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AIR CHUCK FOR FLUSH VALVE STEMS

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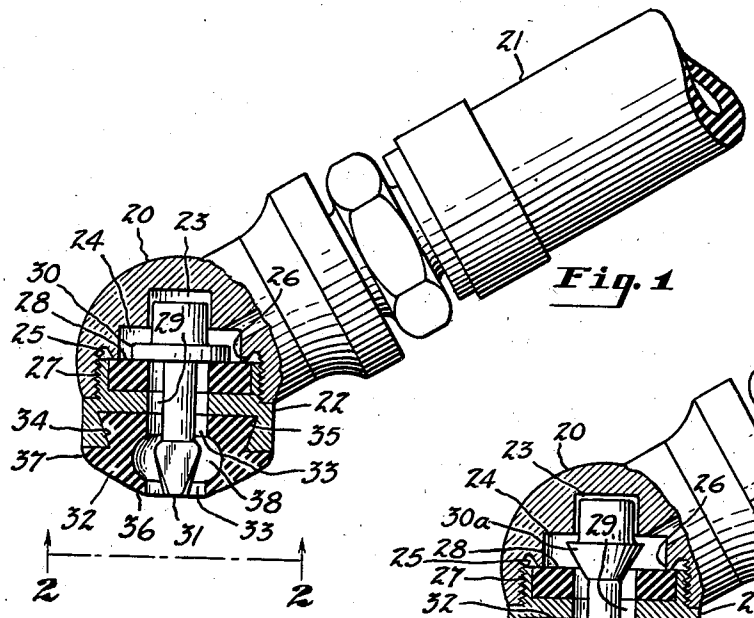

Fig. 1

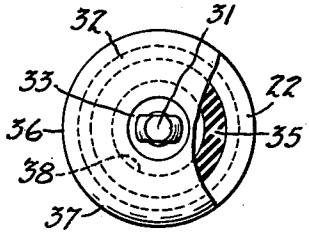

Fig. 2

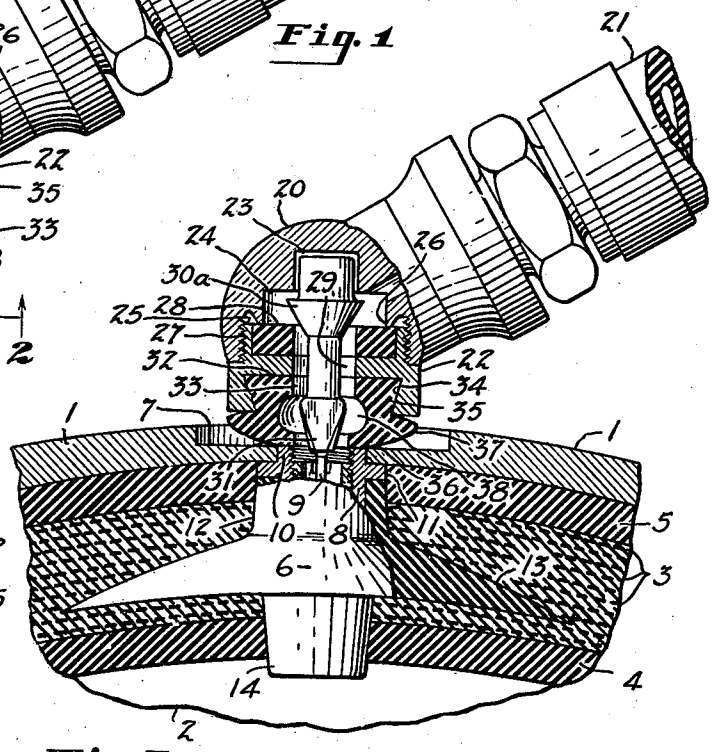

Fig. 3

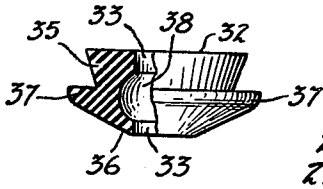

Fig. 4

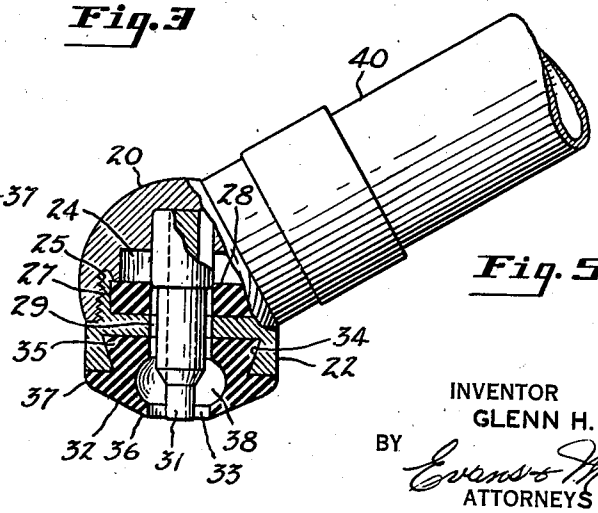

Fig. 5

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AIR CHUCK FOR FLUSH VALVE STEMS

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8 Claims. (Cl. 284—17)

This invention relates to improvements in air chucks and inflating mechanisms and particularly to such mechanism adapted for inflating expansible fluid pressure containers equipped with a valved inlet passage which terminates at the surface of the container or of a mounting member, as distinguished from the usual projecting valve stem, such valved passage being herein referred to as a flush type valve stem.

Heretofore inflatable articles have been equipped with externally extending valve stems for making connection with a source of inflation fluid. In the case of pneumatic tires these externally extending valve stems offer no very serious problems, but in the various couplings, clutches, etc., which are equipped with inflatable resilient members, a long valve stem protruding above the surface of the machinery in some instances offers insurmountable design difficulties, and in other instances its use entails increased hazards and danger.

It is, therefore, an object of this invention to provide an inflating device which does not require an externally extending valve stem.

Another object of this invention is to provide an air chuck suitable for making connection with flush valve stems.

Another object of this invention is to provide an air chuck of simplified design and construction and with improved operating characteristics.

A further object of this invention is to provide an air chuck having a flexible sealing member or tip at its external surface.

A still further object is to provide an air chuck in which the tip that contacts with the valve stem may readily be removed and replaced. Other objects will become apparent from the following detailed description of the invention made in connection with the accompanying drawing, in which:

Figure 1 is an elevational view partly in section of an air chuck adapted for connecting with an air hose;

Fig. 2 is a plan view of the device in Fig. 1 with a portion of the flexible tip broken away;

Fig. 3 is an elevational view partly in section showing a modified form of air chuck applied to a valve stem of the flush type which is contained in a flexible coupling;

Fig. 4 is an elevation partly in section of the flexible tip; and

Fig. 5 is an elevation partly in section of the air chuck mechanism as modified for attaching to a gauge for measuring inflation pressures.

In the accompanying drawing apparatus embodying the invention is shown for inflating the expansible resilient connecting member of a clutch or coupling which may be in the form of an inflatable annulus. In Fig. 3 of the drawing there is shown a portion of the outer drum 1 of a clutch or coupling and a portion of the inflatable member 2 attached to the interior of the drum. The inflatable member is preferably constructed in a manner generally similar to a pneumatic tire, being composed of rubber and superposed plies of reinforcing fabric 3 forming a stretch resisting carcass, layers 4 and 5 of rubber being secured to the interior and exterior surfaces of the carcass. The inflatable member is preferably permanently attached to the interior of the drum 1 by cementing or vulcanization and is provided with a permanently attached valve stem 6 which projects into an opening in the drum 1 and has its outer end substantially flush with the exterior surface of the drum 1, which may be provided with a recessed portion 7 around the valve stem opening.

The valve stem 6 is preferably provided with a tubular metal core 8 adapted to receive a check valve of conventional design, such as employed in the valve stems of pneumatic tires, which has a valve actuating rod 9 which extends to near the outer end of the stem 6. The metal core 8 has an outer end portion 10 which fits in the opening of the drum 1 and a flange 11 which provides a shoulder for engagement with the interior of the drum 1 around the opening. The core 8 inwardly of the flange 8 is enclosed in a rubber body 12 which serves to securely anchor the stem in the wall of the inflatable member. The rubber body 12 has a tapering circumferential flange 13 intermediate its ends which extends radially from the stem into the tire carcass to securely anchor the stem in the wall of the inflatable member. The inner end 14 of the rubber body of the stem preferably projects slightly past the interior rubber layer 4 of the inflatable member. The valve stem 6 may be built into the inflatable member 2 by forming the rubber body 12 of unvulcanized rubber and placing the same on a partially built carcass with the flange 13 resting upon one of the previously laid inner plies and with the inner end 14 thereof extending through openings in the inner plies and the inner rubber layer 4. Subsequent plies may then be laid upon the previously placed inner plies with openings of progressively smaller size to receive flange 13 and the outer portion of the valve stem body. Upon vulcanization the rubber

body of the valve stem is integrally united with the rubber of the inflatable member and the valve stem is permanently and strongly anchored in the wall of the inflatable member.

By reason of the fact that the outer end 10 of the valve stem 6 is flush with the portion of the exterior surface of the drum to which it extends, the usual tire inflating device is not suitable for introducing air under pressure into the inflatable member 2, and it is one of the main objects of the present invention to provide an inflating device having an air delivery passage adapted to be placed in registry with the air passage of the valve stem, means adapted to effect operation of the valves controlling the flow of air through the nozzle and stem and means for providing an effective seal between the end of the nozzle and the surface surrounding the valve stem opening.

An inflating device is provided for introducing air under pressure through the valve stem 6 into the interior of the inflatable member and this inflating device is in the form of an air chuck having a body portion 20 adapted to be connected to a source of air under pressure by a hose 21 suitably coupled thereto. The member 20 is formed to provide a valve receiving chamber and has a nozzle 22 suitably attached thereto. As herein shown, the body portion 20 is bored to provide a guide recess 23, counterbored to provide a valve chamber 24, and again to provide a nozzle receiving portion 25 and a clamping shoulder 26. The nozzle 22 has an upper portion 27 threaded to screw into the outer counterbore of the body 1 and recessed to receive an annular valve seating member 28 preferably formed of rubber which is clamped between the bottom of the recess in the nozzle member 22 and the shoulder 26 of the body portion. The nozzle member 22 has an opening 29 which registers with the central opening of the annular valve seating member 28. A valve 30 in the chamber 24 is adapted to bear against the member 28 to seal the outlet opening. As shown in Fig. 1, the valve 30 is in the form of a flat disk but it may be in the form of a cone 30*a* as shown in Fig. 3. Whether in the form of a disk or cone, the valve has a stem portion 31 projecting outwardly through the nozzle opening 29 and a guide portion projecting inwardly into the guide recess 23.

The nozzle 22 is provided with a tip 32 of abrasion-resistant, elastic material such as a suitable vulcanized rubber composition, which is provided with a central opening 33 which registers with the opening 29 in the body of the nozzle. The tip 32 is preferably fastened in the nozzle 22 by providing a fastening means which makes use of the resistance of the elastic, flexible material of the tip to forces which tend to effect a change in its shape. The tip may be fastened to the nozzle 22 by providing an outwardly tapering anchoring socket 34 in the nozzle 22 to receive a correspondingly shaped fastening portion 35 of the flexible tip 32. The socket 34 and the fastening portion 35 may be conveniently made frustoconical in shape with their diameter increasing outwardly as herein shown. The flexible tip 32 may be molded and cured separately or it may be inserted into the socket 34 before vulcanization. If cured separately the tip 32 may be readily pressed into the socket 34. The tip 32 has a rounded or convex outer face portion 36 and a flangelike marginal portion 37 which covers the face portion of the nozzle body 22 around the anchoring socket 34.

The stem 31 of the valve 30 projects to adjacent the outer face of the nozzle tip 32, so that when the nozzle tip is pressed against the outer end 10 of the valve stem with the opening 33 thereof registering with the valve stem opening, the engagement of the stems 31 and 9 will open the valves of the air chuck and valve stem to permit air under pressure to flow from the hose 21 through the chamber 24, the nozzle and valve stem 6 to the interior of the inflatable member. The elastic rubber around the opening 33 at the surface of the tip 32 compressed against the end 10 of the valve stem and the surrounding surface flush with said end forms an effective air seal which prevents escape of air. In order to increase the yieldability of the portion of the tip 32 surrounding the opening 33, the opening 33 preferably has an enlargement 38 adjacent the outer face 36 of the tip, thus providing a flexible annular sealing portion or lip closely adjacent the opening 33. The increased yieldability of the rounded or tapered face portion of the tip provided by the enlarged portion 38 of the central opening permits the annular sealing portion of the tip, from which the remaining portion recedes, to be flattened into engagement with a greater area around the valve stem opening, thus providing a more effective seal. The marginal flange portion 37 of the tip is preferably unattached to the face portion of the nozzle body 22 and this flange portion of the tip does not resist the flattening of the face of the tip 32, since they are free to move away from the surfaces against which they are normally seated as shown in Fig. 3.

By reason of the high degree of flexibility provided by the form of the tip 32, the tip may be made of a stiffer, less elastic stock of greater durability and strength than would otherwise be required and may contain a substantial amount of a filler such as carbon black which greatly enhances its resistance to abrasion, thus providing an elastic tip which is not only sufficiently flexible to provide an effective air seal but which also has great strength and durability.

The air chuck may, if desired, be connected to a suitable pressure gauge 40 communicating with the chamber 24 through an opening 41 by means of which the air pressure within the inflatable member 2 may be indicated during the inflating operation.

Furthermore, it is to be understood that the particular form of apparatus shown and described, and the particular procedure set forth, are presented for purposes of explanation and illustration, and that various modifications of said apparatus and procedure can be made without departing from my invention as defined in the appended claims.

What I claim is:

1. An air chuck for making connection with flush type valve stems comprising a body portion having a valve chamber therein, a nozzle attached to the body portion, said nozzle comprising a body portion having a central opening and an outwardly tapering socket in its outer face, an elastic tip with a convex sealing face fitting in said socket and having an axial opening registering with said opening of the body portion of the nozzle, and a valve within said valve chamber for closing said opening, said valve being provided with a stem extending to adjacent the outer face of the tip, the face of said tip receding from adjacent the opening and the opening being of sufficiently small diameter to permit the face of said

tip to be brought into sealing contact with the top of a flush valve stem.

2. An air chuck for making connection with flush type valve stems comprising a body portion having a valve chamber therein, a nozzle attached to the body portion, said nozzle comprising a body portion having a central opening and an outwardly tapering socket in its outer face, an elastic tip with a convex sealing face fitting in said socket and having an axial opening registering with said opening of the body portion of the nozzle, said opening having an enlarged portion adjacent the face of the tip, the diameter of said opening at the face of the tip being smaller than that of said enlarged portion, to provide a flexible tip surrounding the opening at the face of the tip, and a valve within said valve chamber for closing said opening, said valve being provided with a stem extending to adjacent the outer face of the tip.

3. An air chuck for making connection with flush type valve stems comprising a body portion having a valve chamber therein, a nozzle attached to the body portion, said nozzle comprising a body portion having a central opening and an outwardly tapering socket in its outer face, an elastic tip fitting in said socket and having an axial opening registering with said opening of the body portion of the nozzle, said opening having an enlarged portion adjacent the face of the tip, the diameter of said opening at the face of the tip being smaller than that of said enlarged portion, to provide a flexible tip surrounding the opening at the face of the tip, said tip having a convex sealing face and a marginal flange-like portion covering the outer face of the body portion of the nozzle around said socket but unattached to said face, and a valve within said valve chamber for closing said opening, said valve being provided with a stem extending to adjacent the outer face of the tip.

4. A device for making connection between a source of inflation fluid and an inflatable member carried by a mounting member, comprising the combination of a flush valve stem, carried by the inflatable member, having a valve controlled passageway for the inflation fluid into said inflatable member and a valve actuating rod which does not protrude substantially beyond the external surface of said mounting member, with an air chuck having a flexible sealing tip with an opening for the passage of air through the tip, said tip having a convex sealing face receding from adjacent the opening, and a stem extending to adjacent the outer surface of the tip, said stem being adapted to contact the valve actuating rod when the flexible tip is brought into sealing contact with the top of said valve stem, so that the opening in said tip is in register with the passageway in said flush valve stem.

5. An air chuck comprising a body portion having a valve chamber therein, a valve of conical form within said valve chamber, and a nozzle having an external tip of flexible elastic material, said nozzle being provided with an air passageway which extends axially through the tip with its opening at the face of said tip, and said valve being operable for preventing the flow of fluid through said passageway and having a stem which extends substantially through the passageway of said tip, and said tip having a yieldable, convex, external outer face receding from adjacent the opening of the air passageway, whereby a seal may be readily formed between flush valve stems.

6. An air chuck for making connection with flush type valve stems comprising a body portion having a chamber therein, a nozzle attached to the body portion, said nozzle comprising a body portion having a central opening and socket in its outer face, an elastic tip fitting in said socket and having an axial opening registering with said opening of the body portion of the nozzle, said opening having an enlarged portion adjacent the face of the tip, the diameter of said enlarged portion being greater than that of the opening at the face of said tip, to provide a flexible lip surrounding the opening at the face of the tip, said tip having a convex marginal sealing face, whereby a seal may be readily made between said chuck and a flush valve stem.

7. An air chuck for making connection with flush type valve stems having a body portion and a nozzle having an external tip of flexible elastic material and provided with an air passageway opening axially through the tip, the passageway in said tip having an enlarged portion adjacent its opening at the face of said tip, the diameter of said opening being smaller than that of said enlarged portion, to provide an annular yieldable sealing lip with a convex contact portion for effecting a seal with flush valve stems.

8. An air chuck for making connection with flush valve stems and having a body portion and a nozzle portion, said nozzle portion having an external tip of flexible elastic material and being provided with an air passageway extending axially through the tip and opening at the face thereof, the face of said tip having an annular yieldable contact portion adjacent the opening of the air passageway with the remainder of the face of said tip receding therefrom, said opening in the tip being of sufficiently small diameter to permit the contact portion of said tip to contact the top of said flush valve stems and effect a seal therewith.

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