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G. W. COWGILL, ADMINISTRATOR.  
DITCH DIGGING MACHINE.  
APPLICATION FILED APR. 28, 1908.

912,937.

Patented Feb. 16, 1909.

3 SHEETS—SHEET 1.

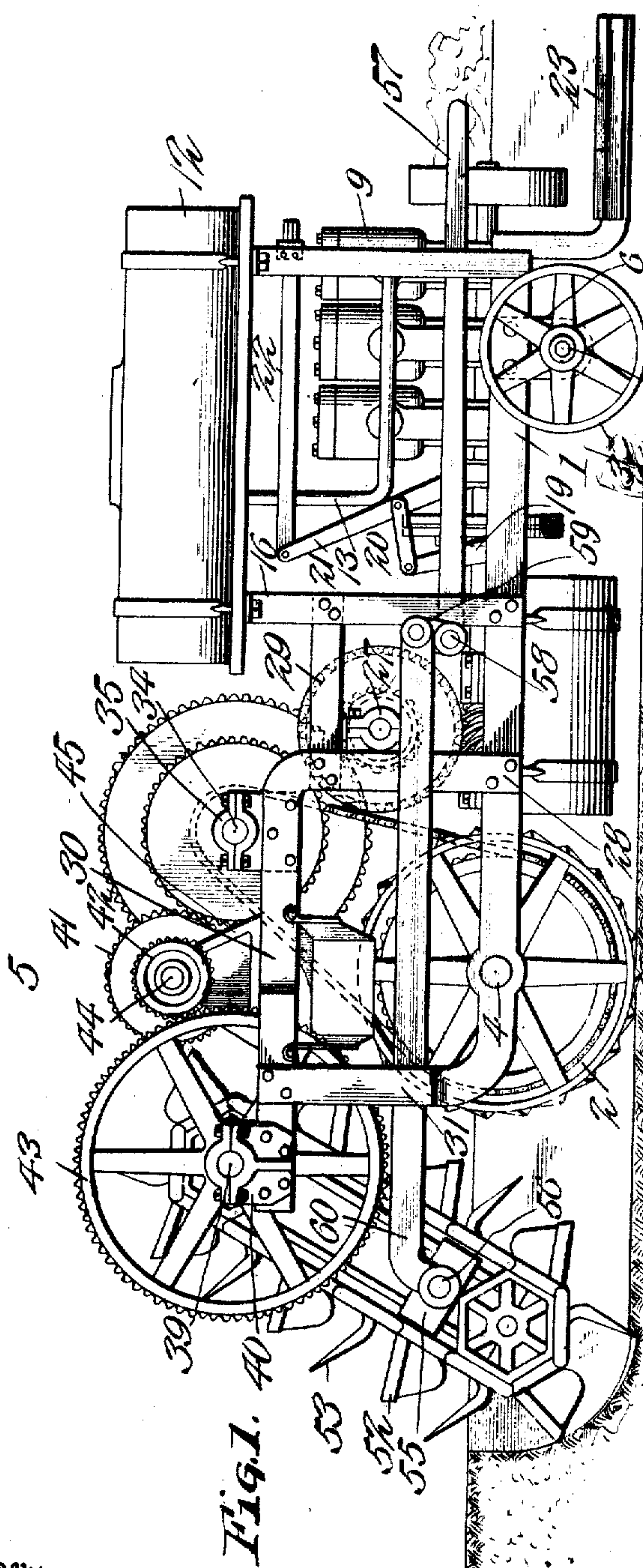


Fig. 1.

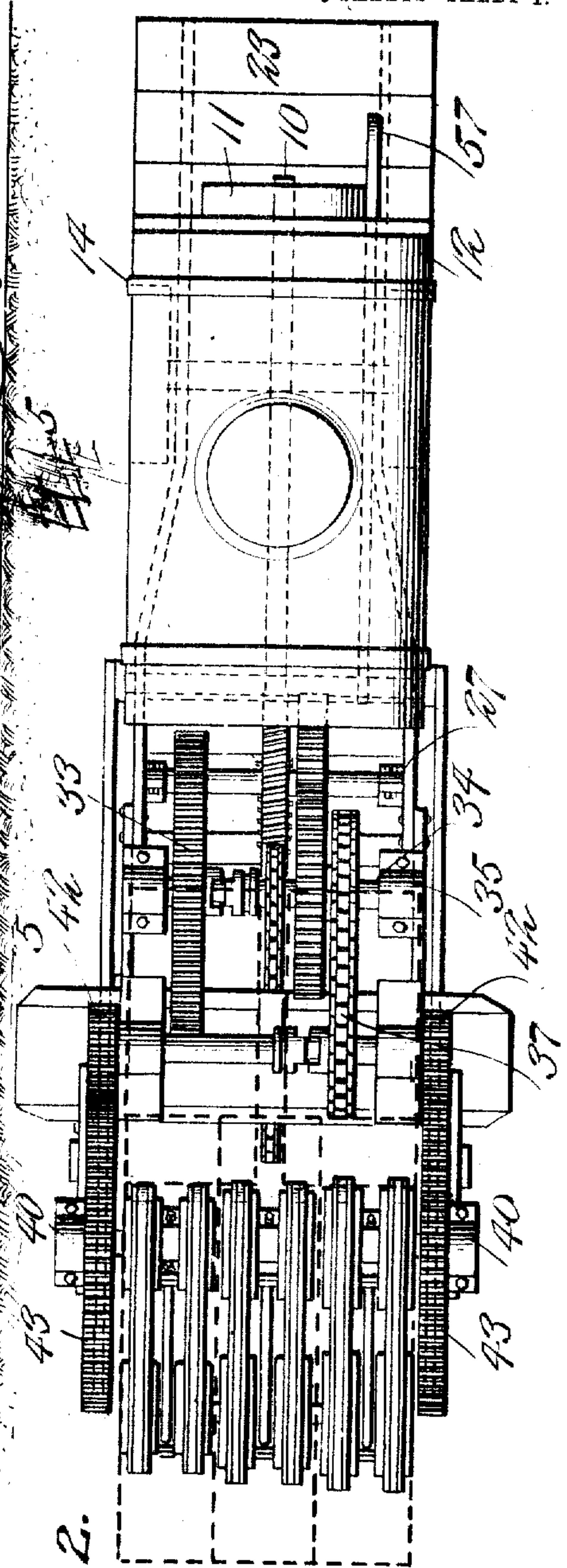


Fig. 2.

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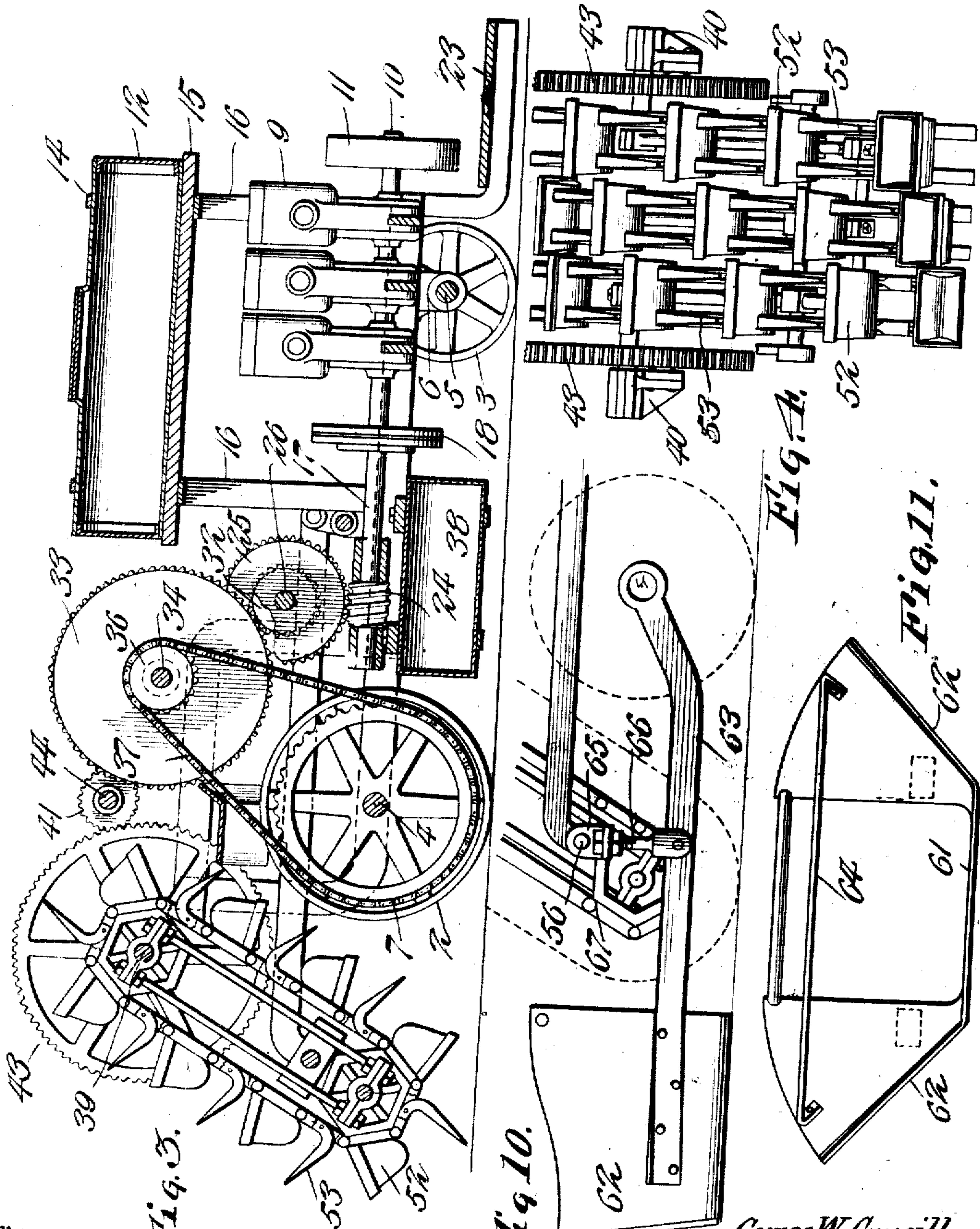
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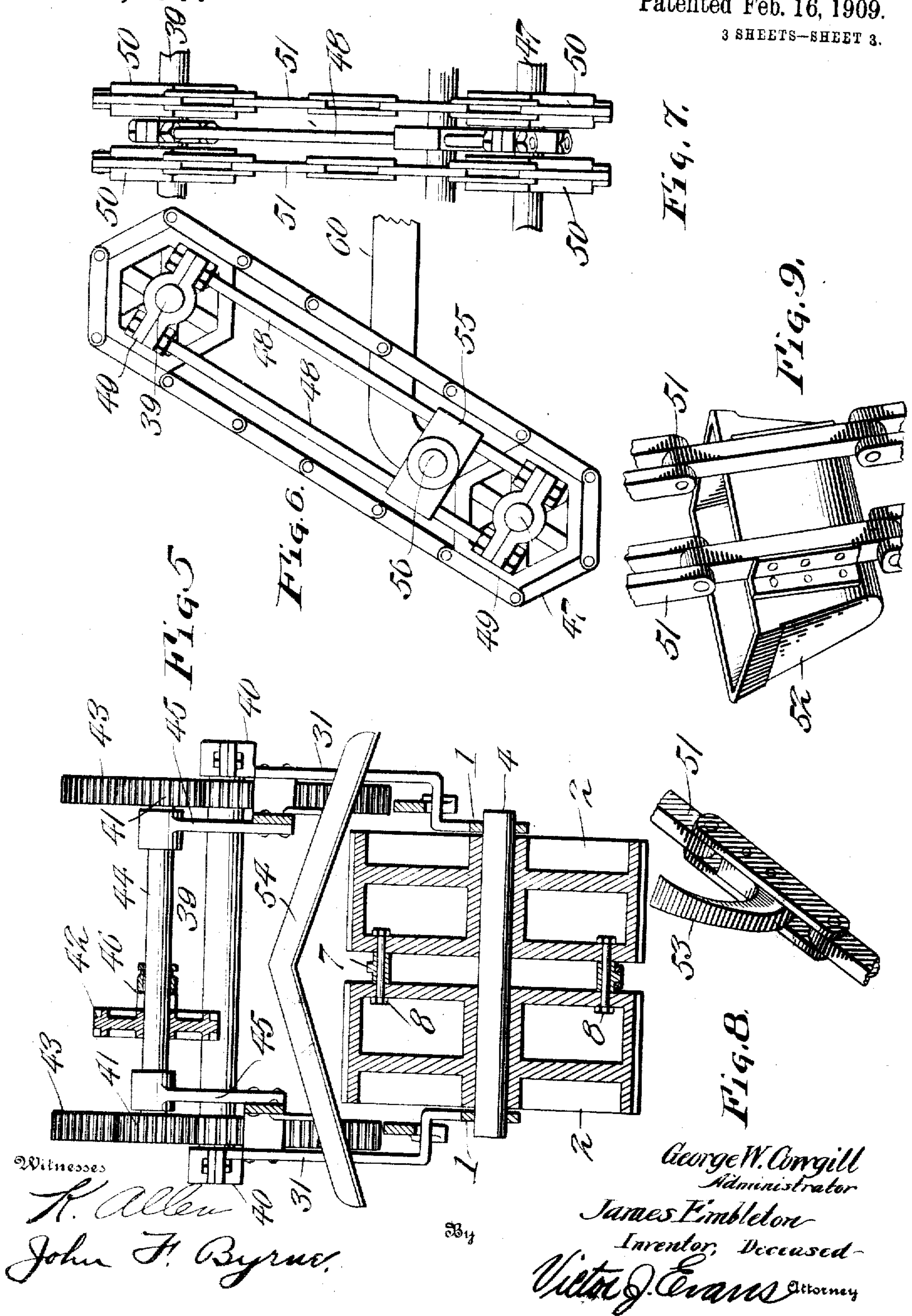
Fig. 10.  
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

GEORGE W. COWGILL, OF PHOENIX, ARIZONA TERRITORY, ADMINISTRATOR OF JAMES EMBLETON, DECEASED.

## DITCH-DIGGING MACHINE.

No. 912,937.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed April 28, 1908. Serial No. 429,761.

*To all whom it may concern:*

Be it known that I, GEORGE W. COWGILL, administrator of the estate of JAMES EMBLETON, deceased, a citizen of the United States of America, residing at Phoenix, in the county of Maricopa and Territory of Arizona, present JAMES EMBLETON'S Improvements in Ditch-Digging Machines, of which the following is a specification.

10 The invention relates to improvements in excavating machines, and its primary object is to provide a device of this character which is especially designed for digging irrigating ditches, one which is simple, durable and  
15 efficient, and which can be manufactured and sold at a comparatively low cost.

A further object of the invention is the provision of a ditch digging machine wherein the excavating mechanism is constructed  
20 to reduce the cutting resistance to the minimum.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter described, claimed and illustrated in the accompanying drawings, wherein:

Figure 1 is a view in side elevation of a ditch digging machine constructed in accordance with the invention. Fig. 2 is a  
30 top plan view thereof. Fig. 3 is a sectional view taken on a vertical plane extending centrally and longitudinally through the machine. Fig. 4 is a view in front elevation of a portion of the excavating mechanism.  
35 Fig. 5 is a sectional view taken on a plane indicated by the line 5—5 of Fig. 1, looking in the direction indicated by the arrow. Fig. 6 is a view in side elevation of a portion of one of the frames of the excavating mechanism. Fig. 7 is a view in front elevation thereof. Fig. 8 is a detail perspective view of one of the soil loosening teeth of the excavating mechanism. Fig. 9 is a detail perspective view of one of the scoops of the excavating mechanism. Fig. 10 is a view in  
45 side elevation of the means by which the slopes of the ditch are made, and of the means by which the slope former is secured in applied position, and Fig. 11 is a view in  
50 front elevation of the slope former.

Referring to the drawings by reference numerals, 1 designates a pair of relatively spaced parallel beams or girders, which are suitably united and braced to provide a

strong, durable and efficient frame for the improved ditch digging machine.

2 designates a pair of front supporting and traction wheels, and 3 a pair of rear supporting wheels. The front wheels 2 are secured to a shaft 4 journaled in the side beams or girders 1, while the wheels 3 are secured to a shaft 5 journaled in brackets 6 secured to the side beams or girders 1. A sprocket wheel 7 is secured between and to the front wheels 2 by means of bolts 8, see  
65 Fig. 5 of the drawings. A plurality of explosive engines 9 are mounted upon the rear end of the frame of the machine above the wheels 3, and the shaft 10 thereof is provided with a balance wheel 11. The engines  
70 9 are supplied with motive fluid from a tank 12 by means of a pipe 13. The tank 12 is secured by means of strips 14 to a platform 15, which is supported above the engines 9 on standards 16. The standards 16 are se-  
75 cured to the side beams or girders 1 of the frame of the machine and rise vertically therefrom.

A power shaft 17 is journaled on the frame of the machine and is adapted to be  
80 connected with and disconnected from the engine shaft 10 by means of a clutch 18. The movable member of the clutch 18 is connected to a lever 19, which in turn is connected by means of a link 20 to a lever  
85 21. The lever 21 is secured to a longitudinally movable rod 22, the operating end of which is disposed above a platform 23, the platform being adapted to support the operator of the ditch digging machine. A worm  
90 24 is keyed to the driving shaft 17 and meshes with a worm gear 25 which is keyed to a shaft 26. The shaft 26 is journaled in bearings 27 secured to vertical standards 28, said standards being strengthened by means  
95 of braces 29 which are secured thereto and to the standard 16. Beams 30 are projected forwardly from the standards 28 and are supported at their front ends by means of standards 31 secured to and preferably  
100 formed integrally with the side beams or girders 1 of the frame. The shaft 26 is provided with a gear wheel 32 which meshes with a larger gear wheel 33 secured to a shaft 34. The shaft 34 is journaled in bear-  
105 ing brackets 35 secured to the beams 30. A small sprocket 36 is secured to the shaft 34 and is connected with the sprocket 7 of



the front supporting and traction wheels by means of a sprocket chain 37.

When it is desired to set the improved ditch digging machine in motion, it is only necessary to start the engines 9 and throw the relatively movable member of the clutch 18 into engagement with the relatively stationary member thereof. The relatively movable member of the clutch 18 is adapted to be operated through the medium of the rod 22. The shaft 17 is adapted to be driven from the engine shaft 10 and is adapted to impart motion to the front supporting and traction wheels 2. A tank 38 is secured to the underside of the frame of the machine and is adapted to carry water for cooling the cylinders of the engines 9.

A shaft 39 is journaled in bearing brackets 40 secured to the beams 30 and is adapted to be rotated from the shaft 34 through a train of gears 41, 42 and 43. The gears 41 and 42 are secured to a shaft 44 journaled in bearing brackets 45 secured to the beams 30, and the gears 43 are secured to the shaft 39. A clutch 46 is mounted upon the shaft 44 and connected with the gear 42, said clutch providing means by which the excavating mechanism can be thrown into and out of operation, said mechanism being adapted to be carried by the shaft 39. A shaft 47 is supported in parallel alinement with the shaft 39 by means of rods 48 which are secured to bearing blocks 49 carried by the shafts. Pairs of polygonal wheels 50 are secured to the shafts 39 and 47, the wheels of each pair being vertically alined. Sprocket chains 51 are mounted upon the wheels 50, and scoops 52 and soil loosening teeth 53 are secured to each pair of chains 51. The teeth 53 and scoops 52 are alternately arranged, and the teeth project beyond the planes of the scoops.

During the operation of the excavating mechanism the teeth engage and loosen the soil and the scoops engage and pick up the soil after the same has been loosened by the teeth. The teeth and scoops of one pair of the chains constitute a set of excavating devices. The teeth of one set of excavating devices are alined in a horizontal direction with the scoops of the next adjacent set of excavating devices. The relative arrangement of the teeth and scoops of each set of excavating devices and the relative arrangement between the teeth and scoops of the different sets of excavating devices are such as to reduce the cutting resistance to the minimum. The scoops deposit the soil on a delivery device 54, which is adapted to deposit the soil on each side of the ditch. The delivery device consists of a pair of chutes which incline downwardly and laterally from the longitudinal center of the machine, said scoops projecting at a suitable distance beyond the sides of the machine. The ex-

avating mechanism has a transverse extent greater than the gage of the wheels, whereby to enable the machine to travel in a ditch. As the machine travels in the ditch it is always supported by a hard level surface. As the shaft 47 is suspended from the shaft 39, the lower end of the excavating mechanism may be moved to and held at any point in the arc of a circle. In view of such adjustability of the lower end of the excavating mechanism, the cutting depth of the teeth 53 may be regulated. Blocks 55 are secured to each pair of rods 28 and are connected by rods 56. The lower end of the cutting mechanism may be adjusted through the medium of a lever 57 which has its operating end disposed above the platform 23 and which is secured at its opposite end to a rock shaft 58. Crank arms 59 are secured to the shaft 58 and link bars 60 are secured to the crank arms 59 and to the shaft 56. The connection between the lever 57 and the blocks 55 is such that when the lever is moved upwardly the lower end of excavating mechanism is adjusted to decrease the cutting depth of the teeth 53, while when the lever is moved in the reverse direction the lower end of excavating mechanism is adjusted to increase the cutting depth of the teeth.

The machine as above described is adapted to dig a ditch with vertical side walls. To provide the ditch with laterally inclined side walls, there is provided the device disclosed in Figs. 10 and 11 of the drawings, which device is hereinafter referred to as slope former. The slope former is substantially in the form of a scoop comprising a bottom wall 61 and laterally diverging side walls 62. The edges of the bottom and each side wall are sharpened to provide the slope former with a cutting edge. The slope former is adapted to be secured in advance of the excavating mechanism by means of bars 63, which are secured to the side walls thereof and which are adapted to be secured to the shaft 4 of the machine. The side walls 62 of the slope former are curved inwardly to direct the soil in position to be gathered up by the scoops 52, and the side walls are prevented from lateral distortion by means of a brace 64. The scoop may be adjusted vertically by means of brackets 65 carried by the rod 56 and bolts 66 secured to the bars 63 and passing freely through the brackets 65. Nuts 67 are mounted on the threaded ends of the bolts 56 to secure them in their adjusted positions. It is to be understood that the slope of the former is only used after the ditch has been dug.

From the foregoing description taken in connection with the accompanying drawings, the construction and mode of operation of the invention should be understood without a further extended description.

Changes in the form, proportions, and



minor details of construction may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

5 Having fully described and illustrated the invention, what is claimed is:

1. A ditch digging machine comprising a wheeled frame, propelling means mounted on the frame and connected with the propelling wheels, an excavating mechanism mounted on the frame and connected with the propelling wheels, said excavating mechanism consisting of a shaft journaled on the frame, another shaft, means adapted to support said other shaft on the shaft journaled on the frame, wheels mounted upon the shaft, a chain mounted on the wheels, scoops secured to the chain, teeth secured to the chain, a rock shaft journaled on the frame, a connection between the rock shaft and said means, and a lever secured to the rock shaft.

2. A ditch digging machine comprising a wheeled frame, propelling means mounted on the frame and connected with the wheels, an excavating mechanism mounted on the frame and connected with the propelling means, and a slope former secured to the frame.

3. A ditch digging machine comprising a wheeled frame, propelling means mounted on the frame and connected with the wheels, an excavating mechanism mounted on the frame and connected with the propelling means, and a slope former secured to the frame, said slope former consisting of a bottom wall and laterally diverging side walls, said side walls being bent inwardly in the direction of their inner ends to guide the soil onto the excavating mechanism.

4. A ditch digging machine comprising a wheeled frame, a propelling means mounted

on the frame and connected with the wheels, the excavating mechanism mounted on the frame and connected with the propelling means, a slope former, and means adapted to adjustably and detachably secure the slope former to the frame.

5. A ditch digging machine including an excavating mechanism which consists of sets of digging devices, each set of digging devices comprising alternately arranged scoops and teeth, the teeth of one set of digging devices being aligned horizontally with the scoops of the next adjacent set of digging devices.

6. The combination with a ditch digging machine, of a slope former secured thereto.

7. The combination with a ditch digging machine, of a slope former secured thereto, said slope former being disposed in advance of the excavating mechanism of the machine.

8. The combination with a ditch digging machine, of a slope former adjustably secured thereto.

9. A ditch digging machine including a slope former which comprises a scoop, and means by which the scoop may be adjustably and detachably secured in applied position.

10. An excavating machine including a slope former which comprises a scoop and means adapted to detachably secure the scoop in applied position.

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

GEORGE W. COWGILL,  
*Administrator of the estate of James Embleton.*

Witnesses:

ALICE S. HINE,  
CHESTER A. WOLFE.