G. T. FORSYTH.

DERRICK PILE DRIVER.

APPLICATION FILED MAY 16, 1907.

914,403. Patented Mar. 9, 1909.

2 SHEETS—SHEET 1.

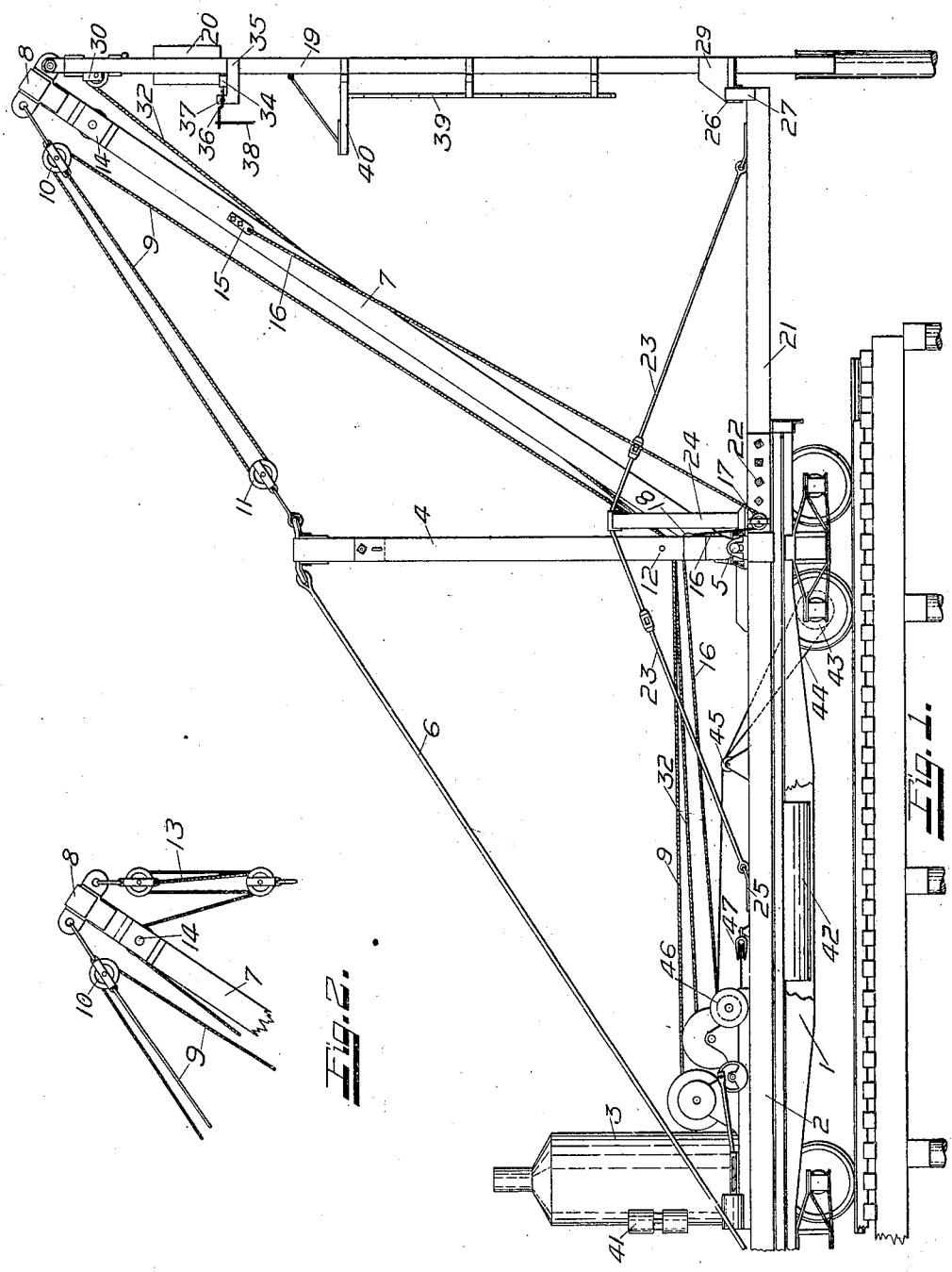


Fig. 1.

Fig. 2.

Witnesses:
Truman J. Glover.
Frank A. Bullington.

Inventor:
George T. Forsyth
by R. Lieberberg
Attorney.

THE NORRIS PETERS CO., WASHINGTON, D. C.

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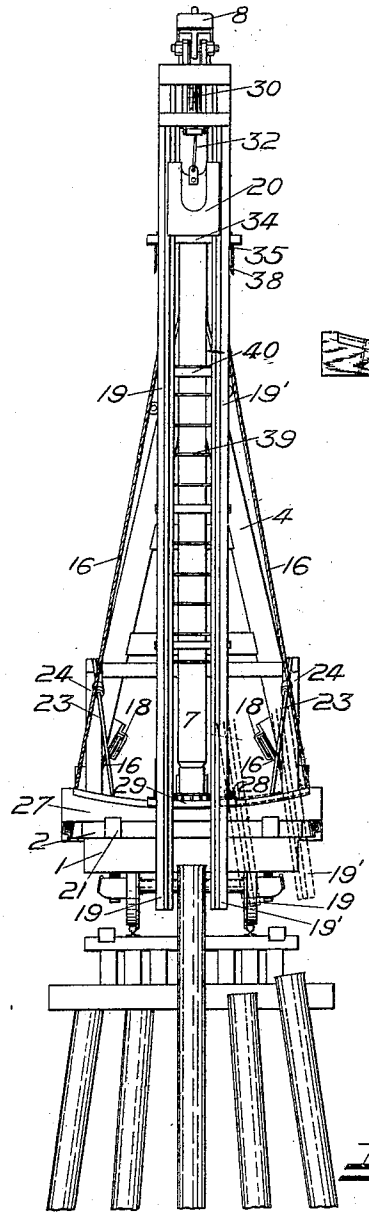


Fig. 3.

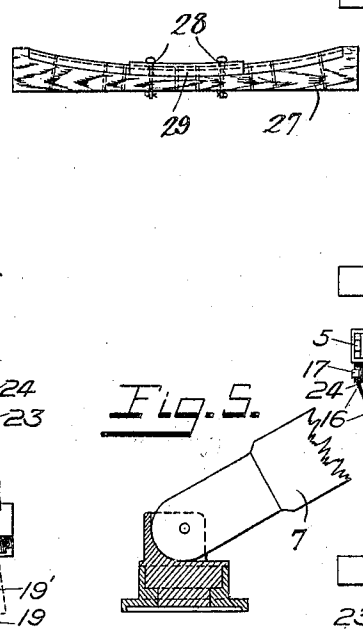


Fig. 6.

Fig. 5.

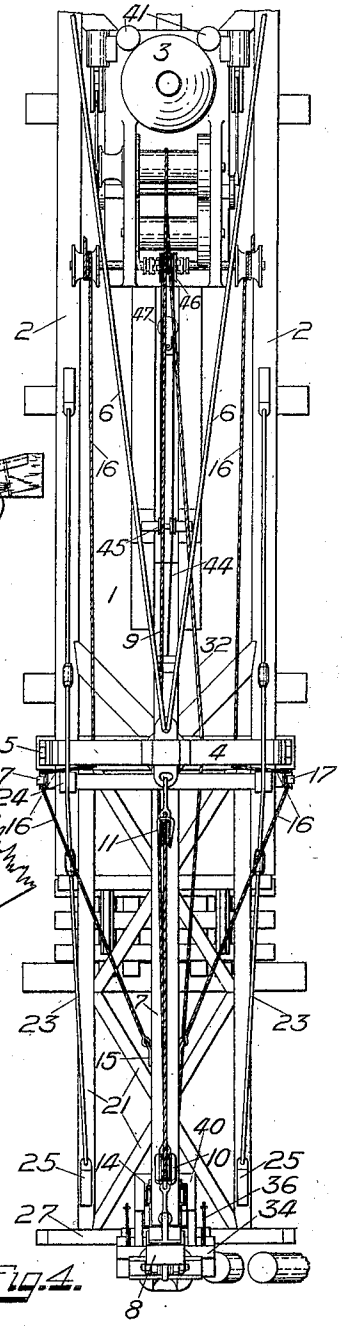


Fig. 4.

Witnesses:

Truman J. Gloor.

Frank A. Bullington.

Inventor:

George T. Forsyth

by R. Ketzenberg

Attorney.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE T. FORSYTH, OF PORTLAND, OREGON.

DERRICK PILE-DRIVER.

No. 914,403. Specification of Letters Patent. Patented March 9, 1909.

Application filed May 16, 1907. Serial No. 374,019.

To all whom it may concern:

Be it known that I, GEORGE T. FORSYTH, a citizen of the United States, residing at Portland, Multnomah county, Oregon, have invented a certain new and useful Improvement in Derrick Pile-Drivers, of which the following is a specification.

This invention relates to a combination derrick and pile-driver, and more particularly to a derrick or derrick crane which can be readily converted into a pile-driver, and vice versa.

Among the salient objects of my invention, are to provide in a device of the character referred to, a derrick or derrick crane complete in itself, and having facilities for hoisting, and also for swinging a load horizontally, which can be readily converted into a pile-driver by means of a pile-driver attachment; to provide in a device of the character referred to, a pile-driver mechanism constructed to be quickly and conveniently attached to a derrick crane adapted by construction therefor, and to be operated as a pile-driver from the power mechanism thereof; to provide a combination derrick-pile-driver and carrier or car constructed to be moved and transported as are other cars when not in use, and also constructed to be self-propelling, forwardly or backwardly, from a connection with the driving mechanism of the derrick-pile-driver, thus avoiding the necessity of having a locomotive for moving it from one position to another when on a job, and also making it possible to do all necessary switching of companion or material cars with the derrick-pile-driver car itself, when used in railroad construction; to provide in combination with a device of the character referred to means for operating the usual riveting or drilling tools used in construction work; and in general, to provide a combination derrick-pile-driver, with self-propelling car or carrier, together with all the necessary mechanisms for erecting and assembling railroad and other bridges, structures and the like, and by means of which all the work of raising, placing and driving the piles, or in preparing a foundation, of lifting and putting into place all beams, timbers, rails or other foundation material used in the construction work, and of riveting or otherwise securing all in place, can be conveniently, quickly and economically done by one machine, without the necessity of using a work train or locomotive and crew, and with a minimum number of workmen.

My invention will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the derrick-pile-driver; Fig. 2 is a fragmentary view of the upper end of the boom when in use as a derrick simply; Fig. 3 is a front elevation of the derrick-pile-driver; and Fig. 4 is a top plan view of Fig. 3. Fig. 5 is a fragmentary view showing pivotal mount of lower end of boom. Fig. 6 is a detail view showing supporting sill for pile-driver gins and method of adjustment.

Referring to the drawings, 1 designates a carrying car, although it is to be understood that the device can be mounted upon and carried by a scow or other boat, or upon a skid or the like, depending upon the character and location of the work to be done. Mounted upon the car are sills 2, constituting the supporting foundation for the engine or power furnishing mechanism, designated as a whole 3, and the derrick frame proper, shown mounted upon the forward end of the car.

4 designates an A frame of the derrick, pivotally mounted and secured at both sides, as at 5, and capable of being laid low either backwardly upon the car upon which it is mounted, or forwardly upon a companion car which can be readily coupled to the carrying car for the purpose of carrying parts of the device or material when being transferred from one place to another. The A frame is vertically supported and braced by tie rods 6 extending rearwardly from the apex thereof and secured to the rear of the car at opposite sides of the engine mechanism. A boom 7 is pivotally mounted at its lower end as indicated in Fig. 5 between the legs of the A frame and is adapted to be raised and lowered at its outer end, and also to be swung from one side to the other by means of cables working through suitable pulley blocks and connected with and driven from suitable drums or gipsy heads upon the engine 3, in a usual and well known manner. The outer or upper end of the boom 7 is provided with an end piece 8 to which tackle is readily attached, as clearly shown in the drawings, Figs. 1 and 2. A cable 9 for raising and lowering the boom is attached at one end to

the block 10, passes thence through a block 11, attached to the upper end of the A frame, thence returning through the block 10, passes downwardly and rearwardly under a sheave at 12, mounted in the A frame and thence to a suitable drum on the engine 3. When used as a derrick for hoisting and moving loads simply, a suitable tackle 13 is provided and attached to the under side of the end piece 8 upon the end of the boom, as clearly shown in Fig. 2 of the drawings. The cable from this tackle, after passing over a sheave at 14 in the boom, passes rearwardly to and is connected with a suitable drum of the engine mechanism, in a usual and well known manner.

In order to swing the boom with its lifted load to one side or the other, there is provided upon each side thereof, as at 15, an eye piece, to which is attached a cable 16, which passes thence around suitable pulleys at the side of the A frame, as at 17—18, and thence to the engine 3, where it is attached to and operated from a suitable drum or gipsy head thereupon.

Thus far described, the device constitutes a derrick or derrick crane, capable of hoisting and also of moving horizontally great and heavy loads in a usual and well known manner. The construction and arrangement of the derrick and car thus far described, makes possible the attachment of a pile-driver mechanism now to be described, and by means of which the derrick is readily converted into a pile-driver. To convert the derrick into a pile-driver, the boom 7 is relieved of the tackle 13 attached to the end piece 8, and instead thereof there is attached a pair of pile-driver gins, or vertical frame members 19—19′, shod with steel to prevent the wearing of the wood by the hammer, and properly secured together at the right distance apart to form a guideway for the weight or hammer 20, slidably mounted thereon. An extension frame 21 is also provided and detachably secured at each side to the base or main frame upon the car by means of long bolts, as at 22, and is supported at its outer ends by means of a pair of brace rods 23, secured thereto, one on each side, passed over suitable standards 24, and secured at their opposite ends to the sills 2, as at 25.

The lower ends of the pile-driver gins are adjustably supported, as at 26, upon a cross sill 27 upon the outer end of the extension frame 21, when in the ordinary use as a pile-driver. At times, however, it is necessary to lift and drive a pile at a considerable distance in advance of the machine, especially in bridge work, whereupon the gins are lifted from the cross sill 27 and are allowed to swing freely from the end of the boom, which is lowered sufficiently to extend it forwardly to the desired distance. The piles are raised by the lifting or pick-up cables, and chocked in the gins in the usual manner, and the weight put into operation, the boom being held steadily at the desired position by means of its various cables connected with the engine mechanism.

The cross sill 27 upon the outer end of the extension frame 21 supporting the lower end of the gins, is made concaved upon its upper side in order to allow the gins to be moved laterally in either direction, as indicated by the dotted line position of the lower ends of the gins, in Fig. 3. The gins can, therefore, be moved pendulum fashion to either side and secured at the desired angle by means of pins being dropped through suitable holes, as at 28, in the supporting bracket 29 on the gins and in the cross sill 27. (See Fig. 6). It will be understood that the gins can be adjusted to various angles laterally for the purpose of driving piles into the ground at any desired angle, as shown in Fig. 3.

Referring to Figs. 1 and 3, a double sheave 30 is provided in the upper end of the gins. The weight or hammer, designated 20, is operated by means of a cable 32 which passes over one of the double sheaves 30, and thence rearwardly over suitable blocks or pulleys to a drum of the engine. The other sheave at 30 serves for a pick-up cable for picking up the piles or other objects when quick action is desired. This cable is not shown, but would pass from the double sheave to the engine mechanism and there would be operated in the usual manner from one of the gipsy heads. The weight or hammer 20 is supported in the raised position, when not in use, by means of a cross piece or trip block 34, resting upon a pair of supporting brackets 35, mounted upon the sides of the gins 19—19′, Fig. 1. The trip block 34 is attached to the end of a lever 36 fulcrumed at 37, and to the outer end of which is attached a trip cable 38, by which said trip block is readily thrown out of place when the hammer is raised a little, thus permitting the hammer to be operated in the usual manner. A ladder 39 and platform 40 are provided upon the gins of the pile-driver for use in adjusting and chalking the piles.

41 designates an air pump mounted upon the engine for the purpose of supplying a compressed air reservoir 42 with air, which reservoir or tank is mounted beneath the car for the purpose of supplying the motive power for operating riveting or drilling tools, used in the construction of bridges and the like.

In order to propel the car forwardly or backwardly, and also to adapt it for switching purposes, a sprocket is mounted upon the axle of one of the car trucks, as at 43, over which operates a sprocket chain 44. This chain, in the present embodiment of the invention, passes thence over an idler 45, and

to the engine, whence it passes over a driving sprocket 46 and around a tightener 47. The driving sprocket 46, as are also the driving drums upon the engine, is adapted to be operated in either direction by means of suitable clutches, in a usual and well known manner, and the details of which need not be here described, as it forms no part of the invention. By means of this driving connection between the engine mechanism and the car trucks, the car becomes, not only self-propelling, but is also adapted to be used in switching material and other cars upon the job.

It will be seen, therefore, from the foregoing description that the device described is particularly adapted for bridge and other railroad construction; that it is complete in itself and has for its combined function the moving and unloading of foundation and other materials; of raising, placing and driving piles either vertically into the ground or at an angle; of assembling and securing in place all beams, timbers or other material, and also of serving to furnish motive power for the material cars used therewith, or of switching other cars when necessary, thus avoiding the use of the usual work train and crew, and reducing the number of men required to do all this work to a minimum, as well as making possible a very great saving in time, by reason of the many functions of the combination device and its quickness and simplicity of action.

While I have shown and described but one embodiment of the invention, it is evident that alterations and modifications can be made in the mechanism without departing from the spirit of the invention, and I do not, therefore, limit the invention to the particular embodiment shown and described, except in so far as the same may be limited by the claims.

I claim as my invention:

1. A derrick-pile-driver, comprising a relatively stationary carrying base, a boom pivotally mounted upon said base and constructed to be moved upon its pivot joint independently of said base in both horizontal and vertical planes, power furnishing mechanism and connections for operating said boom, and a pile-driver attachment comprising pile-driver gins, and hammer, detachably and pivotally supported at their upper ends to the upper end of said boom, and operating connections with said power furnishing mechanism for operating said hammer.

2. A derrick-pile-driver, comprising a relatively stationary carrying base, a boom pivotally mounted upon said base and constructed to be moved upon its pivot joint independently of said base in both horizontal and vertical planes, power furnishing mechanism and connections for operating said boom, and a pile-driver attachment, comprising pile-driver gins, and hammer, detachably and pivotally supported at their upper ends to the upper end of said boom, a detachable extension frame secured to said carrying base and to the lower ends of said gins, and operating connections with said power furnishing mechanism for operating said hammer.

3. A combination derrick-pile-driver comprising a relatively stationary carrying or supporting base, a boom pivotally mounted at its lower end upon said base, pile-driver gins detachably supported at the upper end of said boom, a detachable extension frame from said base provided with an adjustment supporting sill for said gins, means for adjusting the lower ends of said gins at various positions upon said sill, whereby to regulate the angle at which the piles are to be driven, a hammer working in said gins, and power mechanism with driving connections for operating said boom and also for operating said hammer, substantially as described.

4. A derrick-pile-driver comprising a supporting or carrying base, an A-frame pivotally mounted upon said base and adapted to be laid low at will, a boom pivotally mounted upon said base and constructed to be moved upon its pivot joint in both horizontal and vertical planes, power furnishing mechanism and connections for operating said boom, and a pile-driver attachment comprising pile-driver gins and hammer, pivotally supported at their upper ends to the upper end of said boom, an extension frame attached to said carrying base and to the lower ends of said gins, and operating connections with said power furnishing mechanism for operating said hammer.

5. A derrick-pile-driver comprising a car, a supporting base mounted upon said car, a boom pivotally mounted upon said base and constructed to be moved upon its pivot joint independently of said base in both horizontal and vertical planes, power furnishing mechanism mounted upon said car and connections for operating said boom, a pile-driver attachment comprising a pair of gins and hammer pivotally supported at their upper ends to the upper end of said boom, an extension frame attached to the lower ends of said gins, operating connections with said power furnishing mechanism for operating said hammer, and driving connections between the power furnishing mechanism and the car for propelling the latter in either direction, substantially as described.

GEORGE T. FORSYTH.

Witnesses:
W. R. LITZENBERG,
ARTHUR C. SPENCER.