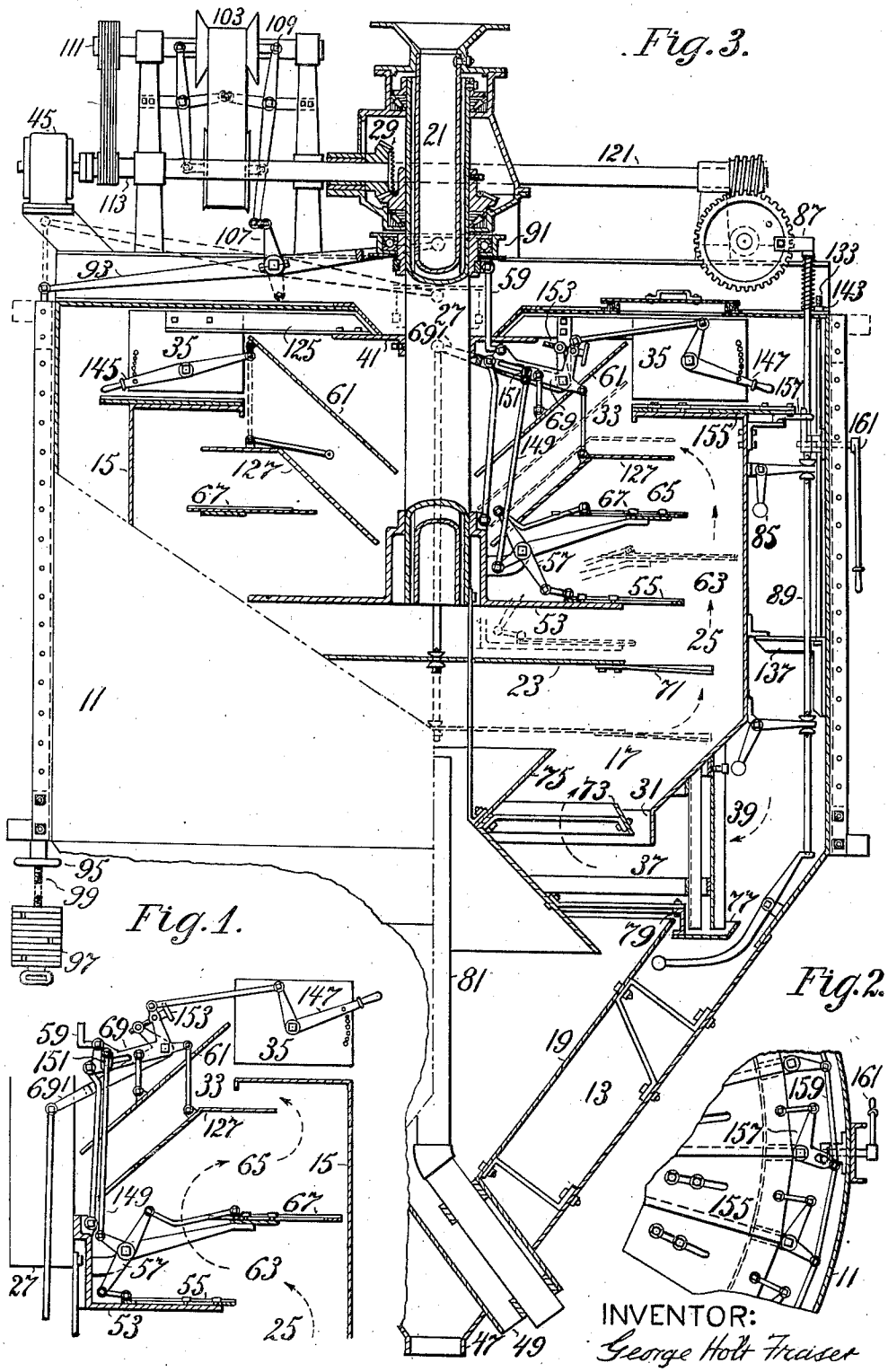
June 3, 1941. G. H. FRASER 2,243,859

FLUID CURRENT SEPARATOR

Filed Aug. 31, 1935



Patented June 3, 1941

2,243,859

UNITED STATES PATENT OFFICE

2,243,859

FLUID CURRENT SEPARATOR

George Holt Fraser, Brooklyn, N. Y.

Application August 31, 1935, Serial No. 38,777

14 Claims. (Cl. 209—139)

This invention relates to separators for separating fine from coarse material by a fluid current, and aims to provide certain improvements therein.

Such separators have an outer casing enclosing a settling chamber, a separating chamber, an inner casing enclosing a separating chamber therein having a lower current inlet and an upward current passage and an upper current outlet in communication therewith, rotary fan blades above the outlet for upflowing a current through it, a rotary distributor below the outlet for supplying material to be separated in the passage, and a rotary upper valve or baffle for varying the separating current.

The distributor and the upper valve or baffle have been adjusted by me when stopped or while they were rotating, to vary the height or width of distribution or the current passage, for varying the fineness of separation, and the upper outlet has been contracted by a ring of plates around it which were individually inwardly and outwardly adjustable for varying its size.

Some such separators have a central feed pipe within a tubular drive shaft, and others have an annular feed conduit around an inner drive shaft. My present improvements may be used with either type of separator.

The types of such separators are shown in my Patents Nos.—

1,542,050 granted June 16, 1925, on my application Serial No. 281,445 filed March 8, 1919;

1,834,095 granted Dec. 1, 1931, on my application Serial No. 26,033 filed April 27, 1925;

1,876,516 granted Sept. 6, 1932, on my application Serial No. 737,411 filed Sept. 12, 1924;

1,931,533 granted Oct. 24, 1933, on my application Serial No. 153,179 filed Dec. 7, 1926;

1,987,615 granted Jan. 15, 1935, on my application Serial No. 687,359 filed Jan. 19, 1924;

1,992,942 granted March 5, 1935, on my application Serial No. 459,930 filed June 9, 1930;

2,055,484 granted Sept. 29, 1936, on my application Serial No. 514,199 filed Feb. 7, 1931;

2,055,485 granted Sept. 29, 1936, on my application Serial No. 714,961 filed March 10, 1934;

2,113,586 granted April 12, 1938, on my application Serial No. 606,407 filed April 20, 1932;

2,148,452 granted Feb. 28, 1939, on my application Serial No. 584,140 filed Dec. 31, 1931;

2,188,345 granted Jan. 30, 1930, on my application Serial No. 1173 filed Jan. 10, 1935;

2,188,430 granted Jan. 30, 1940, on my application Serial No. 55,423 filed Dec. 20, 1935;

2,188,431 granted Jan. 30, 1940, on my application Serial No. 80,258 filed May 18, 1936;

2,188,432 granted Jan. 30, 1940, on my application Serial No. 93,210 filed July 29, 1936;

2,188,474 granted Jan. 30, 1940, on my application Serial No. 141,534 filed May 8, 1937, and

In my copending application Serial No. 276,563 filed May 31, 1939.

This application contains subject matter originally set forth in my said application Serial No. 606,407, other subject matter of which has been protected by claims in my said Patent No. 2,113,586, and other subject matter of which is claimed in my said applications.

The objects of this invention are to provide improved means for varying the action of a pneumatic or other fluid current separator by varying the velocity and path of the current stream and the manner in which the material is distributed.

For accomplishing these objects I preferably provide various features of improvement in the construction, arrangement and operation of a current separator, any of which may be applied in any desired manner to a separator having either an annular feed conduit or a central feed pipe, but I prefer to use all of my features of improvement together in their preferred forms, and to combine them as shown in the accompanying drawing, in which

Fig. 1 is a fragmentary vertical axial section of my improved valve and baffles and my improved adjustment means therefor in their positions for fine separation within the separating chamber of a central feed pipe air separator;

Fig. 2 is a fragmentary plan view of my collectively adjustable plates above and around the outlet from such a separating chamber, showing my collective adjustment means therefor, and showing the outer casing in horizontal section in the plane thereof, and

Fig. 3 is a fragmentary side elevation, partly broken away in vertical axial mid-section, of a central feed pipe air separator provided with the preferred form and combination of my improvements, the adjustable parts being shown in full lines in their position for coarse separation, and the valve and baffles and distributor being shown in dotted lines in their position for fine separation.

Referring to the drawing, in which the same numbers indicate similar parts of an air separator, 11 is an outer casing having a top wall and enclosing a settling chamber 13, 15 is an

BEST AVAILABLE COPY

inner casing concentrically spaced therein and enclosing a separating chamber 17, 19 is a coarse material receiver, 21 is a supply conduit, 23 is a rotary distributor, 71 uptosser means therearound, 53 is a lower baffle, 55 is a ring of radially adjustable segments therearound, 25 is the distribution chamber, 27 is the distributor drive shaft, 29 are its drive gears, 31 is the lower current inlet to the separating chamber, 63 is the upward current passage therein, 33 is the upper current outlet therefrom spaced below said wall, 61 is a rotary upper valve at the outlet, 127 is the rotary upper baffle under the outlet, 67 is a rotary annular baffle within the passage 63, 35 are the fan blades, 125 are the fan spokes, 41 is the fan drive hub fixed on the shaft 27 for rotating the spokes therewith, 37 is the return current passage, 39 is a filter consisting of one or more rings of spaced vertical vanes across the return passage 37, for intercepting and dropping through their open lower ends fine material floating in the current returning from the settling chamber, 73 is a rotary conical retarder within and above the inlet 31, 75 is a tubular partition inwardly thereof, 77 is a rotary shelf under the vanes 39, 79 is a rotary ring above the shelf 77, 45 is a variable speed motor or other primary driver, 121 is its shaft, 103 is a variable speed driver driven by the shaft 121 and having a variable speed shaft 111 which is belted to a gear shaft 113 for driving the distributor at variable speed. 109 are shifter levers for the variable speed driver 103, 91 is an upwardly and downwardly movable bearing for carrying the adjustable rotary parts, 93 is a lever for carrying and moving the bearing 91, and 107 is an arm on the lever 93 and connected with the shifter 109 for shifting the variable speed driver 103 as the lever 93 is moved for automatically varying the speed of rotation of the shaft 27 with movement of the bearing 91. 47 is the outlet for fine material, 49 is the outlet for coarse material, and 81 is a vent or vapor outlet.

These parts may be of any suitable construction for spreading the material to be separated across the upward passage and causing a current to flow up through the separating chamber and upper outlet into the settling chamber, and to return through the filter to the lower inlet, for separating and floating fine material into the settling chamber and dropping coarser material into the coarse receiver. Those shown are similar to those shown in my said application Serial No. 1,173 and are adapted to vertically vary the height of distribution and to radially vary the width of the current passage around it, and to vertically vary the space through which the current may flow, for varying the separation similarly to the method therein disclosed.

One feature of my present invention preferably provides an inner and outer current passage edge annular baffle 67, which is within and radially adjustable across the upward passage 63 from an outward position in which its inner edges are around said passage, for directing the current therein inwardly of said edges, for fine separation, as shown in Fig. 1, to an inward position in which its outer edges are inwardly of said passage, for directly upwardly passing the current, for coarse separation, as shown in Fig. 3. The baffle 67 is spaced above and is preferably vertically movable relatively to the distributor 23, and when the latter is surrounded by the usual uptosser means 71 the outer edges of the segments of the baffle 67 are preferably radially adjustable relatively to the uptosser means from an outer position outwardly thereof for intercepting uptossed material, for fine separation, to an inward position inwardly thereof, for up-passing such material, for coarse separation. The baffle 67 is spaced above the lower baffle 53, and when the latter is surrounded by a ring of radially slidable segments 55, such as claimed in my said application Serial No. 714,961, which has matured into Patent No. 2,055,485 dated Sept. 29, 1936, the segments of the baffle 67 are preferably radially adjustable relatively, and preferably reversely, to the direction of adjustment of the segments 55, and are preferably connected therewith by a reverse radial motion connection, as 57, operable to simultaneously reversely radially move the segments respectively; to the end that when the segments 55 are moved inwardly for fine separation the baffle 67 will be moved outwardly and around the upward passage 63, as shown in Fig. 1, and when the segments 55 are moved outwardly, for coarse separation, the baffle 67 will be moved inwardly of the upward passage 63, for coarse separation, as shown in Fig. 3.

When my present invention is utilized with a separator comprising an outer casing enclosing a separating chamber and an inner casing enclosing a settling chamber, said outer casing having an opening or removable plate in an outer portion of its wall and said inner casing having its top wall spaced below the top wall of its outer casing and having an outlet in the central portion of its top wall and an inlet in its lower portion, said inlet and outlet affording communication between said chambers; a rotary fan located within said outer casing above the top wall of said inner casing and having blades extending radially outwardly of said outlet; a movably adjustable distributor, baffle or valve, within said separating chamber and co-axial with and rotatable with said fan and forming therewith a rotary assembly; and means for feeding material to said distributor; another feature of my present invention preferably combines therewith adjusting means for said distributor, baffle or valve, mounted on said rotary assembly and comprising an operating means rotatable therewith and adjacent said opening or plate, or mounted on one of said blades, or extending radially outwardly of said outlet and adjacent said opening and the outer portion of and mounted on said fan, and connecting means between said operating means and said distributor, baffle or valve, constructed and arranged to change the position of the latter in response to changes in the position of the operating means, whereby through said opening the operating means may be manipulated from without the outer casing for adjusting one or more of the adjustable parts from above and radially outwardly of the upper outlet and below the top wall of the outer casing, and preferably from radially outwardly of the outlet and adjacent an outer portion of the fan.

This may be variously accomplished, but in the construction shown I prefer to accomplish it by extending the operating means radially out of the outlet 33 and outwardly of the fan and by movably mounting the operating means on one or more of the fan blades 35, and by providing connecting means between the operating means and the adjustable part or parts constructed to change the position of the latter in response to changes in the position of the op-

erating means, and preferably comprising a lever 69 below and fulcrumed to one of the fan spokes 125 and above and movably suspending the part or parts to be adjusted by changes in position of the operating means. When, as shown, the adjustable parts comprise in addition to the distributor 23 a baffle 127 or a valve 61, or both of these, and a lever 69 is vertically swingable below the spoke means and inwardly of and above the outlet, the valve or baffle is, and preferably both are, of inverted conical or downwardly chambered shape below the lever 69, in such manner that the latter may move vertically within the recess above them, and that one may move telescopically into a recess in the other when they are reversely movable as shown.

In the construction shown I preferably suspend the different adjustable parts from different points in the length of the lever 69, so that they may be relatively moved by movement thereof, preferably by connecting the lower plate of the distributor 23 to the end of the lever, and the lower baffle 53 to an intermediate part thereof, and the upper valve 61 to an inward part thereof, and the upper baffle 127 at the other side of the fulcrum thereof, all at such points as will produce the desired relative vertical movements of these as the lever 69 is swung.

Another improvement in this construction consists in connecting an arm of the lever 69 with the fan blades 35, so that the lever may be swung from the fan blades when their rotation is stopped, preferably by fulcruming a lever 147 to the fan blades outwardly of the outlet and above it and below the spokes, and by connecting it to the lever 69 in such a way that the lever can be operated by swinging the lever 147 and can be held in any position by bolting this lever in one of a series of holes on the fan blade.

Another improvement in this construction consists in disposing the bearing 91 below the casing for the gears 29, so that it moves up and down in the limited space between this casing and the fan hub 41, and by extending its suspenders 59 slidably through this hub and extending them outwardly thereunder and connecting them to the lever 69 at such intermediate points thereof as will move the lever 69 throughout its desired movement with the movement of the bearing 91 through the limited space between the gear casing and the hub, so that when the lever 69 is moved by the bearing 91 the lever will multiply the movement of the latter in transmitting it to the distributor 23 and the lower baffle 53 when these are moved during rotation by swinging the lever 93, the rod 99 of which is counter-balanced by adjustable weights 97, and may be locked by a lock 95, for sustaining the weight of the adjustable parts and facilitating their adjustment.

In the construction shown the lever 93 is provided with a reversible arm 107, which when in its upper position can operate the shifter 109 to cause the variable speed driver 103 to increase the speed of the shaft 113 when the valve and distributor are raised, and to decrease said speed when they are lowered, and when the arm 107 is reversed and in its lower position, as shown in dotted lines in Fig. 3, it will reversely operate the variable driver 103 and decrease the speed of the shaft 113 when the distributor is lowered and increase it when it is raised.

Another improvement in this construction consists in making the bottom plate 23 vertically slidable relatively to the lower baffle 53, preferably by mounting it on the inner end of the lever 69 and by mounting the lower baffle 53 on but nearer the fulcrum of the lever 69, so that they will be relatively moved as the lever is moved.

In such case the distributor 23 preferably has no radially slidable segments around it, but is preferably surrounded by rotary beaters 71 for upbeating material in the zone of distribution. The lower baffle 53 slides on the shaft 27, and preferably has a ring of radially adjustable segments 55 around it, which preferably move inwardly as it moves down, to widen the upward passage 63 for fine separation, and outwardly as it moves up to narrow the passage 63 for coarse separation, each segment being preferably moved by a bell crank operator 57, which is fulcrumed to the hub of the baffle 53, and the short arm of which is connected to the adjuster 69 at the point between its fulcrum and its connection with the baffle 53 which will produce the desired difference in vertical movement of these so that while the segments 55 are raised and lowered with the baffle 53 they will also be outwardly or inwardly moved relatively thereto.

As shown, this construction provides for shifting the point of connection of the operator 57 from an intermediate point of active connection to the lever 69 to a neutral point near the point at which the baffle 53 is connected to this lever, so that there will be no relative movement between the baffle 53 and the operator 57 as they will then be moved together instead of relatively when the lever 69 is swung, preferably by providing a shiftable or swingable link or connection 149 between the lever 69 and the operator 57, which can be shifted from near the fulcrum of the lever 69, for moving the adjuster 57 a lesser distance than the baffle 53, to near the point of connection of the baffle 53 with the lever 69, for similarly moving the baffle 53 and the adjuster 57 together, so that the segments 55 will then be radially immovable during like vertical movement of the baffle 53 and the adjuster 57, and thus will be rendered radially inoperative.

As shown, this construction provides for shifting the inoperative positions of the segments 55 from one to any relative position so that they may be used in either position when they are inoperative, preferably by shiftably or adjustably connecting them to the lever 69 by links 149, which can be extended or contracted, as by a link 151, which can be swung for shortening this connection, when the segments are passive, but should be swung for lengthening it, when the segments are rendered active by shifting the links 149 to an inner position on the lever 69, and which can be bolted or otherwise fastened in either position. The links 149 may be bolted or otherwise fastened to the lever 69.

As shown, this construction provides for quickly shifting the distributor from an upper to a lower position relatively to the adjuster 69, by providing a shiftable connection between the distributor and the adjuster, preferably as shown, by making the adjuster of two levers, the second one 69' being shiftably connected, as by an adjusting screw 153, so that when the adjusting screw is in one position the adjuster 69 and its lever 69' will coincide, and when the screw 153 is adjusted the lever 69' will be shifted to a lower position, and will accordingly lower the distributor to a lower position relatively to the valve and upper baffle, in which position all will be relative-

ly adjustable by the adjuster. By reversing the screw 153 the parts may be quickly restored to their normal relation.

Another improvement in this construction provides for separately adjusting the valve 61, or the upper baffle 127, by hand and independently of other adjustment when desired, preferably by fulcruming a hand lever 145 to a fan blade, and outwardly of the outlet 33, and detachably connecting either the valve 61 or the upper baffle 127 to this lever, so that by swinging it either the valve or this baffle can be adjusted, and by bolting the lever to one of a series of holes such adjustment can be fixed, to permit which the valve 61 and the upper baffle 127 are each separably connected to the adjuster 69 so that either may be operated independently thereof.

As shown this construction consists in making the upper bearing 91 with an inner outwardly flared thimble which slides on and rotates with the shaft 27, and with an outer Z-shaped ring, and enclosing the balls and races between the flanges of these, and connecting the suspenders 59 to the thimble below them, in which construction a washer between the suspenders and the outer ring affords a bottom for the groove above it and below the outward flange of the outer ring, in which groove the end of the lever 93 enters, so that it may lift up or push down the upper bearing, space for which is afforded by a recess encircled by a conical ring between the top of the hub 41 and the top wall of the casing 11.

Preferably in the construction shown I provide a ring of collectively radially adjustable plates 155 around the outlet 33, which are overlapped and collectively inwardly and outwardly slidable, each of which is preferably slid by one of a number of cranks 157 connected by links 159, one of the cranks 157 being swung by a lever 161, and the links 159 simultaneously swinging the others, by tilting which all the plates 155 are simultaneously moved in or out to vary the outlet 33 from outwardly thereof.

As shown the retarder 73 encircles the return passage and rotates with the tubular partition 75, which is spaced below the distributor 23 sufficiently to permit the latter to slide up or down on the suspenders which suspend the partition from the lower end of the shaft 27, which partition also carries the rotary shelf 77 under the lower ends of the filter vanes 39, and the rotary grooved seal 79 around the upper edge of the receiver 19.

According to another feature of my present invention I provide a rotary ring 79 inwardly of and above the lower discharge ends of the circumferentially spaced interceptor vanes 39 and vertically extended parallel with these vanes from above to below the lower discharge ends of the latter, whereby the inward flow of air between said vanes is permitted above said rotary ring, but is resisted by said rotary ring adjacent the lower ends of the vanes, for accomplishing which in the construction shown, in which the rotary ring has an internal groove around the upper edge of the tailings cone 19, for resisting leakage past said edge, the rotary ring is carried by and rotates with the tubular partition 75, and when the rotary shelf 77 is used with the rotary ring 79 the latter is disposed above said shelf and carries and rotates it from the partition 75, as shown in Fig. 3.

Another improvement in this construction makes the annular baffle 67 radially movable from an outer position around the upward passage 63, for causing current to flow inwardly past it for fine separation, to an inner position inwardly of the upper passage, for affording a direct upward passage from the distribution chamber 25 to the upper baffle 127, for coarse separation, preferably making it of a ring of radially movable segments, which are shown as carried from the hub of the lower baffle 53 and vertically movable with it.

The segments of the baffle 67 are preferably moved reversely of and at the same time as the segments 55, preferably by connecting them to the upper end of the operator 57, so that they may be moved thereby when it is moved by the adjuster 69, and may be adjusted to either position, or rendered inactive in either position, by operation of the links 149 and 151 as before described in connection with the radial movement of the segments 55. By radial adjustment of the baffle 67, the separating chamber can be easily changed to direct the current passage inwardly and then outwardly through the selection chamber 65, for fine separation, or to eliminate the selection chamber and provide a direct current passage from the distribution chamber to the upper baffle, for coarse separation.

In this construction the inner casing 15, filter 39, and tailings receiver 19, are shown as jarred by hammers 85 between the casings, which are operated by a vertical anvil rod 89, struck by a rotatable gravity hammer 87, which is rotated from the motor shaft 121, and the inner casing is shown as carried by brackets 137, suspended by bolts 133, which are adjusted by nuts 143.

In operation with the construction shown, the distributor will be lowered, the lower baffle contracted, the annular baffle expanded, and the valve and upper baffle approached, for fine separation, and the position of these parts will be reversed for coarse separation. From either of their positions these parts will be relatively adjusted to suit variations desired in the fineness of separation. The movement of the bearing 91 will be magnified or reduced as transmitted to the several parts connected to the adjuster 69, and the arm 197 will be adjusted or reversed relatively to the lever 93 for the desired ratio of the driver 193, or for the desired variations of the speed of rotation of the driven parts, and speed of rotation of the rotary parts will be varied coincidently with their adjustment and in accordance with the relation of the arm 197 to the variable speed driver 193.

The rotary fan 35 and the movably adjustable valve 61, baffles 127, 67 and 53, and distributor 23, will constitute a rotary assembly, by which the lever 69 and the operating means 59, 145 and 147 will be rotated with the connecting means between the casings and between said operating means and said adjustable parts and constructed and arranged to change the positions of the latter respectively in response to changes in position of the operating means.

When the annular baffle 67 is in its outward position it will rotatably intercept particles upbeaten by the beater 71 and will discharge them below the selection chamber 65, for fine separation, and when it is contracted it will permit such particles to rise past the selection chamber, for very coarse separation.

As many parts may be used as desired, but I prefer to use three adjusters 69, and to provide one of them with a forked lever 69' for adjusting

the distributor 23, and each of them with a hand lever 147 for manual adjustment when their rotation is stopped, and to provide three hand levers 145 for independent adjustment of the valve 61 or the upper baffle 127, and to make the lower and intermediate baffles each with three or more radially adjustable segments according to the number best suited to the diameter of the baffle, and to provide three or more operations 57 according to the number of segments used for a baffle 55 or 67, and to use twelve or more collectively slidable plates 155 around and above the outlet 33.

All the radial segments are preferably circumferentially and slidably overlapped at their edges, and radially slotted to permit them to slide radially relatively to their usual guiding and retaining bolts, preferably in the manner shown in Fig. 2.

Proportions, relative sizes, and arrangement and co-relation of the parts, may be varied to suit circumstances.

It will be understood that my invention is not limited to the particular details of construction, arrangement, and combination of parts, set forth as constituting the preferred form of the invention, since it can be availed of, in whole or in part, according to such modifications of these as circumstances, or the judgment of those skilled in the art, may dictate, without departing from the spirit of the invention.

As shown the valve 61 and upper baffle 127 constitute successive current space variation means adjacent the outlet and in the path of the current for rotatably defining the space through which it may flow past them, and reversely movably adjustable for varying said space, and their inverted conical portions afford hollows or cavities around and enclosing relatively currentless spaces inwardly of and above the path of the current, within one of which the adjustment means 69 is movably disposed within the height of the adjacent cavity, within which it is movably connected to its operating means as 59 or 147, and the adjustment means 69 is shown as common to both of these current space variation means and as movably connected to each inwardly of the cavity therein.

Preferably when the valve 61 and upper baffle 127 are both used in the one separator their conical portions permit the one to move telescopically of the other as they approach or recede, and when the annular baffle 67 is used with either of them its inner periphery may encircle the conical portion of either and thereby afford clearance for movement thereof telescopically inwardly of or through the annular baffle, a construction which conserves height without impairing the efficiency of the separator.

Disposition of the adjustment means 69 within the recessed upper side of the valve 61 or upper baffle 127 limits molestation of the separating current by the adjustment means, and facilitates current flow.

What I claim is:

1. In a current separator comprising, a settling chamber, a separating chamber therein having a lower current inlet and an upward current passage and an upper current outlet in communication therewith, blower means for upflowing a fluid current through said passage for separating material therein, and a distributor concentrically within said passage, for supplying material therein to be separated by said current; the combination therewith of a ring of radially adjustable segments within said separating chamber, below said outlet and above said distributor for defining the path through which said current may upflow through said upward passage and having inner and outer current passage edges for up-passing said current past said ring, said segments being radially adjustable across and from one side to another side of said passage from an outer position around said passage, for causing said current to upflow circuitously inwardly of said inner edges for fine separation, to an inward position inwardly of said passage, for causing said current to directly upflow outwardly of said outer edges, for coarse separation.

2. In a current separator comprising, an outer casing enclosing a settling chamber, an inner casing enclosing a separating chamber having a lower current inlet and an upward current passage and an upper current outlet in communication therewith, blower means in communication with said passage for upflowing a fluid current therethrough, for the separation of material therein, and a distributor below said outlet and spaced concentrically within said passage, for the supply and distribution therein of material to be separated by said current; the combination therewith of a rotary ring of radially movably adjustable segments within said separating chamber, below said outlet and above said distributor for rotatably defining the space through which said current may upflow within said upward passage, having inner and outer current passage edges, for up-passing said current past said ring, said segments being radially movably adjustable across said passage from an outer position around said passage, for causing said current to upflow inwardly of said inner edges, to an inward position inwardly of said passage, for causing said current to upflow outwardly of said outer edges, for varying said separation.

3. In a current separator comprising, an outer casing enclosing a settling chamber, an inner casing enclosing a separating chamber having a lower current inlet and an upward current passage and an upper current outlet in communication therewith, blower means in communication with said passage, for upflowing a fluid current therethrough, for the separation of material therein, and a distributor below said outlet and spaced concentrically within said passage, for the supply and distribution therein of material to be separated by said current; the combination therewith of a ring of vertically and radially adjustable segments within said separating chamber, for defining the path through which said current may upflow in said passage, said segments having inner and outer current passages edges, for up-passing said current past said ring, said segments being vertically adjustable for vertically varying said path, and being radially adjustable across said upward passage from an outer position in which their inner edges are around said passage, for causing said current to upflow inwardly of said inner edges, to an inner position in which their outer edges are inwardly of said passage, for causing said current to upflow outwardly of said outer edges.

4. In a current separator comprising, an outer casing enclosing a settling chamber, an inner casing enclosing a separating chamber having a lower current inlet and an upward current passage and an upper current outlet in communication therewith, blower means in communica-

tion with said passage, for upflowing a fluid current therethrough, for the separation of material therein, a distributor spaced below said outlet and concentrically within said passage, for the supply and distribution therein of material to be separated by said current, and a ring of radially adjustable segments within said passage and concentric of and adjacent said distributor, having outer edges spaced from said inner casing for defining the space therebetween through which said current may upflow past said outer edges, and radially movably adjustable for varying said space, for varying said separation; the combination therewith of a second ring of radially adjustably movable segments within said upward passage, spaced a substantial distance below said outlet and above said first ring, having inner and outer current passage edges for up-passing said current, said segments of said second ring being radially movably adjustable relatively to those of said first ring, and being radially movably adjustable across said passage and from one side to another side thereof, from an outer position around said passage to an inward position inwardly of said passage, and having in said outer position their outer edges outwardly of those of said first segments, for intercepting and inwardly deflecting upflow of said current above the latter, and having in said inward position their outer edges inwardly of those of said first segments, for directly up-passing said current above the latter.

5. In a current separator comprising, an outer casing enclosing a settling chamber, an inner casing enclosing a separating chamber having a lower current inlet and an upward current passage and an upper current outlet in communication therewith, blower means in communication with said outlet, for upflowing a fluid current through said passage for the separation of material therein, a distributor spaced below said outlet and concentrically within said passage, for the supply and distribution therein of material to be separated by said current, and a ring of radially movably adjustable segments within said passage and spaced below said outlet and above and concentrically of said distributor, having outer edges for inwardly defining the space through which said current may upflow past said outer edges, and radially movably adjustable for varying said space, for varying the separation; the combination therewith of a ring of radially reversely movably adjustable segments within said separating chamber and around said upward passage and spaced below said outlet and above said distributor concentrically of said first ring and having inner edges for outwardly defining the space through which said current may flow past said inner edges, and radially movably adjustable reversely to said first segments, for varying said space, for varying the separation.

6. In a current separator comprising, an outer casing enclosing a settling chamber, an inner casing enclosing a separating chamber having a lower current inlet and an upward current passage and an upper current outlet in communication therewith, blower means in communication with said passage, for upflowing a fluid current therethrough, for the separation of material therein, a distributor concentrically within said passage, for the supply and distribution therein of material to be separated therein, and uptosser means around said distributor, for uptossing said material toward said outlet; the combination therewith of a ring of radially movably adjustable segments within said separating chamber, spaced a substantial distance below said outlet and above said uptosser means, having inner and outer current passage edges for up-passing said current past said ring, said segments having outer edges radial movably adjustable relatively to and from an outer to an inner side of said uptosser means and across and from one side to the other side of said passage from an outward position, in which their outer edges are adjacent said inner casing, and their inner edges are around said passage, to an inward position, in which their outer edges are inwardly of said passage, and having in said outward position their outer edges outwardly of said uptosser means, for intercepting said uptossed material, and having in said inward position their outer edges inwardly of said uptosser means, for up-passing said uptossed material.

7. In a separator comprising an outer casing enclosing a settling chamber and an inner casing enclosing a separating chamber, said outer casing having an opening in an outer portion of its wall and said inner casing having its top wall spaced below the top wall of the outer casing and having an outlet in the central portion of its top wall and an inlet in its lower portion, said inlet and outlet affording communication between said chambers; a rotary fan located within said outer casing above the top wall of said inner casing and having an outer portion extending radially outwardly of said outlet; a distributor within said separating chamber; means for feeding material to be separated to said distributor; a movably adjustable valve above said separating chamber and adjacent said outlet, co-axial with and rotatable with said fan and forming therewith a rotary assembly; and adjusting means for said valve connected to and rotatable with said rotary assembly; the combination therewith of a rotatable operating means for said adjusting means connected to and rotatable with said rotary assembly and having a portion radially outwardly of said outlet and adjacent said opening and said portion of said fan, and connecting means between said operating means and said valve between said casings and constructed and arranged to change the position of the valve in response to changes in position of the operating means.

8. In a separator comprising an outer casing enclosing a settling chamber and an inner casing enclosing a separating chamber, said outer casing having an opening in an outer portion of its wall and said inner casing having its top wall spaced below the top wall of the outer casing and having an outlet in the central portion of its top wall and an inlet in its lower portion, said inlet and outlet affording communication between said chambers, a rotary fan located within said outer casing above the top wall of said inner casing and having an outer portion adjacent said opening and extending raidally outwardly of said outlet; a movably adjustable distributor within said separating chamber and co-axial with and rotatable with said fan and forming therewith a rotary assembly; means for feeding material to be separated to said distributor; and adjusting means for said distributor connected to and rotatable with said rotary assembly; the combination therewith of a rotatable operating means for said adjusting means adjacent and rotatable adjacent said opening and adjacent an outer portion of and

mounted on said fan, and connecting means between said operating means and said distributor between said casings and constructed and arranged to change the position of the distributor in response to changes in position of the operating means.

9. In a separator comprising an outer casing enclosing a settling chamber and an inner casing enclosing a separating chamber, said outer casing having an opening in an outer portion of its wall and said inner casing having its top wall spaced below the top wall of the outer casing and having an outlet in the central portion of its top wall and an inlet in its lower portion; said inlet and outlet affording communication between said chambers; a rotary fan located within said outer casing above the top wall of said inner casing and having an outer portion adjacent said opening and extending radially outwardly of said outlet; a distributor within said separating chamber; means for feeding material to be separated to said distributor; a movably adjustable baffle within said separating chamber below said outlet and above said distributor, co-axial with and rotatable with said fan and forming therewith a rotary assembly; and adjusting means for said baffle connected to and rotatable with said rotary assembly; the combination therewith of an operating means for said adjusting means adjacent said opening and an outer portion of and mounted on said fan and extending radially outwardly of said outlet, and connecting means between said operating means and said baffle between said casings and constructed and arranged to change the position of the baffle in response to changes in position of the operating means.

10. In a separator comprising an outer casing enclosing a settling chamber and an inner casing enclosing a separating chamber, said outer casing having an opening in an outer portion of its wall and said inner casing having its top wall spaced below the top wall of the outer casing and having an outlet in the central portion of its top wall and an inlet in its lower portion, said inlet and outlet affording communication between said chambers; a rotary fan located within said outer casing above the top wall of said inner casing and having an outer portion adjacent said opening and extended radially outwardly of said outlet; a distributor within said separating chamber; means for feeding material to be separated to said distributor; a movably adjustable valve above said separating chamber and adjacent said outet, co-axial with and rotatable with said fan and forming therewith a rotary assembly; and adjusting means for said valve connected to and rotatable with said rotary assembly; the combination therewith of an operating means for said adjusting means adjacent said opening and adjacent an outer portion of and mounted on said fan and extending radially outwardly of said outlet, and connecting means between said operating means and said valve between said casings and constructed and arranged to change the position of the valve in response to changes in position of the operating means.

11. In a separator comprising an outer casing enclosing a settling chamber and an inner casing enclosing a separating chamber, said outer casing having an opening in its wall and said inner casing having its top wall spaced below the top wall of the outer casing and having an outlet in the central portion of its top wall and an inlet in its lower portion, said inlet and outlet affording communication between said chambers; a rotary fan located within said outer casing above the top wall of said inner casing and having blades extended radially outwardly of said outlet; a movably adjustable distributor within said separating chamber, co-axial with and rotatable with said fan and forming therewith a rotary assembly; and means for feeding material to be separated to said distributor; the combination therewith of adjusting means for said distributor carried by said rotary assembly and comprising an operating means adjacent said opening and mounted on one of said blades, and connecting means between said operating means and said distributor constructed and arranged to change the position of the distributor in response to changes in position of the operating means.

12. In a separator comprising an outer casing enclosing a settling chamber and an inner casing enclosing a separating chamber, said outer casing having an opening in its wall and said inner casing having its top wall spaced below the top wall of the outer casing and having an outlet in the central portion of its top wall and an inlet in its lower portion, said inlet and outlet affording communication between said chambers; a rotary fan located within said outer casing above the top wall of said inner casing and having blades extended radially outwardly of said outlet; a distributor within said separating chamber; means for feeding material to be separated to said distributor, and a movably adjustable baffle within said separating chamber below said outlet and above said distributor and co-axial with and rotatable with said fan and forming therewith a rotary assembly; the combination therewith of adjusting means for said baffle carried by said rotary assembly and comprising an operating means adjacent said opening and mounted on one of said blades, and connecting means between said operating means and said baffle constructed and arranged to change the position of the baffle in response to changes in position of the operating means.

13. In a separator comprising an outer casing enclosing a settling chamber and an inner casing enclosing a separating chamber, said outer casing having an opening in its wall and said inner casing having its top wall spaced below the top wall of the outer casing and having an outlet in the central portion of its top wall and an inlet in its lower portion, said inlet and outlet affording communication between said chambers; a rotary fan located within said outer casing above the top wall of said inner casing and having blades extended radially outwardly of said outlet; a distributor within said separating chamber; means for feeding material to be separated to said distributor; and a movably adjustable valve above said separating chamber and adjacent said outlet and co-axial with and rotatable with said fan and forming therewith a rotary assembly; the combination therewith of adjusting means for said valve carried by said rotary assembly and comprising an operating means adjacent said opening and mounted on one of said blades, and connecting means between said operating means and said valve constructed and arranged to change the position of the valve in response to changes in position of the operating means.

14. In a current separator comprising, an outer casing enclosing a settling chamber, an inner

casing enclosing a separating chamber having a lower current inlet and an upward current passage and an upper current outlet in communication therewith, a tailings receptacle having an upper edge spaced below and around said outlet and defining a return current passage in communication from said settling chamber thereto, blower means in communication with said outlet, for upflowing a fluid current through said upward passage and returning said current through said return passage, for the separation of material therein, a distributor spaced below said outlet and above said inlet and concentrically within said upward passage, for the supply and distribution therein of material to be separated, and a ring of circumferentially spaced vertically extended interceptor vanes around said inlet and across said return current passage, for intercepting material floating in said current therein, and having lower discharge ends for discharging said material; the combination therewith of a vertical rotary ring inwardly of and adjacent said vanes and vertically extended parallel with the inner sides of said vanes from above said lower discharge ends to below the latter, revoluble past said lower portion of said vanes and across the spaces therebetween, whereby the inward flow of air between said vanes is permitted above said rotary ring, but is resisted by said rotary ring adjacent the lower ends of the vanes.

GEORGE HOLT FRASER.