(No Model.) 2 Sheets—Sheet 1.

S. T. WELLMAN.

METHOD OF MAKING CAR AXLES.

No. 369,488. Patented Sept. 6, 1887.

Fig. 1.

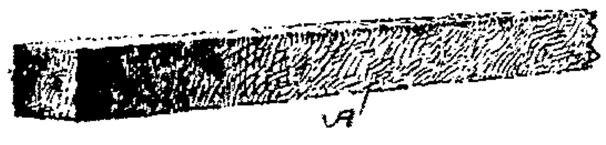
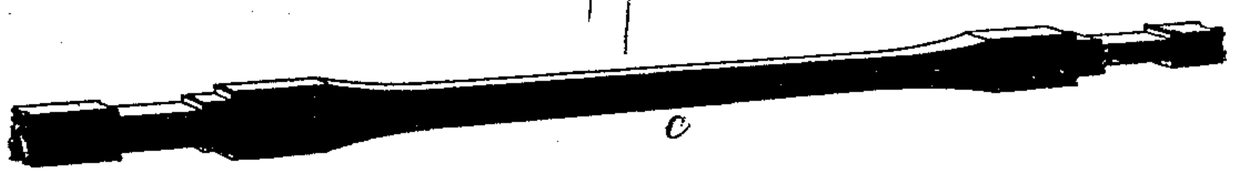


Fig. 2.



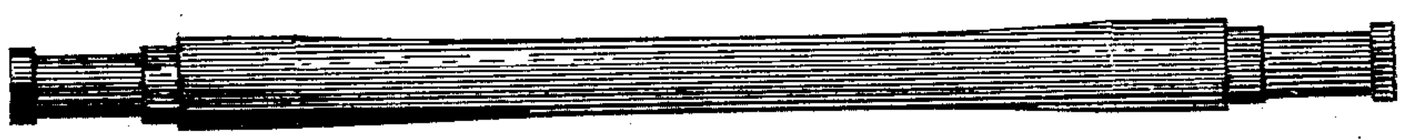


Fig. 3.

Fig. 4.

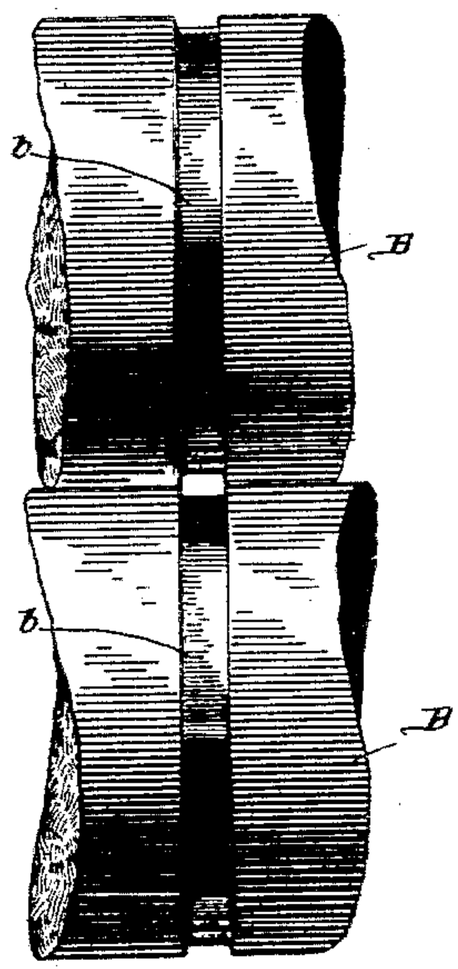
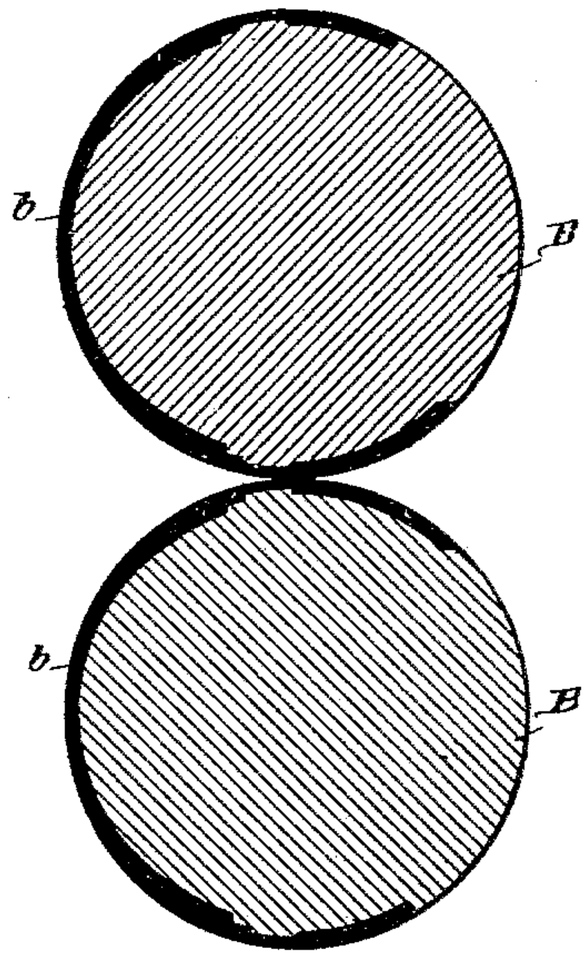


Fig. 5.



WITNESSES

N. S. Amentz

Geo. W. King

Samuel T. Wellman. INVENTOR

By Siggett & Siggett

Attorneys

(No Model.) 2 Sheets—Sheet 2.

S. T. WELLMAN.

METHOD OF MAKING CAR AXLES.

No. 369,488. Patented Sept. 6, 1887.

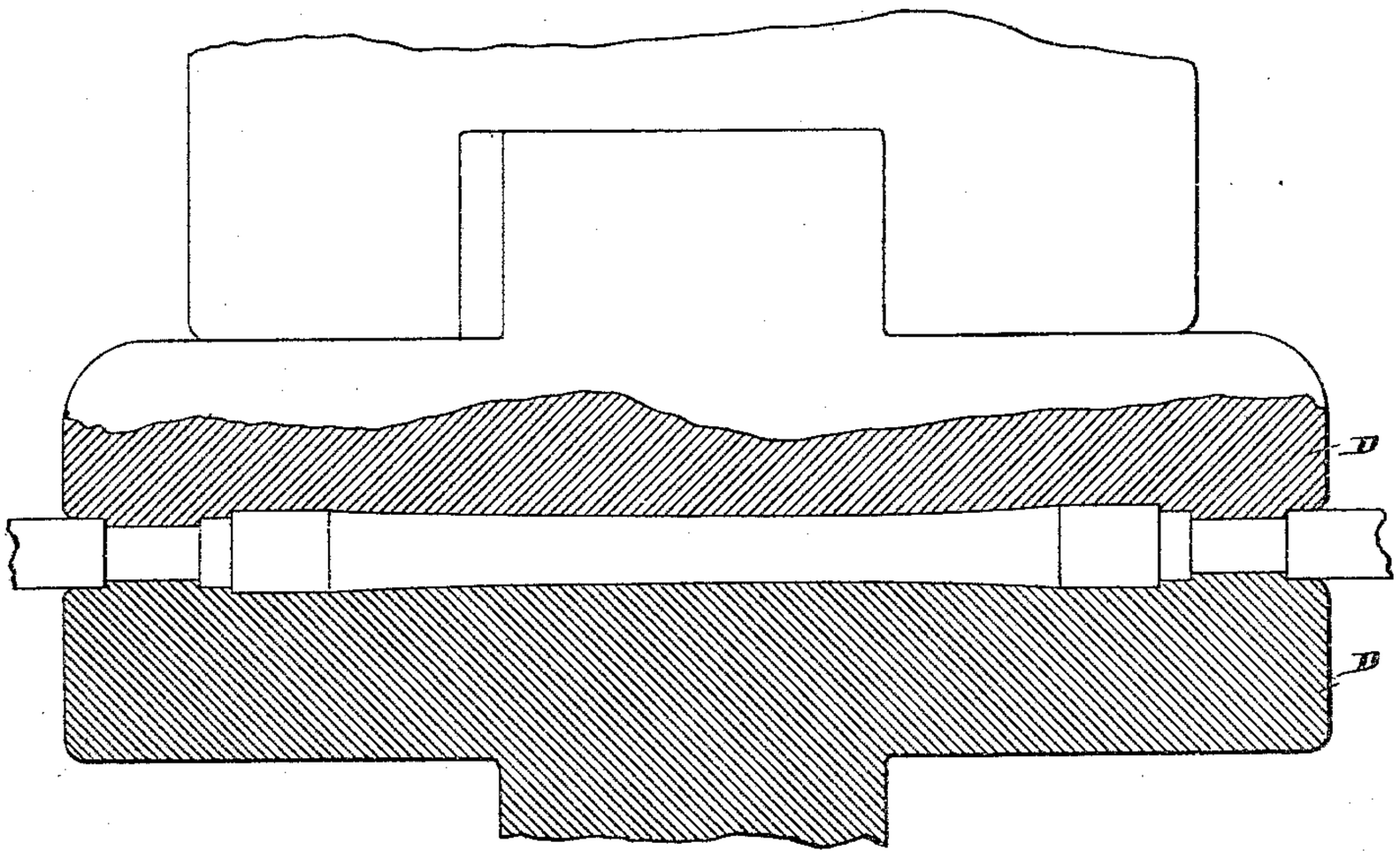


Fig. 6.

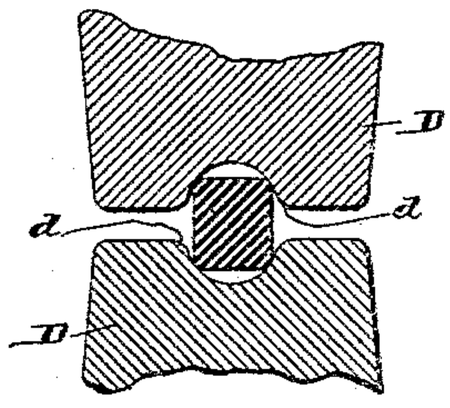


Fig. 7.

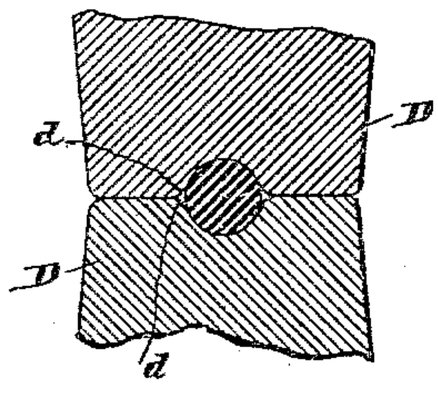


Fig. 8.

WITNESSES
W. S. Austin
Geo. W. Kling

Samuel T. Wellman. INVENTOR
By Liggett & Liggett.
Attorneys

UNITED STATES PATENT OFFICE.

SAMUEL T. WELLMAN, OF CLEVELAND, OHIO.

METHOD OF MAKING CAR-AXLES.

SPECIFICATION forming part of Letters Patent No. 369,488, dated September 6, 1887.

Application filed July 24, 1886. Renewed June 15, 1887. Serial No. 241,352. (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 Improvements in the Method of Making 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 of making car-axles in which suitable blooms or billets, either square or rectangular in cross-section, are passed in turn through rolls of such construction, the same having grooves of uniform width, but of such varying depth that while the blank retains a rectangular form in cross-section with two sides thereof parallel the other two sides are shaped to correspond with the finished forging, the blank being approximately of the same length as the finished axle, and of such varying thickness that the metal is distributed lengthwise of the blank substantially the same in area as in the finished forging for the axle. The blank is next transferred to the finishing-dies, and the latter are of suitable length to receive the blank bodily, and their faces are shaped to correspond accurately with the finished forging desired. The internal edges, where the dies close together, should be rounded off to avoid making fins on the forging. The dies are operated in a steam-hammer of large size or in a suitable press, if the latter is preferred. The blank is placed between the two dies with the parallel edges thereof arranged top and bottom. A few strokes of the hammer will close the dies together and shape the work properly, except narrow strips along the sides where the aforesaid rounded edges of the dies occur. The blank is then turned in the dies, say, a quarter-revolution, more or less, after which a few light blows will finish the work. The ends of the forging are afterward squared off in a lathe.

Heretofore in the manufacture of car-axles the metal, whether of iron or steel, was reduced to a suitable bloom or billet, and afterward hammered into the proper shape. The reduction from the said bloom or billet to the finished forging for the axle was slow, laborious, and expensive, a gang of men with a suitable steam-hammer usually turning out only about twenty or twenty-five axles per day.

With my improved method about eight or ten times the amount of work above mentioned can be accomplished in a day and at about the same expense for labor.

In the accompanying drawings, Figure 1 is a view in perspective, showing approximately the form of an ordinary bloom or billet, such as are commonly used in making car-axles. Fig. 2 is a view in perspective of a blank after passing the rolls. Fig. 3 is an enlarged plan view of the finished forging. Figs. 4 and 5 are respectively side elevations and an elevation in transverse section of the rolls employed. Fig. 6 is an elevation in longitudinal section of the finishing-dies. Figs. 7 and 8 are elevations in transverse section of the finishing-dies, showing the blank as it enters the dies, and showing also the finished forging.

A represents the bloom or billet, that is heated and passed through the rolls B B and formed thereby into the blank C. The grooves *b* of the rolls are of uniform width, by reason of which two sides of the blank are made parallel. The grooves are of varying depth, the bottom thereof corresponding with the plan of the finished forging, by means of which the blank C is of varying thickness, the metal being distributed lengthwise substantially the same in area from point to point as the finished work. Usually several grooves are made on the same set of rolls for axles of different lengths, sizes, or shapes, as the case may be, only one set of grooves being shown. The blank is next placed between the dies D D and set edgewise therein—that is, the parallel sides of the blank are placed at the top and bottom of the dies. These dies are long enough to receive the blank bodily, only the rough ends of the blank containing the surplus metal protruding. The faces of the dies are hollowed out and shaped accurately to give the desired shape to the finished forging. (For instance, see Fig. 3.) Of course different sets of finishing-dies have to be provided for axles of different length, size, or shape. The internal corners of the dies at *d* are rounded off to prevent forming fins on the work. The dies are preferably operated with a steam-hammer of large size, what is known as a four or five ton ham-

mer being ample for the purpose. The dies also may be operated in a suitable press, if preferred. A few strokes of the hammer will close the dies and shape the blank properly, except narrow strips along the sides adjacent the rounded corners aforesaid, at which places the blank will likely swell out a trifle. These sides, however, it will be remembered, were approximately of the desired form when they left the rolls. The blank should next be turned more or less in the dies, after which a few light blows will finish the work. The ends of the forging will be squared off in a lathe.

With my improved method the axles are made with great accuracy and dispatch. A gang of men such as heretofore usually employed in the manufacture of car-axles, and with the necessary tools, substantially as described, will be able to turn out about two hundred car-axles per day at approximately the same expense, except for the extra material, as has heretofore usually been expended in the production of from twenty to twenty-five axles per day.

The method of rolling metal into irregular shapes is old; but we have no knowledge of such method having heretofore been employed in producing blanks such as herein described for car-axles, and such blanks would be worthless for the purpose, except the method was carried out by means of finishing-dies, substantially as described, that would receive the blank bodily.

What I claim is—

The method herein described of producing car-axles from suitable blooms or billets, and consisting, essentially, first, in rolling the bloom or billet into a blank of variable areas in section, said blank having the metal distributed lengthwise thereof in substantially the same proportion as the finished forging of the axle; second, shaping the blank in finishing-dies adapted to receive the blank bodily, said dies having suitable concaved faces made to correspond with the finished work desired, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 3d day of July, 1886.

SAMUEL T. WELLMAN.

Witnesses:
CHAS. H. DORER,
ALBERT E. LYNCH.