

(No Model.)

C. E. SEYMOUR.  
ORE CONCENTRATOR.

No. 456,967.

Patented Aug. 4, 1891.

Fig. 1.

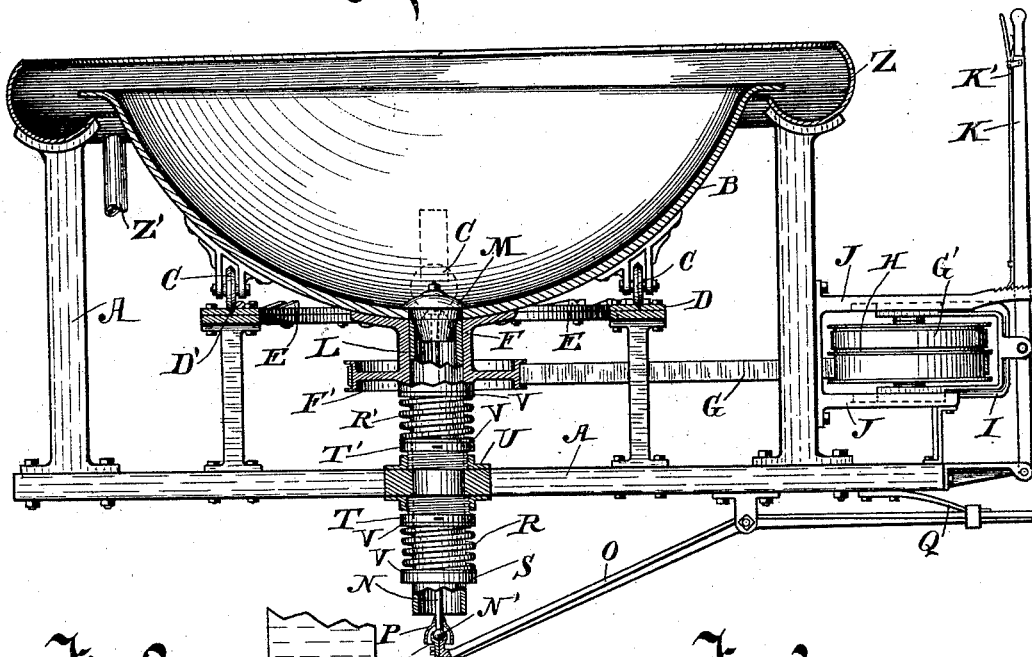


Fig. 2.

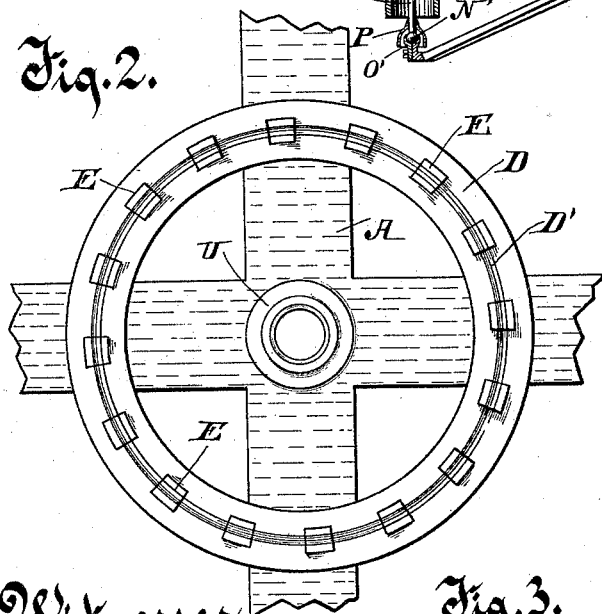
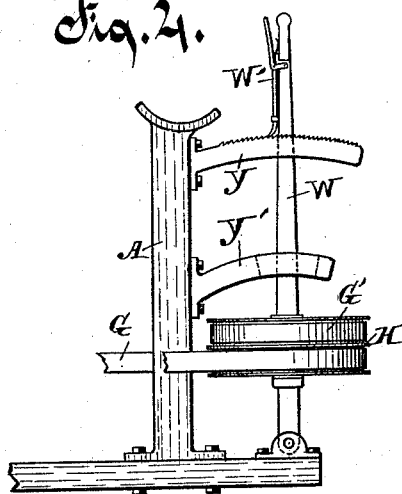


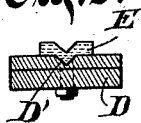
Fig. 4.



Witnesses.

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Fig. 3.



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# UNITED STATES PATENT OFFICE.

CHARLES EVARTS SEYMOUR, OF HURLEY, WISCONSIN.

## ORE-CONCENTRATOR.

**SPECIFICATION** forming part of Letters Patent No. 456,967, dated August 4, 1891.

Application filed November 7, 1890. Serial No. 370,678. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES EVARTS SEYMOUR, of Hurley, in the county of Ashland and State of Wisconsin, have invented a new and useful Improvement in Ore-Concentrators, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification:

My invention relates to a device for use in ore-concentration, in which process the ore is separated from the rock or refuse by the action of centrifugal force and the attraction of gravitation assisted by water.

The object of my invention is to provide a suitable device by and through which centrifugal force and gravity are made to act concurrently for the purpose of separating the ore from the refuse.

In the drawings, Figure 1 is an elevation of my concentrator, the bowl, trough, and a portion of the arbor and frame being shown in vertical section and other parts being broken away to show interior construction. Fig. 2 is a top plan view of a fragment of the frame and of the track on which the supporting-wheels of the bowl travel, showing also the cams for giving vertical motion to the bowl. Fig. 3 is a vertical transverse section of the track shown in Fig. 2. Fig. 4 is a modified form of device for carrying the driving-belt, with means for throwing the belt into and out of action and for adjusting its tension.

A is the frame on which the operative portions of the device are supported. The bowl B is provided with supporting-wheels C C, arranged to travel on a circular track D, fixed on the frame A. The wheels C C are preferably formed with a sharp central periphery adapted to travel in a channel D' therefor in the surface of the track D. A number of inclines or cams E E at equal distances apart are fixed on the track D in the line of the travel of the wheels C C, which are adapted successively to raise the bowl B as it rotates as the wheels pass over them concurrently, the bowl being forced down as the wheels pass off the cams by the action of gravity and by the resilience of a spring, hereinafter to be described. The number of these cams I do

not fix definitely; but there should be a sufficient number of them and of such form as to give the bowl frequent and rapid vertical movements as it is rotated horizontally. A hollow shaft or arbor F is fixed rigidly to the bowl centrally and projects downwardly therefrom. The arbor is provided with a band-wheel F', on which a belt G runs to rotate the bowl horizontally. The belt G runs also on a pulley H, journaled in a yoke I, which yoke travels horizontally in ways therefor in brackets J J, fixed on the frame.

A lever-handle K, pivoted at its lower end to the frame, is pivoted medially to the yoke I, and is adapted to shift the pulley H toward and from the pulley F', whereby the belt G is put into or released from frictional contact with the pulley H, or is made tight or loose on the two pulleys, as desired. The handle K is provided with a spring-latch K', arranged to engage adjustably with a bracket J and lock the yoke I and its supported pulley in position. A driving-belt G' also runs on the pulley H to the power-supplying mechanism, which is located at or nearly at right angles to the line of the belt G, so that the shifting of the pulley H toward and from the shaft F will not materially change the tension of the belt G'.

A port in the bottom of the bowl B opens into the hollow shaft F, forming a discharge passage or duct L downwardly from the bowl, which is closed by a plug-valve M, preferably of rubber, which is provided with a stem N, extending downwardly through the shaft F, and at its lower end is jointed to the lever-handle O, pivoted medially on the frame. The joint between the stem N and the lever-handle O is a universal joint, preferably constructed by a ball N' on the end of the stem N, let into a socket O', formed on the lever-handle O. A cup-shaped hood P, affixed to and surrounding the stem N, covers and protects the joint from sand or other abrading material. A lifting-spring Q, fixed on the frame and connected to the lever-handle, lifts the outer end of the handle and holds the plug-valve M yieldingly to its seat. A spring R, coiled about the shaft F, bearing at its lower end against a collar S, fixed on the shaft, bears at

its upper end against a screw-threaded sleeve-nut T, turning in a block U, fixed in the frame. The spring is adapted to hold the bowl forcibly but yieldingly downward, and its tension is made adjustable by means of the sleeve-nut T. A spring R' is coiled about the shaft F, bearing at its upper end against the hub of the pulley L and at its lower end against a screw-threaded sleeve-nut T', turning in the block U. This spring is intended and adapted to steady and modify the shock of the downward movement of the bowl caused by gravity and the action of the spring R. Washers V V are preferably interposed between the springs R and R' and their bearings.

In Fig. 4 I show a modified form of device very simple in construction, which, as the motion of the belts is usually slow, is a satisfactory device for supporting the band-wheel in most cases. This device consists of a lever W, pivoted at its lower end to the frame and carrying revolubly loose thereon a pulley H', corresponding to the pulley H in the device shown in Fig. 1. The belts G and G' run thereon. This lever-handle W is so pivoted or hinged on the frame as to tilt toward and from the shaft F, and by its tilting capability is adapted to throw the pulley H' into frictional contact with the belt G or release it therefrom. The lever-handle W is steadied and guided in its tilting motion by brackets Y Y', through which it passes in slots therefor, and the lever is provided with a spring-latch W', arranged to engage in a rack on the bracket Y and lock the lever-handle in position.

An annular trough Z about the bowl B at its upper edge is adapted to catch the overflow from the bowl and discharge it through the pipe Z'.

The operation of my improved concentrator is that when the bowl is supplied with a mass of pulverized ore or pulps and a supply of water and is revolved with proper rapidity the concentrates in the ore will, by the combined action of the centrifugal force and gravity, be gradually separated from the ore and will settle at the center in the bottom of the bowl, from which, when the bowl is stopped, the concentrates may be withdrawn by raising the plug-valve and allowing them to pass through the hollow shaft downwardly into a receiver therefor. The refuse material with a portion of the water will, by the centrifugal force, be carried over the edge of the bowl into the trough and discharged therefrom. The shaft F passes through and has a journal-bearing in the block U.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an ore-concentrator, a bowl and supporting-wheels arranged at equal distances apart affixed thereto on the under side thereof, in combination with a circular track on which the wheels on the bowl travel, a series

of inclines or cams on the track at equal distances apart and registering with the wheels on the bowl, adapted to raise the bowl and let it drop, and suitable means for revolving the bowl, substantially as described.

2. In an ore-concentrator, a bowl and supporting-wheels at equal distances apart affixed thereto on the under side, a circular track on which the wheels on the bowl travel, and a series of inclines on the track registering with the wheels on the bowl and adapted to raise the bowl and let it drop, in combination with a shaft affixed to the bowl centrally on the under side and projecting downwardly therefrom, and springs coiled about the shaft below the bowl and bearing in opposite directions against collars rigid on the shaft and in the reverse directions against a fixed support, and means for rotating the bowl, substantially as described.

3. The combination, with a bowl-shaped ore-receptacle provided with supporting-wheels on which it travels rotatably horizontally, of a hollow shaft fixed to the bowl centrally and extending downwardly therefrom, a port in the bottom of the bowl, opening into the shaft, providing a discharging-passage through the shaft from the bottom of the bowl, and a plug-valve arranged to close the port in the bottom of the bowl, the plug-valve being provided with a stem which passes down through the shaft, and means for raising the valve and holding it yieldingly to its seat, substantially as described.

4. The combination, with a bowl-shaped ore-receptacle having supporting-wheels at equal distances apart affixed thereto, on which it revolves horizontally, a circular track and cams thereon registering with the wheels of the bowl, and over which the wheels travel, of a hollow shaft affixed to the bowl centrally and extending downwardly therefrom, the bowl having a port in its bottom opening into the shaft, a plug-valve normally closing the port in the bottom of the bowl, and a spring-actuated lever-handle pivoted on the frame and connected by a universal joint to the downwardly-extending stem of the valve, whereby the valve is held yieldingly to its seat and may be raised therefrom, substantially as described.

5. The combination, with a revolving concentrator-bowl and a pulley on its shaft, of a pulley at a distance therefrom supported on movable mechanism shiftable toward and from the bowl-shaft, a belt running on the bowl-shaft and on the pulley in the shiftable mechanism, and another belt running on the pulley in the shiftable mechanism and on the power-supplying pulley located at right angles to the former belt, substantially as described.

6. The combination, with the revolving bowl of a concentrator and a pulley on its vertical shaft, of a pulley in a sliding yoke at a distance from the shaft of the concentrator,

the yoke sliding in ways toward and from the shaft of the bowl, a belt running on the pulley fixed on the shaft of the bowl and on the pulley in the yoke, and a lever pivoted to the frame and to the yoke for shifting the yoke toward and from the shaft of the bowl, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES EVARTS SEYMOUR.

Witnesses:

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C. H. MUNGER.