United States Patent

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[72] Inventor: **Marion A. Garrison**
2325 Monaco Parkway, Denver, Colorado 80207

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[54] **TIRE PRESSURE ALARM DEVICE**
15 Claims, Drawing Figs.

[52] **U.S. Cl.** **116/34,** 116/70, 73/146.8, 340/239
[51] **Int. Cl.** **B60c 23/02**
[50] **Field of Search** 116/34, 70, 117, 28; 73/146.2, 146.5, 146.8, 419; 200/61.41, 58; 340/239

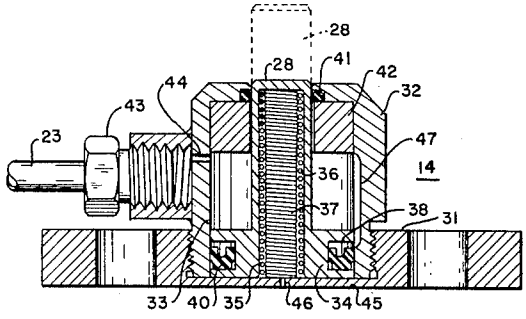
[56] **References Cited**

UNITED STATES PATENTS

2,475,533	7/1949	Varner	200/58
2,669,707	2/1954	Ehrman	340/239
2,948,256	8/1960	Tapp	116/34
3,140,690	7/1964	Siebel	116/70
3,154,049	10/1964	Smith et al	116/70
3,181,496	5/1965	Bilbrey	116/70
3,260,233	7/1966	Bergunder	116/34
3,335,694	8/1967	Dwyer et al	116/70
3,411,477	11/1968	Kudlaty	116/70

Primary Examiner—Louis J. Capozi
Attorney—McGrew and Edwards

ABSTRACT: A device for indicating change of pressure in a pneumatic tire for a vehicle comprises a cylinder having a piston movable therein between normal and abnormal pressure positions. The piston is urged away from the abnormal position by a biasing spring. When moving to the abnormal position the piston moves an indicating member into indicating position in which the member engages a signal producing member to warn the driver of the vehicle. A permanent magnet is mounted adjacent the indicating position of the piston and as the piston approaches urges it into the indicating position and locks it there; this provides a positive movement of the piston into indicating position and its secure retention in that position.



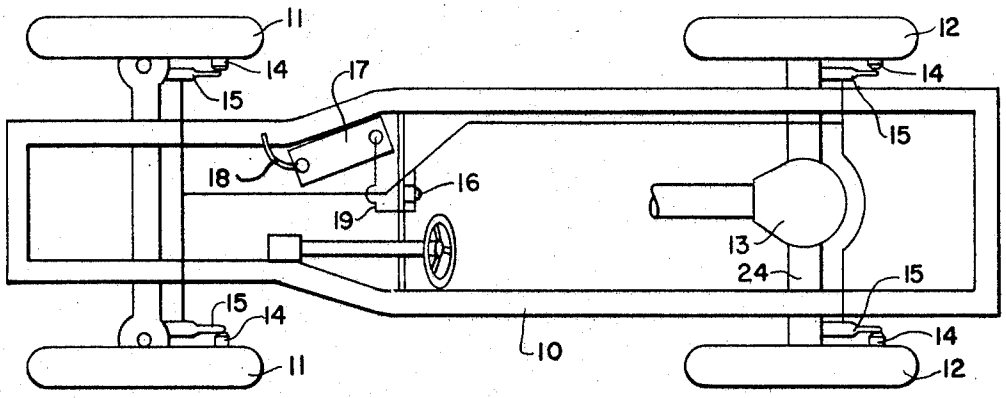


FIG. 1

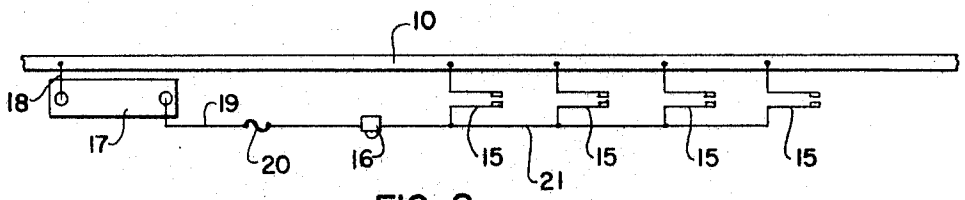


FIG. 2

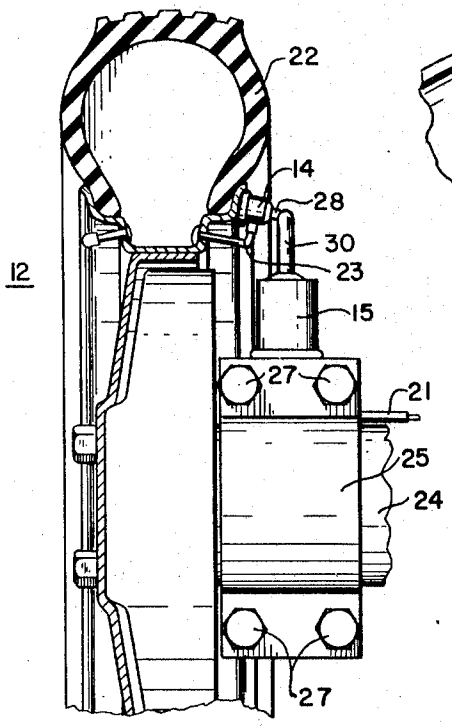


FIG. 3

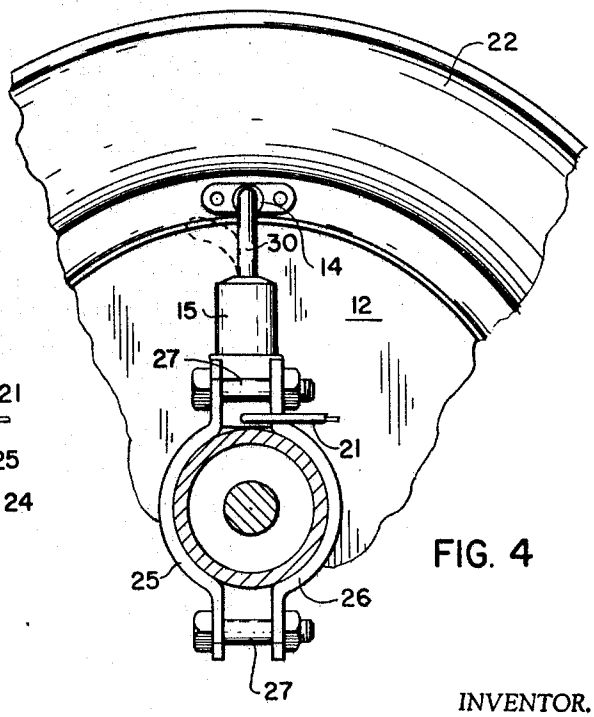


FIG. 4

INVENTOR.
Marion A. Garrison
BY
McGrew & Edwards
ATTORNEYS

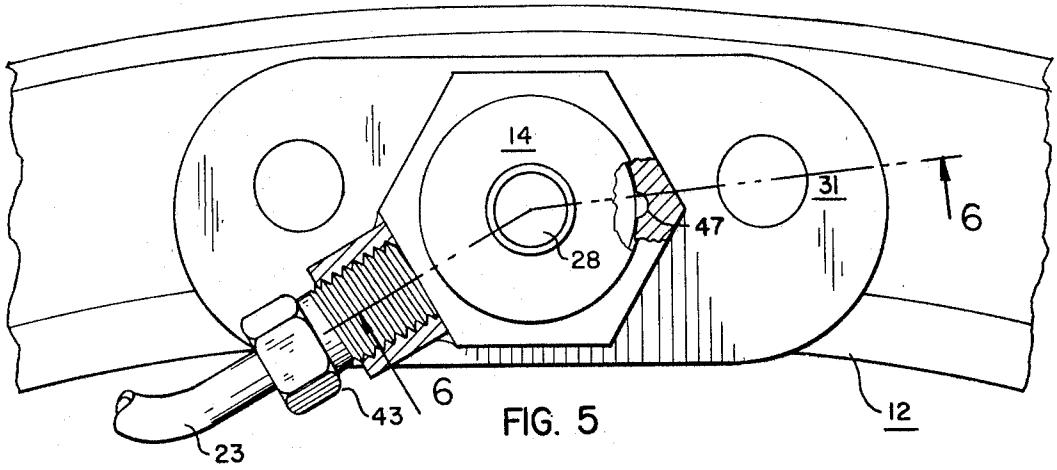


FIG. 5

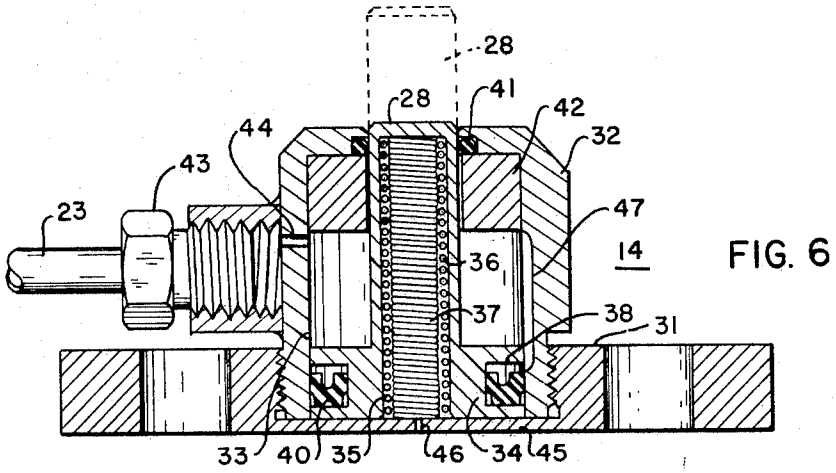


FIG. 6

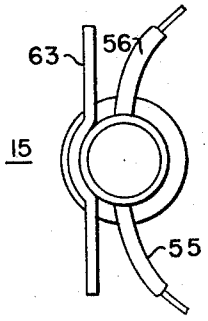


FIG. 8

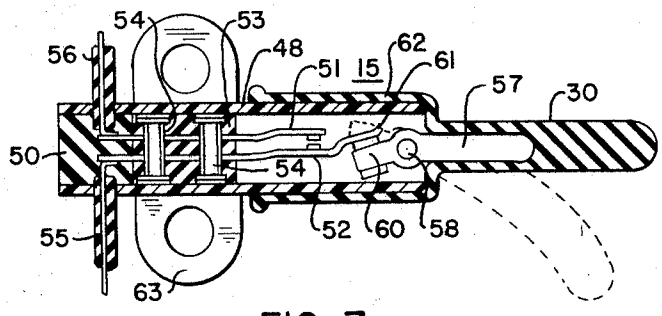


FIG. 7

INVENTOR.
Marion A. Garrison
BY
McGraw & Edwards
ATTORNEYS

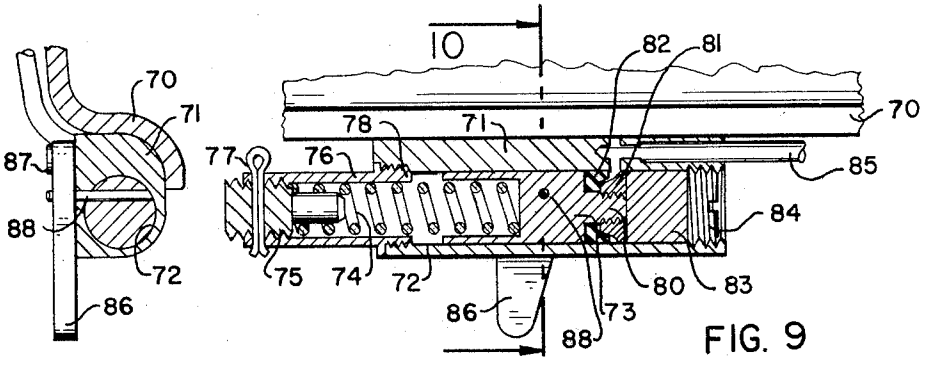


FIG. 10

FIG. 9

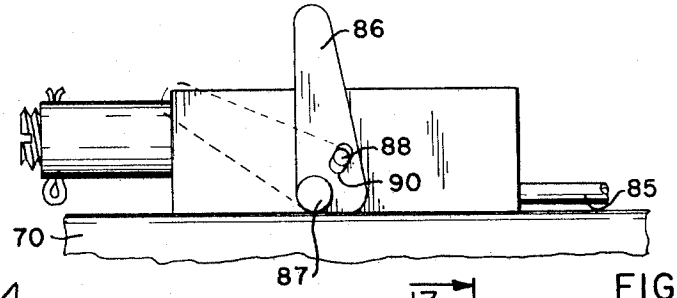


FIG. 11

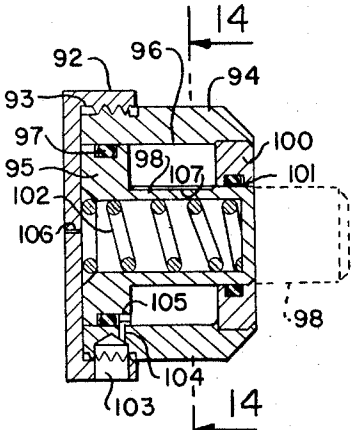


FIG. 13

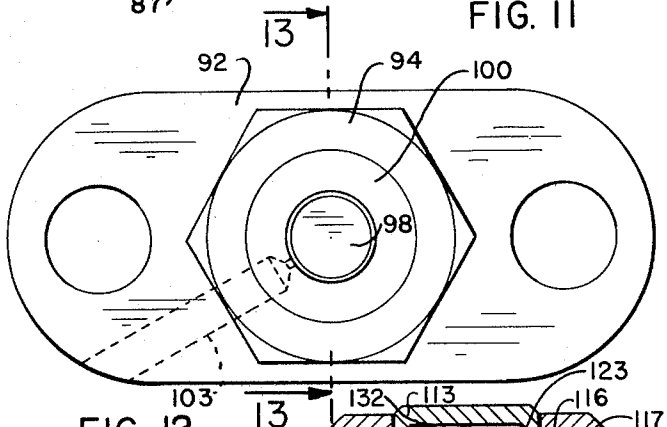


FIG. 12

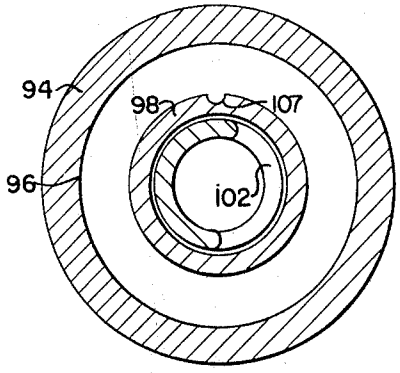


FIG. 14

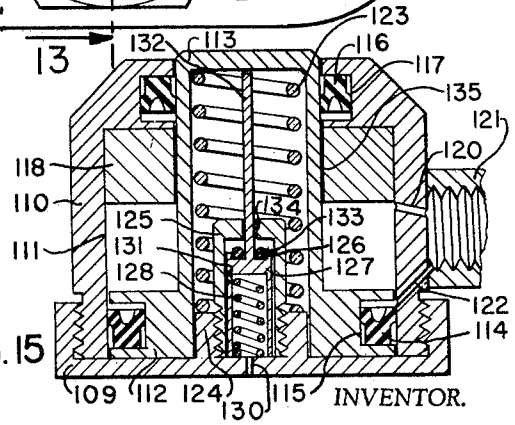


FIG. 15

INVENTOR.
Marion A. Garrison
BY
McBride and Edwards
ATTORNEYS

U.S. PATENT 3,522,789
TIRE PRESSURE ALARM DEVICE

SPECIFICATION

This invention relates to air pressure alarms for the tires of motor vehicles and particularly to an improved change of pressure device of the expansible chamber type.

Many devices have been designed heretofore for the purpose of indicating a change in pressure in the pneumatic tires of vehicles. These devices have been provided for the most part to detect loss of pressure in tires and have included many forms of mechanism for giving alarms or indications in various ways. It is desirable that the alarm device be simple in construction and reliable in operation under all road and weather conditions. Accordingly, it is an object of this invention to provide an improved abnormal tire pressure warning device which has a minimum number of moving parts and is simple, rugged and reliable in operation.

It is another object of this invention to provide an improved abnormal pressure indicator for the pneumatic tires of vehicles.

It is another object of this invention to provide an improved abnormal pressure indicator for tires which remains effective after long periods of normal pressure operation of the tires of a vehicle.

Briefly, in carrying out the objects of this invention in one embodiment thereof, a block or body having a cylinder therein is mounted on the rim of a pneumatic tired vehicle wheel and connected in communication with the interior of the tire. A piston is arranged in the cylinder and a spring urges the piston towards its low pressure position. When tire pressure is normal the piston is held in its high pressure position; if the pressure drops the piston moves away from its high pressure position and as it approaches its low position is urged forward by a permanent magnet and is finally snapped into its low pressure position and locked there. The movement of the piston to its low position projects a rigid contact finger into position to engage a flexible switch finger mounted on a fixed part of the vehicle and to operate the switch on each rotation of the wheel. The warning signal is given by a lamp or a buzzer in the circuit of the switch. In another embodiment an arrangement is included whereby the pressure in the tire is utilized to assist the movement of the piston to its low pressure position. In a further embodiment an arm pivoted on the block constitutes the contact finger.

The features of novelty which characterizes this invention are pointed out with particularity in the claims annexed to and forming a part of this specification. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a diagramatic plan view of an automobile chassis provided with an air pressure warning system embodying the invention;

FIGURE 2 is a schematic diagram of the electric circuit of the system of **FIGURE** 1;

FIGURE 3 is an enlarged sectional elevation view of a wheel of the vehicle of **FIGURE** 1 1showing the pressure sensing and signal switch devices of the system;

FIGURE 4 is a side elevation view of the tire and devices of **FIGURE** 3;

FIGURE 5 is an enlarged side elevation view partly in section of the pressure sensing device of **FIGURE** 3;

FIGURE 6 is a sectional view along the line **6-6** of **FIGURE** 5;

FIGURE 7 is a longitudinal sectional view of the switch device of **FIGURE** 3;

FIGURE 8 is an end elevation view of the switch of **FIGURE** 7;

FIGURE 9 is a longitudinal sectional view of a second sensing device embodying the invention;

FIGURE 10 is a sectional elevation view along the line **10-10** of **FIG.** 9;

FIG. 11 is a side elevation view of the device of **FIG. 9** turned 180° about its longitudinal axis;

FIG. 12 is a plan view of a third embodiment of the invention;

FIG. 13 is a sectional view taken along the line **13-13** of **FIG.** 12;

FIG. 14 is an enlarged sectional view taken along the line **14-14** of **FIG.** 13; and

FIG. 15 is a sectional view similar to **FIG.** 13 illustrating another modified form of the device.

Referring now to the drawings, the vehicle chassis shown in **FIG.** 1 comprises a frame **10** mounted on front wheels **11** and rear wheels **12**. The engine which has not been shown is connected to drive the wheels **12** with a differential **13**. The wheels **11** and **12** are provided with pneumatic tires and each of the four tires illustrated is provided with a sensing device **14** and a flexible switch assembly **15** which is actuated upon an indication of low pressure made by the sensing device **14** and completes a circuit to a pilot light **16** on the dashboard of the vehicle. A circuit has been illustrated as including the usual storage batteries **17** grounded to the frame **10** by a cable **18** and connected to the light through a lead **19**, and thence to each of the switches **15**. When anyone of the switches is closed the circuit is completed and the lamp turned on.

The electrical circuit as shown schematically in . **FIG.** 2 also includes a fuse **20** arranged in the line **19** between the battery and lamp **16**. As shown in these figures, the four switches are connected in parallel between the frame **10** and a line **21** constituting a continuation of the line **19** to the line **16** to the switches. It will be apparent that operation of any one of the switches will energize the lamp **16**. When one of the sensing devices **14** has been operated a finger projects toward the switch **15** and strikes the switch each time the wheel completes a revolution this produces a flashing signal at the lamp **16**.

The arrangement of the sensing devices is such that when it operates it strikes the flexible switch as clearly shown in **FIGS.** 3 and 4. As shown in these figures, the wheel indicated as wheel **12** is provided with a pneumatic tire **22** of the tubeless type. A sensing element is connected in communication with the interior of the tire through a tube **23**. The switch assembly **15** is secured on the rear axle housing indicated at **24** by a clamp comprising two halves **25** and **26** clamped together by bolts **27**. In **FIG.** 3 the sensing device **14** has been shown with its indicating finger **28** projected in indicating position and lies in a path to strike a flexible operating portion **30** of the switch assembly **15**. This portion being made flexible so that it may be bent as it is struck by the projecting finger **28**. The bent position of the member **30** being indicated by dotted lines in **FIG.** 4; this bent portion makes it possible for the vehicle to be reversed without injury to the switch which is held out of its closing position upon reverse movement of the wheel.

The details of construction of the sensing device **14** are shown in **FIGS.** 5 and 6. As illustrated in these figures, the sensing device **14** is securely mounted on a plate **31** which is bolted, welded or otherwise secured to the rim of the wheel **12**. The sensing element comprises a cylindrical member **32** in threaded engagement with a plate **31**. A cylinder **33** is provided within the body or block **32** and a piston **34** is mounted for axial movement in the cylinder. A portion **28** is in the form of a closed end tube having its open end rigidly secured to the piston **34** and having its cylindrical interior in alinement with and constituting an extension of a cylindrical bore **35** in the piston **34**. The piston **34** is urged outwardly by a spring assembly comprising an outer spring **36** and an inner spring **37**. The springs **36** and **37** urge the piston upwardly and when the pressure is lower in the cylinder **33** above the piston, the piston rises and moves the portion **28** to the dotted line position. The piston is provided with an annular groove **38** within which a sealing gasket **40** is seated thereby sealing the piston against leakage when in its lowermost position in cylinder **33**. Leakage between body **32** and the plunger or projection **28** is prevented by an O-ring gasket **41** seated in a groove formed in the inner upward end of body **32** about the projection **28** the

O-ring being retained by an annular ring which is a permanent magnet **42**. Air from the tire **12** is supplied through the connection **23** and a fitting **43** to a duct **44** through the wall of the body **32**. This duct leading into the top of the cylinder **33** below the ring **42** is shown in **FIG. 6**. The opening at the bottom of the body **32** is closed by the plate **31**, thin wall portion **35** of which extends across a threaded opening in which the sensing element **14** is mounted. A portion of the plate **45** is provided with a minute vent **46** to release air from the chamber below the piston **34** as it moves into its lower position against the plate **45**. A longitudinal groove **47** is provided in the wall of the body **32** to equalize pressure on the two sides of the piston **34** after it passes the lower end of the groove. This facilitates the rapid movement of the piston under the force of the springs **36** and **37**. As the piston rises it comes under the influence of the magnet **42** and snaps into position against the magnet. This holds the projection **28** securely and firmly in its extended position and assures positive engagement and operation of the switch portion **30**. The vent **46** preferably has a very slow rate of discharge of air and may, for example, be equivalent to a slow leak by which the tire would become essentially flat in say, three to four hours. When pressure is again applied to the tire **12** the air enters the upper portion of the cylinder **33** and passes to the other side of the piston through the groove **47** which equalizes the pressure on both sides of the piston. The piston is then pressed by hand against the force of the magnet and of the springs **36** and **37** into its lower position closing the groove **47** whereupon the pressure forces the piston downward and the remainder of its movement is cushioned somewhat depending on the rate of flow of air through the vent **46**.

The action of the magnet **42** in attracting and locking the piston in its upper position increases the effectiveness of the pressure sensing element and provides additional force for assuring the setting of the piston projection **28** in its indicating or outside position.

The springs **36** and **37** are selected to provide the required compressive force for the pressure range under which the sensor is to operate and the number and size of springs is selected accordingly.

The mechanism of the switch **15** is shown in **FIGS. 7**, and 8; the body of the assembly **15** comprises a cylindrical portion **48** of rigid plastic material having a solid plug **50** closing the end remote from the flexible finger **30**. The switch comprises two flexible blades **51** and **52** mounted in a block of insulating material **53** in which they are securely held by two rivets **54**. The rivets being surrounded by respective insulating sleeves and passing with the sleeves through circular openings in the plates **51** and **52**. The plug **50** carries leads **55** and **56** which connect the switch between the ground and the supply lead **21** of **FIG. 2**. An operating rocker arm **57** is pivoted at **58** in the end of the insulating tube **48** remote from the block **50** and has an offset end or projection **60** which engages an extended portion **61** of the plate **52**. It will thus be seen that when the arm **30** is moved downwardly the arm **57** is rotated and closes the switch. This closing contact occurs each time the projection **28** engages the flexible finger **30** of the switch. The flexible finger **30** is formed integrally with a skirt portion **62** which fits closely over the tube **48** and encloses the switch contacts and the actuator. The switch assembly **15** may be provided with a mounting bracket **63** for facilitating its mounting between the clamps **25** and **26**.

The embodiment of the invention illustrated in **FIGS. 9**, 10 and 11 is arranged for mounting in the curved flange of the wheel indicated at **70** in **FIG. 10**. The sensing member of this embodiment comprises a body **71** having a longitudinal cylinder **72** formed therein and a piston **73** fitted for sliding movement in the cylinder. The piston is biased toward its right hand position by a spring **74** which is a compression spring exerting pressure between the spring and a block or plug **75** threaded into the outer end of a sleeve **76** which forms an extension of the cylinder. The block **75** may be adjusted in position by first removing a cotter pin **77** a suitable number of holes being provided in the sleeve **76** to afford adjusted positions of the pin. Adjustment of the plug **75** changes the pressure exerted by the spring **74** on the piston **73**. The sleeve **76** provides an annular shoulder **78** which acts as a limit or stop to determine the extreme movement of the piston **73** to the left. The right hand end of the piston is provided with an extension **80** of reduced cross section which is threaded to receive a nut **81** which is provided to clamp an annular sealing gasket **82** against the piston to prevent leakage of air past the piston. A permanent magnet **83** is provided to perform the same function as the magnet **42** of the first embodiment. The magnet **83** is securely attached to a plug **84** which holds it in position in the body **71**. The piston in **FIG. 9** is shown in its low pressure or right hand position. When pressure is admitted from the tire through a duct **85** corresponding to the duct **23** of the first embodiment, the piston moved toward the left as soon as sufficient pressure is built up to break the magnetic armature **81** from the magnet **83** and the spring **74** is compressed. This movement of the piston rotates an indicator arm **86** about a pivot pin **87**, the movement of the arm **86** being effected by the engagement of a pin **88** in a slot **90** in the arm **86**. At the end of its movement toward the left, the arm **86** lies in a retracted position indicated by dotted lines in **FIG. 11**.

Whenever the pressure within the cylinder **72** falls below a predetermined value, the piston moves toward the right rotating the arm **86** in a clockwise manner so that it projects into the path of a switch element such as the finger **30** of **FIG. 7**.

The embodiment of the invention illustrated in **FIGS. 12**, 13 and 14 is similar to that of **FIG. 5** and 6 but includes a further feature whereby the pressure remaining in the tire is used to aid the compression spring in moving the sensing device to its indicating position. The device of this embodiment comprises a base plate **92** having a cylindrical bore **93** in which a cylinder housing or block **94** is secured in threaded engagement. A piston **95** is slidably mounted in a cylinder **96** within the block **94** and is sealed with respect to the cylinder wall by a gasket **97**. A cylinder projection **98** is formed integrally with the piston **95** and passes through a circular opening in a head or closure member **100** which is welded, brazed or otherwise secured to the cylinder block **94**. The projection **98** is sealed for sliding engagement in the head **100** by an annular gasket **101** fitted within an annular recess about the opening in the head **100**. The piston is urged to the right by a compressed spring **102**. The pressure within a tire is communicated to the cylinder **96** through an inlet connection **102** by means of a tube (not shown) such as the tube **23** of the first embodiment. Air from the inlet **103** reaches the cylinder through a duct **104** a recess **105** being provided in the piston **95** so that there is direct communication between the inlet **103** and the interior of the cylinder **96** to the right of the piston **95** when the piston is in its far left position as illustrated in full lines in **FIG. 13**.

During the operation of the tire pressure detector when the indicator cylinder **98** is in its far right hand position as indicated by dotted lines in **FIG. 13**. the tire is in communication with the cylinder **96** on the left hand side of the piston and air leaks out through a very small vent **106**; in order to place the sensor in operation, the projecting cylinder **98** is pressed to the left thereby compressing the spring and finally opening the communication between the right hand side of the cylinder and inlet **103**. The sensor then remains in this position, the air to the left of the piston **95** being slowly exhausted through the vent **106**. The piston **95** remains in its left hand position as long as the pressure of the tire is above a predetermined value. In the event that the pressure falls or reaches a value sufficiently low so that the force of the spring **102** moves the piston to the right the gasket **105** then closes the port **104** and on further movement of the piston, the port **104** is opened to the cylinder on the left hand side of the piston whereupon the left hand side of the cylinder is placed in communication with the inlet **103** and the pressure of the tire aids the spring **102** in moving the piston to the right. A minor amount of leakage occurs through the inlet **103** through the cylinder to the vent **106**. The vent is made sufficiently small that the leakage is

minor or of the order of a slow leak in a tire. In order to speed the movement of the piston to the right when the tire pressure falls a groove **107** is provided in the outer wall of the cylinder **98** and extends about the length of the cylinder chamber when the piston is in its far left hand position. This groove as soon as the piston has moved a distance of about the thickness of the head **100** provides communication between the cylinder **96** and the atmosphere and facilitates the movement to the right. Similarly this groove lessens somewhat the force required to press the piston **95** to the left when setting the sensor.

The head **100** is a permanent magnet like the magnet **42** of the first embodiment and performs the same function in locking the indicator piston **98** in its outermost position.

A further embodiment of the invention is illustrated in **FIG.** 15 which is a sectional view through a sensing element similar to the view in **FIG.** 13. This embodiment differs from the last embodiment in that an arrangement is provided for sealing the sensor against leakage of air from the tire through the sensor after operation thereof. As shown in **FIG.** 15, the sensor is mounted on a base **109** and comprises a cylinder block **110** threadly attached to the base and having a cylinder **111** formed therein; a piston **112** is slidably mounted in the cylinder **111** and an extension **113** of the piston is slidably mounted in a circular opening in the head of the cylinder block **110**. The piston **112** is sealed against leakage by an annular gasket **114** mounted in an annular groove or seat in the outer wall of piston **112**; the portion **113** of the piston is similarly sealed by a gasket **116** seated in an annular groove **117** in the head of the block **110** and around the opening through which the piston **113** projects. An annular magnet **118** is securely mounted adjacent the head of the cylinder and performs the same function as magnet **42** of the first embodiment. The tire pressure is communicated to the cylinder **110** through a passage **120** opening into the upper end of the cylinder and connected to the tire through a fitting **121** and a suitable tube (not shown) corresponding to the tube **23** of the first embodiment. When the piston is in the high pressure position in which it is illustrated high pressure is also admitted to the upper side of the gasket **114** through a duct **122**. As shown the gasket **114** is a generally U-shaped gasket and the pressure within the tire thus urges the two sides of the gasket respectively against the bottom wall of the groove **115** and the side wall of the cylinder **110**; this assures good sealing when the tire pressure is normal.

Should the pressure in the sensing device of **FIG.** 15 fall below a predetermined value, the piston **112** will start to move upwardly under the force of a compression spring **123** mounted within the piston portion **113** and pressing against the closed end of this portion and against an annular boss **124** formed on the base **109**.

Within the piston **113** a small hollow closed end cylinder block **125** is threaded into a cylindrical opening in the boss **124** and a cylinder **126** is provided within the block **125**; a slidable guide or piston **127** is mounted in the cylinder **126** and is urged upwardly by a relatively strong spring **128** mounted within the piston **127** and exerting pressure between the base or plate **109** and piston **127**. The hollow interior of the piston **127** is in communication with the outside through a small vent **130** and with the cylinder **126** through a passage **131** the piston **127** has an extension rod or actuating bar **132** extending upwardly through the block **125** and contacting the interior top wall of the piston **113**. When the piston **113** moves upwardly the piston **127** thus follows it until a soft O-ring gasket **133** seated in an annular recess at the top of the piston **127** engages the inner upper wall of the cylinder **126**. This gasket then seals the cylinder **126** from the interior of the piston **113** with which it communicates through clearance **134** about the rod **132**. As the piston **113** moves farther away from the plate **109** the gasket **114** moves past the port of the duct **122** and pressure from the tire enters the interior of the piston extension **113**, however, the leakage of this air to the atmosphere through the duct **130** is prevented by the engagement of the gasket **133** with the wall of the cylinder **126**. After the O-ring gasket **133** has engaged the top wall of the cylinder and has been compressed to effect sealing of the clearance about the rod **132** it remains in position and the top wall of the piston **113** moves away from the rod **132** under force of the spring **123**. The upward movement of the piston is facilitated by the equalization of air pressure, air from the tire passing through duct **122** to the underside of the piston **112** which has moved upwardly, as well as filling the cylinder above the piston.

It will be noted that the gasket **116** is also of the U type; this gasket is held in good sealing relationship with the wall of the groove **117** and the wall of the piston **113** by air pressure from the tire which reaches the space below the gasket **117** through a clearance **135** between the annular magnet **118** and the piston extension **113**. The sensing unit is thereby effectively sealed against leakage when the piston is in its normal position seated against the plate **109** as illustrated in **FIG.** 15.

During the operation of all the sensing devices disclosed, a contact finger or plunger is moved into the path of a detecting element such as a switch **15** of **FIG.** 7. The movement of the detecting arm or plunger to its indicating position is positive and forcibly effected and its operation is effective even in very cold weather. Construction of the device is simple and rugged and the sensing device operates effectively even though it may remain in its set position for an extended period of time.

While the invention has been illustrated and described in connection with specific structural arrangements other modifications and applications will occur to those skilled in the art; therefore, it is not desired that this invention be limited to the details illustrated and described and it is intended by the appended claims to cover all modifications which fall within the spirit and scope of the invention.

I claim:

1. A device for indicating a change of air pressure in a vehicle tire and the like comprising a rigid body having a pressure chamber therein, a movable air pressure responsive member mounted in said chamber, means for admitting to said chamber air under pressure from a tire or the like for urging said member in a first direction upon an increase in pressure, a spring for biasing said member in the opposite direction, means connected to said member and effective upon movement of said member to a predetermined position in one of said directions to produce a pressure indicating signal, said member having at least a portion thereof of magnetic material, and a permanent magnet secured to said body and effective upon movement of said member near said predetermined position to attract and engage and lock said member in said position.

2. A device for indicating a change of air pressure in a vehicle tire and the like as set forth in Claim 1 wherein said chamber comprises a cylinder and said member is a piston reciprocable in said cylinder.

3. A device for indicating a change of air pressure in a vehicle tire or the like as set forth in Claim 2 wherein said pressure indicating means includes a stop element mounted on said body and connected to said piston, said stop element upon movement of said piston to said predetermined position being moved to a position projecting outwardly from said body for producing said signal.

4. A device for indicating a change of air pressure in a vehicle tire or the like as set forth in Claim 2 wherein said piston is movable between a high pressure position and a low pressure position, said means for admitting air under pressure to said chamber including a port in the wall of said chamber adjacent said high pressure position, said piston upon decrease of the pressure in said chamber and movement under the force of said spring toward said low pressure position uncovering said port and admitting air under the decreased pressure to said chamber on the opposite side of said piston whereby the air under decreased pressure assists said spring in moving said piston toward said low pressure position.

5. A device for indicating a change of air pressure in a vehicle tire or the like as set forth in Claim 2 wherein said

predetermined position is the extreme position of said piston in said opposite direction whereby said magnet locks said piston in its low pressure position.

6. A device for indicating a change of air pressure in a vehicle tire or the like as set forth in Claim 3 wherein said stop member comprises an arm pivoted on said body and connected to said member by a lost motion linkage affording rotation of said arm and straight line movement of said member.

7. A device for indicating a change of air pressure in a vehicle tire or the like as set forth in Claim 5 including by-pass means for substantially equalizing the pressure on the two sides of said piston for a substantial portion of the stroke of said piston when moving toward and away from said low pressure position.

8. A device for indicating a change of air pressure in a vehicle as set forth in Claim 5 including a vent for removing air from the low pressure side of said piston and sealing means for preventing the discharge of air from said low pressure side through said vent when said piston is in its low pressure indicating position.

9. A device for indicating a predetermined decrease of air pressure in vehicle tires and the like comprising a block having a cylinder therein, a piston slidably mounted in said cylinder, means for supplying air under pressure from a tire to said cylinder on one side of said piston for moving said piston toward a high pressure position, spring means for urging said piston toward a low pressure position, means for venting air from said cylinder on the other side of said piston, an indicating device, means dependent upon movement of said piston toward said low pressure position for actuating said indicating device, and means dependent upon a predetermined movement of said piston toward said low pressure position for providing a bypass for air around said piston to equalize the pressure on the two sides thereof and facilitate the further movement of said piston toward said low pressure position.

10. A device for indicating a predetermined decrease of air pressure in a vehicle tire and the like as set forth in Claim 9 wherein said piston includes a concentric cylindrical extension, said block having an opening for accommodating movement of said extension from a position within said block to a position at least partway outside thereof, a first means for sealing said piston and the wall of said cylinder to prevent the leakage of air across said piston, a second means for sealing said extension and the wall of said opening for preventing leakage of air from said cylinder and wherein said bypass means provides a passage directly around one of said sealing means.

11. A device for indicating a predetermined decrease of air pressure in a vehicle tire and the like as set forth in Claim 9 including a sealing means effective upon a predetermined movement of said piston toward said low pressure position for preventing the discharge of air from said cylinder through said vent.

12. A device for indicating a change of air pressure in a vehicle tire and the like comprising a rigid body having a cylinder therein and a piston reciprocable in said cylinder, means for admitting to said cylinder on one side of said piston air under pressure from a tire or the like for urging said piston in a first direction upon an increase in pressure, a spring for biasing said piston in the opposite direction, means connected to said piston and effective upon movement of said piston to a predetermined position in one of said directions for producing a pressure indicating signal, and means dependent upon decrease of the pressure in said cylinder and movement of said piston under the force of said spring toward said low pressure position for admitting air under the decreased pressure to said cylinder on the other side of said piston to assist said spring in moving said piston toward said low pressure position.

13. A device for indicating a change of air pressure in a vehicle tire and the like as set forth in Claim 12 wherein said last mentioned means includes a passage extending through the wall of said cylinder and having a port opening into the cylinder adjacent said high pressure position of said piston.

14. A device for indicating a change of air pressure in a vehicle tire and the like as set forth in Claim 13 wherein initial movement of said piston toward its low pressure position closes said port and terminates the admission of air to the high pressure side of said piston and wherein further movement of said piston toward its low pressure position uncovers said port.

15. A device for indicating a change of air pressure in a vehicle tire and the like as set forth in Claim 12 including means effective upon a predetermined movement of said piston toward its low pressure position for providing communication between the interior of said cylinder and the atmosphere for facilitating the movement of said piston toward its low pressure position.