May 5, 1931. O. G. PARDO ET AL 1,804,108

CENTRIFUGAL SEPARATOR

Filed March 6, 1929 3 Sheets-Sheet 1

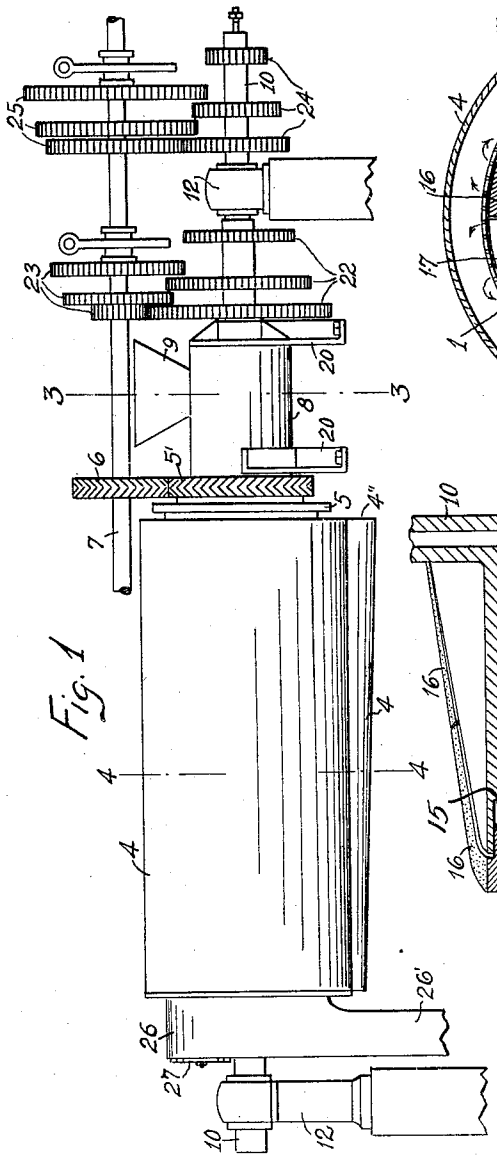


Fig. 1

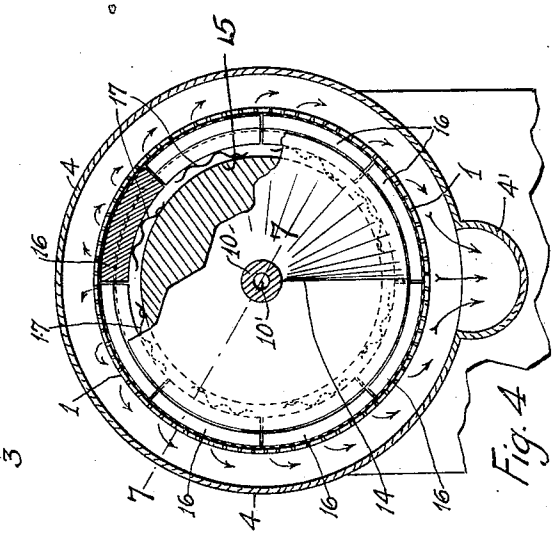


Fig. 4

Fig. 7

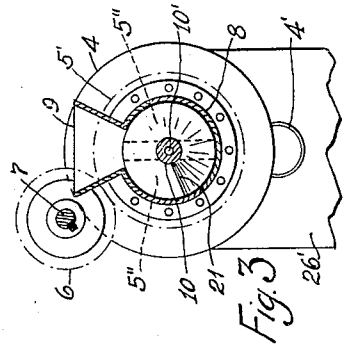


Fig. 3

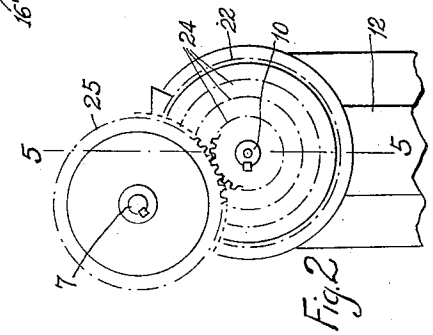


Fig. 2

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CENTRIFUGAL SEPARATOR

Filed March 6, 1929 3 Sheets-Sheet 2

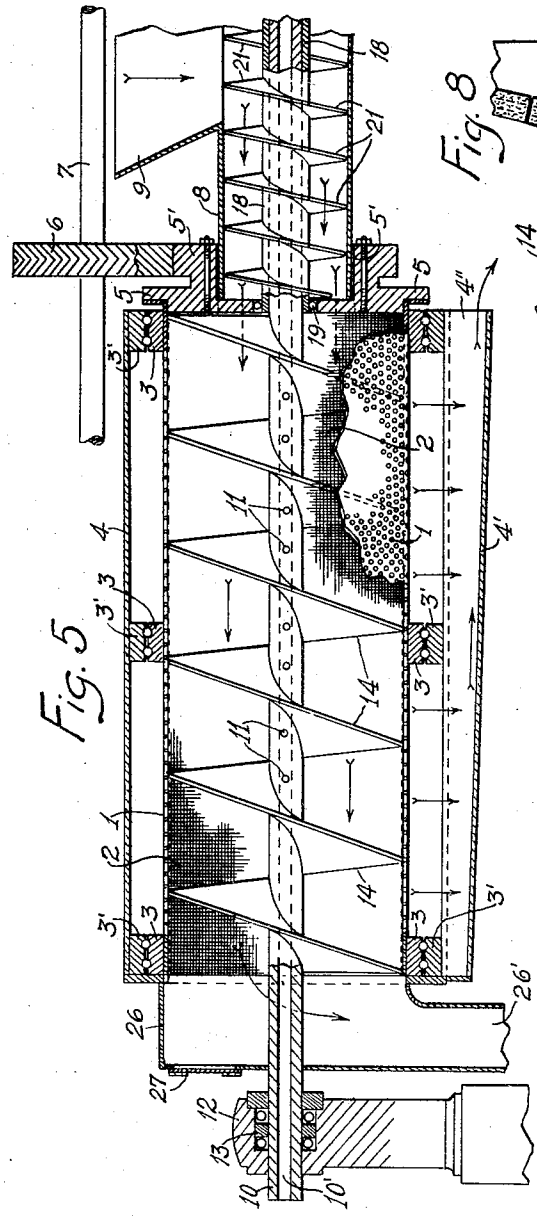


Fig. 5

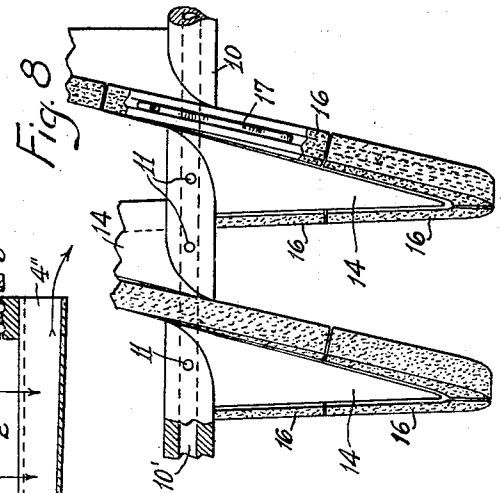


Fig. 8

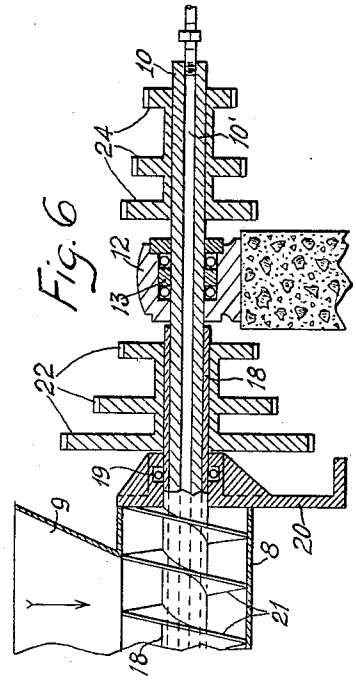


Fig. 6

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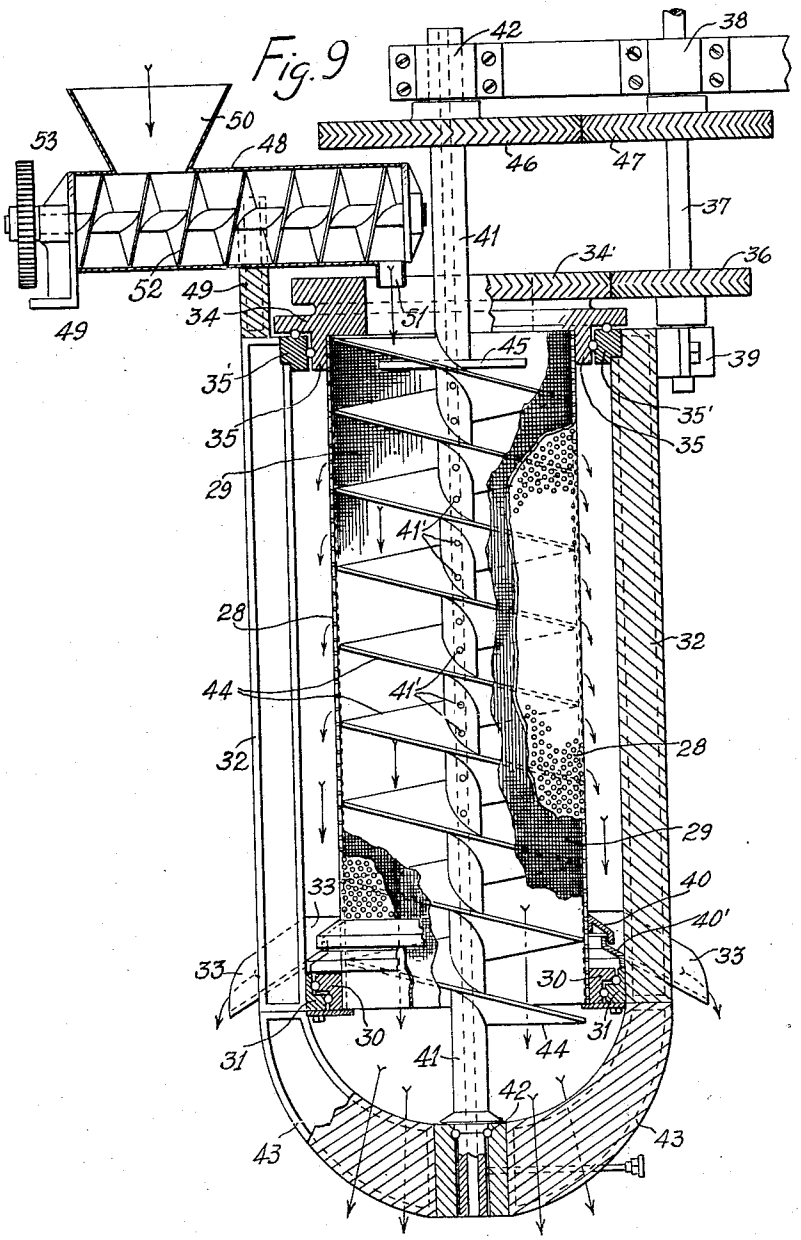
By: Marks & Clark
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May 5, 1931. O. G. PARDO ET AL 1,804,108

CENTRIFUGAL SEPARATOR

Filed March 6, 1929 3 Sheets-Sheet 3

Fig. 9



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Patented May 5, 1931 1,804,108

UNITED STATES PATENT OFFICE

OSCAR GARCIA PARDO AND SEGUNDO DIAZ FERNANDEZ, OF HABANA, CUBA

CENTRIFUGAL SEPARATOR

Application filed March 6, 1929, Serial No. 344,847, and in Cuba May 15, 1928.

This invention refers to a centrifugal separating apparatus and has for its main object, the provision of an apparatus of this kind adapted to separate bodies of different densities, by means of the centrifugal force developed at different speeds in a cylindrical drum with filtering walls, and an impeller for the materials to be separated.

One object of the invention is to provide a centrifugal separating apparatus, of continuous operation, which makes it unnecessary to interrupt the working of said apparatus to fill or to discharge same.

Another object of this invention is to provide a centrifugal separating apparatus which comprises one propeller element for the materials to be separated which functions at a rotating speed, different from that of the filtering drum, said element being provided with an arrangement of scrapers which act upon the filtering surface, keeping same substantially clean or free from obstructions during the centrifugal operation.

In the drawings:

Figure 1 is a side elevation of a centrifugal separator, of the horizontal type, constructed in accordance with the present invention.

Figure 2 is an end elevation of same.

Figure 3 is a vertical transverse section, according to line 3—3 of Figure 1.

Figure 4 is a vertical transversal section, on enlarged scale, and in detail, according to line 4—4 of Figure 1.

Figure 5 is a diametrical, longitudinal partial section on enlarged scale according to line 5—5 of Figure 2.

Figure 6 is a partial sectional view in detail, fragmentary, and on enlarged scale, which completes the section shown in Figure 5.

Figure 7 is a radial, partial section in detail according to line 7—7 of Figure 4.

Figure 8 is a detail view, on enlarged scale, which shows the arrangement of a scraping element, and

Figure 9 is a vertical central sectional view of centrifugal separator, of a vertical type.

Referring to the Figures 1 to 8 inclusive, of these drawings 1 indicates an open end, revolving drum made of perforated plate and lined with a suitable filter cloth 2. This drum rests on ball bearing 3, the other halves of which 3′ are fastened to the inner surface of a cylindrical stationary casing 4 held spaced in this way with relation to the drum 1. The casing 4 has its lower part trough shape as shown by 4′ the bottom of which is slightly sloped and ends in an outlet 4″ at its lowest part.

To one end of the casing 4 is fastened a header 5, which is integral with a gear 5, meshing with a gear 6, fastened to a horizontal driving shaft 7, journaled in standards not shown.

The header 5 has its outer surface recessed as shown at 5″, and in said recess is loosely housed, one end of a stationary cylindrical casing 8, smaller than drum 1, and in alignment therewith; the upper part of said casing 8 is open, forming a feeding hopper 9.

Through the drums 1 and 8 is revolvingly arranged a hollow shaft 10, as shown in 10′ and provided with openings 11, in its length, within the drum 1; the ends of said shaft are journaled in standards 12 by means of ball bearing 13.

A conveyor 14 is fastened to that part of the shaft 10 housed within the drum 1, the edges of which are very close to the filtering cloth 2, presenting as shown in Figures 4 and 7 and 8, a deep groove 15, on which are adjusted sectional rims 16, made of fiber or other suitable material reduced for the purpose as shown in 16′, said sectional rims 16 being forced outwardly by the pressure of a leaf spring 17, housed in the grooves 15 themselves, maintaining in this way a scraping contact with the cloth 2, which however does not damage same, although preventing the materials which are to be separated from adhering.

That part of the shaft 10, on the outside of the drum 1 is mounted through a sleeve 18 which rests on ball bearings 19, arranged in the header 5, which presents opening 5″ for the passage of the material, and on standards 20 upon which the casing 8 bears. To said sleeve is fastened, or is integral with same, another spiral conveyer 21, which re-

ceives a changeable revolving movement by means of the gearings 22 and 23, fastened to the sleeve 18, which projects from the standard 20, and shaft 7 respectively, in the usual form of transmission.

The shaft 10 is driven with variable speed by means of gears 24 fastened thereon and gears 25 fastened to the driving shaft 7.

The delivering head of the drum 1 is closed by a case 26, which ends in a delivering chute 26′, said case having a damper 27 in its upper part.

The operation of this apparatus is as follows:

The material which is to be separated is fed through the hopper 9, being forced forwardly by the spiral conveyer 21 revolving within the casing 8, the feeding being controlled by means of gears 22 and 23. Once the material in the drum is spread over the filtering cloth 2, due to the revolving movement of the spiral conveyer 14, and the rotation of the drum 1 which revolves at a high speed due to the gears 5 and 6, the separating process begins. It should be observed that the spiral conveyer 14 revolves at a greater speed than the drum 1, and in the same direction, by means of the gears 24 and 25.

The difference between the speed of the drum and the speed of the spiral conveyer, gives as a result a relative velocity equivalent to the difference in speeds of said drum and spiral conveyer which causes the material to be forced by the spiral conveyer 14 to the case 26 by which it leaves through the chute 26′, while the material separated passes towards the annular chamber between the drum 1 and the casing 4, discharging through the channel 4′ in the direction of the oulet 4″.

While these steps are taking place, the scrapers 16 which are in engagement with the filtering cloth 2, keep same clean and free from accumulation of obstructing substances.

Through the hollow shaft 10, water or other fluids necessary in the operation, or for cleaning purpose may be supplied.

In Figure 9 of the drawings is shown a separator, of a vertical type, the construction of which is substantially the same as that of the horizontal type, which has been described so far, and shown in the drawings.

It consists, therefore, of a perforated drum 28, with open ends lined with filtering cloth 29, and journaled in ball bearing means 30, the halves 31 of which are fastened to the inner surface of pedestals 32, said drum presenting an annular discharge chute 33.

To the upper end of the drum 28 is fastened a header 34 journaled in ball bearing means 35 and 35′ fastened respectively to the upper part of the header 34 and the supports 32, a gear 34′ being formed integral with the header and meshing with a gear 36 fastened to a vertical shaft 37 mounted between brackets 38 and 39.

The lower part of the drum 28 is provided with a flange 40, bearing on a suitable flange 40′ secured to the pedestals 32.

A vertical hollow shaft 41 is arranged through the drum 28 having bores 41′, and its ends are journaled in ball bearings 42 in the bracket 38 and in the lower part of a truss 43 which engages the standards 32, within the drum 28 a spiral conveyer 44 is arranged, the borders of which are close to the filtering cloth 29, and having scrapers like the ones shown and already described in Figures 4–7 and 8, and a horizontal disk 45 the object of which will be explained further along. A gear 46 is secured to said shaft which meshes with another gear 47 fastened to the shaft 37.

On a higher plane than the mouth of the casing 32 is arranged a stationary casing 48 journaled in a standard 49, and having closed ends, and an opening in its upper part, communicating with a hopper 50 for feeding the material to be separated.

In its lower, inner end, the casing 48 presents an opening with a delivering chute 51, which discharges within the drum 28.

Within the casing 48 is arranged a horizontal spiral conveyer 52 to the shaft of which is fastened a gear 53 which receives its movement from a power source not shown.

The operation of this type of apparatus is as follows:

The product which is to be separated is fed through the hopper 50 and impelled in the direction of the discharging chute 51 by the spiral conveyer 52.

Upon leaving the discharging chute 51 the product falls into the drum 28 upon the disk 45, and is spread towards the filtering walls of the drum 28, and due to the movement of the spiral conveyer 44, adheres to the walls of said drum, on account of the gyratorial movement of same, this being the beginning of the separation process. It should be observed that here, as in the previous type of separator, the speed of the spiral conveyer 44, is greater than the speed of the drum 28, both turning in the same direction and the difference of speeds gives as a result that the product separated is discharged through the filtering walls of the drum 28, and running towards the channel 33 and the product treated is carried by the spiral conveyer 44 toward the lower part of the drum, and discharged.

While this operation is taking place the scrapers of the special conveyer, are cleaning off all the obstructing material which adheres to the walls of the filtering cloth 29.

The supplying of water for cleaning purposes is effected through the hollow shaft 41, and let out through the bores 41 of same.

Claim:

In a separator, a revolving drum, a spiral conveyor rotatable in said drum and having a circumferentially channelled rim portion, scraper sections engaging the interior of the drum arranged end to end extending throughout the length of the edge of the conveyor and having reduced portions slidably mounted in the channel of the conveyor, the side faces of the conveyor and sections presenting substantially continuous surfaces, and a flat bow spring for each scraper section confined between the latter and the base of said channel and normally tending to force the scraper against the interior of the drum.

In testimony whereof we affix our signatures.

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SEGUNDO DIAZ FERNANDEZ.