(No Model.) 3 Sheets—Sheet 1.

O. OHLSSON.

DRIVING MECHANISM FOR CENTRIFUGAL MACHINES.

No. 536,389. Patented Mar. 26, 1895.

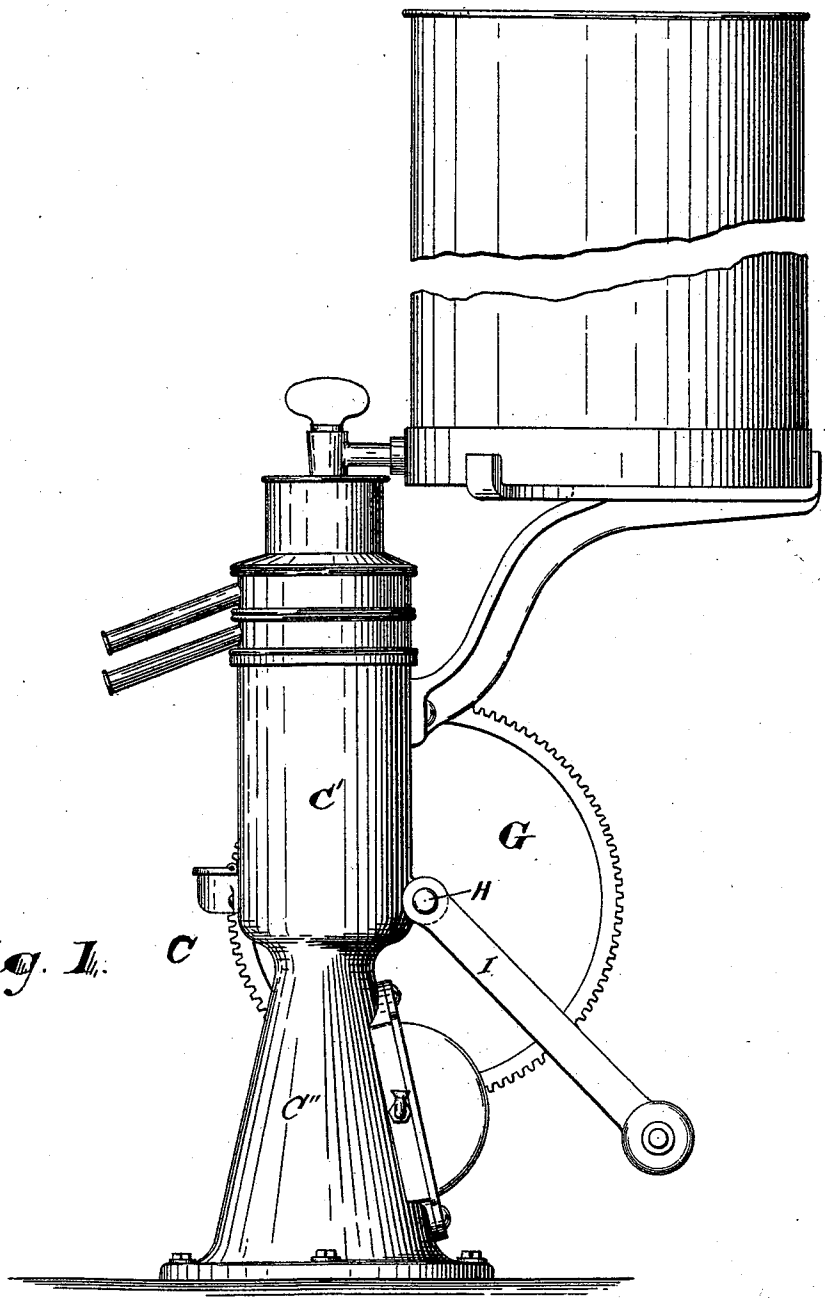

Fig. 1.

Witnesses

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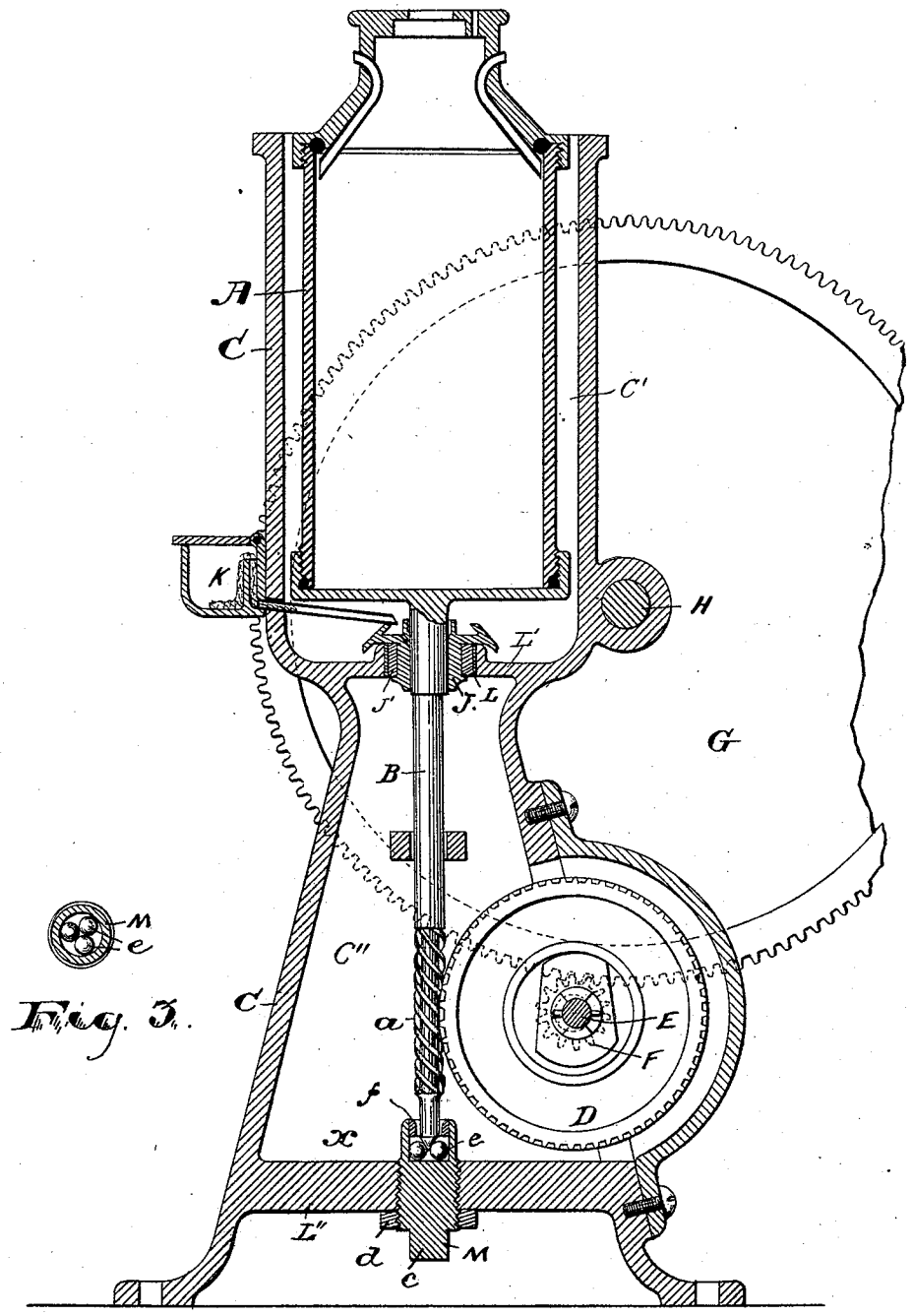

Fig. 2.

Fig. 3.

Witnesses

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(No Model.) 3 Sheets—Sheet 3.

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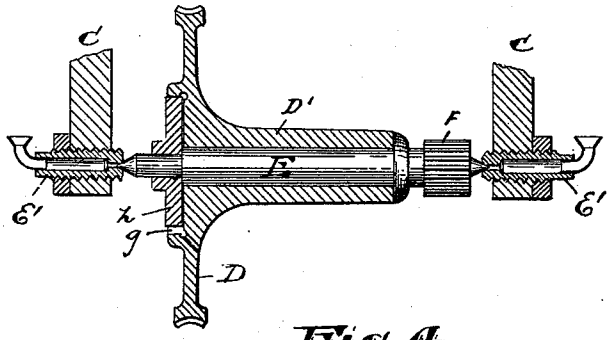

Fig. 4.

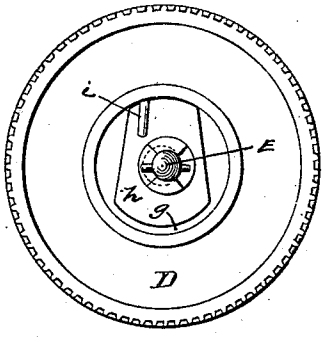

Fig. 6.

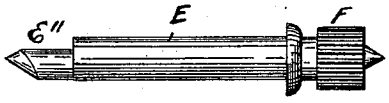

Fig. 5.

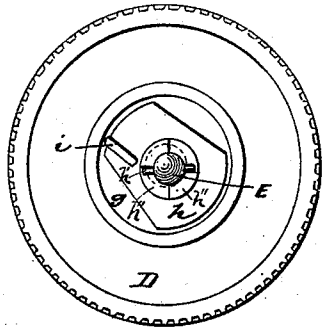

Fig. 7.

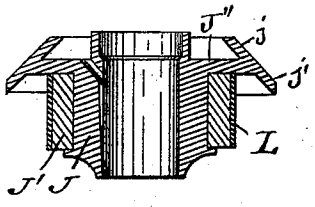

Fig. 8.

Witnesses

Robert Sollberger

Louis L. Browne.

Inventor:

Olof Ohlsson,

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UNITED STATES PATENT OFFICE.

OLOF OHLSSON, OF NEWARK, NEW JERSEY.

DRIVING MECHANISM FOR CENTRIFUGAL MACHINES.

SPECIFICATION forming part of Letters Patent No. 536,389, dated March 26, 1895.

Application filed September 15, 1894. Serial No. 523,088. (No model.)

To all whom it may concern:

Be it known that I, OLOF OHLSSON, a subject of the King of Sweden and Norway, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Motors for Centrifugal Creamers, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification,

This invention relates to centrifugal machines and to a novel arrangement of driving mechanism especially adapted for such machines but also adapted for other purposes.

Among the objects of the invention are the attainment of a high rate of speed of the bowl of a centrifugal machine with a small expenditure of power, the prevention of undue vibration of the rapidly rotating bowl, and the prevention of breakage due to a sudden stoppage of the bowl when the driving mechanism is suddenly arrested.

The invention consists of the various features of construction hereinafter pointed out.

In the drawings forming part of the specification, and in which like letters designate corresponding parts in the several views, Figure 1 is a side elevation of a centrifugal creamer embodying my improvements. Fig. 2 is a central vertical section of the same. Fig. 3 is a detail view showing a bearing for the vertical bowl-shaft. Fig. 4 is a sectional detail of a certain intermediate shaft and parts co-operating therewith. Fig. 5 is a detail view of said shaft showing one end to be eccentric. Figs. 6 and 7 are detail views showing a certain clutch device on the under side of one of the gear wheels by which power is transmitted to the bowl and showing the parts in clutched and unclutched positions, respectively, and Fig. 8 is a sectional view of what I have called a neck-bearing.

The bowl A and its driving shaft B which are rigidly connected together are mounted in an incasing frame C, comprising a chamber C′ for the bowl and a chamber C″ for the shaft and upper and lower bearing plates L′ and L″ for the shaft B. This incasing frame is made in one piece and affords complete protection to the bowl and its shaft from dust and outside interference. The plate L′ carries or provides the upper or neck bearing for the shaft B. This bearing comprises a metallic collar J in contact with which the shaft works, a rubber or other yielding ring J′ encircling the collar J to cushion the vibration of the bowl, and a thin preferably metallic protecting ring L interposed between the rubber ring J′ and the plate L′ to prevent the rubber from adhering to the plate and to prevent damage to the rubber ring when the neck bearing is removed. The ring L has another important function. It is so arranged that it may rotate in the plate L′ in order that, in case the shaft and collar J should stick together on account of heat due to friction or from other cause, the bearing with the shaft may turn in the support plate L′.

If the collar J and shaft B should stick together while the bowl were rotating the machine would be violently stopped in case the collar were enable to move with the shaft, and even if it did move with the shaft the ring J′ would be immediately burned out or otherwise destroyed and in either case the machine would probably be wrecked. The ring L guards against such an accident.

The collar J carries a flange J″ resting upon the plate L′ to support the neck bearing and is preferably provided with an upward projecting flange *j* to provide an oil cup supplied from the reservoir K, and with a downward projecting flange *j′* to prevent drip from the oil cup reaching the outer side of the neck bearing.

The flange J″, ring L and flange *j′* it will be seen, effectually protect the rubber ring from contact with the oil and the entire bearing may be readily removed when required. The lower bearing of the shaft B is carried by the plate L″. It comprises a cup-shaped piece M, preferably tapped in the plate L″ to admit of vertical adjustment and is provided with a head *c*, by which it may be turned. A lock nut *d* secures it firmly in place. The upper cupped end of the piece M carries anti-friction balls *e*, preferably three in number, upon which the shaft B is seated. A ring *f* prevents the balls from falling or twisting out of place.

Upon an intermediate shaft E, mounted in suitable bearings in the frame C, is loosely mounted a worm wheel D meshing with the worm *a* of the shaft B. As shown in the drawings the bearings of the shaft E are adjustable boxes E′ provided with oil tubes. A pinion F fixed upon the shaft E meshes with a large gear wheel G carried by the shaft H and operated by the hand crank I to transmit motion to the bowl A.

When the shaft and bowl in the old forms of machine are rapidly rotating an unequal distribution of the weight of the bowl, or an imperfect alignment of the bearings of the shaft would ordinarily cause an undue vibration of the bowl and a consequent undue amount of friction in the bearings and trembling and jarring of the whole machine. The shaft and its bearings in the present invention are so arranged, however, that this vibration is reduced to a minimum. This is done by having the shaft and bowl rigidly connected and so arranging the bearings that the bowl and shaft when rotating can deviate from a perpendicular line or become inclined first in one direction and then in another, the shaft resting all the while firmly in its lower bearing and the bowl being permitted to sway from side to side just as the axis of the earth prolonged moves about the north star. To accomplish this purpose the upper bearing in the present embodiment of the invention is provided with the cushion J, being arranged to maintain the shaft upright, and the lower bearing is provided with balls preferably three in number between which the tapered end of the shaft rests firmly whether perfectly upright in a vertical line or inclined. Any unequal distribution of the weight of the bowl which would tend to cause the axis of rotation to deviate from a vertical line would cause the cushion J′ to yield and permit the axis to incline without undue restraint and without undue vibration of the bowl. Again in case the upper bearing should become worn or the cushion J′ corroded from oil, the axis could incline to suit the changed condition or alignment of the bearings without undue vibration. In the prior commercial forms of vertical high speed centrifugal machines the shaft of the bowl is divided, the two portions being flexibly connected and the driving power is applied to the lower portion which is fixed in bearings. Any unequal distribution of the weight of the bowl or an imperfect alignment of the bearings caused the axis of rotation to take the form of a line broken at the point of juncture of the two portions of the shaft and therefore to cause an undue vibration and consequent retarding and wearing of the machine. It was considered impracticable, if not impossible, to build an operative machine of this character with the entire shaft rigid with the bowl as has been done in the present invention.

By fixing a worm on the rigid shaft of the present machine and arranging a worm wheel to drive it which exerts a downward strain in line with the axis the bowl is held firmly down in its bearings and the inclination of the bowl is not materially interfered with so that as the bowl spins at its high speed it can incline its axis as the varying conditions may require without undue vibration.

The wheel D is preferably provided with an extended hub D, fitting closely around the shaft E and is also provided on the side opposite to the hub with a recess *g*, the periphery of which is arranged to be engaged by a friction clutch plate or member *h*, loosely mounted upon the shaft E. This shaft is provided with an eccentric E″, adapted to actuate the clutch plate and move it into and out of engagement with the wheel. In the particular form of machine shown in the drawings there is a pin and slot connection for the clutch plate and shaft, the slot *h*″ being in the clutch plate and the pin *h*′ passing through the slot and being fastened in the shaft. Of course this arrangement might be reversed by fastening the pin in the plate and having it pass through a slot in the shaft, the object being to enable the clutch plate to move circumferentially back and forth independently of the shaft, this backward movement of the clutch plate being limited by the eccentric which moves the clutch plate into engagement with the wheel D and this forward movement of the clutch plate being limited by a fixed stop which positively engages the clutch plate and holds it stationary with respect to the shaft. If, when the wheel and shaft are turning together, being locked by the clutch, the shaft is stopped or arrested so that the wheel moves faster than the shaft, then the clutch plate will be carried round by the wheel and will ride down from the eccentric and out of engagement with the wheel, but not farther than the stop. If the clutch plate were not limited in this forward movement on the shaft it would be brought round so as to be moved by the other rise of the eccentric into engagement with the wheel, but now in the opposite direction and thus it would stop the wheel suddenly.

Various arrangements can be easily devised besides the pin and slot connection in which a positive stop will operate to produce the same result without departing from my invention. Heretofore it has been proposed to employ a friction clutch to engage a wheel intended to operate a sewing machine and actuated by treadles; but in this case the wheel is fast on a shaft and the clutch plate is carried by an eccentric sleeve loosely mounted on the shaft and revolving first forward and then backward on the shaft, the clutch plate being connected to the sleeve by a spring. Such an arrangement is objectionable because, among other reasons, the clutch is uncertain and not positive in its operaton and the sudden strain put upon the spring when the movement of the sleeve is reversed is liable to break it, permitting the clutch

plate to be carried round so as to engage the wheel in the opposite direction, violently stopping it and probably causing breakage of some of the moving parts. Moreover, the shaft upon which the wheel is rigidly mounted is liable to be suddenly arrested or stopped by reason of wear or clogging of the bearings of the shaft and this would violently stop the wheel and the machine which it operates and probably cause breakage. In a centrifugal machine this shaft rotates at a very high rate of speed and the bearings are thus subjected to great wear and are not unlikely to burn fast or wear out or break down. Again in this old arrangement, there must be considerable wear between the sleeve and shaft since much of the time they are rotating the one on the other in opposite directions. This wear would give undue play to the sleeve and its eccentric and diminish the effectiveness, sensitiveness and reliability of the clutch. These objections are obviated by my arrangement, in which the clutch plate is mounted loosely upon the shaft, so that although the shaft may be suddenly stopped from heating or wear or clogging of its bearings, still the wheel loosely mounted on the shaft may continue its movement and thus avoid stopping the machine. Moreover, in my construction of clutch there is a positive fixed stop to prevent the clutch plate, when the wheel moves forward from it, from being carried round on the shaft so as to ride upon the opposite rise of the eccentric, thereby clutching the wheel in the opposite direction and violently stopping the wheel and possibly breaking some of the moving parts. When the shaft moves backward this stop serves to positively move the clutch plate backward.

The extended hub D′ is especially advantageous in connection with the clutch plate in that it enables the clutch plate to bind the wheel firmly on the shaft and that too with the least possible lateral play of the wheel and hub with respect to the shaft, thus enabling the wheel when locked to its shaft to turn more nearly in a right plane single and uniform so that the circular line described by the wheel's perimeter if developed would be substantially a straight line. Moreover the clutching operation is more sensitive. The amount of lateral play between the shaft and the wheel and sleeve is as slight as possible. If this play were considerable the wheel when locked on the shaft by the clutch would not turn in a right plane and the circular line described by the wheel's perimeter would when developed be a wavy line. This wavy line would represent a vibration imparted by the wheel to the bowl shaft and bowl which in the applicant's machine would be repeated eight thousand times a minute, since his bowl makes this number of revolutions a minute in operation. Such a vibration, as will be readily appreciated, is of course highly detrimental to the working. It increases the friction and therefore increases the amount of power necessary to drive the machine; and it increases the wear and hence decreases the life of the machine.

While I have shown my clutch as employed to operate a centrifugal machine it is of course not limited to such use as it may be employed in various other relations, and although I have shown the wheel D provided with a worm and the shaft B provided with a corresponding worm *a* of course these parts might be operatively connected by other suitable means.

Various other changes such as will occur to any one skilled in the art might also be made without departing from the spirit of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of a shaft mounted in bearings and provided with an eccentric, a wheel mounted loosely upon said shaft, a friction clutch plate or member mounted loosely upon the shaft so as to be capable of circumferential movement back and forth on said shaft, a fixed stop limiting this movement in one direction, the clutch plate or member being arranged to be actuated by the eccentric so as to engage the wheel, and means for driving the shaft, substantially as set forth.

2. The combination of a shaft mounted in bearings and provided with an eccentric, a wheel provided on one side with an extended hub loosely mounted on the shaft, a friction clutch plate or member mounted loosely upon the shaft on the side of the wheel opposite to the hub and so as to be capable of circumferential movement back and forth on said shaft, a fixed stop limiting this movement in one direction, the clutch plate or member being arranged to be actuated by the eccentric so as to engage the wheel, and means for driving the shaft, substantially as set forth.

3. The combination of a shaft mounted in bearings and provided with an eccentric, a wheel mounted loosely upon said shaft, a friction clutch plate or member mounted loosely upon the shaft with a pin and slot connection so as to be capable of circumferential movement back and forth on said shaft, the clutch being arranged to be actuated by the eccentric so as to engage the wheel, and means for driving the shaft, substantially as set forth.

4. The combination of a shaft mounted in bearings and provided with an eccentric, a wheel provided on one side with an extended hub loosely mounted on the shaft by a pin and slot connection, a friction clutch plate or member mounted loosely upon the shaft on the side of the wheel opposite to the hub and so as to be capable of circumferential movement back and forth on said shaft, the clutch plate or member being arranged to be actuated by the eccentric so as to engage the wheel, and means for driving the shaft, substantially as set forth.

5. In a centrifugal machine the combination of a device to be rotated mounted upon a shaft, a wheel for actuating the shaft mounted

loosely upon an intermediate shaft provided with an eccentric, a friction clutch plate or member mounted loosely upon the intermediate shaft so as to be capable of circumferential movement back and forth on said shaft, a fixed stop limiting this movement in one direction, the clutch plate or member being arranged to be actuated by the eccentric so as to engage the wheel, and means for driving the shaft, substantially as set forth.

6. In a centrifugal machine, the combination of a device to be rotated mounted upon a shaft, a wheel for actuating the shaft provided on one side with an extended hub and loosely mounted upon an intermediate shaft provided with an eccentric, a friction clutch plate or member mounted upon the intermediate shaft, on the side of the wheel opposite to the hub and so as to be capable of circumferential movement back and forth on said shaft, a fixed stop limiting this movement in one direction, the clutch plate or member being arranged to be actuated by the eccentric so as to engage the wheel, and means for driving the shaft, substantially as set forth.

7. In a centrifugal machine, the combination of a device to be rotated mounted upon a shaft, a wheel for actuating the shaft provided on one side with an extended hub and loosely mounted upon an intermediate shaft provided with an eccentric, a friction clutch plate or member mounted upon the intermediate shaft with a pin and slot connection on the side of the wheel opposite to the hub and so as to be capable of circumferential movement back and forth on said shaft, the clutch plate or member being arranged to be actuated by the eccentric so as to engage the wheel, and means for driving the shaft, substantially as set forth.

8. A centrifugal machine comprising a device to be rotated mounted upon a shaft provided with a worm, an intermediate shaft mounted in suitable bearings and provided with an eccentric, a worm wheel provided on one side with an extended hub loosely mounted on the intermediate shaft and engaging the worm shaft, a friction clutch plate or member loosely mounted on the intermediate shaft on the side of the worm wheel opposite to the hub and so as to be capable of circumferential movement back and forth on said shaft, a fixed stop limiting this movement in one direction, the clutch plate or member being arranged to be actuated by the eccentric so as to engage the wheel, and means for driving the shaft on which the worm wheel is mounted, substantially as set forth.

9. A journal bearing comprising a collar adapted to receive a rotatable shaft or journal, a ring encircling the collar, and a cushion interposed between the ring and collar in combination with a support for the bearing encircling the ring said support bearing horizontally against the ring in which the ring may rotate, whereby in case the shaft or journal should adhere to the collar the bearing may rotate in the support, substantially as set forth.

10. A centrifugal machine, comprising a device to be rotated, a vertical driving shaft rigidly connected therewith and provided with a worm, a lower bearing comprising three or more balls between which the end of the shaft rests, an upper bearing provided with a cushion and arranged to maintain the shaft upright, and a worm wheel meshing with the shaft for rotating the shaft, whereby the axis of rotation may be maintained in a straight line through the center of the device to be rotated, and whereby the shaft will be held down in its bearings during rotation, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 11th day of September, 1894.

OLOF OHLSSON.

Witnesses:
CHARLES H. PELL,
LOUISE L. BROWNE.