

R. W. SAMPSON.
TIRE PLUG.

APPLICATION FILED MAY 22, 1914. RENEWED JUNE 21, 1915.

1,184,136.

Patented May 23, 1916.

Fig. 1

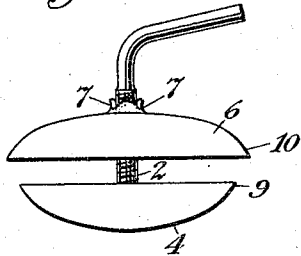


Fig. 2

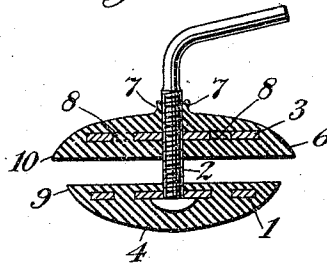


Fig. 3

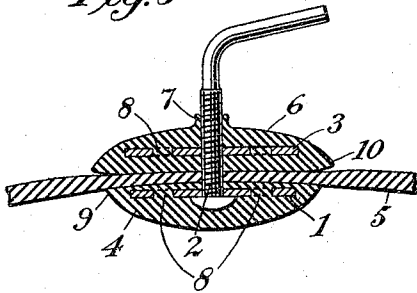


Fig. 4

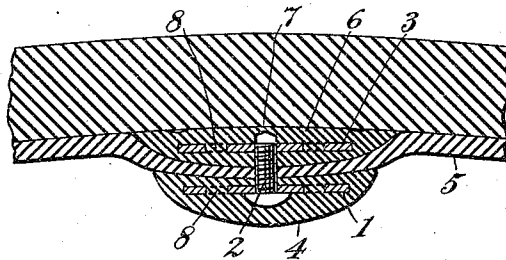


Fig. 5

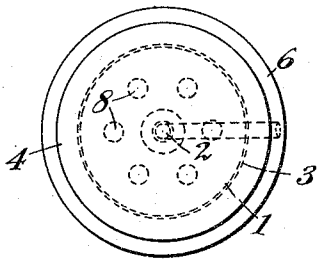
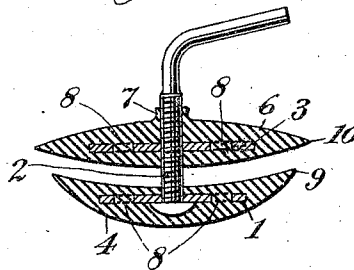


Fig. 6



Witnesses:
Agnes Gerhauer.
Howard M. Corb.

Inventor
Robert W. Sampson.
By his Attorney
Anson Wilson.

UNITED STATES PATENT OFFICE.

ROBERT W. SAMPSON, OF WESTMOUNT, QUEBEC, CANADA, ASSIGNOR OF ONE-HALF TO
LOUIS SCHWAB, OF EAST ORANGE, NEW JERSEY.

TIRE-PLUG.

1,184,136.

Specification of Letters Patent.

Patented May 23, 1916.

Application filed May 22, 1914, Serial No. 840,140. Renewed June 21, 1915. Serial No. 35,426.

To all whom it may concern:

Be it known that I, ROBERT WILLIAM SAMPSON, a subject of the King of Great Britain, residing at Westmount, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Tire-Plugs, of which the following is a specification.

My invention relates to tire plugs of the clamping type wherein an inner head and an outer cap are drawn together by means of a cooperating shank, and more particularly to plugs of this class which are intended to close punctures in the inner tube of double tube pneumatic tires; the details of my improvements being hereinafter pointed out and claimed.

As is well understood in the art, in double tube tires the inner tube is usually composed of a comparatively thin layer of rubber or its equivalent, without the addition of textile material; while the outer tube or shoe is built up with heavy elements or layers of textile material, to enable it the better to withstand the rough treatment to which it must be subjected.

When punctures occur in the inner tube they must not only be hermetically closed, but the closing must be done in such a manner as to subject the material of the inner tube to the least possible abnormal strain or tension; and the closer must be of such a character that it will neither cut, destroy nor tear out of the inner tube nor abrade nor injure the outer tube. And it is to means for accomplishing these ends that my present improvements are particularly directed.

In the drawings Figure 1 is a side view of one of my improved plugs; Fig. 2 is a vertical sectional view of the same; Fig. 3 is a vertical sectional view of the plug applied to a section of an inner tube; Fig. 4 is a vertical sectional view showing the plug applied to an inner tube in position within an outer tube; Fig. 5 is a bottom view of the plug; and Fig. 6 is a vertical sectional view of a modification.

The same parts are designated by corresponding reference numerals in all the figures.

The frame work of the plug consists primarily of a metal head-plate 1, through which passes the headed shank 2 which is threaded through the metal cap-plate 3, so

that the plates 1 and 3 will be drawn together by the rotation of the shank in the well known manner. I prefer to make the cap-plate 3 slightly larger than the head-plate 1.

The head-plate 1 is embedded in a body 4 of rubber or similar flexible material, which is substantially flat upon its upper face and convex upon its lower face, and is adapted to seat itself smoothly and evenly against the inner surface of the inner tube 5.

The cap-plate 3 is embedded in a body 6 of rubber or similar flexible material, the rubber upon the upper surface of the plate being preferably of substantial thickness. And in practice I prefer, in making the caps, to close the rubber nearly or quite over the top of the hole in the head-plate, as shown in Fig. 4, and then to rupture it to permit the shank to be passed up through it, with the result that small flaps or ears of rubber, as 7, 7 will be pushed up by the shank, and when the shank is broken off above the cap-plate they will fall back into place, more or less closing the opening in the rubber above the fractured end of the shank, preventing the inner face of the outer tire from being driven down directly against the end of the shank, and isolating the metallic parts of the plug from contact with the outer tire tube or shoe.

When my plug is applied to a puncture in the inner tube the tube will be gripped between faces which have substantial bodies of yielding rubber, centrally reinforced by metal plates, with the result that the compression of the material of the tube will be greatest toward the center of the plug, while toward the edges of the plug, its head and cap will yield somewhat, as shown in Figs. 3 and 4, so that little, if any, pressure will be exerted upon the material of the tube by the outer edges of the cap and head. Thus the puncture is closed by a device which seizes the material around the edges of the aperture firmly and positively, but with a grip which gradually relaxes toward the outer periphery of the closer and finally becomes merely nominal, so that at no point is there any resisting angle or edge over or in contact with which the material of the tube must bend or work. When the repaired inner tube is placed within the outer tire and is inflated, the air pressure will cause the repaired portion of

the inner tube to bed up against the inside of the outer tire, conforming the flexible body of the cap substantially to the inner curve of the outer tire, the inner tube will bend up the flexible edge 10 of the cap as shown in Fig. 4, the inner tube yielding inward so as to accommodate the body of the cap, the edges of which will lie evenly and smoothly between the outer tire or shoe and the inner tube so that the latter will be bent inward upon a gentle, dishing curve without encountering any abrupt shoulder or angle which might tend to strain or chafe the material of the inner tube during the use of the tire, while the expansion of the flexible edge 9 of the head will allow it to approximate the new position of the adjacent portion of the inner tube. When, therefore, the plug is clamped into an inner tube or tire, and the latter is inflated within an outer shoe or tire, the under face of the cap will be embedded in the outer surface of the inner tube, while its upper face will conform itself substantially to the inner curve of the outer tire, the cap becoming convexed and curved on its under face as well as upon its upper face, and disposing itself between the tube and tire so as to present practically continuous and gently curved and yieldable lines for the tube and tire to follow around it, leaving no opening around its edges for the tube or tire to bridge or to bed into, and presenting no abrupt shoulder or edge for either the tube or tire to bear against. Hence the material of the inner tube will bear at all points against a gently curved surface, either of the outer tire or of the cap, while the outer tire will be met by substantially the same curved surface as would be presented by an unplugged portion of the inner tube. Because of this gradually diminishing and yielding contact between the flexible and attenuated edges of the cap and head and the material of the tire, when the outer shoe is bent, through contact with the road, or otherwise, in service, and the inner tube yields correspondingly, the material of the tube is subjected to no abnormal stress or strain by the edges or other portions of the plug, but works to and fro against the yielding edges of the cap and head without being abraded, cut, or strained; with the result that the plug permanently and effectually closes the puncture and keeps it closed under the stress of use.

It will be seen that the formation of the head permits the material of the inner tube to be held between the head and cap with a grip which gradually diminishes toward the circumference of the head until it becomes merely nominal. In consequence of this, when the inner tube is flexed by the movements of the tire under a load strain, it may bend, with reference to the head,

without encountering a sudden or abrupt circumferential resistance from the latter, which might injure the inner tube, and it will be understood that inasmuch as the outer face of the head does not bear upon anything when the tube is inflated the exact configuration of its surface is not of so much importance as in the case of the cap, so long as it presents nothing which will mar or injure the opposite inside surface of the tube, in case it is collapsed so that the head will meet that surface, and so long as the circumferential portion of the head is adapted to meet the tube with a gradual approach which will avoid an abrupt contact which would cause injury to the tire when in use.

The use of the tire tends to press the edges of the opening in the cap above the cap-plate closely together and to crowd the rubber of the cap in so as to more or less fill up the hole above the ruptured end of the shank, the substantially thickened mass of rubber above the cap-plate facilitating this operation, which will take place to a material extent even when no surplus edge material as 7 is left around the hole. The advantage of this lies not only in preventing abrasion of the outer tube by the end of the shank but also in preventing contact between the metal of the shank and the material of the outer tube so as to forestall any chemical action between them which would deteriorate the outer tube.

In Fig. 6 I have shown a modification wherein the lower face of the cap is convexed and the upper face of the head is concaved, which may be a desirable form, under certain conditions, as it approximates the position which the inner tube must assume when it is inflated within the outer tire as shown in Fig. 4. But in this form also the comparatively thick and yielding bodies of the cap and head are preserved as well as the attenuated, flexible edges.

In practice I prefer to form perforations 8, 8, through the cap-plate and head-plate to aid the rubber bodies in gripping the plates, and I also prefer to make the head of the plug slightly smaller than the cap, as the parts thereby accommodate themselves more closely to the position of the inflated tube, but I do not wish to limit myself to these details, nor to other minor particulars of construction which do not enter into the merits of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. The combination, in a puncture closer for inner tubes of pneumatic tires, of a head embodying a cushion of elastic material having extended, attenuated edges and with a rigid plate embedded therein, a cooperating cap embodying a centrally thickened

cushion of elastic material having attenuated edges and with a rigid plate embedded therein and surrounded on all sides thereby, and means for clamping the head and cap toward each other.

embodying a flexible cushion centrally stiffened and having an attenuated edge, a cooperating head, and means for clamping the head and cap toward each other.

2. The combination, in a puncture closer for inner tubes of pneumatic tires, of a head embodying a cushion of elastic material convexed upon its lower surface and flat upon its upper surface and having extended attenuated edges and with a rigid plate embedded therein, a cooperating cap embodying a cushion of elastic material convexed upon its upper surface and flat upon its lower surface and having attenuated edges and with a substantially flat rigid plate embedded therein and surrounded on all sides thereby, and means for clamping the head and cap toward each other.

6. The combination, in a puncture closer for inner tubes of pneumatic tires, of a cap embodying a flexible cushion centrally stiffened and having a convexed upper surface and adapted to conform its upper surface substantially with the inner curvature of an outer tire when compressed between it and an inflated inner tube, a cooperating head, and means for clamping the head and cap toward each other.

3. The combination, in a puncture closer for inner tubes of pneumatic tires, of a head embodying a rigid central portion entirely surrounded by an elastic cushion having an extended, attenuated edge, a cap embodying a rigid central portion embedded in and entirely surrounded by an elastic cushion having an extended, attenuated edge, and means for clamping the head and cap toward each other.

7. The combination, in a puncture closer for inner tubes of pneumatic tires, of a cap embodying a flexible, centrally stiffened cushion having a substantially flat under face and a convexed upper face, and being adapted to assume curved and convexed under and upper faces when applied to an inner tube and compressed between it and an outer shoe, a cooperating head, and means for clamping the head and cap toward each other.

4. The combination, in a puncture closer for the inner tubes of pneumatic tires, of a head embodying a centrally substantially rigid central portion embedded in and entirely surrounded by a thickened elastic cushion extended into a thin marginal edge, a cap embodying a substantially rigid central portion embedded in and entirely surrounded by a centrally thickened elastic cushion extended into a thin marginal edge, and means for drawing the head and cap toward each other.

8. The combination, with the inner tube and the outer shoe of a pneumatic tire, of a plug embodying a cap having a flexible, centrally stiffened body adapted to embed its lower face centrally in the upper surface of the inner tube while conforming its upper face substantially to the inner curve of the shoe, thereby presenting continuous and gently curved lines for the tube and shoe to follow around it from their line of separation, a cooperating head, and means for clamping the head and cap toward each other.

ROBERT W. SAMPSON.

Witnesses:

HOWARD M. ROWE,
AGNES GERHAUSER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."