Oct. 25, 1949. C. J. DUBY 2,485,961

COIL HANDLING APPARATUS AND METHOD

Filed Oct. 3, 1945 4 Sheets-Sheet 1

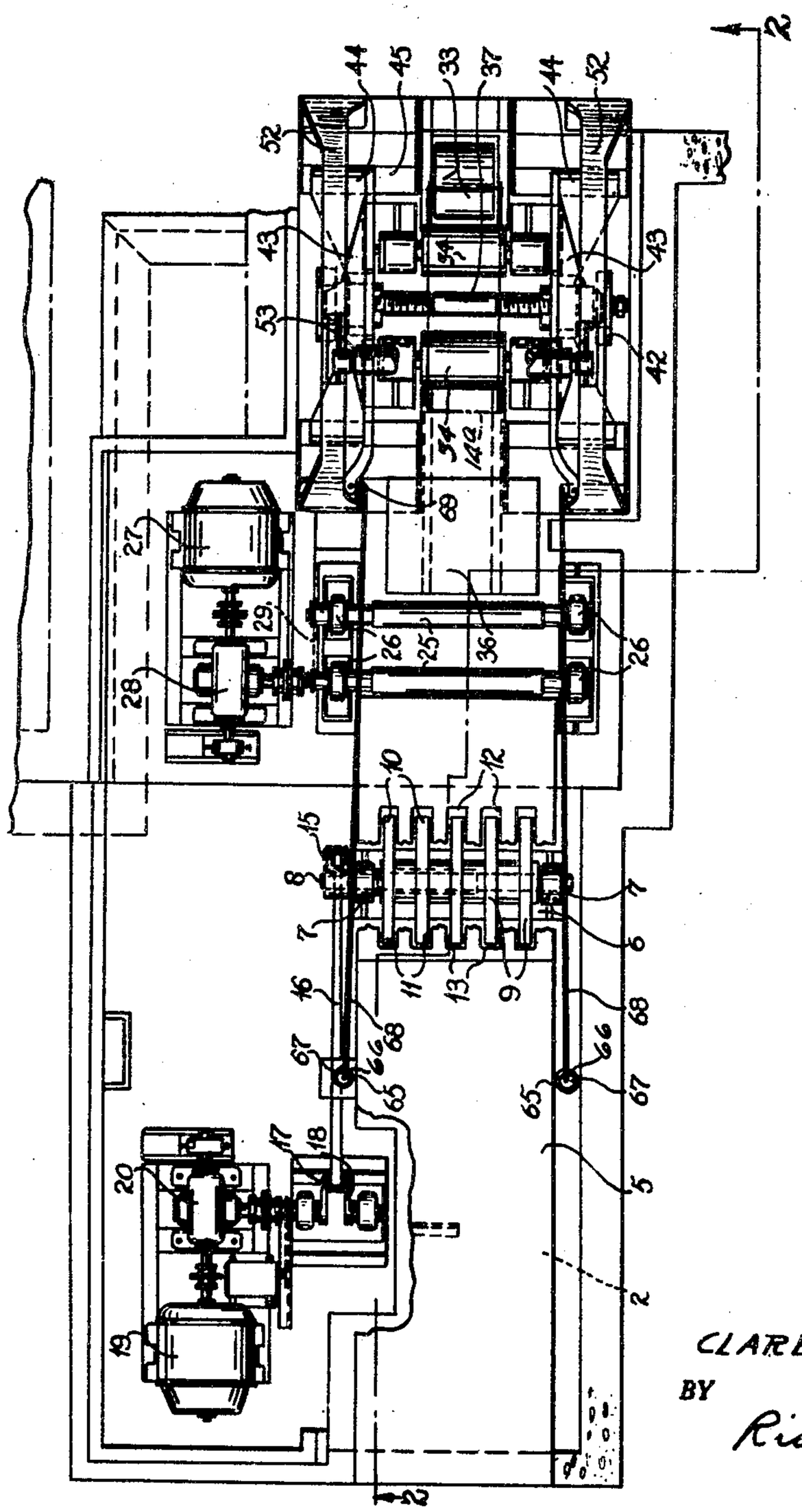

Fig. 1

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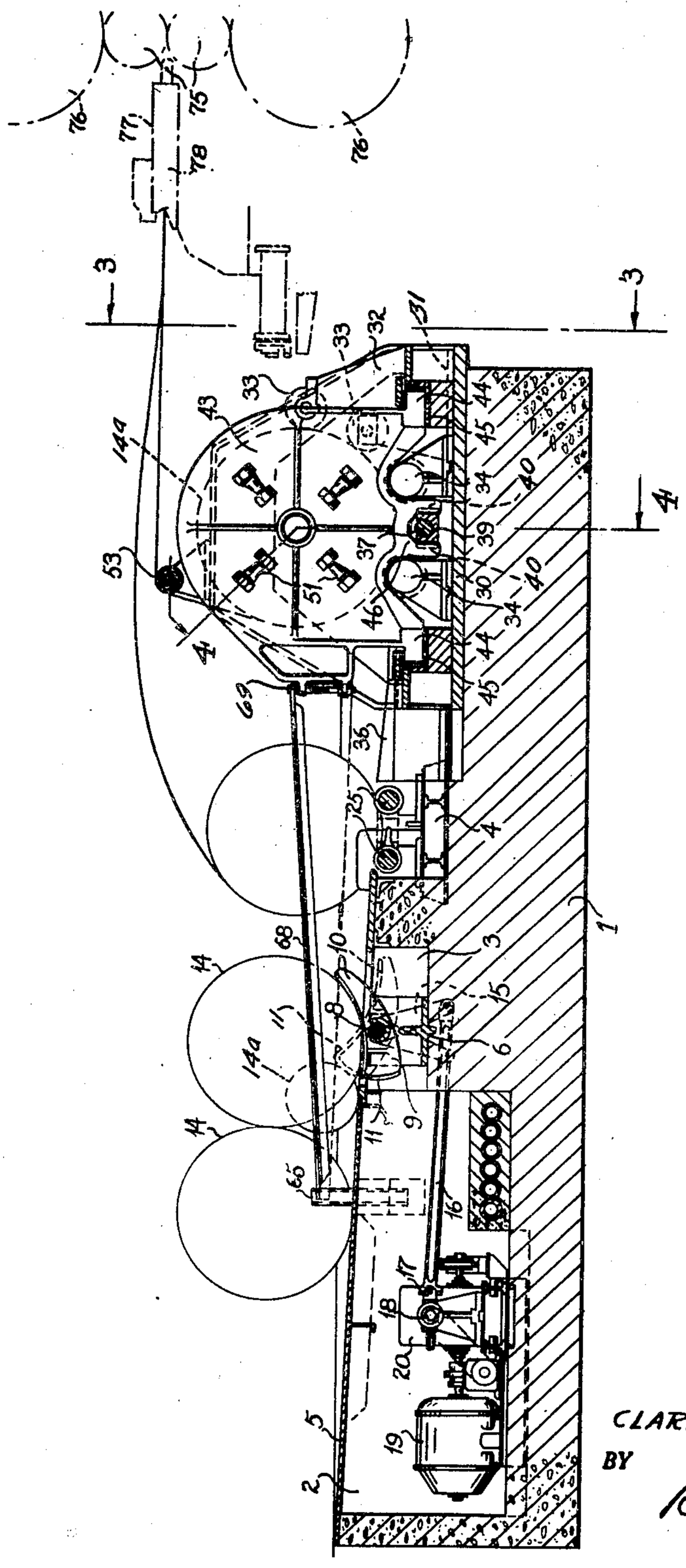

Fig. 2

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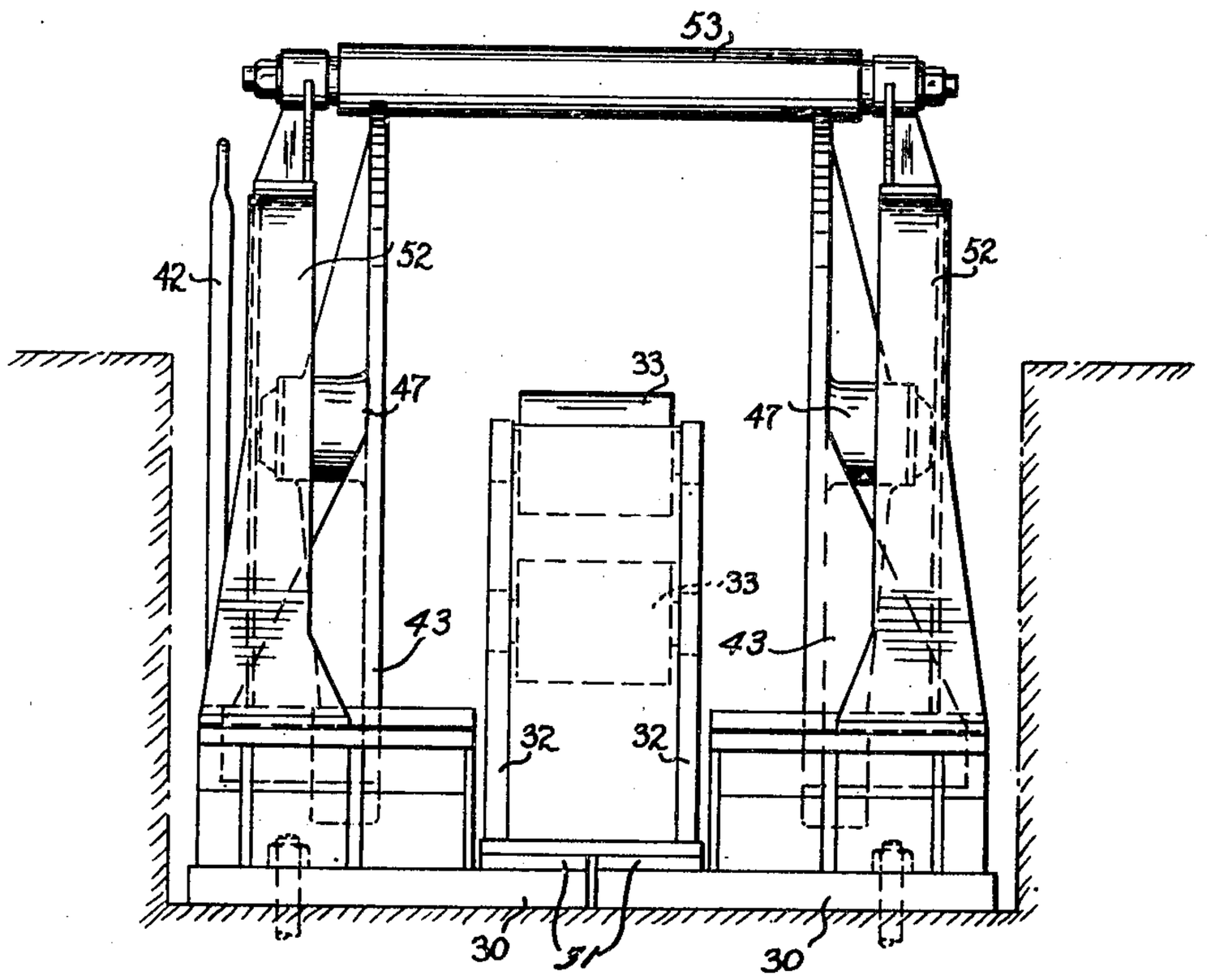

Fig. 3

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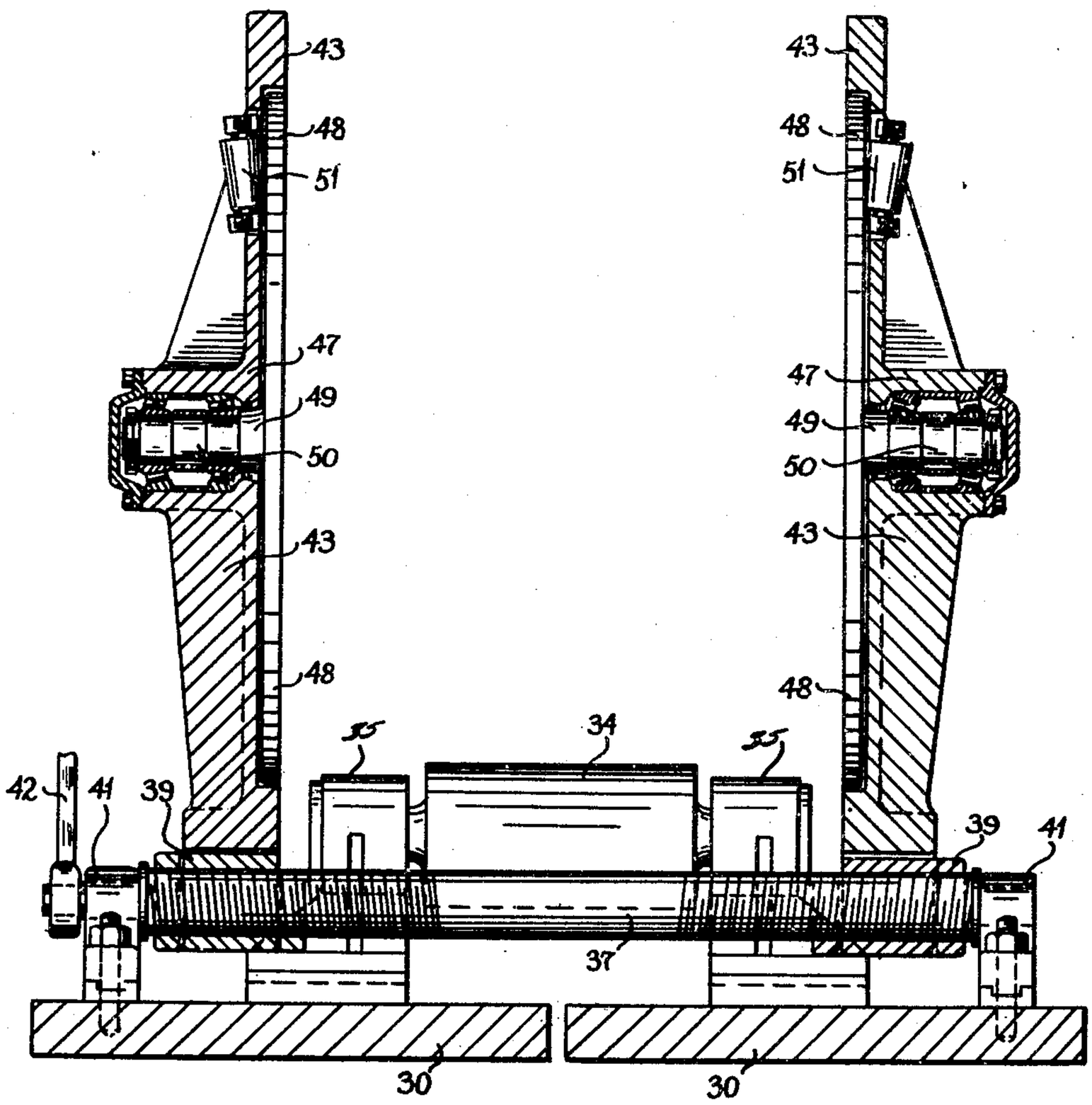

Fig. 4

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UNITED STATES PATENT OFFICE

2,485,961

COIL HANDLING APPARATUS AND METHOD

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Application October 3, 1945, Serial No. 620,108

9 Claims. (Cl. 242—78)

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The present invention relates generally to the art of handling metal and particularly to new apparatus and a new method for handling coils of strip metal which is to be passed between metal reducing rolls.

Since coils of strip metal are dangerous to handle manually, various devices have been proposed for mechanically handling them. None of the proposed devices with which I am familiar is entirely satisfactory. In each of these devices the trailing end of one coil passes between the first set of reducing rolls before the leading end of a fresh coil can be brought between the first set of rolls. Furthermore, these devices require that the new coil be unrolled manually so as to pay out enough of the metal that its leading end may be fed into the first pass of rolls and this hand operation not only consumes time and labor but is somewhat hazardous to the workmen.

The present invention substantially eliminates all loss of time by making it possible for the leading end of a coil to follow closely the trailing end of a preceding coil as it passes between the first set of reducing rolls; and also dispenses with some of the manual labor of unrolling a new coil and paying out the strip therefrom to the extent necessary for it to reach the first pass of rolls; and minimizes the danger of injury to the operator who is directing the leading end of a coil into the first pass of rolls. Furthemore, the present invention provides not only simple, relatively inexpensive apparatus consisting of new parts and a new combination of parts but also a new method comprising certain new steps and a new combination of steps.

The present invention will be better understood by those skilled in the art from the following description and from the drawings which form a part of this specification and in which,

Fig. 1 is a top plan view of one form of apparatus embodying the present invention;

Fig. 2 is a vertical, sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a rear end, elevational view of the apparatus of Figs. 1 and 2 taken from a position indicated by line 3—3 of Fig. 2; and,

Fig. 4 is a transverse, fragmentary, partly sectional view taken on line 4—4 of Fig. 2.

In Figs. 1 and 2, rectangular foundation 1 is provided with pits 2, 3 and 4 having open tops. An inclined runway 5 is supported at one end on the foundation 1 substantially flush with the mill floor and extends over the open tops of pits 2, 3 and 4. This runway slopes downwardly at a small angle, for example, about 7 degrees to

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the horizontal. In pit 3 bracket 6 supports bearings 7 in which shaft 8 is rotatably mounted. This shaft extends transversely of and just below runway 5 and has attached thereto for rotation therewith a plurality of coil stops 9. Each of these stops has a toe 10 and a heel 11 which may alternately be moved upwardly thru slots 12 and 13, respectively, in runway 5 to positions above the runway. The upper surfaces of toes 10 are concave to engage the outer surface of a coil of strip metal, such as is indicated at 14, and to retain such a coil thereon when the toes project upwardly beyond the runway. The heels 11 present convex surfaces to engage an approaching coil to prevent it from rolling onto toes 10 when a coil thereon is released for further downward rolling movement. A coil of about the minimum size which may be uncoiled in the illustrated apparatus is indicated at 14a in Fig. 2.

Lever 15 is keyed to one end of shaft 8 and is pivotally connected to crank 16 and this crank is connected to crank pin 17 of rotatable shaft 18. Shaft 18 is driven by motor 19 thru reduction gearing 20. Motor 19, shaft 18 and associated parts, including crank 17, are disposed in pit 2 below and at one side of runway 5. It will be understood that when shaft 18 is rotated, crank 16 will be reciprocated and will alternately move toes 10 and heels 11 to their respective positions above runway 5. It will be further understood that when coil 14 bears against the upwardly extending toes 10 its rolling motion down the runway will be prevented and that when crank 16 is reciprocated to move toes 10 down below the top surface of runway 5 coil 14 may roll down the runway. However, a following coil will be intercepted by heels 11 and its rolling motion will be prevented until heels 11 are retracted to below the top surface of runway 5, whereupon this following coil may roll onto the then upwardly extending toes 10, where it will be retained until the toes are moved below the top of runway 5.

The runway is open over the top of pit 4 and rolls 25 in the pit are substantially flush with the top surface of the runway. These rolls 25 extend transversely of the runway and are supported in bearings 26 carried by supporting means in pit 4. One of these rolls is driven by motor 27 thru gear reducer 28 and the other roll is driven from the first roll by a roller chain 29. Motor 27 and reducing unit 28 are located in a portion of pit 4 below and at one side of runway 5.

A coil box is positioned beyond and below rollers 25. This coil box consists of a plurality of parts (Figs. 1 to 4). Two base plates 30 are bolted

to foundation 1. Brackets 32 are fastened to plates 31 and carry coil abutment rolls 33 to limit the forward rolling movement of coil 14. Coil supporting rolls 34 are rotatably mounted in bearings of brackets 35. These rolls 34 extend transversely of the path of rolling travel of coils 14 and are spaced apart along that path far enough to support a full coil thereon while the abutment rolls 33 engage the outer curved surface of the coil. If desired, brackets 32 may be mounted adjustably on plates 30 for movement toward and away from rolls 34 to accommodate coils of different diameters. Apron 36 extends between the adjacent rolls 25 and 34 and provides a surface along which coil 14 may roll from rolls 25 into the coil box and onto rolls 35. Shaft 37 disposed between and parallel to rolls 34 has opposite screw threads in blocks 39 which have laterally extending projections 40 at each end thereof. The extreme ends of shaft 37 are rotatably mounted in bearings 41 and lever 42 attached to shaft 37 serves to rotate the shaft for adjustment purposes.

End plates 43 are disposed vertically and at right angles relative to rolls 34. These plates have portions 44 which rest on transverse blocks 45 for sliding movement relative thereto and have depending bifurcated portions 46 which are disposed between the lateral projections 40 of blocks 39. It will be understood that when shaft 37 is rotated, threaded blocks 39 will be moved toward or away from each other and will move end plates 43 toward and away from each other. End plates 43 have central bosses 47. Coil engaging disks 48 extend into recesses in plates 43 and have shafts 49 projecting centrally therefrom into roller bearings 50 in bosses 47. Each end plate 43 is provided with a plurality of tapered rollers 51 which project thru the plate and into engagement with the outer surface of its coil engaging disk 48. Thus disks 48 are mounted in end plates 43 and are mounted for rotation in bearings 50 and are afforded lateral support by rollers 51.

End frames 52 secured to plates 30 and disposed outside of coil box end plates 43 rotatably support roller 53 above a coil in the coil box. It will be understood that strip metal leading from a coil in the coil box passes over this roller 53.

Posts 65 extend vertically upward from foundation 1 at the sides of the runway 5 between the upper end of the runway and the coil stop. These posts 65 have vertically extending slots 66 and plugs 67 rotatable in the posts. Arms 68 are anchored at one end in plugs 67, extend thru slots 66 in posts 65 and extend along and above the sides of runway 5 to coil box end plates 43 to which they are connected by pins 69. These arms 68 and plates 43 serve to guide coils 14 in their travel along runway 5 and onto idler rolls 34 in the coil box and to maintain the coil in upright position during such movement.

Arms 68 pivot in posts 65 when plates 43 are moved toward or away from each other by shaft 37 to accommodate narrow or wide coils.

The first pass of metal reducing rolls is disposed beyond the coil box. As shown, rolls 75 are backed up by large diameter rolls 76 and a coil guide consisting of upper and lower guides 77 and 78 are positioned on the entering side of rolls 75 and closely adjacent thereto. The strip from the coil 14 on idler rolls 34 passes over roll 53 and then between guides 77 and 78 and thence between rolls 75.

The operation of the above described apparatus may be substantially as follows, assuming that rolls 75 and 76 are rotating and the strip metal from a coil on rolls 34 is being drawn over roller 53 between guides 77 and 78 and between rolls 75. While the coil on rolls 34 is being uncoiled, several other coils may be rolled onto runway 5, one of these resting on rolls 25, the following one resting on the toes 10 of the coil stop, and the next succeeding coil bearing against the trailing side of the coil on the stop. When the coil on rolls 34 has been nearly uncoiled, motor 27 is energized and rotates rolls 25 counterclockwise as seen in Fig. 2, and rotates coil 14 on rolls 25 clockwise. The operator pulls back the leading end of the uncoiled strip and presses it down over the following coil, that is, the one on the stop, to take out the set in that part of the strip. Then that part of the strip is bent forwardly and is held against the top surface of the strip from the coil on rolls 34. As the trailing end of that strip passes into the space between guide blocks 77 and 78 the leading end of the revolving coil on driven rolls 25 is immediately entered between guides 77 and 78 and is pushed forwardly by the operator until it is seized by rolls 75. Since these rolls are rotating at a much higher rate of speed than driven rolls 25, rolls 75 quickly take up the slack in the strip from the new coil and roll the coil off driven rolls 25 and along runway 5 and onto idler rolls 34, further forward rolling movement of the coil being prevented by rolls 33. Thereafter, rolls 75 pull the strip over roller 53 and cause the coil to rotate on idler rolls 34.

It will be understood that the tension applied by rolls 75 to the leading end portion of the strip from the coil on driven rolls 25 is thus utilized to move that coil off from rolls 25 and onto rolls 34 and that coil box plates 43 hold the coil upright and direct it onto rolls 34 at right angles thereto.

The disks 48 may engage the axial ends of the coil and rotate therewith relative to end plates 43 and thus maintain the coil in upright position at right angles to rolls 34 while it is being uncoiled.

Having thus described my invention so that others skilled in the art may be able to understand and practice the same, I state that what I desire to secure by Letters Patent is defined in what is claimed.

What is claimed is:

1. Coil handling apparatus comprising a downwardly inclined coil runway, a pair of driven rolls extending transversely of said runway between its ends and positioned to receive a coil rolling down said runway, a pair of idler rolls extending transversely of said runway at its lower end, an abutment beyond said idler rolls positioned to prevent a coil from moving beyond said idler rolls, and means to guide a rolling coil from said driven rolls onto said idler rolls and to maintain it at right angles to said rolls while thereon.

2. Coil handling apparatus comprising a downwardly inclined coil runway, a pair of driven rolls extending transversely of said runway between its ends and positioned to receive a coil rolling down said runway, a pair of idler rolls extending transversely of said runway at its lower end, an abutment beyond said idler rolls positioned to prevent a coil from moving said idler rolls, arms pivoted at one end at the sides of said runway in advance of said driven rolls, coil box end plates above said idler rolls and connected to the adjacent ends of said arms,

and a shaft rotatably mounted above a coil between said plates.

3. Coil handling apparatus comprising a downwardly inclined coil runway, a pair of driven rolls extending transversely of said runway between its ends and positioned to receive a coil rolling down said runway, a pair of idler rolls extending transversely of said runway at its lower end, an abutment beyond said idler rolls positioned to prevent a coil from moving beyond said idler rolls, and coil guides pivoted at one end at the sides of said runway in advance of said driven rolls and converging over said runway.

4. A coil handling apparatus comprising a downwardly inclined coil runway, a pair of driven rolls extending transversely of said runway between its ends and positioned to receive a coil rolling down said runway, a pair of idler rolls extending transversely of said runway at its lower end, an abutment beyond said idler rolls positioned to prevent a coil from moving beyond said idler rolls, coil box end plates above said idler rolls, end frames outside of said end plates, a shaft rotatable in the upper portions of said end frames above a coil between said plates, and coil guides pivoted at one end at the sides of said runway in advance of said driven rolls and converging over said runway and pivoted at their other ends to said plates.

5. Coil handling apparatus comprising a downwardly inclined coil runway, coil stop means projecting upwardly thru said runway, a pair of driven rolls extending transversely of said runway between its ends and positioned to receive a coil rolling down said runway, a pair of idler rolls extending transversely of said runway at its lower end, an abutment beyond said idler rolls positioned to prevent a coil from moving beyond said idler rolls, means to guide a rolling coil from said driven rolls onto said idler rolls and means including rotatable plates engageable with the ends of the coil to maintain it at right angles to said rolls while thereon.

6. Coil handling apparatus comprising a downwardly inclined coil runway, a shaft extending transversely beneath said runway, a coil stop reciprocable with said shaft and including a toe and a heel movable alternately into coil detaining positions above said runway, a lever attached to said shaft, a rotatable shaft having a crank pin, a crank connected to said pin and lever for reciprocating said coil stop to move said heel or toe into coil detaining positions and thereby to discharge a detained coil and to detain a following coil, a pair of driven rolls extending transversely of said runway and positioned to receive a coil discharged from said coil stop, a pair of idler rolls extending transversely of said runway at its lower end, an abutment beyond said idler rolls positioned to prevent a coil from moving past said idler rolls, coil box end plates above said idler rolls, end frames outside of said end plates, a shaft rotatable in the upper portions of said end frames above a coil between said plates, coil guides pivoted at one end at the sides of said runway in advance of said coil stop and converging over said runway and pivoted at their other ends to said plates.

7. A coil handling method which comprises the steps of mechanically rotating a coil of metal and paying out the leading end thereof toward metal feeding rolls, bringing said leading end between said rolls, utilizing tension exerted on said metal by said rolls to roll said coil forwardly onto freely rotatable coil supporting means, and bringing the similarly paid out leading end of a second coil between said coils immediately following the trailing end of said first coil.

8. Coil handling apparatus comprising a downwardly inclined runway, a pair of driven rolls extending transversely of said runway between its ends and positioned to receive a coil rolling down said runway, freely rotatable coil supporting means disposed beyond and adjacent to the lower end of said runway, an abutment positioned beyond said means to prevent a coil from rolling beyond said movable means, and means to guide a rolling coil from said driven rolls to said rotatable means.

9. A coil handling box for use in uncoiling coils of strip material comprising a pair of horizontal parallel idler rolls to receive such a coil and support and rotate with it while it is being unwound, an abutment positioned above and at one side of said rolls to prevent the coil from moving over and beyond said rolls, parallel vertical frames adjacent the ends of said rolls, vertical end plates above said rolls and movable toward and away from the ends of the coil on said rolls, coil positioning disks rotatably supported at the opposed side of said plates and engageable with the ends of a coil on said rolls, and a horizontal strip directing roll carried by said frames above, and at one side of the axis of, a coil on said idler rolls, said strip directing roll serving to direct the strip upwardly substantially vertically from the coil and over the top thereof when the strip is being pulled endwise horizontally beyond said roll to unwind the coil.

CLARENCE J. DUBY.

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The following references are of record in the file of this patent:

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Certificate of Correction

October 25, 1949

Patent No. 2,485,961

CLARENCE J. DUBY

It is hereby certified that errors appear in the above numbered patent requiring correction as follows:

In the grant, line 6, title of invention, for "COIN HANDLING APPARATUS AND METHODS" read *COIL HANDLING APPARATUS AND METHODS*; in the printed specification, column 2, line 35, after the word "roll" insert *on*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of March, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.