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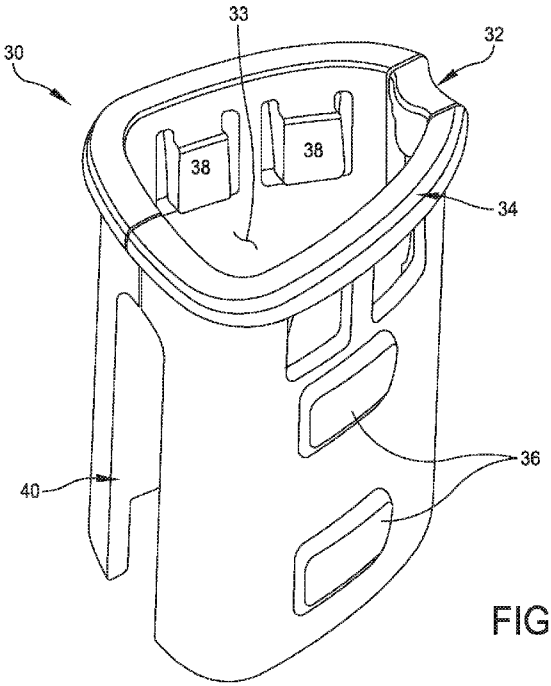

FIG. 4

(57) Abstract: An adaptive bushing is provided for that allows for smooth removal and insertion of a telescopic suitcase handle despite variations in handle size and shape due to environmental factors or manufacturing variances.

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[Continued on next page]

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ADAPTIVE BUSHING FOR A HANDLE

FIELD OF THE INVENTION

[0001] This disclosure relates to a bushing for a suitcase handle that reduces wobbling and instability by providing for a flexible bushing that adapts to the environmental changes in a suitcase handle or differences in handle sizes due to engineering and manufacturing tolerances.

BACKGROUND

[0002] Contemporary luggage designs often include wheels and a handle so that a user can more easily roll heavy luggage through an airport or other location with greater ease. Suitcase handles may comprise one or more lengths of rigid tubing that extend upwards from the top of the suitcase and include a handle or grip portion at its top for the user to grip and pull. In this manner, suitcases may be tipped at an angle so that the weight of the suitcase is carried by the wheels, while the upper portion of the suitcase is held at an angle and pulled by the user.

[0003] However, in some instances, extendible or telescopic handles can become loose or wobbly where they are attached to the luggage item. In some examples, the size and shape of an extendible handles may become altered due to normal wear and tear or environmental factors, such as temperature. Even under ordinary circumstances, the size and shape of an extendible handle may fluctuate due to ordinary variations in engineering and manufacturing tolerances. When these variations in the size and shape of an extendible handle occur, the handle may become loose within its housing or where it is attached to a luggage item thereby creating a wobbly handle.

SUMMARY OF THE INVENTION

[0004] Aspects and embodiments are directed to a telescopic suitcase assembly including a lower extendible handle section movably disposed between a compressed position and extended position. The suitcase assembly further includes an upper extendible handle section movably disposed between a compressed position and an extended position within said lower extendible handle section, and at least one adaptive bushing including one or more projecting tabs

configured to exert an elastic force in an inward direction. The at least one adaptive bushing includes a first adaptive bushing disposed in an upper portion of the lower extendible handle section and configured to surround and movably receive the upper extendible handle section between the compressed position and the extended position.

[0005] Additional aspects and embodiments are directed to a telescopic handle assembly including an extendible handle section movably disposed between a compressed position and an extended position and an extendible handle housing configured to receive the extendible handle section when in the compressed position. The handle assembly further includes at least one adaptive bushing including one or more projecting tabs configured to exert an elastic force in an inward direction. The at least one adaptive bushing includes a first adaptive bushing disposed in an upper portion of the extendible handle housing and configured to surround and movably receive the extendible handle section between the compressed position and the extended position.

[0006] Additional aspects and embodiments are directed to a luggage article including a luggage body, a lower extendible handle section movably disposed between a compressed position and extended position, and an upper extendible handle section movably disposed between a compressed position and an extended position within said lower extendible handle section. The luggage article further includes an extendible handle housing disposed within the luggage body and configured to contain the lower extendible handle section when in the compressed position, a handle connected to a top portion of the upper extendible handle section, and at least one adaptive bushing including one or more projecting tabs configured to exert an elastic force in an inward direction. The at least one adaptive bushing includes a first adaptive bushing disposed in an upper portion of the lower extendible handle section and configured to surround and movably receive the upper extendible handle section between the compressed position and the extended position.

[0007] At least one embodiment of the bushing and the suitcase handle includes one or more projecting tabs disposed on an interior wall of the adaptive bushing.

[0008] Aspects and embodiments of the bushing and the suitcase handle include that the bushing can be formed of nylon, polypropylene, polycarbonate, Teflon, mixtures thereof, or mixtures thereof with other plastic materials.

[0009] Aspects and embodiments of the bushing and the suitcase handle include that the bushing is made up of two halves connected by a living hinge.

[0010] Aspects and embodiments of the bushing and the suitcase handle include that the bushing in a closed position further comprises an internal opening that has substantially the same shape and dimensions as the cross-section of said upper extendible handle.

[0011] Aspects and embodiments of the bushing and the suitcase handle include that the bushing further comprises a rim disposed at a top end of the adaptive bushing.

[0012] Aspects and embodiments of the bushing and the suitcase handle include that the bushing further comprises one or more projections on an exterior surface of the adaptive busing for anchoring the adaptive bushing within a corresponding recessed portion on the interior surface of said lower extendible handle section.

[0013] Aspects and embodiments of the bushing and the suitcase handle include that the bushing further comprises one or more channels to allow the adaptive bushing to partially compress for insertion into said lower extendible handle section.

[0014] Aspects and embodiments of the suitcase handle include that the handle comprises a recessed handle housing with one or more holes for receiving the telescopic handle.

[0015] Aspects and embodiments of the bushing and the suitcase handle include that the bushing further comprises at least one additional adaptive bushing disposed within the recessed handle housing for receiving a telescopic handle.

[0016] Aspects and embodiments of the suitcase handle include that the handle comprises at least one telescopic handle housing that is immovably fixed within a luggage item for receiving said upper and lower extendible handle sections.

[0017] Aspects and embodiments of the bushing and the suitcase handle include that the bushing further comprises at least one additional adaptive bushing disposed within the lower extendible handle section for receiving an upper extendible handle section.

[0018] Aspects and embodiments of the suitcase handle include that the handle comprises a handle portion at a top end of the upper extendible handle section.

[0019] Aspects and embodiments of the suitcase handle include that the handle comprises two parallel lengths of the lower extendible handle section and the upper extendible handle section, wherein said two parallel lengths of upper extendible handle section are attached to said handle section, and wherein at least two adaptive bushings are disposed within said two parallel lengths of lower extendible handle sections.

[0020] Aspects and embodiments of the suitcase handle include that the handle comprises a button on said handle section for selectively retracting one or more spring-loaded bullets.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Various aspects of at least one example of the present disclosure are discussed below with reference to the accompanying figures. The figures are provided for the purposes of illustration and explanation and are not intended as a definition of the limits of the invention. In the figures:

[0022] FIG. 1 is a rear perspective view of a suitcase with a telescopic handle in an extended position.

[0023] FIG. 2 is an internal view of an exemplary telescopic handle housing that may be installed within a luggage item.

[0024] FIG. 3 is a top-side perspective view of a bushing for a telescopic suitcase handle in an open configuration.

[0025] FIG. 4 is a top-front perspective view of a bushing for a telescopic suitcase handle in a closed configuration.

[0026] FIGS. 5A-5F are side perspective views showing various embodiments of the bushing shown in FIGS. 3-4.

[0027] FIGS. 6A-6C are diagrams showing various telescopic handle segments or handle housings with respective adaptive bushings installed therein.

[0028] FIG. 7 is a diagram showing a deconstructed telescopic handle including four telescopic handle segments or handle housing segments with respective bushings installed in each segment.

[0029] FIG. 8 is a diagram showing a portion of a telescopic handle assembly including two telescopic handle segments or handle housing segments with respective bushings installed in each segment.

[0030] FIG. 9 is a diagram showing a portion of a telescopic handle assembly including three telescopic handle segments or handle housing segments with respective bushings installed in each segment.

[0031] FIG. 10 diagram showing a portion of a telescopic handle assembly including two telescopic handle segments and a hole leading to a handle housing with respective bushings installed in each segment and the hole.

LIST OF REFERENCE NUMERALS UTILIZED IN THE DRAWINGS

[0032] With regard to reference numerals used, the following numbering is used throughout the description and drawings. Where technical features in the figures or detailed description are followed by these reference numerals, the reference numerals have been included for the sole purpose of increasing the intelligibility of the figures or detailed description. Accordingly, neither the reference numerals nor their absence are intended to have any limiting effect on the scope of any claim elements. In the figures, each identical or nearly identical component that is

illustrated in various figures is represented by a like numeral. For purposes of clarity, not every component may be labeled in every figure.

[0033] Reference numeral **2** refers to a suitcase or luggage.

[0034] Reference numeral **4** refers to a front side of a suitcase.

[0035] Reference numeral **6** refers to a rear side of a suitcase.

[0036] Reference numeral **8** refers to a top side of a suitcase.

[0037] Reference numeral **10** refers to a bottom side of a suitcase.

[0038] Reference numeral **12** refers to a recessed handle housing.

[0039] Reference numeral **14** refers to a telescopic handle.

[0040] Reference numeral **16** refers to a handle portion.

[0041] Reference numeral **18** refers to a hollow end of a handle portion.

[0042] Reference numeral **20** refers to one or more holes.

[0043] Reference numeral **22** refers to a button.

[0044] Reference numeral **24** refers to an upper extendible handle section.

[0045] Reference numeral **26** refers to a lower extendible handle section.

[0046] Reference numeral **27** refers to a telescopic handle locking bullet.

[0047] Reference numeral **28** refers to a telescopic handle housing.

[0048] Reference numeral **30** refers to an adaptive bushing.

[0049] Reference numeral **31** refers to an exterior surface of an adaptive bushing.

[0050] Reference numeral **32** refers to a living hinge on an adaptive bushing.

[0051] Reference numeral **33** refers to an interior surface of an adaptive bushing.

[0052] Reference numeral **34** refers to a rim on an adaptive bushing.

[0053] Reference numeral **35** refers to an anchor.

[0054] Reference numeral **36** refers to projections on an adaptive bushing.

[0055] Reference numeral **38** refers to spring-loaded tabs on an adaptive bushing.

[0056] Reference numeral **40** refers to channels on an adaptive bushing.

[0057] Reference numeral **100** refers to a telescopic handle assembly.

[0058] Reference numeral **110** refers to a telescopic handle segment or section.

[0059] Reference numeral **112** refers to an outer surface of a telescopic handle section.

[0060] Reference numeral **114** refers to an inner surface of a telescopic handle section.

DETAILED DESCRIPTION

[0061] Reference will now be made in detail to representative examples illustrated in the accompanying drawings. It should be understood that the following descriptions are not intended to limit this disclosure to one preferred example. To the contrary, it is intended to cover alternatives, modifications, and equivalents as may be included within the spirit and scope of the disclosure as defined by the appended claims.

[0062] As disclosed herein, the devices and methods presented can be used for an adaptable bushing for a telescopic suitcase handle that provides a stronger connection between the concentric tubes within a telescopic suitcase handle that is resistant to environmental changes and/or variations in manufacturing or engineering tolerances.

[0063] For the purpose of explanation and illustration, and not limitation, an example of a suitcase with a telescopic handle is shown in FIG. 1. As illustrated, the suitcase **2** shown in FIG. 1 can be of any suitable specific construction in terms of materials, manner of assembly, and configurations of the parts, including both hard shell luggage and soft luggage. In some implementations, a telescopic handle may be used with a wheeled suitcase. The exemplary suitcase **2**, as shown in FIG. 1, includes a front side **4**, and rear side **6**, a top side **8**, and a bottom side **10**.

[0064] Proximate to top side **8**, suitcase **2** also includes a recessed handle housing **12** that is formed of hard plastic material or another suitably rigid material as shown, for example, in FIG. 1. In some examples, the recessed handle housing **12** may be disposed on the top side **8** and adjacent to rear side **6**. However, in other examples, the recessed handle housing **12** may be disposed anywhere on top side **8**, or any other side of suitcase **2**, and may preferably be located approximately in the middle of top side **8**. The recessed handle housing **12** may comprise any suitable shape for receiving a handle portion **16** of a telescopic handle **14**, when the telescopic handle **14** is in a fully-inserted position. The recessed handle housing **12** may also include one or more holes **20** for receiving the telescopic handle **14** and through which the telescopic handle **14** may slide when it is being inserted or retracted into suitcase **2**. In some examples, the handle portion **16** may include a button **22** that controls an internal locking mechanism for the telescopic

handle **14** (such as is shown in FIG. 1). In another example, the button **22** that controls an internal locking mechanism for the telescopic handle portion **16** may be located on a surface of the recessed handle housing **12** (such as is shown in FIG. 2). However, in other implementations, button **22** may be located elsewhere on suitcase **2**, as long as button **22** is readily accessible to the user when suitcase **2** is in use.

[0065] FIG. 1 shows a telescopic handle **14** in an extended position. As shown, telescopic handle **14** may comprise two extendible handle sections or segments, including an upper extendible handle section **24** and a lower extendible handle section **26**. As shown in FIG. 1, in some examples, telescopic handle **14** may comprise two parallel pairs of extendible handle sections that are attached at the top to the two ends of handle portion **16**. In other implementations, telescopic handle **14** may comprise just one upper extendible handle section **24** and one lower extendible handle section **26** that may be attached to one end or the middle of handle portion **16** to form a T-shaped handle.

[0066] In some examples, handle portion **16** may comprise a horizontal portion that a user may grip with their hand while pulling or pushing suitcase **2**. Handle portion **16** may comprise any suitably rigid material, such as hard plastic, ABS plastic, PVC, metal, wood, or any other substantially rigid materials as are known to those of ordinary skill in the art. In some implementations, handle portion **16** may further include a leather or cloth wrapping around the horizontal gripping portion for the comfort of the user as well as to improve the overall appearance of suitcase **2**. As shown, for example, in FIG. 1, the horizontal portion of handle portion **16** may include one or more hollow ends **18** for attaching handle portion **16** to upper extendible handle section **24**. The horizontal portion and one or more hollow ends **18** of handle portion **16** need not be separate components, but may be integrally formed with one another. Handle portion **16** may also be attached to upper extendible handle section **24** using any suitable means of attachment as are known to those of ordinary skill in the art, including screwing, welding, soldering, locking, or otherwise fastening.

[0067] Upper extendible handle section **24** may comprise a length of rigid material, such as hard plastic, ABS plastic, PVC, metal, wood, or any other substantially rigid materials as are known

to those of ordinary skill in the art. In some examples, upper extendible section **24** may comprise a circular cross-section, while in other examples, a square, rectangular, rounded, or irregular cross-section may be utilized. Upper extendible handle section **24** may therefore comprise any aesthetically pleasing design and shape and is not confined to any particular cross-sectional shape along its length. At its lower end, upper extendible handle section **24** is movably disposed within lower extendible handle section **26**, which has an internal cross-sectional shape and dimensions that substantially match the external cross-sectional shape and dimensions of upper extendible handle section **24**. In some embodiments, the internal dimensions of lower extendible handle section **26** may be slightly larger than the external dimensions of upper extendible handle section **24**, in order to allow upper extendible handle section **24** to easily slide within lower extendible handle section **26**.

[0068] As further shown, for example, in FIG. 1, lower extendible handle section **26** may comprise a length of rigid material, such as hard plastic, ABS plastic, PVC, metal, wood, or other substantially rigid materials as are known to those of ordinary skill in the art. At its lower end, the lower extendible handle section **26** may be movably disposed within holes **20** in recessed handle housing **28**. The holes **20** may have an internal shape and diameter that is substantially similar to the external shape and diameters of lower extendible handle section **26**. Preferably, the internal dimensions of the holes **20** may be slightly larger than the external dimensions the lower extendible handle section **26**, in order to allow the lower extendible handle section **26** to easily slide within the holes **20**. The lower extendible handle section **26** may not protrude from the holes **20** when the telescopic handle **14** is in a fully inserted or partially inserted position. For example, a partially inserted position may occur when the lower extendible handle section **26** is fully inserted into the holes **20,** but the upper extendible handle section **24** is disengaged from the lower extendible handle section **26** (not shown). The lower extendible handle section **26** is visible when the telescopic handle **14** is in a fully extended position as shown, for example, in FIG. 1.

[0069] FIG. 2 shows a diagram of a telescopic handle housing **28** disposed within the suitcase **2**. For example, the telescopic handle housing **28** may be disposed within the suitcase **2** beneath the recessed handle housing **12** and behind the rear surface **6**. The telescopic handle housing **28** is

configured to receive and retain one or more segments of the telescopic handle **14** when the telescopic handle **14 is** in a partially or fully inserted or collapsed position.

[0070] As shown, for example, in FIG. 2, telescopic handle **14** may collapse into telescopic handle housing **28** when telescopic handle **14** is in an inserted position. Telescopic handle housing **28** may comprise a stationary tube for receiving upper extendible handle section **24** and lower extendible handle section **26** when telescopic handle **14** is in an inserted position. Thus, when telescopic handle **14** is in a fully inserted position, upper extendible handle section **24** may be disposed within lower extendible handle section **26**, which, in turn, may be disposed within telescopic handle housing **28**.

[0071] The telescopic handle housing **28** may comprise a length of rigid tube material, such as hard plastic, ABS plastic, PVC, metal, wood, or other substantially rigid materials as are known to those of ordinary skill in the art. At its upper end, telescopic handle housing **28** may be fixed beneath holes **20** in recessed handle housing **12**. At its lower end, telescopic handle housing **28** may be anchored to an internal frame or support structure. In some examples, telescopic handle housing **28** may be directly or indirectly attached to suitcase **2** via anchor **35**. The hollow space within telescopic handle housing **28** may have an internal shape and diameter that is substantially similar to the external shape and diameter of lower extendible handle section **26**. Preferably, the internal dimensions of the hollow space within telescopic handle housing **28** may be slightly larger than the external dimensions lower extendible handle section **26**, in order to allow lower extendible handle section **26** to easily slide within telescopic handle housing **28**.

[0072] The telescopic handle **14** may further include additional telescopic handle sections (not shown) in addition to the upper and lower sections **24**, **26** and the handle housing **28** shown in FIGS. 1-2. Any such additional sections will be configured to possess external dimensions equal to or slightly smaller than the internal dimensions of whichever handle section is positioned immediately below the additional section. Similarly, any additional section will be configured to possess internal dimensions equal to or slightly smaller than the external dimensions of any handle section positioned immediately above the additional section.

[0073] Still referring to FIGS. 1-2, upper extendible handle section **24**, lower extendible handle section **26**, and telescopic handle housing **28** together cooperate to provide a telescopic handle for luggage in a manner familiar to one of ordinary skill in the art. In some examples, button **22** atop handle portion **16** may control one or more internal locking mechanisms for holding the handle sections in place with respect to one another in one or more stages of extension. In some examples, the button **22** may control an internal cable that may cause one or more spring-loaded bullets **27** to retract, allowing the concentric handle sections to move with respect with one another. The button **22** may be released when the user has repositioned the telescopic handle into a desired position, thereby allowing spring-loaded bullets **27** to extend outward through one or more openings in the concentric handle sections, thereby holding the concentric handle sections in place.

[0074] The one or more locking bullets **27** involved in the locking mechanism may be disposed at or near the interface between any two segments of the telescopic handle **14**. For example, in FIG. 1, the locking bullets **27** are shown disposed between the upper extendible handle section **24** and the lower extendible handle section **26.** Each bullet **27** is configured to move between a locked position and a compressed position. The locking bullets **27** are shown in the locked position, which causes the upper extendible handle section **24** to be retained in an extended position relative to the lower extendible handle section **26.** The button **22** may be mechanically coupled to the locking bullets **27** and configured to release the locking bullets **27** from the locked position to the compressed position responsive to the button **22** being depressed. In certain additional embodiments, the locking bullets **27** may be compressed responsive to being pressed directly inward, without a button **22** also needing to be depressed. However, it is understood that no particular locking mechanism or telescopic handle arrangement is required by the present disclosure, which provides an adaptive bushing suitable for use with any telescopic handle.

[0075] It is appreciated that in use, the handle sections may undergo environmental changes, for example, expansion or contraction due to temperature changes, or warping and bending over time due to normal wear and tear. In some instances, such expansion and/or bending may cause interior telescopic handle sections to become compressed within an exterior section of the handle, thereby making it difficult to expand or contract the handle due to friction between the

concentric sections. In other instances, normal variations within the manufacturing process and engineering tolerances may result in telescopic sections that are too wide to fit movably within an exterior section which, again, may cause an interior section to become compressed within the an exterior section of the handle, thereby making it difficult to expand or contract the handle due to friction between the concentric sections. In other instances, handle sections may be manufactured with an effective external diameter that is somewhat smaller than intended, resulting in unstable telescopic handle sections and internal sections may wobble within exterior sections.

[0076] FIGS. 3 and 4 show a top view of an adaptive bushing **30** for a telescopic suitcase handle that may be used in some implementations of this disclosure in open and closed configurations, respectively. An adaptive bushing, such as the adaptive bushing **30,** may be employed within a telescopic handle in some examples of the present disclosure in order to allow a luggage item to adapt to changes in the telescopic handle due to environmental factors or normal manufacturing variances. As shown, for example, in FIGS 3 and 4, the adaptive bushing **30** made be made out of any suitably rigid materials with elastic properties. In some examples, nylon, polypropylene, polycarbonate, Teflon, polymer, plastic, composites thereof, or mixtures thereof or with other materials may be employed. As shown in FIG. 3, in some examples, the adaptive bushing **30** may be molded in an open configuration with a living hinge **32** disposed between two symmetrical or non-symmetrical halves of the adaptive bushing, for ease of manufacturing. Once molded, adaptive bushing **30** may be closed along living hinge **32**, for insertion into a telescopic handle, as shown for example in FIG. 4.

[0077] As shown in FIG. 4, in some examples, adaptive bushing **30** may have an exterior size and shape along its length so as to conform to the interior dimensions of openings within a telescopic handle for receiving an interior section. For example, the bushing **30** may be sized and shaped such that an external cross section sits substantially flush relative to the interior dimensions of the holes **20** in the recessed handle housing **12** or the openings proximate the top ends of the telescopic handle housing **28,** the lower extendible handle section **26**, the upper extendible handle section **24** (if configured to receive an additional handle section above it), or an additional telescopic handle section not shown in FIGS. 1-4.

[0078] A rim **34** may be disposed at a top end of adaptive bushing **30** to impede the progress of the adaptive bushing once it is fully inserted into the appropriate opening. In some examples, one or more projections **36** on the exterior surface **31** of adaptive bushing **30** may anchor the bushing within a corresponding recess within a telescopic handle. In additional implementations, one or more channels **40** may be disposed along the sidewalls of adaptive bushing **30** to help properly align the bushing along an internal projection within a section of a telescopic handle or to allow adaptive bushing **30** to more readily compress for insertion into a section of a telescopic handle.

[0079] For example, the adaptive bushing **30** is inserted in a first, exterior section **26** of a telescopic handle **14** as described above. **A** second, interior section **24** of the telescopic handle **14** is inserted into the first section **26** and abuts one or more interior surfaces **33** of the bushing **30.** The bushing **30** may include one or more spring-loaded tabs **38** formed on its interior surfaces **33** to help stabilize the second section **24** of the telescopic handle **14** as it occupies and moves within the first section **26**. In some examples, spring-loaded tabs **38** may be integrally formed from the same sufficiently rigid and elastic materials as the remainder of adaptive bushing **30**, as described above. Accordingly, despite variations in the dimensions of the telescopic handle sections **24**, **26**, telescopic handle housing **28**, or holes **20** due to environmental factors and manufacturing tolerances, the elasticity of the adaptive bushing **30** and its interior surfaces **33** and tabs **38** may aid in properly aligning and spacing the telescopic handle **14** such that the desired handle functionality may be maximized or prolonged**.** In other examples, spring-loaded tabs **38** may be formed of a separate structure that may be attached to the interior of a bushing, such that it is spring-biased in an interior direction within the bushing. Regardless of their manner of construction, spring-loaded tabs **38** are biased in an interior direction, such that the interior section of a telescopic handle **14** disposed within the bushing **30** is appropriately spaced away from the interior walls **33** of the bushing, yet a sufficient amount of friction is maintained between the tabs **38** and the interior telescopic section.

[0080] As one of ordinary skill in the art will appreciate, upon receiving an interior section of a telescopic handle formed with the correct (i.e. ideal) shape and dimensions, spring-loaded tabs

38 and the interior surface **33** will each depress somewhat to moveably retain the telescopic handle section within the bushing **30**. However, even where the interior telescopic handle section **24** is somewhat larger or smaller due to environmental factors or manufacturing variances, spring-loaded tabs **38** and the interior surface **33** may compress more or less than they otherwise would to accommodate a variance in size, while still maintaining the correct amount of friction between the bushing and exterior surface of the interior handle section **24**.

[0081] Similarly, the one or more projections **36** and the exterior surface **31** of the bushing **30** are also elastic. Accordingly, if the exterior telescopic handle section **26** containing the bushing **30** is somewhat larger or smaller due to environmental factors or manufacturing variances, projections **36** and the exterior surface **31** may compress more or less than they otherwise would to accommodate a variance in size, still maintaining a correct amount of friction between the bushing **30** and the interior surface of the exterior handle section **26**.

[0082] As one of ordinary skill in the art will appreciate, the amount of elasticity and compression that may be provided for in the spring-loaded tabs **38, the** projections **36**, the interior surface **33**, or the exterior surface **31** will depend on the amount of variation that may be expected within the size and shape of a handle section **14** to be received by the bushing **30** based on environmental and manufacturing factors. In this manner, adaptive bushing **30** allows for variations within the within the size and shape of a handle section to be received by the bushing **30** without sacrificing the functional advantages of a telescopic handle and maintaining a smooth transition between inserted and retracted positions for a telescopic handle.

[0083] FIGS. 5A-5F are diagrams illustrating various embodiments of the adaptive bushing **30**. As shown in FIGS. 5A-5F, the bushing **30** is originally molded in an unfolded or open position, such as the position shown in FIG. 3. The bushing **30** is then folded or closed (for example as shown in FIG. 4) so that it may be inserted into a portion of the telescopic handle configured to receive the adaptive bushing **30**.

[0084] As demonstrated by the various embodiments shown in FIGS. 5A-5F, the adaptive bushing **30** may be sized and shaped in a variety of manners in accordance with the expected

shape of the telescopic handle section **24**, **26**, hole **20**, or housing **28** in which the bushing **30** is configured to rest. The bushing **30** may be made longer or shorter to provide varying levels of contact with the interior handle section via the spring-loaded tabs **38** over a longer area thereby affecting an amount of stability provided. For example, FIG. 5B shows a longer embodiment in which the upper spring-loaded tabs **38a** are located a certain distance away from the lower spring-loaded tabs **38b** in a vertical direction. In contrast, FIG. 5D shows a shorter embodiment in which the upper spring-loaded tabs **38a** are located closer to the lower spring-loaded tabs **38b** in the vertical direction.

[0085] Also shown in FIGS. 5A-5F, the positioning of the projections **36** relative to the spring-loaded tabs **38** may vary depending on the chosen bushing **30** configuration. For example, in FIG. 5C a lower projection **36b** is shown offset relative to a lower spring-loaded tab **38b** in the vertical direction. In contrast, in FIG. 5D a lower projection **36b** is shown as vertically aligned with and disposed between two lower spring-loaded tabs **38b**, **38c**. The adaptive bushing **30** may therefore include any number of projections **36** or spring-loaded tabs **38** arranged in any suitable manner on the surface of the bushing **30** depending on a desired amount of friction or elasticity.

[0086] FIGS. 6A-6C show three examples of various adaptive bushings **30** configured to be inserted in a respective telescopic handle segment **110**. Each telescopic handle segment **110** may correspond to any of the telescopic handle sections **24** or **26,** an internal segment such as the telescopic handle housing **28**, or another telescopic segment as known to those skilled in the art. In each of the examples shown in FIGS. 6A-6C, the adaptive bushing **30** is folded and inserted into the top portion of each respective handle section **110**. The adaptive bushing **30** is formed such that the outer surface **31** of each bushing **30** substantially matches the dimensions of and abuts an inner surface **114** of each respective handle section **110** in which the bushing **30** has been inserted.

[0087] FIG. 7 shows a handle assembly **100** including successive telescopic handle sections **110a-110d** and corresponding adaptive bushings **30a-30d**. As shown, the outermost, lowermost

telescopic handle section **110a** has the largest cross-sectional area and the innermost, uppermost telescopic handle section **110d** has the smallest cross-sectional area. Similarly, the adaptive bushing **30a** has the largest cross-sectional area since it is configured to be inserted into the largest handle section **110a** and the adaptive bushing **30d** has the smallest cross-sectional area since it is configured to be inserted into the smallest handle section **110d**.

[0088] Each successively larger telescopic handle section and adaptive bushing is sized to possess a cross-sectional area that is slightly smaller than the previous piece below it. This configuration allows each successive piece to be inserted into the previous bushing forming a substantially snug fit. As explained previously, the elasticity provided by each bushing **30a-30d** is sufficient to accommodate minor deviations in sizing.

[0089] Although the suitcases **2** and handle assemblies **100** shown herein include specific numbers of telescopic handle sections and adaptive bushings (such as the four telescopic handle sections **110a-110d** and the four adaptive bushings **30a-30d** shown in FIG. 7) various configurations may include a lesser or greater number of telescopic handle sections and adaptive bushings with cross-sectional areas sized accordingly.

[0090] Although the example shown in FIG. 7 includes an adaptive bushing inserted into each telescopic handle section, in various other embodiments, only certain handle sections, housings, or holes may include an adaptive bushing. For example, an uppermost handle section **110d** may not require an adaptive bushing **30d** since it only needs to support a handle positioned above. In other embodiments, only a single handle section may require an adaptive bushing while remaining handle sections may not. For example, the lowermost handle section **110a** (or handle housing or housing hole) may be the only component requiring an adaptive bushing **30a** since it supports the weight of each additional handle section **110b-110d** positioned above.

[0091] FIG. 8 shows a handle assembly **100** illustrating the spatial relationship between successive telescopic handle sections **110a-110b** and their respective adaptive bushings **30a-30b**. The lower bushing **30a** is folded and placed inside of the lower telescopic handle section **110a**

such that the outer surface **31a** of the bushing **30a** abuts and substantially matches the dimensions of the inner surface **114a** of the lower handle section **110a**. The upper telescopic handle section **110b** is inserted into the lower bushing **30a** such that the outer surface **112b** of the handle section **110b** abuts and substantially matches the dimensions of the inner surface **33a** of the bushing **30a**. The upper bushing **30b** is folded and placed inside of the upper telescopic handle section **110b** such that the outer surface **31b** of the bushing **30b** abuts and substantially matches the dimensions of the inner surface **114b** of the upper handle section **110b**.

[0092] FIG. 9 shows a handle assembly **100** including three telescopic handle sections **110a**-**110c** and respective adaptive bushings **30a**-**30c**. This assembly is similar to the example shown in FIG. 8, with the addition of a third telescopic handle segment **110c** and adaptive bushing **30c**. Specifically, the uppermost telescopic handle section **110c** is inserted into the middle bushing **30b** such that the outer surface **112c** of the handle section **110c** abuts and substantially matches the dimensions of the inner surface **33b** of the bushing **30b**. The uppermost bushing **30c** is folded and placed inside of the uppermost telescopic handle section **110c** such that the outer surface **31c** of the bushing **30c** abuts and substantially matches the dimensions of the inner surface **114c** of the upper handle section **110c**.

[0093] FIG. 10 shows a handle assembly **100** including two telescopic handles, a lower, outer telescopic handle **26** and an upper, inner telescopic handle **24**. The assembly **100** further includes an internal handle housing **28** having a recession **12** and a hole **20** for providing access to the internal housing **28**. The assembly **100** is similar to the example shown in FIG. 9, however the lowermost handle section **110a** has been replaced by the internal handle housing **28**. Accordingly, the lower bushing **30a** is folded and placed inside of housing **28** via the hole **20** such that the outer surface **31a** of the bushing **30a** abuts and substantially matches the inner dimensions the housing **28**. Placing the adaptive bushing **30a** within the internal handle housing **28** may be especially desirable since the housing **28** contains and supports the weight of each handle segment **24**, **26** positioned above it.

[0094] Although various examples shown herein include an adaptive bushing inserted into each telescopic handle section or other aperture (such as the examples shown in FIGS. 7-10), in other embodiments, only certain handle sections, housings, or holes may include an adaptive bushing as needed.

[0095] While the disclosed subject matter is described herein in terms of certain examples, those skilled in the art will recognize that various modifications and improvements can be made to the disclosed subject matter without departing from the scope thereof. As such, the particular features claimed below and disclosed above can be combined with each other in other manners within the scope of the disclosed subject matter such that the disclosed subject matter should be recognized as also specifically directed to other implementations having any other possible permutations and combinations. It will be apparent to those skilled in the art that various modifications and variations can be made in the systems and methods of the disclosed subject matter without departing from the spirit or scope of the disclosed subject matter. Thus, it is intended that the disclosed subject matter include modifications and variations that are within the scope of the appended claims and their equivalents.

What is claimed is:

CLAIMS

1. A telescopic handle assembly comprising:

a lower extendible handle section movably disposed between a compressed position and extended position;

an upper extendible handle section movably disposed between a compressed position and an extended position within said lower extendible handle section; and

at least one adaptive bushing including one or more projecting tabs configured to exert an elastic force in an inward direction, the at least one adaptive bushing including a first adaptive bushing disposed in an upper portion of the lower extendible handle section and configured to surround and movably receive the upper extendible handle section between the compressed position and the extended position.

2. The telescopic handle assembly of claim 1 wherein each of the at least one adaptive bushing is formed of nylon, polypropylene, polycarbonate, Teflon, mixtures thereof, or mixtures thereof with other plastic materials.

3. The telescopic handle assembly of claim 1 wherein each of the at least one adaptive bushing is made up of two halves connected by a living hinge.

4. The telescopic handle assembly of claim 1 wherein the first adaptive bushing comprises an internal opening that has substantially the same shape and dimensions as an outer surface of the upper extendible handle section.

5. The telescopic handle assembly of claim 1 further comprising an extendible handle housing configured to contain the lower extendible handle section when in the compressed position.

6. The telescopic handle assembly of claim 5 further comprising:

a handle connected to a top portion of the upper extendible handle section; and

a recessed handle housing including one or more holes leading to the extendible handle housing, the recessed handle housing being configured to receive the handle such that a top of the handle sits flush with or below an upper surface of the recessed handle housing when the lower and upper extendible handle sections are each in the compressed position.

7. The telescopic handle assembly of claim 6 further comprising:

two parallel lengths of the lower extendible handle section and the upper extendible handle section, wherein the two parallel lengths of the upper extendible handle section are attached to the handle;

a second adaptive bushing of the at least one adaptive bushing; and

wherein the first and second adaptive bushings are each disposed in respective upper portions of the lower extendible handle housing and configured to surround and movably receive each of the two parallel lengths of upper extendible handle section between the compressed position and the extended position , wherein the first and second adaptive bushing each comprise internal openings having substantially the same shape and dimensions as an outer surface of a respective one of the parallel lengths of upper extendible handle section.

8. The telescopic handle assembly of claim 7 further comprising a third adaptive bushing of the at least one adaptive bushing, the third adaptive bushing disposed in an upper portion of the extendible handle housing and configured to surround and movably receive the lower extendible handle section between the compressed position and the extended position, wherein the third adaptive bushing comprises an internal opening that has substantially the same shape and dimensions as an outer surface of the lower extendible handle section.

9. The telescopic handle assembly of claim 8 further comprising:

a fourth adaptive bushing of the at least one adaptive bushing;

wherein the one or more holes of the recessed handle housing includes two holes leading to the extendible handle housing;

wherein the third and fourth adaptive bushings are each disposed in one of the two holes and configured to surround and movably receive each of the two parallel lengths of lower extendible handle section between the compressed position and the extended position; and

wherein the third and fourth adaptive bushing each comprise internal openings having substantially the same shape and dimensions as an outer surface of a respective one of the parallel lengths of lower extendible handle section.

10. The telescopic handle assembly of claim 9 further comprising a button disposed on the handle section for selectively retracting one or more spring-loaded bullets , the spring-loaded bullets configured to lock at least one of the lower extendible handle section and the upper extendible handle section in the extended position.

11. The telescopic handle assembly of claim 9 wherein each of the at least one adaptive bushing further includes a rim configured to retain each adaptive bushing in a fixed position.

12. The telescopic handle assembly of claim 9 wherein each of the at least one adaptive bushing further includes at least one projection disposed on an exterior surface and configured to retain each adaptive bushing in a fixed position by exerting an elastic force in an outward direction.

13. The telescopic handle assembly of claim 9 wherein each of the at least one adaptive bushing further comprises one or more channels configured to allow the bushing to partially compress for aiding insertion into its respective position.

14. The telescopic handle assembly of claim 5 wherein the extendible handle housing is immovably fixed within a luggage item.

15. A telescopic handle assembly comprising:

an extendible handle section movably disposed between a compressed position and an extended position;

an extendible handle housing configured to receive the extendible handle section when in the compressed position; and

at least one adaptive bushing including one or more projecting tabs configured to exert an elastic force in an inward direction, the at least one adaptive bushing including a first adaptive bushing disposed in an upper portion of the extendible handle housing and configured to surround and movably receive the extendible handle section between the compressed position and the extended position.

16. The telescopic handle assembly of claim 15 wherein each of the at least one adaptive bushing is formed of nylon, polypropylene, polycarbonate, Teflon, mixtures thereof, or mixtures thereof with other plastic materials.

17. The telescopic handle assembly of claim 15, wherein each of the at least one adaptive bushing is made up of two halves connected by a living hinge.

18. The telescopic handle assembly of claim 15 wherein the first adaptive bushing comprises an internal opening that has substantially the same shape and dimensions as an outer surface of the extendible handle section.

19. The telescopic handle assembly of claim 15 further comprising:

a handle connected to a top portion of the extendible handle section; and

a recessed handle housing including one or more holes leading to the extendible handle housing, the recessed handle housing being configured to receive the handle such that a top of the handle sits flush with or below an upper surface of the recessed handle housing when the lower and upper extendible handle sections are each in the compressed position.

20. The telescopic handle assembly of claim 19 further comprising:

two parallel lengths of the extendible handle section, wherein the two parallel lengths are attached to the handle;

a second adaptive bushing of the at least one adaptive bushing; and

wherein the first and second adaptive bushings are each disposed in one of the two holes and configured to surround and movably receive each of the two parallel lengths of extendible handle section between the compressed position and the extended position, wherein the first and second adaptive bushing each comprise internal openings having substantially the same shape and dimensions as an outer surface of a respective one of the parallel lengths of the extendible handle section.

21. The telescopic handle assembly of claim 20 further comprising a button on the handle section for selectively retracting one or more spring-loaded bullets, the spring-loaded bullets configured to lock the extendible handle section in the extended position.

22. The telescopic handle assembly of claim 21 wherein each of the at least one adaptive bushing further includes a rim configured to retain the bushing in a fixed position.

23. The telescopic handle assembly of claim 21 wherein each of the at least one adaptive bushing further includes at least one projection disposed on an exterior surface and configured to retain the adaptive bushing in a fixed position by exerting an elastic force in an outward direction.

24. The telescopic handle assembly of claim 21 wherein each of the at least one adaptive bushing further comprises one or more channels to allow the bushing to partially compress for aiding insertion into its respective position.

25. The telescopic handle assembly of claim 15 wherein the extendible handle housing is immovably fixed within a luggage item.

26. A luggage article comprising:

a luggage body;

a lower extendible handle section movably disposed between a compressed position and extended position;

an upper extendible handle section movably disposed between a compressed position and an extended position within said lower extendible handle section;

an extendible handle housing disposed within the luggage body and configured to contain the lower extendible handle section when in the compressed position;

a handle connected to a top portion of the upper extendible handle section; and

at least one adaptive bushing including one or more projecting tabs configured to exert an elastic force in an inward direction, the at least one adaptive bushing including a first adaptive bushing disposed in an upper portion of the lower extendible handle section and configured to surround and movably receive the upper extendible handle section between the compressed position and the extended position.

27. The telescopic handle assembly of claim 26 wherein each of the at least one adaptive bushing is formed of nylon, polypropylene, polycarbonate, Teflon, mixtures thereof, or mixtures thereof with other plastic materials.

28. The telescopic handle assembly of claim 26 wherein each of the at least one adaptive bushing is made up of two halves connected by a living hinge.

29. The telescopic handle assembly of claim 26 wherein the first adaptive bushing comprises an internal opening that has substantially the same shape and dimensions as an outer surface of the upper extendible handle section.

30. The telescopic handle assembly of claim 26 further comprising a recessed handle housing disposed on a surface of the luggage body, the recessed handle housing including one or more holes leading to the extendible handle housing, the recessed handle housing being configured to receive the handle such that a top of the handle sits flush with or below an upper surface of the recessed handle housing when the lower and upper extendible handle sections are each in the compressed position.

31. The telescopic handle assembly of claim 30 further comprising:

two parallel lengths of the lower extendible handle section and the upper extendible handle section, wherein the two parallel lengths of the upper extendible handle section are attached to the handle;

a second adaptive bushing of the at least one adaptive bushing; and

wherein the first and second adaptive bushings are each disposed in respective upper portions of the lower extendible handle housing and configured to surround and movably receive each of the two parallel lengths of upper extendible handle section between the compressed position and the extended position , wherein the first and second adaptive bushing each comprise internal openings having substantially the same shape and dimensions as an outer surface of a respective one of the parallel lengths of upper extendible handle section.

32. The telescopic handle assembly of claim 31 further comprising a third adaptive bushing of the at least one adaptive bushing, the third adaptive bushing disposed in an upper portion of the extendible handle housing and configured to surround and movably receive the lower extendible handle section between the compressed position and the extended position, wherein the third adaptive bushing comprises an internal opening that has substantially the same shape and dimensions as an outer surface of the lower extendible handle section.

33. The telescopic handle assembly of claim 32 further comprising a fourth adaptive bushing of the at least one adaptive bushing, wherein the one or more holes of the recessed handle housing includes two holes leading to the extendible handle housing, and wherein the third and fourth adaptive bushings are each disposed in one of the two holes and configured to surround and movably receive each of the two parallel lengths of lower extendible handle section between the compressed position and the extended position, wherein the third and fourth adaptive bushing each comprise internal openings having substantially the same shape and dimensions as an outer surface of a respective one of the parallel lengths of lower extendible handle section.

34. The telescopic handle assembly of claim 33 further comprising a button disposed on the handle section for selectively retracting one or more spring-loaded bullets , the spring-loaded bullets configured to lock at least one of the lower extendible handle section and the upper extendible handle section in the extended position.

35. The telescopic handle assembly of claim 33 wherein each of the at least one adaptive bushing further includes a rim configured to retain each adaptive bushing in a fixed position.

36. The telescopic handle assembly of claim 33 wherein each of the at least one adaptive bushing further includes at least one projection disposed on an exterior surface and configured to retain each adaptive bushing in a fixed position by exerting an elastic force in an outward direction.

37. The telescopic handle assembly of claim 33 wherein each of the at least one adaptive bushing further comprises one or more channels configured to allow the bushing to partially compress for aiding insertion into its respective position.

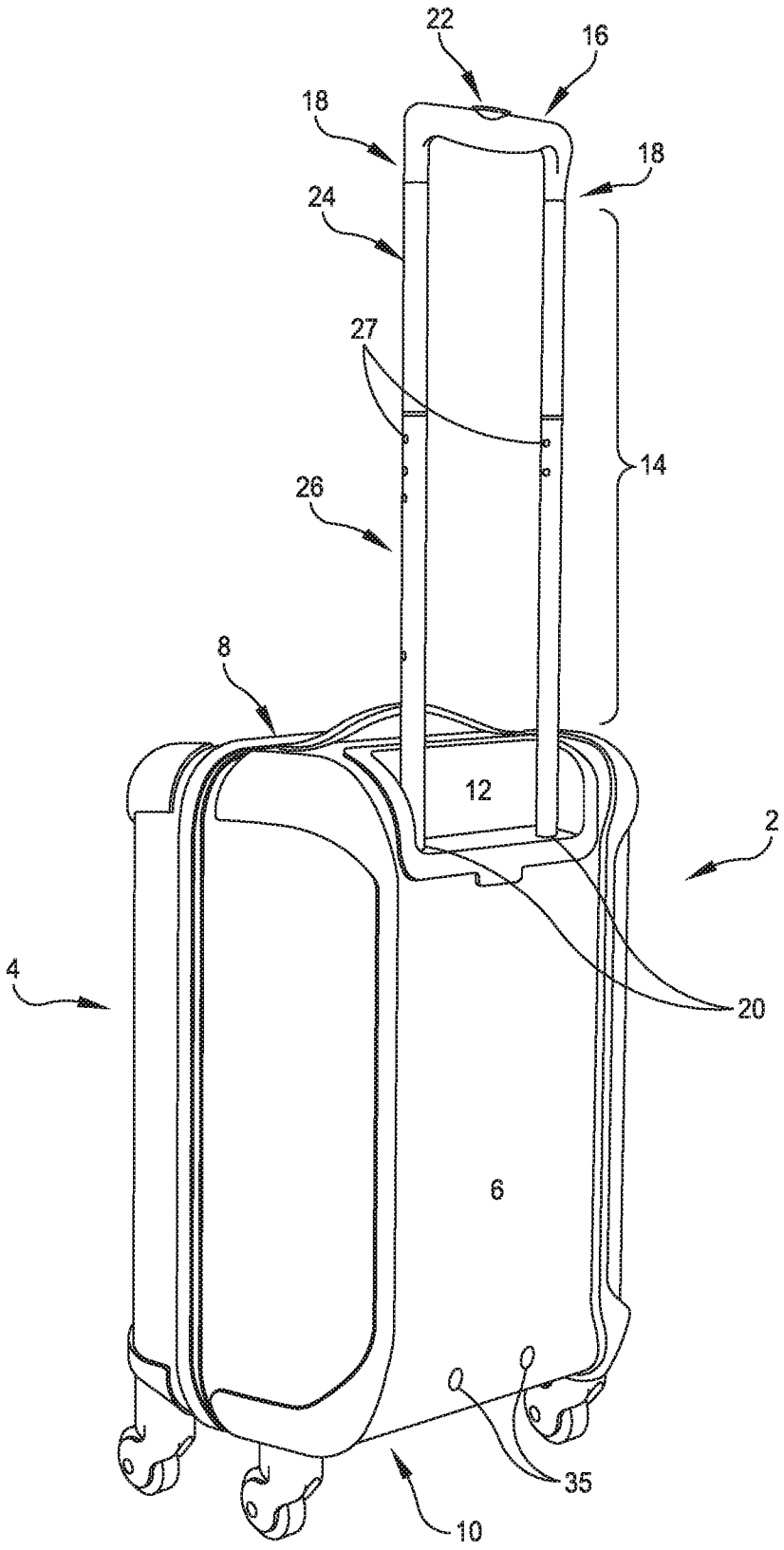


FIG. 1

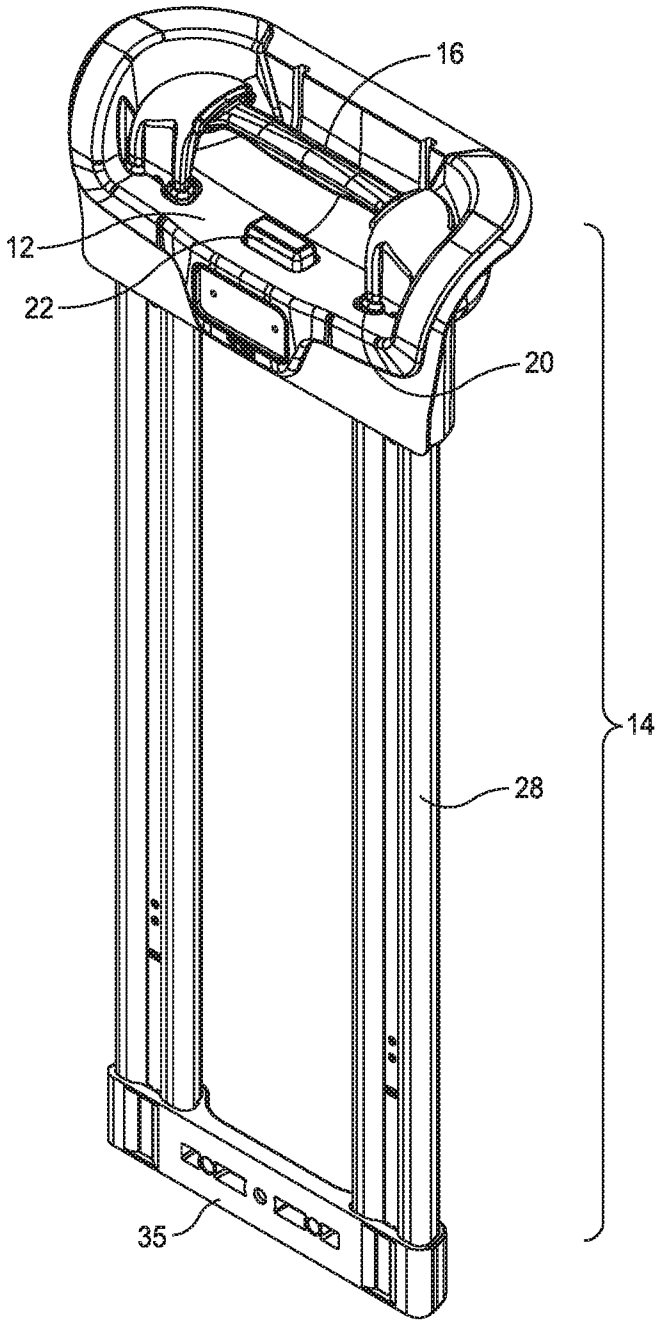


FIG. 2

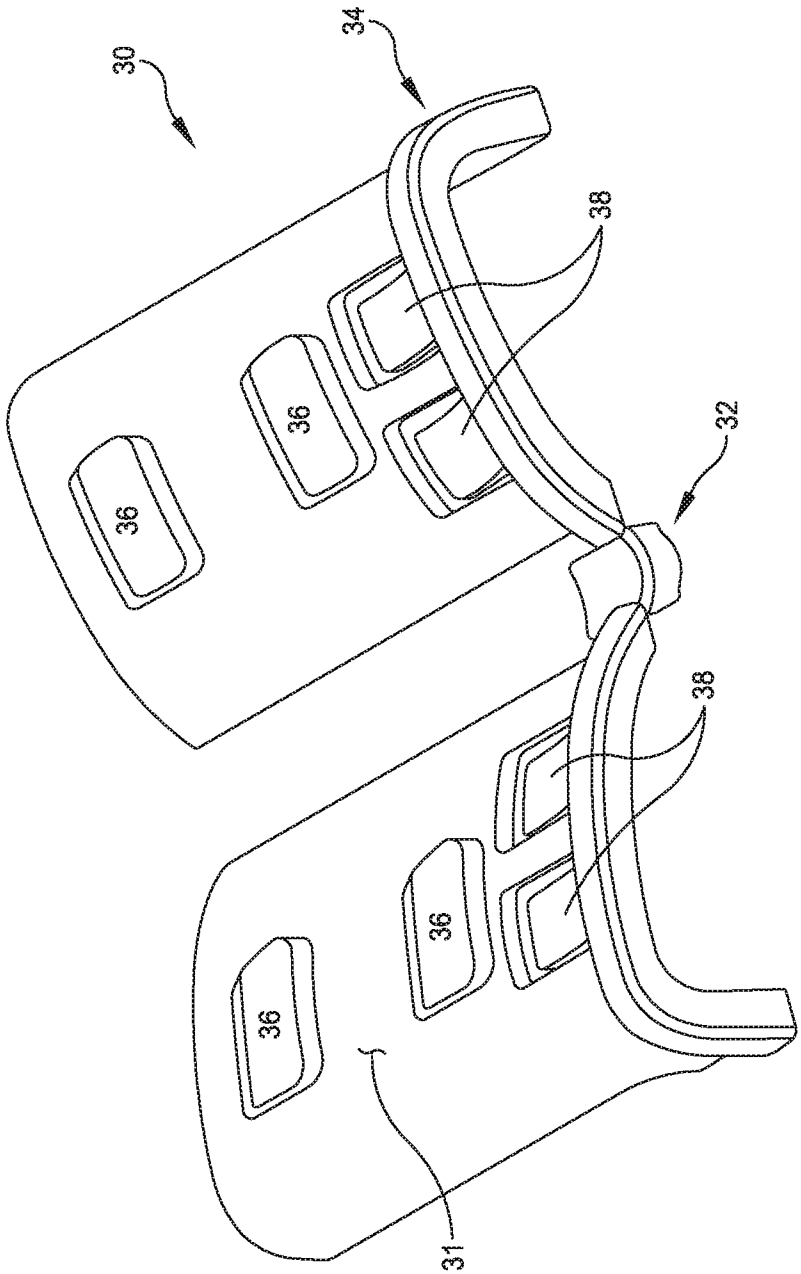


FIG. 3

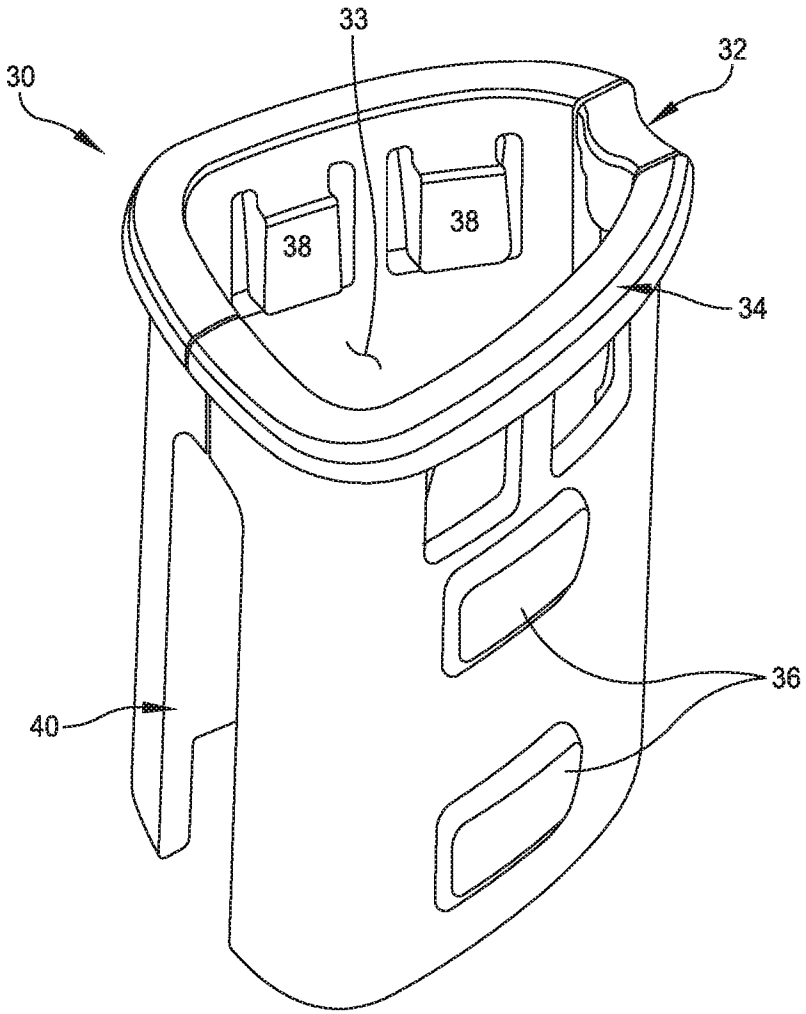


FIG. 4

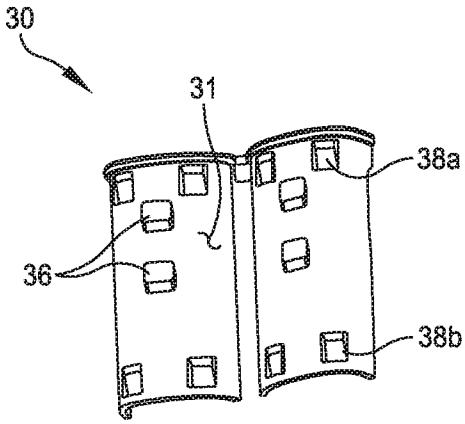


FIG. 5A

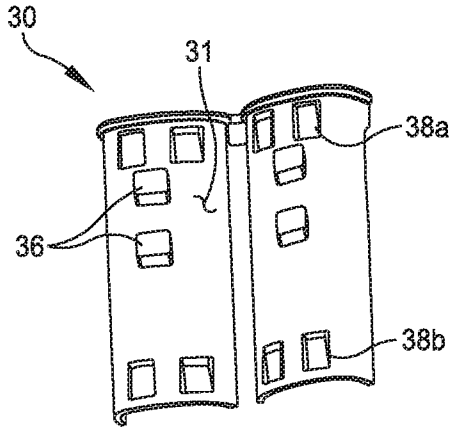


FIG. 5B

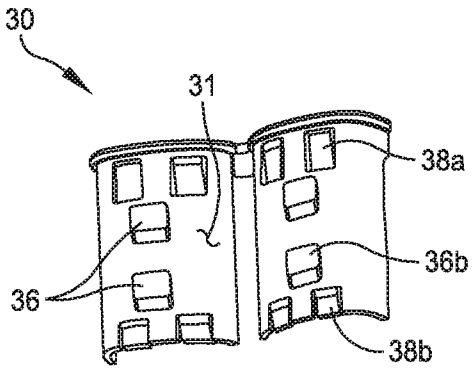


FIG. 5C

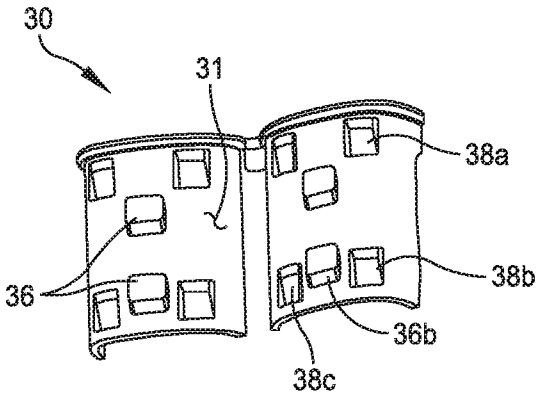


FIG. 5D

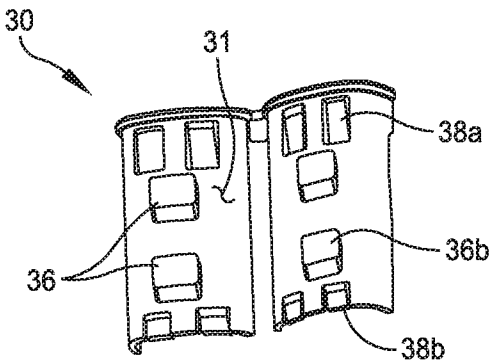


FIG. 5E

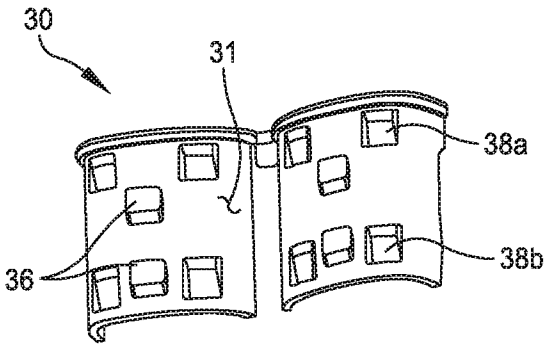


FIG. 5F

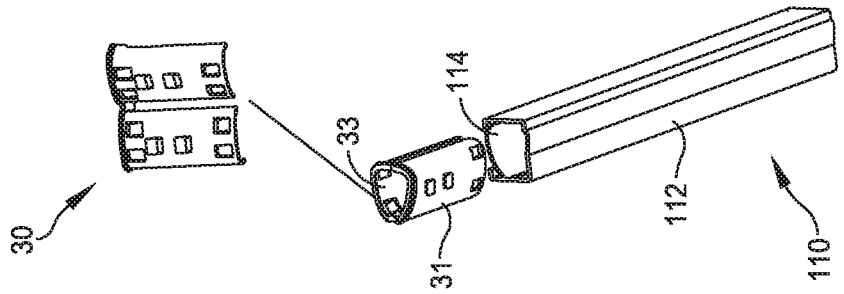


FIG. 6C

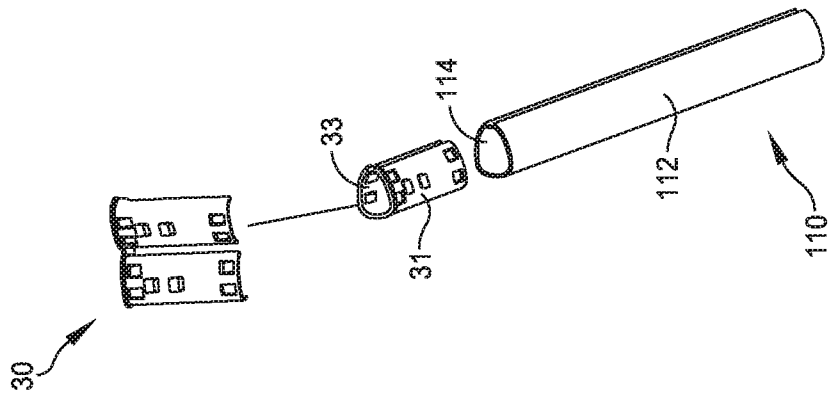


FIG. 6B

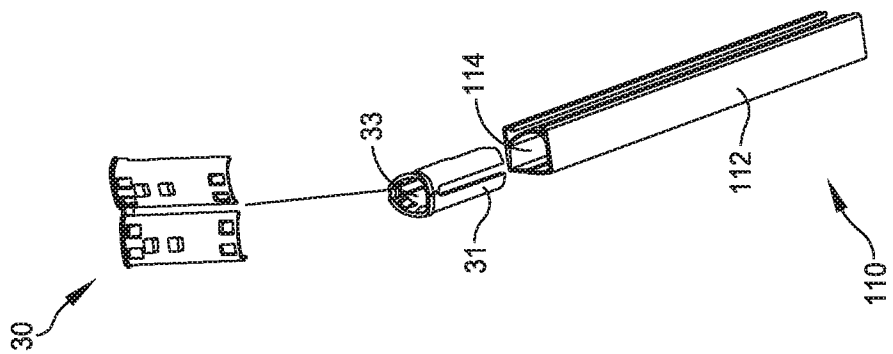


FIG. 6A

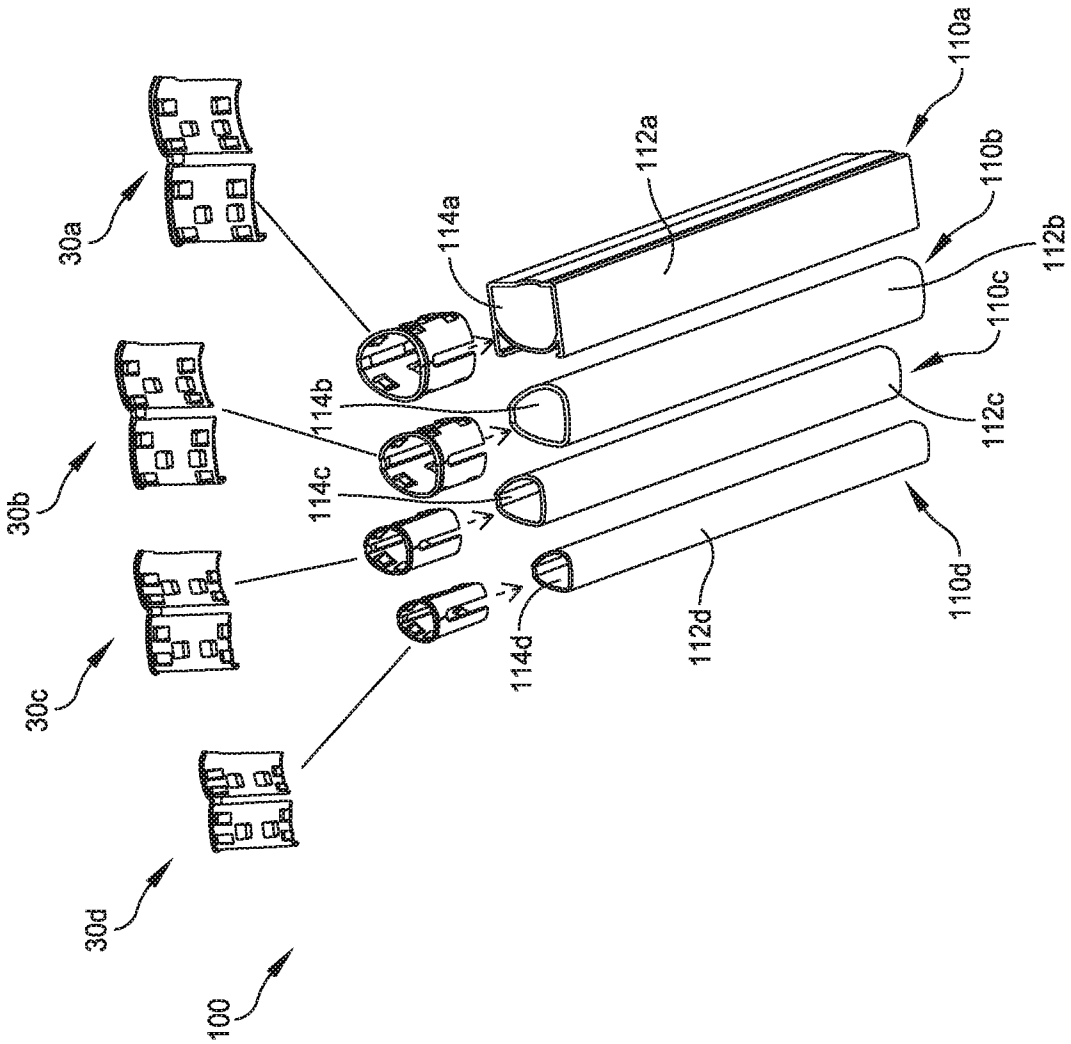

30a
30b
30c
30d
100
114a
114b
114c
114d
112a
112b
112c
112d
110a
110b
110c
110d

FIG. 7

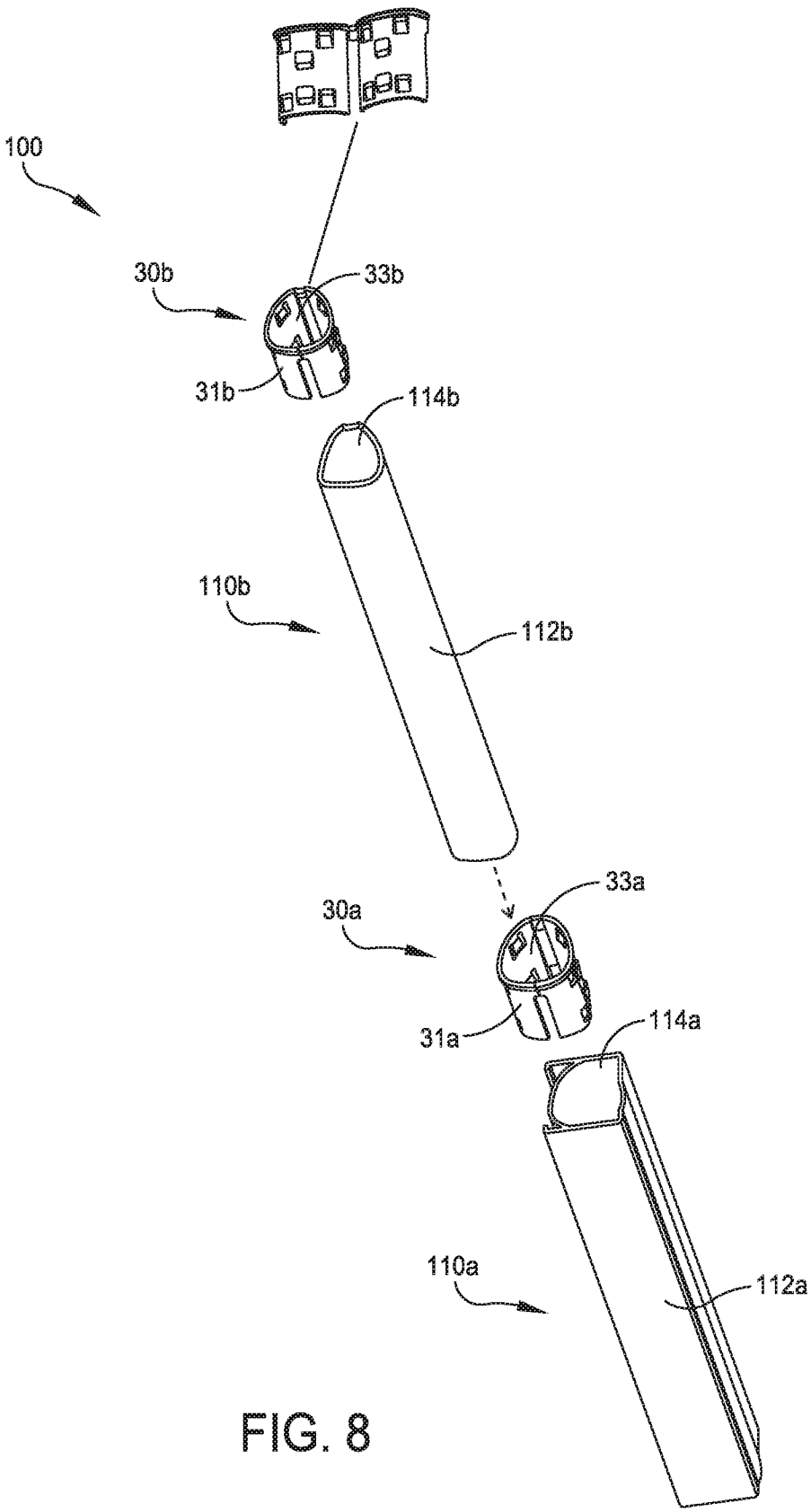
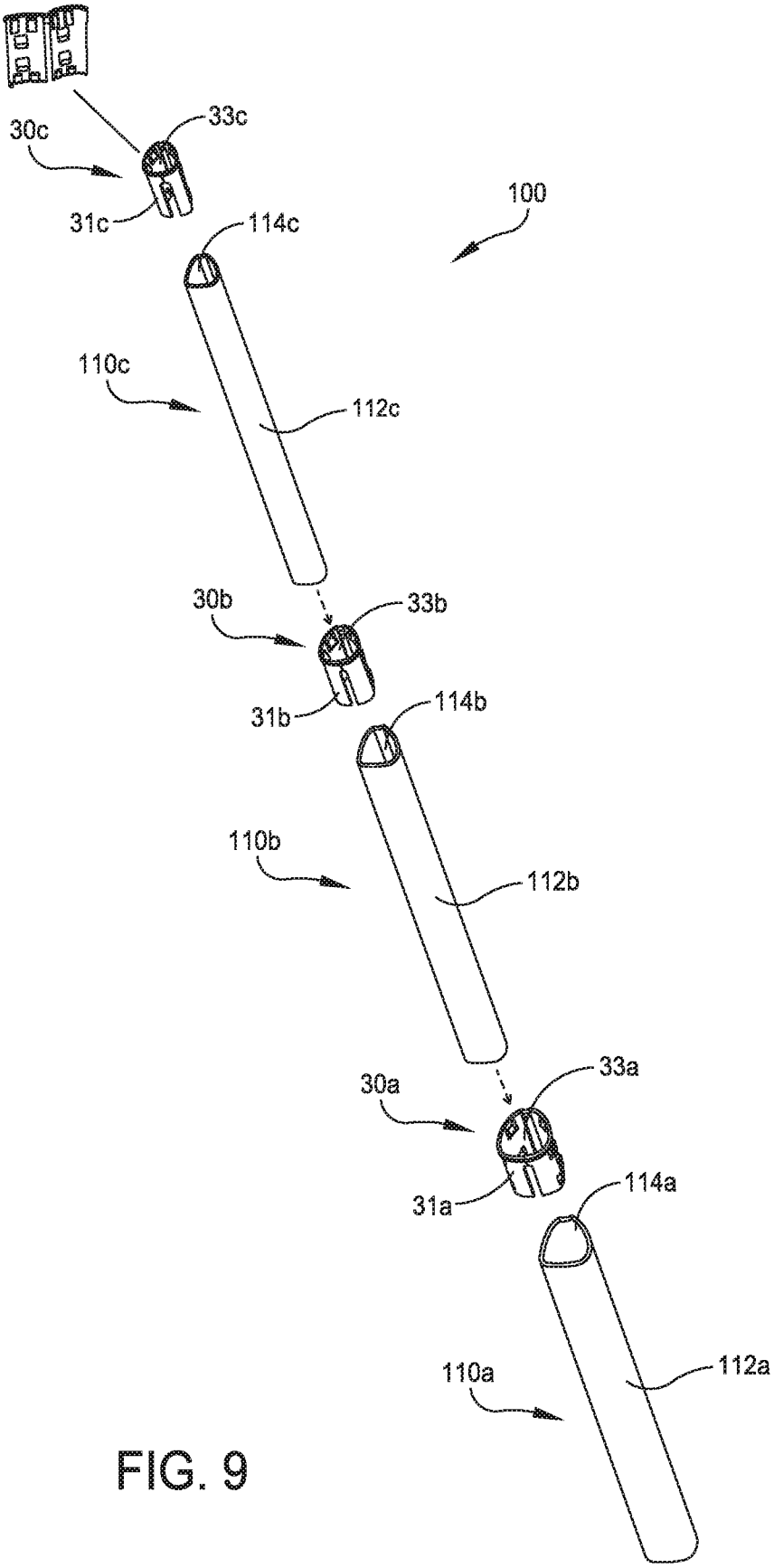


FIG. 8


33c
30c
31c
100
114c
110c
112c
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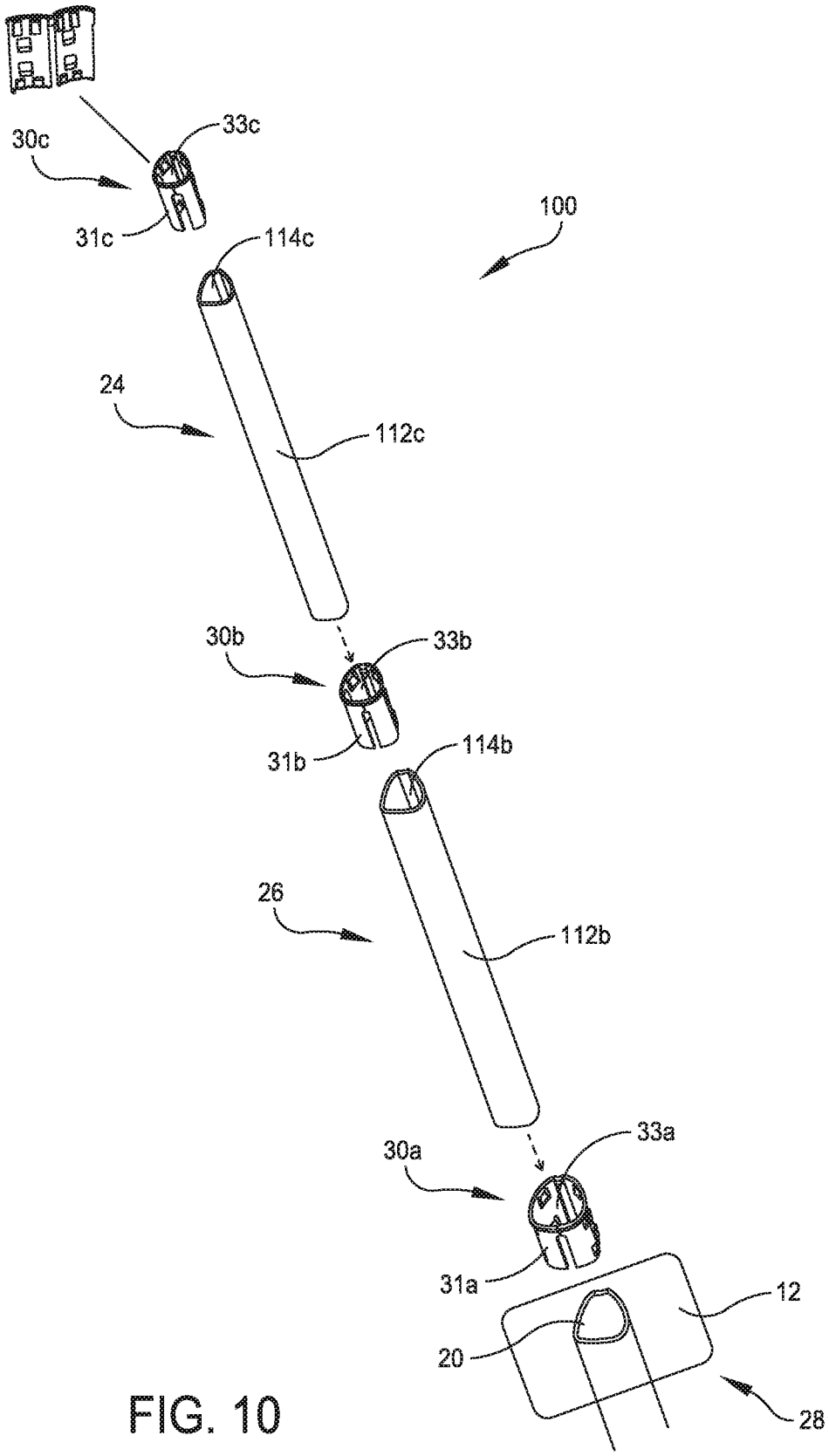
33b
31b
114b
110b
112b
30a
33a
31a
114a
110a
112a

FIG. 9


33c
30c
31c
100
114c
24
112c
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33b
31b
114b
26
112b
33a
30a
31a
12
20
28

FIG. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/030802

A. CLASSIFICATION OF SUBJECT MATTER
INV. A45C13/26
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A45C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2013/043632 A1 (TRAVELPRO INTERNAT INC [US]) 28 March 2013 (2013-03-28)	1,3-9, 11-14, 26, 28-33, 35-37
Y	page 1, line 11 - line 12 page 6, line 11 - page 7, line 27 page 9, line 11 - page 15, line 13 figures 1, 3, 4, 5, 8, 12A, 2B	2,10,27, 34
X	US 6 223 391 B1 (KUO CHUNG-HSIEN [TW]) 1 May 2001 (2001-05-01)	15,17, 18,25
Y	column 2, line 36 - column 3, line 7 figures 3, 4	16,19-24
Y	US 2009/301833 A1 (HYMAS AMMON BRUCE [US]) 10 December 2009 (2009-12-10) paragraphs [0058] - [0060]; figures 3A, 3B	10, 19-24,34

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 June 2017	07/07/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Fidalgo Marron, B

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/030802

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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