

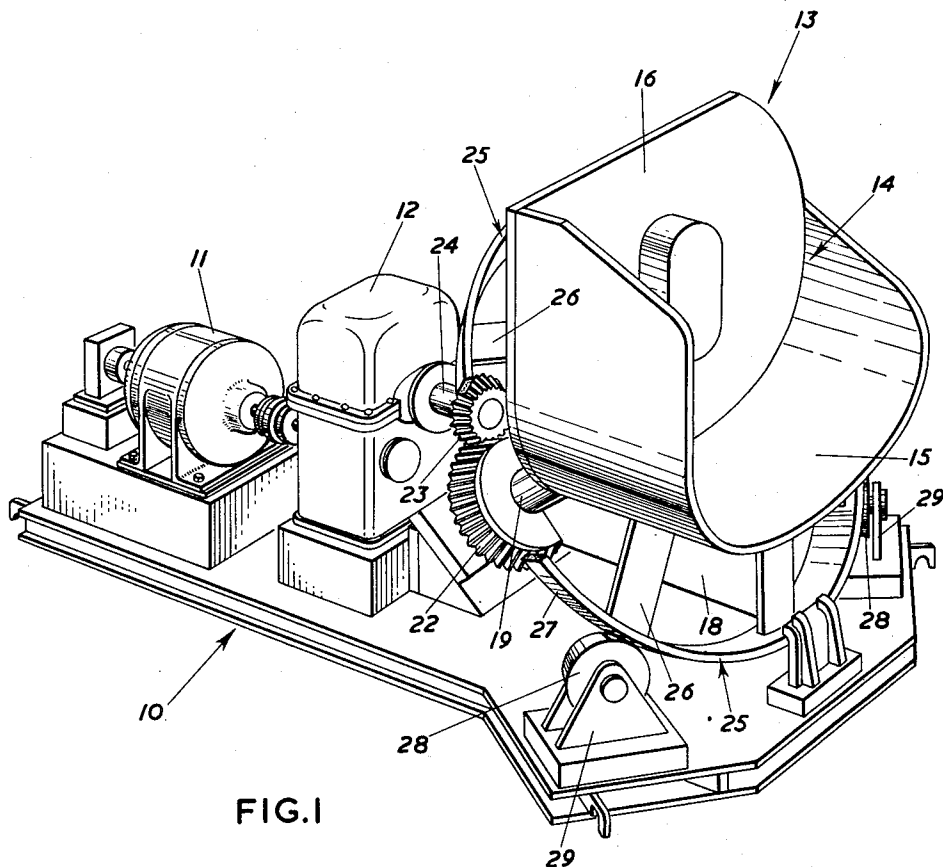
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COIL HANDLING APPARATUS

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2 Sheets-Sheet 1



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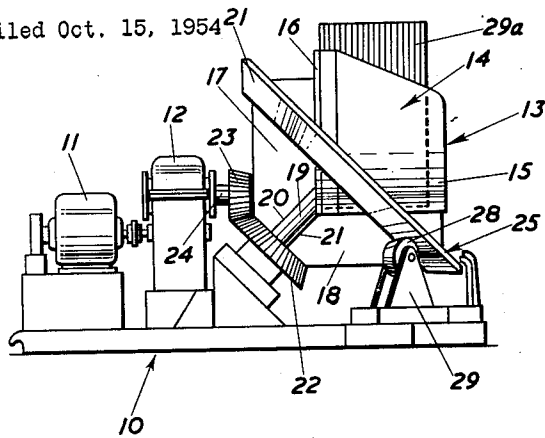


FIG. 2

FIG. 3

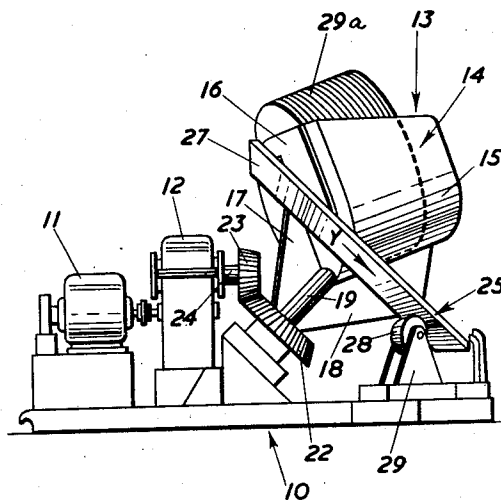
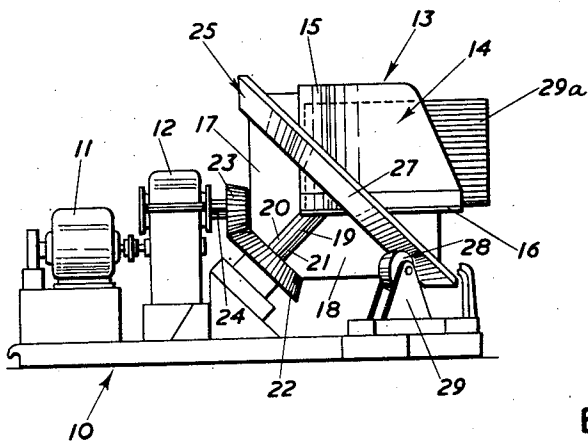


FIG. 4



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COIL HANDLING APPARATUS

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This invention relates to coil handling apparatus.

During the manufacture of steel, strip is frequently handled in the form of cylindrical coils of considerable size and weight. It is often necessary to turn the coils through an angle of 90° to change their axes from a horizontal to a vertical position or vice versa.

A known type of apparatus for this purpose is called a "coil down-ender" and is in the form of a box or cradle which receives the coil with its axis horizontal from the ram of a fork truck, or the like. The cradle is pivoted about a horizontal axis so that it may be swung back vertically through 90° until the coil axis is vertical. The coil may then be removed from the other side of the down-enders; or in some cases, the down-ender is also arranged to rotate about a vertical axis so that it may be turned through an angle of 180° and unloaded in the loading position. This latter feature does away with the need for a clear space around the down-ender which would otherwise be necessary to permit the fork truck to maneuver.

It is an object of the present invention to provide an improved form of down-ender coil handling apparatus wherein the two rotations of former apparatus are combined in one.

Coil handling apparatus of the invention generally comprises a coil receiver in the form of a box or cradle, rotatably mounted on an axis inclined at about 45° to the horizontal so that a rotation of 180° will both turn the axis of the coil through a vertical angle of 90° and in effect rotate it through a horizontal angle of 180° so that the coil is presented with its axis in the required position at the same position for unloading at which it was loaded.

The invention will be appreciated from a study of the following specification taken in conjunction with the accompanying drawings.

In the drawings:

Figure 1 is a perspective view of a preferred form of coil handling apparatus according to the invention; and Figures 2 to 4 are side elevations illustrating rotating operation of the apparatus of Figure 1.

Referring to the drawings, a machine base 10 carries a drive motor 11, a speed reduction device 12 and coil handling apparatus 13.

The coil handling apparatus 13 comprises the receiver 14 in the form of a cradle having a wall formed of a metal plate 15 bent generally in the shape of the letter U at right angles to and mounted on a support wall 16. When the receiver or cradle 14 is in the upright position as illustrated in Figures 1 and 2, the cradle components 15 and 16 are supported by the then vertical support plates 17 and 18 welded to support shaft 19 as at 20 and 21. Shaft 19 is journaled in the inclined abutment and thereby disposed preferably at an angle of forty-five degrees to the horizontal. Bevel gear 22 on shaft 19 is driven by the bevel pinion 23 of reduction output shaft 24 of the drive reduction device 12, the latter in turn being driven by motor 11.

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During rotation of shaft 19, it is necessary to otherwise support the cradle or receiver 14, for example, by the support ring 25 extending thereabout and disposed such that its radial plane is at right angles to shaft 19.

Suitable spokes 26 in the form of plates extend from the support ring 25 to the receiver 14 being welded in place to provide a rigid construction. The ring 25 is so formed that its bearing surfaces 27 are geometrically contained in a cone of 45 degrees apex angle. Supporting rollers 28 are mounted in brackets 29 on the machine base 10 and are of frusto-conical form to engage and support the bearing surfaces 27 of the ring 25.

In operation, a coil 29a as shown in Figure 2, is deposited in the receiver 14 in an upright position. The motor drive is then actuated by suitable electrical switch means (not shown) whereby the receiver is rotated on shaft 19 in the direction of arrow Y as shown in Figure 3, until the coil arrives at a horizontal position as indicated in Figure 4.

It will be apparent that the coil moves on an elliptical path in the vertical plane so that its motion near the stop positions, i. e., the vertical or horizontal positions, is nearly horizontal. Accordingly, a highly accurate stopping device is not required. Thus only the power to the motor need be switched off to effect a satisfactory stopping operation. The gear reduction unit serves as a sufficient brake since the handling apparatus is in substantial balance at the vertical and horizontal positions of the coil though this condition is not essential. It is also desirable to point out that the receiver is so located and constructed relative to the shaft 19 that a coil received therein is disposed thereby substantially with its center of gravity in alignment with the axis of the shaft. This condition further decreases the power consumption required in handling the coil.

It is intended that the present disclosure should not be construed in any limiting sense other than that indicated by the scope of the following claims.

What I claim is:

1. Coil handling apparatus comprising, in combination: a coil receiver in the form of a cradle having two walls disposed at substantially right angles to each other; a drive shaft disposed at an angle of about forty-five degrees to the horizontal; means mounting said cradle on said shaft whereby the right angle between its walls is substantially bisected by the prolongation of the axis of said shaft; a support ring disposed at right angles to said shaft about said cradle; means rigidly connecting said cradle to said ring; and means for supporting said ring during rotation of said cradle about said axis.

2. Coil handling apparatus comprising, in combination: a coil receiver in the form of a cradle having two walls disposed at substantially right angles to each other; a drive shaft disposed at an angle of about forty-five degrees to the horizontal; means mounting said cradle on said shaft whereby the right angle between its walls is substantially bisected by the prolongation of the axis of said shaft; a support ring disposed at right angles to said shaft and co-axial therewith; means rigidly connecting said cradle to said ring; a frusto-conical bearing surface defining an exterior surface of said ring and having its geometric apex located near the lower end of said shaft; and frusto-conical rollers disposed to engage said surface of said ring to support the latter and said cradle during rotation about the axis of said shaft.

3. Coil handling apparatus comprising, in combination: a coil receiver in the form of a cradle having two walls disposed at substantially right angles to each other; a drive shaft disposed at an angle of about forty-five degrees to the horizontal; means mounting said cradle on said shaft whereby the right angle between its walls is substantially bisected by the prolongation of the axis of

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said shaft; a support ring disposed at right angles to said shaft about said cradle; means rigidly connecting said cradle to said ring; means for supporting said ring during rotation of said cradle about said axis; a speed reduction device geared to said shaft; and a motor for driving said reduction device.

4. Coil handling apparatus comprising, in combination: a coil receiver in the form of a cradle having two walls disposed at substantially right angles to each other; a drive shaft disposed at an angle of about forty-five degrees to the horizontal; means mounting said cradle on said shaft whereby the right angle between its walls is substantially bisected by the prolongation of the axis of said shaft; a support ring disposed at right angles to said shaft about said cradle; means rigidly connecting said cradle to said ring; means supporting said ring during rotation of said cradle about said axis; a speed reduction device geared to said shaft; a motor for driving said reduction device; and a machine base supporting said motor, reduction device, shaft, cradle and ring therefor.

5. Coil handling apparatus comprising, in combination: a coil receiver in the form of a cradle having two walls disposed at substantially right angles to each other; a drive shaft disposed at an angle of about forty-five degrees to the horizontal; means mounting said cradle on said shaft whereby the right angle between its walls is substantially bisected by the prolongation of the axis of said shaft; a support ring disposed at right angles to said shaft and coaxial therewith; means rigidly connecting said cradle to said ring; a frusto-conical bearing surface defining an exterior surface of said ring and having its geometric apex located near the lower end of said shaft; frusto-conical rollers disposed to engage said surface of said ring to support the latter and said cradle

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during rotation about the axis of said shaft; a speed reduction device geared to said shaft; and a motor for driving said reduction device, the inertia of said reduction device serving as drag braking means substantially retaining said cradle against rotation except under driving action of said motor.

6. An apparatus for down-ending unattached movable articles and comprising a base member, a rotatable element carried thereby and having its axis of rotation fixedly set at an angle of approximately 45° to the horizontal, means for rotating the element, a cradle carried by and rotatable with the element for receiving an article to be down-ended and having a pair of walls positioned at substantially right angles to each other and upon which an article contained within the cradle to be down-ended by rotation of the cradle successively rests, the right angle between the walls being substantially bisected by the prolongation of the axis of the rotatable member whereby one wall is substantially horizontal and the other wall substantially vertical when the cradle is normally at rest, and means incorporated in the cradle for retaining a contained article from sliding out of the cradle during the article down-ending rotation.

7. An apparatus as claimed in claim 6, wherein a member is positioned between adjacent side portions of the two cradle walls to constitute the means in the cradle for retaining a contained article in the cradle from sliding out of the cradle during the article down-ending rotation.

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