

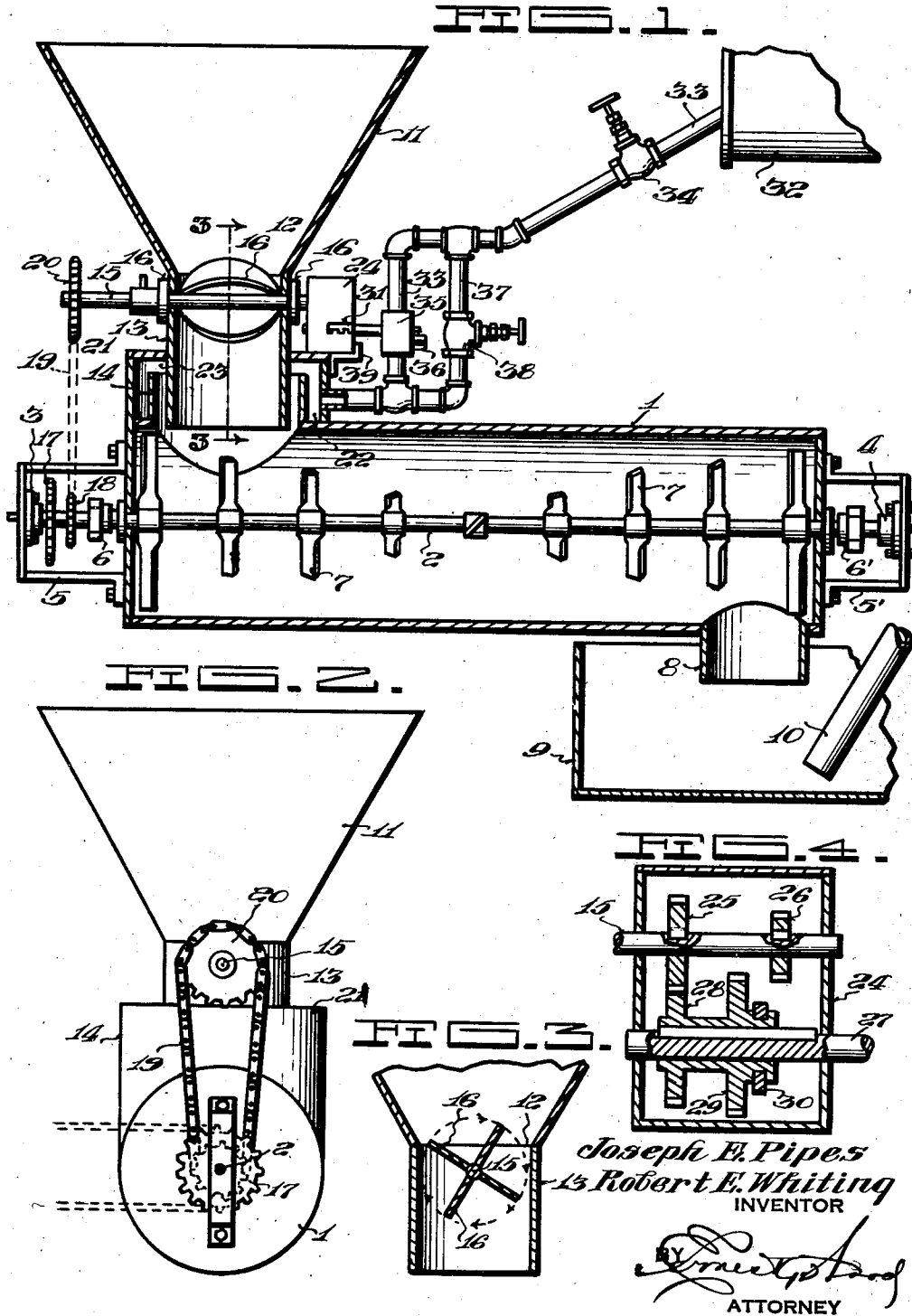
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J. E. PIPES ET AL

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WELL CEMENT MIXER

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WELL CEMENT MIXER

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2 Claims. (Cl. 83—73)

This invention relates to cement mixers, and it has particular reference to a machine wherein the ingredients may be introduced into a mixing chamber in a novel manner and in controlled predetermined relationship, producing a mass of the requisite state of fluidity for the purposes intended and being a continuation in part of the application of Joseph E. Pipes, filed Sept. 10, 1932, Serial No. 632,471, for Cement mixing apparatus, the applicant being one of the joint inventors executing this applicant.

One of the objects of the invention is to provide a machine particularly adapted to provide a maximum quantity of readily fluid mixture, in a short period of time, having a uniform, predetermined, controlled and readily regulatable consistency, for uses, such for example, as the cementing of oil wells, wherein frequently the demand is for a consistent mixture at the unfailing rate of two tons per minute.

A more particular object of the invention is to provide for the introduction into the mixing chamber of the requisite quantity of water, at the earliest possible moment with the cement, without interference with the introduction of the latter, and the further provision of a machine wherein the mixture will be properly mixed and conveyed to a point of discharge.

The mixture is then deposited in a receptacle from which it may readily be picked up by a suitable pump or pumps and introduced into a well.

It is well to bear in mind in considering the salient features of the invention that the cement or the mixture is charged with an element whereby the "setting" of the cement mixture is greatly accelerated, and the time elapsing between the initial bringing together of the elements composing the mixture and its introduction into the well is necessarily the shortest possible moment of time in which the various operations may be accomplished.

The several novel features of the invention are directed to the accomplishment of the foregoing and other results in a novel and practical way, with the minimum of parts, simple in arrangement and practical of results, which may be readily understood by those skilled in the art from the following description together with the accompanying drawing, in which like references denote similar elements, wherein:

Figure 1 is a longitudinal schematic view, partially in section of the entire apparatus.

Figure 2 is an end elevation.

Figure 3 is a fragmentary detail view of the

cement feeding mechanism along lines 3—3 of Figure 1.

Figure 4 is a cross sectional view of the variable speed drive for the water control.

Proceeding with a more detailed description of the drawing, 1 is a housing shown as cylindrical, and which comprises the body or barrel of the mixer which may be supported by conventional means, not shown or mounted upon any suitable conveyance such as a truck, as desired. Through the barrel 1, a shaft 2 is centrally disposed, and is suitably journaled as at 3 and 4 by bearings supported by brackets 5 and 5' mounted upon the ends of the mixer barrel 1. To secure against leakage of the contents of the mixer packing glands 6 and 6' may be provided for shaft 2 at points where it passes through the end walls of the mixer 1.

Shaft 2 carries a series of paddles or blades 7—7 of such contour that upon rotation of the shaft, the contents of the barrel 1 will be moved longitudinally thereof, and when driven in the direction of normal operation will move the ingredients progressively from the point of introduction to the point of discharge, as well as performing the further function of properly mixing them. An outlet 8 is provided for the mixture through which it is discharged into the receptacle 9 from which it is conveyed by pumps into the well or other point of placement, being a pipe through which the mixture is drawn from the receptacle by the pump.

A hopper 11 into which cement, containing the set accelerator, is deposited has a discharge opening 12 to which is suitably joined a skirt portion 13 which projects into a spout 14, secured to the upper portion of barrel 1 adjacent its end opposite the discharge 8. It will be noted that the skirt 13 and the spout 14 have been shown as circular in shape but other shapes such as oblong or rectangular may be employed as desired without departing from the spirit of the invention. It will be also noted that the spout 14 acts as a baffle to the water flowing from pipe 33 hereinafter more fully to be described.

Through skirt 13 a shaft 15 is projected, supported by journals 16 secured to the skirt, all above the discharge end of the latter which is adjacent the upper side of barrel 1, and inside the receiving spout 14 of the mixer. To shaft 15 inside skirt 13, a valve 16 is mounted, rotatable with shaft 15 and so designed as to prevent the flow of cement by gravity into the mixer barrel 1, and to feed positively the cement thereinto. As the shaft 15 is rotated and the valve

16 is driven, valve 16 also acts to prevent a bridging or clogging of the cement in the hopper and skirt.

Shaft 2 may be driven from any suitable source as by an engine from which a drive chain, not shown, is passed over sprocket 17 which latter may be keyed to shaft 2. Shaft 2 is provided with fixed sprocket 18 over which drive chain 19 passes, over sprocket 20 which latter is keyed to shaft 15 whereby the latter shaft and valve 16 is driven. It will be understood that by employing sprockets 18 and 20 of the desired sizes the cement may be metered into the mixing barrel 1 at the ratio desired, with reference to the speed of rotation of the shaft 2.

About the receiving spout 14 and skirt 13 a housing 21 is provided forming a water chamber 22 between the housing and skirt 13. The housing extends above spout 14 to provide an overflow passage 23 for the water from chamber 22 whereupon it may pass downwardly about the skirt 13 into the mixer about the end of the skirt which is the point of discharge of the cement into the mixer barrel 1.

Shaft 16 extends through variable speed gear box 24 having mounted thereon within the box suitable gears 25 and 26 which rotate with shaft 15. Also mounted and journaled in box 24 is a shaft 27 upon which a spool of gears 28 and 29 is slidably mounted, but keyed thereto so that shaft 27 may be driven at different speeds as desired, by the simple movement of the spool of gears by hand lever 30 so as to cause gears 25 and 28 to intermesh, or gears 26 and 29, or to move the spool of gears into a neutral position if desired so that the rotation or nonrotation of shaft 27 with relation to the rotation of shaft 15 may be manually regulated. Lever 30 may for convenience, project through slot 31 in box 24, while slot 31 may be provided with depressions in its edge for receiving lever 30 whereby the spool gears are secured against movement laterally of shaft 27. Gear box 24 may be supported by any suitable means as by bracket 39 secured to the housing 21.

A tank 32 is provided for containing a quantity of water (to which a set accelerator may be added if desired) and a pipe 33 is used to conduct this liquid from the tank into the chamber 22 about the skirt 13. It will be noted that pipe 33 conducts the water into chamber 22 at a point below the upper end of spout 14, which latter acting as a baffle to the flow of the water causes it to flow evenly about the chamber 22 from which it will overflow evenly about the lower end of the skirt 13 and into the mixer 1, thus providing an even flow of the water into the mixer about the column of cement as the latter is introduced into the mixer. A hand operable valve 34 is provided in pipe 33 whereby the flow of liquid from the tank may be shut off if desired. A metering device 35 (a conventional character) is provided in pipe 33, mounted upon or connected to shaft 27 whereby regulation of the quantity of liquid introduced into the mixing barrel through water chamber 22 is obtained. The metering device being responsive to the flow of water, by gravity, through pipe 33, the geared control of its action being such as to retard its movement to that permissible by the rotation of shaft 27 which in turn is controlled by the shaft 15 when the gearing in box 24 is in mesh. When shaft 27 is secured against rotation, as when the gears of box 24 are in mesh and the machine is not in motion, the

metering device acts to arrest the passage of water through pipe 33.

The metering device may be provided with a counter or register 36. A by-pass 37, controlled by valve 38 may also be employed for convenience in flushing or cleaning the mixer and parts without disturbing the count or register of the metered liquid.

It will be noted that the relation of the various elements is such that the water from the tank 32 will flow by gravity through meter 35 into reservoir 22 and into the mixer 1, and that meter 35 may operate freely when the gears of box 24 are out of mesh and without relation to the rotation of shaft 15.

It will be further noted that the liquid and cement are brought together in metered quantities at the point each is introduced into the mixer as the valve 16 is of predetermined capacity, when operated at predetermined or known speed and for this purpose a register of conventional form (not shown) may be employed to determine the number of revolutions of the shaft 15.

It will be still further noted and appreciated by those skilled in the art that the cement has a free passage downwardly through the skirt 13 after passing valve 16, not coming into contact with the water until the actual discharge of both into the mixing barrel 1, and that at the moment of such discharge, the water is discharged uniformly all about the column of cement entering the mixing chamber which very greatly facilitates the thorough intermingling and mixing of the ingredients into a uniform mass in the shortest possible time.

The method of operation is as follows:

A suitable clutch mechanism, if desired, may be placed between the power source and the shaft 2, or the machine may be started in the normal and usual manner while valve 34 is closed, which latter is opened simultaneously with the deposit of cement in hopper 11 so that the water passes through meter 35 thence into reservoir 22 and down about the skirt 13 to there mingle with and surround the column of cement as it discharges into the mixer barrel 1 after passing valve 16, the gears in box 24 having been duly enmeshed for the controlling of the gravity flow of the water through pipe 33. Blades 7 thoroughly mixing the contents of the barrel 1 and moving it forward to and through the discharge spout 8 into receptacle 9 from which point it is taken by the pump through pipe 10 and introduced into the well.

Manifestly, the construction shown is capable of considerable modifications without departing from the scope of the invention and all such modifications as are possible within the meaning of the appended claims are intended to be claimed therein.

What is claimed is:

1. A cement mixer comprising an elongated mixing chamber having an upwardly projecting inlet spout and an outlet, agitating means arranged within the chamber and operative to mix and move laterally the contents thereof, a hopper disposed above and having a skirt portion projecting into the spout and providing therewith a water passage to said chamber, a housing defining a chamber surrounding and above the spout, means for passing a predetermined quantity of cement into the mixing chamber through the skirt portion, said means including a rotary valve operatively disposed in

the skirt portion above the housing and driving means for said valve, and means driven by and synchronously with the cement passing means for admitting a regulated quantity of mixing
 5 water to the chamber surrounding the spout and thence over the spout and through the water passage to said mixing chamber.

2. A cement mixer comprising an elongated mixing chamber having an upwardly projecting
 10 inlet spout and an outlet, agitating means arranged within the chamber and operative to mix and move laterally the contents thereof, a hopper disposed above and having a skirt portion projecting into the spout and providing
 15 therewith a water passage to said chamber, a housing defining a chamber surrounding and

above the spout, means for passing a predetermined quantity of cement into the mixing chamber through the skirt portion, said means including a rotary valve operatively disposed in said skirt portion above the housing and means
 80 for driving said valve, a connection between a source of liquid supply and the housing, and means in said connection under the control of said cement passing means for delivering a regulated quantity of liquid to said housing, from
 85 whence the liquid passes over the spout and through the water passage to said mixing chamber.

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