E. M. STEWART & H. H. McKENNA.

SEPARATOR.

APPLICATION FILED OCT. 10, 1916.

1,229,542.

Patented June 12, 1917.

2 SHEETS—SHEET 1.

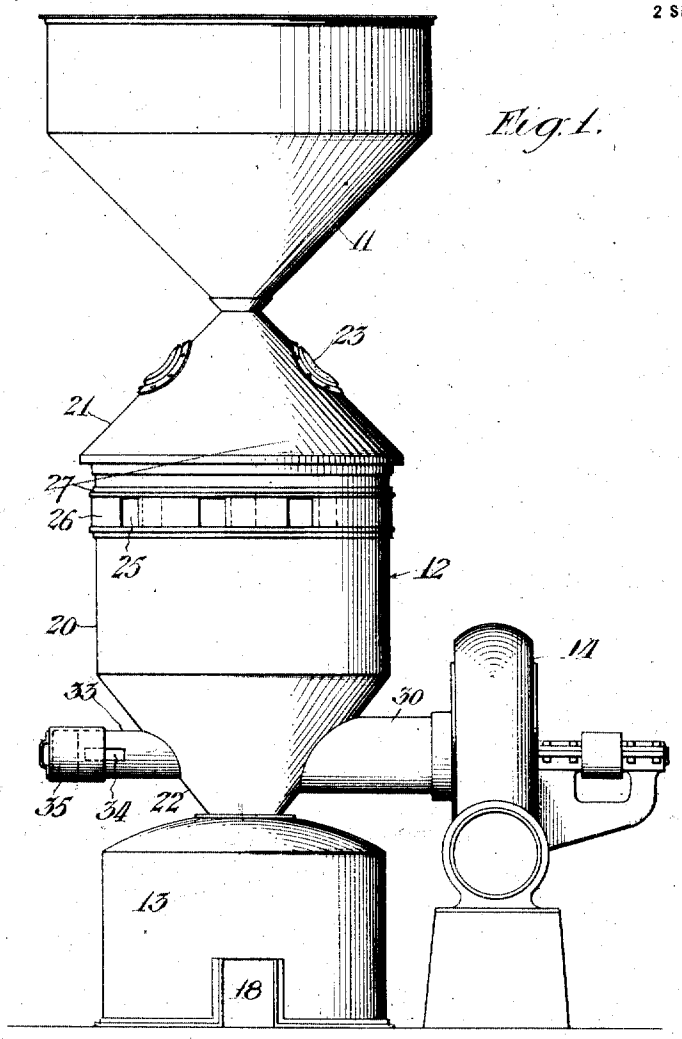


Fig. 1.

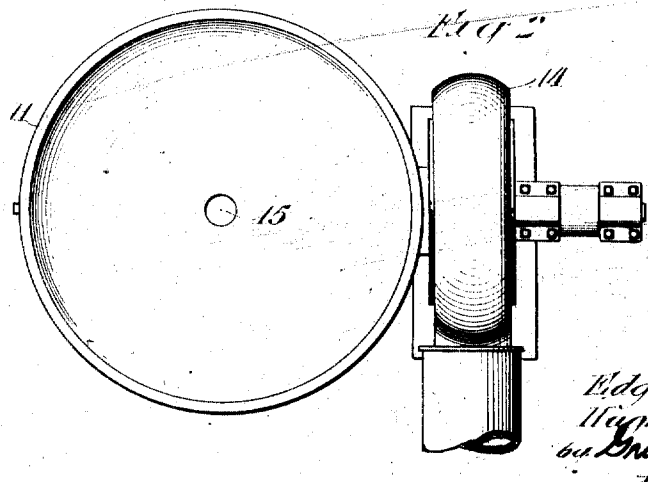


Fig. 2.

Inventors
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their Attorneys

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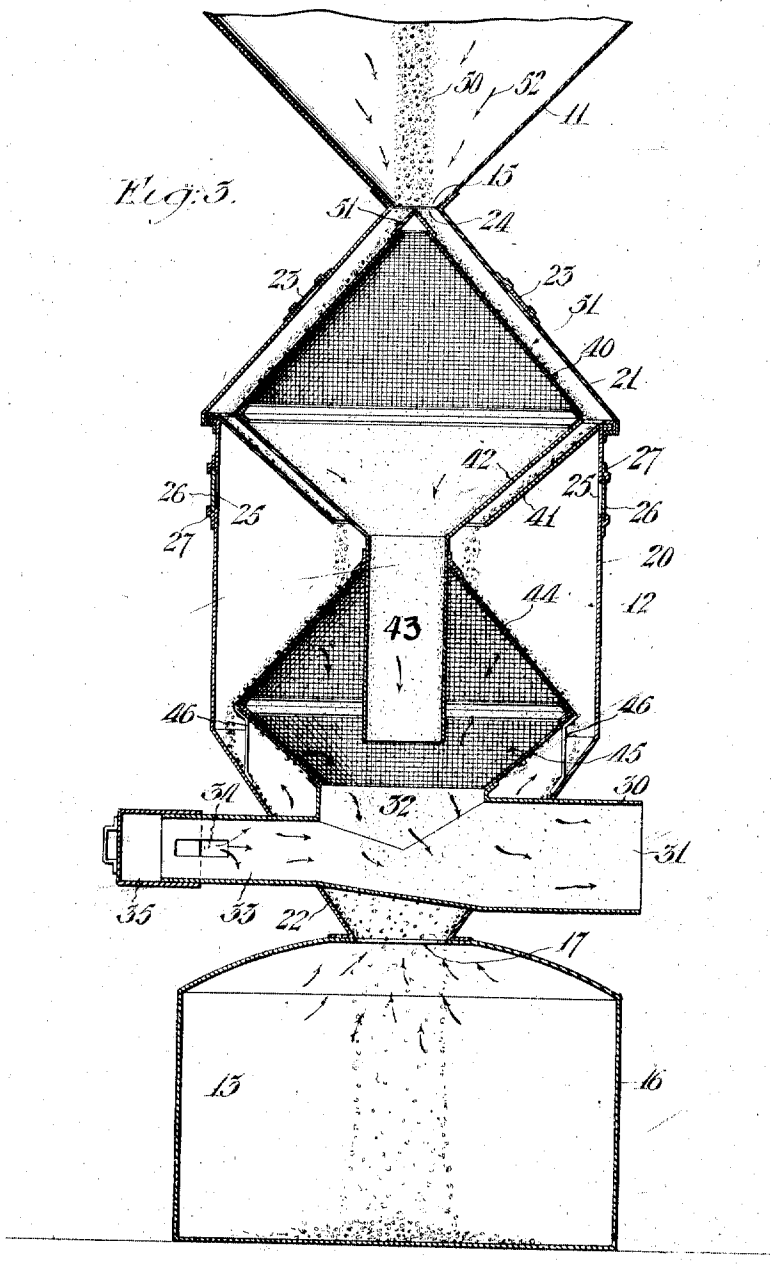
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2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

EDGAR M. STEWART, OF LANG, AND HUGH H. McKENNA, OF LOS ANGELES, CALIFORNIA, ASSIGNORS OF ONE-THIRD TO THOMAS THORKILDSEN, OF LOS ANGELES, CALIFORNIA.

SEPARATOR.

1,229,542. Specification of Letters Patent. Patented June 12, 1917.

Application filed October 10, 1916. Serial No. 124,911.

To all whom it may concern:

Be it known that we, EDGAR M. STEWART and HUGH H. McKENNA, citizens of the United States, the former residing at Lang, in the county of Los Angeles and State of California, and the latter residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Separators, of which the following is a specification.

The invention relates to the art of separating finely divided materials from a mixture of said materials with heavier and coarser particles.

This is accomplished by a combination of suitable screens and a series of properly directed air currents.

The object of the invention is to provide a device into which a comminuted material may be dumped and in which the more finely divided portion of said material may be separated and delivered to suitable receptacles. It is especially valuable where the material to be separated is in the form of fine dust adhering loosely to heavier particles.

Such a device finds a wide application in the arts and may be applied to the separation of various materials. We have found it especially suitable for the separation of values from borax bearing material after said material has been dehydrated, and in the description the treatment of such material will be described. We obviously do not limit ourselves to any particular application of our invention, which may also be used in the treatment of other materials or in other arts.

In the drawings, which are for illustrative purposes only:—

Figure 1 is a side elevation of our invention.

Fig. 2 is a plan view of our invention.

Fig. 3 is a cross section on a slightly enlarged scale through the center of a portion of our invention.

Broadly considered, the apparatus illustrated consists of a receiving hopper 11, a separator 12, a waste bin 13, and a suction blower 14. The receiving hopper 11 is simply an open conical vessel having an opening 15 at its lower end. The blower 14 may be a centrifugal blower of standard construction driven by any convenient means. The waste bin 13 consists of a shell 16 having an opening 17 at the top thereof, the shell 16 also serving as a support for the separator 12. A door 18 gives access to the interior of the bin 13 for the removal of waste matter.

The separator 12 consists of an outer shell having a central cylindrical portion 20, a conical top 21 and a conical bottom 22. Hand holes 23 are provided in the cover 21 which is secured to the hopper 11 and which is provided with an opening 24 registering with the opening 15 of the hopper 11. The cylindrical portion 20 is provided with a plurality of openings 25 which may be partially or wholly closed by a ring damper 26 which slides in guides 27 and which may be turned to regulate the amount of air admitted through the openings 25.

Passing through the bottom 22 is a draft tube 30, this tube having an opening 31 at one end, which is connected directly into the suction side of the blower 14, and having an opening 32 in the top thereof. The tube 30 is also provided with an air inlet portion 33 having openings 34 therein, these openings being wholly or partially closed by a cap 35 so that the flow of air through the openings may be readily regulated.

Secured inside the cover 21 is a primary screen 40, this primary screen being of conical form and concentrically located with relation to the cover 21. Secured in the top of the cylindrical portion 20 is an imperforate diversion cone 41, and secured to the lower edges of the primary screen 40 is an imperforate cone 42 preferably formed of sheet metal. The cone 42 terminates in a tube 43 which extends downwardly to a point slightly above the opening 31 in the draft tube 30. Secured to the upper end of the tube 43 is a secondary screen 44, this screen being conical in form and being joined at its lower end to a tertiary screen 45, the screen 45 being suitably braced by strap iron members 46. The screens 40, 44 and 45 may all be of the same mesh, or they may be of different meshes if desired.

The object of the separator 12 is to remove from a mixture of pulverized material, all the finer portions. The pulverized material is dumped into the hopper 11, falling in a stream approximately as shown at 50, and striking upon a metal cone 51 which protects the upper end of the screen 40 from

the impact of the falling material. The material slides down over the screen 40, as shown at 51, and a portion of the finer particles passes through the screen, partially due to the action of gravity, but mostly due to the suction of the blower 14 which draws air down through the hopper 11 as shown by the arrows 52, this air passing through the screen 40 and drawing the very fine particles of material with it. The screen 40 is shaken by the impact of the material on the cone 51 and by the movements of the heavy particles thereover, so that there is very little likelihood of it becoming clogged.

The material after passing over the primary screen 40 strikes upon the diversion cone 41 and is forced back toward the axis of the separator, falling upon the secondary screen 44 near its upper end. In its passage over the secondary screen 44 there is a further separation of material, due partially to gravity and partially to the action of the air currents which pass therethrough. The material falls from the screen 40 onto the conical bottom 22, passing downwardly thereover and falling through the opening 17 into the waste bin 13. The screen 45 is provided for the purpose of allowing any dust which is generated in the bin 13, or by the material in its passage through the bottom 22, to be drawn upwardly into the interior of the screen chamber and passed outwardly through the blower 14.

The successful operation of our invention depends in a great measure upon the careful regulation of the ring damper 26 and the cap 35; the effective suction of the pump being regulated by the cap 35 and the proportionate admission of air through the various screen members being controlled by the ring damper 26.

The successful operation of our invention further depends in a large measure upon the tube 43 which tends to properly direct the air currents and prevent eddy currents inside the screen chamber.

In the use of our invention for the separation of borax, the crushed material after being dehydrated, is dumped into the hopper 11, passing through the separator 12, as previously described, into the waste bin 13. In its passage through the separator 12 the fine particles of borax bearing material are shaken and sucked from the heavier particles, being drawn off through the blower 14 and passed from the pressure side of the blower into suitable collecting chambers not shown from which they may be readily recovered.

We claim as our invention:—

1. A separator comprising a cylindrical shell with a conical top having an inlet opening at the apex; a conical primary screen fitting concentrically inside said top; an imperforate conical return member secured to the bottom of said primary screen; an imperforate diversion cone secured at its outer edge to the inner walls of said shell and concentrically located close to said return member; a secondary screen secured to said return member inside said shell; means for creating a partial vacuum inside said screens; and a valve means for regulating the amount of air admitted to the space surrounding said secondary screen inside said shell.

2. A separator comprising a cylindrical shell with a conical top having an inlet opening at the apex; a conical primary screen fitting concentrically inside said top; an imperforate conical return member secured to the bottom of said primary screen; an imperforate diversion cone secured at its outer edge to the inner walls of said shell and concentrically located close to said return member; a secondary screen secured to said return member inside said shell; a tube secured to the bottom of said return member and projecting downwardly to a point near the bottom of said secondary screen; means for creating a partial vacuum inside said screens; and a valve means for regulating the amount of air admitted to the space surrounding said secondary screen inside said shell.

In testimony whereof, we have hereunto set our hands at Los Angeles, California, this 4th day of October, 1916.

EDGAR M. STEWART.
HUGH H. McKENNA.