

No. 733,014.

PATENTED JULY 7, 1903.

D. H. COX, JR.
BICYCLE REPAIR PLUG.
APPLICATION FILED MAR. 27, 1903.

NO MODEL.

Fig. 1.

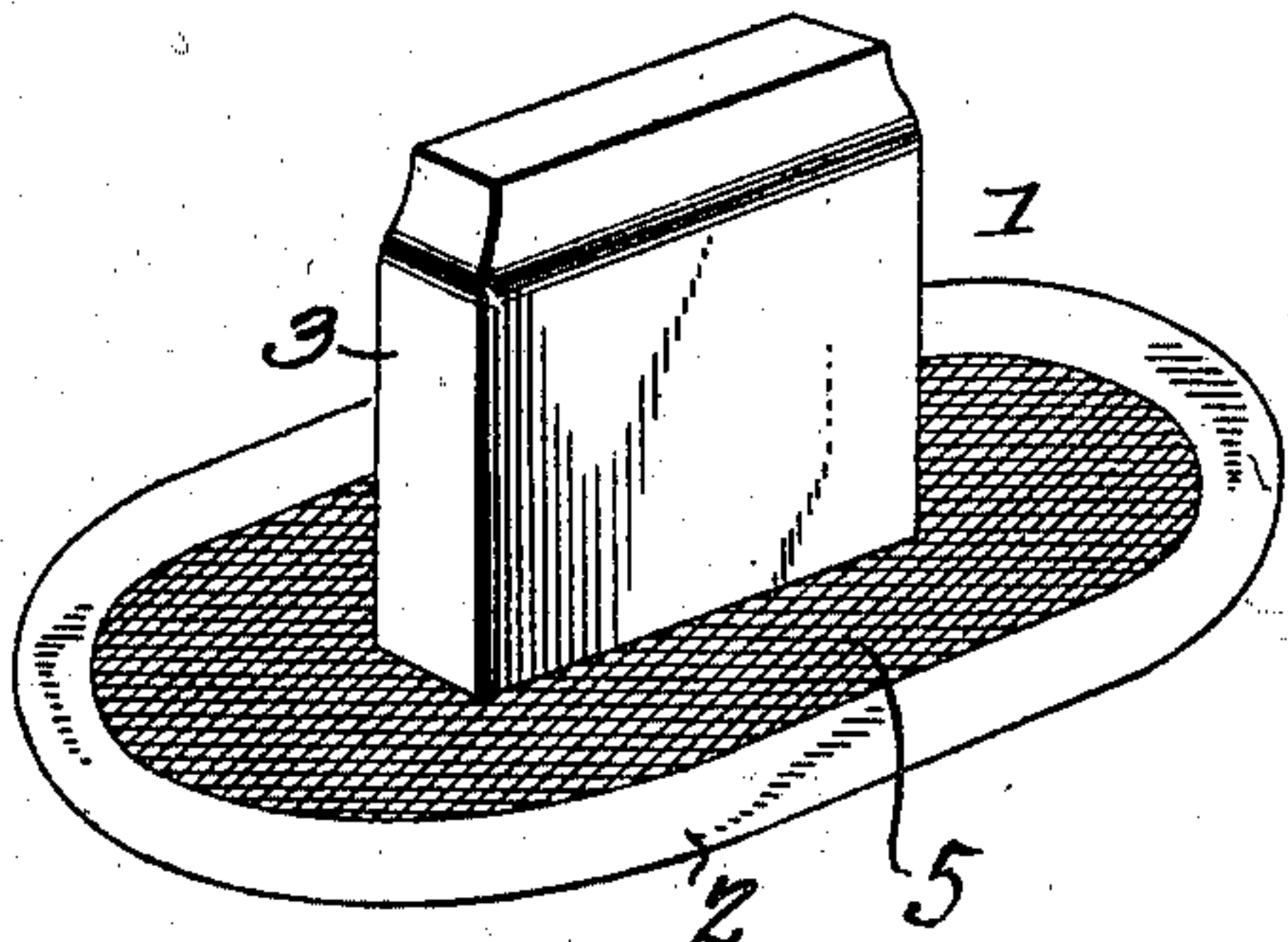


Fig. 2.

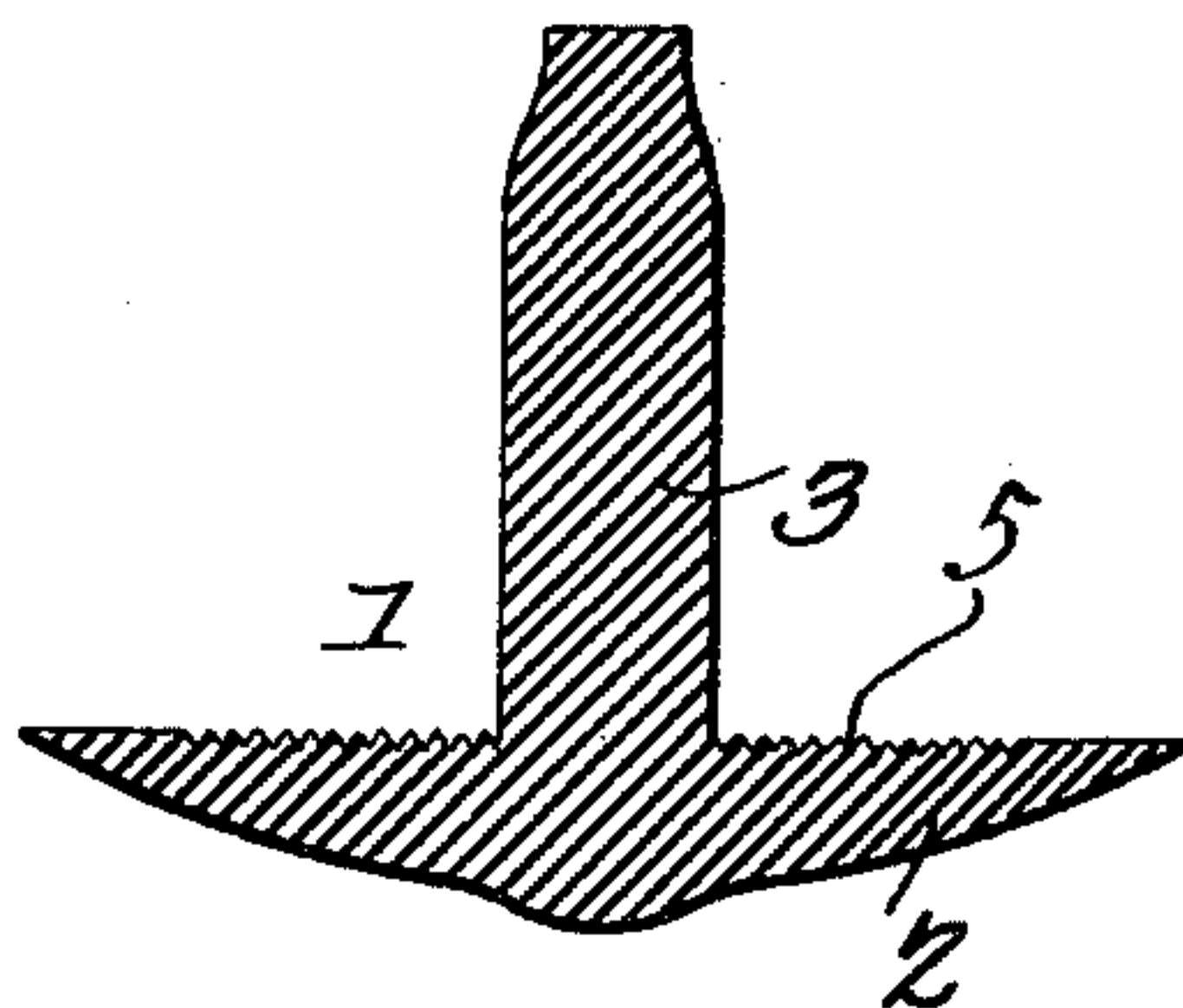


Fig. 3.

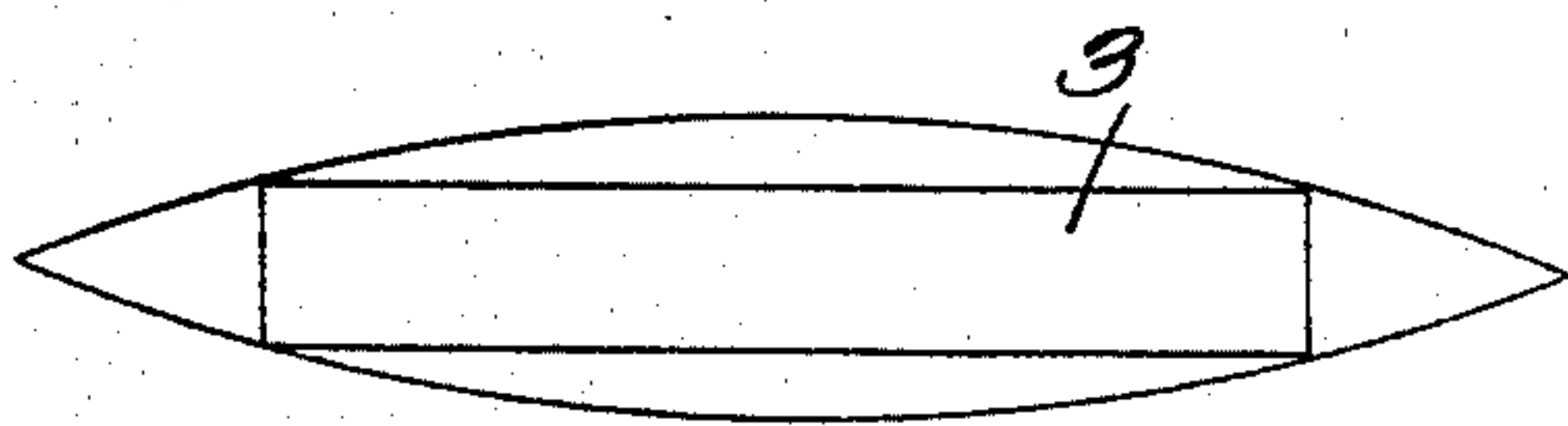


Fig. 5.

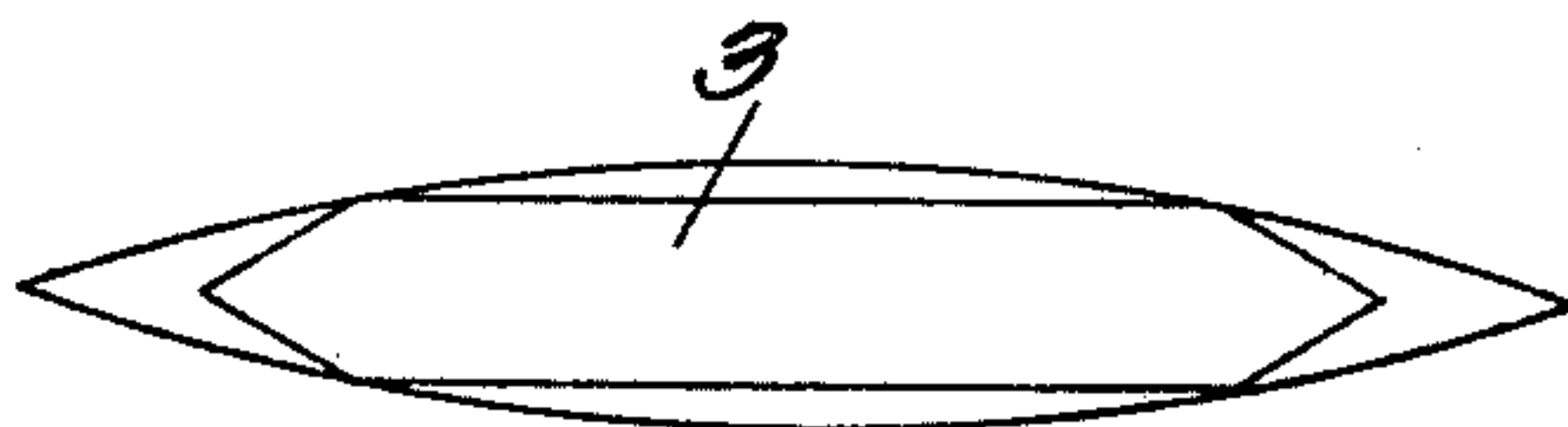


Fig. 4.

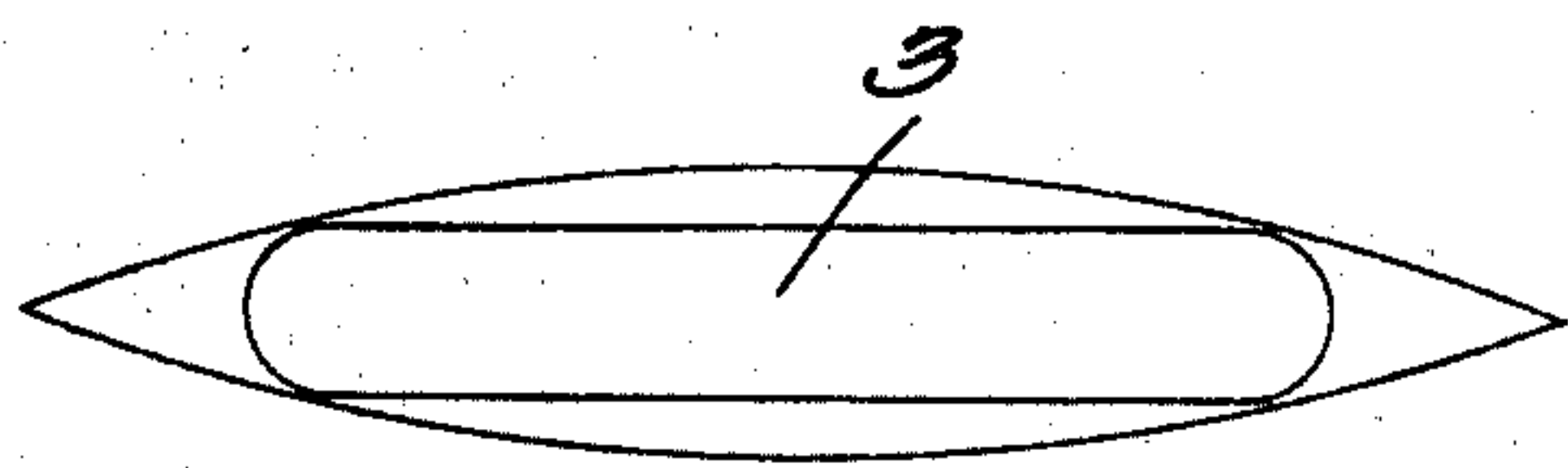


Fig. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

DAVID H. COX, JR., OF RAHWAY, NEW JERSEY.

BICYCLE REPAIR-PLUG.

SPECIFICATION forming part of Letters Patent No. 733,014, dated July 7, 1903.

Application filed March 27, 1903. Serial No. 149,886. (No model.)

To all whom it may concern:

Be it known that I, DAVID H. COX, JR., a citizen of the United States, residing at Rahway, in the county of Union and State of New Jersey, have invented a new and useful Bicycle Repairing-Plug, of which the following is a specification.

This invention relates to certain improvements in plugs of that class employed in repairing punctures in pneumatic tires of bicycles, automobiles, and other vehicles, and has for its principal object to provide a plug adapted especially for the closing of small slits or cuts made in the tire by accidental contact with pointed or sharp objects.

A still further object of the invention is to provide an improved form of tire-repairing plug in which the shape of the plug-stem is such as to permit the proper application of the cement necessary to hold the plug in place and seal the opening.

A still further object of the invention is to provide an improved plug so constructed as to permit the retention of a quantity of cement between the head of the plug and the inner surface of the bicycle-tire, and thus reduce the liability of accidental removal of the plug or the leakage of air by the shifting of the plug from its position or the removal of the small quantity of cement which usually is employed to hold the plug in place.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a perspective view of a tire-repairing plug constructed in accordance with the invention. Fig. 2 is a transverse sectional elevation of the same. Fig. 3 is a plan view showing the application of the plug to an elongated puncture or cut in a heavy tire. Figs. 4, 5, and 6 are similar views showing slight modifications in the construction of the stem of the plug.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In repairing punctures in pneumatic tires the usual and common method of procedure is first to introduce a pointed tool to enlarge the puncture and generally with a view of making the opening of circular form, after which there is introduced a plug having a circular head and cylindrical stem, the head of the plug being forced down through the opening, and after the application of cement the stem is drawn tightly through the opening, which as a rule fits snugly and leaves little if any room for cement between the wall of the opening and the adjacent circular face of the plug. In practice it will be found that in the majority of cases the cement will be squeezed out from between the stem and wall of the opening, the cement between the head of the plug and the inner wall of the pneumatic tire serving in connection with the internal air-pressure to retain the plug in place. This practice is found objectionable, especially in the repair of heavy tires used on automobiles and similar vehicles, inasmuch as punctures in tires are in the majority of cases in the form of slits or cuts as distinguished from mere circular punctures, this being caused in some cases by the shape of the puncturing object and in others by the movement of the vehicle itself during the action. Where a slit is formed and it extends in the direction of the tire, the introduction of a round-stem plug will separate the walls of the slit at a point centrally of the length of the latter and will tend to change the direction of strain on the tire, the insertion of the plug acting, as would a wedge, to increase the length of the slit, and this tendency being further increased when air is pumped into the tire and when the weight of the vehicle rests thereon.

After numerous experiments it has been found that the life of a pneumatic tire, especially of the heavy tires hereinbefore referred to, is practically lessened by the insertion of round or other plugs exercising a wedging action. On the other hand, the cutting or burning of the slit to form a round opening of the shape of the cylindrical plug is objectionable, for the reason that the walls of the opening hug closely to the cylindrical

surface of the plug and the cement is forced out of place. In carrying out the present invention these objections are overcome by employing plugs of such shape as to obviate splitting or spreading tendency of the plug and at the same time to afford space for the cement in order that the latter may firmly hold the plug in position.

Referring to the drawings, 1 indicates a tire-repair plug comprising a head 2 and stem 3, both formed of an integral piece of soft rubber, the stem being of sufficient length to permit its ready application to pneumatic tires of any thickness. The stem 3 is substantially rectangular in cross-section, having two elongated sides and two shorter sides, and the head of the plug is oblong or elliptical in form or may partake partly of the shape of both. The plugs are manufactured of different size in accordance with the present practice of manufacturing round-stem plugs of different size to accommodate tires of different weight and punctures of different size, and in use a plug is selected in which the longer diameter of the stem is less than the length of the slip, while its shorter diameter is as small as the character of the tire will permit.

In applying a plug of this character to a puncture the head is forced downwardly through the slit or puncture, a cord being first passed through the outer end of the stem in order to permit the subsequent withdrawal of the latter, and after the stem is partly withdrawn cement is inserted in the usual manner and rests on the flat head of the plug, which has reassumed its initial area after reaching the inner portion of the tire. The plug is then pulled up until the head rests closely against the inner face of the tire, while the end of the stem projects beyond the outer face of said tire in the usual manner, the strain being preferably exerted on the plug until the cement has set.

Referring now to Fig. 3, which illustrates on an exaggerated scale the shape of the slit or puncture and plug, it will be observed that the walls of the slit make contact with the four corners of the plug, and at these points only is there any close contact between the wall and the stem. The material of which the heavy tires is formed is of such nature as to prevent its hugging closely to a straight surface, and the tendency at all times is to gape, forming two opposing curves, and while these, especially at the longer sides of the stem, may not be perceptible, except on close examination, they nevertheless exist, or, at least, exist to the extent that the pressure of the walls of the slit against the central portion of the elongated sides of the tire is considerably less than that exerted at the corners of the stem, so that there is formed a space in which cement may rest and form a binding agent between the wall of the slit and the adjacent side of the stem. In similar manner there is formed a substantially

triangular space between the shorter sides of the stem and the ends of the slit, and these also become filled with cement when the plug is drawn up to position, so that at at least four points there will be recesses or spaces for the reception of the cement. This is clearly shown in Fig. 3, which is in the nature of a diagram on an exaggerated scale.

The cement serves as a bonding agent between the sides of stem and the adjacent walls of the slit and firmly holds the plug in position, as distinguished from cases where the plug is of the same contour as the opening, and by its inherent elasticity serves to expel all cement from the space between the walls of the opening and the surface of the stem.

Fig. 4 illustrates a slight modification of the invention, in which the ends of the stem are rounded, while in Fig. 5 is shown a still further modification, in which the ends of the stem are pointed in order to occupy a portion of the triangular spaces toward the ends of the slit.

In Fig. 6 is illustrated a still further modification, the stem being substantially diamond-shaped and affording four small spaces between the four flat sides of the stem and the adjacent walls of the slit for the reception of the bonding-cement.

In the majority of instances the plugs after insertion in the tire are drawn up so tightly as to expel the greater portion of the cement, and as the principal object of the present invention is to provide for the retention of sufficient of the bonding material to insure the holding of the plug in place the upper surface of the head of the plug, or that surface which is drawn into contact with the inner wall of the pneumatic tire, is grooved, serrated, or recessed, as indicated at 5 in Figs. 1 and 2, this serrated surface extending from the base-line of the stem to a point near the outer edge of the head, leaving a smooth marginal rim at the most flexible portion of the head for contact with the inner wall of the tire, and thus lessen the liability of escape of air by reason of the serrations in the head. These serrations are preferably so made that their base-lines shall be below the plane of the small margin, affording a large number of small pockets, each of which receives and holds a quantity of cement, and thus forms a perfect bond with the adjacent face of the tire.

Plugs constructed in accordance with this invention may be made at an expense no greater than that of the plugs of ordinary shape and size, and have proven by actual experience, especially in the case of extremely heavy tires, to be much more effective and to exert less strain on the tire than repair-plugs of the ordinary character.

Having thus described the invention, what is claimed is—

1. A tire-repairing plug having a stem oblong in cross-section, the walls of the stem

being substantially straight and at an angle to each other to afford a space between the walls of the stem and the puncture for the reception of a bonding agent.

2. A tire-repairing plug having a stem provided with angular walls so disposed as to make contact with the walls of a slit or puncture at the angle or juncture of the walls, the space between the walls of the stem and slit affording a space for the reception of a bonding agent.

3. A tire-repairing plug having the upper or inner surface of its head provided with a plurality of intersecting serrations for the reception of a bonding agent.

4. A tire-repairing plug having the upper

or inner surface of its head provided with a smooth margin, the remaining portion of the surface being corrugated or recessed.

5. A tire-repairing plug comprising a head and stem, the upper or inner surface of the head having a smooth margin, and the remaining surface, between the smooth margin and the base of the stem being recessed for the reception of a bonding agent.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

DAVID H. COX, JR.

Witnesses:

JOHN J. JEFFRIES,
E. T. McNAUGHTON.