

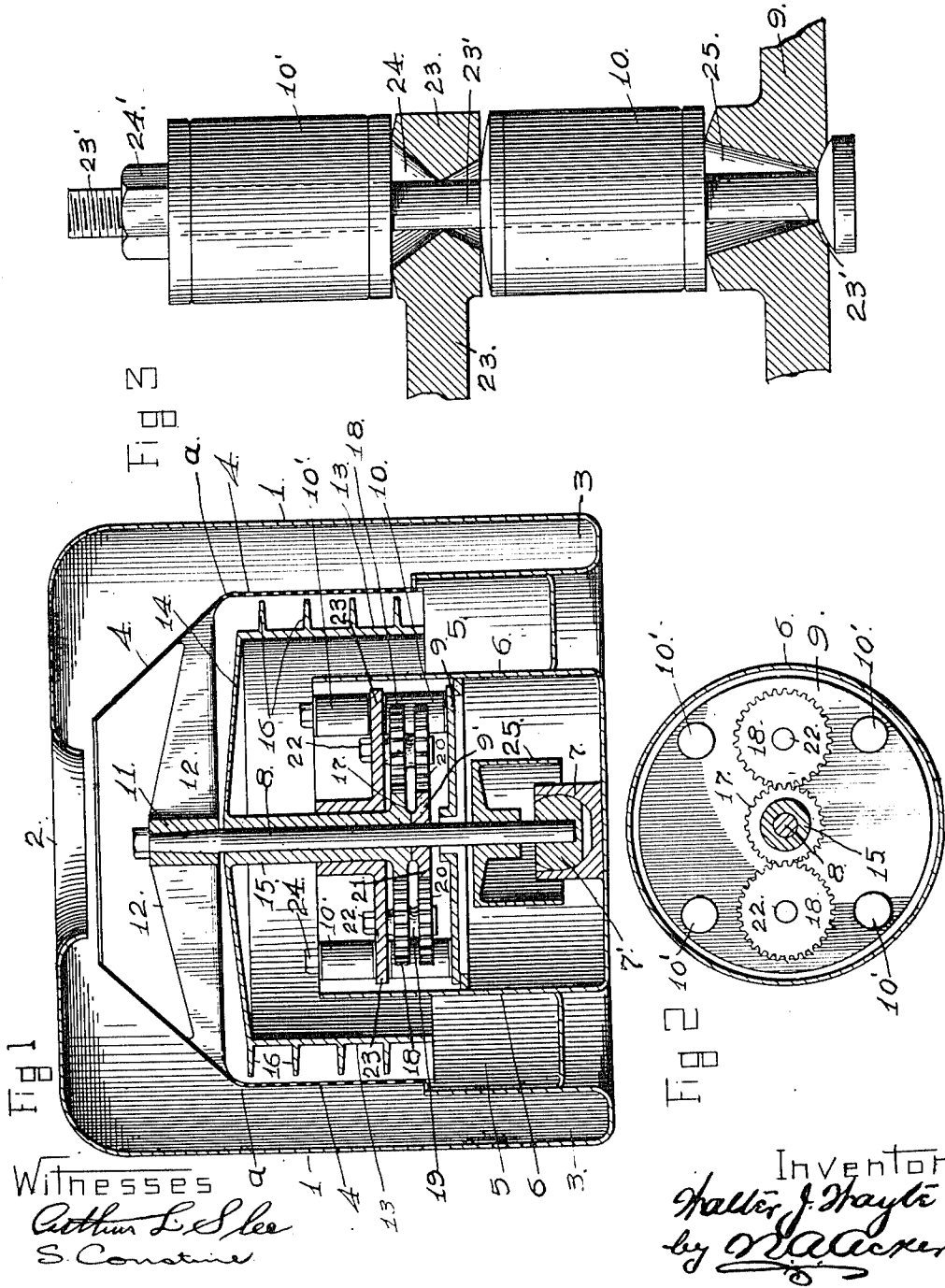
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DRIVING MECHANISM FOR CENTRIFUGAL MACHINES.

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DRIVING MECHANISM FOR CENTRIFUGAL MACHINES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER J. WAYTE, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Driving Mechanism for Centrifugal Machines, of which the following is a specification.

The invention relates to a simple, efficient and durable gear mechanism for operating centrifugal machines generally, but more particularly machines used for the separation of solids from liquid material by centrifugal action through expelling the moisture or liquid from the material under treatment during a continuous feed of the material into the separator, and while the machine is more particularly designed for the removal of moisture from salt and sugar containing liquids, it is equally as well adapted for the separating of finely divided solids from liquids generally.

The object of the invention is the production of a machine for successfully treating liquids containing solids as fed or delivered into the machine under a continuous feed, the drive mechanism for the rotating parts being so arranged as to give to the oscillatory movements of the driven parts without moving out of alinement or mesh under such shifting action of the said parts.

The hereinafter described machine comprises an outer housing or monitor casing, a drive shaft extended therein, a perforated rotatable outer basket and an inner independently driven rotatable basket within the housing or monitor casing, suspended drive mechanism actuated from the drive shaft for imparting rotation to the inner basket, and means for holding said drive mechanism in mesh with the driving member of the drive shaft for actuating the same, and the driven gear for imparting rotation to the inner basket.

To comprehend the invention, reference should be had to the accompanying sheet of drawings, wherein—

Figure 1 is a vertical sectional view of the improved centrifugal separator. Fig. 2 is a sectional top plan view illustrating the upper intermediate drive gears and their connection with the gear of the driven sleeve for the inner basket, also disclosing the relative positions of the upper rubber buffers,

the supporting disk for the suspended drive gear mechanism being removed. Fig. 3 is an enlarged detail elevation of one pair of the compensating buffers for maintaining the suspended transmitting gears in mesh with the driven gear for the inner basket and of the drive gear of the drive shaft, and the connection between said buffers and the fixed diaphragm and the disk from which the intermediate gears are suspended.

In the drawings, the numeral 1 is used to designate the outer housing or monitor casing within which the operating mechanism is situated, the same being provided at its upper end with the feed inlet opening 2 through which the liquid material to be treated is preferably delivered in a continuous stream, and at the bottom thereof is formed an inner annular trough 3 for catching the water or other liquid thrown off or separated from the material being treated.

Within the housing 1 is mounted for rotation an outer perforated basket 4, which rotates within the sphere of an annular passageway 5 into which the separated solids are discharged, the said annular space being formed by an inner or center fixed cylinder 6 upwardly extended within the housing 1, the said cylinder containing a step-bearing 7 having mounted therein a spherical bearing block 7' for the central drive shaft 8 and carrying a circular diaphragm 9 through which the said shaft is extended.

To the circular plate or diaphragm 9 is bolted a plurality of pairs of rubber buffers 10 and 10' which are designed to take up and care for the oscillations of the rotating parts of the machine.

The hub 11 of the outer basket 4 is securely mounted on the upper end of the drive shaft 8, the said hub being connected to the basket 4 by means of the spider 12 in order to transmit the rotary motion of the drive shaft to the said basket. The construction of the perforated basket 4 is substantially the same as those in use at the present time, that is its circumferentially perforated or meshed surface extends from the point *a* to its bottom edge, the bottom being an open one for the free discharge of solids into the annular discharge passage 5.

Within the outer basket and spaced therefrom is suspended the inner rotatable basket 13, which is connected by an inclined cir-

cular plate or disk 14 to a sleeve 15 loosely mounted on the drive shaft 8, being supported thereon by the hub 9' of the herein-after described drive gear. On the outer face of the inner rotatable basket 13 is formed or secured a helical screw or worm 16, which runs close to the inner surface of the outer perforated basket 4 and serves to convey downwardly between the rotating baskets the material delivered through the feed opening of the housing 1 onto the downwardly inclined plate, disk or conical wall connection 14 of the inner basket to the sleeve 15.

The loose sleeve 15 carries at its bottom a spur gear 17, which meshes with the upper pair of opposing intermediate drive gears 18, which gears are connected by a hub 19 to a lower set of opposing gears 20, the said gears 20 being in mesh with a spur gear 21 secured to the drive shaft 8 above the diaphragm 9; the motion of the drive shaft being conveyed by the spur gear 21 to the gears 20, which gears in turn drive the companion gears 18, through the connecting hubs 19 for imparting motion to the spur gear 17 which in turn rotates the sleeve 15 for rotating the inner basket 13.

The connected gears 18 and 20 are suspended by the bolts 22 from the disk 23 loosely fitted over the sleeve 15, which disk is spaced from the fixed diaphragm 9 by the buffers 10 and held thereto by the securing bolts 23' which extend above the disk 23 and secure thereto the buffers 10'. The bolts 23' on an outward or inward strain placed thereon are free to swing or give under such strains by reason of the double inclined bore 24 and the inclined or flared bore 25 formed in the disk 23 and diaphragm 9 respectively.

The buffers 10 and 10' acting against the opposite faces of the disk 23 tend to hold the disk and the rotating elements of the separator in normal central positions but, at the same time, permit slight movements out of central positions when there is uneven loading. As the outer basket 4, the inner basket 13 and the gear supporting disk 23 are all concentrically journaled, it is impossible for one to move laterally with respect to another. Thus, although the intermediate drive gears are suspended and free to give and shift in all directions with the rotating drive shaft 8 and sleeve 15, they are at all times maintained in proper alinement and mesh with the gears 17 and 21, thus securing an even, uniform and perfect rotation for the rotary outer and inner baskets 4 and 13 and this irrespective as to how the said baskets may oscillate during their rotations.

In the present case, four pairs of rubber buffers 10 and 10' are employed, the same being located equidistantly apart and the required tension of these buffers relative to the floating disk 23 is obtained by means of

the tightening nut 24' which screws onto the projecting screw-threaded end of each bolt 23'.

The rubber buffers 10 and 10' serve as elastic compressible means for holding the disk 23 against upward movement relative to the sleeve 15 and by doing so maintain the train of driving gears in mesh and against displacement, thus insuring perfect running of the driven parts and the driving thereof at the proper speed under all working conditions.

The intermeshing gears 17 and 18 and 20 and 21 may be given any number of teeth desired, but for the purpose of permitting the rotary basket 4 and 14 to be driven at different speed, I provide the gears 17, 20 and 21 with, say, sixty teeth, and the gear 18, for driving the sleeve 15 which actuates the inner basket 13, with sixty-one teeth, so that the said basket will rotate one revolution in sixty less than the outer basket 4, the inner basket thus rotating at a slightly less speed than the outer basket, causing a prolonged action of the material traveling over the helical screw 16 onto the inner wall of the outer perforated basket 4 against which it is thrown by centrifugal strains of the machine while in action.

In operation the material to be dried or relieved of its moisture is admitted through the opening 2 of the housing or monitor casing onto the downwardly inclined wall or cover plate 14 of the inner basket 13, the centrifugal force at once throwing the same to the outer edge of the basket 4 where it is deprived of its moisture and comes within the influence of the helical screw 16 carried by the basket 13 driven at a different speed than the basket 4, which moves or conveys the material down the face of the perforated wall of the said basket 4, squeezing or pressing all moisture therefrom during the course of its travel toward the discharge passage way 5.

The drive shaft 8 may be driven in any suitable manner, but preference is given to a drive belt, not shown, working over the belt pulley 25 secured on the said shaft.

By the use of the described machine the work of separation is a continuous one as long as the feed of material is continued and the machine kept running, a large output capacity being thus obtained from a comparatively small sized machine.

Having thus described the invention what is claimed as new and desired to protect by Letters Patent is—

1. In a centrifugal separator, the combination of two concentric members mounted for rotation at different speeds about a common axis, yieldable bearing means for supporting the said members in such a manner as to permit automatic centering during rotation, power transmitting gearing inter-

posed between the two members, means for holding some of the elements of the gearing against rotation about the axis of the two concentric rotatable members, means for holding the last said elements of the gearing in mesh with the other elements irrespective of the transverse centering movements of the concentric members, and means for driving one of the concentric members.

2. In a centrifugal separator, the combination of two concentric members mounted for rotation at different speeds about a common axis, yieldable bearing means for supporting the said members in such a manner as to permit automatic centering during rotation, a gear carrier mounted co-axially with the concentric members for adjustment therewith, means for holding the gear carrier against rotation, gearing mounted in part on the gear carrier for insuring rotation of one of the concentric members at a different speed from that of the other, and means for driving the members.

3. In a centrifugal separator, the combination of three concentric members, two of which are mounted for rotation about the common axis at different speeds, means for holding the third members against rotation, yieldable bearing means for supporting all of the said members, power transmitting gearing interposed between the two rotatable members and mounted in part on the non-rotatable member, and means for driving the rotatable elements.

4. In a centrifugal separator, the combination of two concentric members mounted for rotation at different speeds about a common axis, yieldable bearing means for supporting the said members in such a manner as to permit automatic centering during rotation, a plate having a central bearing with its axis co-incident with the axis of the concentric members, the plate being adjustable with the members as they automatically center themselves, means for holding the plate against rotation, a gear on one of the concentric members, a second gear on the other of the concentric members, gearing mounted on the plate and meshing with the gears on the two concentric members for insuring their rotation at different speeds, and means for driving the concentric members.

5. In a centrifugal separator, the combination of two concentric members mounted for rotation at different speeds about a common axis, yieldable bearing means for supporting the said members in such a manner as to permit automatic centering during rotation, a plate having a central bearing with its axis coincident with the axis of the concentric members, the plate being adjustable with the members as they automatically center themselves, means for holding the plate against rotation, a gear on one of the concentric members, a second gear on the other of

the concentric members, a plurality of sets of gears mounted on the plate for rotation about axes parallel to the axis of the concentric member and meshing with the gears on the said elements to insure rotation at different speeds, and means for driving the concentric members.

6. In a centrifugal separator, the combination of two concentric members mounted for rotation at different speeds about a common axis, yieldable bearing means for supporting the said members in such a manner as to permit automatic centering during rotation, a gear secured to one of the members, a second gear secured to the other of the members, a plate arranged above the said gears with a bearing on one of the concentric members, the plate being adjustable with the members as they automatically center themselves, means for holding the plate against rotation but adapted to permit transverse adjustment, gearing rotatably mounted on the plate at its lower side and arranged to mesh with the two gears on the said concentric members to insure rotation at different speeds, and means for driving the concentric members.

7. In a centrifugal separator, the combination of two concentric members mounted for rotation at different speeds about a common axis, yieldable bearing means for supporting the said elements in such a manner as to permit automatic centering during rotation, a plate having a central bearing on one of the concentric members, the plate being adjustable with the members, means for holding the plate against rotation and for elastically acting upon it to tend to maintain it, together with the concentric elements, in normal central positions.

8. In a centrifugal separator, the combination of two concentric members mounted for rotation at different speeds about a common axis, yieldable bearing means for supporting the said members in such a manner as to permit automatic centering during rotation, a gear holder with a bearing on one of the concentric members, the gear holder being adjustable with the members, means for holding the gear holder against rotation, gearing interposed between the two concentric members and supported in part on the said gear holder, and elastic means acting upon the gear holder and tending at all times to hold the gear holder and the two concentric members in normal central positions.

9. In a centrifugal separator, the combination of two concentric members mounted for rotation at different speeds about a common axis, yieldable bearing means for supporting the said members in such a manner as to permit automatic centering during rotation, a plate having a central bearing on one of the concentric members, the plate be-

ing adjustable with the members as they
automatically center themselves, means for
holding the plate against rotation and for
elastically acting upon it to tend to main-
5 tain it, together with the concentric mem-
bers, in normal central positions, and gear-
ing interposed between the two members and
mounted in part on the said plate.

In testimony whereof I have signed my
name to this specification in the presence of 10
two subscribing witnesses.

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Witnesses:

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