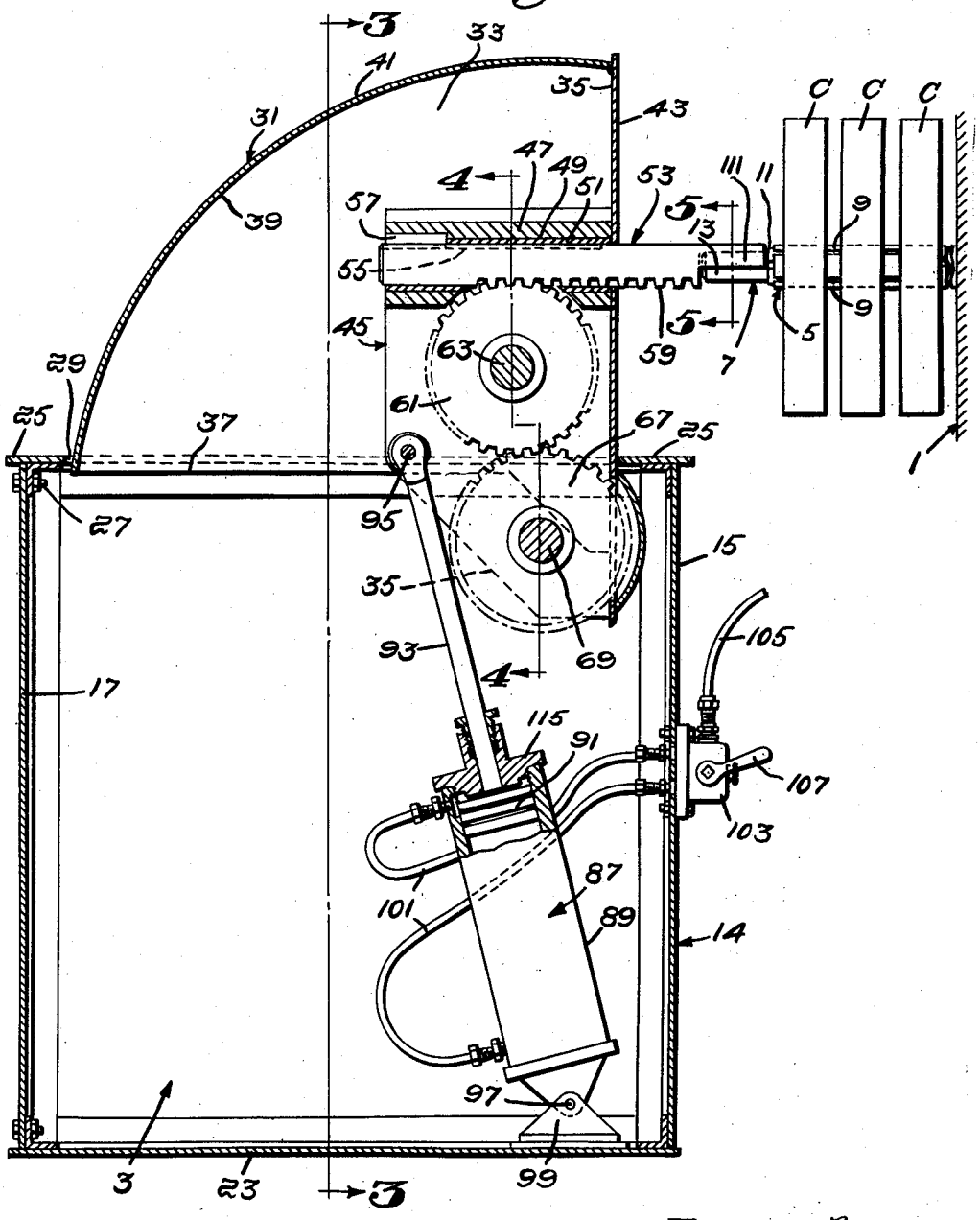
Oct. 23, 1956 E. L. VALIN 2,767,932

COIL HANDLING APPARATUS

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Fig. 1.



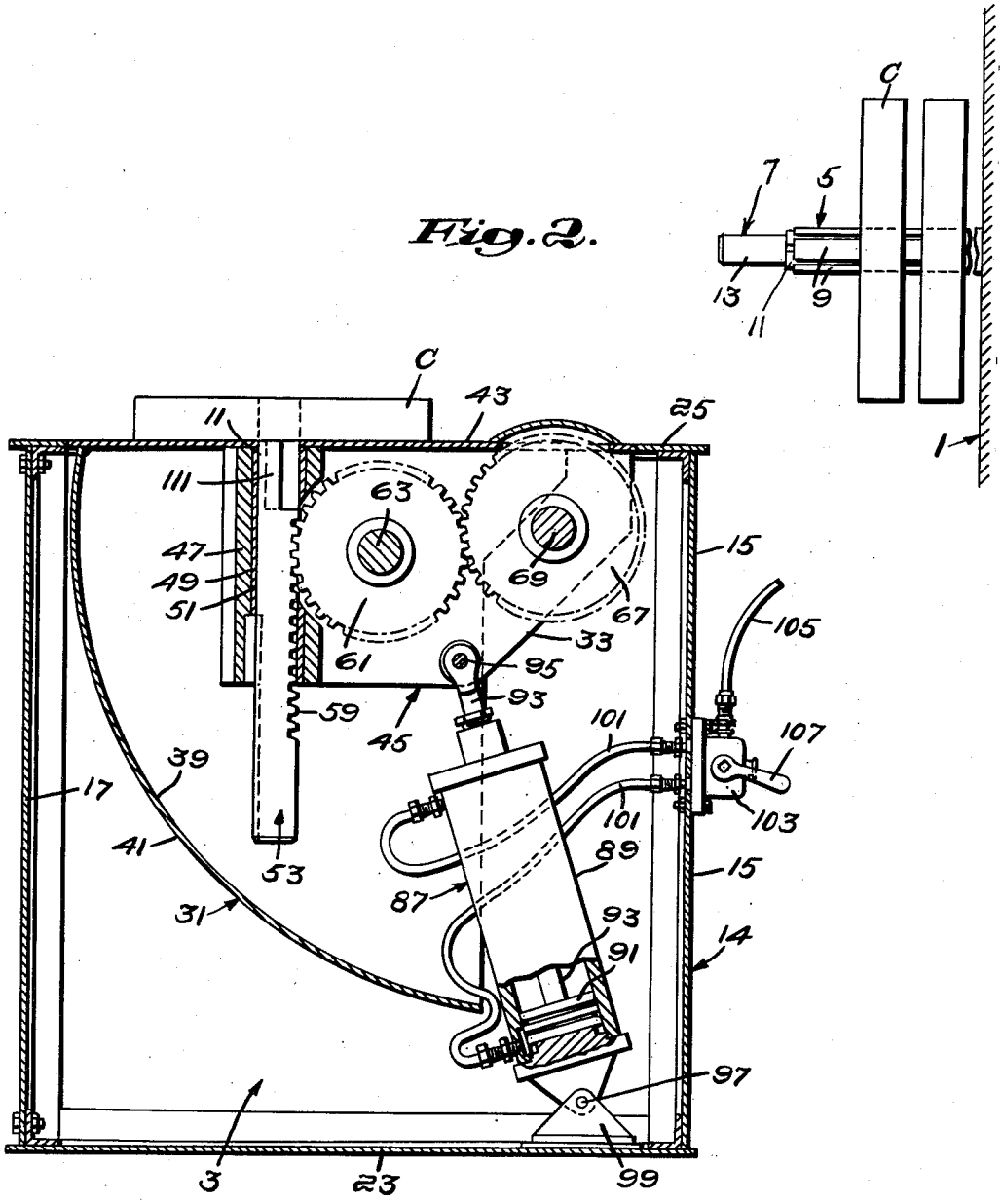
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COIL HANDLING APPARATUS

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Fig. 2.



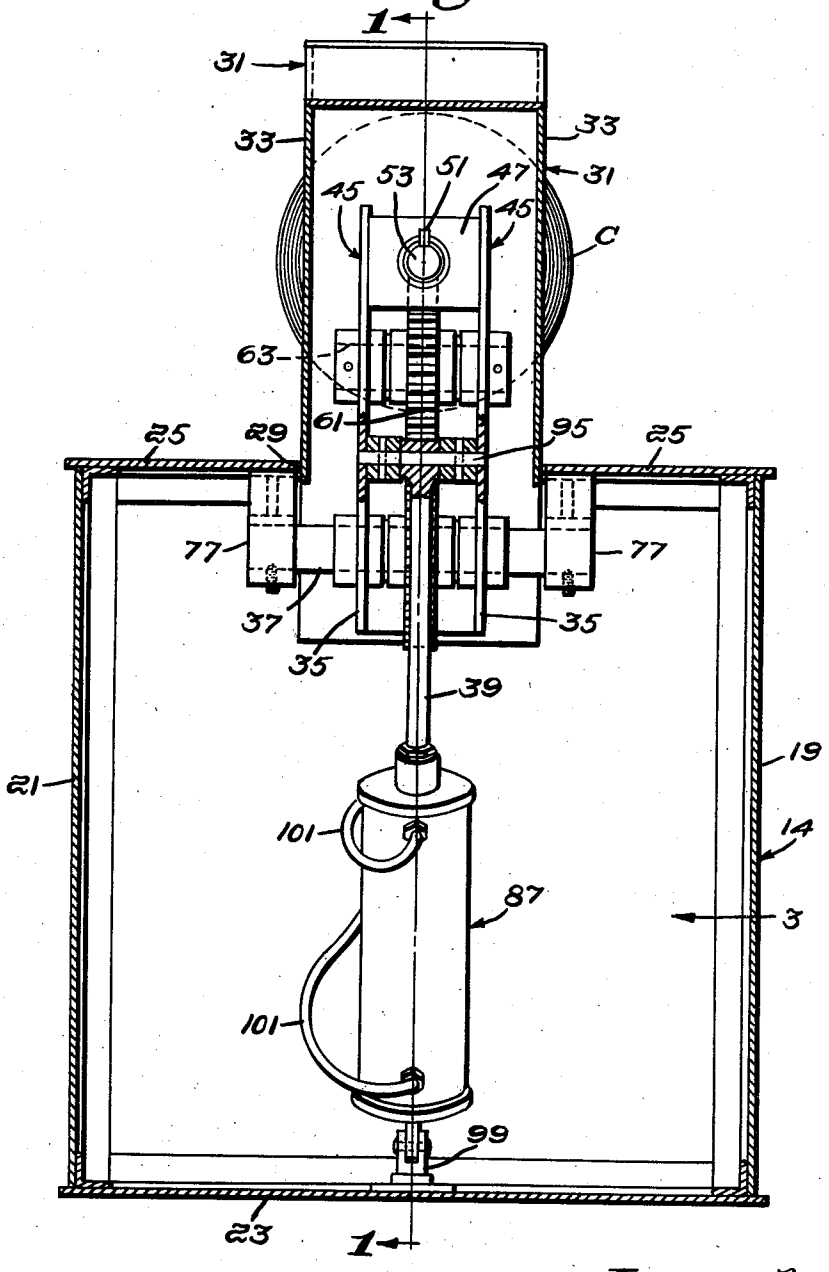
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Fig. 3.



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Fig. 4.

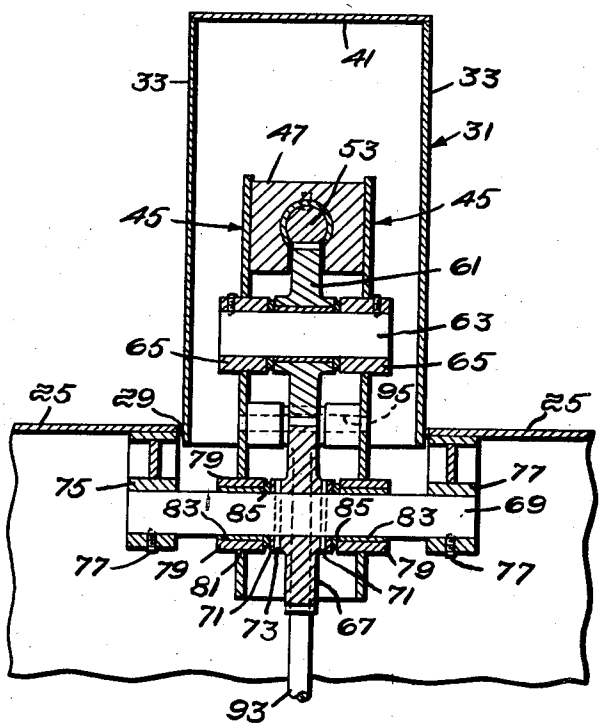
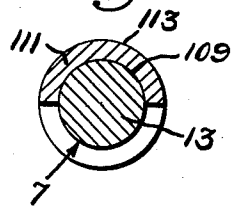


Fig. 5.



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United States Patent Office 2,767,932
Patented Oct. 23, 1956

2,767,932

COIL HANDLING APPARATUS

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Application January 8, 1953, Serial No. 330,212

8 Claims. (Cl. 242—79)

My invention, which relates to strip handling apparatus, is particularly concerned with a device for receiving and upending coils, especially coils of narrow strip formed by longitudinally dividing a wider strip by use of a so-called "slitter" and winding them as they come from the slitter on the so-called "blocker" of a coil winding machine. These and other objects of the invention however will be best understood from the following description when read in the light of the accompanying drawings, while the scope of the invention will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a section on the line 1—1 of Fig. 3, with parts shown in elevation;

Fig. 2 is a view, corresponding to Fig. 1, with parts in a different operative position; and

Figs. 3, 4 and 5 are, respectively, sections on the lines 3—3, 4—4 and 5—5 of Fig. 1.

Referring to the drawings, the winding machine, schematically indicated in its entirety by the reference numeral 1, is associated with the coil upender indicated in its entirety by the reference numeral 3. The winding machine indicated comprises the rotary arbor-like blocker 5 which projects cantilever fashion from the body of the machine. On this blocker the winding machine winds each narrow strip into a pancake coil C as such strips come from the slitter, such coils being wound in slightly spaced relation with respect to each other as shown, or in abutting relation, as convenient.

As shown, the blocker comprises a driven rotary shaft 7 and a split sleeve formed of longitudinally extending segments 9, these segments being mounted on a longitudinally extending exteriorly tapered sleeve 11 mounted on and rotatable with the shaft. One of these segments 9 is provided in the usual manner with a longitudinally extending slot (not shown) for receiving the inner ends of the coils for permitting the strips to be wound under tension as they come from the slitter. By slightly sliding the sleeve 11 longitudinally relative to the shaft 7 (by means not shown) the sleeve formed of the segments will collapse to release the coils to permit them to be slid from the blocker over its free end. As shown, and for a purpose hereinafter described, the shaft 7 is provided with a projecting free end portion 13 of reduced diameter, and the winding machine and blocker being otherwise of well known construction it is believed unnecessary further to describe them.

The upender 3 illustrated comprises a box-like casing or table, indicated in its entirety by the reference numeral 14, having the opposite lateral walls 15 and 17, opposite lateral walls 19 and 21, bottom wall 23, and table top 25. These parts of the casing or table, which are of metal, are rigidly secured together at their adjacent edges in any suitable manner, and conveniently by welding, except in the case of the lateral wall 17 which preferably is removably secured to the rest of the casing by bolts 27 so as to provide for ready access to the interior of the casing.

As shown, the table top 25 is provided with an opening 29 with which is associated a tiltable casing-like part indicated in its entirety by the reference numeral 31. As shown, this part 31 is provided with opposite flat lateral walls formed of metal plates 33 each defined by straight edges 35 and 37 at right angles to each other and an arcuate edge 39. Welded to the arcuate edges of these two walls is a connecting arcuate metal wall or plate 41. Welded to the straight edges 35 of the two walls 33 and the adjacent edge of the arcuate wall 41 is a flat coil supporting plate or wall 43. The plate 43, as shown in Fig. 1, extends downwardly beyond the straight edges 37 of the plates 33 into the interior of the casing or table 14.

Secured to the wall 43 by welding or otherwise, at a position between the two walls 33, is a pair of spaced opposite metal plates 45, these plates 45 extending downwardly to adjacent the lower edge of the wall 43. Between the plates 45, in contacting relation thereto adjacent their upper edges, is positioned an elongated block 47, one end of which block rests against the wall 43. This block is secured in any suitable manner, for example by welding, to said plates and wall.

As shown, the block 47 is provided with a bore 49 into which is driven a sleeve 51, and within this sleeve slidably fits a reciprocatory coil supporting arbor 53. As illustrated, this arbor 53 is provided with a longitudinally extending keyway 55 slidably receiving a key 57 fixedly carried by the block for non-rotatably splining the arbor to said block.

The arbor 53, as further illustrated, is provided with a longitudinally extending series of transverse rack teeth 59 with which meshes a rack pinion 61. This rack pinion, as best shown in Fig. 4, is rotatably mounted on the intermediate portion of a shaft 63, the end portions of which shaft are carried by bushings 65 extending through openings in the plates 45 and welded thereto. The rack pinion in turn meshes with a non-rotatable gear or pinion 67. This gear 67 is carried by the intermediate portion of a shaft 69 to which the longitudinally extending hub portions 71 of the gear are non-rotatably secured, for example, by pins 73. The shaft 69 at its opposite end portions as shown is carried by brackets 75, to which brackets the shaft is non-rotatably secured by set screws 77, the brackets being welded to or otherwise fixedly carried by the immovable table top 25.

The plates 45, as shown, carry bushings 79 which extend through openings 81 in said plates, to which latter the bushings are welded. Driven into these bushings are bearing sleeves 83, which latter are rotatably mounted on the shaft 69 so as swingingly to mount on said shaft the part 31 to which the plates 45 are rigidly secured. As shown, these bushings and sleeves are separated from the hub portions 71 of the fixed gear 67 by washers 85, each of which washers abuts at one side thereof with the outer end face of the adjacent hub portion of such gear 67 and at its opposite side with the adjacent end face of the adjacent sleeve 83 so that the part 31 is prevented from end play relative to the shaft. By this construction it will be observed that the entire part 31, including the reciprocatory arbor 53 and rack pinion 61, is bodily tiltable about the axis of the horizontal shaft 69.

For tilting the part 31 a so-called "air cylinder" 87 is provided. This air cylinder, as shown, comprises the cylinder proper 89 in which is reciprocally mounted a piston 91 to which is connected for reciprocation therewith a piston rod 93. The piston rod at its outer end is shown as pivotally secured by a pin 95 to the plates 45, which plates carry the pin and between which plates the upper end portion of the piston rod extends. As shown, the lower end of the cylinder is pivotally secured by a

pin **97** to a bracket **99** fixedly carried by the bottom wall **23** of the casing or table **14**. Opposite ends of the cylinder are shown as connected by flexible hoses **101** to the casing **103** of a manually operated four-way valve, this casing being fixedly carried by the lateral wall **15** of the table and being supplied with compressed air by a suitable conduit **105**, while the valve is provided with the operating handle **107**. As will be clearly understood by those skilled in the art, the four-way valve may be moved by the operator to place the flexible hoses **101** alternately in communication with the atmosphere and the compressed air supply conduit, so as alternately to admit and exhaust compressed air to and from opposite ends of the cylinder **89** and in that way reciprocate the piston **91** for tilting the part **31** carrying the arbor **53** selectively in either of opposite directions, the piston when moved to either end of its stroke remaining at that end until the valve is moved to reverse the connections of the ends of the cylinder to the compressed air supply conduit and the atmosphere.

The parts are so designed that when the piston **91** is adjacent the upper end of its stroke, as viewed in Fig. 1, the arbor **53** will be positioned horizontally and the coil support **43** positioned vertically, the arbor when in such position projecting horizontally from such support and being in alignment with the blocker shaft **7**. Under these conditions one or more coils may be slid from the blocker shaft onto the arbor and against the coil support **43**. By manipulation of the handle **107** of the four-way valve the piston may then be caused to move to the end of its downward stroke for swinging the coil support **43** into its horizontal position shown by Fig. 2. When the coil support swings from its position shown by Fig. 1 to that shown by Fig. 2 the rack pinion **61**, which constitutes a planetary gear, will roll around the stationary gear **67**, causing the pinion to rotate and move the arbor **53** to the left, as viewed in Fig. 1, so that when the parts are in the position shown by Fig. 2 the arbor will be completely withdrawn from the coil. In this last mentioned position it will be observed that the coil placed on the arbor when the parts were in the position shown by Fig. 1 is upended and stood on end on the support **43**. Movement of the piston from the lower to the upper end of its stroke will of course place the parts again in the position shown by Fig. 1.

It will be understood that the coils wound on the blocker may, if necessary, be temporarily bound prior to severing their outer turns from the lengths of strips coming from the slitter, so as to prevent partial unwinding of the coils. After a coil is upended it may be slid part way off the table top sufficiently to expose part of both ends of the central opening of the coil to permit wires or cords to be passed through that opening and about the periphery of the coil at several places spaced angularly of the coil, as shown by Fig. 6 of United States patent to H. A. Ray 2,615,645, issued October 28, 1952, in that way to bind the turns of the coil together for transportation, the coil being rotated while lying flat on the table with the ends of such opening so exposed to permit such wires or cords to be so placed.

For facilitating sliding of the coils from the blocker onto the arbor **53** the free end of the arbor, as shown, is provided with a bore **109** (Fig. 5) and cut away to form a half segment **111** of a sleeve, which half segment fits over the free end portion **13** of the blocker shaft **7**, at least the upper portion of the outer surface **113** of the half segment being aligned with the corresponding portion of the outer surface of the sleeve formed by the segments **9** of the blocker when this last mentioned sleeve is collapsed to release the coils wound on the blocker.

Preferably the parts are so designed that the half segment **111** on the free end of the coil receiving arbor **53** contacts the reduced free end portion **13** of the blocker just before the piston **91** can move into contact with the upper head **115** of the cylinder **89**. Such construction causes said half segment **111** to cooperate with said free end portion **13** to form a stop means for insuring that the half segment will be properly aligned with the blocker and held firmly in contact with the reduced free end portion of the blocker shaft despite any discrepancies in manufacture and any lost motion of the parts.

It will be understood that within the scope of the appended claims wide deviations may be made from the form of the invention described without departing from the spirit of the invention.

I claim:

1. A device for receiving and upending coils comprising a part pivoted to a stationary support and presenting a surface against which the end of a coil is adapted to rest, a sliding shaft forming a reciprocating arbor carried by said part for axial movement normal and relative to said surface, said arbor having a first position in which its outer end portion is projected axially outwardly beyond said surface into said coil for supporting the latter when slid endwise thereon from a blocker and a second position of reciprocation relative to said surface in which its outer end portion is withdrawn from within said coil and beneath said surface to permit said coil to be slid on said surface, means mounting said part for tilting movement to a first position in which said arbor is in its first projected position to a second position in which said arbor is retracted, power means under control of the operator for tilting said part for selectively placing same in its first and second positions, and positively acting mechanism operated solely by tilting movement of said part to its two positions for reciprocating said arbor axially to its first and second positions.

2. A device according to claim 1 in which the mechanism for reciprocating the arbor comprises a system of relatively movable parts connecting the arbor to a fixed part effective, when the arbor moves with the tiltable part, to move the arbor relative to said tiltable part for reciprocating said arbor.

3. A device according to claim 1 in which the tiltable part is mounted for tilting about a fixed axis, a rack operatively connected to the arbor, a rotatable rack pinion meshing with said rack and mounted for movement with said tiltable part, and a non-rotatable gear meshing with said rack pinion, which gear is carried by a fixed part in coaxial relation to said axis.

4. A device according to claim 1 in which the surface against which the end of the coil is adapted to rest is positioned vertically and the arbor positioned horizontally when in their said first positions and said surface is positioned horizontally and the arbor positioned vertically when in their said second positions, the tiltable part being mounted for tilting about a fixed axis, means forming a rack operatively connected to said arbor for reciprocation therewith, a rack pinion rotatably carried by said tiltable part and meshing with said rack, and a non-rotatable gear meshing with said rack pinion, which gear is carried by a fixed part in coaxial relation to said axis.

5. A device according to claim 1 in which the surface against which the end of the coil is adapted to rest is positioned vertically and the arbor positioned horizontally when in their said first positions and said surface is positioned horizontally and the arbor positioned vertically when in their said second positions, the tiltable part being mounted for tilting about a fixed axis, means forming a rack operatively connected to said arbor for reciprocation therewith, a rack pinion rotatably carried by said tiltable part and meshing with said rack, a non-rotatable gear meshing with said rack pinion, which gear is carried by a fixed part in coaxial relation to said axis; and manually controlled fluid pressure operated means comprising a cylinder and cooperating relatively reciprocatory piston, one of which is pivotally connected to a fixed part and the other of which is pivotally connected to said tiltable part

for tilting the latter about said axis selectively in opposite directions.

6. Apparatus for winding and upending a coil, comprising a blocker adapted to wind thereon a web into a coil, the blocker having a free end over which the coil may be removed therefrom, a swingable arbor for receiving the coil from the blocker and upending it, the arbor having a first position of swinging in which it is longitudinally aligned with the arbor for receiving the coil and a second position of swinging in which the coil so received is upended, means comprising an air cylinder for swinging said arbor into its said first position, the air cylinder having a stroke of such length that said means is adapted to act to urge said arbor to swing past its said first position upon its reaching said position when swung toward it, and stop means for preventing said arbor from being so swung past said position.

7. Apparatus for winding and upending a coil, comprising a blocker adapted to wind thereon a web into a coil, the blocker having a free end over which the coil may be removed therefrom, a swingable arbor for receiving the coil from the blocker and upending it, the arbor having a first position of swinging in which it is longitudinally aligned with the arbor for receiving the coil and a second position of swinging in which the coil so received is upended, means comprising an air cylinder

for swinging said arbor into its said first position, and cooperating means on the blocker and arbor which contact with each other to limit the swinging of the arbor toward the blocker for establishing alignment of the two, the air cylinder having a stroke of such length that the first mentioned means is operative to continue to urge said cooperating means into contact after they are moved into contact by the first mentioned means.

8. Apparatus according to claim 7 in which the free end portion of the blocker is constituted by a part of reduced diameter coaxial with the part thereof on which the coil is adapted to be wound, the free end portion of the arbor being constituted by a longitudinally extending segment of a sleeve adapted to overlie and contact said part of reduced diameter when the arbor is swung into alignment with said blocker.

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