April 3, 1934. C. M. YODER 1,953,092

MACHINE FOR CONDITIONING SHEET STOCK

Filed May 1, 1931 4 Sheets-Sheet 1

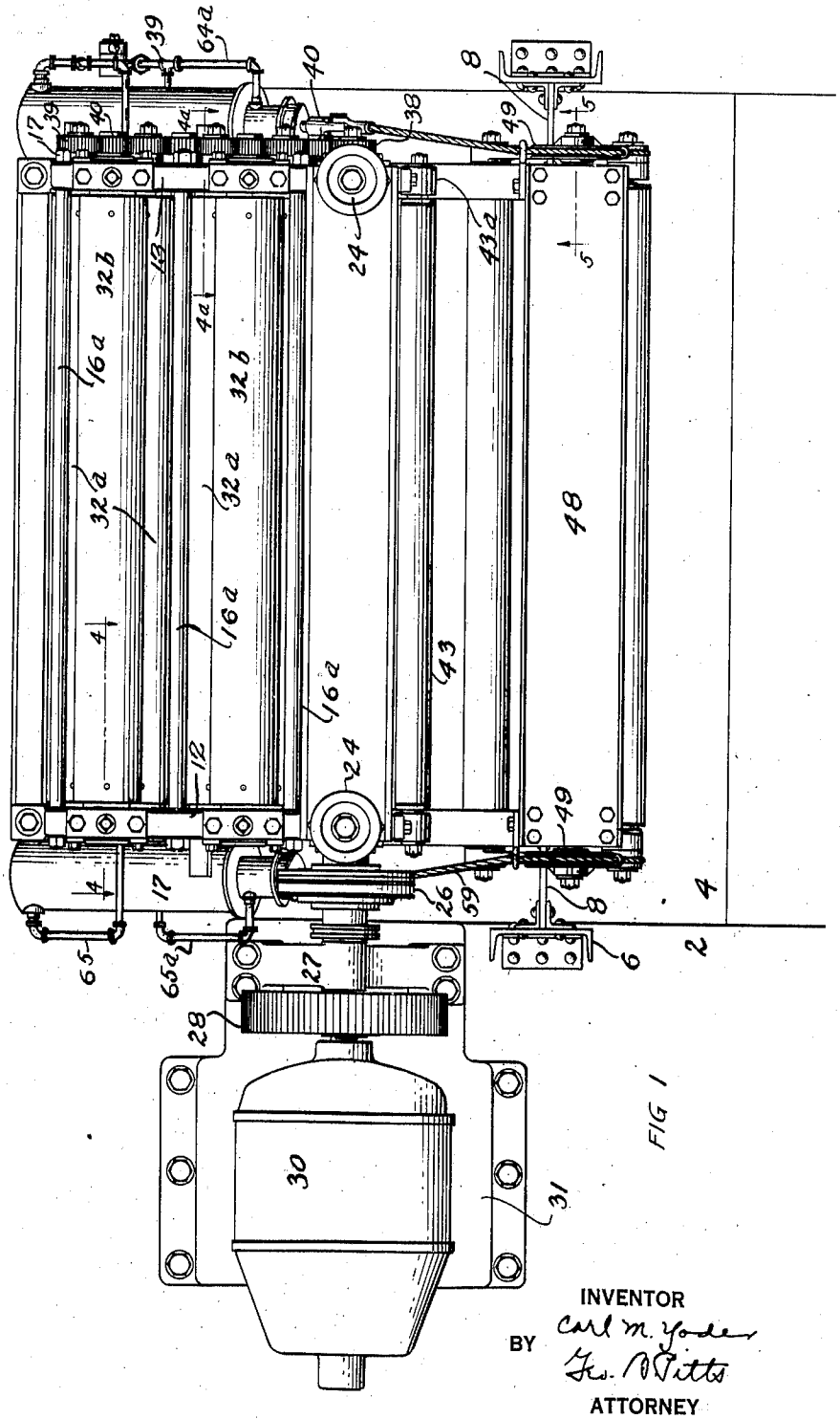


FIG 1

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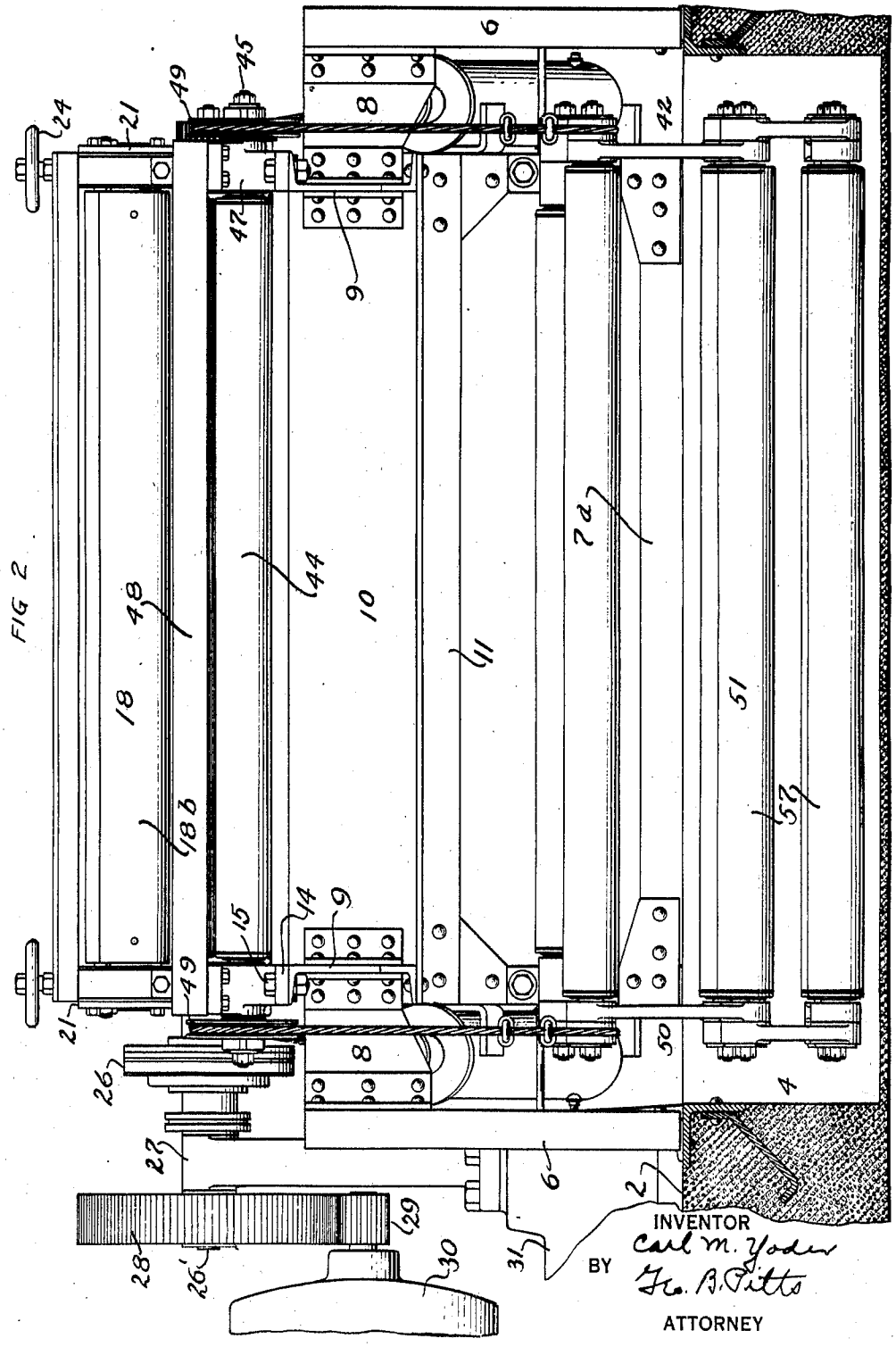


FIG 2

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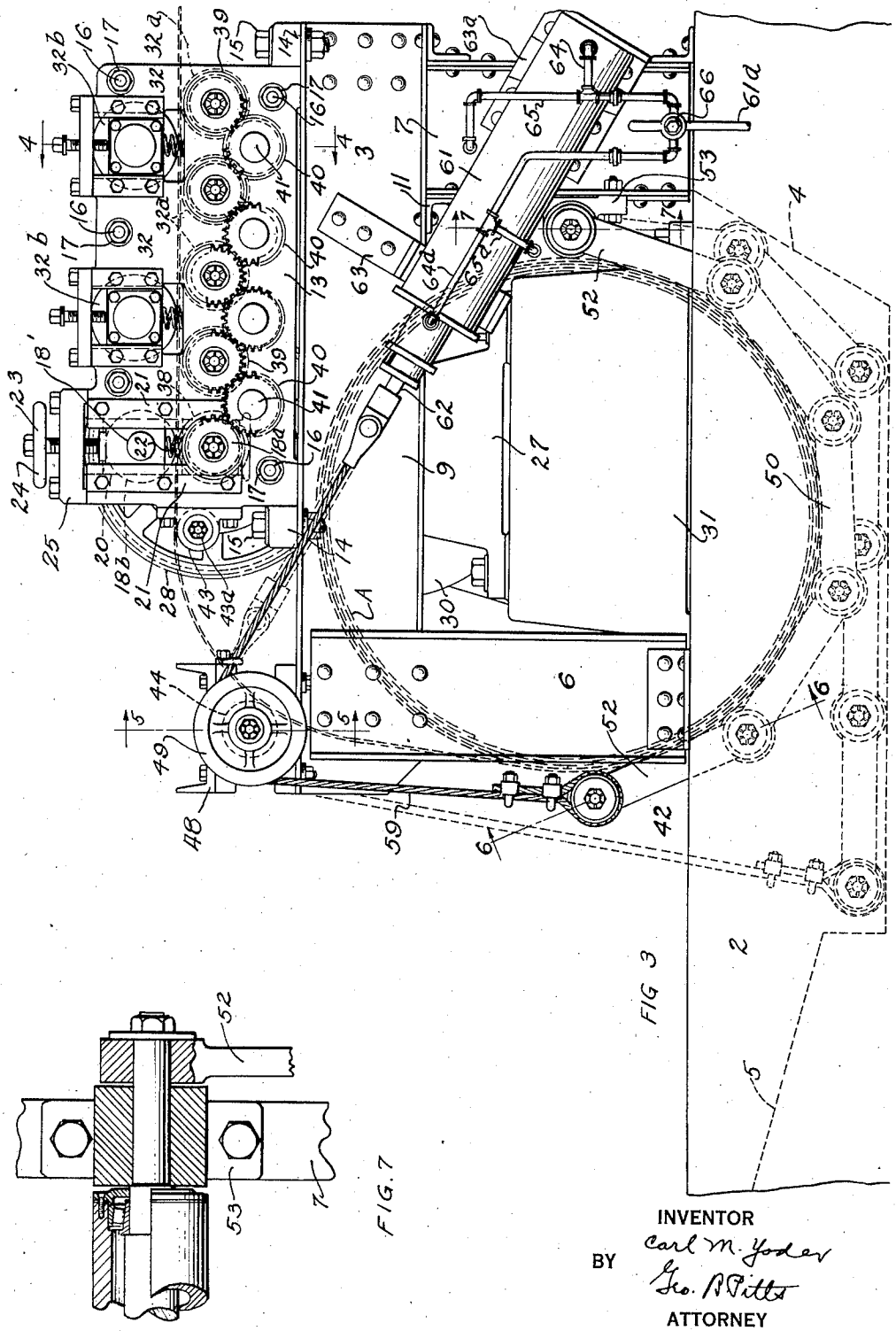


FIG 3

FIG. 7

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MACHINE FOR CONDITIONING SHEET STOCK

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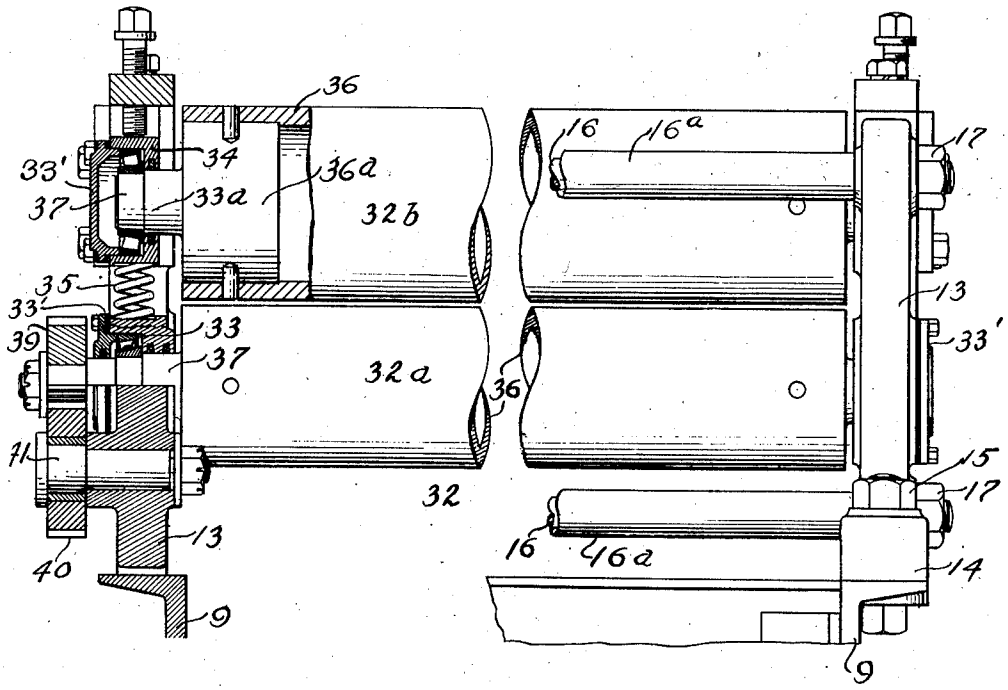


FIG 4

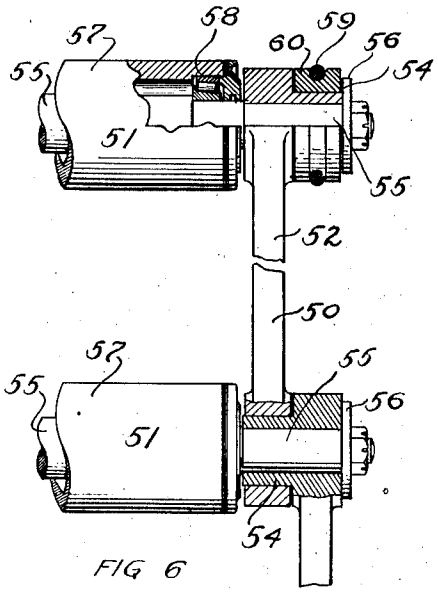


FIG 6

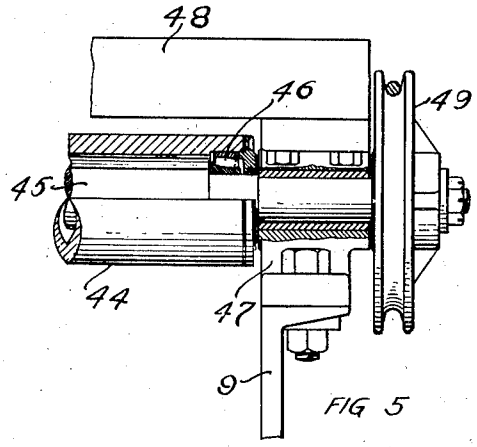


FIG 5

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Patented Apr. 3, 1934 1,953,092

UNITED STATES PATENT OFFICE

1,953,092

MACHINE FOR CONDITIONING SHEET STOCK

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Application May 1, 1931, Serial No. 534,211

16 Claims. (Cl. 242—78)

This invention relates to a mechanism for unwinding sheet steel or sheet stock and delivering it to a machine which is to operate on the stock in unwound condition, for example, a shearing machine, a trimming machine or a leveling or flattening machine, the latter being shown for illustrative purposes. The invention may be used advantageously in unwinding cold rolled as well as hot rolled sheet metal.

One object of the invention is to provide a machine of this character having improved means for supporting, unwinding and feeding the sheet metal to the operating machine, whereby the stock is conditioned for various uses and may be trimmed and cut into lengths or rewound into a coil ready for feeding to a fabricating machine.

Another object of the invention is to provide an improved mechanism for unwinding sheet metal stock as it comes from the mill and feeding it to an operating machine, whereby the feeding or delivering of the stock is maintained in a predetermined relation to the receiving end of such machine to avoid warping, stretching, or wrinkling of the metal in any portion of its area or surface.

Another object of the invention is to associate with a machine for operating on sheet metal stock an improved support and feeding means for the stock capable of being readily adjusted to compensate for the decreased diameter or size of the rolled stock as it is fed to the machine.

A further object of the invention is to provide an improved mechanism of this character that is relatively simple and easily operated.

Other objects of the invention will be apparent to those skilled in the art to which my invention relates from the following description taken in connection with the accompanying drawings, wherein

Fig. 1 is a plan view of a mechanism embodying my invention.

Fig. 2 is a front elevation, parts being broken away and other parts being in section.

Fig. 3 is a side view.

Fig. 4 is a composite section partly on the line 4—4 and partly on the line 4a—4a of Fig. 1.

Fig. 5 is a fragmentary section on the line 5—5 of Figs. 1 and 3.

Fig. 6 is a fragmentary section on the line 6—6 of Fig. 3.

Fig. 7 is a fragmentary view on the line 7—7 of Fig. 3.

Referring to the drawings, A indicates a roll of sheet metal stock (shown diagrammatically in dotted lines) as it leaves the mills. The stock A is shown in position in my improved mechanism. As is well understood, the stock as delivered from the mills is in a convolute coil of indefinite length and the length thereof may vary greatly from time to time. In practice, the stock may be of any desired thickness and width and of different lengths from a few feet to several hundred feet.

2 indicates a bed on which a frame, indicated as an entirety at 3, is mounted. The frame 2 herein shown is constructed to support the roll of material A and the operating machine chosen for illustration in combined relation as a unitary structure. The bed 2 is formed of concrete and shaped to form below a portion of the frame 3, a pit 4 having an inclined delivery wall 5. The frame 3 comprises a pair of forward uprights 6 and rearward uprights 7, the latter being braced by a cross member 7a. The forward uprights are provided with inwardly extending brackets 8, which together with the uprights 7 support a pair of spaced, horizontal sills 9; the latter being braced by a cross plate 10 and angle 11.

12 indicates as an entirety the operating machine consisting in the present arrangement of a sheet flattening or leveling mechanism, mounted on the sills 9. Of this mechanism 12, 13 indicates a pair of standards each having lugs 14 suitably bolted to the flanges of the sills 9, as shown at 15, and connected by a plurality of rods 16, which extend through openings formed in the standards and are threaded on their ends. As shown in Fig. 4, each rod 16 is surrounded by a sleeve 16a, the ends of which abut the opposing faces of the standards. The standards are rigidly clamped against the sleeve ends by nuts 17 threaded on the ends of the rods 16. 18 indicates a pair of feed rolls for the sheet metal stock, the lower roll 18a of the pair being driven as will be later set forth. The rolls 18a, 18b, are mounted at their opposite ends in journal boxes 18', which slidably fit in recesses 20 formed in standards 13 and guided vertically by plates 21 bolted to the sides of each standard. The journal boxes for the roll 18a rest on the bottoms of the recesses. The journal boxes 18' for the upper roll 18b rest on compression springs 22, suitably seated on the journal boxes 18' for the lower roll and are held against the springs by screws 23 having hand wheels 24 or equivalent devices for turning the screws, the springs serving to raise the boxes and the screws serving to lower them, whereby the roll 18b may be adjusted relative to the roll 18a to accommodate sheet metal of different thicknesses. The screws 23 are threaded through cap plates 25 bridging the recesses 20

and suitably secured (bolted) to the standards. The shaft for the roll 18*a* is suitably connected through a clutch 26 (preferably of the magnetic type) to a shaft 26', which is mounted in a hanger 27. The shaft 26' carries on its outer end a gear 28, in mesh with a pinion 29 fixed to the shaft of a motor 30 (preferably an electric motor). The hanger 27 and motor 30 are mounted on a base 31, fixed to the bed 2.

I provide two sets of flattening or leveling rolls, each set being designated 32 in the drawings and comprising (*a*) two lower driven rolls 32*a*, 32*a*, having their peripheries in the plane of the corresponding rolls of the other set and the feed roll 18*a*, and (*b*) an upper roll 32*b*. Each of the rolls 32*a* is mounted in anti-friction bearings 33 (preferably of the tapered roller type) provided in the standards 12, 13; and held in place by a cap 33'. The roll 32*b* is similarly mounted in bearings 33*a* in journal boxes 34. The journal boxes 34 are adjustably mounted in the standards 12, 13, similarly to the journal boxes for the roll 18*b*, except that their supporting springs 35 rest on the walls of the standards at the bottom of the recesses which adjustably receive the journal boxes 34. Each roll 32*a*, 32*a*, 32*b*, comprises a tubular member 36 fixed at its opposite ends to hubs 36*a* having spindles 37 mounted in the adjacent bearings 33 or 33*a*. The rollers 32*a* of the sets 32 are preferably driven by the feed roll 18*a*. For this purpose I fixedly provide on that end of the feed roll shaft remote from the motor 30 a gear 38 and on the corresponding ends of the rollers 32*a* (that is, the spindles 37 at such ends) gears 39. Between the gear 38 and the adjacent gear 39 and between the remaining gears 39, I provide gears 40, these gears being in mesh, each with the adjacent gear or gears; each of the gears 40 being loosely mounted on a stud shaft 41, supported in the adjacent standard 13, as shown in Fig. 4. As will be noted from Fig. 3, the gears 38, 39 and 40 are of the same pitch diameter and the rolls 18*a*, 32*a*, 32*a* are of the same diameter; accordingly these rolls are driven at the same speed and have the same peripheral speed.

42 indicates as an entirety a flexible cradle or support for the stock as it is delivered from the rolling mill and adapted to be expanded or opened to receive the rolled stock and then operated to support the stock while delivering it to and maintaining the supplied end thereof continuously in a substantially fixed relation to guide elements 43, 44. The guide elements are cooperatively related to the cradle 42 and the receiving end of the machine 12, such as the feed rolls 18 to deliver the stock to the latter with danger of buckling or distortion of the stock eliminated, thereby making it unnecessary to subject the stock to special operations to condition it for use. The guide element 43 comprises a roller having reduced ends mounted in suitable bearings 43*a* (preferably of the anti-friction type) carried on the front end walls of the standards 12, 13. As shown, the upper portion of the roller 43 is in the plane of the upper portions of the rolls 18*a*, 32*a*. The guide element 44 preferably comprises a tube surrounding a shaft 45 and rotatably supported at its ends on said shaft by means of anti-friction bearings 46 (see Fig. 5). The shaft 45 is mounted at its ends in bearings provided in blocks 47, which are rigidly bolted to the sills 9 and braced by a channel 48. The guide element 44 is spaced from the element 43 and disposed in a plane below the latter.

The shaft 45 has its opposite ends extended beyond the blocks 47, which ends loosely support guide pulleys 49, the purpose of which will later appear.

The cradle 42 consists of what might be termed a flexible member pivotally connected at its inner end to the frame 3 or other support and movably supported at its opposite end and adapted to be extended to receive the rolled stock and then wrapped partially around the stock to conform to its exterior shape and size and to accommodate itself thereto as the size of the stock decreases. In the illustrated embodiment, the cradle comprises a pair of articulatable members 50 connected together by a plurality of spaced cross members 51. Each articulatable member may consist of a plurality of links 52 pivotally connected at their ends in series, the inner-most link being pivotally connected to a bracket 53 bolted to the adjacent upright 7, the ends of the cross members forming the pivots for the links, as later set forth. Each link 52 is provided at each end with a knuckle and one of the latter is provided with a tubular boss 54, which forms the pivot for the knuckle of the adjoining link (see Fig. 6). The adjoining ends or knuckles of the links 52 are held together by the reduced ends of shafts 55 extending through the knuckle and boss and nuts threaded on the outer ends thereof against washers 56. The shafts 55 form supports for tubular rollers 57, which are supported at their opposite ends thereon by means of suitable anti-friction bearings 58 (see Fig. 6). As will be understood from Fig. 3, the rollers 57 are engaged by the rolled stock A and reduce the friction when the stock is un-rolled as it is fed to the feed rolls 18.

Provision is made for operating the cradle 42, whereby it may be extended, lowered or flattened out, as shown in dotted lines in Fig. 3, upon the floor of the pit 4 and, following the delivery of a roll of stock A onto the cradle, its outer end raised and controlled in the manner to be later set forth. To facilitate the positioning of a roll of stock on the cradle 42, I provide the pit 4 and connect it by the inclined wall or chute 5 with the flooring (not shown). The chute 5 terminates at its inner end at a point above the bottom of the pit, so that the cradle 42 will be disposed below such end.

The operating means for the cradle 42 preferable comprises a pair of steel cables 59, which run over the pulleys 49 and depend downwardly therefrom, their free ends being connected in any suitable manner to the outer ends of the members 50, as by looping their free ends around a groove roller 60 loosely mounted on the bosses 54 of the outer-most links 52, as shown in Fig. 6.

From the foregoing description, it will be seen that the depending portions of the cables 59 are so related to the guide 44, that when the cables are operated to raise the free end of the cradle 42, that portion of the stock A that is being drawn off maintains a substantially predetermined relation to the guide elements 44 and 43, so that danger of distortion or buckling of the metal, before it reaches the leveling rolls is eliminated. For this purpose, the cables 59 depend vertically from a point adjacent the guide roller 44, so that when the outer end of the cradle is moved toward the guide, such end moves vertically to insure the same delivery relation of the stock in the complete unwinding thereof. As shown, the stock engages the under side of the guide 44 and upper side of the guide 43, so that they co-act

to feed the stock to the rolls. The relation of the outer end of the cradle to the guide 44 and the relation of the guides to each other and the feeding rolls 18 is such that the stock is unwound and delivered to the leveling mechanism without strain thereon. As a result, any tendency for the stock to buckle or wrinkle or become distorted throughout its area is eliminated. Because of such elimination, after passing through the leveling mechanism, no further operation on the stock is required. Pull on the cables 59 may be effected by a pair of pistons in cylinders 61 and connected through rods 62 to the inner ends of the cables in any suitable manner. Each cylinder 61 is mounted on the frame 3 by brackets 63, 63*a*. Any desired medium may be used to operate the pistons in the cylinders 61, namely, steam or air or liquid under pressure. The medium is supplied by a pipe 61*a* leading from a source of supply. The medium is admitted to the outer sides of the pistons simultaneously through pipes 64, 65, to lower the cradle 42, such supply being effected by a valve 66. To raise the roll of stock to its delivery position and to raise or adjust it as the unwinding of the stock takes place, the medium is admitted to the inner sides of the pistons simultaneously through pipes 64*a*, 65*a*, the supply of the medium being effected by the valve 66. The supply of the medium to the inner sides of the pistons may be automatically controlled so as to effect uniform or intermittent movement of the outer end of the cradle 42 in proportion to the decreasing diameter of the rolled stock due to the un-rolling thereof. In the arrangement illustrated, the valve 66 is movable to a neutral or cutoff position (see Fig. 3) or to a position to connect the pipe 61*a* with either pipes 64, 65, or pipes 64*a*, 65*a*.

In operating the machine, the pistons in the cylinders 61 are operated outwardly (toward the left in Fig. 3) to pay out the cables 59. This operation permits the cradle 42 to gravitate downwardly and lie flat on the bottom of the pit 4. A roll of stock material A is then positioned on the cradle 42. To facilitate this positioning, it will be noted that the inclined chute is beyond the front portion of the machine, so that the stock may be dropped thereon by a crane or other form of conveyor as well as rolled on to the chute from the flooring by hand. After the stock is positioned, the pistons are moved inwardly, which binds the cradle partially around the stock A and lifts it to the desired position so that its outer end may feed to the guides 44 and 43 and leveling mechanism. The leveling mechanism is then started and the outer end of the stock is then inserted between the feed rolls 18. As the stock is drawn from the roll, the latter rotates freely on the rollers 57. Since the cradle is flexible and conforms to the size of the unwound stock, the stock is held therein while rotating as unwinding takes place. As the unwinding takes place the cradle may be adjusted from time to time, by the operative. This adjustment elevates the stock and serves to maintain the unwinding portion or end thereof in a substantially predetermined relation to the guides 44, 43.

The stock, as it leaves the leveling rolls 32, may be delivered to a winding or coiling machine or fed to one or more mechanisms for trimming and cutting. After the edges are trimmed, they may be conditioned or shaped for welding.

To those skilled in the art to which my invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. My disclosures and the descriptions herein are purely illustrative and are not intended to be in any sense limiting.

What I claim is:

1. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon arranged to operate on sheet stock, of a guide in front of said mechanism, a movable cradle arranged to receive a supply of wound sheet stock and permit unwinding thereof while supported in said cradle, and means for moving said cradle relative to said guide to maintain the stock in substantially a predetermined delivery relation to said guide as the supply of stock decreases.

2. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon arranged to operate on sheet stock, of a pair of guides in front of said mechanism, a movable cradle arranged to receive a supply of wound sheet stock and permit unwinding thereof while supported in said cradle, and means for moving said cradle relative to said guides to maintain the stock in substantially a predetermined delivery relation to said guides as the supply of stock decreases.

3. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon arranged to operate on sheet stock, of a guide in front of said mechanism, a movable cradle arranged to receive a supply of wound sheet stock and permit unwinding thereof while supported in said cradle with its unwinding end below said guide, said cradle being movable toward said guide to maintain the unwinding end of the stock in a substantially predetermined relation thereto, and means for operating said cradle.

4. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon arranged to operate on sheet stock, of a guide adjacent the receiving end of said mechanism, a separate guide in spaced relation to said first mentioned guide, a movable cradle arranged to receive a supply of wound sheet stock and permit unwinding thereof while supported in said cradle with its unwinding end below said last mentioned guide, said cradle being movable toward said last mentioned guide to maintain the unwinding end of the stock in substantially a predetermined relation thereto, and means for operating said cradle.

5. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and adapted to operate on sheet stock, of a guide in front of said mechanism, a movable cradle comprising a flexible member arranged to receive a supply of wound sheet metal stock and permit unwinding thereof while supported therein, and means for moving said cradle relative to said guide to maintain the stock in substantially a predetermined delivery relation to said guide as the supply of stock decreases.

6. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and adapted to operate upon sheet stock, of a guide in front of said mechanism, a movable cradle provided with a series of loosely mounted rollers on which the wound stock rests and permitting unwinding thereof relative to said cradle, and means for moving said cradle relative to said guide to maintain the stock in substantially a predetermined delivery relation to said guide as the supply of stock decreases.

7. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and arranged to operate on sheet stock, of a guide in front of said mechanism, a flexible cradle supported at one end and arranged to receive a supply of wound sheet stock and permit unwinding thereof while supported in said cradle with its unwinding end below said guide, and means for movably supporting the opposite end of said cradle, whereby it is movable toward said guide to maintain the unwinding end of the stock in a substantially predetermined relation thereto.

8. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and arranged to operate on sheet stock, of a guide roller in front of said mechanism and extending transversely thereof, a separate guide roller mounted in parallel spaced relation to said first mentioned roller, a flexible cradle supported at one end and arranged to receive a supply of wound sheet stock and support it with its unwinding end below the last mentioned roller and permit unwinding while supported in said cradle, and means for moving the opposite end of said cradle, whereby it is movable toward said last mentioned roller to maintain the unwinding end of the stock in substantially a predetermined relation thereto.

9. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and adapted to operate upon sheet stock, of a guide roller in front of said mechanism and extending transversely thereof, a cradle comprising a flexible member arranged to support a supply of wound sheet stock with its unwinding end below said roller, said cradle being supported at its inner end, and means for moving the outer end of said cradle toward said roller to maintain the unwinding end of the stock in a substantially predetermined relation to said roller as the unwinding of the stock continues.

10. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and adapted to operate upon sheet stock, of a guide in front of said mechanism and extending transversely thereof, a flexible member arranged to receive a supply of wound sheet stock with its free end adjacent said guide, means for supporting the end of said member remote from the free end of the stock, and means for movably supporting the opposite end of said member, whereby the supply of stock may be moved to maintain its free or unwinding end in delivery relation to said guide as unwinding continues.

11. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and adapted to operate upon sheet stock, of a guide adjacent the receiving end of said mechanism, a separate guide in parallel spaced relation to said first mentioned guide, a flexible member below said guides and arranged to receive and support a supply of wound sheet stock with its free end adjacent said last mentioned guide, means for supporting the end of said member remote from the free end of the stock, and means for movably supporting the opposite end of said member, whereby the stock may be moved to maintain its free or unwinding end in delivery relation to said guides as unwinding continues.

12. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and adapted to operate upon sheet stock, of a guide adjacent the receiving end of said mechanism, a separate guide in parallel spaced relation to said first mentioned guide, a flexible member below said guides and arranged to receive and support a supply of wound sheet stock with its free end adjacent said last mentioned guide, means for supporting the end of said member remote from the free end of the stock, and means for movably supporting the opposite end of said member, whereby the stock may be moved to maintain its free or unwinding end in delivery relation to said guides as unwinding continues, said member comprising spaced sets of articulatable elements and connections between said sets.

13. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon arranged to operate on sheet stock, of a guide adjacent the receiving end of said mechanism, a separate guide in parallel spaced relation to said first mentioned guide, a flexible member below said guides and arranged to receive and support a supply of wound sheet stock with its free end adjacent said last mentioned guide, means for supporting the end of said member remote from the free end of the stock, and means for movably supporting the opposite end of said member, whereby the stock may be moved to maintain its free or unwinding end in delivery relation to said guides as unwinding continues, said member comprising spaced sets of articulatable elements and connections between said sets having rolls on which the stock rotates as unwinding thereof takes place.

14. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon arranged to operate on sheet stock, of a guide adjacent the receiving end of said mechanism, a separate guide in parallel spaced relation to said first mentioned guide, a flexible member below said guides and arranged to receive and support a supply of wound sheet stock with its free end adjacent said last mentioned guide, means for supporting the end of said member remote from the free end of the stock, and means for movably supporting the opposite end of said member, whereby the stock may be moved to maintain its free or unwinding end in delivery relation to said guides as unwinding continues, said member having a roller surface on which the stock rotates as unwinding thereof takes place.

15. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and adapted to operate upon sheet stock, of a guide adjacent the receiving end of said mechanism, a separate guide in parallel spaced relation to said first mentioned guide, a flexible member below said guides and arranged to receive and support a supply of wound sheet stock with its free end adjacent said last mentioned guide, means for supporting the end of said member remote from the free end of the stock, and means for movably supporting the opposite end of said member, whereby the stock may be moved to maintain its free or unwinding end in delivery relation to said guides as unwinding continues, said member comprising spaced sets of articulatable elements and connections between said sets having rolls on which the stock rotates as unwinding thereof takes place.

16. In apparatus of the class described, the combination with a frame and a mechanism mounted thereon and adapted to operate upon sheet stock, of a guide adjacent the receiving end

of said mechanism, a saparate guide in parallel spaced relation to said first mentioned guide, a flexible member below said guides and arranged to receive and support a supply of wound sheet stock with its free end adjacent said last mentioned guide, means for supporting the end of said member remote from the free end of the stock, and means for movably supporting the opposite end of said member, whereby the stock may be moved to maintain its free or unwinding end in delivery relation to said guides as unwinding continues, said member having a roller surface on which the stock rotates as unwinding thereof takes place.

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