

William A. Lewis.

2 Sheets--Sheet 1.

Improved Wagon Axle.

No. 119,864.

Fig. 1.

Patented Oct. 10, 1871.

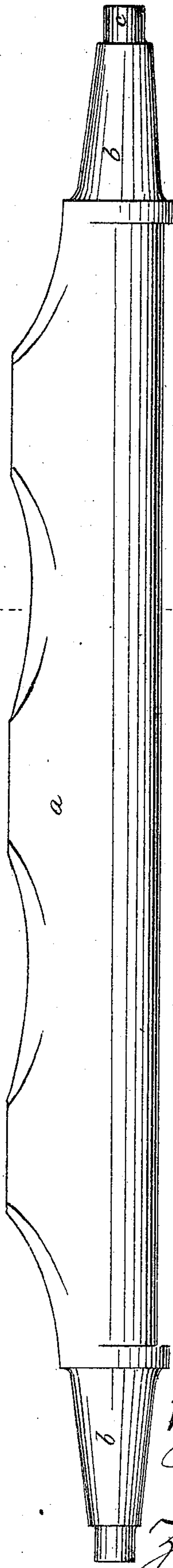


Fig. 2.

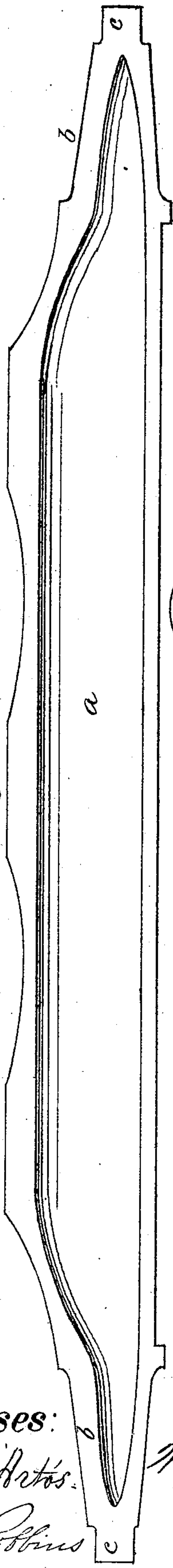


Fig. 4.

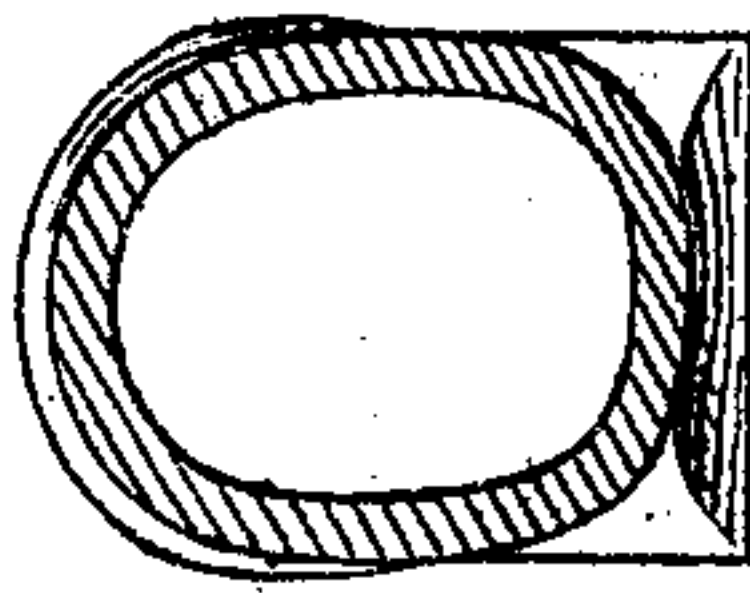
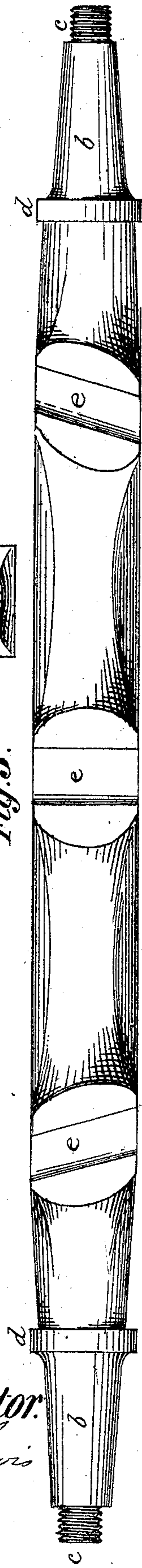


Fig. 3.



Witnesses:

Fred. Artos.

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Inventor.

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Fig. 5 Improved Wagon Axle.

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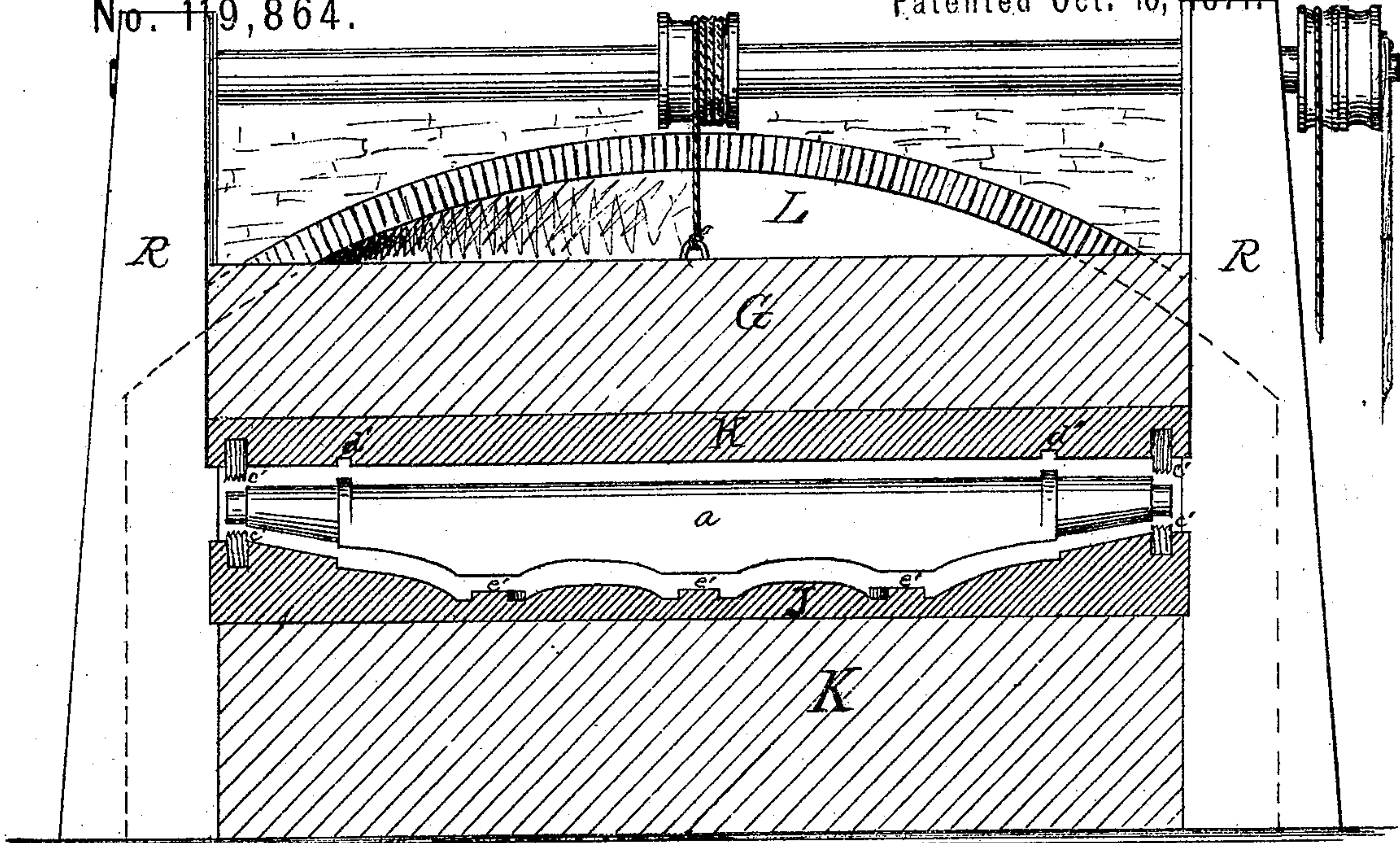
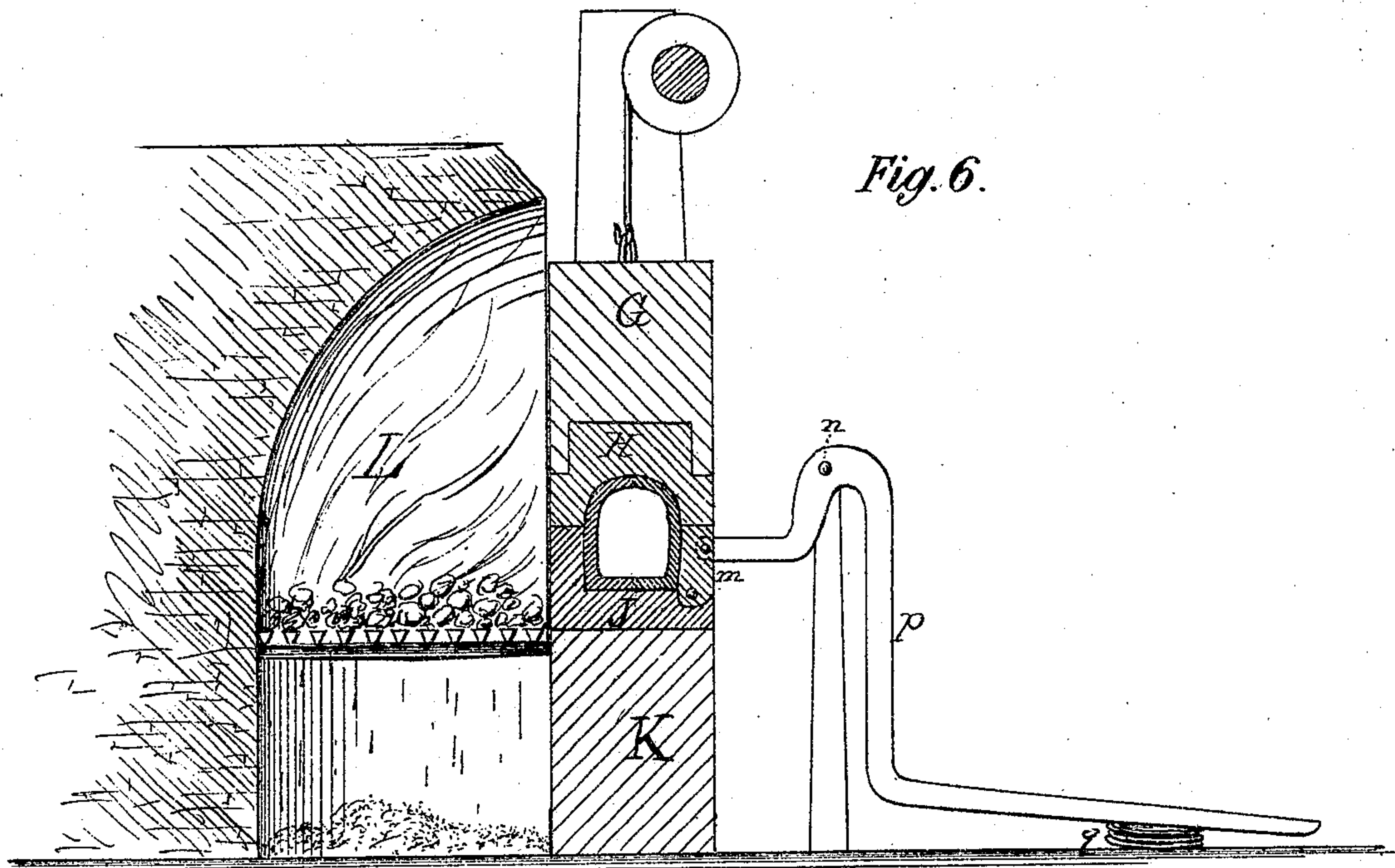


Fig. 6.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

WILLIAM A. LEWIS, OF CHICAGO, ILLINOIS, ASSIGNOR TO HOLLOW-AXLE MANUFACTURING COMPANY, OF MISHAWAKA, INDIANA.

IMPROVEMENT IN THE PROCESSES OF MAKING HOLLOW METALLIC AXLES AND OTHER HOLLOW METALLIC ARTICLES.

Specification forming part of Letters Patent No. 119,864, dated October 10, 1871.

To all whom it may concern:

Be it known that I, WILLIAM A. LEWIS, of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Hollow Metallic Axle for Wagons, Carriages, &c.; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing which forms a portion of this specification.

My said improved axle is made of wrought-iron or steel and by a new process, which results in the production of a hollow axle, consisting of but a single piece, and possessing as graceful and perfect a shape as can be attained in a wooden axle or any other style of axle; while it is so perfect in all its details that the said axle is in as fit a condition to receive the wheels and to be combined with the respective other portions of a wagon or carriage as is the most perfect of metal-trimmed wooden axles or any other style of axles. My said improved metallic axle is also from twenty-five to fifty per cent. lighter than a metal-trimmed wooden axle, is more elastic, and is fully fifty per cent. stronger than the best metal-trimmed wooden axle.

Preparatory to the manufacture of my said improved metallic axle I prepare a series of jointly-operating matrix and follower-rolls, whose surfaces are so shaped that a bloom of iron or an ingot of steel, when raised to the proper temperature and received between the first pair of said rolls, will be partially shaped in passing between the same, and immediately upon its emergence from said rolls the thus partially-formed mass of metal is seized and passed between the second pair of matrix and follower-rolls, and so onward through the entire series of said rolls, emerging from the last pair thereof in the desired shape of an irregular concavo-convex longitudinal half section of the perfect axle that is afterward to be formed of two of such sections by a combined welding and swaging process performed within a properly-shaped die-box.

Figure 1 of the accompanying drawing represents the outer surface of a swaged section, *a*, of one of my improved metallic axles of the shape produced by me by the aid of a matrix and follower-rolls; and Fig. 2 is a view of the inner surface of said section.

When two sections of the shape represented by Figs. 1 and 2 have been united to each other

by passing the same, while in a highly heated state, through my combined welding-and-swaging die-box, they will form the perfectly-shaped and finished axle, of which Fig. 3 is a top view, and Fig. 4 a transverse section.

My welding-and-swaging die-box is composed of the metallic bed-block K and its bed die-plate J, combined with the drop die-plate H and its heavy drop G, in the manner represented by Figs. 5 and 6. The said welding-and-swaging die-box is located immediately in front of the mouth of a furnace, L. The drop G is guided in its vertical movements by means of tenons which project from the ends thereof and work in guiding-grooves in the side posts R R. The said drop G may be raised and dropped in any suitable or well-known manner. A movable section, *m*, is hinged to the front side of the base portion of the bed die-plate J, and is also jointed to an operating lever, *p*, which works on a pivot at *n*, as shown in Fig. 6. A suitable spring, *q*, is so placed as to operate upon the lever *p* in such a manner that when no downward force is exerted upon the lever it will be thrown upward by the spring, and by the said movement it will swing outward to an open position the hinged portion *m* of the bed die-plate. Two of my said axle-sections having been raised to a welding-heat in the furnace, they are then placed side by side upon the base portion of the base die-plate J, while, at the same time, the flame of the furnace is playing upon said sections; then the hinged section *m* of said die-plate H is dropped upon said axle-sections, and with sufficient force to perfectly weld the said sections into one piece, as shown by Fig. 6. The said descent of the movable die-plate H will also cause the projections *e' e' e'* from the base die-plate J to indent the recesses *e e e* in the flat portions of the intended upper surface of the perfect axle, while it will also cause the sectional screw-nuts *c' c'* in the two die-plates, H J, to swage screw-threads on the reduced and rounded ends *c c* of the journal-portions of said axle, and will also cause the recesses *d' d'* in the die-plate H to perfect the outlines of the journal-shoulders *d d* of the finished axle, shown in Fig. 3. Should the hinged section *m* of the base die-plate J be closed before a heated pair of axle-sections are placed in the recess of said plate, the said sections, as a general thing, will not descend to the base portion of said die-plate, but will be sup-

ported by the sides thereof in about the position represented in Fig. 5.

It will readily be perceived that any desired shape can be given to the sections of my improved hollow metallic axle by the before-described forming-rolls; and, also, that such a shape can be given to the welding and swaging die-plates H J as will enable them, when fitted to a properly-constructed and located drop-press, to weld the said axle-sections into one piece, and, at the same time, form the united single article thus produced into a complete and perfect wagon or carriage-axle of any desired shape. It will also be perceived that preliminary sections of tubes, shafts, car-axles, and such other hollow articles as can at first be more conveniently produced in the form of sections of said articles can be united into perfect jointless manufactures by the within-described improved heating, shaping, and welding process; and, therefore, I do not intend to restrict the use of my said

heating, shaping, and welding process to the production of hollow axles for wagons, carriages, &c.

I am aware that dished half-cylindrical bars of uniform thickness have been welded together by repeated heatings and hammerings in swages; and, therefore,

What I claim as my invention in the production of wrought-metal hollow axles is—

1. The within-described heating, shaping, and welding process of producing hollow axles or other hollow articles from previously-prepared sections of the same.

2. As a new manufacture, the within-described wrought-metal hollow axle, said axle having substantially the shape of a metal-trimmed and complete wooden axle.

WILLIAM A. LEWIS.

Witnesses:

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FRED. ARTOS.

(31)