

No. 846,791.

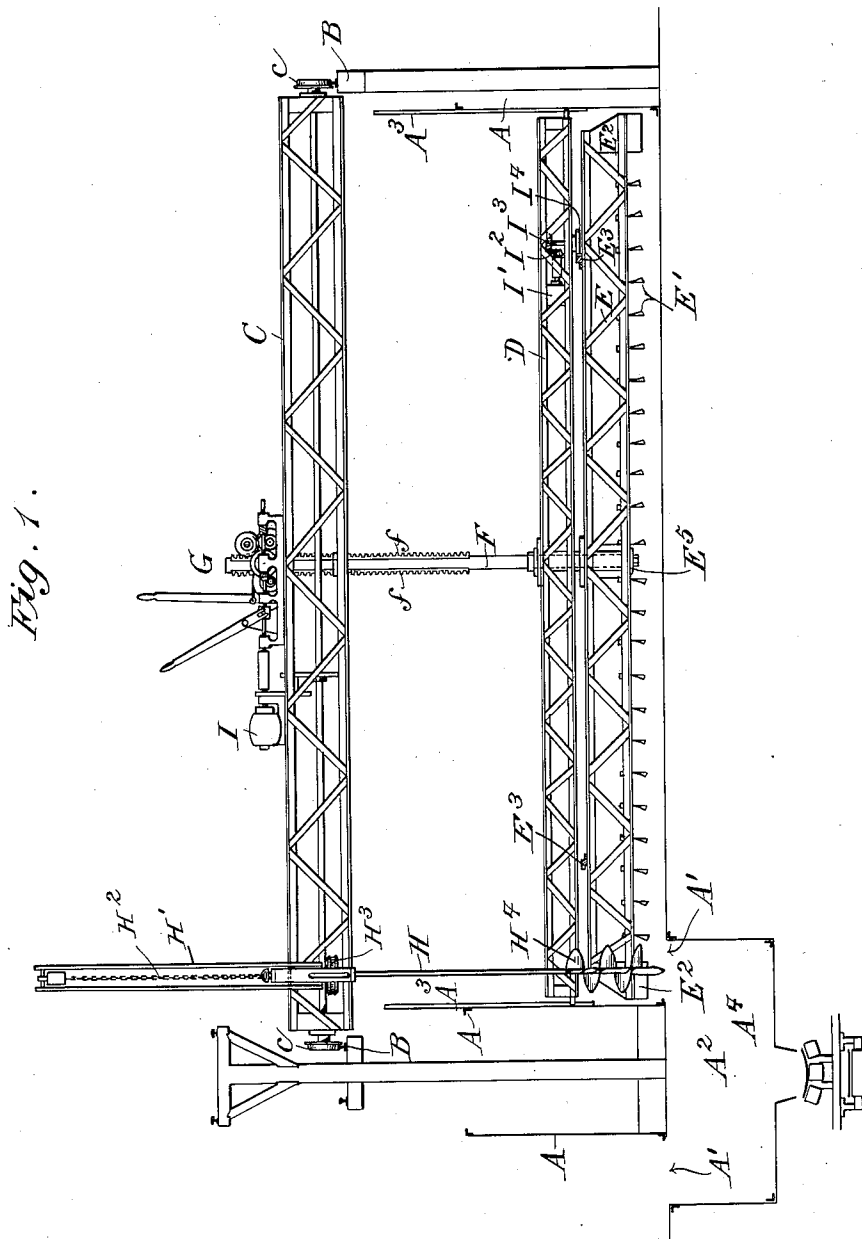
PATENTED MAR. 12, 1907.

J. E. KENNEDY & F. J. HOBSON.

EXCAVATOR.

APPLICATION FILED SEPT. 5, 1906.

5 SHEETS--SHEET 1.



Witnesses
Edward Rowland
Anita Burke

Joseph B. Kennedy ^{and} Inventors,
Francis J. Mahan,
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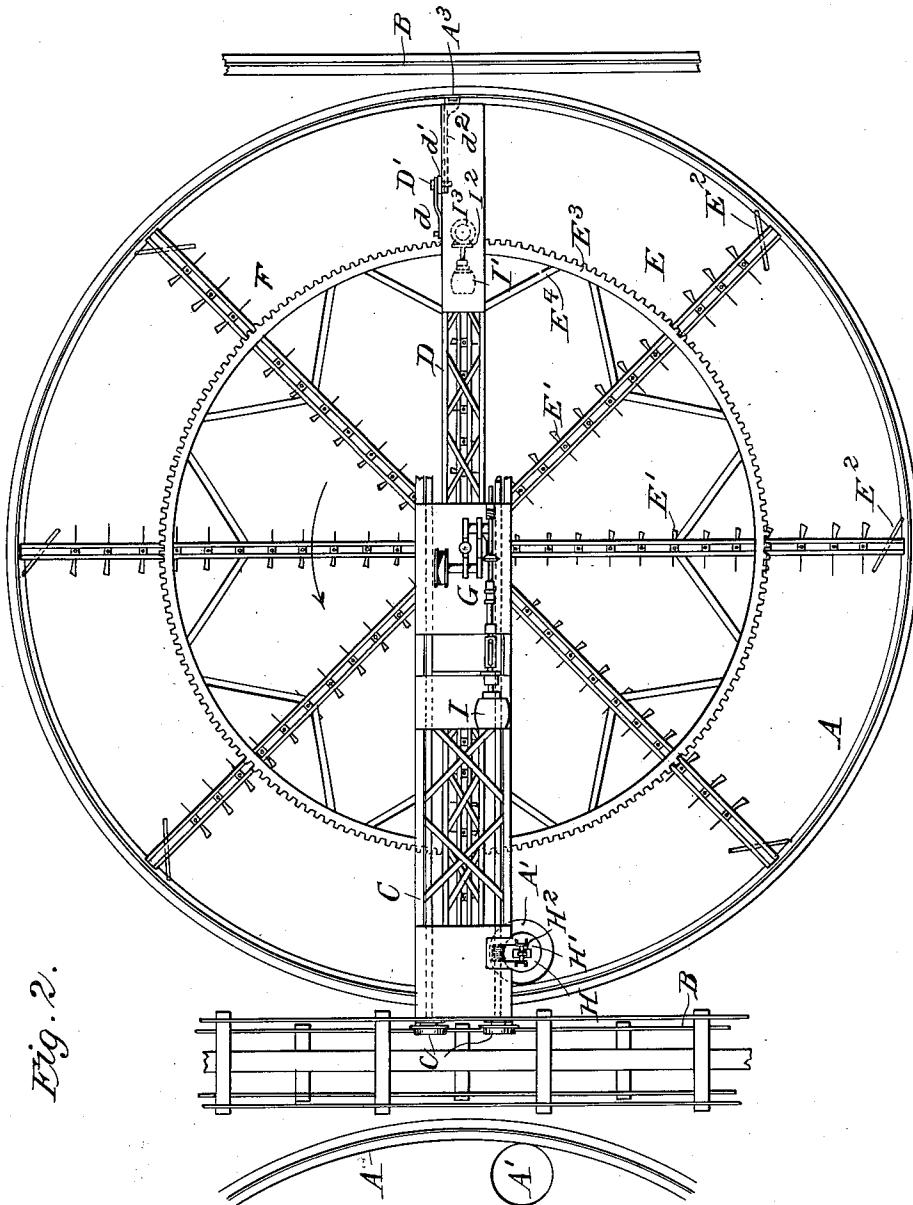
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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

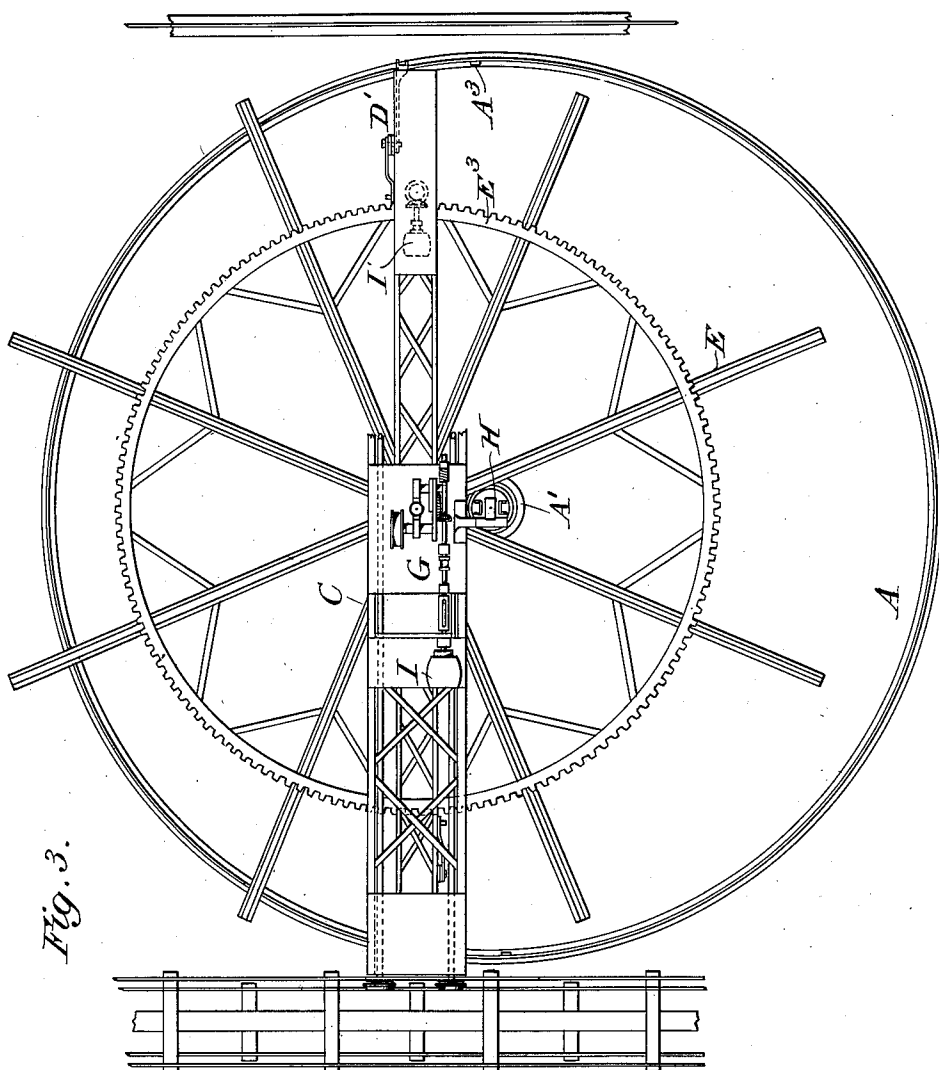


Fig. 3.

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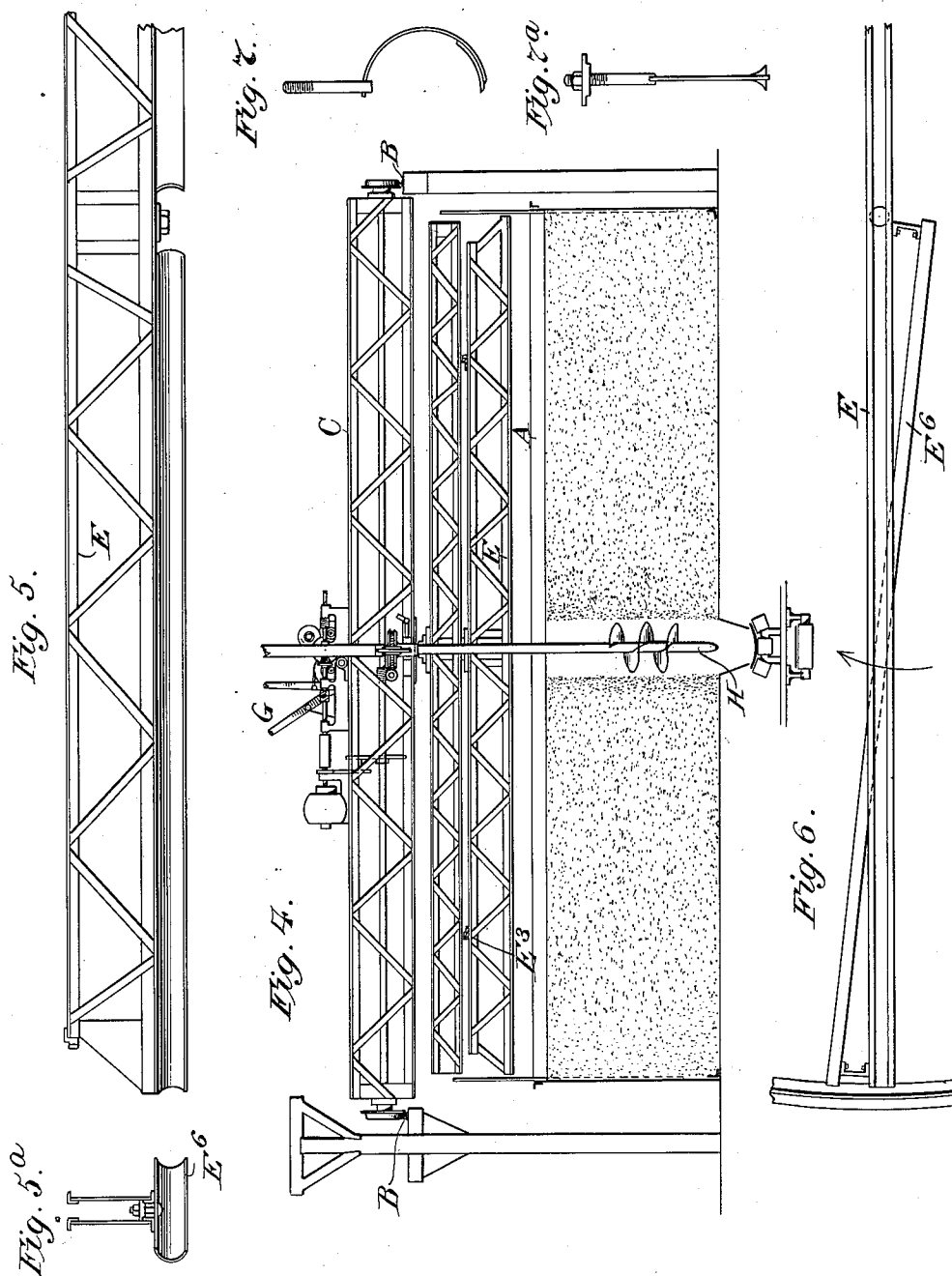
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5 SHEETS—SHEET 4.



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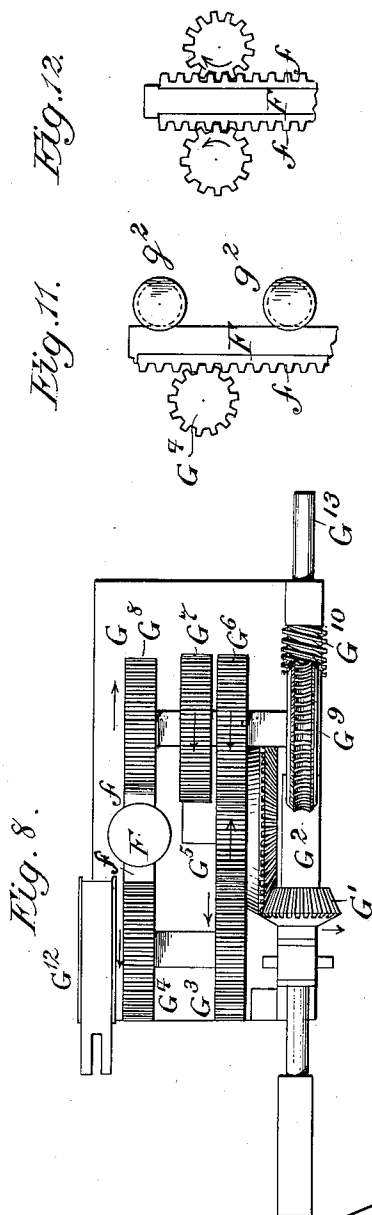
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EXCAVATOR.

APPLICATION FILED SEPT. 5, 1906.

6 SHEETS—SHEET 5.



Witnesses
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UNITED STATES PATENT OFFICE.

JOSEPH E. KENNEDY, OF NEW YORK, N. Y., AND FRANCIS J. HOBSON, OF GUANAJUATO; MEXICO.

EXCAVATOR.

No. 846,791.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed September 5, 1906. Serial No. 333,359.

To all whom it may concern:

Be it known that we, JOSEPH E. KENNEDY and FRANCIS J. HOBSON, citizens of the United States, and residents, respectively, of New York city, State of New York, and of Guanajuato, in the Republic of Mexico, have invented certain new and useful Improvements in Excavators, of which the following is a specification.

Our present invention relates to machines for use principally in mining operations, in which the recovered ore is deposited in tanks to be leached or washed or otherwise treated for the recovery of its contents, and particularly has to do with machines designed to remove from the tank the finely-ground pulp after the leaching or other operation in plants in which our device is especially useful. It is common practice to install a row of tanks (usually circular) and apparatus which will fill these tanks with the ground pulp or "fines," as it is often called. These tanks are usually arranged in series, so that a conveying apparatus of one form or another may readily operate to fill them, as may be desired, and in cases with which we are familiar the tanks are of considerable size and hold a large amount of the fine ore. It is obviously advantageous to distribute the ore or pulp evenly in the tanks, and after the solutions are withdrawn from them the pulp, which is very fine, is compacted so as to make it difficult to remove.

Machines have been heretofore devised which aim to distribute the pulp and afterward by use of the same machine to excavate it; but we do not find these to be well adapted to their purpose, and therefore confine the machine to a single office and adopt other means of distribution.

The machine of our invention consists, therefore, of a beam running upon wheels on a track and spanning a series of tanks somewhat like a traveling crane. A post passing through the center of this transverse beam may be raised or lowered and carries with it the excavating apparatus, consisting of a second transverse beam which may be anchored to the sides of the tank by suitable locking devices and which carries motive power for the excavator proper and the excavator itself, which consists of a spider car-

rying suitable plowshares designed to displace the material in the tank radially as the spider is revolved by the motor on the second beam. Each set of these plows takes up the work where the last left off and further advances the material either toward the center or toward the circumference (as the machine may be arranged) by a definite amount, leaving the advanced material in the path of the next succeeding set of plows, so that the progress of the material from the center to the circumference, or vice versa, is uninterrupted. Broadly speaking, the general arrangement thus described is old, excepting the arrangement of plows which we have just described; but heretofore the power for revolving the excavating apparatus has been applied at the center and has been very considerable. In our arrangement, however, we affix to the spider a gear which is operated by a motor near the circumference of the tank, thus very greatly reducing the necessary power to operate the apparatus.

For raising and lowering the apparatus out of and into the tanks we have arranged racks upon the center post, with gears operated by an electric motor, and since we have found it desirable to lower the apparatus after it comes in contact with the material in the tank at a very slow rate we arrange a shifting-arbor by which after the apparatus has been lowered into the tank to about the proper height it is further lowered by means of a worm as slowly as may be desired. The discharge of the tank as thus arranged may be either near the circumference or in the center. In practice the sands or pulp become packed over the opening, so that after the solution is drawn off they do not readily run out. To provide for this, we have arranged upon the machine a device which clears the opening and may then be run out of the way of the remainder of the operation, so as not to interfere with the movement of the excavator from one tank to another.

The accompanying drawings show an embodiment of our invention.

Figure 1 is a side elevation of the apparatus with the tank shown in diagrammatic section. Fig. 2 is a plan of the parts shown in Fig. 1. Figs. 3 and 4 are a plan and a side

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elevation, respectively, of a modified form, in which the discharge is at the center. Figs. 5 and 5^a are details of one form of plow. Fig. 6 is a plan of the plow shown in Fig. 5. Figs. 7 and 7^a are respectively end and side views of a modified form of plow. Figs. 8 to 12 are details of the gearing.

Referring now to Figs. 1 and 2, A is the tank, having the discharge-opening A' communicating with the chamber A². Two tanks are indicated in these figures, both of which communicate with the common chamber A², having a discharge-opening A⁴, by which the pulp is carried to the traveling conveyer, diagrammatically shown beneath. Upright guides or posts A³ A³ are shown attached to the sides of the tank for a purpose presently to be described.

B B are the track-rails adjacent to the tank, it being understood that as many similar tanks as may be necessary in the plant under consideration may be arranged between the rails.

Running upon wheels *c c* upon the tracks is the transverse beam C. This carries at its center an arrangement of gears G hereafter to be described. These gears may raise and lower a center post F, which bears racks *ff* and carries near its bottom a second transverse beam D.

Part of the beam C is broken away in Fig. 2 to illustrate the construction more clearly. Fastening devices D', consisting of the handle *d*, the eccentric or crank *d'*, and the bolt *d*², are provided at opposite ends of the beam D. In the bolts *d*² is a slot which registers with the guides A³ A³ in the tank when the beam is brought to its proper central position. These guides, as will be observed in Fig. 1, rise above the wall, so that the apparatus may be centered by them before it is lowered into the tank. Upon the beam D is located a motor I', which drives, through beveled gears I² I³, a pinion I⁴, registering with the main gear upon the spider, now to be described.

The spider consists of eight arms E, although it is obvious that a greater or less number may be used. These are preferably equally spaced, so that they will balance properly. Each of the arms carries plows E' E', those upon one arm being slightly displaced from those upon the arms next to it, so that as the plows are turned toward or away from the center the direction of the discharge may be controlled—that is to say, each set of plows takes up the work where those upon an adjacent arm left it and advances the pulp toward the opening through which it is to be removed. At the ends are larger plows or scrapers E², turned so that they bring the accumulated material carried to the circumference of the tank by the plows E' to the opening A', through which it may

fall. Connecting the arms E is the main gear E³ of the machine, meshing with the pinion I⁴, already referred to. Braces E⁴ E⁴ are connected to the gear, making the whole structure rigid and substantial. By applying the power at the circumference, or approximately so, a small motor of moderate output may be employed, and a considerable saving in operation is effected. The whole spider is hung upon the post F by a bearing E⁵, which may be a ball-bearing or other antifriction arrangement.

At H is illustrated the drill to which we have referred. It is carried in a frame H' and supported by a counterweight (not illustrated) by means of a chain H², being driven, through a gear H³, by any suitable means, such as the motor I. The shaft of the drill is square, so that it may slide through the driving-gear. It carries at the bottom the screw-thread H⁴, its operation being obvious without further description.

In Figs. 3 and 4 we show our device when modified to effect the discharge of the tank at the center instead of at the circumference. In these figures the plows have not been illustrated, since their office has already been explained. Here the auger or drill is arranged at the center of the apparatus and must be brought into action before the excavator is centered. To effect this, the beam C is brought to such a position (with the excavator raised) that the drill will tap the central hole of the discharge, and after the opening has been cleared the beam is run forward until the bolts *d*² register with the guides A³, after which the excavator is lowered into the tank, as in Figs. 1 and 2.

Figs. 5, 5^a, and 6 show a modified form of plow which may be employed for the purpose of our invention. It consists of a trough-shaped iron E⁶, extending from the center to the circumference and lying at an angle to the radius. In the case illustrated, if the direction of motion of the device be clockwise the plow, if arranged as in Fig. 6 and with the trough facing in the direction of motion, will bring the material to the center; but obviously it might be arranged to carry it to the circumference as well—as, for example, by running the machine in the opposite direction and disposing the trough in the opposite way.

Figs. 7 and 7^a show a modified form of plow which may be used instead of the plow E' shown in Figs. 1 and 2.

Figs. 8 to 12 show the gearing by which the raising and lowering of the apparatus is effected. Upon the shaft G¹³ is mounted a bevel-wheel G' and the worm G¹⁰. The two are not in operation at the same time, as will be made further apparent. We will describe the apparatus during the process of lifting, which is effected by means of the

racks f upon the post F of Figs. 1 and 2, for example. The bevel-gear G' rotates toward the spectator and the gear G^2 , meshing with it, rotates to the right, carrying the gear G^3 , which is fast with the bevel-gear G^2 . This drives in the opposite direction the gear G^4 , which has fast upon its shaft the gear G^5 , meshing with one of the racks f upon the post F . Upon the shaft of the gear G^3 G^4 is a band-brake drum G^{12} , which it is unnecessary to describe further. The gear G^5 meshes also upon the other side of the apparatus (see Fig. 8 particularly) with the gear G^6 . Fast upon the shaft with the gear G^6 is a gear G^7 . These two gears rotate to the left in the direction of the arrows shown upon them.

Now, referring to Fig. 10, the gear G^7 meshes with the gear G^{11} , having fast upon its shaft the gear G^8 , which coöperates with the other rack f , the arrangement of the racks being diagrammed in Fig. 12. This is the part of the apparatus which raises the excavator from the tank. After this operation has been completed the band-brake is brought into operation, and the spider may be held up while the whole apparatus is shifted from one tank to another, or as long as may be desired. When it is desired to lower the spider, the arbor G^{13} is slid to the left, the pin g moving in the slot g' (see Fig. 9) until the worm G^{10} meshes with the worm-gear G^9 upon the shaft carrying the gears G^6 G^7 . This imparts a very much slower motion to the gear and also prevents any premature descent of the post F and the spider by gravity.

Under some circumstances, as where the weight is not so great, the modification shown in Fig. 11 may be employed, in which only a single gear G^4 is used, having one rack upon the post F , the flanged wheels g^2 serving to keep the gear and the rack in mesh.

Having thus described our invention, what we claim, and desire to protect by Letters Patent of the United States, is—

1. In an excavating apparatus, the combination, with a series of tanks and a track adjoining them, of a main truss spanning the tanks and carried upon the track, a second transverse truss, means for anchoring the second truss in position relative to the tank; a spider carrying plows and having a circumferential gear and a motor upon the anchored truss driving the spider through the circumferential gear.

2. The combination, with a tank, of tracks at the side thereof; a transverse beam or truss spanning the tank and carried upon the tracks, a central post, gearing upon the truss for raising and lowering the central post, a second truss carried upon the central post and having means for anchoring it in position within the tank, and the spider, also carried upon the post and provided with excavating means, a motor upon the fixed truss,

and means at or near the circumference of the spider for driving it by the motor.

3. In an excavating apparatus, the combination with the anchored truss carrying a motor and a spider consisting of radial arms carrying plows and a circumferential gear, of gearing interposed between the anchored truss and the spider; whereby the latter may be rotated by power applied at or near its circumference.

4. In an excavating apparatus, the combination of the transverse beam or truss with a center post carrying an anchored beam and a rotating spider, and means for driving the spider at or near its circumference; with gearing upon the transverse beam or truss coöperating with racks upon the post to raise the apparatus out of the tank, and a worm-gear for lowering it thereinto at desired times.

5. In an excavating apparatus, the combination with the anchored beam or truss, carried upon a central post, of a spider also carried upon the post, and driving connections between the two, at or near the circumference of the spider; and plows carried upon the arms of the spider, the plows upon any arm not tracking with those upon the next arm in advance.

6. In an excavating apparatus, the combination with the anchored beam or truss, of the spider, means for driving the spider, such means carried upon the anchored beam or truss, and plows carried upon the arms of the spider; the plows upon one arm taking up the material where those upon the arm in advance left it, and advancing it by a definite amount toward a discharge-opening, and leaving it in the track of the plow next succeeding.

7. In an excavating apparatus, the combination of the tank with the rotary excavating device carrying the excavated material to a discharge-opening, and a drill arranged to clear the opening at desired times, as described and for the purpose set forth.

8. The combination, with the transverse beam or truss, of a second beam or truss carried thereby and having vertical movement, guides for the vertical movement of the beam or truss, an excavating device having horizontal movements relative to the second beam or truss, with means for driving the excavator whereby the second beam or truss is free to move vertically and is anchored against horizontal motion.

9. The combination, with the transverse beam or truss, of a second beam or truss carried thereby, such second beam or truss carrying a rotary excavator and having vertical movement, with guides for such vertical movement; and securing devices for fastening the beam or truss to the guides arranged to permit free vertical movement, and to anchor the beam or truss against revolution or other horizontal movement.

10. The combination, with a transverse
beam or truss, of a central post carrying a
second beam or truss, with means upon the
first truss for raising or lowering the central
5 post; guides for such vertical movement, such
guides preventing radial or horizontal move-
ment of the truss; a spider journaled upon
the central post and carrying plows, a motor
upon the anchored beam or truss, and gear-
10 ing interposed between the motor and the
spider.

In witness whereof we have hereunto set
our names in the presence of two witnesses.

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FRANCIS J. HOBSON.

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ANITA BURKE.

Witnesses as to Hobson:

P. S. SUJAN,
LUIS CALDERON.