June 18, 1940. G. G. GUTHRIE 2,205,168

TIRE INDICATOR

Filed July 12, 1939

Fig. 1

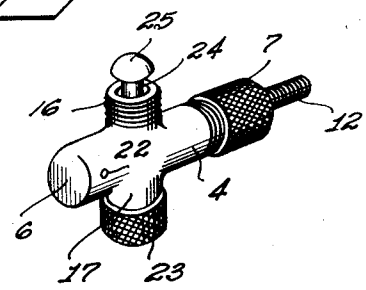


Fig. 2

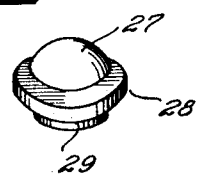
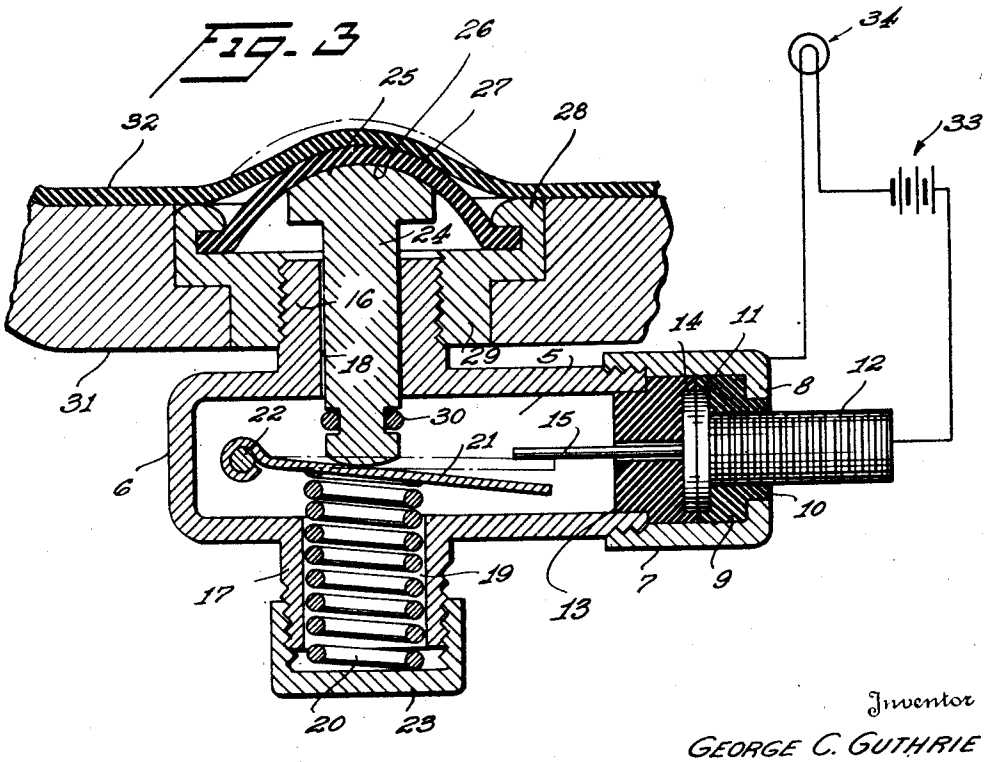


Fig. 3



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TIRE INDICATOR

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3 Claims. (Cl. 200—58)

This invention relates to means for indicating pressure conditions in pneumatic tires and the present application is a continuation in part of my prior application Serial No. 113,904 filed December 2, 1936.

An object of the present invention is to provide a novel type of fluid pressure-operable switch adapted for use in connection with a tire pressure indicating system.

Another object is to provide a novel construction of circuit closer operable by fluid pressure conditions and having means for adjusting the switch so that its response to fluid pressure actuations may be regulated and controlled.

Other objects will be apparent from the description. The present disclosure constitutes an illustraive embodiment of the invention and its various mechanical details. It is to be understood that within the scope of the invention as claimed any design variations and changes may be made as desired.

In the drawing:

Figure 1 is a perspective view of a switch as constructed in accordance with the invention.

Figure 2 is a perspective view of a protective diaphragm member adapted to be used in connection with the switch.

Figure 3 is a fragmentary sectional view illustrating the application of the switch to a pneumatic tired vehicle wheel.

In detail the invention comprises a substantially cylindrical casing 4 having a bore 5 closed at one end as at 6 and having its opposite end externally threaded to receive thereover a pack nut 7 having an internally directed annular end flange 8 that provides a seat for a plug 9 of insulating material which is retained within the nut and which has an axial extension 10 that seats in the circular aperture bounded by the nut flange 8.

The inner face of the insulating plug 9 is bored with a seat which receives the circular head 11 carried by the inner end of an externally threaded binding post stem 12, both the head 11 and the stem 12 being of electro-conductive material. The stem 12 extends axially through the plug 9 and its extension 10 with a relatively loose sliding engagement.

Seated between the plug 9 and the open end of casing 5 is a second plug 13 of insulating material which also is provided on its outer face with a socket receiving the circular head 14 integral with the outer end of a flat contact bar 15 that is passed axially through an aperture provided in the body of the plug 13 and which projects into the interior of the casing in the bore 5. The bore 5 closed at one end by the casing end wall 6 and at its other end by the plug 13 provides a chamber within which the circuit closer means is disposed. The opposed faces of the electro-conductive contact heads 11 and 14 are flat to insure maximum electrical contact. As shown in Figure 3 the two heads are disposed in full face contact with one another, and they are firmly bonded together by the clamping action of the packing nut 7 when it is tightened up on the casing 4.

Somewhat adjacent to its closed end 6 the casing 4 is provided with diametrically opposed lateral extensions 16 and 17. These extensions are of cylindrical form and are externally threaded. The two extensions are bored in axial alignment so that the bore 18 extending through the extension 17 communicates with the casing bore 5 as does likewise the bore 19 of the extension 17. The bore 19 is preferably made somewhat larger in diameter than is the bore 18.

The bore 19 houses a coiled expansion spring 20 which extends into the casing chamber 5 and which bears at its inner end against one face of a flat contact bar 21 that is fulcrumed at one end on a pivot stud 22 which extends transversely across the chamber 5 and which is anchored to the opposite wall of the casing 4. The contact bar 21 is thus fulcrumed at one end on the pin or stud 22 so that it may be oscillated within the chamber 5. The adjacent ends of the contact bars 21 and 15 are disposed in overlapping relation so that under the influence of the spring 20 the pivoting contact bar 21 is forced against the overlapping portion of the contact bar 15 to establish electrical contact therebetween. The tension of the spring 20 may be regulated by adjusting the nut 23 threaded on the extension 17 and which provides a seat for the opposite end of the spring 20.

The casing extension 16 mounts in its bore 18 an axially slidable plunger 24 provided at its outer end with an enlarged head 25 having a convex outer face. The head 25 forms, in effect, a button which bears against the inner face of a flexible diaphragm 27 of circular form and which has its peripheral edge rigidly secured to and sealed in a circular holder 28. The holder 28 is provided with an axial extension 29 that is bored to receive the casing extension 16 and which is internally threaded for engagement with the casing extension threads when the parts are assembled. A radially expansible lock ring 30 is provided within an annular seating groove at the

inner end of the plunger stem 24 where it projects into the casing chamber 5 so that the plunger may not be permitted to move radially outward with respect to the chamber 5 a greater distance than that permitted by the disposition of the lock ring 30.

The circuit closer or switch of this invention is shown as associated in service with a pneumatic tired vehicle wheel. The wheel rim 31 is drilled through and countersunk to provide a seat for the holder 28 and its extension 29, with the diaphragm 27 being disposed in pressure contact with the inner tube 32 of the tire with which the wheel is provided. The extension 16 of the casing 4 is threaded up into the extension 29 of the diaphragm holder and the button head 25 bears against the under face of the diaphragm 27, the plunger 24 being normally urged radilly outward of the wheel rim 31 by the expanding action of the spring 20 bearing against the face of the pivoted contact bar 21 opposite to the face against which the inner rounded end of the plunger stem 24 rests.

Obviously, with the inner tube 32 deflated or having a pressure lower than that which is desired, the spring 20 will act to cause the pivoted contact 21 to force the plunger radially outwardly of the wheel until the contact bar 21 makes contact with the overlapping end of the fixed contact bar 15.

When this occurs an electrical signal circuit is established, which circuit is diagrammatically illustrated in Figure 3 and which disclosed a visual indicator such as an electric light 34 mounted at some convenient place on the vehicle and which is in circuit with a current source 33 which may conveniently be the storage battery of the vehicle. One lead from battery is in electrical connection with the binding post stem 12 while the other circuit lead from the lamp 34 is grounded on some part of the vehicle wheel or the casing 4, as desired. It will be noted that when the pivoted contact bar 21 is moved into electrical contact with the bar 15 that the circuit will be completed and the visual indicator 34 will be operated electrically to indicate the existence of an undesirably low pressure in the inner tube of the tire. As the pressure is built up within the tire the pressure head 25 is, of course, forced radially inwardly with respect to the rim 31 so that the inner end of the plunger forces the pivoted contact bar 21 away from the fixed contact bar 15 against the expansion spring 20 to open the circuit and extinguish the indicator light 34. Under normal conditions with a desired pressure built up in the inner tube 32 the contacts 21 and 15 will remain open. The sensitivity of the control may be regulated by manipulating the nut 23 to vary the tension on the expansion spring 20.

The insulator plugs 9 and 13 effectively eliminate any possibility of either the binding post 12 or the fixed contact bar 15 being electrically contacted with any part of the casing 4.

If desired the protective diaphragm 27 with its holder may be eliminated and the casing extension 16 may be threaded directly into a suitable aperture provided in the rim 31. It is, however, considered better to house the pressure head 25 beneath the flexible diaphragm 27 as this prevents any possibility of dirt or foreign matter entering the casing 5 along the bore 18 and ultimately impeding or obstructing the movement of the parts or establishing a short circuit therein.

I claim:

1. In combination with a metalic wheel rim, a casing carried by said rim and electrically grounded thereon, a plunger movable radially through the wheel rim and through one wall of said casing, one end of said plunger being disposed for movement in accordance with pressure variations in the tire when mounted on said rim, an electrical contact pivotally supported in said casing for movement therein and electrically grounded to said casing, one end of said plunger abutting against said contact for moving said contact as the plungers move, spring means in said casing, said spring means normally urging said pivoted contact against said plunger to force the same radially outward with respect to the wheel rim, and an electrical contact carried by said casing and insulated therefrom for circuit closing engagement by said first named contact.

2. In combination, a wheel having a metal rim, a tire mounted thereon, an inner tube in said tire, a plunger disposed through said rim and axially movable radially of the wheel, a head on the rim end of said plunger in bearing relation with respect to said inner tube, a casing carried by said wheel and electrically grounded thereto, an electrical contact grounded on the casing and pivoted therein to extend into the path of movement of said plunger, one end of said plunger projecting into said casing in contact with said electrical contact, spring means normally forcing said pivoted contact against the end of said plunger to move the same radially outward with respect to the wheel rim when the inner tube pressure falls below a predetermined point, and means carried by the casing for engagement by said pivoted contact when it moves under the influence of said spring means whereby to close an electrical indicating circuit.

3. A tire pressure operable switch comprising a casing having a threaded extension, a plunger movable axially through said extension to project within the casing, the outer end of said plunger having a head, a holder, a flexible diaphragm disposed over said head and secured in a holder on said threaded extension of the casing, said holder and diaphragm being adapted for engagement in and through a wheel rim to dispose the diaphragm beneath the inner tube of the tire when mounted thereon, and means in said casing operable upon movement of said plunger radially outward of the wheel to close an electrical indicating circuit when the plunger has moved a predetermined distance, said means comprising a pivoted contact extending into the path of the plunger and a fixed contact carried by the casing for engagement with said pivoted contact.

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