T. A. BAILEY.

TRACK LAYING MACHINE.

APPLICATION FILED APR. 8, 1912.

1,189,526.

Patented July 4, 1916.

6 SHEETS—SHEET 1.

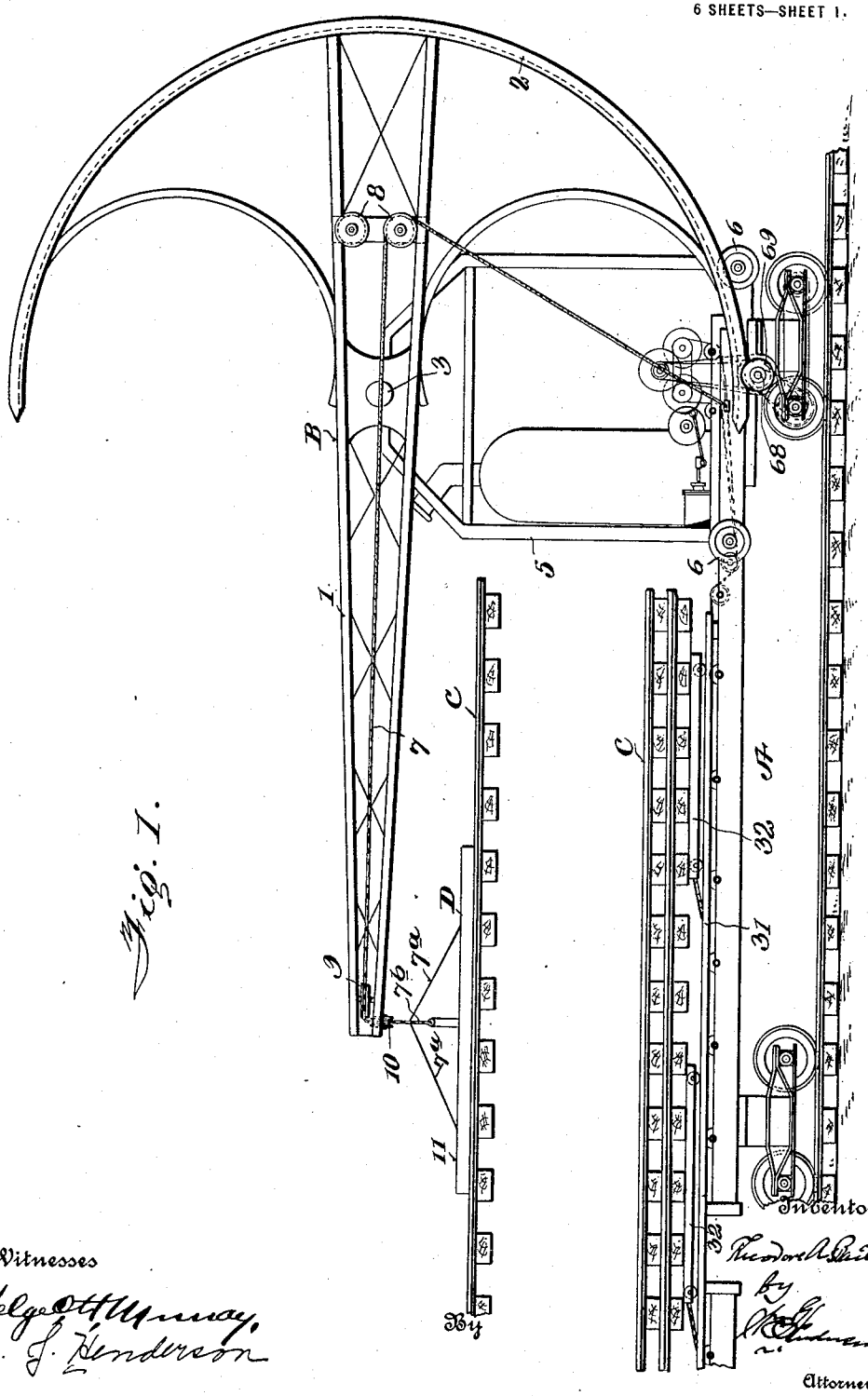


Fig. 1.

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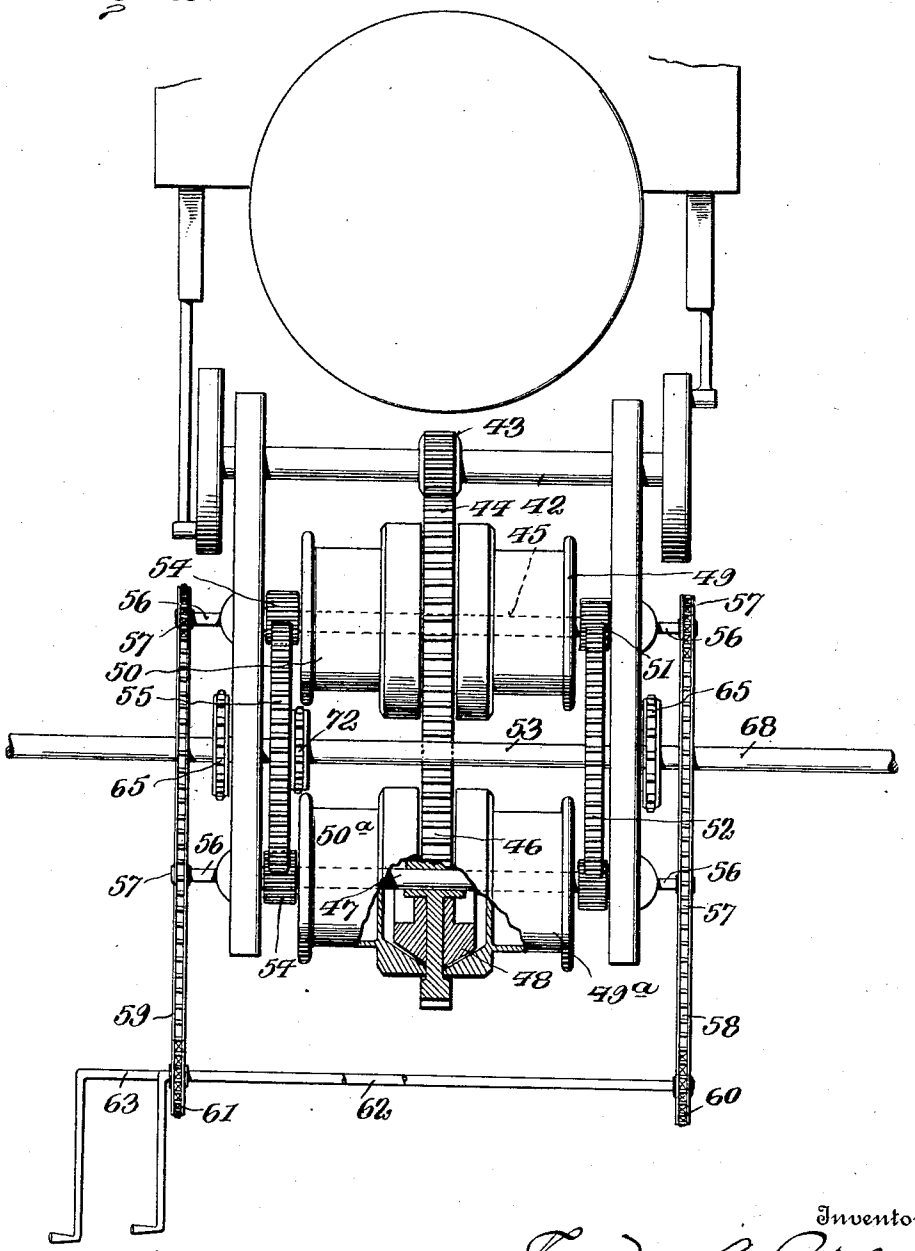
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6 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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Fig. 3.

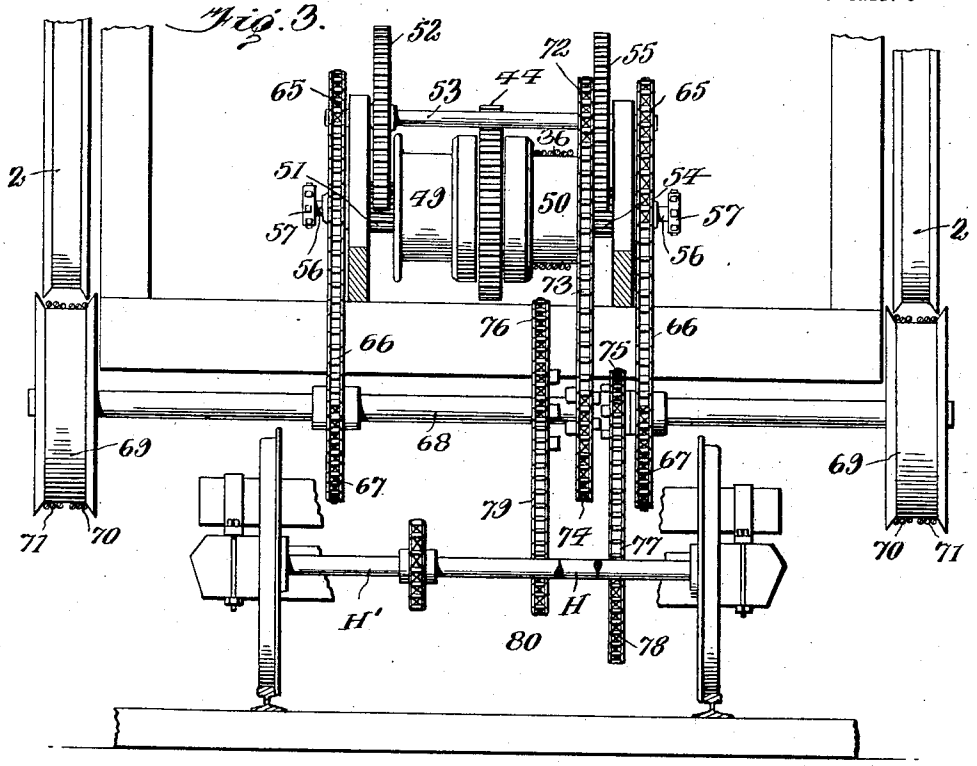
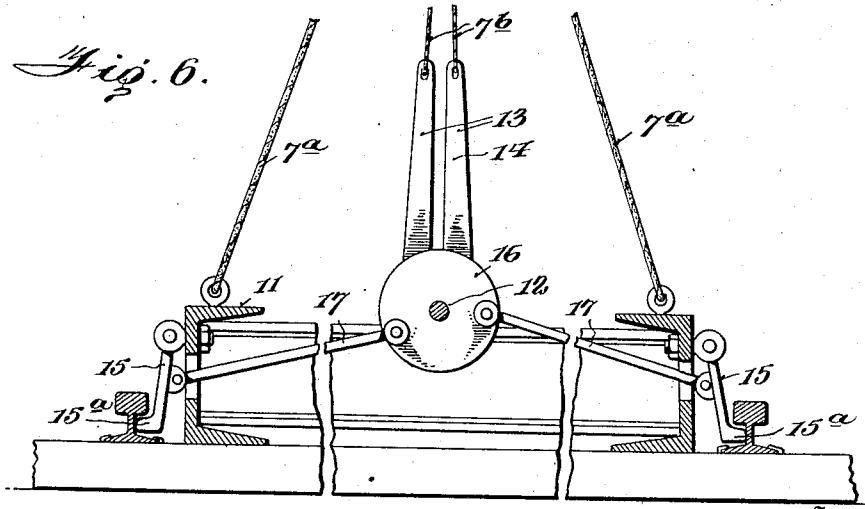


Fig. 6.



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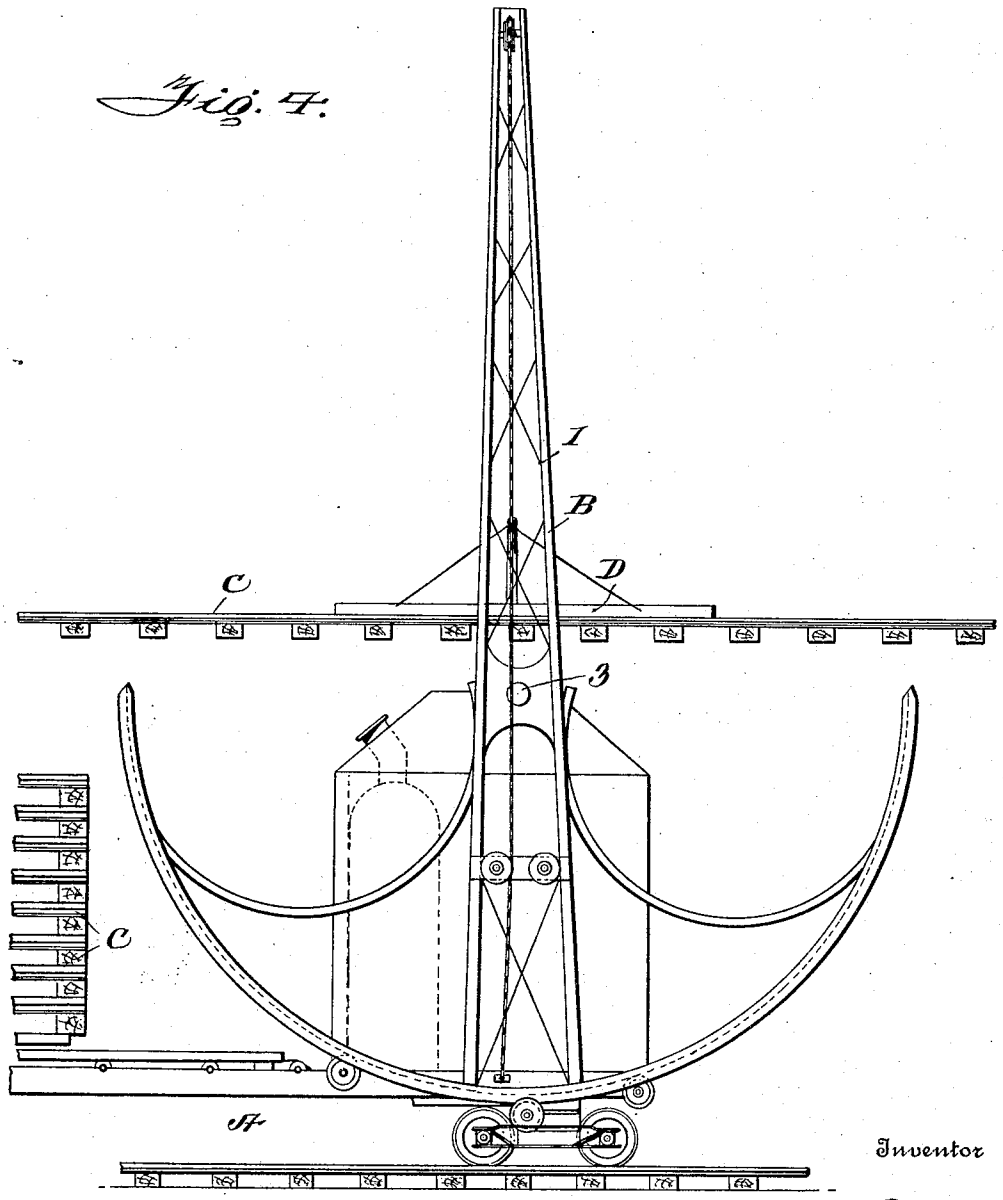
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6 SHEETS—SHEET 4.

Fig. 4.



Witnesses

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6 SHEETS—SHEET 5.

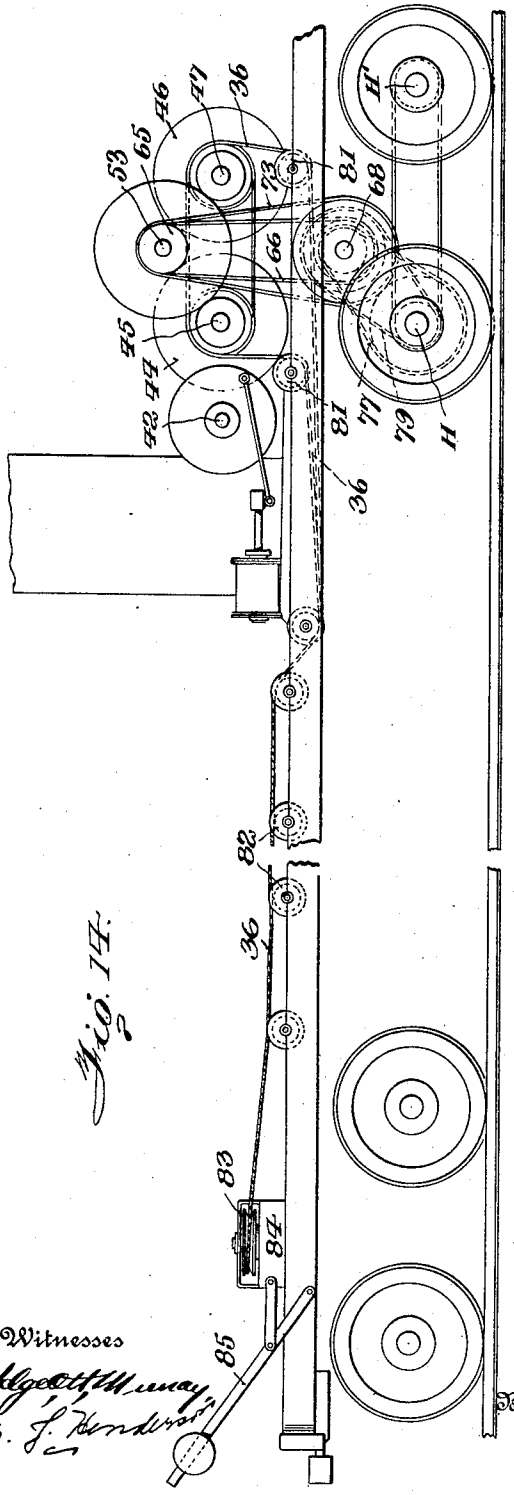


Fig. 14.

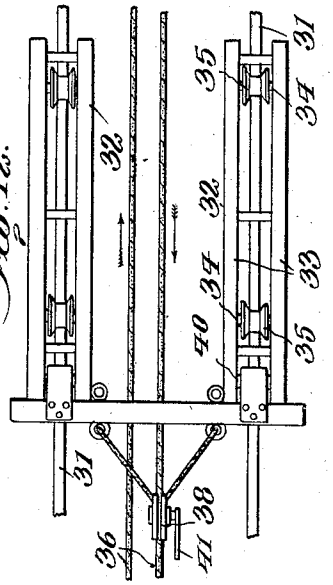


Fig. 12.



Fig. 13.

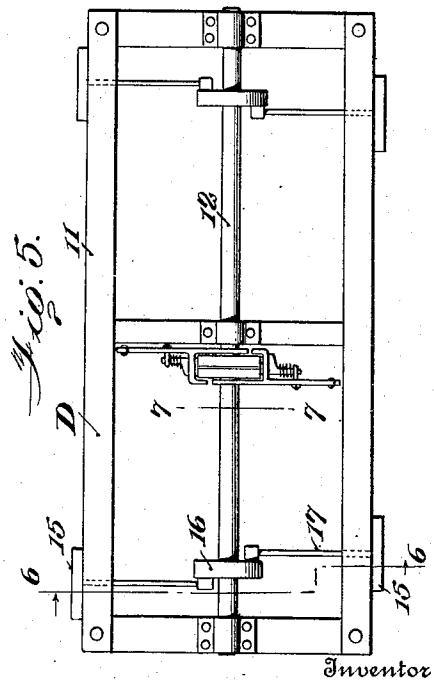


Fig. 5.

Witnesses

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TRACK LAYING MACHINE.

APPLICATION FILED APR. 8, 1912.

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6 SHEETS—SHEET 6.

Fig. 9.

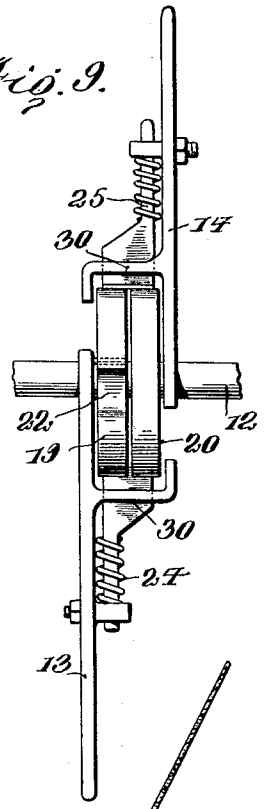


Fig. 8.

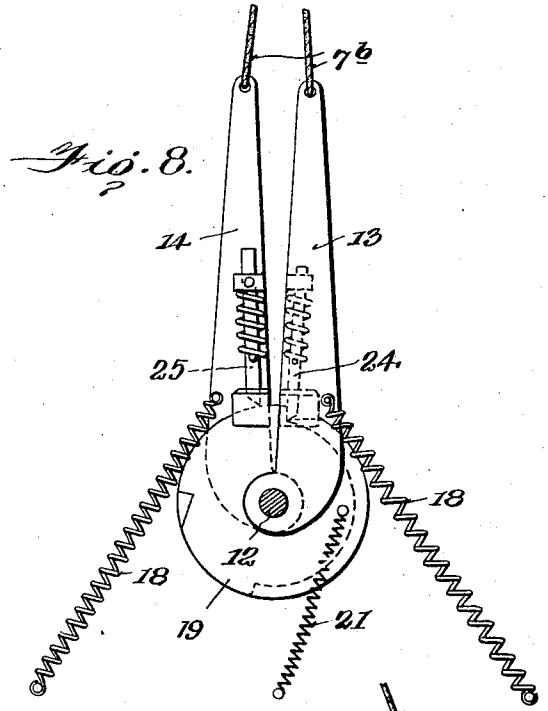


Fig. 7.

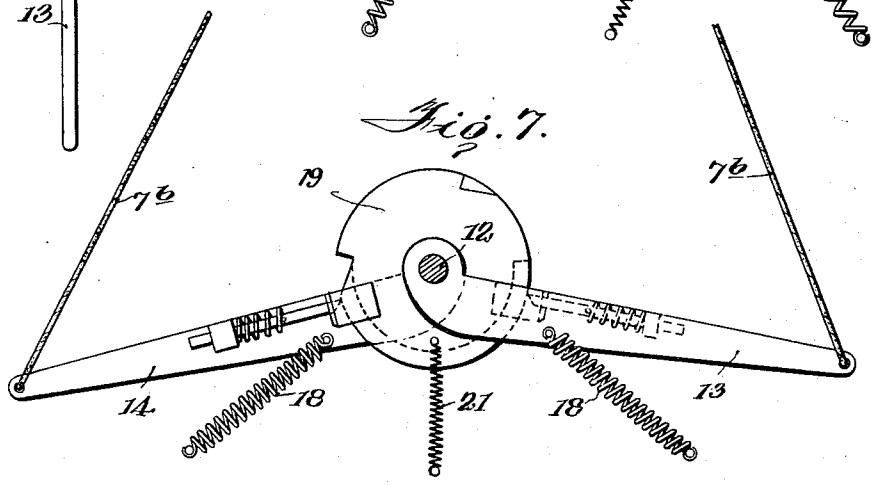


Fig. 10.

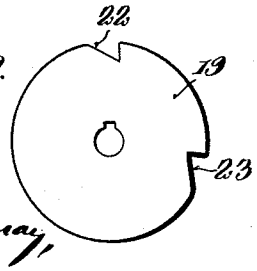
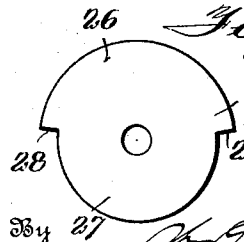


Fig. 11.



Witnesses

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UNITED STATES PATENT OFFICE.

THEODORE A. BAILEY, OF LIVE OAK, FLORIDA.

TRACK-LAYING MACHINE.

1,189,526. Specification of Letters Patent. Patented July 4, 1916.

Application filed April 8, 1912. Serial No. 689,181.

To all whom it may concern:

Be it known that I, THEODORE A. BAILEY, a citizen of the United States, residing at Live Oak, in the county of Suwanee and State of Florida, have invented certain new and useful Improvements in Track-Laying Machines; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to apparatus for handling sections of railway tracks and it proposes an apparatus especially applicable to engineering and construction work and by means of which sections of railway tracks may be loaded upon or laid from a train of cars in a continuous and efficient manner.

The invention proposes a swinging crane equipped with means for supporting the track sections; a series of trucks which is moved in accordance with the progress of the track loading or laying operations, and a driving means for the trucks including elements by which their movements may be correlated to the movements of the crane.

The invention also proposes a novel means for directly carrying the track sections, such means being automatically operable, both to engage a track section that is to be lifted and to release a track section that is to be laid.

The invention also proposes a novel arrangement for suspending the track carrying means with relation to the crane, whereby the power required for the operation of the latter shall be relatively small.

The invention also proposes a compact and well balanced gear organization for operating the elements referred to and also the construction car upon which the apparatus is mounted, and for correlating the operations of the various elements as the progress of the work and the condition of the load may render necessary or desirable.

An embodiment of the invention is illustrated in the accompanying drawings wherein:—

Figure 1 is a side elevation of the apparatus and the construction car upon which it is mounted; Fig. 2 is a plan view of the gear organization; Fig. 3 is a front elevation thereof partly in section; Fig. 4 is a detail side view of the crane showing a vertical position thereof, and a track section supported thereby; Fig. 5 is a plan view of the mechanism for automatically engaging or releasing the track sections; Fig. 6 is a cross section on the line 6—6 of Fig. 5; Fig. 7 is a detail cross sectional view on the line 7—7 of Fig. 5 showing certain relations of parts of the mechanism shown in Fig. 5; Fig. 8 is a similar view showing other relations of the same parts; Fig. 9 is a detail plan view of these parts in the relations in which they are shown in Fig. 7; Figs. 10 and 11 are views of two companion disks employed as elements of the mechanism shown in Fig. 5; Fig. 12 is a plan view showing a pair of parallel trucks employed for moving the track sections along the construction car or train and showing also elements of the cable drive for these trucks; Fig. 13 is a detail view of a draw head which may be connected to a pair of the trucks shown in Fig. 12; Fig. 14 is a diagrammatic view of the cable drive for the trucks.

Similar characters of reference designate corresponding parts throughout the several views.

The crane car is indicated generally by the letter A and is used in connection with a construction train serving as the locomotive thereof. The crane and the gear organization are mounted at the forward end of the car A.

The crane.—The crane, designated generally by the letter B, comprises a pair of suitably connected and braced arms 1, which are disposed in a common transverse plane and carry at their lower ends relatively large and symmetrically arranged pulley segments 2, these having an approximately semi-circular curvature and serving not only as elements of the crane operating gear but also as counterweights to balance the load. The crane is pivotally mounted concentrically of the segments 2, on a shaft 3, which passes through bearing blocks 4, secured to the arms 1 and is supported upon the frame or housing 5 which incloses the boiler and the engine. To steady the movements of the crane as well as to somewhat relieve the shaft 3 of stresses, rollers 6 are provided which have tractive bearing upon the segments 2.

The track sections to be loaded or unloaded are indicated by the letter C. They consist of a pair of rails of determined length, and cross ties to which the rails are spiked, and are arranged in stacks, which are progressively brought into or out of relation with the crane in accordance with whether the latter is being employed to lay a track or to take up a track. In either event each track section is separately handled by a mechanism D which supports the same during the movement of the crane and is automatically operable, both to engage a track section that is to be lifted, either from the ground or from the car, and to release a track section that is to be laid, either upon the car or upon the ground. As the crane swings on its pivot 3, the mechanism D which is suspended from the end of the crane, together with the track section supported by said mechanism, passes, forwardly or rearwardly as the case may be, and in accordance with the direction of movement of the crane, between the arms 1. The mechanism D is suspended by cables 7, the inner ends of which are fixed to the car or to any suitable part of the mechanism. A cable 7 is arranged adjacent to and on the outside of each arm 1, and each cable 7 passes first between a pair of pulleys 8 which are located at some distance inwardly of the pivot 3 and in a plane parallel to the plane of the arm by which they are carried. Leaving the pulley 8, the cables 7 pass over suitable guide pulleys 9 and 10, the latter being arranged at the outer ends of the arms 1, and the pulleys 10 having a swivel mounting. When the arms of the crane point to the left (the drawings, only, being considered) one pulley 8 of each pair will co-act with a corresponding cable 7 and when the arms of the crane point to the right the other pulley of the pair will co-act with said cable. Owing to the fact that the pulleys 8 are located at some distance inwardly of the shaft 3, (in practice about midway between this shaft and the circumferential center of the segments 2), they cause the cables 7 to become longer or shorter (as regards their efficient length) in acordance with the movements of the crane to a vertical position or to a horizontal position; in other words as the crane moves to a vertical position the distance between its end and the mechanism D increases and as the crane moves to a horizontal position the distance between its end and the mechanism D decreases. This results in a substantially horizontal movement of the mechanism D throughout the swinging movement of the crane, and consequently reduces the resisting leverage and the power required for operation to a minimum.

The mechanism for carrying and releasing the track sections.—The mechanism D is illustrated in detail in Figs. 5 to 11 and its operating parts are supported from a frame 11 of a length suitable to insure an efficient and stable support for the track sections, being in practice about three times as long as wide. The side and end bars of the frame 11 are preferably made of channel irons and the frame is reinforced by a central I iron which, together with the end bars, is provided with a centrally located bearing for a longitudinal rock shaft 12. The cables 7 terminate in branches 7^a which are connected to the corners of the frame; and said cables are spliced to cable sections 7^b, which in turn are connected to a pair of arms 13 and 14 loosely mounted on the shaft 12. The side bars of the frame 11 carry adjacent the ends thereof rail engaging plates 15, which are suitably pivoted at the outer sides of said side bars and adjacent the upper edges thereof. The plates 15 are provided at their lower edges with out-turned rail engaging lips 15^a and when a track section is to be lifted are swung outwardly on their pivots so as to engage their lips 15^a under the treads of the rails; on the other hand when a track section is to be released said plates are retracted to withdraw their lips 15^a from engagement under the treads of the rails. The plates 15 are operatively connected to the shaft 12, the connections preferably comprising disks 16 which are fixed on said shaft and links 17 connecting each disk and the adjacent plates 15, the links 17 working through vertical slots in the side bars of the frame and being pivoted to the plates and also to the disks, eccentrically of the latter. The arms 13 and 14 which as above stated, are loosely mounted on the shaft 12, are movable to rock said shaft and thereby actuate the plates 15, said arms co-acting in this function with intermediate instrumentalities to be presently described. The operative movements of the arms 13 and 14 (being their movements toward one another) are effected by the cables 7 and their connections 7^b; while the resetting movements of said arms (being their movements away from one another) are effected by relatively stronger retractile coil springs 18, the ends of which are connected to said arms and to the frame 11.

The arms 13 and 14 work with relation to a pair of companion disks 19 and 20, one of which, the disk 19, is fixed on the shaft 12 and the other of which, the disk 20 is loose on said shaft. The disk 19 constitutes a positive connection between the arms 13 and 14 and the shaft 12; while the disk 20 serves to regulate the operative engagement of said arms and the disk 19, the movements of the disk 20 being effected by the arms 13 and 14 and also by a retractile coil spring 21, having one end connected to said disk 20 and the other end to the central cross bar of the frame 11. The disk 19

is provided with two oppositely directed notches 22 and 23, ninety degrees distant from one another and defining shoulders and cam surfaces, the notch 22 being provided for engagement by a pawl 24 carried by the arm 13 and the notch 23 being provided for engagement by a pawl 25 carried by the arm 14. The disk 20 is, in effect, a cam and as such includes a rise 26 and a dwell 27 concentric thereto, the rise having an extent of slightly less than 180° and terminating in shoulders 28 and 29, the shoulder 28 being engageable by the pawl 25. The pawls 24 and 25 are preferably of the spring pressed slidable type and their engaging ends are of a width to overlie the peripheral surfaces of both of the disks 19 and 20. To hold these disks in proper relation, the arms 13 and 14 are mounted adjacent the outer faces thereof, and the inner guide lugs 30 through which the pawls 24 and 25 work are provided with inturned extremities which overlie said outer faces.

In use: It may be assumed that a track section is about to be laid, for instance, upon the crane car, and that the parts have the relation shown in Fig. 8, in which the cable sections 7^b are taut; the arms 13 and 14 point upwardly and are approximately parallel; the pawl 25 of the arm 14, is in engagement with the shoulder of the notch 23 of the disk 19 and with the shoulder 29 of the disk 20; and the pawl 24 of the arm 13 rests upon the peripheral surfaces of the disks 19 and 20. As the crane continues its movement the track section comes to rest upon the stack on the crane car, and the cable sections 7^b become slack, allowing the springs 18 to move the arms 13 and 14 away from one another and to the position shown in Fig. 7 at which time said arms point downwardly at a slight angle. When the springs 18 act to move the arms 13 and 14 in the manner indicated, the spring 21 (which is connected to the disk 20 midway of and adjacent to the periphery of the dwell 27) acts to move the disk 20 to a position where its shoulders 28 and 29 are in an approximately horizontal plane. During these movements of the arms 13 and 14 and the disk 20, the disk 19 remains stationary and the pawl 25 of the arm 14 rides upon the cam surface of the notch 23, thus passing from said notch to the peripheral surfaces of the disks 19 and 20, while the pawl 24 of the arm 13 ultimately passes into the notch 22 of the disk 19, the shoulder 28 of the disk 20 having just previously come to a position slightly inwardly of said shoulder 22. These movements of the several parts referred to are what may be termed "resetting" movements, and are without direct effect upon the rock shaft 12. Immediately that the parts are reset in the manner described, the movement of the crane is reversed and at such time the cable sections 7^b are again drawn taut, bringing the arms 13 and 14 into the vertical positions first premised. Since the pawl 23 of the arm 13 is in the notch 22 of the disk 19 and in advance of the shoulder 28 of the disk 20, the movement of the arm 13 will effect a movement in the same direction of the disks 19 and 20, and also a turning movement of the shaft 12, and, through the instrumentalities described, the withdrawal of the plates 15 from engagement with the rails of the track section which has just been deposited; while the movement of the arm 14 will be idle, in so far as any direct effect on the shaft 12 is concerned since the pawl 25 of said arm simply rides over the peripheral surfaces of the disks 19 and 20. The plates 15 remain in their retracted relations throughout the return movement of the crane and the mechanism ultimately comes to rest in proper position upon the next track section to be transferred, the frame 11 being disposed upon the cross ties and between the rails of such track section. Thereafter, the cable sections 7^b become slack, and the parts are again reset by the springs 18 and 21. In this case, however, the relations of the parts are reversed, the shoulder 29 and the notch 23 being brought into relation to the pawl 25 of the arm 14. Consequently when the crane reverses, and the cable sections 7^b are again drawn taut, to raise the arms 13 and 14, the arm 14, and not the arm 13, is effective to turn the shaft 12. Since the movement of the shaft 12 by the arm 14 is in an opposite direction to its movement by the arm 13, the plates 15 are forced into engagement with the rails in the manner explained and the track section thus engaged is carried over by the crane and deposited upon the stack on the car, the operations first detailed being repeated. Thus, the shaft 12 is rocked alternately and in opposite directions by the arms 13 and 14; and the resetting of the parts provides for the active movement of these arms in alternation. While in the foregoing description, the operation described was that of taking the track sections from the ground and depositing them upon the car, it will be understood that the mechanism works in the same manner for the reverse operation of the taking the track sections from the car and depositing them upon the ground, the only change being that by an intervening idle actuation of the mechanism, the plates 15 are projected when the crane overhangs the car and retracted when the crane overhangs the ground.

Moving the track sections along the train.—The track sections are arranged, or are to be arranged, in stacks throughout the length of the train, and each stack rests upon a series of trucks, which are movable

upon rails 31 extending throughout the length of the train. In the embodiment disclosed, the trucks, indicated generally at 32, travel individually, upon a single rail, although as a series, upon both rails. Each series of trucks usually comprises eight, four on each rail 31, and arranged in pairs. The trucks may be of any desired construction. Those shown are similar to the ones which are used in dry kiln establishments and in each instance consist of a pair of parallel channel irons 33, connected at intervals by bolts 34, the latter serving as the axles of grooved rollers 35 which engage upon the rails 31. One pair of trucks of each series is to be positively propelled, preferably that pair which is foremost, considering the direction in which the trucks are to be moved. The means of propulsion, comprises an endless cable 36 which operates throughout the length of the train; its guiding and driving means will be explained at a later point. For connecting a pair of trucks to the cable 26, a cross bar 37 is employed, this bar being provided with a suspended cable engaging clamp 38 and with loops 39 which fit between the channels irons 33 of each truck of a pair and engage over transverse, removably fitted pins 40, provided for the purpose. The clamps 38 carry handles 41 whereby they may be conveniently engaged or disengaged with the cable 36.

In loading a stack upon the car A, the stack is moved forwardly for short intermittent lengths in accordance with the depositing operations of the crane, any suitable pushing device being employed for the purpose. This is for the reason that as the depositing plane becomes higher for each section that is laid, the horizontal distance of that section from the shaft 3 becomes correspondingly shorter, and hence slight movements of the stack in a direction toward said shaft are necessary to compensate for these variations and to secure a well balanced and symmetrical load. The same operations are carried out in unloading the stack from the car; but in this case the short intermittent movements of the stack are in a direction away from the shaft 3, in order that the mechanism D may always engage the central positions of the track sections.

When a stack has been completed it is moved to its proper position on the train and is chocked in position and another series of trucks is placed upon the rails 31. Thereupon the next stack is loaded in the manner explained and when completed it, in turn is moved to a position immediately adjacent the stack just previously loaded and is chocked in position. In unloading the stacks are moved one at a time to a position adjacent the crane, the operations being reversed.

It will be understood that between the operations of the crane, the train as a whole is advanced along the track to be taken up or along the track just laid (according to the character of the work) for a distance corresponding to the length of a track section.

The gear organization.—The engine shaft is shown at 42 and carries a pinion 43 which meshes with and drives a spur wheel 44 mounted on a transverse shaft 45. The spur wheel 44 meshes with and drives a similar spur wheel 46 mounted on a transverse shaft 47. The spur wheels 44 and 46 have at each side thereof coniform annular flanges 48, constituting friction clutch elements. The companion elements of the flanges 48 are shown at 49, 49^a, 50 and 50^a, the elements 49 and 50 running loosely on the shaft 45 and the elements 49^a and 50^a running loosely on the shaft 47. The elements 49 and 49^a which are located at the right of the spur wheels 44 and 46 (the drawings, only, being considered) carry pinions 51 which mesh with a spur wheel 52 fixed on an intermediate transverse shaft 53; and the elements 50 and 50^a which are located at the left of the spur wheels 44 and 46 carry pinions 54 which mesh with a spur wheel 55 running loosely on the shaft 53. The friction clutch elements 49, 49^a, 50 and 50^a, are movable axially along the shafts on which they run, into and out of engagement with the corresponding flanges 48 and the control of each pair of elements, 49 and 49^a, and 50 and 50^a, is independent. When the element 49 is engaged with its flange 48, the element 49^a runs free and vice versa; so also of the elements 50 and 50^a. A convenient means for coördinating the relations of the elements comprises screw feed devices which may be of any suitable known form and include the operating shafts 56 which carry sprocket wheels 57. The threads of the devices which control the elements 49 and 49^a are of opposite pitch so that opposite simultaneous movements of these elements are effected. The feed devices which control the elements 50 and 50^a are related in like manner. The feed devices are operated by chains 58 and 59 which engage the sprocket wheels 57, the chain 58 controlling the elements 49 and 49^a and the chain 59 controlling the elements 50 and 50^a. The chains 58 and 59 also pass over sprocket wheels 60 and 61 on their respective operating shafts 62 and 63, the latter carrying handles 64.

The crane drive.—The shaft 53 operates the crane B and is provided at its ends with sprocket wheels 65, which operate chains 66 passing over sprocket wheels 67 on a transverse shaft 68. The latter is arranged under the floor of the car and carries at its ends drums 69. Cables 70 and 71 are connected to and wound in opposite directions upon each drum 69, the outer ends of said cables being connected to the opposite extremities

of the pulley segments 2. The shaft 53 is driven in opposite directions by the clutch elements 49 and 49ª and consequently a reversal of the relation of the said clutch elements reverses the movement of said shaft and hence the movement of the crane B.

The train drive.—The spur wheel 55 constitutes an element of the gearing for propelling the train and carries a sprocket wheel 72 which is connected by a chain 73 to a sprocket wheel 74, as a matter of convenience, running loosely on the shaft 68 and being provided on its opposite sides with clutch teeth. The sprocket wheel 74 may be clutched to either of two sprocket wheels 75 and 76 of different diameters, also running loosely on the shaft 68. The smaller sprocket wheel 75 for low speed is connected by a chain 77 to a large sprocket wheel 78 fixed on one of the axles H of the car, and the larger sprocket wheel 76 for a higher speed is connected by a chain 79 to a small sprocket wheel 80, also fixed on the axle H. Said axle is preferably geared by sprocket and chain connections to the other axle H′ of the same truck, so as to increase the strength of the drive. The spur wheel 55 is driven in opposite directions by the clutch elements 50 and 50ª, and consequently a reversal of the relation of said clutch elements reverses the movement of said spur wheel and of the train, assuming that the sprocket wheel 74 is clutched to either of the wheels 75 or 76.

The truck drive.—As above stated, the trucks 32 are carried along the train by an endless cable 36. The clutch elements 50 and 50ª are utilized in this connection and are, accordingly in the form of drums over which the cable 36 is given a sufficient number of turns to secure a good purchase. Leaving the drums 50 and 50ª the laps of the cable pass over pulleys 81 arranged under the gear system, thence to and over a series of guide pulleys 82 arranged at suitable intervals along the length of the chain, ultimately meeting at a horizontally disposed tensioning pulley 83. The latter is preferably mounted on a slidable block 84 which is connected to a weighted lever 85 or some equivalent device for keeping the cable 36 in tension.

The clamps 38 are disengaged from the cable 36 during the movements of the train and consequently at such time said cable will run free and without effecting any movement of the trucks 32.

Although the drums 50 and 50ª which operate the cable 36 are also utilized in propelling the train, the action of the cable is rendered independent of the train drive during the actual load transferring operation, by reason of the fact that the sprocket wheel 74 is not clutched to either of the wheels 75 or 76.

Having fully described my invention, I claim:—

1. In an apparatus of the class described, a load engaging and releasing mechanism comprising a frame, engaging plates at the sides thereof and mounted to be projected or retracted, a rock shaft, operative connections between the rock shaft and the plates, a pair of oppositely and simultaneously movable arms, connections for causing each arm in its alternate movement in a particular direction to turn said rock shaft, and a cable connected with said movable arms and operable to become slack at the lowering of the load onto a supporting surface and taut at raised positions for the automatic projection and retraction of the engaging plates.

2. In an apparatus of the class described, a load engaging and releasing mechanism comprising a frame, engaging plates at the sides thereof and mounted to be projected or retracted, a rock shaft, operative connections between the rock shaft and the plates, a pair of oscillatory arms mounted on the rock shaft for opposite simultaneous movements, a disk keyed to the rock shaft and having oppositely directed peripheral notches, a second disk loose on the rock shaft and provided with peripheral shoulders having a greater spacing than the notches of the first disk, means for returning the second disk to an initial position, pawls provided on the arms for engagement with the peripheral notches and shoulders of said disks, and a cable connected with said oscillatory arms and operable to become slack at the lowering of the load onto a supporting surface and taut at raised positions for the automatic projection and retraction of the engaging plates.

3. In an apparatus, of the class described, in combination a cable, a load engaging mechanism carried thereby, including engaging plates mounted to be projected or retracted, a pair of arms movable oppositely and simultaneously, connections whereby each arm alternately and positively operates the plates, the movement of one arm causing the projection of the plates and the movement of the other arm causing the retraction thereof, and a connection between the arms and the cable.

4. In an apparatus of the class described, in combination, a cable, load engaging mechanism carried thereby comprising engaging plates mounted to be projected or retracted, a rock shaft, operative connections between the rock shaft and said plates, and mechanism for operating the rock shaft alternately in opposite directions in accordance with the position of the crane and including elements which are connected to said cable and are movable when the cable becomes slack at the lowering of the load

and when the cable becomes taut at the inception of raising movement.

5. In an apparatus of the class described, in combination, a cable, a load engaging mechanism carried thereby, comprising engaging plates mounted to be projected or retracted, a pair of arms connected to the cable and movable simultaneously and in opposite directions when the cable becomes slack and again when it becomes taut, for positively moving the plates, and an element adapted to be moved by either arm and serving as an operative connection between the same and the plate moving mechanism, and means for correlating each arm alternately and in accordance with the movements of the arms, with the element.

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

THEODORE A. BAILEY.

Witnesses:
J. P. LAMB,
S. B. CONNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."