March 13, 1951 R. E. WEAVER 2,544,815

DITCH DIGGING MACHINE

Filed Aug. 10, 1945 4 Sheets-Sheet 1

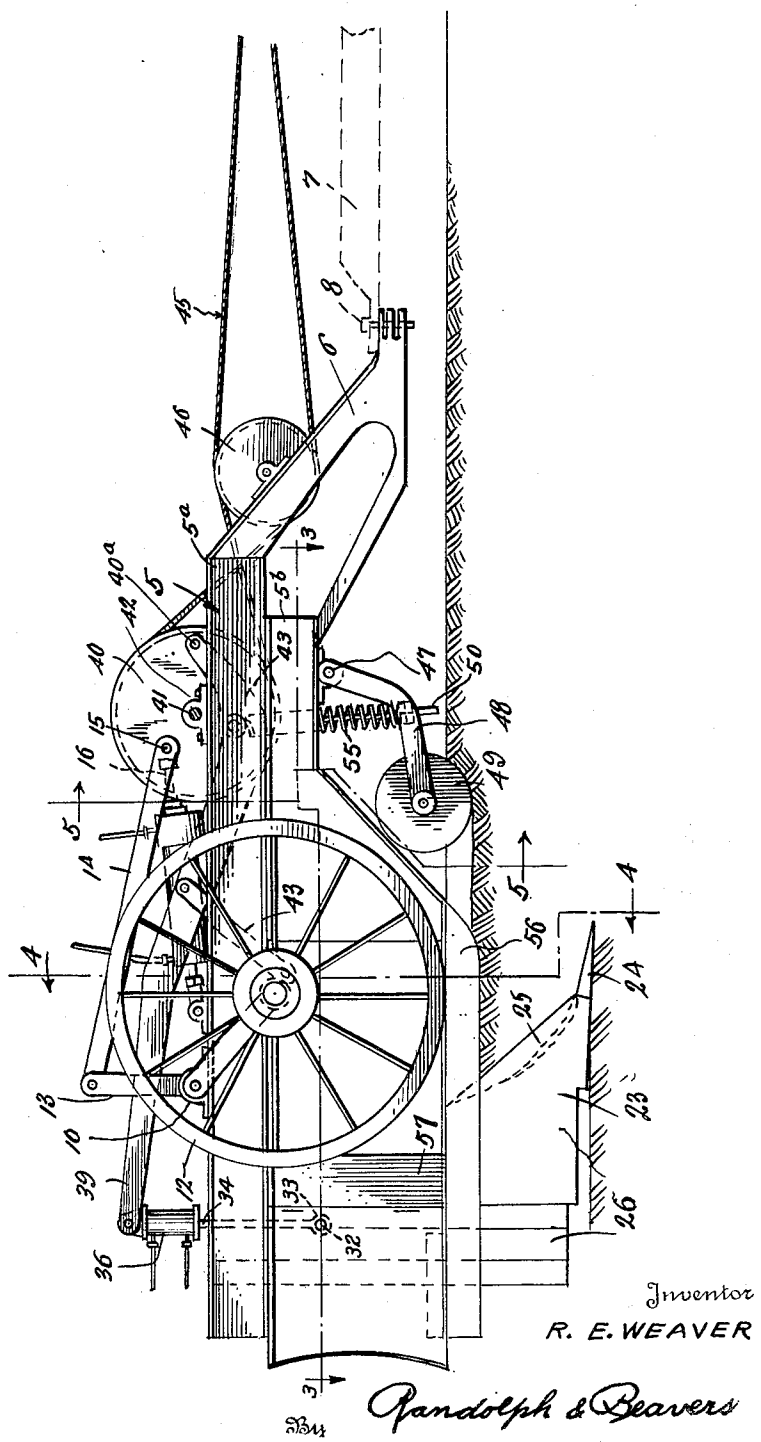


Fig. 1.

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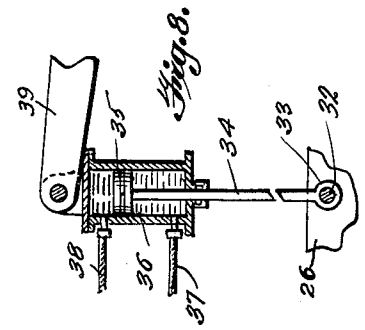
By Randolph & Beavers

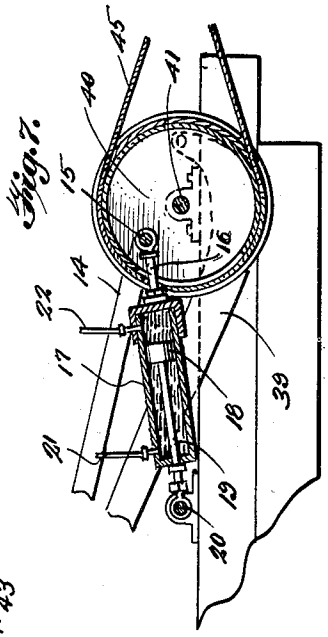
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DITCH DIGGING MACHINE

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DITCH DIGGING MACHINE

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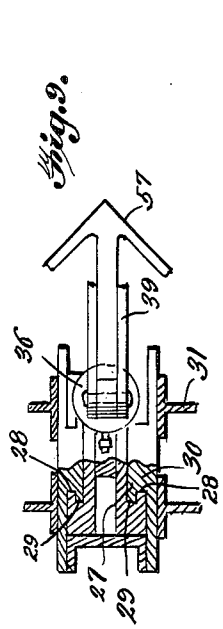


Fig. 9.

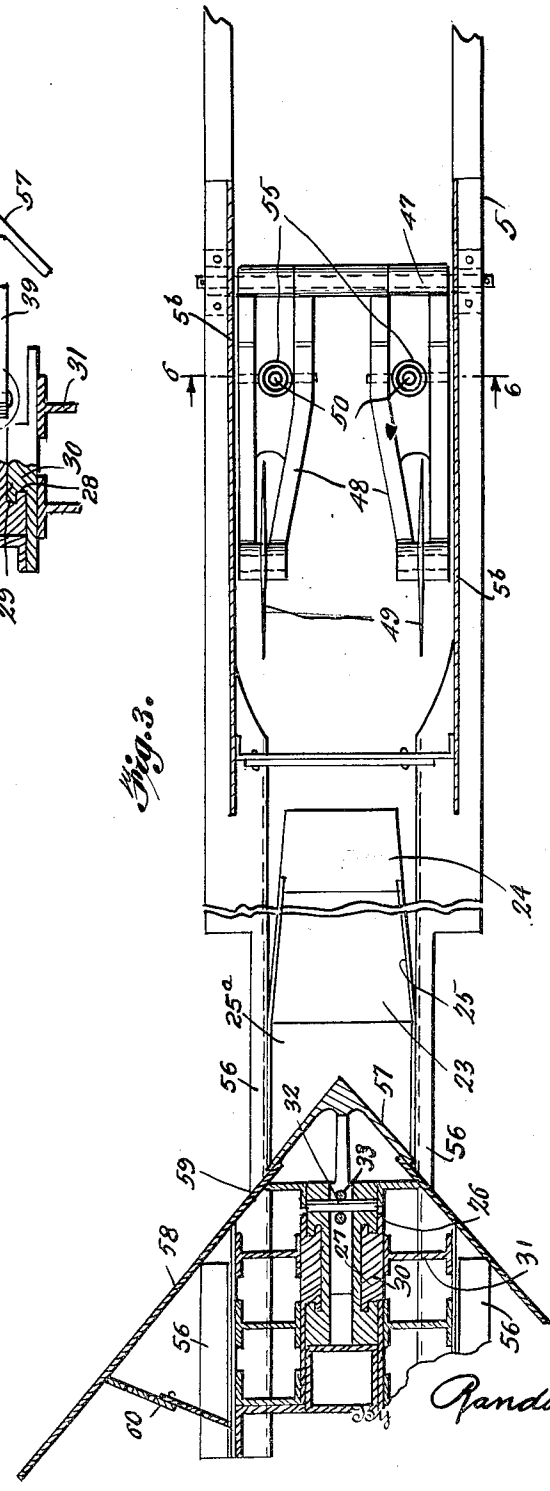


Fig. 3.

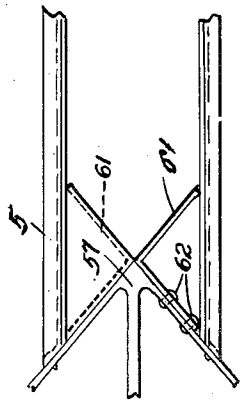


Fig. 10.

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DITCH DIGGING MACHINE

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Fig. 4.

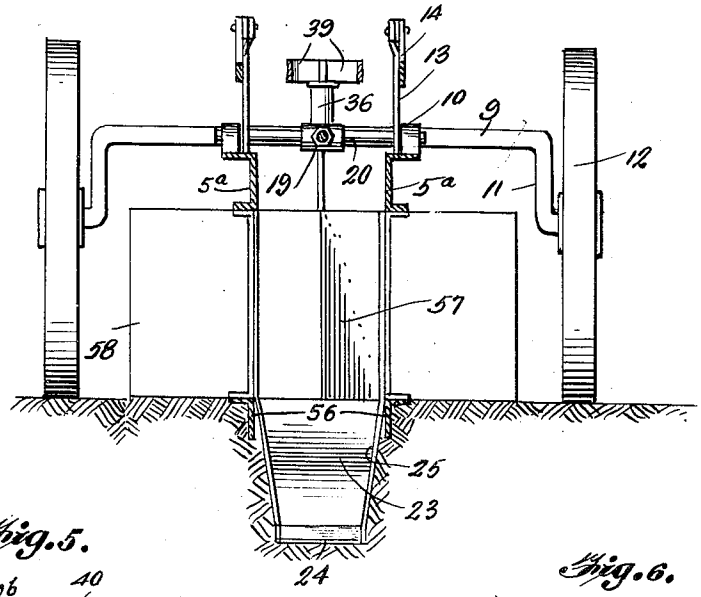


Fig. 5.

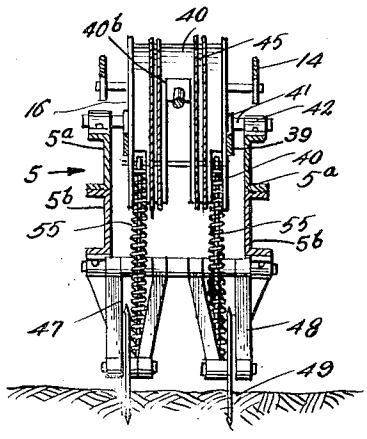


Fig. 6.

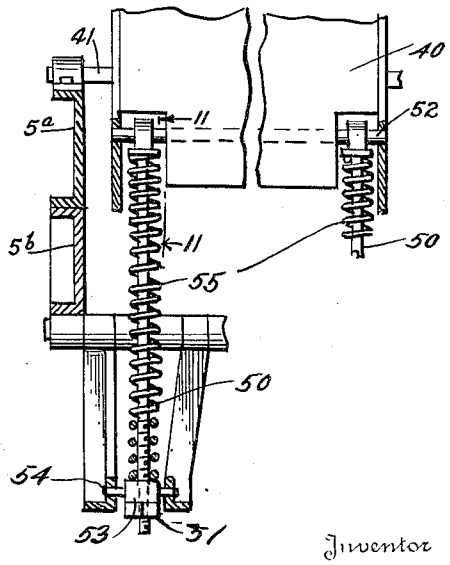
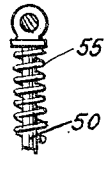


Fig. 11.



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UNITED STATES PATENT OFFICE

2,544,815

DITCH DIGGING MACHINE

Robert E. Weaver, Ziegler, Ill.

Application August 10, 1945, Serial No. 610,079

5 Claims. (Cl. 37—98)

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The present invention relates to new and useful improvements in ditch cutting or digging machines adapted to be drawn or pulled by a tractor or other power driven vehicle along the surface of the ground in which the ditch or trench is to be cut.

An important object of the present invention is to provide a machine of this character embodying a scoop type cutter together with means for vertically adjusting the cutter to regulate the depth of the ditch or trench.

A further object of the invention is to provide adjustable landsides positioned rearwardly of the cutter and by means of which the earth may be moved away from the edges of the ditch at either or both sides thereof.

A still further object of the invention is to provide means for vertically adjusting the cutter and landsides as a unit and independent means for vertically adjusting the cutter to regulate the depth of the ditch.

A still further object of the invention is to provide an apparatus of this character of simple and practical construction, which is efficient and reliable in operation, strong and durable, relatively inexpensive to manufacture and otherwise well adapted to the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout and in which:

Figure 1 is a side elevational view.

Figure 2 is a top plan view.

Figure 3 is a horizontal sectional view taken substantially along a plane as indicated by the line 3—3 of Figure 1.

Figures 4 and 5 are vertical transverse sectional views taken respectively on the lines 4—4 and 5—5 of Figure 1.

Figure 6 is an enlarged fragmentary vertical sectional view taken substantially on a line 6—6 of Figure 3.

Figure 7 is a fragmentary sectional view taken substantially on a line 7—7 of Figure 2.

Figure 8 is a vertical sectional view of the hydraulic cylinder for vertically adjusting the cutter.

Figure 9 is a top plan view of the front end of the landside and with the guide for the cutter shown in section, and

Figure 10 is a top plan view of the front end of the landside with the baffle plate shown in position for distributing the earth toward one side of the machine.

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Figure 11 is a fragmentary side elevational view, partly in section, taken substantially along a plane as indicated by the line 11—11 of Figure 6.

Referring now to the drawings in detail wherein for the purpose of illustration I have disclosed a preferred embodiment of the invention, the numeral 5 designates the frame of the machine having a downwardly extending tongue 6 at its front end for attaching to the draw bar 7 of a tractor or other power driven vehicle by means of the coupling pin 8. The frame 5 includes corresponding sides each including an upper section 5*a* and a lower section 5*b*, each of which is of channel-shaped construction.

An axle 9 is journalled in bearings 10 on the upper edge of the frame 5, the axle having cranks 11 at the ends thereof on which the ground wheels 12 are journalled, the cranks normally extending forwardly and downwardly as indicated in Figure 1 of the drawings.

A pair of arms 13 are secured at one end to the axle 9 and extend upwardly therefrom and links 14 are pivotally attached at one end to the upper end of the arms 13 and extend forwardly for pivotally attaching to a transversely extending cross bar 15 connected to the front end of a rod 16 projecting forwardly from a hydraulic cylinder 17 of conventional construction and including a piston 18 having a piston rod 19 extending rearwardly therefrom and pivoted to a bracket 20 secured on the upper edge of the frame 5. Pipes 21 and 22 are connected to the cylinder at opposite sides of the piston for subjecting the piston to fluid pressure from a suitable source of supply.

A scoop type cutter is indicated at 23 having a tapering detachable shoe 24 suitably secured at its lower front end, the cutter extending upwardly and rearwardly and being formed with diverging side walls 25 and a rearwardly extending top surface 25*a*.

The cutter 23 is formed at the lower end of a vertical slide 26 having vertical channels 27 in the opposite side edges thereof, the walls of the channel being formed with grooves 28 for slideably receiving ribs 29 on guides 30 secured to the rear end of the frame 5 by brace members 31.

To the upper front end of the slide 26 is connected a transversely extending pin 32 receiving an eye 33 on the lower end of a piston rod 34 having a piston 35 in its upper end working in a hydraulic cylinder 36, as best seen in Figure 8. Tubes 37 and 38 are connected to the cylinder at

opposite sides of the piston for subjecting the piston to fluid pressure from a suitable source of supply.

The upper end of the cylinder 36 is pivotally attached to the rear ends of a pair of walking beams 39 having their forward portions disposed in spaced parallel relation and pivotally attached at their front ends to a rod 40a extending eccentrically through a drum 40 adjacent the front side of the drum. Drum 40 is journalled on a shaft 41 transversely of the frame and supported on the upper edge thereof by bearing brackets 42. The front ends of the walking beams 39 are curved upwardly as indicated at 43 in Figure 1 of the drawings. The bar 15 is also mounted eccentrically in the drum 40 adjacent its rear side, the drum being formed with an opening 40b receiving the piston rod 16.

The intermediate portion of the walking beams 39 are pivotally attached at the upper ends of arms 43' which are inclined rearwardly and pivoted at their lower ends on a transversely extending shaft 44 secured to the under side of the frame 5a rearwardly of the frame section 5b.

The drum 40 has a cable 45 wound one or more times thereon and trained over sheaves or pulleys 46 to extend forwardly of the machine for operation by a drum (not shown) from the pulling vehicle to provide an alternate means in lieu of the hydraulic cylinder 17 for rotating the drum 40.

A shaft 47 is journaled transversely at the under side of the forward portion of the frame (section 5b) on which a pair of arms 48 are pivotally attached at one end, the arms extending downwardly and rearwardly and having rotating disc cutters 49 journaled on the lower ends thereof.

The arms 48 are arranged in pairs and extending downwardly between each pair of arms is a rod 50 threaded on its lower end for receiving a nut 51, as best seen in Figure 6. The upper ends of the rods 50 extend into recessed portions of the drum 40 and are journaled on a shaft 52 which extends eccentrically through the drum. Positioned on each rod 50 above the nut 51 is a collar 53 having trunnions 54 projecting from opposite sides thereof for pivotally supporting the collar on its arm 48. A coil spring 55 is mounted on the rod 50 between the collar 53 and the upper end of the rod whereby to yieldably urge the arms 48 downwardly and cause the rotating cutters 49 to cut through the crusted surface of the soil in advance of the cutter 23, the cutters 49 being properly spaced apart to form the edges of the ditch to be cut by the cutter 23.

A pair of landsides 56 are connected at their front ends to the lower rear portions of the frame (section 5b) and extend rearwardly at opposite sides of the cutter 23.

A V-shaped baffle 57 extends vertically at the front edge of the slide 26 above the cutter 23, the front edge of the baffle being disposed at the longitudinal center line of the cutter 23 whereby to deflect the earth removed by the cutter on opposite sides of the ditch formed thereby.

Wing plates 58 are secured at their front ends as at 59 to the rear edges of the baffle 57, the wing plates being adjustable laterally at their rear ends by adjustable braces 60 extending inwardly from the wing plates to the rear end of the frame 5.

The baffle 57 and wings 58 cooperate to scrape the earth cut by the cutter 23 and move the same away from the edges of the ditch at either side thereof.

When it is desired to scrape the earth from the upper edge of the ditch at only one side thereof a removable baffle plate 61 is secured to one side of the baffle 57 with the front wall of the baffle plate 61 disposed diagonally in the plane of the opposite side of the baffle 57 as will be apparent from an inspection of Figure 10 of the drawings. The removable baffle plate 61 may be secured to either side of the baffle 57 as indicated by the full and dotted line position in Figure 10.

In the operation of the device the machine is pulled over the ground by a tractor or other motor driven vehicle, the rotating cutters 49 cutting through the hard surface or crust of the ground in advance of the scoop like cutter 23 whereby the earth will be removed to form a ditch or trench having sloping side walls by reason of the diverging sides 25 of the cutter.

By pulling on the cable 45 in a predetermined direction the drum 40 will be rotated whereby to raise or lower the front end of the walking beams 39 and thus raise or lower the cutter 23 by moving the slide 26 attached to the cutter vertically in the guide 30 or by supplying fluid under pressure to one end or the other of the cylinder 17, the same results can be accomplished. The cutter 23 may also be moved vertically by the hydraulic cylinder 36 independently of the walking beams 39. By vertically adjusting the cutter 23 in the manner indicated the depth of the ditch will be regulated.

This oscillation of the drum 40 will also exert a push or pull on the links 14 to swing the arms 13 forwardly or rearwardly whereby to raise or lower the cranks 11 for the wheels 12.

The expansible springs 55 will yieldably urge the rotating disc cutters 49 into cutting engagement with the surface of the soil and the tension of the springs 55 may be regulated by the nuts 51 to adjust the depth of the rotating cutters.

It will be apparent from the foregoing that a ditch digging machine is thus provided which may be easily and quickly attached to a conventional form of motor driven vehicle such as a tractor or other like and readily detached from the tractor so that the latter may be used for other purposes.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the construction, operation and advantages of a machine of this character will be quite apparent to those skilled in the art. A more detailed description thereof is accordingly deemed unnecessary.

It is to be understood however that even though I have here shown and described a preferred embodiment of my invention that the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described, and the scope of the appended claims.

Having thus described my invention what I claim is:

1. A ditch digging machine comprising a frame, wheels supporting said frame, an axle journaled in the frame having cranks on which the wheels are journaled, a scoop like cutter, a vertically extending slide at the rear of said cutter, a guide for the slide carried by the frame, hydraulic means for vertically adjusting the frame on said wheels and for vertically adjusting the slide, said hydraulic means including link and lever means between the slide and wheels and the hydraulic means, and a second hydraulic means interposed

in the link and lever means for raising or lowering the slide independently.

2. A ditch digging machine comprising a frame, wheels supporting the frame, a guide at the rear end of the frame, a slide mounted for vertical movement in said guide, a scoop like cutter extending forwardly from the lower end of the slide, a walking beam pivoted on the frame and extending longitudinally thereof, said walking beam being attached at one end to the slide, a drum journalled on the frame, the other end of the walking beam being pivotally attached to one end of the drum eccentrically thereof and means for rotating the drum to cause a vertical movement of the end of the walking beam.

3. A ditch digging machine comprising a frame, wheels supporting the frame, a guide at the rear end of the frame, a slide mounted for vertical movement in said guide, a scoop like cutter extending forwardly from the lower end of the slide, a walking beam pivoted on the frame and extending longitudinally thereof, said walking beam being attached at one end to the slide, a drum journalled on the frame, the other end of the walking beam being pivotally attached to one end of the drum eccentrically thereof, and a cable trained over the drum and adapted to rotate the same for causing a raising and lowering movement of the opposite ends of the walking beam.

4. A ditch digging machine comprising a frame, an axle extending transversely of the frame and having crank ends, wheels journalled on the crank ends of the axle, a scoop like cutter having a slide extending vertically at its rear portion, a guide carried by the frame for said slide, a drum

journalled on the frame, means for rotating the drum, and means operatively connecting both the axle and the slide to the drum for vertical adjustment of the frame and for vertical adjustment of the cutter relative to the frame.

5. A ditch digging machine comprising a frame, an axle extending transversely of the frame and having crank ends, wheels journalled on the crank ends of the axle, a scoop like cutter having a slide extending vertically at its rear portion, a guide carried by the frame for said slide, a drum journalled on the frame, hydraulic means for rotating the drum, and means operatively connecting both the axle and the slide to the drum for vertical adjustment of the frame and for vertical adjustment of the cutter relative to the frame.

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