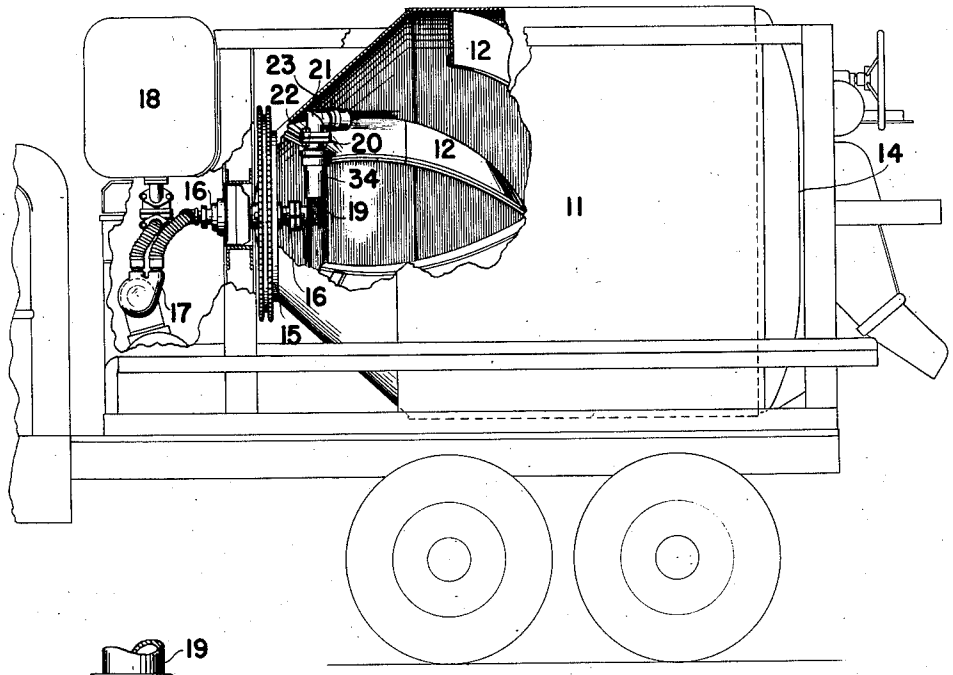
Dec. 19, 1950 L. G. HILKEMEIER 2,534,445

WATER INJECTION DEVICE FOR CONCRETE MIXERS

Filed Jan. 11, 1949

FIG. 1.



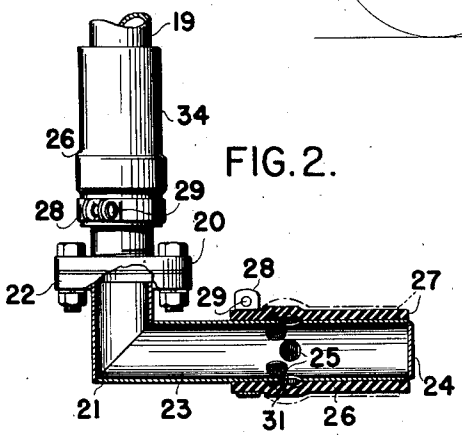


FIG. 2.

FIG. 4.

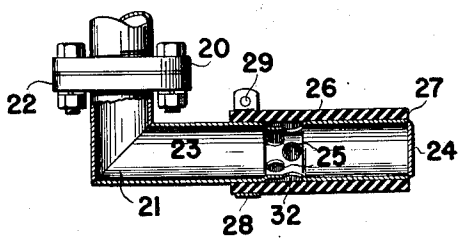
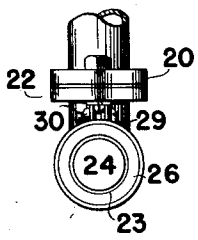


FIG. 3.



LOUIS G. HILKEMEIER
INVENTOR.

BY George A. Evans
ATTORNEY

Patented Dec. 19, 1950

2,534,445

UNITED STATES PATENT OFFICE

2,534,445

WATER INJECTION DEVICE FOR CONCRETE MIXERS

Louis G. Hilkemeier, Greenfield, Wis., assignor to Chain Belt Company, Milwaukee, Wis., a corporation of Wisconsin

Application January 11, 1949, Serial No. 70,174

3 Claims. (Cl. 259—168)

1

This invention relates to apparatus for introducing water into materials collected in the drum of a concrete mixer for producing a batch of mixed concrete.

The invention is especially suited for concrete mixers of the type mounted on trucks, wherein the concrete is mixed as it is hauled.

It is a characteristic of such truck mounted concrete mixers that the dry materials loaded into the drum occupy a large proportion of the drum's volume, and the most effective manner of introducing water into the materials in the drum is to dispose the water valve so that at least during a portion of the mixing period, it is beneath the level of the materials in the drum. Hence during rotation of the drum, concurrently with the introduction of water, rapid and efficient mixing may result.

Utilization of the most effective position for water introduction has resulted in a problem of water orifice clogging, for the concrete that is mixed in the drum naturally adheres to all surfaces with which it comes in contact, and this concrete may set up around the orifice and clog it.

It is an object of this invention to provide a water injection device which facilitates introduction of water into the materials in the drum, but which will not become clogged by the setting of concrete at its discharge point.

According to the present invention, a tubular discharge conduit is provided within the drum having one end closed and the other end communicating with a source of water under pressure. Tightly enveloping a section of the conduit and having one end clamped thereon is a sleeve of yieldable, deformable material, enclosing a series of lateral apertures in the conduit through which the water may flow prior to its passage between the sleeve and the conduit en route to its final discharge from adjacent the other end of the sleeve. The sleeve and the conduit are separated around the apertures to provide a reservoir for the water flowing through the apertures, enabling the pressure on the sleeve to increase because of the increased sleeve area, and thereby expanding the adjacent portion of the sleeve radially. Such expansion produces axial movement of the free end of the sleeve relative to the conduit, which is effective in breaking up any concrete that may set around the orifice and also loosens and enables discharge of any grout or fine material that may have become lodged between the juxtaposed surfaces of the sleeve and the conduit.

Two embodiments of such water injection apparatus are illustrated in the accompanying drawings, together with a novel disposition of a plurality of valves for improving water dispersion in the drum. In the drawings:

Fig. 1 is a side elevation, partly in section, of a truck mounted concrete mixer drum with the water injection devices arranged therein;

Fig. 2 is an enlarged cross sectional view of one of the water injection devices;

Fig. 3 is an end view of the apparatus shown in Fig. 2; and

Fig. 4 is a view similar to Fig. 2, showing a modification of the apparatus.

As illustrated in the drawings, the mixer drum 11 is of the type that its frame may be mounted on the rear of a truck. The drum is provided with spiral blades 12 attached to its inner walls, which elevate and tumble the materials to be mixed. The materials may be introduced into the drum through a hatch opening in the side of the drum, and after the batch is mixed, concrete is discharged through an axial opening 14 arranged at the rear end of the drum. The forward end of the drum is closed and carries a sprocket 15 which is driven by a chain from a suitable source of power to thereby rotate the drum and its contents.

Extending axially through the closed end of the drum is the water pipe 16, the forward end of which communicates with a water pump 17 which derives its supply from the exterior water tank 18. The pump is of a capacity to develop considerable pressure on the water leaving it and entering the drum.

The pipe 16 connects to an elbow fitting 19 which extends generally radially from a point on the axis of the drum spaced a short distance inwardly from the closed, forward drum head. The outer end of the elbow fitting 19 is provided with a flange 20 which may be threaded into the end of the elbow 19. Secured to flange 20 is a second elbow fitting 21 which has a flanged inner end 22 to which the flange 20 is bolted or otherwise secured.

The elbow fitting 21 has a straight outer portion 23 arranged to be closely adjacent the side wall of the drum and parallel to one of the spiral mixing blades 12. The valve at the end of the straight portion 21 is thus closely adjacent the inside wall of the drum, behind one of the blades, and points in the direction of the blade (i. e. diagonally toward the rear of the drum), so that water flowing therefrom may flow peripherally of the drum in the path of the blade as the latter churns through the materials in the drum.

As illustrated in Fig. 2, the outer end of the straight portion 23 of the elbow shaped conduit 22 is closed by the plug 24 which may be welded or otherwise secured to the conduit. Up the pipe a distance from the closed end, are a series of apertures 25 in the conduit, spaced circumferentially around the conduit. Preferably there are several rows of apertures with the individual apertures in each row offset with respect to those in the other row so as to arrange them closer together, and to provide greater area for the passage of water therethrough.

A molded rubber sleeve 26 having an inside diameter slightly less than the outside diameter of the pipe 23 is forced over the closed end of the pipe until the end 27 of the sleeve approximately coincides with the closed end of the pipe. The inner end of the sleeve is engaged by the clamping ring 28 which is tightened by the bolt 29 and nut 30 threaded thereon to prevent displacement of the sleeve and also to prevent escape of water from this end of the sleeve. The free end of the sleeve 27 has a snug fit on the pipe to prevent concrete from entering between the sleeve and the conduit, when the pump 17 is not in operation.

Enclosing the apertures 25, an annular recess 31 is provided on the inside of the sleeve 26. This recess is of a width sufficient to accommodate the apertures and of a depth somewhat less than the thickness of the sleeve. Preferably the thickness of the sleeve in back of the recess is the same as its thickness through other cross sections, and therefore the outside surface of the sleeve protrudes in the region of the recess.

When sufficient pressure of water is developed by the pump 17, the water is forced through the apertures 25 into the recess 31 and thence between the sleeve 26 and the conduit 23 to emerge at the end 27 of the sleeve. The initial water pressure built up in the reservoir provided by the recess 31 causes the sleeve to expand, drawing the discharge end 27 axially of the pipe to the dotted line position shown in Fig. 2. Relative movement between the end of the sleeve 27 and the conduit 23 loosens concrete accumulations that might be tending to seal the orifice, and also scrubs and loosens any fines that may have worked their way back from the orifice into the space between the sleeve and the conduit. Once loosened, they are flushed out by the water passing through the orifice.

It is essential to have adequate aperture area to permit free passage of water through the wall of the conduit and that the rubber sleeve be elastically deformable to a marked extent. It has been found desirable to provide an aperture area in excess of the total cross sectional area of the conduit, and to employ a rubber having a Durometer rating between 30 and 40 to obtain the desired results with the valve disclosed.

Similar results, though not quite as effective, may be obtained by the modified nozzle illustrated in Fig. 4. Instead of providing a recess, as at 31 in the sleeve, an annular depression or recess 32 is provided on the outside periphery of the pipe, the width of the depression being such as to communicate with all the apertures 25, and its depth providing a reservoir similar in volume to the reservoir provided by the recess 31 in the sleeve shown in Fig. 2. In this modification, the cross section of the sleeve is constant throughout its length, but the space which is provided by the depression 32 between the sleeve and conduit increases the area of the sleeve subject to pressure, and enables the total pressure acting on the adjacent portion of the sleeve to increase to the point where the sleeve expands, thereby shortening the length of the sleeve, and producing axial movement of the sleeve relative to the pipe.

A further feature of the present invention consists in providing a second water orifice on the radial portion of the elbow fitting 19, as illustrated in Fig. 1. The sleeve 34 is clamped on the radial section of the pipe only a short distance inwardly from the outer flange 20, and the free end of the sleeve encloses a portion of the pipe nearer the center of the drum. The construction and disposition of the sleeve, and the pipe apertures it encloses, may be similar to that shown in Figs. 2 or 4 and need not be described in detail. Only in this instance, the free end of the sleeve does not coincide with the terminus of the enclosed pipe, but rather the pipe extends beyond both ends of the sleeve 34. This fact does not interfere materially with discharge of water from the orifice between the sleeve and pipe, and the flow from each of the orifices is nearly the same.

The second orifice provides the advantage of equalizing the amount of water discharged into the front and rear portions of the drum. Concentration of water at the rear of the drum is most apt to occur during that portion of the drum's rotation when the outer end of the piping 19 and 21 are at the top of the drum, for then the pipe section 23 may be above the materials, and water issuing from the end orifice is directed toward the back of the drum and along its periphery because the pipe section 23 points in that direction.

The second orifice provided by the sleeve 34 causes water to be discharged back along the direction of the pipe section 19 toward the center of the drum and near the closed, forward end thereof. As a result the water is more evenly distributed throughout the length of the drum, and uniform water content is more easily obtained in all portions of the mix.

I claim:

1. Water injection means for concrete mixers comprising a laterally apertured conduit having one end closed and the other end communicating with a source of water under pressure, and a sleeve of elastically deformable material enveloping the section of the conduit in which the aperture is disposed, said sleeve having a snug fit throughout its length on said conduit except in the region of said aperture where it has an annular inner recess surrounding the apertures, so that the water pressure may be exerted on sufficient area of the sleeve surrounding the aperture to produce radial expansion of the sleeve and consequent axial movement of that portion of other portions of the sleeve during discharge of water requisite to loosen material lodged between the sleeve and the conduit.

2. Water injection means for concrete mixers comprising an elongated conduit closed at one end and having a plurality of circumferentially aligned apertures in a section thereof remote from the closed end, said conduit communicating with a source of water under pressure, a sleeve of elastically deformable material enveloping the section of the conduit in which the apertures are disposed, the portions of the sleeve adjacent its end having a snug fit on the conduit, one end portion being closed to the passage of water between the sleeve and the conduit, the annular portion of the sleeve corresponding to the width of the apertures it surrounds being inwardly recessed from the conduit to enable water pres-

sure to be exerted on the entire circumferential area of the sleeve whereby radial expansion thereof and consequent inward axial movement of the free end of the sleeve during the passage of water through the apertures and between the sleeve and the conduit may loosen material lodged between said elements.

3. Water injection means for concrete mixers comprising a conduit having one end closed and the other end communicating with a source of water under pressure, a sleeve of deformable material tightly enclosing a portion of said conduit, and means for clamping one end of the sleeve on the conduit, the enclosed portion of said conduit having a plurality of apertures communicating with the medial portion of the sleeve, and said sleeve having an annular inner recess surrounding said apertures affording a reservoir for water issuing from said apertures and facilitating discharge of water between the free end of the sleeve and conduit.

LOUIS G. HILKEMEIER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
384,306	Bourdil	June 12, 1888
560,808	Macy	May 26, 1896
887,854	Schenck	May 19, 1908
1,922,700	Knowles	Aug. 15, 1933
1,994,577	Eggert	Mar. 19, 1935
2,159,184	Skrzynski	May 23, 1939
2,360,344	Hilkemeier	Oct. 17, 1944
2,413,488	Draeger	Dec. 31, 1946