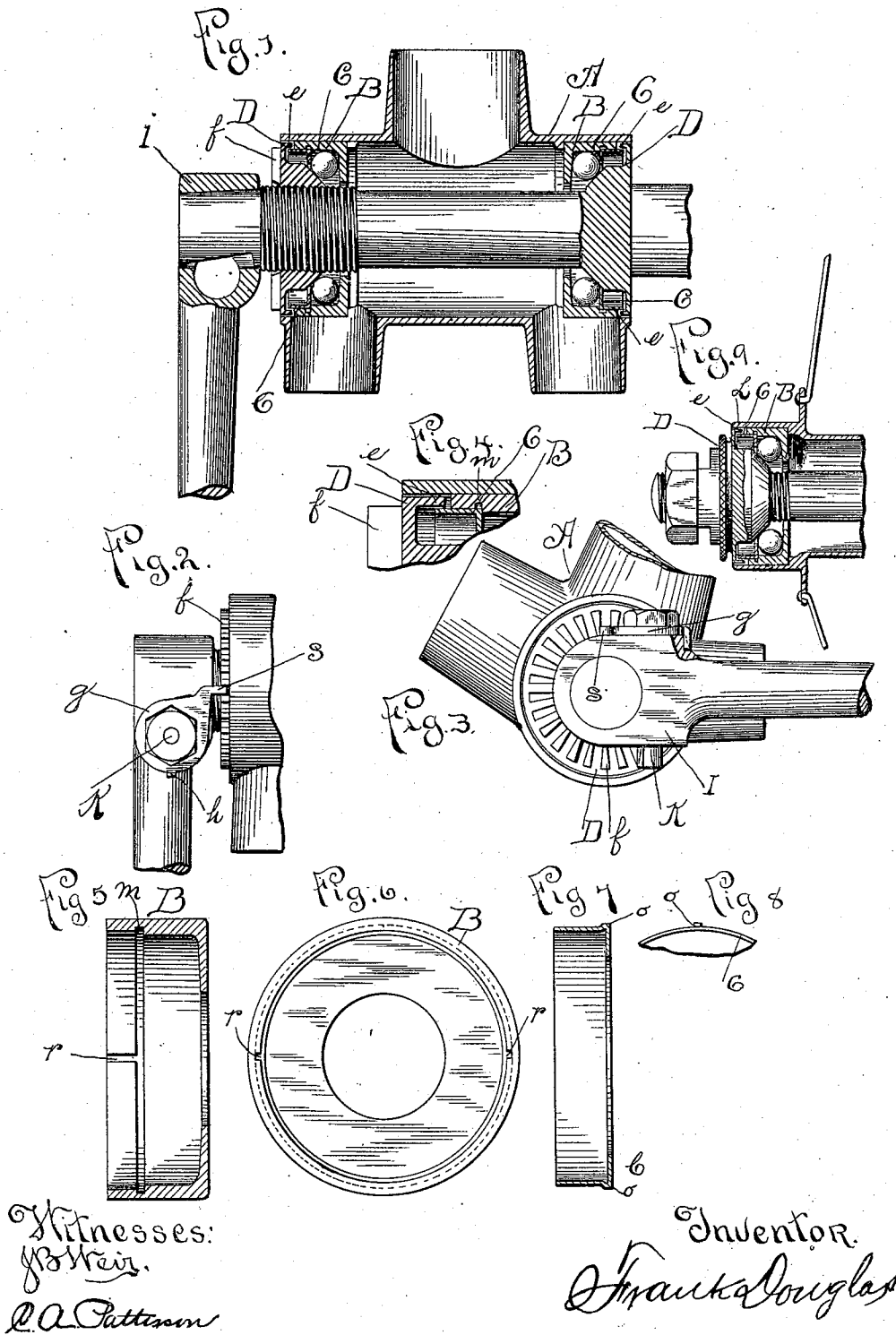


(No Model.)

F. DOUGLAS.
BALL BEARING FOR BICYCLES.

No. 576,661.

Patented Feb. 9, 1897.



UNITED STATES PATENT OFFICE.

FRANK DOUGLAS, OF CHICAGO, ILLINOIS.

BALL-BEARING FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 576,661, dated February 9, 1897.

Application filed September 14, 1896. Serial No. 605,773. (No model.)

To all whom it may concern:

Be it known that I, FRANK DOUGLAS, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented a new and useful Improvement in Dust-Proof Ball-Bearings for Bicycles or other Vehicles, of which the following is a specification.

My invention relates more particularly to a dust-proof retaining-ring which serves to hold the balls of a ball-bearing from falling out of position when the adjusting-cone of shaft is removed. This retaining-ring also serves to prevent the dust from getting to the race-line of the balls by reason of a recess formed between the projecting end of the retaining-ring and shell of the crank-hanger, Figure 1, which leaves a space or recess into which the projecting edge of the cone enters without coming in contact either with the crank-hanger shell or the retaining-ring. The same conditions apply to the hub, as shown in Fig. 9.

The invention also relates to a lock-washer that is attached to the crank and locks into the radial grooves on the face of the adjusting-cone of the crank-shaft, as shown in Fig. 2.

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

Fig. 1 is a top sectional view of a bicycle-crank hanger, in which are sectional views of the ball-cups, retaining-rings, balls of the ball-bearing, stationary and adjusting cone, the shaft, and a section of one of the cranks.

Fig. 2 shows an outside view of a portion of the crank-hanger and crank, showing the projecting radial grooves, the adjusting-cone, and the lock-washer attached to the pedal-pin by a nut. Fig. 3 is an end view of the crank-hanger, the adjusting-cone, a section of the crank, the pedal-pin, and lock-washer. Fig. 4 is an enlarged section of a portion of the end of the crank-hanger, the adjusting-cone, ball-cup, and the retaining-ring. Fig. 5 is an enlarged sectional view of the ball-cup. Fig. 6 is an enlarged plan view of the ball-cup. Fig. 7 is an enlarged sectional view of the retaining-ring. Fig. 8 is a small section of the enlarged view of the retaining-ring, showing a small projection to lock the retaining-ring in the groove of the ball-cup. Fig. 9 is a sectional view of one end of a hub, showing the

ball-cup, retaining-ring, cone, ball, shaft, and nut.

The crank-hanger A is bored out at either end to receive the ball-bearing cups B B. The ball-cups are forced tightly back against stops or shoulders left in the casing to receive them. The cups B B are preferably placed so far into the crank-hanger A as to allow the ends of the crank-hanger to project a short distance beyond the outer end of the ball-cups B B. The retaining-rings C C are placed in the cups B B against the stop or shoulder in the cups, so as to prevent the retaining-rings from resting upon the balls. The retaining-rings project beyond the ends of the cups B B, thereby leaving a space between the projecting ends of the retaining-rings and the projecting ends of the crank-hanger A. The crank-shaft cones D D are made to enter the casing A far enough to leave their outer faces about even with the ends of the crank-hanger A, so as not to leave a projection for the dust to lodge upon. The inwardly-projecting flange edges *ee* of the cones D D enter loosely into the space between the crank-hanger A and the retaining-rings C C. The inner taper ends of the cone rest upon the balls, which allows the cone to turn freely without coming in contact with anything in its revolution but the balls. The radial grooves *f* cut on a projecting end of the adjusting-cone are made to receive the projecting end *s* of the lock-washer *g*. The groove or notch *h* in the crank *l* is made to receive the downward-projecting prong of the lock-washer *g*. The lock-washer *g* fits over the end of the pedal-pin K, and is held firmly in place by the nut of the pedal-pin. The same arrangement of the retaining-ring that applies to the crank-hanger, Fig. 1, applies to the hub, Fig. 9.

The shell of the hub L is bored out to receive the ball-bearing cup, and the retaining-ring C sets into the cup against the shoulder and projects beyond the ball-cup far enough to leave a recess between the retaining-ring and the shell of the hub *l*, which recess receives the projecting ring *ee* of the cone D, and the cone rests upon the balls, allowing the projection *ee* to turn freely without coming in contact with either the shell or the retaining-ring. I also make this ball-cup B with a grooved recess *m* to receive projecting

lugs or points O O, made on the retaining-ring. Grooves *r r* are made from the outer end of the ball-cup to the inside circular groove *m* in the cup and the points O O of the retaining-ring slide down grooves *r r* until it reaches the circular groove *m*, when it may be turned round to lock the retaining-ring in its place. When it is necessary to remove the retaining-ring, points O O are turned round in line with the groove *r r*, when the retaining-ring may be lifted out of the cup freely.

Ball-bearings are usually made with the ball-cups even with the face of the crank-hanger, and the cone-flanges usually project beyond the end of the hubs and only enter the cup a very little way, which allows the dust to lodge upon the projecting end and work its way directly into the ball-bearings. With my improvement there are no projections on the cone upon which the dust can lodge. If it enters the bearing at all, it must work its way horizontally through the little opening between the cone and the crank-hanger, then work its way back again over the projecting retaining-ring, then back the other way, where the dust, if any, will lodge in the retaining-ring, as this ring projects inwardly far enough to prevent the dust from going over onto the balls. The retaining-ring also prevents the balls from falling out

of position and allows the removal of the cones without in any way disturbing the balls from their position in the cups.

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

1. In a dust-proof ball-bearing the combination of a hardened ball-bearing cup set firmly in a hub or crank-shaft casing, with a retaining-ring, having an inwardly-turned flange, to retain the balls in position, and a projecting ring which extends beyond the end of the ball-cup to form a dust-proof space between it and the projecting end of the cup-casing, with a ball-bearing cone, having an inwardly-turned flange to enter and turn freely in the dust-proof space between the retaining-ring and the casing, substantially as described.

2. In a dust-proof ball-bearing, the combination of a hardened cup, having a circular groove *m*, which is connected by longitudinal grooves *r r* with a retaining-ring, having lock lugs or points to fit in the cup-grooves, for the purpose of having a stop for the retaining-ring and for holding it in the cup by turning the ring part way round in the grooves, substantially as herein described.

FRANK DOUGLAS.

Witnesses:

JOS. LOET,
C. A. PATTERSON.