W. TUCKER.

Anti-Friction Journal-Box.

No. 206,649. Patented July 30, 1878.

Fig. 1.

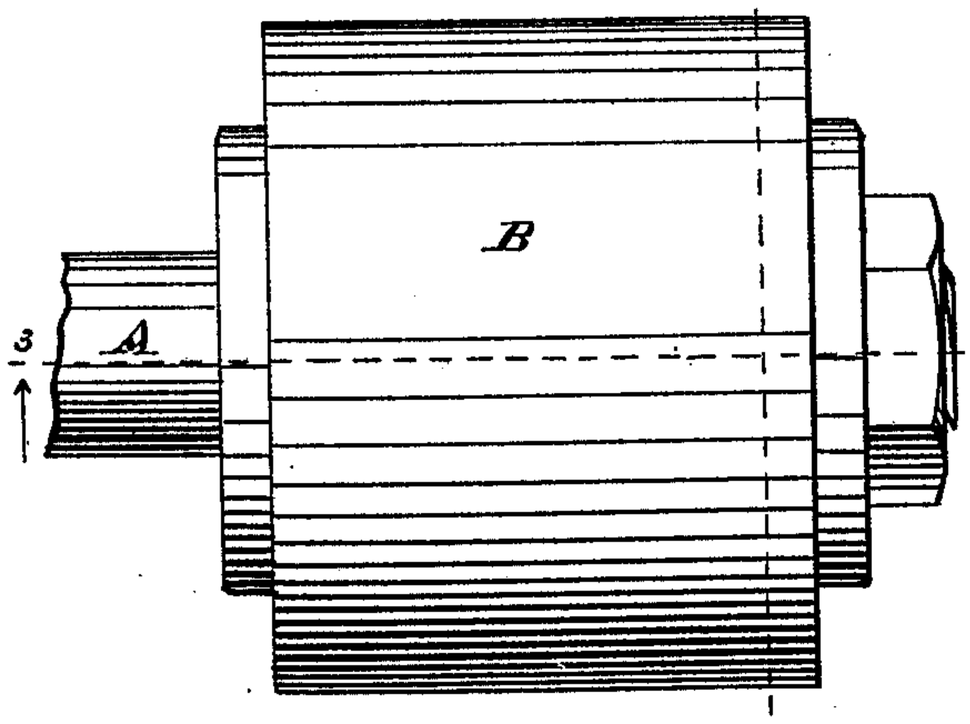

Fig. 2.

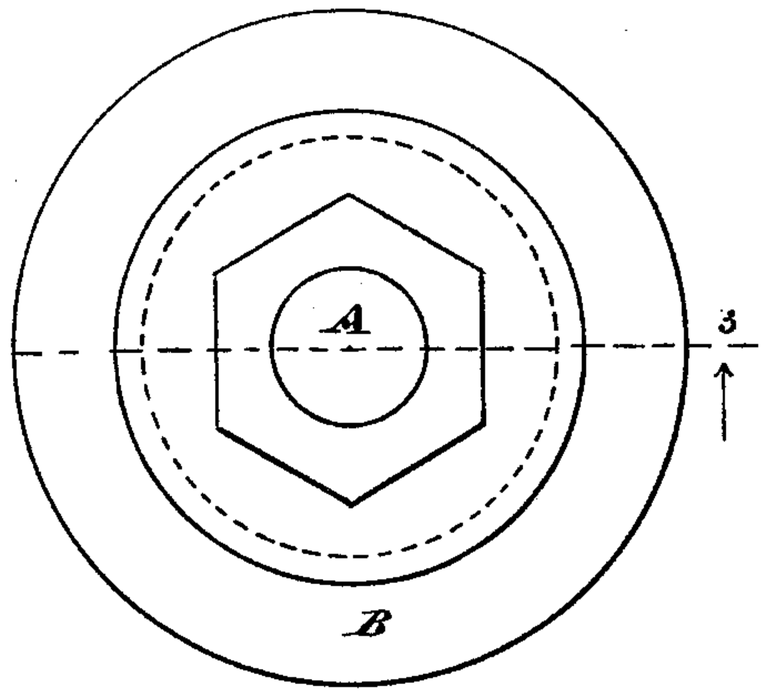

Fig. 3.

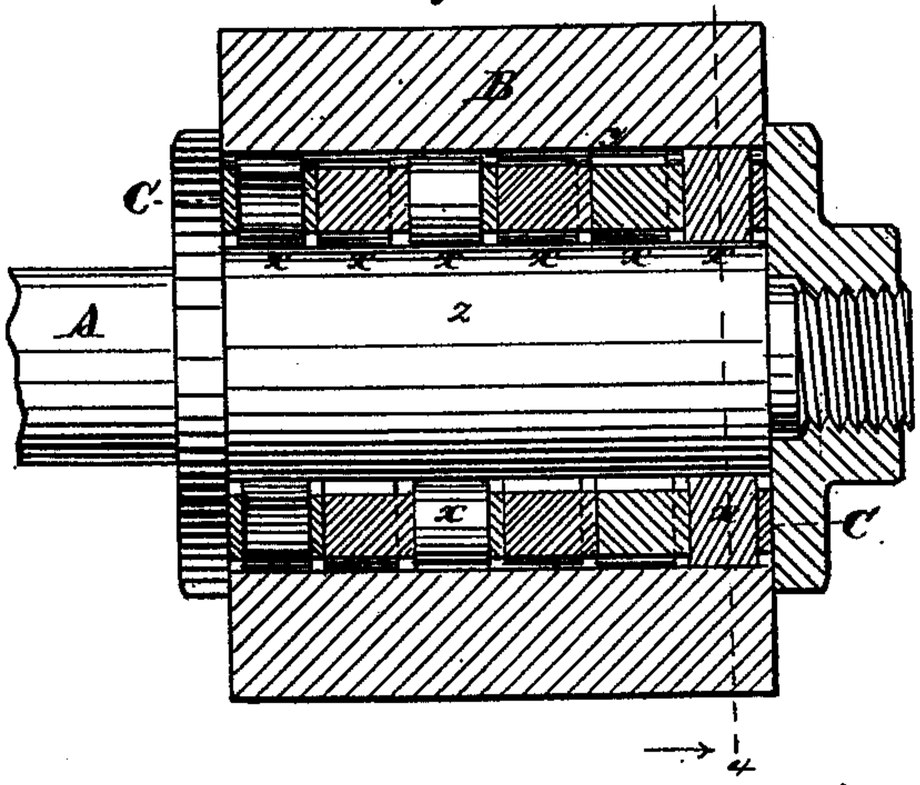

Fig. 4.

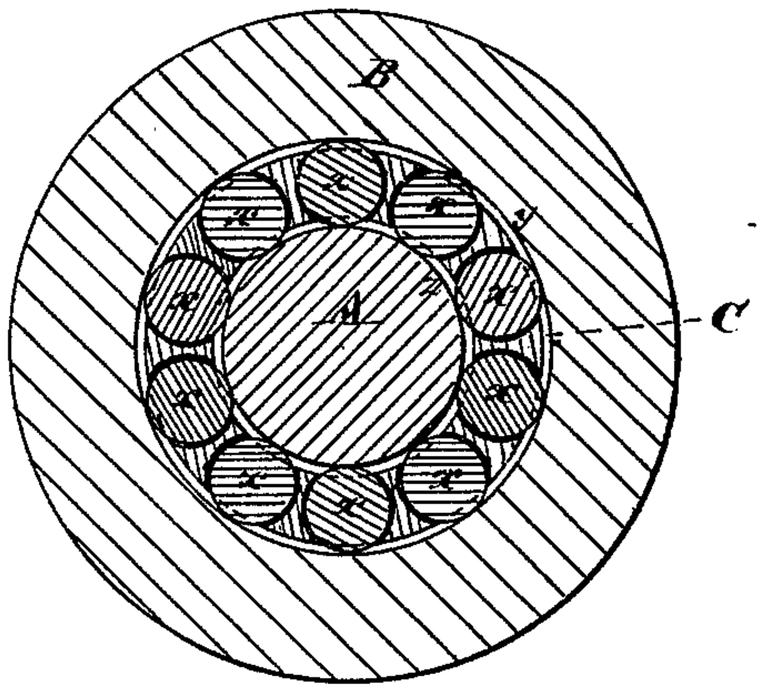

Fig. 6.

Fig. 5.

Fig. 7.

WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM TUCKER, OF EAST BROOKFIELD, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN G. AVERY, OF SPENCER, MASSACHUSETTS.

IMPROVEMENT IN ANTI-FRICTION JOURNAL-BOXES.

Specification forming part of Letters Patent No. **206,649**, dated July 30, 1878; application filed January 3, 1878.

To all whom it may concern:

Be it known that I, WILLIAM TUCKER, of East Brookfield, in the county of Worcester, Massachusetts, have invented a new and useful Improvement in Journals and Bearings, of which the following is a full, clear, and exact specification:

My present invention relates to what are termed "anti-friction" journals and bearings, spindles and hubs, axles and boxes, &c.; and it consists in certain novel features of construction, as hereinafter set forth, the leading objects of my said invention being, first, to prevent uneven and excessive wear; second, to insure a uniform and solid support by means of friction-rollers; and third, to facilitate the manufacture of a simple and efficient skeleton sleeve for combining a large number of small friction-rollers, by which the friction and wear may be distributed and reduced to minimum.

Figure 1 of the accompanying drawing is an elevation of one end of an axle and its box, illustrating this invention. Fig. 2 is an end view of the same. Fig. 3 is a longitudinal section thereof. Fig. 4 is a transverse section thereof. Fig. 5 is a side elevation of the interposed anti-friction sleeve shown in Figs. 3 and 4; Fig. 6, a face view of one of the sections of said sleeve, and Fig. 7 an edge view of two of said sections, showing the mode of uniting them.

The planes of the respective sections are indicated by dotted lines across other figures, said lines being numbered to correspond with the figures in which said sections are shown.

Like letters of reference indicate corresponding parts in the several figures.

A may represent one end of a carriage-axle, for example, and B the box of the same.

This invention is equally applicable, however, to other forms of horizontal or nearly horizontal journal-bearings, and the journals, spindles, or wrists of axles, and all kinds of shafts which rotate or support rotary wheels, pulleys, or the like.

The box B or its equivalent may be of any preferred external shape, and the axle or its equivalent may be of any approved form and proportions, provided only that concentric cylindrical bearing-surfaces *z y* must be provided, with sufficient space between to accommodate friction-rollers *x*, of proper diameter and longitudinal extent. Said rollers *x* are made of hardened steel, or of cast-iron hardened in chills, so as to preserve a perfect cylindrical shape indefinitely. In order to extend a like capacity to said concentric surfaces *z y*, which are, respectively, the periphery of the axle-spindle and the internal surface of the box, I make these portions of the respective parts of hardened steel or its equivalent. To make the axle-spindle hard externally (to a minimum depth) to resist the detrusive wearing action of the rollers upon it, and at the same time soft internally, so as to possess the requisite strength, I wind a thin coil of steel upon an iron bar, or upon a bar of steel of a quality which will not harden, in the usual way, and weld and draw to gage size in dies. The box may be made with steel welded inside, or of steel or iron that will surface-harden, or of chilled cast-iron, and ground out to truth in any usual way.

The method of hardening the said surfaces forms no part of the present invention.

The rollers *x* are short cylinders, being only about as long as they are wide in the illustration, and they are distributed in peculiar manner over the entire area of said surfaces *y z*, as nearly as possible, being held in order or position by means of a skeleton sleeve, C, which has a bearing or pocket for each roller. The principle of said distribution is the arrangement of the rollers as close as practicable in circumferential or latitudinal rows, with no two rollers exactly in line longitudinally. There are consequently as many axes as there are rollers, and some one roller must be brought directly into the line of pressure almost instantly the axis of another passes out of said line. Thus every sudden jar or blow will be resisted by the mass of some roller directly interposed in the line of concussion, the other rollers assisting, and no heavy pressure can force any two rollers apart or cause them to bind in their bearings.

The sleeve C is constructed as illustrated in Figs. 5, 6, 7. A narrow ring, *w*, Figs. 6 and 7, contains equidistant bearings or pockets for one circumferential row of the rollers *x*, said

bearings being drilled in one edge of said ring, with their axes equidistant from its inner and outer surfaces, beyond which the inclosed rollers project a short distance, as shown, neither surface of the sleeve proper coming into contact with axle or box. The bearings are made sufficiently large to permit the rollers to work freely, and small enough to prevent their escape inward or outward. The rollers are inserted longitudinally, and are secured by riveting another ring, c^2, to the first ring, as illustrated in Fig. 7. At the same time the proper disallignment of the rollers longitudinally is secured, the rivet-holes (which alone distinguish the second and succeeding rings, c^2, from the first one, c,) being drilled at certain uniform distances from the axes of the several roller bearings. A sufficient number of these rings c^2, with their complements of rollers, are attached successively, and a flat cap-ring, c, simply provided with rivet-holes, completes the sleeve.

The number and proportions of the rollers x and other mechanical details will vary in the manufacture of journals and bearings of different styles and sizes.

For longer bearings of a given diameter another length or lengths or fractional lengths of the described anti-friction sleeve may be annexed; and in this case there may be two or more rollers (one in each sleeve) in line with each other longitudinally.

The method above described of forming a hard surface by means of a spiral strip of steel is not claimed as new; nor do I claim as new the hardened surfaces of the rollers, the axle-spindle or its equivalent, and the box or its equivalent, separately considered, but solely the combination of hardened rollers with co-acting hardened surfaces, as hereinafter stated, said surfaces operating in this combination to prevent detrusion or indentation between the wearing-surfaces.

I also disclaim as old the mere alternation of relatively-short anti-friction rollers, and limit myself in this connection to the feature of no two rollers in line longitudinally, and also to the independence of each roller, which is an essential feature of my system.

The following is what I claim as new and of my own invention, and desire to secure by Letters Patent, namely:

1. The combination of an axle-spindle or its equivalent having a hardened cylindrical surface, a box or its equivalent having a concentric hardened surface, and a large number of short cylindrical rollers of hardened metal distributed uniformly between said surfaces in several parallel circumferential rows, with the axes of no two rollers in line with each other longitudinally, said rollers being kept in order or position by means of a loose sleeve having a bearing or pocket for each roller, as herein shown and described, for the purposes specified.

2. An anti-friction sleeve consisting of a series of parallel rings riveted together, each ring containing a series of short cylindrical rollers in separate parallel bearings or pockets.

3. An anti-friction sleeve consisting of a series of parallel rings riveted together, each ring containing a series of short cylindrical rollers in parallel bearings or pockets, with the axes of no two rollers in line with each other longitudinally, substantially as herein shown and described, for the purposes set forth.

WILLIAM TUCKER.

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