

L. M. LAING ET AL

POSITION-CHANGING APPARATUS FOR COILS

3 Sheets-Sheet 1



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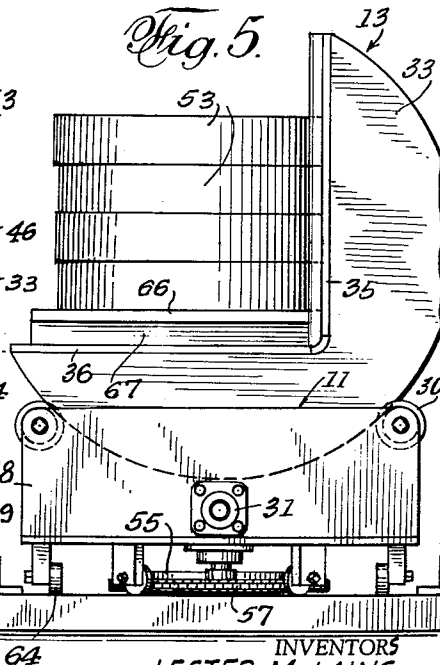
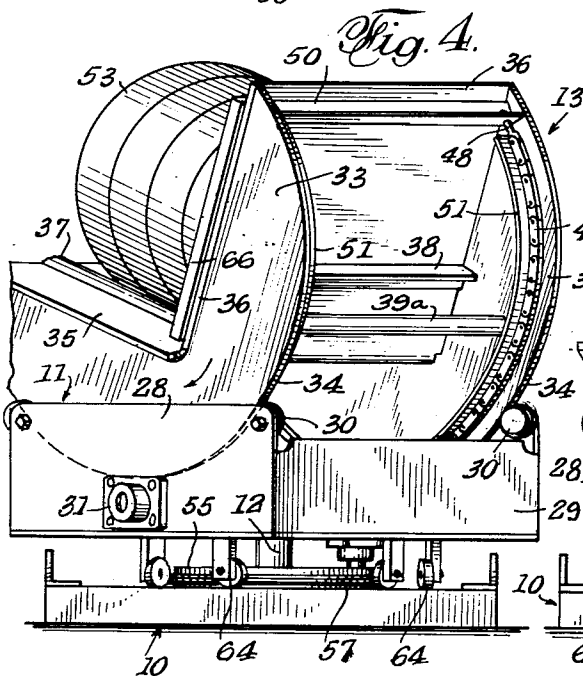
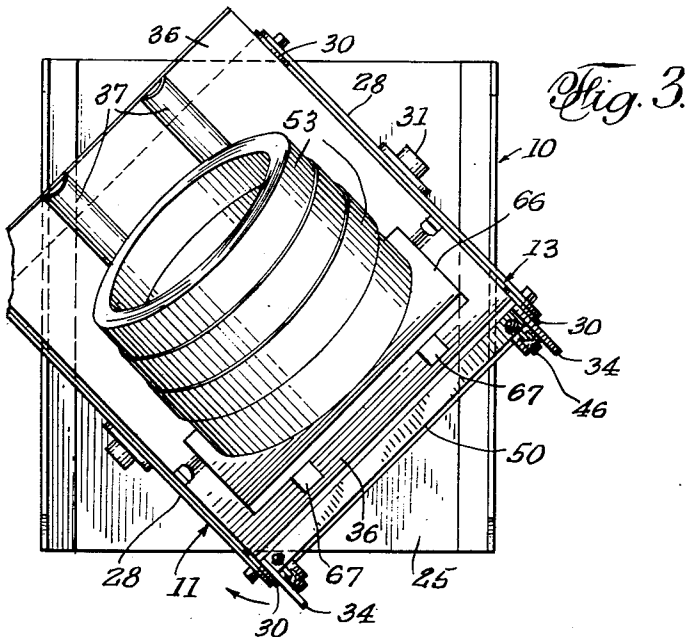
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POSITION-CHANGING APPARATUS FOR COILS

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3 Sheets-Sheet 2



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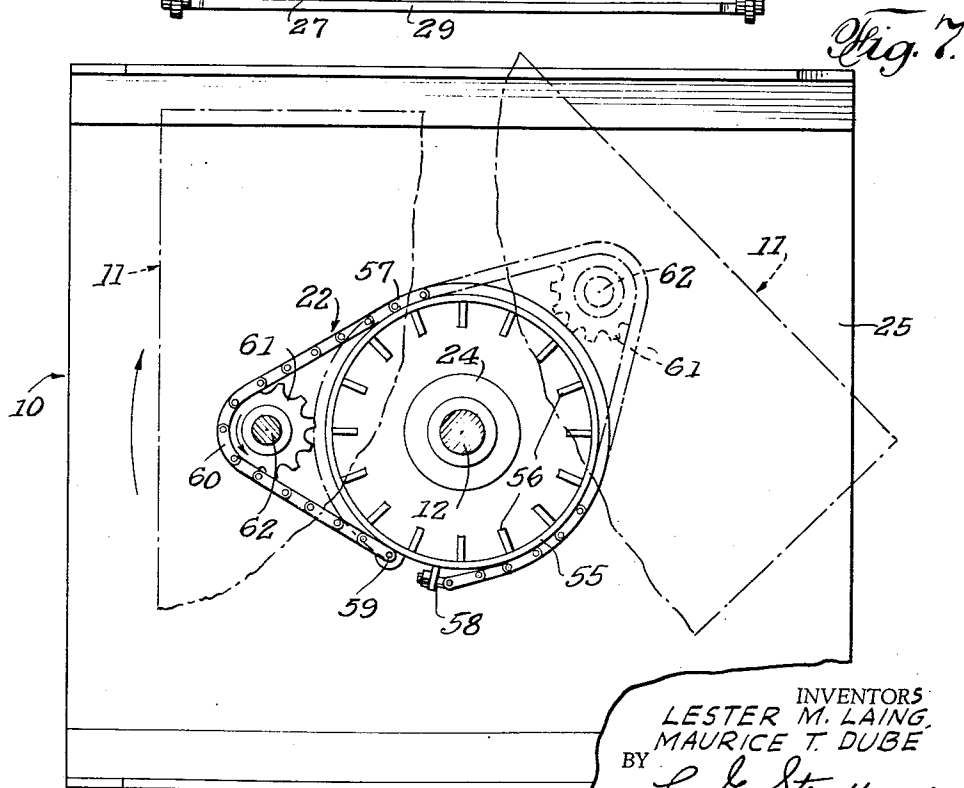
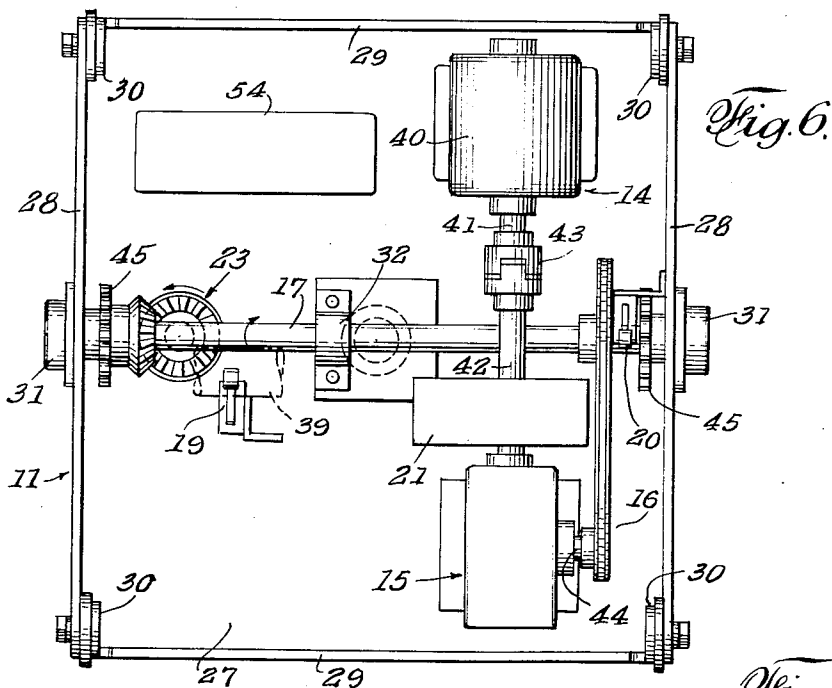
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POSITION-CHANGING APPARATUS FOR COILS

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3 Sheets-Sheet 3



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POSITION-CHANGING APPARATUS FOR COILS
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This invention relates to apparatus for changing the position of heavy articles, such as coils of steel strip and the like.

Heavy coils of steel are best unloaded from a transporting vehicle supporting them with their axes horizontal by picking them up with the forks of industrial lift trucks thrust into the coils. However, these trucks can set the coils down only in the same position they were picked up. Since such coils are best stored in horizontal position with their axes vertical, it is an object of the present invention to provide simple, effective and efficient apparatus that receives coils vertically from a lift truck and moves the same to a horizontal position on a support platform or pallet, which is then adapted to be handled by a lift truck to move the pallet-supported coils to a place of storage. Hence, the invention provides novel means for turning articles through a range of 90° to move them from a vertical to a horizontal disposition.

Another object of the invention is to provide apparatus of the character referred to that may be operated to move articles such as coils to a vertical position from a horizontal position, as when stored. Thus, the apparatus contemplated is reversible.

A more general object of the invention is to provide apparatus that facilitates loading and unloading of trucks, freight cars, etc. by providing for the change in disposition of articles, such as heavy coils of strip metal.

A further object of the invention is to provide apparatus of the character referred to that delivers an article to the same point at which the same had been initially received, the apparatus, while moving the article, changing its disposition as hereinabove indicated.

A yet further object of the invention is to provide apparatus of the character indicated that, primarily because the received and delivered positions are the same, may be placed against a wall or in a corner, thereby saving floor space.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

FIG. 1 is a side elevational view of apparatus for moving articles from one position to another to facilitate handling of said articles.

FIG. 2 is a broken vertical sectional view thereof as taken on a plane parallel to the plane of FIG. 1.

FIG. 3 is a plan view, to a reduced scale, showing said apparatus in an intermediate position between the position of FIG. 1 and that of FIG. 5.

FIG. 4 is a side view thereof.

FIG. 5 is a side elevational view showing the apparatus in the position thereof where articles have been moved from a vertical or nearly vertical disposition to a horizontal position.

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FIG. 6, to the scale of FIG. 1, is a plan view of a rotary base used in the apparatus.

FIG. 7 is a plan sectional view of the fixed base of said apparatus.

The article-handling apparatus that is illustrated comprises, generally, a fixed base 10, a rotational base 11 centered on the base 10 and movable about a pivot locating the rotational base on the fixed base, a cradle 13 supported by the rotational base and movable around a center or axis in a plane transverse to the horizontal plane on which the base 11 moves, the cradle, therefore, having a compound movement which not only includes the movement of the cradle but also the movement of the rotational base, a prime mover 14 carried by the rotational base, reducing gear 15 driven by the prime mover, a drive 16 between said gear 15 and a drive shaft 17 that extends across the rotational base, a chain drive 18 between said shaft and the cradle whereby the latter is moved between its extreme positions with the articles thereon moved between a substantially vertical position and a horizontal position, limit switches 19 and 20 carried by the base 11 and operated at said extreme positions by the cradle to stop the drive to the shaft 17, a brake mechanism 21 controlled by said limit switches to prevent overrun of the drive when the same is stopped, a chain drive 22 between the fixed base 10 and the rotational base, and a drive connection 23 between the shaft 17 and the drive 22.

The fixed base 10, preferably at its center, is provided with a bearing 24 in which the pivot 12 is guided so that the rotational base may turn about the pivot of said shaft. Said base 10 is provided with a base plate 25 that may be spaced from the ground by end supports 26.

The rotational base 11 is shown as a rectangular housing having a bottom wall 27 and opposite pairs of side walls 28 and 29. Said base 11 is formed by said walls to comprise a top-open base member. At the upper opposite ends of the walls 28 there are provided a set of support rollers or wheels 30 that are arranged in two pairs, two wheels on each wall 28.

The mentioned drive shaft 17 is shown as extending transversely between walls 28 and as being supported in outer bearings 31 on said walls and an inner bearing 32 affixed to the bottom wall 27.

The cradle 13 comprises side plates 33 that have arcuate edges 34, and connecting support walls 35 and 36. Each said wall 35 and 36 subtends a segmental portion of the walls 33. The angle between walls 35 and 36 is preferably 90°, as shown. By forming the edges 34 to extend through arcs of about 220° and placing the walls 35 and 36 to be symmetrical with respect to said edges, the cradle is provided with two article-supporting parts that are mutually at right angles and of which said walls 35 and 36 comprise the base plates. One wall, the wall 35, is provided with a pair of transversely spaced longitudinal cleats 37. Each wall 35 and 36 is reinforced by an angle member 38 and the cradle generally is reinforced by tubes 39 and 39a extending between the arcuate side plates 33.

The prime mover 14 is shown as an electric motor 40, the same having a drive shaft 41 that is connected to a driven shaft 42 by a coupling 43.

The shaft 42 comprises the input of the reducer 15, the latter having an output shaft 44 that rotates at a much slower speed than does the motor shaft.

The drive 16 connects said shaft 44 and the shaft 17, the connection, in this case, being a sprocket and chain. Thus, the drive to shaft 17 is much slower than is the speed of the motor 40. A fraction of a revolution per minute of shaft 17 is exemplary.

The chain drive 18 comprises a sprocket wheel 45 on each end of shaft 17 adjacent the base walls 28, a chain 46 trained around each said sprocket wheel and connected at its ends by bolts 47 and 48 to cross angles 49 and 50

of the cradle adjacent the respective outer edges of the cradle support walls 35 and 36, and an arcuately curved shoe 51 affixed to the inner face of each cradle side 34, parallel to and inwardly spaced from the plate edges 33. Said shoes 51 are preferably reinforced by gusset plates 52 so as to better support the forces imposed by the chains 46. As can be seen best from FIG. 2, the chains form bights around the sprockets 45 and comprise a means not only to rock the cradle while supported on rollers 30, but also to hold the cradle down on the base 11. It will be clear that rotation of shaft 17 in one direction will rock the cradle to upend support plate 35 and bring support plate 36 to a horizontal position, and that rotation of shaft 17 in the other direction will rock the cradle back to its initial position with the support plate 35 horizontal or nearly so.

While the electric circuit controlling the motor 40 is not shown, it will be understood that the same may be controlled by the movement of the cradle. The means controlling stopping and starting of the cradle may be carried out by different means. For instance, a reversing switch may be actuated by the cradle near the end of its movement in either direction, and limit switches used to insure breaking of the circuit and/or operation of the brake mechanism 21. In the present case, the limit switches in such a circuit are shown. Switch 19 is normally closed and is opened by the cradle member 39 when the cradle reaches the position of FIG. 1 where the same is receptive of articles, here shown as coils of strip metal 53. Switch 20 is similarly actuated being opened by the cradle member 39a when the cradle reaches the position of FIG. 5 where the coils thereon are supported in a horizontal position.

Thus, the electrical control means may be set into operation by a single switch button or by two buttons, selectively, it being essentially immaterial which is used, provided the cradle and its rotating support frame move as herein described.

An electric control box 54 conventionally encloses the relays, etc. needed to operate the circuit which may be set into operation by a conventional starter switch of the push-button type. The starter switch starts the operation and one or the other limit switch or a reversing switch stops the operation.

The brake mechanism 21 is also conventional and is here shown as operatively associated with shaft 42. Said brake, from its normally "on" position, is opened when the motor 40 is energized and trips "off" to brake the shaft 42 when one of the limit switches is operated.

The chain drive between the two bases 10 and 11 is shown as a fixed drum 55 centered on the axis shaft 12 and affixed to the base plate 25. Said drum has reinforcing gussets 56. A chain 57 is trained, from one connecting point 58, around said drum and extends to another connecting point 59. Said chain is substantially longer than the circumference of said drum so as to form a bight 60 around a sprocket wheel 61 carried by a shaft 62 from the rotational base 11. It will be clear that rotation of said sprocket wheel 61 will cause the same to have planetary movement around the drum 55, the dot-dash line position of FIG. 7 showing how the chain bight 60 traverses circularly around the axis 12.

Since the axis of said sprocket wheel is fixedly carried by the base 11, said base will bodily turn around the axis 12 as the sprocket wheel is turned on its own axis. The latter rotation is effected by the drive connection 23 which is shown as bevel gearing connecting shafts 17 and 62. This gearing is such as to cause clockwise rotation (as in FIG. 7) of the rotational base while the carriage is being moved from the position of FIG. 1 to that of FIG. 5.

By providing the rotational base 11 with a set of wheels 64 arranged around the pivot 12 and engaging said wheels so as to track over the base plate 25, the base 11 is stabilized while turning and it better supports its load during operation.

When unloading a truck or freight car, the forks 65 of a lift truck pick up one or more coils 53 and set them, in vertical position, on the support wall 35. Beforehand, a pallet 66 is placed in vertical position against the vertical wall 36 with the cleats 67 of said pallet against the latter wall. It will be seen from FIG. 1 that the cradle is preferably at a slight angle with the wall 36 tilted backwardly. Thus, the coils 53 will seek a position firmly against pallet 66 because of their backward tilt. The cleats 37 of wall 35 serve to prevent roll-off of the coils by nesting them (see FIG. 3).

Now, the motor 40 is started to cause the base 11 to turn 180° on its pivot 12, while the cradle rocks to a position (FIG. 5) with the wall 36 thereof horizontal and the coils 53 resting upon the pallet 66. The open end of wall 36 will be facing in the same direction that the open end of the wall 35 had faced before the above transition was made. Now, the forks of a lift truck may be inserted beneath pallet 66 and the same, together with its load, may be lifted and moved to a place of storage.

It will be clear that a truck or freight car can be loaded by an operation that is the reverse of the above. A lift truck may transport a coil-laden pallet from a place of storage and place the same on wall 36. Then, after the cradle has been simultaneously rocked and turned to the position of FIG. 1, a lift truck may remove the coils by using its forks 65 as before.

While the foregoing specification illustrates and describes what we now contemplate to be the best mode of carrying out our invention, the construction is, of course, subject to modification without departing from the spirit and scope of our invention. Therefore, we do not desire to restrict the invention to the particular form of construction illustrated and described, but desire to cover all modifications that may fall within the scope of the appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. An article-handling device comprising: a fixed base having an upper horizontal surface; a rotational base having a lower horizontal surface overlying the horizontal surface of the fixed base; anti-friction tracking means carried by one of said bases between said horizontal surfaces and effective to transmit load carried by the rotational base to the fixed base and arranged circumferentially around and spaced from the axis of rotation and adjacent the periphery of said rotational base; a pair of side walls projecting upwardly from opposite sides of said rotational base; a load-carrying cradle having load-engaging surfaces arranged at right angles to one another, the surfaces serving, each in turn, to support an article on one side while the other surface abuts another side at right angles to the supported side to steady the article; arcuate vertical side walls on which said load-engaging surfaces are mounted; two spaced aligned and rotary anti-friction means mounted on each wall projecting upwardly from the rotational base, said anti-friction means being freely rotational, the arcuate edges of the side walls on which said load-engaging surfaces are mounted resting on and frictionally engaging said anti-friction means; means independent of the anti-friction rotary means to rock said cradle through 90° in a vertical plane while supported on the anti-friction means and frictionally rotating the same; and means to rotate said rotational base in a horizontal plane.

2. An article-handling device according to claim 1, the means to rotate the rotational base comprising a chain connected at both ends to the fixed base and provided with a bight, and a rotational sprocket wheel carried by the rotational base and engaged with the chain to track within said bight, a fixed drum being provided on the fixed base and to which the chain ends are connected.

3. An article-handling device according to claim 1, the means to rock the cradle comprising a chain connected at its ends to opposite ends of the cradle and provided with

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a bight, and a rotational sprocket wheel carried by the rotational base and engaged with the bight of the chain.

4. An article-handling device according to claim 1 including a single drive means for the rotating and rocking means, said single drive means being mounted on the rotational base.

5. An article-handling device according to claim 4 and in which the single drive means for the rotating and rocking means simultaneously rotates the rotational base 180° in one plane and rocks the cradle 90° in a transverse plane.

6. A device for handling articles comprising a fixed horizontal base, a fixed horizontal drum disposed at the middle of the base, a housing disposed above said base, an axial support interconnecting the housing and base and around which the former is adapted to rotate, means supporting peripheral portions of the housing from the base to steady said housing during such rotation, a drive means disposed within the housing, a horizontal shaft journaled in said housing and rotated by said drive means, a vertical shaft carried by the housing eccentrically of the axis of rotation thereof and extending through the bottom of the housing outside the mentioned drum, a driving connection between said shafts, a chain connected by its ends to the drum and longer than the periphery of said drum, said vertical shaft being provided with a sprocket around which said chain is trained whereby rotation of the latter shaft by the drive means rotates said sprocket to track along the chain causing the housing to turn on

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its axis, a set of support rollers carried by said housing on horizontal axes, a cradle having curved support sides supported by the edges of said sides on said rollers and adapted to rock thereon in a vertical plane, a chain connected by its ends to spaced points of one of said sides, and longer than the distance around the curvature of the mentioned edge between the ends of the chain, and a sprocket on the horizontal shaft of the housing around which the latter chain is trained, the drive means, thereby, driving both sprockets at the same time to rock the cradle in a vertical plane while the housing turns in a horizontal plane, said cradle being provided with article-supporting faces at right angles to each other that assume article-supporting horizontal positions according to the direction that the cradle is rocked.

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