W. FERRIS.

RAILWAY PILE DRIVER.

APPLICATION FILED APR. 18, 1910.

1,047,025.

Patented Dec. 10, 1912.

7 SHEETS—SHEET 1.

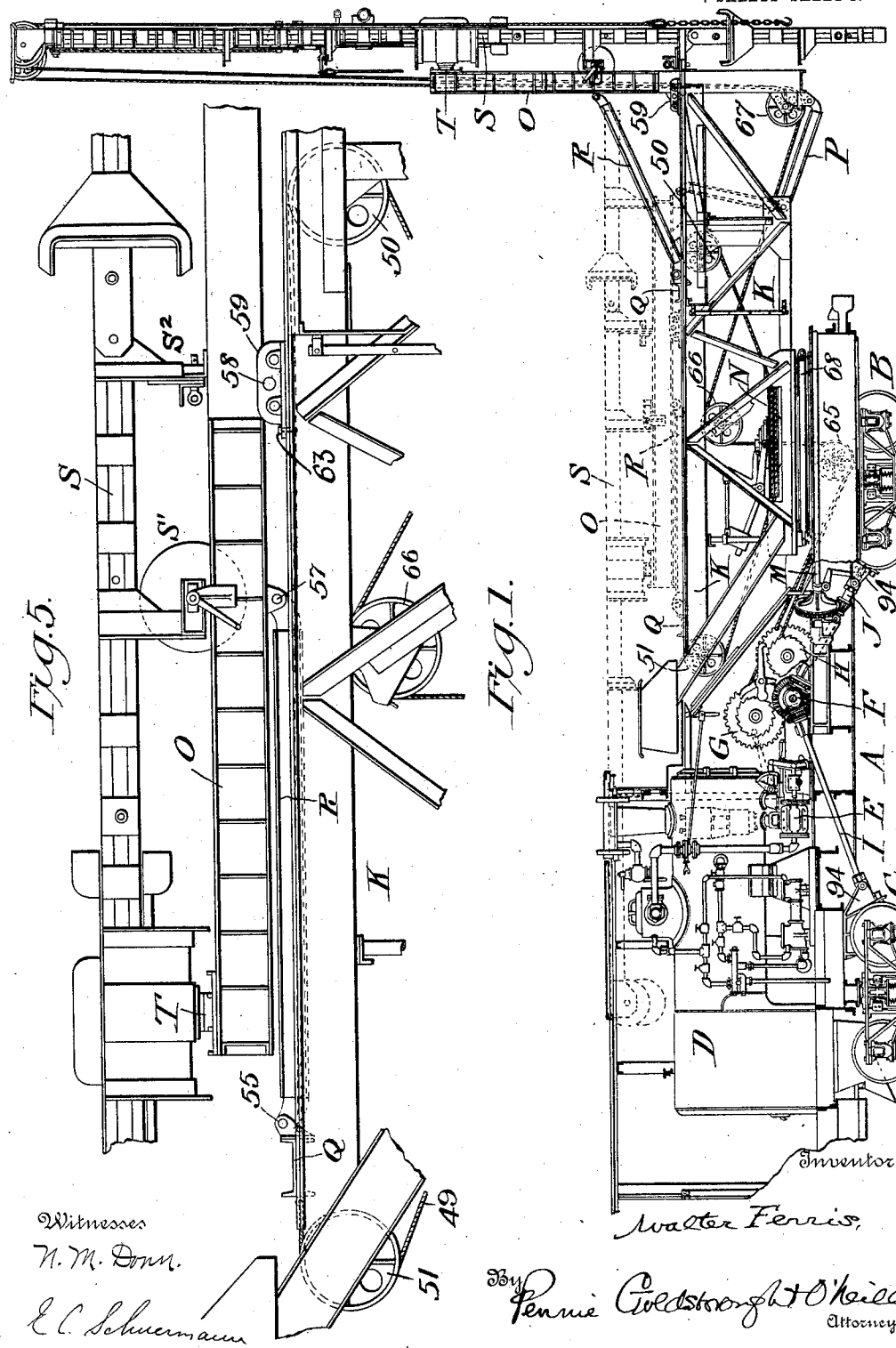


Fig. 5.

Fig. 1.

Witnesses

N. M. Dorn.

E. C. Schuermann

Inventor

Walter Ferris,

By Pennie Goldstrom & O'Neill

Attorneys

W. FERRIS.

RAILWAY PILE DRIVER.

APPLICATION FILED APR. 18, 1910.

1,047,025. Patented Dec. 10, 1912.

7 SHEETS—SHEET 2.

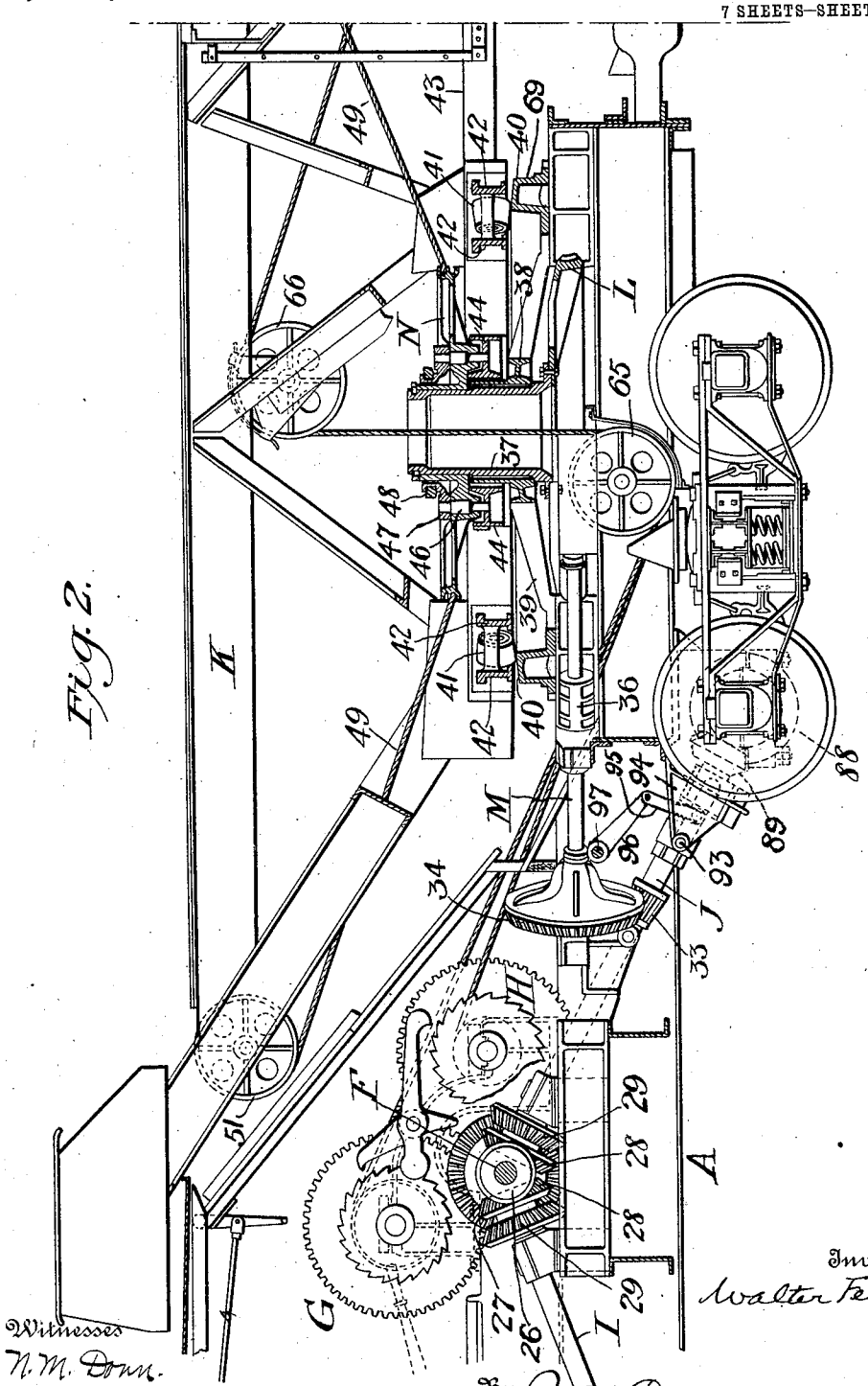


Fig. 2.

Witnesses
N. M. Down.
L. C. Schuermann.

Inventor
Walter Ferris,
By Pennie Goldsborough & O'Neill
Attorneys

W. FERRIS.

RAILWAY PILE DRIVER.

APPLICATION FILED APR. 18, 1910.

1,047,025.

Patented Dec. 10, 1912.

7 SHEETS—SHEET 3.

Fig. 2a.

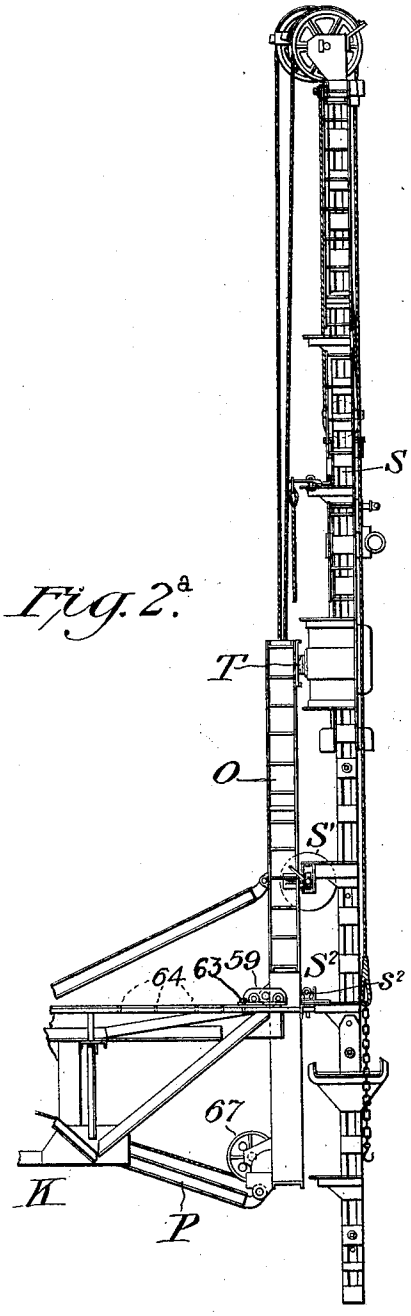
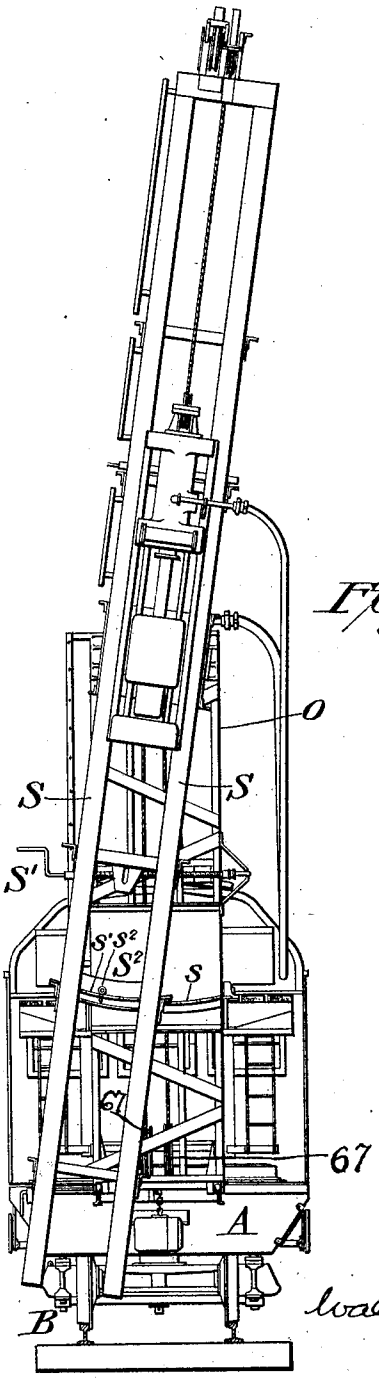


Fig. 4.



Witnesses

N. M. Dorn.

E. C. Schuermann.

Inventor

Walter Ferris,

By Pennie Goldborough & O'Neill

Attorneys

W. FERRIS.

RAILWAY PILE DRIVER.

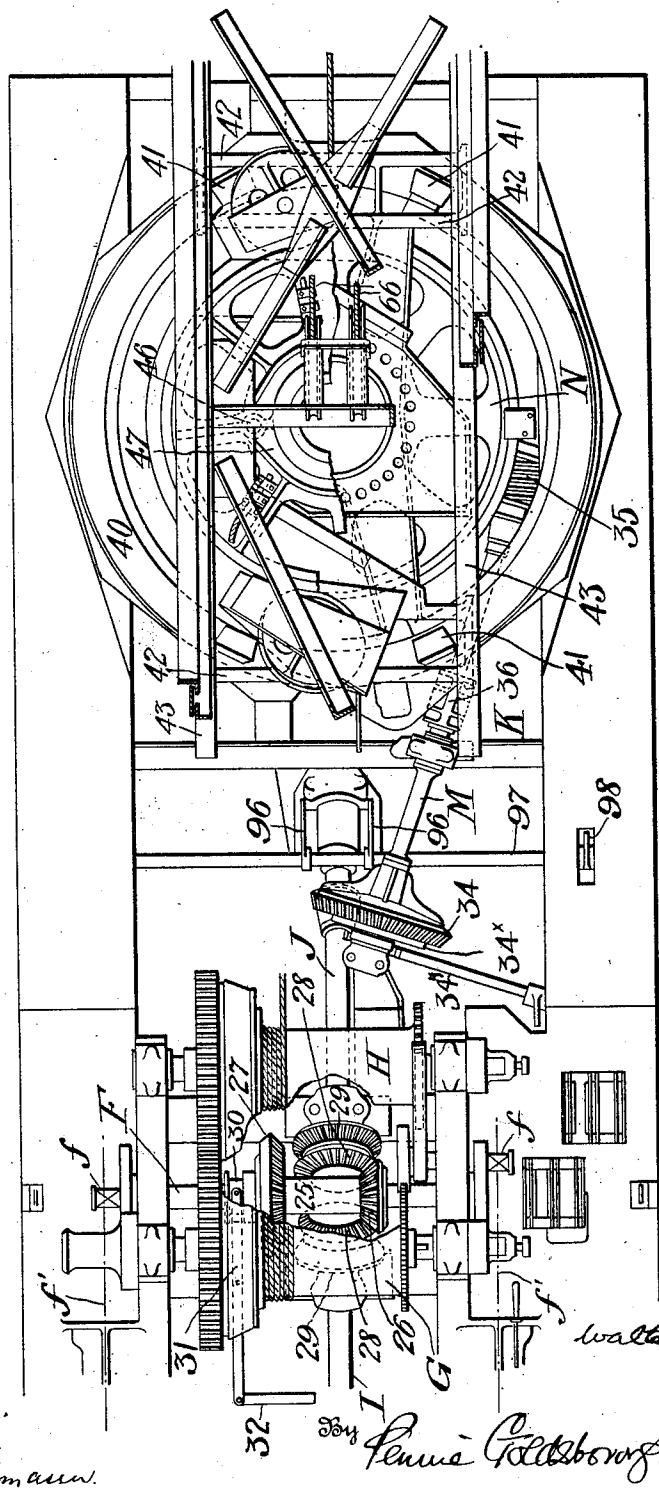
APPLICATION FILED APR. 18, 1910.

1,047,025.

Patented Dec. 10, 1912.

7 SHEETS—SHEET 4.

Fig. 3.



Witnesses

N. M. Donn.

E. C. Schuelmann.

Inventor

Walter Ferris,

By Pennie Goldborough & O'Neill

Attorneys

W. FERRIS.

RAILWAY PILE DRIVER.

APPLICATION FILED APR. 18, 1910.

1,047,025.

Patented Dec. 10, 1912.

7 SHEETS—SHEET 5.

Fig. 7.

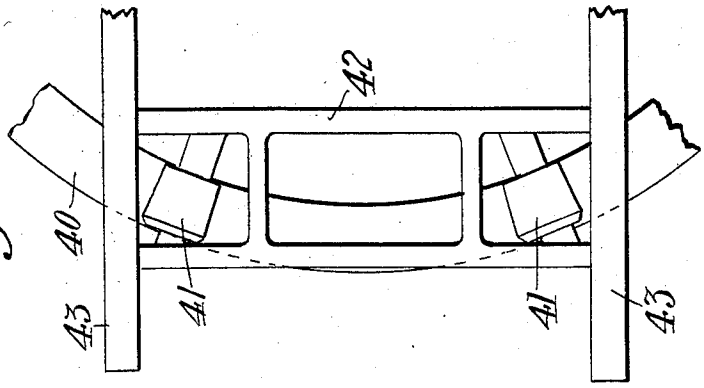
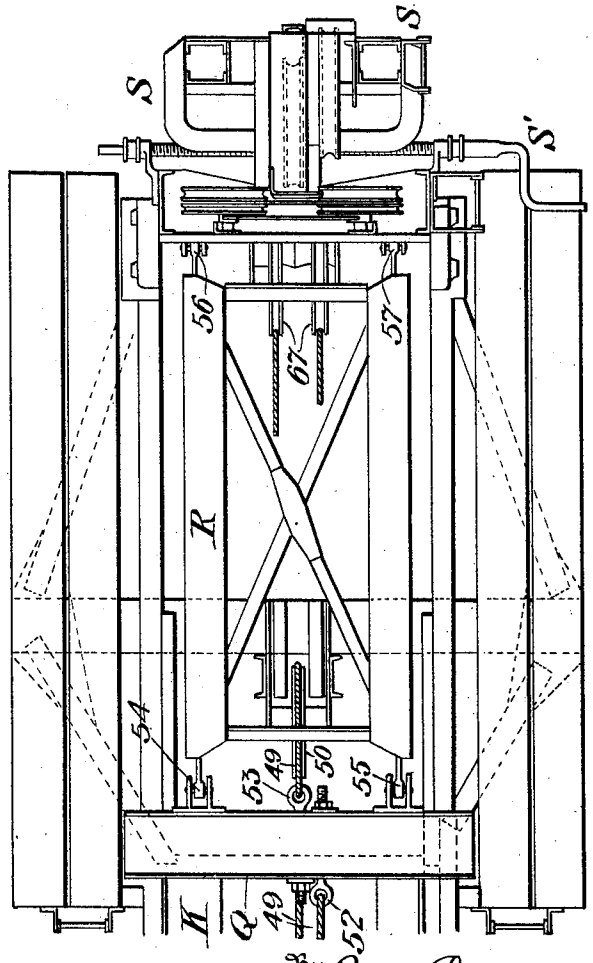


Fig. 3a.



Witnesses

N. M. Donn.

E. C. Schuermann.

Inventor

Walter Ferris,

By Brown Goldsborough & O'Neill

Attorneys

W. FERRIS.

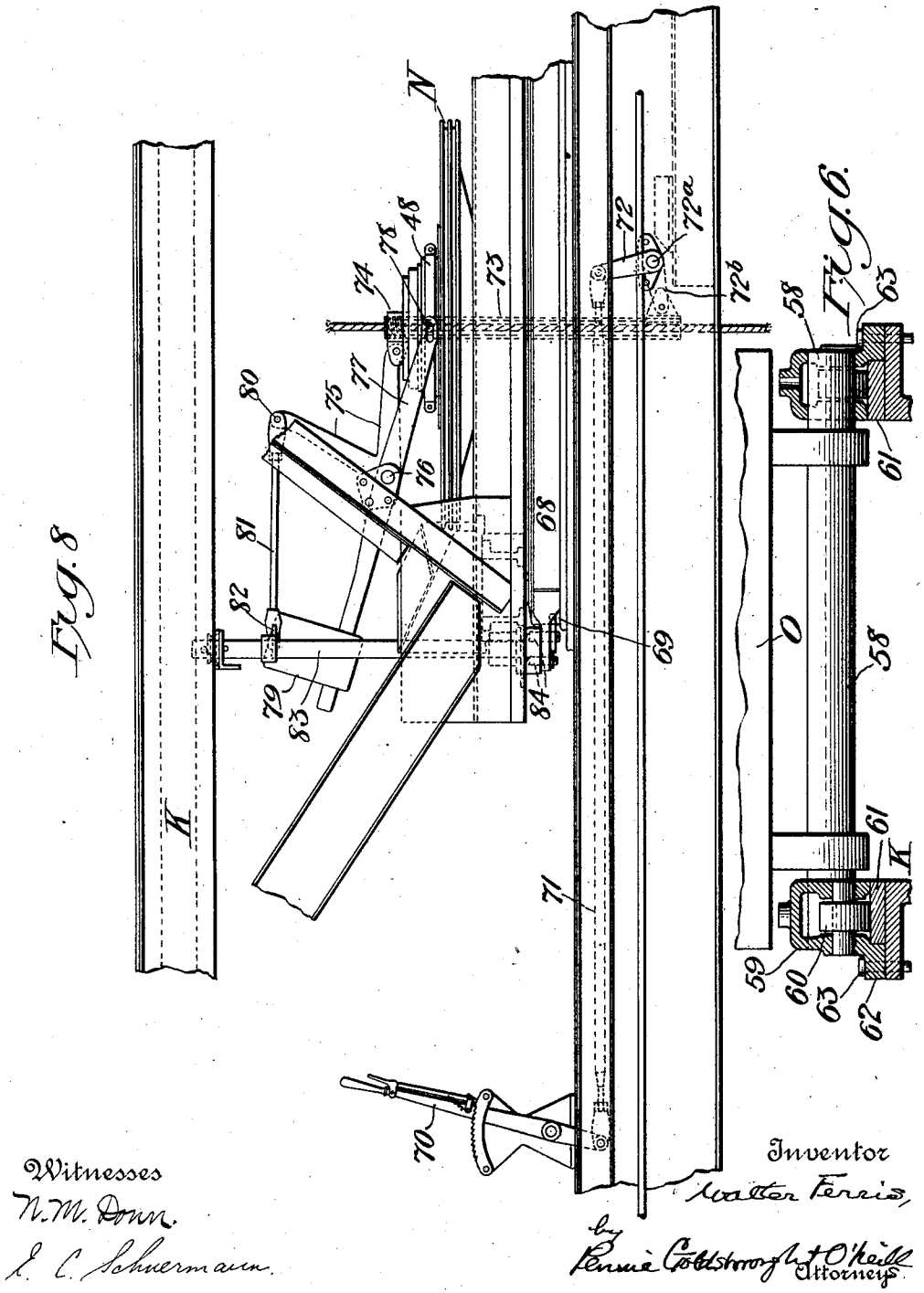
RAILWAY PILE DRIVER.

APPLICATION FILED APR. 18, 1910.

1,047,025.

Patented Dec. 10, 1912.

7 SHEETS—SHEET 6.



Witnesses

N. M. Dorr.

L. C. Schuermann.

Inventor

Walter Ferris,

by Pennie Goldstrong & O'Neill

Attorneys.

W. FERRIS.

RAILWAY PILE DRIVER.

APPLICATION FILED APR. 18, 1910.

1,047,025.

Patented Dec. 10, 1912.

7 SHEETS—SHEET 7.

Fig. 9.

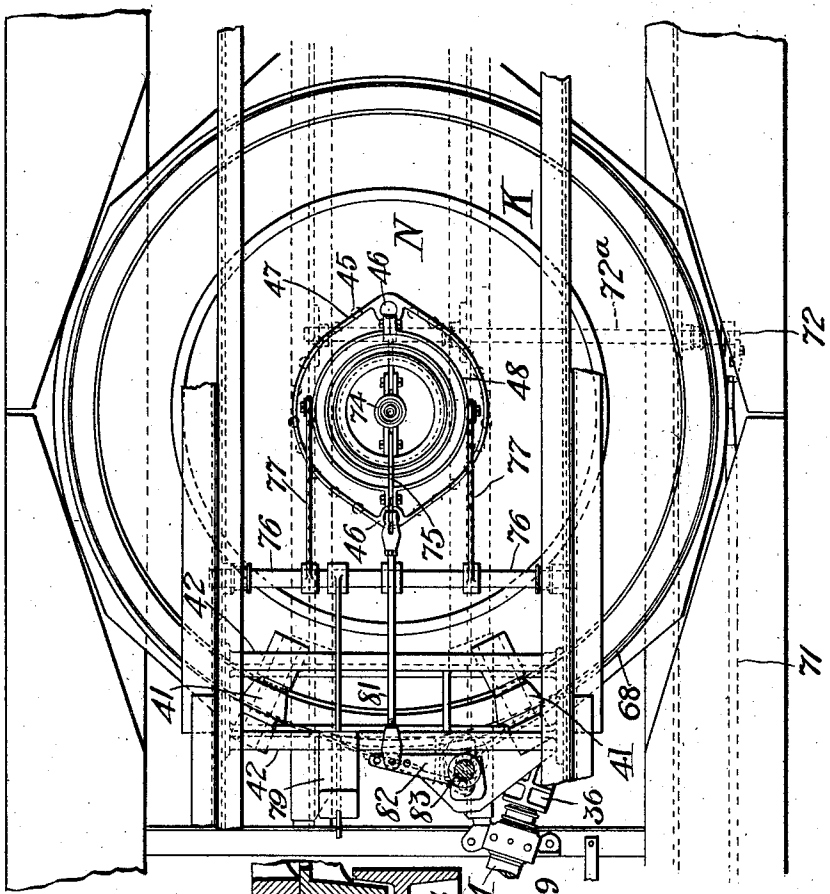
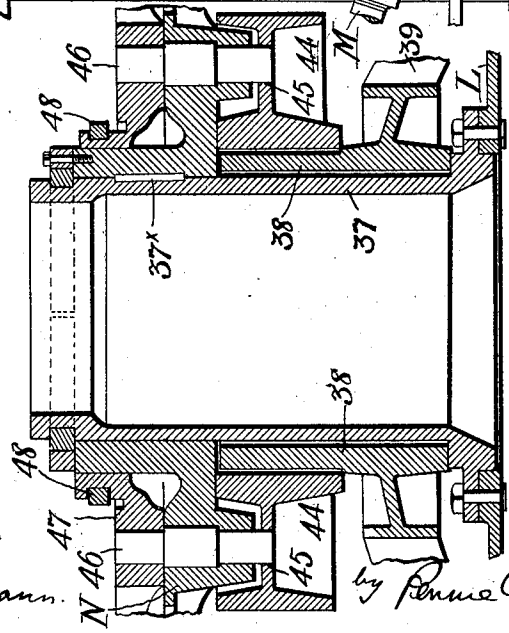


Fig. 10.



Witnesses

N. M. Dorr.

E. C. Schuermann.

Inventor

Walter Ferris,

by Penniman Goldsborough & O'Neill Attorneys

UNITED STATES PATENT OFFICE.

WALTER FERRIS, OF SOUTH MILWAUKEE, WISCONSIN.

RAILWAY PILE-DRIVER.

1,047,025. Specification of Letters Patent. Patented Dec. 10, 1912.

Application filed April 18, 1910. Serial No. 556,163.

To all whom it may concern:

Be it known that I, WALTER FERRIS, a citizen of the United States, and resident of South Milwaukee, county of Milwaukee, and State of Wisconsin, have invented certain new and useful Improvements in Railway Pile-Drivers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to railway pile drivers, and it has special reference to pile drivers of the locomotive type, that is to say, which are propelled on the railway track by their own motive power.

The invention also relates to pile drivers wherein the leader frame and leaders are pivoted at the front of the car body on which the several mechanisms of the pile driver are mounted, said leader frame and leaders being so arranged that they may be erected at different angles in order to drive vertical or batter piles, or folded back along the top of the pile driver in shipping position, wherein the leaders will lie substantially within the lines of the machine and therefore permit the latter to pass through tunnels and under bridges when the same is being transported from place to place in a freight train.

One object of the invention is to provide improved mechanism for mounting and raising and lowering the leader frame and leaders, for the purposes just described, and it is also aimed to furnish an improved arrangement of the swinging deck or revolving frame, that carries the leaders and leader frame, with respect to the machine as a whole, and in particular to the mechanism for swinging said deck or revolving frame in a lateral direction with respect to the car body, in order to drive piles at the front of the latter and also at either side of the same. The mechanism to swing the deck is operated from an engine or engines that are fixedly mounted on the car body, at a point in the rear of the swinging deck, and said engine or engines are also used for erecting the leaders, driving the hoisting drums by means of which piles and the pile hammer are raised, and for propelling the pile driver from place to place.

I also aim to furnish improved means for swinging the leader carrying deck and erecting the leaders through connections with a common actuating mechanism, which preferably comprises a drum rotatable on the car body and operatively connected with the leader frame, to raise and lower the leaders, said drum being driven from the engine or engines on the car body and having mechanism associated therewith to lock it to the swinging deck or frame. When the drum is locked to said frame, the rotation of the former will cause the latter to be swung horizontally, in which case the drum will have no raising or lowering action on the leaders carried by the deck owing to the fact that there is no relative movement between the drum and deck; but when the drum is unlocked from the deck, the rotation of the former will produce the raising or lowering of the leaders. In order to hold the swinging deck stationary while the leaders are being raised and lowered, I employ in connection with said deck, a suitable brake, and said brake is preferably operated automatically from the means which locks the drum to the deck, to the end that as soon as said parts are unlocked, the brake will be automatically applied to the deck to hold it fixed, whereas when the drum and deck are coupled together again, the brake is automatically moved to its off position.

The novel features of the invention will appear clearly from the following description and claims.

In the accompanying drawings, Figure 1 is a side elevation, partly in longitudinal section, of a railway pile driver constructed in accordance with the invention, the leaders being erected. Figs. 2 and 2^a, in conjunction, illustrate a portion of the pile driver in side elevation on an enlarged scale, Fig. 2^a being drawn to a scale somewhat smaller than Fig. 2, and a number of parts in Fig. 2 being shown in vertical section, with certain parts removed, Figs. 3 and 3^a in conjunction, illustrate a portion of the pile driver in plan, Fig. 3 being partially in horizontal section, with certain parts broken away, Fig. 4 is an elevation of the front end of the machine, showing the leaders inclined to drive piles having sidewise batter, Fig. 5 is a side elevation showing portions of the swinging deck, leader frame, and leaders, the leaders and leader frame being in shipping position, Fig. 6 is a transverse

section through certain parts illustrated in Fig. 5, and showing the rolling trucks by which a point on the leader frame is guided horizontally on the track constituted by the top chords of the swinging deck or frame, Fig. 7 is a top plan view of a portion of the swinging deck or frame and the rollers carried thereby, Fig. 8 is a side elevation of the leader raising drum and its adjunctive parts, illustrating the mechanism for coupling and uncoupling the drum and swinging deck and automatically operating the brake used in connection with said deck, Fig. 9 is a top plan view of the mechanism shown in Fig. 8, with certain parts removed, and Fig. 10 is a vertical central section illustrating on a larger scale certain parts shown in Fig. 2.

In its general aspects, the pile driver illustrated in the drawings comprises a car body A on which the several mechanisms are mounted, said car body traveling on the railway track by means of front and rear wheeled trucks B, C. Mounted on the rear part of the car is a steam boiler D which supplies steam to engines E that are preferably arranged near the center of the car and at opposite sides thereof. Said engines are connected by connecting rods (not shown) with a transverse crank shaft F, from which the usual hoisting drums G, H are driven by suitable gearing, as indicated in Fig. 3, said drums being adapted to hoist the pile hammer and to hoist piles, in the manner well understood in the art. The crank shaft F is also used to drive forwardly and rearwardly directed inclined driving shafts I, J by means of which the front axle of the rear truck C and the rear axle of the front truck B are driven when it is desired to propel the machine by its own power or "spot" the same with respect to the piles.

Mounted on the front end of the car body, for lateral swinging movement thereon, is a swinging deck or revolving frame K adapted to be swung horizontally by means of a worm gear L (Fig. 2) driven from the inclined driving shaft J by means of a transmitting shaft M. The worm gear L is arranged to drive a leader raising drum N that is located at the lower part of the deck and is adapted to be coupled to and uncoupled from the latter by mechanism to be presently described. A leader frame O is connected at one end, by means of a pivoted radius rod P to the forward lower end of the swinging deck, and connecting an intermediate point of said leader frame with a sliding cross head Q that moves forward and rearward on the track formed by the top chords of the swinging deck, is a structural link or member R, pivoted to said cross head and to said leader frame. The cross head Q has connected thereto the ends of two suitable ropes wound on the leader raising drum N, in order that the cross head may be moved forward and rearward on its track and thereby raise and lower the leader frame and leaders, as indicated in Figs. 1 and 5.

The leaders S are swiveled at T to the upper end of the leader frame (Fig. 2[a]), as is usual in this class of machines, in order that the leaders may be inclined in a sidewise direction as indicated in Fig. 4, to drive piles with sidewise batter. The usual mechanism S′ is employed to give the leaders the desired slant, and any well known mechanism, such as that illustrated at S^2, may be used to firmly lock the leaders in the desired position. In the embodiment illustrated this mechanism comprises a curved track *s* on the leader frame, on which track a curved piece *s′* connecting the leaders is arranged to slide, a small pin s^2 being adapted to engage registering perforations in the members *s*, *s′*, and thereby lock the leaders in place. The particular construction of the leaders and leader frame and their adjunctive parts is entirely immaterial to the purposes of the present invention.

Turning now to the detailed construction of the machine, it will be observed from Fig. 3 that the transverse operating shaft F is provided at its intermediate portion, beneath the hoisting drums, with a longitudinally slidable sleeve or quill 25 to the ends of which beveled gears 26, 27 are secured, the gear 26 being smaller than the gear 27, Although the sleeve 25 is slidable along the operating shaft it is suitably keyed thereon in order that it may be rotated by the rotation of said shaft. Coacting with the smaller gear 26 are similar bevel gears 28 fixed at the upper ends of the driving shafts I, J, respectively, the upper ends of said shafts being suitably journaled in fixed bearings on the car body, and the lower ends being in operative connection with axles of the front and rear trucks, preferably as set forth in my divisional application Serial No. 625,863, filed May 8, 1911. Adjacent the end gears 28 on the driving shafts are similar gears 29 which are of about the same size as said gears 28 in the embodiment shown and are designed to coact with the larger sleeve gear 27. The sleeve 25 is provided at one end with a collar 30 that is secured to a pivoted forked rod 31, to which motion is transmitted by means of a rod 32 in connection with an appropriate lever (not shown), so that the sleeve 25 may be slid lengthwise on the operating shaft in order to engage its small gear 26 with the gears 28 of the driving shafts, in which case the driving shafts will be driven at a comparatively slow speed, or so that the larger gear 27 at the opposite end of said

sleeve may be engaged with the gears 29 on the respective driving shafts, with the result that a much faster speed will be imparted to said shafts. The fast speed is used when it is necessary to propel the pile driver from place to place under its own motive power, while the slow speed is used in accurately spotting the machine with respect to the piles to be operated upon. It is evident that by suitably manipulating the lever connections 32—31, which are merely indicated by way of example, the sleeve 25 may be shifted to an intermediate position wherein its gears will not engage any of the gears on the driving shafts, so that the rotation of the main shaft F will have no effect on the driving shafts. Fig. 3 illustrates clearly the cranks *f* on the ends of the shaft F, and the positions of the connecting rods, which are omitted in this view, are indicated by the dotted lines *f'*.

The leader raising drum N is actuated from the forward driving shaft J, and this is effected through the following connections:—Said shaft J has keyed thereon, intermediate of its ends, a small bevel pinion 33 with which engages a large bevel gear 34 loosely mounted on the rear end of the transmitting shaft M and adapted to be locked thereto by a suitable clutch 34^x operated by a suitable lever 34^y, Fig. 3. The transmitting shaft M is journaled horizontally in bearings in the car body and carries at its forward end a worm 35 that meshes with the large worm wheel L, it being evident from Fig. 3 that the shaft M is arranged at an angle to the center line of the car and is directed tangentially to the large worm wheel. The transmitting shaft is illustrated as made up of two sections, which are detachably coupled together by means of a coupling device 36 of any approved form, whereby the worm wheel L may be uncoupled from the driving shaft J if such is desired.

The worm wheel L, which is located in a horizontal plane and approximately in line with the car bottom or deck, beneath the swinging deck or revolving frame K, is journaled in the car body by means of a comparatively long upwardly extending hub 37, to which it is bolted, said hub being freely movable in a bearing 38 formed at the center of a spider 39 applied to the deck of the car body. The spider 39 serves to journal the worm wheel, leader raising drum and swinging deck on the car body, and it is preferably made circular in shape, presenting at its peripheral portion a raised circular track 40 on which travel rollers 41 journaled between pairs of cross beams 42 that connect the lower side members 43 of the swinging deck. Two rollers 41 are preferably used in connection with each pair of cross beams, so that the swinging deck will be supported on the track 40 at four points, arranged in a rectangle, as indicated in Fig. 3. In this way, the swinging deck together with the load imposed thereon by the leader frame and leaders, is effectively sustained, and its movement in a horizontal plane is considerably facilitated. As shown in Fig. 2, the upper outer surface of the bearing 38 of the deck casting is made smooth and cylindrical in order to serve as a bearing for a casting or bearing member 44 that is fixed between the lower side members of the swinging deck, in the center line of the latter, and fits over the cylindrical part of the fixed bearing 38. The central casting 44 of the deck is provided with a laterally directed web in which a circular series of perforations 45 is pierced, as shown in Figs. 9 and 10, said perforations or holes being arranged in pairs of which the individual holes are diametrically directed with respect to the hollow hub of the worm wheel, with which hub the said series of openings is concentric. These holes in the center casting of the swinging deck are designed to be engaged by depending pins 46 carried by a vertically movable driving collar 47 normally resting on the upper surface of the drum N, as best shown in Fig. 10, said pins, which are fixed to the driving collar 47, being extended downward through openings in the web of the drum. The drum is driven from the worm wheel L by means of a key 37^x associated with the hub 37, and the driving collar 47 for the deck is in turn driven by the drum by means of the pins 46. The collar may be lifted slightly to disengage said pins from the deck casting, by means of a ring or collar 48, but this movement will not be sufficient to disengage the pins from the holes in the drum. The operating ring 48 for the driving collar is actuated in the manner to be hereinafter described.

As previously intimated, the leaders are raised and lowered by means of a single rope wound on the drum N, and in the drawings these ropes are designated by reference character 49. The end portions of said ropes which extend forward and rearward respectively with respect to the swinging deck, pass over suitable sheaves 50, 51 carried by the swinging deck at its front and rear ends respectively, said sheaves being journaled in any convenient way at points in the center line of the deck and being located between the top chords of said deck. The upper chords of the deck, which are connected with the lower chords by suitable inclined braces, as shown, serve as a track on which the cross head Q is guided in forward and rearward direction, said cross head being preferably constituted by an I-beam to the opposite flanges of which the ends of the ropes 49 are connected, as shown at 52 and 53 in Fig. 3^a. The cross head Q

is pivoted at 54, 55 to the structural link R previously referred to, the pivots 54—55 being located at the corners of said link or member, which comprises suitably braced longitudinally extending side members, as shown. At the forward corners of the link or member R the same is pivoted to the leader frame O, intermediate of the ends of said frame, as indicated at 56 and 57.

At a point in advance of the pivots 56 and 57, the leader frame is provided with a transverse rock shaft 58 which is mounted at the ends in small rolling trucks 59 that move forward and rearward on the top chords of the swinging deck. This arrangement is illustrated in Figs. 5 and 6 from which it appears that each rolling truck 59 is hollowed out to provide an interior chamber in which rollers 60 are journaled at opposite sides of the rock shaft 58, said rollers traveling on members 61 applied to the upper chords of the swinging deck, as indicated. Each truck 59 is provided with a base flange 62 provided with a perforation to receive a locking pin 63 adapted to extend into perforations 64 arranged longitudinally at different points in the length of the top chords, whereby the trucks and leader frame may be locked in the desired position. In Fig. 2[a] the leaders are shown erected, and it appears that when the parts are in this position the trucks are at the extreme forward ends of the chords of the swinging deck, in which position the pins 63 lock them in place, as described. When the leaders are in the perpendicular position shown, vertical piles can be driven, but if it is desired to drive batter piles, the leaders will not be forced into their vertical position, but will take an intermediate position, in which the pins 63 are engaged with corresponding perforations of the longitudinal series, as will be understood. The sliding pivotal connection of the leader frame with the upper portion of the deck, by means such as the shaft 58 and the trucks 59, or equivalent means, is one of the important features of the invention, inasmuch as it sustains the leader frame effectively in all of its various positions. The ease with which the leader frame may be raised and lowered is also very much increased by guiding along the longitudinal track or guideway of the deck, a device secured to the leader frame at an intermediate point in the length of the latter but having a pivotal movement with respect to said frame. The ropes on the hoisting drums are led downward through the car body and over suitable sheaves 65 located beneath the hub 37 of the worm wheel, and said ropes are led up through said hub over sheaves 66 journaled in the upper portion of the swinging deck, and then pass under the sheaves 67 carried at the extremity of the leader frame O, as shown in Fig. 1. When the leader frame and leaders are erected, therefore, the raising of the pile hammer and of individual piles by means of the ropes referred to can be easily effected.

When the machine is properly located and it is desired to drive piles at either side of the same, the driving shafts I and J are uncoupled from the driving wheels, and the shaft J is coupled to the transmitting shaft M by means of the clutch 34[x]. The shaft J is then rotated by the prime mover at the low speed and in such a direction as to swing the deck into the desired position by means of the connections previously described. At this time, the pins 46 of the driving collar 47 are engaged with the perforations 45 in the center casting of the swinging deck, as shown in Fig. 10, and accordingly the rotation of the hollow hub 37 of the worm wheel will produce the rotation of the swinging deck as a whole, as well as the rotation of the leader raising drum N, and as the drum and deck have no relative turning movement there will be no raising of the leaders. After the swinging deck has reached its ultimate position, the leaders are raised by giving the collar 48 on the driving flange 47 a vertical movement, which will pull the pins 46 out of the perforations in the center casting of the swinging deck so that the drum N can revolve independently of said deck. During the rotation of the drum, the deck is held stationary in its adjusted position by means of a band brake 68 that is brought into tight contact with a circular brake surface 69 mounted on the deck of the car, the brake band 68 being carried by the swinging deck structure, as shown in Fig. 8.

In order to effect the raising and lowering of the collar 48 and therefore of the driving flange 47, and its pins 46, and to produce the automatic actuation of the brake 68, 69 the following mechanism is provided:—A hand lever 70 (Fig. 8) is connected by means of a reach rod 71 and bell crank 72 to rock shaft 72[a] by means of which motion is transmitted through a crank 72[b], to a hollow reach rod 73 which extends up through the hub 37 of the worm wheel in the axis of rotation. The reach rod 73 may conveniently be formed of a section of pipe, and it does not rotate with the swinging deck, but is provided at its upper end with a collar 74 that is threaded thereon. The collar 74 can therefore swing laterally with the swinging deck or revolving frame K, but remains in engagement with the pipe 73 at all times. Pivoted to the collar 74 is a bell crank 75 mounted on a shaft 76 that supports parallel arms 77, the ends of which have a slotted connection 78 with the raising and lowering collar 48, as indicated in Figs. 8 and 9. Acting on the rock shaft 76 is a counterweight 79, by means of which the

raising of the driving flange 47 is facilitated, as will be understood. The upper end of the bell crank or elbow lever 75 is pivotally connected at 80 with a reach rod 81 pivoted to a crank 82 on an upright shaft 83 journaled in the upper and lower frame members of the swinging deck. At its lower end the shaft 83, which is rocked through its connection with the reach rod 81 and elbow lever 75, carries pins 84 connected in the usual way with the brake band 68. It will therefore be understood that when the driving collar 47 is unlocked from the swinging deck casting, by suitably manipulating the lever 70 and thereby raising the collar 48, the resulting rocking movement of the upright shaft 83 will cause the frictional engagement of the brake band 68 with the coacting friction surface provided on the car, with respect to which surface the brake band is, of course, movable angularly when said band is loose. An opposite movement of the operating lever 70 will, of course, effect the lowering of the driving flange 47 into locking engagement with the center casting of the swinging deck, so that the drum N and said deck will be locked together again, and this will produce an automatic release of the brake 68, 69, by a reversal of the operations previously described. In this way, provision is made for automatically locking the swinging deck in its adjusted position by the means to uncouple the swinging deck and drum from each other, whereby the locking of the deck in position is produced directly by the devices that are brought into play as a preliminary to the raising of the leaders. It might be stated at this point that the friction surface 69 alluded to may be conveniently formed by the outer surface or periphery of the main fixed deck casting or spider 39, provided with the circumferential track 40 on which the swinging deck rolls by means of the rollers previously described. The several pairs of holes 45 in the deck center casting permit connection of the swinging mechanism to the leaders in various positions—one pair of holes is engaged by the pins 46 when the leaders are down, another pair when the leaders are up, and several other pairs when the leaders have different degrees of backward slope—to provide for the driving of slanting or batter piles, that is to say, piles battered longitudinally of the swinging deck. The provisions for giving the piles a sidewise batter have already been described.

Of course the transmitting shaft M from which the swinging deck and leaders are operated must not be driven when the machine is being propelled. The clutch 34^{x} is therefore actuated to uncouple the shafts J and M. Obviously, the gear 34 will rotate idly on the transmitting shaft when the machine is being propelled and it is not desired to raise or lower the leaders or effect the swinging of the deck.

When the machine is to be driven at a comparatively slow speed, in order to spot the machine with respect to the piles or to enable it to haul heavy loads up grades, the quill or sleeve 25 is moved into such a position that the smaller gear 26 thereon will be brought into operation, as will be understood. After the machine has been properly located, and it is desired to swing the deck or raise the leaders, the axle connections at the lower ends of the driving shafts are uncoupled from the trucks, and the transmitting shaft M is then coupled to the gear 34, as above indicated, in order that the rotation of the driving shaft J, at either of two speeds, may produce the rotation of the transmitting shaft and the operation of the swinging deck and leaders. When, during the operation on the piles, it becomes necessary to move the machine again, this is produced by unclutching the gear 34, so that it will rotate idly, and then clutching in the connections on the driving shafts and driving car axles respectively.

It is to be understood that I have not attempted to describe all of the modifications of the construction that may be adopted without departing from the invention. Among the most obvious modifications is the replacement of the sliding cross head of the leader raising and lowering mechanism by different means to push up and lower the leader frame, and the substitution for the worm gear of the swinging deck, of an operating member of another type.

What I claim is:—

1. In a pile driver, a deck having a longitudinal track or guideway, a leader carrying frame pivoted to the deck, and means to support and guide said frame continually and directly on said track or guideway.

2. In a pile driver, a deck having a longitudinal track, a vertically swinging leader frame, means continually in engagement with said track to directly support said frame and guide the same forwardly and rearwardly on said track, and a power operated member connected with said leader frame to raise and lower the same.

3. In a pile driver, a deck having a trackway or guide along the upper part thereof, a leader frame, a radius rod connecting one end of the leader frame with the forward lower end of the deck, a device pivotally supporting said leader frame directly on the track intermediate of the ends of the frame and continually guided in forward and rearward direction on the trackway or guide of the deck, and a power operated member connected with the leader frame.

4. In a pile driver, a deck, and a leader frame pivoted to the deck at one point and

in direct continual pivotal sliding relation therewith at another point.

5. In a pile driver, a deck having a longitudinal trackway, a leader frame pivotally mounted on the deck, a cross shaft carried by the leader frame intermediate of its ends, rolling trucks supporting the ends of said cross shaft and sliding on said trackway, a sliding member also guided on the trackway and operatively connected with the leader frame to raise and lower the same, and means to operate said sliding member.

6. In a pile driver, a deck structure having a longitudinal trackway at its upper portion, a leader frame, a radius rod connecting one end of said leader frame with the forward end of the deck, means to continually support said frame directly on the track and guide said frame in a horizontal direction along said trackway, and means to push up the leader frame and pull it down in order to effect the raising and lowering of the leaders.

7. In a pile driver, a deck structure having an upper longitudinal track, a leader frame pivotally connected with the forward end of said structure, a power operated link guided along said track and pivoted to the leader frame intermediate of the ends of the latter, and means carried by the leader frame at a point between its connection with the link and its pivotal connection with the deck to guide said frame along said track in a horizontal direction during the raising and lowering of the leader frame.

8. In a pile driver, a deck having a trackway, a leader frame mounted on the deck and adapted to be raised and lowered thereon, means to support said frame directly on the trackway in any position of said frame, and means to lock the frame to the deck.

9. In a pile driver, a deck having a trackway, a leader frame continually supported directly on said trackway and horizontally guided along said trackway, and means to lock the leader frame at different points in the length of the trackway.

10. In a pile driver, a deck having a longitudinal trackway, a leader frame, a device intermediate of the ends of the leader frame and pivoted thereto, to guide said frame directly on the trackway, means to effect the pivotal movement of the leader frame with respect to said device, and means to lock said device to the trackway at different points in the length of the latter.

11. In a pile driver, a deck having a longitudinal trackway, a leader frame pivotally mounted on the deck, a device pivotally connected with the leader frame and slidable along said trackway to support the frame directly on the same, and means to lock said device to the trackway at different points in the length of the latter.

12. In a pile driver, a deck having a longitudinal trackway, a leader frame mounted on the deck, rolling trucks having a pivotal connection with the leader frame and sliding on the trackway, and locking pins coacting with perforations in the trucks and trackway in order to lock the trucks to the trackway at different points.

13. In a pile driver, a deck having an upper longitudinal track, a leader frame pivoted at one end to the lower forward portion of the deck, a truck mounted on said track, said leader frame being pivoted to said truck, and supported directly thereon, means to move said truck along the track, and means to lock said truck directly to the deck to sustain said leader frame in a number of adjustments.

14. In a pile driver, a deck having a longitudinal track, a leader frame pivoted to the deck, means to pivotally support directly on said track the leader frame at a point intermediate of its ends, said means being guided along said track, and means to lock said last named means to the track at different points in the length of the latter.

15. In a pile driver, a deck having a longitudinal track, a leader frame movably connected at one end with the forward lower portion of the deck, a power operated element pivoted at one end to the leader frame intermediate the ends of the latter, means to guide the other end of said element along said track, and means independent of said power element continually guided on said track and pivoted to the leader frame intermediate the connection of the latter with said element and the movable connection of said frame with the deck, said means being adapted to furnish continual support for said frame.

16. In a pile driver, a car body, a swinging deck swiveled thereon, leaders mounted on the deck, leader operating mechanism and mechanism comprising a drum on the car body coaxial with the deck to swing the deck and actuate said leader operating mechanism.

17. In a pile driver, a car body, a swinging deck mounted thereon, leaders carried by the deck, mechanism comprising a drum on the car body coaxial with the deck to raise and lower the leaders, and a connection between said mechanism and said deck whereby the latter may be swung by the former.

18. In a pile driver, a car, a deck swiveled thereon, leaders carried by the deck, leader raising and lowering means comprising a power operated drum coaxial with the deck, and means to lock said drum to the swinging deck, to effect the movement of the latter in a horizontal plane.

19. In a pile driver, a car body, a deck

mounted thereon for laterally swinging movement, leaders carried by the deck, a power driven member on the car body co-axial with the deck, and means to operatively connect said member with the leaders, to raise and lower the same, and also with the deck, to swing the latter.

20. In a pile driver, a swinging deck, leaders carried thereby, a power driven drum coaxial with the deck and having connections with the leaders to raise and lower the same, and a coupling device to lock the drum to the deck.

21. In a pile driver, a swinging deck, leaders carried thereby, a power driven drum coaxial with the deck and having connections with the leaders to raise and lower the same, and a coupling device to lock the drum to the deck in different positions.

22. In a pile driver, a swinging deck, leaders carried thereby, raising and lowering mechanism for the leaders, said mechanism comprising a drum coaxial with the deck, and means to lock said drum to the deck, to effect the swinging of the latter.

23. In a pile driver, a swinging deck, leaders carried thereby, leader raising and lowering mechanism comprising a drum co-axial with said deck, and means to so connect said drum with the deck as to swing the latter when desired without operating the leaders.

24. The combination of a car, a swinging deck swiveled thereon, a power driven gear wheel journaled on the car and coaxial with the deck, a drum mounted on the hub of said gear wheel, leaders carried by the deck, rope connections between the drum and said leaders to raise and lower the latter, and means to lock the drum to the deck, to effect the swinging of the latter.

25. In a pile driver, a car body, a deck swiveled thereon, a leader frame pivoted to said deck, operating mechanism to swing said leader frame around its pivot, said mechanism comprising a drum mounted on the car body and coaxial with the deck, and means to connect said drum with the deck, to swing the latter.

26. In a pile driver, a car body, a deck swiveled thereon, a leader frame pivoted to said deck, operating mechanism to swing said leader frame around its pivot, said mechanism comprising a drum co-axial with said deck mounted on the car body, means to connect said mechanism with the deck, to swing the latter, and means coöperative with the car body and deck to hold the latter stationary when the leader frame is operated.

27. The combination of a car, a deck swiveled thereon and carrying the leaders, a power driven worm wheel, a drum secured to the hub of said worm wheel, connections between said drum and the leaders for raising and lowering the latter, and a driving flange or collar carried by the hub and having studs to couple the hub with the swinging deck, to swing the latter.

28. The combination of a car, a deck swiveled thereon, leaders carried by the deck, a power driven member connected with the leaders to raise and lower the same, said member being concentric with the axis of rotation of the deck, and means to lock said member to the deck in a number of different angular positions.

29. In a pile driver, a swinging deck, leaders carried thereby, an operating member for the leaders, means to hold the deck stationary, means to operatively connect said member with the deck to swing the latter, and means to disconnect said last named means, and operate automatically said deck holding means.

30. The combination of a swinging deck, leaders carried thereby, an operating member for the leaders, means to couple said member to the deck and to uncouple it therefrom, a brake in connection with the deck, and means to automatically apply the brake when the deck and operating member are uncoupled and to release the brake when said parts are coupled together.

31. The combination of a car body, a swinging deck, leaders carried by the deck, leader raising and lowering mechanism comprising a discular drum mounted on the car body co-axial with the deck, said mechanism being provided with a clutch mechanism to couple said leader raising and lowering mechanism to the deck to swing the same, and a brake to hold the deck stationary with respect to the car body while the leaders are being raised and lowered.

32. The combination of a swinging deck, leaders carried thereby, mechanism to raise and lower the leaders, a connection between said mechanism and the deck by which the latter can be swung on its axis, and a brake associated with the deck and automatically operated by said connection.

33. The combination of a swinging deck, leaders carried thereby, leader raising and lowering mechanism, means to couple said mechanism with the deck and thereby render it ineffective for raising and lowering the leaders, and automatic means to hold the deck stationary while the leaders are raised and lowered.

34. The combination of a swinging deck, leaders carried thereby, leader raising and lowering mechanism adapted to be coupled to the deck to swing the same, a brake to hold the deck stationary during the raising and lowering of the leaders, and means to apply said brake automatically when said mechanism is uncoupled from the deck and

to release it when the swinging of the deck is to be effected.

35. The combination of a swinging deck, leaders carried thereby, leader operating mechanism including a power driven hub, a slidable driving collar or flange carried by the hub and constructed to lock the same to the deck in order to swing the latter, and a brake in connection with the deck, operated automatically by said sliding driving collar.

In testimony whereof I affix my signature, in presence of two witnesses.

WALTER FERRIS.

Witnesses:
FLORENCE F. BUEHLER,
H. B. HAYDEN.