May 8, 1928.

1,668,681

O. M. KIRLIN

FLUID FLOW REGULATOR AND COUPLER

Filed Aug. 12, 1925

Fig. 3

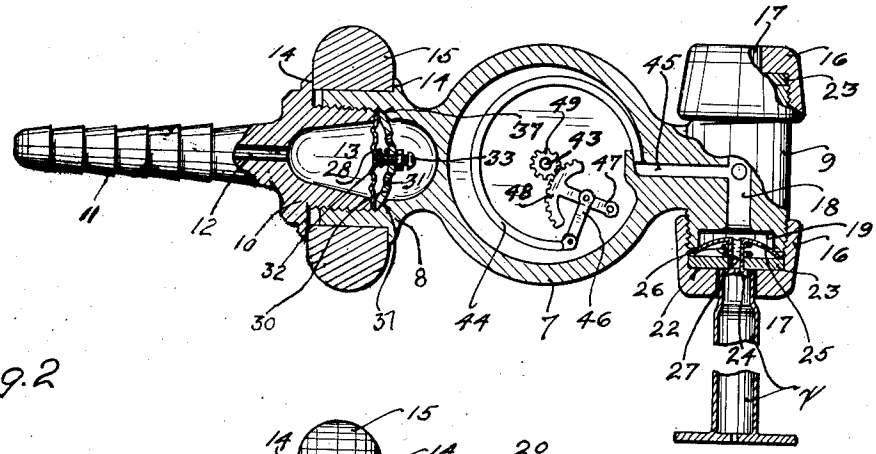


Fig. 2

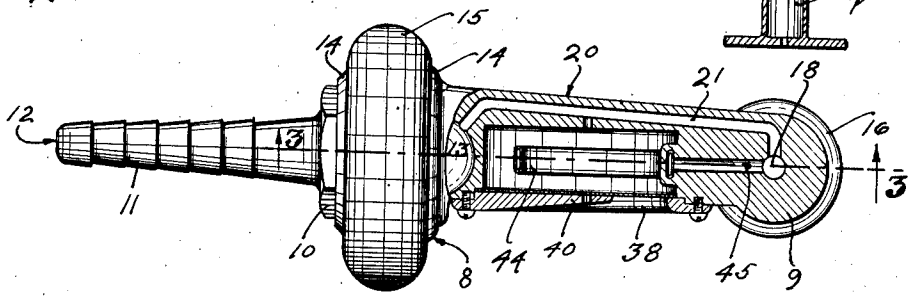


Fig. 1

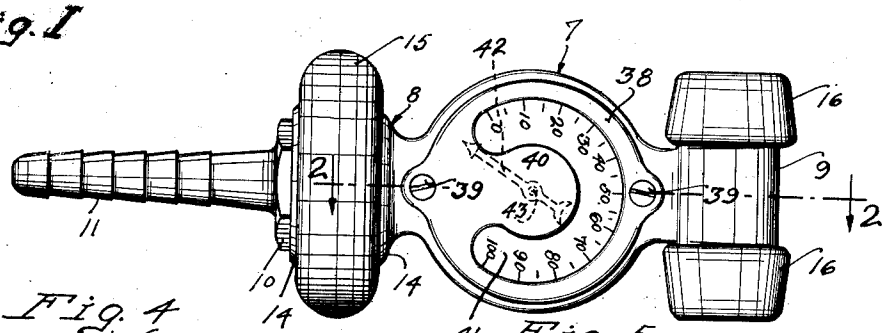


Fig. 4

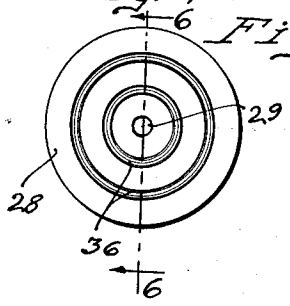


Fig. 6

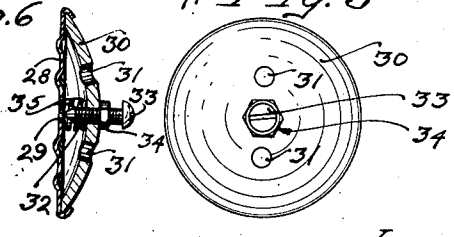


Fig. 5

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UNITED STATES PATENT OFFICE.

OTIS M. KIRLIN, OF WATERTOWN, SOUTH DAKOTA.

FLUID-FLOW REGULATOR AND COUPLER.

Application filed August 12, 1925. Serial No. 49,759.

My present invention has for its object to provide an extremely simple and highly efficient fluid flow regulator and coupler intended for general use but especially adapted for use in connection with air pressure systems for inflating pneumatic tires.

To the above end, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

The invention, as illustrated, is embodied in a coupler for connecting an air hose, leading from a suitable air compressor, to the valve stem of a pneumatic tire.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a face view of the invention;

Fig. 2 is a view partly in elevation and partly in section, taken on the line 2—2 of Fig. 1;

Fig. 3 is a view principally in section, taken on the line 3—3 of Fig. 2;

Fig. 4 is a face view of the fluid flow regulator;

Fig. 5 is a back view of the same; and

Fig. 6 is a view principally in section, taken on the line 6—6 of Fig. 4.

The body member of the hose coupler comprises an intermediate casing 7, an intake head 8 and an outlet head 9 both of which are integrally formed with said casing at diametrically opposite points. Said head 8 has a removable section 10 detachably secured thereto by screw threads, and with which section is integrally formed a nipple 11 having an axial air passage 12 and onto which nipple may be telescoped the delivery end of an air hose leading from a suitable air compressor, not shown. The intake head 8 and its removable section 10 are recessed to afford an intake chamber 13 into which the delivery end of the passage 12 opens. Formed with the intake head 8 and its removable section 10 are opposing annular flanges 14 between which is mounted a heavy rubber cushioning ring 15.

The outlet head 9 is T-shaped and has applied to the free ends of its transverse portion screw caps 16 having axial passages 17 adapted to loosely receive the ends of pneumatic tire valve sleeves. Extending axially through the transverse portion of the outlet head 9 is an outlet or equalizing chamber 18 the ends of which are expanded at 19. Formed with the coupler body at the back of the heads 8 and 9 and extending across the back of the casing 7 is a long rib 20 having a passage 21 which leads from the intake chamber 13 to the outlet chamber 18. Mounted between the ends of the transverse portion of the outlet head 9 and the tops of the screw caps 16 are air outlet valves 22 disclosed and broadly claimed in my copending application filed August 25, 1924, under Serial Number 734,025 and entitled "Automatic valve and gauge." Each outlet valve 22 comprises a flexible diaphragm 23 of rubber or any other suitable material and having an axial opening through which the stem of a fixed valve head 24 extends. These stems of the valve heads 24 are formed with concavo-convex holders 25 at the inner faces of the diaphragms 23. Coiled springs 26 compressed between the diaphragms 23 and holders 25 yieldingly hold said diaphragms pressed against the valve heads 24 and close the ports 27 in the stems of said valve heads. The diaphragms 23 and their holders 25 are held in position and in assembled relation by being clamped between the ends of the transverse portion of the outlet head 9 and the tops of the caps 16 with the valve heads 24 in axial alignment with the passages 17.

Mounted in the intake chamber 13, between the passages 12 and 21, is an air flow regulator in the form of a thin metallic diaphragm 28 which extends transversely across the intake chamber 13 and is provided with an axial port 29. This diaphragm 28 is secured to the concave side of a rigid concavo-convex holder 30 by having its marginal edge portion folded over the periphery thereof, as best shown in Fig. 6. The holder 30 is located on the delivery side of the diaphragm 28 and has two relatively large diametrically opposite air passages 31. Co-operating with the diaphragm 28, to vary the conveying capacity of its port 29, is a needle valve 32 which extends through the holder 30 at the axis thereof and has screw-threaded engagement therewith for axial adjustment toward and from the port 29. This needle valve 32 has on its outer end a head 33 with a transverse channel for the application of a screw driver to adjust the needle valve 32 toward or from the port 29. A lock nut 34 is applied to the needle valve

32 for holding the same where set. Encircling the needle valve 32 is a coiled spring 35 compressed between the diaphragm 28 and holder 30, and which spring is under strain to move that portion of said diaphragm having the port 29 away from the needle valve 32 to open said port to its greatest conveying capacity. The diaphragm 28 is provided with a plurality of concentric reinforcing ribs 36 formed by pressing the same therefrom.

It is important to note that the air-conducting capacity of the port 29 in the air flow regulator is materially smaller than the air-conducting capacity of the passage 12, the passage 21, or either of the ports 27 in the stems of the valve heads 24. As previously stated, the air passages 31 in the holder 30 are relatively large in respect to the port 29 to permit free passage of air therethrough.

The air flow regulator is held in position by having its marginal portion clamped between an internal shoulder 37 on the intake head 8 and the inner end of the detachable section 10 of said head.

The purpose of the air flow regulator is to maintain a steady flow of air regardless of fluctuations in pressure either at the supply or discharge side of the diaphragm 28. When the air pressure increases on the supply side of the diaphragm 28 or decreases on the discharge side thereof, the center of said diaphragm moves toward the needle valve 32 and reduces the conveying capacity of the port 29 and vice versa. By this action of the diaphragm 28 and co-operating needle valve 32, there will be maintained a flow of air of a certain volume regardless of changes of pressure on either side of said diaphragm.

The casing 7 is provided with an open face to which is applied an annular cover plate 38 held in position by screws 39 having threaded engagement with said casing, and provided with an internal tongue extension 40, the body of which projects over the axis of said casing and is concentric therewith. Mounted in the open face of the casing 7 is a gauge dial 41 graduated, as shown, from zero to one hundred to indicate pound pressure, and over this dial is a glass pane or transparent celluloid. Co-operating with the dial gauge 41 is a pointer 42 on a shaft 43 suitably journaled. As shown, the pointer 42 is actuated by air pressure taken between the air flow regulator and the outlet valve heads 24 through the following connections, to wit: A spring-acting helical tube 44, within the casing 7, has one of its ends anchored thereto and in communication with the air outlet chamber 18 through a port 45 in said casing and outlet head 9. The outer or other end of this tube 44 is closed and pivotally connected by a link 46 to a lever 47 having a segmental gear 48 that meshes with a pinion 49 on the shaft 43. When air pressure is admitted to the port 45, the helical tube 44 will tend to straighten and thereby rotate the pointer 42 over the face of the dial gauge 41 through the connections therebetween.

To inflate a pneumatic tire, the operator applies either end of the outlet head 9 over the outer end of its valve stem and moves the coupler so as to cause said stem to enter the passage 17 and engage the diaphragm 23 with sufficient pressure to lift said diaphragm from the valve head 24 and open the port 27. Air from the air hose will flow through the port 12 into the receiving side of the air intake chamber 13 through the port 29 and into the chamber between the diaphragm 28 and holder 30, from thence the air will flow through the passages 31 into the outlet side of the air chamber 13 through the port 21 and into the air outlet chamber 18 and from thence through the respective air outlet chamber extension 19, port 27 and into the valve stem of the pneumatic tire.

It may be here stated that the valve normally closing the valve stem is opened by the respective valve head 24 as the coupler is pressed onto said valve stem. The air pressure acting on the helical tube 44, will operate the pointer 42 to indicate the air pressure in the pneumatic tire.

At the time the valve in the valve stem of the pneumatic tire is open, the pointer 40 of the gauge promptly drops to indicate the pressure in said tire and then advances as the pressure in the tire increases, and which pressure is indicated with almost perfect accuracy.

It will be noted that the rubber ring 15 and the screw caps 16 have external dimensions greater than that of the casing 7 so as to protect said casing and parts carried thereby when the coupler is thrown about and hold said casing 7 out of engagement with the support on which the coupler rests. The rubber cushioning ring 15 also affords convenient means by which the coupler may be held when charging a pneumatic tire. By providing the coupler with two oppositely located outlet valves 22, the same may be easily applied to a valve stem irrespective of its position, and permits the gauge dial to always be in view of the operator.

The pressure gauge, as shown, is for the usual air station pressure of one hundred twenty-five to one hundred fifty pounds which is automatically maintained. The pointer 42 is shown by dotted lines in its position when no pressure is on the gauge, and which is about ten pounds back of the true reading of the gauge, this being the amount expended in pushing the air into the

tire and necessary in order that the gauge will show the correct pressure in the tire while being filled with air.

When in use with one hundred fifty pounds of pressure, the pointer 42 will stand at one hundred forty pounds, which is at the same point as when no pressure is applied; and with one hundred twenty-five pounds of pressure, said pointer will stand at one hundred fifteen pounds, the pointer at both of these points being hidden by the cover plate and not visible so that in use, there is no reading shown on the gauge except when it is being operated to fill a tire.

When either of the outlet valves 22 is applied to a tire, the pointer 42 promptly comes into view and swings to a point indicating the pressure in the tire and advances as pressure in the tire increases and indicates the pressure in the tire with practically perfect accuracy. This result is possible by the fact that the air port 29 in the diaphragm 23 is smaller than the tire inlet and by the pointer being set back of its true position.

Referring again to the statement that the fluid-conducting capacity of the port 29 in the air flow regulator is smaller than the air-conducting capacity of either the intake or outlet of the coupler, it is important that this port 29 be of a smaller fluid-conducting capacity than that of the pneumatic tire valve stem x, shown in Fig. 3, or any other receptacle to which a coupler may be applied.

What I claim is:

1. A fluid pressure coupler for use in inflating tires and indicating the true pressure within the tire during inflation, comprising a body having inlet and outlet ports and a passage connecting said ports, a pressure indicator carried by said body and communicating with said passage, and automatic flow control means mounted in said intake port for maintaining a pressure in said passage constantly proportional to the pressure within the tire during inflation, comprising a valve and means operable on increase in pressure in said passage to move said valve to increase the flow therethrough.

2. A fluid pressure coupler for use in inflating tires and indicating the true pressure within the tire during inflation, comprising a body having inlet and outlet ports and a passage connecting said ports, a pressure indicator carried by said body and communicating with said passage, a valve normally closing said outlet port, and automatic flow control means mounted in said intake port for maintaining a pressure in said passage constantly proportional to the pressure within the tie during inflation, comprising a tapered needle valve adjustably mounted in said passage and a yieldable diaphragm mounted in said intake port and having an aperture therein co-acting with said needle valve, said diaphragm being mounted to move away from said needle valve on increase in pressure in said passage to increase the flow through said aperture when said valve in said outlet port is opened during inflation.

In testimony whereof I affix my signature.

OTIS M. KIRLIN.