

Feb. 14, 1967

E. V. CAVAGNERO

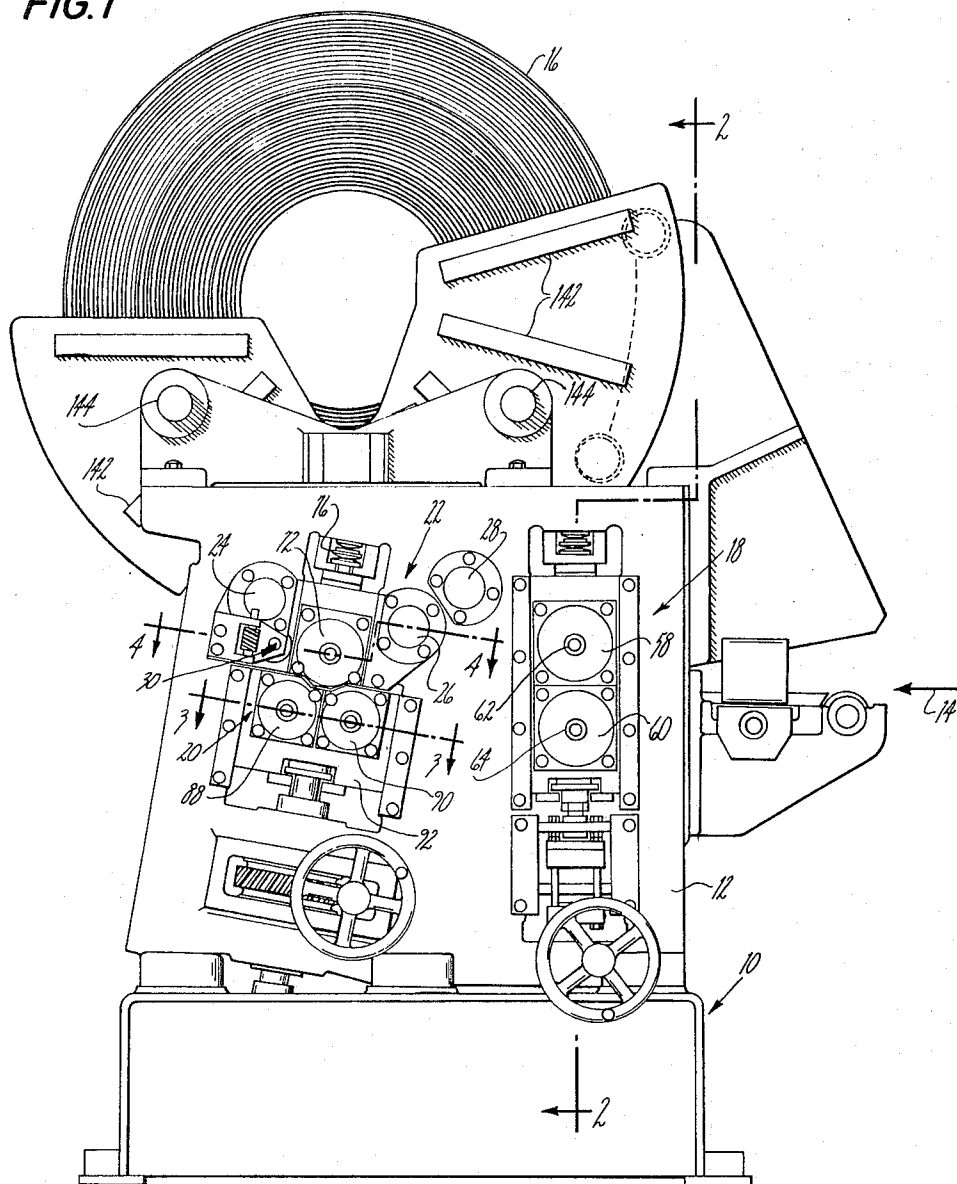
3,303,679

MACHINE FOR COILING STRIP METAL

Filed Dec. 30, 1963

8 Sheets-Sheet 1

FIG. 1



INVENTOR.

ERMAN V. CAVAGNERO

BY

McCormick, Paulding & Hudson  
ATTORNEYS

Feb. 14, 1967

E. V. CAVAGNERO

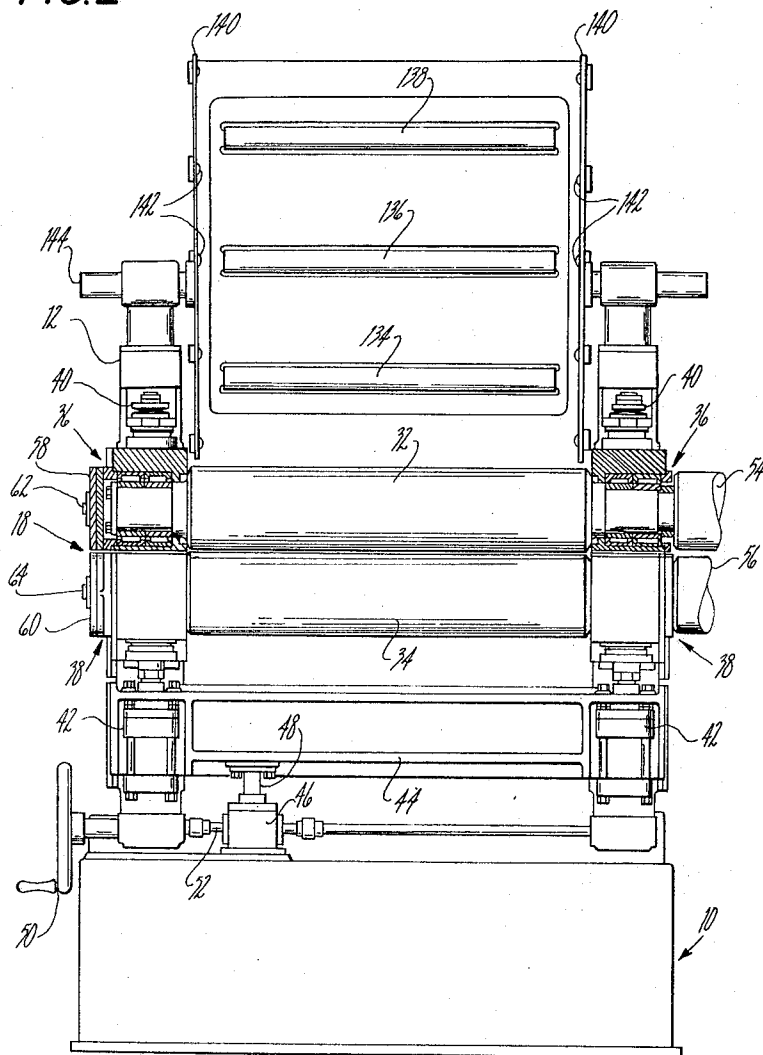
3,303,679

MACHINE FOR COILING STRIP METAL

Filed Dec. 30, 1963

8 Sheets-Sheet 2

FIG. 2



Feb. 14, 1967

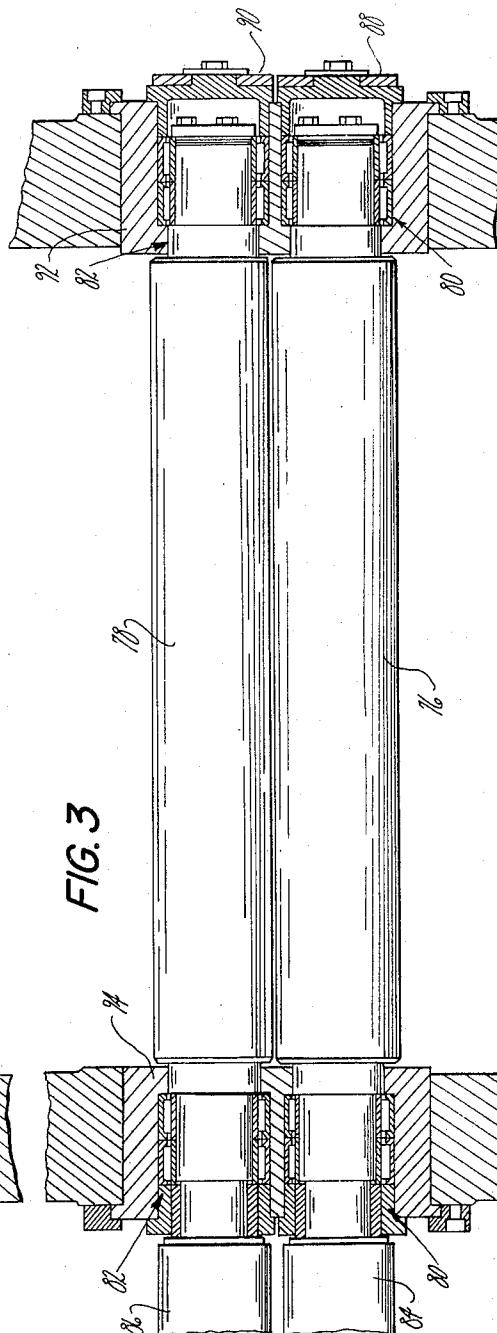
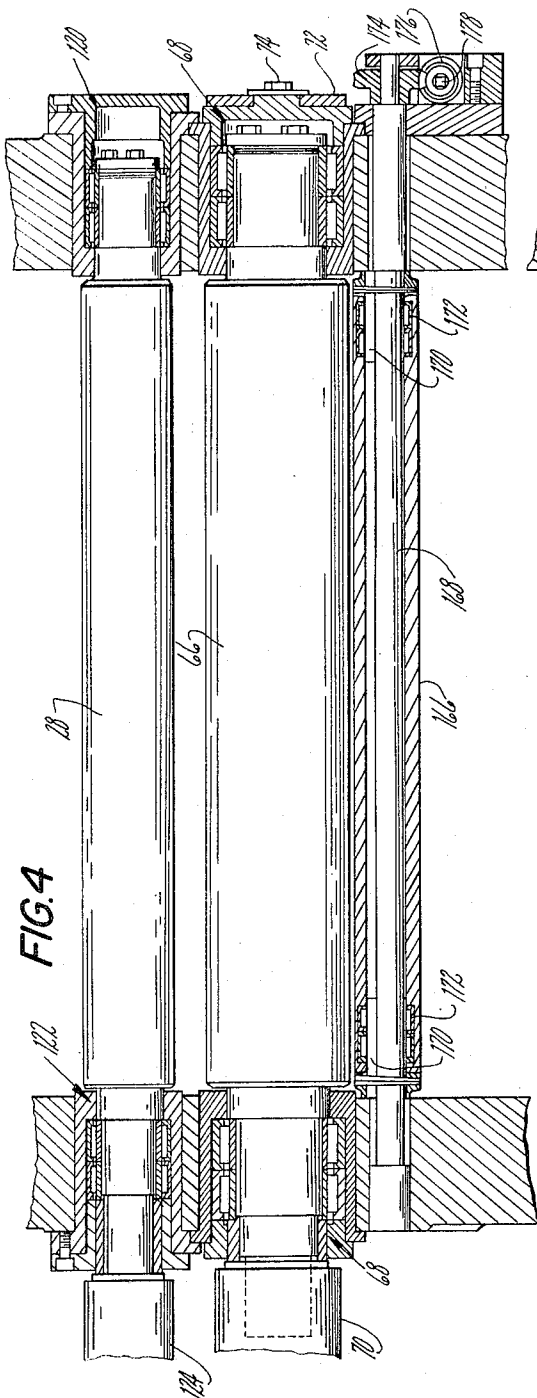
E. V. CAVAGNERO

3,303,679

MACHINE FOR COILING STRIP METAL

Filed Dec. 30, 1963

8 Sheets-Sheet 3



Feb. 14, 1967

E. V. CAVAGNERO

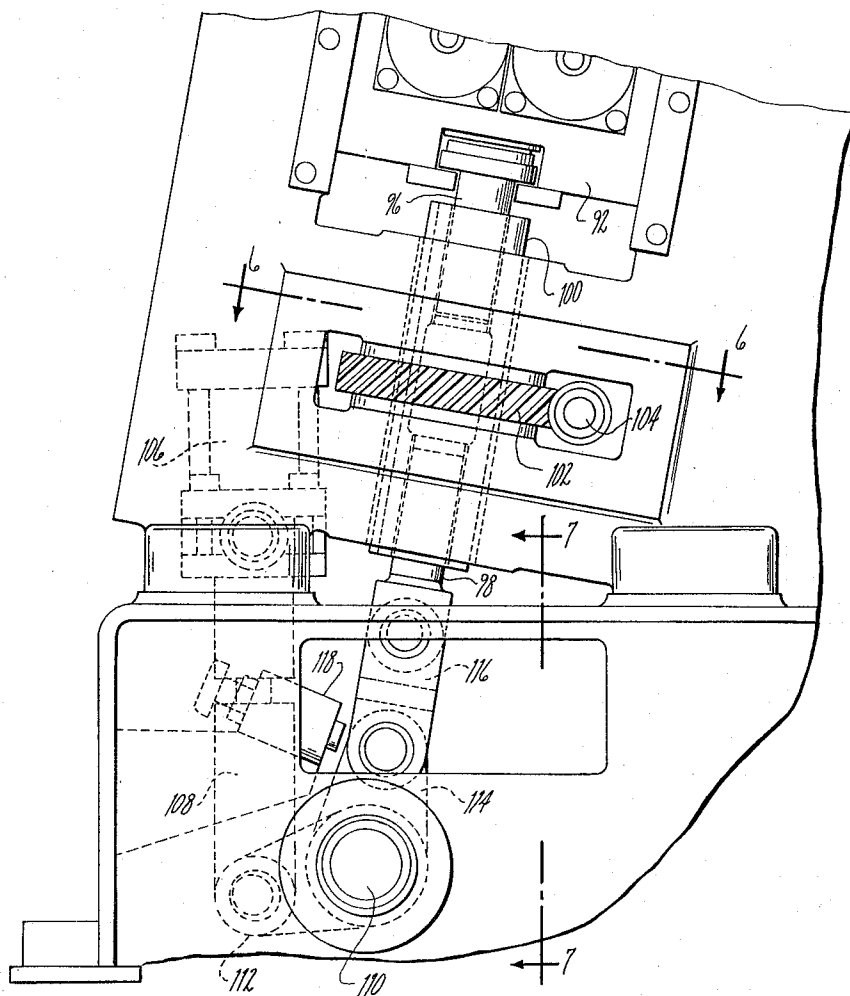
3,303,679

MACHINE FOR COILING STRIP METAL

Filed Dec. 30, 1963

8 Sheets-Sheet 4

FIG. 5



Feb. 14, 1967

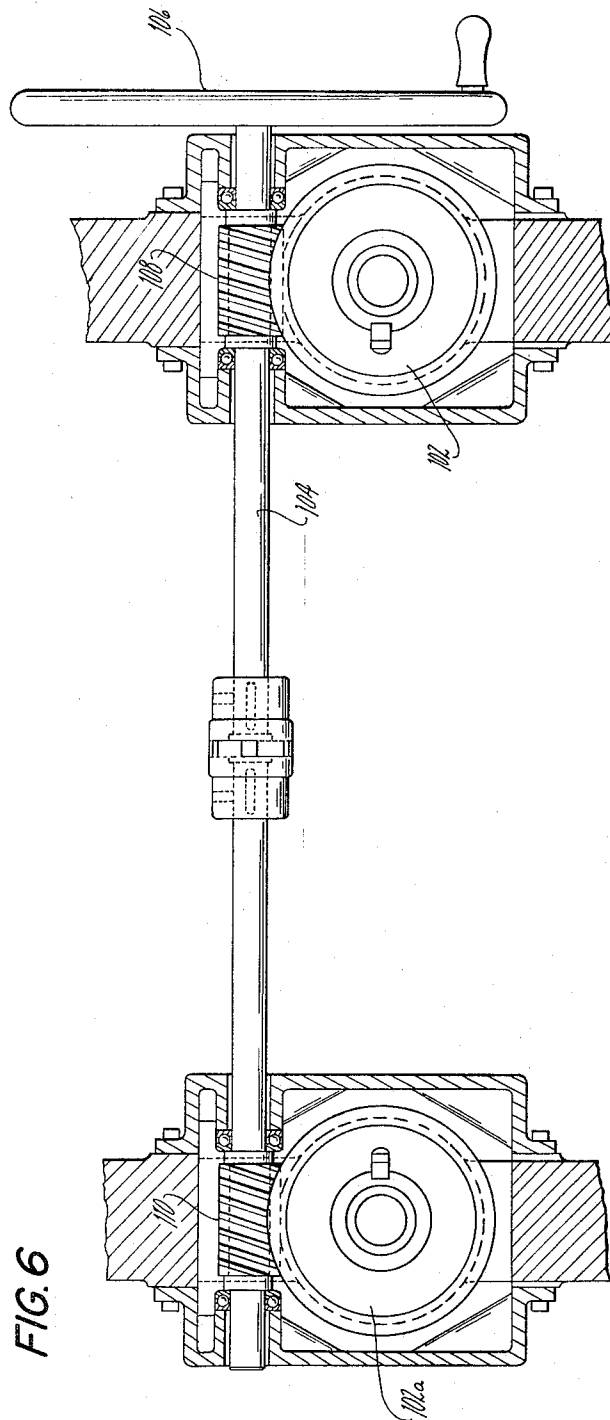
E. V. CAVAGNERO

3,303,679

MACHINE FOR COILING STRIP METAL

Filed Dec. 30, 1963

8 Sheets-Sheet 5



Feb. 14, 1967

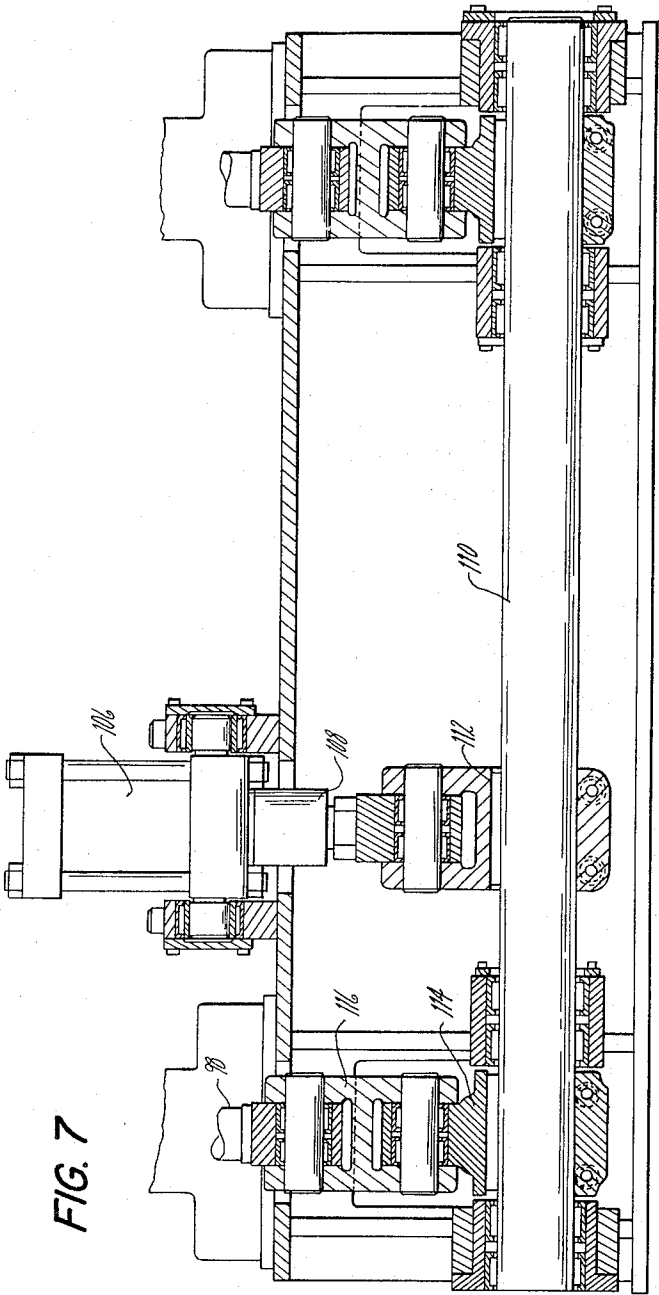
E. V. CAVAGNERO

3,303,679

MACHINE FOR COILING STRIP METAL

Filed Dec. 30, 1963

8 Sheets-Sheet 6



Feb. 14, 1967

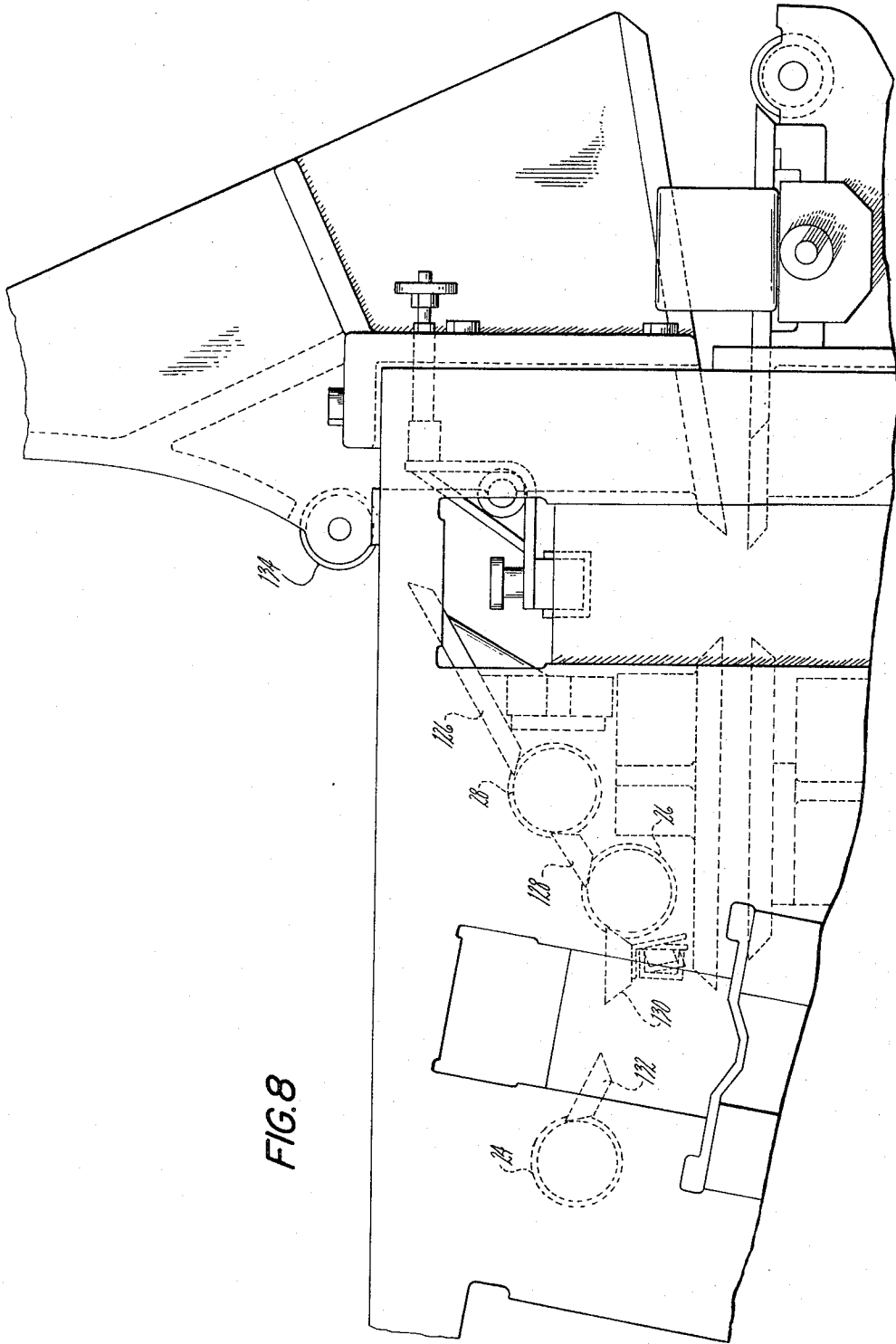
E. V. CAVAGNERO

3,303,679

MACHINE FOR COILING STRIP METAL

Filed Dec. 30, 1963

8 Sheets-Sheet 7



Feb. 14, 1967

E. V. CAVAGNERO

3,303,679

MACHINE FOR COILING STRIP METAL

Filed Dec. 30, 1963

8 Sheets-Sheet 8

FIG. 9

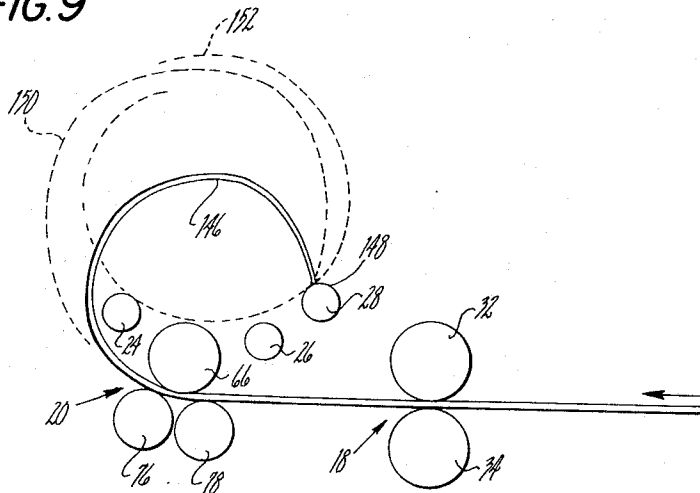


FIG. 10

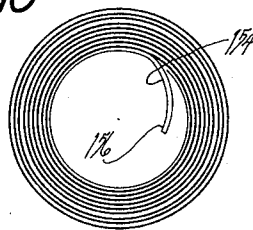


FIG. 12

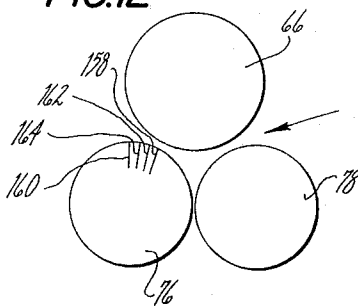
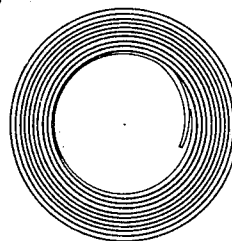


FIG. 11



1

3,303,679

## MACHINE FOR COILING STRIP METAL

Erman V. Cavagnero, Torrington, Conn., assignor to The Torrington Manufacturing Company, Torrington, Conn., a corporation of Connecticut

Filed Dec. 30, 1963, Ser. No. 334,239

13 Claims. (Cl. 72-35)

This invention relates to coiling machines of the type commonly referred to as "upcoilers" and which are employed in steel and brass mill lines to coil heavy strip metal for ease and convenience in storage and in transfer to subsequent operations. The machine of the present invention provides coils weighing several tons from strip metal varying in thickness up to one-half inch and varying in width up to thirty inches. Further, the coiling machine of the present invention is particularly well suited for use in coiling relatively soft copper base alloy strip, but the invention is not so limited.

One object of the invention is to provide a coiling machine of the type mentioned which is capable of forming a more perfect metal coil than has heretofore been attainable, improvement in the strip metal coil being effected primarily in the formation of the innermost coil or coils to the end that subsequent handling and mounting of the coils on mandrels and the like may be accomplished with increased facility and efficiency.

Another object of the present invention resides in the provision of a coiling machine which includes at least two relatively adjustable strip metal engaging rolls and a supporting frame, and which is also provided with roll position indicators visually exposed from outside the frame and which contribute substantially to the ease and efficiency of set-up operations on the machine.

The drawings show a preferred embodiment of the invention and such embodiment will be described, but it will be understood that various changes may be made from the construction disclosed, and that the drawings and description are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawings:

FIG. 1 is a front elevational view of a coiling machine constructed in accordance with the invention;

FIG. 2 is a right-hand end view of the machine;

FIG. 3 is an enlarged fragmentary transverse and approximately horizontal section taken generally at 3-3 in FIG. 1;

FIG. 4 is an enlarged fragmentary transverse and approximately horizontal stepped section taken generally at 4-4 in FIG. 1;

FIG. 5 is an enlarged partial front elevational view of the machine;

FIG. 6 is an enlarged fragmentary transverse and approximately horizontal section taken generally at 6-6 in FIG. 5;

FIG. 7 is an enlarged fragmentary transverse vertical section taken generally at 7-7 in FIG. 5;

FIG. 8 is an enlarged partial front elevational view with several parts of the machine removed for clarity of illustration;

FIG. 9 is a schematic front elevational view of the machine illustrating initial operations in coil formation;

FIGS. 10 and 11 are side views of portions of strip metal coils formed respectively on a prior coiling machine and a machine constructed in accordance with the invention; and

FIG. 12 is a schematic view of a coiling roll assembly.

### General organization

Referring particularly to FIG. 1, a coiling machine or

2

upcoiler constructed in accordance with the present invention is shown with a base frame means 10 and a front or first generally longitudinally extending side frame means 12. A second or rear generally longitudinally extending side frame means, not shown, is spaced transversely from the front side frame means 12 and a space is defined between said two side frame means for the generally longitudinal right to left passage of strip metal as indicated generally by the arrow 14. The machine receives the strip metal and in right to left movement there-through imparts an arcuate bend whereby to coil the metal for the purposes previously mentioned. A completed coil of strip metal is shown at 16 ready for removal and delivery to storage or a subsequent operation.

Preferably, the coiling machine includes a strip metal feed means and a feed roll assembly is illustrated at 18. The feed roll assembly 18, to be described more fully hereinbelow, grips and advances strip metal in a right to left direction and at a uniform rate of movement to a coiling roll assembly indicated generally at 20.

The coiling roll assembly 20, receiving the strip metal in continuous passage therethrough from the feed roll assembly 18, bends the metal arcuately in a generally leftward and upward direction in the machine shown. From the coiling roll assembly 20, the arcuately bent strip metal advances upwardly and leftwardly and thence rightwardly and downwardly whereupon it coils upon itself and is held by a coil support means.

The coil support means is not clearly shown in FIG. 1 but will be described in detail hereinbelow. Said means is indicated generally by the reference numeral 22 and includes coil support rolls 24, 26 and 28. As will be seen, the coil support means is at least approximately partially circular viewed in cross section and is adapted to efficiently receive a leading free end of strip metal advanced through the coiling roll assembly 20, and is further adapted to support the strip metal as it coils upon itself and as it forms a complete coil such as 16.

There is also included in the coiling machine, in accordance with the present invention, a recoil roll disposed between the coiling roll assembly 20 and the coil support means 22 and which is operable arcuately to bend the strip metal slightly in a direction generally opposite to the direction of bend imparted by the coiling roll assembly. The recoil roll is not clearly shown in FIG. 1 but extends between the aforementioned side frame means on a transverse and generally horizontal axis indicated approximately by the reference numeral 30. Thus, the recoil roll is disposed above and in engagement with the strip metal as it emerges from the coiling roll assembly 20 and said roll has effect upon the strip metal at least during an initial portion of coil formation as will be more fully described hereinbelow. The said effect of the recoil roll upon the strip metal includes the formation of a desirably uniform first coil and comparatively tight formation of the initial coils, all of this resulting in ease and efficiency of subsequent handling as aforesaid.

### Feed roll assembly

Referring now particularly to FIG. 2, it will be observed that the feed roll assembly 18 comprises first and second or upper and lower feed rolls 32, 34. The feed rolls 32, 34 extend transversely about generally horizontal and parallel axes in the coiling machine and are supported at their ends by suitable bearing means. Bearing means 36, 36 are shown for the upper roll 32 and bearing means 38, 38 for the lower roll 34. Each of the bearing means 36, 36 has associated therewith a roll deflection compensating device 40, said devices being of known construction and requiring no further description here.

The lower bearing means 38, 38, respectively have associated therewith and in supporting relationship therewith

3

first and second hydraulic cylinders 42, 42. The cylinders 42, 42 are carried by a vertically adjustable bridge 44 in turn connected with a jacking device 46 by means of a rod 48. The jacking device 46 is operable by means of a hand wheel 50 and a shaft 52. Thus, it will be apparent that the hand wheel 50 may be manipulated to rotate the shaft 52 and to operate the jacking device 46 whereby vertically to adjust the position of the bridge 44 carrying the hydraulic cylinders 42, 42, in turn carrying the bearings 38, 38. Adjustment of the spacing between the upper and lower feed rolls 32 and 34 may thus be accomplished in a set-up operation on the machine. Thereafter, and in operation of the machine, the hydraulic cylinders 42, 42 may be operated in unison whereby to rapidly lower the bearings 38, 38 and the lower feed roll 34 to an inoperative position. Means for operating and controlling the hydraulic cylinders are not shown and may take conventional form.

Power operated means for rotating the feed rolls 32 and 34 are not shown but connecting drive shafts are illustrated generally at 54, 56, respectively. The said drive shafts may of course be provided with flexible couplings as required.

Still with regard to the feed roll assembly 18, position indicators are provided at 58, 60 for the feed rolls 32, 34 in accordance with the present invention. Each position indicator is provided with at least a partially circular edge surface on a radius equal to that of its associated roll and, as shown, the indicators 58, 60 take the form of circular discs on diameters equal to the diameters of their corresponding rolls, FIGS. 1 and 2. The position indicators are located so as to be visually exposed from outside the frame means and they are held in fixed relationship with the axes of their associated rolls by suitable means. The said means, in the embodiment of the invention shown, comprise bolts 62, 64 respectively connecting the indicators 58, 60 to the left-hand or front bearings 36, 38 in FIG. 2. Thus, the indicators 58 and 60 shown are secured against rotation with their associated rolls 32, 34.

In set-up operation of the machine, the indicators 58, 60 may be employed as by inserting gage blocks therebetween. Rotation of the aforementioned hand wheel 50 will of course effect vertical adjustment of the roll position indicator 60 in accordance with the similar adjustment of the feed roll 34 whereby to provide for a rapid and efficient set-up operation. The problems encountered in gaging space between the feed rolls 32, 34 directly and in the internal portion of the machine are thus wholly eliminated.

#### *Coiling roll assembly*

The coiling roll assembly 20 is or may be conventional in construction and arrangement. First, second and third coiling rolls are provided for rotation about generally horizontal triangularly spaced parallel axes. The rolls receive the strip metal in continuous passage therebetween and arcuately bend the same as previously mentioned.

An upper coiling roll 66 is best illustrated in FIG. 4 and has associated first and second or front and rear bearing means 68, 68. The said roll engages strip metal from above in right to left passage of the latter therebeneath and is driven by a power operated means represented by a shaft 70. A roll position indicator 72 associated with the upper coiling roll 66 is mounted to the front bearing means 68 by means of a bolt 74 and serves the same purpose as the aforementioned position indicators 58 and 60 associated respectively with the feed rolls 32, 34. As best illustrated in FIG. 1, a deflection compensating device 76 is provided in association with the front bearing means 68 and the corresponding rear bearing means also has a compensator, not shown.

Lower coiling rolls 76 and 78, best illustrated in FIG. 3, are each provided with first and second or front and

4

rear bearing means as indicated at 80, 80 and 82, 82. The said rolls engage the strip metal from beneath in right to left passage of the latter thereover, and cooperate with the coiling roll 66 to bend the metal arcuately in a conventional three-point bending operation. Power operated means associated with the lower rolls 76, 78 are represented by drive shafts 84, 86 which may be provided with flexible couplings or the like. Position indicators 88, 90 associated respectively with the rolls 76, 78 are or may be similar in all respects to the indicators described above.

Preferably and as shown in FIG. 1, the lower coiling rolls 76, 78 are displaced from the horizontal with respect to their engagement with the strip metal. That is, the axes of said two rolls fall in a common plane inclined somewhat upwardly and to the left in FIG. 1. This arrangement provides for an improved angle of entry of the strip metal into the passageway between the lower rolls and the upper coiling roll 66. The strip metal is bent upwardly only in passage through and between the rolls whereas an initial downward bending and a subsequent upward bending of the metal occurs in a coiling roll assembly wherein the lower rolls have their axes in a common horizontal plane.

Reverting now to FIG. 3, it will be observed that the front bearing members 80, 82 of the rolls 76, 78 are supported in a common bearing block 92. The rear bearing members 80, 82 are similarly supported in a block 94. The bearing blocks 92 and 94 are adjustable angularly upwardly and downwardly for set-up operation and gaging of the space between the lower coiling rolls 76, 78 and the upper coiling roll 66 and for rapid downward movement of the lower coiling rolls to an inoperative position.

An adjusting mechanism for effecting the required angular upward and downward movement of the front bearing block 92 is shown in FIG. 5 and it will be understood that an identical mechanism is provided for the rear bearing block 94 and need not be described herein.

Threaded upper and lower studs 96 and 98 of the mechanism are threadably and telescopically received within a sleeve 100 which is outwardly splined for relative sliding motion and rotation with a gear 102. Rotation of the gear 102 in one and an opposite direction results in adjustment in one and an opposite direction of the over-all length of the assembly comprising the studs 96, 98 and the sleeve 100. Thus, the bearing blocks 92 and 94 may be adjusted upwardly and downwardly during a set-up operation by rotation of a shaft 104 best illustrated in FIG. 6. The shaft 104 is provided with a hand wheel 106 for convenience of manipulation and with first and second pinions 108 and 110. The pinion 108 is operatively associated with the aforementioned gear 102 and the pinion 110 drives a gear 102a of the aforementioned adjusting mechanism for the rear bearing block 94.

For rapid withdrawal of the lower coiling rolls 76, 78 from their operative positions, the assembly comprising the studs 96, 98 and the sleeve 100 is drawn downwardly, the sleeve maintaining rotative connection with the gear 102 by means of the abovementioned splines. Means for rapidly moving the assembly comprising the studs 96, 98 and the sleeve 100 includes a hydraulic cylinder 106 best shown in FIGS. 5 and 7. The cylinder 106 has a rod 108 connected with a transverse shaft 110 by means of a crank arm 112 whereby to angularly rotate the shaft in one and an opposite direction. The shaft 110 carries a crank arm 114 at its front end portion which is swung through and arc in one and an opposite direction by the shaft and which has pivotally connected thereto a link 116. The link 116 is pivotally connected in turn at an upper end portion with the aforementioned stud 98 whereby to urge the aforementioned assembly angularly upwardly and downwardly under the control of the hydraulic cylinder 106. A stop means 118 engageable with the arm 114 is positioned so as to abut the said

5

arm when the arm and the link 116 are in a slightly over-center position. Said stop means is operative when the adjusting mechanism holds the lower coiling rolls 76, 78 in their upper and operative position.

#### *Coil support means*

As mentioned, the coil support means 22 includes the support rolls 24, 26 and 28 and is at elast partially circular in cross section viewed from the ends of the coiling rolls. The first and second support rolls 24, 26 are rotatable about generally horizontal axes and are disposed adjacent and at opposite sides of the upper coiling roll 66 so as to support a coil of strip metal on their upper surfaces above the said coiling roll. The third support roll 28 is shown disposed above and to the right of the second support roll 26 and the detailed construction thereof is illustrated in FIG. 3. Front and rear bearing means 120, 122 rotatably support the roll and a power-operated means associated therewith is represented by a shaft 124. The first and second support rolls 24, 26 may be similarly constructed and arranged and they may be similarly supplied with operating power, further illustration and description being deemed unnecessary.

Referring particularly to FIG. 8, it will be observed that transversely extending bridge members are provided to fill spaces between the aforesaid support rolls. A bridge member 126 is inclined upwardly and rightwardly adjacent the support roll 26 and is disposed at the right-hand side of said roll. A bridge member 128 is similarly inclined and disposed between the said support roll 28 and the support roll 26. Adjacent the left-hand side of the support roll 26 there is provided a bridge member 130 and a similar member 132 is disposed adjacent the right-hand side of the support roll 24. Thus, a leading free end of strip metal initially entering the support means is prevented from entering the spaces between the support rolls and the strip metal is instead forced to coil in the desired form.

Still referring to FIG. 8, it will be observed that a transverse roll is shown at 134 for engagement with a coil of strip metal as the coil reaches its maximum diameter. The said roll is also shown in FIG. 2 as are similar rolls 136 and 138 having similar functions.

Side guide or shield members 140, 140 in FIG. 2 are provided with rollers at 142, 142 to prevent binding of the strip metal as it enters the support means. The said side guides may be supported as by horizontally spaced transverse shafts 144, 144, FIG. 1.

#### *Recoil roll*

The need for and the improved results achieved with the recoil roll mentioned above are best understood with reference to FIGS. 9 through 12. In FIG. 9 particularly, it will be observed that the full line 146 represents a length of strip metal initially passed through the feed roll assembly 18 and the coiling roll assembly 20. Said length of metal has a leading free end 148 which is shown impinged upon and in frictionally binding relationship with the support roll 28. The said leading free end of the strip metal is quite obviously unable to follow its natural arcuate downward path due to physical limitations. That is, the coiling roll assembly 20 occupies the space where the coil support means including the support roll 28 would ideally be positioned to receive the leading free end 148 and the first coil of the strip metal coil to be formed.

Due to the impingement of the leading free end 148 of the strip metal upon the roll 28, the strip metal tends to balloon upwardly and outwardly as indicated by the broken line 150. Only when ballooning has occurred sufficiently to alter the angle of engagement between the free end 148 and the surface of the roll 28 does the said free end slip past the roll downwardly and leftwardly whereby to permit a first coil of strip metal to be formed within the support means as illustrated at 152. Thereafter, the strip metal emerging from the coiling roll assem-

6

bly 20 coils upon itself to form a complete coil of the desired size.

FIG. 10 shows the first few convolutions of a coil of strip metal. It will be observed here that a portion 154 immediately adjacent the leading free end 156 of the strip metal curves rather sharply inwardly on a radius somewhat smaller than that of the remaining portion of the first convolution or coil. The said portion 154 is commonly referred to as a "dog leg." This figure represents the type of coil of strip metal commonly encountered with conventional upcoilers or coiling machines, particularly when relatively soft copper base alloys are coiled. Considerable difficulty is encountered in subsequent handling of the coil wherein a mandrel may have to be inserted within the coil. Even with the use of an expandable mandrel a loose fit may result with serious detrimental effects on the subsequent operations.

The reason for the "dog leg" in prior strip metal coils is believed to reside in the above-mentioned initial operation of conventional coiling machines. Reverting to FIG. 9, it will be observed that the ballooning effect tends to enlarge the inner diameter of the initial convolution or coil over the diameter provided for by adjustment of the coiling roll assembly. The strip metal is effectively reversely bent during ballooning over a major portion of the length of the initial convolution or coil, but the portion thereof immediately adjacent the leading free end may be reversely bent to a lesser degree, or not at all, or the said portion may even be bent further and to a smaller radius in the original direction of bend. To compensate for the reverse bending action, it has been a conventional and necessary practice to adjust the coiling roll assembly for a diameter somewhat smaller than that desired for the final inner diameter of the coil. Thus, for example, if a 24-inch inner coil diameter is desired, it has been a conventional practice to adjust the coiling roll assembly to provide approximately a 20-inch inner coil diameter. With a coiling roll assembly adjustment for a 20 inch diameter, the sheet metal may pass through the coiling rolls initially engaging the left-hand lower roll 76 at a point 158 in FIG. 12. Thereafter, and as the leading free end of the strip metal engages a support roll or an adjacent bridge member and as ballooning of the strip metal commences, the point of engagement of the strip metal with the coiling roll 76 may shift leftwardly progressively and in an uncontrolled manner. It may, for example, shift to one or the other of the points 160, 162 in FIG. 12 or it may shift to still a third point. Thus, the bending effect of the coiling rolls upon the metal is altered in an uncontrolled manner and the aforementioned direct reverse bending effect of ballooning is also uncontrolled and unpredictable. The result of these factors is the provision of a coil of the type shown in FIG. 10 wherein an unacceptable "dog leg" may be encountered.

The above-described initial operation in coil formation occurs in substantially all conventional upcoilers and a similar operation occurs in the upcoiler of the present invention but there is nevertheless an important distinction in the operation of the present machine. With the present coiling machine wherein a recoil roll is provided, a slight reverse bend is applied to the strip-metal by the said roll as the metal emerges from the coiling roll assembly and throughout at least a portion of the ballooning operation, the strip metal being unaffected by the recoil roll at a later stage as the coil builds up and the metal shifts away from the said roll in its path of movement. The amount or degree of reverse bend effected by the recoil roll is closely controlled in contradistinction to the uncontrolled and unpredictable reverse bend mentioned above. In FIG. 12, the point of contact of the strip metal with the coiling roll 76 may, for example, shift immediately and precisely from the aforementioned point 158 to a well defined point 164 on contact of the strip metal with the recoil roll. As mentioned, the leading free end of the strip metal thereafter impinges on a roll or bridge

7

member in the support means and ballooning does occur. The amount or degree of ballooning is, however, substantially less with the recoil roll than in the case of a coiling machine of the older and well known type. Further, it is to be observed that the center of the initial partial coil is shifted somewhat to the left by the provision of the recoil roll and this is believed to provide improvement in the angle of impingement of the leading free end of the strip metal on the support roll 28. Still further, it is believed that a significant degree of beneficial mechanical stress relief is provided for on the inner portion of the strip metal by the recoil roll. It is not known to what precise extent each of these factors contributes to and effects the result achieved, but it is known that a greatly improved coil is obtained.

Referring to FIG. 11, it will be observed that a coil there shown has substantially no "dog leg." This figure represents a coil of copper base alloy strip metal formed with a coiling machine of the present invention wherein a recoil roll was employed. As with a conventional coiling machine, it was necessary to establish the adjustment of the coiling rolls for a diameter somewhat smaller than that finally desired for the internal diameter of the coil to be formed. In the specific example tested and found to provide a coil of excellent quality, the coiling roll assembly was set to provide a 20-inch diameter wherein a 24-inch internal coil diameter was desired. The recoil roll was set to apply a slight reverse bend and a resultant diameter of approximately 23½ inches. The coil was thereafter formed with substantially no "dog leg" and with desirably tight convolution throughout as shown.

Considering now the detailed construction of the recoil roll in the present coiling machine, attention is invited to FIGS. 1 and 4. As mentioned above, the recoil roll is rotatable on a horizontal axis indicated approximately by the arrow 30 in FIG. 1. The said roll extends transversely in the machine and is preferably located closely adjacent the coiling roll assembly 20, as illustrated in FIG. 4. The roll engages the strip metal from above as the latter emerges from the coiling roll assembly and bends the same slightly downwardly or in a direction generally opposite to that of the arcuate bend imparted by the coiling rolls.

Adjustment of the recoil roll toward and away from the strip metal is preferably provided for and in FIG. 4 a recoil roll 166 is shown mounted eccentrically upon a transversely extending rotatable shaft 168. Said shaft carries fixed eccentrics 170, 170 at opposing ends which in turn support bearings 172, 172 rotatably mounting the recoil roll 166. Thus, rotation of the shaft 168 can be effected to adjust the recoil roll 166 toward and away from strip metal therebeneath along an accurate along an arcuate path of adjustment. Linear and other adjustment of the roll toward and away from strip metal therebeneath is also to be regarded as falling within the scope of the invention.

Means for effecting rotation or relatively limited annular movements of the shaft 168 may vary widely in form. As shown, a gear 174 is provided at the front end of said shaft and meshes with a pinion 176. The pinion 176 and/or the shaft 168 may be frictionally held in selected positions of rotative adjustment whereby to secure the recoil roll 166 in a desired position of adjustment relative to the strip metal. Manual rotation of the pinion 176 is provided for in the form of an upwardly projecting head 178 which may be readily gripped as by means of a suitable wrench.

The invention claimed is:

1. The combination in a machine for coiling strip metal comprising first, second and third coiling rolls rotatable about generally horizontal triangularly spaced parallel axes, said rolls being adapted to receive strip metal in continuous passage therebetween and arcuately to bend the same substantially in one direction such that it will coil upon itself, power operated means connected in driv-

8

ing relationship with the coiling rolls, coil support means adapted to receive the strip metal from the coiling rolls and to support the same in coil form, a recoil roll rotatable on an axis parallel with the axes of said coiling rolls, said recoil roll being disposed between the coiling rolls and the coil support means in engagement with the strip metal and being operable arcuately to bend the metal slightly in a direction generally opposite to said one direction at least during an initial part of the coil formation, and a means for adjusting the position of said recoil roll to vary the amount of bend effected thereby in said opposite direction.

2. The combination in a strip metal coiling machine as set forth in claim 1 wherein said coiling rolls are arranged to receive strip metal in generally horizontal movement with one roll above and the remaining two rolls beneath the metal, the bending of the metal by the rolls in said one direction thus occurring in an arcuate generally upwardly extending path, wherein said coil support means is at least approximately partially circular in cross section viewed from the ends of the coiling rolls and is disposed generally above said rolls, the spacing of said means in relation to the rolls being such that a leading free end of strip metal emerging from the rolls initially engages the support means and frictionally binds causing generally upward ballooning of an adjacent portion of the strip metal and thereafter freely enters the support means permitting the strip metal to terminate ballooning and to coil upon itself atop said means, and wherein said recoil roll is disposed above the strip metal and in engagement therewith during at least a portion of said ballooning movement of the strip metal.

3. The combination in a strip metal coiling machine as set forth in claim 1 wherein said means for adjusting said recoil roll includes a rotatably adjustable mounting means upon which the recoil roll is carried in eccentric relationship.

4. The combination in a strip metal coiling machine as set forth in claim 2 wherein said coil support means includes first and second support rolls rotatable about generally horizontal axes parallel with the coiling roll axes, said support rolls being disposed adjacent and at opposite sides of said upper coiling roll so as to engage and support a coil of strip metal on their upper surfaces above said coiling roll.

5. The combination in a strip metal coiling machine as set forth in claim 4 wherein said support means also includes a third support roll rotatable about a generally horizontal axis parallel with the axes of said first and second support rolls, said third support roll being disposed with its upper surface spaced horizontally from said upper coiling roll in the direction from which strip metal enters the coiling rolls with one of said first and second support rolls between it and the upper coiling roll, the upper surface of said one support roll being somewhat lower than said upper surface of said third support roll.

6. The combination in a strip metal coiling machine as set forth in claim 4 and which includes cooperating vertically spaced and substantially horizontally extending first and second feed rolls disposed in horizontally spaced relationship with said coiling rolls in the direction from which strip metal enters the latter, and which also includes power operated means drivingly connected with said feed rolls such that the rolls oppositely engage and pass the strip metal therebetween for delivery to the coiling rolls.

7. The combination in a strip metal coiling machine as set forth in claim 6 wherein said means for adjusting said recoil roll includes a rotatably adjustable mounting means upon which the recoil roll is carried in eccentric relationship.

8. The combination in a strip metal coiling machine as set forth in claim 7 wherein said support means also includes a third support roll rotatable about a generally horizontal axis parallel with the axes of said first and sec-

9

ond support rolls, said third support roll being disposed with its upper surface spaced horizontally from said upper coiling roll in the direction from which strip metal enters the coiling rolls with one of said first and second support rolls between it and the upper coiling roll, the upper surface of said one support roll being somewhat lower than said upper surface of said third support roll.

9. The combination in a strip metal coiling machine as set forth in claim 8 wherein said coil support means also includes bridge members disposed in spaces between said first, second and third support rolls particularly to prevent downward passage therebetween of the aforesaid leading free end of strip metal.

10. In a strip metal machine, the combination comprising transversely spaced substantially vertical and generally longitudinally extending first and second frame means, at least two cooperating rolls rotatable about parallel generally transversely extending and generally horizontal axes and adapted for the generally longitudinal passage of strip metal therebetween, bearing means supported by said frame means at opposite ends of each of said rolls for rotatably supporting the rolls, means for adjusting at least one of said rolls at least generally radially toward and away from the other of said rolls, a visual position indicator operatively associated with each of said rolls, each of said indicators having at least a partially circular edge surface on a radius equal to that of its associated roll, and a means for removably mounting each indicator on a bearing means corresponding to its associated roll in a position where it is visually exposed from outside the

10

frame means and maintained in fixed relationship with the axis of its associated roll, said last-mentioned means serving also to hold the indicators with their said partially circular edge surfaces in adjacent relationship.

11. The combination in a strip metal coiling machine or the like as set forth in claim 10 wherein said indicators are secured against rotation with their corresponding rolls by their said holding means.

12. The combination in a strip metal coiling machine or the like as set forth in claim 11 wherein said holding means for the indicators are connected with the bearing means for the rolls.

13. The combination in a strip metal coiling machine or the like as set forth in claim 12 wherein each of said indicators comprises a circular disc on a diameter equal to the diameter of its associated roll.

#### References Cited by the Examiner

##### UNITED STATES PATENTS

|           |         |                  |        |
|-----------|---------|------------------|--------|
| 801,989   | 10/1905 | Kaplan           | 72—35  |
| 1,434,229 | 10/1922 | Schaeffer        | 72—169 |
| 2,038,305 | 4/1936  | Mikaelson et al. | 72—146 |
| 2,233,547 | 3/1941  | Miller et al.    | 72—146 |
| 2,503,597 | 4/1950  | Rodder           | 72—169 |
| 2,877,821 | 3/1959  | Potter           | 72—146 |

RICHARD J. HERBST, *Primary Examiner*.

L. A. LARSON, *Assistant Examiner*.