

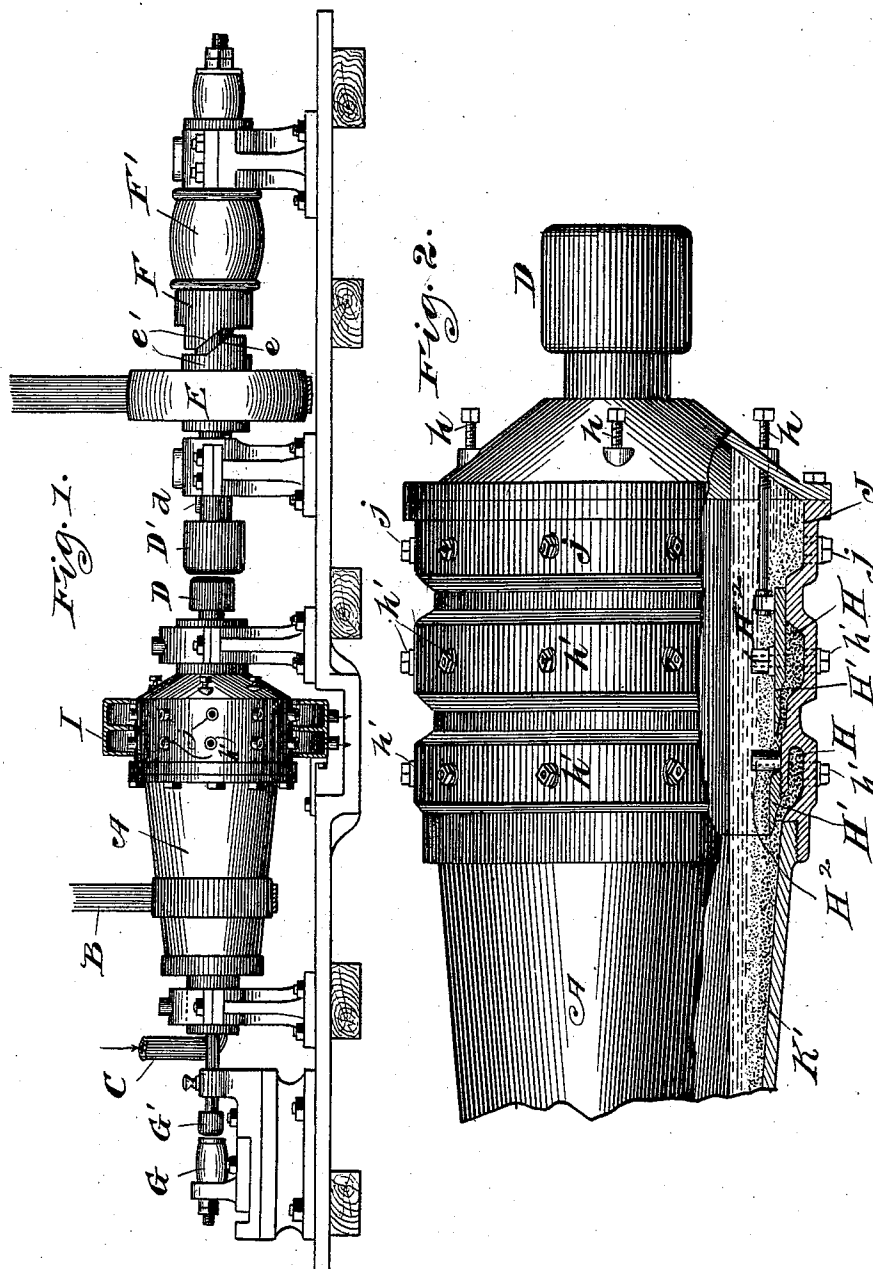
(No Model.)

2 Sheets—Sheet 1.

O. B. PECK.
CENTRIFUGAL ORE SEPARATOR.

No. 499,345.

Patented June 13, 1893.



Witnesses,

J. S. Mann,
Wm. T. Millington

Inventor,

Orrin B. Peck

By Banning & Banning & Payson.
Attys.

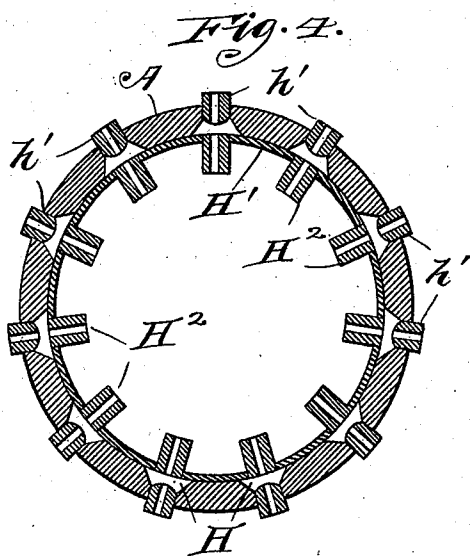
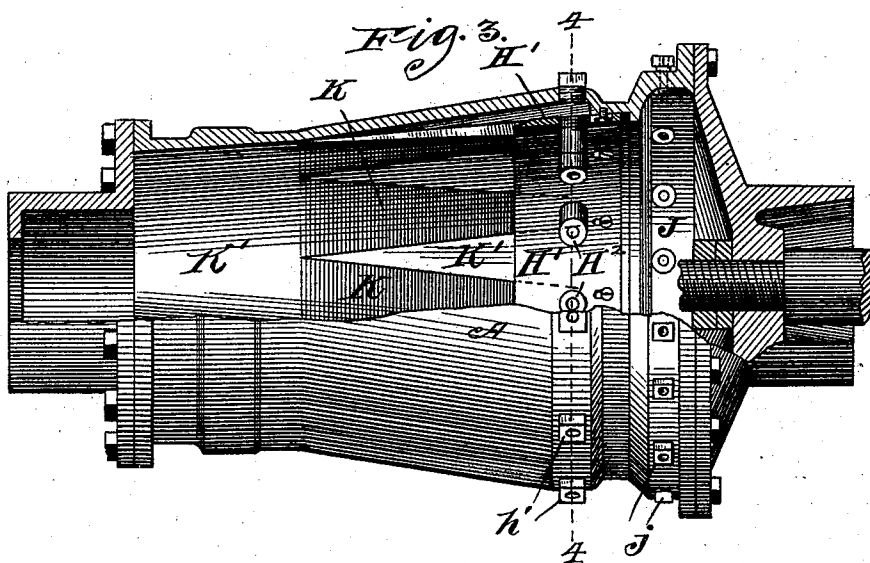
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2 Sheets—Sheet 2.

O. B. PECK.
CENTRIFUGAL ORE SEPARATOR.

No. 499,345.

Patented June 13, 1893.



Witnesses,

D. Mann,
Wm. T. Wellington

Inventor,

Olin B. Peck

By Banning & Banning & Payson
Attys.

UNITED STATES PATENT OFFICE.

ORRIN B. PECK, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO THE PATENT TITLE COMPANY, OF SAME PLACE.

CENTRIFUGAL ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 499,345, dated June 13, 1893.

Application filed July 8, 1892. Serial No. 439,368. (No model.)

To all whom it may concern:

Be it known that I, ORRIN B. PECK, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful
5 Improvements in Centrifugal Ore-Separators, of which the following is a specification.

The object of my invention has more particular reference to the means for removing or discharging the heavier and more valuable particles, after they have been separated from the lighter and more worthless particles, by the action of centrifugal force, in the rotating treatment vessel of a centrifugal ore separator, while the same is in operation and
15 without interruption or cessation; and my invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 represents a side elevation of my improved centrifugal ore separator. Fig. 2 is a side elevation, partly in section, of a somewhat modified form of a portion of a treatment vessel. Fig. 3 is a side elevation, partly in section, of still another
25 modified form of treatment vessel; and Fig. 4 is an end view of a transverse section taken in the line 4, 4 of Fig. 3.

In making my improved centrifugal ore separator for separating the heavier and more valuable from the lighter and more worthless particles of mineral bearing substances, I make a rotatable treatment vessel A, arranged preferably in a horizontal position, as shown, and supported in suitable journals, bearings or
35 frame work, to permit it to be rotated at the requisite degree of speed. In order to effect its rotation, I employ a belt, B, which may be driven by any suitable and convenient motive power.

The material to be treated is intended to be introduced preferably mixed with the desired quantity of water to wash and dilute it, through a pipe C, that enters the interior of the vessel through its end, which is made hollow or open for the purpose of admitting the
45 end of the supply pipe.

In order to impart longitudinal vibrations, jars or shocks to the treatment vessel while in operation, I arrange on the end of the vessel, opposite to that through which the material is introduced, a buffer, D, which may be

mounted on an extension of the trunnion or spindle on which that end of the vessel rotates. In close proximity to this buffer, I arrange a bumper, D', mounted on a shaft that
55 is intended to be supported in bearings in a non-rotatable manner, but capable of longitudinal movement. I have shown a spline, d, in the shaft and bearing, so as to prevent the rotation of the shaft, while permitting it to be moved longitudinally. Loosely mounted on this shaft is a pulley E, driven by a belt connected with any convenient or desired motive power. This pulley is provided with a hub, E', that has inclined or cam surfaces, e, as
65 shown in Fig. 1. Mounted, but non-rotatable on the shaft, is a collar F, provided with inclined or cam surfaces, e', and behind this collar is arranged a cushion, F', forming a yielding spring or material to permit the collar F
70 to be forced against the spring or cushion, so as to compress it as the hub of the pulley E is rotating. At the other end of the rotatable treatment vessel is arranged a cushion, G, in position to be struck by a head G', mounted
75 on an extension of the trunnion or spindle on which the receiving end of the treatment vessel is mounted.

The separator, being in operation, the pulley E is rotated at the desired rate of speed, and as it rotates, it forces the collar F back against the spring or cushion F', carrying the shaft on which the bumper D' is mounted, until the inclined surface e has passed the inclined surface e', when the spring is released and carries the shaft, with the bumper D', forward, so as to impart a sharp blow to the buffer D, forcing the rotating treatment vessel, with its separating surface, quickly back a short distance longitudinally against
80 the spring or cushion G, which gradually checks and stops their longitudinal movement, and then carries them back to their initial position, ready for another blow to be imparted. The treatment vessel, with its separating surface K', is thus forced quickly in a direction against the course of longitudinal travel of the material being treated, which materially assists in the travel or progress of the material from the receiving to the discharge end of the treatment vessel. The rapidity with which these blows or vibrations
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95
100

will be imparted, will of course depend upon the rapidity with which the pulley E is rotated, so that the matter can be regulated as may be desired to secure the best results.

- 5 I will now describe the means for dividing and effecting the removal or discharge of the heavier and lighter particles of the material being treated at separate points and in different classes, while the treatment vessel is
10 being rotated, and preferably without interruption or cessation of operations.

After the material has been introduced through the supply pipe C, it passes along the separating surface, assisted by the shocks or
15 vibrations above described, toward the discharge end of the treatment vessel. The heavier particles will of course seek the outside, or arrange themselves in a stratum against the separating surface, and farthest
20 from the axis of rotation, while the lighter particles will form another stratum on top of the heavier particles, and nearer to the axis of rotation. At a desired point between the receiving and the discharge ends of the vessel, I arrange one or more preferably annular
25 receiving chambers or spaces H, intended to receive the heavier particles, to permit them to be discharged, without interrupting or interfering with the operation of separating.
30 These chambers or spaces may be formed by an enlargement in the diameter of the treatment vessel at the points where they are located, as shown in Fig. 2, or in other ways, as hereinafter described, I arrange a divider H',
35 which is intended to cut or divide the material from beneath the lighter particles. This cutter or divider, as shown in Fig. 2, preferably consists of an annular plate or ring, extending toward the receiving end of the
40 vessel, and beveled or sharpened at its edge toward the receiving end. In Fig. 2 I have shown two of these dividers, and have shown them adjustable toward or from the receiving end of the treatment vessel. One of them
45 is provided with screw threads as shown, so that by screwing it farther in or out, its position may be adjusted, as desired, and the other is provided with screw threaded rods, h, which may be screwed in or out to adjust
50 the divider to the desired position. These dividers lie close to the separating surface, and by adjusting them toward the receiving end of the vessel, the annular groove or channel, through which the heavier particles pass
55 into the receiving chambers or spaces, may be increased or decreased in size, as desired, so as to shave off or divide from the lighter particles the thickness of stratum desired. I have shown two of these receiving chambers
60 for the heavier particles, in Fig. 2, while the treatment vessel shown in Fig. 1 contains but one of them. Of course the number may be regulated to suit the particular circumstances of the case, as may be best adapted for the
65 treatment of different kinds of materials, and I do not therefore limit myself to any particular number of them. After the heavier

particles have passed into the receiving spaces, they are discharged through a number of holes, h', into a curbing or receptacle, I, (shown in
70 Fig. 1) to receive them, whence they may be carried off to the desired place of deposit. As shown in the drawings, these discharge holes are constantly open, so that the heavier particles entering the receiving chambers are
75 constantly discharged, so that the operation of the apparatus is continuous and uninterrupted. Of course if the discharge openings are closed a part of the time, and uncovered or open part of the time, the discharge will be
80 intermittent, though, as above said, I prefer to have it continuous. It is desirable to protect the discharge openings for the heavier material from the pressure of the lighter particles, or the entrance of any except the particular particles intended to be discharged.
85 To this end, I interpose between the discharge openings and the stratum of lighter particles a shield or protector, shown in Fig. 2. As shown this shield or protector is also made to
90 serve as the divider H'; but whether it perform the two functions of a divider and a shield or protector or not, I desire that it shall be of a size and shape sufficient to protect the discharge openings, and prevent the pressure
95 of the lighter particles upon them, or the entrance to them of any particles except those intended to be discharged. I also prefer to arrange one or more open pipes H², forming water passages communicating with the receiving chambers or discharge openings and
100 the water for the treatment vessel above the stratum of lighter particles, so that they will supply a stream of comparatively clean water to the receiving chambers or discharge openings, to facilitate the discharge of the heavier
105 particles, and to prevent the water from being forced through the channels, by which the heavier particles are carried to the discharge openings. After the lighter particles
110 have been carried toward the discharge end, beyond the receiving chambers H, they preferably enter a chamber or enlargement, J, provided with discharge openings j, whence they may be discharged into a curbing adapted
115 to receive them, whence they may be carried to any place desired.

In Figs. 3 and 4, I have shown a modified arrangement of channels for assisting in effecting the division of the material into strata
120 of lighter and heavier particles, and for facilitating the discharge of the heavier particles separate from the lighter, and while the treatment vessel is in operation. In this case, the treatment vessel is provided with a series
125 of grooves or channels K, in its inner wall, and on or in its separating surface. These grooves or channels commence a desired distance back from the receiving end of the treatment vessel. They are preferably made
130 wide and shallow at their commencement toward the receiving end, and narrowed and deepened toward the discharge end, until they have reached the point where the dis-

charge of the heavier particles is intended to be effected. A plate or divider H' , which also serves as a shield or protector, preferably made in the form of an annular ring, is arranged on the inside of the treatment vessel at its discharge end. This divider extends a desired distance beyond the discharge openings toward the receiving end of the vessel, as shown in Fig. 3, but preferably has its inner surface flush with the normal plane of the separating surface K' , which has not been cut away or depressed in forming the grooves or channels K . The discharge openings, h' , open into the grooves or channels, where they are covered by the divider or protector H' , while the water pipes H^2 open through the divider into the grooves or channels, preferably opposite the discharge openings. As the material is introduced into the treatment vessel, in the modified construction shown in Figs. 3 and 4, it passes toward the discharge end, assisted by the shocks or jars, forming into strata of heavier and lighter particles, as above explained. As the heavier particles forming into the outer stratum reach the point where the grooves or channels begin, they follow such grooves or channels, while the lighter particles, forming the inner stratum, move toward the discharge end, over the normal plane of the separating surface K' , and on top of the heavier particles passing along the grooves or channels, until they reach the divider H' , when the lighter particles pass onto the inside surface of the divider, while the heavier particles in the grooves or channels pass, or are deflected, to the outside of the divider, into the spaces H , from which they pass through the discharge opening into the place intended to receive them. The lighter particles, which were divided from the heavier and passed back along the inside of the divider, are delivered into the enlargement or chamber J , and pass out through the openings j .

I have described the construction, arrangement and operation of my improvements above with considerable minutia and detail; but I wish it to be understood that I do not desire to limit myself to details of construction further than specified in the claims. I wish also to say that while I have described the separation of the particles as being effected in the presence of water, I do not desire to limit myself in all cases to this operation of the apparatus, as I contemplate its use without the employment of water.

In my application, Serial No. 439,369, filed July 8, 1892, I have described and claimed certain features which are also illustrated in this case, and therefore do not claim such features broadly herein.

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

1. In centrifugal ore separators, the combination of a rotatable separating surface for separating the material treated into strata of heavier and lighter particles, means for di-

viding the heavier stratum from beneath the lighter stratum, and means for protecting the discharge passages for the heavier from the ingress and discharge of the lighter, substantially as described.

2. In centrifugal ore separators, the combination of a rotatable vibratable separating surface for separating the material treated into strata of heavier and lighter particles, means for dividing the heavier stratum from beneath the lighter stratum, and means for rotating and vibrating the separating surface, substantially as described.

3. In centrifugal ore separators, the combination of a rotatable vibratable separating surface for separating the material treated into strata of heavier and lighter particles, means for dividing the heavier stratum from beneath the lighter stratum, and discharging the strata separately and continuously, and means for rotating the separating surface, substantially as described.

4. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more channels communicating with discharge passages for removing and discharging the heavier particles from beneath the lighter particles, and means for rotating the separating surface, substantially as described.

5. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more passages for the discharge of the heavier material, and one or more water supply passages communicating therewith, and means for rotating the separating surface, substantially as described.

6. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more passages for the discharge of the heavier particles, means for protecting such passage or passages from the centrifugal pressure of the lighter particles, and means for rotating the separating surface, substantially as described.

7. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more passages for the discharge of the heavier particles, a cover, shield or protector for preventing the ingress or discharge of the lighter particles with the heavier, and means for rotating the separating surface, substantially as described.

8. In centrifugal ore separators, the combination of a rotatable separating surface, a plate or cutter for dividing the heavier particles from beneath the lighter particles, and means for rotating the separating surface, substantially as described.

9. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more chambers or spaces, and with one or more channels communicating therewith, and with one or more discharge passages leading therefrom, whereby the heavier particles are collected from beneath the lighter particles and discharged, and

means for rotating the separating surface substantially as described.

10. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more chambers or spaces, and with one or more channels communicating therewith, and with one or more discharge passages leading therefrom, and with one or more water supply passages communicating with the spaces or chambers, whereby the heavier particles are collected from beneath the lighter particles and discharged, and means for rotating the separating surface, substantially as described.

11. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more annular chambers rotatably connected therewith, and with one or more annular channels or passages communicating therewith from the separating surface, and with one or more discharge passages leading therefrom and means for rotating the separating surface, substantially as described.

12. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more annular chambers rotatable therewith, and with one or more annular channels or passages leading from the separating surface thereto, and with one or

more water supply passages leading thereto, and with one or more discharge passages leading therefrom, and means for rotating the separating surface, substantially as described.

13. In centrifugal ore separators, the combination of a rotating separating surface provided with one or more passages for the discharge of the heavier particles, means for protecting such passages from the ingress or escape of the lighter particles, and means for regulating the size of the channels leading to the discharge passages, and means for rotating the separating surface, substantially as described.

14. In centrifugal ore separators, the combination of a rotatable separating surface provided with one or more receiving spaces or chambers and with one or more passages or channels communicating therewith, and with one or more discharge passages leading therefrom, means for regulating the size of the channels leading to the discharge passages, and means for rotating the separating surface, substantially as described.

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