(No Model.) 3 Sheets—Sheet 1.

F. VAN BENTHUYSEN.

ROLLER BEARING.

No. 509,003. Patented Nov. 21, 1893.

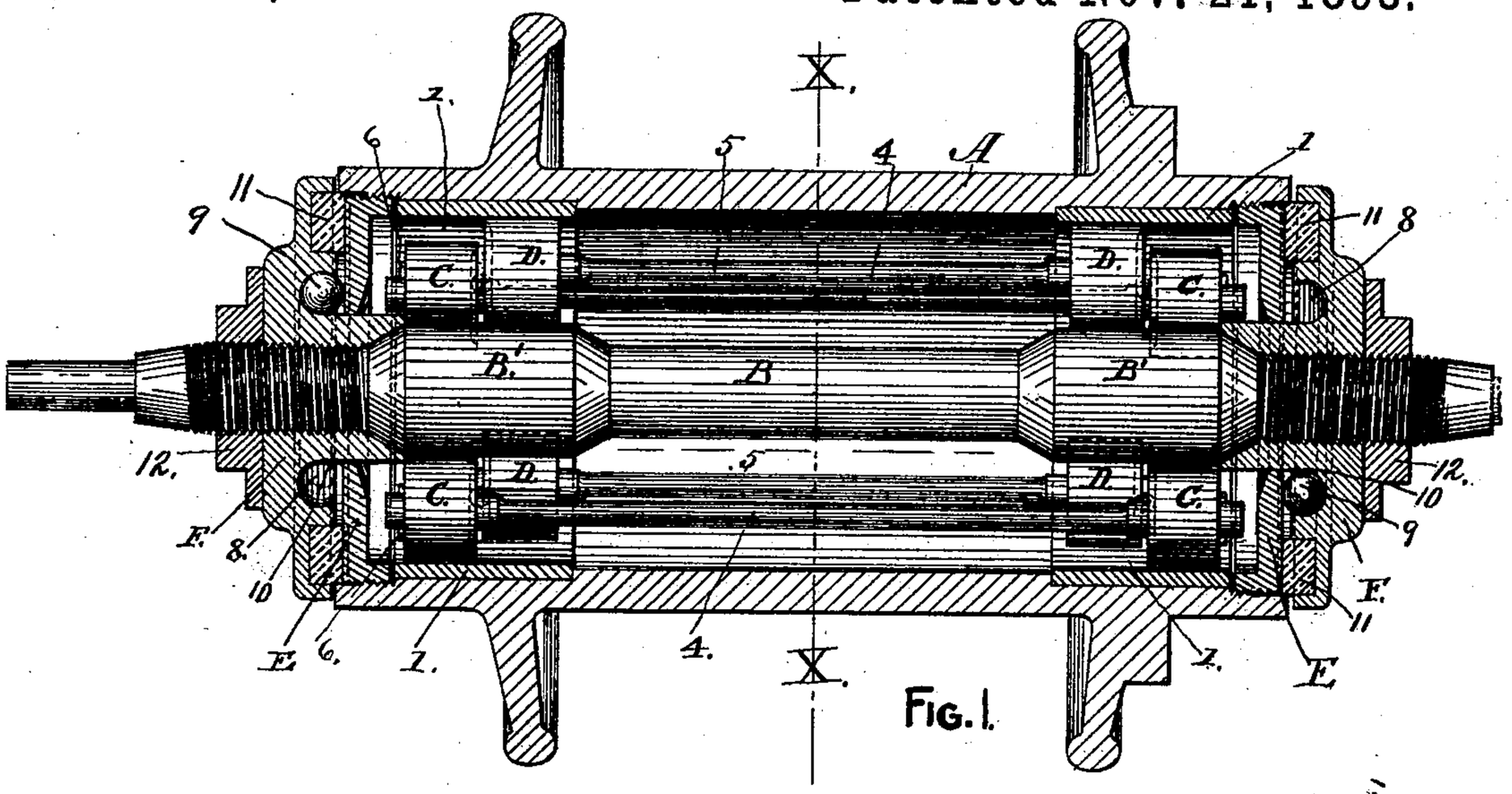

FIG. 1.

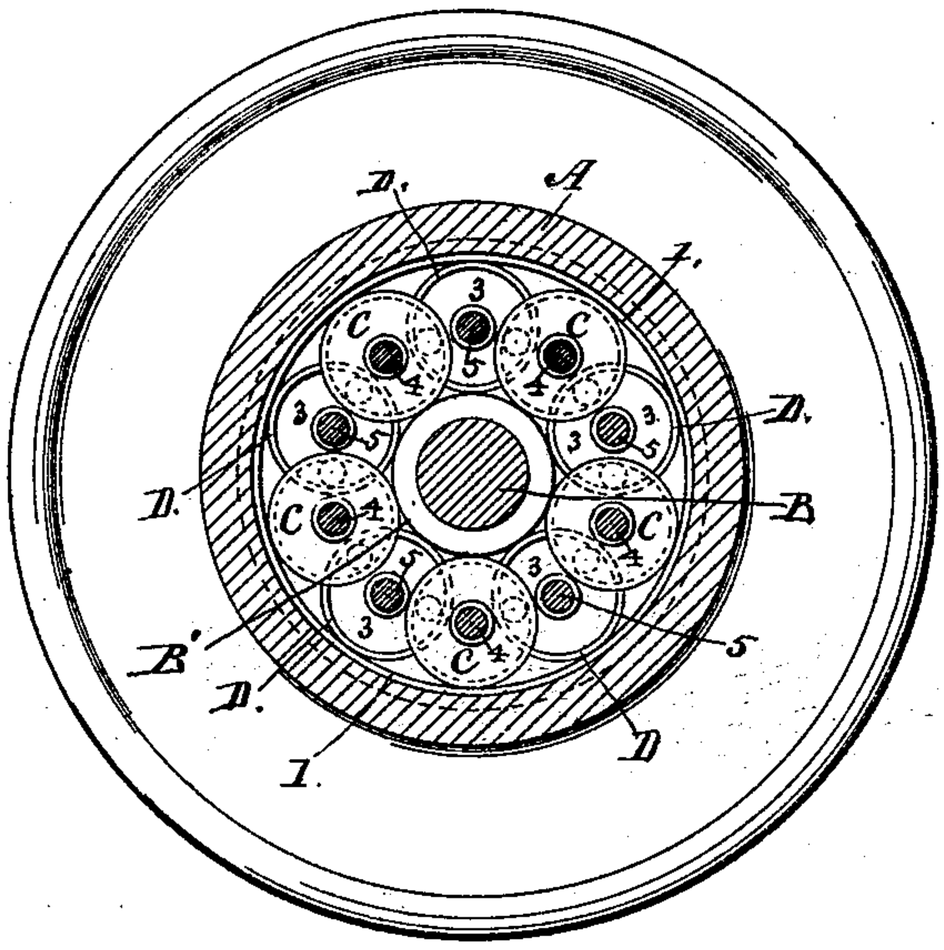

FIG. 2.

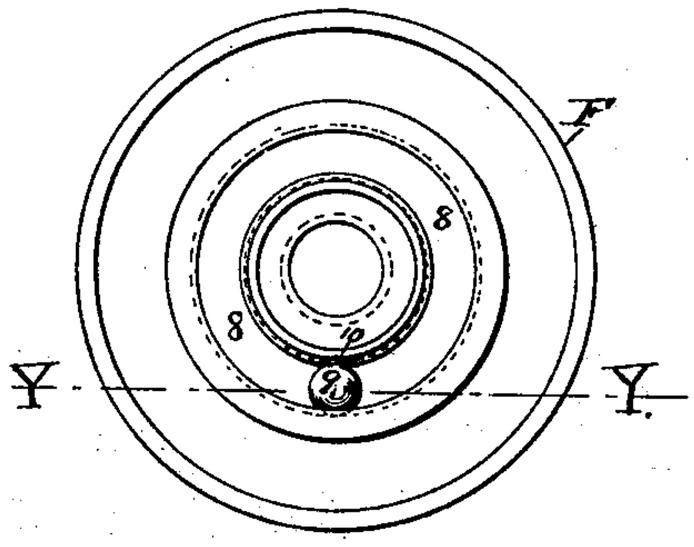

FIG. 4

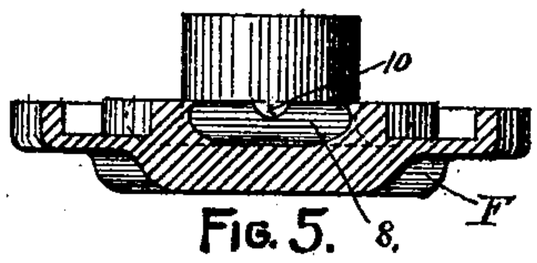

FIG. 5.

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(No Model.) 3 Sheets—Sheet 2.

F. VAN BENTHUYSEN.

ROLLER BEARING.

No. 509,003. Patented Nov. 21, 1893.

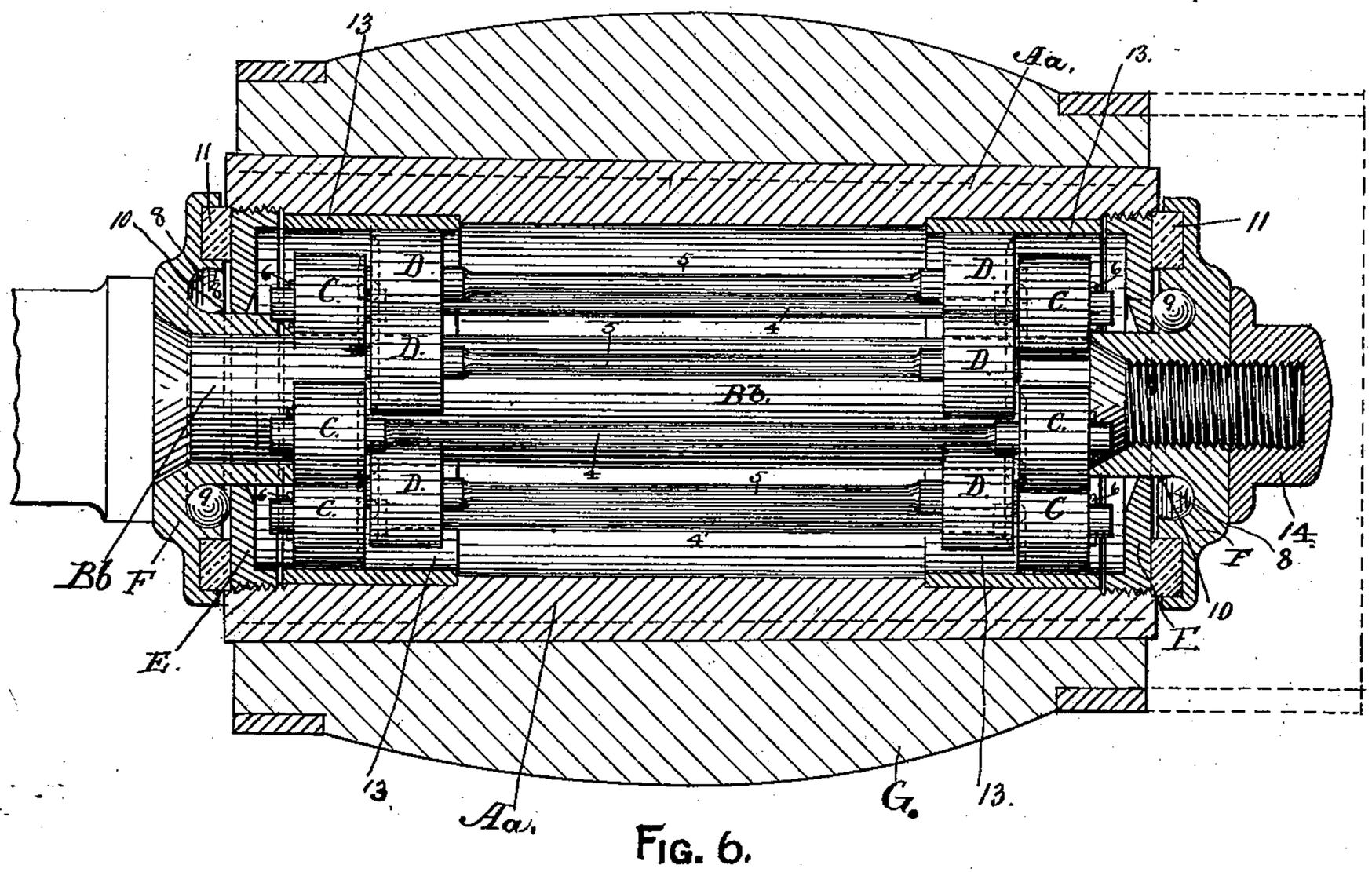

FIG. 6.

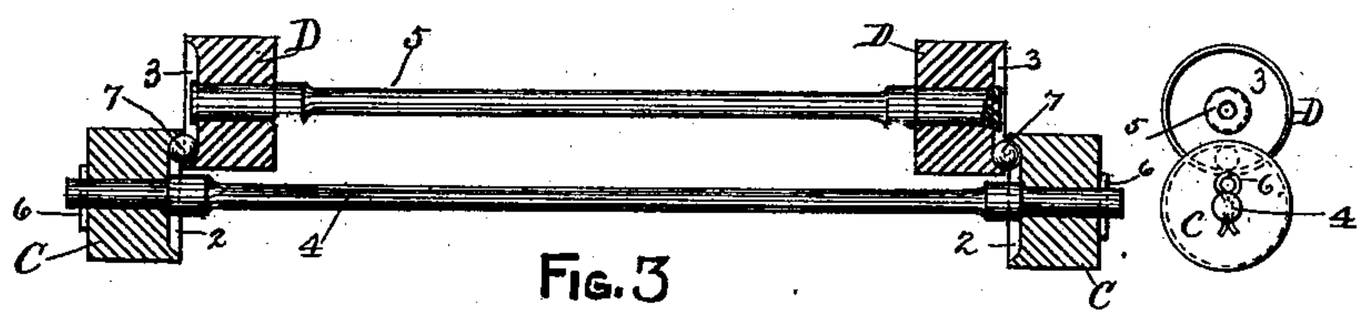

FIG. 3

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(No Model.) 3 Sheets—Sheet 3.

F. VAN BENTHUYSEN.

ROLLER BEARING.

No. 509,003. Patented Nov. 21, 1893.

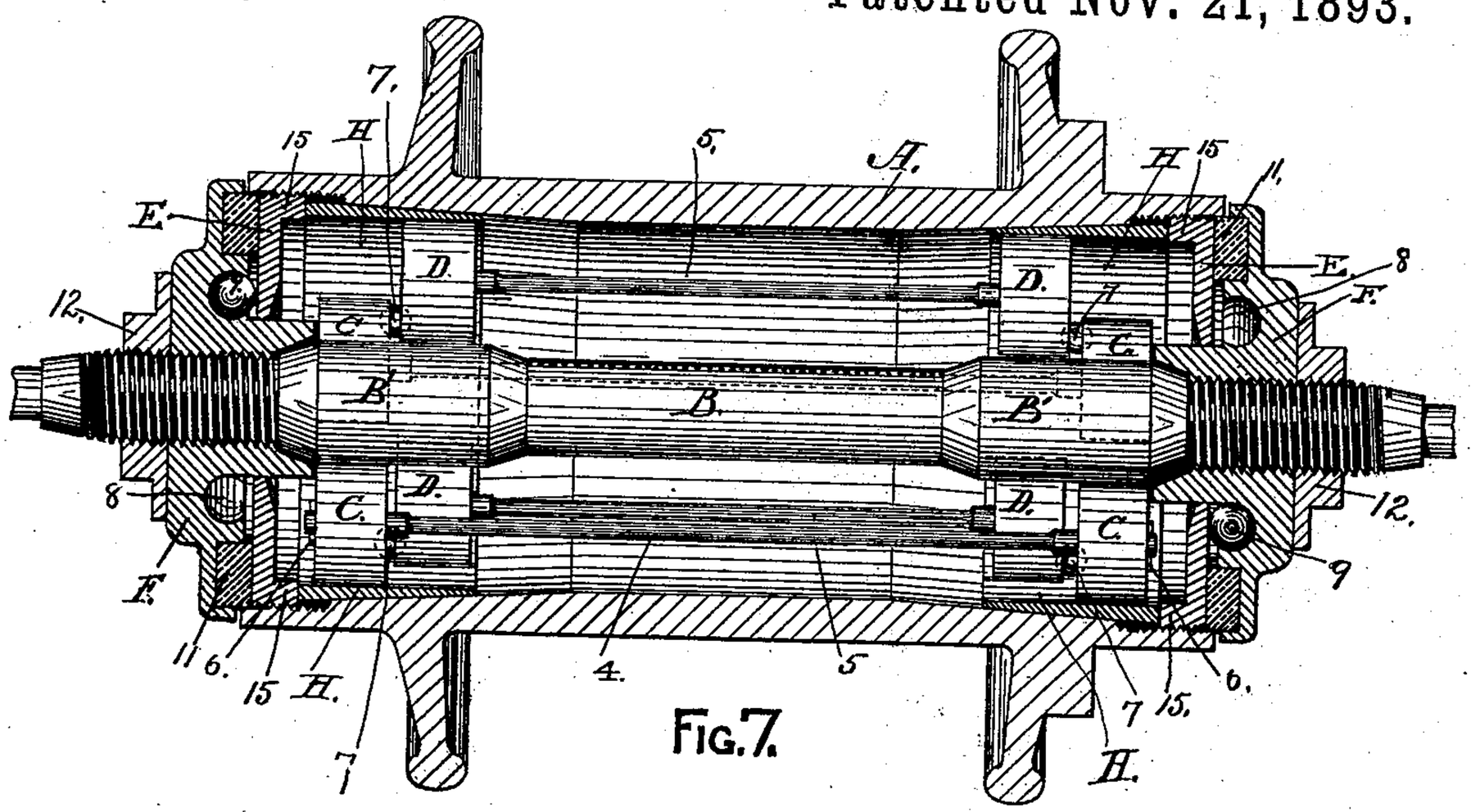

FIG. 7.

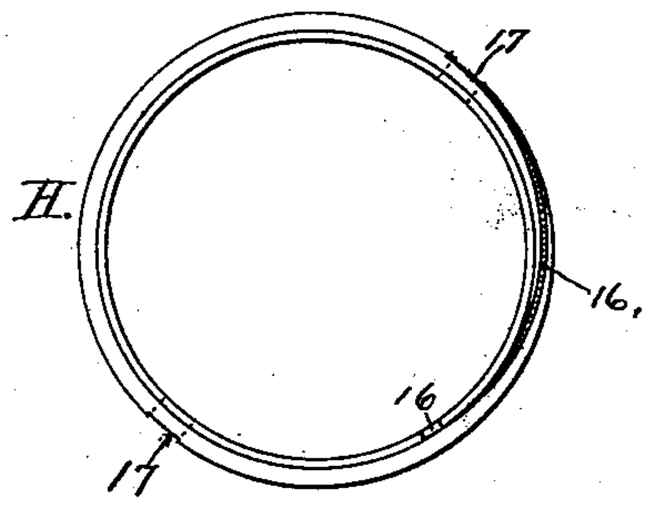

FIG. 9.

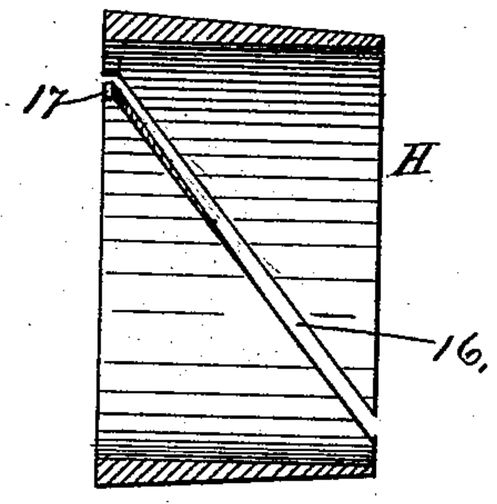

FIG. 8.

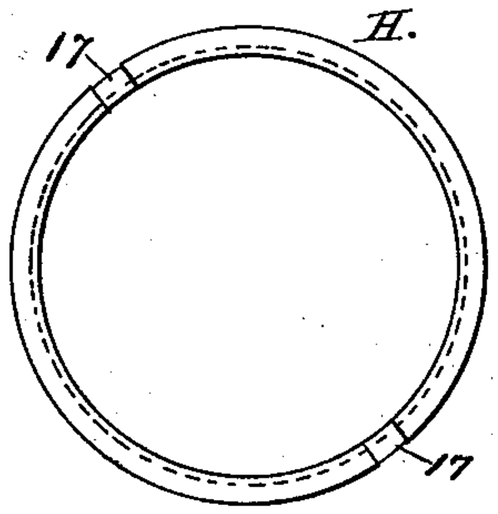

FIG. 10.

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UNITED STATES PATENT OFFICE.

FRANK VAN BENTHUYSEN, OF ALBANY, NEW YORK.

ROLLER-BEARING.

SPECIFICATION forming part of Letters Patent No. 509,003, dated November 21, 1893.

Application filed November 9, 1892. Serial No. 451,442. (No model.)

To all whom it may concern:

Be it known that I, FRANK VAN BENTHUYSEN, of the city and county of Albany, in the State of New York, have invented new and useful Improvements in Roller-Bearings, of which the following is a specification.

This invention relates to improvements on the roller-bearings for which Letters Patent of the United States, Nos. 459,774 and 479,038, were respectively granted to me September 22, 1891, and July 19, 1892; and the object of my present invention is to simplify the construction and render it more effective in its operation. This object I attain by the mechanism illustrated in the accompanying drawings which, being herein referred to, form part of this specification.

In said drawings, Figure 1 is a longitudinal section of the hub of a bicycle wheel provided with one form of my invention, a portion of the rollers being removed therefrom and the remaining rollers and axle of the machine being shown in side elevation. Fig. 2 is a transverse section of said hub and roller-bearing at the line X X on Fig. 1. Fig. 3 is a detached longitudinal section of a pair of my rollers, showing the manner in which said rollers are retained together. Fig. 4 is an elevation of the inner face of a cap-plate which forms part of the thrust-bearing of my device. Fig. 5 is a transverse section of Fig. 4 at the line Y Y. Fig. 6 is a longitudinal section of the hub of a wagon wheel provided with my roller-bearing, the latter and a portion of the axle being shown in elevation. Fig. 7 is a longitudinal section of the hub of a bicycle wheel provided with a modified form of bushing. Fig. 8 is a detached longitudinal section of said bushing, and Figs. 9 and 10 are detached end elevations of opposite extremities of said bushing.

As represented in the drawings, A—in Figs. 1, 2, and 7—is the hub of a bicycle wheel which is made of metal in any preferred form; as shown in Fig. 1, the bore at opposite ends of said hub is enlarged for the purpose of receiving cylindrical bushings, 1, which are inserted in such enlargements in an undivided condition to form seats for the rollers of the bearing; but as shown in Fig. 7, the bore at opposite ends of said hub is made to form conical enlargements to receive bushings, H, which have a cylindrical bore but whose exterior is made coniform to correspond to the form of said enlargements. The construction of said bushings H will be hereinafter more fully described.

B designates a bicycle shaft on which said hubs are designed to revolve, said shaft being retained, in the usual manner, in a non-revoluble position. Said shaft is preferably made with enlargements or seats, B′, which form bearing surfaces for the rollers of my bearing. My roller-bearing consists of a series of outer rollers, C, and a series of inner rollers, D, all of said rollers being made cylindrical and of a uniform diameter; the rollers C are connected together by means of a rod or spindle, 4, and have their inner face provided with a cup-shaped depression, 2, which is concentric to the axis of said rollers. The rollers C are preferably made removable from their spindles 4 and are held in place by split-keys, 6, or other suitable fastenings which are not liable to be accidentally displaced; the rollers D are connected in pairs by means of a spindle or rod, 5, which secures them at such distance apart that a pair of said rollers can be inserted between the inner faces of a pair of the rollers C, and preferably the rollers D are riveted, or otherwise secured, to opposite ends of the spindle 5. The outer face of each roller D is provided with a cup-shaped depression, 3, which is formed concentrically to the axis of said rollers, and the inner face of the rollers C are arranged in respect to the outer face of the ends of the rollers D in such manner that a spherical roller, 7, can be interposed between the adjacent faces of the cup-shaped depressions 2 and 3 and form, in conjunction with the annular rims of said depressions, an interlocking mechanism that will retain the rollers C and D in their proper positions.

E designates an annular head that is fitted to screw into the opposite ends of the hub A; the outer face of said head is preferably made to form a plane surface, but the inner face should be recessed to afford ample clearance for the ends of the spindles 4. As shown in Fig. 7, an annular flange, 15, is formed on the inner face of the head E to bear against the outer end of the bushing H so that, by screwing said head inwardly, said bushing can be pushed farther into the hub A when occasion so requires.

F designates a cap-plate which is fixed on the shaft B at the outer face of each head E for the purpose of forming a ball-bearing at each end of the hub A, to resist an endwise movement of the said shaft. By means of said cap-plate a dust-tight joint can be formed against each of said heads so as to prevent the admission of dust or grit into the interior of the hub A. Said cap-plates are screwed onto the opposite ends of the shaft B, and the inner face of each of said cap-plates is provided with an annulus, 11, of felt, or other suitable material, to form a dust-tight joint as hereinbefore stated. A concave annular groove, 8, is formed in the inner face of the cap-plate F for the purpose of containing a spherical roller, 9, which will bear against the outer face of the head E to form a bearing to resist an endwise thrust of the hub A; the cross-sectional form of said annular groove slightly exceeds a semicircle and thereby inturned-lips will be formed at each of the boundaries of said groove; said lips forming an efficient protection against an accidental discharge of the roller 9 from said groove when the cap-plate F is removed from the shaft B. For the purpose of facilitating the insertion of the roller 9 into the groove 8, a concave indentation, 10, is formed in one of the inturned lips of the groove 8. The depth of said indentation should be just sufficient to allow the roller 9 to be pressed through it into the groove 8. A jam-nut, 12, or other suitable provision should be fitted on the shaft B for the purpose of preventing the cap-plates F from being accidentally screwed off from said shaft.

The conical bushings H, hereinbefore referred to, are split diagonally through one side, as at 16, so that the opening so formed will not affect the operation of the rollers C and D as they pass over the joint. Said bushings are designed to enter the conical enlargements of the hub A′, as shown in Fig. 7, and by pushing said bushing inwardly, by means of the flange 15, the cylindrical bore of said bushing will be correspondingly reduced in diameter. By means of this split conical bushing an adjustment is obtained to produce a perfect fit for the rollers to the hub at the time of first assembling the parts in position, or when, from protracted use, the bore of the bushing becomes sufficiently enlarged to allow of a slight wabbling motion of the roller-bearing in said bushing.

In the modified form of my invention shown in Fig. 6, G designates a wheel-hub, for a wagon or other wheeled-vehicle, which is commonly made of wood; said hub is provided with a metallic sleeve, A^a, having a bushing 13, near each end of its bore; said sleeve contains rollers C and D arranged—as hereinbefore described—to form a roller-bearing. The sleeve A^a is also provided with heads E and cap-plates F as described in respect to Figs. 1, 2, and 7; but in said modification the nut 12—shown in Figs. 1 and 7, as bearing against the inner cap-plate—may be omitted for the reason that the nut 14—shown in Fig. 6 as bearing against the outer cap-plate—will press the hub inwardly with sufficient force to hold the inner cap-plate snugly against the inner conical seat of the axle B^b, and thereby the several parts of the hub and roller-bearing will be retained in their proper positions.

B^b designates the axle on which the wheel hub G is fitted to revolve, and upon which it is retained by means of a check-nut, 14, in conjunction with the outer cap-plate F, so as to hold the spherical rollers 9 in contact with the heads E.

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

1. A roller-bearing consisting of two series of cylindrical rollers formed of short rollers of uniform diameter connected together by means of rods or spindles; the two series being of different lengths so that the short rollers of the longer series will overlap the ends of the shorter series—one of said series having the inner face of each of its short rollers provided with a cup-shaped depression that is concentric to the axis of the roller and the outer end of each of the shorter series being provided with a cup-shaped depression that is concentric to the axis of the roller, and a series of spherical-rollers arranged in the adjacent cup-shaped depressions of said cylindrical rollers to form interlocking devices for retaining said cylindrical rollers in their required relative positions in relation to each other, as and for the purpose herein specified.

2. In a roller-bearing, the combination of a hub or casing fitted to contain said roller-bearing, removable heads which form a tight closure at each end of said hub, a shaft of uniform diameter at the portion whereon said roller-bearing is fitted to revolve, removable cap-plates secured to said shaft; each of said cap-plates having an annular groove which contains a spherical roller which bears against said head to form a thrust-bearing, and each of said cap-plates being provided with an annulus of felt—or other suitable material—which bears against the adjacent head to form a dust-excluding device, as herein specified.

3. The combination in a roller-bearing, of a hub or casing fitted to contain said roller-bearing and having—in the extremities of its bore—conical enlargements whose larger ends are turned outwardly, a bushing whose periphery conforms to each of said conical enlargements and whose bore is cylindrical to form a box for said roller-bearing; said bushing being split diagonally so as to create no break in the path of the roller-bearing; said bushing forming a reducible lining for the ends of said hub or casing, and a removable head which forms a closure for the hub or casing and is provided with an inturned annular flange which takes against the outer end of said bushing; said head being fitted

to screw into place so as to force said bushing inwardly for the purpose of reducing the bore of the latter, substantially as herein specified.

4. The combination of a shaft or axle, a hub or casing fitted to revolve on said shaft, removable heads which form a closure for the opposite ends of said hub; the outer face of each head forming a plane surface between the bore of the hub and the outer diameter of said shaft, removable cap-plates—each made of a single piece and fitted to cover the outer face of the corresponding head—adjustably secured to said shaft and provided with an annular groove whose cross section exceeds a half circle to form inturned lips that will retain a spherical roller in said groove; one of said lips being provided with a concave indentation that will allow said roller to be forcibly inserted into said groove, and a spherical-roller arranged in said groove so that a small portion will protrude beyond the inner face of the cap-plate and bear against the outer face of said head, as and for the purpose herein specified.

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