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COLLECTING AND SEPARATING APPARATUS

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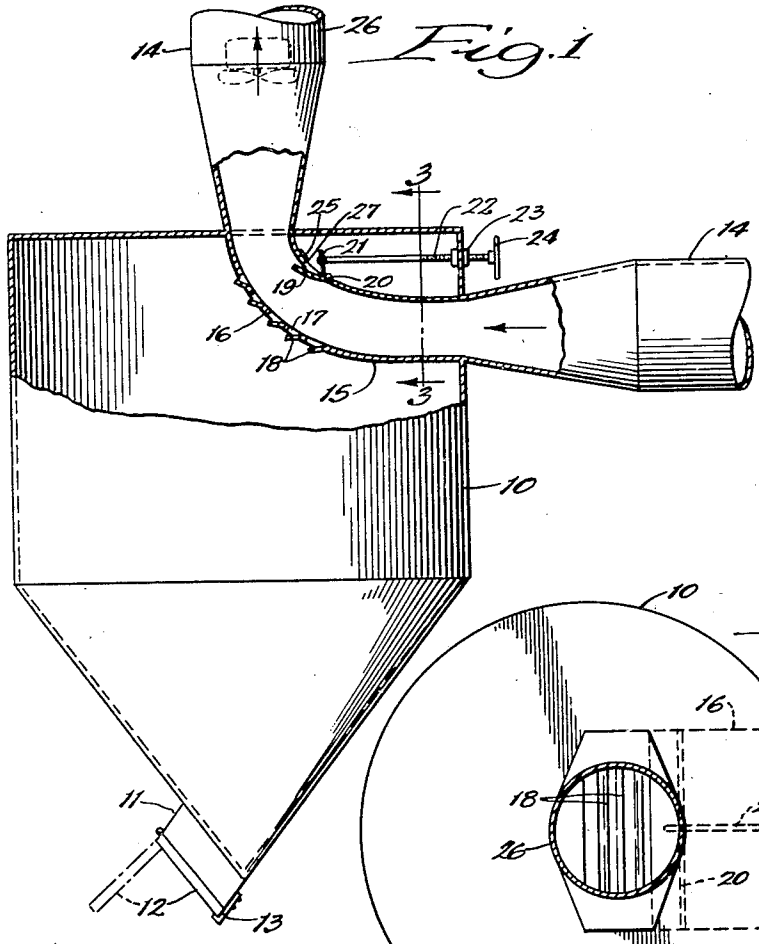


Fig. 1

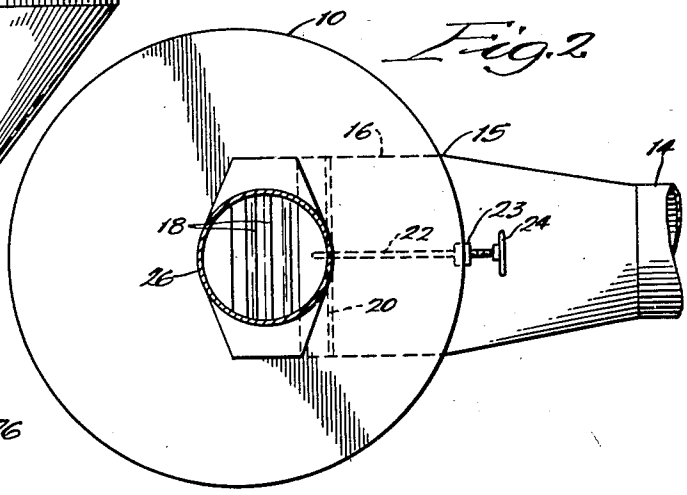


Fig. 2

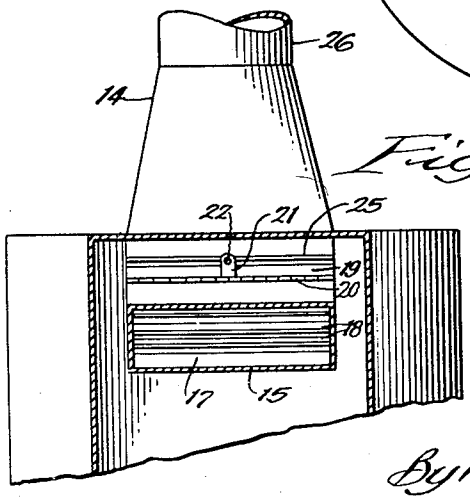


Fig. 3

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COLLECTING AND SEPARATING APPARATUS

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4 Claims. (Cl. 183—79)

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This invention relates to collecting and separating apparatus. It is particularly useful in the separation of particles from a fluid medium, in the removal of heavier fluids from lighter fluids, and in the removal of such materials as dust, chips from castings, and other particles produced in mills, etc.

An object of the invention is to provide improved means for treating fluid media and particle-laden fluids to produce a separation therein. A further object is to provide variable means for controlling the treatment of fluid media and particle-laden fluids within a duct and chamber whereby rapid and efficient separation is produced while providing a new avenue for the release of the lighter fluid or fluid freed of particles. Yet another object is to provide a controlled change of direction separation without change of velocity of the carrying fluid, thus effecting a substantial saving in power and greater efficiency in separation. Other specific objects and advantages will appear as the specification proceeds.

The invention is illustrated in a preferred embodiment by the accompanying drawing, in which—

Figure 1 is a broken vertical sectional view of apparatus embodying my invention; Fig. 2, a top plan view of the structure shown in Fig. 1; and Fig. 3, an enlarged transverse sectional view, the section being taken as indicated at line 3—3 of Fig. 1.

In the illustration given, 10 designates a casing which provides a separation chamber that is maintained in airtight condition. Any means for maintaining the chamber in airtight condition and any means for removing the particles, etc. collected within the chamber may be employed. For example, the collecting structure shown in my copending application Serial No. 604,655 may be employed, if desired. For the purpose of illustration herein, the chamber 10 is provided at its bottom with a draw-off pipe 11 normally sealed or closed by the door 12. The door 12 may be opened after the separating operation to withdraw the particles, etc. collected therein. A spring catch 13 may be employed to maintain the door 12 normally in sealed relation with the outlet pipe 11.

A high velocity fluid duct 14 is provided with an elbow portion 15 extending through the chamber provided by casing 10. In the illustration given, the duct 14 is shown of generally circular cross section, except where the elbow portion 15 extends into the casing 10 the conduit is flattened. The cross sectional area of the conduit 14 remains substantially the same throughout and the flattening of the elbow portion 15 results in creating a greater surface area about the heel portion 16 of the elbow 15. Further, at the point 16 where the greater surface area is created, the

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depth of the elbow is diminished, thus facilitating the separation operation which will be described. At the heel portion 16, I provide openings 17 with guide blades 18 which aid in skimming off the outer layer of fluid containing the particles or heavier constituents of the fluid.

In conjunction with the flattened elbow portion 15, I provide control means whereby the cross sectional area of the section 15 may be varied as desired. In the illustration given, a control door or damper 19 is movably mounted upon the duct 14 by means of a hinge rod 20. In the illustration given, the door 19 is provided with a vertical shaft 21 to which is fixed a control rod 22. The control rod 22 is threaded and engages a threaded boss 23 fixed within casing 10. The rod may be provided with a control handle 24 for effecting a nice regulation of the damper or door 19. The casing 10 is preferably provided with a seal strip 25 which cooperates with the door 19 in effecting a tight seal when the door 19 is drawn to closed position. Any suitable means for producing a high velocity flow through the duct 14 may be employed. Usually, a suction fan (not shown) is connected with the outlet end 26, and this arrangement gives very satisfactory results.

In the operation of the device, the fluid undergoing treatment flows in the direction of the arrows shown in Fig. 1 into the flattened elbow portion 15 within the chamber provided by casing 10 at high velocity, and a change in direction is produced by the elbow within the chamber. The lighter fluid makes the change of direction without difficulty and passes up through the outlet portion 26 of the conduit. The heavier fluid and the particles within the fluid persist in their initial direction and encounter the openings 17 in the heel portion 16 of the elbow. The particles and the heavier portion of the fluid escape through the openings into the chamber, and the blades 18 assist in the skimming of a thin portion of the fluid along with the particles into the chamber. Even where it is desired to recover only the particles and no portion of the fluid, I prefer to skim off in the manner described a portion of the fluid, because this action results in a more complete removal of the fine particles within the chamber, and, with the new structure shown, I provide a means for the recovery of the fluid from the chamber itself. By opening the door 19 at least part way, as illustrated in Fig. 1, there is provided a passage 27 through which the fluid, freed of the particles, may rejoin the fluid in the conduit and pass out through outlet section 26. Since the particles are directed toward the opposite side of the chamber and tend to drop to the bottom of the chamber, there is no tendency for any portion of the particles to pass out with the fluid through the opening 27 at the upper or outer end of the elbow 15. By

means of the door 19 and the control mechanism therefor, I am able to adjust the apparatus for treating different types of fluid and with different solid or heavier fluid portions that are to be separated. The door not only reduces the cross sectional area of the elbow portion 15 at a critical point, but also controls the escape passage 27 through which fluid may rejoin the stream within the duct 14. Thus, by moving the door 19 inwardly, I can maintain the velocity of the stream through the elbow portion 15 irrespective of the removal of a portion of the fluid through the openings 17. Further, the door 19 serves an additional function as a deflector in directing any particles that might be moving upwardlly near it toward the outlet openings 17.

The flattening of the portion 15 is useful not only as creating a greater peripheral area at the heel section 16, but also assists in the separating operation because of its shallower depth and the bringing of the upper wall of the casing closer to the outer wall. In this operation, the upper wall serves constantly as a deflector and as a means for directing the particles toward the openings 17.

It will be understood that the specific form illustrated in the drawings may be varied considerably while still accomplishing the same results. For example, it is not necessary for the elbow portion 15 to enter the chamber provided by casing 10, and it is sufficient if the heel portion 16 communicates with the chamber and if conduit means be provided establishing communication between the upper portion of the casing and the outlet passage 26.

In drop-out boxes heretofore employed, it has been the practice to provide an expansion area in which velocities drop and the particles settle out due to the reduction in velocity. Such operations place a large load upon the power units because velocities have to be immediately restored to the original effective point, as, for example, 4500 feet per minute, and this means the expenditure of additional power. With the structure described, the mass of the fluid may be maintained in the desired directional flow and without substantial change of velocity, while at the same time the heavy particles or heavy fluid portions are being eliminated.

While in the foregoing specification, I have set out a structure in considerable detail as illustrating one embodiment in which the invention may be employed, it will be understood that such details may be varied widely by those skilled in the art wtihout departing from the spirit of my invention.

I claim:

1. In combination, a casing providing an airtight chamber, a duct of substantially uniform cross section, said duct having an elbow portion flattened to increase the peripheral area thereof and extending into said chamber, the heel portion of said elbow communicating through at least one opening with the interior of said chamber, a control door carried by said duct within said chamber and adjacent the outlet of said elbow, said door being swingable to control the flow through said elbow and communication between said chamber and outlet portion of said elbow, and a control rod engaging said door and threadedly engaging a boss within said casing, said control rod extending exteriorly of the casing and providing a means for regulating said door.

2. In combination, a casing providing an airtight chamber, a duct having a portion thereof bent into the shape of an elbow and having the convex and concave sides of the elbow communicating with the interior of said chamber, the heel portion of said elbow communicating through at least one opening with said chamber and the side of the elbow facing said heel portion being provided with an opening providing communication between the chamber and the elbow, a door mounted upon said elbow for control of said opening, and a manually operable member secured to said door and extending out of said casing for actuating said door and to control the flow from said chamber into said elbow.

3. In combination, a casing providing an airtight chamber, a duct having a portion thereof bent into the shape of an elbow and having the convex and concave sides of the elbow communicating with the interior of said chamber, the heel portion of said elbow communicating through at least one opening with said chamber and the side of the elbow facing said heel portion being provided with an opening providing communication between the chamber and the elbow, a door mounted upon said elbow for control of said opening, a manually-operable member secured to said door and extending out of said casing for actuating said door and to control the flow from said chamber into said elbow, and suction means in said duct for drawing fluid through said elbow.

4. In combination, a casing providing a separation chamber, a duct having a portion thereof bent into the shape of an elbow and having the convex and concave sides of the elbow communicating with the interior of said chamber, the heel portion of said elbow communicating through an opening with said chamber and the side of the elbow facing said heel portion being provided with an opening providing communication between the chamber and the elbow, a door mounted upon a hinge at the inner side of said last mentioned opening on the side of the elbow and being inclined in a direction toward the outlet of said elbow, a manually-operable member secured to said door and extending out of said casing for actuating said door to control the flow from said chamber into said elbow, and suction means for drawing fluid through said elbow.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
911,258	Neuman	Feb. 2, 1909
1,628,099	Arrowood	May 10, 1927
1,901,370	Kuhner	Mar. 14, 1933

FOREIGN PATENTS

Number	Country	Date
155,010	Germany	June 3, 1902
352,123	Germany	Apr. 21, 1922
585,277	Germany	May 25, 1932
105,617	Switzerland	July 1, 1924