Sept. 2, 1924. 1,507,412

T. A. BRYSON

CENTRIFUGAL MACHINE

Filed June 12, 1920

Fig. 1.

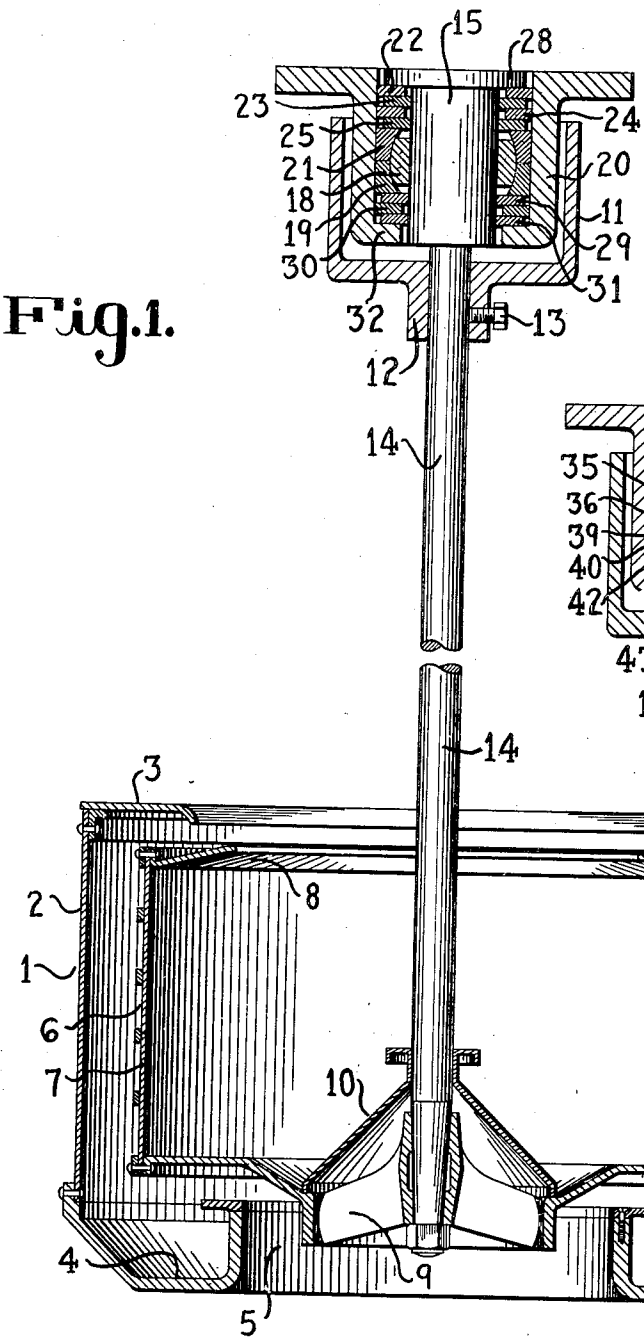
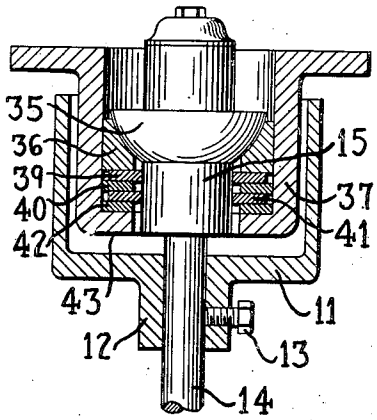


Fig. 2.



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UNITED STATES PATENT OFFICE.

TANDY A. BRYSON, OF TROY, NEW YORK, ASSIGNOR TO TOLHURST MACHINE WORKS, A CORPORATION OF NEW YORK.

CENTRIFUGAL MACHINE.

Application filed June 12, 1920. Serial No. 388,659.

To all whom it may concern:

Be it known that I, TANDY A. BRYSON, a citizen of the United States, residing at Troy, in the county of Rensselaer and State of New York, have invented new and useful Improvements in Centrifugal Machines, of which the following is a specification.

The invention relates to centrifugal machines and more especially to novel means and devices in the machine designed to compensate for, or to take care of, an unbalanced whirling or rotating load, and the objectionable or harmful vibrations which arise or are set up in the machine. The present invention relates more especially to such means or devices as applied to a machine wherein the action of gravity is employed as a centering means to operate against or to govern the gyratory movement or vertical oscillatory movement of the shaft and basket due to an unbalanced load.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention; the same being realized and attained by means of instrumentalities, and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is a central vertical section through a suspended or over-driven centrifugal machine embodying the invention; and

Fig. 2 is a fragmentary vertical section, corresponding to the upper part of Fig. 1, showing a somewhat different form of the mechanism.

The invention provides a regulating or governing device of the kind referred to applied to a basket shaft which is restrained from translational movement at its point or place of suspension, but which is free while rotating also to rock or oscillate vertically about said point (such rocking or oscillation being resisted by gravity), as differentiated from the type of machine having a yielding or resilient bearing which absorbs and resists in part such oscillatory or gyratory motion of the shaft. My application Ser. No. 388,658, Patent No. 1,481,502, issued January 22, 1924, discloses the application of the invention to this resilient bearing type of machine.

In connection with the machine of the gravity resisting type referred to, the invention comprises frictional elements in contact with each other and movable one relatively to the other, one moving with the shaft in its gyratory or vertical angular movement, and another in contact therewith frictionally resisting such movement, the friction being derived from the weight of the basket, shaft and load resting on said relatively movable members.

Further, as embodied, the frictional members consist of a plurality of superposed contacting plates surrounding the shaft or its housing, some of the plates fitting the shaft or housing and having clearance about their outer edges, so as to move with the gyrating or oscillating shaft, and contacting frictionally therewith, other plates having clearance about the shaft or housing and held stationary, the friction between the plates being derived from the weight of the basket, shaft and load.

More in detail, as embodied, the basket shaft housing is mounted for gyration or vertical oscillation in a nonresilient bearing within a casing, and surrounding the housing are one or more horizontally disposed annular friction plates fitting the housing but having clearance within the casing, and in contact therewith are similar plates fitting the casing but having clearance about the housing. Thus, when the basket shaft gyrates or oscillates vertically from an unbalanced basket load, one kind or set of the plates slide on the other and absorb or dampen the vibrations and the oscillatory movement.

Referring now in detail to the present perferred embodiment of the invention, illustrated by way of example in the accompanying drawings it is applied to an overdriven or suspended centrifugal machine, although it is also applicable to the underdriven type of machine. As embodied, a casing 1 is mounted on the floor or on a suitable frame, and has a cylindrical side wall 2, a top flange 3 and a bottom 4, with a suitable outlet 5. The casing may be of any

suitable or convenient form so far as concerns the present invention.

Suspended and rotating within the casing 1 is a basket 6, having a perforate cylindrical side wall 7, an inwardly inclined annular top flange 8 and one or more bottom outlets 9, closed by a valve 10. These may be of any suitable usual or standard construction as may be desired.

Basket 6 is suspended on an upwardly extending shaft or spindle 14, fixed to the basket at the center of its bottom. At its upper end shaft 14 has a housing 15, within which the shaft is rotatably suspended by a suitable construction or mechanism. Shaft 14 is driven by pulley 11, which is fixed by a screw 13 in its hub 12 to the shaft.

The housing 15 for the basket spindle 14 permits vertical angular motion in all directions of the shaft or spindle 14 but does not permit translational movement thereof, that is, movement at right angles to the axis of the shaft. The vertical angular motion or gyration of the spindle due to unbalanced basket load is opposed by the action of gravity, and also by the operation of the friction damping means applied to the shaft suspension, said means also operating to dampen and absorb the objectionable vibrations already referred to.

In Fig. 1 a direct bearing for housing 15 is shown as a spheroidal member 18, surrounding with a sliding fit the housing 15 at or near the middle point of the length or height of the housing. As embodied, spheroidal member 18 has its center on the axis of shaft 14 at the center of oscillation of the shaft on its bearing, whereby member 18 always adjusts itself to the angular position of the shaft and housing during their motion with an unbalanced load as already described. The housing supporting member 18 is itself supported in an annular member 19. Member 19 has flat top and bottom surfaces and cylindrical outer and inner walls, but at the juncture or joining edge of its top surface and inner wall it is spheroidally cut away to fit the spheroidal exterior of the member 18. Member 18 is thus supported by, but is free to rock relatively to its support 19. The internal diameter of member 19 is such that it also provides clearance about housing 15, to permit the gyratory motion of the housing previously referred to. The external cylindrical wall of member 19 makes an easy fit within a supporting casing 20.

In this exemplification, there are employed two sets of friction devices, and with this in view a member 21, corresponding in shape to, but inverted in position from, member 19, is provided, resting upon member 19 and fitting about the upper part of member 18. Member 21 likewise has clearance about the housing 15 and has an easy fit within casing 20. It thus allows the angular or gyratory motion of the housing about its own central point and transmits the frictional pressure between the damping devices.

As here embodied, housing 15 has projecting from its top portion a horizontal annular flange 28, which flange rests upon a flat annular friction plate 22. Plate 22 fits easily within casing 20 but has clearance about the housing 15, whereby the plate is held stationary horizontally within the casing 20.

In contact with plate 22 therebeneath is an annular plate 23 which internally fits the housing 15 but externally has clearance with respect to casing 20. Thus plate 23 will move horizontally with any angular or gyratory motion of housing 15 and at the same time will slide with frictional resistance on plate 22. Plate 24 is like plate 22, and plate 25 is like plate 23, plate 25 resting upon the top of bearing member 21.

Beneath bearing member 19 is a flat, horizontal annular friction plate 29, which plate fits easily about the housing 15 but has clearance within the casing 20. Plate 29 rests upon a similar plate 30, which fits easily within the casing 20 but has clearance about the housing 15. Plate 30 rests upon a plate 31 which is like plate 30. Plate 31 rests upon an internally horizontally projecting annular supporting flange 32 which is part of casing 20.

Thus the weight of the basket and its load is transmitted from flange 28 of the spindle housing 15 through the friction members to a fixed support on flange 32 of the casing. The housing, spindle, basket and load are free to oscillate angularly or gyrate about the bearing on member 19, but are restrained by the action of gravity and by the frictional resistance developed as the two sets of plates slide on each other in the manner described as they carry the weight of the spindle, basket and load. This mechanism also dampens or absorbs all objectionable and harmful vibration arising from the causes hereinbefore described or from other causes. The two sets of friction devices, one above and one below the center of oscillation or gyration of the housing move in opposite directions and cooperate in their damping or absorbing action.

In Fig. 2 is shown a single frictional device, but constructed in essentially the same manner. A hemi-spheroidal bearing member 35 encircles and is fixed to housing 15 preferably midway of the height of the housing. This bearing member 35 rests in an annular bearing member 36 fitting loosely within the casing 37 and having clearance about the housing 15. Member 36 has flat top and bot-

tom surfaces and cylindrical inner and outer vertical surfaces, but is spheroidally cut away at the juncture of its top and its inner vertical wall to provide a seat to fit the member 35 and to permit it to rock in its seat with the angular or gyratory motion of the shaft.

In this construction the spindle, basket and load are supported by the relatively movable members 35 and 36. The friction vibration and gyration damping or absorbing means are located entirely beneath the supporting ring 36. As shown, ring 36 rests on a horizontal annular plate 39 which fits the housing 15 and has clearance within the casing 37. Plate 39 rests on a plate 40, which fits easily within casing 37 and has clearance about housing 15. Plate 40 rests on plate 41, which latter is like plate 39, and plate 41 in turn rests on plate 42, which is like plate 40. Plate 42 rests on the horizontally, inwardly projecting flange 43 of casing 37, which provides a fixed support for the entire mechanism.

The weight of the basket shaft, basket and load are transmitted from bearing ring 35 to ring 36, while ring 35 is free to swing in its seat in ring 36. The load is thence transmitted to the friction plates and to flange 43. The friction plates operate in the manner already described, which description need not be repeated.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A centrifugal machine including in combination a basket and supporting and rotating means therefor comprising a basket shaft, a flexible, non-resilient support therefor, and a plurality of contacting relatively movable friction members carrying the weight of the basket and shaft and acting by such movement to dampen the gyratory movement of the shaft.

2. A centrifugal machine including in combination a basket and supporting and rotating means therefor comprising a basket shaft, a flexible, non-resilient support therefor, and a plurality of contacting relatively movable flat friction plates carrying the weight of the shaft, basket and load, acting by such movement to dampen the gyratory movement of the shaft.

3. A centrifugal machine including in combination a basket and supporting and rotating means therefor comprising a basket shaft, a support therefor permitting vertical oscillation or gyration thereof about a fixed point, and a plurality of contacting friction members, one at least thereof moving with the shaft and relatively to a contacting friction member in non-rotary movement of the shaft, said friction members carrying the weight of the shaft, basket and load, and acting by such movement to dampen the gyratory movement of the shaft.

4. A centrifugal machine including in combination a basket and supporting and rotating means therefor comprising a basket shaft, a support therefor permitting vertical oscillation or gyration thereof about a fixed point, and a plurality of contacting flat friction plates, one at least thereof moving with the shaft and relatively to a contacting friction plate in any gyratory movement of the shaft, said plates carrying the weight of the shaft, basket and load, and acting by such movement to dampen the gyratory movement of the shaft.

5. A centrifugal machine including in combination a basket and supporting and rotating means therefor comprising a basket shaft, a spheroidal support in which the shaft is free to gyrate, or oscilate vertically, a plurality of relatively slidable contacting friction members having contacting surfaces of substantial area carrying the weight of the shaft, basket and load, one at least of said members moving with the shaft and relatively to a contacting friction member to dampen gyratory motion of the basket shaft.

6. A centrifugal machine including in combination a basket and supporting and rotating means therefor comprising a basket shaft, a flexible, non-resilient support therefor, and a plurality of contacting relatively movable non-resilient friction members having contacting surfaces of substantial area, carrying the weight of the shaft, basket and load, acting by such movement to dampen the gyratory movement of the shaft.

7. A centrifugal machine including in combination a basket and supporting and rotating means therefor including a shaft, a housing in which the shaft is journaled, a casing about the housing, a non-resilient support for the housing, and a plurality of relatively movable annular friction plates supporting the housing support, shaft and basket, and supported by the casing, one of said plates fitting the housing and having clearance within the casing and a contacting plate fitting the casing and having clearance about the housing.

8. A centrifugal machine including in combination a basket and supporting and rotating means therefor including a shaft, a housing in which the shaft is journaled, a casing about the housing, a spheroidal support for the housing, and a plurality of relatively movable annular friction plates supporting the housing support, shaft and basket, and supported by the casing, one of said plates fitting the housing and having clear-

ance within the casing and a contacting plate fitting the casing and having clearance about the housing.

9. A centrifugal machine including in combination a basket and supporting and rotating means therefor comprising a basket shaft, a flexible, non-resilient support therefor, and a plurality of contacting relatively movable friction members having contacting surfaces of substantial area in slidable contact with one another, for carrying the weight of the basket and shaft and acting by such movement to dampen the gyratory movement of the shaft said friction members being arranged substantially symmetrically on opposite sides of said support.

10. A centrifugal machine including in combination a basket, a shaft therefor, a non-resilient support for the shaft permitting gyratory movement thereof, a pulley about said support, and a plurality of relatively slidable contacting friction elements within the pulley, said friction elements having contacting surfaces of substantial area for carrying the weight of the basket and serving to dampen the gyratory movement of the shaft.

11. A centrifugal machine including in combination a basket, a shaft therefor, a non-resilient support for the shaft permitting gyratory movement thereof, a pulley about said support, and relatively slidable friction plates within the pulley carrying the weight of the basket and shaft, for damping the gyratory movement.

12. A centrifugal machine including in combination a basket, a shaft therefor, a non-resilient support for the shaft permitting gyratory movement thereof, a pulley about said support, and relatively slidable annular friction plates of different diameters within the pulley for carrying the weight of the basket and shaft, for damping the gyratory movement.

13. A centrifugal machine including in combination a basket, a shaft therefor, a non-resilient support for the shaft permitting gyratory movement thereof, and a plurality of relatively slidable flat annular friction plates of different diameters for supporting the weight of the basket and serving to dampen the gyratory movement of the shaft.

14. A centrifugal machine including in combination a basket, a shaft for supporting the basket, a spherical bearing for the shaft permitting gyratory movement thereof and a plurality of relatively slidable friction plates having contacting surfaces of substantial area for supporting the weight of the basket and serving to dampen the gyratory movement of the shaft.

15. A centrifugal machine including in combination a shaft, a basket suspended on the lower end of the shaft, a bearing at the upper end of the shaft including a spherical member, a spherical seat for said member, a casing about the bearing, member and seat, and a plurality of contacting friction plates, one plate moving with the bearing and another plate not so moving, said plates supporting the bearing, the spherical member and seat and supported by the casing.

16. A centrifugal machine including in combination a shaft, a basket suspended on the lower end of the shaft, a non-resilient bearing at the upper end of the shaft including a spherical member, a spherical seat for said member, and relatively slidable friction devices having contacting surfaces of substantial area for supporting the bearing, member and seat.

17. A centrifugal machine including in combination a shaft, a basket suspended on the lower end of the shaft, a bearing at the upper end of the shaft including a spherical member, a spherical seat for said member, and a plurality of contacting friction plates located both above and below said spherical seat, one plate moving with the bearing and another plate not so moving, said plates supporting the bearing, the spherical member and seat.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

TANDY A. BRYSON.

Witnesses:
M. K. BUSKIN,
A. J. SCHLEICH.