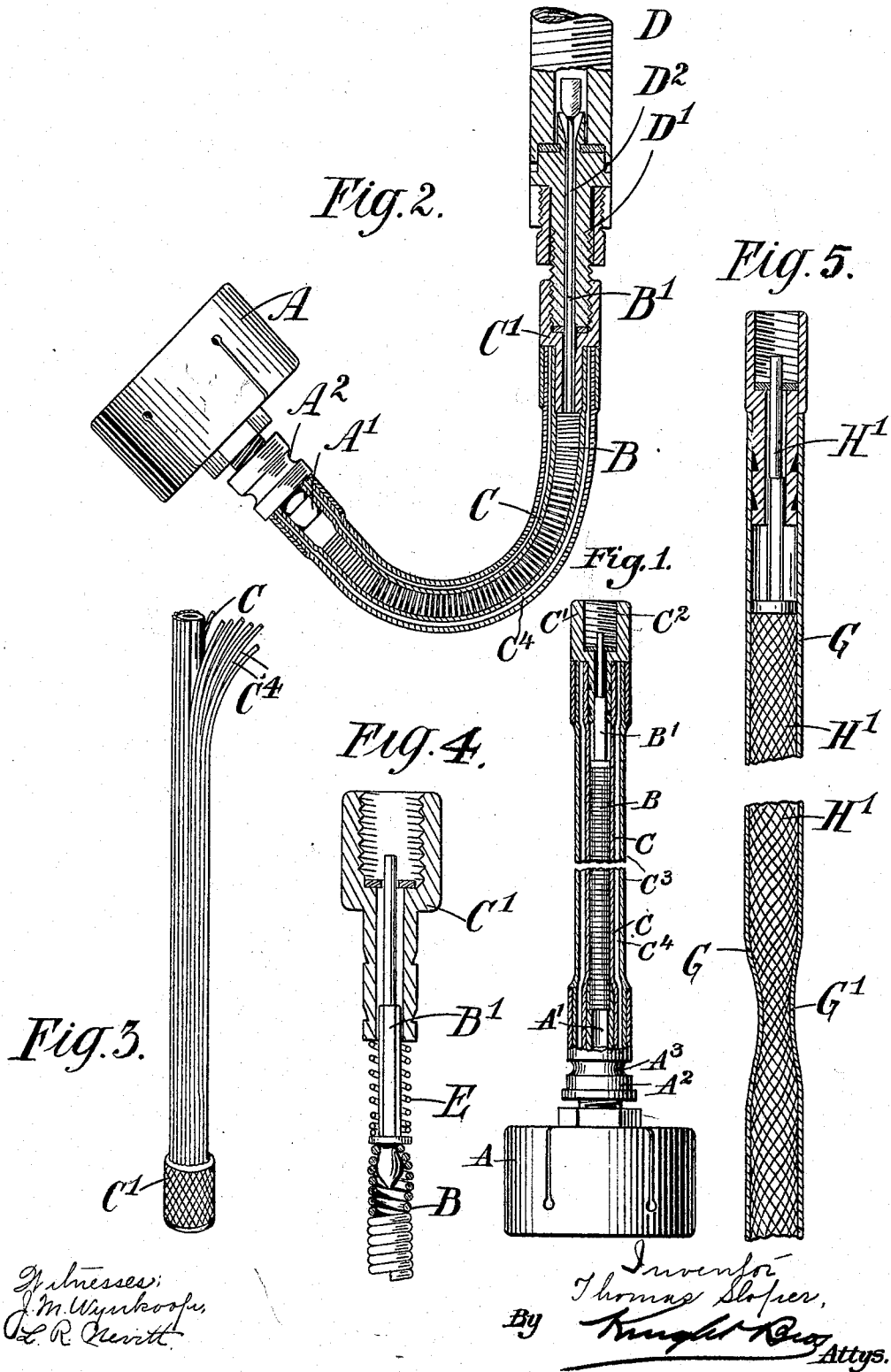


932,504.

Patented Aug. 31, 1909.



UNITED STATES PATENT OFFICE.

THOMAS SLOPER, OF DEVIZES, ENGLAND.

FLUID-PRESSURE-INDICATING DEVICE.

932,504.

Specification of Letters Patent.

Patented Aug. 31, 1909.

Application filed June 27, 1907. Serial No. 381,163.

To all whom it may concern:

Be it known that I, THOMAS SLOPER, a subject of the King of England, residing at Devizes, in Wiltshire, England, have invented a certain new and useful Fluid-Pressure-Indicating Device, of which the following is a specification.

This invention relates to an improved device for indicating the fluid-pressure contained in a closed vessel, and it is more particularly designed for ascertaining the pressure in a pneumatic tire.

It is found in practice that if a pressure-gage is permanently connected with a pneumatic tire and is carried on the wheel, the vibration causes it to get out of adjustment. In order to periodically test the pressure in a tire, several devices have been introduced for making a temporary connection between the tire-valve and a pressure-gage. In such instruments it is usual to employ a plunger having an extension which passes through a packing gland for releasing the non-return plug of the tire-valve.

In carrying out this invention, the plunger is inclosed in a flexible conduit or chamber, whereby movement may be imparted to it from without the conduit without the aid of glands or the like.

According to the preferred construction, a flexible connection is employed between the pressure-gage and the tire-valve, and the parts are so arranged that, when the connection is bent or deflected, the plunger automatically advances. To obtain this result, the plunger may be carried at the end of a spiral of a resilient material, that end of the spiral remote from the plunger being connected to a fitting which also receives one end of the inclosing flexible connection. The flexible connection may be formed of rubber and is preferably provided with longitudinally-disposed threads which render it practically inextensible. It therefore results that when the connection is bent, the mean length of the plunger with its spiral support is increased, while the mean length of the tubular connection is decreased. That end of the connection which is adjacent to the plunger, is adapted to screw on to the nose of the usual tire-valve and when so connected the plunger lies opposite the non-return plug of the valve and consequently, when the connection is bent, the plunger advances against the plug and depresses it to admit the air to the gage. Other means

may be employed for advancing the plug, such as are hereinafter described.

In the accompanying drawings:—Figure 1 is a central longitudinal section through a connection constructed according to one method of carrying out this invention; the connection is attached to a gage; Fig. 2 shows the same connection applied to a tire-valve and bent to depress the plug of the valve; Fig. 3 is a detail view of the tubular portion of the connection; Fig. 4 is a central longitudinal section through the upper portion of a modified form of connection, and Fig. 5 is a central longitudinal section through yet another modified form of connection.

Like letters indicate like parts throughout the drawings.

The gage A may be of any convenient construction and is provided with a nipple A¹. Within the nipple one end of a closely wound spiral B of resilient material is secured, and the other end of the spiral carries a plunger B¹. The plunger with its supporting spiral is inclosed in a flexible tubular connection C which may be of rubber and is made fast to the nozzle A¹ by any suitable means. The other end of the connection C carries a socket C¹ having an internal screw-threaded portion C² which is adapted to engage the usual screw-threaded nipple D¹ (Fig. 2) of a tire-valve D. The socket C² is bored through in the usual manner to admit air from the tire to the gage and the plunger B¹, which is free to slide within the socket, is so disposed that when the socket is attached to a valve, the plunger lies opposite and in close proximity to the non-return plug D² of the valve.

The tubular connection may be covered with any convenient braiding indicated at C³ but is also provided with a series of longitudinally disposed threads C⁴. In the drawings, these threads are shown as lying between the rubber and the outer covering C³.

In Fig. 1, the connection C is shown in the extended state; in Fig. 2, it is shown as connected to a valve D and bent round for the purpose of gaging the pressure within the tire to which the valve is appropriated, and it will be noted that the end of the plunger B¹ is, according to this figure, advanced beyond the socket C¹, and the non-return plug D² of the valve is thereby forced back, while in Fig. 1 the end of the plunger lies

a considerable distance within the socket. The plug D² being thus pressed back, admits the air from the tire to the gage, so that its pressure is registered and this is effected without the loss of any air except that which is required to fill the connection C and the gage.

The advance of the plunger B¹ is due to the fact that bending the connection by thrust applied thereto does not effect any change in the length of the spiral member B on that side which forms the inner curve of the bend, while the side forming the outer curve of the same is extended (the coils of the spiral being spread out on this side) so that the mean length of the spiral is greater than it was. On the other hand, that side of the tube C which forms the outer curve cannot lengthen in that the longitudinal threads C⁴ thereon are practically inextensible, and consequently the side of the tube forming the inner curve is compressed and the mean length of the tube is thereby decreased. The gage end of the plunger-member B is fixed relatively to the inclosing tubular member C and consequently an increase in length of the one member and a decrease in length of the other, produces a displacement of the plunger within the tube, whereby the non-return plug of the valve is opened as already stated. As soon as the connection is again allowed to assume its normal position, the plunger is thereby withdrawn so that the non-return plug or closing piece closes the valve when the connection can be unscrewed from the valve without loss of air except such as has entered the connection C and the gage A.

The spiral B is preferably made of sufficiently stiff and resilient material to withdraw the plunger even if the same should tend to be retained in the advanced position by friction, but should there be a tendency for the plunger to remain in the advanced position after straightening the connection, yielding means such as a spring E (Fig. 4) may be mounted between the base of the plunger and the end of the socket C¹. Said yielding means will in a well known manner, retain the closing piece upon its seat.

It will be understood that by using a flexible connection between the gage and valve of the tire, in combination with a plunger which can be moved relatively to its connection, various means may be employed whereby the plunger may be advanced and withdrawn relatively to the connection, without using glands or the like, and in Fig. 5 an arrangement alternative to that already described is shown. In this figure, the tubular connection G may be made of any convenient flexible material, but the plunger H is carried by a flexible tube H¹ composed of a braiding or lattice-work of wire and constituting a lazy-tongs device which would

have the property of increasing its length upon application of pressure tending to reduce its diameter. If therefore thrust be applied to the connection in such manner as to compress it laterally, as at G¹, the plunger H will be advanced by the increase of length of the braided tube H¹, while the length of the outer tube G will remain approximately constant.

The spiral member B offers no resistance to the passage of air from the tire to the gage as such air can pass freely between the coils of the spiral, and the same applies to the tubular braiding H¹.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a fluid-pressure indicating device comprising a fluid-pressure indicator provided with means for effecting fluid-tight connection with the valve of a container for the fluid whose pressure is to be indicated such valve having a closing piece retained upon its seat by yielding means, the combination of a plunger, an inextensible tie adapted to engage with said container; an expansible plunger-operating connection secured to said inextensible tie and operatively connected with the plunger at a point remote from that at which it is secured to the tie, said connection being composed of co-operating elements adjacent each to another and each arranged to move about its adjacent element; said inextensible tie being made tubular to surround said connection and plunger and adapted to transmit the operative stress to the plunger-operating connection.

2. In a fluid-pressure indicating device comprising a container for fluid under pressure having a valve that is provided with a closing piece retained upon its seat by yielding means, the combination of, a fluid-pressure indicator; a flexible-tubular member comprising an inextensible tie for effecting fluid-tight connection between the aforesaid valve of the container and the indicator, a plunger movably mounted within the tubular member and alined to engage the valve-piece; an expansible plunger-operating connection mounted within the tubular member, and fixed to a point on the tie, said connection being operatively connected with the plunger at a point remote from that at which it is fixed to the tie and composed of co-operating elements adjacently arranged in series to swing about axes transverse to the longitudinal axes of the tubular member, each of said elements affording a fulcrum for its companion in such manner that bending the inclosing tube causes the elements to rock whereby the plunger-operating connection is lengthened and means to maintain the said elements in operative relationship to one another, substantially as set forth.

3. In a fluid-pressure indicating device

comprising a container for the fluid under pressure, said container having a valve that is provided with a closing piece retained upon its seat by yielding means, the combination of, a fluid-pressure indicator, a flexible tubular member for effecting fluid-tight connection between the aforesaid valve of the container and the indicator and constituting an inextensible tie; a plunger movably mounted within the tubular member and alined to engage the valve-piece, an expansible plunger-operating connection mounted within the tubular member and fixed to a point on the same, said connection being operatively connected with the plunger at a point remote from that at which it is fixed to the tubular member and composed of coöperating elements arranged adjacently in series, and disposed at an angle to the longitudinal axis of the tubular member; said elements being adapted to swing about axes transverse to the longitudinal axis of the tubular member, each element affording a fulcrum for its companion for this purpose, whereby bending the said inclosing tubular member causes the elements to rock to positions less oblique to the longitudinal axis of the tube to lengthen the plunger-operating member; and means to maintain the said elements in operative relationship to one another, substantially as set forth.

4. In a fluid-pressure indicating device, the combination of, a flexible tubular member communicating with a fluid-pressure indicator and provided with means for effecting fluid-tight connection with the valve of a container for the fluid whose pressure is to be indicated, such valve comprising a closing-piece retained upon its seating by yielding means, a movable plunger carried within the tubular member, and a spiral of resilient material secured at one end to the plunger and fixed at the other end relatively to one end of the flexible member, such plunger being so situated as to aline with the closing-piece of the valve when connection is established between the valve and the inclosing tubular member, substantially as and for the purpose set forth.

5. In a fluid-pressure indicating device, the combination of, a flexible tubular member communicating with a fluid-pressure indicator and provided with means for effecting fluid-tight connection with the valve of a container for the fluid whose pressure is to be indicated, such valve comprising a closing-piece retained upon its seating by yielding means, a movable plunger carried within the tubular member, and a closed spiral of resilient material secured at one end to the plunger and fixed at the other end relatively to one end of the flexible connection, such plunger being so situated as to aline with the closing-piece in the valve when connection

is established between the valve and the inclosing tubular member, substantially as and for the purpose set forth.

6. In a fluid-pressure indicating device, the combination of, a flexible tubular member communicating with a fluid-pressure indicator and provided with means for effecting fluid-tight connection with the valve of a container for the fluid whose pressure is to be indicated, such valve comprising a closing-piece retained upon its seating by yielding means, means for preventing the lengthening of such tubular member when bent, a movable plunger carried within the tubular member and so situated as to aline with the closing-piece of the valve when connection is established between the valve and the tubular member, and a spiral of resilient material connected at one end to the plunger and fixed at the other end relatively to one end of the flexible tubular member, substantially as and for the purpose set forth.

7. In a fluid-pressure indicating device, the combination of, a flexible tubular member communicating with a fluid-pressure indicator and provided with means for effecting fluid-tight connection with the valve of a container for the fluid whose pressure is to be indicated, such valve comprising a closing-piece retained upon its seating by yielding means, inextensible longitudinally disposed elements in the wall of the flexible tubular member whereby bending the tubular member decreases the mean length thereof, a movable plunger carried within the tubular member and so situated as to aline with the closing-piece of the valve when connection is established between the valve and the tubular member, and a spiral of resilient material connected at one end to the plunger and fixed at the other end relatively to one end of the flexible tubular member, substantially as and for the purpose set forth.

8. In a fluid-pressure indicating device, the combination of, a flexible tubular member communicating with a fluid-pressure indicator and provided with means for effecting fluid-tight connection with the valve of a container for the fluid whose pressure is to be indicated, such valve comprising a closing-piece retained upon its seating by yielding means, longitudinally disposed threads in the wall of the flexible tubular member whereby bending the tubular member decreases the mean length thereof, a movable plunger carried within the tubular member and so situated as to aline with the closing-piece of the valve when connection is established between the valve and the tubular member, and a spiral of resilient material connected at one end to the plunger and fixed at the other end relatively to one end of the flexible tubular member, substantially as and for the purpose set forth.

9. In a fluid-pressure indicating device,

the combination of, a flexible tubular member communicating at one end with a fluid-pressure indicator and provided at the other end with means for effecting fluid-tight connection to the valve of a container for the fluid whose pressure is to be indicated, such valve comprising a closing-piece retained upon its seating by yielding means, a movable plunger carried within the tubular member and so situated that it aligns with the closing-piece of the valve when connection is established between the valve and the tubular member, and a support connected at one end to the plunger and fixed at the other

end relatively to one end of the inclosing tubular member, such support being so constructed that when the flexible tubular member is bent the support lengthens and advances the plunger against the closing-piece of the valve, substantially as and for the purpose set forth. 15 20

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS SLOPER.

Witnesses:

H. D. JAMESON,
F. L. RAND.