No. 798,064. PATENTED AUG. 29, 1905.

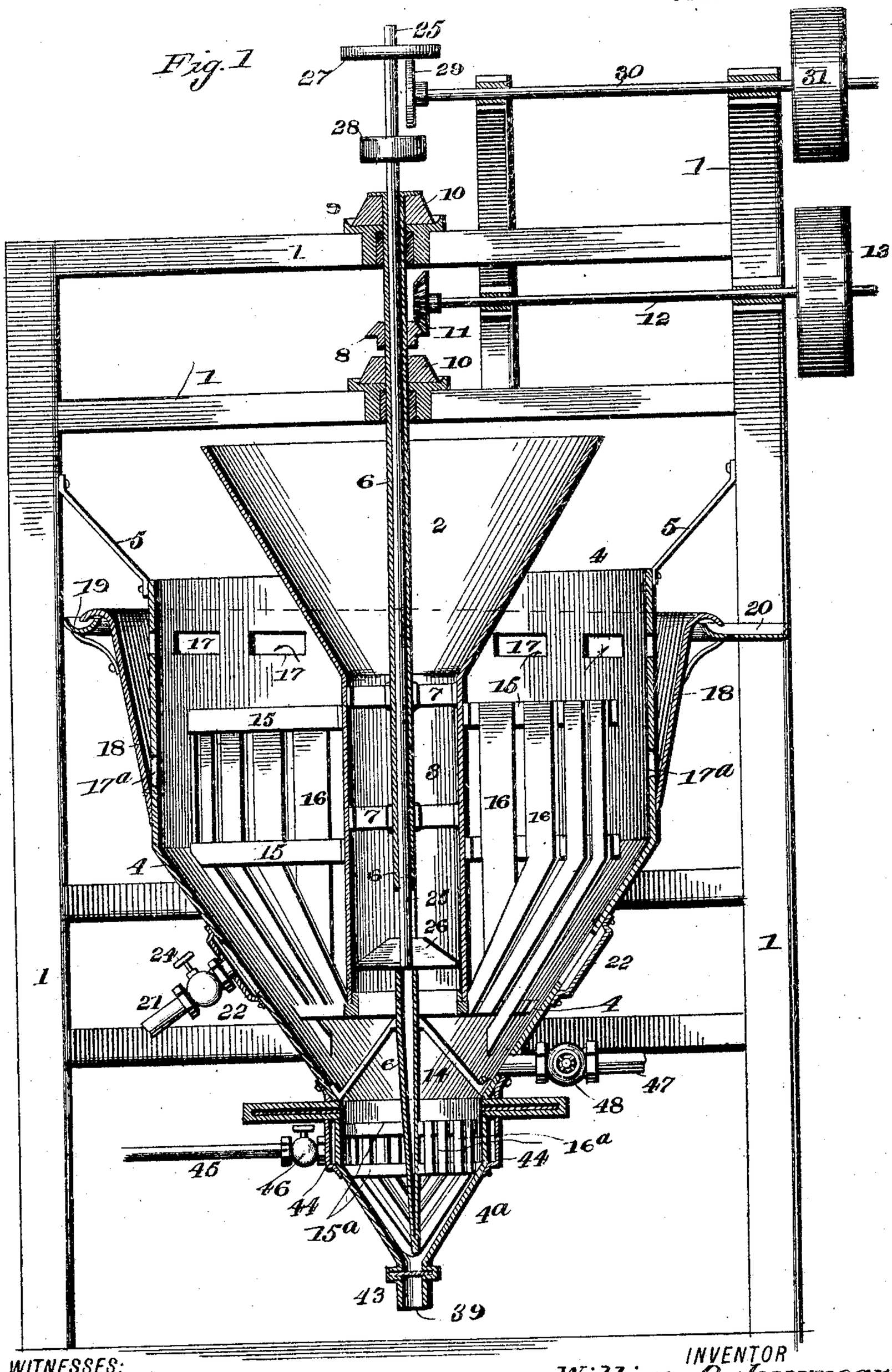
W. O. JOURNEAY.

ORE CONCENTRATOR.

APPLICATION FILED DEC. 2, 1904.

3 SHEETS—SHEET 1.

Fig. 1



WITNESSES:

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INVENTOR

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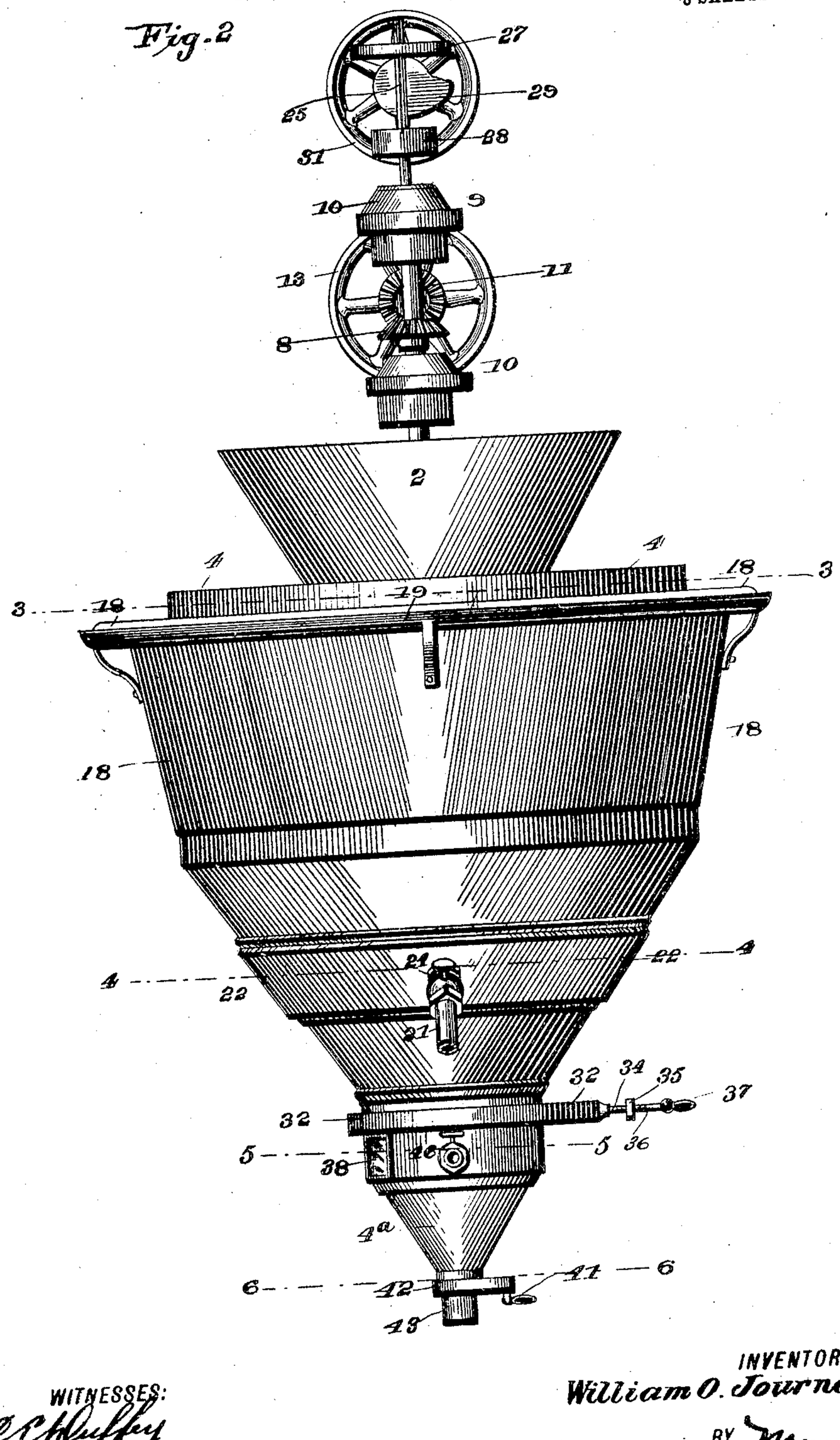
3 SHEETS—SHEET 2.

Fig. 2



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3 SHEETS—SHEET 3.

Fig. 3

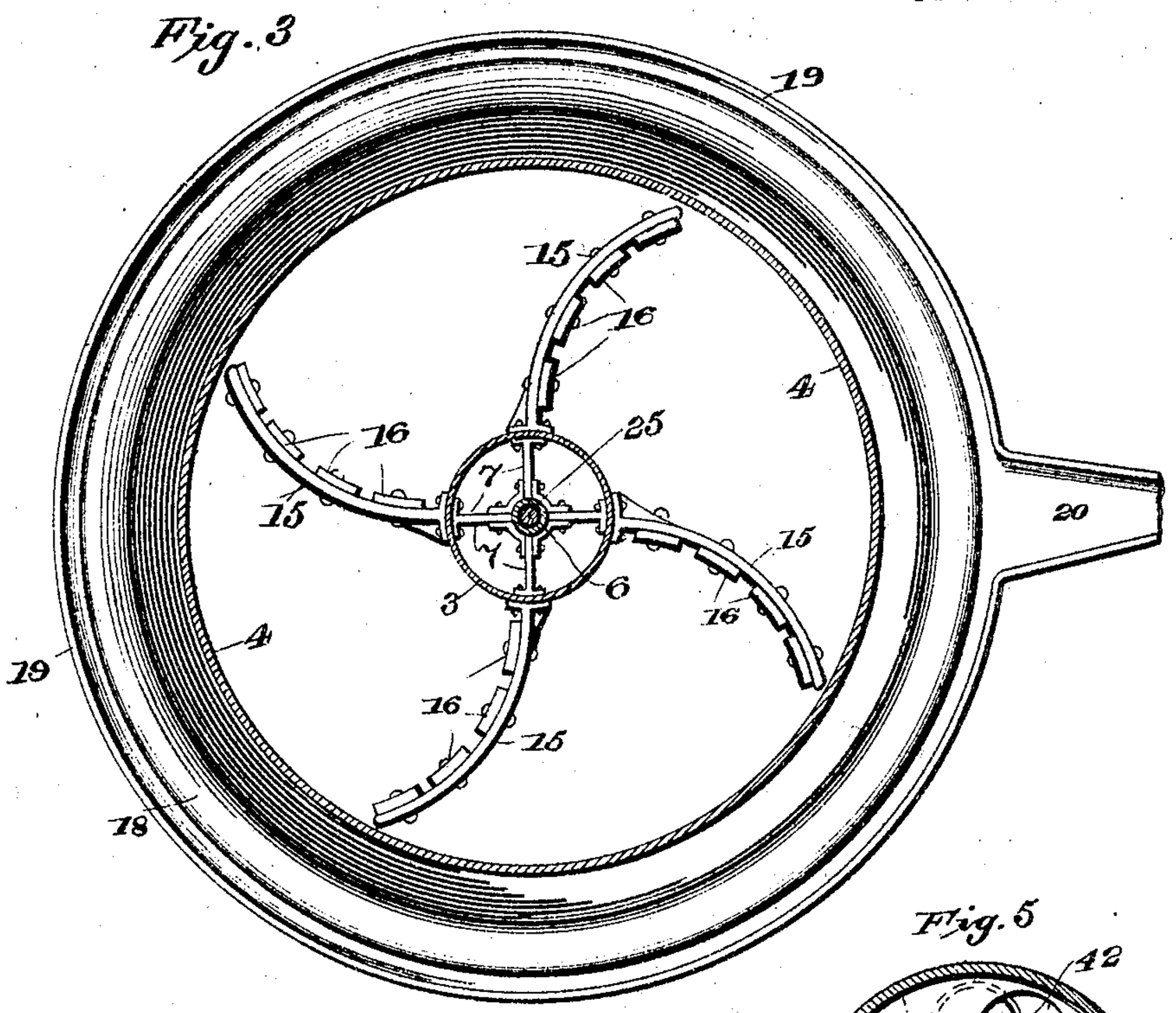


Fig. 5

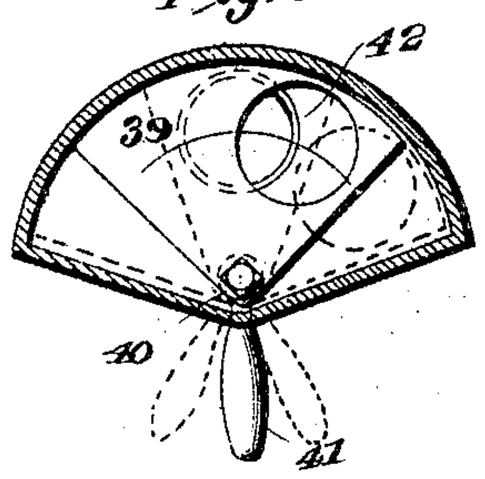


Fig. 4

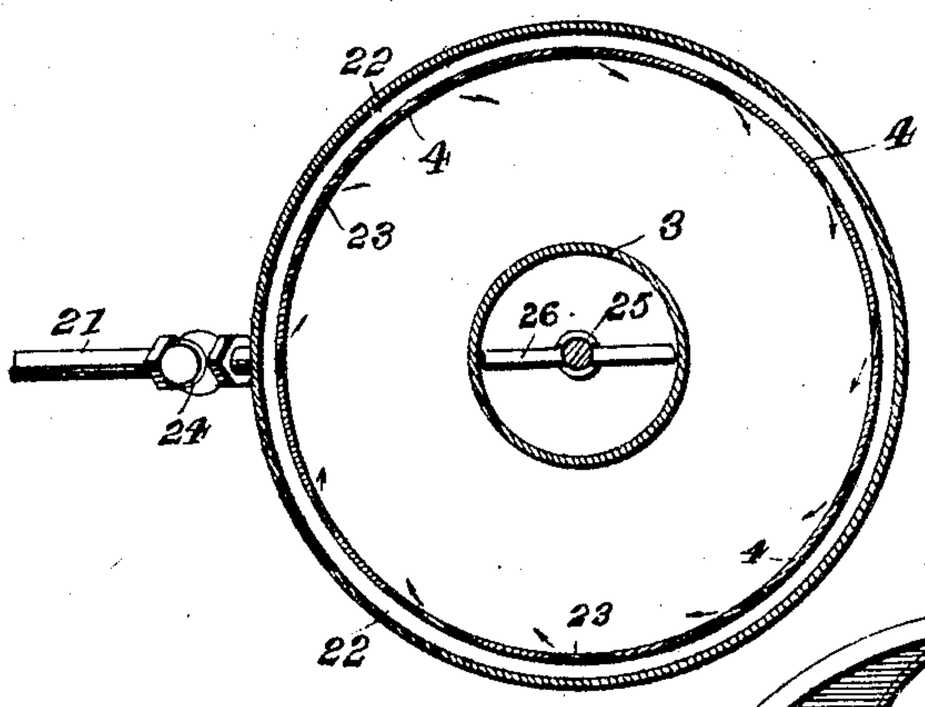


Fig. 6

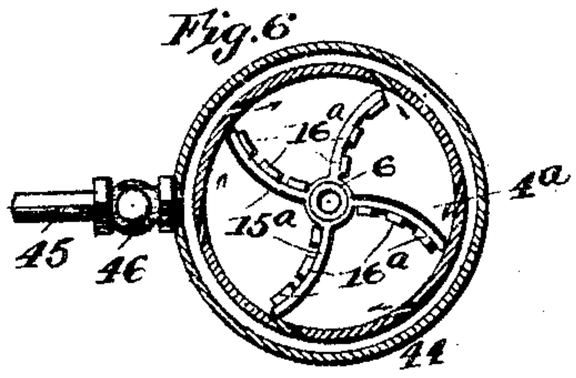
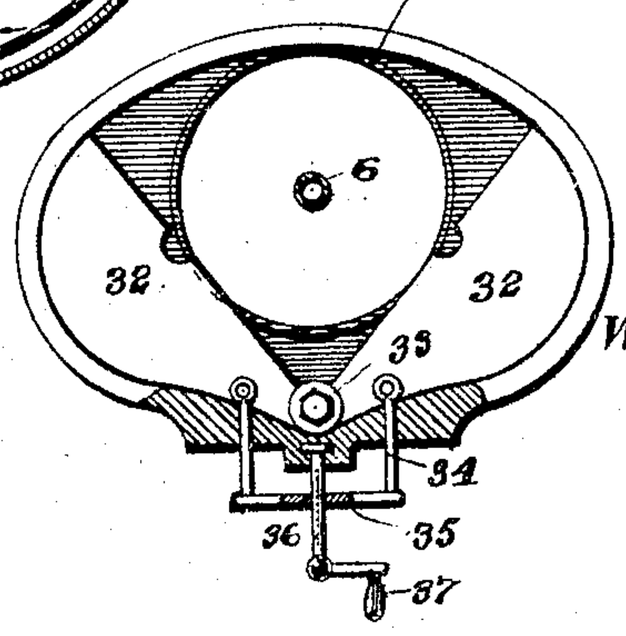


Fig 7



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UNITED STATES PATENT OFFICE.

WILLIAM ORSBORNE JOURNEAY, OF SAN ANTONIO, TEXAS.

ORE-CONCENTRATOR.

No. 798,064. Specification of Letters Patent. Patented Aug. 29, 1905.

Application filed December 2, 1904. Serial No. 235,269.

To all whom it may concern:

Be it known that I, WILLIAM ORSBORNE JOURNEAY, a citizen of the United States, and a resident of San Antonio, in the county of Bexar and State of Texas, have invented an Improved Ore-Concentrator, of which the following is a specification.

My invention is an improved machine for separating valuable portions of ores from the gangue. The construction, arrangement, combination, and operation of parts are hereinafter described, the features of novelty being specifically indicated in the claims.

In the accompanying drawings, Figure 1 is a longitudinal section of the machine. Fig. 2 is a side elevation of the machine without the outside or supporting frame. Fig. 3 is a horizontal section on the line 3 3 of Fig. 2. Fig. 4 is a horizontal section on the line 4 4 of Fig. 2. Fig. 5 is a horizontal section on the line 5 5 of Fig. 2. Fig. 6 is a horizontal section on the line 6 6 of Fig. 2. Fig. 7 is in part a plan view and in part a horizontal section of the cut-off valve applied to the lower portion of the machine.

The working parts of the machine are supported in a suitable rigid iron or wooden frame 1. The pulp or material composed of mixed ores and gangue is received from rolls or stamps into a flaring hopper 2, whose lower portion is constructed as a cylinder, and from which it passes into the main receiver 4. The same is constructed with a cylindrical body and conical lower portion, its lower terminal being a receiver for the concentrates, the same having a form similar to the receiver 4. The latter is supported by brackets 5, attached to the main frame 1. The hopper, with its cylinder 3, is attached to the hollow shaft 6 by means of horizontal bars or arms 7. (See Fig. 1.) The bars 7 have flanged or outturned ends, which are bolted to the respective parts in a suitable manner. The shaft 6 is arranged in suitable bearings 8 and 9, supported upon the upper portion of the frame 1 and provided with supports 10, formed of Babbitt metal or some other metal which will have but slight friction. In place of such bearing I may employ antifriction-rollers. Rotation is imparted to the hollow shaft 6 by means of bevel-gearing 11, operated by a horizontal shaft 12, having a band-pulley or other propelling device 13. It will be seen that the shaft 6 extends down nearly to the bottom of the lower or concentrate receiver 4^a and that guides 14 are arranged at the lower end of the cone of receiver 4, through which the shaft passes and in which it is free to rotate.

To the cylindrical body 3 of the pulp receiver or hopper I attach curved arms 15, (see Fig. 3,) which are extended horizontally and to which a series of vertical bars or plates 16 are secured, as shown. Owing to the conical form of the lower portion of the main receiver 4, the lower portions of the plates 16 converge in a similar way. It is apparent that the main receiver 4 is stationary, while the hopper, with its cylinder 3 and the attached stirrer 15 16, is revolved by means of the shaft 12 and the miter-gearing 11. By this means the pulp is stirred or agitated in the main receiver, the heavier particles being forced toward the center and descending, while the lighter portions, such as sand, are forced upward and pass off through the opening 17 in the upper portion of the receiver 4 and are thus discharged into a flaring hopper 18, that surrounds such portion of receiver 4. The upper edge of this hopper is turned outward and downward and overhangs a circular trough 19, which is inclined from one side to the other of the main receiver 4 and provided at its lowest point with a discharge-spout 20. Below the opening 17 in receiver 4 are other similar openings 17^a. Such portions of the material as may be forced upward and pass outward through the openings 17 and have sufficient weight will pass down in the hopper 18 and again enter the receiver 4 through the lower openings 17^a, while the lighter portions or tailings proper will pass off over the top of the hopper 18 and into the surrounding trough 19. In order to facilitate the separation of the heavy and light materials, I provide a water-inlet pipe 21, which, as shown in Figs. 1 and 4, connects with an annular jacket 22, forming a space surrounding the conical lower portion of the receiver 4. Such portion of the receiver has a series of tangential slots 23, through which water has access to the interior. A valve 24 is provided in the pipe 21 for controlling admission of water at this point. Within the concentrate chamber or receiver 4^a, forming the lower end of the main receiver 4, I arrange a small agitator or stirrer 15^a 16^a, which is a counterpart of the stirrer and agitator in receiver 4, save in respect to size. It is attached to the hollow shaft 6, and thus revolves with it in the same manner as the larger agitator.

A shaft 25 extends down through the hol-

low shaft 6 and is connected with a horizontal plunger 26, arranged in the lower portion of the hopper-cylinder 3. This plunger consists of radial arms which extend laterally through slots in the hollow shaft 6. (See Fig. 4.) To the upper portion of the shaft 25 are applied two disks 27 28, which are spaced apart and between which a cam 29 is arranged to revolve. (See Figs. 1 and 2.) The cam is fixed on a horizontal shaft 30, having a band-pulley or other propelling medium 31.

It is apparent that the rotation of the cam 29 will impart an up-and-down or reciprocating movement to the shaft 25, and thereby to the plunger 26, which will in turn impart a pulsation to the pulp in the main receiver 4, which, as experience has demonstrated, materially facilitates the separation of the concentrates from the other material. It will be seen that this pulsating operation goes on simultaneously with the rotation of the receiver and agitators in the receiver 4 and concentrate-chamber 4ª, the plunger 26 necessarily revolving with the shaft 6 and its connected parts.

At any time when it may be desired the main receiver 4 may be cut off from the concentrate-chamber 4ª by means of a valve composed of two horizontal wings 32, (see Fig. 7,) which are pivoted at a common point 33 and adapted to swing horizontally to open or close. The said wings or valves are operated by means of links or pivoted arms 34, which are connected with a nut 35, and a rotary cylindrical screw 36, that passes through said bar and is provided with a handle 37. The operation is obvious. The function of this valve is ordinarily called into play when the chamber 4ª has become duly filled or charged with concentrates, and this is determined by visual inspection through a glass-covered opening 38, with which the cylindrical portion of the chamber is provided. (See Fig. 2.)

When the cut-off valve 32 has been closed, as indicated, a valve 39, arranged in the lower end of the concentrates-chamber, is opened to allow discharge of the concentrates therein. This valve may be constructed in various ways; but, as shown in Fig. 5, it may consist of a horizontal triangular plate pivoted at 40 and provided with a handle 41 for operating it and with an opening 42, that may be brought into or out of registration with the discharge-nozzle 43 of the concentrate-chamber.

A water-chamber 44 (see Figs. 1, 6) surrounds the cylindrical portion of the concentrate-chamber 4ª, and slits are provided in the adjacent portion of the chamber in the same manner as illustrated in Fig. 4 in relation to the main pulp-receiver 4. The said slots are narrow and tangential, as shown, so that water is admitted in thin or sheet-like currents that are directed around the inner side or wall of the receiver.

Water is admitted to the chamber 44 by means of a pipe 45, provided with a stop-cock 46. The water thus admitted serves to wash the concentrates, as will be readily understood. The general operation of the apparatus may be briefly recapitulated, as follows:

The pulp delivered from stamps or rolls into the hopper 2 passes through the cylindrical portion 3 thereof and into the main receiver 4. The agitator 15 16 therein revolves with the hopper at a rate of, say, thirty to sixty revolutions per minute, the speed being determined mainly by the material being treated. The revolving wings 15 16 not only agitate the pulp, the same passing to some extent between the parallel strips 16, but the material is thrown outward by centrifugal action, and by the effect of gravity the heavier particles pass gradually to the bottom of the receiver, and thus into the lower or concentrates chamber 4ª, while the lighter particles, such as quartz or sand, are forced upward and pass out through the openings 17 in the upper portion of the receiver 4, and thus into the overflow-hopper 18. In the latter the heavier particles may pass downward and through the openings 17ª again into the receiver 4. The vertical reciprocating motion of the plunger 26 within the cylinder 3 causes a pulsating movement throughout the mass of pulp in the receiver 4 and the lower chamber 4ª. When it is observed through the glass window 38 that the chamber 4ª is filled with concentrates, the valve 32 is closed to prevent sands, &c., from mixing with the concentrates, and then, the lower valve 39 being opened, the concentrates are discharged. Water may be turned on through pipe 45 and water-jacket 44 to clean the concentrates and also to make the machine work more easily, since the series of tangential water-currents admitted from the surrounding chamber flow in the usual direction of rotation of the agitator; but the latter may be reversed if it be desired to create greater agitation of the concentrates and to wash them more thoroughly. Water forced through the pipe 21 into the receiver 44 obviously renders the pulp thinner, and thus facilitates the rotation of the agitator 15 16, so that the worthless and light material is more easily carried upward and caused to flow out of the receiver into the surrounding hopper 18. The tailings which finally accumulate in the top portion of such hopper pass over the curved edge of the same into the delivery-trough 19.

It will be understood that ordinarily—that is to say, when the machine is not worked too fast and not flushed with too much water—little or no valuable material will pass downward in the outside hopper 18. Thus the machine operates continuously and concentrates the valuable portion of the ore rapidly and perfectly. The machine can be worked with greater activity when the material is sized before introduction into the same.

A pipe 47, provided with a stop-cock 48, (see Fig. 1,) is connected with the lower end of the conical pulp-receiver 4 for use in discharging the liquid or finer portion of the pulp when required.

What I claim is—

1. The improved ore-concentrator comprising a main pulp-receiver and a concentric chamber pendent therefrom, a pulp-hopper having a vertical body arranged concentrically within the said receiver, a concentric rotary shaft to which the hopper is attached, an agitator attached to the hopper and rotating together with it and the said shaft, an overflow-hopper surrounding the upper portion of the main receiver which is provided with openings at that point, a tailings-spout connected with the overflow-hopper, a vertically-reciprocating plunger arranged in the hopper and means for reciprocating the same to cause pulsations in the mass of pulp, water-jackets applied to the main receiver and the concentrate-chamber and communicating with the same by openings, a cut-off valve arranged between the main receiver and the concentrate-chamber, and a discharge-valve applied to the latter, substantially as described.

2. The improved ore-concentrator comprising the main pulp-receiver and a concentrate-chamber pendent therefrom, a pulp-hopper arranged vertically and concentrically within the said receiver, a concentric rotary shaft to which the hopper is attached, an agitator secured to the hopper and revolving with it and a second agitator secured to the said shaft and revolving within the concentrates-chamber, a cut-off valve arranged in the upper portion of said chamber, and a plunger reciprocating in the hopper for causing pulsations in the pulp, substantially as described.

3. In an ore-concentrator, the combination with a conical pulp-receiver, of a hopper having a cylindrical body portion arranged concentrically within the receiver and extending down nearly to its lower end, a hollow rotary shaft arranged concentrically within the hopper, the two being rigidly connected, arms extending outward from and secured to and supported by the hopper, a second shaft working within the hollow one and a plunger connected with the lower end of the inner shaft and working in the lower end of the hopper, and means for imparting rotary and reciprocating movements to the respective shafts, the said hopper and the agitator being thus revolved together while the plunger acts on the pulp within the lower portion of the hopper and therethrough upon the entire body of the pulp surrounding the hopper, substantially as described.

4. In an ore-concentrator, the combination, with the main pulp-receiver, a hollow rotary shaft arranged concentrically therewith, bearings for supporting the same and its attachments, and gearing for imparting rotary motion thereto, a second shaft passing through the main portion of the hollow shaft and having a horizontal plunger attached to its lower end, disks fixed on the upper portion of the inner shaft, and a rotary cam coacting therewith for imparting reciprocation to the plunger, and an agitator comprising vertical wings rigidly connected with the hollow shaft, substantially as described.

5. The improved ore-concentrator comprising the conical pulp-receiver and the concentrates-chamber connected therewith and forming a reduced extension of the lower portion thereof, a hopper arranged within the main receiver and having an agitator connected therewith so that the two rotate together, a hollow vertical shaft arranged concentric within the hopper and rigidly attached thereto, a second agitator arranged in the concentrates-chamber and rigidly connected with the aforesaid shaft, a cut-off valve arranged between the main pulp-receiver and the concentrates-chamber, and water-jackets applied to the main receiver and the concentrates-chamber both the latter having openings through which water may discharge thereinto, substantially as described.

WILLIAM ORSBORNE JOURNEAY.

Witnesses:

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HARRY LEE BEAGLE.