W. WHALEY.

SHOVELING MACHINE.

APPLICATION FILED MAR. 16, 1908.

940,997.

Patented Nov. 23, 1909.

8 SHEETS—SHEET 1.

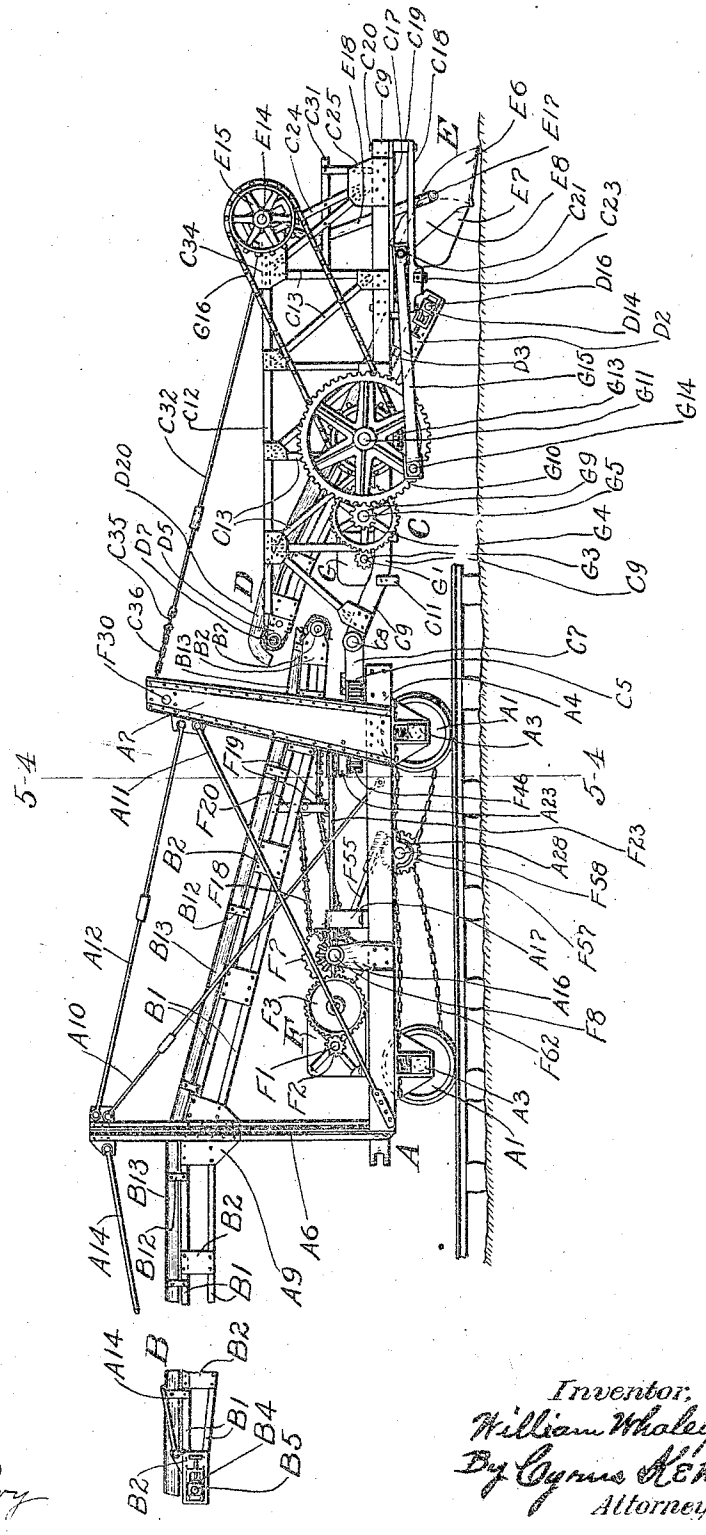

Fig. 1.

Witnesses,
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Carrie R. Ivy

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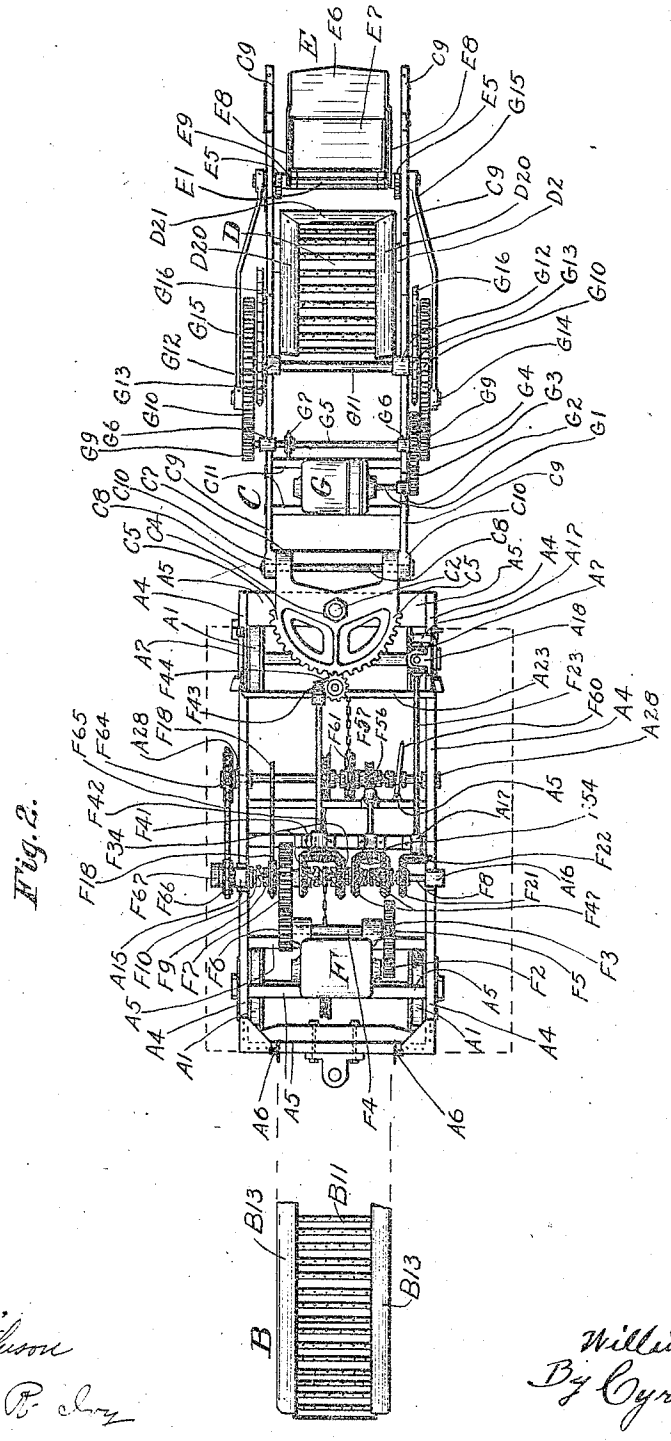

Fig. 2.

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Fig. 15.

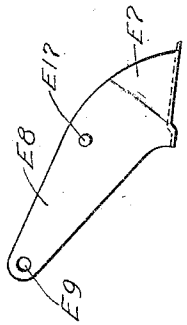

Fig. 3.

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8 SHEETS—SHEET 4.

Fig. 4.

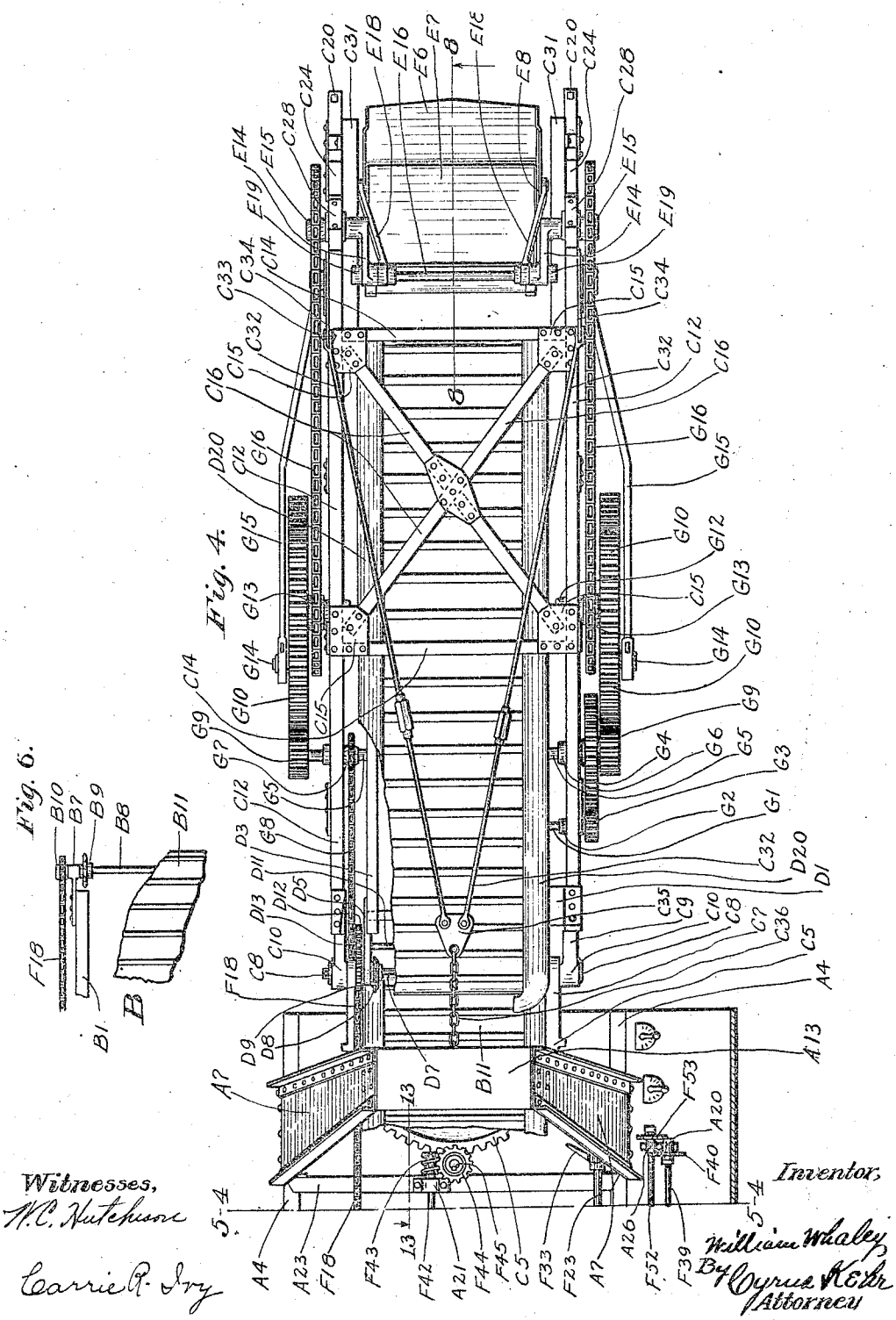

Fig. 6.

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8 SHEETS—SHEET 5.

Fig. 5

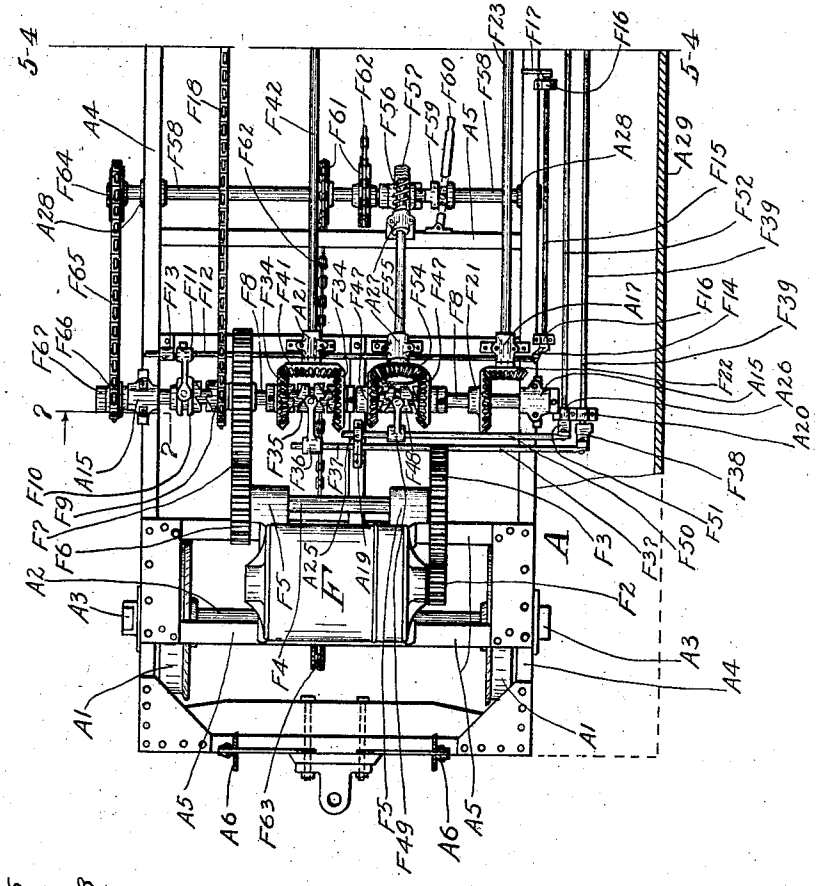


Fig. 7.

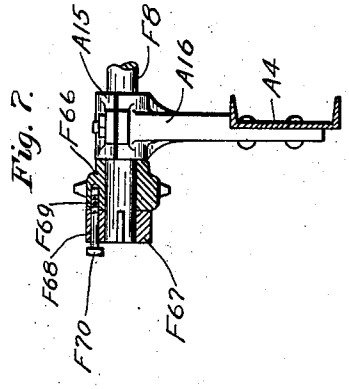
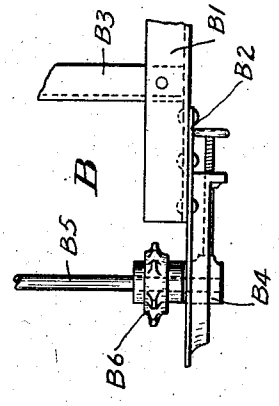


Fig. 14.



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8 SHEETS—SHEET 6.

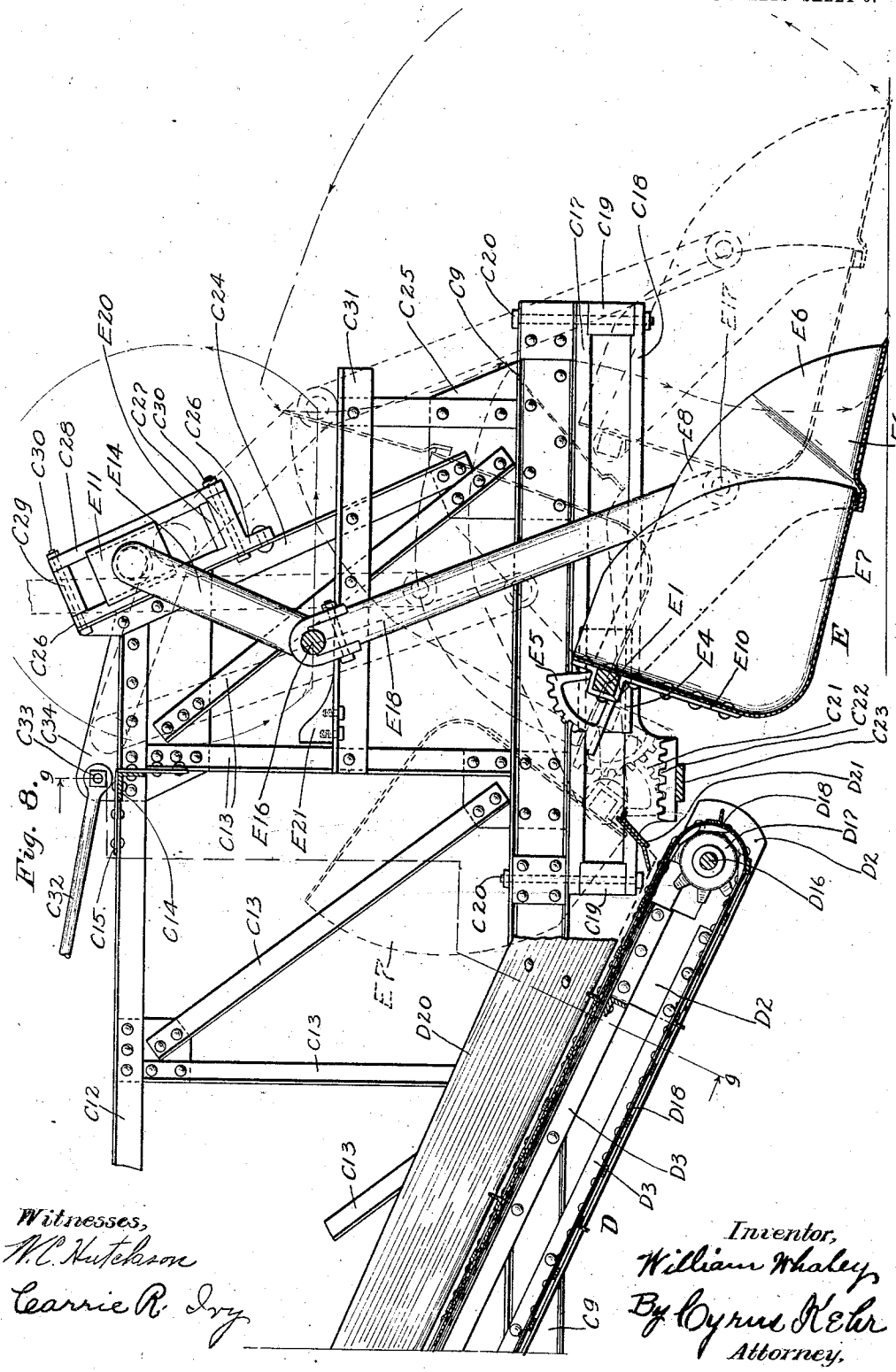

Fig. 8.

Witnesses,
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8 SHEETS—SHEET 7.

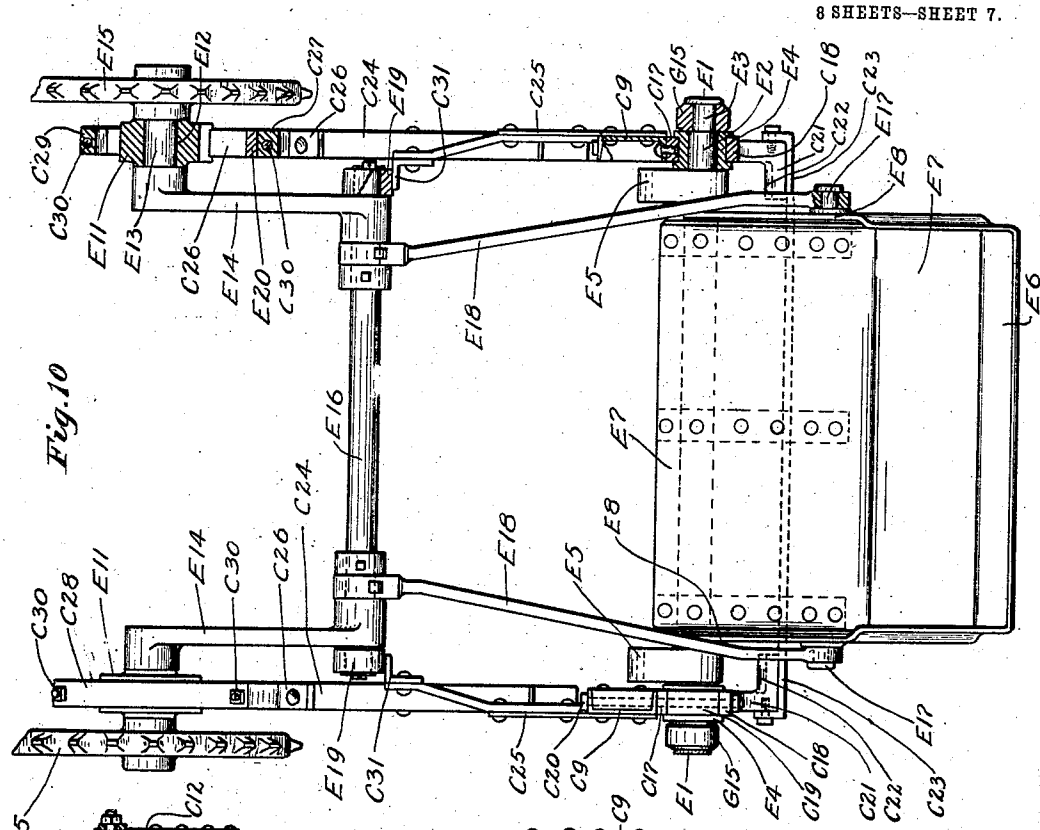

Fig. 10.

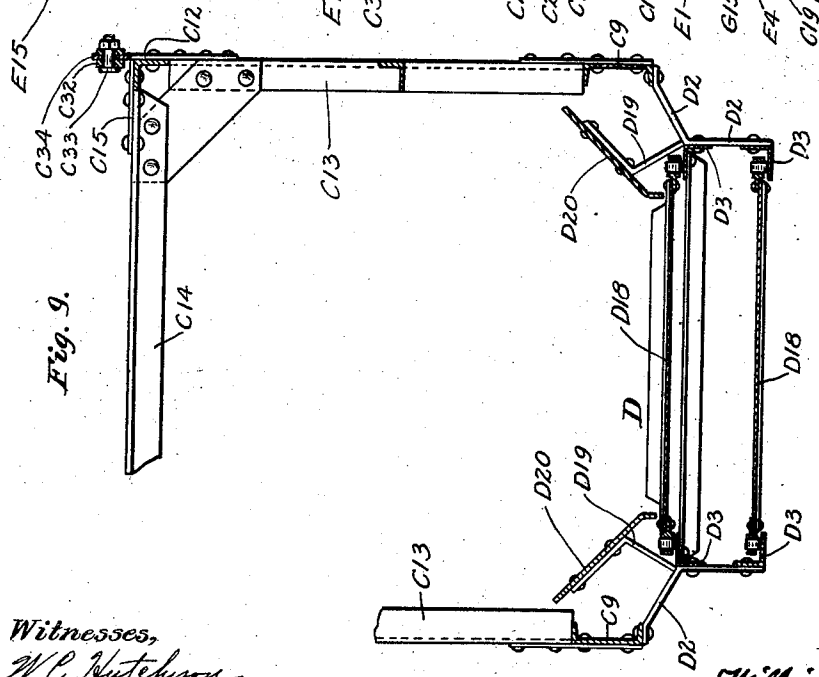

Fig. 9.

Witnesses,

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8 SHEETS—SHEET 8.

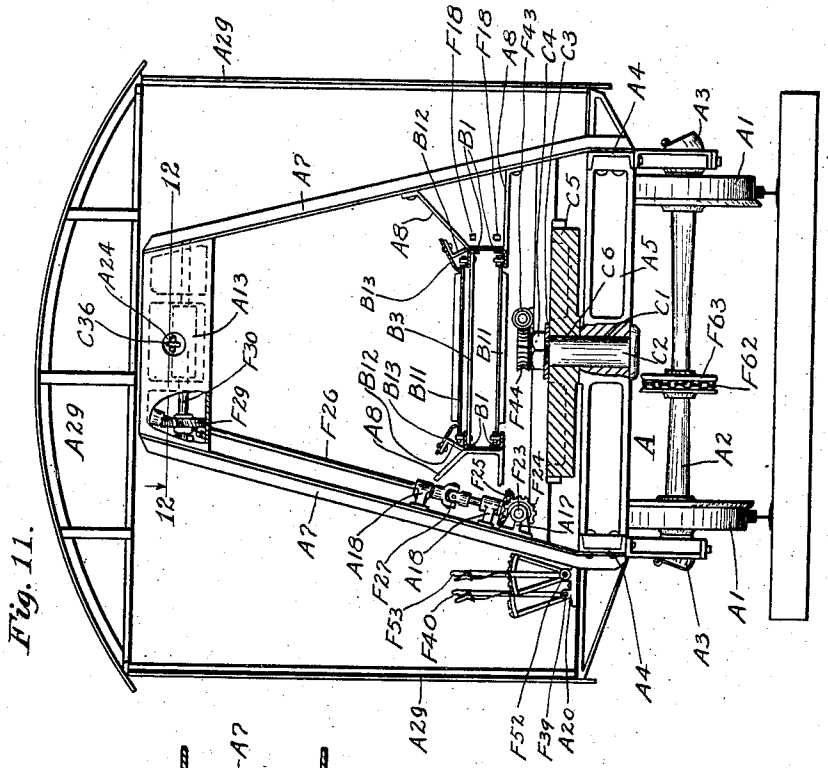

Fig. 11.

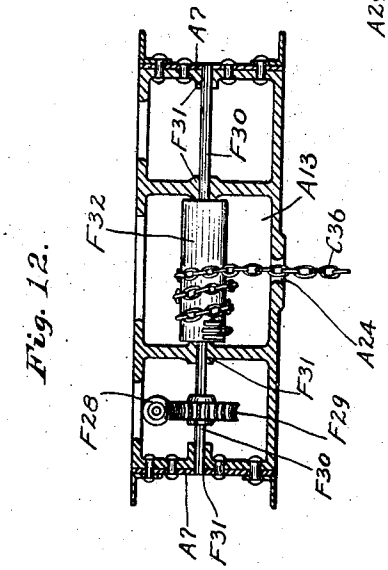

Fig. 12.

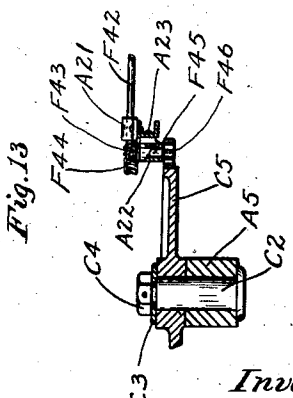

Fig. 13.

Witnesses,
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UNITED STATES PATENT OFFICE.

WILLIAM WHALEY, OF KNOXVILLE, TENNESSEE.

SHOVELING-MACHINE.

940,997. Specification of Letters Patent. Patented Nov. 23, 1909.

Application filed March 16, 1908. Serial No. 421,480.

To all whom it may concern:

Be it known that I, WILLIAM WHALEY, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented a new and useful Improvement in Shoveling-Machines, of which the following is a specification, reference being had to the accompanying drawing.

My improvement relates particularly to mechanism for loading, shoveling, digging or excavating coal, ores, gravel, sand, earth, and other materials which are loose or may be loosened by means of a strong shovel or scoop.

The improvement may be embodied in a variety of forms. In the particular form herein described, the invention is embodied in a machine comprising (1) a section which is, in effect, a car having four wheels intended to rest upon track rails; (2) a conductor, conveyer, or carrier supported by said car; (3) a jib crane section pivotally mounted upon said car and projecting horizontally from the car; (4) a conductor, conveyer, or carrier mounted upon said jib section in proper position to discharge upon the first mentioned conductor, in whatever position the jib section may stand; (5) a shovel or scoop supported at the outer or free end of said jib section and so controlled as to move forward with its nose upon the floor or ground and take a load, lift the load and move it rearward and discharge it upon the second or forward conductor. Suitable power is to be provided for operating said accessories and said shovel and turning said jib horizontally and raising and lowering it, and propelling the car. In the form illustrated by the drawings, an electric motor is used for driving the shovel and the front conveyer, and another electric motor is used for swinging and raising and lowering said jib section, propelling the car, and driving the rear conveyer.

The mechanism described and shown herein is a modification of the mechanism made the subject-matter of my application Serial No. 381,624, filed by me in the United States Patent Office July 1, 1907. As to specific features, the machine of said application was designed to come within certain height limits, in order to adapt it for use in relatively low mine workings. The present machine is limited in the same manner but not to the same extent. It is limited merely to proper height for working in higher mine workings and ordinary tunnels.

In the accompanying drawings, Figure 1 is a side elevation, a portion being broken away; Fig. 2 is a plan of the same machine, portions of the conveyers and other parts being broken away; Fig. 3 is a side elevation of the jib section and the front part of the car; Fig. 4 is a plan of the mechanism shown in Fig. 3; Fig. 5 is a rearward continuation of the portion of the car shown in Fig. 4, portions being broken away; Fig. 6 is a detail plan of the forward end of the rear conveyer; Fig. 7 is a section on the line 7—7 of Fig. 5; Fig. 8 is an enlarged sectional elevation on the line 8—8 of Fig. 4, looking in the direction of the arrow; Fig. 9 is a section on the line 9—9 of Fig. 8, looking in the direction of the arrow, a portion being broken away; Fig. 10 is a front elevation (portions being broken away) of the machine as shown in Fig. 8; Fig. 11 is an upright transverse section on the line 11—11 of Fig. 3, looking in the direction of the arrows, a housing having been added to the bare framing shown in other figures; Fig. 12 is a horizontal section on the line 12—12 of Fig. 11; Fig. 13 is a section on the line 13—13 of Fig. 4, looking in the direction of the arrow; Fig. 14 is a detail plan of the rear end of the rear conveyer; Fig. 15 is a detail side elevation of the front section of the scoop.

Referring to said drawings, A designates the car; B designates the rear conveyer; C designates the horizontal swinging jib crane; D designates the conveyer supported by said jib; E designates the scoop or shovel; F designates the rear electric motor; and G designates the forward electric motor.

In the form shown, the car has four wheels, A^1, secured rigidly to axles, A^2, resting in bearings, A^3, on the longitudinal side members, A^4, of the frame. Said side members are connected by several transverse frame members, A^5. Upon the frame formed by said members, A^4 and A^5, are mounted all of the devices constituting the operative portions of the machine, including the jib. From the rear portion and at opposite sides of the longitudinal middle upright plane of the frame rise two posts, A^6, and from the front and at opposite sides of the frame rise two posts, A^7, to support the rear conveyer and the two forward posts also

support a windlass, hereinafter described, for raising and lowering the jib.

The two rear posts, A^6, are upright and separated from each other a proper distance to permit the rear conveyer, B, to extend between them. The two front posts, A^7, are separated at their bases so that the space between them at the height of the forward portion of the rear conveyer is greater than the width of said conveyer. A bracket, A^8, extends inward from each such post. To the inner face each post, A^6, has secured a plate, A^9, upright and parallel to the length of the machine. Extending from the plate, A^9, and the bracket, A^8, at each side of the car and secured to such plates are two parallel angle rails, B^1, each such rail having a flange directed toward the corresponding rail at the opposite side of the car. Said rails are inclined from the rear toward the front between said posts, as shown by Fig. 1, and are nearly horizontal forward of the posts, A^7. Rearward of the posts, A^6, said rails are extended approximately horizontally any desired distance—for example, far enough to reach over a car placed behind the car, A, to receive material from the rear conveyer, B. The adjacent rails, B^1, are joined to each other by binding plates, B^2, in any desired manner, as by rivets or bolts. For the purpose of imparting greater stability to said rails, any desired number of cross-bars, B^3 (Figs. 11 and 14), may join one of said rails at one side to another of said rails at the other side of the conveyer.

At each side of the car a brace rod, A^{10}, extends from the upper end of the adjacent rear post, A^6, forward and downward to the side member, A^4, and at each side of the car a similar brace rod, A^{11}, extends from the upper end of the adjacent post, A^7, obliquely rearward and downward to said side member. And at each side of the car, a tie rod, A^{12} extends from the post, A^6, to the post, A^7. A bridge-piece, A^{13}, joins the upper ends of the posts, A^7, and forms a seat for a windlass to be hereinafter described. From the upper end of each post, A^6, a tie rod, A^{14}, extends rearward and is joined by its rear end to the rearmost binding plate, B^2.

In bearings, B^4, in the rearmost binding plates, B^2, is mounted a transverse shaft, B^5, having sprocket wheels, B^6, adjacent the inner side of each lateral pair of angle rails, B^1. In the binding plates at the front ends of said angle rails are bearings, B^7, in which rests a transverse shaft, B^8, having a sprocket wheel, B^9, adjacent each lateral pair of angle rails, and projecting through one of said bearings and there supporting a sprocket wheel, B^{10}. The endless apron, B^{11}, of the conveyer surrounds the sprocket wheels, B^6 and B^9, and its edges rest upon the inward-directed flanges of the angle rails, B^1, and slide thereon when said apron is driven. On the upper angle rails, B^1, are placed short oblique standards, B^{12}, which support sloping side plates or boards, B^{13}, at each side of the apron, B^{11}. Said apron and said boards together constitute a trough, of which the apron is a traveling bottom. Said angle rails, B^1, binding plates, B^2, apron, B^{11}, side boards, B^{13}, and the other accessories mentioned in connection with said parts are to be regarded as together constituting the conveyer, B. For the driving of said conveyer apron, a sprocket chain, F^{18}, engages the sprocket wheel, B^{10}, on the shaft, B^8, at the front end of said conveyer and extends thence around a sprocket wheel, F^9, on the countershaft, F^8.

On the motor axle, F^1, is a pinion, F^2, meshing with the spur gear wheel, F^3, on the countershaft, F^4, resting in bearings, F^5. On said countershaft, F^4, is a spur gear wheel, F^6, which meshes with a spur gear wheel, F^7, on the second countershaft, F^8, resting in bearings, A^{15}, in standards, A^{16}, rising from the side members, A^4, of the frame. By this means motion is imparted to said second countershaft, F^8. On said second countershaft is a clutch, F^{10}, adapted to engage the loose sprocket wheel, F^9. Said clutch is controlled by the clutch arm, F^{11}, and said arm is controlled by a shifting arm, F^{12}, having one end resting in the bearing, F^{13}, and having the other end joined to a crank arm, F^{14}, on a rock-shaft, F^{15}, which rests in bearings, F^{16}, and which supports a hand lever, F^{17}. By the setting of said clutch, F^{10}, into engagement by the shifting of said hand lever, F^{17}, motion is imparted from the motor, F, to the conveyer apron. Two idlers, F^{19}, are supported by a bracket, F^{20}, in proper position to adapt said idlers to support the chain, F^{18}, approximately midway between the sprocket wheels, B^{10} and F^9.

Between the posts, A^7, and immediately above the level of the side members of the frame is a horizontal gear segment, C^5, secured to the adjacent cross frame member, A^5, by means of a king-bolt, C^2, extending through an aperture, C^1, in said member, A^5, and through an aperture, C^6, in said segment, and having at its upper end a washer, C^3, and a nut, C^4. Said segment is adapted to partially rotate upon said king-bolt after the manner of the rotation of a turn-table. At each side, said segment is extended forward to form an ear, C^7, which is apertured horizontally and transversely to the length of the machine. A shaft or bolt, C^8, extends through said ears. To said shaft the jib is hinged for up and down movement.

The frame of the jib is made up as follows: C^9, C^9 are side rails forming the basis of said frame. Each of said rails has at its rear end a bearing, C^{10}, through which the

shaft, C^8, extends. A little way forward of the shaft, C^8, two cross frame pieces, C^{11}, join said rails, C^9. (See Figs. 2 and 3.) These are the only transverse pieces directly joining said rails; but said rails are indirectly joined or stayed, as will appear hereinafter. Above each such rail, C^9, is an upper side rail, C^{12}, joined to the adjacent lower side rail by means of intervening frame pieces, C^{13}. Two transverse pieces, C^{14}, join said upper rails, C^{12}, to each other (see Figs. 4, 8 and 9). Connecting plates, C^{15}, are placed upon said upper side rails and said transverse pieces where said rails and said pieces meet. Diagonal brace bars, C^{16}, join the diagonally opposite connecting plates.

The forward conveyer which is supported by the jib, C, is of the same general construction as the conveyer, B; but it is inclined throughout its entire length. It is supported only at its ends, the upper end being supported by hanger plates, D^1, from the rear ends of the upper side rails, C^{12}, while the lower end is supported by hanger plates, D^2, secured to the lower side rails, C^9.

Two angle rails, D^3, D^3, are secured to the hanger plates, D^1 and D^2, at each side of the car, one of the flanges of each of said rails being directed toward the horizontally opposite rail. Between said hanger plates said angle rails are joined to each other by connecting plates, D^4. Above said hanger plates, D^1, the upper and lower angle rails are joined to each other by means of bearing plates, D^5. In said plates are bearings, D^6, in which rests a shaft, D^7, and on said shaft are two sprocket wheels, D^8, one at each side of the space between the two sets of side rails; and one end of said shaft projects beyond its bearing and there supports a spur gear wheel, D^9. A little way forward of said bearings, D^6, said bearing plates, D^5, have bearings, D^{10}, in which rests a shaft, D^{11}, one end of which projects beyond the adjacent bearing and supports a spur gear wheel, D^{12}, which meshes with the spur gear wheel, D^9, on the shaft, D^7. And adjacent the spur gear wheel, D^{12}, said shaft, D^{11}, bears a sprocket wheel, D^{13}. A sprocket chain, G^8, extends from said sprocket wheel, D^{13}, to a sprocket wheel, G^7, on a countershaft, G^5, which rests in bearings, G^6 (Figs. 2, 3, and 4). Motion is imparted to said countershaft from the front electric motor, G. Said motor is supported upon the two transverse frame pieces, C^{11}, and has a shaft or axle, G^1, resting in a bearing, G^2, and on said shaft or axle is a spur gear wheel, G^3, meshing with a spur gear wheel, G^4, on the countershaft, G^5.

Below the hanger plates, D^2, the angle rails, D^3, support adjustable bearing blocks, D^{14}, having bearings, D^{15}, in which rests a transverse shaft, D^{16}, on which are sprocket wheels, D^{17}, between the two pairs of angle rails, one of said wheels being adjacent each pair of said rails. The endless apron, D^{18}, extends around the sprocket wheels, D^{17}, and thence around the sprocket wheels, D^8, at the upper end of the conveyer, the lateral edges of said apron sliding on the horizontal flanges of the angle rails.

Upon the upper angle rails, D^3, are standards, D^{19}, which support sloping side plates, D^{20}, at each side of the apron, D^{18} (see Figs. 2, 3, 8 and 9). At the lower end of said conveyer the sloping end plate, D^{21}, is placed between the ends of the side plates and secured to the latter (Figs. 2 and 8).

The mechanism for supporting and actuating the scoop or shovel, E, will be next described.

The lower side rails, C^9, of the jib, C, extend forward as shown in Fig. 8, and to the lower face of each such rail is applied a guide plate, C^{17}, and directly below such guide plate is a second guide plate, C^{18}, separated from the guide plate, C^{17}, by means of space blocks, C^{19}. Bolts, C^{20}, extend through said guide plates, space blocks, and rail, C^9, and bind said parts immovably together. Said guide plates, C^{17} and C^{18}, form a guide-way for the slide block, E^4. A shaft or bar, E^1, extends transversely from one of said slide blocks to the other, each end of said shaft or bar having a journal, E^2, resting in the adjacent slide block, E^4. Said bar extends beyond each of said slide blocks and such extension is formed into a second journal, E^3. Adjacent each of the slide blocks, E^4, is a segment gear, E^5, rigidly secured to the bar or shaft, E^1. Adjacent the rear end of each of the guide plates, C^{18}, said plate has a downward extension, C^{21}, to the lower portion of which is applied a horizontal, upturned gear rack, C^{22}, adapted to engage said segment gear. A cross bar or strap, C^{23}, extends from one of said downward extensions, C^{21}, to the other for the purpose of imparting stability to said extensions. The forward extensions of the side rails, C^9, make the jib a forked support for the scoop.

The scoop is composed of a forward section, E^6, and a rear section, E^7. The forward section has at each side a rearward extension, E^8, terminating in a bearing, E^9, loosely surrounding the bar, E^1, so that said forward section, E^6, is journaled to said bar. The rear section, E^7, of the scoop rests between the rearward extensions, E^8, of the forward section and is immovably secured to said bar, E^1, by straps, E^{10}, and the forward portion of said rear section rests loosely within the rear portion of the forward section, E^6, so that by the rotation of the bar, E^1, contra-clockwise, as viewed in Figs. 1, 3, and 8, said rear section, E^7, may turn or tilt with said bar on an axis which is hori-

zontal and transverse to the length of the machine, the forward end of said section being lifted out of the section, E^6.

The slide blocks, E^4, are reciprocated by power transmitted from the front electric motor, G, through connections as follows: Above it has been shown how the shaft, G^5, is driven from said motor. On each end of said shaft is a spur gear wheel, G^9, meshing with a larger spur gear wheel, G^{10}, on another transverse shaft, G^{11}, resting in bearings, G^{12}. On each of said spur gear wheels, G^{10}, is a crank pin, G^{14}. The pitman rod, G^{15}, is applied to the crank pin, G^{14}, and to the outer journal, E^3, on the adjacent end of the bar, E^1, which, as already described, rests in the slide blocks, E^4. By means of the reciprocation of said slide blocks, a bodily horizontal reciprocation parallel to the length of the machine is imparted to said scoop or shovel. A partial turning movement is also imparted to the shovel, on the axis of said bar, E^1, during each horizontal reciprocation of the shovel. The mechanism for effecting such partial turning of the shovel upon said axis will be next described.

From the forward end of each upper side rail, C^{12}, a bar, C^{24}, extends obliquely downward and forward and is joined by its lower end to a plate, C^{25}, which rises from the adjacent lower side rail, C^9. The bar, C^{24}, is tangential to the arc of a circle drawn from a center in the axis of the shaft, G^{11}, above described. Said bar might be curved so as to coincide with said arc; but the slight deviation between the straight line and such an arc at this point is immaterial, as will appear further on. To the upper front face of each such bar, C^{24}, is applied a guide plate, C^{26}, having at its lower end a spacing arm, C^{27}. Opposite said guide plate, C^{26}, is another guide plate, C^{28}, resting upon said spacing arm and a space block, C^{29}. Bolts, C^{30}, extend through said bars and bind the guide-plate, C^{28}, in position.

In each guide-way formed by the guide plates, C^{26} and C^{28}, is seated a slide block, E^{11}. In each of said slide blocks is a horizontal bearing, E^{12}, in which rests a journal, E^{13}, of a crank, E^{14}. Each of said crank journals extends through the adjacent guide block and at the outer side of the latter supports a sprocket wheel, E^{15}, to which is applied a sprocket chain, G^{16}, and said chain surrounds a corresponding sprocket wheel, G^{13}, on the shaft, G^{11}, which has already been described. By means of said chain, rotation is imparted to said cranks, E^{14}. Each of said cranks is joined to a horizontal shaft, E^{16}. Said shaft and said cranks are preferably joined rigidly, so that said three parts are virtually one double crank. On each side of the forward section, E^6, of the scoop is a journal or wrist pin, E^{17}, to which is applied one end of a link or pitman rod, E^{18}, the other end of which link surrounds the shaft, E^{16}. By the rotation of said crank, E^{14}—E^{16}—E^{14}, the forward portion of the shovel is raised and lowered, the axis of the bar or shaft, E^1, forming an axis of oscillation.

A little way below the slide blocks, E^{11}, a horizontal guide rail, C^{31}, is secured to the frame of the jib a little way within the circle which would be described by the free end of the adjacent crank arm, E^{14}, if said guide rail were absent, and each end of the shaft, E^{16}, projects a little way beyond the adjacent crank arm and during each rotation of the crank (while going through the lower portion of its orbit) engages and slides horizontally upon said guide rail, C^{31}. Thus the lower portion of the orbit of the shaft, E^{16}, is made horizontal. When the crank engages said guide rails, C^{31}, said crank and the guide blocks, E^{11}, are forced bodily upward, said guide block moving between the guide plates, C^{26} and C^{28}, until said crank arms assume a position which is perpendicular to the rails, C^{31}. Then said cranks and slide blocks again move downward to the lower limit of the guide-way. On each end of the shaft, E^{16}, is an anti-friction roller, E^{19}, which bears upon the guide rail, C^{31}.

In the lower portion of the guide ways in which the guide blocks are confined is a cushion, E^{20}, for receiving the lower end of the adjacent guide block. Upon the rear portion of the guide rail, C^{31}, is secured an inclined guide block, E^{21}, with which the rollers, E^{19}, engage lightly before reaching the horizontal guide rail, in order that the contact with the latter may be less abrupt.

The mechanism for reciprocating the slide blocks, E^4, and for rotating the crank, E^{14}—E^{16}—E^{14}, are so timed as that the crank will move through the horizontal portion of its orbit simultaneously with the forward movement of the slide blocks, E^4. One of the features involved in accomplishing this result is the making of the crank arms, E^{14}, and the crank on the spur gear wheel, G^{10}, of substantially the same length and parallel and arranging them to travel in unison.

From the foregoing it will be seen that during the movement of the shovel crank through the lower portion of its orbit, the two lines of engagement of the shovel, to-wit, the bar or shaft, E^1 (which rests in the slide blocks, E^4) and the axis of the wrist pins, E^{17}, will move horizontally forward in unison, so that during such interval the entire shovel moves forward horizontally. This movement is indicated by arrows in Fig. 8.

When the scoop crank leaves the guide rails, C^{31}, said crank rapidly lifts the front end of the scoop, and, at the same time, and shortly after the beginning of such movement the

slide blocks, E^4, move rearward. This results in the tilting of the scoop bodily into the position shown by dotted lines, the segment gear, E^5, being shifted and turned into position to begin engagement with the gear rack, C^{22}. Then the further rearward movement of said slide blocks causes the rotation of said segment gear on said gear rack, whereby the bar, E^1, and the rear section, E^7, of the scoop are turned further until the position shown by dotted lines immediately above the lower, forward end of the conveyer, D, is attained, the edge of said shovel section lapping over the end-board, D^{21}, of the conveyer, and the contents of said scoop section being dumped upon said conveyer. By the time the entire scoop has been tilted into the position in which said rear section begins to move rearward independently of the forward section, there is sufficient inclination to the bottom of the scoop from the forward scoop section into the rear scoop section to cause all the material to slide into the rear section and be thrown rearward by said section. At the time the scoop crank begins to descend, the slide-blocks, E^4, begin a return movement which leads to the disengagement of the gears, E^5, from the gears, C^{22}, whereby the rear scoop section is made free to assume its normal position in the forward scoop section. But, in the form shown in the drawings, before the rear section is released, the front section has descended through about ninety degrees, and the rear section, upon the disengaging of the gears, falls into position in the forward section. The horizontal forward movement of the shovel is arranged to take place when the shovel is at its lowest limit, in order that the forward edge of the shovel may be pushed beneath the material to be loaded. Immediately after the ending of such forward movement, the upward movement of the front portion of the shovel begins.

The front end of the jib may be raised and lowered for the changing of the horizontal plane in which the shovel takes its load. Such raising and lowering is accomplished by lifting means as follows: To each upper, forward corner of the jib frame is attached a guy-rod, C^{32}. Such connection may be made in any suitable manner. The drawings show bolts, C^{33}, passing through said rods and corner plates, C^{34}. Said rods extend rearward to a connecting plate, C^{35}. From said connecting plate a windable suspending member, as a chain, C^{36}, extends rearward and is joined to a windlass, F^{32}. Power is transmitted to said windlass from the rear electric motor, F, by connections as follows: On the shaft, F^8, already described, is a bevel gear wheel, F^{21}, meshing with a bevel gear wheel, F^{22}, on a horizontal longitudinal shaft, F^{23}, resting in bearings, A^{17}. On the forward end of said shaft is a bevel gear clutch member, F^{24}, which is arranged for engagement with a bevel gear wheel, F^{25}, on the lower end of an approximately upright shaft, F^{26}, resting in bearings, A^{18}, and which has a universal joint, F^{27}, the purpose of said universal joint being to compensate for a lack of alinement in the shaft, F^{26}. On the upper end of said shaft, F^{26}, is a worm, F^{28}, engaging a worm gear, F^{29}, on the windlass shaft, F^{30}, resting in bearings, F^{31}. A hand lever, F^{33}, is arranged in proper relation with the gear clutch, F^{24}, to actuate the latter for turning the shaft, F^{26}, in the desired direction for turning the windlass, F^{32}, in proper direction to take up or pay out the chain, C^{36}.

The mechanism for laterally swinging the jib will be next described.

On the shaft, F^8, are two loose bevel gears, F^{34}, facing each other and each bearing a clutch member. Between said two bevel gears is a slidable clutch member, F^{35}, adapted to engage the clutch member of either of said bevel gears. A clutch arm, F^{36}, controls said clutch member, F^{35}. Said clutch arm is mounted on a shifting rod, F^{37}, slidable longitudinally in a bearing, A^{19}, and connected by one end to the arm, F^{38}, of a rock shaft, F^{39}, resting in bearings, A^{20}, and having a hand lever, F^{40}. Between the two bevel gear wheels, F^{34}, is a bevel gear wheel, F^{41}, in engagement with both of said bevel gears; and said bevel gear, F^{41}, is mounted on the horizontal, longitudinal shaft, F^{42}, resting in bearings, A^{21}. On the forward end of said shaft, F^{42}, is a worm, F^{43}, in engagement with a worm gear wheel, F^{44}, which is on a short upright shaft or axle, F^{45}, mounted in a bearing, A^{22}, on a cross piece, A^{23}, extending from one of the frame posts, A^7, to the other frame post, A^7. On the lower end of the shaft, F^{45}, is a gear pinion, F^{46}, which meshes with the segment gear, C^5, to the front end of which is hinged, the jib, C. By shifting the hand lever, F^{40}, in the proper direction, the clutch member, F^{35}, may be put into engagement with either of the bevel gears, F^{34}, for transmitting power through the shaft, F^{42}, the worm, F^{43}, worm gear, F^{44}, and so on to the segment gear, C^5, whereby the latter is turned upon its upright axis—the king-bolt, C^2—and the jib swung laterally. To afford an upright axis for such lateral swinging of the jib, the chain, C^{36}, is led through a guide aperture, A^{24}, in the bridge piece, A^{13}, directly above the king-bolt, C^2. Being in this manner given an approximately upright axis, the jib will swing in an approximately horizontal plane.

The mechanism for propelling the machine forward or backward upon its supporting wheels, A^1, will be next described.

On the shaft, F^8, are two loose bevel gears, F^{47}, facing each other and each comprising

a clutch member. Surrounding said shaft between said bevel gears is a slidable clutch member, F^{48}, adapted to engage either of the bevel gears, F^{47}. A clutch arm, F^{49}, engages said clutch member and is supported upon a shift rod, F^{50}, having one end resting in a bearing, A^{25}, and having its opposite end joined to the crank arm, F^{51}, on a rock shaft, F^{52}, resting in bearings, A^{26}. To said shaft is connected a hand lever, F^{53}, adjacent the hand lever, F^{40}. Between and in engagement with said bevel gear wheels, F^{47}, is a bevel gear wheel, F^{54}, mounted upon a somewhat inclined, longitudinal shaft, F^{55}, resting in bearings, A^{27}. On the front end of said shaft is a worm, F^{56}, which engages a worm gear, F^{57}, on a transverse horizontal shaft, F^{58}, mounted in bearings, A^{28}. Said worm gear loosely surrounds said shaft and embodies a clutch member adapted to be engaged by the sliding clutch member, F^{59}, also surrounding said shaft and controlled by a hand lever, F^{60}. On said shaft, F^{58}, are two sprocket wheels, F^{61}. From one of said sprocket wheels, a sprocket chain, F^{62}, extends to a sprocket wheel, F^{63}, on the axle, A^2, on which are the supporting wheels, A^1; and from the other of said sprocket wheels another sprocket chain, F^{62}, extends to the sprocket wheel, F^{63}, on the other axle, A^2. By shifting said hand lever, F^{53}, the clutch, F^{48}, is shifted for the transmission of a slow motion to the car axles for slowly moving the car to or from its work—usually for moving it forward at a rate corresponding with the clearing of the material accomplished by the shovel in front of the machine.

For a more rapid propulsion of the machine when it is to be moved from place to place when not working, another mechanism is used. On one end of the shaft, F^{58}, is fixed a sprocket wheel, F^{64}, and from said sprocket wheel a sprocket chain, F^{65}, extends around a sprocket wheel, F^{66}, which loosely surrounds the shaft, F^8. Adjacent said sprocket wheel, F^{66}, is fixed a collar, F^{67}, in which is an aperture, F^{68}, adapted to register with an aperture, F^{69}, when the sprocket wheel, F^{66}, has been turned into the proper position. By the insertion of any suitable pin, bolt, or shaft, F^{70}, from the aperture, F^{68}, into the aperture, F^{69}, the sprocket wheel, F^{66}, is secured rotatably to said collar and through the latter to said shaft, F^8, so that motion of said shaft is transmitted through said sprocket wheel and through the sprocket chain, F^{65}, to the shaft, F^{58}, and from the latter through the sprocket wheels, F^{61}, to the sprocket chains, F^{62}, and through the latter to the sprocket wheels, F^{63}, on the car axles.

Any suitable housing may cover the frame of the car, A. Such a housing, A^{29}, is shown in end elevation in Fig. 11 of the drawings.

By using one motor for operating the shovel and the forward conveyer and using another motor for operating the rear conveyer, the speed of the rear conveyer may be varied independently of the forward conveyer and the shovel.

I claim as my invention:

1. In a machine of the nature described, a scoop, two driving mechanisms, both engaging the scoop, one for forward and backward movement and the other for up and down movement, substantially as described.

2. In a machine of the nature described, a scoop, a conveyer behind said scoop, two driving mechanisms, both engaging the scoop, one for forward and backward movement and the other for up and down movement, substantially as described.

3. In a machine of the nature described, a scoop, driving mechanism for moving the scoop forward and rearward, and driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

4. In a machine of the nature described, a scoop, driving mechanism for moving the scoop forward and rearward, driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, and mechanism for slowly moving the machine forward, substantially as described.

5. In a machine of the nature described, a scoop, driving mechanism for moving the scoop forward and rearward parallel to the length of the machine, and driving mechanism for moving the front portion of the scoop upward during the ending of the forward movement of the scoop and during approximately the first half of such rearward movement and moving the front portion of the scoop downward during the remainder of said rearward movement and during the beginning of the forward movement and then holding said front portion of the scoop at the same elevation until near the end of such forward movement, substantially as described.

6. In a machine of the nature described, a scoop, means for confining the scoop to a rearward and forward movement, and a support for the forward portion of the scoop moving in an orbit which is upright and parallel to the length of the machine and the lower portion of which is forward and horizontal, substantially as described.

7. In a machine of the nature described, a scoop, a support for the scoop confined on guide-ways approximately parallel to the length of the machine, and a support for the forward portion of the scoop, said support being movable in an orbit which is upright and parallel to the length of the machine and the lower portion of which is forward and horizontal, substantially as described.

8. In a machine of the nature described, a scoop, a forked support for said scoop, and mechanism for moving the scoop bodily forward and rearward parallel to the length of the machine and moving the front portion of the scoop upward and then downward during such forward and rearward movement for the taking of a load and discharging it, substantially as described.

9. In a machine of the nature described, a scoop, a forked support for said scoop, driving mechanism for moving the scoop forward and rearward, and driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

10. In a machine of the nature described, a scoop, a laterally movable support for said scoop, driving mechanism for moving the scoop forward and rearward, and driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

11. In a machine of the nature described, a scoop, a laterally movable support for said scoop, driving mechanism for moving the scoop forward and rearward, driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, and mechanism for slowly moving the machine forward, substantially as described.

12. In a machine of the nature described, a scoop, a forked and laterally movable support for said scoop, driving mechanism for moving the scoop forward and rearward, and driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

13. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, driving mechanism for moving the scoop forward and rearward, and another driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it to said conducting mechanism, substantially as described.

14. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, driving mechanism for moving the scoop forward and rearward, another driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it to said conducting mechanism, and mechanism for slowly moving the machine forward, substantially as described.

15. In a machine of the nature described, a scoop conducting mechanism behind said scoop, driving mechanism for moving said scoop forward and rearward parallel to the length of the machine, and driving mechanism for moving the front portion of the scoop upward during the ending of the forward movement of the scoop and during approximately the first half of such rearward movement and moving the front portion of the scoop downward during the remainder of said rearward movement and during the beginning of the forward movement and then holding said front portion of the scoop at the same elevation until near the end of such forward movement, substantially as described.

16. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, means for confining the rear portion of the scoop to a rearward and forward movement, and a support for the forward portion of the scoop moving in an orbit which is upright and parallel to the length of the machine and the lower portion of which is forward and horizontal, substantially as described.

17. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, a support for the scoop confined on guide-ways approximately parallel to the length of the machine, and a support for the forward portion of the scoop, said support being movable in an orbit which is upright and parallel to the length of the machine and the lower portion of which is forward and horizontal, substantially as described.

18. In a machine of the nature described, a scoop, a forked support for said scoop, conducting mechanism behind said scoop, and mechanism for moving the scoop bodily forward and rearward parallel to the length of the machine and moving the front portion of the scoop upward and then downward during such forward and rearward movement for the taking of a load and discharging it to said conducting mechanism, substantially as described.

19. In a machine of the nature described, a scoop, a laterally movable support for said scoop, conducting mechanism behind said scoop, and mechanism for moving the scoop bodily forward and rearward parallel to the length of the machine and moving the front portion of the scoop upward and then downward during such rearward and forward movement for the taking of a load and discharging it to said conducting mechanism, substantially as described.

20. In a machine of the nature described, a scoop, a laterally movable support for said scoop, conducting mechanism behind said scoop, mechanism for moving the scoop bodily forward and rearward parallel to the length of the machine and moving the front portion of the scoop upward and then downward during such rearward and forward movement for the taking of a load and dis-

charging it to said conducting mechanism, and mechanism for slowly moving the machine forward, substantially as described.

21. In a machine of the nature described, a scoop, driving mechanism for moving the scoop forward and rearward, and driving mechanism located above the scoop for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

22. In a machine of the nature described, a scoop, driving mechanism for moving the scoop forward and rearward, driving mechanism located above the scoop for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, and mechanism for slowly moving the machine forward, substantially as described.

23. In a machine of the nature described, a scoop, means for confining the scoop to a rearward and forward movement, and a support for the forward portion of the scoop, said support being located above the scoop and moving in an orbit which is upright and parallel to the length of the machine and the lower portion of which is forward and horizontal, substantially as described.

24. In a machine of the nature described, a scoop, means for confining the scoop to a rearward and forward movement, and a crank located above and connected with the forward portion of the scoop and arranged to turn in an orbit, the lower portion of which is forward and horizontal, substantially as described.

25. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, and mechanism located above the scoop for moving the latter bodily forward and rearward parallel to the length of the machine and moving the front portion of the scoop upward and then downward during said rearward and forward movement for the taking of a load and discharging it to said conducting mechanism, substantially as described.

26. In a machine of the nature described, a jib hinged for lateral and up and down movement, a scoop supported by said jib, driving mechanism for moving the scoop forward and rearward, and driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

27. In a machine of the nature described a jib hinged for lateral and up and down movement, a scoop supported by said jib, driving mechanism for moving the scoop forward and rearward, driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, and mechanism for slowly moving the machine forward, substantially as described.

28. In a machine of the nature described, a jib hinged for lateral and up and down movement, a scoop supported by said jib, driving mechanism for moving the scoop forward and rearward, and driving mechanism located above the scoop for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

29. In a machine of the nature described, a jib, a scoop supported by said jib, conducting mechanism behind said scoop, and mechanism for moving the scoop bodily forward and rearward parallel to the length of the machine and moving the front portion of the scoop upward and then downward during such forward and rearward movement for the taking of a load and discharging it to said conducting mechanism, substantially as described.

30. In a machine of the nature described, two approximately horizontally opposite forward-projecting members, a scoop located between said members, driving mechanism for moving the scoop bodily rearward and forward, and driving mechanism located above said scoop for raising and lowering the forward portion of the scoop, substantially as described.

31. In a machine of the nature described, two approximately horizontally opposite forward-projecting members, a scoop located between said members, crank mechanism for moving the scoop bodily rearward and forward, and crank mechanism for raising and lowering the forward portion of the scoop, substantially as described.

32. In a machine of the nature described, a scoop, crank mechanism for moving said scoop in an orbit, and shiftable bearings for said crank mechanism, substantially as described.

33. In a machine of the nature described, a scoop, a crank for moving the forward portion of the scoop in an orbit, bearing blocks for said crank and approximately upright guide-ways for said blocks and means for confining the crank to a horizontal path during the lower portion of its rotation, substantially as described.

34. In a machine of the nature described, a scoop, a crank for moving the forward portion of the scoop in an orbit, bearing blocks for said crank and approximately upright guide-ways for said blocks, and guide members for confining the crank to a horizontal movement during the lower portion of its rotation, substantially as described.

35. In a machine of the nature described, a scoop, a crank located above the scoop for moving the forward portion of the scoop in an orbit, bearing blocks for said crank and approximately upright guide-ways for said blocks, and means for confining the crank t

a horizontal path during the lower portion of its rotation, substantially as described.

36. In a machine of the nature described, a scoop, a crank located above the scoop for moving the forward portion of the scoop in an orbit, bearing blocks for said crank and approximately upright guide-ways for said blocks, and guide members for confining the crank to a horizontal movement during the lower portion of its rotation, substantially as described.

37. In a machine of the nature described, two approximately horizontally opposite forward-projecting members, a scoop located between said members, conducting mechanism behind said scoop, crank mechanism for moving the scoop bodily rearward and forward, and crank mechanism for raising and lowering the forward portion of the scoop, substantially as described.

38. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, crank mechanism for moving said scoop in an orbit, and shiftable bearings for said crank mechanism, substantially as described.

39. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, a crank for moving the forward portion of the scoop in an orbit, bearing blocks for said crank and approximately upright guide-ways for said blocks, and means for confining the crank to a horizontal path during the lower portion of its rotation, substantially as described.

40. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, a crank for moving the forward portion of the scoop in an orbit, bearing blocks for said crank and approximately upright guide-ways for said blocks, and guide members for confining the crank to a horizontal movement during the lower portion of its rotation, substantially as described.

41. In a machine of the nature described, a scoop comprising a forward section and a rear section, driving mechanism for moving the scoop forward and rearward and tilting said rear section, and driving mechanism for moving the front portion of the scoop in an orbit, substantially as described.

42. In a machine of the nature described, a scoop comprising a forward section and a rear section, driving mechanism for moving the scoop forward and rearward and tilting said rear section, driving mechanism for moving the front portion of the scoop in an orbit, and mechanism for slowly moving the machine forward, substantially as described.

43. In a machine of the nature described, a scoop comprising a forward section and a rear section, mechanism for confining the rear portion of the scoop to a rearward and forward movement and tilting such rear section, and a support for the forward portion of the scoop moving in an orbit which is upright and parallel to the length of the machine and the lower portion of which is forward and horizontal, substantially as described.

44. In a machine of the nature described, a scoop comprising a forward section and a rear section, a forked support for said scoop, mechanism for confining the rear end of the scoop to a rearward and forward movement and tilting said rear section, and crank mechanism joined to the forward portion of the scoop and moving in an orbit which is upright and parallel to the length of the machine and the lower portion of which is forward and horizontal, substantially as described.

45. In a machine of the nature described, a scoop comprising a forward section and a rear section, mechanism for confining the rear end of the scoop to a rearward and forward movement and tilting said rear section, and crank mechanism for moving the forward portion of said scoop in an orbit, and shiftable bearings for said crank mechanism, substantially as described.

46. In a machine of the nature described, a scoop comprising a forward section and a rear section, mechanism for confining the rear end of the scoop to a rearward and forward movement and tilting said rear section, crank mechanism for moving the forward portion of said scoop in an orbit, bearing blocks for said crank and approximately upright guide-ways for said blocks, and means for confining the crank to a horizontal path during the lower portion of its rotation, substantially as described.

47. In a machine of the nature described, a scoop comprising a forward section and a rear section, mechanism for moving the scoop forward and rearward and tilting said rear section, and driving mechanism for moving the forward portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

48. In a machine of the nature described, a scoop comprising a forward section and a rear section, mechanism for moving the scoop forward and rearward and tilting said rear section, and a support for the forward portion of the scoop moving in an orbit which is upright and parallel to the length of the machine and the lower portion of which is forward and horizontal, substantially as described.

49. In a machine of the nature described, supporting wheels, a scoop, conducting mechanism behind said scoop, driving mechanism for moving the scoop forward and rearward, and driving mechanism for moving the front portion of the scoop in an orbit for the taking of a load and discharging it, substantially as described.

50. In a machine of the nature described,

a scoop, conducting mechanism behind said scoop, power-driven mechanism applied to the rear portion of the scoop, and power-driven mechanism applied to the front portion of the scoop, substantially as described.

51. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, guide-ways and mechanism confined to said guide-ways and joined to the rear portion of said scoop and in operative relation with a source of power, and mechanism for raising and lowering the forward portion of the scoop while the latter is being bodily reciprocated by said mechanism confined in said guide-ways, substantially as described.

52. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, approximately horizontal guide-ways, slide members confined in said guide-ways and in operative relation with the rear portion of the scoop, pitman rods in operative relation with the rear portion of the scoop and with cranks, and means for raising and lowering the forward portion of the scoop during the reciprocation of said slide members, substantially as described.

53. In a machine of the nature described, a scoop, conducting mechanism behind said scoop, approximately horizontal guide-ways, slide members confined in said guide-ways and in operative relation with the rear portion of the scoop, pitman rods in operative relation with the said slide members and with cranks, and a crank for raising and lowering the front portion of the scoop during the reciprocations of said slide members, substantially as described.

54. In a machine of the nature described, the combination of a car, a conveyer upon said car, a motor upon said car in operative relation with said conveyer, a jib supported by said car, a scoop and a motor upon said jib, said motor being in operative relation with said scoop, substantially as described.

55. In a machine of the nature described, the combination of a car, a conveyer upon said car, a motor located upon said car in operative relation with said conveyer, a jib supported by said car, a conveyer, a scoop, and a motor upon said jib, said motor being in operative relation with said conveyer and said scoop, substantially as described.

56. In a machine of the nature described, the combination of a car, supporting wheels and axles for said car, a conveyer upon said car, a motor upon said car in operative relation with said conveyer and said axles and wheels, and a jib supported by said car, a conveyer, a scoop, and a motor located upon said jib, said motor being in operative relation with said conveyer and said scoop, substantially as described.

57. In a machine of the nature described, the combination of a car, a conveyer located upon said car, a jib secured to said car upon an upright axis, a conveyer and a scoop located upon said jib, and a motor located upon said car and arranged in operative relation with the conveyer on said car and with said jib for turning the latter upon said upright axis, substantially as described.

58. In a machine of the nature described, the combination of a car, a conveyer located upon said car, a jib secured to said car upon an upright axis and a horizontal axis, a scoop upon said jib, and a motor located upon said car in operative relation with said conveyer and with said jib for moving the latter upon said axes, substantially as described.

59. In a machine of the nature described, the combination of a car, a jib hinged to said car, means for moving said jib, a scoop and a conveyer supported by said jib, and a motor located upon said jib in operative relation with said scoop, substantially as described.

60. In a machine of the nature described, the combination of a car, a windlass on said car, a motor on said car, mechanism comprising a worm and worm gear placing said motor into operative relation with said windlass, a jib, a conveyer and a scoop upon said jib, a windable suspending member between said jib and said windlass, substantially as described.

In testimony whereof I have signed my name, in presence of two witnesses, this 14th day of March, in the year one thousand nine hundred and eight.

WILLIAM WHALEY.

Witnesses:
CYRUS KEHR,
ROY V. MYERS.