(Model.)

J. GRAVES.

ANTI FRICTION BOX.

No. 247,043. Patented Sept. 13, 1881.

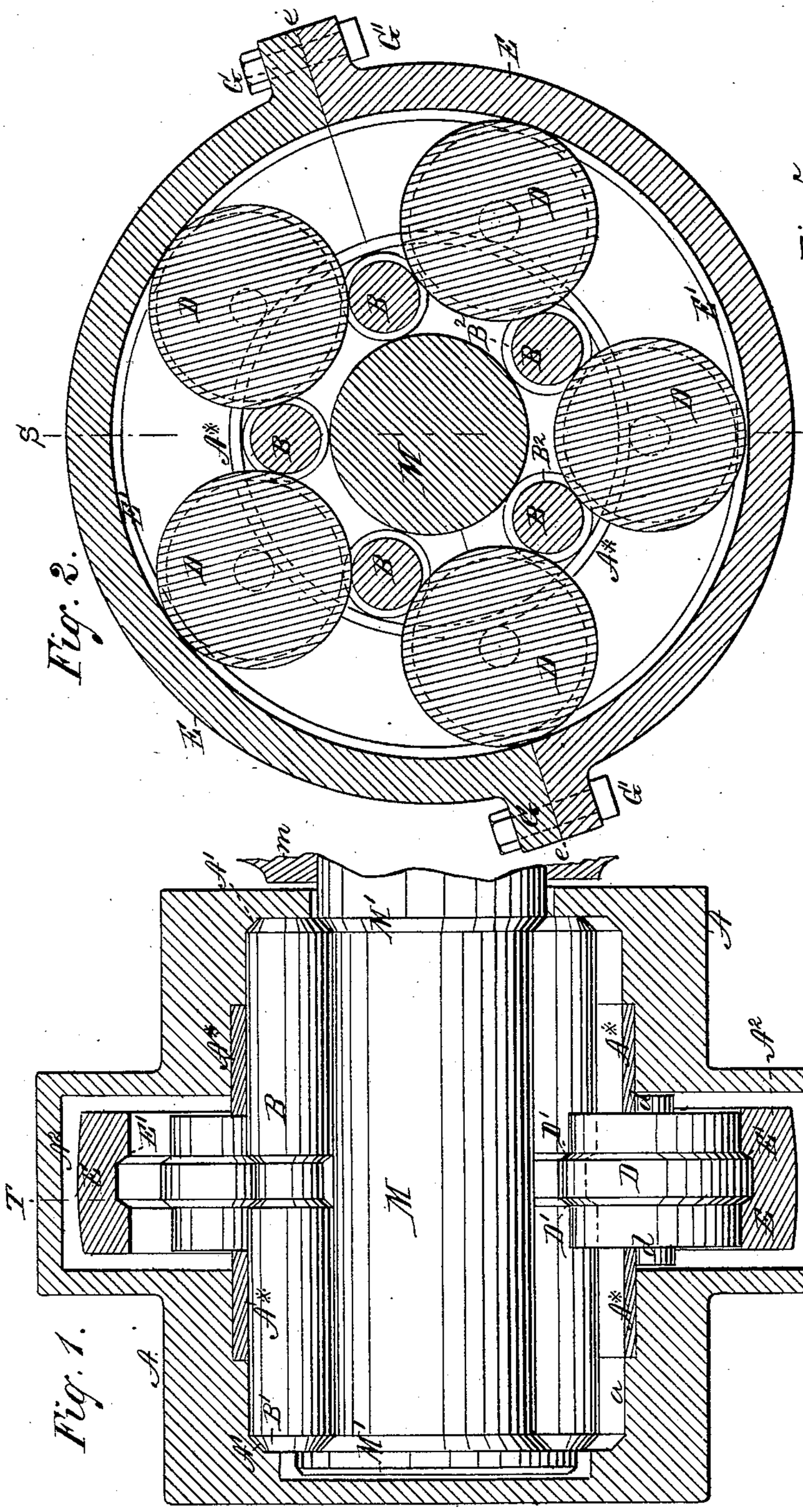

Fig. 1.

Fig. 2.

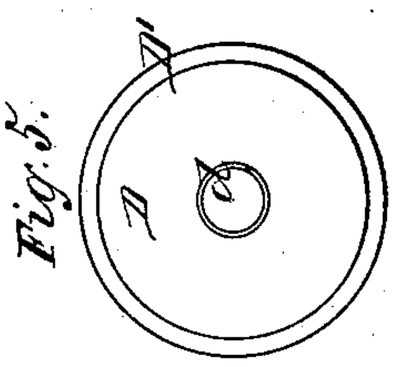

Fig. 5.

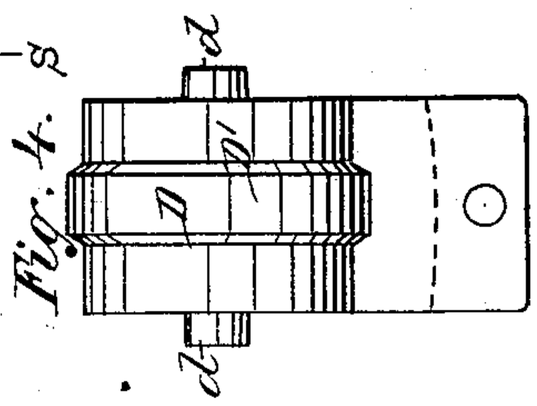

Fig. 4.

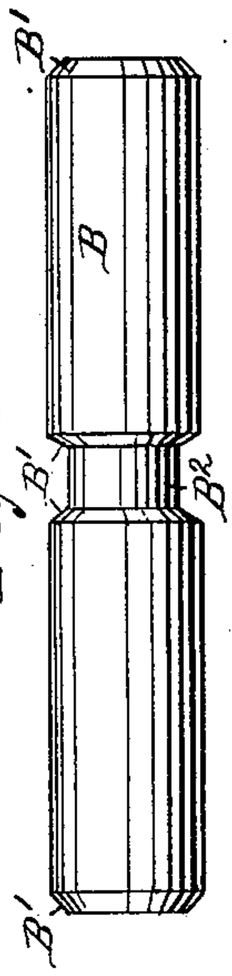

Fig. 3.

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ANTI-FRICTION BOX.

SPECIFICATION forming part of Letters Patent No. 247,043, dated September 13, 1881.

Application filed July 3, 1880. (Model.)

To all whom it may concern:

Be it known that I, JOHN GRAVES, a citizen of the United States, residing in Green Point, city of Brooklyn, Kings county, in the State of New York, have invented certain new and useful Improvements relating to Anti-Friction Boxes, of which the following is a specification.

I will describe what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a section on the line S S in Fig. 2. Fig. 2 is a section on the line T T in Fig. 1. The remaining figures show details detached. Fig. 3 is an elevation of one of the bearing-rolls. Fig. 4 is a corresponding view of one of the wheels or rolls which I call "separating-rolls," the function of which is to keep the bearing-rolls properly related to each other and the other parts. Fig. 5 is an end elevation of a separating-roll.

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

The drawings show the novel parts with so much of the ordinary parts as is necessary to show their relation thereto.

M is a car-axle, and *m* a portion of the car-wheel adjacent. The axle M is formed with beveled shoulders, as indicated at M′.

The exterior and stationary portion of the box is marked A. The cylindrical bearing-surface of the interior is marked *a*, and is very accurately finished.

The bearing-rollers are marked B, and their ends are beveled, as indicated by B′, to correspond to the beveled shoulders M′ on the axle. The adjacent surfaces of the box A present a corresponding bevel, as indicated by A′. The length of the space for the rollers is carefully adjusted to the actual length of the rollers, so that they shall form an approximately close fit at the ends and resist end motion. A portion at the center of the length of each roll B is reduced in diameter, as indicated at B^2. This part performs a function in receiving the tread of other rollers, while the larger portions perform the main function of firmly supporting the axle M.

D D, &c., are what I call "separating-rollers." They are mounted at the mid-length of the rollers B, and partially fill the space between each of said rolls B and the next adjacent. The box A is formed of larger diameter at the mid-length, as indicated by A^2, to accommodate these rolls D and a ring, E, which is fitted closely exterior thereto. This ring E is revolved freely by the rolling motion of the separating-rolls D. The ring is formed with its internal edges beveled, as shown by E′. The separating-rolls are correspondingly beveled at each end, as indicated by D′. Each separating-roll is formed with a trunnion, *d*, at each end, slightly beveled, as shown. These trunnions perform a function which is practically very important.

The box A is formed with a ledge, A*, projecting toward the separating-rolls D from each end, and extends a considerable distance back into the box A, flush with the inner surface thereof, as shown. These ledges are beveled on their outer faces to correspond to the bevel on the trunnions *d*. Their inner faces, however, are continuations of the general cylindrical interior surface of the box A. The ledges A* have such thickness and form that when the rollers are all in working position each ledge shall be close to or in gentle contact with the adjacent trunnion *d*. It does not bear with sufficient force under any ordinary conditions to engender any appreciable friction; but when, from any disturbing cause, there is a tendency of the rolls to jump or take on any irregular motions, the ledges A* bear against the trunnions *d* and restrain them so as to compel a smoothly continuous rotary motion.

The ring E turns freely within the cavity provided for its accommodation in the box A. It is nicely finished on its interior and fits closely against the outermost points in the separating-rolls D. Each of these rolls is formed with bevels D′, which may, if desired, be merely turned off from the periphery of the ends and the ring E correspondingly formed, as will be obvious; but I find it important in practice to carry these beveled shoulders farther inward, as shown in Fig. 1. The inner surface of the ring E is formed with corresponding bevels E′, and the rolls bear fairly and about equally against both the larger and the smaller diameters. The ring E is free to assume the motion due to the higher velocity of the large

diameter or the lower velocity of the smaller diameter of the rolls D. In practice the motion is or may be divided between the two speeds. Whichever bears the hardest will control the motion of the ring. The ring E is divided in two halves by the joint *e* and slightly enlarged in diameter at the points of junction. The parts are held firmly together by bolts G and nuts G′. By inserting a thin shim in the joints when they are first fitted together and subsequently a thicker one, or removing it altogether, the effective diameter of the interior of the ring may be varied within slight limits, as subsequent wear or other conditions may require.

The rolls B are correspondingly formed. The thin portions B bear against the largest diameter of the separating-rolls D. A short length of the adjacent cylindrical surface of the bearing-rolls B bears against the contracted diameter of the separating-rolls. The several rolls thus engaged are, without appreciable friction, held firmly both against endwise motion, and also in the proper parallel positions or against skewing motions. If from any cause one end of a bearing-roller tends to travel faster than the other, the roll is guarded against assuming a false position by the firm hold which the separating-rolls take, not only on the narrow part B^2 at the mid-length, but also on the portion of the larger diameter adjacent thereto.

It is important that the freely-revolving ring E shall be of sufficient strength to resist a considerable outward or expansive force received from the separating-rolls D; but I esteem it desirable to give that ring, or the inner surface thereof, a slight degree of elasticity. To this end I propose to make the ring E not of rigid iron or steel exclusively, but the inner surface, or the entire body, may be of a more elastic material—as hard rubber, gutta-percha, celluloid, or other of the practicable materials—which will hold the rollers in their places, and thus insure the proper separation and control the bearing-rollers B, and at the same time by the slight elasticity of the control will reduce the jar.

In what I esteem the most complete means of carrying out the invention, the main body of the box A is of strong cast-iron or steel in its ordinary condition, while portions of the metal forming the surface *a*, on which the bearing-rolls B traverse, is formed in separate rings, as indicated by rearward extension of the edges A*. These rings, being previously formed by proper machinery of steel in a hardened condition, and fitted very solidly in their places, form a tread for the main bearing-surface of the rollers B, and also a caging-surface or occasional bearing-surface for the trunnions *d*, which is more than usually durable. Thus it will be understood that these hardened-steel rings or ledges A* A* are or may be continuous rings extending around without joining. The body of the box is, on the contrary, formed necessarily in two halves, care being taken to adjust them very accurately and to hold them firmly in their true positions relatively to each other and to the inclosed rollers and axle. The beveled portions of the several revolving parts affect favorably the wear, as also the resistance due to friction. They are also of much advantage in another important point. They make it much easier to put the parts together and to take them apart when required in repairing and for adjustment.

The bevels B′ at the junction of the small central part of the main bodies of the bearing-rollers B are also important in still another respect. They reduce the tendency to fracture at the shoulders. I wish to employ the rolls B in their hardest possible condition. When thus brittle the tendency of the metal to break at the square shoulder is liable to be serious. My form avoids square shoulders.

Modifications may be made in many of the details.

Some parts of the invention may be used without the others; but I prefer the whole used together.

I can increase the length of the trunnions *d* and can increase or lessen the bevel thereof.

I can, by slightly increasing the diameter of the separating-rolls D, make the trunnions *d* of larger diameter or the ledges A* thicker. By employing separating-rolls of the same size as here shown and employing one more of the bearing-rolls B and separating-rolls D in each set, I can have these parts—that is, the trunnions *d* and the ledges A*—considerably thicker.

I can use the trunnions *d* considerably smaller than here shown, if preferred.

The bevels at B′ A′ and at various other points may be changed within wide limits.

I claim as my invention—

1. The combination, with the main shaft or axle M, of the bearing-rolls B, separating-rolls D, free confining-rings E, and box A, when the parts are beveled as indicated by M′ B′ D′ E′ A′, and adapted for joint operation, as also for convenient assembling and separating, as herein specified.

2. The trunnions *d* on the separating-rolls D, in combination with the box A, having the ledges A*, and with the free confining-ring E, bearing-rolls B, and axle or shaft M, as herein specified.

3. The separately-formed rings A*, each in a single piece of hardened steel, in combination with the box A, formed in two pieces, and with the ring E, separating-rolls D *d*, bearing-rolls B B^2, and shaft M, as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 30th day of June, 1880, in the presence of two subscribing witnesses.

JOHN GRAVES.

Witnesses:
HECTOR M. HITCHINGS,
CHARLES C. STETSON.