Jan. 1, 1963 A. TEPLITZ 3,071,032

ADJUSTABLE SIDE GUIDE AND HOLD-DOWN FOR A TANDEM COLD REDUCTION MILL

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FIG. 1

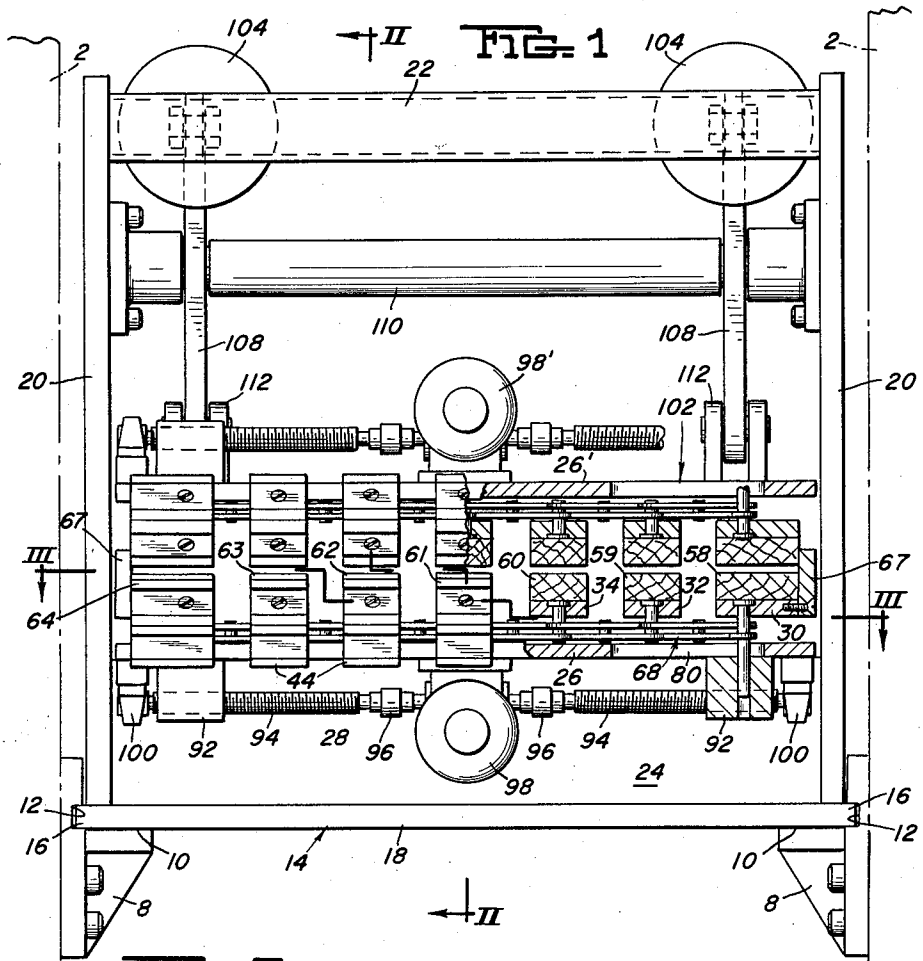


FIG. 5

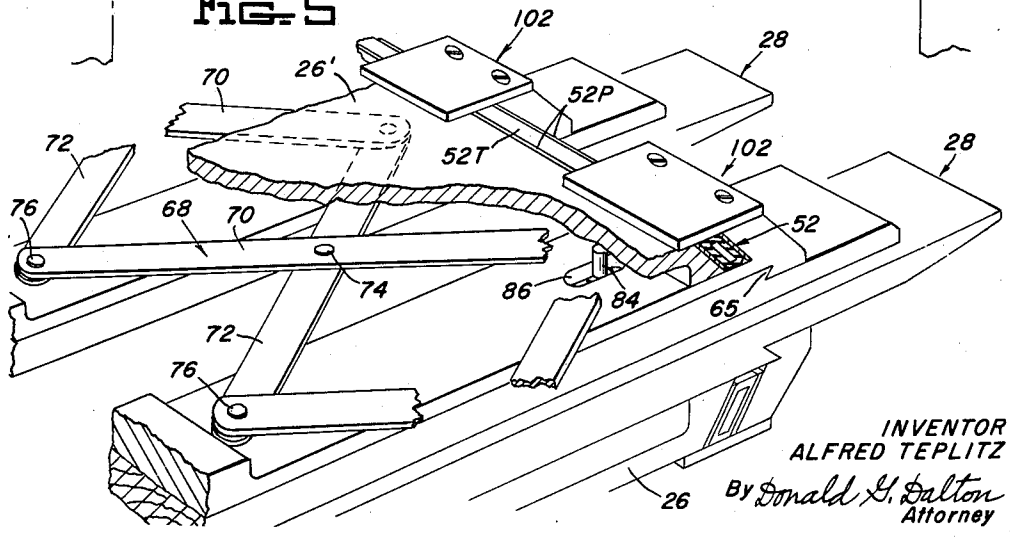


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FIG. 2

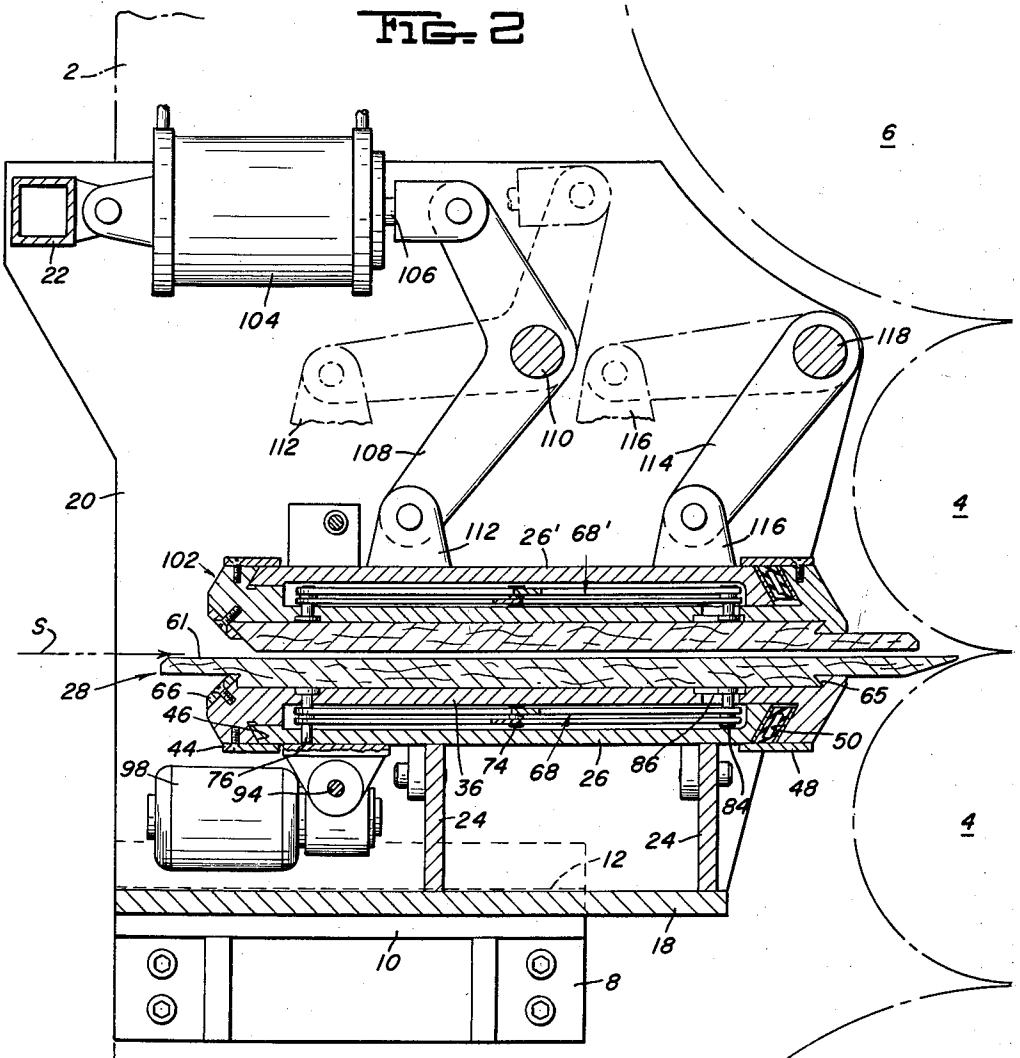


FIG. 6

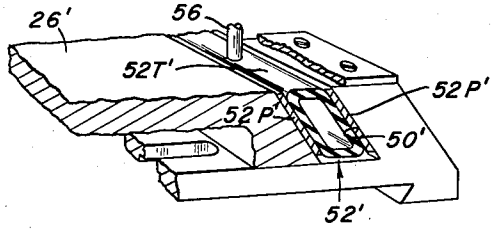


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FIG. 3

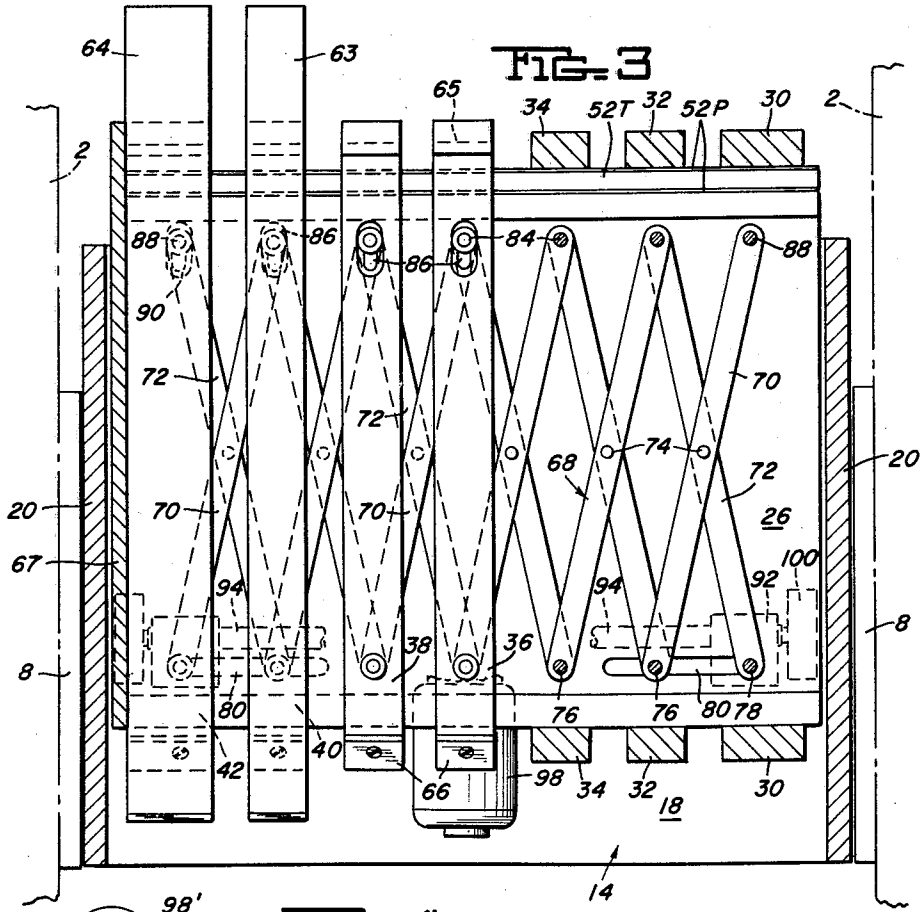


FIG. 4

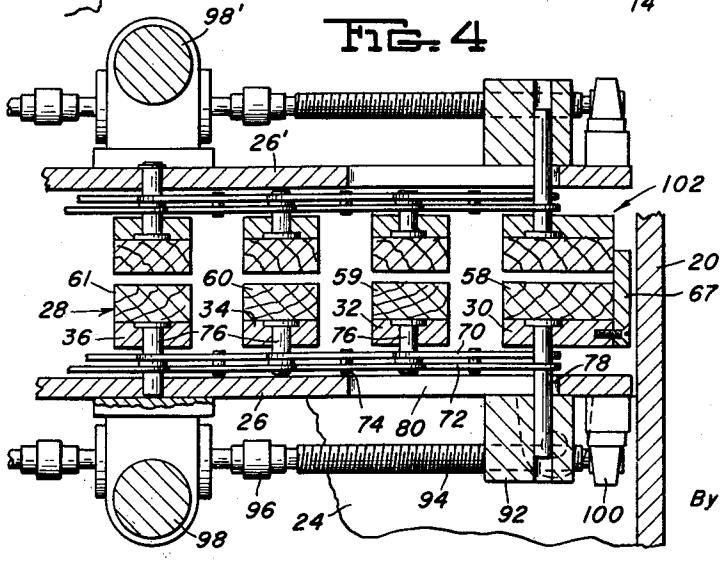


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Fig. 8a

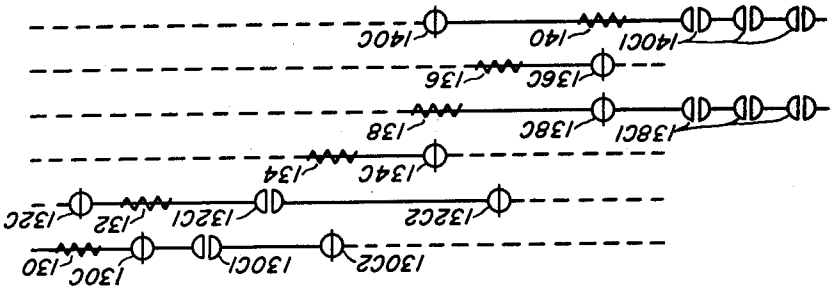



Fig. 8

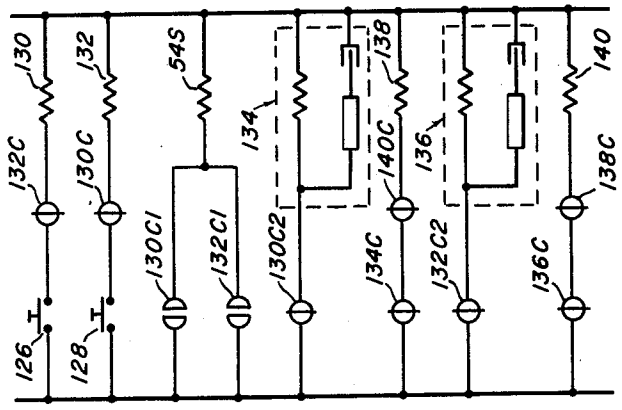
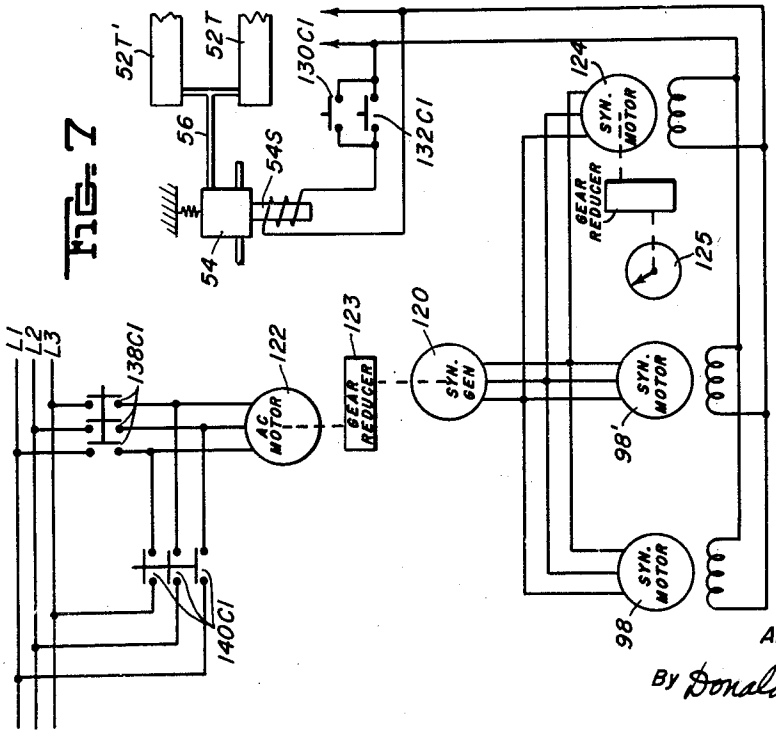



Fig. 7

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United States Patent Office

3,071,032
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3,071,032

# ADJUSTABLE SIDE GUIDE AND HOLD-DOWN FOR A TANDEM COLD REDUCTION MILL

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3 Claims. (Cl. 80—51)

This invention relates to an adjustable width side guide and hold down for a moving strip and more particularly to such a guide for use at the entry side of a tandem cold reduction mill stand. The conventional entry guide has no means for quick and easy adjustment to accommodate different strip widths. Each time the width of the strip to be rolled changes the mill operators must manually rearrange both the top and bottom sets of hold down bars and edge guide bars so that the width between bars is correct for the changed strip width. This is a costly and time consuming procedure which reduces the actual production time of the mill.

It is therefore an object of my invention to provide a side guide and hold down assembly which can be quickly and easily adjusted to accommodate strips of different widths.

These and other objects will be more apparent after referring to the following specification and attached drawings, in which:

FIGURE 1 is an elevation, partly in section, showing the guide of my invention;

FIGURE 2 is a view taken on the line II—II of FIGURE 1;

FIGURE 3 is a view taken on the line III—III of FIGURE 1;

FIGURE 4 is an enlarged fragmentary sectional view of a portion of FIGURE 1;

FIGURE 5 is an enlarged perspective view of a portion of the guide assembly with parts broken away;

FIGURE 6 is an enlarged perspective view of a detail;

FIGURE 7 is a schematic drawing of the electrical circuit used to supply current to the motors and solenoid valve;

FIGURE 8 is an across the line diagram of the electrical controls; and

FIGURE 8*a* is a view showing the relays of FIGURE 8 with their contacts.

Referring more particularly to the drawings, the reference numeral 2 indicates the housing of a roll stand having the usual work rolls 4 and back-up rolls 6. Opposed brackets 8 are mounted on the inner faces of the housing 2. Each bracket 8 includes a horizontal slide surface 10 and a groove 12. A guide supporting framework 14 is mounted on the brackets 8 with an extension 16 at each end extending into the groove 12. The framework 14 is slidable on the slides 10 away from the center line of the mill housing, so as to permit changing of the rolls. The framework 14 may be moved manually or by any suitable mechanism, not shown. The framework 14 includes a horizontal bottom plate 18, vertical side plates 20 which are welded to or otherwise fastened to the plate 18, and an upper cross-tie 22 which is welded or otherwise fastened to the top of plates 20. Brackets 24 which are fastened to and extend upwardly from the plate 18 support a machined plate 26 of bottom guide assembly 28. Board mounts 30, 32, 34, 36, 38, 40 and 42 are supported by the plate



26. The longitudinal cross section of each of the board mounts is the same so that only one need be described in detail. A plate 44 is attached to the ends of the board mounts so as to provide a groove 46 for receiving plate 26. A plate 48 is similarly secured to the other end of the board mounts with a space 50 being provided between plate 26 and the end of the board mounts. A clamping device 52 extends through the aligned spaces provided at the front end of the board-mounts and consists of an inflatable tube 52T having plates 52P bonded thereto. Air is supplied to the tube 52T through a three-way solenoid operated valve 54 and a conduit 56. Boards 58, 59, 60, 61, 62, 63 and 64 are attached to their respective board-mounts by means of a V-notch 65 at one end and a clamp plate 66 at the other end. The center board-mount 36 and board 61 are stationary, being pinned to plate 26 so that they cannot move with respect thereto. The boards 59 to 63 are all of the same width while the boards 58 and 64 are wider to provide increased engagement at the extreme ends of the strip width where uniform pressure is desirable. A brass edge guide plate 67 is attached to each of the board-mounts 30 and 42 and extends upwardly above the pass line. The board-mounts are joined by a lazy-tong linkage 68. Linkage bars 70 and 72 of the lazy-tong linkage 68 are connected at their centers for relative rotation by means of pins 74. One end of each bar 70, except the one to the left end of FIGURE 3, is fastened to the corresponding end of the associated bar 72 and to the associated board-mounts by a pin 76 extending upwardly into the board-mounts 32 to 40. One end of each of the end bars is fastened to the board mounts 30 and 42 by means of pin 78 which extends downwardly through a slot 80 in plate 26. The other ends of paired bars 70 and 72 are fastened together and to the board-mounts by means of pins 84 extending into slots 86 in the board-mounts. The unpaired end of right end bar 70 as shown in FIGURE 3 is fastened to end mount 30 by means of a pin 88 extending into a slot 90 in the associated board-mount. In like manner the unpaired end of left end bar 72 is fastened to end mount 42. As best shown in FIGURE 4 the pins 78 extend downwardly into vertical holes in nut blocks 92 located on the under side of plate 26. The nut blocks 92 are horizontally bored and threaded to accommodate oppositely threaded drive screws 94 which are connected at their inner ends by couplings 96 to a low speed shaft extension of gear motor 98. The screws 94 are supported at their outer ends by means of bearing blocks 100. An upper guide assembly 102 is constructed in the same manner as lower guide assembly 28 except that it does not include side guide plates 67 and is also mounted for vertical movement. To accomplish the vertical movement air motors 104 are pivotally connected to the cross tie 22 adjacent each of the side plates 20. Piston rod 106 of each motor 104 is connected to a two-arm lever 108 which is pivotally mounted intermediate its ends on a shaft 110 extending between and fastened to the side plates 20. The lower end of each lever 108 is pin connected to a clevis 112 fastened to the plate 26′ of the upper guide assembly 102. The other end of plate 26′ adjacent the rolling mill is supported by links 114, each of which has one end connected to an associated clevis 116 attached to the plate 26′ and the other end rotatably supported on a shaft

118 extending between and attached to side plates 20. The parts of upper guide assembly 102 are identified where necessary by priming the reference numeral of the corresponding part of lower guide assembly 28.

Power for driving synchro-motors 98 and 98' is supplied by a synchro-generator 120 which is driven from a standard A.C. motor 122 through a gear reducer 123. The gear reducer permits the generator to operate at a speed low enough to prevent the synchro-motors from getting out of phase. Power for driving the motor 122 is supplied by lines L1, L2 and L3. A third synchro-motor 124 is also powered from the synchro-generator 120. The motor 124 drives a dial indicator 125 which shows the exact distance between the edge guides 66. The control for operating the valve 54 and motors 98, 98' and 124 are shown in FIGURES 7, 8 and 8a. The control includes push button switches 126 and 128 which are connected in series with relay coils 130 and 132, respectively. Relay coil 130 has a normally closed contact 130C in series with relay coil 132, normaly open contact 130C1 and normaly closed contact 130C2. Relay coil 132 has normally closed contact 132C connected in series with relay coil 130, normally open contact 132C1 and normally closed contact 132C2. Contacts 130C1 and 132C1 are connected in parallel with each other and in series with valve solenoid 54S. Contact 130C2 is connected in series with time delay relay 134. Contact 132C2 is connected in series with time delay relay 136. Time delay relay 134 has a normally closed contact 134C which is connected in series with a relay coil 138 which has a normally closed contact 138C and normally open contacts 138C1 for controlling current flow to motor 122. Time delay relay 136 has a normally closed contact 136C mounted in series with contact 138C and a relay coil 140 which has a normally closed contact 140C and normally open contacts 140C1 for controlling current flow to motor 122.

In the operation of my device a strip S passes in the direction of the arrow between the upper and lower guide assemblies 28 and 102. The edge guides 66 center the strip entering the rolls and the wooden blocks provide the necessary drag on the strip. The clamp devices 52 and 52' prevent movement of the boards and board mounts at this time. When threading strip S to the rolls, air is delivered to the blind end of motors 104, thus moving the top guide assembly 102 upwardly. After the strip S is fed into the mill the assembly 102 is lowered to clamp the top assembly 102 down on the strip S. To adjust the guide for wider strip the push button switch 126 is closed, thus energizing relay 130 which opens contact 130C so as to prevent operation of relay coil 132. Contact 130C1 is closed, thus energizing solenoid 54S to cause valve 54 to release pressure from tubes 52T and 52T'. At the same time contact 130C2 will be opened and after a predetermined time delay, relay 134 will be deenergized, thus closing switch 134C. Closing of switch 134C energizes relay coil 138 closing its contacts 138C1 so as to cause motor 122 to rotate in such a direction that synchro-motors 98 and 98' will expand their respective lazy-tongs 68 and 68' to move guide blocks apart. The lazy-tongs cause the distance between the boards to be equal as they move apart. Motor 124 is also energized so that indicator dial 125 will indicate the distance between side guides 67. When this distance is equal to the width of the strip to be rolled the operator releases push button switch 126. This returns the circuit to its original condition and supplies air through valve 54 to the tubes 52T and 52T' to clamp the boardmounts in position. When adjusting the guide for narrower strip, push button 128 is closed, thus energizing relay 132 and closing its contact 132C1 to energize solenoid 54S so as to release pressures from tubes 52T and 52T'. Contact 132C2 will also open and, after a predetermined time delay, relay 136 will cause contact 136C to close, thus energizing relay 140 and closing contacts 140C1 to cause motor 122 to operate in the opposite direction. This causes motors 98 and 98' to also operate in the opposite direction which, through lazy-tongs 68 and 68', moves the guide blocks together. When the distance between edge guides 67 is that desired the operator releases push button switch 128, thus returning the controls to their original position and clamping the board-mounts in place.



While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. An edge guide and hold down for a moving strip at the entry end of a rolling mill comprising a bottom guide assembly, a top guide assembly between which the strip passes, and an edge guide on each side of one of said guide assemblies, each of said guide assemblies including a plate, a flange on said plate adjacent one end thereof extending toward the strip pass line, a plurality of drag blocks mounted on said plate for movement transversely of the path of movement of said strip, a flange on each of said drag blocks extending away from said strip pass line in spaced relation with the flange on said plate, an inflatable tube in the space between the flange on said plate and the flanges on said drag blocks, a rigid plate attached to each side of said tube and adapted to contact the adjacent sides of said flanges when inflated to prevent movement of said drag blocks with respect to said plate, a lazy tong assembly connecting said drag blocks, and means connected to said lazy tongs for moving the bars of said tongs with the drag blocks attached thereto away and toward each other.

2. In a continuous strip processing line having means for moving the strip longitudinally, an edge guide and hold down on the entry side of said means for guiding the strip transversely and applying a drag to the strip; said edge guide and hold down comprising a bottom guide assembly, a top guide assembly between which the strip passes, and an edge guide on each side of one of said guide assemblies, each of said guide assemblies including a generally horizontal plate, more than two drag blocks adjustably mounted on said plate for slidable movement with respect to one another transversely of the path of movement of said strip, drive means operably connected to said drag blocks for moving the drag blocks toward and away from one another to a plurality of positions according to the width of the strip being guided, a connection between said edge guides and said last named means associated with that guide assembly which includes the edge guides to move the edge guides toward and away from one another to a plurality of positions according to the width of the strip being guided, and expandable means acting between said plates and said drag blocks and edge guides for holding said drag blocks and edge guides in adjusted position on said plate.

3. In a continuous strip processing line having means for moving the strip longitudinally, an edge guide and hold down on the entry side of said means for guiding the strip transversely and applying a drag to the strip; said edge guide and hold down comprising a bottom guide assembly, a top guide assembly between which the strip passes, and an edge guide on each side of one of said guide assemblies, each of said guide assemblies including a generally horizontal plate, a flange on said plate adjacent one end thereof extending toward the strip pass line, more than two drag blocks adjustably mounted on said plate for slidable movement with respect to one another transversely of the path of movement of said strip, a flange on each of said drag blocks extending away from said strip pass line in spaced relation with the flange on said plate, an inflatable tube in the space between the plate flange and the drag block flanges, a plate attached to each side of said tube adapted to contact the adjacent sides of said flanges when inflated to prevent movement of said drag

blocks with respect to said plate, drive means operably connected to said drag blocks for moving the drag blocks toward and away from one another to a plurality of positions according to the width of the strip being guided, and a connection between said edge guides and last named means associated with that guide assembly which includes the edge guides to move the edge guides toward and away from one another to a plurality of positions according to the width of the strip being guided.



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