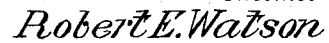


APPLICATION FILED AUG. 21, 1908.

4 SHEETS--SHEET 1.



Frank B. Hoffman.
D. W. Gould.

By *Victor J. Evans*
Attorney

R. E. WATSON.
EXCAVATOR.

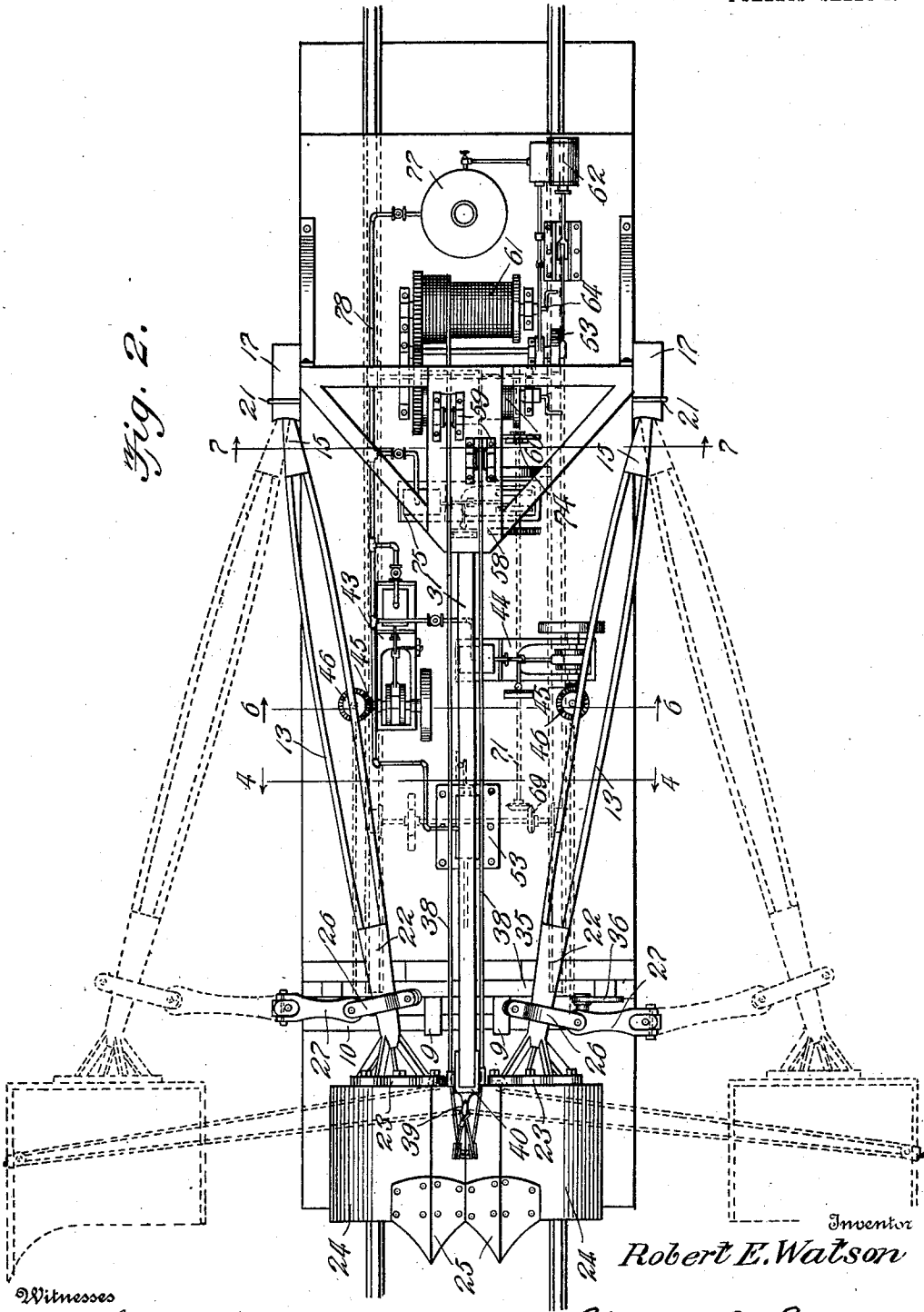
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933,683.

Patented Sept. 7, 1909.

4 SHEETS—SHEET 2.

Fig. 2.



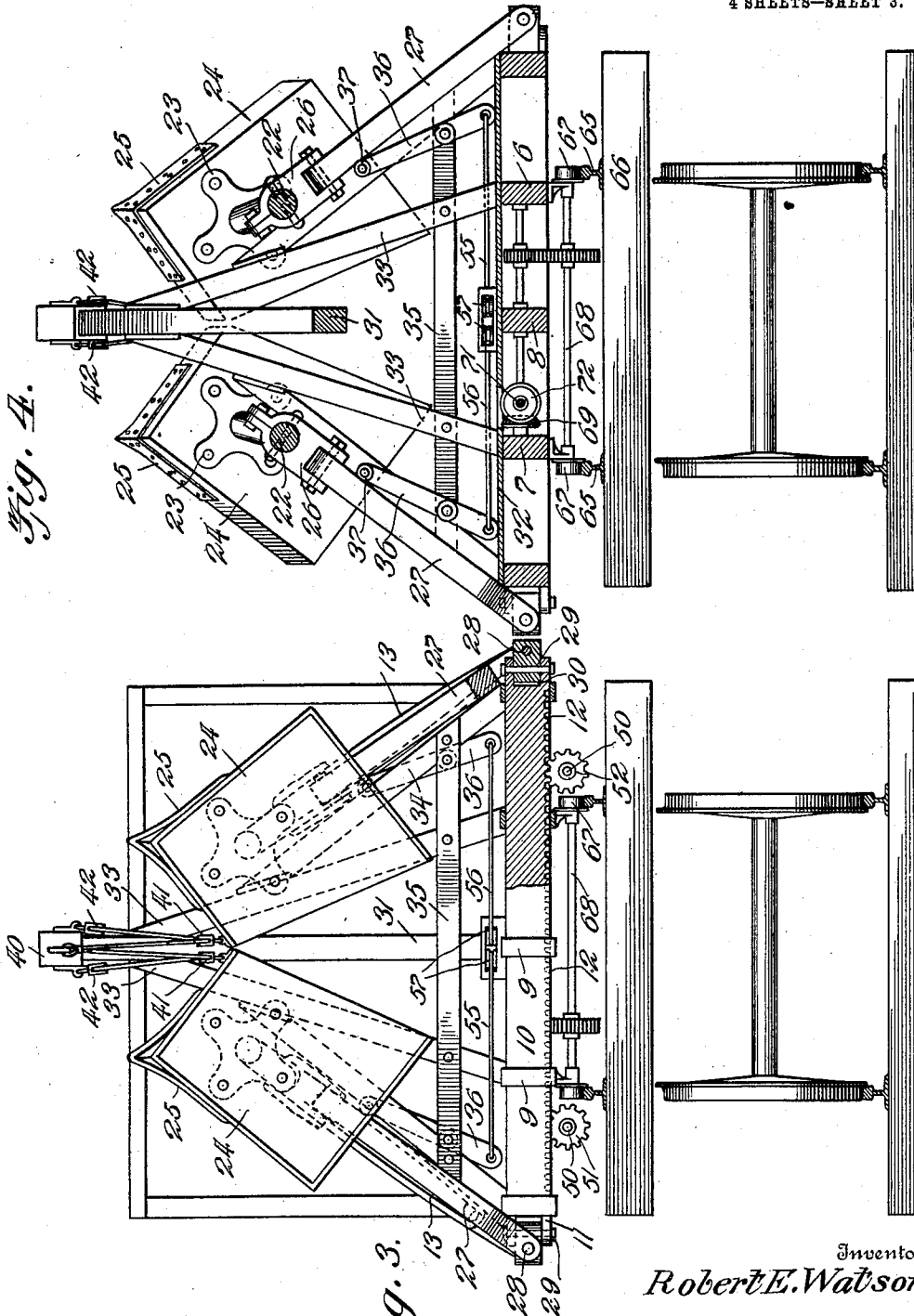
Witnesses
Frank B. Hoffman
D. W. Gould.

Inventor
Robert E. Watson
By Victor J. Evans
Attorney

R. E. WATSON.
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Witnesses

Frank B. Hoffman,
D. W. Gould.

Fig. 3.

Inventor
Robert E. Watson

By Victor J. Evans
Attorney

R. E. WATSON.
EXCAVATOR.
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Fig. 5.

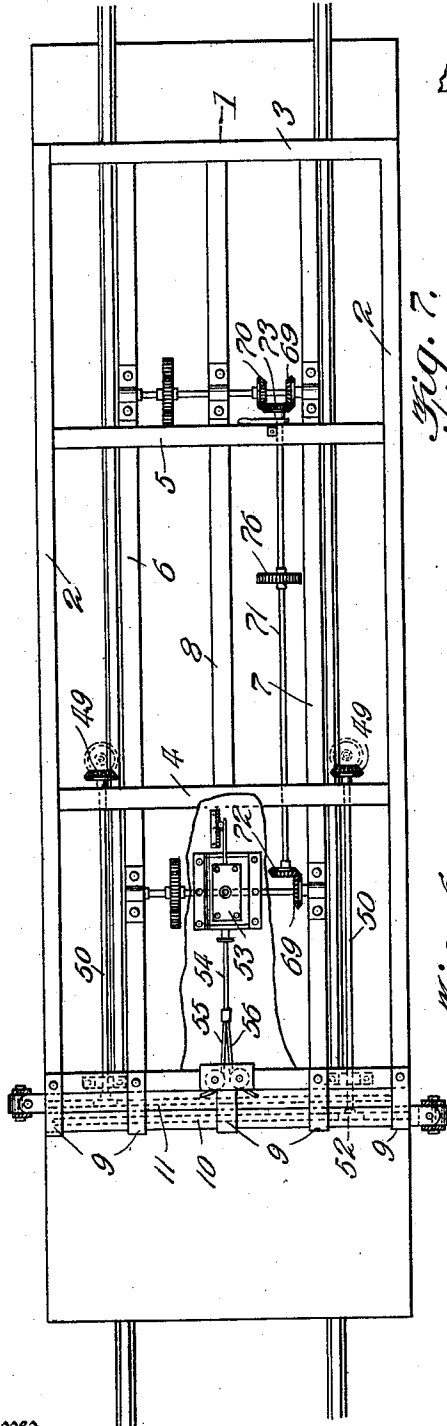


Fig. 7.

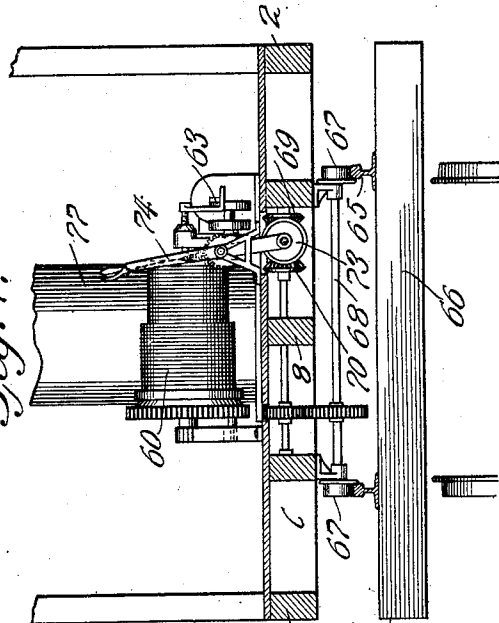
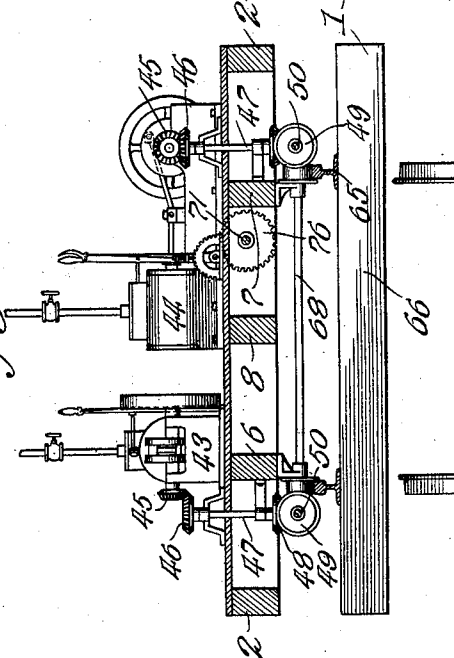


Fig. 6.



Witnesses

Frank B. Hoffman.
D. W. Gould.

Inventor

Robert E. Watson

By Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

ROBERT EMANUAL WATSON, OF WINNFIELD, LOUISIANA.

EXCAVATOR.

933,683.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed August 21, 1908. Serial No. 449,620.

To all whom it may concern:

Be it known that I, ROBERT EMANUAL WATSON, a citizen of the United States, residing at Winnfield, in the parish of Winn and State of Louisiana, have invented new and useful Improvements in Excavators, of which the following is a specification.

The invention relates to an improvement in excavators, being particularly directed to an apparatus primarily designed for ditching on either or both sides of a roadbed of a railway.

The main object of the present invention is the provision of a ditching machine which is adapted for travel on a track arranged lengthwise one or more ordinary flat cars, the construction including a means for controlling the direction and speed of travel of the machine and including digging elements and means for controlling the position of said elements to insure their effective operation along desired lines.

The invention will be described in the following specification, reference being had particularly to the accompanying drawings, in which:—

Figure 1 is a view in elevation of the improved apparatus showing the same mounted for movement upon a flat car, the digging elements being shown in normal or inoperative positions. Fig. 2 is a plan of the same, the digging elements being shown in operative positions in dotted outline. Fig. 3 is a front end elevation of the same, one of the adjusting bars being shown in section. Fig. 4 is a section on line 4—4 of Fig. 2. Fig. 5 is a plan of the apparatus with the platform broken away and the superstructure removed. Fig. 6 is a section on line 6—6 of Fig. 2. Fig. 7 is a section on line 7—7 of Fig. 2. Fig. 8 is an enlarged sectional view partly in elevation showing the mounting of the swinging cutter booms.

Referring particularly to the accompanying drawings, my improved ditching apparatus comprises a main frame 1 including side bars 2 and end bars 3 constructed and arranged to provide a frame of rectangular outline. Spaced cross bars 4 and 5 are arranged intermediate the end bars 3, and spaced longitudinal bars 6 and 7 are arranged between the side bars and extending throughout the length of the frame, an additional bar 8 being arranged centrally between the side bars and extending from one

cross bar to the other, all as clearly shown in Fig. 5.

Secured to the relatively forward end of the bar 3 in alinement with the side bars and longitudinal bars are guide loops 9, within which guide loops are slidably mounted what I term adjusting bars 10 and 11, which bars are connected to the respective cutting implements, as will hereinafter appear. The bars are arranged in horizontal alinement side by side, as shown in Fig. 5, and are preferably slightly greater in length than the width of the main frame. The adjusting bars are formed on their relatively lower edges with teeth or serrations 12, for a purpose which will presently appear.

Mounted on each side bar 2, adjacent the relatively rear end thereof, is what I term a shovel boom 13, each of which booms are of duplicate construction and are preferably of any usual or preferred skeleton formation for the greater portion of their length to provide the desired lightness without sacrificing their strength. The rear end of each boom is movably mounted relative to the main frame of the apparatus through the medium of a ball and socket connection, as more clearly shown in Fig. 8. For this purpose the rear end of the boom is provided with a ball member 14 secured to the boom by a socket connection 15, said ball member being mounted in rounded registering recesses 16 formed in adjacent faces of blocks 17, said recesses being so arranged that when the ball is mounted therein independent forward or rearward movement of the boom is prevented without interfering with the free swinging or turning movement of the boom in any direction, the forward edges of the blocks 17 being cut away at 18 to avoid interference with an effective movement of the boom. The blocks are secured together by tie bolts 19, and the socket member thus provided is secured to the side bar of the main frame by bolts 20, a clip 21 being also used if desired to further secure the relatively forward end of the socket member to the adjacent side bar. The forward end of each boom is provided with a socket sleeve 22 carrying at its forward end beyond the boom a head plate 23 to which is directly secured the cutting member or shovel 24. The shovel may be in any form desired, though preferably is of box-like structure with the relatively forward wall cut away and the relatively outer

corner provided with a cutting implement or blade 25. It is to be understood that I contemplate the use of any form of cutting implement or shovel and that the particular form illustrated is intended to indicate the preferred form only. Each of the shovel booms is directly connected to one of the adjusting bars, said connection comprising a clamp plate 26 designed to be secured to the relatively forward end of the boom and a link 27 terminally connected to the clamp plate at one end and at the opposite end pivotally connected to a block 28, which is in turn mounted on a pivot bolt 29 fixed in the end of the connected adjusting bar, said bar being recessed, as at 30, for the reception of the block. The pivotal connection of the link 27 to the block 28 is at right angles to the pivotal connection of the block to the adjusting bar, whereby a practically universal connection is provided between the adjusting bar and link in order to permit desirable movements of the boom in the operation of the parts.

Arranged longitudinally and centrally of the main frame is a beam 31, the relatively rear end of which is appropriately secured to a platform 32 fixed upon the main frame, from which point the beam inclines forwardly and upwardly and terminates in advance of the main frame. The relatively forward end of the beam is supported upon inclined uprights 33 rising from the main frame with their lower ends overlying the longitudinal frame bars 6 and 7, said uprights being further secured by inclined brace bars 34 which, at their lower ends, overlie the side bars of the main frame and at their upper ends are secured to the standards 33 at a point below the connection of the latter with the beam. Secured to the respective brace bars and standards and bridging the space between them is a frame bar 35, said bar extending transverse the main frame and in a position above and in parallel relation to said frame. Mounted upon the frame bar 35 near each end thereof is a boom operating lever 36, the relatively upper end of which is provided with a pin 37 to bear against the relatively inner edge of the link 27 adjacent the connection of the latter with the clamp plate 26. The relatively lower ends of the levers are operated by mechanism which will be presently described, it being obvious that a swinging movement of the levers will cause the links and thereby the booms connected therewith to be swung outward on the pivotal connection of the links with the blocks 28. The cutting depth of the shovels is controlled through the medium of a cable 38 which at one end engages a hook 39 projecting from the end plate 40 secured to the beam 31, the cable being passed from the hook 39 to and around a pulley 41 secured to the particular

shovel and back over a pulley 42 depending from the end plate 40 in rear of the hook 39, the cables being continued beyond the pulley 42 to an operating mechanism to be later described. Each shovel is thus provided with an independent operating cable by which it is obvious that the cutting depth of the shovel may be controlled and by which the shovels may be returned to normal position by a pull upon the cables.

Arranged upon the platform 32 are independent engines 43 and 44, said engines being positioned on opposite sides of the central line of the platform. The power shaft of each engine is, through the medium of intermeshing bevel gears 45 and 46 adapted to drive a vertically disposed shaft 47 mounted in suitable bearings, on the lower end of which shaft there is arranged a bevel gear 48 adapted to engage and operate a bevel gear 49 fixed upon a longitudinally extending shaft 50 mounted in suitable bearings beneath the main frame. The respective shafts 50, which are those disposed adjacent the respective side bars, extend forward to a position beneath the adjusting bars 10 and 11, one of said shafts terminating beneath the adjusting bar 10 and being provided with a gear 51 to cooperate with the teeth 12 on said bar, the other of said shafts 50 terminating beneath the adjusting bar 11 and having a gear 52 to engage the teeth on said adjusting bars.

The engines 43 and 44 may be of any approved type entirely independent so far as control is concerned, from which fact it will be understood that the adjusting bars may be independently moved longitudinally, that is transverse the frame to arrange the particular boom at any distance beyond the side bar of the frame within the maximum length of the adjusting bar. Mounted on the platform 32 in advance of the engines 43 and 44 is a steam jack 53, the piston stem 54 of which is connected at the relatively forward end to cables 55 and 56. The cables extend forwardly, passing over rollers 57 mounted in a head block secured on the platform, said cables beyond the head block being extended in opposite directions and terminally connected to the relatively lower ends of the respective boom operating levers 36. It is thus apparent that by admitting steam to the cylinder of the jack 53 the cables 55 and 56 will be drawn upon with the effect to rock the respective boom operating levers 36 on their pivots and thereby throw the forward ends of the booms outwardly to dispose the shovels carried by said booms in cutting position.

The auxiliary frame 58 is mounted on the platform adjacent the rear end thereof, in the top plate of which frame there is arranged guide pulleys 59 for the reception of the operating cables 38. Mounted upon

the platform in spaced relation are drums 60 and 61 arranged to respectively receive the cables 38, said drums being positively operated to draw upon said cables through the medium of an engine 62 and gearing 63. Each of the drums is provided with any desired or usual form of frictional braking mechanism, as 64, whereby the speed of the drums in the unwinding operation of the cable may be controlled, the braking mechanism being adapted to lock the drums against movement if desired. From this arrangement it is obvious that the respective booms are independently controlled so far as cables 38 are concerned through the fact that these cables are upon independent drums.

The apparatus is adapted for movement upon rails 65 temporarily secured upon platform cars 66, the rails being laid from car to car to extend the sphere of operations of the apparatus. In this connection it is to be understood that I contemplate using the platform and cars which may be readily converted into dirt cars by the addition of sides and ends, so that the forward car of the train carrying the apparatus may be converted into a dirt car to receive material excavated by the shovels, and as the particular car is filled the next successive car may be similarly converted and so on until the train comprises a series of filled cars except the last which will support the apparatus.

The apparatus, of course, is adapted for travel lengthwise the tracks 65, and for this purpose is provided with flanged wheels 67 fixed upon the axles 68 as is usual. Secured upon the respective axles are bevel gears 69, the rear axle having a second and opposing bevel gear 70 arranged in spaced relation with the bevel gear 69.

Extending longitudinally of the main frame and mounted in suitable bearings is a shaft 71, the respective ends of which are provided with bevel gears 72 and 73 to normally engage the bevel gears 69 of the axles, the relatively rear end of the shaft 71 being mounted for lateral movement through the medium of a lever 74, whereby the gear 73 on the rear end of the shaft may be caused to engage either the gear 69 or 70 on the axle in order to permit operating said axle in reverse directions. The shaft 71 is so arranged that when operated to engage the rear gear 73 with the gear 70 on the rear axle, the forward gear 72 of the shaft will be disengaged from the gear 69 on the forward axle. The shaft 71 is continuously driven through the medium of an engine 75 mounted on the platform beneath the auxiliary frame 58, the power wheel of the engine 75 having a gear to engage a similar gear as 76 on the shaft 71. The shaft is, therefore, continuously operated in one di-

rection as long as the engine is running and the operator may by suitable control of the lever 34 cause the apparatus to travel forwardly or rearwardly on the tracks 65. A boiler 77 and pipe connections 78 supply steam to the respective engines, it being, of course, understood that the pipe connections are appropriately valved to provide for cutting off the power from any engine at will.

The train of flat cars is moved to the appropriate point and the apparatus arranged for movement on the tracks fixed on the flat cars. The steam jack 53 is operated to draw upon the cables 55 and 56 to throw the shovel booms outwardly, the drums 60 and 61 being released from their operating mechanism to permit movement of the cables 38 in securing the outward swing of the booms. The cutting depths of the shovels are adjusted as desired by operating either drum 60 or 61 and the particular cutting position of each shovel relative to the side bar of the main frame is also adjusted through operation of either of the engines 43 or 44 and the consequent movement of the adjusting bars 10 or 11. With the cutting depth and position of the shovels arranged the engine 75 is operated to force the apparatus forward on the tracks 65 with the effect to cause the shovels to excavate the material. When the shovels are filled with material the drums 60 and 61 are geared with the power with the effect to draw upon the cables 38 and swing the shovels inwardly to dump their contents into the dump car. The shovels 24 are, of course, intended to indicate any form of digging or cutting device, it being obvious that the shovels shown may be replaced by cutting mechanism in which event the apparatus will be serviceable for mowing along side the trackway.

The apparatus as a whole is effective for ditching or otherwise clearing the ground immediately adjacent the trackway and for this purpose materially increases the amount of work done in a given time over that of hand labor, while at the same time materially reducing the cost of such operation.

The respective engines are preferably so grouped that their controlling levers are arranged within convenient reaching distance of an operator so that aside from the drum controlling engine a single operator may control all movements of the apparatus.

Having thus described the invention what is claimed as new, is:—

1. A ditching machine comprising a wheeled frame, shovel booms movably connected to the frame, operating devices carried on the forward ends of the shovel booms, and means for adjusting the relatively forward ends of the booms with relation to the main frame.

2. A ditching machine comprising a main frame, booms connected for swinging move-

ment with relation to said frame, operating devices carried by the forward ends of the boom, means for swinging the booms from inoperative to operative position with relation to the main frame.

3. A ditching machine comprising a main frame, booms connected for swinging movement with relation to said frame, operating devices carried by the forward ends of the boom, means for swinging the booms from inoperative to operative position with relation to the main frame, and independent means for moving the booms from operative to inoperative positions with relation to the main frame.

4. A ditching machine comprising a main frame, booms connected for swinging movement with relation to said frame, operating devices carried by the forward ends of the boom, means for swinging the booms from inoperative to operative position with relation to the main frame, and means for adjusting the forward ends of the booms to and from the main frame.

5. A ditching machine comprising a main frame, booms movably connected at their rear ends to said frame, adjusting bars slidably mounted at the forward ends of the frame and respectively connected to one of the booms, and independent power means for operating the adjusting bars.

6. A ditching machine comprising a main frame, booms movably connected at their rear ends to said frame, adjusting bars slidably mounted at the forward ends of the frame and respectively connected to one of the booms, the relatively lower edges of the adjusting bars being formed with teeth, a gear wheel coöperating with the teeth of each bar, and independent power means for operating the gear wheels.

7. A ditching machine comprising a main frame, a shovel boom, a ball and socket connection between said frame and the rear end of the boom, a shovel carried by the forward end of the boom, an adjusting bar mounted in the frame, means for operating said bar, and a link connected to the boom and pivotally connected to the bar.

8. A ditching machine comprising a main frame, a shovel boom, a ball and socket connection between said frame and the rear end of the boom, a shovel carried by the forward end of the boom, an adjusting bar mounted in the frame, means for operating said bar, a link connected to the boom and pivotally connected to the bar, and means adapted in operation to engage the link and move it on its pivotal connection with the bar to engage the boom beyond the main frame.

9. A ditching machine comprising a main frame, a shovel boom, a ball and socket connection between said frame and the rear end of the boom, a shovel carried by the forward end of the boom, an adjusting bar

mounted in the frame, means for operating said bar, a link connected to the boom and pivotally connected to the bar, means adapted in operation to engage the link and move it on its pivotal connection with the bar to engage the boom beyond the main frame, and means engaging the shovel to return the boom to normal position.

10. A ditching machine comprising a main frame, a shovel boom, a ball and socket connection between said frame and the rear end of the boom, a shovel carried by the forward end of the boom, an adjusting bar mounted in the frame, means for operating said bar, a link connected to the boom and pivotally connected to the bar, means adapted in operation to engage the link and move it on its pivotal connection with the bar to engage the boom beyond the main frame, a cable connected to the shovel, and means carried by the main frame for operating the cable to return the boom to normal position.

11. A ditching machine comprising a main frame, booms movably connected to said frame, shovels carried by the forward ends of the booms, adjusting bars slidably mounted in the main frame, means for operating said bars, a link pivotally connected to each of said bars and to the adjacent boom, a frame supporting the booms in inoperative position, boom operating levers adapted to engage the links when the booms are in inoperative position, and means for simultaneously operating said levers to move the booms to operative position.

12. A ditching machine comprising a main frame, booms movably connected to said frame, shovels carried by the forward ends of the booms, adjusting bars slidably mounted in the main frame, means for operating said bars, a link pivotally connected to each of said bars and to the adjacent boom, a frame supporting the booms in inoperative position, boom operating levers adapted to engage the links when the booms are in inoperative position, means for simultaneously operating said levers to move the booms to operative position, a beam secured to the main frame, cables terminally secured to the beam, connections between said cables and shovels, and independent means carried by the frame for operating the cables.

13. A ditching machine comprising a main frame booms movably connected to said frame, shovels carried by the forward ends of the booms, adjusting bars slidably mounted in the main frame, means for operating said bars, a link pivotally connected to each of said bars and to the adjacent boom, a frame supporting the booms in inoperative position, boom operating levers adapted to engage the links when the booms are in inoperative position, means for simultaneously operating said levers to move the booms to operative position, a beam secured to the

main frame, cables terminally secured to the beam, connections between said cables and shovels, a plurality of drums for the respective cables mounted upon the main frame,
5 independent braking means for each drum, and means for simultaneously operating the drums in one direction.

14. The combination with a series of cars,
a continuous trackway supported by the cars,
10 a ditching apparatus mounted for movement

along said trackway, and means carried by the apparatus for causing trackway travel of the latter in either direction.

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

ROBERT EMANUAL WATSON.

Witnesses:

W. K. ROSS,

J. L. GRIFFIN.