May 21, 1929. G. M. HOGAN 1,713,657

METHOD AND MEANS FOR HANDLING FLUIDS AND SOLIDS

Filed Aug. 1, 1927

Fig. 1

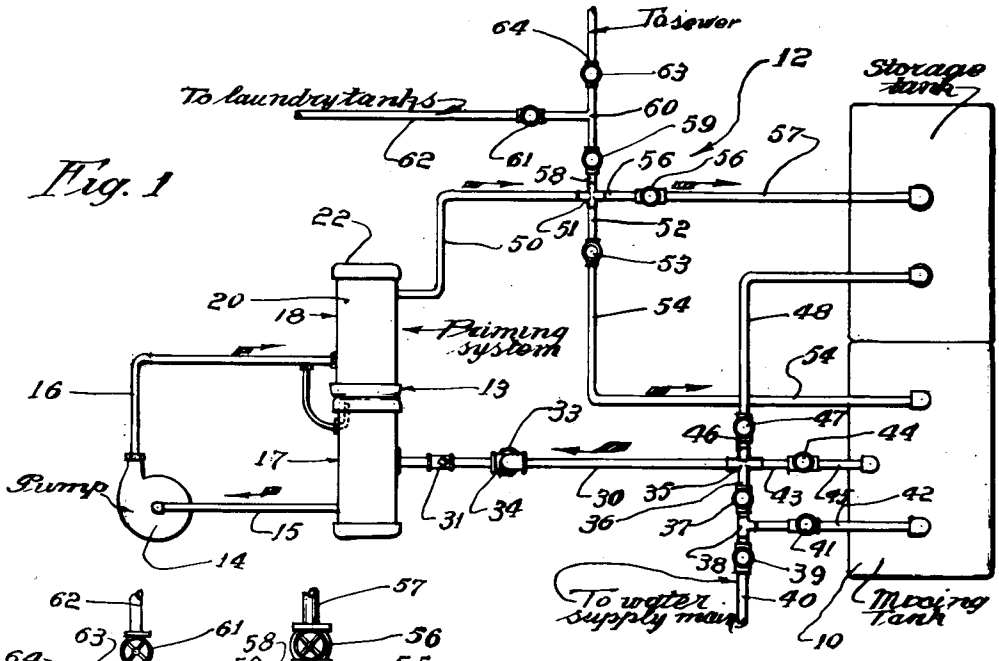


Fig. 3

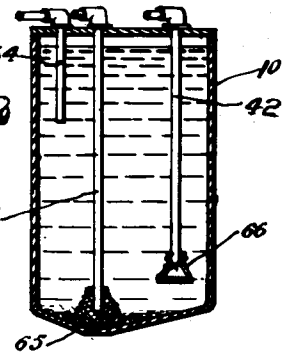
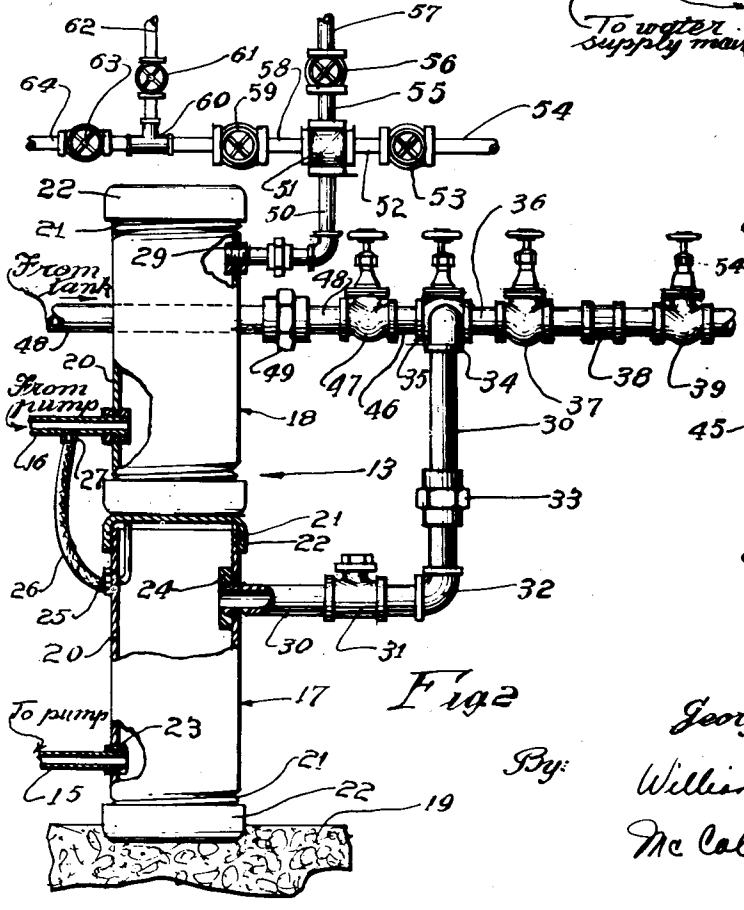


Fig 2



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UNITED STATES PATENT OFFICE.

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METHOD AND MEANS FOR HANDLING FLUIDS AND SOLIDS.

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This invention pertains to an improved method and means for handling fluids and solids. More particularly it relates to a system of interconnected pipes and valves whereby fluids may be mixed with solids and transferred from one tank to another by means of a single pump maintained in operation by an improved priming system.

My invention is adapted to be used in any chemical art where fluids are to be mixed with solids, separated therefrom, and transferred from one place to another.

I will describe my invention as applied to the preparation of bleaching solutions for laundries. This solution is prepared by manually mixing caustic soda (sodium hydroxide) and bleaching lime (calcium oxychloride) with water in large tanks. When the sediment has settled out and the clear bleach liquid has been removed, it has heretofore been necessary for men to manually remove this foul smelling caustic residue. This is not only unpleasant but it is injurious to the health of the workmen.

An object of my invention is to provide a means whereby all of this mixing, transferring and removal of residue may be accomplished by the manipulation of a system of valves.

A further object of my invention is to provide an improved priming means for fluid pumps.

A further object is to remove air from said priming means by utilizing the rapidly flowing liquid in the pump discharge.

A further object of my invention is to provide a system of tanks with interconnected pipes controlled by a system of valves whereby the fluids may be thoroughly mixed with substances in said tanks and transferred at will by a single pump, it only being necessary for the operator to properly adjust certain control valves.

A further object of my invention is to provide a close coupling for control valves whereby performance of the system is rendered continuous.

Another object of my invention is to provide an improved means of mixing chemical substances and removing sediment from clear solutions.

Other objects will appear as the detailed description of my invention proceeds.

A preferred embodiment of my invention is illustrated in the accompanying drawing in which similar parts are designated by similar reference characters throughout the several views and in which:

Figure 1 represents diagrammatically the system of interconnected pipes, together with the motor, priming means and tanks;

Figure 2 is a detail with parts in section showing the improved priming means and the close coupling arrangement of the valves; and

Figure 3 is a vertical section of the mixing tank showing arrangement of inlet and outlet pipes.

Generally the system comprises a mixing tank 10 and a storage tank 11 connected by suitable pipes 12 through a priming system 13 to a pump 14 which circulates the liquid through the system and delivers it to tanks, to the laundry, or to the sewer, as desired.

Pump 14 is preferably of the centrifugal type and its specific construction forms no part of the present invention. It is necessary, however, that it contain no exposed parts which may be acted upon by the liquids circulating through it. Pump 14 is connected by pipes 15 and 16 to cylinders 17 and 18, respectively, of the priming system 13. These parts are preferably supported on a concrete base 19 as shown in Figure 2.

The priming cylinders are preferably short cast iron cylinders 20, about 8 inches in diameter and 16 inches long, said cylinders having threaded ends 21 for receiving internally threaded caps 22 as shown in Figure 2. The nature of the joint and of the materials used will depend on the substance to be treated as will be evident to anyone skilled in the art.

Cylinder 17 is provided with outlet 23 to which is secured pipe 15 by any suitable means, preferably by threaded connection. Into a similar opening 24 is threaded the suction pipe 30 and into an opening 25 is secured a pipe 26, one end of which is secured to an aspirator 27 in pipe 16. This aspirator may be nothing more than a simple union of pipe 26 with pipe 16, the pipe 26 being substantially smaller in diameter than pipe 16. If desired, however, a conventional aspirator unit may be used. One end of pipe 26 preferably extends within the cylinder 17 with its open end near the top of said cylinder.

Cylinder 18 is likewise provided with an opening 28 for receiving pipe 16 and an opening 29 for securing discharge pipe 50.

In suction pipe 30 there is a check valve

31, an elbow 32, a union 33, elbow 34 and a four-way connection 35. To one arm of this connection is threaded a close nipple 36, a valve 37 and a T connection 38. One branch of the T connection leads through valve 41 and pipe 42 to within about 6 inches from the bottom of the mixing tank 10 and the other branch leads through valve 39 and pipe 40 to the water supply means.

Into a second branch of the four-way connection 35 is threaded a close nipple 43 which leads through a valve 44 to pipe 45 which extends to within ½ inch of the bottom of the tank 10. In the other opening of the four-way connection 35 is secured a close nipple 46 connected through valve 47 to pipe 48 leading to the storage tank 11.

The discharge system leads from the upper end of cylinder 18 through connection 29 by pipe 50 to four-way connection 51. Close nipple 52, valve 53 and pipe 54 are connected from one branch of this connection to mixing tank 10; close nipple 55, valve 56 and pipe 57 lead from a second branch to storage tank 11, and close nipple 58 leads through valve 59 to a T connection 60, which in turn communicates through valve 61 and pipe 62 to the laundry or other point of delivery and through valve 63 and pipe 64 to the sewer.

The tanks 10 and 11 may be of any suitable material not injured by the substances to be treated therein and are preferably provided with sloping bottoms as shown in Figure 3. Ordinarily open tanks are used but should it be desirable to mix gases in this system, closed tanks would be necessary. Pipe 45 extends practically to the bottom of the tank, as shown in Figure 3, and is provided with a strainer 65. Pipe 42, which extends within 6 inches of the bottom, is preferably provided with a flat plate 66, the function of which will hereinafter be pointed out.

The operation of my invention will be described as follows:

With valve 37 closed and valves 39 and 41 opened, water is supplied from the mains to the mixing tank 10. Suitable amounts of caustic soda (NaOH) and bleaching lime $Ca(OCl)_2$ are then added to the water. Valves 39, 41, 47, 56 and 59 are then closed and valves 44 and 53 are opened. The rotation of the pump now draws the mixture of liquid and solids through the pipes 45, 30, 15, 16, 50 and 54, discharging the mixture in the tank through the end of pipe 54, to which may be secured a suitable nozzle if desired. By this means effective agitation and a thorough and intimate mixture is effected. Valve 44 is then closed and the solution in the mixing tank is allowed to settle. During the mixing some sediment may have settled out in the pipes and priming system. This system may be cleaned out by closing valves 41, 44, 47, 53, 56 and 61 and opening valves 39, 43, 59 and 63. The pump will then cause the pipes to be thoroughly washed out by water from the supply means.

After the sediment in tank 10 has settled to the bottom and the solution has cleared, valves 44, 47, 53 and 59 are closed and valves 41 and 56 are opened. The pump then transfers the clear liquid from mixing tank 10 to storage tank 11, the horizontal plate on the bottom of pipe 42 serving to prevent the sediment from being transferred in this step.

After this is accomplished it is necessary to clean the sediment out of mixing tank 10. This is accomplished by closing valves 39, 41, 47, 53, 56 and 61 and opening valves 44, 59 and 63. The pump then discharges the sediment into the sewer. After this treatment the tank may be washed out and the pipes cleaned out by water from the supply means as pointed out above.

When bleaching solution is needed in the laundry, valves 37, 44, 53, 56 and 63 are closed and valves 47, 59 and 61 are opened. This allows the motor to transfer the liquid to desired point.

In a system of this type it is necessary that the pump be constantly primed. Accumulation of air in cylinder 17 would cause the prime to be broken. I have devised a means for removing this air by utilizing the suction produced by the liquid discharge from the pump. An aspirator 27 secured to pipe 16 draws all of the air out of cylinder 17 and causes it to be discharged through pipe 50.

Another important feature of my invention is the fact that the nipples are made as short as possible so that the valves are closely arranged. This not only expedites the manipulation of the valves but has an important effect on the operation of the system in that when the pump is idle air tends to collect in the pipe and unless the nipples are made short the system becomes air bound.

While I have described a specific embodiment of my invention it will be understood that I am not limited to the specific details as shown except as defined by the following claims.

I claim:

1. In a fluid system a primer comprising a closed tank adapted to contain a priming liquid, a pump and means associated with the discharge from said pump for removing air from said tank.

2. In combination a liquid pump, a priming tank, a communicating means between said priming tank and said pump, means for carrying the discharge from said pump, an aspirator associated with said discharge means, and a connection between said aspirator and the top of said priming tank whereby the force of the fluid discharged causes the air to be removed from said priming tank.

3. In combination a fluid pump, priming means for said pump, means for removing

air from said priming means, a plurality of tanks, a suction pipe leading from one of said tanks to said priming means, a connection on said pipe provided with a plurality of outlets, a valve secured to each outlet by a close nipple and pipes leading from said valves to said tanks.

4. In combination a pump, a primer, means to remove air from said primer, a mixing tank, a storage tank, two pipes from said mixing tank and one pipe from said storage tank leading to a four-way connection, valves in said pipes, a pipe leading from said connection to the primer, a check valve in said pipe, one pipe from each tank and one from another point leading to a second four-way connection, valves in each of these pipes, and a pipe leading from the discharge of the pump to said second connection.

5. In apparatus of the class described, means for treating a mixture of a solid and a liquid which comprises a mixing tank, a closed system, means for circulating the mixture through the closed system, and means for allowing the sediment to settle whereby the clear liquid may be removed through a portion of the system and the sediment through another portion of the same system by said pump.

6. In apparatus of the class described, a mixing tank and a storage tank, circulating means including a suction and a discharge side, a plurality of pipes leading to the suction side, one of said pipes leading from the bottom of the mixing tank, a second leading from a point in the mixing tank spaced from the bottom, and another of said pipes leading from the storage tank, a plurality of pipes leading from the discharge side of the circulating means, one of said pipes leading to the mixing tank, one leading to the storage tank and one leading to a point of application.

7. In apparatus of the class described, a plurality of tanks, a single circulating means having a suction side and a discharge side, two pipes connecting the suction side of the circulating means with the mixing tank, one opening adjacent the bottom of the tank and one opening at a point spaced from the bottom, a pipe leading from a storage tank to said suction side of the circulating means, a check valve in the suction side of the circulating means for preventing liquid from flowing to the tank from the suction side of the circulating means, pipes connecting the discharge side of said circulating means with said tanks, and valves in all of said pipes whereby liquids may be mixed in one tank or transferred from one tank to another by the circulating means.

8. In combination, a plurality of tanks, a circulating means, a pipe including a check valve in the suction side of the circulating means, pipes leading from said first pipe to some of said tanks and to a water supply, pipes leading from the discharge side of the circulating means to some of said tanks and to a sewer, and valves in all of said pipes whereby water from the water supply may be admitted to said tanks, mixed with substances therein and transferred from one tank to another, and whereby the tanks and the circulating system may be washed with water from the supply by a simple manipulation of said valves.

9. In combination a storage tank and a mixing tank, a pipe leading from said storage tank, a pipe leading from the bottom of said mixing tank, a pipe leading from a point spaced from the bottom of said mixing tank and a pipe leading from a water supply, valves in said pipes, a suction pipe to which all of said pipes lead, a check valve in said suction pipe, a circulating means secured to said suction pipe, a discharge pipe secured to said circulating means, pipes leading from said discharge pipe to said tanks and to a point of application, and valves in said pipes whereby liquids may be mixed in a tank or transferred from one tank to another or to a point of application, and whereby the system may remove sediment and be flushed out with water in accordance with the position of said valves.

10. An apparatus for mixing a fluid with a solid and removing sediment, said apparatus comprising a tank, a circulating system including a plurality of pipes, means for circulating the mixture through said pipes, valves in said pipes, the opening of one pipe being adjacent the bottom of said tank and the opening of another pipe being spaced therefrom whereby the clear solution and the sediment may be independently removed by the same circulating means, and a connection between said system and a water supply whereby the tank may be filled with water or washed out and whereby sediment may be flushed out of the pump and pipe lines.

In witness whereof, I hereunto subscribe my name this 30 day of July, 1927.

GEORGE M. HOGAN.