No. 663,002. Patented Dec. 4, 1900.

M. BAACKES.

MACHINE FOR ROLLING CAR WHEELS.

(Application filed Mar. 3, 1899.)

(No Model.) 4 Sheets--Sheet 1.

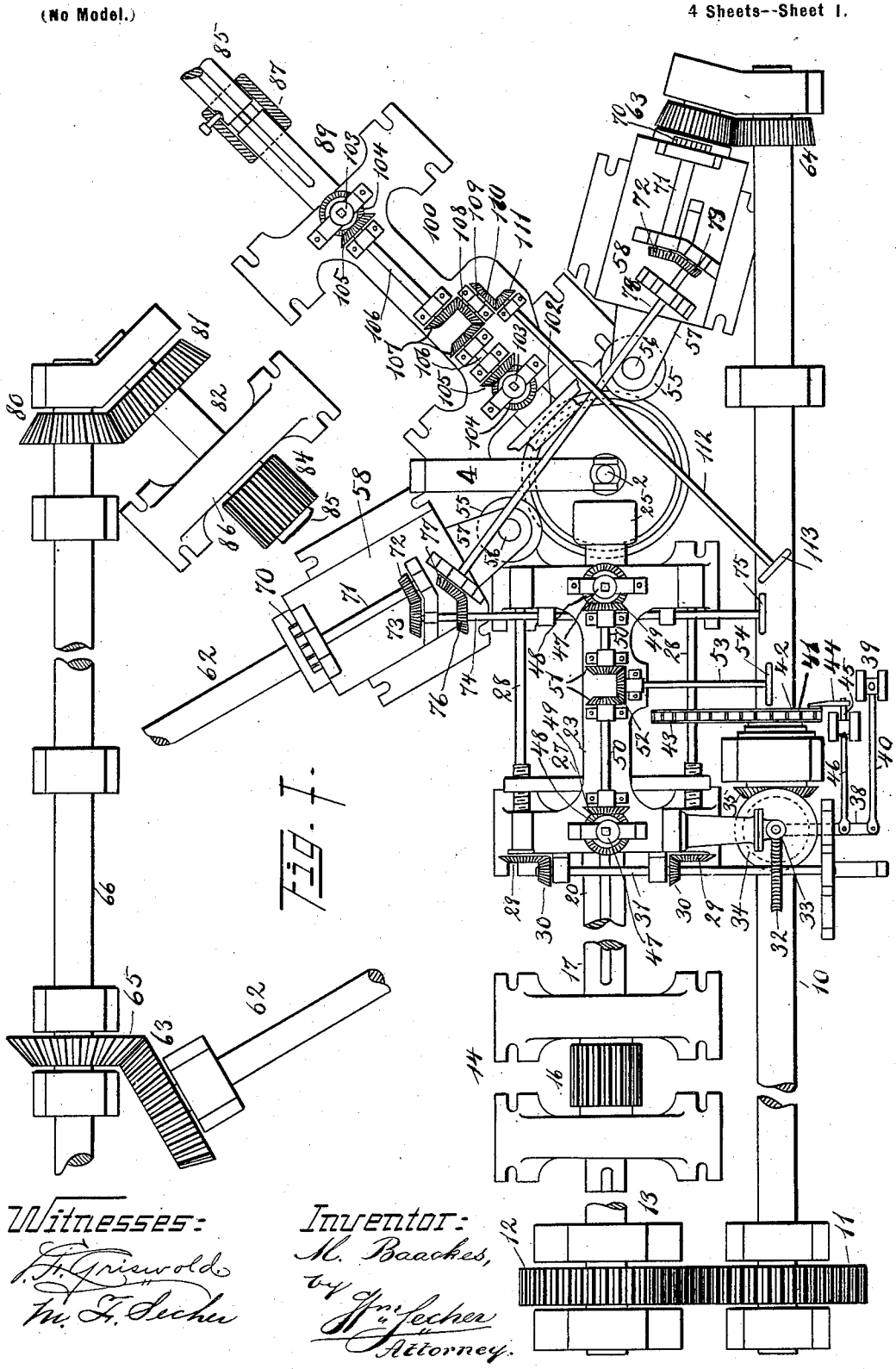

Fig. 1.

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Wm. G. Decher

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by Wm. Decher
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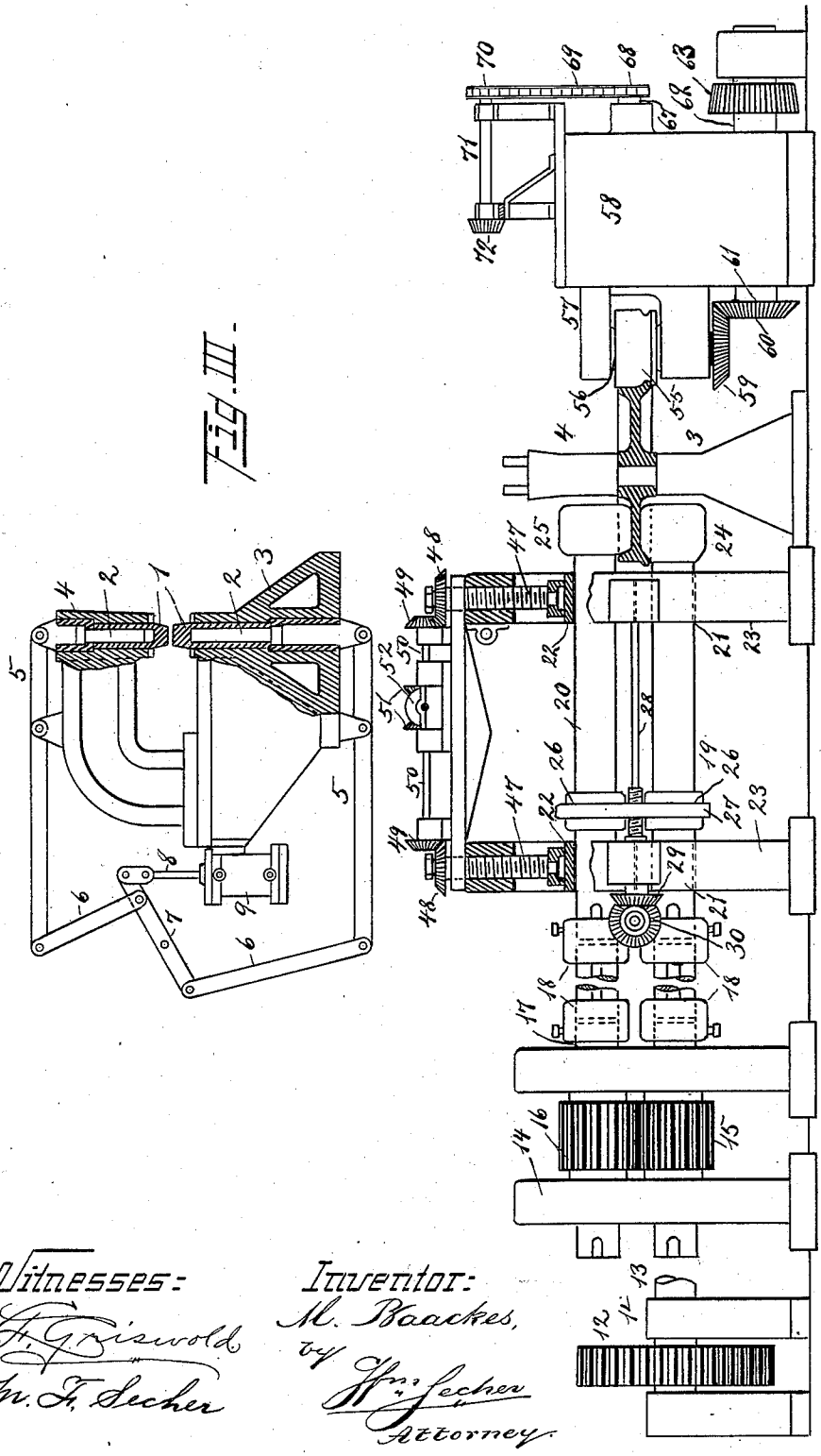

FIG. III.

FIG. II.

Witnesses:
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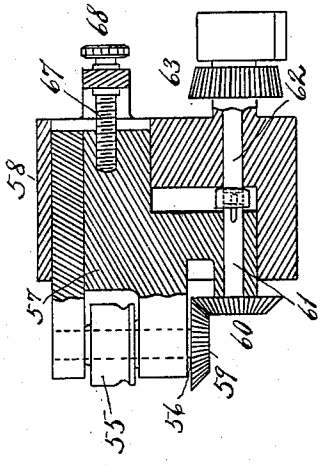

FIG. VI.

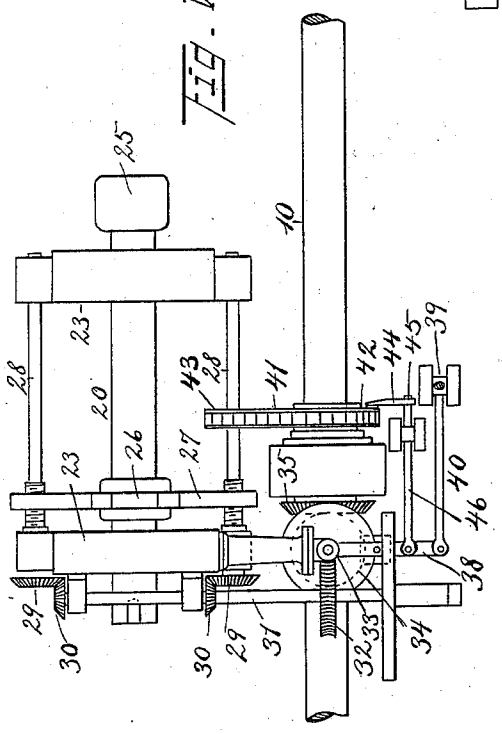

FIG. V.

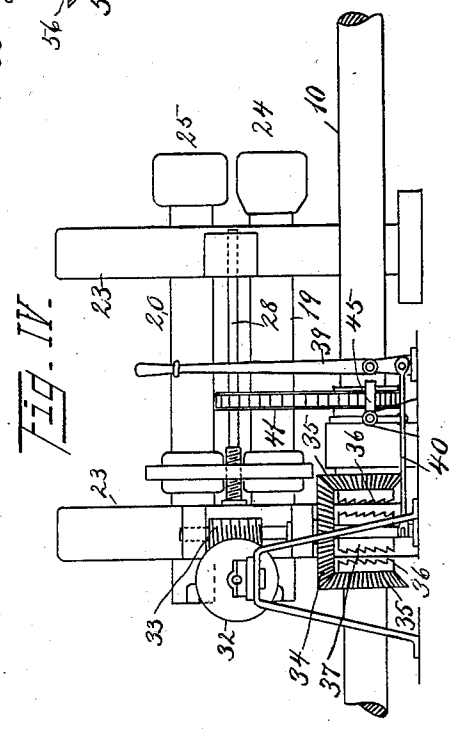

FIG. IV.

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No. 663,002. Patented Dec. 4, 1900.

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MACHINE FOR ROLLING CAR WHEELS.

(Application filed Mar. 3, 1899.

(No Model.) 4 Sheets--Sheet 4.

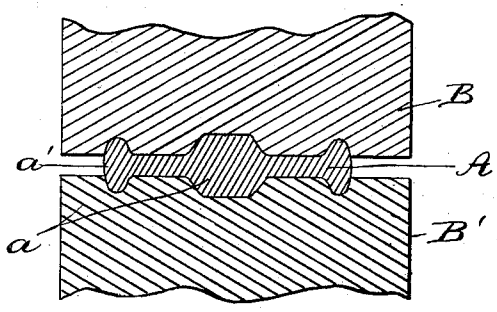

Fig. X.

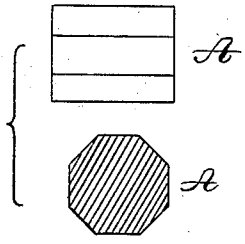

Fig. VIII.

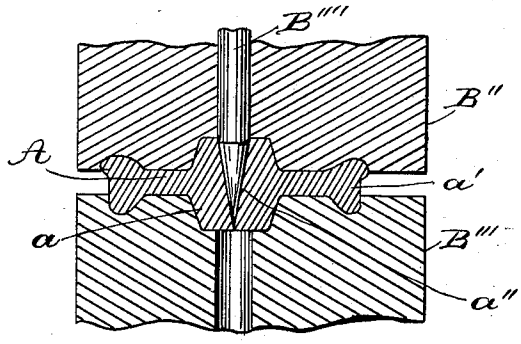

Fig. XI.

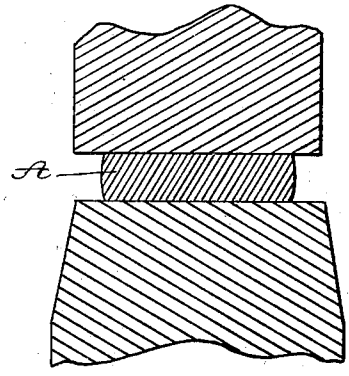

Fig. IX.

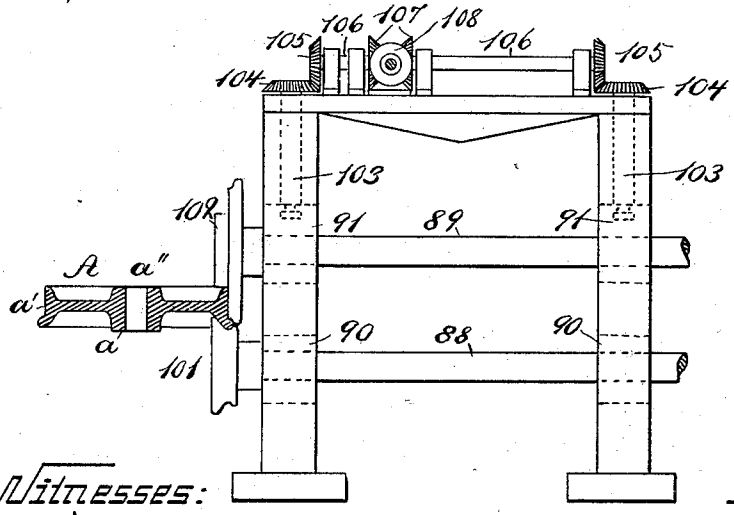

Fig. VII.

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UNITED STATES PATENT OFFICE.

MICHAEL BAACKES, OF CLEVELAND, OHIO.

MACHINE FOR ROLLING CAR-WHEELS.

SPECIFICATION forming part of Letters Patent No. 663,002, dated December 4, 1900.

Application filed March 3, 1899. Serial No. 707,588. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL BAACKES, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Machines for Rolling Car-Wheels, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The annexed drawings and the following specification set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a top plan view of my improved machine for rolling car-wheels; Fig. II, a side view, partly in section, of the machine; Fig. III, a vertical section of the mandrel holding the wheel, illustrating the mechanism for operating the same; Fig. IV, a side view of the mechanism for controlling the web-rolls; Fig. V, a top view of the same; Fig. VI, a sectional view of a tread-roll and its mechanism; Fig. VII, a sectional view illustrating the rim-rolls and their mechanism; Fig. VIII, a side and an end view of the ingot from which the wheel is made; Fig. IX, a sectional view of the hammer-block, anvil, and ingot acted upon by said parts, illustrating the first step in forming the ingot into a blank; Fig. X, a sectional view of two dies and the blank, illustrating a subsequent step in the blank-forming process; and Fig. XI, a sectional view of two dies and the blank, illustrating a final step in the blank-forming process.

In making car-wheels it is of importance that no uneven strains shall be generated in the wheel as the latter cools and that the metal shall be evenly distributed throughout the wheel to prevent weakening of parts by uneven strains. For that purpose I have devised an improved machine for performing the finishing of the wheel, by which means an ingot-section, which is first roughly shaped by forging and pressing into the form of a blank, may thereupon be rolled in such manner that the metal is continually crowded and drawn from the center to the rim, where it is condensed and compressed to form a strong tread and flange.

The blank is formed from an ingot of steel, which is preferably rolled or hammered into octagonal cross-section and cut into blocks A of sufficient size to form the wheel, as illustrated in Fig. VIII. One of said blocks, suitably heated, is now hammered into a circular or nearly-circular shape and flattened by forging, as illustrated in Fig. IX. This forging, suitably heated, is now shaped between hydraulically-actuated dies B and B′ into approximate wheel shape, with a central bulge a for the hub and a peripheral bulge a' for the rim, as shown in Fig. X. The heated blank is thereupon further treated between hydraulically-actuated dies B″ and B‴ for giving the rim and hub a more complete shape, while at the same time a pointed piercer B⁗ pierces the hub to form the bore a'' for the car-axle and at the same time forces the displaced metal into the hub-forming part of the dies, thus crowding the metal outward from the center of the blank. The rolling-machine has a mandrel upon which the wheel is centrally supported, which mandrel is formed by two thimbles 1, removably secured upon two vertically-movable bolts 2, respectively sliding in a column 3, the upper end of which forms the lower support for the blank and a bracket 4, overhanging said column. Said bolts have their outer ends pivoted to levers 5, the long arms of which are connected by links 6 and 7 to the piston-rod 8 of a fluid-pressure cylinder 9, from which the mandrel-thimbles may be withdrawn from or forced into the hub-bore of the blank. The thimbles have preferably a slight taper to admit of their withdrawal from the hub-bore and are removably secured upon the bolts to admit of their being renewed when destroyed by the heat of the blanks placed upon them. A drive-shaft 10 is journaled across the front of the machine and has a gear-wheel 11, which meshes with a gear-wheel 12 upon a shaft 13, journaled in a housing 14 and having within said housing a pinion 15, meshing with a pinion 16 upon a shaft 17, journaled above said former shaft. The two shafts are connected by longitudinally and laterally movable couplings 18 of any suitable form, well known as "shaft-couplings" in rolling-mills, to two-roll shafts

19 and 20, horizontally journaled in boxes 21 and 22 in housings 23. The boxes 21 of the lower roll-shaft are stationary, and the boxes 22 of the upper roll-shaft are vertically movable in vertical slots in the housings. Rolls 24 and 25 are secured upon the ends of said two shafts, and the edges of the upper roll are rounded to draw and shape the outer face of the web and inner side of the rim, and the inner edge of the lower roll is rounded and the outer edge beveled to draw and shape the inner face of the web and the inner side of that part of the rim. The rolls and shafts are radial to the mandrel. The web-roll shafts are longitudinally movable in their boxes and have annular grooves 26 within the housings, which grooves are engaged by an open yoke 27, transversely supported in the housings, which yoke has threaded bores in its ends, through which two screw-shafts 28 are threaded. Said shafts are horizontally journaled in the housings and have bevel-gears 29 at their ends. Said gears engage bevel-gears 30 upon a shaft 31, transversely journaled upon the outer end of the housings. Said shaft has a worm-gear 32 upon one end, which gear is engaged by a vertical worm 33, the shaft of which has a miter-gear 34 upon its lower end. Said gear meshes with two miter-gears 35, loosely journaled upon the main drive-shaft. Said gears have half-clutches 36 upon their opposed faces, which may be engaged by either end of a clutch-sleeve 37, sliding upon and revolving with the main shaft. Said clutch-sleeve is movably connected to the inner end of a lever 38, fulcrumed upon the machine-base and having its outer end connected to the lower end of a vertically-fulcrumed hand-lever 39 by a link-rod 40. A sprocket-chain 41 passes around a wheel 42, loose upon the drive-shaft, and a wheel 43, secured upon one of the screw-shafts, and said wheels and chain are so adjusted as to size that the chain will make one complete rotation when the screw-shaft has been rotated sufficiently in either direction to move the web-rolls forward or back for their full stroke. The sprocket-chain has a projection 44, which may engage one arm of a vertically-pivoted bell-crank 45, the lower arm of which is connected by a link-rod 46 to the outer arm of the clutch-lever. The throw of the bell-crank is sufficient to shift the clutch-sleeve out of engagement with either clutch upon the gear-wheels. Adjusting-screws 47 are threaded in the upper ends of the housings and have their lower ends journaled in the boxes of the upper web-roll shaft, so that said boxes and shaft may be raised or lowered by said screws. Bevel-gears 48 are journaled at the upper ends of the screws and have feather-and-groove connection to the same in such manner that the screws may be rotated by the gears and may slide within the bores of the same. The bevel-gears are engaged by bevel-gears 49 upon shafts 50, journaled upon the tops of the housings and having bevel-gears 51 upon their inner ends, which are engaged by a bevel-gear 52 upon the end of a shaft 53, journaled across the top of the machine to have its other end near the hand-lever 39, where it is provided with a hand-wheel 54, by means of which it may be revolved by the machine operator, who has his stand at said lever and hand-wheel and who may thus bring the web-rolls closer together or farther apart. Tread-rolls 55 are arranged to be radially movable to the wheel-blank and to bear against the tread of the wheel, one at one side of the web-rolls and one nearly opposite the same. Said rolls have their peripheries shaped to fit the tread and flange of the finished wheel and have each a shaft 56, journaled in the inner end of a block 57, radially movable in a housing 58 in relation to the wheel-blank. The lower end of the tread-roll shaft has a miter-gear 59, which meshes with a miter-gear 60 upon a shaft 61, journaled in the sliding block and having sliding coupling to a shaft 62, journaled in the housing and having a bevel-gear 63. The gear 63 of the forward tread-roll device or the one nearly opposite the web-rolls meshes with a gear 64 upon the drive-shaft, and the gear 63 upon the rear roll device or the one at the side of the web-rolls is upon the end of the elongated shaft 62 and meshes with a bevel-gear 65 upon a shaft 66, driven together with the drive-shaft, parallel to the same and to the rear of the machine. A screw 67 is journaled to revolve in the outer end of the housing and to enter a threaded bore in the sliding roll-block, so as to move the latter when rotated. A sprocket-wheel 68 is secured upon the end of said screw and has a chain 69 passing around it and around a wheel 70 upon the end of a shaft 71, journaled upon the top of the housing. The other end of said shaft has a bevel-gear 72. The bevel-gear upon the rear tread-roll device meshes with a bevel-gear 73 upon a shaft 74, journaled across the machine so as to bring a hand-wheel 75 upon the other end of the shaft in reach of the operator. Said hand-wheel shaft has a bevel-gear 76, which meshes with a similar gear 77 upon a shaft 78, so journaled across the machine as to bring a bevel-gear 79 upon its other end to mesh with the bevel-gear 72 of the forward tread-roll device. By these means both tread-rolls may simultaneously be moved toward or from the tread of the wheel-blank. A bevel-gear 80 upon the rear drive-shaft 66 meshes with a bevel-gear 81 upon a shaft 82, having a pinion, (not seen in the drawings,) being below and meshing with a pinion 84 upon a shaft 85, said shafts 82 and 85 being journaled in a housing 86, one above the other. Said two shafts are connected by longitudinally and transversely movable couplings 87, of the form well known as "shaft-couplings" in rolling-mills, to two roll-shafts 88 and 89, journaled in boxes 90 and 91 in housings 100. Said housings stand radially to the wheel-blank and at an obtuse angle to the web-rolls in the space

between the tread-rolls. The boxes 90 of the lower roll are stationary, and the boxes 91 of the upper roll-shaft are vertically movable in vertical slots in the housings. A roll 101 is secured upon the end of the lower shaft and has its periphery shaped to fit and form the inner face of the wheel-rim. The upper shaft has a roll 102 secured upon its end, which roll has a flat-faced inner portion forming the outer face of the wheel-rim and a flange which bears with its side against the face of the tread and with its edge against the outer face of the wheel-flange. Adjusting-screws 103 are threaded in the upper ends of the housings and have their lower ends journaled in the boxes of the upper rim-roll shaft, so that said boxes and shaft may be raised or lowered by said screws. Bevel-gears 104 are journaled at the upper ends of said screws and have feather-and-groove connections to the same in such manner that the screws may be rotated by the gears and may be longitudinally moved within the bores of the same. The bevel-gears are engaged by bevel-gears 105 upon shafts 106, journaled upon the tops of the housings and having bevel-gears 107 upon their inner ends, which gears are engaged by a bevel-gear 108 upon a shaft 109, having a bevel-gear 110, meshing with a gear 111 upon a shaft 112, journaled across the top of the machine to have a hand-wheel 113 upon its end within convenient reach of the operator.

In practice after the blank has been given its primary shape, as hereinabove described, the heated blank is placed upon the support after the web-rolls and rim-rolls have been separated and the mandrel-thimbles have been withdrawn into the column and bracket. After the blank has been centered upon the column the mandrel-thimbles are forced through the hub-bore and the web-rolls and rim-rolls are drawn down together and the tread-rolls are drawn toward the center, if required, all by means of the hand-wheels. The web-rolls have previously been brought inward by means of the connection to the main shaft, the clutch being thrown by means of the hand-lever. As soon as the rolls have arrived at their innermost position the projection upon the sprocket-chain engages the bell-crank and throws the clutch out of engagement, stopping the inward movement of the rolls. When the web-rolls have been brought together upon the web by means of the hand-wheel, the clutch is shifted by the hand-lever and the revolving rolls commence to travel outward, spirally drawing the hot metal toward the rim while compressing the web metal. The web-rolls may be driven in and out to complete the reduction of the web, being fed into the metal by the hand-wheel actuating their adjusting-screws, and the inward and outward travel of the rolls may be gaged by the stop upon the sprocket-chain, which automatically throws the radial feed mechanism of the rolls out of gear at the extremities of their movement. The tread-rolls are drawn inward to form the tread and to gage the diameter of the finished wheel, although the radial movement of said rolls is very slight, as the diameter of the wheel-blank is increasing as the web-rolls draw the metal down and force it outward into the rim. The web-rolls will thoroughly compact the web by their flat faces bearing against the flat faces of the web, and the outer ends of the rolls will crowd the metal into the rim and twist the fiber of the same by their rounded or beveled faces. The upper rim-roll will flatten the outer face of the rim, and its flange will smooth the tread and twist the fiber of the metal therein by the face of the roll-flange rotating against the face of the wheel-tread. As the faces of the web-rolls are nearly as long as the width or radius of the web, the difference in speed at the various parts of the web and the uniform peripheral speed of the rolls will crowd and twist the fiber of the metal, thus compacting and smoothing the surfaces of the web, rendering a fine hard finish to the wheel.

Besides for the purpose of rolling new wheels from blanks this machine may be used with great advantage for rerolling old wheels, which have been turned down upon their treads to true them, bringing the wheels back to their proper diameter by crowding the metal out to the rim and providing wheels of proper diameter, even though somewhat lighter, which may with advantage be used for lighter purposes than originally used. The heating and rolling will also remove the crystallization of the metal in the old wheels and restore the same to their original strength.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a machine for rolling car-wheels, the combination of a drive-shaft, a pair of web-rolls connected to be driven from the said shaft, means for feeding said rolls together, means for moving said rolls radially in their relation to the wheel-blank and connected to the drive-shaft, clutch mechanism in the connection between the drive-shaft and the radial-movement means, and a stop mechanism connected to be operated from the drive-shaft and connected to said clutch mechanism to automatically disengage the latter at the extremes of the radial movement of the rolls, substantially as set forth.

2. In a machine for rolling car-wheels, the combination of a pair of rolls and their shafts, means for rotating said rolls, means for feeding said rolls toward and from each other, a yoke engaging said shafts, a screw-shaft en-

gaging a threaded opening in said yoke, a bevel-gear and a sprocket-wheel upon said screw-shaft, a shaft provided with a bevel-gear engaging said latter gear and with a worm-gear, a worm-shaft engaging said worm-gear and provided with a miter-gear, a drive-shaft, miter-wheels loose upon said shaft and engaging the former miter-gear and provided with half-clutches upon their faces, a clutch-sleeve sliding upon and turning with the drive-shaft between said half-clutches, a clutch-lever engaging said sleeve, a hand-lever, a link-rod connected to the lower end of said hand-lever and to the clutch-lever, a sprocket-wheel loose upon the drive-shaft, a sprocket-wheel upon the screw-shaft, a sprocket-chain passing around said wheels and provided with a projecting lug, a bell-crank having one arm in the path of said lug, and a link-rod connected to the other arm of the bell-crank and to the clutch-lever, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 24th day of December, A. D. 1898.

MICHAEL BAACKES.

Witnesses:
WM. SECHER,
K. F. WINDING.