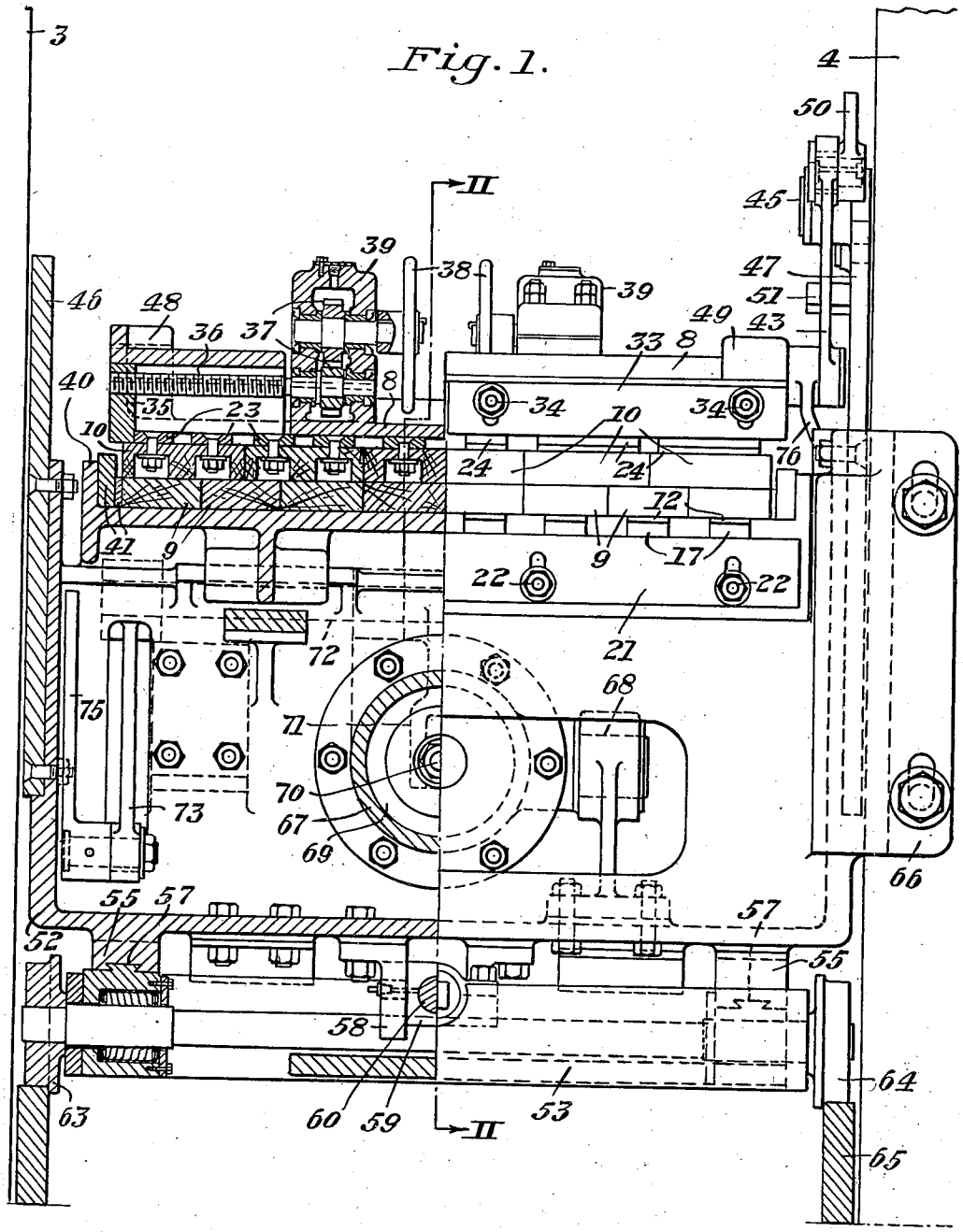
July 4, 1939. C. J. KLEIN 2,165,104

STRIP GUIDE FOR ROLLING MILLS

Filed Dec. 16, 1936 3 Sheets-Sheet 1

Fig. 1.



INVENTOR

Clarence J. Klein

by his attorneys

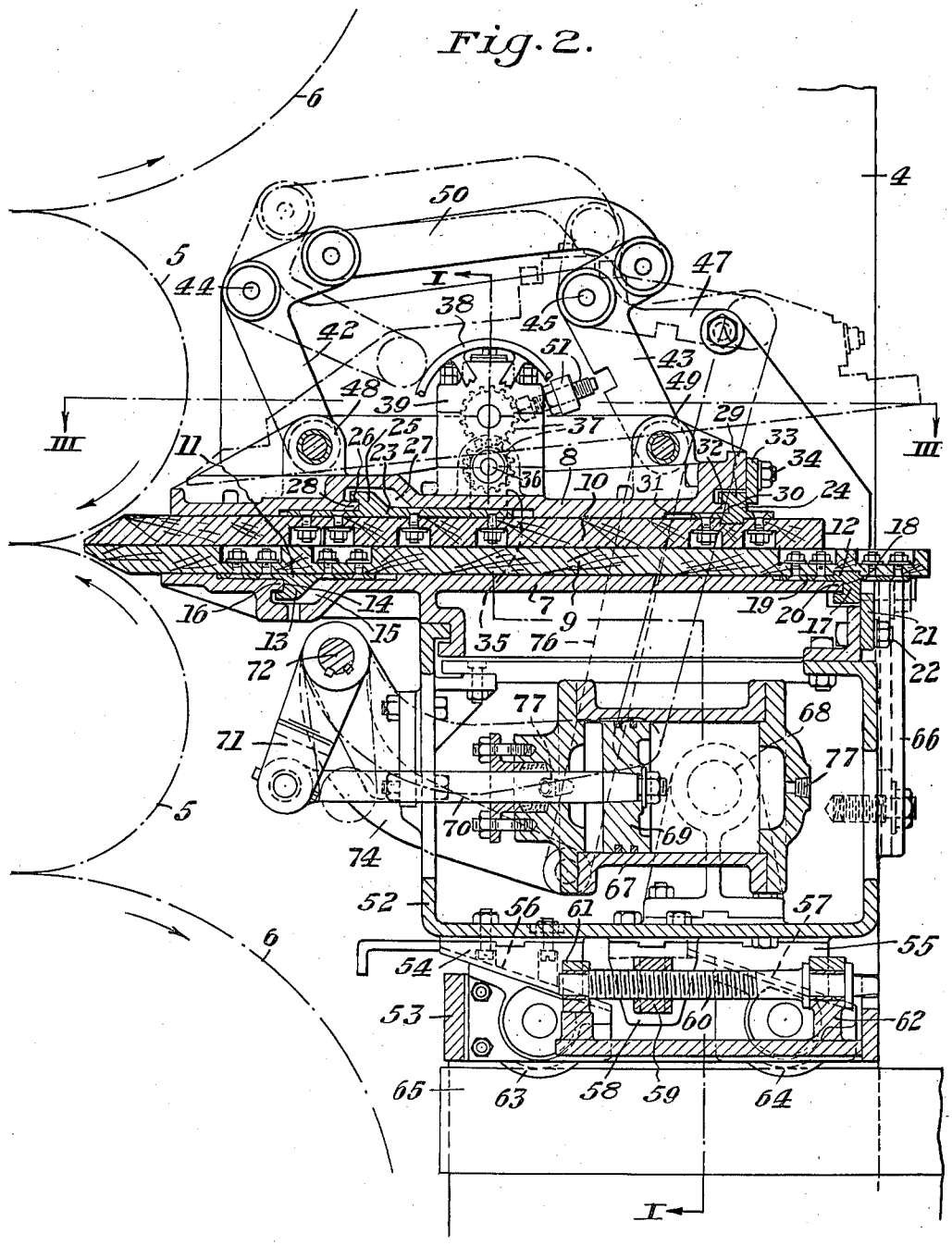
Stebbins, Blenko & Parmelee

July 4, 1939. C. J. KLEIN 2,165,104

STRIP GUIDE FOR ROLLING MILLS

Filed Dec. 16, 1936 3 Sheets-Sheet 2

Fig. 2.



INVENTOR

Clarence J. Klein

by his attorneys

Stebbins, Blenko & Parmelee

July 4, 1939. C. J. KLEIN 2,165,104

STRIP GUIDE FOR ROLLING MILLS

Filed Dec. 16, 1936 3 Sheets-Sheet 3

Fig. 3.

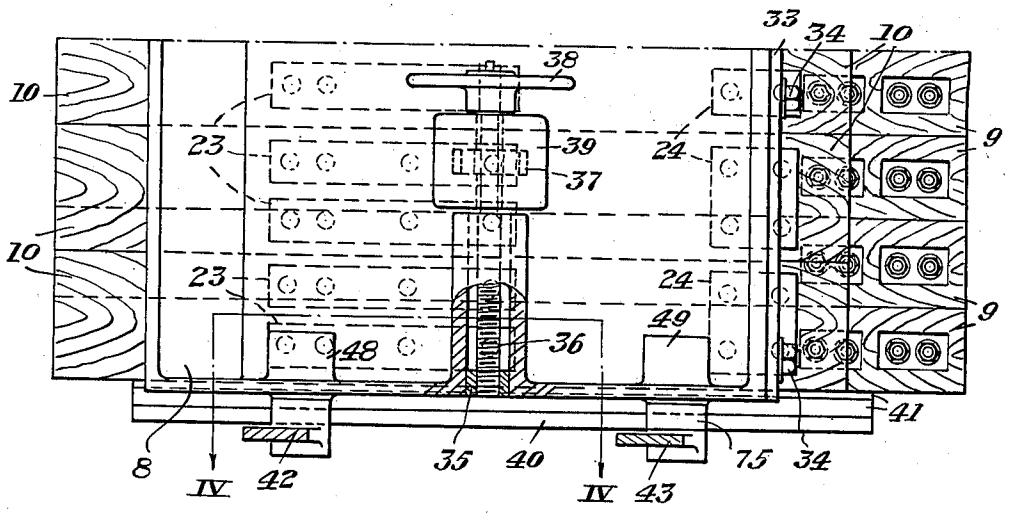
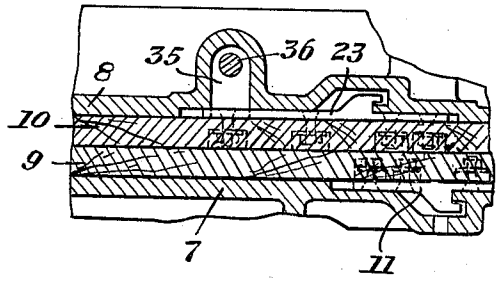


Fig. 4.



INVENTOR

Clarence J. Klein

by his attorneys

Stebbins, Blenko & Parmelee

Patented July 4, 1939

2,165,104

UNITED STATES PATENT OFFICE

2,165,104

STRIP GUIDE FOR ROLLING MILLS

Clarence J. Klein, Steubenville, Ohio

Application December 16, 1936, Serial No. 116,228

22 Claims. (Cl. 80—51)

My invention pertains generally to strip guide for rolling mills, and more particularly to apparatus for guiding material such as sheets, strip and the like into the working rolls of a rolling mill.

In sheet and strip rolling mill practice, it is common practice to provide entry guides or feeding apparatus to straighten the stock and smooth out incipient kinks or folds therein, just before the stock is delivered to the mill, to insure that the strip or sheet will be positively fed into the roll pass and to maintain a desirable tension on the stock while it is being rolled.

As heretofore constructed, entry guides have been made a part of the mill or so designed as to require a considerable length of time to remove the guides when certain adjusting and repairing operations are to be done to the mill machinery. Also, such entry guides have not been readily adjustable to take care of the various conditions encountered in the operation of a rolling mill, nor can they be quickly and satisfactorily adjusted to the various widths of stock to be rolled. The result was that considerable periods of time and unnecessary labor were expended in non-productive effort, and especially when the strip or sheet was being threaded through the guide mechanism and into the mill.

By my invention I provide apparatus which is readily placed in operating position with respect to the mill and which may be readily moved out of the way when repairs and adjustments are to be made, thus reducing the lost operating time of the mill to a minimum. My guide is of simple and sturdy construction and is readily adjustable for various heights of the pass. The mill equipment above the pass line is readily accessible, thus contributing to the ease of adjustment and repair of the mill. It is comparatively inexpensive, and convenient and easy to operate. The guide surfaces or guide boards in contact with the strip are quickly replaceable and the structure is such as to increase the production of a mill with which it is used, as compared with prior practice. The portion of the guide mechanism in contact with the upper part of the strip is moved into and out of position by means of linkage which is positive in operation and which occupies but little of the space between the mill housings. This enables the operator to use the mill for rolling strip to the full operating width of the mill.

The apparatus in general consists of a platform or table with removable facing strips or guide boards, a movable platen having removable facings strips cooperating therewith, linkage for moving the platen into and out of engagement with the table, means for operating said linkage, means for adjusting the height of the table, and means for moving the apparatus as a whole into and out of operating position with respect to the mill with which it is associated.

The facing strips or guide boards are so secured to the guide mechanism that they may be readily inserted and removed when occasion demands. The upper portion of the guide mechanism can be quickly and positively moved out of engagement with the strip to a sufficient distance to permit the workmen to perform their duties, so that the strip may be speedily inserted between the rolls. The upper portion of the guide mechanism can then be quickly moved into contact with the strip and thus no unnecessary time is lost in the operation of the mill. I provide all the aforementioned advantages in a machine which may be conveniently and rapidly applied to a rolling mill already in service or to a mill when it is being constructed.

In the accompanying drawings, wherein like numerals indicate like parts in the various views, I have shown for the purpose of illustration only a preferred embodiment of my invention. In these drawings:

Figure 1 is a view partly in elevation and partly in section, the section being taken on the line I—I of Figure 2, looking toward the mill;

Figure 2 is a longitudinal vertical section of the apparatus along the line II—II of Figure 1;

Figure 3 is a horizontal sectional view along the line III—III of Figure 2; and

Figure 4 is a fragmentary section along the line IV—IV of Figure 3.

In the drawings there is illustrated a strip guide for a rolling mill constructed in accordance with my invention and in operative position with respect to a rolling mill of a type suitable for strip or sheet rolling. The numerals 3 and 4 designate the mill housings and the numerals 5 and 6 designate the working and backing-up rolls, respectively, (shown in chain lines) of a suitable mill herein illustrated as a 4-high mill. In a mill of this type, the material to be rolled passes between the work rolls 5. It is, of course, understood that an entry guide made according to my invention may be used with any other type of rolling mill and is not confined to what is commonly known as the 4-high rolling mill.

A platform or table 7 and a cooperating movable platen 8 are provided, the table and platen being made preferably as wide as the maximum

rolling width of the mill which is somewhat less than the actual distance between the inside portions of the mill housings. In order that the surface of the stock may not be injured by the guide as the stock is passing between the table 7 and the platen 8, the adjacent surfaces of the table and the platen are lined with a suitable material which will not scratch or mar the surface of the strip or sheet. I prefer to use a series of guide boards or wear strips 9, removably mounted on the top of the table 7, and a series of guide boards or wear strips 10, removably mounted on the lower side of the platen 8. The guide boards are preferably made of wood, but it is, of course, understood that materials other than wood having desirable physical characteristics may be used. The guide boards extend to a position closely adjacent the work rolls.

Each of the guide boards 9 has fastened thereto two sets of clips or holder plates 11 and 12 secured, as for example by bolts, to the guide boards adjacent the front end and adjacent the rear end, respectively. Inasmuch as the front end holder plates 11 are all alike and the rear end holder plates 12 are all alike, the structure will be described as if the guide boards or wear strips 9 and 10 were held by one holder plate at each end. It is of course understood that any desired number of holder plates may be secured to the guide boards, and for purposes of illustration two holder plates at the front of each guide board and two holder plates at the rear of the guide boards have been shown. The holder plate 11 has a base portion and a projecting portion 13 in which projecting portion a groove 14 is formed transversely of the longitudinal axis of the guide boards. Holder plate 11 is received in a depressed portion 15 of table top 7, which depression has a projecting tongue 16, which is so positioned and of such a size that it cooperates with groove 14 to hold the front end of guide board 9 in fixed position with reference to table 7. Holder plate 11 and the depression 15 are so proportioned and shaped that the holder plate may slide with reference to table top 7. The rear holder plate 12 is fastened, as for example, by bolts, adjacent the rear end of guide board 9. This holder plate has a projection 17 in which a groove 18 runs transversely to the longitudinal axis of guide board 9. The table top 7 has a groove 19 in which a portion of the holder plate is received and a projecting tongue 20, which is received in the groove 18 of holder plate 12. The holder plates 11 and 12 are so positioned on guide board 9 that when the guide board is moved to the extreme left position, shown in Figure 2 of the drawings, the grooves 14 and 18 of holder plates 11 and 12, respectively, receive the projecting tongues 16 and 20 of table 7. The guide boards 9 are retained in that position by the clamp 21, which is secured by means of bolts 22 to table top 7, and by the tongue-and-groove connection.

Each of the wear strips or guide boards 10 are secured, as for example by bolts, to holder plates 23 and 24 by which they are fastened to the lower side of platen 8. Holder plate 23 has a projecting portion 25 in which is a groove 26, formed transversely of the longitudinal axis of the guide board 10. Formed in the lower portion of platen 8 is a recess 27 in which the holder plate and projection 25 are received. Platen 8 has a tongue 28, which is received in the groove 26. Holder plate 23 and the recess 27 in platen 8 are so proportioned as to allow the groove 26 of plate 23 to move into and out of engagement with tongue 28 of platen 8. The rear portion of guide board 10, which guide board is preferably somewhat shorter than the guide boards 9, is secured to holder plate 24. This holder plate has a projecting portion 29 in which a groove 30 is formed transversely of the longitudinal axis of guide board 10. Holder plate 24 is received in a depression 31 toward the rear end of platen 8, which platen has a tongue 32, which is received in groove 30 of holder plate 24. The holder plates 23 and 24 are so positioned on wear strip 10 that when the strip is moved to the extreme left position shown in Figure 2 of the drawings, the grooves 26 and 30 of holder plates 23 and 24 receive the projecting tongues 28 and 32 of platen 8. The guide board 10 is secured in that position by the clamp 33, which is fastened by bolts 34 to platen 8, and by the tongue-and-groove connections.

It will be observed that any guide board may be readily removed from either platen 8 or the table 7 by unfastening either clamp 21 or clamp 33, as the case may be, and slipping the guide board rearwardly until the tongue-and-groove connections disengage. At the same time by means of the type of connections I have described, the guide boards 9 and 10 may be held securely in their respective operating positions. This is of advantage when the width of the strip to be rolled is changed, at which time certain of the guide bars 9 and 10 must be removed or added so that the width of the friction surfaces of the assembled guide boards are approximately the same width as the stock to be rolled.

The guide boards or wear strips 10 are also retained in sidewise position by the clamping nut 35 which contacts the side of holder plate 23. When the width of the friction surfaces or guide boards of platen 8 is to be changed, the clamp 33 is removed and clamping nut 35 is loosened so as to disengage the side of holder plate 23. This is accomplished by turning screw 36 by means of gears 37 which are operated by the hand wheel 38. Gears 36 are positioned in the housing 39. The clamping nut 35 is moved to the right or left by suitable rotation of screw 36. The necessary guide boards are then removed or added and the remaining boards secured as aforesaid. Similarly when it is desired to change the width of the table top, a desired number of guide boards 9 are taken from or added to it, as the case may be, and the space between the side wall 40 of table 7 and the side of guide board 9 is filled in with filler strips 41.

Platen 8 has connected thereto a linkage whereby it can be moved from the position shown in full lines in Figure 2 to the position shown in chain lines in Figure 2. The linkage consists of two bell crank arms 42 and 43, pivotally mounted at 44 and 45 to uprights 46 and 47, and a connecting link 50. The lower end of each of bell crank arms 42 and 43 is secured to upright portions 48 and 49 of platen 8, the other end of each of these bell crank arms being connected by link 50. The uprights 46 and 47 are so arranged as to fit closely between the housings 3 and 4 of the mill and are fastened to the lower portion or cage 52 of the guide. An adjustable stop 51 is secured to each of these uprights to control the downward limit of the travel of bell crank 43.

By the linkage arrangement and operating means therefor which I shall later describe, it will be apparent that platen 8 can be quickly moved from contact with the strip—the position

shown in full lines in Figure 2—to the elevated position shown in chain lines in Figure 2. When the platen 8 is in the elevated position, the workmen can easily insert the end of the strip between the working rolls and as soon as the strip is gripped by the working rolls, platen 8 is lowered by operation of the linkage and its associated control means to the position in contact with the top side of the strip.

The table 7 is mounted on the cage member 52, which cage member is mounted on and supported by a truck 53. Secured to the under side of cage 52 are two members 54 and 55 having inclined surfaces which surfaces in turn, are received on inclined surfaces 56 and 57 of truck 53. The cage 52 also has a projecting portion 58 in which is received a nut 59, through which passes a screw member 60 which is rotatably mounted in brackets 61 and 62 on truck 53. By operation of screw 60, the relative position of the inclined surfaces is changed and consequently the height of the top of the table, and thus the height of the pass line of the entry guide, may be adjusted. The truck 53 is mounted on two sets of wheels 63 and 64 which operate on a track 65, extending beyond the housing, so that the apparatus, as a whole, may be readily moved back or forth along the track from or into its operating position, as shown in Figure 2.

The housing cage 52 is secured in position relative to the mill housings 3 and 4 by means of a retaining flange 66, which is bolted to the housings. When the apparatus is moved into the operating position shown in Figure 2, the retaining flange 66 is bolted to the mill housing and thus holds the apparatus securely in position. When the apparatus is to be moved away from the mill, the flange 66 is unbolted from the housing.

A cylinder 67 is secured in the housing or cage 52 by a swivel mounting 68. Received in cylinder 67 is a piston 69 which is connected by piston rod 70 to a lever 71 which is keyed to shaft 72 rotatably secured in the housing or cage 52. Keyed to shaft 72 are two lever arms 73 and 74, which lever arms are connected by links 75 and 76 to upright portions 48 and 49 of platen 8. Piston 69 is moved back and forth in the cylinder 67 by means of a fluid, preferably air, admitted through openings 77 from a supply source, not shown. It is understood, of course, that a suitable control valve will be placed in the line leading to ports 77 from the pressure supply source. Movement of piston 69 will cause the raising and lowering of platen 8 by means of the linkage heretofore described.

It will be readily appreciated by those skilled in the art that by means of apparatus constructed according to my invention it is possible to readily thread the strip through the working rolls and to insure proper guidance of the strip to a position very close to the working rolls. The height of the pass line can be conveniently adjusted. The device as a whole can be moved into and out of operating position with a minimum of effort and in a very short period of time; and the apparatus can be readily adjusted so that the friction surfaces presented to the strip being rolled can be of the proper width to take care of variations in the width of the strip. The full maximum rolling width of the mill can be utilized and the guide boards can be readily replaced should the occasion arise. The apparatus is such as to make the mill equipment above the pass line accessible for adjustment and repair, and is very compact, thereby conserving space.

While I have illustrated and described a preferred embodiment of my invention, it will be understood that the same is not limited thereto but may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. In apparatus for guiding strip to the work rolls of a rolling mill, a table, a platen movable away from and toward said table, guide boards on the platen, means for holding said guide boards against movement along their longitudinal axis and relative to the platen but permitting sidewise movement, and means for holding said guide boards against sidewise movement.

2. In apparatus for guiding strip to the work rolls of a rolling mill, a table, a platen for cooperation with the table, guide boards on said table, guide boards on said platen, and means for holding said guide boards against movement along their longitudinal axis and relative to the table and to the platen, respectively, but permitting sidewise movement.

3. In apparatus for guiding strip to the work rolls of a rolling mill, a table, a platen for cooperation with the table, guide boards on said table, guide boards on said platen, means for holding said guide boards against movement along their longitudinal axis and relative to the table and to the platen, respectively, but permitting sidewise movement and means for holding the guide boards against sidewise movement.

4. In apparatus for guiding strip to the work rolls of a rolling mill, a table, guide boards on said table, and holder plates secured to said guide boards, said holder plates having a sliding tongue-and-groove connection with the table which permits sidewise and endwise movement, means for securing the guide boards against movement along their longitudinal axis but permitting sidewise movement, and means for holding said guide boards against sidewise movement.

5. In apparatus for guiding strips to the work rolls of a rolling mill, a table for supporting the strip, a platen for cooperation with the table and movable away from and toward the table, a guide board on said table, a guide board on said platen, a truck for supporting the table and platen, means on the truck for moving the platen into and out of engagement with the table, and means between the truck and the table for raising and lowering the table and platen.

6. In apparatus for guiding strips to the work rolls of a rolling mill, a table for supporting the strip, a platen for cooperation with the table, a guide board on said table, a guide board on said platen, said guide boards being adapted to engage the strip, a truck for supporting the table and platen, means on the truck for moving the platen into and out of engagement with the table, means between the truck and the table for raising and lowering the table, and means for moving the apparatus into and out of operating position relative to the mill.

7. In apparatus for guiding strip to the work rolls of a rolling mill, a table for supporting the strip, a platen movable into and out of strip engaging position, a cage member supporting the table, uprights connected to the cage, linkage connecting the uprights and the platen, and means for operating the linkage whereby the platen can be moved into and out of engagement with the strip and means for moving the cage

member into and out of operating position relative to the mill.

8. The combination with a rolling mill for strip material having rolls, of a cage member, a guide unit connected to said cage member and having opposed members presenting parallel surfaces for engaging the strip material, said surfaces being movable toward and away from each other, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, and means within the unit for adjusting the guide unit vertically whereby the strip may be alined horizontally with the pass between the rolls and means for moving the cage member into and out of operating position relative to the mill.

9. The combination with a rolling mill for strip material having rolls, of a guide unit having opposed members presenting parallel surfaces for engaging the strip material, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, means for adjusting the guide unit vertically whereby the strip may be alined horizontally with the pass between the rolls, and a movable truck on which the unit is carried and a trackway for the truck whereby it may be rolled into and out of position adjacent the rolls.

10. The combination with a rolling mill for strip material having rolls, of a guide unit having opposed members presenting parallel surfaces for engaging the strip material, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, each of said members having parallel surfaces comprised of boards the longitudinal axis of which extends in the direction of travel of the strip, means for releasably securing the parts to the respective members to permit the ready interchange thereof, and adjustable clamping means for holding a variable number of boards according to the width of the strip being rolled.

11. The combination with a rolling mill for strip material having rolls, of a guide unit having opposed members presenting parallel surfaces for engaging the strip material, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, each of said members having parallel surfaces comprised of boards the longitudinal axis of which extends in the direction of travel of the strip, interlocking means on the boards and the respective members for securing the boards to the members and being engageable upon movement of the boards longitudinally in one direction and releasable upon longitudinal movement of the boards in the opposite direction, and means for restraining the boards against longitudinal movement when the interlocking means are engaged but permitting sidewise movement of the boards.

12. The combination with a rolling mill for strip material having rolls, of a guide unit having opposed members presenting parallel surfaces for engaging the strip material, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, each of said members having parallel surfaces comprised of boards the longitudinal axis of which extends in the direction of travel of the strip, interlocking means on the boards and the respective members for securing the boards to the members and being engageable upon movement of the boards longitudinally in one direction and releasable upon longitudinal movement of the boards in the opposite direction, means for restraining the boards against longitudinal movement when the interlocking means are engaged, and adjustable clamping means for pressing the boards together transversely of their length.

13. The combination with a rolling mill for strip material having rolls, of a guide unit having opposed members presenting parallel surfaces for engaging the strip material, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, each of said members having parallel surfaces comprised of boards the longitudinal axis of which extends in the direction of travel of the strip, and means including a tongue and groove connection for releasably securing the boards to the respective members to permit the ready interchange thereof.

14. The combination with a rolling mill for strip material having rolls, of a guide unit having opposed members presenting parallel surfaces for engaging the strip material, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, each of said members having parallel surfaces comprised of boards the longitudinal axis of which extends in the direction of travel of the strip, means including a tongue and groove connection for releasably securing the boards to the respective members to permit the ready interchange thereof, and means for holding a variable number of boards according to the width of the strip being rolled.

15. The combination with a rolling mill for strip material having rolls, of a guide unit having opposed members presenting parallel surfaces for engaging the strip material, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, each of said members having parallel surfaces comprised of boards the longitudinal axis of which extends in the direction of travel of the strip, interlocking means on the boards and the respective members for securing the boards to the members and being engageable upon movement of the boards longitudinally in one direction and releasable upon longitudinal movement of the boards in the opposite direction, and means for restraining the boards against longitudinal movement when the interlocking means are engaged.

16. The combination with a rolling mill for strip material having rolls, of a guide unit having opposed members presenting parallel surfaces for engaging the strip material, means for effecting relative movement between said members to bring them into and move them apart from a strip-engaging position, each of said members having parallel surfaces comprised of boards the longitudinal axis of which extends in the direction of travel of the strip, interlocking means on the boards and the respective members for securing the boards to the members and being engageable upon movement of the boards longitudinally in one direction and releasable upon longitudinal movement of the boards in the opposite direction, means for restraining the boards against longitudinal movement when the interlocking means are engaged, and means for pressing the boards together transversely of their length.

17. In apparatus for guiding strip to the work rolls of a rolling mill, a table, a platen arranged for cooperating with the table and movable to-

wards and away from said table, guide boards on the table, and holder plates secured to said guide boards, said holder plates having a sliding tongue and groove connection with the table which permits sidewise and endwise movement of the boards.

18. In apparatus for guiding strip to the work rolls of a rolling mill, a table, a platen arranged for cooperating with the table and movable away from and toward the table, guide boards on said table and secured thereto by holder plates secured to the guide boards, said holder plates having a sliding tongue and groove connection with the table which permits sidewise and endwise movement of the boards relative to the table.

19. In apparatus for guiding strip to the work rolls of a rolling mill, a table, a platen arranged for cooperating with the table, guide boards secured to said platen, holder plates secured to the guide boards, said holder plates having a sliding tongue and groove connection with the platen which permits movement of the guide boards longitudinally and transversely of the platen and means for preventing sidewise movement of the boards relative to the platen.

20. In apparatus for guiding strip to the work rolls of a rolling mill, a table, a platen for cooperation with the table and movable toward and away from the table, guide boards, and holder plates secured to the guide boards, said holder plates having a sliding tongue and groove connection with the platen permitting sidewise and endwise movement of the plates and boards relative to the platen and means for holding the guide boards against sidewise movement relative to the platen.

21. In apparatus for guiding strip to the work rolls of a rolling mill, a table, a platen movable relative to the table, means for supporting the platen above the table, a guide board on said table over which the strip passes, a guide board on said platen, means for moving said platen into and out of position such that the guide board thereon will engage and guide strip material moving over the guide board on the table, means for adjusting the table and platen supporting means vertically, and means for moving said apparatus into and out of operating position relative to the mill.

22. In apparatus for guiding strip to the work rolls of a rolling mill, a table, guide boards on said table, means including a clamp for holding said guide boards against movement along their longitudinal axes and relative to the table, means including a clamp holding said guide boards against sidewise movement, said means permitting said guide boards to be moved longitudinally and transversely relative to the table when both said clamps are loosened.

CLARENCE J. KLEIN.