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SYSTEM, VERFAHREN UND UMSCHLAG

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Description

TECHNICAL FIELD

[0001] The present invention relates to a system and a method for automatic handling of a pile of sheets of packaging material. It also relates to an envelope arranged to be automatically handled by a system according to the present invention.

BACKGROUND ART

[0002] Within the food industry, it is usual practice to pack drinks and other products in paper- or paperboard-based packages. Packages intended for liquid foods are often manufactured from a packaging laminate comprising a relatively strong core layer of paper or paperboard and an outer, liquid-tight layer of thermoplastic material on at least that side of the core layer which is to form the inside of the packages. For particularly oxygen-gas sensitive foods, such as juice and cooking oil, the packaging laminate also normally includes a layer of a gas barrier material. This layer is often in the form of an aluminum foil which, moreover, makes for induction sealing of the packaging laminate. EP 0 443 502 A discloses a system for unwrapping articles, the system having a heating roller to heat seals so as to enable opening without breaking the wrapping material. There are many different ways of manufacturing packages. As an example, packages of gable-top type can be manufactured from flat-folded blanks of packaging laminate which are raised, filled and sealed in a packaging machine. Awaiting these operations, the blanks are stored in a magazine comprised in the packaging machine. During normal operation of the packaging machine, the magazine must be replenished with new blanks at predetermined intervals.

[0003] The blanks are delivered to the packaging machine arranged in piles containing a predetermined number of packaging blanks. To protect the blanks from contamination and damage, the piles of blanks are wrapped in brown paper. These wrapped piles or parcels are arranged on pallets that are positioned in the vicinity of the packaging machine for loading of the blanks into the magazine.

[0004] In connection with blanks replenishment, an operator of the packaging machine picks a parcel from the pallet and places it on a table before opening it. Thereafter, the operator places the pile of blanks in the magazine of the packaging machine and discards the brown paper. Today's packaging machines have a capacity of several thousands of packages per hour. Thus, during one single eight-hour working day, at normal operation of the packaging machine, the machine operator will have to lift and in other ways move a total of several tons of blanks.

[0005] Machines for performing the above operations are available but regarded as expensive, bulky and unreliable, the latter being associated with extra work for the machine operator. These machines are often based on the principle of compressing the pile of blanks so as to achieve some "slack" in the brown paper. Thereafter, the paper is separated from the blanks, for example by means of a suction cup, before the paper is cut with a knife to open the parcel. In connection with such machines, there is a risk of the knife damaging the blanks during the parcel opening. Further, such machines require regular maintenance containing, for example, sharpening of the knives since the knife loses its sharpness in the course of time. Naturally, such maintenance is associated with machine down time. Furthermore dust in generated during cutting of the paper. The dust which is accumulated inside a machine has to be removed at regular intervals. Naturally, cleaning dust from of the machine is also associated with machine down time.

SUMMARY OF THE INVENTION

[0006] An object of the present invention is to achieve a system, according to claim 1, and a corresponding method, according to claim 6, for automatic handling of a pile of sheets of packaging material that, at least partly, eliminates the shortcomings of prior art solutions. Additionally, an object of the present invention is to achieve an envelope, according to claim 12, for enclosing a pile of sheets of packaging material, being arranged to be automatically handled by a system, and in accordance with a method, of the present invention. The dependent claims define further embodiments. The basic concept of the present invention is to provide an automated solution based on unwrapping or unfolding of the wrapping around the piles of blanks. Thereby, the operator is relieved of a number of ergonomically and time demanding operations and can instead perform other tasks. Furthermore, cutting of the envelope is not used for opening the parcels, and thereby the risk of damaging the blanks in connection with parcel opening is reduced and essentially eliminated. Also, the formation of dust is reduced which is advantageous from a hygiene point of view. Additionally, some maintenance operations necessary for cutting equipment, such as sharpening of knives, do not have to be performed in connection with the present invention.

[0007] The system, the method and the envelope for achieving the objects above are defined in the appended claims and discussed below.

[0008] A system for automatic handling of a pile of sheets of packaging material according to the present invention comprises an unwrapping apparatus. The unwrapping apparatus comprises a support device for receiving the pile which is wrapped in a piece of wrapping material that has been folded and provided with seals to form an envelope enclosing the pile. The unwrapping apparatus further comprises an opening device for unwrapping the wrapping material to expose the pile of sheets.

[0009] The sheets can be plain and unfolded and adapted for later forming and sealing. Alternatively, they

can be (partly) formed and sealed and ready to be raised, e.g. be formed as flat-folded blanks as described by way of introduction.

[0010] The pile is formed by arranging a predetermined number of sheets on top of each other in an aligned manner and the final outer shape of the pile is dependent upon the shape of the sheets. In connection with a conventional rectangular sheet form, the pile will have the form of a rectangular parallelepiped.

[0011] The support device is arranged to carry the pile of sheets during unwrapping and can, to this end, have any suitable construction. As an example, the support device may be formed as a simple plate.

[0012] The wrapping material can be any suitable material, such as paper, plastic film or the like. It is folded, according to a predetermined pattern, around the pile to, at least partly, enclose the same. In order to fix the folding, the wrapping material is sealed in predetermined areas, according to a certain pattern, whereby an envelope is formed. By seal is meant two or more wrapping material contact surfaces connected by some sort of sealing means. Examples of sealing means possible for use in connection with the present invention are tape, magnetic marks and different types of adhesives, such as adhesives that soften or melt when exposed to radiation of some kind, heat, electricity, magnetism, etc, i.e. conduction, convection, radiation, or induction/hysteresis.

[0013] In accordance with the present invention, the envelope is opened by unwrapping or unfolding the wrapping material. Thus, the wrapping material is not torn (at least not outside the sealed areas) or cut but instead the envelope is opened in a careful way. Consequently, dust generation in connection with envelope opening is reduced.

[0014] According to one embodiment of the present invention, the opening device is arranged to unwrap the wrapping material without breaking it. More particularly, this embodiment offers a completely undestructive envelope opening which leaves the corresponding piece of wrapping material intact. Thereby, the dust generation is minimized.

[0015] According to one embodiment of the present invention, the opening device is arranged to interact with the wrapping material so as to enable breaking of at least a first set of the seals to enable unwrapping of the wrapping material. The result of the final seal breaking is dependent upon how the interaction is made and how the seal has been formed, more particularly, the sealing means used. More precisely, the seal breaking may leave all the contact surfaces involved intact or leave one or more of the contact surfaces involved damaged.

[0016] As an alternative or complement to the embodiment above, the unwrapping device may further comprise an exposing device for subjecting the pile wrapped in wrapping material to a condition enabling breaking of at least a second set of the seals to enable unwrapping of the wrapping material. Naturally, the appropriate condition is dependent upon the sealing means used. For example, the condition may involve application of heat or an electric or magnetic field. Further, the result of the final seal breaking is dependent upon i.e. exposure time, exposure intensity and the sealing means used. More precisely, the seal breaking may leave some or all of the contact surfaces involved with a layer of sealing means.

[0017] The first and second sets of seals may be, but do not have to be, wholly or partly the same which may imply that the opening device and the exposing device cooperate to break the seals.

[0018] The exposing device could be arranged to subject the entire wrapped pile to said condition. Though, according to a preferred embodiment, the exposing device is arranged to act locally on areas of the envelope containing the second set of seals. This enables a fast and energy effective seal breaking.

[0019] In accordance with the present invention, the exposing device is movable in relation to the support device so as to assume a first position where it is active and work to enable breaking of at least the second set of seals and a second position where it is passive. This facilitates handling of the pile of sheets since the exposing device can be moved out of the way when it is not active.

[0020] As mentioned above, said condition to which the wrapped pile is subjected for enabling seal breaking, could involve heating. This is beneficial since is enables a mechanically simple and relatively inexpensive construction of the inventive system.

[0021] The system according to the present invention may be so constructed that the opening device is arranged to move between a first and a second position while engaging with the wrapping material to unwrap it.

[0022] According to one specific embodiment, the above engagement is accomplished by suction which enables a particularly mechanically simple and reliable construction of the system.

[0023] Besides for comprising the above described unwrapping apparatus, the system according to the present invention may comprise an automatic loading apparatus for transferring at least a part of the pile of sheets from the unwrapping apparatus to a packaging machine after unwrapping of the wrapping material. This is advantageous since it relieves the operator of another manual operation involving lifting and perhaps twisting.

[0024] The above loading apparatus may be formed in a number of different ways but comprises, according to one embodiment of the present invention, gripping means arranged to grab said part of the pile by engaging with a first and a last sheet thereof and forcing them towards each other to squeeze and hold intermediate sheets. Again, this enables a particularly mechanically simple and reliable construction of the system.

[0025] Additionally, the inventive system may comprise an automatic feeding apparatus for transporting the pile of sheets wrapped in wrapping material from a pallet to the unwrapping apparatus. Again, this is advantageous since it relieves the operator of another manual operation involving lifting and perhaps twisting.

[0026] Finally, in accordance with one embodiment, the system further comprises means for reading an information mark comprised in the envelope to enable correct handling of the pile. Such a mark could contain information on, for example, the type and number of sheets contained in the envelope or the orientation of the envelope. The system could further be arranged to adjust itself in dependence of the specific information contained in the mark.

[0027] A method of automatically handling a pile of sheets of packaging material according to the present invention comprises the steps of receiving, on a support device, the pile which is wrapped in a piece of wrapping material that has been folded and provided with seals to form an envelope enclosing the pile, and unwrapping the wrapping material to expose the pile of sheets.

[0028] An envelope for enclosing a pile of sheets of packaging material according to the present invention is formed by a piece of wrapping material that has been folded and provided with seals. The envelope is arranged to be automatically handled by a system according to the present invention.

[0029] The characterizing features which were discussed in connection with the system according to the present invention are naturally transferable to the corresponding method and envelope according to the present invention. Moreover, these characterizing features may naturally be combined in one and the same embodiment.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0030] The present invention will now be described in greater detail herein below, with reference to the accompanying schematic drawings which show examples of a currently non-restrictive preferred embodiment of the present invention. In the accompanying drawings:

Figure 1 illustrates a pile of blanks wrapped in an envelope according to the present invention,
Figure 2 illustrates the pile of blanks and the envelope of figure 1, the envelope being partially unwrapped or unfolded,
Figure 3 schematically illustrates a system according to the present invention,
Figures 4 and 6 are front views schematically illustrating a part of the system of figure 3 in more detail,
Figure 5 is a view from above of the part shown in figure 4,
Figure 7 and 8 are simplified side views of the part shown in figure 4, and
Figure 9 is a flow diagram which illustrates a method according to the present invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0031] In figures 1 and 2, a pile 10 of a predetermined number of flat-folded blanks 12 of packaging material (of which only a few has been illustrated) is shown. The pile 10 is wrapped in a rectangular piece 14 of wrapping paper that has been folded and sealed so as to form an envelope 16 enclosing the pile, as is illustrated in figure 1. The envelope 16 comprises seven point shaped seals 18 (18'+ 18") (illustrated by circles drawn with dashed lines) of which only five have been illustrated in figure 1. The seals 18' exist between flap a and flap b while the seals 18" exist between flap c and d. The seals 18 (18'+ 18") comprise a sealing means in the form of a hot-melt fixing the folding of the wrapping paper by binding together a number of contact surfaces of the wrapping paper. By contact surface is meant parts of the wrapping paper intended as fixing points.

[0032] Figure 3 schematically illustrates a system 20 for automatic handling of piles which works in accordance with a method illustrated by the flow diagram in figure 9. The system 20 comprises an automatic feeding apparatus 22, an automatic unwrapping apparatus 24 and an automatic loading apparatus 26. The piles of 10 of blanks 12 enclosed or wrapped by respective envelopes 16 (as described with reference to figures 1 and 2) are delivered to the packaging machine (not shown in its entirety) loaded onto pallets 28, each pallet being loaded with a predetermined number of wrapped piles arranged according to a certain loading pattern. The feeding apparatus 22 is arranged to move the wrapped piles, one by one, from the pallet 28 to the unwrapping apparatus 24. For this purpose the feeding apparatus (which will not be described in detail herein) comprises a pick and place arrangement 30, a conveyor arrangement 32 and a control unit (not shown). The pick and place arrangement 30 comprises a gripping means 34 arranged to pick a wrapped pile form the pallet 28 (step S1) by grabbing it from opposite sides. To this end, the gripping means 34 comprises arms 36, the distance between which is adjustable, as is illustrated by the double arrow A. Then, the pick and place arrangement 30 moves the wrapped pile to place it onto the conveyor arrangement 32 before releasing it (step S1). Arranged on the conveyor arrangement 32, the wrapped pile is conveyed to the unwrapping apparatus 24 (step S2), which is illustrated in more detail (but still schematically) in figures 4-8.

[0033] The unwrapping apparatus 24 comprises a support device in the form of a table 38 arranged adjacent to the conveyor arrangement 32. The wrapped pile 10 is fed onto the table 38 by the conveyor arrangement 32 (step S3), by means of a carrier 40 protruding from the conveyor arrangement 32. The table 38 is movable between two positions; an upper position dedicated for the above described transfer of the wrapped pile from the conveyor arrangement to the table, which is illustrated by dashed lines in figure 3, and a lower position, illustrated by solid lines in figure 3, dedicated for unwrapping of the pile, as will be further described hereinafter.

[0034] Thus, after the wrapped pile 10 has been loaded onto the table 38, the table is moved from the upper to the lower position (step S4) for unwrapping of the pile.

In the lower position, the table 38 is arranged adjacent to an opening device 42 and an exposing device 44, which are also comprised in the unwrapping apparatus 24.

[0035] The opening device 42 comprises an elongate rail 46 provided with two suction means 48 arranged to engage with the wrapping paper enclosing the pile and pull it in a direction from the pile to unfold the envelope. For performing this operation, the opening device is movable between a first position, more particularly a front, lower position, which is shown in figure 6, and a second position, more particularly a rear, upper position, which is shown in figures 3, 4 and 5. When the opening device moves from the first to the second position, the suction means 48 are active for connecting to the wrapping paper and enable unfolding of the envelope. In addition to being moveable between the first and second positions, the opening device is further movable between the second position and a back third position, which is illustrated with dashed lines in figure 5. When the opening device moves from the second to the third position, the suction means 48 are active. This will be further discussed bellow. For the sake of clarity, the first, second and third positions of the opening device 42 have also been illustrated in figure 7 (where the exposing device has been omitted) - the first position with solid lines and the other two positions with dashed lines. From this figure it is evident that the opening device 42 moves along an arc between the first and the second position.

[0036] The exposing device 44 comprises a rail 50 bent into U-shape and provided with seven hot air nozzles 52 arranged to heat the seals 18 to make the hot-melt soften to such an extent that the seals 18 can be broken without damaging the wrapping paper. The exposing device 44 is movable in relation to the table 38, more particularly pivotable about an axis X, between a first active position, which is illustrated in figures 3 and 5, and a second passive position, which is illustrated in figures 4 and 6. Further, the design of the exposing device is adapted to the design of the envelope enclosing the pile. More particularly, the dimensions of the rail U-shape are such that the rail 50, in the first active position, surrounds the wrapped pile on three sides with a predetermined distance to the sides. Further, the hot air nozzles 52 are so positioned on the rail 50 that they, in the first active position of the exposing device 44, are arranged in line with a respective one of the seals 18. Thereby, the hot air can be applied locally to the envelope in those areas where the seals 18 can be found. For the sake of clarity, the first active and second passive positions of the exposing device 44 have also been illustrated in figure 8 (where the opening device has been omitted) - the first active position with dashed lines and the second passive position with solid lines.

[0037] When the table 38 is arranged in its upper position, the opening device 42 is arranged in its second (upper, rear) position while the exposing device 44 is arranged in its second (passive) position. After being provided with a pile of blanks to be unwrapped like the one illustrated in figure 1, the table begins to move towards its lower position. When the table reaches its lower position, the situation illustrated in figure 4 prevails, i.e. the opening device 42 and the exposing device 44 are still arranged in their respective second positions. Next, the exposing device 44 turns to assume its first (active) position (step S5), wherein it partly surrounds the envelope, as described above. In connection therewith, the nozzles 52 begin to output hot air towards the seals 18 of the envelope (step S6). This condition is illustrated in figure 5. After a predetermined exposure time, the hot air flow from the nozzles is throttled and the exposing device 44 turns to assume its second (passive) position (step S7). In connection therewith, the opening device 42 moves to assume its first (lower, front) position (step 8) and the suction means 48 are activated (step S9) for engagement with the wrapping paper, as previously described. This condition is illustrated in figure 6. After proper engagement between the wrapping paper and the suction means 48 has been established, the opening device starts to move towards its second position (step S10). When moving upwards and backwards, the opening device pulls the wrapping paper along and away from the pile whereby the envelope is unwrapped or unfolded and the blanks are exposed. A partially unfolded envelope is illustrated in figure 2. When the opening device has reached its second position, it stops but the suction means continues to engage with the wrapping paper.

[0038] The loading apparatus 26 of the system 20 is arranged to move the exposed pile 10 of blanks 12 from the table 38 of the unwrapping apparatus 24 to a magazine 54 of a packaging machine (not further illustrated) (step S11). For this purpose the loading apparatus 26 (which will not be described in detail herein) comprises a control unit (not shown) and a pick and place arrangement 56, similar to the pick and place arrangement 30 of the feeding apparatus 22. The pick and place arrangement 56 comprises a gripping means 58 arranged to pick the pile 10 from the table 38. To this end, the gripping means 58 comprises arms 60, the distance between which is adjustable, as is illustrated by the double arrow B. These arms 60 are arranged to engage with a respective one of the first and last blanks of the pile 10 to force these against each other and squeeze and hold the intermediate blanks. After picking, the pick and place arrangement 56 moves the pile of blanks to place it in the magazine 54 before releasing it. Arranged in the magazine, the blanks are ready to, one by one, be raised, filled and sealed, which operations will not be further discussed herein.

[0039] After the pile of blanks has been picked from the table 38 of the unwrapping apparatus 24, the opening device 42, still engaging with the wrapping paper, moves from the second position to the third position pulling the piece 14 of wrapping paper along and away from the table 38 (step S12). When the opening device reaches the third position it stops and the suction means are de-

activated to release the wrapping paper (S13). Positioned right under the opening device, when this is arranged in the third position, is a recycling bin (not shown) collecting the wrapping paper when it is released. After this operation the opening means moves back to its second position to await another pile of blanks to be unwrapped (step S14).

[0040] The above described embodiment should merely be considered as an example. A person skilled in the art will readily perceive that this embodiment may be modified and varied in a number of different ways without departing from the inventive concept as herein disclosed.

[0041] For example, the system could be constructed so as to be adaptable for handling different types of piles of sheets, e.g. piles of different sizes. The size of a pile can, for example, be different depending on the number and/or the size of the sheets contained in the pile. The size of the sheets is naturally dependent on the desired volume of packaged to be manufactured.

[0042] As a further example, the system could further comprise means 62 (schematically illustrated in figure 3) for reading an information mark 64 (schematically illustrated in figure 1) comprised in the envelope 16 to enable correct handling of the pile of blanks. Such information could, for example, comprise the size and/or orientation of the pile enclosed by the envelope. The orientation of the pile could, for example, be dependent on the loading pattern of the pallet. The information mark 64 could, for example, be in the form of a bar code, a magnetic mark, a tag, etc.

[0043] For example, other sealing means than hot-melt can be used in connection with the present invention. As an example, other types of adhesives could be used, both adhesives that would require exposure to other conditions than heat, e.g. another type of irradiation, a magnetic field or an electric field, to enable undestructive (with respect to the wrapping material) seal breaking, and adhesives that would require no specific exposure to allow undestructive seal breaking. An example of the latter type of adhesive is an adhesive of the type used on Post-it® notes. Naturally, use of such adhesive would allow omission of the exposing device of the system according to the present invention since the seals could be broken by the opening device pulling the wrapping material.

[0044] It is also conceivable that a very limited damage of the wrapping material could be allowed in connection with pile unwrapping, i.e. damage in the form of a torn outer layer of the wrapping material at the contact surfaces, that is in the areas of the seals. For such an application, in principle any sealing means could be used. Further, such an application would allow omission of the exposing device of the system according to the present invention since the seals could be broken by the opening device pulling the wrapping material.

[0045] Furthermore, all seals of an envelope are not of the same kind and/or must be broken in the same way. As an example, a first sealing means could be used for a first set of the seals of an envelope (for example seals 18' of figure 1) and a second different sealing means could be used for a second set, possibly the rest, of the seals of the envelope (for example seals 18" of figure 1). Here, the first set of seals are arranged to be broken by the opening device pulling the wrapping material whereas the second set of seals are arranged to be broken by the exposing device subjecting the envelope to a certain condition, such as heat.

[0046] Naturally, conceivable are also embodiments wherein all or some of the seals are arranged to be broken by a combination of the exposing device subjecting the envelope to a certain condition and the opening device pulling the wrapping material.

[0047] In the above described embodiment, spots of sealing means, more particularly hot-melt, were applied to the wrapping paper to form the envelopes, which resulted in point shaped seals. Naturally, the sealing means could be applied to the wrapping material according to any pattern. As an example, the sealing means could be applied to the wrapping material in lines. Naturally, a change of the sealing means pattern could require a change of the unwrapping apparatus, to enable seal breaking along the complete extension of the seals.

[0048] Further, in the above described embodiment, the exposing device is, with its relative small nozzles, arranged to act locally on areas of the envelope containing the seals. Naturally, the exposing device could instead be arranged to act on larger parts of, or even the whole, envelope o as to enable seal breaking.

[0049] Furthermore, in the above described embodiment, the seals have been heated to the softening point of the hot-melt by being subjected to hot air. Naturally, there are alternative ways of heating the seals. As an example, a hot bar could be pressed against the envelope to heat the seals. Additionally, other adhesives requiring heating to the melting point to allow seal breaking could be used.

[0050] The above described envelopes have the form of a rectangular parallelepiped and consist of wrapping paper that has been folded and sealed. Of course, the invention could be used in connection with envelopes with other forms and folding patterns. Naturally, other materials than pure paper can be used as wrapping material. As an example, a wrapping material containing a (spot wise) layer of a conductive material could be used. Such a material could enable use of an adhesive which softens or melts when exposed to an electric field.

[0051] In the above described embodiment, the steps of the inventive method have been performed in a certain order. Naturally, variants of this are possible. As an example, in accordance with an alternative embodiment, the opening device can be arranged to engage with the wrapping material to unfold the same while the exposing means are still, actively or passively, surrounding the pile of blanks.

[0052] According to the embodiment above, the opening device engages with the envelope at an upper surface

thereof. The opening device could, in accordance with an alternative embodiment, be arranged to (also) engage with other parts of the envelope. The opening device and the exposing device could further be integrated in one single unit. As an example, the exposing device could be provided with suction means for performing the unfolding operation, which would enable omission of a separate opening device.

[0053] Finally, it should be observed the figures are highly simplified and not drawn to scale.

Claims

1. System (20) for automatic handling of a wrapped pile (10) of sheets (12) of packaging material, wherein the pile is (10) wrapped in a single piece (14) of wrapping material that has been folded and provided with at least a first and second set of seals (18' and 18") to form an envelope (16) enclosing the pile (10), the system comprising an unwrapping apparatus (24), which in turn comprises:

   a support device (38) for receiving the wrapped pile (10),
   an exposing device (44), arranged to heat at least the second set of the seals (18"), such as to enable the opening device (42) to unwrap the wrapping material without breaking it,
   wherein the exposing device (44) is movable in relation to the support device (38) so as to assume a first position where it is active and work to enable breaking of at least second set of seals (18") and a second position where it is passive,
   an opening device (42) for unwrapping the wrapping material to expose the pile (10) of sheets (12) and configured to break the first set of seals if not broken by the exposing device.

2. System (20) according to claim 1, wherein the exposing device (44) is arranged to act locally on areas of the envelope (16) containing the second set of seals (18").

3. System (20) according to any preceding claim, wherein the heat is supplied by conduction, convection, radiation, induction or hysteresis.

4. System (20) according to any preceding claim, wherein the opening device (42) is arranged to move between a first and a second position while engaging with the wrapping material to unwrap it.

5. System (20) according to any preceding claim, wherein the opening device (42) comprises a number of suction means (48) for engaging with the wrapping material by suction.

6. Method of automatically handling a wrapped single pile (10) of sheets (12) of packaging material comprising
   receiving (step S3), on a support device (38), the pile which is wrapped in a single piece (14) of wrapping material that has been folded and provided with a first and second set of seals (18' and 18") to form an envelope (16) enclosing the pile,
   comprising moving (step S5 + S7), in relation to the support device (38), the exposing device (44) between a first position where it is active and work to enable breaking of at least the second set of seals (18) and a second position where it is passive,
   subjecting (step S6), using an exposing device (44), the pile (10) wrapped in wrapping material to a condition enabling breaking of at least the second set of the seals (18) to enable unwrapping of the wrapping material without breaking the wrapping material, and
   unwrapping (step S10), by means of an opening device (24) and the opening device being configured to break the first set of seals if not broken by the exposing device, the wrapping material to expose the pile (10) of sheets (12).

7. Method according to claim 7, comprising letting the exposing device act (step S6) locally on areas of the envelope (16) containing said second set of seals (18").

8. Method according to any one of claims 6-7, wherein said condition involves heating of the at least second set of seals (18").

9. Method according to any one of claims 6-8, comprising moving (step S8 + S10) the opening device (42) between a first and a second position while it is engaging with the wrapping material to unwrap it.

10. Method according to claim 9, comprising engaging with the wrapping material by suction.

11. Method according to any one of claims 6-10, further comprising transferring (step S11) at least a part of the pile (10) of sheets (12) form the support device (38) to a packaging machine after unwrapping of the wrapping material.

12. Envelope (16) for enclosing a single pile (10) of sheets (12) of packaging material, said envelope (16) being formed by a piece (14) of wrapping material that has been folded and provided with at least a first set and a second set of seals (18',18") at least the second set of seals being arranged to be broken when subjected to a condition enabling breaking of the second set of seals by an exposing device, the envelope thus being arranged to be opened without being broken, according to the system of claim 1 and according to the method of claim 6.

13. Envelope (16) according to claim 12, comprising an adhesive in the form of a hot-melt binding together different parts of the piece (14) of wrapping material to form the seals (18), wherein the adhesive is applied in isolated points or in isolated strings.

Patentansprüche

1. System (20) für die automatische Handhabung eines eingewickelten Stapels (10) aus Bögen (12) von Verpackungsmaterial, wobei der Stapel (10) in einem einzelnen Stück (14) Hüllmaterial eingewickelt ist, das gefaltet worden und mit wenigstens einem ersten und einem zweiten Satz Versiegelungen (18' und 18") versehen ist, um einen Umschlag (16) zu bilden, der den Stapel (10) umschließt, wobei das System eine Auswickelvorrichtung (24) umfasst, die wiederum Folgendes umfasst:

eine Stützvorrichtung (38) zum Aufnehmen des eingewickelten Stapels (10),
eine Freilegungsvorrichtung (44), die so angeordnet ist, dass sie wenigstens den zweiten Satz Versiegelungen (18") so erwärmt, dass sie der Öffnungsvorrichtung (42) das Auswickeln des Hüllmaterials ermöglicht, ohne es zu zerreißen, wobei die Freilegungsvorrichtung (44) in Bezug auf die Stützvorrichtung (38) so bewegbar ist, dass sie eine erste Stellung, in der sie tätig ist und so arbeitet, dass sie das Lösen wenigstens des zweiten Satzes Versiegelungen (18") ermöglicht, und eine zweite Stellung, in der sie untätig ist, einnimmt,
eine Öffnungsvorrichtung (42) zum Auswickeln des Hüllmaterials, um den Stapel (10) aus Bögen (12) freizulegen, die so ausgelegt ist, dass sie den ersten Satz Versiegelungen löst, falls dieser nicht von der Freilegungsvorrichtung gelöst worden ist.

2. System (20) nach Anspruch 1, wobei die Freilegungsvorrichtung (44) so angeordnet ist, dass sie lokal auf Bereiche des Umschlags (16) einwirkt, die den zweiten Satz Versiegelungen (18") enthalten.

3. System (20) nach einem der vorhergehenden Ansprüche, wobei die Versorgung mit Wärme über Konduktion, Konvektion, Strahlung, Induktion oder Hysterese erfolgt.

4. System (20) nach einem der vorhergehenden Ansprüche, wobei die Öffnungsvorrichtung (42) so angeordnet ist, dass sie sich zwischen einer ersten und einer zweiten Stellung bewegt, während sie in das Hüllmaterial eingreift, um es auszuwickeln.

5. System (20) nach einem der vorhergehenden Ansprüche, wobei die Öffnungsvorrichtung (42) eine Reihe von Saugmitteln (48) umfasst, um durch Saugwirkung in das Hüllmaterial einzugreifen.

6. Verfahren für die automatische Handhabung eines einzelnen eingewickelten Stapels (10) aus Bögen (12) von Verpackungsmaterial, umfassend:

Aufnehmen (Schritt S3) des Stapels auf einer Stützvorrichtung (38), wobei der Stapel in einem einzelnen Stück (14) Hüllmaterial eingewickelt ist, das gefaltet worden und mit einem ersten und einem zweiten Satz Versiegelungen (18' und 18") versehen ist, um einen Umschlag (16) zu bilden, der den Stapel umschließt,
Umfassen des Bewegens (Schritt S5 + S7) der Freilegungsvorrichtung (44) in Bezug auf die Stützvorrichtung (38) zwischen einer ersten Stellung, in der sie tätig ist und so arbeitet, dass sie das Lösen wenigstens des zweiten Satzes Versiegelungen (18) ermöglicht, und einer zweiten Stellung, in der sie untätig ist,
mit Hilfe einer Freilegungsvorrichtung (44) Überführen des in dem Hüllmaterial eingewickelten Stapels (10) in einen Zustand, in dem das Lösen wenigstens des zweiten Satzes der Versiegelungen (18) möglich ist, um das Auswickeln des Hüllmaterials zu ermöglichen, ohne das Hüllmaterial zu zerreißen, und
Auswickeln (Schritt S10) mit Hilfe einer Öffnungsvorrichtung (24), wobei die Öffnungsvorrichtung so ausgelegt ist, dass sie den ersten Satz Versiegelungen löst, falls dieser nicht von der Freilegungsvorrichtung gelöst worden ist, damit das Hüllmaterial den Stapel (10) aus Bögen (12) freilegt.

7. Verfahren nach Anspruch 7, umfassend das Ermöglichen für die Freilegungsvorrichtung, lokal auf Bereiche des Umschlags (16), die den zweiten Satz Versiegelungen (18") enthalten, einzuwirken (Schritt S6).

8. Verfahren nach einem der Ansprüche 6 bis 7, wobei der Zustand das Erwärmen wenigstens des zweiten Satzes Versiegelungen (18") in sich schließt.

9. Verfahren nach einem der Ansprüche 6 bis 8, umfassend das Bewegen (Schritt S8 + S10) der Öffnungsvorrichtung (42) zwischen einer ersten und einer zweiten Stellung, während sie in das Hüllmaterial eingreift, um es auszuwickeln.

10. Verfahren nach Anspruch 9, umfassend das Eingreifen in das Hüllmaterial durch Saugwirkung.

11. Verfahren nach einem der Ansprüche 6 bis 10, ferner umfassend das Weiterleiten (Schritt S11) wenigs-

tens eines Teils des Stapels (10) aus Bögen (12) von der Stützvorrichtung (38) zu einer Verpackungsmaschine nach dem Auswickeln des Hüllmaterials.

12. Umschlag (16) zum Umschließen eines einzelnen Stapels (10) aus Bögen (12) von Verpackungsmaterial, wobei der Umschlag (16) aus einem Stück (14) Hüllmaterial gebildet ist, das gefaltet worden und mit wenigstens einem ersten Satz und einem zweiten Satz Versiegelungen (18', 18") versehen ist, wobei wenigstens der zweite Satz Versiegelungen so angeordnet ist, dass er gelöst wird, wenn er in einen Zustand überführt wird, der das Lösen des zweiten Satzes Versiegelungen durch eine Freilegungsvorrichtung ermöglicht, wobei der Umschlag somit so angeordnet ist, dass er geöffnet wird, ohne zerrissen zu werden, nach dem System von Anspruch 1 und nach dem Verfahren von Anspruch 6.

13. Umschlag (16) nach Anspruch 12, umfassend einen Klebstoff in Form eines Schmelzklebstoffs, der verschiedene Teile des Stücks (14) Hüllmaterial verbindet, um die Versiegelungen (18) zu bilden, wobei der Klebstoff in vereinzelten Punkten oder in vereinzelten Reihen aufgetragen wird.

Revendications

1. Système (20) pour manipuler automatiquement une pile enveloppée (10) de feuilles (12) d'un matériau d'emballage, dans lequel la pile (10) est enveloppée dans une seule pièce (14) de matériau d'enveloppement qui a été pliée et pourvue d'au moins un premier et un second ensembles de joints (18' et 18") afin de former une enveloppe (16) renfermant la pile (10), le système comprenant un appareil de déballage (24), qui comprend à son tour:

un dispositif de support (38) pour recevoir la pile enveloppée (10),
un dispositif d'exposition (44), agencé de manière à chauffer au moins le second ensemble de joints (18"), de manière à permettre au dispositif d'ouverture (42) de déballer le matériau d'emballage sans le casser,
dans lequel le dispositif d'exposition (44) est mobile par rapport au dispositif de support (38) de manière à adopter une première position, dans laquelle il est actif et fonctionne pour permettre de casser au moins le second ensemble de joints (18"), et une seconde position dans laquelle il est passif, et
un dispositif d'ouverture (42) pour déballer le matériau d'enveloppement afin d'exposer la pile (10) de feuilles (12), et configuré de manière à casser le premier ensemble de joints s'il n'est pas cassé par le dispositif d'exposition.

2. Système (20) selon la revendication 1, dans lequel le dispositif d'exposition (44) est agencé de manière à agir localement sur des régions de l'enveloppe (16) qui contiennent le second ensemble de joints (18").

3. Système (20) selon l'une quelconque des revendications précédentes, dans lequel la chaleur est fournie par conduction, convection, rayonnement, induction ou hystérésis.

4. Système (20) selon l'une quelconque des revendications précédentes, dans lequel le dispositif d'ouverture (42) est agencé de manière à se déplacer entre une première et une seconde positions tout en s'engageant avec le matériau d'enveloppement pour dérouler celui-ci.

5. Système (20) selon l'une quelconque des revendications précédentes, dans lequel le dispositif d'ouverture (42) comprend un certain nombre de moyens d'aspiration (48) pour s'engager avec le matériau d'enveloppement par aspiration.

6. Procédé pour manipuler automatiquement une seule pile enveloppée (10) de feuilles (12) d'un matériau d'emballage, comprenant les étapes suivantes:

recevoir (étape S3), sur un dispositif de support (38), la pile qui est enveloppée dans une seule pièce (14) de matériau d'enveloppement qui a été pliée et pourvue d'un premier et d'un second ensembles de joints (18' et 18") afin de former une enveloppe (16) renfermant la pile,
comprenant le déplacement (étapes S5+S7), par rapport à un dispositif de support (38), du dispositif d'exposition (44) entre une première position, dans laquelle il est actif et fonctionne pour permettre la cassure d'au moins le second ensemble de joints (18), et une seconde position dans laquelle il est passif,
soumettre (étape S6), en utilisant un dispositif d'exposition (44), la pile (10) enveloppée dans le matériau d'enveloppement à une condition qui permet la cassure d'au moins le second ensemble de joints (18) afin de permettre le déballage du matériau d'enveloppement sans casser le matériau d'enveloppement, et
dérouler (étape S10), à l'aide d'un dispositif d'ouverture (24), et le dispositif d'ouverture étant configuré de manière à casser le premier ensemble de joints s'il n'est pas cassé par le dispositif d'exposition, le matériau d'enveloppement afin d'exposer la pile (10) de feuilles (12).

7. Procédé selon la revendication 7, comprenant l'étape consistant à laisser le dispositif d'exposition agir (étape S6) localement sur des régions de l'enveloppe (16) qui contiennent le second ensemble de joints

(18").

8. Procédé selon l'une quelconque des revendications 6 à 7, dans lequel ladite condition implique le chauffage dudit au moins un second ensemble de joints (18").

9. Procédé selon l'une quelconque des revendications 6 à 8, comprenant le déplacement (étapes S8+S10) du dispositif d'ouverture (42) entre une première et une seconde positions pendant qu'il s'engage avec le matériau d'enveloppement afin de dérouler celui-ci.

10. Procédé selon la revendication 9, comprenant l'engagement avec le matériau d'enveloppement par aspiration.

11. Procédé selon l'une quelconque des revendications 6 à 10, comprenant en outre le transfert (étape S11) d'au moins une partie de la pile (10) de feuilles (12) à partir du dispositif de support (38) à une machine d'emballage après le déballage du matériau d'enveloppement.

12. Enveloppe (16) pour contenir une seule pile (10) de feuilles (12) d'un matériau d'emballage, ladite enveloppe (16) étant formée par une pièce (14) de matériau d'enveloppement qui a été pliée et pourvue d'au moins un premier ensemble et un second ensemble de joints (18', 18"), au moins le second ensemble de joints étant agencé de manière à être cassé lorsqu'il est soumis à une condition qui permet la cassure du second ensemble de joints par un dispositif d'exposition, l'enveloppe étant donc agencée de manière à être ouverte sans être cassée, selon le système de la revendication 1 et selon le procédé selon la revendication 6.

13. Enveloppe (16) selon la revendication 12, comprenant un adhésif sous la forme d'un adhésif thermofusible qui lie les unes aux autres différentes parties de la pièce (14) de matériau d'enveloppement afin de former les joints (18), dans lequel l'adhésif est appliqué dans des points isolés ou dans des chaînes isolées.

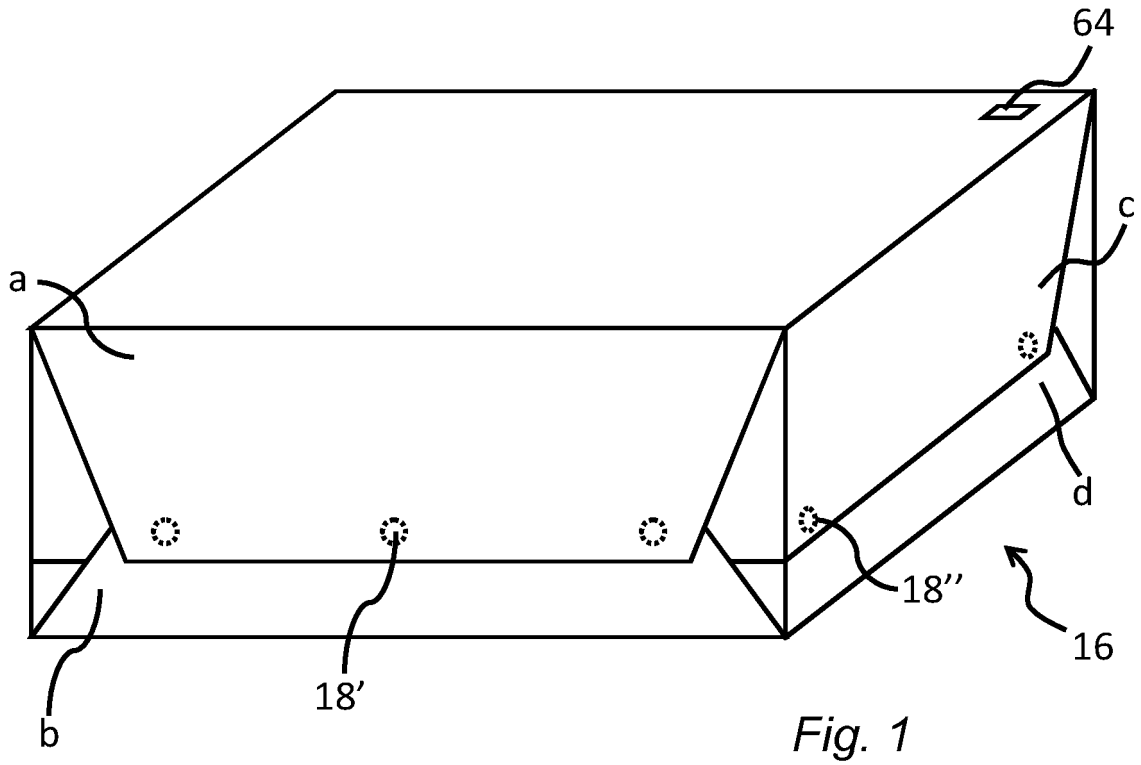

Fig. 1

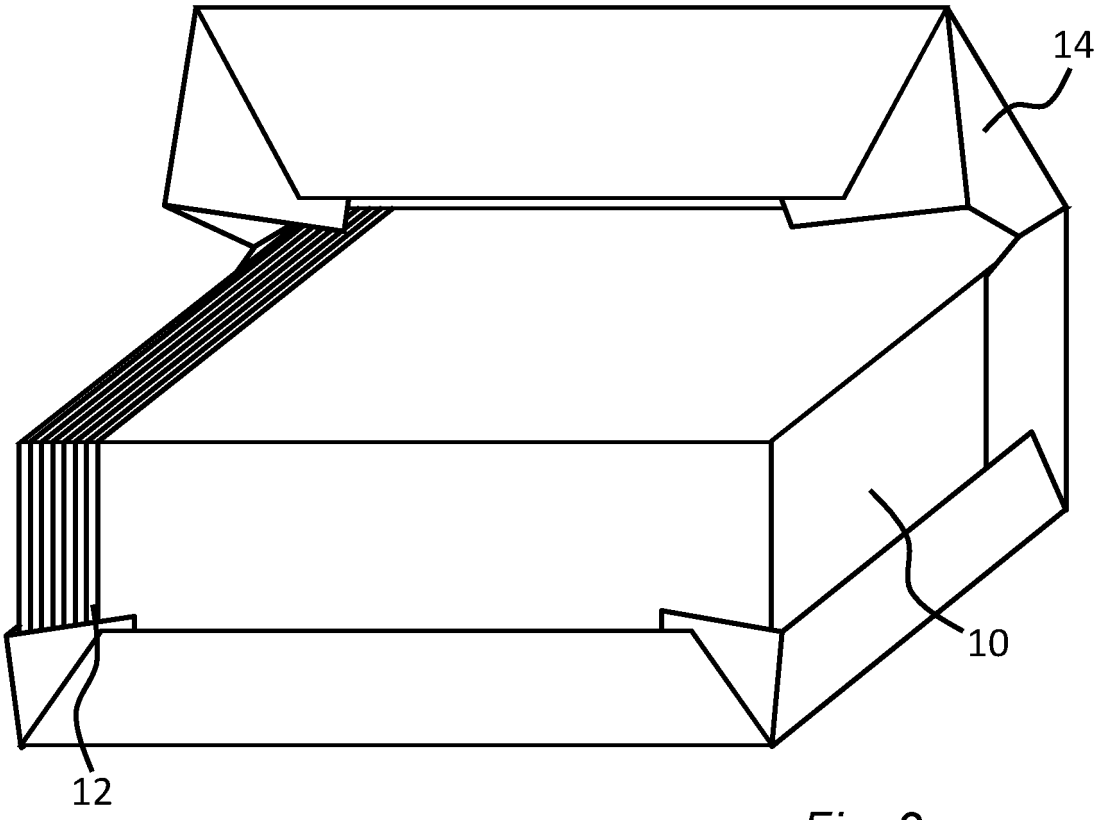

Fig. 2

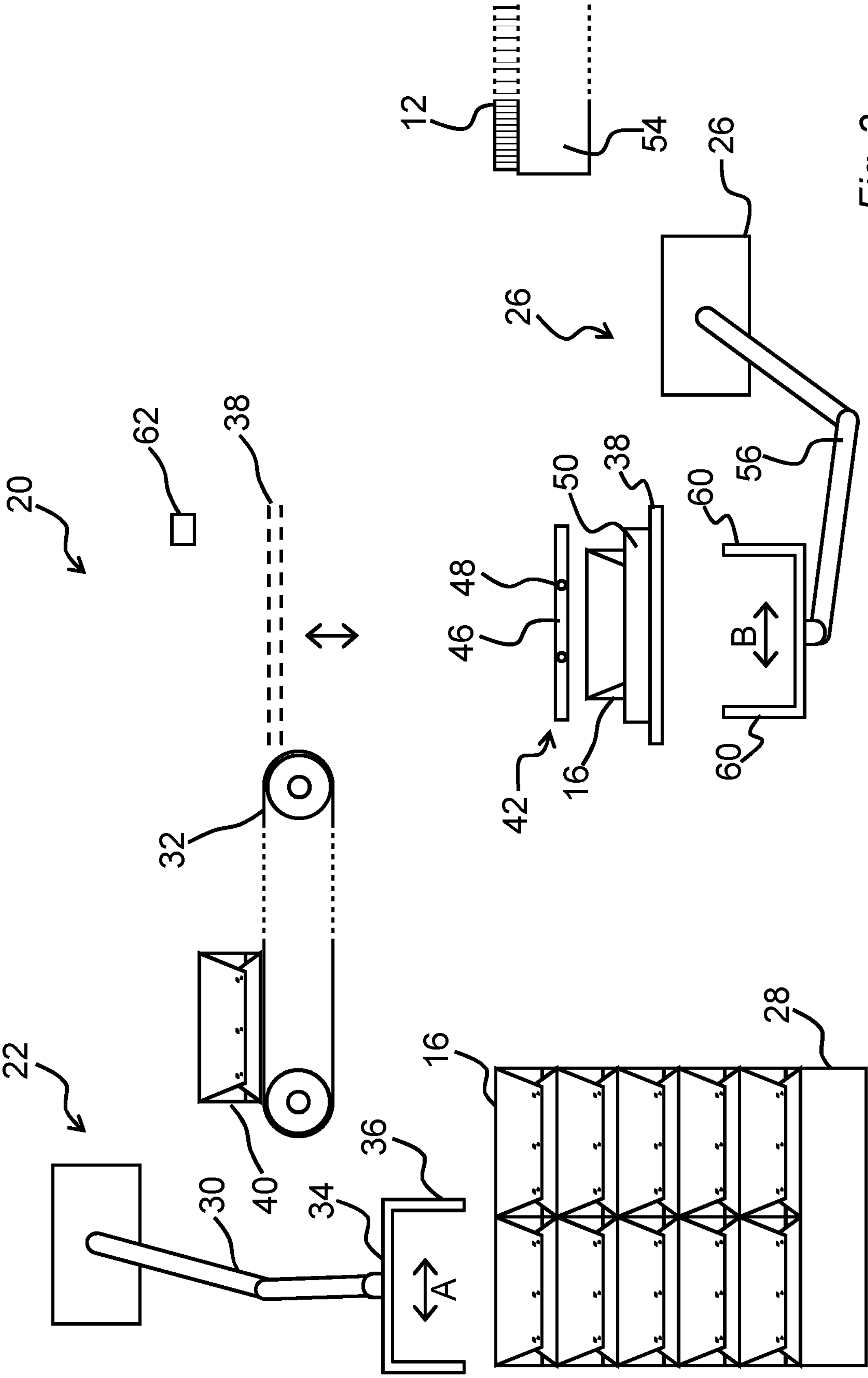
12
54
26
26
20
62
38
50
38
60
56
48
46
B
60
42
16
32
22
16
28
36
30
40
34
A

Fig. 3

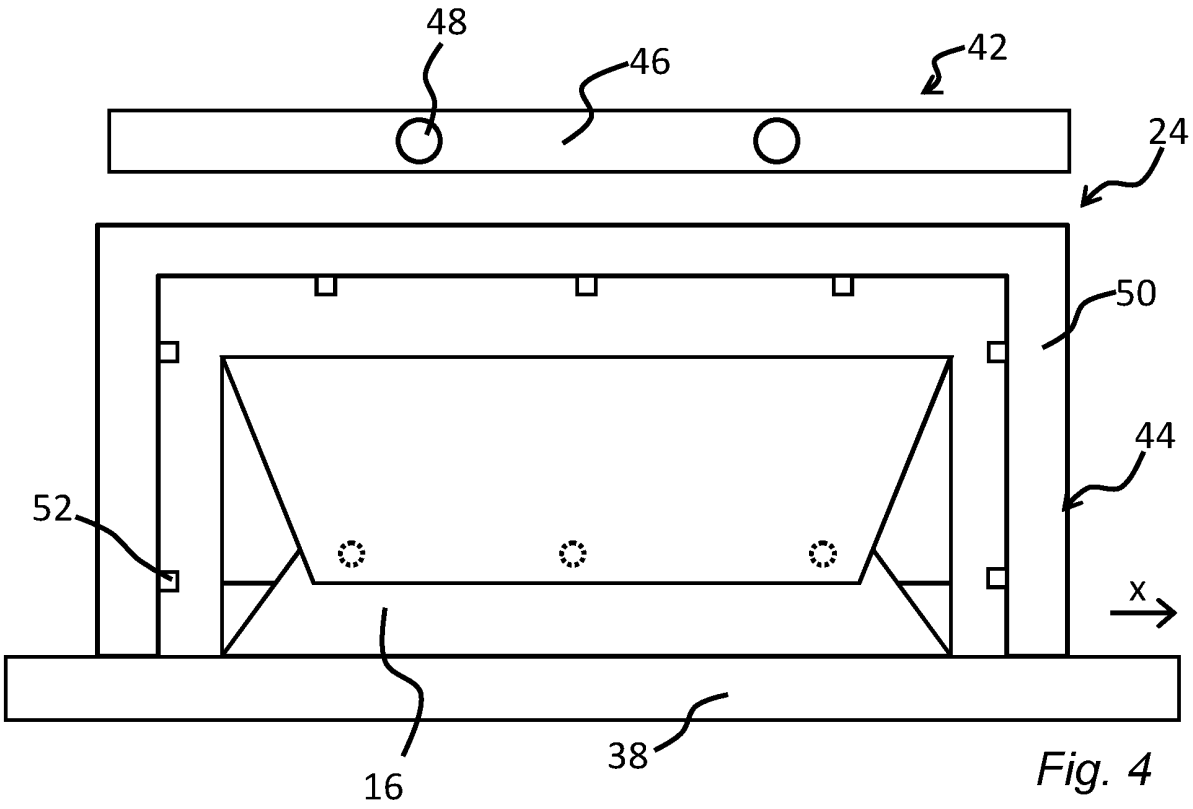

Fig. 4

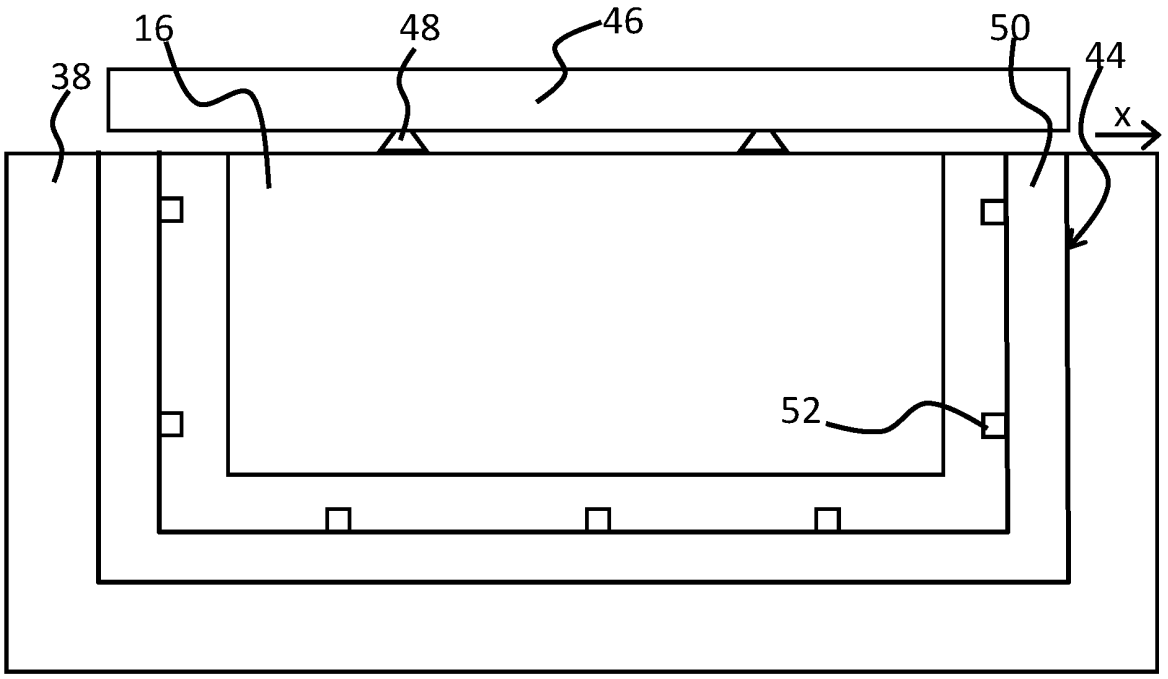

Fig. 5

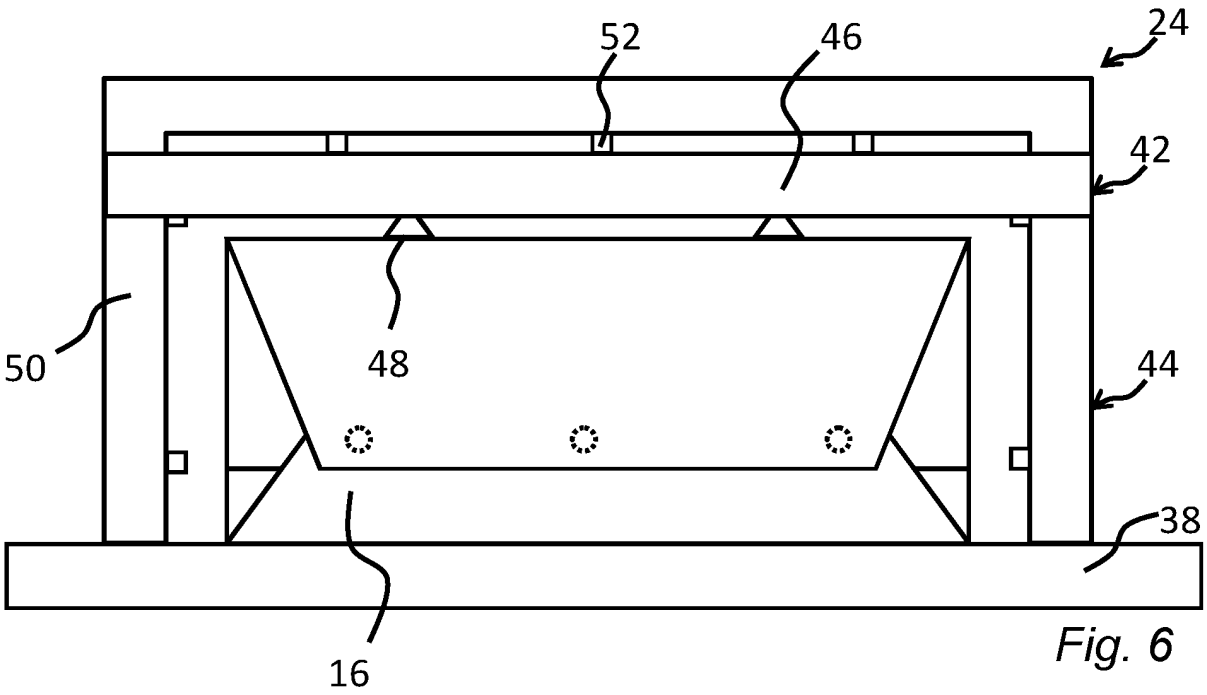

Fig. 6

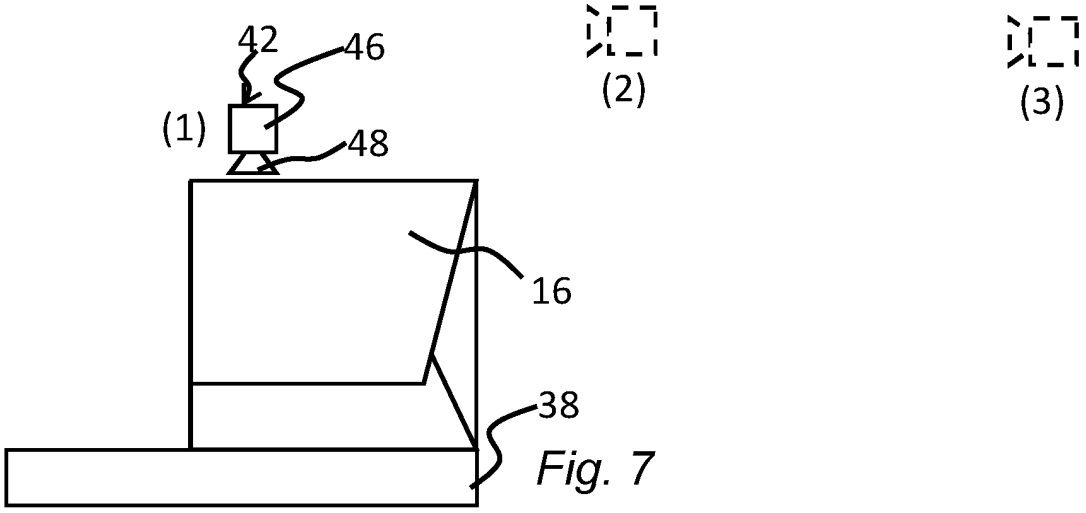

Fig. 7

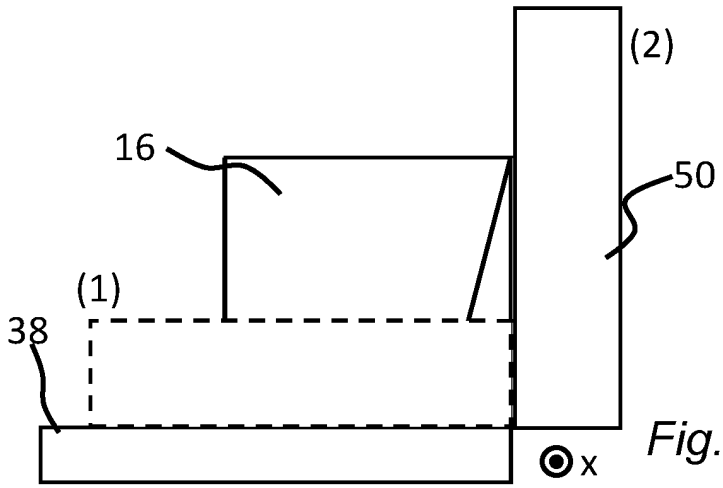

Fig. 8

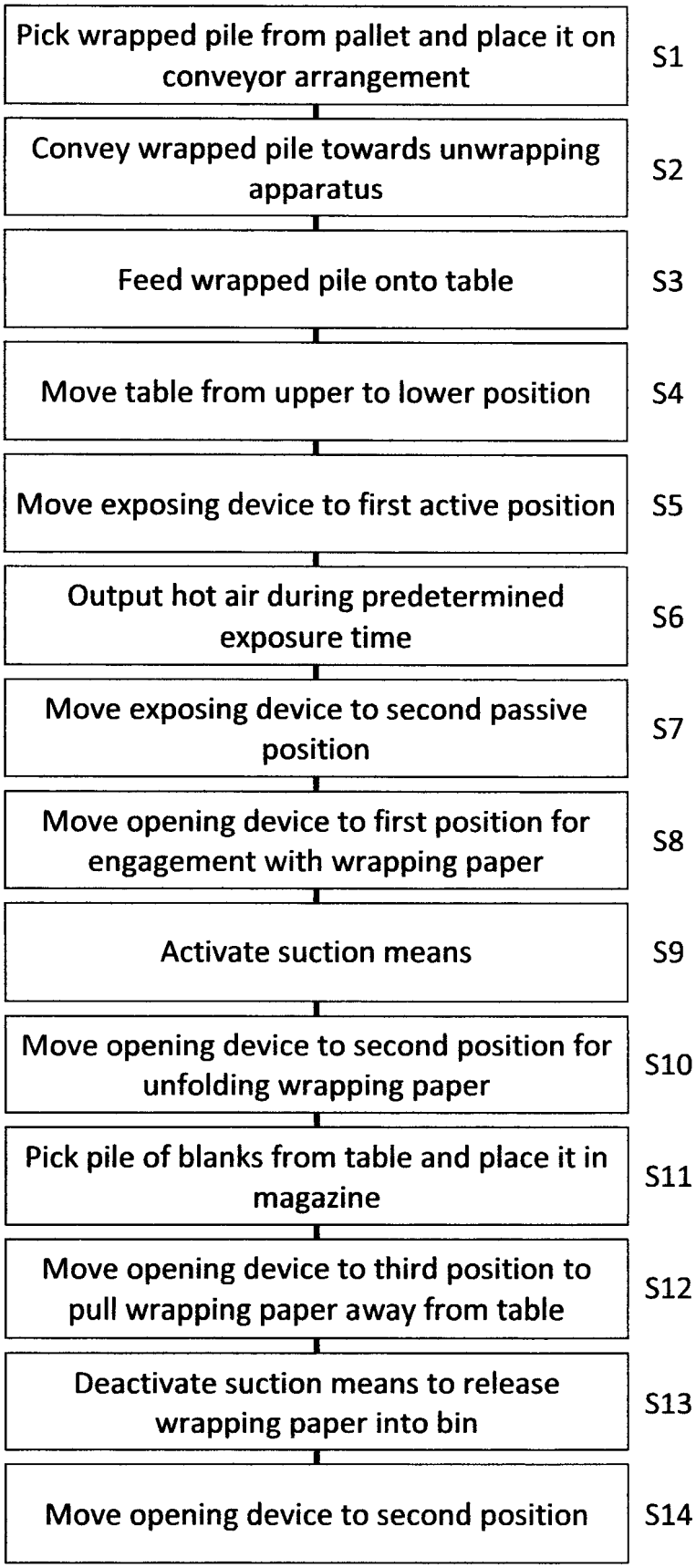
Pick wrapped pile from pallet and place it on conveyor arrangement
S1
Convey wrapped pile towards unwrapping apparatus
S2
Feed wrapped pile onto table
S3
Move table from upper to lower position
S4
Move exposing device to first active position
S5
Output hot air during predetermined exposure time
S6
Move exposing device to second passive position
S7
Move opening device to first position for engagement with wrapping paper
S8
Activate suction means
S9
Move opening device to second position for unfolding wrapping paper
S10
Pick pile of blanks from table and place it in magazine
S11
Move opening device to third position to pull wrapping paper away from table
S12
Deactivate suction means to release wrapping paper into bin
S13
Move opening device to second position
S14

Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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