

1,244,203.



Inventor
Frank E. Hawksworth
by Townsend Ingham Harris
his Attorneys

UNITED STATES PATENT OFFICE.

FRANK E. HAWKESWORTH, OF LOS ANGELES, CALIFORNIA.

METHOD OF AND APPARATUS FOR PLACER-MINING.

1,244,203.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRANK E. HAWKESWORTH, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Method of and Apparatus for Placer-Mining, of which the following is a specification.

My invention relates to the art of mining, and particularly to the art of working surface deposits of rare metals, commonly designed as placer mines.

The object of my invention is to provide means, first, for working such deposits thoroughly so that all the surface earth of the property is systematically removed, worked to extract the precious values, and then piled in such a manner that it will not require rehandling or interfere in any way with subsequent working of the untouched ground; second, for separating waste boulders and large stones, tree stumps, brush and other debris, from the earth before the process of extraction is started, and for piling said waste material in such a location that it will not interfere with the subsequent working; third, for providing a working pit which will have continuous and adequate drainage so that there will be no possibility of its becoming flooded by cloud bursts or heavy rains; fourth, for so operating that a definite trench of considerable size is at all times left between the worked and unworked ground so that operations are facilitated and there is no liability of reworking any part of the property.

To produce these new and useful results, the apparatus illustrated diagrammatically in the drawing is used. In this drawing, Figure 1 is a plan view, and Fig. 2 is a section on a plane represented by the line x^2-x^2 of Fig. 1.

Broadly considered, the apparatus consists of a digging means 11, a waste material separating means 12, a primary conveyer 13, a precious value extracting means 14, a secondary conveyer 15, and a stacker 16. The material is taken from a working bank 17 and delivered to a tailings bank 18. All the apparatus works in a pit 19 bounded by the banks 17 and 18. The apparatus illustrated may be driven by electric power, steam, compressed air, or any other convenient means. No novelty is claimed herein for any one of the above named elements of apparatus, the novelty residing in the combination of ele-

ments and method of working to be more fully disclosed herein.

The digging means 11 may conveniently be a steam shovel having a boom 21 and a bucket 22, the whole shovel being self propelling on traction wheels 23, or caterpillar tractors or common railroad wheels on railroad track suitably laid for the purpose. The shovel cuts material out of the working bank 17 and dumps it into the hopper 24 of the waste material separating means 12 which may be a grizzly or similar piece of apparatus. The means 12 is mounted on wheels running on a circular track 25, or caterpillar tractors or traction wheels without track, traveling in a like circular direction, and has a chute 26 through which the waste material which is separated from the smaller workable portion of the ground by the grizzly is dumped on the floor of the pit 19, this material falling on the opposite side of the track 25 from the steam shovel and between the track 25 and the extracting means 14. The waste material left on the floor of pit 19 is shown at 27 and the location thereof is important in that it is in a place where it need not be later disturbed, as will be further understood hereinafter.

The smaller workable material which passes the waste material separating means 12 is delivered by the primary conveyer 13 to the forward end of the precious value extracting means 14. The conveyer 13 is pivoted at a point 30 in the means 14 and swings about this point 30, the track 25, or the travel of the separating means 12 being preferably on an arc of a circle struck about this point. The precious value extracting means 14 is located in a shed 31 mounted on wheels running on a straight track 32 parallel with and between the banks 17 and 18 and on the bottom of the pit 19. Traction wheels or caterpillar tractor runners are also contemplated in this case, the line of travel or motion forward being the same.

The precious value extracting means 14 may consist of any apparatus or collection of apparatus which is adapted to remove the values it is desired to obtain from the material delivered by the conveyer 13. In placer workings, the means 14 may consist of a crusher with a concentrator, an amalgamator, jigs, or indeed any of the common forms of mining machinery suited to isolate and separate the gold, or other metals or valuable materials, from the tail-

ings. The values are retained and stored in the shed 31 and the tailings are delivered to the secondary conveyer 15 which is mounted on the front of the stacking means 16, and from thence to the stacker 16 which delivers the tailings to the bank 18. The conveyers 13 and 15 are of any of the well known types.

The stacker 16 is also well known in the art, being carried with the conveyer 15 on suitable trucks, the parts 14, 15 and 16 moving along the track 32. The stacker 16 preferably has two booms 40 and 41 in which are placed elevating conveyers which carry the tailings to the top of the bank 18.

The method of operation is as follows:

The whole apparatus is arranged on the surface of the field approximately as shown, and starts to excavate from the front and stack in the rear, gradually attaining depth as it proceeds forward until the proper level is reached when it proceeds as in the manner shown and described, having formed the pit by gradual descent, taking material from the working bank 17 and dumping it into the hopper 24, the waste material 27 being separated by the waste material separating means 12. The smaller material is carried by the primary conveyer 13 to the precious value extracting means 14 in which it is treated to remove the gold or other precious metals and materials contained therein. The tailings are carried back by the secondary conveyer 15 to the stacker 16, the tailings being carried upwardly by the stacker and delivered to the top of the tailings bank 18. As the digging means 11 progresses in the direction of the arrow D, the waste material separating means 12 is moved around in the direction of the arrow E, the working bank 17 being cut away along the line F—G. When the digging means 11 has completed its circuit to the front drainage ditch C, the means 14 is moved forward on the track 32, and the track 25 is lifted and moved forward into the position shown in dotted lines at H. At the same time the means 14, 15 and 16 are moved forward on the track 32, a forward section of track being laid, and a back section of track being removed as necessity requires. The operation of digging out the working bank 17 is then repeated along the line I. It will be seen that the method consists in general of excavating a circular arc from the front of the pit, separating the values from the material excavated, and piling the tailings in the rear of the pit, the whole apparatus moving forward in the direction of the arrow J of Fig. 1. It will further be noted that the heavy rocks and debris 27 are piled in such a position that they do not interfere with any of the means 11, 12, 13, 14, 15 or 16.

The apparatus is so arranged that the

stacker 16 delivers material in such a manner that the rear ditch B is constantly left open. After the pit has traveled across the length of the property, the apparatus is reversed and a return cut is made, the forward ditch C being in reality a rear ditch B from a previous excavation. The ditches B and C serve two purposes. In the first place they prevent any accumulation of water in the pit, one ditch or the other serving to drain the water off, depending on the direction in which the land slopes. In the second place they serve to separate the working banks 17 and 18 so that there is no danger of reworking any of the tailings. The operation is a continuous one and need not be worked in an approximately definite straight line if the configuration of the property does not admit of this.

I claim as my invention:—

1. In an apparatus for placer mining, a precious value extracting means, means for piling the tailings from said precious value extracting means in the rear of said precious value extracting means, a primary conveyer mounted on a pivot at the front of said precious value extracting means, the outer end of said primary conveyer swinging in an arc of a circle about said pivot, a circular arc of track on which the outer end of said primary conveyer is mounted, and a digging means so placed as to excavate material from in front of said precious value extracting means and deliver it to the outer end of said primary conveyer.

2. In an apparatus for placer mining, a precious value extracting means, means for piling the tailings from said precious value extracting means in the rear of said precious value extracting means, a primary conveyer mounted on a pivot at the front said precious value extracting means, the outer end of said primary conveyer swinging in an arc of a circle about said pivot, a digging means so placed as to excavate material from in front of said precious value extracting means and deliver it to the outer end of said primary conveyer, and large material separating means arranged to remove heavy and large material from the excavated material before it is passed to said primary conveyer.

3. In an apparatus for placer mining, a precious value extracting means, means for piling the tailings from said precious value extracting means in the rear of said precious value extracting means, a primary conveyer mounted on a pivot at the front of said precious value extracting means, the outer end of said primary conveyer swinging in an arc of a circle about said pivot, a circular arc of track on which the outer end of said primary conveyer is mounted, a digging means so placed as to excavate material from in front of said precious value extracting means and deliver it to the outer end of said

primary conveyer, the large material separating means mounted to move on said circular arc of track and arranged to remove large and heavy material from the excavated material before it is passed to said primary conveyer.

4. In an apparatus for placer mining, a precious value extracting means, means for piling the tailings from said precious value extracting means in the rear of said precious value extracting means, a primary conveyer mounted on a pivot at the front of said precious value extracting means, the outer end of said primary conveyer swinging in an arc of a circle about said pivot, a digging means so placed as to excavate material from in front of said precious value extracting means and deliver it to the outer end of said primary conveyer, large material separating means arranged to remove heavy and large material from the excavated material before it is passed to said primary conveyer, and means by which said heavy and large material is dumped to the rear and inside of said circular arc of track, said primary conveyer being adapted to extend over said dumped heavy material.

5. In an apparatus for placer mining, a precious value extracting means, means for piling the tailings from said precious value extracting means in the rear of said precious value extracting means, a primary conveyer mounted on a pivot at the front of said precious value extracting means, the outer end of said primary conveyer swinging in an arc of a circle about said pivot, a circular arc of track on which the outer end of said primary conveyer is mounted, a digging means so placed as to excavate material from in front of said precious value extracting means and deliver it to the outer end of said primary conveyer, large material separating

means mounted to move on said circular arc of track and arranged to remove large and heavy material from the excavated material before it is passed to said primary conveyer, and means by which said heavy material is dumped to the rear and inside of said circular arc of track, said primary conveyer being adapted to extend over said dumped heavy material.

6. The method of placer mining, which consists in digging a pit, removing material from the front of the pit, separating the values from said excavated material, and piling the tailings at the rear of the pit, the removal of the material from the front of the pit and the piling of material at the rear of the pit being carried on in such a manner as to leave a front and rear drainage ditch having their bottoms on the same level as the pit floor, said ditches serving to separate the tailings from the unexcavated material.

7. The method of placer mining, which consists in digging a pit, removing material from the front of the pit, separating heavy material from the excavated material, piling said heavy material in the bottom of the pit, separating the values from said excavated material, and piling the tailings at the rear of the pit, the removal of material from the front of the pit and the piling of material at the rear of the pit being carried on in such a manner as to leave a front and rear drainage ditch having their bottoms on the same level as the pit floor, said ditches serving to separate the tailings from the unexcavated material.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 8th day of February, 1916.

FRANK E. HAWKESWORTH.