No. 840,818.

PATENTED JAN. 8, 1907.

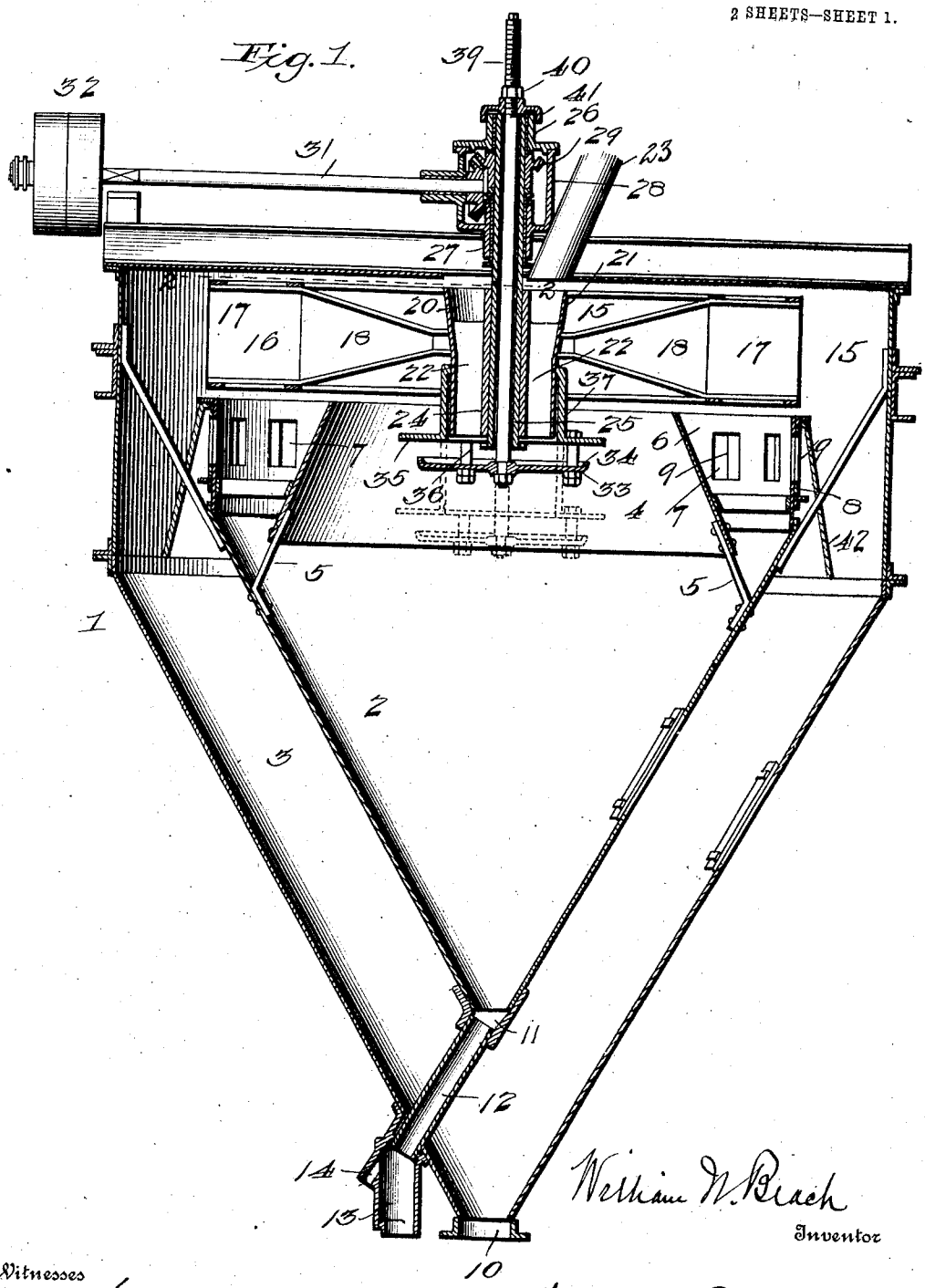
W. N. BEACH.

DRY SEPARATOR.

APPLICATION FILED JUNE 25, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

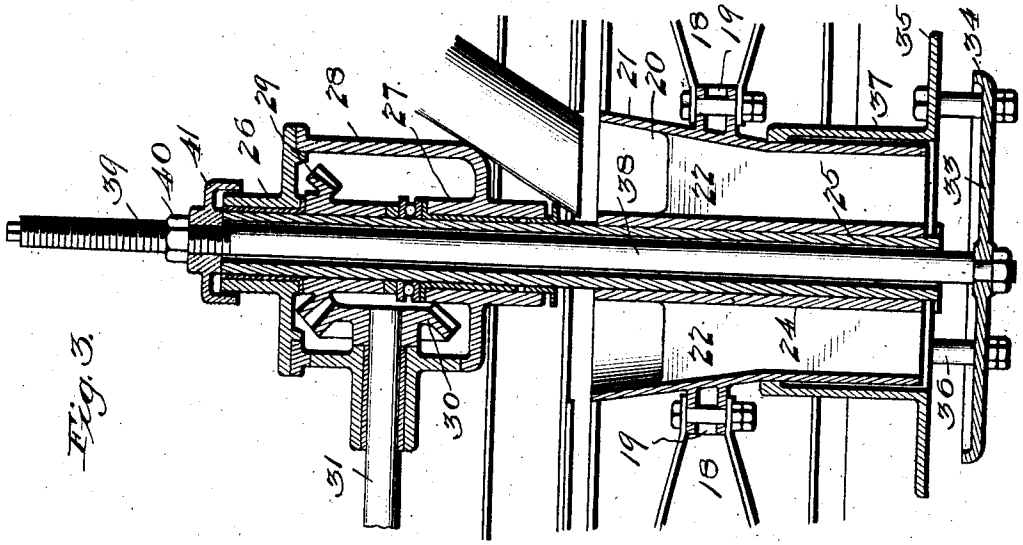

Fig. 3.

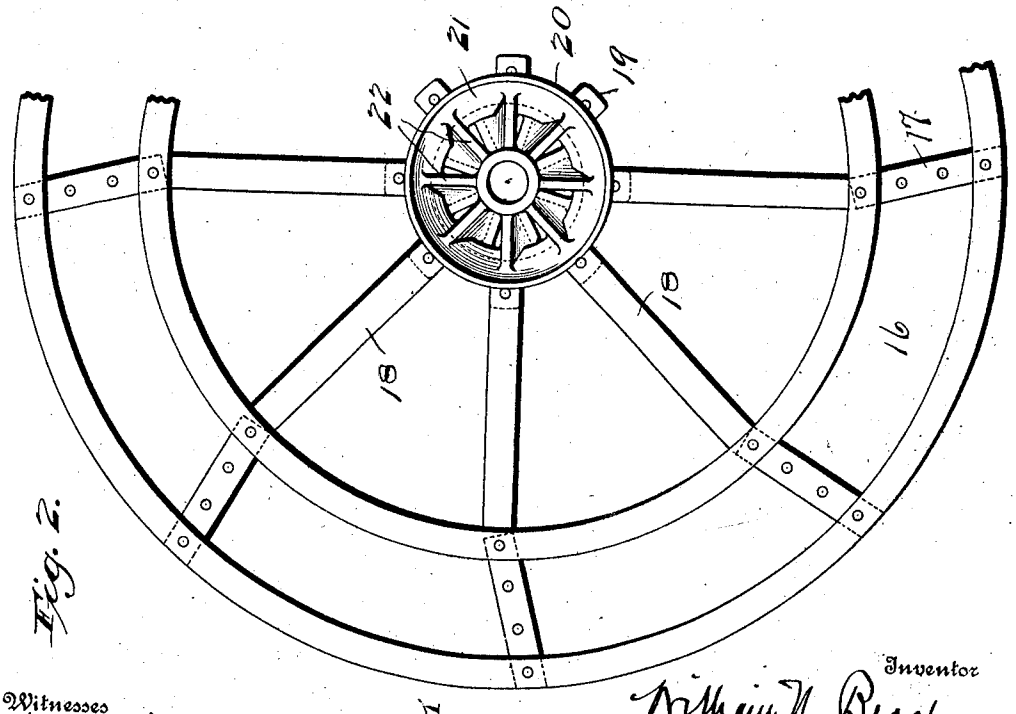

Fig. 2.

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UNITED STATES PATENT OFFICE.

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No. 840,818. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed June 25, 1906. Serial No. 323,322.

To all whom it may concern:

Be it known that I, WILLIAM N. BEACH, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Dry Separators, of which the following is a specification.

This invention relates to separating-machines of the type technically termed "dry" separators, and has specially in view a separating mechanism adapted specially for use in connection with cement-mills for separating the fine-ground cement from the coarser cement mingled therewith.

To this end the invention contemplates a simple and practical construction of separator possessing special utility as a separating means for granular substances and serving to insure an effectual separation of fine and coarse particles and causing the separate discharge thereof from the machine.

A special object of the invention is to improve that type of separators relying upon both centrifugal force and the action of a suction appliance to secure the proper separation of fine and coarse particles or particles of different specific gravities.

In this connection the invention contemplates improved feeding and distributing means for the material to be separated and a novel mounting thereof in relation to the inner and outer collecting-cones and the suction appliance.

With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described and claimed.

The essential features of the invention involved in carrying out the foregoing objects are necessarily susceptible to structural change without departing from the scope of the invention; but a preferred embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view of a separator embodying the present improvements. Fig. 2 is a partial top plan view on the line 2 2 of Fig. 1, showing a portion of the suction-fan in combination with the rotary feeding-chute with which it is associated. Fig. 3 is an enlarged sectional view of the feeding and distributing devices for the separator and the driving means therefor.

Like references designate corresponding parts in the several figures of the drawings.

In carrying out the present invention the special improvements claimed herein are preferably associated with a separator-casing of the type shown in the drawings and designated in its entirety by the reference-numeral 1. The said casing 1 is constructed with the inner and outer collecting-cones 2 and 3, respectively, which are arranged in spaced relation suitably braced apart to constitute separate collecting and receiving chambers for the different grades of material separated through the action of the machine. The outer collecting-cone 3 constitutes a conical bottom continuation of the main upper cylindrical part of the casing, while the inner cone 2 is arranged in concentric spaced relation to the outer cone 3 and has fitted within the upper open base portion thereof an upwardly-tapering suction-funnel 4. This funnel 4 is open at top and bottom and is supported at its lower edge in spaced relation to the wall of the cone 2 through the medium of a plurality of supporting and bracing legs 5, secured to the bottom edge of the funnel 4 and to the inner side of the inner cone 2 near the upper edge of the latter. In addition to the suction-funnel 4, supported centrally within the upper part of the inner cone 2, the latter has also fitted to its extreme upper edge an upstanding annular air-feeding frame 6, projecting above the said inner cone to substantially the plane of the top opening of the suction-funnel 4. The said annular air-feeding frame 6 is in the form of a ring or band constituting what might be termed a "partition" between the upper ends of the inner and outer cones, and said frame is provided therein with a continuous series of air-circulating ports 7, adapted to be covered or uncovered to the desired extent through the medium of an annular controlling shutter-slide 8. This shutter-slide 8 acts in the capacity of a controlling-valve for varying the size of the openings 7 and is also provided with a continuous series of valve-openings 9, working over the said openings 7, so that by the turning of the slide 8 to any set position the desired quantity of air for feeding from the outer cone into the inner cone may be regulated. The deflector-ring 42 is mounted

on the upper end of the shutter-slide 8 and extends downward so as to cover the air-circulating ports 7 and deflect the air which passes upward from the chamber 2 through the fan-chamber 15 and into the outer chamber 3, carrying with it the fine particles of material which have been separated from the coarser material remaining in the chamber 2. The object of this deflector is to carry the air laden with the fine particles of material past the air-circulating ports to such a distance that the returning current of air, which in the large outer chamber moves very slowly, will not be able to carry the particles back into the chamber 2.

Aside from the structural features referred to the separator-casing 1 is provided at the apex or lower end of its outer collecting-cone 3 with a bottom discharge opening or spout 10 for the grade of material collected by the outer cone 3, while the inner of the collecting-cones 2 is provided at its apex or lower end with a bottom discharge-opening 11, communicating with a discharging-pipe 12, fitted to the apex of the cone 2 and projecting through the wall of the outer cone 3 into the upper end of an outlet-spout 13, fitted to one side of the outer cone 3, continuous to the lower extremity thereof. The outlet-spout 13 not only receives the discharging material from the inner cone 2, but is also provided with a side air-feeding port 14, substantially in line with the discharging-pipe 12 and affording an air-inlet through which air is taken into the apparatus.

The separator-casing 1 is provided in the top part thereof, above the plane of the suction-funnel 4 and the air-feeding frame 6, with a top fan-chamber 15, within which is mounted a horizontal suction-fan 16. This suction-fan 16 is arranged for rotation above the plane of the funnel 4 and the frame 6 and essentially consists of a plurality of radially-arranged fan-blades 17, suitably braced upon and carried by a series of radial spokes 18, which in the present invention are preferably mounted directly upon the attaching lugs or elements 19, carried upon the external periphery of a rotary tubular feeding-chute 20. This feeding-chute 20 is in the form of a cylinder or tube, having an upper flaring or conical portion 21 and open at both ends. Below its upper flaring or conical portion 21 the said feeding-chute 20 has arranged therein a circular series of spaced radial and spirally-disposed distributing-blades 22. These distributing-blades 22 are integral with or otherwise rigidly fitted to the rotary feeding-chute 20 and lie directly below the top opening of said chute, so as to receive the granular material from the inlet or supply spout 23, entering the separator-casing at the top and center thereof.

The rotary feeding-chute 20, equipped with the radial and spiral distributing-blades 22 referred to, is provided with a central longitudinal hub 24, fitted upon the inner end portion of a vertically-disposed rotary sleeve-shaft 25. This sleeve-shaft projects through the top of the separator-casing and extends through the upper and lower bearings 26 and 27 of a gear-case 28, surmounting the separator-casing. Also the sleeve-shaft 25 has mounted thereon within the gear-case the miter-gear 29, meshing with a similar gear 30, likewise located within the case 28 and mounted upon the inner end of a driving-shaft 31, carrying the belt-pulleys 32 for receiving the driving-belt in the usual manner.

One of the distinctive features of the invention resides in associating with the feeding-chute 20 a rotary deflector-table 33. This table is in the form of a disk arranged below the lower end of the chute 20 and provided at its edge with a peripheral upstanding deflecting-lip 34, which is designed to deflect the material upwardly against a baffle-plate 35, arranged above and in spaced relation to the table 33 and of greater diameter than the same. The said baffle-plate 35, which lies directly above the table 33, is rigidly connected thereto and held in spaced relation therefrom through the medium of a plurality of connectors 36, and the said baffle-plate 35 is also provided with an upstanding guiding-sleeve extension 37, slidably engaging the exterior of the feeding-chute 20.

The deflector-table 33, and hence the baffle-plate 35 supported thereby, are carried upon the lower end of a shaft-rod 38, extending longitudinally through the sleeve-shaft 25 and provided with a threaded upper end 39, receiving thereon an adjusting-nut 40, adapted to engage against the binding cap or collar 41, which is held in clamping engagement with the upper end of the sleeve-shaft 25, thus providing a connection between such shaft and the shaft-rod, so that these parts will rotate in unison. At the same time the construction described permits of the vertical adjustment of the shaft-rod with reference to the bottom of the feeding-chute to suit the conditions under which the separation is carried out.

In the operation of the machine the cement or other material is fed through the inlet or supply spout 23 and is directed into the upper receiving end of the feeding-chute 20. Through the rotary motion of this feeding-chute the distributing-blades 22 thereof tend to distribute the fine cement over the deflector-table 33. The material which is thus deposited on said table is caused by the centrifugal force, due to the rotation thereof, to fly outward until it strikes the lip 34. This lip serves to deflect the particles upward against the baffle-plate 35, and the heavier and larger parts are again deflected from said baffle-plate and fly in a downward direction, whereas the lighter particles are drawn by

the suction of the fan through the open top of the suction-funnel 4 and pass through the fan and into the outer cone 3. The heavier particles, which are deflected downwardly from the baffle-plate, pass into the inner cone 2 and are carried away through the pipe 12 and the outlet-spout 13 back to the grinding-machine, where they are reground.

While the air-feeding port 14 supplies air to the machine through the inner cone 2, the air-circulating ports 7 of the frame 6 permit air to be taken from the outer cone 3 into the inner cone 2. As already pointed out, the size of the openings may be regulated through the adjustment of the rotary shutter-slide or valve 8.

When very fine material is to be selected, the deflector-table 33 and the baffle-plate 35 are adjusted farther away from the lower end of the feeding-chute and the top opening of the funnel 4, so that the suction to which the particles are subjected is reduced. When it is desired to take through coarser material, the said members 33 and 35 are elevated, so that the particles are subjected to a stronger suction.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described separator will be readily apparent without further description.

Having thus described my invention, what I claim is—

1. In a separator, a separator-casing having separate collecting-chambers, a rotary feeding-chute arranged within the top part of the casing, a suction-fan located above the lower end of the chute, a rotary distributing-table mounted below the lower end of the feeding-chute and carried therewith, said table having a vertical adjustment independent of the chute, and provided with a peripheral upstanding deflecting-lip, and a baffle-plate supported and carried by the distributing-table and arranged above the same.

2. In a separator, a separator-casing having separate collecting-chambers, a rotary feeding-chute arranged within the top of the casing, and provided with distributing-blades, a rotary suction-fan mounted above the lower end of said chute, a vertically-adjustable deflector-table supported below the chute, and a baffle-plate carried by and supported above the table.

3. In a separator, a separator-casing having separate collecting-chambers, a rotary feeding-chute arranged within the top part of the casing and provided with a plurality of radial and spirally-disposed distributing-blades, a rotary suction-fan mounted above the lower end of the feeding-chute, a vertically-adjustable rotary distributing-table supported below the chute, and provided with a peripheral deflector-lip, and a baffle-plate supported and carried by said table and arranged above and in spaced relation thereto, said baffle-plate having a sleeve extension working over the feeding-chute.

4. In a separator, a separator-casing having separating collecting-chambers, a rotary feeding-chute arranged in the top of the casing and carrying a rotary suction-fan, a suitably-driven sleeve-shaft fitted to and carrying said feeding-chute, a rotary distributing-table arranged below the chute, a baffle-plate carried by said table and arranged above and in spaced relation thereto, a shaft-rod extending through the sleeve-shaft, and connected at its lower end with the distributing-table and an adjustable coupling connection between said shaft-rod and said sleeve-shaft to provide for their rotation in unison and also to permit vertical adjustment of the shaft-rod with reference to the sleeve-shaft.

Signed at New York city, in the county of New York and State of New York, this 18th day of June, A. D. 1906.

WILLIAM N. BEACH.

Witnesses:
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