Abstract: A zipper puller (110) has a one piece structure including a molded plastic body (112) and an integral molded looped tether (114). The looped tether is molded in a first size and shape, and after molding the looped tether is permanently deformed to a second size and second shape by aligning the crystalline structure of the looped tether material.

Fig. 1

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ONE-PIECE ZIPPER PULLER

CROSS-REFERENCE TO RELATED APPLICATIONS

[01] The present application claims the benefits of United States Provisional Application Serial No. 61/442,051; filed February 11, 2011.

FIELD OF THE INVENTION

[02] The present invention relates generally to zippers, and more particularly to attachments that are provided for the handles of the zippers to provide a larger, more easily grasped article by which to pull a zipper for zipping or unzipping.

BACKGROUND OF THE INVENTION

[03] Standard zippers used on clothing, personal articles such as backpacks, shoulder bags, luggage and other things have relatively small handles or tabs by which the zipper is operated for closing (zipping) or opening (unzipping). Even on a large zipper, such as those found on suitcases, the handle or tab can be relatively small and difficult to grasp securely. Frequently made of metal, the handle is often smooth and can be somewhat slippery. Zippers are often concealed, with fabric overlapping the zipper along each side of the zipper. In such arrangements, the handle can be difficult to locate and dislodge from beneath the fabric edges. In heavily packed articles, tension on the zipper can make it difficult to operate, and the small surface of the handle can be inadequate to grip securely for operating the zipper.

[04] It is known to provide zipper pullers of various types attached to the zipper handle to provide a larger, more easily grasped article by which to operate the zipper. The zipper handle commonly has a hole near the end thereof, and known configurations of zipper pullers are attached by looping, tying or otherwise securing the puller through the hole in the handle. A pliable portion along with a knob, knot or other enlargement provides a more readily graspable article by which the zipper can be operated.
In a simple form, a zipper puller may be an elongated piece of nylon or other fabric tied or looped through the hole in the zipper handle. While fabric secured in this manner provides a longer structure than the zipper handle alone by which to grasp and operate the zipper, the smooth, thin fabric can sometimes be difficult to grasp as well. More advantageously, a zipper puller has an enlarged or bulbous end or portion more easily grasped than the relatively thin zipper handle. Known zipper pullers of this type have been two piece articles, including a string, cord or the like serving as a tether between the zipper handle and a larger body end piece attached to the tether. While two-piece zipper pullers of this type have performed somewhat adequately for the purpose intended, the two-piece zipper puller can be costly to manufacture and install. Further, the string, cord or other tether portion can stretch or otherwise change, or even break, making the zipper puller nonfunctional, even if not lost completely. More elastic tethers have been used but tend to act more like a rubber band, being too springy to transmit the load from the user to the zipper handle.

It is known that a body of thermoplastic elastomer can be processed to align the crystalline structure thereof to a permanently deformed thinner shape having increased flexibility while maintaining the strength of a thicker, more robust and less flexible body. The process has been referred to as "orienting" and can be found described in US Patent 7,441,758 and United States Patent Application Publication 2006/0267258; which are incorporated herein by reference.

**SUMMARY OF THE INVENTION**

A robust, one-piece zipper puller is disclosed herein which can be manufactured easily by known molding processes, yet does not have the same disadvantages of known zipper pullers.

An advantage of at least one form of the zipper pullers disclosed herein is that a complete zipper puller is molded in an injection molding tool in one piece, thereby eliminating the time and expense required for assembling previously known zipper pullers.
Another advantage of at least one form of the zipper pullers disclosed herein is that the zipper puller can be molded in readily moldable sizes and shapes, and thereafter processed to meet or exceed flexibility, strength and size requirements that might otherwise be difficult to achieve by standard molding processes.

Still another advantage of at least one form of the zipper pullers disclosed herein is that the zipper puller offers flexibility, high strength and tuned stretch in a one-piece molded structure.

Other features and advantages of the invention will become apparent to those skilled in the art upon review of the following detailed description, claims and drawings in which like numerals are used to designate like features.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a perspective view of a one-piece zipper puller;

Fig. 2 is a cross-sectional view of the one-piece zipper puller shown in Fig. 1, taken on line 2-2 of Fig. 1;

Fig. 3 is a perspective view of a second embodiment of a one-piece zipper puller;

Fig. 4 is a cross-sectional view of the one-piece zipper puller shown in Fig. 3, taken on line 4-4 of Fig. 3;

Fig. 5 is a perspective view of another embodiment of a one-piece zipper puller;

Fig. 6 is a cross-sectional view of the one-piece zipper puller shown in Fig. 5, taken on line 6-6 of Fig. 5;

Fig. 7 is a perspective view of still another embodiment of a one-piece zipper puller;

Fig. 8 is a cross-sectional view of the one-piece zipper puller shown in Fig. 7, taken on line 8-8 of Fig. 7;

Fig. 9 is a perspective view of yet another embodiment of a one-piece zipper puller;

Fig. 10 is a cross-sectional view of the one-piece zipper puller shown in Fig. 9, taken on line 10-10 of Fig. 9;
Fig. 11 is a perspective view of a further embodiment of a one-piece zipper puller;

Fig. 12 is a cross-sectional view of the one-piece zipper puller shown in Fig. 11, taken on line 12-12 of Fig. 11;

Fig. 13 is a perspective view of a yet further embodiment of a one-piece a zipper puller;

Fig. 14 is a cross-sectional view of the one-piece of zipper puller shown in Fig. 13, taken on line 14-14 of Fig. 13;

Fig. 15 is a perspective view of a still further embodiment of a one-piece zipper puller;

Fig. 16 is a perspective view of an additional embodiment of a one-piece zipper puller; and

Fig. 17 is a perspective view of still another embodiment of a one-piece zipper puller.

Before the embodiments of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is understood that the phraseology and terminology used herein are for the purpose of description and should not be regarded as limiting. The use herein of "including", "comprising" and variations thereof is meant to encompass the items listed thereafter and equivalents thereof, as well as additional items and equivalents thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more specifically to the drawings, a zipper puller 110 is shown in Figs 1 and 2. Zipper puller 110 is a one-piece article having a grasping body 112 and a looped tether 114. Looped tether 114 is a loop of sufficient length that it can be inserted through a hole in a zipper handle, with body 112 then passed through the distal end of the loop to secure tether 114 on the zipper handle, in known fashion. Body 112 can have any of a variety of shapes and in
the exemplary embodiment of Figs. 1, 3, 5, 7, 9, 11 and 13 has a generally hourglass shape for easy grasping. However other shapes can be used, including more simple geometric shapes such as a rectangle, sphere, triangle, etc., or even artistic designs such as logos and the like of manufacturers of the article on which zipper puller 110 is used.

Zipper puller 110 is made of injection molded plastic. Body 112 and looped tether 114 are made from the same material. To perform well for its intended purpose, looped tether 114 must be strong to resist breaking and transmit forces to the zipper handle, yet flexible to be looped through a zipper handle and secured on the zipper as described above. Thermoplastic elastomer is used for zipper puller 110. Looped tether 114 is subjected to a post-molding process to refine the strength and flexibility required. If a loop of about 1.0-1.5 mm diameter is molded at sufficient length (such as approximately 40.0 mm) the form can be hard to fill in a mold and may not meet the required tensile load for the puller. Processing by orienting can provide looped tether 114 with different load bearing characteristics in different directions.

Generally in the manufacture of zipper puller 110, a larger diameter shorter length loop than what is required for final use is molded. For example and not limitation, a loop of 2.0-4.0 mm diameter having a length of 10.0-20.0 mm may be used. In the orientation process, the crystalline structure of looped tether 114 is aligned in the direction of its length to both increase the length and decrease the thickness of the looped tether material as molded. For example and not limitation, from an as-molded size of approximately 2.0 mm diameter and approximately 25.0 mm length, looped tether 114 is permanently deformed to about 1.0-1.5 mm diameter and a length of approximately 40.0 mm. Processing by orienting is performed to align the crystalline structure of the loop portion along the axis of tensile loading to increase the length of the loop to the required dimension and improve the characteristics of the molded loop, such as flexibility for attachment. By strengthening the loop through the orienting process to the proper diameter and length, a one-piece zipper puller can be provided with the required characteristics.
The process conditions for orienting can be varied to achieve desired results and physical characteristics of an oriented product. Generally speaking, looped tether 114 is oriented, whereas body 112 is not. Zipper puller 110 may be manufactured from essentially elastomeric material capable of being oriented to provide the desired characteristics. For example, zipper puller 110 may be a thermoplastic elastomer, polyester, nylon-based TPE or a thermoplastic urethane. A variety of alternative elastomers may be suitable for use in the present invention. The thickness of zipper puller 110 can vary from application to application, depending on conditions in which it will be used and desired performance characteristics, such as, for example, the anticipated tensile load to be applied and the desired stiffness or flexibility of looped tether 114. Accordingly, the as molded size and shape of the looped tether can differ to achieve the desired result after processing for orienting.

After zipper puller 110 is formed by molding, looped tether 114 is oriented to give it the desired physical characteristics. In the orienting process, for example, tether 114 may be intentionally and permanently deformed such as by alignment of the crystalline structure in the direction along which the principle tensile loads will be applied during use (i.e. to elongate looped tether 114). By orienting in this way prior to actual use, undesired deformation, referred to as "creep", that might otherwise occur during use can be limited and potentially avoided altogether. In anticipation of orienting, zipper puller 110 is intentionally designed for an as "molded size" that is shorter but thicker than the required "in use" size by the amount that it will be altered by the permanent deformation brought on during the orienting process. The precise method and manner of orienting looped tether 114 of zipper puller 110 may vary from application to application and may differ depending in part on the intended use and final characteristic of zipper puller 110. A single act of stretching looped tether 114, repeated acts of stretching under the same or different conditions and/or compression by hammering or pressing are all examples of some suitable orienting processes. Acts of bending around a curved surface, such as a mandrel;
or twisting while stretching can be used to develop permanently curved or rotated shapes in looped tether 114.

While a one shot process for molding has been disclosed, it is anticipated that a two shot process also can be used to mold the loop and base in different colors, for example, but as a single monolithic structure. Customized loop colors similar to customized nylon cord pullers can be provided. Still other features can be included. For example, the body portion can be provided with a hole 116 for decorative or functional inserts, labeling, indicia, or the like. In one potentially advantageous embodiment, a magnet is provided in hole 116 of body 112. Still other variations can be provided.

Figs. 3-14 show other zipper pullers 120, 130, 140, 150, 160 and 170, respectively, having bodies 122, 132, 142, 152, 162 and 172, respectively that are molded plastic similar to body 112. Looped tethers 124, 134, 144, 154, 164 and 174 are molded integrally with bodies 122, 132, 142, 152, 162 and 172, as described above with respect to body 112 and looped tether 114. Holes 126, 136, 146, 156, 166 and 176 can be provided for receiving decorative or functional inserts.

Looped tethers 124, 134, 144, 154, 164 and 174 can be provided of different sizes and cross-sectional shapes to achieve different desired final characteristics in the oriented product. As can be seen, the as molded shapes of looped tethers 124, 134, 144, 154, and 164 are not round, and if provided with major diameters of between about 2.3 and 2.6 mm the cross-sectional areas thereof will be greater than that of the substantially round shape of looped tether 114 provided at about 2.0 mm diameter; and the final processed looped tethers 124, 134, 144, 154, and 164 are somewhat stronger than the final processed strength of looped tether 114. The as molded shape of looped tether 174 can be provided with an even greater cross-sectional area, and if provided with a major diameter of about 3.8 mm the final processed looped tether 174 may have about twice the strength of looped tether 114.

Fig. 15 illustrates a zipper puller 180 having a body 182 and a looped tether 184 integral therewith. Looped tether 184 is shown in an after processing
condition, being both elongated and thinned from its as molded form. Body 182 is provided with heavy valleys 188 in the surface thereof for improved grip during use.

Fig. 16 illustrates a zipper puller 190 having a body 192 and a looped tether 194 integral therewith. Looped tether 194 is shown in an after processing condition, being both elongated and thinned from its as molded form. Body 192 is provided with the appearance of an arrangement of distinct geometric shapes that are both decorative and functional to improve grip. Still other types of surface roughening or treatment can be used to improve grip and reduce slippage, and/or for aesthetic purposes.

Fig. 17 illustrates a zipper puller 200 having a body 202 and a looped tether 204 integral therewith. Relative to body 202, looped tether 204 includes a proximal solid rib portion 206 and a distal loop portion 208. Rib portion 206 can be processed along with loop portion 208 to alter the characteristics thereof. In some applications and uses, it may be adequate to leave rib portion 206 in an unprocessed condition, as with body 202. Body 202 as shown defines a hole 210, but can be solid and/or of other shapes.

Variations and modifications of the foregoing are within the scope of the present invention. It is understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text and/or drawings. All of these different combinations constitute various alternative aspects of the present invention. The embodiments described herein explain the best modes known for practicing the invention and will enable others skilled in the art to utilize the invention. The claims are to be construed to include alternative embodiments to the extent permitted by the prior art.

Various features of the invention are set forth in the following claims.
CLAIMS

WHAT IS CLAIMED IS:

1. A one-piece zipper puller, comprising:
   a molded, elastomeric puller body;
   a molded tether defining a loop integrally formed with said puller body;
   and
   said tether being oriented by permanent deformation of the molded shape thereof.

2. The one-piece zipper puller of claim 1, said tether being permanently deformed in a size sufficiently large for said body to pass through said loop defined by said tether.

3. The one-piece zipper puller of claim 1, said tether being permanently deformed by stretching.

4. The one-piece zipper puller of claim 1, said tether being permanently deformed longer and thinner than in the molded shape thereof.

5. The one-piece zipper puller of claim 1, said tether and said body being molded of the same material.

6. The one-piece zipper puller of claim 1, said tether and said body being formed as a monolithic structure of different materials in a two-shot molding process.

7. The one-piece zipper puller of claim 1, said body including a hole for receiving an insert.
8. The one-piece zipper puller of claim 1, said body provided with a 
grip enhancing surface configuration.

9. The one-piece zipper puller of claim 1, said tether including a 
proximal solid rib portion and a distal loop portion.

10. A one-piece zipper puller, comprising:
a molded, elastomeric puller body;
a molded tether integral with said puller body and defining a loop; and 
said tether being oriented in the direction of its length to provide different 
load bearing characteristics in a first direction than in a second direction, with a 
crystalline structure thereof having a greater degree of alignment along the length 
of the loop.

11. The one-piece zipper puller of claim 10, said tether being 
permanently deformed by stretching.

12. The one-piece zipper puller of claim 10, said tether being 
permanently deformed longer and thinner than in the molded shape thereof.

13. The one-piece zipper puller of claim 10, said tether and said body 
being molded of the same material.

14. The one-piece zipper puller of claim 10, said tether and said body 
being formed as a monolithic structure of different materials in a two-shot 
molding process.

15. The one-piece zipper puller of claim 10, said body including a 
hole for receiving an insert.
16. The one-piece zipper puller of claim 10, said body provided with a grip enhancing surface configuration.

17. The one-piece zipper puller of claim 10, said molded tether including a solid rib portion proximate said puller body and a looped portion at a distal end of said rib portion.

18. A method for manufacturing a zipper puller, including steps of:
   molding a body and looped tether integral with the body as a one-piece molding; and
   processing the looped tether to align the crystalline structure thereof to permanently deform the looped tether from its molded condition.

19. The method of claim 18, said step of processing including stretching.

20. The method of claim 18, said step of processing including pressing.

21. The method of claim 18, said step of processing performed to achieve a desired strength along the length of the looped tether different from the strength of the looped tether as molded.

22. The method of claim 18, said step of processing performed to achieve a desired size different from the as molded size of the looped tether.

23. The method of claim 18, said step of processing performed to achieve a desired flexibility in the looped tether different than the flexibility in the looped tether as molded.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. A44B19/26

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)

A44B

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

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Further documents are listed in the continuation of Box C. X See patent family annex.

Date of the actual completion of the international search

30 May 2012

Date of mailing of the international search report

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Name and mailing address of the ISA

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