April 21, 1942. C. F. BALL 2,280,518

WATER SUPPLY SYSTEM FOR CONCRETE MIXERS

Filed Oct. 9, 1939 7 Sheets-Sheet 1

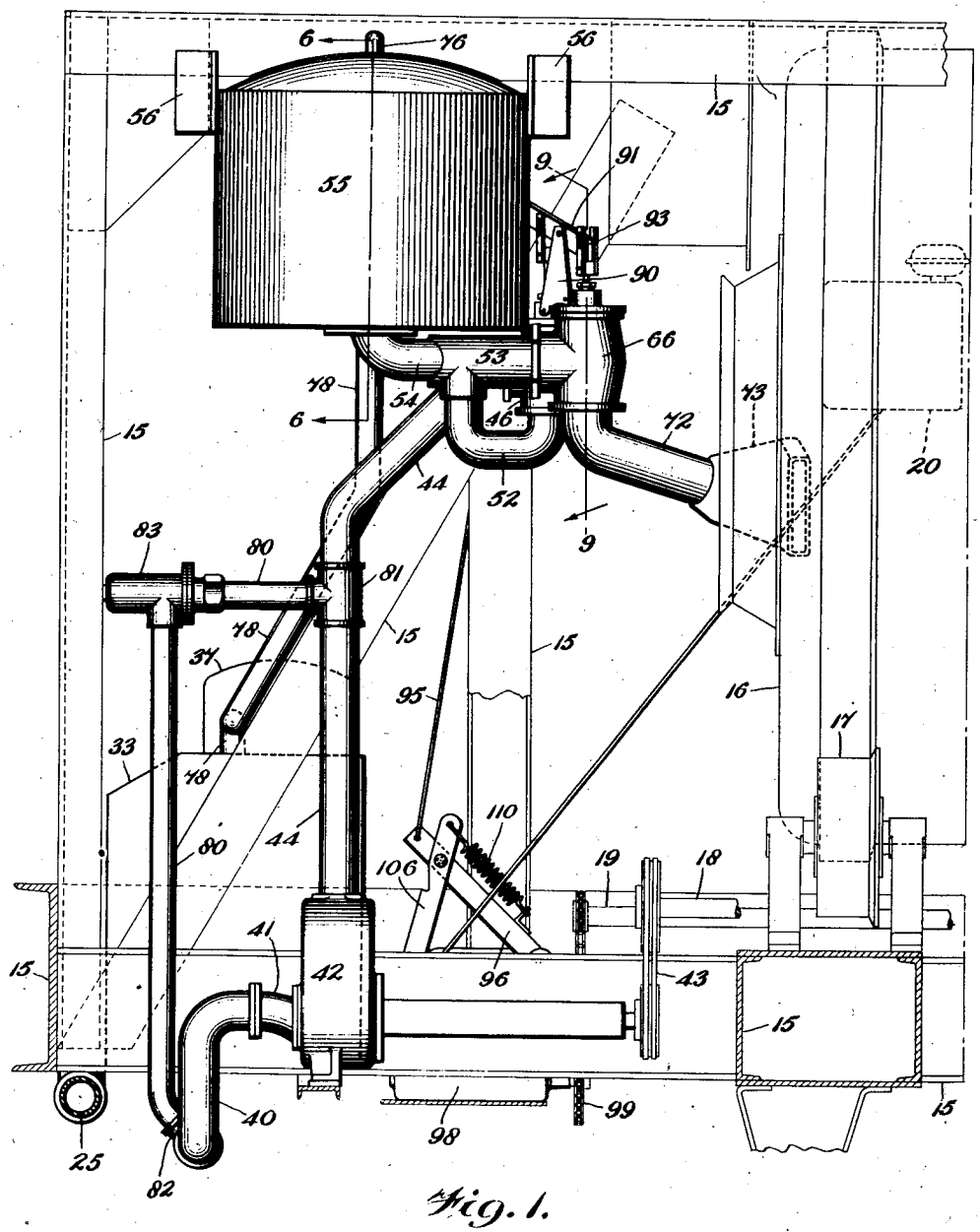


Fig. 1.

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WATER SUPPLY SYSTEM FOR CONCRETE MIXERS

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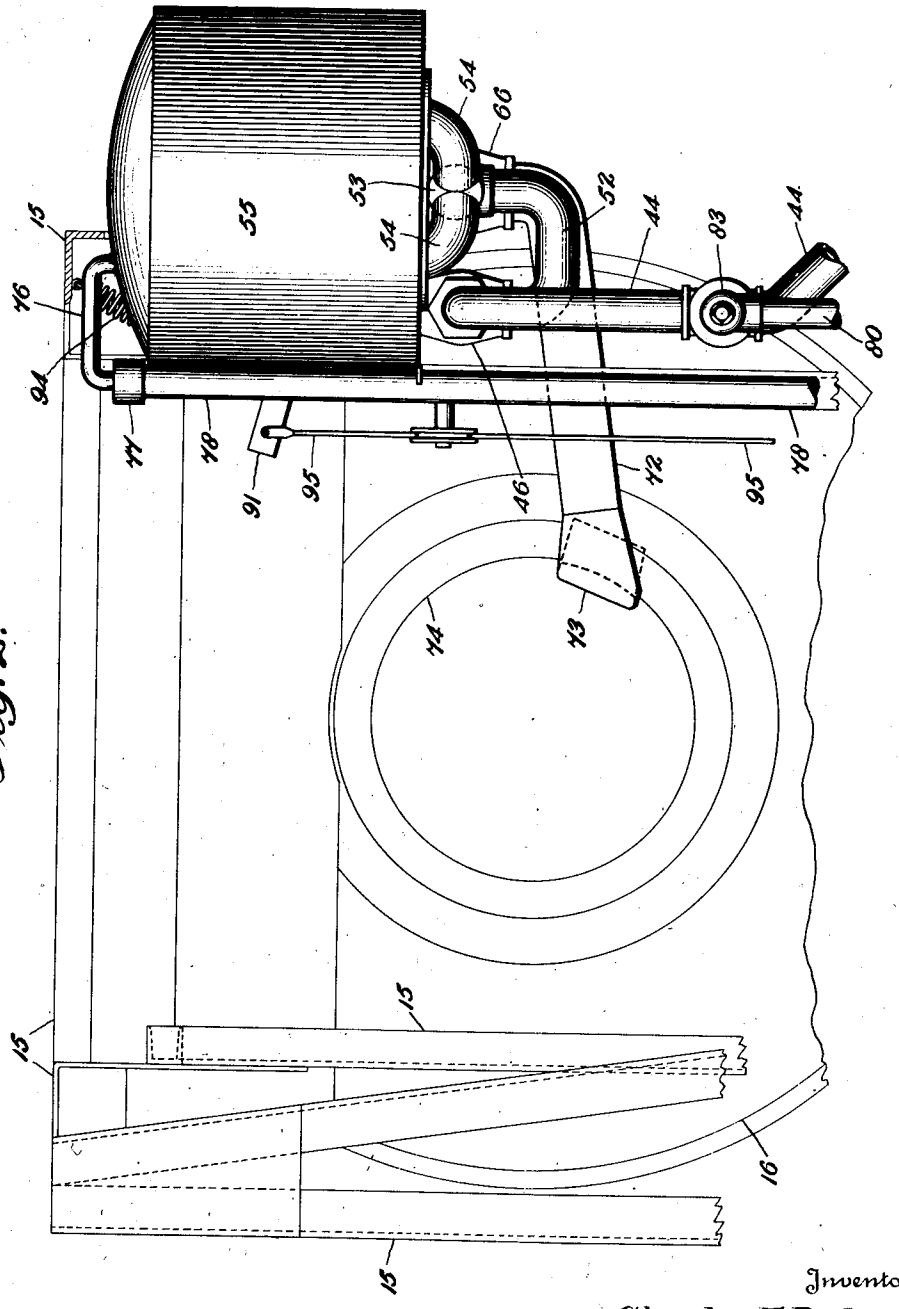


Fig. 2.

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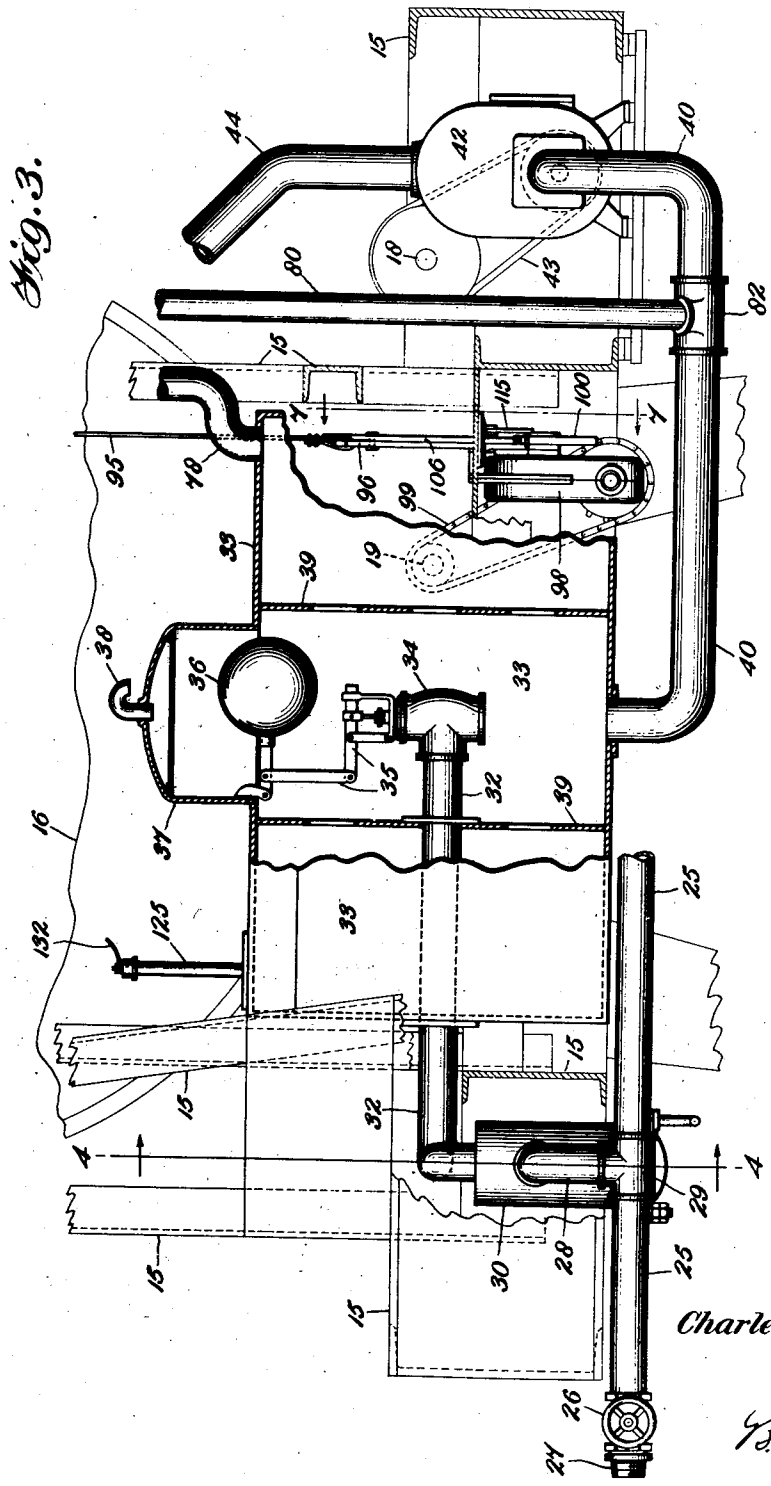
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WATER SUPPLY SYSTEM FOR CONCRETE MIXERS

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Fig. 3.



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WATER SUPPLY SYSTEM FOR CONCRETE MIXERS

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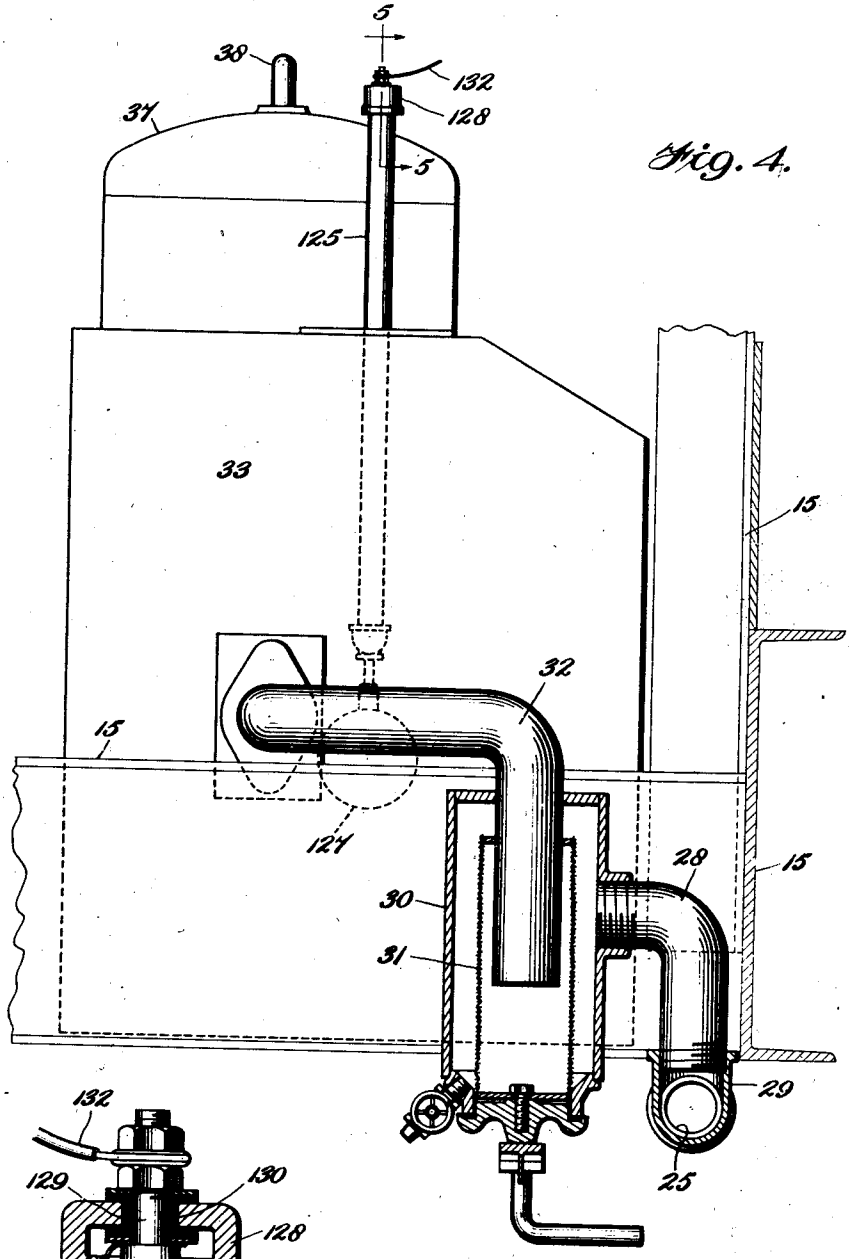


Fig. 4.

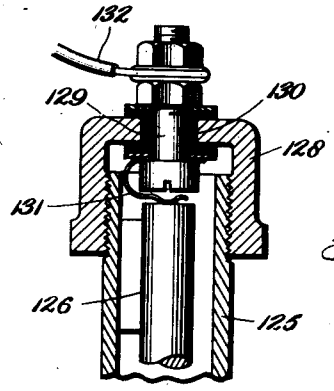


Fig. 5

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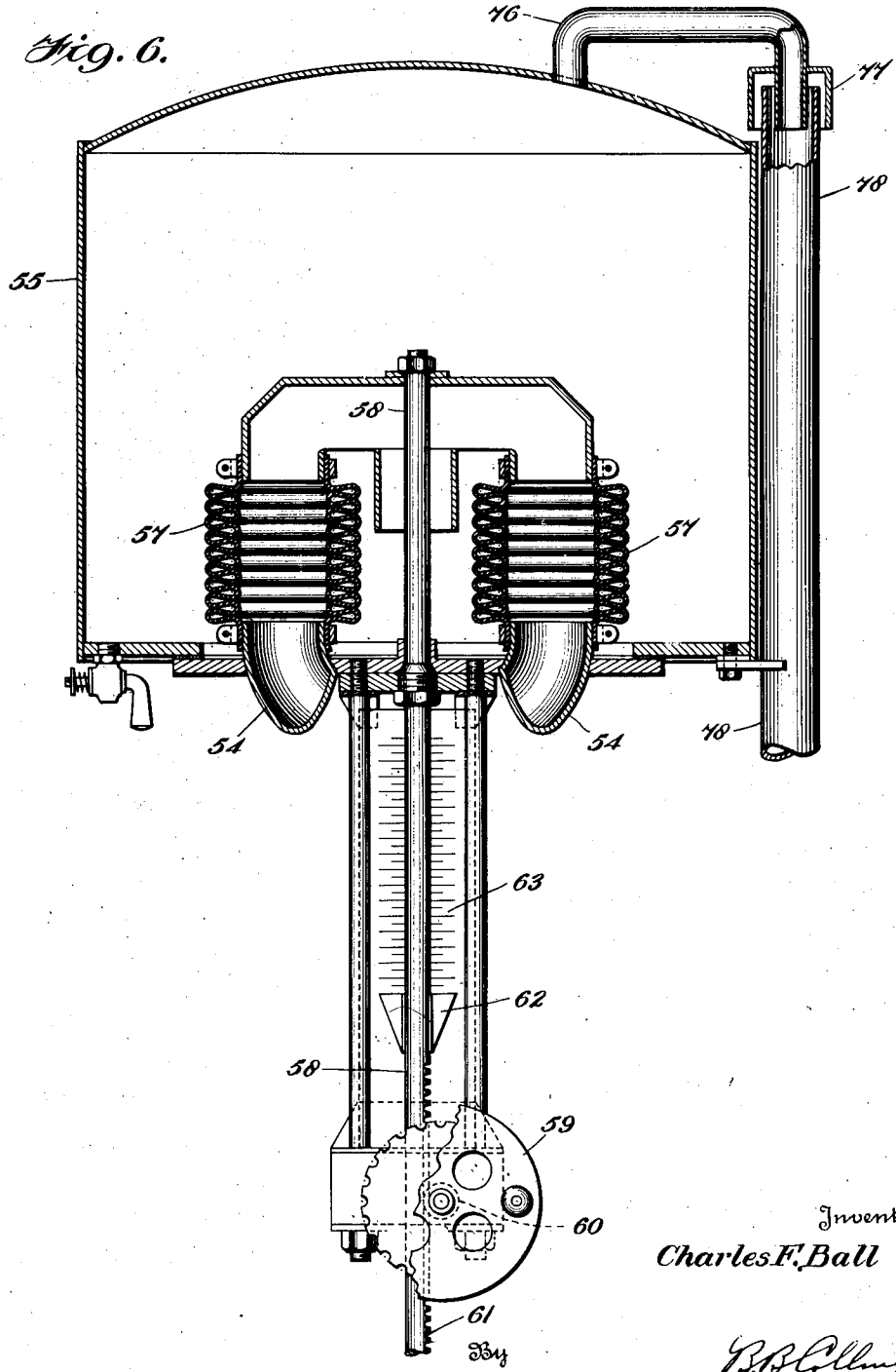
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WATER SUPPLY SYSTEM FOR CONCRETE MIXERS

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Fig. 6.



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WATER SUPPLY SYSTEM FOR CONCRETE MIXERS

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Fig. 7.

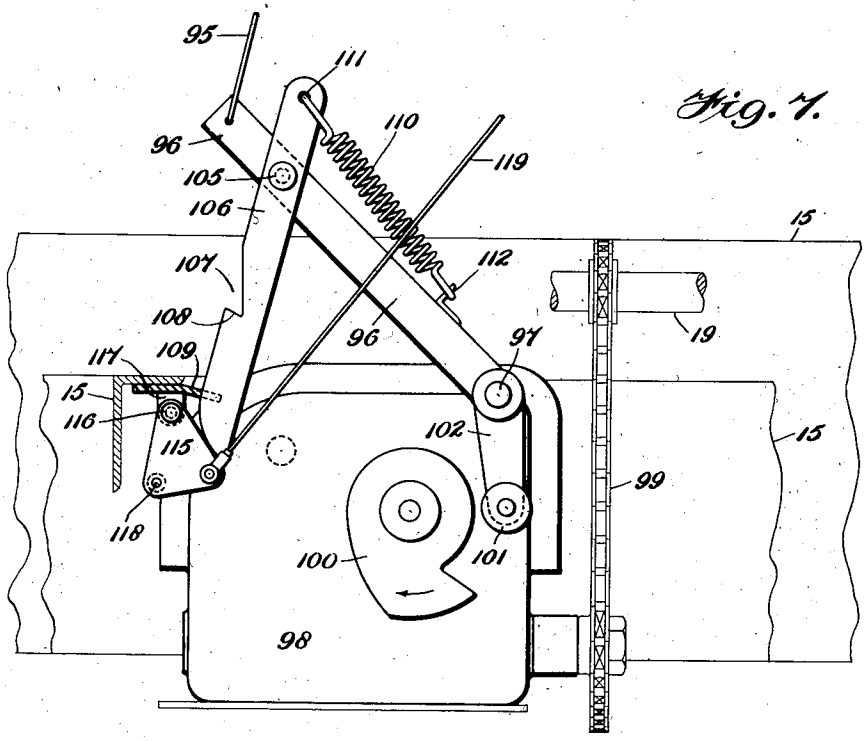
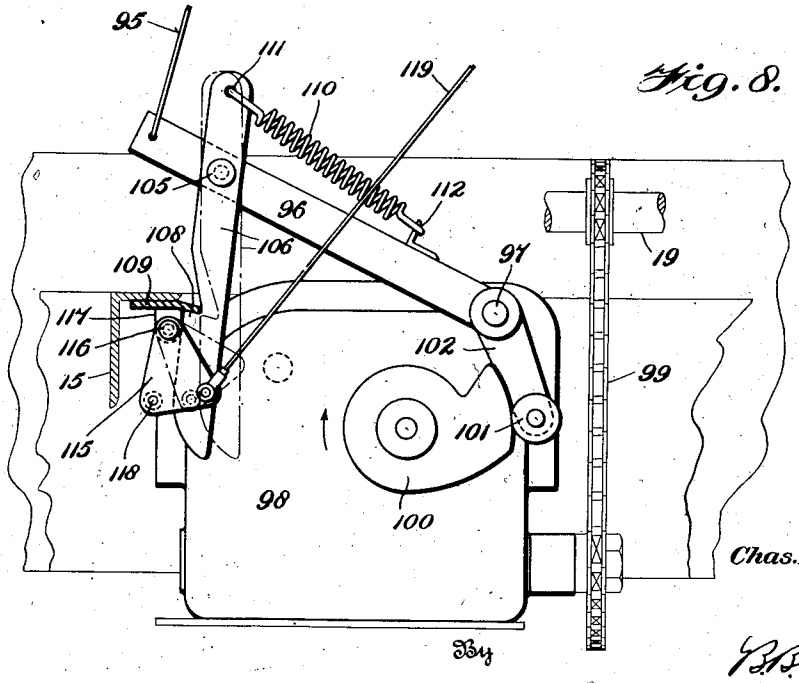


Fig. 8.



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WATER SUPPLY SYSTEM FOR CONCRETE MIXERS

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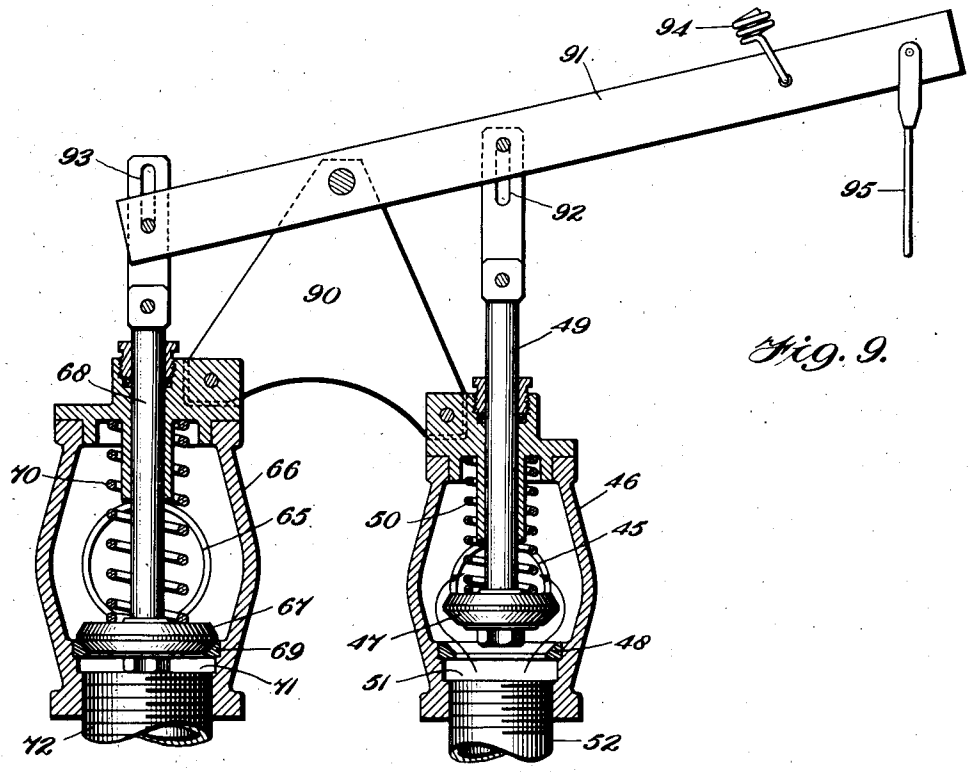


Fig. 9.

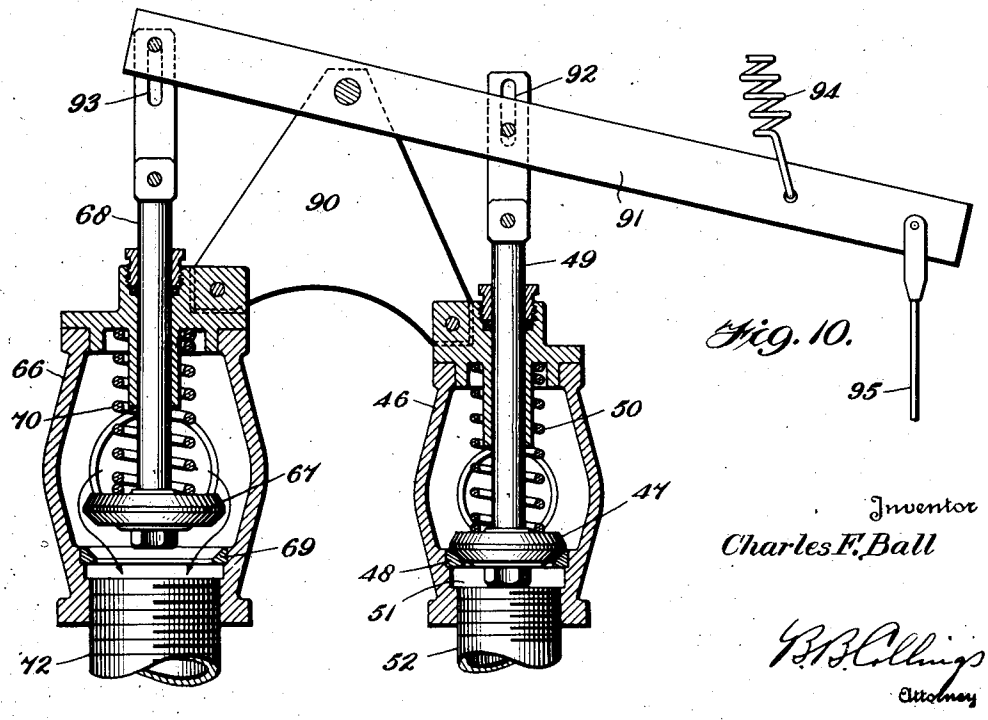


Fig. 10.

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UNITED STATES PATENT OFFICE

2,280,518

WATER SUPPLY SYSTEM FOR CONCRETE MIXERS

Charles F. Ball, Wauwatosa, Wis., assignor to Chain Belt Company, Milwaukee, Wis., a corporation of Wisconsin

Application October 9, 1939, Serial No. 298,637

5 Claims. (Cl. 259—163)

The invention relates to water supply systems for concrete mixers, and has for one of its objects to provide apparatus particularly although not solely adapted to mixers of the paving type for efficiently supplying accurately measured amounts of water to their mixing receptacles.

A further object of the invention is to provide a water supply system for concrete mixers in which water from a suitable source of supply, such for example as a city water system, or from an independent pump, under relatively high pressure may be received into a tank or reservoir on the mixer, reduced therein to atmospheric pressure, transferred under relatively low pressure to a second or measuring tank, from which predetermined accurately measured quantities may be intermittently discharged, preferably by gravity flow, to the mixing receptacle of the mixer for incorporation into a plastic concrete mixture. The tank or reservoir is desirably located relatively low on the mixer frame to reduce the overall height of the machine and improve its appearance.

A still further object of the invention is to provide a water supply system for concrete mixers in which the valve mechanism controlling the admission of water to and its discharge from the measuring tank is automatically controlled in timed relation to the functioning of the other instrumentalities of the mixer.

The operation of modern high speed concrete mixers is generally predicated upon the use of an automatic control device for initiating and terminating the several operations of the mixer and its accessories in proper time sequence. One example of such device is described in detail and claimed in my prior U. S. Patent No. 1,608,831, granted November 30, 1926. It is also desirable to regulate the length of time for mixing a batch of concrete and for this purpose a batch meter is an accessory of the modern concrete mixer.

There is apt to be a wide variation in the time required for mixing a batch of concrete on different jobs, and also in the time required for a complete cycle of operations, of which mixing is only a part. For example, such cycle may vary from 35 seconds on one job to 80 seconds or more on another job. With this wide variation in time for the complete cycle and with the mixing time constituting a variable proportion of that time, it is not always practicable to initiate and terminate the supply of water to the mixing batch by means of the automatic control, but rather it is more desirable to start the water entry into the mixer by means of the automatic control and to shut off the water through an instrumentality operating under the control of the batch meter. By this arrangement the several operations under the control of the automatic device are normally fixed and the variation of time of mixing and turning off the water are under control of the batch meter.

A still further object of the invention is therefore to provide a water supply system for concrete mixers, which mixers are provided with a batchmeter for timing a mixing operation and with an automatic control device for controlling the functioning of the various mixer instrumentalities, said system including a valve or valves associated with the measuring tank arranged to normally establish open communication between the receiving tank or reservoir and the measuring tank, and to close off communication between the measuring tank and mixing receptacle; said valve or valves being automatically operable by said automatic control device to close communication between the receiving and measuring tanks and to open it between the measuring tank and receptacle, there being latch means arranged to temporarily retain the valve mechanism in this last named position, and a trip device controlled by the batchmeter for releasing the latch to permit restoration of the valve mechanism to its normal position.

A still further object of the invention is to provide an improved low-water alarm mechanism for the supply tank of the system.

With the above and other objects in view which will appear as the description proceeds, the invention comprises the novel details of construction and combinations and arrangements of parts more fully hereinafter disclosed and particularly pointed out in the appended claims.

Referring to the accompanying drawings forming a part of this specification, in which like reference characters designate like parts in all the views:

Figure 1 is a side elevational view of a well known form of paving mixer, a portion of the frame of which is broken away, provided with a water supply system constructed and arranged in accordance with the present invention;

Fig. 2 is an elevational view, partly in section, of the upper portion of the parts shown in Figure 1, as seen from the left of said figure;

Fig. 3 is a view similar to Fig. 2 of the lower portion of the parts illustrated in Fig. 1;

Fig. 4 is a vertical sectional elevational view taken approximately on the plane indicated by the line 4—4 of Fig. 3, looking in the direction of the arrows;

Fig. 5 is an enlarged detail sectional view, taken approximately on the plane indicated by the line 5—5 of Fig. 4;

Fig. 6 is a vertical sectional view through the measuring tank, taken approximately on the plane indicated by the line 6—6 of Fig. 1, looking in the direction of the arrows;

Fig. 7 is an enlarged detail elevational view, taken approximately on the plane indicated by

the line 7—7 of Fig. 3, illustrating the automatic control device, the latch mechanism and the batchmeter-controlled trip, the parts being shown in the normal positions;

Fig. 8 is a view similar to Fig. 7 but showing the parts in the positions they assume when the latch is operative, the said latch being also shown in broken lines in the position to which it is moved for release by the trip;

Fig. 9 is an enlarged sectional view through the valve mechanism, taken approximately on the plane indicated by the line 9—9 of Fig. 1, looking in the direction of the arrows, and illustrating the parts in their normal positions; and

Fig. 10 is a view similar to Fig. 9 but showing the parts in the positions they assume when the automatic control device and its associated parts are in the positions illustrated in Fig. 8.

Referring more particularly to Figs. 1, 2 and 3, 15 indicates generally the framework of a well known form of concrete mixer of the paving type within which a mixing drum or receptacle 16 is mounted for rotation about a longitudinal axis upon rollers 17. The said mixer is provided with a main power shaft 18 and a counter-shaft 19 both driven from an internal combustion engine or other suitable source of power, not shown, which shafts supply power for the operation of the various mixer instrumentalities, all as is well known in the art. The mixer is also provided with a batchmeter 20 for timing the mixing operations in the drum or receptacle 16, which batchmeter may be of any suitable construction, such for example as that illustrated and described in prior U. S. Patent 2,018,964, granted October 29, 1935, on an application filed by Rudolph F. Lindow.

The water supply system constituting the present invention comprises a supply pipe 25 which preferably extends completely across the machine from side to side and is provide at either end with a valve 26 and a threaded connection 27 by means of which it may be connected to a hose or other suitable conduit leading from the city mains or from an independent pump where city water is not available. Only one valve 26 and connection 27 is illustrated in Fig. 3, but it will be understood that the other end of the pipe 25, which is broken away in said figure, is provided with corresponding elements so that the hose connection may be made at either side of the machine.

A pipe 28 communicates with the pipe 25 by means of a T-connection 29 and leads into the casing 30 of a suitable strainer which may include the removable foraminous strainer element 31, see Fig. 4, through which the water must pass in order to reach a pipe 32 leading from the top of the strainer casing 30. The said pipe 32 extends into a receiving tank or reservoir 33 which is suitably supported upon the framework 15 of the mixer and said pipe at its discharge end is provided with a valve 34 which is preferably controlled through suitable linkage 35 by a float 36 whereby admission of water into the tank 33 will be automatically governed to maintain a substantially constant level therein. The float 36 also controls the valve 34 so as to provide gradual closing thereof, thereby avoiding shocks in the supply line which would be occasioned by a rapidly closing valve. The tank 33 is also preferably provided with a dome 37 which is vented to the atmosphere by means of a vent pipe 38. The tank 33 may also be provided with suitable perforated partitions or baffles 39 to reduce surging of the water within the tank.

A pipe 40 leads from the bottom of tank 33 and extends to the inlet connection 41 of a centrifugal or other suitable pump 42 which may be driven by a belt and pulley drive 43 from the main shaft 18, as clearly shown in Figs. 1 and 3. A pipe 44 extends from the discharge side of the pump and communicates with the inlet port 45, see Fig. 9, of an inlet valve 46. This valve is here shown as of the reciprocating disc type, being provided with a valve disc or member 47 arranged to be moved to and from the valve seat 48 by means of the valve stem 49, the said disc being normally urged toward the seat by means of a coil spring 50.

The outlet port 51 of the valve is connected by means of a pipe 52 to a fitting 53 from one end of which leads a pair of pipes 54 which extend upwardly through the bottom of the measuring tank 55 which is suitably supported by brackets 56 in an elevated position upon the framework 15.

The measuring tank 55 is provided with suitable mechanism for determining accurately an amount or quantity of water to be discharged therefrom, which measuring mechanism may conveniently take substantially the form of that described and claimed in the prior U. S. patent to Charles F. Ball, 1,913,301, granted June 6, 1933. As fully set forth in the said Ball patent, this mechanism includes accordion pleated tubes 57 the lower ends of which are secured to the pipes 54, the said tubes being extensible and contractible vertically by means of a rod 58 extending through the bottom of the tank 55 and having suitable operating mechanism in the form of a hand wheel 59, pinion 60 and rack teeth 61, for accomplishing the said vertical movements. The rod 58 may also carry an indicator 62 arranged to cooperate with a scale 63 whereby the positions of the tubes 57 and consequently the amount of water to be discharged may be visibly indicated.

The other end of the fitting 53 communicates with the inlet port 65 of outlet valve 66, see Fig. 9, which valve is or may be of similar construction to valve 46 and may include the valve disc or member 67 carried by the valve stem 68 movable to and from the valve seat 69, being normally urged toward seating position by the valve spring 70. The outlet port 71 of the said valve communicates by means of a pipe 72 with a suitable discharge nozzle 73 located within the charging opening 74 of the mixing drum 16.

Since the present system contemplates that the measuring tank 55 is to be completely full in order to secure accurate measurement of the discharge therefrom, and since the pump 42 operates constantly, tank 55 is provided with overflow pipe 76 leading from the top of the said tank, which pipe, best shown in Fig. 6, has secured adjacent to its discharge end an enlarged hood or shield 77. The end of the pipe 76 is received within the upper end of a larger pipe 78 which is in spaced relation to both the discharge end of the pipe 76 and to the hood or shield 77, as clearly indicated in said figure. It thus results that a hooded or shielded vent is provided in the overflow line through which air may escape while the liquid is conducted through the pipes 76 and 78 and the system is protected against the entry of cement or dirt by reason of the hood or shield 77. The pipe 78 extends downwardly and communicates with the top of the receiving tank 33, as clearly shown in Figs. 1 and 3.

In order that the system may be protected against excessive pressure in the pipe 44 and tank 55 a by-pass pipe 80 is connected to the

pipe 44 by means of a T-connection 81, see Fig. 1, and extends downwardly to and communicates with the supply pipe 40 by means of a T-connection 82. This by-pass pipe 80 is provided with adjustable pressure relief valve 83 by means of which the by-pass may be controlled to function only when pressure within the pipe 44 builds up beyond a certain predetermined point.

For actuating and controlling the inlet and outlet valves 46 and 66 the following mechanism is provided. Supporting members 90 are secured to the casings of the valves 46 and 66, see Figs. 1, 9 and 10, which pivotally support an arm or lever 91 which has suitable lost motion connections 92 and 93 with the valve stems 49 and 68, respectively. A spring 94 tends to maintain the said arm or lever 91 in the position shown in Figs. 1 and 9 in which the inlet valve 46 is open and the outlet valve 66 is closed. It therefore follows that normally the said valves provide open communication between the tanks 33 and 55 by way of the pipe 40, pump 42, pipe 44, pipe 52, fitting 53 and pipes 54. At the same time communication between the tank 55 and the mixing receptacle 16 through the pipes 54, fitting 53, valve 66, pipe 72 and discharge nozzle 73 is closed.

A cable 95 is secured to the arm or lever 91 and extends downwardly to a lever 96 which is pivoted as at 97 upon the housing of an automatic control device 98. As here shown, this automatic control device is of the type described and claimed in the prior U. S. patent to Charles F. Ball, 1,608,831, granted November 30, 1926. This device is power driven by a chain and sprocket drive 99 from the countershaft 19 of the mixer and is provided with a cam 100 which is adapted to co-act with a roller 101 carried by an arm 102 which is rigidly connected to the arm 96 above mentioned. It thus results that as the cam 100 is rotated by the automatic control device from the position shown in Fig. 7 to that shown in Fig. 8 it will, through contact with the roller 101, cause arms 102 and 96 to be swung in a counter-clockwise direction, as viewed in said figures, from the positions shown in Fig. 7 to those shown in Fig. 8. This movement of the arm or lever 96 is communicated through the cable 95 to the valve actuating arm 91 and causes the valves 46 and 66 to reverse their positions, moving from those indicated in Fig. 9 to those illustrated in Fig. 10. The lost motion connections 92 and 93 between the lever 91 and the valve stems 49 and 68 are so constructed and arranged that during such movement of the lever 91 the valve disc 47 will be seated shortly before the valve disc 67 is moved from its seat so that momentarily at least the two valves are simultaneously seated and there will be no by-passing or leakage of the water directly from the pipe 44 to the pipe 72 which would destroy the accuracy of the measurement effected by the measuring apparatus in the tank 55. The same momentary simultaneous seating of the valves 46 and 66 is also true upon reverse movements of the valves.

The arm or lever 96 has pivotally secured to it as at 105 a latch bar 106 which is provided with a notch 107 providing a shoulder 108 which, when the parts are moved to the position shown in Fig. 8, is adapted to engage under a plate or keeper 109 which is carried by one of the frame members 15. A spring 110 which is secured as at 111 to one end of the latch bar 106 and is anchored as at 112 to the arm 96, tends to move the latch bar 106 in a clockwise direction, as viewed in Figs. 7 and 8, whereby to cause the said shoulder 108 to engage with the keeper 109 as will be readily understood. It thus results that when the automatic control device 98 moves the arm 96 to the position shown in Fig. 8 the latch 106 will automatically become operative to retain the arm 96 in the said position, notwithstanding the fact that the cam 100 of the automatic control device may move beyond the roller 101 or to say the position illustrated in Fig. 7. The valves 46 and 66 will thus be temporarily retained in the positions shown in Fig. 10 to insure complete discharge of the measured quantity of water from the measuring tank 55 into the mixing receptacle 16, even though the said cam 100 may have passed beyond the roller 101 as above indicated.

To release the latch 106 and thereby permit restoration of the valves 46 and 66 to the normal positions shown in Fig. 9, whereby the tank 55 may be refilled for the next batch, a trip member 115 is pivoted as at 116 to an extension 117 of the plate 109. The said trip member 115 carries a pin 118 which extends transversely and a portion of which lies in a position to engage with the lower end of the latch 106 when the latter is in the position shown in Fig. 8. A cable 119 or other suitable connection extends from the trip member 115 to the batchmeter 20 as indicated in Fig. 1 and said batchmeter is provided with a suitable cam or other device as is customary in the art which, at a suitable time in the batchmeter cycle, actuates the cable or connection 119 to draw the trip member 115 from the full line position illustrated in Fig. 8 to the broken line position shown therein. This movement of the trip member causes its pin 118 to engage the lower end of the latch 106 and to move the pin about its pivot 105 to the broken line position shown in Fig. 8, whereby the shoulder 108 is disengaged from the plate 109, whereupon the spring 94 will return the parts to the position shown in Figs. 7 and 9.

As best shown in Figs. 4 and 5, the receiving tank or reservoir 33 is preferably provided with means for giving a visible or audible signal to the operator in the event the water within the reservoir 33 becomes dangerously low. As here shown this mechanism comprises a float controlled electric switch which is or may be arranged to complete a circuit to cause a light to appear adjacent the operator's station. This switch construction, as will be clear from Figs. 4 and 5, comprises a tubular casing 125 which extends downwardly into the tank or reservoir 33 and serves as a housing for a reciprocatory rod 126 which carries a float ball 127 at its lower end. At its upper end the tubular casing 125 is provided with a cap 128 in which a bolt or screw 129 is axially mounted and insulated therefrom by suitable insulation 130. A spring contact member 131 is carried by the bolt or screw 129 in electrical contact therewith and is adapted to be contacted by the upper end of the rod 126 which carries the float 127. A wire or other electrical conductor 132 extends from the screw or bolt 129 to the signaling device which is preferably in the form of a lamp positioned adjacent the operator's station where it may be readily seen. The other side of the circuit is or may be grounded upon the framework 15. With the construction as described the float 127 will maintain the rod 126 in engagement with the spring contact member 131 so long as there is ample water in the reservoir 33 and the circuit will thus

be completed so that the lamp will be lighted. However, if for any reason the water level in the tank 33 should fall below that which is necessary to cause the float 127 to maintain the contact between the rod 126 and the contact 131, then such contact will be broken and as a result the lamp will be extinguished.

While one form of the invention has been illustrated and described it is obvious that those skilled in the art may vary the details of construction as well as the precise arrangement of parts without departing from the spirit of the invention and therefore it is not wished to be limited to the above disclosure except as may be required by the claims.

What is claimed is:

1. A water supply system for concrete mixers which are provided with a mixing receptacle and a batchmeter for timing a mixing operation in said receptacle, comprising a tank arranged to receive water from a source of supply; a measuring tank; means for determining a quantity of water to be discharged from said measuring tank; connections between said tanks; connections between said measuring tank and the mixing receptacle; valve means for controlling said connections, arranged to normally provide open communication between said tanks and to close off communication between said measuring tank and receptacle; means arranged to actuate said valve means to close off communication between said tanks and open it between said measuring tank and receptacle; means for temporarily retaining said valve means in said last named position independently of said valve actuating means; and means controlled by said batchmeter arranged to release said retaining means, whereby said valve means may be restored to normal.

2. A water supply system for concrete mixers which are provided with a mixing receptacle and a batchmeter for timing a mixing operation in said receptacle, comprising a tank arranged to receive water from a source of supply; a measuring tank; means for determining a quantity of water to be discharged from said measuring tank; connections between said tanks; connections between said measuring tank and the mixing receptacle; valve means for controlling said connections, arranged to normally provide open communication between said tanks and to close off communication between said measuring tank and receptacle; means arranged to automatically actuate said valve means to close off communication between said tanks and open it between said measuring tank and receptacle; a latch arranged to temporarily retain said valve means in said last named position independently of said valve actuating means; and a trip controlled by said batchmeter arranged to release said latch, whereby said valve means may be restored to normal.

3. A water supply system for concrete mixers which are provided with a mixing receptacle, a batchmeter for timing a mixing operation therein, and an automatic cam mechanism for controlling the functioning of the various instrumentalities of the mixer, said system comprising a tank arranged to receive water from a source of supply; a measuring tank provided with means for determining a quantity of water to be discharged therefrom; connections between said tanks; connections between said measuring tank and the mixing receptacle; valve means for controlling said connections, arranged to normally provide open communication between said tanks and to close off communication between said measuring tank and receptacle; connections between said valve means and said automatic cam mechanism whereby the latter may cause said valve means to close off communication between said tanks and open it between said measuring tank and receptacle, said connections including a latch arranged to temporarily retain said valve means in said last named position independently of said cam mechanism; and a trip controlled by said batchmeter arranged to engage and release said latch, whereby said valve means may be restored to normal.

4. A water supply system for concrete mixers which are provided with a mixing receptacle, a batchmeter for timing a mixing operation therein, and an automatic cam mechanism for controlling the functioning of the various instrumentalities of the mixer, said system comprising a tank arranged to receive water from a source of supply; a measuring tank provided with means for determining a quantity of water to be discharged therefrom; connections between said tanks; connections between said measuring tank and the mixing receptacle; valve means for controlling said connections; actuating means constantly urging said valve means toward a position in which they provide open communication between said tanks and close off communication between said measuring tank and receptacle; connections between said valve means and said automatic cam mechanism whereby the latter may move said valve means to close off communication between said tanks and open it between said measuring tank and receptacle; means arranged to temporarily retain said valve means in said last named position independently of said cam mechanism and against the action of said first named valve actuating means; and means controlled by said batchmeter arranged to release said retaining means, whereby said first named valve actuating means may restore said valve means to normal.

5. A water supply system for concrete mixers which are provided with a mixing receptacle, a batchmeter for timing a mixing operation therein, and an automatic cam mechanism for controlling the functioning of the various instrumentalities of the mixer, said system comprising a tank arranged to receive water from a source of supply; a measuring tank provided with means for determining a quantity of water to be discharged therefrom; connections between said tanks; connections between said measuring tank and the mixing receptacle; valve mechanism for controlling said connections; spring means constantly urging said valve mechanism toward a normal position in which it provides open communication between said tanks and closes off communication between said measuring tank and receptacle; an arm arranged to be positively moved in one direction by said automatic cam mechanism; connections between said arm and said valve mechanism whereby the latter may be moved against the action of said spring means to a position in which it closes off communication between said tanks and opens it between said measuring tank and receptacle; a latch carried by said arm arranged to temporarily retain said valve mechanism in said last named position; and a trip controlled by said batchmeter arranged to release said latch, whereby said spring means may return said valve mechanism to normal.

CHARLES F. BALL.