July 3, 1934. J. M. ATER 1,964,716

PLACER CONCENTRATING MACHINE

Filed April 24, 1933

FIG. 1

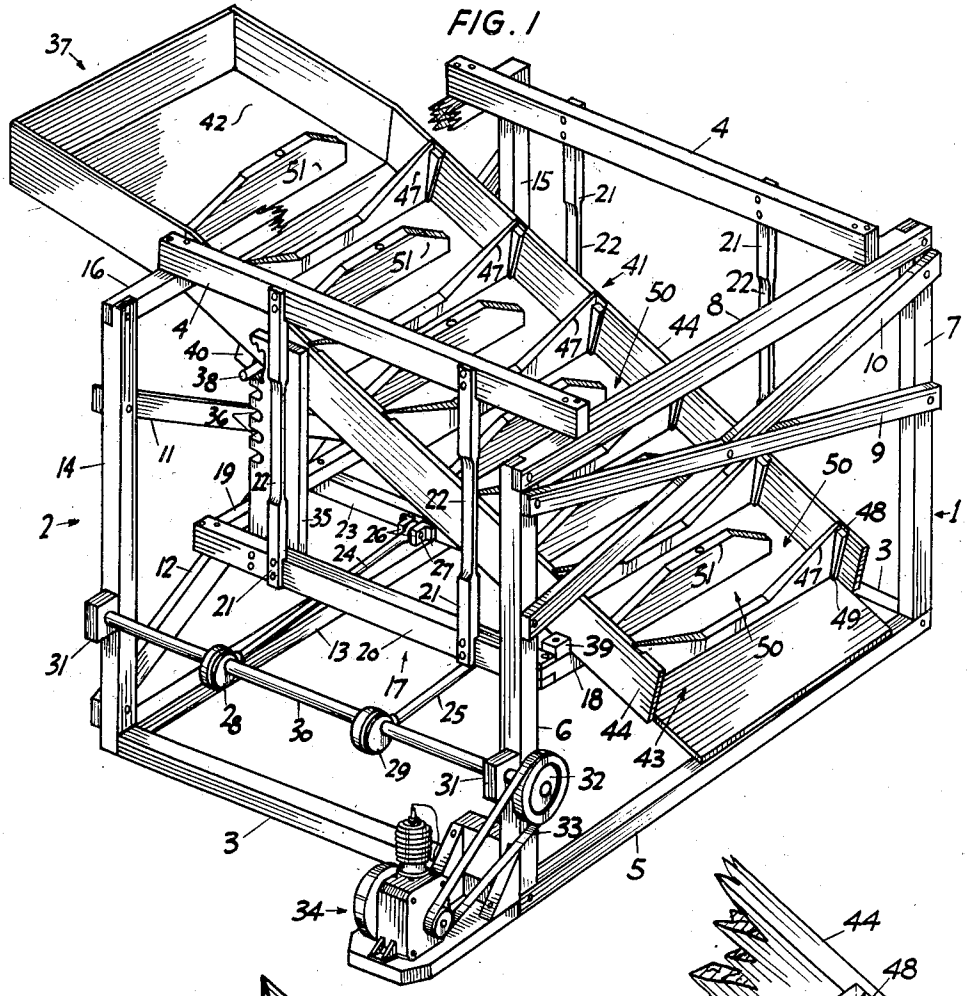


FIG. 2

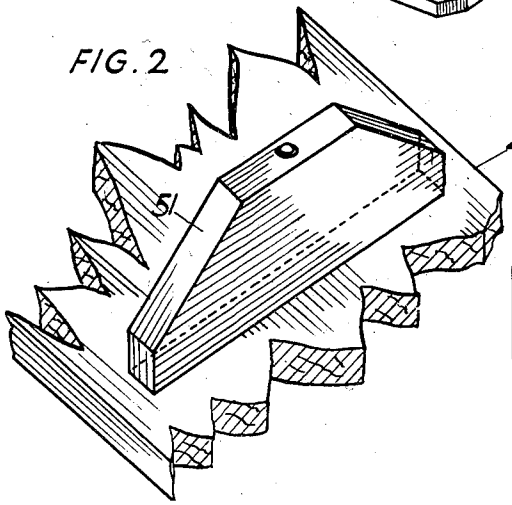
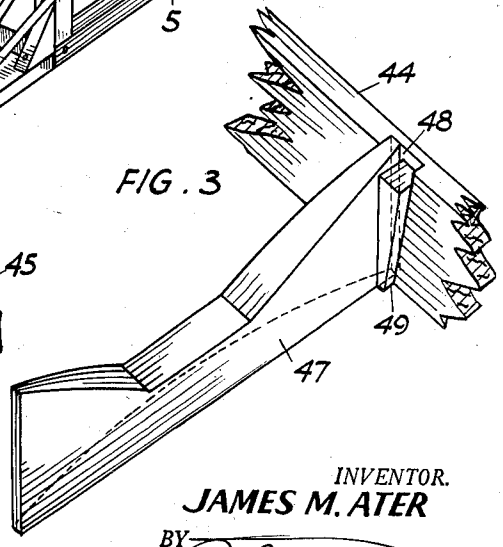


FIG. 3



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PLACER CONCENTRATING MACHINE

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5 Claims. (Cl. 209—437)

This invention relates to the art of dry placer mining.

More particularly the invention relates to improvements in apparatus for treating placer sand and gravel containing gold ore or particles of gold, and an important object of the invention is to settle the gold or other heavy ores or metals by agitation, whereby to facilitate the concentrating of the gold and other heavy minerals.

The invention further consists in the provision of an improved concentrator trough wherein a series of spaced riffles cooperate with a series of intervening distributors, the relative positions, size and configurations of said riffles and distributors causing a more satisfactory deposition of the gold or other precious metal during the oscillation of said trough.

In the attainment of this object, as well as still further objects which will hereinafter appear, the invention consists of certain novel constructions, combinations and arrangements of parts which will be subsequently fully described and claimed.

In the past ages erosion has exposed the rich veins of gold ore in the high mountains and as the soil and rock are washed away the heavy gold collects in the river sands. It is in this sand the gold today is mined. Due to changes in climate and in the locations of streams some of these old river beds are now located in places far from water. Therefore, due to a great initial cost of pumps and pipeline equipment, the pumping of water to these deposits for wet separation is often very expensive. Many times it is impossible, due to no water being available.

With these conditions prevailing in many placer regions, a machine of the dry type makes possible profitable operation of deposits which have hitherto remained unworked on account of the lack of water.

In the accompanying drawing Fig. 1 is a perspective view of a machine illustrating a practical embodiment of the invention.

Fig. 2 is an enlarged perspective fragmentary view illustrating one of the distributors thereof; and

Fig. 3 is an enlarged perspective fragmentary view illustrating a riffle and the manner in which it is attached.

Referring in detail to the several views, the machine consists of a supporting frame comprising a front frame 1, a rear frame 2, base members 3 and transverse members 4, connecting the front frame to the rear frame.

The front frame consists of a base member 5, two upright members 6 and 7, and a top member 8, which are joined together, and there are provided diagonal bracing members 9 and 10 connecting one upright member to the other.

The rear frame is constructed similarly to the front frame, except that the diagonal bracing members 11 and 12 are spread farther apart, and includes a base member 13, two upright members 14 and 15, and a top member 16.

The transverse members 4 support the cradle frame 17, which consists of a rectangular base frame comprising, a front base member 18, a rear base member 19, and side base members 20; only one of which is shown. Said cradle frame is suspended from the transverse members 4, by suspending members 21.

The suspending members 21 are preferably rods made of hickory wood and are hewn away on either side along their mid-length to form flexible webs 22, permitting the cradle 17 to be oscillated.

There is an intermediate cross member 23, in spaced parallel relation to the side base members 20, which is connected to the front and rear base members 18 and 19. To said intermediate member 23 are fastened the eccentric rods 24 and 25, by means of brackets 26, and pins 27, one of said pins and brackets being shown in Fig. 1.

The eccentric rods 24 and 25 are connected to the eccentrics 28 and 29 mounted on the shaft 30. Said shaft is journalled in bearing blocks 31 fastened to the uprights 6 and 14. On the end of the shaft 30 is mounted a pulley 32, and a belt 33 is connected to a power unit 34. By this mechanism the shaft 30 is rotated, the eccentrics 28 and 29 are operated, and the cradle is oscillated.

Upon the side base members 20, at points adjacent their rear ends, are upstandingly mounted the concentrator supports 35. Said supports each have formed in them, along one of their side edges, a series of spaced open ended slots 36, said slots being slightly pitched with respect to the vertical. In said slots is mounted a rod 38 which adjustably supports the concentrator 37.

The concentrator 37 is detachably mounted on the cradle 17, it fitting snugly between the inner faces of the concentrator supports 35, and the inner faces of the blocks 39 fastened to the front base member 18. A stop member 40 is fastened on the under side of the concentrator 37, engageable with the rod 38, to maintain a proper relative position of the concentrator with relation to the cradle.

The concentrator 37 comprises a wooden

trough shaped bin 41, having a depending hopper compartment 42 at one end, and a spillway 43 at the other end. The hopper end is slightly pitched with relation to the trough 41, so that when the trough is mounted at an inclination upon the cradle, the hopper compartment will be in a more nearly horizontal position than the remainder of the concentrator.

The plates 44 form the sides of the bin, the plate 45 the bottom, and the end plate 46 together with the side plates 44 form an enclosure for the hopper; the bottom plate 45 being extended at the spillway end so as to project slightly therebeyond.

Between the side plates 44 are detachably mounted a series of spaced riffles 47; the plates 44 being provided with upwardly and downwardly extending internal grooves 48 into which are driven the wedge shaped tenons 49 alongside the riffles, whereby the riffles are held in place. Said tenons facilitate easy removal of the riffles.

The riffles 47 are weir shaped. The down-stream sides of the riffles are straight while their up-stream sides are longitudinally curved, as dottedly indicated in Fig. 3. The reason for curving the up-stream sides will be stated later.

The side plates 44, together with the riffles 47, form a series of compartments 50 in which the placer gravel is agitated in its passage by gravity from the hopper thru the various compartments to the spillway.

Forwardly of each riffle 47 is mounted upon the plate 45 a distributor 51, which is shown on an enlarged scale in Fig. 2. These distributors are shaped high at their centers and low at their ends, and are unlike the riffles, which are designed just the opposite, low at their centers and high at their ends. Furthermore the distributors do not occupy the full width of the bin, but provide for the placer gravel to travel around their ends, from one riffle to the other, thus increasing the length of travel of the placer gravel in its passage down the incline and thereby permitting greater settling of the gold concentrate contained therein.

The distributors also serve as a dam or abutment against which the material being treated are directed immediately after crossing the riffles.

As the material is agitated due to the oscillation of the cradle, it passes around the ends of the distributors whence it is directed into the pockets formed at the intersection of the curved portions of the riffles with the side plates.

The continued shaking of the cradle forces the larger particles of the gravel from these corner pockets along the curved face of the riffles toward their low portions whence it flows over the riffles by gravity as a result of the agitation.

The small particles of gold deposit collect in the corners thus formed, and though the larger particles of placer gravel are shifted therefrom and eventually pass over the riffles, the gold, due to the curved face of the riffles, tends to settle and remain in the sheltered corners where it is found to abound when the concentrator is finally removed from the frame.

The heavy portion of the gravel which includes the gold, forms in the V pocket formed at the intersection of the riffles, with the sides of the trough and is there concentrated while the light sands shake to the top and thence over the center of riffle.

After a predetermined period of running, the compartments are all filled with concentrates and the concentrator will have been adjusted from its lowest desired inclination to its greatest desired inclination and during the adjusting stages the cradle will have been shaken until no more gravel and sand will pass over the riffles. The concentrator is then detached from the frame and the concentrates are collected for final treatment.

I claim

1. In a concentrating apparatus, a frame, a cradle, means to support said cradle upon said frame for oscillation, a concentrator having an inclined trough supported by said cradle, riffles extending from side to side of said trough at spaced intervals, said riffles having low centers, upstanding distributors in said trough in upwardly spaced relations to said riffles, said distributors having their ends in spaced relation to the sides of the trough and said riffles having upwardly directed convex faces, and means to oscillate said trough transversely.

2. An inclined concentrator trough comprising a floor and upstanding sides, a riffle extending across said floor from one to the other of said sides, said riffle consisting of an elongated plate with a depression in the central portion of its upper edge and inclinations leading upwardly from the ends of said depression to the end portions of the riffle, said riffle having a convex face directed towards the upper end of the trough, and an upstanding distributor plate extending parallel to said riffle thereabove in the trough and sufficiently near said riffle to cooperate therewith, the end portions of said distributor being in spaced relation to the sides of the trough.

3. In a device of the kind described, a frame, a cradle supported by said frame, an inclined concentrator detachably mounted on said cradle and having a hopper at one end and a spillway at the other end, adjustable means carried by said cradle for regulating the height of the hopper end of said concentrator relative to the spillway end thereof, a series of spaced riffles detachably mounted in said concentrator and dividing it into a plurality of compartments, a distributor mounted in each of said compartments forwardly of each riffle, said riffles having their up-stream faces curved and thereby forming with the sides of said concentrator a pocket into which the material fed into said hopper is directed after it passes said distributors, said riffles having depressed central portions.

4. In a device of the kind described, a frame, a cradle supported by said frame, an inclined concentrator detachably mounted on said cradle and having a hopper at one end and a spillway at the other end, adjustable means carried by said cradle for regulating the height of the hopper end of said concentrator relative to the spillway end thereof, a series of spaced riffles detachably mounted in said concentrator and dividing it into a plurality of compartments, a distributor mounted in each of said compartments forwardly of each riffle, said riffles having their up-stream faces curved and thereby forming with the sides of said concentrator a pocket into which the material fed into said hopper is directed after it passes said distributors, said riffles having weirs cut into their central portions whereby to direct the material against said distributors in its passage from one compartment to the other.

5. In a device of the kind described, a frame, a cradle supported by said frame, an inclined concentrator detachably mounted on said cradle and having a hopper at one end and a spillway at the other end, adjustable means carried by said

cradle for regulating the height of the hopper end of said concentrator relative to the spillway end thereof, a series of spaced riffles detachably mounted in said concentrator and dividing it into a plurality of compartments, a distributor mounted in each of said compartments forwardly of each riffle, said riffles having their up-stream faces curved and thereby forming with the sides of said concentrator a pocket into which the material fed into said hopper is directed after it passes said distributors, said riffles being shaped to direct the material against said distributors in its passage from one compartment to the other.

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