G. N. GODDARD.

CENTRIFUGAL MACHINE.

APPLICATION FILED NOV. 1, 1904.

928,912. Patented July 20, 1909.

2 SHEETS—SHEET 1.

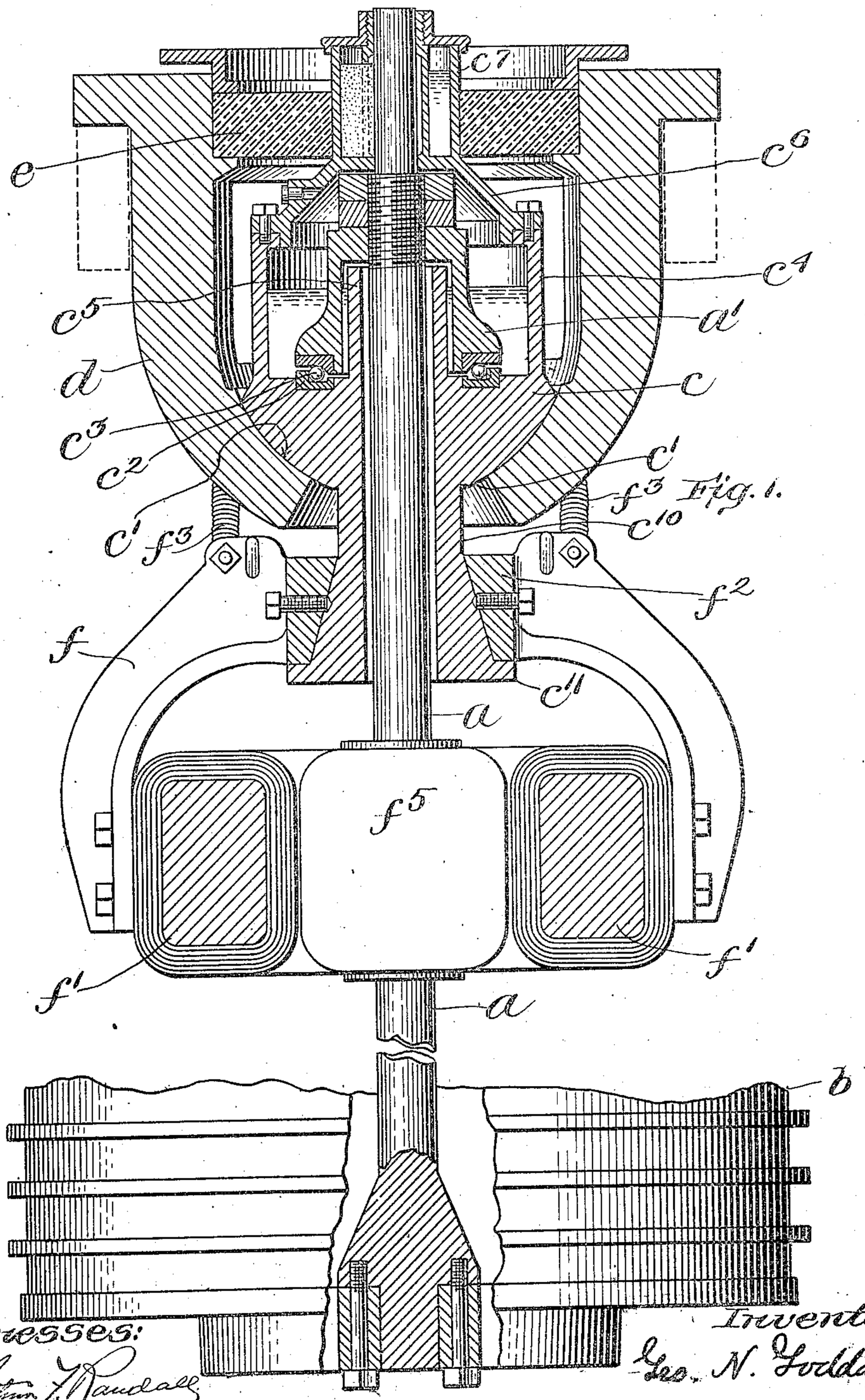

Fig. 1.

Witnesses:

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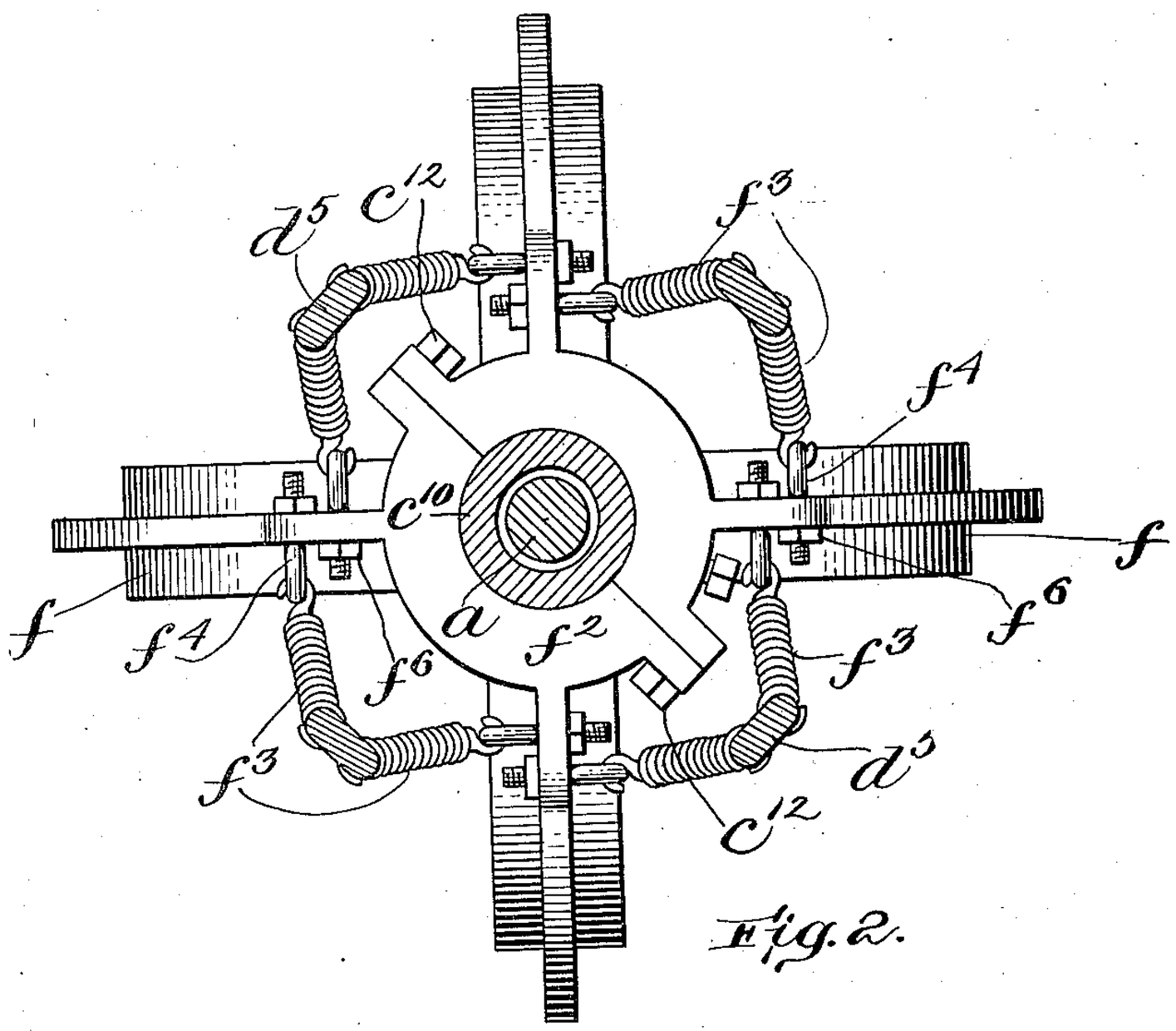
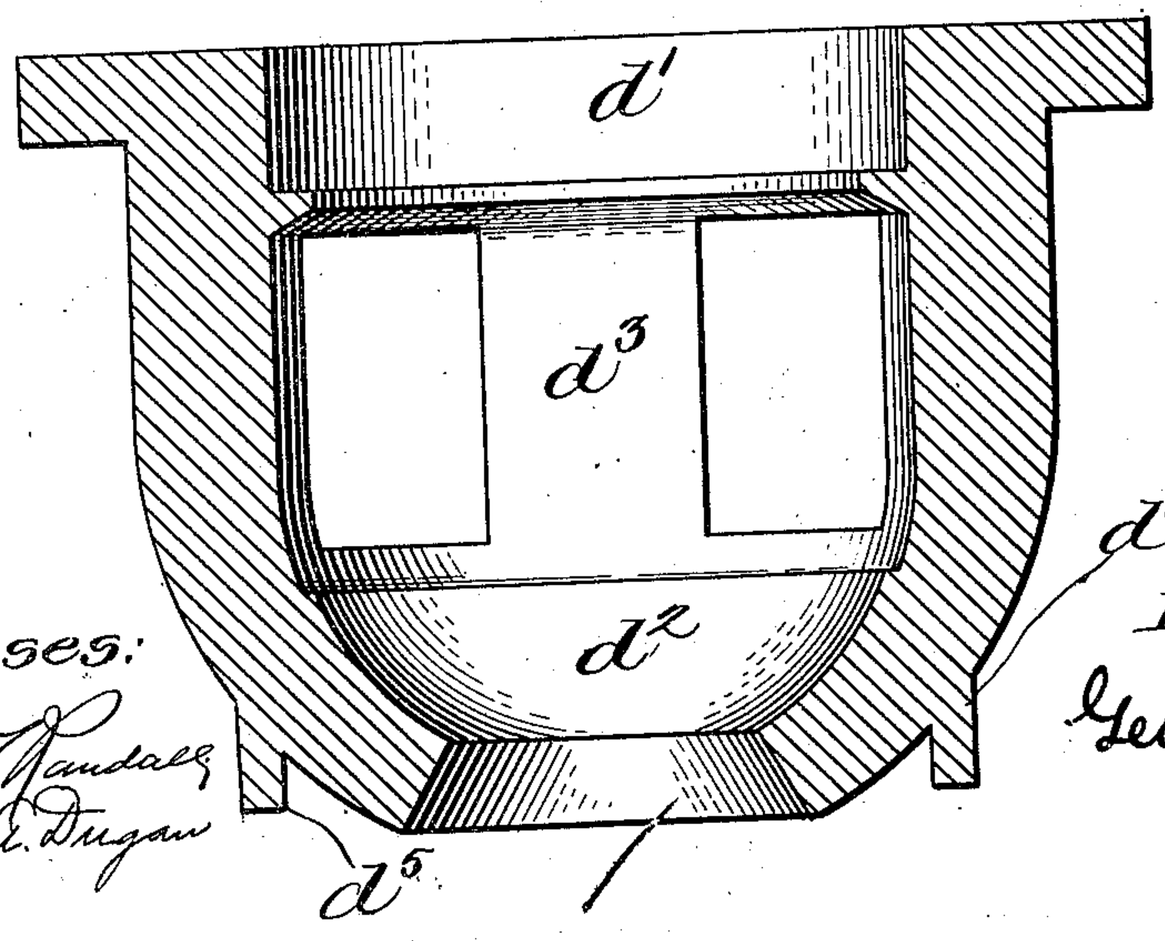


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL MACHINE.

No. 928,912. Specification of Letters Patent. Patented July 20, 1909.

Application filed November 1, 1904. Serial No. 230,915.

To all whom it may concern:

Be it known that I, GEORGE N. GODDARD, citizen of the United States, and resident of Newton Center, county of Middlesex, Massachusetts, 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 a simple and efficient construction whereby the perfect lubrication of such machines is secured by the use of only a single shaft, while at the same time making it possible to employ a direct connected motor for driving the machine. These objects are accomplished by a novel construction and arrangement of parts which will be fully described in this specification and pointed out in the claims, reference being had for the sake of illustration to the accompanying drawings which show one of the modes of embodying my aforesaid invention.

Figure 1 is a vertical sectional view showing the novel construction and arrangement by which the machine is supported and driven. Fig. 2 is a plan view on the horizontal plane intersecting the oscillatory bracket and shaft immediately beneath the hanger in order to show the motor carrying yoke. Fig. 3 is a central vertical section through the stationary hanger from which the machine is suspended.

Referring now to the drawings, *a* designates the rotary shaft to the lower end of which is secured the basket or receptacle *b*. The shaft is supported by means of a bearing head *a'* having the general shape of an inverted cup, the shaft *a* being securely fastened thereto by means of clamping nuts or other suitable means. This bearing head *a'* is carried by a non-rotatable oscillatory bracket *c* having a spherically curved face *c'* which has a ball and socket engagement with the stationary hanger *d*. Above the bearing surface this oscillatory bracket *c* is provided with an annular channel provided with a bearing ring or surface c^3 which supports the rotary head *a'* so as to permit its free rotation. In this instance I have shown bearing balls c^3 which are used as the anti-friction medium between the rotatable head *a'* and the non-rotatable bearing c^2. The bearing c^2 rests in an annular oil channel formed between the outer annular wall c^4 and the inner annular wall c^5 of the oscillatory bracket. This forms an annular oil reservoir which is closed by means of the lid or cover c^6 which is provided with an upward extension c^7 for engaging the upper end of the rotary shaft *a* so as to give an elongated bearing surface extending from the plane of the bearing ball c^3 to the top of the extension c^7 of the cover. The upward extension c^7 of the cover or casing is surrounded by an annular elastic washer or buffer *e* which is held in place by means of the upper portion of the hanger *d*.

The hanger *d* is cut away at its bottom to form an enlarged orifice through which projects a downwardly extending portion c^{10} of the oscillatory bracket *c*. This downward extension c^{10} is formed in any suitable shape to support a yoke or hanger *f* for carrying the field magnets or non-rotatable element of a direct connected electric motor. As shown in the drawings this downward extension c^{10} is of conical shape and at its lower end has a projecting flange c^{11} for supporting the hub f^2 of the carrying yoke *f*. This carrying yoke for convenience in assembling may be made in two parts which may be put together to surround the downward extension c^{10} after which they are bolted together by means of the retaining bolts c^{12} as best shown in Fig. 2. This yoke *f* being rigidly secured to the bracket *c* partakes fully of its oscillation, the yoke and its carrying bracket being held against rotation by means of any suitable contrivance such as the spiral springs f^3 one end of which is hooked into eye-bolts f^4 adjustably secured to the yoke *f*, while the other ends are secured to depending lugs or ears d^5 formed on the exterior of the hanger *d*. This arrangement and construction prevents the rotation of the carrying yoke and hence of the non-rotatable motor element while at the same time securing simultaneous and equal oscillation of the two motor elements. The stationary motor element f^5 is secured directly to the rotary shaft *a* so as to lie in proper operative relationship to its coöperating element *f'*.

The hanger *d* is made practically in the form of upper and lower rings *d'* and d^2 connected by vertical arms d^3. This not only conduces to the lightness of the construction but the spaces between the vertical arms d^3 permit access to the interior parts without necessitating any disassembling of the machine. The tension of the springs f^3 may be varied by setting up the eye-bolts f^4 which

are tapped into the flanges or ribs formed on the yoke *f* and are held against accidental movement by means of jam nuts *f*[6].

If desired, for the purpose of greater steadiness horizontal arms may be carried across the yoke *f* both above and below the motor parts, to connect the opposite arms thereof in order to afford an additional bearing for the rotary shaft or for the rotating element of the motor. In such case suitable bearing boxes would be provided at the middle of said arms. In machines of the larger size this would be effective in giving greater rigidity between the rotatable and non-rotatable members.

Without attempting to set forth all the variations in the details of construction and arrangement that may be made in the practice of my invention, what I claim is:—

1. A centrifugal machine embracing in its construction, a rotary basket-carrying shaft, a bearing head secured to the upper part of said shaft to support the same, an oscillatory bracket by which said head is rotatably supported, said bracket being provided with a downwardly extending central portion, a yoke secured to said central downward extension, and a direct connected motor whose rotatable element is secured to the shaft and whose non-rotatable element is secured to said yoke, substantially as described.

2. A direct connected electrically driven centrifugal machine embracing in its construction, a hanger whose bottom portion is formed with a central orifice, an oscillatory bracket having a ball and socket engagement with said hanger, said bracket being formed with a downward extension projecting through the central orifice in the hanger, means for securing the non-rotatable element of the motor to said downward extension for support, a rotary basket-carrying shaft, a bearing head to which said shaft is secured, said bearing head having rotatable engagement with the oscillatory bracket above its ball and socket connection with the hanger, the rotatable element of the motor being directly connected to the rotary shaft in proper operative relationship to the non-rotatable member, substantially as described.

3. A direct connected electrically driven centrifugal machine embracing in its construction, a rotary basket-carrying shaft, a supporting bearing head to which said shaft is secured, an oscillatory supporting bracket provided with a spherically curved bearing surface, said bracket having its upper portion provided with an annular bearing for supporting the rotary bearing head, and having its lower portion below its spherical bearing surface provided with a downward extension, said downward extension being provided with a yoke for carrying the non-rotatable element of the motor, the rotatable element of said motor being directly connected to the rotary shaft, substantially as described.

4. A direct-connected electrically-driven centrifugal machine embracing in its construction, a fixed hanger formed with a spherical seat or socket provided with a central aperture, an oscillatory bracket formed intermediate of its ends with a spherical bearing surface adapted to be seated in said spherical socket, a basket-carrying shaft suspended to hang through a vertical axial bore formed in said bracket and having a basket secured to its lower end, a bearing head rigidly connected with the upper end of said basket shaft and supported upon a rotary bearing carried by said bracket, an electric motor whose rotating member is secured to said basket shaft and whose field magnets are rigidly secured to the lower portion of the oscillatory bracket beneath its seat, substantially as described.

5. A direct-connected electrically-driven centrifugal machine embracing in its construction an oscillatory supporting bracket, a rotary supporting head to which the shaft of said centrifugal is secured for suspension, said head being supported by a rotary bearing upon said bracket, an electric motor directly connected to said centrifugal machine, the said rotary bearing being located between the motor and the horizontal plane passing through the center of oscillation, substantially as described.

6. A centrifugal machine embracing in its construction an oscillatory bracket, a bearing head rotatably mounted upon the bracket, a basket-carrying shaft suspended from said head, a motor supporting yoke secured to the lower portion of said bracket, and a motor whose outer element is secured to the yoke and whose inner element is secured to said shaft, substantially as described.

7. A centrifugal machine embracing in its construction a rotary shaft having a basket secured thereto, a hanger having an orifice in its bottom portion, an oscillatory bracket extending through said orifice, the upper portion of the bracket being constructed to form a supporting bearing for said rotary shaft, an electric motor whose members are supported respectively by the bracket and by the shaft below said hanger, substantially as described.

In witness whereof, I have hereunto set my hand, this 31st day of October, 1904.

GEORGE N. GODDARD

In the presence of—

ARTHUR F. RANDALL,

KATHARINE A. DUGAN.