Sept. 18, 1928. 1,684,869

F. H. KRUEGER

PLACER MINING MACHINE

Filed April 13, 1923 5 Sheets-Sheet 1

Fig. 1.

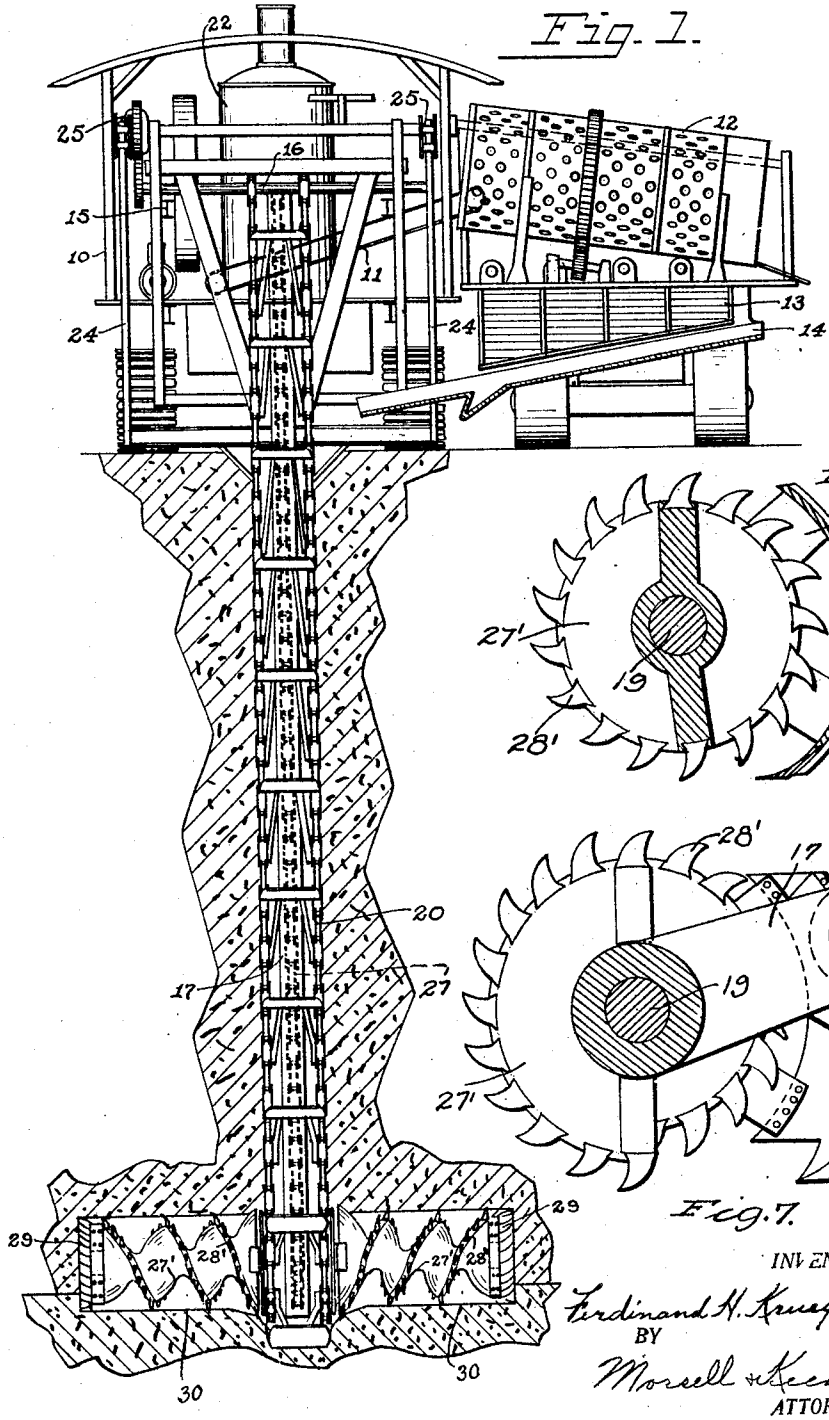


Fig. 6.

Fig. 7.

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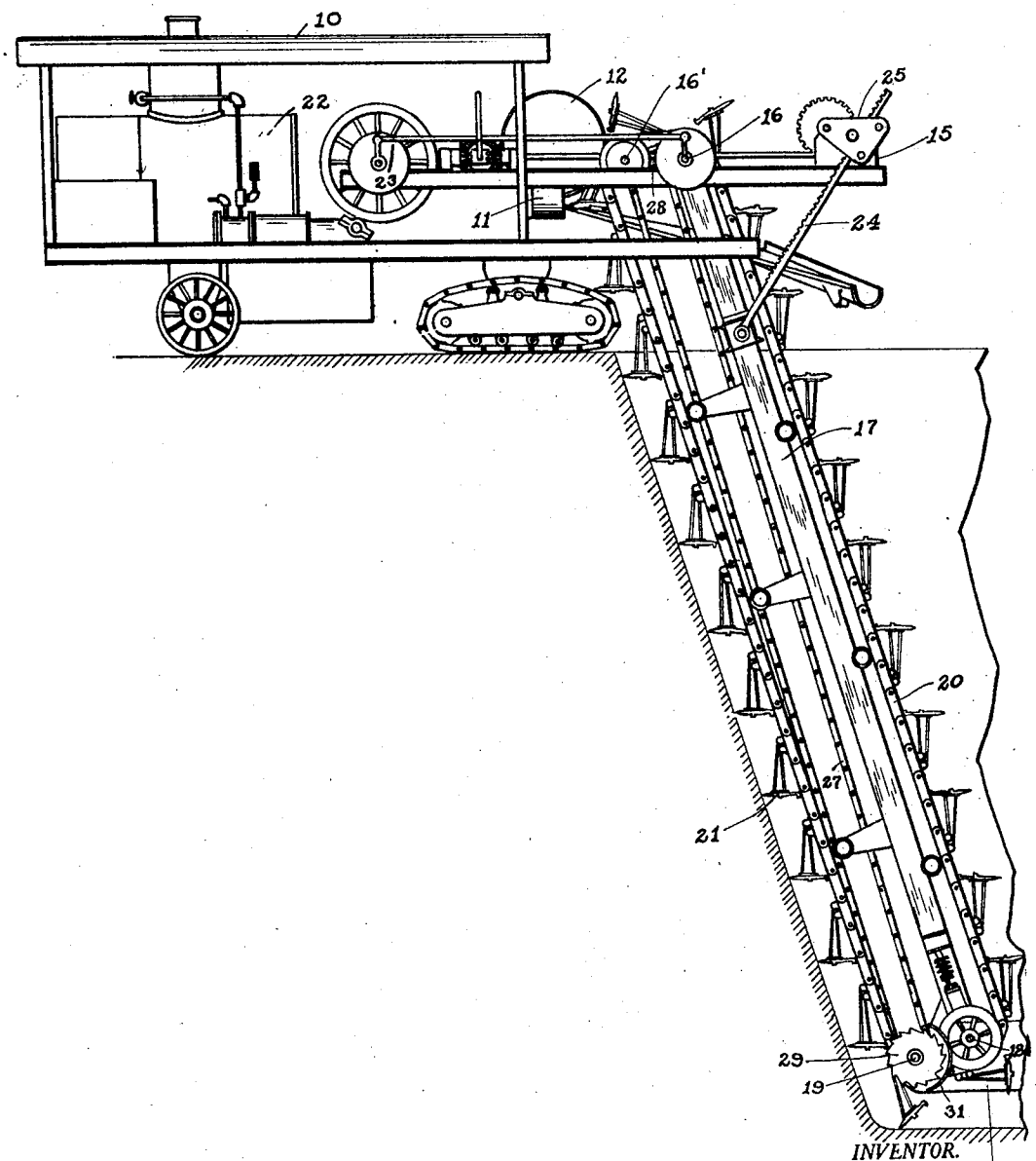
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Fig. 2.



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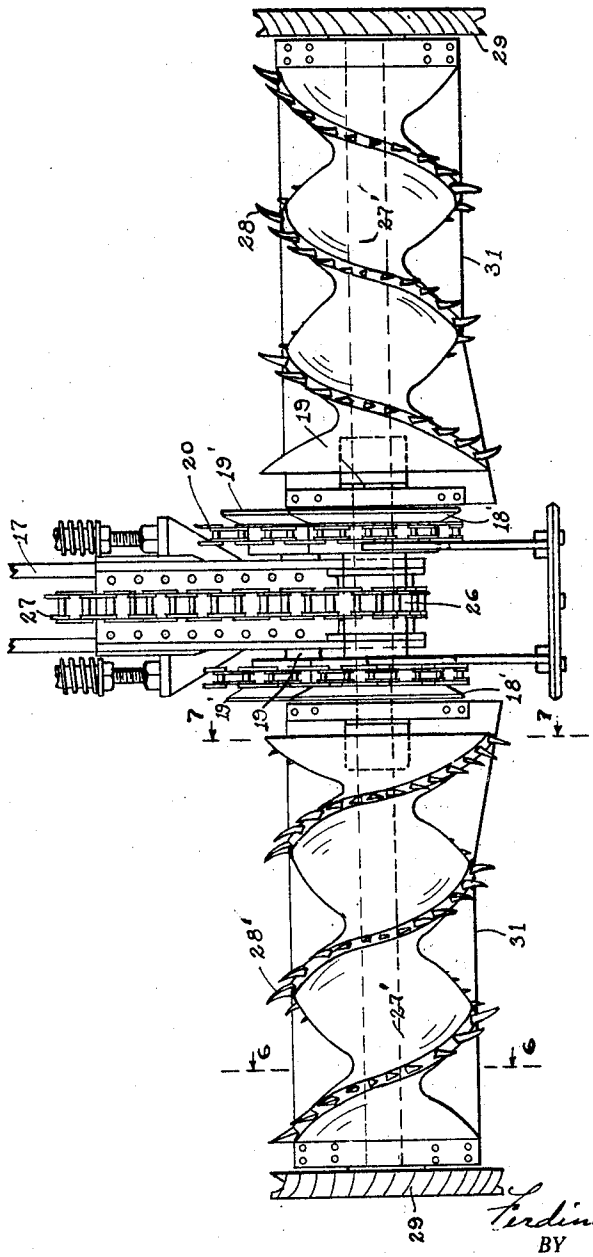
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PLACER MINING MACHINE

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Fig. 3.



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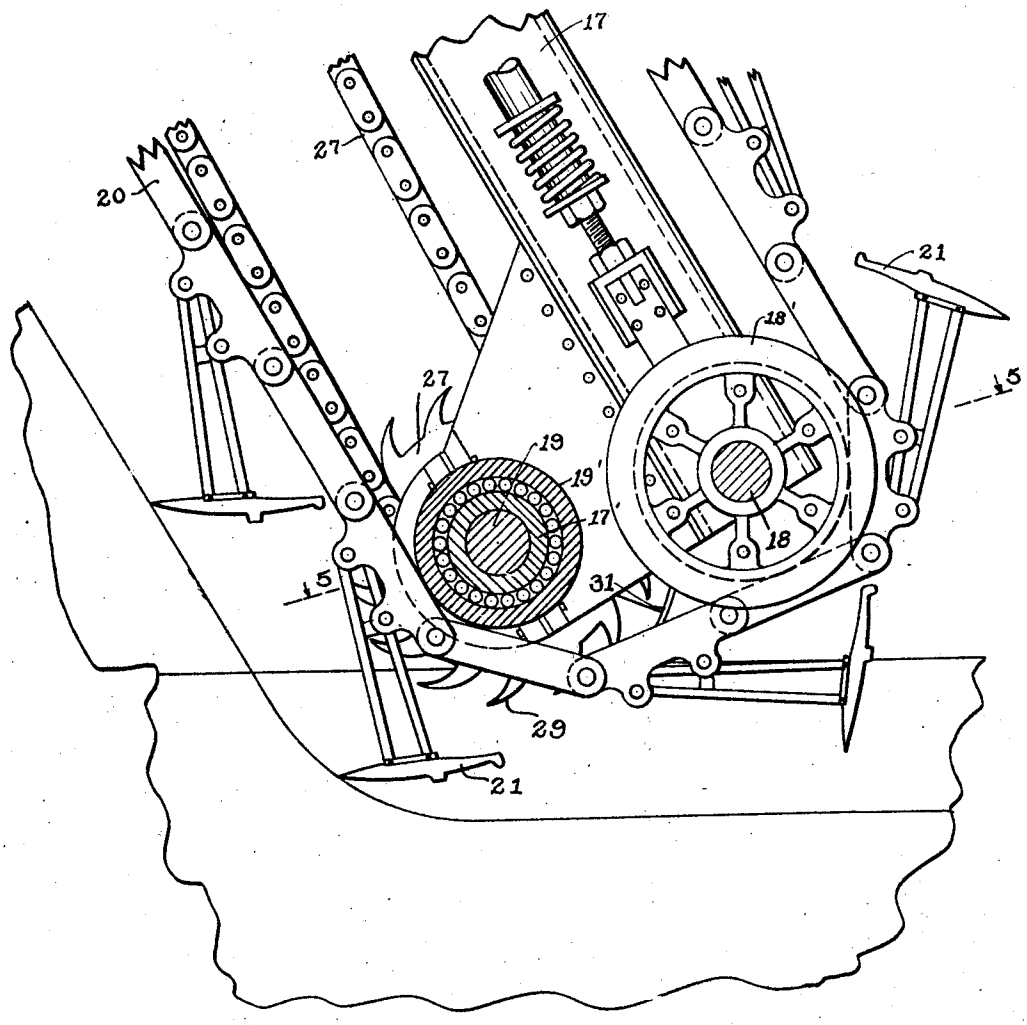
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Fig. 4.



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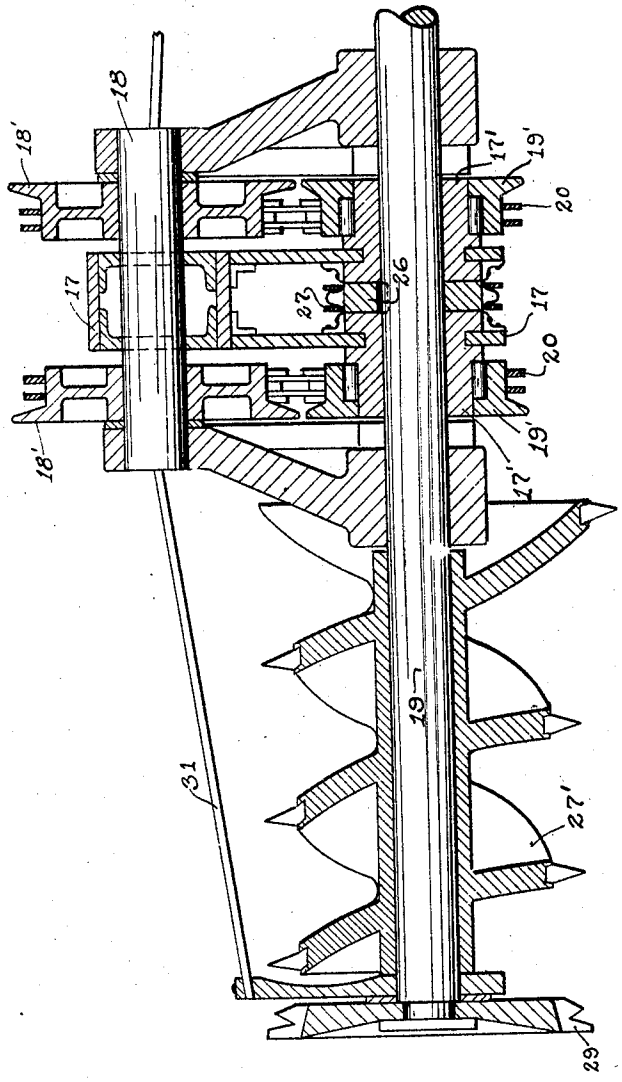
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Filed April 13, 1923 5 Sheets-Sheet 5

Fig. 5.



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UNITED STATES PATENT OFFICE.

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PLACER-MINING MACHINE.

Application filed April 13, 1923. Serial No. 631,834.

This invention relates to improvements in placer mining machines.

It is well known and an established fact that in the greatest number of cases the gold, platinum or tin in a placer deposit usually lies on or within two or three feet of bed-rock. This is so in every case where the deposition has taken place in a fast flowing stream. The values which are found concentrated on the bed-rock usually amount to 90 or 95% of the total values found.

It has also been demonstrated in various localities, and especially in arid and semi-arid countries that the overburden (ground above the bed-rock) will permit of drifting and tunneling without the use of reinforcing timbering of any kind. This is due to the fact that in all such cases the gravel contains a small proportion of natural cements; which hold the particles together and keep them from caving in for a considerable length of time. Also, in numerous instances there are strata of gravel intermixed with strata of clay; and in such cases the clay strata keep the gravel strata from caving in. Many hydraulic banks which have been undermined for a distance of two or six feet have stood up perpendicularly for years and have not caved in. In Arizona, shafts were sunk to bed-rock and then drifts dug radially in all directions for ten to twenty feet in length on bed-rock and the overburden stood up well.

Also, there are many placer properties in this and other countries which carry very good values but do not have the proper physical qualities to permit of hydraulic mining, and cannot be practically dredged for the following reasons:

First. The property may carry good values, but the dredgable area may be too small to warrant the installation of a dredge and permanent camp and probably a power plant (such installations cost from $200,000 upwards).

Second. The property may be so isolated that the cost would prohibit the transportation of a heavy and cumbersome dredger.

Third. A dredger requires a wide cut, usually from 140 feet upwards and cannot be manipulated in small and narrow canyons at all. In many cases, the richest values lie up the source of these canyons and at the present time there is no known mechanical apparatus which can dig its way up these canyons, extract the values and proceed back again.

Fourth. A dredger cannot work very well a surface grade exceeding 10 feet in a hundred and this is a serious objection in many localities.

Fifth. Another serious objection to the dredger is that when operations are commenced at a certain locality and it is found that the values do not come up to expectations and it is deemed advisable to move the dredger to another part of the property, oftimes several miles, the only way to get the dredge there is by digging its way through, or by dismantling, transporting and then re-erecting. The cost, however, in either case is so great that in most cases it is prohibitive.

Sixth. As before stated, a dredger requires a wide cut (140 feet upwards) in which to operate. It very often happens that the pay streaks may be very rich, but are too narrow to warrant the operation of the dredger.

It must be further understood that in mining gold, tin, platinum and other like minerals by mechanical methods, in all cases, the entire overburden (ground above bed rock) has heretofore been removed, and in practically all cases this overburden is handled at a loss unless the bed rock values are great enough to warrant the removal of such ground.

It is one of the objects of this invention to overcome the before mentioned objectionable features and provide a placer mining machine at a nominal cost that can be operated on a very economical basis; and where the values are concentrated on bed-rock, the machine can be operated at a very good profit, where the operation of a dredge would not pay.

A further object of the invention is to provide a placer mining machine which will excavate a narrow trench to the desired depth and at the same time will excavate lateral trenches on or above the bed rock on opposite sides of the main trench without the necessity of removing the overburden therefrom.

A further object of the invention is to provide a placer mining machine adapted to excavate a trench of inverted T-shape in cross section and remove the earth from the vertical and lateral portions of the

trench and convey it to a point where it is worked to remove the gold, platinum or tin in the usual manner.

A further object of the invention is to provide a placer mining machine of the bucket chain type excavator adapted to excavate a narrow vertical trench of thirty feet more or less in depth and at the same time excavate lateral extension trenches of from four to ten feet in transverse length on opposite sides of the vertical trench without disturbing the overburden or earth immediately above said lateral extension trenches.

A further object of the invention is to provide a placer mining machine of the type described in which the excavating members may be easily raised or lowered to pass over obstructions.

A further object of the invention is to provide a placer mining machine of the boom type in which the excavating portion of the machine may be easily raised from or lowered into the ground to permit convenient moving of the machine from place to place.

A further object of the invention is to provide a placer mining machine which will excavate a vertical trench or ditch with lateral under ground cuts, remove the values from the excavated ground and return the worked ground to the trench in one operation while traveling over the ground.

A further object of the invention is to provide a placer mining machine which is of simple construction, is strong and durable and is well adapted for the purpose described.

With the above and other objects in view the invention consists of the improved placer mining machine and its parts and combinations as set forth in the claims and all equivalents thereof.

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a rear view, partly in section and parts broken away, of the improved placer mining machine, and a section view of the ground to illustrate operation of machine;

Fig. 2 is a side view of the machine;

Fig. 3 is a front view of the lower portion of the machine;

Fig. 4 is a vertical sectional view of the lower portion of the machine;

Fig. 5 is a vertical sectional detail view of the lower end portion of the machine taken on line 5—5 of Fig. 4;

Fig. 6 is a transverse sectional detail view of one of the lower excavating members taken on line 6—6 of Fig. 3; and

Fig. 7 is a similar view taken on line 7—7 of the same figure.

Referring to the drawing the numeral 10 indicates a power dredging machine adapted to travel along the surface of the ground and which is provided with a transverse conveyer 11, a perforated washing drum 12, riffles or saving tables 13, a return trough 14 for directing the coarser materials to the excavated trench, a lifting boom 15 extending rearwardly from the trench excavator and a transversely extending driven shaft 16.

An elongated trench frame 17 is pivotally mounted at its inner or upper end around the transverse shaft 16 and extends outwardly or downwardly therefrom. The upper end of the trench frame 17 has journaled therein a transversely extending counter shaft 16′ and the lower end carries transverse shafts 18 and 19 having flanged idle wheels 18′ and 19′ therearound for guiding an endless conveyer chain 20 provided with buckets 21 for carrying the valuable minerals and dirt to the surface. The flanged wheels 19′ while extending around the shaft 19 are journaled on projecting bearing portions 17′ of the trench frame 17.

The shaft 16 is driven from the power plant 22 by crank and pitman means 23 or in any other manner desired. The elongated trench frame may also be raised and lowered from the same power plant by means of the rack arms 24 which are connected at their lower ends to the trench frame and are actuated by suitable mechanism 25 driven from the power plant in the ordinary manner to swing the trench frame upwardly or downwardly.

The shaft 19 between the bearing portions 17′ has a sprocket wheel 26 engaged by a sprocket chain 27 which leads upwardly and is driven by a sprocket 28 from the power plant 22. Said sprocket wheel 26 is keyed on the shaft 19 and rotates the same and the said shaft projects outwardly on opposite sides of the bearings and has mounted thereon spiral conveyers 27′ reversely threaded with relation to each other to work the earth towards the endless conveyer which carries it to the surface. The peripheral edge portion of the spirals are provided with detachable teeth 28′ which dig and cut the earth so it can be moved by the conveyers. The outer ends of the shaft 19 also carry supplemental cutters 29 for cutting or digging the outer ends of the transverse trench 30. To provide for all of the earth loosened in the transverse trench being directed to the endless lift buckets 21, guards 31 of semi-circular shape in across section are positioned to the rear of the spiral conveyer so that they will hold the material in engagement with the spirals and the spirals will work the material towards the elevating buckets.

In operation the trench frame is gradually lowered as the spiral members and the endless conveyer dig into the earth and when the desired depth or bed rock is reached, the

machine is gradually moved forward to cut the vertical and transverse trench and to elevate the valuable mineral and earth therefrom. While the machine is adapted to handle boulders within its capacity, it can easily avoid the larger ones by raising the trench frame so that the spiral members will pass over the larger boulders.

In moving forward, the ore from the transverse trenches will be raised to the surface and the values separated therefrom and the ore returned to the excavation as a continued operation.

From the foregoing description it will be seen that the placer mining machine is adapted to mine gold, platinum or tin over a considerable area of bed rock without the necessity of excavating all of the overburden or earth thereabove.

What I claim as my invention is:

1. A placer mining machine, comprising a vehicle, a downwardly extending trench frame provided with an endless chain and bucket trench digger swingingly carried by said vehicle for digging a vertical trench, and reversely threaded spiral excavators and conveyers carried by the lower end portion of the trench frame for digging laterally extending extension trenches on opposite sides of the vertical trench and removing the mineral bearing earth therefrom to a position to be engaged by the buckets of the vertical trench digger, the spiral portions of said excavators extending entirely around the excavators.

2. A placer mining machine, comprising a vehicle, a downwardly extending trench frame provided with an endless chain and bucket trench digger swingingly carried by said vehicle for digging a vertical trench, spiral excavators and conveyers carried by the lower end portion of the trench frame for digging laterally extending extension trenches on opposite sides of the vertical trench and removing the mineral bearing earth therefrom to a position to be engaged by the buckets of the vertical trench digger, and means for independently rotating the spiral excavators and conveyers.

3. A placer mining machine, comprising a vehicle having a boom, a downwardly extending trench frame pivotally connected at its upper end to the vehicle, a connection between the boom and the trench frame for raising and lowering said frame, an endless trench digger carried by said trench frame for digging a vertical trench, means for rotating said endless trench digger, transversely extending spiral excavators and conveyers carried by the lower end portion of the trench frame for digging laterally extending extension trenches on opposite sides of the vertical trench, and means for independently rotating the spiral excavators and conveyers.

4. A placer mining machine, comprising a vehicle having a boom, a downwardly extending trench frame pivotally connected at its upper end to the vehicle, a connection between the boom and the trench frame for raising and lowering said frame, an endless chain bucket type trench digger carried by said trench frame for digging a vertical trench, means for rotating said endless trench digger, transversely extending spiral excavators and conveyers carried by the lower end portion of the trench frame for digging laterally extending extension trenches on opposite sides of the vertical trench, guards positioned at the rear of said spiral excavators and conveyers, and means for independently rotating the spiral excavators and conveyers.

5. A placer mining machine, comprising a vehicle having a boom, a downwardly extending trench frame pivotally connected at its upper end to the vehicle, a connection between the boom and the trench frame for raising and lowering said frame, an endless trench digger carried by said trench frame for digging a vertical trench, means for rotating said endless trench digger, transversely extending spiral excavators and conveyers carried by the lower end portion of the trench frame for digging laterally extending extension trenches on opposite sides of the vertical trench, said spiral excavators and conveyers having toothed peripheral edge portions, and means for independently rotating the spiral excavators and conveyers.

6. A placer mining machine, comprising a vehicle having a boom, a downwardly extending trench frame pivotally connected at its upper end to the vehicle, a connection between the boom and the trench frame for raising and lowering said frame, an endless trench digger carried by said trench frame for digging a vertical trench, means for rotating said endless trench digger, transversely extending spiral excavators and conveyers carried by the lower end portion of the trench frame for digging laterally extending extension trenches on opposite sides of the vertical trench, said spiral excavators and conveyers having toothed peripheral edge portions, guards positioned at the rear of said spiral excavators and conveyers, and means for independently rotating the spiral excavators and conveyers.

In testimony whereof I affix my signature.

FERDINAND H. KRUEGER.