(No Model.) 2 Sheets—Sheet 1.

R. BAGALEY & W. HAINSWORTH.

METAL ROLLING MACHINE.

No. 374,335. Patented Dec. 6, 1887.

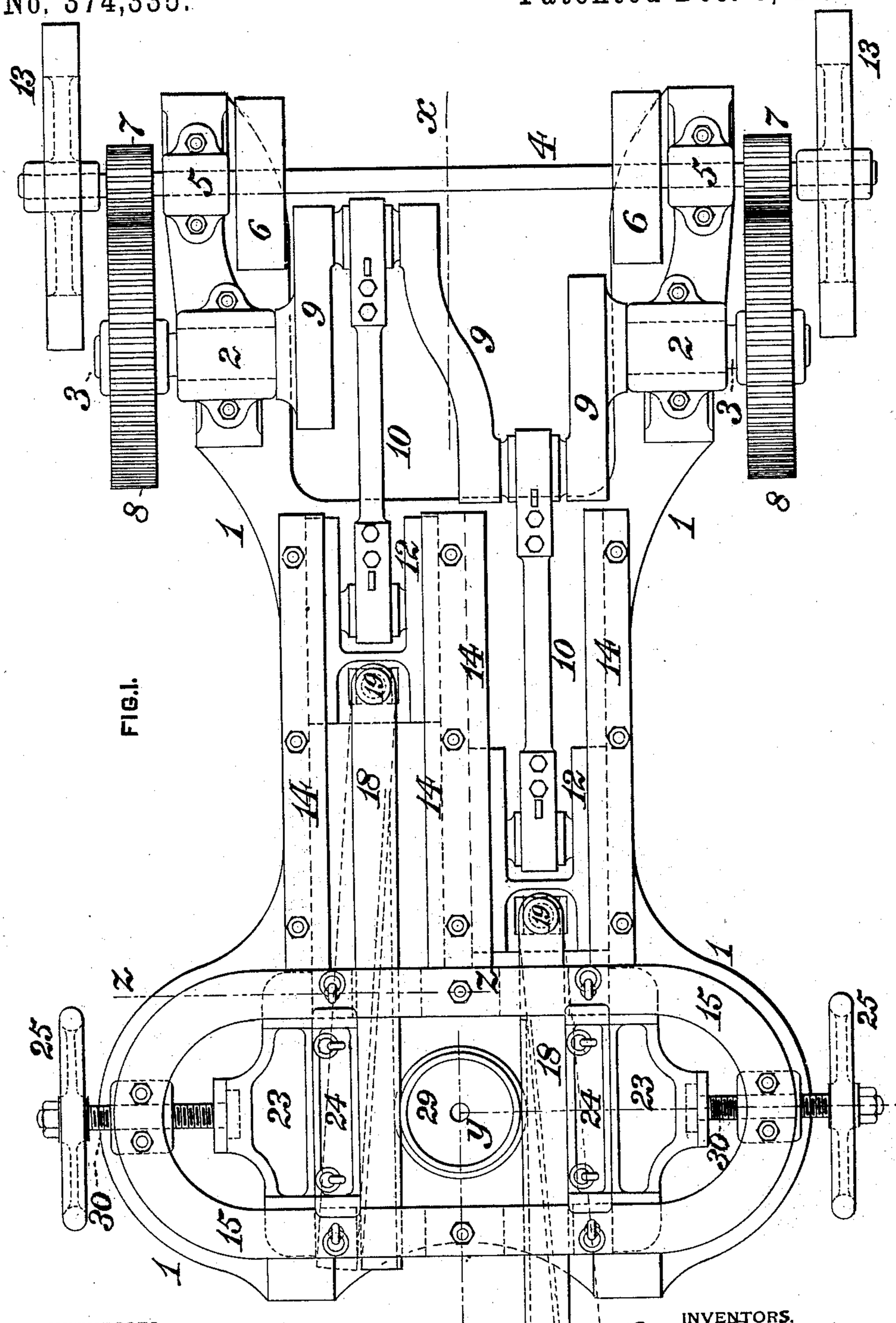

FIG. 1.

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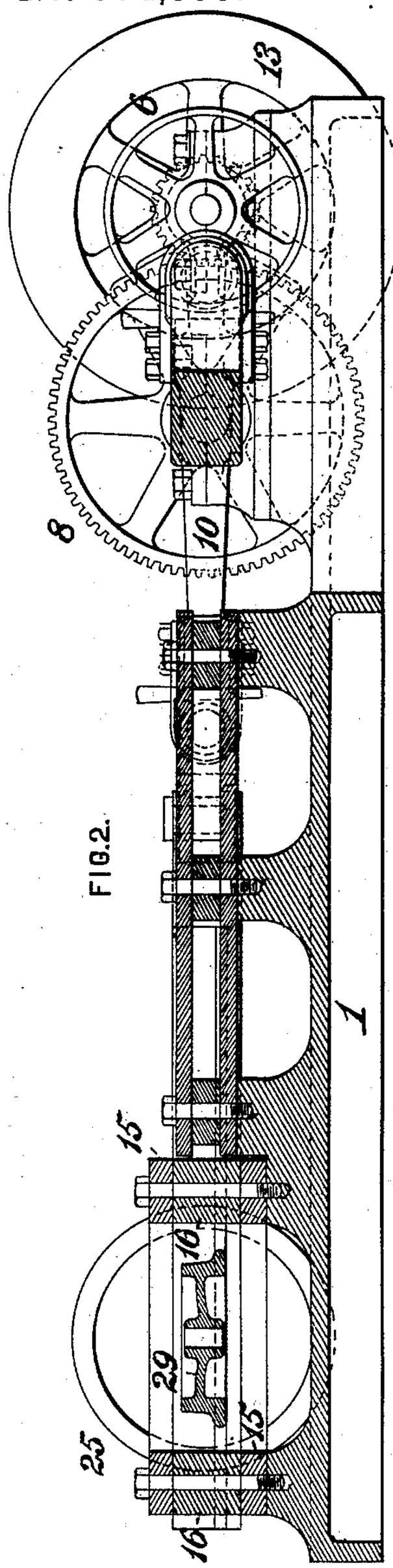

FIG. 2.

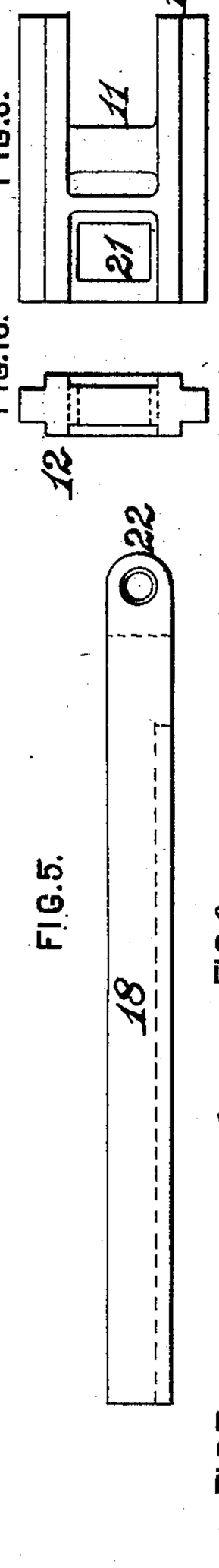

FIG. 5.

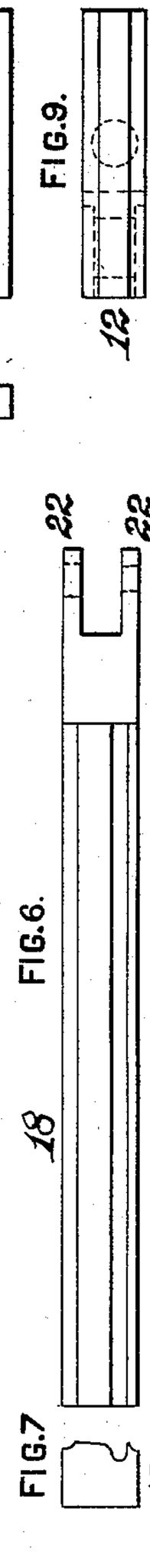

FIG. 6.

FIG. 7.

FIG. 8.

FIG. 10.

FIG. 9.

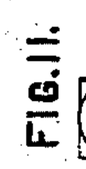

FIG. 11.

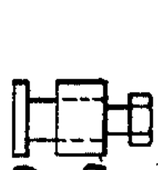

FIG. 12.

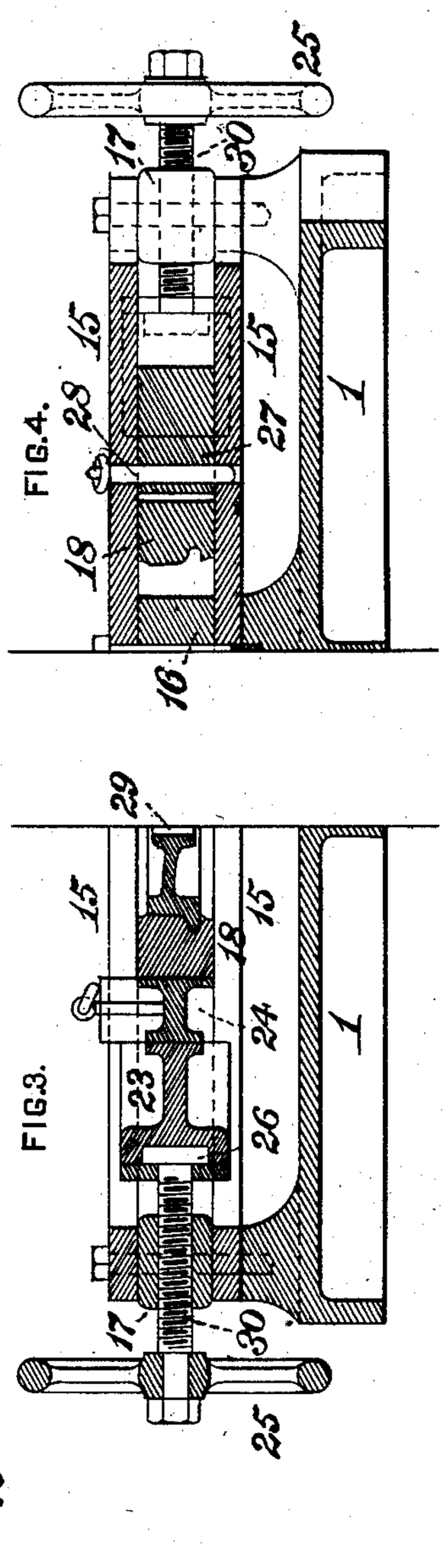

FIG. 4.

FIG. 3.

WITNESSES:

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UNITED STATES PATENT OFFICE.

RALPH BAGALEY AND WILLIAM HAINSWORTH, OF PITTSBURG, PENNSYLVANIA.

METAL-ROLLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 374,335, dated December 6, 1887.

Application filed August 13, 1887. Serial No. 246,831. (No model.)

To all whom it may concern:

Be it known that we, RALPH BAGALEY and WILLIAM HAINSWORTH, both residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented or discovered a certain new and useful Improvement in Metal-Rolling Machines, of which improvement the following is a specification.

The object of our invention, which relates to the manufacture of articles of cylindrical transverse section—as car-wheels, axles, shafts, &c.—is to provide effective and desirable means whereby a metal blank of such character may be reduced at all points to desired and determined diameter of section and a surface smooth and uniform throughout and of increased durability imparted to its periphery.

To this end our improvement consists in certain novel devices and combinations hereinafter fully set forth.

Our invention, while applicable without variation of principle to the production of other articles, is more particularly designed for and is herein illustrated as applied in the finishing of steel castings for the formation of car-wheels.

It has been developed by practical experience in the manufacture of car-wheels of various sizes from steel castings during a period of some nine or ten years past that the following objections are encountered and must be effectually overcome in order to produce a strong, durable, and merchantable wheel, to wit: First, the tread and flange of the wheel are liable to present at different points projections or depressions, due to the action of the hot steel against the mold in the operation of casting; second, in the cooling of the casting and the resultant shrinkage the metal is frequently distorted from normal form, so that the wheel when cold fails to be truly cylindrical; and, third, for the same reason, the wheels are found to vary in diameter to such an extent that it is not practicable to attain such uniformity in size as is necessary in a set of wheels designed to run together under the same car. We enable these objections to be obviated and insure the production of wheels which are uniform in diameter, of truly cylindrical contour, and smoothly and uniformly finished upon their outer faces by the provision of a mechanism by which the rolling of the treads and flanges through which these results are attained may be thoroughly and desirably performed.

In the accompanying drawings, Figure 1 is a plan or top view of a metal-rolling machine embodying our invention; Fig. 2, a vertical longitudinal section through the same at the line *x x* of Fig. 1; Fig. 3, a half-transverse vertical section through the same at the line *y y* of Fig. 1; Fig. 4, a similar section at the line *z z* of Fig. 1; Fig. 5, a plan or top view of one of the reciprocating bars detached; Fig. 6, a side or face view, and Fig. 7 an end view, of the same; Fig. 8, a plan or top view of one of the cross-heads detached; Fig. 9, a side view, and Fig. 10 an end view, of the same; Fig. 11, a plan view, and Fig. 12 a side view, of one of the coupling-pins of the reciprocating bars.

In the practice of our invention we provide a substantial frame or bed-plate, 1, adjacent to one end of which are secured the bearings 2, in which a crank-shaft, 3, is mounted. Rotation is imparted to the crank-shaft from a counter-shaft, 4, mounted in bearings 5 on the frame and rotated by power transmitted from a prime mover in any suitable manner, as by belts passing around pulleys 6 on the counter-shaft. The counter-shaft carries a spur-pinion, 7, adjacent to each of its ends, which meshes with a corresponding gear, 8, on the crank-shaft 3 and effects the rotation of the latter at a speed lower than that of the counter-shaft. A balance-wheel, 13, is also secured upon each end of the counter-shaft.

Two double cranks, 9, of equal throw, which are set oppositely, or with their pins one hundred and eighty degrees apart, are formed upon the crank-shaft 3, and the pin of each crank is coupled by a connecting-rod, 10, to a pin, 11, upon a cross-head, 12, fitted to slide in guides 14, fixed to the frame. Reciprocating movements, equal in extent and respectively opposite in direction, are consquently imparted to the cross-heads 12 by the rotation of the crank-shaft 3. A supplemental pressure and guide frame composed of upper and lower bars or plates 15, maintained at a proper distance apart by interposed blocks or distance-pieces 16 and 17 at its sides and ends,

is secured firmly to the main frame 1, transversely thereto and adjacent to the ends of the guides 14, between which the cross-heads 12 traverse, and a rolling-bar, 18, having its face nearest the center line of the machine grooved and inclined in conformity with the contour of the flange and tread of the wheel which is to be rolled, is coupled by a pin, 19, to each of the cross-heads 12, so as to reciprocate therewith between the upper and lower members of the supplemental frame 15.

In order to provide increased bearing-surface for the rolling-bars upon the cross-heads, as well as to admit of the transverse adjustment of the rolling-bars and of their pivotal movement upon the pins 19, as is in each case from time to time required, as presently to be described, a rectangular block, 20, is mounted upon each of the coupling-pins 19 and is fitted in a slot, 21, in the cross-head, which slot is of sufficiently greater width than the block to permit the required degree of transverse movement of the rolling-bar. The latter is provided with jaws or lugs 22, which embrace the pin 19 above and below the block 20.

A pair of pressure-heads, 23, is fitted to slide in the frame 15, at right angles to the line of traverse of the rolling bars 18, one of said heads being located exterior to each of said bars and acting to transmit applied pressure thereto, preferably through the intermediation of a removable facing-block, 24, which rests upon the upper frame-bar 15 and fits between the head 23 and bar 18. Movement toward and from the center line of the machine, which movement, when in the former direction, correspondingly moves the rolling-bars, is imparted to the heads 23 by adjusting-screws 30, engaging nuts in the end blocks, 17, of the supplemental frame, and rotated by hand-wheels 25 on their outer ends. Collars 26 on the inner ends of the adjusting-screws are fitted to rotate freely in recesses in the heads 23, so as to effect the longitudinal traverse of the latter without interference with the rotation of the screw, and the inward traverse of the heads is limited by stop-blocks 27, connected by pins 28 to the supplemental frame 15.

The operation of the machine is as follows: It being understood that a sufficient amount of movement of the blocks 20 in the slots 21 of the cross-heads is allowed to admit of the transverse adjustment of the rolling-bars in accordance with the difference of diameters of the wheels which are from time to time to be rolled, a steel wheel-blank, 29, which is cast slightly larger in diameter than that to which it is to be finished, is taken from the mold as soon as it is in proper condition to be removed, and is placed upon a suitable block or stand within the supplemental frame 15 and between the rolling-bars 18 in such vertical relation to the latter that its tread and flange shall stand in line with the corresponding portions of their inner faces. The heads 23 are then moved inwardly by the adjusting-screws 30, carrying with them the facing-blocks 24 and the rolling-bars 18, against which the latter bear and which are free to follow the inward movement of the facing-blocks, by reason of the space allowed therefor in the slots of the cross-heads. When the rolling-bars have thus been moved sufficiently close together to exert pressure upon the interposed wheel-blank 29, rotation is imparted to the crank-shaft 3, and by the resultant reciprocation in opposite directions, respectively, of the rolling-bars the blank is rolled to the desired diameter and finished surface, the heads 23 and facing-blocks 24 being gradually moved toward the blank by the hand-wheels 25 as the rolling proceeds until the distance between the inner faces of the rolling-blocks is equal to the diameter required for the finished wheel. At the termination of the operation the pressure of the heads upon the facing-blocks and rolling-bars is relieved by backward rotation of the feed-screws, and by removing one or both of the facing-blocks 24, which can be readily effected by means of hooks provided for the purpose, the rolling-bars may be swung outwardly upon the coupling-pins 19, as indicated in dotted lines in Fig. 1, and the finished wheel removed to be replaced by another blank. Where the facing-blocks are not employed, the heads 23 can be drawn outward sufficiently far by the screws 30 to admit of such pivotal movement of the rolling-bars as may be necessary to allow the withdrawal of the wheel. The stop-blocks 27 prevent the inward movement of the rolling-bars farther than is required to accurately bring the wheel to a determined diameter, and blocks of different widths may be provided and inserted in correspondence, respectively, with the different diameters to which it may be desired to finish wheels.

The employment of opposite cranks to effect the reciprocation of the pressure-bars embodies the advantages of enabling the application of power thereto to be made as directly as practicable and of equalizing the strain upon the shaft and bearings, and by reason of the equal pressure which is exerted in opposite directions by the rolling-bars upon the casting the movement of the latter is practically an axial one only, it being rotated for slightly over half a revolution in opposite directions alternately while being rolled without substantial change of position relatively to the supplemental frame and adjusting screws through which pressure is applied to the bars. The parallelism of the latter is insured at all points of their traverse, and by their capacity of movement transversely to their line of reciprocation within the slots of the cross-heads they are rendered adjustable within their determined range of lateral movement in accordance with the initial and progressive adjustments of the pressure-heads, which by means of the stop-blocks can be regulated and limited with positive accuracy to insure the production of wheels of the diameters required.

It will be understood that a material reduction of diameter in the castings is not necessary, the substantial result to be attained being the production of wheels of uniform diameter and truly circular periphery finished throughout to a smooth and uniform surface.

We claim as our invention and desire to secure by Letters Patent—

1. In a metal-rolling machine, the combination of a shaft provided with a pair of diametrically-opposite cranks, and two rolling-bars, each coupled to the pin of one of said cranks and laterally adjustable relatively thereto, substantially as set forth.

2. In a metal-rolling machine, the combination of a shaft provided with a pair of diametrically-opposite cranks, and two rolling-bars, each coupled to the pin of one of said cranks and adjustable both pivotally and laterally relatively to said pin, substantially as set forth.

3. In a metal-rolling machine, the combination of a shaft provided with a pair of diametrically-opposite cranks, two rolling-bars, each coupled to and reciprocated by the pin of one of said cranks, and a pair of pressure-heads movable and adjustable transversely to the line of traverse of the rolling-bars, substantially as set forth.

4. In a metal-rolling machine, the combination of a shaft provided with a pair of diametrically-opposite cranks, two rolling-bars, each coupled to and reciprocated by the pin of one of said cranks, a pair of pressure-heads movable and adjustable transversely to the line of traverse of the rolling-bars, and a pair of adjusting-screws for traversing the pressure-heads and transmitting pressure through the same to the rolling-bars, substantially as set forth.

5. In a metal-rolling machine, the combination of a pair of rolling-bars reciprocated in respectively opposite directions by connections to diametrically-opposite cranks, a pair of pressure-heads fitted to bear upon the rolling-bars and traverse at right angles to their line of movement, and fixed stops for limiting the traverse of the pressure-heads in the direction of the rolling-bars, substantially as set forth.

6. In a metal-rolling machine, the combination of a pair of reciprocating rolling-bars, a pair of pressure-heads adapted to bear upon the rolling-bars and traverse at right angles to their line of movement, adjusting-screws for traversing the pressure-heads and transmitting pressure through the same to the rolling-bars, and fixed stops for limiting the traverse of the pressure-heads in the direction of the rolling-bars, substantially as set forth.

7. In a metal-rolling machine, the combination of a cross-head coupled by a connecting-rod to a crank-pin, and a rolling-bar connected to a block which is fitted to slide in the cross-head at right angles to the line of traverse thereof, substantially as set forth.

8. In a metal-rolling machine, the combination of a cross-head coupled by a connecting-rod to a crank-pin, a block fitted to slide freely in a transverse slot in the cross-head, and a rolling-bar pivoted on a pin fitting in said block, substantially as set forth.

9. In a metal-rolling machine, the combination of a reciprocating rolling-bar, a pressure-head fitted to traverse at right angles to the line of movement of the rolling-bar, and a removable facing-block against which the pressure-head bears in its traverse and through which pressure is transmitted from the pressure-head to the rolling-bar, substantially as set forth.

10. In a metal-rolling machine, the combination of a reciprocating rolling-bar, a pressure-head fitted to traverse at right angles to the line of movement of the rolling-bar, a removable facing-block against which the pressure-head bears in its traverse and through which pressure is transmitted from the pressure-head to the rolling-bar, and a fixed stop limiting the traverse of the pressure-head and facing-block, substantially as set forth.

11. In a metal-rolling machine, the combination of a main frame having bearings for a crank-shaft at or near one of its ends and a series of longitudinal guides fixed upon its top, and a supplemental pressure and guide frame secured upon the main frame transversely thereto and at the end opposite that at which the crank-shaft bearings are located, substantially as set forth.

12. In a metal-rolling machine, the combination of a main frame and a supplemental pressure and guide frame having transverse guides for the reception of a pair of pressure-heads, and a nut at each of its ends to engage a pressure-head-adjusting screw, substantially as set forth.

13. In a metal-rolling machine, the combination of a main frame, a shaft mounted in bearings adjacent to one end thereof and provided with a pair of diametrically-opposite cranks, a pair of cross-heads, each fitted to slide in guides in the frame and coupled to the pin of one of said cranks, a pair of rolling-bars, each connected to a block fitted to slide freely in a transverse slot in one of the cross-heads, a pair of pressure-heads fitted to traverse at right angles to the line of movement of the rolling-bars and transmit applied pressure thereto, and a pair of adjusting-screws each engaging a fixed nut and traversing one of the pressure-heads toward and from the adjacent rolling-bar, substantially as set forth.

In testimony whereof we have hereunto set our hands.

RALPH BAGALEY.
WILLIAM HAINSWORTH.

Witnesses:
J. LINCOLN RALPH,
DARWIN S. WOLCOTT.