

No. 816,584.

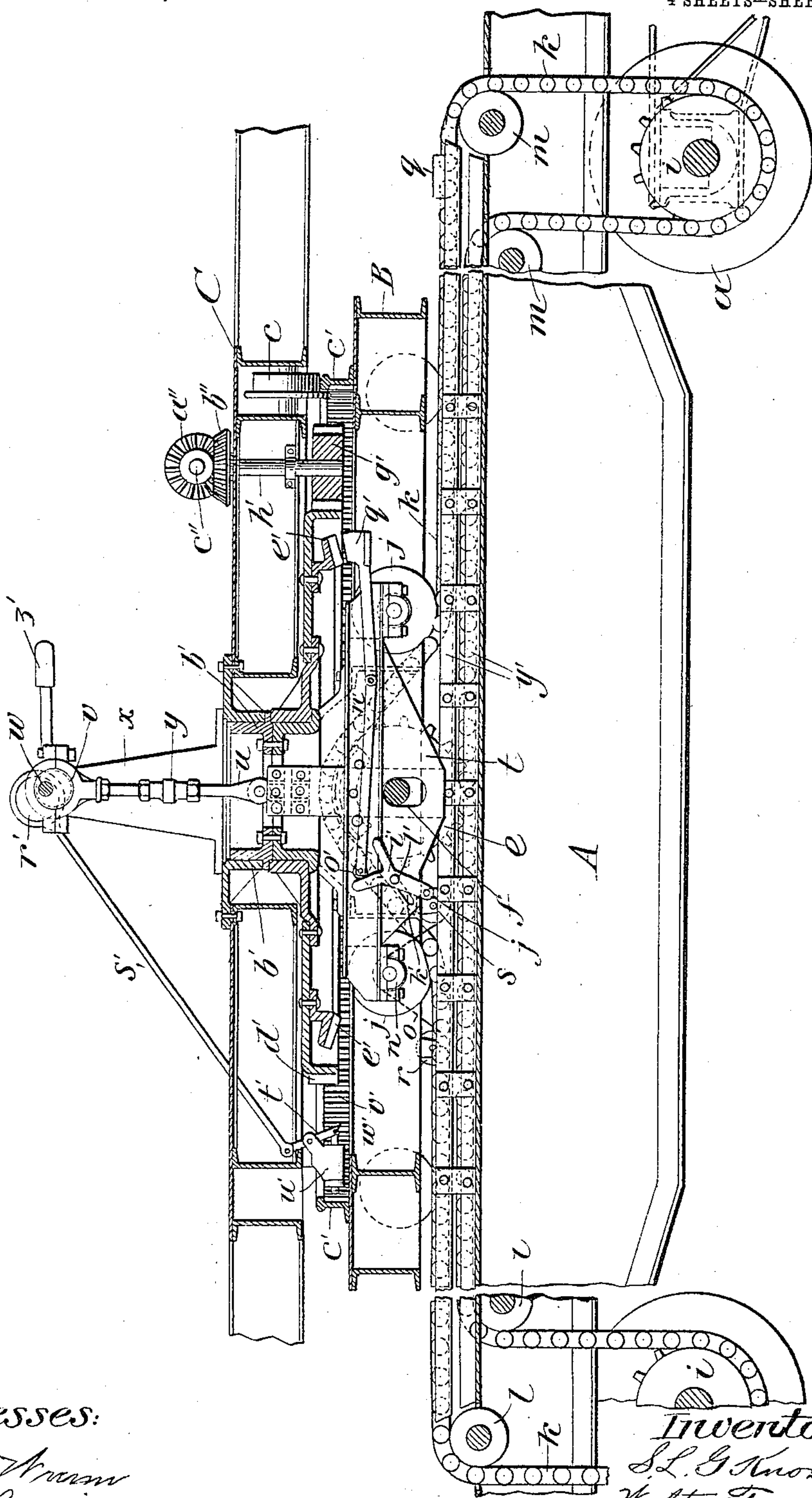
PATENTED APR. 3, 1906.

S. L. G. KNOX & W. FERRIS.
RAILWAY PILE DRIVER AND THE LIKE.

APPLICATION FILED MAY 29, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



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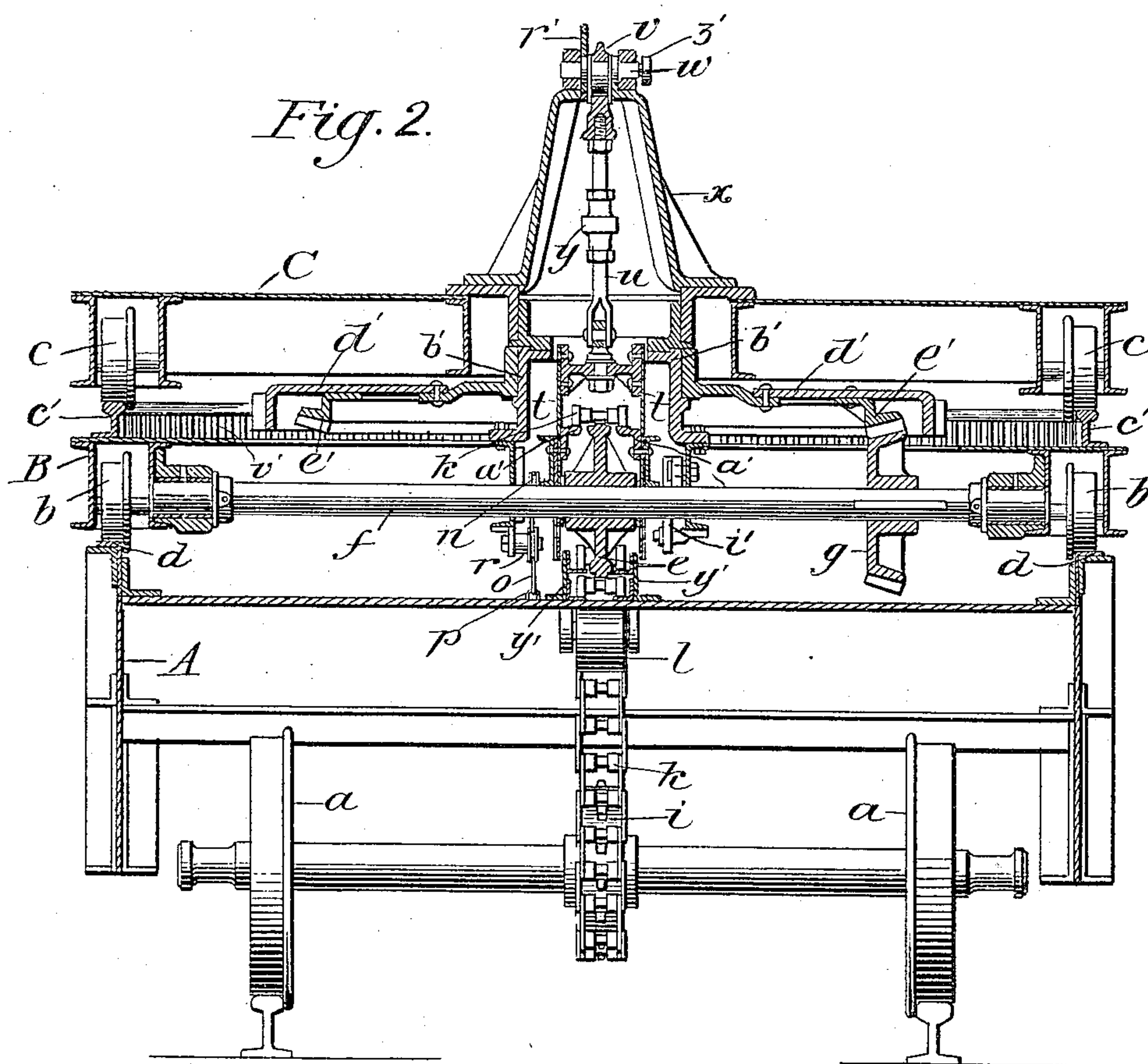
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4 SHEETS—SHEET 2.



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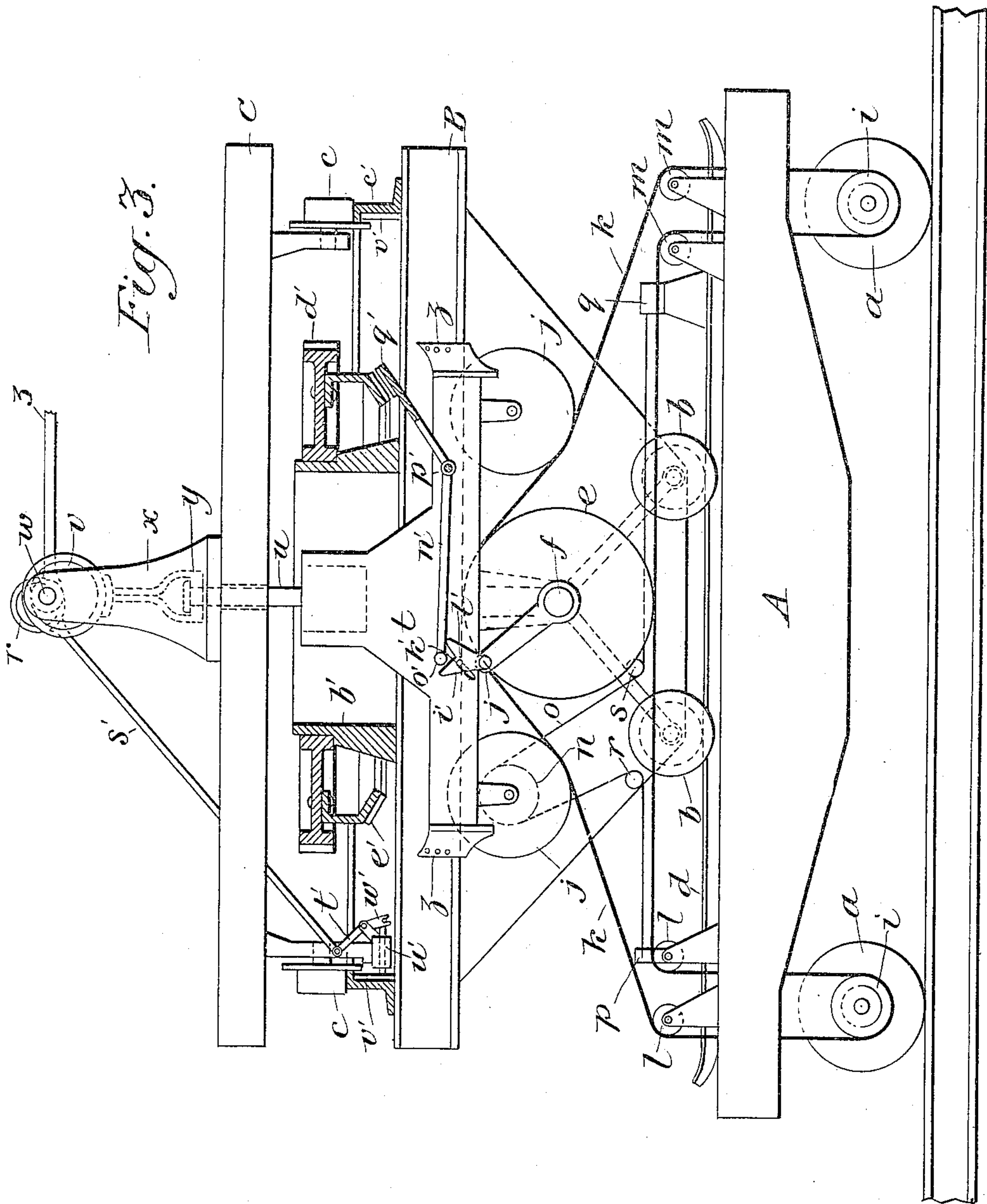
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APPLICATION FILED MAY 29, 1905.

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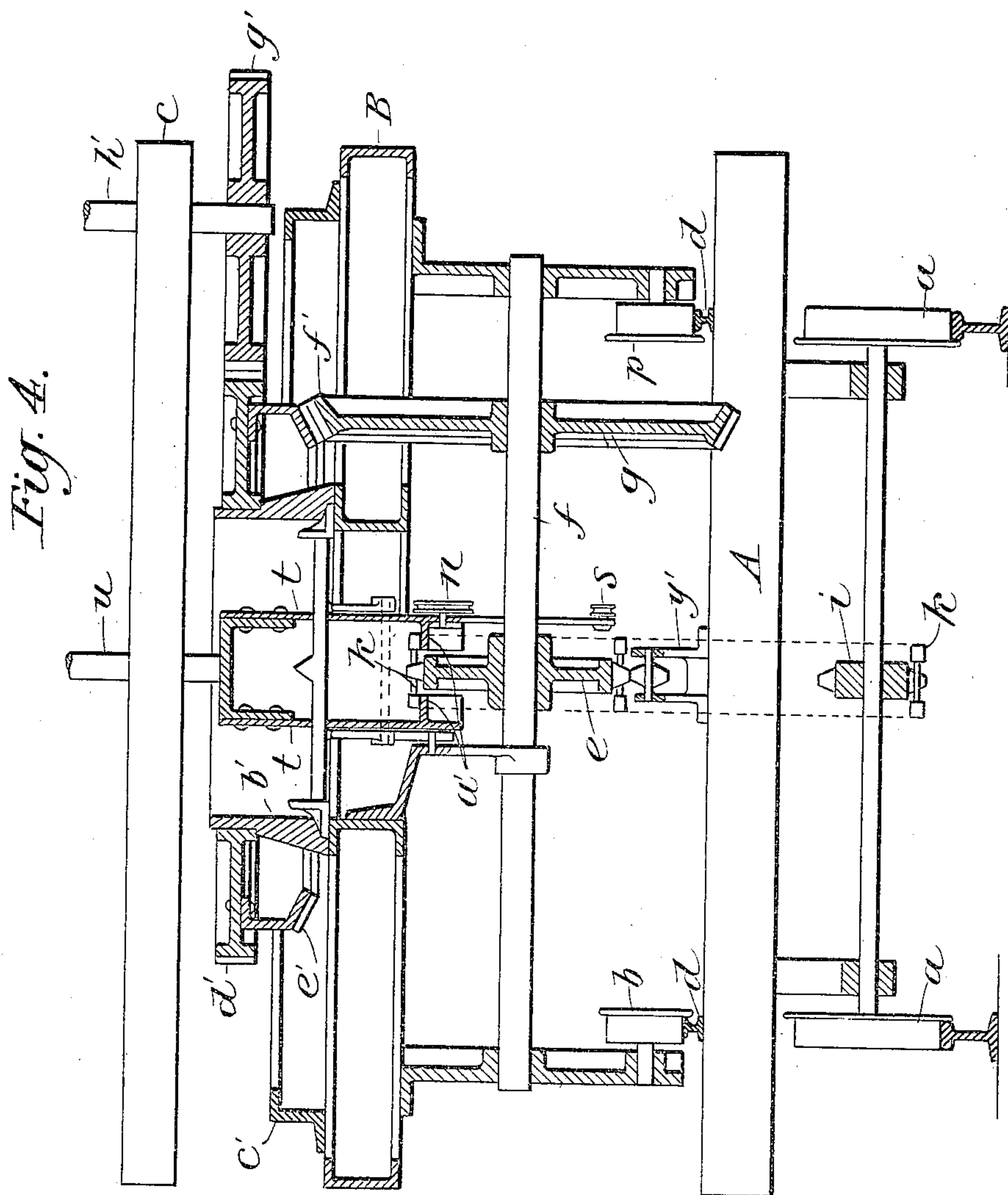
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APPLICATION FILED MAY 29, 1905.

4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

SAMUEL LIPPINCOTT GRISWOLD KNOX, OF MILWAUKEE, AND WALTER FERRIS, OF SOUTH MILWAUKEE, WISCONSIN, ASSIGNORS TO THE BUCYRUS COMPANY, OF SOUTH MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

RAILWAY PILE-DRIVER AND THE LIKE.

No. 816,584.

Specification of Letters Patent.

Patented April 3, 1906.

Application filed May 29, 1905. Serial No. 262,800.

To all whom it may concern:

Be it known that we, SAMUEL LIPPINCOTT GRISWOLD KNOX, residing in Milwaukee, and WALTER FERRIS, residing in South Milwaukee, county of Milwaukee, State of Wisconsin, citizens of the United States, have invented certain new and useful Improvements in Railway Pile-Drivers and the Like; and we 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.

The invention relates to certain improvements in railway pile-drivers and the like having a superstructure mounted for both rotary and longitudinal movement upon a railway-car, together with a source of power—viz., a prime mover preferably mounted upon the superstructure, which is enabled to effect the rotation and the longitudinal movement of said superstructure upon the car and the propulsion of the car upon the railway-tracks, all by means of a single train of driving mechanism which is compelled to perform any of the several movements, as desired, by means of certain locking devices engaging with one or another of the operating elements of the mechanism.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a fragmentary longitudinal section of a railway pile-driver embodying a preferred form of the improvements. Fig. 2 is a vertical transverse section of the same. Figs. 3 and 4 are corresponding views illustrating the invention in diagram for purposes of more clearly showing the relative arrangement of the cooperating parts.

Referring to the drawings, A indicates a railway-car provided upon the top with longitudinal rails *d*, upon which is mounted a carriage B, having wheels *b* engaging said track, said carriage in turn carrying a deck C, having wheels *c* engaging a circular trackway *c'*, by means of which the deck is rotated on the carriage to bring the leader mechanism into proper relation to operate upon piles in any position about the car. The deck C, it is to be understood, carries the engine or other prime mover, the pile-driver apparatus proper, the hoisting apparatus, and the controlling de-

vices for the various mechanisms by which the entire machine is operated and governed.

Heretofore it has been customary to provide separate controlling means for the various mechanisms by which the propelling, swinging, and traversing operations were effected; but it is the purpose of the present invention to so dispose and arrange the several mechanisms by which the above-noted operations are performed that the mechanisms are preferably directly controlled by a single lever or similar device which is capable of being moved to successive positions by the operator, to the end that the car will be propelled along the track, the carriage will be traversed longitudinally of the car-body, or the deck will be rotated upon the carriage to any desired position.

Mounted centrally on the top of the carriage B is a hollow stud or bearing *b'*, upon which is journaled for free revolution a floating gear *d'*, provided on its outer periphery with gear-teeth and having secured to the under face thereof a beveled gear-rim *e'*. The latter meshes with a beveled gear *g* upon a transverse shaft *f*, journaled in brackets on the carriage B, and midway of said shaft *f* is rigidly secured a driving-sprocket *e*. Said driving-sprocket *e* coöperates with an endless sprocket-chain *k*, which normally engages opposite sides of said sprocket—that is to say, the upper stretch of said chain *k* engages the teeth on the upper side of the sprocket, while the lower stretch of said chain engages the teeth on the lower side thereof. The chain *k* is guided in a suitable chainway *y'* along the top of the car-body and after passing over suitable guide-rollers *l l* and *m m*, located at opposite ends of the car, passes around sprockets *i i*, which are secured to the car-axles and serve to impart motion thereto to drive the car-wheels *a a* and propel the car along the track under certain conditions to be hereinafter explained. The upper stretch of said chain *k* passes under suitable guide-rollers *j j*, located on opposite sides of the sprocket *e* and journaled on the lifting-frame *t*.

Mounted for vertical reciprocation in suitable guide-brackets *z z*, secured to the under side of the carriage-body, is a frame *t*, pro-

vided with a lifting-rod u , which passes through the hollow journal b' and is provided at its upper end with an eccentric v , mounted upon a transverse stub-shaft w , which is jour-
 5 naled in a standard x , projecting vertically above the center of the deck C , said shaft w being provided with an operating-handle z' , by means of which said shaft is capable of be-
 10 ing rotated substantially one hundred and eighty degrees. The rod u is provided with a swivel-joint y to permit the deck to rotate on the carriage without interfering with the lifting operation of said rod. Projecting in-
 15 wardly from the sides of frame t are lugs a' a' , which are adapted to engage opposite sides of the chain k and lift the upper stretch of said chain out of engagement with the teeth on sprocket e when said frame t is raised by the rod u through the agency of its eccen-
 20 tric connection with the shaft w .

Pivoted to the under side of the carriage B is a lever n' , provided at one end with a locking-dog q' , adapted to engage the teeth of the beveled gear e' to lock the floating gear d'
 25 against rotation. The other end of said lever n' is provided with a small roller o' , which co-operates with a fork-cam i' , pivoted at its lower end to the carriage-body B and having a laterally-projecting pin l' disposed upon its
 30 rear face and coöperating with an inclined slot k' in the lifting-frame t , so that when said frame t is raised or lowered the pin l' , engaging slot k' , will rock the Y-cam on its pivot and swing the locking-lever n' so as to cause
 35 the dog q' thereon to be engaged with or disengaged from the teeth of the gear e' . In the lowest position of the frame t the cam i' is swung to the right, as shown in Figs. 1 and 2, and the roller o' on lever n' engages the
 40 left-hand member of the cam-fork to disengage dog q' from the gear e' . The highest position of the frame t causes the right-hand member of the cam-fork to likewise lift the roller end of lever n' and disengage the dog q' ,
 45 while the intermediate position of the frame permits the roller o' to rest in the lower portion of the cam-fork, so that the dog q' is permitted to engage with the teeth of the gear e to lock the same rigidly against rotation.
 50 The roller end of the lever being heavier than the dog end, the dog will rise into the first tooth-space which passes above it after the cam is placed in mid-position.

Under certain conditions of operation, to
 55 be hereinafter more fully explained, it is necessary to lock the deck to the carriage, and for this purpose there is provided a deck-lock u' , secured to the under surface of the deck and having reciprocating bolt mechanism adapt-
 60 ed to be moved into or out of engagement with a series of teeth or stops v' , located on the inner periphery of the circular trackway c' . In order to operate the bolt mechanism of the deck-lock u' at the proper times, the lock is
 65 provided with a lever t' , pivoted thereon,

which engages the reciprocating bolts at one end and is attached at the other end to a rod s' , which in turn is provided at its upper end with an eccentric r' , which is mounted upon the shaft w , and is therefore controlled
 70 and also controls the relation of the bolts in the deck-lock and the teeth in the circular trackway by the handle z' . It is also necessary under certain conditions of operation to lock the chain to the car-body in order to pre-
 75 vent said chain being driven by the sprocket e , and to this end there is provided a chain-lock q , which comprises a sliding bolt adapted to be moved into and out of engagement
 80 with the links of the chain by means of a cable o , secured at one end to said bolt and anchored to the car-body at the other end. This cable o , which controls the operation of the chain-lock, as will be seen, passes along
 85 substantially the whole length of the car-body. Intermediate the chain-lock q and the anchor p , to which the opposite end of the cable o is secured, said cable passes over
 90 a sheave n , preferably mounted upon the same axis as the left-hand guide-roller j , as shown in Figs. 1 and 3, and under guide-
 95 rollers r s , journaled on the under side of the carriage-frame, so that as the frame t is lifted the cable o is drawn up and tightened by the vertical movement of sheave n , and the bolt
 of the chain-lock is forced into engagement with the chain to lock the latter securely to the car-body.

The operation of the entire mechanism is preferably effected by an engine or other
 100 prime mover mounted upon the deck, as heretofore mentioned, and in order to provide suitable driving connections between said prime mover and the mechanism on the
 105 carriage B and the car-body A there is journaled on the top of the deck a shaft c'' , connected by suitable gearing with the engine, which shaft is provided with a beveled gear
 110 a'' , meshing with a like beveled gear b'' upon the end of the vertical shaft h' passing through the deck and journaled thereon. The lower end of said shaft h' has a gear g' meshing with the peripheral gear-teeth on
 115 the floating gear d' , so that the latter gear is actuated by the engine or prime mover. The chain-lock q has not been particularly described in view of the fact that it is preferably of the type shown in an application
 120 filed by S. L. G. Knox, one of the present applicants, March 8, 1904, Serial No. 197,080, which application covers a pile-driver of this general type. It may be said, however, that
 125 the chain-lock may be of any preferred form and may, in fact, consist of a pawl or pawls engaging the links of the chain or any of the sprocket-wheels around which the chain
 130 passes, the one essential condition being that some mechanism be provided which will prevent the movement of the chain under certain conditions.

The operation of the apparatus as above described is substantially as follows: When it is desired to propel the car along the track, the handle z' is moved to the position shown in Figs. 1 and 3, thereby dropping the frame t to its lowest position. When the driving-chain k is disengaged from chain-lock q , its upper and lower stretches are in coöperative engagement with the upper and lower sides of the driving-sprocket e and floating gear d' is unlocked—that is to say, dog q' on lever n' is moved out of engagement with the teeth of the beveled gear e' by the Y-cam i' . In this position of the lever z' eccentric r' is in position to cause rod s' and lever t' to permit the bolts of the deck-lock u' to engage the teeth v' on the circular trackway and lock the deck against rotation on the carriage. If the shaft c'' be now driven by the engine on the deck C and floating lever d' is rotated through the intermediate gearing b'' and g' and in turn imparts rotary motion to the shaft f by means of the beveled gears e' and g on said floating gear and said shaft f , respectively, the sprocket e on shaft f is thereby rotated and drives the chain, which, passing over the sprockets i i on the car-axles, rotates the wheels a a and drives the car along the track. It is to be noted that the sprocket-wheel e would not move the chain k if the carriage B were not stationary with respect to the car-body A; but since chain k forms a loop in tension between two stationary points on the car-body A it suffices that the chain mesh with two sides of the sprocket e in order to render its shaft stationary as regards longitudinal movement on the car-body, whereby the carriage will be practically locked to the car-body. When it is desired to swing the pile-driver to the right or left, so that the leader mechanism may be brought in proper position to operate upon piles disposed laterally of the right of way, the deck C is rotated upon the circular trackway c . To accomplish this, the lever z' is moved to its vertical or intermediate position, thereby raising the frame t a short distance in its guides z . This has the effect of causing eccentric r' to actuate rod s' and lever t' to retract the bolts of deck-lock u' from engagement with the teeth v on the circular trackway c to permit the deck to rotate on said trackway. The upward movement of the frame t causes the brackets a' thereon to engage the top stretch of chain k and lift that portion of said chain partially out of engagement with the sprocket e . Sheave n , moving upward with the frame t , tightens cable o , which permits chain-lock q to engage the chain, thereby locking the latter securely to the car-body. Y-cam i' is rocked to the left by the coöperative engagement of slot k' with pin l' and permits the longer end of lever n' to drop down onto the lower or forked portion of said cam, while the locking-dog q' on the other end of said lever

engages the teeth on gear e' , thereby locking the floating gear d' against rotation. As the shaft h' is driven by its gearing from the engine upon the deck C, said gear is caused to travel around the periphery of the now stationary floating gear, and thereby rotate the deck to the desired position. It will be seen that in the swinging operation with the lever z' in its mid-position the car is held stationary upon the track and the carriage is prevented from traversing the car-body by reason of the locked position of the floating gear d' , while the same locked relation of the floating gear affords a proper resistance or reaction for the gear g to operate against in order to rotate the deck. The traversing operation or the operation of moving the carriage longitudinally of the car-body in order that the driving mechanism may be brought into position to operate upon piles at varying distances from the car, is accomplished by swinging the lever z' to its extreme left-hand position opposite that shown in Figs. 1 and 3, thereby causing deck-lock u' to again engage the circular trackway and lock the deck against rotation and also moving the frame t to its third or uppermost position. This final position of the frame t causes the lugs $a' a'$ to lift the upper stretch of the chain entirely out of engagement with the sprocket e and causes the right-hand member of the Y-cam to force the long end of the lever n' upward, thereby disengaging locking-dog q' from gear e' and permitting the floating gear d' to be rotated by shaft h' and gear g' , driven by the engine on the deck. The cable o is further lifted and tightened by the sheave n , and thereby actuates the chain-lock to lock the chain securely to the car-body. The chain is thereby converted into a rack, and as the sprocket e , which engages with the lower stretch of the chain only, is free to move along said chain, said sprocket and the carriage B, to which it is connected by shaft f , is moved along the tracks d on the car-body A.

It will thus be seen that the entire control of the several operations as above described is accomplished through a single lever z' , and in addition to greatly simplifying the apparatus heretofore employed to accomplish the same operations the present invention reduces the probability of mishap due to mistake on the part of the operator, who, instead of having a relatively large number of different controlling mechanisms to be looked after, may confine his attention to a single device, which even if improperly actuated would not produce any dangerous or injurious effect upon the mechanism or the work to be performed.

What we claim is—

1. In railway pile-driver and like apparatus having a rotary and longitudinally-movable superstructure, the combination of a driving-sprocket carried by the superstruc-

ture, a driven sprocket on the car-axle, an endless chain engaging the respective sprockets to drive the car, and means for imparting motion to said driving-sprocket.

2. In railway pile-driver and like apparatus having a rotary and longitudinally-movable superstructure, the combination of a driving-sprocket carried by the superstructure, a driven sprocket on the car-axle, an endless chain adapted to engage the driving-sprocket on opposite sides thereof and meshing with the driven sprocket, means whereby the driving-sprocket may be engaged with one or both stretches of the chain irrespective of the position of the superstructure, and mechanism for imparting motion to said driving-sprocket.

3. In railway pile-driver and like apparatus having a rotary and longitudinally-movable superstructure, the combination of a driving-sprocket carried by the superstructure, driven sprockets on two of the car-axles, an endless chain adapted to engage the driving-sprocket on opposite sides thereof and meshing with both of said driven sprockets, means for disengaging one stretch of the chain from the driving-sprocket, and means on the superstructure for imparting motion to said driving-sprocket, whereby when both stretches of the chain are engaged with the driving-sprocket and the latter is driven, the car will be propelled on the track.

4. In railway pile-drivers and the like, the combination of a car, a longitudinally-movable superstructure thereon, a driving-sprocket carried by the superstructure, driven sprockets on the car-axle, an endless chain meshing with the driven sprockets and engaging the driving-sprocket on opposite sides thereof, means for imparting motion to the driving-sprocket, and mechanism for disengaging one stretch of the chain from the driving-sprocket and for locking said chain to the car-body, whereby when both stretches of the chain engage the operating driving-sprocket, the car is propelled on the track, and when one stretch of the chain is disengaged and said chain is locked to the car-body, the superstructure is moved longitudinally on the car-body.

5. In railway pile-drivers and the like, the combination of a car, a carriage mounted for longitudinal movement thereon, a deck revolvably mounted on said carriage, a driving-sprocket on said carriage, driven sprockets on the car-axles, an endless chain meshing with said driven sprockets and engaging the driving-sprocket on opposite sides thereof, a floating gear on the carriage meshing with a gear on the driving-sprocket shaft, a shaft on the deck operated by a prime mover on said deck and geared to said floating gear, whereby the car may be propelled by the prime mover, a lock for securing the chain to the car-body, and mechanism for disengaging

one stretch of the chain from the driving-sprocket and for engaging the chain-lock with the chain, whereby the carriage may be moved longitudinally of the car-body by the prime mover.

6. In railway pile-drivers and the like, the combination of a car, a carriage mounted for longitudinal movement thereon, a deck revolvably mounted on said carriage, a floating gear on the carriage driven from the prime mover on the deck, a driving-sprocket on the carriage geared to said floating gear, driven sprockets on the car-axles, an endless chain engaging the driving-sprocket on opposite sides thereof and meshing with the driven sprockets, and means operated by a single lever for controlling the engagement of the chain with the driving-sprocket, the locking of the floating gear against rotation, the locking of the deck to the carriage, and the locking of the chain to the car-body.

7. In railway pile-drivers and the like, the combination of a car, a carriage longitudinally movable thereon, a deck revolvably mounted on said carriage, and means controlled by a single lever for propelling the car, for swinging the deck on the carriage and for traversing the carriage on the car.

8. In railway pile-drivers and the like, the combination of a car, a carriage longitudinally movable thereon, a deck revolvably mounted on said carriage, a floating gear on the carriage geared to the prime mover on the deck, a driving-sprocket geared to the floating gear, a drive-chain engaging with opposite sides of said driving-sprocket and meshing with driven sprockets on the car-axles, and means controlled by a single lever for locking the deck and the floating-gear drive to the carriage and the chain to the car-body, and for disengaging one stretch of the chain from the driving-sprocket.

9. In railway pile-drivers and the like, the combination of a car, a carriage longitudinally movable thereon, a deck revolvably mounted on said carriage, a floating gear on the carriage geared to the prime mover on the deck, a driving-sprocket geared to the floating gear, a drive-chain engaging with opposite sides of said driving-sprocket and meshing with driven sprockets on the car-axles, a deck-lock for locking the deck to the carriage, a chain-lock and a lock for the floating gear, a reciprocating frame controlling the engagement of one stretch of the chain with the driving-sprocket, the chain-lock with the drive-chain and the gear-lock with the floating gear, and a lever on the deck for actuating the deck-lock and the reciprocating frame.

10. In railway pile-drivers and the like, the combination of a car, a carriage longitudinally movable thereon, a deck revolvably mounted on said carriage, a floating gear on the carriage, a driving-shaft on the deck

geared to the prime mover and to the float-
ing gear, a driving-sprocket on the carriage
operated by said floating gear, a drive-chain
engaging with opposite sides of said driving-
5 sprocket and meshing with driven sprockets
on the car-axles, a deck-lock, a chain-lock,
and a lock for the floating gear carried by the
deck, the car and the carriage respectively, a
reciprocating frame on the carriage provided
10 with means for disengaging one stretch of the
chain from the driving-sprocket and also for

controlling the operation of the chain-lock
and the floating-gear lock, and a lever on the
deck for simultaneously actuating the deck-
lock and the reciprocating frame.

In testimony whereof we affix our signa-
tures in presence of two witnesses.

SAMUEL LIPPINCOTT GRISWOLD KNOX.

WALTER FERRIS.

Witnesses:

H. B. HAYDEN,

GEO. H. RONDEAU.

15