

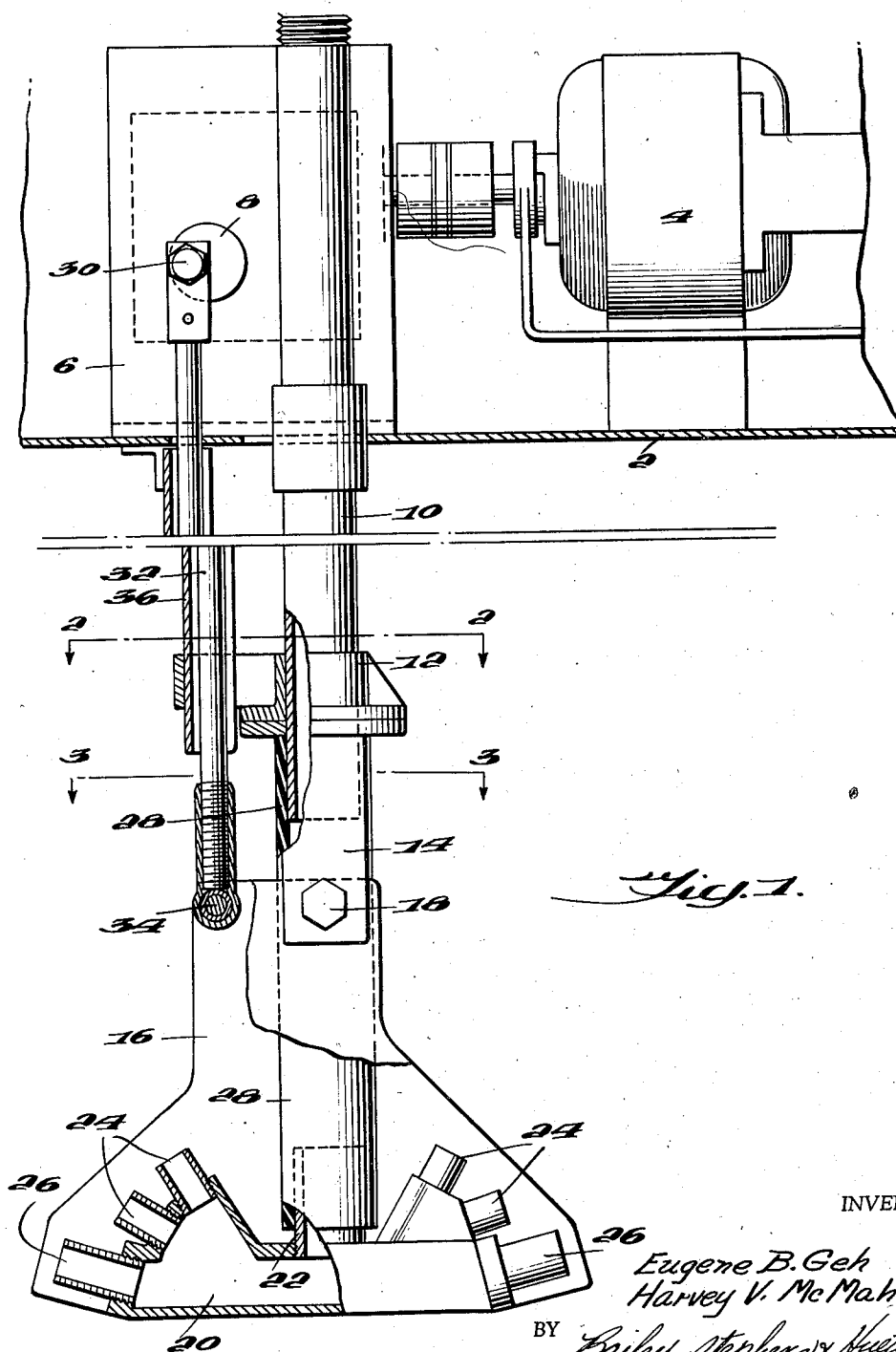
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E. B. GEH ET AL  
TANK CLEANING APPARATUS

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2 Sheets-Sheet 1



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*Fig. 2.*

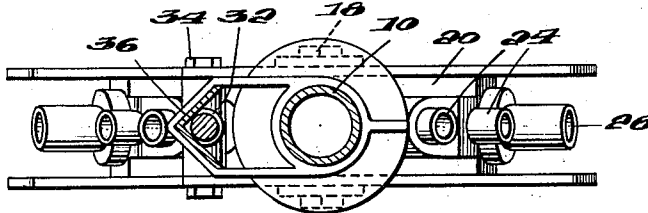


*Fig. 3.*

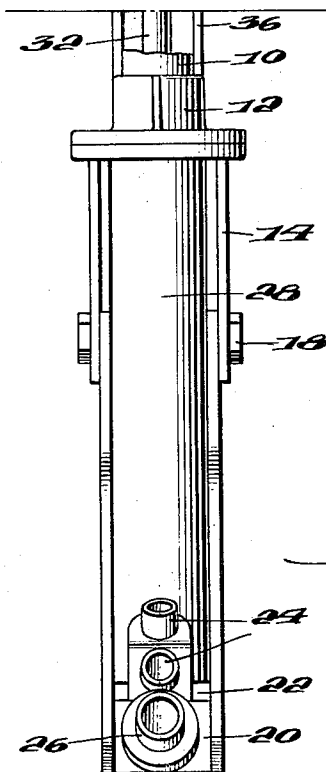
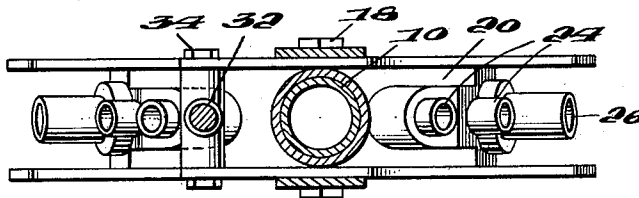


*Fig. 5a*



*Fig. 5c.*

*Fig. 5b.*



*Fig. 4.*

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## TANK CLEANING APPARATUS

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7 Claims. (Cl. 134—167)

The invention relates to cleaning apparatus, and particularly to apparatus for spraying a cleaning solution inside an elongated tank such as a tank truck or tank car.

Present devices for spraying the interior of milk tank trucks have proven unsatisfactory, particularly in the longer trucks now being used which are more than thirty-four feet long and have a single central manhole. It has been found that presently used cleaners are not effective in such long trucks.

The primary purpose of the present invention is to provide an arrangement which can adequately spray and clean the interior of tanks from a single manhole even though such tanks are considerably more than thirty-four feet in length, and up to the greatest length which is practical or legally permitted at the present time for tank cars and tank trucks.

Another object of the invention is to provide an arrangement which is simple and inexpensive, but which nevertheless adequately accomplishes the desired cleaning.

A further object of the invention is to provide an arrangement in which only the top surface and the upper portion of the ends of the tank are sprayed, the flow of the sprayed liquid down the side walls and ends of the tank being adequate to accomplish the necessary cleaning.

An additional object of the invention is to provide an arrangement which eliminates the use of complicated rotary motions of the spraying nozzles and uses instead a simple oscillating motion of the nozzles in a vertical plane.

Further objects and advantages of the invention will appear more fully from the following description, especially when taken in conjunction with the accompanying drawings which form a part thereof.

In the drawings:

Fig. 1 shows in side elevation with parts in section a cleaning apparatus embodying the invention;

Figs. 2 and 3 are horizontal cross-sections on the lines 2—2 and 3—3 respectively of Fig. 1; and

Fig. 4 is a view of the lower part of the apparatus at right angles to Fig. 1.

Figs. 5a, 5b and 5c show the nozzles used in the device. The arrangement includes a manhole cover 2 arranged to be clamped on a manhole in the top of a tank. On the top side of this cover is mounted a motor 4 which drives a speed reducer 6, the output of which rotates a crank arm 8.

Extending downwardly through the manhole cover is a pipe 10, to the upper end of which a hose from a source of water or cleaning fluid under pressure can be attached. Brackets 14 extend downwardly from the lower side of collar 12 and between these brackets are mounted parallel plates 16, connected to the brackets 14 by pivot bolts 18. Between the plates 16 is arranged a hollow casting 20 provided with an upwardly extending inlet pipe 22 and with nozzles 24a, 24b, 24c. A piece of flexible hose 28 joins the lower end of pipe 10 to inlet pipe 22 so as to conduct fluid from the pipe 10 to the casting 20 while

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permitting the plates 16 and the casting to rock about pivots 18.

The nozzles are of a type calculated to provide, in conjunction with the 20° oscillation of casting 20, the most complete and uniform coverage of the surfaces to be sprayed. The uppermost nozzle 24a discharges liquid in the form of a solid cone having a square cross section and the included angle of the spray is approximately 75°. This type of nozzle ensures wide top surface coverage in the area nearest the manhole. Its capacity must be ample for that purpose.

The middle nozzle 24b discharges a flat spray having an included angle of approximately 43° and is so situated that the leading edge of the spray is horizontal. Its capacity is somewhat greater than that of nozzle 24a since it must reach further and cover a greater area.

The lower nozzle 24c also discharges a flat spray and is situated so that the leading edge of the spray is horizontal. However, it has double the capacity of nozzle 24b and an included angle of about 20°, since it must spray a larger area and to a greater distance from the unit.

Crank arm 8 has an eccentric pivot 30 for rod 32 which extends downwardly and is pivoted at 34 to plates 16. This rod is shielded through most of its length by a V-shaped shield 36.

In operation, this device is positioned in the manhole of a tank with the cover 2 clamped to the edges of the manhole. It is arranged in such a manner that the vertical plane of the axes of the nozzles, that is, the plane perpendicular to the axes 18 and 34, extends longitudinally of the tank.

A source of liquid under pressure is connected to the pipe 10 and current is supplied to motor 4. The motor oscillates the nozzles at about two complete oscillations per minute. The angle of oscillation is 20°. As a result, the cleaning solution is supplied to the whole of the top of the tank, this being the area which ordinarily requires the most cleaning, particularly in the case of milk tank trucks because of the accumulation of suds and fats above the load level. The running down of the water and cleaning solution is adequate to wash completely the sides, end and bottom areas. Usually the liquid is supplied at about 90 p. s. i. and the rate of flow from the six nozzles is around 80 gallons per minute. For cleaning milk tank cars and trucks, cold, fresh water is sprayed for about five minutes for rinsing, then a hot alkaline cleaning solution for seven or eight minutes, and then the tank is rinsed with cold water for about five minutes.

While we have described herein one embodiment of our invention, we wish it to be understood that we do not intend to limit ourselves thereby except within the scope of the claims hereto or hereinafter appended.

We claim:

1. Apparatus for cleaning the interior of a tank provided with a manhole, comprising a manhole cover adapted to be attached on the manhole, a pipe extending downwardly through said cover and adapted to be connected to a source of liquid, a hollow member pivoted to the lower end of said pipe about a horizontal axis, a plurality of nozzles mounted in said member, all of said nozzles having their axes located in a plane perpendicular to said axis and being upwardly and angularly directed, a flexible hose connecting said pipe with the interior of said member, a rod pivoted to said member and extending upwardly therefrom, and means operatively connected to said rod to impart to said rod a reciprocation so as to impart a rocking motion to said member.

2. Apparatus for cleaning the interior of a tank pro-

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vided with a manhole, comprising a manhole cover adapted to be attached on the manhole, a motor carried by said cover, a pipe extending downwardly through said cover and adapted to be connected to a source of liquid, a hollow member pivoted to the lower end of said pipe about a horizontal axis, a plurality of nozzles mounted in said member, all of said nozzles having their axes located in a plane perpendicular to said axis and being upwardly and angularly directed, a flexible hose connecting said pipe with the interior of said member, a rod pivoted to said member and extending upwardly therefrom, and means operatively connecting said rod to said motor to impart to said rod a slow reciprocation so as to impart a rocking motion to said member.

3. Apparatus for cleaning the interior of a tank provided with a manhole, comprising a manhole cover adapted to be attached on the manhole, a pipe extending downwardly through said cover and adapted to be connected to a source of liquid, a pair of fixed brackets extending downwardly from the lower end of said pipe, a hollow member pivoted on said fixed brackets about a horizontal axis, a plurality of nozzles mounted in said member, all of said nozzles having their axes located in a plane perpendicular to said axis and being upwardly and angularly directed, a flexible hose connecting said pipe with the interior of said member, a rod pivoted to said member and extending upwardly therefrom, and means operatively connecting said rod to said motor to impart to said rod a slow reciprocation so as to impart a rocking motion to said member.

4. Apparatus for cleaning the interior of a tank provided with a manhole, comprising a manhole cover adapted to be attached on the manhole, a motor carried by said cover, a pipe extending downwardly through said cover and adapted to be connected to a source of liquid, a pair of fixed brackets extending downwardly from the lower end of said pipe, a hollow member pivoted on said fixed brackets about a horizontal axis, a plurality of nozzles mounted in said member, all of said nozzles having their axes located in a plane perpendicular to said axis and being upwardly and angularly directed, a flexible hose connecting said pipe with the interior of said member, a rod pivoted to said member and extending upwardly therefrom, and means operatively connecting said rod to said motor to impart to said rod a slow reciprocation so as to impart a rocking motion to said member.

5. Apparatus for cleaning the interior of a tank provided with a manhole, comprising a manhole cover adapted to be attached on the manhole, a pipe extending downwardly through said cover and adapted to be connected to a source of liquid, a pair of spaced parallel movable plates pivoted to the lower end of said pipe about a horizontal axis, a hollow member mounted between said movable plates, a plurality of nozzles mounted in said member, all of said nozzles having their axes located in a plane parallel to the planes of the movable plates and being upwardly and angularly directed, a flexible hose connecting said pipe with the interior of said member, a rod pivoted to said member and extending upwardly therefrom, and means operatively connecting said rod to said motor to impart to said rod a slow reciprocation so as to impart a rocking motion to said member.

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said nozzles having their axes located in a plane parallel to the planes of the movable plates and being upwardly and angularly directed, a flexible hose connecting said pipe with the interior of said member, a rod pivoted to said movable plates and extending upwardly therefrom, and means operatively connected to said rod to impart to said rod a slow reciprocation so as to impart a rocking motion to said movable plates and member.

6. Apparatus for cleaning the interior of a tank provided with a manhole, comprising a manhole cover adapted to be attached on the manhole, a motor carried by said cover, a pipe extending downwardly through said cover and adapted to be connected to a source of liquid, a pair of spaced parallel movable plates pivoted to the lower end of said pipe about a horizontal axis, a hollow member mounted between said movable plates, a plurality of nozzles mounted in said member between said movable plates, all of said nozzles having their axes located in a plane parallel to the planes of the movable plates and being upwardly and angularly directed, a flexible hose connecting said pipe with the interior of said member, a rod pivoted to said movable plates and extending upwardly therefrom, and means operatively connecting said rod to said motor to impart to said rod a slow reciprocation so as to impart a rocking motion to said movable plates and member.

7. Apparatus for cleaning the interior of a tank provided with a manhole, comprising a manhole cover adapted to be attached on the manhole, a motor carried by said cover, a pipe extending downwardly through said cover and adapted to be connected to a source of liquid, a pair of fixed brackets extending downwardly from the lower end of said pipe, a pair of spaced parallel movable plates pivoted on said fixed brackets about a horizontal axis, a hollow member mounted between said movable plates, a plurality of nozzles mounted in said member between said movable plates, all of said nozzles having their axes located in a plane parallel to the planes of the movable plates and being upwardly and angularly directed, a flexible hose connecting said pipe with the interior of said member, a rod pivoted to said movable plates and extending upwardly therefrom, and means operatively connecting said rod to said motor to impart to said rod a slow reciprocation so as to impart a rocking motion to said movable plates and member.

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