M. G. BUNNELL.

DRAINAGE EXCAVATOR.

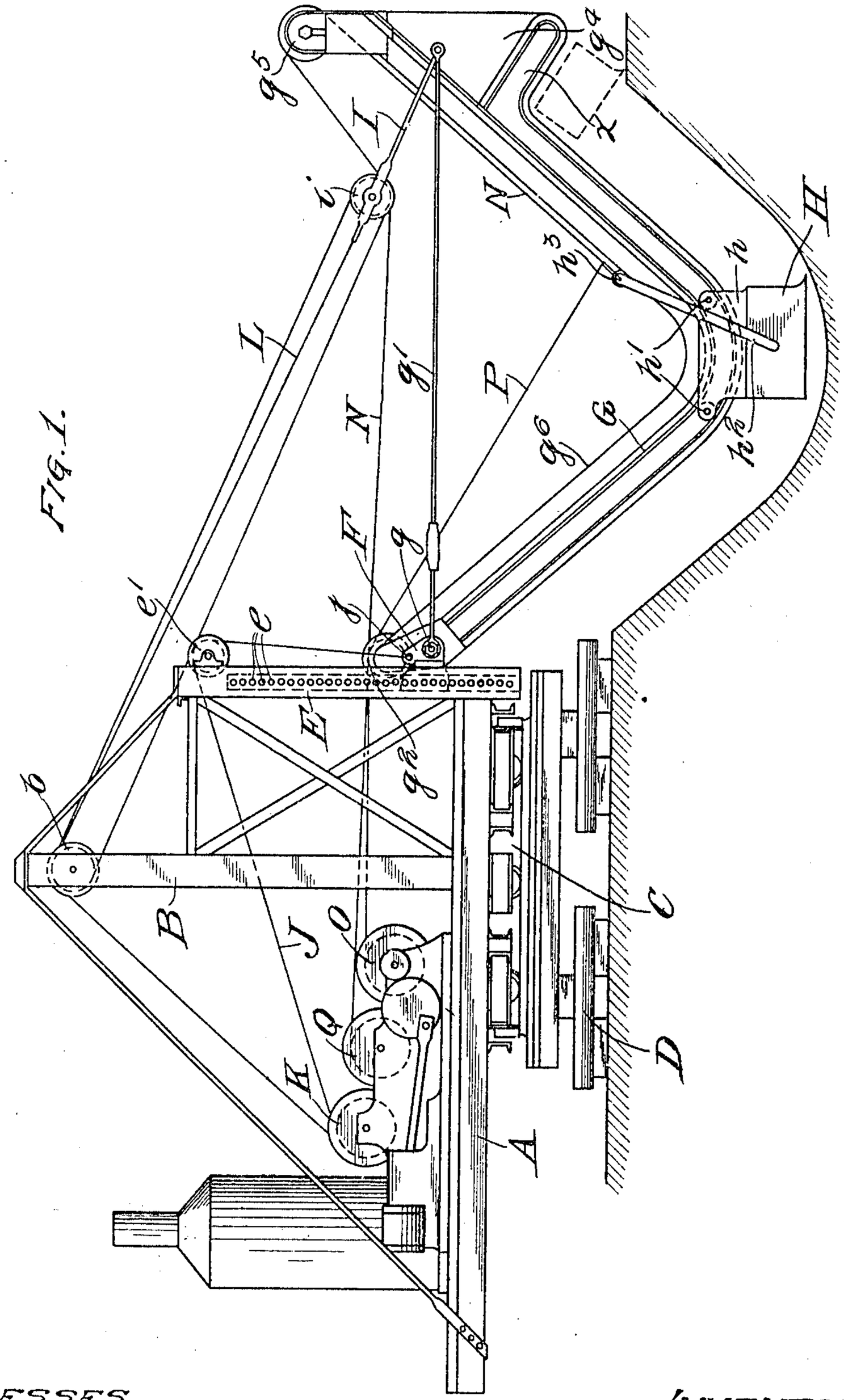
APPLICATION FILED DEC. 14, 1908.

950,631.

Patented Mar. 1, 1910.

3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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3 SHEETS—SHEET 2.

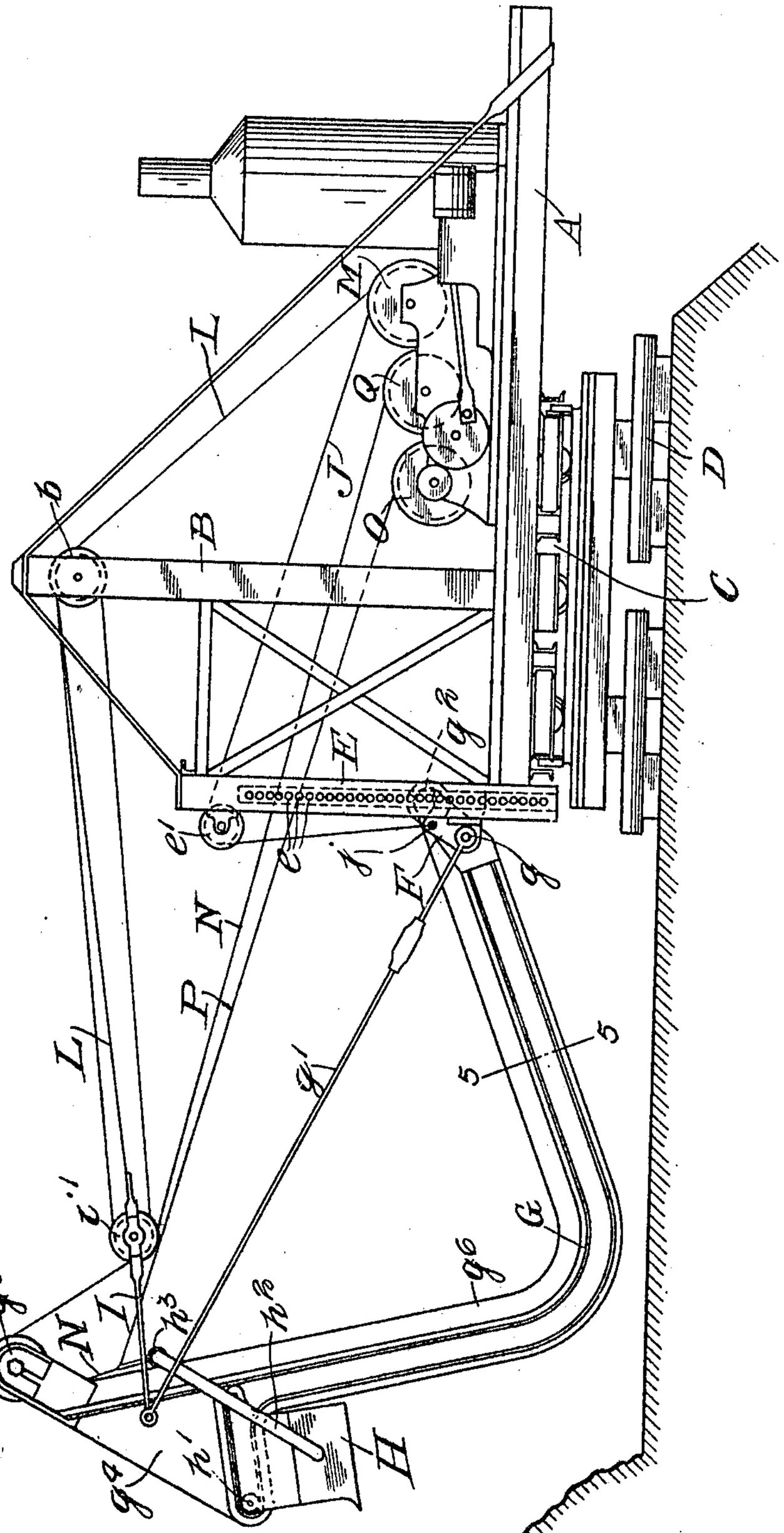

FIG. 2

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3 SHEETS—SHEET 3.

FIG. 5.

FIG. 4

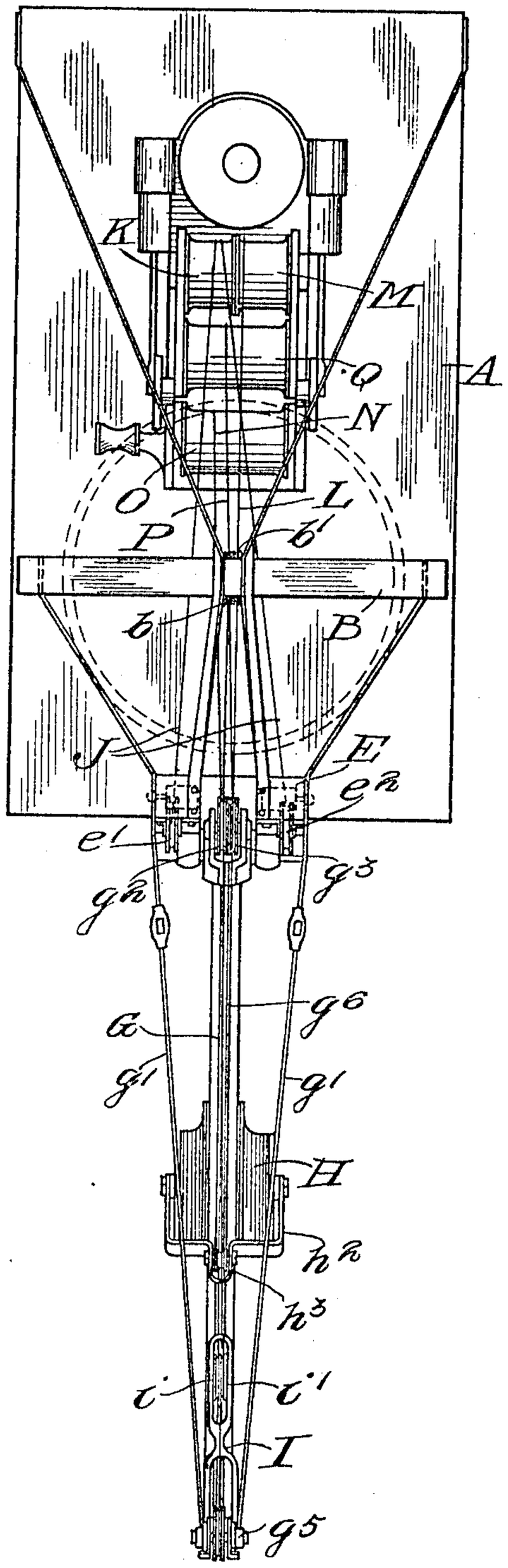
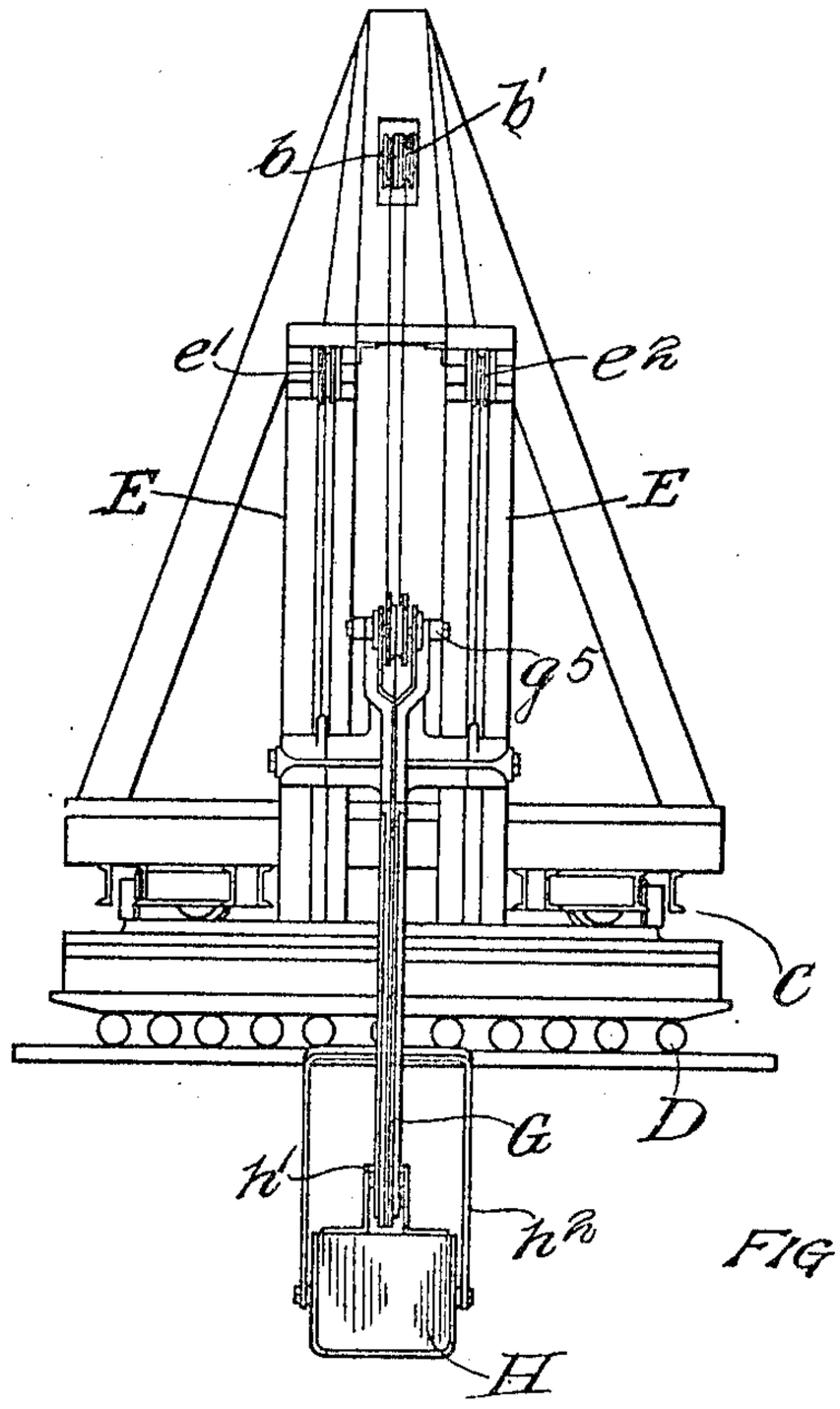


FIG. 3.



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UNITED STATES PATENT OFFICE.

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DRAINAGE-EXCAVATOR.

950,631. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed December 14, 1908. Serial No. 467,326.

To all whom it may concern:

Be it known that I, MORTON G. BUNNELL, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Drainage-Excavators, of which the following is a specification.

My invention relates to excavators of that character in which the excavating bucket is arranged to travel back and forth on a runway projecting from the side of the machine, and extending across the area to be excavated, and in which the said runway is adapted, by reason of its shape or outline, to determine the cross sectional outline of the ditch or trench, preferably for all depths thereof, and in which the runway is preferably arranged to be swung around to the other side of the excavation, whereby the bucket may discharge its load at either side of the excavation or area being operated upon.

The object of my invention is the provision of an excavator of the foregoing character in which the bucket is wider than the runway and adapted, therefore, to descend to any depth desired for the ditch or trench, the downward movement of the bucket not being limited by the runway, as the latter is narrower than the bucket and adapted, therefore, to follow the latter down into the groove cut in the ground by the back and forth motion of the same.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings—Figure 1 is a side elevation of a drainage excavator embodying the principles of my invention, showing the same in condition for work, and showing the bucket and runway in position in the excavation. Fig. 2 is a view similar to Fig. 1, but showing the excavator swung around for the purpose of dumping the load at the same side of the excavation at which the machine is standing. Fig. 3 is a front elevation of the machine shown in Fig. 1. Fig. 4 is a plan of the said machine. Fig. 5 is a cross section of the runway on line 5—5 in Fig. 2.

As thus illustrated, my invention comprises a body or platform A upon which is mounted an upright frame or structure B provided at its upper end with a sheave *b*. The said body or platform is preferably mounted upon a turn table C, which latter may be supported upon rollers D, or upon a boat or scow, depending upon whether the machine is to be arranged to travel upon land or water. At its forward end the said body or platform is provided with an upright guide-way E having a vertical series of bolt holes *e*, and in which is mounted the bearing or casting F. This casting, it will be seen, is adapted to be moved up and down in the said guide-way, and secured at any point therein, depending upon the position desired for the runway G, which latter is pivoted to the said casting at *g*. This runway, it will be seen, is substantially V-shaped in form or outline, when viewed from the side, and is strengthened by braces or stay rods *g'* extending across from one upper end to the other. At its pivoted end the said runway carries a couple of sheaves g^2, g^3, which are arranged to rotate about the same axis. The said runway, it will be observed, is constructed from an I-beam, or from a couple of channel irons secured with their backs to each other and in engagement with a flat middle plate, as shown in Fig. 5. In this way the said runway has a channel or track at each side thereof, in the manner illustrated. At its outer end the said runway is provided with a dumping portion g^4 in which the two oppositely arranged grooves or tracks are extended downwardly, and at its extreme upper end the said outer portion of the runway is provided with a sheave g^5. The excavating bucket or scoop H is wider than the said runway, and is provided with an upper frame or body *h* that embraces the runway, and is provided with wheels or rollers *h'* adapted to travel in the tracks or ways on the opposite sides thereof. Furthermore, the said bucket is provided with a bail or draft appliance h^2 that embraces the bucket and runway, and is provided at its upper end with a wheel or roller h^3 adapted to travel upon the upper edge g^6 of the said runway, as shown more clearly in Figs. 1 and 2. A swinging link I is attached to the outer end of the runway and provided with sheaves *i* and *i'*, both adapted to rotate about the same axis. At its upper end the vertically disposed guide-way E is provided with sheaves *e'* and e^2. Another

sheave b' is arranged at one side of the sheave b, and adapted to rotate about the same axis as the latter. By means of bolts or pins the casting or pivot bearing F for the runway can be positioned at various heights in the guide-way E, depending upon the depth desired for the ditch or trench. The said casting is raised and lowered by means of a cable J having one end secured to the said casting or pivot bearing at j. In fact, there are two cables J, as shown more clearly in Fig. 4, one traveling over the sheave e' and the other over the sheave e^2, but both being wound upon the drum K operated by the engine at the other end of the body or platform. This, it will be seen, provides for the raising and lowering of the pivoted end of the runway, so as to position the same and the bucket at any desired height above the ground, keeping the runway horizontal at all times, or at least when it reaches the bottom of the trench or ditch.

At its outer end the runway is raised and lowered by a cable L having one end attached to the link I and its other end wound upon the drum M, it being observed that this cable is arranged to travel upon the sheaves i, b and b', thus insuring a powerful hoisting action for the outer end of the runway. It will be seen that the movement of the bucket away from the machine, it being observed that the mouth of bucket faces toward the outer end of the runway, is accomplished by means of a cable N secured at one end to the upper end of the bail h^2, and wound upon the drum O at its other end. It will be seen that this cable is arranged to travel upon the sheaves g^5, i and g^2, in the manner shown more clearly in Figs. 1 and 2. The backward movement of the bucket—that is to say, its return movement toward the body of the machine—is accomplished by another cable P having one end secured to the upper end of the bail h^2, and its other end wound upon the drum Q, it being observed that this cable is arranged to travel upon the sheave g^3; see particularly Fig. 4, in which the sheaves g^2, g^3 are shown mounted side by side upon the pivoted end of the runway. By means of the bail h^2 and the guide wheel h^3, the pull of the operating cables is centered upon the bucket, and at the same time there is no friction upon the runway where the cables are attached to the bucket—that is to say, the draft of the cables is centered upon the bucket, notwithstanding the fact that the runway is also arranged centrally of the bucket. In this way the runway can be positioned at any desired height, and the bucket can then be caused to travel back and forth, the runway gradually swinging down about its pivot or axis, until the desired depth is reached for the trench or ditch. When the runway has swung downward to the desired depth, it will then be found to be perfectly level, and the cross sectional outline of the ditch is then determined by the shape or outline of the runway. Or, on the other hand, and if desired, both ends of the runway can be allowed to descend gradually, thus keeping the runway level at all times, and keeping the bottom of the ditch level from start to finish. As the bucket is wider than the runway, the groove which it cuts in the ground is wider than the runway, and consequently the latter can follow down to any desired depth. In other words, the depth of the groove which the bucket can cut is not limited or determined by the extent to which it projects below the runway.

The bucket is upset when it reaches the downward inclined outer end portions X of the two tracks in which the wheels h' travel, the bucket being shown in dumping position in dotted lines in Fig. 1. In this way the bucket dumps at the end of its outward movement and the volume of dirt excavated is accumulated at the farther side of the ditch or trench, or at the farther side of the area being operated upon. If desired, however, the whole machine can be swung around on the turn table C, and in such case the contents of the bucket will then be dumped at the same side of the excavation at which the machine is standing, as shown more clearly in Fig. 2. Thus the excavated dirt can be discharged and accumulated at the side of the machine at which the excavation is being formed, or it can be transferred to the other side, depending upon the conditions and requirements of any particular case.

It will be understood, of course, that an excavator constructed in accordance with my invention may be used for digging ditches or trenches, or for constructing levees, or for removing an embankment or ridge of dirt, and that for this purpose it may be constructed to operate upon land or water, as may be found desirable, and without departing from the scope and spirit of my invention.

What I claim as my invention is:

1. In a drainage excavator, a pivoted runway, a bucket traveling back and forth upon and made wider than the runway, so as to cut a groove in the ground in which the runway may descend, said runway being adapted by its shape to determine the cross sectional contour of the ditch, and means for causing the bucket to fill by movement thereof away from the pivot or axis about which the runway is arranged to swing up and down.

2. In a drainage excavator, a pivoted runway adapted to descend into the ditch being excavated, said runway being adapted by its shape to determine the cross sectional contour of the ditch, a bucket traveling upon and made wider than the runway, whereby the latter may descend into the groove cut in the ground by the bucket, and means for raising

and lowering the pivoted end of the runway, by vertical movement thereof in a straight line.

3. In a drainage excavator, a pivoted runway, means for raising and lowering said runway vertically and bodily, a bucket traveling back and forth upon and made wider than the runway, whereby the latter may descend into the groove cut in the ground by the bucket, means for causing the bucket to fill by motion thereof away from the pivot or axis about which the runway is arranged to swing up and down, and means for causing the bucket to automatically discharge its load at the outer end of the runway.

4. In a drainage excavator, a pivoted runway, having the same shape or outline as the cross sectional outline desired for the trench or ditch, whereby the final cross sectional outline of the trench or ditch is determined by the shape or outline of the runway, a bucket traveling back and forth upon and made wider than the said runway, whereby the latter may descend into the groove cut into the ground by the bucket, means for operating the bucket, and means for raising and lowering the free outer end of the runway.

5. In a drainage excavator, a runway pivoted at one end to swing up and down, an excavating bucket and means for causing the same to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, and means for effecting a raising and lowering of the pivoted end of said runway.

6. In a drainage excavator, a runway arranged to swing up and down, an excavating bucket and means for causing the same to travel back and forth on the said runway and to fill by motion toward the outer end of the runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, to form the excavation, and means on the outer end of the runway for causing the bucket to automatically discharge its load before returning to starting point at the inner end of the runway.

7. In a drainage excavator, a substantially V-shaped runway pivoted at one end, means for raising and lowering the pivoted end of said runway, an excavating bucket and means for causing it to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, and means on the outer end portion of the runway for automatically causing the bucket to discharge its load.

8. In a drainage excavator, a vertically swinging runway, an excavating bucket and means for causing it to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, and means for effecting a vertical and bodily raising and lowering of the entire runway, whereby the depth of the ditch or trench may be varied without varying the slant or angle of the sides thereof.

9. In a drainage excavator, a runway, an excavating bucket and means for causing it to travel back and forth on the runway, and only between the two ends thereof, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, said runway having the same shape and slant at both sides of the ditch, whereby the shape of the runway alone determines the cross sectional outline of the ditch or trench.

10. In a drainage excavator, a runway having a definite shape, being substantially V-shaped when viewed from the side, with a rounded apex or bottom, an excavating bucket and means for causing the same to travel back and forth on the runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, means whereby the bucket dumps the load without leaving the runway, and provisions whereby the shape of the runway alone determines the cross sectional outline of ditches or trenches of different depths.

11. In a drainage excavator, a runway pivoted at one end to swing up and down, an excavating bucket and means for causing the same to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, the mouth of said bucket facing away from the excavator and toward the outer end of the runway, whereby the said bucket is caused to fill by movement away from the excavator, and means for effecting a raising and lowering of the pivoted end of said runway.

12. In a drainage excavator, a runway arranged to swing up and down, an excavating bucket and means for causing the same to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, to form the excavation, the mouth of said bucket facing away from the excavator and toward the outer end of the runway, whereby the said bucket is caused to fill by movement away from the excavator, and means on the outer end of the runway for causing the bucket to automatically discharge its load.

13. In a drainage excavator, a substantially V-shaped runway pivoted at one end, means for raising and lowering the pivoted end of said runway, an excavating bucket and means for causing it to travel back and

forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, the mouth of said bucket facing away from the excavator and toward the outer end of the runway, whereby the said bucket is caused to fill by movement away from the excavator, and means on the outer end portion of the runway for automatically causing the bucket to discharge its load.

14. In a drainage excavator, a vertically swinging runway, an excavating bucket and means for causing it to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, the mouth of said bucket facing away from the excavator and toward the outer end of the runway, whereby the said bucket is caused to fill by movement away from the excavator, and means for effecting a vertical and bodily raising and lowering of the runway, whereby the depth of the ditch or trench may be varied without varying the slant or angle of the sides thereof.

15. In a drainage excavator, a runway, an excavating bucket and means for causing it to travel back and forth on the runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, the mouth of said bucket facing away from the excavator and toward the outer end of the runway, whereby the said bucket is caused to fill by movement away from the excavator, said runway having the same shape and slant at both sides of the ditch, whereby the shape of the runway alone determines the cross sectional outline of the ditch or trench.

16. In a drainage excavator, a runway having a definite shape, being substantially V-shaped when viewed from the side, an excavating bucket and means for causing the same to travel back and forth on the runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, the mouth of said bucket facing away from the excavator and toward the outer end of the runway, whereby the said bucket is caused to fill by movement away from the excavator, and provisions whereby the shape of the runway alone determines the cross sectional outline of ditches or trenches of different depth.

17. In a drainage excavator, a runway pivoted at one end to swing up and down, an excavating bucket and means for causing the same to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, means for swinging the runway laterally, whereby the load may be dumped at either side of the ditch or trench, and means for effecting a raising and lowering of the pivoted end of said runway.

18. In a drainage excavator, a runway arranged to swing up and down, an excavating bucket and means for causing the same to travel back and forth on the said runway and to fill by motion toward the outer end of the runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, means for swinging the runway laterally, whereby the load may be dumped at either side of the ditch or trench, and means on the outer end of the runway for causing the bucket to automatically discharge its load before returning to starting point at the inner end of the runway.

19. In a drainage excavator, a substantially V-shaped runway pivoted at one end, means for raising and lowering the pivoted end of said runway, an excavating bucket and means for causing it to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, means for swinging the runway laterally, whereby the load may be dumped at either side of the ditch or trench, and means on the outer end portion of the runway for automatically causing the bucket to discharge its load.

20. In a drainage excavator, a vertically swinging runway, an excavating bucket and means for causing it to travel back and forth on the said runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, means for swinging the runway laterally, whereby the load may be dumped at either side of the ditch or trench, and means for effecting a vertical and bodily raising and lowering of the runway, whereby the depth of the ditch or trench may be varied without varying the slant or angle of the sides thereof.

21. In a drainage excavator, a runway, an excavating bucket and means for causing it to travel back and forth on the runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, means for swinging the runway laterally, whereby the load may be dumped at either side of the ditch or trench, said runway having the same shape and slant at both sides of the ditch, whereby the shape of the runway alone determines the cross sectional outline of the ditch or trench.

22. In a drainage excavator, a runway having a definite shape, being substantially V-shaped when viewed from the side, an excavating bucket and means for causing the same to travel back and forth on the runway, said bucket being wider than the runway to

permit the latter to descend into the groove cut in the ground by the bucket, means for swinging the runway laterally, whereby the load may be dumped at either side of the ditch or trench, and provisions whereby the shape of the runway alone determines the cross sectional outline of ditches or trenches of different depths.

23. In a drainage excavator, an excavating bucket and means for causing it to load or fill by movement thereof away from the excavator, a runway therefor, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, and means for causing the bucket to automatically discharge its load upon reaching the end of its movement away from the excavator, whereby the bucket must return to starting point after the load is discharged therefrom.

24. In a drainage excavator, an excavating bucket and means for causing it to load or fill by movement thereof away from the excavator, a runway therefor, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, and means serving automatically to upset the bucket at the end of its movement away from the excavator, whereby the load is dumped by an upsetting of the bucket before the return movement of the same to starting point.

25. In a drainage excavator, a swinging runway adapted to be raised and lowered in the excavation, an excavating bucket movable back and forth only on the runway, said bucket being wider than the runway to permit the latter to descend into the groove cut in the ground by the bucket, said bucket adapted to fill by movement thereof toward the free end of the runway.

Signed by me at Chicago, Illinois, this 7th day of December, 1908.

MORTON G. BUNNELL.

Witnesses:
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