Jan. 2, 1934. S. G. SYLVAN 1,941,449

SEPARATOR

Filed Oct. 2, 1930

Fig. 2

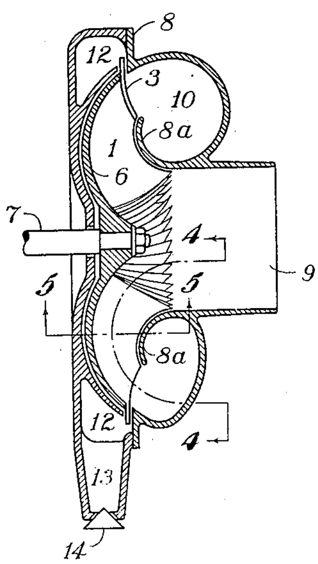


Fig. 1

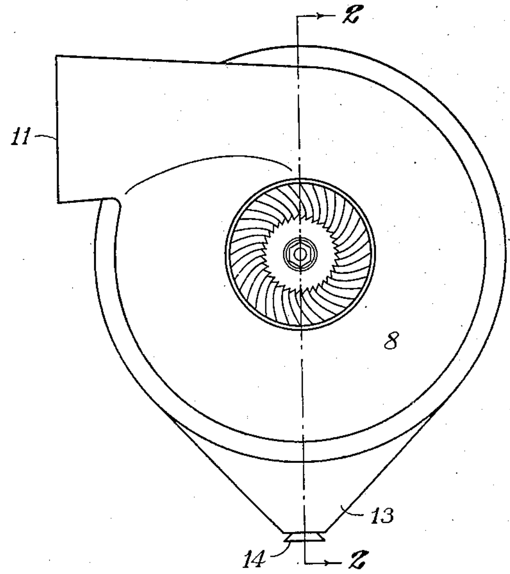


Fig. 3.

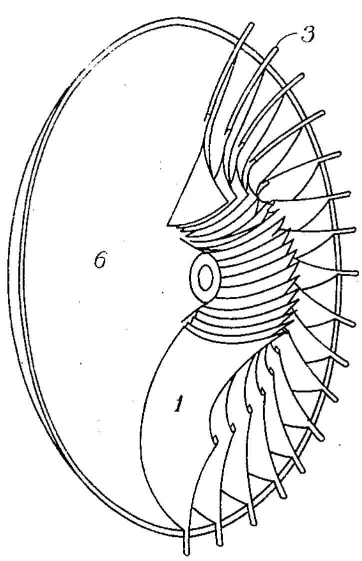


Fig. 4

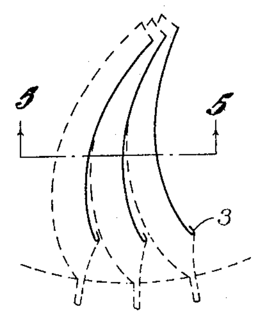
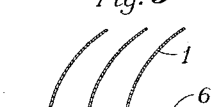


Fig. 5



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Patented Jan. 2, 1934 1,941,449

UNITED STATES PATENT OFFICE

1,941,449

SEPARATOR

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Application October 2, 1930. Serial No. 485,941

24 Claims. (Cl. 183—77)

This invention relates to separating devices of the type utilizing blades for the purpose of effecting the separation of particles from a fluid medium, the particles being of different specific mass than the medium. While the invention is capable of a variety of uses, such as separating the constituents of emulsions, suspensions of solids in liquids, liquids in vapors or gases, or the like, and is also capable of removing certain size particles from an emulsion or suspension, thereby thickening or thinning out these materials, it is herein described in connection with its use as an air cleaner or dust collector, for which it is particularly suitable.

At the outset it should be understood that while the "average" size of the solid particles contained in any fluid medium depends largely upon the origin of that medum, the range of sizes ordinarily encountered in the various mediums, varies from the large, heavy, cinder-like particles down to particles so small and light that they remain more or less suspended in the medium. In fact the bulk, by weight, of all particles contained in any medium such as air, is usually composed of suspended particles. All of these particles down to an extremely small size of the suspended particles, are generally considered objectionable. Consequently, in order that a cleaner operate efficiently, it must be capable of removing not only the heavy particles but the greater proportion of the suspended particles as well.

In various types of air cleaners and dust collectors, including the type above-mentioned, the so-called deflection principle of cleaning is utilized. This principle consists in changing the direction of the flow of fluid and is ordinarily carried out by subjecting the flud to a series of changes or deflections. The principle is based on the fact that dust particles, due to their mass or inertia, have a tendency to continue along a straight line when the air stream is deflected and may be illustrated by considering the flow of air through a U-shaped pipe. Thus at the beginning of the bend in the pipe it is evident that the particles, by virtue of their inertia, tend to continue in straight lines instead of following the bent in the pipe, and are thus caused to pass across the stream toward the outermost portion of the inner walls of the pipe, which portion may be termed the deflector. In passing across the stream, the particles move relative to the air, with the result that the air stream exerts on them a resistance or frictional force which is proportional to the relative velocity and which resists the deviation of the particles relative to the steam. This resisting force has the effect of altering the path of the particles so that they curve toward the flow and away from the deflector. In consequence some of the particles, especially the lighter ones, may escape deposition on the deflector.

I have discovered that the angle of deflection and the dimension of the flow in the plane of the deflection are factors which largely determine the number of particles escaping deposition in a separator utilizing a bent flow. The general effect of these factors can be readily illustrated by again considering the flow in a U-shaped pipe, For instance, if the angle of deflection of the flow be increased, or, if the dimension of the flow in the plane of the deflection be decreased, the precipitating surface or deflector in either case will extend more deeply into the curved path of the particles and consequently insure a more complete precipitation. I have also discovered that by properly utilizing these factors, a separator having either stationary or revolving blades can be produced that will in a single deflection effect the separation of the greater proportion of suspended particles down to a size which is so small that their separation by apparatus of this general character has heretofore been considered highly improbable if not impossible even with a series of deflections. It is to this end that the present invention is principally directed.

The principal objects of my invention are, therefore, to secure in a blade type of separator, an effective utilization of the bent flow, and, to provide a separator of this type which utilizes a deflection that it is not only effective but highly efficient in separating particles ranging from the heavy to the extremely light or suspended particles.

A further object is to provide a revolving blade type of separator which effectively and efficiently utilizes a deflected flow.

Another object is to provide the particle precipitating, revolving blades of a separator with means for collecting the precipitating particles which are arranged so that they not only receive substantially all of the particles precipitated on the blades but also utilize the full effect of centrifugal force in effecting the removal of such particles.

Another object is to provide a simple separating means which may easily be incorporated in an air delivering construction to remove particles contained in the air, without necessarily affecting the air delivering efficiency of the construction and/or complicating the construction or otherwise increasing in any substantial measure the expense of its manufacture.

Another object is to arrange the air passage between the inlet and outlet openings of a blower-type separator construction so that it will effect a gradual and uniform deflection of the air, thereby avoiding any abrupt changes in the direction or area of flow and consequently reducing the possibility of distorting the flow during the deflection.

Another object of the invention is to arrange the blades in a separator of the blower type so that they tend to cause particles rebounding from their surfaces to rebound more or less away from the main body of the air flow in a direction favoring their subsequent precipitation.

Another object of the invention is to arrange the blades in a separator of the blower type so that certain forces arising as a result of the rotation of the blower are utilized to cause the precipitated particles to move away from the main body of the air flow and thereby make ultimate separation more certain.

Embodiments of the invention are illustrated in the accompanying drawing, wherein:

Figure 1 is a side elevation of a blower construction embodying the invention;

Figure 2 is a section taken generally along lines 2—2 of Figure 1 in a manner such as to avoid sectioning any blades, this being done for the sake of clearness;

Figure 3 is a perspective of a portion of the rotor of Figure 2;

Figure 4 is a developed section along line 4—4 of Figure 2;

Figure 5 is a section along line 5—5 of Figures 2 and 4.

The present invention is not only generally adapted for use in connection with the blower types of construction but is particularly suited for use in apparatus of this character by virtue of the action of the blades upon the air. The blades of a blower not only move the air outwardly thereby subjecting it and its contained particles to the action of centrifugal force, but deflect or move it laterally forward in the direction of rotation and thus effect a continuous lateral deflection of the air during its outward passage. The inertia of the particles naturally prevents an abrupt change in their direction of flow and thus tends to maintain their movement in a radial direction, thereby permitting the blades to approach and strike the particles. It will readily be appreciated that the degree of deflection depends upon the speed of rotation varying directly in proportion thereto. It will also be appreciated that other factors such as spacing and length of blades apply to this type of construction. Consequently for purposes of efficiency, the length and width or spacing must be coordinated to the speed of rotation and the size of the smallest or lightest particle contained within the range to be removed in the same manner as stated in connection with the stationary blade construction. Before passing it may be noted that the inherent deflection of air produced by the blades enables the use of straight blades without, of course, preventing the use of curved blades.

The invention is shown in Figures 1 to 5 inclusive as applied to a suitable blower construction. This construction includes a series of blades 1 which are secured edgewise in a more or less radial arrangement to an outwardly extending face provided by the annular member 6, the latter being mounted on one end of a suitable drive shaft 7. The member 6 is located within a casing 8 and so arranged that, when rotated, air is drawn axially into the casing through an axial opening 9, the air passing outwardly between the blades and being discharged more or less axially into a convolute passage or scroll 10 which terminates in a tangential discharge tube 11.

With this form of construction, it is manifest that the air in passing through the blower is by virtue of the passage itself, deflected approximately 180 degrees in a direction such as to cause the particles to travel toward the annular member 6 with the result, naturally, that some are precipitated on the member 6. In order to prevent or at least reduce the formation of eddy currents and other disturbing influences which might arise as a result of this 180 degree deflection, the path between the inlet opening 9 and the convolute discharge passage 10 is made to curve uniformly throughout its extent. This is accomplished by providing the inner end of the inlet casing wall with an outwardly directed, convexly curved annular extension 8*a* and by forming the blade or deflecting face of the annular member 6 so that it curves annularly from its center concavely outward. In other words, the members 6 and 8*a* cooperate to define a smooth fluid passage, the sectional outline of which, in an axial plane, is arc-shaped and curves outwardly from the axis of rotation. By so doing the deflection is brought about both gradually and uniformly thereby avoiding any abrupt changes in the direction or area of flow and consequently reducing the possibility of distorting the flow.

The longitudinal edges of each blade, that is to say its secured edge and the edge opposite to it, naturally are respectively curved to conform to the adjacent surface curvature of the member 6 and the extension 8*a* with the result that the outline of each blade, when viewed from either of its faces, is somewhat arc-shaped. While the faces of the blades may, if desired, be made straight and the blades themselves arranged in any suitable manner, I prefer to utilize a form and arrangement which will insure the efficiency of their operation. To this end the blades 1 are formed so that their advancing faces are more or less concavely curved both longitudinally along the stream lines and transversely across the stream lines. The blades as a whole are secured to the face of the member 6 in a more or less spiral radial arrangement, the arrangement shown in Figures 3 and 4 being such that the axial or up-stream end portions of the blades lead their outer or downstream portions in the direction of rotation, this however, not being necessary.

Obviously during the operation of this construction, the air passing between the blades is not only subjected to a 180 degree deflection in an axial plane, as previously mentioned, but, in addition, is bodily deflected laterally forward, that is to say, the plane of rotation by the rotation of the blades with a consequent precipitation of the dust upon the advancing faces of the blades. Furthermore the lateral deflection is augmented by the longitudinal concave curvature of the advancing faces of the blades. It will be more easily understood that the deflection due to the longitudinal concave curvature of the advancing faces of the blades augments the rotational deflection by considering the operation of the blades as if they were held stationary and fluid drawn or forced through the passages. In such case, it becomes apparent that the fluid is not only deflected rotationally about the axis of the device and thus centrifuged as it passes outwardly along the blades, but that such deflection is exerted in a direction which effects the precipitation of contained particles on the longitudinal concave faces of the blades. Thus while the deflection does not depend on actual rotation, it has the same effect as actual rotation, and hence must augment the deflection due to such rotation. The dust precipitated will, of course, be moved outwardly along the blades by the combined action of centrifugal force and the sweep of the air. It will readily be appreciated that the effectiveness of this construction will be increased by causing the precipitated dust, as it moves outwardly, also to move laterally across the blades toward their secured edges. By so doing the dust is removed as far as possible from the main body of the air flow thus making the ultimate separation more certain. With this in mind it may be pointed out that the rotation of the blades creates a pressure on the dust particles which is directed tangentially opposite to the rotation and therefore tends to hold the particles on the blades, this pressure, obviously, being proportional to the tangential acceleration of the particles. In the present construction, by inclining the blades transversely forward in the direction of rotation so that their advancing faces extend transversely over or across the air flow, a component of this force is thereby directed toward the annular member 6 and thus utilized to effect the lateral movement of the dust particles.

The transverse inclination of the blades has a further advantage. For example, where a particle is struck by one of the blades and rebounds instead of precipitating, the inclination tends to direct the rebounding particles more or less along the surface of the blades toward their secured edges instead of causing them to pass directly back into the main body of the air flow. The inclination thus increases the possibility of ultimately precipitating the partcle either upon the blade or the member 6. With regard to the particles precipitated upon the member 6, it may be observed that they not only tend to move outwardly, but, as a result of the pressure exerted on the particles through the rotation of the member 6, they also tend to move laterally across the member 6 toward the secured edges of the blades. Thus by virtue of this construction, all of the particles precipitated on the blades 1 and the member 6 are caused to move toward the intersection of the blades and the member 6 as they move outwardly toward the outermost discharge ends of the blades where they are most favorably situated for ejection from the air stream.

The discharge ends of the blades are provided with channels 3 which are arranged on the advancing face side or edge of the flow to receive the outwardly moving particles of precipitated dust. These channels are made to extend radially across the lateral flow or discharge portion of the air stream so as to utilize the full effect of centrifugal force in discharging the collected dust. The channels 3 extend outwardly beyond the peripheral edge of the annular member 6 and may be arranged to discharge either into the atmosphere or into some suitable receiver. In the embodiment shown, the casing 8 is formed with an annular passage or chamber 12 to receive and direct the discharged dust into a hopper 13 formed in the casing at the bottom of the chamber 12, the hopper being provided with suitable closure means 14 through which the dust may be removed from the casing.

Generally speaking, it may be said that as long as the forces acting on a particle are exerted in a direction which intersects a surface of a separator, the path of travel of the particle will be controlled inasmuch as unprecipitated particles will be moved toward such surface while precipitated particles will be held on the surface and moved along it in a direction controlled by the surface components of the forces. When such forces are parallel to the surface or directed away from it, the path of travel of the particles will be uncontrolled inasmuch as the particles are then free, or forced to spread out in the air stream. Due to this tendency of uncontrolled particles to spread out in the air stream, where removal is practically impossible, it is necessary for effective results that the removal be effected while the path of the particles is controlled; hence the removal should be effected somewhere along or at the end of the precipitating surface and directly therefrom so as to eliminate or reduce the possibility of their reentering the stream. With this in mind, it will be noted in the present embodiment that the precipitating surface of the annular deflection passage is provided by the outer or concave wall and that this precipitating surface terminates at the periphery of the impeller or rotatable member 6. The precipitating surface of the blades likewise terminates at this point, and consequently the annular slot which connects the dust chamber with the deflection passage is positioned in radial alignment with the periphery of the rotating structure so as to permit the removal of the particles from the stream directly at a point where control of the particles is about to cease. The annular slot may, therefore, be said to have direct communication with the precipitating surface inasmuch as the path of travel of the particles is always along an edge of the flow and so arranged that it extends directly into the slot. In connection with this slot, it may also be pointed out that it introduces a sudden or abrupt variation in the cross-sectional area of the deflection passage, thereby causing an air flow disturbance. Its flow distorting effect, however, can be greatly minimized in fact, practically nullified, by making it narrow so that its width, preferably in the direction of air flow, is substantially smaller than the width across the flow of the adjacent portion of the main air or deflection passage.

From the foregoing it will be apparent that the arc-shaped deflection passage defined by the members 6 and 8*a* causes the particles to be thrown in the direction of the member 6; that the rotation of the blades causes a deflection of the air in a plane at right angles to the deflection caused by the arc-shaped passage whereby particles are relatively moved in the direction of the advancing faces of the blades; and that the effect of this latter deflection is augmented by the longitudinal concave curvature of the advancing faces of the blades.

It will also be seen that the rotation of the member 6 causes the particles precipitated thereon to move laterally along the member 6 toward the advancing face of the nearest blade, such lateral movement occurring as the particle moves outwardly; and that the transverse inclination of the blades causes the particles to move laterally toward the member 6 as they move outwardly along the blades.

As a result of these features, the particles are not only continuously deflected in a direction favoring ultimate precipitation, but, when precipitated, are caused to approach that portion of the blades where they are most favorably situated ror centrifugal ejection from the air stream. Furthermore, the deflection of the air is carried out in such uniform manner that the air is not subjected to any abrupt change in direction or cross-sectional area. Consequently, all disturbing influences, such as eddy-currents, etc., which would tend to sweep precipitated particles back into the air stream are either eliminated or greatly reduced.

Having described my invention, I claim:

1. In combination with a rotatable series of blades which are adapted to create a flow of fluid from the center outwardly and to discharge the fluid substantially laterally, of particle receiving channels positioned on the advancing faces of the blades so as to extend substantially in a radial direction across the stream of fluid near the point of fluid discharge.

2. In combination with a blower having a rotatable series of outwardly extending blades which are adapted to draw in a fluid at their inner ends and to cause the fluid to pass outwardly and thence laterally to the point of discharge, of channels positioned on the lateral flow portion of the advancing faces of the blades and arranged so as to extend substantially in a radial direction, said channels being adapted to centrifugally eject the precipitated particles received from the blades during their rotation.

3. A separator of the class described comprising a casing having an inlet opening, an outwardly located annular outlet opening, means defining an annular deflection passage which uniformly curves concavely outward from the inlet to the outlet opening, said means including a rotatable member having a series of blades which extend outwardly in said passage between said openings, and which are shaped to conform to the curvature of said passage, the deflections produced in the passage causing contained particles to be precipitated on and moved outwardly along the deflecting surfaces, and means for conducting the precipitated particles from the passage.

4. A separator of the class described comprising a casing having an inlet opening, an outwardly located annular outlet opening, an annular convexly curved wall portion extending between the inlet and outlet openings, a rotatable member spaced from said wall portion and extending from its center concavely to a point adjacent the outer edge of the outlet opening, said member cooperating with said wall portion to define a uniformly curving deflection passage between said openings, a series of outwardly extending blades arranged in said passage between said openings and secured to said member, said blades being shaped to conform to the curvature of said passage, the deflections produced in the passage causing contained particles to be precipitated on and moved outwardly along the deflecting surfaces, and means for conducting the precipitated particles from the passage.

5. A separator comprising a rotatable series of blades extending longitudinally in the direction of flow and inclined transversely across the flow so as to cause precipitated particles to move transversely across the blades toward one side of the flow as they move longitudinally along the blades, and means on the same side of the flow for receiving the precipitated particles.

6. A separator of the class described having an axis of rotation comprising a rotatable series of blades extending longitudinally outward from said axis of rotation and providing passages for the radial flow of a fluid, the advancing faces of said blades being inclined transversely across the flow so as to cause precipitated particles to move transversely across the blades toward one side of the flow as they move longitudinally along the blades, and means on the same side of the flow for receiving the precipitated particles.

7. In a separator of the class described a rotatable member having an outwardly extending face, a series of blades mounted on said face in edgewise relation thereto and providing passages for the outward flow of a fluid, the advancing faces of the blades being inclined transversely across the outward flow of fluid so as to cause the precipitated particles to move transversely across the blades toward the face of said rotatable member as they move longitudinally outward along the blades, and means along the outer edge of said face to receive the precipitated particles.

8. A separator of the class described having an axis of rotation comprising a rotatable series of blades extending longitudinally outward from said axis of rotation and providing passages for the outward flow of a fluid, the advancing faces of said blades presenting a surface which is inclined transversely across the flow so as to cause particles precipitated thereon during the rotation of the blades to move transversely across said surface as they move longitudinally along said surface whereby the particles are directed to a point of centrifugal ejection, and means defining a dust chamber having an inlet opening radially aligned with said point.

9. In a separator of the class described having an axis of rotation, the combination of means providing spaced surfaces which define a fluid passage, the sectional outline of which curves smoothly outward in an axial plane from the axis of rotation, a rotatable series of blades which extend outwardly and across the passage formed by said surfaces, said blades having their advancing faces inclined transversely across the flow so as to cause the precipitated particles to move laterally toward one of said surfaces as they move outwardly along the blades, and means for collecting the precipitated particles.

10. In a separator of the class described having an axis of rotation, the combination of means defining a fluid passage, the sectional outline of which bends smoothly outward in an axial plane from the axis of rotation, said means including an inner member presenting a convex surface to the flow and a rotatable outer member presenting a concave surface to the flow, and a series of blades extending longitudinally outward from the axis of rotation across said passage, said blades being arranged to rotate with said rotatable outer member, the advancing faces of said blades being transversely inclined across the flow so as to cause precipitated particles to move transversely toward said outer member as they move longitnudially outward.

11. A separator of the class described comprising means defining a passage for the flow of a fluid, the sectional outline of which curves longitudinally whereby the fluid is deflected in one plane, a series of blades extending longitudinally along and across said curving passage, one face of each blade being concavely curved longitudinally whereby the fluid is deflected in another plane, and means adjacent one of said curved

surfaces for collecting the particles precipitated as a result of said deflections.

12. In a separator of the class described having an axis of rotation, the combination of means providing inner and outer spaced surfaces which define a fluid passage, the sectional outline of which curves uniformly outward in an axial plane from the axis of rotation whereby fluid passing therethrough is deflected in an axial plane, a rotatable series of blades which extend longitudinally outward and across the passage formed by said surfaces whereby the fluid is deflected in the plane of rotation, said blades having their advancing faces concavely curved longitudinally so as to augment the rotational deflection, and means for conducting the precipitated particles from the stream, said means presenting along said outer surface a slot having direct communication with the path of precipitated particles.

13. A separator comprising a rotatable series of blades extending longitudinally in the direction of flow and inclined transversely across the flow so as to cause the precipitated particles to move transversely across the blades toward one side of the flow as they move longitudinally along the blades, the advancing faces of the blades being concavely curved longitudinally and means on the same side of the flow for collecting the precipitated particles.

14. In a separator of the class described having an axis of rotation, the combination of means providing spaced surfaces which define a fluid passage, the sectional outline of which curves smoothly outward in an axial plane from the axis of rotation, a rotatable series of blades which extend outwardly from said axis and across the passage formed by said surfaces, said blades having their advancing surfaces inclined transversely across the flow so as to cause the precipitated particles to move laterally toward one of said surfaces as they move outwardly along the blades, the advancing faces of said blades also being concavely curved longitudinally, and means for collecting the precipitated particles.

15. A separator comprising a rotatable series of blades extending longitudinally in the direction of flow, the advancing faces being concavely curved both longitudinally so as to augment the deflection produced by rotation and transversely so as to cause the particles precipitated on the blades to move laterally toward a limited section of the blades, as they move outwardly along the blades, and means for conducting the particles out of the stream from said section.

16. A separator of the class described having an axial fluid inlet opening, an outwardly located annular opening, means defining an annular deflection passage between said openings, said means including an annular convex wall portion on the inner side of the passage, and an annular concave wall portion on the outer side thereof between which the passage uniformly curves directly from the axial inlet concavely outward so as to deflect a fluid stream passing therethrough uniformly and continuously from an axial flow to an outward flow, whereby contained particles are precipitated on and caused to move outwardly along said outer wall and means along the said outer wall for conducting precipitated particles from the stream, said conducting means presenting a particle receiving slot directly in the path of travel of the precipitated particles.

17. A separator of the class described having an axis of rotation an axial inlet opening, a scroll outlet passage presenting an outwardly located annular inlet opening arranged to receive a more or less annular axial flow, means defining an annular deflection passage between said openings, said means including a convex wall portion on the inner side of the passage and a concave wall portion on the outer side thereof between which the passage uniformly curves directly from the scroll inlet opening concavely inward, means for centrifuging the fluid in said deflection passage about said axis of rotation whereby the fluid stream passing toward said outlet opening is deflected uniformly and continuously from an outward flow to a more or less axial flow and contained particles thereby precipitated on and caused to move outwardly along said outer wall, and means along said outer wall for conducting precipitated particles from the passage, said means presenting a narrow outwardly-directed particle-receiving slot in the path of travel of the precipitated particles.

18. A separator of the class described having an axis of rotation, an axial inlet opening, means defining a deflection passage which curves in an axial plane from the axial inlet opening uniformly and concavely outward substantially to a point of axial flow, means for centrifuging the fluid in said deflection passage about said axis of rotation whereby the fluid stream is deflected uniformly and continuously as it passes outwardly along said passage and contained particles thereby precipitated on and caused to move outwardly along a wall of said passage, and means along said wall for conducting precipitated particles from the passage, said means presenting a narrow outwardly-directed particle-receiving slot in the path of travel of the precipitated particles.

19. A separator of the class described having an axis of rotation, an axial inlet opening, a scroll outlet passage presenting an outwardly located annular inlet opening arranged to receive a more or less annular axial flow, means defining an annular deflection passage between said openings, said means including a convex wall portion on the inner side of the passage and a concave wall portion on the outer side thereof between which the passage uniformly curves directly from the scroll inlet opening concavely inward, a spirally curved series of arc-shaped blades extending transversely across said curving passage and longitudinally toward said scroll inlet, said blades providing relatively long narrow passages in which fluid passing toward said scroll inlet is deflected rotationally about said axis and contained particles thereby precipitated, and means along said outer wall presenting an opening for conducting the particles outwardly from the passage.

20. A separator of the blower type having an axis of rotation, an axial inlet opening, a scroll outlet passage presenting an outwardly located annular inlet opening arranged to receive a more or less annular axial flow, means defining an annular deflection passage between said openings, said means including inner and outer wall portions extending from said scroll inlet convexly and concavely inward respectively, the outer concave wall portion being rotatable about said axis, a series of arc-shaped blades extending transversely between said wall portions longitudinally toward said scroll inlet, said blades providing relatively long narrow passages and being arranged to rotate with said concave wall portions so as to create and rotationally deflect a flow of fluid thereby precipitating contained particles, the advancing faces of said blades being concavely curved longitudinally, and means presenting

along the outer wall of said passage a small opening through which the particles may be centrifugally ejected from the passage.

21. A separator of the blower type having an axis of rotation, an axial inlet opening, a scroll outlet passage presenting an outwardly located annular inlet opening arranged to receive a more or less annular axial flow, means defining an annular deflection passage between said openings, said means including inner and outer wall portions extending from said scroll inlet convexly and concavely inward respectively, a series of arc-shaped blades extending transversely between said wall portions longitudinally toward said scroll inlet, said blades providing relatively long narrow passages and being arranged to rotate about said axis of rotation so as to create and rotationally deflect a flow of fluid thereby precipitating contained particles, the advancing faces of said blades being transversely inclined from the outer concave side of the deflection passage forwardly in the direction of rotation, and means presenting along the outer wall of said passage a small opening through which the particles may be centrifugally ejected from the passage.

22. A separator of the blower type having an axis of rotation, an axial inlet opening, a scroll outlet passage presenting an outwardly located annular inlet opening arranged to receive a more or less annular axial flow, means defining an annular deflection passage between said openings, said means including inner and outer wall portions extending from said scroll inlet convexly and concavely inward respectively, the outer concave wall portion being rotatable about said axis, a series of arc-shaped blades extending transversely between said wall portions longitudinally toward said scroll inlet, said blades providing relatively long narrow passages and being arranged to rotate with said concave wall portions so as to create and rotationally deflect a flow of fluid thereby precipitating contained particles, the advancing faces of said blades being concavely curved longitudinally and inclined transversely from the outer concave side of the deflection passage forwardly in the direction of rotation, and means presenting along the outer wall of said passage a small opening through which the particles may be centrifugally ejected from the passage.

23. A separator of the blower type having an axis of rotation, an axially directed inlet opening, a scroll outlet passage presenting an outwardly located annular inlet opening arranged to receive a more or less annular axial flow, means defining an annular deflection passage between said openings, said means including an annular wall portion extending from the inner edge of the scroll inlet opening convexly inward to the outer edge of said axially directed inlet opening and an annular outer wall portion extending from the outer edge of said scroll inlet opening concavely inward to the center of said axially directed opening, the outer concave wall portion being rotatable about said axis, a series of arc-shaped blades extending transversely between said wall portions longitudinally toward said scroll inlet, said blades providing relatively long narrow passages and being arranged to rotate with said concave wall portions so as to create and rotationally deflect a flow of fluid thereby precipitating contained particles, the advancing faces of said blades being concavely curved longitudinally and inclined transversely from the outer concave side of the deflection passage forwardly in the direction of rotation, and means along the outer concave wall of the passage adjacent the scroll end thereof presenting an annular outwardly-directed slot through which the precipitated particles may be centrifugally ejected from the stream.

24. A separator comprising a series of blades concavely curved longitudinally in the direction of flow with their concave faces inclined transversely across the flow so as to cause the precipitated particles to move transversely across the blades toward one side of the flow as they move longitudinally along the blades and means on the same side of the flow for collecting the precipitated particles.

STIG G:SON SYLVAN.