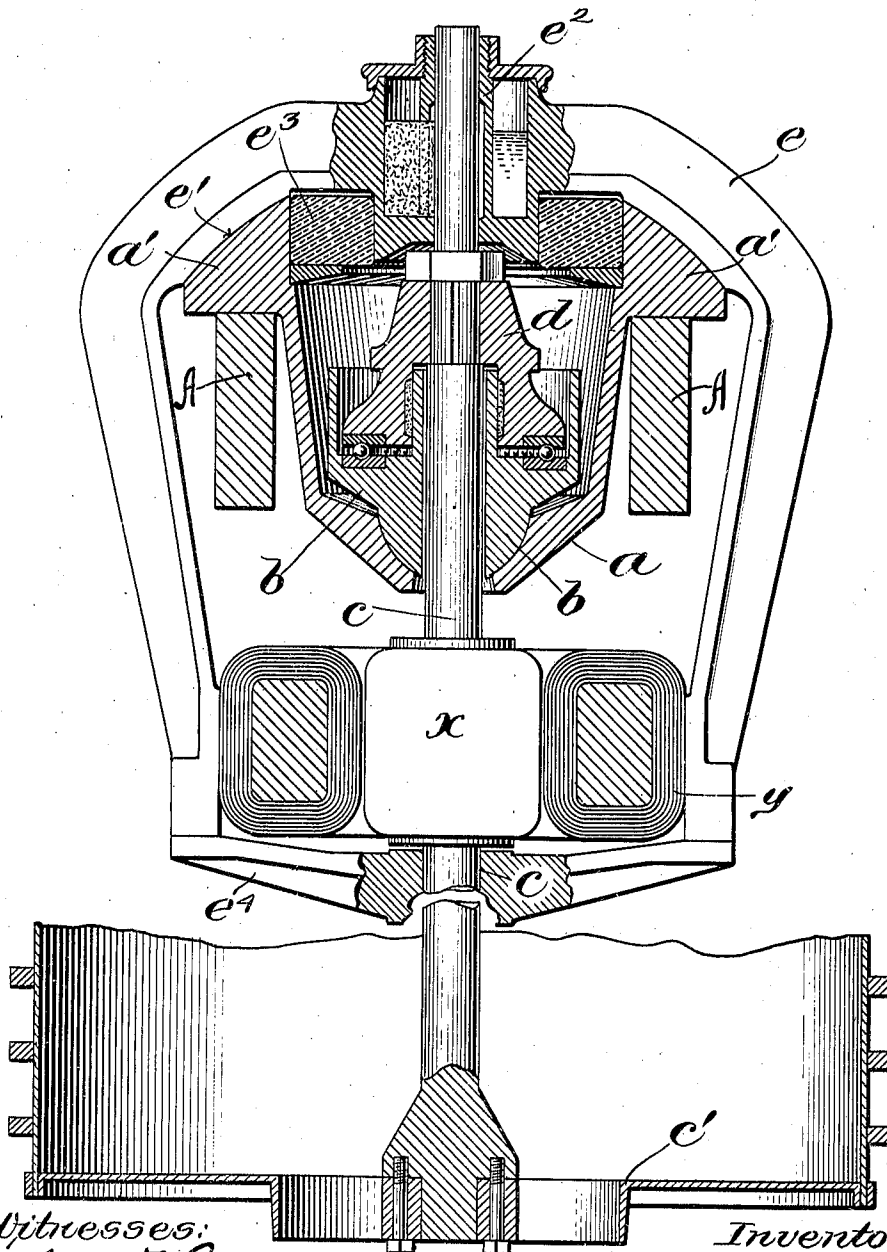


G. N. GODDARD.
CENTRIFUGAL MACHINE.
APPLICATION FILED NOV. 11, 1905.

939,904.

Patented Nov. 9, 1909.



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL MACHINE.

939,904.

Specification of Letters Patent.

Patented Nov. 9, 1909.

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To all whom it may concern:

Be it known that I, GEORGE N. GODDARD, a citizen of the United States, and resident of Newton, Massachusetts, county of Middlesex, have invented certain new and useful Improvements in Centrifugal Machines, of which the following is a specification.

This invention relates to centrifugal machines and is intended to provide an improved means of suspending this class of machines in connection with an electric motor directly attached to the same for driving purposes.

The drawings represent an elevation partly in central section of the essential parts of this apparatus constructed according to my invention.

The necessity of preserving a constant relationship between the rotatable and non-rotatable elements of the driving motor unaffected by the oscillation of the shaft to which the rotatable member is secured is well understood. This invention has particular reference to the accomplishment of that object while providing an improved arrangement for guiding the non-rotatable field of the motor so as to cause it to perfectly accommodate itself to the oscillatory movements or gyrations of the armature on the rotary shaft of the machine. At the same time, by this arrangement, the rotary shaft is relieved of the extra strain of supporting the heavy field magnets and its supporting and guiding brackets.

In the practice of my invention according to the form illustrated in the drawings, I provide a suitable hollow hanger *a* which is rigidly supported in any suitable manner as by horizontal beams *A* against movement and which is provided at its lower end with a spherically curved socket to receive the convexly curved lower end of the oscillatory bearing head *b*. A single solid rotary shaft *c* is secured to a cup-shaped rotary bearing head *d* which is supported upon suitable anti-friction bearings interposed between the lower end of said rotary head *d* and the horizontal bearing face of the oscillatory head *b*. To the lower end of the shaft *c* is secured the usual basket or receptacle *e'*. The armature or rotary element of the motor *x* is secured directly to the rotary shaft *c*. The field or non-rotatable element *y* of the motor is supported by the downwardly

extending arms of a yoke *e*. This yoke *e* is provided with spherically curved bearing surfaces indicated at *e'* which rest upon similarly curved convex surfaces formed on radial extensions *a'* of the hanger *a*. The curves of these bearing surfaces *a'* *e'* are concentric with the curved surfaces of the ball and socket universal joint between the bearing head *b* and the socket portion of the hanger *a*. The upper and central part of the yoke *e* is centrally bored to form a bearing head *e²* surrounding the upward extension of the shaft *c* and forming an oil bearing therefor. Surrounding the lower part of this central hub or head *e²* of the yoke *e* is a compressible or elastic buffer *e³* which opposes a yielding resistance to the oscillation of the yoke *e* and the shaft *c*. An additional brace or guide *e⁴* is extended from the lower end of the field supporting yoke to the rotary shaft.

According to the form illustrated in the drawings, the yoke arms are four in number, the front one being omitted on account of the sectional plane of the drawing, while the rear one is obscured by the parts in front of it.

The above described arrangement provides guides for communicating an oscillatory movement of the shaft to the field magnet both above and below the center of oscillation or point of support of said shaft and at a considerable distance from said center so that there is a perfect and instantaneous response to the oscillatory movements of the shaft on the part of the supporting yoke and field magnets. At the same time the very considerable weight of the field magnets and the supporting yoke is taken from the shaft thereby relieving it of this extra load and strain.

The illustration of the motor is a purely conventional one, since any suitable type of motor may be used for this purpose.

What I claim is:—

1. A centrifugal machine embracing in its construction an oscillatory rotary basket-carrying shaft, an electric motor whose rotatable element is secured directly to said shaft, a yoke for supporting the non-rotatable element of said motor, said yoke having engagement with said rotary shaft above and below the center of oscillation of said shaft and provided with a spherically curved

bearing surface concentric with the center of oscillation of said shaft, substantially as described.

2. A centrifugal machine embracing in its construction, a hanger provided with a spherically curved convex bearing surface, an oscillatory yoke supported upon said spherical bearing surface, a rotary oscillatory basket-carrying shaft suspended from said hanger by means of a ball and socket joint, said rotary shaft having a rotary engagement with said yoke above its center of oscillation whereby the oscillatory movement of said shaft is imparted to said yoke, and an electric motor whose rotary element is secured directly to said shaft and whose non-rotatable element is secured to said oscillatory yoke, substantially as described.
3. A centrifugal machine embracing in its construction, a rotary basket-carrying shaft suspended by means of a ball and socket joint to permit gyration of the shaft and basket, an electric motor whose rotatable element is secured to said shaft and whose non-rotatable element is supported by a yoke having bearings independent of said shaft, said yoke having a bearing engagement with the rotary shaft above said universal joint whereby the two elements of the motor are made to oscillate in unison, substantially as described.

4. A centrifugal machine embracing in its construction, a hanger, an oscillatory head having a ball and socket engagement with said hanger, a rotary basket-carrying shaft rotatably supported upon said oscillatory head, a yoke supported by said hanger and having bearing engagement with the upper end of said rotary shaft, an electric motor whose armature is secured to said shaft and whose field is secured to and supported by said yoke, substantially as described.

5. A centrifugal machine embracing in its construction, a hanger, a rotary basket-carrying shaft suspended from said hanger by a ball and socket joint, a carrying yoke supported upon said hanger by a spherical joint, said yoke being provided with a bearing for engaging the upper end of the rotary shaft, means for opposing a yielding resistance to the oscillation of said yoke, and an electric motor whose armature is secured directly to the shaft and whose field is connected to and supported by said yoke, substantially as described.

In witness whereof, I have hereunto set my hand, this eighth day of November, 1905.

GEORGE N. GODDARD.

In the presence of—

IRA L. FISH,

KATHARINE A. DUGAN.