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CENTRIFUGAL SEPARATING APPARATUS

Filed July 21, 1947

2 SHEETS—SHEET 1

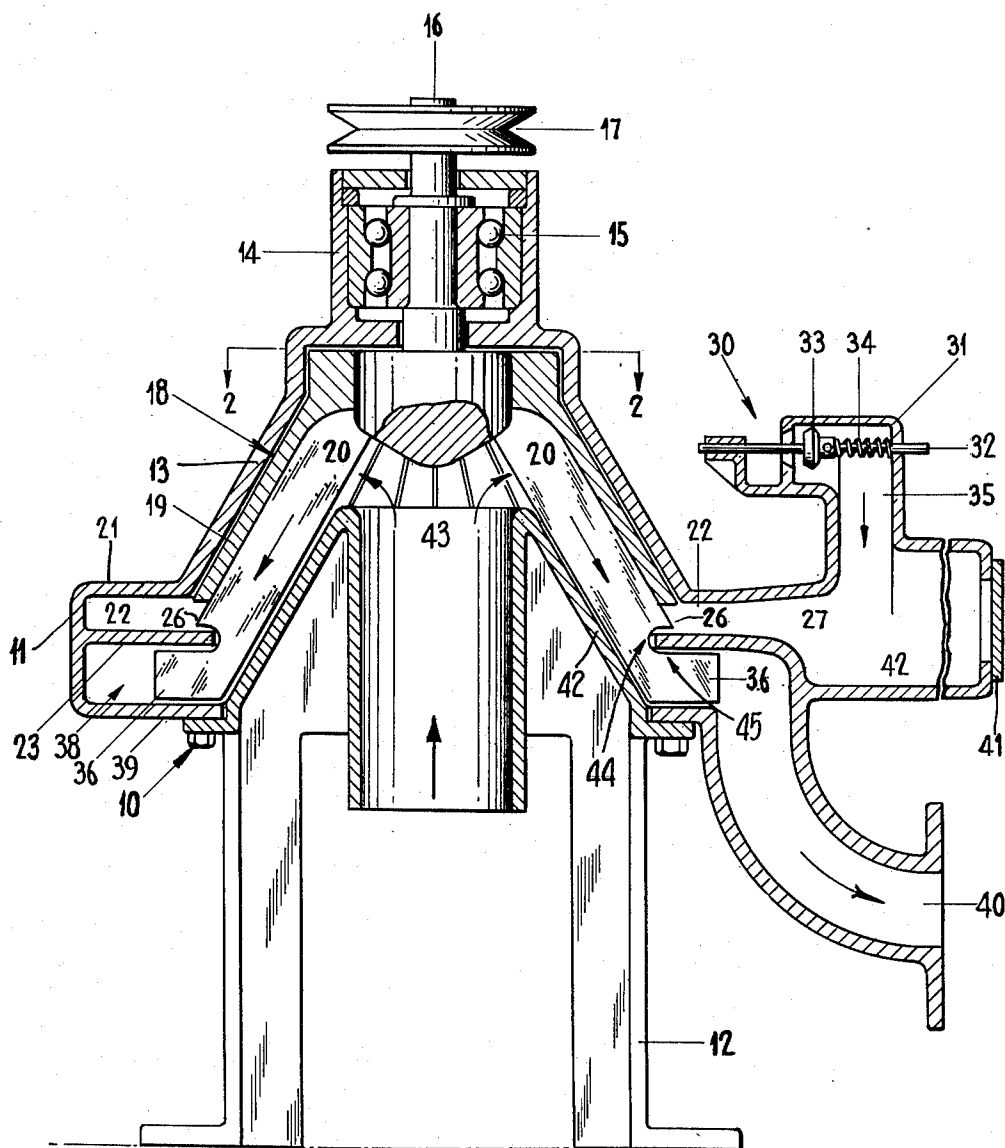


FIG. 1

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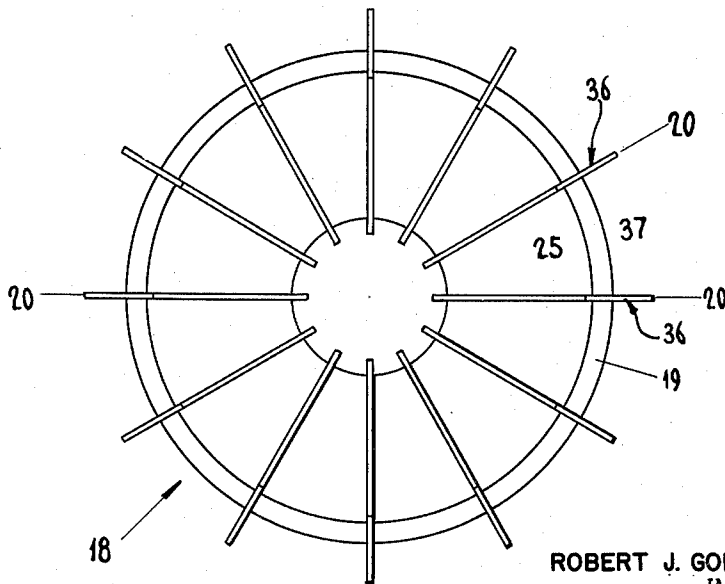
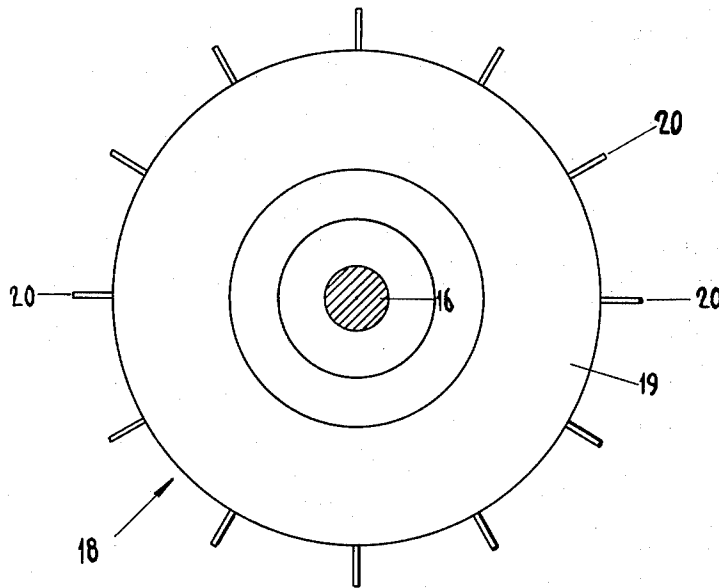
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2 SHEETS—SHEET 2

FIG. 2



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FIG. 3

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UNITED STATES PATENT OFFICE

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CENTRIFUGAL SEPARATING APPARATUS

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2 Claims. (Cl. 233—27)

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This invention relates to centrifugal separating apparatus and particularly to an apparatus especially adapted for the separation of solid particles from air or gas.

An object of this invention is to provide effective feeding of the stream of fluid to be separated and to provide for the effective withdrawal and collection of the separated material.

Another object of this invention relates to a rotary separator having an axial inlet passage, a rotatable internally conical impeller which, when rotated operates to confine and centrifuge the stream whereby the heavy particles are precipitated upon the outer edges of the blades of the impeller and through a peripheral opening circumscribing the blades, whereby the heavy particles are separated from the air flow and discharged in a dust chamber, while the lighter particles follow the inner portions of the blades and along radial extensions of the blades and discharged in a separate dust chamber.

Another object of this invention is to provide a rotary separator for separating and classifying particles of material of different specific gravities whereby materials of predetermined difference in specific gravity may be separated.

With the above and other objects in view, the invention will be hereinafter more particularly described, and the combination and arrangement of parts will be shown in the accompanying drawings and pointed out in the claims which form part of this specification.

Reference will now be had to the drawings, wherein like numerals of reference designate corresponding parts throughout the several views, in which:

Figure 1 is a central cross-sectional view of the separating apparatus.

Figure 2 is a cross-sectional view, the sectional view being taken as on line 2—2 in Figure 1.

Figure 3 is a bottom plan view of the rotor.

In the illustrated embodiment of the invention, the numeral 10 indicates a centrifugal separating apparatus comprising a stationary outer casing or housing 11 which is suitably supported on a leg shaped housing 12.

The upper portion 13 of the casing 11 is of conical form and terminates in a hub 14 for a ball bearing 15 and a shaft 16. A pulley 17 fixed to the shaft 16 serves for transmitting power to the shaft.

Mounted on the shaft 16 is a conical impeller or rotor 18 having a conical casing 19 and radially positioned blades 20. The blades are angularly directed and form a conical outer contour,

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The rotor 18 comprises the casing 19 and the blades 20 secured in unitary relation and rotatable in unitary relation with the shaft 16.

The blades 20 extend below the rotary casing 19. The lower face of the rotary casing 19 terminates in the same plane as the lower surface of a horizontally positioned casing wall 21.

The blades 20 extend into an annularly-shaped chamber 22 and terminate substantially at the upper face of a horizontally positioned casing wall 23.

It is to be noted that the space between any two blades 20 forms a discharge outlet 25 through which the light and heavy particles pass downwardly and radially.

The heavier particles are precipitated upon the outer edge portions of the blades 20 and are guided downwardly by the inner surface of the conical casing 19 to a point 26 on the blades. The heavy particles are thrown off the blades by centrifugal force and pass through the chamber 22 and feed into and through an outlet 27.

Where particles much heavier than air are processed, a valve arrangement 30 is employed to allow air to enter. The valve arrangement 30 comprises a housing 31 integral with the casing 11 and in which is slidably mounted a shaft 32. Secured to the shaft 32 is a valve 33 which is normally kept closed by a spring 34.

Suction in the annularly shaped chamber 22 causes the valve 33 to open against the closing action of the spring 34 and allows air to enter into an extension 35 of the chamber 22.

The blades 20 have radial extensions 36 below the discharge outlets 25 and below the disk-shaped wall 23 and form discharge outlets 37 for discharge of lighter separated material. As best shown in Figure 1, it will be seen that the radial extensions 36 are of larger diameter than the largest diameter of the impeller, as defined by the numeral 26.

The lighter particles follow the inner edge portions of the blades 20, past the wall 23 along the blade extensions or tips 33 into an annularly shaped chamber 38 between the horizontal casing wall 23 and the lowest wall 39.

The light particles are thrown off the blade extensions 36 and pass through the chamber 38 and feed into and through an outlet 40.

It is to be noted that while I have shown the apparatus as mounted to rotate on a vertical shaft, that the entire apparatus may be turned ninety degrees with the shaft in a horizontal plane.

The valve 33 permits a flow of air as shown by

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the arrow in the extension 35. This air prevents the discharge of the pre-determined lighter material through the outlet 27. This material will thus continue its outward passage through the outlet 40.

As shown in Figure 1, the outlet 27 terminates in a storage box 42 which is closed by a removable flange 41. The flange serves for removing the material deposited in the outlet 27.

Under conditions where dust laden air is to be separated, I provide a valve arranged to permit the discharge of air from the chamber 27. This air may be discharged into a porous dust container or into the atmosphere.

As shown in Figure 1, there is provided a stationary conical central member 42 adjacent the inner edges of the blades 20 and having a central opening 43 through which the material passes to the blades.

It will be noted that the chamber 33 for the lighter separated material is considerably larger than the chamber 22 for the heavier separated material.

It will also be noted that the inner peripheral portion of the annular casing wall 23 overhangs the outer edge portions of the blades 20 where the blades are undercut as shown at 44. This overhang arrests the motion of the heavy particles and directs the particles radially into the chamber 42.

The arresting motion of the internal annular wall 23 on the particles to be separated functions to positively separate the particles prior to leaving the blades 20.

In accordance with the patent statutes I have described and illustrated the preferred embodiment of my invention, but it will be understood that various changes and modifications can be made therein without departing from the spirit of the invention as defined by the appended claims.

I claim:

1. In a centrifugal separating apparatus having an axial inlet opening and conically directed flat radial blades carried by a circumscribing solid internally conical rotary member, said rotary member being integral with and confining said blades and causing materials to be separated to follow the conical contour of said member, a stationary conical outer casing inclosing said rotary member, and terminating in an enlarged peripheral extension having upper and lower walls, said extension having an internal annular wall between said upper and lower walls forming an upper and a lower discharge chamber, the lower edge of said conical rotary member terminating in spaced-apart relation from said internal annular wall, said upper chamber serving for receiving the discharged heavy material, said blades having flat radial extensions below

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said internal annular wall and forming radial discharge outlets therebetween for discharge of light separated material, said flat blades being undercut to permit said internal annular wall to enter thereto to positively separate said particles prior to leaving said blades, and a stationary conical central member adjacent the inner edges of said blades for confining said light particles during passage through said separating apparatus.

2. In a centrifugal separating apparatus having an axial inlet opening and conically directed flat radial blades carried by a circumscribing solid internally conical rotary member, said rotary member being integral with and confining said blades and causing materials to be separated to follow the internal conical contour of said member, a stationary conical outer casing inclosing said rotary member and terminating in an enlarged peripheral extension having upper and lower walls, said extension having an internal annular wall between said upper and lower walls, forming an upper and a lower discharge chamber, the lower edge of said conical rotary member terminating in spaced-apart relation from said internal annular wall, said upper chamber serving for receiving the discharged heavy material, said blades having flat radial extensions below said internal annular wall of larger diameter than the largest diameter of said rotary conical member and forming radial discharge outlets therebetween for discharge of light separated material, said flat blades being undercut to permit said internal annular wall to enter thereto to positively separate said particles prior to leaving said blades, a stationary conical central member adjacent the inner edges of said blades for confining said light particles during passage through said separating apparatus, and means for admitting air into said upper heavy particle chamber to augment the flow of the lighter particles into the lower lighter particle chamber.

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