Sept. 2, 1958 E. WIDMER 2,850,162

SEPARATORS FOR PNEUMATICALLY CONVEYED AGGREGATE GOODS

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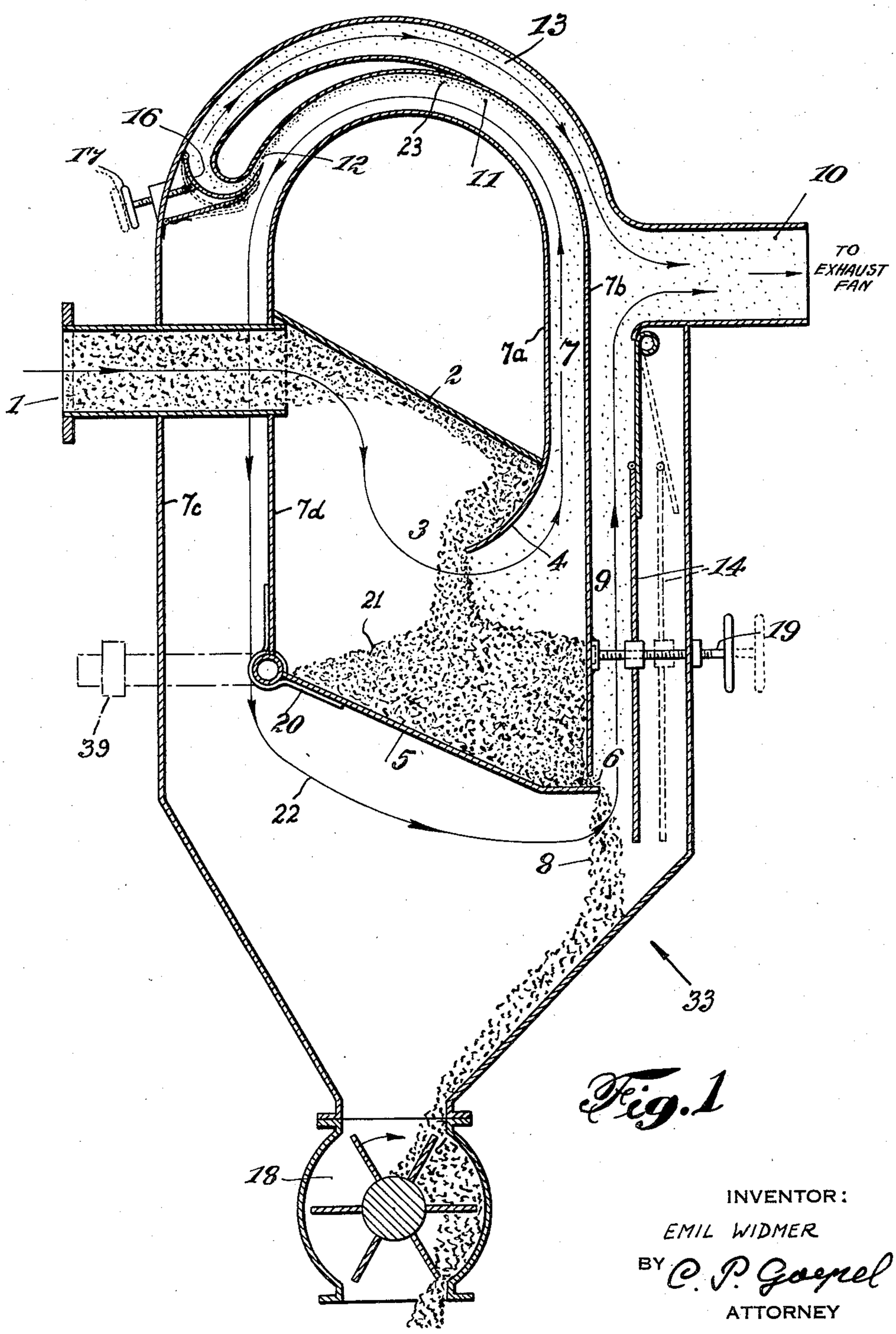

Fig. 1

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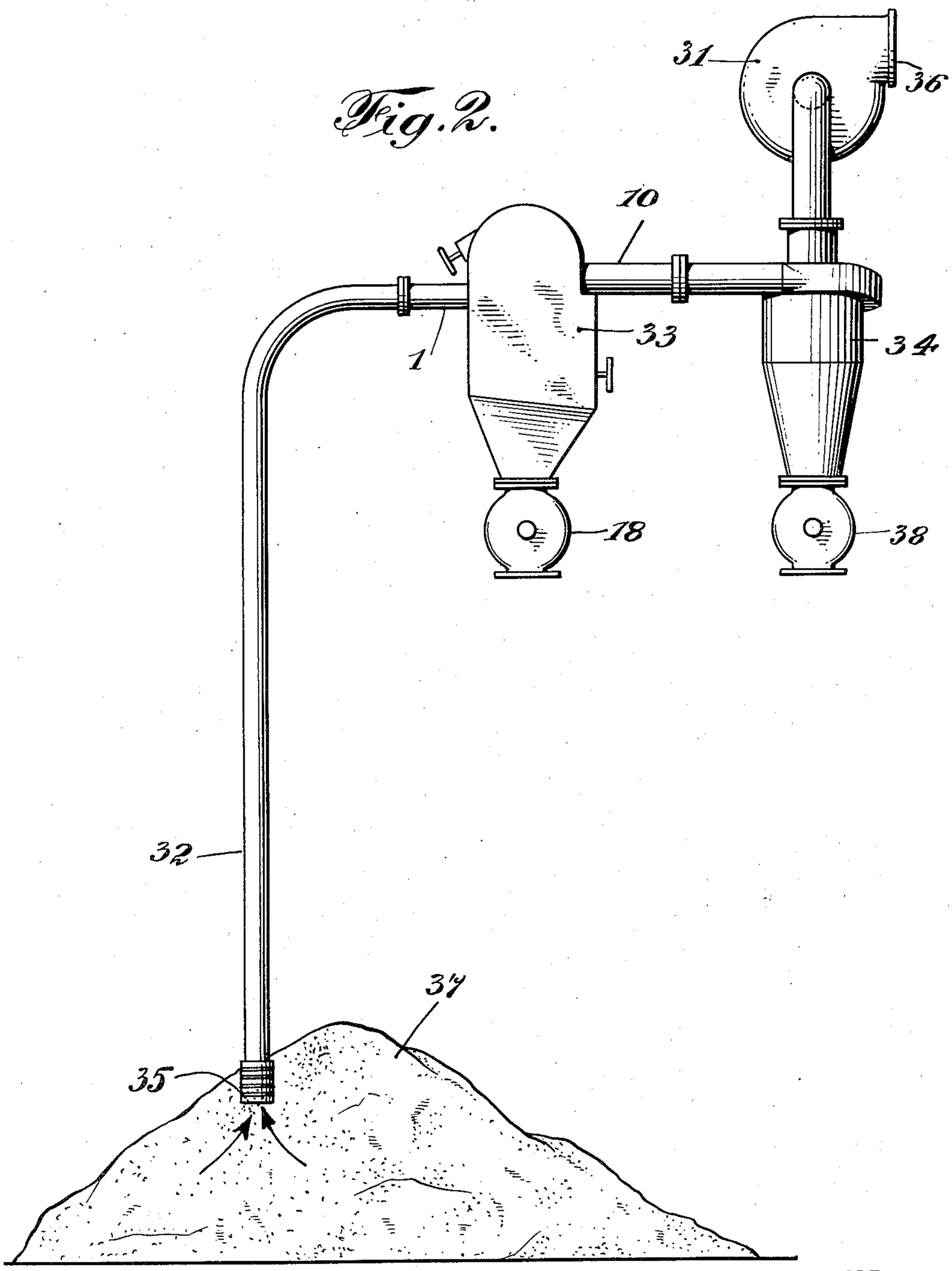
Fig. 2.



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SEPARATORS FOR PNEUMATICALLY CONVEYED AGGREGATE GOODS

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8 Claims. (Cl. 209—134)

This invention relates to separators, and more particularly to separators for pneumatically conveyed aggregate goods wherein the goods are cleaned and sorted by the conveying medium.

Recent types of separators for cleaning and sorting pneumatically conveyed goods, such as grains or powdery substances, are based on the recognition that it is particularly advantageous to clean and sort the conveyed goods in a single step by means of air, to wit: by employing the principle of air sifting. The more economical systems use the conveying medium for cleaning and sorting of goods. In known devices of this character, the aggregate goods are separated from the air by means of an impact separator and thereupon permitted to descend as a thin veil from a chamber, and the conveying medium is guided therethrough to carry away the lighter components, such as dust, chaff, etc., thereby cleaning the goods and sorting the diverse components according to their specific weight. A serious disadvantage of such separators is in that the conveying medium, passing through the veil of goods, itself contains a certain quantity of dust or other impurities remaining therein from the conveying step. By passing through the veil of goods, these foreign particles again adhere to the larger grains and are not carried away by the conveying medium.

The present invention represents an improvement over such prior separators in that it provides a labyrinth system in which the impurities retained from the conveying step are separated from the conveying medium, and the clean conveying medium is then reintroduced through the separated aggregate goods to remove the remaining impurities therefrom.

The invention also provides a system in which the conveyed, separated and partially cleaned goods descend in a chamber with a mobile bottom wall to form a narrow aperture, and the goods, descending therethrough in a thin veil, are again subjected to the meanwhile purified conveying medium to remove the remaining impurities therefrom.

The invention further provides a system wherein the velocity of the conveying medium may be controlled by varying the cross-sectional area of the duct leading to the exhaust opening of the separator.

Still further, the invention provides a system wherein a baffle is installed below the impact separator to facilitate the sorting of separated goods and the removal of lighter impurities by the conveying medium.

An additional feature of the novel separator is in the provision of a dust collecting device at the exit end of the aspirating opening for removal of impurities and other lighter matter from the conveying medium.

The novel separator consists essentially of an airtight housing with an inlet for the conveying medium carrying the aggregate goods about to be cleaned and sorted in the separator, an impact separator chamber with a deflecting device and preferably a baffle member installed therein, the bottom of the chamber being pivotally attached to provide an elongated opening for passage of partially cleaned and sorted goods in a thin veil, a duct leading from the chamber with an arcuate portion and an adjustable passage therein. The conveying medium, usually and hereinafter referred to as air, carrying lighter impurities from the impact separator chamber, passes through the arcuate portion of the duct and the impurities following the outer peripheral wall thereof by centrifugal force enter the passage provided therein and are led through a conduit to the aspirating opening of the separator. The cleaned air is then introduced through the thin veil of goods descending from the chamber to remove any remaining impurities and undesirable lighter matter therefrom. Before entering the aspiration opening, the air is led through a duct portion whose cross-sectional area may be controlled to regulate the velocity of air.

Other features and advantages of the novel separator will be pointed out in the course of the following detailed description of one at this time preferred embodiment which is illustrated in the accompanying drawing, and the invention will be finally pointed out in the appended claims.

In the drawing,

Fig. 1 is a vertical section through the separator; and

Fig. 2 is a somewhat schematic illustration of the device shown in Fig. 1 combined with a dust cyclone and a blower.

In Fig. 1, the illustrated separator **33**, which is shown in vertical section, includes an inlet **1** leading into the impact separator chamber **3** with a deflector plate **2** in the path of goods **21**, and a pivotable plate **5** as the bottom member of said chamber. Wall **7***a* of duct **7** is inwardly curved at its lower end **4** to form a simple baffle for goods **21** rebounding on plate **2**. As illustrated, the heavier and larger particles carried by the air through inlet **1** rebound on plate **2** and are separated from the air in chamber **2** by descending onto the mobile bottom **5** which yields under a predetermined weight to form an elongated slot **6** between its free end and the lower extremity of wall **7***b* of duct **7**. The air follows the route indicated by continuous arrow **22** and passes through the whirled goods **21** below member **4** before entering vertical duct **7**, whose portion **11** is arcuate, carrying with it fine impurities **23**, such as dust and chaff, which impurities by centrifugal force concentrate along the outer peripheral wall of the arcuate duct portion **11** to be absorbed into exhaust channel **13** through an adjustable passage **12**, and to be thereupon aspirated through opening **10** by a blower **31** (see Fig. 2) or any other suitable device. As indicated, passage **12** is adjustable by moving flap **16** by means of a screw and hand wheel **17**. The mass of air, now free from impurities **23**, enters the left-hand vertical portion of channel **7** formed by walls **7***c* and **7***d* and passes below member **5** through veil **8** of goods **21** descending through aperture **6** to be deposited in the bottom of the separator **33**. Any remaining lighter matter is removed from the veil **8** of goods **21** and is carried away by the air through duct **9** and exhaust opening **10**. The cross-sectional area of duct **9** may be varied by screw and hand wheel **19** moving members **14** and **15**, as indicated in dotted lines, to control the velocity of the air. An air lock **18** seals the separator and serves for removal of cleaned and sorted goods **21**. A dust collector, such as a cyclone **34** (see Fig. 2), may be placed behind the aspiration opening **10**.

It will be understood that the passage **12** may be provided at any point of the arcuate portion **11** of duct **7**. Also, a different eddying device may be substituted

for the baffle member **4**, and a counterweight **39**, shown in broken lines in Fig. 1, or the like may replace spring **20** which compensates for the weight of the goods **21** deposited on plate **5**, or a permanent slot **6** may be provided between members **5** and **7***b*. In the latter case, the baffle **4** may be omitted entirely.

The sucking passage **12** should be large enough to allow removal of all the impurities **23** therethrough and into channel **13**. On the other hand, this passage **12** should be relatively small as compared with the cross-sectional area of duct **7** in order to introduce a large quantity of purified air through the veil **8** of goods **21**.

In Fig. 2, conveying line **32**, communicating with inlet **1** of the separator **33**, aspirates the goods **21** directly from heap **37** through its intake **35**. Adjacent to exhaust opening **10** is a dust cyclone **34** which is also connected to a blower **31** having an outlet **36**. Blower **31** generates an underpressure in the system formed by the conveying line **32**, separator **33** and the cyclone **34** causing the flow of air into intake **35** of line **32** and its escape through the outlet **36** of blower **31**. The flowing air takes up the goods **21** from heap **37** and leads the material into separator **33** wherefrom the normal particles are discharged through the air lock **18**. Smaller impurities flow through outlet **10** of separator **33** into the dust cyclone **34** to be separated from the conveying air and discharged through the air lock **38**. Thus, the conveying air escaping through outlet **36** of blower **31** is clean.

As various changes and modifications in the details of construction, arrangement of parts and substitution of similar or equivalent elements may occur to persons skilled in the art, I do not desire to be limited to the exact details of the device shown and described, but only by the scope of the appended claims.

What is claimed is:

1. In a device for cleaning and sorting pneumatically conveyed aggregate goods having a housing, an inlet and an aspiration opening: an impact separator chamber, a deflecting member in said chamber in the path of pneumatically conveyed goods entering through said inlet opening, said chamber having an elongated aperture substantially in the bottom portion thereof for descent of aggregate goods separated from the conveying medium, a labyrinth duct for the conveying medium in said housing communicating with said chamber between said deflecting member and said aperture, said duct thereupon extending around said chamber and below said aperture and terminating at said aspiration opening, and means for separating impurities from the conveying medium in said duct in advance of the passing of said duct below said aperture in said chamber.

2. A device according to claim 1, further including means for varying said aperture in said chamber.

3. A device according to claim 1, wherein said chamber has a bottom wall, means pivotally connecting said bottom wall with said chamber and resilient means for urging said bottom wall against said chamber whereby to control said aperture in said chamber.

4. A device according to claim 1, wherein said duct includes an arcuate portion in advance of its passing below said aperture in said chamber, said arcuate portion having an aspirating passage in the outer peripheral wall thereof, and a conduit is provided for connecting said aspirating passage with said aspiration opening.

5. A device according to claim 4, further including means for varying said aspirating passage in said arcuate portion of said duct.

6. A device according to claim 1, further including a baffle member in said chamber below said deflecting member and above the communication of said duct with said chamber, said baffle member being in the path of conveyed goods descending from said deflecting member toward said aperture for eddying same, whereby the conveying medium entering said duct removes lighter matter therefrom.

7. A device according to claim 1, further including an air lock in the bottom of said housing for removal of conveyed and cleaned goods from said housing.

8. A device according to claim 1, further including a dust separating device for the cleaning medium in the proximity of said aspiration opening.

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