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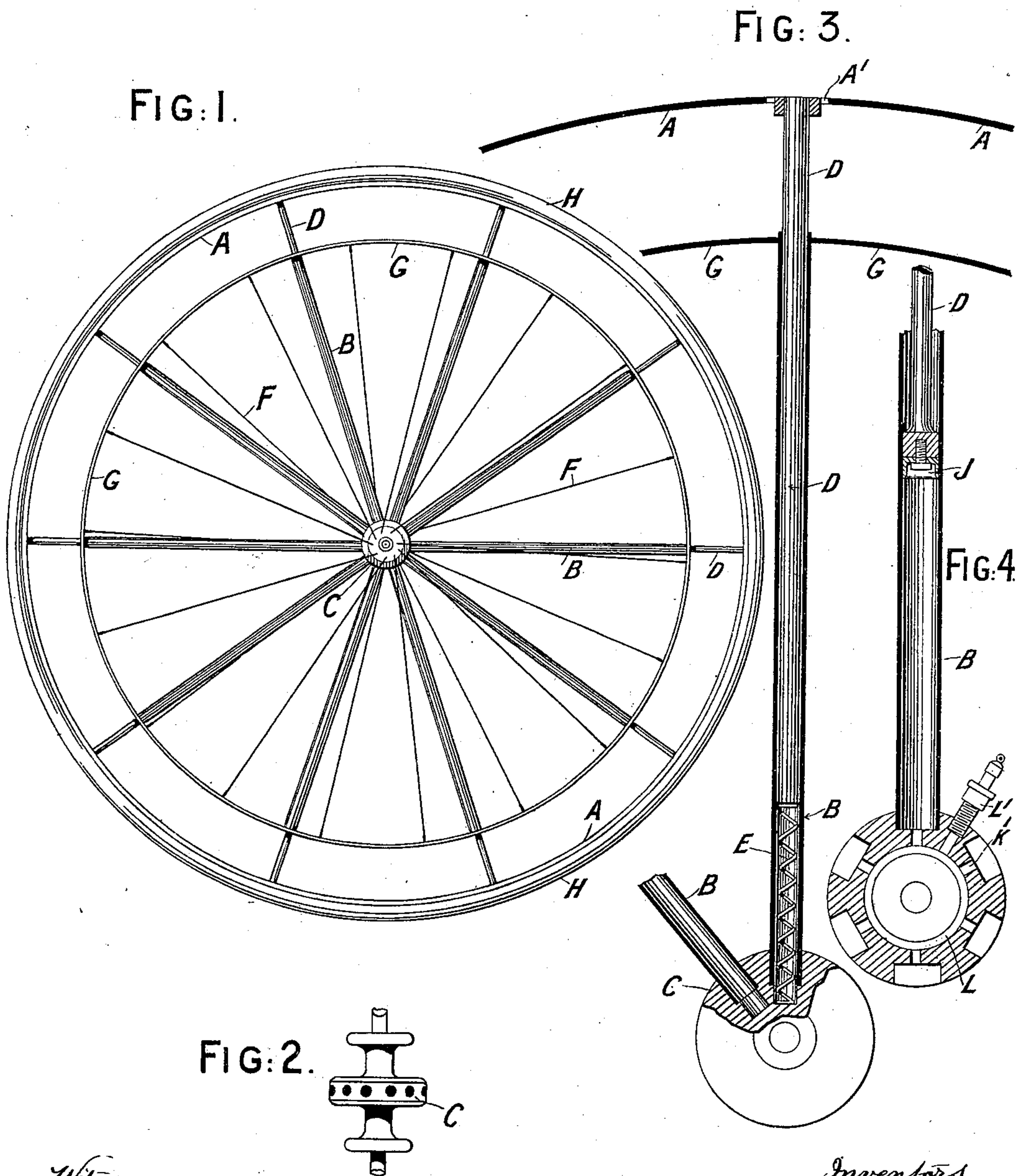
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G. H. NEEDHAM & W. SMITH.

ELASTIC WHEEL.

(Application filed Dec. 29, 1897.)

(No Model.)



Witnesses
Chas. H. Smith
J. Staib

Inventors
George H. Needham
William Smith
Per L. W. Carroll & Son

UNITED STATES PATENT OFFICE.

GEORGE HENRY NEEDHAM AND WILLIAM SMITH, OF LONDON, ENGLAND.

ELASTIC WHEEL.

SPECIFICATION forming part of Letters Patent No. 618,430, dated January 31, 1899.

Application filed December 29, 1897. Serial No. 664,413. (No model.)

To all whom it may concern:

Be it known that we, GEORGE HENRY NEEDHAM and WILLIAM SMITH, subjects of the Queen of Great Britain, residing at London, England, have invented new and useful Elastic or Resilient Wheels for Velocipedes and other Vehicles, (for which we have obtained a patent in Great Britain, No. 13,584, bearing date June 19, 1896,) of which the following is a specification.

The object of our invention is to produce an elastic or resilient wheel and without the employment of inflated tires.

With this object we provide an annular ring, rigidly supported from the hub-flanges by tension-spokes, the ring and the hub forming carrying parts for a series of radial tubes. Exterior to the ring we provide a continuous annular metal felly, which is somewhat elastic and carries inwardly-extending radial plungers connected to shoes located and capable of a sliding motion in circumferential slots in the outer metal felly. The plungers enter telescopically into the radial tubes, and are held out by elastic medium in the tubes; and our invention consists in the specific construction and combination of parts.

We will describe our invention with reference to the accompanying drawings, wherein—

Figure 1 illustrates in side elevation a wheel made in accordance with our said invention. Fig. 2 is a plan view of a wheel-hub detached. Fig. 3 shows in partial sectional side elevation the arrangement of the telescopic spokes, the inner ring, and the outer felly, drawn to a larger scale than the previous figure. Fig. 4 shows in sectional side elevation another arrangement of the said spokes.

According to our invention and with special reference to Figs. 1, 2, and 3 of the drawings we provide an annular ring G, rigidly supported by tension-spokes F from side flanges on the hub C.

B are a series of radial tubes, the inner ends being fixed in a central flange of the hub C, and the outer ends are fixed and pass through the ring G.

The felly A of the wheel is preferably formed of metal and is a continuous annulus of somewhat elastic character having circumferentially-extending slots A', as shown at Fig. 3, in it at regular intervals. In each slot A'

there is a shoe D', capable of sliding therein, and each shoe D' carries one end of a radially-extending plunger D, the plungers entering the open outer ends of the radial tubes, within which they have telescopic action. The inner ends of the plungers D within the tubes B rest and are acted upon by elastic cushions, such as springs E, Figs. 1, 2, and 3. An india-rubber or other flexible tire H may be secured to the felly A.

When the wheel is in use, the upper and lower spokes will have telescopic action, the action of the lower spokes being resilient, while the spokes which are horizontal will not prevent such action by reason of the flexure of the felly and the play allowed by the slots in the said felly.

At Fig. 4 we have illustrated means whereby the plungers D instead of resting upon metal springs E rest upon cushions of air. In this case the ends of the plungers D are fitted with leather cups J, so that when forced into the tubes B the air is compressed, and in this manner an air-cushion is interposed between the plungers D and the hub C of the wheel. Instead of the air being only compressed by the insertion of the plungers D means may be provided, such as are shown at Fig. 4, whereby the air may be compressed within a chamber L in the hub and have passages K' communicating with all the tubes B. An inflation-valve L' is fitted, whereby the compressed air from an ordinary air-pump may be supplied to all the plungers.

We claim as our invention—

1. In elastic or resilient wheels for velocipedes and other road-vehicles, the combination with a wheel-hub having flanges, a rigid ring of less diameter than the wheel-felly, tension-spokes from the hub-flanges to the ring to support the latter, and a series of radial guide-tubes fixed to and extending centrally from the hub to the ring, of an outer continuous elastic felly having a series of circumferential slots, shoes capable of sliding in the slots, inwardly-extending radial plungers carried by the shoes at one end and extending into the radial guide-tubes, and elastic cushions in the tubes between the bases of the plungers and the hub, substantially as set forth.

2. In elastic or resilient wheels for velocipedes and other vehicles, the combination

with a triple-flanged hub, a surrounding ring of less diameter than the wheel-felly, tension-spokes extending from the two outer flanges of the hub to support the ring, and a number
5 of radial tubes, their inner ends fixed in the central parts of the hub and their outer open ends extending through and supported by the aforesaid ring, of an outer elastic felly of larger diameter than the ring and having cir-
10 cumferential slots, inwardly-extending radial plungers entering the radial tubes, shoes located and capable of sliding in the slots of the felly, to which shoes the plungers are connected, to allow the felly circumferential mo-
15 tion relatively to the plungers, and springs in the tubes to act against the inner ends of the plungers, substantially as set forth.

3. In elastic or resilient wheels for veloci-
20 pedes and other vehicles, the combination with a hub, a surrounding ring of less diameter than the felly, spokes extending from each side of the hub to rigidly support the ring, and a number of radial tubes with their inner ends fixed in the hub, and their outer open
25 ends extending through and supported by the aforesaid ring, of an outer felly of larger diameter than the ring and having slots, radial rods extending from the slots and having a

motion at said slots in relation to the felly, the rods extending into the radial tubes, and
30 pistons on the ends of the rods fitting the tubes in an air-tight manner, thereby providing an air-spring to elastically support the outer felly, substantially as set forth.

4. In elastic or resilient wheels for veloci- 35
pedes and other vehicles, the combination with an outer felly having circumferentially-extending slots, sliding shoes in the slots, radial rods carried by the shoes, and pistons on
40 the ends of the rods, of a hollow hub, a surrounding ring of less diameter than the felly, spokes extending from each side of the hub to rigidly support the ring and a number of radial tubes into which the pistons and rods
45 extend, the outer ends of said tubes being supported by the ring, and the inner ends fixed to and opening into the hollow hub, a valve by which air can be forced into the hub to act as a spring-support for the rods extending to the felly, as set forth.

• GEORGE HENRY NEEDHAM.
WILLIAM SMITH.

Witnesses:

T. F. OSMAN,
WALTER J. SKERTEN.