June 30, 1931. E. W. McCULLOUGH 1,812,108

SEPARATOR

Filed Nov. 1, 1926 2 Sheets-Sheet 1

FIG. 2

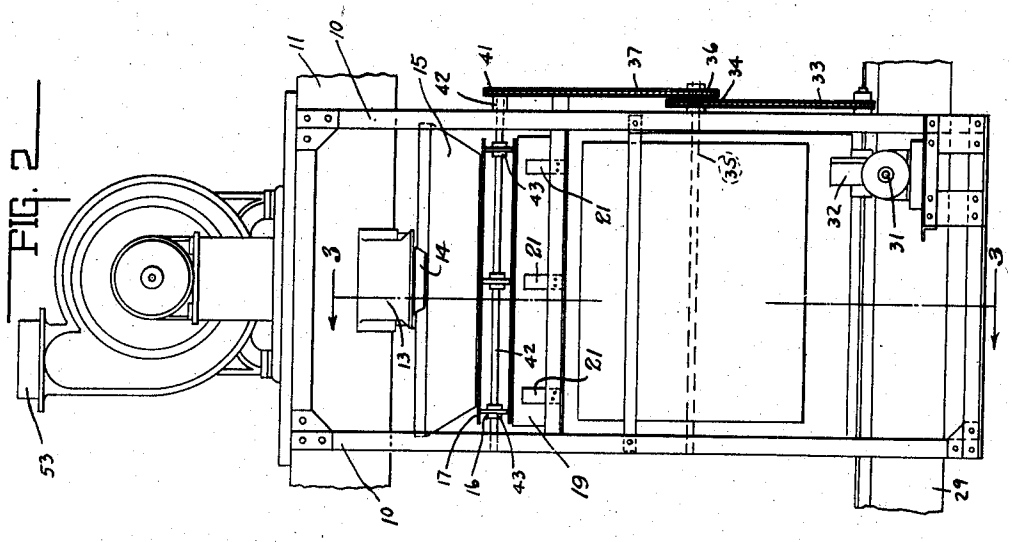
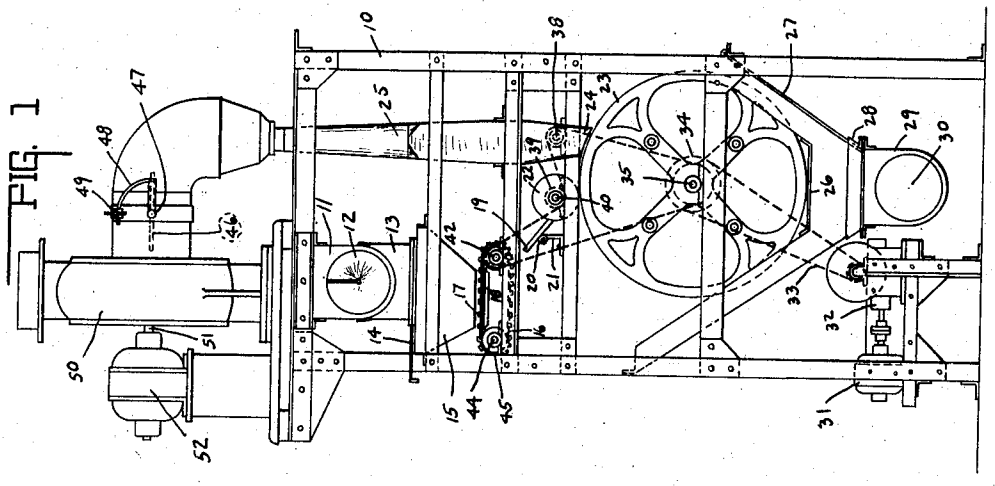


FIG. 1



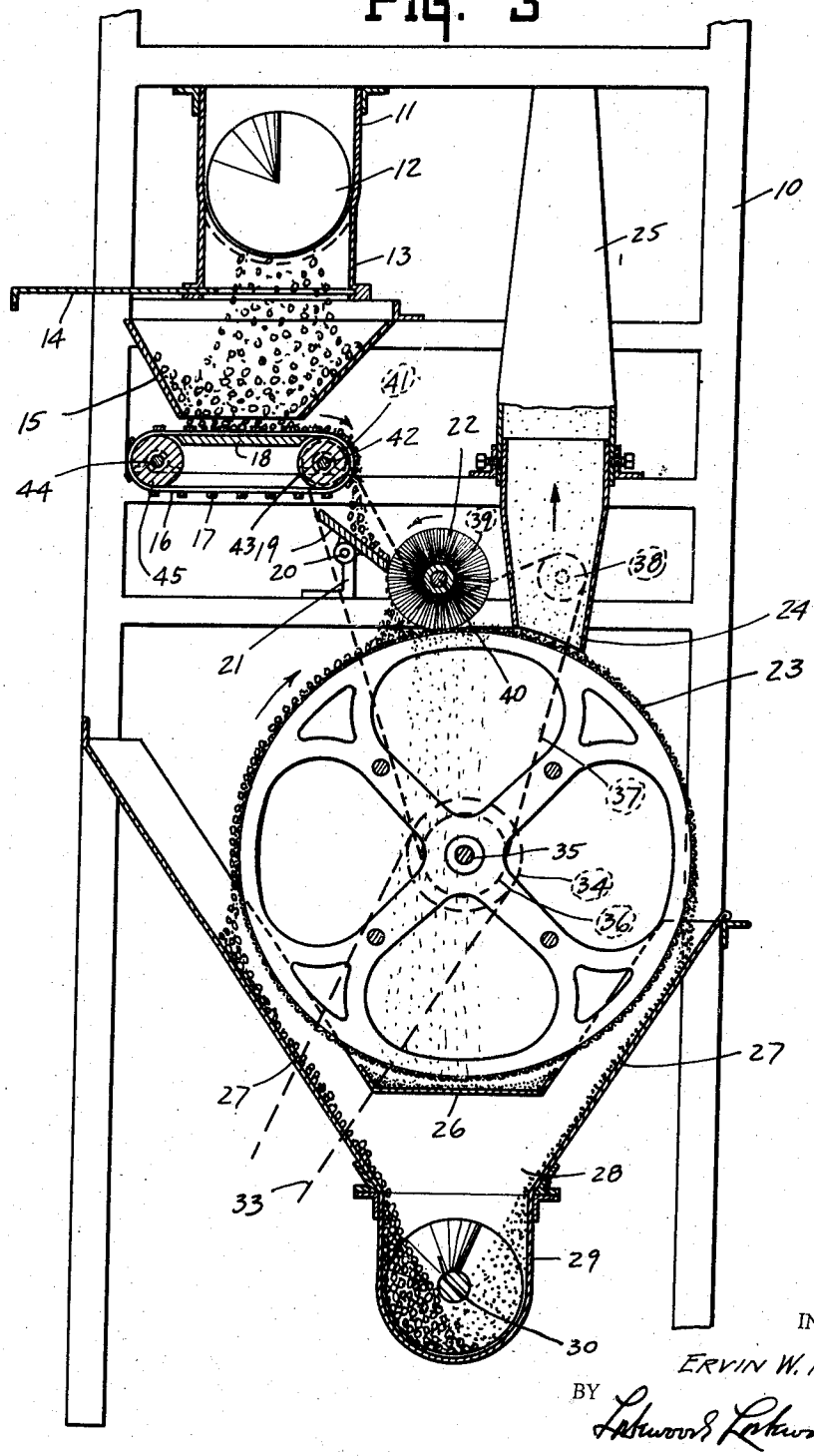
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Filed Nov. 1, 1926 2 Sheets-Sheet 2

FIG. 3



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UNITED STATES PATENT OFFICE

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Application filed November 1, 1926. Serial No. 145,388.

This invention relates to a separator.

This invention is continuation in part of the copending application, Serial No. 653,403, filed July 23, 1923, entitled Garbage reducer.

The chief object of the invention is to separate a material such as relatively dry disintegrated garbage tankage into several constituents, one of which has the characteristic of relatively low specific gravity or relatively small size, whereby said constituent may be separated from coffee grounds, paper wads, eggshell particles, metallics, minerals, glass and china resulting in a product satisfactory for food purposes.

The chief feature of the invention consists in passing a material of the character described through a separator so constructed that the metallics and minerals of minute size are removed from the material and thereafter the desired constituent, to wit, the included low specific gravity or relatively small size food product particles are separated from the mass, the resulting overruns being suitable for successive processing through the same machine until such time as the final overrun is only satisfactory for fertilizer base since substantially all commercial food values have been removed from the overrun.

The machine generically consists of a moving foraminated supporting surface, upon which the material is projected preferably in sheet or layer formation, and through which surface the heavy, small particles such as glass, china, sand, minerals and metallics, are separated from the mass by screening and from which mass by an overhead pneumatic or suction device, the relatively lighter and smaller desirable particles are removed when the same are respectively carried beneath the mouth of the pneumatic separating device leaving the remainder of the mass as the final overrun, the initial discharge in sheet formation permitting the largest and heavier particles to separate in opposition to surface movement.

The full nature of the device will be understood from the accompanying drawings and the following specification and claims:

In the drawings Fig. 1 is a side elevational view of the separator. Fig. 2 is an end elevation of the same. Fig. 3 is an enlarged sectional view particularly of the perforated screen, particularizing brush, overrun collectors, feeding mechanism, pneumatic separating mechanism and associated parts and is taken on line 3—3 of Fig. 2 and in the direction of the arrows.

In the drawings Figs. 1 and 2 illustrate improved forms of the same general invention disclosed in original Figs. 7 and 8 of application, Serial No. 653,403, filed July 23, 1923, and Figs. 4 and 5 of application Serial No. 698, 106, filed March 10, 1924.

In the drawings 10 indicates a rectangular frame upon which is mounted channel forming means 11 having conveying means such as the screw 12 therein, which feeds a spout 13 controlled by suitable means such as the gate-valve or cut off plate 14. Spout 13 discharges into hopper 15 and positioned immediately beneath the open mouth of this hopper and in spaced relation therewith is a measuring feeding device of suitable form, such an endless construction indicated generally by the numeral 16 and including a plurality of spaced or parallel bars 17 connected by a plurality of parallel chains. The upper run of this endless construction passes over a suitable support 18. This particular type of conveyor and measuring device is self cleaning. Also the foregoing arrangement permits the discharge of only a predetermined amount of material from the hopper for conveyance to the separating device in the form of the invention herein illustrated.

The sheet forming and measuring conveyor discharges the material to a baffle board 19 which is adjustably mounted by pivot 20 and brackets 21, or in any other suitable manner. Baffle board 19 discharges the material in the aforesaid sheet formation towards a rotary brush 22.

Usually the material even though in sheet formation, is "balled" and may vary up to the size of a pea. This "balled" material usually is of the desired constituent, but the mass is such that it would not be separated pneumatically. Thus the overrun would contain much desirable material that should

be separated. Brush 22 running against the baffle board breaks apart or divides the "balled" material into the finer particles and thus separates the material which may have been stuck together, into separated and finer particles and also gives an even spread or layer of material on the foraminated supporting surface which in the present invention is illustrated as a drum having a perforated screen surface 23.

The finely divided or particularized material is projected by the brush action, to wit, its engagement with the baffle board upon the surface of the drum, which projection drives a great deal of the finer and particularly the inorganic material, through the drum surface openings. Also from the point of deposition of the material upon the drum surface to the point where it is subjected to pneumatic action, the mass of said material is subjected to vibration of the machine and by gravity the smaller heavier particles such as sand, glass, china, minerals and metallics, pass through said screen perforations and into the drum. These particles thereafter pass through the perforations of the drum surface substantially opposite from their point of entrance and are collected in a pan 26 beneath the drum and are thus permanently removed from the material. The largest particles roll over the approach side of the drum 23 and constitute one separation.

The particularized material which is supported by the foraminated surface, see the adjustment at 100, Fig. 3, is passed beneath the suction spout 25 having a mouth 24 in spaced relation to said surface and relatively movable with respect to said surface. The suction in the spout 25 carries upwardly the smaller and lighter particles of material from the mass leaving the remainder, which in the present instance is carried beyond said mouth by the drum until it drops off of the drum as the overrun and is collected by the hopper 27. If the degree of separation is suitable and the same is herein indicated as such, the overruns which discharge into the hopper 27 from both sides or ends of the drum thereupon discharge into the mouth 28 of the channel 29 containing a suitable conveyor in the form of a screw 30 which removes the discharges from the machine and conveys the same to a fertilizer forming machinery or storage, or the conveyor may return the discharges to the separator for rerunning.

Upon the lower part of the framework there is mounted an electric motor 31 which drives a speed reducer 32 which drives chain 33 meshing with sprocket 34 upon the shaft 35 of the drum 23. The drum is thus rotated by motor 31. Also mounted upon the shaft 35 is sprocket 36 which drives a chain 37 that passes over an idler gear 38. This may be a tension adjusting gear if desired. The chain 37 also passes under sprocket gear 30 upon shaft 40 of the brush 22 and thus serves to rotate the brush 22 oppositely from drum 23. The chain also passes over sprocket gear 41 upon the shaft 42, which shaft 42 carries the gears 43 meshing with and driving the chain construction 16. The rear end of the chain construction 16 is similar to the forward end, that is, an idler shaft 44 carries the gears 45 similar to power shaft 42 carrying the gears 43.

The suction conduit 25 includes a control or butterfly valve 46 pivotally supported at 47 and associated therewith is an arcuate arm 48 adjustably secured as at 49 for maintaining the butterfly 46 in any predetermined position to secure predetermined suction in the conduit 25 and at the mouth 24. A suction fan or exhauster 50 mounted on shaft 51, driven by motor 52 secures the suction. Motor 52 is mounted upon the upper part of the framework. The exhauster discharge 53 is connected to any suitable collector whereby the desirable constituents retained by the suction action on the material such as garbage material, are collected. As shown in the drawings, the conduit 25 is initially tapered upwardly and outwardly which enhances or increases the following action: The suction is initially sufficient at the mouth 24 of the conduit 25 to elevate all of the smaller and lighter particles and some of the smaller and slightly heavier particles. As these two types of particularized material pass upwardly into increased cross sectional area adjacent the mouth of the spout, the coarser and relatively heavier particles attempt to return to the mouth and pass therefrom. In this movement, therefore, these particles engage and oppose the other and ascending particles and tend to separate or clean them. Thus, a cleaning action is secured, which when viewed resembles the rise and fall of the sand particles in a flowing spring.

The foregoing may be briefly described as sorting and settling to this extent; the larger and relatively heavier particles gradually fall out of the stream and return to the drum by which they are carried over and discharged into the overrun. The resultant material, therefore is thus further sorted and cleaned while separated. It is to be understood that the perforated portion of the surface is in spaced relation with the mouth 24 of the suction tube 25 for the most efficient action and for commercial degrees of separation.

The foregoing apparatus permits of four way separation, one over the screen in one direction, one upwardly and pneumatically, one through the screen, and a fourth over the screen in the opposite direction. The drum is herein shown cylindrical with the axis of rotation positioned in a plane between the brush 39 and the spout 24.

The invention claimed is:

In a pneumatic separator the combination of a cylindrical, perforated, continuously rotating horizontal screen, an oppositely rotating parallel brush positioned immediately thereabove and slightly offset from the vertical plane including the screen axis and upon the approach side of the screen, a superposed pneumatic separating spout similarly positioned but oppositely offset and having its mouth terminating adjacent the screen surface, and means for supplying a measured quantity of material to the brush whereby the latter particularizes the material and throws the same in a direction opposite to the direction imparted thereto by the screen when projected thereon whereby four-way separation is obtained.

In witness whereof, I have hereunto affixed my signature.

ERVIN W. McCULLOUGH.