No. 863,368. PATENTED AUG. 13, 1907.

E. W. DURFEE.

MUCKING MACHINE.

APPLICATION FILED APR. 17, 1907.

3 SHEETS—SHEET 1.

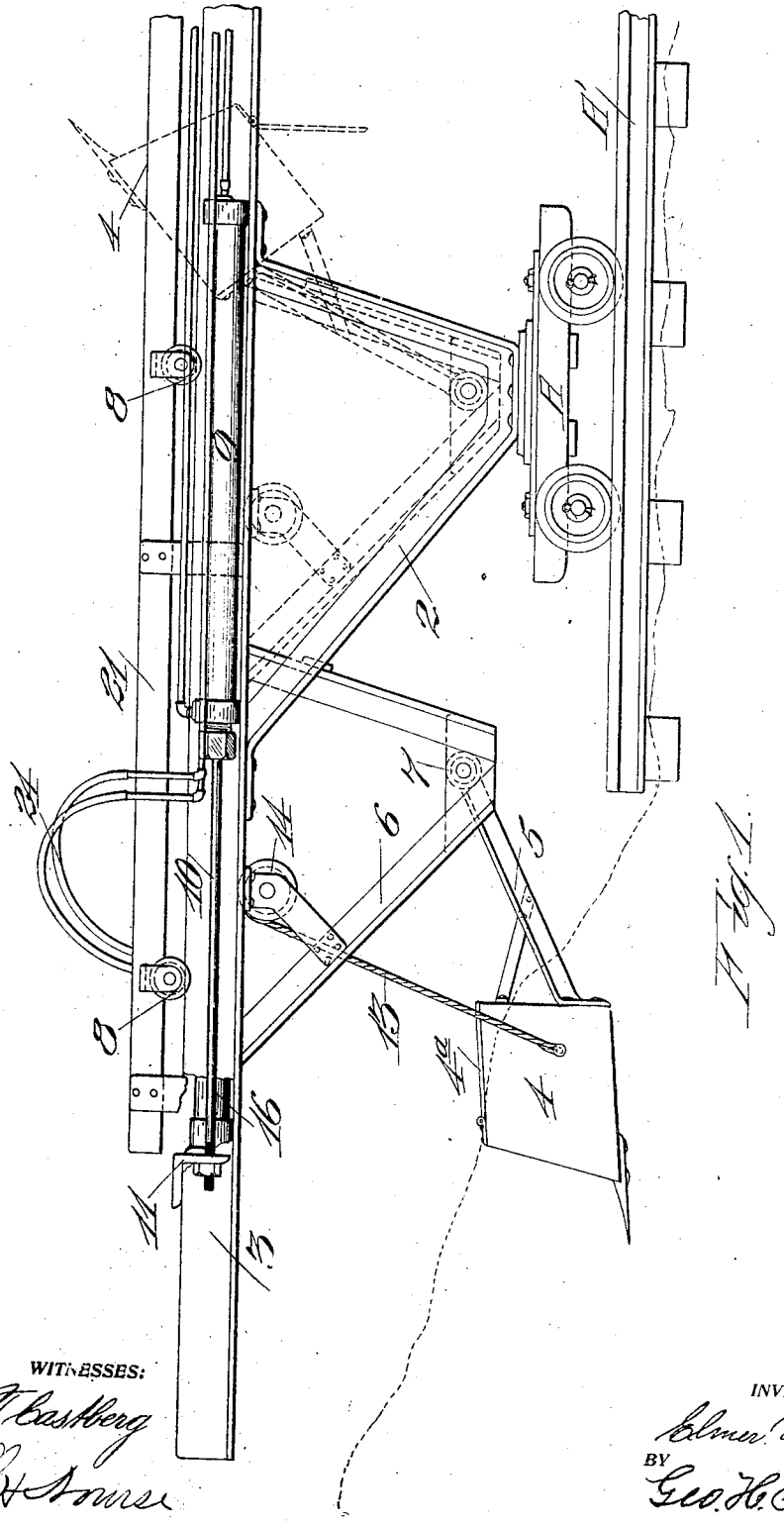


Fig. 1.

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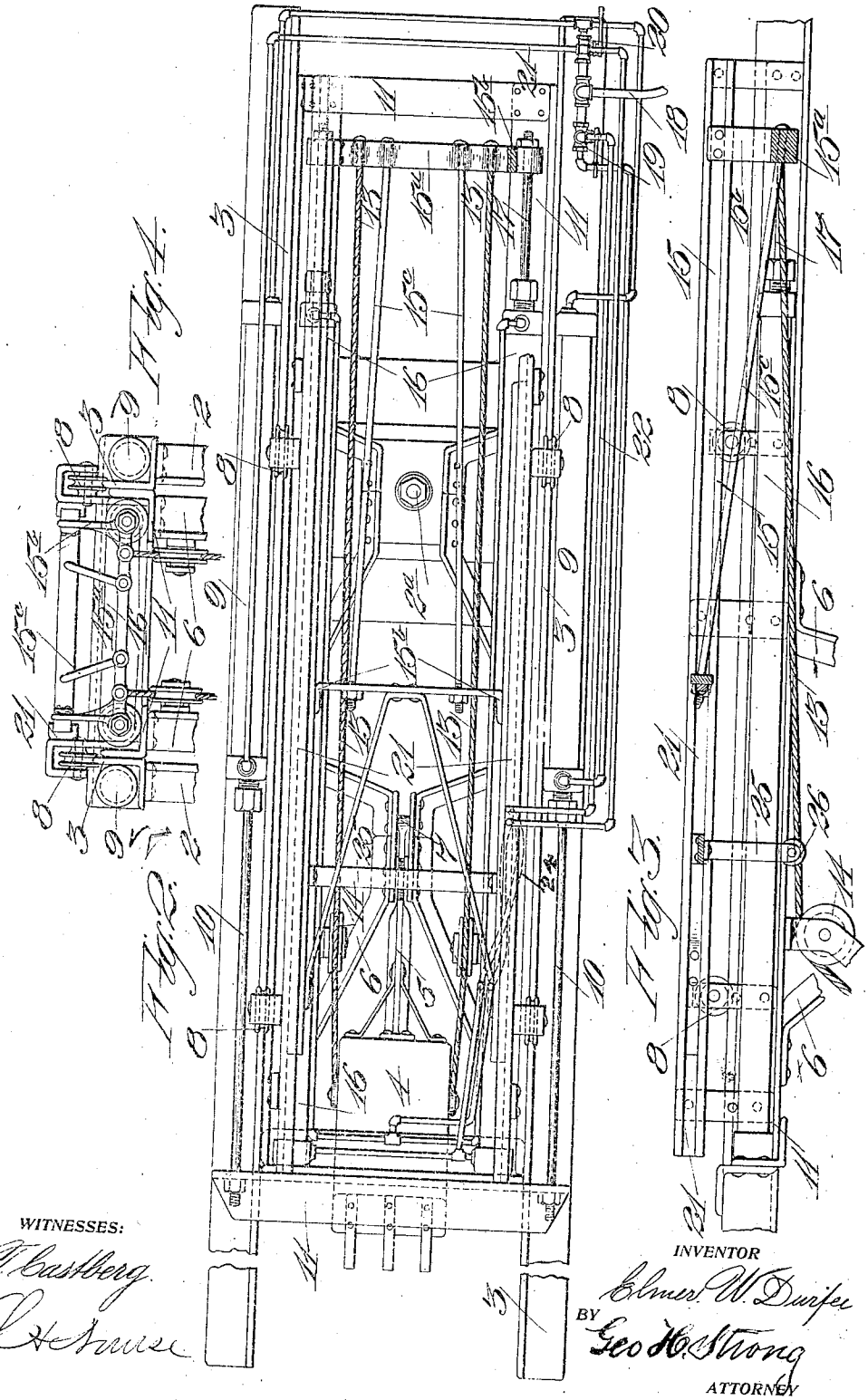


Fig. 4.

Fig. 5.

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3 SHEETS—SHEET 3.

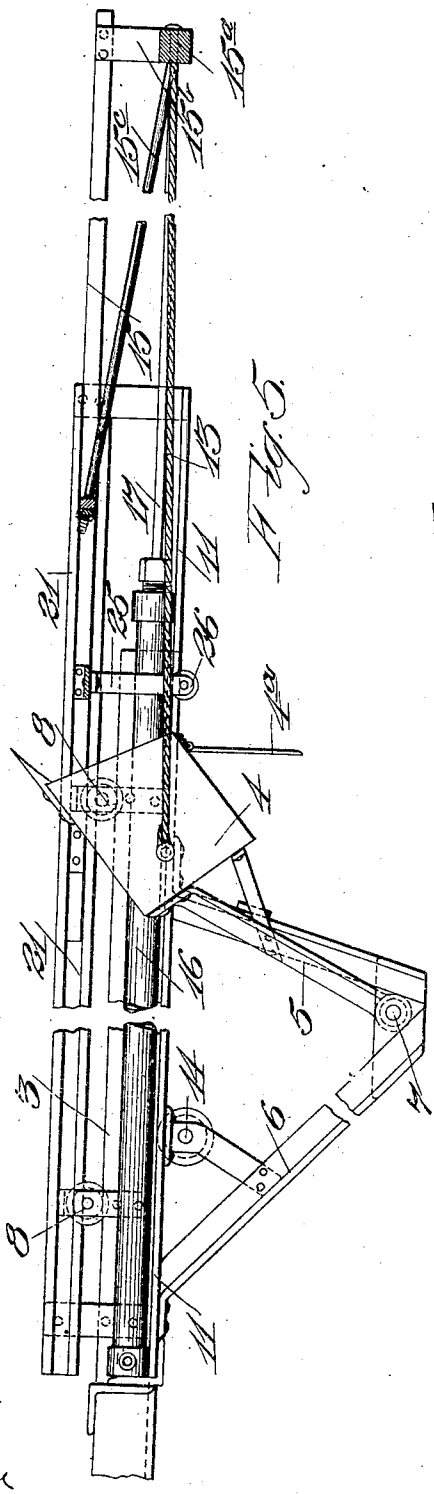


Fig. 5.

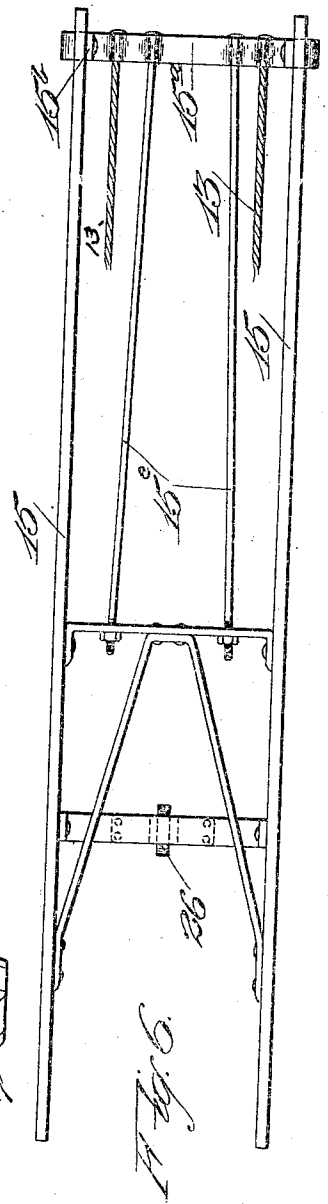


Fig. 6.

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UNITED STATES PATENT OFFICE.

ELMER W. DURFEE, OF BINGHAM CANYON, UTAH.

MUCKING-MACHINE.

No. 863,368. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed April 17, 1907. Serial No. 368,786.

To all whom it may concern:

Be it known that I, ELMER W. DURFEE, a citizen of the United States, residing at Bingham Canyon, in the county of Salt Lake and State of Utah, have invented new and useful Improvements in Mucking-Machines, of which the following is a specification.

My invention relates to an apparatus which is designed to excavate and transfer ore, earth or material capable of being thus transferred, such machines being known technically as "mucking machines".

My invention consists in the combination of parts, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation. Fig. 2 is a plan view. Fig. 3 is a partial side elevation in section. Fig. 4 is a transverse section. Fig. 5 is a side elevation of a part of the apparatus. Fig. 6 is a plan view of frame 15.

It is the object of my invention to provide a substantially automatic apparatus by which material may be excavated by the forward movement of a bucket, then elevated and carried rearwardly to a point where the bucket may be dumped or discharged into a suitable receptacle. For the purpose of conveniently carrying out this operation I employ a truck as at A mounted upon suitable wheels and adapted to travel upon a track as at A′ so that the truck A may be advanced as required toward the pile of material which is to be excavated, and this truck carries the excavating apparatus. Upon the truck is mounted a frame 2, and upon the upper ends of the diverging arms of this frame is secured a track 3 which is shown substantially parallel with the track A′.

The excavating bucket 4 is operated with relation to the truck and frame as follows: The bucket is connected by an arm 5 with the lower part of a traveling frame 6; this arm being pivoted or fulcrumed as shown at 7. This traveling frame 6 is fixed to and supported by a frame 11 reciprocable upon the track 3 by means of rollers 8 which are journaled in yokes or hangers, as shown plainly in section Fig. 4, and rest upon the upturned edges of the rails 3. This frame 11, and the bucket frame with it, are capable of being moved forward and back with relation to the truck and frame 2, as will be hereafter described. Supported upon the horizontal portion of the angle iron track 3, are cylinders 9 having their axes parallel with the track and the line of travel of the frame 6. These cylinders are provided with pistons from which piston-rods 10 extend forwardly and connect with the front cross-bar of the frame 11 which carries the bucket frame 6 as previously described. The bucket-carrying frame 6 is thus capable of being moved forward and back by the travel of this frame when fluid pressure is admitted to the cylinders 9. The bucket 4 is supported by its fulcrumed arm 5, and also by ropes 13; these ropes passing over guide pulleys 14 upon the traveling frame, and extending thence to a transverse bar of another movable frame 15 to which bar these ropes are attached. This bar and the frame of which it forms a portion, are moved by the action of pistons located in cylinders 16 which are carried upon the frame 11, as clearly shown in Fig. 4, and having piston-rods 17 extending through the cylinder-heads and connecting with the cross-bar 15^a. The cross-bar 15^a to which the ropes connect, is in line with the piston-rods and the axes of the cylinders 16 and are connected with the longitudinal bars of the frame 15 by hangers 15^b and diagonal brace rods 15^c. The frame 15 is slidable in guides 21 which are supported from the frame 11 as shown in Figs. 4 and 5. The movement of this frame and cross-bar serves to raise the bucket 4 after it has been filled, and to transfer it to its dumping or discharge position.

The fluid which is most convenient to be employed is compressed air which may be admitted through a pipe or hose 18 from any source of supply, and this supply pipe connects through cocks or valves 19 and 20 with supply pipes 21 and 22 through which air is admitted respectively to the cylinders 9 and 16, these cocks being under the control of an operator.

The operation of the apparatus as far as described is as follows: The truck A having been advanced upon its track A′ to a point as near the pile of material as is convenient, remains in a stationary position, and fluid pressure being admitted into the cylinders 9, will, through the piston and piston-rod, advance the frame 11 with which the arms 6 form a rigid connection to carry the bucket, and the bucket having been lowered into the position shown in Fig. 1, this advance will force the bucket into the pile of material with a lifting movement until it is loaded. The reverse movement of the pistons in the cylinders 9 will then retract the bucket-carrying frame 11 until it is substantially in a position within the frame 2 and supported above the truck A. Air being then admitted into the cylinders 16, the pressure upon their pistons acting through the piston-rods 17, will force the second frame 15 to travel independently with relation to the first frame 11, and this, pulling upon the suspending ropes 13, will draw the bucket up to a point contiguous to the direction pulleys 14, the bucket moving in an arc from its lowest and filled position, until it reaches a point just above the axis of the pulleys 14. A continuation of the movement of the frame 15 then carries the bucket over the remainder of its circular travel until it has arrived at the position shown in dotted lines in Fig. 1, when the top or cover 4^a will drop open and allow the contents of the bucket to fall. A car, not here shown, is provided to receive the discharge from the bucket 4, this car also running upon the track A′, and may be transmitted to any desired point. Connection is made between the fixed air-conducting pipes and the cylin-

ders upon the frames which are movable with relation to these fixed pipes by flexible hose as shown at 24. Provision is made for maintaining the proper tension of the ropes 13 by any suitable take-up devices for the purpose. When the bucket has been dumped it is returned through its arc of travel by the admission of fluid to the opposite ends of the cylinders 16, this acting through the pistons and the piston-rods 17 to retract the frame 15, and when the bucket reaches its depressed position shown in Fig. 1, the frame which carries it will then be advanced by opening the controlling valve by which air is admitted into the cylinders 9, and the slidable frame 11 which carries the depending frame 6 to which the bucket is attached is again advanced to force the bucket into the material and load it. In order to return the bucket through the first part of its arc of return movement, and to a point beyond the fulcrum point of the arm 5, I have shown an arm or hanger 25 extending down from the frame 15, and it may carry an anti-friction roller 26. When the frame 15 commences its return movement, this arm on the roller first contacts with the bucket and its door, closing the latter, and then moving the bucket until it has passed a vertical line through its fulcrum point, after which the bucket may continue its movement to its filling position, by gravitation.

It will be understood that if it is desired to discharge the material to one side of the apparatus, the frame 2 may be turnable upon a vertical pivot 2^a connecting it with the truck A.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. An apparatus for transferring material, said apparatus consisting of a bucket, a fulcrumed lever arm upon which the bucket is carried from an excavating to a dumping position, fluid pressure means for advancing the bucket to be filled while in the excavating position, and means by which the bucket is raised and inverted about the fulcrum of said lever arm.

2. In an apparatus for excavating and transferring earth, a track, a frame-work and base upon which the track is supported at an elevation from the base, a second frame-work and rollers adapted to travel upon the track, a bucket carried upon said second frame-work, a fluid pressure mechanism and suspending cables whereby the bucket may be lowered to an excavating position, and raised to a dumping position, and a fluid pressure mechanism by which the bucket is advanced to be filled while in its excavating position.

3. In an apparatus for excavating and transferring material, a wheeled base, a track supported at an elevation above said base, a bucket frame having rollers traveling upon the track, a bucket carried by said frame, cylinders having fluid pressure actuated pistons movable parallel with the track, cables connecting the bucket with the piston-rods to swing the bucket about its fulcrum support, other cylinders with pistons, connections whereby the bucket is advanced to be filled while in its loading position, and a gate adapted to open when the bucket has been returned to its discharge position.

4. In an apparatus for excavating and transferring material, a main frame with substantially horizontal elevated tracks, a second frame and means for reciprocating it upon the tracks, a bucket and a fulcrumed arm by which it is supported from the movable frame, and means by which the movable frame and bucket are advanced to fill the bucket.

5. In an apparatus for excavating and transferring material, a main frame with substantially horizontal elevated tracks, a second frame and means for reciprocating it upon the tracks, a bucket and a fulcrumed arm by which it is supported from the movable frame, means by which the movable frame and bucket are advanced to fill the bucket, and means by which the bucket is raised and inverted about its fulcrum point.

6. In an apparatus for excavating and transferring material, a main frame with substantially horizontal elevated tracks, a second frame and means for reciprocating it upon the tracks, a bucket carried by and movable forward and back with said second frame, a lever-arm supporting the bucket and fulcrumed upon the movable frame, means carried upon the second frame and connections by which the bucket is caused to traverse a circular arc about the fulcrum point of its support, from the loading to a discharge position.

7. An apparatus for excavating and transferring material including a bucket, supports upon which it may be advanced to excavate a load and subsequently retracted, a fulcrumed arm connecting the bucket with its movable support, and means by which the bucket is caused to move and be inverted about its fulcrum support.

8. In an apparatus for excavating material, the combination of a track, a frame work upon which said track is supported at an elevation, a second frame suspended from and movable longitudinally with relation to the track, a bucket carried upon the traveling frame, and fluid-pressure cylinders upon both frames with pistons and rods movable substantially in the line of travel of the bucket carrying frame and connected therewith whereby the bucket may be advanced to load itself and subsequently retracted.

9. In an apparatus of the character described, a fixed frame, a second frame suspended from, and movable longitudinally with relation to the fixed frame, a bucket with an arm fulcrumed to the traveling frame, fluid pressure cylinders upon the fixed frame with pistons and rods connected with the bucket-carrying frame to advance and retract said frame and bucket, other cylinders carried by the bucket frame, a third frame guided and slidable with relation to the bucket-carrying frame, connections between said other cylinder piston-rods and the third frame, flexible connections between said frame and the bucket whereby the latter is moved from its loading to its discharge position.

10. In an apparatus of the character described, a fixed frame, a bucket-carrying frame mounted and slidable upon the fixed frame, a third frame mounted and slidable upon the bucket frame, fluid pressure cylinders mounted upon the fixed frame with piston-rods connecting with the bucket frame to advance and retract it, other cylinders carried upon the bucket-frame and having their piston-rods connected with the third frame, flexible connections between said third frame and the bucket, whereby said bucket is transferred from its loading to a discharge position, and an arm carried by the third frame to contact with the bucket and partially return said bucket to a loading position when the frame is retracted.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ELMER W. DURFEE.

Witnesses:
J. E. DAW,
T. H. QUILLEN.