

No. 641,599.

Patented Jan. 16, 1900.

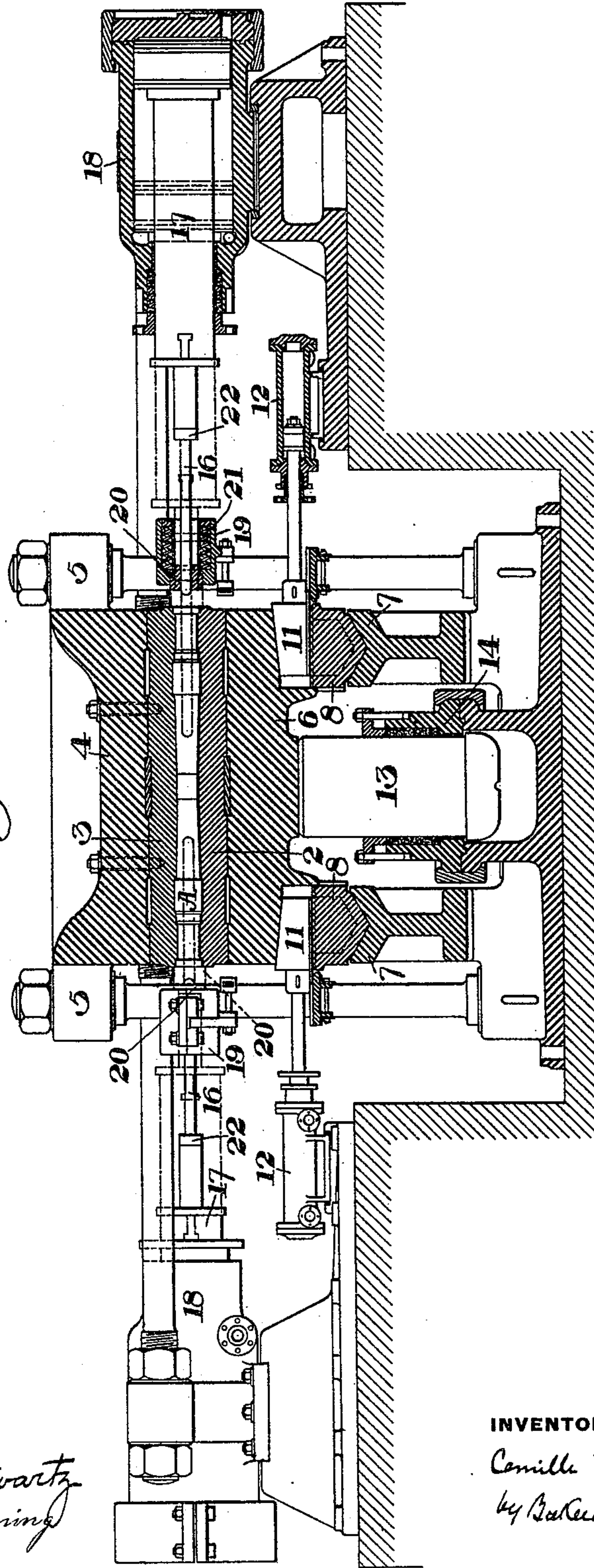
C. MERCADER.
AXLE FORGING MACHINE.

(Application filed Apr. 28, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



WITNESSES

Warren W. Sivarty
George B. Blumming

INVENTOR

Camille Mercader
by Baker & Baker
his attys

No. 641,599.

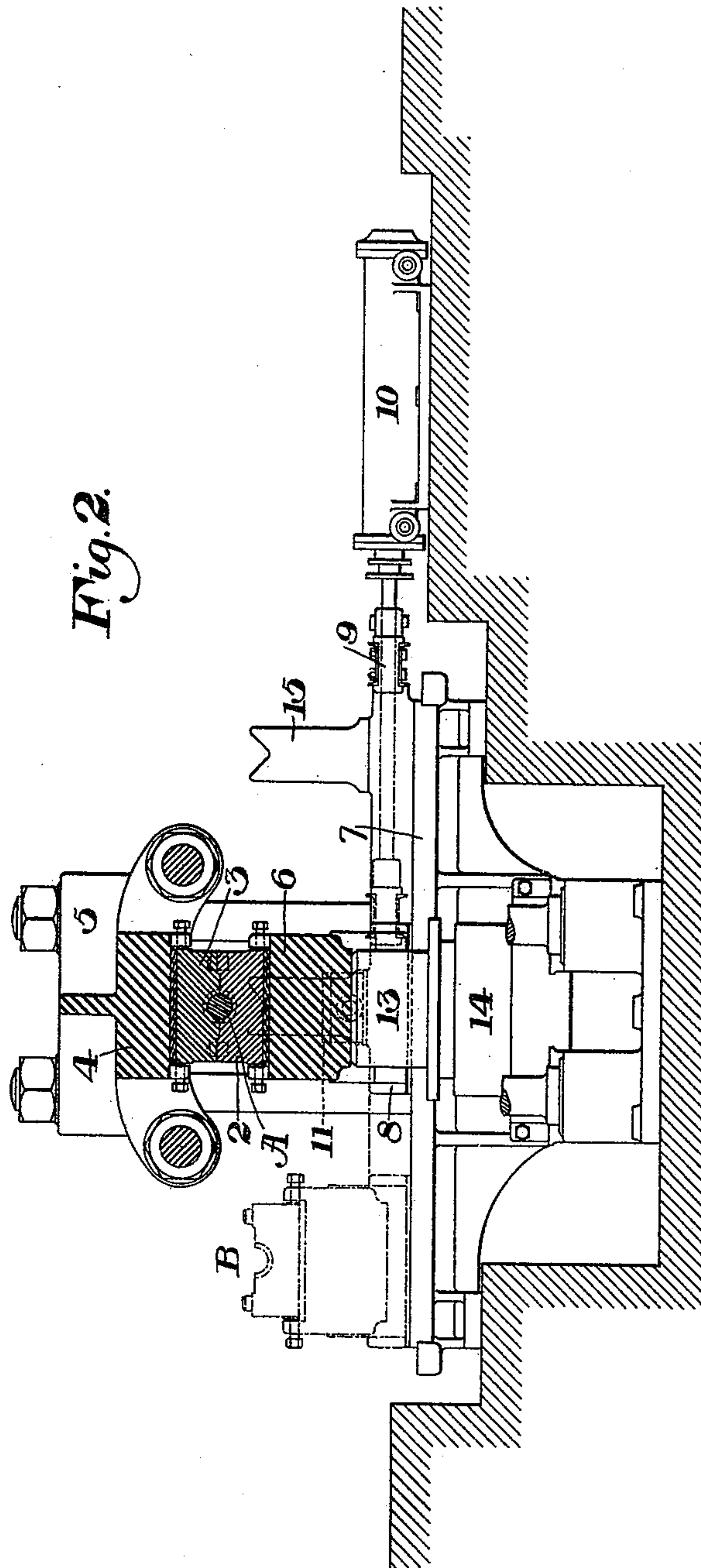
Patented Jan. 16, 1900.

C. MERCADER.
AXLE FORGING MACHINE.

(Application filed Apr. 28, 1899.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES

Warren W. Swartz
George B. Blumming

INVENTOR

Camille Mercader
by *Butcher & Butcher*
his attys.

UNITED STATES PATENT OFFICE.

CAMILLE MERCADER, OF BRADDOCK, PENNSYLVANIA.

AXLE-FORGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 641,599, dated January 16, 1900.

Application filed April 28, 1899. Serial No. 714,796. (No model.)

To all whom it may concern:

Be it known that I, CAMILLE MERCADER, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Axle-Forging Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a longitudinal section of my improved axle-forging machine. Fig. 2 is an end elevation, partly in section.

In the drawings, 2 represents the bed-die on which the axle-blank is laid during its manufacture, and 3 is the upper die, which is a counterpart thereof, these two dies having a conjoined cavity which is approximately of the shape of the finished axle. The upper die 3 has a holder 4, preferably fixed to the frame 5 of the machine. The lower die 2, which is the movable die, is fixed to a die-head 6 and is capable of two movements—a vertical movement to carry it into conjunction with the upper die and a lateral or traveling movement by which the blank is carried into the machine. To effect the lateral or traveling movement, I provide a lateral track 7, on which are mounted slides 8, upon which the die-head 6 when in its lowest position rests and by which it is engaged. These slides are connected by a cross-head 9 to the plunger of a cylinder 10 or other motor suitable for the purpose, and by the operation of this motor the slides carrying the die-head 35 and die are moved back and forth from a position B outside of the machine to the position shown in the drawings inside the machine, with the die 2 directly under the die 3.

11 11 are wedges which are mounted opposite to the operative position of the die-head 6 and are adapted to be moved by motors 12 forwardly underneath said die-head in order to support and lock it when elevated. The lifting of the die-head 6 is effected by the plunger 13 of a cylinder 14, which is set directly beneath the operative position of the die-head, so that when the die-head 6 is moved so as to bring the die 2 directly beneath the die 3 the die-head will be directly above and adapted to be elevated by the plunger 13. Some other suitable motor may be substituted for this cylinder and plunger.

For the purpose of removing the finished axle from the machine I mount on the slides 8 a carrier 15, consisting, preferably, of up-right arms having notched or concave upper ends adapted to receive and support an axle-blank.

In order to shape the ends of the axle, I employ punches 16, set at opposite ends of the die-cavity and adapted to enter the same longitudinally, being moved in a longitudinal direction by the plungers 17 of hydraulic cylinders 18 or by any other suitable motor. These punches are made sufficiently long and the plunger is given a sufficient stroke to enable them to penetrate the axle-blank lengthwise to and preferably beyond the wheel-seat of the axle. Opposite to the die-cavity, at each end thereof, is a box 19, having a follower-die-block 20, through which passes the end of the punch 16. This follower-block serves as a guide for the punch and also as a shaping-die for the end of the axle. It is provided with retracting-springs 21, and its inner end is of proper contour and size to engage and shape the end of the axle-blank.

The operation of my improved machine constructed as above described is as follows: The parts being in the position as shown in Fig. 2, with the die-head 6 and die 2 projected outwardly from under the die 3, as shown by dotted lines, the operator places on the die 2 an axle-blank A, which has been raised to a welding heat and is adapted to be forged in the dies. Then by operation of the cylinder 10 the die 2 is drawn under the die 3 into the working positions shown in Figs. 1 and 2. Then the plunger 13 is elevated in its cylinder 14, so as to engage the die-head 6 and to lift the die 2 into contact with the die 3, the axle-blank being gripped and held thereby at the center and at the journals. To retain the dies in this position and to withstand the outward pressure exerted during the forging operation, the wedges 11 are projected by the cylinders 12 under the die-head 6, so as to engage and support the same. The die 2 being thus locked by the wedges, the cylinders 18 are actuated, so as to project the plungers and to move the punches 16 through the follower-blocks 20 into engagement with the ends of the axle-blank, whereupon said punches penetrate the blank, passing beyond the

wheel-seat portions and displacing the metal of the axle-blank outwardly, so as to fill the cavity of the dies, forming the wheel-seat and taper of the axle of their proper size and contour. Near the end of the inward motion of these punches stops or shoulders 22, at the rear portions thereof, engage the follower-blocks 20 and carry them forward, causing them to engage the ends of the axle-blank and to force the same inwardly toward the die-cavity, and thus by compressing them shaping up these ends and forming the collars. The forging of the axle is then completed, and it only remains to remove it from the machine and subsequently to turn the journals and wheel-seats. To remove the axle, the punches 16 are partially retracted, the wedges 11 are pulled back, so as to free the die-head 6, and the plunger 13 is lowered, so as to lower the die 2 to free said die from contact with the finished axle and to deposit the die-head 6 upon the slides 8. Then said slides are projected by operation of the cylinder 10, and the die 2 is carried thereby from under the upper die 3 into the position shown by dotted lines in Fig. 2, and in that position another axle-blank may be placed upon it in readiness to be drawn back into the machine. The same motion of the slides which carries out the die 2 from under the die 3 also brings under the die 3 the carrier 15, which is mounted upon the opposite end of the slides. Meanwhile the axle-blank has been supported by the punches 16 penetrating partially into its ends, and now said punches are withdrawn and permit the finished axle to drop upon the carrier 15. The slides are then retracted, thus bringing back the finished axle on the carrier 15 and bringing into the machine under the die 3 the axle-blank, which is supported on the die 2, and with this axle-blank the operations above described are repeated.

The machine above described has many advantages. It is effective in construction and produces a strong and light axle. The end portions of this axle are of course hollow, the perforations extending to and beyond the wheel-seat; but this is an advantage, because the forging action which is produced by the entrance of the punches greatly compacts and strengthens the metal and renders the axle less apt to break. This will be understood when it is considered that heretofore in the finishing of an axle it has been greatly weakened by cutting away the outer skin which has been compacted by the forging operation; but in the use of my dies a tough dense skin is produced on the interior of the axle by the forging action of the entering punches, and this skin is not cut away, but remains as a permanent element of strength. My invention also renders it unnecessary, as heretofore, to turn the axle throughout its entire length, for by my dies it is made so true that

it is sufficient if only the end portions are turned.

Within the scope of my invention as defined in the following claims many changes may be made in the construction of the parts of the apparatus and of the motors by which the different parts are actuated, since

What I claim is—

1. The combination of dies adapted to receive the metal blank, means by which the dies are caused to approach, and in addition to said means, locking mechanism by which they are held in contact, and a punch adapted to penetrate the blank; substantially as described.

2. The combination of dies adapted to receive the metal blank, means by which the dies are caused to approach, and, in addition, means by which they are held in contact, and a punch, substantially as described.

3. The combination of dies adapted to hold the article to be formed, mechanism by which one of the dies is movable laterally from opposition to the other die, means for bringing said dies into contact to grip an axle-blank, and an end punch; substantially as described.

4. The combination of dies adapted to hold the article to be formed, a slide on which one of said dies is mounted, means for moving said slide, a motor adapted to move said die vertically on the slide into contact with the other die, and an end punch; substantially as described.

5. The combination of dies adapted to hold the article to be formed, mechanism by which one of the dies is movable laterally from opposition to the other die, means for bringing said dies into contact to grip an axle-blank, means for locking the dies in such engagement, and an end punch; substantially as described.

6. The combination of dies adapted to hold an article to be formed, an end punch adapted to pierce the end of the article, a shaping follower-die through which the punch moves, and which serves as a guide therefor, and a stop carried by the end punch and adapted to engage the follower-die at an advanced period of motion of the punch and to force it against the article to shape the end thereof; substantially as described.

7. The combination of axle-forming dies, having a matrix-cavity adapted to shape the wheel-seat and taper of an axle, a punch and mechanism adapted to force the punch lengthwise into the axle to the inner end of the wheel-seat, substantially as described.

In testimony whereof I have hereunto set my hand.

CAMILLE MERCÂDER.

Witnesses:

THOMAS W. BAKEWELL,
G. I. HOLDSHIP.