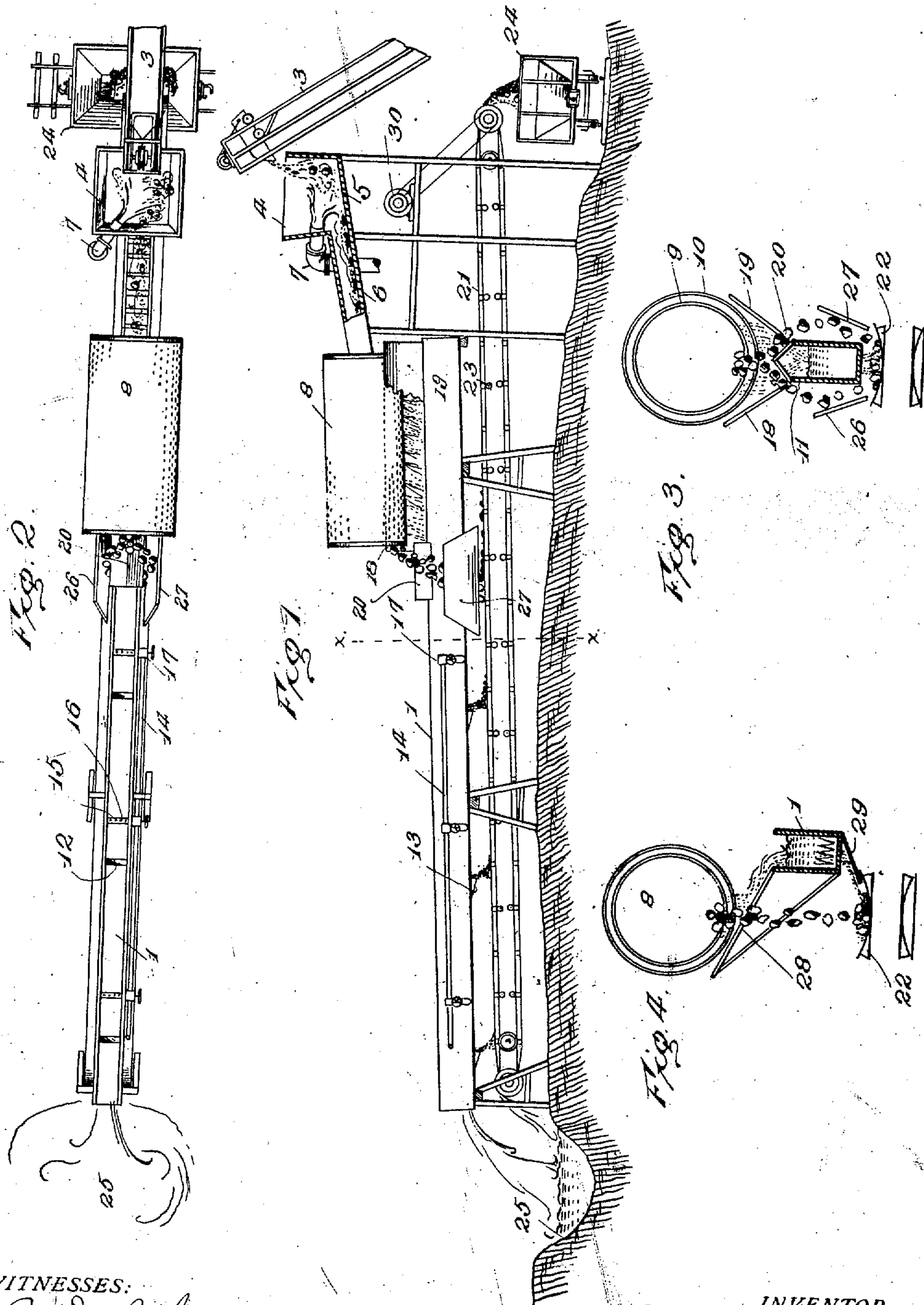


A. McDOUGALL.  
ORE CLEANER.  
APPLICATION FILED NOV. 29, 1907.

963,721.

Patented July 5, 1910.



WITNESSES:  
C. P. Wright, Jr.  
A. H. E. Hunt

INVENTOR.  
A. McDougall  
BY A. S. Pattison  
ATTORNEY.

# UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

## ORE-CLEANER.

963,721.

Specification of Letters Patent.

Patented July 5, 1910.

Application filed November 29, 1907. Serial No. 404,387.

*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 drawing.

My invention relates to improvements in ore cleaners.

The object of my invention is to provide an ore cleaner in which the ore, as it is taken from the mine or stock pile, and the sand and clay are washed therefrom, and the ore when cleaned is conveyed to cars or stock piles.

Another object of my invention is to provide a more simple, cheap and effective apparatus of this character.

In the accompanying drawings, Figure 1, is a side elevation partly in longitudinal section of my improved ore cleaner. Fig. 2, is a top plan view. Fig. 3, is a transverse vertical sectional view taken on the line  $x-x$  of Fig. 1. Fig. 4, is a vertical transverse sectional view similar to Fig. 3, showing a modified form of screen.

Referring now to the drawings, 1 represents a long narrow cleaning trough which is placed either adjacent the mine or stock pile, and said trough is arranged at an inclination, the said inclination at which the trough is set being governed by the kind and character of ore to be treated or cleaned.

What is termed a skip-conveyer 3 is shown for conveying the material from the mine or stock pile and delivers it to the cleaner. While I have shown this form of conveyer, it will be understood that dump cars, steam shovels, endless chain conveyers, or any other form may be used, as this forms no part of my invention.

Beyond the rear or upper end of the inclined trough and a distance thereabove, is a hopper 4 which has a downwardly-inclined bottom 5, and a chute 6 extending from the lower end thereof and in a plane therewith, forming a continuation of the inclined bottom. The said chute 6 is of an elongated form and may be provided with riffles or obstructions which serve to further disturb the ore on its downward movement thereover and disintegrate the clay, sand and ore. The length of this chute would be varied according to the character

of ore being operated on. Connected to the hopper 4 is a water supply pipe 7 which is supplied with water from any desired source. The pipe 7, as shown, is in the lower side of the hopper and causes the water to pass upwardly through the ore as it is fed to the hopper.

Below the lower end of the chute 6 is a screen 8 which is shown of a rotary form and located directly above the trough 1, and inclined at substantially the same angle as the trough, and is adapted to receive the ore, etc., from the chute 6. As before stated, I have shown a cylindrical rotary screen, the construction of which is that shown in Fig. 3; that is, an inner screen 9 and an outer screen 10 concentrically arranged one within the other. While I have shown a compound rotary screen as my preferred form, it will be understood that a single rotary, or a reciprocating screen could be used with good results. The lower end of the screen 8 is directly above the trough 1. The trough at this point is provided with an inverted V-shaped hood 11, upon which the contents of the screen are discharged as it passes from the lower end. This hood, as shown in Fig. 3, prevents the contents of the screen as they are discharged from its lower end, from entering the trough and diverts them to either side. The contents of the screen discharged from its lower end, and the larger pieces of the ore, etc., which have not been disintegrated, and are of such a size that they cannot pass through the screen, do not enter the trough 1. The smaller pieces together with the sand, clay and water pass through the screen to the trough. The trough, as before stated, is of an elongated narrow form inclined at the proper angle according to the character of ore to be cleaned or separated. The bottom of the trough is provided with one or more valves or openings 12 which extend transverse the trough and are provided with gates 13 by means of which the sides of the openings 12 are regulated. Extending longitudinally along the side of the trough is a water supply pipe 14 which is provided with transverse pipes 15 which extend through the side of the trough and have their ends closed, and the said pipes within the trough are provided with a suitable number of perforations 16 which are preferably placed on the upper side of the pipe for the purpose of delivering the water under pressure in an upward di-



rection to form a cross-current. For the purpose of regulating the water through the branch pipes, the same are provided with suitable valves 17. These branch pipes are so located above the openings 12 as to convey the lighter and smaller pieces of sand and clay up over the openings, as is well understood. The trough 1 on each side of the screen is provided with plates 18 and 19 which guide the water, fine ore, sand, etc., sieved through the screen into the trough.

Below the trough 1 is an endless conveyer 21 which is of a concaved form, as indicated at 22, and held in said position by rollers 23, whereby the ore discharged thereon is conveyed upwardly and discharged into a car 24, while the water is allowed to drain downwardly and discharge into the pool 25. In order to divert the larger pieces of ore which pass out the lower end of the screen at 20 to the endless conveyer, I provide the inclined plates 26, and 27. In Fig. 4 I have shown a rotary screen 8 at one side of the trough, 1, but parallel therewith, and a plate 28 for conveying the water, ore, sand, etc., from the screen to the trough. The endless conveyer 21 is arranged directly below the screen, and the trough 1 below each opening 12 is provided with a trough 29 which conveys the discharge through the openings to the endless conveyer. The endless conveyer is preferably driven by an electric motor 30. In operation the ore from the elevator 3 is discharged into the upper end of the hopper, and water is supplied by means of the pipe 7, which strikes the ore as it falls upon the inclined bottom of the hopper and the water and ore then pass downwardly over the chute, and the ore is partly disintegrated when it enters the screen 8. As shown in Fig. 2, the larger pieces of ore, etc., pass from the screen upon the hood 20 and are diverted to either side of the trough, while the finer pieces of ore, sand and clay, and the water, pass through the screen and enter the trough and pass down the inclined bottom of the trough. The ore, sand and clay in its downward course within the trough is acted upon by the cross-currents and the ore is graded as shown, the lighter pieces of sand, clay, etc., being lifted over the openings while the heavier pieces fall through the same and are graded accordingly, while the lighter pieces of sand, clay, etc., are held in suspense by the cross-current, they pass downwardly over the opening.

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

1. An apparatus of the character described, comprising an inclined trough, an inclined screen above the upper end of the trough, a hood above the trough below the

lower end of the screen, a hopper above the upper end of the screen and having an inclined bottom terminating in an elongated chute, and discharging into the upper end of the screen, a conveyer for discharging the ore into the upper end of the hopper, a water supply for said hopper, the bottom of the trough having openings therein, water supply pipes resting upon the bottom above the openings, deflecting plates on each side of the screen, an endless concaved conveyer below the trough and receiving the ore therefrom, and deflector plates receiving the larger pieces of ore from the hood and deflecting them upon the endless conveyer.

2. An apparatus of the character described comprising an inclined trough, an inclined rotary screen above the trough, an inverted V-shaped hood above the trough and below the lower end of the screen and upon which the discharge of the screen falls and is conveyed beyond the sides of the trough, a chute above the screen and discharging therein, a water supply for the chute, an ore supply for the chute, the bottom of the trough having transverse openings, transverse water supply pipes resting upon the bottom above said openings, an inclined endless conveyer under the trough and traveling in an opposite direction to the flow of the contents of the trough and receiving the discharge from the openings and conveying it upward, and deflector plates receiving the ore from the hood and deflecting it below the trough upon the endless conveyer.

3. An apparatus of the character described comprising an inclined trough, an inclined screen above the upper end of the trough, a hood extending over the trough below the lower end of the screen, a chute discharging into the upper end of the screen and riffles in its bottom, a water supply for the chute, an ore supply for the chute, an endless conveyer below the trough and receiving the ore therefrom, and deflector plates receiving the larger pieces of ore from the hood and deflecting them upon the endless conveyer.

4. An apparatus of the character described comprising an inclined trough, a rotary inclined screen above the upper end of the trough, an inverted V-shaped hood above the trough below the lower end of the screen and conveying the discharge therefrom to the sides of the trough, a hopper above the upper end of the screen and having an inclined bottom terminating in an elongated chute discharging into the upper end of the screen, means for supplying ore to the hopper, a water supply for said hopper, the bottom of the trough having openings therein, water supply pipes resting upon the bottom above the openings, an endless inclined conveyer below the trough and

traveling in a direction opposite the flow of water in the trough and receiving the ore therefrom, and deflector plates receiving the larger pieces of ore from the hood and  
5 deflecting them upon the conveyer.

5. An apparatus of the character described, comprising an inclined trough, a rotary screen above the upper end of the trough, a hopper above the upper end of the  
10 screen and having a downwardly inclined bottom extending within the upper end of the screen, riffles carried by the upper face of the inclined bottom of the hopper, an ore supply for the said hopper, a water supply for the hopper, inwardly inclined de-  
15 flector plates below the screen and conveying the discharge therefrom to the trough, an inverted V-shaped hood above the trough

below the lower end of the screen and conveying the discharge therefrom to the side 20 of the trough, the bottom of the trough having openings therein, water supply pipes resting upon the bottom and above the opening, an endless inclined conveyer below the trough and traveling in the opposite direc- 25 tion from the water in the trough and receiving the ore therefrom, and deflector plates receiving the larger pieces from the hood and deflecting them upon the conveyer.

In testimony whereof I affix my signature 30 in presence of two witnesses.

ALEXANDER McDOUGALL.

Witnesses:

M. F. CHALK,

DONALD McLENNAN.