

(No Model.)

2 Sheets—Sheet 1.

H. A. FLEUSS.
INFLATABLE WHEEL TIRE.

No. 585,562.

Patented June 29, 1897.

Fig. 1

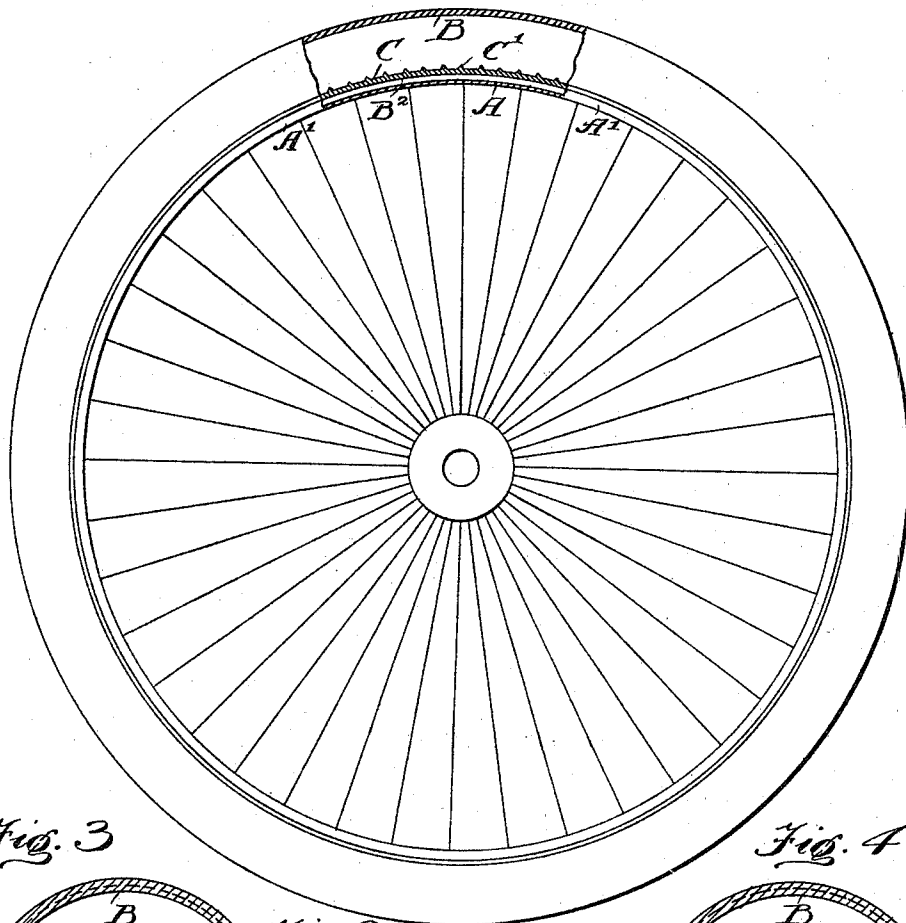
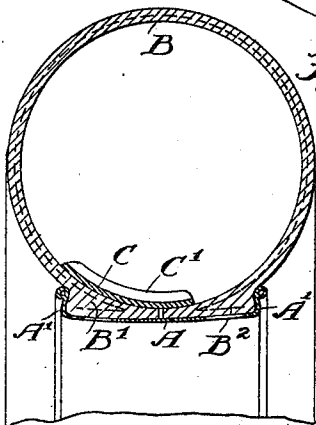


Fig. 3



Witnesses

Edmund H. Stansie.
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Fig. 2

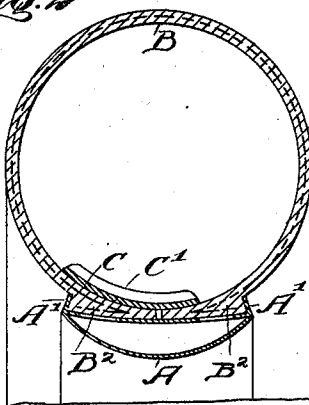
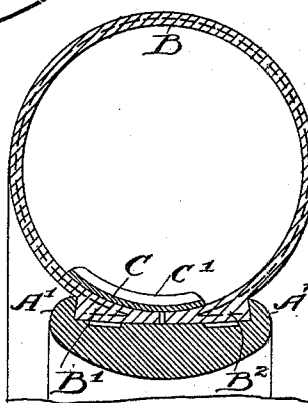


Fig. 4



Inventor

Henry A. Fleuss

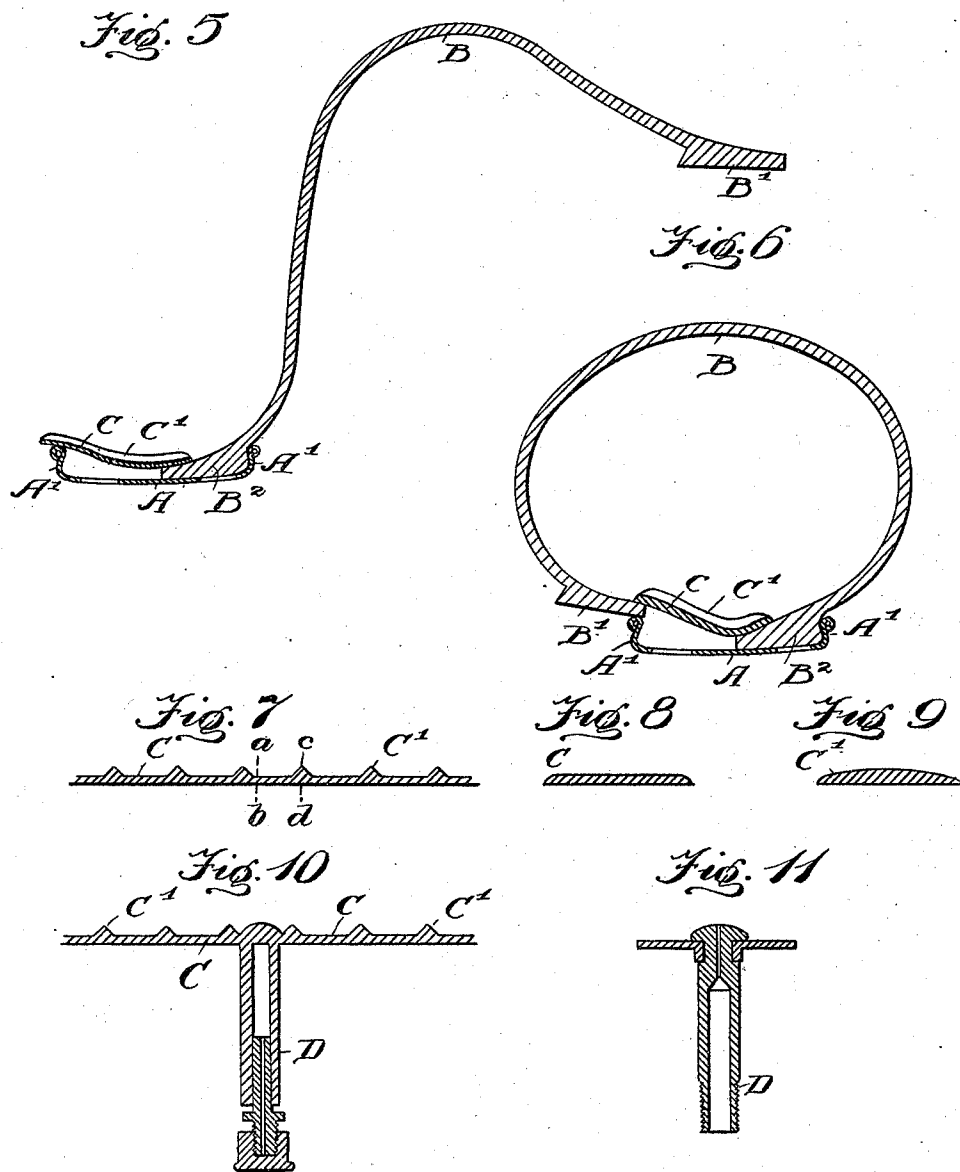
By his Attorneys

Walden Davidson Wright.

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UNITED STATES PATENT OFFICE

HENRY ALBERT FLEUSS, OF LONDON, ENGLAND, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO RANDAL MORGAN, OF PHILADELPHIA, PENNSYLVANIA.

INFLATABLE WHEEL-TIRE.

SPECIFICATION forming part of Letters Patent No. 585,562, dated June 29, 1897.

Application filed May 29, 1897. Serial No. 638,749. (No model.) Patented in France August 17, 1895, No. 249,670; in Belgium August 19, 1895, No. 117,030; in England October 25, 1895, No. 20,145; in Switzerland January 15, 1896, No. 11,799; in Norway January 23, 1896, No. 4,758; in Sweden January 28, 1896, No. 7,808; in Cape Colony January 29, 1896, No. 1,129; in Hungary February 7, 1896, No. 5,372; in Victoria February 13, 1896, No. 12,884; in New South Wales February 17, 1896, No. 6,401; in South Australia February 17, 1896, No. 3,173; in Tasmania February 17, 1896, No. 1,573; in Western Australia February 25, 1896, No. 842; in Queensland March 3, 1896, No. 3,275; in New Zealand March 4, 1896, No. 8,326; in Italy March 31, 1896, LXXIX, 477; in Austria April 21, 1896, No. 46/1,564; in Spain April 25, 1896, No. 18,583; in Canada June 26, 1896, No. 52,763; in Portugal July 20, 1896, No. 2,142, and in India August 13, 1896, No. 34.

To all whom it may concern:

Be it known that I, HENRY ALBERT FLEUSS, engineer, a subject of the Queen of Great Britain, residing at 46 Heathfield South, Twickenham, London, in the county of Middlesex, England, have invented certain new and useful Improvements in Wheels, the Tires of which are Inflatable, (for which I have received Letters Patent in Great Britain, No. 20,145, dated October 25, 1895; in France, No. 249,670, dated August 17, 1895; in Belgium, No. 117,030, dated August 19, 1895; in the Cape of Good Hope, No. 1,129, dated January 29, 1896; in India, No. 34, dated August 13, 1896; in New Zealand, No. 8,326, dated March 4, 1896; in New South Wales, No. 6,401, dated February 17, 1896; in South Australia, No. 3,173, dated February 17, 1896; in Western Australia, No. 842, dated February 25, 1896; in Tasmania, No. 1,573, dated February 17, 1896; in Victoria, No. 12,884, dated February 13, 1896; in Queensland, No. 3,275, dated March 3, 1896; in Austria, No. 46/1,564, dated April 21, 1896; in Hungary, No. 5,372, dated February 7, 1896; in Italy, No. 79/477, dated March 31, 1896; in Norway, No. 4,758, dated January 23, 1896; in Sweden, No. 7,808, dated January 28, 1896; in Spain, No. 18,583, dated April 25, 1896; in Portugal, No. 2,142, dated July 20, 1896; in Switzerland, No. 11,799, dated January 15, 1896, and in Canada, No. 52,763, dated June 26, 1896,) of which the following is a specification.

My invention relates to that class of pneumatic tires in which the tubular ring has a division all around its interior circumference, so that the tube may be opened or turned inside out and access gained to its interior, so that any cuts, perforations, or punctures may be repaired on the inside.

According to my invention I form an airtight joint all around the division in the tubular ring by making the division as a radial

slit and by bringing the two side edges of the curved strip so formed close together within the metallic rim of the wheel, leaving only a narrow radial space between the two, and by covering over this narrow space on the inside of the tire with an elastic rubber band, which extends all around the wheel and which by the pressure of air within the tire is pressed firmly against the two closely adjacent edges. The rim of the wheel I make with side flanges, as usual. The portions of the inflatable tire which come against it are thickened on the exterior to form projections, which fit closely to the side flanges when the two side edges of the curved strip forming the tire are brought nearly together.

The rubber band may be permanently cemented onto the inside of the tire on one side of the radial division, and this side edge of the curved strip may itself be cemented into its place around the rim of the wheel. The side of the band which is to overlap the inside of the tire on the other side of the division I make to extend out beyond the side flange of the rim of the wheel which is on that side. In this way the side edge of the curved strip not cemented to the rim can readily be inserted under the band and be pushed between the band and the outer edge of the flange, and so inserted into its place. The separately-formed elastic band is stretched when attached to the inside of the tire on one side of the radial division, and therefore when the tire is placed in position upon the rim it contracts throughout its circumference against the inner face of the other side of the tire. However the elastic band may be formed, it should be of such character as by its contraction to establish a sufficiently perfect seal before the initial pumping up of the tire.

In the drawings annexed, Figure 1 is a side view, partly in section, of the rim of a wheel having around it an inflatable tire formed as

above described, the section being taken in a plane at right angles to the axis of the wheel. Fig. 2 is a cross-section through one part of the tire and rim in a plane parallel with the axis. In this figure the rim is shown to be made hollow. Fig. 3 is a similar section through the tire and a solid metal rim. Fig. 4 is a similar section through the tire and a wooden rim. Fig. 5 shows a rim and tire similar to that shown in Fig. 2, but opened and turned inside out, so that any defect in it may be repaired. Fig. 6 is a similar view to Fig. 5, but showing the free edge of the tire just being pushed back into its place. Fig. 7 is a longitudinal section of part of the rubber band which covers over the division in the tire. Fig. 8 is a transverse section through the band on the line *a b*, Fig. 7; and Fig. 9 is a section on the line *c d*. Fig. 10 shows part of the band with a short elastic tube extending from it and carrying an air-valve of any suitable construction. Fig. 11 shows a metal tube having a washer secured to it by which it may be attached to the band and having within it an air-valve which may be of any suitable construction.

A is the rim of the wheel, with its side flanges A'; B, the flexible tire formed of a divided tubular ring; C, the elastic band forming a flap-valve for covering over the division in the tubular ring. On one side of the division it is cemented to the interior of the tubular ring and on the other side lies over its interior.

B' B² are the projections on the exterior of the ring, one at each side of the division, to fit into the rim of the wheel.

D is a tube extending outward from the tubular ring, through which the tire can be inflated. It is fitted with an air-valve of any suitable construction. The tube, whether it be of metal, as in Fig. 11, or of rubber, as in Fig. 10, may be secured to the flap and carried through a hole in the rim. If the tube is a metal one, the exterior of the tube and the hole may be made square to prevent the tube from turning, or the tube, especially if it be a flexible tube, may pass out from the tire at one side close to the rim, its free end being then bent round and secured to one of the spokes in the wheel.

The flexible tire I make with a smooth rubber surface on the inside, the canvas used for strengthening it and preventing it from stretching being in the form of an insertion—that is, it is covered both on the exterior and interior with rubber. Preferably I first form the tire as a complete undivided tubular ring. Afterward with a sharp cutter a radial division is made in the tube all around the inner circumference of the ring. This leaves sharp edges on the inside of the tube on both sides of the division. One side of an elastic band C is then made to embrace a portion of the slit tubular ring on one side of the division and is cemented to it. The other side of the elastic band is left projecting to lie over the

portion of the slit tubular ring on the other side of the division.

The band I make of thin rubber to allow it readily to expand or contract in diameter, and I may form it with transverse ridges C' on its exterior. These act as springs and when bent out of a straight line tend always to return to it.

By forming the elastic band separately I am enabled conveniently to make it of pure gum of a lower condition of vulcanization than the rubber forming the body of the tire, and hence it has more elasticity or "life," as well as a surface of a character that contributes to the formation of a proper closure or sealing of the tire both before and after the initial pumping.

The portion of the divided tubular ring which has one side of the band C cemented to it and has the projection B² on its exterior is made to embrace one side of the rim of the wheel and may be cemented to it, the projection B² being made to fit closely to the side flange. The free side of the band C then extends over the other side flange and lies against its outer edge, as seen in Fig. 5. The second edge of the divided tubular ring B is now inserted, as seen in Fig. 6, between this edge of the flange and the band C and is pushed into its place in the rim. This is done little by little, first inserting a portion at one point and then more and more working continuously all around the wheel. The ridges C' on the exterior of the band C become bent out of the straight as the edge of the divided tubular ring is pushed beneath the band, and they therefore press the interior of the band onto the portion of the ring which has been inserted between it and the rim and hold the free edge of the band closely against the interior of the tubular ring. The tire can now be inflated through the tube D with a small air-pump such as ordinarily used for inflating tires.

If desired, the band C may be made somewhat conical and its larger diameter be cemented to the one edge of the tubular ring on one side of the division. This would cause the transverse ridges on the exterior of the band to be bent to a greater extent when the other edge of the tubular ring is inserted between the band C and the tire and so cause the band to be pressed the tighter against the edge of the divided tubular ring.

In order to facilitate the pressing the second edge of the tubular ring into its place around the rim and between the rim and the band C, I first moisten this portion of the tubular ring on its interior with soft soap, or it might be with a solution of soap and water or with glycerin or like lubricant. This renders it easy to insert the edge of the tube into its place. I prefer to use soft soap.

Small holes may be formed at intervals into or through the rims of the wheels, so that the exterior of the elastic tires may be pressed more or less into them and the tires so kept

from gradually turning or creeping around the rims if the tires are not cemented to them.

The tire herein described, as appears from the foregoing specification, possesses certain characteristics which severally and collectively distinguish it from all other tires of the general class to which it belongs. The most prominent of these features are as follows:

First. The radial division in the inner side or face of the tire forms a gap that permits the escape of air under the relatively flexible elastic band C, so that in the initial pumping up of the tire there is no back pressure under the band that would tend to prevent its proper seating and the sufficiently perfect sealing of the gap.

Second. The radial opening is cut or formed in such manner that its upper edge on that side of the tire to which the flexible elastic band is not attached is relatively sharp or angular, a construction that contributes to the perfect sealing of the gap when the elastic band is forced against this corner or angle by the pressure of the contained air.

Third. The elastic band is stretched when or as it is applied to the edge of the tire, and when the tire is applied to the rim the band, by its contraction, hugs or draws against the radial opening and against the inner face of that side of the tire to which it is not attached throughout the entire circumference. Thus before the initial pumping there is a sufficiently perfect seal to prevent the escape of the air, and consequently the tire may be readily pumped up with the usual pumps of small capacity. Without this construction the band would be liable to fall away from the radial opening throughout the lower half of the circumference.

Fourth. The elastic band is so applied, as clearly appears from the drawings, that the circumference of its outer or free edge when the tire is in position is considerably greater than the circumference at the point at which it is attached to one edge of the tire. The tendency of the band therefore to contract against the inner face of the tire to which it is not attached is enforced or emphasized. This contraction also contributes to the formation of a sufficiently perfect seal before the initial pumping.

Fifth. The elastic band being separately formed and then attached to one end of the tire may be made of a higher grade of rubber—that is to say, of pure gum of a lower condition of vulcanization than the rubber forming the body of the tire. The band may therefore have more elasticity or life and, furthermore, has a surface or character that contributes to the formation of a perfect seal both before and after the initial pumping.

Sixth. The elastic band is of such width that it projects beyond the edge of the rim, and this construction permits of the very ready insertion of the edge of the tire under it in applying the tire to the rim.

What I claim is—

1. A single-tube tire having a radial division around its inner circumference and a stretched elastic band attached to the interior face of the tire on one side of the radial division, that bridges or extends over the radial division and bears against the inner face of the tire on the other side of the radial division, the stretched elastic band being so constructed as to contract against said inner face of the tire throughout its circumference when applied to a rim.

2. A single-tube tire formed with a radial division around its inner circumference, a separately-formed elastic band stretched and secured to the interior of the tire on one side of the radial division and bridging or extending beyond said division and bearing against the inner face of the tire on the other side of the division, whereby when the tire is applied to a rim the contraction of the elastic band against the inner face of the tire throughout its circumference, forms a sufficiently perfect seal before the initial pumping.

3. A single-tube tire having a layer of fabric to impart strength and prevent stretching, a radial division around its inner circumference, and exterior projections on each side of said division, adapted to engage annular seats or grooves in a wheel-rim, and a separately-formed flexible elastic band stretched and attached to the inner face of the tire on one side of said division, and of such width as to bridge or extend beyond the radial division, and of such dimensions as by its contraction to embrace or bear against the inner face of the tire throughout its circumference.

4. A single-tube tire having a layer of fabric to impart strength and prevent stretching, a radial division around its inner circumference, and exterior projections on each side of said division adapted to engage annular seats or grooves in a wheel-rim, and a separately-formed flexible elastic band of rubber of relatively great elasticity, *i. e.* pure gum of a low stage of vulcanization, stretched and attached to the inner face of the tire on one side of said division, and of such width as to bridge or extend beyond the radial division, and by its contraction to embrace or bear against the inner face of the tire throughout its circumference.

5. A single-tube tire having a radial division around its inner circumference, formed with a relatively sharp corner at one of its inner edges, a flexible elastic band attached to the inner face of the tire on the other edge or side of the radial division, and bridging or extending across said radial division, and by its elasticity embracing or bearing against the inner face of the tire throughout its entire circumference.

6. A single-tube tire having a radial division around its inner circumference, formed with a relatively sharp corner at one of its inner edges, a flexible separately-formed stretched elastic band attached to the inner face of the tire on the other edge or side of

the radial division, and bridging or extending across said radial division, and by its elasticity embracing or bearing against the inner face of the tire throughout its entire circumference.

7. The combination of a wheel-rim and a single-tube tire having a radial division around its inner circumference, and an elastic band attached to the interior of the tire on one side of said division, bridging the gap formed by said division, and extending beyond it to a point beyond the edge of the wheel-rim, said elastic band by its contraction embracing or bearing against the interior of the tire throughout its circumference.

8. A single-tube tire having a radial division around its inner circumference, forming a gap, exterior projections on each side of said gap adapted to engage seats in a wheel-rim, the inner corner of such radial division presenting a relatively sharp angle and a separately-formed elastic band stretched and attached to the inner face of the tire at the other edge or side of the radial division, and bridging or extending beyond the gap formed by said division, and by its contraction embracing or bearing against the inner face of the tire throughout its circumference.

9. A single-tube tire having a radial division around its inner circumference and a separately-formed elastic band stretched and secured to the interior of the tire on one side of the radial division and covering over airtight the division, extending beyond it, and bearing on the interior of the other side of the tire, a wheel-rim and a permanent connection between the wheel-rim and the tire on one side of the circumferential division.

10. The combination of a wheel-rim, a tubular-ring tire B surrounding the rim and having a narrow radial division around its inner circumference, and also having external projections on each side of the division to fit to the rim, and an elastic band having transverse corrugations on its exterior covering over the division, substantially as described.

11. A pneumatic tire composed of a rigid wheel-rim having a trough or hollow groove

around it, a tubular, flexible ring surrounding the rim having a radial division around its inner circumference and solid external projections on each side of the division, one of which is securely fastened to the rim, and which fit to the trough or groove when a narrow open space is left between the two projections from which air can escape and a stretched elastic band not only covering over the division on the inside of the tubular ring and bearing by its elasticity against the inside of this ring, but also extending beyond one side of the rigid rim, substantially as described.

12. A pneumatic tire composed of a rigid wheel-rim having a trough or hollow groove around it, a tubular, flexible ring surrounding the rim and having a radial division around its inner circumference, and solid external projections on each side of the division to fit to the trough or groove when a narrow open space is left between the two projections from which air can escape and a stretched, elastic band covering over the division on the inside of the tubular ring and permanently secured to the ring on one side of the division and extending beyond the side of the rigid rim on the opposite side of the division, substantially as described.

13. A pneumatic tire composed of a rigid wheel-rim, a tubular, flexible ring surrounding the rim having a radial division around its inner circumference and cemented on one side of the division to one side of the rim and on the other side of the division having an external projection upon it to fit into a groove around the rim and a stretched, elastic band covering over the division on the inside of the tubular ring and cemented to the tubular ring on that side of the division where the tubular ring is cemented to the rim and on the opposite side of the division extending beyond the side of the rigid rim, substantially as described.

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Witnesses:

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