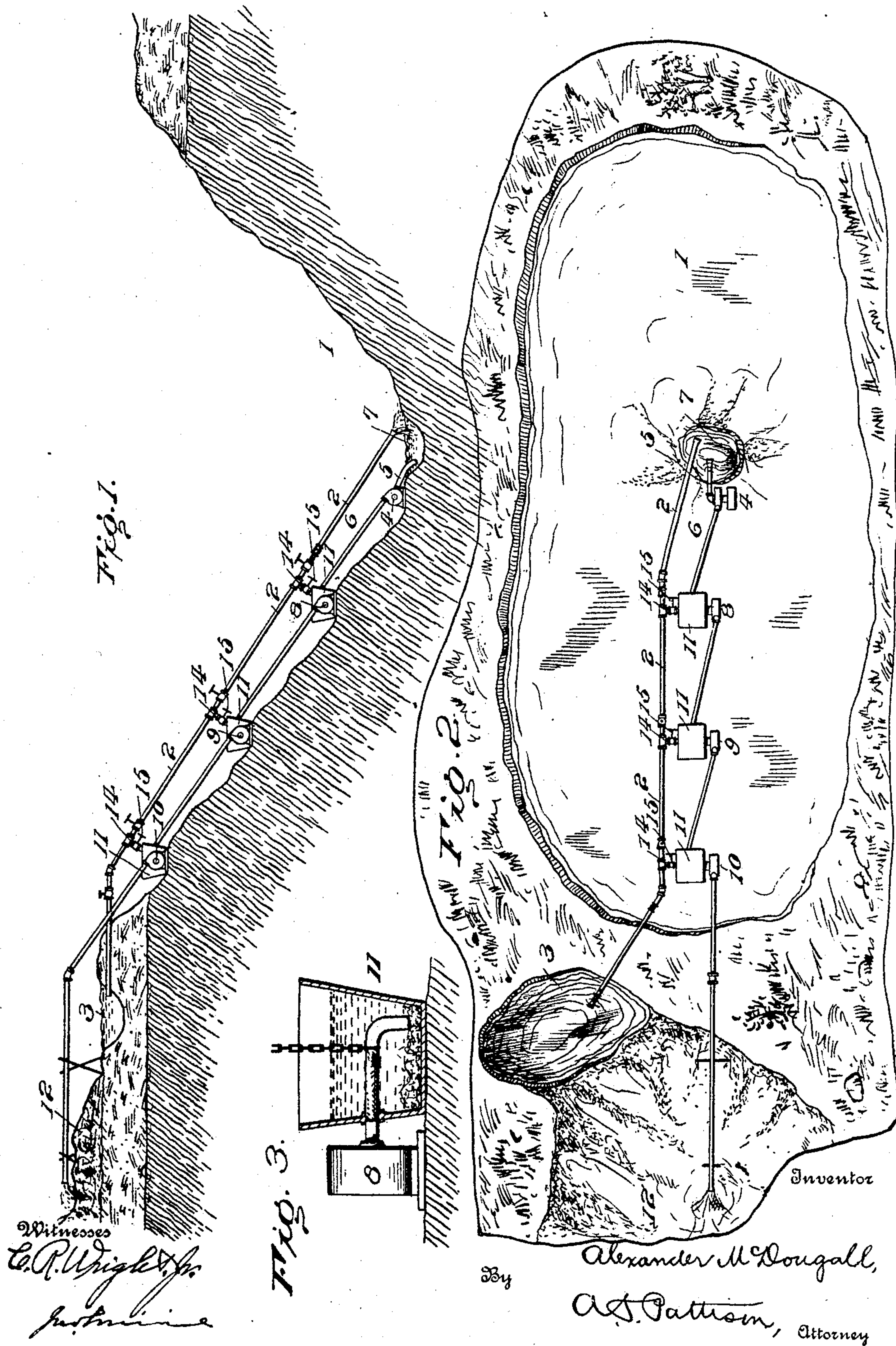


No. 797,068.

PATENTED AUG. 15, 1905.

A. McDOUGALL.
MINING APPARATUS.
APPLICATION FILED JUNE 20, 1904.



UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

MINING APPARATUS.

No. 797,068.

Specification of Letters Patent.

Patented Aug. 15, 1905.

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To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Mining Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in mining apparatus, and pertains to that class in which the ore, sand, earth, or gravel is mixed with water and the mixture conveyed by a suitable pump to either a dump or stock pile, a car, a conveyer, or a washing or sorting machine, and has for its object certain improvements which will be fully described hereinafter.

In the accompanying drawings, Figure 1 is a sectional view of a mine, showing my improved apparatus in side elevation. Fig. 2 is a top plan view of a mine, showing my apparatus in a top plan view. Fig. 3 is an enlarged sectional view through one of the priming-tanks, with its pump shown in elevation.

Referring now to the drawings, 1 indicates a mine or pit from which the material is mined through the medium of the supply of water. As here shown, the water is supplied to the pit or mine through a pipe 2, and the pipe 2, as here illustrated, receives its supply from a pond or reservoir 3, and the water is fed by gravity through the pipe. However, this may be varied, and the water may be supplied from any suitable source and may be forced to the mine or pit instead of flowing by gravity without departing from the scope and spirit of my invention.

My present invention involves a suitable pump 4, preferably of the centrifugal type, which has its inlet-pipe 5 extending into the pit or mine, as here shown, and is adapted to suck the material being mined mixed with the water and deliver it through a pipe 6 to the desired point. As the material is being removed from the mine the cavity 7 increased in depth and area, and the primary pump and its suction gradually lowered down an inclined or circular slope in the pit or mine in order to keep it as close to the water as possible, so as to be easily primed and smallest lift by suction, and as the primary pump is lowered its discharge-pipe is lengthened.

Part of this discharge-pipe and part of the suction-pipe may be made of rubber or flexible pipe or joints to allow of the shifting of the primary pump, which may be placed on any side of the sump. It is of advantage to have the smallest quantity of water practical to give the pump full supply. This allows a better view of the operation and sometimes the water is all removed from the mine to shift the primary pump.

It will be noted that the pipe 2 supplies water for washing the ore from the bed, and thus constitutes a means for supplying mixed water and ore to the inlet of the priming-pump 5.

In the operation of my improved apparatus the primary pump 4 is lowered by degrees until the mine or cavity has been made sufficiently deep to form a bench for the installment of another pump. As here shown, the apparatus has been in operation until four of such benches have been formed. The pump 4 is supported upon the lower bench, a pump 8 is installed on the succeeding bench, a pump 9 on the next bench, and a pump 10 is installed on the next and highest bench. Combined with each of the pumps 8, 9, and 10 is a priming-tank 11 of large capacity. The pump 4 delivers the material and water to the priming-tank 11 thereabove, the pump 8 delivers the water and mined material to the tank above, the pump 9 delivers the water and material from its tank to the tank above, and the pump 10 delivers the mined material and water to either a dump or stock pile 12, as here shown, or to a car, conveyer, washing or sorting apparatus, as may be desired. When the priming-tanks are nearly full of water, the pumps are always properly primed, for their suction-pipes enter the tanks at about the middle, and the lower end of the suction-pipe reaches nearly to the bottom of the tank, but is arranged to be raised a little, as may be required, to prevent an overfeed or supply of material, ore, or earth that is being fed to the tank by the pump below. When the mine or cavity 7 has been made sufficiently deep to constitute another bench, the pump 4 is lowered to this bench and another pump and priming-tank similar to the ones above are installed upon the bench which is vacated by the pump 4. The pump 4 is then again put into operation and the

apparatus continues to mine the ore or other material in the same manner previously described until another bench is formed, when another pump and priming-tank are installed thereon, and this operation is repeated until the mine is carried to the desired depth.

In the arrangement here shown the water which is carried with the mined material to the dump 12 is collected by seepage, as shown, in a pond or reservoir 3, with which the upper end of the pipe 2 communicates and from which, as here shown, it receives its supply. A branch pipe 14 connects the pipe 2 with each of the priming-tanks, and these branch pipes are provided with valves or gates 15 for the purpose of regulating the supply of water to the tanks or of cutting off the supply of water to the tanks completely should it be necessary. The pipe 2 is also provided with a suitable number of valves or gates for the purpose of controlling the passage of water therethrough.

By the arrangement here shown a mine may be operated at a great depth, and each pump is supplied with a priming-tank and with means to insure the proper feed of both water and ore or other material to each pump to insure its proper working and to obtain the very best results therefrom.

For convenience the pump 4 will be referred to as a "primary" pump and the other pumps as "secondary" pumps in the claims.

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

1. A mining apparatus comprising a primary pump, means for supplying water and mined material to the inlet thereof, a priming-tank in communication with the outlet of said pump, and a secondary pump having its inlet in communication with the priming-tank, and its outlet depositing the mixed water and material to a receiving-point.

2. A mining apparatus comprising a pump, a pipe delivering water to and mixing it with ore or other material, the inlet of the said pump in communication with the mixed water and material, the outlet of the pump delivering the mixed water and material to a dump-pile, a reservoir in which the water is collected by seepage from the dump-pile, the aforesaid pipe in communication with and receiving its supply from the reservoir.

3. A mining apparatus comprising a primary pump, means for supplying mixed water and ore or material to the inlet of the pump, a priming-tank located above the pump, a secondary pump having its inlet in communication with the said tank and its outlet delivering the mixed water and material to a receiving-point, and means for supplying water to the priming-tank independent of the primary pump.

4. A mining apparatus including a primary pump, means for supplying water to the ore

or material being mined, an inlet-pipe for the pump adapted to be lowered as the depth of the mine increases, the outlet of the pump delivering the water and mined material to a dump-pile, a reservoir adapted to collect the water by seepage from the dump-pile, and a water-supply for the mine in communication with the said reservoir.

5. A mining apparatus comprising a primary pump, means for mixing water with the ore or mined material, an inlet-pipe and the pump adapted to be lowered as the depth of the mine increases, a priming-tank at a point above the primary pump and in communication with the outlet of said pump, and a secondary pump having its inlet in communication with the priming-tank and its outlet delivering the contents of the tank to a receiving-point.

6. A mining apparatus comprising a water-supply to the ore or mined material, a primary pump having its inlet receiving the mixed water and mined material, and a plurality of priming-tanks and secondary pumps communicating therewith and located at points above the primary pump to the top of the mine, the secondary pumps finally delivering the contents of the tanks to a receiving-point.

7. A mining apparatus comprising a water-supply to the ore or mined material, a primary pump having an inlet-pipe and pump adapted to be lowered as the depth of the mine increases, a priming-tank thereabove and in communication with the outlet of the pump, a secondary pump having an inlet adjustable in relation to the bottom of the tank, and its outlet delivering the contents of the tank to a receiving-point.

8. A mining apparatus comprising a water-supply to the ore or material being mined, a primary pump having its inlet in communication with the mixed water and mined material, a priming-tank at a point above the pump, a secondary pump having an inlet adjustable in relation to the bottom of the tank and its outlet delivering the contents of the tank to a receiving-point, and means for supplying water to the priming-tank independent of the primary pump.

9. A mining apparatus comprising a primary pump, a priming-tank thereabove, a secondary pump in communication with the priming-tank, and a water-supply in communication with the mine and with the said priming-tank.

10. A mining apparatus comprising a primary pump, a plurality of priming-tanks located one above the other and above the primary pump, the lowest tank in communication with said pump, a water-supply pipe extending to the mine and delivering the water thereto and branch pipes communicating with the said priming-tanks.

11. The combination of a primary pump

having an inlet and an outlet, a pipe-line having one end communicating with said outlet, a priming-tank communicating with the opposite end of the pipe-line and a secondary pump having its inlet in communication with said priming-tank and its outlet delivering to a receiving-point.

In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER McDOUGALL.

Witnesses:

MICHAEL F. CHULK,
DONALD McLENNAN.