J. D. IMBODEN.

CAR-AXLE.

No. 182,673. Patented Sept. 26, 1876.

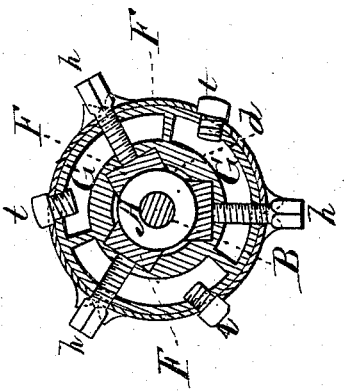

Fig 3

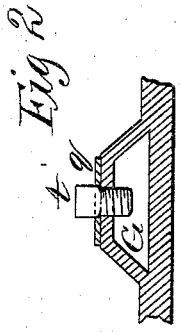

Fig 2

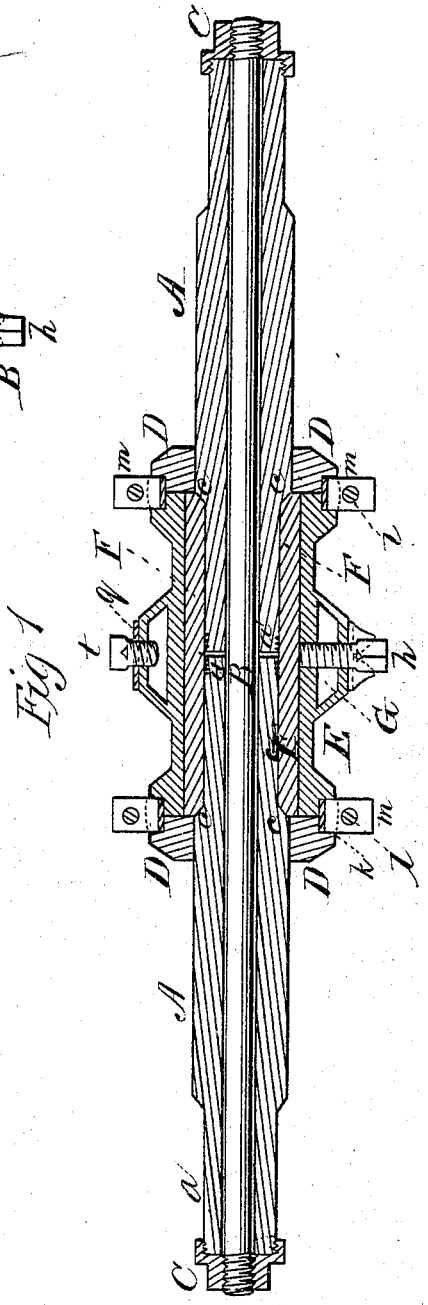

Fig 1

WITNESSES

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JOHN D. IMBODEN, OF RICHMOND, VIRGINIA.

IMPROVEMENT IN CAR-AXLES.

Specification forming part of Letters Patent No. **182,673**, dated September 26, 1876; application filed June 17, 1876.

To all whom it may concern:

Be it known that I, JOHN D. IMBODEN, of Richmond, in the county of Henrico, and State of Virginia, have invented a new and valuable Improvement in Twisting Car-Axles; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a longitudinal central section of my improved car-axle. Fig. 2 is a detail view; and Fig. 3 is a cross-sectional view taken through the splice-box, the gibs, and the core.

This invention has relation to that class of railway-car axles, which are divided into two sections, of which each section moves with its own wheels independently of the other; and it consists in the construction and novel arrangement of the cylinder-sections with equal and similar journals on both ends of each section; of the binding-core and the countersunk nuts in connection therewith; of the central splice and truss-box, its gibs, set-screws, and other adjuncts; and, finally, of all the parts in combination, as hereinafter fully shown and described.

In the accompanying drawings, the letters A A designate the cylinder-sections of the axle, to which the wheels are secured at the proper distance from the end of each to conform to the gage of the particular road on which they are to run. These cylinders form the external portion of the axle, and they are provided with an axial bore to receive the binding-core B, which extends the entire length of the axle. Each cylinder-section is half the length of the axle, and has a journal turned at each end, one marked *a* on the drawings, exterior to the wheel, and answering to the ordinary burden-journal of the common axle; the other *a'* on the inner end of the cylinder. The two journals *a* are designed to work in the usual way in the journal-boxes. The other two journals *a'*, meet each other end to end exactly at the middle of the core.

The core B has a screw-thread cut on each end *b* to receive the countersunk nuts C, which serve the double purpose of clasping and drawing together the axle-sections, and keeping the journals, at the middle of the axle, well up to their bearings in the splice-box; and also of keeping the brasses in place in the ordinary journal-boxes, in this manner answering to the heads or end buttons of the ordinary axle.

When the cylinder-sections have been placed on the core and the nuts C screwed up, we have a simple severed hollow axle held together by the bolt or core, which, without further mechanical aid, would be wholly dependent on the stiffness of the core, to resist bending.

To render the central portion of the axle or the point of junction of the two cylinders as inflexible as any part of the axle, capable of resisting bending strains and yet free to yield to torsional force, the central splice-box and its bearings are employed. In order to form proper abutments for the ends of the splice-box, the collars D are shrunk or screwed on the cylinders at the shoulders *c* of the inner journals.

E represents the splice and truss box, preferably formed of cast-iron, and long enough to abut against the collars D, when the inner journals *a'* are in close contact with each other at the ends—that is to say, if the collars D are placed at the shoulders of the inner journals, as represented in the drawings, the splice-box should be exactly the combined length of the two inner journals. In casting this box, it is cored out to have a bore, *d*, of somewhat greater diameter than that of the incased journals. In this bore are formed several longitudinal grooves, *e*, extending its entire length, each groove being preferably about half the diameter of the bore in width, and one-fourth its diameter in depth. These grooves are intended to receive the gibs or bearings F, which are closely fitted and well embedded therein. These bearings are ground to fit neatly on the journals *a'*, and each gib, being as long as both journals, acts as a splice over the joint where the ends of the journals meet.

In this construction it is plainly impossible to bend the axle at the joint without bending the gibs. In order, however, to re-enforce these gibs

or bearings at the point of greatest strain—to wit, over the joint between the ends of the journals *a'*—a hole, *g*, is bored and tapped out from the outside of the splice and truss box, and a strong set-screw, *h*, is forced down into close contact with the gib under it, so that its bearing is exactly in the middle of the gib. By this means the strain at this point is transferred in great part to the body of the splice and truss box.

The splicing-gibs are all securely trussed in their beds, and bending cannot occur unless the strain is sufficient to cause the entire mass of the gibs and truss-box to give way. The axle may in this manner be made stronger at the splice than at any other point.

To lubricate the parts in the splice-box, an annular oil-chamber, G, is cored out and cast in the said splice-box, with external supply-apertures and screw-stops *t*, and suitable internal perforations through which the oil is fed to the journals between the sides of the gibs.

To prevent leakage of oil from the box, and to exclude dust, adjoining rabbets are formed in the adjacent edges of the collars and boxes, forming grooves *k*, into which are laid close-fitting packings of sole-leather or other suitable material, breaking the joint. To keep the packing in place in the groove a clamp-band, *m*, is applied over the same, fitting closely in the groove *k*, and being drawn together by a screw passing through suitable lugs, as indicated at *l*.

If the parts referred to are well fitted the leakage of oil will be prevented, unless it may be that a small portion may find its way along the core to the nuts at the ends of the axle, and there escape. In that case the leak is of service in the car-axle box.

In order to secure the set-screws and oil-stoppers in position lock-nuts may be employed. These may consist of flexible metallic plates *q*, designed to be arranged transversely on the splice-box. Each plate is provided in its central portion with a square hole to fit on the head of the oil-stopper, at one end with an elliptical aperture, through which one of the set-screws passes, and at the other with a bifurcation, the branches of which are designed to clasp the head of the set-screw and hold it securely.

The motion of the journals at the middle of the axle is limited to that occasioned by curvature in the roadway, undulations in the rails, or difference in the diameters of the wheels, causing one wheel to revolve faster than its fellow. This motion will be so slow and inconsiderable, and the bearing upon these inner journals so small, that they will probably sustain no appreciable loss of size from wear until the outer journals are too much worn to be further used with safety. Then it is proposed to reverse the cylinders in the wheels, drawing off the latter from the outer ends, removing the washers from the inner ends, and replacing these parts, respectively, on the opposite or inner ends of the sections and on the outer ends thereof. In this manner the worn journals will be turned inward, and the wheels will be upon the unworn journals, which were the inner ends of the cylinders. The gibs of the truss-box are now fitted to the worn journals, and the outer journals put to use in the axle-box, the axles thereby acquiring double life.

By the freedom of motion allowed to the wheels flattening is prevented, and the life of the wheels prolonged perhaps threefold over what it is in the inflexible axle. A corresponding saving is effected in the wear of rails, and an important gain secured in the traction necessary to haul a train. This axle is capable of introduction on all present rolling-stock, requiring no change in the standard bearings or boxes, and no independent or supplemental box. The axle is designed to preserve its alignment under all conditions, and spreading of the wheels, by reason of the core, is as impossible as it is with the solid axle.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the tubular axle-sections A A, the solid core filling up said sections, screw-threaded upon its ends, and the countersunk nuts clamping the adjacent inner ends of the said sections together, substantially as specified.

2. In combination with the tubular axle-sections, and a solid core, breaking joints therewith, the splice or truss box E, having an annular oil-reservoir, G, substantially as specified.

3. The splice or truss box E, having gibs or bearings F between the box and axle-sections, in combination with the axle-sections A A, and the set-screws clamping the said bearings across the joint of the axle-sections, substantially as specified.

4. In combination with the axle-sections A A, having rabbeted collars D, the splice or truss box, having correspondingly-rabbeted ends, and a packed clamp-ring fitting in the groove formed by the said rabbets, substantially as specified.

5. The sections A A, of a car-axle, adapted to be reversed, substantially as set forth.

6. The sections A A of a car-axle, having the rabbeted screw-threaded ends *a*, whereby they are capable of being reversed, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

JOHN D. IMBODEN.

Witnesses:

ALLEN H. GANGEWER,

F. J. MASI.