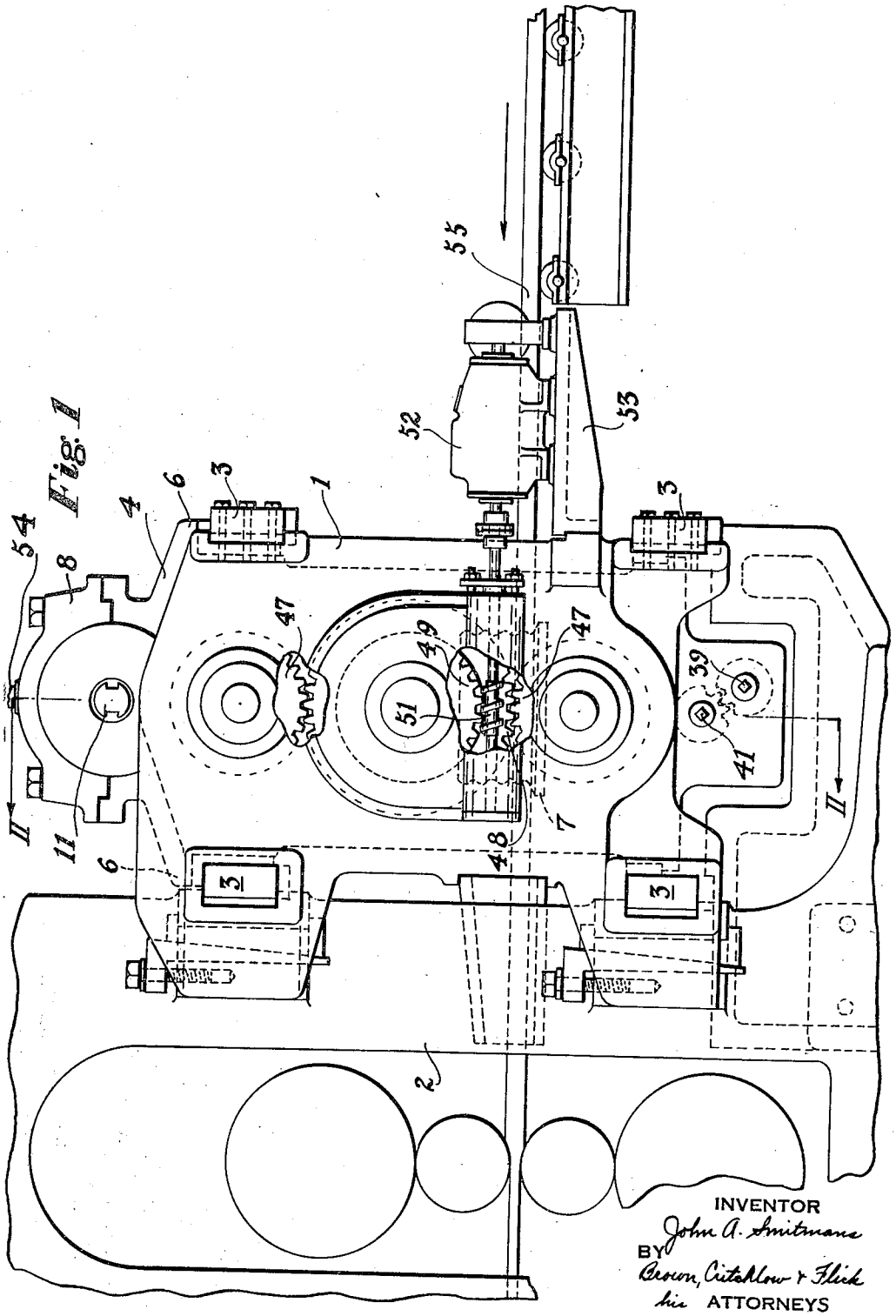
April 2, 1940. J. A. SMITMANS 2,195,502

VERTICAL EDGING MILL

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Fig. 1



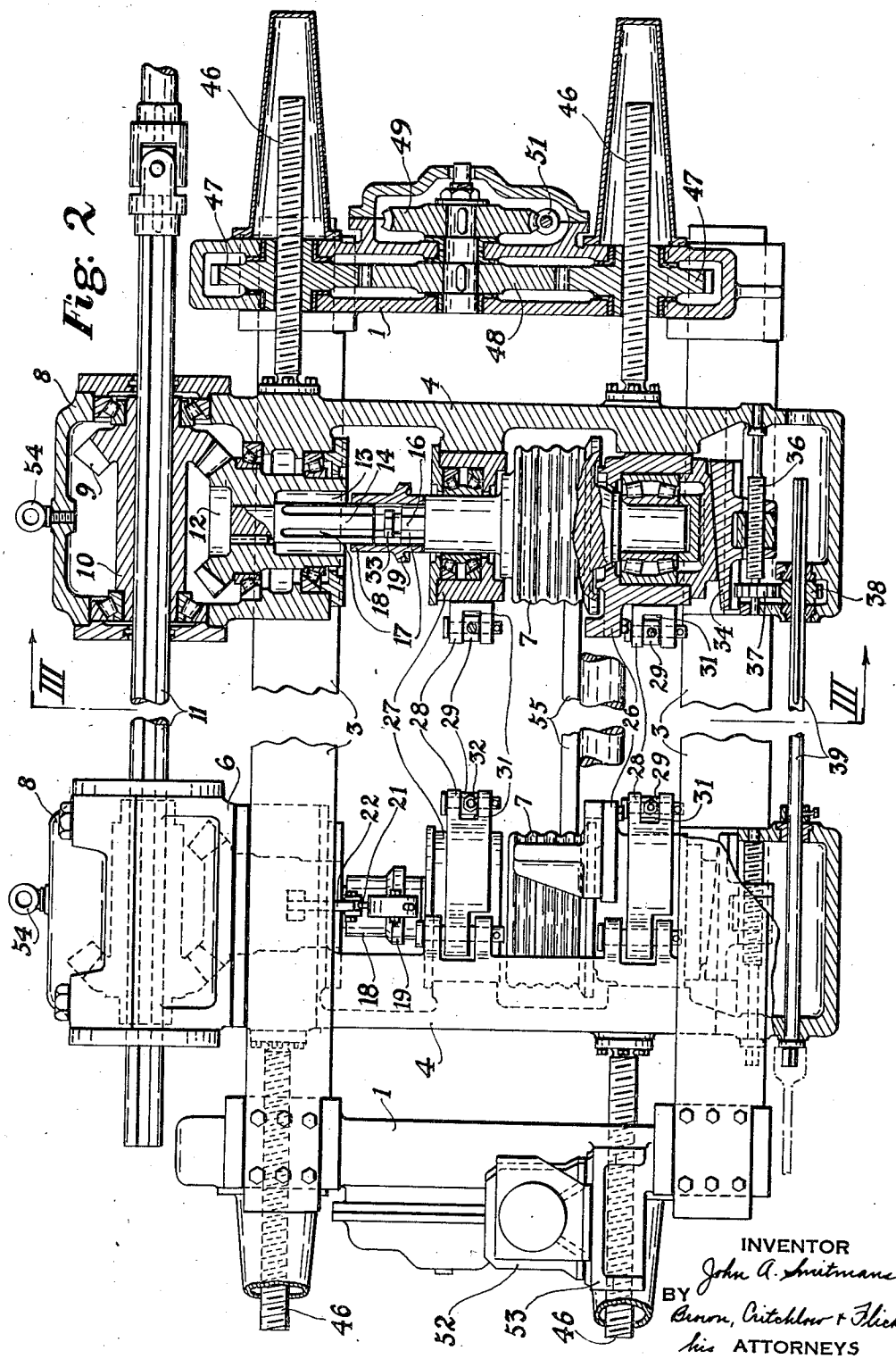
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VERTICAL EDGING MILL

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Fig. 2



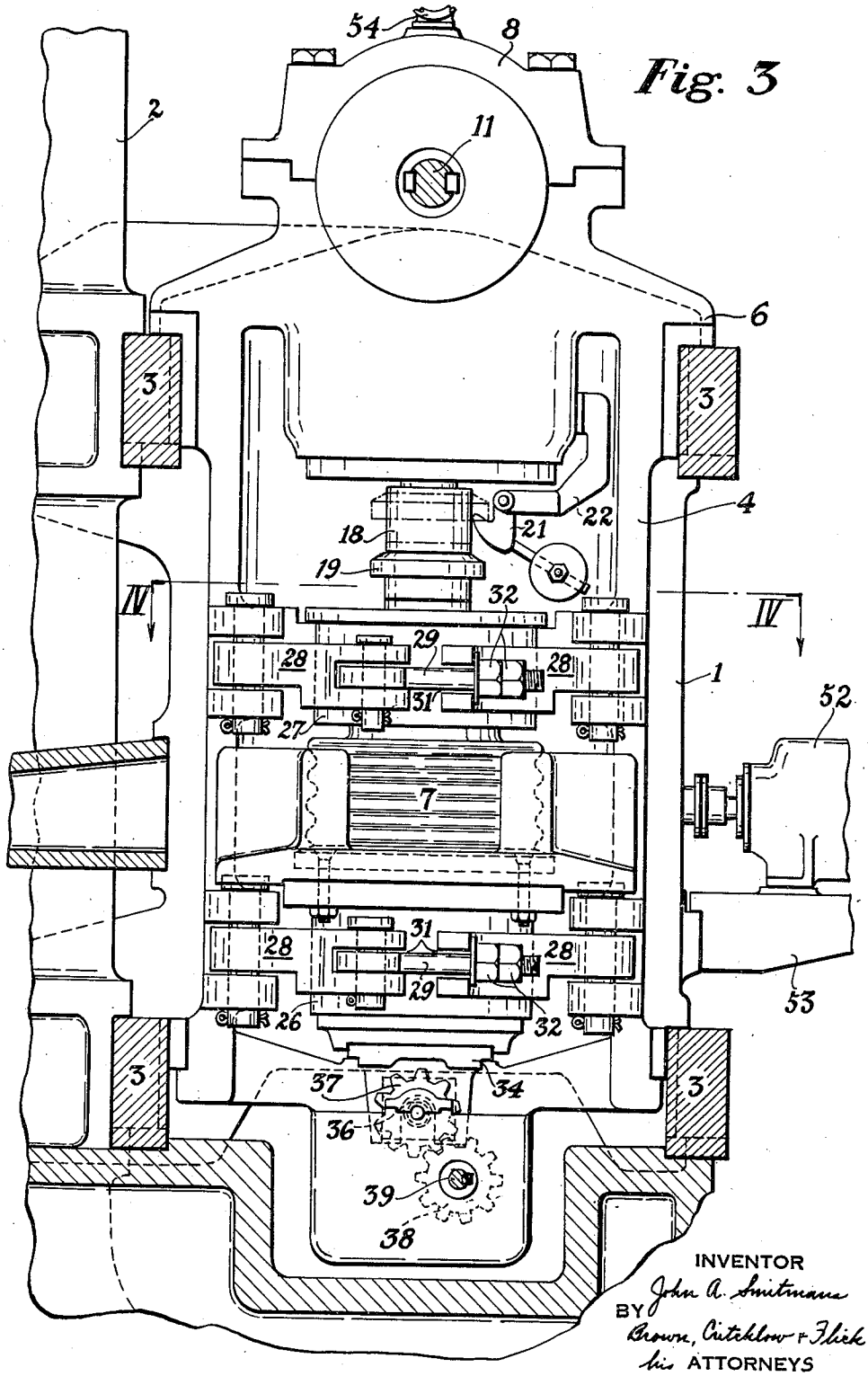
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Fig. 3



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Fig. 4

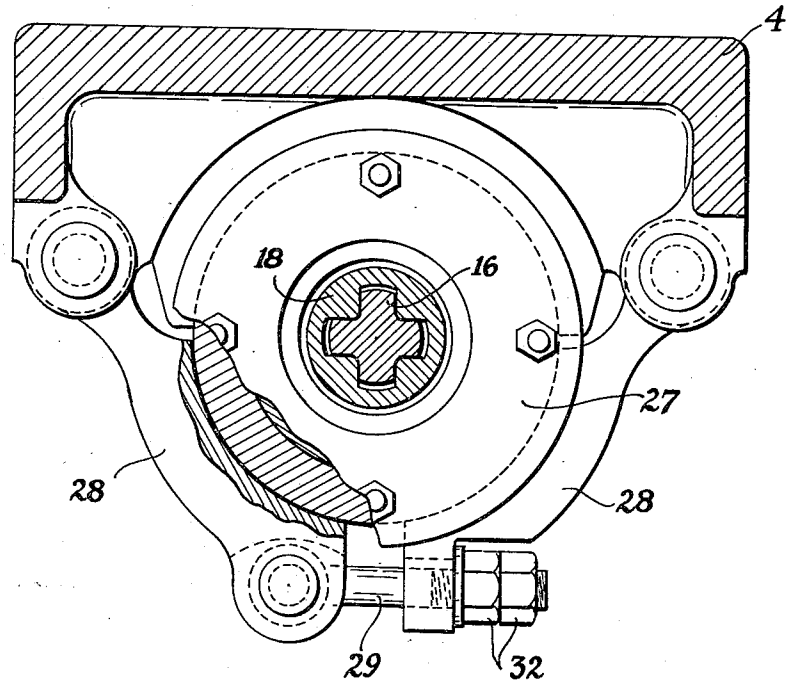


Fig. 5

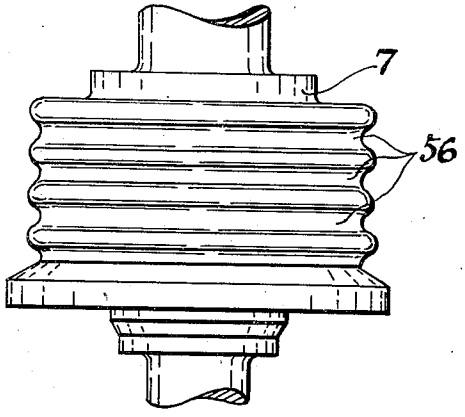
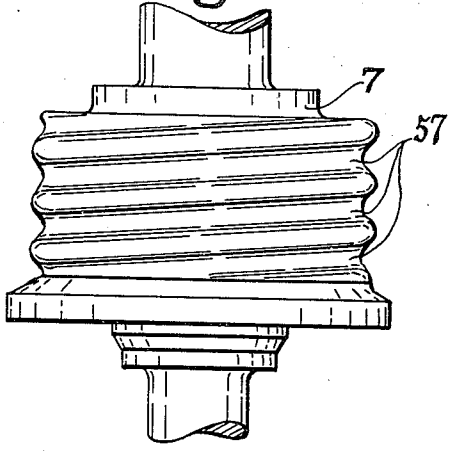


Fig. 6



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2,195,502

UNITED STATES PATENT OFFICE

2,195,502

VERTICAL EDGING MILL

John A. Smitmans, Pittsburgh, Pa., assignor to United Engineering & Foundry Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application July 22, 1937, Serial No. 154,951

11 Claims. (Cl. 80—31.1)

This invention relates to mills, generally known as vertical edging mills, for rolling the edges of metal blanks such as slabs and the like. As such mills and their uses are well known to those skilled in the art, it is believed unnecessary to go into a general description of them here. However, some of the difficulties encountered in connection with vertical edging mills have been the relatively great amount of time and labor required to remove the rolls from the mills for dressing or replacement, and the tendency for the blanks passing through the mills to climb upwardly on the peripheries of the rolls and to thereby get out of line with the pass of the rolling mill to which they are being delivered.

It is among the objects of this invention to provide a vertical edging mill of relatively simple construction having rolls which are readily adjustable, which can be quickly and easily removed, and which are formed for resisting upward movement of a blank passing between them.

An embodiment of the invention is illustrated in the accompanying drawings, in which Fig. 1 is an end view of my vertical edging mill connected to a 4-high rolling mill; Fig. 2 is a view of the entry side of the edging mill with half of it shown in vertical section taken substantially on the line II—II of Fig. 1, the 4-high mill being omitted; Fig. 3 is an enlarged view of the edging mill taken on line III—III of Fig. 2; Fig. 4 is a horizontal section taken on the line IV—IV of Fig. 3; Fig. 5 is an enlarged view of one of the edging rolls showing the corrugations greatly exaggerated in depth in order to more clearly disclose the general contour of the rolls; and Fig. 6 is a view similar to Fig. 5 of a modified edging roll.

In accordance with this invention there is provided a vertical edging mill comprising a pair of frames adjustable toward and away from each other as is the usual practice. Each frame houses a vertical edging roll which is preferably provided with one or more peripheral grooves that aid in preventing a blank from climbing up the rolls. The rolls are mounted in the frames in such a manner that they can be removed laterally therefrom without difficulty and without disturbing their driving and vertically adjusting apparatus. Each roll is driven from above by a gear journaled on a horizontal axis, the gears of the two frames being rotated by a common drive shaft splined therein. The two frames are supported in such a manner that when the drive shaft is removed axially from the gears either frame, with its roll and associated members, can be lifted bodily away from its support without disturbing the other frame. Preferably, the support comprises parallel horizontal rails between which are disposed the frames which are provided with laterally projecting portions that rest on top of the rails for slidably supporting the frames.

Referring to the drawings, a gear casing 1 is rigidly connected in any suitable manner to each end of a rolling mill housing 2 adjacent its entry side from which the two casings extend rearwardly in parallel relation. The two casings are rigidly connected at top and bottom by four parallel horizontal rails 3 secured to opposite sides of the casings.

Disposed between these rails in sliding engagement with their inner faces is a pair of frames 4 which are suspended from the upper rails by integral lateral projections 6 that rest on the rails as shown in Fig. 3. Journaled on a vertical axis in each frame in a manner to be described hereinafter is an edging roll 7 that is driven from its upper end. According to this invention each frame is provided above the top rails with a gear housing 8 in which a bevel gear 9 is journaled on a horizontal axis. The gears are provided with hollow or tubular hubs 10 in which is splined a common drive shaft 11 driven from any suitable source of power. Each bevel gear meshes with a mitre gear 12 journaled in the frame below it on a vertical axis in line with the axis of the edging roll below.

Also, in accordance with this invention and as shown in Fig. 2, each mitre gear has a socket 13 in its lower end through which extends a stub shaft 14 that is rigidly connected to the gear and that projects downwardly therefrom. The upper neck of each edging roll is provided with a reduced extension 16, and this extension and the stub shaft above are provided with aligned vertical grooves 17 in their peripheries. The stub shaft is detachably connected to extension 16 by a sleeve 18 that encircles both of them and is splined in vertical grooves 17 so that the roll must rotate with the stub shaft.

To facilitate sliding of sleeve 18 up on the stub shaft in order to disconnect it from roll extension 16, the sleeve is provided with an annular collar 19 adapted to be engaged by a crane hook or other suitable means to lift the sleeve. It is preferred to hold the sleeve in its upper position by means of a counterbalanced hook 21 suspended from the lower end of an arm 22 connected to the frame, the end of the hook supporting the sleeve collar. Preferably, the upper and lower

surfaces of the collar are inclined outwardly and downwardly to better trip the counterweighted hook and to form a recess for the crane hook, respectively.

Another feature of this invention is that the rolls are removable laterally from the frames so that they can be taken out without disturbing their driving and adjusting apparatus. As shown in Fig. 2, each roll has its lower neck journaled in a bearing housing 26, and its upper neck journaled in a bearing housing 27 in which it is slidable vertically. Each bearing housing is retained in the frame by a pair of clamping arms 28 pivoted at one end on vertical axes to the adjoining frame on opposite sides of the bearing, as shown in Fig. 4. The bearing housing engaging portion of the frame conforms to the contour of the bearing housing as do also the arms which are fastened together at their outer ends to hold the bearing housing in place. The fastening means preferably consists of a bolt 29 hinged in one arm and extending through a slot 31 in the other arm in which it is locked by nuts 32. By loosening the nuts and swinging both bolts out of their slots, the arms can be swung outwardly away from the bearings so that the roll and its bearings can be removed laterally from its frame after sleeve 18 is disconnected from roll extension 16. The latter is preferably provided with a knob 33 adapted to be gripped by a special type of crane hook to swing the roll away from the frame and lift it up between the rails.

By loosening nuts 32 on the lower bolt 29 to release the lower pair of clamping arms from the lower bearing sufficiently to permit that bearing to slide vertically, the roll can be adjusted vertically with its upper neck sliding in the fixed upper bearing. This vertical adjustment is accomplished by a wedge 34 on which the lower bearing rests. As viewed in Fig. 2, the wedge in the right-hand frame is actuated by a screw 36 turned by a pinion 37 meshing with a pinion 38 journaled in the lower end of the frame where it is rotated by a shaft 39 splined therein. This shaft also extends through the lower end of the left-hand frame in which it is slidable, and has an end adapted to receive a wrench for turning it. The adjusting wedge in the left-hand frame is actuated by a screw 41 which is turned directly by a wrench that may be connected to its outer end.

In order that the edging mill may accommodate blanks of different widths, the two frames 4 are slidable toward and away from each other by means of adjusting screws 46 that are detachably connected to their outer surfaces. As shown in Fig. 2, the two screws for each frame are threaded in interiorly threaded gears 47 journaled in the top and bottom of the adjoining gear casing 1. These two gears are rotated to move the screws lengthwise by an intermediate gear 48 journaled in the center of the casing and turned by a worm gear 49 at one side of it. This worm gear is rotated by a worm 51 driven by a motor 52 mounted on a bracket 53 secured to the rear edge of the adjoining casing 1, as shown in Fig. 1.

An important feature of this invention is that either frame and the roll and associated members carried by it can be removed bodily from the mill without disturbing the other frame. This is readily accomplished by disconnecting adjusting screws 46 from the frame to be removed, withdrawing splined adjustment shaft 39 from pinion 38 in the right-hand frame, and withdrawing splined drive shaft 11 from one or both bevel gears 9. By inserting a crane hook in the eye 54 connected to the top of frame housing 8, that frame can be lifted upwardly from between the rails and deposited in any desired location where the necessary repairs or replacements can then be made.

A still further feature of this invention is that the edging rolls are formed for resisting the tendency of blanks to climb up their peripheries while passing between them. Accordingly, the rolls are provided with peripheral grooves that give them corrugated surfaces which bite into the edges of the blank 55 and prevent it from working upwardly. When the edging mill is used in connection with a reversing mill the grooves are preferably a plurality of vertically spaced independent grooves 56, as best shown in Fig. 5. Such grooves are equally effective in holding a blank down whether it is passing through the edging mill in one direction or the other. However, when the edging mill is used with a non-reversing mill through which the blanks always pass in the same direction, each edging roll may be provided with a helical groove 57, as shown in Fig. 6. The direction of the helix is such that as the rolls revolve, they act like screws which constantly urge the blank downwardly against its support.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to be its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A vertical edging mill comprising a pair of horizontally spaced rails provided with horizontal surfaces, a pair of frames disposed between the rails and suspended from said horizontal surfaces along which the frames are slidable, the widest part of each frame below the top of the rails being narrower than the shortest distance between the rails, means detachably connected to the frames for adjusting them toward and away from each other, a gear journaled on a horizontal axis in the upper portion of each frame, an edging roll journaled on a vertical axis below each gear, means operatively connecting each gear to the roll below it, and a common horizontal drive shaft splined in said gears and adapted to be removed axially therefrom whereby either of said frames with its gear and roll can be lifted bodily upwardly from between the rails.

2. A vertical edging mill comprising a pair of horizontally spaced rails, a pair of frames disposed between the rails and suspended therefrom, a gear journaled on a horizontal axis in the upper portion of each frame, an edging roll journaled on a vertical axis below each gear, means operatively connecting each gear to the roll below it, means mounted in each frame below the roll above it for adjusting the roll vertically, a shaft journaled in both frames for actuating one of said adjusting means and removable therefrom, and a common horizontal drive shaft splined in said gears and adapted to be removed axially therefrom, said frames being adapted to be independently lifted bodily upwardly from between the rails after said shafts are removed.

3. A vertical edging mill comprising a pair of horizontally spaced rails, a pair of frames suspended therefrom, a gear journaled on a horizontal axis in the upper portion of each frame,

an edging roll journaled on a vertical axis below each gear, means detachably connecting each of said gears to the roll below it, means connecting said rolls to the frames and adapted to be removed laterally from the rolls to permit the rolls to be removed laterally from the frames, and a common horizontal drive shaft splined in said gears and adapted to be removed axially therefrom whereby either of said frames with its gear and roll can be lifted bodily upwardly from between the rails.

4. A vertical edging mill comprising a support, a pair of frames suspended therefrom, a gear journaled on a horizontal axis in the upper portion of each frame, an edging roll journaled on a vertical axis below each gear, means detachably connecting each of said gears to the roll below it, laterally movable arms pivoted to the frames for removably retaining the rolls in the frames, means detachably connecting the outer ends of the arms together and a common horizontal drive shaft splined in said gears and adapted to be removed axially therefrom, whereby either of said frames with its gear and roll can be lifted bodily straight up from said support.

5. A vertical edging mill comprising a support, a pair of frames supported thereby, a vertically disposed edging roll disposed in each frame and having an upper and lower neck, a bearing mounted on each neck, a pair of arms pivoted at their inner ends on vertical axes to the frame on opposite sides of each of said bearings and engaging the bearings, and means detachably connecting the outer ends of the arms for retaining said bearings in the frame.

6. A vertical edging mill comprising a support, a pair of frames supported thereby, a vertically disposed edging roll disposed in each frame and having an upper and lower neck, a bearing mounted on each neck, a pair of arms pivoted at their inner ends on vertical axes to the frame on opposite sides of each of said bearings, means detachably connecting the outer ends of the arms for retaining said bearings in the frame, and means mounted below each roll for adjusting it vertically.

7. A vertical edging mill comprising a support, a pair of frames supported thereby, a gear journaled on a vertical axis in each frame, a stub shaft depending from said gear, an edging roll journaled on a vertical axis below said stub shaft and provided at its upper end with an extension, said shaft and extension being provided with vertical grooves, a sleeve splined on said shaft and extension for operably connecting them, said sleeve being adapted to be slid up the stub shaft to disconnect the shaft from the extension and being provided with a lateral projection, and means connected to said frame for engaging said projection when the sleeve is raised to hold it in its upper position.

8. A vertical edging mill comprising a support, a pair of frames supported thereby, a gear journaled on a vertical axis in each frame, a stub shaft depending from said gear, an edging roll journaled on a vertical axis below said stub shaft and provided at its upper end with an extension, said shaft and extension being provided with vertical grooves, a sleeve splined on said shaft and extension for operably connecting them, said sleeve being adapted to be slid up the stub shaft to disconnect the shaft from the extension and being provided with a lateral projection, and a counterweighted hook connected to said frame for engaging said projection when the sleeve is raised to hold it in its upper position.

9. In a vertical edging mill, an edging roll provided with a plurality of vertically and closely spaced shallow annular grooves, said grooves being substantially parallel to said blank adapted to receive the adjoining edge of a metal blank passing through the mill to restrain it from working upwardly on the roll.

10. In a vertical edging mill, an edging roll provided with a helical corrugation of very slight pitch in its periphery adapted to frictionally engage the adjoining edge of a metal blank passing through the mill for urging it downwardly as it passes the roll.

11. An edging roll for use in a vertical edging mill, said roll being provided with a plurality of narrow and closely spaced circumferential corrugations adapted to press into the adjoining edge of a metal blank passing through the mill and to thereby restrain it from creeping upwardly on the roll, said corrugations being disposed in parallel planes substantially parallel to said blank.

JOHN A. SMITMANS.

CERTIFICATE OF CORRECTION.

Patent No. 2,195,502. April 2, 1940.

JOHN A. SMITMANS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, lines 29 and 30, claim 9, strike out the comma and words ", said grooves being substantially parallel to said blank" and insert the same after "roll" and before the period in line 33, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of June, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)