E. D. MACKINTOSH.

MEANS FOR SUPPORTING AND DRIVING SINGLE SHAFT CENTRIFUGAL MACHINES.

APPLICATION FILED FEB. 8, 1904.

985,358. Patented Feb. 28, 1911.

FIG. 1

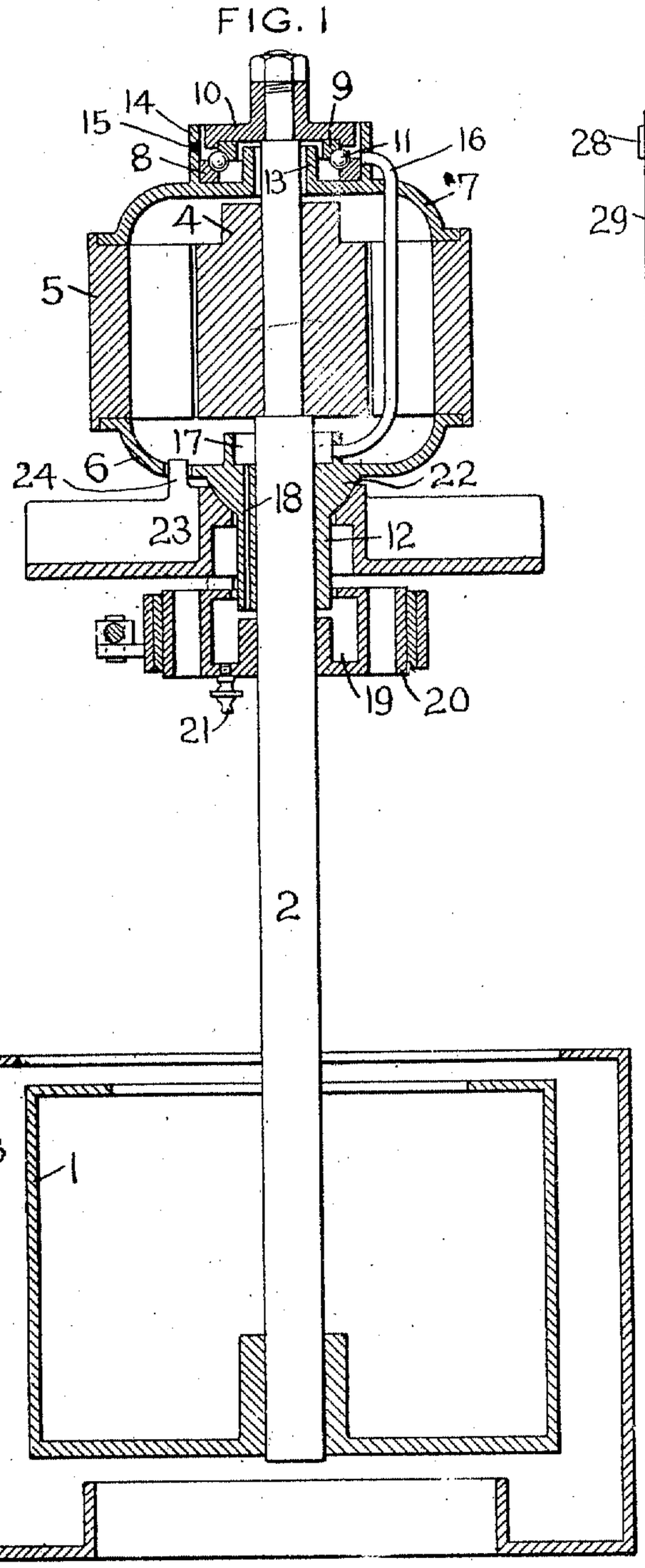


FIG. 2

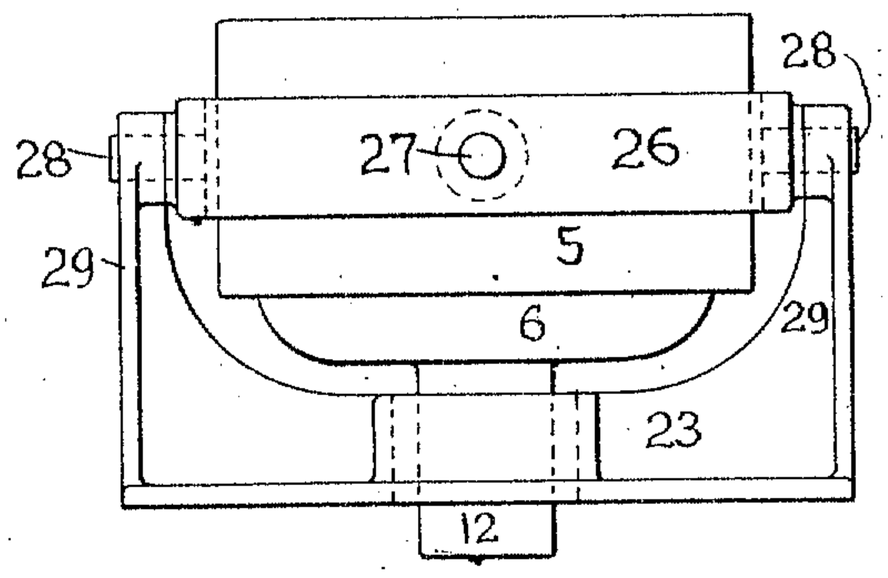
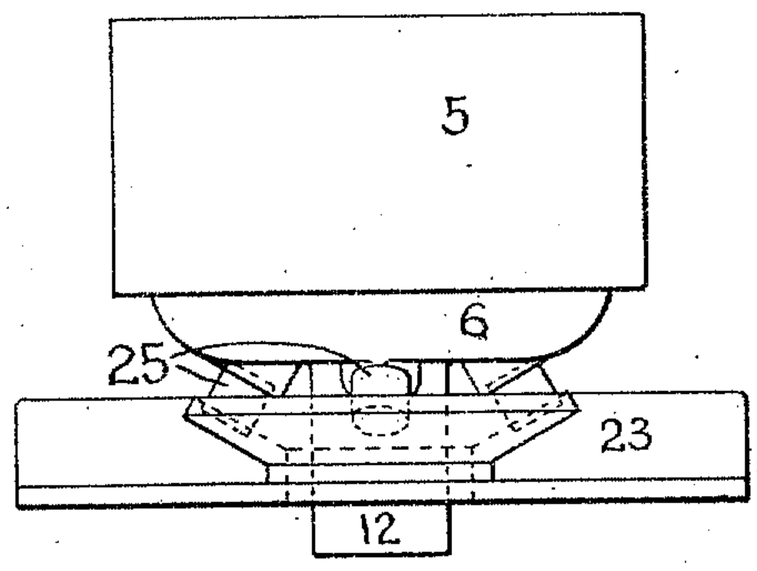


FIG. 3



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MEANS FOR SUPPORTING AND DRIVING SINGLE-SHAFT CENTRIFUGAL MACHINES.

985,358. Specification of Letters Patent. Patented Feb. 28, 1911.

Application filed February 8, 1904. Serial No. 192,548.

To all whom it may concern:

Be it known that I, EDWARD D. MACKINTOSH, of the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented a new and useful Improvement in Means for Supporting and Driving Single-Shaft Centrifugal Machines, of which the following is a specification.

The object of my invention is the supporting and driving of single shaft centrifugal machines more especially that form in which the basket is swingable from a point above the latter and independently of the surrounding casing.

Referring to the accompanying drawing forming part of this specification, Figure 1 is a vertical section of my improved means for supporting and driving single-shaft centrifugal machines showing the swingable parts supported by a ball and socket joint, and Figs. 2 and 3 show how these parts may be supported by a gimbal or on elastic cushions.

1 is the basket secured to the spindle 2 and surrounded by the casing 3.

4 is the rotor of an electric motor fixed to the spindle 2.

The frame of the motor consists of a ring 5 and brackets 6 and 7, all secured together. The upper bracket 7 carries a ball race 8 and another ball race 9 is carried by the spindle through the medium of a flange 10. These two races with balls 11 between form a bearing to support the weight of the rotating parts and one against which the spindle can also act laterally. 12 is another bearing in the form of a sleeve member united with the lower bracket 6 and located between the rotor and the basket.

To get oil to the two bearings and keep it away from parts that it might injure or befoul I carry two cylindrical walls 13 and 14 from the surface supporting the race 8 to planes above the bottom of the balls. A cup is thus formed which I provide with an inlet 15 and an outlet 16. The last named is arranged to allow the escape of oil from the cup before it reaches the top of either wall. This outlet is in the form of a tube connecting also with another cup 17 formed on the top of the sleeve member 12, so that the bearing formed by the sleeve member is lubricated by the oil escaping from the upper cup.

18 is an outlet from the lower cup to prevent it from over-flowing, and any oil escaping through this outlet or through the bearing is caught in a chamber 19 forming part of a brake drum 20 fixed to the spindle. The oil so caught is drawn off from time to time through a cock 21.

The exterior part of the upper end of the sleeve member 12 is formed into a spherical zone 22 which fits into a corresponding socket in a fixed hanger 23. This zone and its socket, forming what is commonly known as a ball and socket joint, permit the swinging of all the parts supported thereby in the manner required of all hanging centrifugals, but a projection 24 forming part of the fixed hanger 23 and passing loosely through a hole in the bracket 6 prevents the last named from rotating.

When the basket runs with an unevenly distributed load it swings or gyrates and forces the motor parts to swing also. The enforced swinging takes place about the center of motion represented by the center of the ball and socket joint and, when of any considerable extent, imposes a more or less severe bending stress on the spindle. This stress is ordinarily at the minimum, for a given swinging of the basket, and as related to the ability of the different parts of the spindle to withstand it, when the center of motion is located at some point between the two bearings. The exact point depends upon the proportions and weights of the parts and must be determined separately, in each case, with such accuracy as may be thought necessary. Whatever the exact location, so long as it be between the bearings the spindle will act and react laterally on both in causing the swinging. In doing so it will use each bearing as a fulcrum in acting on the other and the work will be divided between them in a manner that can be predetermined, by predetermining the location of the center of motion, so as to utilize the strength of the spindle to good advantage.

An important part of my invention consists in providing means for locating the center of motion within the limits described. The means I prefer to employ are the ball and socket joint hereinbefore referred to, but when a higher location is desired than can be practicably obtained with this device a gimbal may be used as shown by Fig.

2 or elastic cushions 25 as shown by Fig. 3. The gimbal consists of a hoop 26 loosely surrounding the ring 5 and provided with two sets of pivots. One pivot passes through the hoop and the ring at 27 and its mate passes through the same parts at a point diametrically opposite. At right angles to these are the other pivots 28 passing through the hoop 26 and the standards 29, the last named being formed as parts of the fixed hanger 23. The elastic cushions 25, when employed, are preferably made of rubber or of steel springs and are interposed between the head 6 and the fixed hanger 23. By making these cushions of proper proportions and placing them suitably they may be caused to locate the center of motion where desired.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a centrifugal drive, the combination of a hanger, a sleeve member having a gyration bearing therein, a rotatable shaft extending through the sleeve member and adapted to carry a basket at the lower end, a motor rotor secured to the shaft, a bearing adapted to withstand axial thrust and located above the sleeve member and the motor rotor, a motor stator, a bracket supporting the motor stator and connecting it with the sleeve member, and means to prevent the bracket from rotating.

2. In a centrifugal drive, the combination of a hanger, a sleeve member having a gyration bearing in the hanger, a motor stator, a bracket supporting the motor stator and connecting it with the sleeve member, a motor rotor, a bearing adapted to withstand axial thrust and located above the sleeve member and the motor rotor, and a shaft extending through the sleeve member, deriving support from the last named bearing, and adapted to carry a basket at its lower end.

3. In a centrifugal drive, a bearing, a motor with its rotor below the bearing, a second bearing below the rotor, and a spindle adapted for carrying a basket below the said bearings, rotating within them, and using each as a fulcrum in acting on the other to swing the frame of the motor about a point between the two.

4. In a centrifugal drive, a bearing, a motor with its rotor below the bearing, a second bearing below the rotor, a spindle adapted for carrying a basket below the said bearings, rotating within them, and using each as a fulcrum in acting on the other to swing the frame of the motor, and means constraining the swinging to take place about a point between the bearings.

5. In a centrifugal drive, a bearing, the rotor of an electric motor below the bearing, a second bearing below the rotor, the frame of an electric motor connecting the bearings, a spindle rotating within the two bearings, acting and reacting laterally on both to swing the frame of the electric motor about a point between the two, and adapted for carrying a basket below the bearings, and stationary means engaging with the stator of the motor to prevent its rotation.

6. In a centrifugal drive, a bearing, the rotor of an electric motor below the bearing, a second bearing below the rotor, the frame of an electric motor connecting the bearings, a spindle rotating within the two bearings, acting and reacting laterally on both to swing the frame of the electric motor, and adapted for carrying a basket below the bearings, means constraining the swinging to take place about a point between the bearings, and stationary means engaging with the stator of the motor to prevent its rotation.

7. In a centrifugal drive, two bearings swingable about a point between them and forming part of the stator of a motor, means for swingably supporting the stator, and a shaft rotatable in the two bearings and adapted to carry the rotor of the motor between the bearings and the basket of the centrifugal below them.

8. In a centrifugal drive, two bearings constrained to swing about a point between them and forming part of the stator of a motor, means for swingably supporting the stator, and a shaft rotatable in the two bearings and adapted to carry the rotor of the motor between the bearings and the basket of the centrifugal below them.

9. In a centrifugal drive, the combination of a motor stator, means for swingably supporting the same, a bracket forming part of the motor stator, a motor rotor below the bracket, another bracket below the motor rotor and forming part of the motor stator, bearings held by the brackets, and a shaft affording support to the motor rotor, confined by the two bearings, deriving support from one of them, and adapted to carry a basket at its lower end.

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

EDWARD D. MACKINTOSH.

Witnesses:

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