Feb. 24, 1959 D. McNICOLL 2,875,004

AXLE-BOXES

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Fig. 1.

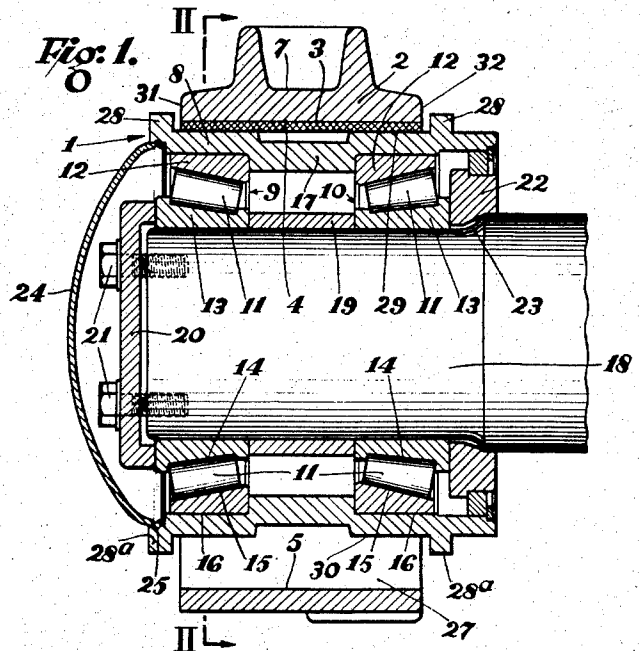
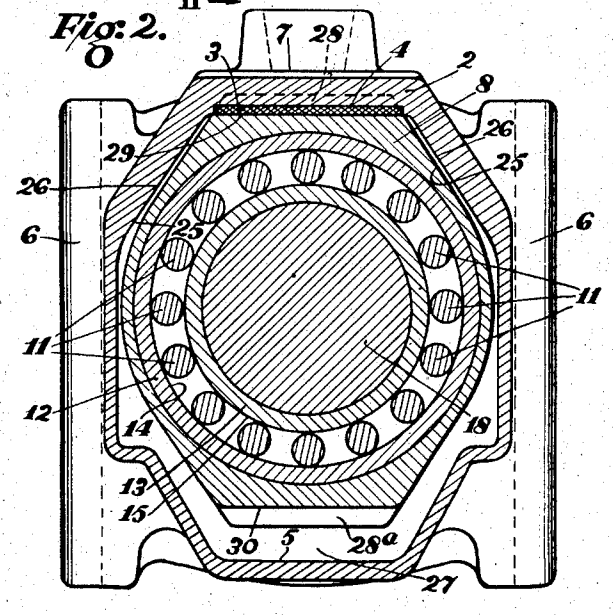


Fig. 2.



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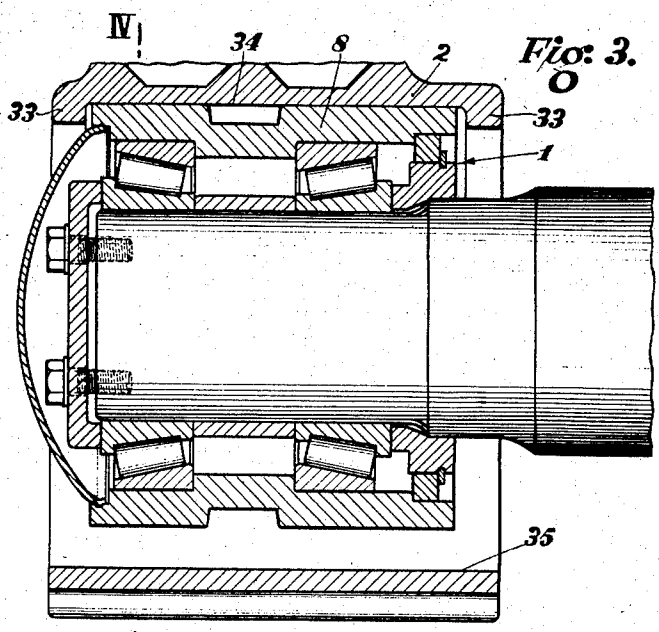

Fig. 3.

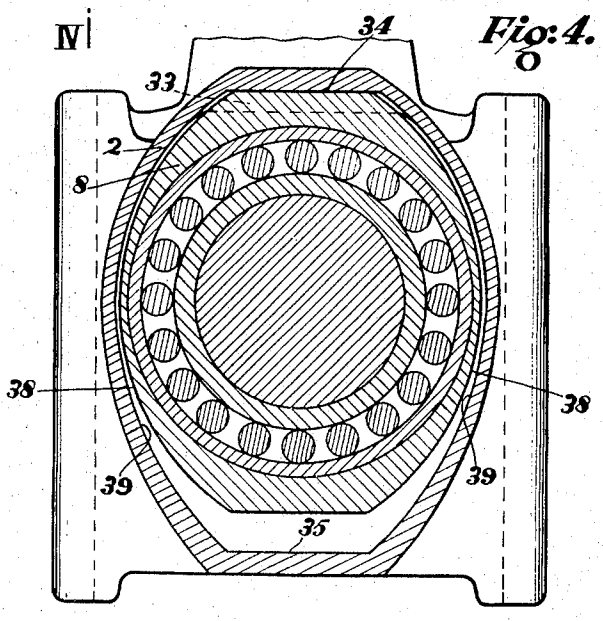

Fig. 4.

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Fig. 5.

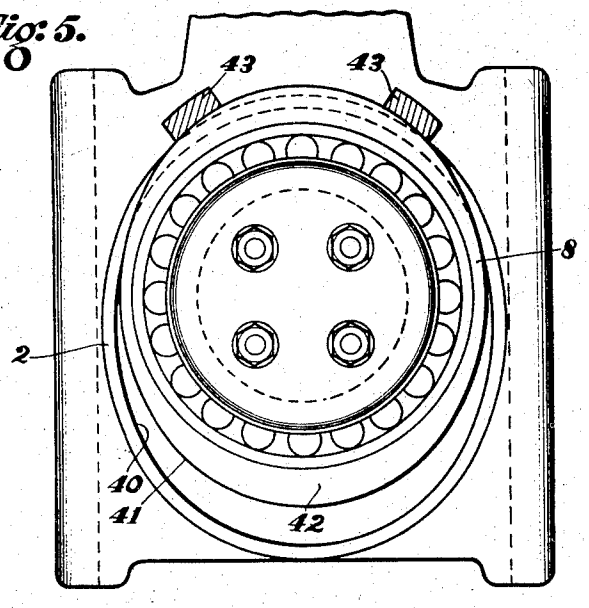
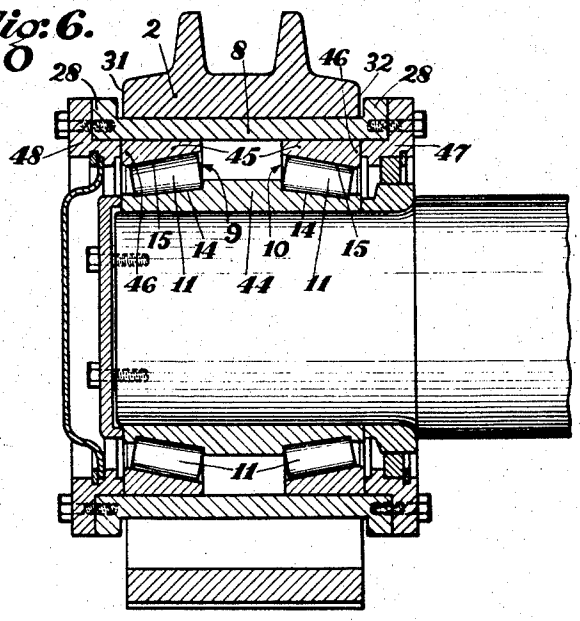


Fig. 6.



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AXLE-BOXES

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Fig: 7.

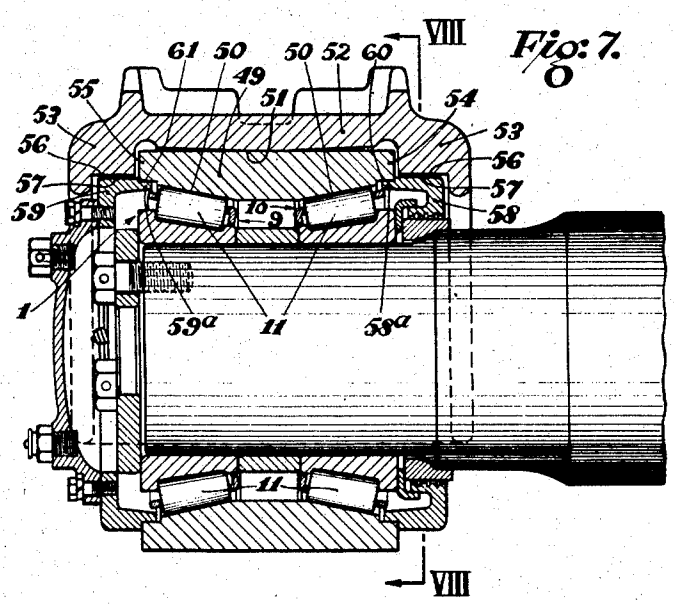
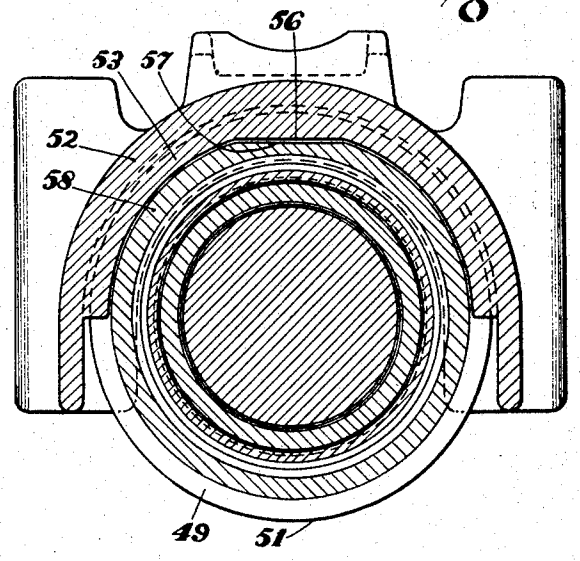


Fig: 8.



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United States Patent Office 2,875,004 Patented Feb. 24, 1959

2,875,004

AXLE-BOXES

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Application June 14, 1955, Serial No. 515,451

Claims priority, application Great Britain December 20, 1954

4 Claims. (Cl. 308—180)

This invention relates to railway and like vehicle axle-boxes of the kind comprising two axially-separable units, one unit being a self-contained inner bearing unit consisting of anti-friction bearings contained within a housing, and the other unit consisting of an outer box body or casing carrying at the top a spring-supporting seat for accommodating the vehicle spring and provided at opposite sides with horn guides for slidable engagement with the horn plates or horn blocks of the vehicle frame. Such a construction permits of the respective component units being made of a material most suited to their individual functions.

The principal object of the present invention is to provide an improved form of axle-box, of the kind referred to, in which there is no need of separate fixing means, such as bolts or the like, for holding the two units together against relative axial displacement; which permits of relatively quick and easy separation of the units; and which facilitates interchange or replacement of parts of the axle-box. A further object is to reduce the overall degree of essential machining accuracy for the entire axle-box.

According to the invention, an axle-box of the kind referred to, comprises inner and outer units, means for preventing or restricting relative rotation between the said units, and means for preventing or restricting relative axial displacement of the units, the latter means consisting of spaced flanges or projections situated at both ends of the upper parts of the said units, each flange or projection being carried on one of the units so as to overlap an end of the other unit; the outer unit normally resting directly upon the inner unit and the form of the lower portion of the outer unit being such as to permit of a relative vertical movement of the units sufficient to cause each of the said flanges or projections on one unit to move clear of the opposed end of the other unit, so that the units can be separated by a relative axial movement.

The flanges or projections may be outwardly-directed flanges on the ends of the bearing housing, so as to co-operate with the ends of the outer unit; or they may be inwardly-directed flanges or projections on the ends of the outer unit, so as to co-operate with the ends of the inner bearing unit.

The outer unit may completely surround the inner unit, with sufficient clearance between its lower part and the bottom of the inner unit to permit of the required relative vertical displacement for clearing the flanges from their co-operating part; or the said outer unit may be of inverted U form, open at the bottom, to permit of the said relative displacement.

In the accompanying drawings showing axle-boxes constructed in accordance with the present invention:

Figure 1 is a vertical longitudinal section through an axle-box, with the axle shown in elevation, in accordance with one embodiment of the invention.

Figure 2 is a transverse section on line II—II, Figure 1.

Figure 3 is a view similar to Figure 1, showing a modified construction of axle-box.

Figure 4 is a section on line IV—IV, Figure 3.

Figure 5 is an end view of an axle-box of another modified construction, and with the end cover plate removed.

Figure 6 is a longitudinal section, showing a further modification.

Figure 7 is a longitudinal section of another modified form of axle-box.

Figure 8 is a section on line VIII—VIII, Figure 7.

Referring to Figures 1 and 2 of the drawings, a two-unit axle-box consists of an inner bearing unit **1** and a separate outer unit surrounding and enclosing the inner unit.

The outer unit consists of an open-ended body or casing **2**, of substantially octagonal cross-section interiorly, with flat horizontal top and bottom interior faces **4**, **5**, and provided at opposite sides with vertical horn guides **6**, **6**, of channel section formed integrally with the side walls of the body **2** and extending for substantially the full height of the latter. On the top of the body unit **2** is an upwardly projecting seat **7**, of conventional form, for reception of the pad of the vehicle suspension spring. The top interior face **4** may, as shown, have applied to it a wear pad or plate **3**.

The inner bearing unit **1** of the axle-box consists of a housing **8** in the form of a sleeve or barrel of an axial length greater than the axial length of the outer body unit **2** and containing two tapered roller bearings **9**, **10**, one at each end, the larger ends of the rollers **11** of each bearing being directed outwardly. The rollers **11** of each bearing run between outer and inner race rings **12**, **13**, having conical race surfaces **14**, **15**. The outer race rings **12** are received within cylindrical annular recesses **16** in the respective outer ends of the housing **8** with their inner ends abutting shoulders formed by an inwardly-directed annular spacing rib **17** extending around the interior of the housing, at the middle thereof. The inner race rings **13** of each bearing **9**, **10**, are fitted upon the axle **18**, and a spacing or distance ring **19**, also surrounding the axle, is located between said inner race rings. A retaining plate **20** attached to the end of the axle **18** by screws **21** overlaps the inner race ring **13** of the outermost bearing **9** to hold both the bearings **9** and **10** on the axle **18**, with the inner race ring **13** of the innermost bearing **10** abutting a closure ring **22** situated at the inner end of the axle-box and which is axially supported against a shoulder **23** on the axle. An end cover plate **24** may be sprung into an annular rebate **25** in the outer end of the housing **8**.

The said housing sleeve or barrel **8** which encloses the bearings **9**, **10**, has its exterior surface shaped at top and bottom to a truncated triangular form, to provide flat top and bottom faces **29**, **30**, and oblique side faces **25**, **25**, adjacent the latter, said oblique faces being substantially parallel with the inner faces of the oblique portions **26**, **26**, of the octagonal body unit **2**. In use, the flat interior face **4** of the upper portion of the body unit or the wear pad **3** thereon, rests on the flat top face **29** of the bearing housing **8**, with the oblique upper side faces **25**, **25**, of the housing mating with or slightly spaced from the opposed oblique faces **26**, **26**, of the body unit. The interior depth of the body unit **2**, however, is considerably greater than the exterior depth of the bearing unit **8**, so that when, in use, the upper parts of the two units rest one upon the other, as above described, a considerable vertical clearance **27** is provided between the lower part of the bearing unit and the lower interior portion of the body unit, both as regards the opposed flat bottom faces **5** and **30** and the opposed oblique side faces.

In order to prevent or restrict relative axial displace-

ment between the bearing and body units, the bearing housing 8 of the bearing unit 1 is provided at opposite ends of the flat upper face 29 with upwardly-projecting flanges 28, 28, preferably extending across the full width of said face 29 so as to overlap, with suitable clearances, the respective ends 31, 32, of the body unit; said flanges 28, 28, being of a depth less than the bottom clearance 27 between the two units 1 and 2. The said two units can be separated and removed from one another by lifting the body unit 1 relatively to the bearing unit 2 until the flanges 28, 28, on the latter are clear of the body unit ends 31, 32, when the two units can be separated by a relative axial movement.

Similar flanges 28a, 28a, can be provided at the ends of the bottom flat face 30 of the bearing housing 8, so that, if desired, the bearing unit 2 can be inverted in position within the body unit 1, in order to bring the flanges 28a, 28a, which were previously inoperative at the bottom, into operative position at the top, for co-operation with the ends 31, 32, of the body unit as hereinbefore described.

In the modification shown in Figures 3 and 4 of the drawings, instead of the axial retaining flanges being on the bearing housing, inwardly-extending or depending flanges 33 are provided on the ends of the body unit 2 so as to ovelap the ends of the housing 8 of the bearing unit 1. Also, instead of the body unit 2 being of octagonal form in cross-section, it is, as shown in Figure 4, of substantially elliptical shape both interiorly and exteriorly, but with flat horizontal upper and lower ends 34, 35, opposed to the corresponding flat upper and lower faces 36, 37, of the bearing unit 1. In this case, the sides 38, 38, of the bearing housing 8 are of arcuate or curved form of smaller curvature than the interior side surfaces 39, 39, of the body unit 2. The body unit 2 may have an interior form of any other non-circular shape than elliptical.

In a further modification shown in Figure 5, the interior 40 of the body unit 2 is of substantially elliptical contour, and the circular bearing housing 8 has end flanges 41 also of elliptical shape but of smaller overall dimensions than the interior 40 of the body, said flanges 41 providing, at the top, crescent-shaped end retaining parts 42 which, when the body unit 2 rests on the housing 8, overlap the ends of said body unit. In this case fore-and-aft rocking movement (that is, relative rotary movement) between the bearing and body units is prevented by providing on each end of the body unit, two angularly-spaced overhanging stop lugs 43 which engage the edge of the upper flange or retaining part 42 at each end of the housing. Alternatively the stop lugs 43 may engage end flanges of other suitable shape than crescent shape and which may have flat portions to co-operate with the lugs.

In a further modification shown in Figure 6, the general arrangement of a housing 8, containing the bearings 9 and 10 and provided with upwardly-projecting end flanges 28 which overlap with ends 31, 32, of a surrounding body unit 2, is similar to that hereinbefore described with reference to Figures 1 and 2, but the two rows of tapered bearing rollers 11 are arranged with their large ends inwards and run between coned race surfaces 14 on a single common inner race sleeve 44 and conical surfaces 15 of outer race rings 45 whose thicker outer ends 46 abut against flanged end closure rings 47, 48, attached to the ends of the bearing housing 8.

In another modification, shown in Figures 7 and 8, the housing of the inner bearing unit 1 consists of a sleeve 49 which also constitutes a common outer race member of the bearings 9 and 10, the interior surface of said sleeve 49 having two relatively reversed conical race surfaces 50, 50, which form the outer tracks for the tapered rollers 11. The outer periphery 51 of the said sleeve 49 is of cylindrical form. The body unit 52 is of inverted U shape in cross-section (Figure 8), its lower end being entirely open and the inner surface of its upper portion resting on the sleeve 49 of the inner bearing unit 1, as in the other constructions. The body unit 52 is provided with inwardly-projecting flanges 53 which overlap the ends 54, 55, of the housing sleeve 49, thereby preventing relative axial movement between the body unit 52 and the bearing unit 1. In this construction, relative rotation between the units is prevented by providing on the underside of the upper part of the flanges 53 flat portions 56 which are closely opposed to similar flat surfaces 57 provided at the top of end closure rings 58, 59, having extension parts 58a, 59a, which are a press fit within rebated ends 60, 61, of the sleeve 49.

In the constructions hereinbefore described, the end flanges for preventing axial displacement of the units have both been carried on one of the units. If desired, however, the flange at one end may be carried on one of the units and the flange at the other end carried on the other unit.

It is to be understood that the outer unit may be of any desired non-circular arcuate or polygonal form interiorly so long as it co-operates with a suitably-shaped non-circular inner unit in order that relative rotation between the two units is prevented or restricted.

I claim:

1. A vehicle axle-box for an axle having an end surface and a shoulder spaced from said end surface, said axle-box comprising an inner bearing comprising two inner race rings upon said axle, a spacing ring surrounding said axle and located between the two inner race rings, two outer race rings enclosing said inner race rings, said outer and inner race rings having opposed conical race surfaces, rollers between said opposed race surfaces and a housing unit enclosing said outer race rings and having a central inwardly directed spacing rib to form shoulders engaging said outer race rings, said housing unit having flat parallel outer top and bottom surfaces, and substantially elliptical outer side surfaces extending between said top and bottom surfaces, whereby said housing unit is of non-circular exterior shape which is symmetrical above and below a horizontal median plane; and an outer casing unit having a flat inner top surface resting upon the outer top surface of said housing unit, a flat inner bottom surface located at a distance from the inner bottom surface of said housing unit, and curved inner side surfaces spaced from the outer side surfaces of said housing unit and joining said inner top and bottom surfaces, a spring supporting upwardly projecting seat upon the top of said casing unit and vertical horn guides upon the sides of said casing unit, flanges located on the ends of one of said units and overlapping the ends of the other one of said units, the depth of said flanges being less than said distance between said bottom inner and outer surfaces to permit of a relative vertical movement of said inner bearing and said outer casing unit sufficient to cause said flanges to move clear of the housing unit, whereby the units can be separated by a relative axial movement in either axial direction, and whereby said inner bearing, being of symmetrical form, can be reversed in position within said outer casing unit on reassembly of the units, a closure ring unit engaging said shoulder of the axle, said housing unit, and one of said inner race rings, a retaining plate connected to said end surface of the axle and overlapping the other one of said inner race rings, and an end cover plate enclosing said retaining plate and engaging an annular rebate formed in said housing.

2. An axle-box in accordance with claim 1, wherein said flanges are located at the ends of said casing unit and extent inwardly to overlap the ends of said housing unit.

3. An axle-box in accordance with claim 1, wherein said flanges are located at the ends of said housing unit and extend outwardly to overlap the ends of said casing unit.

4. An axle-box in accordance with claim 3, comprising a wear plate located between the flat inner top surface of the casing unit and the flat outer top surface of the housing unit.

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