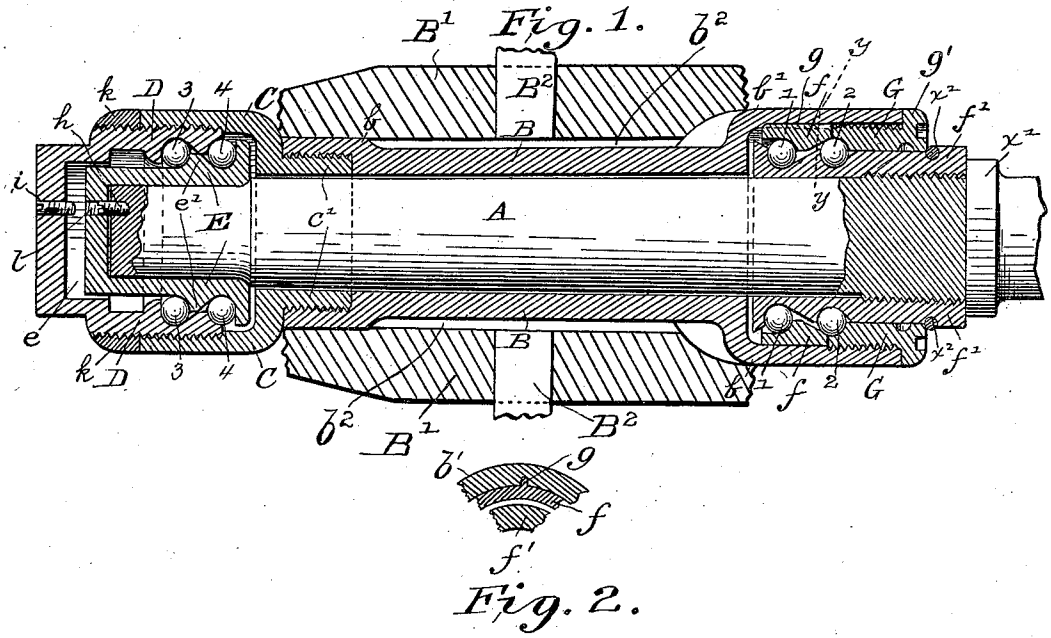
(No Model.)

T. J. REID.

BALL BEARING.

No. 546,557. Patented Sept. 17, 1895.



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BALL-BEARING.

SPECIFICATION forming part of Letters Patent No. 546,557, dated September 17, 1895.

Application filed December 18, 1894. Serial No. 532,224. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. REID, a citizen of the United States, residing at Washington Court-House, in the county of Fayette and State of Ohio, have invented certain new and useful Improvements in Ball-Bearings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to ball-bearings for vehicle and other journals, and my principal objects are to improve the construction of the ball-incasements and to make the same independent of both the box and journal and to render more simple and efficient the adjustment of the parts, to lessen the number of parts, to exclude dust and dirt from the bearings, while holding effectually the lubricating material in place, to give length and strength to the ball-races by giving them long surface-bearings in the box and on the journal, doing away with the usual light short cones, thus avoiding the rocking and shattering motion between the balls and their bearings by which the contacting parts are worn away and broken and the cone-seats in box and axle rendered unfit for new cones. By my construction long and uniform wear of the ball-races is insured, and a bearing that is softer than another cannot wear any faster.

To these ends my invention consists of the parts and combinations of parts and their equivalents, as illustrated in the accompanying drawings and as described and particularly claimed in the following specification.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of a journal-box, journal, and ball-bearings and hub, partly broken away; and Fig. 2 a transverse sectional view on line *y y* of Fig. 1.

Referring to the drawings, A is the journal part of an axle. In the drawings the journal is shown tapering, but my invention is adapted to be used with straight journals also.

B is the axle-box, secured within the bore of the hub and enlarged at the point or outer end *b*, forming a raised flange, threaded inside, so as to receive an exteriorly-threaded case C instead of having, as in some instances, such cap screwed to the outside of the box. By having the point end of the box enlarged and by having the case screwed under this enlarged end two abutting shoulders are formed for the case C to bear against, one at the inner end of the threaded flange of the box, where the case-flange *c'* abuts the box, and, the other at the exterior end of the box, where the portion of the case bears against the box. Thus a more solid support is obtained for the case and the balls than if the case were screwed on the outside of the box. Again, by this construction of the point of the box counterboring the hub between the ends of the spoke-tenons and the box for clearance space is dispensed with, thus saving one operation in boring the hub for the box. This clearance space is necessary, owing to the fact that if the spokes were in direct contact with the box the elasticity of the hub would be destroyed, the box would be liable to be broken, and the life of the wheel would be greatly shortened. Heretofore it has been the custom to bore out the hub under and adjacent to the spoke-tenons in order that the latter may be free to yield somewhat to the strain upon them without danger of destroying the box. This additional boring is rendered unnecessary by my construction. When the box B is driven into the hub B', the enlarged or raised part of the outer end *b* will fit tightly in the hub, and at the other end the box will fit tightly in the hub at the base of the enlarged part *b'*, thus leaving a space b^2 between the hub and the box throughout the greater length of the latter. The spokes B^2 are thus prevented from bearing against the box and the necessary freedom and elasticity secured.

The case C is threaded on the inside near its outer end to receive an axle-cap D, threaded on its outer surface. The journal at its outer end receives a shell E, which is provided with a locking-screw *h*, having its inner end fitting into a hole in the axle to keep the shell from turning. A locking-ring *k* screws on the cap D for the purpose of locking the cap after the balls have been adjusted by screwing the ring tightly against case C. The cap D partially incloses the journal-shell E, leaving a

space between them, which constitutes an oil-channel *e*, to which oil is conducted through a hole *i* in the cap D. This oil-hole is threaded and provided with a screw-plug, which registers with the screw *h* in the shell E.

On the interior surface of the cap D are recesses to form raceways for two sets of balls 3 and 4. The balls also have bearings or raceways in the journal-shell E. The raceways in cap D face inwardly, so as to bear on the balls in front, and the raceways in the journal-shell E face outwardly, so as to engage the balls on the inside, thus forming diagonally-opposite supporting-bearings for the balls.

The incasement for the balls and ball-races at the point is thus composed of the case C, the ball-adjusting cap D, and the journal-shell E.

The inner or butt end *b'* of the box is threaded near its end to receive a retaining-cone G. Inside of this retaining-cone is a ring *f*, which is provided with a rib or lug *g*, adapted to slide with the ring in a groove in the box to prevent the ring from turning. The groove in the box for the rib *g* extends the length of the enlarged part of the box, and is cut through the threads in the box to the end of the same to permit of the insertion of the rib in the groove. A sleeve or nut *f'*, threaded part of its length, screws on the journal and bears against the axle-collar *x'*. The cone G has an outwardly-extending flange *g'*, which overlaps and abuts against the end of the box and locks the cone in place. Raceways for the two rows of balls 1 and 2 are formed in and by the cone G and ring *f* and the threaded sleeve *f'*. The incasement composed of these parts is in turn incased by the enlarged end of the box *b'*.

The inner end of retaining-cone G bears against end of ring *f*, and both bear on their respective sets of balls, and all four sets or rows of balls are simultaneously adjusted by the cap D being screwed into the case C. By screwing the cap D against the balls 3 and 4 the wheel will be drawn outward on the axle; but since the sleeve *f'* is screwed on the axle and the balls have their bearings therein the wheel, together with the ring *f* and cone G, is limited in its movement toward the outer end by the balls 1 and 2. Hence when the wheel is drawn outward by screwing in the cap D the ring and cone will bear directly on the balls 1 and 2 and adjust them in their raceways.

To place the wheel on the axle, the ball-incasements being in the box, the wheel is moved back on the journal until the threads in the sleeve *f'* engage with the threads on the journal. Then the sleeve is screwed up against the axle-collar and thus locked. The outer end of the sleeve may be octagonal, or may be provided with other means for the application of a wrench. If the balls have been adjusted previously in their incasements no adjustment is required; but if they have not been it is merely necessary to loosen the screw-ring *k*, adjust the balls with cap D, and screw the ring *k* against case C, by which the adjusting-cap is locked in place. To remove the wheel from the axle it is only necessary to unscrew the sleeve *f'* from the axle, when the wheel can be at once taken off.

To put the balls in place in their incasements when the latter are disengaged from both the wheel and axle the cap D is set on its outer closed end and the first row of balls 3 placed in their raceway, which is undercut, so as to keep the balls in place. The shell E is then placed within the cap D, nearly down on the balls 3, but leaving enough space between the cap and shell for the insertion of balls 4. The balls 4 are then placed and the shell E dropped down in the cap. The case C is then screwed on cap D and the balls adjusted and locked. The manner of placing the balls at the other end of the journal is practically the same as that just described.

A band or ring of rubber or other elastic material is sprung into the recess x^2 on the sleeve *f'* and overlaps the edge of the cone G. This band serves to keep the dirt and water from entering the bearings and to keep the lubricant within the box. A more important object accomplished by this band, however, is that of holding the cone G in place on the sleeve *f'* when the incasement is removed from the box.

The case C and cone G may be provided with suitable holes or notches for the application of a spanner-wrench, by which the incasements may be removed entire from the box. The incasements may be shipped separately from the wheel and axle, and they can be fitted up for use on shafting, counter-shafts, loose pulleys, and rotary journals generally without departing from the principle of my invention.

While in the drawings four rows of balls are shown, yet it may be seen that two or three rows of balls can be employed without changing the principle of my construction.

Having thus described my invention, what I claim is—

1. The combination with the journal, of an axle box, enlarged at its outer end and interiorly screw threaded, a case having a threaded flange extending under and engaging the said outer end of the box, the outer end of said case also interiorly screw threaded, a cap having exterior screw threads engaging with said case, a shell placed on the end of the journal and partially inclosed by said cap, said cap and shell each provided with raceways, and balls in said raceways, and an internally screw threaded locking ring on said cap, substantially as described.

2. The combination with the journal of an axle box enlarged at its inner end and interiorly screw threaded, a cone externally threaded extending under and engaging with said box, an unthreaded ring within said box abutting said cone, a partly threaded sleeve

screwed onto the inner end of said journal, the threaded end of said sleeve adapted to bear against the journal collar, said ring and cone placed between the journal box and said sleeve, and the said ring, cone and sleeve provided with raceways for balls, and said balls, substantially as described.

3. The independent, removable and adjustable incasement for the outer end of the journal, said incasement comprising a case interiorly screw threaded, a cap externally threaded to engage with said case, a shell inclosed by said cap and adapted to be placed on the end of the journal, said cap and shell each provided with raceways for balls, and said balls, and a locking ring for locking the said cap and case, substantially as described.

4. The independent, removable and adjustable incasement for the inner end of the journal, said incasement comprising a cone, an unthreaded ring next to the inner end of said cone, a partly threaded sleeve adapted to be screwed on the end of said journal, said ring, cone and sleeve provided with raceways for balls, and said balls, and an elastic band sprung into a recess on said sleeve to hold said cone in place, substantially as described.

5. The combination with an axle box, of a hub having a bore of a plain continuous surface at its central portion, said box provided at its outer end with a peripheral enlargement fixed by a driven fit into the outer end of said bore, whereby when the axle box is inserted in place in the hub a clearance space for the spoke tenons is left between the middle portion of the axle box and the hub, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS J. REID.

Witnesses:
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