(No Model.) 2 Sheets—Sheet 1.

A. L. ANDERSON.

Car Axle Box.

No. 238,830. Patented March 15, 1881.

Fig. 1

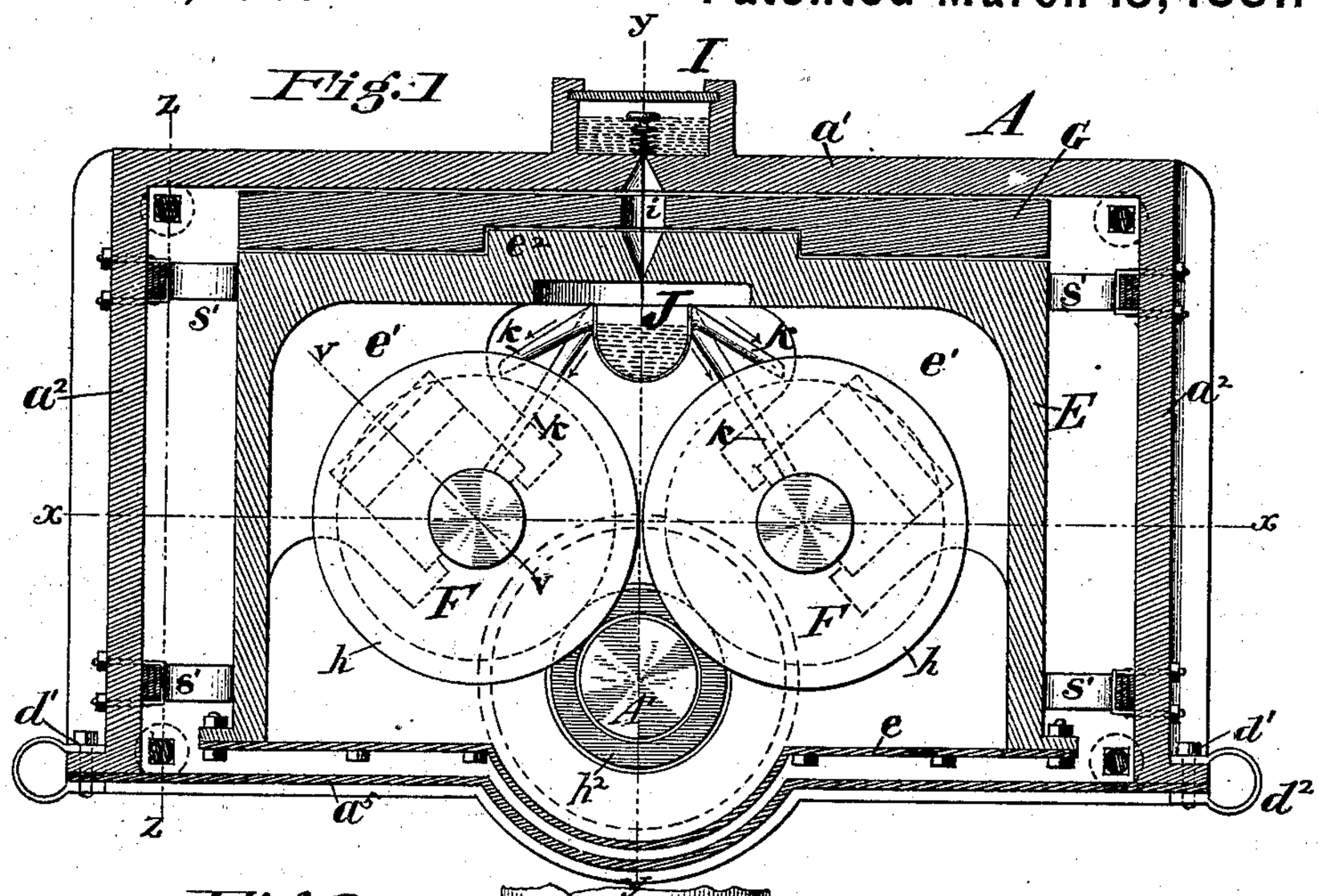

Fig. 2

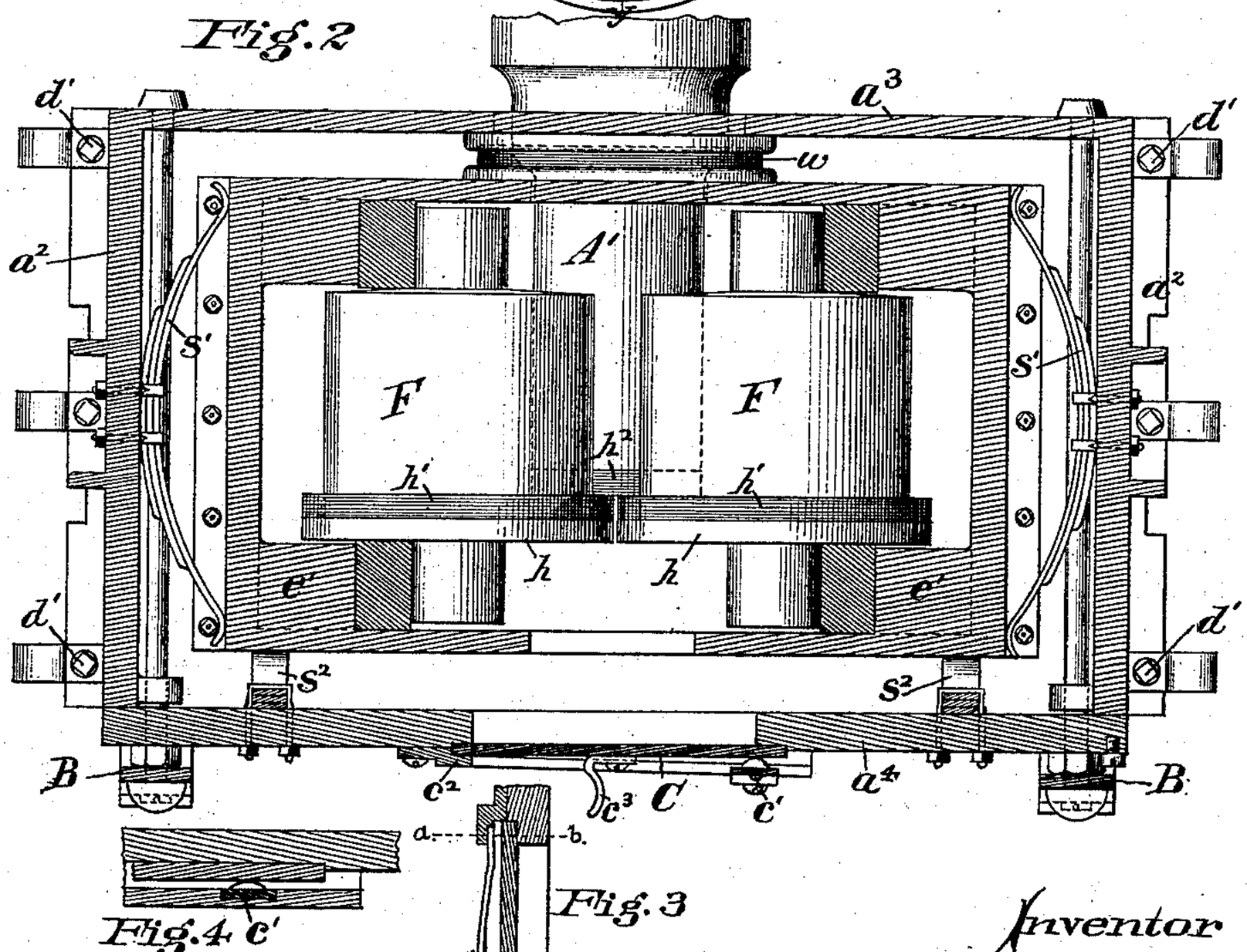

Fig. 4 c'

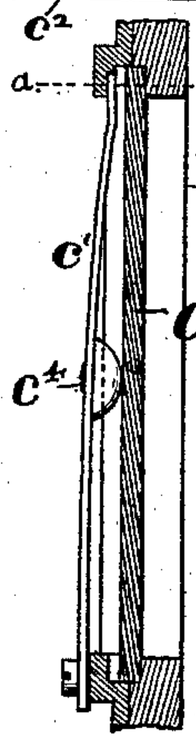

Fig. 3

Attest

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by Kellogg & Co.

Attorneys.

(No Model.) 2 Sheets—Sheet 2.

A. L. ANDERSON.

Car Axle Box.

No. 238,830. **Patented March 15, 1881.**

Fig. 5

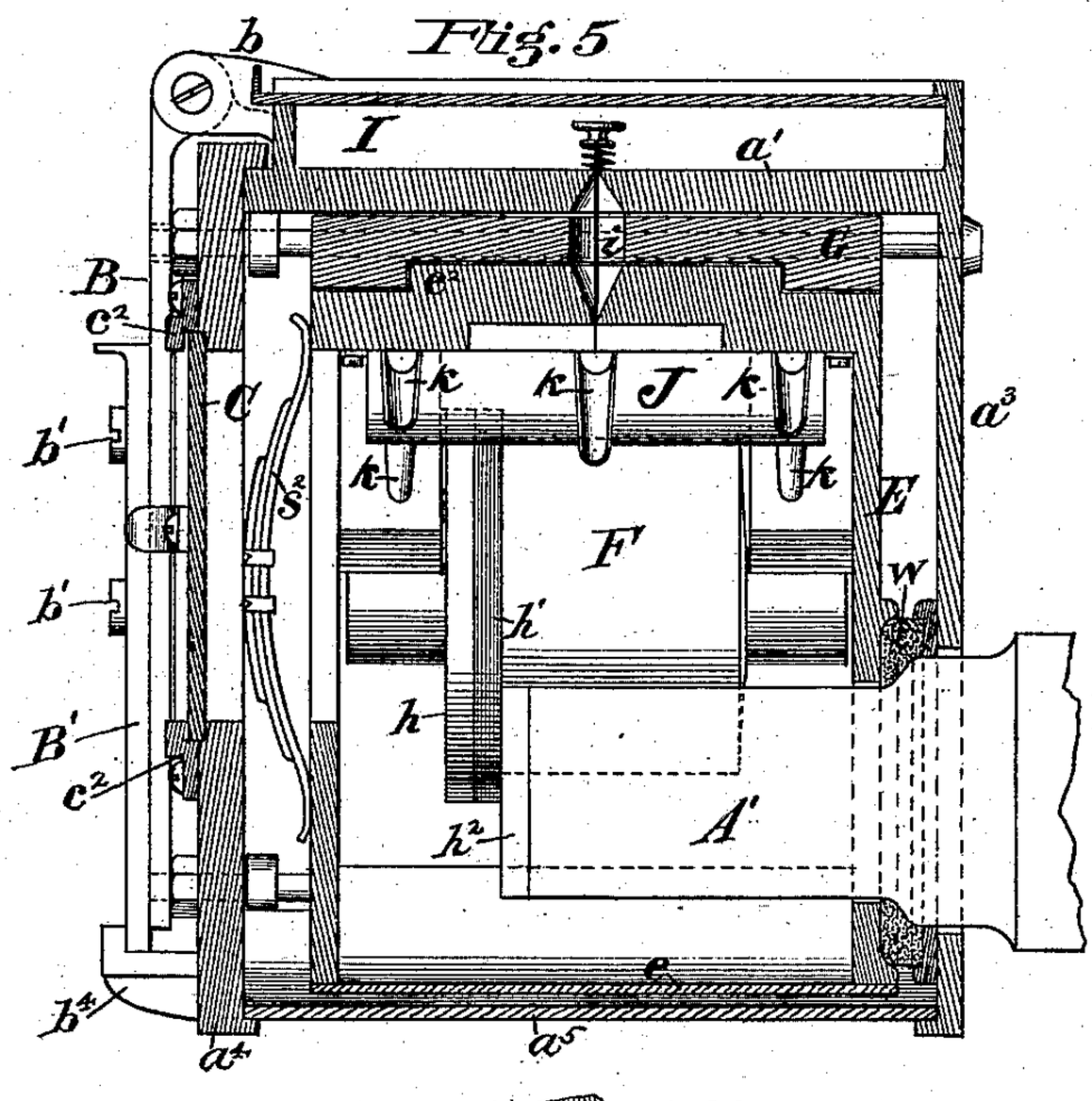


Fig. 6

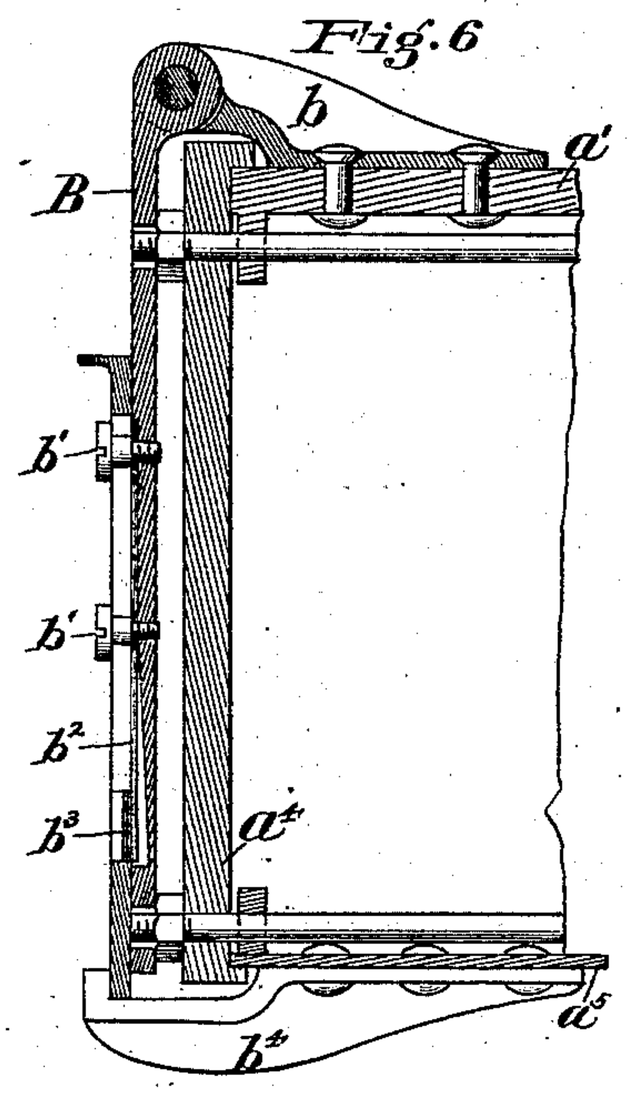


Fig. 7

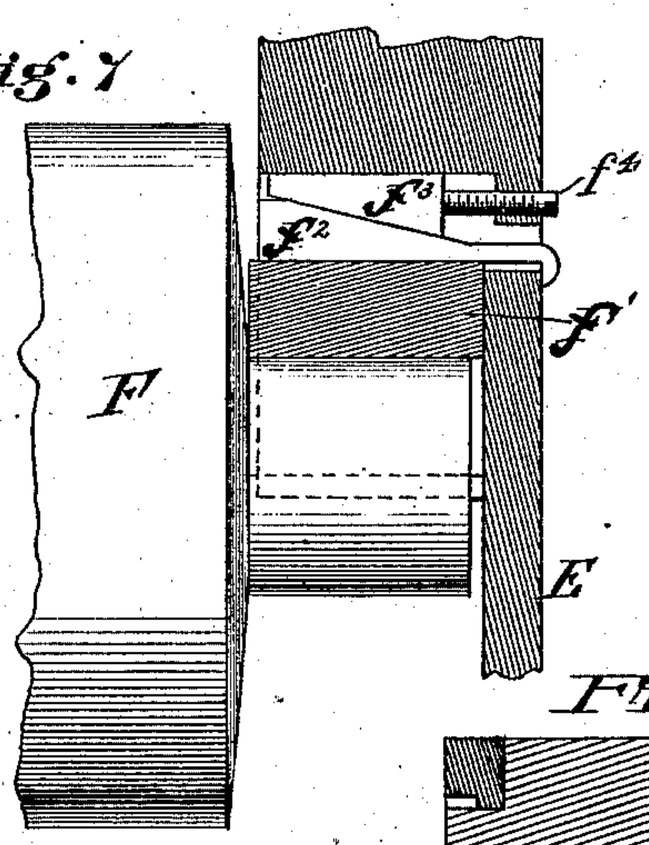


Fig. 8

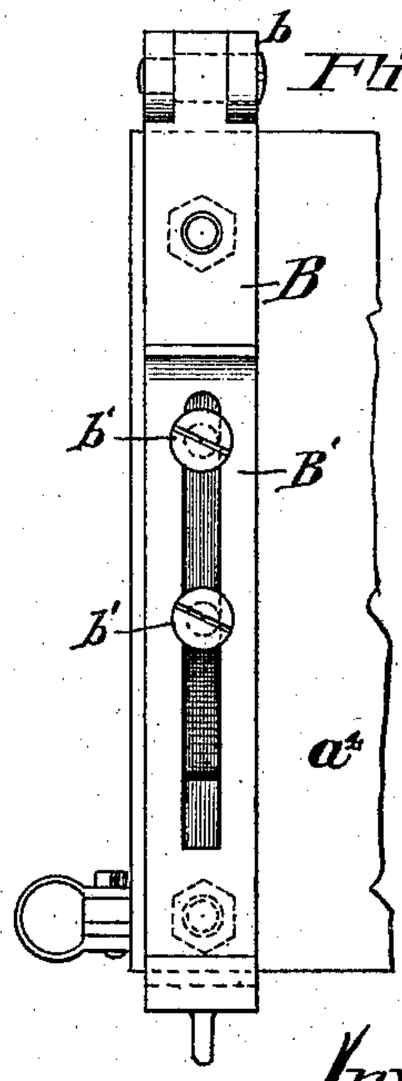


Fig. 9

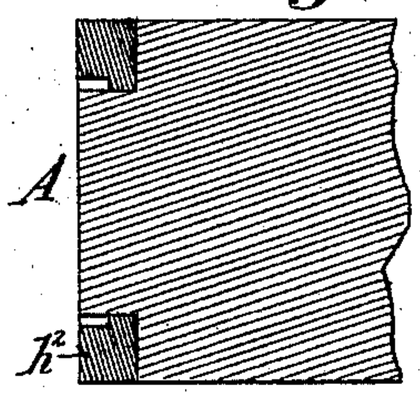
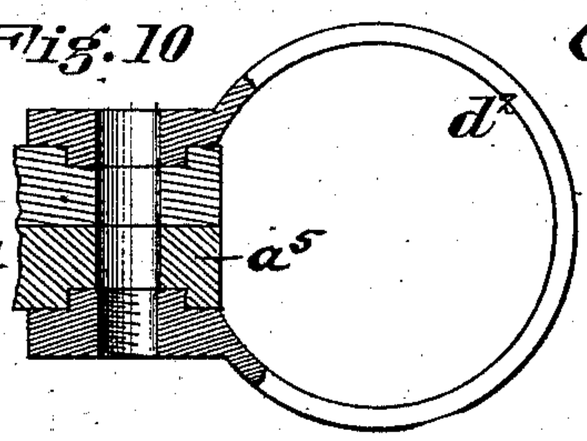


Fig. 10



Attest
C. P. Doolittle.
Ed Kelihan

Inventor
Allen L. Anderson
by Kell & Hood
Attorney

UNITED STATES PATENT OFFICE.

ALLEN L. ANDERSON, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO JAMES H. FOOTE, OF SAME PLACE.

CAR-AXLE BOX.

SPECIFICATION forming part of Letters Patent No. 238,830, dated March 15, 1881.

Application filed December 9, 1880. (No model.)

To all whom it may concern:

Be it known that I, ALLEN L. ANDERSON, a citizen of the United States, residing at Cincinnati, Hamilton county, Ohio, have invented new and useful Improvements in Car-Axle Boxes, of which the following is a specification.

My invention relates to improvements in the bearings of car-axle journals, and its object is to provide a bearing which will remedy certain disadvantages of those now in use, and especially, among others, in respect to preserving a constant parallelism between the bearings and the axle-journal, and at the same time permit a free horizontal movement of the axle in adapting itself radially to curvatures of the track, and in respect, also, to other advantages tending to the more efficient and useful operation of the box and axle-bearing, as more fully hereinafter set forth.

To this end my invention consists, first, in the combination, with an exterior main axle-box, the walls of which are practically closed, of an independent box or bearing for the axle, inclosed within the outer box, and arranged to permit of its free longitudinal movements independent of the latter, the upper portion of the outer box resting against the top portion of the interior box or bearing, and permitting a pivotal movement of the latter; second, in the construction of the main and auxiliary boxes in respect to their mutual operation, whereby the above-stated results are attained; third, in the provision and construction of a washer-plate as a bearing between the main box and the auxiliary box or carriage, and the construction of the auxiliary box in relation to and its combination with the same, whereby the auxiliary box has a pivotal movement upon the washer independent of the movement of the latter upon the main box; fourth, in the means whereby the auxiliary box or bearing-carriage is held to its proper normal position, yet permitted to move, when required, by the pivotal movements of the axle, as above set forth; fifth, in the combination, with a railway-car axle and its wheels set rigidly thereon, and the frame of the containing-truck, of the main axle-boxes and auxiliary boxes, in which bearings are seated, having flanges projecting over and upon the ends of the axle, and springs actuating the bearings against the axle from opposite ends to take up lost end motion, thereby controlling the side motion of the car on uneven tracks; sixth, in the combination, with a main and auxiliary box, and the axle journaled therein, of a washer of absorbent and resilient material, forming a dirt and oil proof covering for the axle-aperture of the main box, and capable of adapting itself to independent movements of the axle; seventh, in the provision and construction of safety-straps to prevent loss of the retaining-nuts holding the parts of the main box together; eighth, in the provision and construction of a removable door covering an access-opening for inspecting the interior parts of the main and auxiliary boxes; ninth, in the construction of the bottom plates of the main and auxiliary boxes, whereby an oil-receptacle is provided in which the axle-journal rotates; tenth, in the means for holding the bottom plate of the main box in position, and preventing loss of retaining-bolts; eleventh, in the provision and arrangement of means for automatically lubricating the bearings; twelfth, in the construction of the washer at the end of the axle.

A preferred form of my invention, in which friction-rollers are employed as bearings for the axle-journal, is embodied in mechanism illustrated in the accompanying drawings, (two sheets,) in which—

Figure 1 is a sectional elevation of the boxes in position in the plane of the inner face of the outer wall of the roller-carriage at right angles to the axle-journal; Fig. 2, a sectional plan of the boxes in the plane *x x* of Fig. 1; Fig. 3, a sectional plan of removable door of the outer box; Fig. 4, a partial sectional plan in the plane *a b* of Fig. 3. Fig. 5 is a sectional elevation of the boxes in position in the plane *y y* of Fig. 1. Fig. 6 is a partial sectional elevation of the main box in the plane *z z* of Fig. 1. Fig. 7 is a sectional plan of journal-bearing in the plane *v v* of Fig. 1. Fig. 8 is an elevation of one of the safety-straps shown in Figs. 5 and 6. Fig. 9 is a partial axial section of the axle-journal and its washer. Fig. 10 is a sectional elevation of one of the safety-spring washers shown in Figs. 1, 2, and 8.

To enable others skilled in the art to which

my invention appertains to construct and use the same, I subjoin the following description.

A, in the drawings, designates the outer or main car-axle box, which is substantially of rectangular form, carries the bearings proper of the axle, and moves in vertical guides in the pedestal of the truck, with or without ordinary springs and equalizing-bar.

The top wall, a', side walls, a^2 a^2, and rear wall, a^3, of the main box A may be cast together as one piece; but the front wall, a^4, and bottom plate, a^5, are removable. The rear wall, a^3, is provided with an aperture of greater diameter, to allow a limited movement in all directions to the axle. The front wall, a^4, is held in position by four bolts passing horizontally through the box near the corners. These retaining-bolts have square shoulders passing through square apertures in the rear wall, a^3, to prevent turning when their nuts are tightened against the front wall, a^4, in drawing it firmly into its place.

To prevent the nuts from working loose in the ordinary use of the apparatus I provide safety-straps B B, each hinged to a projecting lug, b, bolted securely to the top wall, a', of the box, having a slotted extension-piece, B', held thereto by guide or set screws b' b', and retained in its ultimate position by a flat bar-spring, b^2, secured on the face of the strap B in a suitable depression, and provided at its free end with a square shoulder, b^3, which engages in the slot of the extension-piece B, to hold it down, or in a notch at its lower end, to hold it up. The object of this construction is to enable the clamping-bar thus constituted to swing over the upwardly-projecting jaw or hook of a retaining-cleat, b^4, securely attached or bolted to the bottom plate, a^5. When the extension-piece is raised the clamping-bar can pass over the hook or jaw of the retaining-cleat, when, by pushing the spring inward, the extension-piece is released and allowed to drop down into the socket formed by the jaw, when the spring again flies out in the slot of the extension-piece and holds it securely in its extended position, and thus the clamping-bar is retained against the face of the nuts, as shown in Figs. 5 and 6. The two clamping-bars are thus held securely at top and bottom, and aid in holding the front of the box secure against pressure from within.

For the purpose of access to the inside of the box for inspection or other purposes, the front wall, a^4, is provided with an aperture covered by a sliding door, C, held in a marginal depression around the opening constituting its seat by a spring, c', and provided with guide-cleats c^2 c^2 above and below to assist in removing and replacing it, and a handle, c^3, for the same purpose.

The spring c', for retaining the door C in position, may consist of a spring-bar, c', Fig. 3, pivoted to the front wall, a^4, at one side of the opening, and provided with a button, c^4, which, when the spring is moved into position across the door and caused to engage behind a suitable catch, as shown, rests against and retains the door in position.

The bottom plate, a^5, of the main box is formed with a semi-cylindrical depression or gutter, as shown, corresponding with the position of the axle-journal and extending from front to rear across the plate. The bottom plate, a^5, is held in position by flanges projecting inwardly from the front and rear walls, upon which it rests when the front and rear walls are drawn together by their retaining-bolts, as shown in Fig. 5, and also by screw-bolts d', passing through and securing the same to flanges projecting outwardly at the bottom of the side walls, a^2. The bolts d' are passed through the perforated ends of a U-spring, d^2, which is slipped over the end of the flange and plate, one of the ends of the spring serving as a washer and the other as a nut for the retaining-bolt, the latter being provided with threads for the purpose. The jaws of the U-spring d^2 are so spaced apart as to require spreading to slip over the flange and plate, and are provided with bosses, which sink into depressions around the bolt-holes in the upper side of the flange and lower side of the bottom plate, and thus the spring is permanently retained in position by its own tension, as well as by the retaining-bolts. The springs are of such tension that four of them will sustain the bottom plate, a^5, in position in case of loss of the retaining-bolts d. Six or more of these bolts and springs may be used, if desired.

Having thus described the principal features of the main box, it remains to describe the inner box and the connections and relative functions of the two.

The inner box, E, which is, in fact, simply a carriage for the bearings, is preferably formed in one piece as a rectangular box open at the bottom, and having an aperture at one side, which, when the parts are in position together, corresponds with the access-aperture at the side of the main box for inspection of the inner parts, and an aperture at the rear end for the axle.

Cast or secured in the upper corners of the carriage E are jaws or seats e' for the journals of the two steel friction-rollers F F, whose axes, when the parts are in position, preferably occupy positions parallel to and equidistant from the vertical plane of the axis of the axle-journal—about forty-five degrees.

The mode of constructing the bearings of the friction-rollers is clearly shown in Figs. 1 and 7. The bearing-brasses f', which are preferably made of gun-metal, are adapted to move out and in between the jaws as guides, as actuated by two wedges, f^2 f^3, one of which is adapted to be forced laterally upon the other by a regulating-screw, f^4, passing through the side of the inner box. An opening is also left in the side of the box for the insertion of the wedges f^2 f^3. By these means the rollers may be adjusted parallel to each other.

The top of the box-carriage E may be a plane surface resting against the plane inner surface of the top wall, a', of the main box; but I prefer to form it with a circular boss, e^2, projecting upwardly and fitting a corresponding seat in a washer-plate, G, otherwise flat and about the horizontal dimension of the box-carriage E, and interposed between it and the top wall of the main box A. It will be seen that by this construction any pivotal movement of the carriage E in a horizontal plane will not necessitate any movement of the washer-plate G, the boss e^2 acting as a pivot, but that any longitudinal movement of the box-carriage will carry with it the washer-plate; but as in operation the movement is both pivotal and longitudinal the plate acts as a washer.

The bottom plate, e, of the inner box is secured to its position by retaining-bolts, and is formed with a shallow depression to accommodate the axle-journal, and forms a trough in which the oil dripping downward from the parts above is caught and retained, so that the axle revolves constantly in oil.

The inner box or carriage, E, is held to its normal position by springs s' s^2, interposed between it and the side and front walls of the main box A, suitable space being left for that purpose, and for the independent movements of the inner box. In the drawings I have shown bowed springs used for this purpose, but coiled springs or blocks of elastic rubber or any resilient material may be used. The springs s', as will be obvious, operate to resist any longitudinal movements of the inner box, and are mutually in opposition on opposite sides in compression.

The full operation and function of the springs s^2 require for their explanation a reference to the construction of other parts, which is as follows: In the first place there is interposed at the rear, between the outer and inner boxes, a washer, w, of felt or other absorbent and resilient material of any suitable kind, surrounding the axle and held in a suitably-formed depression or concavity in the rear wall of the inner box, and against a metal washer snugly fitting the axle and resting against the rear wall covering the axle-aperture. The immediate effect of the springs s^2, therefore, is to hold the washer w in a state of compression, and it is obvious that any vibratory or side movement of the inner box in relation to the outer one will be followed by an expansion or compression of the washer w, which always keeps the aperture in the rear wall, a^3, closed in relation to the axle, and thus the access of dirt or escape of oil is prevented. The further function of the springs s^2 is as follows: The rollers F F are provided with flanges h h, re-enforced by washers h' h' of steel or gun-metal, which project somewhat over and upon the end of the axle A', the contact-surface being a washer, h^2, of steel or gun-metal of slightly less diameter than the journal proper of the axle, a suitable seat being turned off the end of the axle for its reception. The rollers F being held firmly in their bearings, and end-play prevented by their bearings, it is manifest that the end-thrust of the axle is transmitted through the roller-flanges and inner box to and resisted by the springs s^2 seated against the wall of the outer box; and in arranging the box in the pedestal-guides and adjusting the pedestal upon the truck-frame the boxes A at opposite ends of the axle are so placed as that the springs are permanently in compression sufficient to maintain a constant end pressure against the axle. By this arrangement of the parts any relative thrust of the axle in one direction is resisted by the further compression of the spring on that side, and followed up by the relaxation of the opposite spring, and this effect being transmitted to the car through the truck-frame and swivel-bearing, the lurch of the car is constantly resisted by the resiliency of the springs.

The radial thickness of the annular washers h' is somewhat less than that of the washer h^2, and the washer h^2 is counterbored for a portion of its axial length, so as to present a face of contact equal to the radial thickness of the washers h'. By this construction the wear of the washer h^2 extends over its entire contact-face uniformly, and the washers h' are never in contact with the axle-journal. The counterboring of the washer h^2 also affords a means of determining, by inspection of the parts in position, whether the wear of the washers is such as to require renewal, as such would not be required until the counterbored portion of the washers h^2 is worn entirely away.

In order to secure a perfect lubrication of the parts, I provide on the top of the main box an oil-receptacle or trough, I, fitted with a sliding cover suitably secured. At or near the center is an opening through the top wall of the box, which enlarges below in cone shape and registers with a correspondingly large cylindrical opening extending through the washer-plate G, and this again registers with an opening in the top wall or boss, e^2, of the inner box, E, which is contracted at its lower end, also cone-shaped. The object of this construction is to preserve the opening under all movements of the inner box for the oil descending from the trough I.

Through the common axis of the openings extends a needle, i, having a weighted head and upheld by a spring of slight tension. The lower end of the needle passes entirely through the opening, acts as a valve for the lower end of the opening, and the shaking movements of the box in running over uneven track will cause a vertical reciprocation of the needle and permit oil to drip through into the interior of the box, where it is caught by an inner trough, J, provided with overflow-spouts k, extending to the surface and journal-bearings of the friction-rollers, as shown in the drawings.

The apparatus described herein involves the use of friction-rollers as bearings for the axle-journal; but it will be apparent that many of the advantages claimed can be attained in a degree by the use of ordinary socket-bearings, instead of the friction-rollers, though the latter are much to be preferred.

Heretofore axle-boxes have been supported by shackles pivoted to the lower ends of the ordinary car-pedestals, the several boxes being connected by a system of rods, whereby said boxes are adapted to simultaneously adjust themselves to conform to the curvature of the road; but such is not my invention.

Having described my invention, I claim and desire to secure by Letters Patent—

1. The combination, with an exterior main axle-box, the walls of which are practically closed, of an independent box or bearing for the axle, inclosed within the outer box and arranged to permit of its free longitudinal movements independent of the latter, the upper portion of the outer box resting against the top portion of the interior box or bearing and permitting a pivotal movement of the latter, all substantially as described.

2. In combination with a main axle-box and an inner box or carriage for the axle-bearing, adapted to have an independent horizontal movement, side springs, s', interposed between the outer box and the bearing-carriage, as and for the purpose set forth.

3. In combination with a car-axle box and a movable inner box containing the axle-bearing, springs s' and s^2, interposed between the outer and inner boxes on three sides, as shown, to retain the axle-bearing in its normal position, but allow movement in either direction, as and for the purpose set forth.

4. In combination with a railway-car axle, its truck-frame, and axle-boxes having therein independently-movable bearings, springs interposed between the movable axle-bearings and the outside walls of the axle-boxes proper, and arranged to exert a constant pressure against the ends of the axle to resist end-thrusts of the axle and side movements of the car, as set forth.

5. In combination with a car-axle box having within the same a horizontally-movable inner box or carriage for the bearing of the axle-journal, a washer, G, interposed between the bearing-surfaces of the two boxes, as set forth.

6. The outer box, A, in combination with an inner box, E, provided with a boss or pivot, e^2, on its upper side, and washer G, having a corresponding seat in which the boss e^2 enters, as and for the purpose set forth.

7. In combination with a car-axle box and a movable inner box or carriage containing the axle-bearing, and provided with a spring or springs holding the movable bearing in its normal position, but permitting a horizontal movement, a washer, w, of resilient material, surrounding the axle and maintaining a constant cover for the axle-aperture in the rear wall of the box, as set forth.

8. The extensible safety-straps B B′, in combination with the removable front and retaining-nuts of the axle-box, as set forth.

9. In combination with the box A, provided with hinging and retaining lugs $b\,b^4$, the safety-straps consisting of the fixed member B and the movable member B′, provided with spring b^2, as and for the purpose specified.

10. In combination with a main axle-box and an inner movable box or carriage for the axle-bearing, a washer of absorbent and resilient material surrounding the axle and constituting a covering for the axle-aperture of the main box capable of accommodating the movements of the axle, as set forth.

11. The inner box or carriage, having its bottom plate formed into a depending trough-like depression in which the axle revolves, substantially as and for the purpose described.

12. In combination with the bottom plate of the main box and the flanges of the side walls, the curved springs d^2, constituting a nut and washer, provided with bosses, arranged to spring over and seat in the marginal depressions of the bolt-holes and clamp the bottom plate in position independently of the bolts, as set forth.

13. In combination with an oil-trough, I, upon a car-axle box, provided with suitably-formed discharge-apertures, the spring needle-valve i, arranged to be automatically operated by the ordinary movement of the parts in use, as set forth.

14. In combination with the oil-trough I, having a discharge-aperture enlarging downward, the washer G, perforated, as shown, and the inner box having a corresponding perforation diminishing downward, and the needle-valve i, substantially as specified.

15. In combination with the main box and axle-bearing, the oil-reservoir J, provided with overflow-spouts k, arranged and operating as shown, for the purpose specified.

16. In a car-axle box having a removable front and bottom, the combination of the rear wall having a flange projecting inward, forming a seat for the bottom plate, with a front plate provided with an upper flange projecting inward above the box, and a lower flange projecting inward below the box and holding the bottom plate, constructed and arranged as shown and set forth.

17. The washer h^2, counterbored for a portion of its axial length, in combination with the axle-journal and flanged bearing-rollers, substantially as and for the purpose specified.

18. The combination, with the front wall, a^4, of an axle-box provided with an access-opening and with guide-cleats c^2, of the sliding door C, and the spring-bar c', pivoted to the front wall at one end, and arranged to be moved across the door and press thereon, substantially as and for the purpose described.

19. The inner box or carriage, E, constructed with jaws e' at the inner corners for the bearings of the friction-rollers, and an opening at the rear for the car-axle, and at the

front for inspection of the bearings, and a removable bottom having a depression constituting an oil-trough for the axle, as set forth.

20. The friction-roller F, seated in the carriage E, in combination with the jaws e', bearing-brasses f, wedges f^2 f^3, and regulating-screw f^4, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALLEN L. ANDERSON.

Witnesses:
C. P. DOOLITTLE,
L. M. HOSEA.