J. SAILER.

AUTOMATIC SUGAR WASHER AND WATER MEASURER FOR THE SAME.

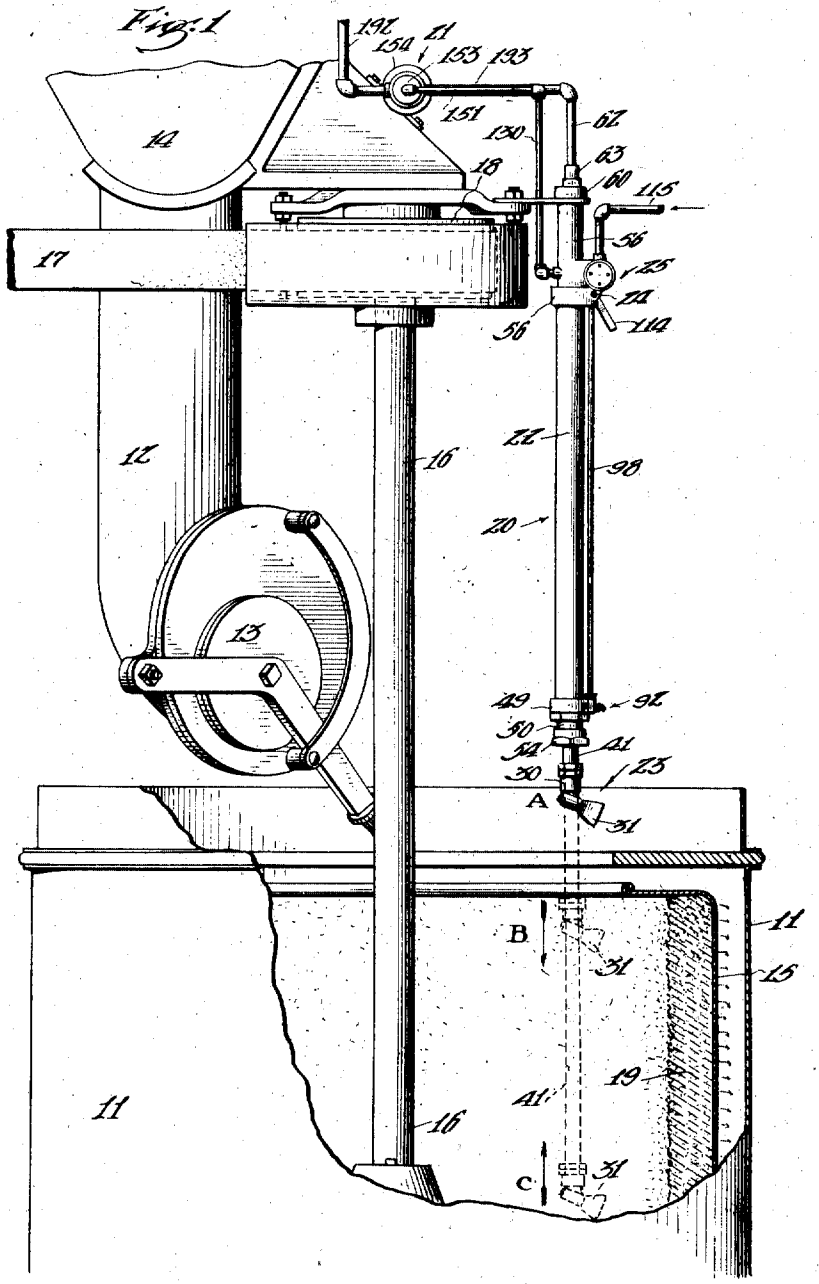
APPLICATION FILED MAY 5, 1915.

1,230,328.

Patented June 19, 1917.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2

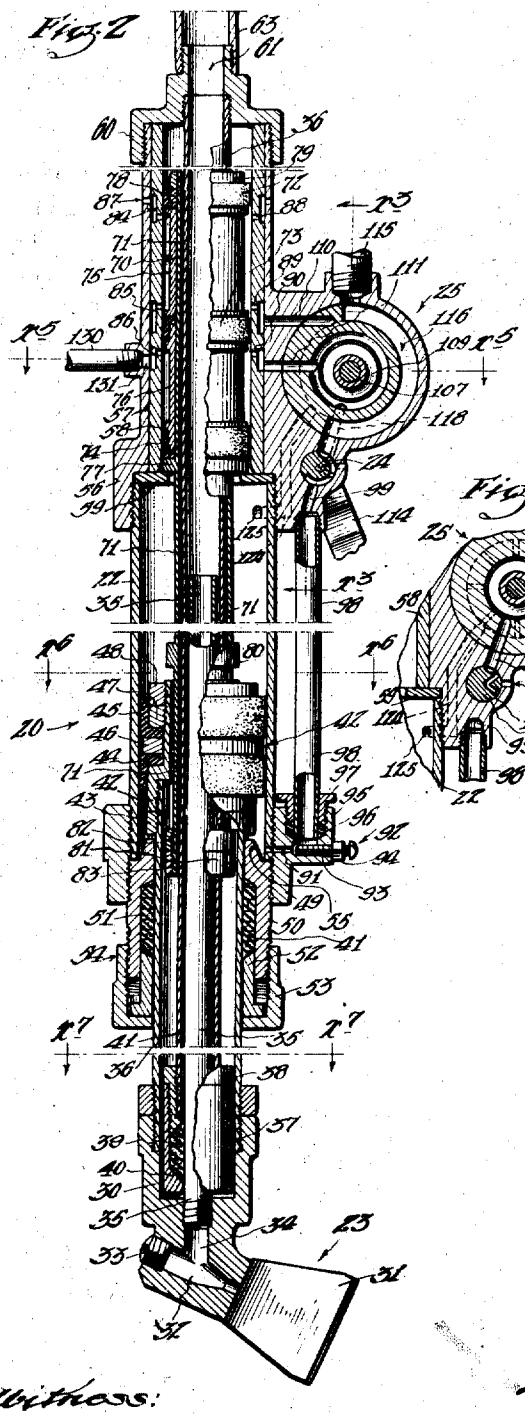


Fig. 4

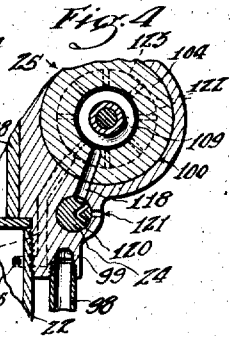
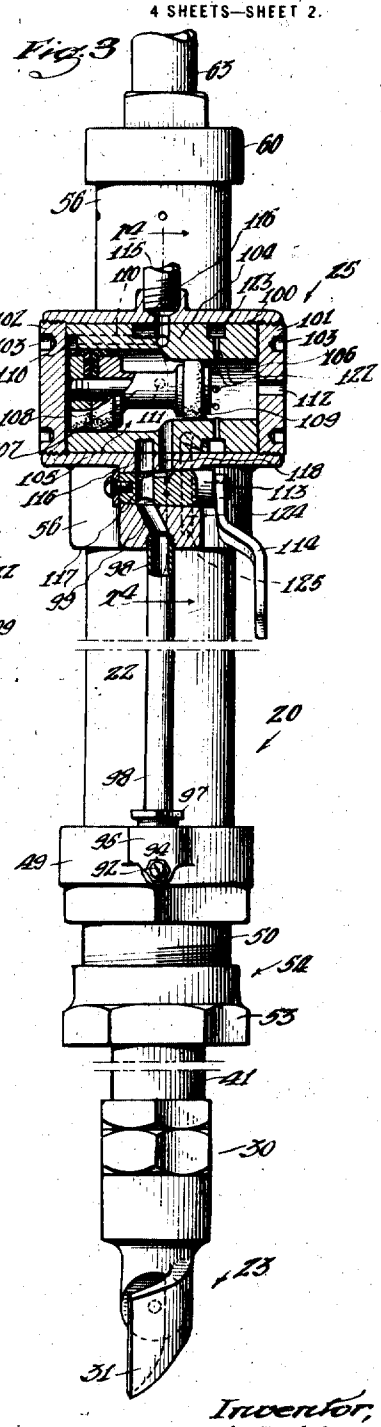


Fig. 3



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4 SHEETS—SHEET 3.

Fig. 9

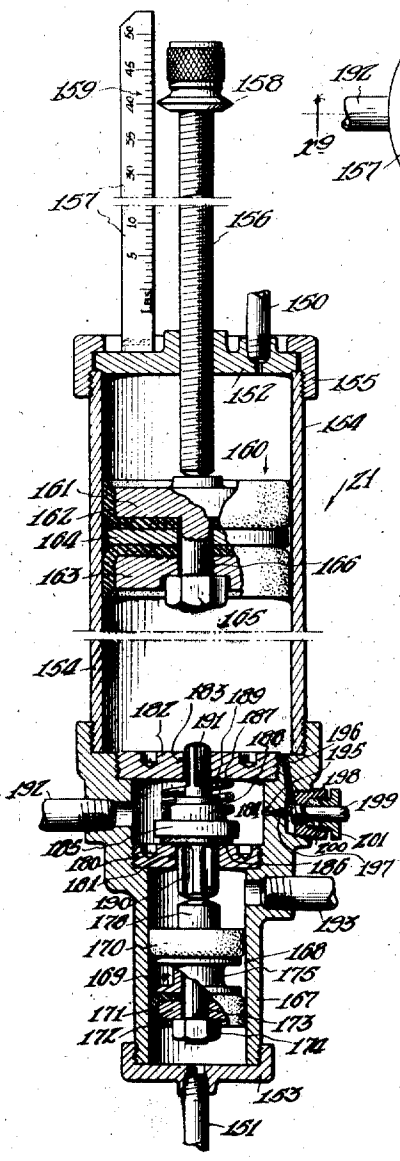


Fig. 8

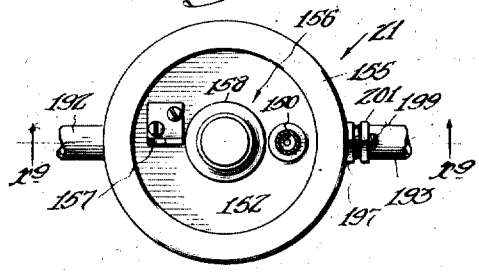


Fig. 5

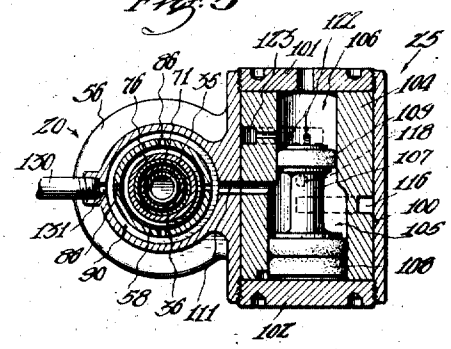


Fig. 6

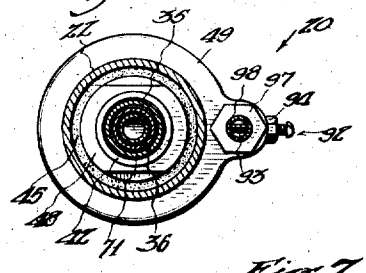
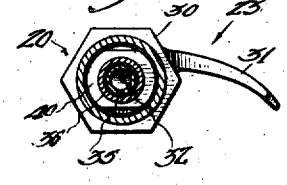


Fig. 7



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APPLICATION FILED MAY 5, 1915.

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Patented June 19, 1917.

4 SHEETS—SHEET 4.

Fig. 10

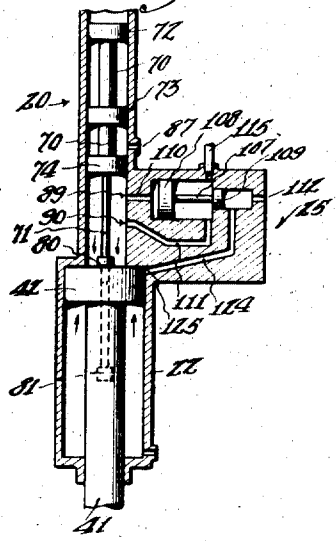


Fig. 11

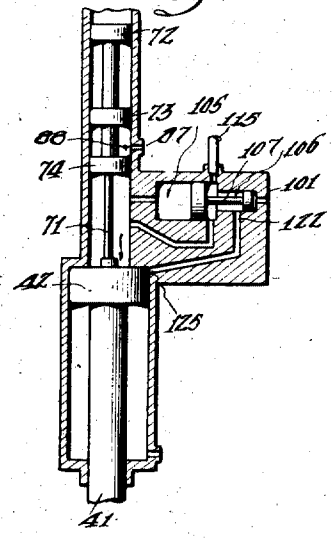


Fig. 12

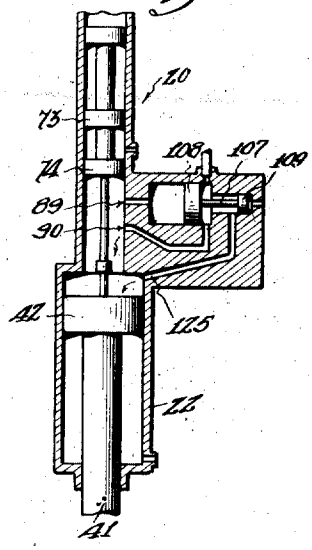


Fig. 13

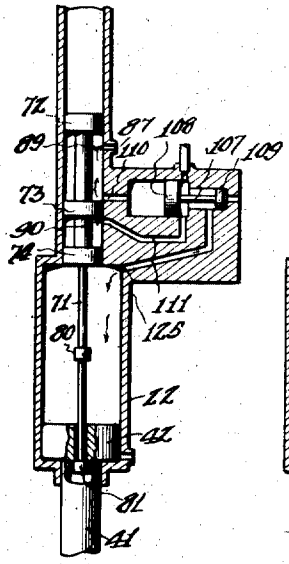


Fig. 14

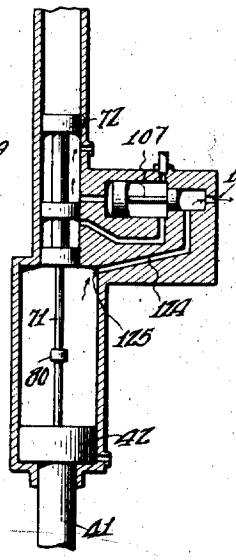


Fig. 15

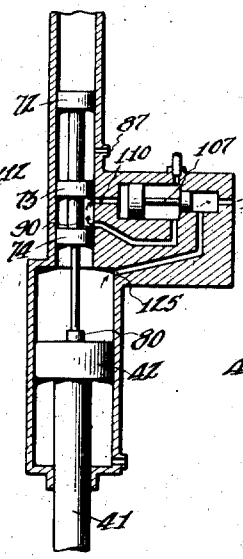
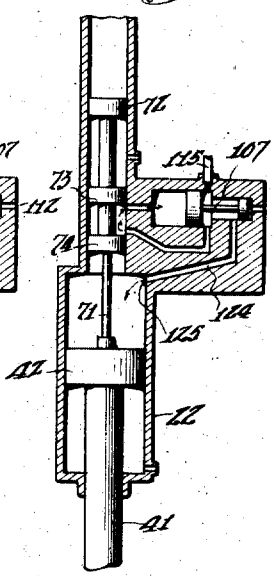


Fig. 16



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UNITED STATES PATENT OFFICE.

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AUTOMATIC SUGAR-WASHER AND WATER-MEASURER FOR THE SAME.

1,230,328. Specification of Letters Patent. Patented June 19, 1917.

Application filed May 5, 1915. Serial No. 26,171.

To all whom it may concern:

Be it known that I, JOSEPH SAILER, a citizen of the United States, residing at Oxnard, in the county of Ventura, State of California, have invented a new and useful Automatic Sugar-Washer and Water-Measurer for the Same, of which the following is a specification.

The invention relates to the sugar refining art and particularly to the purging and washing of the sugar crystals, in which process of this art the pure sugar crystals are separated from the surrounding "mother liquor" in a mixture of the two. This mixture of pure sugar crystals and the impure mother liquor is commonly known by the trade name of "masse-cuite" or "fellmass." In this art a batch of fellmass is placed in the rotating perforated basket of a centrifugal separator, the batch of fellmass being held against the inner side of the basket by centrifugal force, the molasses or the uncrystallized portion of the syrup being thrown off from the charge of sugar by centrifugal action. The inner surface of the bath is sprayed with water, or other suitable liquid, for the purpose of washing off the molasses or mother liquor from the charge of sugar, the basket being rotated during the spraying.

The principal object of my invention is to provide an automatic sugar washer which will introduce the water evenly over the inner side of the rotating charge of sugar by the use of a film nozzle, the film nozzle being automatically reciprocated up and down inside said basket to evenly distribute the water over the batch of sugar. A further object of the invention is to provide means for holding said film nozzle when not in use in such a position that it is entirely above and free from the basket. A further object of the invention is to provide means which can be automatically set to measure the amount of water passed to the batch of fellmass and to automatically shut off the water supply as soon as this predetermined amount has been passed.

Referring to the drawings which are for illustrative purposes only:

Figure 1 is an elevation partly in section of my invention applied to a standard form of centrifugal sugar separator.

Fig. 2 is a sectional elevation of the sugar washer proper.

Fig. 3 is a sectional elevation on the plane x^3—x^3 of Fig. 2, looking in the direction of the arrows.

Fig. 4 is a partial section on the plane x^4—x^4 of Fig. 3, looking in the direction of the arrows.

Fig. 5 is a section on the plane x^5—x^5 of Fig. 2, looking in the direction of the arrows.

Fig. 6 is a section on the plane x^6—x^6 of Fig. 2, looking in the direction of the arrows.

Fig 7 is a section on the plane x^7—x^7 of Fig. 2, looking in the direction of the arrows.

Fig. 8 is a plan view of the automatic water measurer, and

Fig. 9 is a section on the plane x^9—x^9 of Fig. 8, looking in the direction of the arrows.

Fig. 10 is a diagrammatic view of the washer mechanism in what is hereinafter called position one.

Fig. 11 is a view of same in position two.

Fig. 12 is a view of same in position three.

Fig. 13 is a view of same in position four.

Fig. 14 is a view of same in position five.

Fig. 15 is a view of same in position six.

Fig. 16 is a view of same in position seven.

In Fig. 1, a centrifugal sugar separator 11 is shown provided with a fellmass chute or "goose neck" 12 having a gate 13, fellmass being taken from a bin 14 and delivered through the chute 12 and the gate 13 into the interior of the separator. The separator is provided with a perforated rotating basket 15 which is rigidly secured to a central shaft 16, the shaft 16 being rotated from any suitable source, not shown, by a belt 17 passing over a pulley 18. A batch of fellmass 19 is held against the interior of the rotating basket 15 by centrifugal force, the syrup adhering thereto being thrown off by centrifugal force as the basket rotates.

A washer 20 and a water measurer 21 are secured to the centrifugal separator as shown. The washer 20, shown in Figs. 2 to 7 inclusive, consists of a main cylinder 22, a film nozzle 23, a plug cock 24, and an auxiliary valve 25. The film nozzle 23 consists of a threaded body 30 terminating in a deflecting plate 31, this deflecting plate being so shaped as to throw the water in a solid film against the rotating batch of sugar. A constricted opening 32 throws the water at high velocity against the deflecting

plate 31, this water being fed into the opening 32 through a central opening 34 formed in a body 30. A plug 33 closes the outer end of the opening 32.

A lower water pipe 35 is threaded in the opening 34 and projects upwardly through the center of the washer inside an upper water pipe 36. A stuffing box 37 secured on the pipe 36 serves to make a tight joint between the water pipes 35 and 36. The stuffing box 37 consists of a body member 38 rigidly secured on the end of the upper water pipe 36, a series of packing members 39 surrounding the lower water pipe 35 and a follower 40 threaded in the body member 38 and shaped so as to compress the packing 39 about the lower water pipe 35, the pipe 36, the stuffing box 37, and the pipe 35 forming a continuous water channel through which water may be passed under pressure.

Threaded in the body member 30 is a main piston pipe 41, this pipe being threaded in the body 30 and secured therein by means of a lock nut or by any other convenient means. Threaded on the upper end of the main piston pipe 41 is a main piston 42, this piston being secured on the pipe 41 by means of a lock nut 43. Rigidly clamped on the main piston 42 is a lower main piston leather 44 and an upper main piston leather 45, these leathers being separated by a washer 46 and being clamped in place by a nut 47 and a lock nut 48, these nuts being threaded on the body 42.

Threaded on the lower end of the main cylinder 22 is a foot valve casting 49 and threaded in the foot valve casting 49 is a main piston pipe packing body 50 having a cavity formed therein in which is placed a series of packing members 51, these packing members being compressed by a follower 52 actuated by a main piston follower nut 53, the parts 50, 51, 52 and 53 forming a stuffing box 54, the purpose of which is to make a tight joint between the main piston pipe 41 and the end of the cylinder 22. Formed on the top of the main piston packing body 50 is a ring seat 55 which serves as a bumper for the lock nut 43 to limit the downward movement thereof in case of need.

Threaded on the upper end of the main cylinder 22 is a head 56, this head being preferably of cast metal and having a cylinder bore 57 in which is placed a sleeve 58, this sleeve being retained rigidly in place by a washer 59 clamped between the end of the cylinder 22 and a shoulder formed on the head 56, and an upper cap 60 which closes the upper end of the bore 57. The upper water pipe 36 is threaded in the cap 60 and communicates through an opening 61 with the interior of a washer water supply pipe 62 which is secured in a coupling 63 threaded on the cap 60. Sliding freely inside the sleeve 58 is a main valve 70, this main valve being carried on a main valve pipe 71 which slides freely on the upper water pipe 36 inside the main piston body 42. Rigidly clamped on the main valve pipe 71 is a first cup leather 72, a second cup leather 73, and a third cup leather 74, these cup leathers being separated by a first spacer 75 and a second spacer 76, the cup leathers being clamped between a collar 77 brazed or otherwise secured on the main valve pipe 71 and a nut 78 which is secured by a check nut 79, the nuts 78 and 79 being threaded on the extreme upper end of the main valve pipe 71. Secured on the main valve pipe 71 is an upper stop 80 and a lower stop 81, the upper stop being brazed or otherwise secured on the main valve pipe 71, and the lower stop 81 consisting of a nut 82 and a check nut 83 threaded on the pipe 71. The nuts 82 and 83 slide freely inside the main piston pipe 41, the stops 80 and 81 serving to actuate the main valve 70 when engaged by the main piston 42.

An exhaust cavity 84, an auxiliary valve inlet cavity 85, and a pressure cavity 86 are cut in the outer surface of the sleeve 58, the exhaust cavity 84 communicating with the outside air through a series of exhaust openings 87 and all of the cavities 84, 85 and 86 communicating with the interior of the sleeve 58 through a series of openings 88, 89 and 90. An inlet opening 91 communicates with the extreme bottom of the cylinder 22 adjacent to the ring 55, this opening being controlled by a needle valve 92 consisting of a screw 93 and a check nut 94. A stuffing box 95 is formed in the foot valve casting packing 96, being compressed by a follower 97 which surrounds a foot valve supply pipe 98, this foot valve supply pipe 98 extending upwardly and being threaded in the head 56 in open communication with an opening 99 formed therein.

In the head 56 is the auxiliary valve 25 and the plug cock 24. The auxiliary valve 25 is placed in a bore 100 formed in the head 56 and closed at either end by threaded caps 101 and 102 having openings 103 formed therein which may be engaged by a spanner wrench. A sleeve 104 is rigidly clamped between the caps 101 and 102, this sleeve having a large bore 105 and a small bore 106. An auxiliary valve body 107 slides freely therein and has large cup leathers 108 and small cup leathers 109 firmly clamped therein, the large cup leathers 108 fitting tightly in the bore 105 and the small cup leather 109 fitting tightly in the bore 106. An opening 110 connects the left-hand end of the large bore 105 to the cavity 89, and the cavity 90 is connected by means of an opening 111 with the interior of the bores 105 and 106 at their juncture. An exhaust opening 112 in the cap 101 connects the extreme end of the bore

106 with the outer air. The plug cock 24 consists of a tapered plug 113 which is turned by a handle 114. An air supply pipe 115 is secured in the head 56 over the top of the auxiliary valve 25, the air from the pipe 115 passing through an opening 116 formed on the outer surface of the sleeve 100 and communicating with a tapered opening 117 in which the tapered plug 113 tightly fits. The opening 116 is always in communication through the opening 99 with the interior of the pipe 98 so that air pressure is always supplied through the pipe 98 to the bottom of the main cylinder 22. When the tapered plug 113 is in the operative condition, the opening 116 is in open communication through an opening 118 with the interior of the bores 105 and 106 near their juncture thereof, and this opening 118 is always in open communication with the opening 111 so that air under pressure is supplied to the cavity 90 whenever the handle 114 is in the operative position. When the handle 114 is thrown to the inoperative position, the cavity 118 is connected through openings 120 with an exhaust port 121 communicating with the outer air. A series of small openings 122 communicate with a cavity 123 formed in the outer walls of the sleeve 104, the cavity 123 communicating through a hole 124 with port 125 in the upper portion of the cylinder 22 near the top thereof. An air pipe 130 is tapped into the side of the head 56 communicating through an opening 131 with the cavity 90 which is supplied with air whenever the washer is operating, the pipe 130 therefore containing air under pressure during this time. The pipe 130 is connected to pipes 150 and 151 which are connected into outer heads 152 and 153 of the water measurer 21.

The outer head 152 is secured on the end of the main cylinder 154 by a nut 155. An adjusting bolt 156 is threaded through the center of the head 152 and a measuring scale 157 is secured to the head, a ring 158 on the bolt 156 coöperating with a scale 159 to indicate the exact position of the bolt 156 and thereafter the position of a main piston 160 which slides freely in the cylinder 154. The main piston 160 consists of a main piston body 161, cup leathers 162 and 163 separated by a washer 164 and clamped in place by a nut 165, and a bolt 166 secured on the body 161. The head 153 is secured on an inner head casting 167, this inner head casting having a bore 168 in which an auxiliary piston 169 is free to slide. This piston consists of cup leathers 170 and 171 secured on the body 172 by means of a bolt 173 and a lock nut 174, a spacing washer 175 serving to separate them. A projection 178 is centrally formed on the end of the body 172. The bore 168 is closed by a washer 180 having a central opening 181 formed therein. The lower end of the cylinder 154 is closed by a washer 182 having an opening 183 formed therein, the space between the washer 180 and 182 forming a valve chamber 184 in which a valve 185 is placed, the valve consisting of rubber washers 186 and 187 secured on a body 188. A compression spring 189 is placed between the body 188 and the washer 182 for the purpose of normally holding the washer 186 against the washer 180, thereby closing the hole 181. A fluted stem 190 formed on the body 185 projects into the hole 181 for the purpose of guiding the valve 185, and a fluted stem 191 projects into the hole 183 for the same purpose. Water from a tank or other source of supply is conducted through a pipe 192 into the valve chamber 184, this water passing freely through the opening 183 into the interior of the cylinder 154 when the parts are in the position shown in Fig. 9. A water outlet pipe 193 communicates with the interior of the bore 168 below the washer 180, this pipe 193 communicating with the pipe 192 which supplies water to the interior of the washer, this water passing downwardly through the washer to the film nozzle 23.

Open communication is provided between the valve chamber 184 and the interior of the cylinder 154 through openings 195 and 196. The opening 195 is controlled by a needle valve 197 threaded in a needle valve body 198, the needle valve 197 having a stem 199 passing through packing 200 which is compressed by a follower 201 which is also threaded in the needle valve body 198.

The method of operation is as follows:

When the various apparatus is not in operation, the handle 114 and the plug 24 are turned to the inoperative position, the foot valve supply pipe 98 being in open communication with the pipe 115 through the groove in the tapered plug 113 and through the opening 116. At the same time the opening 118 is in open communication with the outer air through the opening 120 in the tapered plug 113 and through the exhaust port 121. Air pressure is therefore exerted against the bottom of the main piston 42. The main piston 42 is therefore held in the extreme upper end of the cylinder, the end of the piston contacting with the upper stop 80 and holding the main valve 70 to its extreme upper position, this position of the various parts being hereinafter called position 1 and shown diagrammatically in Fig. 10. In this position the exhaust openings 88 are closed by the piston leather 74, the openings 89 and 90 communicating with the interior of the sleeve 58 which is in open communication with the interior of the main cylinder 22. The openings 90 are in open communication with the outer air through the openings 111, the open-

ing 118, the openings 120 and the exhaust port 121. In position 1 there is therefore no tendency for the parts to move, the main piston 42 being at the extreme top of the cylinder 22, the main valve 70 being at the extreme top of the sleeve 58, and the auxiliary valve body 107 being in the position shown in Fig. 3. With the parts in this position the film nozzle 23 is in the position shown at "A" in Fig. 1, being entirely above the basket and out of the way.

Since the pipes 150 and 151 are in open communication through the pipe 130 with the cavity 90 which is in open communication with the outer air, there is no air pressure in the end ends of the water measurer and the valve 185 is seated against the washer 180, thereby shutting off communication between the pipes 192 and 193. No water therefore flows through the pipes 193 and consequently no water is supplied to the opening 61 in the top of the washer. Water is, however, free to flow through the openings 195 and 196 into the interior of the cylinder 154 of the water measurer. This water pressure forces the main piston body 161 into the position shown in Fig. 9, the amount of water taken into the cylinder 154 being regulated by adjusting the bolt 156.

When it is desired to put the machine into operation the plug cock 24 is thrown into the operative position. This connects the opening 118 with the opening 116, therefore admitting air pressure from the pipe 115 into the space between the cup leathers 108 and 109, pressure being maintained in this space during the entire time the washer is in operation. At the same time the openings 120 are thrown out of engagement with the port 121. Pressure is still maintained, however, in the pipe 98 so that the upward pressure on the main piston 42 is constant. Owing to the large diameter of the main piston pipe 41 the effective area on the bottom of the piston is very considerably less than the area on the top so that whenever an equal air pressure is placed on both the top and bottom of the main piston 42 this piston is forced downwardly. Whenever the plug cock is thrown into the operative position the air under pressure from the space between the cup leathers 108 and 109 flows through the opening 111 into the pressure cavity 86 and from thence through the openings 90 into the interior of the sleeve 58 and into the interior of the main cylinder 22. The air pressure acting on the top of the main piston 42 tends to force the main piston downwardly, at the same time the air pressure entering the opening 110 through the openings 89 and the cavity 85 is transmitted back of the cup leather 108 forcing the auxiliary piston body to the right so that it strikes against the washer 101. This connects the openings 122 with the air pressure between the cup leathers 108 and 109, and this air pressure flows downwardly through the openings 123 and 124 to the port 125. The parts at this time are in what will hereinafter be called position 2, as shown in Fig. 11, the auxiliary valve being at its extreme right hand position, the main valve being at its extreme upper position, and the main piston just starting downwardly. As the main piston starts downwardly it uncovers the port 125 thereby opening an additional channel to the top of the cylinder 22, the parts at this time being in what may be called position 3, as shown in Fig. 12. The main piston 42 continues to move even after the cup leathers 74 pass over the openings 90, thereby shutting off the air which has been flowing through these openings into the cylinder, as air is still being supplied through the port 125, the opening 124 and the ports 122. As the main piston 42 nears the end of its stroke the auxiliary valve 70 is actuated by the main piston body striking the stop 81, the auxiliary valve body being carried down into the position shown in Fig. 2 and the film nozzle being in the position "C" as shown in Fig. 1. The parts are then in the fourth position, as shown in Fig. 13, the main piston being at the extreme lower limit of the stroke, the auxiliary valve being still at its extreme right hand position, and the main valve being at its extreme bottom position. With the parts in this position, as shown in Fig. 2, the ports 90 are completely isolated by the cup leathers 73 and 74, the ports 88 and 89 being in open communication through the space between the cup leathers 72 and 73. The air under pressure is therefore free to escape from the extreme left hand end of the auxiliary valve cylinder, this air escaping through the exhaust ports 87 into the outer air. The air pressure between the cup leathers 108 and 109 always tends to force the valve 107 to the left hand position since the cup leathers 108 are larger in diameter than the cup leathers 109. The auxiliary valve therefore moves to its original or left hand position, the parts then assuming position 5, as shown in Fig. 14. In this position the port 125 is connected to the outer air through the openings 124, 123, the ports 122, and the exhaust port 112. Pressure is therefore relieved from above the main piston 42 and the constant air pressure beneath this piston starts it upwardly. The main piston does not, however, go to the extreme top of the cylinder due to the fact that the stop 80 is so placed that it is struck and the main valve is moved upwardly until the cup leather 73 passes over the openings 89, thereby disconnecting the openings 89 from the exhaust port 87 and connecting them to the pressure cavity 86 through the openings 90. The parts are then in position 6, as shown in

Fig. 15. The film nozzle 23 is in position "B" of Fig. 1. This results in putting pressure on the valve 107 through the opening 110, the valve being moved to its extreme right hand position, this being position 7 as shown in Fig. 16. In this position air flows in the pipe 115, the opening 116, the opening 118, the ports 122, the openings 123 and 124, and the port 125 into the interior of the cylinder, forcing the main piston 42 downwardly. The main piston 42 moves downwardly until it strikes the stop 81 pulling the auxiliary valve into position 4, air pressure then working to throw the parts into the position 5, and the cycle being repeated through positions 6 and 7 to the original position 4.

It is thus seen that the main piston reciprocates up and down actuating the main valve 70 which in turn opens and closes ports to actuate the auxiliary valve 107, this auxiliary valve in turn controlling the movement of the main piston. This continues until the plug cock 24 is thrown into the inoperative position. This connects the various parts as has been previously explained, the main piston being forced up to its extreme upper position and the parts occupying position 1. It will thus be seen that the film nozzle 23 is reciprocated up and down from the position shown at "B" in Fig. 1 to the position "C." When the plug cock 24 is operated the film nozzle 23 is lifted to the position "A" and remains there until the machine is again put in operation.

The function of the water measurer 21 is to automatically shut off the flow of water to the charge of fellmass as soon as a certain predetermined amount of water has passed through the measurer.

The water measurer operates in the following manner: The various parts being in the position shown in Fig. 9, the plug cock 24 is thrown into the operating position and the washer 20 starts to reciprocate throwing the water in a thin film over the charge of fellmass in the centrifugal separator as it moves up and down. As soon as the plug cock 24 is thrown into the operating position air pressure is supplied to the water measurer through the pipe 130 and through the pipes 150 and 151. A constant water pressure is maintained in the pipe 192, air pressure being supplied through the pipes 150 and 151, the pressure per square inch of the air supplied through the pipes 150 and 151 being considerably in excess of the pressure per square inch of the water supplied through the pipe 192. As soon as the air is turned on in the pipe 130, this air acting through the pipe 151 acts against the auxiliary piston 169 forcing it upwardly as shown in Fig. 9, the projection 178 striking against the end of the fluted stem 190 and forcing the valve 185 upward into such a position that the rubber washer 187 strikes against the washer 182 closing the opening 183 therethrough. As the air pressure exceeds the water pressure the auxiliary piston 169 is held in this position, water flowing through the pipe 192 into the valve chamber 184 and through the flutes in the fluted stem 190 and the opening 181 to the pipe 193, this pipe being connected to the coupling 63 so that the water flows downwardly through the opening 61 into the interior of the washer and through the pipe 35 to the film nozzle 23. At the same time that the air pressure acts on the auxiliary piston 169 through the pipe 151 it acts on the main piston 160 through the pipe 150, this main piston being forced downwardly by the action of the air pressure thereon. As the auxiliary piston 169 acts almost instantly the opening 183 is practically instantly closed so that the water in the main cylinder 154 below the main piston 160 is almost immediately trapped, this water escaping from the main cylinder 154 through the openings 195 and 196. The rate of flow through these openings is controlled by the needle valve 197, this needle valve being set so that the flow of water is very much restricted and so that the main piston 160 moves relatively slowly. During the movement of the main piston the auxiliary piston 169 holds the valve 185 in its raised position, water flowing through the pipe 192 to the pipe 193 and from the pipe 193 to the washer as previously explained. As the main piston 160 continues to move downwardly it strikes against the end of the fluted stem 191 pushing the valve 185 downwardly and forcing the rubber washer 187 from its seat so that water is free to flow through the opening 183 around the fluted stem 191. As the main piston continues its movement it forces the washer 186 against the washer 180 thereby closing the opening 181 so that the flow of water between the pipes 192 and 193 is entirely shut off and water ceases to flow through the film nozzle 23. The washer will continue to reciprocate without water being supplied until the plug cock 24 is thrown to the inoperative position, thus throwing the film nozzle 23 into position "A" free from the centrifugal separator. At the same time the air supply in the pipes 150 and 151 is released and the water pressure acting against the main piston 160 and flowing through the opening 183 forces the main piston 160 into its upper position as shown in Fig. 9. The parts of the measurer and the washer are then in their inoperative or initial position and the cycle may be repeated.

The time required for the main piston 160 to close the valve 185 and shut off the flow of water between the pipes 192 and 193 may be regulated by means of the screw 156, this screw regulating the amount of water taken into the main cylinder 154 and therefore

regulating the time required to expel this water. The time for the main piston 160 to close the valve 185 may also be regulated by means of the needle valve 197, this needle valve regulating the rate of flow of the water through the openings 195 and 196 and thereby controlling the time required for the piston 160 to complete its motion.

I claim as my invention:

1. An automatic sugar washer comprising a film nozzle, means for feeding a washing fluid through said nozzle against the charge of sugar, means for holding said nozzle in its extreme upper position so that it is entirely out of the basket, and means for reciprocating said nozzle back and forth from its lower position inside said basket to an intermediate position near the top of the basket.

2. An automatic sugar washer comprising a film nozzle, means for feeding a washing fluid through said nozzle against the charge of sugar, means for holding said nozzle in its extreme upper position so that it is entirely out of the basket, means for reciprocating said nozzle back and forth from its lower position inside said basket to an intermediate position near the top of the basket, and means for automatically shutting off the flow of washing fluid to said nozzle when a certain predetermined amount of such fluid has passed through said nozzle.

3. An automatic sugar washer for use in a centrifugal separator comprising a main cylinder, a main piston sliding in said cylinder, a nozzle carried by said main piston, means for supplying water to said nozzle, valve means for applying pressure to said main piston to raise or lower same, and means by which the movement of said main piston automatically actuates said valve means.

4. An automatic sugar washer for use in a centrifugal separator comprising a main cylinder, a main piston sliding in said cylinder, a nozzle carried by said main piston, means for supplying water to said nozzle, valve means for applying pressure to said main piston to raise or lower same, an auxiliary piston, means by which said auxiliary piston actuates said valve means, and means by which said main piston automatically controls the pressure on said auxiliary piston.

5. An automatic sugar washer for use with a centrifugal separator comprising a vertical pipe so placed as to project inside a charge of sugar carried in said separator, a nozzle secured to said pipe in such a position that it may throw a washing fluid against said charge of sugar, means for supplying a washing fluid to said pipe, automatic means for raising and lowering said pipe vertically, and means by which said pipe actuates said automatic means.

In testimony whereof, I have hereunto set my hand at Oxnard, California, this 24th day of April, 1915.

JOSEPH SAILER.