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VALVE STEM OF THE CAPLESS TYPE

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The present invention relates to valve stems of the capless type, and more particularly to the valve cores thereof.

It is an object of the present invention to provide a valve stem of the type characterized which is of improved construction to facilitate assembly and disassembly of a valve core with and from the stem.

Another object of this invention is to provide a device of the type characterized wherein the core may be assembled with and disassembled from the stem without requiring that the head on the valve pin be moved into clutching relationship with the core body.

Other objects of the invention will appear as the description thereof proceeds.

The invention is capable of receiving a variety of mechanical expressions, two of which are illustrated on the accompanying drawing, but it is to be expressly understood that the drawing is for purposes of illustration only and is not to be construed as a definition of the limits of the invention, reference being had to the appended claims for that purpose.

Referring in detail to said drawing, wherein the same reference characters are employed to designate corresponding parts in the several figures,

Fig. 1 is an axial section of one embodiment of the present invention;

Fig. 2 is a top plan view of the embodiment of Fig. 1;

Fig. 3 is a view corresponding to Fig. 1 but of another embodiment of the present invention;

Fig. 4 is a top plan view of the embodiment of Fig. 3;

Fig. 5 is an elevation of a member of the core body which may be used with either of the foregoing embodiments; and

Fig. 6 is an elevation of the head used on the valve pin according to the embodiment of Fig. 1, but illustrating the modification of said head according to the embodiment of Fig. 3.

As shown, the rubber valve stem body 10 has embedded in its tip portion a container or tubular insert 11 which extends to the extremity of said rubber body and is laterally covered thereby substantially throughout its entire extent, being preferably vulcanized into said rubber body during the molding operation. As illustrated the outer periphery of said container 11 may be provided with any suitable number of exteriorly projecting ribs or fins 12, which may be of any suitable size and form and are shown as of progressively increasing size and projecting to progressively increasing extents toward the inner end of the container. Said ribs or fins are of such number, size and disposition along the length of said container as to assure that said container shall be permanently secured in the rubber body against dislodgement either by the air pressure from within the valve stem or by the handling and treatment to which the stem is subjected.

Said container at its outer extremity has a cylindrical bore, as shown at 13, and inwardly of said cylindrical portion said bore is provided with threads 14 to receive the core as heretofore described. Inwardly of said threaded portion 14 the bore is cylindrical as shown at 15, the diameter of said portion 15 being no greater than the inner diameter of the threads 14, and said portion 15 terminating in an inwardly inclined or beveled portion 16 for a purpose to be described. Inwardly of said beveled portion 16 the bore of said container is preferably cut away and flared outwardly as shown at 17 to receive rubber body material, as shown at 18, during the molding operation, to the end that the inner extremity of the container 11 is entirely confined within the rubber of said body, both interiorly and exteriorly thereof, to prevent the air under pressure from dislodging said container.

Mounted within said container 11 is a core which may be inserted into and withdrawn from said container as a unit. The body of said core is composed of two sections which may be suitably united but which preferably constitute separable parts for a purpose to appear. The outer body member 20 of said core is of generally cylindrical form at its outer end, as shown at 19, and of such diameter as to snugly fit the cylindrical bore 13 of said container 11. Inwardly of said cylindrical portion 13 said body member 20 is constricted at 21 and provided with a second generally cylindrical portion 22 which is exteriorly threaded as shown at 23 for coaction with the threads 14 of said container 11.

Interiorly said body member 20 is provided with a passage extending therethrough, said passage at its outer extremity being cylindrical as shown at 24 (see Fig. 5). Inwardly of said cylindrical portion 24 the passage is enlarged as shown at 25 and extends at said enlarged diameter as shown at 28 for the greater part of the cylindrical portion 18 of said body member. Where the passage approaches the constricted portion 21, it also is constricted by a beveled wall 27, and is continued as a substantially cylindrical passage 28 through the threaded portion
of member 20 to the inner extremity of said member. Member 20 is also provided with a pair of diametrically opposed slots 25 which extend inwardly from the outer end of said member for a major part of the length of the outer cylindrical portion 19 of the member 20.

The inner member 28 of the core body is provided with an outer cylindrical portion 31 designed to snugly fit the cylindrical portion 15 of the core member 20. Diametrically of said cylindrical portion 31 is a second generally cylindrical portion 32 of smaller diameter so as to provide an inwardly facing shoulder 33. The inner extremity of said portion 32 is inwardly tapered as shown at 34 to approximate a sharp edge at its innermost extremity. The peripheral wall of portion 32 is also provided with a suitable number of outwardly extending ribs or fins 35, and secured to the member 30 below the shoulder 33, preferably by vulcanization during a molding operation, is a tubular rubber member 36 which surrounds the portion 32 of member 30 and which terminates at its inner extremity in a depending skirt portion 37 of smaller diameter. The outer portion of member 30 is preferably flush with the peripheral of the portion 21 of said member 20.

Interlocking said body member 30 has a passage extending therethrough, said passage at its inner portion 38 being generally cylindrical and of substantially the same diameter as the portion 28 of the passage in the outer member 20. The inner portion 38 of said passage is of smaller diameter than the portion 38 so as to provide an outwardly facing shoulder 40, and is preferably of substantially the same diameter as the passage through the free end of the skirt 37. The outer diameter of said skirt 37 may be somewhat smaller than the passage 24 extending through the body of the stem so as to leave a small clearance as shown at 42 for a purpose to be explained.

The valve provisions include a valve member 45, a valve pin 46 to which said valve member 45 may be secured in any suitable way, or said valve member 45 may be integral with said valve pin, a head 47 formed integrally with or suitably attached to said valve pin 46, and a collar spring 48 adapted to seat on the shoulder 40 and react between said shoulder and said head 47. Valve member 45 may take any suitable form, but is shown as generally conical in shape so as to make a nearly line contact with the innermost inner edge of skirt 37. Head 47 may be attached to the valve pin 46 in any suitable way, and is provided with diametrically disposed radially extending ribs or keys 48, which may be formed integrally with or suitably attached to the head 47, and which are of such size and shape in cross-section that they substantially fill but slide freely in the slots 29 heretofore described.

Head 47 is of such diameter that it substantially fills but slides freely in the aperture 24 which constitutes the outer extremity of the passage through the core member 20. The outer face of head 47 may be nearly flush with the outer extremity of said member 20, but as shown it preferably projects somewhat beyond said member 20 and is provided with a rounded exterior surface. Said exterior surface 50 is preferably smooth and uninterrupted as shown in Figs. 1, 2 and 6, but if preferred said head may be provided with a diametrically extending kerf 51 as shown in full lines in Figs. 3, 4 and 6.

In assembly the core body portions 20 and 30 may be telescoped over the pin 46, and when the collar spring 48 has been seated on the shoulder 40 the head 47 may be attached to the pin 46 in any suitable way, and then the entire unit composed of the core body portions 20 and 30, the valve member 45, pin 46, head 47 and interposed spring 48 may be inserted into the container 11 as a unit. By means of a screw driver or other suitable instrument the head 47 may be depressed into the passage through the member 20. Then the outer extremity of the screw driver or other tool of engagement the key 49 is engaged in the container 11, preferably to be used in the threads 14, advancing the inner core body member 28 ahead of the member 20 but rotating independently thereof, until the rubber sleeve 37 is tightly seated on the beveled seat 16 in the container 11 with the depending skirt 37 occupying the position shown in Figs. 1 and 3. Upon removal of the screw driver or other tool the spring 48 restores the parts to the position shown in Figs. 1 and 3, the head 47 snugly filling the aperture 24 so as to prevent substantial admission of dust, moisture and other foreign matter into the passage through the stem.

When it is desired to inflate the tire, by use of any suitable coupling applied to the outer end of the stem, the head 47 is moved inwardly into the enlarged portion 28 of the passage through the member 20, so that air may flow freely around said head 47 and thence inwardly through the passage 24, before described, and as the valve member 45 is removed from its seat when the head 47 is moved inwardly, the air may flow freely between the valve member 45 and its seat at the inner extremity of skirt 37 and into the passage 41. When pressure is removed from the head 47, spring 48 will restore the parts to the relationship shown in Figs. 1 and 3, and the pressure of the air on the valve member 45 supplemented by the action of spring 48 will press valve member 45 into tight sealing engagement, of a nearly line character, with the edge of the skirt 47, also tending to press said skirt 37 outwardly so as to seat the latter against the wall of the bore 41 and prevent leakage of air around the periphery thereof.

During inward and outward movement of the head 47 said head and the parts associated therewith are guided by the engagement of the keys 49 in the slots 29, and when the head is in its outermost position to close the passage at 24 said keys 49 fill the slots 29 to prevent substantial admission of dust, moisture or other foreign matter through said slots. Thereby the core is provided with means in the form of slots for engagement by a screw driver or other tool to facilitate insertion and withdrawal of the core without said slots constituting a passage by which foreign matter can get into the passage through the stem.

While slots as described in the core member 20 are sufficient for the improved facility of inserting and withdrawing the core, the head 47 may, as before described, be also provided with the kerf 51, which gives somewhat greater flexibility in the size of the tool that may be used, because if the extremity of the parts associated therewith is not of sufficient transverse dimensions to engage in the slots 29, rotation of the head 47 will transmit rotary movement to the core member 20 because of the engagement of the keys 49 in the slots 29. It will be noted that even though the head 47 is provided with the kerf 51, said kerf does not have to be aligned with the slots 29 because, if the tool is of a transverse dimension greater than the diameter of the head 47, engagement of the tool with the slots 29
will automatically depress the head 47 ahead of the tool.

While the passage through the core members has been described as cylindrical, it will now be perceived that such is not essential provided that the parts may cooperate in the manner hereinafter described. Thus the passage through the outer extremity of the core body member 20 may be made other than circular and the head 47 be correspondingly shaped. Other changes may be made as will now be apparent to those skilled in the art without departing from the spirit of the present invention.

It will therefore be perceived that a capless valve has been provided which greatly facilitates insertion and withdrawal of the core assembly because it is unnecessary to clutch a head on the valve pin with a barrel or other member of the core assembly, or otherwise bring parts which are not necessarily in alignment into such a cooperative position as will enable a transfer of torque from one to the other of said members.

While one particular form of core assembly has been described with considerable particularity because now preferred, it is to be expressly understood that the invention is not restricted to use in a core assembly of the type illustrated and described, and which in its broader aspects is the subject matter of my prior Patent No. 2,188,713, granted January 30, 1940, for Valve core container and stem. Therefore it is to be expressly understood that the present invention may be incorporated in any other suitable construction of core and core container, and reference is to be had to the appended claims for a definition of the invention.

What is claimed is:

1. A valve core comprising a valve pin, a valve body carried by said pin at one end of the latter, a core body through which said pin extends, said body having at one end a seat for cooperation with said valve body, spring means normally seating said valve body, an exteriorly threaded portion on said body, said body having a passage through which said pin extends, and a head on the other end of said pin for closing the passage through said body, said body having slots to receive a tool to transmit rotation to said body and said head having corresponding ribs engaged in said slots for closing said slots.

2. A valve core according to claim 1 in which said head is provided with a transversely extending kerf.

3. In combination in a valve stem having a core container, a core therefor comprising a member threaded into said container and having an axial opening, a pin extending through said opening and projecting therefrom in both directions, a valve member carried by said pin at one end thereof, a seat for said valve member, a head on the other end of said pin normally positioned in and of such size as to substantially fill the extremity of the passage through said member, spring means normally holding said head in its normal position and maintaining said "id" valve closed, said member being interiorly enlarged inwardly of said extremity, and a rib and slot connection between said head and said member.

4. In combination in a valve stem having a core container, a core therefor comprising a member threaded into said container and having an axial opening, a pin extending through said opening and projecting therefrom in both directions, a valve member carried by said pin at one end thereof, a seat for said valve member, a head on the other end of said pin normally positioned in and of such size as to substantially fill the extremity of the passage through said member, spring means normally holding said head in its normal position and maintaining said "id" valve closed, said member being interiorly enlarged inwardly of said extremity, and a rib and slot connection between said head and said member.

5. A device as claimed in claim 4 wherein said head is provided with a transversely extending kerf.

6. In a rubber valve stem of the capless type, in combination with an interiorly threaded core container, a core body having a threaded portion and a valve seat, said core body having a passage extending therethrough, a valve member cooperating with said seat, a valve pin extending from said valve member through the passage in said core body, a head on said valve pin normally closing the outer end of the passage through said core body, said passage being enlarged inwardly of its extremity so that when said head is depressed air may flow therearound, and a rib and slot connection between said head and said core body.

7. In a rubber valve stem of the capless type, in combination with an interiorly threaded core container, a core body having a threaded portion and a valve seat, said core body having a passage extending therethrough, a valve member cooperating with said seat, a valve pin extending from said valve member through the passage in said core body, and a head on said valve pin normally closing the outer end of the passage through said core body, said passage being enlarged inwardly of its extremity so that when said head is depressed air may flow therearound, and a rib and slot connection between said head and said core body.

8. In a rubber valve stem of the capless type, in combination with an interiorly threaded core container, a core body having a threaded portion and a valve seat, said core body having a passage extending therethrough, a valve member cooperating with said seat, a valve pin extending from said valve member through the passage in said core body, and a head on said valve pin normally closing the outer end of the passage through said core body, said passage being enlarged inwardly of its extremity so that when said head is depressed air may flow therearound, and a rib and slot connection between said head and said core body.

9. In a rubber valve stem of the capless type, in combination with means interiorly threaded to receive a valve core, a valve core adapted to be threaded into position and including separable outer and inner members, said outer member being provided with exterior threads and said inner member providing a valve seat, a valve member cooperating with said seat, a valve pin extending outwardly through said members, a head on said pin normally filling the outer extremity of the passage in said first named mem-
ber, said passage being enlarged inwardly of its outer extremity to permit air flow around said head when said head is depressed, and a spring for urging said head into passage closing position, said outer member being provided with slots adapted to receive a tool for rotating said member, and said head having corresponding ribs slidable in but substantially filling said slots.

10. In a rubber valve stem of the capless type, in combination with means interiorly threaded to receive a valve core, a valve core adapted to be threaded into position and including separable outer and inner members, said outer member being provided with exterior threads and said inner member providing a valve seat, a valve member cooperating with said seat, a valve pin extending outwardly through said members, a head on said pin normally filling the outer extremity of the passage in said first named member, said passage being enlarged inwardly of its outer extremity to permit air flow around said head when said head is depressed, and a spring for urging said head into passage closing position, said outer member being provided with slots adapted to receive a tool for rotating said member, said head having corresponding ribs slidable in but substantially filling said slots, and said head having a transversely extending kerf whereby said outer member may be rotated from said head when a tool is engaged in said kerf.

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