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J. BUCHANAN, Jr.

CENTRIFUGAL DRYING AND CLEANING MACHINE.

No. 189,185. Patented April 3, 1877.

Fig 1

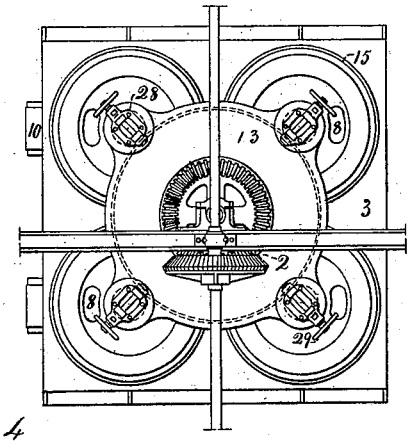


Fig 4

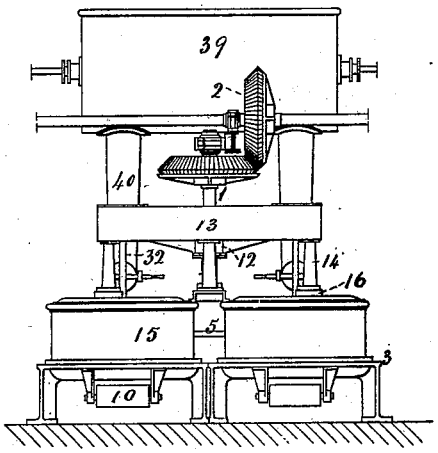
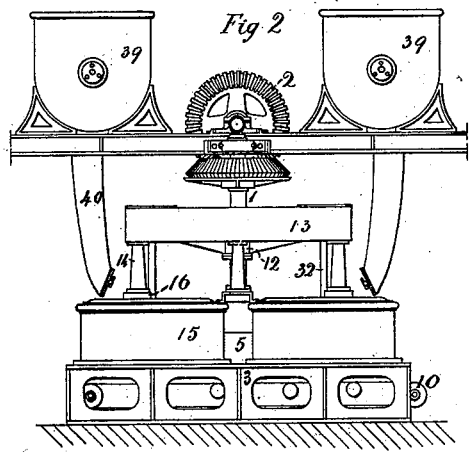


Fig 2



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2 Sheets—Sheet 2.

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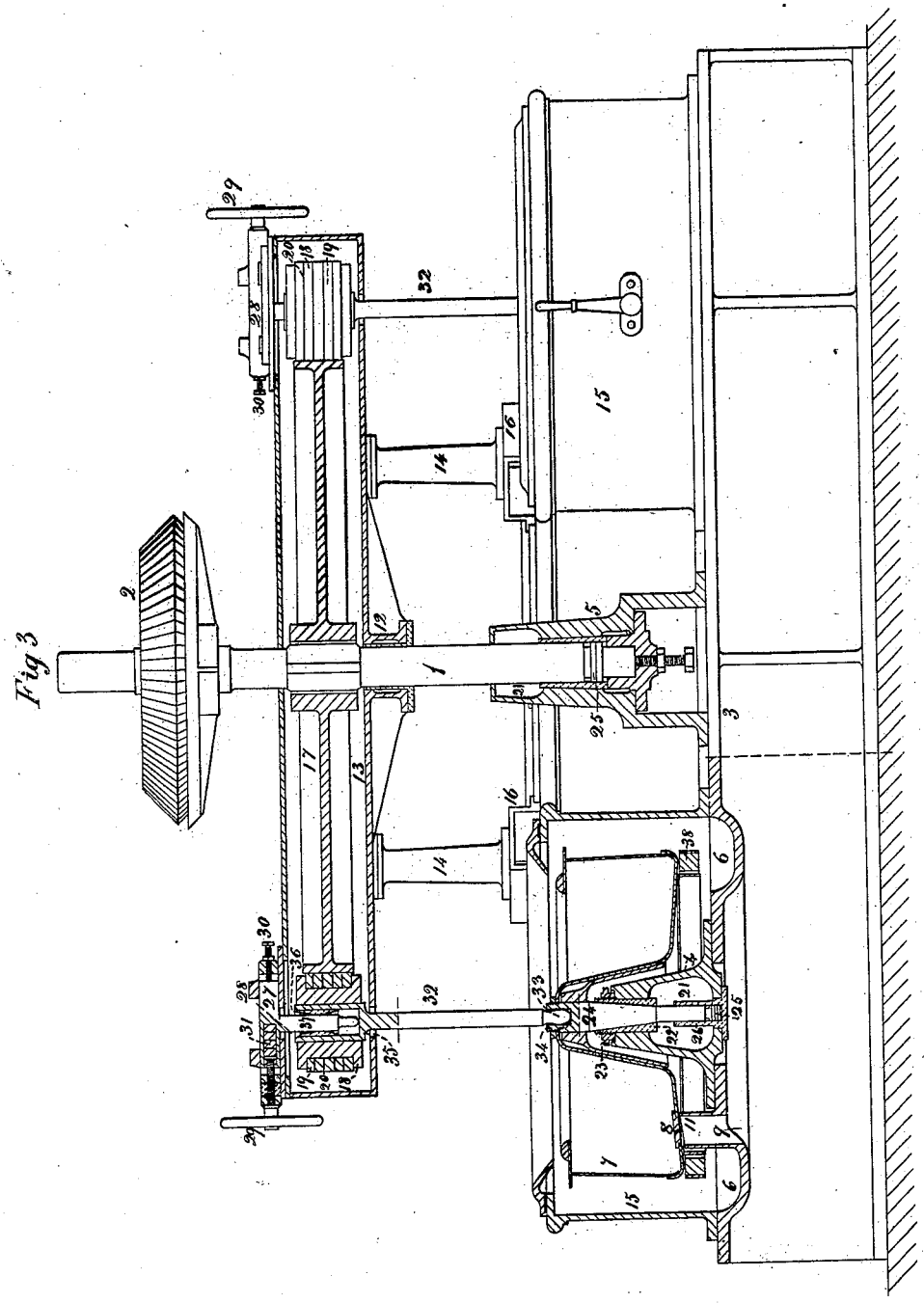
Fig 3



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UNITED STATES PATENT OFFICE.

JAMES BUCHANAN, JR., OF LIVERPOOL, ENGLAND.

IMPROVEMENT IN CENTRIFUGAL DRYING AND CLEANING MACHINES.

Specification forming part of Letters Patent No. **189,185**, dated April 3, 1877; application filed March 6, 1877.

To all whom it may concern:

Be it known that I, JAMES BUCHANAN, Jr., of Liverpool, in the county of Lancaster, England, engineer, have invented new and useful Improvements in Centrifugal Drying and Cleaning Machines, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

This invention relates to centrifugal apparatus used in drying sugar, cloth, cleaning rice, and drying and cleaning granular, fibrous, or powdery substances, wherein are employed—

First, as means for conveniently arranging a number of centrifugal cleaning and drying machines so as to occupy small ground space, and possess great compactness, in grouping the said machines circumferentially around a central driving-spindle.

Second, as means for relieving the machine-casings from strains transmitted by the motive power, in securing the said centrifugal machines to a sole-plate provided with bearings for the machine-spindles and driving-shaft.

Third, as means for carrying away easily and cleanly from machines arranged as above described, both the refuse matter and the finished material, in constructing or forming, in the sole-plate, discharge-channels for carrying off the sirup or liquid refuse, and openings through which the finished material is removed. The said openings are protected by ledges, so as to prevent the sirup or liquid refuse matter from intermixing with the finished or treated material while being discharged from the baskets or cages. The finished material, after passing through the discharge-openings, is received by an endless traveling band, truck, or like appliance.

Fourth, as means for supporting the top driving and machine spindle bearings, for preventing wind or draft from being caused by the rapid motion of the machinery, and for securely binding the whole of the parts together, in employing a system of casings, columns, and bridges in combination with the sole-plate.

Fifth, as means for driving centrifugal machines, arranged as above described, efficiently and regularly, for utilizing more efficiently the motive power, and for attaining great speed, in employing a large central friction driving-wheel, acting on small pulleys connected to the said centrifugal-machine spindles. I prefer that the pulleys on the centrifugal machines should be formed of compressed paper divided into layers by disks of metal tapering from the center outward, so that pressure between the pulley and driving-wheel when in gear shall tend to consolidate the paper.

Sixth, as means for securing efficient, continuous, and economical lubrication, in forming the bottom bearings with oil-reservoirs, from which the oil or other lubricant is caused to ascend and lubricate the working parts by the action of centrifugal force. Side channels are provided, by which the oil or lubricant may fall back into the reservoirs after having reached the top of the bearings, and thus keep up a continual circulation. The spindles or shafts rest on a series of plates having convex surfaces and oilways.

Seventh, as means for quickly starting and stopping the machines without arresting the motion of the prime mover, in providing adjustable carrying-pieces or bearings working in slides, whereby the driven pulleys may be independently thrown into and out of gear with the periphery of the driving-wheel.

Eighth, as means for keeping the driven pulleys in uniform friction contact with the driving-wheel, and for preventing vibration, in interposing between the carrying-pieces or bearings above mentioned and their actuating-gear india-rubber or other spring buffers or cushions.

Ninth, as means for reducing wear and tear in centrifugal machines arranged as above described, for allowing them to revolve freely when out of gear, and for freeing the bearings from strain, in securing the driven pulleys to an auxiliary or intermediate spindle connected by universal or free joints to the main machine-spindles at bottom, and working in or around bearings in the sliding or carrying pieces at top.

I prefer that the sliding or carrying piece should be provided with a rocking bearing, and that the auxiliary or intermediate spin-

dle should be formed with a cylindrical recess at top, to work around the said rocking bearing and contain oil or lubricant.

A friction-brake of usual or desired construction is employed to arrest the motion of the cages when out of gear. The said cages are constructed of wire-gauze or perforated material, in the ordinary way.

Figure 1 is a plan view; Fig. 2, a side elevation; Fig. 3, a sectional elevation, and Fig. 4 an end elevation, all of centrifugal cleaning and drying apparatus constructed under my invention.

Under the first head, 1 is the central driving-spindle, around which the centrifugal cleaning and drying machines are circumferentially grouped. Four machines so arranged are here shown. The driving-shaft 1 is operated through bevel-wheels 2 or other gearing. The said gearing may be on the top of the shaft 1, or the shaft may be carried down through the sole-plate and be driven from below.

Under the second head, 3 is the sole-plate constructed to carry four centrifugal machines, and provided with bearings 4 and 5 for the machine and driving-shaft spindles.

Under the third head, the sole-plate 3 is formed with channels 6, into which the sirup or liquid refuse expelled through the cages 7 collects, whence it is drawn off or discharged by means of cocks or otherwise, as desired. The cages 7 are fitted with doors 8, by means of which the cleaned or dried material can be allowed to pass down through the openings 9 to the traveling band 10, or other carrying apparatus. 11 are ledges or flanges around the openings 9, to prevent sirup or refuse from the channels 6 coming into contact with the cleaned or dried material while being discharged through the said openings 9.

Under the fourth head, the top bearing 12 of the driving-shaft and the top bearings of the machine-spindles are supported by the casing 13, which also serves to inclose the driving appliances. The casing 13 is supported by the columns 14, which rest on the bridges 16, attaching to and binding together the casings 15, which surround the cages 7, and serve, conjointly with the channels 6, to catch the refuse liquids.

Under the fifth head, 17 is a large friction-wheel secured to the central driving-shaft 1, for giving motion to the friction-pulleys 18 on the centrifugal-machine spindles. The pulleys 18 are formed of alternate layers of paper 19 and of metal disks 20, tapering from the center outward, all held together by the said metal core or boxes 18. Friction-pulleys constructed as above described, take a better hold on the driving-wheel, and are less liable to slip than are pulleys as ordinarily constructed.

Under the sixth head, 4 are the machine-spindle bearings, secured to the sole-plate 3, and provided with oil-reservoirs 21. 22 are loose conical bushes, fitting in the bearings 4, and held in position and adjusted for wear by the nuts 23. 24 are the machine-spindles, on which the cages 7 are hung. The said spindles are formed taper, fit the conical bushes 22, and rest on the metal plates 25, contained in the foot-steps 26. The foot-steps 26 are formed loose, as shown, so that the bottom of the machine-spindles can be inspected without being removed. The plates 25 are formed convex, and have grooves or ways to insure lubrication and prevent sticking and heating. A channel is provided from the top of each bearing to the reservoir, to allow any excess of oil raised by centrifugal force to flow back. In the central driving-shaft, 21 is the oil-reservoir. 25 are the convex plates.

Under the seventh head, 27 are adjustable carrying-pieces or bearings, working to and fro in slides 28 on the casing 13. The said carrying-pieces or bearings give a to-and-fro motion to the pulleys 18, by means of the hand-wheels and screws 29, or their equivalents, so as to throw the said pulleys into and out of gear with the driving-wheel 17. 30 are screws to regulate the amount of motion in the carrying-pieces or bearings 27, and consequently to limit the pressure applied by the hand-wheels.

Under the eighth head, india-rubber or other springs 31 are interposed between the gearing 29 and the carrying-pieces or bearings 27, so as to prevent vibration and keep the driving and driven pulleys in equal friction contact.

Under the ninth head, auxiliary or intermediate spindles 32 are employed to convey motion from the pulleys 18 to the main machine-spindles 24. The said spindles 32 are connected to the main spindles 24 by means of the spherical joints 33, fitting in the cups 34, the parts being connected together by pins. The tops 35 of the said spindles 32 carry the pulleys 18, and are formed hollow, so as to hold oil or lubricant. They work around the rocking bush 36, attached to the stem 37 on the carrying-pieces or bearings 27. By the above arrangement of parts the to-and-fro motion of the pulleys 18, when being thrown into and out of gear, does not affect the steadiness of motion of, or throw any strain on, the cage-carrying spindles 24. 38 are friction-brakes to arrest the motion of the cages when out of gear. 39 are coolers for holding and mixing sugar or other material to be treated. 40 are spouts for conducting the said material to the cages. Other means may be employed.

Having now particularly described my said invention, I claim—

1. A group of centrifugal cleaning and drying machines, arranged circumferentially around a central driving-spindle, and in combination therewith, substantially as and for the purposes set forth.

2. The centrifugal machines arranged equally around the circumference of the central shaft, and in combination therewith, so as to obtain an equal pressure in all directions, substantially as and for the purpose specified.

3. The combination of centrifugal machines, arranged circumferentially around a central driving-shaft, with a sole-plate provided with bearings for the machine and driving-shafts, substantially in the manner and for the purposes set forth.

4. The casing 13, columns 14, bridges 16, and casings 15, in combination with the sole-plate 3, substantially as and for the purposes set forth.

5. In a centrifugal machine, the friction-pulleys of compressed paper 19, divided into layers by metal disks 20, tapering from the center outward, substantially as and for the purposes set forth.

6. The combination of the bearing 4, oil-reservoir 21, conical bushes 22, adjusting-nut 23, spindle 24, convex plates 25, foot-step 26, and adjustable carrying-pieces 27, substantially as and for the purpose set forth.

7. The combination of bearing 5, oil-reservoir 21, convex plates 25, and loose foot-step 26, substantially as and for the purpose specified.

8. The combination of pulley 18, casing 13, adjustable carrying-pieces 27, slides 28, and adjusting-screws 29, substantially as and for the purpose specified.

9. The combination of the pulley 18, the casing 13, the carrying-pieces 27, slides 28, adjusting-screws 29, and limiting-screws 30, substantially as and for the purpose specified.

10. The combination of the carrying-pieces or bearings 27 and hand-wheel and screw 29 with springs 31, substantially as and for the purposes set forth.

11. The combination of the auxiliary or intermediate spindles 32 with the main spindles 24 and carrying-pieces or bearings 27, for the purposes set forth.

12. The driven pulleys 18, secured to the auxiliary spindles 32, and arranged substantially as set forth.

13. The combination of the spindles 32 and 24 with the joint 33 34, arranged, connected, and combined substantially as and for the purposes set forth.

14. The combination of the stems 37, rocking bushes 36, spindles 32, and cups 35, substantially as and for the purposes set forth.

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Witnesses:
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W. B. JOHNSON.