No. 624,419. Patented May 2, 1899.

J. W. ARMSTRONG.

BICYCLE WHEEL.

(Application filed Sept. 24, 1897.)

(No Model.)

FIG. I.

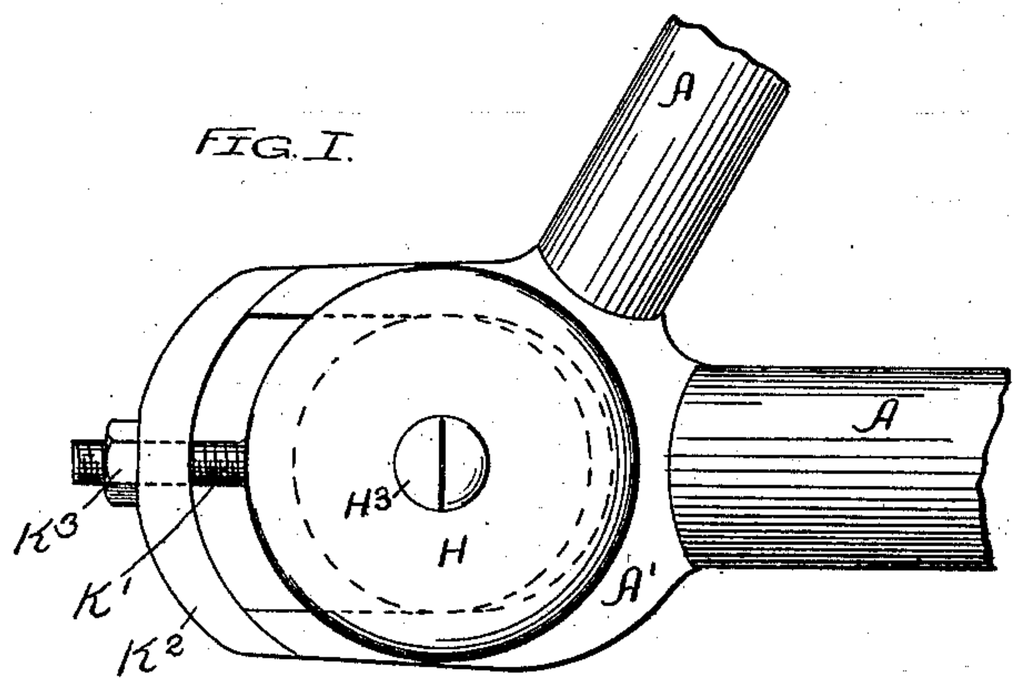
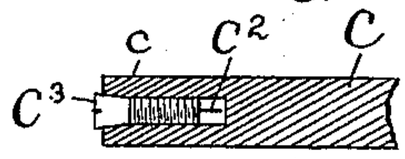


FIG 2.

FIG. 3.



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UNITED STATES PATENT OFFICE.

JAMES W. ARMSTRONG, OF CHICAGO, ILLINOIS.

BICYCLE-WHEEL.

SPECIFICATION forming part of Letters Patent No. 624,419, dated May 2, 1899.

Application filed September 24, 1897. Serial No. 652,804. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. ARMSTRONG, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Bicycle-Wheels, of which the following is a specification.

My invention relates to improvements in bicycle-wheels, and more particularly to the hubs and ball-bearings of such wheels.

In bicycle-wheel hubs heretofore in use the ball-bearings have been located comparatively close together and generally directly under or in line with the sprocket-wheel and a considerable distance inside of the frame pieces or forks to which the axle is secured at each end, so that the full spread or distance between the frame-forks is not utilized in distributing the pressure between the two ball-bearings and in preventing or reducing the prying or leverage action against one or the other bearing as different strains are put upon the wheel in use. The durability and easy running of the wheel and its bearings are thus materially diminished.

The object of my invention is to provide a bicycle-wheel hub and ball-bearing construction in which the ball-bearings may be located much farther apart without increasing the spread or distance between the frame pieces or forks of the wheel that connect with the axle—in other words, bringing the ball-bearings directly under or in line with said frame pieces or forks, so that the prying, twisting, or leverage action upon the ball-bearings may be diminished to a minimum, and wherein also the sprocket-wheel may be located well between the two ball-bearings instead of directly over one of them, and thus better distribute the pressure or strain due to the driving-chain between the two ball-bearings instead of concentrating it entirely or chiefly upon one of them.

My invention consists in the novel construction and in the novel combinations of parts and devices by which I am enabled to secure these important results or advantages, as will be hereinafter particularly described and explained in connection with the accompanying drawings, which form a part of this specification.

In the drawings, Figure 1 is a side elevation of a portion of a bicycle-wheel frame to which my invention is applied. Fig. 2 is a central longitudinal section through the hub and ball-bearings, and Fig. 3 is a detail sectional view of one end of the axle.

In the drawings, A represents a bicycle-frame of any ordinary and suitable construction and provided with the forks or pieces A′ for connection with the axle of the rear wheel on either side. B is the hub; C, the axle; D, the ball-bearing cup; E, the balls; F, the cones; G, the sprocket-wheel, and H cap or connecting pieces which connect the axle at each end with the frame forks or pieces A′.

The hub B is provided with flanges *b b* for the attachment of the spokes of the wheel, with an annular shoulder *b′* adjacent to one of the flanges *b* for the sprocket-wheel G to abut against, with a screw-threaded enlargement b^2 to receive the screw-threaded sprocket-wheel, and with a screw-threaded portion b^3 to receive the jam-nut G′, by which the sprocket-wheel is locked in place.

The ball-bearing cups D fit inside the ends of the hub B and are rigidly secured thereto by being forcibly driven therein, the cups D being provided with shoulders *d*, bearing against the ends of the hub B, and with beveled or conical faces *d′* at their extreme ends to bear against the balls E.

The caps or connecting-pieces H are provided each with an inwardly-projecting hollow interiorly-threaded sleeve or thimble H′ to receive the screw-threaded end *c* of the axle C. The caps or connecting-pieces H are further provided with an annular channel or recess *h* to receive the ball-bearing cone F, which is in the form of an annulus fitting around the integral sleeve or thimble H′ on the cap or connecting piece H. Each of the caps or connecting-pieces H is further provided with an inwardly-projecting flange *h′*, which fits over or around the end of the cup D and the end of the hub B. The integrally-projecting flange *h′* fits within the fork or frame piece A′ of the frame and within the adjusting-washer K and is externally screw-threaded at h^2 to receive the nut H^2, by which the frame fork or piece A′ is locked or held in position on the cap or connecting piece H. The cap or connecting piece H, it will thus

be seen, is a thin disk which has a smooth outer face, so as to give a neat finish and appearance to the end of the hub, and is provided on its inner face with an inner flange or sleeve H′, by which it is connected to the axle, and a large outer flange or annular projection h', which projects through the frame-fork, while the annular channel or chamber between the flanges H′ and h' serves to receive the balls and the cone or member F of the ball-race, while the extreme outer rim h^3 of the thin disk-shaped cap or connecting piece H fits against the frame-fork A′ on the outside and clamps the frame-fork between itself and the nut H^2 which fits on the inside of the frame. By this construction, as the flange h' on the cap-piece which projects through the fork or frame A′ is external to the ball-chamber formed in the cap-piece, the axle is relieved entirely of all strain tending to bend it or throw the wheel out of its true plane. The ball-bearing cone D is provided with an external annular recess d^2 to receive the felt or other dust-excluding washer d^4.

The cap, connecting-piece, or clamp H embraces the frame piece or fork A′, on the outside thereof, and also fits directly within the frame-piece by reason of its integral flange h', while the nut or clamp-piece H^2, threaded on said integral flange h' of the cap or clamp H, embraces the frame-piece on the inside. The frame-piece is thus directly and rigidly connected to the cap, connecting-piece, or clamp H, while said cap or clamp itself is directly connected to the axle C by its integral internally-screw-threaded flange or sleeve H′, and as one member of the ball-race is formed in or carried by the cap H which fits outside the frame the ball-race is brought in line with the frame-piece and at the extreme end of the hub, while the cap itself, fitting at the extreme end of the hub and axle, gives a neat smooth finish and entirely obviates the necessity of applying the frame-piece directly to the axle and of employing a clamp-nut on the outside of the frame-piece for clamping the frame-piece onto the axle.

The axle C is provided with a shoulder C′ at one end for the end of the integral sleeve or flange H′ on the cap or connecting piece H to abut against, and at its opposite end the axle C is split or provided with a longitudinal slot C^2 and is bored or screw-threaded to receive the screw-threaded conical plug or wedge C^3, by which the cap or connecting piece H at this end is firmly locked in place on the axle. To make a neat finish and close the central openings in the cap or connecting pieces H H, I provide the same with central screw-plugs H^3 H^3.

By this construction and combination of parts and devices it will be seen that the ball-bearings are separated from each other the full length of the hub and each brought directly under or in line with the fork or frame piece A′ of the bicycle-frame and that the sprocket-wheel G is located well between the ball-bearings, thus diminishing to a minimum the chance for any prying, twisting, or leverage action upon either of the ball-bearings, and also causing the pressure exerted by the drive-chain or sprocket-wheel to be distributed between the two ball-bearings and to come partly on each.

The adjusting-washer K is provided with the customary screw-threaded shank K′, shoe K^2, and nut K^3.

I claim—

1. In a bicycle, the combination with the wheel-hub, the axle and the bicycle frame pieces or forks on each side of the wheel, of a pair of ball-bearing cups secured inside the hub and having their beveled or ball-bearing faces at the extreme ends of the hub, a pair of caps or connecting-pieces provided with integral hollow, inwardly-projecting, screw-threaded sleeves or flanges secured to the threaded ends of the axle, and a ball-bearing cone seated in each of said caps or connecting-pieces, said caps or connecting-pieces having also each an integral, inwardly-projecting, externally-screw-threaded flange surrounding the end of said ball-bearing cup and hub and fitting within said frame forks or pieces, whereby the ball-bearings are separated the full length of the hub and brought under or in line with said forks or frame-pieces, substantially as specified.

2. In a bicycle, the combination with a wheel-hub, the axle and the bicycle frame pieces or forks on each side of the wheel, of a pair of ball-bearing cups and a pair of ball-bearing cones, one of said pairs being secured inside the hub and having their beveled or ball-bearing faces at the extreme ends of the hub, a pair of caps or connecting-pieces fitting outside of said frame-pieces and provided with integral hollow, inwardly-projecting, screw-threaded sleeves or flanges secured to the threaded ends on the axle, the other pair of said ball-bearing cones or cups being seated in said caps or connecting-pieces, said caps or connecting-pieces having also each an inwardly-projecting, externally-screw-threaded flange surrounding the end of said hub and of said ball-bearing cup or cone carried thereby and fitting within said frame-pieces and supporting the same, and clamp-nuts threaded thereon and fitting inside of said frame-pieces whereby the ball-bearings are separated the full width of the frame, and a sprocket-wheel secured to said hub between said ball-bearings, substantially as specified.

3. The combination in a bicycle, of a frame-piece, a wheel, hub and axle and a disk-shaped connecting-piece having an annular chamber on its inner face to receive the balls and one member of the ball-race, and having on said inner face an inwardly-projecting flange external to the balls and extending through the frame, said connecting-piece being secured to the axle and fitting both within and outside of the frame-piece, and to which the frame-piece is clamped or secured inde-

pendent of the axle, said connecting-piece supporting part of the ball-race, substantially as specified.

4. In a bicycle, the combination with the frame-piece, of a wheel-hub and axle, a cap or clamp piece fitting within and outside of the frame-piece and having a screw-threaded sleeve engaging the axle, a nut fitting inside the frame-piece by which it is clamped to said cap or clamp piece, and a ball-race in line with the frame-piece and having one of its members carried by the hub at the end thereof and its other member carried by said cap or clamp which connects the frame-piece with the axle, substantially as specified.

5. The combination with a bicycle-wheel hub, the axle and the frame forks or pieces, of ball-bearing cups, cones and balls substantially in line with said forks or frame-pieces and thin disk-shaped caps or connecting-pieces having smooth outer faces, and provided on their inner faces each with an inner flange secured to the axle, and an outer flange external to the balls projecting inwardly through the frame-piece and to which the frame-piece is secured, said caps or connecting-pieces carrying part of the ball-race, and a sprocket-wheel secured to said hub between said ball-bearings, substantially as specified.

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Witnesses:
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