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PROTECTIVE MULTI-UNIT PACKAGING ARRANGEMENT

Background of the Invention

The present invention relates to a protective multi-unit packaging arrangement for packaging together plural objects to be packaged each of which is formed nearly in the shape of a rectangular parallelepiped such as an external storage unit of a computer.

Description of the Related Art

In order to transport efficiently and safely an external storage unit of a computer and the like, a protective multi-unit packaging arrangement has been used, and an existing example of such a protective multi-unit packaging arrangement is shown in Figs. 8 to 11.

In Figs. 8 to 11, a protective multi-unit packaging arrangement 30 is composed of a packaging box 31 and a pair of upper and lower buffer cases 32 to be accommodated in the packaging box 31. Plural hollows 33 into which the upper and the lower end part of an external storage unit 7 placed long sideways are respectively inserted are provided in the faces of the respective buffer cases opposite to each other. These hollows 33 are provided in the left and right spaces which have a central partition wall as a boundary between them, and five hollows 33 are provided in parallel with one another in each of the spaces. An adjacencies partition wall 35 is provided projectingly between the hollows 33 adjacent to each other. And side walls 36 are provided all around a group of these

hollows 33, and the thickness dimensions D3 and D4 of the side walls 36 are set at dimensions enough to protect performance of the external storage unit 7 against a shock in a horizontal direction in a packaged state.

A plurality of shock absorbing projection parts 37 are provided on the face reverse to a face of the respective buffer cases 32 in which face the hollows 33 are provided, and these shock absorbing projection parts 37 are made so as to have a height H enough to protect performance of the external storage unit 7 in a packaged state against a shock in the vertical direction.

In the above-mentioned composition, the lower buffer case 32 is inserted into the packaging box 31 whose bottom part has been sealed. The lower end part of an external storage unit unit 7 is covered with an antistatic bag 11 and fittingly inserted into each hollow 33 of the lower buffer case 32. After an external storage unit unit 7 has been inserted into each of the hollows 33, the upper buffer case 32 is inserted into the packaging box 31 and the upper end part of each external storage unit unit 7 is inserted into each of the hollows 33. The packaging is completed by sealing the top part with an adhesive tape or the like after folding upper flaps 31a of the packaging box 31.

In a protective multi-unit packaging arrangement 30 packaged in such a way, a shock in the vertical direction is absorbed by the shock absorbing projection parts 37, and a shock in a horizontal direction is absorbed by the surrounding side walls 36. And the

external storage unit units 7 adjacent to each other are prevented by the adjacencies partition wall 35 from colliding with each other.

However, according to the above-mentioned existing example, although the external storage unit units 7 adjacent to each other are prevented from colliding with each other by providing the adjacencies partition wall 35 between the hollows 33 adjacent to each other, it is not possible to make small the package by making the partition walls thin due to a problem of strength of the buffer material and its formability. Namely, the buffer case 32 is formed out of a buffer material such as foam styrene, and thickness of some degree (about 10 millimeters) is needed in order to obtain a desired strength with a buffer material which is weak in strength. And in case of molding the buffer case 32 by filling up a mold with the buffer material, since a failure of filling up happens when there is a narrow space in the space to be filled up, the adjacencies partition wall 35 needs to have thickness of some degree (about 10 millimeters). From the above description, the thickness T of the adjacencies partition wall 35 becomes thick and the buffer case 32 is made large-sized so much. A disadvantage of increase in consumption of packaging materials, cost of packaging materials, cost of transportation, and the like has been caused by that the buffer case 35 is larged-sized.

Summary of the Invention

Thus, it is an object of the present invention to overcome the drawbacks of the related art.

It is a further object of the invention to provide a protective multi-unit packaging arrangement in which a pair of buffer cases are made compact and durable offering a high degree of secure containment during shipping of a packaged article.

According to one aspect of the invention there is provided a protective multi-unit packaging arrangement; comprising: a pair of upper and lower buffer cases made of a buffer material and being so configured as to include; vertical posture hollows into which both upper and lower end portions of an object to be packaged in a vertical posture are inserted; horizontal posture hollows into which both upper and lower end portions of said object to be packaged in a horizontal posture are inserted alternately in parallel with one another in opposingly arranged faces of said buffer cases; said vertical posture hollow of each of said buffer cases being depressed more deeply than said horizontal posture hollow, and by making it depressed more deeply, makes a holding face for holding said object to be packaged nearly in the shape of a rectangular parallelepiped; said horizontal posture hollow of each of said buffer cases projecting longer in both the left and right directions than said horizontal posture hollow, so as to establish a holding face for holding said object to be packaged having a substantially rectangular parallelepiped configuration; and a gap defined between adjacent portions of said vertical posture hollow and said horizontal posture hollow.

According to another aspect of the invention, there is provided a protective packing shell unit so configured as to secure a plurality of manufactured articles formed as like dimensioned parallelepiped units fittingly inserted therein in a mutually stationary condition, comprising: a packing shell having a first surface formed with a plurality of insert recesses including lateral insert recesses proportioned for snugly receiving an axial end of one of the parallelepiped units and second vertical insert recesses proportioned so as to snugly receive a lateral side of one of the parallelepiped units; the vertical insert recesses of the packing shell being defined into the first surface more deeply than the lateral insert recesses; the lateral and vertical insert recesses being adjacently formed in parallel with each other such that facing sides of two of the parallelepiped units axially inserted into two of the vertical insert recesses are retained in a predetermined spaced apart relationship suitable to act as holding faces for an interposed one of the units laterally inserted into an intervening lateral insert recess and wherein, conversely; facing sides of two of the parallelepiped units laterally inserted into two of the lateral insert recesses are retained in a predetermined spaced apart relationship suitable to act as holding faces for an interposed one of the units axially inserted into an intervening vertical insert recess, the holding faces thus formed extending to a greater lateral dimension at both sides of facing sides of the axially inserted unit; and partitioning means defining a predetermined space

between each of the adjacent lateral and vertical insert recesses.

Brief Description of the Drawings

Fig. 1 is an exploded perspective view of a protective multi-unit packaging arrangement according to a first preferred embodiment according to the invention;

Fig. 2 is a perspective view of a buffer case according to a first preferred embodiment according to the invention;

Fig. 3 is a perspective view of a buffer case according to a first preferred embodiment according to the invention;

Fig. 4 is a plan view of a buffer case according to a first preferred embodiment according to the invention;

Fig. 5 is a sectional view taken along line A-A of Fig. 4 according to a first preferred embodiment according to the invention;

Fig. 6 is a sectional view taken along line B-B of Fig. 4 according to a first preferred embodiment according to the invention;

Fig. 7 is an exploded perspective view of a protective multi-unit packaging arrangement according to a second preferred embodiment of the invention;

Fig. 8 is an exploded perspective view of a protective multi-unit packaging arrangement according to the related art;

Fig. 9 is a perspective view of a buffer case according to the related art;

Fig. 10 is a perspective view of a buffer case according to the related art; and

Fig. 11 is a plan view of a buffer case according to the related art.

Description of the Preferred Embodiment

Embodiments of the invention are described in the following with reference to the drawings. Figs. 1 to 6 show a first embodiment of the invention, and a protective multi-unit packaging arrangement 1 of the first embodiment shows a case where it is applied to such an object to be packaged as an external storage unit of a computer (such as a CD-ROM drive unit, a FD (floppy disk) drive unit, or the like).

Fig. 1 shows an exploded perspective view of the protective multi-unit packaging arrangement 1. In Fig. 1, the protective multi-unit packaging arrangement 1 is composed of a packaging box 2 and a pair of upper and lower buffer cases 3 to be accommodated in this packaging box 2. The packaging box 2 is made of corrugated cardboard, and is composed so that its top face may be closed by folding upper flaps 2a at its upper part. The one pair of upper and lower buffer cases 3 are formed out of a buffer material such as foam styrene for example, and the pair of buffer cases 3 of the first embodiment are respectively formed in the same shape as each other.

Figs. 2 and 3 show perspective views of the buffer case 3, Fig. 4 shows a plan view of it, Fig. 5 shows a sectional view taken along line A-A of Fig. 4, and Fig. 6 shows a sectional view taken along line B-B of Fig. 4.

In Figs. 2 to 6, a integrally molded plurality of adjacent vertical posture hollows 4 and horizontal posture hollows 5 are provided in facing surfaces of each buffer case 3. The vertical posture hollows 4 and the horizontal posture hollows 5 are arranged in two rows in on either side of a central partition wall 6 forming a boundary between them. The vertical posture hollows 4 and the horizontal posture hollows 5 are alternately provided in parallel with one another on each side of the partition wall 6. According to the present embodiment, five adjacent hollows 4, 5, are provided in each row.

The vertical posture hollow 4 is set at a size fit for inserting one of the upper and lower end parts of an external storage unit 7 in a vertical posture into it. The horizontal posture hollow 5 is set at a size fit for inserting one of the upper and lower end parts of an external storage unit 7 in a horizontal posture into it.

And the vertical posture hollow 4 is made so as to be depressed more deeply than the horizontal posture hollow 5, and a holding face 4a for holding the external storage unit 7 in a vertical posture is made by making it depressed more deeply. The horizontal posture hollow 5 is made so that it may projectingly extend longer in both the left and right directions than the vertical posture hollow 4, and a holding face 5a for holding the external storage unit 7 in a horizontal posture is made by making it extend longer in the left and right directions.

A space including a minute gap t in addition to the holding faces 4a and 5a is formed between the vertical posture hollow 4 and the horizontal posture hollow 5 adjacent to each other. In this first embodiment, the gap t is set at about 1 to 3 millimeters.

And side walls 8 are provided all around a group of these vertical posture hollows 4 and the horizontal posture hollows 5, and the thickness dimensions D1 and D2 of the side walls 8 are set at dimensions enough to protect performance of the external storage units 7 in a packaged state against a shock in a horizontal direction. And relieving hollows 9 for reducing an amount of material are respectively provided in the parts of the central partition wall 6 and the side walls 8 which parts are located at both outsides of the vertical posture hollows 4 and in the bottom parts of the horizontal posture hollows 5

On the other hand, as shown in detail in Figs. 3 and 5, shock absorbing projection parts 10 are provided at plural positions on the other face reverse to one face of each buffer case 3 provided with the vertical posture hollows 4 and the horizontal posture hollows 5. Each of these shock absorbing projection parts 10 is projectingly provided mainly on a part other than a part corresponding to the bottom part of a vertical posture hollow 4 and is projectingly provided partially also on a part corresponding to the bottom part of the vertical posture hollow 4 in order to prevent breakage caused by a shock. However, the whole shock absorbing projection part 10 may be projectingly provided on a

part other than a part corresponding to the bottom part of a vertical posture hollow 4. The shock absorbing projection part 10 is set so as to have a height H enough to protect performance of the external storage unit 7 in a packaged state against a shock in the vertical direction.

In the above-mentioned composition, the lower buffer case 3 is inserted into the packaging box 2 whose bottom part has been sealed. The lower end part of an external storage unit 7 in a vertical posture covered with an antistatic bag 11 is inserted into each vertical posture hollow 4 of the lower buffer case 3, and the lower end part of an external storage unit 7 in a horizontal posture covered with an antistatic bag 11 is inserted into each horizontal posture hollow 5 of the lower buffer case 3. After external storage units 7 have been inserted into all of the vertical posture hollows 4 and the horizontal posture hollows 5, the upper buffer case 3 is inserted into the packaging box 2 and the upper end part of each external storage unit 7 in a vertical posture is inserted into each of the vertical posture hollows 4 of the upper buffer case 3, and the upper end part of each external storage unit 7 in a horizontal posture is inserted into each of the horizontal posture hollows 5. The packaging is completed by sealing the top part with an adhesive tape or the like after folding upper flaps 2a of the packaging box 2.

In the above-mentioned packaging process, since external storage units 7 which are set alternately in a vertical posture and in a horizontal posture are inserted

by stages into the upper buffer case 3 when covering the external storage units 7 with the upper buffer case 3, the inserting operation is easy.

In a protective multi-unit packaging arrangement 1 packaged in this way, a shock in the vertical direction is absorbed by the shock absorbing projection parts 10, and a shock in a horizontal direction is absorbed by the surrounding side walls 8. The external storage units 7 arranged at the left and right sides of the central partition wall 6 making a boundary between them do not collide with each other thanks to the central partition wall 6.

Assuming that length of the external storage unit 7 is L and its width is W ($W < L$), an external storage unit 7 in a vertical posture is held by a holding face 4a vertically in a range of $(L - W)/2$, and an external storage unit 7 in a horizontal posture is held by a holding face 5a horizontally in a range of $(L - W)/2$. Therefore, the external storage units 7 adjacent to each other do not collide with each other only if they have a minute gap t between them.

Here, when comparing a buffer case 32 of an existing example and a buffer case 3 of the first embodiment with each other, in case that they have the side walls 8 equal in thickness to each other, the buffer case 3 of the first embodiment can be made smaller by $4(T - t)$ in the horizontal direction where T is thickness of the existing adjacencies partition wall 35. And if the first embodiment and the existing example have the same dimensions in thickness of the side walls 8 and

thickness of the central partition wall 6 (the thickness between the horizontal posture hollows 5) as each other, they have the same size in the longitudinal direction as each other. Furthermore, since the shock absorbing projection part 10 of the buffer case 3 of the first embodiment is projectingly formed on a part other than a part corresponding to the bottom part of the vertical posture hollow 4, namely, on a part corresponding to the bottom part of the horizontal posture hollow 5, the buffer case 3 of the first embodiment becomes also the same in height as the existing buffer case. Namely, the present invention can make a buffer case be the same as the existing buffer case 3 in the length and height directions and be smaller than the existing buffer case 3 in the width direction.

Fig. 7 shows an exploded perspective view of a protective multi-unit packaging arrangement 15 of a second embodiment. Although in a protective multi-unit packaging arrangement 15 of the first embodiment a pair of buffer cases 3 are designed so that the external storage units 7 are difficult to be broken even if they are dropped in any direction of the six faces, in a protective multi-unit packaging arrangement 15 of the second embodiment a pair of buffer cases 17 and 18 are designed so as to cope with only bottom-down dropping on the assumption that it is transported in a palletized state (where the bottom is always positioned down) without fail.

In Fig. 7, the same symbols are given to the same components as the protective multi-unit packaging arrangement 1 of the first embodiment and explanation about them are omitted, and only components different from those of the first embodiment are explained.

The protective multi-unit packaging arrangement 15 is composed of a packaging box 16 and a pair of upper and lower buffer cases 17 and 18 to be accommodated in the packaging box 16. Upper flaps 16 of the packaging box 16 are made to hold the upper buffer case 18 only so as not to slip up out of the packaging box 16. The upper and lower buffer cases 17 and 18 of one pair are composed differently from each other, and the lower buffer case 17 is made much thinner in thickness of the surrounding side walls 19 in comparison with that of the said first embodiment. the upper buffer case 18 is made much thinner in thickness of the surrounding side walls 20 in comparison with that of the said first embodiment and is not provided with shock absorbing projection parts on its upper face. Namely, since it will do to cope with only bottom-down dropping, a buffer material has been reduced in the front and rear parts, the left and right parts, and the upper part.

Although in the above-mentioned embodiments a case has been shown where an external storage unit 7 is an object to be packaged, the invention can be applied to any object to be packaged which is nearly in the shape of a rectangular parallelepiped.

According to the present invention as described above, a protective multi-unit packaging arrangement of the invention has a pair of upper and lower buffer cases made of a buffer material; provides vertical posture hollows into which both the upper and lower end parts of an object to be packaged in a vertical posture which object is nearly in the shape of a rectangular parallelepiped are inserted and horizontal posture hollows into which both the upper and lower end parts of an object to be packaged in a horizontal posture which is nearly in the shape of a rectangular parallelepiped are inserted, alternately in parallel with one another in the faces of these buffer cases which faces are opposite to each other; makes said vertical posture hollow of each of said buffer cases depressed more deeply than said horizontal posture hollow, and by making it depressed more deeply, makes a holding face for holding said object to be packaged nearly in the shape of a rectangular parallelepiped; makes said horizontal posture hollow of each of said buffer cases projectingly extend longer in both the left and right directions than said horizontal posture hollow, and by making it extend longer in the left and right directions, makes a holding face for holding said object to be packaged nearly in the shape of a rectangular parallelepiped; and makes a space including a gap in addition to said holding faces between said vertical posture hollow and said horizontal posture hollow adjacent to each other; and therefore, an adjacencies partition wall as required up to now does not need to be

provided between the vertical posture hollow and the horizontal posture hollow, and since it will do to provide only a minute gap instead of the adjacencies partition wall, the invention brings an effect that it is possible to make a pair of buffer cases compact and reduce consumption of packaging materials, cost of packaging materials, cost of transportation, and the like.

What is Claimed:

1. A protective multi-unit packaging arrangement; comprising:

a pair of upper and lower buffer cases made of a buffer material and being so configured as to include;

vertical posture hollows into which both upper and lower end portions of an object to be packaged in a vertical posture are inserted;

horizontal posture hollows into which both upper and lower end portions of said object to be packaged in a horizontal posture are inserted alternately in parallel with one another in opposingly arranged faces of said buffer cases;

said vertical posture hollow of each of said buffer cases being depressed more deeply than said horizontal posture hollow, and by making it depressed more deeply, makes a holding face for holding said object to be packaged nearly in the shape of a rectangular parallelepiped;

said horizontal posture hollow of each of said buffer cases projecting longer in both the left and right directions than said horizontal posture hollow, so as to establish a holding face for holding said object to be packaged having a substantially rectangular parallelepiped configuration; and

a gap defined between adjacent portions of said vertical posture hollow and said horizontal posture hollow.



2. A protective multi-unit packaging arrangement as set forth in claim 1, wherein a shock absorbing projection part formed projectingly on a portion other than a portion which corresponds to a bottom portion of said vertical posture hollow is provided on a face reverse to a face of each of said buffer cases in which face said vertical posture hollows and said horizontal posture hollows are provided.

3. A protective multi-unit packaging arrangement as set forth in claim 1, wherein said horizontal and vertical posture hollows of said packaging arrangement are configured so as to retain a plurality of substantially rectangular objects.

4. A protective multi-unit packaging arrangement as set forth in claim 1, wherein said pair of buffer cases of said packaging arrangement are configured to enclose said objects arranged in two adjacent groups arranged parallel to one another.

5. A protective multi-unit packaging arrangement as set forth in claim 1, further including an enclosing box for snugly encasing said pair of buffer cases.

6. A protective multi-unit packaging arrangement as set forth in claim 1, wherein said pair buffer cases are formed of stearol.



7. A protective packing shell unit so configured as to secure a plurality of manufactured articles formed as like dimensioned parallelapied units fittingly inserted therein in a mutally stationary condition, comprising:

a packing shell having a first surface formed with a plurality of insert recesses including lateral insert recesses proportioned for snugly receiving an axial end of one of said parallelapied units and second vertical insert recesses proportioned so as to snugly receive a lateral side of one of said parallelapied units;

said vertical insert recesses of said packing shell being defined into said first surface more deeply than said lateral insert recesses;

said lateral and vertical insert recesses being adjacently formed in parallel with each other such that facing sides of two of said parallelapied units axially inserted into two of said vertical insert recesses are retained in a predetermined spaced apart relationship suitable to act as holding faces for an interposed one of said units laterally inserted into an intervening lateral insert recess and wherein, conversely;

facing sides of two of said parallelapied units laterally inserted into two of said lateral insert recesses are retained in a predetermined spaced apart relationship suitable to act as holding faces for an interposed one of said units axially inserted into an intervening vertical insert recess, said holding faces thus formed extending to a greater lateral dimension at both sides of facing sides of said axially inserted unit; and



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partitioning means defining a predetermined space between each of said adjacent lateral and vertical insert recesses.

8. A protective packing shell unit as set forth in claim 7, wherein said packing shell is formed of a resilient force absorbing material and said receiving recesses are dimensioned so as to frictionally engage contacted side of said parallelepiped unit when inserted thereinto.

9. A protective packing arrangement as set forth in claim 7, wherein a bottom surface of each of said lateral insert recesses of said packing shell includes a deeper recessed concave portion defined therein.

10. A protective packing arrangement as set forth in claim 7, wherein portions of said packing shell unit which define side walls at each longitudinal end of each vertical insert recess are formed with a corresponding concave portion formed in said first surface.

11. A protective packing arrangement as set forth in claim 7, wherein said packing shell unit is formed of stearyl.

12. A protective packing arrangement as set forth in claim 7, wherein a pair of said packing shells in a facing condition of said first surface are utilized for retaining said parallelepiped units.

