



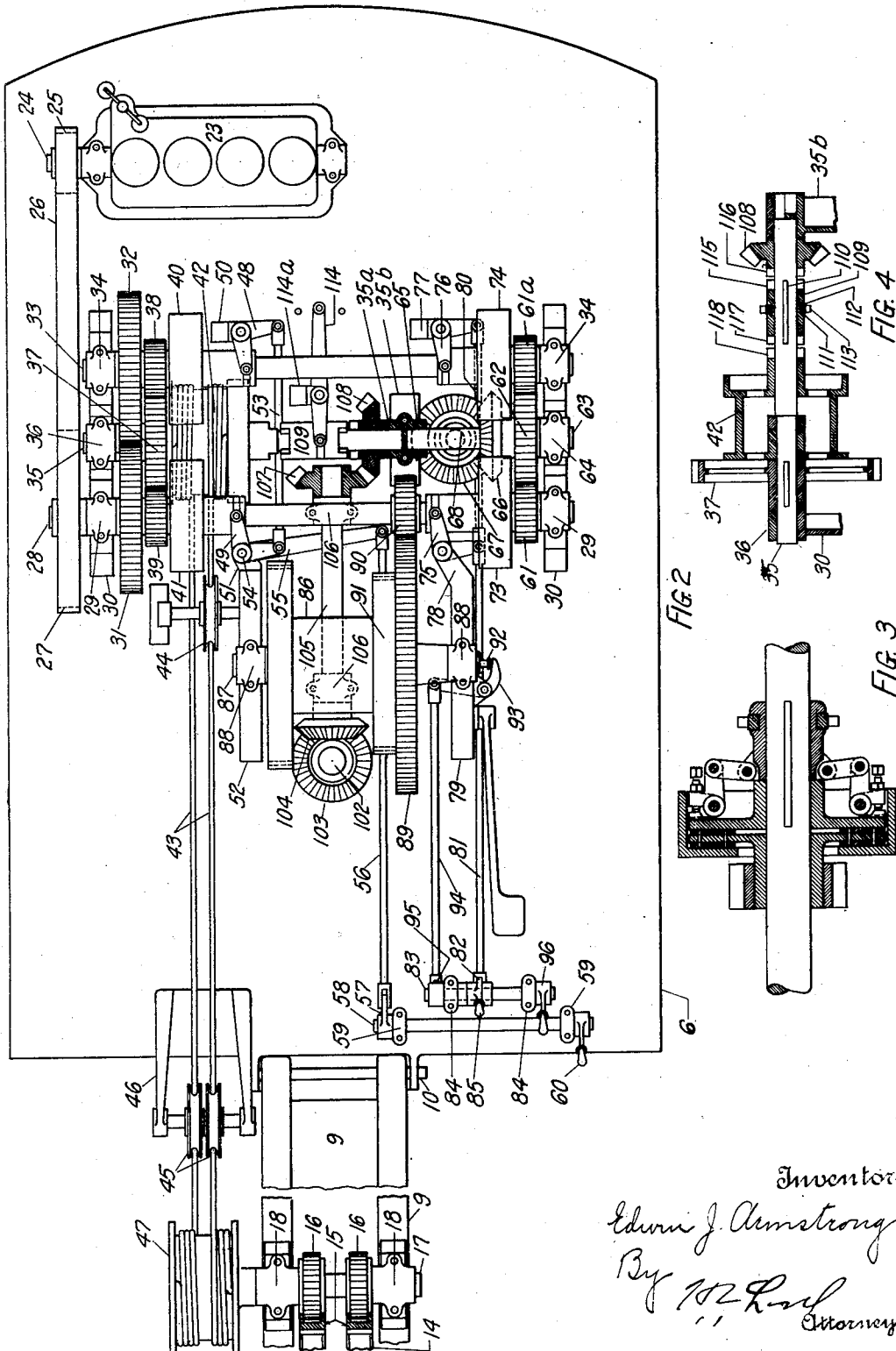
Oct. 13, 1925.

1,556,574

E. J. ARMSTRONG  
EXCAVATING MACHINE AND THE LIKE

Filed Oct. 26, 1923

2 Sheets-Sheet 2



Inventor  
Edwin J. Armstrong  
By *W. H. Reed*  
Attorney

Patented Oct. 13, 1925.

1,556,574

# UNITED STATES PATENT OFFICE.

EDWIN J. ARMSTRONG, OF ERIE, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ERIE STEAM SHOVEL COMPANY, OF ERIE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## EXCAVATING MACHINE AND THE LIKE.

Application filed October 26, 1923. Serial No. 670,951.

To all whom it may concern:

Be it known that I, EDWIN J. ARMSTRONG, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Excavating Machines and the like, of which the following is a specification.

The invention is designed to provide a simple and efficient mechanism for driving different instrumentalities of an excavating machine or the like. In carrying out the invention the driving mechanism is particularly advantageous in connection with an explosive engine where it is necessary, or at least desirable to have different gear ratios between the motor and the driven parts although the driving mechanism may be used if desired for other motors.

Where the invention is applied to a power shovel part of the mechanism utilized for handling the crowding engine with the shovel in operation is utilized for driving the traction wheels of the implement. The mechanism also involves an improved driving mechanism for the various instrumentalities of a machine of this type. Other features and details of the invention will appear from the specification and claims.

The invention is illustrated in the accompanying drawings as follows:—

Fig. 1 shows a side elevation of a power shovel.

Fig. 2 a plan view of the same.

Fig. 3 a sectional view of one of the clutches utilized in the machine.

Fig. 4 a section showing the assembling of one of the drive shafts.

1 marks the frame, 2 a steering axle, 3 the driving axle, 4 the steering wheels, 5 the driving wheels, 6 a platform mounted on the frame, 7 a track mounted on the frame, 8 rollers carrying the platform on the track, 9 a boom pivoted at 10 on the platform, 11 a rod carrying the boom, 12 a strut to which the rod 11 extends, 13 guy rods extending from the strut to the platform, 14 a dipper stick, 15 racks on the dipper stick, 16 gears meshing the racks on the dipper stick, 17 a shaft on which the gears 16 are mounted, and 18 bearings in which the shaft 17 is journaled, these bearings being mounted on the boom 9. A hoisting cable 19 extends over a sheave 20

at the upper end of the boom around a sheave 21, the sheave 21 being connected to a dipper 22. These parts are of common construction as found on the usual power shovel.

An explosive engine 23 is mounted on the platform. This engine has a power shaft 24 on which a drive pulley 25 is mounted. The drive pulley 25 is connected by a belt 26 with a pulley 27. The pulley 27 is fixed on a shaft 28. The shaft 28 is mounted in bearings 29 carried by frames 30 extending upwardly from the platform. A gear 31 is fixed on the shaft 28 and meshes with a gear 32 fixed on a shaft 33. The shaft 33 is parallel to the shaft 28 and is carried in bearings 34 mounted on the frames 30. A shaft 35 has one end journaled in a bearing 35<sup>a</sup> which is arranged on a post 35<sup>b</sup> on the platform and the opposite end of the shaft is journaled in a bearing 36 on one of the frames 30. This shaft is somewhat below the shafts 28 and 33. A gear 37 is fixed on the shaft 35 and meshes with a gear 39. The gear 39 is journaled on the shaft 28 and a similar gear 38 is journaled on the shaft 33 and meshes with the gear 37. Clutches 40 and 41 are adapted to lock the gears 38 and 39 respectively with the shafts 33 and 28. A drum 42 is mounted on the shaft 35 and adapted to be locked therewith by clutch mechanism hereinafter described. Cables 43 are wound on the drum 42 in reverse directions, the upper one being deflected by a sheave 44 mounted on the platform and both cables extending under sheaves 45 carried by a bracket 46 at the front of the platform, the bottom of the sheaves being approximately coincident with the pivotal mounting of the boom and the sheaves are carried over a drum 47 in reverse directions, the drum 47 being fixed on the shaft 17. It will readily be seen that by merely throwing the clutches 40 and 41 alternately the crowding shaft 17 may be nicely controlled with a rugged and compact mechanism.

The details of the clutches 40—41 may be as desired, any suitable friction clutch being applicable. The clutches are thrown by bell crank levers 48 and 49 mounted on brackets 50 and 51, the bracket 50 extending upwardly from the platform and the bracket 51 extending from a frame 52 ex-

tending from the platform. The bell cranks 48 and 49 are connected by a link 53 and the bell cranks are opposingly placed so that as one clutch is thrown in the other is released. The bell crank 49 is fixed on a shaft 54. A lever 55 is also fixed on this shaft. A link 56 connects the lever 55 with a rock arm 57. The rock arm 57 is mounted on a rock shaft 58 journaled in bearings 59 on the frame and is actuated by a hand lever 60 secured to the rock shaft.

Gears 61 and 61<sup>a</sup> are mounted on the shafts 28 and 33 respectively at the opposite ends from the gears 38 and 39. The gears 61 and 61<sup>a</sup> mesh with a gear 62 fixed on a shaft 63. The shaft 63 is journaled in a bearing 64 on the frame 30 and a bearing 65 on the post 35<sup>b</sup>. A beveled gear 66 is fixed on the shaft 63 and meshes with a beveled gear 67. The beveled gear 67 is mounted on a vertical shaft 68 extending through the platform and has a pinion 69 fixed on its lower end meshing with a gear 70. The gear 70 is fixed on a shaft 25 with a gear 71 and the gear 71 meshes with a gear 72 on the frame. Friction clutches 73 and 74 are mounted on the shafts 28 and 33 respectively and are adapted to lock the gears 61 and 61<sup>a</sup> with those shafts. The clutches are similar to the clutches 40 and 41, the detail of which is shown in Fig. 3 and the clutches are set and released through bell crank levers 75 and 76. The bell crank lever 76 is mounted on a post 77 extending up from the platform and the lever 75 on a bracket 78 extending from a frame 79 on the platform. The bell cranks are oppositely placed and connected by a link 80 so that as one clutch is set the other is released. A link 81 extends from the bell crank lever 75 to a rock arm 82. The rock arm 82 is mounted on a shaft 83. This shaft is mounted in bearings 84. A hand lever 85 controls the rock arm 82 and consequently provides means for controlling the clutches 73 and 74 and in consequence the swinging of the platform. This is accomplished because the gears 61 and 61<sup>a</sup> are driven in opposite directions through the direct connection of the gears 31 and 32 mounted directly on the shafts 28 and 33.

The hoisting line 19 is operated from a drum 86. The drum 86 is mounted on a shaft 87 carried in bearings 8 on the frames 52 and 79. A gear 89 is mounted on the shaft 87 and meshes with a gear 90 on the shaft 28. A clutch mechanism 91 is mounted on the drum and adapted to be operated relatively to the gear 89 through a clutch operating pin 92 extending inwardly through the end of the shaft 87, this clutch mechanism being one of common construction. The pin 92 is operated by a lever 93. A link 94 extends from the lever 93 to a rock lever 95 fixed on the shaft 83. A hand lever

96 is also fixed on this shaft and affords a means for controlling the hoisting drum. When it is desired to move the shovel this may be done by utilizing the same reversing mechanism that is used for the crowding engine when the shovel is in operation. The driving mechanism is as follows: A gear 97 is fixed on the drive shaft 3 and meshes with a pinion 98. The pinion 98 is fixed on a shaft 99 journaled in bearings 99<sup>a</sup> extending from the frame. A gear 100 is fixed on the shaft 99 and meshes with a pinion 101. The pinion 101 is fixed on a vertical shaft 102 extending through the frame and platform and forming a pivotal central support for the platform. A gear 103 is fixed on the upper end of the shaft 102 and meshes with a gear 104. The gear 104 is fixed on a shaft 105. The shaft 105 is journaled in bearings 106 on a post extending upwardly from the platform. A beveled gear 107 is fixed on the shaft 105 and meshes with a gear 108 journaled on the shaft 35. A clutch element 109 is locked with the shaft 35 by a spline 110. It has the usual groove 111, ring 112, trunnions 113 and is operated by a lever 114 mounted on a post 114<sup>a</sup>. The clutch element 109 is provided with a toothed end 115 adapted to engage with a toothed end 116 on the gear 108 so that when the clutch element is thrown into engagement with the gear 108 the gear is locked with the shaft 35 and the shovel may be driven and reversed through this shaft and the direction of movement is capable of being reversed by throwing the clutches 40 and 41. The same clutch element when thrown in the opposite direction locks the toothed end 117 with a toothed end 118 on the drum 42 and in this position the shaft 35 is utilized for operating the crowding shaft in the manner herebefore described.

What I claim as new is:—

1. In excavating machines and the like, the combination of an operating shaft; drive shafts gear connected to turn in opposite directions; a wheel on the operating shaft; a crowding shaft; a wheel on the crowding shaft; a driving connection between said wheels; and clutch controlled gear connections between the drive shafts and the wheel on the operating shaft.

2. In excavating machines and the like, an operating shaft; drive shafts gear connected to turn in opposite directions, a wheel on the operating shaft, a crowding shaft, a driving connection between the wheel and crowding shaft, clutch-controlled gear connections between the drive shafts and the wheel, and a tractor driving connection comprising a traction drive gear on the operating shaft and clutch mechanism adapted to throw the wheel or traction drive gear into driving connection with the drive shaft through the clutch controlled gears.

3. In excavating machines and the like, the combination of an operating shaft; drive shafts parallel with the operating shaft and gear connected to turn in opposite directions; a wheel on the operating shaft; a crowding shaft; a wheel on the crowding shaft; a driving connection between said wheels; a swinging platform; a swinging driving gearing comprising a swinging driving gear; and clutch controlled gear connections between the swinging driving gear and the driving shafts.

4. In excavating machines and the like, the combination of an operating shaft; drive shafts parallel with the operating shaft and gear connected to turn in opposite directions; a wheel on the operating shaft; a crowding shaft; a wheel on the crowding shaft; a driving connection between said wheels; a swinging platform; a swinging driving gearing comprising a swinging driving gear; clutch controlled gear connections between the swinging driving gear and the driving shafts; and opposing bell cranks controlling said clutch controlled gear connections.

5. In excavating machines and the like, the combination of an operating shaft; drive shafts parallel with the operating shaft and gear connected to turn in opposite directions; a wheel on the operating shaft; a crowding shaft; a wheel on the crowding shaft; a driving connection between said wheels; a swinging platform; a swinging driving gearing comprising a swinging driving gear; clutch controlled gear connections between the swinging driving gear and the driving shafts; a hoisting wheel; and a gear connection between one of the driving shafts and the hoisting wheel.

6. In excavating machines and the like, the combination of an operating shaft; driving shafts parallel with the operating shaft and arranged at opposite sides thereof, said driving shafts being gear connected to turn in opposite directions; a crowding shaft; a driving wheel on the operating shaft; a driven wheel on the crowding shaft; a driving connection between said wheels; clutch controlled gear connections between the driving shafts and the driving wheel; a swinging platform on which the apparatus is mounted; a swinging gearing mechanism swinging the platform comprising a swinging driving gear having an axis

parallel with the driving shaft; and clutch controlled gear connections between the driving shafts and the swinging driving gear.

7. In excavating machines and the like, the combination of an operating shaft; driving shafts parallel with the operating shaft and arranged at opposite sides thereof, said driving shafts being gear connected to turn in opposite directions; a driving wheel journaled on the operating shaft; clutch controlled gear connections between the operating shaft and the driving shaft; a crowding shaft; a driven wheel on the crowding shaft; a driving connection between said wheels; a traction driving mechanism comprising a gear mounted on the operating shaft; clutch mechanism adapted to lock either the traction driving gear or the driving drum with the operating shaft; a swinging platform on which the apparatus is mounted; a swinging gearing comprising a swinging driving gear having an axis parallel with the driving shafts; and clutch controlled gear connections between the swinging driving gear and the drive shaft.

8. In excavating machines and the like, the combination of an operating shaft; driving shafts parallel with the operating shaft and arranged at opposite sides thereof, said driving shafts being gear connected to turn in opposite directions; a driving wheel journaled on the operating shaft; clutch controlled gear connections between the operating shaft and the driving shaft; a crowding shaft; a driven wheel on the crowding shaft; a driving connection between said wheels; a traction driving mechanism comprising a gear mounted on the operating shaft; clutch mechanism adapted to lock either the traction driving gear or the driving wheel with the operating shaft; a swinging platform on which the apparatus is mounted; a swinging gearing comprising a swinging driving gear having an axis parallel with the driving shaft; clutch controlled gear connections between the swinging driving gear and the driving shafts; a hoisting drum; and a gear connection between the hoisting drum and one of the driving shafts.

In testimony whereof I have hereunto set my hand.

EDWIN J. ARMSTRONG.