(No Model.) 5 Sheets—Sheet 1.

# J. A. SPANGLER.

## PILE DRIVER.

No. 569,435. Patented Oct. 13, 1896.

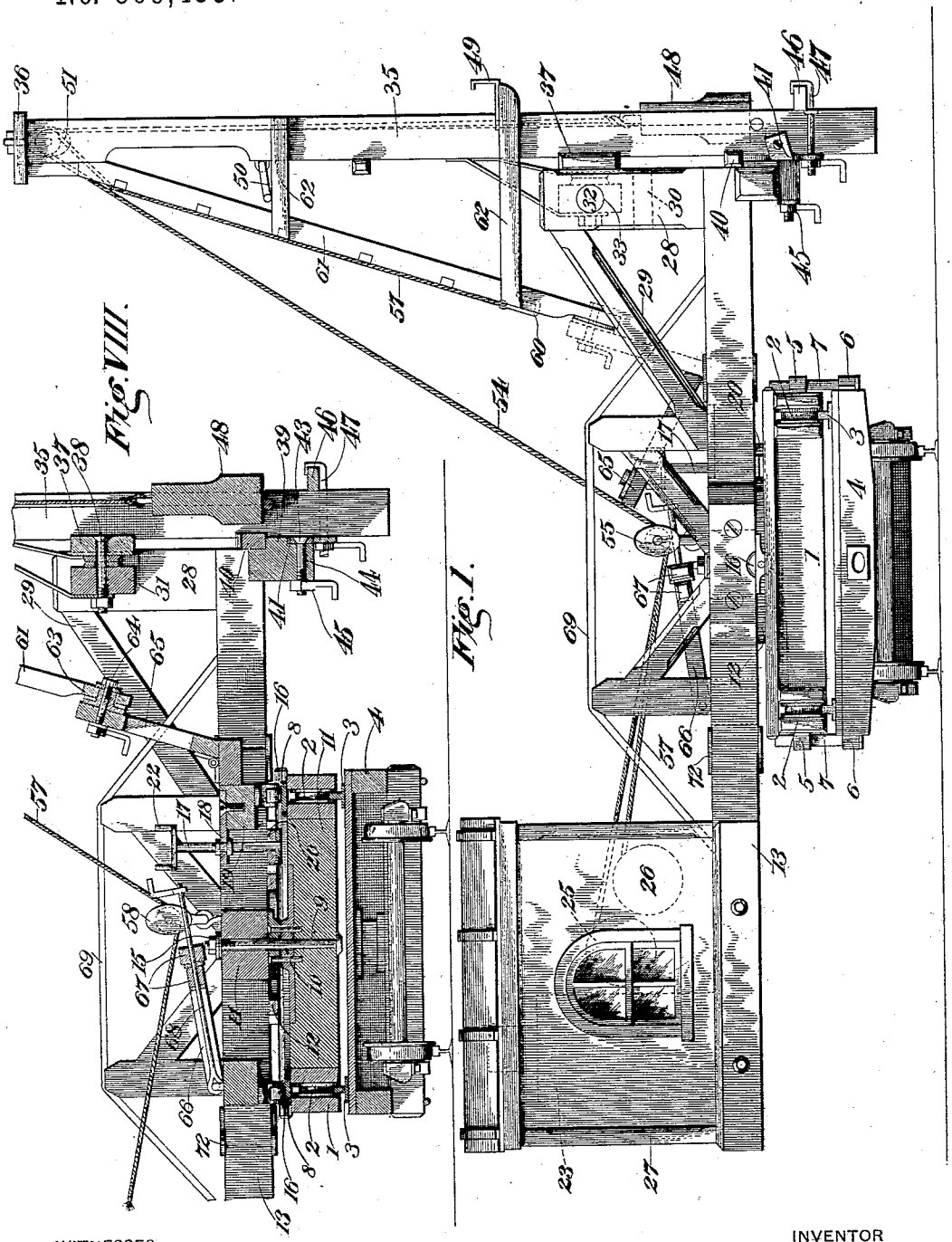

Fig. VIII.

Fig. I.

WITNESSES

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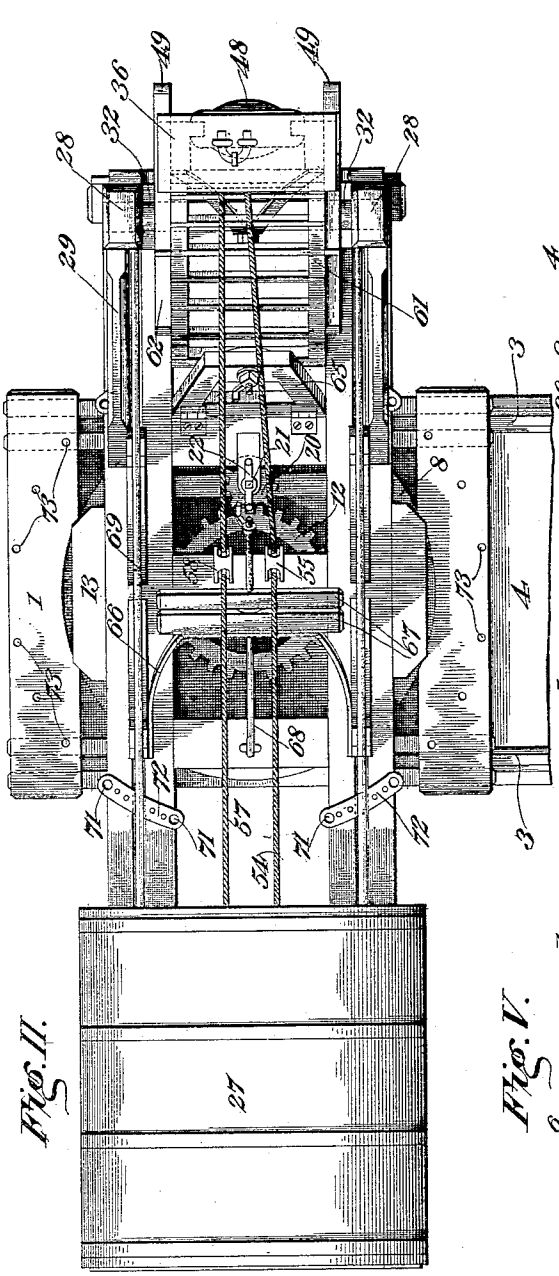

Fig. II.

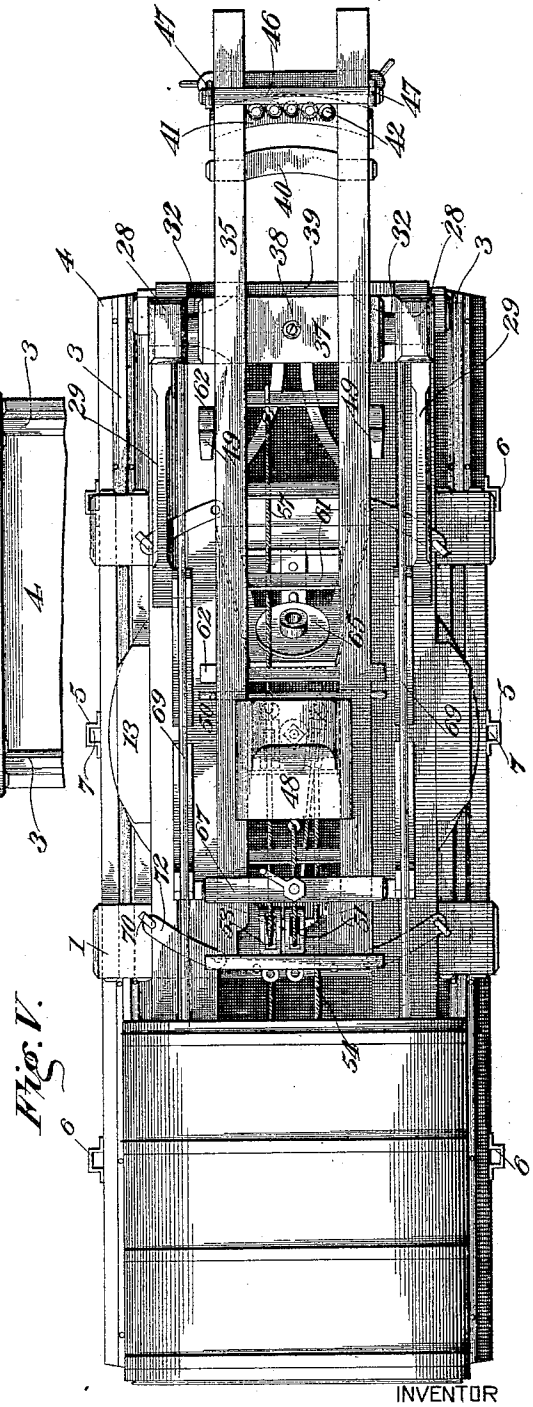

Fig. V.

WITNESSES

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(No Model.) 5 Sheets—Sheet 3.

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## PILE DRIVER.

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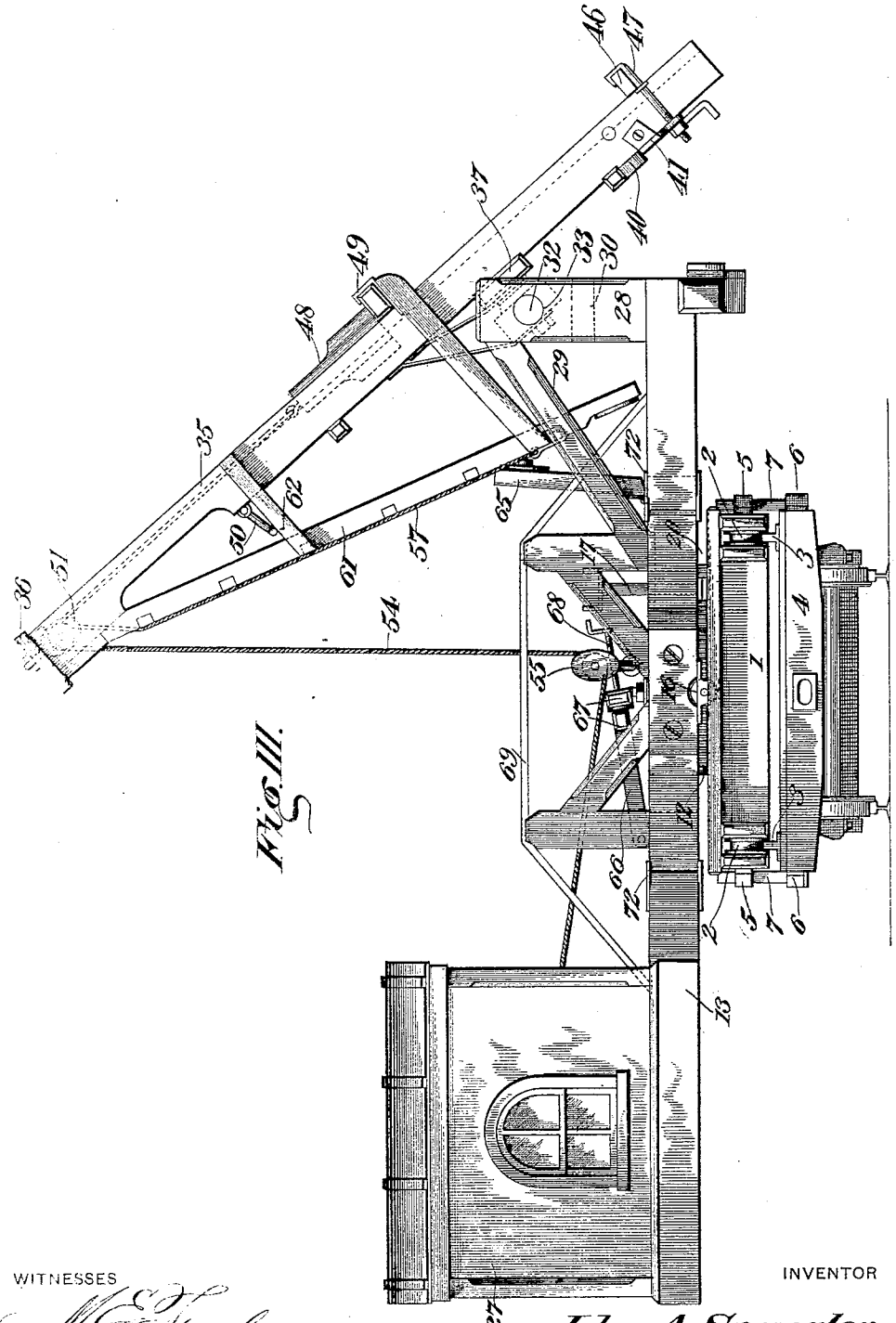

FIG. III.

WITNESSES

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(No Model.) 5 Sheets—Sheet 4.

# J. A. SPANGLER.

## PILE DRIVER.

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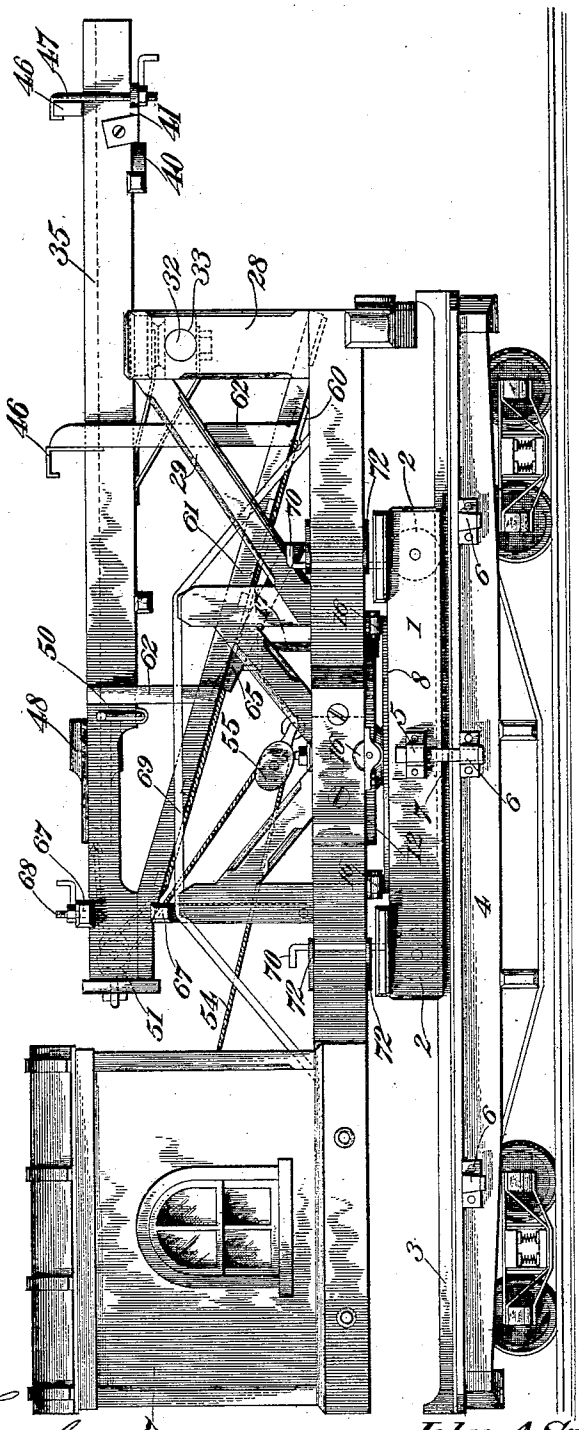

Fig. IV.

WITNESSES

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(No Model.) 5 Sheets—Sheet 5.

# J. A. SPANGLER.

## PILE DRIVER.

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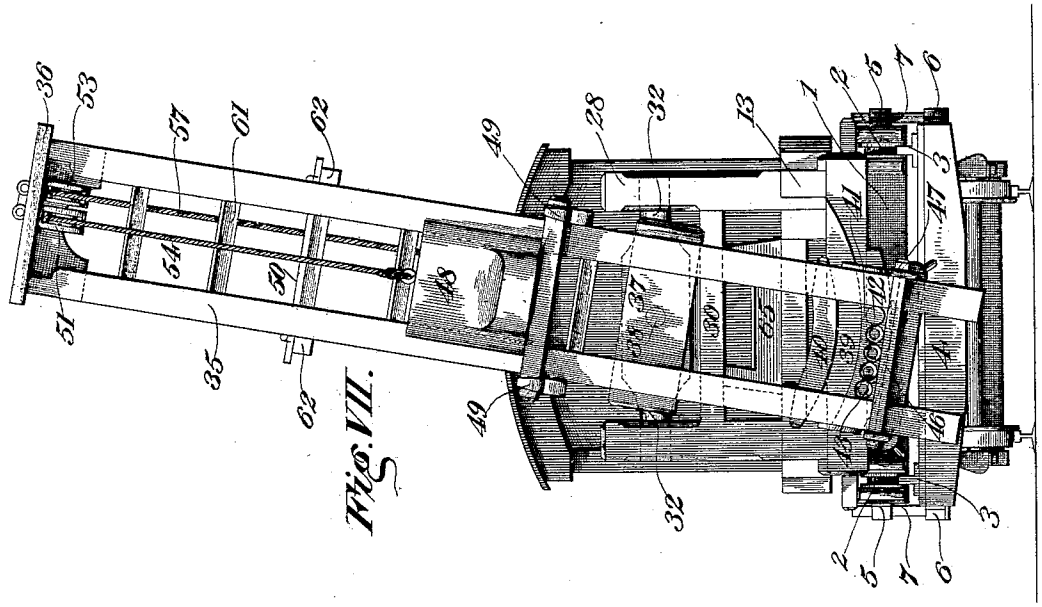

Fig. VII.

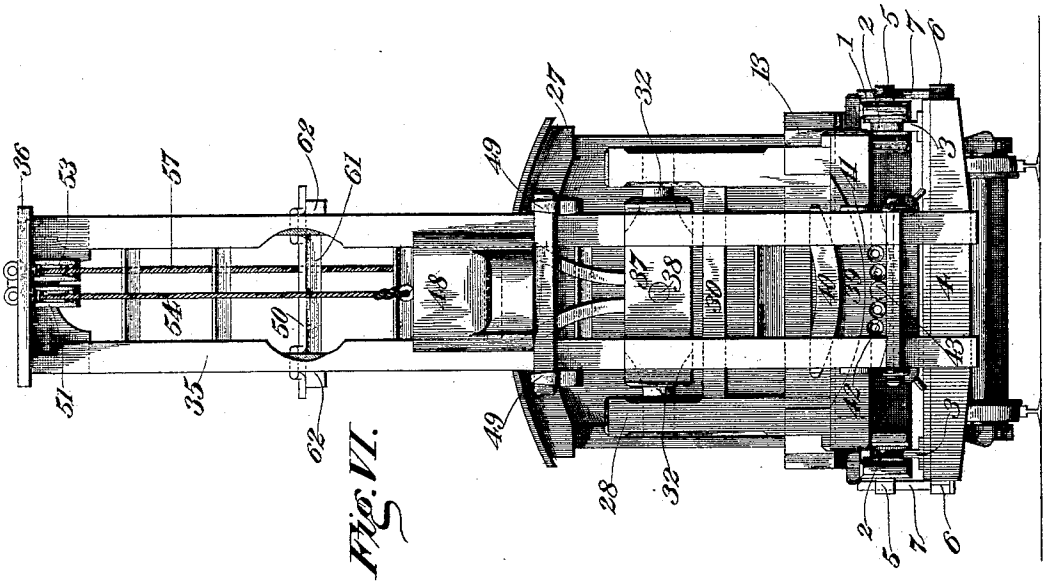

Fig. VI.

WITNESSES

M. E. Fowler

S. N. Acker

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# UNITED STATES PATENT OFFICE.

JOHN A. SPANGLER, OF WASHINGTON, PENNSYLVANIA.

## PILE-DRIVER.

SPECIFICATION forming part of Letters Patent No. 569,435, dated October 13, 1896.

Application filed October 8, 1895. Serial No. 565,050. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. SPANGLER, of Washington, county of Washington, State of Pennsylvania, have invented certain new and useful Improvements in Pile-Drivers, of which the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to produce an improved railroad pile-driver, or in other words a pile-driver which is adapted to be operated from the deck of a flat-car or the like.

The special advantages of my apparatus are that it can be operated with great facility, convenience, and speed in any horizontal angle from a flat-car, the leaders being adjustable to any required vertical angle from the vertical position, and also that it can be readily folded for transportation, either for the purpose of making long journeys or in avoiding bridges or tunnels in making short shifts from one position to the other.

In the accompanying drawings, Figure I is a side elevation of my apparatus in the upright position, the frame of the machine being located transversely across its carriage. Fig. II is a top plan view of the same. Fig. III is a similar view of the apparatus at half-mast. Fig. IV is a side elevation of the apparatus folded for transportation. Fig. V is a top plan view thereof. Fig. VI is a front elevation of the front portion of the frame with the leaders in the vertical position. Fig. VII is a similar view with the leaders inclined from the vertical position. Fig. VIII is a central vertical section of the subject-matter of Fig. I, with the cab-house removed.

Referring to the figures on the drawings, 1 indicates the carriage of my machine, which is preferably made of heavy timber, suitably stayed and bolted to give it great strength and durability. It is provided with wheels 2, that adapt it to move longitudinally upon tracks 3, mounted upon the deck of a flat-car 4. Any ordinary flat-car may be adapted for the transportation of my machine, and that one illustrated is shown merely by way of example. The carriage is provided with side loops or staples 5, and the car is provided with corresponding staples 6, arranged so that by the insertion of standards 7 the carriage may be firmly secured upon the track of the flat-car at either end or in the middle thereof.

8 indicates a circular track mounted upon the carriage, in the center of which, upon a stud 9 in cross-piece 11, forming part of the frame 1, is fixed a gear 12.

13 indicates the frame of my machine, which, with its full equipment, is balanced upon the track 8, so as to move pivotally upon the stud 9, being provided with a cross-piece 14, through which the stud 9 extends and by which it is secured, as by a nut 15, working upon the threaded end of the stud. The frame 13 is provided with wheels 16, which support it upon the track 8 and enable it to turn freely upon the stud 9 as a pivot.

17 indicates a crank-shaft mounted in suitable bearings 18 on the cross-piece 19 of the frame 13. It is provided at its lower end with a pinion 20, that meshes with the gear 12 and is adapted to drive the frame 13 in either direction around the pivotal stud 9. It may be provided with a square head 21, through which power may be applied, as by a crank 22.

Upon one end of the frame is mounted an engine 23, adapted to drive a weight-operating drum 25 and a leader-elevating drum 26.

27 indicates the cab of the engine.

28 indicates the upright frame which forms a part of the frame 13, and to which it is firmly braced, as by braces 29.

30 indicates a cross-brace constituting a part of the upright frame.

31 indicates the leader-support, which is provided at its opposite end with trunnions 32, which fit and work within bearings 33 in the sides of the upright frame 28.

35 indicates the parallel leaders, that are united into a compact rigid frame by terminal cross-pieces 36 and an intermediate cross-piece 37. The cross-piece 37 is pivotally secured to the supporting-piece 31, as by a main bolt 38. This bolt serves to firmly unite the leaders to the frame, but permits of their vertical swing, to accommodate which I provide a segmental track 39 upon the end of the main frame 13. This track projects from the face of the frame and works between segmental bearings 40 and 41, the lower one of which is provided with a series of holes 42, through one of which a bolt 43 is passed into

a hole 44 in the frame-piece 13. The bolt is secured in place as by a crank-nut 45. The inclination of the leaders from the vertical position is determined by the selection of the hole 42, through which the bolt is inserted.

46 indicates a cross-piece adapted to be secured in hooks 47 for supporting the weight 48 in the leaders at their lower ends.

49 indicates hooks by which the cross-piece 46 may be secured to the middle part of the leaders, so as to fix their center of gravity for convenience of swinging them upon the support 31.

50 indicates a pivoted eccentric frame adapted to be swung between the leaders or away from them for retaining the weight 48 in the upper part of the frame or for permitting its operation, as required in driving piles.

51 indicates a central pulley secured to the upper cross-piece 36 of the leaders, and 53 a similar pulley located to one side thereof. Over the pulley 51 is passed a rope 54, that is secured at one end to the weight 48 and, passing under a pulley 55, secured to the cross-piece 14, is operatively connected with the drum 25. A rope 57 passes around the pulley 53, around the pulley 58, secured to the cross-piece 14, and is operatively connected at one end to the drum 26. At its opposite end it is provided with a hook 60, designed to be fastened to the frame 13 for raising and lowering the leaders.

61 indicates a ladder permanently secured, as by cross-pieces 62, to the leaders at a required angle thereto. It is provided at its lower end with a cross-piece 63, which, as by a bolt 64, is in use pivotally secured to a hinged frame 65. The bolt 64 is in approximate axial alinement with the bolt 38, so that the leaders may be swung vertically without disengagement of the ladder from the swinging frame.

66 indicates a folding leader-support secured to the frame 13. It is provided with cross-pieces 67, which engage the leaders, and with a bolt 68, by which they may be secured in position when the machine is folded for transportation, as shown in Fig. IV of the drawings.

69 indicates a guard-rail with which the sides of the frame 13 are preferably provided.

70 indicates pins carried in bearings 71 in bearing-plates 72 on the frame 13 and adapted to engage, respectively, with any one of a series of apertures 73 in the carriage 1, by which, when adjusted horizontally to the required position, the frame 13 may be rigidly secured to the carriage.

In operation suppose the parts of the machine to be in the lowered position shown in Fig. IV of the drawings, in which the weight is retained directly over the carriage 1, as by the frame 50, the leader being supported and held immovably by the cross-pieces 67 on the support 66. In this position the ladder 61 is disengaged from the frame 65 and the latter is folded down out of the way.

In the position for transportation shown in Fig. IV the carriage 1 is located centrally upon its flat-car, and the standards 7 are inserted in the appropriate staples 5 and 6 upon the carriage and the flat-car, respectively, for securely holding it in that position. The frame is also held in longitudinal alinement with the flat-car and the carriage 1 by the engagement of the pins 70 on the frame 13 with the proper apertures 73 on the carriage 1. If, now, it is desired to set the leaders into the operative position, all that is necessary to do is to detach them from the cross-pieces 67 of the support 66, folding the support 66 out of the way, as shown, for example, in Fig. I of the drawings. Next, the cross-piece 46 having been previously placed upon the hooks 49, the weight 48 is shifted against it. In this position the weight of the leaders is distributed so as to balance them over the axis of the trunnions 32. In this position a few pounds will suffice to turn the leaders upon the trunnions in either direction. The leaders may be lowered against the tension of the rope 57, the hook 60 on the end thereof being secured to the frame 13 and the drum 26 being operated to allow the rope 57 to unwind, as required. When the leaders have reached the vertical position, the bolt 64 is employed to secure the cross-piece 63 of the ladder 61 to the hinged frame 65. The bolt 43 is then inserted into one of the holes 42 and is made fast therein, the central hole 42 being selected if a vertical pile is to be driven. Any of the lateral holes 42 may be selected in place of the central one, in proportion to the required angle, if an inclined pile is to be driven. The engagement of the segmental track 39 with the segmental bearings 40 and 41 enables the leader-frame to be swung smoothly and truly upon the bolts 64 and 38 as often as may be required.

It may be noted that any position of the frame 13 upon its flat-car will permit the elevation of the leader-frame. When the leader-frame is elevated to adjust the required vertical angle, the frame 13, through the operation of the shaft 17, may be adjusted to the required horizontal position, in which position it may be secured by means of the insertion of the pins 70 into the required aperture 73. As often as may be required the carriage 1 may be moved upon the tracks 3 and secured in any of the three positions named, or any intermediate positions, if need be, by means of the standards 7 and the staples 5 and 6, respectively.

I do not propose to limit myself to the mechanical details of construction herein shown and described, but reserve the right to modify and vary the same within the scope of my invention, as hereinbefore specified and as defined in the terms of the claims.

What I claim is—

1. In pile-driving mechanism, the combination with a carriage, frame pivoted thereto, and frame-revolving mechanism, of bearing-

plates 72 secured to the side beams of the carriage upon opposite sides of the axis of the carriage and provided with apertures immediately adjacent to the opposite sides of the beams, a segmental series of apertures 73 in the carriage, and pins 70 designed to enter the apertures upon opposite sides of the side beams of the frame and to enter apertures 73 to prevent vibration of the frame upon the carriage, substantially as specified.

2. In pile-driving mechanism, the combination with a frame, of leaders pivotally secured thereto, a supporting-frame likewise pivotally carried by the frame, and a detachable pivotal connection between the supporting-frame and the leader-frame at right angles to the pivotal connection between the leader support and frame, substantially as specified.

3. In pile-driving mechanism, the combination with a frame and leaders pivoted thereto, of a ladder secured to the leaders, a ladder-supporting frame carried by the frame, and a detachable pivotal connection between the ladder and ladder-supporting frame independent of, but in approximate axial alinement with the pivot of the leaders, substantially as specified.

4. In pile-driving mechanism, the combination with a frame, of leaders pivotally secured thereto, and a folding leader-support carried by the frame and designed to be folded thereupon, and mechanism carried by the leader-support for securing the leaders in the depressed position, substantially as specified.

5. In pile-driving mechanism, the combination with a frame, of leaders pivotally secured thereto, a ladder carried by the leaders, a ladder-supporting frame, a detachable pivotal connection between the ladder and ladder-supporting frame independent of but in approximate axial alinement with the pivot of the leaders, and a leader-support carried by the frame and designed to support the leaders in the depressed position, substantially as specified.

6. In pile-driving mechanism, the combination with a frame, leaders pivoted to the support, a ladder secured to the leaders, a hinged frame carried on the frame, and a pivotal connection between the ladder and the hinged frame, said pivotal connection and the pivotal connection between the leader-support and the leaders being in approximate axial alinement, substantially as set forth.

7. In pile-driving mechanism, the combination with a frame, of leaders having a plurality of pivotal connections therewith a ladder secured to the leaders, a ladder-supporting frame carried by the frame, and a detachable pivotal connection between the ladders and ladder-supporting frame, substantially as specified.

8. In pile-driving mechanism, the combination with a frame, of leaders pivoted thereto provided with a ladder, a folding leader-support and a hinged ladder-supporting frame carried by the frame and designed to support the leaders in the depressed and elevated positions, substantially as specified.

9. In pile-driving mechanism, the combination with a frame, of leaders pivotally secured thereto, a ladder carried by the leaders, a ladder-supporting frame, a detachable pivotal connection between the ladder and ladder-supporting frame independent of but in approximate axial alinement with the pivot of the leaders, a leader-support carried by the frame and designed to support the leaders in the depressed position, and mechanism carried by the leader-support for securing the leaders thereto, substantially as specified.

10. In pile-driving mechanism, the combination with a frame, of leaders pivotally secured thereto, a ladder carried by the leaders, a ladder-supporting frame, a detachable pivotal connection between the ladder and ladder-supporting frame independent of but in approximate axial alinement with the pivot of the leaders, a folding leader-support carried by the frame and designed to support the leaders in the depressed position, and mechanism carried by the folding leader-support for securing the leaders thereto, substantially as specified.

11. In pile-driving mechanism, the combination with a main frame and upright frame thereupon, of leaders pivoted thereto, a segmental track upon the frame, a pair of segmental bearings upon the leaders concentric and in substantially the same vertical plane with the segmental track upon the frame, whereby the track and bearings constitute guiding mechanism for the leaders when they are swung upon their pivot, corresponding holes in the frame and in one of the segmental bearings, and a bolt designed to be inserted in correlative holes, substantially as specified.

In testimony of all which I have hereunto subscribed my name.

JOHN A. SPANGLER.

Witnesses:
HUGH A. ROGERS,
HORACE SCHEU.