(No Model.)

J. D. McKINNON.

HYDROSTATIC ELECTRIC AMALGAMATOR.

No. 548,265. Patented Oct. 22, 1895.

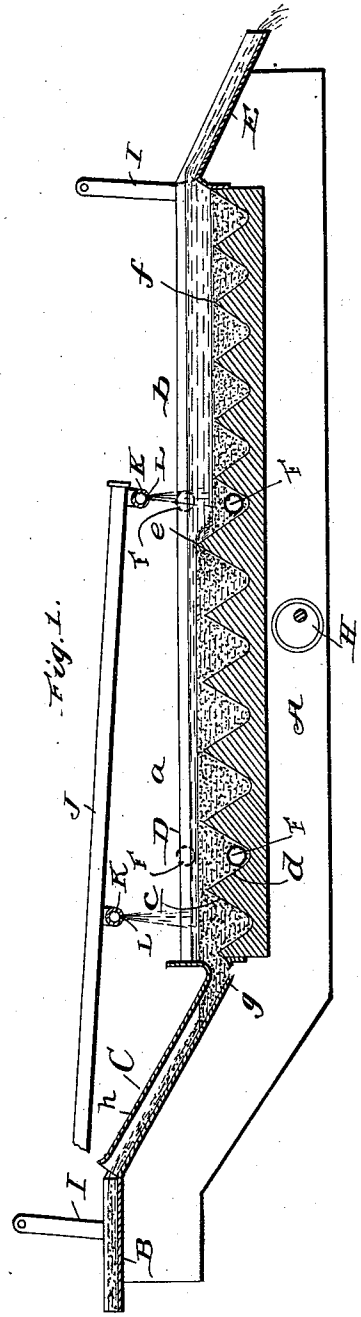

Fig. 1.

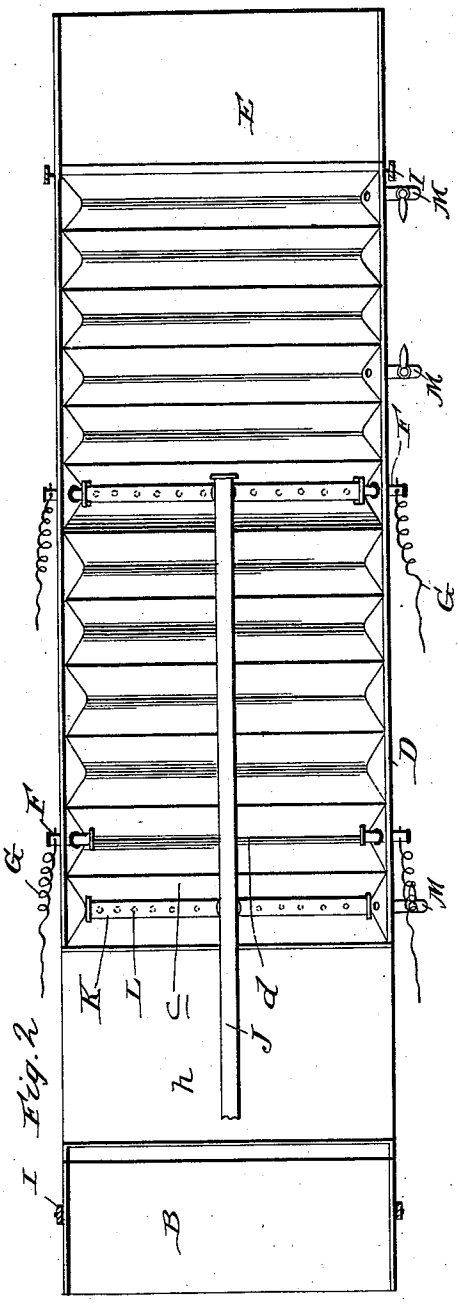

Fig. 2.

Witnesses:
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UNITED STATES PATENT OFFICE.

JAMES D. McKINNON, OF PORTLAND, OREGON.

HYDROSTATIC ELECTRIC AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 548,265, dated October 22, 1895.

Application filed December 14, 1894. Serial No. 531,844. (No model.)

To all whom it may concern:

Be it known that I, JAMES D. MCKINNON, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in Hydrostatic Electric Amalgamators; and I do 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.

This invention relates to improvements in hydrostatic electric amalgamators, and the novelty will be fully understood from the following description and claims when taken in connection with the annexed drawings, in which—

Figure 1 is a longitudinal sectional view of my improved apparatus, showing the same as in operation, with a part of the water-pipe broken away. Fig. 2 is a plan view.

Referring by letter to said drawings, A indicates a frame, which may be of any suitable construction to receive and support the various parts of my apparatus.

B indicates an apron. C indicates a hydrostatic chute leading from said apron in an inclined manner and connecting with the first set of riffles.

D indicates a frame, which is disposed horizontally and may be formed in one piece, and contains two sets or series of riffles *a* and *b*, and from one end of this frame leads an inclined discharge-spout E. The first set or series of riffles *a* have their inclined walls *c* and *d* of a greater height than the walls of the second set or series of riffles *b*. This construction is better shown in Fig. 1 of the drawings, in which the tops *e* of the first set or series of riffles are disposed at a greater altitude than the tops *f* of the second set or series. The oppositely-inclined or upwardly-diverging walls *c d*, as better shown in Fig. 1, form riffles *a b*, of approximately triangular form in cross-section. This form of riffle is advantageous, inasmuch as a small quantity of mercury (the saving of which is a desideratum in this class of devices) placed therein is contracted, and therefore presents a proportionately greater thickness to the pulp, and at the same time presents to the pulp a broad upper surface, so as to enable it to amalgamate with a large amount of metal. The apron B, onto which the gold-bearing material, either black sand or crushed quartz, is fed, may be disposed horizontally, and the hydrostatic chute C, which leads therefrom, connects with the first series of riffles and has a bend *g* for a purpose which will presently appear. The chute is covered, as shown at *h*, so as to confine the volume in its descent and contract its discharge as it enters into the first riffle. The riffles which are designed to be filled with mercury are all disposed transversely of the frame, and each is designed to empty the water, sand, &c., into the one next in the series, and the first series empties into the next series below. The discharge-spout E, which is pitched or inclined, has its connection with the frame D and with the last riffle of the lower series at an altitude the same or approximately the same as the top *e* of the first series of riffles.

As the water is passed down the hydrostatic chute, and with it the black sand or pulverized quartz, it will be brought into contact with mercury which is placed in the riffles, when an amalgam will be formed between the gold or other precious metal and the quicksilver.

By having the walls of the set or series of riffles *b* lower than the walls of the riffles *a* and the connected end of the spout E at the same altitude as the tops of the first series of riffles it will be seen that what may be properly termed a "basin" is formed at the discharge end of the frame D, which will receive and retard the passage of the water, sand, &c., over the set of riffles *b* and will enable the mercury in the said riffles to amalgamate with any gold or platinum that may remain in the water or sand after the same passes over the riffles *a*. It will also be seen that by reason of the construction described should any of the mercury be washed from the first set or series of riffles *a* it will be prevented from passing out of the frame D, which is a desideratum.

In order to render the mercury active and keep the surface of the same clean, so as to enable it to better amalgamate with the gold,

I place electrodes F F in contact with the mercury and the pulp above the mercury and arrange them in circuit with suitable conductors G, leading to a suitable electric generator. (Not illustrated.)

The whole frame may be subjected either to lateral or longitudinal vibratory motion by any suitable means. As one convenient means of imparting such vibratory motion to the frame, I might employ an eccentric, such as H, connected with a suitable drive-shaft, and suspend the frame from a support by hangers I. I do not, however, wish to confine myself to any particular means of imparting motion to the apparatus, as there are many ways in which this might be accomplished. The shaking movement, however, is very desirable, as it causes the heavier matter to settle in the bottom of the troughs or riffles and shifts the lighter particles to the next succeeding one, where the amalgam is formed.

When the gold-bearing material is fed upon the apron B, it is carried down the chute C and passes through the mercury with the water, which is also fed down the chute. During the descent of the material the gold naturally works to the bottom of the chute and is forced into contact with the mercury at the bend or depression *g* at the edge of the first riffle, where a large percentage will be amalgamated and dropped into the first riffle. The gold or other precious metal escaping this point will float to the surface of the mercury and drop into the next riffle, and so on throughout the series, while the fine particles of gold that may pass the first series will be cast down in the next series of riffles, the water and other waste matter passing off through the discharge-spout E.

In order to render the operation more effective, and as the invention is designed more particularly for working flour gold, such as is found along the Pacific coast in deposits of black sand, I provide a fall or spread above the riffles, there being any suitable number employed. In the present illustration I have shown a pipe J, disposed longitudinally above the riffles. This pipe leads from the apron B or any suitable point and has its opposite end closed, the pipe being arranged horizontally, or approximately so.

K indicates branch pipes which communicate with the water-pipe J and extend laterally therefrom in opposite directions. These transversely-disposed pipes K are closed at their ends and provided in their bottoms with holes or perforations L, as shown. In the drawings one of these pipes is shown as arranged above the first riffle of the first series and another above the first riffle of the second series; but it is obvious that more may be used. With these perforated pipes arranged as described and as mercury is so much heavier than water the black sand or quartz, after passing through the bend *g*, will not again sink into the mercury, but will float over the surface of the same unless cast down by the water discharged from the perforated pipes, the particles of gold being forced down and into contact with the mercury becoming amalgamated and dropping into the different riffles.

By this construction and operation I am able to recover a larger percentage of gold than heretofore.

In order that the quicksilver may be drawn from the riffles prior to cleaning up, I provide plugs or faucets M at the base of any number of riffles in the sides of the frame, as shown.

Having described my invention, what I claim is—

1. The herein described amalgamator comprising the approximately horizontal frame D, formed in one piece and provided with the set or series of transverse riffles *a*, having their bottoms arranged in the same plane and also having the inclined or upwardly diverging side walls and adapted to contain mercury, and the set or series of transverse riffles *b*, having their bottoms arranged in the same plane as the set *a*, and the upper edges of their inclined side walls in a plane below the upper edges of the side walls of set *a*, and also adapted to contain mercury, the discharge spout E, connected to the outer end riffle of the set *b*, and having its connected end arranged in the same plane as the upper edges of the side walls of the riffles *a*, the inclined hydrostatic chute C, connected with the outer end riffle of the series or set *a*, below the plane of the upper edge of the side wall thereof and having the bend or pocket *g*, at its lower end, and the forward end and side walls connected to the frame D, and having their upper edges arranged in a plane above the upper edges of the side walls of the riffles *a*, substantially as and for the purpose set forth.

2. The herein described amalgamator comprising the approximately horizontal frame D, provided with the set or series of transverse riffles *a*, having the inclined or upwardly diverging side walls *c*, *d*, and containing mercury, and the set or series of transverse riffles *b*, having the inclined or upwardly diverging walls *c*, *d*, and also containing mercury and having the upper edges of their side walls arranged in a plane below the upper edges of the side walls *a*, the discharge spout E, connected to the outer end riffle of the set *b*, and having its connected end arranged in the same plane as the upper edges of the side walls of the riffles *a*, the inclined hydrostatic chute C, connected with the outer end riffle of the series or set *a*, below the plane of the upper edge of the side wall thereof and having the bend or pocket *g*, at its lower end, the forward end and side walls connected to the frame D, and having their upper edges arranged in a plane above the upper edges of

the side walls of the riffles *a*, and the longitudinal water pipe arranged above the riffles and extending over the two sets of riffles and having the lateral branch pipes perforated in their under side so as to spray water on the materials in or on the riffles, substantially as and for the purpose set forth.

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

JAMES D. McKINNON.

Witnesses:
F. CLARNO,
K. DARRIN.