F. PARDEE.

APPARATUS FOR SEPARATING COAL, ORE, &c.

APPLICATION FILED MAY 2, 1913.

1,197,946.

Patented Sept. 12, 1916.

2 SHEETS—SHEET 1.

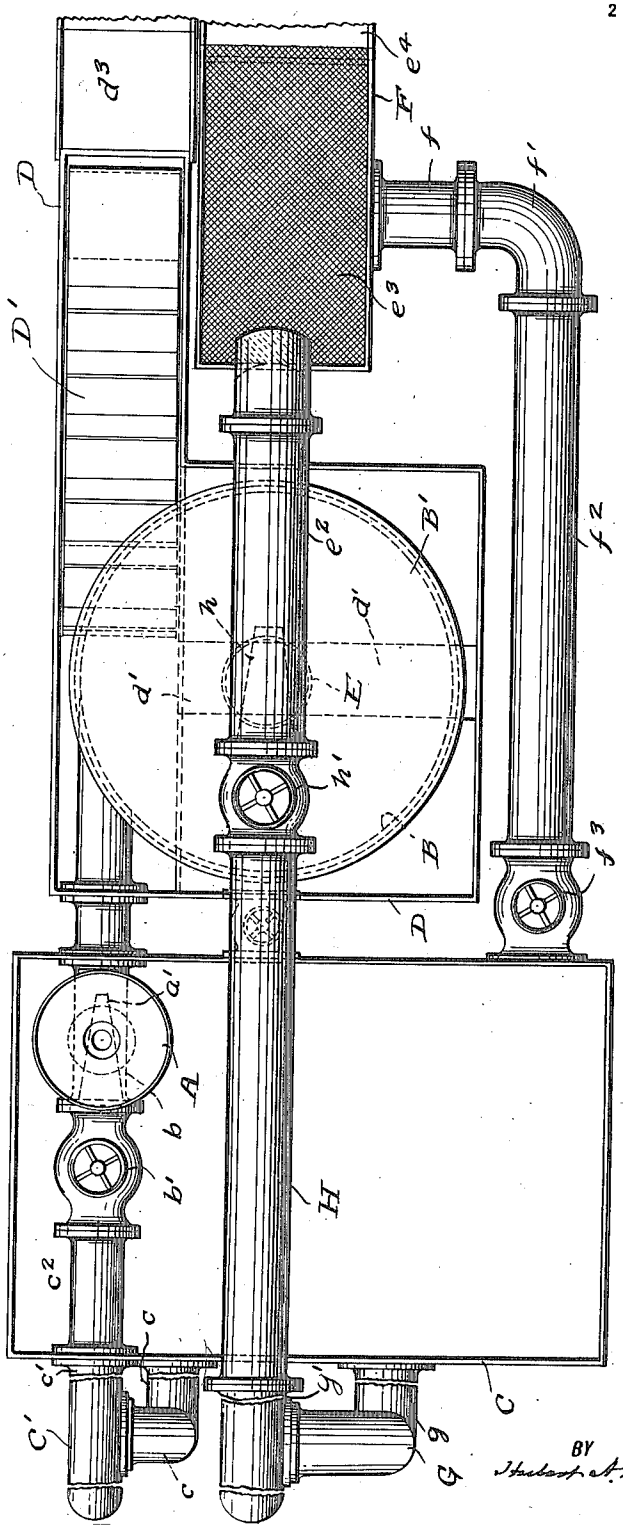


Fig 1.

WITNESSES

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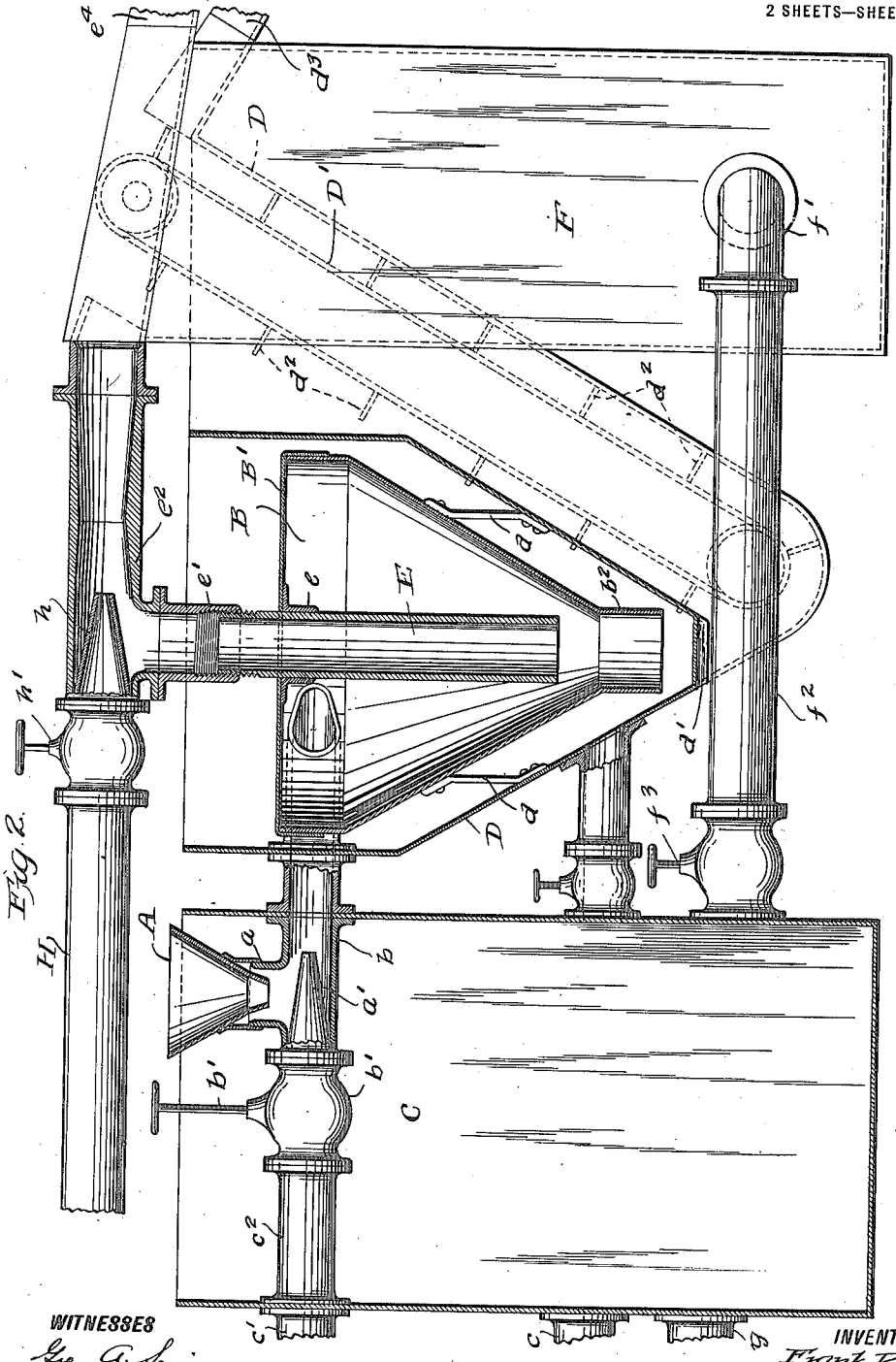


Fig. 2.

WITNESSES

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APPARATUS FOR SEPARATING COAL, ORE, &c.

1,197,946. Specification of Letters Patent. Patented Sept. 12, 1916.

Application filed May 2, 1913. Serial No. 765,171.

To all whom it may concern:

Be it known that I, FRANK PARDEE, a citizen of the United States, and a resident of the city of Hazleton, in the county of Luzerne and State of Pennsylvania, have discovered or invented certain new and useful Improvements in Apparatus for Separating Coal, Ore, &c., of which the following is a specification, reference being had to the accompanying drawings.

The improvements relate to apparatus for separating solid substances of different specific gravity and weight and is of the hydraulic or jig type constituting one means by which the separating operation set forth and claimed in another application filed by me on May 2nd, 1913, Serial No. 765,170, may be practically carried into effect in separating some of the commercial sizes of coal from bone or slate, or in separating various kinds of ores from rock and other foreign substances or impurities.

The invention consists of a combination of elements comprising means for admitting mixed materials to a feed-pipe, means for forcing or drawing water and the mixed materials through said pipe under regulated pressure, a separating chamber into which said feed-pipe leads tangentially, said chamber having an outlet, at its lower end, for the heavier materials, a chamber for receiving the heavier materials when they pass through the outlet therefor in the separating chamber, an exhaust-pipe depending within the separating chamber and means for causing a flow of water up through said exhaust-pipe for removing the lighter materials from said chamber and means for otherwise circulating and regulating the flow of water, as hereinafter more fully described and claimed.

Figure 1, of the drawings, is a plan view of the apparatus adapted to the use of water as the fluid or medium for causing the separation of the materials and for cleansing those which are useful and require saving. Fig. 2, is a sectional elevation of the same apparatus.

A centrifugal differential movement is imparted to the mixed materials by the water coming from the feed-pipe which enters a separating chamber, the action in the separating chamber being such as to impart a spiral downward motion of the materials while drawing those of lighter weight inward or toward the central part of the separator. The resistance to the gravitation of the lighter substances is increased so that they slow-up as they come to a plane or series of planes where they are held for an instant in suspension, and are then drawn into the main vortex and follow the exhaust-draft and are finally delivered separate from the heavier materials.

The materials to be separated are preferably fed through a hopper A, and stand-pipe a, to a horizontal feed-pipe b, opening tangentially into the upper part of a separating chamber B, which is preferably conical and provided with a tight fitting cover B′. The stand-pipe a, leads into the feed-pipe b, above, near, or in front of an ejector or nozzle a'. A cock or valve b', is used to regulate the volume and force or pressure of the water ejected from the pipe b, through the nozzle a'. The water is supplied from a tank C, by a pump C′, the tail or suction-pipe c, which by connections not shown, draws its supply from the upper part of the tank C, and the outlet or discharge pipe c', of which connects with a water feed-pipe c^2, leading to the valve b', and ejector or nozzle a'.

The conical separating chamber B, has an opening or spout b^2, at its lower end through which the heavier materials drop into a receiving chamber D. The chamber D, surrounds the separator B, to which it is secured by braces d, d, and extends somewhat above the cover B′, of the separating chamber B. The feed-pipe b, passes through the shell of the chamber D, and through the space between the chambers B, and D, so as to open tangentially into the separating chamber as shown in Fig. 2. The chamber D, has a sloping bottom d', which leads the heavier materials to one side where they drop into an extension of the chamber D, forming an elevator compartment as seen in Fig. 1. The formation is such as to deepen the compartment of chamber D, and allow the heavier materials to drop from the sloping bottom d', to an elevator D′, having the scrapers d^2, which take up the heavier materials and convey them to a chute d^3, in proximity to the dumping end of the elevator, while the water carried by the elevator D′, falls back into the elevator compartment. The chamber D, is connected with the tank C, by a pipe d^4, and controlling valve d^5, which may be opened or closed as desired.

A pipe E, passes down into the separating chamber B, and ends somewhat above the bottom of the chamber or above the spout b^2, through which the heavier materials pass to the chamber D. The pipe E, passes up through a collar e, and through the lid or cover B′, and is made adjustable. It is shown as having a threaded upper end connecting with a flanged threaded coupling e', which joins a discharge-pipe e^2, from which the lighter materials are ejected over a screen e^3, to a chute e^4, for conveying them to any desired place or receptacle. The screen e^3, is placed over a tank F, which receives the water from the discharge or outlet-pipe e^2.

The water in the water-receiving tank F, returns to the tank C, through pipe connections f, f', f^2, and is controlled by a valve f^3, near the tank C. The exhaust is caused by a pump G, the tail or suction pipe g, of which connects with tank C, and the discharge pipe g', of which connects with a pipe H, leading to an ejector or nozzle h, in the discharge pipe e^2, so as to produce a jet of water which exhausts from the pipe E, and conveys the lighter materials from the lower part of the separator B. A controlling valve h', is placed behind the ejector h, so as to regulate the volume and force of the water or fluid coming from the pump G, and that of the suction or exhaust draft for the lighter materials.

Assuming materials of different specific gravity and weight to pass through the funnel or hopper A, into the feed-pipe b, and the pump C′, to be set in operation, and mixed substances will be driven or forced through the feed-pipe into the separating chamber B, and make various convolutions while descending. The pump G, being also set in motion will exhaust the contents of the pipe E, by the action of the water delivered from the ejector h, to the discharge pipe e^2. The exhaust thus produced will increase the circulation of the water in the separating chamber B, and cause it to form eddies and vortices which act to retard the descent of the lighter materials and to draw them inward toward the exhaust pipe E, and also suspend them in the fluid at and near the lower end of the pipe E, so that the lighter substances will be drawn into the main vortex and up through the pipe E, to the discharge pipe e^2, in front of the ejector h, and will be forced over the screen e^3, to the outlet chute e^4. The ejected and exhaust water will pass through the screen e^3, into the water receiving chamber F.

The superior force of gravity inherent in the heavier substances, will cause them to drop below the separating vortex and escape into the receiving chamber D, and pass from the bottom d, to the elevator D′, which conveys them to the chute d^2.

It will be understood that the several tanks, receivers and pipes throughout the system, are partially filled with water when the pumps are operating. There will always be more or less empty space and some air in the circulation which will aid in the formation of the eddies and convolutions in the separating chamber, but the apparatus as herein shown and described may be regarded as essentially hydraulic, serving to wash and to separate the desirable materials or commodities.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:—

1. In separating apparatus for coal, etc., the combination with a feed pipe, of a separating chamber into which said pipe leads tangentially, said separating chamber having a normally open outlet at its lower end for the heavier materials and an outlet at a point above the lower end for the lighter materials, a receiving chamber receiving the heavier materials and water from the separating chamber, and adapted to settle said materials from the water, means for separating water from the solids of the effluent and means connected to both the receiving chamber and the effluent water separator for returning the water to the feed pipe and separating chamber.

2. In separating apparatus for coal, etc., the combination with a hydraulic separating chamber having a normally open bottom outlet, of a receiving chamber inclosing said separating chamber and communicating with said outlet and adapted to settle the solids from the liquid, means for drawing off the lighter particles from the separating chamber, means for separating water from the solids of the effluent and means connected to both the receiving chamber and the effluent water separator for returning the water to the separating chamber.

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Witnesses:
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A. T. PLATT.