Feb. 20, 1951 H. E. CULLY 2,542,482

ROTARY BEATER, ROCK REDUCER, DISINTEGRATOR, AND MINERAL RELEASING MACHINE WITH SEMIPERFORATE DRUM AND INTERIOR MATERIAL LIFTING AND IMPACTED POCKETS

Filed Dec. 10, 1947 2 Sheets-Sheet 1

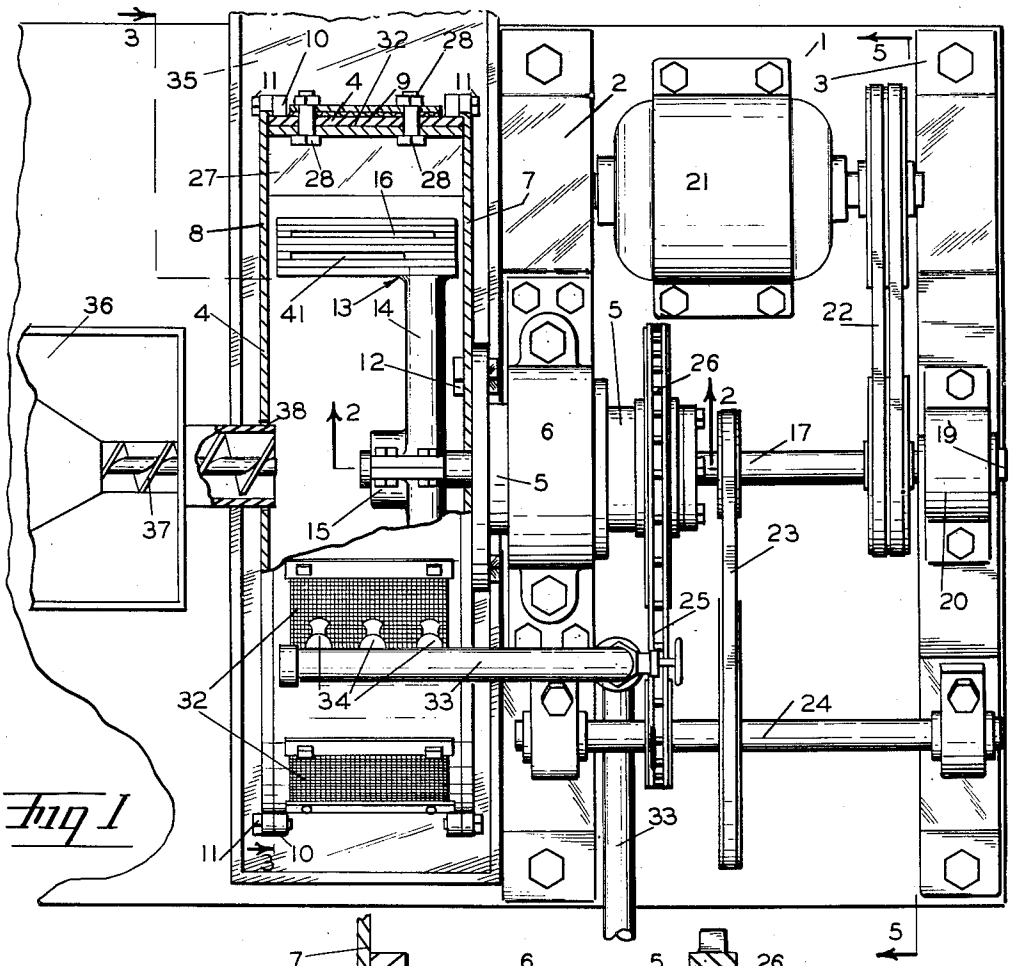



Fig 1

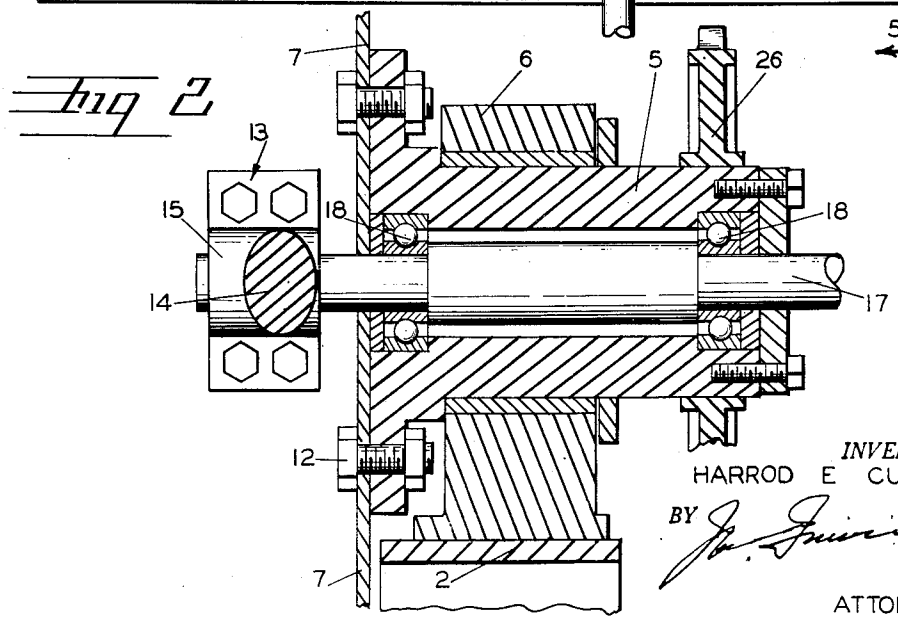



Fig 2

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Fig 3

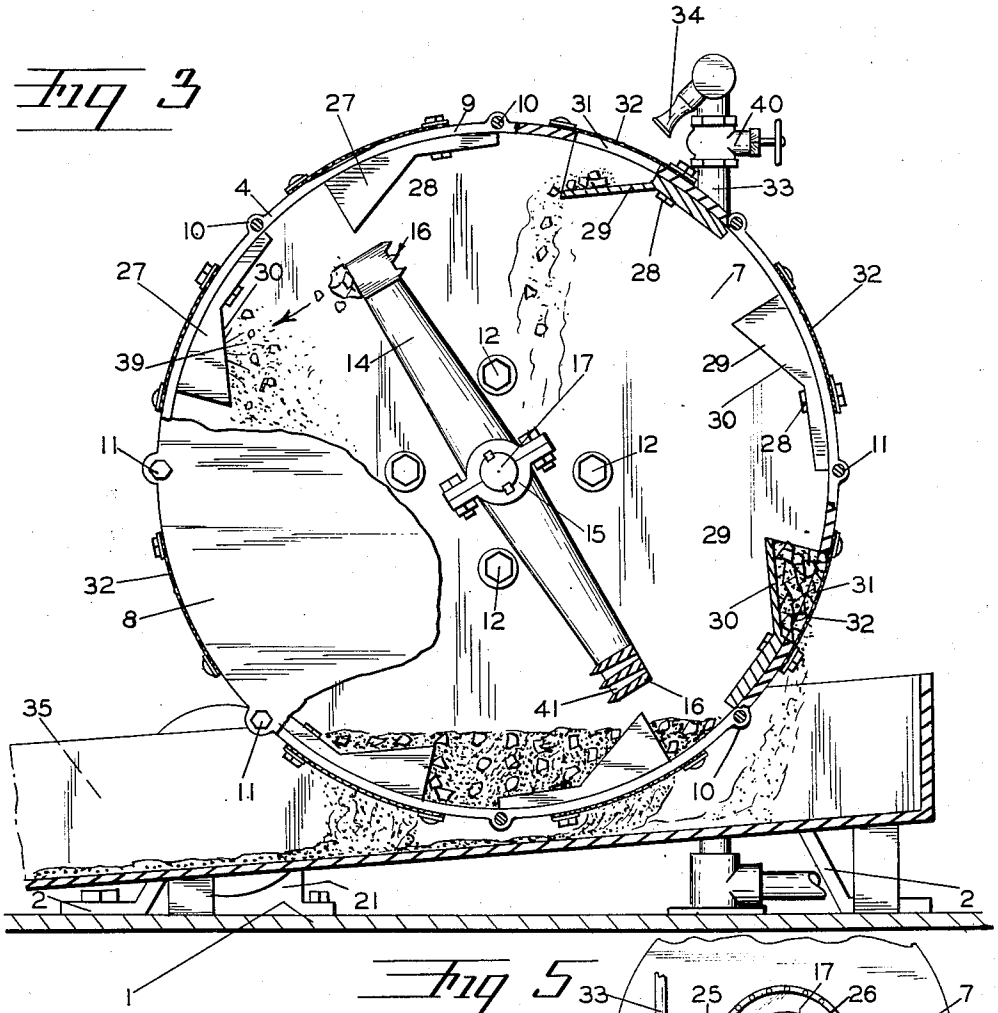



Fig 5

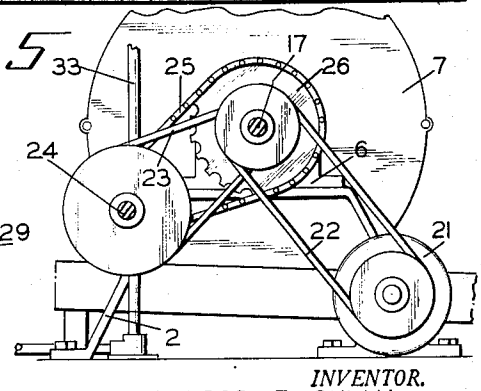
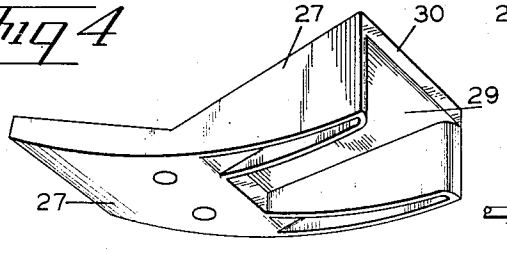



Fig 4




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## ROTARY BEATER, ROCK REDUCER, DISINTEGRATOR, AND MINERAL RELEASING MACHINE WITH SEMIPERFORATE DRUM AND INTERIOR MATERIAL LIFTING AND IMPACTED POCKETS

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3 Claims. (Cl. 241—38)

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This invention relates to ore disintegrating machines and is particularly adapted for handling most types of mine run ores.

The primary object of the invention is to provide an ore disintegrator that will break the rock away from the mineral without pounding or imbedding the rock into the mineral.

A further object is to free and clean the rocky material, or gang matter from the valuable minerals so completely that the minerals are more readily amalgamated or concentrated than if they had been pulverized or ground between steel plates, balls, rods, or stamps.

Another object of my invention is to disintegrate the mine-run ore more nearly as is done by nature, whereby the minerals are left in as clean a state as the minerals to be found in placer mining ground. This is accomplished by feeding the ores into a revolving drum, where the ore falls down into the path of high-speed rotors or beaters located within the revolving drum to the bottom of the latter to be scooped up in pockets within the drum periphery for discharge at the top, and the ore is then batted or knocked against hardened steel impact plates forming the backs of the pockets, said plates being securely fastened to the inside periphery of the revolving drum. This scooping, lifting and batting or beating process continues until the ore is fully reduced to the required fineness of mesh, when it is forced out through classifying screens, located on the periphery of the revolving drum at spaced openings over the pockets, by wind generated within the revolving drum by the rotor, and by water forced into the revolving drum at the pockets to force the ore out of the pockets into the path of the beaters to be again impelled against the impact plates and the fine disintegrated particles passed through the classifying screens, thereby eliminating the use of a separate classifying machine.

Its simplicity of construction, exceptional economy in operating, lightness in weight and the thoroughness with which it cleans and scours valuable minerals is greatly needed in the mining world. It completely eliminates the great expense of replacing costly steel liners, balls, rods and stamps, and assures a much greater percentage of recovery of the mineral content.

These and other incidental objects will be apparent in the drawings, specification and claims:

Referring to the drawings:

Figure 1 is a plan view of my ore disintegrator, parts broken away for convenience of illustration.

Figure 2 is an enlarged detail sectional view

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taken on line 2—2 of Figure 1, made to illustrate the bearing assemblies.

Figure 3 is a side elevational view taken on line 3—3 of Figure 1, parts broken away for convenience of illustration, and shows the rotor assembly and location of impact plates, ore pockets, classifying screens, and water injector.

Figure 4 is a perspective view of one of the combination impact plates and ore pockets removed from the drum.

Figure 5 is a diagrammatic drawing looking at the driving side of the disintegrator.

My ore disintegrator consists of a base 1 having upwardly extending base frames 2 and 3 and bearings 6 and 20. A revolving drum 4 is mounted upon the base frame 2 by way of the hollow spindle 5 journalled within the pillow block and bearing 6. The drum 4 consists of two circular end walls 7 and 8, having a tubular ring 9 spacing the said end walls apart. The ring has bosses 10 forming part thereof for receiving the cap screws 11 passing through the end walls and maintaining the assembly together.

The end wall 7 has the spindle 5 fixedly mounted to its center portion by the cap screws 12. The spindle revolves within the bearing 6 which supports the drum assembly 4. A rotor and beater assembly 13, consisting of radial arms 14, terminating on their inner ends within a hub portion 15 and having their outer ends terminating in beaters 16 is keyed or fixed as by clamping or bolting the hub portion 15 to the shaft 17, as shown. The shaft 17 is journalled within the spindle hub 5 by the bearings 18.

The outer end 19 of the shaft 17 is journalled within the pillow block and bearing 20 mounted on the base frame 3.

The shaft 17 is driven by the motor 21 directly through the belts 22 operating the rotor and beater assembly at a relatively high rate of speed. The spindle 5 and the drum 4 are rotated slowly from the shaft 17 through the belt 23, countershaft 24, chain 25 and the sprocket 26. The object of which will be described later.

Located within the periphery of the drum 4 are combination impact plates and ore pockets 27. These are secured within the cylindrical ring 9 by bolts 28. These units contain the pockets 29 which pick up and carry the ore to the top position of the drum. The back surfaces 30 of the impact plates provide a solid stop against which the ore strikes after having been struck by the beaters 16. This action will be more fully described later.

Transverse openings 31 are formed adjacent

the ore pockets 29 within the periphery of the tubular ring 9 of the drum and are covered by classifying screens 32. A water supply line 33 delivers water under high pressure to the nozzles 34 which directs the water through the classifying screens into the ore pockets 29 flushing the oversize ore therefrom back into the path of the beaters. A delivery chute 35 is located under the drum and receives the disintegrated minerals and rock which have been reduced fine enough to pass through the screens 32.

Ores to be disintegrated are delivered from the feed hopper 36 by the conveyor 37 into the opening 38 located in the central part of the end wall 8 of the drum, best illustrated in Figure 1, thence the ore drops into the path of high speed rotor 13 and beater arms and heads 14 and 16, respectively, thereof. The conveyor 37 is driven by any means not here shown, and can be of any accepted design.

I will now describe the operation of my new and improved ore disintegrator. As stated above the power unit 21 drives the drum 4 at a relatively slow speed in the direction of the arrow as indicated in Figure 3 through the countershaft assembly 24. The rotor 13 is driven at a relatively high rate of speed through the shaft 17 from the power unit in the same direction as the drum. The ore pockets 29 catch the oversize ore at the bottom part of the drum lifting the same with the drum to the point indicated adjacent the water nozzles 34 where the water is forced through the screen 32 by high pressure forcing the ore out of the pockets into the path of the rotor beaters 16. The beaters strike the ore breaking and forcing the same against the impact plate surfaces 30, as best illustrated at 39 (Fig. 3), further breaking the ore away from the mineral.

The broken rock and mineral falls and washes at the bottom of the drum where the finest sizes will be forced by wind and water through the classifying screens 32 at the bottom run of the drum. But the oversize rock and mineral will be caught within the pockets of the impact plates and carried back to the top position of the drum, from where it is forced out of the pockets by water under pressure from the nozzles 34 and back into the path of the rotors for further disintegrating. After the finely reduced ore and mineral passes through the classifying screens 32 it drops down into a sluiceway or launder 35 whereby it is delivered to any system selected by the operator for the final separation and recovery of the valuable minerals from the rock or gang matter.

The beaters 16 have openings or slots 41 formed therethrough. These slots being slightly wider on the trailing edges of the beaters so that the ore will not stick therein. These slots control wind resistance and at the same time provide additional beater edges for breaking up the ore. Due to the high speed of the rotor wind is developed which is used as above described.

The amount of water flow may be controlled by the control valve 40. The drum is revolved at a relatively slow speed sufficient to raise the ore and drop it from the ore pockets in the path of the beaters so that the said ore can be disintegrated properly, the drum itself acting as a container for the ores while being disintegrated with the impact plates taking the blows of the ore which is forced against them by the rotor.

I do not wish to be limited to the exact mechanical structure, as other mechanical equivalents may be substituted still coming within the scope of my claims.

That which is claimed as new, is:

1. An ore disintegrating machine comprising a rotatable drum having sides and a peripheral wall with spaced openings substantially across the same, screens of predetermined mesh over said openings, impact plates having attaching portions fixed to the insides of said peripheral wall and extending forwardly from the rear edges of the openings inwardly as partial chords of arcs in increasing spaced relation to the peripheral wall within the openings to a point substantially in radial alignment with the forward edges of the openings and having closed ends forming pockets of U-shaped section open at their forward ends for lifting ore as the drum is rotated and to discharge same near the top of the drum, radial arms extending along one side of the drum and mounted within the drum for rotation in the same direction but at a higher speed than the drum and having lateral slotted beaters at their free ends adjacent the open ends of the pockets extending substantially across the width of the drum, said slots forming beater edges and being wider toward their trailing edges to prevent clogging said heads adapted to strike the ore dropped from the pockets for impelling the same against the impact plates on the down travel, and means for feeding the ore into the drum at the side opposite the arms and means to simultaneously rotate the drum slowly and arms at a high speed in the same direction, fine particles being passed through the screens and oversize ore being again scooped up in the pockets and carried around for further breaking until reduced to a fine condition.

2. A one pass ore disintegrating machine comprising a drum rotatably driven at a slow speed on a horizontal axis and having side walls and a peripheral wall, said peripheral wall having equidistantly spaced openings, classifying screens covering the openings, pockets fixed to the peripheral wall at the inside and having inner walls diverging from the rear edges of the slots and extending in spaced relation to the front edges of the slots forming impact plates at the back, and closed sides, said pockets being open at the front only to scoop up ore in the drum and discharge same near the top zenith position, a rotor including radial arms and adjacent one side of the drum and laterally extending heads connected to the outer ends of the arms and extending in proximity to the pockets and widthwise of the drum with slots therethrough across same widened toward the trailing edges of the heads, said arms being rotatably driven from the axis of the drum at a high rate of speed and in the same direction as the drum, means to supply fluid under pressure through the screens toward the open fronts of the pockets to discharge the ore from the pockets, means to supply ore to the interior of the drum at the center of the side wall opposite the shaft and arms, and a delivery chute beneath the drum to receive and carry off the fine particles passed through the screens for separation of the disintegrated rock and minerals.

3. A one pass ore disintegrating machine comprising a base frame, a revolving drum having side walls and a peripheral wall, mounted on the base, a horizontal shaft rotatably mounted on the base frame and extending into the drum at one side, a hollow spindle fixed to one side of the drum and rotatably mounted on the base frame and journalling the shaft therethrough, means

on the base frame for rotating said drum slowly and the shaft at a high speed in the same direction, said drum having spaced transverse openings in its peripheral wall, classifying screens covering said openings, flat impact plates extending in from the rear ends of the opening in spaced relation to the lead ends of the openings at such an angle that the pockets discharge near the top zenith position and having attaching portions secured to said peripheral wall and walls closing the sides forming pockets to scoop up the ore from the bottom of the drum, means to supply water under pressure through the screens into the pockets from the outside toward their open front ends to discharge the ore from the pockets on approaching the top of the drum, radial arms fixed to the shaft at the side through which the shaft extends, beater heads on the ends of the arms extending substantially the width of the drum and having slots therethrough across same widened toward the trailing edges of the heads, said arms and heads striking the ore dropping from the pockets to impel the same against the impact plates and break the ore away from the mineral so that the disintegrated fine particles pass through the screens and the oversize particles drop to the bottom of the drum to be again carried around and broken up, means to feed the ore into the drum and pockets through the side



wall thereof opposite the arms, and a delivery chute beneath the drum to receive and carry off the finely reduced minerals and rock for subsequent separation.

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## REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 104,910 | Whelpley | June 28, 1870 |
| 843,466 | Krickbaum | Feb. 5, 1907 |
| 910,196 | Hess | Jan. 19, 1909 |
| 1,118,846 | Driesbach | Nov. 24, 1914 |
| 1,418,735 | Plaisted | June 6, 1922 |
| 1,431,251 | Pomeroy | Oct. 10, 1922 |
| 1,713,507 | Ammon | May 21, 1929 |
| 1,784,983 | Borton | Dec. 16, 1930 |
| 2,108,793 | Borton | Feb. 22, 1938 |
| 2,199,729 | Peterson | May 7, 1940 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 38,036 | Germany | Jan. 6, 1887 |
| 9,886 | Great Britain | Sept. 8, 1910 |