Nov. 24, 1931. I. J. SIMMONS 1,833,376

ROLLING MILL

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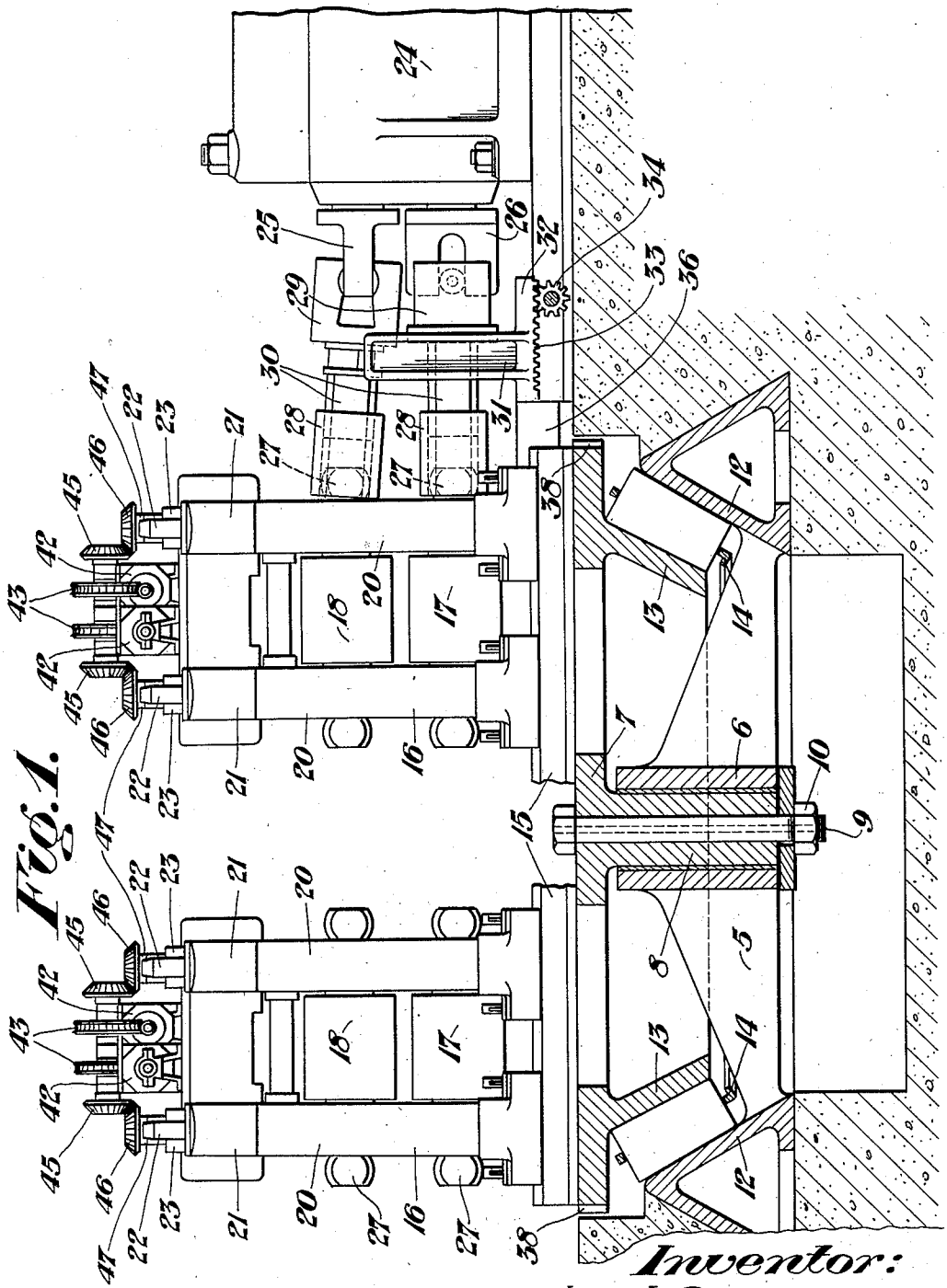


Fig. 1.

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Fig. 4.

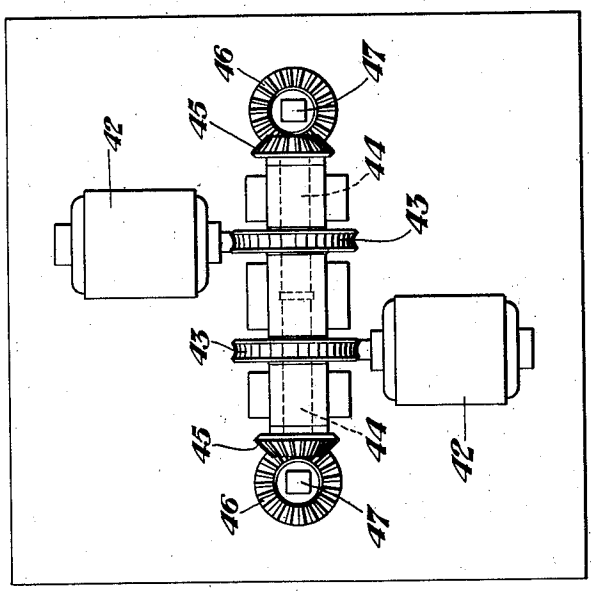
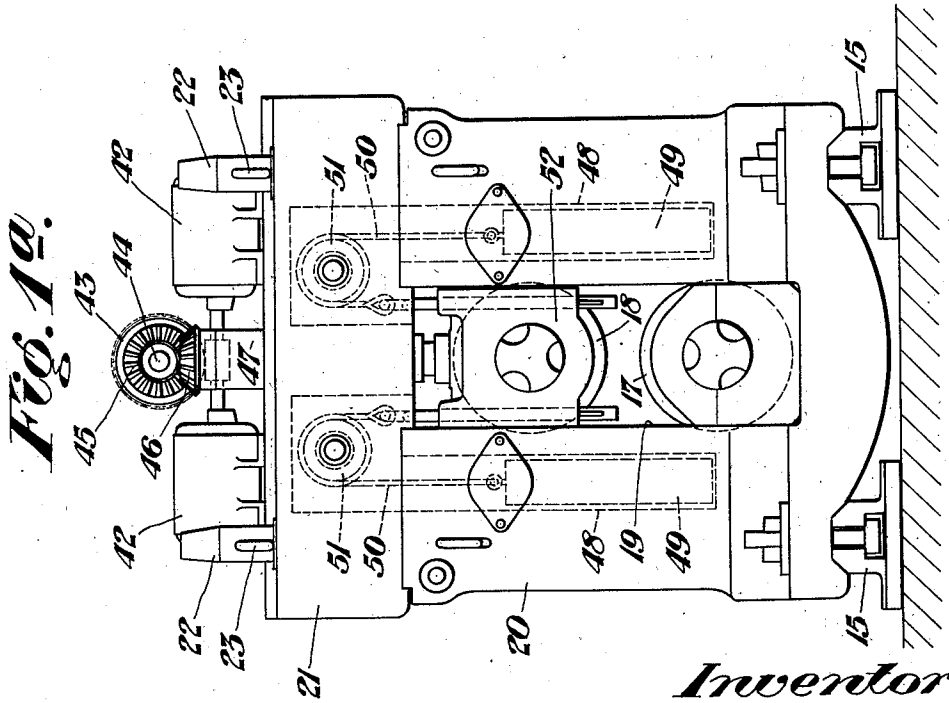


Fig. 1a.



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Fig. 2.

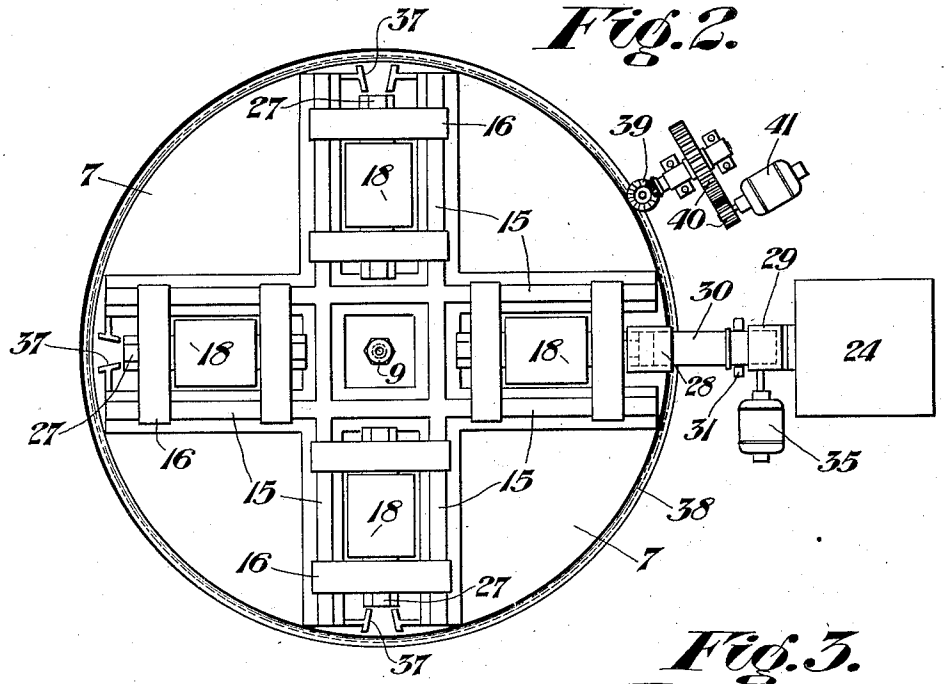
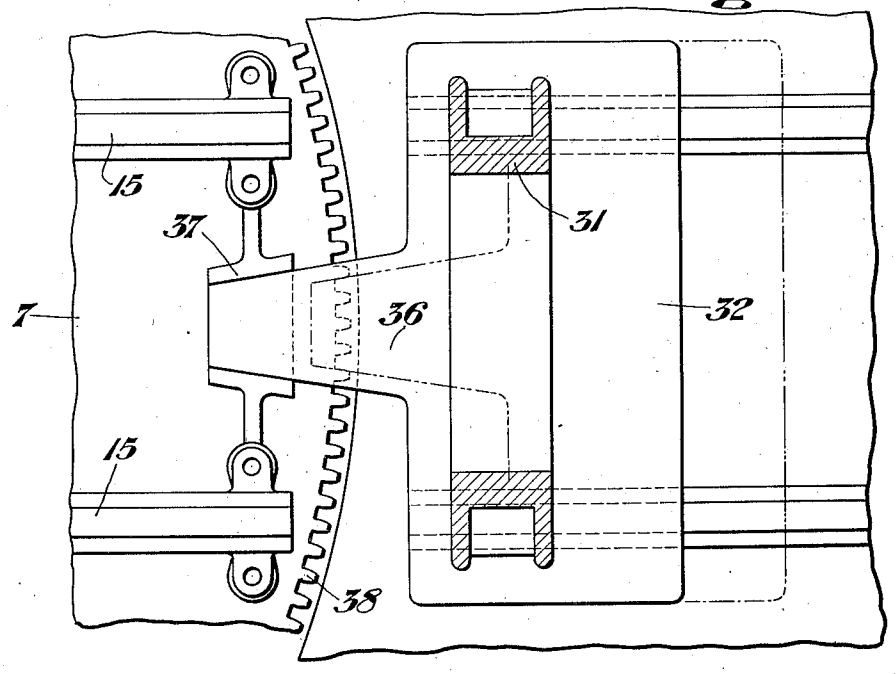


Fig. 3.



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UNITED STATES PATENT OFFICE

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ROLLING MILL

Application filed October 22, 1930. Serial No. 490,003.

This invention relates to rolling mills broadly and more particularly to mills of that type wherein a plurality of roll housings or stands are mounted on a turntable or analogous rotatable support so that one stand of rolls can be operated while the rolls of the remaining stand or stands are being changed or repairs are being made thereto.

Generally stated, the objects of the invention are to improve upon the construction and arrangement of parts of rolling mills, and particularly mills of the type above specified, with a view toward facilitating the roll changing and adjusting operations and otherwise rendering the mill more efficient and convenient in operation and maintenance.

With the foregoing and other objects and advantages in view, the invention consists in the preferred construction and arrangement of parts which will be more fully hereinafter described and claimed.

In the drawings:—

Figure 1 is a view in elevation, partly in section, of a two high mill of the turntable type embodying the features of the invention, two separate and independent stands of reducing rolls being shown;

Fig. 1*a* is an opposite side view in elevation of one of the stands;

Fig. 2 is a plan view of the mill, showing four stands of rolls mounted on the turntable;

Fig. 3 is a partial plan view, showing the locking mechanism for the turntable; and

Fig. 4 is a plan view of the mechanism for operating the housing screws and by means of which the top roll of each stand is raised and lowered.

The reference numeral 5 designates the base of the turntable which is provided with a central bearing 6. The table, generally indicated at 7, is formed with a spindle 8 which extends into said bearing and is held against displacement by a bolt 9 and nut 10, the bolt 9 being hollow for a purpose to be described.

The base 5 and turntable 7 are formed with cooperating inclined bearing portions 12 and 13, and therebetween a series of antifriction bearing rollers is mounted and held against displacement by means of a cage 14.

The turntable 7 has secured thereon housing shoes or bases 15, and mounted on these shoes are a plurality of stands of rolls each of which is generally designated at 16. Reducing rolls 17 and 18 are mounted in the windows 19 of the housings 20 for the roll stands, said housings being open-topped and provided with caps 21 which are held in place by housing bolts 22 and keys 23.

An advantageous feature of the present invention is the particular means for rotating the turntable and shifting the spindles and coupling boxes by which the reducing rolls are positively driven into a position which will permit the turntable to be rotated and which will now be described.

At one side of the turntable 7 are the usual gear or pinion housings 24 which house the gears of pinions through the medium of which the mills are driven. The pinions, not shown, are provided with spindles 25 and 26, and said spindles are connected to the wabblers 27 of the reducing rolls 17 and 18 by means of coupling boxes 28 and 29 and spindles 30. The spindles 30 are supported on a reciprocating carrier 31 which is formed with a foot portion 32 provided with teeth 33 which mesh with a pinion 34, the latter being connected to a motor 35, see Fig. 2, for moving the carrier 31 back and forth in disengaging the spindles 30 and coupling boxes 28 from the wabblers 27 of the rolls 17 and 18.

The carrier 31 is formed with a tapered centering projection 36, see Fig. 3, which extends into a tapered slot or recess formed in a member 37 on the upper face of the turntable 7 and locks the latter against rotation, there being a member 37 for each of the stands of rolls 16, so that they may be successively locked into position for rolling metal.

In order to rotate the turntable, the latter is provided with teeth 38 on its periphery and is connected, through the medium of suitable reduction gearing 39 and 40, with a motor 41.

When it is desired to change the rolls 17 and 18 in one or more of the mills 16, the motor 35 is actuated to move the carrier 31 back and retract the spindles 30 and coupling boxes 28 clear of the wabblers 27 on the ends of said rolls, and this backward movement of

the carrier also retracts the projection 36 from its coacting slotted member 37 on the turntable 7 and permits rotation of the latter.

Another advantageous feature of the present invention is the screw operating mechanism for adjusting the rolls. This mechanism is mounted on the housing cap 21 for each stand of rolls, and comprises separate motors 42, each motor having a worm on its armature shaft which meshes with a worm wheel 43 on a counter-shaft 44 mounted in suitable bearings on top of said cap 21. The end of each shaft 44 has a bevel pinion 45 on one end thereof which meshes with a bevel gear 46 on the upper end of each housing screw 47.

The electrical connections for each motor 42 may extend to a suitable control platform, and from this point the screw down motors may be easily and conveniently controlled, to thereby provide for accurate lining of the rolls up or down while the mill is in operation.

Another feature of advantage is the particular mounting of the balancing mechanism for the top roll 18 of each stand. The housing 20 is provided with a recess 48 for accommodating the balance weight 49, which is attached to a chain or cable 50 passing over a sheave or pulley 51 and connected to the carrier bearing 52 for the roll 18. This recess 48 for receiving the balance weight 49 conserves space and effectively shields the weight.

The pin or bolt 9 is hollow or formed with an axial opening to accommodate the water pipes used in cooling the rolls, oil and grease pipes and electrical conductors for the four stands of rolls mounted on the turntable, which is a further feature of merit in the present invention.

The operation of the mill will be readily understood. The parts, being in position, show that one of the four stands of rolls may be operated in reducing metal while the others are available for changing the rolls, lining them up or otherwise adjusting them without interrupting the operation of the mill. When it is desired to change the rolls, the motor 35 may be actuated to move the carrier 31 backwardly and retract the spindles 30 and coupling boxes 28 and 29 clear of the wabblers 27 on the ends of the rolls 17 and 18, this backward motion of the carrier also disengaging the centering projection 36 from its coacting slotted member 37. The motor 41 is then actuated to rotate the turntable and bring another of the roll stands 16 into position for rolling metal.

The motor 35 is then actuated to advance the carrier 36 into position and establish a driving connection between the wabblers 27 and drive pinions in the housing 24 and center the table 7 and lock the latter in firm operating position.

What is claimed as new is:—

1. A rolling mill comprising a rotatable turntable, a plurality of roll housings mounted on said table, reducing rolls supported by said housings, drive pinions mounted adjacent said table, means for coupling said pinions to said rolls, and a reciprocating carriage for said coupling means, said carriage and table provided with means for locking said table against rotation.

2. A rolling mill comprising a turntable, a plurality of roll housings mounted on said table, reducing rolls provided with spindles supported by said housings, means for rotating said turntable, drive pinions mounted adjacent said table, means for operatively coupling said pinions to said spindles, and a reciprocating carriage for moving said coupling means into and out of engagement with said spindles, said carriage and table being provided with cooperating male and female members for centering said table and locking the latter against rotation.

3. In a rolling mill, a turntable, a plurality of roll housings mounted on said table, reducing rolls provided with spindles mounted in said housings, means for driving said rolls, coupling members for operatively connecting said driving means to said spindles and a motor-operated reciprocating carriage for said coupling members, said carriage being provided with a tapered projection adapted to engage in a recess on said turntable and lock the latter against rotation.

4. In a rolling mill a housing, reducing rolls supported by said housing, means for driving said rolls including drive pinions, coupling means for said rolls comprising a pair of coupling boxes and an interposed spindle, a reciprocating carriage for said spindle, said carriage having a base portion provided with a series of teeth in the form of a rack, a pinion meshing with the teeth on said base and a motor for operating said pinion to reciprocate said carriage to disengage said coupling boxes and spindles.

5. A rolling mill comprising a turntable, a plurality of roll housings mounted on said turntable, reducing rolls provided with spindles supported by said housings, means for rotating said turntable, drive pinions mounted adjacent said table, means for operatively coupling said pinions to said spindles, a reciprocating carriage for moving said coupling means into and out of engagement with said spindles, said carriage being provided with a series of teeth on the under side of its base in the form of a rack, a pinion meshing with the teeth on said base and a motor for operating said pinion to reciprocate said carriage.

In testimony whereof, I have hereunto set my hand.

IRA J. SIMMONS.