No. 795,360. PATENTED JULY 25, 1905.

H. McCORNACK.

SHAFT MECHANISM FOR CENTRIFUGAL MACHINES.

APPLICATION FILED DEC. 14, 1903.

Fig. 1.

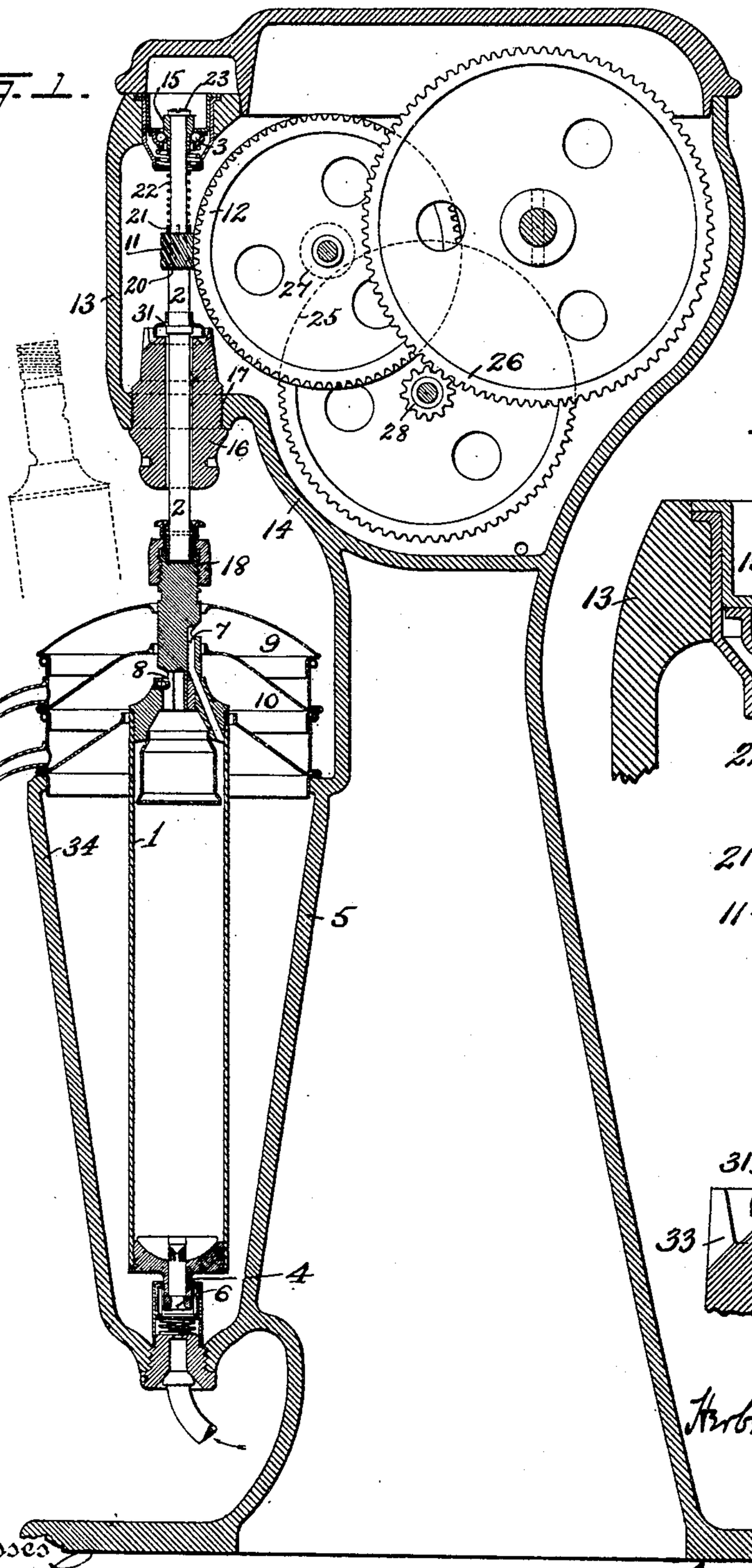
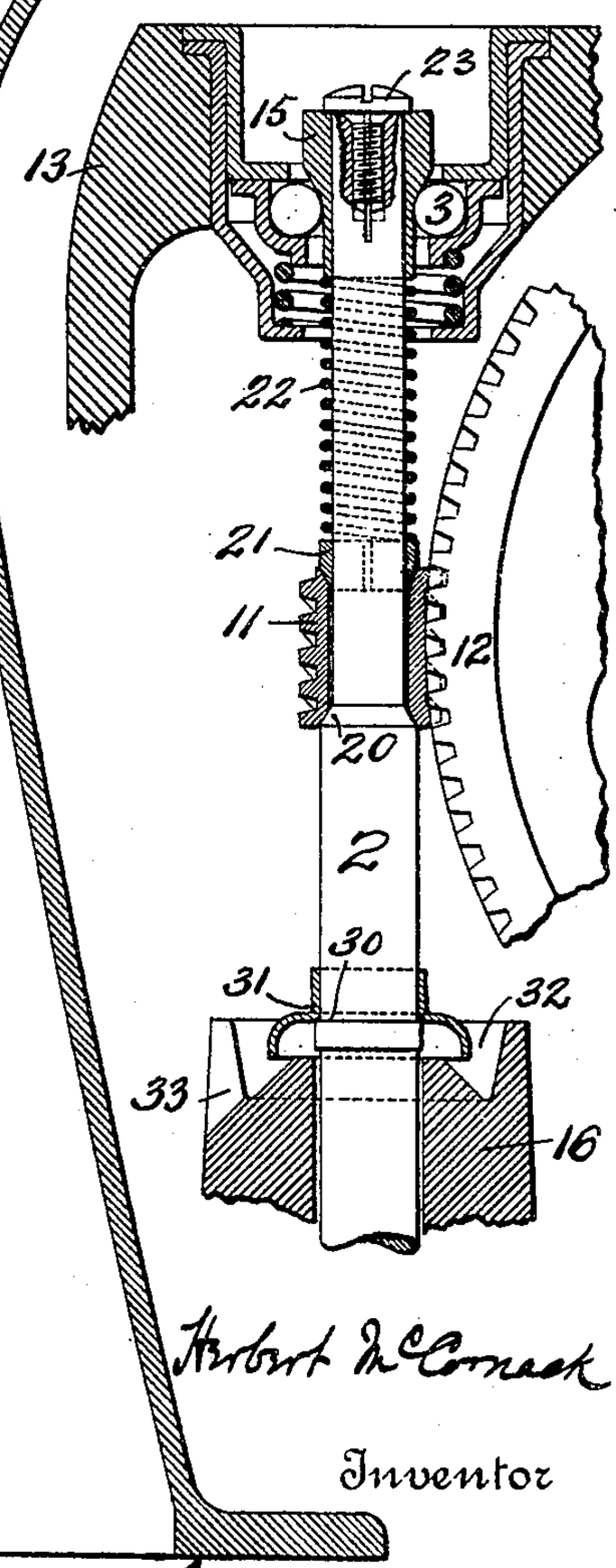


Fig. 2.



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SHAFT MECHANISM FOR CENTRIFUGAL MACHINES.

No. 795,360. Specification of Letters Patent. Patented July 25, 1905.

Application filed December 14, 1903. Serial No. 185,007.

To all whom it may concern:

Be it known that I, HERBERT McCORNACK, a citizen of the United States, residing in the borough of Westchester, county of Chester, State of Pennsylvania, have invented certain new and useful Improvements in Shaft Mechanism for Centrifugal Machines, of which the following is a specification.

My invention relates to the mounting of centrifugal machines; and it consists in certain improvements in the manner of supporting, driving, and lubricating the shaft and in the relative arrangement of the centrifugal vessel suspended therefrom.

The invention is fully described in connection with the accompanying drawings and the novel features are specifically pointed out in the claims.

Figure 1 of the drawings shows a sectional elevation of a portion of a centrifugal machine having my improvements applied thereto. Fig. 2 is an enlarged detail view.

The machine illustrated is similar in general arrangement to that shown in my prior patent, No. 706,088, issued to me August 5, 1902, the centrifugal vessel 1, of tubular form, being separably coupled to a hanging shaft 2, which is carried upon a top bearing 3, provided in the frame of the machine, and the hollow lower end 4 of said pendent vessel being provided with a steadying-bearing mounted in the lower portion of the casing 5, which incloses the vessel. The general operation of the present machine is also similar, the rapid rotation of the hanging vessel 1 by means of the shaft 2 while feeding a compound liquid, such as milk, to said vessel through the bottom inlet 6 thereto effecting the rapid separation of the liquid into its constituent parts, which are separately discharged through outlets 7 and 8, respectively, into separate milk and cream pans 9 and 10, as usual. In my present construction, however, are embodied a number of improvements which are shown in connection with a hand-operated machine and which I will now particularly describe.

In order to secure the requisite centrifugal action for rapid and effective separation, it is essential that the centrifugal vessel and its shaft 2 shall be rotated at very high speed, and where the tubular form of vessel is employed, as shown in the drawings, its small diameter requires that the shaft be rotated at especially high speed. To accomplish this satisfactorily, especially with a simple system of gearing, such as is desirable, is an important object of my invention. In order to gear quickly up to the required high speed, a worm 11 on the shaft 2 and a worm-wheel 12, meshing directly therewith to drive the shaft, are employed; but in order to make this construction satisfactorily operative I have found it essential that the worm 11 on the shaft should be so arranged as to be capable of rotation independently of the shaft and so as to transmit to the shaft only a limited rotating strain sufficient to insure the gradual increase of speed and its maintenance at the normal during operation while adapted to itself turn upon the shaft when subjected to undue strain and in such manner as to prevent the jarring and unsteadiness of rotation which otherwise results at best in very unsatisfactory operation of the machine. To attain this object and at the same time provide for the satisfactory lubrication of the parts, I employ the preferred construction shown in the drawings, which I will now particularly describe.

The shaft 2 is inclosed in a shaft-casing 13, forming, as shown, an extension of the gear-casing 14 and a portion of the frame of the machine. A suitable suspension-bearing 3, already referred to, is provided at the top of the said shaft-casing, in which the cone bearing-sleeve 15 at the upper end of the shaft bears, while the lower depending portion of said shaft passes loosely through a removable plug 16, which closes an enlarged opening 17 in the bottom of said shaft-casing. The hanging centrifugal vessel 1 is suitably coupled at 18 to the projecting lower end of the shaft and is rotated in the casing 5, which also forms part of the frame of the machine, as shown, and is constructed as hereinafter described. Below the suspension-bearing 3 and within the shaft-casing the shaft is formed, as shown, with a conical shoulder 20. Loosely strung upon the shaft above this shoulder is the worm 11, the central opening in which is slightly larger than the shaft and countersunk, so as to be centered by and frictionally bear upon said conical shoulder. Strung upon the shaft above the worm 11 is a conical centering-ring 21, seating in a corresponding coun-

tersink of the worm, and above this cone-ring is a spiral spring 22, strung upon the shaft and having its lower end engaging the cone-ring. Finally, the cone bearing-sleeve 15 upon the upper end of the shaft is secured to the latter by means of the tapered screw 23 in the split end of the shaft in such a manner as to produce a proper tension upon the spring 22, said bearing-sleeve forming an engaging shoulder for the upper end of said spring. The effect of thus constructing, it will be readily seen, is to provide a frictional engagement between the worm 11 and its shaft 2, the amount of driving friction between them being determined by the tension of the spring 22 and said worm being capable of rotation on the shaft when subjected to a rotating strain in excess of the normal provided for. Furthermore, owing to the fact that the worm is bored slightly larger than the shaft and centered on the latter by the conical shoulder 20 and centering-ring 21 it is capable of a very slight lateral movement on the shaft by wedging upward the spring-backed centering-ring, which assists in avoiding jars and unsteadiness of rotation.

The gearing provided in the construction shown for rotating the shaft comprises the worm-wheel 12, meshing directly with the worm 11, together with spur-wheels 25 and 26 and pinions 27 and 28, all of which are located in the gear-casing 14, which is also adapted to serve as an oil-chamber.

The location of the worm below the bearing 3, with the spring 22 intervening, permits the use of a directly-meshing worm-wheel 12 of considerable diameter, the periphery of which rotates in close proximity to said bearing. When the machine is in operation, the rapidly-rotating spur-wheel 25, which dips into the stored oil, throws the latter upon all the incased gearing, and the worm-wheel 12, the periphery of which preferably rotates in an upward direction adjacent to the bearing 3, as indicated, insures positive oiling of the latter as well. To prevent escape of oil through the removable guard-plug 16, which loosely incloses the lower portion of the depending shaft, I form upon the latter a shoulder 30, upon which is supported an oil-shield 31, strung upon the shaft below the worm 11 and which serves to deflect the oil from the body of the shaft into an annular groove 32, formed in the upper face of said guard-plug, from which it is returned through an outlet 33 to the oil-chamber.

What I claim is—

1. A shaft having a conical shoulder, a drive-gear rotatably mounted thereon in frictional contact with said shoulder, a longitudinally-movable cone-sleeve mounted on said shaft in frictional contact with said gear, and a spring pressing said sleeve and the interposed gear toward said shoulder.

2. A shaft having a conical shoulder, a drive-gear rotatably mounted thereon in frictional contact with said shoulder, a longitudinally-movable sleeve mounted on said shaft in frictional contact with said gear, and a coil-spring on said shaft engaging said sleeve to yieldingly resist turning movement thereof and pressing said sleeve and the interposed gear toward said shoulder.

3. A shaft having a conical shoulder, a drive-gear rotatably mounted thereon in frictional contact with said shoulder, a longitudinally-movable cone-sleeve mounted on said shaft in frictional contact with said gear, and a coil-spring on said shaft engaging said sleeve to yieldingly resist turning movement thereof and pressing said sleeve and the interposed gear toward said shoulder.

4. The combination with a supporting-frame of a suspended shaft having a suspension-bearing at its upper end, a drive-gear rotatably mounted on said shaft below said bearing in frictional contact with a shoulder on said shaft, a spring pressing on said gear to produce frictional resistance to rotation thereof, and a driving mechanism engaging said gear.

5. The combination with an inclosing gear-casing and oil-receptacle, of a suspended shaft having a suspension-bearing at its upper end, and depending through an opening therefor in said casing, a worm-gear on said shaft below said suspension-bearing, oil-retaining means inclosing said shaft above said opening, and meshing driving-gears mounted in said casing and serving to distribute oil to the inclosed shaft.

6. The combination with an inclosing gear-casing and oil-receptacle, of a suspended shaft having a suspension-bearing at its upper end and depending through an opening in said casing, a drive-gear on said shaft below said suspension-bearing, a removable hollow plug in said casing-opening, loosely inclosing the suspended shaft, and an oil-retaining collar on said shaft.

7. A shaft having a conical shoulder, a drive-gear thereon having an enlarged bore and centered upon said conical shoulder, a cone-sleeve thereon centering the opposite end of said drive-gear, and a spring arranged to yieldingly press said cone-sleeve and interposed gear toward said shoulder, whereby said gear is frictionally engaged with the shaft and capable of slight lateral movement thereon.

8. A suspension driving-shaft having its upper portion of reduced diameter thereby forming a supporting-shoulder thereon, and an enlargement forming a lower shoulder of

increased diameter, in combination with an oil-retaining collar strung upon said shaft in contact with said lower shoulder and a drive-gear, a follower-sleeve, a coil-spring and a suspension bearing-sleeve successively strung upon said reduced portion, said bearing-sleeve being rigidly secured to the shaft and said drive-gear being pressed against the supporting-shoulder by the interposed spring and follower-sleeve.

In testimony whereof I affix my signature in the presence of two witnesses.

HERBERT McCORNACK.

Witnesses:

ETHEL RUPERT,

MARY E. RUPERT.