(Model.)

J. GRAVES.

ANTI FRICTION BEARING.

No. 247,041. Patented Sept. 13, 1881.

FIG. 1

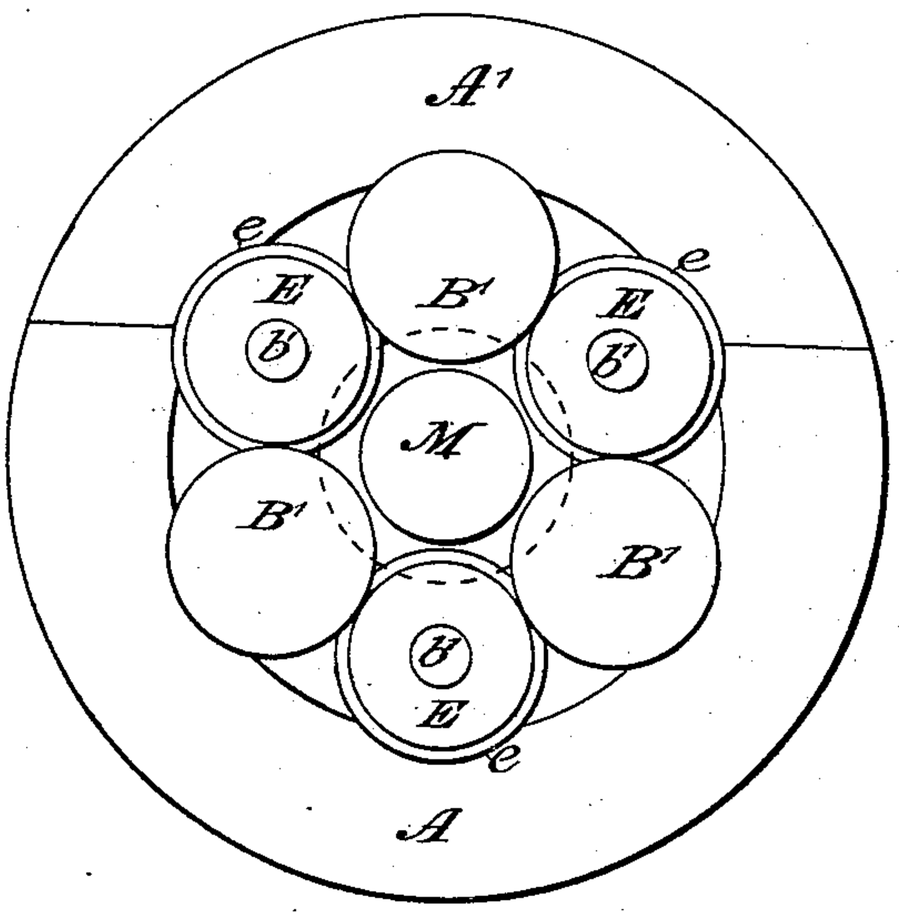


FIG. 2.

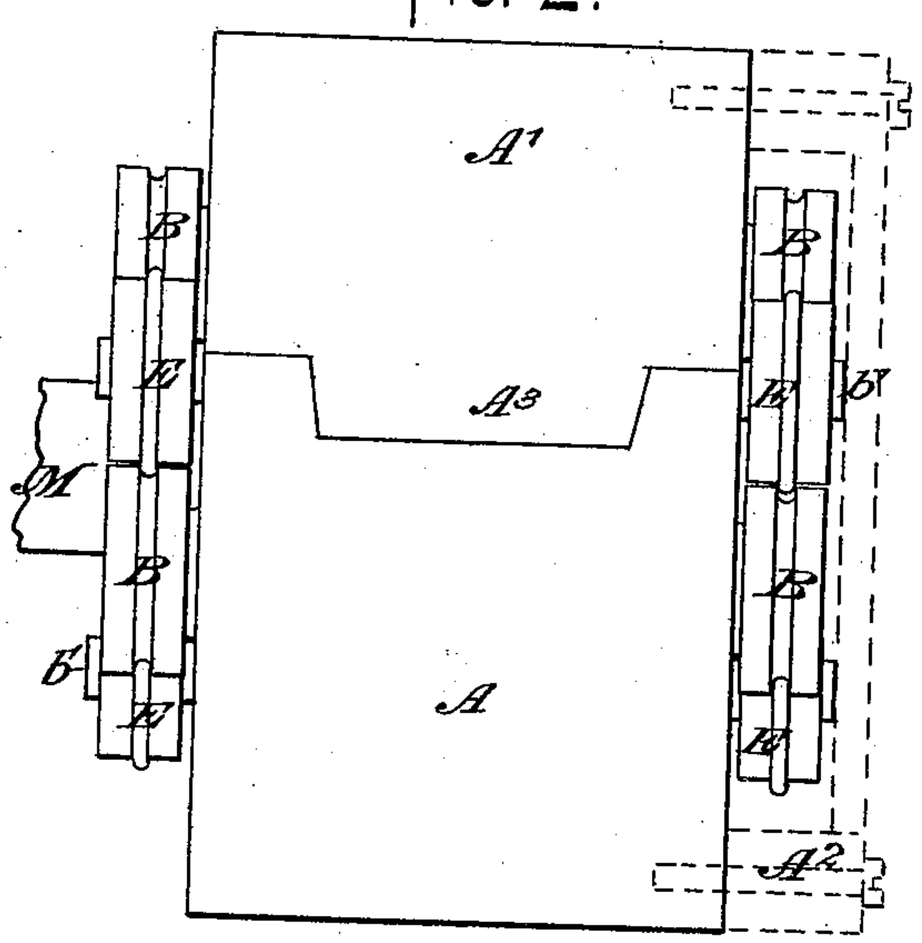


FIG. 4

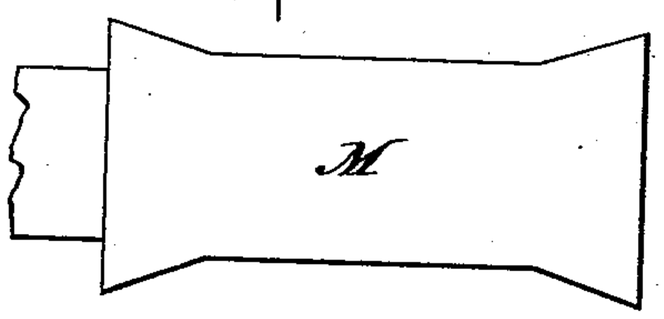


FIG. 5.

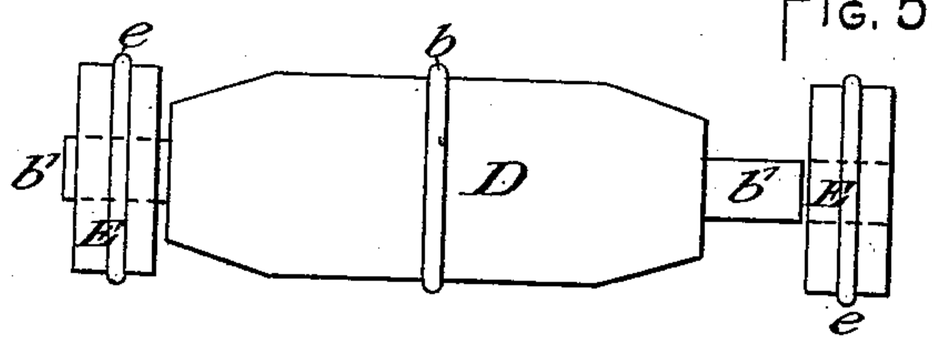


FIG. 6.

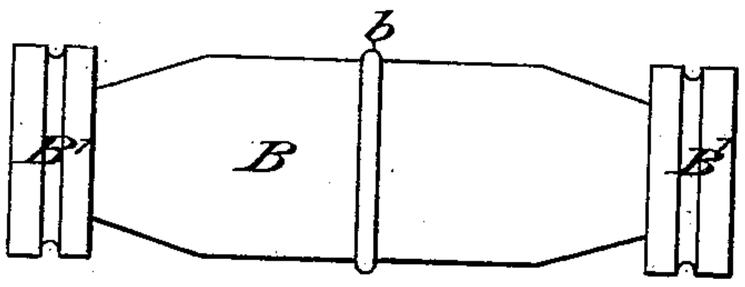
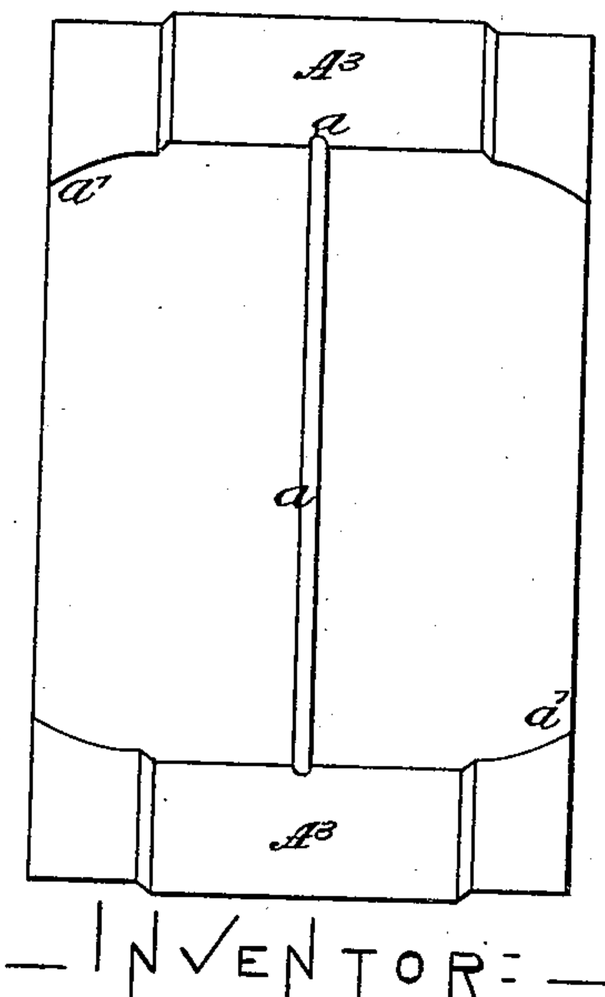


FIG. 3.



WITNESSES:

Charles C. Stetson
E. B. Bolton

INVENTOR:

John Graves
by his attorney
C. A. Stetson
New York

UNITED STATES PATENT OFFICE.

JOHN GRAVES, OF NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BENJAMIN G. HITCHINGS, OF GRAVESEND, N. Y.

ANTI-FRICTION BEARING.

SPECIFICATION forming part of Letters Patent No. 247,041, dated September 13, 1881.

Application filed February 21, 1881. (Model.)

To all whom it may concern:

Be it known that I, JOHN GRAVES, of New York city, in the State of New York, have invented certain new and useful Improvements relating to Anti-Friction Bearings; and I do hereby declare that the following is a full and exact description thereof.

It has long been common to provide journal-bearings with a series of rollers adapted to follow each other in a continuous circuit round and round the shaft, and by being interposed between the shaft and the concave, which takes the place of an ordinary bearing, to render the support frictionless. Obviously, such a device is capable of working with absolutely no friction, except that due to what is called "rolling contact." In practice the success of the bearing is greatly defeated by the difficulties of keeping the anti-friction rollers at proper distances apart. I have devised a construction and arrangement whereby the rollers are kept apart by the direct contact of wheels formed on or mounted on overhanging ends of the anti-friction rollers.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is an end elevation complete. Fig. 2 is a side view. Fig. 3 is an interior view, showing the shape of the bearing-surface of the part A′ and the central groove which receives the bead on the rollers. Fig. 4 is a view of the shaft. Fig. 5 is a view of the roller D and distancing-wheels E, and Fig. 6 is a view of the roller B, with its enlargements B′.

Similar letters of reference indicate like parts in all the figures.

A is a fixed support, containing a semi-cylindrical cavity; and A′ is a cap or binder, having the upper portion of the cavity formed therein. These parts, being secured together by bolts, constitute what corresponds to the ordinary bearing and binder for a similar shaft, M; but the cavity to receive the shaft is sufficiently larger than the shaft to allow for a series of anti-friction rollers.

B B, &c., are a series of anti-friction rollers. I will distinguish the alternate rolls by the additional mark D. Both sets of rolls extend out beyond the bearing proper. The ends of the rolls B are enlarged, as indicated by B′. The ends of the rolls D carry a separate loose wheel, as indicated by E. Each of these wheels E turns on an extension of the roll D, which forms an axis for the wheel E. The enlargements B′ and the wheels E are of uniform size and are nicely turned. When the rollers, with their enlarged ends and wheels, are placed in position, they form a series extending quite around the shaft-bearing. The enlargements B′ are each in contact with the adjacent wheels E. In operation the wheels E roll in contact with the enlargements B′ on the alternate rollers. The rollers B D all turn in the same direction, and, being caused to bear the considerable load on the bearing, turn strongly and uniformly. The enlargements B′ turn obviously in the same direction; but the wheels E tend to turn in the opposite direction. Being mounted loosely on their slender axes *b′*, these wheels turn freely. There is but slight strain, if any, on these parts, and, being lubricated, they thus turn in the opposite direction to their respective axes with little or no appreciable friction. All the parts may be, and preferably are, in practice lubricated at intervals.

So far as yet described the rollers and wheels require some extraneous means of keeping them in position endwise. They are certain to be properly distributed around the shaft by reason of the fact that the enlarged ends B′ and the corresponding wheels E are of such size as to nearly or quite fill the circle. The bodies of the rollers B and D are necessarily kept apart to the proper extent by reason of the fact that the enlargements and wheels on their ends are of little greater diameter. Those parts bearing against each other hold the rollers mathematically spaced. If, through imperfect calculation, or through wear or other cause, the enlargements B′ and the wheels E are of a little less than the proper diameter, the rollers will fail to be spaced with mathematical accuracy; but no particular mischief will result.

Any ordinary or suitable means may be employed to keep the rollers in position endwise. I can attain this end by any fixed or movable casing at the ends. I propose to use such a

casing in addition to the special means which I have provided.

I have provided special means in the form of circumferential beads and grooves for holding the rollers B and D in their proper positions endwise relatively to the box A A′, and also for holding the wheels E in their proper positions endwise. Referring to the body of the rollers, *b* is a smooth bead extending quite around each roller in the middle. A corresponding groove, *a*, is turned or otherwise produced around the interior of the parts A A′. The bead *b* matches in the groove *a* and travels around therein. This insures that the rollers shall not get out of place endwise. A corresponding bead, *e*, is formed around the exterior of each wheel E. A corresponding groove is turned around the exterior of each enlarged end. These parts engage with each other, and as the enlargement B′ is fast on the end of its roll, these last-named beads and grooves insure that the wheels E shall be kept in proper position endwise.

I have provided still another means for keeping the rolls in the proper position endwise. This is analogous to a shoulder or lip on the fixed parts engaging against a collar or shoulder on the roller; but I prefer that the parts shall be tapered.

I have described the cavity in each part A and A′ as completely semi-cylindrical. That form is not maintained absolutely throughout the entire length. The groove *a* in the middle has been already described. Besides this, I make the ends of the cavity smaller—that is to say, I produce an internal angle, *a′*, at each end of the cavity. The inner face of this angle is inclined, and I make a corresponding contraction on each of the rolls B and D. The effect of these several provisions is to insure the maintenance of the correct positions of the parts endwise irrespective of any extraordinary casing or other ordinary means; but I prefer to use, in addition to all these parts, plates A^2, which may be bolted on the overhanging ends of the fixed parts A A′, and constitute, in effect, parts thereof, as shown. These plates A^2, being secured by suitable bolts, aid in excluding dust and in preventing the introduction of any foreign matter, and they also serve, by receiving the contact of the ends of the several rolls, to maintain the rolls in position endwise additional to the security afforded by the several angles and grooves *a a′ b e*.

It will be observed that the bearing portion of my shaft M is enlarged a little, so as to give a fair bearing on the rollers and allow the enlargement B′ and the wheels E at the ends. My bearing is so nearly frictionless that no difficulty will be experienced from the increase of motion due to such enlargement.

The break or line of junction between the parts A and A′ is not a straight joint. I form a tongue in the one part matching into a corresponding socket or recess in the other. This tongue (marked A^3) aids to bridge the several rollers over the joint. It is theoretically desirable to make the pieces A and A′ in a single solid casting. Practically this is difficult; but the rollers will traverse around in my box with the same smoothness.

Modifications may be made. I can use some of the parts without the others. Thus some or all of the beads and grooves may be dispensed with, and still the advantages due to the enlarged ends B′ and wheels E may be enjoyed. Instead of the bead *b* formed on the rollers engaging in a groove formed in the fixed parts, I can make a groove in the roller and a bead in the fixed parts. Corresponding changes may be made in regard to the wheels and enlargements. The bead *b* may be formed on the enlargement B′, and the groove in which it engages may be formed in the wheel E, if preferred in any case. I can increase the number of the beads and grooves.

I claim as my invention—

1. An anti-friction bearing composed of a set of rollers formed with an extended axle, *b′*, on each alternate roll, in combination with loose wheels E, mounted thereon, of a size larger than the rolls, so as by their presence to hold the several rolls apart, as herein specified.

2. In combination with a shaft or journal bearing, M, and a suitable fixed casing or box, A A′, the anti-friction rollers B D, held a proper distance apart by enlargements B′, and loose wheels E, alternating on the several rolls, as herein specified.

3. In an anti-friction bearing, the inclosing-box formed in two pieces, A A′, tongued together at A^3, so as to bridge across the joint and induce a continuous smooth motion for the rollers, as herein specified.

In testimony whereof I have hereunto set my hand, this 2d day of June, 1879, in the presence of two subscribing witnesses.

JOHN GRAVES.

Witnesses:

WILLIAM CORLISS,

CHARLES C. STETSON.