Dec. 19, 1922. 1,439,676.

W. W. HARTMAN.

REGULATABLE SUGAR WASHING APPARATUS.

ORIGINAL FILED MAY 19, 1919. 5 SHEETS—SHEET 1.

Fig. 1.

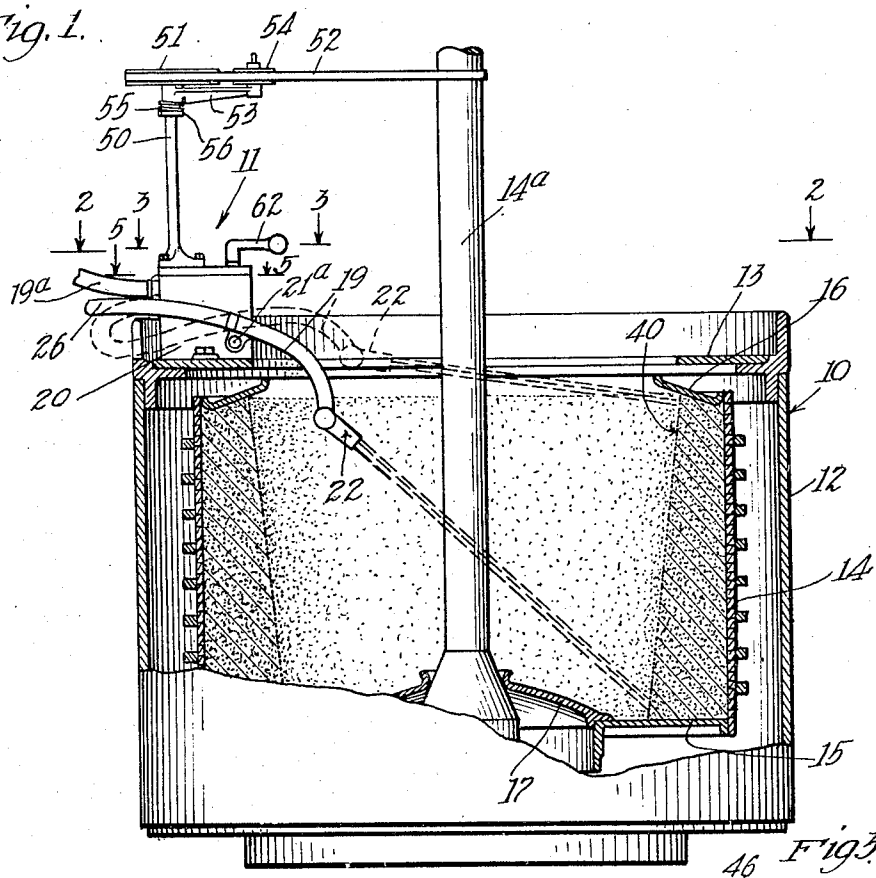


Fig. 2.

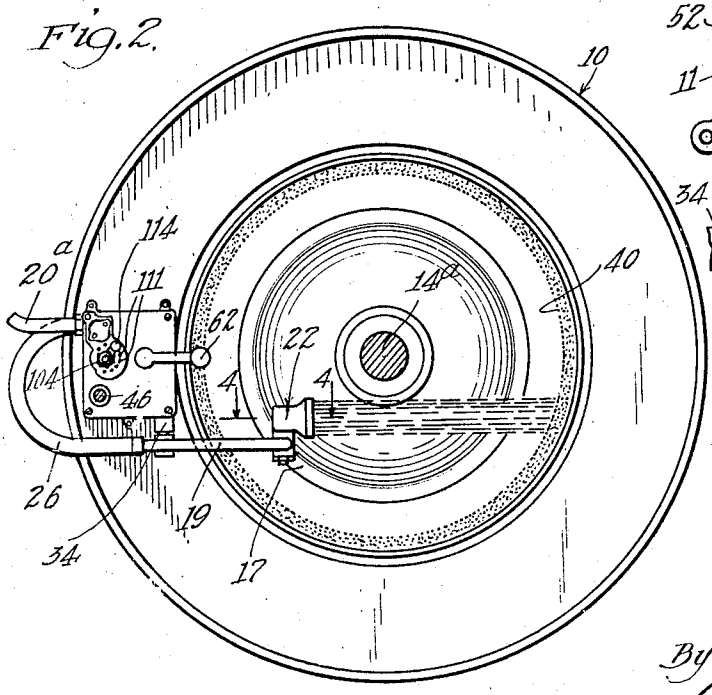


Fig. 3.

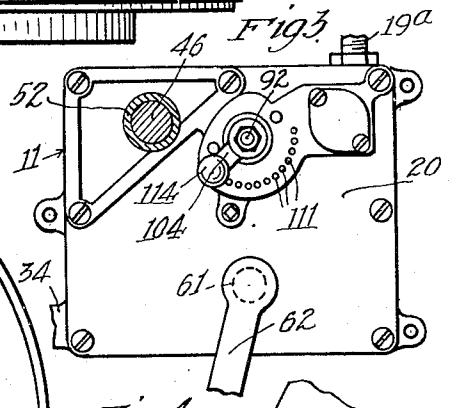
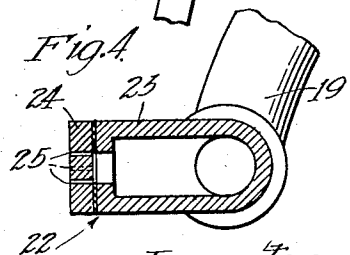


Fig. 4.



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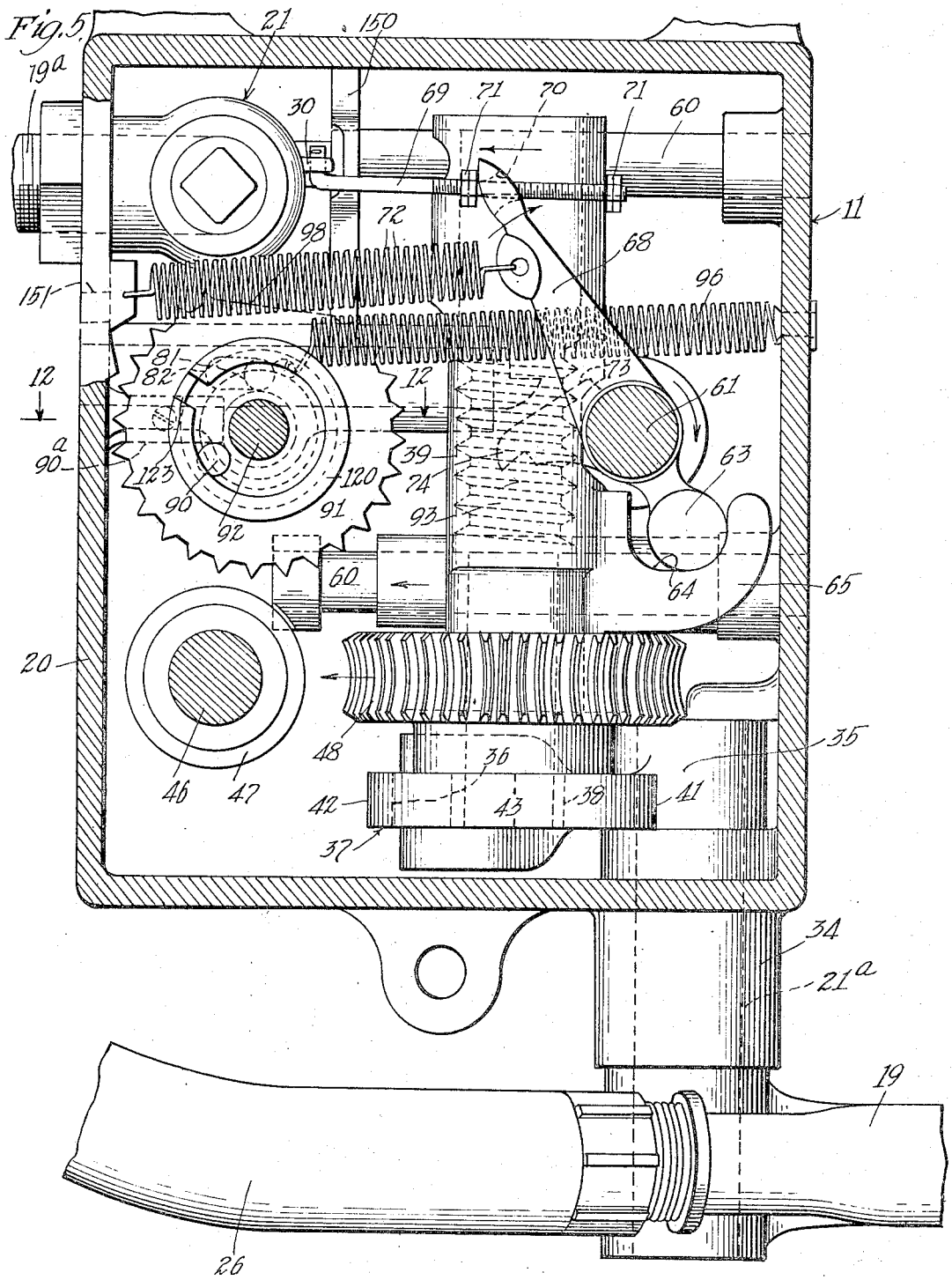
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REGULATABLE SUGAR WASHING APPARATUS.

ORIGINAL FILED MAY 19, 1919. 5 SHEETS—SHEET 2.

Fig. 5.



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REGULATABLE SUGAR WASHING APPARATUS.

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Fig. 6.

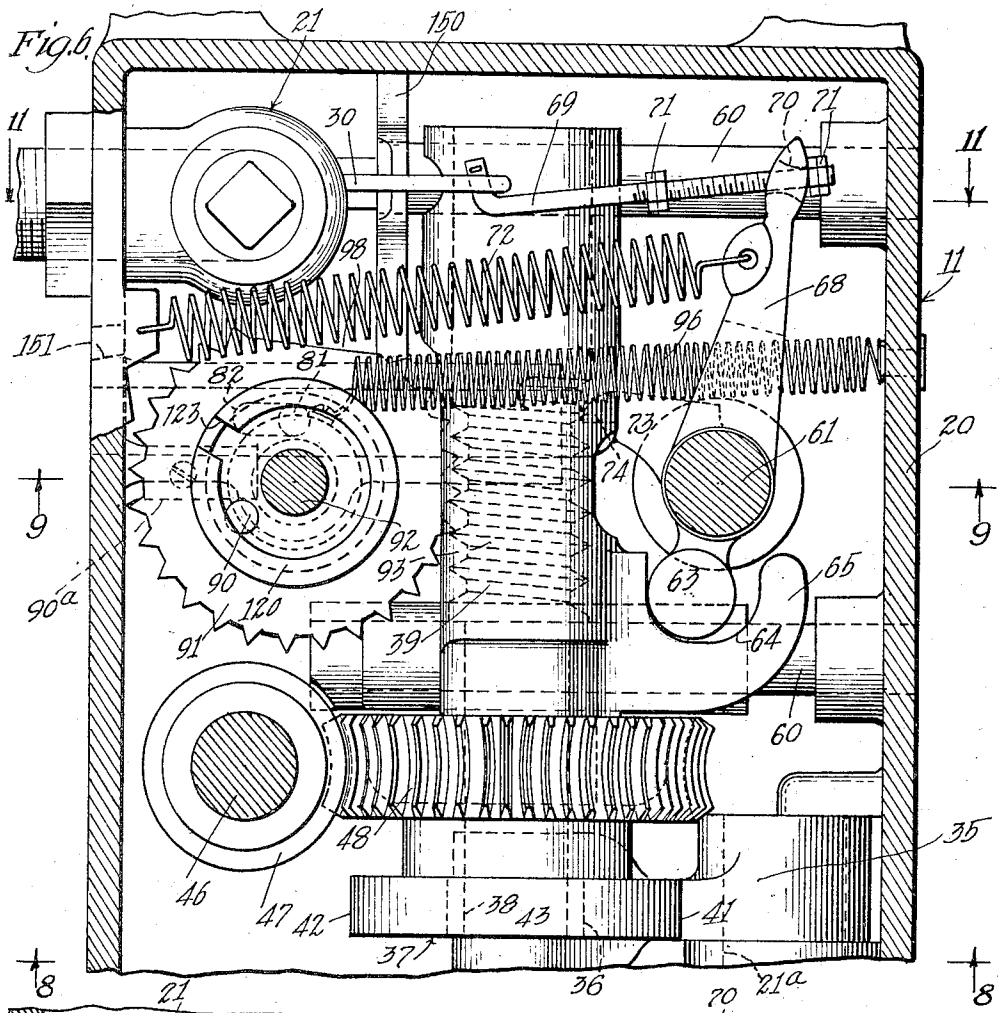
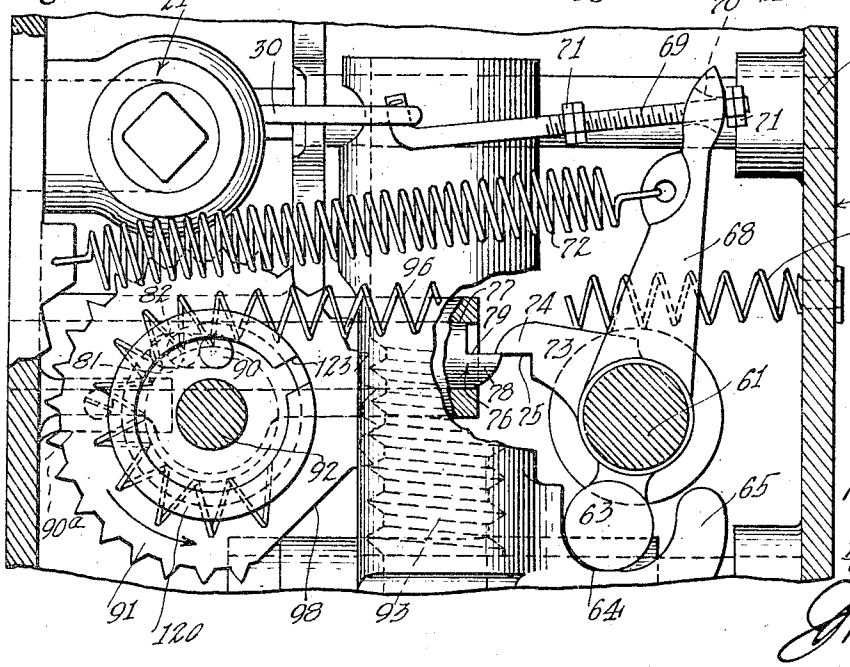


Fig. 7.



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REGULATABLE SUGAR WASHING APPARATUS.

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Fig. 8.

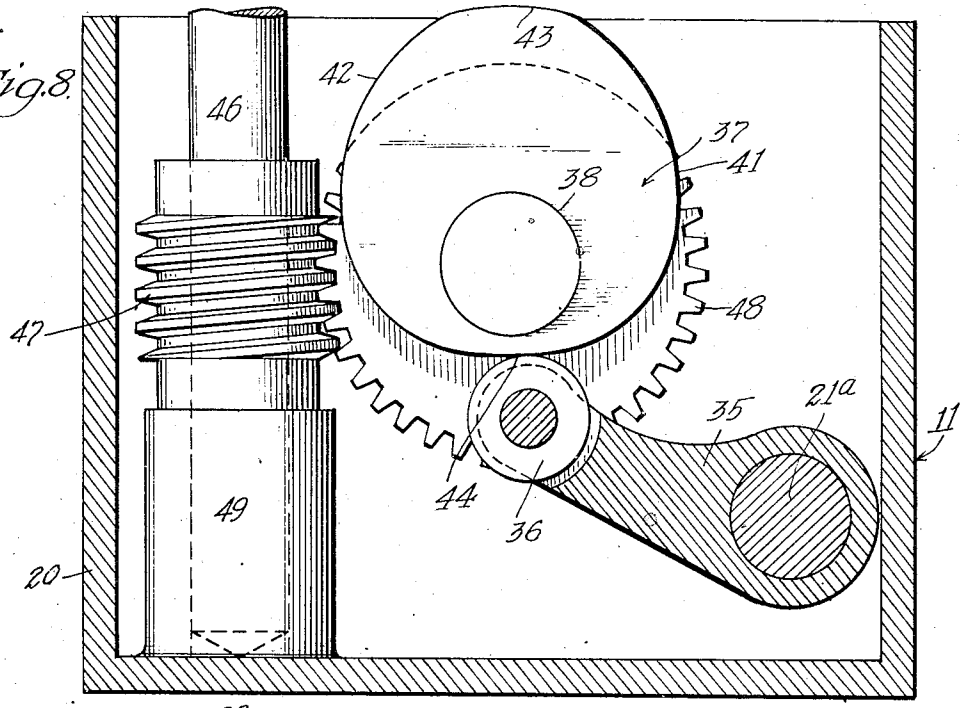


Fig. 9.

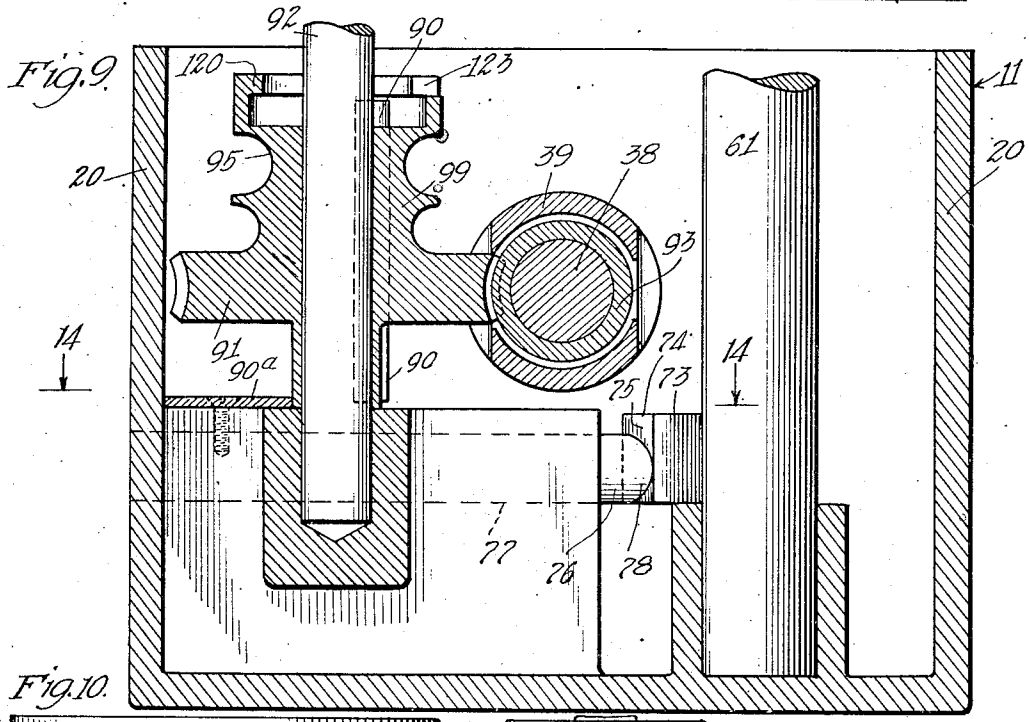
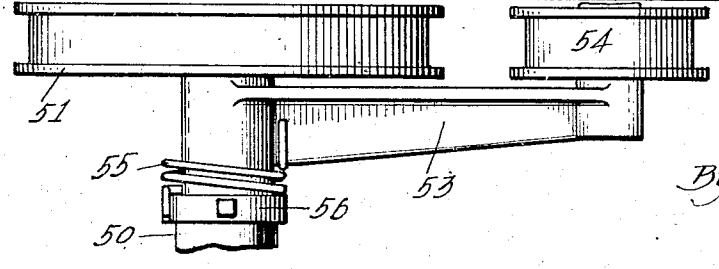


Fig. 10.



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REGULATABLE SUGAR WASHING APPARATUS.

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Fig. 11.

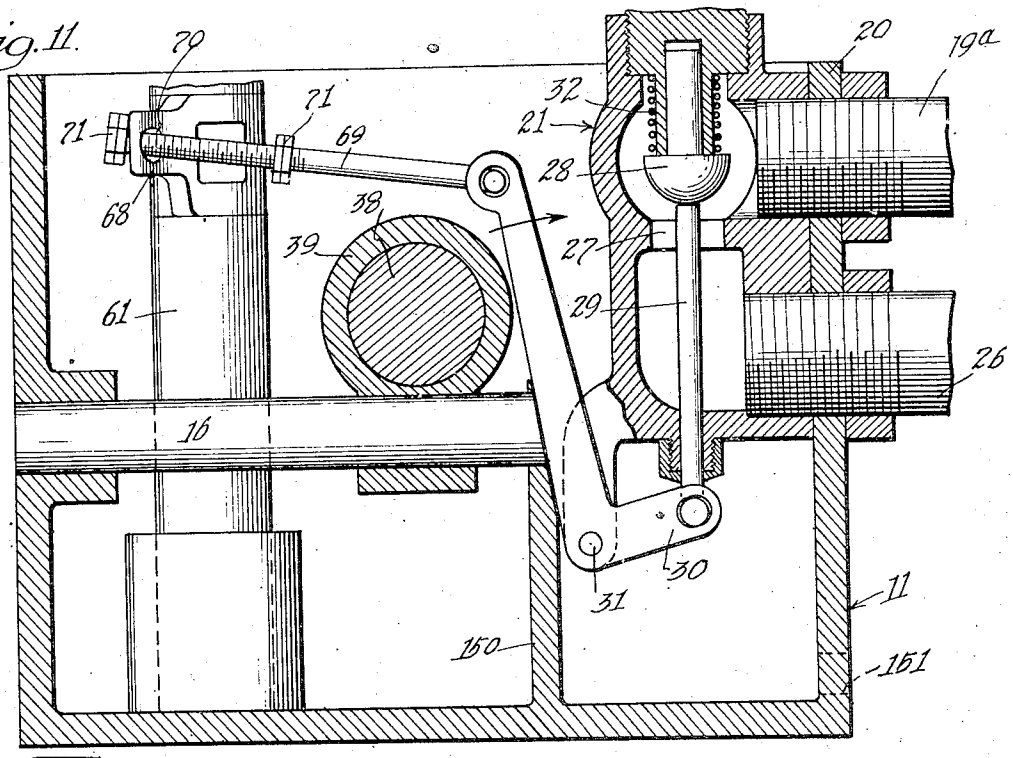


Fig. 12.

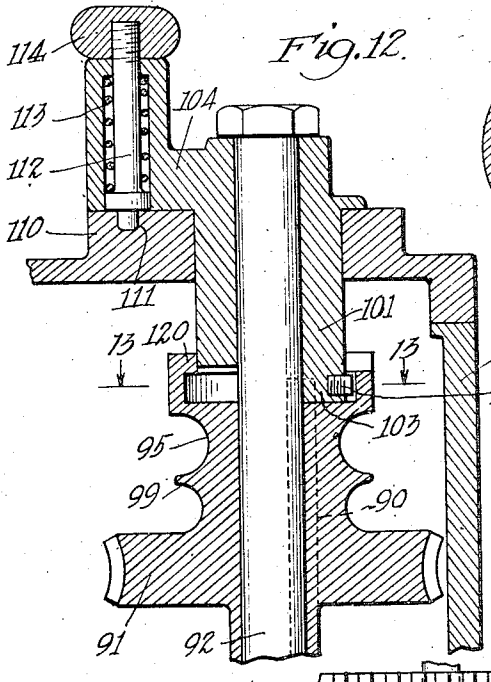


Fig. 13.

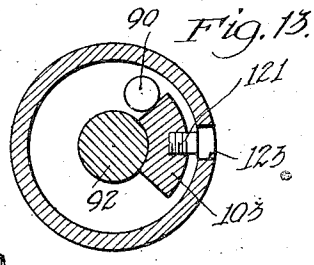


Fig. 14.

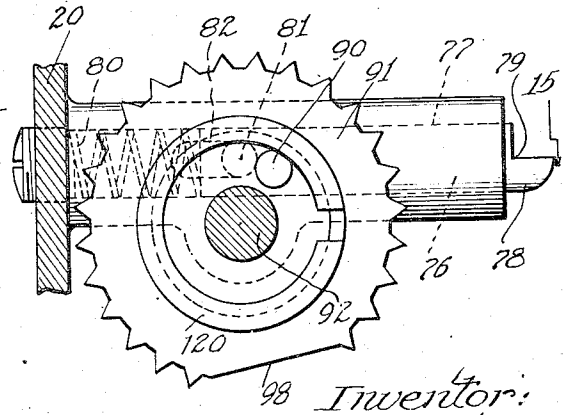
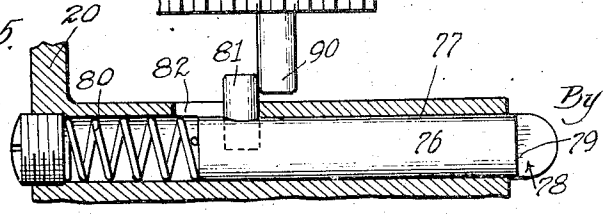


Fig. 15.



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Patented Dec. 19, 1922. 1,439,676

UNITED STATES PATENT OFFICE.

WILLIAM W. HARTMAN, OF LOS ANGELES, CALIFORNIA.

REGULATABLE SUGAR WASHING APPARATUS.

Continuation of application Serial No. 298,324, filed May 19, 1919. This application filed March 21, 1921. Serial No. 453,956.

To all whom it may concern:

Be it known that I, WILLIAM WALTER HARTMAN, a citizen of the United States, residing in Los Angeles, county of Los Angeles, State of California, have invented new and useful Improvements in Regulatable Sugar-Washing Apparatus, of which the following is a specification.

This invenion relates to apparatus for use in connection with centrifugal separators such as are used in sugar refining processes, and the like. An object of the invention is to provide apparatus of this character which is simple, effective and easily operated.

This application is a continuation of my copending application filed by me May 19, 1919, Serial No. 298,324, entitled Sugar washing and water measuring device. Furthermore this application includes all of the features of improvement set forth in that application, to which reference should be made for same, and also some additional improvements as will be understood from the following specification.

This invention concerns itself with that class of apparatus for distributing wash water in such manner as to a body of massecuite in a centrifugal to properly wash the syrup from all parts of the body without dissolving any appreciable amount of sugar crystals. The apparatus distributes various amounts of water to different parts of the body so that each part receives just enough water to properly wash it. A greater amount of water is supplied to the thicker parts of the body than to the thinner parts and the proper extra amount of water is supplied to the end parts of the body where the syrup is not readily removed. The apparatus is even and uniform in operation and washes the body in a particularly effective manner.

Another object of the invention is to provide an apparatus which is adjustable to deliver various amounts of water to the body of the massecuite, distributing the water to the various portions of the body in proportion as they require washing. Massecuite varies in consistency and proportions, thus making it necessary to vary the amount of wash water in order to obtain best results.

A feature of the invention is the construction and manner of operation of the mechanism which it provides. The mechanism is adjustable and automatic in operation, is easily set and operated, embodies safety devices which prevent it from being improperly operated and assembled, and is simple, effective and durable.

The various objects and features of the invention will be best and more fully understood from the following detailed description of a typical embodiment of the invention, throughout which reference is had to the accompanying drawings, in which—

Fig. 1 is a vertical fragmentary sectional view of a typical centrifugal separator equipped with the device of the present invention; Fig. 2 is a plan view of the mechanism shown in Fig. 1, taken as indicated by line 2—2 on Fig. 1; Fig. 3 is an enlarged plan view of the case which carries the operating mechanism; Fig. 4 is an enlarged detail sectional view of the spray nozzle, taken as indicated by line 4—4 on Fig. 2; Fig. 5 is an enlarged plan view of the operating mechanism showing it in its released position, being a view taken as indicated by line 5—5 on Fig. 1; Fig. 6 is a view of a portion of the apparatus shown in Fig. 5, showing the mechanism in operating position; Fig. 7 is a view similar to Figs. 5 and 6, showing the mechanism in position where it is about to release; Fig. 8 is a detail sectional view taken as indicated by line 8—8 on Fig. 6; Fig. 9 is a detail sectional view taken as indicated by line 9—9 on Fig. 6; Fig. 10 is an enlarged side elevation of the upper end portion of the apparatus; Fig. 11 is a detail sectional view taken as indicated by line 11—11 on Fig. 6; Fig. 12 is an enlarged detail sectional view taken as indicated by line 12—12 on Fig. 5; Fig. 13 is a detail sectional view taken as indicated by line 13—13 on Fig. 12; Fig. 14 is a plan section taken as indicated by line 14—14 on Fig. 9; and Fig. 15 is a sectional view taken as indicated by line 15—15 on Fig. 14.

In the drawings, numeral 10 designates a typical centrifugal separator such as is used in sugar manufacture and numeral 11 designates the washing device provided by the present invention. The centrifugal embodies a stationary housing 12 provided at its upper end with an inwardly extending annular flange 13. A rotating shaft 14^a extends downwardly into the housing 12 and a foraminous basket 14 is mounted on the shaft 14^a within the housing 12. The basket 14 is provided at its lower end with an in-

wardly extending flange 15 and at its upper end with an inwardly and upwardly extending flange 16. A bottom plate 17 fits around the shaft 14ª and seats on the flange 15. In the usual operation of the centrifugal the shaft 14ª, and therefore the basket 14 is operated slowly while a charge of massecuite is filled into the basket. When the charge is in place the shaft 14 is speeded up, say to about eleven hundred revolutions per minute, causing the massecuite to move to the outer portion of the basket and form in a more or less compact body between the flanges 15 and 16. The body of massecuite, however, is not uniform in thickness throughout but is generally somewhat thicker at its lower end than at its upper end. As the basket continues to rotate the syrup in the massecuite is thrown outwardly through the foraminous basket 14 into the housing 12. In practice it is found desirable to deliver water to the inner wall of the body of massecuite to wash through the body and aid the removal of the syrup by softening it and by circulating through the body. It is important that only enough water be applied to the body of massecuite to wash out the syrup and that there should not be enough water to dissolve any appreciable amount of sugar crystals. It has been found in practice that more water is required to wash the thicker parts of the body than to wash the thinner parts and that an extra amount of water is required to wash the end parts of the body. The syrup in the massecuite at the flanges or ends of the body has been found to be much more difficult to remove than the syrup at the other part of the body. Further it has been found that the syrup is the massecuite at a flaring flange, such as the flange 16 in the particular centrifugal herein set forth, is even more difficult to remove than the syrup in the massecuite at a straight flange, such as the flange 15 in the contrifugal set forth. To uniformly and efficiently wash the syrup out of the entire body of massecuite it is necessary to apply a greater amount of water to the thicker parts of the body than to the thinner parts, to apply a greater amount of water to the end parts of the body than to the other parts of the body, and to apply a greater amount of water to the end part adjacent the flange 16 than to the end part adjacent the flange 15.

The device 11 provided by this invention comprises, generally, a distributing pipe 19 supplied with water from a supply pipe 19ª through a control valve 21, an operating mechanism for the pipe 19, and a casing 20 for the operating mechanism. The casing 20 is mounted on the flange 13 so that the pipe 19 extends into the upper portion of the basket to one side of the shaft 14ª. The pipe 19 is carried transversely on a shaft 21ª which extends into the casing 20 and is operated by the operating mechanism therein. The shaft 21ª is operated to move the pipe 19 between the position shown in full lines in Fig. 1 and that shown in dotted lines in Fig. 1 in the manner hereinafter described. The pipe 19 is preferably shaped as shown in Fig. 1 of the drawings so that it will not be engaged by the basket 14 if the basket operates out of line, and a spray nozzle 22 is provided at the outer end of the pipe 19. The spray nozzle 22 comprises a body part 23 adjustably pivotally connected to the end portion of the pipe 19 about an axis transverse of the longitudinal axis of the pipe, and a cover plate 24 for the body 23. The cover plate 24 is removably attached to the body 23 and is formed with a plurality of openings 25 through which the water is adapted to spray. It will be obvious how cover plates having various numbers of openings and openings of various sizes may be readily attached to the body 23 as desired. When the apparatus is operating at a given speed and liquid is being supplied to the nozzle under a given head, the cover plate will pass a certain definite amount of fluid during each operation of the distributing pipe. It may be said therefore that the apparatus not only distributes but also measures the fluid.

The supply pipe connects to the intake end of the valve 21 while a flexible tube 26 connects the discharge end of the valve with the inner end of the pipe 19. The valve 21 is preferably mounted in the casing 20, and has its intake and discharge ends connected by a port 27. A valve 28 is carried in the intake end of the valve 21 and is adapted to control the communication between the two ends of the valve 21. The valve 28 is carried on a stem 29 which is adapted to be operated by a bell crank 30 pivotally mounted at 31 on the outer part of the valve 21. A compression spring 32 is arranged to normally hold the valve 28 on its seat so that the communication between the two ends of the valve 21 is closed. When the bell crank 30 is in the position shown in Figs. 6, 7, and 11 of the drawings the valve 28 is open so that fluid can pass from the pipe 20 through the valve 21 to the tube 26. When the bell crank 30 is moved in the direction indicated by the arrow in Fig. 11 to the position shown in Fig. 5, the valve 28 is in the closed position so that communication between the pipe 20 and tube 26 is closed, and is held in that position by the spring 32.

The shaft 21ª is rotatably carried in a bearing 34 and has an arm 35 secured on it within the casing. The outer end portion of the arm 35 carries roller 36. The roller 36 is adapted to engage an operating cam 37 mounted on a shaft 38 supported by a carrier 39 mounted in the casing 20. When the car-

rier 39 is in operative position the cam 37 engages the roller 36 so that rotation of the shaft 38 and therefore of the cam 37 will cause oscillatory movement of the arm 35 and the pipe 19. The various parts are arranged and proportioned so that the pipe 19 is moved from the position shown in full lines in Fig. 1 to that shown in dotted lines in Fig. 1 thus causing a spray of water issuing from the nozzle 22 to engage the inner wall or surface 40 throughout the entire movement of the arm 19 and to engage every part of wall 40 during each complete movement of the arm. Further, the configuration of the cam 37 is such that the arm 19 moves at different speeds during different portions of its travel and allows the arm to momentarily remain still at each end of its travel. The surfaces 41 and 42 of the cam cause the down and up movements, respectively. The surfaces 43 and 44 are between the surfaces 41 and 42 and cause the pauses at the bottom and top ends of the movement, respectively. The curvatures of the surfaces 41 and 42 are such that the arm 19 varies in speed between the two ends of its travel and moves more rapidly at the upper end portion of its travel than at the lower end portion. In ordinary cases the variation in speed between the two ends of the arm movement may be substantially uniform. The difference in speed of movement of the arm 19 between the two ends of its travel is to compensate for the difference in thickness of the body of massecuite between the two ends of the basket. In other words, the variation in speed of movement of the arm 19 is provided so that different amounts of water will be supplied to different parts of the body of massecuite and is proportioned so that just enough water is supplied to each portion of the body of massecuite to properly wash it. The upper portion of the body of massecuite being thinner than the lower portion requires less water to properly wash out the syrup. The pauses in the movement of the arm 19 at the ends of its travel are so that an extra amount of water will be delivered to the end portions of the body of massecuite so that these portions will be properly washed. As has been outlined, the syrups are not as readily removed from the end portions of the body of massecuite near the flanges as they are at the intermediate portions of the body. The surfaces 43 and 44 of the cam 37 allow the arm 19 to pause at the ends of its movement sufficiently long to allow just enough water to be supplied to the end portions of the body of massecuite to adequately wash them. Syrup is not as readily removed from the vicinity of flared flanges, such as the flange 16, as it is from straight flanges, such as the flanges 15. For this reason the surface 43 is made somewhat longer than the surface 44, thus causing the arm to pause for a longer period of time at the upper end of its travel than at the lower end. In the case of the particular machine illustrated in the drawings the surface 43 extends through an angle of about 30° while the surface 44 extends only through an angle of about 20°. This difference in length of the surfaces 43 and 44 compensates for the difference in the tendency for the syrup to remain in the body of massecuite at the two ends of the body. It will be obvious how the surfaces 41 and 42 of the cam 37 may be curved and proportioned so that the speed of the arm will vary between the two ends of its travel an amount just sufficient to compensate for the difference in thickness of the body of massecuite between its two ends, and how the surfaces 43 and 44 may be varied in length to accurately and properly compensate for the tendency of the syrup to remain at the ends of any particular body of massecuite. The arm 35 carrying the roller 36 is held up so that the roller 36 is in engagement with the cam 37 by the weight of the pipe 19 and nozzle 22.

The actuating shaft 38 which carries the actuating cam 37 is adapted to be driven from a vertical shaft 46 through a driving worm 47, mounted on the shaft 46, and a worm wheel 48 mounted on the shaft 38. The shaft 46 is carried in a bearing at 49 in the bottom of the casing 20 and extends upwardly through a housing 50 mounted on the top of the casing 20. A pulley 51 is mounted on the upper end of the shaft 46 above the housing 50. A belt 52 is arranged around the pulley 51 and the shaft 14^a so that the shaft 46 is driven from the shaft 14^a. An arm 53 is rotatably mounted on the upper end of the housing 50 and carries an idler pulley 54 at its outer end. A spring 55 is arranged in connection with the arm 53 and a collar 56, mounted on the housing 50, to tend to rotate the arm 53 on the housing. The idler pulley 54 is arranged so that the belt 52 runs over it and so that the tendency for the arm 53 to rotate about the housing 50 keeps the belt 52 tight between the pulley 51 and shaft 14^a. With this arrangement the belt 52 can stretch and the shafts 46 and 14^a can be moved relative to each other without disturbing the driving connection between them.

Of course, so far as the operation of the actuating and functional parts of the sprayer, treated specifically, are concerned, the drive shaft 46, carrying the driving worm 47, need not be driven from the centrifugal shaft 14^a, this mode of driving being both broadly and specifically the subject-matter of a separate invention to which I have directed a separate application.

The various parts and drives are designed and proportioned so that the relative movement between the basket 14 and pipe 19

is such that the entire surface 40 of the body of massecuite is washed during a movement of the arm 19 from one end of its travel to the other. With this construction there are no strips or portions of the body of the massecuite which are not properly and thoroughly washed.

The carrier 39, which supports the actuating shaft 38, is slidably carried on guide bars 60 mounted in the casing 20. The guide bars 60 are horizontally disposed so that the carrier 39 is movable horizontally. The carrier 39 is movable from the position shown in Figs. 6 and 7, where the gear 48 meshes with the worm 47, to the position shown in Fig. 5, where the gear 48 is completely out of engagement with the worm 47. With this construction the shaft 38 and therefore the pipe 19 can be operated from the drive shaft 46 at the will of the operator merely by proper manipulation of the carrier 39.

The carrier 39 is adapted to be operated in the manner above described through a shaft 61 which extends upwardly through the top of the casing 20 and has mounted on its upper end a suitable operating handle 62. The shaft 61 has an arm 63 extending from it within the casing 20 into a notch 64 formed in a lug 65 which extends from the carrier 39. With this construction it is possible to shift the carrier 39 by suitable turning of the handle 62.

The present invention provides a connection between the shaft 61 and the bell crank 30 of valve 21 so that the valve 21 will be automatically opened when the carrier 39 is moved to connect the worm wheel 48 and worm gear 47 and automatically closed when the carrier is moved to separate the worm wheel 48 from the worm gear 47. The connection comprises an arm 68 extending from the shaft 61, and a connecting rod 69 connecting the outer end of the arm 68 with the bell crank 30. The connecting rod 69 is pivotally connected to the bell crank 30 and extends loosely through an opening 70 formed in the outer end of the arm 68. Stop nuts 71 are positioned on the rod 69 to be engaged by the arm 68 so that the rod 69 will be moved to actuate the valve 21 when the shaft 61, and therefore the arm 68, is moved. The stop nuts 71 may be set or adjusted on the rod 69 so that the valve 21 is accurately operated when the shaft 61 is operated to move the carrier 39. A tension spring 72 connects the arm 68 with a suitable part of the casing 20 so that the arm 68 and therefore the valve 21, shaft 61, carrier 39, and worm wheel 48, normally assume the position shown in Fig. 5 of the drawings. In other words, the spring 72 is arranged in connection with the arm 68 to normally hold the mechanism out or in released position.

The invention provides means for holding the mechansm in a set position against the spring 72. An arm 73 extends from the shaft 61 and has a rounded lug 74 on its outer end forming a notch 75. A rod 76 is slidably carried in a bore 77 formed in the casing 20 and is provided at its outer end wtih a rounded lug 78 which forms a notch 79. The rod 76 is normally pressed outwardly by a spring 80 arranged back of it and is limited in its movement by a pin 81 which extends from it through a slot 82 in the casing. When the mechanism is moved from the position shown in Fig. 5 in the direction indicated by the arrow in that figure the rounded portion of lug 74 engages the rounded portion of lug 78 so that the rod 76 is depressed or pushed inwardly. When the mechanism reaches a point where the lug 74 has passed the lug 78 the spring 80 moves the rod 76 outwardly, causing the lug 78 to extend into the notch 75 and the lug 74 to extend into the notch 79 as shown in Fig. 6 of the drawings. When the mechanism is moved to a position where the lug 78 can move into the notch 75 the worm wheel 48 and worm gear 47 are in mesh and the mechanism is in operation. At all times when the lug 78 is in the notch 75 the mechanism is positively held in operative position and will not be returned to its released position by the spring 72.

Means is provided whereby the lug 78 is automatically released from the notch 75 to allow the mechanism to be moved to its released position by the spring 72. A pin 90 extends downwardly from a worm wheel 91 which is mounted on a vertical shaft 92 in a manner to engage the pin 81 as the wheel 91 is rotated. The wheel 91 is carried on the shaft 92 so as to be engaged by a worm gear 93 carried on the shaft 38 when the mechanism is in operating position. When the mechanism is in operating position the shaft 38 is rotating and the worm wheel 91 is rotated from the shaft 38 through the worm gear 93. As the mechanism continues to operate the worm wheel 91 rotates, causing the pin 90 to engage the pin 81 and move it through the slot 82 until the lug 78 is released from the recess 74. Figs. 14 and 15 clearly illustrate this mechanism and it will be obvious how the pin 90 moves the pin 91 to release the lug 78 and thereby allow the entire mechanism to be moved to the released position by the spring 72. In the hub 99 of the worm wheel 91 there is a groove 95 adapted to carry a tension spring 96. The spring 96 connects the hub with the casing 20 to tend to move the worm wheel in a direction opposite to that in which it is moved by the worm gear 93. The worm wheel is limited in the amount it can be moved by the spring 96 by a stop 90^a which is en-

gaged by the lower end of the pin 90. As the worm wheel 91 is rotated by the worm gear 93 the spring 96 is wrapped around the hub 99 in the groove 95 so that the worm wheel 91 is immediately returned to the position shown in Fig. 5 when the mechanism is released so that the worm wheel 93 is moved out of engagement with the worm wheel 91.

In accordance with this invention the worm wheel 91 is formed with a flat side 98. The flat side allows the mechanism to be held in operative position by means of the handle 62 after the mechanism has been automatically released by the mechanism above described without causing the worm wheel 91 to continue to rotate and thereby damage any of the mechanism. The flat side 98 is located on the worm wheel 91 so that it reaches the worm gear 93 just after the pin 90 has moved the pin 81 sufficiently to release the mechanism. It will be readily understood how the worm wheel 91 will not be driven by the worm gear 93 when the flat side 98 of the worm wheel reaches the gear 93.

The pin 90 extends completely through the hub 99 and projects from its upper end. A sleeve 101 is rotatably carried on the shaft 92 above the hub and extends through the top of the casing 20. The sleeve 101 is formed with a lug 103 adapted to engage and cooperate with the pin 90. An arm 104 is provided on the sleeve 101 at the outside of the casing 20 so that the sleeve 101 can be moved or rotated to cause the lug 103 to engage the pin 90 and thereby move the worm wheel 91 in the direction indicated by the arrow in Fig. 7 when the mechanism is in released position. With this mechanism the worm wheel may be moved partially around before the mechanism is thrown into operation, thereby making it necessary for the worm wheel to move only a comparatively short distance before the mechanism is released. It will be obvious how the worm wheel 91 may be moved to various positions by suitable operation of the arm 104 to cause the mechanism to release at various times, or, after it has operated various lengths of time. A curved boss 110 may be provided on the top of the casing 20 and a plurality of recesses 111 may be provided in the boss 110. A pin 112 is carried in the arm 104, to be normally pressed downwardly by a spring 113 to extend into one of the recesses 111. A knob 114 is provided on the upper end of the pin 112 in order that it may be conveniently withdrawn from a recess 111 when it is desired to move the arm 104 to another position where the pin will extend into another recess. With this mechanism the arm 104 may be moved to various positions and positively locked by means of the pin 112. I prefer to space the recesses 111 in the boss 110 so that movement of the arm 104 between any two adjacent recesses will move the worm wheel 91 a distance which will cause the mechanism to operate for a period of time equal to a complete operation or cycle of the pipe 19. In other words, I prefer to space the recesses 111 so that the mechanism may be adjusted to give one or more movements more or less of the pipe 19. In the particular mechanism shown in the drawings the worm wheel 91 and worm gear 93 are proportioned so that the worm wheel 91 is moved a distance of one tooth every time the shaft 38 revolves, thereby making it necessary to space the recesses 111 distances equal to the distances between the teeth on the worm gear 93. In practical operation this mechanism allows the operator to set the device so that the arm 19 will swing a predetermined number of times before the mechanism automatically releases. When the operator finds that the syrup is not being effectively washed out of the body of massecuite he can adjust the mechanism so that it will deliver more water to the body of massecuite by properly adjusting the arm 104. Likewise, when the operator finds that too much water is being supplied to the body of massecuite he can set or adjust the arm 104 so that only the desired amount of water will be delivered by the machine each time it is thrown into operation.

In order that the mechanism will always be assembled properly after it has been taken apart and to prevent the lug 103 from being arranged at the wrong side of the pin 90, a flange 120 is formed on the end of the lug 99 and a pin 121 is arranged to extend from the outer side of the lug 103. The flange 120 is shaped to overhang the pin 121 and is formed at the proper point with a notch 123 through which the pin 121 can be passed in assembling the mechanism. The notch 123 is located so that the lug 103 can only be arranged in connection with the pin 90 in one way. Fig. 13 shows the position of the lug 103 relative to the pin 90 when the mechanism is assembled.

In the operation of the machine the operator sets the arm 104 so that the mechanism will operate for the desired length of time, that is, so that the pipe 19 will move the desired number of times, whereupon the machine can be thrown into operation by turning the handle 62 in the proper direction. The machine will then automatically operate during the time for which it was set and will automatically cut off or release at the end of that time. If at any time it is desired that the machine should continue in operation for a period longer than it has been set for it is merely necessary for the operator to hold the handle 62 in the

position which causes the mechanism to be in operative position. This can be done without damage to any part of the apparatus.

It is preferred to provide a wall 150 in the casing 20 around the valve 21 to catch any water that may leak from the valve. A drain opening 151 is provided in the portion of the casing enclosed by the wall 150 so that the water will drain from the casing. Oil is preferably filled into the other portion of the casing so that the mechanism will operate in it.

Having set forth a preferred embodiment of my invention, I do not wish to limit or restrict myself to the particular details hereinabove set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art or that may fall within the scope of the following claims.

In reviewing the above operation it will, of course, be clear that that portion of the mechanism including the shaft 14ª, the belt 52, the vertical shaft 46 and the worm 47, constitutes only a train of driving mechanism as will be apparent from the fact that the sole and exclusive function of this entire train is to drive or to transmit power into the important subsequent members where the true actuating or functional movements of the washer are performed.

The first of these actuating, or truly functional members, beyond the train of driving mechanism, is termed the actuating shaft, and it comprises the shaft 38 carrying the nozzle actuating cam 37, and a timing worm 93, the actuating functions of these members being obviously the two most important functions in the entire device.

This invention is characterized by the fact that this actuating shaft 38 is allowed normally to lie idle and at rest, and that it operates only for very brief periods, perhaps 15 seconds every 4 minutes about, while the actual work of spraying the sugar is in process. This prolonged idleness is more important than might at first appear. In manufacturing these washers this actuating shaft and parts are originally made and fitted with a high degree of accuracy in order to insure the accurate and scientific distribution of the wash-water contemplated in this class of washers. Consequently, since continuous operation of the actuating shaft, produces unnecessary wear in the bearings, and thus impairs the accuracy of the washing function, this normal idleness of the actuating shaft eliminates all unnecessary wear and thus greatly increases accuracy and prolongs the life of the machine.

On the other hand, though the driving worm 47, and the other parts in the driving train above mentioned, operate somewhat more than the actuating shaft, this is of little consequence, as the driving members are much cruder than the actuating members and the wear occasioned in the driving members by slight excess operation, in no way impairs the accuracy with which the real washing function is performed. However, it should be noted that even this driving worm, and the other driving parts, do not operate constantly, but only intermittently with the centrifugal, there being, during normal operation, substantial opportunities of rest occurring periodically about every four minutes when the centrifugal is shut down to remove the cleansed sugar and to take on a new charge of raw massecuite.

In the foregoing parts of this specification I have now described minutely the preferred form of this invention, but I wish to point out that it is only the preferred form and is subject to extensive remodelling and changing without departing from the spirit of my invention, and I do not limit myself to the precise details of the actuating shaft as the same may carry only one of the actuating members in place of both, and the actuating members may be formed to embrace the shaft integrally therewith in place of having a separate piece of shafting therein, and in general I do not limit myself in any particular except as such limitations are expressly set forth in the appended claims.

I now wish to point out that the invention embraced in that certain relation and arrangement of parts whereby the actuating members and shaft are rendered normally idle, is a separable invention from the one in which the driving of the spray mechanism is done directly from the centrifugal shaft and the obvious distinction between these two inventions will be emphasized by the fact that substantial benefits of the one, namely, of having the actuating members normally idle, can be obtained whether or not the other, namely, the driving from the centrifugal shaft, is present, or whether the driving is done from some other totally different source; and on the other hand, substantial benefits of the second invention, that is, the driving of the spray mechanism directly from the centrifugal shaft, can be obtained irrespective of whether the actuating members are normally idle or not, and irrespective even of whether the type of spray mechanism and details bear any similarity in form or operation, to those shown in this specification.

I have shown in this application the direct drive from the centrifugal shaft only because it is necessary to show some form of drive, and because this is the preferred form that I use, but it should be noticed that I do

not cover or claim in this application the arrangement embracing this mode of driving the sprayer, as all claims directed to that separate invention have been studiously omitted from this application.

However, I maintain that I am broadly new, basic, and pioneer in this separate and important invention of driving the sprayer parts of whatever type, directly from the centrifugal shaft, and, therefore, in addition to further amplifying upon its operation and usefulness in my copending application, I am covering and claiming that invention both broadly, and specifically in combination with other parts, in my said copending application, Ser. No. 298,324, to which reference should be made, and no presumption of dedication or abandonment is to arise from the fact that I did not cover or claim that separate invention in this application also.

Having described a preferred form of my invention, I claim:

1. In apparatus for washing sugar in a centrifugal basket, an oscillating nozzle, releasable operating mechanism for the nozzle, means whereby the operating mechanism may be positively held in engagement, means for releasably holding the operating mechanism in operating position, means operated by the operating mechanism to automatically release the holding means, and means for automatically disengaging the releasing means when the operating mechanism is positively held in operative position after the releasing means has actuated.

2. In apparatus for washing sugar in a centrifugal basket, an oscillating nozzle, releasable operating mechanism for the nozzle, means whereby the operating mechanism may be positively held in engagement, means for releasably holding the operating mechanism in operating position, means operated by the operating mechanism to automatically release the holding means, said means embodying a gear mechanism having a gear without teeth at a portion so that the releasing means automatically discontinues operation when the operating mechanism is positively held in operative position after the releasing means has actuated.

3. In apparatus of the character described an adjustable releasing mechanism comprising a projection, and an adjustable part adapted to be adjusted through said projection, a member detachable from the other parts for engaging and moving the projection, and means to prevent said member from being arranged in connection with the other parts so that it will not properly engage the projection.

4. In a sugar washing apparatus the combination of an oscillatory spray nozzle, a liquid supply pipe therefor, an automatic cut-off valve for said supply pipe, a rotary shaft having a timing worm and nozzle oscillating means thereon, a timing gear adapted to rotate always in the same place, and toward which said shaft is moved for operative connection with said timing gear simultaneously with the operation of opening said valve, and valve-closing mechanism arranged to be set in operation by means of said timing gear at a predetermined point.

5. An apparatus for washing sugar in centrifugal baskets embracing in its construction a spray nozzle adapted to sweep a vertically thin spray of wash-water successively along the basket substantially from end to end, means for conducting the washing liquid to said nozzle, a cut off valve, a lever for opening said valve, an actuating shaft adapted automatically to commence operating when the liquid commences to flow and to become automatically idle when the liquid stops flowing, a valve closing device arranged to be operatively connected with said shaft simultaneously with the valve opening movement of said lever, and a vertical drive shaft carrying a gear for driving said actuating shaft.

6. An apparatus for washing sugar in centrifugal baskets, embracing in combination an oscillatory spraying nozzle adapted to sweep a vertically thin spray of wash-water successively along the basket substantially from end to end, a liquid supply pipe leading thereto, a cut off valve, a normally idle shaft adapted to rotate only when said valve is open, a valve controlling mechanism operatively connected with said shaft simultaneously with the operation of opening the valve, mechanism connected with said normally idle shaft for oscillating the spray nozzle, and a vertical drive shaft carrying a gear for driving said normally idle shaft.

7. In an apparatus for washing sugar in centrifugal baskets, the combination of an oscillatory spray nozzle adapted to sweep a vertically thin spray of wash-water successively along the basket substantially from end to end, a supply pipe therefor, a cut off valve for said supply pipe, a timing mechanism for controlling the closing of said valve, mechanism for oscillating said vertically thin spray nozzle, a normally idle actuating member adapted to rotate only when said valve is open, said member being adapted to actuate said timing mechanism, both the timing and oscillating mechanism being operatively engaged with said actuating member simultaneously with the opening of said valve, and a vertical drive shaft carrying a gear for driving said normally idle actuating member.

8. In a sugar washing apparatus including a centrifugal basket, the combination of an oscillatory spray nozzle, a liquid supply pipe therefor, a cut off valve in communication with said pipe, a normally idle screw shaft carrying nozzle oscillating means, a fixed timing device adapted to rotate on a stationary axis, said timing device being adapted to be actuated by said normally idle screw shaft when the valve is open.

In witness that I claim the foregoing I have hereunto subscribed my name this 9th day of March, 1921.

WILLIAM W. HARTMAN.