Jan. 17, 1961 F. H. CLUTE 2,968,400

MATERIAL COLLECTOR

Filed Nov. 12, 1957

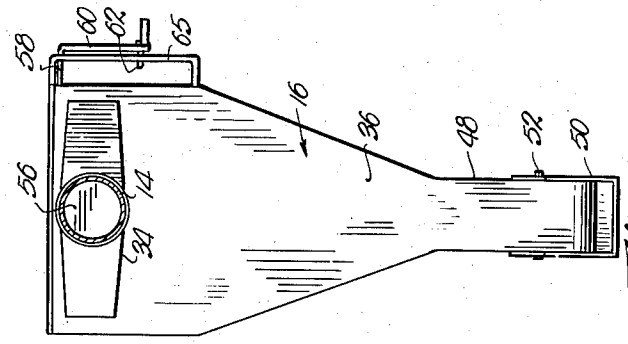


Fig. 3.

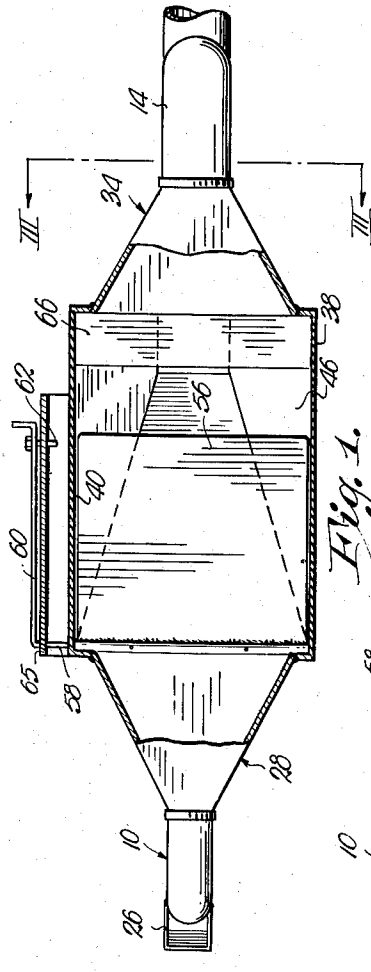


Fig. 1.

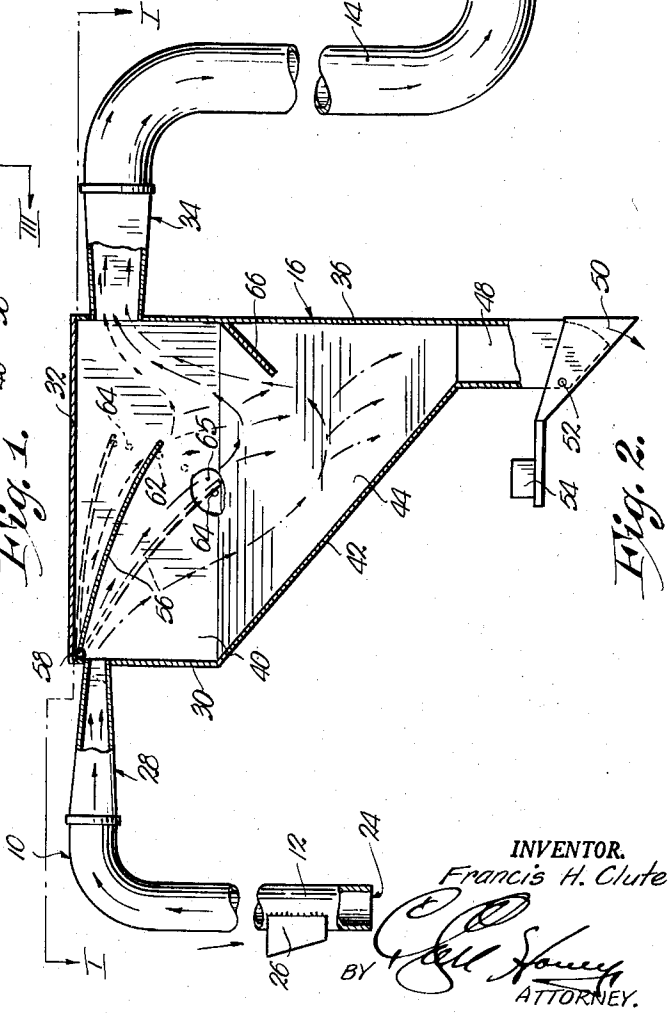


Fig. 2.

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MATERIAL COLLECTOR

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1 Claim. (Cl. 209—143)

This invention relates to a separator for materials of differing specific gravities and has for its primary object the provision of structure permitting movement of the material along a predetermined path of travel and automatically dropping out heavier particles for collection and ultimate discharge to a point of storage, use, packaging or other dispensation.

It is the most important object of the present invention to provide a material separator wherein the material is caused to be moved by creation of artificial currents of air and employing structure interposed within the air stream for permitting heavy particles to gravitate therefrom as the lighter particles continue to move with the air currents to a point of ultimate discharge.

Another important object of the instant invention is to provide air-flow structure that expands intermediate the ends thereof into a hollow body for collecting the heavy particles to the end that the material may be introduced into the air stream at one restricted end of the structure and the lighter particles carried away from the hollow body through an opposed restricted end of the air-flow structure.

Another important object of the present invention is to provide improved means within the aforementioned hollow body for controlling separation of the particles and, therefore, the volume of light particles which are permitted to continue through the system toward and through the source of suction.

In the drawing:

Fig. 1 is a fragmentary, cross-sectional view taken on irregular line I—I of Fig. 2, parts being broken away for clearness illustrating a material collector made pursuant to the present invention.

Fig. 2 is a side elevational view thereof, parts being broken away and in section to reveal details of construction; and

Fig. 3 is a cross-sectional view taken on line III—III of Fig. 1.

A continuous air flow system is provided in the instant invention to present the material collector illustrated in the drawing, including therefore, an inlet tube **10** having a vertical stretch **12**, an outlet tube **14** and a hollow body **16** interposed between and depending from the tubes **10** and **14**. The means chosen for illustration to create artificial currents of air and draw the same through the hollow components **10**, **14** and **16**, constitutes a suitable blower **18** at the outermost end of the outlet tube **14** and provided with an outlet **20**. A damper **22** is interposed in the outlet tube **14** between the body **16** and the blower **18** to control the flow of air.

The vertical stretch **12** of the inlet pipe **10** has a downwardly facing air inlet opening **24** at the lowermost end thereof and a material inlet opening (not shown) is provided in the vertical stretch **12** intermediate the ends thereof for receiving material to be separated and fed thereinto by means of hopper **26** registering with such material inlet of the stretch **12**.

The tube or conduit **10** terminates adjacent body **16**

in a diffuser **28** that progressively increases in width horizontally as the body **16** is approached (Fig. 1) and progressively decreases in its vertical dimensions as body **16** is approached (see Fig. 2). Accordingly, one vertical wall **30** of the body **16** is provided with a rectangular opening for receiving the diffuser **28**, such opening having its longitudinal axis disposed horizontally immediately below top wall **32** of the body **16**.

Conversely, there is provided a plenum chamber **34** between the body **16** and the outlet tube or conduit **14** that progressively increases in width as body **16** is approached (Fig. 1) and progressively decreases in its vertical dimensions as body **16** is approached (see Fig. 2). It follows therefore, that vertical wall **36** of body **16** is likewise provided with a rectangular opening adjacent top **32** for receiving the plenum chamber **34** and such outlet opening in the wall **36** has its longitudinal axis is disposed horizontally.

Manifestly, by virtue of such construction, the material entering the body **16** adjacent the zone of merger between walls **30** and **32**, is diffused in the body **16** to substantially span the distance between vertical walls **38** and **40**. By the same token, the chamber **34** collects lighter particles and condenses the same as they move into the conduit **14**.

The lowermost portions of the body **16** are formed much like a funnel in that there is provided three walls **42**, **44** and **46** that converge toward a tube **48** and form the bottom of the body **16**, it being understood that walls **44** and **46** interconnect walls **36** and **42**.

A gate **50** mounted on the tube **48** for swinging movement about horizontal axis **52** is normally held biased to the closed position shown through the medium of a counterbalance weight **54**.

Means is provided in body **16** within the path of air and therefore, material to be separated normally flowing from diffuser **28** to plenum chamber **34**, to control the amount of lighter particles that are permitted to pass to the conduit **14**. Such control is in the nature of a baffleplate **56** spanning the distance between the walls **38** and **40** and swingably carried thereby along one edge of baffle **56** by hinge means **58**.

The pivotal connection **58** for the baffle **56** is disposed at the corner between walls **30** and **32** and suitable handle means **60** is provided therefor exteriorly of the body **16** to permit positioning of the baffle **56** within the body **16** as desired. A pin or the like **62**, insertable in handle **60** and in any one of a plurality of openings **64**, holds the baffle **56** in selected positions of adjustment, openings **64** being in a plate secured to wall **40**. It is to be noted that the baffle **56** terminates at its free end in spaced relationship to the wall **36** and that it is swingable toward and away from the top wall **32**.

Additional, but stationary baffle means **66** is provided in the body **16** spanning the distance between the walls **38** and **40** and secured to the inner face of wall **36** between the inlet of plenum **34** and the tube **48**. It is to be noted that elongated baffle **66** is inclined downwardly and inwardly transversely thereof from wall **36**.

Material to be separated is fed into hopper **26** during operation of the blower **18** and, by virtue of suction that is created in the inlet conduit **10**, such material is elevated along the vertical stretch **12** and flows through the diffuser **28** into the body **16**. Heavier particles separate immediately from the material as the same enter the body **16**, whereas the lighter particles remain in the air stream and pass from the body **16** into the plenum chamber **34**, thence into the outlet conduit **14**, and finally through the blower **18** for discharge from outlet **20** of the latter.

The heavy particles collected in the body **16** ultimately discharge from the tube **48** as the heavy particles over-

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come the gate **50** and particularly the counter balance weight **54** thereof. Any tendency of the heavy particles to rise along the inner face of wall **36** for outward flow into the plenum chamber **34** is impeded by the baffle **66**.

Assuming that the blower **18** is operating to produce an air flow of a predetermined volume and velocity, the amount of lighter particles that is permitted to flow from the body **16** into the plenum **34** is dependent upon the position of the baffle **56** within the air stream. Manifestly, as the baffle **56** is lowered, thereby impeding free direct flow of the material from diffuser **28** to plenum **34** directly across the body **16**, lesser amounts of lighter particles are permitted to discharge from the body **16**.

Adjustment of the baffle **56** through use of the handle means **60** is made by the operator in conjunction with adjustment of the damper **22** upon examination of the particles emanating from the tube **48** and the outlet **20**, all depending upon the nature of the ultimate product or products desired to be placed in use whether the same be the heavy or the light particles, or both.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

Separating apparatus for comminuted material having particles of different specific gravities, said apparatus comprising a hollow body having a plurality of structural members, said members including an upright first end wall and a second end wall spaced from said first end wall and having an upper portion disposed substantially in parallelism with said first end wall and an inclined lower portion converging with the first end wall, each of said end walls being provided with an elongated, longitudinally horizontal opening proximal the upper edge thereof; an inlet conduit having an uppermost end spaced from said opening in said second end wall and including a vertical stretch having an air inlet opening at the lowermost end thereof, said stretch being provided with a material inlet means intermediate the ends thereof; an outlet conduit having an uppermost end spaced from said opening in said first end wall and provided with an outlet opening; a hollow, horizontally disposed diffuser interconnecting said uppermost end of said inlet conduit and said opening in said second end wall, said diffuser progressively increasing in horizontal width and decreasing in vertical height as said last-mentioned opening is approached; a hollow, horizontally disposed plenum chamber interconnecting said uppermost end of said outlet conduit and said opening in said first end wall, said plenum chamber progressively increasing in horizontal width and decreasing in vertical height as said last-mentioned opening is approached; means interposed in said outlet conduit intermediate the ends thereof for creating artificial currents of air and forcing the same through the conduits and the body from said air inlet opening to said outlet opening, said material inlet means being disposed for gravitational feeding of said material into the stream of air flowing upwardly through said stretch from said air inlet opening to said body; a baffle within said body between the opening of said end walls, said baffle being swingable at the uppermost edge thereof directly above and substantially parallel with the longitudinal axis of said opening in said second end wall, the baffle having a lowermost edge between the end walls, parallel with the axis of swinging movement of the baffle, said baffle spanning more than half the distance between said end walls and having a concave lowermost face to maintain substantially laminar flow of the air stream issuing from said opening in said second wall as the air stream is being deflected downwardly by said baffle, whereby particles of said material having lower specific gravities are separated from particles having higher specific gravities by remaining in said air stream after deflection thereby as the heavier particles gravitate downwardly; a fixed, flat baffle inclined downwardly to said first end wall and having an uppermost edge secured to the innermost face thereof at a position spaced directly below and substantially parallel with the longitudinal axis of said opening therein, the lowermost ends of said fixed baffle and said swingable baffle presenting an orifice for the passage of said air stream therethrough upon movement of the swingable baffle; lever means mounted on said body and exterior thereto, said lever means being operably coupled to said swingable baffle at said uppermost edge of the latter for selectively swinging said swingable baffle downwardly into and upwardly out of said air stream; and collector means connected with the body at the lowermost edges of the end walls, whereby heavier particles of said material are collected therein after being deflected downwardly in said air stream by said swingable baffle and flow thereto under gravitational action, after being removed from said air stream.

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