

March 5, 1940.

W. C. LUDINGTON

2,192,406

FLUID INLET FOR ROTARY MIXER

Filed Oct. 31, 1938

3 Sheets-Sheet 1

Fig. 1.

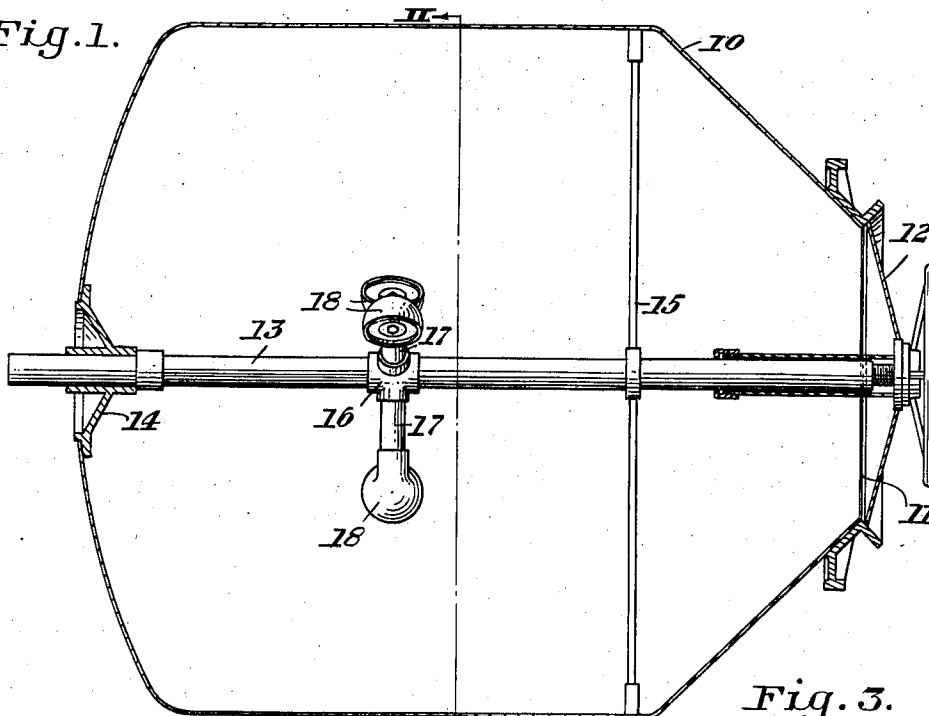


Fig. 2.

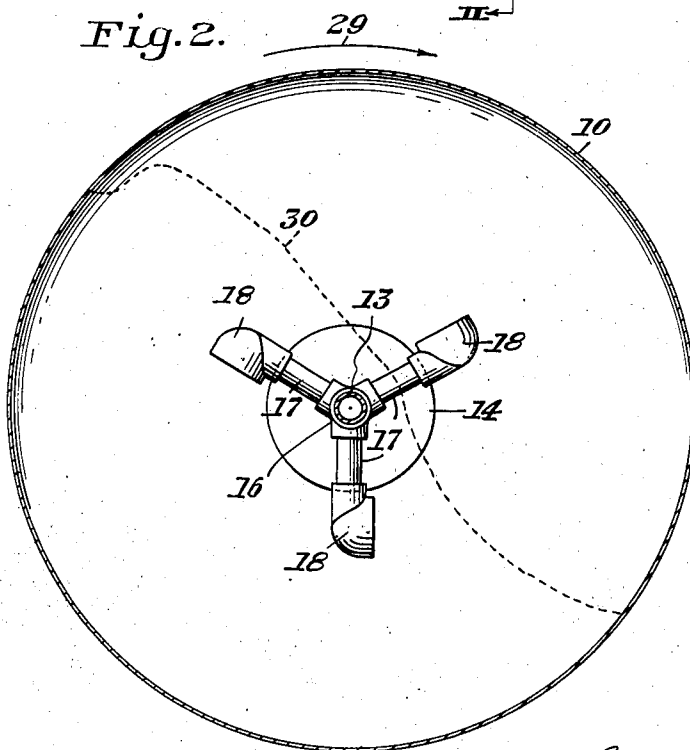


Fig. 3.

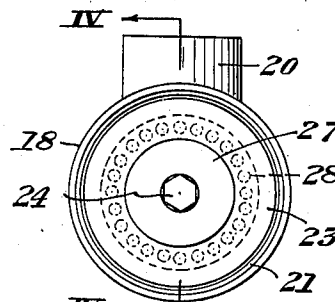
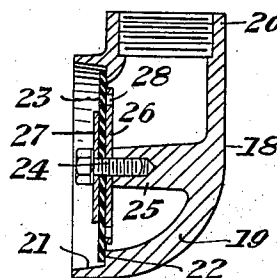


Fig. 4.



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3 Sheets-Sheet 2

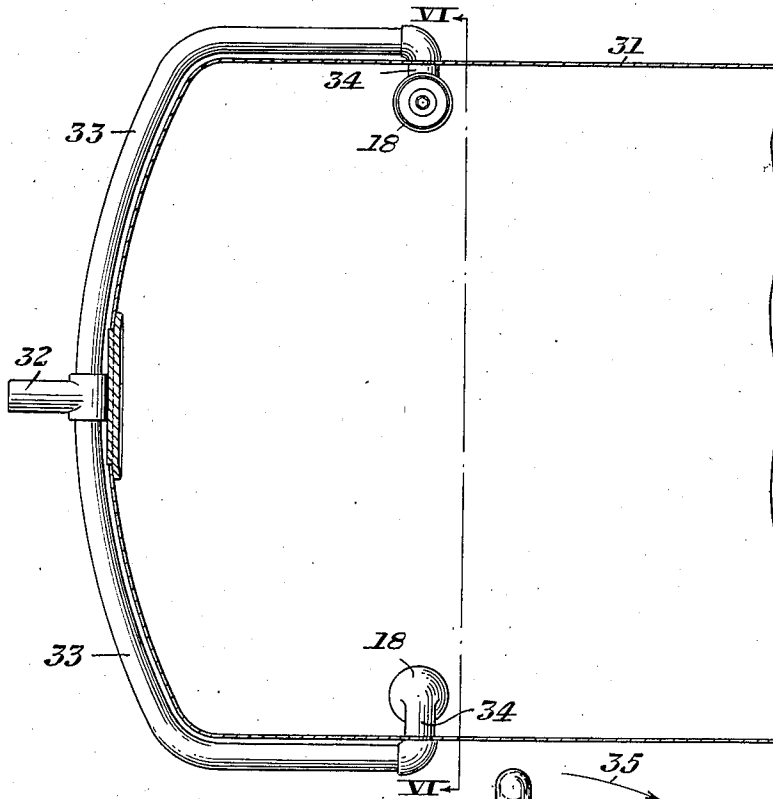
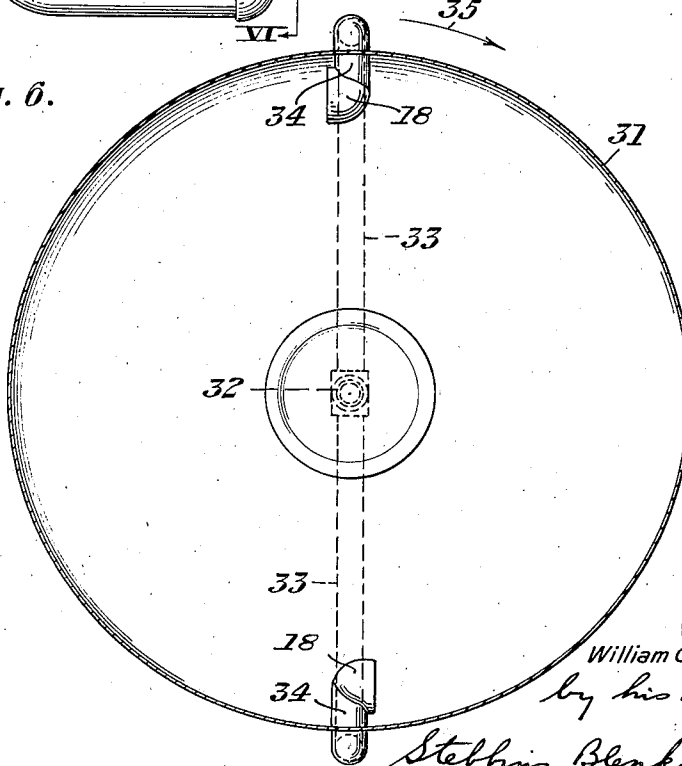


Fig. 5.

Fig. 6.



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3 Sheets-Sheet 3

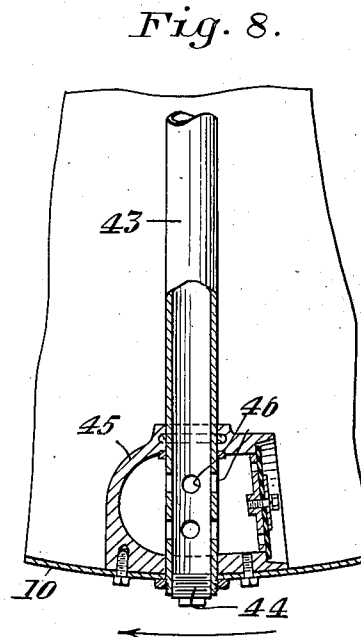
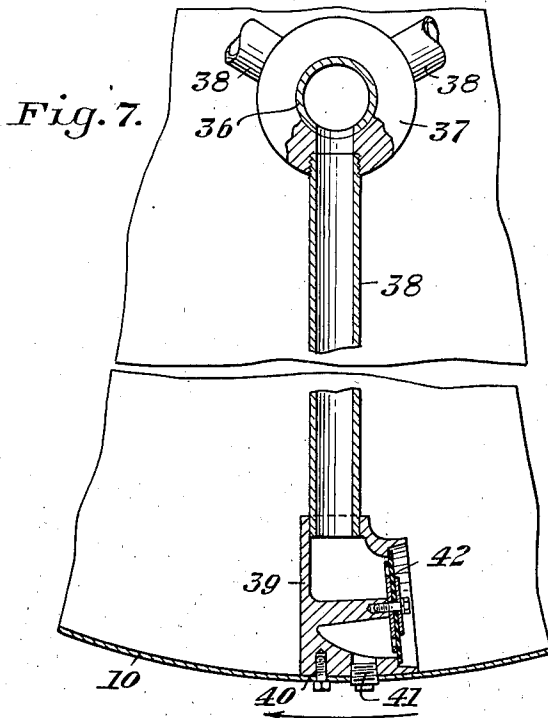


*Fig. 9.*

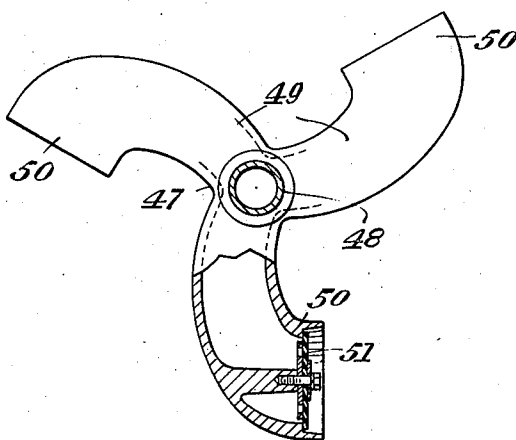
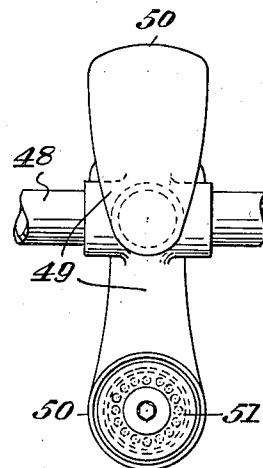


*Fig. 10.*



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## UNITED STATES PATENT OFFICE

2,192,406

## FLUID INLET FOR ROTARY MIXERS

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Application October 31, 1938, Serial No. 237,812

4 Claims. (Cl. 259—168)

This invention relates to a mixer and, in particular, to means for supplying fluid to the interior of a mixer. The invention is specially adapted for the supplying of water to the interior of a concrete mixer but may be used in other applications.

In the use of traveling concrete mixers, it is desired to mix the batch dry en route and then add water thereto before the final mixing. The water used in mixing the batch is usually carried in a tank on the upper part of the superstructure of the mixer. Because of the limits imposed by road clearances, the elevation of the water tank above the mixer proper cannot be very great. The water to be supplied to the tank is thus under a relatively low head and difficulty has been experienced heretofore in obtaining the discharge of water into the mixer with the desired rapidity. The apparatus which has been used heretofore for distributing the water to the interior of the mixer is of such nature as to be blocked quite readily by the contents of the mixer so that the supply of fluid to the latter is relatively slow and uncertain.

I have invented a novel apparatus for supplying water to the interior of a mixer which is capable of discharging a large volume in a relatively short time. A preferred form of the invention comprises a conduit extending radially of the usual rotatable mixer drum, the conduit being rotatable in the same direction as the drum and conveniently secured thereto. The conduit is provided with a discharge head which is disposed substantially tangentially relative to the direction of rotation of the conduit and mixer and facing rearwardly. By this arrangement, the discharge head on rotation through the contents of the mixer is not subject to blocking by the latter and a rapid discharge of water therethrough is obtained. A further feature of the invention is the provision of means for preventing the contents of the mixer from flowing backwardly into the fluid supply conduit. Various forms of the above described embodiment of the invention are illustrated in the accompanying drawings. In the drawings:

Fig. 1 is a partial section, largely diagrammatic, through a mixer having the invention applied thereto, on an axial plane, parts being shown in elevation;

Fig. 2 is a transverse sectional view taken substantially along the plane of line II—II of Fig. 1;

Fig. 3 is a rear elevation of a discharge head;

Fig. 4 is a sectional view taken along the plane of line IV—IV of Fig. 3;

Fig. 5 is a view similar to Fig. 1 illustrating a modification;

Fig. 6 is a sectional view taken along the plane of line VI—VI of Fig. 5;

Fig. 7 is a partial sectional view similar to Fig. 6 showing a further modification, the plane of section being that containing the axes of the water supply conduits;

Fig. 8 is a view similar to Fig. 7 showing a further modification;

Fig. 9 is a side elevation, partly in section, of a further modified form of fluid supply apparatus;

Fig. 10 is an elevation of the apparatus shown in Fig. 9 such as would be seen by looking on the latter from the right.

Referring now in detail to the drawings, and for the present to Figs. 1 through 4, a mixer drum indicated generally at 10 is mounted for rotation by means already well-known whereby it may be driven to mix thoroughly the material therein. A charging and discharging opening 11 at one end of the drum is normally closed by a closure 12. A water supply conduit 13 extends into the drum from the end opposite the charging opening, being supported at that end by a central casting 14 and adjacent the other end by a spider 15, the legs of which terminate on the wall of the drum.

A branch fitting 16 is connected in the conduit 13 and radial conduits 17 extend therefrom as clearly shown in the drawings. Each radial conduit 17 is provided with a discharge head 18, the construction of which may best be seen in Figs. 3 and 4. As there shown, each head or outlet 18 comprises a substantially bell-shaped body 19 and a neck 20 which is threaded for connection to the conduits 17. The bell-shaped body portion of the head terminates in a flaring mouth 21. A shoulder 22 spaced inwardly from the mouth 21 provides a seat for a flexible diaphragm 23 of rubber or other suitable material. The diaphragm 23 is carried on a screw 24 threaded into a post 25, which projects from the wall of the body portion toward the mouth 21. The diaphragm is disposed on the screw between backing plates 26 and 27. The plate 27 has holes 28 formed peripherally thereof. The diaphragms 23 is of such character that a slight excess of pressure on the inner side thereof will suffice to deform it sufficiently to permit a free flow of water from the mouth of the discharge head. Upon reversal of the pressure, the diaphragm tightly seals the mouth of the head, thus constituting a check valve.

The conduit 13 is connected to the water tank usually carried on portable mixing units through any suitable swivel connection. The conduit and the assembly of branches and discharge heads

thus rotate with the drum, in the direction indicated by the arrow 29. As clearly shown in Fig. 2, the heads 18 face rearwardly of their direction of rotation and are disposed substantially tangentially thereof. The heads 18 thus pass successively through the contents of the drum, the surface of the latter being indicated roughly by the line 30. On opening of the water control valve between the tank and the conduit 13, water will be supplied to the conduit and flow thence through the branches 17 and the heads 18. The volume of flow will naturally be greatest through the branch extending to the lowermost head. It will be apparent that the contents of the drum do not obstruct the flow of water from the heads since the motion of the latter through the batch opens a clearance space for the water and may even produce some slight suction effect to accelerate the flow from the heads. At the same time, the diaphragms 23 prevent any back-flow of the materials of the batch into the heads 18, should conditions ever tend to cause this result.

It will be apparent that the apparatus described is capable of more rapidly discharging a given volume of water into the drum than water supply means previously used. In a comparative test, the apparatus of my invention discharged more than twice as much water in a given time as a water supply means of a prior type. The concrete is mixed to a uniform consistency but no batch materials are found in the heads after use. The diaphragms exhibit no deformation and no special attention to the water supply means is necessary, other than the ordinary flush-out at the end of a day's operations. The discharge heads, being generally bell-shaped, traverse the batch without imposing excessive stress upon the conduit 13, fitting 16, or branches 17.

Figs. 5 and 6 illustrate a modified construction, according to which a mixer drum 31 is provided with a fluid supply conduit 32 having branches 33 extending around the end thereof and for a short distance along the length thereof. From the branches 33, short conduits 34 extend radially into the drum and at their ends are provided with heads 18. As in the arrangement of Figs. 1 and 2, the heads or outlets 18 are directed rearwardly of the direction of rotation indicated by the arrow 35 and are disposed substantially tangentially. The operation of the apparatus shown in Figs. 5 and 6 is quite similar to that of the system previously described.

Fig. 7 illustrates a further modification according to which a conduit 36, corresponding to that shown at 13, is provided with an annular fitting 37, both the conduit and fitting being bored to receive radial branches 38. The latter are provided with heads or outlets 39, similar in general to those shown at 18 except that they are shaped to engage the interior of the wall of the drum 40 and are secured thereto as by screws 40. A clean-out opening is normally closed by a plug 41. The rearwardly directed mouth of the head 39 is provided with a diaphragm check valve assembly indicated generally at 42, substantially identical with that shown in Fig. 4.

Fig. 8 illustrates another modification generally similar to that of Fig. 7. In Fig. 8, branch conduits 43 extend from a central axial conduit and penetrate the drum wall, the outer end of each branch conduit being closed by a plug 44 which may be removed for clean-out. A head or outlet 45 surrounds the outer end of each conduit 43 and the latter is perforated as at 46 to permit the flow of water therefrom into the head and

outwardly therefrom in the same manner as in the embodiments previously described.

In a still further modification shown in Figs. 9 and 10, a unitary casting 47 is connected in a conduit 48 corresponding to that shown at 13. The casting has a hub connected in the conduit 48 and branches or elbows 49 extending generally radially therefrom, the outer end of each branch having a head or outlet 50 formed therein with a mouth normally closed by a diaphragm check valve assembly 51. It will be understood that the devices shown in Figs. 7 through 10 function in substantially the same manner as that of Figs. 1 through 4 to provide rapid inflow of water from the supply tank to the mixer drum proper. This is an important advantage because it is desired that the entire mixing operation be completed while the truck mixer is on its way to the point of delivery, and sometimes this is only a short trip.

While I have disclosed only a few embodiments of the invention, it will be understood that changes in the construction illustrated and described may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In a mixer, a rotatable drum, a fluid supply system therefor comprising an eccentrically positioned discharge terminal within the drum and mounted for rotation therewith, said discharge terminal having an outlet opening in a direction opposite to that in which the drum normally rotates, and pipe connections for conducting water from a source of supply to said discharge terminal comprising a central supply pipe and a branch pipe leading from the central supply pipe to said terminal and so disposed that any head of liquid available at the central supply pipe for causing discharge will be increased as the terminal moves downward during the rotation of the mixer drum.

2. In a mixer, a rotatable drum, a fluid supply system therefor comprising an eccentrically positioned discharge terminal within the drum and mounted for rotation therewith, said discharge terminal having an outlet opening in a direction opposite to that in which the drum normally rotates, pipe connections for conducting water from a source of supply to said discharge terminal comprising a central supply pipe and a branch pipe leading from the central supply pipe to said terminal and so disposed that any head of liquid available for causing discharge will be increased as the terminal moves downward during the rotation of the mixer drum, said discharge terminal having an outwardly opening check valve element therein to enable the water to be discharged when the drum is rotating in a direction to mix the contents of the drum and to exclude the contents of the drum from being forced into the terminal when the direction of rotation of the drum is reversed to discharge mixed material therefrom.

3. Apparatus for introducing water into a rotatable mixing drum comprising a water supply pipe, a conduit communicating with said pipe and rotatable with the drum and having a discharge terminal thereon which opens into the drum in a direction tangentially opposite to the direction of rotation of the drum, the length of the conduit in a circumferential direction from the supply pipe to the discharge terminal being substantially less than the diameter of the drum whereby the hydraulic head effective for causing discharge of

water from the terminal increases as the terminal approaches its lowermost position.

5 4. In a mixer, a rotatable drum, a fluid supply system therefor comprising a discharge terminal within the drum at a distance from the axis thereof, said terminal having an outlet opening in a direction opposite to that in which the drum normally rotates while the contents of the drum

is being mixed, and pipe connections attached to the drum for conducting water from a source of supply to said terminal so disposed that the flow of water within said pipe connections attached to said drum is continually downward when said 5 terminal is in its lowermost position.

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