

M. G. BUNNELL.
EXCAVATING MACHINE.
APPLICATION FILED SEPT. 2, 1908.

937,764.

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Fig. 1

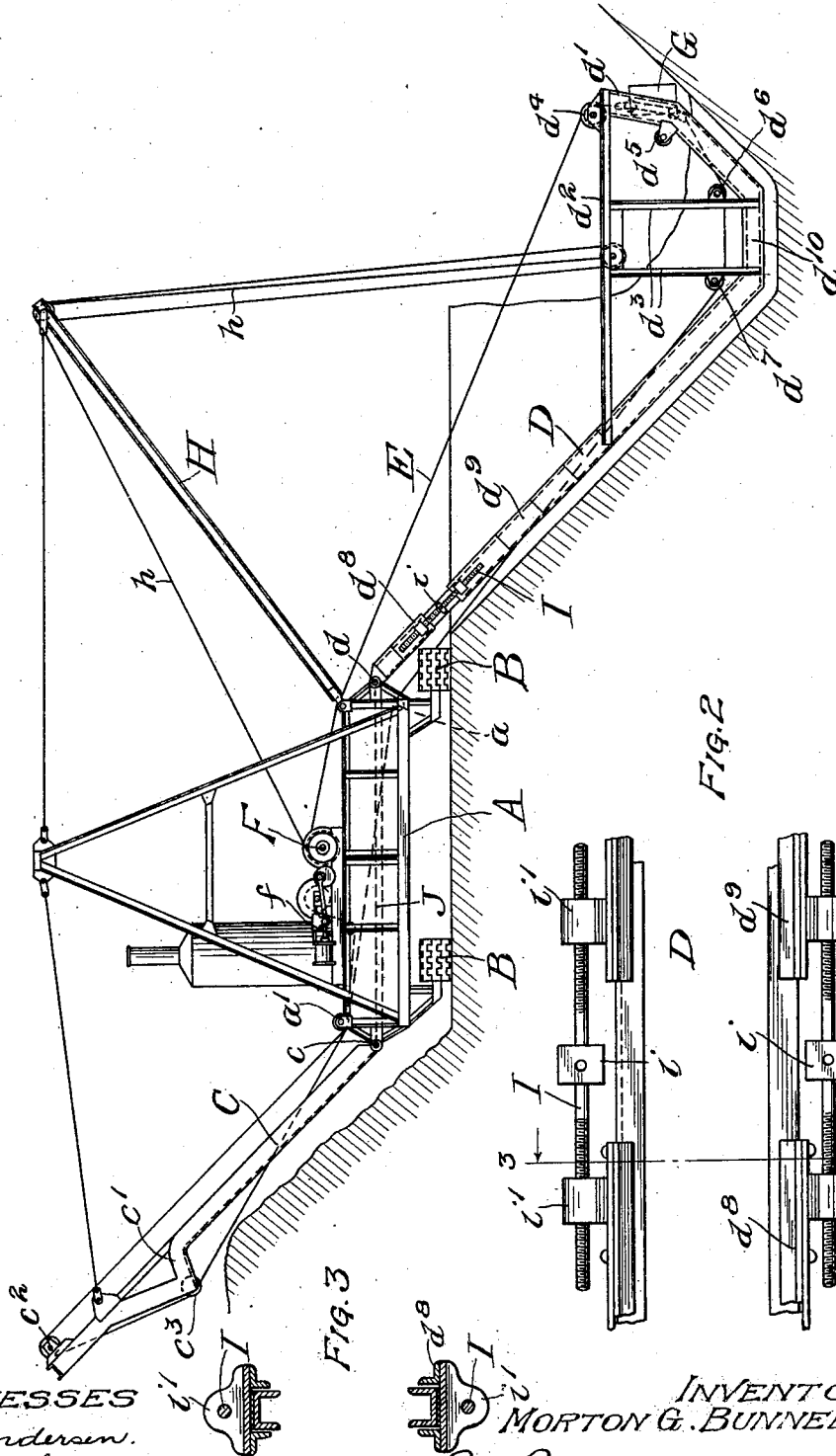


Fig. 2

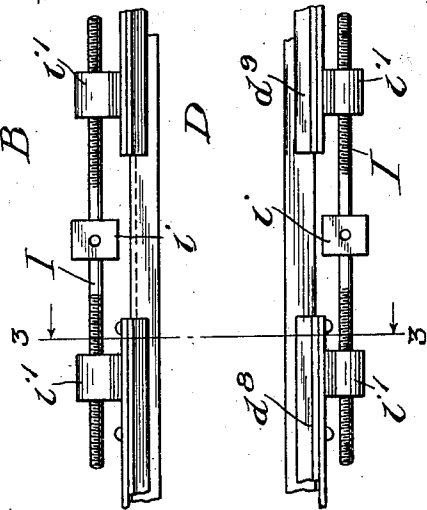


Fig. 3



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EXCAVATING-MACHINE.

937,764.

Specification of Letters Patent.

Patented Oct. 26, 1909.

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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 Excavating-Machines, of which the following is a specification.

My invention relates to excavating machines of the kind used in building levees.

It relates more especially to that type of levee builder employing a bucket that scoops up the dirt at one side of the machine and carries it across to the other side where it is then discharged onto the levee. As the machine travels along it forms an excavation at one side and a levee or embankment at the other. A swinging runway is provided that reaches into the excavation to guide the bucket in its back and forth movements. Means are provided for raising and lowering said runway about its axis to allow the bucket to work at different depths.

The object of my invention is the provision of means whereby the said runway can be lengthened and shortened at will, so as to regulate the operation and action of the bucket in the excavation, thereby insuring a level and straight floor or base for the ditch or excavation, notwithstanding that the machine may not be able to move along level ground, and even though the distance of the machine above the bottom line of the ditch may necessarily vary considerably, as in digging ditches or trenches of different depths as will hereinafter more fully appear.

In the accompanying drawings:—Figure 1 is a side elevation of an excavator embodying the principles of my invention, showing the manner in which the same forms an excavation at one side in order to obtain dirt to build the levee at the other side. Fig. 2 is an enlarged detail top plan view of the adjustable portion of the runway that guides the bucket into and out of the excavation. Fig. 3 is a cross section on line 3—3 in Fig. 2.

Thus illustrated, my invention comprises a body A supported for movement on trucks B of any suitable character. The runway C is composed of parallel guides secured together and pivoted at *c* to the levee side of the body. Said runway has an outer bent portion *c'* for upsetting the bucket, as will

hereinafter be explained. A sheave *c*² is mounted at the end of the runway, and a sheave *c*³ at the lowest part of the portion *c'*, as shown. At the excavating side of the machine a swinging runway D is pivoted to the body at *d*, said runway being composed of parallel guides. The said runway D has its lower end *d'* turned up to provide a starting place for the bucket, and horizontal and vertical braces *d*² and *d*³ are applied to said runway to give strength and rigidity thereto. Sheaves *d*⁴, *d*⁵, *d*⁶ and *d*⁷ are mounted on the lower upturned portion of the runway D, and a sheave *a* is mounted on the body A adjacent the point *d*. Another sheave *a'* is mounted on the other side of the machine adjacent the point *c*. An operating cable E runs around and upon all of said sheaves, from the arm or runway C across the body to the runway D, and is wound on the operating drum or windlass F driven by the engine *f*. Suitable means are provided for enabling the operator to control the motion of the cable at will. A bucket G is secured to said cable and provided with wheels that travel in the guides of the runway D, as well as in the guides of the runway C. As shown, the bucket is just starting down and around the lower end of the runway D, so as to fill with dirt. When it arrives at the portion *c'* the bucket overturns and dumps the load on to the levee. Then the motion of the cable is reversed and the bucket travels back to starting place *d'*, preparatory to getting another load.

A boom or derrick arm H projects from the side of the machine, and is equipped with a cable *h* for raising and lowering the runway D. Thus the runway can be lowered as fast as the bucket cuts its way into the ground, and can then be raised to give the bucket a fresh area to work on. It will be understood that the machine is moved a distance ahead each time it is desired to bring the bucket over new ground. Any suitable arrangement can be used for thus moving the machine.

In order to vary the length of the runway D, and thereby raise and lower it bodily for different depths of ditch, it is divided into upper and lower sections *d*⁸ and *d*⁹, which are so connected that the lower section is movable or adjustable toward and away from the upper section. For this purpose

the two sections are connected by adjusting screws I—I, one at each side of the runway. Each screw has right and left threads, as shown in Fig. 2, and a middle portion i by which it can be rotated in the threaded lugs i' on the two sections of the runway. By rotating these screws the two sections can be moved toward and away from each other and the length of the runway D thereby varied to insure proper regulation of the bucket in the excavation. The effect, more broadly stated, is to raise the runway bodily, and to lower it the same way, for different depths of ditch.

From the foregoing it will be seen that the line of the bottom or base of the ditch or excavation can be kept straight or level, notwithstanding that the machine itself may be compelled to travel over ground that first takes it up hill and then down. In this way the floor or bottom of the ditch or excavation can always be straight or level, which for work of this kind is obviously desirable, and which prior to my invention was not always possible in the use of a machine of this kind; for where the machine was compelled to go up and down over hilly ground, the floor of the ditch then had the same rise and fall or was not always level; and this was also true when it was desired to vary the depth of the ditch, as then the bottom would not be level. Now, however, and by means of my invention, the runway D can be lengthened when the machine goes up hill and shortened when the machine goes down hill, thus preserving the line or level desired for the base of the ditch. The bottom will be level at any ultimate depth of the ditch. When the runway is lengthened, the machine is steered away from the ditch, and when the runway is shortened, the machine is steered closer to the ditch. Thus the ditch can be made to take the desired course at all times and under varying conditions of the surface of the ground over which the trucks of the machine are forced to travel. Also, in making ditches of different depths the bottom will always be level.

The lifting cable h can be used for raising and lowering the runway D and the bucket, but it cannot be used for varying the depth of the ditch below the surface of the ground, because when the runway is moving up and down its bottom portion d^{10} (that forms the floor or base of the ditch) is given a different angle, and this would make one corner of the base of the ditch lower than the other—that is to say, the runway must always be lowered to a certain position, in order to secure a level floor or base for the ditch. By means of the screw I, however, the bottom of the runway D can be made to fall to a greater or less distance below the surface of the ground, without varying the shape of the floor or base of the

ditch in cross section. Thus, as explained, the required shape or character of the ditch can be preserved, even though the machine is forced to travel over rough or hilly ground. Further lengthening and shortening of the runway D can be obtained by dividing the section d^{10} into sub-sections which can be readily taken out and replaced, thus varying the length in accordance with requirements. When the right length is thus approximately obtained, the exact length can then be insured by a rotation of the screw I, in the manner explained. In addition to a vertical rise and fall about its axis, the runway which forms the ditch at one side of the machine has an up and down adjustment to keep the bottom of the ditch level at different depths. Also, with the specific arrangement shown, the said runway has a bodily adjustment toward and away from the side of the excavator. The track J is under the machine or body of the excavator and connects the two runways. One runway tends to counter-balance the other. Each runway is, of course, in the nature of an arm that reaches out from the side of the excavator.

What I claim as my invention is:—

1. In an excavator, a runway adapted to hang in the ditch, a bucket, means for moving the bucket along the runway, and means for varying the length of the runway.

2. In an excavator, an arm, a bucket, means for moving the bucket along the arm, and a pair of screws having right and left threads and means cooperating therewith for varying the length of said arm.

3. In an excavator, an arm, a bucket, means for moving the bucket along the arm, and means for varying the length of the arm, said arm composed of a plurality of endwise adjustable sections, the outer section having an upturned end to start the bucket down at one side of the ditch or excavation.

4. In an excavator, an arm, a bucket, means for moving the bucket along the arm, and a pair of screws having right and left threads and means cooperating therewith for varying the length of said arm, said arm composed of a plurality of endwise adjustable sections, the outer section having an upturned end to start the bucket down at one side of the ditch or excavation.

5. In an excavator, a runway adapted to hang in the ditch, a bucket, means for moving the bucket along the runway, means for varying the length of the runway, said runway pivoted at its upper end, and means for raising and lowering said runway.

6. In an excavator, an arm, a bucket, means for moving the bucket along the arm, a pair of screws having right and left threads and means cooperating therewith for varying the length of said arm, said arm

pivoted at its upper end, and means for raising and lowering said arm.

7. In an excavator, an arm, a bucket, means for moving the bucket along the arm, means for varying the length of the arm, a body to which said arm is pivoted, and a delivering arm at the other side of said body, said bucket adapted to travel from said first mentioned arm across the body to said delivering arm to discharge the load.

8. In an excavator, an arm, a bucket, means for moving the bucket along the arm, a pair of screws having right and left threads and means cooperating therewith for varying the length of said arm, a body to which said arm is pivoted, and a delivering arm at the other side of said body, said bucket adapted to travel from said first-mentioned arm across the body to said delivering arm to discharge the load.

9. In an excavator, a runway adapted to hang in the ditch, a bucket, means for moving the bucket along the runway, and means for varying the length of the runway, the means for operating said bucket consisting of a cable operated by a power driven drum or windlass.

10. In an excavator, a runway adapted to hang in the ditch, a bucket, means for moving the bucket along the runway, and a pair of screws having right and left threads and means cooperating therewith for varying the length of said runway, the means for operating said bucket consisting of a cable operated by a power driven drum or windlass.

11. The improved excavator, the same having a bodily adjustable and swinging runway for a traveling excavating bucket, substantially as shown and described.

12. In an excavator, a pivoted runway, a bucket, means for causing the bucket to travel back and forth on the runway, means for adjusting the runway bodily up and down for different depths of ditch, and means for raising and lowering the runway about its pivot.

13. In an excavator, a pivoted runway, a bucket, means for causing the bucket to travel back and forth on the runway, means for suitably adjusting the runway to keep the bottom of the ditch level for all depths thereof, and means for raising and lowering the runway about its pivot.

14. In an excavator, a swinging runway adapted to hang in the ditch and determine the cross sectional outline thereof, means for raising and lowering the outer end of the runway about an axis at its inner end, a bucket, means for causing the bucket to travel back and forth on the runway, and means at the inner end of the runway for adjusting the runway bodily up and down for different depths of ditch.

15. In an excavator, a pivoted runway, a bucket, means for operating the bucket along

the runway, devices for lowering the outer end of the runway as the excavation progresses, and means disposed above ground for adjusting the runway up and down for different depths of excavation.

16. In an excavator, a pivoted runway adapted to hang in the ditch, an excavating bucket, means for causing the bucket to travel back and forth on the runway, means for raising and lowering the outer end of the runway, and means for varying the depth at which the bottom of the runway assumes a level position in the downward swing thereof.

17. In an excavator, a pivoted runway, an excavating bucket thereon, means at or near the pivot of the runway for suitably raising and lowering the latter, and means for swinging the runway up and down about its pivot.

18. In an excavator, a runway, a bucket and means for causing it to travel back and forth on the runway, and devices for adjusting the runway bodily and horizontally in a direction crosswise of the ditch.

19. In an excavator, a runway, a pivot for one end of the runway, means for swinging the runway up and down about its pivot, devices for adjusting the runway bodily and horizontally toward and away from the side of the excavator, and a bucket and means for causing it to travel back and forth on the runway.

20. In an excavator, a bucket runway, means for raising and lowering the runway, and devices for adjusting the runway for different depths of ditch.

21. In an excavator, a bucket runway, and devices for adjusting the same bodily and in a direction transverse of the ditch.

22. An excavator comprising a pivoted runway, a bucket, means for causing the bucket to travel back and forth on the runway, means for adjusting the runway up and down for different depths of ditch, and means for raising and lowering the runway about its pivot, said bucket being disposed in position to fill by movement thereof toward the pivoted end of the runway.

23. An excavator comprising a pivoted runway, a bucket, means for causing the bucket to travel back and forth on the runway, means for adjusting the runway to keep the bottom of the ditch level for all depths thereof, and means for raising and lowering the runway about its pivot, said bucket being disposed in position to fill by movement thereof toward the side of the excavator and the inner end of the runway.

24. An excavator comprising a swinging runway adapted to hang in the ditch and determine the cross sectional outline thereof, means for raising and lowering the outer end of the runway about an axis at its inner end, a bucket, means for causing the bucket to

travel back and forth on the runway, and means for adjusting the runway up and down for different depths of ditch, said bucket being disposed in position to fill only
 5 by movement thereof toward the inner end of the runway, whereby it runs idle in the other direction.

25. An excavator comprising a pivoted double runway, a bucket, means for operating the bucket along the runway, devices for lowering the outer end of the runway as the excavation progresses, and means for adjusting the runway up and down for different depths of excavation, said bucket being disposed
 10 between the two sides of the runway and in position to fill by movement thereof toward the inner end of the runway.

26. An excavator comprising a pivoted runway adapted to hang in the ditch, an excavating bucket, means for causing the bucket to travel back and forth on the runway, means for raising and lowering the outer end of the runway, and means for varying the depth at which the bottom of the runway
 20 assumes a level position in the downward swing thereof, said bucket being disposed in position to fill by movement thereof toward the inner end of the runway, and toward the point of discharge.

27. An excavator comprising a pivoted runway, an excavating bucket thereon, means at the pivoted end of the runway for raising and lowering the latter, and means for swinging the runway up and down about
 30 its pivot, said bucket being disposed in position to fill by movement thereof toward the point of discharge.

28. An excavator comprising a runway, a bucket and means for causing it to travel back and forth on the runway, and devices for adjusting the runway bodily and in a direction crosswise of the ditch, said bucket being
 40 disposed in position to fill by movement thereof toward one end of the runway.

29. An excavator comprising a runway, a pivot for one end of the runway, means for swinging the runway up and down about its pivot, devices for adjusting the runway bodily toward and away from the excavator, and a bucket and means for causing it to
 50 travel back and forth on the runway, said bucket being disposed in position to fill by movement thereof toward the pivoted end of the runway.

30. An excavator comprising a pivoted bucket runway, means for raising and lowering the runway, and devices for adjusting the runway for different depths of ditch, said bucket being disposed in position to fill
 60 by movement thereof toward one end of the runway, and toward the point of discharge.

31. An excavator comprising an outwardly extending bucket runway, and devices for adjusting the same bodily and in

a direction transverse of the ditch, the bucket being disposed in position to fill by movement thereof toward the inner end of the runway.

32. The combination of a pivoted runway, a bucket, means for causing the bucket to travel back and forth on the runway, means for adjusting the runway up and down for different depths of ditch, means for raising and lowering the runway about its pivot, and a body adapted to travel entirely at one
 70 side of the ditch.

33. The combination of a pivoted runway, a bucket, means for causing the bucket to travel back and forth on the runway, means for adjusting the runway to keep the bottom of the ditch level for all depths thereof, means for raising and lowering the runway about its pivot, and a body adapted to stand
 80 entirely at one side of the ditch.

34. The combination of a swinging runway adapted to hang in the ditch and determine the cross sectional outline thereof, means for raising and lowering the outer end of the runway about an axis at its inner end, a bucket, means for causing the bucket
 90 to travel back and forth on the runway, means for adjusting the runway up and down for different depths of ditch, and a body adapted to travel entirely between the dump and one side of the ditch.

35. The combination of a pivoted runway, a bucket, means for operating the bucket along the runway, devices for lowering the outer end of the runway as the excavation progresses, means for adjusting the runway up and down for different depths of excavation, and a body supporting all of said elements and adapted to stand between the
 100 dump and one side of the ditch.

36. The combination of a pivoted runway adapted to hang in the ditch, an excavating bucket, means for causing the bucket to travel back and forth on the runway, means for raising and lowering the outer end of the runway, means for varying the depth at which the bottom of the runway assumes a level position in the downward swing thereof, and a body to one side of which the runway is pivoted adapted to travel at one side
 110 of the ditch.

37. The combination of a pivoted runway, an excavating bucket thereon, means at the pivoted end of the runway for raising and lowering the latter, means for swinging the runway up and down about its pivot, and a body to one side of which the runway is pivoted at a fixed point, adapted to travel at one side of the ditch.

38. The combination of a runway, a bucket and means for causing it to travel back and forth on the runway, devices for adjusting the runway bodily and in a direction crosswise of the ditch, and a body rela-

tive to which the runway is adjustable, adapted to stand entirely at one side of the ditch.

39. The combination of a runway, a pivot
5 for one end of the runway, means for swinging the runway up and down about its pivot, devices for adjusting the runway bodily toward and away from the excavator, a
10 bucket and means for causing it to travel back and forth on the runway, and a body carrying the entire operating equipment, including a power operated drum or windlass for controlling the bucket, adapted to travel therewith entirely at one side of the ditch.

15 40. The combination of a pivoted bucket runway, means for raising and lowering the runway, devices for adjusting the runway for different depths of ditch, and an excavator body or platform adapted to travel
20 entirely at one side of the ditch.

41. The combination of a bucket runway, devices for adjusting the same bodily and in a direction transverse of the ditch, and a body upon which the said runway is suitably mounted, adapted to travel at one side
25 of the ditch.

42. In a machine of the class described, a pivoted runway, a bucket, means for causing the bucket to travel back and forth on the
30 runway, means for adjusting the runway up and down for different depths of ditch, means for raising and lowering the runway about its pivot, and another runway for carrying the bucket to a suitable position
35 for dumping the load.

43. In a machine of the class described, a pivoted runway, a bucket, means for causing the bucket to travel back and forth on the
40 runway, means for adjusting the runway to keep the bottom of the ditch level for all depths thereof, means for raising and lowering the runway about its pivot, and another pivoted runway for carrying the bucket to a suitable position for dumping the load.

45 44. In a machine of the class described, a swinging runway adapted to hang in the ditch and determine the cross sectional outline thereof, means for raising and lowering the outer end of the runway about an axis
50 at its inner end, a bucket, means for causing the bucket to travel back and forth on the runway, means for adjusting the runway up and down for different depths of ditch, and another runway for carrying the bucket to
55 a suitable position for dumping the load at the other side of the machine.

45. In a machine of the class described, a pivoted runway, a bucket, means for operating the bucket along the runway, devices for
60 lowering the outer end of the runway as the excavation progresses, means for adjusting the runway up and down for different depths of excavation, and another runway for carrying

the bucket to a suitable position for dumping the load, provided with means for
65 automatically upsetting the bucket.

46. In a machine of the class described, a pivoted runway adapted to hang in the ditch, an excavating bucket, means for causing the bucket to travel back and forth on
70 the runway, means for raising and lowering the outer end of the runway, means for varying the depth at which the bottom of the runway assumes a level position in the downward swing thereof, another runway
75 for carrying the bucket to a suitable position for dumping the load, and a connecting track between the two runways.

47. In a machine of the class described, a pivoted runway, an excavating bucket thereon, means at the pivoted end of the runway for raising and lowering the latter, means
80 for swinging the runway up and down about its pivot, and another runway for counterbalancing the first runway, and for carrying the bucket to a suitable position for dumping
85 the load.

48. In a machine of the class described, a runway, a bucket and means for causing it to travel back and forth on the runway, devices for adjusting the runway bodily and in a direction crosswise of the ditch, and another runway for carrying the bucket to a suitable position for dumping the load at a distance from the side of the ditch at which
90 the machine starts.

49. In a machine of the class described, a runway, a pivot for one end of the runway, means for swinging the runway up and down about its pivot, devices for adjusting
100 the runway bodily toward and away from the excavator, a bucket and means for causing it to travel back and forth on the runway, another pivoted runway for carrying the bucket to a suitable position for dumping
105 the load, and a straight horizontal track connecting the two pivoted ends of said runway.

50. In a machine of the class described, a pivoted bucket runway, means for raising and lowering the runway, devices for adjusting the runway for different depths of ditch, and a track for carrying the bucket to a suitable position for dumping the load.

51. In a machine of the class described, a bucket runway, devices for adjusting the same bodily and in a direction transverse of the ditch, and a horizontal track under the machine for carrying the bucket to a suitable position for dumping the load.
120

Signed by me at Chicago, Illinois, this
22nd day of August, 1908.

MORTON G. BUNNELL.

Witnesses:

C. E. TAYLOR,
ELLEN CLEGG.