

(No Model.)

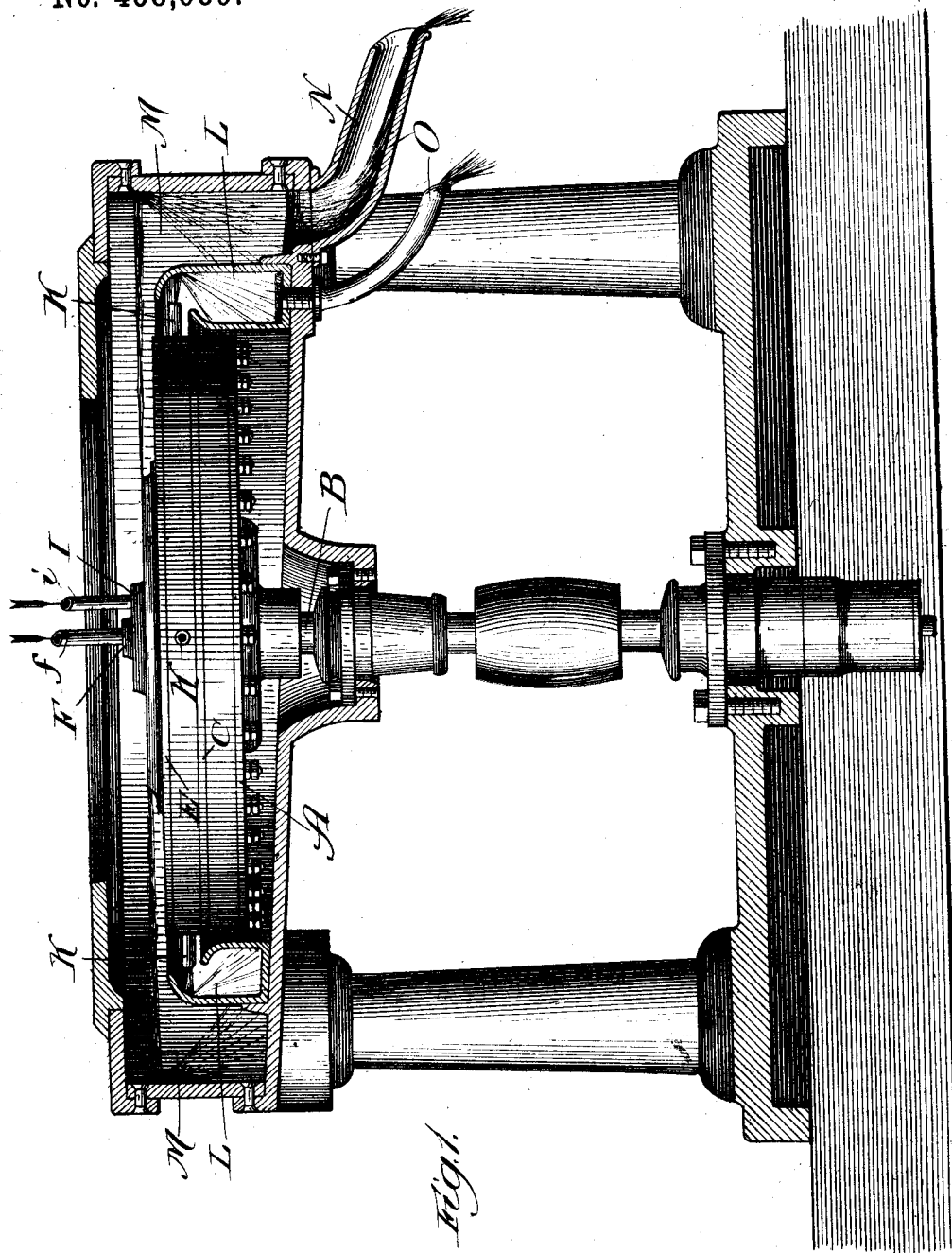
3 Sheets—Sheet 1.

O. B. PECK.

APPARATUS FOR TREATING FINELY DIVIDED OR POWDERED SUBSTANCES
OF DIFFERENT DEGREES OF SPECIFIC GRAVITY.

No. 468,689.

Patented Feb. 9, 1892.



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Clifford White

Inventor:
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(No Model.)

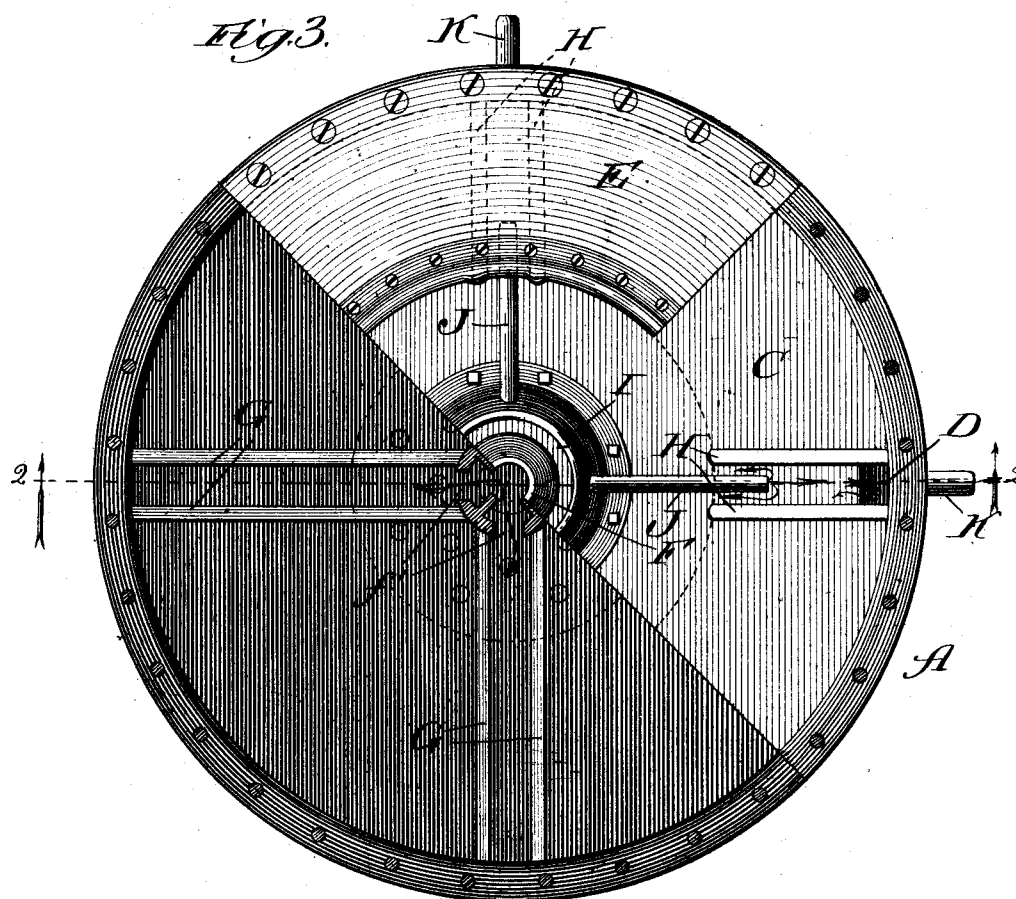
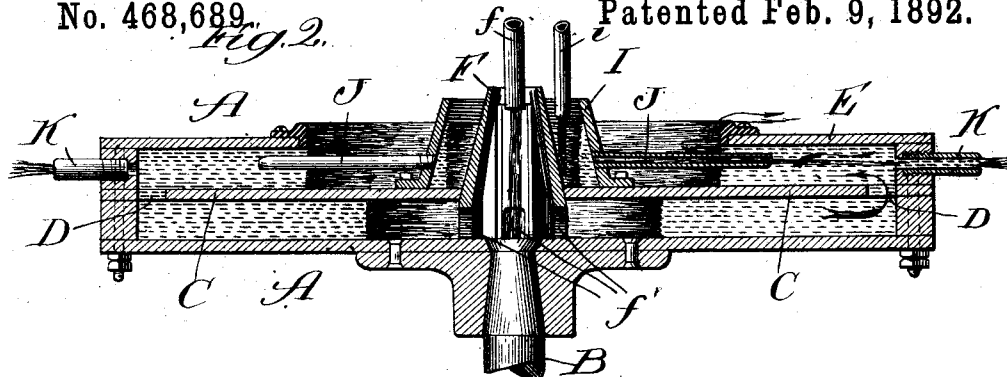
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OF DIFFERENT DEGREES OF SPECIFIC GRAVITY.

No. 468,689.

Patented Feb. 9, 1892.



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(No Model.)

3 Sheets—Sheet 3.

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APPARATUS FOR TREATING FINELY DIVIDED OR POWDERED SUBSTANCES
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Fig. 4.

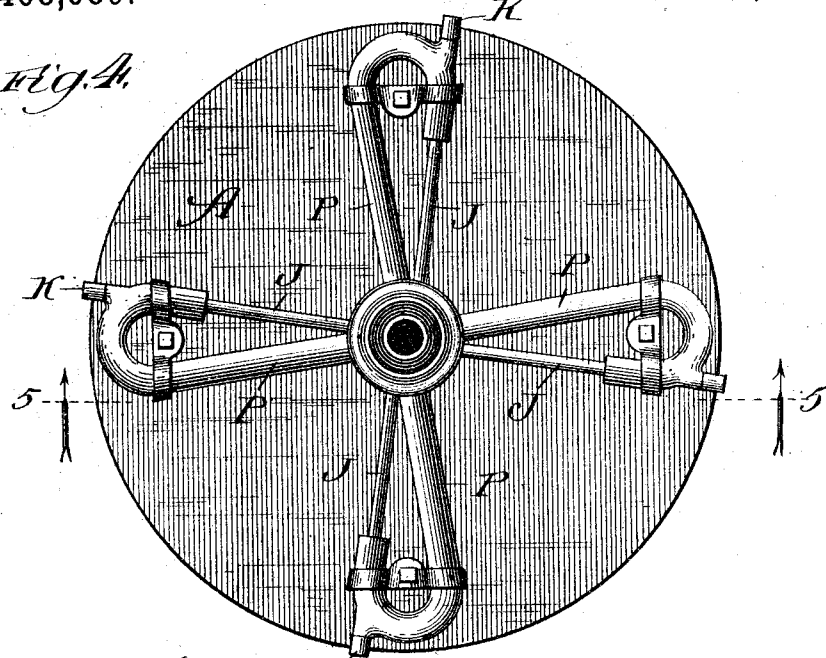
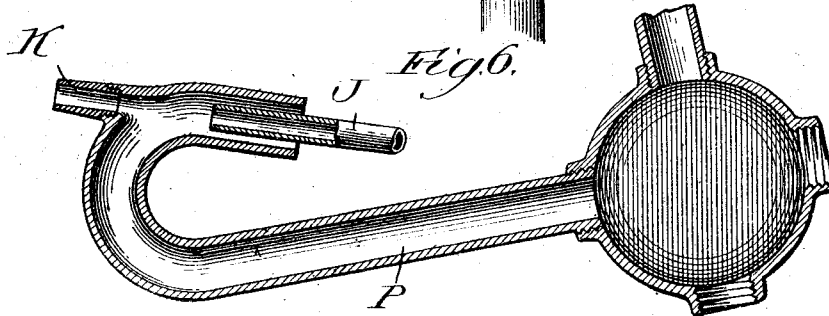
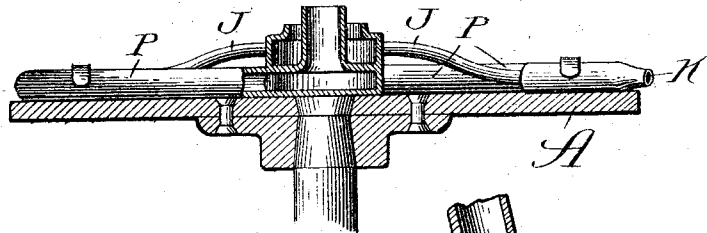


Fig. 5.



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UNITED STATES PATENT OFFICE.

ORRIN B. PECK, OF CHICAGO, ILLINOIS, ASSIGNOR TO MELINDA PECK, OF SAME PLACE.

APPARATUS FOR TREATING FINELY DIVIDED OR POWDERED SUBSTANCES OF DIFFERENT DEGREES OF SPECIFIC GRAVITY.

SPECIFICATION forming part of Letters Patent No. 468,689, dated February 9, 1892.

Application filed October 5, 1891. Serial No. 497,806. (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 Improvements in Apparatus for Treating Finely Divided or Powdered Substances of Different Degrees of Specific Gravity, of which the following is a specification.

The object of my invention is to make an apparatus in which finely divided or powdered substances of different degrees of specific gravity may be treated by the action of centrifugal force while in an opposing current of water; and my invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 represents a vertical transverse section of the apparatus by which I carry out or embody my process with part of the apparatus in elevation. Fig. 2 represents a vertical transverse section of the revoluble treatment-chamber, taken through the line 2 of Fig. 3, but with the chamber in its fully completed condition. Fig. 3 is a plan view of the revoluble treatment-chamber with a portion of the chamber removed, showing the horizontal dividing-plate, and also a portion of the horizontal dividing-plate removed, showing a portion of the bottom of the chamber, as hereinafter explained. Fig. 4 is a plan view of the treatment-chamber of the apparatus modified. Fig. 5 is a vertical section taken through the line 5 of Fig. 4, looking in the direction of the arrows; and Fig. 6 is a plan view of a horizontal section of a part of the treatment-chamber.

It will be understood that in the treatment of finely divided or powdered substances to separate the heavier and more valuable portions from the lighter and more worthless it is a difficult matter to effect the separation of the particles, although they really differ in degrees of specific gravity, from the fact that as such particles are extremely small the difference between their gravities is almost immeasurable and inappreciable, so that it is impractical to apply or regulate the use of water to effect the separation of the particles unless their specific gravities have been in-

creased or magnified, so to speak. As is well known, and as I have demonstrated by experience, the specific gravity of the particles may be practically increased or magnified by the action of centrifugal force sufficiently to make the difference between the heavier and the lighter particles, appreciable, and I have found by experience that the particles, while being thus acted upon by centrifugal force and thus magnified or increased as to their specific gravity, may be separated, the lighter from the heavier, by subjecting them to an opposing current of water or other fluid of sufficient resistance to carry away the lighter particles, but of insufficient resistance to arrest the heavier particles, which, augmented by centrifugal force, will pass through the opposing current, so that a separation of extremely minute particles may be effected.

In the description of my improved apparatus I do not wish to confine myself to the various details of construction of the apparatus, as they can be modified in various ways without departing from the spirit of my invention. In my improved apparatus, A is a revoluble treatment-chamber intended to be mounted on a shaft B, capable of being revolved by any convenient motive power, and to which as great a speed of revolution may be imparted as is necessary to effect the desired object. I divide the treatment-chamber into two horizontal sections or compartments by means of a horizontal dividing-plate C, which may be arranged or supported in place by bolts or rivets, as shown in the drawings, or in other convenient way. This dividing-plate is provided with openings D, preferably arranged at the outer edge of the chamber, affording communication between the upper and lower compartments of the treatment-chamber. These openings are preferably four in number, arranged opposite each other, although there may be any convenient number, as the constructor of the apparatus may desire. The treatment-chamber is covered by a top or cover E, that is intended to extend in as a rim or covering inclosing the top of the treatment-chamber from the outer edges inward as far as desired. In practice I pre-

fer to extend the cover in about half of the distance from the outer edge of the chamber to the center, as shown in Fig. 2, although this is a matter of construction in which as much latitude may be indulged as suitable to the conditions under which the apparatus is intended to be operated. I arrange a central water-receiving aperture F, extending from the bottom of the treatment-chamber up a desired distance to receive the desired supply of water which is conducted into it through a pipe *f* from any convenient supply. This receiving-chamber is provided with holes or openings *f'* between the bottom of the treatment-chamber and the horizontal dividing-plate C, through which the water from the pipe *f* may pass. These holes or openings are preferably four in number, arranged to correspond with the opening D, although there may be any desired number. I prefer to arrange between the bottom of the treatment-chamber and the dividing-plate vertical partitions G, forming passages or channels leading from the holes *f'* to the openings D to conduct the water to such openings to permit it to pass through the dividing-plate into the upper compartment of the treatment-chamber. Similar vertical partitions H, arranged between the dividing-plate C and the cover E, form channels or passages from the openings D inwardly toward the center of the treatment-chamber. Around the water-receiving aperture F is arranged a material-receiving aperture I, that extends up from the dividing-plate D a desired distance to receive the material to be treated, which is flowed or delivered into the same through a pipe *i*, leading from any convenient source or supply. From this material-receiving aperture pipes J extend out into the channels or passages formed by the vertical partitions H and enter the same a desired distance, so that their outer or discharge ends will be under the cover E. Leading out from the passages or channels between the vertical partitions H are discharge pipes or spouts K, through which the heavier portions of the material treated are discharged by the action of centrifugal force. These spouts discharge the material passing through them into an annular trough or receptacle L, while the material that is carried out over the top of the treatment-chamber is discharged into an annular trough or receptacle M. Appropriate spouts N and O lead from these troughs or receptacles, as shown in Fig. 1, to carry away the water and waste particles and the portions of material treated which it is desired to save and deliver them at any convenient point or desired vessel.

From the above description it will be apparent that the operative or effective features of the apparatus consist in the passages or pipes by which the material to be treated is forced out by the action of centrifugal force to meet an opposing current of water that is being forced in. Any way, therefore, of forming channels or passages by which the ma-

terial to be treated can be forced out by the action of centrifugal force against an opposing current of water will embody the idea and spirit of my invention. To illustrate this, I have shown in Figs. 4, 5, and 6 of the drawings a modification of my apparatus. Instead of forming the water-passages by means of plates and partitions, I use a pipe P, extending out from the water-receiving aperture and turning in again toward the center, and to carry the material to be treated out by the action of centrifugal force I use a pipe J, as in the other case extending out from the material-receiving aperture into the inturned end of the water-pipes P. In this case the spout K may be arranged in the pipe P opposite the outer end of the pipe J, and the main portion of the water will escape around the end of the pipe J, which is small enough to permit the water to so escape, as shown in Fig. 6. In this modification of the treatment-chamber it will be apparent that the same effects and results will be secured as in that described in detail with reference to the first three figures of the drawings.

In operation the treatment-chamber is revolved at sufficiently high speed to develop as great a degree of centrifugal force as may be necessary to separate the heavier from the lighter particles of the material to be treated. A stream of water is admitted into the central water-receiving aperture and carried by the action of centrifugal force out along the channels or passages between the vertical partitions G and up through the openings D into the channels or passages formed by the vertical partitions H, whence the current or stream of water passes inward toward the center of the treatment-chamber to escape over the top or inner edge of the cover E. In the modified form of machine the water passes out along the pipe and turns inward along its inwardly-projecting portion, instead of passing between partitions. A stream of material to be treated is now turned into the material-receiving aperture I to be carried by the action of centrifugal force out through the pipes J into the passages or channels formed by the partitions H or to the inwardly-projecting ends of the pipes P, where the modified form of apparatus is used. As the material is projected or thrown by the action of centrifugal force, it passes out through the pipes J and comes into contact with an opposing current of water. The amount of water introduced to form the opposing current is intended to be sufficient and to be driven at a sufficient velocity to arrest and carry off the lighter portions of the material being treated, but not to carry off the heavier portions, which are projected through the current of water by the action of centrifugal force to escape through the spouts or pipes K. Of course a certain quantity of water will also escape through these spouts with the heavier particles of material being treated; but as they afford an exit much too small for the escape of the en-

tire quantity of water introduced a constant current will be forced inward against the material being projected through the pipes J.

As I have in this specification only claimed the novel features of construction of the apparatus, I do not herein claim the process or mode of operation, but make that the subject of another application filed contemporaneously herewith, Serial No. 407,805.

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

1. In an apparatus for treating and separating finely divided or powdered substances of different degrees of specific gravity, a revoluble treatment-chamber provided with a water-receiving aperture and a material-receiving aperture, and passages conducting the water inward and the material outward, substantially as described.

2. In an apparatus for treating and separating finely divided or powdered substances of different degrees of specific gravity, a revoluble treatment-chamber provided with a wa-

ter-receiving aperture and a material-receiving aperture, and passages conducting the water outward and then inward and the material outward, with an exit for the heavier particles of the material farther from the center of the treatment-chamber than the exit for the main portion of the water and the lighter particles, substantially as described.

3. In an apparatus for treating and separating finely divided or powdered substances of different degrees of specific gravity, a revoluble treatment-chamber provided with a water-receiving aperture and a material-receiving aperture, in combination with pipes for carrying the water outward and then inward and pipes for carrying the material outward by the action of centrifugal force to meet an opposing current of water, substantially as described.

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SAMUEL E. HIBBEN.