(No Model.)

S. T. WELLMAN.

METHOD OF AND DIE FOR FORMING THE CENTER AND END COLLARS OF CAR AXLES.

No. 369,487. Patented Sept. 6, 1887.

Fig. 3

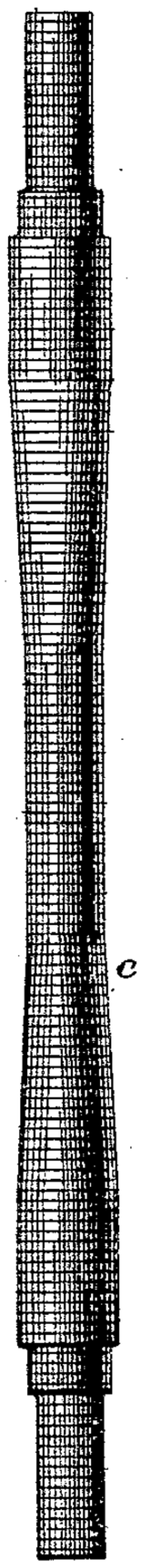

Fig. 4

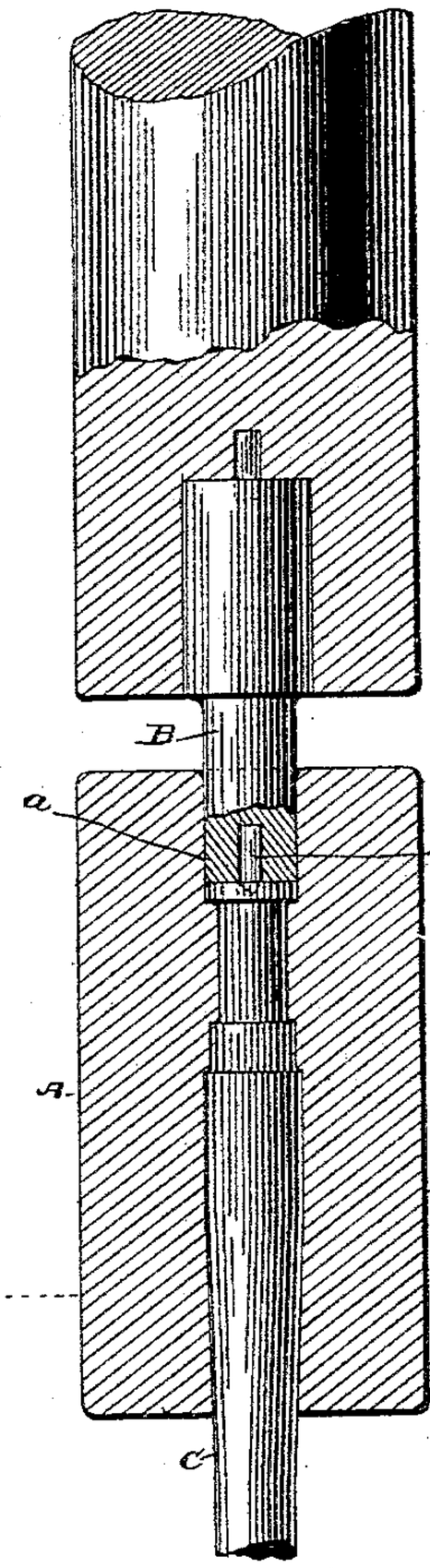

Fig. 1.

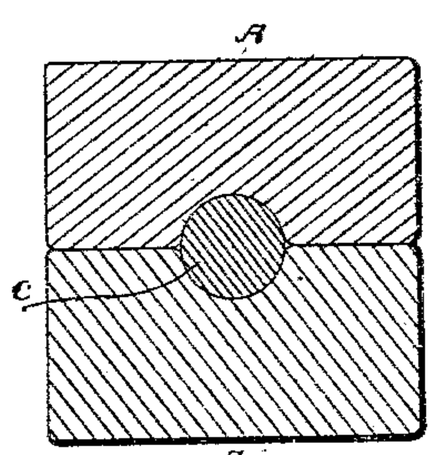

Fig. 2.

WITNESSES
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SAMUEL T. WELLMAN, OF CLEVELAND, OHIO.

METHOD OF AND DIE FOR FORMING THE CENTERS AND END COLLARS OF CAR-AXLES.

SPECIFICATION forming part of Letters Patent No. 369,487, dated September 6, 1887.

Application filed February 28, 1887. Serial No. 229,122. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. WELLMAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improved Methods of Manufacturing Car-Axles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to an improved method used in manufacturing car-axles in which the axle-forging is clamped in holding-dies, and by means of a plunger the ends of the axle are upset in the holding-dies to form the outside or end collars of the axle. A center-pin is inserted in the ends of the plunger. The protruding end of this pin enters the end of the axle while the latter is being upset, thus forming a depression in the end of the axle to serve as a center to hold the axle in a lathe for a subsequent operation of turning the axle, to the end that much time and material are saved as compared with the method heretofore in use.

In manufacturing car-axles there is no difficulty whatever in forming the inside collars, there being sufficient metal on either side of these collars to counteract the end-flow tendency of the metal in working the same. In forming the outside collars, unless a large excess of metal is had at the ends of the axle, the tendency of the metal in working the same is to flow outward lengthwise of the axle, and consequently it is found extremely difficult, without such excessive metal, to bring out these outside collars to their full respective diameters. With my improved method the end portions next outside of the respective journals are left, in the first instance, approximately of the same diameter as the journals, and in such form the axle is cut off, leaving the end portions long enough to contain the metal necessary to form the outside collar by upsetting the metal.

In the accompanying drawings suitable mechanism is shown for carrying out my improved method.

Figure 1 is a side elevation, partly in section, of the holding-dies and plunger, showing, also, a completed axle-forging in the dies. Fig. 2 is a plan section on the line of *x x*, Fig. 1. Figs. 3 and 4 are plans of axle-forgings in different stages of the work, the latter showing the axle-forging cut off and in condition to enter the holding-dies for upsetting the ends thereof to form the end collars.

A A are the holding-dies, the same being made in halves, the division-line being lengthwise thereof. These dies are made to fit the axle-forging, except at the outer end, where the cavity of the dies at *a* is of suitable diameter to form the end collar, *c*, of the axle C. These dies are opened and closed by any suitable mechanical means, usually by a press—hydraulic, steam, or otherwise, as the case may be.

B is a plunger, the free end thereof being made to fit the bore *a* of the holding-dies. The plunger may be operated in a drop-press, or by any other suitable means, several of which are well known. In the end of the plunger is set and centrally located the center-pin *b*, the conical end thereof protruding. The axle C, having been cut off at the ends, as shown in Fig. 4, is placed in the dies A, and by operating the plunger the end of the axle is upset to form the collar *c*, as shown in Fig. 1, the pin *b* at the same time being pressed into the end of the axle to form a center for holding the axle in a lathe for subsequently turning the axle.

The dies A may be made long enough to embrace the entire axle, and plunger B may be arranged at the respective ends of these dies; and if these plungers are made to operate simultaneously in upsetting the axle there will be much less strain on the holding-dies, in which case the latter need not necessarily be made to fit the central portion of the axle, whereby would be effected a considerable saving in fitting these dies.

By means of my improved method much time and metal are saved, and the end collars are forged full-sized and sharp-cornered.

What I claim is—

1. A step in the method of manufacturing car-axles, consisting, essentially, in simultaneously upsetting the ends of the axles to form end collars, and forming centering depressions in the ends of the axles.

2. The combination, with a holding-die made in halves and constructed to form end collars on the axle, of an upsetting-plunger for upset-

ting the ends of the axle, substantially as set forth.

3. The combination, with the dies constructed to form end collars on the axle, of an upsetting-plunger having a conically-ended center-pin secured thereto, substantially as set forth.

4. The combination, with a holding-die made in halves and constructed to form end collars on the axle, of an upsetting-plunger having a conically-ended center-pin secured thereto, substantially as set forth.

In testimony whereof I sign this specification in the presence of two witnesses this 7th day of February, 1887.

SAMUEL T. WELLMAN.

Witnesses:

W. H. SHEPARD,

THOS. H. BROOKS.