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M. H. BARKER.

CENTRIFUGAL MACHINE.

APPLICATION FILED APR. 3, 1901.

NO MODEL.

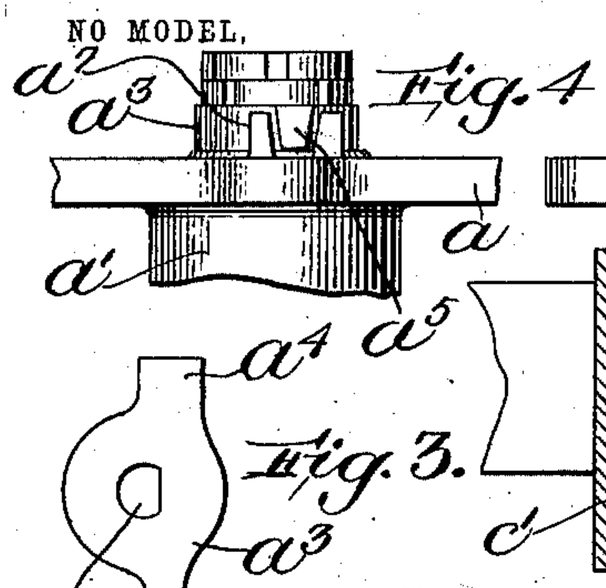

Fig. 4.

Fig. 3.

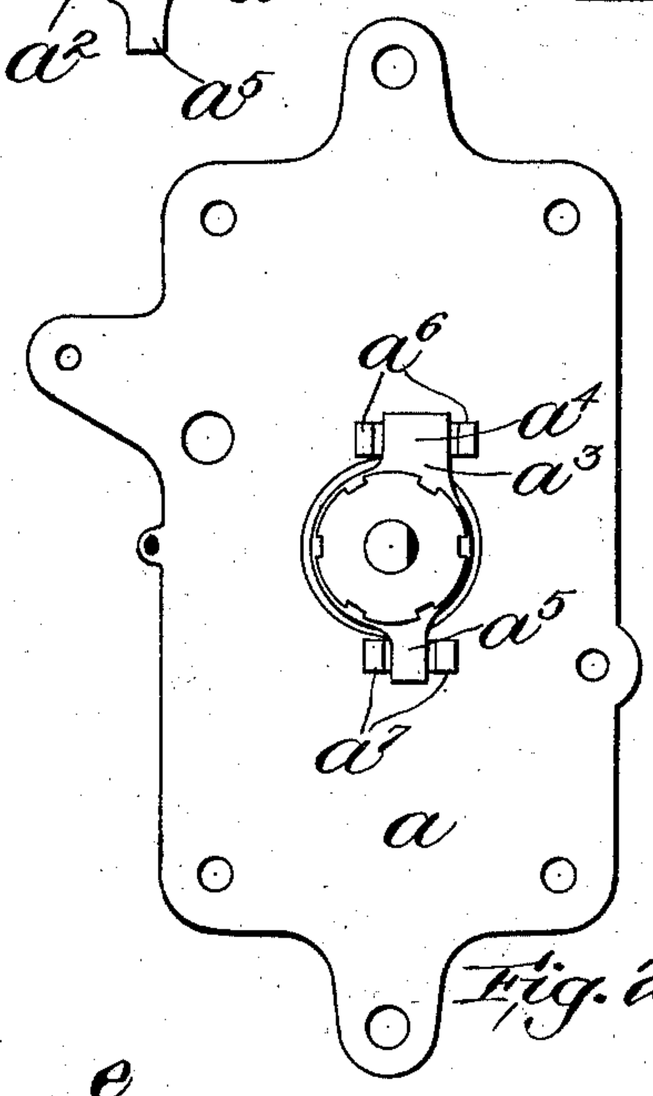

Fig. 2.

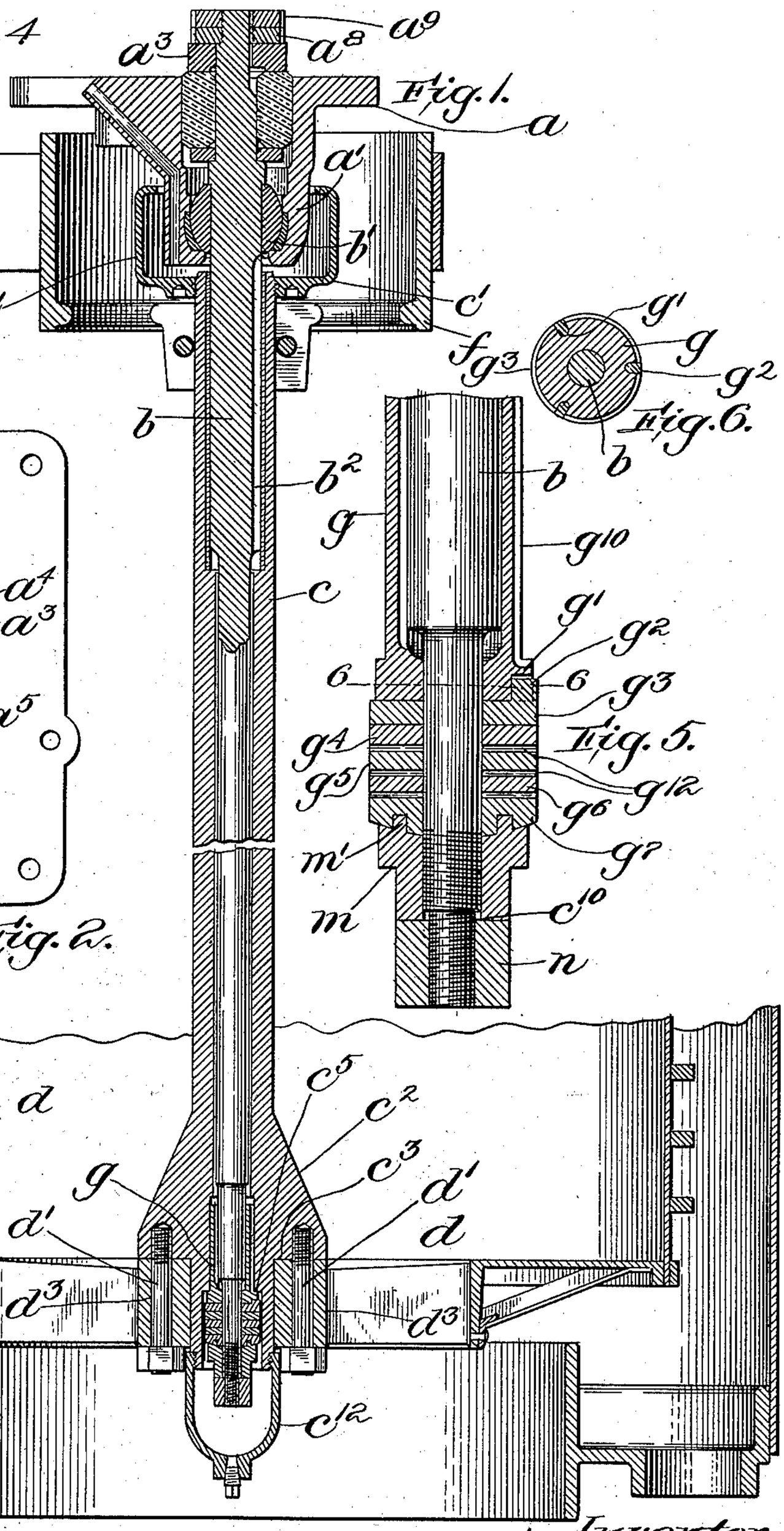

Fig. 1.

Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE.

MELVILLE H. BARKER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO AMERICAN TOOL & MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 748,465, dated December 29, 1903.

Application filed April 3, 1901. Serial No. 54,139. (No model.)

To all whom it may concern:

Be it known that I, MELVILLE H. BARKER, a citizen of the United States, and a resident of Boston, county of Suffolk, Massachusetts, have invented certain new and useful Improvements in Centrifugal Machines, of which the following is a specification.

My improvements relate to centrifugal machines or separators—such, for example, as are used in sugar-refineries and the like—and are intended to provide improved means by which the liability of breakage and undue wear of parts is reduced to a minimum and the possibility of improper assemblage of the parts through carelessness or ignorance is prevented. One difficulty often encountered in machines of this class is the unequal wear on the spindle, owing to the tendency to insufficient lubrication on that side of the spindle upon which the greatest wear or strain is exerted by the rotary sleeve due to the stress or tension of the driving-belt.

One feature of my invention consists in an improved construction by which I completely overcome this difficulty and secure a constant and adequate lubrication of the parts at this point.

Another feature of my invention consists in providing a special locking means by which it is rendered practically impossible for the mechanic assembling the machine to assemble the spindle, the hanger, and the sleeve, except in a predetermined relationship.

Another difficulty heretofore experienced in this art is the tendency of certain chemical ingredients or acids contained in the rotating basket to eat away or corrode the supporting screws or bolts that secure the basket to the rotary sleeve. This difficulty I have overcome by means of a construction whereby the screw-threads are completely protected against the action of acids or other corrosive substances contained in the basket.

Another feature which characterizes my invention is the construction and arrangement of the parts by which the rotary sleeve is prevented from slipping from the supporting-spindle.

These and other features of my invention will be more particularly pointed out in the following specification and will be clearly defined in the annexed claims.

In the accompanying drawings I have shown the preferred form of embodying my present improvements, although it will be understood that many changes in form, construction, and arrangement may be made without departing from the principles of my invention as herein set forth and claimed.

Figure 1 is a vertical sectional elevation of a complete centrifugal machine embodying my improvements. Fig. 2 is a plan view of the hanger and the means for locking the supporting-spindle against rotary movement in the hanger. Fig. 3 is a detail view showing the locking-belt which locks the spindle against rotation. Fig. 4 is an end elevation showing the hanger and the locking-belt. Fig. 5 is a vertical sectional view showing the means for preventing the rotary sleeve from slipping off the supporting-spindle. Fig. 6 is a horizontal sectional view on the plane 6 6 of Fig. 5.

The machine, generally speaking, comprises a supporting-hanger a, a supporting-spindle b, and a rotary sleeve c, to which is attached the basket d, which contains the material. The usual casing e may also be employed, and the adjuncts will be more particularly described hereinafter.

The hanger a has the well-known depending socket a', which forms a bearing for the ball b', this ball-and-socket joint forming a bearing-support for the spindle, which permits a sliding oscillation of the spindle in order that it may automatically center itself, all of which will be readily understood by those skilled in the art.

The rotary sleeve c has secured to its upper end an oil-cup c' and a driving-pulley f.

The upper end of the spindle is chamfered off on one side, so as to fit the flat-sided aperture a^2 in the fastening-nut a^3. This fastening-nut a^3 is provided with two wings or arms a^4 a^5, these arms being arranged to fall between retaining lugs or stops a^6 a^7, formed on the hanger. As it is intended to lock the supporting-spindle b so that it must always have the same side opposite the same side of the hanger and never in any other relationship, the nut a^3 is peculiarly formed to accomplish

this object. It will be noticed that the nut is asymmetrical or irregular in outline and also that the lugs or stops a^6 are placed farther apart than the lugs or stops a^7, so that the nut can only lie in place when the arm a^4 engages the lugs a^6 and the arm a^5 engages the lugs a^7. Not only are these arms of unequal width, but they are arranged asymmetrical with reference to the center of the nut, so that it is impossible to engage the nut with the lugs when the nut is held upside down. The lugs a^6 a^7 are beveled somewhat on their inside or locking faces, and the arms a^4 a^5 are correspondingly beveled, as indicated in Fig. 4. The object of this beveling of these faces is to afford a locking means which will permit the oscillation of the supporting-spindle without breaking off the retaining-lugs on the hanger. With the constructions at present in use this breakage is in practice a frequent occurrence. This beveling of these parts allows the proper play for the oscillation of the spindle, and if the oscillation is so great that the arms of the lock-nut a^3 come in contact with the retaining-lugs of the hanger there is an even pressure exerted from the top to the bottom of their faces instead of causing it to exert a torsional strain solely against the upper portions of the retaining-lugs, which in such case are easily broken off owing to the leverage which the contact between the nut and the lugs at their upper portions involves. Suitable fastening-nuts a^8 and a check-nut a^9 may be attached to the upper end of the spindle to hold the locking-nut a^3 in position.

The middle portion of the spindle b is in accordance with the usual practice of reduced diameter, so that a slight space is left between the spindle and the sleeve, the bearing-surface between the spindle b and the sleeve c being formed only at the top and bottom, at both of which points bearing-bushings may be employed.

Instead of boring an internal passage in the spindle to conduct the oil from the oil-cup c' to the reduced portion of the spindle I form in the outside surface or periphery of the spindle a longitudinal oil-groove b^2. This oil-groove should always be formed on that side of the spindle which is to be opposite the power-pulley which drives the driving-belt, so that the groove will extend along that side of the spindle upon which the greatest stress or friction of the rotary sleeve is exerted by the pull of the belt. The peculiar construction of nut a^3 makes it impossible to assemble the parts with the oil-groove in any other than the correct position.

Of course I do not confine myself to the precise construction and arrangement of locking means shown, the gist of this improvement consisting in so locking the spindle to the hanger that the oil-groove must necessarily always assume a fixed and invariable position with relation to the hanger.

In order to prevent the corrosive action of acids or other chemicals upon the retaining-screws which support the basket from the sleeve, I form the lower end of the rotary sleeve c with an enlarged head c^2, having an unbroken outside surface and formed with an undercut shoulder, as indicated at c^3, in which are bored the screw-holes in which the retaining-screws d' are screwed. These holes, it will be noticed, do not pass through the upper side of the enlarged head c^2. The supporting-brackets d^3 of the basket d fit snugly against the under side of these shoulders. By this construction and arrangement of parts neither the solid nor liquid ingredients of the materials contained in the basket can have any access to the retaining-screws, and thus serious accidents due to the breaking of the screws, owing to their partial corrosion, are avoided.

In order to more securely support the rotary sleeve upon the spindle, while at the same time giving it the greatest possible freedom of rotation, I have provided a novel arrangement of bushing, washers, and fastening-nuts. The lower end of the sleeve is bored to a somewhat larger diameter than the upper portion thereof to receive a shoulder-bushing g. This shoulder-bushing engages and supports a corresponding shoulder g^5 of the sleeve c. The bushing is also provided at its lower end with a series of symmetrically-arranged notches g', which engage a corresponding series of projecting lugs g^2 on the washer g^3. Beneath the washer g^3 are a series of loose washers g^4 g^5 g^6, which rest upon a fixed washer g^7, whose under face is provided with a plurality of symmetrically-arranged notches which engage a corresponding series of lugs m', formed on the supporting-nut m. The supporting-nut m is arranged to screw upon the screw-threaded shank of the spindle c. The extreme end of the spindle may be still further reduced, as shown at c^{10}, and formed with a screw-thread cut with a reverse spiral to the spiral of the screw-thread which holds the supporting-nut m. On this reverse-threaded portion of the spindle is screwed a fastening-nut n. It will be understood that the rotary movement of the nut m in working loose tends to tighten the fastening-nut n. As the consequences of the accidental working off of the nut m are extremely serious, this feature is of considerable importance. I prefer to use a plurality of lugs forming an engagement between the nut m and the washer g^7, since if only one such lug or pin should be used and there should be any failure to seat it properly in its corresponding recess the washers would be supported on one side and not on the other. This unbalanced support would tend to spring or break the spindle, whereas by having a plurality of such fastening-lugs if the workman who sets up the machine should fail to seat the lugs in their recesses the lugs would still support both sides of the washer evenly. An oil-cup c^{12} is secured

to the bottom of the rotary sleeve and formed with a drip-cup and reservoir for the oil. In practice it will be found that the oil after running down into this reservoir will work gradually back and forth between the spindle and the rotary sleeve.

In order to more thoroughly lubricate the loose washers between the bushing *g* and the supporting-nut *m*, I provide the bushing with an external longitudinal groove g^{10}, and I also provide washers with radial oil-grooves g^{12}, so that their surface may be kept at all times thoroughly lubricated.

Without attempting to set forth the various changes in form, construction, and arrangement that may be made in the embodiment of my invention herein shown and described or all the uses to which said invention may be applied, what I claim is—

1. In a centrifugal machine the combination of a supporting-spindle, a rotary sleeve thereon, a basket suspended from said sleeve, said sleeve being formed with an overhanging shoulder at its lower end, said shoulder being provided on its under side with screw-holes extending only part way through the shoulder, and fastening-screws arranged to pass through the central portion of the basket into said screw-holes whereby the screw-threads are completely protected from contact with acids or the like, substantially as described.

2. A centrifugal machine embracing in combination a basket, a supporting-spindle, a rotary sleeve surrounding and supported by said spindle in order to carry and rotate said basket, the upper end of said sleeve extending up beyond the top of the basket and its lower end being formed with an enlarged portion which is undercut to form an annular overhanging shoulder, said shoulder being provided with screw-threaded holes tapped into its lower face but not piercing the outer face of the sleeve, and retaining-screws adapted to fit into said screw-threaded holes to secure the basket to the sleeve without exposing the screw-threads to contact with the contents of the basket, substantially as described.

3. In a centrifugal machine the combination with a rotary basket of a supporting-spindle, a rotary sleeve to which the basket is secured, said sleeve being provided with an enlarged recess in its lower end, a bushing inserted in said recess so as to be interposed between the spindle and the sleeve, a supporting-nut arranged below the bushing, washers arranged between the supporting-nut and the bushing, and a cap for preventing the oil used to lubricate the spindle and the sleeve from mingling with the contents of the basket, substantially as described.

4. In a centrifugal machine the combination with a basket of a rotary sleeve to which it is secured, a bearing-spindle passed through said sleeve to support the sleeve in its rotation, a shouldered bushing interposed between the spindle and the sleeve near their lower ends, the shoulder of said bushing being formed to engage a corresponding shoulder formed in the interior of the sleeve, a supporting-nut secured to the lower end of said spindle in order to support the weight of the basket through the medium of the sleeve and of the bushing, and a series of antifriction-washers interposed between the bushing and the nut, substantially as described.

5. A centrifugal machine embracing in combination a supporting-hanger, a bearing-spindle formed with a longitudinal oil-channel in its bearing-surface, a rotary basket, said basket being secured to a rotary sleeve which is mounted on said spindle, means for imparting rotary movement to said basket and sleeve, and means for forming a locking engagement between the spindle and the hanger to prevent the spindle from rotating during the rotation of the basket, substantially as described.

6. A centrifugal machine embracing in combination a supporting-hanger, a bearing-spindle supported thereby, a rotary basket, a sleeve for supporting said basket upon the bearing-spindle, a locking device for locking the spindle against rotation during the rotation of the basket, said locking device being constructed and arranged so that the spindle can be locked to the hanger in but a single predetermined relationship, whereby a given side of the spindle may always register with the same side of the hanger, substantially as described.

7. In a centrifugal machine, the combination of a rotary basket, a hollow sleeve to which said basket is secured, a bearing-spindle passing through said sleeve in order to support the same, a hanger for supporting the spindle, an asymmetrical locking-nut constructed to engage asymmetrical lugs on the hanger to hold the spindle against turning during the rotation of the basket, substantially as described.

8. A centrifugal machine embracing in combination a rotary basket secured to a rotary sleeve, a bearing-spindle passing through said sleeve, said bearing-spindle being formed with a longitudinal groove on its bearing-surface, a hanger by which said bearing-spindle is supported, a driving-pulley connected with the sleeve, and means for locking said spindle in a predetermined position in said hanger so that the grooved side of the spindle will be opposed to the lateral stress exerted by the belt upon the driving-pulley and sleeve when the machine is in operation, substantially as described.

In witness whereof I have hereunto set my hand this 21st day of March, 1901.

MELVILLE H. BARKER.

In presence of—

GEO. N. GODDARD,

KATHARINE A. DUGAN.