(No Model.) 2 Sheets—Sheet 1.

I. CHRIST.

SEPARATING APPARATUS FOR MINERAL SUBSTANCES.

No. 534,467. Patented Feb. 19, 1895.

Fig. 1.

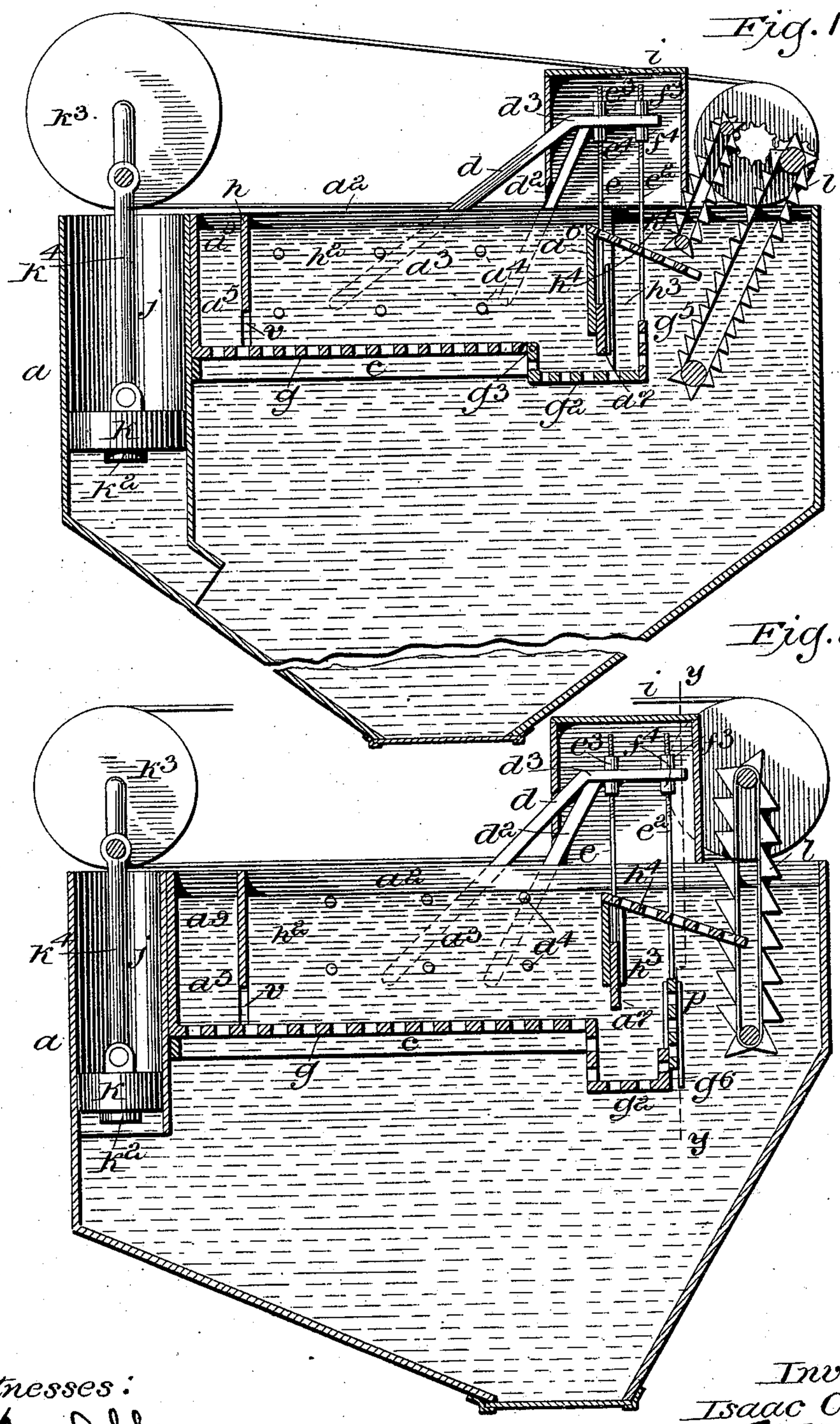

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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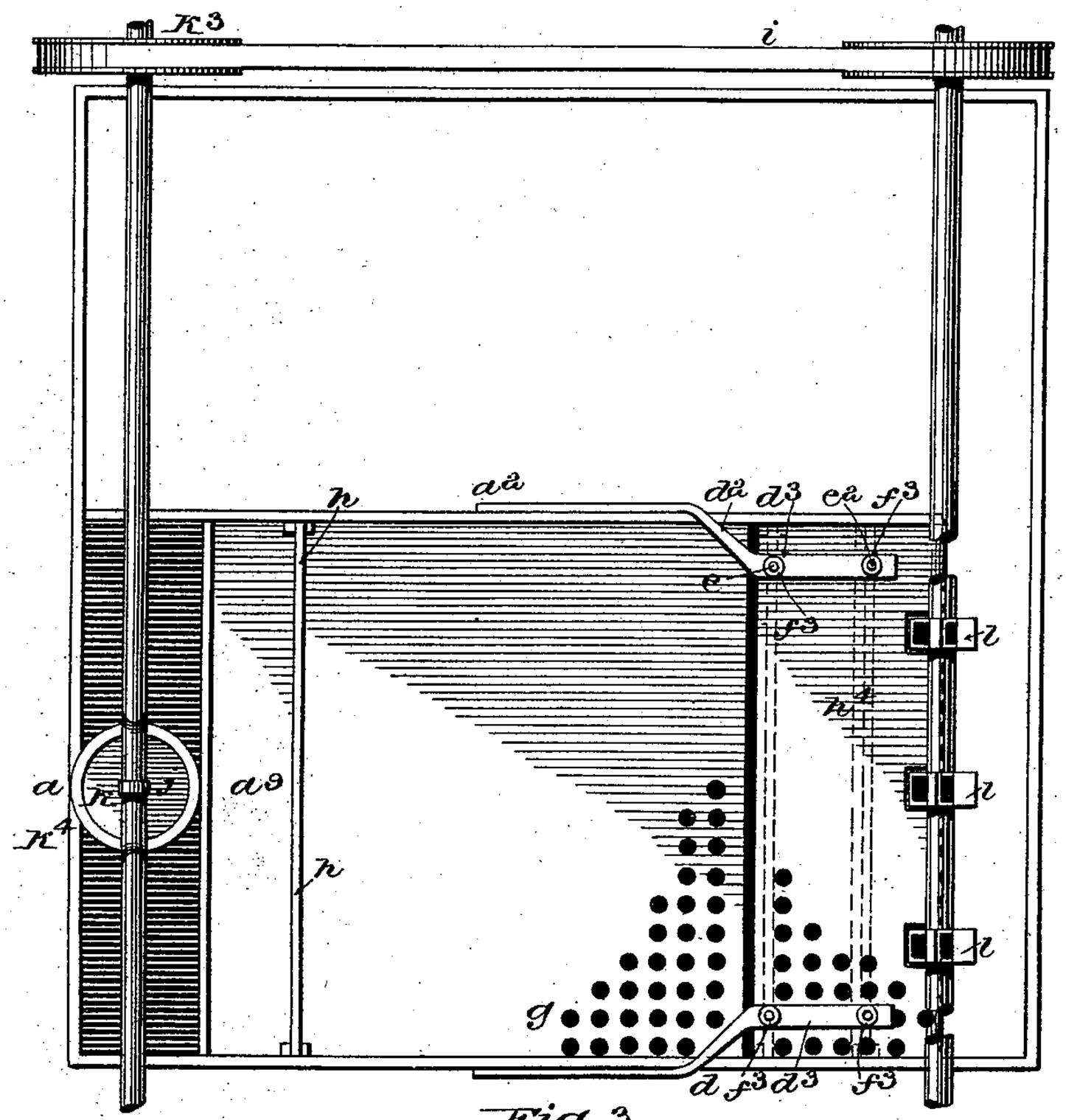
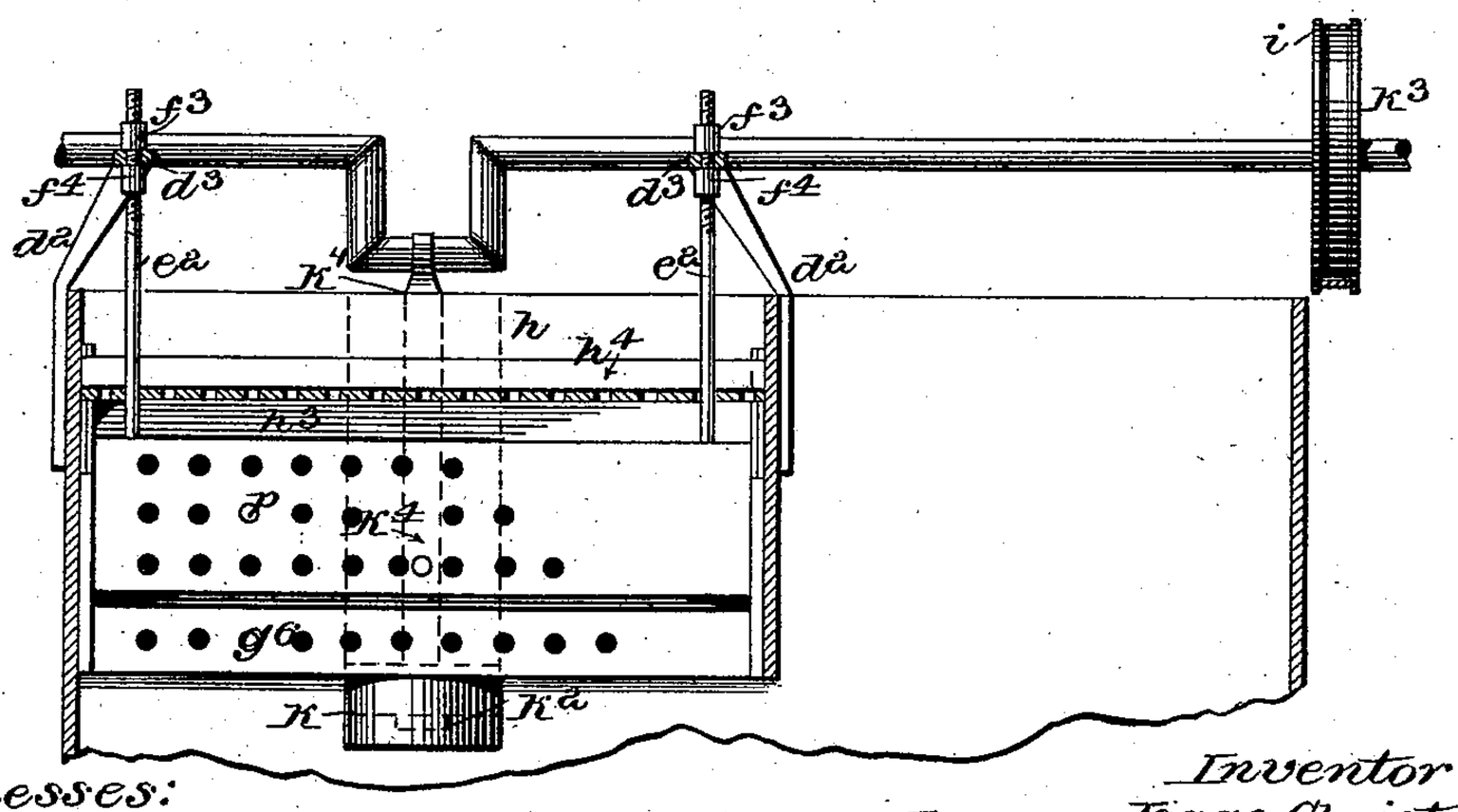


Fig. 3.



Witnesses:
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Fig. 4.
on line y-y

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UNITED STATES PATENT OFFICE.

ISAAC CHRIST, OF TAMAQUA, PENNSYLVANIA.

SEPARATING APPARATUS FOR MINERAL SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 534,467, dated February 19, 1895.

Application filed June 7, 1894. Serial No. 513,761. (No model.)

To all whom it may concern:

Be it known that I, ISAAC CHRIST, a citizen of the United States, and a resident of the borough of Tamaqua, in the county of Schuylkill, in the State of Pennsylvania, have invented a new and useful Separating Apparatus for Mineral Substances, of which the following is a full and accurate description.

The invention relates generally to the class of machines which are employed, in the vicinity of collieries, in the treatment of the products thereof,—after they have been broken, and "graded" or assorted into sizes,—with a view to their further improvement, through the separation of the slate, and other inferior substances of like gravity, from the coals; and it relates particularly to improvements upon a separating-apparatus for mineral substances which constitutes the subject-matter of an application for a patent, which was filed by me in the United States Patent Office on the 7th day of April, 1894, and which bears the serial number 506,692.

In the application above referred to, I described and claimed as of my own origination, a water-tank provided with receptacles or chutes for separated coal, and for the refuse therefrom, combined with a contained reciprocating-receptacle which at one extremity has a compartment for receiving the material, as it is discharged into the receptacle,—which at its opposite extremity has a discharging-compartment or receptacle, and which, between the two end-compartments, has a separating-compartment,—that is, a compartment in which the refuse is separated from the coal;—the separation being effected through the movement of the receptacle, up and down, aided by the presence of the water, in which these substances have partial flotation,—although not in equal degree. In connection with the reciprocating-receptacle were provided a grated or perforated bottom-plate a section of which is pivoted and made adjustable, up or down, in an arc,—and a vertical extension-plate which is adjustable, up or down in a vertical plane;—the two adjustable parts being provided with novel securing appliances.

In the construction now presented, the features claimed as novel in the application above referred to, are in the main, retained, in connection with some minor improvements; but I have discovered that the advantages of the elements and combinations of novelty therein claimed as of my invention, are available in a large, if not in a fully equal degree, under a construction in which the receptacle for the coals and other substances, is rigidly maintained in its position, instead of being made to reciprocate, up and down, as in the described application;—the provision of a reciprocating plunger, within the tank, in connection with the fixed receptacle, provided with the open or grated bottom, and with the adjustable extension plate, being satisfactorily effective for the separation of the slate from the coal, and for the certain, regular, and simultaneous discharge of the two, at different elevations;—as in the former construction.

In the accompanying drawings, which constitute a part of this specification:—Figure 1 represents a longitudinal, vertical sectional elevation of a separating-apparatus in which my invention is embodied. Fig. 2 is a longitudinal vertical section of an apparatus which is similar to that which is represented in Fig. 1; but differing therefrom in some of the details of construction;—as will appear from the further description thereof. Fig. 3 is a top plan view; and Fig. 4 is a vertical transverse section, in the line y—y of Fig. 2.

It will be understood that under the construction represented in each of the figures above described, the containing-tank a, will be composed essentially of wood, or of wood and iron, as is common.

As is represented in Fig. 1,—the metallic side-plates a^3, of the material-receptacle a^2, are secured by bolts a^4, to the corresponding surface of the tank a. The end-plates a^5 and a^6 of the receptacle a^2, will also, by their ends, be suitably secured to the wooden body of the tank; and the perforated bottom-plate or grate g, of the receptacle a^2 will rest by its edges, upon suitable cleats c, which are secured to the body of the tank, the pivoted, depressed, trough-like discharging end-section g^2 of the grate, being supported through its pivotal connection g^3 with the main body g, of the bottom-plate or grate, as seen in the figure referred to and by its adjusting-rods e^2, which are suitably attached to the upper extremity

of the grated front g^5, of the depressed section. The inclined rod-supporting arms, d and d^2, are by their lower portions made fast to the body of the tank,—upon the exterior surface thereof,—and in their upper inwardly turned horizontal portion d^3, they receive the adjusting-rods e and e^2, which operate, respectively, the extension-plate a^7, upon the end-plate a^6, of the receptacle a^2, and the pivoted, depressed, discharging end-section g^2, of the grate or bottom-plate g. The threaded supporting-rod e is provided with an adjusting spool e^3, above and upon the horizontal extremity d^3 of the supporting-arm d, and with a securing spool or nut e^4 below such arm; and similar adjusting and securing-spools f^3 and f^4 respectively, are provided upon the rod e^2, by which the discharging end-section g^2 or the independent grated vertical regulating plates p of the grate or bottom-plate g is adjusted. In practice, a detachable protecting-case, or housing i, which is adapted to be closed and locked about the spools e^3 and e^4, and about the spools f^3 and f^4, to prevent change of adjustment by unauthorized persons, is provided. A plate h which may be made adjustable up or down, in coincident vertical grooves v formed in the side-plates, serves as a partition to constitute in connection with the side-plates and with the rear end-plate a^5, an inlet-chute or primary compartment a^9. The discharging-section g^2 of the grate g, in connection with the front end-plate a^6, forms a discharging-chamber h^3, of variable capacity; and the space intermediate of the two end-chambers constitutes the separating-chamber h^2. The grated incline or chute h^4, extending forward from the upper extremity of the front end-plate a^6, is preferably secured in its discharging position in such manner as to be detachable, for renewal when necessary; or for convenience of access to adjacent parts of the apparatus.

To the rear of the material receptacle is the plunger-chamber j, which extends downwardly to a point a considerable distance below the plane of the separating-receptacle.

The plunger k, having the valve k^2, is operated by means of the pulley k^3, to which the plunger-rod k^4 is eccentrically pivoted, as shown. At the opposite extremity of the tank, and in advance of the discharging-extremity of the separating-receptacle, is the elevating-mechanism l, which for the purposes of this invention may be of ordinary construction. It will be noted that the front part g^5, as well as the rear part and the bottom-part, of the pivoted extension g^2, is represented as perforated or grated.

Under the construction represented in Fig. 2 the proportions of the containing-tank are varied, somewhat, from the construction seen in Fig. 1; the discharging-extremity of the plunger-chamber is not contracted; the vertical extent of the depressed extension g^2, is made greater; the extension itself is made integral with the grate or bottom-plate, instead of being pivoted thereto, and made adjustable in an arc; and an independent regulating plate p, adjustable up or down by its rod e^2, is operated in connection with the relatively short upwardly-extending front plate or rim g^6, the plate p being movable in suitable vertical ways, formed in or upon the side-walls of the tank.

In the operation of the apparatus, the material to be treated being supplied to the primary compartment a^9, through or along a suitable conductor, will be received upon the surface of the grated bottom-plate, and will then at once be subjected to the lifting and separating action of the water-currents, which, being set in motion by the displacing action of the plunger, find their most direct exit obliquely upward and forward, through the openings of the grate or bottom-plate, and operate to lift and partially float the pieces of coal, separating them from and elevating them above the slate, and moving them, gradually but surely, to their point of discharge, at the highest extremity of the inclined chute h^4, the slate being simultaneously moved, by the action of the same currents, but in a substantially horizontal plane, to its point of discharge, above the depressed section or cavity g^2 of the grate or plate g,—the plane of the discharge being varied and regulated by adjustment of the raising and lowering rod e^2, as may be desired;—the rapidity of the discharge being affected also by like movement of the extension-plate a^7, upon the end-plate a^6, of the receptacle.

Under the construction represented in Fig. 2, in which the depressed end-section g^2 of the grate is not pivoted and separately adjustable,—but is made integral with the main body of the grated bottom,—and in which the separate and independent plate p, is made adjustable in coincident vertical ways in or upon the sides of the tank, and in connection with the outer face of the short upwardly-projecting front plate or rim g^6 of the trough-like depression or discharging-cavity g^2, the slate discharge is effected at a higher or a lower level, according to the adjustment of the independent regulating-plate p.

Through the provision of the duplicate or upper and lower securing-nuts, e^3 and e^4 upon the adjustable-rod e, and f^3 and f^4, upon the adjustable-rod e^2; the extension-plate a^7, and the depressed section g^2 when pivoted, or the independent regulating-plate p, when that is employed in connection with the fixed depressed section g^2, the adjustable supporting rods may be effectively secured in their adjustment; and through the provision of the housing or locked protecting-case i, access to these parts by unauthorized persons is rendered impossible, and thus the entire apparatus when once carefully regulated and set in order for the proper performance of its work, may be left wholly unattended for an indefinite period,—the operation of supplying the material and separating and discharging

it, proceeding automatically, and with perfect regularity and success, so long as the supply of material is continued, undiminished.

It will be apparent that the movement of water-currents through the openings in the grated auxiliary plate *p*, will greatly facilitate the discharge of the finer portions of the separated refuse; and that by reason of the adjustability of such plate, not only is the capacity of the discharging-chamber h^3 made variable, but it is made practicable to readily discharge the contents of such chamber either at the upper edge of the front proper, or at any desired higher point within the range of adjustability of the auxiliary plate.

The invention having been thus described, what is claimed as of my invention is—

1. In a separating-apparatus for mineral substances, a containing-tank; a fixed separating-receptacle, within the tank, provided with a one-part grated or open-work bottom-plate which at its front extremity is depressed below the plane of the main body of the plate,—and provided also with a front end-plate which is shortened at top and at bottom, to provide discharge-openings; an adjustable extension-plate which operates in connection with the lower extremity of the shortened end-plate; an adjustable grated regulating plate which operates in connection with the front extremity of the depressed discharging-section of the bottom-plate and constitutes the main portion of the front wall of such extension; and a plunger-chamber and a plunger, in the rear portion of the containing-tank, in combination; substantially as described.

2. In a separating-apparatus for mineral substances,—a water-tank; a fixed separating-receptacle within the tank, provided with a grated or open-work bottom-plate which at its discharging extremity has a transversely-extending trough-like offset or depressed section, with a primary or receiving-compartment, with a front end-plate which at top and at bottom has a discharging-opening, with a discharging-chute at the upper extremity of the front plate, with an adjustable extension-plate at the lower extremity of the front grated plate, and with an adjustable plate which operates in connection with the front extremity of the depressed trough-like section of the bottom-plate; in combination with a plunger-chamber; and with a plunger which is operated to force volumes of water obliquely upward in a series of rapidly-succeeding movements,—through the fixed separating-receptacle, thereby causing the slate and the coal to become separated, and to be separately discharged.

3. In a separating-apparatus for mineral substances, the combination with the separating-receptacle, of the described end-plate a^6, cut away above and below, as described, and having the extension-plate a^7, operated by the adjusting-rod *e;* and the grated plate *p*, operating in connection with the depression or trough-like offset g^2, and with its grated front g^6 and adjustable by the rod e^2, and its spool f^3; whereby discharge may be effected either over the upper edge of the fixed grated front g^6, or over the upper edge of the adjustable grated front *p*, as may be desired.

ISAAC CHRIST.

Witnesses:
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C. E. CHRIST.