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SEPARATOR.

APPLICATION FILED MAR. 9, 1912.

1,053,855.

Patented Feb. 18, 1913.

2 SHEETS—SHEET 1.

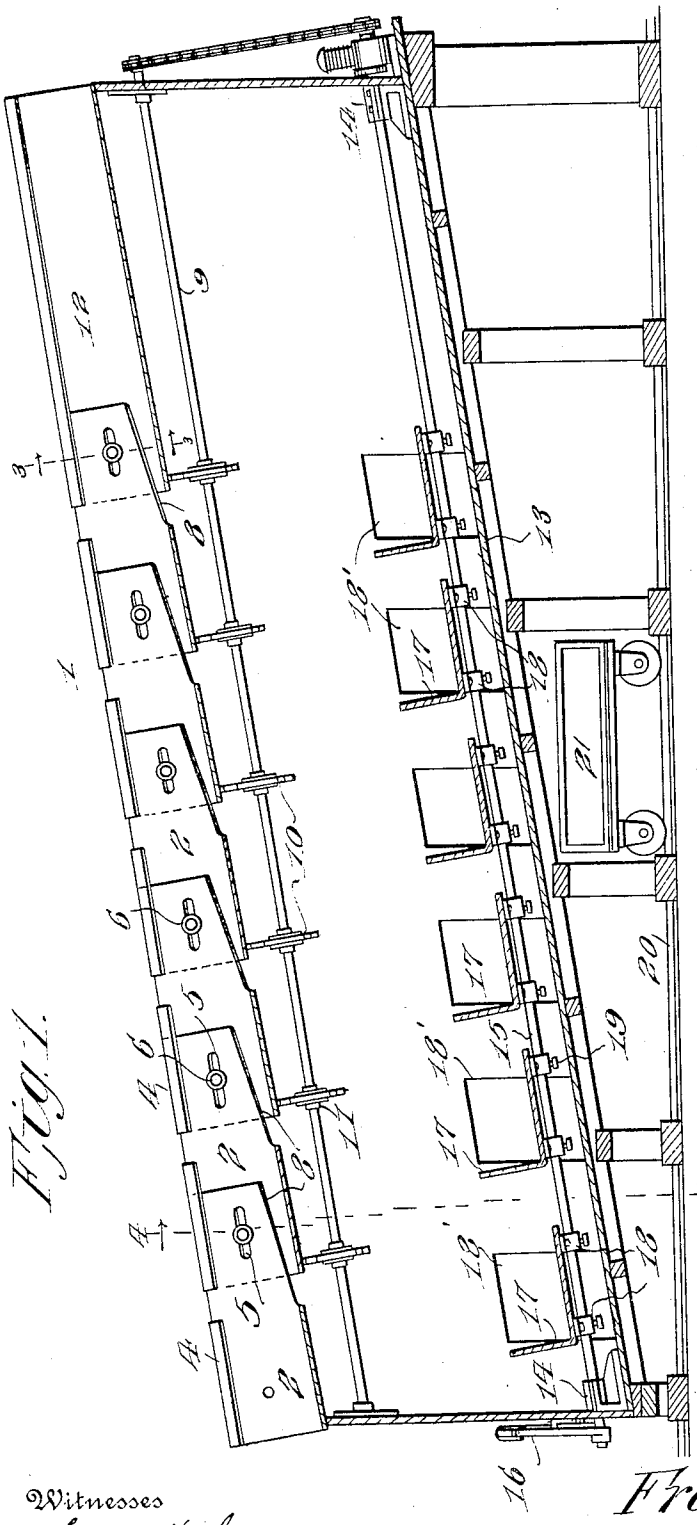

Fig. 1.

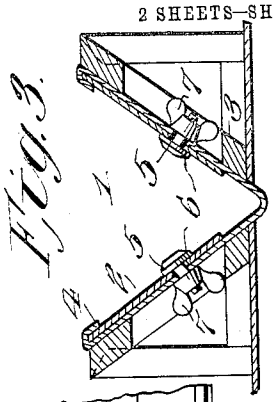

Fig. 3.

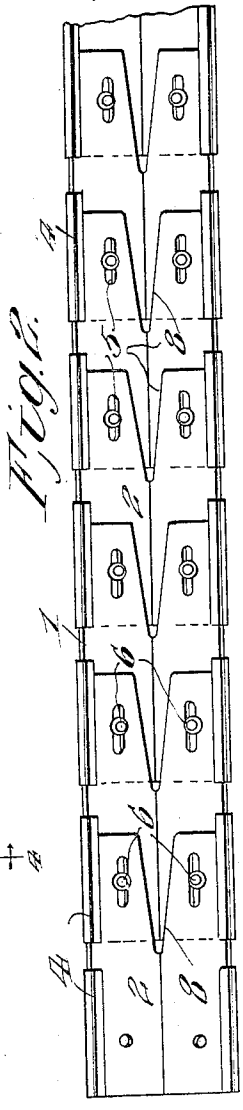

Fig. 2.

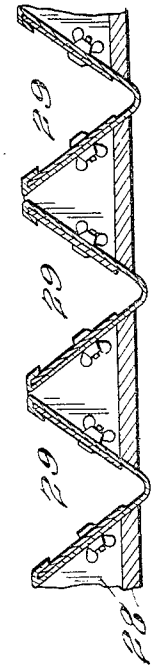

Fig. 4.

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2 SHEETS—SHEET 2.

Fig. 5.

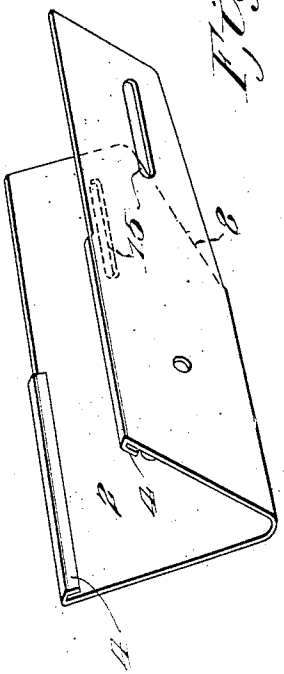


Fig. 7.

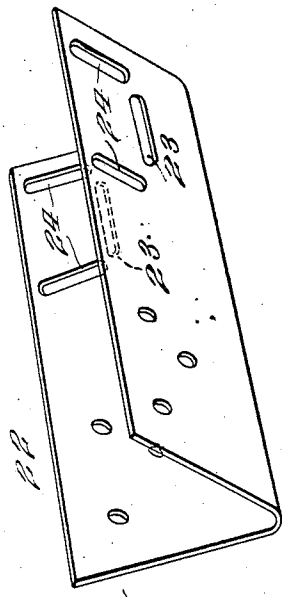


Fig. 6.

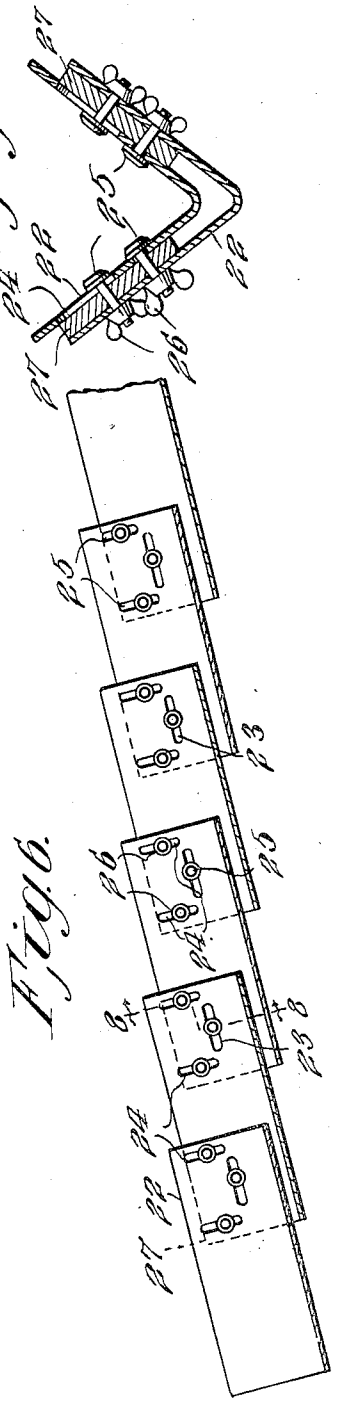
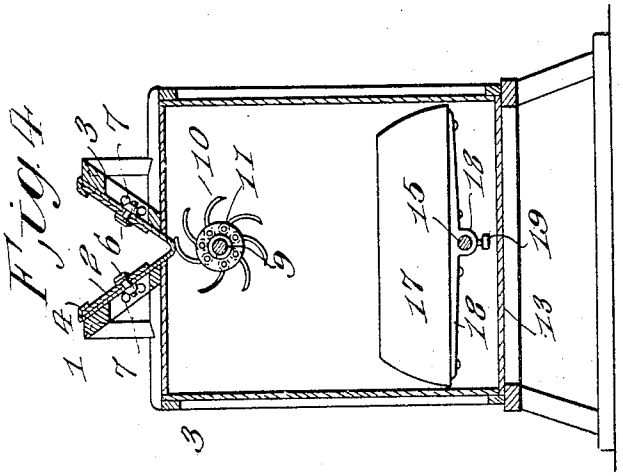


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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SEPARATOR.

1,053,855. Specification of Letters Patent. Patented Feb. 18, 1913.

Application filed March 9, 1912. Serial No. 682,585.

To all whom it may concern:

Be it known that I, FRANCIS C. NICHOLAS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Separators, of which the following is a specification.

This invention relates to the separation and classification of ores or other materials, and has for its object to render the process more expeditious and considerably cheaper.

With my method and apparatus, the substances to be separated are subjected to an impact of force, the exertion of which will cause particles of a certain size to collect with other particles of a similar size, and with the employment of skimmers in a series of troughs, arranged at an inclination, the accumulation of the particles are allowed to gravitate down the trough and are accurately sized by the successive skimmers within the trough.

The skimmers are arranged successively within the inclined trough, and any number of superimposed troughs may be employed in accordance with the desired rapidity of the separations, and as the different accurately sized particles emerge from the trough I have arranged therebelow simple and effective means for separating each of the series of sized particles in accordance with their varying specific gravities.

I accomplish the above with the aid of simple mechanism, a satisfactory illustration of the same being shown in the accompanying drawings, and in which drawings—

Figure 1 is a side elevation of the apparatus employed in carrying out my invention, parts being shown in section. Fig. 2 is a top plan view of the trough. Fig. 3 is an enlarged transverse sectional view taken upon the line 3—3 of Fig. 1. Fig. 4 is a sectional view upon the line 4—4 of Fig. 1. Fig. 5 is a perspective view of one of the skimmers. Fig. 6 is a side elevation of a slightly modified form of the trough. Fig. 7 is a perspective view of one of the skimmers employed in the construction of the trough illustrated in Fig. 6. Fig. 8 is an enlarged transverse sectional view taken approximately on the line 8—8 of Fig. 6. Fig. 9 is a front elevation of a series of troughs.

It is to be understood that the accompanying drawings are employed merely to illustrate the means whereby my invention may be reduced to practice and that I am not to be limited to the precise structural features shown therein, as the invention is susceptible to such changes in form, proportion, material, etc., as will fall within the scope of the annexed claims.

In the device illustrated in the drawings. I employ a trough 1, the same being made up of any desired number of sections 2. In the showing of the drawings each of the sections is substantially V-shaped in transverse section, and the said sections are supported upon a suitable frame 3. Each of the sections 2 has its longitudinal edges provided with inturned portions forming what may be termed ways and which are designated by the numerals 4. The flanges or ways 4 do not extend the entire longitudinal length of the sections, and the said flanges 4 of one of the sections is adapted to engage with the longitudinal edges of the succeeding section, thus arranging the trough with what may be termed steps, as the outer face and edge of the first section engages with the inner face and edge of the next section, and so on until the trough is completed. Each of the sections 2 is provided with an elongated slot 5 which is arranged upon its opposite sides, and passing through the registering slots of the sections are headed bolts 6. The threaded portions of the bolts are arranged upon the outer sides of the sections and are provided with thumb nuts 7. By this means it will be noted that any of the said sections are longitudinally adjustable with relation to the remaining sections, and that, through the medium of the nuts and bolts the said sections may be brought tightly into engagement with each other. Each of the sections at its bottom and adjacent what may be termed its front or forward edge is provided with a substantially V-shaped cut-away portion or opening 8, the walls of which provide the skimmers for the trough.

The trough is retained upon the frame 3 at a desired angle, suitable for the gravitation of the material to be sized and separated, and it will be noted that by the longitudinal adjustment of the sections 2, the space between the ends of the sections and the end walls of the V-shaped openings or skimmers may be regulated to a nicety. The frame 3 is substantially rectangular and

of a skeleton construction and mounted in suitable bearings provided by the said frame, and extending longitudinally of the frame directly below the trough is a shaft 9. This shaft is rotated by any suitable or desired source of power, and arranged upon the said shaft, at spaced intervals and directly below the sections of the troughs opposite to the ends provided with the skimmers are flexible beater arms 10. These arms 10 are in the form of curved fingers and are secured upon suitable collars 11, which in turn are attached to the shaft 9. When the shaft is operated it will be noted that each of the series of arms 10 contact with the sections of the trough and impart upon the under faces thereof a direct blow which may be considered an impact of force which does not impart a vibratory, oscillatory or shaking movement to the sections of the trough. This impact of force acts directly upon the substances to be separated and by this impact in the strata, which is first arranged within the upper section, designated by the numeral 12, of the trough, particles of a certain size will collect and mingle with other particles of a similar size. The particles, of course gravitate down the trough, and the particles of varying specific gravity will pass through the openings provided by the skimmers, the lighter particles through the openings nearest the section 12, the heavier particles or what may be termed the gradings which successively increase in specific gravity through the remaining openings, while the heaviest particles are deposited through the last section 2 of the trough.

It is to be noted that the separation or sizing of the material is accomplished by the gravitation of the said material within the trough in connection with the direct impact of force upon the bottom of the sections together with the inclined walls of the skimmer, and that no shaking oscillatory action or vibration is imparted to the sections of the trough as such action has been found, from actual practice will combine the material instead of obtaining the desired object, that of separation. As stated the impact force not only sizes the material but assists the same in gravitating down the trough, and the heavier particles of the material responding first to the action of gravity and being also under the influence of the impact blow will pass the openings nearest the section 12 of the trough. It will thus be noted that the lighter particles will fall through the first opening adjacent the said section 12, the next heaviest through the second opening, and so on until the heaviest particles pass over the last section of the trough, the skimmers directing the various sized particles toward their particular openings.

Arranged upon the frame 3, and at a suitable distance below the trough 1 and the shaft 9 is an inclined floor 13. This floor supports adjacent its opposite transverse ends suitable bearings 14 within which is mounted a shaft 15. The shaft 15 has one of its ends extending beyond the frame, and the said ends may be either offset or provided with a suitable handle 16, whereby the shaft 15 may be rocked.

The numerals 17 designate a plurality of substantially L-shaped separators. Each of these separators have their under faces provided with bearing brackets 18, through the bores or openings of which passes the shaft 15. Each of these brackets is provided with a retaining element, such as a screw 19, and whereby the said separators may be longitudinally adjusted upon the shaft and retained in the said adjusted position. One or both of the longitudinal sides of the frame may be closed, in which instance the closed side is provided with a plurality of openings 18′, and these openings are disposed below the openings or passages provided between the skimmers and the sections of the trough. It is, of course, understood that the graded material passing through the openings in the trough will, in accordance with their varying specific gravities, spread to the shape of a fan, the heavier particles falling nearest the vertical and it will be noted that by adjusting the separators 17 upon the shaft 15 a desired grade or weight of each of the separate series of particles will be caused to fall upon the horizontal member or base of the L-shaped separators.

Arranged opposite the side of the frame provided with the door-ways 18′ is a track 20 upon which is mounted for travel a wheel truck 21, and by rotating the shaft 15, through the medium of its handle 16 the separators 17 will be inclined and the particles received thereon will be deposited through the doorways or openings 18′ to the truck 21.

In Figs. 6, 7 and 8 I have illustrated a slightly modified form of the trough. As shown the trough is made up of a series of sections 22. These sections are interposed one above the other and each of the sections has its sides adjacent its end which is connected with the succeeding section provided with an elongated longitudinally extending enlarged opening 23 and spaced vertically extending elongated openings 24. The openings in the sides of one of the sections are adapted to register with the openings in the sides of the adjacent or co-acting sections, and the numerals 25 designate bolts which are adapted to pass through the openings, and to have the threaded portions thereof, which are arranged upon the outer faces of the sides, engage by suitable thumb screws 26. Interposed between the adjacent or connected sections are spacing blocks 27, each of which being provided with

openings corresponding with the openings 23 and 24, and by this arrangement it will be noted that the sections are not only sufficiently spaced apart but that any of the said sections may be adjusted either longitudinally or vertically with relation to the remaining sections. It is to be understood that when the sections are adjusted, say longitudinally, the securing bolts are removed from the vertical openings and, of course, the bolts are to be removed from the longitudinal openings when the sections are adjusted vertically. The sections are each subjected to an impact of force, the same being preferably produced by beater arms similar to those previously described, and the action of the material within the trough is similar to the action of the materials in the trough 1 when subjected to the impact force. The sections 22 each comprises a skimmer, the action of which is similar to that of the walls provided by the elongated and substantially V-shaped slots 8 of the trough sections 2.

In Fig. 9 I have illustrated a table 28 which is provided with longitudinally extending V-shaped channels, and arranged within the channels are the substantially V-shaped troughs 29. The troughs are arranged in series, one adjacent the other, and in this instance the impact of force is delivered directly upon the under face of the table 28. It is to be stated that any number of tables and troughs may be employed.

From the above, when taken in connection with the drawings, it is believed that the advantages of my device, the simplicity of the construction, as well as the method of operation will be perfectly apparent to those skilled in the art to which such inventions appertain without further detailed description.

Having thus described the invention what I claim is:—

1. In a separator, an inclined trough made up of stepped sections forming skimmers provided with openings, means for imparting an impact force to the bottom of the trough adjacent the openings provided by the skimmers to size the particles as well as to gravitate the same down the trough and to force the sized particles of varying and increasing specific gravities successively through the openings, and means arranged below the trough for dividing the heavier of the evenly sized particles from the lighter particles.

2. In a separator, a trough constructed of a series of sections forming skimmers, means for adjusting any of the troughs with relation to the remaining troughs, a frame supporting the troughs, a shaft extending longitudinally of the frame, means for imparting motion to the shaft, beater arms upon the shaft and arranged to contact with the bottoms of each of the sections making up the trough, and said beater arms comprising a plurality of spaced flexible members, substantially as described.

3. In a separator, a trough made up of a series of sections forming skimmers, the said sections having their upper edges provided with longitudinal ways which serve as passages for the co-acting sections, the sides of each of the sections being provided with registering elongated openings, bolts passing through the openings, nuts for the bolts, a frame supporting the trough, a longitudinally extending shaft journaled within the frame and arranged below the trough, means for imparting motion to the shaft, beaters upon the shaft, each of said beaters comprising a plurality of flexible fingers arranged to contact successively with the bottom of the sections adjacent the skimmers, a second shaft journaled upon the frame and arranged below the first named shaft, and L-shaped separators adjustably sustained upon the said second shaft, substantially as and for the purpose set forth.

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Witnesses:
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W. C. DAVIS.