

Variable-volume luggage item

The invention relates to a piece of luggage featuring a capability of volume variation between a position of small volume
5 and at least one position of large volume.

The invention is particularly useful in its application for the manufacturing of luggages with casters, provided with a telescopic handle and comprising nonrigid side parts.

Currently, a system enabling to vary satisfactorily the volume
10 of a piece of luggage featuring casters and a telescopic handle, and comprising nonrigid side parts, is not known.

Indeed, luggages exhibiting casters and telescopic handle generally consist in a floor with side frames, combined with a polypropylene sheet exhibiting a C shape conformation.

15 This design of the floor and of the side frames, makes it possible to maintain the spacing, the rigidity and the coplanarity of the four wheels, while enabling a good efficiency of driving with the telescopic handle.

Documents EP 1 882 424 A2, WO 2006/023 722 A2, EP 1
20 097 654 A2 and US 2006/070 837 A1 describe a piece of luggage with a variable volume. The luggage structures taught by these documents are not suited to a piece of luggage, comprising casters and a telescopic handle: indeed, the deformations and displacements of parts that make the floor, do not make it possible
25 to insure a spacing, a rigidity and the desired coplanarity of the four casters that are intended to equip the floor of the piece of luggage.

A first aim of the invention is to propose a new luggage featuring a volume variation capability, the structure of which can be implemented to a piece of luggage with or without casters.

Document US 2013/140 118 A1 describes another system for
5 a volume-variation luggage item comprising an intermediate frame associated with a plurality of foldable joints with a Ω shape. The structure disclosed in document US 2013/140 118 is not suitable for a piece of luggage comprising four casters. Indeed, the system of expansion described in US 2013/140 118 A1 does not make it
10 possible to obtain the coplanarity of the four casters, because this expansion mechanism exhibits a certain elasticity and cannot be locked in position.

Other luggages with variation of volume have intermediate structures, in particular extension bellows, which cannot be used
15 effectively for luggages featuring casters

A first aim of the invention is to propose a new piece of luggage capable of volume variation, with a light structure comprising nonrigid side parts and having a good rolling quality and a stability comparable with the luggages without volume
20 variation capability.

A second aim of the invention is to propose a new piece of luggage with volume variation capabilities comprising nonrigid side parts, whose selected volume can be maintained, even during rolling.

25 The invention concerns a luggage item featuring a volume-variation capability between a position of small volume and at least one position of large volume, the volume-variation luggage item comprises a modifiable floor between a reduced position and at least one extended position, the modifiable floor comprising a rigid
30 front part and a rigid rear part, characterized, in combination, by the fact that the front rigid and the rear rigid parts are

complementary or with a fitting, to ensure the overall rigidity of the floor in the position of small volume; by the fact that the rigid front part is remote by translation from rigid rear part in a large volume position, in particular by a relative sliding motion, on rigid means of translation; and by the fact that the piece of luggage comprises nonrigid side parts stabilized in the small volume position by rigid stabilizing or stiffening means, as well as rigid stabilizing or stiffening means in a large volume position, so as to exhibit a stable and rigid structure, in the position of small volume and in a position of large volume.

Because the structure can be modified while being stabilized between a reduced position and an extended position, the rolling stability of and the coplanarity of the casters can be obtained in an embodiment of the invention suitable for a luggage item with casters.

According to other embodiments of the invention:

- the luggage item features a plurality of stiffening means for the nonrigid side parts so as to maintain the luggage item in a position corresponding to a selected volume.

When the luggage item comprises a plurality of stiffening means, the luggage can thus be maintained in a position corresponding to the volume selected by the user.

- the ceiling of the luggage item may feature two complementary rigid parts, or with fittings, in order to ensure the overall rigidity of the ceiling in the position of small volume; the front rigid part is then remote from the rigid rear part in a position of large volume by a relative sliding motion, on rigid sliding means.

- the floor exhibits two rigid parts comprising an inner edge with a saw-toothed conformation and connected together by sliding rigid stems.

- the ceiling exhibits two rigid parts comprising an inner edge with a saw-toothed conformation and connected together by sliding rigid stems.

- the stiffening means advantageously comprise rigid frames
5 and swivelling frames.

- the luggage item comprises struts cooperating with C shaped swivelling frame to prevent their distortion during rolling.

- the luggage item may comprise means for locking the
10 stiffening frames in order to maintain the piece of luggage in a position corresponding to a selected volume.

- the C shaped swivelling frames may be sliding frames, whose ends of the C shapes are guided on rails, laid out on the front face that allows to access to the content of the luggage item.

- the swivelling frames may comprise pairs of swivelling
15 frames, laid out in a V shape in the position of small volume of the piece of luggage and appreciably parallel in a large volume configuration of the luggage item.

- the luggage item may comprise control means in order to
20 shift from the small volume position of the piece of luggage, to a large volume position, and conversely.

The invention will be better understood considering the following description given as a nonrestrictive example, and in reference to the annexed drawings in which:

25 Figure 1 schematically represents a perspective view of a structure of a variable-volume luggage item according to the invention, in the position of small volume.

Figure 2 schematically represents a perspective view of a structure of a variable-volume luggage item according to the
30 invention in a position of large volume.

Figure 3 schematically represents magnified perspective view illustrating in detail the locking of a stiffening frame corresponding to a small volume position.

Figure 4 schematically represents a partial perspective view illustrating the locking of a stiffening frame corresponding to a large volume position.

Figure 1 schematically represents a perspective view of another embodiment of a variable-volume luggage item according to the invention.

With reference to figures 1 to 4, identical or functionally equivalent items, are referred by identical reference numbers.

The structure of the luggage item with volume variation capability according to the invention, described with reference to the figures 1 to 4, is particularly advantageous for making a piece of luggage with four casters, so as to ensure an appropriate rolling quality in any position corresponding to a selected volume, while preserving the properties of impact resistance, of use and portability, of a luggage item with casters without volume variation capability from the prior art.

The invention makes it possible to vary the volume of a luggage item with casters, in a simple and ergonomic way, without disassembling and any particular handling.

According to figure 1, a luggage item 1 with volume variation capability according to the invention comprises a floor 2 and a ceiling 3 and comprises nonrigid side parts.

Two rigid side frames 4 are set between the floor 2 and the ceiling 3. Floor 2 is an extensible floor between a position of small volume of the luggage item 1 and a position of large volume shown on figure 2. The floor 2 comprises a front part 2a and a rear part 2b. The ceiling 3 can be extended between a position of small volume of the luggage item 1 and a position of large volume shown

on figure 2. The ceiling 3 comprises a front part 3a and a rear part 3b. The front parts 3a, 3b of the ceiling 3, exhibit in their brought closer position an opening enabling the assembly of a handle. The 2a and 2b parts of the floor 2 are connected in the position of small
 5 volume. Two swivelling frames are set inside the structure of the variable-volume luggage item, so as to constitute stiffening frames in the position of large volume shown on figure 2. Frames 5 form a pair of swivelling frames, forming a V in the position of small volume. Stiffening frames 4 are continuous rigid frames in the
 10 position of small volume ensuring the maintenance of the structure and the avoidance of distortion of the variable-volume luggage item 1. Struts 6 are designed to cooperate with the swivelling frames 5 in the position of large volume of figure 2.

The front part 2a of the floor 2 is preferably a rigid part,
 15 whose inner edge exhibits a saw-toothed shape.

The rear part 2b of floor 2 is a rigid part which advantageously exhibits an inner edge with a saw-toothed shape.

The saw-toothed shapes of the front part 2a and of the rear part 2b are preferably complementary in shape, or with fittings,
 20 ensuring an overall rigidity of floor 2 in the position of small volume shown on figure 1.

The front part 3a of the ceiling 3 can also be a rigid part exhibiting laterally a saw-toothed shape edge. The rear part 3b of the ceiling 3 is a rigid part which exhibits an interior edge with a
 25 saw-toothed shape.

The front part 3a and the rear part 3b of the ceiling 3 are complementary in shape on their side parts, so as to constitute an appreciably rigid ceiling supported by the stiffening frame 4.

On figure 2, the variable-volume luggage item 1 according to
 30 the invention is shown in a position of large volume.

In this position of large volume, the front part 2a is remote from the rear part 2b of floor 2. The front part 2a and the rear part 2b, can slide relatively one to the other, on rigid stems 2c. The rigid stems 2c can be affixed alternatively either on the front part
 5 2a or on the rear part 2b. The clamping means of the rigid stems 2c are fitted in the hollow parts of the saw-toothed profile while the guiding and sliding means are fitted in the protruding parts of the saw-toothed profile.

The rigid stems 2c may be made of any rigid material, for
 10 example out of glass fiber, out of steel, or a rigid plastic.

Fitting the clamping means of the rigid stems 2c in alternance in the front part 2a and the rear part 2b of floor 2 makes it possible to avoid the stress concentrations due to the embedment of the stems 2c. This avoids to create a shearing plan
 15 on the level of embeddings of the rigid stems 2c and allows to distribute the forces over a longer length, corresponding to the outline of the saw-toothed shape interior edges.

In a similar way, the front part 3a and the rear part 3b of the ceiling are connected one to the other by rigid stems 3c. The rigid
 20 stems 3c are embedded in alternance in the front part 3a and in the rear part 3b of the floor 3. The saw-toothed shape provisions of the inner edges of the floor 2 and of the ceiling 3 make it possible to increase the rigidity of the floor 2 and of the ceiling 3 as compared to straight edges, because the resisting points are set in
 25 alternance on both sides of the geometrical separation plan between the front part 2a and the rear part 2b of floor 2 or between the front part 3a and the rear part 3b of the ceiling 3.

The stems 2c and 3c are respectively guided in cylindrical bores 2d and 3d. The guiding bores 2d and 3d are advantageously
 30 opened upwards and downwards in order to limit surfaces of friction during the sliding motion of the stems 2c, 3c.

During their displacement towards a position of large volume, the 2a and 3a parts of the floor 2 and of the ceiling 3 are guided by the closed rigid frames 4 laid out laterally.

During this same movement, the swivelling frames 5 open
 5 towards the outside, being jointed with the back face of the luggage item. The swivelling frames 5 stand appreciably parallel in the large volume position. In their swivelling movement, the front ends of the swivelling frames 5 are guided on rails 5a installed in the edge of the front part 2a, 3a of the floor 2 and of the ceiling 3.
 10 To this end, the swivelling frames 5 preferably exhibit a C shape conformation, the front ends of the C shape being guided on the slides 5a from the position shown on figure 1 to the position shown on figure 2.

In the position depicted on figure 2, the C shaped frames 5 are
 15 supplemented by the struts 6 which brace the ends of the C shape to supplement the framework 5 and to thus constitute a rigid structure in the large volume position

Thus, thanks to the invention, the variable-volume luggage item exhibits a stable and a rigid structure in the position of small
 20 volume and in the position of large volume: indeed, in the small volume position, the side parts are stabilized by the rigid frames 4, while in a large volume position the side parts are stabilized by the swivelling frames 5 supplemented by struts 6.

Struts 6 are set in the alignment of the ends of the C shaped
 25 swivelling frames 5 thus making it possible to create a continuity between the ends of C shapes, by the "closing of the C".

The invention is here described in reference to only one pair of swivelling frames 5 but also applies to an unspecified number of swivelling frames 5, possibly with different orientations.

In the case of a plurality of swivelling frames, the swivelling frames may be jointed with the front or with the back of the variable-volume luggage item according to the invention.

When the swivelling frames are jointed with the back, as
5 depicted on figures 1 and 2, the swivelling frames are of a C shape conformation so as to allow access by the front opening of the variable-volume luggage item.

When the swivelling frames are jointed with the front of the variable-volume luggage item, on the side of the access opening ,
10 the swivelling frames may be continuous frames. This provision however limits the swivelling possibilities in the case where a telescopic handle is assembled on the back face of the variable-volume luggage item.

The joints with the front or with the back of the swivelling
15 frames are preferably made by hinges laid out on the top part or on the bottom part of the luggage item.

The movement of the swivelling frames simultaneously provides the spacing of the half-floors 2a, 2b and of the half-ceilings 3a, 3b to arrive in a position similar to the position
20 described on figure 2.

In order to ensure the rigidity and the stability of the variable-volume luggage item according to the invention, in all of the positions corresponding to a selected volume, it is advantageous to provide locking means for the stiffening frames so
25 as to maintain them in a position enabling the transmission of the vertical and side forces.

Figure 3 shows a locking means for a stiffening frame 4.

The locking means comprises at least one lock, for which the locking position is secured by an elastic effect, e.g. by a spring. In
30 the position drawn with dotted lines, the frame 4 is released from its lock 7, for example during an extension of the bag with a

spacing of the half-floors or half-ceilings. In the position drawn in plain lines, the rigid frame 4 is locked in its housing by the lock 7, so as to thus constitute an edge of maintenance of a side face of the luggage item according to the invention. This edge of maintenance comprises the vertical extensions of the frame 4 and the lower and upper outlines of the frame 4 set in the half-floors and the half-ceilings.

The rear part of the stiffening frame 4 may be clamped in the rear half-floor 2b and in the rear half-ceiling 3b, while the front parts of the frames 4 are slidingly connected in corresponding grooves with the front half-floor 2a and with the front half-ceiling 3a.

The invention also covers the not shown alternative embodiment where the front part of the stiffening frame 4 is clamped in the front half-floor 2a and in the front half-ceiling 3a, while the rear parts of the frames 4 are slidingly connected in corresponding grooves with the rear half-floor 2b and with the rear half-ceiling 3b.

The operation of the lock 7 can be carried out manually by direct depression, or by pulling a flexible bond, or by other means, so as to exert a force counteracting the effect of the elastic means keeping the lock 7 in the locking position.

Preferably, each stiffening frame 4 cooperates with a lower lock 7, set on the front part 2a of the floor 2, and with an upper lock 7, set on the front part 3a of the ceiling 3.

The invention also covers the not shown alternative embodiment where each stiffening frame 4 cooperates with a lower lock 7, set on the rear part 2b of the floor 2, and with an upper lock 7, set on the rear part 3b of the ceiling 3.

Locking means other than locks 7 can be considered without leaving the framework of the invention, the essential feature being

that the locking means of the stiffening frames 4 may be manually operated, directly, or indirectly, using hand driven or automatic control means.

Figure 4 shows a locking means of a mobile frame 5. The mobile frame 5 according to this example is a swivelling frame. Other types of strengthening frames can be considered in lieu of the swivelling frames 5, without leaving the framework of the invention.

The invention also covers not shown alternatives embodiments where frames 4 or 5 are sliding frames. In such a case, frames 4 and 5 can be assembled together, thus making a telescopic framework with a fix part corresponding to the geometry of frame 4 and a moving part whose complete exit corresponds to the geometry of frame 5 in the large volume position.

On figure 4, a locking means of a mobile frame 5 is laid out in the vicinity of a strut 6 supplementing the C shape conformation of a mobile frame 5.

In the position depicted in dotted lines, the mobile frame 5 has not yet completely swivel to its position of co-operation with the strut 6. The lock 8 is cleared by the end of the C shape conformation of the mobile frame 5, until it arrives in a final housing, corresponding to a large volume position, enabling the strut 6 to carry the forces. In this final position, the lock 8 elastically preloaded in its locking position by an elastic means impedes any retreat of the swivelling frame 5, by ensuring the rigidity of the combination consisting in the strut 6 and the C shape conformation of the mobile frame 5.

The lock may be actuated directly or via a flexible bond 8a operable from the inside or from the outside of the variable-volume luggage item according to the invention.

On figure 5, another embodiment of a variable-volume luggage item 10 according to the invention comprises nonrigid side par, a telescopic handle 11, an extensible floor 12 and a ceiling 13. Casters R are advantageously set on the floor 12. The expansion of the floor 12 and of the ceiling 13 makes it possible to increase the volume of the variable-volume luggage item 10 up to a selected position. The luggage item 10 comprises two rigid frames 14 and two swivelling frames 15. The swivelling frames 15 differ from the frames 5 described in reference to figures 1 to 4, by the fact that these swivelling frames 15 are jointed with the front face of the luggage, and are sliding on the side of the telescopic handle.

The swivelling frames 15 may be continuous swivelling frames or broken swivelling frames, exhibiting a C shape conformation, so as to allow the installation of the telescopic handle 11 inside luggage item 10. In such a case, the side tubes of the telescopic handle 11 may hold slideways or guiding rails for the ends of the C shape conformation of the swivelling frames 15, so as to ease the upward and downward swivelling of the swivelling frames 15.

The swivelling frames 15 may be connected to each other by a rigid framework 16 defining the front face of the luggage item and movable in translation. This provision of the rigid framework 16 defining the front face of the luggage item and movable in translation makes it particularly possible to coordinate the upwards and the downwards swivelling, of the swivelling-frames 15.

A hand driven operation means, integrated in the telescopic handle 11, may be designed so as to control the displacement of the swivelling frames 15 from their small volume position depicted in dotted lines, up to their position of large volume depicted in plain line.

The invention disclosed in reference to several specific embodiments is by no way limited to them, but covers any modification of shape and any alternative embodiment falling into the scope of the annexed claims.

CLAIMS

1 A variable-volume luggage item (1,10) a position of small volume and at least one position of large volume, the variable-volume luggage item comprising a modifiable floor (2) between a reduced position and at least one extended position, the modifiable floor (2) comprising a rigid front part (2a) and a rigid rear part (2b), characterized, in combination, by the fact that the front rigid part (2a) and the rear rigid part (2b) are complementary or with a fitting, to ensure the overall rigidity of the floor (2) in the position of small volume; by the fact that the rigid front part (2a) is remote by translation from rigid rear part (2b) in a position of large volume, by a relative sliding motion, on rigid means (2c) of translation; and by the fact that the piece of luggage comprises nonrigid side parts stabilized in the position of small volume by rigid stabilizing or stiffening means (4,6), as well as by rigid stabilizing or stiffening means (5,6) in a position of large volume, so as to exhibit a stable and rigid structure, in the position of small volume and in a position of large volume.

2. The luggage item according to claim 1, characterized by the fact that the luggage item (1) has a plurality of stiffening means (4, 5; 14, 15) for stiffening the nonrigid side parts so as to secure the luggage item (1, 10) in a position corresponding to a selected volume.

3. The luggage item according to claim 1, comprising a modifiable ceiling (3) between a reduced position and at least one extended position, said ceiling (3) comprising two rigid parts (3a, 3b) connected together, characterized in combination by the fact that the two rigid parts (3a, 3b) are complementary or with fittings, in order to ensure the overall rigidity of the ceiling (3) in the small volume position; by the fact that the rigid front part (3a) is

remote from the rear rigid part (3b) in a position of large volume by a relative sliding on rigid sliding means (3c); and by the fact that the luggage item comprises non-rigid side parts stabilized in the small volume position by rigid stabilizing means (4), as well as
 5 rigid stabilizing means (5,6) in the large volume position, so as to exhibit a stable and rigid structure in the small volume position and in a large volume position.

4. The luggage item according to claim 1, characterized by the fact that the floor (2) comprises two rigid parts (2a, 2b)
 10 comprising a inner edge with a saw-toothed profile, connected between them by rigid sliding stems (2c)

5. The luggage item according to claim 3, characterized by the fact that the ceiling (3) comprises two rigid parts (3a, 3b) comprising an inner edge with a saw-toothed profile and connected
 15 between them by rigid sliding stems (3c).

6. The luggage item according to any of the preceding claims, characterized by the fact that the stiffening means (4, 5; 14, 15) comprise rigid closed frames (4, 14) and swivelling frames (5, 15).

7. The luggage according to claim 6, characterized by the
 20 fact that the luggage item comprises swivelling frames (5) presenting of a C shape conformation and struts (6) making it possible to close the C shape conformation in order to prevent the distortion of the luggage item (1).

8. The luggage item according to claim 1, characterized by
 25 the fact that the luggage item (1) comprises locking means (7,8) of the stiffening means (4,5), so as to secure the luggage item (1) in a position corresponding to a selected volume.

9. The luggage item according to claim 7, characterized by
 30 the fact that the end of the swivelling frames (5) of a C shape conformation are guided, during the sliding motion, on rails (5a)

laid out on the front face side allowing the access to the contents of the luggage item.

10. The luggage item according to any of the preceding claims, characterized by the fact that the swivelling frames (5, 15) form a V in the position of small volume of the luggage item and stand appreciably parallel in a position of large volume of the luggage item.

11. The luggage according to any of the preceding claims, characterized by the fact that the luggage item (1) comprises operation means (8a) to shift from a small volume position of the luggage item (1) to a large volume position of the luggage item, and conversely.