper 26 without rubbing whereas during the rest step of the wrapping conveyor 21 the sealing gripper 26 is closed (i.e. the two jaws 27 are pushed one against the other with a certain force to tighten, in between, the ends 13 and 14 of the sheet 11 of wrapping material) so as to perform the heat-sealing process (as a result of the simultaneous application of heat and pressure) of the overlapping portions of the ends 13 and 14 of the sheet 11 of wrapping material. It is important to note that a single sealing device 25 is provided, i.e. a sealing gripper 26, which is arranged in a fixed position along the wrapping conveyor 21, i.e. along the wrapping path P2, and is common to all the wraps 1; in other words, all the wraps 1 are heat-sealed in the area of the ends 13 and 14 of the sheet 11 of wrapping material (i.e. the sealing fins F) by a single common sealing device 25.

[0027] According to a possible embodiment, the folding device 24 only performs the folding of the end 13 of

the sheet 11 of wrapping material thus giving to the end 13 itself an "L"-shape (as illustrated in Figure 7) leaving the sealing device 25 the task of performing the heat-sealing of the overlapping portions of the ends 13 and 14. According to an alternative embodiment, the folding device 24 can also comprise (at least) one heated element for simultaneously performing both the folding of the end 13 of the sheet 11 of wrapping material thus giving to the end 13 itself an "L"-shape (as illustrated in Figure 7), and an initial heat-sealing of the overlapping portions of the ends 13 and 14; thereafter, the sealing device 25 completes the heat-sealing of the overlapping portions of the ends 13 and 14 started by the folding device 24.

[0028] In the embodiment illustrated in the attached figures, the transverse folding unit 18 comprises a single sealing device 25 arranged immediately downstream of the folding device 24; according to a different and perfectly equivalent embodiment, the transverse folding unit 18 comprises two or more (typically no more than three) sealing devices 25 arranged in succession immediately downstream of the folding device 24.

[0029] As illustrated in Figure 12, along the wrapping conveyor 21, i.e. along the wrapping path P2, and immediately downstream of the sealing device 25, a folding device 28 is arranged, which performs the folding by 90° of the flaps 13 and 14 overlapped and heat-sealed to one another (i.e. of the sealing fin F) illustrated in Figure 9; in other words, the folding device 28 folds by 90° the flaps 13 and 14 overlapped and heat-sealed to one another (i.e. the sealing fin F) against the lower wall 4 of the group 2 of cigarettes and with the interposition of part of the sheet 11 of wrapping material. According to a preferred embodiment, the folding device 28 is of a passive type (i.e. it is completely devoid of moving parts) and only comprises fixed folding helices.

[0030] As illustrated in Figure 12, the wrapping conveyor 21 feeds each wrap 1 (formed, in the area of the wrapping conveyor 21, by a group 2 of cigarettes partially wrapped in a sheet 11 of wrapping material) so that the upper and lower walls 3 and 4 and the larger side walls 5 and 6 of the group 2 of cigarettes are parallel to the wrapping path P2 and the smaller side walls 7 and 8 of the group 2 of cigarettes are perpendicular to the wrapping path P2; in other words, the wrapping conveyor 21 feeds each wrap 1 so that the ends 13 and 14 of the sheet 11 of wrapping material (i.e. the sealing fin F) are (at least until the heat-sealing process) parallel to the wrapping path P2.

[0031] As illustrated in Figure 11, at the end of the transverse folding unit 18 (i.e. at the entrance of the longitudinal folding unit 19) each wrap 1 has a tubular shape having two side edges open in the area of the smaller side walls 7 and 8 of the group 2 of cigarettes. The longitudinal folding unit 19 comprises a wrapping conveyor (known and not illustrated), which receives the wraps 1 in succession (each formed by a sheet 11 of wrapping material folded in a tubular shape around a correspond-

ing group 2 of cigarettes) from the longitudinal wrapping conveyor 21 in a transfer station S2 and advances along a path P3 that is straight and is arranged perpendicular to the folding path P2. The transfer station S2 is opposite to the transfer station S1 and is arranged at 180° along the wrapping path P2 relative to the transfer station S1. The longitudinal folding unit 19 comprises folding devices (known and not illustrated), which fold, in a known manner, the two open side edges of each wrap 1 to complete the formation of the wrap 1 itself; preferably, the folding devices of the longitudinal folding unit 19 are passive (i.e. they are completely devoid of moving parts) and only comprise fixed folding helices. The longitudinal folding unit 19 comprises sealing devices (known and not illustrated) which stabilize each wrap 1 by means of heat-sealing the overlapping portion of the sheet 11 of wrapping material in the area of the smaller side walls 7 and 8 of the group 2 of cigarettes.

[0032] Along the transverse folding unit 18 the group 2 of cigarettes are transversely fed (i.e. the cigarettes are arranged perpendicular to the wrapping path P2), while along the longitudinal folding unit 19 the group 2 of cigarettes are longitudinally fed (i.e. the cigarettes are arranged parallel to the wrapping path P3).

[0033] In the non-limiting embodiment illustrated in the accompanying figures, the longitudinal folding unit 19 comprises a straight wrapping conveyor, and having pushers that feed the wraps 1 through a fixed folding tunnel; alternatively, the longitudinal folding unit 19 comprises a circular wrapping conveyor (i.e. a wrapping drum, which is mounted so as to rotate around a central rotation axis).

[0034] As illustrated in Figure 11, the preliminary folding unit 17 comprises a feeding conveyor, which feeds the sheets 11 of wrapping material in succession along a straight feeding path P4; by way of example, the feeding conveyor comprises two conveyor belts which are closed in a loop, arranged in the area of opposite ends of the sheets 11 of wrapping materials, and hold the sheets 11 of wrapping materials by suction. The feeding path P4 has a parallel section and is adjacent to the wrapping path P1 in the area of a feeding station S3 in which each sheet 11 of wrapping material is released by the feeding conveyor to a pocket of the wrapping conveyor 20 so as to be coupled, as described above, to a corresponding group 2 of cigarettes. To the wrapping conveyor 20 a folding device is coupled (known and not illustrated) that folds the sheet 11 of wrapping material in a "U"-shape around the group 2 of cigarettes as described above. According to an alternative and perfectly equivalent embodiment not illustrated, each sheet 11 of wrapping material is fed flat in the area of the transfer station S1 and folds in a "U"-shape around the group 2 of cigarettes as described above while the group 2 of cigarettes itself enters a pocket of the wrapping drum 22.

[0035] As illustrated in Figure 11, when the reinforcing element 12 is provided, each reinforcing element 12 is fed to the corresponding pocket of the wrapping conveyor

20 upstream of the hoppers i.e. before feeding the group 2 of cigarettes to the pocket.

[0036] In the alternative embodiment illustrated in Figure 13, the methods of coupling the sheet 11 of wrapping materials to the group 2 of cigarettes in the feeding station S3 are modified, the methods for folding the ends 13 and 14 overlapped and heat-sealed to one another (i.e. of the sealing fin F) are modified, and the methods for folding the two open side edges of each wrap 1 in the longitudinal folding unit 19 are modified. In the feeding station S3, each group 2 of cigarettes is coupled to the corresponding flat sheet 11 of wrapping material by resting a side part of the sheet 11 of wrapping material against the larger side wall 5 of the group 2 of cigarettes; successively, the sheet 11 of wrapping material is "U"-folded around the corresponding group 2 of cigarettes so as to form a U-shaped wrap 1 having the two ends 13 and 14 projecting out from the group 2 of cigarettes. The ends 13 and 14 overlapped and heat-sealed one to the other (i.e. the sealing fin F) are folded by 180° against the larger side wall 5 of the group 2 of cigarettes (as illustrated in Figure 10) and with the interposition of part of the sheet 11 of wrapping material. In the longitudinal folding unit 19, two fin-shaped folds are sealed to one another while they are perpendicular to the corresponding smaller side walls 7 and 8 of the group 2 of cigarettes and after the heat-sealing process has ended, are folded by 90° against the smaller side walls 7 and 8 themselves.

[0037] As illustrated in Figure 14, each pocket of the wrapping drum 22 is provided with a pair of holding devices 29 which are arranged on opposite sides of the pocket and are moveable between an open position (held in the area of the transfer stations S1 and S2) wherein the two holding devices 29 are relatively set apart from one another so as to allow the partially formed wrap 1 to get into/out of the pocket without interfering with the holding devices 29 and a closed position (held outside the transfer stations S1 and S2) wherein the two holding devices 29 are relatively close to one another to "grip" the group 2 of cigarettes, and therefore keep the group 2 of cigarettes laterally compressed to prevent the group 2 of cigarettes from deforming. The function of the pair holding devices 29 of each pocket of the wrapping drum 22 is to keep the group 2 of cigarettes laterally compressed during the advancement of the wrapping drum 22 without, at the same time, subjecting the sheet 11 of wrapping material to unwanted folds in the area of the open side edges.

With the folding methods of the open side edges adopted in the embodiment illustrated in Figure 11, an initial folding of the sheet 11 of wrapping material is already made in the wrapping drum 22 in the area of the open side edges (the fold of so called "nibs"), thus the pockets of the wrapping drum 22 can comprise fixed profiles which first produce this initial folding of the sheet 11 of wrapping material (i.e. fold the "nibs"), and then guarantee the lateral compression of the group 2 of cigarettes so as to prevent the group 2 of cigarettes from deforming. Instead,

with the folding methods of the open side edges adopted in the embodiment illustrated in Figure 13, no folding of the sheet 11 of wrapping material must be made in the wrapping drum 22 in the area of the open side edges and therefore it is necessary to use the holding devices 29 which open and close to laterally push only on the group 2 of cigarettes without affecting the sheet 11 of wrapping material (i.e. without causing the folding of the sheet 11 of wrapping material).

[0038] As illustrated in Figure 14, a straight wrapping conveyor 30 is provided (for example a belt conveyor) provided with pockets 31, which are suited to receive and hold the wraps 1. The wrapping conveyor 30 extends along the wrapping path P3 and extends from the transfer station S1, throughout the transfer station S2, and along the entire longitudinal folding unit 19. In addition, the wrapping conveyor 30 is arranged perpendicular to the rotation axis 23 of the wrapping drum 22 and passes through the rotation axis 23 of the wrapping drum 22 (i.e. crosses the wrapping drum 22 from one side to the other by passing through the rotation axis 23 of the wrapping drum 22 and passing both through the transfer station S1 and through the transfer station S2).

[0039] The main function of the wrapping conveyor 30 is to feed the wraps 1 along the entire longitudinal folding unit 19, i.e. to receive the wraps 1 from the wrapping drum 22 in the transfer station S2 and to feed the wraps 1 along the wrapping path P3. It is important to note that in the transfer station S2, a pocket 31 of the wrapping conveyor 30 passes through a pocket of the wrapping drum 22 thus picking up directly (i.e. without further transfer/pusher elements) a corresponding wrap 1. The further function of the wrapping conveyor 30 is to transfer the wraps 1 from the preliminary folding unit 17 to the transverse folding unit 18 in the transfer station S1, i.e. to extract, in the transfer station S1, a wrap 1 from the pocket of the wrapping conveyor of the preliminary folding unit 17, subsequently inserting the wrap 1 into the pocket of the wrapping drum 22; in particular, in the transfer station S1 a pocket 31 of the wrapping conveyor 30 passes through a pocket of the wrapping conveyor of the preliminary folding unit 17 to pick up the wrap 1 and then passes through a pocket of the wrapping drum 22 to release the wrap 1. In other words, the wrapping conveyor 30 is suited to insert a group 2 of cigarettes coupled to a sheet 11 of wrapping material in a pocket of the wrapping drum 22 in the transfer station S1, and the wrapping conveyor 30 is suited to pick up a group 2 of cigarettes coupled to a sheet 11 of wrapping material from a pocket of the wrapping drum 22 in the transfer station S2 opposite to the transfer station S1 and is arranged at 180° along the wrapping path P2 relative to the transfer station S1.

[0040] It is important to note that the straight wrapping conveyor 30 illustrated in Figure 14 can be used both in the embodiment illustrated in Figure 13 and in the embodiment illustrated in Figure 11.

[0041] Figure 15 illustrates an alternative of the embodiment illustrated in Figure 11, wherein the conveyor

21 of the transverse folding unit 18 is straight and not circular.

[0042] Figure 16 illustrates an alternative of the embodiment illustrated in Figure 13, wherein the conveyor 21 of the transverse folding unit 18 is straight and not circular.

[0043] In the embodiments illustrated in the accompanying figures, the sheet 11 of wrapping material is folded from the beginning around the group 2 of cigarettes, i.e. the folds of the sheet 11 of wrapping material are all performed against the group 2 of cigarettes. According to an alternative and perfectly equivalent embodiment, each pocket of the wrapping conveyor 20 is formed by a hollow folding spindle which is suited to contain a group 2 of cigarettes and around which the sheet 11 of wrapping material is initially "U"-folded; in other words, a sheet 11 of wrapping material is initially "U"-folded (with the same methods as described above) around a folding spindle (forming a pocket of the wrapping conveyor 20), which contains a group 2 of cigarettes and the group 2 of cigarettes is coupled to the sheet 11 of wrapping material already "U"-folded against the folding spindle in the area of the transfer station S1 (i.e. at the moment in which a pocket of the wrapping conveyor 21 enters). In this embodiment, the initial folding in a "U"-shape of each sheet 11 of wrapping material takes place against a folding spindle, a group 2 of cigarettes is coupled to the "U"-folded sheet of wrapping material in the area of the transfer station S1 (i.e. at the moment in which a pocket of the wrapping conveyor 21 enters) and the folding of the sheet 11 of wrapping material is completed against the group 2 of cigarettes.

[0044] The packer machine 15 described above has many advantages.

[0045] First, the packer machine described above is able to operate quickly (i.e. with a high hourly productivity rate) while guaranteeing a high and above all constant production quality. This result is achieved due the fact that both in the transverse folding unit 18 and in the longitudinal folding unit 19 there is a single common sealing device, which is on the outside of the corresponding wrapping conveyor (i.e. does not move along with the wrapping conveyor but remains always in the same position) and therefore operates with all the wraps 1. Due to this arrangement, during the fine adjustment step of the packer machine 15, it is sufficient to finely adjust a single common sealing device for each folding unit 18 and 19 and hence it is usually possible to obtain higher quality standards.

[0046] Furthermore, in the packer machine 15 described above, the production of the wrapping conveyor 21 of the transverse folding unit 18 is very simple since the wrapping conveyor 21 is not required to support moveable heating parts; among other things, it is important to emphasize that it is not necessary to supply electrical power to the wrapping conveyor 21 as on the wrapping conveyor 21 no heating elements are provided.

[0047] Finally, in the packer machine 15 described

above, the replacement operation of the sealing device 25 of the transverse folding unit 18 (in case of change of size or maintenance) is greatly simplified and faster, since the sealing device 25 comprises only one sealing gripper 26 common to all the pockets of the wrapping drum 22.

[0048] It is important to note that also the folding methods of the sheet 11 of wrapping material around the group 2 of cigarettes allow to improve the final quality of the folding process, as they allows obtaining a very precise positioning of the sheet 11 of wrapping material relative to the group 2 of cigarettes also when rapidly operating (i.e. with a high hourly productivity rate); consequently, in the wraps 1, the pull-out opening 9 (overlapped by the reusable closing tab 10) is always exactly in the desired position.

[0049] The embodiment illustrated in the attached figures refers to the manufacturing of a packet of cigarettes but the present invention is applicable without any substantial modifications to the manufacturing of any other type of packet of tobacco articles (for example, a packet of cigars, a packet of liquid vaporizing type electronic cigarettes, a packet of new generation cigarettes without tobacco combustion...).

Claims

1. A wrapping method to fold a sheet (11) of wrapping material around a group (2) of tobacco articles with a parallelepiped shape, which has an upper wall (3) and a lower wall (4) that are parallel and opposite to one another, two larger side walls (5, 6) that are parallel and opposite to one another, and two smaller side walls (7, 8) that are parallel and opposite to one another; the wrapping method comprises the steps of:

placing the "U"-folded sheet (11) of wrapping material around the group (2) of tobacco articles, so that the "U"-folded sheet (11) of wrapping material is arranged in the area of the upper wall (3) and of the two larger side walls (5, 6) of the group (2) of tobacco articles and has two ends (13, 14) that are parallel to the larger side walls (5, 6) and project from the larger side walls (5, 6); overlapping the two ends (13, 14) of the sheet (11) of wrapping material to one another, thus giving to the sheet (11) of wrapping material a tubular shape; and

heat-sealing the overlapping portions of the two ends (13, 14) of the sheet (11) of wrapping material, so as to stabilize the tubular shape of the sheet (11) of wrapping material and form a sealing fin (F);

wherein the two ends (13, 14) are overlapped to one another and heat-sealed while the group (2) of tobacco articles coupled to the sheet (11)

- of wrapping material is housed in a first pocket of a first wrapping conveyor (21), which is fed along a wrapping path (P2) and comprises a wrapping drum (22), which is mounted so as to rotate around a central rotation axis (23); wherein the first pocket of the first wrapping conveyor (21) is oriented so that the sealing fin (F), i.e. the overlapping portions of the two ends (13, 14) of the sheet (11) of wrapping material, is arranged parallel to the wrapping path (P2) at least until the heat-sealing process has ended; wherein a second straight wrapping conveyor (30) is provided, which is provided with a second pocket (31), which is suited to receive and hold the group (2) of tobacco articles coupled to the sheet (11) of wrapping material and is suited to insert the group (2) of tobacco articles coupled to the sheet (11) of wrapping material into the first pocket of the wrapping drum (22) in a first transfer station (S1); and wherein the second wrapping conveyor (30) is arranged perpendicular to the rotation axis (23) of the wrapping drum (22) and passes through the rotation axis (23) of the wrapping drum (22); the wrapping method is **characterized in that** the second wrapping conveyor (30) is suited to pick up the group (2) of tobacco articles coupled to the sheet (11) of wrapping material from the first pocket of the wrapping drum (22) in a second transfer station (S2), which is opposite to the first transfer station (S1) and is arranged at 180° along the wrapping path (P2) relative to the first transfer station (S1).
2. The wrapping method according to claim 1, wherein, when the group (2) of tobacco articles is arranged in the first pocket of the first wrapping conveyor (21):
 - the two larger side walls (5, 6) of the group (2) of tobacco articles are arranged parallel to the wrapping path (P2);
 - the two smaller side walls (7, 8) of the group (2) of tobacco articles are arranged perpendicular to the wrapping path (P2); and
 - the upper wall (3) and the lower wall (4) of the group (2) of tobacco articles are arranged parallel to the wrapping path (P2).
 3. The wrapping method according to claim 1 or 2, wherein a first folding device (24) is provided, which is arranged on the outside of the first wrapping conveyor (21) and folds the two ends (13, 14) of the sheet (11) of wrapping material against one another.
 4. The wrapping method according to claim 1, 2 or 3, wherein a sealing device (25) is provided, which is arranged on the outside of first wrapping conveyor (21) and heat-seals the overlapping portions of the two ends (13, 14) of sheet (11) of wrapping material so as to form the sealing fin (F), when the first pocket of the first wrapping conveyor (21) is in the area of the sealing device (25).
 5. The wrapping method according to any of the claims from 1 to 4, wherein a second folding device (28) is provided, which is arranged on the outside of first wrapping conveyor (21) and folds the sealing fin (F), when the first pocket of the first wrapping conveyor (21) is in the area of the second folding device (28).
 6. The wrapping method according to any of the claims from 1 to 5, wherein in the pocket of the first wrapping conveyor (21) a pair of holding devices (29) are provided, which are arranged on opposite sides of the pocket and are moveable between an open position, in which the two holding devices (29) are relatively far from one another, so as to allow the sheet (11) of wrapping material coupled to the group (2) of tobacco articles to get into/out of the pocket without interfering with the holding devices (29), and a closed position in which the two holding devices (29) are relatively close to one another, so as to lock the group (2) of tobacco articles between them resting against the smaller side walls (7, 8) of the group (2) of tobacco articles.
 7. The wrapping method according to any of the claims from 1 to 6, comprising the further step of folding the first end (13) by 90° against the lower wall (4) of the group (2) of tobacco articles and, at the same time, folding a final part of the first end (13) by 90°, so as to give the first end (13) an "L" shape and, hence, arrange the final part of the first end (13) parallel to and rests against the second end (14), which remains parallel to the second larger side wall (5), thus giving to the sheet (11) of wrapping material a tubular shape.
 8. The wrapping method according to claim 7, wherein the sheet (11) of wrapping material is caused to asymmetrically rest against the upper wall (3) of the group (2) of tobacco articles, so that a first end (13) projecting from a first larger side wall (6) is longer than a second end (14) projecting from a second larger side wall (5).
 9. The wrapping method according to claim 8, wherein the difference in length between the first end (13) and the second end (14) is equal to the width of the lower wall (4) of the group (2) of tobacco articles.
 10. The wrapping method according to any of the claims from 1 to 9 and comprising the further step of folding the sealing fin (F) by 90° against the lower wall (4) of the group (2) of tobacco articles.

11. The wrapping method according to any of the claims from 1 to 9 and comprising the further step of folding the sealing fin (F) by 180° against the second larger side wall (5) of the group (2) of tobacco articles.

12. The wrapping method according to any of the claims from 1 to 11, wherein the sheet (11) of wrapping material has a cigarette pull-out opening (9), which is closed by a reusable closing tab (10) and is arranged partly in the area of a larger side wall (5) of the group (2) of tobacco articles and partially in the area of the upper wall (3) of the group (2) of tobacco articles.

13. A packer machine (13) to fold a sheet (11) of wrapping material around a group (2) of tobacco articles with a parallelepiped shape, which has an upper wall (3) and a lower wall (4) that are parallel and opposite to one another, two larger side walls (5, 6) that are parallel and opposite to one another, and two smaller side walls (7, 8) that are parallel and opposite to one another; the packer machine (15) comprises:

a first folding device to place the "U"-folded sheet (11) of wrapping material around the group (2) of tobacco articles, so that the "U"-folded sheet (11) of wrapping material is arranged in the area of the upper wall (3) and of the two larger side walls (5, 6) of the group (2) of tobacco articles and has two ends (13, 14) that are parallel to the larger side walls (5, 6) and project from the larger side walls (5, 6);
 a second folding device (24) to overlap the two ends (13, 14) of the sheet (11) of wrapping material to one another, thus giving to the sheet (11) of wrapping material a tubular shape;
 a sealing device (25) to heat-seal the overlapping portions of the two ends (13, 14) of the sheet (11) of wrapping material, so as to stabilize the tubular shape of the sheet (11) of wrapping material and form a sealing fin (F);
 a first wrapping conveyor (21), which is fed along a wrapping path (P2) and comprises a wrapping drum (22), which is mounted so as to rotate around a central rotation axis (23) and is provided with a first pocket, which houses the group (2) of tobacco articles coupled to the sheet (11) of wrapping material while the two ends (13, 14) are overlapped and sealed to one another; and
 a second straight wrapping conveyor (30) that is provided with a second pocket (31) suited to receive and hold the group (2) of tobacco articles coupled to the sheet (11) of wrapping material and the conveyor is suited to insert the group (2) of tobacco articles coupled to the sheet (11) of wrapping material into the first pocket of the wrapping drum (22) in a first transfer station (S1);
 wherein the first pocket of the first wrapping con-

veyor (21) is oriented so that the sealing fin (F), i.e. the overlapping portions of the two ends (13, 14) of the sheet (11) of wrapping material, is arranged parallel to the wrapping path (P2) at least until the heat-sealing process has ended; wherein the second wrapping conveyor (30) is arranged perpendicular to the rotation axis (23) of the wrapping drum (22) and passes through the rotation axis (23) of the wrapping drum (22); the packer machine (13) is **characterized in that** the second wrapping conveyor (30) is suited to pick up the group (2) of tobacco articles coupled to the sheet (11) of wrapping material from the first pocket of the wrapping drum (22) in a second transfer station (S2), which is opposite to the first transfer station (S1) and is arranged at 180° along the wrapping path (P2) relative to the first transfer station (S1).

14. A wrapping method to fold a sheet (11) of wrapping material around a group (2) of tobacco articles with a parallelepiped shape, which has an upper wall (3) and a lower wall (4) that are parallel and opposite to one another, two larger side walls (5, 6) that are parallel and opposite to one another, and two smaller side walls (7, 8) that are parallel and opposite to one another; the wrapping method comprises the steps of:

placing the "U"-folded sheet (11) of wrapping material around the group (2) of tobacco articles so that the "U"-folded sheet (11) of wrapping material is arranged in the area of the upper wall (3) and of the two larger side walls (5, 6) of the group (2) of tobacco articles and has two ends (13, 14) that are parallel to the larger side walls (5, 6) and protrude from the larger side walls (5, 6);
 overlapping the two ends (13, 14) of the sheet (11) of wrapping material to one another, thus giving to the sheet (11) of wrapping material a tubular shape; and
 heat-sealing the overlapping portions of the two ends (13, 14) of the sheet (11) of wrapping material, so as to stabilize the tubular shape of the sheet (11) of wrapping material and form a sealing fin (F);
 wherein the two ends (13, 14) are overlapped and heat-sealed to one another while the group (2) of tobacco articles coupled to the sheet (11) of wrapping material is housed in a first pocket of a first wrapping conveyor (21), which is fed along a wrapping path (P2) and comprises a wrapping drum (22), which is mounted so as to rotate around a central rotation axis (23); and
 wherein the first pocket of the first wrapping conveyor (21) is oriented so that the sealing fin (F), i.e. the overlapping portions of the two ends (13,

14) of the sheet (11) of wrapping material, is arranged parallel to the wrapping path (P2) at least until the heat-sealing process has ended.

15. A packer machine (13) to fold a sheet (11) of wrapping material around a group (2) of tobacco articles with a parallelepiped shape, which has an upper wall (3) and a lower wall (4) that are parallel and opposite to one another, two larger side walls (5, 6) that are parallel and opposite to one another, and two smaller side walls (7, 8) that are parallel and opposite to one another; the packer machine (15) comprises:

a first folding device to place the "U"-folded sheet (11) of wrapping material around the group (2) of tobacco articles so that the "U"-folded sheet (11) of wrapping material is arranged in the area of the upper wall (3) and of the two larger side walls (5, 6) of the group (2) of tobacco articles and has two ends (13, 14) that are parallel to the larger side walls (5, 6) and protrude from the larger side walls (5, 6);

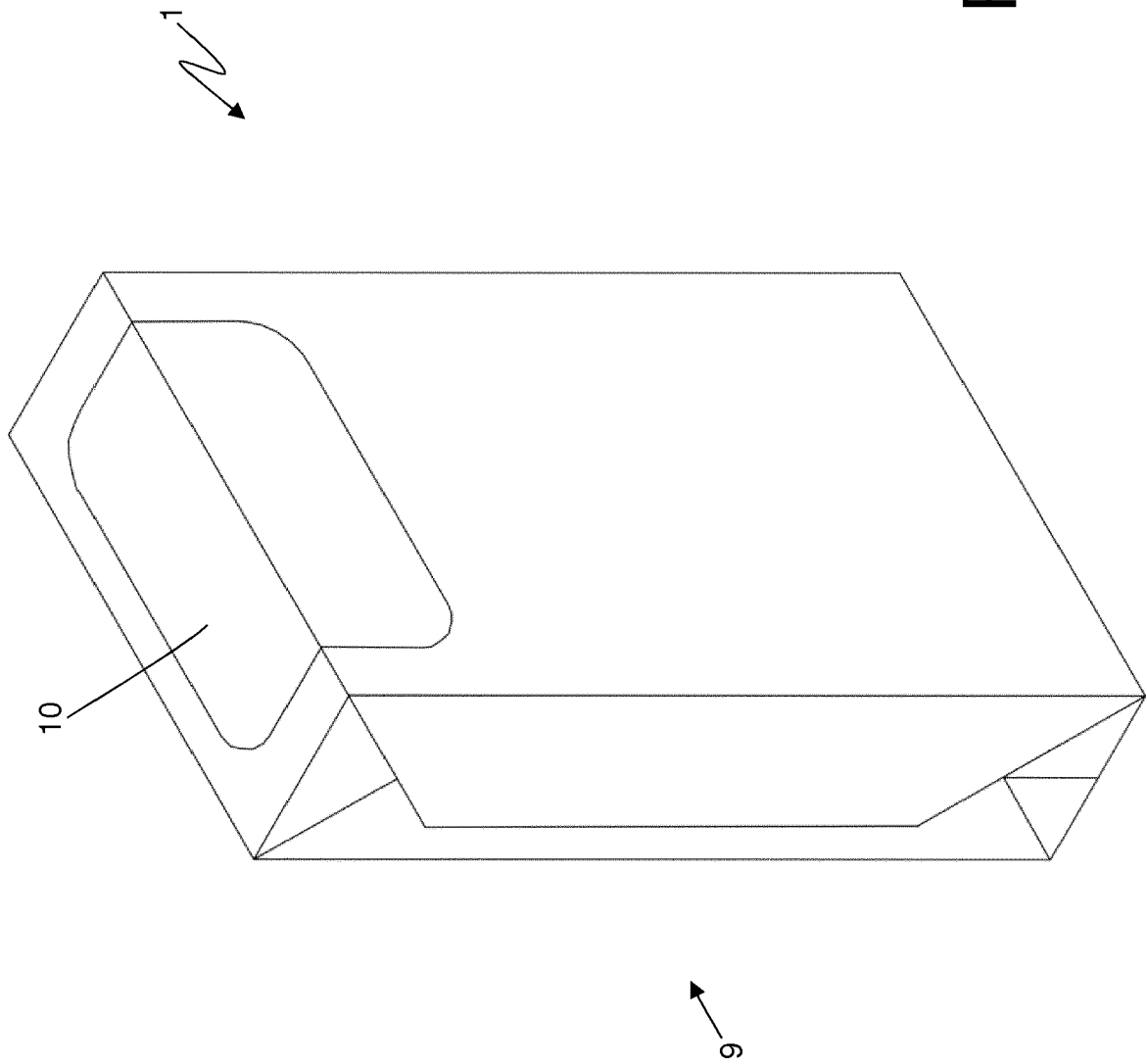
a second folding device (24) to overlap the two ends (13, 14) of the sheet (11) of wrapping material, thus giving to the sheet (11) of wrapping material a tubular shape;

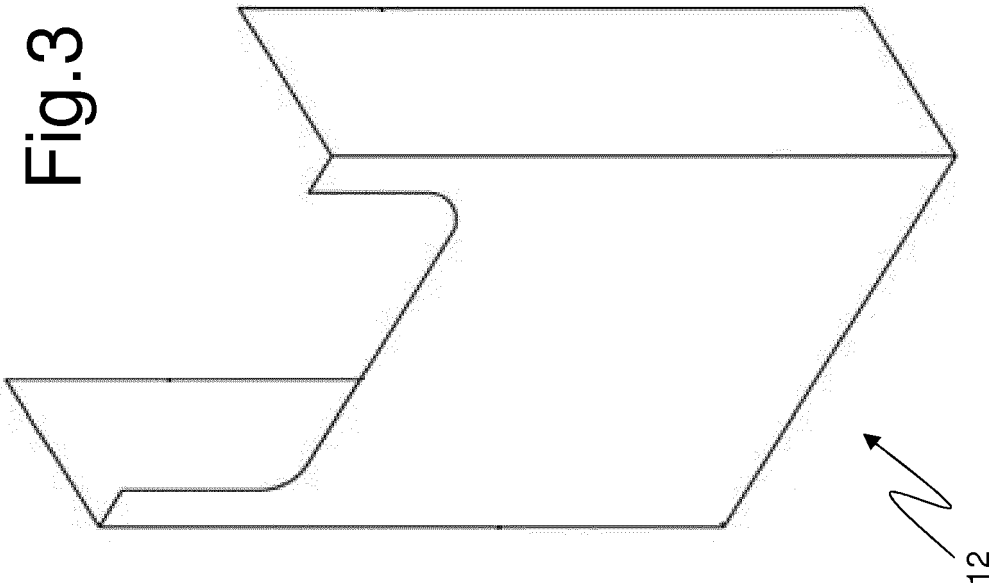
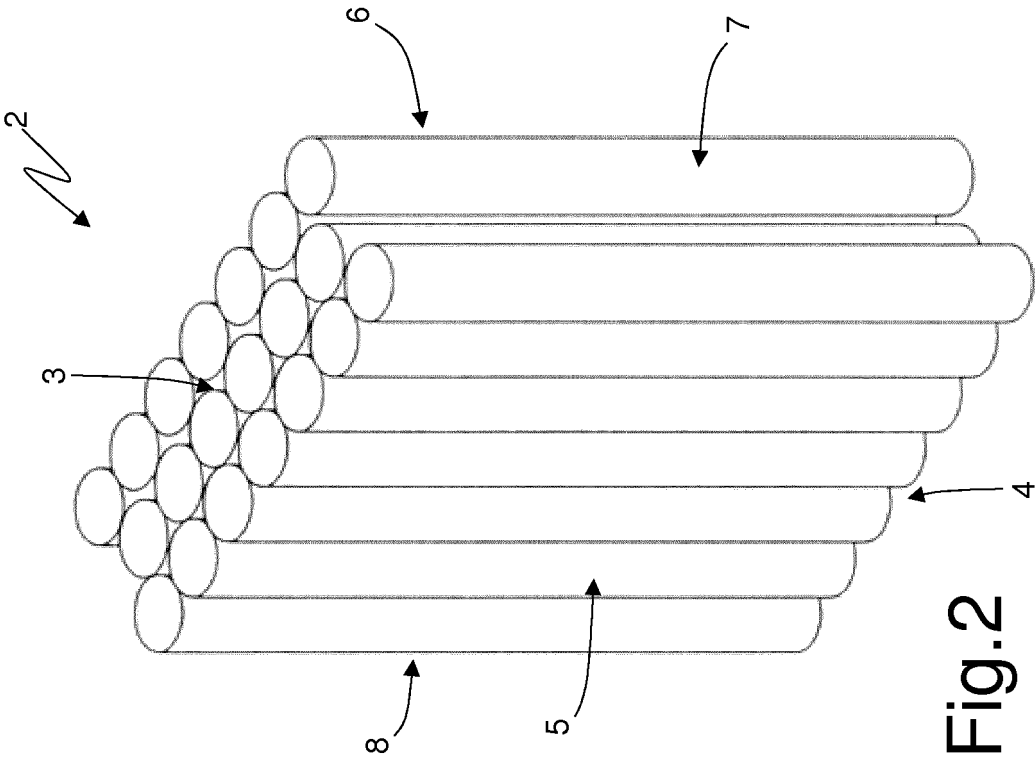
a sealing device (25) to heat-seal the overlapping portions of the two ends (13, 14) of the sheet (11) of wrapping material, so as to stabilize the tubular shape of the sheet (11) of wrapping material and form a sealing fin (F);

a first wrapping conveyor (21), which is fed along a wrapping path (P2) comprises a wrapping drum (22), which is mounted so as to rotate around a central rotation axis (23) and is provided with a first pocket which houses the group (2) of tobacco articles coupled to the sheet (11) of wrapping material while the two ends (13, 14) are overlapped and heat-sealed to one another; and

a second straight wrapping conveyor (30) provided with a second pocket (31), which is suited to receive and hold the group (2) of tobacco articles coupled to the sheet (11) of wrapping material and is suited to insert the group (2) of tobacco articles coupled to the sheet (11) of wrapping material into the first pocket of the wrapping drum (22) in a first transfer station (S1);

wherein the first pocket of the first wrapping conveyor (21) is oriented so that the sealing fin (F), i.e. the overlapping portions of the two ends (13, 14) of the sheet (11) of wrapping material, is arranged parallel to the wrapping path (P2) at least until the heat-sealing process has ended.





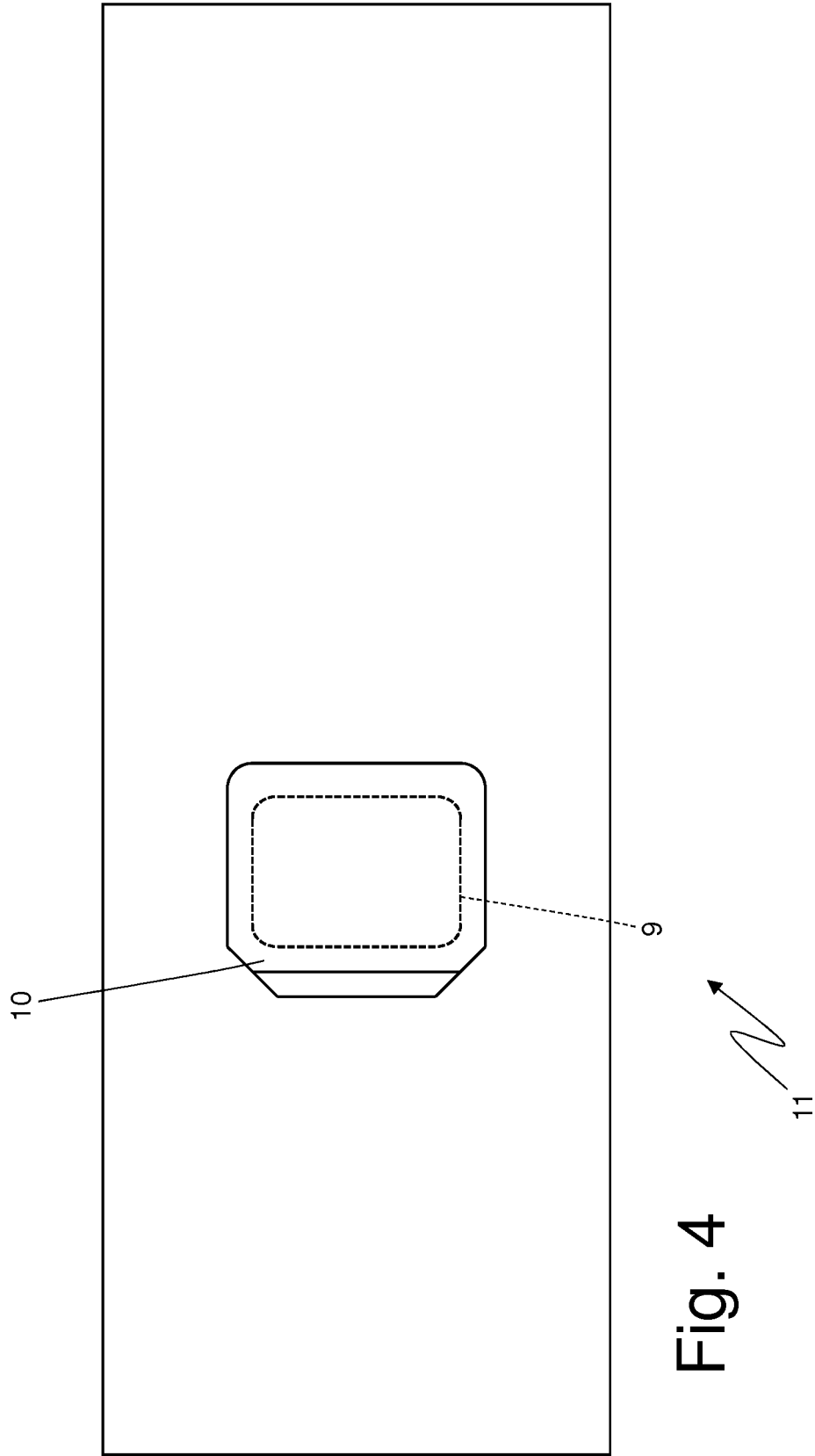


Fig. 4

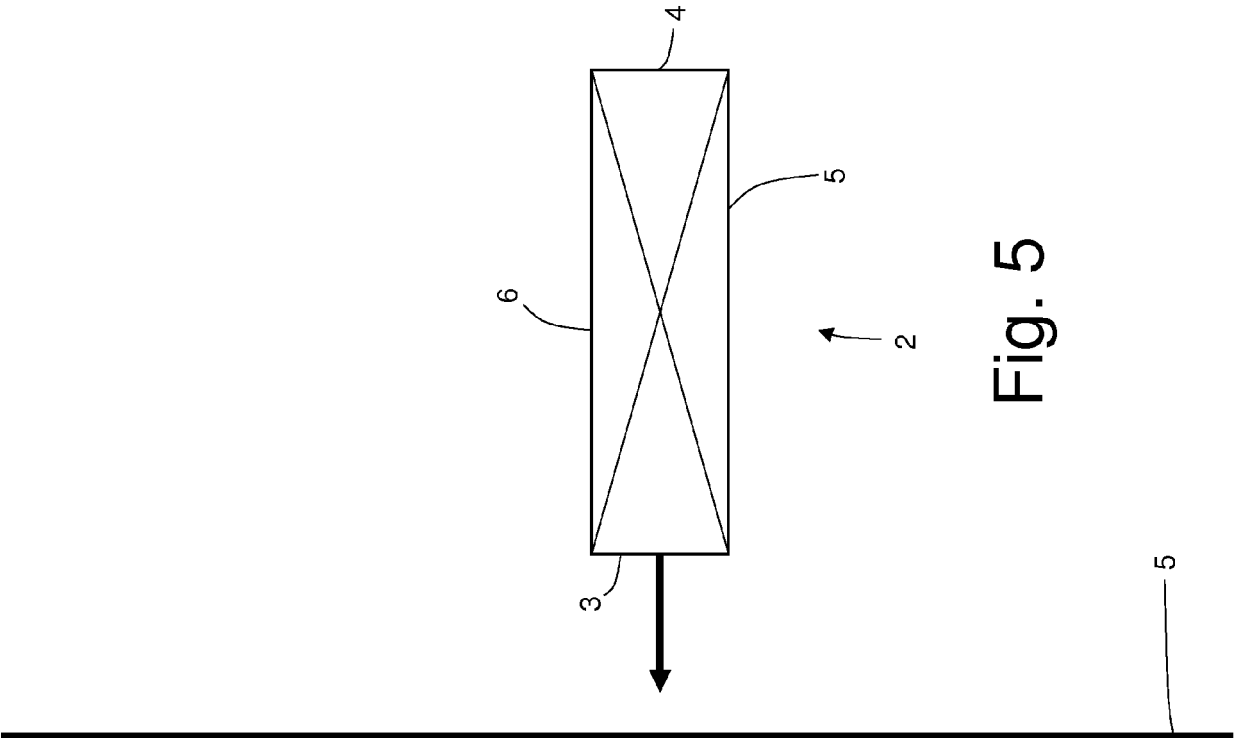


Fig. 5

Fig. 6

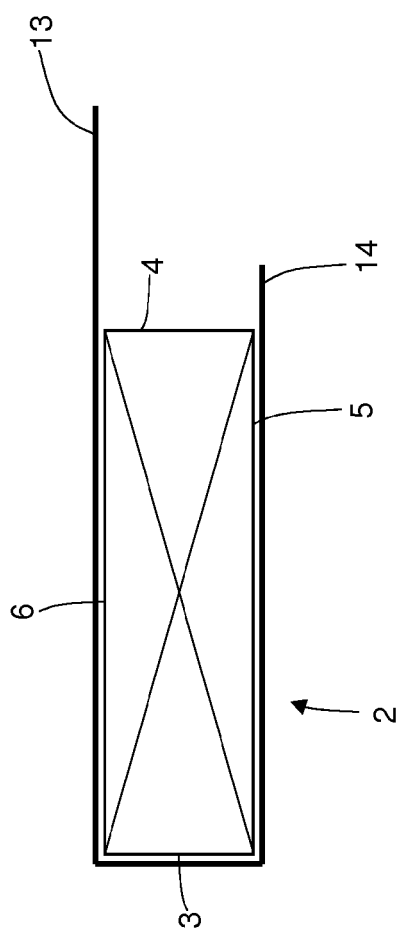


Fig. 7

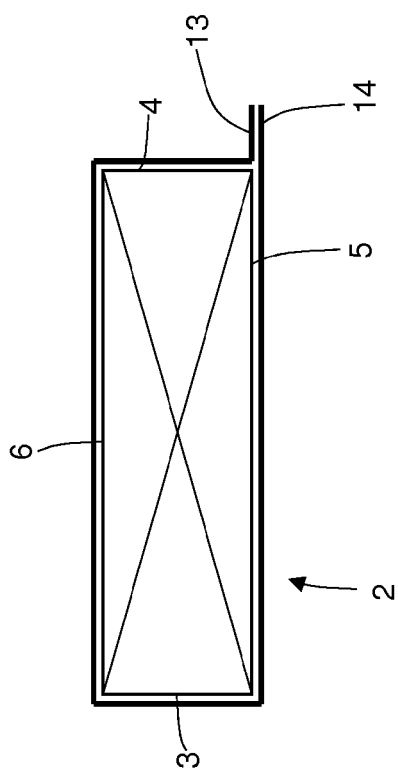
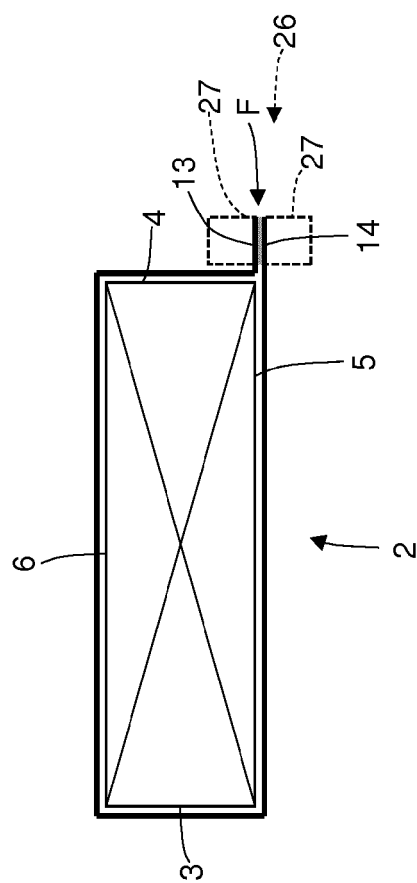
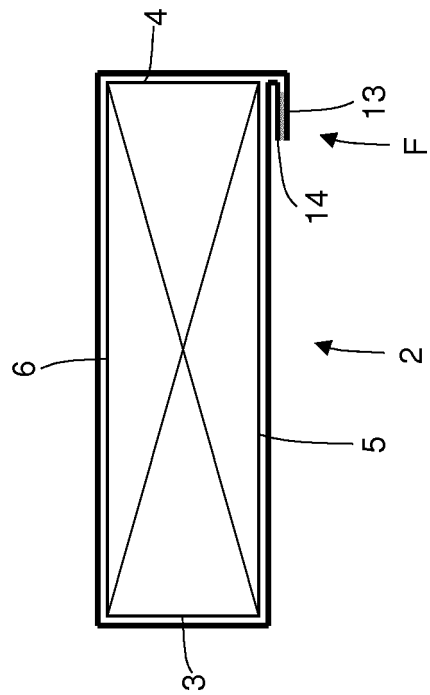
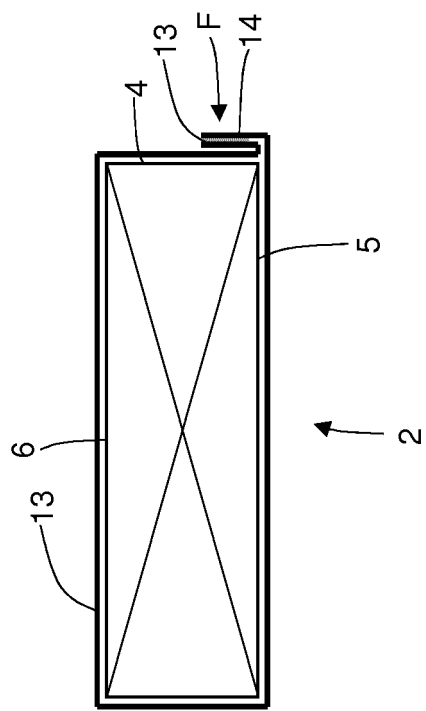


Fig. 8





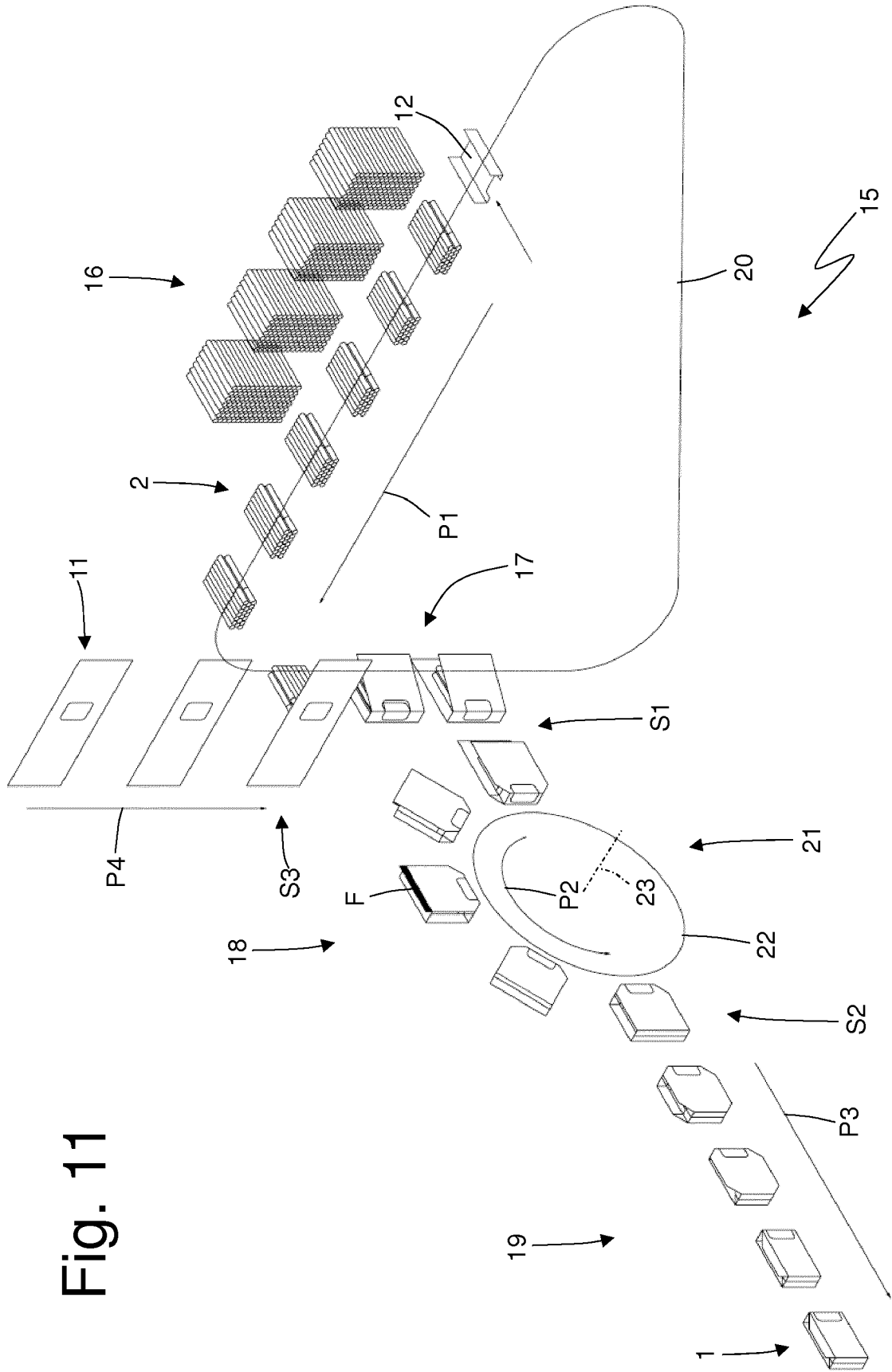


Fig. 11

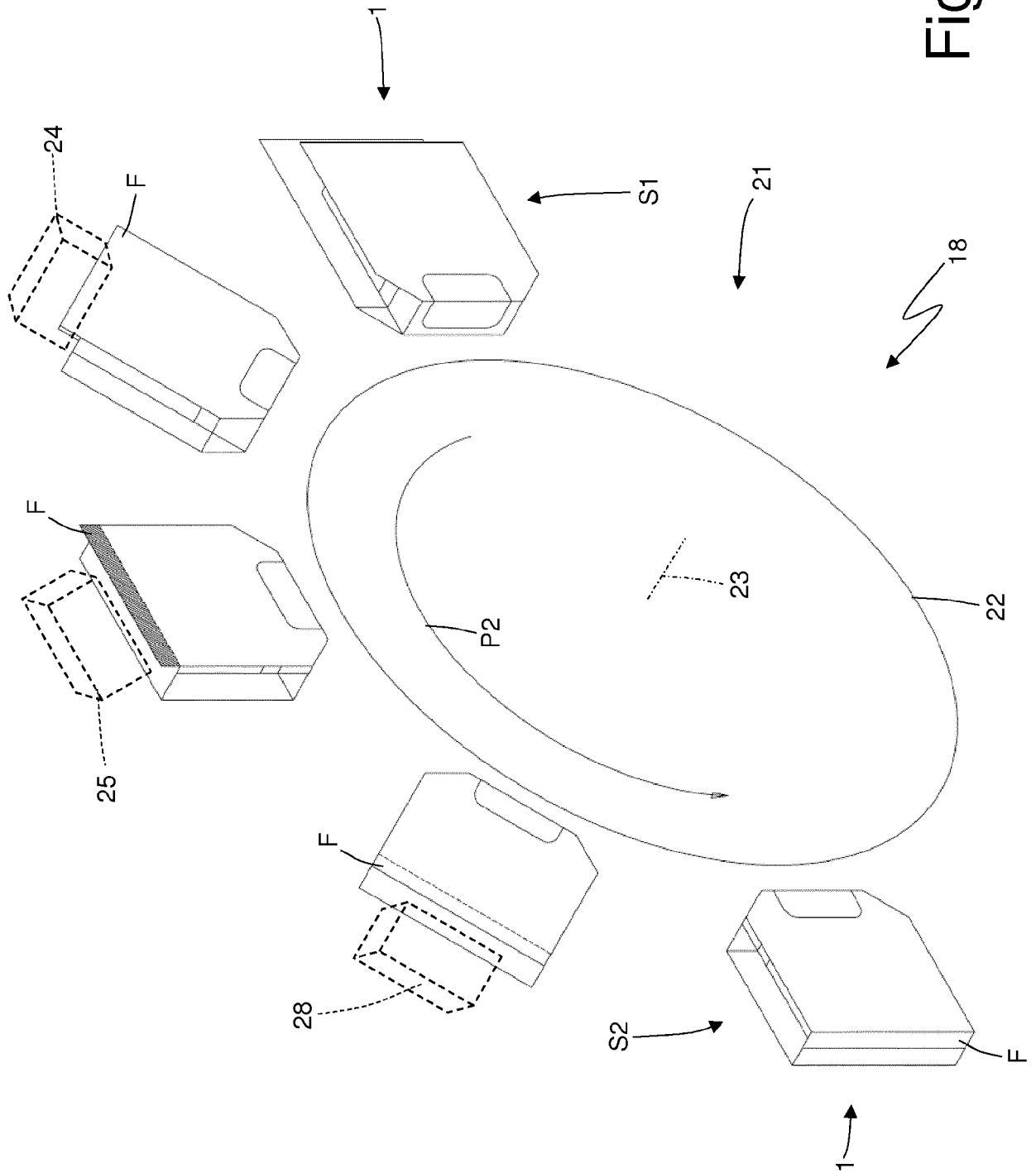


Fig. 12

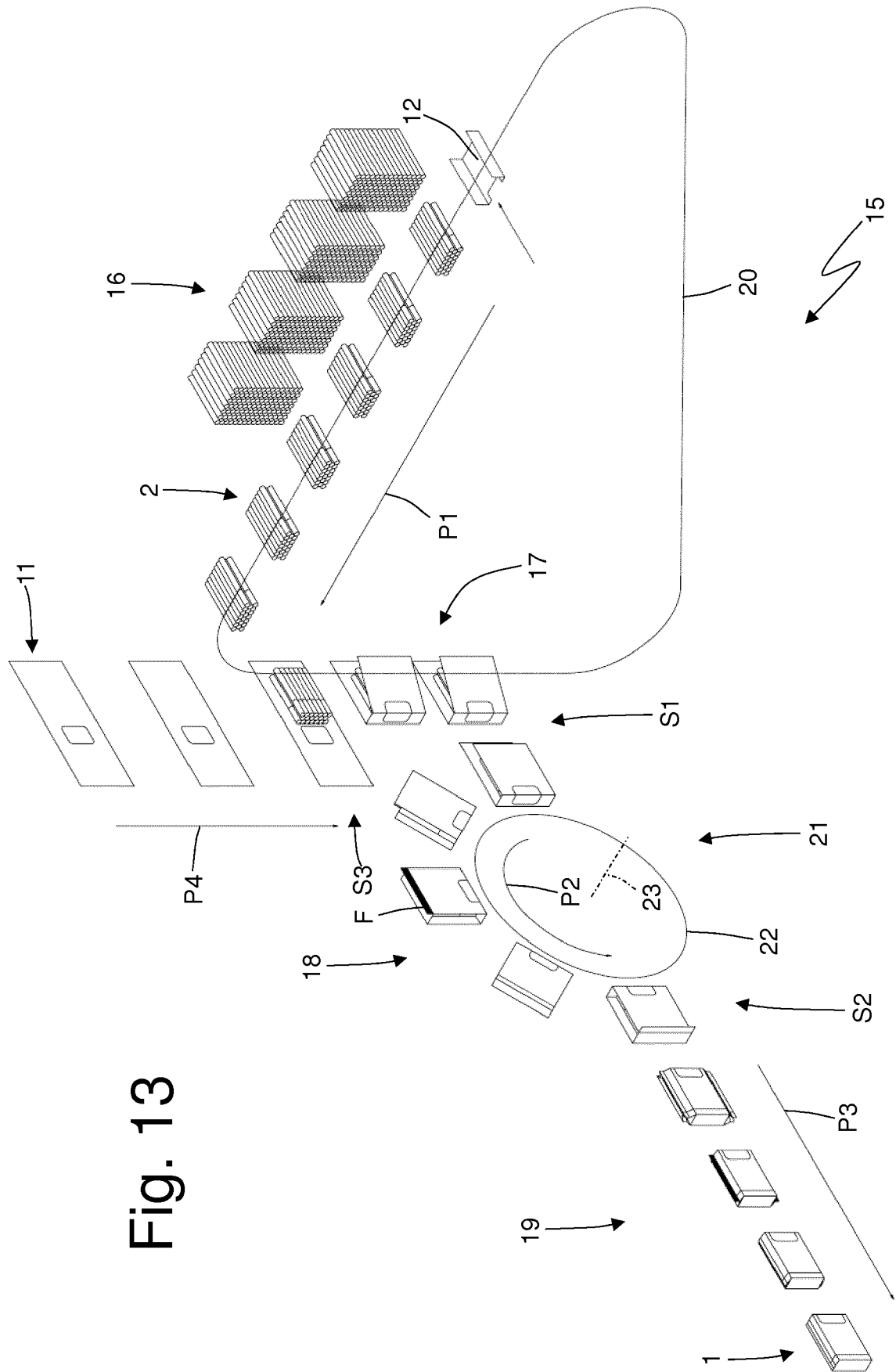


Fig. 13

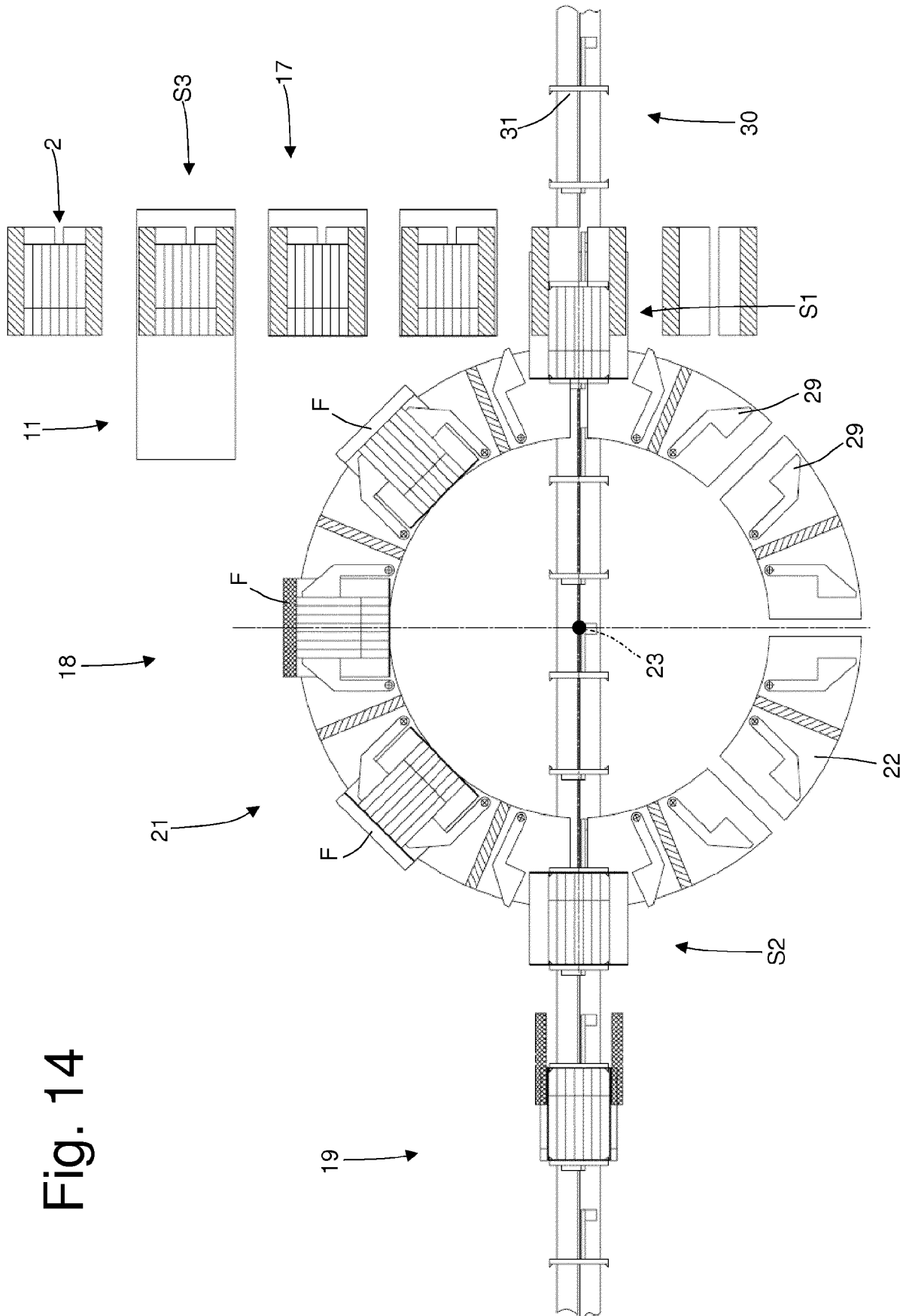


Fig. 14

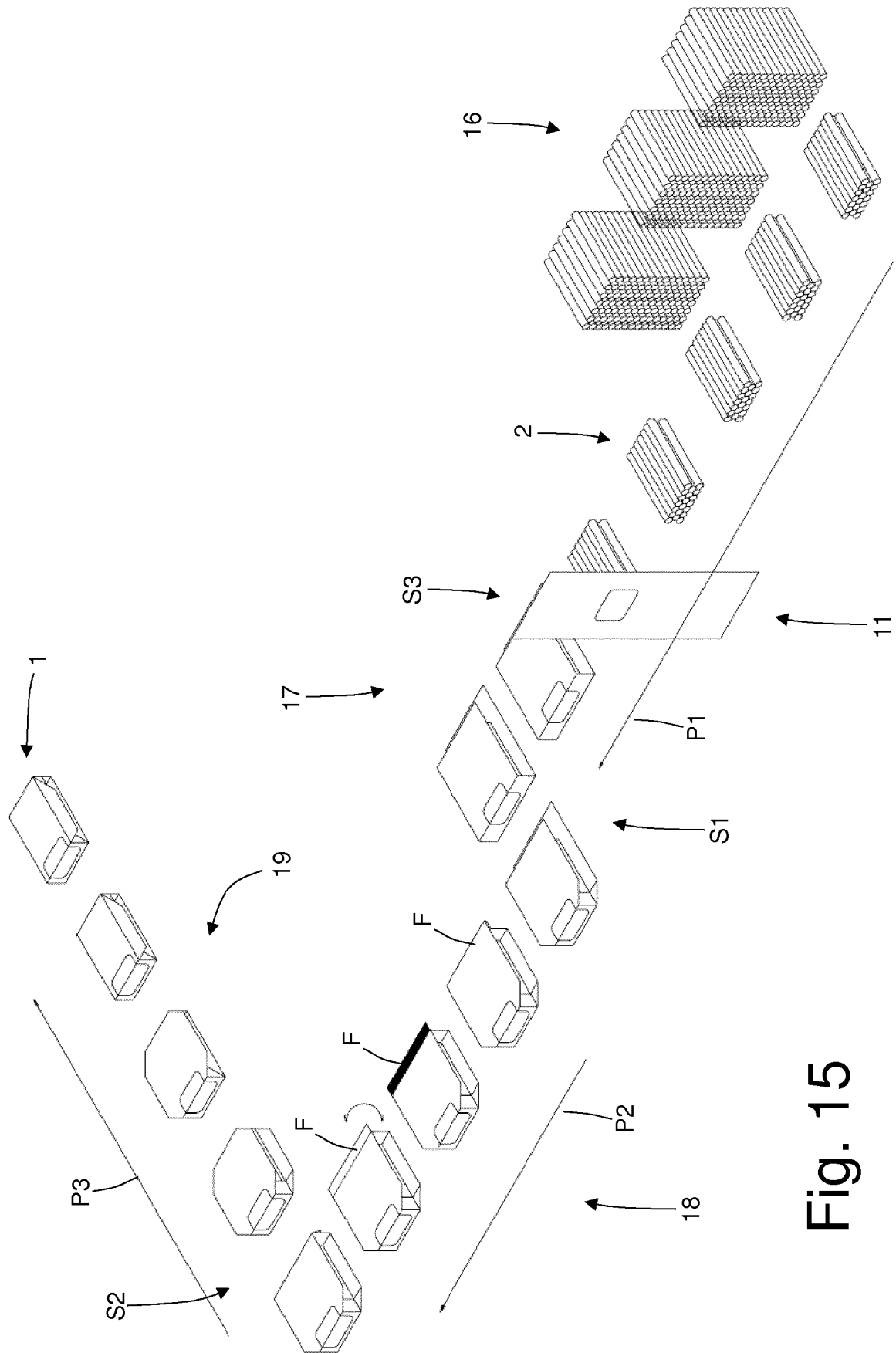


Fig. 15

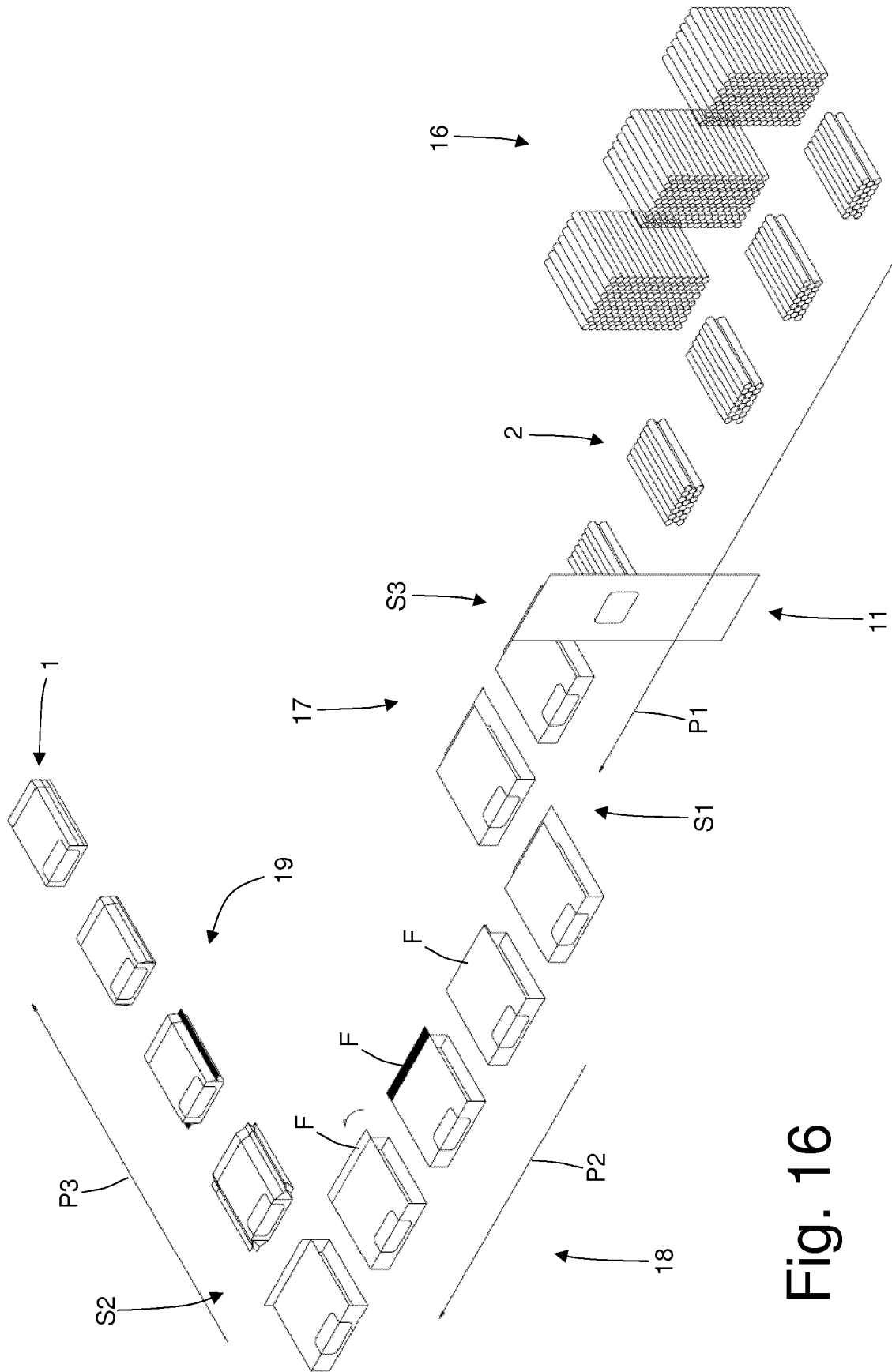


Fig. 16



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Application Number
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			B65B B65D B29C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 September 2017	Examiner Schmitt, Michel
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