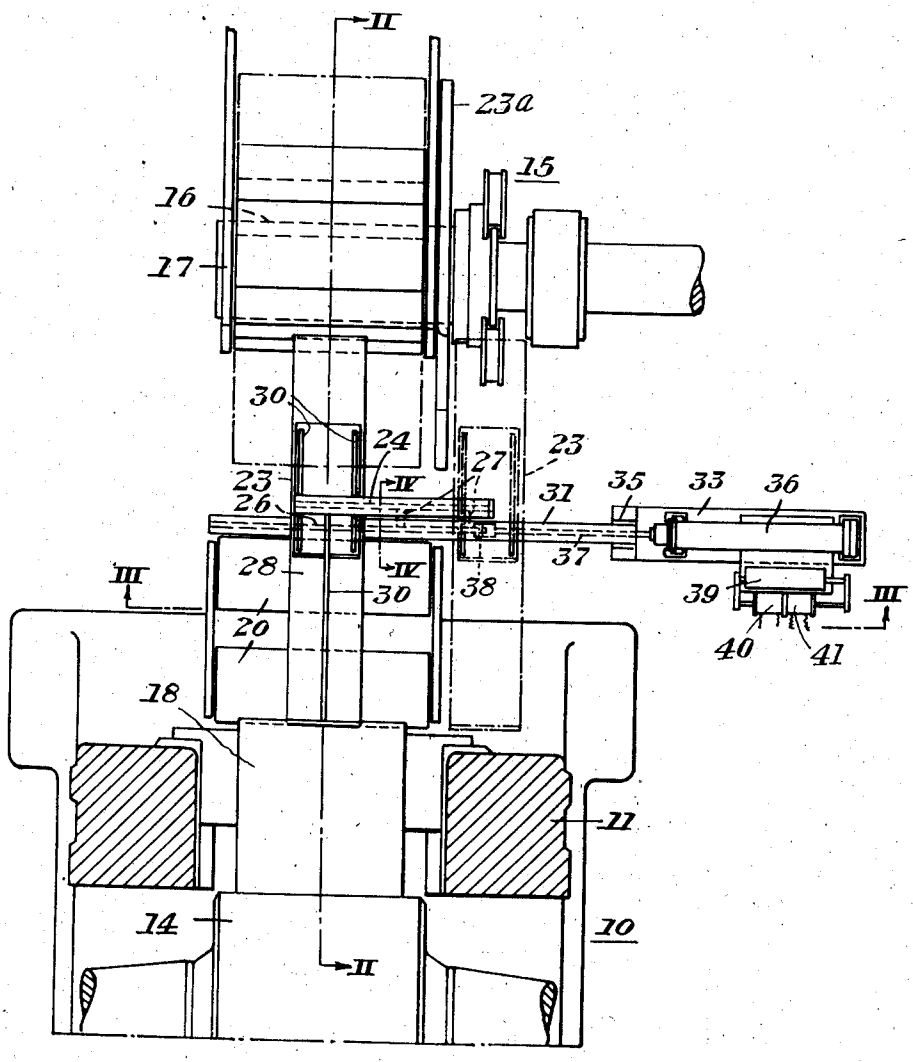
June 29, 1943. C. J. KLEIN 2,322,784

GUIDE FOR STRIP COILERS

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Fig. 1.



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GUIDE FOR STRIP COILERS

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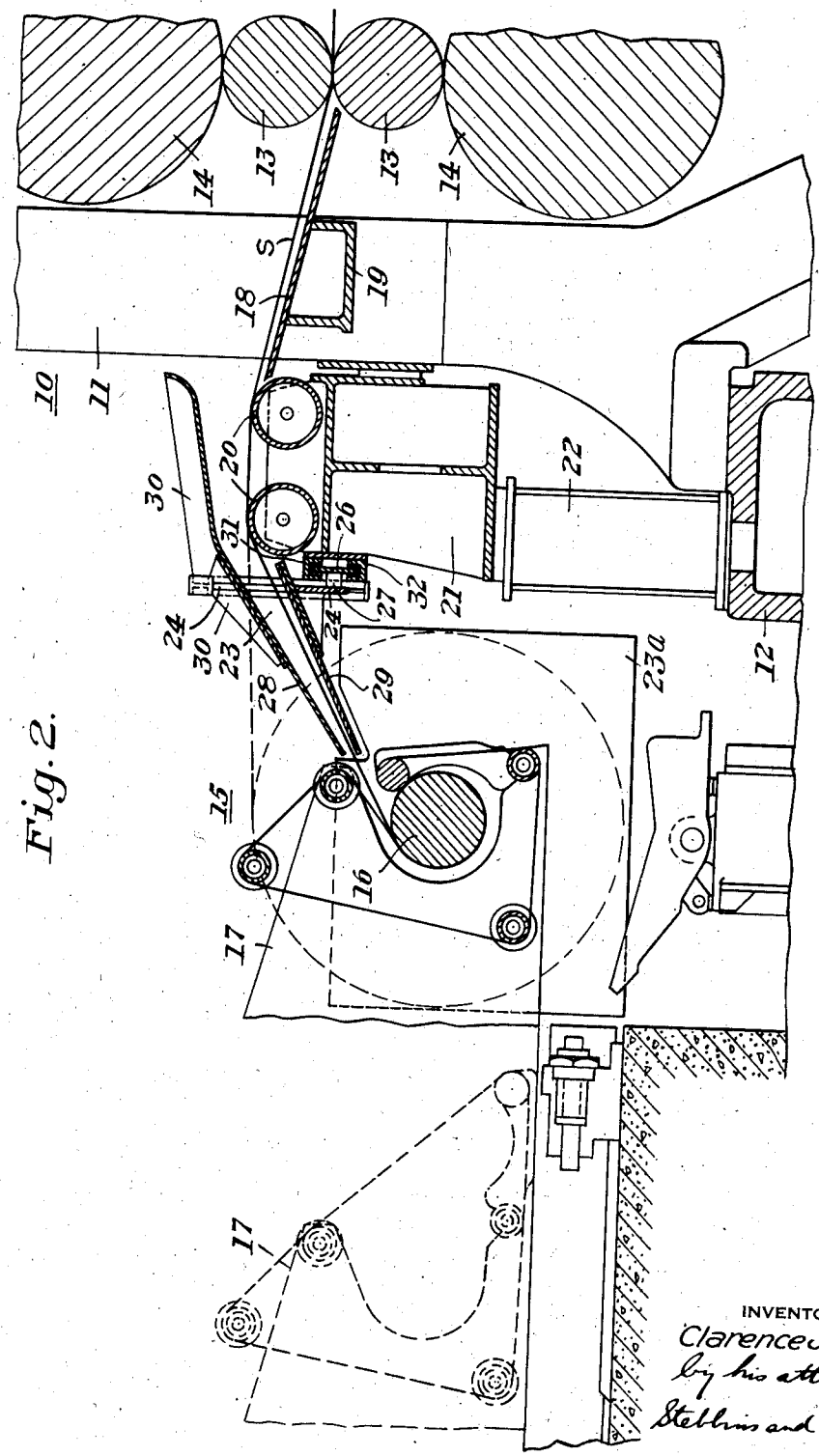


Fig. 2.

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Fig. 4.

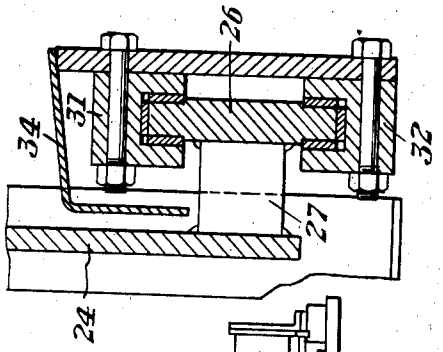


Fig. 3.

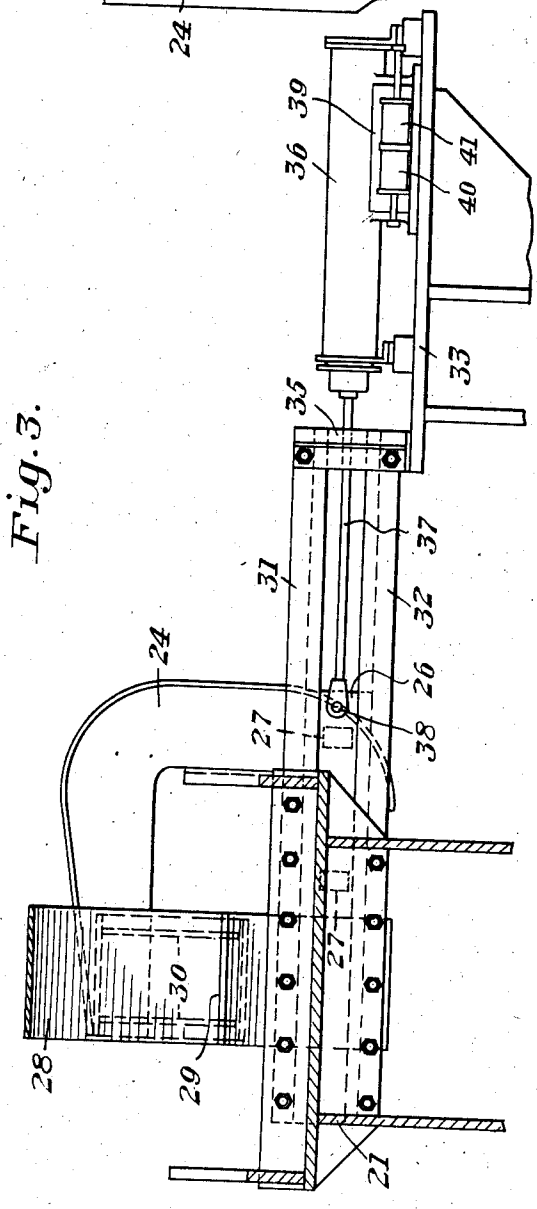
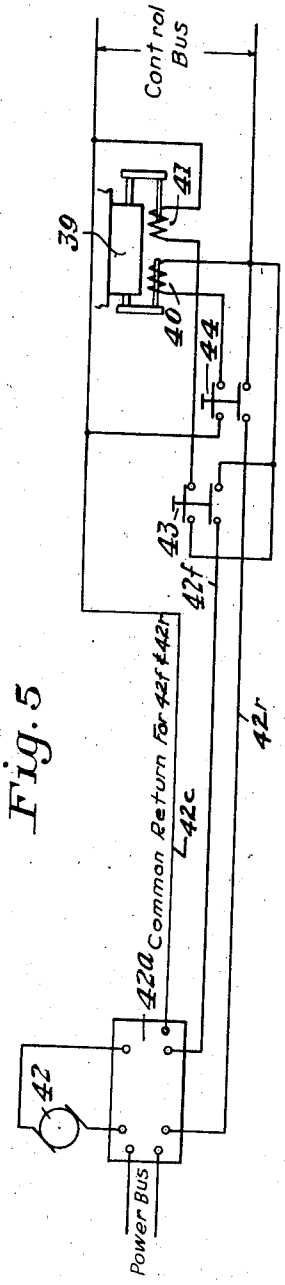


Fig. 5



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GUIDE FOR STRIP COILERS

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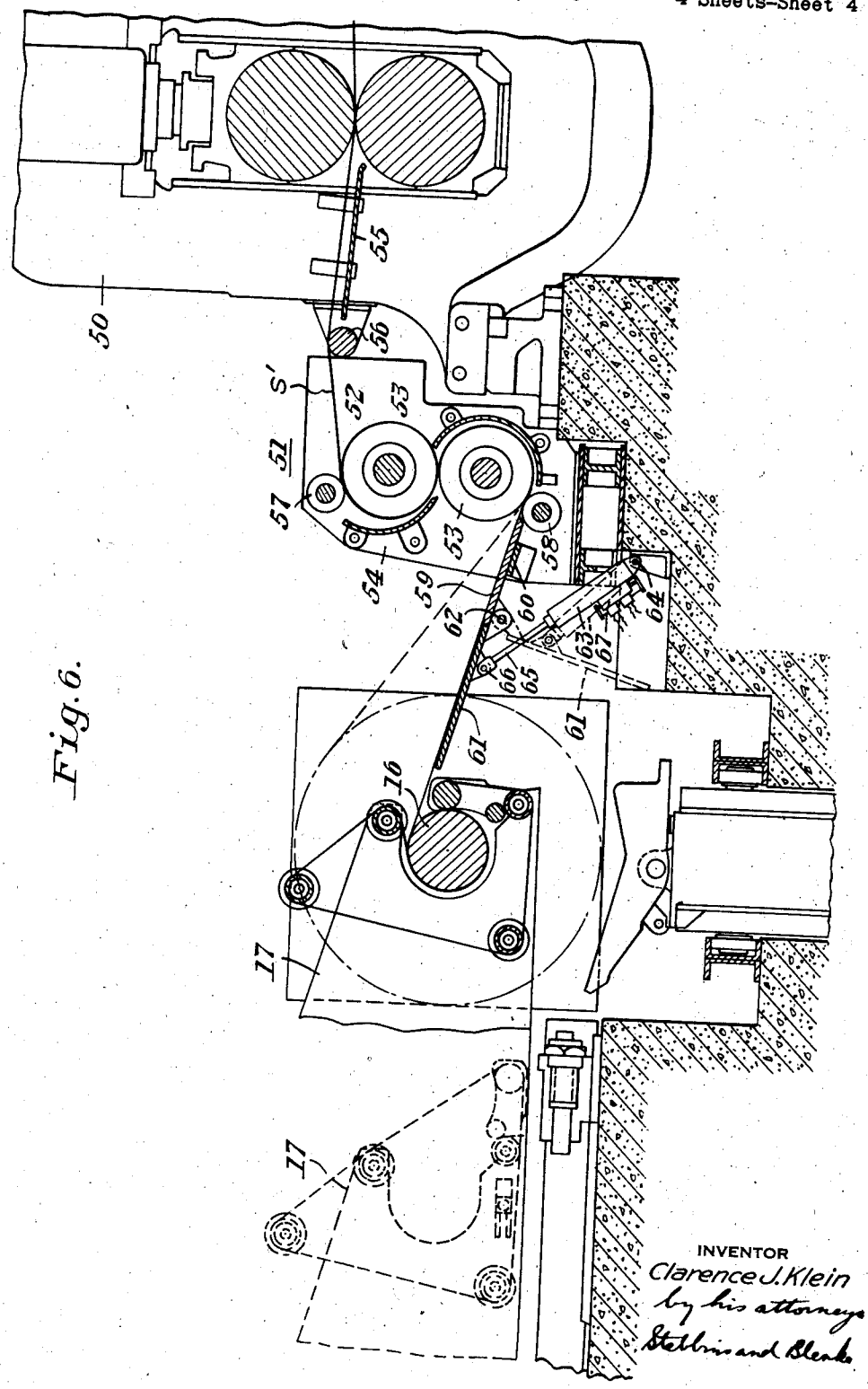


Fig. 6.

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UNITED STATES PATENT OFFICE

2,322,784

GUIDE FOR STRIP COILERS

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Application October 24, 1940, Serial No. 362,595

5 Claims. (Cl. 242—78)

This invention relates to guide mechanism for directing the leading end of a strip length on to a coiler mandrel.

In the rolling or other processing of metal strip, the disposition of the material as it comes from the mill or other apparatus presents a serious problem. The most satisfactory solution therefor is to coil the strip to facilitate further handling. Coilers have been devised which will receive the leading end of a hot-rolled strip and wind it into a coil. In the reduction of the strip by cold-rolling in a multi-stand continuous mill and the treatment of strip in other types of apparatus, however, it is still the practice to start the leading end of the strip on the coiler mandrel by hand, with the aid of a belt wrapper, after threading the strip through the several stands of the mill, or after shearing a completed coil from the strip issuing from apparatus which processes a continuous length.

I have invented apparatus for performing this function without the intervention of manual effort, which saves considerable time in starting a coil, particularly at the exit end of a continuous cold mill because the hot-rolled strip, as initially threaded through the mill, is relatively stiff and rather difficult to manipulate by hand, when any considerable length thereof is free. In one embodiment of the invention, I provide converging guide plates between the last mill stand and the coiler. The guide plates are mounted for horizontal movement laterally of the center line of the mill whereby they may be retracted after the strip has been started on the coiler. The invention also contemplates an automatic control system for the guide plates whereby they are actuated simultaneously with the movement of the belt wrapper toward and from the coiler mandrel.

In a modification of the invention, I provide a hinged guide plate between the mill and the coiler, having means for actuating it from operative to inoperative position. I coordinate the control of said means with the operation of the belt wrapper by the control system aforementioned.

While the invention is disclosed herein as applied to the coiling of material issuing from a rolling mill, it is equally applicable to the coiling of strip delivered from any equipment designed for processing the material in the flat, such as a pickling line, tinning line, etc.

Further details of the preferred embodiment and modification outlined above will become apparent during the following complete description and explanation which refers to the accompanying drawings. In the drawings,

Fig. 1 is a plan view showing a portion of the last mill stand in horizontal section;

Fig. 2 is a sectional view taken substantially along the plane of line II—II of Fig. 1;

Fig. 3 is a view partly in elevation and partly in section taken along the plane of line III—III of Fig. 1;

Fig. 4 is an enlarged sectional view taken substantially along the plane of line IV—IV of Fig. 1;

Fig. 5 is a schematic diagram illustrating the control system for the belt wrapper and coiler guide; and

Fig. 6 is a view similar to Fig. 2 showing the modified form of the invention applied to a mill of a type different from that shown in Fig. 2.

Referring now in detail to the drawings and, for the present, to Figs. 1 through 4, the last stand of a multi-stand continuous cold strip mill is indicated at 10 and includes housings 11 supported on bed rails 12 and having working rolls 13 and backing rolls 14 journaled in bearings mounted therein in the known manner. A coiler indicated diagrammatically at 15 is spaced from the stand 10 and is provided with a rotating mandrel 16 on which strip issuing from the mill as indicated at *s*, is adapted to be coiled. A belt wrapper 17 is movable toward and from the mandrel 16. This device is of known construction and operates in a manner well understood, to start the leading end of the strip length *s* around the mandrel 16, when moved into engagement with the latter, as indicated in solid lines in Fig. 2. When not in use, the belt wrapper is retracted to the position shown in chain lines. The movement from one position to another is effected by a suitable motor and driving connections, all of which are well understood in the art and require no further explanation here.

An exit guide plate 18 is disposed between the housings 11 and the stand 10, being carried on a transom 19 secured to the housings, and extends inwardly of the mill toward the bite of the work rolls 13. Guide rolls 20 are journaled in a supporting frame 21 secured to the housings and supported on columns 22 resting on the bed rails 12. The guide of my invention is disposed between the guide rolls 20 and the mandrel 16 and is indicated generally at 23.

The guide 23 includes a C-shaped plate 24 overhanging the center line of the mill and secured to a slide 26 by spacer blocks 27. Guide plates 28 and 29 which converge toward the mandrel 16 are secured to the spaced inner edges

of the plate 24 and are braced by gussets 30. These plates provide a throat which, when positioned symmetrically of the center line of the mill, is effective to direct the leading end of a strip length such as that indicated at *s* between the mandrel 16 and the belt wrapper 17.

The slide 26 is slidable longitudinally along spaced guides or ways 31 and 32 of channel section. These guides are supported partly on the frame and partly on a table 33. A water shield 34 overhangs the upper rail 31. At their outer ends, the rails are connected by a tie plate 35.

A fluid-pressure cylinder and piston 36 are disposed on the table 33 and the piston rod 37 thereof is pivotally connected to the slide 26 at 38. An electromagnetic valve 39 controls the admission of fluid to opposite ends of the cylinder and its discharge therefrom, to move the guide 23 from its operative position as shown in solid lines in Fig. 3 to its retracted or inoperative position indicated in dotted lines. It will be apparent that when the guide 23 is in its operative position, it functions to direct the leading end of a strip length emerging from between the roll 13 and sliding upwardly along the guide plate 18 and over the rolls 20, into the bite of the belt wrapper-mandrel combination, whereby the starting wraps of the coil are formed on the mandrel. When the coil has been started, the belt wrapper 17 and the guide 23 are retracted until the next coil is threaded through the mill. This avoids interference with the coil as it builds up on the mandrel or its removal therefrom by stripper 23*a*.

Fig. 5 illustrates diagrammatically a control system which I have invented to coordinate the operation of the belt wrapper 17 and the guide 23. This system includes solenoids 40 and 41 which operate the valve 39, the belt-wrapper actuating motor indicated at 42, and control switches in the form of push buttons 43 and 44. A starting and reversing panel 42*a* of known construction is associated with the motor 42 and is provided with the usual starting and reversing resistors and switches (not shown). These devices function in the known manner to start the motor 42 in one direction or the other, upon the closing of a single control circuit for the desired direction of rotation. Such control circuits extend from the control bus in Fig. 5 to the panel 42*a* through the lower contacts of push button switches 43 and 44 or their equivalents and have a common return 42*c*. The upper contacts of these switches control the energization of the solenoids 40 and 41.

Assuming that the belt wrapper 17 and guide 23 are in the positions shown in solid lines in Figs. 2 and 3, they may be moved to their dotted line positions by operating the push button 43. The upper contact thereof closes an obvious energizing circuit for the solenoid 41 and the lower contact closes a circuit 42*f* which includes the common return 42*c* for starting the motor 42. The reversal of the position of the valve 39 causes the cylinder and piston 36 to retract the guide 23 and energization of the circuit 42*f* causes the motor 42 to retract the belt wrapper 17. When the guide and belt wrapper have been fully retracted, the push button 43 may be released. Suitable protective devices such as limit switches for the belt wrapper motor will also be incorporated in the control system but are not illustrated therein since their nature and function are well known. When it is desired to restore the belt wrapper and guide to their operative positions, before starting the next coil, the push button 44 is actuated. In the same manner as previously explained, this energizes solenoid 40 and circuit 42*r* including the return 42*c* and causes the cylinder 36 and motor 42 to move the belt wrapper and guide to the solid line positions of Figs. 2 and 3.

A modification of the invention illustrated in Fig. 6 is adapted for use in connection with a skin-pass mill, one stand of which is indicated at 50, such as disclosed and claimed in Patent 2,287,380 granted June 23, 1942, jointly to me and E. W. Rieger, for Rolling mill.

A tension device 51 including rolls 52 and 53 journaled in housings 54 serves to draw strip *s'* from the stand 50 over a guide plate 55 and a billy roll 56. Curved guides 52*a* and 53*a* are disposed adjacent the rolls 52 and 53. Pressure rolls 57 and 58 cooperate with the rolls 52 and 53 in the manner of pinch rolls.

The strip *s'* is started upon a coiler mandrel 16 by the aid of a belt wrapper 17, the same as in the previously described form of the invention.

In order to start the strip *s'* on the mandrel 16 without manual handling, I provide a relatively fixed guide plate 59 carried on a cross bar 60 extending between the housings 54. A relatively movable guide plate 61 is hinged to the guide plate 59 at 62 and is adapted to be moved from the operative position shown in solid lines in Fig. 6 to the retracted or inoperative position indicated in chain lines.

A fluid-pressure cylinder and piston 63 are pivoted at 64 to a fixed bearing, illustrated as a casting seated on the mill foundation. The piston rod 65 of the cylinder 63 is pivoted to the guide plate 61 at 66. A valve 67 similar to that shown at 39 controls the admission of fluid under pressure to opposite ends of the cylinder 63 and its discharge therefrom.

It will be apparent that when the guide plate 61 is in the operative position, the leading end of the strip *s'*, after emerging from the stand 50 and being guided around the rolls 52 and 53 by the curved guide plates associated therewith, slides upwardly along the guide plates 59 and 61 and is directed by the latter into the bite of the belt wrapper 17 cooperating with the mandrel 16. As in the case of the embodiment first described, the belt wrapper 17 and guide plate 61 are retracted after the starting wraps have been formed on the mandrel 16. The control system shown in Fig. 5 may be employed for the operation of the belt wrapper and guide of Fig. 6 in precisely the same manner as above described with respect to the embodiment of strip guide illustrated in Figs. 1 through 4.

It will be apparent from the foregoing description that the invention is characterized by important advantages. In the first place, the leading end of a strip which has been threaded through a multi-stand continuous mill is guided directly to the coiler mandrel without manual handling or the loss of time incident thereto. The operation of threading the mill is thus considerably expedited. A further advantage of the invention is that the guide which I provide between the last stand of the mill or the exit tension apparatus such as that shown at 51 and 56, is retractible so that after it has performed its function, it may be moved to an out-of-the-way posi-

tion during the rolling and coiling of the full length of the strip and the stripping of the coil. A further advantage is the coordination which I provide by the control system illustrated diagrammatically in Fig. 5 between the operation of the guide and the belt wrapper which cooperates with the coiler mandrel in forming the starting wraps thereon. In addition to the foregoing advantages, the apparatus of my invention is relatively simple and inexpensive and may be incorporated in existing mills without materially altering the set-up thereof. It is, furthermore, adaptable to both a reducing mill such as shown in Figs. 1 and 2 in which the strip is delivered on a level above the coiling mandrel, and to a skin pass mill with a delivery tension device, as shown in Fig. 6, in which the strip is delivered from the tension device at a level below the mandrel.

Although I have illustrated and described herein but a preferred embodiment of the invention and a modification thereof, it will be understood that the underlying principles of the invention may be embodied in forms other than those illustrated, without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. Apparatus for starting strip from strip-treating apparatus on a coiling mandrel comprising a belt wrapper adapted to cooperate with said mandrel, a guide member, means mounting said member for movement from operative to inoperative position, means for actuating said member from one of said positions to the other, means for moving said belt wrapper to and from cooperative relation to said mandrel, and common means controlling said two last-mentioned means.

2. Apparatus for guiding strip from strip-treating apparatus onto a coiling mandrel comprising a belt wrapper adapted to cooperate with said mandrel, a guide member, means mounting said member for movement from strip-guiding position to an out-of-the-way position, power-operated means effective to move said member from one position to the other, power-operated means effective to move said belt-wrapper into and out of cooperative relation to said mandrel, and common control means for both said power-operated means.

3. Apparatus for guiding strip from strip-treating apparatus to a coiling mandrel having a belt wrapper adapted to cooperate therewith, comprising spaced guide plates extending to a point adjacent said mandrel and the belt wrapper when in cooperative position relative thereto, a transverse plate to which said guide plates are secured, guides extending laterally from the path of the strip, and a slide movable in said guides, said transverse plate being mounted on said slide.

4. Apparatus for guiding strip from strip-treating apparatus to a coiling mandrel having a belt wrapper adapted to cooperate therewith, comprising a guide throat directed tangentially of said mandrel, a support for said throat adapted to overhang the path of the strip, a slide on which the support is mounted, ways extending transversely of said path in which said slide is movable, and means for reciprocating said slide in said ways so as to move said throat from a position in said path to an out-of-the-way position.

5. Apparatus for guiding strip from strip-treating apparatus to a coiling mandrel having a belt wrapper adapted to cooperate therewith, comprising a guide throat directed tangentially of said mandrel, a support for said throat adapted to overhang the path of the strip, a slide on which the support is mounted, and ways extending transversely of said path in which said slide is movable.

CLARENCE J. KLEIN.