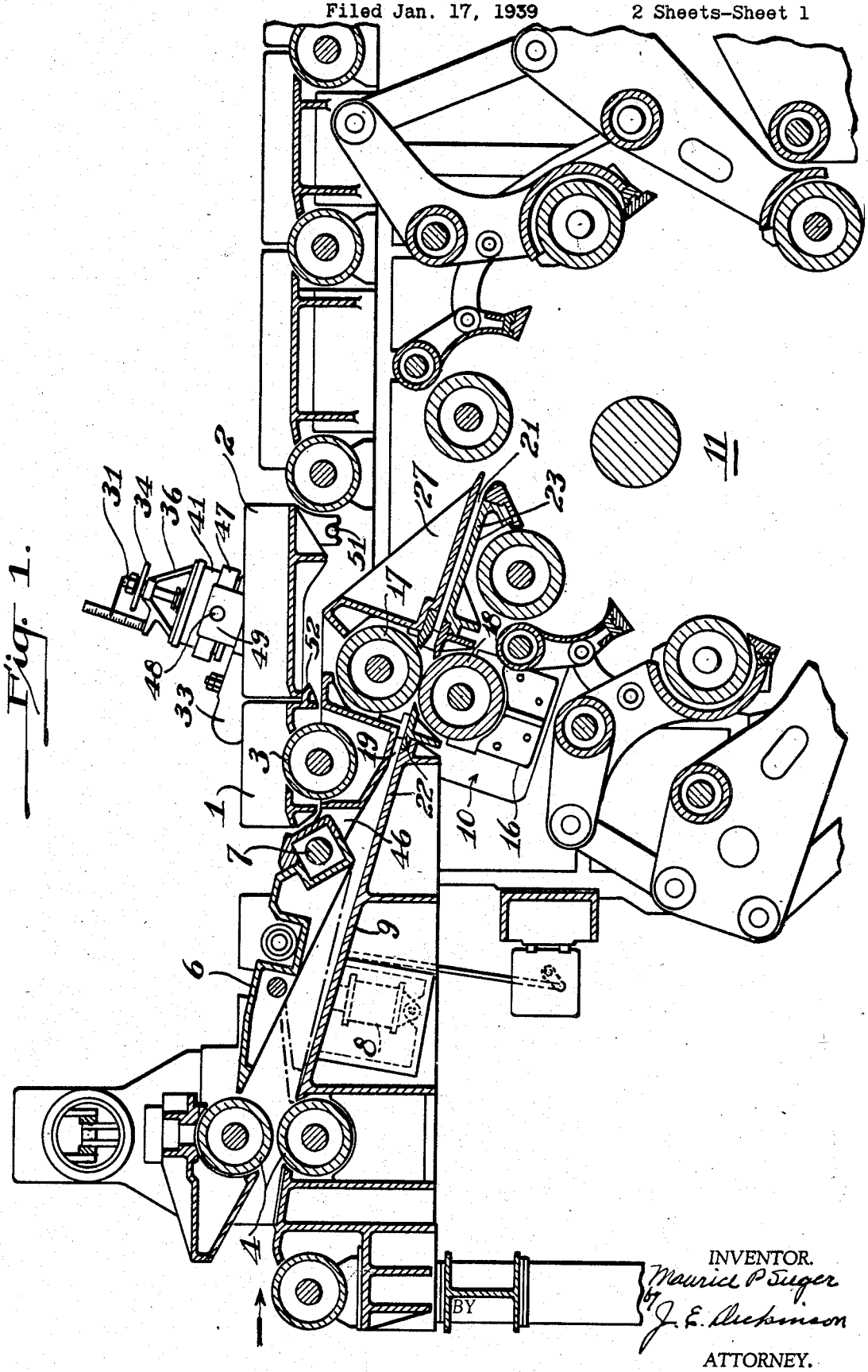
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APPARATUS FOR COILING STRIP

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Fig. 1.



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Fig. 3.

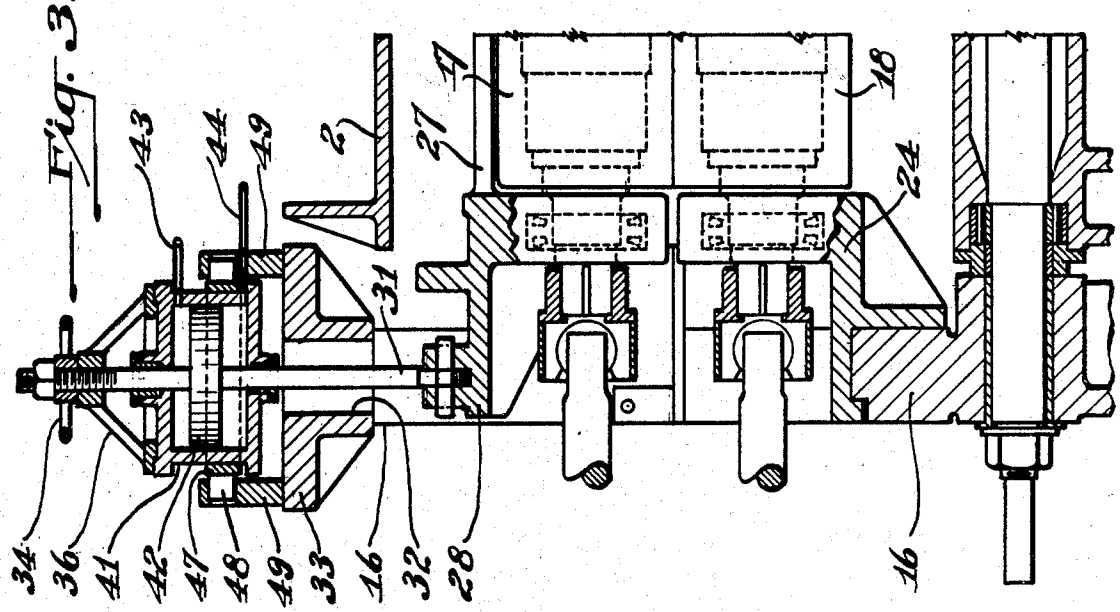
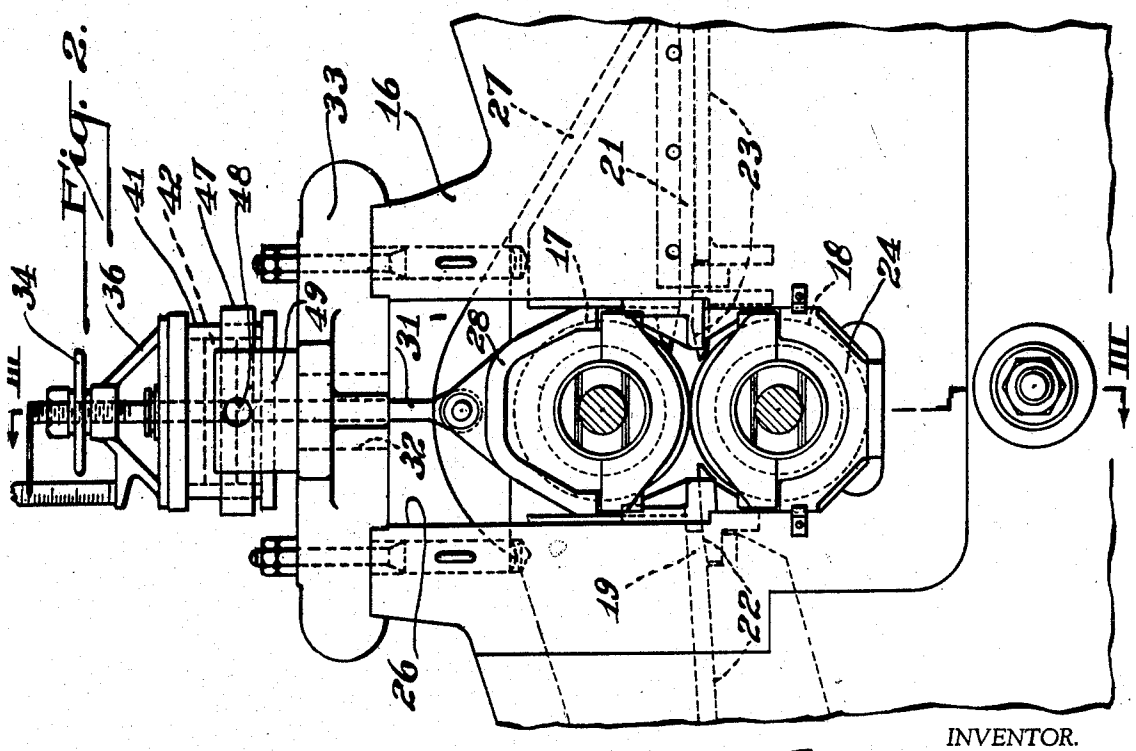


Fig. 2.



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APPARATUS FOR COILING STRIP

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Application January 17, 1939, Serial No. 251,355

19 Claims. (Cl. 271—51)

This invention relates to apparatus for coiling strip and more particularly to means for feeding the strip to be coiled into the bending rolls of a strip coiler as it issues from a rolling mill although it may have other uses as will readily appear from the following description.

The conventional way of feeding metal strip into strip coilers and especially down type coilers of the type commonly used on hot mills is to pass it between suitable vertically spaced guides and power driven pinch rolls. These guides are normally placed rather close together and permanently held in their operating position. A difficulty which such a construction presents is that it permits the strip to become jammed in the feed guides due to their narrow spacing from each other. This jamming is usually caused by the front end of the strip folding upon itself although sometimes these folds occur in the strip after the front end is entered in the coiler. Such jamming causes the strip to cobble and when this occurs the operation of the whole mill is retarded and in many cases the strip damaged beyond recovery due to loss of heat, bending and one thing or another. Furthermore, it has been necessary heretofore to partly dismantle the feeding apparatus in order to extricate one of these jams or cobbles.

It is among the objects of this invention to provide a strip coiler employing a feeding apparatus which will permit folded portions of a blank to either pass through the feeding apparatus, or feeding apparatus to be quickly released to remove the cobbles and then readily returned to its operative position.

In accordance with this invention a pair of pinch rolls and suitable guides are mounted in the feeding throat of the coiler to deliver the strip to it, and means is provided for biasing one of these rolls and its associated guide toward the other. This means in turn is adapted to permit one roll and its associated guides to be forced away from the other when a fold in the strip attempts to pass into the coiler. Consequently, if the strip jams it can be quickly removed and in many instances if the strip is partly coiled when the fold presents itself the momentum of the coil will pull it through the guides and pinch rolls into the bending rolls of the coiler. Manually controlled means is provided for quickly separating the rolls so that buckled material can be removed from the feeding apparatus when desired. Preferably one roll and its associated guide is mounted in fixed position and the other roll and guide is biased toward the first by fluid pressure means which permits the first set to be separated when the pressure between the two exceeds a predetermined amount. Manually controlled fluid pressure means may also be used for quickly moving the movable roll and guide away from the stationary roll and guide.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a vertical longitudinal section through apparatus of which my feeding apparatus, shown in the center of the drawing, is a part; Fig. 2 is an enlarged side view of the feeding apparatus; and Fig. 3 is a vertical section of the feeding apparatus taken on the line III—III of Fig. 2.

Referring to Fig. 1 of the drawings a sectional roller table over which strip material is adapted to pass includes adjoining sections 1 and 2, section 1 carrying one of the rollers 3. Strip material, such as hot metal strip from a rolling mill, is delivered to the left end of the table and is fed forward by pinch rolls 4 associated with the table. At the delivery side of these pinch rolls a portion of the table is in the form of a vertically movable gate 6 pivoted at one end on a shaft 7 about which it is oscillated by a fluid pressure cylinder 8. When this gate is in its lower broken line position the strip material is fed by pinch rolls 4 across it and on across table sections 1 and 2 and the rest of the table. However, when it is desired to coil the strip under the table, gate 6 is raised to its full-line position shown in the drawings so as to deflect the strip downwardly over ramp 9 to further feeding apparatus, designated generally by the numeral 10, by which it is delivered to a coiling apparatus 11 that may be of the general type shown in Biggert et al. Patent No. 1,850,312.

The feeding apparatus 10 includes a pair of laterally spaced upright standards 16 between which upper and lower pinch rolls 17 and 18 are disposed. As shown in Figs. 1 and 2, this feeding apparatus is so constructed as to provide entering and delivery guideways 19 and 21 through which the strip is fed to and from the pinch rolls. The bottoms of the guideways are formed by stationary plates 22 and 23 disposed between the standards to which they are connected. Lower pinch roll 18 is journaled in chucks 24 mounted in the lower ends of windows 26 with which the standards are provided.

It is a feature of this invention that this feeding apparatus is so formed as to ordinarily permit buckled or folded material to pass between the pinch rolls, and also to permit its pinch rolls

and members that form its guideways to be quickly separated or returned toward each other at the will of an operator. Accordingly, the top of guideways 19 and 21 is preferably formed by a single frame 27 in the sides of which the upper pinch roll is journaled (Fig. 3). This frame has lateral extensions 28 that project into the windows of the standards and in which the frame is movable vertically for varying the space between the pinch rolls. To permit the upper pinch roll to be adjusted toward and away from the lower stationary roll, the lower end of a rod 31 is connected to each lateral extension 28 of movable frame 27 and extends upwardly through an enlarged opening 32 in a cross beam 33 mounted on top of the standard above window 26. The upper end of each rod is threaded and carries a threaded hand-wheel 34 which bears against a bracket 36 supported by the underlying standard. By turning the two hand-wheels, top roll 17 can be raised or lowered any desired amount, its downward movement being limited by engagement of the hand-wheels with brackets 36.

As shown in Fig. 3, the top roll is biased toward the lower one preferably by fluid pressure means comprising a cylinder 41 encircling the rod 31, and a piston 42 rigidly mounted on the rod within the cylinder. The cylinder above and below the piston is connected by pipes 43 and 44 and suitable valves (not shown) to a source of fluid under pressure. Normally the pressure fluid is admitted to the cylinders only above the pistons for urging the top roll downwardly with a predetermined pressure. When the formation of a fold in the strip causes the pressure between the rolls or guideway members to exceed the hold-down pressure above pistons 42, the top roll is forced upwardly by the fold which is thereby permitted to pass through the feeding apparatus without jamming therein. Of course, the hold-down pressure is regulated so that the rolls can be thus separated by an ordinary fold without slowing down the strip appreciably. In some cases, however, the cobble may be so severe or extensive that it is necessary or desirable to stop the machine and positively separate the rolls in order to withdraw and cut out the jammed portion of the strip. This is accomplished by an operator turning the valves necessary to deliver fluid under pressure to cylinders 41 below pistons 42 and to relieve it above the pistons. The top roll can be quickly lowered again to operative position by merely reversing this procedure. The momentum of the growing coil will often be sufficient to help pull folds of strip between pinch rolls 17 and 18, but this action can be more definitely assured by positively driving the coiler rollers.

As difficulty might be experienced in balancing movable frame 27 so that it would not bind in the windows of the standards during vertical movement, it is preferred to pivot one end of the frame so that the frame will move in a fixed path about its pivot. Accordingly, as shown in Fig. 1, the entering end of the frame is provided with longitudinal arms 46 that are pivotally mounted on shaft 7 at the ends of the gate 6, and sufficient clearance is left between lateral extensions 28 and the standards to permit the slight amount of arcuate movement that the frame makes in its vertical travel. To allow for this arcuate movement of the frame about its pivot, the lower ends of adjusting rods 31 are pivotally connected to frame extensions 28, and the cylinders are mounted in rings 47 having trunnions 48 journaled in blocks 49 mounted on top of beams 33. The cylinders and rods can thus swing with the pivoted frame as it is raised and lowered.

In order that sections 1 and 2 of the table will not interfere with movement of frame 27, section 1 is mounted on the frame in such a manner that it is lifted thereby when the frame rises. Section 2 rests at one end on pivot pins 51 in the table frame, and at its other end on a projection 52 of section 1 by which it is tilted upwardly by the rising frame and section 1.

Strip feeding apparatus constructed in accordance with this invention holds down to a minimum the extent of cobbling that may occur, because it permits folded portions of the strip to pass through before they can build up to a very serious extent. For the same reason this invention practically eliminates the possibility of damage to the apparatus. Furthermore, feeding apparatus of this character generally need not be dismantled to any extent in order to remove severely buckled portions of the strip, whereby a material amount of time and labor is saved.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention, and have illustrated and described what I now consider to represent 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. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of pinch rolls for feeding said blanks between them, and a constant pressure means for biasing to a limited extent one roll toward the other, said biasing means being adapted to permit one roll to be forced away from the other by folds in said blanks whereby said folds pass between the rolls.

2. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of pinch rolls for feeding said blanks between them, a constant pressure means for biasing to a limited extent one roll toward the other, said biasing means being adapted to permit one roll to be forced away from the other by folds in said blanks whereby said folds pass between the rolls, and manually operable means for quickly separating said rolls.

3. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of pinch rolls for feeding said blanks between them, and a constant fluid pressure means for biasing to a limited extent one roll toward the other, said biasing means being adapted to permit one roll to be forced away from the other by folds in said blanks whereby said folds pass between the rolls.

4. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of pinch rolls for feeding said blanks between them, fluid pressure means for biasing to a limited extent one roll toward the other, said biasing means being adapted to permit one roll to be forced away from the other by folds in said blanks whereby said folds pass between the rolls, and fluid pressure means for positively separating said rolls.

5. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of pinch

rolls for feeding said blanks between them, a fluid pressure cylinder, a piston therein connected to one of said rolls, means for introducing pressure fluid into one end of the cylinder for biasing to a limited extent said one roll toward the other roll of such magnitude as to permit separation of the rolls for passage of a buckled portion therethrough, and means for introducing fluid pressure into the other end of the cylinder for separating said rolls.

6. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of frames, means for biasing to a limited extent one frame toward the other, and a roll journaled in each frame and adapted to feed said blanks between them, said biasing means being adapted to permit said rolls to be forced away from each other by folds in said blanks whereby said folds pass through the apparatus.

7. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of frames, pivotally mounted fluid pressure means pivotally connected to one of the frames, a roll journaled in each frame for feeding said blanks between them, means for supplying fluid under pressure to said fluid pressure means for biasing to a limited extent said one frame toward the other frame, and means for supplying fluid under pressure to said fluid pressure means for separating the frames and rolls.

8. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of frames, a pivotally mounted fluid pressure cylinder, a piston therein pivotally connected to one of the frames, a roll journaled in each frame for feeding said blanks between them, means for supplying fluid under pressure to said fluid pressure means for biasing to a limited extent said one frame toward the other frame, and means for supplying fluid under pressure to said fluid pressure means for separating the frames and rolls.

9. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of frames, means for yieldably biasing one frame toward the other, a roll journaled in each frame and adapted to feed said blanks between them, said biasing means being adapted to permit said rolls to be forced away from each other by folds in said blanks whereby said folds pass through the apparatus, and means for pivotally supporting said biased frame laterally of said rolls.

10. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of frames, means for yieldably biasing one frame toward the other, a roll journaled in each frame and adapted to feed said blanks between them, said biasing means being adapted to permit said rolls to be forced away from each other by folds in said blanks whereby said folds pass through the apparatus, means for pivotally supporting said biased frame laterally of said rolls, and a guide for said biased frame.

11. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of frames, pivotally mounted fluid pressure means pivotally connected to one of the frames, a roll journaled in each frame for feeding said blanks between them, means for supplying fluid under pressure to said fluid pressure means for biasing said one frame toward the other frame, means for supplying fluid under pressure to said fluid pressure means for separating the frames and rolls, and means for pivotally supporting said biased frame laterally of said rolls.

12. Feeding apparatus for metal blanks having a tendency to buckle, comprising a stationary frame forming a support for said blanks, a frame movable up and down above the stationary frame, means pivotally supporting the movable frame, a roll journaled in each frame for feeding blanks between them, and means for yieldably biasing the movable frame toward the stationary frame, said biasing means being adapted to permit said movable frame to be raised by folds in said blanks.

13. Feeding apparatus for metal blanks having a tendency to buckle, comprising a stationary frame forming a support for said blanks, a frame movable up and down above the stationary frame, means pivotally supporting one end of the movable frame, a roll journaled in each frame for feeding blanks between them, means for yieldably biasing the movable frame toward the stationary frame, said biasing means being adapted to permit said movable frame to be raised by folds in said blanks, and manually operable means for quickly raising the movable frame.

14. Feeding apparatus for metal blanks having a tendency to buckle, comprising a stationary frame forming a support for said blanks, a frame movable up and down above the stationary frame, means pivotally supporting one end of the movable frame, a roll journaled in each frame for feeding blanks between them, fluid pressure means pivotally connected to the movable frame, means for supplying fluid under pressure to said fluid pressure means for biasing the movable frame toward the stationary frame, and means for supplying fluid under pressure to said fluid pressure means for raising the movable frame.

15. Feeding apparatus for metal blanks having a tendency to buckle, comprising a stationary frame forming a support for said blanks, a frame movable up and down above the stationary frame, a rod connected to the movable frame and projecting upwardly therefrom, means threaded on the rod for adjustably limiting downward movement of the rod, a fluid pressure cylinder surrounding a portion of said rod, a piston rigidly mounted on the rod within the cylinder, and conduits for supplying fluid under pressure to the cylinder above and below said piston, whereby to raise the movable frame or to bias it downwardly.

16. Feeding apparatus for metal blanks having comparatively little resistance against buckling, comprising a pair of pinch rolls for feeding said blanks between them, pressure means for moving said rolls toward each other with a predetermined force, and adjustment means comprising a threaded rod connected at one end to one of said rods and engaged by a cooperating threaded member at the other end for limiting said movement.

17. In a clustered roll type strip coiler for coiling metallic strip having entry guides forming the throat for directing the strip into the coiler, a pair of pinch rolls mounted in said guides for assisting in feeding the strip into the coiler and means for biasing to a limited extent one of the said pinch rolls towards the other, said biasing means being constructed to permit the roll influenced thereby to be forced away from the other roll by folds occurring in the strip whereby said folds are prevented from blocking the entry of the strip into the coiler.

18. A cluster roll type strip coiler for coiling

metallic strips in which the bending rolls are positively driven and with which the guiding apparatus forming an entry throat for the strip is provided at the point of entry to the coiler, a pair of relatively movable pinch rolls located in said entry throat for assisting in feeding the strip to the coiler and means for resiliently urging one of said rolls toward the other to a limited extent for cooperation therewith, said latter means being adapted to permit separation of the rolls sufficiently to allow folds in the strip occurring in front of the pinch rolls to pass therethrough and into the coils.

19. Feeding apparatus for metal blanks having a tendency to buckle, comprising a pair of pinch rolls for feeding said blanks between them, a constant pressure means for biasing one roll toward the other and means limiting the amount of movement of one roll toward the other, said biasing means being adapted to permit one roll to be forced away from the other by folds in said blanks whereby said folds pass between the rolls.

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