Dec. 4, 1934. G. HERING 1,983,457

ORE SEPARATOR

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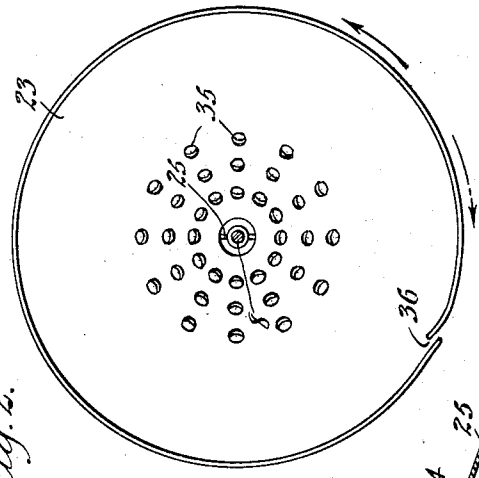

Fig. 2.

Fig. 1.

WITNESSES

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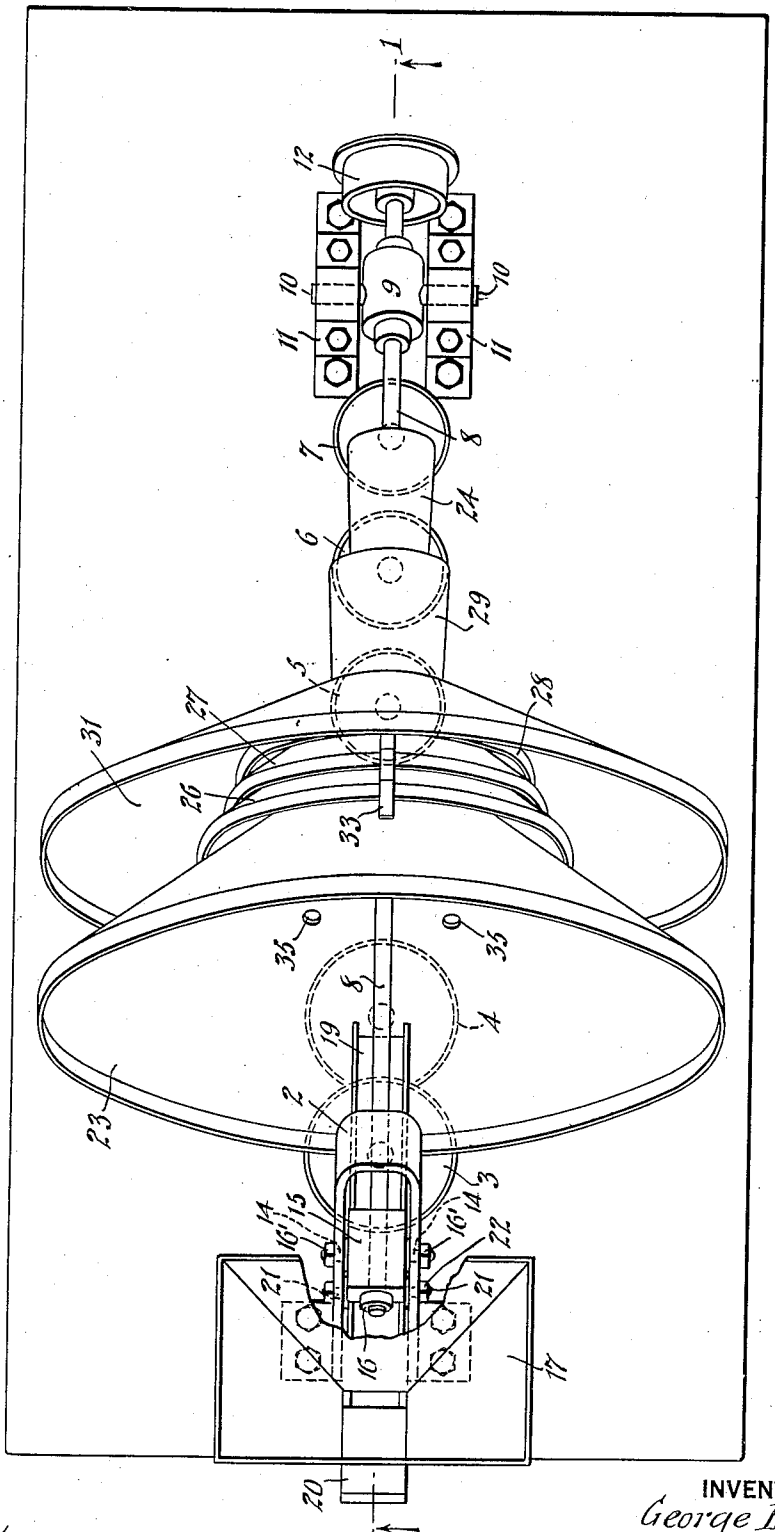
Fig. 3.



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Patented Dec. 4, 1934 1,983,457

UNITED STATES PATENT OFFICE

1,983,457

ORE SEPARATOR

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Application February 14, 1934, Serial No. 711,259

6 Claims. (Cl. 233—18)

This invention relates to ore separators, and more particularly to an apparatus for recovering or saving the minutest particles of gold and other precious metals which commonly accompanies auriferous sand or dust.

A further object is to improve upon the apparatus illustrated in Patent No. 1,216,118, granted to me February 13, 1917. The apparatus includes a rotary drum comprising an improved arrangement of cones, improved means for adjusting the angle of the drum, and other details of construction all of which will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings—

Figure 1 is a view in vertical longitudinal section taken on the line 1—1 of Figure 3, illustrating a preferred embodiment of my invention;

Figure 2 is a face view of one of the cones constituting a part of a rotary drum; and

Figure 3 is a top plan view partly broken away.

1 represents a base or support having uprights or standards 2 secured thereon and spaced apart, and the base 1 provides mounting for a series of receivers 3, 4, 5, 6 and 7 for a purpose which will hereinafter appear.

The reference character A is employed to indicate generally a rotary drum which is fixed to turn with and is supported by a shaft 8. This shaft 8 is mounted to turn in a bearing block 9, the latter having trunnions 10 thereon pivotally mounted in bearing blocks 11 at the upper end of the standard 2. A pulley 12 is fixed to the shaft 8 and to which motion may be transmitted from any source of power to revolve the shaft 8 and the drum A thereon.

The standard 2 above referred to is bifurcated and its upper portion is curved concentrically with the pivots of the bearing block 9. This curved portion of the bifurcated standard 2 is provided in its furcations with slots 13 receiving trunnions 14 on a bearing block 15 which supports and provides rotary mounting for the forward end of the shaft 8. Nuts 16' are screwed onto the threaded outer ends of the trunnions 14 to securely clamp the bearing block in any position of adjustment on the standard 2. A collar 16 is secured on the forward extremity of the shaft 8 and rests against the bearing 15, and similar collars 16 are secured on the shaft 8 on opposite sides of the bearing block 9 to prevent any longitudinal movement of the shaft relative to its bearing. It will thus be noted that by reason of the mounting of the shaft 8 the said shaft and the drum A can be given any desired angular disposition, and this is an important feature of my invention as it regulates the rapidity of the movement of the material and enables the apparatus to be adjusted in accordance with the material to be separated and the rapidity of said separation.

17 represents a hopper containing material 18 to be separated, and this hopper has a chute 19 directing the material onto the drum A. A gate valve 20 is provided at the lower portion of the hopper regulating the feed of the material onto the chute, and said chute portion, which constitutes a fixed part of the hopper, is secured by bolts 21 and nuts 22. The bolts 21 constitute, as a matter of fact, angular trunnions which extend through the block 15 of the standard 2, and the nuts 22 are screwed onto the outer ends of these bolts or trunnions and clamp the chute and hopper in any desired position of adjustment.

The drum A constitutes a series of cones which are, in fact, frusto cones but for convenience of description hereinafter they will be referred to as cones. The receiving or forward cone 23 of the drum A has a central tubular sleeve 24 around the shaft 8 and secured to the shaft by suitable spiders 25, and this sleeve 24, which is open at its rear end, deposits material passing therethrough into the receiver 7. A series of cones, preferably three, indicated by the reference numerals 26, 27 and 28, constitute an assemblage in rear of the cone 23 and these cones are of different diameters and have different sizes of central openings, the cone 26 being largest of this assemblage of three, depositing onto the cone 27, and the cone 27 in turn depositing onto the cone 28, and the cone 28 has a central sleeve 29 which deposits this material into the receiver 6. This cone 29 is connected by radial arms 30 to the sleeve 24. The sleeve 29 is of appreciably larger diameter than the sleeve 24 and is located around the sleeve 24. The rear member of the drum A constitutes a cone 31 which is appreciably larger than the cone 26, and has a central opening 32 through which material falls into the receiver 5. The cones 23, 26, 27, 28 and 31 may be secured in an assemblage in any approved manner, but I have illustrated a metal strip 33 which connects them, it being understood, of course, that as many of these strips or other securing means may be utilized to connect the several cones without interfering with the operation of the apparatus.

All of the cones at their outer extremities are formed with flanges 34, which constitute beads or rims at the extremities of the cones and which offer an obstruction to the fall of the material from the periphery of the cones and allow the material which falls on the cones to collect to a certain extent at the edges of the cones. The material which falls from the periphery of the cone 23 drops into the receiver 3, and the material which falls from the periphery of the cone 31 drop into the receiver 4. The receiving cone 23 is formed near its central portion with any desired number and size of perforations 35, through which the finer material which reaches

the central portion of the cone will drop onto one of the cones 26 or 27, as the case may be.

The flanges 34 of the several cones constitute strips of material which, at one point, overlap and are separated, forming an outlet 36 through which material is allowed to escape when the drum is turned in the reverse direction to that in which it normally turns. The normal turning movement is indicated by the solid arrow in Figure 2, and the direction of turning to discharge the material from the periphery of the cone is indicated by the dot and dash arrow in Figure 2.

The operation of the apparatus is as follows: The material 18 from the hopper 17 moves down the chute 19 onto the cone 23, it being understood that the drum A, which includes the assemblage of cones, is being revolved at the desired speed. The material is caused to move on the face of the cone by the combined action of gravity, adhesion and to some extent centrifugal action. The larger and heavier particles of material will fall to the edge of the cone against the flange 30, while the finer material will move toward the center of the cone. Some of this finer material will pass through the opening 35 and fall onto the cones 26 and 27, and the finest of the material, which will be a fine dust, will pass to the center of the cone 23 down through the sleeve 24 to the receiver 7. The heaviest and larger material will pass over the edge of the flange or rim 34 and drop into the receiver 3, and the material which passes through the openings 35 onto the cones 26 and 27 will in turn be separated, the heavier particles passing over the edges or rims of the cones onto the cone 31, and the finer particles passing onto the cone 28 and in turn is discharged through the sleeve 29 into the receiver 6. The particles of material which fall on the cone 31 will be separated, the heavier particles falling over the edge of the cone into the receiver 4 and the finer particles passing through the center of the cone and dropping into the receiver 5.

It will be noted that the material is separated into several gradations, the heaviest and larger falling into receiver 3 and the next larger material into the receiver 4, and the gradations of finer material into receivers 5, 6 and 7. The angular adjustment of the drum as a whole can be varied by the tilting of the shaft, the feed of the material from the hopper can be regulated, and the speed of the drum as a whole can be regulated so the apparatus can be utilized in handling various materials and will function properly in the separation thereof.

While I have illustrated what I believe to be the preferred embodiment of my invention, it is to be distinctly understood that various slight changes may be made with regard to the form and arrangement of parts without departing from my invention, and hence I do not limit myself to the precise details set forth but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the claims.

What I claim is:

1. The herein described ore separator comprising in combination a drum including a series of coaxial cones, the intermediate cones being of appreciably smaller diameter than the front and rear cones, the front cone having perforations therein depositing onto the intermediate cones, and all of said cones having outlets for the discharge of material directed thereon.

2. The herein described ore separator comprising in combination a drum including a series of coaxial cones, the intermediate cones being of appreciably smaller diameter than the front and rear cones, the front cone having perforations therein depositing onto the intermediate cones, all of said cones having outlets for the discharge of material directed thereon, and flanges constituting rims at the extremities of all of said flanges.

3. The herein described ore separator comprising in combination a drum including a series of coaxial cones, the intermediate cones being of appreciably smaller diameter than the front and rear cones, the front cone having perforations therein depositing onto the intermediate cones, all of said cones having outlets for the discharge of material directed thereon, and flanges constituting rims at the extremities of all of said flanges, said flanges constituting overlapping strips spaced apart forming outlets at one portion of each rim.

4. The herein described ore separator comprising in combination a drum including a series of coaxial cones, the intermediate cones being of appreciably smaller diameter than the front and rear cones, the front cone having perforations therein depositing onto the intermediate cones, all of said cones having outlets for the discharge of material directed thereon, a shaft on which the drum is secured, means pivotally supporting one end of the shaft, and means permitting vertical adjustment of the other end of the shaft so that the angular disposition of the drum may be varied.

5. The herein described ore separator comprising in combination a drum including a series of coaxial cones, the intermediate cones being of appreciably smaller diameter than the front and rear cones, the front cone having perforations therein depositing onto the intermediate cones, all of said cones having outlets for the discharge of material directed thereon, a shaft on which the drum is secured, a standard to which one end of the shaft has pivotal as well as rotary mounting, a second standard to which said shaft has pivotal and rotary mounting and is adjustable longitudinally of the standard to vary the angle of the shaft and drum, and a hopper adjustably secured to the last mentioned standard and discharging onto the front or rear cone.

6. An ore separator comprising a drum consisting of a forward cone, a rear cone, a series of intermediate cones of varying diameters between the forward and rear cones, a sleeve fixed to the forward cone, a sleeve fixed to the smallest of the intermediate cones and secured around the first mentioned sleeve, the rear cone having a central opening, receivers to receive materials from said sleeves and central opening, and also receivers to receive material from the edges of the forward and rear cones, said forward cone having openings therein directing finer material onto the intermediate cones, a shaft extended through the forward cone and its sleeve and secured thereto, and means for varying the angular disposition of the shaft.

GEORGE HERING.