(No Model.) 3 Sheets—Sheet 1.

J. LAIDLAW.

CENTRIFUGAL MACHINE.

No. 337,166. Patented Mar. 2, 1886.

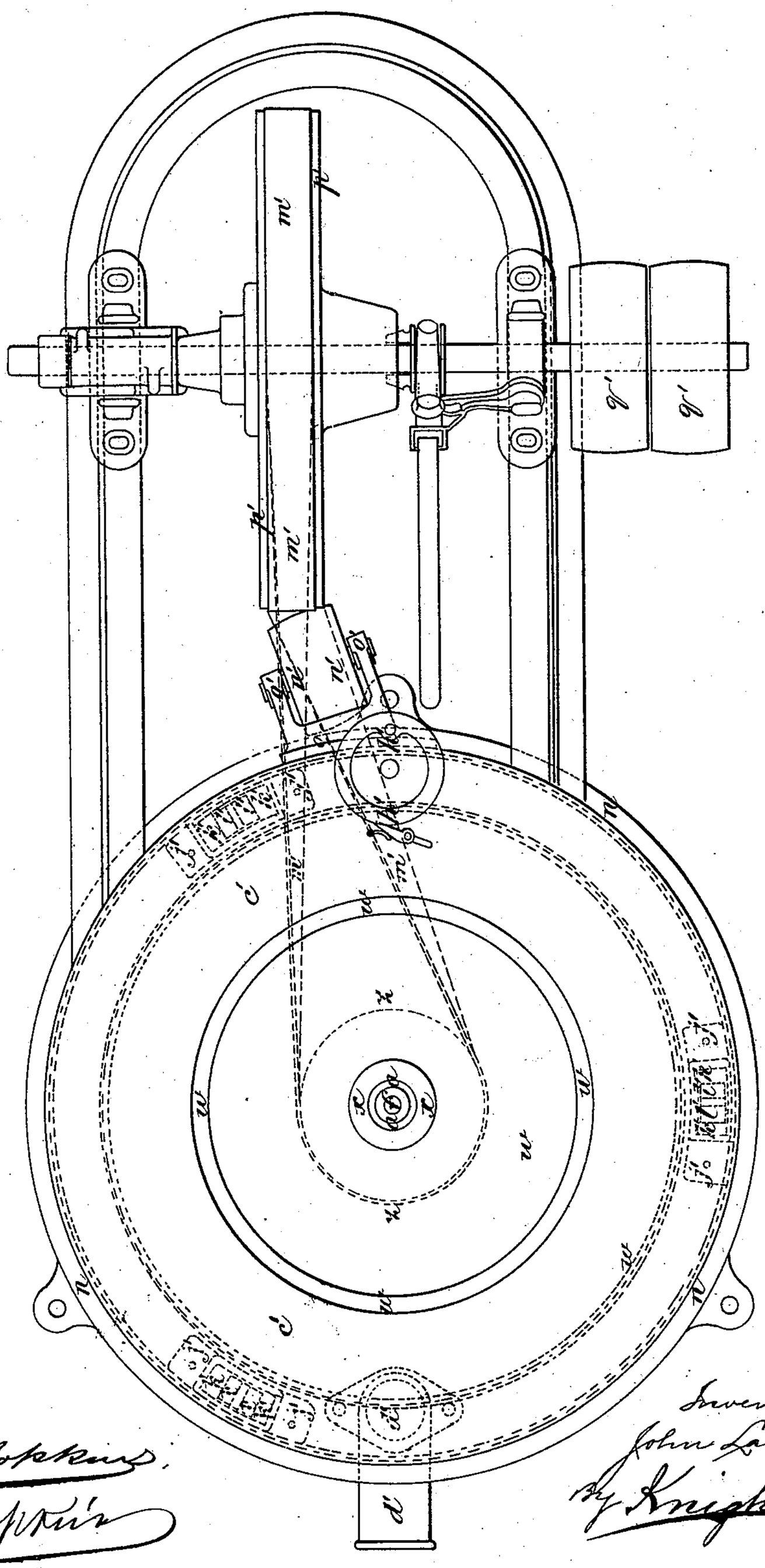

Fig. 1.

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Fig. 2.

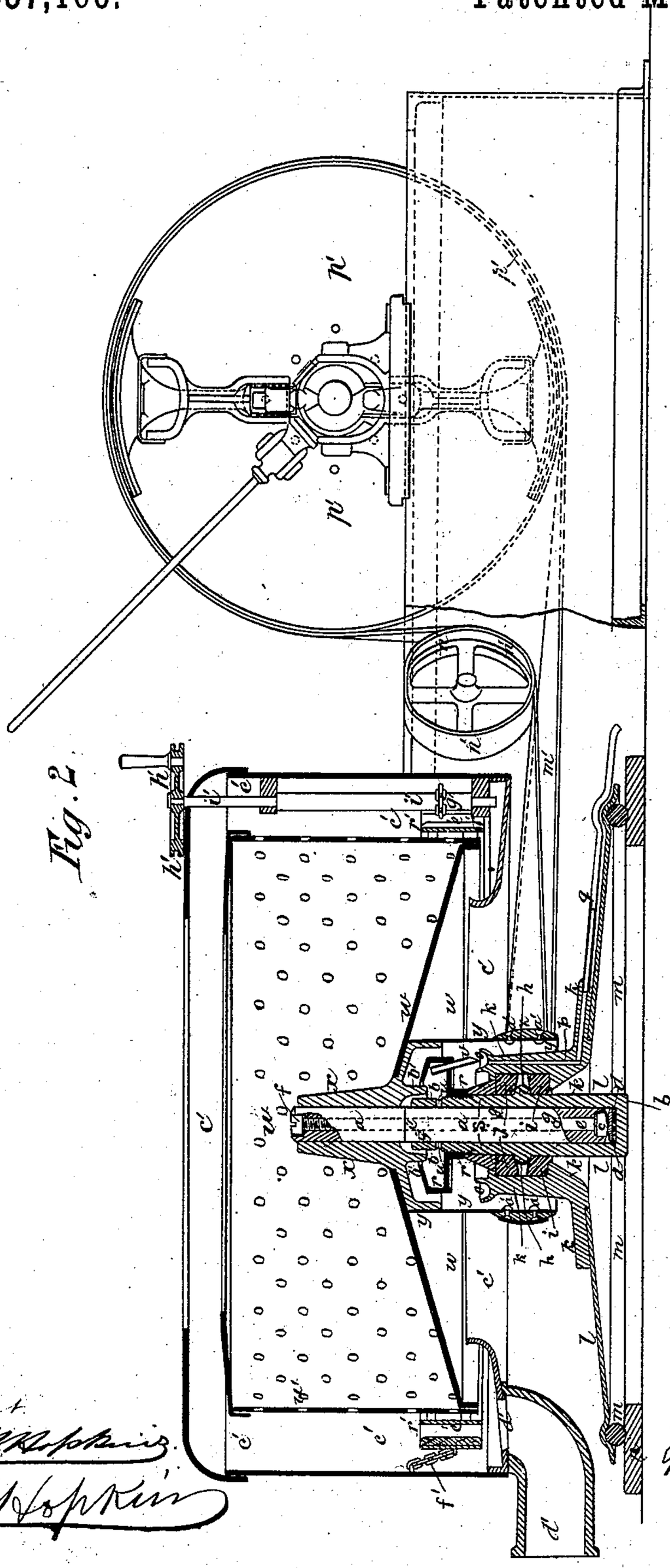

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Fig. 4.

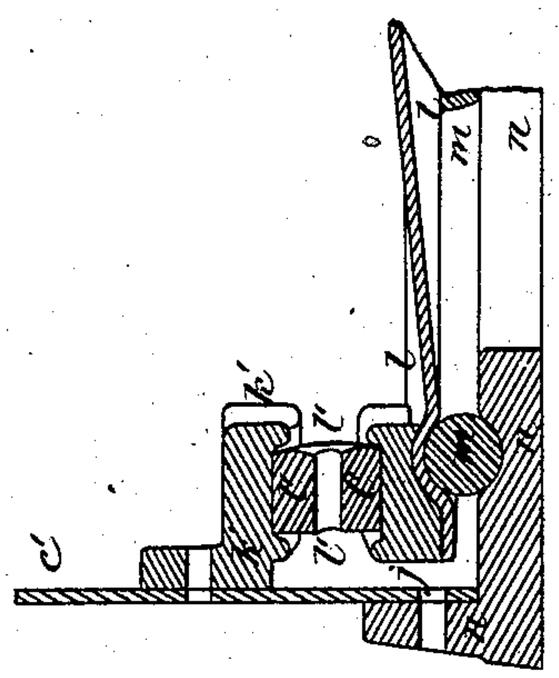
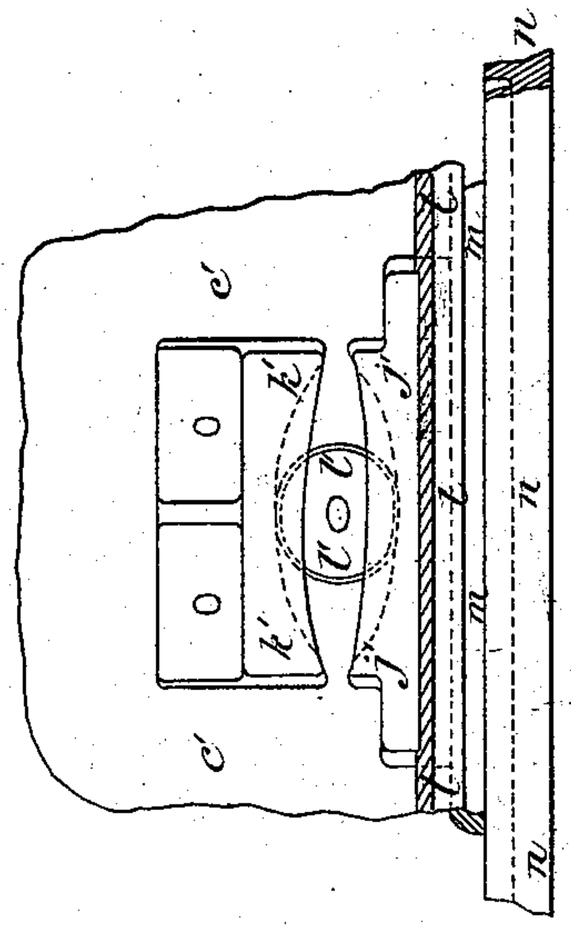


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN LAIDLAW, OF GLASGOW, COUNTY OF LANARK, SCOTLAND.

CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 337,166, dated March 2, 1886.

Application filed September 22, 1885. Serial No. 177,842. (No model.)

To all whom it may concern:

Be it known that I, JOHN LAIDLAW, of the firm of Watson, Laidlaw & Co., of 98 Dundas street, Kingston, Glasgow, in the counties of Lanark and Renfrew, Scotland, engineer, have invented Improvements in Centrifugal Machines, otherwise known as "Hydro-Extractors," of which the following is a specification.

This invention, which relates to improvements in centrifugal machines, otherwise known as "hydro-extractors," is applicable to that class of machines known as "under-driven" centrifugal machines. By this present invention the vertical rotating shaft of an under-driven centrifugal machine is so supported as to be above the level of the lowermost portion of the machine.

In the drawings, Figure 1, Sheet 1, is a plan of a centrifugal machine constructed according to this present invention. Fig. 2, Sheet 2, is a view of the same, partly in elevation and partly in vertical section. Figs. 3 and 4, Sheet 3, are respectively a front elevation and a transverse section, on an enlarged scale, of a detailed portion of the same.

In constructing a centrifugal machine in accordance with this present invention, and as represented upon the annexed drawings, the vertical rotating shaft *a* is supported within the tubular bearing *b*.

Between the case or equivalently hardened plug *c*, which is recessed into the lower end of the vertical shaft *a*, and the supporting surface of the bearing *b* there is provided the hardened disk *d*, the under side of which is grooved for the ready circulation of oil, besides having a vertical hole therethrough to allow of the passage of the oil to the bearing surfaces. The upper surface of this disk *d*, and also the under or contiguous surface of the plug *c*, are formed convex, so as to reduce the area of the surfaces in contact. A hole or oil-canal, *e*, is bored lengthwise through the vertical shaft *a*, and into the upper end of this oil-canal *e* the plug *f* is screwed, the said plug *f* being provided with a leather or equivalent washer to prevent the escape of oil at this part. Horizontal and radial holes *g* are drilled through the shaft *a*, and connect with the vertical or main oil-canal *e*, so that the oil passes outward and lubricates the shaft *a* at the required intervals.

Upon the external periphery of the tubular bearing *b* the annular projection *h* is formed. This projection *h* forms the support of the bearing *b*, and constitutes the neutral axis of the machine—that is to say, the axis upon which, when loaded and in revolution, the rotating basket and its directly-connected parts oscillate or vibrate. The annular projection *h* is supported upon the ring *i*, of india-rubber, while a second ring, *j*, of similarly-elastic material, is supported at the upper side of the projection *h*.

In place of the elastic ring *i*, the tubular bearing *b* may be provided at its center of oscillation with a spherical bearing on the under side, with an elastic ring above or below it. These two rings *i* and *j* are situated within the casting *k*, which is bolted or otherwise secured to the base plate or frame *l*. This base plate or frame *l* is supported upon the elastic ring *m*, for the reception of the upper side of which a groove is formed in the under side of the said base plate or frame *l*, while the under side of the said elastic ring *m* rests in a corresponding groove formed in the ring *n*, which constitutes the lower part of the casing.

It is to be understood that although I have shown upon the annexed drawings a circular ring, *m*, of india-rubber for supporting the centrifugal machine, yet any suitable elastic medium may be substituted for the said ring *m*—such, for example, as spiral springs, either continuous or at intervals—or blocks of india-rubber may be placed at intervals in place of the continuous ring *m*. In the upper edge of the casting *k* the annular groove *o* is formed, and from this groove holes *p* are drilled, so that any oil flowing into the said groove *o* will pass down through the holes *p* and pipe *q*, which is connected therewith.

At the upper part of the tubular bearing *b*, and to the outside thereof, the oil-reservoir *r* is screwed tightly down upon the shoulder *s*, and the ring or washer *t* fills up the space intervening between the said reservoir *r* and the india-rubber ring *j*. The tubular bearing *b* is provided at its upper part with the holes *u*, which form connections with the interior of

the reservoir *r*. The reservoir *r* is provided with the overflow-pipe *v*, the lower extremity of which is immediately over the annular groove *o*. The basket *w* is secured to the casting *x*, the interior of which is bored out to fit upon the upper portion of the vertical shaft *a*, which said upper portion is turned slightly conical, and the said shaft rotates with the casting *x*. The casting *x* also supports the cylinder *y*, around which the convex ring *z*, which constitutes the band-pulley, is secured by rivets *a'*, or otherwise. The casting *x* is further formed with the annular lip *b'*, which extends down into the reservoir *r*. The basket *w* is arranged with suitable perforations through its periphery, to allow of the discharge of the liquid from the substance being dried, as is usual in the case of other centrifugal machines, and the said basket rotates within the inclosing-casing *c'*, the discharge-orifice *d'* of which may be arranged at any desired part. A brake-band, *e'*, is provided around the basket *w*, and is suspended from the casing *c'* by short lengths of chain *f'*, which are arranged at intervals around the said casing *c'*, the necessary braking power being applied to the chain *g'*, secured to the free end of the brake-band and coiled, by means of the hand-wheel *h'*, around the shaft *i'*, which brings the brake-blocks upon the said band *e'* with the requisite degree of pressure upon the brake-ring *r'*, which is riveted to the basket *w* in the manner shown at Fig. 2—that is to say, with an annular space between the said ring *r* and the exterior of the basket, thus preventing the perforations at that part of the basket from being covered over. The casing *c'* is supported from the ring *n*, and has in the sides of the lower part thereof two openings—one for the passage therethrough of the discharge-pipe *d'*, the other for the passage therethrough of the driving-belt *m'*—such openings being of sufficient size to allow the easy placing of the driving-belt *m'* on the pulley *z*.

At intervals around the base plate or frame *l* there are secured the bearing-blocks *j'*. (Shown more particularly on an enlarged scale at Figs. 3 and 4 of the annexed drawings.) These blocks *j'*, of which three are shown in dotted lines in plan at Fig. 1, are coaxial with the shaft *a*, and corresponding blocks, *k'*, are secured to the inclosing-casing *c'*. The opposing surfaces of these blocks *j'* and *k'* are hollowed out in the direction of their length, as represented in dotted lines at Fig. 3, and between these hollowed surfaces buffers *l'*, of india-rubber, are located, it being explained that the blocks *k'* are adjusted sufficiently near the blocks *j'* to compress the buffers *l'* to any required extent.

The basket *w* is rotated by means of a band, *m'*, passing around the pulley *z*, and at one part below the pulley *n'*. This pulley *n'* is supported in the bracket *o'*, Fig. 1, the said bracket being secured to the casing *c'*. The band *m'* from the pulleys *z* and *n'* passes onto the driving-pulley *p'*, the shaft of which is provided with the fast and loose pulleys *q'*, and, as represented upon the annexed drawings, with Weston's well-known patent centrifugal friction-pulley. These last mentioned parts constituting no part of the present invention need not be herein further described.

In the operation of the machine the basket *w* is free to vibrate or oscillate about a point which is in the plane of the center line of the driving-belt *m'* as it passes around the pulley *z*, and at the intersection of the vertical axis of the shaft *a* with the said plane. The residual vibration over and above what is absorbed by the elastic central bearing contained within the casting *k* is translated by means of the base plate or frame *l* to the outer elastic bearing, *m*, whereby great steadiness of running of the centrifugal machine is secured.

For the proper lubrication of the several parts of mechanism hereinbefore described, the plug *f* is removed from the upper end of the shaft *a*, and oil is poured into the oil-canal *e* until such time as the oil is seen flowing out from the pipe *q*, it being then known that the reservoir *r* is charged to the required extent, and the oil is passing out therefrom through the overflow-pipe *v*. Around the periphery of the shaft *a* any suitably arranged grooves are provided, so that the oil may in the rotation of the machine be caused to circulate as may be found necessary.

I claim—

1. In a centrifugal machine, the combination, with the basket and its shaft, of an elastic bearing which supports said shaft and permits its free oscillation, a base-frame supporting said elastic bearing, and a second elastic bearing upon which said base-frame rests and oscillates, substantially as and for the purpose set forth.

2. In a centrifugal machine, the combination, with the basket and the shaft thereof, of a tubular bearing in which said shaft revolves and by which it is supported, an elastic bearing upon which said tubular bearing rests and oscillates, and a base-frame supporting said tubular bearing, substantially as and for the purpose set forth.

3. In a centrifugal machine, the combination, with the basket, of a hollow shaft having radial holes or perforations, a hollow bearing in which said shaft fits, and a base-frame supporting said hollow bearing, substantially as set forth.

4. In a centrifugal machine, the combination, with the basket, of a hollow shaft having radial holes or perforations, a hollow bearing in which said shaft fits, an oil-reservoir secured to said hollow bearing and having communication with said hollow shaft, and a base-frame, substantially as and for the purposes set forth.

5. In a centrifugal machine, the combination, with the basket and a hollow shaft therefor, of a chilled or case-hardened plug fitted in the lower end of said shaft, a hollow bear-

ing in which said shaft works, and a chilled or case-hardened step upon which said shaft rests, substantially as set forth.

6. In a centrifugal machine, the combination, with the basket and its shaft, of a hollow bearing in which said shaft fits, an annular flange or projection from said hollow bearing, elastic bearings placed above and below said flange, and a casting or frame supporting said elastic bearing, substantially as set forth.

7. In a centrifugal machine, the combination, with the basket and an oscillating shaft to which it is secured, of a broad supporting-base supported near its outer margin by an elastic bearing, substantially as set forth.

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

JOHN LAIDLAW.

Witnesses:
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HENRY HART,
Both of 115 *St. Vincent Street, Glasgow.*