

No. 749,652.

PATENTED JAN. 12, 1904.

B. P. YOUMANS & H. W. RAND.
BALL BEARING WHEEL HUB.

APPLICATION FILED JUNE 3, 1903.

NO MODEL.

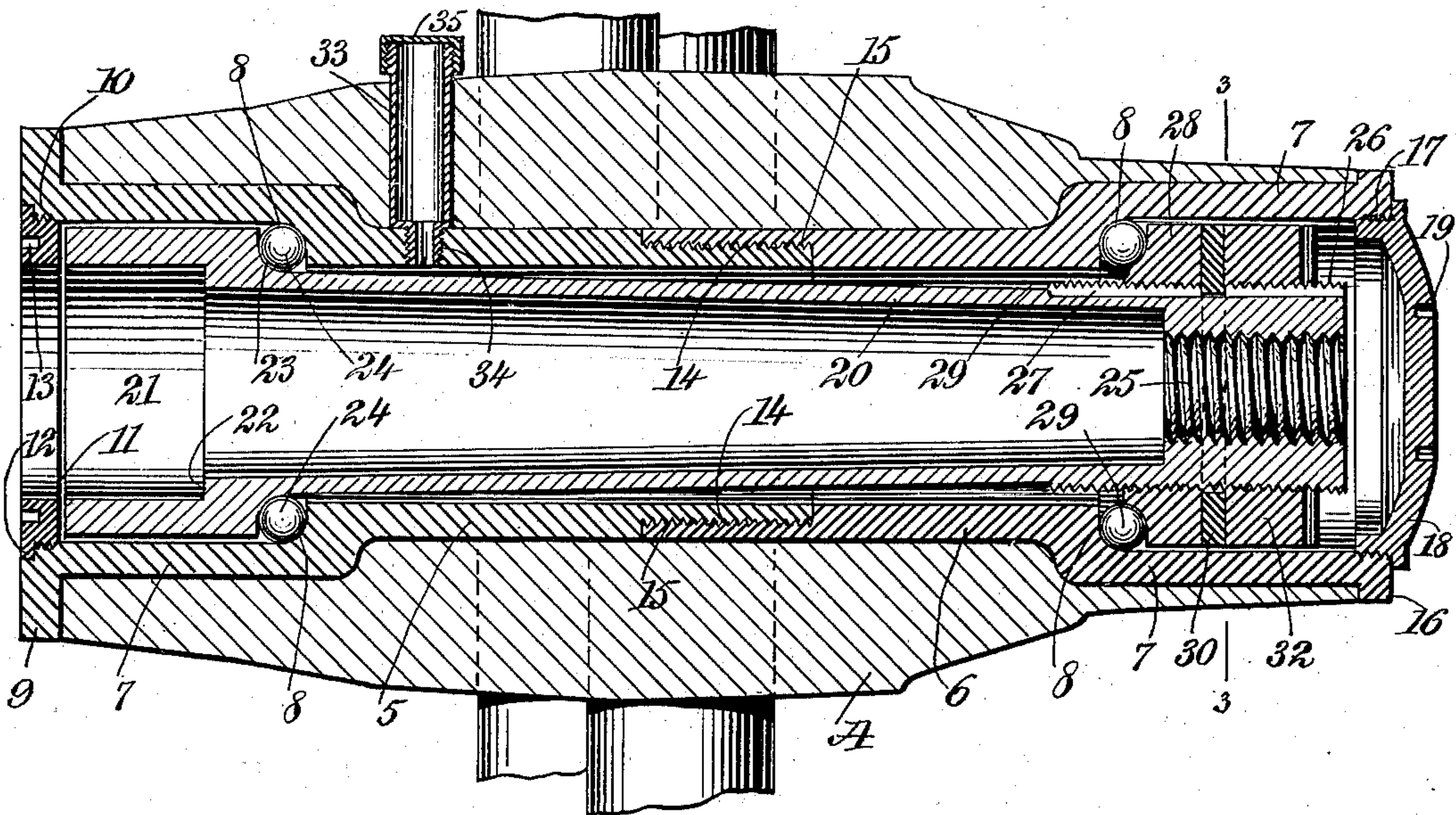


Fig. 1

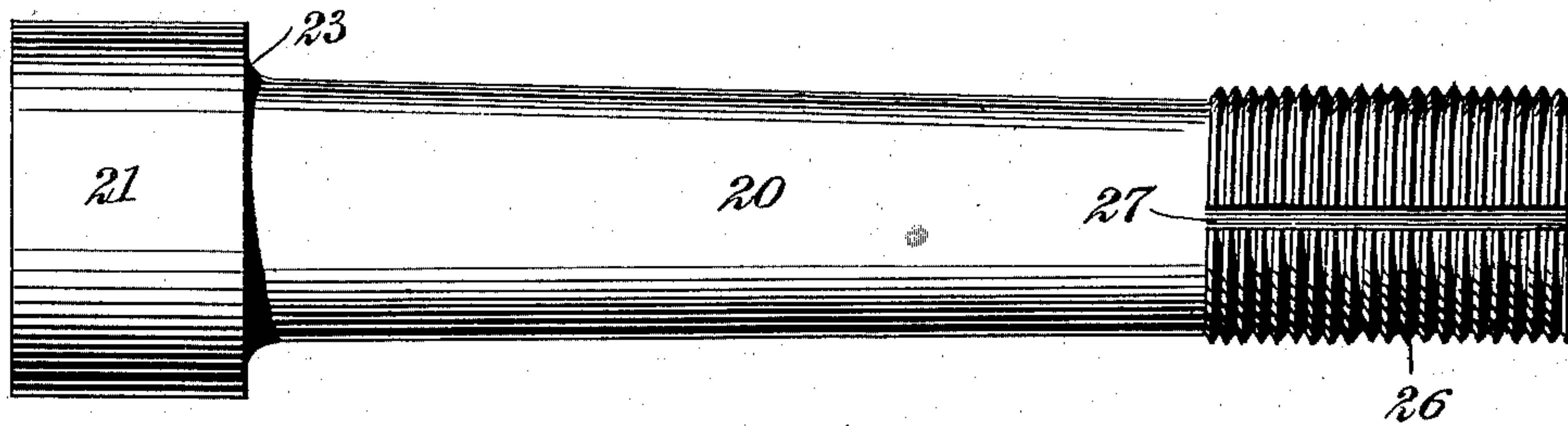


Fig. 2

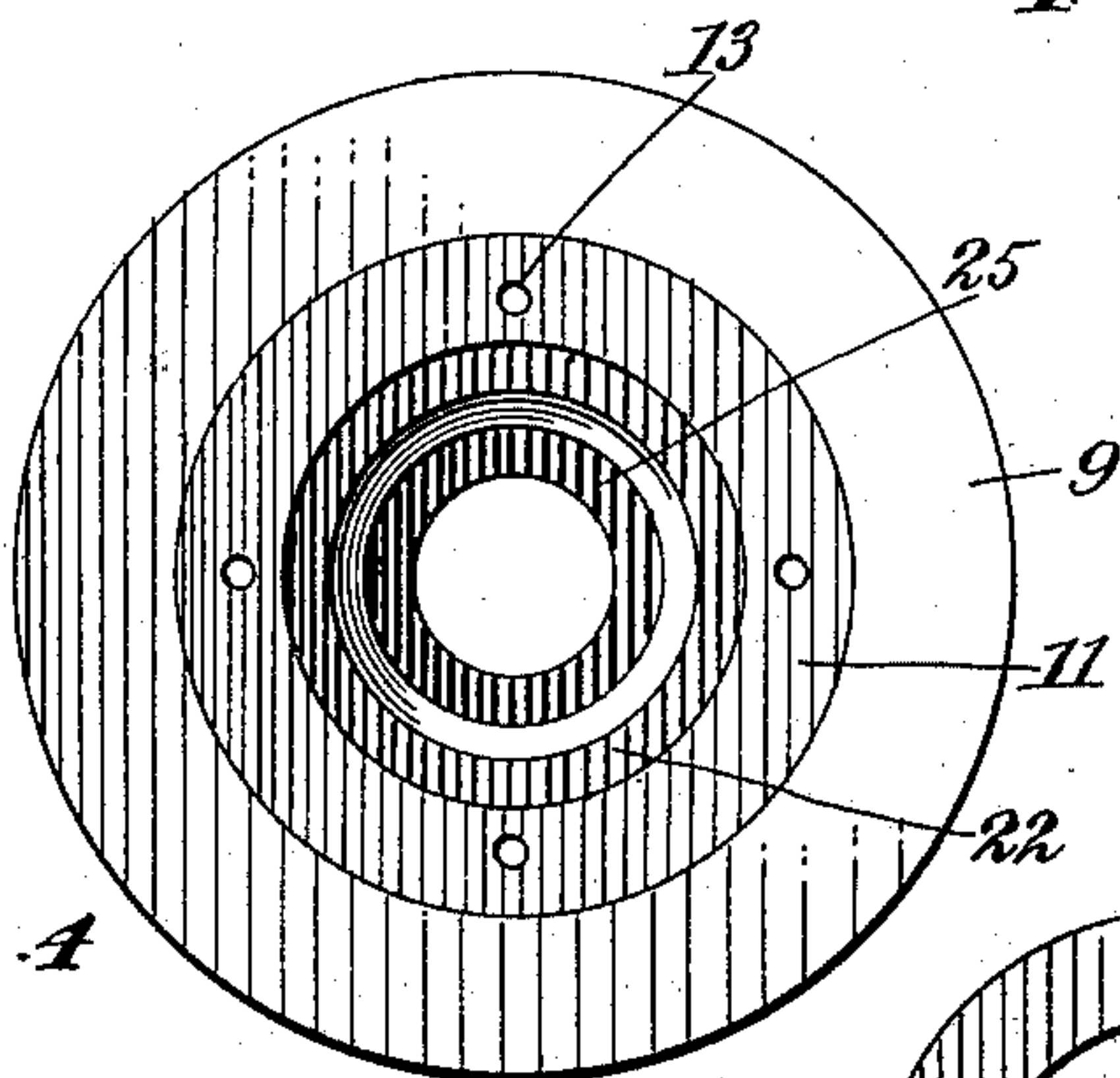


Fig. 4

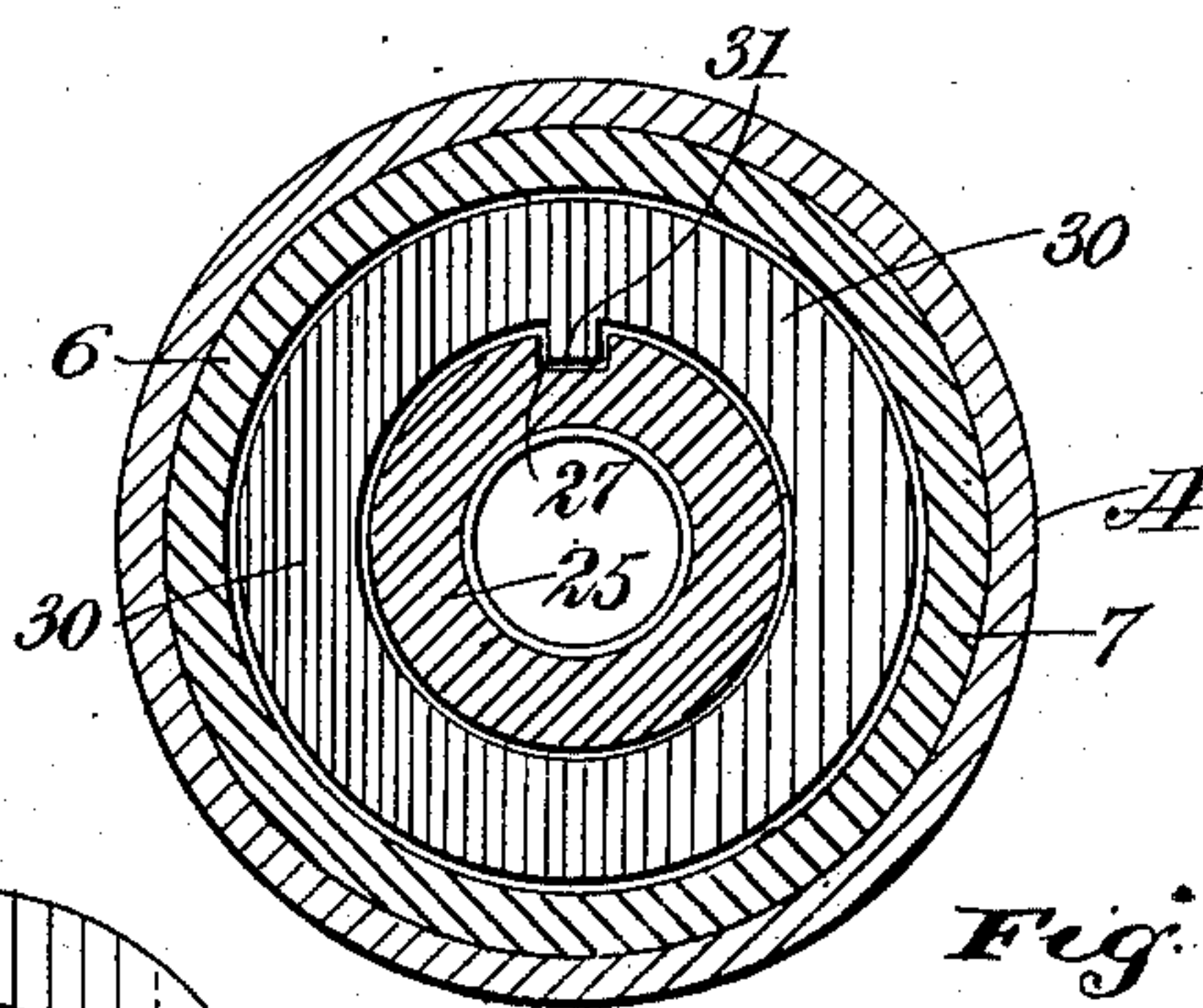


Fig. 3

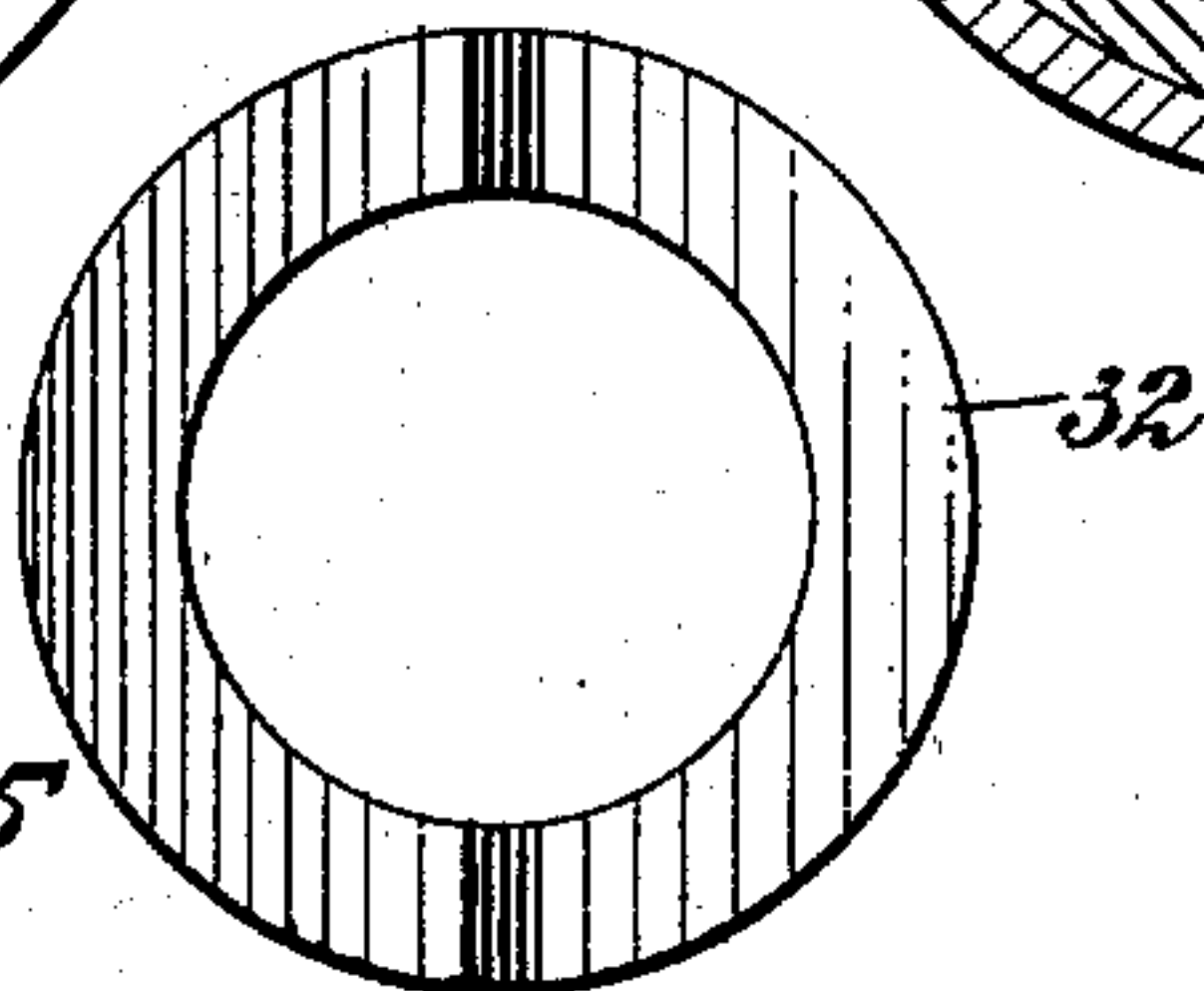


Fig. 5

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UNITED STATES PATENT OFFICE.

BENJAMAN PERRY YOUNG AND HARRY WHITCOMB RAND, OF
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BALL-BEARING WHEEL-HUB.

SPECIFICATION forming part of Letters Patent No. 749,652, dated January 12, 1904.

Application filed June 3, 1903. Serial No. 159,886. (No model.)

To all whom it may concern:

Be it known that we, BENJAMAN PERRY YOUNG and HARRY WHITCOMB RAND, citizens of the United States, and residents of Vancouver, in the county of Clarke and State of Washington, have invented a new and Improved Ball-Bearing Wheel-Hub, of which the following is a full, clear, and exact description.

Our invention relates to improvements in ball-bearing wheel-hubs for vehicles; and the object that we have in view is the provision of a simple and durable construction adapted to be readily applied to ordinary wooden hubs of any size and style which insures easy running of the hub on the axle-spindle and is thoroughly dust-proof.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the novelty will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional elevation of an ordinary wheel-hub with our improvements applied thereto. Fig. 2 is a detail plan view of a removable axle-sleeve detached from the wheel-hub. Fig. 3 is a vertical transverse section in the plane of the dotted line 3 3 of Fig. 1. Fig. 4 is an elevation looking at the inner end of the wheel-hub with our improvements applied thereto, and Fig. 5 is a detail view of a removable lock-nut employed.

In carrying our invention into practice we provide a sectional boxing adapted to be secured in the opening of an ordinary wheel-hub, the members of said boxing forming the cups of roller-bearings, as will presently appear. The members of this boxing are indicated at 5 6 in the drawings, and for the purpose of distinguishing these members one from the other we will hereinafter refer to the member 5 as the "inner" member, while the member 6 will be designated as the "outer" member.

The members of the boxing are circular in cross-section, and each member has an ex-

panded or widened portion 7, forming an annular shoulder 8. The inner member 5 is furthermore provided with a radial annular flange 9, adapted to bear against the inner end of an ordinary wheel-hub A, and the bore of the enlarged part 7 of said inner member 5 is provided with a female screw-thread 10, the latter being adapted to receive a dust-ring 11. This dust-ring is flanged at 12 to fit snugly to the inner end of the boxing member 5, and the dust-ring is furthermore provided with a male screw-thread and with a series of sockets or apertures 13, whereby a wrench or other implement may be fitted to the dust-ring for the purpose of screwing it into the threaded part 10 of said boxing member 5. The other end of the boxing member 5 is reduced in diameter and provided with a male screw-thread, thereby forming a threaded portion 14, which is adapted to be screwed into a widened or enlarged female-threaded end portion 15 of the boxing member 6. (See Fig. 1.) The threaded portions 14 15 at the overlapping ends of the boxing members 5 6 provide a threaded separable coupling between the two members, which enables them to be readily assembled and separated.

The boxing member 6 is provided at its outer end with a radial flange 16, adapted to have abutting engagement with the opposite end of the wheel-hub A, and the expanded part 5 of said boxing member 6 is provided with a short female thread 17, into which may be screwed the threaded dust-cap 18. This dust-cap may be of any suitable construction—as, for example, it may have a dished head provided with sockets 19 to receive a suitable spanner or wrench. Said dust-cap is screwed to the member 6 of the boxing in a way to effectually prevent the admission of dust and dirt into the outer end of the wheel-hub.

One of the important features of our invention consists of a sleeve 20, which embraces an axle-spindle (not shown) and is adapted to fit within the boxing formed by the members 5 6. This sleeve is expanded or enlarged at one end, as indicated at 21, in order to provide an internal shoulder 22 and an external

curved shoulder 23, the latter being presented in opposing relation to the shoulder 8 of the boxing member 5, whereby a ball-race is formed between the opposing shoulders 23 8, adapted to accommodate one series of bearing-balls 24. The outer end portion of the sleeve 20 is thickened or enlarged internally and provided with a female-threaded passage, the whole forming a nut 25, which is made in one piece with said outer end of the sleeve. This construction enables the sleeve to be screwed or coupled to the threaded extremity of an axle-spindle in a way to firmly attach the sleeve to said spindle, thus dispensing with the ordinary axle-nut. The female-threaded nut at the outer end of said axle-sleeve is provided with an exterior or male screw-thread 26 and with a longitudinal groove or channel 27. On this externally-threaded end of the sleeve 20 is adapted to be screwed a bearing-cone 28, having a grooved face presented in opposing relation to the shoulder 8 of the boxing member 6, thereby forming another ball-race adapted to receive the other series of bearing-balls 29.

After the cone 28 shall have been screwed on the male-threaded extremity of the axle-sleeve a washer 30, of any suitable material, is slipped upon the sleeve in a position to bear against the cone 28; but this washer has an opening of a diameter which exceeds the threaded portion of the axle-sleeve. To hold the washer against rotation, we provide it with an inwardly-extending tongue 31, adapted to be fitted into the groove or channel 27 of said sleeve. This tongue is adapted to slide in the groove of the sleeve when the washer is placed in position during the operation of assembling the parts, and said tongue abuts against the walls of the groove in a way to hold the washer from turning when the jam-nut 32 is screwed on the threaded end of the sleeve 20 in a position to bind against the interposed washer 30.

By reference to Fig. 1 it will be seen that the nut at the outer end of the axle-sleeve, the cone 28, the washer 30, and the jam-nut 32 are all housed or contained in the chamber formed by the enlarged portion 7 of the boxing member 6, and this chamber is securely closed against the admission of dirt by the application of the dust-cap 18 to said boxing member 6, whereby the outer ball-bearing is effectually protected from the entrance of dust into the wheel-hub.

The internal shoulder 22 at the inner end of the axle-sleeve 20 is adapted to engage with a collar on the axle-spindle in a way to limit the inward movement of the hub in the ordinary way. During the operation of assembling the parts lubricant of any suitable solid nature may be applied to the shoulders 8 23 and the cone 28, as also to the two series of bearing-balls 24 29, thus providing for the initial lubrication of the ball-bearings. Lubricant

of a liquid nature may be supplied constantly or at intervals to the boxing, the sleeve, and the ball-bearings by means of a reservoir, which consists of a suitable receptacle or container 33, which is inserted in the wheel-hub A and is provided with a threaded nipple 34, the latter being screwed into a suitable threaded opening provided in the member 5 of the boxing. This container 32 may be charged with a suitable liquid lubricant, and said container is closed by a removable cap or cover 35.

Our improvements may be applied to the hubs of new wheels in the process of manufacturing the same, or said improvements may be readily fitted to existing wheel-hubs. In the application of the invention to a hub in use the bore of the hub should be enlarged by reaming it in any suitable way after the old boxing shall have been displaced. The member 5 of the new two-part boxing is inserted into the inner end of the wheel-hub A in any suitable way—as, for example, by driving it into place—and the member 6 should then be inserted into the outer end of the wheel-hub and rotated therein in order to couple the members 5 6 of the boxing. The lubricant-container 33 may now be inserted into the hub and screwed into the boxing member 5. A solid lubricant should be applied to the proper parts before the series of bearing-balls 24 29 are placed in position, after which the sleeve 20 should be thrust through the left-hand or inner end of the hub, the bearing-balls 24 having been first previously placed in the enlarged portion 7 of the boxing member 5. The cone 28 and the series of bearing-balls 29 are now placed in the chamber of the boxing member 6, and said cone is screwed into place by the provision of left-hand threads on the sleeve 20 and in the cone 28. The washer 30 is slipped into place, and the jam-nut 32 is screwed by a left-hand thread onto the threaded end of the sleeve and against the washer. The sleeve 20, attached to the hub, may now be fitted to the axle-spindle, the inside dust-ring 11 having been first screwed into the wheel, and by turning the entire structure the nut 25 of the sleeve is screwed onto the threaded end of the axle-spindle. It is only necessary now to screw on the outside dust-cap 18, thus completing the wheel-hub. By using a right-hand thread on the left wheel and a left-hand thread on the right wheel and by employing washers 30 and lock-nuts 32 in each wheel we find that the parts can be assembled on the axle in a way which makes it impossible for the bearings to become loose or tight in the practical service of the wheels.

Our improved construction can be readily adapted to any vehicle without the assistance of a blacksmith or a skilled mechanic, and vehicles so equipped will run with great ease and lightness. The size of the axle-sleeve 20 can be modified or changed to enable the improved hub and ball-bearings to be used in

connection with any axle-spindle and with any size of bearing-balls on vehicles which may vary in weight. The sleeve entirely dispenses with the use of the old axle-nut, and all the parts of the ball-bearing are effectually prevented from deterioration by the grinding action of dust and dirt. The separable boxing clamps the end portions of the hub A when the members of the boxing are screwed tightly together, thereby materially strengthening and reinforcing the hub.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The combination of a boxing having enlargements at its end portions forming internal shoulders, an axle-journal, a sleeve enveloping said journal and having its inner end portion enlarged internally and externally and producing internal and external shoulders, the external shoulder of said sleeve cooperating with one internal shoulder of the boxing, bearing-balls between said cooperating shoulders, and an antifriction-bearing at the other end of the boxing.

2. The combination of an internally-shouldered boxing, a sleeve provided with a nut which is threaded internally and externally, a cone screwed on the externally-threaded part of the nut and into cooperative relation to a shoulder of the boxing, bearing-balls between said shoulder and cone, and means for locking the cone.

3. The combination with an internally-shouldered boxing, a sleeve having an enlarged shouldered inner end and provided at its outer end with a nut which is threaded internally and externally, a cone screwed on the exter-

nally-threaded nut and cooperating with one internal shoulder of the boxing, and bearing-balls between the boxing-shoulders, the sleeve-shoulder, and the cone.

4. The combination with a boxing, and an axle-journal, of a non-revoluble sleeve provided with a nut which has a female thread, and a male thread, said nut being screwed on the journal and holding the sleeve fixed thereon, a cone screwed on said nut of the sleeve, and bearing-balls between the boxing and the cone.

5. The combination with a boxing having an internal shoulder, and an axle-journal, of a non-revoluble sleeve enveloping the journal and provided with an externally and internally threaded nut which is screwed on the journal, a cone screwed on the nut and cooperating with the shoulder of the boxing, and bearing-balls between the cone and the shoulder.

6. The combination with a boxing having a shoulder, and an axle-journal, of a non-revoluble sleeve enveloping and fixed to said journal and provided with a male thread and with a groove intersecting said thread, a cone screwed on the sleeve, interposed bearing-balls, a washer having a projection fitting in said groove, and a lock-nut.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

BENJAMAN PERRY YOUMANS.
HARRY WHITCOMB RAND.

Witnesses:

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CHARLES W. CAPLES.