A method for infiltrating a water-proof material into a zipper, includes the steps of combining an upper mold with a lower mold, filling a liquid polyurethane (PU) rubber into the mold cavity of the upper mold, drawing the zipper through the underside of the mold cavity such that the liquid PU rubber will infiltrate into the fabric of the zipper tapes, passing the zipper through a scraper portion formed at the lower edge of the upper mold to remove surplus liquid PU rubber, and forming a laminate on the zipper tapes, so as to accomplish a water-proof zipper.
METHOD FOR INFILTRATING WATER-PROOF MATERIAL INTO ZIPPER

BACKGROUND OF THE INVENTION

[0001] (a) Technical Field of the Invention

[0002] The present invention relates to a method for infiltrating a water-proof material into a zipper, such that a common zipper will become water-proof due to the infiltration of the impermeable rubber material into the zipper tapes. The present invention is applicable to processing water-proof zippers and water-proof fabrics or the like.

[0003] (b) Description of the Prior Art

[0004] In the method for manufacturing water-proof zippers of the prior art as disclosed in U.S. Pat. No. 6,105,214, a water-proof layer is attached to the surface of the zipper tape via adhesive or heat press. The zipper is composed of a pair of opposed tapes, which are combined or separated by a moving zipper tab. Therefore, after application of the water-proof layer of to the surface of the zipper via adhesive or heat press, an additional process for cutting the water-proof layer to separate the tapes is required, rendering the manufacture process relatively complicated, the manufacture speed slower, and the manufacture cost higher.

[0005] As the water-proof layer for a conventional zipper can only adhered to the surface of the zipper tapes, it cannot firmly combine with the zipper tapes. Therefore, after being used for a short period of time, the water-proof layer would easily detach from the zipper tapes due to friction, causing the water-proof effect apparently reduced.

[0006] In view of the disadvantages existing in the manufacture of the water-proof zippers of the prior art, the inventor has researched and developed the present invention.

SUMMARY OF THE INVENTION

[0007] The primary object of the invention is to provide a method for infiltrating a water-proof material into a zipper, such that after the impermeable material has solidified, it can infiltrate into the zipper tapes and form a water-proof layer with the zipper tape fabric to obtain a super water-proof effect. The secondary object of the invention is to provide a method for infiltrating a water-proof material into a zipper, which can efficiently shorten the manufacture process, since there is no need to cut the zipper to separate the zipper tapes. Accordingly, the manufacture cost can be reduced.

[0008] A further object of the invention is to provide a method for infiltrating a water-proof material into a zipper, which can efficiently lengthen the use life of the water-proof zipper.

[0009] To obtain the above objects, the method for infiltrating a water-proof material into a zipper according to the invention include the following steps:

[0010] thickening—adding thickening agents and hardening agents into a water-proof liquid PU rubber, and mixing the above materials to present an appropriate viscosity;

[0011] pouring—combining an upper mold with a lower mold, and then pouring the thickened water-proof liquid PU rubber into the mold cavity of the upper mold; and

[0012] applying the water-proof layer—pulling the zipper through the underside of the mold cave, such that the water-proof liquid PU rubber will infiltrate into the zipper tape fabric; scrapping away the surplus liquid PU rubber by a scraper portion at the lower edge of the upper mold; meanwhile, the liquid PU rubber applied onto the zipper tapes will further infiltrate into the tape fabric and form a water-proof layer with the zipper tapes.

[0013] By way of the above steps, a water-proof zipper, which has long use life, can be accomplished. Besides, the manufacture procedure can be shortened, and the manufacture cost can be reduced.

[0014] The foregoing object and summary provide only a brief introduction to the present invention. To fully appreciate these and other objects of the present invention as well as the invention itself, all of which will become apparent to those skilled in the art, the following detailed description of the invention and the claims should be read in conjunction with the accompanying drawings. Throughout the specification and drawings identical reference numerals refer to identical or similar parts.

[0015] Many other advantages and features of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is an exploded view of the upper mold, the lower mold and the zipper of the present invention.

[0017] FIG. 2 shows the manufacture process according to the invention, wherein the zipper is going into the mold cave.

[0018] FIG. 3 shows the manufacture process according to the invention, wherein the zipper has gone into the mold cave for infiltrating an impermeable liquid material into the fabric of the zipper tapes, and zipper surface is applied with a layer of water-proof rubber material.

[0019] FIG. 4 shows the multi-process procedure according to the invention.

[0020] FIG. 5 shows the process of imprinting patterns on the zipper.

[0021] FIG. 6 is a cut-away view showing the supplementary molds of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] The following descriptions are of exemplary embodiments only, and are not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description provides a convenient illustration for implementing exemplary embodiments of the invention. Various changes to the described embodiments may be made in the function and arrangement of the elements described without departing from the scope of the invention as set forth in the appended claims.

[0023] Referring to FIGS. 1 to 3, the method for infiltrating a water-proof material into a zipper according to the
The present invention includes the steps of thickening, pouring and applying the water-proof layer, and can lengthen the use life of the water-proof zipper, and relatively reduce the manufacture procedure and cost.

[0024] FIGS. 1 and 2 show a preferred embodiment of the invention, which includes a lower mold 10 and an upper mold 20. The lower mold 10 is provided with a positioning recession 11 and a groove 12, which is most preferably arranged at the center of the positioning recession 11, such that when a zipper 30 is born by and sliding on the positioning recession 11, the groove 12 can receive the zipper teeth 31, thus allowing the zipper tapes 32 stay flat on the positioning recession 11. The upper mold 20 is provided with a mold cave 21 on the top, and a scraper portion 22 on the bottom edge adhering to the bottom surface of the position recession 11.

[0025] As shown in FIGS. 2 and 3, the invention relates to a method for processing a normal upper 30 into a water-proof zipper, including the steps of combining the lower mold 10 integrally with the upper mold 20, processing the zipper 30 via a conveyor roller 50 forwardly such that the zipper 30 will go into the positioning recession 11 with the zipper teeth 31 filled into the groove 12 of the lower mold 10. Accordingly, the zipper 30 is moving under the upper mold 20.

[0026] Following is the steps of—

[0027] Thickening.—A liquid PU rubber water-proof material 40 is added with a thickening agent and a hardening agent and mixed together to form a liquid PU rubber 41 of an appropriate viscosity.

[0028] Pouring.—The thickened liquid PU rubber 41 is poured into the mold cave 21 of the upper mold 20 (as shown in FIG. 2).

[0029] Applying a water-proof layer.—The zipper 30 is disposed on the conveyor roller 50 and transmitted into the molds, such that the zipper teeth 31 fills into the groove 12 of the lower mold 10 and the zipper tapes 32 stay flat on the bottom of the positioning recession 11. The zipper tapes 32 go through the underside of the mold cave 21, the liquid PU rubber 41 in the mold cave 21 will infiltrate into the fabric of the zipper tapes 32 as desired. As a traction force generates between the liquid PU rubber 41 and the processing zipper tapes 32, the liquid PU rubber 41 will form a liquid wheel 42, which will attach to and roll on the surface of the zipper 30. Furthermore, by way of a scraper portion 22 at the lower edge of the upper mold 20, the surplus liquid PU rubber 41 can be removed and those adhered to the tapes 32 of the zipper 30 would have an even thickness to form a water-proof layer 43 (as shown in FIG. 3). Being pressed by the liquid wheel 42 and the scraper portion 22, the liquid PU rubber 41 will infiltrate into the fabric of the tapes 32 of the zipper 30 and form a layer of even height on the surface of the tapes 32. In order to expedite drying the water-proof layer, a heating device 60 can be provided at the outlet end for drying purposes. According to the above steps, a novel method for infiltrating a water-proof material into a zipper can be accomplished.

After that, application of a second layer of water-proof 43 can be applied, including provision of a supplementary lower mold 15 and upper mold 25. Likewise, the supplementary lower mold 15 is provided with a positioning recession 11 and groove 12. The gap 27 at the lower edge of the supplementary upper mold 25 forms a supplementary scraper portion 26 (as shown in FIG. 6). After application of second water-proof layer 44 to the zipper 30, the gap 27 of the supplementary scraper portion 26 can allow the tapes 32 along with the applied water-proof layer 43 to pass through. Therefore, when the zipper is pulled through the supplementary upper and lower molds, the second water-proof layer 44 will cover the original water-proof layer 43 (as shown in FIG. 4). Accordingly, a water-proof zipper of an appropriate thickness can be accomplished.

[0031] Referring to FIG. 5, showing a further embodiment of the invention, the zipper 30 with the water-proof layer can be imprinted with a pattern 45 via patterning roller 70 which is provided with notches 71 such that when the zipper 30 is pressed by the patterning roller 70, a pattern 45 can be imprinted on the water-proof layer 43 of the zipper 30, accomplishing a beautiful water-proof zipper.

[0032] Under the principle of the manufacture process, the pattern can be imprinted on the zipper via roller printing, mold pressing or spraying with colorants, which can be added with metal powder such as gold powder and silver powder, etc. to increase the impressiveness of the product. Furthermore, after imprinting the pattern 45 on the surface of the water-proof zipper, an additional protective layer (not shown) can be applied to coat the colorants and/or metal powders for the pattern, such that the pattern not be easily scratched.

[0033] Concluded above, the method for infiltrating a water-proof material into the fabric of the zipper tapes according to the invention can lengthen the use life of the water-proof zipper, prevent the zipper from being easily bended and damaged. Although specific embodiments have been illustrated and described, it will be obvious to those skilled in the art that various modifications may be made without departing from what is intended to be limited solely by the appended claims.

[0034] It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

[0035] While certain novel features of this invention have been shown and described and are pointed out in the annexed claim, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

I claim:

1. A method for infiltrating a water-proof material into a zipper, including the following steps:
   A. providing a lower mold, which can receive a zipper;
   B. providing on the top of the lower mold an upper mold, which keeps a gap from the lower mold and has at least one mold cave going through to said gap, and
C. disposing a zipper on the lower mold, such that the zipper is attached to the bottom of the upper mold and is able to move freely in the gap;
D. filling the mold cave with a liquid impermeable material, which will contact the surface of the zipper and infiltrate into the fabric of the zipper tapes; and
E. forming an impermeable layer on the surface of the zipper after the liquid impermeable material is solidified.

2. The method for infiltrating a water-proof material into a zipper according to claim 1, wherein after accomplishment of step D, a heating device can be applied for drying the zipper surface to expedite humidifying the impermeable liquid material.

3. The method for infiltrating a water-proof material into a zipper according to claim 2, wherein the lower mold is provided with a positioning recession, in the center of which is provided with a groove.

4. The method for infiltrating a water-proof material into a zipper according to claim 1, wherein the bottom edge of the mold cave has a scraper portion.

5. The method for infiltrating a water-proof material into a zipper according to claim 1, wherein the liquid impermeable material is a liquid polyurethane (PU) rubber.

6. The method for infiltrating a water-proof material into a zipper according to claim 1, wherein in addition to the upper mold, a supplementary upper mold, which is provided with a scraper portion at the bottom of the mold cave, can be alternatively provided, such that there is a selectively adjustable drop height between the scraper portion and the bottom surface of the mold cave.

7. The method for infiltrating a water-proof material into a zipper according to claim 6, wherein the zipper is moving on the lower mold during process, the zipper goes from the primary molds to the supplementary molds to accomplish a multi-process manufacture, such that the liquid impermeable material accumulated on the zipper would become thickened.

8. The method for infiltrating a water-proof material into a zipper according to claim 6, wherein a heating device can be further provided between the primary upper mold and the supplementary upper mold.

9. The method for infiltrating a water-proof material into a zipper according to claim 6, wherein after the liquid impermeable material applied onto the zipper surface is solidified, a pattern can be imprinted on the zipper surface with colorant.

10. The method for infiltrating a water-proof material into a zipper according to claim 9, wherein the colorant for imprinting pattern on the zipper surface can be added with metal powder.

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