No. 686,901. Patented Nov. 19, 1901.

H. LIEBERTHAL.

WHEEL TIRE.

(Application filed Aug. 31, 1901.)

(No Model.)

Fig. 1.

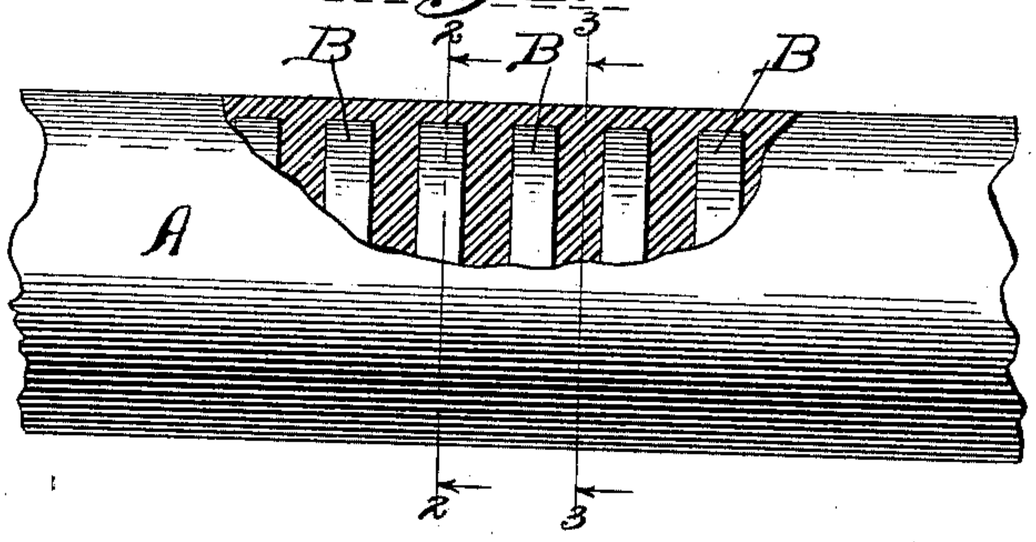

Fig. 2.

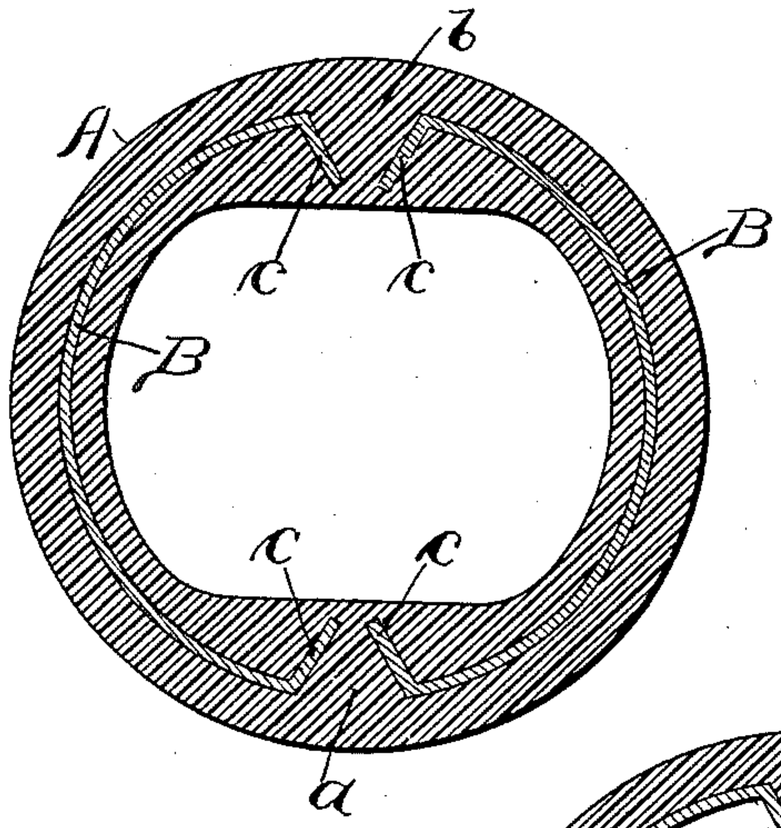

Fig. 3.

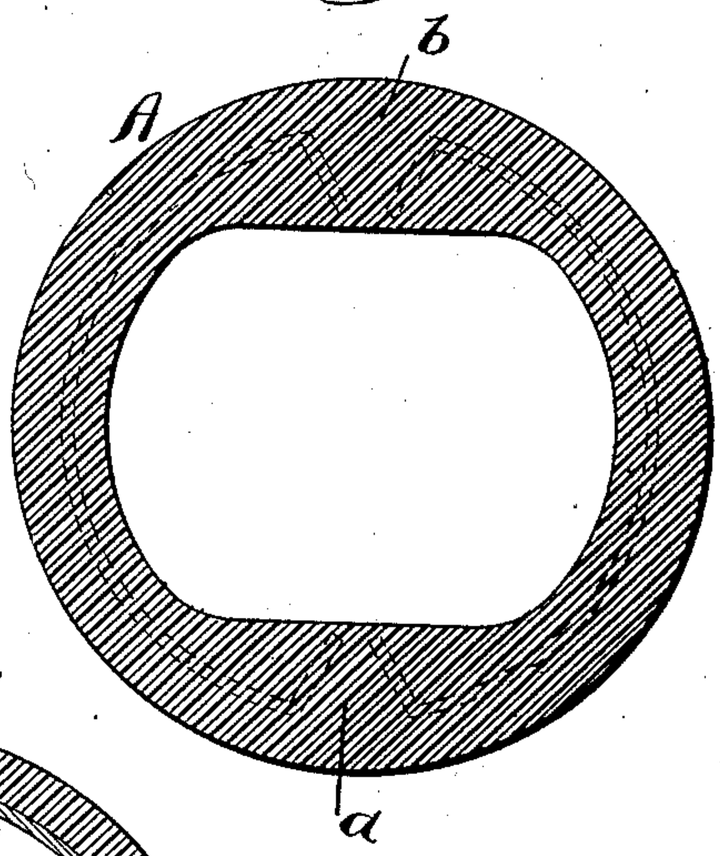

Fig. 4.

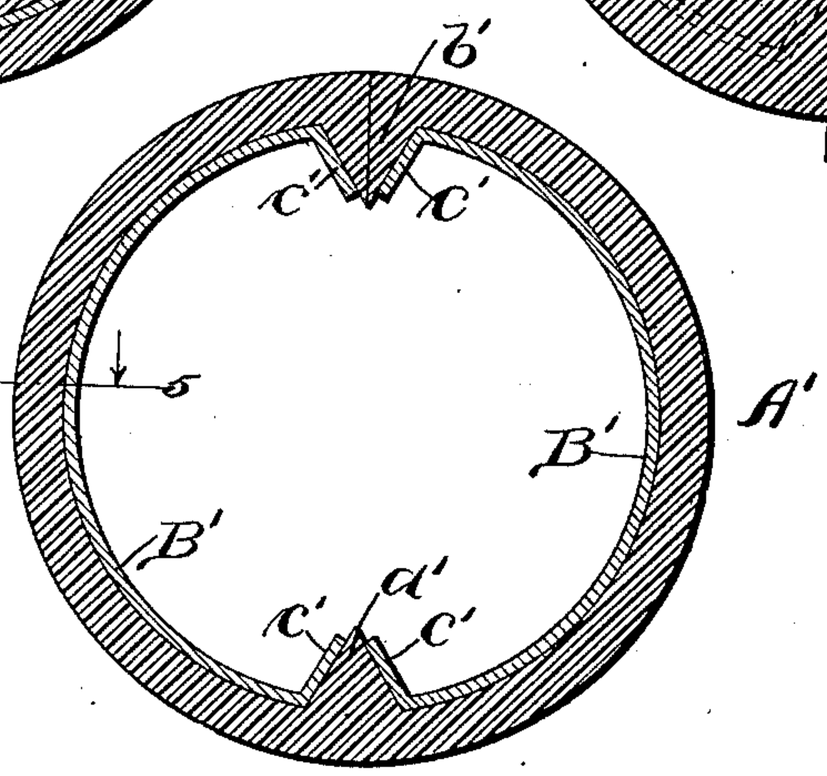

Fig. 5.

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HYMAN LIEBERTHAL, OF CHICAGO, ILLINOIS.

WHEEL-TIRE.

SPECIFICATION forming part of Letters Patent No. 686,901, dated November 19, 1901.

Application filed August 31, 1901. Serial No. 74,026. (No model.)

To all whom it may concern:

Be it known that I, HYMAN LIEBERTHAL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Wheel-Tires, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to tires for bicycles and other wheels, and has for its object to provide a hollow elastic tire possessing the resilient easy-riding qualities of the ordinary pneumatic tire, but without the necessity of filling the same with air under pressure and without liability of collapsing in case of puncture. I accomplish this by the means shown in the drawings and hereinafter specifically described.

That which I regard as new will be set forth in the claims.

In the accompanying drawings, Figure 1 is an elevation of a portion of my improved tire, a part of the same being broken away to show the arrangement of the side springs. Fig. 2 is a cross-section at line 2 2 of Fig. 1. Fig. 3 is a cross-section at line 3 3 of Fig. 1. Fig. 4 is a cross-section showing a modification in construction; and Fig. 5 is a detail, being a longitudinal section at line 5 5 of Fig. 4.

Referring to said drawings, A indicates a flexible tube, preferably of vulcanized rubber, thickened at opposite sides, as indicated by *a* and *b*, such thickened portions being respectively the tread and that part lying against the wheel-rim.

B indicates two series of thin flat metal springs placed opposite to each other at the sides of the tube A, the said springs being embedded in the material of the tube A, which can be accomplished by suitably locating them in the mold in which said tube when of rubber is formed. The two series of springs and the springs of each series are separated from each other, as shown, so that there is no possibility of their working one against the other. Each spring is curved to conform to the proper curvature of the tube A and together act to maintain the said tube in its desired shape. The upper and lower ends of each spring are bent at an angle and are embedded in and bear against the thickened portions *a* and *b* of the tube A, thus presenting a flat bearing-surface *c* for each end of the spring.

When in use and weight is applied to the wheels equipped with my improved tire, the two series of side springs will yield sufficiently to render riding easy and comfortable, as in the case of the ordinary pneumatic tire, and enable the wheels to pass over ordinary obstructions with but little jolt or jar. The thickened tread portion of the tube will ordinarily guard the tire from punctures; but of course even if punctures are made they will ordinarily have no bad effect, as in the case of pneumatic tires, as the tube is maintained in proper shape by the springs.

In the modification shown in Figs. 4 and 5 the tube is indicated by A′, and the springs, which are the same in construction as those of the other figures of the drawings, but indicated by B′, are not embedded in the tube, but are placed against the inner face of such tube and held separated from each other by being placed in grooves formed on such inner face, as shown in Fig. 5. The ends *c′* of the springs B′ bear against thickened portions *a′ b′* of the tube. The tube A′ is slit along its length through the thickened portion *b′*, which is the part that lies against the wheel-rim, and the two edges may, after the tire is filled with springs, be united by cords or in any other suitable manner. In this modified construction the springs will act under like conditions exactly as do the springs in the construction first described and with the advantage at any time of being able to readily and quickly renew one or more of the springs when such renewal is deemed desirable.

In both forms of construction the turned ends of the springs have a firm bearing against the enlarged or thickened portions of the tube, which effectually prevents any endwise movement of the springs and any cutting of the tube by them.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. In a wheel-tire, the combination with a flexible tube, of two series of flat springs in said tube, each series being located at one side of the longitudinal center of the tube, substantially as specified.

2. In a wheel-tire, the combination with a flexible tube, of two series of flat springs in

said tube, each series being located at one side of the longitudinal center of the tube and the springs of one series being arranged opposite the springs of the other, substantially as specified.

3. In a wheel-tire, the combination with a flexible tube, of two series of flat springs in said tube, each of said series being located at one side of the longitudinal center of the tube, means for securing one end of each spring of each series at a point opposite the tread portion of the tire, and means for securing the other end of each of said springs at a point opposite the portion of the tire adapted to lie against a wheel-rim, substantially as specified.

4. In a wheel-tire, the combination with a flexible tube having thickened portions on its upper and lower sides, of a series of springs in said tube at each side thereof with their ends bearing against said thickened portions, substantially as specified.

5. In a wheel-tire, the combination with a flexible tube having thickened portions on its upper and lower sides, of a series of springs in said tube at each side thereof, each spring having its ends bent at an angle to form bearing-surfaces adapted to bear against said thickened portions of the tube, substantially as specified.

6. A wheel-tire tube having a thickened longitudinal, central portion, in combination with a series of springs in said tube at each side of said thickened portion, each spring being adapted to be supported at one end by said thickened portion of the tube, substantially as specified.

7. A wheel-tire tube having a thickened longitudinal, central portion, in combination with a series of springs in said tube at each side of said thickened portion, each spring having formed on one end a bearing adapted to contact with said thickened portion of the tube, substantially as specified.

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