

(No Model.)

J. SMITH.
Manufacture of Car Axles.

No. 243,642.

Patented June 28, 1881.

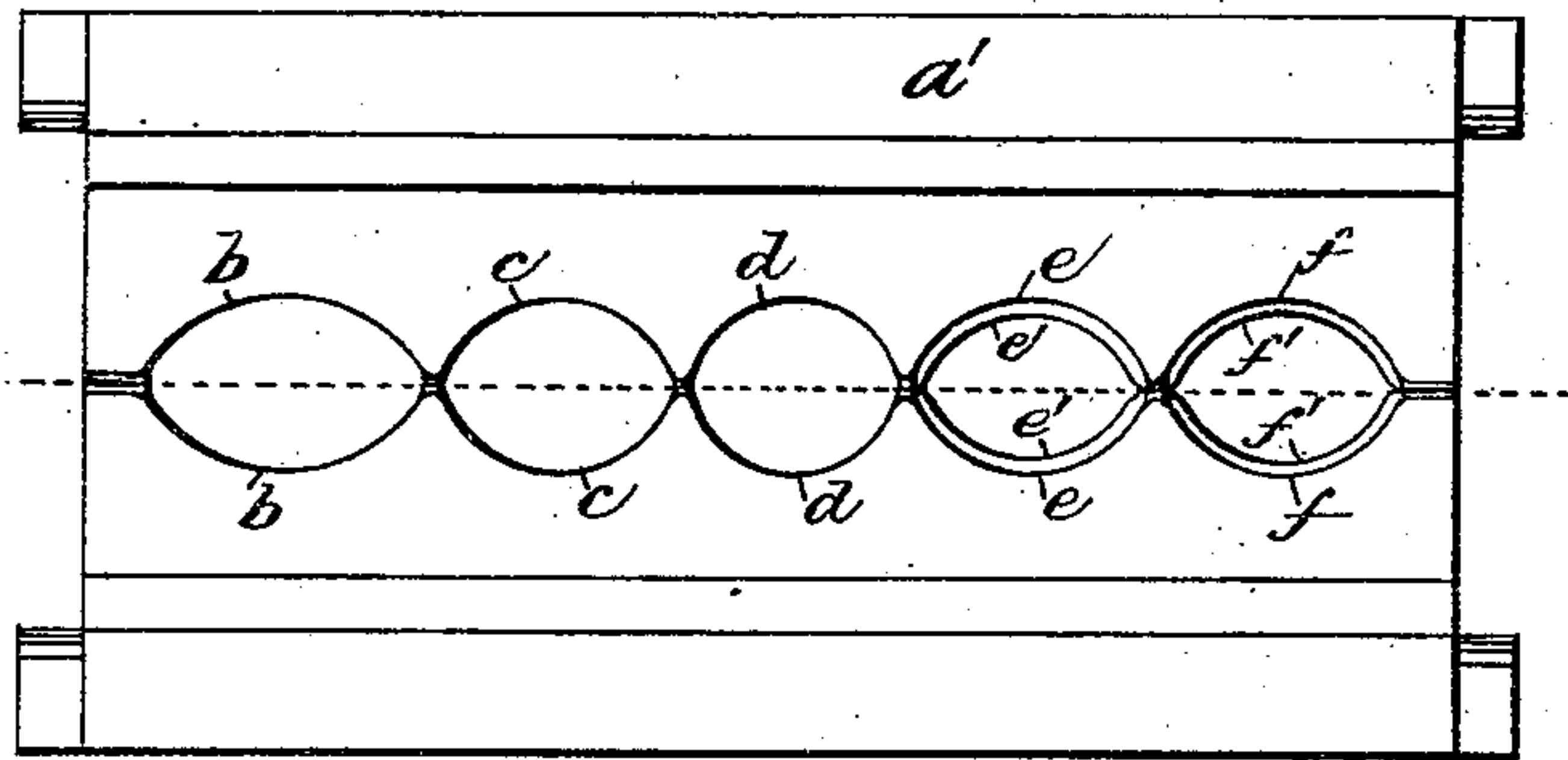


Fig. 1.

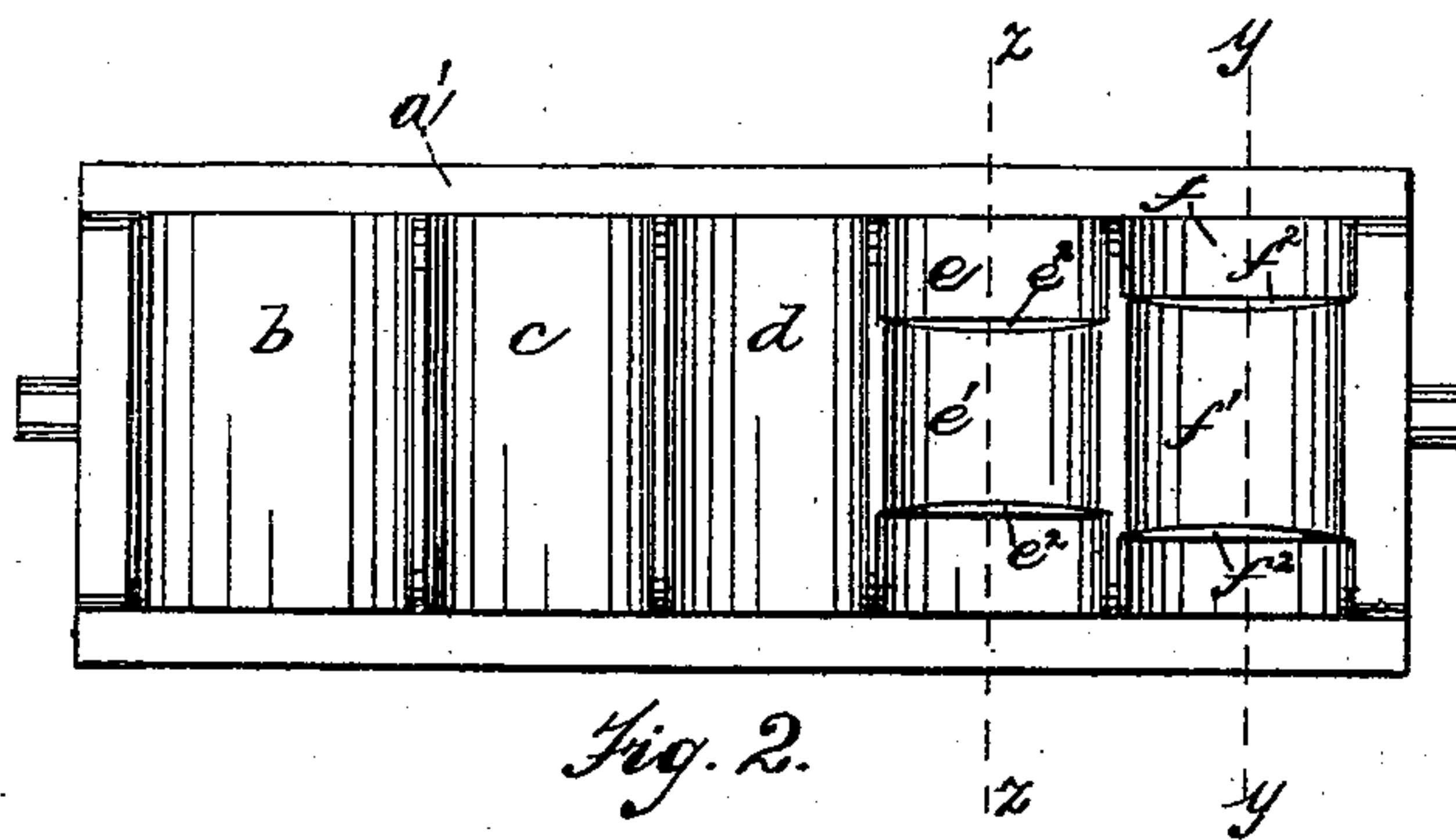


Fig. 2.

Fig. 11.



Fig. 12.



Fig. 13.

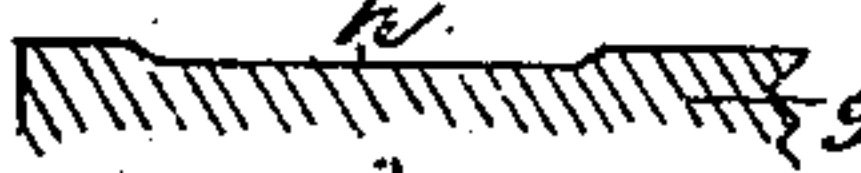


Fig. 14.

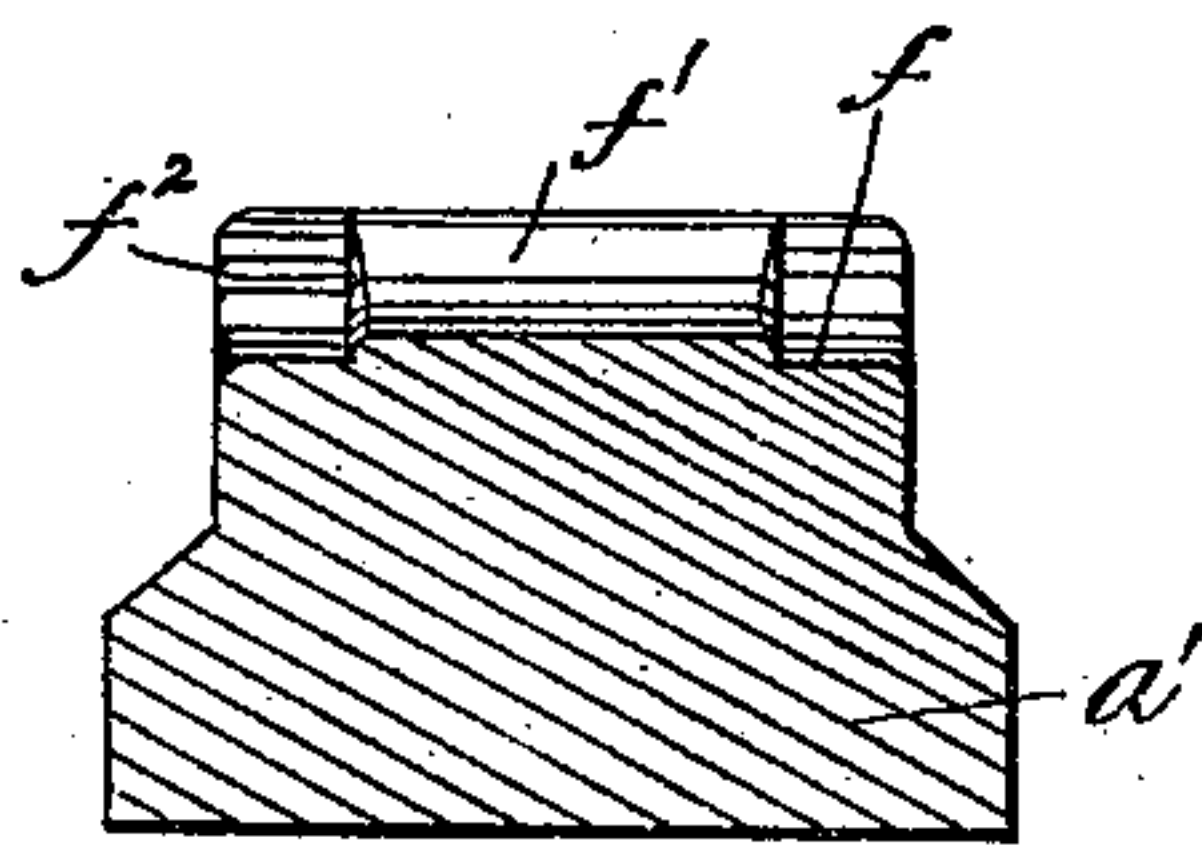
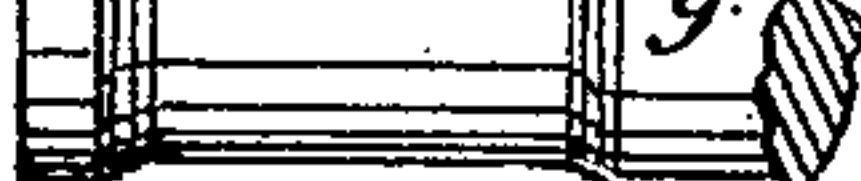
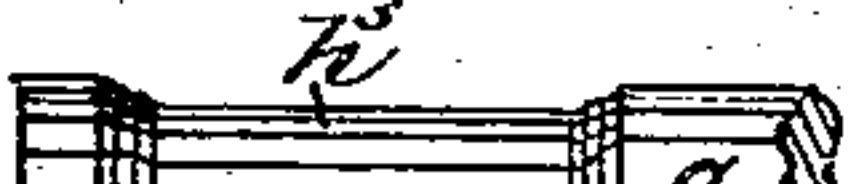


Fig. 3.

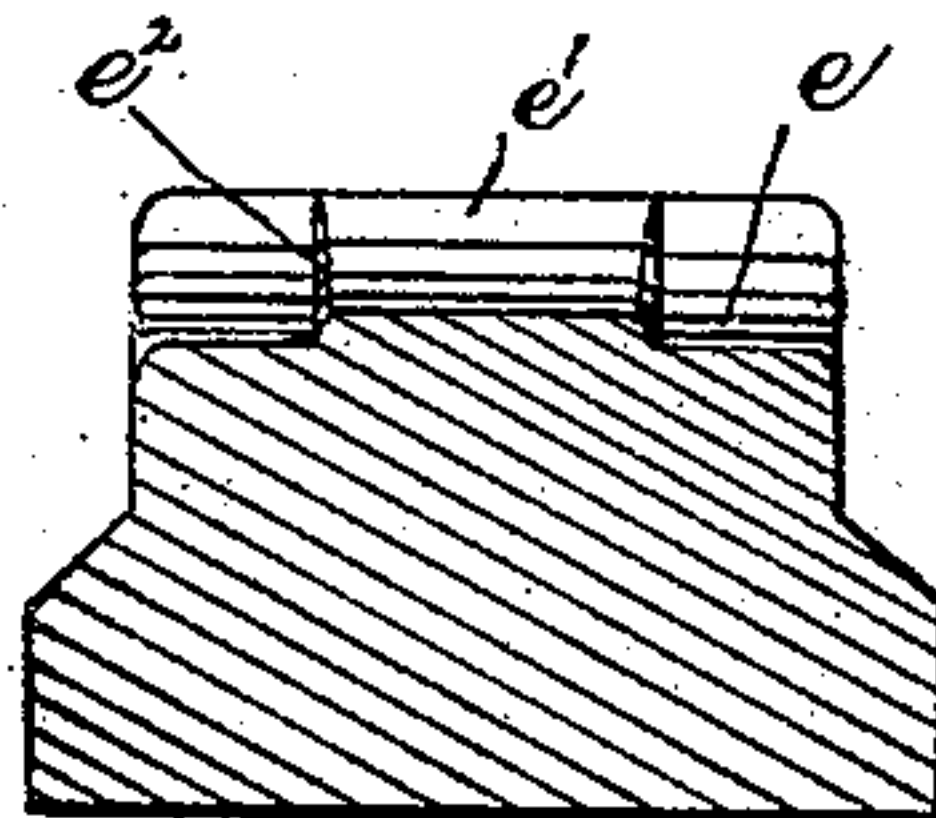


Fig. 4.

Fig. 5.

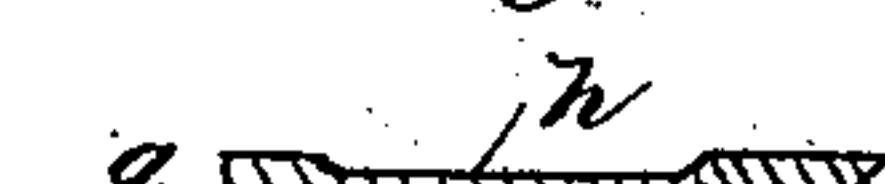


Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.

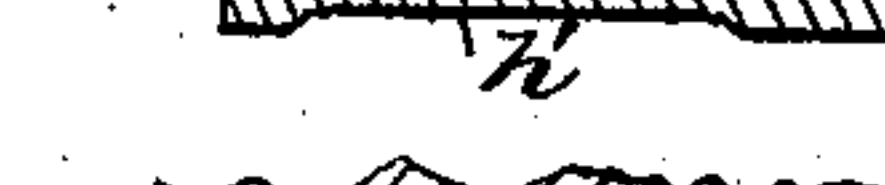


Fig. 10.



Witnesses:
H. G. Wadlin.
H. Climo.

Inventor:
JAMES SMITH
Per. Wright & Brown Attys.

UNITED STATES PATENT OFFICE.

JAMES SMITH, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE BOSTON FORGE COMPANY, OF SAME PLACE.

MANUFACTURE OF CAR-AXLES.

SPECIFICATION forming part of Letters Patent No. 243,642, dated June 28, 1881.

Application filed April 25, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES SMITH, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Methods of and Dies for Forging the Journals of Car-Axles, of which the following is a specification.

This invention relates to the operation of forging car-axles, having near their ends the usual elongated peripheral depressions or grooves constituting the journals of the axle, said journals being formed by first hammering the heated bar of which the axle is made between a pair of suitably-formed dies and rotating the bar during the hammering operation; and, secondly, by turning the axle in a lathe to impart the required finish to the journals.

Heretofore it has been the custom to employ a single pair of dies in forming each journal; but it is impossible to give the ends of the groove or journal a form closely approximating the final form to be imparted by the latter, for the reason that the portion of the axle acted on by the dies in forming the grooves or journals is elongated by the blows of the dies, so that the ends of the indentations made by each blow of the die are moved outwardly by the succeeding blow, the result being that the ends of the groove or journal do not conform exactly to the ends of the dies, which are curved or rounded, but are so formed (as hereinafter described) that considerable labor and the removal of a considerable quantity of metal are required in finishing the journal in the lathe.

My invention has for its object to enable the grooves or journals of a car-axle to be brought as nearly as possible to their required form by the forging operation, so that the amount of labor required and the quantity of metal removed by the finishing operation may be reduced to the minimum.

To this end my invention consists in the improved method of forging and in the improved series of dies for carrying said method into effect, which I will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification, Figure 1 represents a side

elevation of a set of dies embodying my invention. Fig. 2 represents a plan view of one of said dies. Figs. 3 and 4 respectively represent sections on lines *y y* and *z z*, Fig. 2. Figs. 5, 6, 7, 8, 9, and 10 represent sectional views, showing the operation of forming a journal under my improvements. Figs. 11, 12, and 13 represent sections; and Fig. 14, an elevation, showing the operation as heretofore carried out.

The same letters of reference relate to the same parts in all the figures.

In the drawings, *a a'* represent the heads or blocks, in which are formed the usual dies, *b b c c d d*, for forging the car-axles into cylindrical form, and the dies *e e* and *f f* for forging the journals of the axle.

My invention does not relate to the dies *b b*, *c c*, and *d d*, said dies being of the usual form and arrangement.

The block *a* is supported rigidly on a suitable bed, and the block *a'* is operated in the ordinary manner of operating a trip-hammer.

The dies *e e* have projecting faces *e' e'* and rounded ends *e² e²*, and are adapted to form a groove or incipient journal in a car-axle, *g*, of a lesser length than the completed journal.

In the operation of the dies *e e* on a heated cylindrical bar placed between them, each blow of the dies indents and at the same time elongates the portion of the axle with which it comes in contact. Thus the first blow forms a slight groove, *h*, in the axle *g*, as shown in Fig. 6; the next blow deepens the indentation and elongates the indented portion, so that the ends of the first indentation are carried slightly outward in opposite directions, and so on until the faces *e' e'* have entered the axle as far as they are able and formed a groove, *h'*, of the required depth, as seen in Fig. 8. It will be observed that the extreme length of this groove is greater than that of the faces *e e*, so that the ends of the groove do not conform to the rounded ends of the faces, but extend away from the same, the ends of the groove *h'* being rough and showing traces of each separate blow of the dies.

The dies *f f* have faces *f' f'*, which are similar in form to the faces of the dies *e e*, but are longer, their length being equal to that of the

completed groove or journal. The dies $f f$ in operation do not increase the depth of the grooves or journals, and therefore do not elongate the portions of the axle in which the journals are formed. The only function of the dies $f f$ is to finish the ends of said grooves, causing them to conform to the rounded ends $f^2 f^2$ of the faces $f' f'$, as shown in Fig. 10. The difference in length between the faces $f' f'$ and $e' e'$ is such that very little metal is displaced by the ends of the faces $f' f'$, the only effect of the latter being to give the desired rounded form to the ends of the journals, causing them to approximate closely the final form given by the lathe, so that the minimum of time, labor, and waste of material attends the finishing operation.

Heretofore each journal has been forged by a single pair of dies of substantially the same form and length as the dies $f f$. It is obvious that the ends of the journal formed in this manner (shown in Fig. 14) are precisely like those formed by the first pair of dies, $e e$, the journal h^3 itself being somewhat longer than that formed by the last-named dies. It will also be observed that in order to finish the journal and to bring the ends of the same to their required form much more lathe-work is required, and the waste of more metal is pro-

duced than in finishing the journal made after my improved method. I also secure greater compactness and durability at the ends of the journal by forging them nearly to their required shape than can be secured by the above-described method heretofore practiced.

Having thus described my invention, I claim—

1. The method herein described of forging car-axles, the same consisting in first forging an incipient journal of less than the required length, but of the proper depth, and, secondly, elongating and finishing the ends of the incipient journal so formed without increasing the depth thereof, substantially as set forth.

2. As a means for forging journals in car-axles, a series of dies, $e e$ and $f f$, provided respectively with faces $e' e'$ and $f' f'$, the latter faces being of substantially the same length as the completed journal and the former of lesser length, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 22d day of April, A. D. 1881.

JAMES SMITH.

Witnesses:

H. G. WADLIN,
W. CLIMO.