

Aug. 16, 1932.

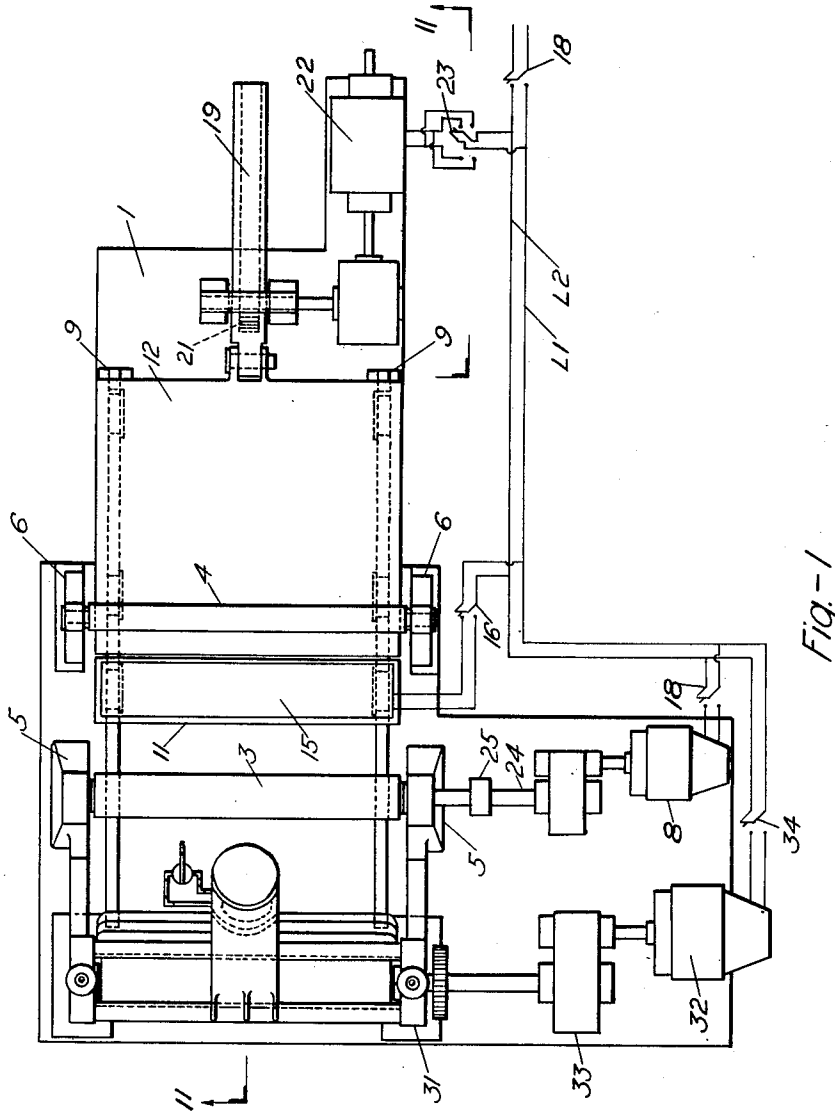
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APPARATUS FOR UNCOILING COILS OF METAL STRIP

Filed Aug. 1, 1931

2 Sheets-Sheet 1



WITNESS:

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2 Sheets-Sheet 2

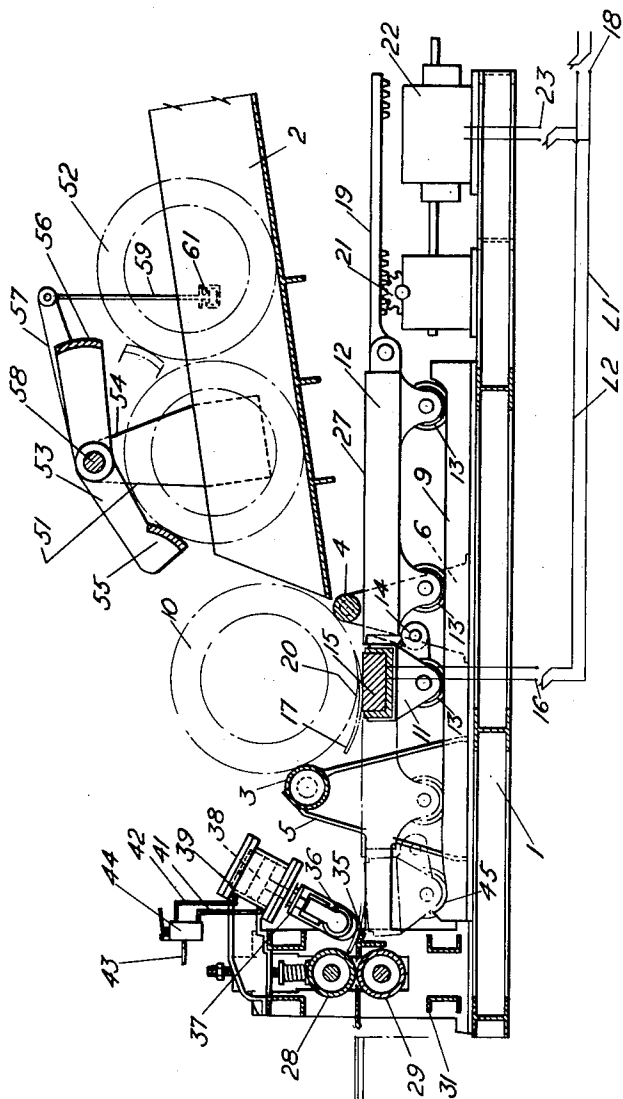


Fig-2

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## UNITED STATES PATENT OFFICE

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## APPARATUS FOR UNCOILING COILS OF METAL STRIP

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This invention relates to apparatus for uncoiling and delivering strip from coils of strip steel.

5 It is a common practice to-day in mills where strip steel is manufactured to wind the strip into compact coils on reels as it issues from the rolling mills. This is done for various reasons but chiefly to facilitate the further handling and storing of the strip. As a result of such practice considerable difficulty is frequently encountered in the uncoiling of the strip when it is desired to use it or pass it through other working devices and particularly so when the strip is heavy.

10 With this problem in view it is the object of this invention generally stated to provide a comparatively simple and sturdily constructed as well as dependable and easily operated apparatus whereby coils of the nature referred to may be quickly and efficiently uncoiled and the strip delivered therefrom without difficulty and without injury to it.

15 A full understanding of the invention will be had when the following detailed description is read in conjunction with the accompanying drawings wherein Fig. 1 illustrates a plan view of an uncoiling apparatus constituting a single embodiment of the invention; and Fig. 2 a longitudinal section of the same taken on the line 11-11 of Fig. 1.

20 In accordance with the invention as illustrated in the drawings, the apparatus shown comprises a frame or base 1 which forms the main support for the apparatus. Over the rear end of this frame there is provided an inclined chute 2 which is adapted to receive and deliver the coils to be uncoiled onto a pair of rolls 3 and 4 which function as a support for and permit rotation of the coils about their axes during the uncoiling operation. These rolls are suitably mounted in bearing supports 5 and 6, respectively, provided on frame 1. The lower of the two rolls, that is, roll 4, is an idler roll, and the upper, roll 3, a drive roll, the latter being mounted on a drive shaft 7 that is operably coupled to a driving motor 8 which is em-

ployed to rotate the coils into decoiling position for initiating the uncoiling operation, as well as otherwise aid in the decoiling operation as will presently appear.

25 Below chute 2 and rolls 3 and 4 a track 9 is provided in the base of frame 1 and on it a pair of pivotally connected trucks 11 and 12 equipped with flanged wheels 13 are arranged for movement lengthwise of the frame. The foremost of these trucks, which is equipped with only two wheels, and attached to the after truck by a pin 14, is employed as a movable support for an electromagnet 15.

30 This magnet is employed to engage the outer or free end of the strip and separate it from the rest of the coil when the trucks are moved forward on track 9 after such engagement is made. In order that the magnet will not exert an unnecessary down pull upon the coil, such as coil 10, disposed on rolls 3 and 4, it is preferably so mounted on truck 11 as to provide an air gap 20 between its face and the periphery of the coil. While to control its energization it is suitably connected through a switch 16 with a source of current supply provided by line conductors  $L_1$  and  $L_2$ .

35 In case the outer end 17 of coil 10 when delivered to rolls 3 and 4 by chute 2 is not in proper position above magnet 15 for the latter to engage the free end of the strip properly when it is desired to initiate the uncoiling operations, motor 8 is set in motion and the coil rotated thereby until such position is obtained. To control the operation of this motor for such purpose, and others as will presently appear, it is connected to line conductors  $L_1$  and  $L_2$  through a switch 18.

40 For moving trucks 11 and 12 on track 9 to separate the outer layer of the strip from the coil after the free end thereof has engaged magnet 15 the after truck is provided with a gear rack 19 pivotally connected to its rear end. The latter is meshed with a driving gear 21 which is operably coupled to a reversible motor 22 that in turn is connected to line conductors  $L_1$  and  $L_2$  by a reversing switch 23. As will be appreciated, when the motor 22 is actuated to move the trucks 11

and 12 forward on track 9 after the end of the strip has been engaged by magnet 15, the outer layer of the coil will be stripped from the rest of the coil as the coil is itself prevented from leaving rolls 3 and 4.

To relieve the strain on the magnet during this movement of the trucks motor 8 may be actuated. However, where strips are being uncoiled which have a tendency to buckle and leave cross creases in them, unless the strip is subjected to tension during the uncoiling operation, motor 8 may be allowed to remain idle whereby a tensional force sufficient to rotate the coil is set up in the strip when the magnet is moved forward. To permit roll 3 to operate in this manner when motor 8 is deenergized the latter may be connected to shaft 24 through a clutch 25 which is adapted to permit the roll to move forward free of the motor, and as clutches of this nature are well known in the art it is deemed unnecessary to illustrate it or describe such here in detail.

The purpose of the after truck 12 is to support the strip as it is unwound from the coil by the forward movement of truck 11 and magnet 15, and prevent it from fouling the rest of the apparatus as it is pulled from the coil. It also aids in preventing the strip from buckling or creasing as it is uncoiled. Preferably it is provided with a perfectly flat and smooth upper surface 27 so as to avoid injury to the strip through contact with it.

In order to deliver the strip from the coil after its free end is separated therefrom by magnet 15 as referred to above, a pair of pinch rolls 28 and 29 are employed. These are mounted in a frame 31 arranged on base 1 forward of bearing supports 5. For operating such rolls a motor 32 is operably coupled to them through a gear reducing unit 33, and the motor is in turn connected by a switch 34 with line conductors  $L_1$  and  $L_2$ . On the entrance side of these rolls there is provided a table like guide 35 for directing the strip from the magnet into them and to aid in accomplishing this feeding of the end of the strip into the rolls a guide roll 36 is mounted directly above guide 35. This latter roll is reciprocally mounted in a suitable frame 37 which is attached to the piston 38 of a cylinder 39.

For operating guide roll 36 the opposite ends of cylinder 39 are connected by pipes 41 and 42 with a source of pressure supply 43 through a valve 44. To enter the end of the strip in rolls 28 and 29 valve 44 is actuated to raise guide roll 36 before the end of the strip reaches table 35 and to lower it into engagement therewith after it is moved over the top of such table. In order that the strip may be fed into the pinch rolls in this fashion, it is necessary that a portion of the end of

the strip be extended over the end of the magnet when it is engaged thereby, as shown in full and dotted lines in Fig. 2. To attain such end coil 10 is rotated by motor 8 as referred to above before the magnet is energized until its free end 17 extends a sufficient distance beyond the end of truck 11 to engage in the pinch rolls when the magnet reaches the forward end of track 9.

To further facilitate the feeding of the strip into the pinch rolls, and to also carry the magnet and truck 11 out of the line of travel of the strip, so that the strip will not contact or be injured by it, during the unreeling operation, track 9 is inclined downwardly at 45 in such a way as to permit the truck to drop below the normal line of the strip when it is advanced to the forward end of the machine. The curvature of the track at this point is also adapted to function as a stop block for the truck. On reaching such position the end of the strip is engaged by roll 36 which is lowered at such time and immediately thereafter the magnet is deenergized.

To provide for continuous operation of the apparatus a plurality of reserve coils such as coils 51 and 52 may be mounted in chute 2. For preventing these from interfering with coil 10 and also control their delivery to rolls 3 and 4, a stopping device consisting of a latch 53 is provided on the chute. This latch is pivotally mounted on a bracket 54 and equipped with a round faced hook-like construction 55 on its forward end and a rounded face 56 on its rear end, these round faces being employed to prevent the latch injuring the surface of the strip. For operating such latch a lever 57 is rigidly connected to a shaft 58 on which the latch is keyed and is equipped at its outer end with a handle rod 59 arranged to engage in a lock 61 which is mounted on the side of the chute. When the handle and latch are in the position shown in Fig. 2, the forward end of the latch engages coil 51, and holds the coils disposed in the chute from moving forward. When handle 59 is removed from lock 61 and pulled downwardly it lifts the face 55 of the latch away from coil 51 and at the same time engages face 56 with the coil 52 positioned immediately back of coil 51. When the forward face 55 is free of coil 51 the latter will roll due to gravity onto rolls 3 and 4, being prevented from rolling over such rolls by the former of the rolls. With the returning of handle 59 to its upper position face 55 engages roll 52 and its face 56 reassumes its disengaged position.

The operation of the apparatus is as follows. The coils to be unwound are mounted on the chute 2 by any suitable means and after rolling into engagement with latch 53 the latch is operated to permit the foremost coil to move onto rolls 3 and 4. When the coil reaches this position motor 8 is energized by

closing the switch 18 and roll 3 is actuated until the free end of the coil is moved to the position shown in full line in Fig. 2 when the motor is stopped. The switch 16 is then closed and magnet 15 energized. As soon as the end of the strip is engaged by the magnet, motor 19 is set in motion by closing switch 23 to operate the motor in the forward direction. This causes the trucks 11 and 12 to be moved forwardly on track 9, carrying the outer layer of the coil with them. As referred to hereinbefore, during this movement of the trucks motor 8 may be operated or allowed to remain idle, depending upon the characteristics of the strip. When the trucks approach the forward end of the track 9, truck 11 moves down the incline 45 and the overlapping end of the strip moves up over the face of guide table 35. As soon as truck 11 arrives at the end of the track 9 motor 19 is stopped and valve 44 operated to move guide roll 36 into engagement with the end of the strip, whereupon the strip is forced into rolls 28 and 29 which have previously been set in motion by closing switch 34.

To insure the forcing of the strip into the rolls 28 and 29 the frame 37 in which the roll 36 is supported is mounted on an incline and in such a way that it carries the strip forward as well as downward when the roll is moved into engagement with it. With the engagement of the strip by the roll 36 the magnet 15 is deenergized by opening the switch 16 which permits the strip after engagement with rolls 28 and 29 to move freely through the pinch rolls and be fed thereby into any metal working device or other apparatus desired, such, for example, as the mill illustrated schematically in front of these rolls.

After a coil is completely unrolled switch 23 is closed in the opposite direction and the trucks 11 and 12 returned to their starting position. During this latter operation the latch 53 may be operated to release another roll and thereby prepare the apparatus for a repetition of the operation.

While the control of the various parts of the apparatus has been illustrated as adapted for simple manual control, it is obvious that automatic devices of various well known types may be employed for effecting the majority of the operations referred to. It is also obvious that the invention may be practiced in various other forms than that shown. Consequently it is not intended to in any way limit the invention as defined in the appended claims.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to be 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. In an apparatus for uncoiling coiled metal strip the combination of a coil support, an electro-magnet adapted to attract and engage the free end of a coil of permeable metal strip mounted on said support and means for moving said magnet to and from said support to separate the free end of the strip from the rest of the coil after it is engaged by the magnet.

2. In an apparatus for uncoiling coiled metal strip the combination of a coil support, an electro-magnet adapted to attract and engage the free end of a coil of permeable metal strip mounted on said support, means for moving said magnet to and from said support to separate the free end of the strip from the rest of the coil after it is engaged by the magnet, and means for receiving the end of the strip from said magnet and continuing the uncoiling operation.

3. In an apparatus for uncoiling coiled metal strip the combination of a coil support, means for rotating a coil mounted on said support about its axis, an electro-magnet adapted to attract and engage the free end of a coil of permeable metal strip mounted on said support, means for moving said magnet to and from said support to separate the strip from the coil after the free end is engaged by said magnet, a pair of pinch rolls for uncoiling the strip after the end is delivered thereto by said magnet and means for guiding the strip from the magnet into said pinch rolls.

4. In an apparatus for uncoiling coiled metal strip the combination of a frame for said apparatus, a pair of rolls mounted on said frame for supporting a coil of strip mounted thereon, means for rotating one of said rolls to rotate said coil about its axis, an electro-magnet mounted on a truck arranged for movement along a track located on said frame below said support, means for energizing said magnet to attract the free end of a coil of permeable metal strip mounted on said support and means for moving said truck along said track to carry said magnet and the free end of the coil away from the rest of the coil after such end is engaged by said magnet.

5. In an apparatus for uncoiling coiled metal strip the combination of a coil support, an electro-magnet adapted to engage the free end of a coil of permeable metal strip mounted on said support, a pair of pinch rolls for unwinding the strip from the coil, means for moving said magnet to deliver the end of the strip from the coil to said pinch roll.

6. In an apparatus for uncoiling coiled metal strip the combination of a coil support, means for delivering a coil to be uncoiled to said support, an electro-magnet adapted to

engage the free end of a coil of permeable metal strip mounted on said support, a pair of pinch rolls for uncoiling the strip from said coil, means for moving said magnet to deliver the end of the coil engaged thereby to said pinch rolls, means for guiding said pinch rolls and means to support said strip between said coil and said pinch rolls.

7. In an apparatus for uncoiling coiled metal strip the combination of a coil support, means for delivering coils to be uncoiled to said support, means for selectively releasing the coils from said delivery means onto said support, an electro-magnet movably mounted below said support for engaging the free end of a coil of permeable strip supported thereby, means for rotating said coil about its axis on said support, means for controlling the energization of said magnet, a pair of pinch rolls for uncoiling the strip from the coil, means for moving said magnet to deliver the end of the coil engaged thereby to said pinch rolls, means for guiding the strip from said magnet into said pinch rolls, and a platform arranged to move with said magnet for supporting said strip between said pinch rolls and the coil support while the coils are being uncoiled.

8. In an apparatus for uncoiling coiled metal strip the combination of a coil support, means mounted below said support for engaging the free end of a coil supported thereby, means for moving said end engaging means to separate said free end from the rest of the coil and a movable platform for supporting the strip as it is pulled from the coil.

In testimony whereof, I sign my name.

JOHN A. SMITMANS.

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