

DESCRIPTION

TITLE OF INVENTION: PACKING MAT AND PACKING UNIT USING PACKING MAT

Technical Field

[0001] The present invention relates to a packing mat and a packing unit using packing mat to be used for article packing, particularly, article delivery in home delivery service.

Background Art

[0002] When transporting an article, in order to effectively protect the article from impacts and vibrations that are applied thereto during transportation, normally, a cushioning material having shock-absorbing characteristics such as paper, a plastic sheet, or the like is used to pack the article, and further, filling is filled in an outer box so as to prevent the article from moving as appropriate and the article is packed in the outer box.

[0003] At the time of sale of a product or delivery of a product to a manufacturer or repair center of a retail store, "individual packing" is necessary, that is, it is necessary to pack articles individually and, for increasing the commodity value of the article, or for protecting the articles, apply an appropriate material and container to the articles, however, when a person requests a home delivery service person to transport a product

to be repaired, "individual packing" as in the case of product sale is not necessary, but the product is only required to be effectively protected from impacts and external forces that may be applied thereto during transportation.

[0004] Patent Document 1 describes a bag using a heat-insulating effect of foamed granular bodies as a temperature-keeping bag to be used as a shopping bag although it is not a bag for article transportation. This temperature-keeping bag is a double bag, having an inner bag portion and an outer bag portion which form a granular body storing portion therebetween and are freely deformable, and includes a bag main body that is formed so as to store an object to be kept in temperature, and is non-breathable on at least the side of the outer bag portion of the bag portions, numerous foamed granular bodies which are stored in the granular body storing portion and gather together in a close-contact state and turn into a solidified state as the granular body storing portion is deaerated, and an air intake and exhaust port that is provided in the bag main body and communicatively connected to the granular body storing portion, and includes an air intake valve for keeping the deaerated state of the granular body storing portion.

[0005] The effect of the temperature-keeping bag described in Patent Document 1 is emphasized in which, by solidifying numerous

foamed granular bodies stored in the granular body storing portion along the shape of the object to be kept in temperature, heat loss due to circulation of air around the object to be kept in temperature inside the bag main body is eliminated, and the foamed granular body group can insulate heat, so that changes in temperature of the object to be kept in temperature can be reduced for a long period of time, and by positioning the object to be kept in temperature by the solidified foamed granular bodies so as to prevent this from moving inside the bag main body, the object to be kept in temperature can be prevented from being deteriorated in quality due to movement of the object to be kept in temperature.

[0006] The temperature-keeping bag described in Patent Document 1 uses the heat-insulating effect of the foamed granular body group (beads) for temperature keeping of the object to be kept in temperature by solidifying the foamed granular body group along the shape of the object to be kept in temperature, and it can be expected that positioning of the object to be kept in temperature by the solidified foamed granular bodies so as to prevent the object to be kept in temperature from moving inside the bag main body will provide not only a heat-insulating effect but also a cushioning effect by the solidified foamed granular body group, and it can also be expected that stable

holding of the article at a fixed position will provide a great effect in packing of the article to be transported by home delivery service.

[0007] However, the beads cannot be evenly distributed in the packing mat only by being stored in the bag body of the mat, and particularly, when a three-dimensional article is wrapped with the packing mat, a portion of the packing mat rises along the article outer wall surface, and at the rising portion, the beads storing amount inside the packing mat decreases, and in an extreme case, beads are absent in a fixed range of the rising portion. As a matter of course, if the beads storing amount decreases or beads are locally absent, the packing mat cannot be stably held in close contact with the article, and furthermore, the cushioning effect of the beads cannot be expected.

Citation List

Patent Literature

[0008]

Patent Document 1: Japanese Published Unexamined Patent Application No. 2001-321217

Patent Document 2: Japanese Published Examined Patent No. 2847651

Summary of Invention

Technical Problem

[0009] A problem to be solved by the present invention is that when an article to be packed is wrapped with a packing mat, beads filled in the packing mat are unevenly distributed, and the article cannot be stably held at a fixed position, and furthermore, the cushioning effect of the beads cannot be obtained.

Solution to Problem

[0010] In order to solve the above-described problem, the most distinctive feature of a packing mat according to the present invention is that the packing mat is comprised of a combination of an airtight outer bag, an air-permeable inner bag incorporated in the outer bag, and cushion beads filled in the inner bag, wherein necessary portions at regular intervals on opposed surfaces of a pair of sheet surfaces constituting the inner bag are seamed to confine a fixed amount of cushion beads in each section surrounded by three or more of junction points adjacent to each other so as to prevent the beads filled in the packing mat from being unevenly distributed.

Advantageous Effects of Invention

[0011] The packing mat according to the present invention can be spread on the floor or table and wrap an article like a wrapping cloth, store an article and be folded as a storing bag, or pack an article by sandwiching the article, and when packing an

article, even if the packing mat is partially raised or bent, cushion beads filled in the packing mat are not unevenly distributed inside the inner bag.

[0012] Further, by deaerating the inside of the outer bag of the mat in a state where an article is packed, the layer of the cushion beads inside the inner bag solidify while having a fixed thickness, the solidified layer of the cushion beads stably supports the packed article, and by the cushioning effect of the solidified layer of the cushion beads, the packed article can be effectively protected from impacts, breakage and damage due to vibrations that may be applied thereto during transportation.

Brief Description of Drawings

[0013]

Figs. 1 are views showing an embodiment of a packing mat according to the present invention, and Fig. 1a is a perspective view, and Fig. 1b is a sectional view taken along the line A-A in Fig. 1a.

Fig. 2a and Fig. 2b are views showing modes of junction points provided on the inner bag.

Fig. 3 is a view showing sections formed by the junction points.

Figs. 4 are views showing a valve structure, and Fig.

4a is a plan view and Fig. 4b is a sectional view taken along the line B-B in Fig. 4a.

Fig. 5 is a view showing an example in which a unit is formed by combining a packing mat and an outer box.

Fig. 6a is a view showing an example in which fixing tapes for fixing the mat wrapping an article to the outer box is provided, and Fig. 6b is a view showing a state where the mat wrapping an article is held by the fixing tapes, and further, the mat wrapping the article is fixed to the outer box by fixing tapes of the outer box.

Fig. 7 is a view showing an example in which fixing tapes for holding an article wrapping state are also provided on the mat.

Figs. 8 are views showing an example in which a unit is formed by combining the packing mat with a cover sheet, and Fig. 8a is a bottom view, Fig. 8b is a sectional view taken along the line X-X in Fig. 8a, and Fig. 8c is an example in which the mat is half-folded to serve as a bag or holder.

Fig. 9 is a view showing measurement procedures of Evaluation 1.

Fig. 10 is a view showing measurement procedures of Evaluation 2.

Description of Embodiments

[0014] Hereinafter, an embodiment of the present invention is described in detail. In Fig. 1, a packing mat (hereinafter, abbreviated to mat) 10 according to the present invention is composed of a combination of an outer bag 1, an inner bag 2, and cushion beads 3 filled in the inner bag 2. In this embodiment, the outer bag 1 is processed into a flat rectangular bag shape by laminating a pair of rectangular airtight outer sheets 1a and 1b up and down and sealing the peripheral edges of the outer sheets airtightly. A valve 4 is attached to a portion of the sheet surface of the outer bag 1.

[0015] The inner bag 2 is a stretchable air-permeable bag. The peripheral edges of a pair of rectangular air-permeable sheets are seamed and processed into a flat rectangular bag shape slightly smaller than the outer bag. The inner bag 2 filled with the cushion beads 3 is inserted in the outer bag 1. In the present invention, the inner bag 2 has junction points 5 on upper and lower sheet surfaces that form the bag. The junction points 5 are portions at which the upper and lower sheets of the inner bag 2 are joined integrally in minute ranges at regular intervals in the longitudinal and lateral directions across the entire surfaces of the upper and lower sheet surfaces as shown in Fig. 2. In this embodiment, the respective junction points 5 are scattered to the respective positions so that the

positions deviate from each other longitudinally and laterally on a column to column basis in a matrix, however, they may be aligned longitudinally and laterally as shown in Fig. 2b.

[0016] The inner bag 2 is obtained by seaming the peripheral edges of air-permeable sheets or joining necessary portions of a bag-shaped knit, and as the sheets of the inner bag used in the present embodiment, a three-dimensional knit composed of a front knit fabric and a back knit fabric knitted with fiber yarns, and a connecting yarn that connects these knit fabrics. As such a knit, for example, there is a three-dimensional knit called "Double Russel (registered trademark)" made by Asahi Kasei Corporation (refer to Patent Document 2).

[0017] This kind of three-dimensional knit forms a structural body having substantially independent sections each of which is surrounded by three or more of several junction points proximal to each other, that is, in this embodiment, sections each surrounded by four junction points 5, 5, 5, and 5 as shown in Fig. 3, and the knit fabrics are very stretchable, so that cushion beads 3 can be substantially confined in each section connecting the respective junction points 5, so that the inner bag 2 filled with the cushion beads 3 becomes flat and substantially constant in thickness. In the case where the inner bag is formed of the above-described three-dimensional

knit, when the cushion beads 3 are enclosed in the inner bag 2 first, an opening (not illustrated) is provided at a portion of the inner bag 2, and the cushion beads are pneumatically fed by high-pressure air from the opening and an appropriate amount of the beads can be enclosed in each section connecting the respective junction points 5. The opening is closed later to prevent the cushion beads from flowing-out and being lost. The upper and lower sheets forming the inner bag 2 are required to be stretchable, however, they do not necessarily have to be knit fabrics. Stretchable textiles may also be used.

[0018] The cushion beads 3 are granular bodies of foamed polyethylene or foamed polystyrene, and may have any grain size, however, the smaller the grain size is, the more the beads fit the shape of an article. By inserting the air-permeable inner bag 2 filled with the cushion beads 3 into the airtight outer bag 1, the cushion beads 3 are filled in the sealed space of the outer bag 1. The thickness of the layer of the cushion beads 3 is restricted according to the height of the inner bag 2, the inner bag 2 becomes a buffer layer with a substantially constant thickness, and the outer bag 1 is combined with the inner bag 2, whereby obtaining a flat mat.

[0019] The valve 4 provided on the sheet surface of the outer bag 1 is composed of a combination of a check valve and an air

intake valve. The structure of the valve 4 is shown in Fig. 4. The valve 4 is composed of a combination of the check valve 6 and the air intake valve 7, the air intake valve 7 is incorporated in a flow passage at the interior center of a cylindrical valve cage 8, and the check valve 6 is incorporated in a flow passage formed concentrically around the air intake valve 7.

[0020] The check valve 6 opens when a suction force of a pump is applied thereto when deaerating the inside of the mat 10, and after the deaeration, closes to block introduction of the outside air into the mat 10, and by manual rotation of a cap 9 provided on the upper end of the valve cage 8, the air intake valve 7 is pushed down to open to make it possible to introduce the outside air into the deaerated inside of the mat 10. The deaerated mat 10 becomes solidified and comes into close contact with the surface of a stored article M and holds the article M at a fixed position. The planar shapes of the outer bag and the inner bag are described as being rectangular by way of example, however, they may be square. The mat 10 may have any shape.

[0021] Next, for transportation as home delivery service, the mat can be used as an article packing unit by being combined with the outer box 11. Hereinafter, procedures of wrapping an article with the mat 10 and packing it in the outer box 11 are described. In Fig. 5a, first, the mat 10 is inserted in

the outer box 11, and as shown in Fig. 5b, the mat 10 is spread over the bottom of the outer box 11, and the end edges (four corners) of the mat are raised along the inner walls and hung down to the outside from the edge of the outer box 11.

[0022] Then, the article M to be packed is put in the outer box 11 and placed on the mat (Fig. 5c), the end edges (four corners) of the mat are folded in the order shown in Fig. 5d and Fig. 5e to cover the upper surface of the article M, and while the article M is wrapped with the mat 10, a pump 12 is inserted in the valve 4 attached to a portion of the outer bag 1 of the mat 10 as shown in Fig. 5f, and a handle 13 is operated to deaerate the inside of the mat 10. Accordingly, the mat 10 becomes solidified as shown in Fig. 5g and comes into close contact with the surface of the article M.

[0023] In this state, packing is completed by lidding the opening of the outer box 11 as shown in Fig. 5h, however, for transportation as home delivery service, it is necessary to prevent the article from moving inside the outer box during transportation by fixing the mat 10 wrapping the article M to the outer box 11. Figs. 6 show an example in which fixing tapes 14 for fixing the mat 10 wrapping the article M to the outer box 11 are provided. The fixing tapes 14 are, for example, hook-and-loop fasteners (Magic Fastener (registered

trademark)), and Fig. 6a shows an example in which pairs of fixing tapes 14 are provided on the opposed inner wall surfaces of the outer box 11 so as to be opposed to each other.

[0024] On the other hand, it is preferable that fixing tapes 15 for holding an article wrapping state are also provided on the mat 10 as shown in Fig. 7. According to this example, in the article wrapping state, as shown in Fig. 6b, opposed end edges of the mat are fastened to each other by the fixing tapes 15, and then, the pairs of the fixing tapes 14 attached to the inner walls of the outer box 11 are fastened to the upper surface of the mat 10 and the outer box is lidded.

[0025] Accordingly, the article wrapped with the mat is fixed to the outer box 11, and does not float or tumble inside the outer box even if vibrations and impacts are applied thereto during transportation, and vibrations and impacts that may be applied during transportation are absorbed by the buffer layer of the cushion beads 3 substantially solidified inside the mat 10. To unpack the article delivered to a destination, the lid of the outer box 11 is opened, the fixing tapes 14 and 15 are unfastened, the cap 9 of the valve 4 is rotated to push the air intake valve 7 down to open the flow passage, and through the flow passage, the outside air is introduced into the mat 10.

[0026] By the introduction of the outside air, the capacity inside the mat 10 increases and the filling density of the cushion beads 3 decreases, the mat 10 is relaxed and softened, so that the article M can be taken out of the outer box 11 by easily opening the mat 10.

[0027] Thus, when the mat is utilized as a packing unit, the outer box 11 is a box that stores and fixes the mat 10 wrapping the article M to be packed, and the mat 10 according to the present invention solidifies along the surface shape of the article M while wrapping the article M to be packed, and becomes a buffer layer that comes into close contact with the surface of the article M to protect the article.

[0028] The example of use as a packing unit is not limited to the combination with the outer box. The mat can be used as a bag by being combined with a cover sheet. In this case, as shown in Fig. 8a and Fig. 8b, a cover sheet 16 is a rectangular sheet longer than the entire length of the bag, the mat 10 is layered on the sheet surface of the cover sheet while leaving a portion of the cover sheet that serves as a flap 17, and the cover sheet is joined to the mat 10 integrally to cover one surface of the mat 10, the mat 10 is half-folded together with the cover sheet 16 so that the exposed surface of the mat 10 comes to the inner side, and both side edges are joined or sealed

so as to become openable and closable as shown in Fig. 8c. Accordingly, the half-folded mat 10 becomes a bag (or holder), and the flap 17 becomes a lid that closes the opening of the bag. By storing the article M in the bag and deaerating and solidifying the inside of the mat 10, the solidified layer holds the packed article M at a fixed position, the solidified layer serves as a buffer layer to protect the packed article M from impacts and vibrations that may be applied thereto from the outside.

[0029] (Evaluation Examples)

The beads were filled in the inner bag formed of a three-dimensional knit, and beads distribution unevenness and foldability were evaluated as described below when the beads filling amount was changed. The three-dimensional knit of the inner bag was made of polyester with fineness of 75 deniers, had external dimensions of 1000 mm × 1000 mm, the front and back knitting patterns were repeating dot patterns, the dot portion had a diameter of 10 mm, the distance between dots was 50 mm, and the cloth weight was 205 g. As the cushion beads, foam beads of foamed polyethylene, having a foaming ratio of 30 ±3% and a grain size of 4.5 mm ±10% were used.

[0030] The evaluation method is as follows.

(1) (Evaluation 1) Evaluation on Distribution Unevenness of

Cushion Beads inside Inner Bag

<Method>

- The left, right, and central upper ends of the inner bag containing beads evenly flattened were respectively fixed to a vertical wall surface as shown in Fig. 9, and after this state was left for 5 minutes, displacement amount of the beads inside the inner bag was measured.

- Three points at the left end, the right end, and the central portion were measured and it was judged whether the measured results were good (A), not good (B), or bad (C) according to the following criteria.

<Judgment criteria>

The beads displacement amount X of 0 or more and less than 5% with respect to the height L of the inner bag placed vertically was judged as good (A), the beads displacement amount X of 5% or more and less than 10% was judged as not good (B), and the bead displacement amount X of 10% or more was judged as bad (C). The judgment results are shown in Table 1.

[0031] (2) (Evaluation 2) Evaluation on Foldability of Inner Bag

<Method>

The inner bag containing beads evenly flattened was folded into four as shown in Fig. 10, and a plane table was placed

thereon and measurement was performed. The thickness at the corner that was folded twice when the inner bag was folded into four was measured.

<Judgment Criteria>

The thickness X of less than +10% at the corner folded twice when the inner bag was folded into four with respect to a thickness four times the thickness of the inner bag containing beads evenly flattened was judged as good (A), the thickness X of +10% or more and less than +15% was judged as not good (B), and the thickness X of +15% or more was judged as bad (C).

The judgment results are shown in Table 1.

[0032] [Table 1]

	Beads content	Distribution unevenness of beads	Foldability of inner bag
	g/bag		
Evaluation 1	450	C	A
Evaluation 2	460	C	A
Evaluation 3	470	B	A
Evaluation 4	480	A	A
Evaluation 5	490	A	A
Evaluation 6	500	A	B
Evaluation 7	510	A	C

Evaluation 8	520	A	C
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[0033] As is clear from the results shown in Table 1, when the beads content was 480 to 490 g per bag, both of beads distribution unevenness and foldability were judged as good (A).

In each of the bent state, the folded state, and the raised state of the mat according to the present invention when the mat is folded like an envelope to wrap an article, processed into a bag shape to store an article, or half-folded to sandwich an article, the thickness of the beads layer stored in the inner bag does not greatly change, and even after the deaeration, the thickness is maintained substantially constant and the cushioning effect is secured, so that the article can be stably held.

Industrial Applicability

[0034] A packing mat according to the present invention can be widely utilized for transportation of a commodity by a mover company or a home delivery service company, delivery of a commodity from a department store or retail store, transportation of articles and papers between a factory and an office as well as delivery of a commodity from a retail store or a mass retailer to a purchaser, delivery of an article from a user of the article to a repair center so as to repair the

article, return of a repaired product from a repair center to a client.

Reference Signs List

[0035] 1: Outer bag, 1a, 1b: Outer sheet, 2: Inner bag, 3: Cushion beads, 4: Valve, 5: Junction point, 6: Check valve, 7: Air intake valve, 8: Valve cage, 9: Cap, 10: Mat, 11: Outer box, 12: Pump, 13: Handle, 14, 15: Fixing tape, 16: Cover sheet, 17: Flap, M: Article

CLAIMS

1. A packing mat comprising: an outer bag, an inner bag, and cushion beads, wherein

the outer bag is an airtight bag that stores the inner bag, and has a valve,

the valve is a combination of a check valve and an air intake valve,

the check valve opens when a suction force is applied thereto when deaerating the inside of the outer bag, and after the deaeration, closes to block introduction of the outside air into the outer bag,

the air intake valve is opened by a manual operation to introduce the outside air into the deaerated inside of the outer bag,

the inner bag is a stretchable air-permeable bag, and has junction points on upper and lower sheet surfaces forming the bag,

the junction points are portions at which the upper and lower sheet surfaces are joined integrally in minute ranges at regular intervals in the longitudinal and lateral directions across the entire upper and lower sheet surfaces of the inner bag, scattered onto flattened surfaces of the inner bag, and form the sections to confine the cushion beads, the cushion beads are granular bodies having shock-absorbing characteristics, and the cushion beads are filled in the inner bag and a fixed amount of cushion beads is substantially confined in the sections each of which connects several junction points, the inner bag filled with the cushion beads becomes a flat buffer layer with a substantially fixed thickness, and inserted in the outer bag.

2. The packing mat according to Claim 1, wherein the respective junction points are scattered to the respective positions so that the positions deviate from each other longitudinally and laterally on a column to column basis in a matrix with the flattened surfaces of the inner bag, the sections surrounded by four junction points adjacent to each other have a structural body that is substantially independent to

substantially confine the cushion beads in each section connecting the respective junction points.

3. The packing mat according to Claim 1, wherein the sheets of the inner bag are a three-dimensional knit composed of a front knit fabric and a back knit fabric knitted with fiber yarns, and a connecting yarn that connects the knit fabrics.

4. The packing mat according to Claim 1, wherein the cushion beads are pneumatically fed by high-pressure air from an opening provided at a portion of the inner bag and enclosed evenly in sections of each connecting the respective junction points.

5. The packing mat according to any one of Claims 1, 2, 3, and 4, where the packing mat is combined with a cover sheet, wherein the packing mat is layered on the sheet surface of the cover sheet while leaving a portion that serves as a flap of the cover sheet, and the mat is joined to the cover sheet integrally, the cover sheet is half-folded in the inner side to exposed surface of the packing mat, and both side edges are joined or sealed so as to become openable and closable, wherein the combination of the packing mat, and the half-folded cover sheet forms the bag, and the flap of the cover sheet becomes a lid that closes an opening of the bag.