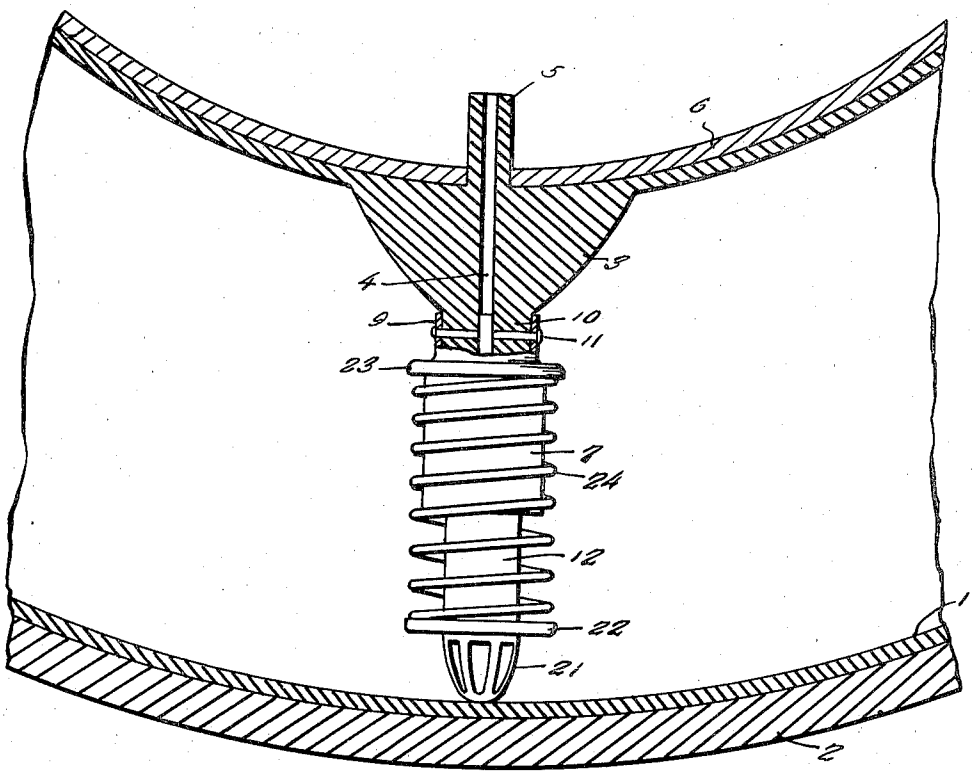
July 2, 1940. E. A. SMITH 2,206,621

PNEUMATIC TIRE TUBE

Filed April 7, 1938 2 Sheets-Sheet 1

Fig. 1.



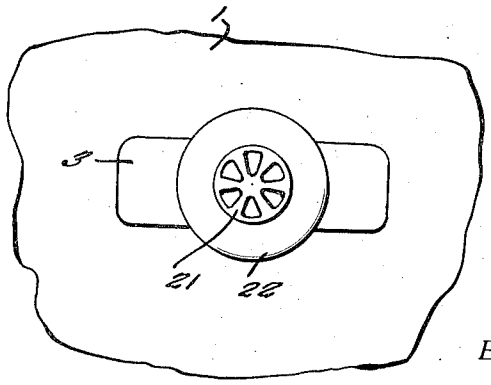


Fig. 2.

Inventor

E. A. Smith

By Clarence O'Brien and Hyman Berman

Attorneys

July 2, 1940. E. A. SMITH 2,206,621

PNEUMATIC TIRE TUBE

Filed April 7, 1938 2 Sheets-Sheet 2

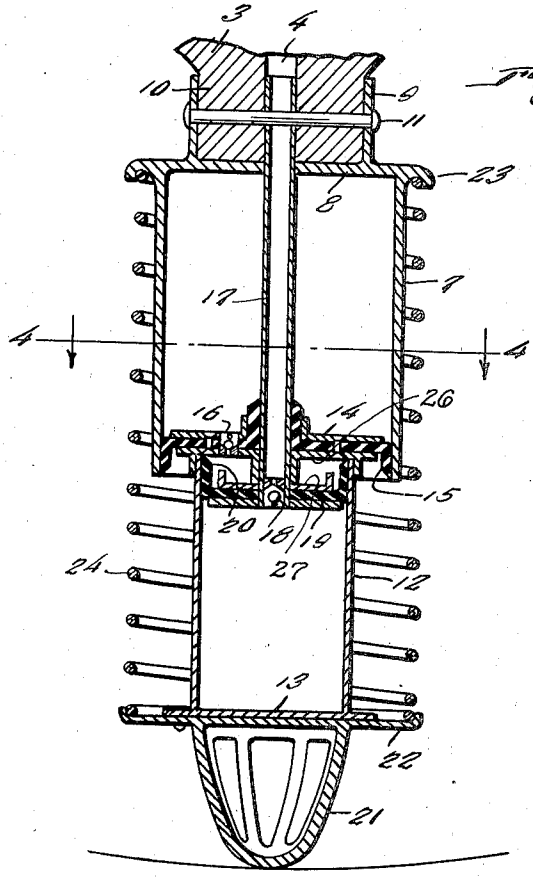


Fig. 3.

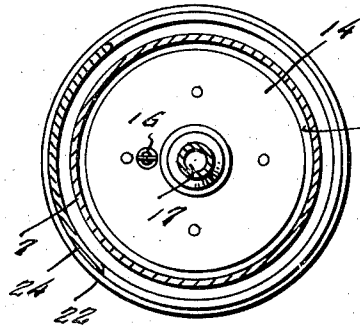


Fig. 4.

Inventor

E. A. Smith

By Clarence A. O'Brien and Hyman Berman

Attorneys

Patented July 2, 1940

2,206,621

UNITED STATES PATENT OFFICE

2,206,621

PNEUMATIC TIRE TUBE

Edgar Alton Smith, New York, N. Y.

Application April 7, 1938, Serial No. 200,773

3 Claims. (Cl. 152—426)

The present invention relates to new and useful improvements in tubes for pneumatic tires and has for its primary object to provide, in a manner as hereinafter set forth, a tube having incorporated therein a pump of a novel construction and arrangement for automatically maintaining the air in said tube at a predetermined pressure.

Other objects of the invention are to provide an automatically inflated inner tube of the aforementioned character which will be comparatively simple in construction, strong, durable, highly efficient and reliable in use, compact and which may be manufactured at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views, and wherein:

Figure 1 is a view in vertical section through a portion of an inner tube embodying the present invention, the base portion of the pump being shown in section with the rest of said pump in side elevation.

Figure 2 is a view in end elevation of the pump.

Figure 3 is a vertical sectional view through the pump.

Figure 4 is a view in horizontal section, taken substantially on the line 4—4 of Fig. 3.

Referring now to the drawings in detail, it will be seen that the reference numeral 1 designates an inflatable inner tube mounted in a conventional casing 2. Formed integrally with the inner periphery of the tube 1 is a rubber base 3 having an air passage 4 therein. The base 3 includes a tubular stem 5 which is adapted to project through the rim 6 on which the tire is mounted.

Mounted on the base 3 is a cylinder 7 of suitable material. The inner end of the cylinder 7 is closed, as at 8, and projecting therefrom is a neck 9 which is secured to an extension 10 on the base 3 for mounting said cylinder on said base. A pin 11 anchors the neck 9 to the extension 10. The cylinder 7 is open at its outer end.

The reference numeral 12 designates a comparatively small outer cylinder which is adapted to be moved into the inner cylinder 7. The cylinder 12 is closed at its outer end, as at 13. The inner end of the cylinder 12 is closed by a piston 14 which is fixed thereon and which is slidably engaged in the cylinder 7. The piston 14 comprises a cup 15 engaged with the walls of the cylinder 7 in the usual manner. The piston 14 further includes a disk 26 in the cup 15, said disk being secured to the cylinder 12. The piston 14 still further includes a check valve 16 through which air is forced from the inner portion of the cylinder 12 into the cylinder 7 by the piston 19. Any desired number of the check valves 16 may be provided in the piston 14.

Also mounted in the extension 10 on the base 3 and communicating with the air passage 4 is a tube or conduit 17. The pin 11 passes through the conduit 17 for anchoring same in the extension 10 of the base 3. The air conduit 17 constitutes an inlet pipe which extends through the cylinder 7 and the piston 14 into the cylinder 12. The piston 14 is slidable on the inlet pipe 17. A check valve 18 is provided in the inlet pipe 17 to prevent the escape of the air from the outer portion of the cylinder 12 back through said inlet pipe 17. Mounted on the inlet pipe 17 and operable in the cylinder 12 is a piston 19 comprising a cup 20. The piston 19 further includes a disk 27 in the cup 20.

Fixed on the closed end 13 of the cylinder 12 is a nose 21 which is engageable with the outer periphery of the tube 1 in the manner shown to advantage in Fig. 1 of the drawings. The base of the nose 21 comprises a flange 22 which projects beyond the periphery of the closed end 13 of the cylinder 12. A cupped flange 23 projects from the closed end 8 of the cylinder 7. The reference numeral 24 designates a coil spring which encircles the cylinders 7 and 12 and which has its ends engaged with the flanges 22 and 23.

Briefly, the operation of the device is substantially as follows:

The tire is first inflated to the desired pressure in the usual manner. This pressure is such that, acting on the piston 14, the cylinder 12 will be moved into the cylinder 7 against the tension of the coil spring 24, thus moving the nose 21 out of contact with the tube 1. With the cylinder 12 and the nose 21 in this position, the pump will not function as the tire rolls over the highway. However, should the pressure in the tire drop to any considerable extent, the spring 24 will move the cylinder 12 outwardly and contact the nose 21 with said tire. Then, when the tire flexes under the load as it contacts the highway the cylinder 12 with the piston 14 thereon will be forced into the cylinder 7 against the tension of the coil spring 24, the piston 19, of course, remaining stationary. Thus, air trapped in the cylinder 7 is forced past the cup 15 into the tube 1 and air trapped into the cylinder 12 is forced past the

cup 20 into the chamber between said piston 14 and the piston 19. When the portion of the tire with which the nose 21 is engaged leaves the highway the cylinder 12 is forced outwardly by the spring 24. When this occurs, air from the atmosphere is drawn through the inlet pipe 17 into the cylinder 12 and the air thus trapped between the pistons 14 and 19 in the cylinder 12 is forced past the check valve 16 into the cylinder 7. This operation is repeated until the pressure in the tire has again been built up to the desired point when the piston 14 will again be forced inwardly and held in this position, thus again moving the nose 21 out of contact with the tire.

It is believed that the many advantages of an automatic tube inflating means constructed in accordance with the present invention will be readily understood and although a preferred embodiment of the device is as illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which will fall within the scope of the invention as claimed.

What is claimed is:

1. A pneumatic tire including an inflatable tube, a cylinder mounted in said tube on the inner periphery thereof, a piston operable in said cylinder, a comparatively small cylinder mounted on the piston and projecting outwardly therefrom, an air inlet pipe communicating with the atmosphere and extending through the first named cylinder into the second named cylinder, the piston being slidable on said inlet pipe, a piston fixed on the inlet pipe and operable in the second named cylinder, a check valve in the inlet pipe for preventing the return flow of air to the atmosphere, the first named piston having a check valve controlled passage therein for admitting air to the first named cylinder from the second named cylinder, and a spring engaged with the second named cylinder for yieldingly urging same outwardly for engagement with the outer periphery of the tube for actuation thereby.

2. A pneumatic tire including an inflatable tube, a resilient base integral with the inner periphery of the tube, said base having an air passage therein communicating with the atmosphere, a cylinder mounted on the base in the tube, an air inlet pipe mounted in the air passage in the base and extending longitudinally into the cylinder, a check valve in the inlet pipe, a piston fixed on said inlet pipe, a piston operable in the cylinder and slidably mounted on the inlet pipe, a comparatively small cylinder fixed on the second named piston and slidable on the first named piston, said second named piston having a check valve controlled opening therein for the passage of air from the second named cylinder into the first named cylinder, the first and second named pistons including cups engaged with the walls of the cylinders, and means for operatively connecting the second named cylinder to the outer periphery of the tube for actuation thereby when said tube is flexed.

3. A pneumatic tire including an inflatable tube, a resilient base integral with the inner periphery of the tube, said base having an air passage therein communicating with the atmosphere, a cylinder mounted on the base in the tube, an air inlet pipe mounted in the air passage in the base and extending longitudinally into the cylinder, a check valve in the inlet pipe, a piston fixed on said inlet pipe, a piston operable in the cylinder and slidably mounted on the inlet pipe, a comparatively small cylinder fixed on the second named piston and slidable on the first named piston, said second named piston having a check valve controlled opening therein for the passage of air from the second named cylinder into the first named cylinder, the first and second named pistons including cups engaged with the walls of the cylinders, and means for operatively connecting the second named cylinder to the outer periphery of the tube for actuation thereby when said tube is flexed, said means including a nose member fixed on one end of the second named cylinder, a flange projecting from the base portion of said nose member, a flange projecting from the first named cylinder, and a coil spring encircling the cylinders and having its ends engaged with the flanges.

EDGAR ALTON SMITH.