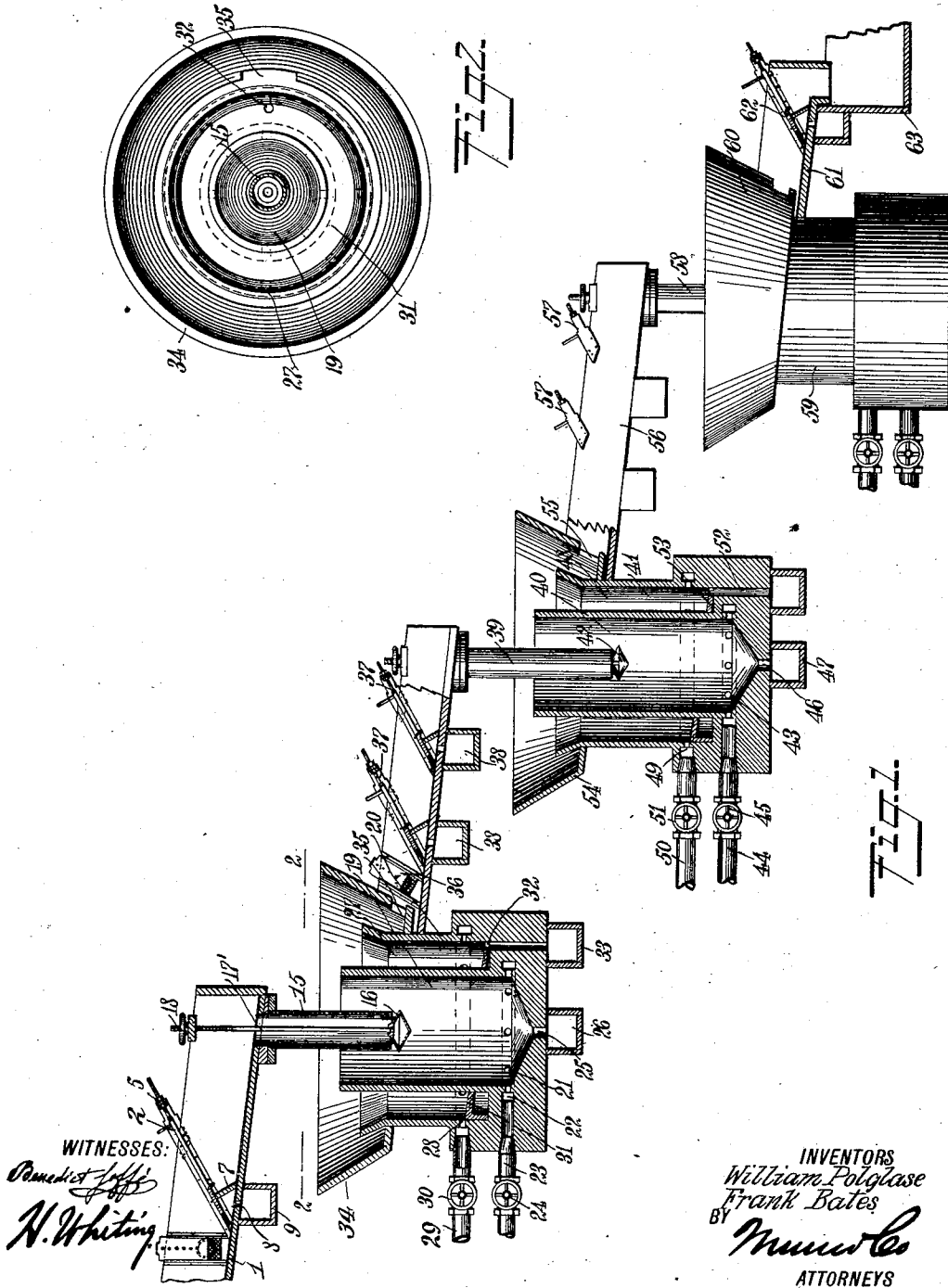


W. POLGLASE & F. BATES.
HYDRAULIC SYSTEM OF ORE SEPARATION.
APPLICATION FILED JULY 22, 1910.

1,012,151.

Patented Dec. 19, 1911.

3 SHEETS—SHEET 1.

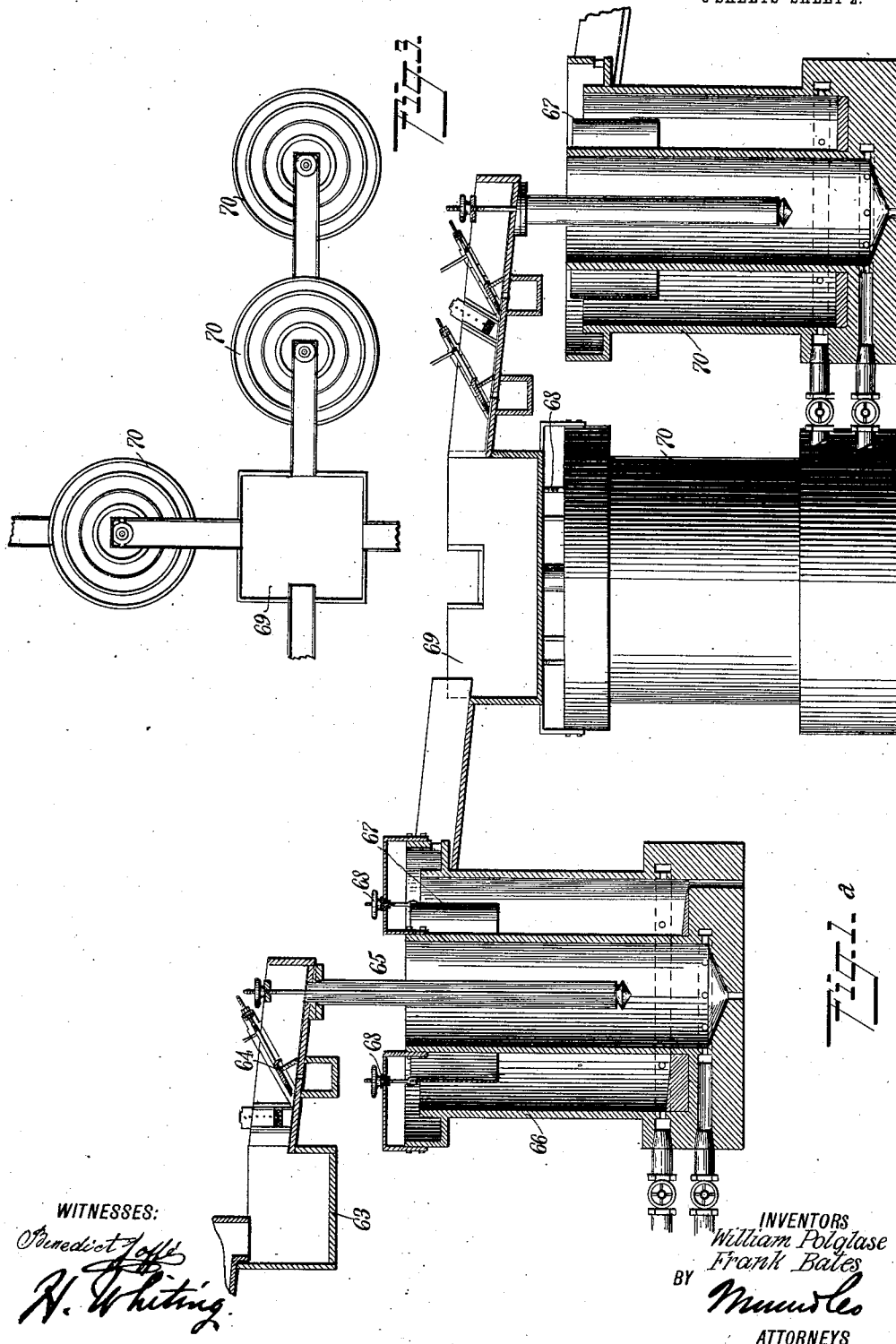


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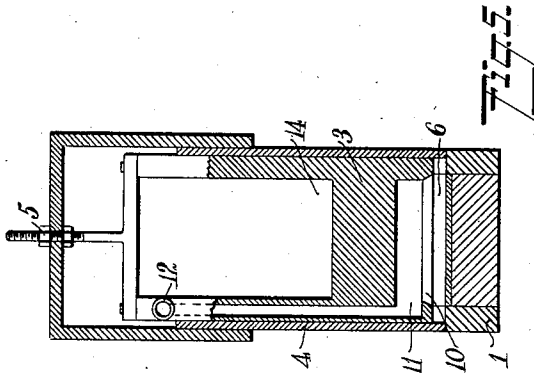


Fig. 5.

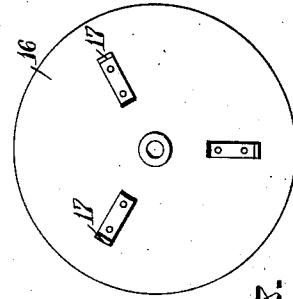


Fig. 8.

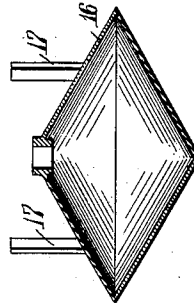


Fig. 7.

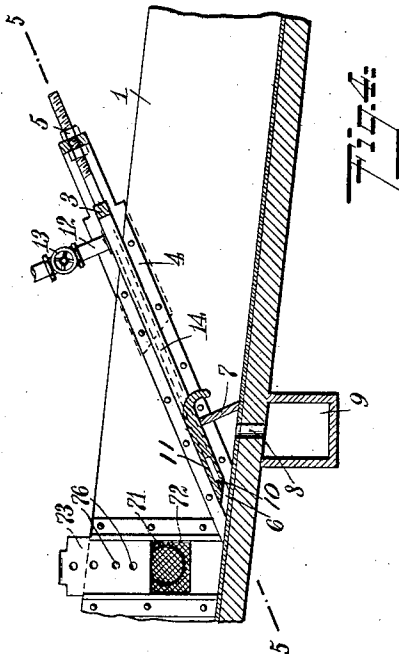


Fig. 4.

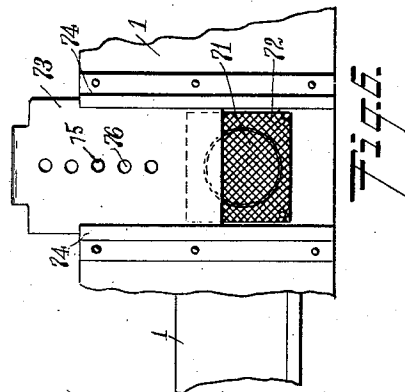


Fig. 6.

WITNESSES:
James H. Poff
N. Whiting

INVENTORS
William Polglase
Frank Bates
BY *Mumford*
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM POLGLASE AND FRANK BATES, OF GREAT FALLS, MONTANA.

HYDRAULIC SYSTEM OF ORE SEPARATION.

1,012,151.

Specification of Letters Patent.

Patented Dec. 19, 1911.

Application filed July 22, 1910. Serial No. 573,211.

To all whom it may concern:

Be it known that we, WILLIAM POLGLASE and FRANK BATES, both citizens of the United States, and residents of Great Falls, in the county of Cascade and State of Montana, have invented a new and Improved Hydraulic System of Ore Separation, of which the following is a full, clear, and exact description.

This invention relates to a new and improved hydraulic system for the separation of high and low grade ores, such as copper and gold, and including the slimes.

An object of this invention is to provide a system which will be comparatively simple in construction, inexpensive to manufacture, strong, durable, readily accessible for the purpose of cleaning, and highly efficient in its operation.

Another object of this invention is to provide a system in which a plurality of separations are obtained by a rising current in stand separators, and in which intermediate separations are obtained by baffle launder separators.

A further object of this invention is to provide a concentrating system in which the successive hydraulic separators are of increased depth, with feed pipes having their outlet openings located at successively-increasing depths within the separators, so as to increase the efficiency of the system as the process proceeds.

These and further objects, together with the construction and combination of parts, will be more fully described hereinafter and particularly set forth in the claim.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figures 1 and 1^a illustrate in elevation the complete system, partly in section to show the underlying structure; Fig. 2 is a top plan view, partly in section on the line 2—2 of Fig. 1, of one of the stand separators; Fig. 3 is a top plan view of the slimers or sliming separators; Fig. 4 is a fragmentary vertical section illustrating one of the launder separators; Fig. 5 is a section on the line 5—5 of Fig. 4; Fig. 6 is a fragmentary view in elevation, showing the overflow outlet and the controlling gate therefor; Fig. 7 is a vertical section through one of the spreaders for controlling the outlet from

one of the feed pipes; and Fig. 8 is a top plan view of one of the spreaders illustrated in Fig. 7.

Referring to the more particular description of the system, it will be seen by reference to Fig. 1 that the crushed ore carrying the concentrates and sand to be separated, running anywhere from slimes up to $\frac{5}{16}$ " sizes, is fed to the system at a launder or chute, indicated at 1. In this launder, there is provided a baffle separator 2, which consists, as will be seen by reference to Figs. 4 and 5, of a baffle plate 3, adjustable in ways 4 toward and from the bottom of the launder 1, by any suitable means, such as the adjusting screws and nuts 5. This baffle plate 3 is spaced a suitable distance above the bottom of the launder 1, so as to provide a passage 6, through which the heavy concentrates traveling along the bottom of the launder may just pass. These heavy concentrates are caught by a riffle 7 and forced to enter by means of a passage 8 into a chute 9 from whence they travel to the storing bins.

In order to offer a hydraulic resistance through the passage 6, there is provided an outlet 10 in the plate 3, which communicates with a fluid passage 11, which in turn is supplied with a suitable fluid, such as water, by means of a pipe 12 controlled by a valve 13. The resistance of the hydraulic stream through the passage 6, and the size of the passage 6 are such that only the heavy concentrates will pass therethrough, and the lighter concentrates and sands will pass up over the lower portion of the baffle plate 3, through an opening 14 provided therein. One or more of these baffle separators, which are shown to be inclined, may be provided in the baffle chute 1.

At the lower end of the launder 1, which is inclined so as to permit the material to flow by gravity, there is provided a downwardly-extending feed pipe 15, which is connected to an outlet opening in the launder 1. The flow of material from this feed pipe is controlled by means of a spreader 16, the particular form of which is more clearly illustrated in Fig. 7, where it will be seen that it consists of a double conical member, having guides 17, preferably three in number, adapted to engage the inner side of the feed pipe 15, so as to guide its movement. For the purpose of adjusting this spreader 16, it is provided with a rod 17',

having an adjusting means, in the form of a screw-threaded engagement, with an adjusting nut 18, supported in any well known manner. The feed pipe 15 extends down into the inner compartment 19 of a stand separator 20. The material fed into the compartment 19 is exposed to the action of an upwardly-traveling hydraulic current admitted at the bottom of the compartment 19 by means of a plurality of openings 21, which are supplied by a passage 22, which in turn is supplied by a pipe 23 controlled by a valve 24. This upward flow of water is so regulated that the heavy concentrates alone will fall to the bottom of the compartment, where they pass through a conduit 25 into a passage 26, which is connected in any suitable manner to a receptacle, into which the concentrates drop and travel to the bins. The rest of the material, consisting of the sands and lighter concentrates, which are not heavy enough to fall against the upwardly-traveling stream of water, is carried up over the edge of the inner compartment 19, and falls into a preferably concentrically-arranged compartment 27, where it is exposed to the action of a similar upwardly-traveling stream of water under pressure, of less intensity and force, however, than the stream to which the material was exposed in the compartment 19. This hydraulic stream is likewise supplied by a plurality of openings 28 opening into the compartment 27, adjacent the bottom thereof, and supplied by a pipe 29, which is controlled by a regulating valve 30. In this compartment 27, the heavy material, embodying heavy sands and some concentrates, such as gangue carrying included grains of concentrates, settles to the bottom of the compartment, where it travels, by virtue of an inclined false bottom 31, to one side of the compartment 27, where is provided an outlet passage 32, communicating with a drawing-off chute 33, which may be connected to a suitable hopper. The material which is not heavy enough to settle against the upwardly-rising current of water in the compartment 27, flows over the upper edge of the compartment, and is caught in a catch basin 34, the bottom of which inclines downwardly toward one side, where there is provided an outlet opening 35. The material traveling through the upward opening 35, is caught by a launder 36, which is provided with one or more baffle separators 37 similar to the baffle separator 2, and adapted to separate out into chutes 38, a certain amount of the concentrates. The remainder of the concentrates and the sand pass through the openings in the baffle plates and travel to the lower end of the launder 36, from whence they are dropped by means of a feed pipe 39, into the inner compartment 40 of a stand separator 41. This feed pipe 39 is also controlled by a spreader 42, which distributes the material in the compartment 40 in such a manner that every particle thereof will be exposed to the action of an upwardly-traveling current of water, which is let into the compartment 40, adjacent the bottom thereof, by means of a plurality of openings 43, which are supplied by a suitable pipe 44, controlled by a valve 45. The force of this upwardly-flowing current is somewhat less than the force of the current in the compartment 27, of the separator 20, but is sufficient to make a further separation between the heavy concentrates and sand, the heavy concentrates falling to the bottom, where they pass out into a conduit 46 and into a chute 47; from whence they may be drawn into a suitable bin or hopper at suitable intervals. The lighter material, which has not sufficient mass to settle against the rising current of the water, passes up over the edge of the compartment 40, and is deposited in the preferably concentrically-arranged outer compartment 48 of the stand separator 41, where it is submitted to the separating action of an upwardly-flowing current of water or other solution of less head than the current in the compartment 40. This water is supplied, as in the other compartments, by means of openings 49, a pipe 50 and a valve 51. The settlings in the compartment 48, consisting probably of some gangue and some concentrates, are drawn off through an opening 52, which is located at the lower side of an inclined bottom 53, and is taken up to the crushers to be further treated. The overflow from the compartment 48 is caught in a catch basin 54, from the lower side of which it travels through an outlet 55 into a launder 56, where it is subjected to the separating action of one or more baffle separators 57. From this launder 56, it passes, by means of a feed pipe 58, into a stand separator 59, which is similar to the separators 20 and 41, the upward currents, however, in this separator being of considerably less strength, and, inasmuch as the sands by this time, by reason of their size, have somewhat greater settling force than the concentrates, which at this point approach slimes in magnitude, the sands will settle to the bottom of the compartment, and the concentrates together with the light slimes, will overflow into a catch basin 60 with which the separator 59 is provided. The overflow in the catch basin 60 passes out into a launder 61, where it may be further treated by one or more baffle separators 62, from whence it may pass to another launder 63 (see Fig. 1^a), provided with one or more baffle separators 64.

Extending from the launder 63, there is

provided a feed pipe 65, which projects downwardly into a stand separator 66. This separator is similar to the separators 20, 40 and 59, with the exception that the outer compartment is divided adjacent its top by means of a ring band 67, which is adjustably supported in any well known manner, as by means of adjustable screw and nut hangers 68. The purpose of this ring band 67 is to force the overflow from the inner compartment to pass down a considerable distance in the outer compartment, so as to expose the very fine particles to the action of the upwardly-flowing current of water in the outer compartment. From this separator 66, the overflow passes into a distributor 69, from whence the material is distributed to a plurality of slimers or slime separators 70, having gradually-decreasing upward hydraulic currents. These slime separators 70 are similar to the separators 66, and are provided with baffle rings similar to the ring 67.

It will be noted that each of the launders may be provided with one or more outlets 71, located in juxtaposition to the baffle separators, which are adapted to drain off the surplus water and the slimes. These outlets are each preferably provided with a screen 72, whereby the heavy material is prevented from passing therethrough. For the purpose of controlling these outlets, there are provided sliding gates 73, which slide in ways 74, and are adapted to be held in any adjusted position by means of a pin 75, which is adapted to engage any one of a plurality of openings 76 in the gate 73. Another point to be noted is the fact that the stand separators 41 and 59 are somewhat deeper than the stand separator 20, and that the feed pipes 38 and 58 extend somewhat deeper down into the central compartment than does the feed pipe 15. The purpose of this is to start the finer particles of concentrate lower down in the compartment, so that they will be exposed to the action of the rising current for a greater period of time.

The operation of the device will be readily understood from the above description. The material is so treated that it is not once allowed to settle, but is kept in a constant turmoil by the rising currents of water until the last slime separation is made, these currents in the main separators being the strongest, and decreasing gradually to almost nothing in the slime separators.

It will thus be seen that this system does away with the excessive expenditure and the use of an excessive amount of machinery which is usually needed in the treatment of ores at the present time.

While we have shown one embodiment of our invention, we do not wish to be limited to the specific details thereof, but desire to be protected in various changes, modifications and alterations which may come within the scope of the appended claim.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:—

The combination with a plurality of separators, of launders connecting said separators, each of said separators comprising a plurality of nesting compartments adapted to receive the overflow from each other, and means for affording a rising hydraulic current in said compartments, one or more baffle separators in said launders, each of said baffle separators comprising a baffle plate adapted to be spaced apart from the bottom of said launders to form a passageway, and means for affording a resisting hydraulic stream in said passage, a distributor connected to the lowermost of said separators, and slimes separators connected to said distributor.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM POLGLASE.
FRANK BATES.

Witnesses:

ANDREW HENSLER,
WILLIAM J. TRETHENY.