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COIL OPENER AND UNCOILER

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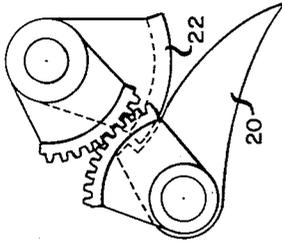
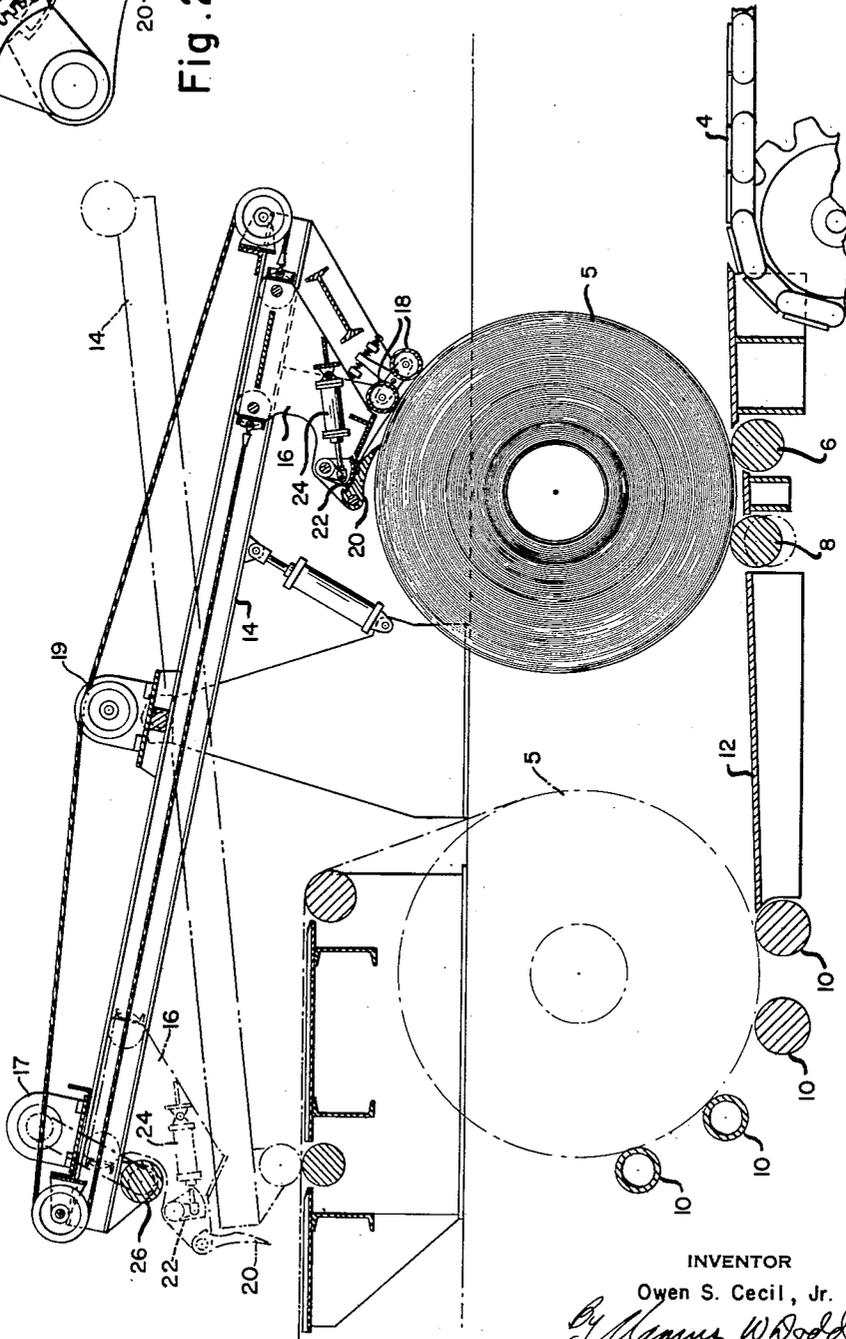


Fig. 2.

Fig. 1.



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My invention relates to materials handling apparatus and more particularly to coil feed apparatus for a rolling mill.

In accordance with the prior art of which I am aware, strips of steel and similar metals are fed between rollers in a rolling mill so as to reduce the thickness of the metal. Prior to introduction into the rolling mill, the steel is usually in the form of a roll of sheet metal. These rolls are very large and extremely difficult to be handled by hand and it is, therefore, important that they be handled as much as possible by machines. To prevent injury to human operators, devices have been envisioned for feeding the lead edge of the sheet of strip metal into the rollers of the rolling mill be mechanical apparatus. In the patent Haig No. 2,331,392, a device is built for holding the lead edge of the metal after the lead edge is fed into the device by a human operator and then feeding the lead edge into the rollers. This tends to prevent injury to the human operators when the rollers first grab the sheet of metal. However, with heavy metal, the feeding of such a machine by human operators is extremely difficult. In the patent of Darbaker No. 2,041,235, an attempt was made to handle the lead edge of a sheet of roll steel by means of temporary magnets which grab the lead edge of the roll by magnetic force and turning it forward to a point where it is grabbed by the rolls of the rolling mill.

It is accordingly an object of my invention to build an improved device for opening a coil or roll of metal and feeding the lead edge of the metal into the rolling mill.

It is another object of my invention to provide apparatus for mechanically opening a coil, grasping the lead edge, unwinding a portion of the coil and then causing the lead edge to bed into the rolls of the rolling mill.

It is another object of my invention to provide an improved device for handling a roll of coiled metal.

It is another object of my invention to provide a novel and useful article of manufacture.

In accordance with my invention I provide especially designed knife and grasping means for raising the lead edge of coil of steel from the coil, grasping the leading lead edge tightly and moving the lead edge forward generally in the direction into which it is pointed causing the coil to unwind. The lead edge is then dropped on a bed comprising a roller which supports the unwound lead edge of the coil. I then provide apparatus which comprises a powered roller which is lowered to cooperate with the idling roller to form a grasping apparatus which grasps the lead edge of the sheet so as to move the lead edge of the sheet forward into the rolling mill.

The novel features that I consider characteristic of my invention are set forth with particularly in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description when read in connection with the accompanying drawing in which:

FIGURE 1 is an elevation view partially in section of apparatus in according with the preferred embodiment of my invention.

FIGURE 2 is an enlarged showing of a side view of the grasping apparatus and the gears therein employed in the embodiment shown in FIGURE 1.

In accordance with my invention I provide a coil con-

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veyor 4 for moving a coil 5 of sheet steel in a cold rolling mill. The coil conveyor, in a manner well known in the art, comprises a plurality of sprocketed wheels engaging a segmented metal belt. The coil conveyor is disposed opposite and substantially parallel to a small platform and two rollers 6, 8 which extend perpendicular to the direction of motion of the conveyor belt 4. Preferably the second roller 8 furthest from the conveyor belt 4 is mounted so that it may be elevated. One or both of the first rollers is motor-driven and can be rotated in either direction so as to rotate the roll of steel resting thereon. The first pair of rollers comprise the coil positioner.

Beyond the coil positioner is a coil box comprising a plurality of rollers 10 oriented so as to hold a roll of steel in position while the roll is being turned and the steel is being unwound. The coil positioner and coil box have a ramp 12 extending therebetween which slopes slightly downward so as to carry the roll of steel from the coil positioner to the coil box when the coil is released from the coil positioner by lowering the roller of the coil positioner which is closest to the coil box.

Above the coil positioner and coil box I provide a coil opener and strip feeding machine which is mounted on trunnions between the coil box and coil positioner.

The coil opener and strip feeding machine comprises a track 14 suspended above the rolls and having thereon a car 16 which may be moved along the track. The track 14 extends in a direction generally parallel to the direction of motion of the conveyor 4 and is pivoted in its center so that alternate ends may be raised or lowered. Near one end of the track, i.e., the end toward the conveyor, I provide a pair of coil opener positioning rollers 18 mounted below the track and attached to the track by means of a spring-mounted tilting frame so that they will conform to the outside circumference of the coil of the sheet steel. The car comprises a frame mounted on a pair of wheels which ride on the track. The frame extends downward below the track. A knife blade 20 is located at the lower end of the frame and is mounted so that the edge of the blade extends parallel to the axis of the roll of steel. The blade is located so that when the positioning rollers 18 which are spring-mounted, engage the outside edge of the roll of steel, the knife blade forms an acute angle with the steel roll and the edge of the blade is pointed in the direction of the conveyor belt. A clamping plate 22 is provided above the knife blade so as to cooperate with the knife blade to hold the end of the roll of steel between the knife blade and the clamp plate. A cog joint as shown in FIGURE 2 is provided between the clamp plate and the knife blade so that as the clamp plate is moved toward the knife blade, the knife blade is moved upward toward the clamp plate. A hydraulic motor 24 is provided which is connected to the chassis of the car 16 at one end and to the clamp plate 22 at the other end so as to move the clamp plate with respect to the knife blade.

Above the coil box comprising rollers 10 there is provided a pair of feed rollers with a platform therebetween. The feed rollers serve to support the sheet steel as it is rolled off of the rolls. A roller 26 which is power-operated is provided suspended below the track near the end opposite that on which the said spring-mounted positioning rollers are located. The power-operated roller 26 is located so as to dispose opposite to and to cooperate with one of the feed rollers above the coil box so that when a piece of steel lies between these rollers, it will be caused to move forward by the power-operated roller 26 and the support roller which cooperates therewith.

In the operation of this embodiment of my invention, a coil of steel 5 is brought up on the coil conveyor 4 and rolled down a short ramp into the coil positioner, the coil positioner comprising two rollers 6, 8, one of which is

power-driven. At this time the end of the coil opener apparatus which is above the coil positioner has been raised sufficiently high to allow the roll of steel 5 to roll into place. The coil opener is now slowly lowered by means of hydraulic cylinders until the spring-mounted positioning rollers 18 contact the coil. The car 16 is then moved toward the spring-mounted position rollers 18 until it comes into position beside those rollers. The clamp plate hydraulic cylinder 24 is then actuated so as to cause the knife to drop down into contact with the coil.

The coil is then slowly rotated so as to move the lead edge of the coiled strip toward the knife blade. The coil is caused to rotate by rotation of the rollers on which the coil is resting. The lead edge of the strip of steel passes under the spring-mounted rollers 18 until it comes in contact with the lead edge of the knife. The lead edge of the strip then rises up on the knife blade and then continues back until it butts against the raised lip on the knife blade when it stops. The clamping blade is then actuated by the clamping plate cylinder so that it moves down against the knife blade. The lead edge of the strip is now held tightly in place between the knife blade and the clamping plate. The car is then moved to the opposite end of the track until it is stopped at the right location by limit switches. Power is then applied to the main cylinder so as to lower the end of the track on which the car is now located.

The lead edge of the strip is now located above the platform and the rollers thereon. The clamping plate is moved away from the knife blade and the knife blade is caused to swing downward allowing the strip to fall to the feeding platform. After the strip has fallen to the first end of the track, the car is then moved back to the first end of the track, the track is then rotated until the motor-operated roller mounted on the end of the track rests against the strip of steel. The lead edge of the strip is now held between the motor-operated roller which is mounted on the track and the idler roller located on the platform underneath the strip. Power is then applied to the motor-operated roller causing the strip to feed toward the reducing rollers. After the mill has taken hold of the strip, the track is raised so that the rollers are separated and the motor which rotates the motor-operated roller on the track is shut off. The coil of steel is then permitted to roll off of the coil positioner by lowering the roller which is nearest to the coil box. The roll of steel now rolls down the ramp into the coil box and from this position, it is fed out to the cold mill. The coil positioner is now ready to receive another roll of coil. While the first coil is feeding into the mill from the coil box, a new coil is moved along the conveyor belt and then moved into the coil positioner where it is opened and grasped by the knife blade and the clamp plate as described above. The car is then moved forward to a position above the coil box where it holds the lead edge of the new roll until the old roll is finished. When the old coil has run out, the end of the new coil will be dropped immediately on the feeder rolls and then into the coil mill with substantially no loss of time between coils.

I have thus provided a device for feeding coils into a mill by completely mechanical means which is substantially failure proof and by means of which substantially no time is lost between rolls. Since the apparatus is entirely mechanical and there is no need for human

handling of the materials, a minimum of manpower is needed, and there is no danger of workers being injured by whipping action of the sheet when the rollers of the rolling mill first grab it.

While in the preferred embodiment of my invention coiled steel in a cold rolled mill is employed, nevertheless, it is understood that other materials may be handled in a similar manner.

Although I have shown and described specific embodiments of my invention, I am aware that other modifications thereof are possible; my invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and the spirit of the invention.

I claim as my invention:

1. A strip feeding machine comprising an elevated track mounted so as to rotate about a point near its center in a vertical direction, a car movably mounted on said track having a strip grasping assembly appended thereto and extending downward therefrom, said strip grasping assembly comprising a rigid frame, a knife blade mounted on said frame and extending below said frame and capable of lifting the lead edge of a roll of sheet steel, a power-operated clamping plate cooperating with said knife to hold the lead edge of said roll with a tight grip, gears connecting said clamp plate and said knife so that when said clamp plate is rotated away from said knife, said knife is rotated away from said clamp; means for moving said car along said track, and a power-operated roller attached to and located below said track near one end thereof, the axis of said roller being parallel to the lead edge of said knife, and means for tilting said track about its supporting axis.

2. A strip feeding machine comprising an elevated track mounted so as to rotate in a vertical plane, a car movably mounted on said track having a strip grasping assembly appended thereto and extending downward therefrom, said strip grasping assembly comprising a rigid frame, a knife blade mounted on said frame and extending below said frame and capable of lifting the lead edge of a roll of sheet steel, a power-operated clamping plate cooperating with said knife to grasp the said lead edge of said roll; means for moving said car along said track, and a power-operated roller attached to and located below said track near one end thereof, the axis of said roller being parallel to the lead edge of said knife, and means for tilting said track about its supporting axis.

3. A strip feeding machine comprising an elevated track mounted so that the ends may be moved in a vertical direction, a car movably mounted on said track having a strip grasping assembly appended thereto and extending downward therefrom, said strip grasping assembly comprising a rigid frame, a grasping mechanism mounted on said frame and extending below said frame and capable of lifting the lead edge of a roll of sheet steel; means for moving said car along said track, and a power-operated roller attached to and located below said track near one end thereof, the axis of said roller being parallel to the lead edge of said knife, and means for tilting said track about its supporting axis.

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