April 25, 1933. R. W. KALTENBACH ET AL 1,905,906

PILE DRIVER

Filed Aug. 28, 1930 2 Sheets-Sheet 1

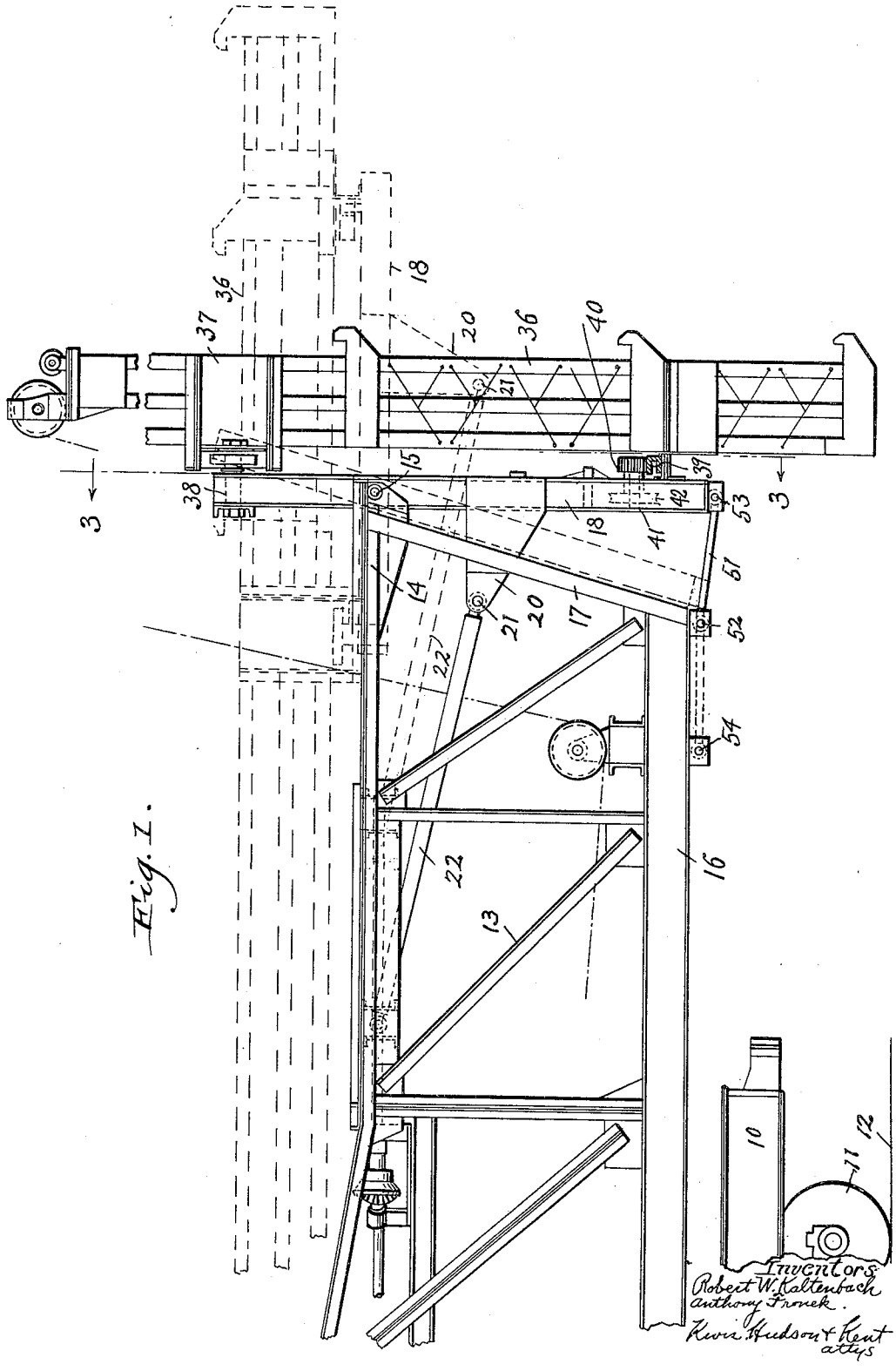


Fig. 1.

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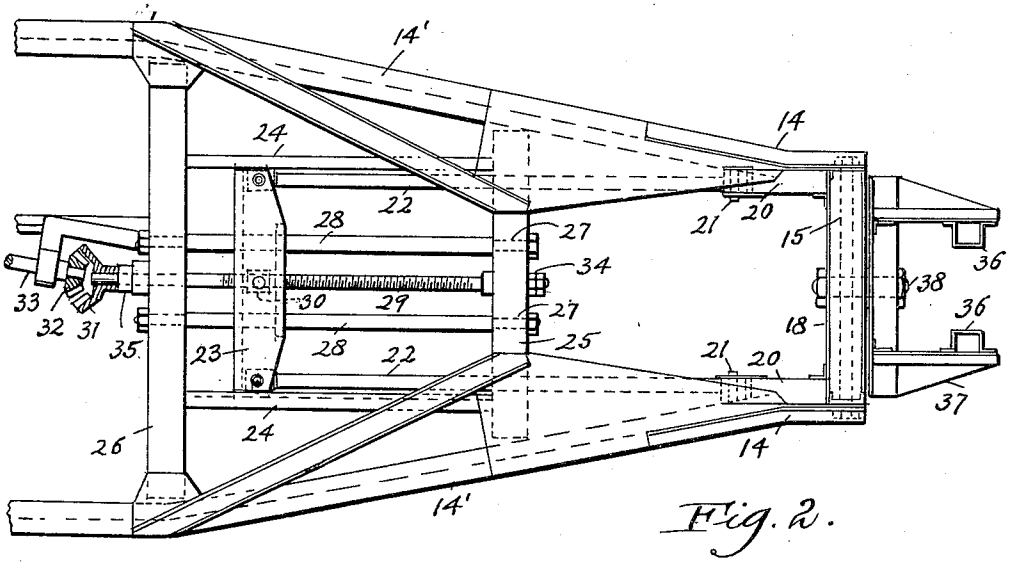


Fig. 2.

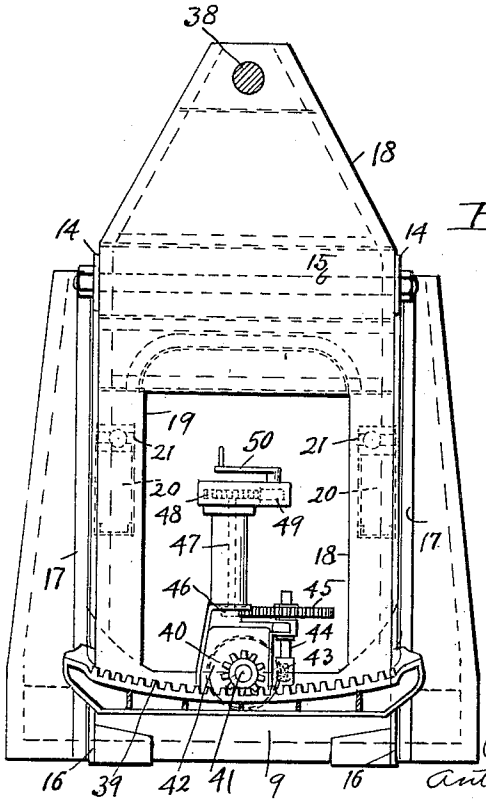


Fig. 3.

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UNITED STATES PATENT OFFICE

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PILE DRIVER

Application filed August 28, 1930. Serial No. 478,434.

This invention relates to improvements in pile drivers. It has to do particularly with railroad pile drivers such as are mounted upon railroad cars and are used primarily in railroad construction work.

One of the objects of the invention is the provision of means for tilting the lower end of the leads inwardly as well as outwardly.

Another object is the provision of a connection for tilting the leads which shall be capable of taking compression as well as tension.

Still another object is the provision of operating mechanism with power connections which are irreversible, that is connections in which the driven element is incapable of becoming the driving element, so that when the leads are tilted to a given angle they will remain at that angle without being otherwise fastened.

Other objects and features of novelty will appear as we proceed with the description of that embodiment of the invention which, for the purposes of the present application, we have illustrated in the accompanying drawings, in which

Figure 1 is a side elevational view of the forward end of a railroad pile driver embodying the invention.

Fig. 2 is a plan view of the same, and

Fig. 3 is an end elevational view taken partly in vertical transverse section upon the line 3—3 of Fig. 1.

In the drawings we have indicated at 10 the forward end of a railroad car mounted upon the usual car wheels, one only of which appears at 11, the wheels being adapted to run upon a railroad track, the upper surface of which is indicated at 12 in Fig. 1. The car may be of special construction arranged to support upon a vertical axis a truss 13 capable of swinging upon its axis to position the leads as desired. The foregoing is all conventional construction.

In the customary practice heretofore the leads have been mounted upon a batter frame which was in turn mounted upon a transverse pivot and the batter frame could be tilted upon the latter pivot by means of flexible connections. These connections were capable of transmitting tension only, and hence it was necessary to employ them in pairs in order to provide for movement in either direction, and in order to keep the connections on opposite sides of the truss taut it was necessary to employ a differential gear drive. Furthermore, these power connections were not irreversible, and hence locking or latching means were necessary in order to hold the leads in a given tilted position. In addition, the maximum possible movement of the batter frame was 90°, that is from a horizontal shipping position to a vertical position and reverse. Therefore any piles which were to be battered had to be driven with their upper ends inclined toward the truss. A reverse batter could not be obtained. We have departed from these conventional features of construction, substituting a rigid link for the flexible power connections, eliminating the differential gear drive, operating this link by a screw and nut mechanism which is irreversible (that is to say the direction of the transmission of energy cannot be reversed by the load) and so constructing the truss that the batter frame may be tilted to batter piles with their upper ends inclined outwardly from the truss.

According to our invention side plates 14, protruding from the forward ends of the upper side members 14′ of the truss, are connected by a pivot shaft or bolt 15. The lower side members 16 of the truss are shorter than the members 14′. They are connected together by a tie member 9, and are attached to the upper members 14′ and plates 14 by inclined struts 17. Upon the pivot bolt or shaft 15 we mount a batter frame 18. The major portion of this frame is rectangular, but that portion which extends above the truss may be tapered upwardly as shown in Fig. 3. This frame encloses a large opening 19 within which is positioned and mounted the mechanism for swinging the leads transversely, as will presently appear.

Attached to the frame 18 on either side thereof and extending rearwardly is a pair of brackets 20 which carry pivots 21 for

the forward ends of two links 22. These links are connected at their rear extremities, preferably by universal joints, with an equalizer beam 23, the outer ends of which slidably engage tracks 24 supported by the transverse members 25 and 26 of the truss. These members also carry rods 27 that are surrounded between the members 25 and 26 by spacing sleeves 28. The equalizer beam is perforated to receive these sleeves, which therefore act as further supporting and guiding means for the beam.

We provide mechanism for moving the beam 23 back and forth toward and away from the pivot 15, this mechanism including power connections which are irreversible, that is not subject to movement in a reverse direction under the influence of the load. The mechanism itself may be operated to move the beam 23 in either direction however. The mechanism which we employ for this purpose consists of a screw 29 rotatably mounted in bearings in the transverse truss members 25 and 26. Threadably mounted upon this screw is a nut 30 which has upper and lower trunnions by means of which the nut is mounted in the beam 23. Rotation of the screw 29 therefore produces travel of the nut 30, and with it the beam 23 and the links 22. Beyond its rear bearing in the cross member 26 the screw 29 has secured thereto a bevel gear 31, with which meshes a bevel gear 32 on the forward end of a power shaft 33. This shaft may be driven by any suitable means which includes provision for rotation in either direction. At 34 and 35 we have indicated thrust bearings to take the thrust transmitted by the screw shaft when working in either direction.

Leads are shown at 36. They may be of any conventional construction, and are supported by a yoke 37 which is rotatably mounted upon a pivot bolt 38 carried by the upper end of the frame 18. In order to tilt the leads transversely, we mount upon them at their lower end a rack 39 curved to conform with a circle struck from the axis of pivot 38. A pinion 40 meshes with this rack and is carried by a shaft 41 mounted in bearings upon the batter frame 18. The shaft 41 is adapted to be turned in either direction by a worm wheel 42 fixed to the shaft, which worm wheel meshes with the worm 43 fixed to a vertical shaft 44, this latter shaft carrying also a large spur gear 45 which meshes with a pinion 46 on the lower end of a vertical shaft 47, the upper end of the latter shaft carrying a large gear 48 which meshes with a small gear 49 mounted upon a vertical shaft to which is attached an operating hand-crank 50. A very considerable gear reduction is thus provided, whereby a single workman may readily exert sufficient power to move the pinion 40 and thereby transmit movement to the rack 39 to swing the leads in the desired direction. All of the above mechanism, with the exception of the rack 39, is mounted upon and carried by the batter frame 18.

The maximum swing of the batter frame 18 upon its pivot 15 to produce a reverse batter is indicated by dotted lines in Fig. 1. The maximum movement of the frame and leads in the opposite direction is indicated in dotted lines in the same figure, this being the horizontal or shipping position of the leads.

Although we do not regard it as essential, we may provide means for bracing the batter frame in certain of its most commonly used operative positions. In the present instance we have shown for this purpose a bar 51 provided with eyes at its ends to receive transverse pins or bolts 52 and 53 in the truss and batter frame respectively, one or both of these pins being removable. This bar is of a length to brace the batter frame when in vertical position, but obviously bars of different lengths may be employed if desired. When the frame 18 is to be moved to some other position, the pin 53 may be removed and the bar swung back upon the pin 52 as a pivot until it takes the dotted line position, after which a pin 54 may be inserted to hold it in this inoperative position.

While in the foregoing description and in the accompanying drawings we have disclosed more or less in detail one particular embodiment of the invention, we desire it to be understood that such detailed disclosure has been resorted to primarily for the purpose of fully illustrating the invention in accordance with the requirements of the statute, and that it is not to be construed as amounting to any limitation upon the scope of the invention.

Having thus described our invention, we claim:

1. In a railroad pile driver, a truss adapted to overhang its mounting, a horizontal pivot carried by the free end of said truss, a batter frame mounted upon said pivot at a point intermediate the ends of the frame, and leads pivotally carried by said frame, the outer end of said truss below the level of said pivot being formed to provide a space into which the batter frame may be tilted inwardly.

2. In a pile driver, a truss, a horizontal pivot carried thereby, a batter frame mounted upon said pivot, leads carried by said frame, a screw rotatably mounted in said truss at right angles to said pivot, a nut threadably mounted upon said screw, a rigid link pivoted at one end to said frame and at the other end to said nut, and means for rotating said screw in either direction, said pivotal connection between the frame and link lying at the same distance approximate-

ly from the vertical plane through said pivot when the frame is in horizontal or vertical position.

3. In a pile driver, a truss, a horizontal pivot carried thereby, a batter frame mounted upon said pivot, leads carried by said frame, a screw rotatably mounted in said truss at right angles to said pivot, a nut threadably mounted upon said screw, a transversely arranged equalizer beam mounted to slide backwardly and forwardly upon said truss and operatively connected intermediate its ends with said nut, and a pair of rigid links connected at their rear ends with said beam upon opposite sides of said nut and at their forward ends with said frame at points remote from said pivot, and means for rotating said screw in either direction.

4. In a railroad pile driver, a truss, a horizontal pivot carried by the truss in a fixed position, a batter frame mounted upon said pivot extending downwardly therefrom in its operative position, leads carried by the frame, a bracket mounted upon the frame at a point spaced from the pivot and extending in a direction parallel to the length of the truss when the frame stands vertical, a rigid link pivotally connected at one end with said bracket at a point in a line extending from said pivot at an angle of approximately 45° to the frame, and means mounted upon said truss for moving the opposite end of the link to swing the frame to horizontal shipping position or to upstanding operative position.

5. In a railroad pile driver, a truss adapted to overhang its mounting, a horizontal pivot carried by the free end of said truss, a batter frame mounted upon said pivot, leads carried by the frame, said truss being constructed with the forward end inclined downwardly and rearwardly from said pivot, and means for swinging the batter frame to inclined position in either direction from the vertical and in one direction down to horizontal shipping position.

In testimony whereof, we hereunto affix our signatures.

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