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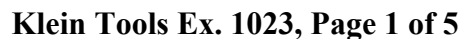
(57) **ABSTRACT**

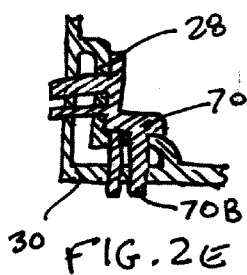
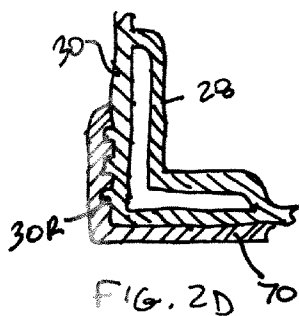
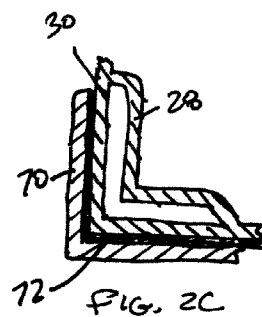
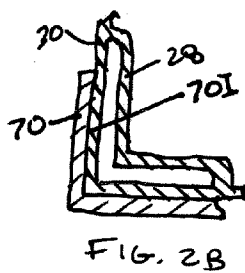
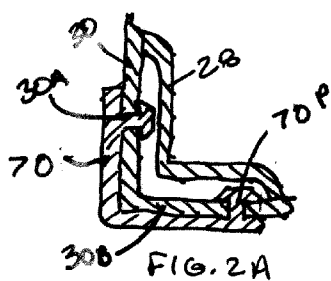
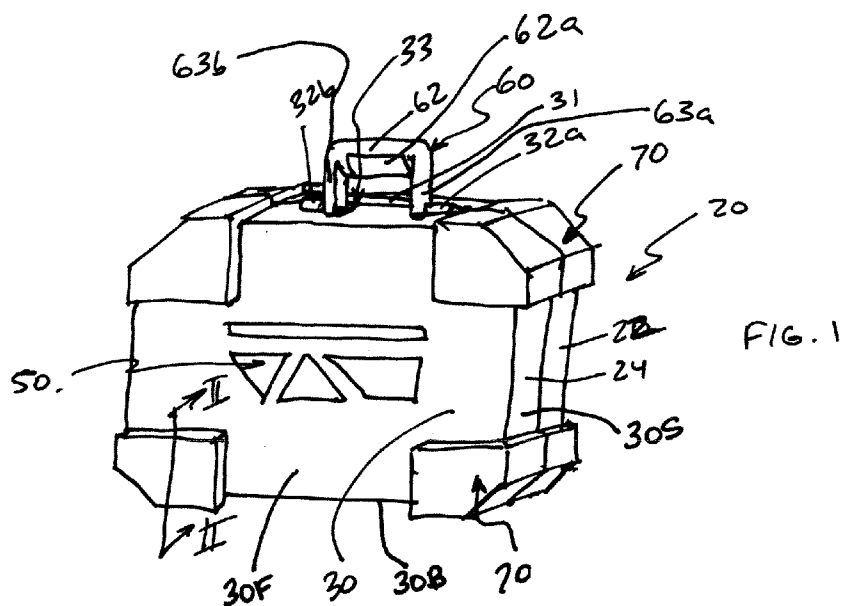
A carrying case for carrying a portable electric power tool may have a container and a cover pivotably attached to the container. The container and/or cover may have an outer wall. A bumper may be mounted to the container and/or cover, and preferably to the outer wall thereof. A handle may be connected to the container and/or cover. The bumper serves to cushion an impact load exerted on the case if the case is dropped in an orientation in which the case strikes a hard surface.

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Related U.S. Application Data

(60) Provisional application No. 60/751,517, filed on Dec. 19, 2005.





CARRYING CASE

FIELD

[0001] This specification relates to carrying cases and more specifically to blow-molded carrying cases for power tools and other products.

BACKGROUND

[0002] Blow molding is a well-known fabrication method for thermoplastic components. The process generally involves the molding of a hollow tube, or "parison," of molten thermoplastic, that is lowered from an overhanging extrusion head to a position between halves of a reciprocating mold. As the mold halves close, air or some other gas is injected into the parison; the increase in air pressure within the parison caused by such injection forces its walls into the contours of the cavities of the mold halves and thus forms the parison into a desired molded shape. The resulting component has molded walls that surround a hollow chamber. Blow molding has proven to be particularly popular for the production of large parts that would require unduly large molding injection molding machines.

[0003] One type of blow molding that has been used successfully for large components that require structural rigidity is the so-called "double-walled" blow molding process. In this process, mold halves are most often designed as distinct core and cavity halves (rather than as two cavities, as would be the case for blow-molded bottles or other containers). The core portion of the core mold half extends within the cavity as the mold halves close. In addition, the mold halves for double-walled components are configured so that the molded components have "full-perimeter flash"; i.e., after molding the component has excess material, or "flash", around the perimeter defined by mating surfaces of the mold halves. This contrasts with single-walled components, in which the parison is inflated entirely within closed mold cavities, and the molded component has flash only on its top and bottom portions. Blow-molded components have distinct inner and outer walls that surround a hollow space, with the inner wall having been formed by the core and the outer wall having been formed by the cavity, with the inner and outer walls being separated by the weld line remaining after the flash is removed. In a typical double-walled component the inner and outer walls are positioned proximate to one another and can have "pinched-off" areas, in which the inner and outer walls are contiguous.

[0004] One distinct advantage provided by double-walled blow-molded components is the capability for adjacent regions of the inner and outer walls to differ significantly in their localized contour. For example, a region of the outer wall may have a relatively flat profile, while the adjacent region of the inner wall can contain numerous projections, recesses, and the like, with the profile of either localized region failing to impact significantly the appearance or structural integrity of the other. Such differences in localized inner and outer wall contour are less likely to be successfully achieved in injection-molded components because the inclusion of substantial detail in the inner wall can have a deleterious effect on the dimensional stability, appearance, and even strength of the outer wall. Another performance advantage conveyed by double-walled components stems from the formation of the hollow chamber within the inner

and outer walls, as it can provide an air cushion that protects items contacting the inner wall.

[0005] For these reasons, double-walled components have proven to be particularly popular for protective containers and carrying cases. Detailed-contour that mates with, matches, supports, or captures portions of an item, such as a power tool or instrument or item used in jobsites, to be carried within the carrying case can be included in the inner wall of the double-walled component even as the outer wall has a generally flat, appearance-sensitive surface. Further, the air cushion between the inner and outer walls helps to protect the item. Thus, the container has the detail and structure necessary to support, transport and protect the item and also provides the desired aesthetic appeal, and does so without the manufacturer having to produce two separate inner wall and outer wall parts.

SUMMARY

[0006] A carrying case for carrying a portable electric power tool is disclosed. Such case may have a container and a cover pivotably attached to the container, at least one of the container and cover having an outer wall, a bumper mounted to at least one of the container and cover, and preferably to the outer wall, and a handle connected to at least one of the container and cover, wherein the bumper serves to cushion an impact load exerted on the case if the case is dropped in an orientation in which the case strikes a hard surface. The handle may be pivotally connected to at least one of the container and cover. The outer wall may have a front, bottom and side surfaces. The bumper may be mounted to at least one of the front, bottom and side surfaces.

[0007] Additional features and benefits of the present invention are described, and will be apparent from, the accompanying drawings and the detailed description below.

BRIEF DESCRIPTION OF THE FIGURES

[0008] The accompanying drawings illustrate preferred embodiments according to the practical application of the principles thereof, and in which:

[0009] FIG. 1 is a perspective view of a carrying case according to the specification.

[0010] FIG. 2 is a view taken along lines 2-2 of FIG. 1 showing the inner walls of the carrying case cover, where FIGS. 2A-2E show first, second, third, fourth and fifth embodiments according to the specification, respectively.

DETAILED DESCRIPTION

[0011] The present invention will now be described more fully hereinafter. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0012] Referring first to FIG. 1, a carrying case, designated broadly at 20, comprises a container member 22 and a cover 24. Such case 20 is described in U.S. Pat. No. 6,070,754, which is fully incorporated herein by reference.

[0013] Case 20 may include a nameplate insert 50 as described in U.S. Pat. No. 6,070,754.

[0014] The container 22 and the cover 24 are preferably double-walled blow-molded components. As used herein, a "double-walled" component is one which has been produced

by or blow molding and in which substantial portions of one wall of the component are adjacent but spaced away from substantial portions of an opposed wall. Preferably, the mold used to produce the component has distinct core and cavity halves and is configured to produce a component having the aforementioned full-perimeter flash. Persons skilled in the art will recognize that container 22 and/or cover 24 may be injection molded components. Alternatively, container 22 and/or cover 24 may be made of metal, aluminum, foam, wood, cardboard, etc.

[0015] The container 22 and cover 24 are preferably pivotally interconnected at their lower facing edges by a hinge (not shown) that enables the container 22 and cover 24 to pivot relative to one another between closed and open positions. The configuration of the hinge is not critical. An exemplary hinge suitable for interconnecting double-walled blow-molded components is illustrated in U.S. Pat. No. 5,361,456, which is hereby fully incorporated herein in its entirety. Another exemplary hinge suitable for interconnecting double-walled blow-molded components is illustrated in U.S. Pat. No. 6,315,154, which is hereby fully incorporated herein in its entirety.

[0016] The illustrated carrying case 20 preferably has a cavity therein that is configured to contain, transport, and protect a power tool, such as a power drill, but those skilled in this art will appreciate that a carrying case of the present invention can take a variety of configurations and protect any number of items, such as electronic, computer, video, or camera equipment, sales samples, and the like.

[0017] The cover 24 may be formed of a thermoplastic material, preferably polyethylene, suitable for blow-molding. Other suitable materials include propylene, polystyrene, ABS, and copolymers thereof. It is preferred that the container 22 also be formed of a thermoplastic material and have a double-walled construction, although those skilled in this art will recognize that other materials and structures are also suitable for use in the container 22.

[0018] Inasmuch as the cover 24 is of a double-walled construction, it includes a preferably textured outer wall 30 (seen in FIG. 1) and an inner wall 28 (seen in FIG. 2). In the illustrated embodiment, the inner and outer walls 28, 30 preferably have a nominal thickness of between about 0.060 and 0.090 inches, although the skilled artisan will recognize that some variation in wall thickness typically occurs in blow-molded parts. The skilled artisan will further recognize that other nominal thicknesses may also be suitable for use with this invention, particularly if the cover 24 is formed of a different thermoplastic material.

[0019] As is conventional for components of double-walled construction, over much of the expanse of the cover 24 the inner wall 28 and outer wall 30 may be adjacent to but spaced from one another. Persons skilled in the art will recognize that inner wall 28 and outer wall 30 could be at least partially contiguous. Persons skilled in the art will also recognize that container 22 could have inner and outer walls 28, 30 as well.

[0020] At the peripheral edge of the container 22 and/or the cover 24 on the side of the container 22 and/or cover 24 opposite the hinge, the case 20 preferably includes a handle molded into container 22 and/or cover 24, as shown in U.S. Pat. No. 6,070,754.

[0021] Alternatively, a rotatable handle 60 may be attached to case 20, as disclosed in U.S. Pat. No. 6,381,819, which is fully incorporated herein by reference. Container

22 and/or cover 24 preferably have a handle receiving section 33 for receiving handle 60. The handle receiving section 33 may include a central portion 31 and a pair of receptacles 32a, 32b.

[0022] The handle 60 preferably includes an elongate grip segment 62. Extensions 63a, 63b extend from the respective ends of the grip segment 62 in a direction generally perpendicular to the longitudinal axis of the grip segment 62. At each of the free ends of each of the extensions 63a, 63b, a respective pin (not shown) extend in both directions generally parallel to the grip segment 62.

[0023] The handle 60 is preferably attached to the case 20 such that the ends of the pins inserted into respective pockets (not shown) of the receptacles 32a, 32b. The pins preferably fit and pivot within the pockets, thereby enabling the handle 60 to pivot relative to the case 20 about the longitudinal axes of the pockets. This configuration enables the handle 60 to be moved between a gripping position, in which the grip segment 62 is spaced apart from the case 20, and a storage position, in which the grip segment 62 is adjacent the case 20.

[0024] Grip segment 62 may have a portion 62a made of elastomer, rubber or a soft material to provide a softer grip. Such portion 62a may be glued on, overmolded on, molded on, welded on, mechanically attached to and/or thermally attached to grip segment 62.

[0025] Outer wall 30 may have a front surface 30F, bottom surface 30B and side surface 30S. Preferably bottom and side surfaces 3B, 30S contact each other and/or front surface 30F.

[0026] It is preferable to provide a bumper 70 on at least one of the front, bottom and/or side surfaces 30F, 30B, 30S. Bumper 70 is preferably a relative soft elastic bumper mounted to case 20. The bumper 70 is preferably disposed on at least the bottom surface 30B to protect the case 20 and/or the product carried therein by cushioning the impact load exerted on the case 20 when dropped in an orientation in which case 20 strikes a hard surface. The bumper 70 preferably extends about the outer peripheral edge of the bottom surface 30B and overlays portions of the front and/or side surfaces 30F, 30S.

[0027] Any durometer of bumper 70 is contemplated. For example, the durometer may be between about 20 Shore O and about 80 Shore A. However, it is desired to provide the bumper 70 with characteristics that absorb and dampen some of the impact load and therefore a durometer of about 20 Shore A to about 75 Shore A is preferred. The durometer will be preferably dictated by the bumper thickness, the weight of case 20 and/or of the item intended to be carried therein, and the bumper contact area at the shock point.

[0028] Further information on bumper 70 and its characteristics may be found in US Published Application No. 2005/0058890 A1, which is fully incorporated herein by reference.

[0029] Referring now to FIG. 2, a plurality of case bumper details are illustrated in partial section view, including the preferred embodiment case 20 and alternative embodiment cases, to demonstrate various manufacturing methods for affixing an elastic bumper to the corresponding plastic housing.

[0030] Referring now to FIG. 2A, a partial cross section of the case 20 is provided to illustrate the attachment of the bumper 70 to the outer wall 30. Specifically, outer wall 30 may be formed with a nominal wall thickness ranging from

2.5 mm to 3.5 mm. The bumper 70 is preferably over-molded onto the outer wall 30 providing a rubbery bumper with a thickness of approximately 1 mm. The outer wall 30 may include a plurality of apertures 30A formed there-through. As the bumper 70 is over-molded onto the outer wall 30, a projection 70P of the bumper 70 is formed through the aperture 30A thereby mechanically interlocking the bumper 70 to the outer wall 30. Alternatively, the bumper 70 and projection 70P may be formed separately from the outer wall 30 and may be fastened thereto, such as by pressing the projection 70P through the aperture 30A, thereby mechanically interlocking the bumper 70 to the outer wall 30. Of course, other common fasteners such as screws, retaining clips or the like are contemplated by the present invention.

[0031] Referring now to FIG. 2B, an alternative bumper 70 is illustrated in accordance with the present invention. The bumper 70 may be bonded to outer wall 30 such that an interface 70I of the bumper 70 and outer wall 30 is completely melted together. This feature may be provided by over-molding the bumper 70 to the outer wall 30, or co-molding the bumper 70 and outer wall 30. The bumper 70 may be approximately 1.5 mm to 2 mm in thickness in order to obtain the desired protection characteristics and satisfy the manufacturing requirements.

[0032] Persons skilled in the art will recognize that bumper 70 may also be created by spraying a liquid elastomeric material onto the outer wall 30 to cure and form the bumper 70. The material of such bumper 70 may be formed from either a regular soft touch paint or a foam type rubbery paint having a thickness of 0.3 mm or greater. The material of the bumper 70 may also include an agent for causing a chemical reaction with the exterior of the outer wall 30 creating a bond upon curing to secure the bumper 70 to the outer wall 30.

[0033] Alternatively, bumper 70 may be formed from a liquid elastomeric material, preferably molten rubber, where the outer wall 30 is dipped partially therein. The outer wall 30 may receive a layer of rubber material that either melts with or cures to an interface 70I with the outer wall 30 thereby creating the bumper 70.

[0034] Referring now to FIG. 2C, an alternative bumper 70 may be affixed to outer wall 30 by an adhesive 72 dispensed therebetween. The adhesive 72 and bumper 70 may be affixed to the outer wall 30 in a progressive molding operation or by assembly of separate components. The bumper 70 is preferably formed with a thickness of at least approximately 1 mm.

[0035] Referring now to FIG. 2D, another alternative bumper 70 may be affixed to the outer wall 30 through frictional engagement therebetween. Thus, the bumper 70 is preferably formed separately from the outer wall 30 and is pressed thereon in an assembly operation. Outer wall 30 may further include a plurality of external ribs 30R formed thereabout for enhancing the frictional engagement within the bumper 70. Additionally, the external ribs 30R may be barbed in a direction corresponding to the direction in which the bumper 70 is pressed thereon to prevent removal of the bumper 70 from the outer wall 30. Alternatively, the ribs 30R may be provided about the outer wall 30 and the bumper 70 may be molded thereto for mechanical interlocking engagement with the ribs 30R. Bumper 70 is preferably at least approximately 1 mm thick.

[0036] Referring to FIG. 2E, an alternative bumper 70 may have protrusions 70B that extend through inner and/or outer walls 28, 30. Bumper 70 may be inserted from the inside of case 20, so that protrusions 70B extend through inner and outer walls 28, 30. Any method of affixing bumper 70, including any of the methods described above, can be used to affix bumper 70 to inner wall 28. Persons skilled in the art will recognize that bumper 70 may be disposed between inner and outer walls 28, 30, so that protrusions 70B extend only through outer wall 30.

[0037] Persons skilled in the art will recognize other possible benefits to providing case 20 with bumper(s) 70. Bumper 70 may prevent case 20 from sliding along a surface, or may provide the user with a better or alternate grip. To these ends, bumper 70 may be shaped in order to meet ergonomic or functional requirements. Bumper 70 may also provide aesthetic variations to case 20, such color breaks, shapes, etc. To these ends, bumper 70 may be shaped or colored in order to meet aesthetic requirements.

[0038] 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: A carrying case for carrying a portable electric power tool comprising:

a container;

a cover pivotably attached to the container;

at least one of the container and cover have an outer wall;

a bumper mounted to at least one of the container and cover; and

a handle connected to at least one of the container and cover;

wherein the bumper serves to cushion an impact load exerted on the case if the case is dropped in an orientation in which the case strikes a hard surface.

2: The case of claim 1, wherein the bumper is mounted to the outer wall.

3: The case of claim 1, wherein the handle is pivotally connected to at least one of the container and cover.

4: The case of claim 1, wherein the outer wall has a front, bottom and side surfaces.

5: The case of claim 4, wherein the bumper is mounted to at least one of the front, bottom and side surfaces.

6: The case of claim 1, wherein at least one of the container and cover is made of a thermoplastic material.

7: The case of claim 1, wherein the bumper has a durometer rating between about 20 Shore O and about 80 Shore A.

8: The case of claim 1, wherein the bumper has a durometer rating between about 20 Shore A and about 75 Shore A.

9: The case of claim 1, wherein the bumper is overmolded onto the outer wall.

10: The case of claim 1, wherein the bumper is bonded to the outer wall.

11: The case of claim 1, wherein the bumper is affixed to the outer wall.

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