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(54) **PACKAGING APPARATUS AND METHOD OF PACKAGING AN OBJECT**

(57) The packaging apparatus for packaging an object (1) of a compressible, elastic material into a foil material comprises compressing means (2, 3) comprising compressing surfaces (2a, 3a) facing each other, the distance between the compressing surfaces (2a, 3a) being adjustable for compressing an object (1), bagging means (4, 5) comprising parallel support surfaces (4a, 5a), and pushing means (6) for pushing a compressed object (1) from the compressing means (2, 3) to the bagging means

(4, 5) between the support surfaces (4a, 5a). The apparatus is configured to receive foil material between the compressing means (2, 3) and the bagging means (4, 5), and pushing of an object (1) from the compressing means (2, 3) to the bagging means (4, 5) is configured to draw the foil material around the object (1) so that the foil material covers the object (1) between the object (1) and the support surfaces (4a, 5a).

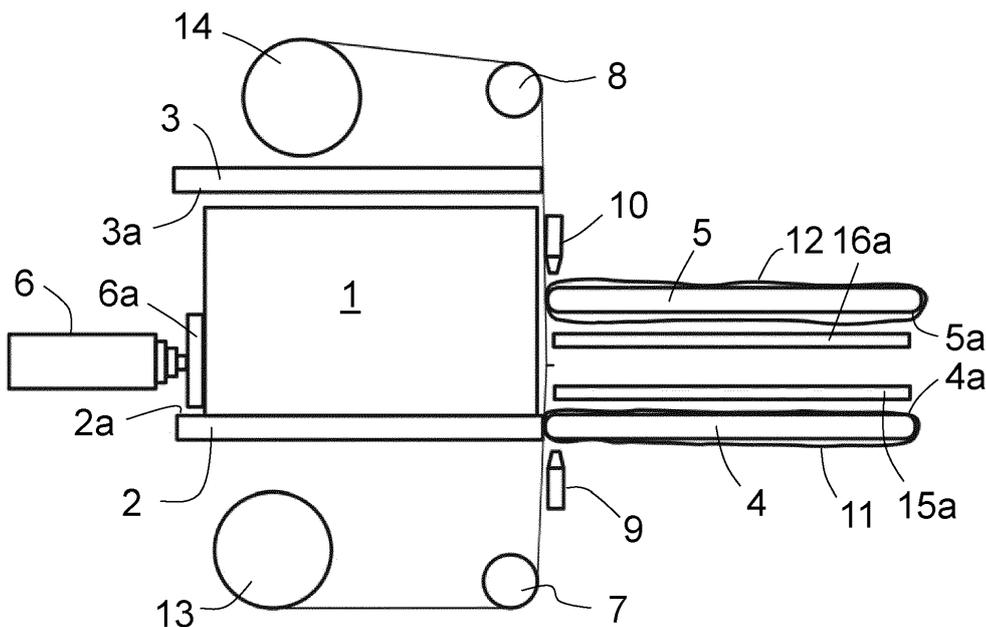


FIG. 1

Description

Technical field of the invention

[0001] The present invention concerns a packaging apparatus according to claim 1. The invention also concerns a method of packaging an object.

Background of the invention

[0002] Different packaging apparatuses for packaging compressible insulating material, such as mineral wool, into a plastic foil are known. In one known type of packaging apparatus a bag is formed of a plastic foil tube. The bag is arranged around a pair of conveyor belts. Another pair of conveyor belts is used for compressing insulation material, which is driven into the bag by the conveyor belts. A problem of this kind of apparatus is that because the bag is arranged around the conveyor belts, a bigger bag is needed than what would be required by the material to be packaged. In addition, the insulation material needs to be compressed a lot. This may cause damage to the insulation material and the material does not always return to its nominal dimensions.

[0003] In a modification of the above-mentioned packaging apparatus the conveyor belts around which the bags are arranged are replaced by steel plates forming a funnel. The funnel takes less space within the bag than conveyor belts, but the bag still needs to be bigger than what would be required by the material to be packaged.

[0004] In another type of a packaging apparatus a pair of conveyor belts push the insulation material against a plastic foil and simultaneously compress the insulation material. Another pair of conveyor belts receives the compressed insulation material and the foil is seamed between the two pairs of conveyor belts. A problem with this kind of apparatus is that the compressed insulation material is expanded when it moves past the foil, because the material is not supported against a support surface at that position. The problem can be reduced by moving the conveyors or by providing the apparatus with turning support plates. However, a triangle-shaped slot remains between the conveyor belts and the surface of the insulation material is mangled as it protrudes into the slot. The moving conveyors or support plates also make the apparatus more complex. Driving of the conveyor belts also requires a lot of power.

Summary of the invention

[0005] An object of the present invention is to provide an improved packaging apparatus for packaging an object of a compressible, elastic material into a foil material. The characterizing features of the packaging apparatus according to the invention are given in claim 1. Another object of the invention is to provide an improved method of packaging an object of a compressible, elastic material into a foil material. The characterizing features of the

method are given in the other independent claim.

[0006] The packaging apparatus according to the invention comprises

- 5 - compressing means comprising a first compressing surface and a second compressing surface facing the first compressing surface, wherein the distance between the first compressing surface and the second compressing surface is adjustable for allowing
- 10 reducing of the distance between the compressing surfaces to compress an object fed between the first compressing surface and the second compressing surface,
- 15 - bagging means comprising a first support surface and a second support surface arranged at a distance from the first support surface and parallel to the first support surface, the support surfaces being parallel to the compressing surfaces of the compressing means, and
- 20 - pushing means for pushing a compressed object from the compressing means to the bagging means between the first support surface and the second support surface.

25 **[0007]** The apparatus is configured to receive foil material between the compressing means and the bagging means from at least one direction that is substantially perpendicular to the planes of the support surfaces and pushing of a compressed object from the compressing

30 means to the bagging means is configured to draw the foil material around the object so that the foil material covers the object between the object and the first support surface and between the object and the second support surface.

35 **[0008]** In the method according to the invention, the object is packaged using a packaging apparatus defined above.

[0009] The packaging apparatus and the method according to the invention solve at least some of the problems of prior art packaging apparatuses. Conveyor belts, which are susceptible to breaking, are not needed for compressing the objects and supplying them into the foil material. Because conveyor belts are not needed, the compressing means and the bagging means can be arranged very close to each other. The slot between the compressing means and the bagging means can thus be minimized, which prevents the compressed material from protruding into the slot and damaging of the material can thus be avoided.

50 **[0010]** According to an embodiment of the invention, the apparatus comprises first seaming means for seaming the foil material behind the object between the compressing means and the bagging means after the object has been pushed to the bagging means. The first seaming means can also form a front seam for the following

55 object to be packaged. The seaming means can utilize, for instance, heat to form the seam.

[0011] According to an embodiment of the invention,

the bagging means comprise a first support plate and a second support plate, the first support surface being part of the first support plate and the second support surface being part of the second support plate.

[0012] According to an embodiment of the invention, a first endless belt is arranged around the first support plate, a second endless belt is arranged around the second support plate, and the first belt and the second belt are configured to be moved by a moving object that is pushed by the pushing means. The belts facilitate moving of the foil against the support plates. This prevents scratching of the foil. The belts do not need to be driven by an actuator, but the belts can be moved solely by the moving objects.

[0013] According to an embodiment of the invention, each of the first belt and the second belt is configured to have a greater coefficient of friction against the foil material than against the respective support surface. This ensures that the belts slide against the support surfaces but not against the foils. This prevents scratching of the foil.

[0014] According to an embodiment of the invention, the first support plate and the second support plate are made of steel.

[0015] According to an embodiment of the invention, the first support surface and the second support surface are coated to reduce friction against the support surface. A low-friction coating facilitates sliding of the belt against the support surface. The foil could also slide directly against the support surfaces, i.e. without belts between the foil and the support surfaces.

[0016] According to an embodiment of the invention, the distance between the compressing surfaces and the support surfaces in the direction in which the object is pushed by the pushing means is adjustable for keeping the distance minimized during pushing of an object to the bagging means. By keeping the support surfaces close to the compressing surfaces when the object is moved, the slots between the surfaces are minimized and damaging of the object is prevented. After moving of the object, the distance between the compressing means and the bagging means can be increased to make space for the operation of seaming means.

[0017] According to an embodiment of the invention, the apparatus comprises second seaming means for seaming the foil material on a first side of the object and third seaming means for seaming the foil material on a second side of the object. This allows seaming of the foil on all sides of the object before moving the object from between the support surfaces.

[0018] According to an embodiment of the invention, the pushing means comprise a pushing plate that is substantially perpendicular to the pushing direction.

[0019] According to an embodiment of the invention, the apparatus is configured to receive the foil material between the compressing means and the bagging means from two opposite directions that are substantially perpendicular to the planes of the support surfaces. This

makes the construction simpler, as there is no need to provide means for drawing the foil material between the compressing means and the bagging means, but the foil material can be drawn by the moving object.

[0020] According to an embodiment of the invention, the material to be packaged is insulation material for thermal insulation.

Brief description of the drawings

[0021] Embodiments of the invention are described below in more detail with reference to the accompanying drawings, in which

Fig. 1 shows schematically a packaging apparatus according to an embodiment of the invention before compressing of an object to be packaged,

Fig. 2 shows the apparatus of Fig. 1 after compressing of the object,

Fig. 3 shows the apparatus of Fig. 1 after pushing the object into a foil material,

Fig. 4 shows the apparatus of Fig. 1 in a seaming phase, and

Fig. 5 shows another view of the apparatus of Fig. 1 in a seaming phase.

Detailed description of embodiments of the invention

[0022] Figure 1 shows schematically a simplified view of a packaging apparatus according to an embodiment of the invention. For the sake of clarity, some parts of the apparatus have been omitted. Figures 2-4 show similar views of the apparatus of figure 1, but in different phases of a packaging process. Figure 5 shows the apparatus of figure 1 from a different direction.

[0023] The packaging apparatus according to the invention can be used for packaging objects that are made of a compressible, elastic material into a foil material.

[0024] The expression "compressible, elastic material" refers here to a material which can be compressed by at least ten percent from its original volume and which returns to substantially the original volume and shape when the compressing force is released. An object made of such a material can be packaged into a package having smaller dimensions than the object in its original shape. The material can be, for instance, insulation material for thermal insulation. The material could be, for instance, mineral wool or insulation material made of natural fibers, such as wood fibers.

[0025] The term "object" refers here to an item that is packaged within a single package made of the foil material. The object can comprise several pieces. The term "object" can thus refer to, for instance, a bundle of insulation slabs.

[0026] The foil material that is used for packaging the object can be, for instance, plastic material.

[0027] The packaging apparatus according to the invention comprises compressing means 2, 3. The compressing means 2, 3 comprise a first compressing surface 2a and a second compressing surface 3a. The compressing surfaces 2a, 3a face each other. Preferably, the first and the second compressing surfaces 2a, 3a are parallel to each other. The distance between the first compressing surface 2a and the second compressing surface 3a is adjustable. At least one of the compressing surfaces 2a, 3a is thus moveable relative to the other compressing surface 2a, 3a in a direction that is perpendicular to the plane of at least one of the surfaces 2a, 3a. This allows compressing of an object 1 that is fed between the first compressing surface 2a and the second compressing surface 3a. One of the compressing surfaces 2a, 3a, for instance the lower compressing surface 2a, can be fixed, but it is also possible that both compressing surfaces 2a, 3a are moveable.

[0028] The packaging apparatus comprises means for moving the second compressing surface 3a and/or the first compressing surface 2a. The means can comprise, for instance, one or more pneumatic or hydraulic cylinders, or one or more electrical linear actuators. The means could also comprise vertical guides and one or more chains or belts for moving the second compressing surface 3a and/or the first compressing surface 2a.

[0029] The compressing means 2, 3 can comprise a first compressing plate 2 and a second compressing plate 3. The first compressing surface 2a can be a surface of the first compressing plate 2 and the second compressing surface 3a can be a surface of the second compressing plate 3. The compressing plates 2, 3 can be, for instance, steel plates. The compressing plates 2, 3 could also be made of some other material, such as plastic, plywood or other wooden material or composite.

[0030] The compressing surfaces 2a, 3a are configured to allow sliding of the objects to be packaged against the surfaces 2a, 3a. Friction between the compressing surfaces 2a, 3a and the objects 1 to be packaged should thus be relatively low. Sufficiently low friction can typically be achieved with steel surfaces, but the compressing surfaces 2a, 3a could also be coated with a low-friction coating.

[0031] The packaging apparatus further comprises bagging means 4, 5. The bagging means 4, 5 comprise a first support surface 4a and a second support surface 5a facing the first support surface 4a. The second support surface 5a is arranged at a distance from the first support surface 4a and parallel to the first support surface 4a. The support surfaces 4a, 5a are parallel to at least one of the compressing surfaces 2a, 3a of the compressing means 2, 3. The packaging apparatus can comprise a first support plate 4 and a second support plate 5. The first support surface 4a can be a surface of the first support plate 4 and the second support surface 5a can be a surface of the second support plate 5. The support plates

4, 5 can be, for instance, steel plates. The support plates could also be made of some other material, such as plastic, plywood or other wooden material or composite.

[0032] The distance between the support surfaces 4a, 5a can be fixed. However, the support surfaces 4a, 5a could also be moveable in relation to each other for adjusting the distance between the support surfaces 4a, 5a and thus allowing making packages of different heights. The vertical position of the first support surface 4a could be fixed and the second support surface 5a could be moveable in the vertical direction. Alternatively, the first support surface 4a could be moveable and the second support surface 5a could be fixed, or both support surfaces 4a, 5a could be moveable in the vertical direction.

[0033] In the embodiment of the figures, the support surfaces 4a, 5a are moveable in a horizontal direction for adjusting the distance between the support surfaces 4a, 5a and the compressing surfaces 2a, 3a. This allows forming a larger gap between the support surfaces 4a, 5a and the compressing surfaces 2a, 3a for using seaming means. Instead of moveable support surfaces 4a, 5a, the compressing surfaces 2a, 3a could be moveable in the horizontal direction. It is not necessary that the distance between the support surfaces 4a, 5a and the compressing surfaces 2a, 3a is adjustable, but the packaging apparatus could be provided with seaming means not requiring adjustment of the gap.

[0034] The packaging apparatus further comprises pushing means 6 for pushing a compressed object 1 from the compressing means 2, 3 to the bagging means 4, 5 between the first support surface 4a and the second support surface 5a. The pushing means 6 are configured to push the object 1 from the back side. The expression "back side" refers here to a side that faces a direction that is opposite to the moving direction of the object 1 when it is being pushed by the pushing means 6.

[0035] In the embodiment of the figures, the pushing means 6 are illustrated as a telescopic cylinder, to which a pushing plate 6a is attached. The pushing plate 6a contacts the object 1. The pushing means 6 could be implemented in many alternative ways. For instance, the pushing means could comprise one or more hydraulic or pneumatic cylinders or linear actuators. The pushing plate 6a could also be moved, for example, by a chain drive or belt drive.

[0036] In the embodiment of the figures, the packaging apparatus is configured to receive foil material between the compressing means 2, 3 and the bagging means 4, 5 from two opposite directions that are substantially perpendicular to the plane of the support surfaces 2a, 3a. It is not necessary that the directions are exactly perpendicular to the planes of the support surfaces or exactly opposite to each other, but each direction can differ from the perpendicular direction for instance by 0-20 degrees.

[0037] It is not necessary to feed the foil material from two directions, but the foil material could be fed from one direction only. The packaging apparatus could be provided with a device for pulling the foil material between

the compressing means and the bagging means. Alternatively, the foil material could be fed from a roll located above the compressing and bagging means by rotating the roll.

[0038] In the packaging apparatus according to the invention, pushing of a compressed object 1 from the compressing means 2, 3 to the bagging means 4, 5 is configured to draw the foil material around the object 1 so that the foil material covers the object 1 between the object 1 and the first support surface 4a and between the object 1 and the second support surface 5a. Because a front side of the object 1 contacts the foil, also the front side is covered by the foil. The expression "front side" refers to the side facing the moving direction of the object 1.

[0039] The foil is configured to be broader than the object 1 to be packaged. The foil thus extends beyond the sides of the object 1. On each side of the object 1, the foil is configured to extend beyond the side to a distance corresponding at least half of the height of the compressed object 1. This allows seaming of the foil on the sides of the object 1. The term "side" refers here to a side that is parallel to the moving direction of the object 1.

[0040] In the embodiment of the figures, the apparatus comprises a first foil guide 7 that guides the foil material to the space between the compressing means 2, 3 and the bagging means 4, 5 from a first direction. The apparatus comprises a second foil guide 8 that guides the foil material to the space between the compressing means 2, 3 and the bagging means 4, 5 from a second direction. The foil guides 7, 8 could be, for instance, rolls or bars.

[0041] In the embodiment of the figures, the foil material is supplied from a first roll 13 and from a second roll 14. The ends of the foils supplied from the two rolls 13, 14 are joined together. The foil guides 7, 8 are not necessary, but the rolls 13, 14 could be located so that the foil material could be supplied to the space between the compressing means 2, 3 and the bagging means 4, 5 directly from the two rolls 13, 14. The foil material rolls 13, 14 can be freely rotatable. It is thus not necessary to provide the packaging apparatus by means for driving the rolls 13, 14, but the foil can be supplied by the force exerted on the foil by the moving object 1. However, it is also possible to provide the packaging apparatus with means for rotating the foil material rolls 13, 14 or with a separate pulling device that is configured to pull the foil material from the rolls 13, 14. Especially when the rolls 13, 14 are large and heavy, that would facilitate feeding of the foil material.

[0042] If the foil material is supplied from one direction only, i.e. from a single foil material roll, the packaging apparatus can be configured to hold the free end of the foil material when the object 1 is being moved by the pushing means 6. The foil material could thus be drawn from the foil material roll by the movement of the object 1. Feeding of the foil material could be facilitated by rotating the foil material roll or by means of a separate pulling device. Alternatively to holding the free end of the foil

material, a suitable amount of the foil material could be supplied from the foil material roll before pushing of the object, and one end of the foil material could hang free.

[0043] In the embodiment of the figures, the compressing surfaces 2a, 3a and the support surfaces 4a, 5a of the bagging means 4, 5 are horizontal. The first roll 13 is arranged to feed the foil material from below the level of the first compressing surface 2a, which is a lower compressing surface. The second roll 14 is arranged to feed the foil material from above the second compressing surface 3a, which is an upper compressing surface. In the embodiment of the figures, the second roll 14 is arranged above the second support surface 3a. However, the foil guides 7, 8 could be configured to allow placing the second roll 14 differently. For instance, the packaging apparatus could comprise several foil guides, which would allow placing also the second roll 14 close to the floor.

[0044] In the embodiment of the figures, the apparatus comprises first seaming means 9, 10. The first seaming means 9, 10 are configured to form a seam behind the object 1 to be packaged, i.e. on the back side of the object 1. The first seaming means 9, 10 are also configured to simultaneously form a seam for the front side of the following object 1 to be packaged. The first seaming means 9, 10 can also be configured to separate the formed package from the rest of the foil. The first seaming means 9, 10 can utilize for example heat to form the seams. If the foil material was supplied from one direction only, the first seaming means 9, 10 would form a seam only behind the object 1. On the front side of the object 1, there would be no seam.

[0045] In the embodiment of the figures, the apparatus comprises second seaming means 15a, 16a and third seaming means 15b, 16b. The second seaming means 15a, 16a are configured to form a seam on a first side of the object 1 and the third seaming means 15b, 16b are configured to form a seam on a second side of the object. The first side and the second side are sides that are parallel to the moving direction of the object 1 when the object 1 is pushed by the pushing means 6. It is not necessary to provide the apparatus with the second and third seaming means, but the side seams could be formed in a separate apparatus.

[0046] According to an embodiment of the invention, the distance between the compressing surfaces 2a, 3a and the support surfaces 4a, 5a in the direction in which the objects 1 are pushed by the pushing means 6 is adjustable. This allows keeping the distance minimized during pushing of an object 1 to the bagging means 4, 5. During the pushing phase, the support plates 4, 5 can be kept close to the compressing means 2, 3. When the object 1 has been moved between the support plates 4, 5, the support plates 4, 5 can be moved farther from the compressing means 2, 3 to make space for the operation of the first seaming means 9, 10.

[0047] In the embodiment of the figures, the first support surface 4a is part of a first support plate 4 and the second support surface 5a is part of a second support

plate 5. A first belt 11 is arranged around the first support plate 4 and a second belt 12 is arranged around the second support plate 5. The first belt 11 and the second belt 12 are configured to be moved by a moving object 1 that is pushed by the pushing means 6. The belts 11, 12 are driven only by the moving objects 1. The belts 11, 12 are thus not driven by any motor. In the embodiment of the figures, the support plates 4, 5 are not provided with any rolls for facilitating moving of the belts 11, 12, but the belts 11, 12 slide directly against the support plates 4, 5. In the embodiment of the figures, lateral edges of the support plates 4, 5, i.e. the edges running in a direction that is perpendicular to the moving direction of the objects 1 to be packaged, are rounded. This ensures that the belts 11, 12 move smoothly. The radius of rounding can be relatively small, which allows making the slot between the compressing plates 2, 3 and the support plates 4, 5 small.

[0048] The belts 11, 12 can be very slack, which allows the belts to be moved with little force. Due to the belts 11, 12, the foil does not need to slide against the support surfaces 4a, 5a, which prevents scratching of the foil.

[0049] Each of the first belt 11 and the second belt 12 is configured to have a greater coefficient of friction against the foil material than against the respective support surface 4a, 5a. This ensures that the belts 11, 12 slide relative to the support plates 4, 5 but not relative to the foil. This prevents scratching of the foil. The support surfaces 4a, 5a can be coated with a low-friction material, which reduces friction between the belt 11, 12 and the support surface 4a, 5a. A low-friction coating could also allow the use of the packaging material even without the belts 11, 12. Depending on the material of the foil, the packaging apparatus could be used without the belts 11, 12 even if the support surfaces 4a, 5a are not coated.

[0050] The operation of the packaging apparatus is described next.

[0051] In the situation of figure 1, an object 1 to be packaged has been arranged between the first compressing surface 2a and the second compressing surface 3a. The object 1 can be a bundle of insulating material, such as mineral wool. The bundle can comprise several insulation slabs. The object 1 can be fed between the compressing surfaces 2a, 3a by means of a suitable conveyor or other means. In the situation of figure 1, the distance between the first compressing surface 2a and the second compressing surface 3a is greater than the height of the object 1 to be packaged.

[0052] In the situation of figure 2, the object 1 has been compressed by reducing the distance between the first compressing surface 2a and the second compressing surface 3a. In the embodiment of the figures, the second compressing surface 3a is moveable, and it has been brought closer to the first compressing surface 2a.

[0053] Instead of the moving the second compressing surface 3a, the first compressing surface 2a could be moveable or both compressing surfaces 2a, 3a could be moveable. After the compressing, the distance between

the compressing surfaces 2a, 3a substantially equals the distance between the support surfaces 4a, 5a of the bagging means 4, 5. However, the distance between the support surfaces 2a, 3a can be slightly smaller than the distance between the support surfaces 4a, 5a. After the compressing, the first compressing surface 2a is substantially at the same level as the first support surface 4a. The second compressing surface 3a is substantially at the same level as the second support surface 5a. However, the first compressing surface 2a could be at a slightly higher level than the first support surface 4a and the second compressing surface 3a could be at a slightly lower level than the second support surface 5a.

[0054] In the situation of figure 3, the pushing means 6 have been used for pushing the compressed object 1 from the compressing means 2, 3 to the bagging means 4, 5 between the first support surface 4a and the second support surface 5a. The pushing means 6 comprise a pushing plate 6a that is substantially perpendicular to the pushing direction and configured to push the object 1 from the back side.

[0055] During pushing of the object 1, the support surfaces 4a, 5a of the bagging means 4, 5 are arranged close to the compressing surfaces 2a, 3a. The distance between the support surfaces 4a, 5a and the compressing surfaces 2a, 3a in the pushing direction is thus minimized so that the gap between the compressing surface 2a, 3a and the respective support surface 4a, 5a is as small as possible. The material to be packaged can thus not significantly protrude into the gap. When the object 1 is pushed, it draws foil material from the rolls 13, 14. The lower surface of the object 1, i.e. the surface facing the first support surface 4a is thus covered by the foil material drawn from the first roll 13 and the upper surface of the object 1, i.e. the surface facing the second support surface 5a, is covered by the foil material drawn from the second roll 14.

[0056] In the situation of figure 4, the support surfaces 4a, 5a have been moved farther from the compressing surfaces 2a, 3a. A larger gap has thus been formed between each compressing surface 2a, 3a and the respective support surface 4a, 5a. The gap allows using of the first seaming means 9, 10. The first seaming means 9, 10 have been moved against each other for forming a seam behind the object 1 in the pushing direction. The first seaming means 9, 10 also detach the formed package from the foil material fed from the two rolls 13, 14 and joins the ends of the foils for allowing packaging of the next object. The first seaming means 9, 10 can, for instance, apply heat to the foil material in order to join the foil material fed from the two rolls 13, 14 together.

[0057] Instead of increasing the gap between the compressing means 2, 3 and the bagging means 4, 5, the first seaming means 9, 10 could be moveable in a lateral direction, which would allow forming a seam behind the object 1.

[0058] In the situation of figure 4, the pushing means 6 and the compressing means 2, 3 have returned to their

initial positions for allowing receiving a next object 1 to be packaged. Retrieving of the pushing means 6 and the compressing means 2, 3 can take place simultaneously with the seaming of the foil behind the object 1, or, alternatively, before or after the seaming. The next object 1 to be packaged can be received between the compressing surfaces 2a, 3a as soon as the compressing means 2, 3 and the pushing means have retrieved to their initial positions.

[0059] Figure 5 shows a front view of the packaging apparatus in a situation where the second seaming means 15a, 16a and third seaming means 15b, 16b are being used to form seams on the first and second sides of the object 1. The second and third seaming means 15a, 16a, 15b, 16b can be used simultaneously with the first seaming means 9, 10. Alternatively, the second and third seaming means can be used after the first seaming means. The second and third seaming means can be used after using the first seaming means without moving the object 1 in between. Alternatively, the object 1 can be moved before the second and third seaming means are used. It is also possible that the object 1 is removed from between the support surfaces 4a, 5a and the seaming of the first and second side is done in a completely different step.

[0060] It will be appreciated by a person skilled in the art that the invention is not limited to the embodiments described above, but may vary within the scope of the appended claims.

Claims

1. A packaging apparatus for packaging an object (1) of a compressible, elastic material into a foil material, the packaging apparatus comprising

- compressing means (2, 3) comprising a first compressing surface (2a) and a second compressing surface (3a) facing the first compressing surface (2a), wherein the distance between the first compressing surface (2a) and the second compressing surface (3a) is adjustable for allowing reducing of the distance between the compressing surfaces (2a, 3a) to compress an object (1) fed between the first compressing surface (2a) and the second compressing surface (3a),
- bagging means (4, 5) comprising a first support surface (4a) and a second support surface (5a) arranged at a distance from the first support surface (4a) and parallel to the first support surface (4a), and
- pushing means (6) for pushing a compressed object (1) from the compressing means (2, 3) to the bagging means (4, 5) between the first support surface (4a) and the second support surface (5a),

wherein

- the apparatus is configured to receive foil material between the compressing means (2, 3) and the bagging means (4, 5) from at least one direction that is substantially perpendicular to the planes of the support surfaces (4a, 5a), and
- pushing of a compressed object (1) from the compressing means (2, 3) to the bagging means (4, 5) is configured to draw the foil material around the object (1) so that the foil material covers the object (1) between the object (1) and the first support surface (4a) and between the object (1) and the second support surface (5a).

2. A packaging apparatus according to claim 1, wherein the apparatus comprises first seaming means (9, 10) for seaming the foil material behind the object (1) between the compressing means (2, 3) and the bagging means (4, 5) after the object (1) has been pushed to the bagging means (4, 5).

3. A packaging apparatus according to claim 1 or 2, wherein the bagging means comprise a first support plate (4) and a second support plate (5), the first support surface (4a) being part of the first support plate (4) and the second support surface (5a) being part of the second support plate (5).

4. A packaging apparatus according to claim 3, wherein a first endless belt (11) is arranged around the first support plate (4), a second endless belt (12) is arranged around the second support plate (5), and the first belt (11) and the second belt (12) are configured to be moved by a moving object (1) that is pushed by the pushing means (6).

5. A packaging apparatus according to claim 4, wherein each of the first belt (11) and the second belt (12) is configured to have a greater coefficient of friction against the foil material than against the respective support surface (4a, 5a).

6. A packaging apparatus according to any of claim 3-5, wherein the first support plate (4) and the second support plate (5) are made of steel.

7. A packaging apparatus according to any of the preceding claims, wherein the first support surface (4a) and the second support surface (5a) are coated to reduce friction against the support surface (4a, 5a).

8. A packaging apparatus according to any of the preceding claims, wherein the distance between the compressing surfaces (2a, 3a) and the support surfaces (4a, 5a) in the direction in which the object (1) is pushed by the pushing means (6) is adjustable for keeping the distance minimized during pushing of

an object (1) to the bagging means (4, 5).

9. A packaging apparatus according to any of the preceding claims, wherein the apparatus comprises second seaming means (15a, 16a) for seaming the foil material on a first side of the object (1) and third seaming means (15b, 16b) for seaming the foil material on a second side of the object (1). 5
10. A packaging apparatus according to any of the preceding claims, wherein the pushing means (6) comprise a pushing plate (6a) that is substantially perpendicular to the pushing direction. 10
11. A packaging apparatus according to any of the preceding claims, wherein the apparatus is configured to receive the foil material between the compressing means (2, 3) and the bagging means (4, 5) from two opposite directions that are substantially perpendicular to the planes of the support surfaces (4a, 5a). 15 20
12. A packaging apparatus according to any of the preceding claims, wherein the material to be packaged is insulation material for thermal insulation. 25
13. A method of packaging an object (1) of a compressible, elastic material, wherein the object (1) is packaged using a packaging apparatus according to any of the preceding claims. 30

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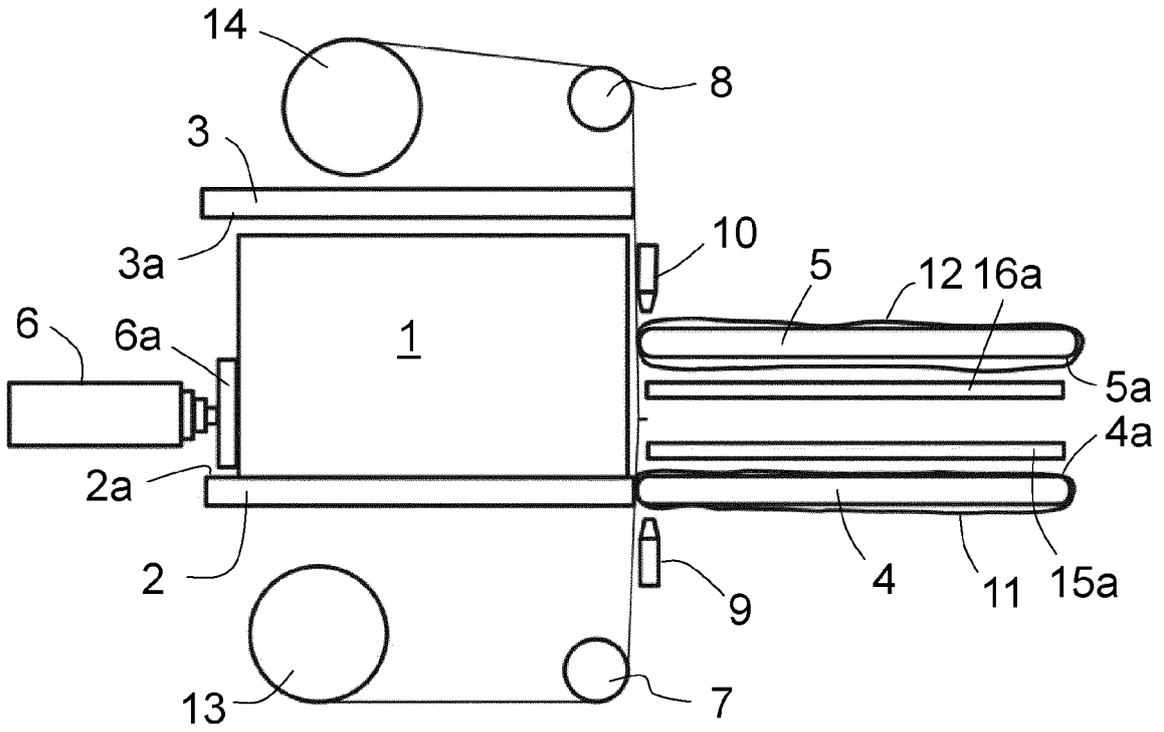


FIG. 1

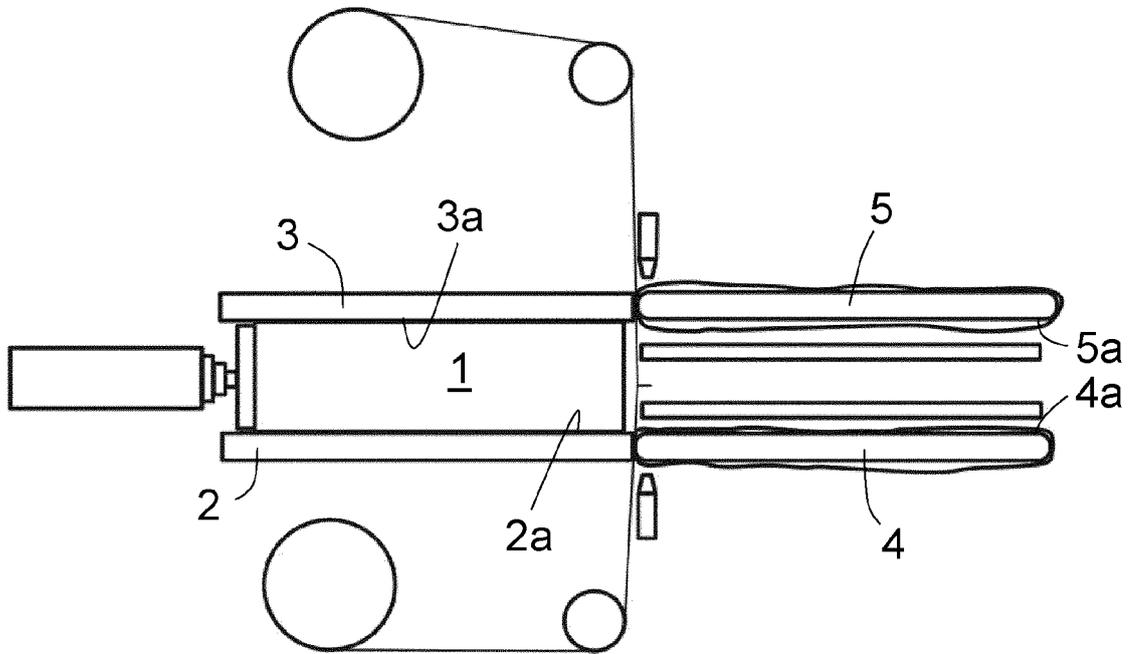


FIG. 2

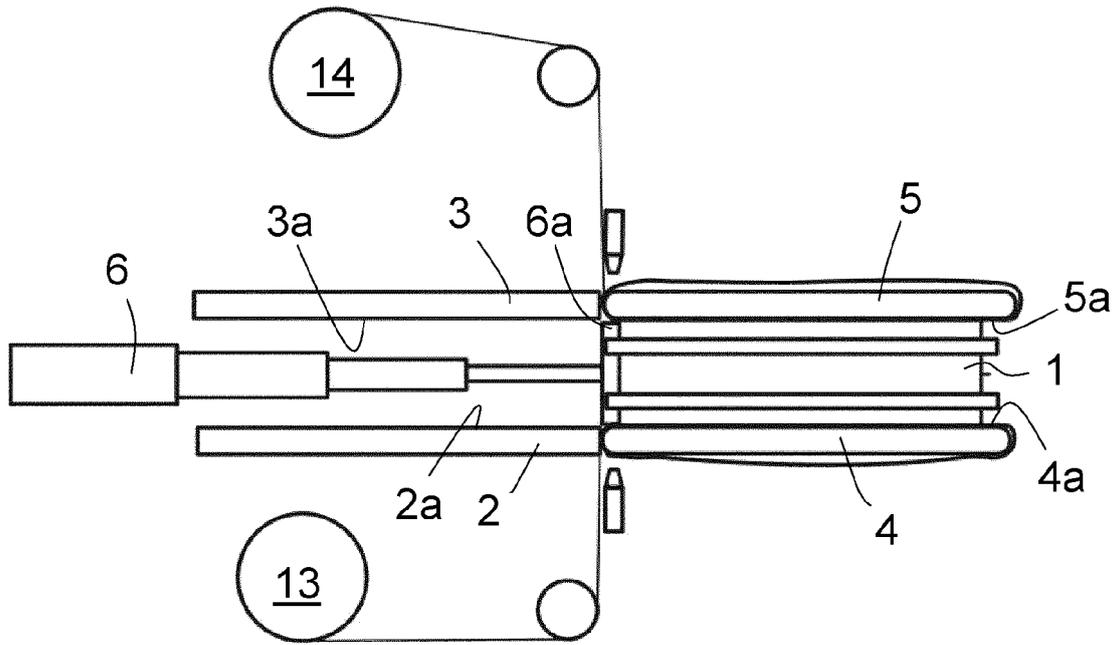


FIG. 3

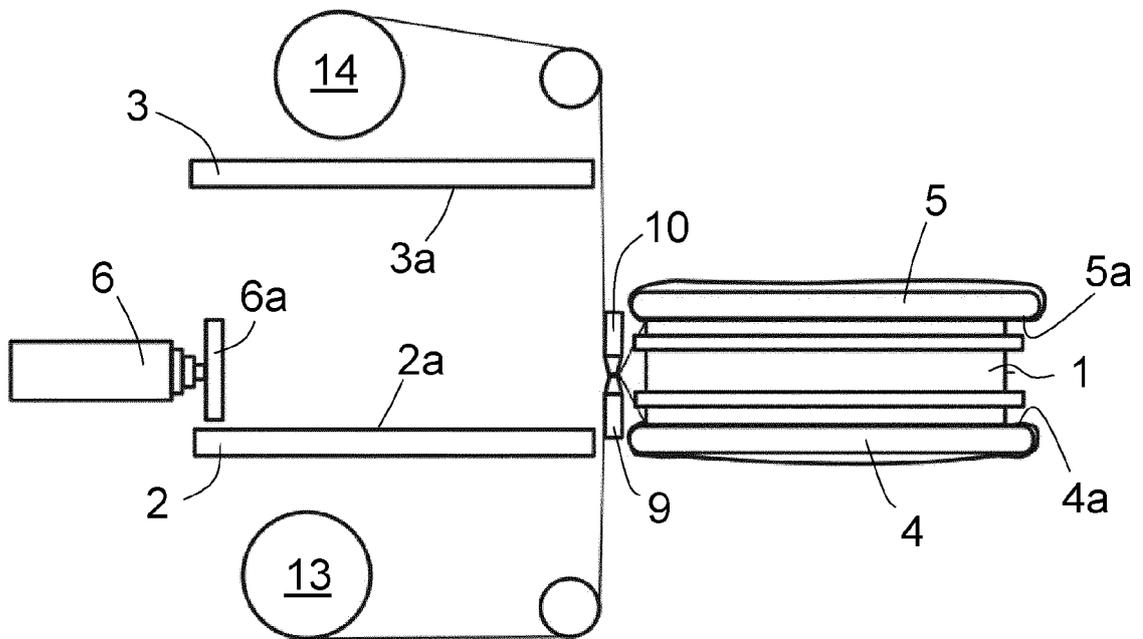


FIG. 4

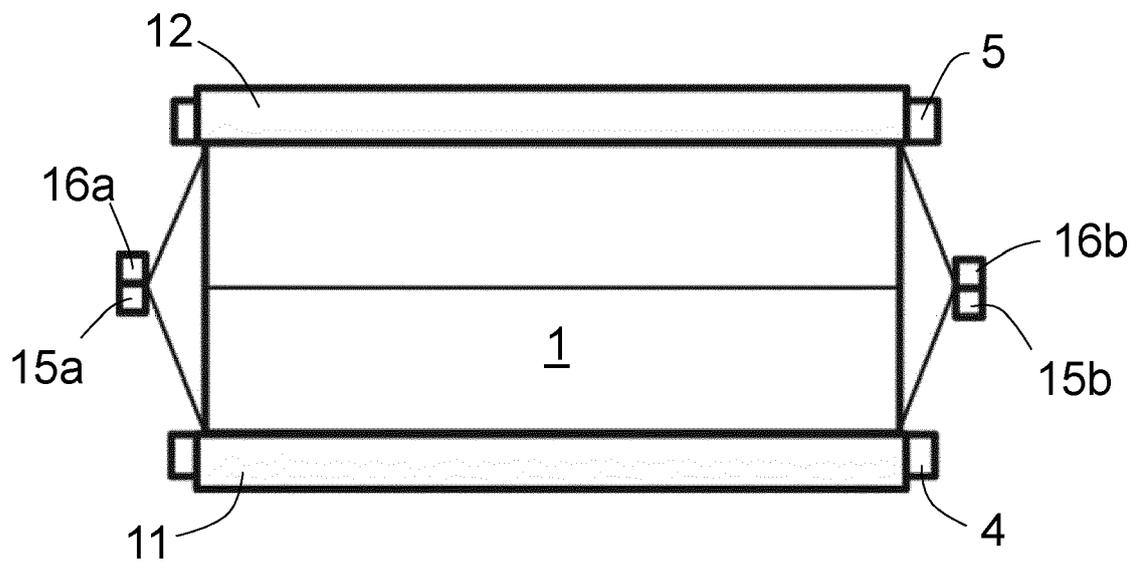


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 22 15 0310

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Y	* paragraph [0029] - paragraph [0064] *	3, 4, 6, 7, 9	B65B63/02
A	-----	5	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 September 2022	Examiner Yazici, Baris
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

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Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

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No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

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LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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see sheet B

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All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

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As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

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Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

1-7, 9, 11-13

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None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 22 15 0310

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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1. claims: 1, 2, 9, 11-13

seaming means comprising first seaming means and second seaming means to pack compressible objects in a bag.

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2. claims: 3-7

a first support plate wherein a first endless belt is arranged around the first support plate, a second support plate wherein a second endless belt is arranged around the second support plate wherein each of the first belt and the second belt is configured to have a greater coefficient of friction against the foil material than against the respective support surface.

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3. claims: 8, 10

compressing surfaces and the support surfaces with a distance in-between wherein the distance is adjustable and pushing means.

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

EP 22 15 0310

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-09-2022

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