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COIL THREADING MECHANISM

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COIL THREADING MECHANISM
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The invention relates generally to uncoiling mechanism and has reference in particular to uncoiling and threading mechanism for uncoiling relatively heavy coils of stock material and for directing the leading end of the uncoiled material to a straightening and feeding machine.

An object of the invention is to provide uncoiling mechanism which will employ a hold down and power carriage, and a stripping finger, the power carriage having operation when in contact with the periphery of the coil for rotating the coil, and the stripping finger having operation for engaging and directing the leading end of the uncoiled material to a machine for straightening the material and for feeding the same to other machines for subsequent operations.

Another object of the invention is to provide uncoiling mechanism which will provide a hold down and power carriage for rotating a coil of metal stock and which will have releasable contact with the outer periphery of the coil to cause the coil to rotate as the result of frictional engagement of the wheels of the carriage with the coil, the carriage having its own independent power source and which is carried thereby in a manner to form part of the carriage structure.

Another object of the invention resides in the provision of uncoiling mechanism of the character described which will employ a hold down and power carriage and a stripping finger, and wherein both said devices are pivotally supported and power oscillated so as to have an operative and an inoperative position with respect to the coil of metal stock which is being uncoiled.

Another object is to provide uncoiling mechanism wherein the pivotal supporting structure for the hold down and power carriage will support a power actuated back breaker for bending the leading end of the uncoiled material so as to facilitate the directing of the same between the initial rolls of the straightening and feeding mechanism.

A further object is to provide uncoiling mechanism wherein the coil will be rotated by a hold down and power carriage, and wherein the double cone reel which supports the coil will also be rotated but at a slower speed so that the convolutions of the coil will be maintained in a tightly coiled condition rather than unwound as would otherwise be the case.

With these and various other objects in view the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts:

FIGURE 1 is a side elevational view of the coil threading mechanism of the invention, the same being illustrated in combination with a double cone reel and with a straightening and feeding machine, the power carriage stripping finger and apron being located in inoperative positions;

FIGURE 2 is a side elevational view similar to FIGURE 1 but showing the carriage, stripping fingers and apron in operative positions for an uncoiling action;

FIGURE 3 is a side elevational view similar to FIGURES 1 and 2 but additionally showing the action of the back breaker during the uncoiling operation;

FIGURE 4 is a top plan view taken substantially along line 4—4 of the uncoiling apparatus as shown in FIGURE 2;

FIGURE 5 is an end elevational view of the apron and stripping finger including the supporting structure for the same, the parts being shown in the position of FIGURE 2 looking toward the left; and

FIGURE 6 is an end elevational view of the double cone reel for supporting the coil for rotation, with parts in section to show the driving means for the coil supporting cone.

The coil of metal stock such as 10, FIGURES 1, 2 and 3, is a当中, which is to be uncoiled by the apparatus of the invention, is suitably supported for rotation by the coil supporting cones 11 and 12, FIGURE 6, of the double cone reel indicated in its entirety by the numeral 13. The mechanism of the invention directs the leading end 9 of the uncoiling stock material to the initial feeding rolls 14 and 15 of a straightening and feeding machine 16. The base 17 of the machine 16 and the side frames 18 thereof which journal the rolls such as 14 and 15, provide upright supports 20 for pivotally supporting the arms 21 and 22. Said arms although spaced at their pivot end converge inwardly and outside to provide the single supporting arm 23 for supporting the holddown and power carriage 24.

The sections 25 and 26 of the apron are also pivotally supported from the upright supports 20 in a manner to be presently described.

Considering first of all the supporting structure for the power carriage 24, it will be observed from FIGURE 4 that the arms 21 and 22 comprise an integral part of the hollow shaft 27, which extends between the upright supports 20. The hollow shaft 27 is journaled by the upright supports 20 by means of the pivot members 28. Reinforcing rods 30 are provided for the arms 21 and 22, the said rods each having a fixed connection at one end to the hollow shaft 27 and at its opposite end to its respective arm. It has been found desirable to prevent the leading edge of the stock material from being directed or deflected upwardly, rather than into the bite of the rolls 14 and 15. Accordingly, the hollow shaft 27 is provided with journaling extensions 31 at respective ends for journa ling the roller 32 by means of the rod 33.

The arms 21 and 22, and thus the single carrying arm 23 for the power carriage 24 are oscillated by the power cylinders 34, each cylinder being pivotally mounted at 35 in a support 36 having a fixed relation on an upright support 20. Each arm 21 and 22 provide a pair of supporting flanges such as 37 and 38, the flange 37 being located inwardly and the flange 38 being located outwardly of its respective arm. A pivot pin 40 is mounted by each pair of flanges and each pivot pin provides a connection for the piston rod 41 of its respective power cylinder 34. When a fluid medium under pressure is
admitted by the conduits 42 with conduits 43 being open for exhaust, the power cylinders are actuated to retract the piston rods 41, and as a result the arm 23 is elevated to locate the holddown and power carriage 24 in a lifted inoperative position as shown in FIGURE 1. When the pressure medium is admitted by the conduits 43, with conduits 42 being open for exhaust, the piston rods 41 are projected outwardly, thus lowering the arm 23 and the power carriage 24 so that the wheels of the carriage will engage the periphery of the coil 10, all in the manner as shown in FIGURES 2 and 3.

The holddown and power carriage 24 is pivotally carried by the arm 23 and in a manner whereby the front and rear wheels 44 and 45, respectively, will freely and frictionally contact the coil. The pivot shaft 46 connects the arm 23 to the side frames 47 of the carriage. At the front end the side frames are joined by the shaft 48 which journal the front wheels 44. At the rear, each side frame carries a stud shaft 50 on which the wheels 45 are journaled. Driving chains such as 51 are employed on respective sides of the carriage for operatively connecting the power sprocket 52 with the front and rear wheels. The said power sprocket is provided by the gear reducing mechanism 53, and it is to be understood that the said mechanism is suitably driven by the air motor 54 of the turbine type, and having inlet and outlet conduits collectively designated 55. A turbine type motor is preferred as the power source for the power carriage, since the drive to the coil contemplates that considerable slippage will take place. However, even though slippage must be provided for, the drive from the wheels of the carriage to the coil must be sufficiently positive to maintain a rotative action on the coil in excess of that imparted by the motor drive through the coil supporting cones 11 and 12. An air motor of the turbine type has been found to function in a highly satisfactory manner.

The apron for supporting the stock material as it unwinds from the coil 10 is formed in two parts, the said parts having been previously designated by the numerals 25 and 26. Each section has a shape and a position as best shown in FIGURE 4. The pivot end of each apron section is supported by the shaft 56, FIGURE 5, the said shaft extending between and being supported by the upright supports 20. At an intermediate location, each apron section has formed integral therewith a web 57 which provides means by which the apron section can be connected to a source of power. This is accomplished by pivotally joining the piston rod 60 of a power cylinder 61 to said web 57. A power cylinder is thus provided for each of the apron sections and each piston cylinder is pivoted at 62 to the stationary support 63. In operation of the power cylinders, the conduits 64 and 65 will alternately admit and exhaust a pressure medium so as to extend and retract the piston rod 60 and thus raise and lower the apron sections in unison.

In FIGURE 2 the apron sections 25 and 26 have been elevated by the power cylinders 61 and the stripping finger 66 has also been rendered operative for contact with the leading edge of the coiled material 9. The stripping finger is pivoted at 67 to the fixed support 63 and said finger is adapted to oscillate in the space between the apron sections 25 and 26 to and from an inoperative position as shown in FIGURES 1 and 3, and an operative position as shown in FIGURE 2. A power cylinder 68 is provided for actuating the stripping finger 66, the cylinder being pivotally connected at 70 to the yoke 71 fixed to support 63. The piston rod 72 of the power cylinder 68 is connected at 73 to the stripping finger. Oscillation of the finger is effected by employing the conduits 74 and 75 for alternately admitting and exhausting a pressure medium to the cylinder.

The stripping finger 66 has an especially designed top end 76 which provides a notched formation 77 for stripping the leading end 9 from the coil and for contact there-
The gear reducing mechanism 100 is driven from any suitable source of power such as an electric motor, not shown. The said gear reducing mechanism is operatively connected by means of the chain drive 101 with shaft 102 which is suitably journaled within the supporting structure 96 to which it has fixed thereto the pinion 103. From the pinion 103 the drive is transmitted to the gear 104, to the pinion 105, and finally to gear 106 on the journaled shaft 107 to which the cone 11 is fixed. Whereas the cone 11 is fixed to the right hand extending end of shaft 107, its left hand extending end is provided with drum brake mechanism 108. Accordingly, by means of the gear reducing mechanism 100 and the brake mechanism 108, the desired driving speed can be imparted to the driving cone 11 for any particular driving action of the power carriage 24.

After a coil 10 of metal stock has been supported for rotation by the supporting cones 11 and 12, the arm 23 can be lowered to effect contact of the knurled wheels 44 and 45 with the periphery of the coil. The air motor 54 is then rendered operative to cause the knurled wheels to rotate and to thus rotate the coil 10 due to the frictional contact between the wheels and the coil. The coil is additionally rotated by the drive to the cones 11 and 12 which, however, does not take over the rotative action imparted to the coil but merely assists the power carriage.

With the coil now rotating, the stripping finger 66 can be rendered operative to cause the notched formation 77 to engage the coil periphery. Since the coil is rotating in a counterclockwise direction, the leading end portion 9 will presently engage the notched formation 77 of the stripping finger in a manner as shown in FIGURE 2, whereupon the stripping finger is retracted so as to lead the portion 9 along the length of the apron sections and toward the bite of the feed rolls 14 and 15. Reference is made to the dotted line position of the leading portion 9 shown in FIGURE 2.

In order to facilitate the threading of said leading portion of the stock material between the feed rolls 14 and 15, it is desirable to produce a reverse bend in the material as shown in FIGURE 3. The reverse bending is accomplished by a back breaker in the form of a roller 78 which is caused to depend from the supporting arms 21 and 22. The roller in contacting the leading end of the stock material effects a bend in the same opposite to that naturally assumed by the material due to its coiled condition. During this operation of the back breaker the material is supported by the apron sections 25 and 26 which have been located in elevated position for the uncoiling operation. Eventually the leading end 9 of the stock material will enter the bite between the feed rollers 14 and 15 whereupon the action of the feed rolls 14 and 15 will effect the material through the straightening and feeding machine. Since the threading operation has been completed the arm 23 together with the power carriage 24 can now be located in the inoperative position as shown in FIGURE 1. Also, the apron sections can be lowered to the position as shown in FIGURE 1 and the uncoiling of the coil 10 will continue under the action and control of the straightening and feeding machine.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings, as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In uncoiling apparatus of the character described, the combination with supporting structure and a coil of metal stock material supported thereby and which is to be uncoiled, of a stripping finger pivotally supported by said supporting structure and adapted to have an operative position in contact with the coil for stripping the leading end of the material from the coil and for momentarily retaining contact therewith, a pair of spaced apron sections also pivotally supported by said supporting structure and having a substantially horizontal position adjacent the coil for contact with the leading end of the material so as to support the same as it uncoils, said stripping finger having a location in the space between the apron sections, power means for oscillating the stripping finger whereby the finger can be moved in the proper direction for directing the leading end of the material along the length of the apron sections as the material has contact with the sections, an arm pivoted to said supporting structure, a power carriage carried by the free end of the arm, power means associated with the supporting structure and with the arm for oscillating the arm, said power carriage having a pair of front journaled wheels and a pair of rear journaled wheels, and a power source carried by the power carriage for driving said wheels, whereby when the said wheels of the power carriage are caused to frictionally contact the coil the said coil is caused to rotate.

2. In uncoiling apparatus of the character as described in claim 1, wherein the support for the coil of metal stock material includes coil supporting cones having contact with the coil, and independent power means for rotating at least one of said cones.

3. In uncoiling apparatus of the character as described in claim 1, wherein the support for the coil of metal stock material includes coil supporting cones having contact with the coil, independent power means for rotating at least one of said cones, and additionally including a back breaker carried by the arm intermediate its length, said back breaker including a roller pivotally connected to the arm, and additional power means carried by the arm for bodily oscillating the roller, whereby the roller can be caused to contact the leading end of the material while in contact with the apron sections and produce a bend in the same opposite to that caused by the winding of the material on the coil.

4. In uncoiling apparatus of the character described, the combination with supporting structure including a straightening and feeding machine providing a pair of initial feeding rolls, a coil of metal stock material supported by the supporting structure and adapted to be uncoiled, an arm pivoted to the straightening and feeding machine, a power carriage pivotally carried by the free end of the arm and disposed over the coil, said power carriage having a pair of front journaled wheels and a pair of rear journaled wheels, a power source carried by the power carriage and having operative connection with the front and rear journaled wheels, respectively, power means for oscillating the arm whereby the wheels of the power carriage can be caused to frictionally contact the coil, and a back breaker carried by the arm intermediate its length, said back breaker including a roller pivotally connected to the arm, and additional power means carried by the arm for bodily oscillating the roller.

5. In uncoiling apparatus of the character described, the combination with supporting structure including a straightening and feeding machine providing a pair of initial feeding rolls, a coil of metal stock material supported by the supporting structure and adapted to be uncoiled, a pivotally mounted arm having its free end directed toward sand above the coil of metal stock, a power carriage carried by the free end of said arm, said power carriage having a pair of front journaled wheels and a pair of rear journaled wheels, a power source carried by the power carriage and having operative connection with the front and rear journaled wheels, respectively, power means for oscillating the arm whereby the wheels of the power carriage can be caused to frictionally contact the coil, a stripping finger pivotally supported by said supporting structure and having an operative position in contact with the coil for stripping the leading end of the stock material from the coil and for momentarily retaining con-
tact therewith, a pair of spaced apron sections pivotally supported by the straightening and feeding machine, said spaced apron sections being adapted to have a substantially horizontal position adjacent the coil for contact with the leading end of the material so as to support the same as it uncoils, said stripping finger having a location in the space between the apron sections, and additional power means for oscillating the stripping finger, whereby the finger can be moved in the proper direction for directing the leading end of the material along the length of the apron sections and towards the initial feeding rolls of the straightening and feeding machine.