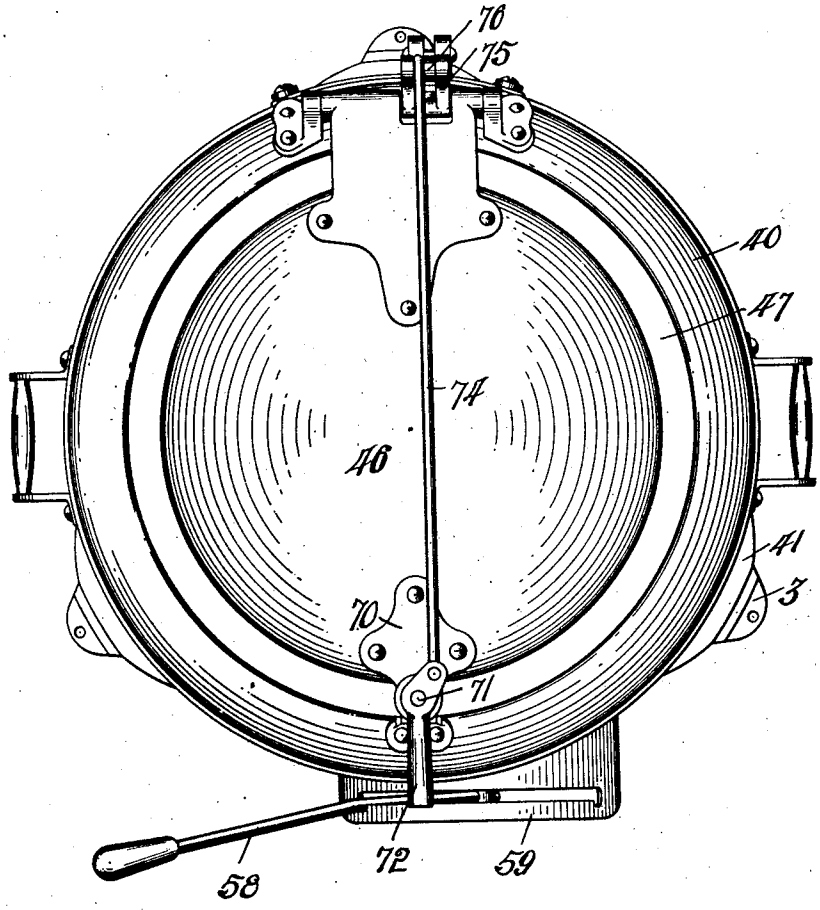
Nov. 27, 1928. 1,692,804

W. E. BOCK

CENTRIFUGAL MACHINE

Filed Aug. 24, 1923 4 Sheets-Sheet 1

Fig. 1



INVENTOR.

William Emil Bock.

By Owen Owen & Crampton.

Attys.

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Fig. 2

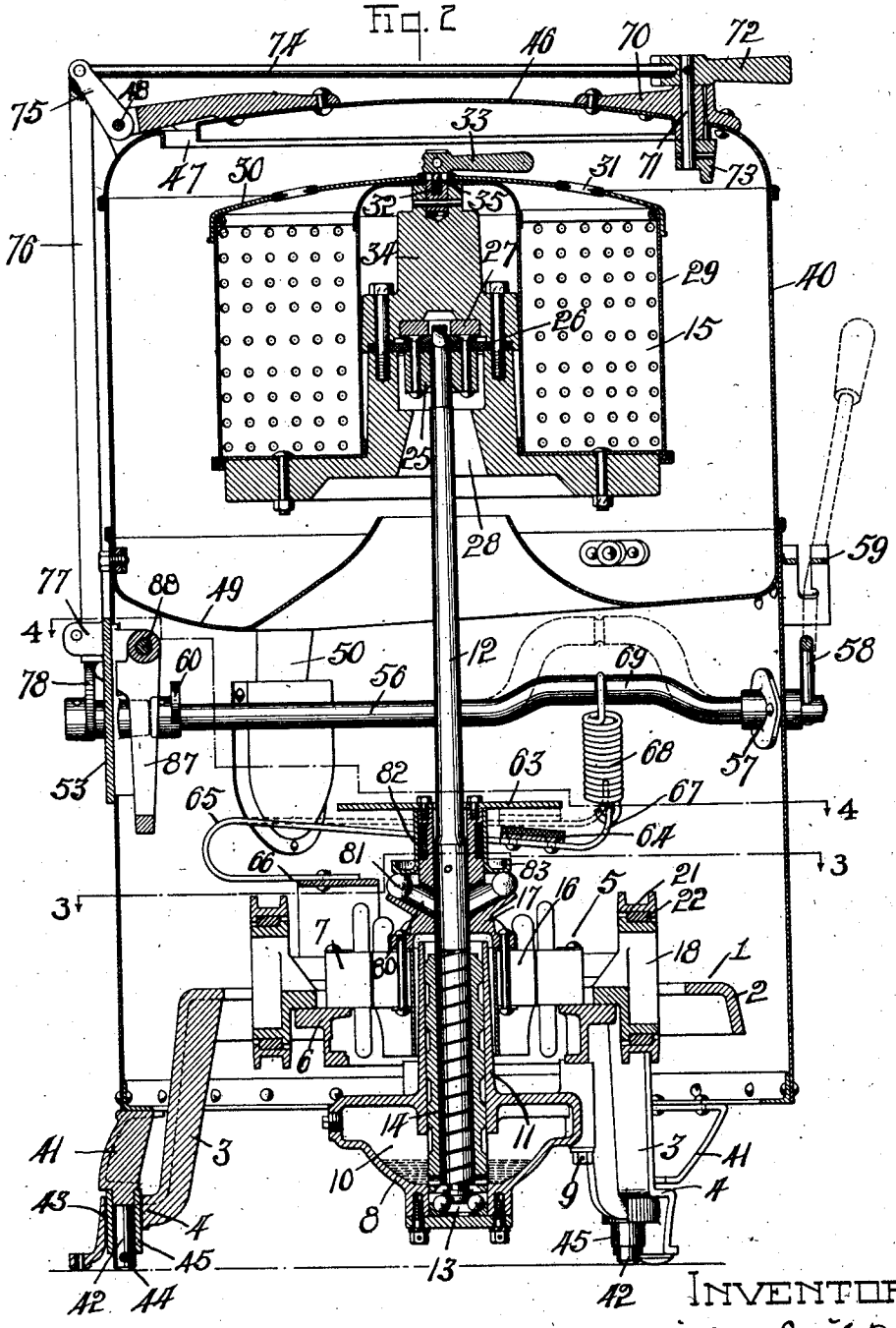

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Fig. 3

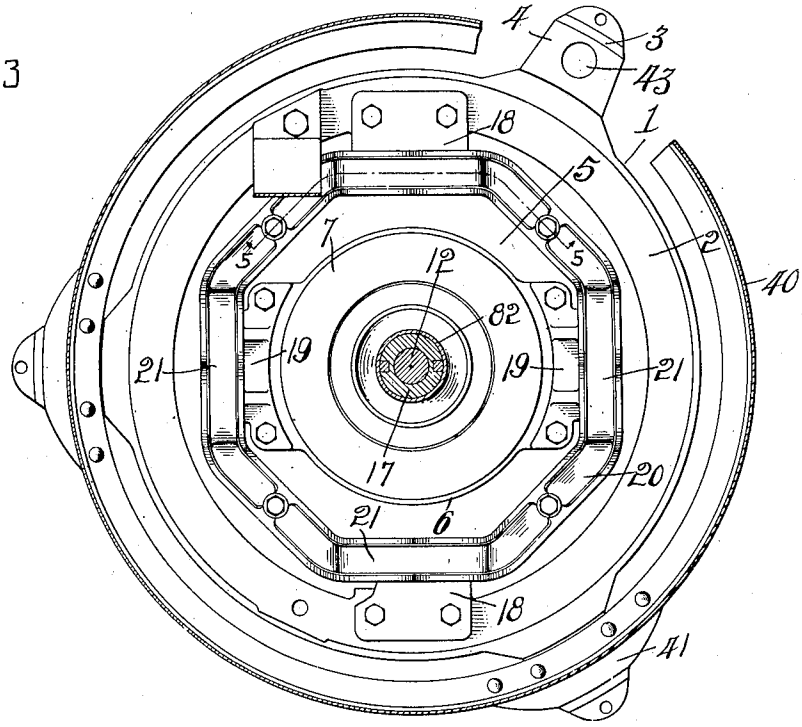

Fig. 4

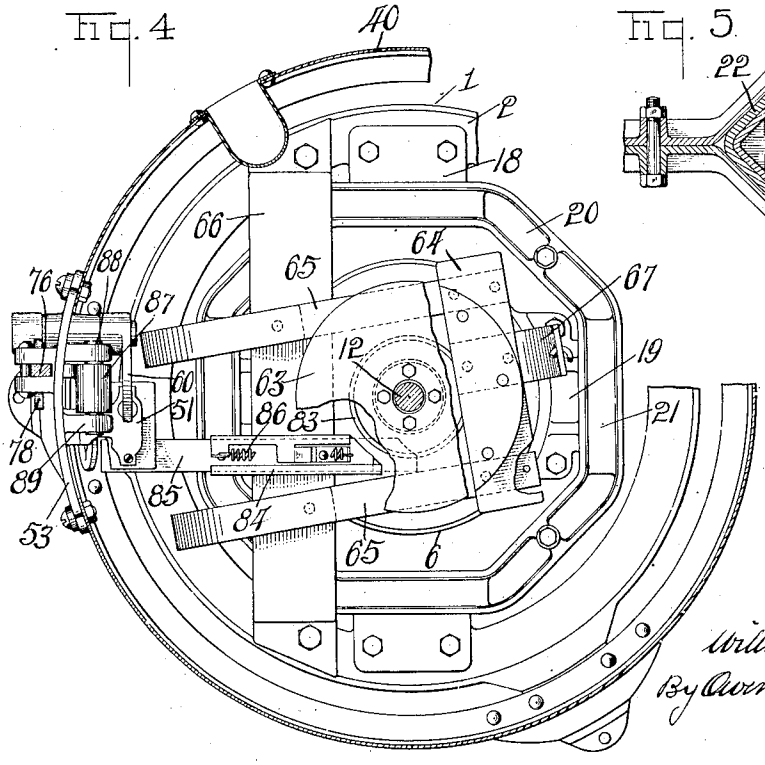

Fig. 5

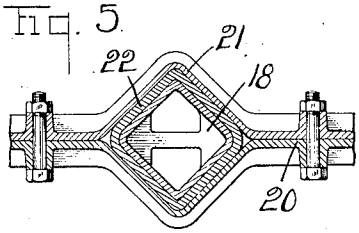

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Fig. 6.

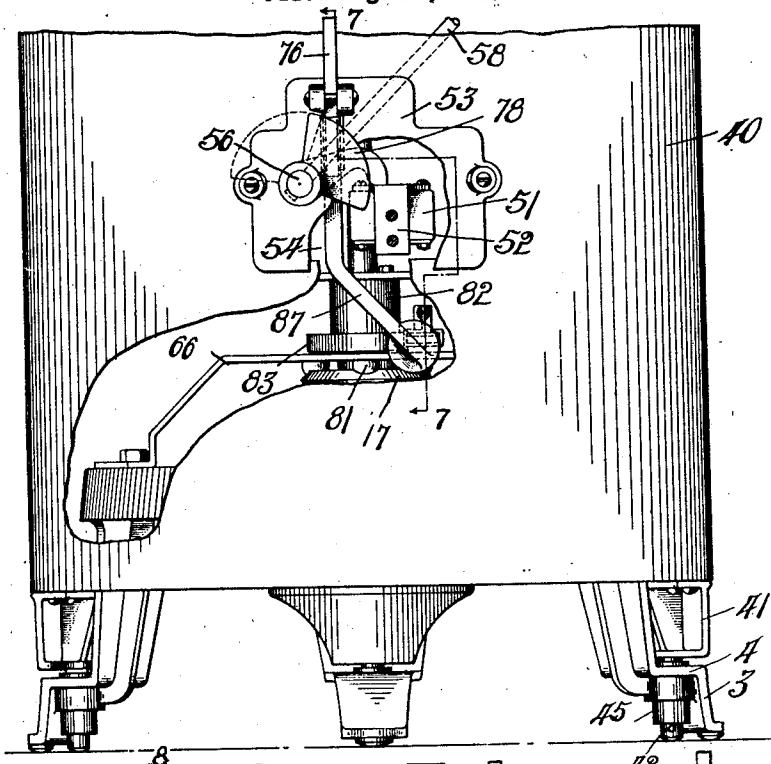


Fig. 7.

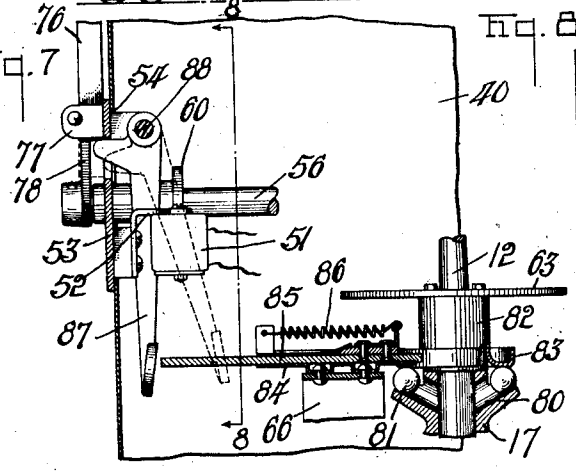


Fig. 8

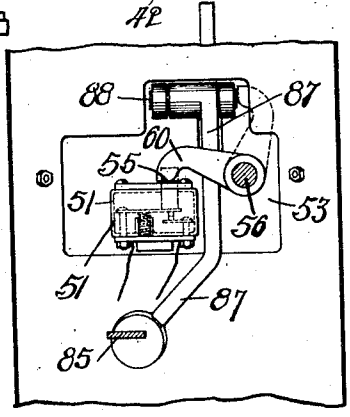
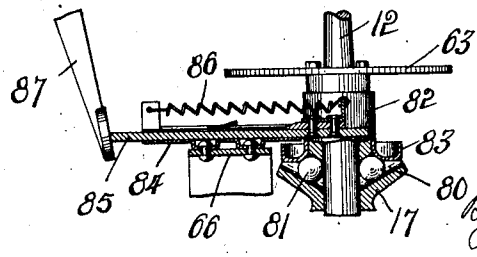


Fig. 9



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Patented Nov. 27, 1928. 1,692,804

UNITED STATES PATENT OFFICE.

WILLIAM EMIL BOCK, OF EAGLE POINT COLONY, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE BOCK LAUNDRY MACHINE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

CENTRIFUGAL MACHINE.

Application filed August 24, 1923 Serial No. 659,120.

This invention relates to centrifugal machines, and particularly to those adapted for the extraction of liquids from material or matter containing the same. It also relates to certain improvements, refinements and safety features for use in connection with the apparatus described and claimed in my Patent No. 1,483,326, issued February 12th, 1924.

An object of my invention is the provision of locking means for one or more parts thereof, which will render the machine absolutely safe for use by inexperienced or careless persons. To accomplish this, means, operable by the control for the driving motor, is provided and locks the enclosing means to prevent access to the rotating parts, except when the motor control is in off position; and means is also provided to prevent access to the rotating parts except when such parts are at rest. Other objects and advantages of the invention will be apparent from the following detailed description thereof.

While each of the novel features of the machine in its broader aspect is capable of embodiment in numerous forms, a machine including a preferred or one embodiment of each of the different features is illustrated in the accompanying drawings, in which,

Fig. 1 is a top plan view of the apparatus embodying the invention in closed operating position. Fig. 2 is a central vertical section of the apparatus. Figs. 3 and 4 are cross sections on the lines 3—3 and 4—4 respectively, in Fig. 2, with parts broken away. Fig. 5 is a section on the line 5—5 in Fig. 3. Fig. 6 is a rear side elevation of the lower portion of the machine with parts broken away and with the control lever and associated parts in operating position. Fig. 7 is a section on the line 7—7 in Fig. 9. Fig. 8 is a section on the line 8—8 in Fig. 7, and Fig. 9 is a fragmentary section similar to Fig. 7, with the parts in normal at rest position.

Referring to the drawings, 1 designates a pedestal or base comprising, in the present instance, a ring-like top portion 2 and a plurality of supporting legs 3 extending down from the top and each having an outwardly offset portion 4 adjacent to its foot for the purpose hereinafter described.

An electric motor 5 is mounted in the pedestal 1 for yielding universal rocking movements relative thereto, as hereinafter described, with its rotor axis normally vertically disposed. The motor frame 6, which carries the field 7, has its top preferably open or devoid of the customary shaft bearing and has at its under side a frame-part 8, which is secured at several points around the same to the frame 6 by bolts 9. The frame-part 8 forms an oil chamber 10 therein and has a sleeve 11 extending upward therefrom through the frame 6 axially thereof, preferably to a point above the same. An upright shaft or spindle 12 is journaled at its lower end portion in the sleeve bearing 11 with its lower end resting on a step bearing 13 so that it is free to rotate within the frame, but is prevented from lateral movements relative thereto. A bushing 14, in the present instance, is provided between the sleeve bearing 11 and shaft 12. The shaft 12 projects a distance above the motor and carries at its upper end a container 15 for universal rocking movements relative thereto.

The rotor 16 of the motor is mounted for free rotation within the field 7 around the sleeve 11 concentric therewith, and has at its upper end a head 17 which is mounted around the shaft 12 and rigidly pinned or otherwise secured thereto for rotation therewith. The motor 5 is mounted for yielding movements to permit substantially free lateral rocking movements of the shaft 12 projecting therefrom, and the rocking center of the motor and shaft preferably substantially coincides with the center of mass of the motor. A simple and efficient form of mounting for this purpose consists in providing the pedestal 1 at opposite sides of its top portion 2, in diametrically opposed relation, with a pair of inwardly projecting bearing brackets 18 having inner bearing ends, in the present instance, of rectangular form in cross-section, as best shown in Figs. 3 and 5. The motor frame 6 is provided on its periphery in dia-

metrically opposed relation with a pair of radially projecting bearing brackets 10 projecting from the frame at right angles to the diametrical line of the brackets 18 and having their outer ends preferably squared or of rectangular form, the same as the ends of the brackets 18. A ring member 20 freely encircles the motor frame circumferentially thereof and is provided therearound with four equidistantly spaced squared or rectangular loop portions 21 and each adapted to receive the free end portion of one of the brackets 18 and 19 together with a band of rubber 22 or other suitable yielding material disposed between the bracket and loop. It is important that the cushion means 22 support the motor in such manner as to act as centralizing means which normally tends to hold a motor with its shaft in upright or vertical position. The yieldability of the motor support, however, enables the motor to automatically and freely adjust itself to the forces set up during rotation by reason of the center of gravity of the load being offset from the shaft axis, and as soon as the shaft is relieved of such forces, it returns to normal vertical position.

The container 15 for the clothes or other material to be acted on is mounted centrally of its bottom on the upper end of the shaft 12 for rotation therewith and for limited universal rocking or floating movement relative thereto. For this purpose any suitable flexible joint connection between the two may be employed. A simple and efficient joint of this character which is used in the commercial machine consists of a collar 25 mounted on the upper end of the shaft and having a flexible disk 26 of leather, canvas or other suitable flexible material fixedly attached to an end thereof near its center with its outer or marginal edge portion secured to the bowl in spaced relation to the collar 25, as shown in Fig. 2. The major weight of the container on the collar 25 is sustained by a yielding member 27 of rubber or other suitable material disposed between the upper end of the collar 25 and container. This joint permits a free rocking of the container relative to the shaft to permit its rocking movement to respond to the forces set up when the container is being driven under unbalanced conditions. The flexible joint for the container is disposed within a central bottom socket 28 of the container so that the center of gravity of the container is disposed below the rocking center thereof, thereby causing the container to be in stable equilibrium with respect to the shaft. The container is also weighted in its bottom and central portion in such manner that the major portion of its weight is concentrated near its center. This feature keeps the starting torque low, which is an important item as it enables the motor to be smaller than otherwise required. The weight of the container also constitutes a means which is centrifugally operated to rock the container into symmetrical or balanced relation to the plane of rotation, as fully set forth in my said former application.

The outer peripheral wall 29 of the container is perforated to permit the centrifugal discharge of liquid from within the container and the top of the container is closed by a cover 30, which seats at its outer edge closely down over the upper edge of the wall 29. The cover has a plurality of openings 31 which facilitate grasping the same to remove it from the container, and is provided at its center with an opening through which a stud 32 and clamping lever 33 freely project when the cover is mounted on the container. The stud 32 projects upward from the central weighted portion 34 of the container and the lever 33 is pivoted thereto. When the lever is swung into upright position it longitudinally aligns with the stud 32 and permits a removal of the cover from the container, and when the lever is thrown to reclining position, as shown in Fig. 2, it engages the top of the cover and securely holds it against removal. A spring pressed detent 35 in the stud 32 acts on the lever to yieldingly retain it in either position of its movement.

An enclosing shell or casing 40 is provided for the operating parts of the apparatus. The shell is open at its lower end and has supporting brackets or legs 41 projecting downward therefrom and provided with foot studs 42 which project loosely down through openings 43 in respective leg portions 4 of the pedestal legs 3, and rest on the subjacent floor or other support so that each, the shell and the pedestal, has an independent support. A pin 44 is projected through each foot stud 42 with its ends projecting therefrom, thereby preventing a removal of the studs from the pedestal leg openings and enabling the shell and pedestal and associated parts to be moved as a unit. In order to prevent a noisy rattling due to the connecting of the shell and pedestal together and a vibration thereof when the machine is running, each foot stud 42 has a sleeve 45 of rubber or other sound deadening material mounted thereon within the opening 43, and the opening is preferably of sufficient size so that a space is left between its wall and the bushing. It is found in practice that this construction effectually prevents noise and rattling of the parts and at the same time provides a simple manner of connecting the parts to retain them in assembled relation.

The upper end of the casing extends above the container 15 and is open except for a cover 46 for closing the same. This cover is hinged to one side of the top opening 47 of the casing at 48. An annular trough member 49 is provided internally of the casing 40 below the container, being attached to the casing wall,

and is adapted to catch the liquid thrown from the container and to direct it to a drainage tube 50 projecting downward from the trough bottom and to a suitable point of discharge without the casing. The member 49 has its central portion open to provide a free space through which the shaft 12 projects and within which it may oscillate.

An electric control switch 51 for the motor is mounted within the casing 40 at one side thereof, being carried by a bracket 52 that projects from a plate 53 through an opening 54 in the rear side of the casing below the trough 49. The switch 51, which is conventionally illustrated in Fig. 8, is in the present instance of a normally open type and its movable contact member is moved to circuit closing position by the depression of a button 55, which normally stands in projected position. A rock shaft 56 extends crosswise of the casing 40, being journaled at its rear end in the plate 53 and at its forward end in a bearing 57 projecting through the casing front. A control lever 58 projects transversely of the forward end of the shaft 53 at the outer side of the casing 40 and operates in a slotted guide 59 secured to the casing. The slot of this guide is offset at each end to provide seats in which the lever 58 rests when at either limit of its throw, which may be designated as the "on" and "off" positions of the switch. The lever has a sufficient spring action to normally seat in either offset portion of the guide slot so as to require a slight lateral pressure to move it from seated position. The shaft 56 has an arm 60 projecting therefrom over the push button 55 of the switch and when the lever and its shaft are thrown to the full line position shown in the drawings, the arm 60 presses down on the button 55 and closes the switch.

The head 17 which is fixed to the shaft 12 is provided at its upper end with a brake disk 63 disposed in concentric relation to the shaft and adapted to be engaged by a brake member 64 to stop the rotation of the shaft and other driven parts when the current is thrown off. The brake member 64 in the present instance, is disposed below the brake disk 63 at one side of the shaft and is carried by the looped or cross-bar portion of a U-shaped carrying yoke 65, the legs of which straddle the head 17 and have their free end portions turned back under themselves and fixedly mounted on a cross-bracket 66, which extends over the motor 5 and is mounted at its ends on the pedestal frame 2. The yoke 65, due to its manner of mounting, constitutes a spring support for the brake member 64 and tends to normally hold the brake member lowered from braking engagement with the brake disk 63. A tongue 67 projects outward from the closed end of the yoke 65 and is connected by a coiled contractile spring 68 to an offset or crank portion 69 of the shaft 56. The connection between the yoke and shaft and the position of the crank 69 with respect to the shaft axis are such that when the control lever 58 and shaft 56 are thrown to the "off" position indicated by the dotted lines in Fig. 2, the brake member 64 will be drawn up into braking coaction with the disk 63, thereby acting to quickly stop the rotation of the driven parts. With the construction of brake shown it is apparent that the brake member 64, its mounting and operating means are permanently under tension even when the former is not thrown into braking engagement with the disk 63, thereby avoiding loosely connected parts and the consequent liability of noise incident to the vibration thereof when the machine is running at speed. This is an important feature in machines of this class.

It is important in machines of this class to prevent access to the interior of the casing 40 when the rotatable parts are being driven thereby preventing danger of accident to the user of the machine or other persons, due to engagement in any manner with the rotating parts of the machine. To accomplish this I provide a lock for the cover 46 that is connected both to the motor circuit control and to a rotating part of the device to prevent an opening of the cover except when the control lever 58 is in its off position and the rotatable driven parts are at rest.

For this purpose the cover, in the present instance, is provided at its free edge in opposed relation to its hinge with a casting 70 having a vertical spindle 71 rotatably mounted therein adjacent to the wall of the casing opening 47. The upper end of the spindle 71 has a control-handle 72 fixed thereto and the lower end of the spindle has a catch member 73 fixed thereto and adapted to be turned under the lower edge wall of the opening 47 to prevent an opening of the cover. The handle 72 is of lever form and is connected at its inner end by a rod 74 to the upper end of a link member 75 which, in the present instance, is of U-form (Fig. 1) and is rockably mounted at its looped end on the pivot pin 48 of the cover. A rod or bar 76 extends down from the outer end of the link 75 at the rear of the casing 40 and is caused to have predetermined vertical reciprocatory movements when the handle 72 is turned. The lower end of the bar 76 passes through a guide 77 projecting from the plate 53 that is secured to the back of the casing 40. The control shaft 56 is provided on its rear end with a segment 78 disposed under the lower end of the bar 76. This segment is so arranged and is of such length that its periphery is intended to coact with the lower end of the bar 76 and prevent any lowering movement thereof except when the control lever 58 is in its "off" position. In other words, when the lever 58 is in its "off" position, or that

indicated by dotted lines in Fig. 5, the segment 78 is out of coacting register with the bar 76, thereby permitting a raising of the cover 46, and when the lever has been moved from such position sufficiently to throw on the motor current the segment is moved under the bar 76 and prevents any cover opening movement of such bar until the control lever has again been returned to "off" position.

The means above described prevents an opening of the cover except when the control lever is in "off" position, and the means which prevents an opening of the cover when the driven parts of the machine are rotating will now be described. The head 17 that is fixed to the shaft 12 has a plurality of ball receiving race-ways 80 extending up at a slight incline and outward in a radial direction therefrom in each of which a ball or other element 81 is mounted to be acted on by centrifugal force to move outward in its race-way when the shaft is rotated. The portion of the head 17 above the race-way 80 is of reduced cylindrical form and a sleeve 82 is mounted thereon for free reciprocatory movements longitudinally of the shaft. The lower end of the sleeve 82 is flanged outward a distance and then upward to form an enlargement 83 for seating on the tops of the centrifugally operated elements 81. It is evident that an outward movement of the elements 81 up the inclined guide-ways will effect a predetermined raising of the sleeve 82 resting thereon. A guide bracket 84 is mounted on the top of the bracket 66 and guides the reciprocatory movement of a slide-bar 85, the inward movement of which is limited by reason of its inner end striking the peripheral portion of the sleeve enlargement 83 when the sleeve is in the raised position, which it assumes when the elements 81 are in outwardly thrown position, as shown in Fig. 7. When the sleeve 82 is in its lowered or "at rest" position, the enlargement 83 thereof is disposed below the plane of movement of the slide-bar 85 and such bar is thus permitted to move inward over said enlargement, as indicated by the dotted line position of the same in Fig. 4.

The slide-bar 85 is normally held at the limit of its outward movement by a coiled contractile spring 86 which is connected at one end to the bar near its forward end and at its other end to the bracket 84. A lever or trigger member 87 of bell crank form is pivoted within the casing 40 at 88 to bearings 89 projecting inward from the plate 53 and the short arm of this lever projects outward through a registering opening in the plate 53 under the lower end of the bar 76 so that the lever is rocked when the bar is moved downward by an opening of the cover. The other arm of the lever extends downward within the casing 40 and terminates without the outer end of the slide-bar 85 in position to cause an inward movement of the slide-bar when the lever is rocked by an opening of the cover. If the driven parts of the machine are rotating the stop sleeve stands in its uppermost position with the enlargement 83 thereof in the path of movement of the slide-bar 85, thus preventing an inward movement of such bar and a consequent opening of the cover 46 until the rotative parts are at rest.

During the experiments which were carried on during the construction of this machine it was found that when the container 15 was disposed within an enclosing case and driven at speed, the container had a bad rocking and rebounding action that was detrimental to the operation of the machine, such action being due, it is believed, to the confining of air within the casing between it and the drum periphery, which air was rapidly driven around within the casing and created an air cushion that acted on the container to cause it to rebound from one side to the other of the casing and sometimes to strike the sides of the casing, although spaced a considerable distance from the container when the latter was in normal position. It was found that this objectionable action could be entirely prevented by providing an air relief through the casing wall at a point or points without the periphery of the container. It was not practical, however, to provide such relief around the peripheral wall of the container inasmuch as such wall must be imperforate to prevent the passage therethrough of liquid thrown outward from the container, and the relief was therefore provided in the top portion of the casing by making the top opening 47 sufficiently large to provide a relief space between it and the peripheral edge of the cover 46. This relief opening or at least a portion thereof should be disposed without the periphery of the container as otherwise it is found that the results are not satisfactory.

In the use of my machine the operator places wet clothes or other articles or material from which liquid is to be extracted into the container 15, and does not need to take any particular care in so placing the material within the container that its weight is substantially equally distributed around the container axis, as any unbalanced condition of the material load and of the container will be taken care of by the automatic balancing action of the machine, as fully set forth in my said former application. The material to be operated on having been placed in the container the cover 30 is placed thereon and the handle 33 thrown over to reclining position to prevent an accidental removal of the cover. The outer casing cover 46 is then closed and the handle 72 thrown to position to place the catch 73 in holding engagement

with the adjacent casing wall. The control lever 58 is then thrown from its "off" position to its "on" position, to actuate the motor switch 51 to close the motor circuit and start the rotation of the motor driven parts. This movement of the control lever places the segment 78 in stop relation to the bar 76 to prevent an opening of the cover until the control lever has again been returned to its "off" position. Substantially at the start of the rotation of the shaft 12 the centrifugally operated elements are thrown outward, effecting a raising of the sleeve 82 to place its enlargement 83 in stop relation to the slide bar, thus preventing the lever 87 from being rocked inward and consequently preventing a raising of the cover 46 due to the lower end of the bar 76 acting against the short arm of the lever 87. When the container has been rotated for a sufficient time to effect the desired centrifugal separation of liquid from the contents the operator turns off the power by throwing the control lever 58 to its "off" position and the movement which is thus imparted to the control shaft 56 causes a raising of the brake member into braking coaction with the brake disk 63, and this braking coaction of the two is maintained until the control lever is again thrown to position to start the motor. This braking action causes the rotating parts to quickly come to a stop and when such parts are practically at rest the centrifugally operated elements 81 return to their normal position and permit lowering of the sleeve 82 out of obstructing relation to the slide-bar 85. The operator is now free to turn the handle 72 and release and open the cover 47. When the cover is opened the lower end of the bar 76 moves down at an end of the segment 78 and coacts therewith to lock the control parts against movement to motor starting position until the cover 46 has again been closed and the handle 72 turned to locking position.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of apparatus, as the different features of novelty constituting the present invention may be modified in different ways and are capable of separate use without departing from the spirit of the claims.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is,—

1. In combination, a driven mechanism, an enclosing case for the same having a cover, a manually operated control means for the mechanism having a rockable segmental part movable therewith, means for locking the cover in closed position, and means connected to said locking means and adapted to coact with the segmental member of the control means both to prevent an unlocking of the locking means and an opening of the cover when the control means is in on position and to prevent a movement of the control means to operate the mechanism when the cover is in open position.

2. In combination, a driven mechanism, an enclosing case for the same having a cover hinged thereto, a rotatable lock carried by the cover for engagement with the case to prevent opening of the cover, a reciprocally movable rod disposed at one side of the case, connection between said rod and lock whereby rotary movements of the lock and also swinging movements of the lock with the cover in an opening or closing of the latter will impart reciprocatory movements to the bar, a drive means for the mechanism, and a manually operable control means for the drive means mounted for rocking movements and when in one position coacting with said bar to prevent movements thereof either to permit releasing of the lock or an opening movement of the cover.

3. In combination, a driven mechanism, a drive motor therefor, an enclosing case for the mechanism having a hinged cover, a manually controlled locking means for the cover, a bar reciprocally movable at one side of the case and connected to the locking means whereby both swinging movements of the cover and controlling movements of the locking means impart reciprocatory movements thereto, a manually operable rockable control for the motor having a segmental part which coacts with the bar to prevent cover releasing movements of the locking means and swinging movements of the cover when the control means has been moved a predetermined extent from its off position and which coacts with the bar to prevent a movement of the control means to on position when the cover is opened.

4. In combination, a driven means, an enclosing case for the means having a cover capable of opening to permit access thereto, a manually controlled locking means for the cover having a reciprocally movable member, a lever having an arm engaging said member and operable when in one position of its movement to prevent cover releasing movements of the locking means, movable means normally standing in one position of its movement and adapted when held in such position to coact with said member and prevent cover releasing movements of said locking means, and means centrifugally operated by said driven means to move a part thereof into the path of movement of said movable means to hold it in its normal position of movement until the speed of movement of the driven means has been reduced a predetermined extent.

5. In combination a driven means, an enclosing case for the means having a part capable of opening to permit access to said

means, a manually controlled locking means for the cover having a reciprocally movable member, movable means normally standing in one position of its movement and adapted when held in such position to coact with said member and prevent cover releasing movement of said locking means, and means centrifugally operated by said driven means to move a part thereof into the path of movement of said movable means to hold it in its normal position of movement until the speed of movement of the driven means has been reduced a predetermined extent.

In testimony whereof, I have hereunto signed my name to this specification.

WILLIAM EMIL BOCK.