(No Model.)

W. H. DANIEL.

ROLLER SKATE.

No. 352,739. Patented Nov. 16, 1886.

Fig. 1.

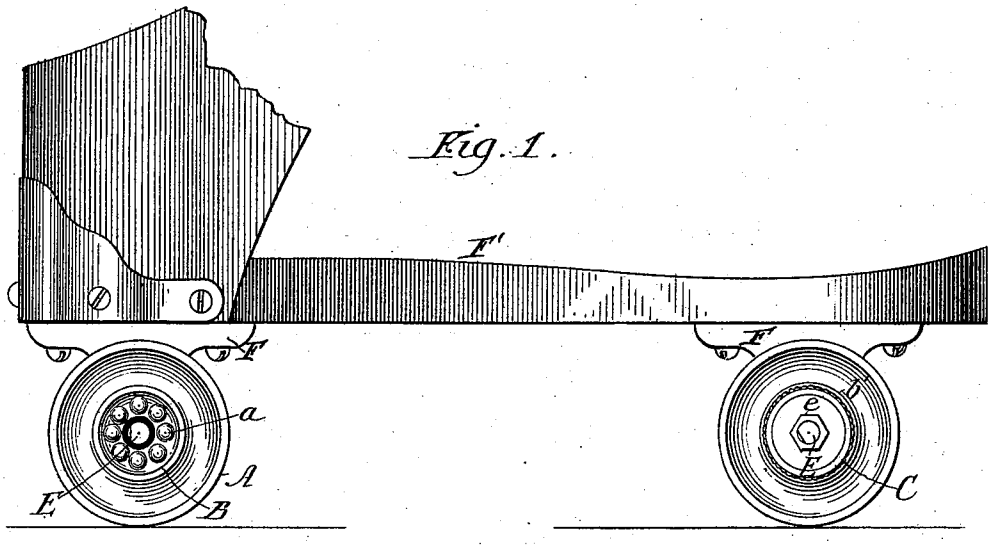


Fig. 2.

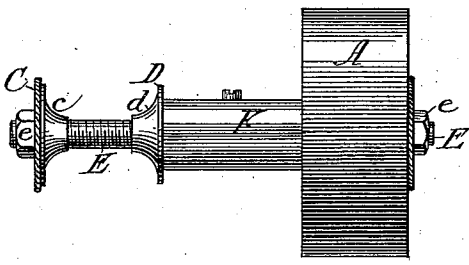


Fig. 3.

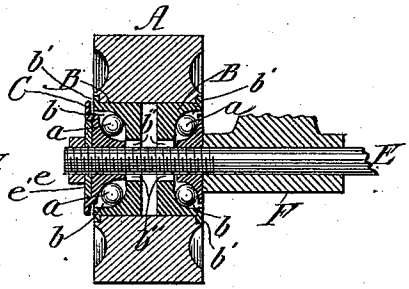


Fig. 4.

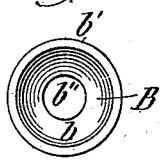


Fig. 5.

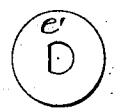
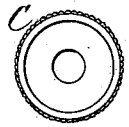


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM H. DANIEL, OF CHICAGO, ILLINOIS.

ROLLER-SKATE.

SPECIFICATION forming part of Letters Patent No. 352,739, dated November 16, 1886.

Application filed November 17, 1884. Serial No. 148,151. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. DANIEL, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented a new and useful Improvement in Roller-Skates, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation with the bearing of one of the wheels removed to show the anti-friction balls; Fig. 2, an elevation showing the axle with one wheel removed to show the bearings for the anti-friction balls; Fig. 3, a section through one of the wheels, showing the anti-friction balls in position; Fig. 4, a detail showing the bearing end of one of the hub-boxes; Fig. 5, a detail of the locking-washer; Fig. 6, a detail showing the outer end of the wedge-bearing.

The object of this invention is to construct a roller-skate which will be easy and light running in use by removing the friction between the wheel and axle and between the wheel-hubs and the washers or nuts, so that the wheel will have a bearing independent of the axle in both a vertical and lateral direction; and this object is accomplished in the manner and by the means hereinafter described, and pointed out in the claims.

In the drawings, A represents the wheels of a roller-skate—four wheels being used, one set at the front and one set at the rear, as usual—and the wheels are made of wood or other suitable material.

B represents boxes or linings for the hubs of the wheels, two of such boxes or linings being used in each wheel, and being inserted from each end in an opening in the wheel-hub, and the exterior end face of each box is cut out so as to form a concave depression, *b*, and, as shown, the exterior periphery of each box is provided with a locking and limit flange, *b'*, which rests against the side of the wheel when the box is in position, so that the weight upon the skate, acting through the balls *a* against the vertically-inclined surfaces, tends to crowd the hub-flanges *b'* against the roller A, so that however much weight may be upon the skate the wooden part of the roller will not turn upon the metal part, and the interior of the wood is prevented from wearing larger and becoming loose. Each box at its center is provided with a circular hole, *b''*, of a larger diameter than the diameter of the axle with which the wheel is to be used, as shown in Fig. 3. These boxes, as shown, do not fill the entire length of the hub in the form of construction shown; but they might be of such length, if desired, as to entirely fill the hub lengthwise.

C represents the outer bearings for the wheels, one being provided for each wheel, and each consisting of a plate or circular portion with an inward extension having a concave surface or face, *c*, corresponding to the face or surface *b* when the bearing C is in position, and these concave surfaces or faces *b c* form an opening in which is located a sufficient number of bearing-balls, *a*, to fill the opening and have a bearing on both the concave surface or face *b* and the concave surface or face *c*, as shown in Fig. 3.

D represents the inner bearings for the wheels, one being provided for each wheel, and each bearing having a plate or disk portion with an inward extension having a concave surface or face, *d*, similar to the surface or face *c*, to coact with the surface or face *b* of the inner hub-box, to form a space in which is located a series of balls, *a*, corresponding to those for the outer bearing. The recesses formed by the concave surfaces or faces *b c* and the concave faces or surfaces *b* on each side of the wheel, and in which are located the bearing-balls *a*, owing to the formation of the surfaces or faces, furnish a bearing by which the balls support the wheels in a direct line vertically and longitudinally, and also form a diagonal bearing in all directions for the wheel.

E represents the axle, each end of which is screw-threaded to receive the bearings C D, and a nut, *e*, by means of which and a lock-washer, *e'*, the outer bearing, C, is held against end movement outwardly. The washer has a square face on one side, and the end of the axle has a corresponding face, so that when the washer is slipped onto the axle end the square faces furnish a lock against the turning of the washer, and, as shown, the washer *e'* lies in a recess formed on the exterior end of the bearing C.

F represents the hanger-frame, attached to the foot-plate E' of the skate and to axle, either by driving the axle therein, or in any other

suitable and firm manner, and when in place the ends of the frame form a backing for the inner bearings, D, in the form of construction shown.

The axle E is driven or otherwise secured into the frame F, so as to be firm therewith and not capable of revolving. The inner bearings, D, are screwed onto the opposite ends of the axles until they abut against the ends of the frame. The balls for the inner bearings are placed in the cavity of the inner box, B, resting on the surface or face *b*, to do which a round piece is slipped through the opening in the box to form a stop, and prevent the balls from dropping through the axle-opening *b''*, which piece can be withdrawn, leaving the balls resting on the surface or face *b*, and the wheel can then be slipped onto its axle end, bringing the balls in contact with the surface or face *d* of the bearing, and as this surface or face is tapering it acts as a wedge, forcing the balls outward and in contact with the surface or face *d*. The balls *a* are then dropped into the cavity of the outer box resting on the surface or face *b* thereof, and the bearing C is screwed onto the axle, bringing the surface or face *c* in contact with the balls, and as this surface or face is also conical it forces the balls outward in the same manner and for the same purpose as does the face *d*. The washer *e'* is then dropped into place and the nut *e* screwed down, locking the bearing C against end movement, and as the bearing C can be moved in or out by reason of the screw-threads, it will be seen that this bearing acts to adjust the bearing-faces *b d* and *b c* in proper relation to each other and to the balls *a*, to have the balls form the bearings for the wheels, and at the same time have them run with sufficient looseness for the wheel to turn readily and easily.

The bearing furnished by the balls *a* and the bearing-surfaces of the box B and bearings C D removes the bearing for the wheel from the axle and puts it on the balls, and as these balls have each an independent rolling movement, it will be seen that the bearing-surface presented is very small, and consequently but little, if any, friction will take place, and as the balls also bear laterally as well as vertically, it will be seen that the side friction, if any, will also be very slight in degree.

The use of bearing-balls, combined with the boxes B and bearings C D, furnishes a bearing of such nature that if the skater leans to the right or left no appreciable increase in the frictional surfaces will be had, as the balls only present a small bearing-surface, no matter in what direction the pressure may come, and by using such ball-bearings the friction heretofore occurring in roller-skates, where the operator leans either to the right or left, bringing the wheel-hub in contact with the end washers or other holding device, will be entirely overcome, and at the same time the direct bearing on the axle heretofore had in roller-skates is entirely removed.

The balls present a movable bearing, against which the wheel runs, instead of coming in contact with a fixed surface or bearing, as roller-skates have been heretofore constructed, by which means, as the balls always move in the direction in which the wheel is impelled, the wheel will not have to overcome the inertia of an axle, which, if it revolves at all, would only do so when the friction of the wheels on the axle became greater than that between the axle-bearing or the box and axle.

I am well aware that anti-friction balls have been used in journal-bearings, and in one instance known to me such balls have been placed in square recesses of a revolving wheel, and retained in place by a fixed conical collar on the journal, and a conical washer, which is adjusted by a nut for taking up the wear of the balls or lost motion. My invention differs from the above, since I use roller seats or recesses of a special form, whereby concave faces or supports for the rollers are formed, and a bearing is produced in which the thrust is received in all directions, as has already been explained.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. The hub B, made in two parts, having the locking and limit flanges *b'*, and the vertically-concave surface *b*, in combination with the end plates, C D, having concave grooves, substantially as shown and described, whereby the action of the balls tends to crowd the locking-flanges against the roller A, as set forth.

2. In combination with a foot-plate of a roller-skate, its hanger and supporting-axle, a hub, B, made in two parts, having locking and limit flanges *b'*, the vertically-concave surface *b*, and the end plates, C D, having concave grooves, substantially as shown and described, for the purposes set forth.

WILLIAM H. DANIEL.

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O. W. BOND.