(No Model.) 2 Sheets—Sheet 1.

D. H. BENJAMIN.

CENTRIFUGAL MACHINE.

No. 423,408. Patented Mar. 18, 1890.

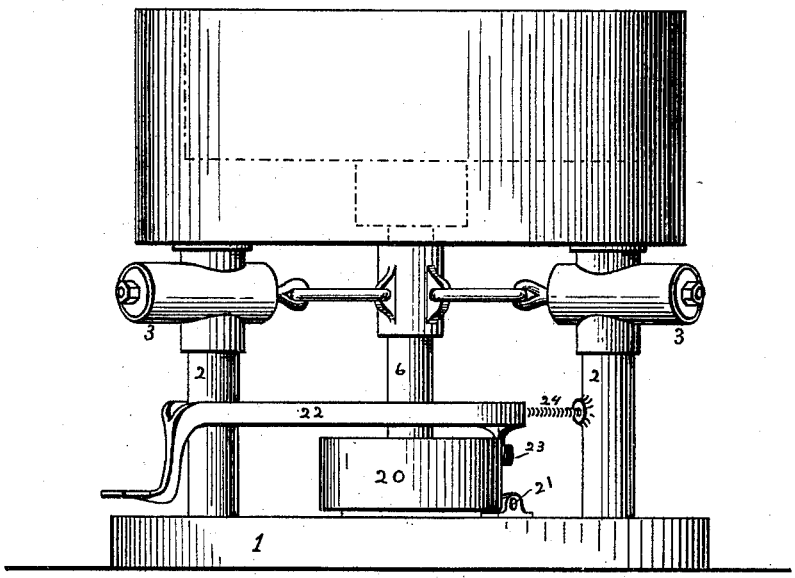

Fig. 1

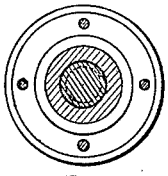

Fig. 3.

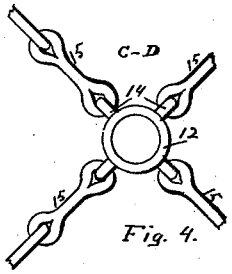

Fig. 4.

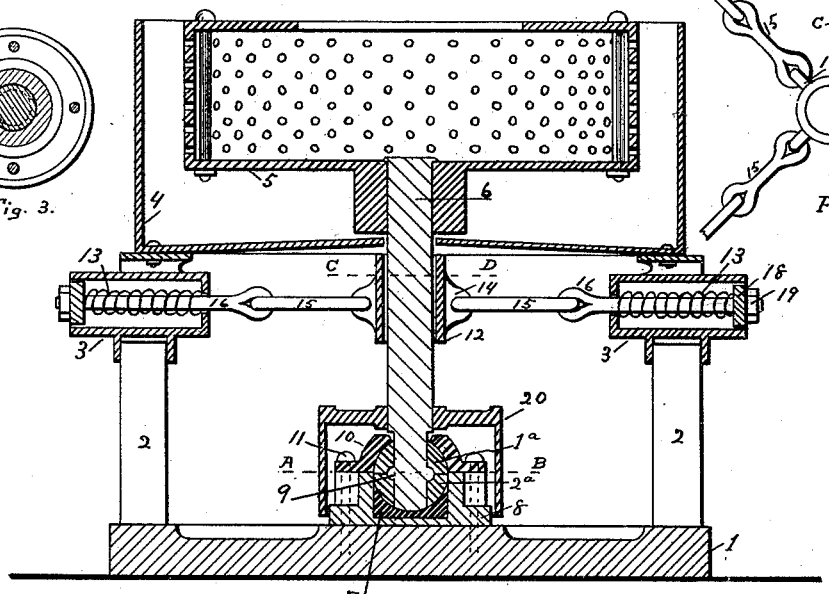

Fig. 2.

WITNESSES:

Egrah R. Pugh

James Barnum

D. H. Benjamin INVENTOR

BY

Ridley & Perry

ATTORNEY

(No Model.) 2 Sheets—Sheet 2.

D. H. BENJAMIN.

CENTRIFUGAL MACHINE.

No. 423,408. Patented Mar. 18, 1890.

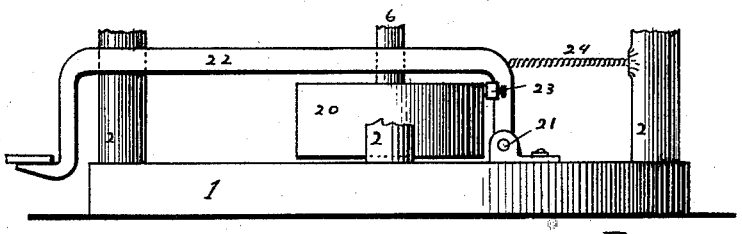

Fig. 5.

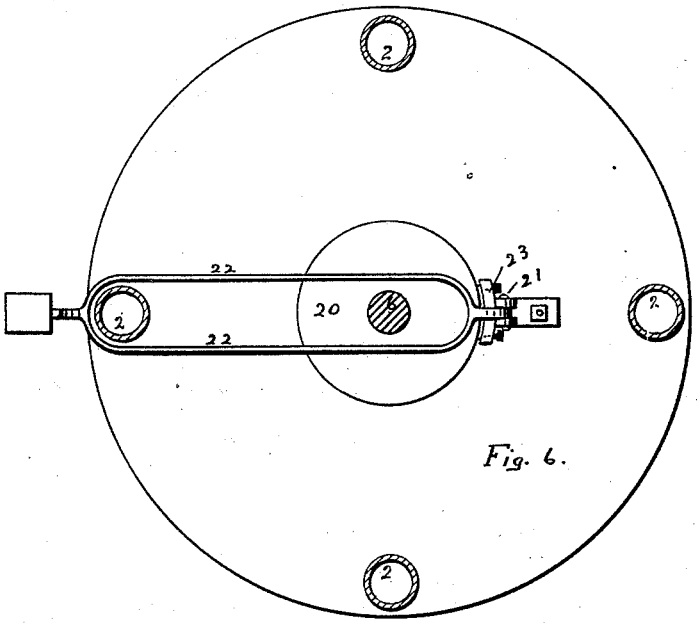

Fig. 6.

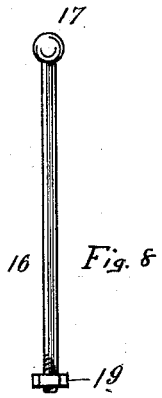

Fig. 8

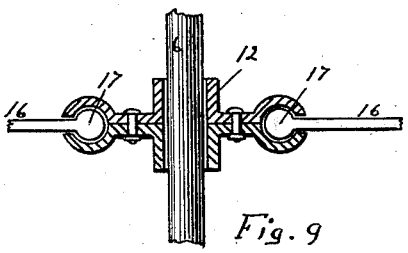

Fig. 9

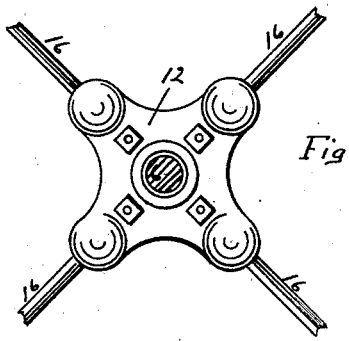

Fig. 7

WITNESSES:

Ezra R. Pugh

James Bannum

D. H. Benjamin INVENTOR

BY

Ruby & Perry

ATTORNEY

UNITED STATES PATENT OFFICE.

DANA H. BENJAMIN, OF UTICA, NEW YORK, ASSIGNOR TO EDWARD HURLBURT, OF SAME PLACE.

CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 423,408, dated March 18, 1890.

Application filed August 23, 1888. Serial No. 283,604. (No model.)

To all whom it may concern:

Be it known that I, DANA H. BENJAMIN, a citizen of the United States, and a resident of the city of Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Centrifugal Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to improvements in centrifugal machines.

In the drawings, Figure 1 shows a side elevation of my device. Fig. 2 shows a vertical central section thereof. Fig. 3 shows a cross-section of bearing and shaft on line A B. Fig. 4 is a detail view of the shaft-collar, its ears, and portions of the links connected thereto. Fig. 5 is a side elevation of the lower portion of the machine, and is especially intended to show the brake. Fig. 6 is a horizontal section of the machine, taken on the line E F, Fig. 1. Figs. 7, 8, and 9 show details of construction.

Like figures and letters of reference refer to like or similar parts in the several figures of the drawings.

In constructing my device I provide a suitable base 1, with stationary posts 2, Figs. 1, 2, 5, and 6, preferably four in number. On the posts I form chambers 3 for the reception of springs 13. Supported by the posts 2 is curb 4, surrounding basket or receptacle 5. Basket 5 is provided with perforated walls, as shown in Fig. 2, and is mounted upon and rigidly held to upright shaft 6, so as to revolve with it. Underneath the shaft I provide step 7, preferably concave, although it may be a plain step. The step is held in a stationary oil-box 8, secured to the base. The lower end of the shaft is convex and passes through a ball-bearing, which is incased in the stationary oil and bearing box 8. The ball-bearing is preferably formed in semi-spherical parts 1^a and 2^a, which fit together and on shaft 6. The ball-bearing is free to rotate in the oil and bearing box, and the shaft is also free to rotate in the ball-bearing, through which it passes.

As the speed at which these machines run is so very great, heretofore considerable trouble has been encountered with the bearing heating and also jumping out of the box or well. I overcome these difficulties by the construction described, and also provide a bearing that is readily, easily, and economically removed and repaired to compensate for wear.

Upon the lower portion of the shaft I provide projecting flange 9, which fits in a circular groove in the ball-bearing constructed to receive it, for preventing vertical displacement of the shaft. The projecting flange may be in the ball-bearing and the groove in the shaft and the same result accomplished. Section 10 of the oil-box is fitted in its curvature to the ball-bearing, forms a cap, and is held in position by bolts 11. The step 7 is preferably concave and fits the lower end of the shaft and the ball-bearing.

For maintaining the shaft and basket in a substantially vertical position, I provide collar 12 on the shaft, as shown in Figs. 4, 7, and 8. Collar 12 is located on the shaft in substantially the same horizontal plane with chambers 3 on the stationary posts 2. The collar is both elastically and flexibly connected to the posts as follows: Each spring 13 is connected by rod or link 15 with link or rod 16, which extends into chamber 3, where it is engaged by the springs 13, so that the collar on the shaft is both flexibly and elastically connected to the posts to allow an oscillating or wabbling motion to the shaft 6 when the same is being rotated.

The elastic and flexible connection of the collar with the posts may be accomplished by forming a collar in halves, as shown in Fig. 9, and connecting the same with ball-bearings 17, and using connecting links or rods 16, with springs 13 in chambers 3, as heretofore described.

For keeping the basket and shaft in substantially an upright position and still permit of a wabbling motion when the load in the basket is unevenly distributed, I provide springs 13, inserted in chambers 3 on the posts 2, and links or rods 16, passing through

the springs 13, which bear against the inner end—*i. e.*, the end toward the shaft 6—of the chambers, and the outer ends of the springs are engaged with washers 18 upon rods or connecting-links 16, the desired tension being obtained by nuts 19 upon the screw-threaded ends of the connecting-rods 16. The purpose of the spring-tension is to maintain the shaft and basket in a substantially upright position.

A pulley 20 is secured to shaft 6 for rotating the same, and through it the basket 5. A brake is pivoted at 21 to a plate secured to the base and provided with a forked operating-lever 22, and an adjustable friction-block 23, adapted to be brought into contact with the surface of pulley 20. A spring 24, secured to the brake and to one of the posts, is provided for holding the brake out of contact with the pulley when not required.

The operation of the device is substantially as follows: The materials to be operated upon—as, for instance, wet cloths—are placed in the basket 5 through the opening in the top of the same. The basket is then rotated at a high rate of speed, the fluid portion being thrown off through the perforations of the basket and being collected and conducted off by the curb 4. Should the center of gravity of the basket and contents be out of line with the shaft, the center of gravity would determine the approximate center of rotation and the shaft would have a wabbling motion, which motion is accommodated by the springs and step-bearing described, while the springs and connections have a tendency to hold the shaft in a substantially vertical position.

The use and operation of the brake are obvious. The fork-lever spanning a post acts as a guide for the operating-lever of the brake and prevents lateral displacement.

Various alterations and modifications may be made in my machine without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a centrifugal extractor, of a rotating basket, the upright shaft carrying the basket and having its lower end convex, the concave step upon which the convex end rests, the rotatable ball surrounding the shaft at its lower end, and the oil-box inclosing the ball and step, substantially as set forth.

2. The combination, in a centrifugal separator, of a rotating receptacle, the upright rotating shaft carrying the receptacle having its lower end convex, and a projecting flange adjacent to its lower end, a halved ball having an internal groove surrounding the shaft adjacent to its lower end, the concave step, and the oil-box inclosing the ball and step, substantially as set forth.

3. In a centrifugal separator, the combination of the ball-bearing, the upright shaft having its lower end passing through and rotatably secured in the ball by flange and groove, the step under the end of the shaft, and the oil-box inclosing the ball and step, substantially as set forth.

4. In a centrifugal separator, the combination of a rotating receptacle, an upright shaft having a projecting encircling flange adjacent to its lower end, the lower end being curved or convex, a concave step on which the shaft bears, a spherical ball-bearing surrounding the shaft and flange and having the same radius of curvature as the end of the shaft, and an oil and bearing box, substantially as set forth.

5. The combination, in a centrifugal extractor, of a rotating basket, the upright shaft carrying the basket and having its lower end convex, the concave step upon which the convex end rests, the rotatable ball surrounding the shaft at its lower end, the oil-box inclosing the ball and step, the collar on the shaft above the step, the rigid post having chambers thereon, the springs in the chambers on the posts, and the links forming flexible connection between the springs and collar, substantially as set forth.

In witness whereof I have affixed my signature in presence of two witnesses.

DANA H. BENJAMIN.

Witnesses:
E. W. JONES,
M. E. ROBINSON.