W. R. LITZENBERG.

EXCAVATING AND DREDGING MACHINE.

APPLICATION FILED JUNE 29, 1911.

1,075,923.

Patented Oct. 14, 1913.

3 SHEETS—SHEET 1.

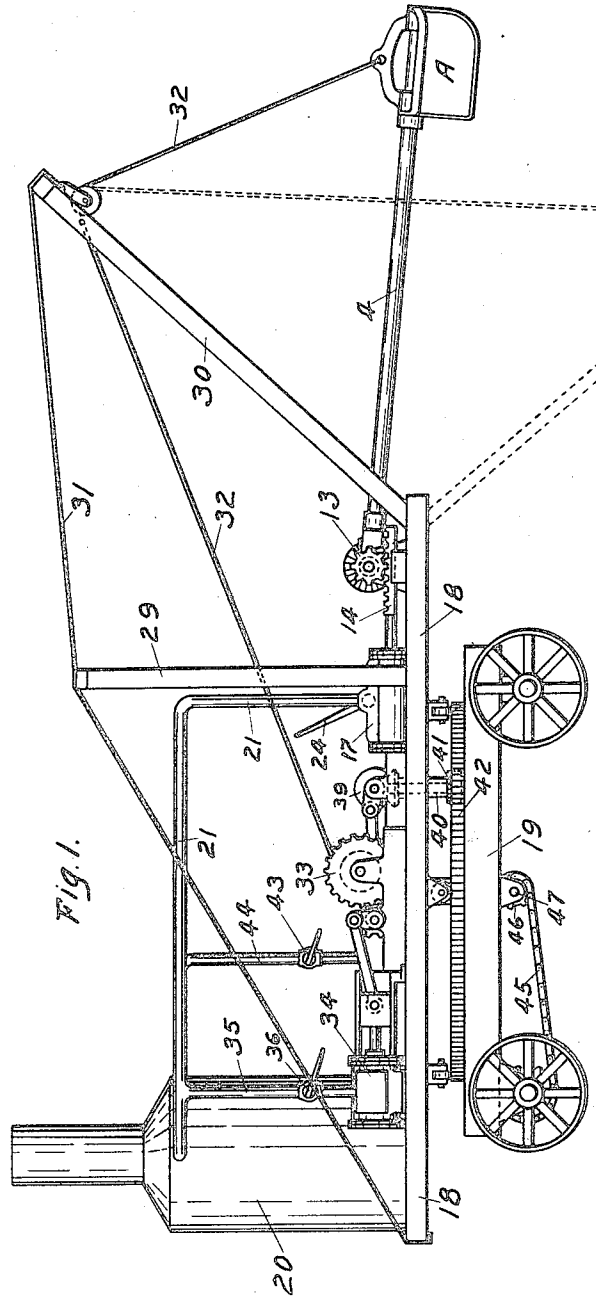


Fig. 1.

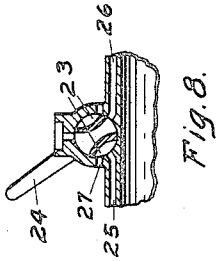


Fig. 8.

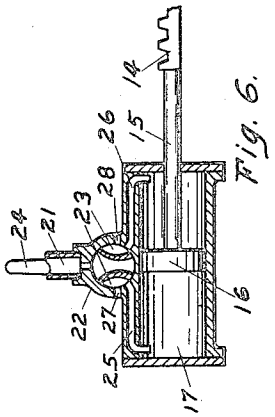


Fig. 6.

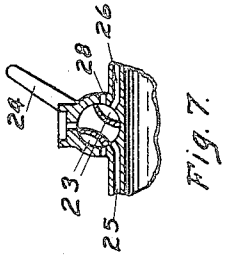


Fig. 7.

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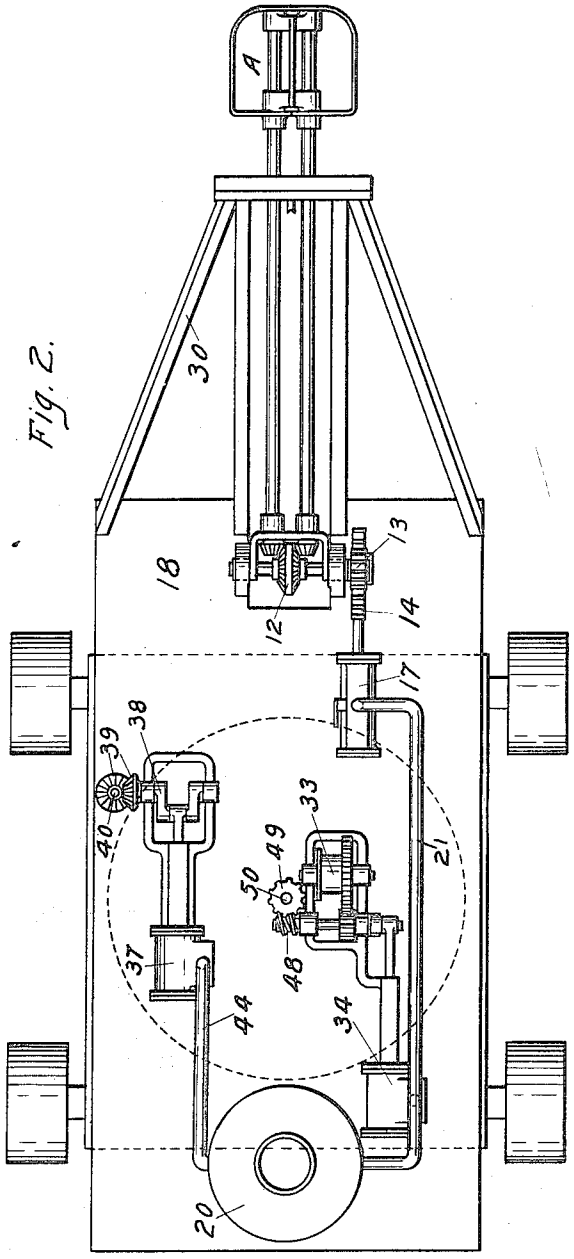
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

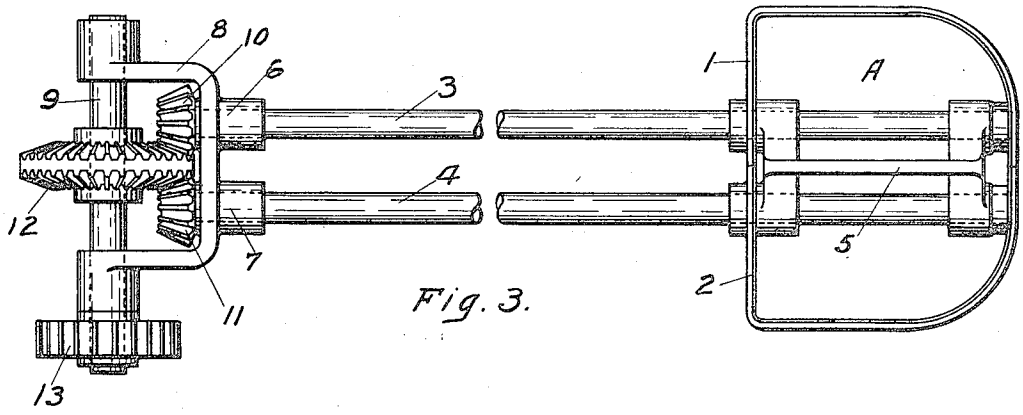


Fig. 3.

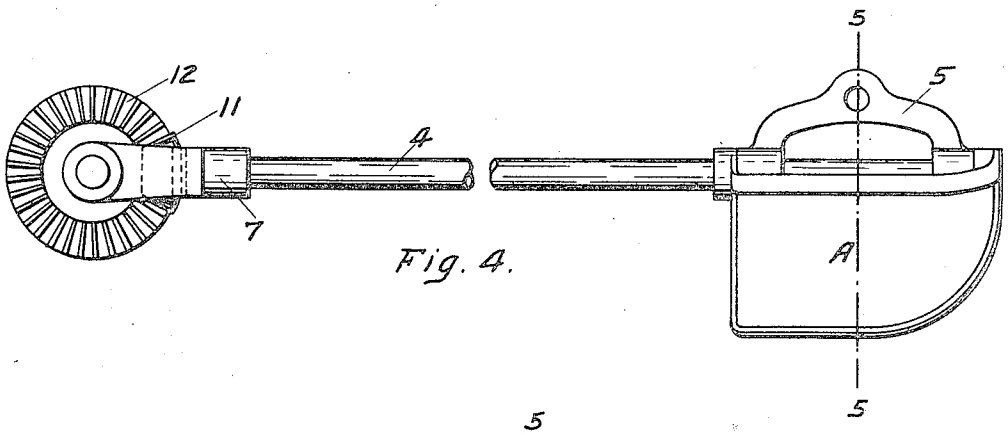


Fig. 4.

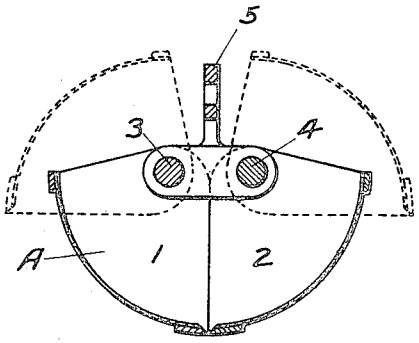


Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM R. LITZENBERG, OF PORTLAND, OREGON.

EXCAVATING AND DREDGING MACHINE.

1,075,923. Specification of Letters Patent. Patented Oct. 14, 1913.

Application filed June 29, 1911. Serial No. 636,101.

To all whom it may concern:

Be it known that I, WILLIAM R. LITZENBERG, a citizen of the United States, residing in the city of Portland, county of Multnomah, and State of Oregon, have invented certain new and useful Improvements in Excavating and Dredging Machines, of which the following is a specification.

My invention relates to excavating and dredging machines and more particularly to an improved means of supporting, operating and handling the shovel or bucket.

I have conceived the idea of a two part bucket or shovel, such, for example, as the clamshell bucket, mounted at the end of one or more arms or shafts, and adapted to be positively opened and closed by a power actuated movement of said arms or shafts, the opposite ends of the arms or shafts being pivotally mounted, so that the bucket end thereof can be raised and lowered, as from a loading position to a discharging position. I am aware that it is old to support and operate clamshell buckets and the like from crane arms by means of operating cables. In this construction, the bucket is lowered or dropped in its opened position, upon the material to be picked up, and as the lifting cable is drawn, the bucket is closed upon the material and lifted by means of said cable and crane and carried to the place of discharge.

My invention contemplates supporting and operating a bucket or shovel at the end of one or more arms or shafts, by means of which the bucket can be positively opened and positively closed by mechanical power operating upon the opposite ends of the arms or shafts.

The operation of one embodiment of my invention is similar to the operation of the human arms, with the hands corresponding to the bucket, as in picking up a double handful of sand or other material, at arm's length.

Among the salient objects of my invention are: to provide a bucket or shovel supported and operated at the end of one or more arms, or shafts, and adapted to be positively opened and positively closed by movement of said arms or shafts, which arms or shafts are moved or operated by means of power mechanism, operating upon the opposite ends thereof; to provide a construction in which the supporting and operating arms or shafts are pivotally mounted at the power end, whereby to permit said arms or shafts, with the bucket or shovel, to be moved upon their pivotal mounting for the purpose of raising and lowering the bucket from a loading position to a discharging position; to provide in combination with such supporting and operating arms or shafts and bucket, operating machinery and carriage therefor, whereby said shafts and bucket can be moved around a vertical axis during the operation of the machine, thereby making it possible to handle a greater area of dirt, sand or gravel without moving the entire machine; to provide in a machine of the character referred to, a construction of bucket, with supporting and operating arms or shafts, which can be operated under the water as well as upon dry land, thereby adapting the machine for dredging; and in general, to provide a bucket or shovel supported and operated by one or more arms or shafts, with suitable machinery for operating same, whereby said bucket can be power-closed and power-opened through its arms or shafts, and thus providing an excavating or dredging bucket which can be forced into the material to be removed, whether it has been previously loosened or not.

In order that others may more clearly understand my invention, I have shown in the accompanying drawings, one embodiment thereof, in which a cam-shell bucket is mounted upon and operated by two arms or shafts, there being one arm or shaft for each half of the bucket which is secured to the end of its shaft so as to turn therewith. These two arms or shafts, at the bucket end, work in suitable bearings in a lifting yoke, and at their opposite ends said shafts carry gears arranged to be operated by a larger gear working therebetween, all being supported upon a main pivotal shaft from which the arms and buckets are operated and upon which they turn as a pivotal support. Any suitable and practical power machinery may be used for operating the bucket arms or shafts and for raising and lowering the bucket by means of its lifting yoke.

Referring now to the drawings, illustrating one practical embodiment of the invention,—Figure 1 is a side elevation of a machine embodying the invention; Fig. 2 is a plan view thereof, with parts omitted; Fig. 3 is a top plan view of one embodiment of

the invention proper, disconnected from any supporting and operating machinery; Fig. 4 is a side view of the same; Fig. 5 is a sectional view thereof, taken on line 5—5 of Fig. 4, and also showing the bucket in the open position in dotted lines; Fig. 6 is a sectional view of an operating cylinder which may be used to operate the shaft of the mechanism for opening and closing the bucket; and Figs. 7 and 8 are fragmentary sectional views showing two different positions of the controlling valves shown in Fig. 6.

Referring now to the drawings, I will describe the embodiment of the invention here shown for the purpose of illustrating it.

Referring first to Figs. 3, 4, and 5, which show the real invention, I provide a bucket or shovel A, composed of two parts 1 and 2, mounted upon the ends of two operating shafts 3 and 4, which said shafts are secured to the two parts of the bucket or shovel in such a manner that when the shafts are turned in one direction, the bucket or shovel is opened, and when the shafts are turned in the opposite direction, the bucket or shovel is closed. A lift yoke 5 provides bearings for the ends of shafts 3 and 4, and at the same time constitutes a means for lifting the ends of the shafts, together with the bucket or shovel mounted thereupon. The opposite ends of the shafts 3 and 4 have suitable bearings, at 6 and 7, in a yoke 8, mounted upon a shaft 9. Mounted upon the ends of the shafts 3 and 4, within the yoke 8, are beveled gears 10 and 11 which mesh with and are driven by a larger gear 12, mounted upon and driven by the shaft 9. The gear 12, when turned in one direction, operates, through the gears 10 and 11, to positively open the shovel or bucket A, and when turned in the opposite direction, said gear 12 operates to positively close said bucket or shovel. The shaft 9 is operated through a gear 13, adapted to be operated by means of a reciprocating rack 14, (Figs. 1 and 6) constituting a part of a piston rod 15 which is operated by the piston head 16 working within a cylinder 17.

The invention so far described, it will be understood can be mounted upon any suitable carrier support, depending upon whether it is to be used as an excavator, or as a dredge. In the present showing I have illustrated it mounted upon a platform or turn-table 18, mounted upon a carrying truck 19. I have also shown a steam boiler 20 for furnishing the operating power, although it is to be understood that any power furnishing mechanism can be used. This steam boiler is connected with the cylinder 17, through a pipe 21, whereby to admit steam to either end of said cylinder for the purpose of moving the piston head 16, and thereby the rack 14, in either direction, for the purpose of operating the gear 13, the shaft 9, the gear 12, and the gears 10 and 11, which are mounted upon and operate the shafts 3 and 4, carrying the different parts of the bucket or shovel.

Referring to Fig. 6, the pipe 21 discharges into a valve chamber 22, in which is a valve member 23 operated by a hand lever 24. Said valve chamber communicates with the opposite ends of the cylinder 17 through the passage ways 25 and 26, and is also provided with outlet ports 27 and 28. The valve member 23 is of peculiar shape and when in the position shown in Fig. 6, both ends of the cylinder 17 are open to the atmosphere through the passage ways 25 and 26, and the outlet ports 27 and 28, thereby equalizing the pressure in the cylinder on the opposite sides of the piston head and permitting a free reciprocation thereof, when the shafts 3 and 4, with the bucket carried thereby, are raised and lowered upon their pivotal mounting. When said valve member 23 is in position shown in Fig. 7, the left hand end of the cylinder is open to steam pressure from the steam boiler 20, while the opposite end is open to the atmosphere through the passage 26 and the outlet 28. This operates to force the piston 6 and the rack 14 to the right and thereby turns the gear 13, the shaft 9 and the gear 12 in a direction which would operate to positively close the bucket or shovel A. When the valve member is in the position shown in Fig. 8, the left end of the cylinder is open to the atmosphere through the passage 25 and the outlet port 27, while the opposite end is open to the admission of steam through the passage 26. This operates to force the piston 16 to the left end of the cylinder 17, thereby operating the gear 13, the shaft 9 and the gear 12, in a direction which operates to positively open the bucket or shovel A.

The platform or turn-table 18 is supplied with the usual brace frame 29 and the forwardly projecting leg or crane 30, supported by brace rods 31, extending rearwardly to the opposite end of the platform 18. The bucket A, together with its operating shafts, are raised and lowered by means of a cable 32, operating over a pulley in the upper outer end of the leg 30, said cable being operated from a drum mechanism at 33, which is operated from a cylinder 34, receiving steam from the steam boiler 20, through a pipe 35. The admission of steam thereto is controlled by a valve mechanism 36. The platform or turntable 18, is turned upon the carrying truck 19, in the usual way, as from a cylinder 37, operating a crank at 38, gears 39 and a vertical shaft 40 (Figs. 1 and 2) carrying a small gear 41, which meshes with the large truck gear 42, shown in Fig. 1. This mechanism is controlled by a valve lever 43, in the pipe

44, connecting the cylinder 37 with the steam boiler 20.

As a means for propelling the machine shown in the drawings from one place to another, I mount a driving sprocket upon the rear axle of the truck and drive it through a sprocket chain 45, and a small sprocket 46, mounted upon a short shaft 47, which may be driven by any suitable connection with the power furnishing mechanism, as from a worm gear 48 (Fig. 2), in mesh with a gear 49, mounted upon a shaft as 50 and extending through the center of the turn-table so as to have driving connections with the shaft 47 upon which is mounted the small sprocket 46.

It is to be understood that any suitable carrying and operating mechanism can be used to support and operate the invention proper, one practical embodiment of which is shown and illustrated in Figs. 3, 4 and 5.

The invention broadly considered contemplates any bucket or shovel mounted upon the end of an arm and capable of being positively opened and positively closed at will by the movement of said arm relative to said bucket or shovel. In the embodiment of the invention shown in Figs. 3 and 4 I have shown this arm composed of two shafts, and the relative movement of the shafts is a rotary movement.

I am aware that the invention may be embodied in a variety of different constructions without departing from the spirit thereof and I do not intend to limit the invention to the particular showing here made for purposes of illustration, except as it may be limited by the language of the hereto appended claims.

I claim:

1. A bucket or shovel mounted upon the end of an arm and adapted to be opened and closed by the rotative movement of a part of said arm about its longitudinal axis, said arm being pivotally mounted at its opposite end, and means for mechanically rotating a part of said arm to open and close said bucket or shovel.

2. In combination, a two-part bucket or shovel, two operating shafts pivotally mounted upon a transversely extending axis at their attached ends and connected at their opposite ends respectively with the parts of said bucket or shovel whereby a rotative movement of said shafts operates to open and close said bucket or shovel, and means for mechanically rotating said shafts in opposite directions.

3. In combination, a two-part bucket or shovel, a supporting and operating arm therefor pivotally mounted at one end and comprising two shafts connected at their outer ends to the respective parts of said bucket or shovel, and means for mechanically rotating said shafts simultaneously in opposite directions whereby to open and close said bucket or shovel.

4. In combination, a two-part bucket or shovel, a supporting and operating arm therefor pivotally mounted at one end and comprising two shafts rotatably mounted and connected at their outer ends to the respective parts of said bucket or shovel, and means for rotating said shafts to open and close the parts of said bucket or shovel.

5. In an excavating or dredging machine, the combination with the carrying and power furnishing mechanism thereof, of a two-part arm, a two-part shovel or bucket mounted upon the end of said arm and adapted to be opened and closed by the movement of one part of said arm relative to the other part thereof, said arm being pivotally mounted and supported at its opposite end upon a transversely extending axis, operative connections at said pivotal support between the power furnishing mechanism of said machine and said arm and means for moving said arm upon its pivotal mounting.

6. In an excavating or dredging machine, the combination with the carrying and power furnishing mechanism thereof, of a two-part shovel or bucket, a supporting and operating arm therefor pivotally mounted at one end and comprising two shafts connected at their outer ends to the respective parts of said bucket or shovel, driving connections between the power furnishing mechanism of said machine and the ends of said shafts whereby to positively rotate the latter relative to each other to open and close said bucket or shovel, and means for raising and lowering said bucket or shovel and its supporting arm upon the pivotal mounting of the latter, for the purpose referred to.

7. In an excavating and dredging machine, the combination with the power furnishing mechanism thereof, of a two-part shovel or bucket, operating shafts connected respectively at their outer ends with the parts of said bucket, gears mounted upon the inner ends of said shafts, an operating gear turning between and meshing with the gears upon said shafts, and driving connections between the power furnishing mechanism of said machine and said operating gear whereby the operation of the latter operates to positively rotate said shafts in opposite directions to open and close said bucket or shovel.

8. In an excavating or dredging machine of the character referred to, the combination with carrying and power furnishing mechanism, of a two-part bucket or shovel, two operating shafts connected respectively at their outer ends with the parts of said bucket or shovel, driving gears mounted upon the inner ends of said shafts, an operating shaft and gear with the latter working between and meshing with the driving gears upon

said bucket shafts, said bucket shafts being pivotally mounted to turn upon said operating shaft, driving connections between the power furnishing mechanism of said machine and said operating shaft, a lifting yoke for said bucket or shovel, and a lifting cable connected with said lifting yoke and the power furnishing mechanism of said machine whereby said bucket and its operating shafts can be raised and lowered upon their pivotal mounting, substantially as shown and described.

9. In excavating, dredging or grappling mechanism, the combination with power mechanism, of a rigid structure mounted at one end to be oscillated upon an axis transverse to its longitudinal axis, a two-part tool carried by the swinging end of said arm structure and means for positively opening and closing said two-part tool comprising a direct positive mechanical connection extending from one member of the two-part tool along the supporting arm structure to the pivotally supported end of the latter and through it to the power mechanism, whereby movement of the supporting arm structure about its pivotal axis does not disturb the tool-actuating connections and the tool may be positively opened and closed in any position of the supporting arm.

10. In an excavating, dredging, or grappling mechanism, the combination of a supporting arm structure comprising a pair of shafts extending alongside of and united to each other, one of said shafts journaled to rotate about its own axis, a two-part tool mounted upon said supporting arm structure, one of its parts being pivotally mounted thereon, operative connections between said movable part of the tool and said rotative supporting arm structure member, and means for mechanically rotating said latter element.

11. In an excavating, dredging, or grappling mechanism, the combination of a duplex supporting arm structure, comprising a pair of parallel shafts yoked together and journaled to rotate in said yokes, a shaft mounted at right angles to the longitudinal axis of said supporting structure, journal connections between said latter shaft and the yoke structure of the supporting arm, gearing connections between said transverse shaft and the supporting arm shafts, whereby the latter are simultaneously rotatable in opposite directions, and a two-part tool mounted upon the opposite end of said supporting arm structure, each member thereof being positively and operatively connected with a corresponding supporting arm shaft.

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