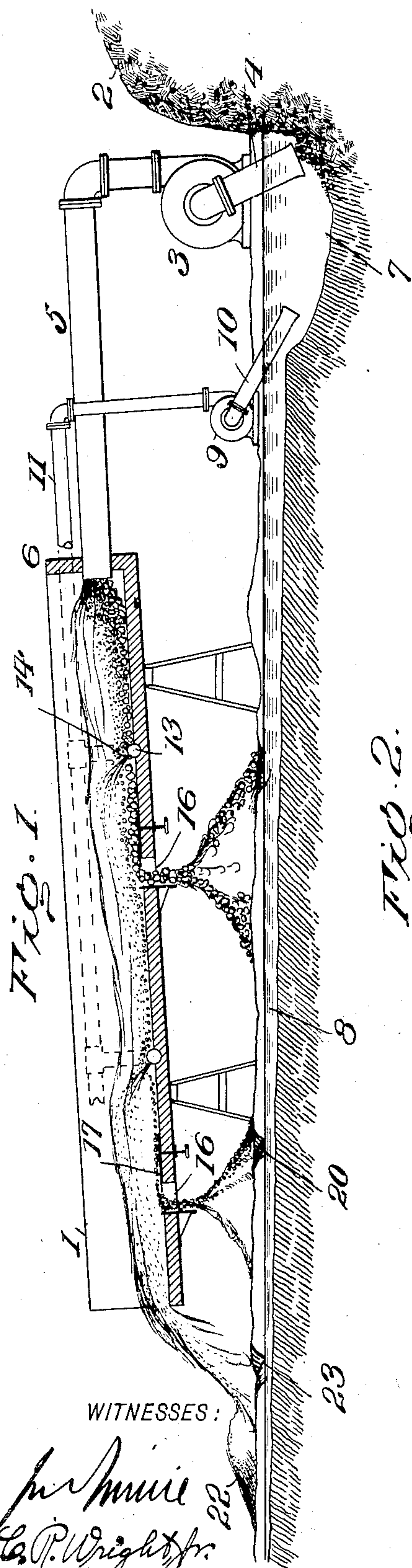


A. McDOUGALL.  
ORE CLEANER.

APPLICATION FILED APR. 7, 1905.



WITNESSES:

*for Minnie*  
*E. P. Wright Jr.*

Fig. 2.

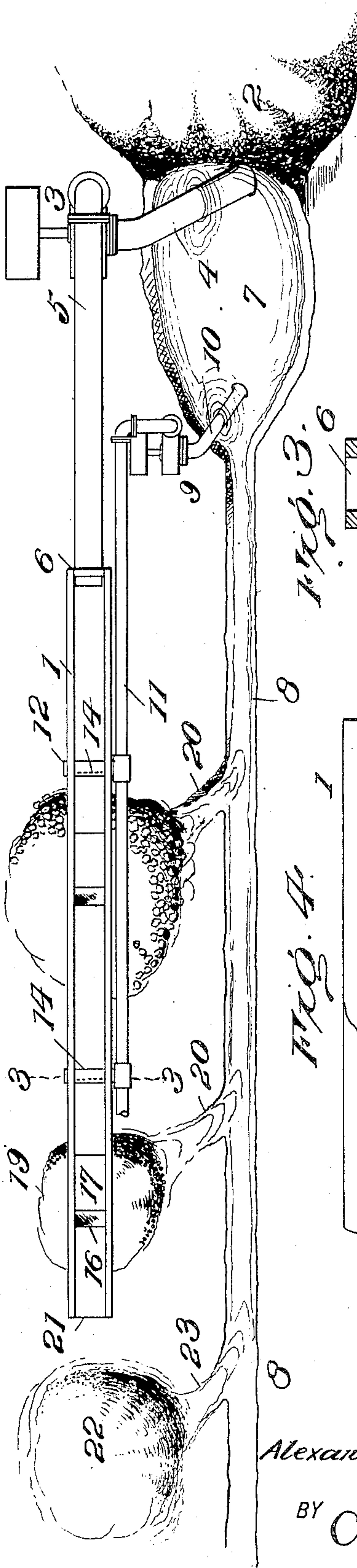


Fig. 3.

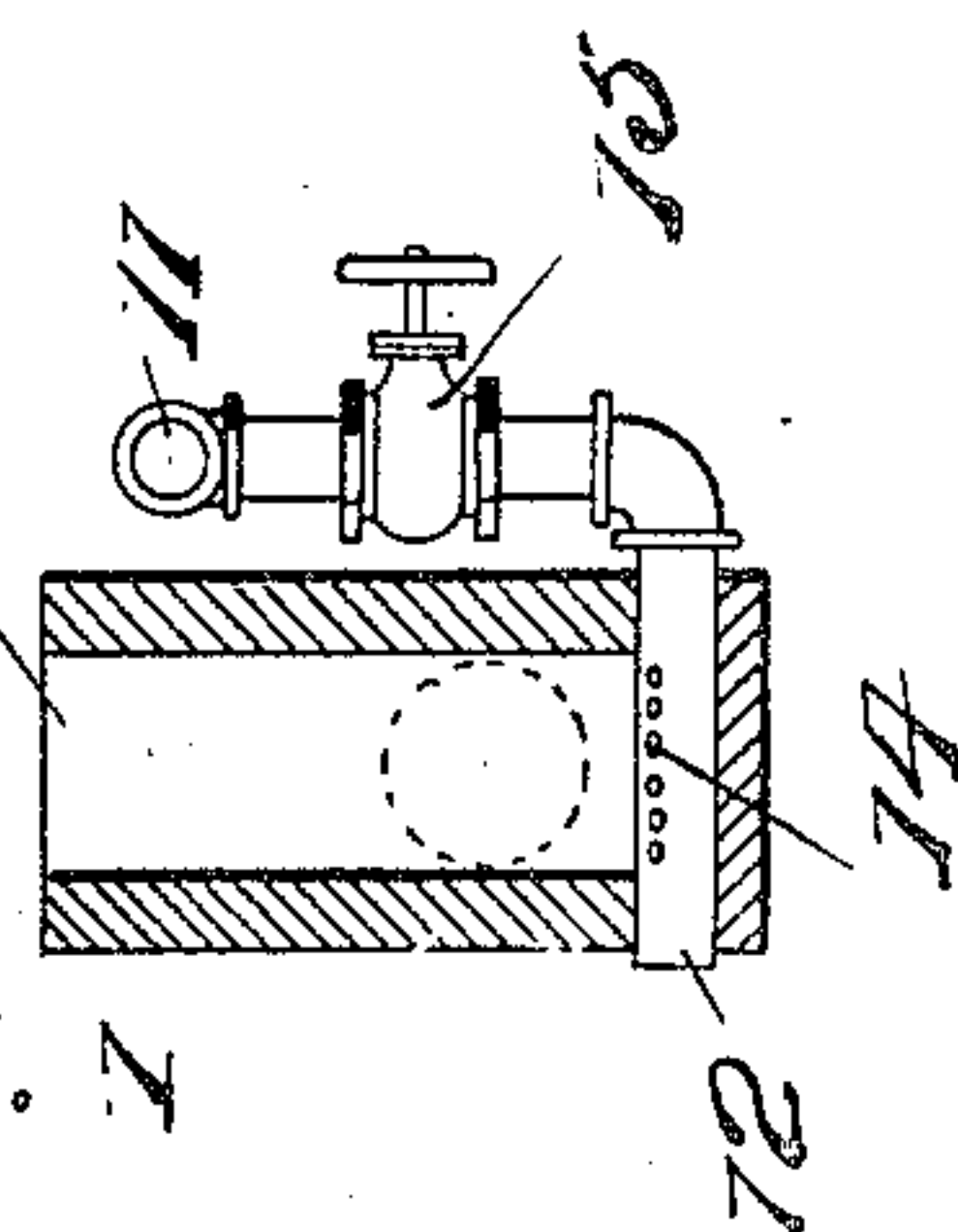
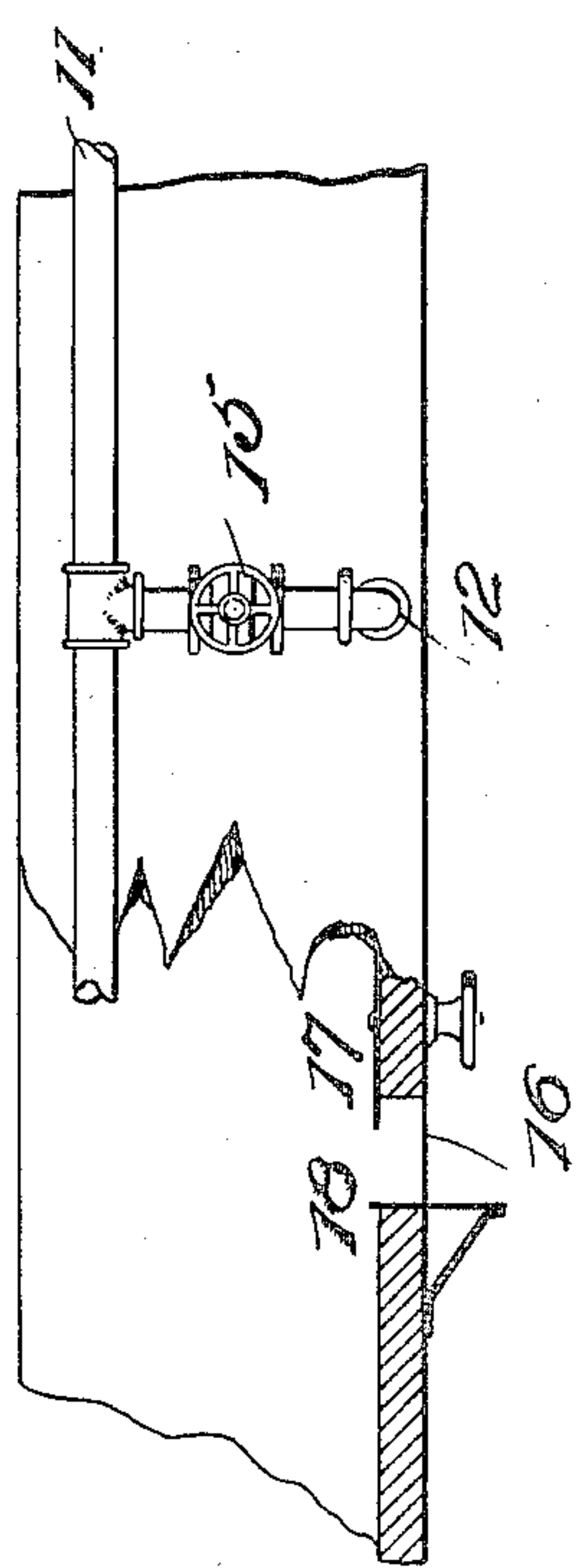


Fig. 4.



INVENTOR

*Alexander M. Dougall*

BY

*A. S. Pattison*  
ATTORNEY



# UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

## ORE-CLEANER.

No. 822,753.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed April 7, 1905. Serial No. 254,300.

*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 Ore-Cleaners, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to improvements in ore-cleaners, the object of which is to clean the ore as it is mined or to take the ore from a stock-pile and clean it.

Some iron-ore formations which are of a broken or granular form have mixed with them bodies of sand and clay, the ore being of a greater specific gravity than the small quantities of sand and clay which partly stick to the broken or granulated ore. The value of this ore if carried to market without cleaning is lowered by extra weight in transportation and other loss by melting useless material.

By the use of my present invention the ore is cleaned either as it is mined or from a dump-pile and before transportation, whereby the extra cost of transportation and the melting of useless material is saved.

Referring now to the accompanying drawings, Figure 1 is a side elevation, partly in longitudinal section, of an apparatus which embodies my invention. Fig. 2 is a top plan view of the same. Fig. 3 is an enlarged sectional view on the line 3-3, Fig. 2. Fig. 4 is an enlarged view, partly in section and partly in side elevation, of a portion of the cleaning-trough and the water-supply pipe.

In carrying out my invention I provide a long narrow cleaning and conveying trough 1, which is placed either adjacent the mine or stock-pile 2, and the trough is set at an inclination which is best suited for the kind of ore to be treated.

A centrifugal pump 3 takes the ore from the mine or the stock-pile 2 through a receiving-pipe 4 and delivers the ore to the upper end of the trough 1 through a suitable delivery-pipe 5, which has its delivery end delivering the ore to the high or receiving end of the trough 1. Preferably the delivery end of the pipe 5 passes through the vertical wall 6 of the upper end of the inclined trough 1, as here shown.

The receiving-pipe 4 is located in a suitable sump 7, which is located adjacent the mining point or dump, as the case may be, and the

water for the sump is obtained from any suitable source, and an overflow is provided for any surplus of water at a suitable point in the watercourse.

A canal, ditch, drain, or suitable pipe-line 8 is provided and extends longitudinally alongside of the trough 1, one end of the canal being in communication with the sump 7 for the purpose hereinafter explained.

A second suitable pump 9, preferably of the force-pump type, has a receiving-pipe 10 extending into the water-supply and has a delivery-pipe 11 extending alongside of the trough. A suitable number of shunt or short pipes 12 extend transversely of the trough, which have their ends closed, and these pipes are provided with a suitable number of perforations 14. These perforations are preferably placed on the downward side of the pipes 14 for the purpose of delivering the water in an upward direction to form a cross-current, the object of which will be explained hereinafter. The pump 9 takes water from the sump or other source of supply and delivers it to the transverse or shunt pipes 14, and these pipes 14 deliver the water to the trough to act with force upon the ore as it passes through the trough. For the purpose of regulating the water through the shunt-pipes each of them is provided with a suitable regulating-valve 15.

The bottom of the trough is provided with one or more transverse slots or openings 16, and these openings are provided with adjustable valves or shutters 17, located at one side of the said opening, and at the other side of said openings is preferably provided the stop-plates 18, which extend below the bottom of the trough to guide a vertical flow through the opening, the upper end of the plate preferably extending slightly above the bottom of the trough, as shown, for guiding the material through the openings and also providing a stop for the shutters. The openings will be made of a maximum size required and are then capable of regulation through the medium of the shutters or valves.

In operation the mining-pump 3 is started and sucks up the ore mixed with sand or clay, which is rattled through the fans of the pump, pipes, and then down the trough, which loosens the refuse matter therefrom. The larger and heavier pieces seek the bottom as they pass down the trough mixed with the fine material till they reach the rounded upper part of the perforated pipe, which ex-



tends across the bottom of the trough. At this point they are pushed and lifted over the pipe by the flow of water, and while partly in suspense the forced jets from the openings 14 raise the lighter particles—sand, clay, &c.—by the cross-currents created, and these are therefore carried in suspension by the downward current above the heavier parts of the mixture and beyond the openings of the valves, which draw off all or part of the cleaned ore to its stock-pipe or conveyor 19 beneath the respective openings of the trough. The little water that is drawn away with the ore seeps off into the canal 8 through suitable passage-ways 20 and is conveyed back to the sump 7. The sand and clay pass out the outlet end of the trough and are deposited upon a dump 22, the water from this dump seeping into the canal 8 through the passage-way 23 and is conveyed back to the sump. In this way the water is used over and over again for mining and cleaning purposes.

By reference to Fig. 1 it will be observed that the inclination of the canal is the reverse of the inclination of the cleaning-trough, whereby the water which seeps into the canal drain or pipe 8 is conveyed back to the sump 7.

The perforated pipes 12 are so located in the trough and at a point above the opening 16, so that the lighter particles, such as sand and clay, are lifted over the openings, while the heavier particles (ore) will fall through the openings.

The number of openings in the trough will be controlled according to the character and condition of the ore being treated, as will be readily understood, in order to effect a thorough cleaning thereof.

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

1. An apparatus of the character described, including an inclined trough, an ore-sump, a supply of water therefor, a return passage-way extending longitudinal the trough and connected with the sump and having an inclination reverse the inclination of the trough, the trough having a plurality of outlet-open-

ings each delivering to a dump, means for taking the water and ore from the sump and delivering it to the upper end of the inclined trough, and means for taking water from the sump and delivering it to the trough to clean the ore as it passes downward therethrough, and laterally-extending passage-ways connecting the return-passage with the dumps, substantially as described.

2. An apparatus of the character described, including a trough, an inclined trough having outlet-openings in its bottom, a mining-machine adapted to take the ore and water from the sump and deliver it to the upper end of the trough, a return passage-way having an inclination reverse to the inclination of the trough, means for taking water from the sump and delivering it to the bottom of the trough to subject the ore to the cleaning operation of the water, the cleaned ore passing through the outlet-openings and the refuse passing out of the lower end of the trough, and laterally-extending passage-ways connecting the several dumps with the return passage-way, whereby the water is used over and over again for ore conveying and cleaning purposes, substantially as described.

3. An apparatus of the character described, comprising an inclined trough having openings in the bottom and extending transversely thereof, a water and ore supply for the upper end of the trough and of a size to maintain several inches of water in the trough, water-supply pipes resting upon the bottom of the trough a distance above the openings and below the maintained water-level, means for regulating the supply to said transverse pipes, independent of each other, and said pipes having openings discharging the water in an upward and downward direction, whereby the lighter materials are raised in the maintained water-level and carried downward over the openings by the same.

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

ALEXANDER McDOUGALL.

Witnesses:

MICHAEL F. CHALK,  
DONALD McLENNAN.