

May 21, 1929.

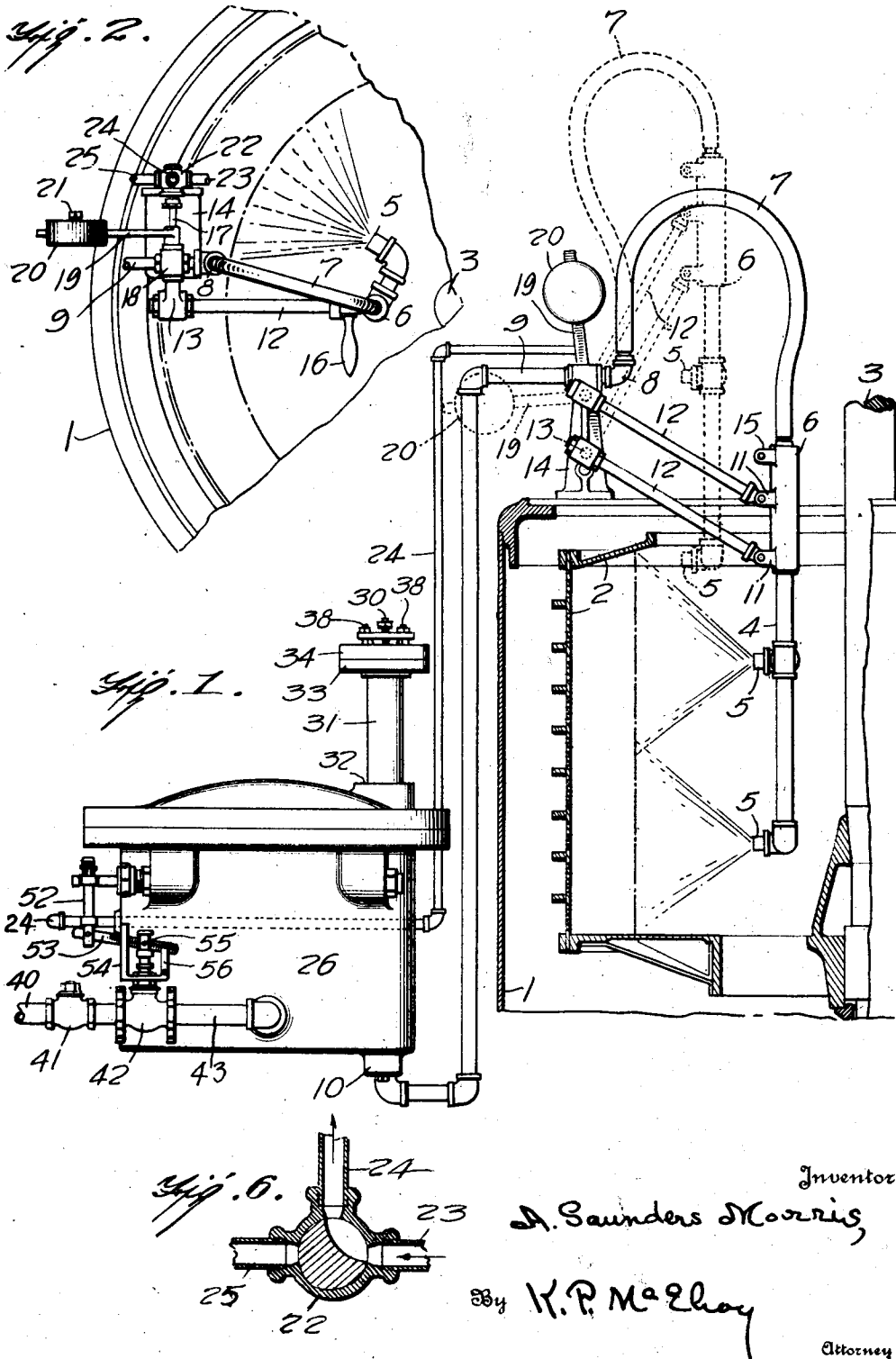
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SPRAYING DEVICE

Filed March 22, 1923

2 Sheets-Sheet 1



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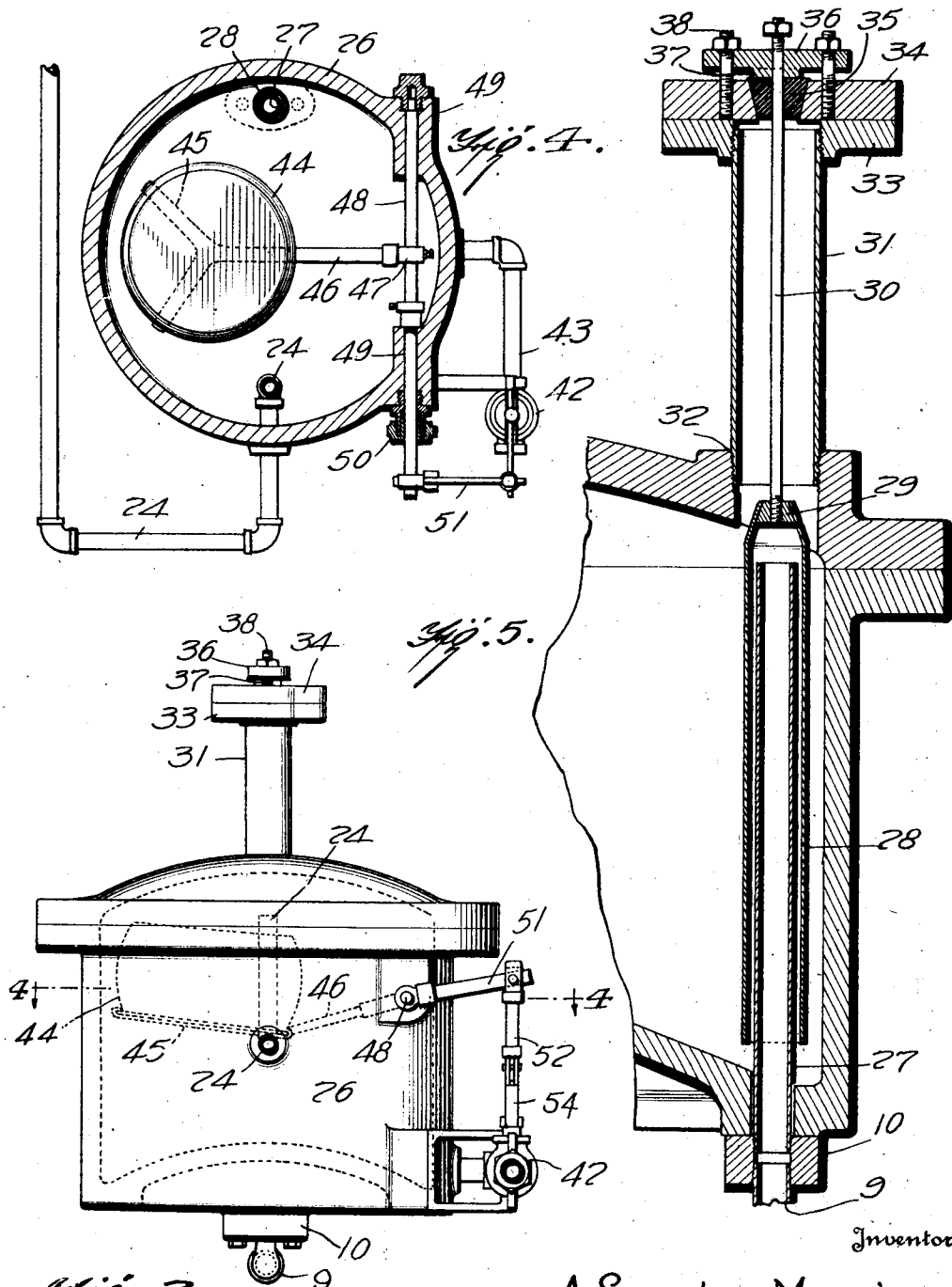
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SPRAYING DEVICE.

Application filed March 22, 1923. Serial No. 626,918.

This invention relates to spraying devices and it comprises a tank having a liquid outlet, connections for directing the liquid to a point of use, an inlet to the tank, automatic means for controlling admission of liquid into the tank, means for admitting fluid such as air under pressure to the tank to expel the liquid therefrom through the liquid outlet and means arranged to place the tank in communication with the atmosphere when a predetermined amount of liquid has been delivered therefrom, whereby the automatic means aforesaid may function to fill the tank, the connections for delivering the liquid to the point of use having advantageously spray nozzle connections and having means arranged to position the spray nozzles in different positions, such, for instance, as into and out of a centrifugal, and the positioning means for the spray nozzles advantageously operating to permit the admission of the fluid under pressure to the tank when the spraying nozzles are in spraying position and to prevent admission of the fluid under pressure and place the tank in communication with the atmosphere when the spraying nozzles are in another position; all as more fully hereinafter set forth and as claimed.

The invention also comprises improvements in spraying mechanism for receptacles such as centrifugals and certain simple combinations of elements arranged for easy operation to deliver to the spraying device a predetermined amount of liquid.

At one stage in the operation of making sugar and of refining sugar, the sugar is purged—the mixture of crystallized sugar and molasses is placed in the centrifugal basket and the machine put in motion to expel the molasses. Sometimes the molasses is that occurring with the sugar in the “massecuite” as it is delivered from the vacuum pans; sometimes more molasses is added. The operation in the centrifugal is usually discontinuous and in the ordinary routine of operation the basket is first charged with a certain amount of sugar, is put in motion and kept in rotation until the molasses has been expelled as far as practical, the wall of sugar in the basket is then washed with some spraying liquid, such as sugar sirup, water, etc., the basket is then stopped and the sugar is discharged. In modern practice the whole cycle is, of course, conducted as

rapidly as possible. Sometimes the cycle can be speeded up so as not to take more than three or four minutes and occasionally as short a time as 2.5 minutes has been found practical. The element of time is quite important; and it is the object of the present invention to provide mechanism whereby the washing or spraying part of the operation can be conducted with a minimum amount of labor and attention and in the shortest possible time. To this end I provide a tank or receptacle for containing washing liquid; ordinarily either water or a white sirup. As far as my invention is concerned, the particular liquid which is used for washing is not material. To this tank I connect means for introducing air, advantageously under rather heavy pressure; say 45 pounds gage or thereabouts. In washing it is an object to subdivide the washing liquor as far as possible, getting a uniform permeation of the wall of sugar in the whirling basket with as little liquid as may be. While it is desirable to wash the sugar thoroughly, it is also desirable not to use any more liquid than is absolutely necessary for the reason that washing is attended with some solution loss. Where water is used for washing, this loss is, naturally, greater than where sirup is used; but on the other hand, where sirup is used it is deteriorated in quality to the extent that it takes up molasses. It is not desirable to use either in any greater amount than is necessary. With water or the like emerging from a spray nozzle under a rather heavy pressure, such as that of 45 pounds, it is practicable to deliver the water or washing fluid as a very fine spray approximating a mist or fog. To the tank is also connected a source of liquid supply with valving so arranged that when the air pressure is shut off, the air in the tank can be allowed to escape and solution allowed to enter under such pressure as it may have. From this tank I draw the washing liquid under the air pressure and lead it to a suitable nozzle mounted so as to enable it to be swung into place in the centrifugal at the stage when washing is necessary and then swung out again. The motion of the spray nozzle into and out of the centrifugal may, by suitable linking, be caused to actuate the stated valve. In washing the sugar wall it is also highly desirable that a rather definite quantity of liquid be em-

ployed, neither more nor less; the object being of course to use as much as may be necessary and no more. Therefore I provide a tank with adjustable means whereby the amount of discharge of liquid in the tank can be regulated, using a sort of bell arrangement covering a discharge pipe extending to a high point in the tank. When the air pressure forces the level of the liquid below the lower end of the bell, air enters and the flow of liquid ceases.

In the accompanying drawings illustrating a specific embodiment of my invention:

Figure 1 is a view partly in section and partly in elevation showing the supply tank, a segmental view of the centrifugal and the pipe connections;

Figure 2 is a top plan view of the centrifugal of Figure 1;

Figure 3 is a side elevation of the water tank at right angles to the water tank of Figure 1;

Figure 4 is a horizontal section along line 4—4 of Figure 3 looking in the direction of the arrows;

Figure 5 is an enlarged segmental vertical section through the tank showing the regulating means; and

Figure 6 is an enlarged vertical section through one type of three-way valve which may be used.

Referring to the drawings in which similar reference numerals designate corresponding parts 1 designates the outer wall of a centrifugal, such as used in centrifuging sugar and the like, while 2 indicates the screen or basket of the type customarily used. The screen is revolved by means of shaft 3 operated from a source of power not shown.

For the purpose of washing the sugar on the inner walls of the screen there is provided the spraying mechanism shown, adapted to be lowered into the centrifugal inside the screen to direct the water under pressure towards the wall thereof and adapted to be raised from the centrifugal when not in use. The spraying device comprises the pipe 4 carrying a plurality of spraying nozzles 5 arranged to throw a fine spray of water under the pressure prevailing in the tank as hereafter described. The pipe 4 is preferably adjustably secured to the section 6 to which is attached the flexible connection such as a hose or the like 7 leading to the elbow 8 which in turn is connected to the pipe 9 attached to the bottom of the tank at 10. On the connection 6 are provided a plurality of ears 11 to which are pivoted a plurality of links 12 (two being sufficient). These links constitute parallel arms which are pivoted at 13 to the standard 14 mounted on top of the centrifugal. The connection 6 is further provided with an ear or lug 15 to which the handle 16 may

be secured, the handle serving for lowering and raising the spray nozzles into and out of the centrifugal. The shaft 17 of the upper link 12 passes through trunnion 18 on the standard 14 and has keyed to it the arm 19 carrying counter balance 20 which may be adjusted on the arm 19 in balancing position by means of the set screw 21.

The shaft 17 extends into the valve casing 22, such casing containing a three-way valve operated by this shaft. In some cases, as where the shaft of the centrifugal is provided with a distributing disk, it is inconvenient to remove the nozzles from the centrifugal. Therefore I provide means for operating the valve without the necessity of removing the spray nozzles. The three-way valve shown in Fig. 6 may be provided with a handle opposite the shaft 17 for turning the valve or, advantageously, the upper arm 12 of the spray nozzle may be disconnected at the upper ear 11. This arm may serve as a handle for operating the valve. Connected to the valve casing are the pressure pipe 23, the tank pipe 24 and the exhaust pipe 25, and the valve which may be of known construction is arranged so that, when the spraying device is lowered into the machine, pressure may reach the tank through pipes 23 and 24 but when the spraying device is removed from the centrifugal the pressure to the tank is cut off and air in the tank may pass from pipe 24 to exhaust or to the atmosphere through pipe 25.

Raising or lowering the spraying device from and into the receptacle cuts off the pressure to the tank or turns it on as the case may be. The pipe 23 may lead to a source of air under pressure or direct to a compressor or the like.

The tank 26 is usually made of a capacity to hold the amount of water necessary for washing the sugar in a given centrifugal. However, the amount of water delivered from the tank to the centrifugal upon the operation of the spraying device may be governed by the means to be described. The water from the tank is driven out of it by means of the air admitted to it through the operation of the spraying device as described and this water will continue to flow out of the tank and through the spray nozzles as long as there is a seal of water between the pipes 27 and the elongated bell 28. The pipe 27 inside the tank is in communication with the pipe 9 leading to the spray nozzles. This pipe 27 extends upwardly in the tank to a point near the top and is surrounded by the adjustable closed sleeve or bell 28. This bell 28 is provided at its upper end 29 with a stem 30 in sleeve 31 secured to the top of the tank at 32. The top of the sleeve 31 is provided with the plate 33 and corresponding plate 34 and in the plate 34 is provided yielding packing 35 through which the stem

30 extends. Above the plate 34 and the packing 35 is a third plate 36 having the downwardly projecting portion 37 and provided with bolts 38 screwing into the plate 34.

In order to adjust the bell 28 with respect to the pipe 27, the stem 30 is raised or lowered and when in adjusted position is secured there by means of the nut on bolts 38 which pull the plate 36 downwardly and cause the projection 37 to bear upon the yielding packing 35 to grip the stem 30. The position of the bell 28 with respect to the pipe 27 determines the amount of water delivered to the centrifugal when the nozzles are in spraying position. If the water in the tank should be below level of the end of the bell 28 the seal between bell and pipe 27 would be broken and the air in the tank would not force the water from it.

As before stated, when the spraying device is removed from the centrifugal the air pressure to the tank is cut off and there is established a communication from the tank to the atmosphere through line 24 and line 25. This permits filling of the tank.

The tank is provided with water supply pipe 40 having the check valve 41 and leading to automatically controlled valve 42. The water flows past this valve through pipe 43 into the tank. The valve 42 is automatically operated by means of the float 44 (shown in Figures 3 and 4). The float is mounted on spider arms 45 provided with a rod 46 keyed at 47 to shaft 48. This shaft 48 is journaled at the top of the tank in journals 49 and passes through one end of the tank through stuffing box 50. The shaft 48 at the end which passes through the tank is provided with a rod 51 pivoted to a link 52 which in turn is pivoted to the second link 53 passing through guides 54 and pivoted to the top of the valve stem 55 at one point and to the bracket 56 near its end. As the water is delivered from the tank the float descends and as soon as pressure ceases to exist in the tank and as soon as the tank is opened to the atmosphere water flows past the check valve 41 and valve 42 into the tank, valve 42 now being open because of the low position of the float controlling the valve. As the water enters the tank the float rises and when the float has risen to such a point that the valve 42 is closed, water ceases to enter the tank. The water is discharged from the tank upon the lowering of the spray nozzles which admit air under pressure to the tank through lines 23 and 24. The line 24 advantageously terminates in the upper portion of the tank at a point above the normal level of the water therein.

What I claim is:—

1. Spraying apparatus comprising a spraying device adapted to be vertically raised and lowered, a liquid supply tank and

a connection between the supply tank and the said device, means for admitting fluid under pressure to said tank to expel the liquid therefrom through the said connection and to the spraying device, means for cutting off the supply of fluid under pressure to said tank, means operated by the raising of the said spraying device for venting the tank to the atmosphere and automatic means for supplying the tank with the liquid when the tank is vented to the atmosphere.

2. Spraying apparatus comprising a spraying device adapted to be vertically raised and lowered, a liquid supply tank and a connection between the supply tank and said device, means for admitting fluid under pressure to said tank to expel the liquid therefrom through the said connection and to the spraying device, means for cutting off the supply of fluid under pressure to said tank, means actuated by the raising of the spraying device for venting the tank to the atmosphere and float-controlled means for controlling the supply of liquid to said tank.

3. Spraying apparatus comprising a spraying device adapted to be raised and lowered, a liquid supply tank and a connection between the supply tank and the said spraying device, a connection leading from the tank and to a source of fluid under pressure, a 3-way valve in said connection, one port of said valve leading to the atmosphere, another port leading to the connection from the tank, and the third port leading to the source of fluid under pressure, whereby manipulation of the valve will establish communication between the source of fluid under pressure and the tank or between the tank and the atmosphere, and means connected with the spraying device operating the said valve to establish communication between the source of fluid under pressure and the tank when the spraying device is lowered and for establishing communication between the tank and the atmosphere when the spraying device is raised.

4. Spraying apparatus comprising a spraying device adapted to be raised and lowered, a liquid supply tank and a connection between the supply tank and the said spraying device, a connection leading from the tank and to a source of fluid under pressure, a 3-way valve in said connection, one port of said valve leading to the atmosphere, another port leading to the connection from the tank, and the third port leading to the source of fluid under pressure, whereby manipulation of the valve will establish communication between the source of fluid under pressure and the tank or between the tank and the atmosphere, means connected with the spraying device operating the said valve to establish communication between the source of fluid under pressure and the tank when the spraying device is lowered and for

establishing communication between the tank and the atmosphere when the spraying device is raised, and automatic means in the tank to admit fluid thereto when the tank is placed in communication with the atmosphere.

5. Apparatus for delivering liquid under pressure, comprising a tank having a liquid delivery outlet, means for admitting air under pressure thereto, means for venting the tank to the atmosphere to permit delivering liquid thereto when the air under pressure has been cut off and means for regulating the amount of liquid discharged from the tank, said means comprising an upright pipe in the tank connected to the liquid outlet thereof and a vertically adjustable bell surrounding said upright pipe, said vertically adjustable bell having a horizontal end and said upright pipe having a horizontal top.

6. In a spraying apparatus a liquid supply tank, a connection from said tank to a source of fluid under pressure, a connection from said tank to a source of liquid supply, means operative only when a predetermined minimum level of liquid is reached in said supply tank for admitting additional liquid thereto from the source of supply, a spraying device, means caused by movement of said spraying device for controlling the flow of liquid from the liquid supply tank to the spraying device, said means simultaneously preventing a refilling of said liquid supply tank regardless of the condition of said first-named means when liquid is passing through the said spraying device.

7. Spraying apparatus comprising a

spraying device, a liquid supply tank and a connection between said supply tank and the said device, means for admitting fluid under pressure to said tank to expel liquid therefrom through the said connection and to the spraying device, means actuated by movement of said spraying device for controlling the flow of liquid therefrom and for venting the liquid supply tank when the flow of liquid through the spraying device is stopped, and additional means for preventing re-filling of said liquid supply tank from a source of supply until it has been vented to the atmosphere by movement of the spraying device to stop the flow of liquid there-through.

8. Spraying apparatus comprising a spraying device, a liquid supply tank, a connection between the spraying device and tank, a valve operable by movement of the spraying device, said valve, when the spraying device is in one position admitting fluid under pressure to the tank to cause a flow of liquid therefrom to the spraying device, said valve, when the spraying device is in another position venting the tank to the atmosphere, a pipe line for admitting liquid to the tank, a second valve for opening and closing said pipe line, said second valve opening to admit liquid through the pipe line to the tank only when the liquid in the tank reaches a predetermined level, and an additional valve in said pipe line opening only when the tank has been vented to the atmosphere.

In testimony whereof, I have hereunto affixed my signature.

A. SAUNDERS MORRIS.