(No Model.) 2 Sheets—Sheet 1.

R. F. HALL.

BALL BEARING.

No. 544,406. Patented Aug. 13, 1895.

Fig. 1.

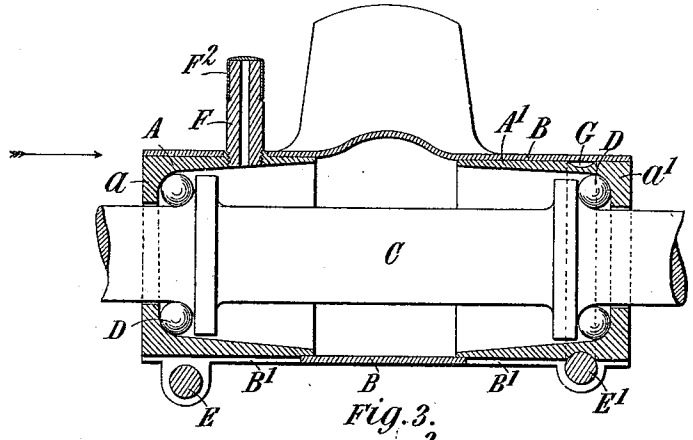


Fig. 3.

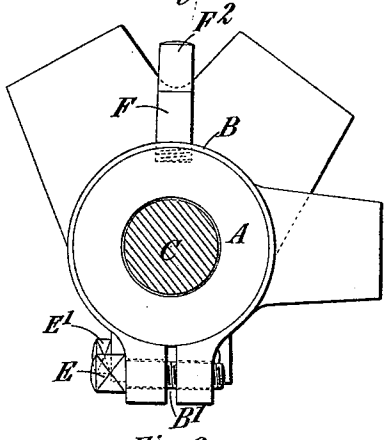
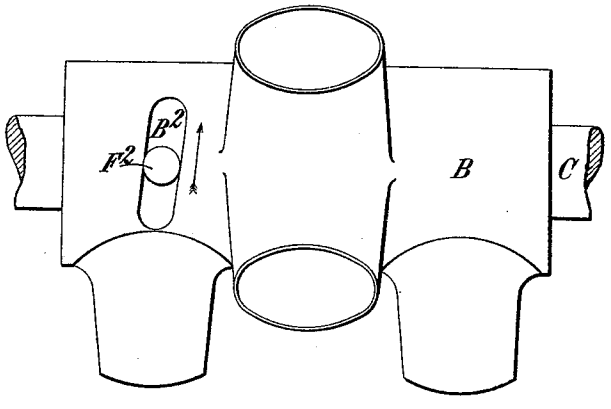


Fig. 2.



Witnesses:
Raphael Netter
Ernest Hopkinson

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(No Model.)

2 Sheets—Sheet 2.

R. F. HALL.

BALL BEARING.

No. 544,406. Patented Aug. 13, 1895.

Fig. 4.

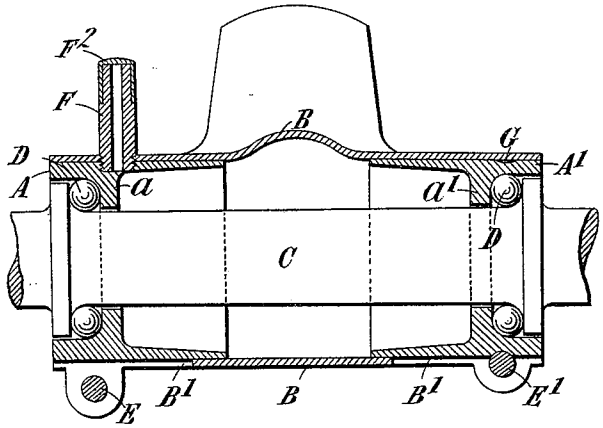


Fig. 6.

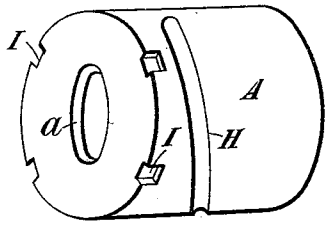
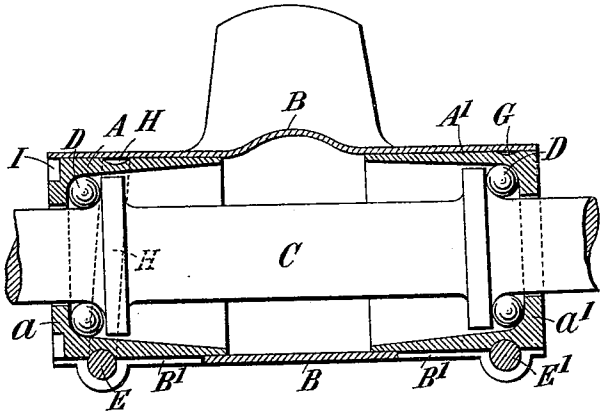


Fig. 5.



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UNITED STATES PATENT OFFICE.

ROBERT FREDERICK HALL, OF MOSELEY, ENGLAND.

BALL-BEARING.

SPECIFICATION forming part of Letters Patent No. 544,406, dated August 13, 1895.

Application filed October 8, 1894. Serial No. 525,259. (No model.)

To all whom it may concern:

Be it known that I, ROBERT FREDERICK HALL, managing director of the Cycle Components Manufacturing Company, limited, a subject of the Queen of Great Britain, residing at Ferndale, Church Road, Moseley, near Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in Ball-Bearings, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to ball-bearings, and provides an improved means for adjusting the pressure of the balls against the bearing-surfaces of the ball-races.

My said invention is applicable to bearings of that kind in which the spindle rotates and the outer case or shell is stationary and forms a bracket for the bearing.

According to my invention I provide for carrying the ball-races two independent plain tubes or cups, each of which is shorter than half the length of the sleeve or bracket-shell in which they are held, and I provide for adjusting said cups in a novel manner, as hereinafter described. Heretofore such cups have been usually screwed into the ends of the bracket-shell and have been adjusted by screwing them in or out, as required. This method of securing the cups is expensive, and, moreover, renders the accurate adjustment of the ball-bearings very difficult on account of the impossibility of truing the external surface of the cup after hardening. By the means hereinafter described the cups can be accurately ground true and readily adjusted.

In order that my invention may be clearly understood, I will now describe it with reference to the accompanying drawings, in which—

Figure 1 is a longitudinal central section of a bearing illustrating my invention as applied to the bottom bracket of a cycle, the cups being adjusted inwardly. Fig. 2 is a plan of the same, and Fig. 3 is an end view thereof, looking in the direction of the arrow in Fig. 1. Fig. 4 is a longitudinal central section of a bearing wherein the cups are adjusted outwardly. Fig. 5 is a similar section illustrating a modified method of adjusting the cups. Fig. 6 is a perspective view of the cup A of Fig. 5, showing a spiral groove on its circumference for adjustment, as will be hereinafter fully described.

Like letters denote similar parts throughout the drawings.

A A′ are two cups, each of which is provided with a ball-race at its outer end.

B is the sleeve or bracket-shell in which the cups A A′ are held, as hereinafter described.

C is the spindle or axle, which is also furnished with ball-races.

D D are the balls placed between the pairs of races. The sleeve B, which is split at each end for a short distance longitudinally, as shown at B′, is provided at or near each of its ends with clamping bolts or studs E E′, passing through projecting eyes or lugs provided near the edges of the said slits. By this means the cups contained within the sleeve B can be gripped thereby and retained in any desired position within the cover B and prevented from rotating or moving axially therein. By slackening either of the bolts E E′ the corresponding inner cup or tube can be adjusted without disturbing the other cup, which is retained by its bolt. The cups A A′ are made a little longer than the slits B′ and thereby prevent the entrance of dust into the bearings. The cups are provided with plain cylindrical surfaces, and the shell is bored to accurately fit the same.

In Figs. 1 to 4 I show one method of enabling the ball-cups A A′ to be adjusted. I provide one of the cups A with an outwardly-projecting pin F, which projects through an inclined or spiral slot B^2, Fig. 2, in the sleeve B. The length and inclination of the slot B^2 limit the amount of axial adjustment which can be given to the bearings. A circumferential groove G is provided round the circumference of the cup A′, and the bolt E′ is so placed and arranged as to engage with the said groove, as clearly shown in Fig. 1. In this manner the bolt E′ engaging with the groove G prevents axial movement of the said cup A′, and the grip of the outer sleeve B when the bolt E′ is screwed up tightly prevents rotary movement of the cup.

To adjust the bearings, Figs. 1 and 2, the bolt E is slackened to release the grip of the sleeve B on the cup A, thus allowing the cup to move. The pin F is then moved in the

slot B^2 in the direction of the arrow, Fig. 2, if it is desired to tighten the bearings, till the required amount of adjustment is attained.

It is obvious that it is only necessary to adjust one of the cups, as, in so doing, the axle C adjusts itself by moving slightly in an axial direction until the pressure of both sets of ball-bearings on their respective ball-races is equal. The pin or nipple F is also adapted to serve as a lubricator, and for that purpose it is provided with an axial channel F′ through which the oil is introduced, and also with a spring-cap F^2 to fit over the orifice of the nipple to exclude dust therefrom. Lubrication of the bearings is effected by the oil thus introduced splashing and running about in the cups A A′ and shell B in the usual manner. In Figs. 5 and 6 is shown another method for adjusting the ball-cups. In this case the cup A′ is similar to that shown in Figs. 1 to 4, as in fact it is throughout the whole of the drawings.

The cup A is provided on its external circumference with a spiral groove H. (Clearly shown in Fig. 6.) The bolt E is arranged so as to engage with the said groove H and act as a fixed guide for it.

To accomplish the adjustment of the bearings, the bolt E having been previously slackened a suitable key or wrench is caused to engage with one or more of the slots or holes I I on the exterior face of the cup A. The said cup A may be thus turned and as it rotates it will also move axially, due to the inclination of the spiral groove H. The bolt E may be inclined slightly to fit properly the groove H.

It will be seen that according to my invention all the parts can be easily changed and replaced, besides being of simple construction. As the cups are not screwed into the sleeve B the labor and expense of screw-threading the cups and the sleeve are avoided. Besides involving less labor in construction and greater ease and accuracy of adjustment, my invention enables a far better grip to be made by the sleeve on the cups than if they were held by screw-threads, as my improved cups are gripped over the whole of their exterior surface. Moreover, there is no tendency to a warping effect in tightening the bearings, as occurs where screwed cups are used, and consequently with this improved construction the bearings always run quite true. Although I have only shown and described one of the cups as being adjustable axially, it is obvious that I may make both cups adjustable.

What I claim is—

1. In a ball-bearing the combination of a bracket-sleeve which is slit at its ends, ball-race cups having plain cylindrical surfaces within the ends of the sleeve, clamping bolts by which the said sleeve can be caused to grip the ball-cups, a pin fixed in one of the parts and engaging a spiral or inclined groove or slot in the other part, whereby when the cup is turned it is simultaneously adjusted in the axial direction, substantially as described.

2. In an adjustable ball-bearing, the combination of a bracket-sleeve which is slit at its ends, ball-race cups, having plain cylindrical surfaces, within the ends of the sleeve, clamping bolts by which the said sleeve can be caused to grip the ball cups and means for axially adjusting said cups said means consisting of a pin on one of the cups and a spiral or inclined slot in the sleeve through which the pin projects, whereby when the cup is turned it is simultaneously adjusted axially, substantially as described.

3. In an adjustable ball-bearing, the combination of a bracket sleeve which is slit at the ends, ball-race cups adapted to slide within the ends of the sleeve, clamping bolts by which the sleeve can be caused to grip the ball-cups means for axially adjusting said cups said means consisting of an outwardly projecting pin on one of the cups and a spiral or inclined slot in the sleeve through which the pin projects, the said adjusting pin being provided with an axial thoroughfare through which oil may be introduced to the bearings and a dust cap to fit over and close said thoroughfare, substantially as described and for the purposes specified.

In testimony whereof I have hereunto set my hand this 20th day of September, 1894.

ROBERT FREDERICK HALL.

Witnesses:

HENRY GUY SILK,

BENJAMIN SMALLWOOD.