

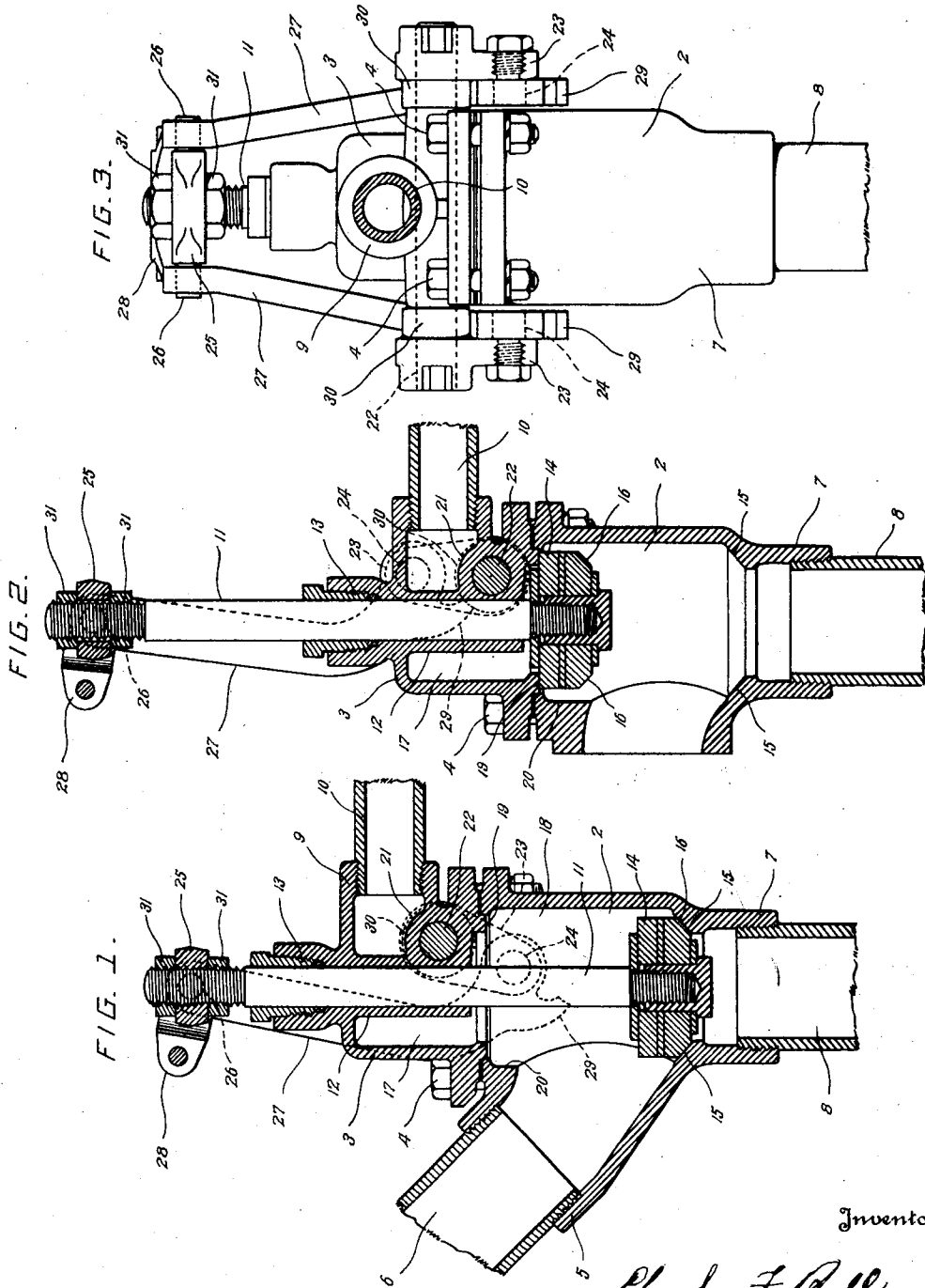
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FREE-WAY VALVE FOR CONCRETE MIXING MACHINES

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FREE-WAY VALVE FOR CONCRETE-MIXING MACHINES.

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My invention relates to a free-way valve adapted to be used in connection with machines for mixing concrete and for other purposes; and it has for its object to so construct the valve that the flow through it in one direction shall be practically free, and without obstructions which cause eddies, or such diversions in the flow of the water as tend to prevent its free and rapid passage through the valve. It is well understood that in the use of concrete mixing machinery it has come to be customary to equip the apparatus with a tank in which water is stored and from which it is intermittently delivered to the mixing drum in regulated quantities, the delivery usually being at the same time that the coarse aggregates which are to enter into the batch of concrete to be produced are delivered to the drum.

In modern practice, where concrete mixing machinery is worked at its maximum speed and capacity, it is of the greatest importance that the water valve shall be quick-acting and also that the delivery from the water tank to the mixing drum shall be rapid, for the charging time in the production of a batch of concrete is but a small fraction of the period allowed for each batch, and if the delay in delivering the charge or any element thereof is unduly prolonged the operation of the machine is slowed up and its production correspondingly reduced. Much difficulty has been experienced in getting a charge of water from the storage tank into the drum within the period allowed for charging, this resulting, as has been found, from a number of facts. In the construction of the water system of a concrete mixer, it often happens that the conduit between the tank and the drum contains many bends, and these of such angles that the flow is slow. Again one frequent cause for slowing up the delivery of the water to the drum is the obstruction to its flow due to the construction of the valve employed, and another cause is the necessarily slow movement of the valve that controls the water flow, incident to its construction.

In the operation of three-way valves constructed for use on concrete mixing machines, it is customary to adjust the moving parts thereof so as to put the water tank into connection with the supply main at the instant that the charging of the mixing drum is completed, maintaining this connection until

the drum is to be again charged. This results in the water tank being maintained in communication with the supply main for a much longer period than it is in communication with the drum, so that it is not so imperatively important that the flow between the main and the supply tank shall be free, as that it should be free from the tank to the mixing drum.

I have availed myself of the method of operation just referred to and have constructed the valve so that it may be quick-acting, and so that the way between the water tank and the drum affords little obstruction to the free flow of the water, either from the presence of obstructing parts in the path of flow, or the occurrence of sharp and obstructing angles or bends in the course of the connecting conduit between the tank and drum. On the other hand whatever obstructions are necessarily incident to the construction of the valve and its location are disposed so as to be in the path of water flow from the main to the tank where their presence is not very material, as the time allowed for the filling of the tank is always ample, and is much greater than the time allowed for its discharge.

In the accompanying drawings:

Fig. 1 is a vertical central sectional view of one form of valve embodying my invention, the parts being adjusted to cause flow from the supply pipe, through the valve and flow pipe, to the water tank or its equivalent.

Fig. 2 is a similar view illustrating a slightly different form of valve, and with the movable parts adjusted to position to cause the water to be discharged through the flow pipe and the valve, as when the water tank is delivering to the mixing drum.

Fig. 3 is an end of the valve shown in Fig. 1.

The casing, of the free-way valve shown, consists of two parts, a main section 2, to which the flow and delivery pipes are secured and an upper or head section 3 to which the supply pipe is connected. These two sections are united by bolts 4, suitable gaskets being employed between their engaging surfaces to insure water-tight joints.

5 indicates a hub to which is secured the flow pipe 6. This pipe is the one leading to the water tank, when the invention is applied to a concrete mixing machine, and is herein termed a flow pipe because the water travels through it first in one direction in flowing to

the tank and then in the other direction as the tank empties.

7 is a hub into which is screwed the delivery pipe 8, the pipe that delivers to the mixing drum, when the valve is used on a concrete mixer. The pipes 6 and 8 are of relatively large diameter so as to permit a rapid, and free flow of water from the tank to the drum. The supply pipe 10 is screwed into a hub or socket 9 carried by the head section 3 of the valve. There is a chamber 18 formed in the valve section 2 between the inner ends of the hubs 5 and 7, and another chamber 17 formed in the head section of the valve, into which the supply pipe 10 discharges, the two chambers communicating with each other. 11 indicates a reciprocating valve stem, that moves within a sleeve or bearing 12 carried by the upper or head section 3 of the valve casing, being preferably an integral part thereof. The sleeve 12 is preferably centrally disposed within the chamber 17. At the inner or lower end of the rod or stem 11 is secured a valve head 14. The lower face of this valve is formed with a beveled peripheral portion 16 adapted to set against a valve seat 15 surrounding the port or opening from the valve chamber 18 to the hub 7. The upper face of the valve, which is flat, is adapted to set against a valve seat 19 surrounding the port between the chamber 12 in the upper valve section and chamber 18 in the lower section. The valve is adapted to have two positions of adjustment, represented respectively in Figs. 1 and 2, that represented in Fig. 1 being with the valve head set against the seat 15 to cause a flow of water from the supply pipe 10 to the tank, and the other, represented in Fig. 2, with the valve set against the seat 19 to cut off the supply from the pipe 10 and permit a flow from the tank through the flow pipe 6, the chamber 18 of the valve, and the discharge pipe 8. When the valve is in the latter position, that is held against the seat 19, the major portion of the valve lies within a recess 20 formed therefor adjacent to the valve seat 19, and also adjacent to and extending above the upper edge of the opening from the hub 5 into the chamber 18. As represented in Fig. 1 the central axis of the hub 5 is disposed at an acute angle of approximately 45 degrees to the central axis of the valve, passing through the chambers 17 and 18. When the valve piston is in the position indicated in Fig. 2, that is elevated to permit a discharge of the water tank through the pipe 6, the main flow chamber 18, and the discharge pipe 8, the passage of water is free and will be rapid. This is owing to the fact that the pipes 6 and 8 and the chamber 18 are large, there are no sharp and obstructing bends or shoulders in the water passage, and the valve head is housed so as not to obstruct the water flow, being located within the recess 20. By beveling the valve seat 15 and locating it so that it

intersects a segment of the port between the hubs 5 and 7 and the chamber 18, the flow through the valve is smooth and the change in direction from the flow pipe to the discharge pipe is made easily and without danger of producing eddies or obstructing counter currents. Furthermore the lower edge of the valve head 14, which may extend beyond the recess 20 and slightly into the chamber 18, being beveled, as at 16, offers only a negligible amount of obstruction to the flow of water.

The ideal arrangement of the parts of the valve which have been described is that illustrated in Fig. 1, where the angle between the hubs 5 and 7 is obtuse, but the invention is not limited to the particular arrangement there shown as will be apparent from an examination of Fig. 2 in which the axis of the hub 5 is at right angles to the central axis of the valve casing. While in the latter arrangement the water has to make a right angular turn in its flow the parts of the valve are so constructed and disposed that the turn is made gradually and smoothly without encountering unnecessary obstructions, and owing to the size of the chamber 18.

The means for shifting the valve from the position shown in Fig. 1 to that of Fig. 2 and vice versa may be widely varied. Those which I have shown and which I prefer to use when the valve is arranged to be applied to a concrete mixing machine and is intended to be operated by hand or by the mixer skip, I will now describe.

22 is a cross shaft supported in a suitable bearing 21 formed in the head member 3 of the valve. To the ends of this shaft are secured a pair of arms 23 in which are respectively seated pivot pins 24. The hubs of the arms 23 may be keyed to the shaft 22 and be also constructed to receive a manually operated handle or other means by which the shaft 22 is turned and the valve-shifting means moved. A cross head 25 formed with trunnions 26 at its ends is secured to the upper end of the rod or valve stem 11, and curved links 27, 27 connect the trunnions of the cross head with the pivot pins 24. The upper ends of the links are preferably formed with perforated offsets 28, which are united by a bolt or other suitable means. One, or both, of the links 27 is formed with a heel 29 that is adapted to engage with a hub 30 of an arm 23 to limit the movements of the parts of the valve as they come to their positions indicated in Fig. 2. It will be seen by reference to this view that when the parts are in these positions—that is with the valve head 14 set against the seat 19—the pivot pins 24 are over-center, or on the opposite side of a line drawn through the center of the cross shaft and the axial center of the trunnions 26 from the position occupied by the pins 24 when the valve head is upon the seat 15. This being the case, the valve head 14 is held against its up-

per seat by a toggle action and there maintained due to the heel 29 resting against a hub of one of the arms 23. The valve 14 is held on its lower seat 14 by the pressure of water acting against the valve.

It will be noted that the linkage which has been described is so arranged that the greatest mechanical advantage in moving the valve from one position to the other is obtained when starting to move the valve from off its seats. After the valve has been started from the seat it is occupying, further movement thereof is easy and rapid.

The yoke or cross head 25 is adjustable upon the stem 11, by means of the nuts 31 which engage a screw-threaded part of the stem and are located upon opposite sides of the yoke. By these means the valve can be accurately adjusted to its seats.

I have in this specification employed the terms "upper" and "lower" because they properly describe the location of the parts shown when the valve is placed as represented in the drawings, but it is to be understood that these terms have no limiting effect, as to direction relative to the horizon, upon the invention or the position in which the valve may be mounted.

What I claim is:

1. A quick-acting free-way valve comprising a casing with a chamber into which are connected a supply pipe, a flow pipe and a discharge pipe, there being valve seats adjacent to the supply and discharge ports to said chamber, an unbalanced quick-acting valve

arranged to be seated on the said valve seats accordingly as adjusted, there being a recess in which the valve is located when upon the seat adjacent to the supply port whereby it is out of the path of liquid movement from the flow pipe to the discharge, and toggle means controlling the movements of the valve and holding it against the seat adjacent the supply port.

2. The combination with a free-way valve comprising a casing to which are connected a supply pipe, a flow pipe, and a discharge pipe and a quick-acting, unbalanced valve movable to close the communication through the valve casing between either the flow and discharge pipes or the supply and flow pipes accordingly as adjusted, of means for adjusting the valve from one said position to the other consisting of a reciprocating stem connected with the valve, a cross head carried thereby, links connected with the cross head, a cross shaft supported in the casing and arms secured fast to the cross shaft to which the ends of the links opposite those connected with the cross head are pivoted, the arrangement of parts being such that when the valve is moved to close the supply opening it is held against its seat by a toggle action of the parts.

3. The combination stated in claim 2 in which one at least of the links is provided with a heel extension adapted to engage with a stop that arrests further movements of the valve-moving parts when the valve is seated and held as set forth.

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