METHOD OF FORMING AND INSTALLING A RECESSED VALVE STEM

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Sheet 1 of 2

Fig. 1

Fig. 2

Fig. 3

Fig. 4

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METHOD OF FORMING AND INSTALLING A RECESSED VALVE STEM

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This invention relates to a novel and useful method of forming and installing a recessed valve stem and more specifically to a method of modifying an existing inner tube so that it is provided with a recessed valve stem.

Fishermen and swimmers as well as others persons use inner tubes for support in water. However, conventional inner tubes including inwardly projecting valve stems constitute a danger to the user in that the valve stem can cause injury to an adjacent body portion of the user.

Therefore the main object of this invention is to provide a means and method for modifying a conventional inner tube in a manner such that the inwardly projecting valve stem thereof may be made secure, the area of the tube from which the conventional valve stem was supported can be closed by a suitable gasket or vulcanizing process.

After the inner tube has been modified in this manner, a valve stem assembly enclosed within a tubular member defining a recess thereon may be secured to the tube in an operative manner and with the recessed valve stem disposed on an outer peripheral portion of the tube. In this manner, the modified tube is completely free of projections extending inwardly from the inner peripheral portion of the tube.

Yet another object of the invention is to provide a method of constructing a recessed valve stem assembly which may be readily carried out by the utilization of conventional materials and equipment.

Still another object of this invention, in accordance with the preceding object, is to provide a recessed valve stem assembly which may be readily secured in any desired location on the outer periphery of an inner tube.

A final object of this invention to be specifically enumerated herein is to provide a means and method of forming and installing a recessed valve stem in an inner tube which will conform to conventional forms of manufacture, be of simple construction and easy to carry out so as to provide a device that will be economically feasible.

Thereby, the object of this invention is to provide a method of modifying an existing inner tube so that it is provided with a recessed valve stem assembly; FIGURE 1 is a perspective view of an inner tube which has been modified in accordance with the present invention; FIGURE 2 is an exploded perspective view of the various elements which are utilized in the assembly of the recessed valve stem assembly; FIGURE 3 is a perspective view of a completed recessed valve assembly; FIGURE 4 is a fragmentary sectional view taken through an assemblage of the various plates utilized during the vulcanizing step performed in constructing the recessed valve assembly and with the components of the recessed valve assembly and the internal tubular bracing member therefor illustrated in position; FIGURE 5 is a fragmentary perspective view of an inner tube illustrating the manner in which the recessed valve stem assembly is secured to an inner peripheral portion of the tube in accordance with the present invention and with the recessed valve assembly being shown as seen from the inside of the inner tube; FIGURE 6 is a perspective view illustrating the manner in which the recessed valve assembly is held in position during the step of vulcanizing the valve assembly to an associated inner tube, portions of the supporting plates utilized during the vulcanizing process and the inner tube being broken away and illustrated in section; and FIGURE 7 is an enlarged fragmentary perspective view taken substantially upon a plane indicated by the section line 7—7 of FIGURE 6.

Referring now more specifically to the drawings, the numeral 10 generally designates an inner tube which has been modified in accordance with the present invention by the installation of a recessed valve assembly generally referred to by the reference numeral 12 thereon.

The inner tube 10, prior to being modified in accordance with the present invention, may have been constructed without a valve stem or may have been a conventional inner tube including a conventional valve stem assembly projecting inwardly from an inner peripheral portion of the inner tube. However, the inwardly projecting conventional valve stem has been cut out of the inner tube 10 and the void formed in the wall of the tube 10 by the removal of the conventional valve stem has been closed by any convenient method such as by a patch (not shown) or by vulcanizing the opening defining the aforementioned void closed in a conventional manner.

With attention now invited more specifically to FIGURES 2—4 of the drawings, there it may be seen a recessed valve assembly 12 constructed in accordance with the present invention including a rubber mounting annulus 14, a tubular body 16 also constructed of rubber, a conventional valve stem assembly generally referred to by the reference numeral 18, and a closure annulus 20. The valve stem assembly 18 may consist of a valve stem assembly especially constructed in the configuration illustrated in FIGURE 2 of the drawings or comprise a conventional valve stem assembly which has been cut from a conventional inner tube, such as the inner tube 10, in a manner leaving a circular base portion 22 of the tube attached to the base end 24 of the conventional valve stem assembly 18. In any event, it is preferable that the base end of the valve stem assembly 18 be provided with a radially outwardly projecting base portion such as the base portion 22.

The tubular body 16 is of a diameter such that its inner diameter is substantially equal to the diameter of the inner periphery 25 of the annulus 14. The recessed valve assembly 12 is first assembled by inserting the valve stem assembly 18 within the tubular body 16 in the manner illustrated in FIGURE 4 of the drawings. Then, a threaded fastener 23 may be threaded upwardly at least partially into the inner or base end of the valve stem assembly 18 to prevent the inner end from being vulcanized closed. Then, the disc or annulus 20 is inserted into the end of the tubular body 16 into abutting engagement with the under surface of the valve stem assembly 18 with the under surface of the annulus 20 flush with the lower end edges of the tubular body 16. Then, a metallic sleeve 26 is inserted into the tubular body member with its first inserted end abutting against the shoulder.
or base portion 22 of the valve stem assembly 18 and its other end projecting slightly outwardly of the tubular body 16. Thereafter, the annulus 14 is slipped over the end of the sleeve 26 projecting outwardly from the tubular body 16. The assembled recessed valve stem assembly 12 is then inserted into the bore 28 formed through a supporting plate 30 and provided with a shallow countersink 32 at one end. Thereafter, a bottom closure plate 34 may be disposed beneath the plate 30 and a top closure plate 36 may be disposed over the plate 30 so as to completely enclose the assembled recessed valve assembly between the plates 34 and 36. Of course, the confronting surfaces of the annulus 20 and the base portion 22 and the inner surfaces of the tubular body 16 and the outer peripheral edges of the base portion 22 and the annulus 20 as well as the abutting surfaces of the annulus 14 and the adjacent end of the tubular body 16 may be suitably cleaned and/or roughened and treated so as to be readily adapted to be vulcanized together. Thereafter, the assemblage illustrated in FIGURE 4 of the drawings may have sufficient heat applied thereto to cause the rubber portions thereof to impinge into engaging engagement with each other to be vulcanized together. Then, the completed recessed valve assembly 12 may be removed from the bore 28. Thereafter, the sleeve 26 may be removed and an opening 40 may be formed in an outer peripheral portion of the tube 10 so that a similar operation may be formed in an opposing inner peripheral portion of the tube 10. Thereafter, the end of the completed recessed valve assembly 12 remote from the annulus 14 is first inserted through the opening 40 and then through the opening 42 in the manner illustrated in FIGURE 7 of the drawings. Then, the two wall portions of the inner tube 10 through which the openings 40 and 42 are formed may be clamped between a base plate 44 and a plate 46 similar to the plate 30 and having a bore 48 formed therethrough in which a portion of the completed recessed valve assembly 12 projecting through the openings 40 and 42 is received. Thereafter, the assemblage illustrated in FIGURES 6 and 7 may be suitably heated so as to vulcanize the surfaces of the annulus 14 and the wall portion of the tube 10 through which the opening 40 is formed together. Of course, these opposing surfaces have been previously prepared by being suitably roughened and coated with any suitable substance to enhance the vulcanizing process. After the completed recessed valve assembly 12 has been vulcanized to the wall portion of the tube 10 through which the opening 40 is formed, the tube 10 with the recessed valve assembly 12 vulcanized thereto may be removed from between the plates 44 and 46. Thereafter, the wall portion of the tube 10 through which the opening 42 is formed may then be slid off the end of the valve stem assembly remote from the annulus 14 and the opening 42 may be closed by conventional patching or vulcanizing methods. However, before the completed recessed valve assembly 12 is vulcanized to the tube 10 or before the opening 42 is vulcanized closed, the threaded fastener 23 is removed from the inner end of the valve stem assembly 18.

After the opening 42 has been vulcanized closed, the tube 10 as illustrated in FIGURE 1 is formed and includes the recessed valve assembly 12 secured to an outer peripheral portion thereof and is devoid of a conventional inwardly projecting valve stem assembly carried by its inner periphery. The plates 30 and 46 as well as the corresponding plates 34, 36 and 44, respectively, may be of such size and the plates 30 and 46 may include a plurality of openings or bores 28 and 48, respectively, enabling large numbers of valve assemblies 12 to be formed in a single vulcanizing operation and corresponding large numbers of valve assemblies 12 to be vulcanized to inner tubes 10 in a single vulcanizing step. Further, the inner tubes 10, in addition to being adapted for use on water, may be utilized on snow in conjunction with the more recently popular "snow tubing" sport and the tubes 10 may still further be utilized, after being slightly modified appropriately, as simple trampolines.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:
1. The method of forming a recessed valve stem comprising the steps of cutting a valve stem assembly from an inner tube by forming a generally circular cut in the tube about and spaced at least slightly outwardly of the base end of the assembly thereby removing the assembly from the tube with a generally circular portion of said tube remaining attached to said assembly and thereafter, positioning said valve assembly with in a tubular member with said base disposed in one end portion of said tubular member and said assembly projecting toward the other end of said tubular member, and securing said base in said one end portion of said tube in fluid-tight sealed engagement therewith and said assembly at least substantially entirely enclosed within the confines of said tubular member.
2. The method of claim 1 wherein said tubular member is constructed of rubber and the step of securing said base in said one end portion of said tubular member comprises the step of vulcanizing said base to said tubular member.
3. The method of claim 2 including the step of placing a disc of rubber in said one end portion of said tubular member outwardly of said base prior to the vulcanizing step, said vulcanizing step including the step of simultaneously vulcanizing said disc and base to said tubular member and said disc to said base.
4. The method of claim 3 wherein said vulcanizing step includes the step of vulcanizing outer peripheral portions of the face of said disc opposing said base to the end edge portions of said one end portion of said tubular member and said outer peripheral edge of said base to the inner peripheral edge portions of said tubular member immediately adjacent said end edge portions of said tubular member.
5. The method of claim 4 including the step of threading a threaded Shank portion of a headed fastener in the end of said assembly from which said base is supported prior to the step of positioning said disc against said base, and rupturing said disc in the area registered with said fastener after the vulcanizing step and then backing said fastener outwardly of the last-mentioned end of said assembly through the ruptured portion of said disc.
6. The method of claim 1 including the step of securing the portions of a panel-like rubber annulus defining the inner periphery thereof to said other end portion of said tubular member.
7. The method of claim 6 wherein said tubular member is constructed of rubber and the last-mentioned step includes the step of vulcanizing said annulus to said other end portion of said tubular member while securing being free of portions thereof projecting outwardly of the side of said annulus remote from said one end of said tubular member.
8. The method of claim 1 including the step of securing the portions of a panel-like rubber annulus defining the inner periphery thereof to said other end portion of said tubular member, inserting the end of said annulus through an opening formed in a wall portion of an inner tube from the exterior of the latter with the surface of said annulus facing said one end of said tubular member overlying the outer surface portions of said wall portion.
disposed about the opening therein, and securing said annulus to said outer surface portions in fluid-tight sealed engagement therewith.

9. The method of claim 8 wherein the step of securing said annulus to said outer surface portions includes the step of vulcanizing said annulus to said outer surface portions.

10. The method of claim 9 including the step of placing a disc of rubber in said one end portion of said tubular member outwardly of said base prior to the vulcanizing step, said vulcanizing step including the step of simultaneously vulcanizing said disc and base to said tubular member and said disc to said base.

11. The method of claim 10 wherein said vulcanizing step includes the step of vulcanizing outer peripheral portions of the face of said disc opposing said base to the end edge portions of said one end portion of said tubular member and vulcanizing the outer peripheral edge of said base to the inner peripheral edge portions of said tubular member immediately adjacent said end edge portions of said tubular member.

12. The method of claim 11 including the step of threading a threaded shank portion of a headed fastener in the end of said assembly from which said base is supported prior to the step of positioning said disc against said base, and rupturing said disc in the area registered with said fastener after the vulcanizing step and then backing said fastener outwardly of the last-mentioned end of said assembly through the ruptured portion of said disc.

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