Dec. 20, 1949 E. F. GOERG 2,491,655

GUARD FOR ROLLS

Filed Sept. 26, 1946 2 Sheets-Sheet 1

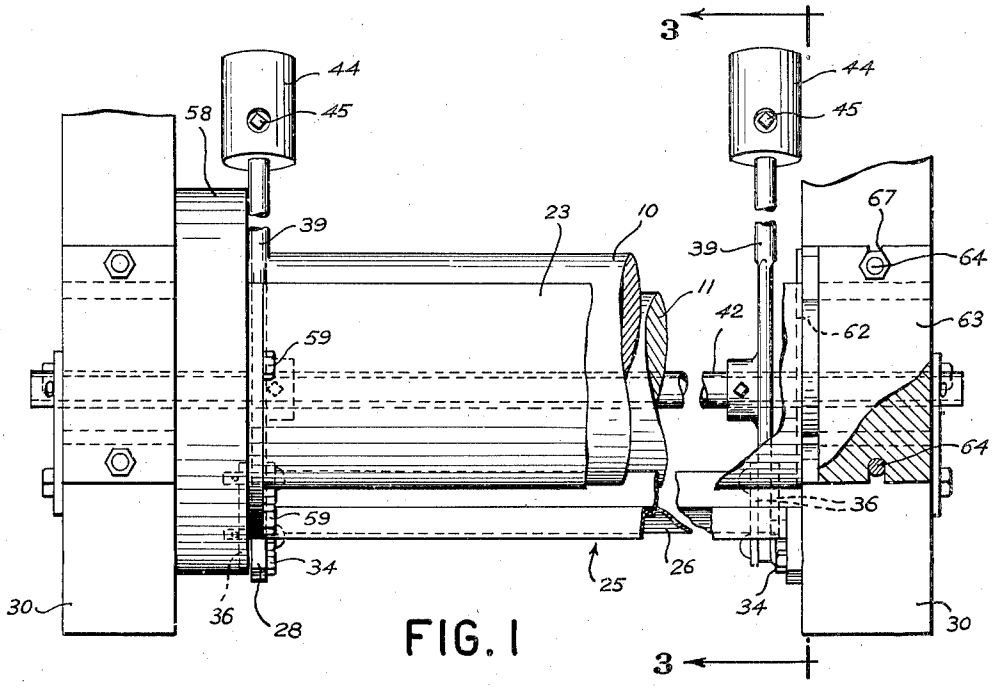


FIG. 1

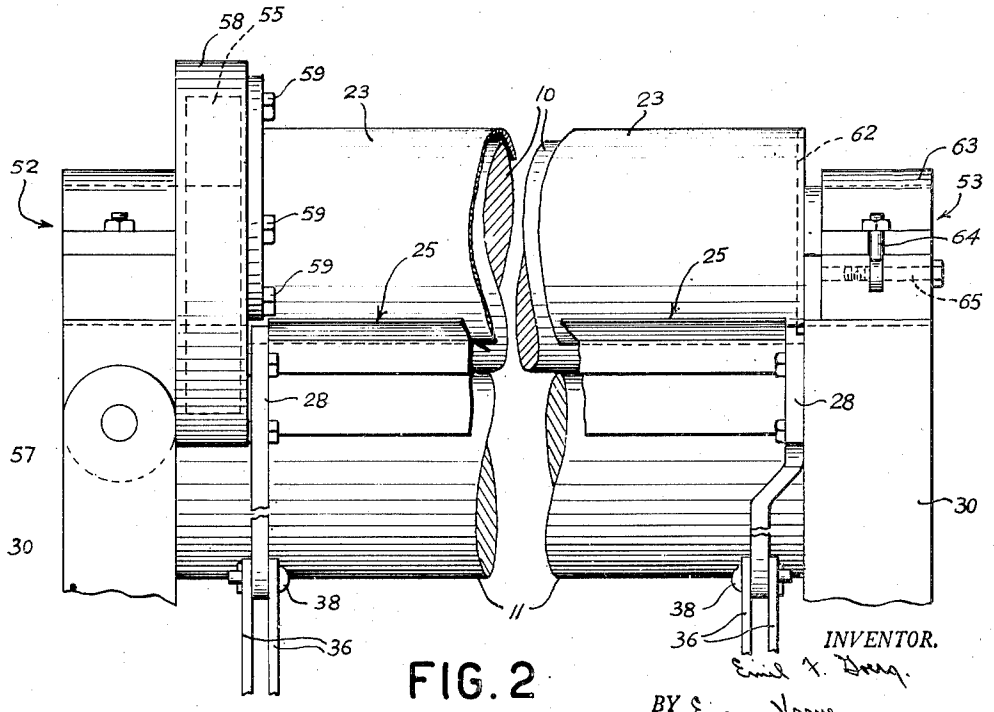


FIG. 2

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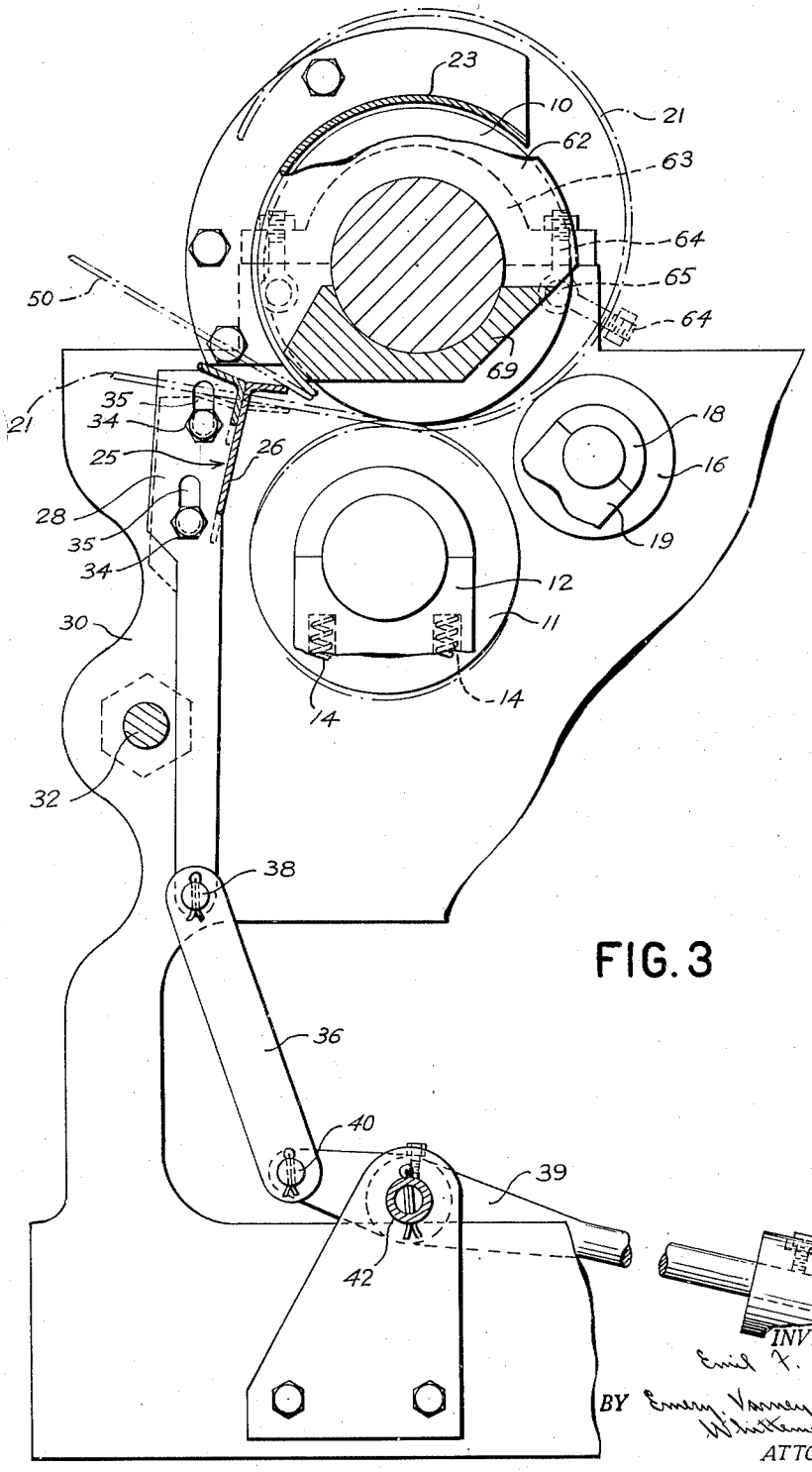


FIG. 3

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Patented Dec. 20, 1949

2,491,655

UNITED STATES PATENT OFFICE

2,491,655

GUARD FOR ROLLS

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Application September 26, 1946, Serial No. 699,389

2 Claims. (Cl. 153—54)

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This invention relates to machines having rolls for exerting heavy pressure on work that is fed to the machines by hand, and the invention relates more particularly to guards for preventing an operator's hand from being caught between the rolls.

Roll stands to which work is fed by hand present a safety hazard, and various devices, such as emergency shut-off switches, and latches for releasing roll tension, have been provided for limiting the extent of injury when an operator does have his hand caught in the rolls, but it is not always possible to operate such safety devices before considerable damage has been done.

Guards for preventing the operator's hands from coming into the bite of the rolls have been applied to certain types of machines, but other machines could not be equipped with the known types of guards without interfering with the intended use of the machines, or seriously reducing their efficiency. One kind of machine in particular, used for rolling sheets or plates into cylindrical or tubular forms, has been operated without guards because the workpiece on such a machine has to come over the top of the upper roll to be fed inward again from the front of the roll pass and has to be accessible for manipulation as it comes over the upper roll.

It is an object of this invention to provide improved guard means for a roll stand. The invention can be applied to roll stands generally on the feed side of the roll stand, but the more outstanding advantage of the invention is that it can be applied to machines for rolling sheets or plates to cylindrical or tubular shape. With such machines equipped with the guard means of this invention, it is not possible for an operator to have either of his hands caught in the bite of the rolls and yet the machine can be used just as efficiently as without the guard, and for rolling a workpiece to a diameter only slightly greater than the diameter of the upper roll around which the workpiece passes as it is brought to cylindrical or tubular shape.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views;

Figure 1 is a top plan view of a rolling machine equipped with guard means embodying this invention;

Figure 2 is a front view of a portion of the machine shown in Figure 1;

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Figure 3 is an end view mostly in section on the line 3—3 of Figure 1.

The rolling machine shown in the drawings includes an upper roller 10 and a lower roller 11 defining a roll pass through which a workpiece moves. The lower roll 11 has necks at its opposite ends, each supported in a bearing 12 (Fig. 3) which is adjustable to move the lower roll 11 toward and from the upper roll 10 to vary the height of the pass between the rolls 10 and 11. The bearing 12 is yieldably supported by spring means shown diagrammatically as coil springs 14. The machine can be adjusted so that the springs 14 hold the lower roll 11 in contact with the upper roll 10 with different degrees of pressure, and the term "roll pass," as used herein, designates the region of tangency or minimum clearance between the rolls 10 and 11 and is not to be understood as limited to a construction in which the rolls 10 and 11 are spaced from one another before the workpiece enters the bite of the rolls.

Just behind the rolls 10 and 11, there is an auxiliary roll 16 having necks at both ends each supported in a bearing 18 at the upper end of a support 19 adjustable to move the auxiliary roll 16 closer to or further from the upper roll 10. This auxiliary roll 16 is adjusted to control the curvature to which the machine bends a workpiece.

In Figure 3 a workpiece 21 is shown in dotted his hands close enough to the roll pass to inwhich the workpiece is bent upward by the rolls, and advances beyond the auxiliary roll 16 and around the top of the upper roll 10 so that the forward end of the workpiece 21 can be again fed into the pass between the main rolls 10 and 11 for several successive rolling operations that bring it to the final desired curvature. Because of the elasticity of the workpiece, a single rolling operation does not usually leave the workpiece with the curvature for which the rolls are set. The number of rolling operations required depends upon the kind of material and the thickness of the workpiece.

In order to prevent the operator from putting his hands close enough to the roll pass to involve danger of having one or both hands caught between the rolls 10 and 11, the machine is equipped with a fixed guard element 23 comprising a cylindrical shell that covers the top and front of the upper roll 10 throughout the entire width of the working face of this upper roll. The forward end of the fixed guard 23 extends down close to the roll pass.

The guard includes also a movable guard element 25 comprising two angle sections connected together, and one of which has a downwardly extending leg 26 which serves as an apron for covering the upper portion of the lower roll 11. This movable guard element 25 has brackets 28 connected to the angle sections at opposite ends of the guard element, and these brackets 28 slide on confronting faces of a main frame 30 of a rolling machine. Opposite ends of the main frame 30 are connected together by tie rods 32 one of which is shown and others of which are located at the back of the machine.

The brackets 28 are held against the faces of the frame by screws 34 extending through slots 35 in the brackets and threaded into the frame 30. Each of the brackets 28 extends downwardly to links 36 which are connected to the bracket 28 by a pivot connection 38, and to a lever 39 by a pivot connection 40. Each of the levers 39 is supported by a fulcrum shaft 42 extending the full length of the machine in the construction shown in the drawing.

There is a counterweight 44 on the rearward end of each lever 39 and these counterweights 44 are adjustable lengthwise of the lever 39 and can be locked in any desired position with screws 45. The purpose of the counterweights 44 is to overbalance the weight of the movable guard element 25 and its brackets 28 and links 36, and the weights 44 are heavy enough so that they hold the guard element 25 in a raised position, as shown in full lines in Figure 3.

The level of the movable guard element 25, when in raised position, is determined by the location of the lower ends of the slots 35, and these slots 35 are so correlated with the screws 34 and the upper end of the guard element 25 that the guard element 25, when in a raised position, is above the line of the roll pass, that is, above a line tangent to the rolls 10 and 11 at the point of contact or at their points of minimum separation. The upper end of the guard element 25 is in front of and above the lower edge of the fixed guard element 23. It is impossible, therefore, for an operator of the machine to get his hands into the pass between the rolls 10 and 11 when the movable guard element 25 is in its raised position. There is space, however, between the guard elements 23 and 25 for the forward edge of the workpiece, that curves over the upper guard element 23, to pass down between the front of the upper guard element 23 and the top rearward edge of the lower guard element 25. If more clearance is necessary, and this depends upon the thickness and curvature of the workpiece, the lower guard element 25 is pushed downward by the workpiece which travels under the bottom of the guard element 23 and into contact with the lower roll 11 at such an angle that the rotation of the roll 11 advances the workpiece into the pass between the rolls 10 and 11.

The movable guard element 25 can be depressed, into the dotted line position shown in Figure 3, by inserting a workpiece into the space between the guard elements 23 and 25 at the angle indicated by the dash lines 50. With the workpiece in such a position, the operator presses down on the outer portion of the workpiece and forces the movable guard element 25 downward so that the workpiece can move into line with the roll pass.

The mass of the counterweights 44 and their spacing from the fulcrum shaft 42 are so chosen

that the movable element 25 cannot be displaced downward easily enough for the operator to depress it accidentally. The leverage provided by a workpiece that has its forward end inserted under the upper guard element 23 assists the operator in pushing the movable guard element 25 downward with the workpiece. For working on very light materials, it is sometimes advisable to move the counterweights 44 closer to the fulcrum shaft 42 so that the movable guard element 25 can be pushed downward without bending the workpiece out in front of the movable guard element 25. Such bending would be in a direction opposite to that for which the machine is designed.

The upper roll 10 has necks at opposite ends supported in bearings 52 and 53 (Fig. 2). A gear 55 at one end of the top roll 10 is driven to supply power for rotating the roll 10. The lower roll 11 is preferably an idler. The bearing 52 is supported on the machine in such a way that it can be rocked so as to permit the opposite end of the roll 10 to be raised to facilitate removal of the workpiece that is wrapped around the upper roll and its fixed guard 23. A support on which the bearing 52 can be rocked to permit such movement of the upper roll 10 and guard element 23 is shown diagrammatically as a pivot support 57 connecting the bearing 52 with the main frame 30 of the machine. A guard 58 over the gear 55 is rigidly connected with the bearing assembly 52 and rocks with this bearing assembly. The fixed guard element 23 at the end adjacent the driving gear 55 is secured to the gear housing 58 by screws 59 extending through a flange 60 that is welded or otherwise attached to the end of the guard element 23. The other end of the guard element 23 is attached to an end plate 62 that extends inward and is cut out to fit over the neck of the upper roll 10.

The bearing 53 has a cap 63 attached to the lower portion of the bearing by bolts 64, one or both of which are preferably connected to the lower part of the bearing by a pivot 65 about which the bolts 64 can be rotated to shift the bolt 64 beyond the ends of slots 67 in the bearing cap so that it is not necessary to completely remove the nuts from the bolt 64 when the bearing cap 63 is to be taken from the machine.

With the bearing cap 63 removed, the upper roll 10 can be lifted and rocked about the pivot connection 57 so that the upper and lower rolls are separated and a workpiece can be removed endwise from the upper roll. The end plate 62 and upper guard element 23 are lifted upward as a unit with the upper roll 10. This is an important feature because the upper guard element 23 is substantially concentric with the upper roll 10 and spaced from the upper roll by only a small clearance so that the machine can be used for rolling workpieces of only slightly larger diameter than the diameter of the upper roll 10.

Plate 62 has an opening in the center so that it will slide over the bearing of roll 10, thereby supporting the entire upper roll guard 23 so that when the upper roll is raised to remove the workpiece, endwise, guard element 23 moves with the roll 10.

The preferred embodiment of the invention has been illustrated and described. Terms of orientation are, of course, relative. Changes and modifications can be made and some features of the invention can be used in different combinations without departing from the invention as defined in the claims.

I claim as my invention:

1. A rolling machine including upper and lower rolls defining a pass through which a workpiece advances, a frame, bearings at opposite ends of the lower roll for supporting said lower roll on the frame, other bearings on the frame for supporting the upper roll, one of said other bearings having a removable cap that can be lifted so that one end of the upper roll can be raised for removing a workpiece edgewise from the roll pass, a pivoted support for the other bearing at the other end of the upper roll for rocking movement when one end of the roll is raised, a guard element of cylindrical section overlying the top and front of the upper roll, said guard element being rigidly connected with the pivoted bearing structure at one end of the roll and supported from the bearing structure at the other end of the upper roll, and a movable guard element in front of the lower roll effective in one position to block access to the roll pass but movable into another position to open a space for entrance of a workpiece into the roll pass.

2. A rolling machine including upper and lower rolls defining a pass through which a workpiece advances, a frame, bearings at opposite ends of the lower roll for supporting said lower roll on the frame, other bearings on the frame for supporting the upper roll, one of said other bearings having a removable cap that can be lifted so that one end of the upper roll can be raised for removing a workpiece edgewise from the roll pass, a pivoted support for the other bearing at the other end of the upper roll for rocking movement when one end of the roll is raised, a guard element of cylindrical section overlying the top and front of the upper roll, said guard element being rigidly connected with the pivoted bearing structure at one end of the roll and being supported from the bearing structure at the other end of the upper roll, and a movable guard element in front of the lower roll effective in one position to block access to the roll pass but movable into another position to open a space for entrance of a workpiece into the roll pass, said movable guard element comprising an angle section extending for the full width of the work face of the lower roll and connected at opposite ends with slides supported by the frame on which the bearings are supported, a shaft supported at opposite ends by said frame, a plurality of levers fulcrumed on said shaft, link means between the forward end of the levers and said slides for rocking the levers on the fulcrum shaft when the slides and lower guard element move up and down, weights on the end portions of the levers remote from the link connections, and means for adjusting the weights to different positions along the lengths of the levers to control the effective force of the weights transmitted through the levers and links to the lower guard element.

EMIL F. GOERG.

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The following references are of record in the file of this patent:

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Certificate of Correction

Patent No. 2,491,655 December 20, 1949

EMIL F. GOERG

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 2, line 31, strike out the words and hyphen "his hands close enough to the roll pass to in-" and insert instead *lines, and this view illustrates the manner in*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of April, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.