(No Model.) 2 Sheets—Sheet 1.

A. D. CLARKE.

ORE CONCENTRATOR.

No. 328,006. Patented Oct. 13, 1885.

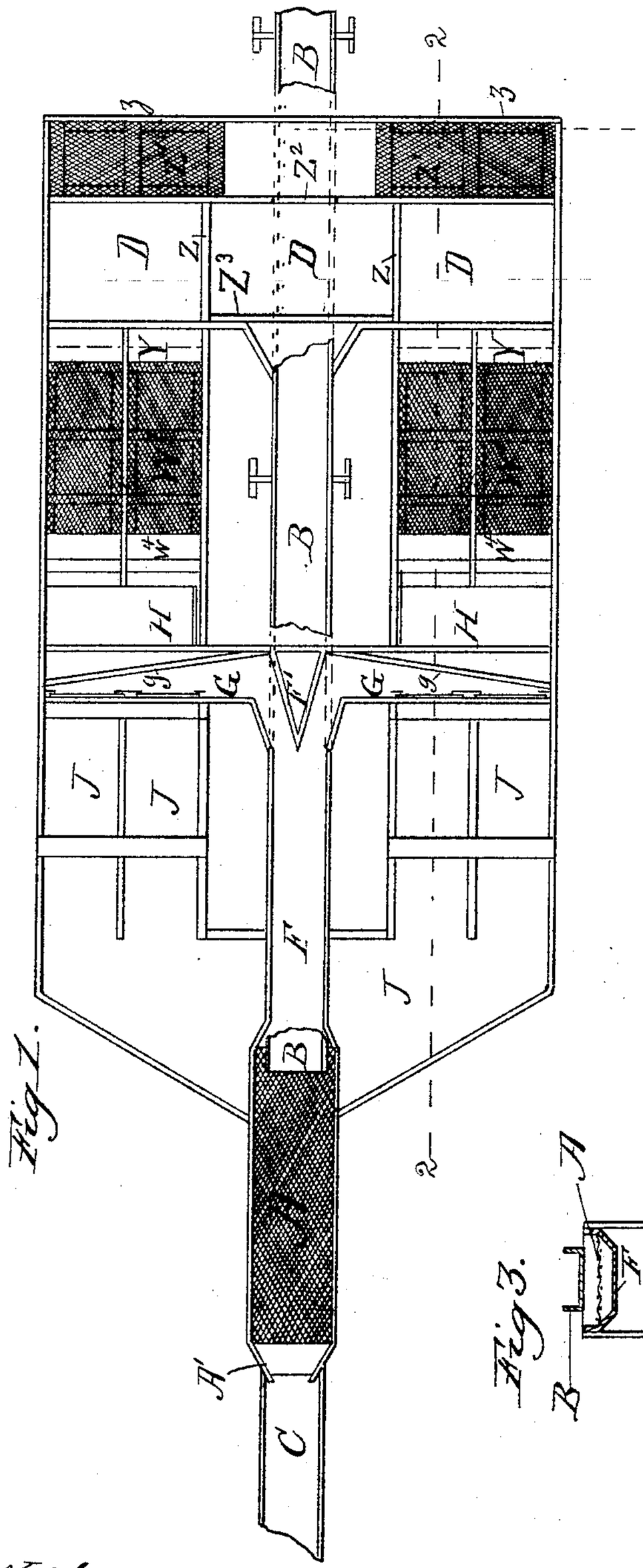

Fig 1.

Fig 3.

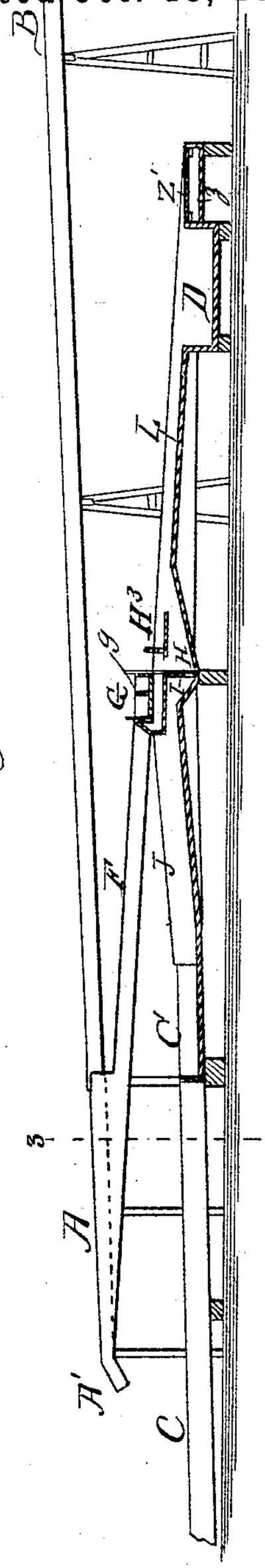

Fig 2.

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his Attorneys.

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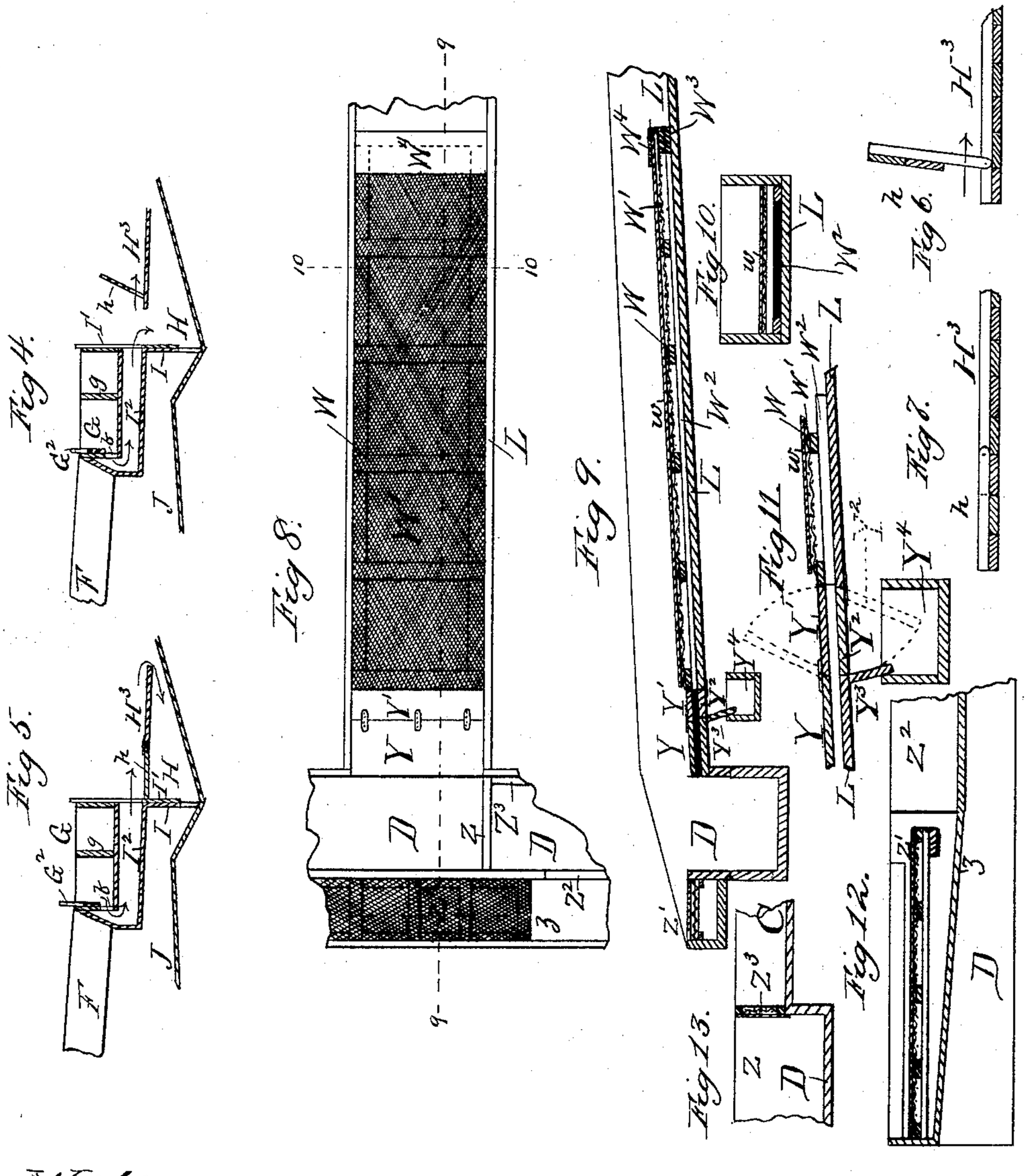

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UNITED STATES PATENT OFFICE.

ALEXANDER D. CLARKE, OF NEW YORK, N. Y.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 328,006, dated October 13, 1885.

Application filed November 10, 1884. Serial No. 147,558. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER D. CLARKE, a citizen of the United States, residing in New York, in the county of New York and State of New York, have invented a new and useful Improvement in Ore-Concentrators, of which the following is a specification.

This invention relates to concentrators for use in placer-mines containing float or flour gold, and is intended to increase the efficiency of that class of apparatus. The nature of the improvement is fully explained below, and pointed out in the claims.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a plan of my improved concentrator. Fig. 2 is a section thereof on the line 2 2 of Fig. 1. Fig. 3 is a cross-section on the line 3 3 of Fig. 2. Figs. 4 and 5 are enlarged sections of transverse sluice G and tank H, showing the hinged portion of platform H^3 in different positions, and Figs. 6 and 7 are still more enlarged detail sections of said platform. Fig. 8 is an enlarged plan of a portion of the machine. Fig. 9 is a vertical section on the line 9 9 of Fig. 8. Fig. 10 is a cross vertical section on line 10 10 of Fig. 8. Fig. 11 is a still more enlarged view of a portion of the parts shown in Fig. 9. Fig. 12 is a cross vertical section through the filtering devices at the rear of the apparatus. Fig. 13 is an enlarged detail section of the tank D.

In said drawings, B represents the sluiceway from the mine; A, the screen at the lower portion of sluice B; A′, the chute at the foot of the screen for conducting the gravel to the dump, and C the central sluice for carrying the water, &c., after it has passed through the various filtering and collecting pockets, &c., to the dump.

F is the inclined sluice chute or apron, which receives the sand or gravel falling through the screen A with the water. In order that the screen may do its work effectually and permit the passage through it of all the gold-bearing parts of the sand or gravel, I make it wider than the sluice B, as shown; but this necessitates the narrowing of the chute F to about the dimensions of the sluice B, because if the chute is made as wide as the screen, and used in mines where the greater proportion of the sand or gravel falls through the screen, it will fail to carry off the material and become clogged. Those portions of the chute immediately below the screen are therefore provided with sloping sides, while those portions in front of it are narrowed, as illustrated, thereby strengthening the current in the chute and enabling it to carry off all the material.

The triangle F′ is placed centrally in the foot of chute F, to divide the current passing through the same equally between the two ends of the transverse sluice G. The partitions *g* in this sluice may be employed to throw the water toward the front side of the sluice. From sluice G the water and sand or gravel pass into tank H through the opening *b* in the sluice closed by the gate G^2, and in this tank the current is divided, the surface portions carrying the lighter particles passing off over the table L, and the under portion carrying the heavy sand, &c., passing under the partition I, and thence up and over the table J. In former constructions the orifice *b* has been located so immediately over the opening under the partition that the commotion in the bottom of the tank caused by the fall of the water has not permitted all the heavy sand to pass onto the table J, but has acted to carry some of it to the rear of tank H, which is sometimes filled and clogged thereby. To obviate this I now place the sluice G over the inclined platform I^2. The water and sand are now delivered through the opening *b* upon this platform, whence they flow into tank H, as indicated by the arrow, the operation being much more gentle than formerly, the heavier sand sinking to the floor of the tank and passing under the partition to the rear of the machine, while the lighter portions pass off in the opposite direction.

H^3 is a platform placed in the tank H between platform I^2 and table L. It is set at a somewhat lower level than I^2. When the machine is running to its full capacity, the tank H is full to overflowing, the gate therein being so adjusted as to insure a portion of the water passing out over table L, but the under current is strong and carries off the bulk of the water, while the upper or table L current is light and gentle. Into this upper current I deflect the light or flour gold through the medium of platforms I^2 and H^3, as follows:

The current receives considerable impetus toward tank H from the inclination of platform I^2, and from the fact that its only outlet is in that direction, and this impetus is designed to be sufficient to project or force at least the upper portion of the stream in which the light floating gold will naturally be found over the intervening space and onto the platform H^3. Of course such particles as are heavy enough to resist the current will fall short of the platform H^3, and drop more or less directly into tank H with such part of the stream as fails to reach the platform. It will thus be seen that the particles of sand and gold are automatically separated as they pass from platform I^2 in accordance with their gravity and the impetus of the current, the heaviest of all sinking directly to the bottom of tank H, the next lighter grades also falling short of platform H^3 and sinking to the bottom of the tank, but less directly and less quickly, while the lightest portions are carried past the edge of and onto platform H^3, as stated. This latter division of the current flows to the farther side of platform H^3, and from thence onto table L, and the gold therein is either deposited on said platform or in the rear quiet portion of tank H, or is caught by the filter on table L.

The action of the machine in this separating operation may be regulated or modified by adjusting the gate in tank H, or by changing the distance between platforms I^2 and H^3, or by changing the relative heights of the two platforms, or by so changing platform I^2 as to affect the impetus imparted thereby, or by simultaneous changes in two or more of these features. Of course room should always be left for the heavy material to flow under the gate, so that tank H may not clog. When the machine is in full operation, the motion of the water from platform I^2 is retarded when it passes from said platform and comes in contact with the comparatively dead water in tank H, and as the greater and under portion of the current sinks and passes out under the gate, there is danger that the lighter particles will be drawn off with it, which is not to be desired, because the under current is not subjected to any treatment adapted to rescue all such light floating gold; and hence the two platforms should not be placed at the same elevation, nor should the distance between them be too great; and, on the other hand, the difference in elevation should not be too marked, nor should the distance between them be too small, and these points must be determined partly by the nature of the material operated upon. A certain amount of sediment will collect on platform H^3, which must be removed as soon as it obstructs the flow over said platform. By means of this sediment, and the coarseness or fineness of the particles composing it, is judged, to some extent, the proper velocity of the current flowing from platform I^2 and the proper width of the opening between the two platforms. When it is necessary to clear off this sediment, as well as any other accumulations in tank H, the end or door *h*, hinged to platform H^3, is lowered, so that the entire current is deflected over said platform, as illustrated in Fig. 5. During this operation it will be found desirable to cut off the supply of gold-bearing earth and to reduce the quantity of water, as thereby the gold previously confined in the sediment may be extracted in its passage over table J. The door *h* is so constructed and hinged, as illustrated, that when raised an opening of three or four inches exists between its lower edge and the top of platform H^3, thereby giving room for the current passing over the latter. The gate I′ may also be raised during the cleansing, so that the water will not rise in tank H to the level of table L.

The heavy sand is forced out of tank H onto table J by hydrostatic pressure, th umn of water in the tank being higher in front of the partitions than it is in the rear next to table J. From table J the current is conducted directly into the chute C, by which it is conducted to the dump. The backward current carrying the float gold passes from the tank H over the table L to the transverse tank D at the rear of the machine. I find in practice in the handling of fine sand that a much larger filtering-surface than can be provided in the tank D is necessary; hence a filter-frame, W, the upper side of which is covered with a stout wire-cloth, W′, is laid upon the table L, and blankets *w* or other permeable material laid over the frame. The frame is so constructed of longitudinal and cross strips as that a longitudinal channel, W^2, one or two inches deep is left between the main body of the frame and the table L. This channel permits the water passing through the filtering material on the frame to flow off into tank D. The channel is closed at the initial end by a transverse strip, W^3, which may be removable, and is preferably provided with a short canvas apron, W^4, intended to lap over the front blanket on the frame, as illustrated. Should the channel W^2 become clogged, or should it be desired to flow the water directly to the tank D without passing it through the filter, it is only necessary to remove the strip W^3, when the water from tank H will seek said channel as the most immediate exit open to it, cleaning out said channel as it proceeds. Replacing the strip W^3 will compel the water to rise, and it is then conducted by canvas W^4 onto the filter on frame W, the particles of gold held in suspension in or floating upon it being taken out by the filter.

In order that the filter may be washed without removing it from the machine, I have devised the following plan: The filter-frame W is made to extend to within a foot or so of the lower end of table L, where it meets the floor or platform Y, the top of one being level with the top of the other, and both having the same fall or incline. The platform or floor

Y has the same channel or space under it as the filter-frame W. In this platform Y is the hinged trap-door Y′, extending across the full width of table L. Immediately beneath it, in the table L, is the hinged trap-door Y^2, which opens into the chute Y^3, which conveys any material thrown into it into the sluice Y^4, by which it is conveyed into any suitable storage tank or reservoir. When it is desired to wash the filter on the filter-frame W, it is only necessary to raise the gate I′ in the tank H, so that all the water may flow over table J and none over the filter to be washed. Then the trap-door Y′ is opened, permitting access to trap-door Y^2, which is also opened. The filter is then turned upside down on the filter-frame and water sprayed upon it from a nozzle, which washes out the fine particles of gold, &c., lodged in the filter. These fine particles, with the water, fall upon the surface of the table L and flow down to the opened trap-door Y^2, through which they fall into the chute Y^3, and through it to the sluice Y^4, by which they are conveyed to the storage tank or reservoir. When the filter is washed, the trap-doors Y^2 and Y′ are closed, the gate I′ lowered, and the surface water in tank H again forced over the filter. Each side of the filter is thus alternately washed until it is worn out.

The filter-frame W may be set at a dead level, while the blanket-table L may have the usual fall or incline. This arrangement provides a gradually-increasing space toward the lower end of the table L, between the filter-frame W and the surface of the table L, for the passage of the water.

The water-tight partitions Z are put in the tank D, which cause the water flowing into tank D off the table L to rise high enough to flow over the filter Z′, which is arranged on platform *z*, attached to the rear of the tank D. The platform has a gradual fall from the outside end to Z^2. The water passing through the filter Z′ falls upon the inclined platform and flows to the point Z^2, where it escapes into the tank D at a point midway between the water-tight partitions Z. Particles held in suspension in or which float on the water, and which have escaped the filter on the filter-frame W and the filter Z′, have here a chance to settle in the tank D between the partitions Z, or are taken out by the vertical filter Z^3 before the water finally escapes into the central sluice, C.

It will be noticed in the drawings that I have duplicated the concentrating devices at each side of the main supply-sluice B and the dump C. When this is not done, the triangle F′ will be unnecessary.

I claim—

1. In an ore-concentrator, the tank H, having the partition for dividing the current, as described, the sluice G, and the inclined platform I^2, all combined and arranged as set forth, so that the platform receives the current from the sluice and breaks the force of its fall into the tank, substantially as specified.

2. The combination, with the divided tank H and its feeding-sluice, the platforms I^2 and H^3, substantially as specified.

3. The combination, with the divided tank H and its feeding-sluice, of the platform I^2 and the platform H^3, having a hinged end, *h*, substantially as specified.

4. In an ore-concentrator, the table L, in combination with the filter-frame W, having the wire-cloth W′, and forming the channel W^2, the tank H, and the tank D, substantially as specified.

5. In an ore-concentrator, the combination, with table L, of the filter and filter-frame upon said table, having the channel W^2 formed between them, substantially as specified.

6. The filter and filter-frame and the table L, having channel W^2 formed between them, in combination with the removable strip W^3, substantially as and for the purpose set forth.

7. The combination, with the table L, the filter, and filter-frame, forming channel W^2, of the strip W^3 and apron W^4, substantially as specified.

8. The table L, having the door Y^2, the filter, and its frame, in combination with the platform Y, having the door Y′, substantially as specified.

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