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(54) A material and process of manufacturing luggage cases

(57) The invention relates to novel modified polypropylene compositions, especially for luggage case applications. More particularly, the invention relates the blend of PP and elastomer which are compatible to polypropylene are heated to melt in the injection moulding unit barrel. The melted material of the blend bonds together in the predetermined proportion of PP - 60 to 90% and Elastomer which are compatible to Polypropylene - 40 to 10% depending on the product design & structure (For example - Engage , Ethyl vinyl acetate (EVA) etc. to give a single material type with molecular continuity . In short, the material properties are enhanced through molecular properties of each polymer , resulting in manufacture of luggage case as "No break". [This modified polypropylene composition for a luggage case is henceforth called as "K-PP"]. It also relates to manufacturing of various luggage cases from the said material.

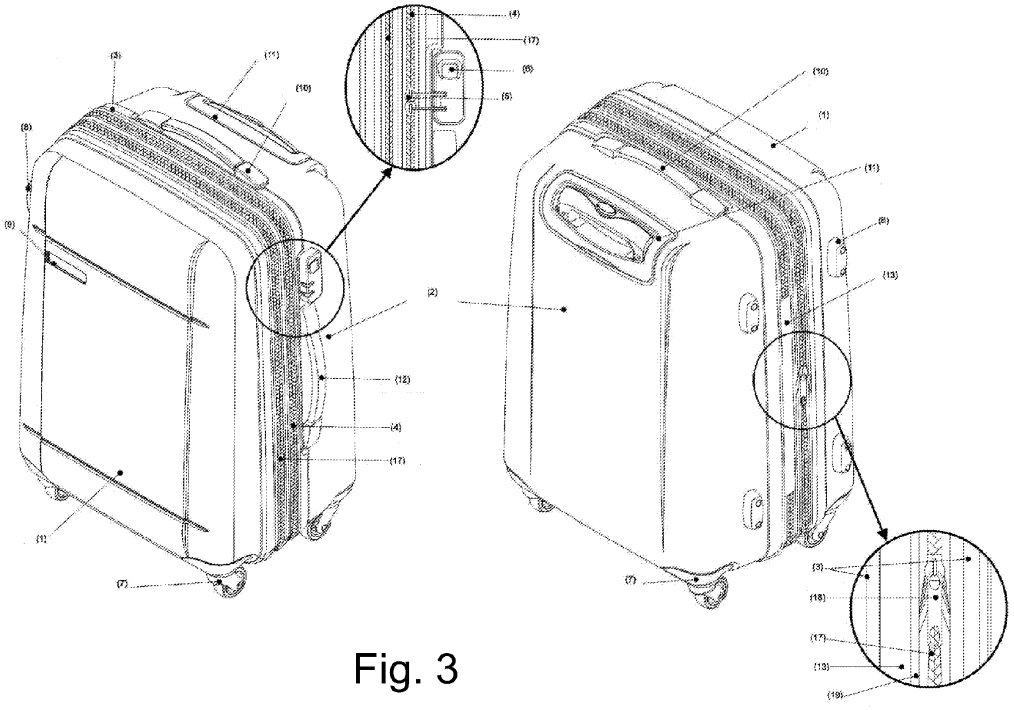

Fig. 3

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Description

FIELD OF INVENTION

[0001] The present invention relates to a luggage case and more particularly to a Semi-hard case with or without reinforcing frame and a hard case with or without frame

BACKGROUND OF THE INVENTION

[0002] In a luggage case, generally the top half shell (1) and the bottom half shell (2) of a hard luggage case is made up of plastic raw material viz. HDPE, PP , Reinforced PP, ABS or PC . These materials are basically hard and are processed by injection moulding or Vacuum forming technology. All these materials have a tendency to break if the force applied on it is more than it's breaking yield at normal atmospheric temperatures. (Minus 20 °C to 50 °C).

[0003] HDPE & PP material shells (1) (2) are generally injection moulded and are hard. The luggage case made from these materials known in prior art are complete injection moulded case (IML) or the case with reinforcing frame.

[0004] Reinforced PP shell is generally pressure formed and are very hard, The luggage case made from this material known in prior art is stitched Zippered case or the case with reinforcing frame , but no IML.

[0005] ABS & PC shell is generally Vacuum formed or pressure formed and are hard, The luggage case made from this material known in prior art is stitched Zippered case, the case with reinforcing frame and Injection moulded case (IML).

[0006] Many constructions of suitcases for use by travelers are known. These known constructions are of varied form and not infrequently include at least a pair of wheels / rolls (7) for facilitating the movement of the case by a user.

[0007] In addition, it is also known to provide suitcases incorporating a towing handle structure (11) which is usually moveable between a user case towing position and a retracted stowage position.

[0008] Suitcases, can conveniently be considered as comprising two major types, the first the so called soft case and the second the so called hard-case.

[0009] The soft case conventionally incorporates a metal or plastic frame work which provides the means whereby the required shape and visual appearance of the case is maintained and also services to support a soft outer covering.

[0010] The above mentioned hard skinned cases are regarded as being hard skinned in the sense that the walls -formed as to provide a substantially rigid or hard skin in the sense that the walls, top (1) and bottom (2) are formed by material that is sufficiently rigid in that it retains its shape and form in use. A material commonly used for forming hard skinned cases is a polypropylene / ABS or PC.

[0011] Such cases comprise two rigid shells that are hinged (13) one to the other with purpose built hinges and which meet with an inter nesting tongue and groove frame like formation. Mechanical fasteners such as hinged locks are used to retain the lid portion (1) and the based portion in their closed positions.

[0012] Conventionally the so called "hard" cases incorporate a metal or plastics framework extending all around the internal perimeter of the case in such position as to provide structural strength to the case and additional to ensure that any internal tongue and groove arrangements will always nest one relative to the other.

[0013] Bearing in mind that many present day modes of travel, i.e. by aircraft, coach etc., impose a weight limit upon the amount of luggage an individual passenger may carry, it has been found that whilst the known hard case constructions afford a considerably higher degree of security and resistance to damage, the extra weight of the case impose considerable limitations upon the actual weight of articles that may be introduced into the case.

[0014] On the other hand, whilst the lighter weight of the soft case allows more articles to be packed into the case, weight for weight the lesser security afforded by the soft case constructions against damage, deliberate or otherwise introduces unacceptable content security problems for the traveler.

OBJECTS OF THE INVENTION

[0015] The objective of this invention is to provide a flexible shell for a Zippered upright case, which does not break with in the normal atmospheric temperature (minus 20 deg centigrade to 50 deg centigrade) under very abusive test conditions to provide high strength & durability of the luggage case intended for use while travel.

[0016] Another objective of the invention is to provide ease of stitching of fastening means such as zip (4) on the shell (1) (2) for construction of the luggage case.

[0017] Yet another objective of the invention is to provide the looks of the luggage case like Polycarbonate luggage case or a soft luggage case.

[0018] Another object of invention is to provide a flexible shell for a Suitcase with or without a reinforcing frame which does not break with in the normal atmospheric temperature (minus 20 deg centigrade to 50 deg centigrade) under very abusive test conditions to provide high strength & durability of the luggage case intended for use while travel.

[0019] A further object is the provision of a suitcase whose appearance departs from that of a purely standard rec-

tangular block like formation for a suitcase.

SUMMARY OF INVENTION

[0020] The invention relates to novel modified polypropylene compositions, especially for luggage case applications. More particularly, the invention relates the blend of PP and elastomer which are compatible to polypropylene are heated to melt in the injection moulding unit barrel. The melted material of the blend bonds together in the predetermined proportion of PP - 60 to 90% and Elastomer which are compatible to Polypropylene - 40 to 10% depending on the product design & structure (For example - Engage , Ethyl vinyl acetate (EVA) etc. to give a single material type with molecular continuity. In short, the material properties are enhanced through molecular properties of each polymer, resulting in manufacture of luggage case as "No break". [This modified polypropylene composition for a luggage case is henceforth called as "K-PP"]

[0021] The Semi-hard case comprising of top (1) & bottom shells (2) as in Figure 01 , Figure 03 , Figure 04 and another case as in Figure 05 comprising of two shells (101) are made with K-PP constructed in suitable shape and design with suitable joining methods like beading (3), zip (4) and thread stitching (14) construction, or fitting the edges of the shells in a suitable metal or plastic frame (104) (105) . This is a unique distinguished category of luggage style hereafter called as "PP Zippered case" in relation to the known categories of the luggage styles.

[0022] A luggage case made with the modified composition named K-PP has excellent properties, especially a very high impact strength, elasticity and surface stability.

[0023] The top half (1) & bottom half (2) of a luggage case as in Figure 01, Figure 03 , Figure 04 and another case as in Figure 05 comprising of two shells (101) made with K-PP has the potential to be made with all the design characteristics of an injection moulded part. It overcomes the design constraints of thermoformed top half & bottom half of a luggage case.

[0024] The presence of elastomer molecules compatible to polypropylene in K-PP has better flow ability in injection moulding in relation to the known injection mouldable materials like HDPE, PP , Reinforced PP, ABS or PC etc. This gives an advantage of the ease in manufacturing and higher productivity of top half (1) & bottom half (2) of a luggage case as in Figure 01, Figure 03 , Figure 04 and another case as in Figure 05 comprising of two shells (101).

[0025] K-PP is low density and is soft which allows the potential for constructing a luggage case with zipped sections of a zip fastener arrangement (4) by a stitching operation involving a securing thread (14).

[0026] The presence of elastomer molecules compatible to polypropylene in K-PP makes the top half (1) & bottom half (2) of a luggage case as in Figure 01, Figure 03 , Figure 04 and another case as in Figure 05 comprising of two shells (101) moulded with this material to be soft. Apparently making the luggage case feel like "Soft- Hard".

[0027] The surface thus obtained by the virtue of the elastomer molecules compatible to polypropylene in K-PP in the top half (1) & bottom half (2) of a luggage case as in Figure 01, Figure 03 , Figure 04 and another case as in Figure 05 comprising of two shells (101) moulded with this material feels Soft when touched, hereafter called as "Soft-touch" luggage case.

[0028] K-PP is low density, combined with good mechanical properties, allows the potential for significant weight saving of a luggage case made with this material over the luggage case made with an equivalent PP . Design studies suggest 15 % weight savings are possible for the same impact strength through careful attention to design details of top half (1) & bottom half (2) of the luggage case as in Figure 01, Figure 03 , Figure 04 and another case as in Figure 05 comprising of two shells (101), especially on thicknesses.

BRIEF DESCRIPTION OF DRAWINGS

[0029]

Figure-01 shows the isometric view of a Zippered upright luggage case which is volume wise non expandable in closed condition with the enlarged scale view of the lock fixing arrangement;

Figure-02 shows _the cross sectional view of a detail of the luggage case construction as per Figure-01 to an enlarged scale;

Figure -03 shows the isometric view of a second embodiment a luggage case which is volume wise expandable with the enlarged scale view of the lock fixing arrangement .The figure illustrating the luggage case when unexpanded;

Figure -04 shows the isometric view of luggage case of Figure-03 when the luggage case is expanded;

Figure-05 shows the isometric view of a third embodiment of suitcase case with reinforcing frame in closed condition.

DETAILED DESCRIPTION OF INVENTION

[0030] This invention relates to the construction of luggage such as suitcases for use by travelers.

[0031] It is an object of the present invention to provide, inter alia, a "Semi-hard" suitcase construction that avoids at least some of the problems arising from the use of the known construction of hard and soft cases.

[0032] For the purpose of the present Application a "Semi-hard" case is regarded as being such by reason of the fact that the top bottom side and end walls cannot readily be pierced by a blade or needle as is the case with known soft case construction.

[0033] A further object is the provision of a suitcase whose appearance departs from that of a purely standard rectangular block like formation for a suitcase.

[0034] Broadly according to a first aspect of the invention there is provided a method of constructing a hard suitcase as shown in (Figure 01) including forming a shaped based portion (2) and a shaped lid portion (1) from a plastic material of such characteristic that the portions retain their intended shape, and attracting to each of said portions the respective zipped portion of a zip fastener (4) arrangement by a stitching operation involving a securing thread (14).A further aspect of the invention provides a method of constructing a frameless "Semi-hard" suitcase characterized by the steps of forming a base portion (2) and a lid (1) portion from a material of such characteristic that the portions retain their formed shape and attaching to each of side portions the respective zipped portions of a zip fasteners arrangement (4) by a stitching operation involving a securing thread (14) as per Figure 02.

[0035] According to further aspect of the invention, there is provided a method of constructing a frameless "Semi-hard" soft case looking suitcase characterized by the steps of forming a tray like base portion (2) and tray like lid portion (1) from a material of such characteristics that the base (2) and lid portions (1) retain their intended soft case looking shape and attaching the to the free edge regions of the walls of said tray like portion by stitching operation using a thread (14), the respective fasteners arrangement for enabling the base (2) and lid portion (1) to be retained in a suitcase closed condition.

[0036] In accordance with a still further aspect of the invention there is provided a method of constructing a suitcase incorporating a capability of increasing the storage volume of the case as shown in Figure 03 & Figure 04.

[0037] Preferably a means, for enabling said increase in the closed volume of the suitcase includes a zip fastener arrangement (17).

[0038] Conveniently the zip fastener arrangement (4) (17) is a two part zip fastener arrangement. In according with a second aspect of the invention there is provided a method of constructing a Semi-hard suitcase including forming a base portion (2) and a lid portion (1) from a material of such characteristic that the portions retain their formed shape and attaching to each of said portions the respective zipped of portion of a zip fastener arrangement (4) by a stitching operation involving a securing thread (14).

[0039] In accordance with a further aspect of the invention there is provided a method of constructing a suitcase including forming like a tray like base portion (2) and a tray like lid portion (1) from a material of such characteristics that the portions retain their formed shape, and attaching to each of the said portions the respective zipped sections of a zip fastener (4) (17) arrangement by a stitching operation involving a securing thread (14), the zip fastener arrangement (4) (17) being such as to enable the suitcase to be retained in a closed condition , and incorporating means for enabling increase in the storage volume of the closed suitcase.

[0040] Preferably a suitcase is provided with four sets of floor engaging support members (8), there being a set being provided one to each of two traverse surfaces of the suitcase whereby the case can be stood on a support surface on one or the other of two orientations.

[0041] In a preferred construction two of the elements of one such set (8) are provided upon the bottom portion and incorporate wheels/rolls (7) whereby the case is rendered towable, and in which at least one other element of this set is located on the lid portion (1), the arrangement being such as to provided a stable support for the case when not being towed.

[0042] In a preferred construction that side of the base portion that is opposite to the wheels/rolls (7) is provided with a case carrying handle (10) and a retractable towing means (11).

[0043] Preferably, two elements of the second such set are provided upon a longer side wall of the base portion (2) and two further elements of this set are provided upon a corresponding wall of the lid portion(1), the arrangement being such that the case when resting on the elements (8) of this set is stable and wherein a carrying handle (12) is provided on the side of the bottom portion that is opposite to the side with said elements(8).

[0044] In a further preferred construction the case incorporates means whereby the volume of the case is expandable.

[0045] Conveniently, the expandability is achieved by providing a tow part Zip fastener arrangement (17) of which a first Zip part (4) is associated with the closing of the case and of which a second Zip part (17) is associated with the expandability of the case.

[0046] Preferably, the second Zip part (17) is interposed between the lid section of the case and the portion of the zip fastener arrangement (4) associated with the closure of the case.

[0047] Conveniently, the second Zip part (17) includes a first section attached to the case and additionally along the peripheral edge of a strip of flexible material (20) circumscribing the mouth of the lid portion (1) and attached thereto, and a second section that is attached to the peripheral edge of the strip of material (20) that is remote from the case lid (1) portion.

[0048] Refering to the drawing as shown in Figure 05 the suitcase comprises of a peripheral frame (104) (105) to which is suitably secured opposed , shells (101) made with K-PP. A handle (109) and locks (106)(1061) are fastened to the bottom section of the frame (105) in the embodiment illustrated. However it should be noted that the invention is not limited to the particular lock construction shown in the drawing which is of the single action latch type lock , nor is the invention limited to the shells (101) that are illustrated.

[0049] As may be seen in Figure 05 the frames (104) (105) are defined by four sides and connected to each other by suitable hinges (not shown in figure) .Each frame section may be continuous extrusion profile that is bent to form the needed corners or the sides may be an extrusion that is cut to the required lengths which are then joined by cast corners (not shown in figure) .

[0050] The top side of the frame section (104), that is the side in which handle (109), centre lock(108) and side Locks (106) (1061) are secured. The handle (109) is pivotly fixed on lugs (110) which is securely fixed on the frame.

[0051] Rivets (111) pass through the holes in shells (101) and frame (104)(105) and is flared on the other side to securely fix shells(101) on the frame (104)(105)

[0052] The hooks (not shown in figure) are mounted on top frame (104) with rivets. The Locks mounted on bottom frame (105) when engages with these hooks in closed condition restricts the opening of top lid (104) from bottom (105),

[0053] It should be appreciated that this embodiment is described for purpose of illustration only, and that numerous alterations and modifications may be practiced by those skilled in the art without departing from the spirit and scope of the invention. It is intended that all such modifications and alterations be included insofar as they come within the scope of the invention as claimed or the equivalents thereof.

A New Generation Polymer composition:

[0054] An outstanding new material that combines the versatility of a 100% thermoplastic with the high performance of Elastomers which are compatible to Polypropylene. [henceforth called K-PP]

[0055] K-PP captures the exceptional mechanical properties of polypropylene and Elastomers which are compatible to polypropylene. High tensile strength but flexible and outstanding impact resistance provides the opportunity to make parts with unprecedented properties in a blend of PP and Elastomers which are compatible to Polypropylene thermoplastic.

The Technology Behind K-PP:

[0056] In a unique process, the blend of PP and elastomer which are compatible to polypropylene are heated to melt in the injection moulding unit barrel. The melted material of the blend bonds together in the predetermined proportion of PP - 60 to 90% and Elastomer which are compatible to Polypropylene - 40 to 10% depending on the product design & structure (For example - Engage , Ethyl vinyl acetate (EVA) etc. to give a single material type with molecular continuity. In short, the material properties are enhanced through molecular properties of each polymer, resulting in producing the part as "No break".

How K-PP is Made:

[0057] K-PP is made by blending Polypropylene polymer and elastomers which are compatible to Polypropylene in a best performance proportions ranging from 60:40 to 90: 10 depending on the product design & structure along with the mixing of the desired colour pigments.

The Material Advantages:

[0058]

Stitch ability - K-PP is low density and is soft which allows the potential for constructing a luggage case with zipped sections of a zip fastener arrangement by a stitching operation involving a securing thread.

Weight Saving - K-PP is low density, combined with good mechanical properties, allows the potential for significant weight saving over an equivalent PP part. Design studies suggest 15 % weight savings are possible for the same impact through careful attention to design details of part thicknesses.

Contains No Glass - K-PP is gentle on moulds and cutting tools, it is easy to handle in the workplace and causes none of the irritation associated with materials containing glass fibers. Finished surfaces are smooth and flexible and products can be used without additional coatings.

Injection mouldable - K-PP injection mouldability characteristics enable parts to be produced with all the design characteristics of injection moulded part. It overcomes the design constraints of thermoformed parts.

Inert - K-PP is polypropylene blend, a material widely recognised as being non-toxic and highly resistant to corrosion.

High Impact Strength - K-PP unique material property results in a material with exceptionally high resistance to impact. All the more remarkable point is that the colder it gets, the tougher it becomes, providing maximum protection when other materials become easily broken.

KPP technical data Product: Polypropylene/Polypropylene blend

S NO	TEST	TEST METHOD	RESULT	UNIT
1.	Density	ASTM D 792-08 METHOD-B	0.897	gm/cc
2	Water Absorption	ASTM D 570 - 98 (2005)	0.021	%
3.	Tensile strength	ASTM D 638 - 10	18.9	N/mm^2
4.	Elongation at break		190	%
5.	Compressive Strength at 10% deformation	ASTM D 695-2010	14.4	N/mm^2
6.	Flexural Strength	ASTM D 790 - 10 Procedure A	19.1	N/mm^2
7.	Flexural Modulus		725	N/mm^2
8.	Hardness	ASTM D 2240 -05(2010)	A/99/1	A
9.	Izod Impact (Notched)	ASTM D 256 - 10 Method A	NB (No Break)	mJ/mm^2
10	Heat Deflection temperature @ 66 psi	ASTMD 648 - 07 Method B	69	°C
11	Heat Deflection temperature @ 264 psi	ASTMD 648- 07 Method B	44	°C
12	Melting Point	ASTMD 3417	165 to 167	°C
13.	Coefficient of thermal expansion	ASTM D696-08	2.11×10^{-4} 1/°C	
14	Dielectric Strength	ASTMD 149-09	Average -22.88	KV/mm
15	UV Resistance @ 100hrs (Grade 5 is best & Grade 1 is worst)	ASTM G154-06	Grey scale - 4-5	-
16	Chemical Resistance	ASTM D 543- 06		
a	Acids (concentrated $H_2 SO_4$)		Slight colour change	-
b	Alkalis (NaOH, 60 %)		Slight colour change	-
c	Solvents (xylene)		Slight colour change & visual warp	-

[0059] The foregoing description is a specific embodiment of the present invention. It should be appreciated that this embodiment is described for purpose of illustration only, and that numerous alterations and modifications may be practiced by those skilled in the art without departing from the spirit and scope of the invention. It is intended that all such modifications and alterations be included insofar as they come within the scope of the invention as claimed or the equivalents

thereof.

Claims

1. Zippered Upright luggage case comprising:

   semi-hard case having a top shell (1) and bottom shell (2) manufactured from a material produced by blending of polypropylene and elastomers compatible to polypropylene;
   at least one fastening arrangement for enabling the base (2) and lid portion (1) to be retained in a luggage case closed condition wherein said zipped sections of a zip fastener (4) (17) arrangement by a stitching operation involving a securing thread (14) and enabling increase in the storage volume of the closed suitcase;
   plurality of wheels (7) provided on the bottom shell or each of top and bottom shell for easy movement said case;
   at least one case carrying handle (10) and at least one retractable towing means (11) provided on side of the base portion that is opposite to the wheels/rolls;
   plurality of sets of floor engaging support members (8) wherein a set is being provided to each of two traverse surfaces of the suitcase such that one such set are provided upon the bottom portion (2) and at least one other set is located on the lid portion (1) to facilitate a stable support for the case when not being towed;
   at least one carrying handle (12) is provided on the side of the bottom portion that is opposite to the side with said support members (8).

2. Zippered Upright luggage case comprising:

   semi-hard case having a top shell (1) and bottom shell (2) manufactured from a material produced by blending of polypropylene and elastomers compatible to polypropylene;
   plurality of wheels (7) provided on the bottom shell or each of top and bottom shell for easy movement said case;
   at least one case carrying handle (10) and at least one retractable towing means (11) provided on side of the base portion that is opposite to the wheels/rolls;
   plurality of sets of floor engaging support members (8) wherein a set is being provided to each of two traverse surfaces of the suitcase such that one such set are provided upon the bottom portion (2) and at least one other set is located on the lid portion (1) to facilitate a stable support for the case when not being towed;
   at least one carrying handle (12) is provided on the side of the bottom portion that is opposite to the side with said support members (8);
   at least one tow part Zip fastener arrangement of which a first Zip part (4) is associated with the closing of the case and of which a second Zip part (17) is associated with the expandability of the case interposed between the lid section of the case and the portion of the zip fastener arrangement (4) associated with the closure of the case wherein the second Zip part (17) includes a first section attached to the case and additionally along the peripheral edge of a strip of flexible material (20) circumscribing the mouth of the lid portion and attached thereto, and a second section that is attached to the peripheral edge of the strip of material (20) that is remote from the case lid portion.

3. The luggage case with peripheral frame comprising
   semi-hard case having a top shell (1) and bottom shell (2) manufactured from a material produced by blending of polypropylene and elastomers compatible to polypropylene;
   at least one peripheral frame (104) (105) configured for securing opposed shells (101) made with said material;
   at least one handle (109) and locking means (106)(1061) are fastened to the bottom section of the frame (105).

4. A material comprising polypropylene and elastomers compatible to polypropylene, produced by blending of said Polypropylene polymer and said elastomers in performance proportions ranging from 60:40 to 90: 10 respectively, depending on the product design, structure to be manufactured and mixing of the desired colour pigments for manufacturing luggage case.

5. Luggage case as claimed in claim 3 wherein said handle (109), centre lock (108) and side Locks (106) (1061) are securely fastened on the frame section (105) wherein said handle (109) is pivotly fixed on lugs (110) and the hooks are mounted on the top frame (104).

6. Luggage case as claimed in preceding claims wherein said material is low density, combined with good mechanical properties, allows the potential for significant weight saving of a luggage case maintaining the high impact strength

of top half (1) & bottom half (2) of the luggage case in addition to elasticity and surface stability.

7. Zippered Upright luggage case as claimed in claim 1 and 2 wherein said zip fastener arrangement (17) is configured for increasing the storage volume of said luggage case.

8. Zippered Upright luggage case as claimed in claim 1 and 2 wherein said luggage case is manufactured with all the design characteristics of an injection moulded part.

9. Zippered Upright luggage case as claimed in claim 1 and 2 wherein said elastomer molecules compatible to polypropylene enhances flow ability of the said material in injection moulding to facilitate easy manufacturing and higher productivity of top half shell (1) & bottom half shell (2) of a luggage case and provide "Soft-touch" feel for said luggage case.

10. Zippered Upright luggage case as claimed in claim 1 and 2 wherein said K-PP is low density and is soft which facilitates the constructing of a luggage case with zipped sections of a zip fastener arrangement (4) by a stitching operation with a securing thread (14).

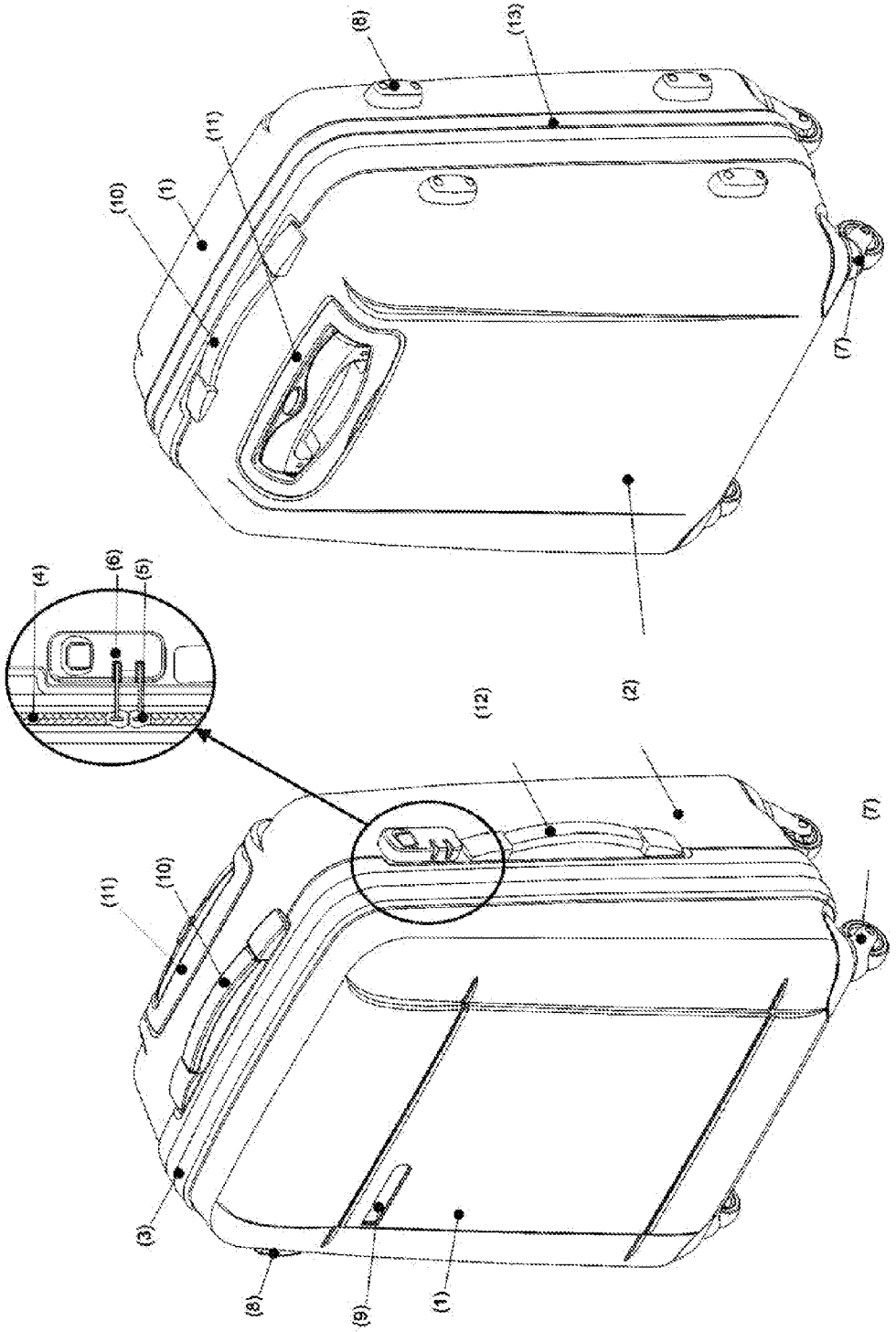

Fig. 1

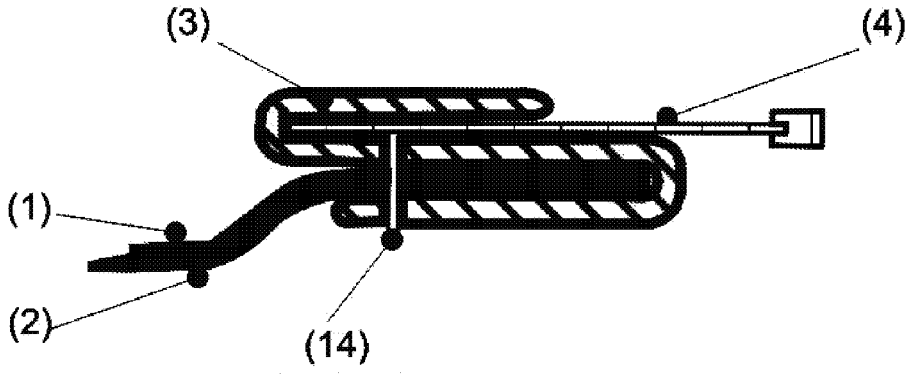

Fig. 2

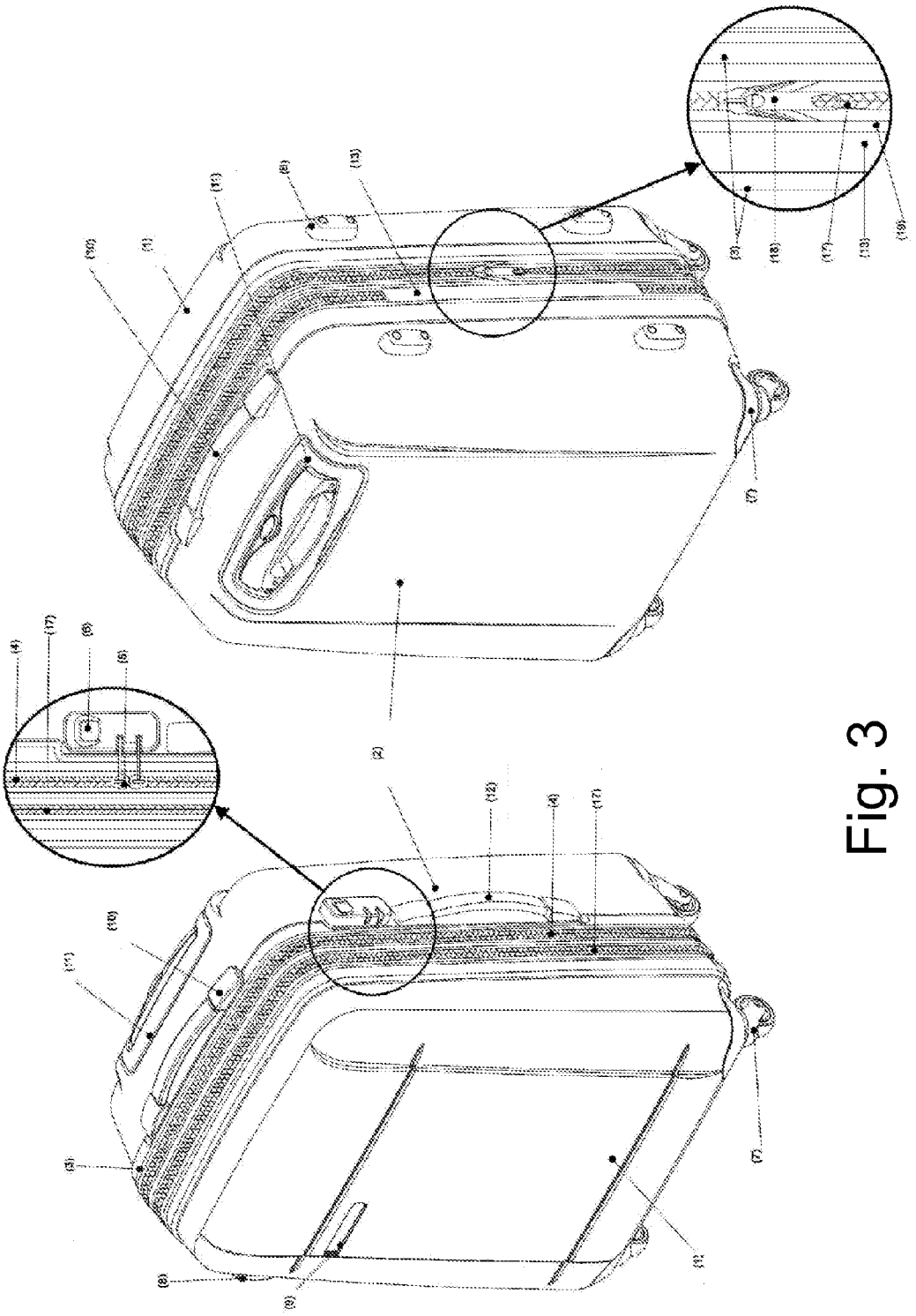

Fig. 3

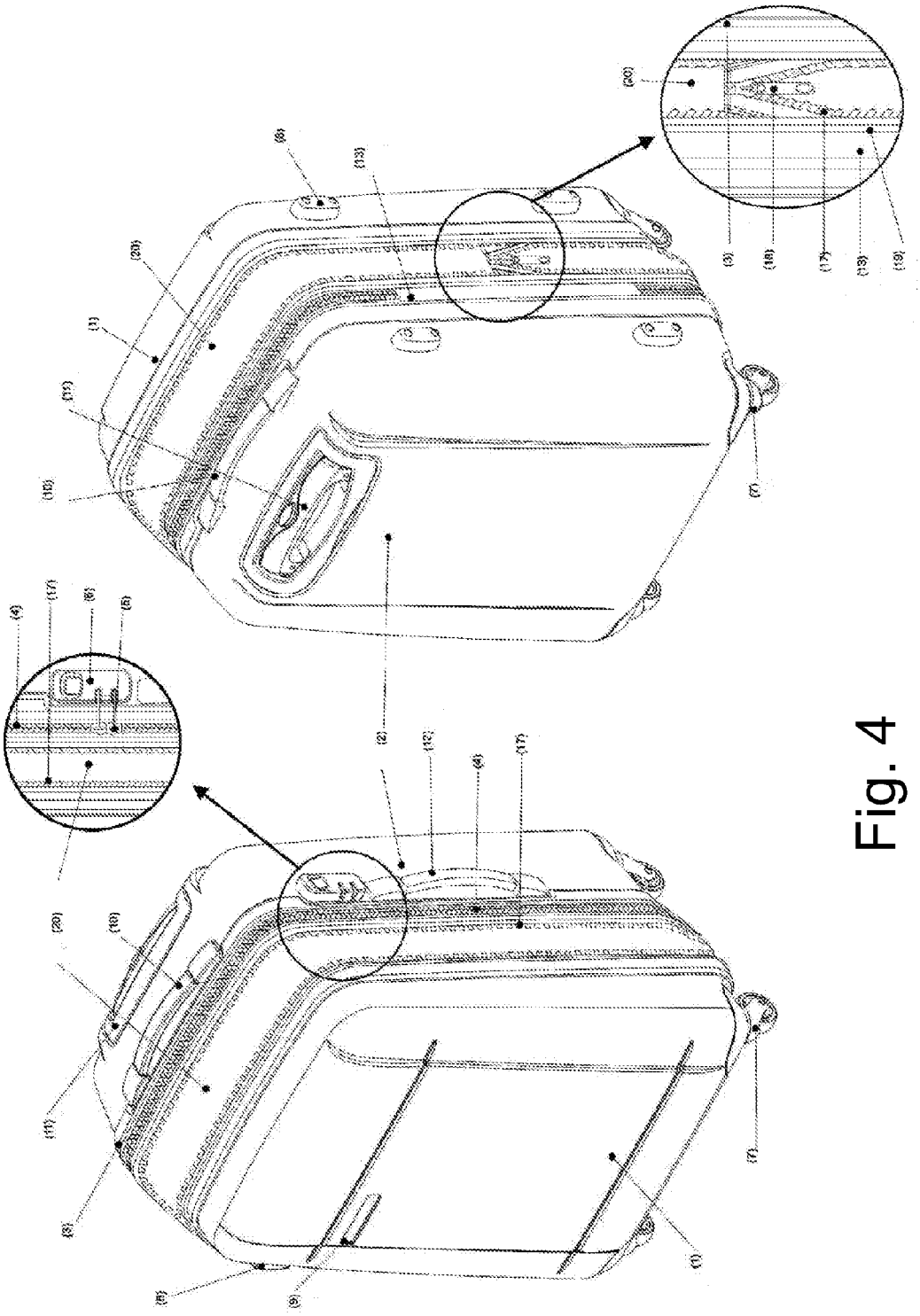

Fig. 4

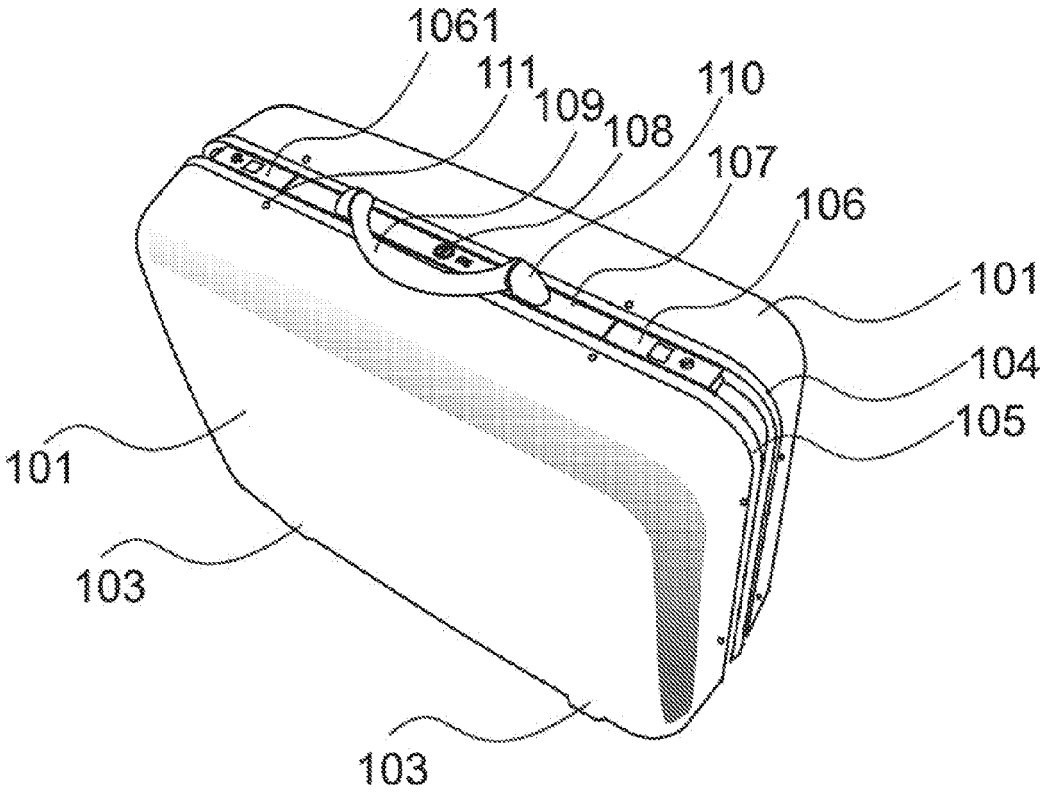

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 11 18 1305

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	GB 2 403 211 A (LANDOR & HAWA INTERNAT LTD [GB]) 29 December 2004 (2004-12-29) * pages 2, 6-10; figures 1-9 * -----	1,2,6-10	INV. A45C5/14 A45C7/00 A45C13/10
Y	DE 92 01 216 U1 (GREBENSTEIN GMBH) 26 March 1992 (1992-03-26) * page 4 - page 5; figures 1-2 * -----	3,5	A45C13/36
Y	FR 1 329 414 A (HOECHST AG) 7 June 1963 (1963-06-07) * column 1 - column 3 * -----	1-3,5-10	

TECHNICAL FIELDS SEARCHED (IPC)

A45C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 January 2012	Ehrsam, Sabine

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 18 1305

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