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VALVE STEM AND VALVE

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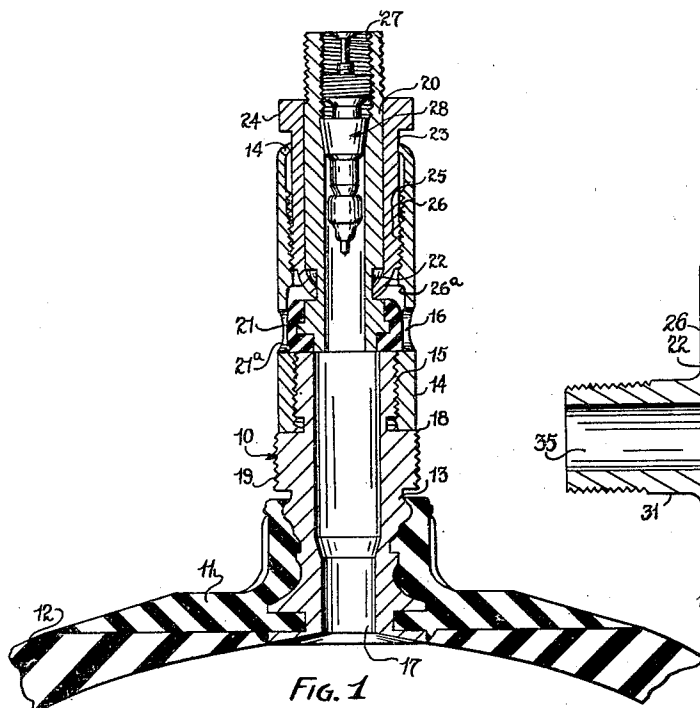


FIG. 1

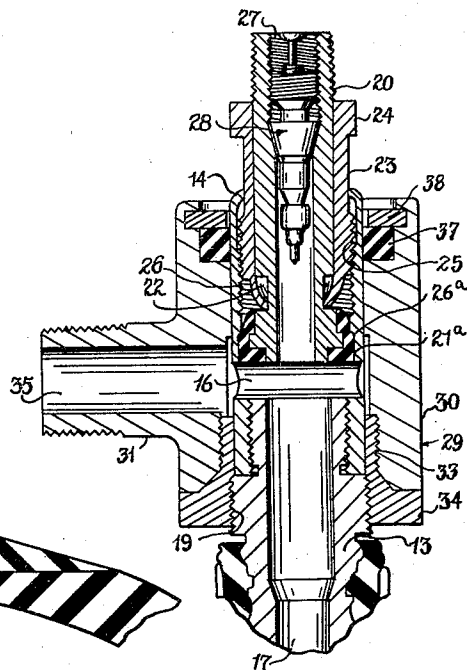


FIG. 3

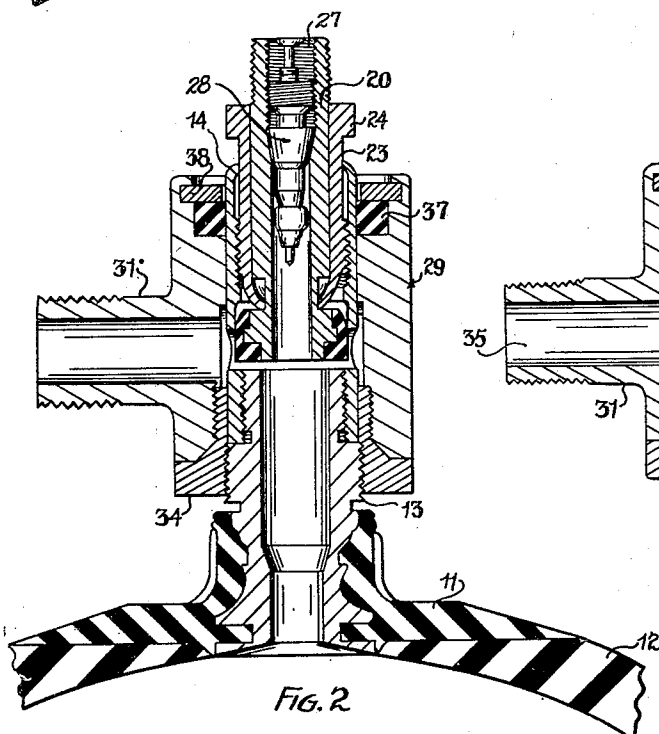


FIG. 2

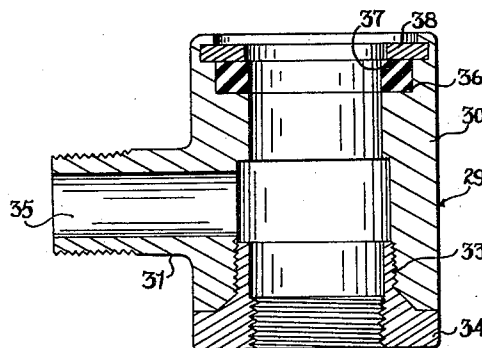


FIG. 4

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VALVE STEM AND VALVE

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6 Claims. (Cl. 152—415)

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This invention relates to a valve stem and valve particularly adapted to be used with an article that is to be inflated with liquid as, for example, the tires used on tractors or similar work apparatus.

It has been found that the inflation of large tires, such as used on tractors, earth moving equipment and similar pieces of apparatus, with liquid results in increased traction and longer life, thus effecting important economies in fuel consumption and amount of work that can be accomplished in a given length of time. The liquid used to so inflate the tires may be water or some suitable anti-freeze mixture, such as calcium chloride solution. The tires may be inflated either partially or completely with liquid, and in the latter instance it is necessary to completely exhaust the air from the tires in order that they may be completely filled with the liquid. Heretofore it has been necessary to completely remove the air valve, core or core housing from the valve stem of the tires to effect this exhausting of the air and subsequent refilling with liquid, since the space around the conventional core of the valve in the valve stem is too small to allow a very rapid flow of liquid. This removal of the valve core or core housing is not desirable because, after the filling with the liquid is completed, the reinsertion of the core or core housing either requires a special apparatus or else considerable liquid is lost during the operation.

It is, therefore, an object of this invention to provide an improved valve stem and valve for an inflatable article which will facilitate the exhaustion of air from the article and the introduction of liquid therein without the necessity of completely removing the usual valve core or core housing.

A further object of the invention is to provide an improved valve means for use with articles that are to be inflated with liquid which includes the usual removable valve core in a core housing, but is so constructed that the said core and housing do not have to be removed from the valve means prior to exhausting the air from the article and inflating the latter with liquid.

A further object of the invention is to provide an improved valve means for an inflatable article, the said valve means having an opening through the side wall thereof for exhausting the air and admitting liquid and provided with a tubular means, preferably constituting a core housing, having a sealing element thereon for selectively sealing and unsealing said opening.

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A still further object of the invention is to provide an improved valve means for an inflatable article in which the usual valve core member is mounted in a longitudinally movable tubular housing extending within the said valve means and provided with a sealing means operating to seal and unseal a filling opening provided in the wall of said valve means.

It is also an object of the invention to provide an improved valve means for an inflatable article, having a filling opening in the wall of the valve means, with an adapter for connection of a conduit to said opening.

Further and additional objects and advantages will become apparent during the following detailed description of one embodiment of the invention, which is illustrated in the accompanying drawing wherein:

Fig. 1 is a longitudinal, sectional view through a valve stem and valve, constructed in accordance with this invention, and a portion of an inflatable article to which the valve and valve stem are attached, the position of the parts being such that the fluid opening in the wall of the valve stem is sealed;

Fig. 2 is a view similar to Fig. 1 and shows an adapter mounted upon the valve stem to provide a connection to a fluid conduit, the parts being shown in a position such that the fluid opening in the valve is only partially sealed;

Fig. 3 is a view similar to Fig. 2 showing the parts in a position such that the fluid passageway is completely open;

Fig. 4 is a longitudinal, sectional view of the adapter shown in Figs. 2 and 3.

In Fig. 1 the improved valve means, indicated generally at 10, has a rubber base 11 molded and vulcanized to its inner end, which has the usual flanges and projections provided for this purpose. The rubber base 11 is vulcanized or otherwise attached to a portion of an inflatable article 12 so that the passageway 17 in the valve means communicates with the interior of the article. The valve means 10 is shown as constructed of an inner stem portion 13 and an outer sleeve portion 14 connected together by threads 15 provided upon the outer end of the stem 13 and the internal surface of the inner end of sleeve 14 with the outer end of the sleeve projecting beyond the outer end of the stem 13. While the valve means has been shown as formed in two pieces, it will be obvious that it can be formed from a greater number of separate elements connected together or as one integral piece.

The sleeve member 14 has a transversely extending bore 16, forming air exhausting and liquid filling openings, through the walls of the sleeve and communicating with the passageway 17 provided in the stem portion 13 which is in communication with the interior of the article 12. The inner end of the sleeve member 14 butts against the outer surface of a shoulder 18 formed on an enlarged portion 19 of the stem 13, the circumference of this enlarged portion 19 being provided with threads for a purpose later to be described.

Extending into the outer portion of the interior of sleeve 14 is a tubular member or core housing 20 which has a flange 21 provided adjacent its inner end upon which is mounted a sealing means 21a, formed from rubber, leather or other suitable material having a diameter such as to have a sliding fit in sleeve 14 and a length such that when positioned, as shown in Fig. 1, it will completely seal the openings provided by the bore 16. Immediately beyond the flange 21 the tubular member or housing 20 has a reduced portion 22, while the diameter of the outer end of the tubular member or housing 20 is less than that of the internal diameter of the said sleeve.

A second sleeve or actuator member 23 surrounds a part of this outer portion of tubular member or valve core housing 20 and extends within the outer end of the first-mentioned sleeve, the outer end of the core housing 20 projecting beyond the outer end of the sleeve or actuator 23. The inner ends of this actuator 23 are turned inwardly into the space provided by the reduced diameter 22 of the housing member 20 so that there is provided a swivel connection between these two members. The outer end of sleeve or actuator 23 projects beyond the outer end of sleeve 14 and has an enlarged head portion 24 which may have a polygonal shape or be provided with other expedients whereby it may be grasped and turned. The outer end of the sleeve 14 is curved inwardly to engage the external surface of the actuator 23 below the head 24, the said members having a sliding fit at this point.

A threaded portion 25 is provided in the circumference of actuator 23 for cooperation with a threaded portion 26 upon the internal surface of sleeve 14 so that when the head portion 24 is rotated, the actuator 23 will move relative to sleeve 14, the actuator 23 carrying with it the tubular housing member 20 and the sealing means 21a. There is thus provided a valve formed by the said sealing means 21a for controlling the bore or opening 16 through which air may be exhausted and liquid introduced into the interior of the inflatable article in a manner subsequently to be described.

The internal surface of sleeve 14 immediately below the threaded portion 26 is provided with a curved shoulder 26a which is engaged by the sealing means 21a when the latter is moved to the position shown in Fig. 3 to open the said liquid passage through the bore 16. This cooperation of the sealing means 21a with the shoulder 26a seals the space between the housing member 20 and the sleeve 14 to prevent the entrance of air or the escape of liquid through the outer end of the valve means.

The tubular housing member 20 has a longitudinally extending bore 27 similar to the bores in the usual tire valve stems in that the said bore is so formed to receive and retain the well known valve insides or core member, generally designated 28. This provides a means for controlling

the addition of air to the interior of the inflatable article if it be desired to employ air either wholly or partially as the inflating means.

Turning now to Figs. 2, 3 and 4, I have shown a connector or adapter, generally designated 29, for attachment to the valve means 10 so that a conduit (not shown) may be attached for the purpose of exhausting air from the inflatable article and filling it with liquid. This connector or adapter, which is shown in position upon the valve means in Figs. 2 and 3, comprises a generally cylindrical portion 30 having a lateral extension 31. The cylindrical portion 30 is suitably bored so as to have a sliding fit over the sleeve 14 and stem 13 of the valve means. The lower end of the bore in the adapter 29 is provided with a threaded portion 33 cooperating with an externally threaded portion on a sleeve nut 34 which threadedly engages the enlarged portion 19 of stem 13 to secure the adapter 29 in place. While the construction of the adapter is shown as generally cylindrical and having a separate nut for securing it to the valve means, it will be readily apparent that it may be constructed in different shapes and with an integral portion for cooperation with said valve means.

The lateral extension 31 of the adapter 29 is provided with a bore 35, which communicates with the opening provided by the bore 16 in the sleeve member 14 when the adapter is positioned on the valve stem. The outer end of extension 31 may be provided with threads or other means for connecting a conduit thereto. To provide a fluid-tight seal between the adapter and the valve means, the upper end of the cylindrical portion of the adapter 29 has a counterbore 36 in which is positioned a packing means 37 retained by a ring 38. This packing means 37 engages the outer surface of sleeve member 14 and provides a fluid-tight seal at this point.

Having described the detailed construction of my improved device, the operation thereof is as follows. When it is desired to fill an inflatable article with liquid, the head portion 24 of the actuator 23 is rotated in a direction to move the valve or sealing means 21a to the position shown in Fig. 3 where the bore 16 is open and the valve 21a is in sealing engagement with shoulder 26a. The adapter 29 is then applied to the valve means 10 (if it is not already thereon) and occupies the position shown in Figs. 2 and 3, thereupon the attendant applies a suitable conduit to the end of lateral extension 31 of adapter 29 and connects said conduit to a means for evacuating the air from the inflatable article and subsequently filling with liquid through the same conduit. A number of different devices for effecting this evacuation and filling are available, and since they do not form a part of this invention, they are not here illustrated. After the air has been completely exhausted, liquid is caused to flow through the passage provided by bores 35, 16 and 17 until the inflatable article is completely filled. The actuator 23 is then rotated in a reverse direction, thus moving the sealing means 21a from its sealing engagement with the shoulder 26a, as shown in Fig. 3, to a position where the said sealing means completely closes the opening through the bore 16, as shown in Fig. 1. The adapter 29 may then be removed, since it is no longer necessary, and the liquid will be retained within the inflated article until it is desired to release it therefrom.

In the event the filling of the inflatable article is to be partially liquid and partially air, the liquid

may be placed therein as previously described to the desired extent, whereupon the valve means 21a is operated to its closed position, as shown in Fig. 1, and the desired air pressure is then introduced through the valve core 28. In this type of filling, the air must be replenished from time to time and this can be readily accomplished by applying the usual air line to the end of the tubular member 20.

While I have disclosed a preferred embodiment of the invention in considerable detail, I do not wish to be confined to the exact construction illustrated but desire to cover all modifications coming within the spirit and scope of my invention as set forth in the appended claims.

Having thus described my invention, I claim:

1. A device of the character described comprising, a tubular stem means having a passageway extending longitudinally therethrough and an opening extending through the wall thereof and communicating with the passageway, means on the inner end of said stem means for connection thereof to an inflatable article with the passageway therethrough in communication with the interior of said article, a tubular member extending into the outer end of the passageway through said stem means and movable longitudinally therein, sealing means on a portion of the exterior surface of said tubular member within said stem means, a sleeve member surrounding a portion of said tubular member and extending into the outer end of the passageway in said stem means, means on the outer end of said sleeve member for rotating it, and means interconnecting said stem means, sleeve and tubular member so constructed and arranged that rotation of the sleeve produces longitudinal movement of the tubular member within the stem means to selectively seal and unseal the opening in the stem means.

2. A device as defined in claim 1 and further comprising, a connector having a longitudinal bore therethrough adapted to be fitted over said stem means, a transverse extension on said connector having a bore therethrough adapted to communicate with said opening in the stem means, and means to releasably retain said connector on said stem means.

3. A device as defined in claim 1 and further comprising, a cylindrical member adapted to be fitted over said stem means, a transverse extension on said cylindrical member having a bore therethrough adapted to communicate with said opening in the stem means, cooperating means carried by said stem means and one end of said cylindrical member to releasably retain said cylindrical member on said stem means, and sealing means carried by the other end of said cylindrical member to form a fluid-tight seal with said stem means.

4. A device of the character described comprising, a tubular stem means having a passageway extending longitudinally therethrough and an opening extending through the wall thereof and communicating with the passageway, means for connecting a fluid conduit to said opening, means on the inner end of said stem means for connection thereof to an inflatable article with the passageway therethrough in communication with the interior of said article, a tubular member extending into the outer end of the passageway through said stem means and movable longitudinally therein, said member having a bore therethrough

communicating with the passageway in said stem means and adapted to receive a valve for air, the outer end of said tubular member being adapted to receive an air line, sealing means on a portion of the exterior surface of said tubular member within said stem means, an actuator surrounding a portion of said tubular member and extending into the outer end of the passageway in said stem means, means on the outer end of said actuator for rotating it and means interconnecting said actuator with said stem means and said tubular member so constructed and arranged that rotation of the actuator produces longitudinal movement of the tubular member and the sealing means thereon between a position where said sealing means seals the passage of fluid through said opening in the stem member and a second position where the said passage of fluid is permitted and the space between the stem means and said tubular member sealed.

5. A valve stem and valve for an inflatable article comprising, a tubular stem adapted to have the inner end thereof attached to said inflatable article with the passage through said stem in communication with the interior of said article, a sleeve member connected at its inner end to said stem and extending above the outer end of said stem, said sleeve being provided with a transversely extending opening communicating with the passage through said stem, a tubular core housing member extending into the outer end of said sleeve and movable longitudinally therein, said housing member having a bore therethrough communicating with the passage in said stem, a valve core in said bore, valve means on a portion of the exterior surface of said tubular member within said sleeve, an actuator surrounding a portion of said tubular member and extending into the outer end of said sleeve member, means swivelly connecting said actuator to said tubular member, cooperating threads on said sleeve and actuator, and means on the outer end of said actuator for rotating it, whereby said cooperating threads will be effective to move the tubular member and the valve means thereon longitudinally within the sleeve member between a position where said valve means seals the opening in said sleeve and a second position where the said opening is unsealed and the space between the sleeve and said tubular member is sealed.

6. The combination as defined in claim 5 and further comprising, a cylindrical member adapted to be fitted over said stem and said sleeve, a transverse extension on said cylindrical member having a bore therethrough adapted to communicate with the said transverse opening in the sleeve, means to releasably retain said cylindrical member on said stem, and means on said transverse extension for connecting a fluid conduit thereto.

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The following references are of record in the file of this patent:

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