W. A. WOOD.
CONTINUOUS CENTRIFUGAL MACHINE.
(Application filed June 19, 1899.)

INVENTOR

ATTORNEY
UNITED STATES PATENT OFFICE.

WILLIAM ALEXANDER WOOD, OF ANSONIA, CONNECTICUT, ASSIGNOR TO ADELBERT PHILANDER HINE, OF TORRINGTON, CONNECTICUT.

CONTINUOUS CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 662,214, dated November 20, 1900. Application filed June 12, 1899. Serial No. 720,320. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ALEXANDER WOOD, a citizen of the United States, residing at Ansonia, in the State of Connecticut, have invented a Continuous Centrifugal Machine, of which the following is a specification.

My continuous centrifugal machine consists, essentially, of an enclosing casing, a revolving basket having discharge-openings, a series of revolving wings within the basket, and mechanism by reason of which the speed of the basket relatively to that of the wings may be adjusted, whereby the solid material in the basket will at intervals be brought into positions to be discharged through the lateral openings in the sides of the basket. I will describe my improved machine in connection with the accompanying drawings, and then point out in the claims what I consider to be my invention.

In the drawings, 10 is a vertical spindle mounted in the bearings 11, 12. The bearing 12 is adjustable by means of the screw 13. 14 is a pulley keyed to the spindle 10 and adapted to transmit rotary motion to the spindle. Instead of using a long spindle with a pulley mounted on the upper part, as shown in the drawings, I may, as is common in centrifugal machines, use a short spindle and mount the pulley below the basket.

The enclosing casing 15 is composed of the rim 16, base 15, and body 15. The casing 15 as a whole is carried by means of the rods 16, which depend from the casing 17, carried by the universal joint 18, which latter is suitably secured to any horizontal support. (Not shown.) The base 15 of the casing 15 has formed in it two channels 15°, 15°. The channel 15° is open at the bottom, so that any solid material—for instance, sugar after spinning—which is discharged into the channel—may pass freely out of the machine. The channel 15° has a closed bottom and is separated from the channel 15° by the wall or flange 15°. The channel 15° has its bottom inclined downward toward the discharge-spout 15°, so that any liquid discharged into the channel—as, for instance, the liquor extracted from sugar in spinning—will flow freely from the machine through the spout 15°. Depending from the base 15° are the rods 19, which support the lower bearing 12, the spindle 10, and parts carried by the spindle.

Located within the casing is the rotatable basket 20. The basket is composed of the cover 20°, bottom portion 20°, exterior body 20°, and interior perforated body 20°. Formed in the cover 20° is the central hub 21, which extends downward into the basket and is provided with the delivery-chutes 22. The body of the hopper is so formed as to have situated at its center the central hub 23, which is bored to receive the spindle 10, but which is not attached to the spindle. The interior diameter of the hub 23 is such that it may rotate freely around the spindle. The bottom portion 20° consists of the disk 24, having the central hub 25 bored to receive the spindle 10. The hub is not connected to the spindle and is sufficiently large on its interior diameter to move freely around the spindle.

Depending from the outer periphery of the disk 24 and adapted to move over the wall 15° is a flange 26. Immediately within this flange is a second flange 27, which projects downward and is adapted to move within the channel 15°. Projecting upward from the disk 24 is another flange 28, and between the flange 27 and the flange 28 are arranged openings 29. These openings, it will be observed, are situated over the channel 15°. A second hub 25 projects downward from the disk 24 and is somewhat larger in diameter than the hub 25.

The cover 20° and the bottom portion 20° are connected through the outer body portion
20° and the perforated inner body portion 20°. The outer body portion 20° is made of sheet metal and is connected at the top to the outer periphery of the cover 20° and at the bottom to the outer periphery of the disk 24 and between the flanges 26 and 27. The inner body portion 20° is made of perforated sheet metal or wire-gauze and is connected at the top to the cover 20° and at the bottom to the inner side of the upwardly-projecting flange 28. Surrounding the perforated inner body portion 20° are parallel strengthening-rings 30.

Mounted on the collar 10° and keyed fast to the spindle 10 is a worm-gear 31. (Best shown in Fig. 5.) Carried in bearings 32, which depend from the disk 24 of the bottom portion of the basket, are the worm-shafts 33, (two are shown, but only one may be employed,) in gear with the worm-gear 31. On the opposite ends of the worm-shafts are ratchets 34. Depending from the worm-shafts 31 are the arms 35. These arms are not keyed upon the shafts 33, but are merely supported thereby.

Mounted on the outer side of the depending portions of the arms 35 are the spring-pressed pawls 36, which engage with the ratchet-wheels 34. The arms 35 are inserted through the links 37 with the vertically-movable block 38. The block 38 is bored to receive the spindle 10 and is keyed thereto through a long key 10°. The block 38 and worm-gear 31 rotate with the spindle, and rotary motion is imparted to the basket through the worm-gear 31 and worm-shafts 33.

The block 38, as before stated, is vertically movable upon the spindle 10. The block 38 is composed of the central hub 38°, over which is fastened a collar 38°, having pivotal bearings for the links 37. The hub 38° is also provided with a horizontal flange 38° and a removable ring 38°. Surrounding the hub 38° and between the flange 38° and ring 38° is an independent ring 39. Between this ring 39 and the flange 38° and the ring 38° are interposed balls 40, which form antifriction bearings. The independent ring 39 is provided with the lateral trunnions 41. A bifurcated lever 42 is pivoted in the bearings 43, which is secured to one of the rods 44. The trunnions 41 have their bearings in the sides of the bifurcated lever 42.

It will be understood that the independent ring 39, while vertically movable, does not rotate with the spindle 10 and the block 38, but is stationary, so far as rotation is concerned, the block 38 rotating in the antifriction ball bearings 40.

The end 44 of the lever 42 is turned downward and to the right and may be formed either as shown in Figs. 1 or 7. In Fig. 1 the end 44 has the slot 45, and in the slot is located a bolt 46, by means of which a connecting member 47 is adjusted in the slot.

In the construction shown in Fig. 7 the end 44 is provided with a slot along its surface and a screw-thread at each end. The connecting member 47 has its base-located in the slot, and this base is threaded. An adjusting-screw 48 engages the threaded portion of the connecting member 47 and the threaded ends of the slot. Adjustment is effected by means of a hand-wheel 49. 50 represents a rod connected at one end to an eccentric 51 on the shaft 52 and at the other end adjustabley connected to the connecting member 47 by means of the nuts 53.

It will be understood that when the shaft 52 is rotated, which rotation may be derived from any source of power, an up-and-down motion will be communicated to the block 38, and that this motion will be transmitted, through the interposed parts, to the worm-shafts 33 with the result of imparting a motion to the basket in a direction opposite to that imparted by the rotation of the spindle 10.

In other words, assuming the rotation of the basket imparted by the lever 44 to be that of the spindle 10.

The object of the arrangement above described for regulating the speed of the basket will hereinafter be explained and described in the operation of the device.

Located within the basket 20 and keyed to the spindle 10 is a spider 54, (best shown in Fig. 4,) provided with radial wings 55, twelve being shown. The wings are bifurcated at their outer ends to carry the vertically-arranged scrapers 56. In the construction shown in Figs. 3 and 4, the rotation imparted by the worm-shafts 33 will move the spider 54 relative to the lever 44, the degree of vertical motion imparted to the block 38 can be altered, and consequently the speed of rotation of the basket relative to that of the spindle likewise changed.

The spider 54, as before stated, is keyed fast to the spindle 10, and therefore has the same speed of rotation as the spindle. Consequently if the speed of rotation of the basket be by reason of reciprocation of the block 38 be made less than that of the spindle then the scrapers 56 will scrape over the inner surface of the perforated body 20° and gradually move any material located between any pair of wings toward lateral openings 60, arranged through opposite sides of the basket 20. In Fig. 9 I have shown a vertical elevation of the framework of one of these openings. In practice the vertical diameter of the framework is
less than that of the scrapers, so that the scrapers will not be thrown out of the openings 60 by centrifugal force as they come to them.

It will be observed from an examination of Figs. 3 and 4 that some two of the twelve spaces included between pairs of the radial wings will at all times be in front of the two openings 60, so that as the successive spaces between the wings register with these openings there will be a continual discharge of the material acted on in the machine. It will also be observed that the position of the feed-chutes 22 is such that they do not register with the openings 60, but feed into the second spaces between the wings from the openings in the direction of rotation of the arms.

I do not wish to limit myself in any wise to the position shown for the feed-chutes, as they may be moved nearer to or farther away from the openings. The position shown in the drawings, however, is the one which I consider best.

The operation of my improved device is as follows: The material to be acted on, which is in a wet state, is fed continuously in any suitable manner, such as a gravity hopper 21 in the basket 20 and is delivered through the chutes 22 into the spaces between the wings 55. The material is thrown out by centrifugal action against the perforated body 20 and at the same time is advanced in its position in the rotating basket toward one of the discharge-openings. The rapidity of the advance of the material will depend, as described, by the difference in speed between that of the rotating wings and that of the basket. The degree of the advance in the basket may be determined in advance, thus: Given a material to be acted upon containing a definite amount of moisture, the degree of advance of the material in the basket may be such that the material will reach the discharge-opening when the requisite spinning has been reached — i.e., the degree of moisture has been extracted.

In the operation of the machine the liquids, &c., are discharged through the perforations in the body 20 and gathered in the channel 13 and conveyed therefrom through the spout 15, whereas the dried material will be discharged through the openings 60 into the channel 15 and thence into suitable receptacles. It will be further observed that the construction of this machine is such that there will be no mingling or possibility of mingling of the extracted liquids and solids.

I have shown no means in the drawings for opening the screw 22. Manifestly it may be driven in any suitable manner to produce the required reciprocating motion of the block 38.

I wish it understood that I do not limit myself to the specific construction described and shown in the accompanying specification and drawings, as I believe I am the first to describe a continuously-acting centrifugal machine which involves the principle of a difference in speed between a horizontally-rotating basket having suitable vertical discharge-openings for the solid materials and a series of independent vertical wings located and rotated within the basket.

Having thus described my invention, what I claim is:

1. A continuous centrifugal machine, comprising an enclosing casing, a horizontally-rotating basket having its periphery formed of an exterior body and an interior perforated body with lateral vertical openings through which the solid materials may be discharged; a series of independent scraper-wings within the basket, mechanism for revolving said basket and wings, and mechanism for varying the speed of rotation of the basket relative to that of the wings.

2. A continuous centrifugal machine, comprising an enclosing casing having hopper and delivery chutes, a horizontally-rotating basket having its periphery formed of an exterior body and an interior perforated body with lateral vertical openings through which the solid materials may be discharged; a series of independent scraper-wings within the basket, mechanism for revolving said basket and wings, and mechanism for varying the speed of rotation of the basket relative to that of the wings.

3. In a continuous centrifugal machine, the combination of a rotating spindle, a series of independent scraper-wings positively driven by said spindle, a rotating basket also driven by said spindle, and mechanism whereby the speed of rotation of the basket may be varied from that of the spindle and wings.

4. In a continuous centrifugal machine, the combination of a rotating spindle, a series of independent scraper-wings positively driven by said spindle, a rotating basket, and means carried by said basket, whereby the speed of rotation of the basket may be varied from that of the spindle and wings.

5. In a continuous centrifugal machine, the combination of a rotating spindle, a series of independent scraper-wings positively driven by said spindle, a rotating basket, a worm-gear on said spindle, a worm-shaft on said basket, and means for rotating said worm-shaft, whereby the speed of rotation of the basket may be varied from that of the spindle and wings.

6. In a continuous centrifugal machine, the combination of a rotating spindle, a series of independent scraper-wings positively driven by said spindle, a rotating basket, a worm-gear on said spindle, a worm-shaft on said basket, and adjustable means for rotating said worm-shaft, whereby the speed of rotation of the basket may be varied from that of the spindle and wings.

7. In a centrifugal machine, the combination of a rotating spindle, a worm-gear on said spindle, a rotating basket, a worm-shaft on said basket, a driven shaft, and mechanism adapted to vary the speed of rotation of the basket from that of the spindle.

8. In a continuous centrifugal machine, the
combination of an inclosing casing provided with bottom channels, a revolving basket provided with lateral openings, and a series of rotating scraper-wings located within said basket.

9. In a continuous centrifugal machine, the combination of an inclosing casing provided with bottom channels, a revolving basket provided with a cover, an exterior body, an interior perforated body, and a bottom portion provided with openings between said inclosing bodies; and a series of rotating scraper-wings located within said basket and moving over the interior perforated surface of said basket.

10. In a centrifugal machine, an inclosing casing comprising a flanged upper ring provided with suspending-lugs, a body-casing, and a bottom portion having two channels, one channel open at the bottom and the other channel connected to a discharge-spout.

11. In a centrifugal machine, a revolving basket comprising a cover provided with a central hopper and feed-chutes, two body-casings, one solid and the other perforated, a bottom portion having openings between the points of attachment of the casings and having upwardly and downwardly extending flanges.

12. In a continuous centrifugal machine, the combination of a revolving basket supporting a horizontally-arranged worm-shaft, a spindle carrying a worm-gear which meshes with said worm-shaft, a vertically-reciprocating block mounted on and rotating with said spindle, mechanism interposed between said block and said worm-shaft for imparting rotary motion to said shaft, a non-rotatable ring carried in friction-bearings on the said reciprocating block, and an adjustable device for imparting a reciprocating motion to said ring and block.

13. In a continuous centrifugal machine, the combination with a rotating basket, of a horizontally-arranged worm-shaft supported by said basket, a ratchet-wheel fixedly attached to said shaft, a depending arm carrying a spring-pressed pawl loosely attached to said shaft, a reciprocating block, and mechanism between said arm and block whereby when the block is reciprocated the pawl and ratchet-wheel will revolve the worm-shaft.

14. In a continuous centrifugal machine, the combination with the series of bifurcated wings, of a series of scrapers located in said bifurcations, and resilient devices behind said scrapers.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM ALEXANDER WOOD.

Witnesses:
J. E. PEARSON,
J. H. FOSTER.