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(54) **PERFORATED SHRINK FILM, PACKAGE USING PERFORATED SHRINK FILM, PACKAGING DEVICE, PERFORATED SHRINK FILM MANUFACTURING METHOD, AND PACKAGING METHOD USING PERFORATED SHRINK FILM**

(57) The present invention is a porous perforated shrink film (100) in which a large number of holes (110) are provided in a shrink film material, and bridges (120) are provided between the holes (110). By using this porous perforated shrink film (100), it is possible to enable stable packing using a small amount of packing resources when packaging an object to be packaged. The holes (110) are, for example, regularly or irregularly perforated short linear or short thick linear holes, regular or irregular holes having a mesh-like polygonal shape, or regularly or irregularly perforated circular, ellipsoidal, or arc-shaped holes. The form in which the perforated shrink film is supplied is a rolled body in which the perforated shrink film is continuously wound in a roll shape and is a zigzag folding of a single-leaf flat sheet or a plurality of leaves, with the porous perforated shrink film being supplied for every leaf.

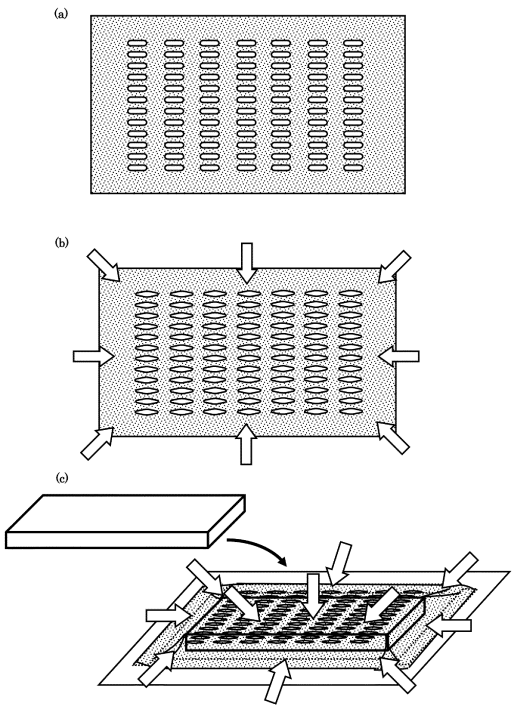


FIG. 1

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Description

Technical Field

[0001] The present invention relates to a technology of shrink wrap packaging using a shrink film, and a technology of a packaging device. A general shrink film in the prior art has a property of shrinking when heat is applied. The outer shape is a uniform planar film such as a so-called thin film wrap.

[0002] The shrink film according to the present invention has a technical feature in the shape itself.

Background technology

[0003] In packaging for an object such as a commodity, a thick paper box such as a corrugated cardboard box is generally used. However, since the shape and the size of the corrugated cardboard box are often standardized, the corrugated cardboard box does not necessarily coincide with the size of the object to be packaged therein, and it has been a problem that the object to be packaged has excessive play space inside the corrugated cardboard box. Therefore, as the cushioning material such as bubble cushioning material having a large number of air bubbles or foamed polystyrene was filled with inside the corrugated cardboard box to package an object to be packaged or surround the object to be packaged.

[0004] In the prior art, a blister package is often used for bulk sales products. The blister is a plastic three-dimensional container having a recess substantially matching the outer shape of a product to be packaged, and after the product is filled in the recess, packaging is performed by sealing the opening with a mount or the like.

However, in recent years, environmental problems are closed up, and using such plastic packaging is problematic, and packaging with little waste is strongly required.

[0005] As described above, the packaging of the corrugated cardboard box and the blister packaging have many problems with a view point of a continuous use, and the importance of the shrink film packaging technology is increased more.

[0006] As shrink film packaging in the prior art, the technology disclosed in JP 2011-157116 A publication (Patent Document 1) is known.

FIG. 15 is a drawing illustrating shrink film packaging in the prior art disclosed in Japanese Patent Application No. 2011-157116.

[0007] As shown in FIG. 15 A, the shrink film 121 is provided so as to be extended over the same width as the opening 111. The end portions 122a and 122b of the shrink film 121 are firmly fixed to the lid portion 112a and 112b. After the object to be packaged is placed on the stretched shrink film 121, the lid portions 112a, 112b, 113a, 113b are folded as they are to close the opening 111. In this state, although there is a large excessive play space in the state where the object to be packaged is shaken by the shrink film 121 in the packing box 110 of the corrugated cardboard box, the package is held by a space between the shrink film 121 and the four lid portions covering the opening 111 in the packing box 110 of the corrugated cardboard box. Here, when the shrink film 121 is shrunk by applying heat to the entire packaging box 110 of the corrugated cardboard box, the volume of the space between the shrink film 121 and the four lid portions covering the opening 111 is reduced, As the excessive play of the space between the object to be packaged, the shrink film 121, and the four lid parts becomes small, the package can be packed in a stable state.

Note that, as shown in FIG. 15 B, the shrink film 121 is fixed to the bottom inner surface by reversing the upside down, and the shrink film 121 is contracted and packed by applying heat to the entire packing box 110 of the corrugated cardboard.

[0008] Next, the technology disclosed in Japanese Patent Application No. 2004-231230 (Patent Document 2) is known as shrink film packaging in the prior art.

[0009] FIG. 16 is a drawing illustrating shrink film packaging in the prior art disclosed in JP 2004-231230 A.

[0010] As shown in FIG. 16, the shrink film sheet 2 is set at a predetermined position of the mount 6 by manual work or automatic operation. Next, the object 4 to be packaged (book in this example) is placed on the shrink film sheet 2 by manual work or automatic operation. In this example, the object 4 to be packaged is set at a position overlapping the mount 6 and not protruding from the mount 6.

[0011] Next, a pair of "folded-back portions" protruding to both sides of the mount 6 are folded back from both sides and stacked on the object 4 to be packaged. Further, identification label is attached to the object, and then heat is applied to the shrink packaging machine to shrink and pack the shrink film. The volume of the space between the shrink film 2 and the object 4 to be packaged is reduced to reduce excessive play space and be packed in a stable state.

Patent art 1: JP 2011-157116 A
Patent art 2: JP 2004-231230 A

Disclosure of the invention

Problem to be solved by the invention

[0012] In the prior art, there is a problem. In the shrink film packaging technology of FIG. 15, and the shrink film packaging technique of FIG. 16, there is no problem if the object to be packaged is a planar object or rectangular prism as a three-dimensional object to be packaged, a gap between the shrink film and the packaged object is a plane facing each other, that is, if the shrink film is a flat surface, and the facing surface of the packaged object is a flat surface, the flat surfaces are opposed to each other as a gap therebetween. When heat is applied in this state to shrink the shrink film, the surface of the shrink film

approaches the surface of the object to be packaged to reduce the volume. That is, the shrink film packaging technology of the prior art can be applied without any problem if it is a planar packaged object or rectangular prism as a three-dimensional object to be packaged that is configured from a plane basis.

[0013] However, the outer shape of the object to be packaged is not always be planar one as described above.

[0014] For example, if the surface of the object to be packaged has a sharp protrusion or an acute-angled convex shape, the sharp protrusions and acute-angled convex shapes may be pierced into the shrink film to be damaged, and tearing or some may be broken. When the shrink film is torn or broken, if the shrink film is shrunk in the subsequent heat application process, the tearing and the break of the shrink film are made to cut, and then the tear is spread and broken, and the package may be incompletely packed.

[0015] In recent years, there are many various designs on an object to be packaged, and there may be a sharp projection or an acute-angled convex shape on the surface of the object to be packaged. In addition, there is a demand for shrink film packaging technology that can apply to the not mass-produced, that is various small lot production, and enables optimal packing. In addition, in recent years, a large number of customers who are conscious about the product of the state of the distribution and delivery, they often require the object to be packed in a stable packing using a few packing materials.

[0016] It is an object of the present invention in view of the above problems to provide a special processed shrink film and a packaging device using the shrink film, with which it is possible to stably pack a packaged object having any outer shape using a small packaging material.

Means for solving the problems

[0017] To achieve the above-mentioned object, the present invention is provided with the following configuration. Note that the configurations described below can be employed in any combination as much as possible. It should also be understood that aspects of the present invention or technical features are described in the entirety and drawings of the description or based on the idea that could be ascertained by a person skilled in the art from the description, without being limited to what is described below.

[0018] A special processed porous perforated shrink film for a packing material according to the present invention is a shrink film in which a large number of holes are perforated in a shrink film.

[0019] In general, general the shrink film is uniformly planar, and even if a notch or a cutout is provided in a part of the edge, it is merely a shape forming a part of the outline of the edge or is merely a locking hole provided at the edge even if plural holes are present around the edge.

[0020] The porous perforated shrink film according to the present invention is a porous perforated shrink film in which a number of holes are provided in a shrink film.

[0021] Here, many holes may include many short-segment or short-thick cut-in holes, holes of many polygonal openings, holes of a large number of circular or elliptical openings, holes of slits on a large number of circular arcs, and the like. In the present invention, the porous perforated shrink film refers to a main range of wrapping the body to be packaged of the shrink film, and holes of such a number of openings and holes of slits are perforated.

[0022] That is, the range in which the holes and the slits of the many openings of the porous perforated shrink film of the present invention are provided can be within the center region portion of the shrink film material, that is, the main area for wrapping the body to be packaged. Since a large number of openings and slits are provided in the center area of the shrink film surface instead of one or two holes provided in the cutting and the periphery of the edge, a large number of bridges generated between the hole and the hole in an area in which the object to be packaged is wrapped. Since the holes of many openings and slits are regularly or irregularly provided, a number of bridges are regularly or irregularly generated, and a number of bridges are complicated and continuous. That is, the perforated shrink film can be a nest or mesh-like shape in which a large number of bridges are complicatedly entangled.

[0023] According to the above configuration, even if the surface of the object to be packaged has a sharp protrusion or an acute convex shape, the protrusion penetrates into the hole and protrudes upward, whereby the adverse effect of damaging or breaking the shrink film can be mitigated. In addition, even if some of the bridges are broken due to damage or breakage of some of the holes, the continuous other bridges are maintained independently, so that the rupture does not propagate one after another, and the influence of the rupture can be retained within a small area. On the contrary, a conventional uniform, flat shrink film, a break in one place is sequentially propagated to the surroundings one after another. In the porous perforated shrink film according to the present invention, such a situation can be avoided.
In addition, the shrink film material is shrunk by applying heat to the porous perforated shrink film, since the large number of each bridge forming the net-shaped or mesh-like bridge that is complicated and entangled is shrunk as a whole to reduce the covering space, any shape of the object to be packaged can be shrink-wrapped while being wrapped along the surface shape thereof.

[0024] The providing configuration of the porous perforated shrink film according to the present invention has at least following two patterns.
The one pattern of the porous perforated shrink film is provided by a roll body wound in a roll shape continuously, and the porous perforated shrink film can be delivered from the roll body by a desired length.

[0025] The other pattern of the porous perforated shrink film is provided by a single-leaf flat sheet or a

double-leaf zigzag folded film, and the porous perforated shrink film can be provided by each leaf.

[0026] Here, there are a plurality of patterns as holes of the porous perforated shrink film of the present invention.

[0027] For example, a hole is a slit having a short line segment shape or a short thick line segment shape, and a large number of short line segment-shaped or short-drum-shaped cuts are regularly or irregularly bored.

[0028] If the holes are a large number of small point like holes, a bridge between the holes is less likely to be generated, but holes are a large number of cuts in a short line segment shape or a short thick line segment shape are provided, a bridge is likely to be generated between the cuts in a short line segment shape or a short thick line segment shape. As described above, the bridges are independent of each other, and the influence of the breakage can be kept within a small range.

[0029] Note that, as the size of the short-segment or short-thick segment, the long sides are thought to be several millimeters to several centimeters, and the number of holes is not limited, but dozens to hundreds or the like may be within the area of wrapping the body to be packaged. They may be examples and may exceed their numerical ranges.

[0030] In addition, for example, the hole is a hole having a polygonal opening, and the holes of many polygonal openings are regularly or irregularly perforated to form a mesh shape.

If the hole is in the form of a mesh, the bridge is more clearly generated, and the influence of the breakage can be retained in a small range, and since the bridge itself becomes long, and functions as a so-called long network, the shrinkage margin of the bridge at heat application is also increased, and the packaged objects of various shapes can be more appropriately wrapped and packaged.

[0031] The size of the hole may be several millimeters from several centimeters. The number of holes is not limited but may be dozens to hundreds in the area of wrapping the object to be packaged. They may be examples and may exceed their numerical ranges.

[0032] In addition, for example, hole can be a slit forming of a circular or elliptical opening or an arc-shaped slit, and a large number of circular or elliptical openings or arcuate cuts are regularly or irregularly perforated.

[0033] In this case, although the bridge itself tends to be thick, but the effect close to the mesh shape can also be obtained, and the influence of the breakage can be kept within a small area.

[0034] The size of the hole may be several millimeters from several centimeters, and the number of holes is not limited, but may be dozens to hundreds in the area of wrapping the object to be packaged. They may be examples and may exceed their numerical ranges.

[0035] Next, the present invention provides a new packaging body as a packaging result and is a new packaged object that has been packaged with the porous perforated shrink film employing the present invention.

[0036] For example, the porous perforated shrink film of the present invention is attached to the sheet-like mount, and the shrink label packaging can be performed in a state in which the packaged object is loaded between porous perforated shrink film and the mount.

[0037] In addition, for example, a porous perforated shrink film is attached to any of the bottom inner surface, the top surface or the inner peripheral wall surface of the box for transportation, and the shrink wrap package can be packaged in a state in which an object to be packaged is loaded between the porous perforated shrink film and any of the bottom inner surface, the top surface back or the inner peripheral wall surface.

[0038] Next, the present invention is also directed to a packaging device that automatically packages an object to be packaged using the porous perforate shrink film of the present invention.

[0039] The packaging device according to the present invention has at least following two device configuration patterns.

[0040] The first device configuration is a device in which a double-sided tape to be used is previously attached to a mount, and the porous perforated shrink film of the present invention is placed and affixed to the double-sided tape.

[0041] This packaging device according to a first device configuration comprises: a mount supply unit that supplies a mount; a double-sided tape attachment unit that attaches a double-sided tape to a predetermined position of the mount supplied from the mount supply unit; a porous perforated shrink film supply unit that supplies the porous perforated shrink film of the present invention; a covering and fixing device that fixes the periphery of the porous shrink film by placing on the double-sided tape. The shrink device shrinks the porous shrink film by heat application to shrink the object to be packaged.

According to the packaging device according to the first device configuration, if the attaching position of the double-sided tape can be affixed by the double-sided tape affixing portion, the arrangement relationship between the porous perforated shrink film, the mount, and the object to be packaged can be appropriately controlled and affixed.

[0042] The second device configuration is a device in which an adhesive to be used is previously applied to the mount, and the porous perforated shrink film of the present invention is placed and pasted to the adhesive application place.

[0043] A packaging device according to a second device configuration according to the present invention comprises: a mount supply unit that supplies a mount; an adhesive application unit that applies an adhesive to a predetermined position of the mount supplied from the mount supply unit; a porous perforated shrink film supply unit that supplies the porous perforated shrink film of the present invention; a covering and fixing device that covers and fixes the periphery of the porous shrink film by placing on the adhesive while covering the object to be

packaged placed on the mount. The shrink device shrinks the porous shrink film by heat application to shrink the object to be packaged.

According to the packaging apparatus according to the second apparatus configuration, the adhesive is applied earlier by the adhesive application unit, and the porous perforated shrink film is stuck on the adhesive to apply heat to package the object to be packaged.

[0044] Note that, as the double-sided tape used in the double-sided tape affixing part of the packaging device of the present invention, an adhesive on one surface can be bonded to the shrink film material, and if the adhesive on the opposite surface is selected as being able to adhere to the surface of the mount, good adhesion can be achieved.

[0045] An adhesive that simultaneously and satisfactorily bonds the shrink film material and the paper material is not known currently, but it is possible to select double-sided tape having an adhesive suitability for the front side and for the rear side independently.

Although the packaging apparatus according to the second apparatus configuration of the present invention is premised on the use of an adhesive, it is possible to use the adhesive when an adhesive that simultaneously adheres the shrink film material and the paper material at the same time is developed in future.

[0046] Next, the present invention is also directed to a packaging method for automatically packaging an object to be packaged using the porous perforate shrink film of the present invention.

[0047] The packaging method according to the present invention includes at least following two method patterns.

[0048] The first packaging method is a packaging method in which a double-sided tape to be used is previously attached to a mount, and a perforated shrink film of the present invention is placed and affixed to the double-sided tape.

A packaging method using a porous perforated shrink film according to the present invention comprises: a mount supply step of supplying a mount; a double-sided tape attachment step of affixing a double-sided tape to a predetermined position of the mount supplied by the mount supply step; a packaged object transfer step of placing an object to be packaged on the mount; a porous perforated shrink film supply step of supplying a porous perforated shrink film of the present invention; a coating fixing step of fixing the periphery of the porous perforated shrink film by placing on the double-sided tape while covering the object to be packaged placed on the mount so as to cover the object to be packaged, and a shrink step of shrinking the porous perforated shrink film by heat application to shrink the object to be packaged.

[0049] The second packaging method is a packaging method in which an adhesive to be used is previously applied to a mount, and a porous perforated shrink film of the present invention is placed and affixed to the adhesive surface.

A packaging method using a porous perforated shrink film according to the present invention comprises: a mount supply step of supplying a mount; an object transfer step of placing an object to be packaged on the mount; an adhesive application step of applying an adhesive to a predetermined position of the surface of the mount where the porous perforated shrink film to be placed; a porous perforated shrink film supply step of supplying a porous perforated shrink film of the present invention; and a coating step of covering the packaged object placed on the mount with an adhesive by using the porous perforated shrink film. The method is characterized by comprising a shrink step in which the porous perforated shrink film is shrunk by heat application to shrink the object to be packaged.

[0050] Next, the present invention is also directed to a method for manufacturing a porous shrink film itself of the present invention.

A method for producing a porous shrink film according to the present invention comprises: a shrink film supply step for supplying a porous shrink film; a release sheet formation step for applying a release sheet to which a release agent is applied to the back surface of the supplied porous shrink film; a slit formation step for forming the porous hole in at least one layer of the porous shrink film or the two layers of the shrink film layer and the release sheet layer by means of the Thomson blade; a peeling step for peeling the layer of the release sheet from the layer of the porous shrink film.

[0051] In the manufacturing method described above, there are at least two method patterns according to the shrink film supply step for supplying a porous shrink film.

[0052] In the first method, the shrink film material supplied in the shrink film supply step is a rolled continuous body, and the release sheet supplied by the peeling sheet forming step is a roll-shaped continuous body, and the Thomson blade used in the slit forming step is provided on the surface of the rotating body, and the hole is continuously formed in the slit forming step by the continuous rotation of the rotating body.

[0053] If the shrink film material is a roll-shaped continuous body, the porous perforated shrink film can be continuously manufactured continuously.

[0054] In the second manufacturing method, the shrink film material supplied in the shrink film supply step is a single sheet of a flat sheet or a zigzag folded plural sheet, and the release sheet supplied by the peeling sheet forming step is a single sheet of a flat sheet or zigzag folded plural sheet, and the Thomson blade used in the slit forming step is provided on the surface of the flat plate, and the porous hole is formed in the hole forming step in the hole forming step in the single sheet unit or the plural leaf zigzag folding body.

[0055] If the shrink film material is a single-leaf flat sheet or zigzag folded plural-leaf body, the porous perforated shrink film can be produced one after another sheet by sheet.

Effects of the invention

[0056] According to the porous shrink film of the present invention, even if there is a sharp protrusion or an acute-angled convex shape on the surface of the object to be packaged, an adverse effect of damaging or breaking the shrink film can be mitigated by the protrusion protruding upward through the hole. In addition, even if some of the bridges are broken due to damage, the other bridges are maintained without damage independently, so that the influence of breakage can be retained within a small area according to the porous perforated shrink film of the present invention. However, in case of the conventional shrink films such as the normal flat surface, the broken damage propagate next to each other one after another.

[0057] By using the porous perforate shrink film according to the present invention, a good package state can be obtained.

[0058] The present invention makes it possible to provide a packaging device capable of satisfactorily and automatically packaging an object to be packaged using a porous perforate shrink film of the present invention.

[0059] Since the method for manufacturing the porous perforated shrink film of the present invention is established, a large number of porous perforated shrink films can be stably supplied to the market.

Brief description of the drawings

[0060]

FIG. 1 is a drawing illustrating a simple configuration of a porous perforated shrink film 100a according to a first pattern of the present invention.

FIG. 2 is a drawing illustrating a simple configuration of a porous perforated shrink film 100b according to the second pattern of the present invention.

FIG. 3 is a drawing illustrating a simple configuration of another porous shrink film 100c according to a second pattern of the present invention.

FIG. 4 is a drawing illustrating an example in which the porous perforated shrink film 100 is provided in a form of being delivered from a roll body 130 continuously wound in a roll shape.

FIG. 5 is a drawing illustrating an example in which the porous perforated shrink film 100 is supplied by a single sheet of planar sheet.

FIG. 6 is a drawing illustrating a configuration example of the first packaging apparatus 400a of the present invention.

FIG. 7 is a drawing illustrating a simple configuration of the double-sided tape affixing device 420a.

FIG. 8 is a drawing illustrating a simple pattern 1 of the sticking operation of the double-sided tape sticking device 420a.

FIG. 9 is a drawing simply illustrating a state in which the half-cut double-sided tape 510 is attached to the attachment target portion using the double-sided tape affixing device 420a and then separated.

FIG. 10 is a drawing illustrating an example of a sticking mark obtained by controlling the sticking direction of the strip-shaped half-cut double-sided tape 510 according to the movement of the double-sided tape sticking device 420.

FIG. 11 is a drawing showing a simple pattern 2 of the sticking operation of the double-sided tape sticking device 420a.

FIG. 12 is a drawing illustrating a flow of each process by the first packaging apparatus 400a of the present invention.

FIG. 13 is a drawing showing a simple configuration of the second packaging apparatus 400b according to the present invention.

FIG. 14 is a drawing illustrating an example of a package in which the object to be packaged is directly packaged by the porous perforated shrink film 100 of the present invention on the bottom inner surface of the box for transportation by the first packaging apparatus 400 of the present invention.

FIG. 15 is a drawing illustrating shrink film packaging of the prior art disclosed in JP 2011-157116.

FIG. 16 is a drawing illustrating shrink film packaging in the prior art disclosed in JP 2004-231230.

Detailed description of the preferred Embodiment

[0061] Hereinafter, a porous perforated shrink film according to the present invention will be described with reference to the drawings. However, the scope of the present invention is not limited to those shown in the following examples.

[0062] As Embodiment 1, the porous perforated shrink film 100 of the present invention and a package obtained by shrink-wrapped packaging with the porous perforated shrink film 100 of the present invention will be described.

[0063] As Embodiment 2, a packaging device for packaging an object to be packaged is described using the porous shrink film 100 of the present invention.

[0064] As Embodiment 3, a device for manufacturing a porous perforated shrink film that manufactures the porous perforate shrink film 100 will be described.

Embodiment 1

[0065] A porous perforate shrink film according to Embodiment 1 of the present invention will be described below.

[0066] As the porous perforate shrink film 100 according to the present invention, the shape of a hole and the arrangement of many holes are not limited to regular or irregular, and there may be various patterns. Here, typical example is shown.

[0067] FIG. 1 is a drawing illustrating a simple configuration of the porous perforated shrink film 100a according to the first pattern. The shown hole is an example in

which a large number of short thick lines are regularly perforated. Although the material of the porous perforated shrink film 100 is transparent materials, the bridge 120a is hatched in such a manner due to the shrink film material be easy to understand here. Note that the shrink film material may not necessarily be transparent material or colored material.

[0068] As shown in FIG. 1A, a large number of short thick lines 110a are perforated, and the portion of the shrink film material between the short thick lines 110a becomes as the bridge 120a. As shown in this example, the large number of short thick lines 110a are also provided in the center area of the porous perforated shrink film 100. Typically, a large number of holes are perforated in a central area for packaging the body to be packaged, not being provided at outline of the edge.

[0069] As shown in FIG. 1B, the porous perforated shrink film 100a shown in FIG. 1A changes in the direction in which the bridge 120a contracts when heat is applied. That is, since the bridge 120a is regularly arranged in one direction in FIG. 1B, the porous perforated shrink film 100a is shrunk in one direction as a whole.

[0070] FIG. 1C is an example of a package using the porous perforated shrink film 100a shown in FIG. 1A. As the package, a porous perforated shrink film 100a is attached to the sheet-like mount, and the shrink wrap packaging is operated in a state where the packaged object 300 is loaded between the mount 200 and the perforated shrink film 100a.

[0071] As shown in FIG. 1C, an object 300 to be packaged is placed on the mount 200, a double-sided tape 510 is attached to a predetermined portion around the object 300 to be packaged, and an edge of the porous perforated shrink film 100a is further attached to be fixed to the mount 200, and heat is applied to the package before packaging to shrink the shrink film material to complete the packaging.

[0072] In this example, since the one bridge portion 120a is relatively short and thick, the object to be packaged 300 suitable for this porous perforated shrink film 100a in which a large number of short thick wires 110a are regularly provided may be large in height and has a planar shape.

[0073] Although FIG. 1 is an example in which a large number of short thick lines are regularly perforated, the porous perforated shrink film 100a of the present invention may have many short thick lines 110a irregularly perforated when the holes 110 are a large number of short thick lines 110a. If a large number of short thick lines 110a are irregularly perforated, so the bridge 120a, which is generated in the shrink film material between the short thick lines 110a, may also be arranged irregularly without directionality.

[0074] If there is no directionality in the bridge 120a, when heat is applied to the porous perforated shrink film 100a, the direction in which the bridge 120a contracts may be shifted so as to be shrunk. When a large number of short-thick lines 110a are irregularly perforated, the shrinking direction is averaged as a whole, and the porous perforated shrink film 100a is shrunk toward the center from all directions.

[0075] FIG. 2 is a drawing illustrating a simple configuration of the porous perforated shrink film 100b according to the second pattern. The hole is a polygonal hole 110b, and many polygonal holes 110b are regularly perforated. In this example, the polygonal hole 110b is a square hole. Here, hatching is applied to the bridge 120b so that the shrink film material is easy to understand. Note that the shrink film material may not necessarily be transparent material or colored material.

[0076] As shown in FIG. 2A, many square holes 110b are perforated, and the portion of the shrink film material between the square holes 110b becomes a bridge 120b. As a whole, the bridge portion 120b of this example is formed in a mesh shape. Typically, a large number of polygonal holes 110b are also provided in the center area of the porous perforated shrink film 100 for packaging the body to be packaged, not being provided at outline of the edge.

[0077] As shown in FIG. 2B, the porous perforated shrink film 100b shown in FIG. 2A changes in the direction in which the bridge 120b contracts when heat is applied. That is, in FIG. 2B, the bridge 120b is regular, but since the bridge 120b is in a mesh shape, so the bridge 120b is regarded as equal in all directions to the macro, and as a whole, the porous perforated shrink film 100b is shrunk toward the center.

[0078] FIG. 2C is a drawing illustrating a state in which a packaged object 300 is placed on a mount 200, a double-sided tape 510 is affixed to a predetermined location around the packaged object 300, an edge of the porous perforated shrink film 100b is further affixed to be fixed to the mount 200, and then heat is applied to the package before packaging to shrink the shrink film material to complete the package. In this example, even if the porous perforated shrink film 100b is swollen and loosed state around the packaged object 300 before heat is applied, the entire porous perforated shrink film 100b shrinks to the center direction as a whole. In this process, the packaged object 300 is tightly packaged by contracting the mesh-shaped bridge 120b along the outer shape of the object 300 to be packaged. That is, it is held by a net-like string with moderate tension from a plurality of directions.

[0079] Note that a hole 110 may be another polygon.

[0080] For example, FIG. 3A is an example in which the polygonal hole 110c is a hexagonal hole 110c. As shown in FIG. 3A, a large number of hexagonal holes 110c are perforated in the porous perforated shrink film 100c, and a portion of the shrink film material existed between the hexagonal holes 110c becomes as the bridge 120c, and the bridge portion 120c is formed in a honeycomb shape. If the hexagonal holes 110c are evenly regularly arranged, the honeycomb structure is uniform in all directions as viewed from the macro configuration and is shrunk toward the center as a whole of the porous perfo-

rated shrink film 100c. In the example of FIG. 3A, a large number of hexagonal holes 110c are also provided in the central area of the porous perforated shrink film 100, and a large number of holes are perforated in the central area of the packaged body, so the hexagonal holes 110c is not simply provided at a part of the edge outline.

[0081] In addition, there may be an example in which many polygonal holes 110 are irregularly drilled. For example, a quadrangle, a pentagonal, a hexagonal, or the like of various shapes may be combined as the hole 110. In this case, the bridge portion 120 is formed in an irregular nest shape. If the bridge 120 is nest in irregular arrangement and is appropriately dispersed in all directions, it is shrunk toward the center as a whole of the porous perforated shrink film 100.

[0082] The hole 110c is a hexagon shape in the porous perforated shrink film 100c as shown in FIG. 3A, it is the same case that the case where the hole 110b is square as shown in FIG. 2C. The double-sided tape 510 is placed on the mount 200, the edge of the porous perforated shrink film 100 provided with many hexagonal holes 110 is stuck and fixed to the mount 200, and heat is applied to the package before the packaging to contract the shrink film material to create the package. Similar to FIG. 2C in the example of the honeycomb structure in which the hole 110c has a hexagonal shape, the entire porous perforated shrink film 100c is shrunk in the center direction by heat application even if the entire porous perforated shrink film 100c is swollen and loose state around the packaged object 300 before heat application. In this process, the packaged object is tightly packaged by tightening bridge 120 of the honeycomb structure along the outer shape of the object 300 to be packaged. That is, the state is held by a net-like string with moderate tension from a plurality of directions.

[0083] Typical examples relating to other patterns are also shown.

[0084] FIG. 3B is an example of a porous perforated shrink film 100d having a circular hole 110d. A large number of circular holes 110d are regularly perforated. Here, hatching is applied to bridge 120d so that the portion of shrink film material is easy to understand. Note that the shrink film material may not necessarily be transparent or colored material.

[0085] As shown in FIG. 3B, many circular holes 110d are perforated, and the region of the shrink film material between the circular holes 110d becomes as bridge 120d. Bridge 120d has a curved line in which a portion of the circular arc shape of the outline is connected. Since it has a circular arc shape, it is advantageous to package an object to be packaged, which is a smooth continuous edge. In the example of FIG. 3B, a large number of circular holes 110d are also provided in the central area of the porous perforated shrink film 100, and a large number of holes are perforated in the central portion of the packaged body, which is not simply provided at a part of the outline edge.

[0086] The porous perforated shrink film 100d changes in the direction in which the bridge 120d contracts when heat is applied. That is, FIG. 3B is a regular and uniform bridge 120d, and is uniform in all directions, and shrunk toward the center as a whole of the porous perforated shrink film 100d.

[0087] Although the package is not shown in the drawings, an object 300 to be packaged is placed on the mount 200, a double-sided tape 510 is attached to a predetermined location around the object 300 to be packaged, an edge of the porous shrink film 100d is attached and fixed to the mount 200, and heat is applied to the package before packaging so that the package can be completed after the shrink film material is shrunk.

[0088] Note that the example of FIG. 3B is an example in which a circular hole 110c is regularly provided, if the hole is perforated irregular, packaging process is the same.

[0089] Next, the example of FIG. 3C is an example in which a large number of oval holes 110e are perforated. Here, hatching is applied to bridge 120e so that the shrink film material is easy to understand. Note that the shrink film material may not necessarily be transparent, colored material can be employed.

[0090] As shown in FIG. 3C, many elliptic holes 110e are perforated, and the region of the shrink film material between the circular holes 110e becomes as bridge 120e. Bridge 120e is a curved line in which a part of the circular arc shape of the ellipse is connected. Since it has a circular arc shape, it is advantageous to package an object to be packaged, because it has smooth continuous edge. In the example of FIG. 3C, many elliptic holes 110d are also provided in the center area of the porous perforated shrink film 100, and a large number of holes are perforated in a central portion for packaging the body to be packaged, instead of being provided at a part of the edge outline.

[0091] The porous perforated shrink film 100e changes in the direction in which bridge 120e contracts when heat is applied. That is, in FIG. 3C, bridge 120e is regular and equal to the macro in all directions, and the porous perforated shrink film 100e is shrunk toward the center as a whole.

[0092] Although the packaging is not shown in the drawings, an object 300 to be packaged is placed on the mount 200, a double-sided tape 510 is attached to a predetermined location around the object 300 to be packaged, an edge of the porous perforated shrink film 100e is attached and fixed to the mount 200, and the package can be completed by applying heat to the package before packaging to shrink the shrink film material.

[0093] Note that the example of FIG. 3C is an example in which an elliptical hole 110e is regularly provided, if the hole is perforated irregular, packaging process is the same.

[0094] In addition, other hole 110 having a shape other than that of hole 110 illustrated in FIG. 3 is also possible.

[0095] Next, the supply process of the porous perforated shrink film 100 will be described.

[0096] Although the supply process of the porous perforated shrink film 100 may be various, here, two supply processes are shown.

[0097] FIG. 4 is a drawing illustrating an example in which the porous perforated shrink film 100 is provided in the configuration of roll. The porous perforated shrink film 100 is delivered from a roll body 130 continuously wound in a roll shape. When the porous perforated shrink film 100 continuous to the roll body 130 is wound in a roll shape and supplied, the porous perforated shrink film 100 can be fed and supplied from the roll body 130, and the shaft 131 of the roll body 130 can control by rotating angle of the shaft 131 of the roll body 130 so that a desired length can be controlled and delivered. It is necessary to cut by a cutter (not shown) at a length measured after delivery, and to make a single leaf. After making a single leaf, it is provided as a packaging material.

[0098] FIG. 5 is a drawing illustrating an example in which the porous perforated shrink film 100 is supplied by a single sheet of planar sheet from the beginning. An example is supplied from the feeder 140 for each leaf. A porous perforated shrink film 100 of a large number of single sheets of flat sheets is stacked in the feeder 140. It supplies each sheet by a transport system (not shown). Since the sheet is already single, it can be used as a packaging material.

[0099] The single sheet-shaped porous perforated shrink film 100 supplied in the supply process shown in FIG. 4 and FIG. 5 can be used as packaging material.

Embodiment 2

[0100] As Embodiment 2, a packaging apparatus 400 for packaging an object to be packaged using the porous perforated shrink film 100 of the present invention will be described.

Although the packaging apparatus 400 may have various configurations, typical 2 configuration examples, the first packaging apparatus 400a and the second packaging apparatus 400 b will be described below.

[First packaging apparatus 400a]

[0101] FIG. 6 is a drawing illustrating a configuration example of the first packaging apparatus 400a of the present invention.

[0102] As shown in FIG. 6A, the first packaging device 400a includes a mount supply unit 410, a double-sided tape affixing device 420a, an object transfer device 430, a porous perforated shrink film supply unit 440, a covering and fixing device 450, a heating shrink device 460, and a conveyance path 470.

[0103] Hereinafter, each component will be described below.

[0104] The conveyance path 470 provides only one path for conveying both the porous perforated shrink film 100 and the mount 200 in a predetermined posture. In the configuration example shown in FIG. 6, the conveyance path 470 is one. As another configuration example, a "main conveyance path" and a "sub-conveyance path". Here, sub-conveyance path supplies components such as a mount, a porous perforated shrink film, a packaged article, and the like from the side of the main conveyance path to the main conveyance path. For example, each traveling direction is orthogonal to each other, and a structure of delivering a conveyed object from the sub-conveyance path to the main conveyance path at an intersection can also be provided. In the following description, a configuration example shown in FIG. 6 in which the conveyance is performed on one conveyance path and various components are supplied along the road.

[0105] Although not illustrated in FIG. 6, for example, the structure of the conveyance path 470 has the conveyance mechanism that the travel belt of an endless track moving along the conveyance path is provided to face up and down, and the conveyance path 470 conveys where the mount 200 is placed on the travel belt.

[0106] Although there is a variety of structures of the conveyance path 470, for example, as the conveyance mechanism, the travel belt of an endless track moving along the conveyance path is folded back via a pulley at both ends as in the conveyance path 470, and the driving force is applied by the pulleys at both ends.

[0107] Since such a conveyance mechanism is widely known as a conveying mechanism for an object to be conveyed, so the detailed description is omitted here.

[0108] In the middle of the conveyance path 470, as will be described later, there are a mount supply unit 410, a double-sided tape sticking device 420a, a packaged object transfer device 430, a porous perforated shrink film supply unit 440, a fixing device 450, and a heating shrink device 460, and work is performed sequentially to completion of the package.

[0109] The mount supply unit 410 is a feeder that supplies the mount 200 according to the packaging operation of the first packaging device 400a. For example, a mount stack for holding a large number of the mount 200, a mount delivery unit for taking out the mount 200 from the mount stack one by one in accordance with the packaging operation, and a mount transport device for sending out the taken-out mount 200 to the conveyance path 470 in a predetermined orientation are provided. As described above, the mount supply unit 410 feeds the mount 200 to the conveyance path 470 in accordance with the packaging operation of the first packaging device 400a.

[0110] The double-sided tape attachment device 420a is a device that attaches the double-sided tape 510 to a predetermined position of the mount 200 supplied from the mount supply unit 410. Although the double-sided tape sticking device 420a may have various structures, here, the supplied double-sided tape material is a half-cut double-sided tape 500 with a release liner.

[0111] The half-cut double-sided tape 500 with the release liner has a two-layer structure. The surface layer

is a half-cut double-sided tape 510 that is half-cut to an appropriate length. The rear layer is a release liner 520 that holds the half-cut double-sided tape 510 of the surface layer to be peelable. Although the release liner 520 of the rear layer is continuous tape-shaped, the half-cut double-sided tape 510 of the surface layer is provided on the release liner 520. the half-cut double-sided tape 510 seems like a continuous body, but actually, the half-cut double-sided tape 510 is half-cut state cut at a predetermined length, so half-cut double-sided tape 510 are arranged in strip-shaped sections on the release liner 520.

[0112] The double-sided tape affixing device 420a is a device capable of automatically affixing the half-cut double-sided tape 510 to a predetermined portion of the mount 200.

[0113] FIG. 7 is a drawing illustrating a simple configuration of the double-sided tape sticking device 420a.

[0114] As shown in FIG. 7, the configuration of the double-sided tape sticking device 420a is a module provided with the roll body attachment part 421, the rotary sticking rolling part 422, and the release liner collection part 423.

[0115] The roll body attachment portion 421 rotatably supports the roll-shaped half-cut double-sided tape with the release liner 500. The half-cut double-sided tape with the release liner 500 is delivered by rotating like a so-called reel delivery device.

[0116] That is, the half-cut double-sided tape with the release liner 500 is roll-shaped and is installed on the roll body attachment portion 421 of the double-sided tape attachment device 420a so as to be able to be delivered.

[0117] The rotation sticking rolling part 422 is a member that the half-cut double-sided tape with the release liner 500 delivered from the roll body attachment part 421 passes through the outer surface. The rotation sticking rolling part 422 rotates and presses the delivered half-cut double-sided tape 510 in contact with a predetermined potion of the mount 200 to which the rotation sticking rolling part 422 is to be attached. Thereby the rotation sticking rolling part 422 rolls and sticks the half-cut double-sided tape 510 which a large number of small pieces in a half-cut state onto a predetermined place of the mount 200.

[0118] The release liner collection unit 423 collects and recovers the release liner 520 remaining after passing through the rotation sticking rolling part 422. By rotating like a so-called reel winding device, the release liner 520 is wound, collected, and recovered.

[0119] The sticking operation of the double-sided tape sticking device 420a may be such that the double-sided tape sticking device 420a and the mount 200 contact each other and move relative to each other. At least following two patterns are present.

[0120] In the pattern 1 of the sticking operation, the double-sided tape sticking device 420a operates in the vertical direction, and the mount 200 is a pattern traveling on the conveyance path 470. As the pattern 2 of the sticking operation, the mount 200 traveling on the conveyance path 470 is temporarily stopped immediately below the double-sided tape sticking device 420a, and the double-sided tape sticking device 420a is moved down and the double-sided tape is stuck during contacting the mount 200.

[0121] First, an example of the pattern 1 of the sticking operation will be described in detail.

[0122] FIG.8 is a drawing illustrating a pattern 1 of the sticking operation of the double-sided tape sticking device 420a simply.

[0123] As shown in FIG. 8A, the mount 200 moves on the conveyance path (in this case, the conveyance path 470). In this state, it passes below the double-sided tape sticking device 420a.

[0124] Here, as shown in FIG. 9A, the double-sided tape sticking device 420a is lowered so as to contact a predetermined place on the surface of the mount 200, and the rotation sticking rolling part 422 comes into contact with the surface of the mount 200.

[0125] In this state, during the mount 200 moving, the rotation sticking rolling part 422 continues to contact the surface of the mount 200. If the surface of the mount 200 has physical properties that strongly sticks to the adhesive surface of the half-cut double-sided tape 510, the half-cut double-sided tape 510 is stuck and peeled off from the release liner 520 at the same time. The release liner 520 is collected and recovered in the release liner collection unit 423.

[0126] Here, as illustrated in FIG. 8B, when the sticking of the half-cut double-sided tape 510 to the predetermined portion of the mount 200 is completed, as shown in FIG. 9B, the double-sided tape sticking device 420a is raised so as not to contact the surface of the mount 200, and the rotation sticking rolling part 422 is left from the surface of the mount 200.

[0127] Here, the half-cut double-sided tape 510 is half-cut at a predetermined length to be a strip-shaped consecutive segment. It is easy to separate at any position (edge of the segment). When the double-sided tape sticking device 420a rises and leaves from the surface of the mount 200, the segment of the half-cut double-sided tape 510 affixed to the mount 200 remains on the surface of the mount 200, but the slice of the unstuck half-cut double-sided tape 510 rises in accordance with the double-sided tape sticking device 420a while being held on the release liner 520.

[0128] Further, in the double-sided tape sticking device 420 of the present invention, the double-sided tape used for affixing may be a continuous double-sided tape, or a half-cut double-sided tape 510 that has been half-cut in advance in a strip shape. In case that each double-sided tape is provided as an independent segment in a strip shape, the strip-shaped half-cut double-sided tape 510 adjacent to each other can easily control the attachment direction in accordance with the movement of the double-sided tape sticking device 420. In other words, as shown in FIG. 10A, sticking operation to a three-dimensional curved surface having a smooth vertical height can be

easily performed, as shown in FIG. 10B, except for sticking in a straight line.

[0129] The above shown operation is an outline of the operation of the pattern 1 of the sticking operation of the double-sided tape sticking device 420a.

[0130] Next, an example of the pattern 2 of the sticking operation will be described.

[0131] FIG. 11 is a drawing illustrating pattern 2 of the sticking operation of the double-sided tape sticking device 420a simply.

[0132] As shown in FIG. 11A, the mount 200 moves on the conveyance path (in this case, the conveyance path 470) and temporarily stops before and immediately below the double-sided tape sticking device 420a.

[0133] Similarly, to FIG. 9A, the mount 200 is stationary state, the double-sided tape sticking device 420a is lowered to contact a predetermined portion of the surface of the mount 200, and the rotation sticking rolling part 422 comes into contact with the surface of the mount 200. In this state, the double-sided tape sticking device 420a moves in a predetermined path, and the rotation sticking rolling part 422 continues to contact the surface of the mount 200. Since the surface of the mount 200 has physical properties that adhere strongly to the adhesive surface of the half-cut double-sided tape 510, the half-cut double-sided tape 510 is peeled from the release liner 520 and affixed to the surface of the mount 200. The release liner 520 is collected and recovered in the release liner collection unit 423.

[0134] Here, as illustrated in FIG. 8B, as in FIG. 9B, when the double-sided tape sticking device 420a moves in a predetermined path and the sticking operation of the half-cut double-sided tape 510 with respect to a predetermined portion of the mount 200 ends, the double-sided tape sticking device 420a rises so that it does not come into contact with the surface of the mount 200, and the height of the rotation sticking rolling part 422 becomes an enough height separated from the surface of the mount 200.

[0135] Here, the half-cut double-sided tape 510 is half-cut at a predetermined length in the consecutive strip-shaped cut pieces. It is easy to cut at any position (edge of the segment). As shown in FIG. 8B, if the double-sided tape sticking device 420a rises and separates from the surface of the mount 200, the cut pieces of the half-cut double-sided tape 510 stuck to the mount 200 remain on the surface of the mount 200, but the cut pieces of the non-stuck half-cut double-sided tape 510 are separated and raised in accordance with the double-sided tape sticking device 420a while being held on the release liner 520.

[0136] The sticking direction can be easily controlled in accordance with the movement of the double-sided tape sticking device 420 in the same manner shown as the pattern 1 of the sticking operation when the sticking operation is performed by the pattern 2. In other words, as shown in FIG. 10A, sticking to a three-dimensional curved surface having a smooth vertical height can be easily performed, as shown in FIG. 10B, except for sticking in a straight line.

[0137] The above description is an overview of the operation of the pattern 2 of the sticking operation by the double-sided tape sticking device 420a.

[0138] Next, referring back to FIG. 6, the packaged object transfer device 430 will be described.

[0139] The object transfer device 430 is a device that transfers the object 300 to be packed to a predetermined position on the mount 200. Various configurations of the object transfer device 430 can be possible. For example, a device such as a robot arm may pick the object 300 to be packaged, and the robot arm may put the object 300 to be packaged at a predetermined portion of the mount 200 that is being conveyed by the conveyance path 470.

[0140] The object transfer device 430 is an optional configuration of the packaging apparatus 400 of the present invention, and the object transfer device 430 may be omitted as a simple configuration, and an operation worker standing at a predetermined position near the conveyance path 470 may put the packaged object 300 on a predetermined place on the mount 200 with a hand.

[0141] Next, the porous perforated shrink film supply unit 440 will be described.

[0142] The porous perforated shrink film supply unit 440 is a feeder that supplies the porous perforated shrink film 100 in accordance with the packaging operation of the first packaging device 400a. For example, there are provided a porous perforated shrink film stack for stacking and holding a large number of porous perforated shrink films 100 shown in Example 1, it comprises a porous perforated shrink film delivery unit for taking out the porous perforated shrink film 100 from a porous perforated shrink film stack one by one in accordance with the packaging operation, and a porous perforated shrink film transport unit for sending out the extracted porous perforated shrink film 100 to the covering and fixing device 450 in a predetermined posture.

[0143] The porous perforated shrink film supply unit 440 transfers the porous perforated shrink film 100 to the covering and fixing device 450 in accordance with the packaging operation of the first packaging device 400a.

[0144] The covering and fixing device 450 is a device for fixing the periphery (edge) of the porous perforated shrink film 100 by carrying and pressing the porous perforated shrink film 100 onto the double-sided tape 510 so as to cover the packaged object 300 placed on the mount 200.

[0145] As described above, in a state in which the double-sided tape 510 (here, the half-cut double-sided tape 510) is attached to a predetermined portion of the mount 200, and the non-packaged article 300 is also transferred to a predetermined portion of the mount 200, the covering and fixing device 450 receives the porous perforated shrink film 100 from the porous perforated shrink film supply portion 440, and covers the packaged object 300, and while covering the package object 300, a porous perforated shrink film 100 is placed

and affixed on the double-sided tape 510. A portion where the porous perforated shrink film 100 is affixed to the double-sided tape 510 may be any portion but is usually considered to be an edge of the perforated shrink film 100.

[0146] The back surface layer of the double-sided tape 510 is coated with an adhesive that adheres to the mount 200 and is firmly bonded to the mount 200. The surface layer is coated with an adhesive that adheres to the material (shrink film material) of the porous perforated shrink film 100 and is firmly affixed to the porous perforated shrink film 100, so that the perforated shrink film 100 is firmly fixed to the predetermined portion of the mount 200.

[0147] The heating shrink device 460 is a device that shrinks and wraps the packaged object 300 by application to shrink the porous perforated shrink film 100. Since this heating shrink device 460 is widely used in the shrink wrapping step, the detailed description of this heating shrink device 460 will be omitted here.

[0148] Hereinafter, the outline of the operation of the first packaging device 400a according to the second embodiment will be described below.

[0149] FIG. 12 shows the flow of each process by the first packaging device 400a of the present invention.

[0150] As shown in FIG. 12, there are a mount supply step, a double-sided tape sticking step, an object transfer step, a perforated shrink film supply step, a covering and fixing step, and a shrink step.

[0151] As described above, the mount supply step is a step for supplying the mount by the mount supply unit 410.

[0152] The double-sided tape sticking step is a step of sticking the double-sided tape 510 to a predetermined position of the mount 200 supplied by the mount supply step. Here, the half-cut double-sided tape 510A is attached.

[0153] The object transfer step is a step for placing the object 300 to be packaged on the mount 200 by the object transfer device 430. Note that the object transfer device 430 may be omitted, and the object 300 may be placed easily by manual work with the worker with a hand.

[0154] The porous perforated shrink film supply step is a step for supplying the porous perforated shrink film by the porous perforated shrink film supply unit 440.

[0155] In the covering and fixing step is a step for fixing the periphery of the perforated shrink film 100 by placing the covering and fixing device 450 on the double-sided tape 510 while covering the packaged object 300 placed on the mount 200 so as to cover the object 300 to be packaged placed on the mount 200.

[0156] The shrink step is a step in which the porous perforated shrink film 100 is shrunk by heat application by the heating shrink device 460 to shrink and wrap the packaged object 300.

[0157] As shown in FIG. 12, the package is completed by each process.

[Second packaging device 400b]

[0158] Next, the second packaging apparatus 400b will be described.

[0159] FIG. 13 is a drawing illustrating a simple configuration of the second packaging apparatus 400b according to the present invention.

[0160] As shown in FIG. 13A, the second packaging device 400b comprises a mount supply unit 410, an adhesive application device 420b, an object transfer device 430, a porous perforated shrink film supply unit 440, a covering and fixing device 450, a heating shrink device 460, and a conveyance path 470.

[0161] Here, since the mount supply unit 410, the object transfer device 430, the porous perforated shrink film supply unit 440, the covering and fixing device 450, the heating shrink device 460, and the conveyance path 470 may be similar to the respective components shown by the first packaging device 400a, the description thereof will be omitted here.

[0162] The adhesive application apparatus 420b is a device that applies an adhesive to a predetermined position on the surface of the mount 200. For example, it may be a configuration including a tank storing an adhesive, a supply path for supplying a predetermined amount of adhesive from the tank, and a coating head for applying the adhesive supplied from the supply path to the application target. The coating head serves as a roll head, and an adhesive may be applied while rolling the surface of the object with which the coating head contacts. Since such an adhesive application device is widely known, the detailed description thereof will be omitted here.

[0163] As the premise of the second packaging device 400b, the adhesive used in the adhesive application device 420b is interposed between the material of the mount 200 such as paper and the shrink film material of the porous shrink film 100 to provide sufficient adhesive force to both. In the market at present of the present invention, the adhesive having such properties is not generally spread, but the second packaging device 400b is enabled if an excellent adhesive having such properties is developed and used in the market.

[0164] Other operation of the second packaging apparatus 400b according to the present invention, shown in the flow of each step shown in FIG. 11, the double-sided tape sticking step is only replaced by the adhesive application step shown above, the description for other steps thereof will be omitted here.

[0165] Next, as a variation of the package operation, an example of packaging an object to be packaged using the porous perforated shrink film according to the present invention is described which the porous perforated shrink film 100 is used any portion to the bottom inner surface, the top surface rear, or the inner peripheral wall surface of the box body for transportation.

[0166] FIG. 14 is a drawing illustrating an example of a package in which the object 300 to be packaged is directly packaged by the porous perforated shrink film

100 of the present invention on the bottom inner surface of the box for transportation by the first packaging apparatus 400 of the present invention.

[0167] In the example of FIG. 14, as shown in FIG. 14A, the object 300 to be packed is placed on the bottom inner surface of the box body. The double-sided tape is attached to the periphery thereof or an adhesive is applied thereto, and then the porous perforated shrink film 100 of the present invention is attached. As shown in FIG. 14B, the object 300 to be packed is shrunk and packaged in a state in which the packaged object 300 is loaded between the bottom inner surface of the box body and the porous perforated shrink film 100.

In the example of FIG. 14, the loading place of the packaged object is the bottom inner surface of the transporting box body, but is not limited to the bottom inner surface, and may be the top surface rear, the inner peripheral wall surface, or the like.

[0168] As described above, it will be understood that various modifications can be made without departing from the technical scope of the present invention, although a preferred embodiment in the packaging method using the porous perforated shrink film, the package, the packaging device, and the porous perforated shrink film according to the present invention has been described in the drawings.

INDUSTRIAL APPLICABILITY

[0169] The porous perforated shrink film of the present invention can be widely applied as a packaging material. The packaging apparatus of the present invention can package various objects to be packaged in a simple and stable manner using a porous perforated shrink film.

Description of the reference numerals

[0170]

100	Porous perforated shrink film
110	Hole
120	Bridge
130	Roll body
140	Feeder
200	Mount
300	Object
400	Packaging apparatus
410	Mount supply unit
420	Double-sided tape sticking device
430	Object transfer device
440	Porous perforated shrink film supply unit
450	Covering and fixing device
460	Heating shrink device
470	Conveyance path

Claims

1. A porous perforated shrink film in which a large number of holes are perforated in a shrink film.

2. A porous perforated shrink film according to claim 1, wherein the holes are short line segment cut holes or a short thick line segment cut holes,
wherein the short line segments or the short thick line segments are arranged regularly or irregularly.

3. A porous shrink film according to claim 1, wherein the hole is a hole having a polygonal opening, and the holes of many polygonal openings are arranged regularly or irregularly to form a mesh shape.

4. A porous shrink film according to claim 1, wherein the hole is a hole of a circular or elliptical opening or a circular arc shaped slit, and holes of many circular or elliptical openings or holes of the circular arc shape are arranged regularly or irregularly.

5. A package employing the porous perforated shrink film in which the object to be packaged is shrink wrapped by the porous perforated shrink film according to any one of claims 1 to 4.

6. A package employing the porous perforated shrink film according to claim 5, wherein the porous perforated shrink film is attached to a sheet like mount, and the shrink wrap packaging is performed in a state in which the packaged object is loaded between the mount and the porous perforated shrink film.

7. A package employing the porous perforated shrink film according to claim 5, wherein the porous perforated shrink film is attached to any of the bottom inner surface, the top surface or the inner peripheral wall surface of the box for transportation, and the shrink wrap packaging is performed in a state in which the packaged object is loaded between any of the inner surface of bottom, the inner surface of top, or the inner surface of peripheral wall of the box body, and the porous perforated shrink film.

8. A packaging apparatus comprises,

a mount supply unit that supplies a mount;
a double-sided tape sticking part for sticking a double-sided tape to a predetermined position of the mount supplied from the mount supply unit;
an object transfer unit on which an object to be packaged is placed on the mount;
a porous perforated shrink film supply unit for supplying a porous perforated shrink film according to any of claims 1 to 4;
a covering and fixing device for fixing the periphery of the porous perforated shrink film by placing the porous perforated shrink film on the double-sided tape while covering the object to

be packaged placed on the mount so as to cover the object to be packaged;
a packaging device for the object to be packaged is provided with a shrink device that shrinks the porous shrink film by heat application to shrink wrap the object to be packaged.

9. A packaging apparatus according to claim 8, wherein the adhesive on one side can adhere to the shrink film material, and the adhesive on the opposite side can adhere to the surface of the mount.

10. A packaging apparatus comprises,

a mount supply unit that supplies a mount;
an object transfer unit on which an object to be packaged is placed on the mount;
an adhesive application part for supplying and applying an adhesive to a predetermined position between the surface of the mount and the porous perforated shrink film;
a porous perforated shrink film supply unit for supplying a porous shrink film according to any of claims 1 to 4;
a covering and fixing device for fixing the periphery of the porous perforated shrink film on the adhesive while covering the object to be packaged,
a packaging device for an object to be packaged is provided with a shrink device that shrinks the porous shrink film by heat application to shrink wrap the object to be packaged.

11. A packaging process comprises,

a mount supply step of supplying a mount;
a double-sided tape sticking step of sticking a double-sided tape to a predetermined position of the mount supplied by the mount supply step;
an object transfer step in which an object to be packaged is placed on the mount;
a porous perforated shrink film supply step of supplying the porous perforated shrink film according to any of claims 1 to 4;
a covering and fixing step of fixing the periphery of the porous perforated shrink film by placing the porous perforated shrink film on the double-sided tape while covering the object to be packaged placed on the mount so as to cover the object to be packaged;
a packaging step of the packaged object using the porous perforated shrink film by heat application to shrink wrap the object to be packaged.

12. A packaging process comprises,

a mount supply step of supplying a mount;
an object transfer step of placing an object to be packaged on the mount;
a porous perforated shrink film supply step of supplying the porous perforated shrink film according to any of claims 1 to 4;
an adhesive application step of applying an adhesive to a predetermined position on the surface of the mount;
a covering and fixing step of fixing the periphery of the porous perforated shrink film by placing the porous perforated shrink film on the adhesive while covering the object to be packaged on the mount so as to cover the object to be packaged;
a packaging step of the packaged object using the porous perforated shrink film by heat application to shrink wrap the object to be packaged.

13. A method for manufacturing the porous perforated shrink film for manufacturing the perforated shrink film according to any of claims 1 to 4,

a shrink film supply step of supplying a shrink film;
a release sheet formation step in which a release sheet to which a release agent is applied is applied to the back surface of a supplied shrink film;
a hole forming step of forming the hole at least in one layer of the shrink film or two layers of the shrink film and the release sheet by the Thomson blade, which Thomson blade provided with a blade die corresponding to the hole to be formed;
a peeling step of peeling the layer of the release sheet from the shrink film layer.

14. A method for manufacturing the porous perforated shrink film according to claim 13,

the shrink film material supplied in the shrink film supply step is a rolled continuous body;
the release sheet supplied by the release sheet forming step is a roll-shaped continuous body;
the Thomson blade employed in the hole forming step is installed on the surface of the rotating body, the holes are formed continuously by the continuous rolling of the rotating body in the hole forming step.

15. A method for manufacturing the porous perforated shrink film according to claim 13,

the shrink film material supplied in the shrink film supply step is a single-leaf flat sheet or a double-leaf of zigzag folded plural sheet;
the release sheet supplied by the release sheet forming step is a single-leaf flat sheet or a double-leaf of zigzag folded plural sheet;

the Thomson blade employed in the hole forming step is installed on the surface of the flat body, the holes are formed one by one by the flat body in the hole forming step.

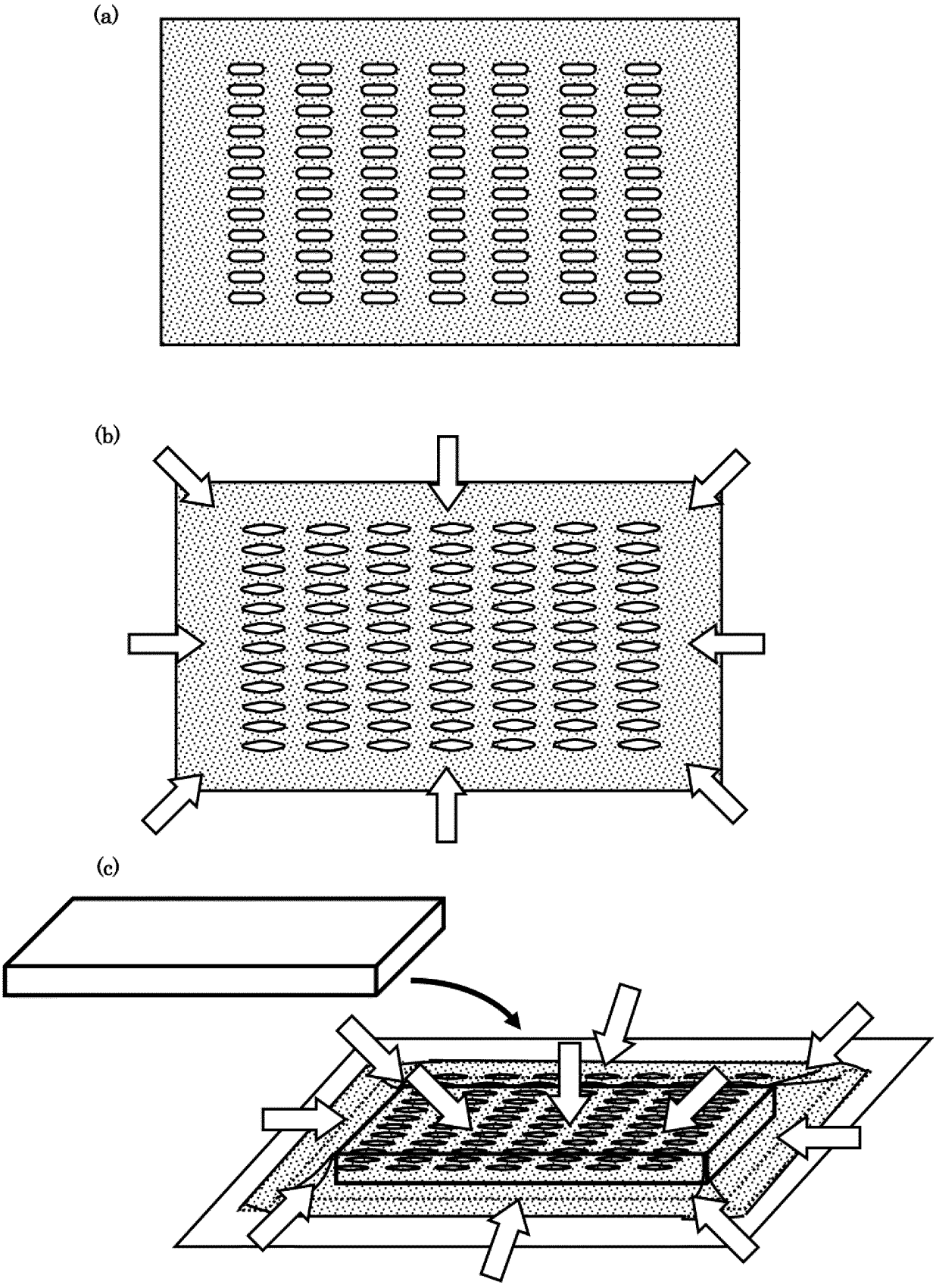


FIG. 1

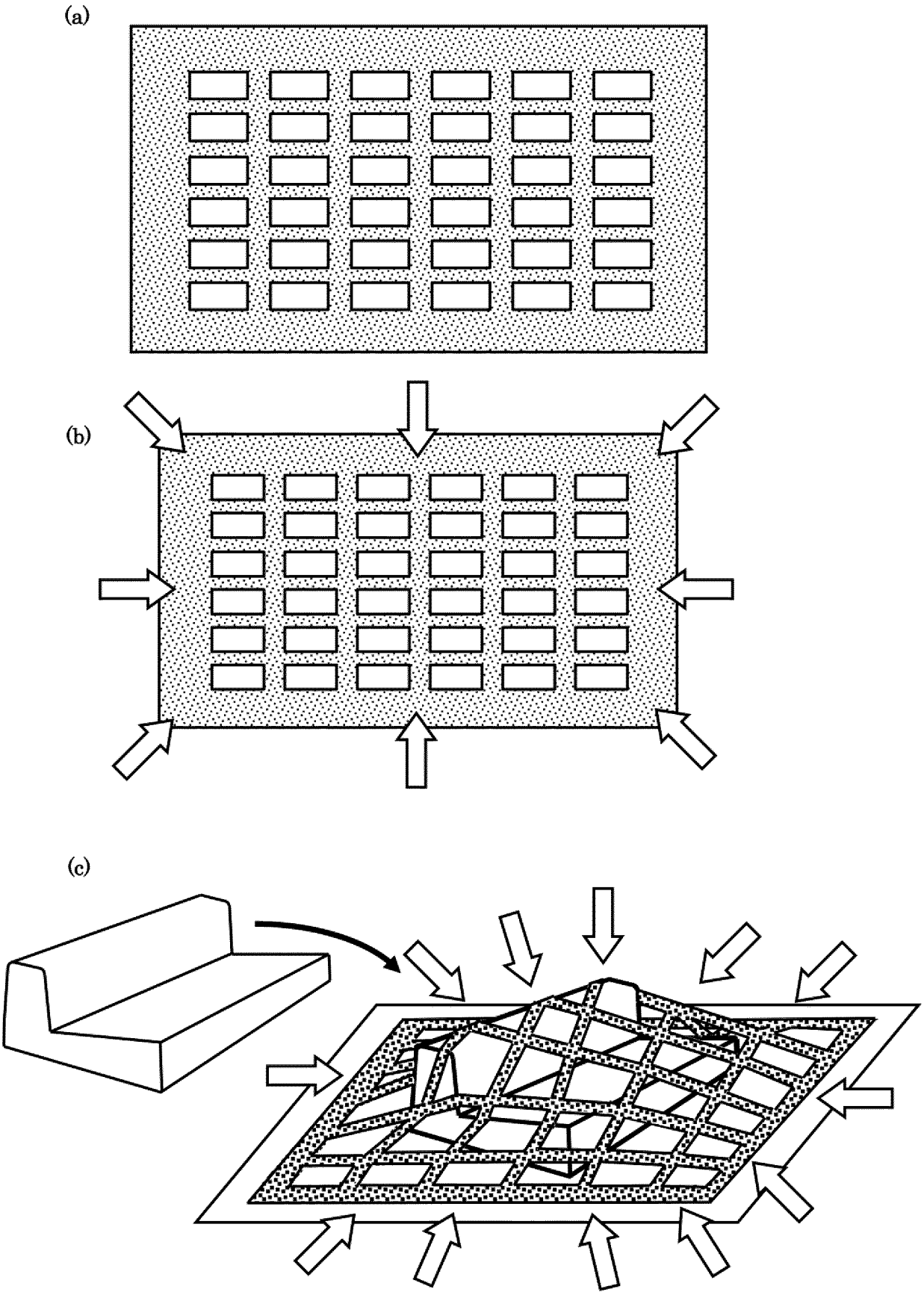
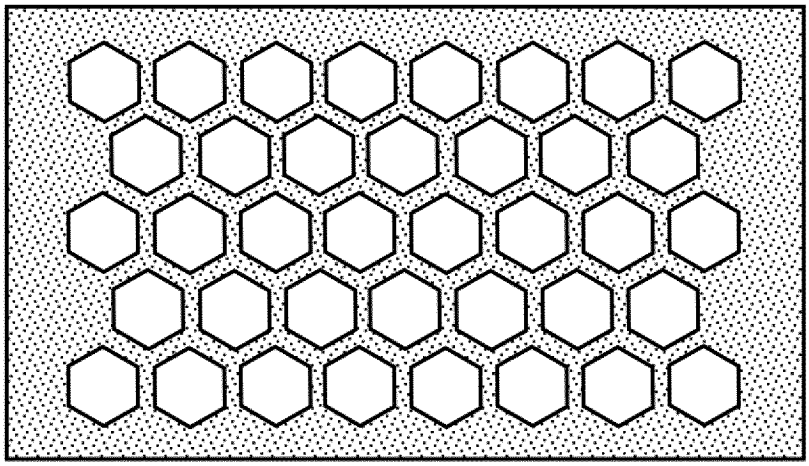
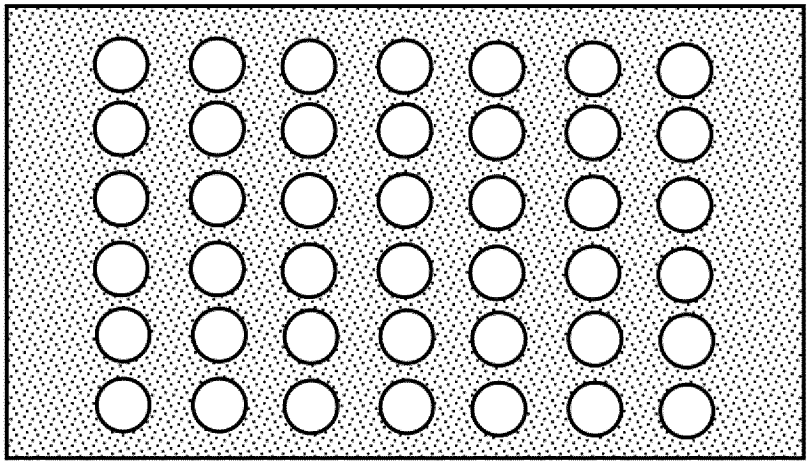


FIG. 2

(a)



(b)



(c)

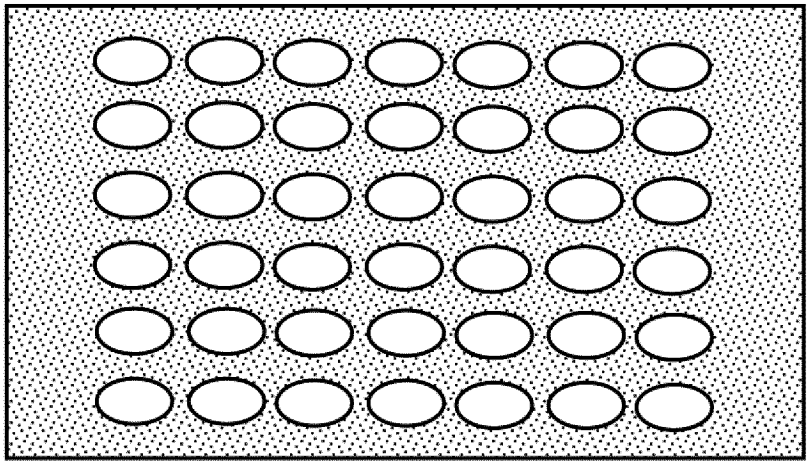


FIG. 3

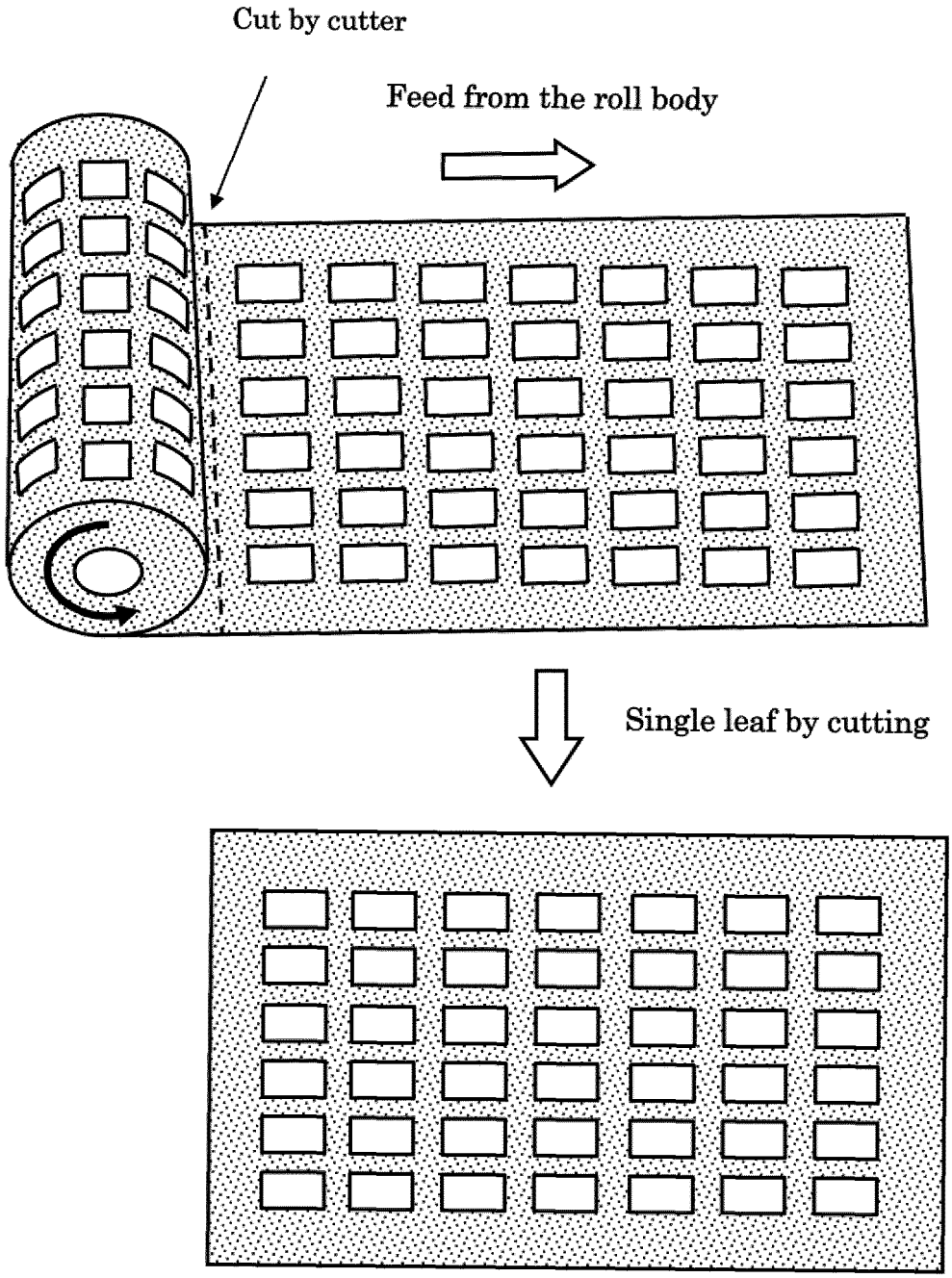


FIG. 4

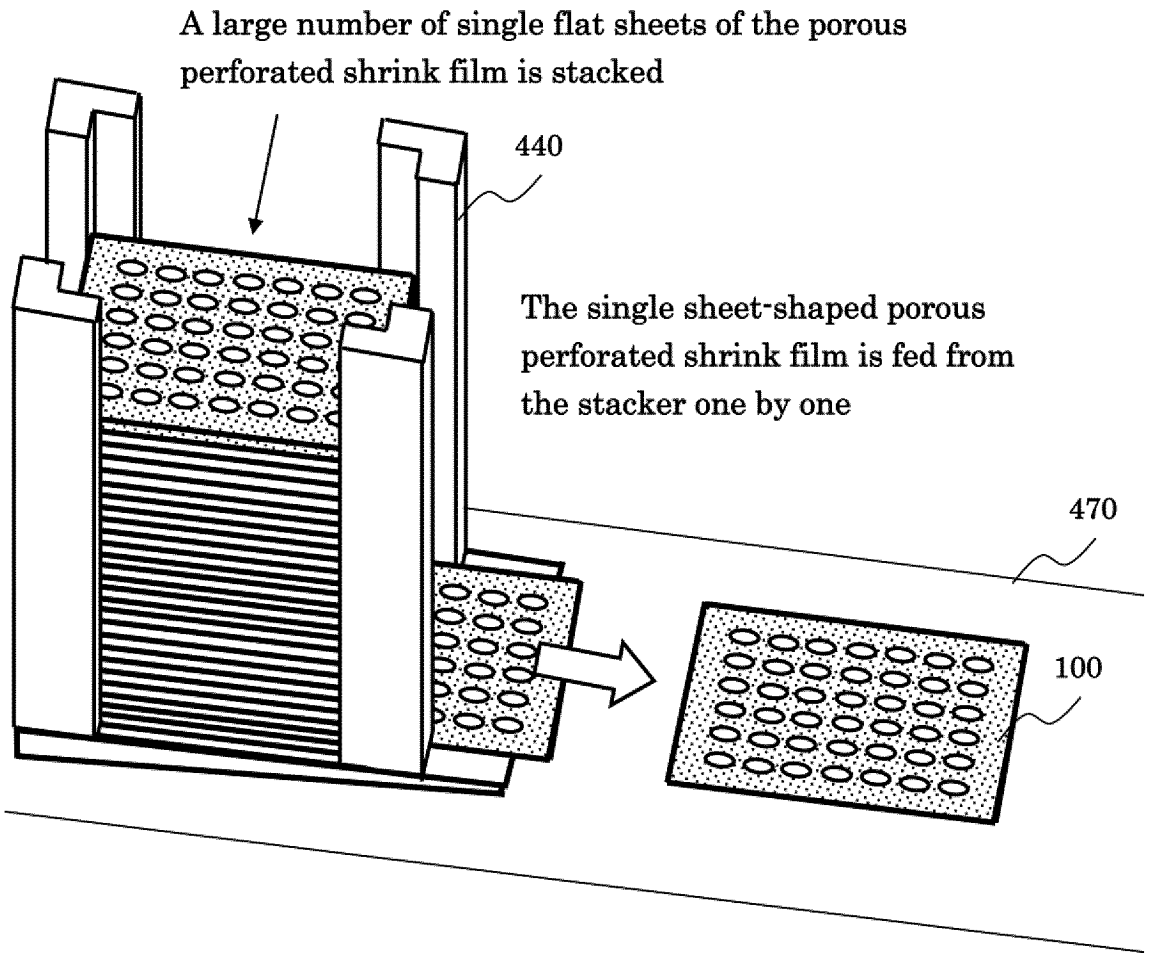

A large number of single flat sheets of the porous perforated shrink film is stacked
440
The single sheet-shaped porous perforated shrink film is fed from the stacker one by one
470
100

FIG. 5

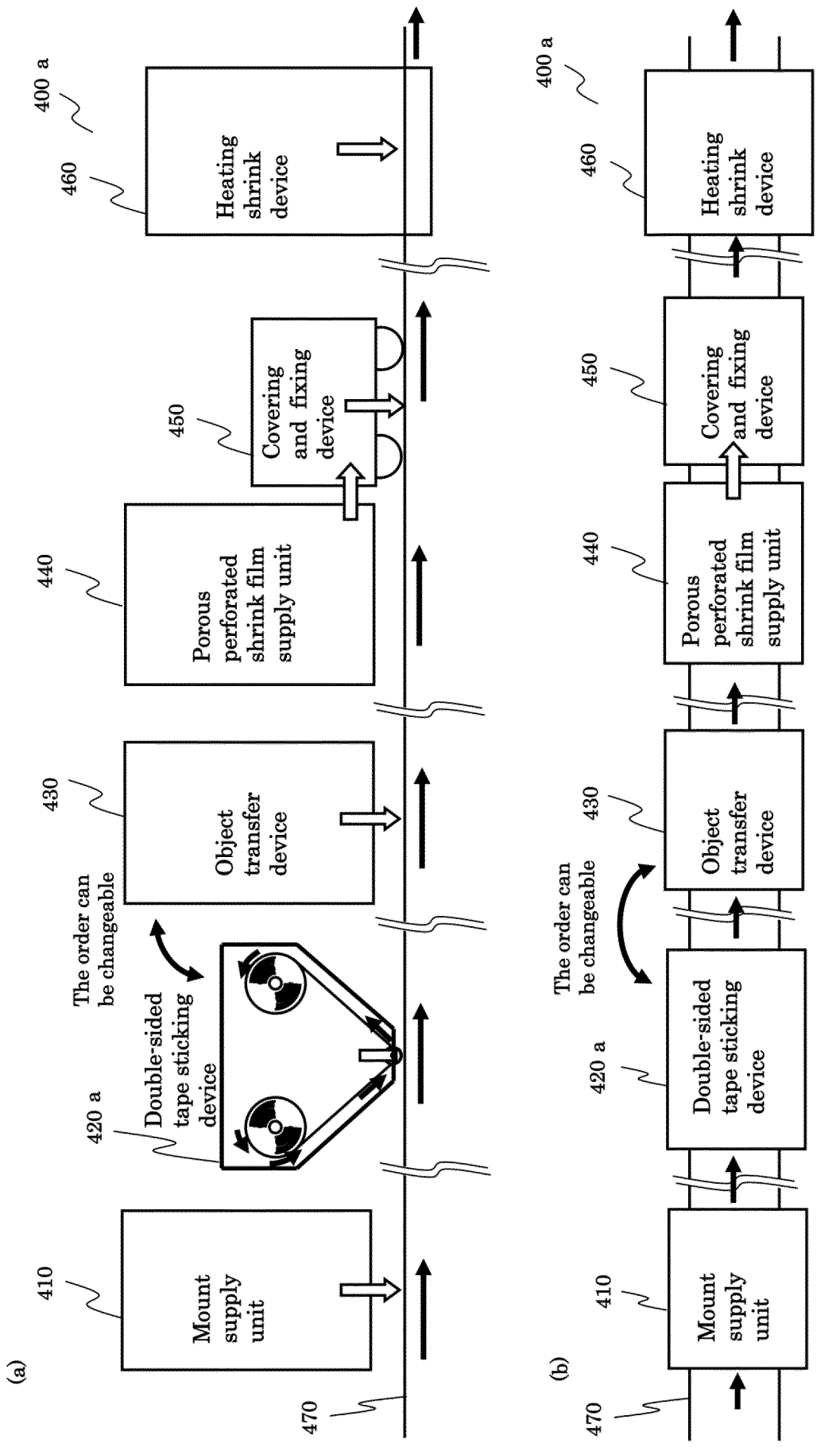

(a)
400 a
460
Heating shrink device
450
Covering and fixing device
440
Porous perforated shrink film supply unit
430
Object transfer device
The order can be changeable
420 a
Double-sided tape sticking device
410
Mount supply unit
470
(b)
400 a
460
Heating shrink device
450
Covering and fixing device
440
Porous perforated shrink film supply unit
430
Object transfer device
The order can be changeable
420 a
Double-sided tape sticking device
410
Mount supply unit
470

FIG. 6

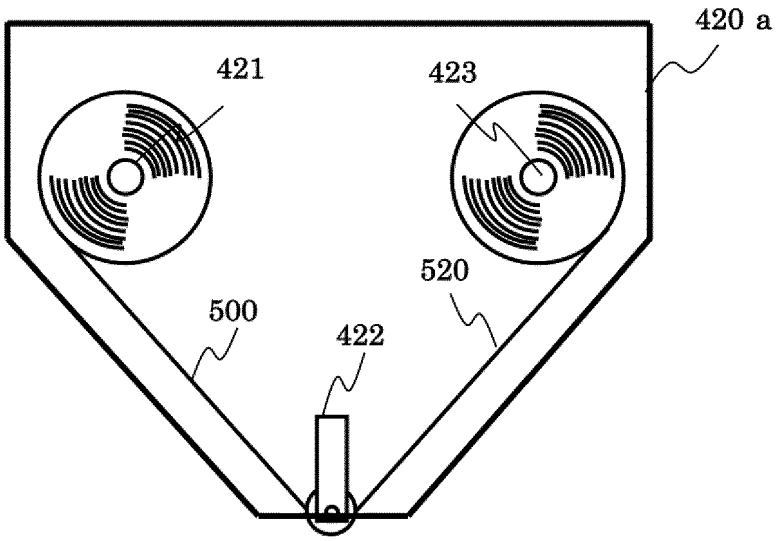


FIG. 7

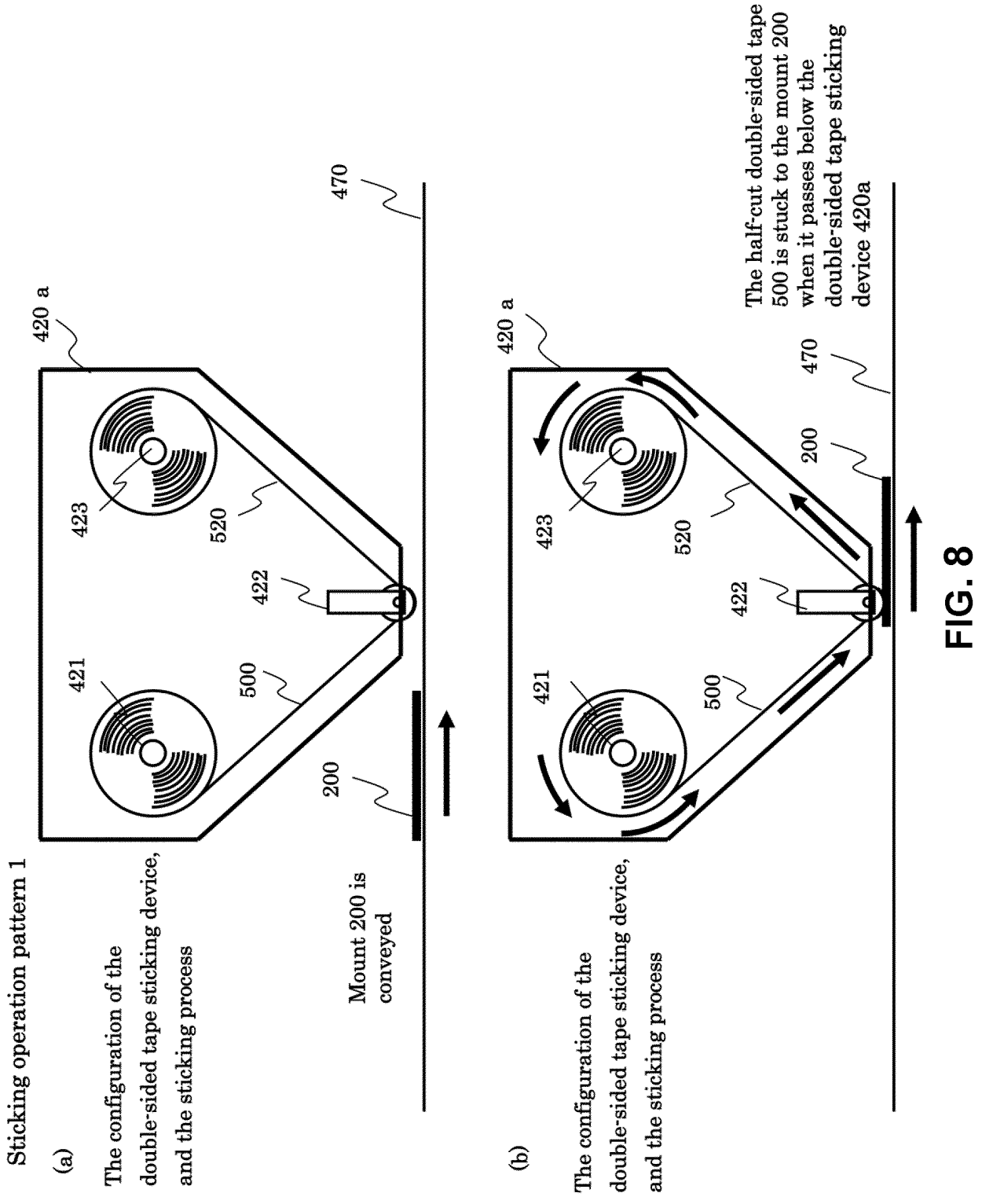
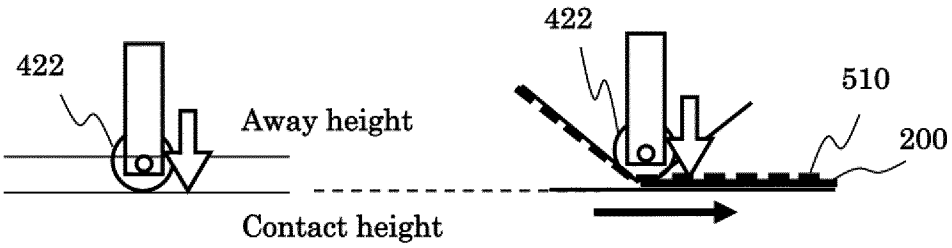

Sticking operation pattern 1
(a)
The configuration of the double-sided tape sticking device, and the sticking process
420 a
421
423
520
422
500
200
470
Mount 200 is conveyed
(b)
The configuration of the double-sided tape sticking device, and the sticking process
The half-cut double-sided tape 500 is stuck to the mount 200 when it passes below the double-sided tape sticking device 420a

FIG. 8

(a) The rolling body 422 is lowered to contact height so as to contact the surface of the mount 200 conveyed on the conveyance path 470, the double-sided tape 500 is stuck



(b) The rolling body 422 is raised so as not to contact the surface of the mount 200, the rotation sticking rolling part 422 is left from the surface of the mount 200

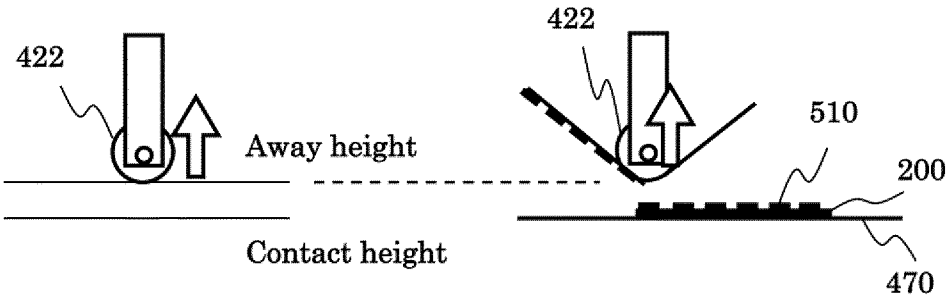


FIG. 9

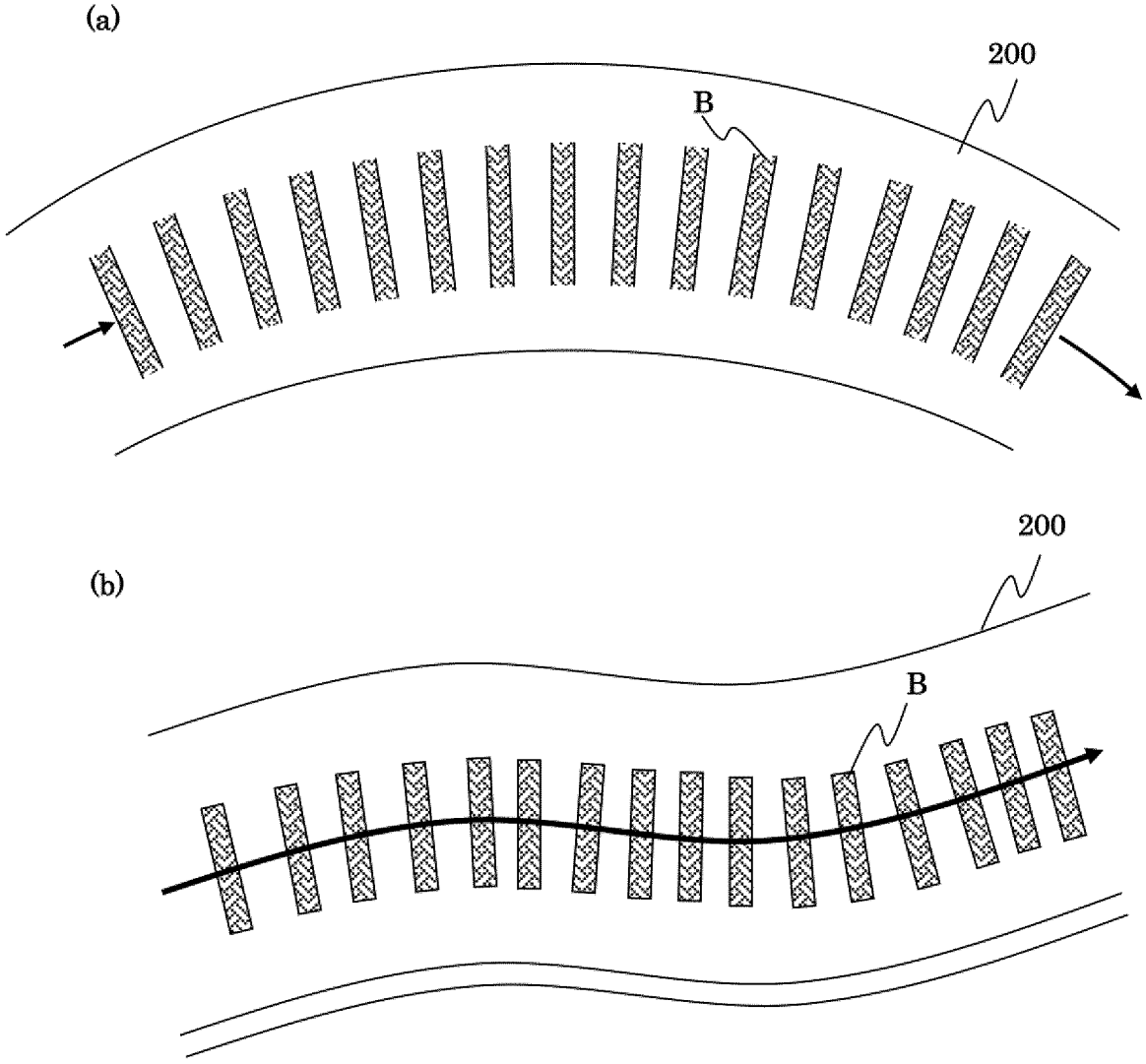


FIG. 10

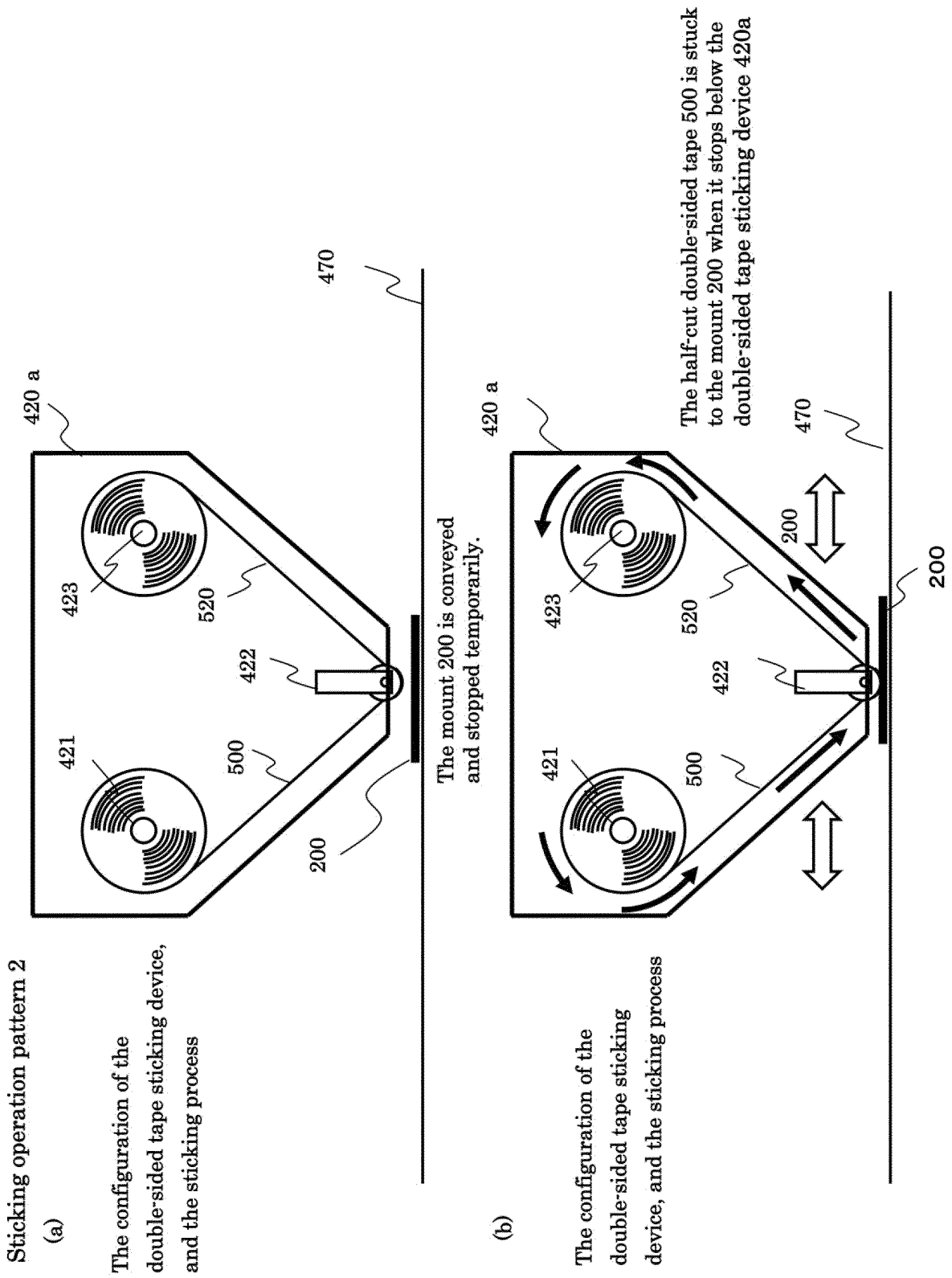

Sticking operation pattern 2
(a)
The configuration of the double-sided tape sticking device, and the sticking process
420 a
421
423
520
422
500
200
470
The mount 200 is conveyed and stopped temporarily.
(b)
The configuration of the double-sided tape sticking device, and the sticking process
420 a
421
423
520
422
500
200
470
The half-cut double-sided tape 500 is stuck to the mount 200 when it stops below the double-sided tape sticking device 420a

FIG. 11

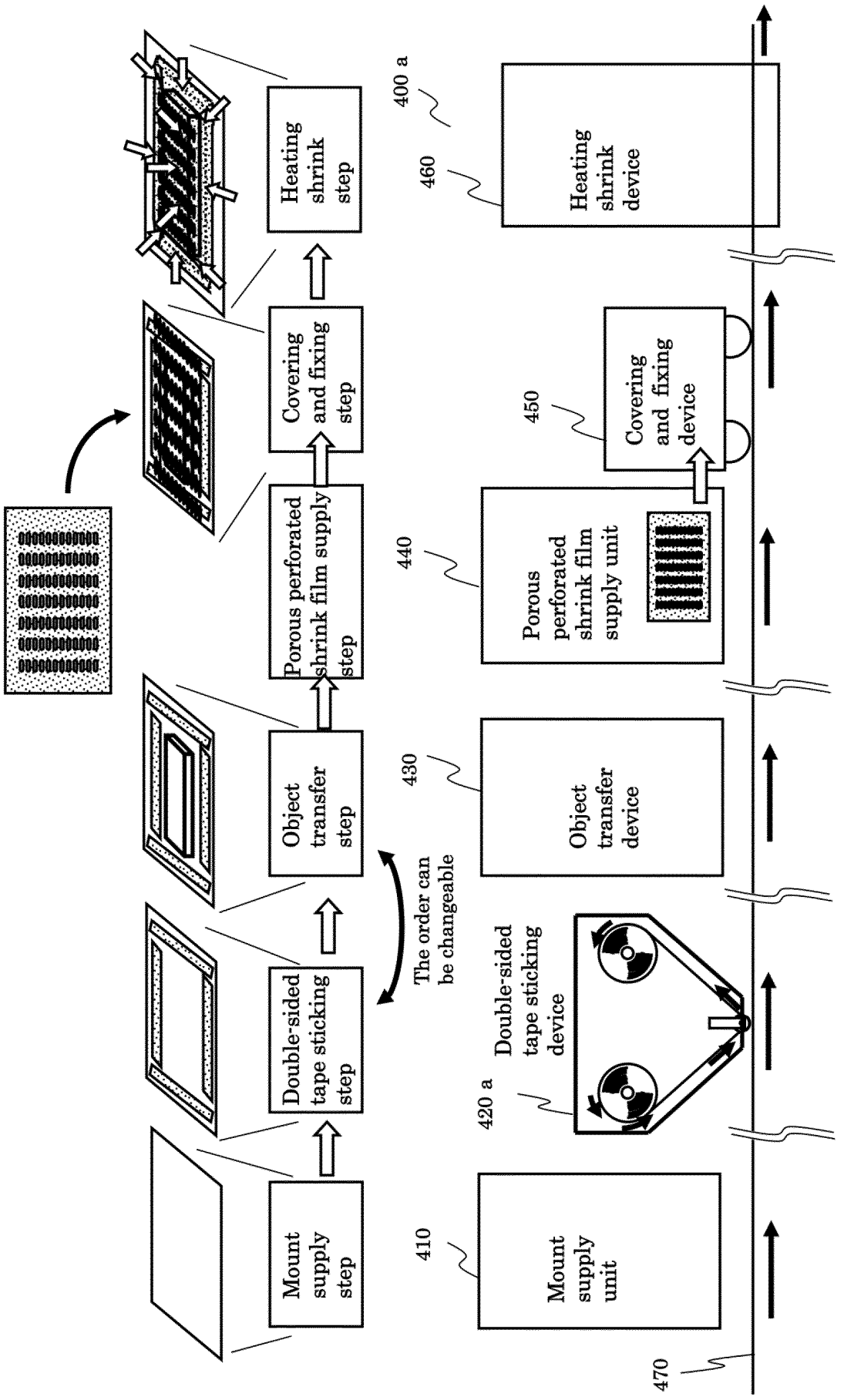

Mount supply step
Double-sided tape sticking step
Object transfer step
Porous perforated shrink film supply step
Covering and fixing step
Heating shrink step
The order can be changeable
410
Mount supply unit
420 a
Double-sided tape sticking device
430
Object transfer device
440
Porous perforated shrink film supply unit
450
Covering and fixing device
460
Heating shrink device
400 a
470

FIG. 12

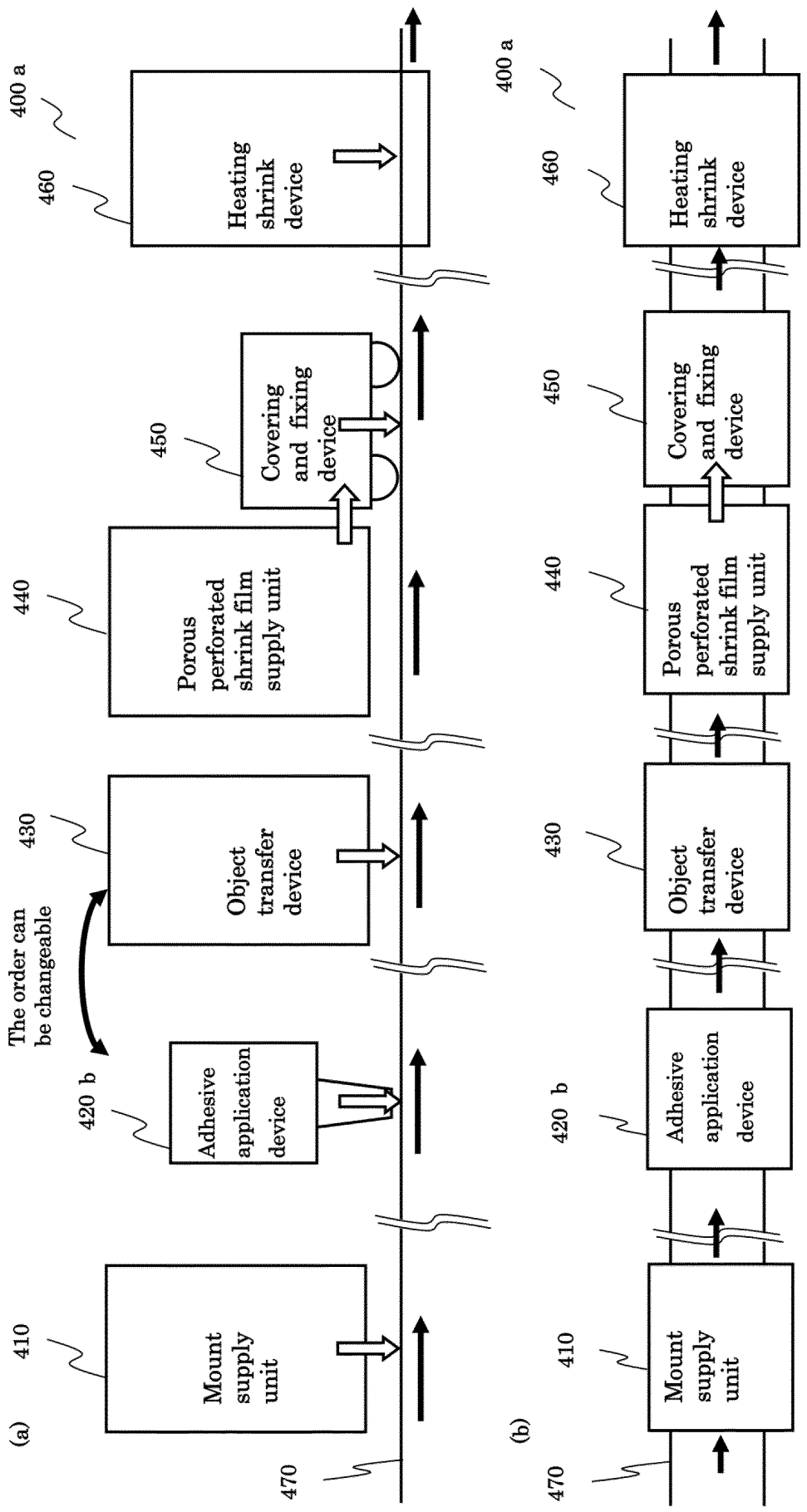

(a)
400 a
460
Heating shrink device
450
Covering and fixing device
440
Porous perforated shrink film supply unit
430
Object transfer device
The order can be changeable
420 b
Adhesive application device
410
Mount supply unit
470
(b)
400 a
460
Heating shrink device
450
Covering and fixing device
440
Porous perforated shrink film supply unit
430
Object transfer device
420 b
Adhesive application device
410
Mount supply unit
470

FIG. 13

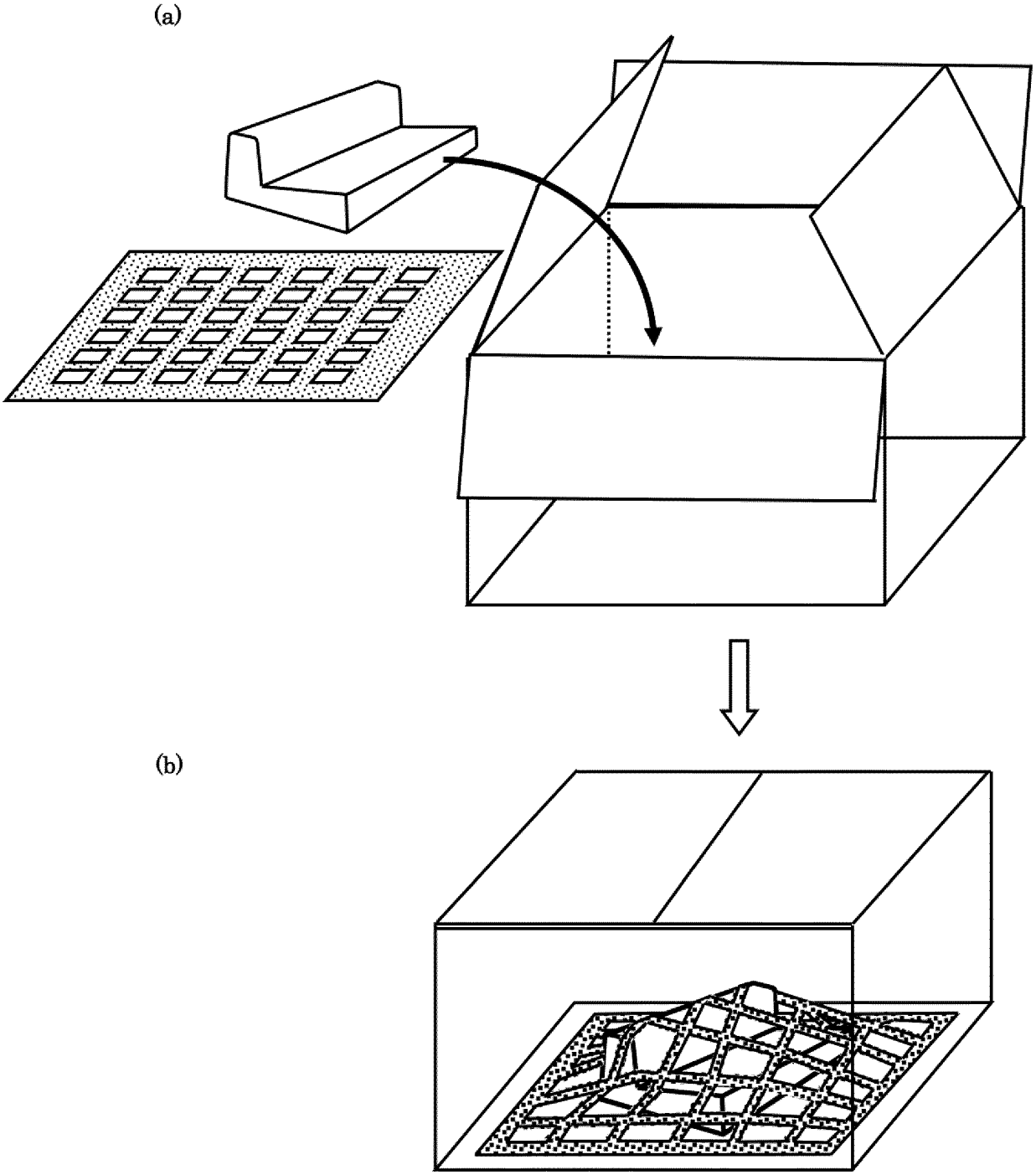
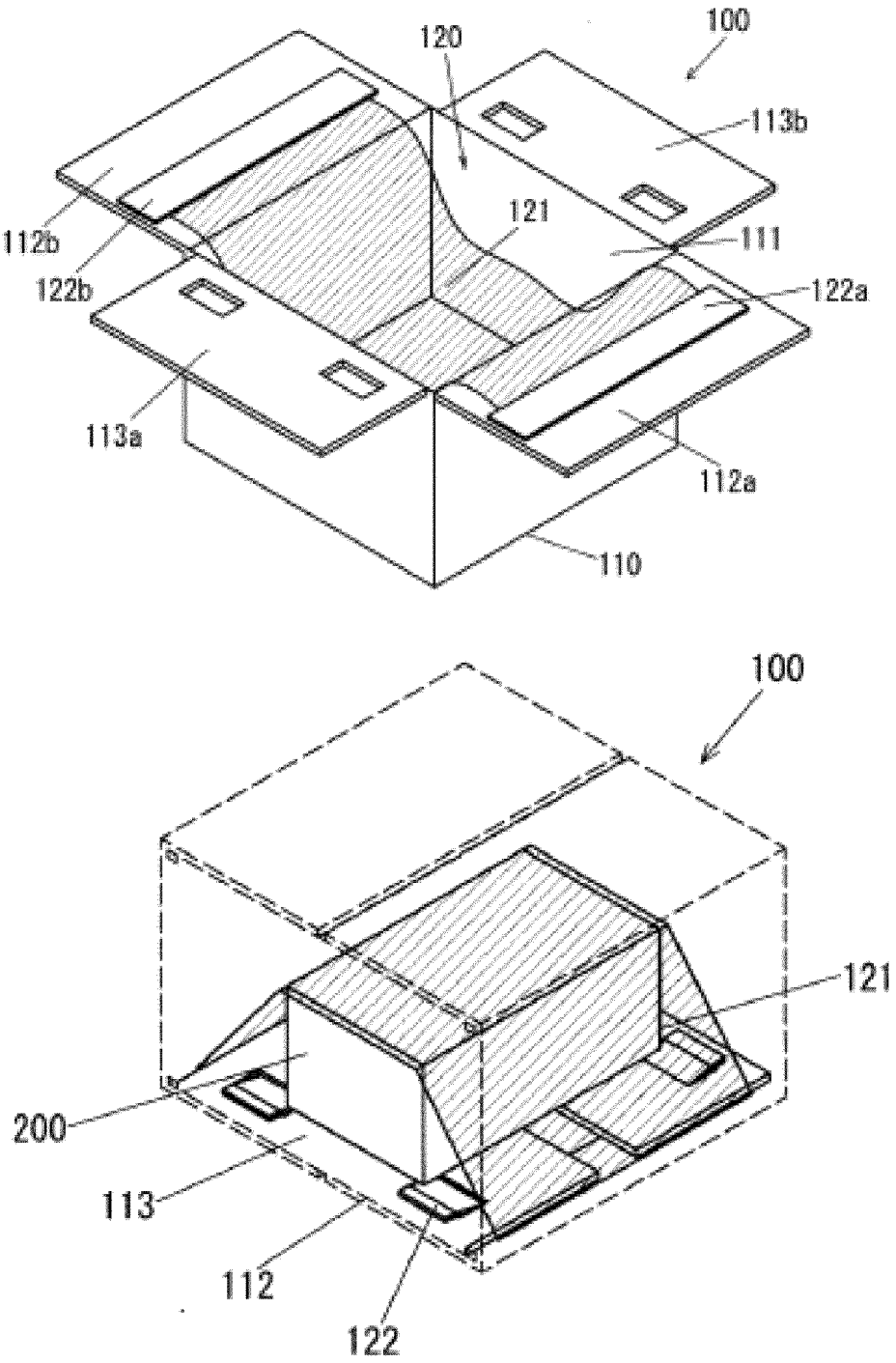
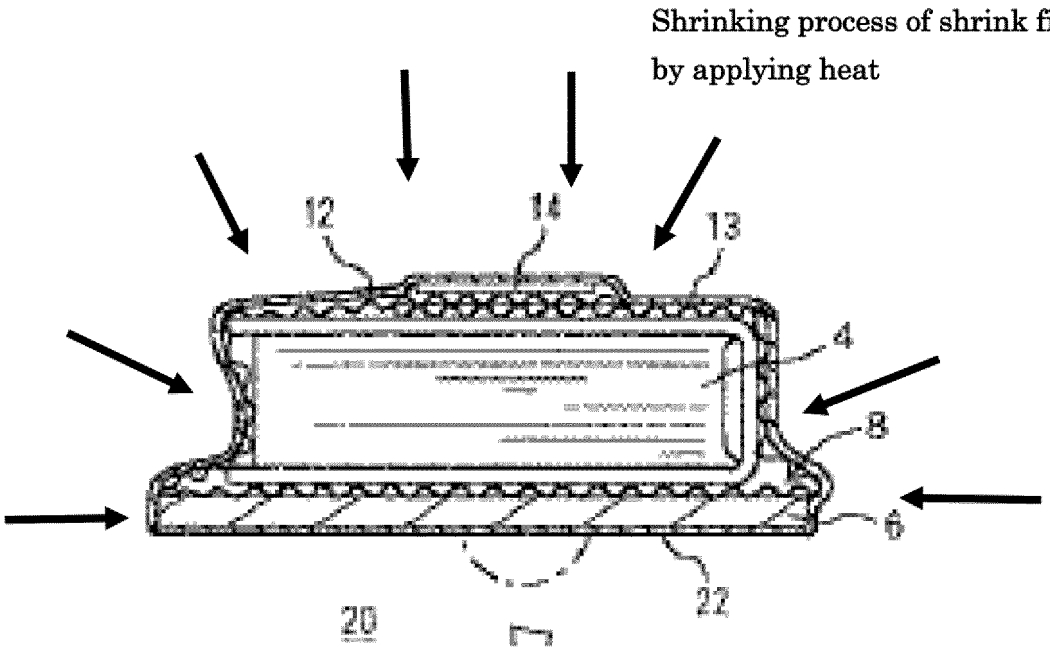


FIG. 14



The conventional shrink packaging disclosed in Prior art JP2011-157116

FIG. 15



The conventional shrink packaging disclosed in
Prior art JP2004-231230

FIG. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2022/025105

A. CLASSIFICATION OF SUBJECT MATTER

B65D 71/08(2006.01)i; ***B65B 53/02***(2006.01)i; ***B65D 65/02***(2006.01)i; ***B65D 81/03***(2006.01)i
FI: B65D71/08; B65D81/03 100Z; B65B53/02 Z; B65D65/02 Z

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D71/08; B65B53/02; B65D65/02; B65D81/03

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2022
Registered utility model specifications of Japan 1996-2022
Published registered utility model applications of Japan 1994-2022

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2016-20217 A (DAINIPPON PRINTING CO., LTD.) 04 February 2016 (2016-02-04) claims, paragraphs [0019]-[0021], [0024], fig. 1	1, 4-6
Y		2-3, 6-7
A		8-15
X	JP 2017-105541 A (ASAHI KASEI CORP.) 15 June 2017 (2017-06-15) claims, paragraphs [0001], [0003], [0004], [0033], fig. 1	1, 4-6
Y		2-3, 6-7
A		8-15
X	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 121711/1974 (Laid-open No. 67066/1975) (HITACHI, LTD.) 16 June 1975 (1975-06-16), p. 1, lines 11-17, fig. 1	1, 4-6
Y		2-3, 6-7
A		8-15

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* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 August 2022	**06 September 2022**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2022/025105

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2001-336057 A (SEKISUI CHEMICAL CO., LTD.) 07 December 2001 (2001-12-07) claims, paragraphs [0001], [0002], [0011], [0015], [0030], [0034], [0042]	1, 4-5
Y		2-3, 6-7
A		8-15
X	JP 2012-35877 A (RENGO CO., LTD.) 23 February 2012 (2012-02-23) claims, paragraphs [0012]-[0014], fig. 1-4	1, 4-5
Y		2-3, 6-7
A		8-15
Y	US 2014/0231493 A1 (DELKOR SYSTEMS, INC.) 21 August 2014 (2014-08-21) paragraph [0052], fig. 13	2-3
Y	JP 10-338265 A (MORIYA SANGYO CO., LTD.) 22 December 1998 (1998-12-22) claims, paragraphs [0007]-[0011], fig. 1-6	7
A	JP 10-251424 A (FUJI SEAL INC.) 22 September 1998 (1998-09-22)	1-15
A	JP 2020-15540 A (KOHJIN FILM & CHEMICALS CO., LTD.) 30 January 2020 (2020-01-30)	1-15
A	JP 2008-13197 A (RENGO CO., LTD.) 24 January 2008 (2008-01-24)	1-15
A	WO 2021/235035 A1 (NISHIKAWA, Yoshihide) 25 November 2021 (2021-11-25)	1-15

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2022/025105

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2016-20217 A	04 February 2016	(Family: none)	
JP 2017-105541 A	15 June 2017	(Family: none)	
JP 50-67066 U1	16 June 1975	(Family: none)	
JP 2001-336057 A	07 December 2001	(Family: none)	
JP 2012-35877 A	23 February 2012	(Family: none)	
US 2014/0231493 A1	21 August 2014	US 2016/0130059 A1	
JP 10-338265 A	22 December 1998	(Family: none)	
JP 10-251424 A	22 September 1998	(Family: none)	
JP 2020-15540 A	30 January 2020	(Family: none)	
JP 2008-13197 A	24 January 2008	(Family: none)	
WO 2021/235035 A1	25 November 2021	WO 2021/033384 A1	
		WO 2021/033344 A1	
		WO 2021/033683 A1	

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Patent documents cited in the description

- JP 2011157116 A **[0006] [0011] [0060]**
- JP 2004231230 A **[0008] [0009] [0011] [0060]**