Feb. 26, 1952 A. D. SMITH 2,586,874

ARTICLE HANDLER

Filed July 7, 1950 2 SHEETS—SHEET 1

FIG. 1.

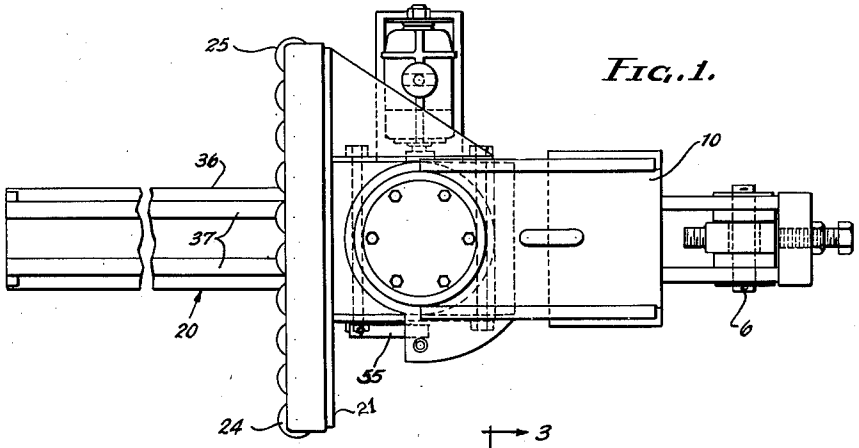
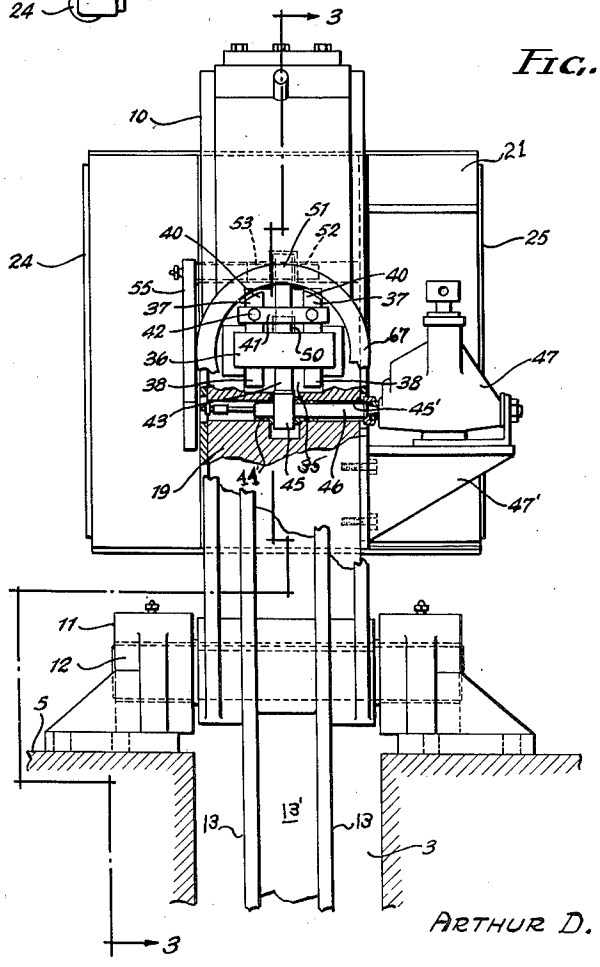


FIG. 2.



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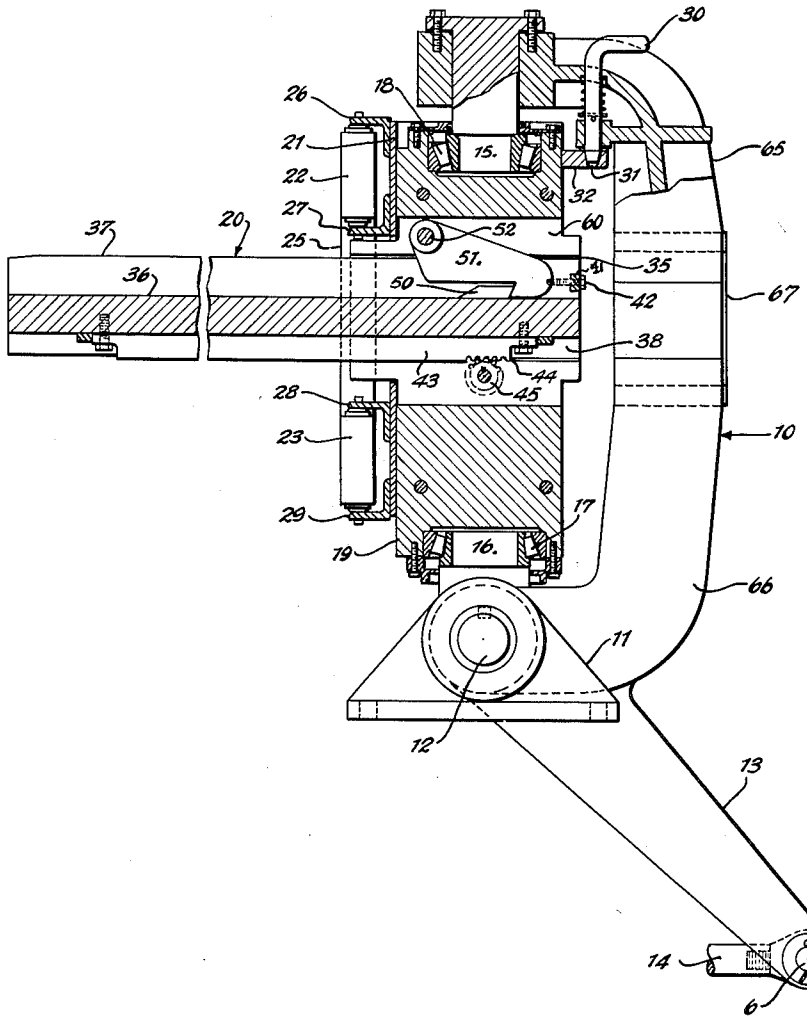
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FIG. 3.



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ARTICLE HANDLER

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7 Claims. (Cl. 214—1)

1

This invention relates to a coil handling apparatus. More particularly, it is concerned with providing a coil handling device of exceptional versatility, the coil receiving arm of which is capable of movement in a horizontal arcuate path, as well as in a vertical arcuate path, whereby it is adapted to receive coils from a coiling block or the like and to transfer the coils to a conveyor or some other coil handling apparatus in either an upended or flat condition, the term "flat" being used to designate the position of the coil, when its axis lies in a horizontal plane.

After strips of metal are rolled in a rolling mill or subjected to various other fabricating processes such as pickling, annealing, normalizing, tempering, etc., they are usually wound or coiled on reels, since the metal can be more easily handled and transported from one place to another or from one apparatus to another when it is in the form of coils. The axes of the reels and consequently the axes of the coils are usually located in a horizontal plane.

In the transfer of metal stock such as steel and aluminum in coil form from a coiling block or reel to some other coil handling apparatus it has been found advantageous in some instances to remove the coils initially from the reels by means of an upender, which receives the coils from the coiling block and immediately places them on end, since the upended condition of the coils helps to eliminate the danger of surface marring and scratching of the coils during further handling.

A disadvantage incident to the use of an upender for initially removing the coils from the coiling block lies in the fact that the upending device is not capable of removing and transferring the coils without placing them in an upended position, since an upender is limited in its operation to receiving the coils from the coiling block in a horizontal plane after which it places the coils in a vertical plane or in an upended condition.

Accordingly, whenever it was desirable to transfer the coil from the coiling block in a flat condition to some other coil handling apparatus incapable of receiving or handling the coil in an upended condition, a second coil handling device having movements in a horizontal plane had to be employed either to remove the coil from the upender or from the coiling block initially, after which it transferred the coil to the final coil handling machine.

In view of the fact that working space in rolling mills and the like is usually at a premium the advantages of a single machine, having the functions of an upender as well as the functions of a coil handling apparatus which is adapted to remove and transfer the coil from a coiling block or the like to another coil handling apparatus while maintaining the coil in a flat condition, will be readily appreciated.

2

It is an object of this invention, therefore, to provide a novel coil handling apparatus which is adapted to transfer a coil from a coiling block or the like to a conveyor or the like in either an upended or flat position.

Another object of this invention is to provide a novel coil handling apparatus having a coil receiving arm capable of movement in a horizontal arcuate path, as well as a vertical arcuate path.

A further object of this invention is to provide a novel coil handling apparatus having a retractable coil receiving arm, and gravity actuated latch means for holding the coil receiving arm in an extended position.

Another object of the invention is to provide a coil handling apparatus which is of relatively simple construction and subject to easy maintenance and repair.

A further object of this invention is to provide a coil handling apparatus which, while taking up a minimum amount of space, will serve as a transfer mechanism for transferring coils from one machine to another in either an upended or flat position.

These and other objects are accomplished by providing a coil handling apparatus having a C-shaped bearing member or arm pivotally mounted upon a base or support and arranged for movement in a vertical arcuate path about a horizontal axis. This bearing member is further provided with a pair of trunnion arms between which a carriage or supporting member is pivotally mounted in such a manner that the carriage may be moved in an arcuate path about an axis which is transverse to the aforesaid horizontal axis about which the bearing arm pivots. A face plate, to which rollers are attached, is affixed to the carriage. Spring latch means are also provided to prevent indiscriminate rotation of the carriage within the bearing member. A coil receiving arm is slidably mounted within a hollowed out portion of the carriage and gravity operated latch means are used to maintain this coil receiving arm in an extended coil receiving position. A pair of positively actuated crank arms are used to move the bearing member in a vertical arcuate path and rack and pinion means may be used to reciprocate the coil receiving arm, so as to move the arm into and out of engagement with the coil.

Other objects and advantages of the present invention will be more apparent upon consideration of the following detailed description, when taken in conjunction with the drawings, wherein:

Figure 1 is a plan view of the coil handling apparatus partly broken away at the coil receiving arm;

Figure 2 is an end view partially in section of the coil handling apparatus, and;

Figure 3 is a horizontal elevational view partly in section of the coil handler, taken along lines 3—3 of Figure 2, and partly broken away at the coil receiving arm, and showing in addition the connection between the crank arm arrangement and the piston for actuation of the same.

Although the coil handling apparatus of the present invention is adaptable for use with numerous types of machines, it will be described as one which is particularly adaptable for use with a rolling mill, being installed on the slitting line near the last stand of mill rolls for the purpose of handling coils, after they have been pushed from a coiling block or mandrel onto the coil receiving arm of the coil handler by a suitable stripper plate.

With further reference to the drawings it will be seen that the coil handling apparatus located adjacent a coiling block or reel (not shown) is generally comprised of a C-shaped bearing member or arm **10** pivotally mounted by means of a pivot shaft **12** to a pair of standards or pedestals **11**, which pedestals in turn are rigidly mounted on the floor **5** of the building, which houses the rolling mill. A crank arm arrangement is used for moving bearing member **10** and is comprised of a pair of crank arms **13** joined together by a web **13'**, and rigidly fastened at their upper extremities to the base of the C-shaped bearing member **10**, while their lower extremities are secured to a piston rod **14** by means of the pin **6**. This piston rod **14** in turn is secured to a piston and double acting cylinder arrangement (not shown), positioned in the pit or opening **3** of the floor **5**, and is adapted to reciprocate within a horizontal plane. Upon being reciprocated piston rod **14** actuates the crank arms **13** thereby causing the C-shaped bearing member **10** to pivot about the standards **11** in a vertical arcuate path alternately away from and then back toward the coiling block or reel.

A carriage **19** provided with a coil receiving arm **20** is rotatably mounted within the C-shaped bearing member **10** between the trunnion arms **15** and **16** by means of the pivot bearings **17** and **18**.

To prevent indiscriminate rotation of the carriage **19** within bearing member **10**, a manually operable spring latch **30** is provided. This spring latch is located in the upper portion of the C-shaped member and is adapted to be seated in an opening **31** in the plate **32** welded or otherwise secured to carriage **19**.

The face plate **21** of the carriage **19** is provided with an upper and lower line of rollers **22** and **23** and with a pair of elongated side rollers **24** and **25**. Upper rollers **22** are journalled between a pair of L-shaped brackets **26** and **27**, which are welded to plate **21** while the lower rollers **23** are journalled between the lower set of L-shaped members **28** and **29**, which likewise have been welded to plate **21**. Side rollers **24** and **25** are journalled between L-shaped brackets **26** and **29**.

The carriage **19** is also provided with a central hollowed out portion **35**, within which the elongated coil receiving arm **20** is adapted to reciprocate. In the preferred embodiment of the invention this coil receiving arm, which is H-shaped in cross section, is comprised of a web plate **36**, upper elongated leg members **37** and lower elongated leg members **38**, all of which legs are welded to web plate **36**. The upper edges **40** of the upper leg members may be curved, if desired, so that they will present rounded, rather than square or sharp contacting surfaces for the inner diameter of a coil to rest on, when it is positioned upon the coil receiving arm **20**. At the end of the coil receiving arm adjacent bearing **10** a bridging strip **41** is advantageously secured to each upper leg **37** such as by bolts or rivets **42**, to thus increase the rigidity of these two upper legs.

Rigidly secured to the under portion of the web plate **36** of coiling arm **20** is a rack **43** having teeth **44**, which are engaged by a pinion **45** mounted in carriage **19** below the central hollowed out portion **35** by means of a shaft **46**. Shaft **46** in turn is mounted within a bore **45'** in carriage **19** by means suitable bearing members **44'**. One end of this shaft is connected to and is adapted to be rotated by a reversible type of motor **47**, fixed to a platform **47'** which platform is rigidly secured to one side of the carriage **19**. This motor may be either an electric, fluid or air type of motor.

Secured to the upper portion of the web plate between the two upper leg members **37** adjacent the inner extremity of the coil receiving arm **20** is a latching lug **50**, which is adapted to engage the hooked end portion of a latch **51**, whereby the arm **20** will be held in an extended position even though the force of friction of the coil, as it moves out of the arm from the coiling block and onto arm **20**, tries to move arm **20** endwise against the pinion **45**. This latch is pivotally mounted by means of a pivot shaft **52**, within a longitudinal slot **60**, which is in open communication with the hollowed out portion **35** of carriage **19**.

The end of pivot shaft **52**, which projects out of the side of carriage **19** has a weight **55** affixed thereto. This weight assists in keeping latch **51** in engagement with latching lug **50**. In addition, when the C-shaped bearing member **10** and carriage **19** are rotated in a vertical arcuate path away from the coiling block or mandrel through an angle of slightly more than 90°, so as to place the coil is an upended position, gravity activates this weight, as well as latch **51**, in such a manner that the weight assists in causing pivot shaft **52** to rotate, whereby the hooked end portion of latch **51** is disengaged from latching lug **50** on the coil receiving arm **20**. Coil receiving arm **20** is then permitted to move downwardly and out of engagement with the center of the coil located thereon by means of the rack **43** and pinion **45** when the latter is activated by the motor **47**. Suitable stops (not shown) on arm **20** may also be used, if desired to restrict its downward movement.

To prevent bearing member **10** from interfering with this downward movement of arm **20** the preferred embodiment of the invention contemplates that the C-shaped bearing member will be constructed of an upper and lower curved segment **65** and **66** joined together in the center by a hollow cylinder or ring member **67**. In this way arm **20** will pass through this ring or through bearing member **10** as it is retracted downward when the coil upender assembly has been rotated in a vertical arcuate path away from

the coiling block. The aforesaid operation and movements of the coil handling apparatus take place when it is desirable to remove the coil from the coiling block and to place it upon end.

After the coil has been moved off of the coil handling apparatus by means of the rollers 22, 23, 24 and 25 and onto a conveyor (not shown) the motor 47 is again activated in a reverse direction. In re-activating motor 47 movement is again transmitted to the coil receiving arm 20 in the opposite direction through the medium of shaft 46, pinion 45 and rack 43, whereby arm 20 moves upward and into an extended position so that when the hydraulic cylinder (not shown) actuates the crank arm 13 to move the upender assembly back towards the coiling block and to a horizontal position, arm 20 is ready again to receive another coil from the coiling block, and latch 51 drops downward to become engaged again with latching lug 50.

When it is desirable to remove the coil from the coil receiving arm 20 in a flat condition, i. e., without at the same time upending it, the hydraulic cylinder which actuates the crank arms 13 is made inactive, and spring latch 30 on the C-shaped bearing member 10 is disengaged from carriage 19. The coil receiving arm can then be manually swung in a horizontal arcuate path in either direction through an angle of approximately 90° by means of the pivot bearings 17 and 18, which have been previously referred to, so that the coil can be easily removed by means of a crane or fork truck or other suitable apparatus from the coil receiving arm in the same plane, in which it was originally wound on the coiling block.

From the above description it will be evident that an exceptionally versatile coil handling apparatus has been provided for transferring coiled material either in an upended or flat condition from a coiling block or the like to another coil handling mechanism. Because of its compactness the equipment requires but a small amount of space within which to operate and its simplicity of construction permits ease of operation and requires but a small amount of maintenance to keep in proper working order.

An advantageous arrangement of the invention has been herein illustrated and described, it will be understood, however that changes in the construction and operation of the parts may be made without departing either from the true spirit or scope of the invention, as defined by the appended claims.

What is claimed is:

1. In a coil handling apparatus the combination of a support, a bearing member pivotally mounted upon said support and arranged for movement in a vertical arcuate path about a horizontal axis, a carriage pivotally mounted within said bearing member and arranged for movement about an axis transverse to said horizontal axis, a coil receiving arm mounted upon said carriage and arranged for reciprocating movement into and out of engagement with a coil, latch means for maintaining said coil receiving arm in an extended position, and a positively actuated crank arm for moving said bearing member in said vertical arcuate path.

2. In a coil handling apparatus the combination of a support, a bearing member pivotally mounted upon said support and arranged for movement in a vertical arcuate path about a horizontal axis, a carriage rotatably mounted within said bearing member and arranged for movement about an axis transverse to said horizontal axis, a plate on said carriage, a plurality of supporting rollers attached to said plate, a coil receiving arm mounted upon said carriage and arranged for reciprocating movement into and out of engagement with a coil, latch means for maintaining said coil receiving arm in an extended position, and means including a positively actuated crank arm for moving said bearing member in said vertical arcuate path.

3. In a coil handling apparatus the combination of a plurality of pedestals, a C-shaped bearing member pivotally mounted between said pedestals and arranged for movement about a horizontal axis in a vertical arcuate path, a support rotatably mounted within said bearing member and arranged for movement about an axis transverse to said horizontal axis, spring latch means for preventing indiscriminate rotation of said support within said bearing member, a coil receiving arm carried by said support and arranged for reciprocating movement into and out of engagement with a coil, a second latch means for maintaining said coil receiving arm in an extended, coil engaging position, and means for moving said bearing member in said vertical arcuate path.

4. In a coil handling apparatus the combination of a base support, a C-shaped bearing member pivotally mounted upon said base support and arranged for movement in a vertical arcuate path about a horizontal axis, a supporting member rotatably mounted within said bearing member and arranged for movement about an axis transverse to said horizontal axis, latch means for preventing indiscriminate rotation of said supporting member within said bearing member, a reciprocating coil receiving arm carried by said supporting member, a gravity operated latch for maintaining said coil receiving arm in an extended coil engaging position, a positively actuated crank arm for moving said bearing member in said vertical arcuate path and means for reciprocating said coil receiving arm to move said arm into and out of engagement with said coil.

5. In a coil handling apparatus the combination of a support, a bearing member pivotally mounted upon said support and arranged for movement in a vertical arcuate path about a horizontal axis, a carriage rotatably mounted within said bearing member and arranged for movement about an axis transverse to said horizontal axis, a face plate on said carriage, a plurality of rollers affixed to said face plate, latch means for preventing indiscriminate rotation of said carriage within said bearing member, a coil receiving arm slidably mounted on said carriage and arranged for reciprocating movement into and out of engagement with a coil, gravity operated latch means for maintaining said coil receiving arm in an extended, coil engaging position, and a positively actuated crank arm for moving said bearing member in said vertical arcuate path.

6. In a coil handling apparatus the combination of a support, a bearing member pivotally mounted upon said support and arranged for movement in a vertical arcuate path about a horizontal axis, trunnion arms on said bearing member, a carriage pivotally mounted between said trunnion arms whereby said carriage is adapted for movement in an arcuate path about an axis transverse to said horizontal axis, a face plate on said carriage, a plurality of rollers affixed to said plate, latch means for preventing indiscrimi-

nate rotation of said carriage within said bearing member, a coil receiving arm mounted on said carriage and arranged for reciprocating movement into and out of engagement with a coil, a latching lug mounted on said coil receiving arm, a gravity actuated latch for engaging said lug and for maintaining said coil receiving arm is in an extended position and a positively actuated crank arm for moving said bearing member in said vertical arcuate path.

7. In a coil handling apparatus the combination of a support, a bearing member pivotally mounted upon said support and arranged for movement in a vertical arcuate path about a horizontal axis, trunnion arms on said bearing member, a carriage pivotally mounted between said trunnion arms whereby said carriage is adapted

for movement in an arcuate path about an axis transverse to said horizontal axis, latch means for preventing indiscriminate rotation of said carriage within said bearing member, a coil receiving arm mounted on said carriage and arranged for reciprocating movement into and out of engagement with a coil, a latching lug mounted on said coil receiving arm, a gravity actuated latch for engaging said lug and for maintaining said coil receiving arm is in an extended position, and a positively actuated crank arm for moving said bearing member in said vertical arcuate path.

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No references cited.