

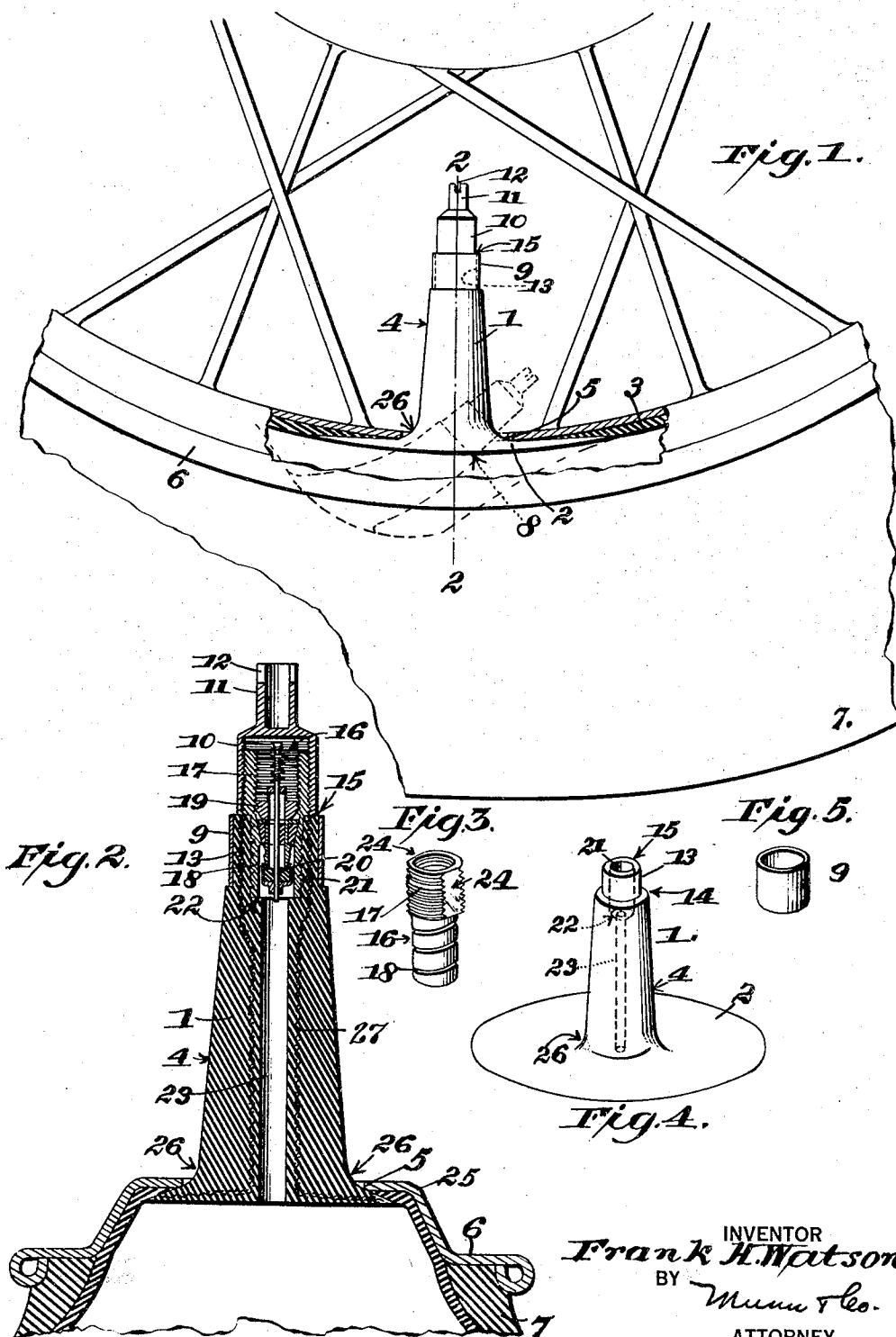
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PNEUMATIC INNER TUBE AND VALVE STEM

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PNEUMATIC INNER TUBE AND VALVE STEM

REISSUED

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This invention relates to improvements in pneumatic tires and it consists of the constructions, combinations and arrangements herein described and claimed.

One of the outstanding objects of the invention is to provide a pneumatic inner tube with an integral valve stem or filling tube of either the same or similar yieldable material for the purpose of enabling flexure of the stem in the event of deflation of the inner tube so that the stem can bend over and even flatten down against the inner tube during the distortions and strains to which the latter is then subjected, without any possibility of injury either to the valve stem or the delicate valve insides customarily used.

A further object of the invention, and one contributing largely to the successful functioning of the valve stem under the foregoing circumstances, is to taper the stem and to make the superimposed metallic parts of successively smaller diameters so that there will be no outstanding obstruction to hang in the hole in the wheel rim.

A further object of the invention is to provide a combined valve stem of yieldable material and a separable core or valve insides container, the advantage of the latter being the ability of replacement in the event of any possible mechanical defect or damage in or to the original.

Another object of the invention is to provide a more effective and enduring air seal for the customary cap, a confined portion of the valve stem being so located as to provide a seat for the rim of the cap.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawing in which:—

Figure 1 is a partial side elevation of a wheel having the improved inner tube and valve stem incorporated therein, portions being shown in section in order to illustrate internal construction.

Figure 2 is a vertical section taken on the line 2—2 of Figure 1.

Figure 3 is a detail perspective view of the improved core container.

Figure 4 is a perspective view of the yieldable valve stem body alone.

Figure 5 is a detail perspective view of the metallic sleeve or band.

Persons having had experience with deflated tires, either of the high pressure or balloon types, know that damage of minor or grave characters to the inner tube are apt to occur if the vehicle is kept running for even a short distance. The prevailing custom is to connect a metal valve stem with the inner tube by means of a jam nut, insert the valve stem through a hole in the rim and secure the valve stem to the rim with another jam nut.

In instances where the second jam nut is in place there is of course no possibility of the valve stem dropping inside of the casing upon deflation of the inner tube but there is the possibility of tearing the inner tube from its moorings to the valve stem by virtue of the creeping action of the casing over the inner tube and the resulting frictional pull on the inner tube that is bound to occur by virtue of the remaining air at least under atmospheric pressure.

Very often the motorist will omit the second jam nut, and then in the event of a deflated tire the foregoing frictional pull of the casing on the inner tube will draw the valve stem through the hole and bend it to such an extent that its further usefulness is instantly destroyed. This metal valve stem can then become the instrument of tearing the adjoining parts of the inner tube to pieces so that the usefulness of the tube also will be instantly destroyed.

The remedy herein proposed for these faults is a valve stem or body 1 of rubber or other yieldable material. This valve stem is made part of a flap 2 of oval or other configuration, which is intended to be cemented, vulcanized or otherwise attached to the inflatable tire member or tube 3 in the following manner. To all intents and purposes the valve stem is an integral part of the inner tube. The stem 1 is mounted so that the flap 2 contacts the inside of the tube 3 around the hole. This not only gives a part of the stem 1 the added function of reinforcing the tube, but eliminates the need for a patch custom-

arily used in attaching the stem to the inner tube. This simplification of the construction enables an actual saving of from two to five cents on the mounting alone of the valve stem.

A feature of outstanding importance in the valve stem 1 is its tapering shape 4. This shape is purposely adopted as a means of enabling and insuring the passage of the valve stem 1 through the hole 5 in the rim 6 with the least possible resistance in the event of the deflation of the inner tube 3. Moreover, the tapering shape contributes to no small extent both to the easy flexure of the valve stem in passing through and to the erect posture when the tire is inflated.

Figure 1 illustrates the valve stem 1 in its normally erect position when the inner tube 3 is properly inflated. Upon deflation of the inner tube the valve stem 1 will drop through the hole 5, but during the motion of the casing 7 relatively to the rim 6 and the consequent shifting of the inner tube 3 there will also be an immediate tendency to bend the valve stem 1. The bent position is indicated in dotted lines 8. The tapering shape 4 facilitates the slipping of the valve stem through the hole 5, and even should the valve stem be flattened against the periphery of the rim 6 there would never be a rupture at its point of connection with the inner tube nor would there be any damage to the associated parts for reasons presently brought out.

Superimposed on the end of the valve stem 1 is a metallic sleeve 9 and valve cap 10. The valve cap has a tubular extension 11 which is slotted at 12 according to custom so as to enable using the inverted cap for the extraction of the core or insides. It is to be observed that the parts 9, 10 and 11 are of successively smaller diameters. This arrangement is purposely adopted in order to carry out the tapering shape 4 of the valve stem 1. There are no outstanding parts whatever that might in any way act as an obstruction of the free passage of the valve stem through the hole 5 in the foregoing event of the deflation of the inner tube 3. It is readily perceived that the sleeve 9, cap 10 and extension 11 will slip through the hole 5 just as easily as will the valve stem 1 itself.

A thimble end 13 of the valve stem 1 provides a shoulder 14 by virtue of its reduced diameter. It is upon this thimble end that the metallic sleeve 9 is forced under pressure. This sleeve can be fitted on so tightly that it will never come off in ordinary use. The thickness of the sleeve 9 is such that the outer surface does not come quite flush with the adjoining parts of the valve stem 1. This leaves a very slight annular projection of the valve stem at the base of the sleeve 9, the purpose being an insurance of the step down in size between the two. A fabric liner 27, incorporated in the valve stem 1, extends into

the thimble end or terminal 13 for the purpose of reinforcing the latter. In practice the amount of rubber between the sleeve 9 and the extended fabric in the thimble end 13 is very little. The thinness of the rubber at this place enables a virtual grip of the sleeve on the fabric, thus preventing the forcible slipping off of the sleeve under pressure.

An important function of the metallic sleeve 9 is to confine the rubber or other yieldable material of which the thimble end 13 is composed. A narrow, annular portion of the thimble 13 appears inside of the upper end of the sleeve 9 providing a seat 15 against which the rim of the cap 10 can be forced in screwing the cap down thus to make an air tight joint.

The prevailing custom in making valve caps is to employ a rubber washer on the inside. In repeatedly screwing the cap down against the metallic valve stem this washer becomes grooved and sometimes cut to such an extent that it will not hold compression and since the valve cap is often relied upon to hold compression it follows that flat tires often result from the fault at this point. By confining the portion 15 by the sleeve 9 there is no possibility whatever of spreading of the rubber, and it is immaterial how often the cap 10 is screwed down because there will always be available material to compose an efficient valve seat. To this end the external diameter of the cap 10 is less than the internal diameter of the sleeve 9 so that the cap can be screwed down into the sleeve if necessary.

Situated on the inside of the thimble 13 is a core or valve insides container 16 (Fig. 3). This comprises tubular portions 17, 18 of which the latter is smaller than the former. The portion 17 is threaded both externally and internally respectively to receive the cap 10 and to receive the follower 19 of the core or insides 20. The core may be of any known type.

The tubular portion 18 has a quick-pitch thread (Fig. 3) which insures the holding of the core container in place and enables its quick application when screwing the core container 16 into the chamber 12 that occurs at the upper end of the valve stem 1. This chamber extends down past the level of the shoulder 14 and terminates at a shoulder 22 whence the bore 23 extends to the base of the tube 1 and to the inside of the inner tube 3.

Screwing in of the core container 16 is continued until the portions 17, 18 rest on the respective seat 15 and shoulder 22. The portion 17 may be flattened on opposite sides as at 24 (Fig. 3) to provide a pincer hold and thus avoid damaging the threads.

In practice it is not absolutely essential that the portion 18 shall abut the shoulder 22. The portion 17 acts largely in the capacity of an internal filler for the thimble

end 13. The thimble end will be under great compression between the portions 17 and sleeve 9, and like the sleeve 9 the portion 17 prevents spreading of the confined material so that the valve seat 15 will always retain a desired uniformity.

It is to be observed that the rim 6, heretofore generally alluded to, is of the type known as drop center. The drop center (Fig. 2) consists of an annular depression in the rim. It is in rims of this type that havoc is wrought most notably to the inner tubes and valve stems upon deflation because the same design of structure that facilitates an easy application of the casing 7 in the first place also makes a quick release of the casing upon deflation of the inner tube.

It is not uncommon for the casing to fly off of the rim almost immediately upon deflation. This means that unless some safety provision is adapted the inner tube will be instantly torn to pieces. By providing the inner tube with the valve stem 1, bearing in mind its specific shape as well as appurtenances, the inner tube can effect a release from the rim as easily as the casing and even should the stem 1 be bent completely over no harm would come to it.

In rare instances the core container 16 may sustain damage which although minor may warrant its removal. For example, the screw threads on the portion 17 might become stripped. In such case the container 16 is readily separable from the rest of the valve stem 1, and a new container 16 can be inserted as easily as a new core 20.

The customarily needed and used jam nuts first alluded to are not required in connection with the improved valve stem 1. Sole reliance is put on the factor of friction between the inner tube 3 and its contacting parts to keep it and the valve stem in place. It is intended that the valve stem 1 shall clear the hole 5 quickly and easily upon deflation of the inner tube, hence the omission of any of the known kinds of anchoring means.

It is to be observed in both Figures 1 and 2 that the base of the stem 1 is fully rounded at 26 at the place of mergence with the flap 2. In addition to strengthening the connection of the stem 1 with the flap the rounding 26 produces a seal around the edge of the hole 5. The natural expansion of the air in the inner tube presses the rounded base 26 against the edge of the hole making a joint that will exclude both dirt and water. Drop center wheels do not customarily carry inner tube flaps thus making possible a direct contact of the rounding 26 with the edge of the hole.

While the construction and arrangement of the improved pneumatic inner tube and valve stem is that of a generally preferred form, obviously modifications and changes may be made without departing from the

spirit of the invention or the scope of the claims.

I claim:—

1. A valve stem of yieldable material, a cap, and means on which the cap is fitted, being carried by the stem and having a relatively short extension beyond the end of the stem to enable utilization of said end of the stem as a seat for the rim of the cap.

2. A valve stem of yieldable material, a cap, means on which the cap is fitted, being carried by the stem and having a relatively short extension beyond the end of the stem to enable utilization of said end of the stem as a seat for the rim of the cap, and means for confining said portion of the stem to maintain the durability of the seat.

3. A valve stem of yieldable material, a cap, a core container carried by the stem and carrying the cap, and means confining the stem material around a portion of said container, leaving an exposed annulus to provide a seat, said means being of greater internal diameter than the external diameter of the cap enabling fitting of the rim of the cap down inside of said means.

4. A valve stem having a thimble providing an external shoulder, an internal bore ending in a chamber and providing a shoulder, a core container having a core and including a portion inserted in the chamber in contact with the shoulder and having a larger portion extending above the thimble, a cap fitted on said larger portion to protect the core, and a sleeve fitted on the thimble to confine the stem material therein, said confined material providing a seat for the rim of the cap.

5. A valve stem, a core container having a portion inserted into said stem and a core, a cylindrical sleeve to assist in holding the container on the stem, and a cylindrical cap fitted on said container to protect the core, said stem and cap being in substantially end to end contact, and said stem, sleeve and cap being of successively smaller diameters to establish a generally tapering configuration.

6. A tubular valve stem composed of yieldable material having tapering sides and a cylindrical thimble end of minor length being of lesser diameter than the adjacent part of the stem, a core container having a portion fitted in the stem, said portion being substantially co-extensive with said thimble end leaving the major part of the stem flexible, and a cap fitted on the exposed remainder of said container being of lesser diameter than the thimble end.

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