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2,492,159

RETRACTING DEVICE FOR WHEEL EXCAVATORS

Filed May 4, 1944

3 Sheets-Sheet 1

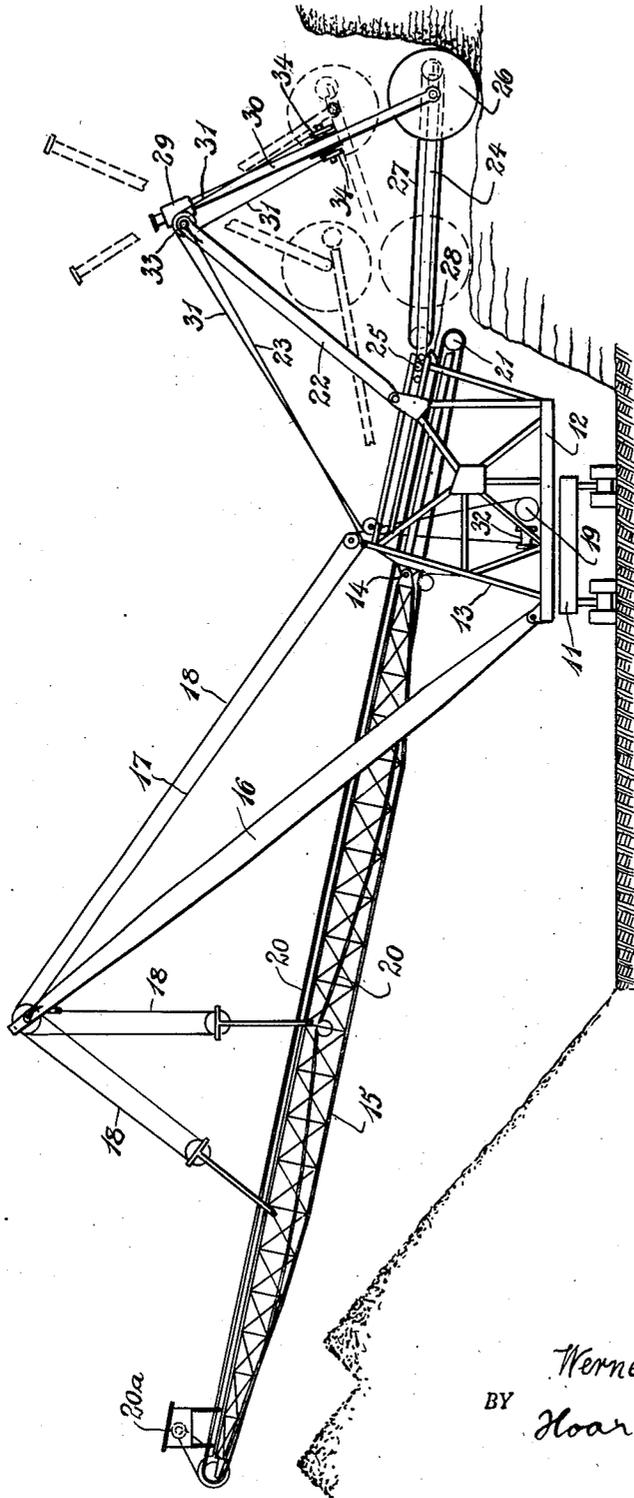


Fig. 1.

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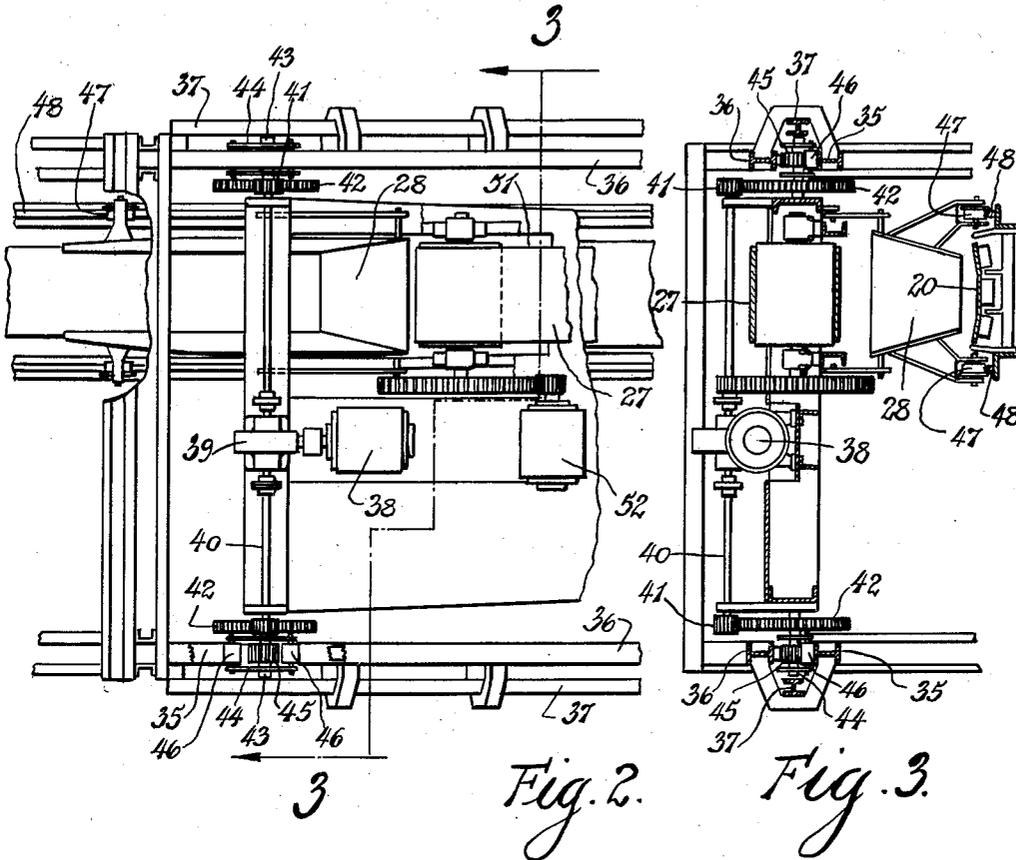


Fig. 2.

Fig. 3.

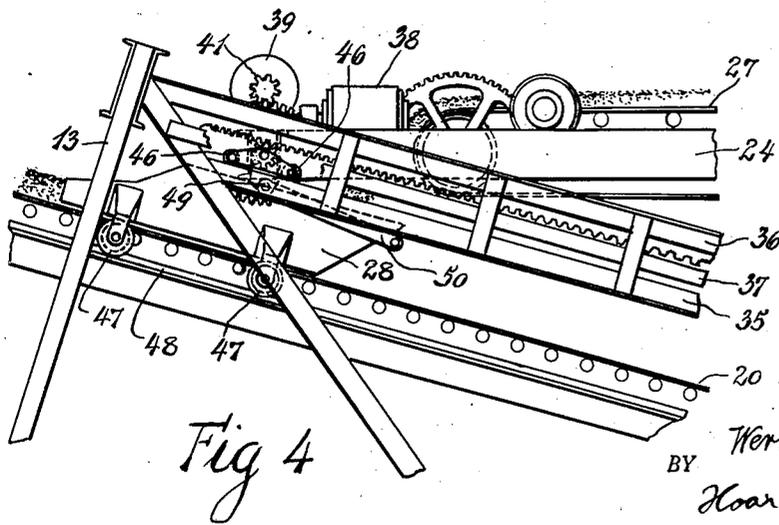


Fig 4

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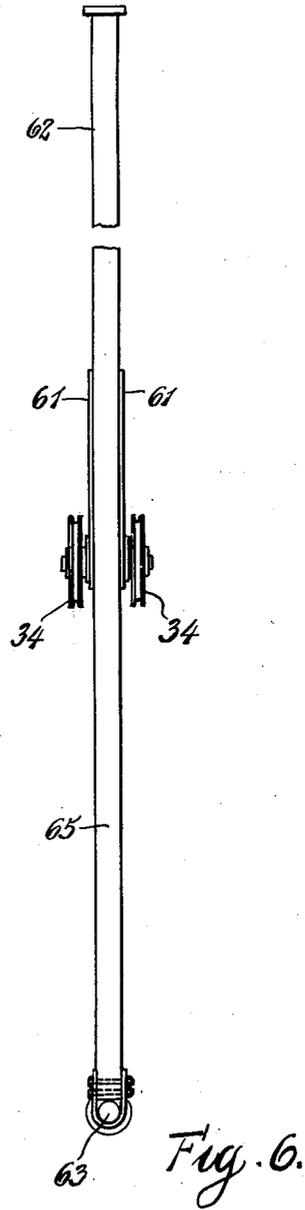
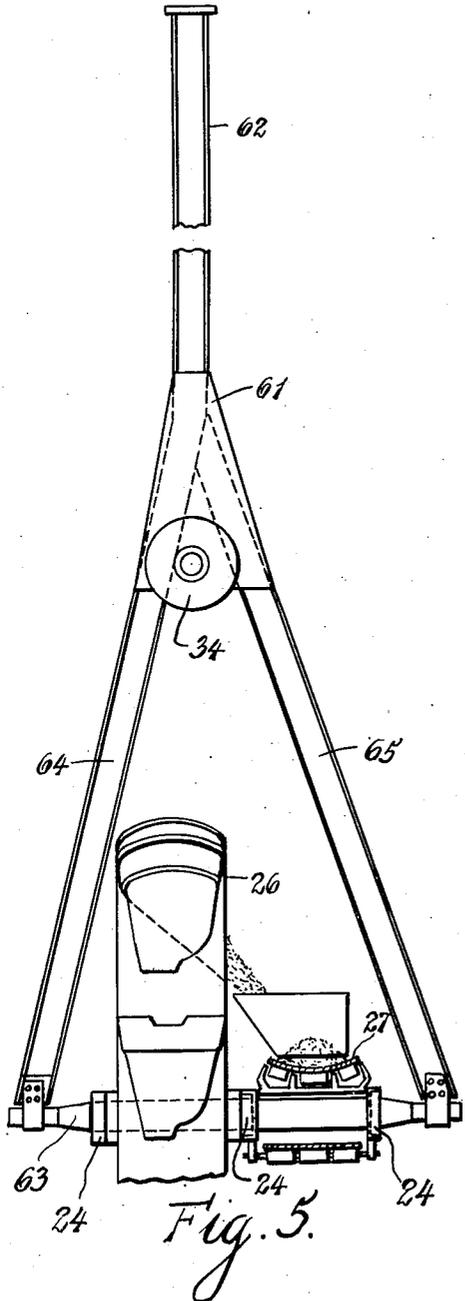
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3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

2,492,159

## RETRACTING DEVICE FOR WHEEL EXCAVATORS

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7 Claims. (Cl. 37—190)

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My invention relates to new and useful improvements in retracting devices for wheel excavators.

The wheel excavator is a highly specialized, but well-known, form of excavator.

The wheel of such a machine is usually mounted on the end of a boom, and carries a series of digging buckets on its periphery. In all variants, these buckets dig as they move forward and/or upward with the revolution of the wheel. In some variants, they dump as they move downward after passing through their highest position. In other variants, the buckets have a spiral configuration which forces the excavated dirt out sidewise, either directly or through a hollow axle of the wheel (as for example, Smith, No. 242,484 and in Fischer, No. 1,763,769.) In most variants, the buckets dump onto a rearwardly moving conveyor-belt either directly or through a hopper.

The problem arises as to how to traverse the face of the bank of dirt with the digging wheel.

It is generally considered advisable to have the propelling machinery of the main base of the excavator face along the cut, whereby to move the excavator from station to station. In each station, the problem then arises of traversing the adjacent portion of the face of cut with a combination of motions in two or three dimensions.

For example, Kuhsel, No. 2,153,719, pivots his boom on his base, and traverses up and down, and incidentally to a slight extent forward and back, by raising and lowering his boom about its pivot. He traverses lengthwise of the cut, in each station, by swinging the turntable of his machine.

Weimer, No. 1,956,738, does the same, but employs an auxiliary turntable (on top of the main turntable) for lengthwise traversing in each station.

Johnson, No. 1,762,441, raises and lowers his wheel, and reciprocates his boom in and out, in much the same manner as the dipper of a conventional power-shovel.

My invention is, in general, of the Johnson type, my principal object being to improve the reciprocating means and the raising and lowering means.

The problems which I had to solve in this connection involved: (1) preventing interference, and assuring cooperation, between the means for thrusting the boom in and out, and the conveyor-belt carried by the boom; and (2) steadying the

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wheel in its raising and lowering, and more particularly during digging.

In addition to my principal objects, above stated, I have worked out a number of novel and useful details, which will be readily evident as the description progresses.

My invention consists in the novel parts and in the combination and arrangement thereof, which are defined in the appended claims, and of which one embodiment is exemplified in the accompanying drawings, which are hereinafter particularly described and explained.

Throughout the description the same reference number is applied to the same member or to similar members.

Figure 1 is a side elevation of my complete excavator, somewhat conventionalized, together with a dotted showing of my wheel and some associated parts in three additional positions.

Figure 2 is an enlarged plan view of my reciprocating mechanism.

Figure 3 is a front elevation of the same, partly in section, taken along the lines 3—3 of Figure 2.

Figure 4 is a side elevation of the same.

Figure 5 is a front elevation of the "wishbone" of my hoisting mechanism.

Figure 6 is a side elevation of the same.

Referring now to Figure 1, we see that 11 is the main propelling base of my excavator. Mounted thereon, for 360° swing, is a turntable 12, carrying a superstructure or A-frame 13.

Pivoted to the A-frame at 14, and projecting rearwardly (i. e., to the left in the picture), there is a stackerladder 15. A mast 16 is pivoted on the rear of the turntable 12, and is held by a suspension-line 17.

By means of a ladder-hoist line 18, proceeding from a winch 19 on the turntable, over appropriate sheaves on the A-frame, mast, and ladder, the ladder may be raised and lowered.

A long conveyor belt 20, extends from the front end of the machine at 21 past appropriate jointing at 14, to the rear end of the ladder. This belt may, if desired, be provided with an appropriate intermediate unloader (not shown) well-known in the art. The belt can be actuated by a motor 20a, or any other convenient means.

Pivoted on the front of the A-frame is another mast 22, with its suspension-line 23.

A boom 24 is pivoted at its rear end to a carriage 25, capable of sliding backward and forward on a track in the A-frame. The means for reciprocating this boom and carriage constitutes one of the principal features of my invention,

and will be hereinafter more particularly described.

The boom 24 carries at its outer end a digging-wheel 26, which may be of any conventional or non-conventional type. The boom also carries a conveyor-belt 27. There is a hopper 28, for guiding the dirt, delivered off the rear end of belt 27, onto the other belt, 20.

A saddle-block 29 is pivoted on the upper end of mast 22. Through this saddle-block there slides wishbone 30, the lower forked end of which is attached to and supports the outer end of boom 24.

This wishbone and its mounting constitute the second principal feature of my invention, and will be hereinafter more particularly described.

A boom-hoist line 31 passes from a winch 32 on the turntable 12, over sheaves 33 at the upper end of mast 22 and sheaves 34 on the wishbone 30, to raise and lower the wishbone.

By rotating the turntable 12, shifting the carriage 25, and raising and lowering the wishbone 30, the wheel traverses the face of the cut in three dimensions.

Turning now to Figures 2, 3 and 4, let us consider my reciprocating mechanism.

Each side of the A-frame 13 supports a trackway. Each trackway comprises a lower track 35, an upper rack 36, and a side track 37.

The rear end of the boom 24 carries a motor 38 which, through appropriate transmission 39, actuates a cross-shaft 40, journaled on the boom. At each end of this cross-shaft, there is a pinion 41, which engages a gear 42, mounted on a shaft 43, journaled in a carriage 44. This shaft 43 carries, within the saddleblock, a pinion 45 which engages the rack 36. The carriage 44 also carries two rollers 46, which run on lower track 35.

Side track 37 serves as a guard-rail for shaft 43.

The two carriages 44 and the boom 24 act together as an articulated unit; and it is very advisable that the motor 38 and propelling pinions 45 be carried by this unit, and the racks 36 be carried by some stationary part of the machine, rather than vice versa, in order that the discharge end of belt 27 shall travel always at a substantially fixed distance from belt 20, regardless of the inclination and extent of retraction of the boom 24.

Hopper 28 has wheels 47, which run on rails 48, which are carried by A-frame 13, parallel to stacker belt 20. Depending from the rear end of boom 24, are two lugs 49, one on each side of hopper 28. From these lugs to anchorages on the two sides of the front of the hopper, there extend two links 50, whereby the hopper is constrained to reciprocate with the boom, and yet is not tilted when the boom is tilted under the influence of hoist-ropes 31.

The rear end of the boom has an opening 51 above the hopper. Thus dirt excavated by the wheel 26 is deposited on belt 27 in any convenient manner, is carried to the rear by that belt, is projected off the rear end of that belt, falls through hole 51, through hopper 28, onto belt 20, which belt carries it to the rear of the machine for stacking.

Belt 27 can be actuated by a motor 52 carried by boom 24, or by any other convenient means.

Turning now to Figures 5 and 6, let us consider my wishbone. As shown, it comprises three converging I-beams, secured together in any convenient manner, as by welding, by plates 61.

Upper I-beam 62 slides in saddle-block 29 (see Figure 1).

Shaft 63 for wheel 26 is journaled in the lower ends of I-beams 64 and 65. Journaled on the faces of my wishbone, adjacent the juncture of the three I-beams, are sheaves 34, to accommodate hoist-rope 31 (see Figure 1). Other means than these sheaves and this-rope could be used to raise and lower my wishbone; such, for example, as a rack and pinion, as in the conventional single-part dipper-handle of a power-shovel.

It will be noted, from Figure 5, that my wishbone is asymmetrical. Upper I-beam 62 is centrally located with respect to the center of gravity of boom 24 and its contents. The wide side permits the passage of belt 27. The front end of boom 24 is built integral with shaft 63.

It will be seen that my wishbone construction steadies the wheel and its boom against side thrust and lateral tilt, not only during raising and lowering, but more important still when one side of the bottom or front of the wheel is bearing hard against the bank during digging, as is normal. Furthermore my design obviates running the hoist-rope 31 clear down to boom 24, where it might interfere with the digging mechanism, and in turn be interfered with by the dirt.

Having now described and illustrated one form of my invention, I wish it to be understood that my invention is not to be limited to the specific form or arrangement of parts herein described and shown.

I claim:

1. In a wheel excavator, comprising a main frame, a stacker conveyor carried thereby, a track on the main frame paralleling this conveyor, a carriage running on the track, a boom pivoted adjacent its inner end on the carriage, means for raising and lowering the outer end of the boom, a conveyor carried lengthwise of the boom, a digging wheel carried by the outer end of the boom and adapted to dump what it digs onto the second mentioned conveyor, and means for propelling the carriage along its track, the combination therewith of: a second track on the main frame, substantially paralleling the stacker conveyor; and a hopper, reciprocable with the boom and carriage, running on this last named track, whereby the second conveyor dumps onto the stacker conveyor through the hopper.

2. A wheel excavator according to claim 1, characterized by the further fact of having at least one link pivoted to the boom-carriage unit and to the hopper, whereby movement of the carriage on its track propels the hopper on its track.

3. A wheel excavator according to claim 1, characterized further by the fact that the means for raising and lowering the outer end of the boom comprises: a mast, pivoted at its foot on the main frame; means for supporting the upper end of the mast from the frame; a saddle block at the upper end of the mast; a Y-shaped wishbone member, the stem of which is reciprocable through the saddle block; and the branches of which are pivoted to the outer end of the boom; at least one sheave carried by the upper end of the mast; at least one sheave carried by the wishbone; a hoist-rope passing around the sheave; and means for actuating the hoist-rope.

4. In a wheel excavator, the combination of: a main frame; a boom, pivotally supported adjacent its inner end by the main frame; a digging wheel carried by the outer end of the boom; a mast, pivoted at its foot on the main frame;

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means for supporting the upper end of the mast from the frame; a saddle-block at the upper end of the mast; a Y-shaped wishbone member, the stem of which is reciprocable through the saddle-block, and the branches of which are pivoted to the outer end of the boom; at least one sheave carried by the upper end of the mast; at least one sheave carried by the wishbone; a hoist-rope passing around the sheaves; and means for actuating the hoist-rope.

5. In a wheel excavator, the combination of: a main frame; a boom, pivotally supported adjacent its inner end by the main frame; a digging wheel carried by the outer end of the boom; a mast, pivoted at its foot on the main frame; means for supporting the upper end of the mast from the frame; a saddle-block at the upper end of the mast; a Y-shaped wishbone member, the stem of which is reciprocable through the saddle-block, and the branches of which are pivoted to the outer end of the boom; and means for reciprocating the wishbone.

6. A wheel excavator according to claim 5, further characterized by the fact that the wheel is coaxial with the pivotal connection of the wishbone to the boom.

7. In a wheel excavator, the combination of: a main frame; a boom, pivotally supported adjacent its inner end by the main frame; a conveyor, carried lengthwise of the boom, a digging wheel carried by the outer end of the boom, and adapted to dump what it digs onto the conveyor;

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the conveyor being to one side of the wheel; a mast, pivoted at its foot on the main frame; means for supporting the upper end of the mast from the frame; a saddle-block at the upper end of the mast; a Y-shaped wishbone member, the stem of which is reciprocable through the saddle-block, and the branches of which are pivoted to the outer end of the boom; said wishbone being asymmetrical, in that the stem is approximately aligned with the center of gravity of the end of the boom and its contents, and that its branches straddle both wheel and conveyor; and means for reciprocating the wishbone.

WERNER LEHMAN.

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