

Feb. 12, 1957

W. G. J. HECKMANN

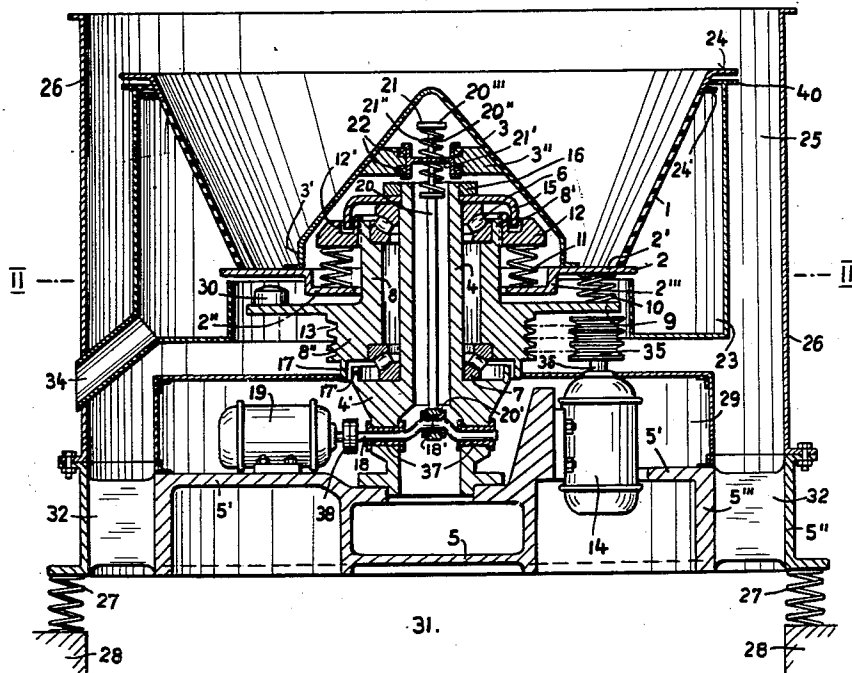
2,781,131

CENTRIFUGAL DEVICE

Filed May 7, 1954

3 Sheets-Sheet 1

FIG. 1



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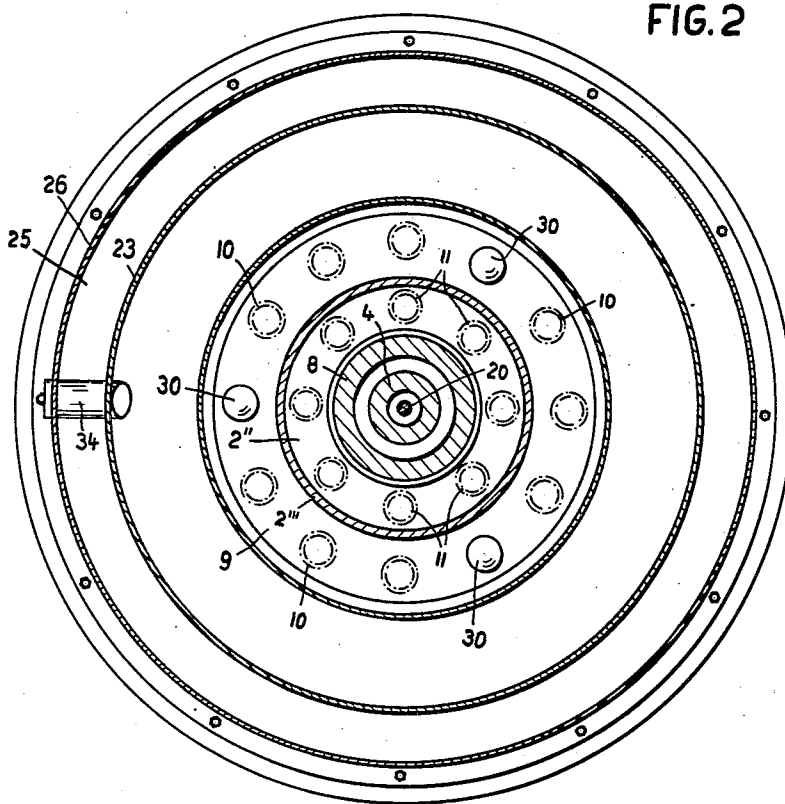
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3 Sheets-Sheet 2

FIG. 2



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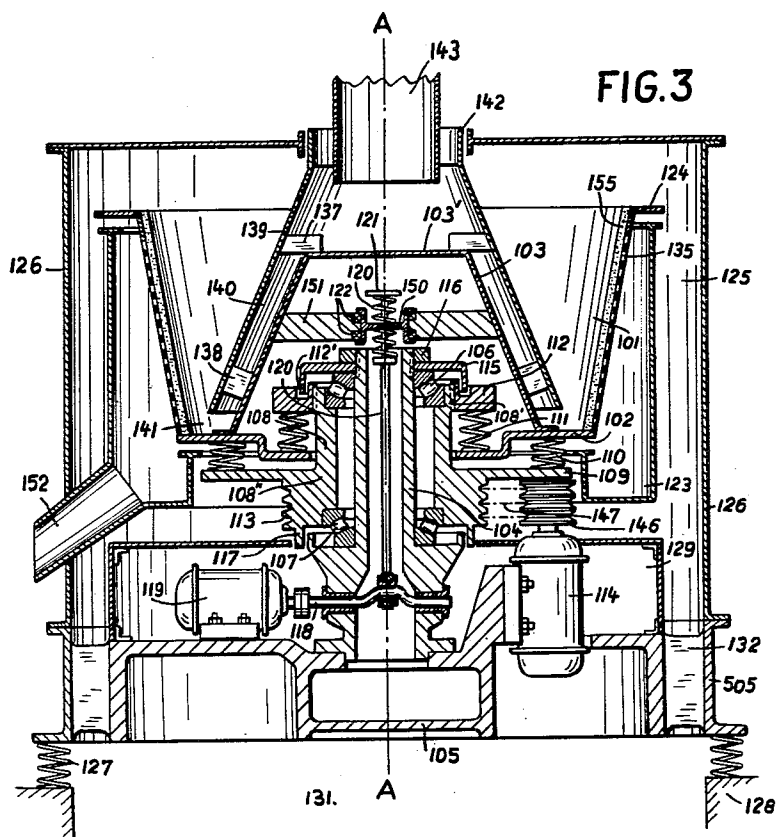
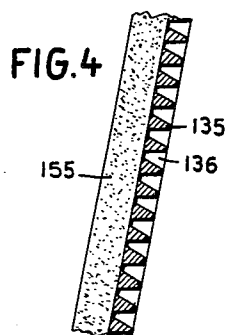
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3 Sheets-Sheet 3



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CENTRIFUGAL DEVICE

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32 Claims. (Cl. 210—72)

The present invention relates to a centrifugal device, and more particularly to a centrifugal device or centrifuge for dehydrating a fine-granular material, and to a method for dehydrating the same.

Centrifugal devices of this kind are known in the art, in which a sieve drum being open at the upper end thereof is resiliently arranged on a driving member. The material is removed from the drum by axial vibrations which are imparted to the sieve drum.

It is an object of the present invention to provide an improved and compact design of such centrifugal devices which has particularly the advantage of being closed from all sides.

It is another object of the present invention to make use of resonance phenomena of the vibrations of the sieve drum.

It is a further object of the present invention to render the sieve drum capable of an automatic adjustment thereof.

It is still another object of the present invention to improve the dehydration of the material fed to the centrifugal device according to my invention.

It is a still further object of my invention to improve the yield of solid particles obtained by the sieve drum.

Other objects and structural details of the present invention will become apparent from the following detailed description thereof when read in connection with the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a sectional elevation of a first embodiment of a centrifugal device according to the present invention;

Fig. 2 is a horizontal sectional view of the centrifugal device shown in Fig. 1, taken on line II—II of Fig. 1;

Fig. 3 is a sectional elevation of a second embodiment of a centrifugal device according to the present invention; and

Fig. 4 is, on an enlarged scale, a section of a detail of the device shown in Fig. 3.

Referring now to the drawing and first to Figs. 1 and 2, it will be seen that a sieve drum 1 is shaped as a frustum of a hollow inverted circular cone having a substantially vertical axis and which is open at the upper end thereof. At the lower end of the sieve drum 1 a substantially horizontal ring-shaped base member or plate 2 is arranged which is preferably offset so as to form substantially horizontal outer and inner portions 2', 2'' connected with each other by a substantially vertical portion 2''', the outer portion 2' being arranged at a higher level than the inner portion 2''. A substantially conical cap 3 is attached to the upper or outer portion 2'' of the base member 2 by means of the lower marginal portion 3' of the cap 3 so that the cap 3 protects the bearings and springs more fully to be described hereinafter, against water and dirt.

A stationary member 4 designed as a hollow vertical shaft rigidly connected to the frame 5 of the machine projects with its upper end into the conical cap 3. A hollow vertical body or actuating means 8 forming part of the

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actuator for producing rotations of the sieve drum 1 surrounds part of the stationary shaft 4 against which it abuts by first and second bearings 6 and 7, respectively, the first bearing 6 being enclosed by the cap 3.

The actuating means or body 8 has an outer collar 9 (termed hereinafter the "lower outer portion") forming one piece therewith. Along the outer part of the collar 9 are arranged vibrating bodies or members 10 (termed hereinafter the "second" vibrating bodies or members) which abut against the outer portion 2' of the base plate 2. Furthermore vibrating bodies or members 11 (termed hereinafter the "first" vibrating bodies or members) are arranged on the inner offset portion 2'' of the base plate 2 and abut against a ring 12 (termed hereinafter the "upper outer portion") which is secured to the body 8 by means of a screw-threaded portion 8'. The vibrating bodies 10 and 11 are termed hereinafter collectively the second resilient means, and are designed preferably as helical springs as shown in the drawing; however, they can be replaced, if desired, by rubber blocks (not shown), preferably of cylindrical cross-section. The vibrating bodies or members 10, 11 are inserted in suitable recesses (not shown) of the base plate 2, the collar 9, and the ring 12 in order to impart to the bodies or members 10, 11 well defined positions relative to the parts 2, 9 and 12. The bodies 10, 11 thus serve for transferring the torque from the body 8 to the base plate 2 and to the sieve drum 1 rigidly connected thereto.

The lower portion 8'' of the body or actuating means 8 which is arranged below the collar 9 is designed as a pulley provided with grooves 13 for V-belts indicated by the dash-dotted lines 44 which engage a second pulley 35 attached to the upper portion of a shaft 36 of a first driving motor 14 secured to the frame 5 of the machine. The driving motor 14, the body 8 and the belt-drive connecting same represent an actuator for rotating the sieve drum 1.

The upper or first bearing 6 is protected by a cap 15 against dust and/or moisture. The cap 15 is held in position by an annular nut 16 screwed to the uppermost portion of the stationary member 4 and projects with its rim portion into a recess 12' of the ring 12. The second bearing 7 is protected against dust and/or moisture by interengaging rings 17, 17' forming part, respectively, of the lower portion 8'' of the rotating body 8 and the lower enlarged portion 4' of the stationary member or shaft 4.

A substantially horizontal crank shaft 18 is supported by bearings 37 arranged in the enlarged portion 4' of the stationary member 4. The crank shaft 18 is coupled by a coupling 38 with a second driving motor 19 secured to the upper plate 5' of the frame 5 of the machine.

The upper plate 5' of the frame 5 and the driving motors 14 and 19 supported by the same are enclosed in an inner casing 29 protecting the motors 14 and 19 largely against damage.

The stationary member or shaft 4 is hollow and serves as a housing for a connecting rod 20 the lower end 20' of which engages the bend 18' of the crank shaft 18. The upper end portion 20'' of the connecting rod 20 is provided with a loose coupling 21 including a cross member 21' connected to the upper end portion 20' of the connecting rod 20 and two compression springs 21'' abutting against collars such as 20''' of the upper end portion 20' and against the cross member 21' from different sides.

The loose coupling 21 is connected through resilient bearings 22 with a block 3' attached to the cap 3. In consequence thereof the sieve drum 1 is imparted axial vibrations by the connecting rod 20, the latter being coupled therewith by the loose coupling 21 connected to the cap 3 rigid with the base plate 2 rigidly connected to the sieve drum 1.

Thus the crank shaft 18, the connecting rod 20 and the loose coupling 21 form a vibrator or a device for

imparting to the sieve drum 1 vibrating movements in the axial direction thereof. Preferably the number of revolutions per minute of the crank shaft 18 is chosen in such manner that the natural frequency of the sieve drum 1, i. e. the frequency of the vertical vibrating movements of the sieve drum 1 supported by the vibrating bodies 10, 11 is in resonance with the frequency of the vibrator formed by the crank shaft 18, the connecting rod 20 and the loose coupling 21.

An annular container 23 is arranged outside and below the sieve drum 1 and provided with an outlet 34. The upper rim portion 24 of the sieve drum 1 forms a gap together with a ring-shaped member 24' which is engaged by the upper rim portion 40 of the container 23. The inner casing 29 and the container 23 are surrounded by an outer casing 26 forming an annular space 25 with the container 23 and the inner casing 29 which opens at the bottom into a collecting bin 31 formed by a foundation or supporting means 28 supporting the frame 5 of the machine by means of first resilient means designed as soft springs 27, i. e. as springs having a low spring constant. The outer casing 26 is secured to the outer rim portion 5'' of the frame 5 connected by stiffening ribs 32 with the main portion 5''' of the frame 5. Thus it is seen that the casings 26 and 29 are rigidly connected to the frame 5.

Between the vibrating springs 10 arranged on the collar 9 are placed rubber springs such as 30 having a very progressive characteristic, i. e. the spring constant thereof increases with the compression of these springs. The rubber springs 30 are preferably spherical at the upper sides thereof and become operative in the last third of the vibrating path of the springs 10.

The operation of this device is as follows:

The motors 14 and 19 are started so that the sieve drum 1 is rotated by the motor 14 over the second pulley 35, the V-belts 44, the first pulley 13 and the rotating body 8 transferring its rotation by the springs 10, 11 to the base plate 2 rigidly connected to the sieve drum 1. At the same time the motor 19 drives over the crank shaft 18 the connecting rod 20 carrying out upward and downward movements which are transferred as vibrations by the loose coupling 21 to the conical cap 3 rigidly connected to the base plate 2 rigid with the sieve drum 1.

The material to be dehydrated is filled into the interior of the sieve drum 1 between the latter and the conical cap 3. The liquid contained in the material to be dehydrated is carried through the perforated wall of the sieve drum 1 and is caught in the annular container 23 from which it escapes through the outlet pipe 34. The dehydrated material moves under the action of the centrifugal force upward to the rim portion 24 and into the annular space 25 from where it is discharged into the collecting bin 31.

The dehydrating centrifuge includes thus a two-mass system, the sieve drum 1 with the parts rigidly connected therewith forming the first mass, and the frame 5 together with the driving devices and the casings 26 and 29 forming the second or counter-mass.

During operation the sieve drum 1 and the parts rigidly connected therewith vibrate in a direction opposite to that in which the counter-mass vibrates so that a very favorable balancing of the masses is obtained. Preferably the vibrations of the sieve drum 1 have only an amplitude of a few millimeters. The proportion of the first mass to the counter-mass amounts preferably to 1:8 to 1:15 so that the amplitude of the vibrations carried out by the frame 5 and the parts rigidly connected therewith is very small. These small vibrations have a favorable effect on the carrying away of the dehydrated material since the formation of bridges by the material in the annular space 25 is avoided.

The rubber springs 30 cause a rapid damping of procession movements (if any) of the sieve drum 1 due to temporary differences in the load thereof such as those caused by a non-uniform or intermittent charging of the

sieve drum 1. Thus it is seen that the rubber springs 30 limit undesirable vibrating movements. This effect is particularly favorable if the vibrating springs 10 and 11 dimensioned in axial direction for resonant operation, are arranged at such distances from the axis that the transversal and/or torsional vibrations in the direction indicated by the arrow 33 are hypercritical. In such a case the sieve drum 1 has the tendency to adjust itself automatically to the free axis thereof, the free axis corresponding to the geometrical axis of the sieve drum 1.

Referring now to Figs. 3 and 4, it will be seen that the centrifugal device comprises a drum 101 open at the upper end thereof and having a frusto-conical sieve jacket 135 the generatrix of which is inclined by an angle of 8-18°, preferably 10°, to the axis A-A of the drum. The mean diameter of the drum 101 measured at half the height thereof amounts to approximately 900 millimeters. The sieve openings of the jacket 135 are preferably designed as horizontal slots 136 (Fig. 4) each having a wedge-shaped cross-section having an opening width amounting, for instance, to 0.5 millimeter at the inner side thereof, and to 0.8 millimeter at the outer side thereof. At the lower side the drum 101 is closed by a base plate 102 which is preferably offset as the base plate 2 shown in Fig. 1. A cap 103 shaped as a frustum of cone having a horizontal upper end plate 103' is attached to the base plate 102 in the same manner as the cap 3 shown in Fig. 1 is attached to the base plate 2.

The cap 103 is connected by means of ribs 137 and 138 to a cone-shaped shell 139 enclosing a free space 140 with the cap 103. The lower rim 161 of the cone-shaped shell 139 is arranged at a distance from and above the base plate 102 so as to form a gap 141.

At the upper side the cone-shaped shell 139 is continued by a hollow cylindrical piece 142 through which passes a stationary feed pipe 143 for the material to be fed to the centrifugal device.

A stationary member 104 designed as a hollow vertical shaft rigidly connected to the frame 105 of the machine projects with its upper end into the frusto-conical cap 103 and is surrounded by the hollow vertical body or actuating means 108. The hollow vertical body 108 is rotatably supported by first and second bearings 106 and 107 and provided with an outer collar or lower outer portion 109 along the outer part of which are arranged second vibrating bodies or members such as helical springs 110 abutting against the base plate 102. Furthermore, first vibrating bodies or members such as helical springs 111 are arranged on the inner offset portion of the base plate 102 and abut against an upper outer portion such as a ring 112 screwed by an internal thread thereof to a screw-threaded portion 108' of the body 108. The first and second vibrating bodies may be designed, if desired, as cylindrical rubber blocks (not shown) inserted in suitable recesses (not shown) of the base plate 102, the collar 109 and the ring 112.

The upper or first bearing 106 is protected by a cap 115 against dust and/or moisture. The cap is held in position by an annular nut 116 screwed to the uppermost portion of the stationary member 104 and projects with its rim portion into a recess 112' of the ring 112. The second bearing 107 is protected against dust and/or moisture by interengaging rings 117, 117' forming part, respectively, of the lower portion 108'' of the rotating body 108 and the lower enlarged portion 104' of the stationary member or shaft 104.

Below the collar 109 the lower portion 108'' of the body 108 is provided with grooves 113 for the reception of V-belts 147 engaging a (second) pulley 146 driven by a (first) driving motor 114 supported by the frame 105 of the machine. The driving motor 114, the body 108 and the belt-drive connecting same represent an actuator for rotating the sieve drum. As pointed out hereinabove in the description of the operation of the first embodiment of the present invention shown in Figs. 1

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and 2 having analogous parts, the torque transferred from the motor 114 by means of the parts 146 and 147 to the body 108 is transferred by the springs 110 and 111 to the drum 101 so that the latter rotates with the body 108 and makes, e. g., 400 revolutions per minute. As this number of revolutions per minute prevails at half the height of the drum 101, i. e., where the diameter of the same amounts to 900 millimeters and at the perimeter to the drum 101 a centrifugal acceleration $r\omega^2$ where r is the mean radius of the drum 101 and ω the angular velocity thereof, the centrifugal acceleration thus depending on the angular velocity of the drum 101 and being at 400 revolutions per minute equal to

$$\frac{40\pi}{3} \text{ sec.}^{-2}$$

so that for the centrifugal acceleration results approximately 79000 cm./sec.² which is about the 80-fold of the acceleration of gravity. Generally the number of revolutions per minute of the drum 101 should be so chosen that at half the height thereof a centrifugal acceleration prevails which is the 60 to 90 fold of the acceleration of gravity.

In the enlarged portion 104 of the stationary member 104 is arranged for rotation a substantially longitudinal crank shaft 118 having a small bend 118' of e. g. 2.5 millimeters. The crank shaft 118 is coupled with a second driving motor 119 supported by the frame 105 of the machine. A connecting rod 120 the lower end 120' of which engages the bend 118' of the crank shaft 118, passes through the hollow member 104 and is provided at the upper end 120'' thereof with an elastic coupling 121 operatively connected with a plate 150 held for rotation by means of ball bearings 122, but axially indisplaceably in an intermediate wall 151 of the cap 103. In operation the drum 101 is imparted axial oscillations by the crank drive 118 and the cap 103, said oscillations having a frequency of 25-30 cycles per second and an amplitude of 1-3 millimeters, the optimal result being achieved with a frequency of 30 cycles per second and an amplitude of 3 millimeters.

The drum 101 is surrounded by an annular container 123 provided with an outlet 152. Below the container 123 is arranged an inner casing 129 which rests on the frame 105 of the machine and protects the motors 114 and 119 against dirt and/or moisture. The outer cover is formed by a cylindrical casing 126 defining an annular space 125 with the container 123 and the inner casing 129. The outer casing 126 is supported by the outer rim portion 105'' of the frame 105 which is provided with recesses 132 forming the continuations of the annular space 125. The recesses 132 open into the upper part of a collecting bin 131. The casing is supported by springs 127 supported in turn by the foundation 128.

Thus the device comprises again two masses, one being formed by the drum 101, the cap 103, and the conical shell 139, this being the first or working mass, whereas the second or counter-mass is formed by the frame 105 including the driving means, the inner casing 129, the container 123 and the outer casing 126. The ratio between the working mass and the counter-mass is very small and amounts preferably to 1:8 to 1:15 as in the first embodiment. Therefore the amplitude of the oscillations or vibrations of the counter-mass is relatively small. Preferably the total spring constant of the springs 110 and 111 is so tuned to the working mass that the axial oscillations or vibrations are carried out in resonance.

In operation a fine coal (anthracite), preferably after first removing the dust and consecutive washing, is fed to the centrifugal device by the feed pipe 143, said coal having a grain size of less than 10 millimeters with a grain-size fraction of 5% below 0.5 millimeters, and a water content of approximately 25%. When the fine coal impinges on the upper end plate 103' of the cap 103 it is driven by the action of the centrifugal force towards the outside where it hits the cone-shaped shell 139. Then the

coal traverses the annular space 140 and is thrown by centrifugal action immediately after the exit from the gap 141 against the sieve jacket 135. Under the influence of the vibrating movement and the components of the centrifugal force in direction of the generatrices of the shell of the drum the fine coal will travel upwards along the shell. The speed of travel is only small owing to the steep slope of the jacket 135, the given value of the centrifugal acceleration, and the frequency and amplitude of the axial vibrations so that the material remains a relatively long time in the drum 101 so as to be thoroughly dehydrated. Furthermore by the slow advance of the material toward the upper rim portion 124 of the drum 101 it is achieved that at a charging quantity of e. g. 60 tons per hour a layer 155 of the material is formed having a thickness of 10-15, preferably 15 millimeters which acts as a filter on the permeating water and retains a very large quantity of the fine solid components which otherwise would leave through the sieve openings 136 together with the water. Thus the centrifuged water has only a very low content of solid constituents which is practically negligible. The water after having passed the sieve drum 101 is caught in the annular container 123 and discharged through the outlet 152. The centrifuged coal leaves the sieve drum 101 over the upper rim portion 124 thereof and falls subsequently through the annular space 125 and the recesses 132 into the collecting bin 131. It should be noted that by the vibrations carried out by the casing and the frame of the machine any formation of bridges of material are prevented in the space 125 and the recesses 132.

It should be understood that numerous changes may be made in the form, construction, and arrangement of the several parts of the illustrated centrifugal device without departing from the spirit and scope of my invention or sacrificing any of its attendant advantages, the form herein described being merely for the purpose of illustrating the invention.

What I claim is:

1. A centrifugal device, comprising in combination: a first system of masses including a frame work, an actuator for producing rotating movements and a vibrator for producing vibrating movements, said actuator and said vibrator being mounted on said frame work, a second system of masses including a sieve drum rotatable around its longitudinal axis, and three resilient means between said first and second systems of masses, two of said resilient means opposing each other and resiliently holding one mass from the other, the third such means resiliently connecting the vibrator to the second mass, all of said resilient means yielding in the direction of the longitudinal axis of the sieve drum for permitting vibrating movements of said second system of masses in said direction of the longitudinal axis of said sieve drum, said actuator imparting rotations to said sieve drum, and said vibrator imparting vibrating impulses to said sieve drum.

2. In a centrifugal device as claimed in claim 1, said sieve drum being in the shape of a frustum of a hollow cone.

3. In a centrifugal device as claimed in claim 1, said second system of masses including a base rigid with said sieve drum, and said two first mentioned resilient means being engaged with said base and said actuator.

4. In a centrifugal device as claimed in claim 1, said second system of masses including a base rigid with said sieve drum, said base having a bore, a portion of said actuator passing through said bore, first lateral means on said actuator extending at one side of said base, second lateral means on said actuator extending at the other side of said base, said two first mentioned resilient means including a first set of springs and a second set of springs, said first set of springs being engaged with said first lateral means and one side of said base, and said second set of springs being engaged with said second lateral means and the other side of said base.

5. In a centrifugal device as claimed in claim 1, said

second system of masses including a base rigid with said sieve drum, said base having a bore, a portion of said actuator passing through said bore, first lateral means on said actuator extending at one side of said base, second lateral means on said actuator extending at the other side of said base, said two first mentioned resilient means including a first set of springs and a second set of springs, said first set of springs being engaged with said first lateral means and one side of said base, said second set of springs being engaged with said second lateral means and the other side of said base, and the radial distance of one of said two sets of springs from the longitudinal axis of said sieve drum being larger than the radial distance of the other set of springs from said longitudinal axis of the sieve drum.

6. In a centrifugal device as claimed in claim 1, said second system of masses including a base rigid with said sieve drum, said two first mentioned resilient means being engaged with said base and said actuator, and resilient limiting means attached to one member of said two members including the base and the actuator, said resilient limiting means being capable of abutting cooperation with the other of said two members so as to limit the relative movement between said two members.

7. A centrifugal device, comprising in combination: a first system of masses including a frame work, an actuator for producing rotating movements and a vibrator for producing vibrating movements, said actuator and said vibrator being mounted on said frame work, a second system of masses including a sieve drum rotatable around its longitudinal axis, three resilient means between said first and second systems of masses, two of said resilient means opposing each other and resiliently holding one mass from the other, the third such means resiliently connecting the vibrator to the second mass, all of said resilient means yielding in the direction of the longitudinal axis of the sieve drum for permitting vibrating movements of said second system of masses in said direction of the longitudinal axis of said sieve drum, and fourth resilient means supporting said system of masses resiliently, said fourth resilient means yielding in the direction of the longitudinal axis of the sieve drum for permitting vibrating movements of said first system of masses in said direction of the longitudinal axis of said sieve drum, said actuator imparting rotation to said sieve drum, and said vibrator imparting vibrating impulses to said sieve drum.

8. In a centrifugal device as claimed in claim 7, said fourth resilient means being in the shape of springs having a low spring constant.

9. In a centrifugal device as claimed in claim 7, the weight of said first system of masses being at least eight times the weight of said second system of masses.

10. In a centrifugal device as claimed in claim 7, the weight of said first system of masses being between eight and fifteen times the weight of said second system of masses.

11. In a centrifugal device as claimed in claim 7, said sieve drum being in the shape of a frustum of a hollow cone.

12. In a centrifugal device as claimed in claim 7, said second system of masses including a base rigid with said sieve drum, and said first and second resilient means being engaged with said base and said actuator.

13. In a centrifugal device as claimed in claim 7, said second system of masses including a base rigid with said sieve drum, said base having a bore, a portion of said actuator passing through said bore, first lateral means on said actuator extending at one side of said base, second lateral means on said actuator extending at the other side of said base, said two first mentioned resilient means including a first set of springs and a second set of springs, said first set of springs being engaged with said first lateral means and one side of said base, and said second set of springs being engaged with

said second lateral means and the other side of said base.

14. In a centrifugal device as claimed in claim 7, said second system of masses including a base rigid with said sieve drum, said base having a bore, a portion of said actuator passing through said bore, first lateral means on said actuator extending at one side of said base, second lateral means on said actuator extending at the other side of said base, said two first mentioned resilient means including a first set of springs and a second set of springs, said first set of springs being engaged with said first lateral means and one side of said base, said second set of springs being engaged with said second lateral means and the other side of said base, and the radial distance of one of said two sets of springs from the longitudinal axis of said sieve drum being larger than the radial distance of the other set of springs from said longitudinal axis of the sieve drum.

15. In a centrifugal device as claimed in claim 7, said second system of masses including a base rigid with said sieve drum, said two first mentioned resilient means being engaged with said base and said actuator, and resilient limiting means attached to one member of said two members including the base and the actuator, said resilient limiting means being capable of abutting cooperation with the other of said two members so as to limit the relative movement between said two members.

16. In a centrifugal device as claimed in claim 7, a resilient coupling arranged between said vibrator and said second system of masses.

17. A centrifugal device, comprising in combination: a frame work, actuating means rotatably mounted in said frame work, a crank mechanism including a crank and a connecting rod mounted in said frame work, driving means mounted on said frame work for actuating said actuating means and said crank mechanism, a sieve drum, a base rigid with said sieve drum, the longitudinal axis of said sieve drum coinciding with the longitudinal axis of said actuating means, first and second resilient means engaged with said actuating means and said base, said first and second resilient means opposing each other and being capable of transmitting rotary movements from said actuating means through said base to said sieve drum and being yieldable in the direction of the longitudinal axis of the sieve drum for permitting vibrating movements of the latter in the direction of its longitudinal axis, a resilient coupling between said connecting rod of said crank mechanism and said sieve drum whereby said crank mechanism may impart vibrating impulses to the latter, and additional resilient means supporting said frame work resiliently, said additional resilient means yielding in the direction of the longitudinal axis of said sieve drum for permitting vibrating movements of said frame work and the parts attached thereto in said direction of the longitudinal axis of the sieve drum.

18. In a centrifugal device as claimed in claim 17, the connecting rod of said crank mechanism being substantially in register with the center of said sieve drum, and said rotatable actuating means being hollow and surrounding said connecting rod.

19. In a centrifugal device as claimed in claim 17, said frame work including a hollow center shaft, said actuating means being rotatably mounted on said center shaft, and said connecting rod passing through the bore of said center shaft.

20. A centrifugal device, comprising in combination: a frame work, actuating means rotatably mounted in said frame work, a crank mechanism including a crank and a connecting rod mounted in said frame work, driving means mounted on said frame work for actuating said actuating means and said crank mechanism, a sieve drum, a base rigid with said sieve drum, the longitudinal axis of said sieve drum coinciding with the longitudinal

axis of said actuating means, said actuating means being hollow and surrounding said connecting rod, said connecting rod being substantially in register with the center of said sieve drum, first and second resilient means engaged with said actuating means and said base, said first and second resilient means opposing each other and being capable of transmitting rotary movements from said actuating means through said base to said sieve drum and being yieldable in the direction of the longitudinal axis of the sieve drum for permitting vibrating movements of the latter in the direction of its longitudinal axis, a resilient coupling between said connecting rod and said sieve drum whereby the former may impart vibrating impulses to the latter, and additional resilient means supporting said frame work resiliently, said additional resilient means yielding in the direction of the longitudinal axis of said sieve drum for permitting vibrating movements of said frame work and the parts attached thereto in said direction of the longitudinal axis of the sieve drum.

21. In a centrifugal device as claimed in claim 20, a member rigid with the structure including said sieve drum and base, said resilient coupling including a body attached to said connecting rod and rotatably engaged with said member, a pair of abutting means secured to said connecting rod at opposite sides of said body, and a pair of counteracting springs, one of said springs being engaged with one of said abutting means and one side of said body, the other spring being engaged with the other abutting means and the other side of said body.

22. In a centrifugal device as claimed in claim 20, said base having a bore, said actuating means passing through said bore, a cap rigid with said base, said cap covering the end of said actuating means projecting through said bore, said resilient coupling including a body attached to said connecting rod and rotatably engaged with said cap, a pair of abutting means secured to said connecting rod at opposite sides of said body, and a pair of counteracting springs, one of said springs being engaged with one of said abutting means and one side of said body, the other spring being engaged with the other abutting means and the other side of said body.

23. In a centrifugal device as claimed in claim 22, said cap being substantially in the shape of a cone, the apex of which being remote from said base.

24. In a centrifugal device as claimed in claim 17, an inner casing attached to said frame work, said inner casing enclosing said driving means.

25. A centrifugal device, comprising in combination: a first system of masses including a frame work, an actuator for producing rotating movements and a vibrator for producing vibrating movements, said actuator and said vibrator being mounted on said frame work, a second system of masses including a sieve drum rotatable around its longitudinal axis, a rotatable base rigid with said sieve drum, a rotatable closure member rigid with said base and a rotatable shell rigid with said closure member, said shell having an inlet for the supply of material to be centrifuged, the cross section of said shell being smaller than that of said sieve drum, said shell surrounding said closure member at a predetermined distance and terminating at a predetermined distance from said base whereby a chamber for the supply of material to said sieve drum is formed, said closure member being closed at its end facing said inlet, and three resilient means between said first and second systems of masses, two of said resilient means opposing each other and resiliently holding one mass from the other, the third such means resiliently connecting the vibrator to the second mass, all of said resilient means yielding in the direction of the longitudinal axis of the sieve drum for permitting vibrating movements of said second system of masses in said direction of the longitudinal axis of said sieve drum, said actuator imparting rotations to said sieve drum, and said vibrator imparting vibrating impulses to said sieve drum.

26. In a centrifugal device as claimed in claim 25, said closure member being in the shape of a frustum of a hollow cone, and said shell being of conical shape.

27. A centrifugal device, comprising in combination: a first system of masses including a frame work, an actuator for producing rotating movements and a vibrator for producing vibrating movements, said actuator and said vibrator being mounted on said frame work, a second system of masses including a sieve drum rotatable around its longitudinal axis, a rotatable base rigid with said sieve drum, a rotatable closure member rigid with said base and a rotatable shell rigid with said closure member, said shell having an inlet for the supply of material to be centrifuged, the cross section of said shell being smaller than that of said sieve drum, said shell surrounding said closure member at a predetermined distance and terminating at a predetermined distance from said base whereby a chamber for the supply of material to said sieve drum is formed, said closure member being closed at its end facing said inlet, three resilient means between said first and second system of masses, two of said resilient means opposing each other and resiliently holding one mass from the other, the third such means resiliently connecting the vibrator to the second mass, all of said resilient means yielding in the direction of the longitudinal axis of the sieve drum for permitting vibrating movements of said second system of masses in said direction of the longitudinal axis of said sieve drum, and additional resilient means supporting said first system of masses resiliently, said additional resilient means yielding in the direction of the longitudinal axis of the sieve drum for permitting vibrating movements of said first system of masses in said direction of the longitudinal axis of said sieve drum, and said vibrator imparting vibrating impulses to said sieve drum.

28. In a centrifugal device as claimed in claim 27, said closure member being in the shape of a frustum of a hollow cone, and said shell being of conical shape.

29. A method for dehydrating fine-granular material by means of a centrifugal device having a rotatable and vibratable conical sieve drum the generatrix of which is inclined to the axis thereof by an angle of approximately 10°-18°, comprising the steps of rotating the sieve drum at such a number of revolutions per minute that the centrifugal acceleration at the mean perimeter of the sieve drum equals about 60-90 times the acceleration of gravity, and imparting to the drum a vibrating movement having a frequency of about 25-35 cycles per second and an amplitude of approximately 1-3 millimeters.

30. A method for dehydrating fine-granular material by means of a centrifugal device having a rotatable and vibratable conical sieve drum the generatrix of which is inclined to the axis thereof by an angle of 10°, comprising the steps of rotating the sieve drum at such a number of revolutions per minute that the centrifugal acceleration at the mean perimeter of the sieve drum equals 80 times the acceleration of gravity, and imparting to the drum a vibrating movement having a frequency of 30 cycles per second and an amplitude of 3 millimeters.

31. In a centrifugal device as claimed in claim 17, said frame work including a hollow center shaft, said base of the sieve drum having an opening, said hollow center shaft passing through said opening into the interior of said sieve drum, a first bearing arranged on said hollow shaft outside said sieve drum, a second bearing arranged on said hollow shaft inside said sieve drum, said first and second bearings rotatably supporting said actuating means, said connecting rod passing through the bore of said hollow center shaft, and a cap arranged inside said sieve drum and rigid with the latter, said cap covering said second bearing and the portion of said hollow center shaft penetrating into the interior of said sieve drum.

32. A centrifugal device comprising in combination: a first system of masses including a framework, an actuator for producing rotating movements and a vibrator for

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producing vibrating movements, said actuator and said vibrator being mounted on said framework, a second system of masses including a sieve drum rotatable around its longitudinal axis, and a plurality of resilient means between said first and second systems of masses including a pair of resilient means opposing each other and resiliently holding one system of masses from the other and including a resilient means resiliently connecting the vibrator to the second system of masses, all of said resilient means yielding in the direction of the longitudinal axis of said sieve drum, said actuator imparting rotations to said sieve drum, and said vibrator imparting vibrating impulses to said sieve drum.

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