No. 633,850. Patented Sept. 26, 1899.

P. N. JONTE.

STEAM SHOVEL OR EXCAVATOR.

(Application filed Aug. 29, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 7

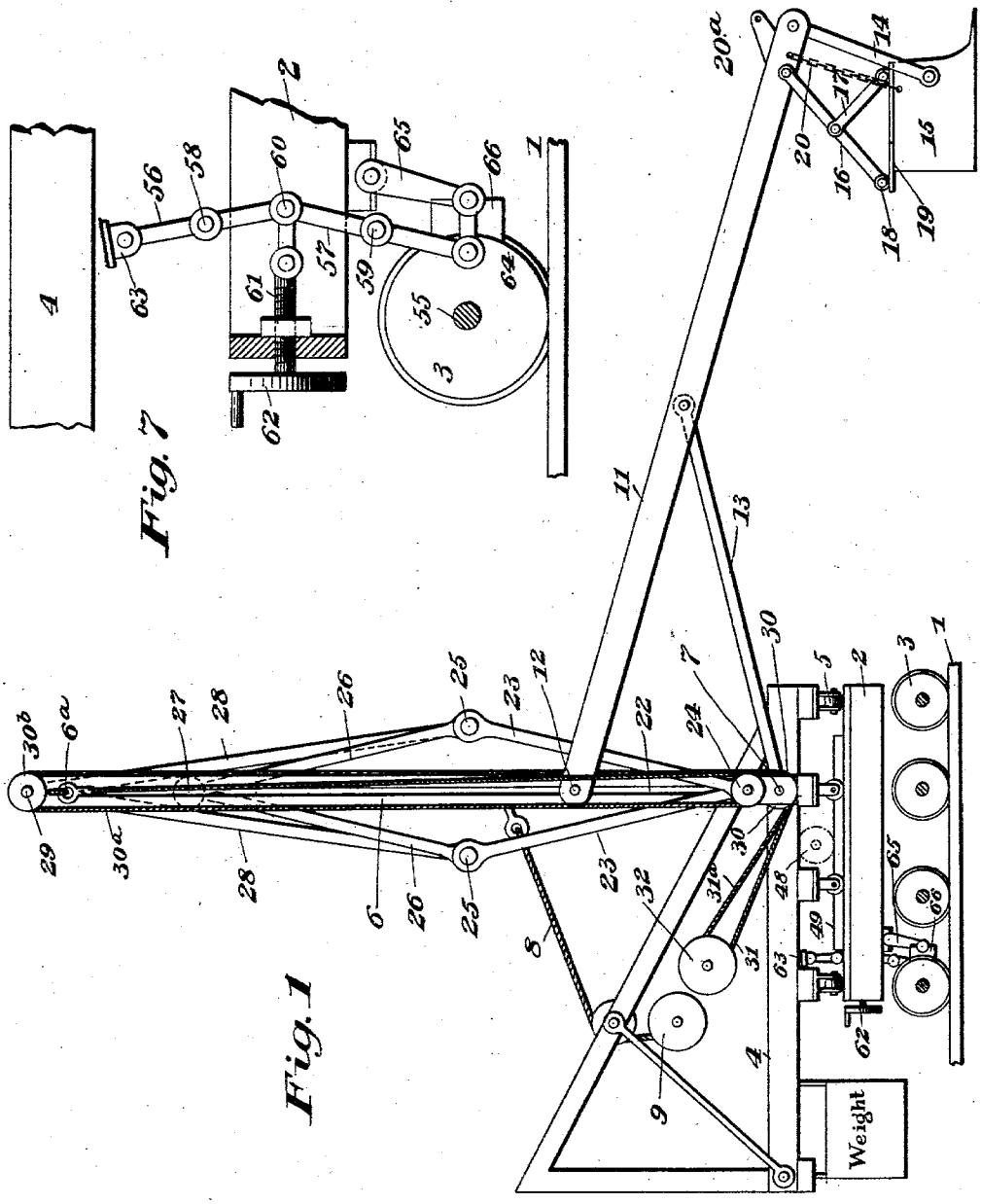

Fig. 1

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(No Model.) 3 Sheets—Sheet 2.

Fig. 8

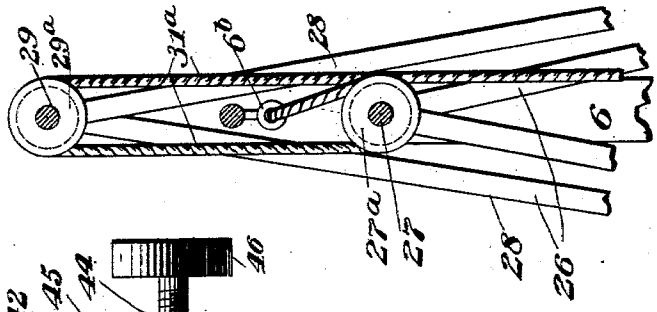


Fig. 4

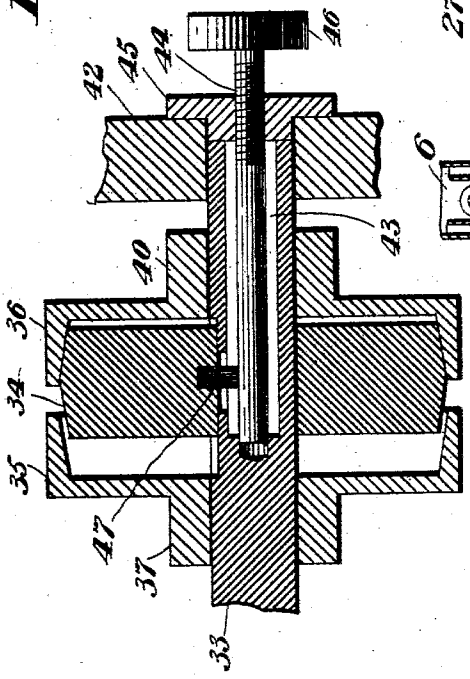


Fig. 9

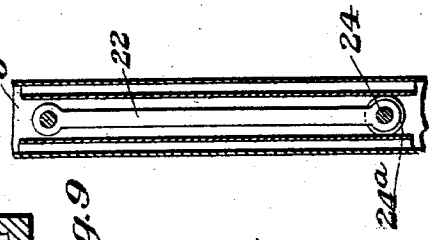


Fig. 10

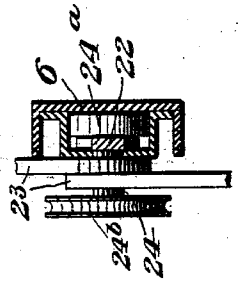
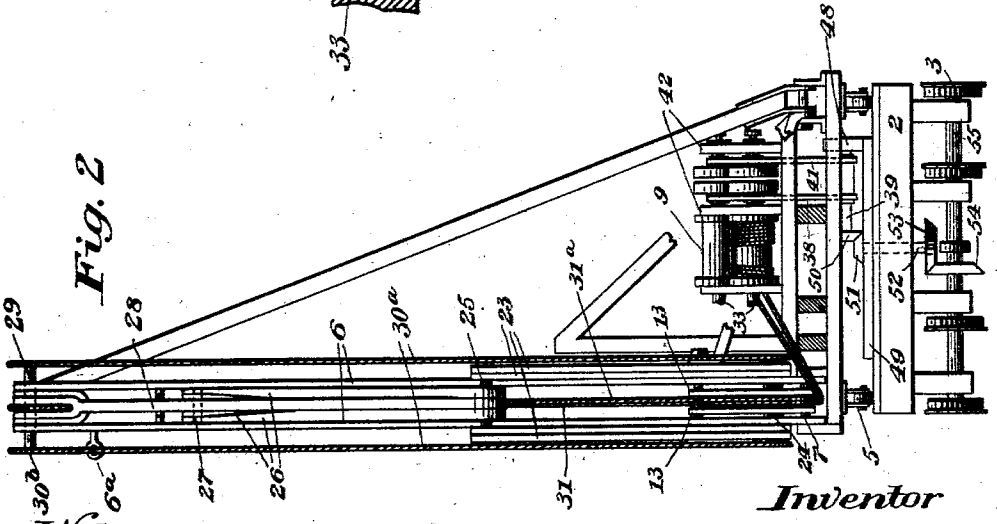


Fig. 2



Witnesses

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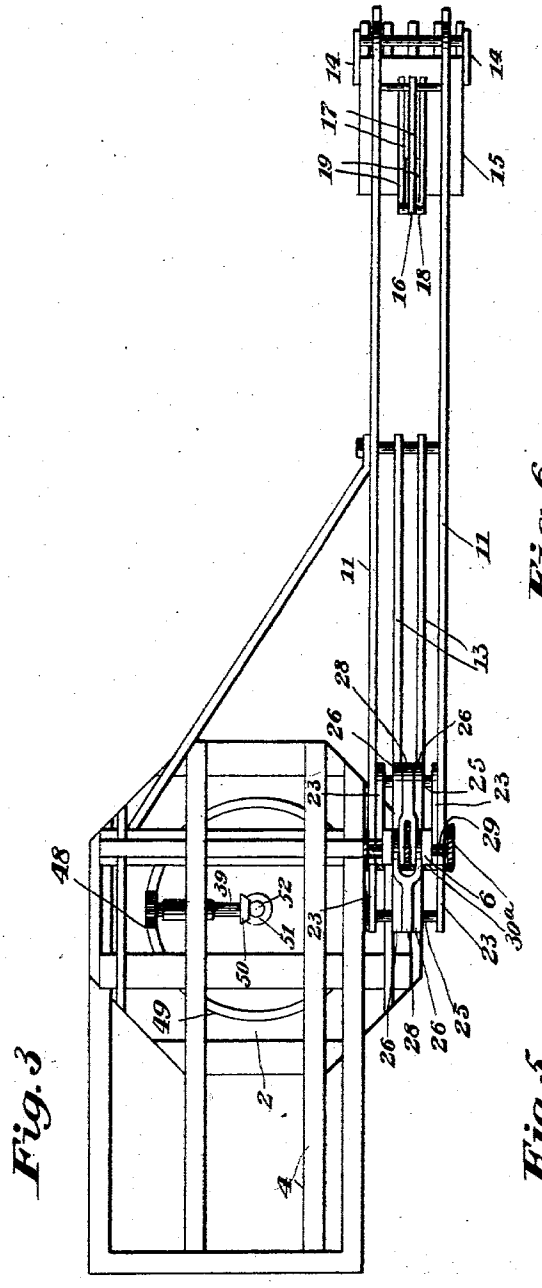

Fig. 3.

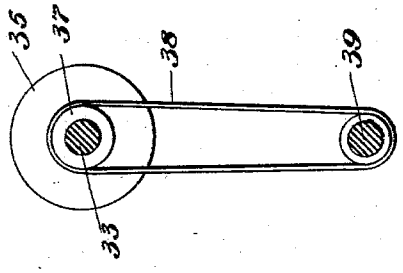

Fig. 6.

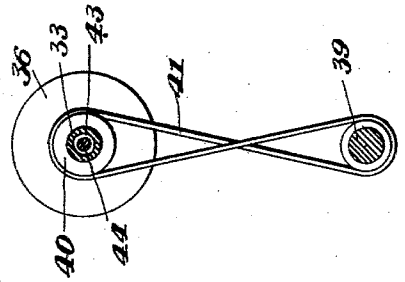

Fig. 5.

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UNITED STATES PATENT OFFICE.

PETER N. JONTE, OF CINCINNATI, OHIO.

STEAM SHOVEL OR EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 633,850, dated September 26, 1899.

Application filed August 29, 1898. Serial No. 689,718. (No model.)

To all whom it may concern:

Be it known that I, PETER N. JONTE, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Steam Shovels or Excavators; 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 figures of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in steam shovels or excavators, such as are used for excavating and ditching, and has for its object to provide an apparatus of this character of a simple and inexpensive nature which shall be strong, durable, and effective and which shall be adapted for adjustment so that the excavation may be made in either a horizontal or in an inclined plane.

The invention consists in certain novel features of the construction, combination, and arrangement of the several parts of the improved apparatus whereby certain important advantages are attained and the device is made simpler, cheaper, and otherwise better adapted and more convenient for use, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my invention, Figure 1 is a side elevation showing the improved steam shovel or excavator, and Fig. 2 is an end view of the same. Fig. 3 is a plan view of the apparatus. Fig. 4 is an enlarged detail sectional view showing the friction reversing-gear. Figs. 5 and 6 are enlarged detail views showing the means for driving the reversing-gear. Fig. 7 is an enlarged detail view showing the brake device for holding the rotative platform and the carriage whereon the same is mounted against movement. Fig. 8 is an enlarged fragmentary sectional view taken longitudinally through the mast of the apparatus and showing the connections of one of the cables employed for operating the shovel or bucket. Fig. 9 is an enlarged section taken transversely through one of the side bars of the mast and showing the connection of the jib therewith. Fig. 10 is an enlarged sectional view taken longitudinally through one of the side bars of the mast and showing the connection between the jib and the jointed frame of the apparatus.

In the views, 1 indicates the tracks or rails whereon is mounted for movement the carriage 2, which latter supports the apparatus and is provided with track-wheels 3, running on said tracks or rails 1. The tracks are usually laid in the excavation or ditch made by the apparatus, though this is not essential. 4 indicates the revolving platform mounted on rollers 5 on top of the carriage 2 and adapted to turn or swing pivotally, so as to impart a pivotal or turning movement in a horizontal plane to the parts of the apparatus carried upon it.

6 indicates the mast of the apparatus, formed of vertically-slotted side bars spaced apart and connected at top and bottom, the mast being stepped pivotally, as indicated at 7, at one side of the platform and being provided with a brace pivotally connected to the other side of the platform, whereby the said mast is adapted to be swung to a vertical or rearwardly-inclined position in a perpendicular plane. The said mast is moved pivotally by means of a cable 8, which passes around a drum 9 on the platform and is adapted to be wound on or unwound from said drum when it is desired to operate the mast.

11 indicates the jib, also formed of parallel side pieces or bars suitably spaced apart and braced, one end 12 of each side piece taking over the outer side of the mast 6. The jib is braced and held to rock pivotally at its central part upon rods or arms 13, which are pivotally connected at their outer ends to the central part of the jib, and have their inner ends pivoted at the step 7 of the mast 6.

On the outer end of the jib is carried, by means of links 14, a bucket or shovel 15, adapted to hang suspended on said links by gravity when the jib is raised and having its bottom made to be opened, so that when in proper position the contents of the bucket or shovel may be readily dumped. The bucket or shovel is also connected with the end of the jib by means of jointed links 16 and 17, the end of the link 16 being extended

and provided with a roller 18, adapted to engage a track 19, formed on the top or back face of the bucket or shovel. This arrangement serves to keep the rear end of the bucket pressed firmly against the ground and prevents it from kicking up behind. A slack chain 20 is also provided, extending between the bucket and the jib, and this serves to bring the bucket into digging position at the beginning of the stroke. The chain may be adjusted as to length so as to bring the bucket or shovel into digging position at the beginning of the digging stroke, so as to permit of commencing said digging stroke when the jib stands at different angles. As shown in the drawings, the jib is provided with a lug 20^a, extending up from it and adapted for the attachment of said chain in adjusted position.

The ends 12 of the side pieces of the jib 11 are connected, by means of vertical links 22, with a jointed frame formed of the lower levers 23, pivotally connected at 24 with said links 22 and arranged to play outside the side bars of the mast 6. The pivot-pins 24 extend through the slots in the side bars of the mast, so as to guide the jointed frame for movement longitudinally with relation to the mast, and inside the said side bars of the mast are formed channels wherein play rollers 24^a on the inner ends of said pivot-pins 24. These rollers serve to reduce the friction as the jointed frame moves upon the mast.

The upper ends of the levers 23 are pivotally connected, as shown at 25, with the upper levers 26 of the frame, which levers 26 are pivotally connected together at 27 and play inside the side bars of the mast. The jointed frame is held in place by means of the long upper links 28, which are connected at their lower ends with the pivot-pins 25 of the levers 23 and 26 of the jointed frame and have their upper ends pivoted, as shown at 29, between the upper ends of the side bars of the mast.

At the lower end of the mast is arranged a double pulley 30, under which passes a pair of cables 31 and 31^a, connected to the upper and lower ends of the jointed frame, as will be hereinafter described, and arranged to wind in opposite directions on the drum 32, mounted on the platform 4. The cable 31 after being passed under the pulley 30 is connected to a loop, the two ends 30^a of which pass over pulleys or sheaves 30^b on the outer ends of the pivot-pin 29 at the top of the mast, as clearly shown in Figs. 1 and 2. Thence the ends of said loop are carried down and around pulleys or sheaves 24^a on the outer ends of the pivot-pins 24 at the lower end of the jointed frame, and thence said ends of the loop are carried upward along the outer faces of the side bars of the mast and connected by eyes 6^a to the upper ends of said side bars. If desired, the pulleys or sheaves 24^a may be dispensed with and the ends of the loop may be attached directly to the lower end of the jointed frame instead of the upper end of the mast; but by the means shown greater leverage is attained and the power exerted to move the bucket or shovel in digging is increased. The other cable 31^a is also carried upward after being passed beneath the sheave or pulley 30 and is carried over a sheave or pulley 29^a, arranged on the pivot-pin 29 at the upper end of the mast and located centrally between the side bars of the same, and thence said cable is carried down, as clearly shown in Fig. 8, around a sheave or pulley 27^a on the pivot-pin 27 at the upper end of the jointed frame. Thence said cable is carried upward and connected to an eye 6^b at the upper end of the mast, as clearly seen in said figure. The cable 31^a might also be connected directly to the upper end of the jointed frame; but by the employment of the sheave or pulley 27^a increased power is attained. By this arrangement when the drum 32 is turned in one direction, so as to wind the cable 31 thereon and to unwind the cable 31^a from the drum, the lower end of the jointed frame will be drawn upward, the upper end of said frame being correspondingly lowered by reason of the pivotal connections of the levers of the frame with each other and with the links 28. The inner end of the jib being connected with the lower end of the jointed frame by means of the links 22, said inner end of the jib will be moved upward, causing the jib to swing pivotally upon the rods 13, whereby the outer end of the jib and the bucket or shovel carried thereon will be moved in toward the mast 6. When the drum 32 is turned in the opposite direction to unwind the cable 31 and wind the cable 31^a upon the drum, the upper end of the jointed frame, which was lowered in moving the bucket or shovel toward the mast, will be raised, and the lower end of said frame will be again lowered to the position shown in Fig. 1. The jib connected to the lower end of the jointed frame will thus be swung pivotally on the arms or rods 13, and the shovel or bucket carried on the outer end of the jib will be moved in a direction away from and at right angles to the plane in which the mast stands, so as to readily and properly fill said bucket, as will be readily understood.

The drums 9 and 32 are mounted on shafts 33, held in bearings 42 on the platform and driven from any suitable source of power—as, for example, from an engine (not shown) mounted upon the platform—and said drums are operated by reversing-gears of similar construction, which I will now describe. Each shaft has feathered on it a clutch member 34, (see Fig. 4,) on opposite sides of which are loosely mounted on the shaft friction-disks 35 and 36, each constructed with a pulley 37 and 40, respectively. Over the pulley 37 passes a belt 38, which extends down and passes around the thickened part of a shaft 39, journaled under the platform 4 of the apparatus. Over

the pulley 40 passes a belt 41, which also extends down and is crossed, its lower bight being also passed around the thickened portion of the shaft 39. In this way it will be seen that the shaft 39 is capable of being alternately driven in opposite directions from the disks 35 and 36. Each shaft 33 is made hollow or tubular at its end whereat the reversing-gear is located, and in the hollow 43 of the shaft is arranged a screw-threaded stem 44, screwing in a nut secured to one of the bearing-blocks 42 of the shaft and having at its outer end a hand-wheel 46, by means of which the screw-stem may be turned. The other end of the screw-stem carries a pin 47, which plays through a slot in the shaft 43 and has engagement with the clutch member 34 in such a way that when the screw-stem is moved lengthwise in the hollow of shaft 33 its movement will be imparted to the clutch member 34, so as to move the same into operative engagement with one or the other of the friction-disks 35 and 36. The clutch member, together with the shaft whereon the same is feathered, will thus be caused to drive the shaft 39 in one or the other direction, according as the clutch member is engaged with the disk 35 or with the disk 36. When the stem 44 is turned so as to move the clutch member 34 to a central position, it is evident neither of the disks 35 and 36 will be driven, and consequently the shaft 39 will remain stationary. The shaft 39 also drives the platform 4, being provided with a friction gear-wheel 48, which meshes with an annular gear-face 49 on the top of the carriage 2, and said shaft also drives, by means of bevel friction-gears 50 and 51, a vertical shaft 52, journaled on the carriage 2 at the center of the gear-face 49 and having its lower end provided with a bevel-gear 53, which meshes with a bevel-gear 54 on one of the axles 55 of the carriage.

To hold the carriage 2 against movement along its tracks when the platform is being turned, and also to hold the platform 4 against rotative movement—as, for example, while the carriage is being moved along its tracks, the clutch member being in each case engaged with one or the other of the disks 35 and 36, according to the direction of movement required—I employ the brake device shown in Figs. 1 and 7. This device consists of two levers 56 and 57, pivoted at 58 and 59, respectively, and pivotally connected at 60 with a screw-shaft 61, which engages a nut held on the carriage and is provided with a hand-wheel 62, by means of which it may be turned. The lever 56 extends upwardly and has its upper end provided with a serrated shoe adapted for engagement with the under side of the platform 4.

The lever 57 extends downwardly and has its lower end connected by a link 64 with an arm 65, pivoted under the carriage and carrying at its lower end a brake-shoe 66 to engage the tread of the wheel 3 of the carriage. By this construction it will be seen that when the shaft 61 is turned in one direction the shoe on lever 56 will be engaged with the platform to hold the same against rotative movement, and when said shaft is turned in the other direction the shoe 66 will be engaged with wheel 3, so as to hold the carriage securely against movement along its tracks.

During the digging stroke of the shovel or bucket and at other times when it is desired to hold both the carriage and platform stationary the clutch member 34 will be held in its central position out of engagement with both disks 35 and 36, so that no movement will be imparted to said carriage and platform. At such times, if desired, the carriage may be held against movement along its tracks by means of suitably-arranged blocks or chucks beneath the wheels 3 thereof.

In operation when it is desired to dig a trench or other excavation with a horizontal bottom the mast 6 is held in a vertical position during the digging stroke. When said mast is inclined during the digging stroke of the bucket or shovel, the sides or end of the excavation will be correspondingly inclined. At the beginning of the stroke of the bucket or shovel, when the same stands adjacent to the carriage, the pivot-point 24 of the jointed frame will be raised to the upper part of the mast, the pivot-point 27 being correspondingly lowered, so that the positions of these two pivot-points as they are shown in Fig. 1 will be reversed. The ends 12 of the jib being connected to the pivot-point 24 of the jointed frame by means of links 22, as seen in Fig. 9, will be correspondingly raised, while the bucket carried on the outer end of the jib will be moved to a position adjacent to the carriage 2. The cable 31 being wound on the drum 32, the positions of the pivot-points 24 and 27 of the jointed frame will be gradually reversed, assuming the positions shown in Fig. 1, the inner end of the jib 11 being drawn down while said jib is swung pivotally on its braces 13, causing the bucket or shovel held on the outer end of the jib to be moved in a direction away from the carriage, its forward edge entering the earth at the bottom of the excavation, so as to fill the bucket. The movement of the drum is stopped when the bucket reaches the end of its out or digging stroke and stands in the position shown in Fig. 1, and the hoisting-drum 9 is then actuated to wind thereon the cable 8 thereby throwing the mast 6 backward to a rearwardly-inclined position and raising the jib, with the bucket at its outer end, out of the excavation. Rotative movement is then applied to the platform 4 by properly moving the clutch member 34 and actuating the brake device above described, so as to release the shoe 66 from engagement with the platform and cause the same, together with the mast and jib carried thereon, to swing in the arc of a circle, so as to move the bucket

or shovel 15 to one side of the excavation to permit it to be dumped. After the bucket has been dumped the screw-shafts 44 are manipulated to reverse the rotative movement of the platform 4, so as to return the bucket or shovel to a position over the excavation, and simultaneously the mast 6 is returned to its vertical position, (shown in Fig. 1,) after which the bucket is lowered into the excavation again and the pivot-points of the jointed frame are returned to their first positions by reason of the shortening of the cable 31^a, which is then wound on the drum 32, whereby the jib is again moved pivotally and the bucket on the outer end thereof is moved over toward the carriage, so as to be in position to begin the next digging stroke, when the preceding operation shall be repeated.

By the employment of the jointed frame and long upper links 28 uniform speed and power are imparted to the bucket throughout the entire length of its stroke, so that the variations in speed and power of the bucket which would be caused were these parts omitted and the cable from the drum 32 connected directly with the inner end of the jib are altogether avoided.

From the above description it will be obvious that the apparatus constructed according to my invention is of an extremely simple and inexpensive construction and is especially well adapted for use in excavating, since the strains imposed upon the several parts in the operation of the apparatus are equalized, so that the liability of breakage is lessened. It will also be obvious from the above description that the apparatus is capable of some modification without material departure from the principles and spirit of the invention, and for this reason I do not wish to be understood as limiting myself to the precise form and arrangement of the several parts herein set forth.

Having thus described my invention, I claim—

1. In an excavating apparatus, the combination of a platform, a mast pivotally mounted and adapted to be swung in a vertical plane to a vertical or to an inclined position, a jib having pivotal connection with the platform connected at one end to the mast, a bucket or shovel carried on the outer end of the jib, and means for moving said mast pivotally in a vertical plane, substantially as set forth.

2. In an excavating apparatus, the combination of a mast, a jib, pivotally mounted independently of said mast and having one end guided for movement along the mast, a bucket or shovel on the other end of said jib, and means for imparting pivotal movement to said jib, substantially as set forth.

3. In an excavating apparatus, the combination of a mast, a pivoted brace, a jib pivotally mounted on said pivoted brace and having one end guided for movement along said mast, a bucket or shovel on the other end of said jib, and means for imparting pivotal movement to said jib, substantially as set forth.

4. In an excavating apparatus, the combination of a mast pivotally mounted and adapted to be swung in a vertical plane to a vertical or to an inclined position, a jib, pivotally mounted independent of the mast and having one end guided for movement along the mast, a bucket or shovel on the other end of said jib, means for imparting pivotal movement to the jib, and means for moving said mast pivotally in a vertical plane, substantially as set forth.

5. In an excavating apparatus, the combination of a mast pivotally mounted and adapted to be swung in a vertical plane to a vertical or to an inclined position, a brace pivoted at one end and also adapted to swing in a vertical plane, a jib pivotally mounted at its central portion on said pivoted brace and having one end connected to the mast and adapted for movement lengthwise along the same, a bucket or shovel carried on the other end of the jib, means for imparting pivotal movement to the jib, and means for moving said mast pivotally, in a vertical plane, substantially as set forth.

6. In an excavating apparatus, the combination of a mast mounted for swinging movement in a vertical plane, a jib pivotally mounted at its central part and having one end connected to the mast and adapted for movement lengthwise along the same, a bucket or shovel carried on the other end of the jib, means for imparting pivotal movement to the jib, an equalizing device connecting said means with the jib, and means for swinging said mast, substantially as set forth.

7. In an excavating apparatus, the combination of a mast, a jib pivotally mounted at its central part and having one end connected to the mast and adapted for movement lengthwise along the same, a bucket or shovel carried on the other end of the jib, means for imparting pivotal movement to the jib, and an equalizing device connecting said means with the jib, substantially as set forth.

8. In an excavating apparatus, the combination of a mast, a jib pivotally mounted at its central part and having one end connected to the mast and adapted for movement lengthwise along the same, a bucket or shovel carried on the other end of the jib, means for moving the jib pivotally, and an equalizing device interposed between said means and the jib and consisting of a jointed frame formed of pivotally-connected upper and lower levers and links pivotally connecting opposite sides of said frame with the mast, substantially as set forth.

9. In an excavating apparatus, the combination of a mast, a jointed frame connected at opposite sides to the mast and consisting of two sets of pivotally-connected levers having upper and lower pivot-points adapted for movement lengthwise of the mast, a pivoted jib connected to the jointed frame and pro-

vided with a bucket or shovel, and means for moving said jointed frame, substantially as set forth.

10. In an excavating apparatus, the combination of a jib, a bucket or shovel pivotally connected thereto, pivotally-connected links pivoted to the bucket or shovel and to the jib, respectively, and a roller carried by one link and having engagement with the bucket, substantially as set forth.

11. In an excavating apparatus, the combination of a carriage having wheels and axles, a platform mounted to turn on the carriage, a mast on the platform, a shovel or bucket carried by the mast, a driving-shaft, gearing to impart movement alternately in opposite directions from the driving-shaft to both said carriage and platform, and means arranged when moved to hold said carriage and platform alternately against movement, substantially as set forth.

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

PETER N. JONTE.

Witnesses:
JOHN ELIAS JONES,
J. D. THORNE.