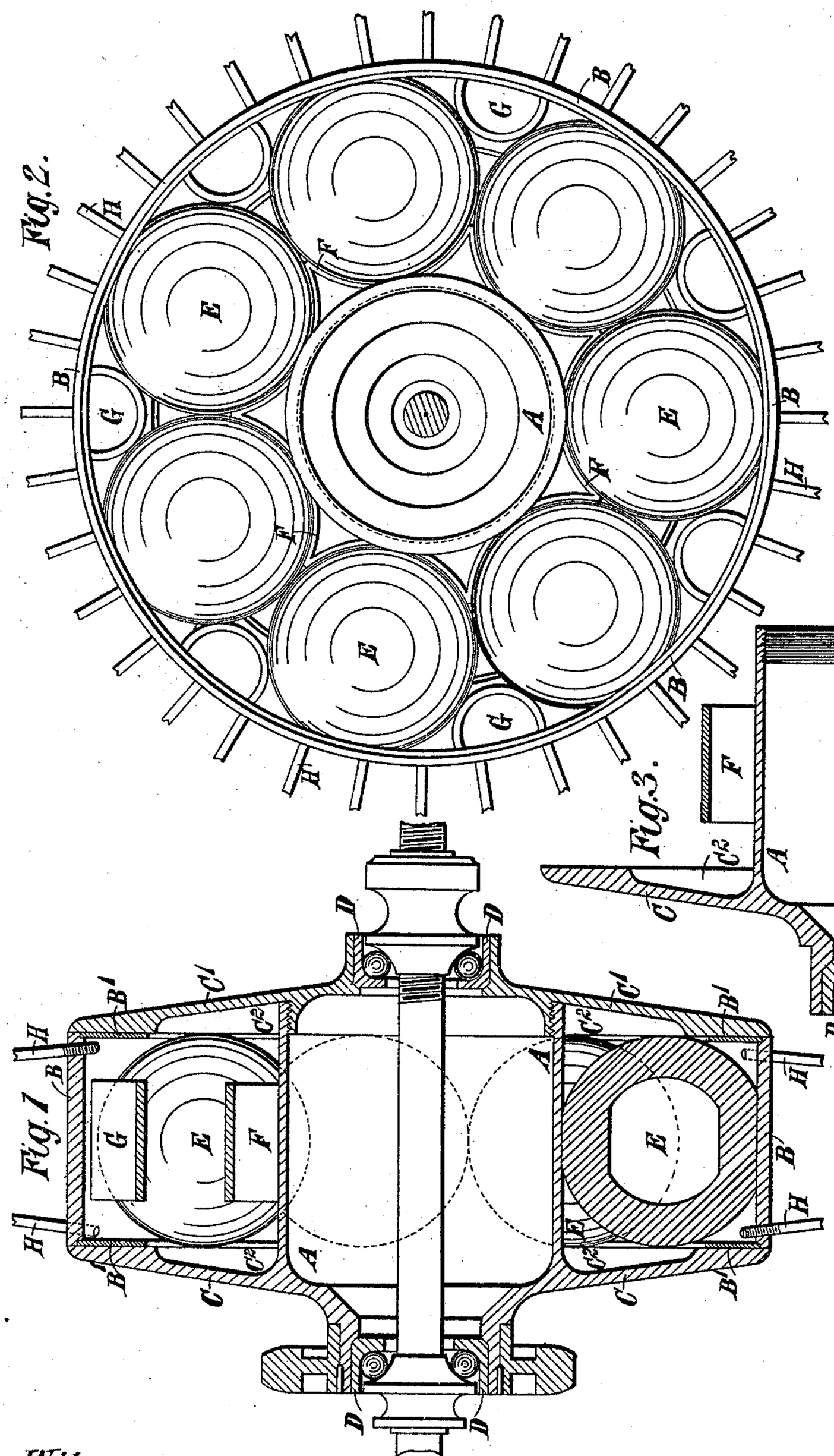
(No Model.)

4 Sheets—Sheet 1.

J. M. McMAHAN.

VELOCIPEDE WHEEL.

No. 509,549. Patented Nov. 28, 1893.



Witnesses:
Ernest Hopkinson
James Catlow

Inventor
John M. Mc. Mahan
by Duncan & Page
Attorneys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

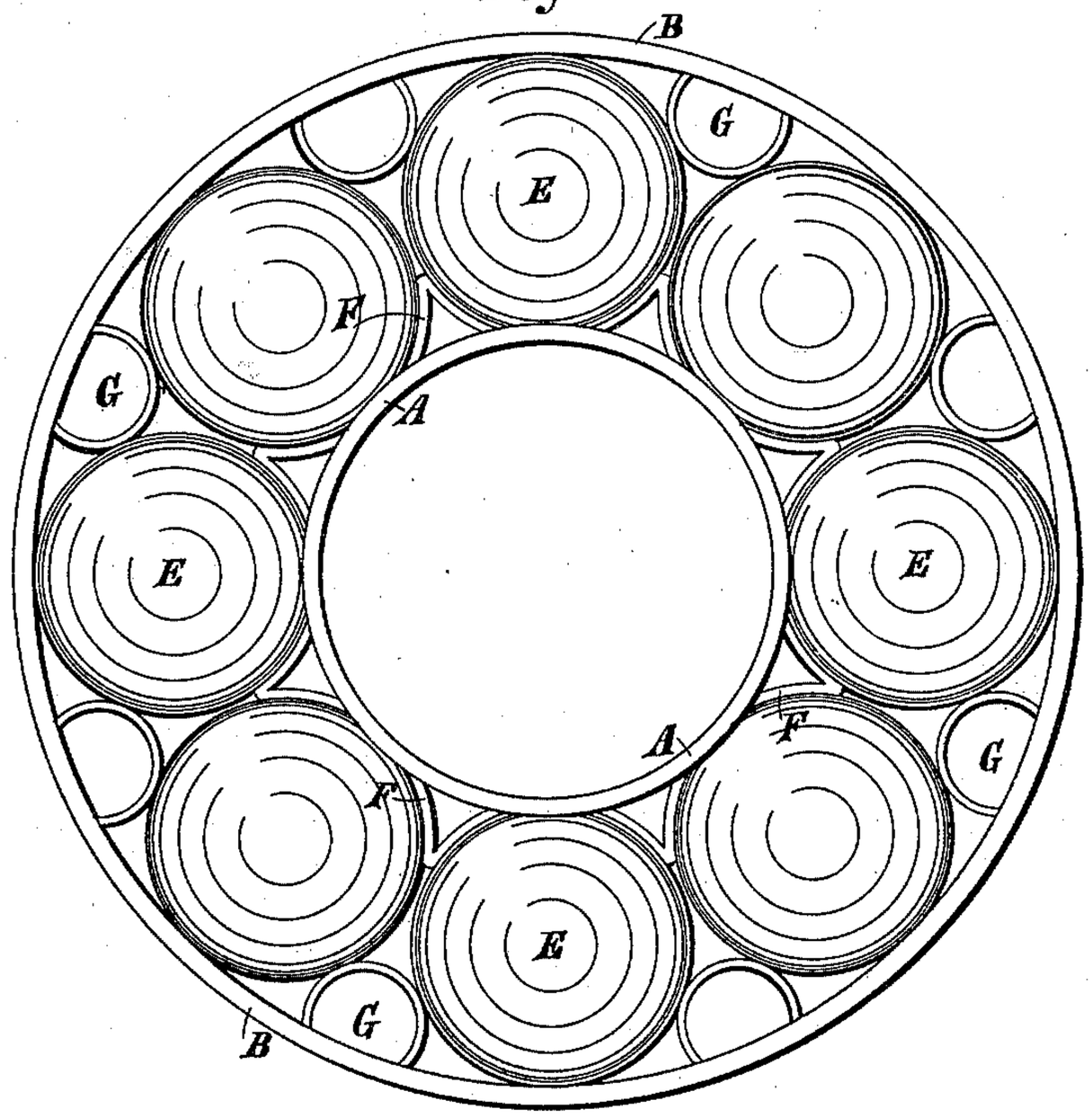
4 Sheets—Sheet 2.

J. M. McMAHAN.

VELOCIPEDE WHEEL.

No. 509,549. Patented Nov. 28, 1893.

Fig. 4.



Witnesses:
Ernest Hopkinson
James Catlow

Inventor
John M. McMahan
by Duncan & Page
Attorneys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

4 Sheets—Sheet 3.

J. M. McMAHAN.

VELOCIPEDE WHEEL.

No. 509,549. Patented Nov. 28, 1893.

Fig. 6.

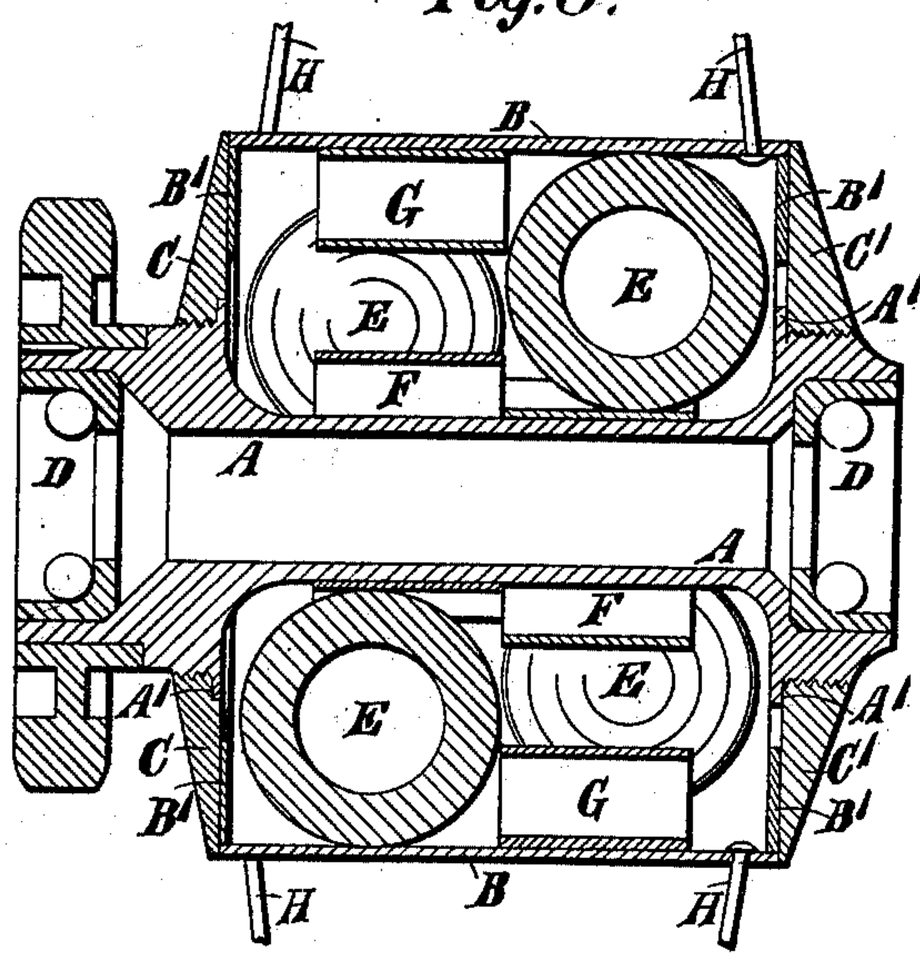


Fig. 7.

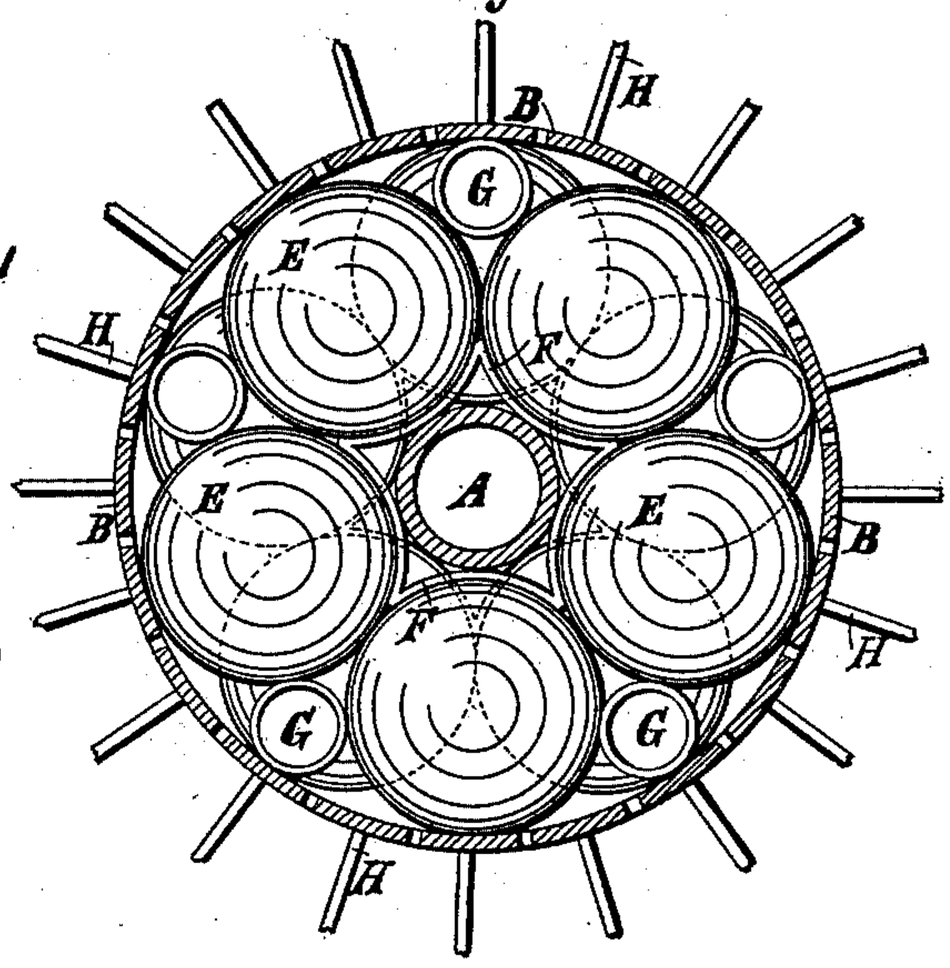


Fig. 8.

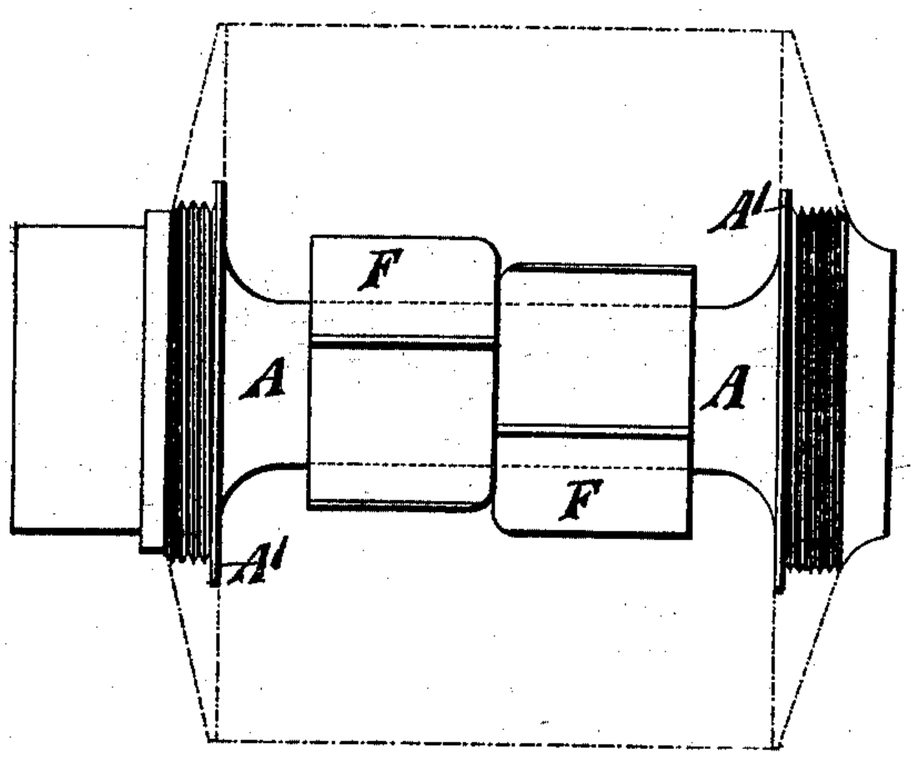
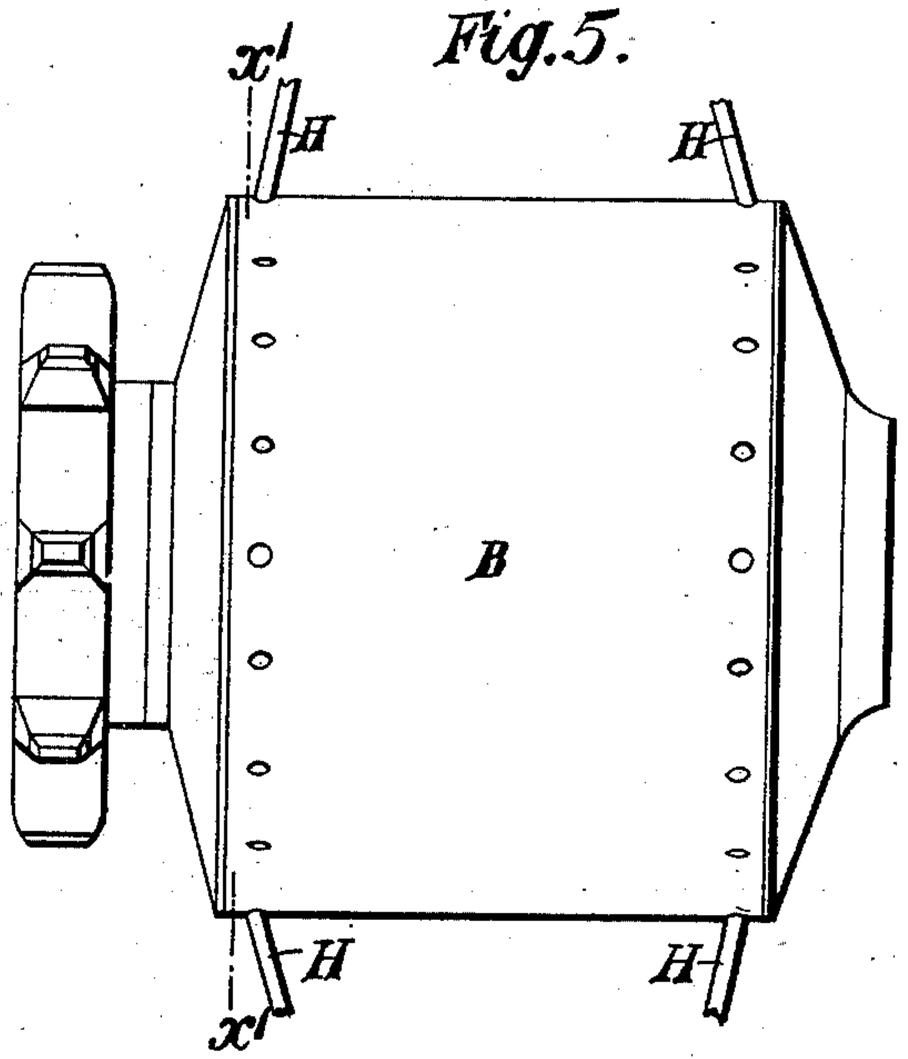


Fig. 5.



Witnesses:
Ernest Hopkinson
James Catlow

Inventor
John M. McMahan
by Duncan & Page
Attorneys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

J. M. McMAHAN.

VELOCIPEDE WHEEL.

No. 509,549. Patented Nov. 28, 1893.

Fig. 9.

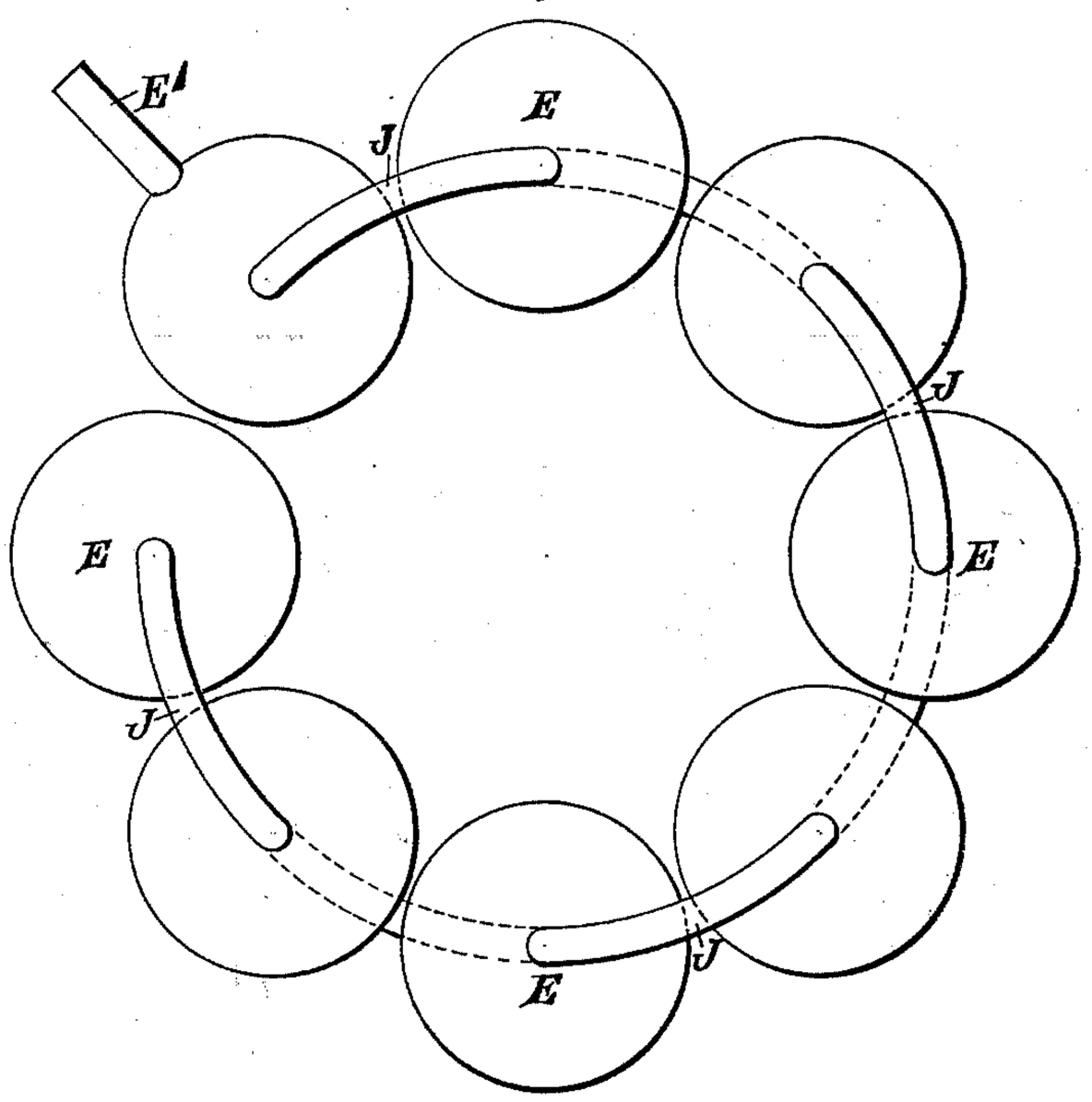


Fig. 10.

Witnesses:
Ernest Hopkinson
James Cattow

Inventor
John M. McMahan
by Duncan & Page
Attorneys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN M. McMAHAN, OF PARIS, FRANCE, ASSIGNOR TO HENRY RAYMOND HAXTON, OF SAME PLACE.

VELOCIPEDE-WHEEL.

SPECIFICATION forming part of Letters Patent No. 509,549, dated November 28, 1893.

Application filed March 16, 1893. Serial No. 466,251. (No model.)

To all whom it may concern:

Be it known that I, JOHN MABRY MCMAHAN, a citizen of the United States, but at present residing at Paris, France, have invented new and useful Improvements in Wheels for Velocipedes and other Vehicles, of which the following is a specification.

Figure 1 is a longitudinal central section and Fig. 2 a side elevation of a wheel constructed in accordance with my invention. Fig. 3 is a front elevation, partly in longitudinal central section, showing details of construction. Fig. 4 is a side elevation, some of the parts being removed, showing another arrangement. Fig. 5 is a front elevation; Fig. 6 a longitudinal central section; Fig. 7 a section on the line x', x', Fig. 11, illustrating a further modification of my said invention. Fig. 8 is a front elevation illustrating details of construction. Figs. 9 and 10 are diagrams showing two forms of cushions in which the balls are connected so that they can be all inflated through a single inlet-tube.

Like letters indicate corresponding parts throughout the drawings.

A is the hub proper, that is to say, the part of the wheel that fits upon the axle.

B is an annular casing or ring which I term the idle or subsidiary hub, and to which the spokes are attached in any convenient manner.

C is a guiding disk formed integrally with the said hub A, and C′ is another guiding disk screwed upon the said hub and bearing against a shoulder A′ thereon.

D, D are bushes forming parts of the ball bearings.

E, E are hollow india-rubber balls or spheres which serve as the air-cushions. The disks or flanges c, c' are so arranged as to permit the requisite lateral expansion of the said balls E when the latter are compressed by the movement of the hub A toward the subsidiary hub B.

The weight of the rider is transmitted from the axle to the hub A and through the balls E to the idle or subsidiary hub B and thence to the tire through the spokes H, the lowermost balls of the series being compressed and the hub A becoming eccentric with the subsidiary hub B. In the rotation of the wheel, the balls E are thus compressed in succession.

To permit the required relative radial movement of the hub A and subsidiary hub B, the said subsidiary hub is accurately fitted between the flanges or disks C, C′ so that it can slide freely, the said subsidiary hub being provided with internal flanges B′ as shown in Fig. 1 or in Fig. 6. When the wheel strikes an obstruction on the road, the lowermost balls of the series will be still further compressed and will subsequently react, so that no heavy shock or jar will be communicated to the rider.

To prevent relative rotation of the hub A and subsidiary hub B, while permitting the required relative radial motion thereof I form or fix on the hub A, driving arms or projections F, the shape of which may be varied according to the size and number of the balls employed, and which may either be made of separate pieces of sheet-metal, brazed or otherwise suitably secured to the outside of the hub A, or may be formed integrally with the said hub; and I provide the subsidiary hub B with similar driving arms or projections G, there being a pair of the said driving arms F, G between every two balls E″. In the arrangements shown in the drawings, the driving arms F form seats for the balls E″.

In some instances, I use a single circular series of my spherical cushions or balls as shown in Figs. 1, 2 and 3, and in Fig. 4. In other instances, I employ more than one series of such balls or spheres as shown in Figs. 6 and 7. I thus obtain the advantage that a smaller subsidiary hub can be used with any given number of balls, and a larger number of the said balls will be in compression when the hub A and subsidiary hub B are moved radially relatively to each other. When I use more than one series of balls or spheres, I prefer to so arrange the same that the centers of the balls of one series are in line with the points of contact of the balls of the other series, or with the spaces between these balls.

By arranging the balls as shown in Fig. 4 I provide for enabling the uppermost ball to turn about its axis in its seat, when the hub A becomes eccentric with the subsidiary hub;

this action takes place with each ball once in each revolution of the wheel, and prevents a permanent set being given to the balls.

I sometimes form grooves or recesses C^2 Figs. 1 and 3 or suitable holes, in the disks or flanges C, C′, so as to afford additional space for the lateral expansion of the balls when compressed by the movement of the hub A relatively to the subsidiary hub B. If compressed air is to be used in the said hollow balls, I sometimes provide each ball with a suitable opening or inlet and valve to permit the introduction of compressed air into the ball and to retain it therein, and I provide suitable apertures through the subsidiary hub to permit such introduction of compressed air into the balls without the necessity for removing them from the wheel. In such case, however, I prefer to connect the balls with each other by tubes J as shown in Fig. 9 or in Fig. 10, so that the air introduced through a single inlet-tube E′ can be forced through one ball into another and so on throughout the entire series.

Instead of using hollow spherical cushions or balls I sometimes employ solid india-rubber balls arranged as hereinbefore described.

If desired, I secure upon the wheel provided with my pneumatic hub, an ordinary solid or other india-rubber tire or a pneumatic tire.

What I claim is—

1. In a vehicle-wheel, the combination, with an axle or hub and a ring or subsidiary hub surrounding the same and guided relatively thereto, of rubber balls or cushions arranged in a circular series between the said axle or hub and the ring and driving-arms on the said axle or subsidiary hub respectively, extending between each ball and the adjacent balls, whereby rotary motion is transmitted from the axle or hub to the ring or subsidiary hub or vice versa, substantially as described.

2. In a vehicle wheel, the combination, with an axle or hub and a ring or subsidiary hub surrounding the same and guided relatively thereto, of rubber balls E arranged in a circular series between the said axle or hub and the ring or subsidiary hub, driving-arms F on the said axle or hub forming seats for the said balls, and driving-arms G on the ring or subsidiary hub extending between each ball and the adjacent balls, substantially as, and for the purposes above specified.

3. The combination, in a vehicle-wheel, of an axle or hub A, guiding plates or disks C secured to the said axle or hub, a ring or subsidiary hub B to which the wheel-spokes are attached and which slides between the said plates or disks, rubber balls or cushions E arranged in a circular series between the axle or hub and the said ring or subsidiary hub, and driving-arms F, G on the said axle or hub and the said ring or subsidiary hub respectively, extending between each ball and the adjacent balls, suitable holes or recesses C^2 being formed in the plates or disks C to permit lateral expansion of the said balls, as set forth.

4. In a vehicle-wheel, the combination, with an axle or hub and a ring or subsidiary hub surrounding the same and guided relatively thereto, of hollow rubber balls E arranged in a circular series between the axle or hub and the ring or subsidiary hub and connected with each other by tubes J, an inlet tube E′ connected with one of the said balls, and driving-arms, F, G, on the said axle or hub and the ring or auxiliary hub respectively and extending between the said balls, substantially as and for the purposes set forth.

Dated the 9th day of February, 1893.

J. M. McMAHAN.

In presence of—
CLYDE SHROPSHIRE,
A. DE. FOIARD.