J. M. DRAPER.

SEPARATOR FOR THE TREATMENT OF COAL, CLAYS, ORES, AND THE LIKE.

APPLICATION FILED FEB. 4, 1919.

1,351,234. **Patented Aug. 31, 1920.**

FIG. 1.

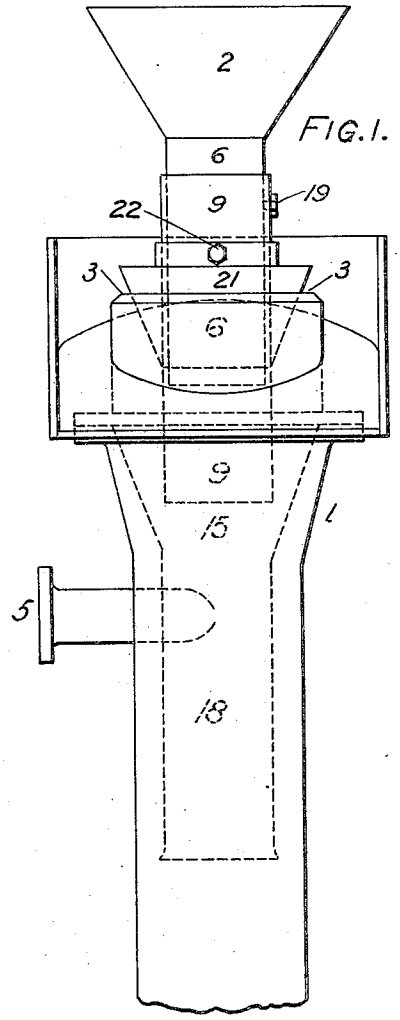


FIG. 2.

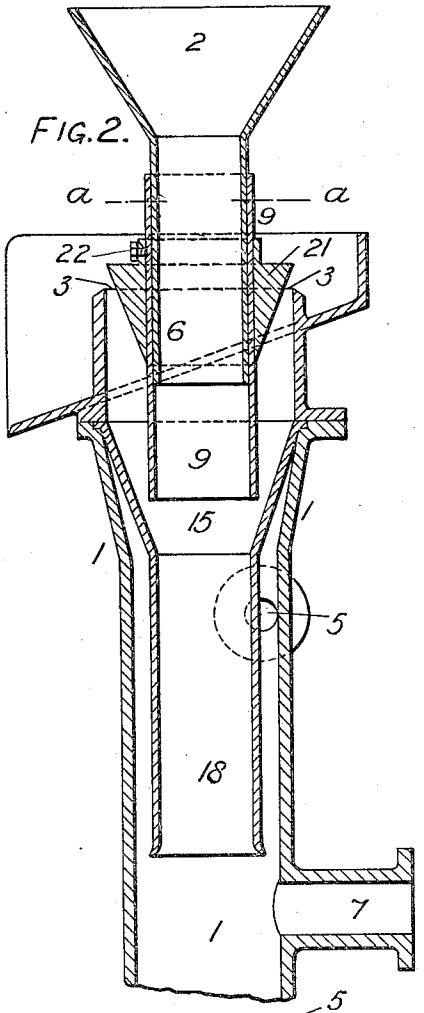
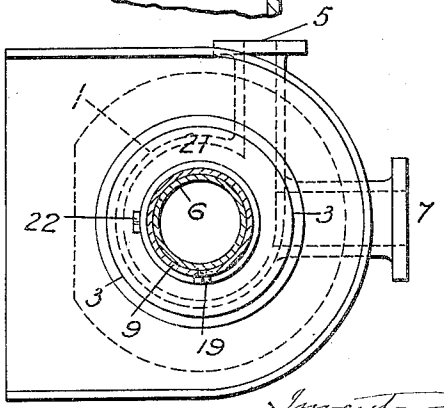


FIG. 3.



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UNITED STATES PATENT OFFICE.

JOHN MARRIOTT DRAPER, OF BRIDGEND, ENGLAND.

SEPARATOR FOR THE TREATMENT OF COAL, CLAYS, ORES, AND THE LIKE.

1,351,234. Specification of Letters Patent. Patented Aug. 31, 1920.

Application filed February 4, 1919. Serial No. 274,836.

To all whom it may concern:

Be it known that I, JOHN MARRIOTT DRAPER, a subject of the King of Great Britain, residing at New Foundry, Bridgend, in the county of Glamorgan, England, mining engineer, have invented new and useful Improvements in Separators for the Treatment of Coal, Clays, Ores, and the like, of which the following is a specification.

The present invention relates to separators of the class in which the material to be treated is caused to pass through an inner chamber contained in an outer receptacle in which an ascending current of water travels so as to carry the lighter portions of said material up with it to an overflow situated toward the top of the apparatus, while the heavier portions pass down and are discharged at the bottom thereof, and it consists in improvements in apparatus of this class in which as described in the specification of prior Patent 1,323,174, dated November 25, 1919, application Serial No. 201,518/15, the inner chamber is of inverted conical form and is provided with a downwardly depending tube from its apex, while the outer receptacle is preferably connected with a balancing column of liquid at a point intermediate the hydraulic connection and the point of discharge, as described in the specification of prior Patent No. 1,210,916, as also in that of said Patent 1,323,174.

The objects of the improvements are firstly to greatly increase the capacity of separators of this class and to enable same to handle largely varying sizes or kinds of coals, clays, ores and the like; secondly to provide a central feed to the inner chamber which is capable of adjustment to suit varying rates of flow or varying sizes of material to be treated; thirdly to provide means of adjustment to enable a definite rate of flow to be maintained in relation to whatever size of tube is employed depending from the apex of the inner chamber.

The improved apparatus is illustrated in the accompanying drawing, in which—

Figure 1 is a front elevation of the separator.

Fig. 2 a vertical section on a line at right angles to Fig. 1, and

Fig. 3 a plan view, but with the feed tube in section on the line *a*—*a* of Fig. 2.

1 is the tube or outer receptacle containing the inner inverted conical chamber 15 with its downwardly depending tube 18, and provided with a hydraulic connection 5 for the admission of water to produce the ascending current within said chamber and which passes to the overflow ledge 3 at the upper end.

7 is the connection to the outer receptacle 1 for the balancing column of liquid, which is not shown in the drawing but may as fully described in the specification of my said Patent No. 1,323,174 consist of an upwardly extending closed tube with a superposed air cushion above the level of liquid therein, or which balancing column may as described in the specification of my prior Patent No. 1,210,416 consist of a tube leading to an open tank arranged at a suitable elevation and in which a constant level of water is maintained.

To permit of the handling of all sizes of coal, ore, etc., in order to prevent choking in the separator the tube 18 should be as large as possible in relation to the conical inner chamber 15, which of course necessitates that a correspondingly large area of the outflow should be provided.

For this purpose I provide a circular or peripheral discharge overflow 3 so as to secure all possible area whatever be the diameter of the apparatus and thereby vastly increase the capacity thereof.

The feed to the conical chamber 15 is central to such chamber so as to present the material to the action of the ascending current rising through the depending tube 10 at the point of maximum flow, and thus insure maximum efficiency of separation.

The feed comprises a hopper 2 with a downward tubular extension 6 terminating at a distance above the conical inner chamber 15 and over which a telescopic tube 9, fitted with a fixing bolt 19, is mounted to permit of adjustment of the point of delivery to vary the feed to suit various rates of flow, or to suit the feed of various sizes of material.

For the purpose of enabling a definite rate

of flow to be maintained in relation to whatever size of tube 18 is employed at the bottom of the inverted conical inner chamber 15, a movable cone shaped adjuster 21 is arranged so that its adjustment will vary the extent of area open for the overflow at 3, to permit of the regulation of the discharge to suit the treatment of material of any particular size when a tube 18 of a given diameter is employed, and thereby maintain the velocity of the ascending current which is required for the separation and carrying upward of the light material of such given size, and allow the heavy material to fall freely and pass to the discharge.

This cone shaped adjuster 21 is mounted on the telescopic tube 9 of the central feed, on which it is capable of adjustment and of being fixed in position by the binding bolt 22.

In some cases it will be found advantageous to impart a gyratory motion to the water in the upper part of the tube or outer receptacle 1, and which movement will consequently in some measure extend to the ascending current in the separating tube 18 depending from the apex of the inverted inner conical chamber 15, and for this purpose the hydraulic connection 5 for the admission of the water to said tube or outer receptacle 1 will be made in a direction tangential to said tube.

The imparting of this gyratory movement to the separating liquid will be found of especial value in dealing with certain classes of coal, ores, and clays, and will greatly increase the efficiency of the separating action thereof.

What I claim as my invention, and desire to secure by Letters Patent, is:—

1. A separator comprising an outer tube or receptacle, an inverted conical inner chamber to which the material to be treated is fed and from the apex of which a tube of relatively large diameter extends downward, a hydraulic connection for the admission of liquid to the outer tube or receptacle below the top of the inner chamber, a circular or peripheral overflow ledge above the upper end of said inner chamber, and a vertically adjustable conical regulator to adjust the area thereof, substantially as specified.

2. A separator comprising an outer tube or receptacle, an inverted conical inner chamber contained within the upper part of said receptacle to which the material to be treated is fed and from the apex of which a tube of relatively large diameter extends downward, a hydraulic connection for the admission of liquid to the outer tube or receptacle below the top of the inner chamber, a circular or peripheral overflow ledge above the upper end of said inner chamber, and a vertically adjustable conical regulator to adjust the area thereof, substantially as specified.

3. A separator comprising an outer tube or receptacle, an inverted conical inner chamber contained within the upper part of said receptacle and from the apex of which a tube extends downward, a central feed fitted with a telescopic adjustable delivery tube to regulate the point of delivery in relation to the bottom or apex of the inverted conical chamber, a hydraulic connection for the admission of liquid to the outer tube or receptacle below the top of the inner chamber, and a circular or peripheral overflow ledge above the upper end of said chamber, substantially as specified.

4. A separator comprising an outer tube or receptacle, an inverted conical inner chamber contained within the upper part of said receptacle and from the apex of which a tube of relatively large diameter extends downward, a hydraulic connection for the admission of liquid to the outer tube or receptacle below the top of the inner chamber, a circular or peripheral overflow ledge above the upper end of said inner chamber, a central tube delivering the feed to near the bottom or apex of such inner chamber and an adjustable conical regulator mounted on said central tube to adjust the area of the circular or peripheral overflow ledge above such chamber, substantially as specified.

5. A separator comprising an outer tube or receptacle, an inverted conical inner chamber within the upper part of said receptacle and from the apex of which a tube of relatively large diameter extends downward, a circular or peripheral overflow ledge above the upper end of said chamber, a central tube delivering the feed to near the apex of such inner chamber, an adjustable conical regulator to adjust the area of the circular or peripheral overflow ledge above such chamber, and a hydraulic connection for the admission of liquid to the outer tube in a direction tangential thereto, so as to impart a gyratory motion to the liquid contained in the upper portion thereof and to the current ascending in the tube depending from the inverted inner conical chamber, substantially as specified.

6. A separator comprising an outer tube or receptacle, an inverted conical inner chamber within the upper part of said receptacle and from the apex of which a tube of relatively large diameter extends downward, a hydraulic connection for the admission of liquid to the outer tube or receptacle below the top of the inner chamber, a circular or peripheral overflow ledge above the upper end of said chamber, a central tube delivering the feed to near the apex of such inner chamber, an adjustable conical regulator to adjust the area of the circular or peripheral overflow ledge above such

chamber, and a connection with a balancing column of liquid at a point in the containing outer tube or receptacle intermediate the hydraulic connection therewith and the bottom or discharge opening therefrom, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN MARRIOTT DRAPER.

Witnesses:
WILLIAM J. PERKINS,
F. H. LITTLE.