

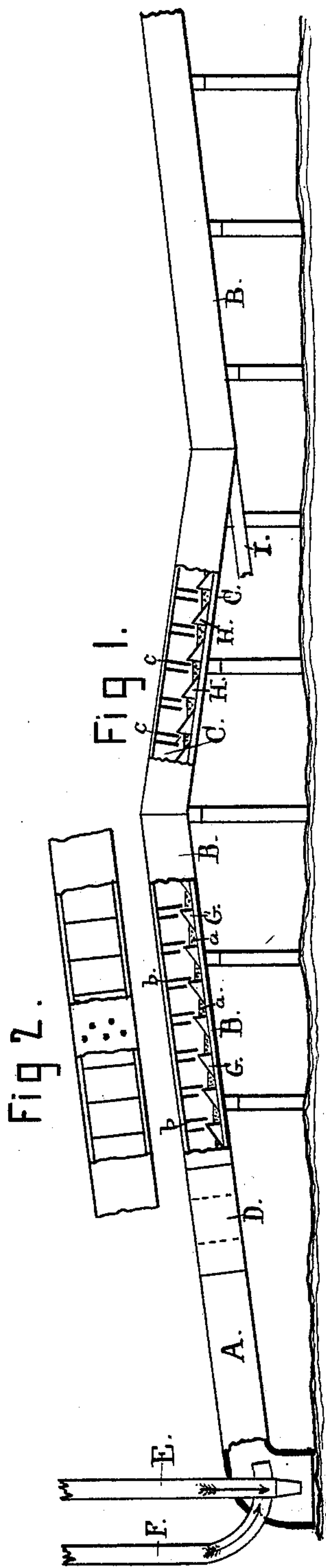
(No Model.)

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Apparatus for Hydraulic Mining.

No. 231,221.

Patented Aug. 17, 1880.



Witnesses.

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APPARATUS FOR HYDRAULIC MINING.

SPECIFICATION forming part of Letters Patent No. 231,221, dated August 17, 1880.

Application filed May 11, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLARD B. FARWELL, of the city, county, and State of New York, have invented a new and useful Improvement
5 in Apparatus for Hydraulic Mining for Gold and other Precious Metals, of which the following is a specification.

This invention relates to that class of mining where the deposit of sand, gravel, or other
10 material containing gold or silver lies in low or level places, and where it is necessary to lift the mass of matter with which the gold or silver is mixed, and wash and carry the debris away to some other locality.

15 Instances of such deposits are found in those localities where the waste or "tailings" from hydraulic or quartz mining have accumulated, and which contain more or less fine gold, but which lie so low as to preclude their being re-
20 worked until they can be lifted and handled by some cheap process, and the final waste carried away to some other locality.

Heretofore hydraulic mining has been carried on for the purpose of washing down high
25 masses of gravel and carrying the loose matter down inclines through sluice-boxes provided with riffles and interstices in which quicksilver has been placed, for the purpose of amalgamating with and retaining the loose particles of gold mixed with the sand, gravel, or
30 other matter carried through such sluice-boxes. In nearly all mining operations for gold similar processes are adopted for washing the material with which gold is held or mixed down
35 inclines and into some low place where the waste may be deposited. The result has been that a very large percentage of fine float-gold has been lost and carried away with the tailings.

40 In various localities in gold-producing countries deposits of fine gold are also found mixed with sand or other matter in low places, where the expense and difficulty of handling the same are so great as to prevent their economical or
45 profitable working.

The object of this invention is to enable all such localities and deposits to be successfully and profitably worked or handled, and thus to open up a new and wide field of mining in-

dustry, which, without some such device, must
50 always remain unproductive.

The invention consists in a new arrangement of sluice or riffle boxes, either in combination with a force-jet of water intended to
55 loosen and raise to a certain height sand, gravel, or other matter in which gold or silver is contained as a means of supplying such sluice or riffle boxes with material to be operated upon, or in combination with a hopper,
60 into which such material may be shoveled, sluiced, or dumped, and a second force-jet of water, which sends the gravel or earthy matter forward and up through a pipe lying at a moderate incline and discharging into a sluice
65 or riffle box which is continued on at a similar line of elevation to such distance as the strength or source of supply of the second
70 force-jet of water will successfully carry the gravel or other earthy matter, and at the same time keep the riffle-box free and the riffles in
75 working order. The current of water and gravel or other matter is then allowed to run down another sluice or box provided with riffles in the usual manner, against which such
80 gold as may remain in the mixture may be precipitated and held in the ordinary manner.

The first-described riffle-box is fitted with riffles or cross-pieces on the bottom, placed as close together as actual working operations may demonstrate to be most effective. These
85 riffles are made with their lower sides forming an inclined plane and their upper faces at an acute or right angle with the bottom of the sluice-box. Behind the upper side of each
90 quicksilver is placed, for the purpose of receiving, amalgamating with, and retaining the gold that may come in contact with it. Above each riffle are inserted from the cover of the
95 sluice-box strong spikes or metallic pins, which run down nearly to the surface of the quicksilver. These are placed in two or more rows alternating with each other, and their function is to break the current, and thus stir up the water, sand, gravel, &c., immediately above the surface of the quicksilver, and to give a
bubbling motion to the latter, so that the tendency to keep the surface of the quicksilver clear of sand, and to bring the particles of gold and

the quicksilver together, will thereby be greatly enhanced. Above the riffles in the descending sluice-box are similar spikes or pins, which perform the same office as the water and gravel run down the incline.

It will be seen that in the first riffle-box the gold is caught and held on the side of the riffle opposite to the flow of the water-current. This is an entirely new and novel arrangement, and, in combination with the hanging detents and the ascending sluice-box, will prove a great saving of both gold and quicksilver.

In the ordinary sluice-boxes, where the fine float-gold is driven down with great rapidity by the current of water, the waste of both gold and quicksilver is enormous, a comparatively small percentage of the gold ever coming in contact with the quicksilver lying in front of the riffles, the tendency of the gold, by its own specific gravity, being to glide down with the water-current, and to pass in and out, into and among the "tailings," so called.

In the present arrangement, while the fine particles of gold are forced up along the ascending sluice-box, their own specific gravity is at the same time tending to cause them to fall back and downward upon the quicksilver lying in front of the riffles, where they are amalgamated and secured.

In the descending sluice or riffle box the hanging spike or pin detents tend greatly also to overcome the liability of the gold particles to sweep down and over the riffles, and so out into the tailings. These pins or detents also operate to keep the surface of the quicksilver free from fine heavy sand.

By this system the gravel or other matter containing gold can be carried to any distance that may be required, a second, third, fourth, or more ascending and descending sluice or riffle boxes connecting with each other, the lower end of each ascending box being provided with a new force-jet of water of sufficient power to carry the water flowing into it up to such height as may be necessary or desirable. Thus the free gold or silver contained in tailings and other gold or silver bearing deposits may be washed free from every portion of free gold which they contain.

In the accompanying drawings, in which similar letters of reference indicate like parts, Figure 1 is a longitudinal sectional view of my invention; and Fig. 2 is a top view of a small section of the ascending sluice or riffle box, showing the position of the hanging spike or pin detents.

A is a sluice-pipe, made preferably of cast-iron, and having a curved elbow at its end, opening downward and resting on the surface of the ground where operations are to be carried on.

B B is the ascending sluice or riffle box, and C C the connecting descending one.

D is a flexible joint, made of strong canvas or other material, by which the sluice-pipe A is connected with the box B. This joint enables the sluice-pipe A to be swung

round into various positions, so as to operate over a wide surface of ground. To enhance its utility in this direction this sluice-pipe may be made telescopic, if found to be desirable.

E is the vertical pipe through which the jet of water is forced which digs up the ground on which the open end of the sluice-pipe rests, and F is the pipe through which the force-jet of water flows up along the ascending sluice-box, carrying with it the loose gravel and the other matter dug up by the jet from the pipe E.

G G are the riffles in the ascending sluice-box, showing the quicksilver lying in front of them, as at *a a*, and *b b* are the hanging spike or pin detents.

H H are the riffles in the descending sluice-box, with the hanging spike or pin *c c* above them.

I is a second force-jet pipe for forcing the gravel, water, &c., up through the second ascending riffle-box as fast as delivered from the descending riffle-box, which arrangement may, as has already been remarked, be continued on to any required distance.

The riffle-boxes are supported on trestles, or in any other way that may be found most economical and practicable.

It is obvious that the force water-jets may be supplied by steam-power or by the ordinary method of a fall from a sufficient height to make them effective.

I do not consider any particular angle of inclination of the sluice-box as material, and the angle may be varied according to circumstances.

As has already been set forth, one of the chief advantages of the arrangement which I have described is, that the force of gravity does not tend to carry the particles of gold along in the direction in which the stream of water is flowing, and so out at the end, as in the ordinary sluice-box.

I prefer to arrange the sluice at a considerable inclination, so that gravitation and the force of the current shall be in a considerable degree opposed to each other, in order that the particles of gold may all find their way to the riffles before reaching the end of the sluice. It is obvious, however, that any inclination of the sluice, however slight, or even a horizontal arrangement of it, when used in connection with a forced jet of water, would secure in a beneficial degree the advantages above referred to, as the force of gravity would tend to retard rather than to hasten the passage of particles of gold through the sluice.

The mouth of the sluice-pipe A may be provided with a screen to prevent stones or other large objects from being forced up through the sluice-box and clogging the same.

It is also obvious that the first ascending sluice-box may be supplied with gravel, sand, &c., containing gold, by means of a hopper, into which the material can be dumped or shoveled, as may be desired, without the intermediation of the digging jet-pipe E, a single force-jet pipe, F, being in such case only

required to carry the matter thus fed into the sluice-box up over the riffles, as already described. This hopper may also be provided with a screen to prevent stones or other matter from getting into the riffle-box.

What I claim as my invention is—

1. In hydraulic mining, the combination of the sluice-pipe A with its digging and forcing jet-pipes E and F, connected by a flexible joint, D, to an ascending sluice or riffle box, B, substantially as and for the purposes described.

2. In hydraulic mining, an ascending sluice or riffle box, B, having riffles G, behind which, and opposite to the flow of water, gold or other precious metals are caught and saved, substantially as and for the purposes described.

3. In hydraulic mining, the combination of

a swinging sluice-pipe, A, with its accompanying force-jet pipes E and F, the flexible joint D, ascending and descending sluice or riffle boxes B and C, riffle G, and hanging detents *b b* and *c c*, substantially as and for the purposes described.

4. In hydraulic mining, a series of inclined riffle-boxes having a stream of water forced through the first and every alternate box in an upward direction, substantially as described.

5. In hydraulic mining, an inclined riffle-box having a stream of water forced through it in an upward direction.

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Witnesses:

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