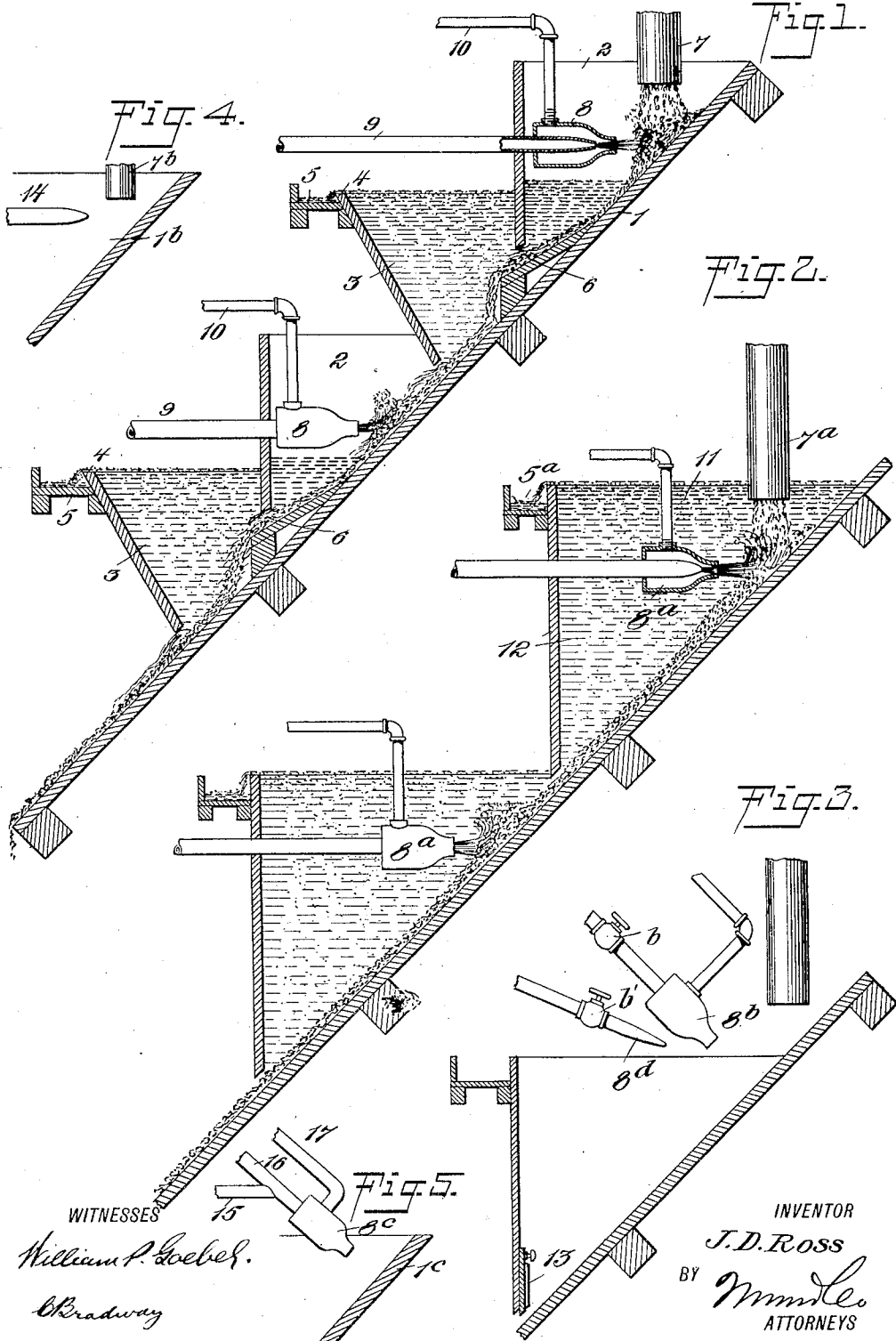


J. D. ROSS.
 PROCESS AND APPARATUS FOR ORE SEPARATION.
 APPLICATION FILED JULY 27, 1916.

1,328,456.

Patented Jan. 20, 1920.



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PROCESS AND APPARATUS FOR ORE SEPARATION.

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Specification of Letters Patent.

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Application filed July 27, 1916. Serial No. 111,604.

To all whom it may concern:

Be it known that I, JAMES D. ROSS, a citizen of the United States, and a resident of Seattle, in the county of King and State of Washington, have invented a new and Improved Process and Apparatus for Ore Separation, of which the following is a full, clear, and exact description.

This invention relates to means and method for separating finely ground ore, and it has for its general objects to improve and simplify the method of ore separation so as to be economically, efficiently and expeditiously carried on.

In carrying out the invention an inclined table is employed against which a stream of pulp is continuously discharged, and this pulp is agitated and aerated by a fluid stream directed against it at a point above a body of water contained in a compartment or spitzkasten for separation of the concentrate by the flotation process, or at a point below the surface of the water for separation by the wet process, the agitating or aerating stream being water, steam or air delivered from a nozzle, or a mixture of water and elastic fluid delivered from an aspirator, and if desired the pulp may be mixed with oil or chemical, or the oil or chemical may be delivered with the jet of fluid from the nozzle or aspirator.

According to another method the pulp can be directed against the inclined table directly by the aspirator with the air and water, the main point being the agitation and aeration of the pulp by being discharged against an inclined table at a point immediately above a body of water or within the said body.

For a more complete understanding of the invention reference is to be had to the following description and claims taken in connection with the accompanying drawing which illustrates certain embodiments of the invention and wherein similar characters of reference indicate corresponding parts in all the views, in which

Figure 1 is a sectional view of a machine in which the pulp is subjected to the jet of fluid before the pulp enters the water in the separating compartment;

Fig. 2 is a modified form of machine in which the jet of fluid acts on the pulp at a point within the water in the spitzkasten;

Fig. 3 is a further modification showing a

different disposition of the jet device with respect to the inclined table;

Fig. 4 is a detail view showing an air stream or water nozzle in relation to the pulp supply spout and inclined table; and

Fig. 5 is a detail view showing means for discharging the pulp against the inclined table by an aspirator.

Referring to the drawing, Fig. 1 shows a machine in which the ore is separated in successive steps, the machine comprising an inclined table 1 which has separating compartments 2 and spitzkasten 3 on the upper side of the table, there being a spitzkasten adjacent each separating compartment, so that the aerated pulp can pass out of the separating compartment to the associated spitzkasten, and from the first spitzkasten the pulp can flow to the next separating compartment, and in this manner the pulp is successively treated for the fractional abstraction of the concentrate, the gangue finally passing out through the lowermost spitzkasten. The spitzkasten is filled with water and the concentrate floating on the surface overflows over the lip 4 into a trough 5 or equivalent means for conveying away the concentrate. Water is also contained in the separating chamber 2, which latter communicates through an opening 6 with the spitzkasten. The pulp to be treated is discharged through a spout or equivalent means 7 into the upper separating compartment 2 and the pulp encounters a jet of fluid before it enters the water in the separating compartment. This fluid, which may be air and water discharged from an aspirator 8, causes the pulp to be agitated and aerated, so that after passing into the spitzkasten the light particles will rise to the surface and float off by way of the gutter 5. The aspirator 8 is supplied with water and air through the pipes 9 and 10. The oil or chemical may also be supplied to the water or supplied to the pulp. With this machine it will be observed that the separation takes place according to the flotation process. The force of the jet acting on the pulp will be varied according to the nature of the material to be separated.

In the construction shown in Fig. 2 the spout 7^a extends into the water 11 in the spitzkasten 12, and the aspirator or jet-producing device 8^a is submerged in the water so as to act on the pulp to cause separation.

ration according to the wet process. The fine particles rise out of the water and overflow into the trough or gutter 5^a. Some of the fine particles that are not liberated in the first spitzkasten flow with the gangue into the next spitzkasten, where further separation takes place. The aspirator or jet-producing device 8^b can be disposed at right-angles to the inclined table, as shown in Fig. 3, or at a different angle, as shown in Figs. 1 and 2. Furthermore, the spitzkasten may be provided with a gate or valve 13 to control the flow of water and gangue out of the bottom thereof.

15 In Fig. 4 is shown an arrangement in which the pulp discharged from the spout 7^b upon the table 1^b is acted on by a jet of steam, air or water delivered from a nozzle 14, the pressure of the jet being determined by the nature of the material to be separated. According to another method the pulp can be forcibly discharged against the inclined table 1^c, Fig. 5, by an aspirator 8^c to which water, pulp and air are supplied through the pipes 15, 16 and 17, respectively.

Instead of an aspirator, the pulp can be acted on by compressed air that is forced into the jet of water, this compressed air and water jet being delivered by a pipe 8^d, as shown in Fig. 3. This device can be used simultaneously with the aspirator 8^b, the controlling of these devices being effected by valves *b* and *b'*.

35 From the foregoing description taken in connection with the accompanying drawing, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have de-

scribed the principle of operation, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative and that such changes may be made when desired as fall within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An ore separator of the class described, comprising an inclined table, a plurality of compartments successively disposed on the upper side of such table and maintaining bodies of water thereon, spitzkastens adjacent each compartment, means for discharging ore pulp into the initial compartment at an angle to the inclined table, means for aerating and agitating the pulp in each compartment, means for delivering the aerated pulp from each compartment to its associated spitzkasten, means conveying away concentrate from the spitzkastens, and means for delivering aerated pulp and gangue from each spitzkasten to the succeeding chamber.

2. The herein described method of treating ore consisting in precipitating downwardly in an oblique path a downwardly oblique continuous stream of ore, subjecting such continuous stream to successive jets of mixed air and water directed angularly into the ore pulp during the progress through such oblique path, and in removing portions of the ore by flotation at intervals between the successive jets of mixed air and water.

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Witnesses:

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