Dunnage for storing and handling parts, such as automotive steering wheels, comprises identical vacuum-formed dunnage sections having tapering walls enabling the sections to be nested in each other. Sections may also be stacked upon each other and are provided with parts receiving pockets whereby when the sections are stacked to form a closed container, the pocket in the stacked sections cooperatively hold the parts separated from each other, thereby avoiding damage to the parts. Two or more of the dunnage containers may be stacked on each other and projections and cavities on the stacked containers interfit to prevent lateral movement and collapse of the stack.
NESTABLE AND STACKABLE DUNNAGE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] In the manufacture of automotive vehicles, and possibly in other industries as well, parts are shipped to the vehicle manufacturers who insert them into the vehicles as they pass down an assembly line. The parts are shipped from the parts suppliers to the vehicle assembly plant in dunnage which is filled by the parts supplier. The dunnage is intended to protect the parts during shipment and storage prior to installation in the vehicles. As the dunnage is emptied, it must be set aside and this causes disposal problems resulting in scraping the dunnage because of the space required for storage or shipment back to the supplier. Similarly, considerable space is required for storage of the dunnage prior to use at the parts supplier or subsequent to use at the assembly plant.

[0003] Similarly, when parts are delivered to the vehicle assembly plant, they must be stored prior to use and this imposes further requirements on the supplier to either find storage space for the dunnage containing the parts, or time the delivery accurately in accordance with the manufacturer’s needs.

[0004] Accordingly, the need has arisen for a more economical handling of parts contained in dunnage or handling of the dunnage itself during use and prior to or after use, so that a minimum of space is required at the parts supplier and at the vehicle manufacturer.

[0005] In addition to the foregoing, there has been a need for a more economical form of dunnage, which if to be discarded after use does not result in substantial financial loss. Similarly, after use of the dunnage, it would be desirable to be able to return the dunnage to the parts supplier for re-use or disposal as desired. This would appear only to be feasible if after use the dunnage can be very easily stored in a compact manner thereby resulting in substantial space-saving until it can be disposed of or when disposed of, may even be shipped back to the parts supplier for re-use.

[0006] These requirements for handling the dunnage and storage of the parts has presented a long-term challenge for industry which are at least in part met in the following disclosure.

[0007] 2. Background Art

[0008] The following U.S. patents show the state of the art relating to dunnage-like products:

[0009] U.S. Pat. No. 3,376,046
[0010] U.S. Pat. No. 4,557,382
[0012] U.S. Pat. No. 4,779,732
[0013] Re. 33,361
[0014] U.S. Pat. No. 5,046,615
[0015] U.S. Pat. No. 5,324,105
[0016] U.S. Pat. No. 5,409,110
[0017] U.S. Pat. No. 5,887,718

SUMMARY OF THE INVENTION

[0018] As herein disclosed, the dunnage is made up of identical vacuum-formed plastic sections that may be nested in one another when not in use, thereby occupying a minimum of space, and yet may be inverted and stacked on one another to form a closed container for receiving and holding parts to be stored and transported. The design of the plastic sections is such that the closed containers may themselves be stacked, such as three containers high, thereby facilitating the storage of parts waiting to be removed and put to use. The plastic sections have projections and recesses which interfit when the closed containers are stacked, thereby preventing the stacked containers from lateral displacement and collapse of the closed container stack.

[0019] The individual plastic sections may have pockets formed therein for receiving parts to be handled, and when two plastic sections are in stacked alignment they cooperatively hold the parts for storage and shipment. The plastic sections may have projections that interfit in recesses or cavities in opposed sections to keep the stacked sections in proper alignment so that the sections will cooperatively hold the parts against any applicable movement relative to the dunnage. The projections or pockets may also have surfaces which are treated to prevent scratching or damage to the surfaces of the parts stored in the dunnage. Such treatment may comprise adhering foam strips for other non-scratching material to surfaces of the wall portions or pockets.

[0020] Thus, my design of the identical nestable and stackable dunnage enables the dunnage sections to:

[0021] (1) be nested one within another so that a substantial number may be stored in a small space;
[0022] (2) dunnage sections may be inverted and stacked on one another to form a closed container;
[0023] (3) the closed containers with products stored therein may be stacked on one another to minimize the space required for storage of products; and
[0024] (4) eliminates the need for an external container.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. 1 is a perspective view of the outside of one of the dunnage sections;
[0026] FIG. 2 is a perspective view of the inside of the dunnage section shown in FIG. 1;
[0027] FIG. 3 is a perspective view of two of the dunnage sections of FIGS. 1 and 2 wherein one of the sections is inverted and stacked on the other to form a closed parts-receiving container;
[0028] FIG. 4 is a perspective view of two of the dunnage containers of FIG. 2 stacked on top of each other;
[0029] FIG. 5 is a perspective view showing two dunnage sections in registry and how an automotive steering wheel, for example, would be packaged between them;
[0030] FIG. 6 is a top view of the outside of a dunnage section;
[0031] FIG. 7 is a side elevation of a dunnage compartment formed by stacking two dunnage sections;
[0032] FIG. 8 is an end elevation of a dunnage compartment as shown in FIG. 7;
[0033] FIG. 9 is a side elevation as in FIG. 7 but stacked two containers high;
[0034] FIG. 10 is a cross-sectional view taken on the line 10-10 of FIG. 3;
[0035] FIG. 11 is a cross-sectional view taken on the line 11-11 of FIG. 3;
[0036] FIG. 12 is a cross-sectional view through the dunnage sections disposed in nested relation; and
Fig. 13 is a cross-sectional view taken along a vertical plane 13-13 extending through the dunnage sections between the end walls.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

In FIG. 3 I have shown my dunnage in the form of a closed container or parts receiving enclosure 20a made up of two identical dunnage sections 22 and 24 arranged in stacked relationship. In FIG. 4 I have shown two of the closed containers 20b and 20c stacked on one another. In use, the containers may be stacked three or more high as requested by the user.

Preferably, the dunnage sections are vacuum-formed of plastic, such as high weight molecular polyethylene. As shown in FIG. 2, each section has substantially identical opposed inwardly tapering side walls 28 and 30, opposed substantially identical inwardly tapering end walls 32 and 34, and a bridging wall 36 extending between the inwardly tapering ends of the side and end walls. An integral peripheral flange 38 extends around the outer ends of the side and end walls.

Each side wall is shaped to provide a succession of outwardly projecting portions in the form of nine identical ribs, with the ribs on one side wall being directly opposite the ribs on the opposite wall. Thus, the ribs on side wall 28 are identified by reference numerals 40, 42, 44, 46, 48, 50, 52, 54 and 56, and the ribs on side wall 30 being directly opposite are identified by reference numerals 58, 60, 62, 64, 66, 68, 70, 72 and 74. The inside of the ribs form pockets 76 as shown in FIGS. 2 and 5 for receiving the products to be handled by the dunnage, such as automotive steering wheels 78.

To protect the steering wheels from being scratched by the dunnage, a thin strip of foam rubber or the like 80 may be adhered to the inside of each pocket, as shown in FIG. 5, which is in contact with the dunnage. From FIG. 5 it may be noted that the dunnage section 20c substantially encloses the lower half of the steering wheel. Upon inverting another section of the dunnage such as section 20b, it may be placed over the upper half of the steering wheel and when moved downwardly so that the flanges 38a and 38b of the two sections are brought into flush engagement, the steering wheel is supported in spaced relation at the top and bottom out of engagement with other steering wheels in the dunnage.

To further prevent movement of the steering wheels, the bridging wall 36 may be provided with a series of inward projections best shown in FIGS. 1, 4, 6 and 13, at 80, 82, 84, 86, 88, 90, 92, 94 and 96. The exposed surface of each such projection, which might come into contact with the parts being stored, is also covered with a thin layer of foam rubber such as at 98 (see FIG. 10) to prevent scratching of the steering wheels.

Relative lateral movement between the dunnage sections when in the stacked condition shown in FIG. 3 is prevented by interlocking projections 102a and 102b fitting into cavities 100a and 100b on opposite edges of opposed dunnage sections on the flanges 38, as shown in FIGS. 5, 6, 7 and 9. The cavities and projections are arranged in the flanges in opposition as best shown in FIG. 6. When the dunnage sections are stacked with the bridging walls in flush opposition as shown in FIGS. 4 and 9, relative lateral movement is prevented by a series of projections 104a of the bridging wall of one dunnage section received in cavities 104b of the opposite dunnage section as shown in FIGS. 2, 3, 6 and 10 arranged in rows on opposite sides of the projections 80-94. The interlocking of projections on one dunnage section in the cavities or recesses in an opposed dunnage section serves to prevent both longitudinal and lateral relative movement between opposed dunnage sections, and enables stability in the closed container shown in FIG. 3 and in the stacked arrangement of FIG. 4.

The dunnage sections can be nested as shown in FIG. 12 for storage purposes. In such nested relation several dunnage sections may be stored in a relatively small space.

When desired for use with parts to be handled, the dunnage sections can be removed from the nested relation and one section filled with the parts, as in FIG. 5, and once filled, a second dunnage section may be inverted and placed on top of the previously filled section with the parts interfitting with the pockets 76 as the dunnage container is closed by the dunnage sections as in FIGS. 3 and 5.

As mentioned previously, the closed dunnage containers may be stacked one atop another as in FIG. 4 for storage or transport.

While I have shown the dunnage designed for reception and handling of automotive steering wheels, the dunnage may be designed for a variety of parts, particularly parts whose shape lends them to be stored by interfitting with identical dunnage sections.

FIGS. 5 and 7 illustrate how projections 102a and 102b along opposite edges of a dunnage section interfit with cavities 100a in opposite edges of another identical dunnage section.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

What is claimed is:
1. Nestable and stackable dunnage for receiving and holding products for transport and storage comprising:
   a plurality of identical dunnage sections having opposed inwardly tapering side walls, opposed inwardly tapering end walls, and a bridging wall extending between the inwardly tapering ends of the side and end walls; said walls having opposed product receiving pockets; projections and cavities on said dunnage sections for engaging each other when one dunnage section is inverted and stacked on another, to hold the dunnage and in turn said pockets in registered alignment; and when the dunnage sections are in said alignment, said pockets cooperate at spaced apart locations to hold products in said pockets out of contact with one another.
2. The invention defined by claim 1 wherein upon removal of products from the dunnage sections, one section may be inverted and placed within another section in nested relation.
3. The invention defined by claim 1 wherein there are projections and cavities on the bridging wall for holding dunnage sections in alignment when the sections are stacked with the bridging walls in immediate confronting relation.
4. The invention defined by claim 1 wherein there is a peripheral flange extending around the dunnage section at the wider end of said walls and there are cavities and projections in said flange at opposite sides of the dunnage section for cooperation with corresponding opposed flanges on another dunnage section when the sections are in stacked relation.
5. Nestable and stackable dunnage for receiving and holding parts for transport and/or storage comprising:
- a plurality of identical dunnage sections having opposed inwardly tapering side walls, opposed inwardly tapering end walls, and a bridging wall extending between the inwardly tapering ends of the side and end walls;
- said walls having opposed inwardly opening parts receiving pockets whereby, when one dunnage section is inverted and stacked on another dunnage section, product receiving pockets may embrace upper and lower portions of parts to be handled; and
- projections and cavities on said dunnage sections for engaging each other when the sections are in the aforementioned stacked relation to hold the dunnage sections against relative movement.

6. Nestable and stackable dunnage for receiving and holding parts for transport and storage comprising:
- a plurality of identical dunnage sections having opposed inwardly tapering side walls, opposed inwardly tapering end walls, and a bridging wall extending between the inwardly tapering ends of the side and end walls;
- said side walls having opposed inwardly opening parts receiving pockets whereby when one dunnage section is inverted and stacked on another dunnage section forming a parts receiving enclosure, the parts receiving pockets within the enclosure embrace spaced apart portions of the parts to be handled;
- said bridging walls having projections and cavities for engagement with corresponding cavities and projections when one parts enclosure is stacked on another parts enclosure with the bridging walls in flush engagement; whereby said projections and cavities hold the dunnage sections against lateral movement; and
- said dunnage sections being nestable, one within another, when one dunnage section is inverted and stacked within another dunnage section.

7. Nestable and stackable dunnage for receiving and holding parts for transport and storage comprising:
- a plurality of identical dunnage sections having opposed inwardly tapering side walls, opposed inwardly tapering end walls, and a bridging wall extending between the inwardly tapering ends of the side and end walls;
- said side walls having opposed inwardly opening parts receiving pockets whereby when one dunnage section is inverted and stacked on another dunnage section forming a parts receiving enclosure, the parts receiving pockets within the enclosure embrace spaced apart portions of the parts to be handled; and
- said dunnage sections being nestable one within another when one dunnage section is inverted and stacked within another dunnage section.

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