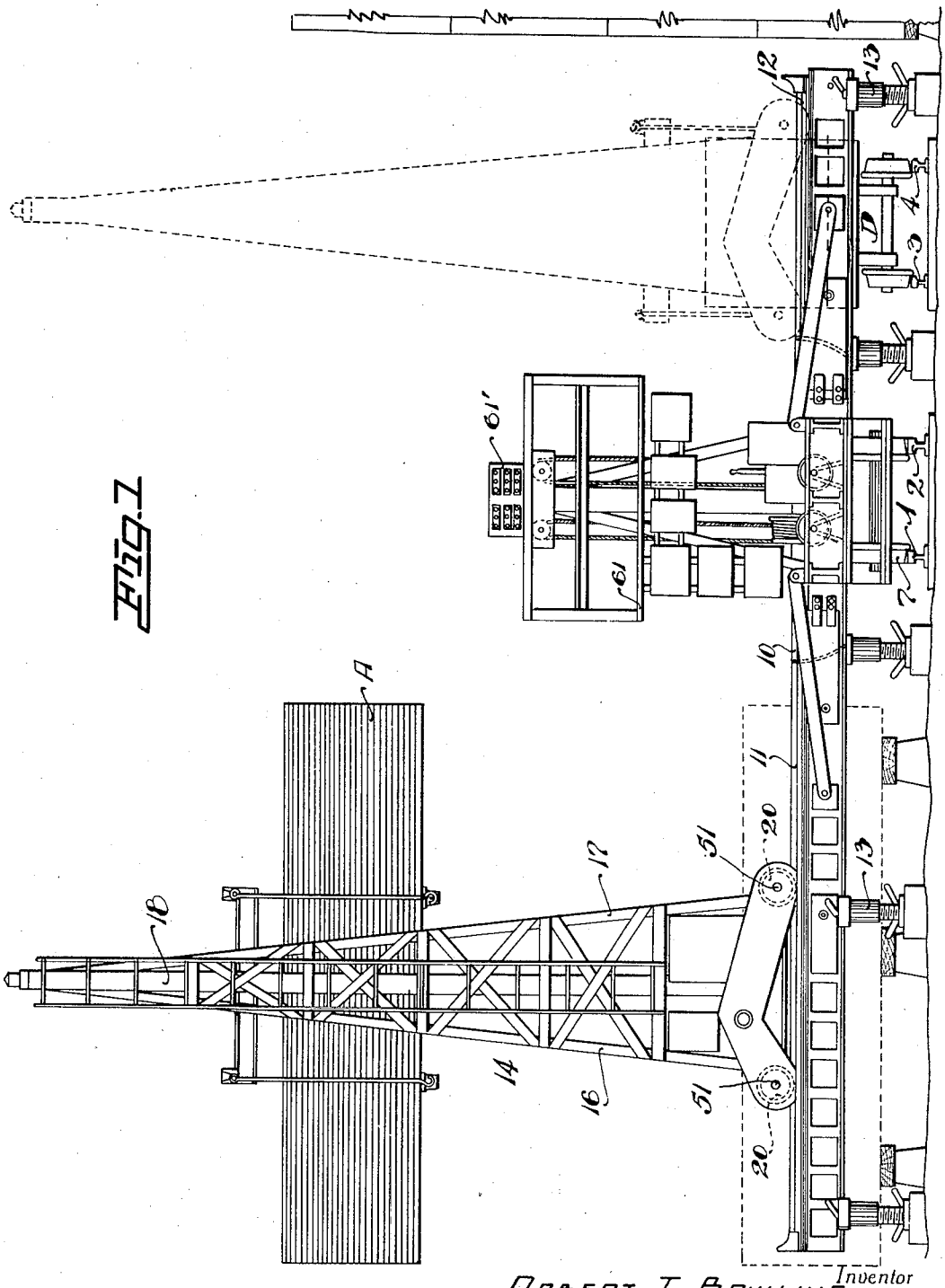
July 25, 1933. R. T. BOWLING 1,919,823

PORTABLE CRANE

Filed Feb. 2, 1932 5 Sheets-Sheet 1



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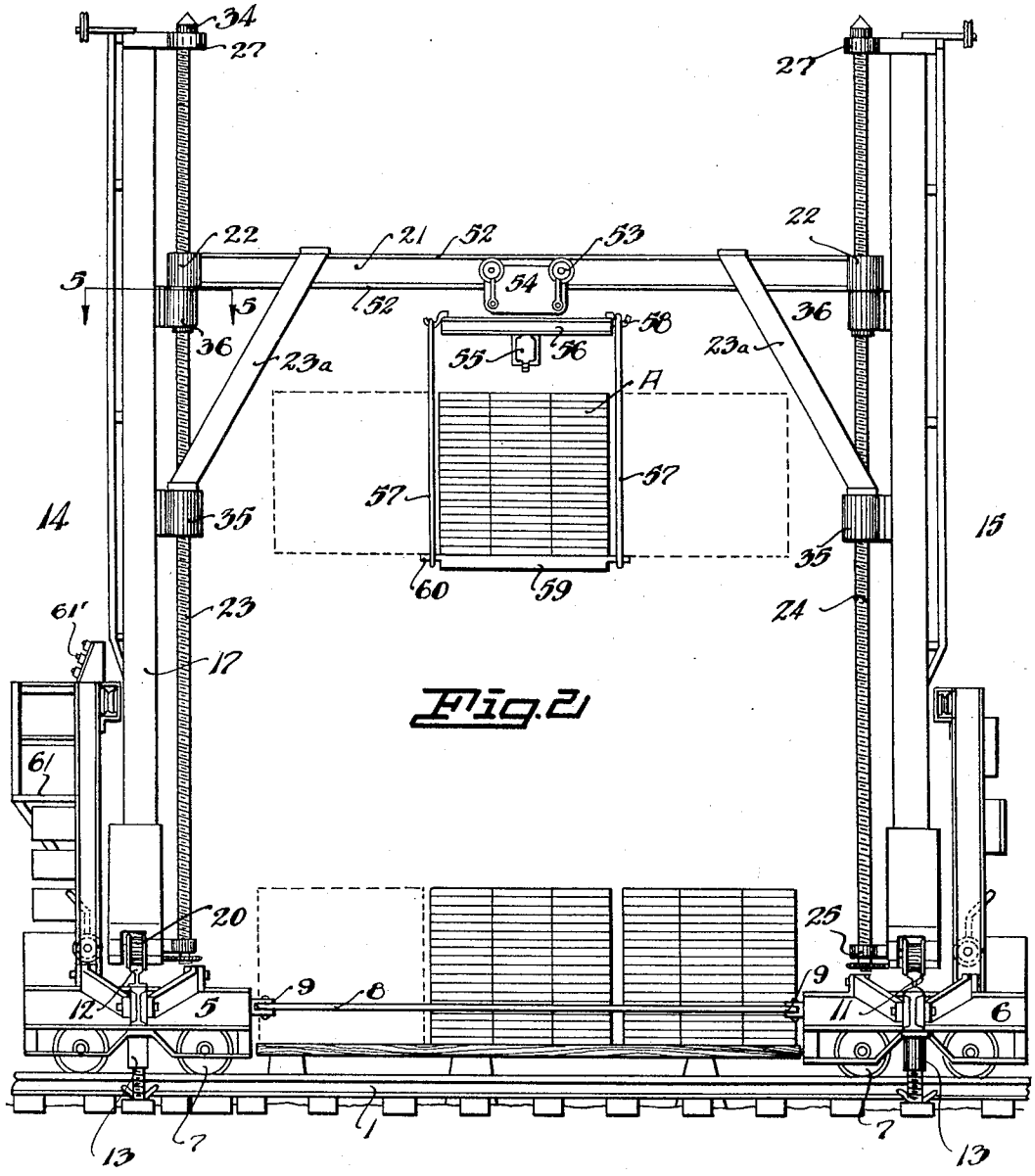
PORTABLE CRANE

Filed Feb. 2, 1932 5 Sheets-Sheet 2



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PORTABLE CRANE

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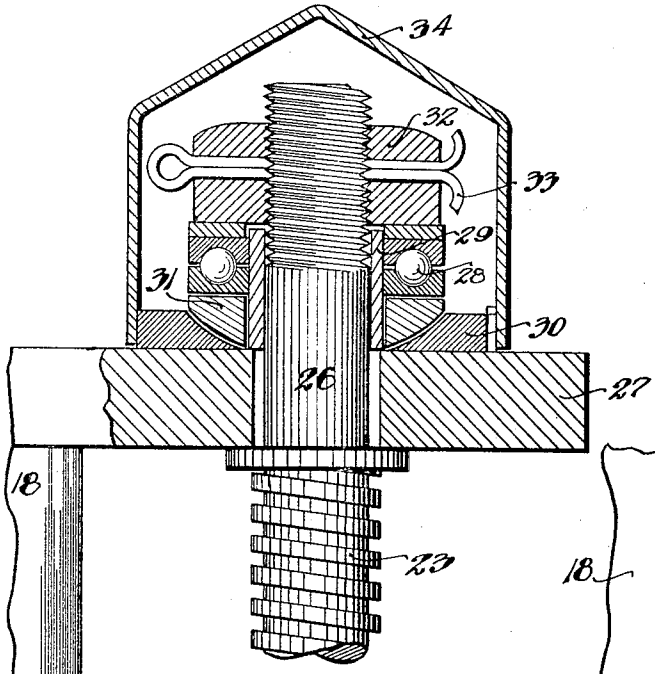

Fig. 3

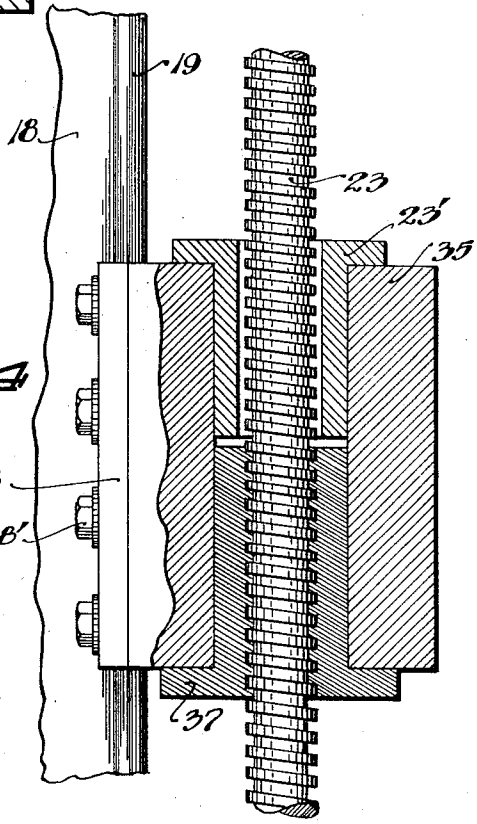

Fig. 4

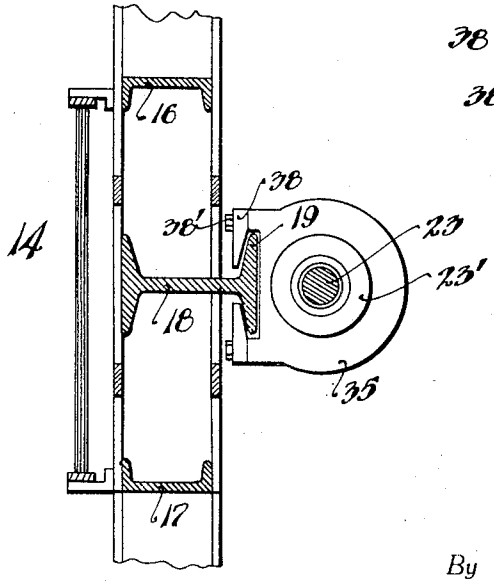

Fig. 5

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PORTABLE CRANE

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Fig. 6

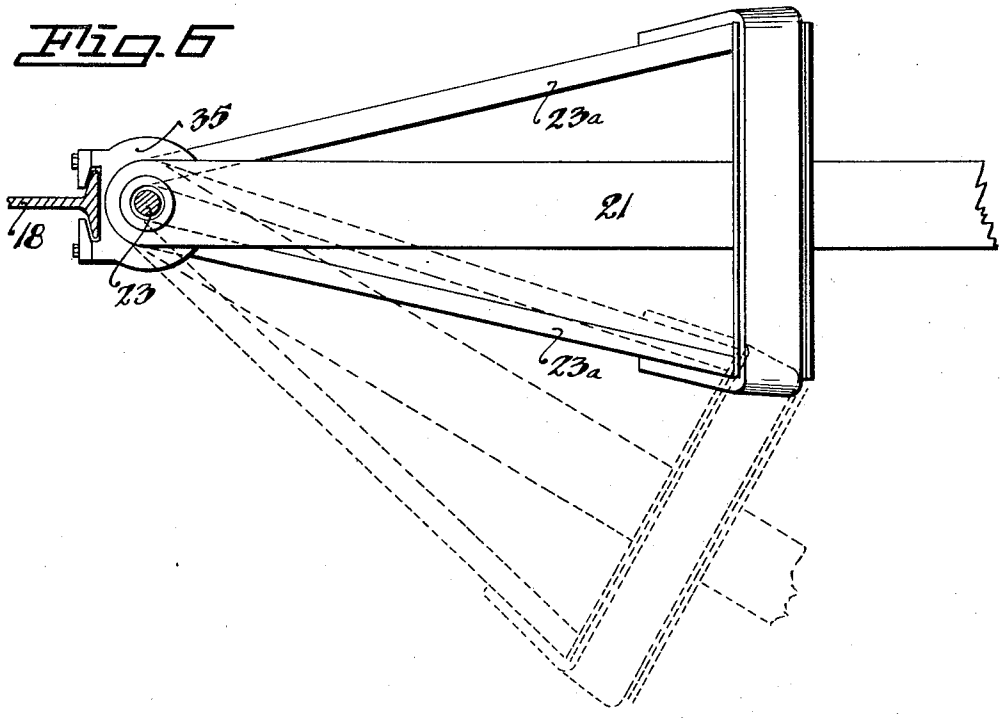
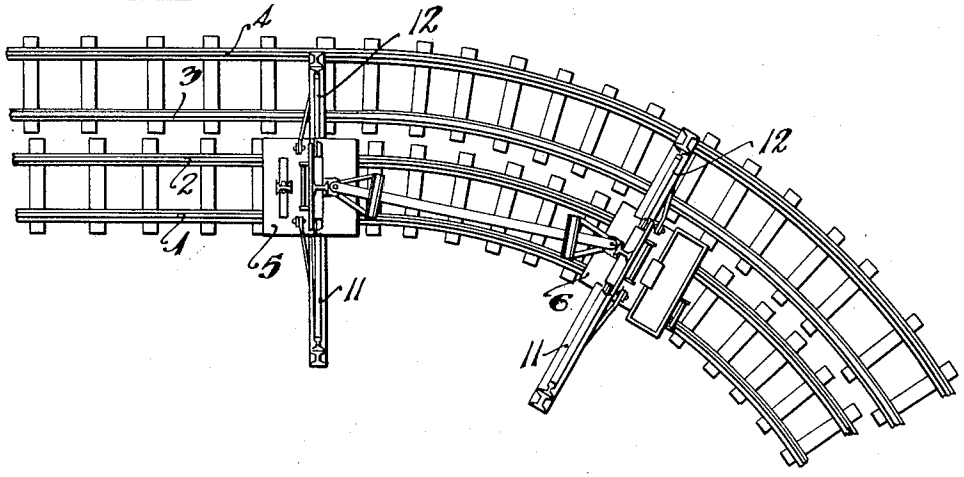


Fig. 7



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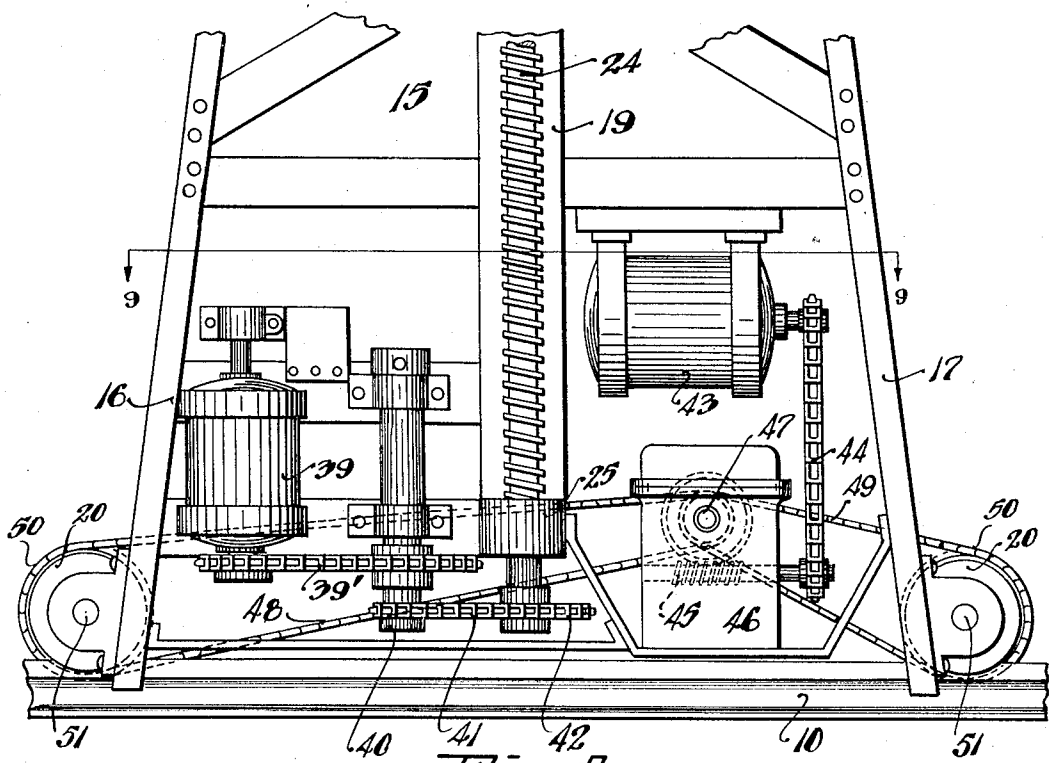

Fig. 8

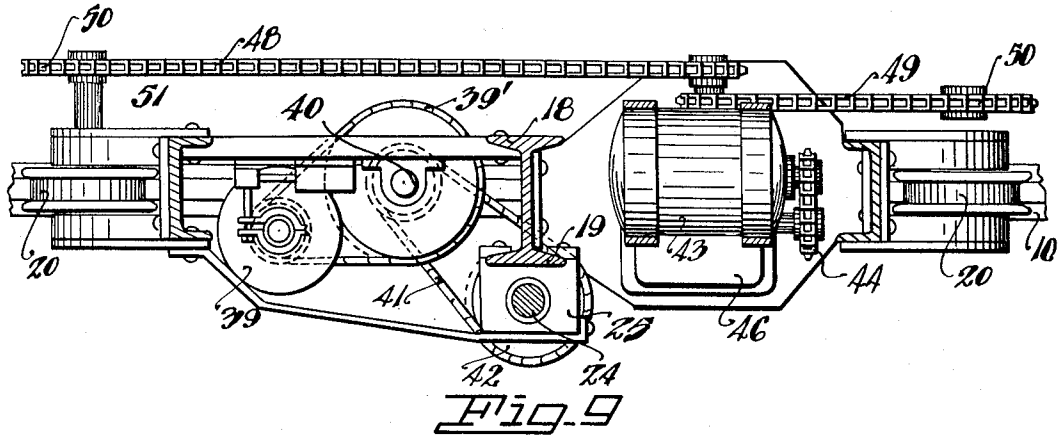

Fig. 9

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UNITED STATES PATENT OFFICE

ROBERT T. BOWLING, OF LEWISTON, IDAHO, ASSIGNOR TO POTLATCH FORESTS, INC., OF LEWISTON, IDAHO

PORTABLE CRANE

Application filed February 2, 1932. Serial No. 590,383.

My present invention relates to an improved portable crane of the railway type, employing a crane and screw operated hoist or elevator of the sling type, and the subject matter of the present invention forms part of the lumber piling implement shown and described in my co-pending application for patent Serial Number 544,438 filed June 15, 1931.

While the implement of which my present application forms a part may be employed for transferring various materials, the crane is particularly designed for use in lumber plants, where the crane is conveyed about the plant or yard on railway trucks traveling on narrow gage tracks. In the utilization of the improved crane two tracks are employed, one for the crane and the other for the dolly or truck on which the lumber in piles is conveyed to and from kilns, storage sheds, the saw-mill, and other locations, and the portable crane may be moved from place to place on its track for various operations. While I have illustrated the crane as building up a lumber stack from piles that are conveyed on successive dollies to the crane, it will of course be understood that various other operations may be carried out in the handling or transferring of lumber and other materials, by means of the improved crane.

The lumber is handled in bundles, packages or piles, in the sling of the elevator or hoist, and consequently this handling of the material in large bulks can be accomplished with a substantial saving in material, time, labor, and expense.

My invention consists in certain novel combinations and arrangements of parts in the crane whereby the latter may with facility make the sharp curves of the railway tracks when being moved from place to place in the lumber yard or plant; in the construction and operation of the screw operated hoist or elevator; and in other associations of parts, rendering the implement facile in its control, and smooth in its operations of transferring heavy, bulky loads. The operating parts are supplied with power to electric motors on the implement from supply stations located at intervals along the tracks of the system, and in addition to the man on the implement in control of the operating mechanism, two men are employed for handling the lumber as it is arranged in the sling, guiding the load while in the sling, and depositing the load, either in a stack, or for loading a pile from a stack to a dolly.

Figure 1 is a view of the implement complete, showing by dotted lines, the crane standing by a stack and over a dolly, and in full lines showing the crane at the opposite side of the implement and in position to deposit its load of lumber in the erection of a stack.

Figure 2 is a side view of the implement showing the crane with a load in its sling, indicating by dotted lines how the load may be turned with its swivel-sling, and showing also piles that have been deposited in the erection of a stack.

Figure 3 is an enlarged, detail sectional view at the upper end of one of the two operating screws for the hoist or elevator.

Figure 4 is a detail sectional view of one of the vertically moving guides for the crane and showing the relation of the operating screw thereto.

Figure 5 is a transverse, horizontal, sectional view on line 5—5 of Fig. 2 of one of the masts of the crane, showing also an operating screw in its relation thereto.

Figure 6 is a detail top plan view at one end of the braced beam of the crane, showing by dotted lines the relative movement in a horizontal plane between the supporting beam of the crane and its upright masts and screws.

Figure 7 is a plan view showing two parallel tracks at a curve with the implement traveling on one track, and indicating the articulation between the crane beam and its masts to permit turning of curves in the railway system or trackage.

Figure 8 is an enlarged detail elevation showing the propulsion mechanism for the crane and the screw operating mechanism for the hoist, and Figure 9 is a top plan view of these mechanisms showing the tower in section as at line 9—9 of Figure 8.

In Figure 1 the pile of lumber A has been lifted from the dolly D, and the successive piles, lifted from successive dollies, are stacked as indicated in Figure 2, the portable crane of my invention traveling alternately to the right and left in Figure 1 for transferring the successive loads.

The lumber yard is equipped with a narrow gage railway system comprising paral-

lel tracks as 1, 2, for the implement, and 3, 4, for dolly, and both the implement and the dollies may be driven or hauled by electric motors from station to station in the yard or plant.

The portable implement is supported upon two spaced, four-wheel trucks 5 and 6, with their wheels 7 rolling on the rails 1—2 or 3—4 of the parallel tracks of the railway system, and the trucks are coupled by means of a bar or link 8, with couplings at 9, 9, to the respective trucks.

Upon each truck 5 and 6, is mounted a tower, as 14, 15, which form the uprights of the portable crane, and the crane travels transversely of the railway tracks on supporting rail-sections 10 fixed transversely of the trucks, and also upon pairs of hinged, foldable rail sections 11 and 12 mounted on the trucks at opposite sides thereof and adapted to be supported by a number of jacks 13. The rail sections 10 fixed to the trucks, and the lateral foldable sections 11 and 12 thus form a pair of supporting rails one for each tower of the crane, and the crane as a unit is adapted to travel back and forth on these spaced parallel rails or tracks.

Each tower 14, 15, is constructed of channel beams 16 and 17 and fabricated metal, and as indicated in Figure 1 the towers taper toward their upper ends, with a central vertical I-beam 18 rigidly secured in each tower and with the adjoining flanges 19 of the beams projecting slightly from the inner sides of the towers, as best seen in Figure 5.

At its base, each tower is provided with a pair of spaced, grooved rollers or wheels 20 to roll on the rails 10, 11, 12, and to provide a wide bearing for supporting the towers on the rails, and between the two crane-towers a screw operated hoist is mounted for raising and lowering a load.

The screw operated hoist includes a horizontal beam 21 that spans the space between the two masts 18, 18, of the towers, and at its ends the beam is provided with bearing bosses 22 having smooth bores that surround, but do not operatively engage the threads of a pair of operating screw bars 23 and 24. These screw bars are vertically arranged parallel with the masts, and they are supported at their lower ends to revolve in bearings 25 rigid with the respective trucks 5 and 6. At their upper ends, as shown in Figure 3 the screw bars have smooth bearings journaled at 26 in the overhanging bearing brackets 27 rigidly attached at the tops of the two masts or towers.

Roller bearings 28 and bearing collars 29 for the screws are mounted above the brackets, and the bearings are seated on the brackets by means of the dished concave plate 30 and the convex bearing plate 31, to insure proper alinement for the bearings. A lock nut 32 on the screw and a cotter pin 33 are employed for preventing displacement of parts, and the bearing is capped by a housing as 34 for usual protective functions.

In its vertical movement the hoist is raised by the screws and guided by means of vertically spaced guide blocks 35 and 36, one pair of blocks for each screw and its complementary mast. These tubular guide blocks have smooth bores surrounding the screws, and screw threaded traveling nuts 37 are mounted in the blocks for engagement with the screws, as best seen in Figure 4. As best seen in Figure 2 the upper slide blocks 36 support the beam 21 and the bosses 22 at the ends of the beam rest upon the guide blocks or slide blocks. The lower guide blocks 35 are provided with bushings 23′ which are rigidly connected to the beam by diagonal braces or triangular yokes 23*a* fixed to the beam.

As best seen in Figure 5 each guide block is fashioned with a pair of guide flanges or flanged plates 38 secured by bolts 38′ at opposite sides of the web of a mast, and overlapping the inner flange 19 of the mast to form a guide groove at each edge thereof to guide the vertical movement of the guide block.

In Figures 8 and 9 it will be seen that each screw 23, 24, is driven from an electric motor 39 mounted in a suitable frame at the base of the tower, and by means of the chain drive 39′ to the shaft 40, power is transmitted through the driving chain 41 to the reduced sprocket gear 42 on the lower end of the screw. The electric motor 38 is of the reversible type, and is controlled to revolve the screw in alternately opposite directions for raising or lowering the hoist.

The two operating screws are turned in unison, and the elevator hoist, through the instrumentality of the traveling nuts 37 on the operating screws, will be positively lifted, or lowered by action of gravity.

Figures 8 and 9 also show the operating means for propelling the crane on its tracks 10, 11, 12, from a reversible electric motor 43 mounted on a frame at the base of the tower. Each tower has a driving mechanism, and the motor transmits power through the chain drive 44 to the worm gear 45 shown in dotted lines as enclosed in the housing or gear box 46, and an operating shaft 47 transmits power through the two chain drives 48 and 49 to the sprockets 50, 50 on the shafts 51 of the wheels or rollers 20 of the towers.

The beam 21 of the hoist, supports a traveling, swiveled, sling in which the pile A is ably carried, and the beam is preferably made up of channel irons, suitably joined and braced, and provided with exterior horizontal flanges 52 upon which the rollers or wheels 53 (two at each side of the beam 21) of the sling-carriage 54, may travel or roll,

as the sling, with its load is guided manually.

A swivel head 55 is supported at the underside of the carriage 54, and the swivel bar 56 of the sling is mounted to turn on the head. Two pairs of sling-links 57, one pair at each side of the pile A, are suspended by hooks 58 of the swivel bar, and at their lower ends, beneath the pile A, these links are joined by cross bars 59, spaced apart, and provided with end hooks 60 for detachable connection with the sling links.

Before the pile A is lifted by the crane, the cross bars 59 are placed in position beneath the pile, and while the pile is supported on the dolly D in Figure 1. In manipulating the sling, the two pairs of links 57 having been suspended from the swivel-bar 56, are hooked to the projecting ends of the cross bars 59, after which the crane and its load may be raised to position of Figures 1 and 2.

The load or pile may be shifted with the carriage longitudinally of the beam 21, and the pile may be turned to desired position as indicated by dotted lines in Figure 2, through the instrumentality of the swivel bar 56 and the swivel head 55, these movements being accomplished manually.

One of the trucks is provided with a control platform 61 to accommodate the control man, who stands in position where he has ready access to the control board 61'. Suitable control switches are mounted on the board 61, not only for the two motors 38 and 43, but also for controlling the operating means for the foldable rail sections 11 and 12 of the implement.

As shown in Figure 1, the rail sections 10 form rigid parts of the two trucks 5 and 6, and the foldable sections 11 and 12, when lowered to horizontal position, form extensions of the two fixed rail sections 10, in order that the traveling crane may run out at either side of the trucks.

When the implement is to be towed or hauled over the tracks 1, 2, or 3, 4, the crane is moved to position on the fixed rails 10 of the two trucks, and centered or balanced over these two trucks, with the hinged sections 11 and 12 folded against the opposite sides of the two towers. It will be apparent that the articulated or coupled trucks, and the pivotal arrangement of the crane at 22 and 35 with the screws, permit the implement to turn curves in the railway, as indicated in Figure 7, and by dotted lines in Figure 6, the two trucks being flexible in their coupling connection, and the crane having a swiveled support by means of the bearings 35 and 36 on the two screws 23 and 24.

The towers and masts provide a stable support for the hoist, when the latter is being reciprocated vertically, and the beam 21 and its end braces 39 provide an adequate joining member between the two masts or towers to hold together the towers, while the coupling bar or line 8 also joins the trucks of the crane.

The braces 39, which may be welded to the beam 21, and which at their lower ends are joined with the bushings 23', strengthen the hoist, and provide bearings that are spaced from the bearings 36, to insure stability in the relation between the beam and the screws.

While I have shown and described one exemplification of the portable crane, and illustrated its use in removing piles of lumber from the dollies and erecting stacks of lumber from these successive piles, it will be apparent that various other operations of the crane may be accomplished, usually by the services of three men, one on the control platform 61, another to fasten the sling about the pile of lumber, and the third man stationed at the stack for unloading the pile in its place on the stack.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a portable crane, the combination with a pair of spaced, articulated trucks, and a fixed, transversely disposed track on each truck, of a wheeled tower supported on each truck and propelling means for each tower, a screw mounted on each tower and separate means for turning the screws, a vertically reciprocable hoist, and guides rigid with the hoist and in driving relation to said screws, for said hoist.

2. In an articulated portable crane of the railway type, the combination with a pair of towers, and masts rigid with the towers, of screws mounted on the towers, a hoist disposed between said screws, guide means mounted at the ends of the hoist for non-threaded co-action with the screws, a pair of guide blocks mounted on the screws and rigidly connected with the hoist, a second pair of guide blocks on the screws loosely supporting the hoist, traveling nuts mounted in said pairs of guide blocks and engaging the screws, and guide flanges on said masts for said blocks.

3. In a portable lumber piler, the combination with spaced portable supports, and a fixed transversely disposed track-rail rigid with each support, of a self-propelled wheeled tower mounted on each track-rail, separate operating means for each tower, a hoist articulated between said towers and comprising the sole connections between the towers, and means for operating the hoist.

ROBERT T. BOWLING.