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PATENTED JAN. 8, 1907.

B. E. SWEET.
PNEUMATIC CLEANER AND SEPARATOR.
APPLICATION FILED DEC. 28, 1905.

2 SHEETS—SHEET 1.

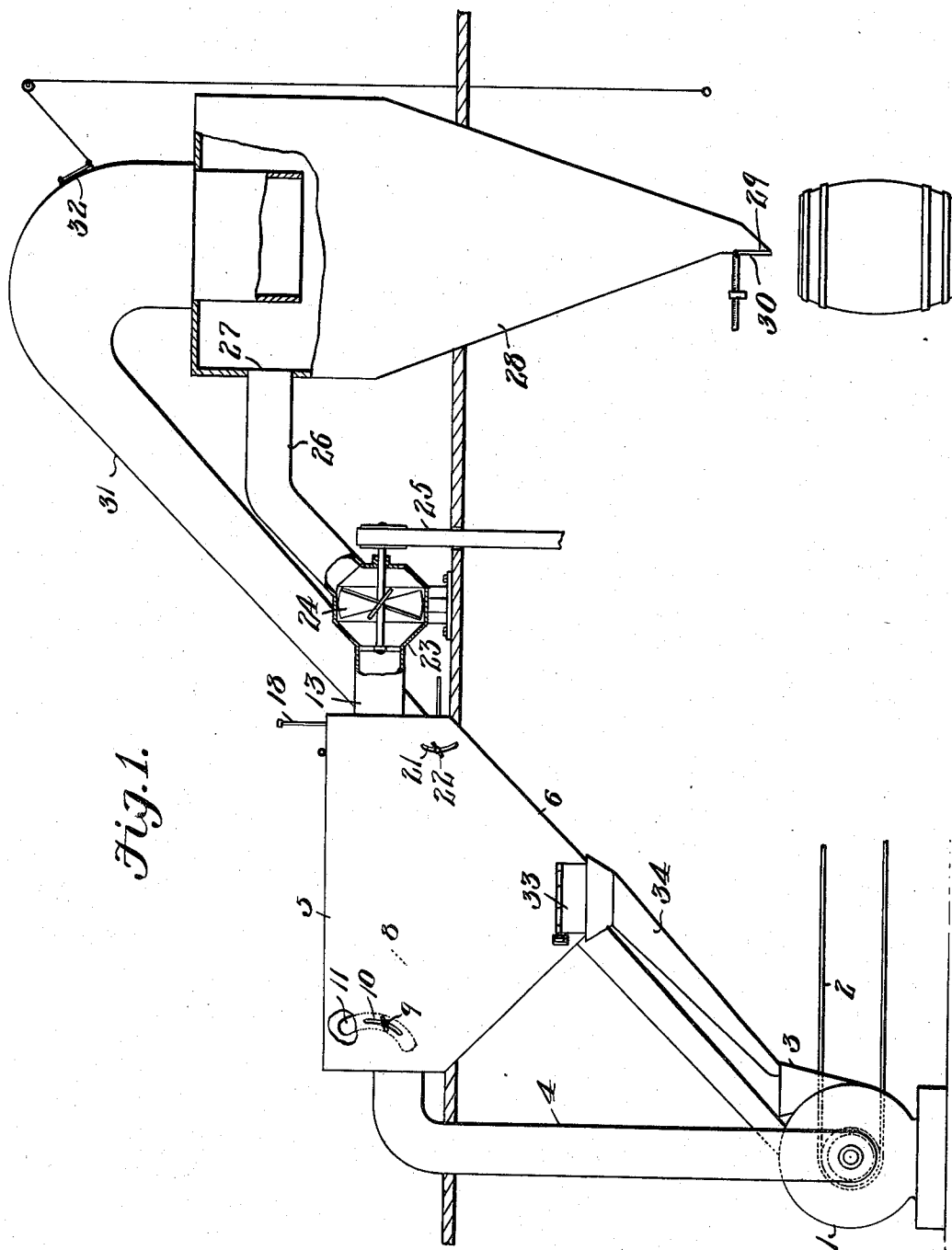


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

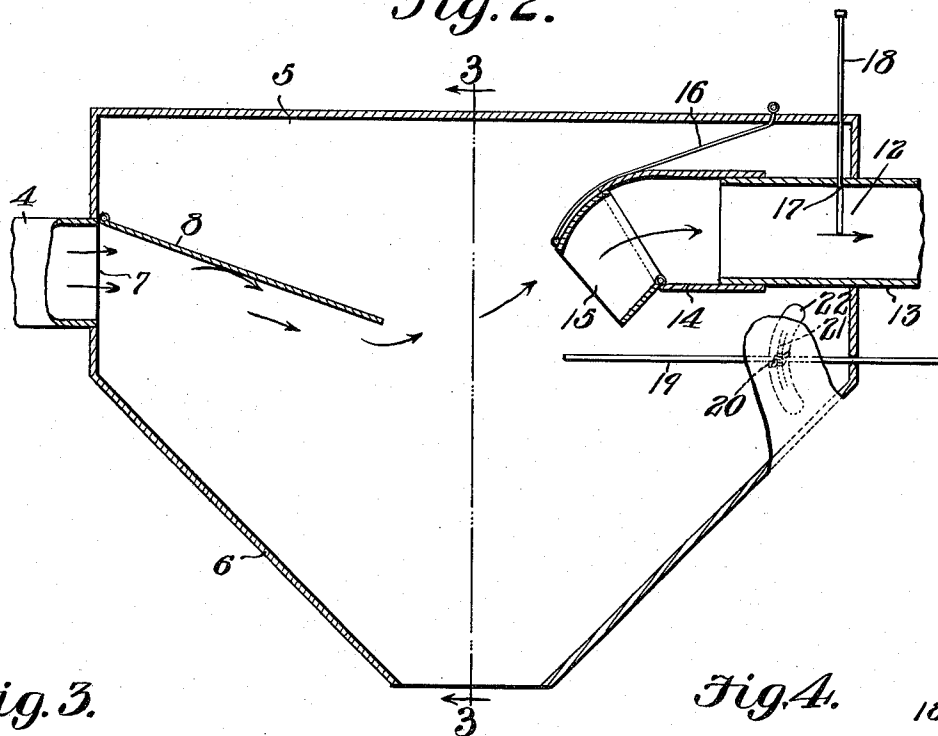


Fig. 3.

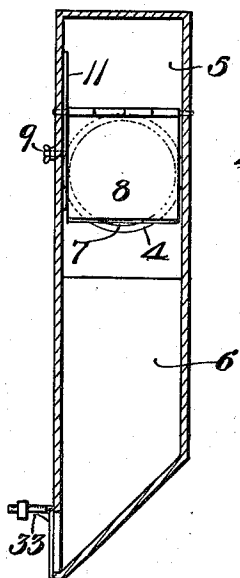
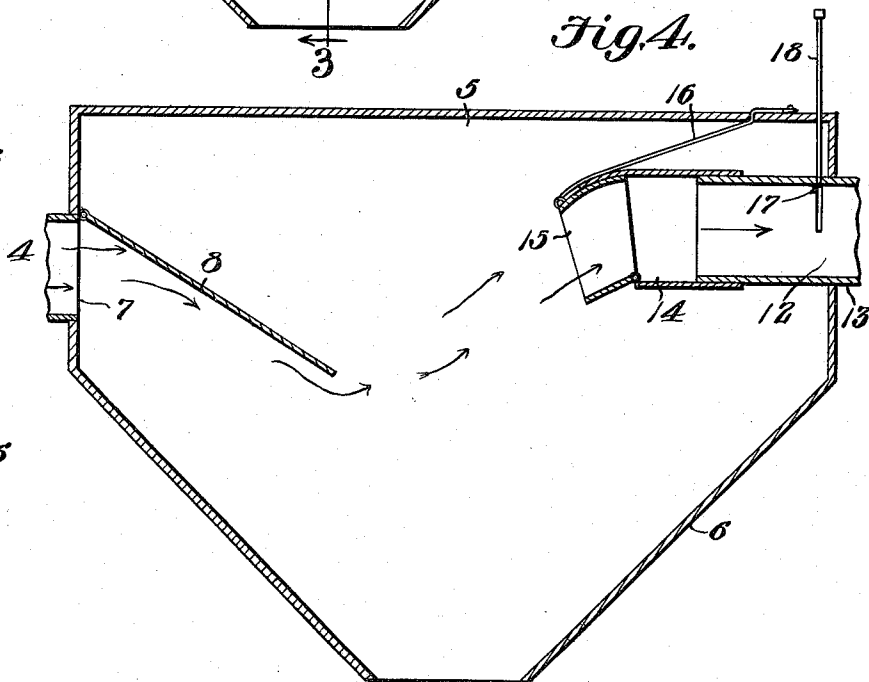


Fig. 4.



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PNEUMATIC CLEANER AND SEPARATOR.

No. 840,724.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed December 28, 1905. Serial No. 293,646.

To all whom it may concern:

Be it known that I, BERT ERASTUS SWEET, a citizen of the United States, residing at Lodi, in the county of San Joaquin and State of California, have invented a new and useful Pneumatic Cleaner and Separator, of which the following is a specification.

This invention relates to pneumatic cleaners and separators which are used for the purpose of separating relatively light and fine from relatively heavy and coarse particles of material by carrying the material suspended in an air-current through a casing within which said air-current is deflected, the relatively heavy and coarse particles following the direction of the deflected air-current until they pass beyond the range of influence of said air-current and are precipitated by gravity, while the relatively light and fine particles remain within the sphere of influence of the air-current and are conveyed by the latter to a settling-chamber or dust-collector, thereby making separation.

The objects of the invention are to simplify and improve the construction and operation of this class of devices, and with these and other ends in view, which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations, and modifications within the scope of the invention may be made when desired.

In the drawings, Figure 1 is a diagrammatic view illustrating the invention installed for use. Fig. 2 is a vertical longitudinal sectional view of the separating-chamber. Fig. 3 is a transverse sectional view of the separating-chamber, taken on the plane indicated by the line 3-3 in Fig. 2. Fig. 4 is a vertical longitudinal sectional view of the separating-chamber, illustrating a modification.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

The improved device has been shown in the drawings, Fig. 1, installed in connection with a grinding apparatus, which latter has

been conventionally illustrated at 1, 2 designating the driving-belt whereby said grinding apparatus is driven. The grinding apparatus has a feed spout or hopper 3 and a discharge-spout 4, through which the reduced material or product is discharged and is directed laterally into a separator-casing 5, having a hopper-shaped bottom 6. Adjacent to the upper edge of the inlet 7 in the side of the separator-casing is hinged a deflector 8, having an adjusting-screw 9, which extends through a curved slot 10 in the wall of the casing, thereby enabling the deflector to be secured at various adjustments. The adjusting-screw 9 carries a sliding plate 11, whereby the slot 10 will be covered in the various positions occupied by the deflector, so as to prevent leakage.

The side of the casing opposite to that having the inlet 7 is provided with an outlet 12, through which extends an eduction-spout 13, provided within the casing with a telescopic extension 14, equipped with a hinged elbow member 15, the mouth of which may be deflected more or less in a downward direction by means of an operating member 16, which may consist of a flexible cord or wire. The eduction-spout may be obstructed by means of a slidable valve or damper 17, operable by means of a handle 18.

By reason of the presence of the telescopic extension member 14 the distance between the exit-port, which is formed by the mouth of the elbow member 15, and the terminal of the deflector 8 may be varied at will.

In the eduction end of the casing beneath the eduction-spout is arranged a deflector 19, having an adjusting-screw 20 extending through a curved slot 21 in the wall of the casing and carrying a plate 22, that constitutes a closure for the slot 21 to prevent leakage through the latter.

The eduction-spout 13 is connected with a casing 23 of a suction-fan 24, which is driven by means of a belt 25 from some convenient source of power, and the outlet of the fan-casing is connected by a conducting-tube 26 with the inlet 27 of a settling-chamber, such as a dust-collector 28 of the well-known "cyclone" type, having at its lower end an outlet 29, which is closed by means of a gravity-valve 30. The purified air is conveyed from the settling-chamber or dust-collector back to the reduction-mill 1 through a conduit 31, which is preferably provided with a valved outlet 32 for an excess of air.

The bottom of the separating-chamber is provided with a gravity-valve 33, opening into a conduit 34, through which the separated material is returned to the hopper of the reduction-mill.

The installation illustrated in Fig. 1 may be used with slight and obvious modifications in all establishments where material is to be reduced to powder or other degree of fineness—such as flour-mills, cement-mills, sugar-mills—or in mills where oil-cake is to be reduced to meal of any desired degree of fineness. Heretofore it has been customary to obtain the requisite degree of fineness by sifting or bolting; but in many cases this has been objectionable or difficult, especially where the nature of the material operated upon has been such as to cause the meshes of the bolting material to become clogged or choked, which has been specially the case with oil-meal, sugar, and various other products and materials.

By this improved apparatus when the suction-fan is set in motion a partial vacuum is created in the separating box or chamber, whereby a current of air laden with the reduced product will be caused to pass into the casing from the reduction-mill through the spout or conduit 4. The deflector 8 in the separator-box has been previously adjusted in the proper position to compel the air-current to deviate from its straight course at any desired angle or inclination before being permitted to reach the outlet 12, and such particles as are too heavy and coarse will be thrown or passed beyond the range of influence of said air-current in the direction of the deflected air-current into the undisturbed air-space in separator box or casing, making a separation of the heavy or coarse from light and fine at the deflected turn or angle in air-current. The lighter particles will follow the air-current through the conduit 13 and through the suction-fan, being eventually discharged into the settling-chamber or dust-collector, from which they are discharged through the gravity-valve, while the purified air is returned to the reduction-mill.

It is obvious that by adjusting the deflector 8 in various positions or at various inclinations the separation may be regulated—that is to say, when the air-current is permitted to pursue an almost straight course through the separator box or casing nearly all the material will remain suspended in the air-current, and only the very largest and coarsest particles will be separated or deflected within the separator-box. When, on the other hand, the deflector is adjusted to compel the air-current to deviate largely from a straight course, only the lightest and finest particles will remain suspended in the air-current when the latter escapes through the exit-spout 13. Thus a clean and coarse

product may be separated through the sepa-

rating box or chamber, or a powdered product of any desired degree of fineness may be separated by the above plan.

The range of adjustment is increased and the scope of utility of the apparatus is greatly augmented by the presence of the telescopic member 14, carrying the elbow 15, whereby the distance between the free end of the deflector 8 and the exit-port may be varied at will.

Under some circumstances the reduction-mill is dispensed with—for instance, when the device is to be utilized for the purpose of purifying grain or other material. Under such circumstances the conduit 4 will be connected with a bin or chamber containing the material which is to be purified, and the dust or fine particles separated from the material will be regarded as waste.

When the invention is used, as illustrated in Fig. 1, in connection with a reduction-mill, it may oftentimes be found desirable to install a plurality of separating boxes or chambers for the purpose of grading the product; as will be readily understood, the deflectors in the several separator-boxes being adjusted at various angles, so as to cause various degrees of separation to take place within the several boxes. When an installation of this character is resorted to, a single exhaust-fan may be found insufficient to perform the work of sustaining the product-laden air-current in motion, and I therefore reserve the right of using a plurality of independently-driven fans, the same being located between the separator-boxes.

It may also be found practicable and at times desirable to force the product-laden air-current through the separator-box and the settling-chamber, and the privilege is therefore reserved of locating a fan between the reduction-mill or other source of supply and the separator box or casing.

The elbow 15 at the inner end of the eduction-pipe may be readily adjusted to the most convenient and favorable position to cause the product-laden air-current to be conducted away from the separator box or casing and to further regulate the deflected turn or angle in air-current and to regulate the course of the air-current within the casing, and the telescopic extension member upon the eduction-pipe facilitates and increases the range of adjustment, as will be readily understood. The deflector 19 also serves to guide and to regulate the course of the air-current within the casing and to assist in deflecting in a downward direction such particles of relatively coarse material as may impinge thereon.

By proper adjustment of the sliding valve or damper 17 the volume of the air-current is capable of being gaged or regulated, and the speed of the air-current decreasing as the volume increases, and vice versa, it is obvi-

ous that the speed or velocity of the said air-current at a given speed of the fan may be very closely regulated. It is obvious that in this manner the separation may to a large extent be gaged or graded, since it is obvious that the greater the velocity of the air-current the greater weight material may be carried suspended therein. Thus it will be seen that by proper adjustment of the regulating-valve, the deflectors 8 and 19, and the outlet 15 a very uniform separation may be obtained.

The improved separating device, as will be seen from the foregoing description, is extremely simple in construction and operation, and it may be installed and operated at a very moderate expense. It may be usefully employed for cleaning or purifying, separating, and grading materials of many different kinds, its use not being in any respect limited. It may be successfully utilized in place of bolting devices now commonly employed for the purpose of separating the finely-ground or comminuted particles from reduced material of any kind, and by using a plurality of separator-boxes, as has been hereinbefore described, the product may be graded or separated into any desired number of grades of different degrees of fineness, the finest of which may, when desired, be in the nature of an impalpable powder.

The deflector 19 is not always considered essential to the successful operation of the device, and in Fig. 4 of the drawings has been illustrated as a separator-box in which said deflector has been dispensed with.

Having thus described the invention, what is claimed is—

1. A separator-casing, means for setting up an air-current through the casing, a deflector supported within the casing in the path of the air-current, and an exit-pipe having a telescopic extension within the separator-casing said telescopic extension member constituting means for varying the distance between the deflector and the exit-port.

2. A stationary separator-casing having an air-inlet and an air-outlet, means for setting up an air-current through the casing, a deflector supported within the casing adjacent to the air-inlet and in the path of the air-current, and an adjustable elbow within the casing and connected with the air-outlet.

3. A separator-box having an inlet, a conduit connecting the inlet with a source of supply, a deflector within the casing adjacent to the inlet, an exit-pipe extending through the wall of the casing opposite to the inlet, a telescoping extension member upon the exit-pipe having an adjustable elbow, a valve in the exit-pipe, a settling-chamber, a conduit connecting the settling-chamber with the exit-pipe, and means for setting up suction in said conduit.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

BERT ERASTUS SWEET.

Witnesses:

W. H. LORENZ,
JAS. P. SHAW.