(No Model.)

H. M. ENDERS.

CARRIAGE AXLE.

No. 497,371. Patented May 16, 1893.

Fig. 1.

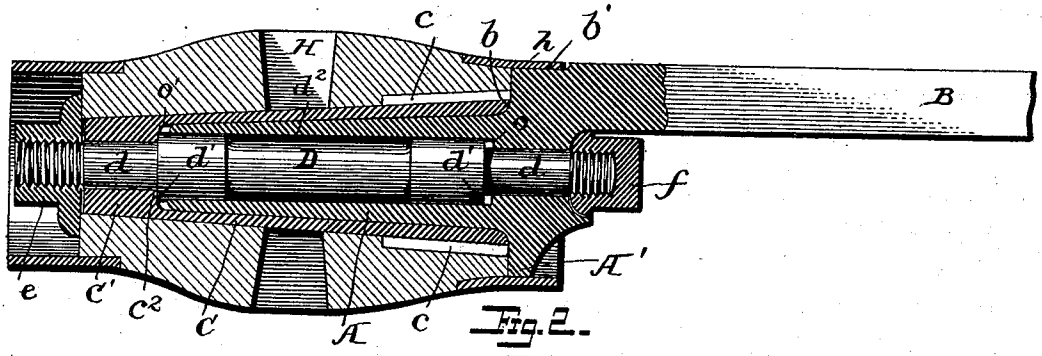


Fig. 2.

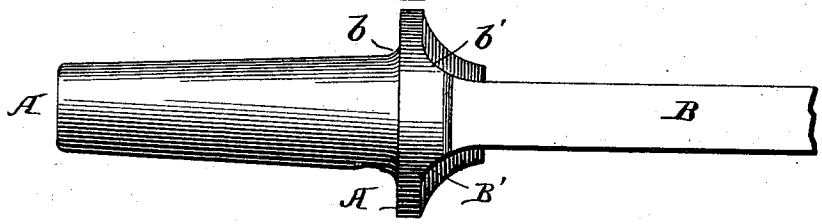


Fig. 3.

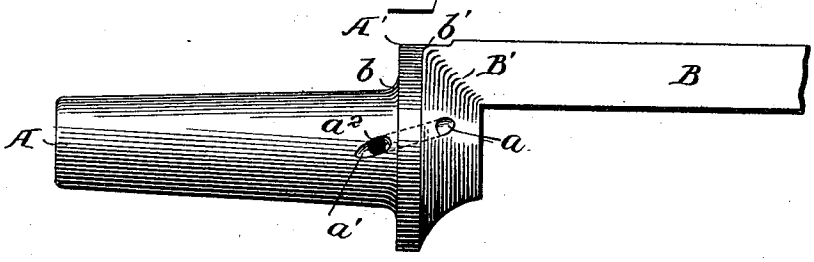


Fig. 4.

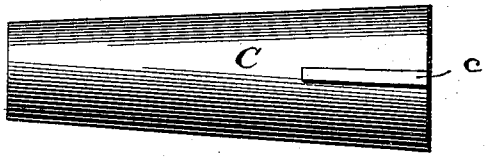
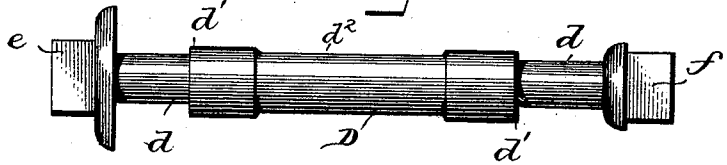


Fig. 5.



Witnesses.
Jno. G. Hinkel
Wm. E. Neff

Inventor
Henry M. Enders
By J. Watson Attorney

UNITED STATES PATENT OFFICE.

HENRY M. ENDERS, OF YORK, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO WILLIAM S. STAIR, OF SAME PLACE.

CARRIAGE-AXLE.

SPECIFICATION forming part of Letters Patent No. 497,371, dated May 16, 1893.

Application filed September 28, 1892. Serial No. 447,104. (No model.)

To all whom it may concern:

Be it known that I, HENRY M. ENDERS, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented certain new and useful Improvement in Carriage and Wagon Axles, of which the following is a specification.

My invention relates to wagon and carriage axles and it consists more particularly in improvements in the boxes and spindles of such axles.

In the accompanying drawings, Figure 1 is a sectional view of an axle and hub constructed in accordance with my invention. Figs. 2 and 3 are plan and side views respectively of one end of the axle. Fig. 4 is a side view of the axle box, and Fig. 5 is a side view of the reversible spindle with the retaining nuts upon its ends.

In carrying out my invention, the axle spindle A is preferably offset from the axle proper B to facilitate the connection of the axle box and spindle as hereinafter described. The offset may be a slight one as shown in the drawings at B′ and the axle may be located either above and below the central line of the spindle; or the offset may be greater thus forming what is called a cranked axle. The axle box C is of the usual conical form externally and is provided with the usual lugs *c* to prevent it from turning in the hub. Internally the axle box is conical for the greater portion of its length so as to fit the conical spindle A. Near the smaller end of the axle box the bore is smaller and cylindrical, thus forming a thickened wall *c′* and a circular shoulder c^2.

D is an inner cylindrical spindle having reduced end portions *d* of equal length and diameter, said reduced portions being threaded to receive nuts *e* and *f*. Abrupt shoulders *d′* are formed at the junction of the main spindle D with the reduced portions *d*. The spindle is also reduced along its middle portion at d^2 to form a chamber to receive and retain the oil or lubricant.

To distinguish between the spindles A and D the former, which is preferably integral with the axle, will be called the axle spindle, and the one rigidly connected to the box will be called the box spindle. The axle spindle A is bored out centrally to two diameters, the bore of larger diameter being adapted to receive the larger portion of the box spindle, and the bore of smaller diameter extending through the inner end of the axle spindle and forming a bearing for the reduced end *d* of box spindle.

The parts are assembled as follows: The box is driven into the hub as usual and the box spindle is then placed within the box, with one of its shoulders *d′* against the shoulder c^2. The nut *e* is then screwed up tightly upon the threaded end of the reduced portion *d* thus drawing the box more tightly into the hub and at the same time clamping the box spindle rigidly to the box. The hub is then placed upon the axle spindle and the nut *f*—screwed tightly upon the inner end of the box spindle. The threaded hole in the nut *f* extends only part way through the nut and is of such depth that when the nut is screwed tightly upon the spindle it does not press against the axle, sufficient play being allowed to enable the hub and box spindle to revolve freely. A space *o* at the inner end of the box spindle and a similar space *o′* at the outer end of axle spindle permit adjustment to compensate for the wear of the box upon the axle spindle. As the inner end of the box marked *b* wears away the adjustment is made by placing a washer inside the nut *f* or substituting a longer nut. It will be noted that the outer end of the hub is entirely closed and the entrance of dust and sand at that end is effectually prevented. The inner end of the axle is provided with a circular flange A′ which fits loosely within the ferrule *h* of the hub H thus practically preventing the entrace of dust at the inner end of the hub.

Extending through the flange or collar A′ is an oil hole *a* having an opening *a′* to the outer side of the axle spindle and a branch opening a^2 extending through to the inner side of the axle spindle to supply oil to the chamber d^2 and lubricate the box spindle. I prefer to construct the axle and axle spindle from a single piece of metal, and in order to get the strongest possible shape with the least material I avoid sharp angles by rounding the junctions of the axle and spindle with the flanges A′ as shown at *b* and *b′* instead of making said junctions angular. It will be

seen that in my construction the bearing surface of the wheel is nearly doubled and the wear thus very much reduced. The axle spindle within the outer box forms a box for the inner or box spindle. The latter spindle is reversible and when its inner end becomes worn it can be quickly reversed, thus greatly increasing its life. When the spindle is reversed if the worn end is very much smaller than the opening in the box the latter may be bushed in any well known manner.

It will be evident that many minor changes within the province of a skilled mechanic may be made without departing from the spirit of my invention. Therefore

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. The combination with an axle and a hollow offset axle spindle, of a hub having a box arranged to run upon the axle spindle, and a box spindle rigidly attached to the box and arranged to run within the axle spindle, said box spindle passing through the offset portion and having a nut *f* on its end, substantially as described.

2. The combination with an axle and a hollow axle spindle *b* bored to two diameters, of a hub having a box, and a spindle having reduced end portions, one of said end portions being retained in a socket in the smaller end of the box and the other end portion arranged to turn in the smaller bore of the axle spindle, substantially as described.

3. The combination with an axle and an axle spindle offset from the body of the axle and bored out to two diameters, of a box the larger end of which fits the axle spindle, and the smaller end of which is provided with a socket, and a reversible box spindle D having reduced ends, one of said ends fitting the socket in the box and the remainder of the spindle fitting the opening in the axle spindle, substantially as described.

4. The combination with the axle and hollow axle spindle, of the box running upon said spindle, the box spindle D extending through the box and axle spindle, and the nuts *e* and *f* for clamping the spindle D to the box and retaining the box on the axle, substantially as described.

5. The axle and the hollow offset spindle A having a flange or collar A′ and an oil hole *a* with branches *a′*, *a²*, leading to the outside and inside of the said spindle, in combination with the spindle D having a reduced portion *d²* to form an oil chamber, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY M. ENDERS.

Witnesses:
C. P. RICE,
JOHN BONER.