(No Model.) 2 Sheets—Sheet 1.

G. L. LEWIS.

EXCAVATING, DITCHING, OR DREDGING MACHINE.

No. 531,199. Patented Dec. 18, 1894.

Fig. 1.

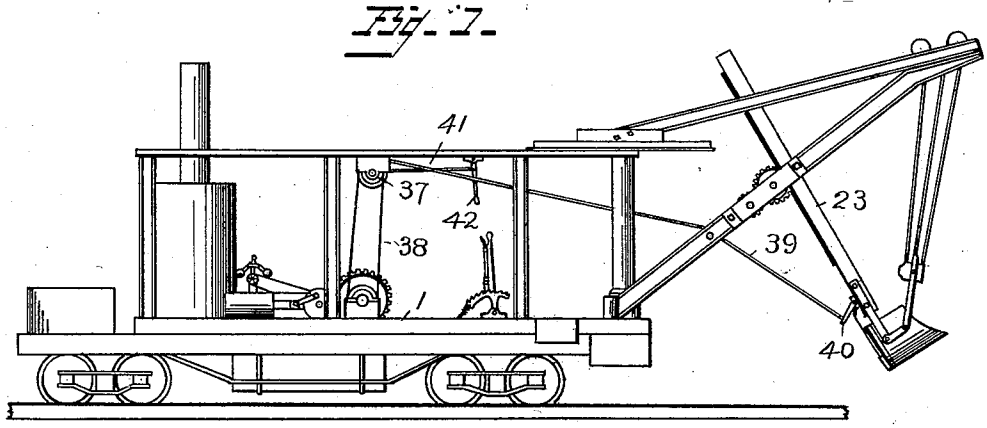

Fig. 2.

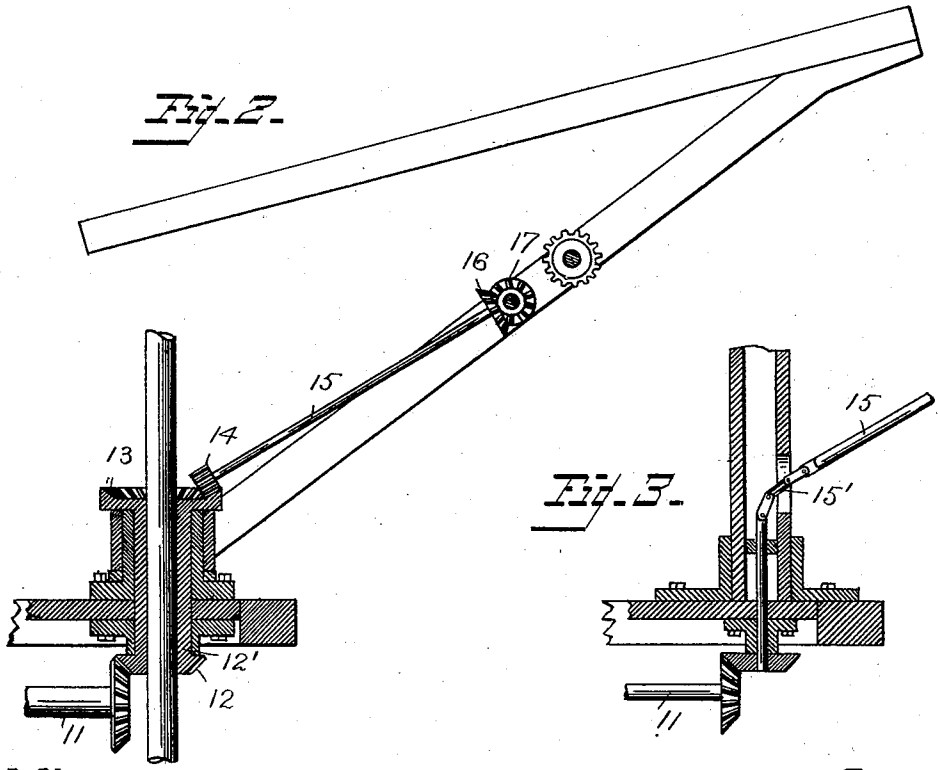

Fig. 3.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

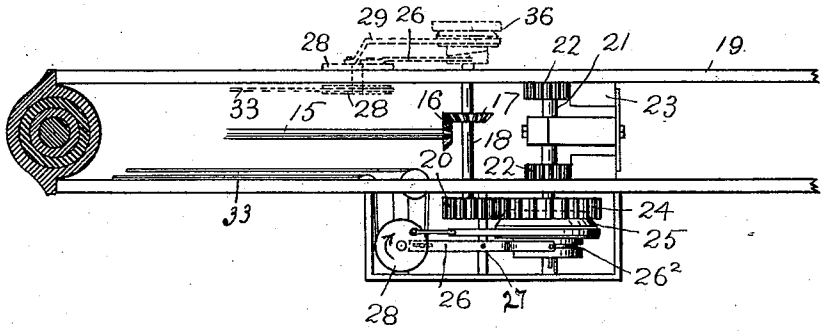


Fig. 5.

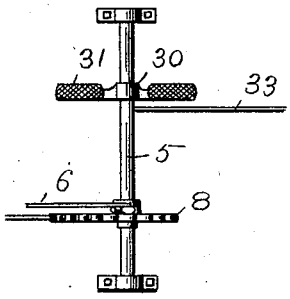


Fig. 6.

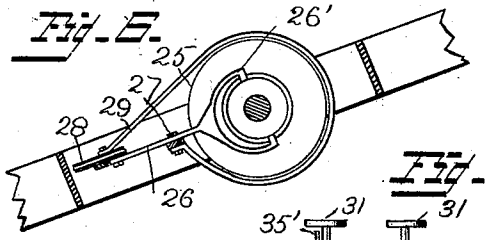


Fig. 8.

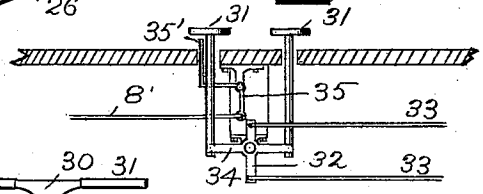


Fig. 7.

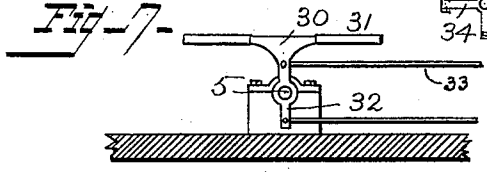
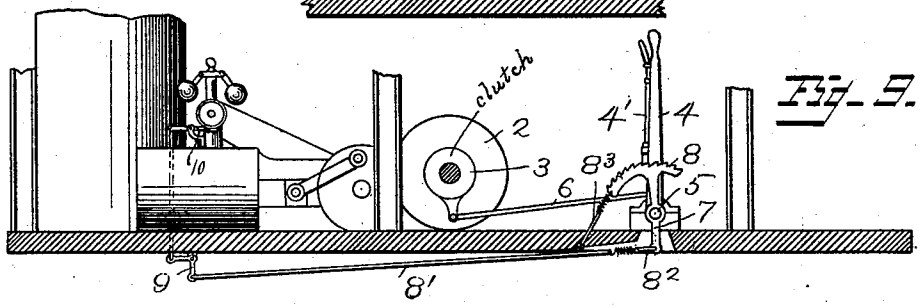


Fig. 9.



Witnesses.

Conrad J. Webster

Floyd R. Webster.

Inventor.

George L Lewis

By William Webster

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UNITED STATES PATENT OFFICE.

GEORGE L. LEWIS, OF TOLEDO, OHIO.

EXCAVATING, DITCHING, OR DREDGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 531,199, dated December 18, 1894.

Application filed March 26, 1892. Serial No. 426,521. (No model.)

To all whom it may concern:

Be it known that I, GEORGE L. LEWIS, of Toledo, county of Lucas and State of Ohio, have invented certain new and useful Improvements in an Excavating, Ditching, or Dredging Machine; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form part of this specification.

My invention relates to an excavator or dredging machine, and has for its object to construct a machine in which the working parts shall be controlled by the engineer, thereby dispensing with the crane-man heretofore usually employed.

A further object is to provide convenient means for varying the steam power to suit the work to be accomplished.

A further object is to simplify the mechanism heretofore employed for controlling the feed of the dipper, scoop or bucket, by which to render the same controllable by the engineer.

The invention consists in the parts and combination of parts hereinafter described and pointed out in the claims.

Figure 1 is a side elevation of a complete machine which for convenience I shall hereinafter designate as an excavator, it being understood that it is equally well adapted to ditching, dredging, or excavating. Fig. 2 is a detail view in vertical section of the boom and drive mechanism for feeding the scoop into the material to be moved. Fig. 3 is a detail sectional view of a modification of the drive mechanism. Fig. 4 is a plan view of a portion of the boom showing the mechanism for controlling the movement of the scoop, or dipper handle, showing in full lines a mechanism for driving and controlling, as illustrated in Figs. 2 and 3, and in dotted lines a side sprocket wheel which is another means of driving the shaft, the controlling mechanism for controlling this form being shown in dotted lines, the dotted lines illustrating a modified construction of the mechanism for controlling the movement of the scoop or dipper handle to adapt the same to different constructions of excavators. Fig. 5 is a detail view of the rock shaft and treadles for controlling the movements of the scoop or dipper handle. Fig. 6 is a detail view of the combined clutch and brake, showing the wheel for actuating the same in edge view. Fig. 7 is a side elevation of the rock shaft and duplex treadles for actuating the clutch and brake mechanism. Fig. 8 is a side elevation of the mechanism for controlling the clutch and brake and also the speed of the engine. Fig. 9 is a side elevation of the power mechanism showing more particularly the mechanism for controlling the supply of steam to the engine.

Heretofore, in the operation of the class of machines to which my invention belongs either in excavating, dredging, or ditching there has been usually employed two operators, an engineer and a crane-man, or person to control the trip and operation of the scoop, bucket or shovel, thereby not only requiring the expense of wages of the crane-man, but frequently resulting in an inharmonious action between the engineer and crane-man, due to the difficulty of communicating orders from the engineer to the crane-man on account of the noise. I have overcome these difficulties by providing for the control of the engine and excavating mechanism entirely by the engineer.

1 designates the base of the frame upon which is supported the boiler and engine, the latter being connected to the hoisting drum 2 in the usual or in any preferred manner. The drum is controlled as to its revolution by means of a lever 4 secured upon a shaft 5 and connected by a rod 6 to a clutch operating mechanism 3.

Journaled upon shaft 5 is a lever 7 formed with a segmented ratcheted bar 8 upon its upper end, the lower end of the lever being connected with a bell crank lever 9 by means of a rope or cable 8′, the opposite end of the bell crank being connected by a rod to one end of a pivoted lever 10, the opposite end of which connects with the governor valve stem.

Lever 4 is located at one side of the ratcheted segment 8, and is provided with a pawl 4′ for engagement therewith. To revolve

the drum at a normal speed, lever 4 is thrown over, actuating the clutch, it being understood that pawl 4′ is raised from engagement with the ratcheted segment and that the initial movement of lever 4 operates the clutch to speed the drum, the pawl is allowed to engage the segment, when, by a further movement of the lever (it being understood that the clutch is previously engaged) by the connections already described the governor valve then is raised, it being readily understood that the segment is carried the distance of the throw of the lever after the pawl is engaged, therefore the movement of the governor valve stem is regulated by the position upon the segment the pawl engages.

It will be seen that in the connection 8′ between the bell crank lever and the lever 7 there is interposed a resilient section 8^2 which co-acting with a like resilient section 8^3 upon a fastening secured to the base and to the end of the ratchet bar 8 thereby allowing a full throw of the lever, as the resilient connections will yield after the valve stem has been raised to the limit of its movement, to permit lever 4 to be still further moved.

In order to render the movement of the dipper handle, controllable by the engineer, I have provided a simple and effective automatically working mechanism shown in full lines as applied to one specific form of excavator, the dotted lines being intended to illustrate its adaptability to a somewhat modified form.

11 designates a power shaft geared with the engine at one end, and at the opposite end with a bevel gear 12 on a hollow shaft 12′ formed with a concentric bevel gear 13 into which meshes a straight faced pinion 14 upon a shaft 15 having a bevel gear 16 upon its upper end, which meshes with a like gear 17 upon a shaft 18 journaled transversely of the boom 19 intermediate its length, there being a pinion 20 secured upon the shaft upon one end which extends outside the boom.

21 designates a shaft journaled in the boom in parallel relation with the shaft 18, having pinions 22 thereon which mesh with rack bars upon the dipper handle 23, there being a gear 24 loosely mounted upon the outer end of the shaft which meshes with pinion 20 upon shaft 18.

Gear 24 is formed with a clutch face comprising a conical depression (see dotted lines Fig. 4) into which a conical clutch section 25 splined upon shaft 21 enters to frictionally cause shaft 21 to revolve when desired.

Clutch section 25 is moved into or out of engagement with pinion 24 by means of a lever 26 having a clutch fork 26′ which engages a groove 26^2 in the clutch section 25, the lever being fulcrumed at 27 and connected at its outer end with a wheel 28, journaled at right angles to gear 20. Upon clutch section 25 is formed a plain face 25′ around which is a brake strap 29, secured at one end, the opposite end being connected with wheel 28, whereby when wheel 28 is moved in the direction of the arrow the brake is relieved of frictional contact with the clutch section and the clutch section is forced into frictional engagement with the clutch face of gear 24 and a reverse movement of the wheel will throw the clutch out of engagement and force the brake strap into frictional engagement, to hold the dipper handle in fixed raised position as the wheel may be stopped after releasing the clutch, allowing the strap to remain loose when the dipper handle is free to run back by gravity to take a fresh load.

Wheel 28 is controlled by the engineer by being connected with a foot lever 30 in convenient reach of his foot.

Lever 30 as shown in Figs. 5 and 7 comprises a duplex treadle 31, and a depending bar 32 pivotally mounted upon shaft 5, there being a rope or cable 33 connected with the lower end of the bar 32 and from thence passed around wheel 28 and the opposite end secured to bar 32 above shaft 5 which acts as a fulcrum so that when the forward end of the foot lever is depressed the clutch is engaged, and when the rear end is depressed the clutch is disengaged and the brake strap put in tension.

In Fig. 8 I have shown a mechanism for controlling the clutch and brake, and also the speed of the engine, this construction dispensing with the ratchet bar 8 and pawl 4, and comprises bar 32 to which the rope or cable 33 is attached as has been described, there being bars 34 at right angles to bar 32 to which the duplex treadles 31 are secured; the operation of revolving wheel 28 being identical with that described.

In the construction, as shown in Fig. 8, in order to speed the engine a bell crank lever 35 is pivotally secured to the frame, the lower end of which is connected with bell crank lever 9 by means of the rod or cable 8′; and the upper end 35′ projecting in parallel relation with one of the treadles 31 and in position to contact therewith when the treadle is depressed, so as to speed the engine when the dipper is filling, this arrangement relieving the engineer of the necessity of attending the pawl 4′ and ratchet 8 while handling lever 4; and is of great value, as this work is accomplished automatically while controlling the movement of the dipper handle while feeding.

In Fig. 3 I have shown a modified form of connection between shaft 11 and bevel gear 16 comprising a shaft 15 extending from gear 12′ to the gear 16 with a flexible section 15′ formed either of a series of links as shown, or it may be of the usual ball and socket character, this construction dispensing with the tubular shaft 12′ and the straight pinion 14, the operation, however, being identical with that heretofore described.

In Fig. 4 I have shown in dotted lines the wheel 28 comprising two sections one upon each side of the boom timber and journaled upon the same in a plane parallel with a

clutch 36 upon the outer end of the shaft 18, this modification being intended to show the adaptability of the clutch operating mechanism, *i. e.*, the duplex treadles, to wheel 28, and the clutch and brake operating mechanism connected therewith, and the rope or cable 33, to any form of excavator, or power for controlling the feed of the dipper. In this construction the clutch lever 26 may enter an inclined groove in the movable clutch section to move the same into or out of engagement with the fixed section, the lever and brake strap being secured to wheel 28, although I do not confine myself to any particular form of clutch or brake mechanism, my invention pertaining more particularly to the automatic mechanism for controlling the same whether the power is on the boom in the form of an engine, or taken from the chain wheel or direct from the engine, the great value being in the controllability of the clutch and brake, and consequently the feed of the dipper, by the engineer.

In order to render the dump of the dipper or scoop controllable by the engineer, I provide a drum 37 driven by a belt 38 from the engine and attach one end of a rope or cable 39 thereto, the opposite end being connected with the trigger 40 of the dipper, and control the revolution of the drum by means of a clutch operated by a rod 41 connected with a lever 42 in convenient reach of the engineer whereby when the clutch is released, the rope may pay out to give the desired slack, and when in engagement the drum is revolved and the rope or cable 39 wound thereon to pull the trigger and release the bottom to permit the dipper to discharge its load.

It will of course be understood that the wheels 20, 22 and 24 operate only to raise or hold the scoop elevated, and that after the load is discharged the brake and clutch are thrown out allowing the scoop to descend by gravity.

It will of course be understood that the wheels 20, 22, and 24 operate to raise the scoop in elevated position, or to feed the same after the scoop is lowered, the brake clutch being thrown, and after the load is discharged, allowing the scoop to descend by gravity, the brake and clutch being engaged to feed and raise the same to secure a fresh load.

I wish it understood that I may vary the different levers and their connections with the working parts without departing from the spirit of my invention, and also that the word excavator used in the claims, is intended as a generic term for an excavating dredging or ditching machine.

What I claim is—

1. In an excavator, a boom a dipper handle movably supported upon the boom, gearing upon the boom for actuating the handle, a continuously revolving shaft geared with the power and gearing upon the boom, a clutch upon the handle operating mechanism, a wheel for operating the same, a lever and resilient connections with the lever and wheel.

2. In an excavator a boom, a dipper handle movably supported therein, mechanism supported on the boom for operating the handle, a clutch and brake upon the mechanism, a wheel for operating the clutch and brake, a lever under control by the engineer and connections with the lever and wheel.

3. In an excavator, a shaft, a lever thereon connected with the chain wheel, and a lever upon the shaft for opening the governor valve stem and mechanism upon said shaft for operating said lever to speed the engine.

4. In an excavator, a power mechanism, a hoisting mechanism, a boom, a dipper handle movably supported upon the boom, a shaft a lever thereon for connecting the power and hoisting mechanism, gearing upon the boom for actuating the dipper handle, a transmitting gear from the power gear to the gearing upon the boom, a clutch upon the handle operating mechanism, a wheel for operating the clutch, a lever upon the shaft connected with said wheel, and a lever upon the shaft having connections with the governor valve stem, all under control of the engineer, whereby when the dipper is filling the governor valve is opened.

5. In an excavator, a power mechanism, a drum driven thereby, a clutch upon the drum, a lever under control of the engineer for actuating the clutch, a dipper a clutch and brake for controlling the same, a lever under control of the engineer and a flexible connection between the same.

6. In an excavator a boom, a dipper handle movably secured therein, a plurality of geared shafts journaled in the boom to actuate the handle, a clutch and brake mechanism upon one of the shafts, a wheel for actuating the same, and means for operating the wheel and speeding the engine simultaneously comprising an angled lever pivoted centrally, a flexible connection with the wheel and two of the arms of the lever treadles upon the opposite arms, and a bell crank lever pivoted beneath one treadle, having one end to contact with the same, the opposite end being connected with the governor valve stem.

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

GEORGE L. LEWIS.

Witnesses:
WILLIAM WEBSTER,
FLOYD R. WEBSTER.