No. 609,804. Patented Aug. 30, 1898.

S. I. HALLETT.

ORE CONCENTRATOR.

(Application filed Sept. 16, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

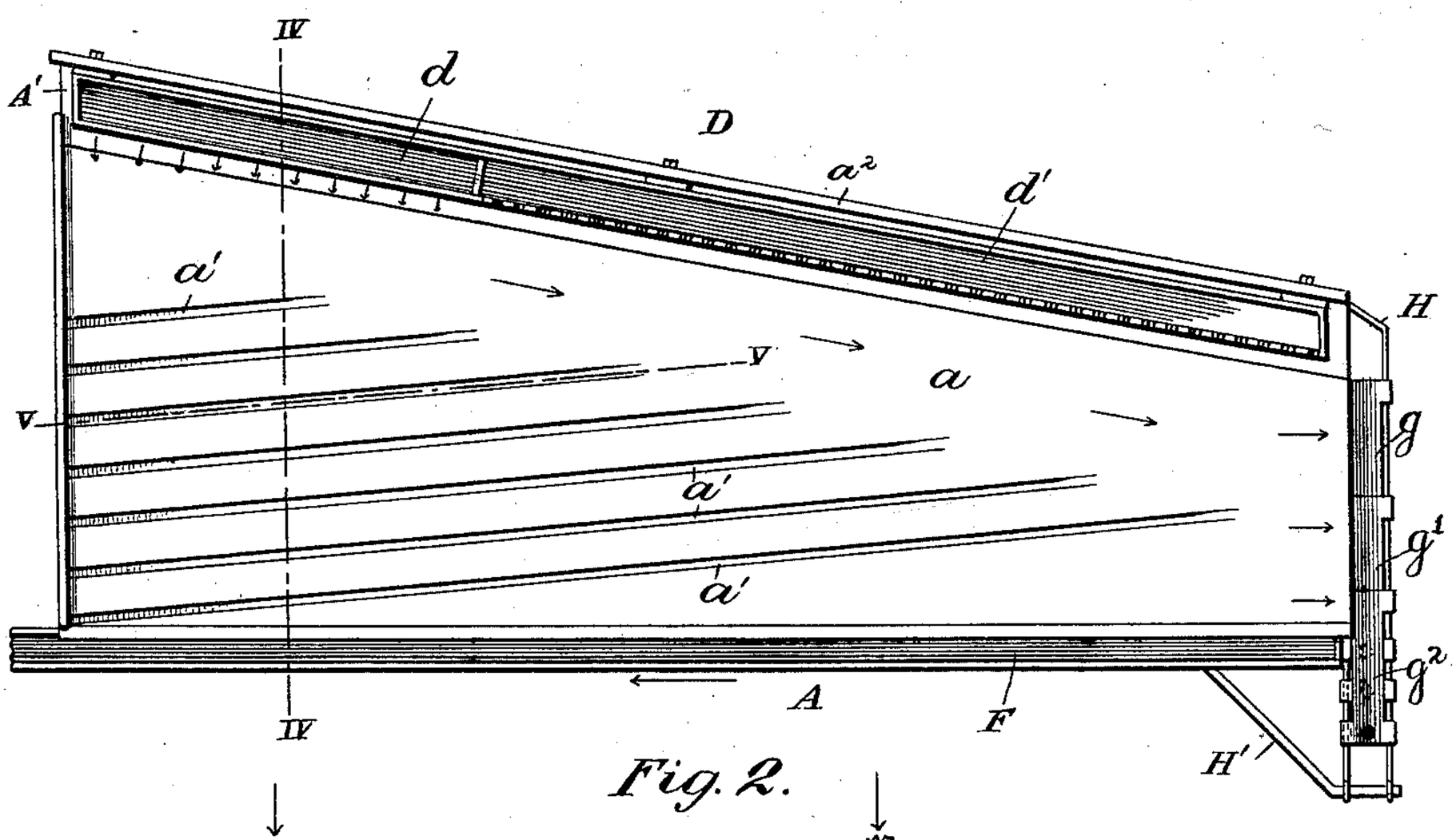


Fig. 2.

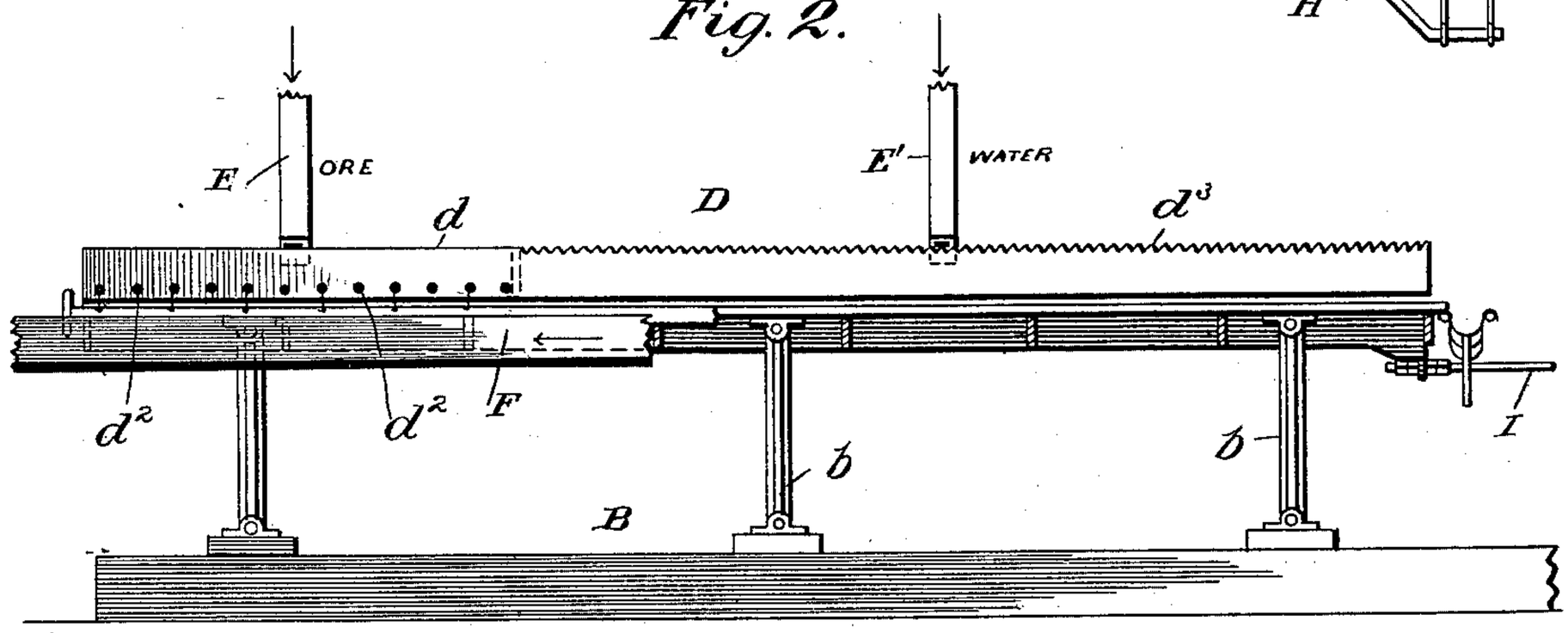
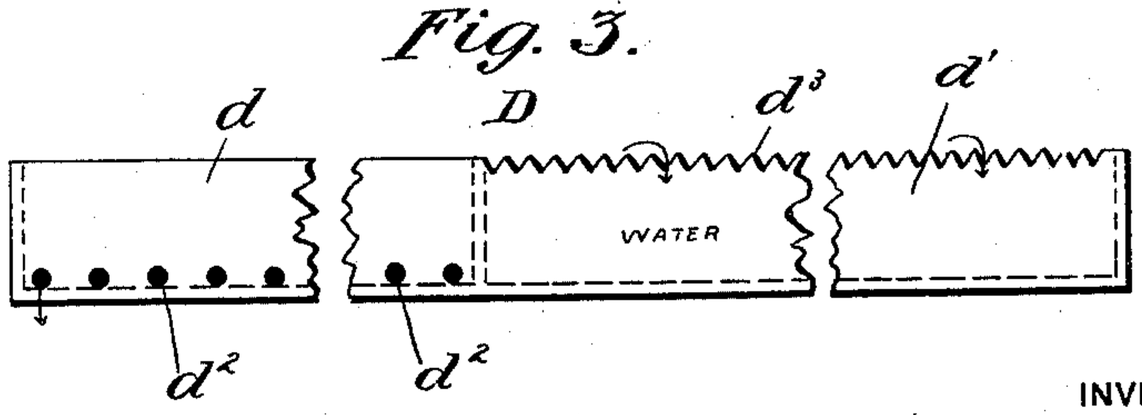


Fig. 3.



WITNESSES

Chas. E. Riordon

Wm. D. Dowell.

INVENTOR

Samuel I. Hallett

By Julius C. Dowell

His Atty

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Fig. 4.

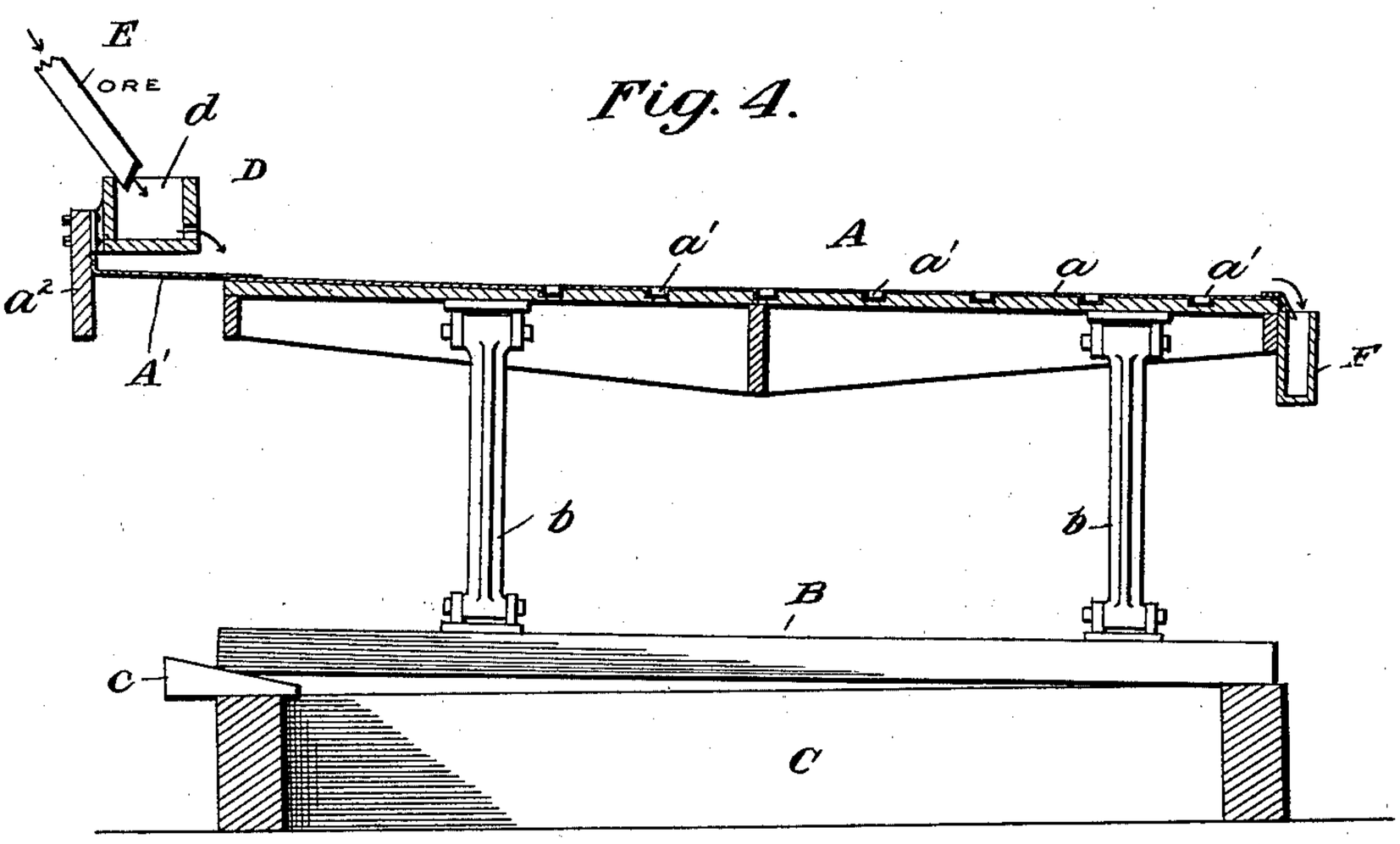

Fig. 5.

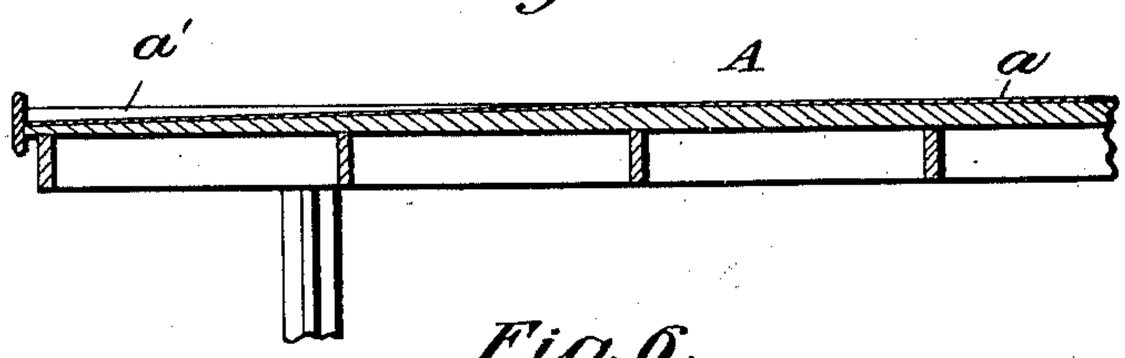

Fig. 6.

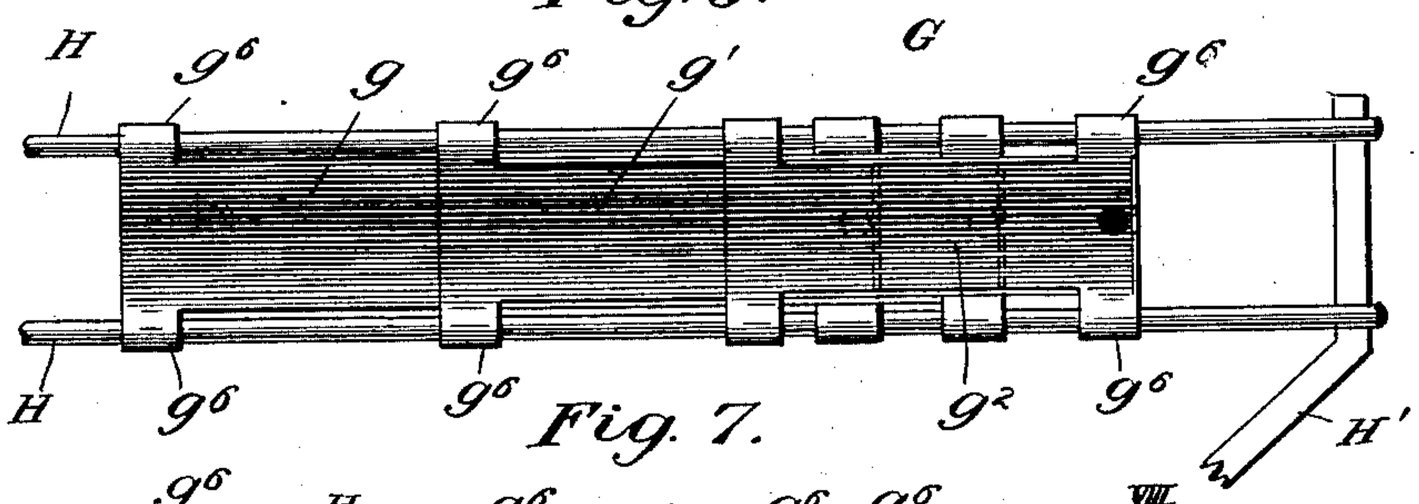

Fig. 7.

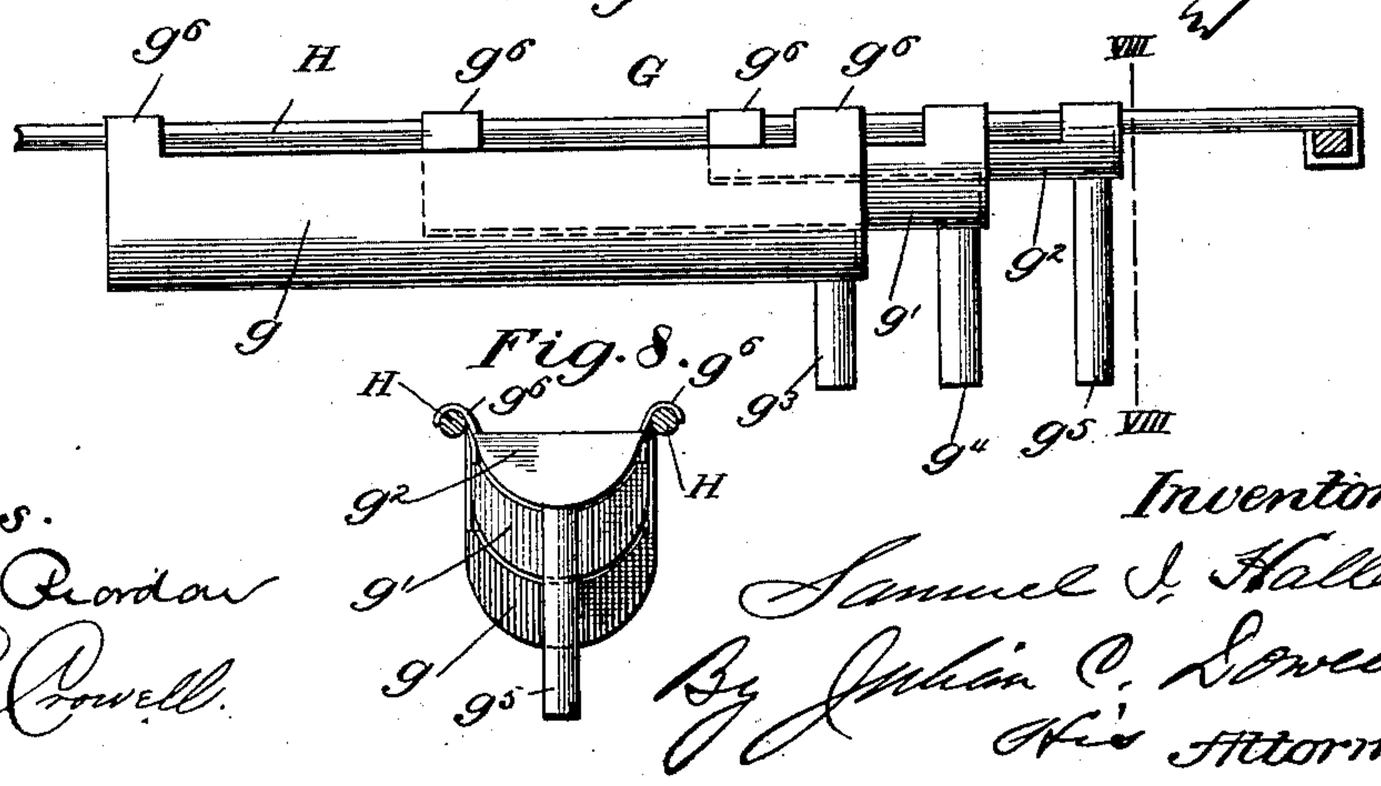

Fig. 8.

Witnesses.
Chas. E. Riordon
Wm. P. Cowell.

Inventor.
Samuel I. Hallett
By Julian C. Lowell
His Attorney.

UNITED STATES PATENT OFFICE.

SAMUEL IRVING HALLETT, OF ASPEN, COLORADO, ASSIGNOR OF ONE-HALF TO DAVID M. HYMAN, OF CINCINNATI, OHIO.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 609,804, dated August 30, 1898.

Application filed September 16, 1897. Serial No. 651,877. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL IRVING HALLETT, a citizen of the United States, residing at Aspen, in the county of Pitkin and State of Colorado, have invented certain new and useful Improvements in Ore-Concentrators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to ore-concentrators or that class of machines or apparatus employed for concentrating or separating and grading mineral substances of different specific gravities, and more particularly to apparatus operating to carry out the wet process of concentrating ores, whereby ores of various kinds may be washed and concentrated and the valuable minerals separated and graded with economy of time and labor.

The invention is especially designed for use in connection with ore-concentrators of that class in which the crushed ore is distributed upon and caused to move or flow along a plane surface or table, to which is imparted a combination of shaking and rocking motions whereby the concentrates or particles of mineral settling on the surface of the table are carried along and discharged in different classes or grades at one end or side of the table, while the gangue and refuse matter are carried off at the side or end of the table opposite the distributing-launder.

The primary objects of my invention are to provide simple, inexpensive, and efficient means for separating the ore and for collecting the same in different grades or classes, so that in treating ores containing minerals of different specific gravities the different minerals may be separated and collected in their respective classes or grades.

The invention will first be hereinafter more particularly described with reference to the accompanying drawings, which form a part of this specification, and then pointed out in the claims at the end of the description.

Referring to the drawings, Figure 1 represents a top or plan view of an ore-concentrating table and its attachments embodying my invention. Fig. 2 is a side elevation of the same with parts broken away to show the construction of parts which would otherwise be concealed from view by the broken-away portions. Fig. 3 is a detail front view of the distributing-launder. Fig. 4 is a vertical transverse section taken on the line IV IV of Fig. 1. Fig. 5 is a detail sectional view through a portion of the table, the section being taken on the line V V of Fig. 1. Fig. 6 is a top or plan view, Fig. 7 a side elevation, and Fig. 8 an end view, of the sectional launder or trough for collecting the valuable metals separated from the gangue or tailings.

In the drawings, in which similar letters of reference are used to denote corresponding parts in different views, A denotes the table, which is suitably supported to adapt it to have imparted thereto by any suitable mechanism in common use a combination of shaking and rocking motions or any desired movement for accomplishing the desired results. As shown, it is mounted on posts or legs *b b*, the upper ends of which are pivotally connected to the under side of the table, while the lower ends thereof are pivotally connected with and rest upon suitable frame-pieces or bars B, which latter may rest upon a suitable support or frame C, as shown, or in any proper manner, suitable devices, as screws or adjustable wedges *c*, being interposed between the bars B and frame C for varying the inclination of the table. The legs or rocking arms that support the table act not alone as a support therefor, working on the arc of a circle and giving the ore a slightly-pitching motion, but they also act as a guide for the table, allowing it to have no side movement whatever, which is a very important consideration in separating the ore. The surface of the table A is covered or provided with a metallic sheet or facing *a*, of metal, having an affinity for the particular metal contained in the ore under treatment and which is the more valuable and desirable to be thoroughly separated—as, for instance, lead in treating lead ore or a silver sheet or coating in treating gold ore. This metallic surface or covering is provided with a series of longitudinal grooves, channels, or recesses *a'*, which preferably extend from the rear end of the table toward the front or discharge end thereof

with a slight rearward inclination and terminate a sufficient distance from the receiving or discharge end or side of the table to leave a clear unobstructed smooth surface extending the length of the table on the side thereof adjacent to the distributing-launders, as shown more clearly in Fig. 1. The grooves a' taper from end to end—that is to say, they gradually decrease in depth from the front or receiving end thereof to their opposite terminals, where they merge into the smooth unobstructed surface of the table-top.

At or near the receiving end or side of the table and on that portion thereof on which the crushed ore or pulp is delivered from the distributing-launder I provide a removable wearing-plate A′, which may consist of a sheet-metal or other suitable plate, having one edge or angle thereof secured to the frame-piece or bar a^2, while the other portion or edge thereof overlaps and rests upon the surface of the table, as shown more clearly in Fig. 4. By this means when that portion of the table which is most subject to wear becomes worn and in need of repairs the wearing-plate may be removed and a new one substituted in its stead without necessitating the renewal of the entire metallic surface of the table or the substitution of a new table-top, as is usual in using ore-concentrators as heretofore constructed.

The distributing-launder D may be formed with two or more compartments d d', the compartment d being adapted to receive the pulp or crushed ore from a suitable conduit or pipe E, as indicated in Figs. 2 and 4, while the compartment d' is adapted to receive the water for washing the ore from a suitable conduit or pipe E′, as shown in Fig. 2. The ore-compartment d of the launder D is provided on the discharge side thereof with a series of holes or perforations d^2, through which the pulp or ore mixed with water is permitted to escape onto the surface of the table. The upper edge of that side of the compartment d' nearest the table is preferably notched or serrated, as at d^3, in order that the water used for washing the ore as it passes downward toward the front or lower end of the table may be more evenly and smoothly distributed without splashing or spurting onto the table in greater volume or with greater force at any one point than at other points along the table, thus insuring an even distribution and smooth flow of the water across the table for the purpose of washing the ore and drawing off the lighter material and gangue into a water box or trough F, extending along underneath the edge of the table at that side thereof opposite the distributing-launder.

At the front or discharge end of the table is placed a sectional trough or launder G to receive the heavier particles of mineral or valuable metal separated from the ore. This launder G may be constructed in two, three, or more sections, which are preferably telescopically arranged, so that the material which is separated may be assorted and graded and collected in different grades or classes—as, for instance, lead, iron, and zinc—according to the nature and character of the ore under treatment and the specific gravities of the minerals contained therein. In the form shown the launder G is constructed in three concave or semicylindrical sections g, g', and g^2, which are telescopically arranged and supported on the rods or bars H, which bars extend transversely of the table at the discharge end thereof and are rigidly secured at one end to a bracket H′ and at their opposite ends to the frame of the machine. The sections g g' g^2 of the launder are provided with discharge openings or spouts g^3, g^4, and g^5, respectively, and are supported, with capacity for longitudinal adjustment on the rods H H, by lateral lugs or hooks g^6, resting upon and overlying said rods, so that any one of the sections may be moved forward or back for the purpose of varying the extent or area of the surface of the section which is exposed to the discharge end of the table and adapted to receive the material therefrom, so as to adapt the same for use in treating different kinds of material or in classifying the material according to different requirements in use. Either of said sections may be removed bodily by simply lifting the same from the rods, and, if desired, any suitable securing device may be employed for securing the several sections in the positions to which they may be adjusted for use and to prevent accidental displacement in use caused by the jarring or shaking of the table. From the discharge openings or spouts g^3 g^4 g^5 the material may be discharged into a suitable receptacle or conducted through a suitable spout or conveyer to any desired point for further treatment or shipment.

In the operation of the table the ore is fed into the compartment d of receiving launder or trough D, while the wash-water, which is located farther down the length of the table and which is used to wash the ore as it passes downward toward the discharge end, is fed into the compartment d' and flows over the top or serrated edge d^3 of said compartment, so as to secure an even distribution and gentle flow thereof without spurting. At the same time a reciprocating movement, differential in its action, with the strength of the longest throw or bump toward the discharge end of the table, is imparted to the table by any suitable mechanism connecting with the pitman or rod I, which may be applied at either end of the table, so as to cause the ore to move along or over the surface of the table toward the discharge end thereof, whereby as the ore is moved along it is washed all the way at right angles by the water issuing from the compartment d' of the launder, thus washing the lighter material and gangue toward the opposite side of the table and into the trough or box F, from which the gangue and waste may flow off into any suitable re-

ceptacle or conduit provided therefor. The heavier ore or valuable material to be recovered remains scattered along the smooth surface of the table above the terminals of the inclined grooves or channels *a'* and is discharged at the end of the table into the section or compartment *g* of the receiving-launder G, while the float-lead or lighter particles of mineral, that are not sized, as is the heavier lead or particles, are caught in the grooves *a'* and caused to gradually work backward and toward the discharge end of the table, so as to be brought back into the plane of the body of ore or valuable metal which takes a position forward of an imaginary line running the length of the table outside of the terminals of the aforesaid grooves or slots, whereby the very fine float-lead or other float mineral is separated and recovered with the larger particles of like kind and specific gravity instead of being carried over and discharged into a middlings receiver or receptacle, as heretofore, and conveyed back to the distributing-launder to be again run over the table, with consequent loss resulting from the fact that the material which is so finely pulverized as to be once discharged and again returned to the table will seek the same place as before and be run again and again into the middlings-receptacle and returned until worn by attrition so fine that it will pass off with the dirty water into the waste. The inclined sloping grooves, which run against the slant of the table, cause the float mineral to be carried back to the place it should not have left, while allowing the waste to pass over it and off into the trough or receptacle to receive the same, thus saving the valuable float material with the heavier ore that lies along the upper line or surface of the table beyond the terminals of the grooves. I thus avoid all intricate savings and returnings and accomplish what has hitherto been attempted to be accomplished by returning the same ore to be run over two or more times. The mineral of less specific gravity and of a different class from that which is discharged into the first compartment or section of the sectional launder will be carried farther across the table and will be discharged into the second section or compartment, while the material of the next or third class will be discharged into the third section or compartment, thus separating and collecting the different grades or classes of material into two or more classes, the first of which, for instance, may be lead, the second iron, and the third zinc, according to the ore under treatment, the same rule applying to any minerals having different specific gravities.

By constructing the surface of the table of metal having an affinity for the particular metal it is desired to recover from the ore under treatment the separation and collection thereof are greatly facilitated, and a more complete separation is effected than is possible under the usual conditions.

The desired differential movement or bumping action may be imparted to the table by any suitable mechanism, such as has heretofore been employed in devices of a similar character and which it is unnecessary to illustrate or describe herein, inasmuch as my invention resides in the construction of the table and its attachments and not in the mechanism for imparting the desired vibratory or reciprocating movements thereto.

I may mention, however, as a desirable movement that which has heretofore been employed with what is known as the "Rittinger" table made in Germany many years ago and which has been in use in this country for many years, in which there is a side movement or bumping action combined with the transverse washing of the ore.

It will be understood, of course, that the form and construction of the parts hereinbefore described may be modified in a number of ways without departing from the spirit of my invention, and hence I do not desire to be limited to the exact construction shown and described.

The novel construction of table herein shown and described is made the subject of a separate divisional application, and hence claims to the same are omitted from the present case.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an ore-concentrator the combination with the shaking-table, of a receiving-launder extending along the discharging side of the table and composed of sections independently adjustable to vary their individual longitudinal extent for receiving the ore from the table.

2. In an ore-concentrator the combination with the shaking-table, of a receiving-launder extending along the ore-discharging side of the table and composed of a series of overlapping sections independently adjustable in the direction of their length, substantially as and for the purpose described.

3. In an ore-concentrator, the combination of a shaking-table, rods extending crosswise of the discharging end of said table, and a series of overlapping troughs together constituting a sectional launder and separately supported on said rods with provision for separate longitudinal adjustment, substantially as described.

4. In an ore-concentrator, the combination with the table, of a sectional launder composed of a series of independent coöperatively-arranged longitudinally-adjustable and removable sections, substantially as described.

5. In combination with the table, the sectional launder or receptacle composed of telescopically-arranged sliding sections each removably supported adjacent to the discharge end of the table to adapt the several sections to be separately adjusted and secured in different positions relatively to each other and

to be readily removed and replaced, substantially as described.

6. A sectional launder comprising a series of independent concave sections or receptacles telescopically arranged and adapted to slide longitudinally with respect to each other, each having lateral supporting fingers or lugs adapted to rest on suitable supports adjacent thereto, and provided at one end with a discharge-opening, substantially as described.

7. In an ore-concentrator, the combination with the table, of the sectional launder comprising a series of concave sections or receptacles telescopically arranged and adapted to slide longitudinally with respect to each other, each having lateral supporting fingers or lugs and provided at one end with a discharge-opening, and longitudinally-arranged supporting rods or bars on which said sections are supported and adjustably secured adjacent to said table, substantially as described.

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

SAMUEL IRVING HALLETT.

Witnesses:
JESSE J. MAY,
JOSEPH HICKS.