Mar. 27, 1923. 1,450,118

H. A. SMITH ET AL.

ORE CONCENTRATING DEVICE

Filed Apr. 29, 1922 3 sheets-sheet 1

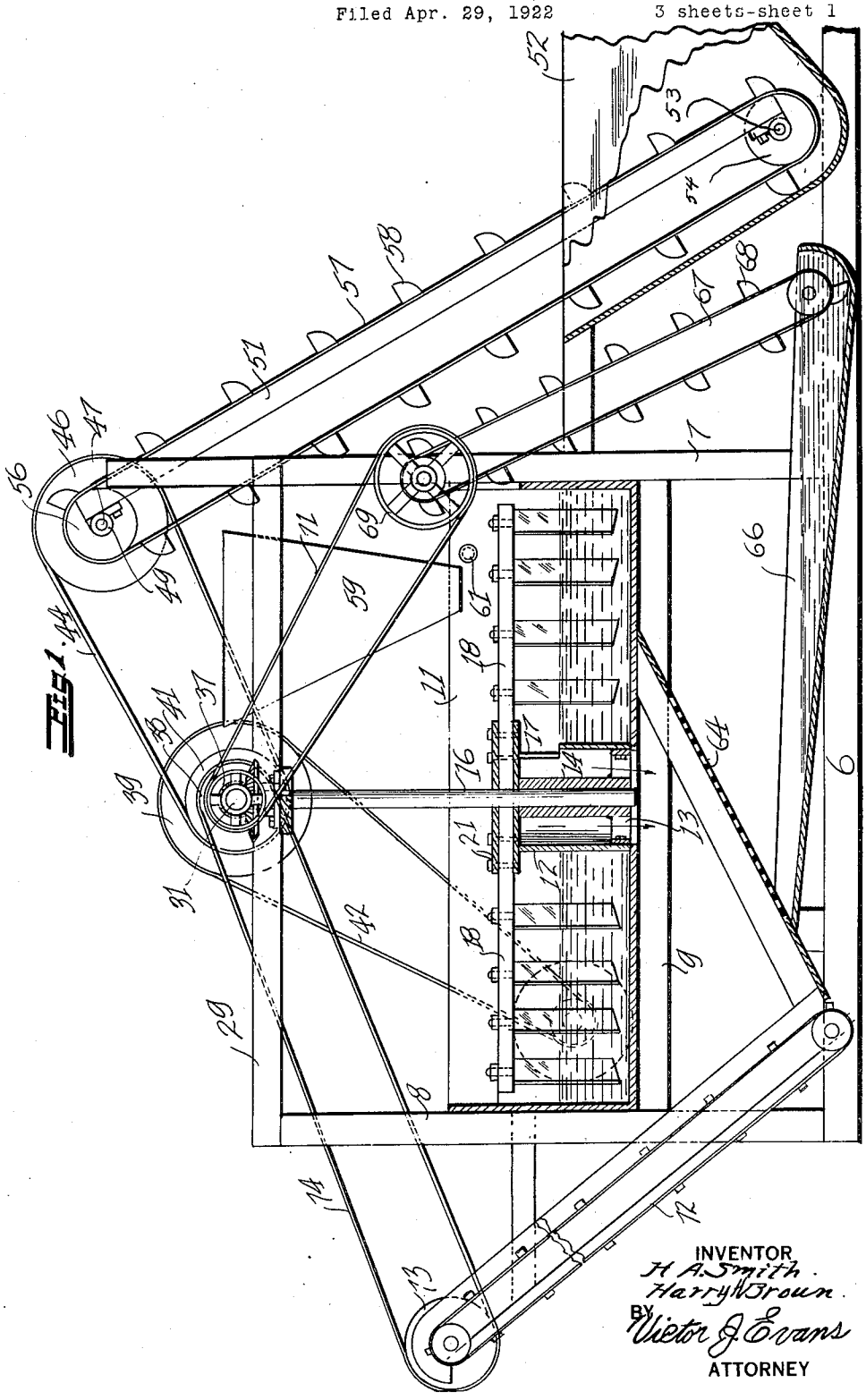

Fig. 1.

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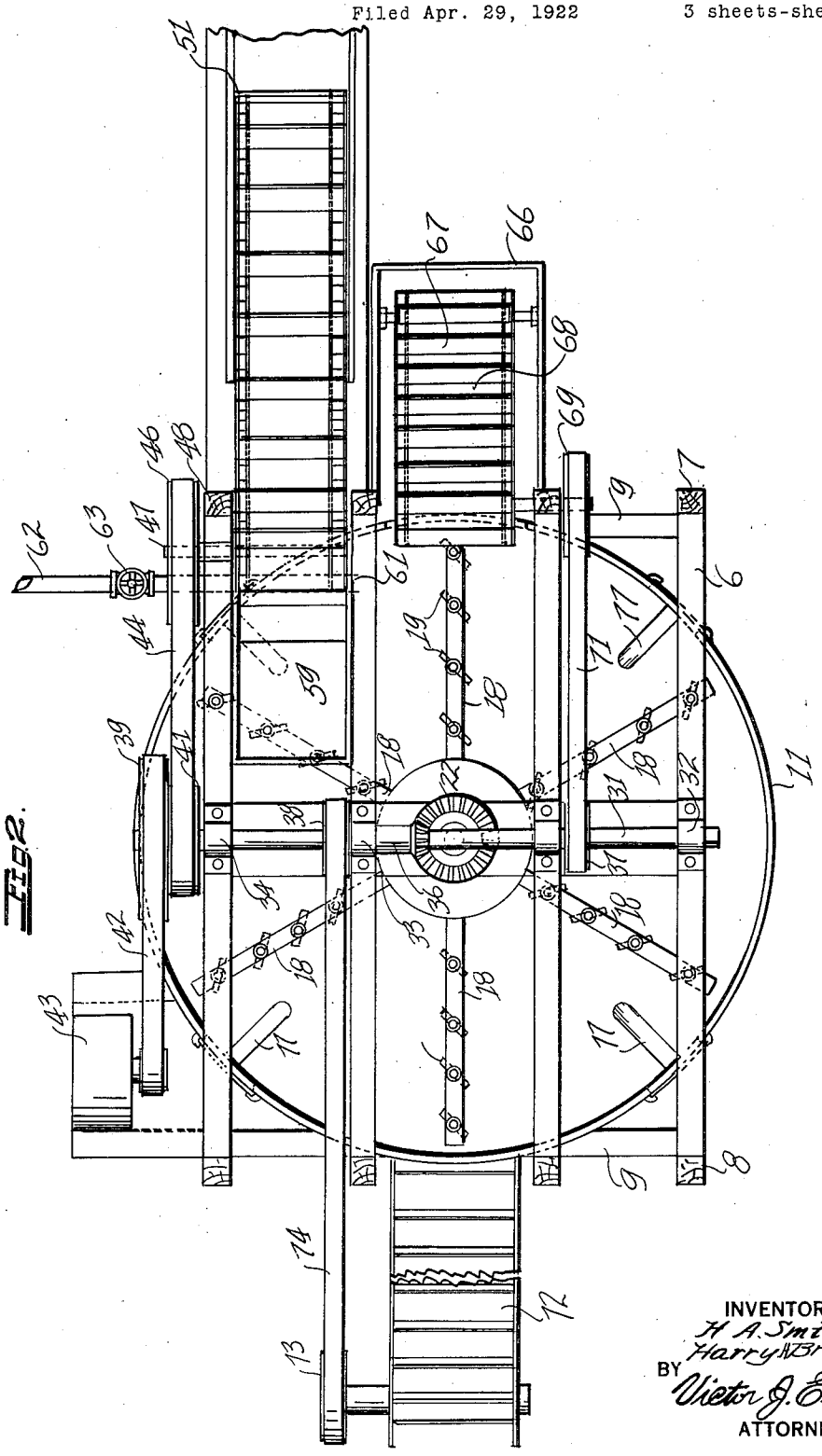

Fig. 2.

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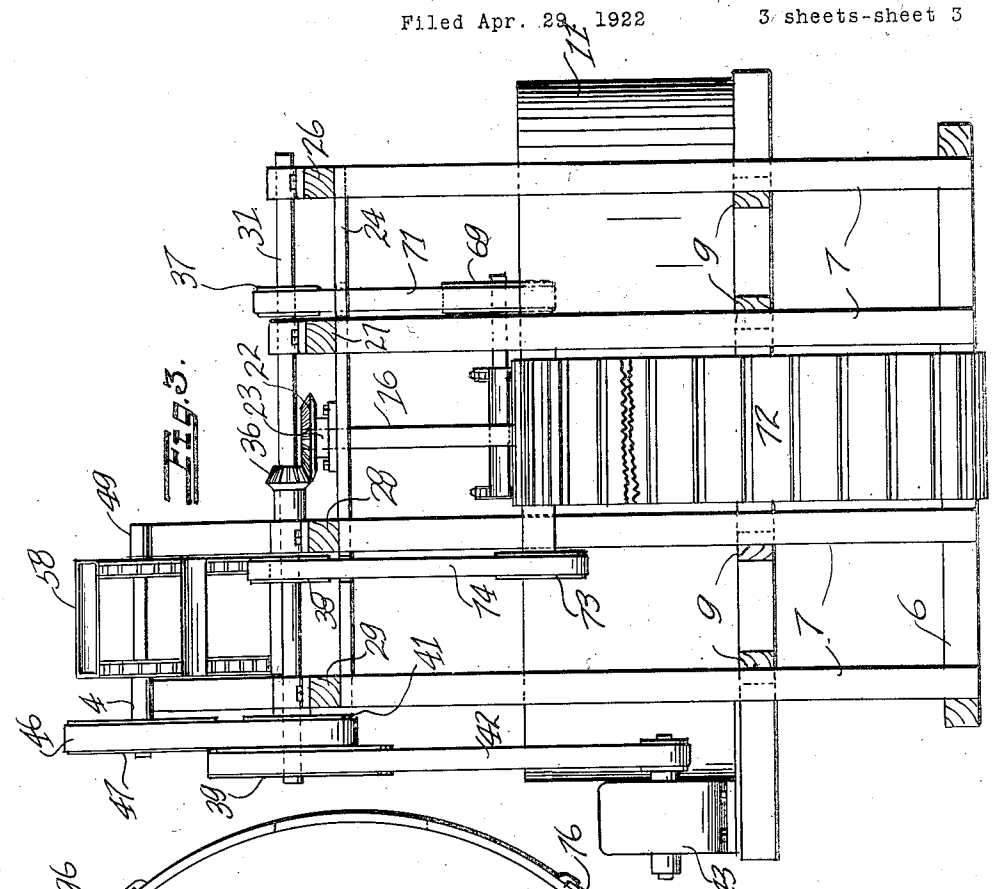

Fig. 3.

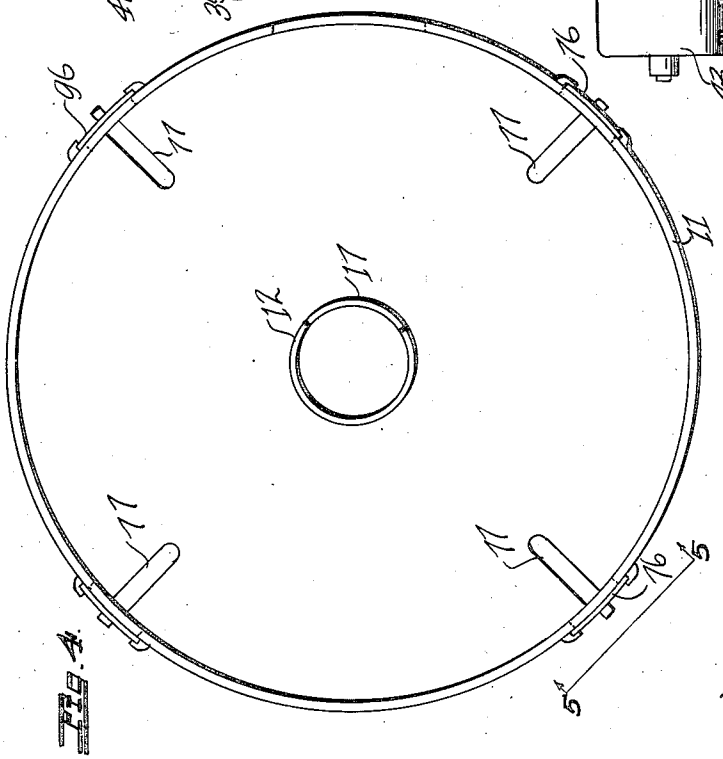

Fig. 4.

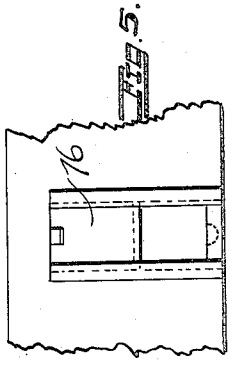

Fig. 5.

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# UNITED STATES PATENT OFFICE.

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## ORE-CONCENTRATING DEVICE.

Application filed April 29, 1922. Serial No. 557,387.

*To all whom it may concern:*

Be it known that we, HENRY A. SMITH and HARRY HARGRO BROWN, citizens of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Ore-Concentrating Devices, of which the following is a specification.

This invention relates to improvements in ore concentrating devices.

The principal object of this invention is to provide means for treating dirt containing minerals for the purpose of extracting a mineral content therefrom.

Another object is to provide means whereby the concentrator will act in such a manner as to extract not only a single mineral but also retain other minerals which may be in the mass being treated.

A further object is to provide a device of this character which is simple in construction and one which may be moved by dissembling and again set up in a new location by an ordinary laborer.

An additional object is to provide means for conserving the washing medium such as water in order that it may be used several times.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is an elevation partly in cross section showing our improved ore concentrator,

Fig. 2 is a top plan view of our concentrator,

Fig. 3 is an end elevation of our concentrator,

Fig. 4 is a top plan view of the tank showing the position of the mercury sumps, and

Fig. 5 is a fragmentary detail view of the sump cleanout, looking in the direction of the arrow on the line 5—5 of Figure 4.

In ore concentrating wherein the mass being treated is washed by water, it is common to wash away all of the dirt leaving only the pure metal, such as gold, and as the dirt generally contains other valuable minerals a great waste takes place and we propose to save this waste by employing means for retaining the heavier mineral bearing dirt within the tank of our machine.

In the accompanying drawings wherein for the purpose of illustration is shown a preferred embodiment of our invention, the numeral 6 designates a base which is provided with a series of uprights as shown at 7 and 8. These uprights carry a supporting framework composed of cross rails 9. These cross rails are adapted to support a tank 11 which tank is preferably circular in form and is provided with a central upstanding tubular portion 12. This tubular portion is provided internally with a spider 13 which spider supports a bearing 14 for a shaft 16.

An overflow is provided at 17 which overflow is formed by cutting away a portion of the upstanding member 12. The shaft 16 serves to rotate a series of cross arms 18 which arms are each provided with a series of paddles. These paddles are preferably placed on an angle with relation to the cross arms.

The numeral 21 designates clamping members which serve to attach the cross arms 18 to the shaft 16, which shaft carries at its upper end a bevel gear 22.

Supported in a bearing 23 upon a cross brace 24, as shown to advantage in Figures 1, 2 and 3 a suitable framework composed of cross beams 26, 27, 28 and 29, is secured upon the top of the uprights 7 and 8. A cross shaft 31 journaled as at 32, 33 and 34, is provided with a gear 36 which is adapted to mesh with the gear 22, which shaft also carries a pulley 37, a pulley 38 and pulleys 39 and 41. It will be noted that the pulley 39 is connected through the medium of a belt 42 to a motor 43, which pulley 41 is connected through the medium of a belt 44 to a pulley 46. This last mentioned pulley is mounted upon a shaft 47 journaled as at 48 and 49 upon the upper extremity of a conveyor framework 51. This conveyor framework extends downwardly and forwardly into a hopper 52. Suitable bearings are provided at the lower end of this framework and serve to support a shaft 53 having a conveyor pulley 54 mounted thereon. Mounted upon the shaft 47 is a conveyor pulley 56, and over the conveyor pulleys 54 and 56, we position a belt 57, which belt is provided with buckets 58 adapted to deliver material, such as gravel from the hopper 52 to a hopper 59

carried on the upper framework of our device. The position of this hopper is best shown in Figures 1 and 2.

In the bottom of the hopper 59 we have provided a suitable discharge port and have mounted adjacent thereof, a sprinkler 61, which sprinkler receives water from a pipe 62 which is controlled through the medium of a valve 63.

Beneath the upstanding tubular portion we propose to place a screen 64 adapted to receive the discharge therefrom. This discharge consists of gravel and water with the result that the water passes through the screen 64 and is caught in a trough 66. This water is received by means of a conveyor 67 having buckets 68 thereon and caused to be dumped back into the tank 11. This last mentioned conveyor is driven through the medium of a pulley 69 driven by a belt 71 which belt passes over the pulley 37 on the shaft 31. The gravel and dirt are separated from the water by the screen 64, and move down the screen and are carried away from the machine by a dumping conveyor 72. This dumping conveyor is driven through the medium of a pulley 73 which pulley in turn receives its power through a belt 74 which belt passes over the pulley 38 upon the shaft 31.

On the exterior of the tank we place sliding water-tight doors 76, there being four of these doors equally spaced about the periphery of the tank. The construction of these doors is best shown in Figures 4 and 5, and it will be observed that a sump 77 is placed adjacent each door, which sumps are filled with mercury for retaining heavier metal, such as gold.

The operation of our device is as follows: The dirt containing mineral which may be either gravel or crushed ore is placed in the hopper 52. Water is placed in the tank 11 and water admitted through the pipe 62 to the sprinkler 61. The motor 43 is now started with the result that all of the conveyors are caused to move throughout their given path at the same time the paddles 19 are caused to rotate within the tank. Dirt is delivered by the conveyor 58 from the hopper 52 to the hopper 59 from whence it issues and is acted upon by the sprinkler 61. The dirt now falls into the tank and is whirled around with the water, the heavier ore bearing dirt is thrown to the outside of the tank, while the lighter dirt is caused to pass with the water through the overflow 17 and to be discharged upon the screen 64. At the same time free gold which may be within the dirt drops to the bottom of the pan and in moving around the bottom will come into contact with one of the sumps 77. Since gold is heavier than mercury it will immediately sink into the mercury sump. The dirt which has been discharged through the overflow will be separated by a screen, then the water, and will pass from the screen to the dumping conveyor 72. While the water is in the trough 66 the same will be conveyed by the buckets 68 back to the tank 11.

From a consideration of the foregoing description in conjunction with the accompanying drawings it will be seen that we have provided simple and efficient means for separating the free gold as well as other ore bearing dirt from the gravel and refuse with which it is mixed. We have found that in actual practice one hundred tons of dirt passed through the machine will result in about a quarter of a ton of concentrates being left around the outer edge of the pan and that the free gold will be further separated and retained within the mercury sumps. At the end of a run the doors 76 are opened and the water within the tank allowed to be discharged. The concentrates gathered about the periphery of the tank will now be removed for further concentration and the mercury removed from the sumps for the purpose of removing the gold therefrom. The gold is removed from the mercury in the usual manner, that is, by draining through a chamois bag.

It is to be understood that the form of our invention herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claim.

Having thus described our invention, we claim:—

In an ore concentrator, the combination with a tank adapted to receive a washing fluid, of cross arms mounted within said tank, paddles carried by said cross arms, said paddles being arranged to force the contents of said tank toward said tubular member, a tubular member centrally located in said tank, a shaft supported in said tubular member, an overflow formed in said tubular member, means for driving said shaft for the purpose of rotating said paddles, a screen mounted below said tubular member for the purpose of receiving the discharge therefrom, and means for conveying said discharged material away from said machine and for returning the washing fluid accompanying said discharge to said receptacle.

In testimony whereof we affix our signatures.

HENRY A. SMITH.
HARRY HARGRO BROWN.