R. M. FOTHERINGHAM.

EXCAVATING BUCKET.

APPLICATION FILED OCT. 22, 1917.

1,309,846. Patented July 15, 1919.

Fig. 1.

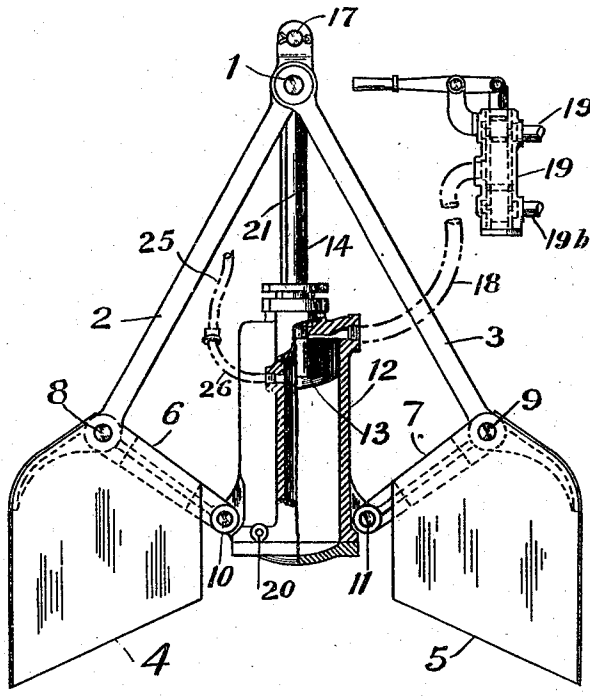


Fig. 3.

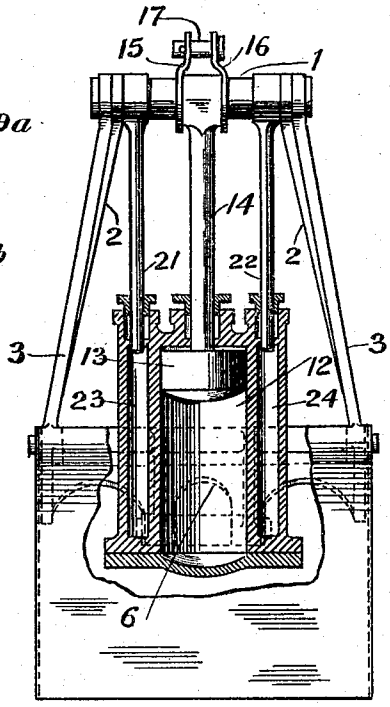
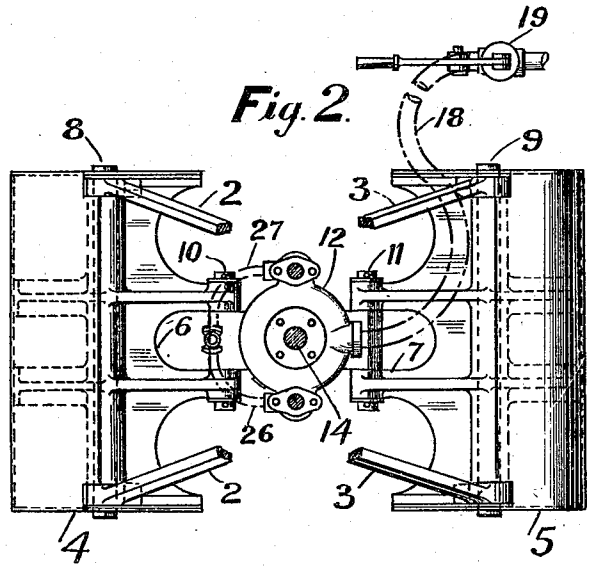


Fig. 2.



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EXCAVATING-BUCKET.

1,309,846. Specification of Letters Patent. **Patented July 15, 1919.**

Application filed October 22, 1917. Serial No. 197,899.

To all whom it may concern:

Be it known that I, ROBERT M. FOTHERINGHAM, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Excavating-Buckets, of which the following is a specification.

My invention relates generally to excavating buckets, and particularly to that type commonly known as "grab buckets", comprising coöperating jaws with mechanism for opening and closing them.

One object of my invention is to provide an excavating bucket device with an efficient power mechanism, self-contained in the device, and operating to cause the jaws of the bucket to close upon and dig into the material to be removed, operating independently of any direct action which lifts the bucket with its load.

Another object of my invention is to provide power mechanism for forcefully opening the jaws of the bucket, whereby the jaws may be opened more quickly than by the usual gravity forces.

Another object of my invention is to dispense with the sheaves and cables ordinarily used to close excavating bucket jaws, thereby effecting this purpose in a more direct way, eliminating all friction of parts so dispensed with.

Another object of my invention is to provide for the use of larger buckets than are ordinarily used by having the power mechanism for closing and opening the jaws independent of the hoisting apparatus.

The details of one embodiment of my invention are shown in the accompanying drawings, in which;

Figure 1 is a side view of the bucket equipped with devices embodying one form of my invention.

Fig. 2 is a plan view partly in section of the apparatus shown in Fig. 1.

Fig. 3 is an end view partly in section of the apparatus shown in Fig. 1.

In the figures, the crosshead 1, has journaled thereon two pairs of toggle arms 2 and 3 to which are pivoted the complementary jaws or bucket halves 4 and 5 respectively, having extensions 6 and 7, fulcrumed on the shafts 8 and 9, and connected pivotally by the pins 10 and 11 to the main cylinder 12. The main cylinder 12 and its gland slides respectively on the piston 13 and the piston rod 14 which is rotatably connected to the crosshead 1. Links 15 and 16 are also pivotally connected to the crosshead 1 and are provided with a pin 17 adapted to be engaged by the hook of the hoisting device, not shown in these drawings. The flexible pipe 18 has a three way controlling valve 19 with inlet port 19^a and outlet port 19^b placed at a convenient position for the operator to control the inlet to and outlet from the main cylinder 12. An opening 20 is provided at the lower end of the main cylinder 12 for an air vent. The rams 21 and 22 are pivotally connected to the crosshead 1 and slide in the small return cylinders 23 and 24 attached to the main cylinder 12. The flexible pipe 25 with its two branches 26 and 27 convey the fluid pressure to these return cylinders continuously during the period of excavating.

The general operation of my device is as follows:—

Assume that the buckets 4 and 5 are in open position as shown in Fig. 1, ready to be plunged into the material to be raised. The working fluid under pressure is conveyed from the source of supply to the main cylinder 12 by way of the inlet port 19^a of the valve 19 and the flexible pipe 18 and to the small cylinders 23 and 24 through the flexible pipes 25, 26 and 27. By operating the three way valve 19 pressure is admitted to the main cylinder 12 above the piston 13. The piston 13 being connected by the piston rod 14, with the crosshead 1, the cylinder 12 will rise on the piston rod 14 and pull on the arms 6 and 7, the outer ends of these arms being pivoted at 8 and 9 to the respective toggle arms 2 and 3 will cause a forcible inward rotary movement of the buckets 4 and 5 toward one another into the material to be lifted. The pressure in the main cylinder 12 is maintained until it is desired to discharge the buckets 4 and 5. When the three way valve 19 is operated to release the pressure in the main cylinder 12 by way of the flexible pipe 18 and the outlet port 19^b, the buckets 4 and 5 open by the combined weight of the cylinders, buckets, and the load of excavated material, this opening movement is accelerated by the fluid pressure in the small return cylinders 23 and 24 acting on the rams 21 and 22. The vent opening 20 in the bottom of the main cyl-

inder 12 allows the air underneath the piston to escape as the cylinder rises, and prevents the formation of a partial vacuum underneath the piston when the cylinder descends.

Having described my invention I claim,

1. In an excavating bucket, the combination with a crosshead, of toggle arms hinged upon said crosshead, complementary jaws hinged on the lower ends of said toggle arms, a cylinder positioned between said jaws and pivoted to extensions thereof, a piston within said cylinder, a piston rod fixed to said piston at one end and hinged at its other end to said crosshead, said cylinder having an air vent, a return cylinder attached to the aforesaid cylinder, a plunger entering said return cylinder and having connections with said crosshead, fluid connections with both cylinders for operating the same.

2. In an excavating bucket the combination with a crosshead, of toggle arms hinged upon said crosshead, complementary jaws hinged on the lower ends of said toggle arms, a cylinder positioned between said jaws and pivoted to extensions thereof, a piston within said cylinder, a piston rod fixed to said piston at one end and hinged at its other end to said crosshead, said cylinder having an air vent, a plurality of return cylinders attached to the aforesaid cylinder, a plunger entering each of said return cylinders and having connection with said crosshead, fluid connections with all cylinders for operating the same.

ROBERT M. FOTHERINGHAM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."