

(No Model.)

W. L. MORRIS.
AXLE MAKING MACHINE.

No. 458,685.

Patented Sept. 1, 1891.



Fig. 4



Fig. 5

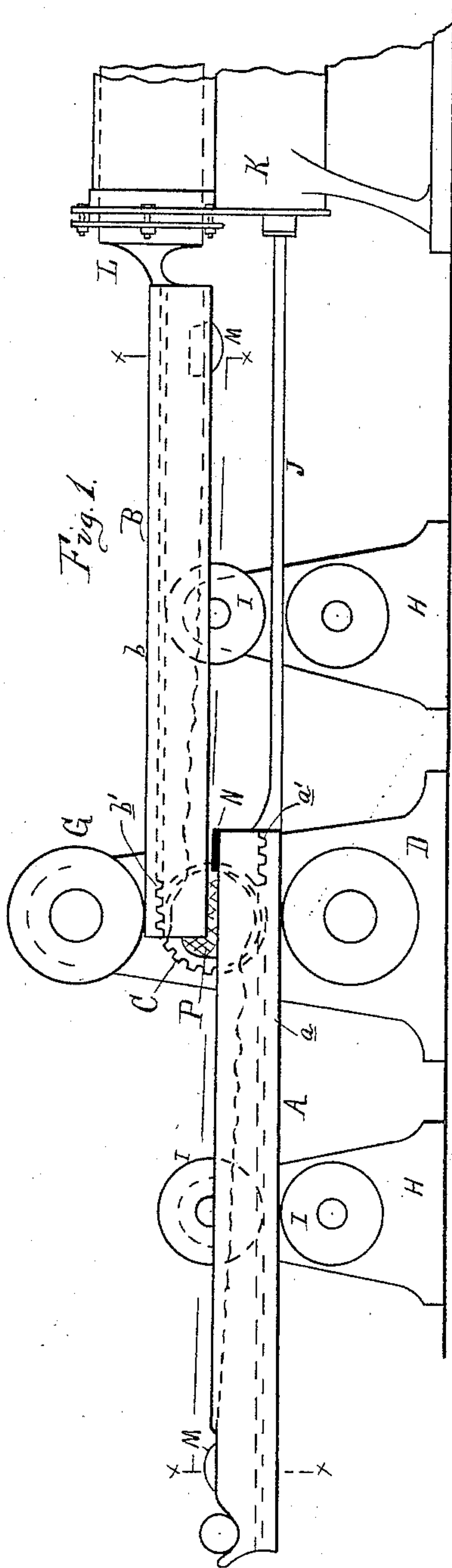


Fig. 1.

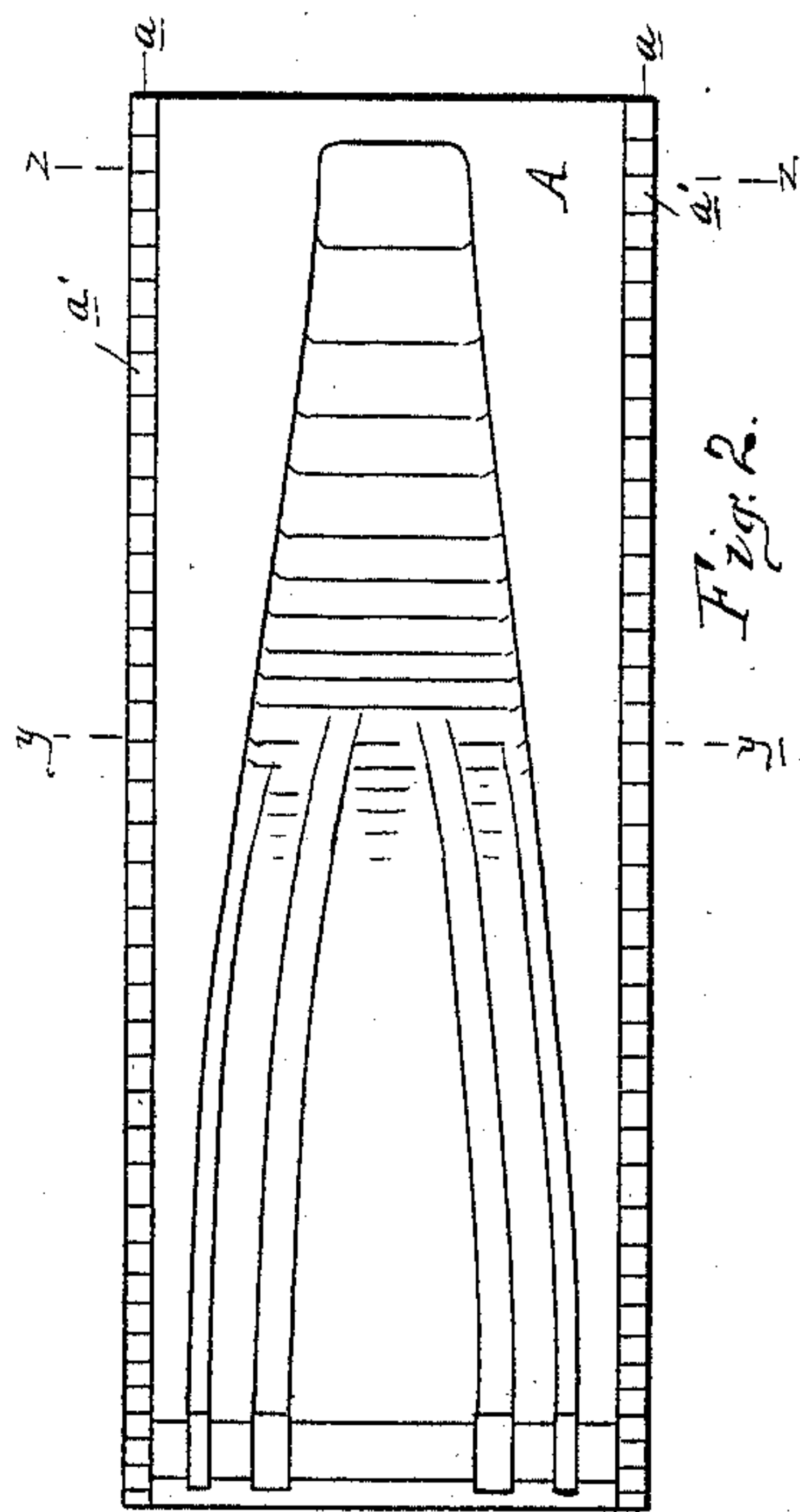


Fig. 2.

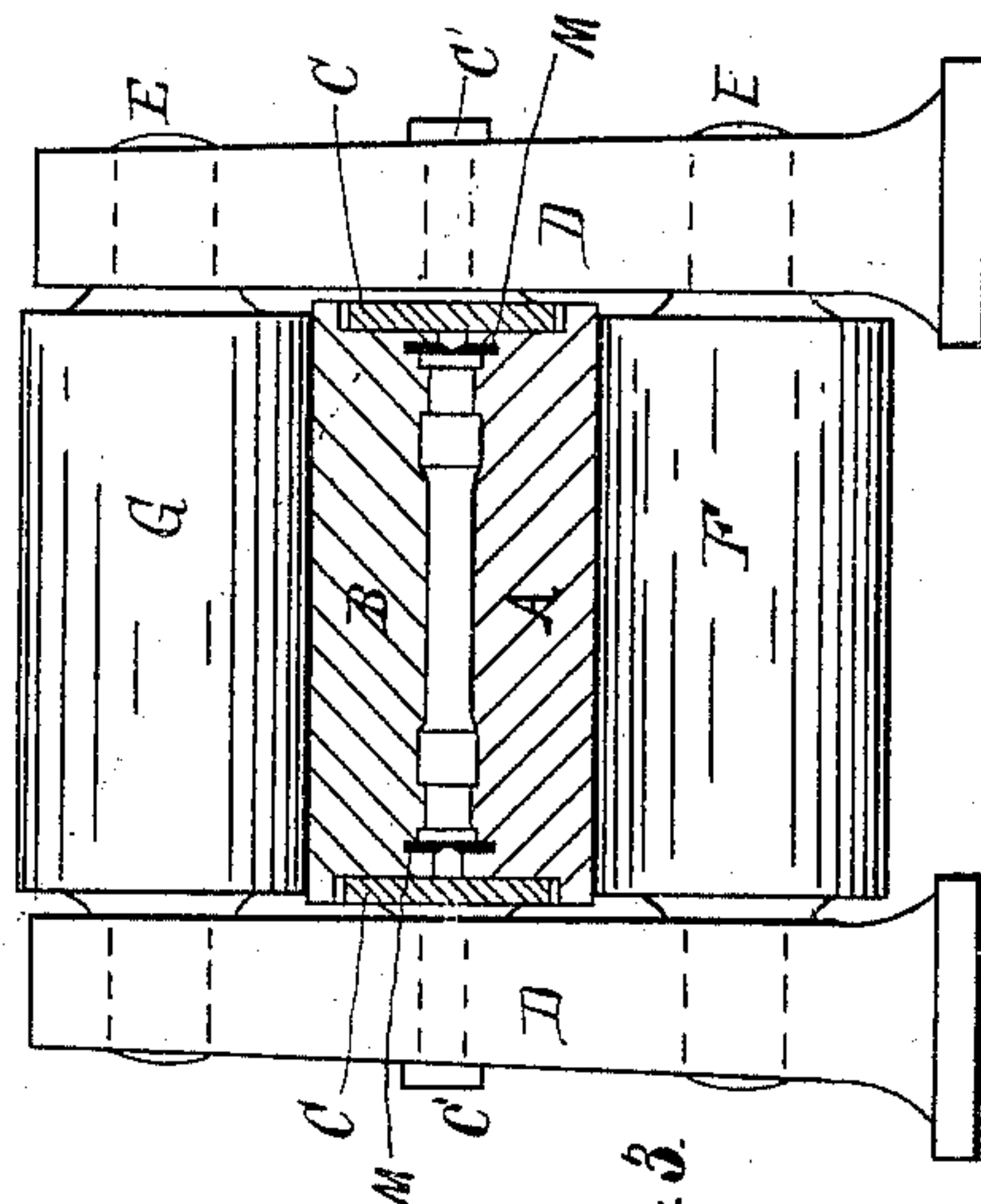


Fig. 3.

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WILLIAM L. MORRIS, OF CLEVELAND, OHIO.

AXLE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 458,685, dated September 1, 1891.

Application filed January 14, 1891. Serial No. 377,707. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. MORRIS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Axle-Manufacturing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in machines especially designed for use in the manufacture of car-axles.

The invention has for its object the construction of a simple machine which shall be adapted to receive the heated billet of iron and in one passage of such billet through the machine produce a perfect axle.

To this end the invention consists in the peculiar construction and combination of two die-plates the die-faces of which are constructed to produce the form of axle required, as the billet from which said axles is to be produced is operated upon by the said die-plates, the action of the dies being such as to thoroughly knead the iron, and while the billet is passing between the dies it is compelled to conform to the shape of the die and be delivered at the end of the machine in the form and shape of a true axle; also, in the combination, with said dies, of suitable cutters that trim off the ends of the axle just before the same is finished, the parts being constructed, arranged, and operating substantially in the manner and for the purposes hereinafter described, and pointed out in the claims.

Figure 1 is a side elevation with the side housings removed. Fig. 2 is a face plan of one of the die-plates. Fig. 3 is a vertical section through the die-plates at the point of finish of the axle and as indicated by the dotted line *xx* in Fig. 1. Fig. 4 is a cross-section on line *zz*, Fig. 2. Fig. 5 is a similar view on line *yy*, same figure.

In the accompanying drawings, which form a part of this specification, A B represent the two die-plates, the dies of which must necessarily be exact duplicates at their finishing ends in order to produce a perfect axle, while the remaining portion of the working-faces of such dies may be varied in their confor-

mation so as to produce the best effect in the working and kneading of the billet before it passes to the finishing portion. These dies are intaglio in their construction, being cut or otherwise formed transversely in the die-plates and below the faces thereof, leaving a portion of the faces upon the longer sides of said die-plates, as shown in Figs. 2, 3, 4, and 5, for the purpose of preventing a too great elongation of the billet as it is being operated upon; and it will be observed that these two die-plates do not come together or in contact with each other, but that they are separated, leaving an opening or space between their opposing faces in their longitudinal direction at their sides. Were the dies formed in bas-relief there would be no such restriction to the elongation of the billet, and the latter would in the operation of the device be drawn or forced toward the ends of the die formations so rapidly that while an axle would be produced it would be one full of imperfections, owing to the want of the "end-pressure," which must necessarily result in the employment of dies constructed as herein described.

Each die-plate A B is provided upon its longest sides with flanges *a b*, respectively, and such flanges terminate in racks *a'* and *b'*. Preferably the teeth of the former rack have a little more pitch than the pitch diameter of the governing-gears C, while the pitch of the latter is a little less than the pitch diameter of such governing-gears. These gears C are mounted upon stub-axles C', projecting inwardly from the central side housings of the machine. In the lower portions of these side housings D, and mounted upon suitable trunnions E, is a supporting-roll F, upon which the lower face of the die-plate A rests and travels, while a compression-roll G, similarly mounted in the upper ends of the side housings D, affords resistance to the upper face of the die-plate B. These two rolls F and G compel an engagement of the racks *a'* and *b'* with the governing-gears C.

H represents two standards erected in the longitudinal direction of the machine, and these standards are provided with suitable supporting and guiding rolls I, for the purpose of keeping the die-plates in proper alignment in the operation of the machine. The

initial end of the die-plate A is connected to the end of a piston-rod J, which is designed to be actuated through the medium of a cylinder K, while the rear end of the die-plate B is connected to and designed to be actuated by a ram L.

Each die-plate is provided at or near the finishing end with cutters M.

N is a guard-bar which extends laterally across the machine and lies between the two die-plates, preferably at or near the point shown in Fig. 1. The inner face of the guard-bar may be constructed to conform to the shape of the axle to be produced and be designed to scrape the scale therefrom, and to bear upon the metal being worked to prevent the same from rolling out of line at right angles to the line of motion; but as I deem this an important feature, and as being divisible from this present invention, I reserve the right to hereafter make a separate application embracing this feature, and where in its detail of construction and application will be fully shown.

The device being constructed and arranged substantially as herein described and shown, and the parts being in the position indicated in Fig. 1, the operation of the machine is as follows: The billet P, from which the axle is to be formed, is placed upon the lower die-plate A, where it is retained from rolling off by both the upturned end of the die and the guard-bar N. The power now being applied, the upper die-plate is caused to advance, and the lower die-plate is simultaneously retracted, thus causing the two die-plates to travel in opposite directions, and, owing to the relative "pitch" of the two racks a' and b' and their engagement with the governing-gears C, the lower die-plate is compelled to travel a little more rapidly than the upper die. Owing to the conformation of the dies, the billet is being continually turned over and kneaded, while it is also being gradually decreased in circumference, but is being extended in its longitudinal direction.

Fig. 4 is a section of the dies, as at $z z$ in Fig. 2, and it shows about the conformation of the dies at the initial point of working. From this point the dies change their conformation to or about the section shown at $y y$, Fig. 5. From this point the conformation of the dies continually changes until the finishing-point is reached, where they must be exact duplicates. Just prior to reaching this point the two sets of cutters M in the operation of the machine come opposite each other, and as they pass they produce a shear cut

upon both ends of the axle and remove the superfluous material, as is clearly shown in Fig. 3. The heel of the lower die A should be provided with a channel or gutter, into which the finished axle may drop and be retained therein during the retrograde movement of the machine until it has been removed by hand or suitable mechanical appliance.

There are various forms that this device may take on in details of construction and still be clearly within the spirit of my invention—as, for instance, one of the die-plates may be stationary, or the dies may be formed upon the peripheries of suitable rolls.

What I claim as my invention is—

1. In a device of the character described, two dies adapted to be moved in opposite directions, each die being provided with a set of cutters, substantially as and for the purposes specified.

2. In an axle-forming machine, two dies adapted to be moved in opposite directions and arranged to pass each other to a finishing-point, substantially as herein set forth.

3. In an axle-forming machine, the combination of two oppositely-moving die-plates with racks and governing-gears, substantially as and for the purposes described.

4. The combination of two die-plates constructed and arranged substantially as herein described, with a guard-bar located between said die-plates, substantially as described.

5. In combination with two similarly-formed dies traveling in opposite directions, the arrangement by which the form at one end of one of the dies will be located at the opposite end of the other die, and when dies approach each other similarly-formed forging-faces will bear upon metal at same instant, and as the axle is being formed similar faces will be bearing upon metal, substantially as described.

6. In a machine of the character described, two intaglio dies traveling in opposite directions, the opening between the dies at the ends of the transverse die formations being partially closed by the body of the die-plates and in the longitudinal direction thereof, substantially as and for the purposes herein specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 8th day of January, 1891.

WILLIAM L. MORRIS.

Witnesses:

H. S. SPRAGUE,
F. B. S. MORGAN.