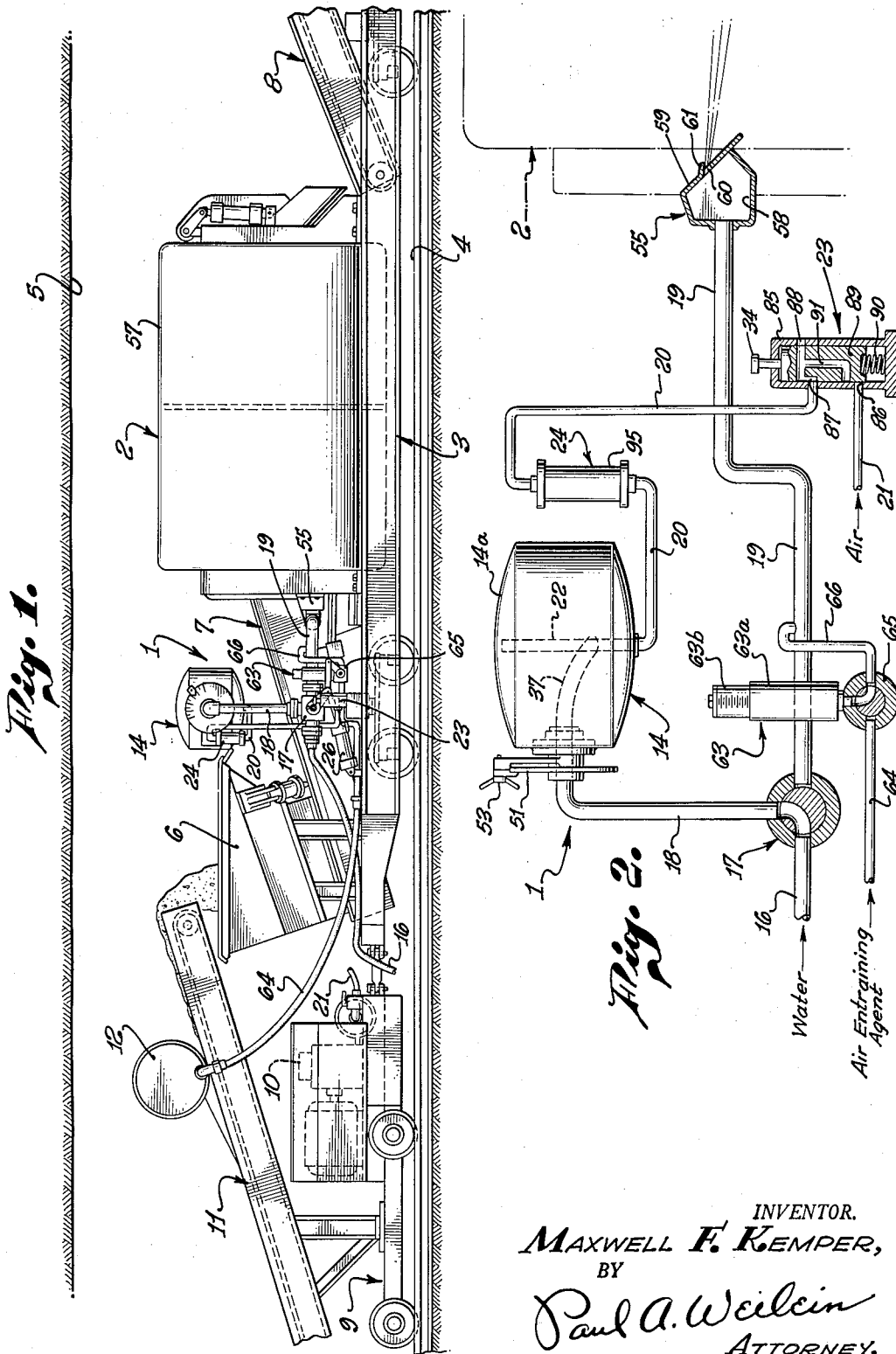


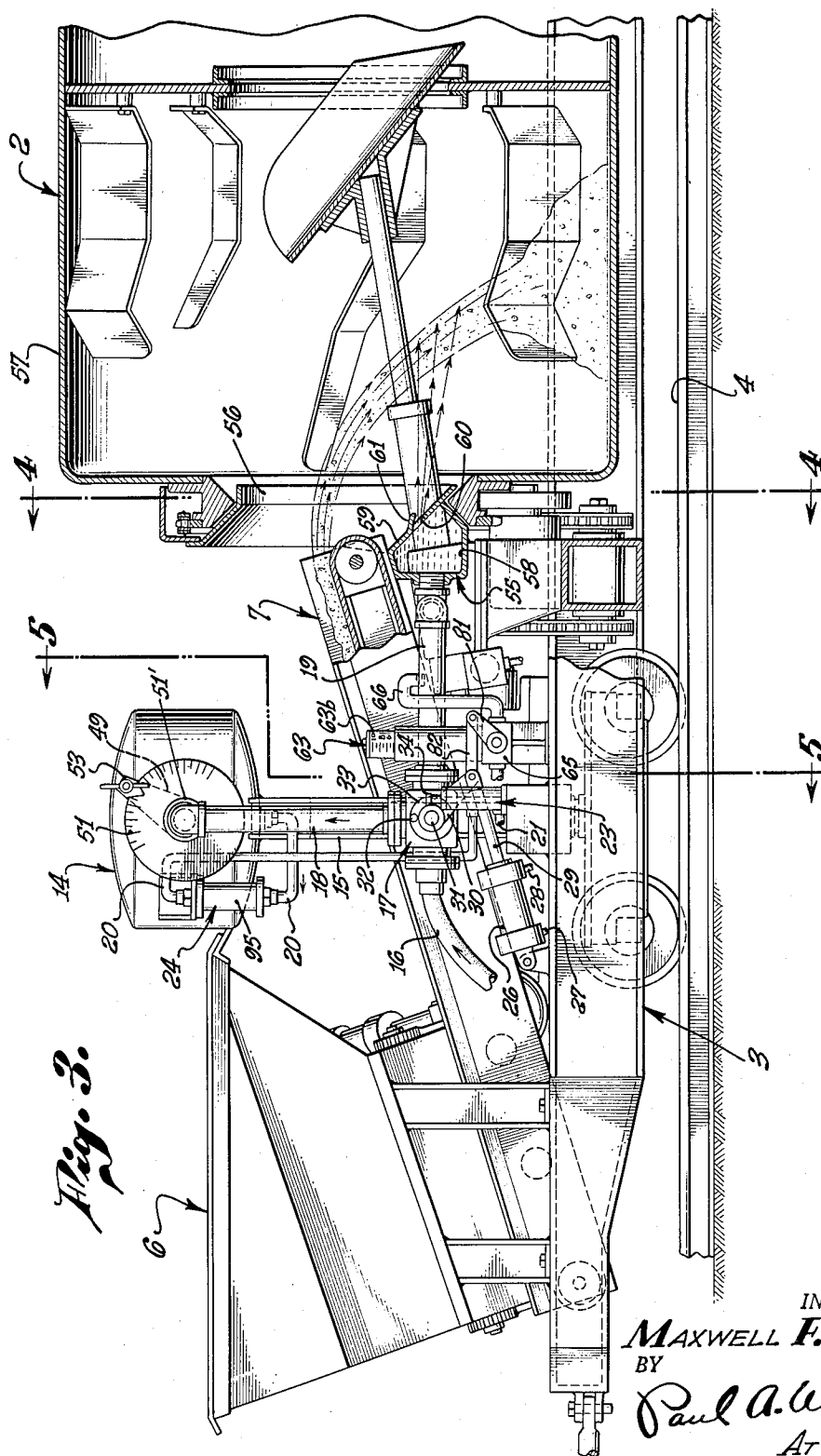


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APPARATUS FOR CONTROLLING THE FEED
OF LIQUID TO CONCRETE MIXERS

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Fig. 4.

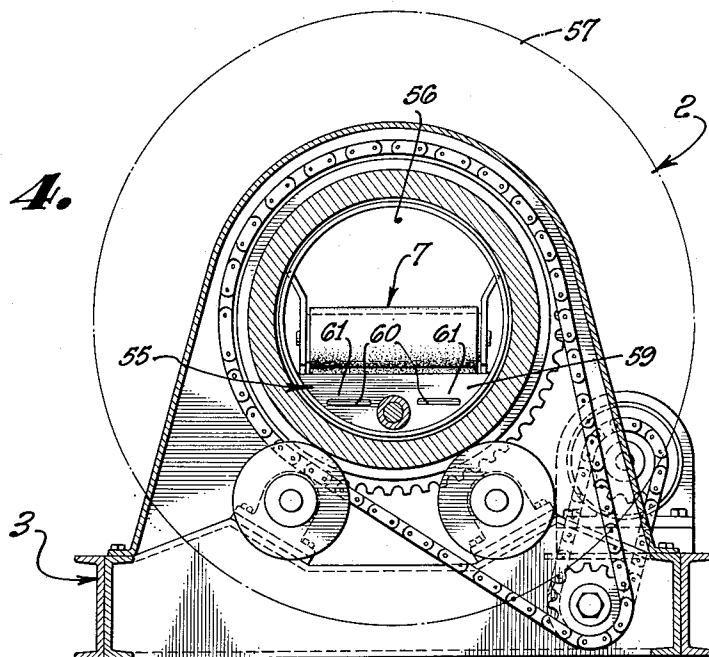


Fig. 5.

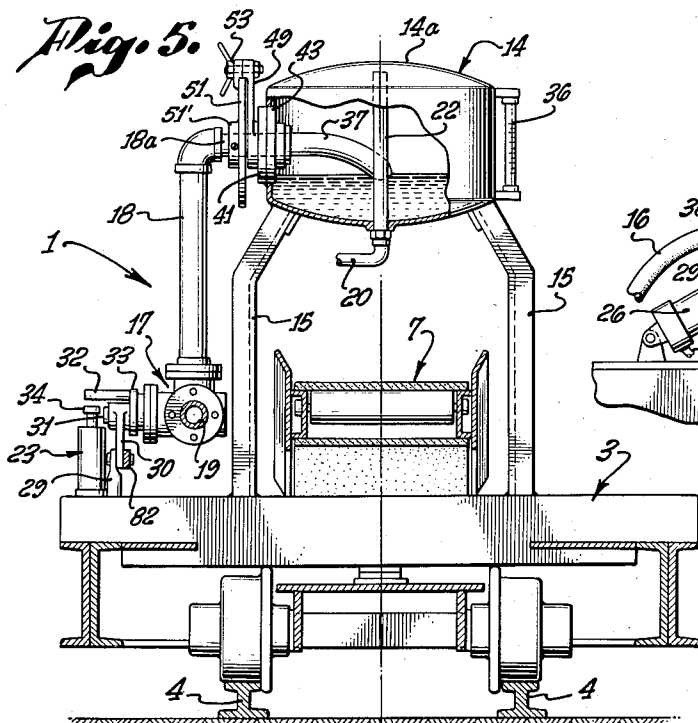
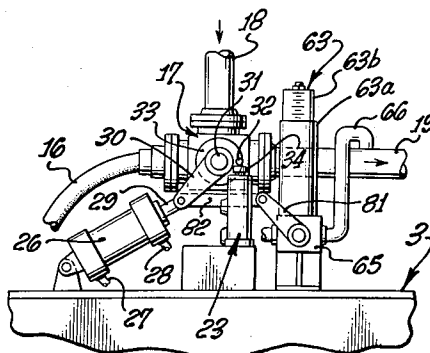


Fig. 6.

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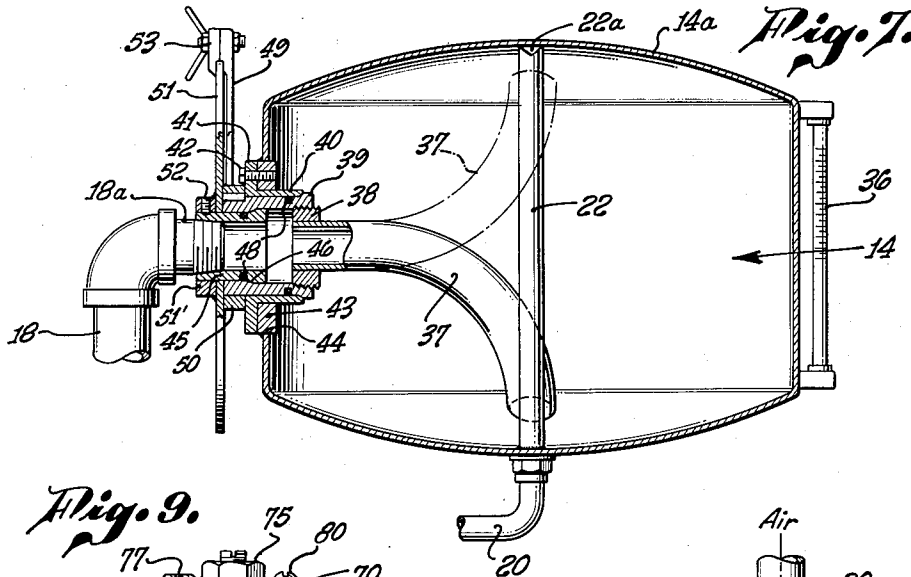
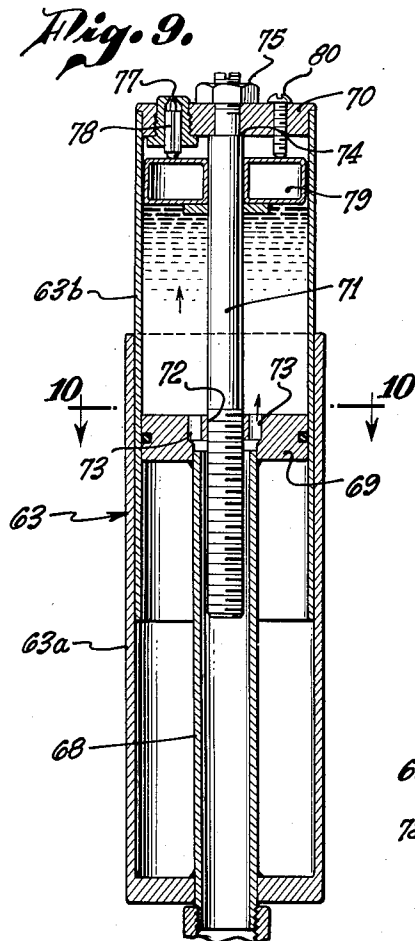
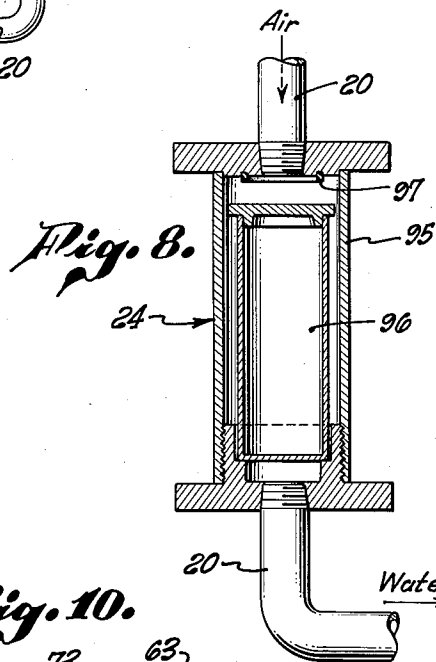
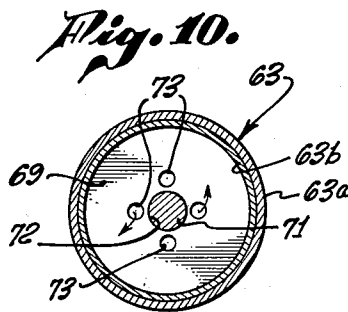
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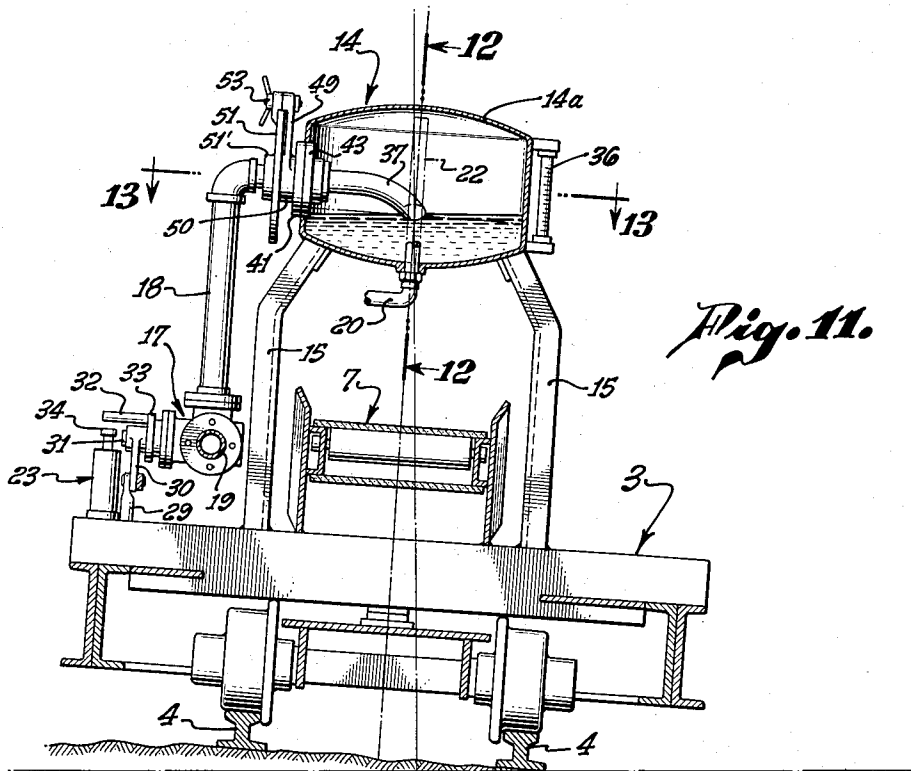
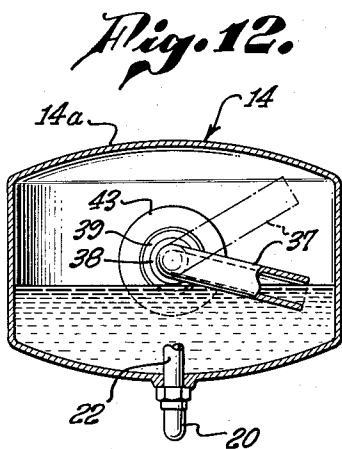
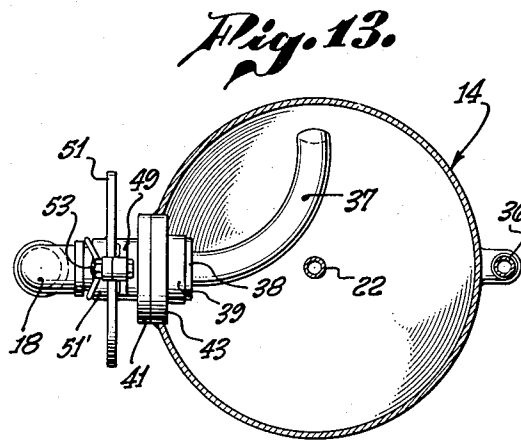
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**APPARATUS FOR CONTROLLING THE FEED OF
LIQUID TO CONCRETE MIXERS**

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Application August 25, 1952, Serial No. 306,226

11 Claims. (Cl. 222—373)

This invention relates to apparatus for controlling the feed of liquid to concrete mixers.

An object of this invention is to provide apparatus of this type, which is adapted for use in connection with concrete mixers operated in tunnels to be lined with concrete.

Another object of this invention is to provide an improved apparatus, such as described, for introducing accurately, metered amounts of water under pressure into a concrete mixer.

It is another object of this invention to provide a novel means for introducing into the metered stream of water being supplied to the mixer, a predetermined quantity of an air-entraining agent or chemical which may be specified for a particular mix of concrete.

It is a further object of this invention to provide water feed apparatus for a concrete mixer, which makes it possible to introduce the water in a manner causing hydration of the dry concrete-forming ingredients to commence while these ingredients are falling freely into the mixer.

It is another object of this invention to provide apparatus for accurately introducing predetermined amounts of water under pressure into a concrete mixture in the form of jets or spray.

It is another object of this invention to provide apparatus of the character described, for selectively introducing predetermined amounts of water from a supply tank into a concrete mixer regardless of tilting of the tank and associated parts, whereby the apparatus may be operated with accuracy on a rail car or other vehicle standing on uneven rails or other surfaces.

It is another object of this invention to provide apparatus such as described, which may be mounted in small compass on a vehicle supporting a concrete mixer, and wherein the vehicle is adapted to be run into and out of small bore tunnels and disposed in convenient positions therein for use of the apparatus in the operation of lining the tunnel with concrete.

It is another object of this invention to provide in apparatus such as described, a novel arrangement of a water tank, interconnected conduit lines for conducting water and compressed air to the tank, as well as for conducting the water under pressure into the concrete mixer, valves for controlling the flow of water and compressed air through said conduits, and volume-selecting means in the tank, adjustable to cause predetermined quantities of water to be discharged therefrom under air pressure, into the mixer.

This invention possesses many other advantages and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose there is shown one form in the drawings accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

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Referring to the drawings:

Fig. 1 is a side elevation of apparatus embodying the present invention, as mounted on a rail car for cooperation with a concrete mixer and associated apparatus for lining tunnels with concrete;

Fig. 2 is a schematic view of liquid control and feeding apparatus embodying the present invention;

Fig. 3 is an enlarged fragmentary side elevation, partly in section, of the liquid control and feed apparatus, showing the manner of introducing the liquid into the concrete mixer;

Fig. 4 is a cross sectional view, taken on the line 4—4 of Fig. 3;

Fig. 5 is a cross sectional view, taken on the line 5—5 of Fig. 3;

Fig. 6 is a fragmentary side elevation of valve means for controlling the flow of liquids and compressed air in accordance with this invention;

Fig. 7 is an enlarged sectional view of the metering tank and rotative mounting for the metering pipe;

Fig. 8 is a vertical sectional view of the float valve in the compressed air line leading to the tank;

Fig. 9 is a vertical sectional view of the metering tank for the liquid air-entraining agent;

Fig. 10 is a cross sectional view, taken on the line 10—10 of Fig. 9;

Fig. 11 is a cross sectional view corresponding to Fig. 5, showing the apparatus in a tilted position;

Fig. 12 is a vertical section taken on the line 12—12 of Fig. 11; and

Fig. 13 is a cross sectional view taken on the line 13—13 of Fig. 11.

As shown in Fig. 1, apparatus 1 embodying the present invention is adapted for supplying metered quantities of liquid to a concrete mixer 2, as required for given batches of concrete. The mixer 2, as here shown, is mounted on a rail car 3 operable on a track 4 in a tunnel designated 5, for supplying concrete for lining the tunnel.

The car 3 supports a hopper 6 and a conveyor 7 for supplying cement and a suitable aggregate to the mixer 2. It also supports a conveyor 8 for conducting mixed concrete to apparatus, not shown, for placing the concrete in forms for lining the tunnel.

The car 3 is adapted to form part of a train of cars carrying apparatus for lining a tunnel with concrete. A portion of one of such cars, designated 9 in Fig. 1, is coupled to the car 3 and supports an air compressor unit 10 for supplying compressed air to operate the apparatus of the present invention. In addition to the compressor unit, the car 9 mounts a conveyor 11 for carrying the dry ingredients into the hopper 6, also a tank 12 for supplying a suitable liquid air-entraining agent to be conducted with the water to the mixer in accordance with the present invention.

The mixer 2, as here shown, forms the subject matter of my application, Serial No. 300,721, filed July 24, 1952 entitled Method of and Apparatus for Mixing Concrete, and is particularly adapted for use in conjunction with the apparatus of the present invention.

It should be noted that while the apparatus of the present invention is particularly adapted for use with concrete mixers, it may be used to advantage in other applications where it may be desired to supply metered quantities of liquid in the manner disclosed.

In accordance with the present invention, a water metering tank 14 is mounted on a pair of upright posts 15 on the car 3, so as to overlie the conveyor 7 which runs between the posts, it being noted that the top of the tank is no higher than the top of the mixer to maintain a low head room.

Water is supplied to the tank 14 from a suitable source, not shown, through a flexible hose 16 connected with a

valve 17. This valve controls the flow through pipes 18 and 19 leading respectively to the tank 14 and the mixer 2, being movable between a position (see Fig. 2) connecting the supply hose 16 with the pipe 18 for filling the tank 14, and a position shutting off the supply hose 16 and connecting the pipe 18 with pipe 19 whereby in the latter position both pipes become a discharge conduit for conducting water under pressure from the tank to the mixer.

As it is desired that the water be discharged under pressure into the mixer in the form of jets or a spray which will intercept and cause hydration of the dry ingredients while the latter are falling freely into the mixer 2, compressed air is introduced into the top of the tank 14. This introduction of compressed air takes place after the tank 14 is filled and following the operation of the valve 17 to shut off the water supply from the hose 16 and approximately when the valve connects the pipe 18 with pipe 19, whereby the compressed air in the tank will force water through the pipe 18, valve 17 and pipe 19 to the mixer 2.

Accordingly, an air line 20 is adapted to be coupled to the compressor unit 10 as by means of a hose 21, and leads to a pipe 22 disposed vertically in the tank 14 with its upper end positioned close to the upper wall 14a of the tank. The upper end of the pipe 22 may be notched as at 22a whereby air and water may pass freely into and out of the pipe.

Control of the air line 20 is effected by means of a mechanically operated valve 23 and a float valve 24. The float valve 24 is mounted as a coupling in that part of the line 20 between the tank and the valve 23, and so positioned relative to the tank that it will close the air line when the tank 14 is filled, thereby preventing flow of water to the valve 23. However, the float valve will open responsive to air pressure when the valve 23 is operated to open the air line. In this connection, it should be noted that valve 23 is spring-loaded to normally close the air line, that is, to close the air line while the water valve 17 is in position to permit the flow of water into the tank 14.

It is desired to operate the water valve 17 and the air valve 23 in closely timed relation, with the air valve opening the air line 20 after the water valve 17 has moved sufficiently to shut off the supply from the hose 16 to the pipe 18. Accordingly the valves 17 and 23 are operatively connected with a two-way pneumatic ram 26 mounted on the car 3 and having conduits 27 and 28 connected to opposite ends thereof and adapted to be connected with the air compressor unit 10. The piston rod 29 of the ram 26 is pivoted to one end of a crank arm 30 having its other end fixed to the rotary stem 31 of the valve 17, whereby reciprocation of the ram will cause the valve 17 to move from position for filling the tank 14 into position for discharging water from the tank, and vice versa.

The air valve 23 is moved from normally closed position into position opening the air line 20 by means of a projection 32 fixed to a disc 33 mounted to turn with the valve stem 31 of the valve 17. This projection is spaced from the stem 34 of the valve 23 when the valve 17 is in tank-filling position. However, when the valve 17 has been moved sufficiently to shut off the supply hose 16, the projection 32 will contact stem 34 and open the valve 23 substantially simultaneously with the movement of the valve 17 into position connecting the pipe 18 with the pipe 19. When the air valve 23 is opened, air pressure in the line 20 will open the float valve 24 and force water from the float valve and that portion of the air line between the float valve and the tank, back into the tank and become effective in the tank to force water therefrom under pressure into the mixer 2.

To provide for accurately discharging the desired amount of water from the tank 14, according to the batch of concrete to be mixed, metering means is mounted in the tank 14, subject to selective operation exteriorly

thereof. A water gauge 36 is also mounted exteriorly of the tank 14 to show the water level therein and indicate when the tank 14 should be refilled.

The metering means is of simple form, consisting of an arcuate metering pipe 37 open at opposite ends and having one end coupled as shown in Fig. 7, to the pipe 18 through one side of the tank 14, for rotation about a horizontal axis to dispose the other end at different elevations within the tank, whereby different amounts of water may be discharged from the tank.

Accordingly, the mounted end of the metering pipe 37, as shown in Fig. 7, has a screw threaded collar 38 fixed thereon and threadedly connected with one end of a rotative sleeve 39 mounted in a bearing member 40. This bearing member has a flange 41 secured by screws 42 to the exterior of a supporting ring 43 welded in an opening 44 in the side wall of the tank 14. An end section 18a of the pipe 18 is threaded into one end of a coupling sleeve 45 which extends into the rotative sleeve 39 for establishing communication between the pipe 18 and the metering pipe 37. The sleeves 39 and 45 have cooperating shoulders 46 to hold the coupling sleeve 45 against being pulled out of coupled relation with the sleeve 39. Sealing rings 48 are interposed between the sleeves 39 and 45 and between the sleeve 39 and bearing 40 to prevent leakage.

Metering adjustments of the metering pipe 37 are effected by means of a crank arm 49 having a hub 50 surrounding and welded to the rotative sleeve 39. The outer end of the crank arm 40 projects beyond the outer edge of a dial 51 which may be graduated in gallons or other divisions as desired, and is fixed to the coupling sleeve 45, by means of a ring 51' welded to the dial and held on the coupling sleeve by a set screw 52. A clamp 53 on the outer end of the crank arm 49 serves as a pointer with respect to the graduations on the dial and as a means for releasably clamping the crank arm to the dial to hold the metering pipe 37 in the desired position to cause a predetermined amount of water to be discharged from the tank 14.

It will be seen, with reference to Figs. 11, 12 and 13, that the metering pipe 37 is mounted to turn on a horizontal axis extending transversely of the rail car 1, with the free end of the metering pipe disposed in the center of the tank and subject to movement in a vertical plane passing through the center of the tank. With this arrangement, sidewise tilting of the tank occasioned when the car is disposed on uneven track, as is often the case in tunnels, will not alter the level of the water at the intake or free end of the metering pipe 37 to such an extent, that any appreciable variance of the amount of water discharged will take place. In this manner, accuracy of the metering means is assured under rough and uneven track conditions.

In order that the water directed under pressure through the pipe 19 be discharged in forceful, fan-like jets into the mixer 2, a nozzle structure 55 is connected with the pipe 19 and supported adjacent the lower side of the intake opening 56 of the drum 57 of the mixer 2. This nozzle structure consists of an elongated receptacle 58 disposed below the conveyor 7 and provided with a downwardly inclined front wall 59 having elongated jet orifices 60 which cause fan-like jets of water to project into the path of the free falling ingredients delivered from the conveyor 7. Baffle members 61 formed on the wall 59, extend above the orifices 60 in downwardly inclined relation thereto, deflecting the jets downwardly as indicated in Fig. 3.

As in some instances, concrete specifications call for the use of a liquid air-entraining agent in the mix, provision is made for introducing such an agent into the pipe 19 leading to the nozzle structure 55. As here shown, a metering tank 63 is mounted on the car 1 and is supplied with the liquid air-entraining agent through a flexible hose 64 leading from the tank 12 on the car 9.

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A valve 65 (see Fig. 2) controls the flow into the tank 63, as well as flow from this tank through a discharge pipe 66, for conducting the air-entraining agent into the pipe 19. The discharge pipe 66 and the tank 63 are arranged with relation to the pipe 19, so that the air-entraining agent will flow by gravity in a given amount into the line 19, according to the metering adjustment of the tank 63, when the valve 65 is in position to connect the tank 63 with the discharge pipe 66.

As shown in Figs. 9 and 10, the tank 63 consists of a cylindrical lower section 63a in telescopic contact with a vertically adjustable upper section 63b. The lower section 63a is fixed to the valve 65, which is mounted on the car 3 adjacent the air valve 23. A pipe 68 extends from the valve 65 up through the section 63a into the upper section 63b, where it supports a piston-like member 69 within the upper section. The space in the upper section 63b between the piston-like member 69 and the end wall 70 is adapted to contain the liquid air-entraining agent, this space being varied as to volume by vertically adjusting the upper section, to cause a metered amount of the liquid agent to gravitate into pipe 19 when the valve 65 is operated to release the liquid from the tank 63.

Adjustment of the tank 63 is effected by means of a rod 71 threadedly engaged with a screw threaded opening 72 in the piston member 69. A series of openings 73 surrounding the opening 72 in the piston member 69, open into the upper end of the pipe 68, whereby liquid may flow through the openings 73 from the pipe 68 into the space above the piston member, and from this space into the pipe 68.

The upper end of the adjusting rod 71 is fixed to the end wall 70 of the upper section 63b, by means of a shoulder 74 and a nut 75, disposed on the rod to contact opposite sides of the end wall 70.

Adjustment of the upper section 63b, to vary the capacity of the tank 63, is effected by turning the upper section 63b and thereby causing the rod 71 to turn in the threaded opening 72 in the piston-like member 69. Clockwise turning of the upper section 63b reduces the capacity of the tank, whereas turning in the opposite direction increases the capacity thereof. The outer surface of the upper section 63b is suitably graduated so as to index at the upper edge of the lower section 63a, as shown in Fig. 2, to permit of setting the tank 63 for the delivery of a metered amount of the air-entraining agent into the pipe 19.

The end wall 70, as shown in Fig. 9, is provided with an air vent 77, controlled by a needle valve 78. The valve 78 is operated by a float 79 guided on the rod 71, for closing the valve when the tank 63 is filled and which lowers and permits the needle valve to open the vent 77 when the liquid is discharged from the tank. A stop screw 80, in the end wall 70, limits the movement of the float in valve-closing direction.

It is desired that the valve 65 be operatively connected with the ram 26 in order to operate in timed relation to the water control valve 17 and the air control valve 23, in a manner such that a measured quantity of the liquid air-entraining agent will be present in the pipe line 19 each time a measured quantity of water is released under pressure from the tank 14 for discharge through the line 19 into the mixer. This causes the air-entraining agent in the liquid to be mixed with the water as the latter is passed under pressure through the line 19 to the mixer and causes a more effective and uniform distribution of the air entraining agent throughout the mixture of concrete forming ingredients in the mixer 2.

Accordingly, the valve 65 is operated by a crank arm 81 connected by means of a link 82 with the piston rod 29 of the ram 26. This connection is such that the valve 65 is in position, as shown in Fig. 2, to permit a gravity flow of a metered amount of the air-entraining agent into the pipe 19, while the water control valve 17 is in position to supply water to the tank 14. Thus, when the

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valve 17 is moved to its other position, causing cessation of filling of the tank 14 and the discharge of water from the tank through the lines 18 and 19, the valve 65 will be positioned to shut off the feed to the line 19 and to cause the liquid from tank 12 to flow into the metering tank 63, as will be apparent with reference to Fig. 6.

The air valve 23, as shown in Fig. 2, comprises a housing 85 having axially spaced ports 86 and 87 to which are connected the air line 21 and 20 respectively. A vent port 88 is also provided in the housing 85 to relieve air from that portion of the line 20 between the tank 18 and the valve 23, when the valve member 89 in the housing is maintained by the spring 90 in position to connect the ports 86 and 88 through the L-shaped port 91 in the valve member. In this position the L-shaped port 91 is out of registry with the air intake port 86. When the stem 34 is depressed, the valve member 89 moves into position to connect the ports 86 and 87 through the L-shaped port 91, thereby opening the air line 20 to the tank 14.

The float valve 24, as shown in Fig. 8, comprises a housing 95 connected at its ends as a coupling between sections of the air pipe line 20, and having a float valve member 96 operable therein to shut off the flow of water from the tank 14 and prevent water from entering the air valve 23. The housing 95 and the sections of the pipe line 20 connected thereto are arranged and positioned, so that the float valve member 96 will contact its seat 97 and shut off the flow of water from tank 14, before the water level in the housing 95 rises to the upper end of the housing, from which upper end, one section of the pipe line 20 leads to the air valve 23. When the air valve 23 is opened, air pressure will force the float valve member 96 away from its seat and expel the water from the housing 95 and the section of the pipe line 20 leading into the tank 14, thereby putting the contents of the tank 14 under pressure for a forceful discharge therefrom as hereinbefore noted.

Control of the pneumatic ram 26 may be effected in any suitable manner, which it is not thought necessary to show in the accompanying drawings. In this connection, it is important to note that this ram 26 controls the water valve 17, the two air line valves 23 and 24, and the air-entraining agent valve 65 in a particular sequence, assuring the introduction of the water and the air-entraining agent into the mixer under pressure as jets or sprays for the purpose hereinbefore noted.

Details of the construction and operation of the conveyors 7 and 8, the mixer 2 and associated element are omitted in this application as they are shown and described in my application hereinbefore identified.

It will now be apparent that the present invention provides a new and advantageous apparatus for directing accurately, metered quantities of one or more liquids under pressure into a concrete mixer in a manner improving the operation of mixing concrete, particularly in connection with apparatus for lining tunnels with concrete where compactness, small bulk, and low head room, as in the present apparatus, are essential.

I claim:

1. Apparatus for discharging metered amounts of liquid comprising: a closed tank, conduit means for discharging liquid from said tank, a valve for controlling the flow of liquid through said conduit means, means operable responsive to actuation of said valve for introducing into the tank a gaseous fluid under pressure for expelling liquid under pressure from said tank through said conduit means, said last named means including a pipe line leading into said tank, and float valve means operable in said pipe line to limit flow of liquid from said tank through said pipe line, said float valve means responding to pressure of said gaseous fluid whereby said gaseous fluid will force liquid from said pipe line back into said tank, a metering pipe in said tank connected with said conduit means and having an opening for admitting liquid from

the tank into said conduit means, and means for moving the metering pipe to dispose said opening at different levels in said tank.

2. Apparatus for discharging liquid under pressure comprising: a closed tank adapted to contain a supply of liquid, conduit means for introducing liquid into said tank as well as for discharging liquid from said tank, a valve for controlling the flow of liquid through said conduit means, a pipe line for introducing gaseous fluid under pressure into said tank to force the liquid under pressure through said conduit means, valve means for controlling the flow of the fluid under pressure in said pipe line, said pipe line being connected with said tank so as to receive liquid therefrom when the liquid in the tank exceeds a predetermined level, and a float valve arranged in said pipe line between said valve means and the tank to prevent the flow of liquid through said pipe line to the valve means when the liquid in the tank exceeds a predetermined level and to open said line to said valve means responsive to fluid pressure directed from said valve means when the latter opens said line.

3. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank as well as for conducting water from said tank, a discharge pipe, a valve connecting said pipe means with said discharge pipe movable between a first position for confining the flow of water into the tank through said pipe means and a second position shutting off the supply of water for the tank and communicating said pipe means with said discharge pipe, a pipe line for introducing gaseous fluid under pressure into said tank to force the water under pressure therefrom, a normally closed valve means in said pipe line, said pipe line being connected with said tank so as to receive water therein when the water in the tank exceeds a predetermined level, a float valve arranged in said pipe line between said valve means and the tank to prevent flow of liquid in said pipe line to said valve means when the water in the tank exceeds a predetermined level and to open said line to said tank responsive to fluid pressure directed from said valve means when the latter opens said line, and means operating said valve means to open said line upon movement of said valve into said second position.

4. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank as well as for conducting water from said tank, a discharge pipe, a valve connecting said pipe means with said discharge pipe movable between a first position for confining the flow of water into the tank through said pipe means, and a second position shutting off the flow of water into the tank and communicating said pipe means with said discharge pipe for discharging water from said tank, a pipe line for introducing compressed air into said tank to force the water therefrom, a normally open valve means in said pipe line, normally closed valve means closing said line responsive to liquid entering said line from said tank when said valve is in said first position, and means operating said normally closed valve means to open said line when said valve is moved into said second position, said normally open valve means opening said line to said tank responsive to air pressure when said normally closed valve is opened.

5. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank, a discharge pipe, a valve connecting said pipe means with said discharge pipe movable between a first position for confining the flow of water into the tank through said pipe means and a second position shutting off the supply of water for the tank and communicating said pipe means with said discharge pipe, a pipe line for introducing compressed air into said tank to force the water therefrom, valve means in said pipe line, means operating said valve means to close said line when said valve is moved into said first position and

operating said valve means to open said line when said valve is moved into said second position, float valve means in said pipe line operable responsive to liquid from said tank and compressed air in said line, respectively, to control the flow of liquid and air in said pipe line, a metering pipe connected with said pipe means and disposed in said tank for discharging water from an opening therein into said tank as well as for admitting water discharging from the tank through said opening into said pipe means, and means for moving said metering pipe to dispose the opening therein at different levels in the tank.

6. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank as well as for discharging water from said tank, a discharge pipe adapted to conduct water from said tank into a concrete mixer, a valve connecting said pipe means and said discharge pipe movable between a position confining flow of water into said tank and a position causing flow of water from said tank through said discharge pipe, said pipe means including a metering pipe in said tank having an opening for discharging water into the tank as well as for receiving water discharging from said tank, means for adjusting said metering pipe to vary the position of said opening relative to the level of the liquid in said tank, and means for introducing compressed air into said tank, said last named means including a pipe line leading into said tank, and float valve means in said pipe line operable responsive to water from said tank in said pipe line and to said compressed air in said pipe line, respectively, to control the flow of water and compressed air in said pipe line.

7. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank as well as for discharging water from said tank, a discharge pipe adapted to conduct water from said tank into a concrete mixer, a valve connecting said pipe means and said discharge pipe movable between a position confining flow of water to said tank and a position causing flow of water from said tank through said pipe means into said discharge pipe, metering means in said tank connected with said pipe means for discharging water into the tank as well as for conducting water from said tank into said pipe means, means for adjusting said metering means to vary the amount of water to be discharged from said tank, a pipe line leading into said tank for supplying compressed air thereto, valve means operable to open and close said line, and a float valve closing said air line between said tank and said valve means responsive to the water in said tank exceeding a predetermined level and opening said air line to said tank responsive to air pressure directed thereagainst when said valve means opens said air line.

8. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank as well as for discharging water from said tank, a discharge pipe adapted to conduct water from said tank into a concrete mixer, a valve connecting said pipe means and said discharge conduit movable between a first position confining flow of water to said tank and a second position causing flow of water from said tank through said discharge pipe, said pipe means including a metering pipe in said tank having an opening for discharging water into the tank as well as for receiving water discharging from said tank, means for adjusting said metering pipe to vary the position of said opening relative to the level of the liquid in said tank, a pipe line leading into said tank for supplying compressed air thereto, spring loaded valve means closing said air line when said valve is in said first position, a float valve in said line between said tank and said spring-loaded valve means operating to close the air line when the water in said tank exceeds a predetermined level and operating responsive to air pressure when said valve means opens said line, to open said air line to said tank, and means

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operating said valve means to open said air line responsive to movement of said valve into said second position.

9. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank as well as for conducting water from said tank, a discharge pipe, a valve connecting said pipe means with said discharge pipe movable between a first position for confining the flow of water into the tank through said pipe means and a second position shutting off the supply of water for the tank and communicating said pipe means with said discharge pipe, operating means for moving said valve into said positions, a pipe line for introducing compressed air into said tank, valve means for controlling said line, means operatively connecting said operating means with said valve means for moving said valve means to open said line upon movement of said valve into said second position, spring means moving said valve means to close said line responsive to movement of said valve into said first position, said line receiving water from said tank when the water in the tank exceeds a predetermined level, a float valve chamber in said line between said tank and said valve means, and a float valve in said chamber operating to close said line when a predetermined amount of water enters said chamber from said tank, said float valve opening said line responsive to air pressure directed thereagainst when said valve means opens said line.

10. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank as well as for conducting water from said tank, a discharge pipe, a valve connecting said pipe means with said discharge pipe movable between a first position for confining the flow of water into the tank through said pipe means and a second position for shutting off the supply of water for the tank and communicating said pipe means with said discharge pipe, means operable responsive to movement of said valve into said second position for introducing air under

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pressure into said tank for expelling water under pressure from said tank through said pipe means, said valve and said discharge pipe, and means operating when said valve is in said first position to feed a liquid air-entraining agent into said discharge pipe and to shut off the feed of said liquid air-entraining agent into said discharge pipe responsive to movement of said valve into said second position.

11. Apparatus for introducing water under pressure into a concrete mixer, comprising: a closed tank, pipe means for supplying water to said tank as well as for conducting water from said tank, a discharge pipe, a valve connecting said pipe means with said discharge pipe movable between a first position for confining the flow of water into the tank through said pipe means and a second position shutting off the supply of water for the tank and communicating said pipe means with said discharge pipe, and means operable responsive to movement of said valve into said second position for introducing into the tank air under pressure for expelling water under pressure from said tank through said pipe means, said valve and said discharge pipe, and means operatively connected with said valve for feeding a predetermined amount of a liquid air-entraining agent into said discharge pipe when said valve is in said first position and for shutting off said feed of said air-entraining agent when said valve is moved into said second position.

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