

Sept. 26, 1961

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3,001,534

TANK CAR CLEANING APPARATUS

Filed Aug. 5, 1959

2 Sheets-Sheet 1

FIG. 1

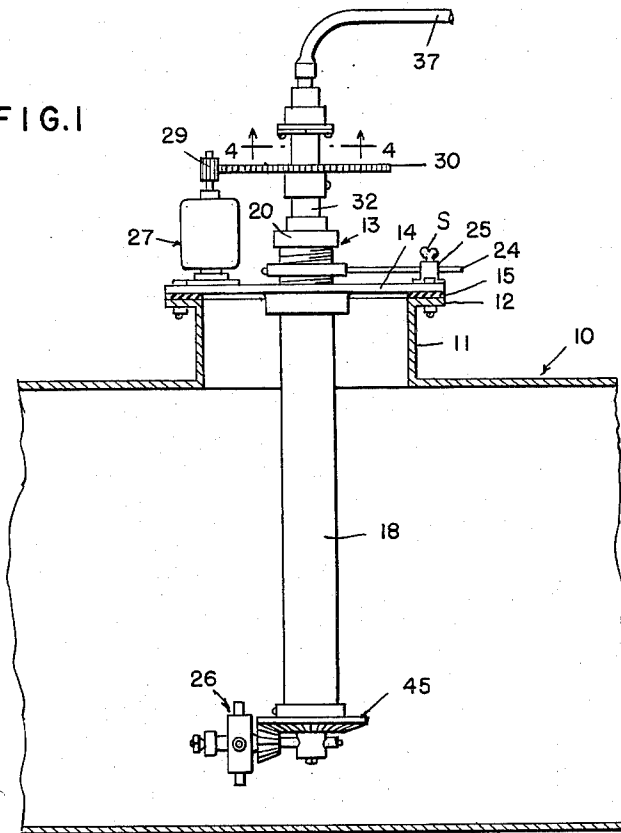


FIG. 3

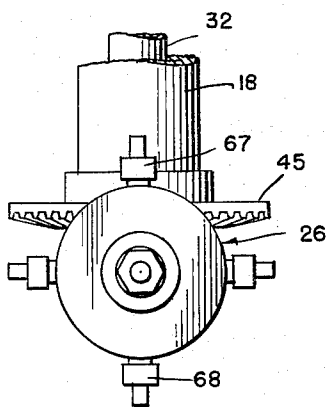
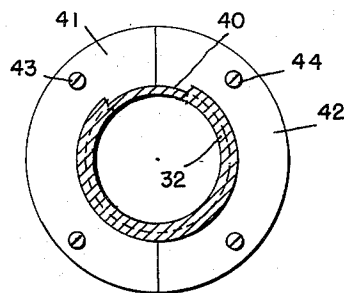


FIG. 4



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Filed Aug. 5, 1959

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TANK CAR CLEANING APPARATUS

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Filed Aug. 5, 1959, Ser. No. 847,443

4 Claims. (Cl. 134-167)

This invention relates to cleaning apparatus and pertains, more particularly, to a cleaning assembly for use in conjunction with large tanks or containers such as, for example, railway tank cars.

It is imperative, in many instances, to thoroughly clean the inside of railway tank cars and to do so in an economical and feasible fashion. Consequently, the present invention is directed to this specific and particular problem and the structure comprising this invention is particularly well suited and adapted for this purpose.

Essentially, the present invention consists of a portable unit which is inserted into the tank car to be cleaned and includes a base plate which temporarily replaces the dome cover of the tank car and is held down by the dome cover lugs. The base plate constitutes a support for the entire assemblage and which includes a member depending therefrom which extends into the interior of the tank car and which carries a rotating spray head assembly in such fashion as to permit the spray head to direct a water spray into all reaches and regions of the car while the apparatus is being operated.

A further object of this invention resides in the provision of mechanism of compact and efficient design specifically adapted for use in conjunction with the cleaning of tank car interiors and for directing jets of water throughout and over the entire inside surface of such tank cars and which apparatus is easily positioned in operation and carried about from one car to the other and which is otherwise practical and efficient and is economical in construction and operation.

Still another object of this invention is to provide a mechanism including a base plate adapted to replace the dome cover on a tank car and which mounts thereon apparatus for cleaning the inside of the tank car including an elongate support member rigid therewith and depending from the base plate and carrying at its lower end means for causing rotation of a spray nozzle assembly which is also caused to rotate at an axis perpendicular thereto so that the spray nozzle will direct jets of water throughout and completely over the interior of the tank car.

A further object of this invention is to provide an assembly in conformity with the preceding object, wherein the base plate also serves as a mount for a motor supplying the motive power for operating the spray head and causing it to rotate about the two axes specified.

With the above and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportions, and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

FIG. 1 is a sectional view taken through a portion of a tank car illustrating the invention mounted operatively in relation thereto;

FIG. 2 is a vertical section taken through the spray device and showing details of its internal construction;

FIG. 3 is an end view of the lower end of the spray unit; and

FIG. 4 is an enlarged horizontal section taken substantially along the plane of section line 4-4 in FIG. 1 and illustrating details of the swivel coupling.

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Referring at this time more particularly to FIG. 1, the reference numeral 10 indicates, in general, the body of a tank car of entirely conventional construction and which includes the usual tower or dome 11 terminating at its upper end in a radial flange 12 and upon which the conventional dome cover normally rests, there being provided conventional clamping lugs for holding the dome cover sealingly in place when the tank car is in use.

The spray assembly, which is indicated generally by the reference character 13, mounts upon the flange 12 and extends downwardly through the dome 11 into the interior of the tank car and is connected to a suitable source of water under pressure for impinging high velocity jets of water against the interior of the tank car to thus wash the same.

As can be seen best in FIG. 2, the spray assembly consists essentially of a generally circular base plate 14 which is so constructed and of a size as to fit upon the dome and rest upon the flange 12 thereof and to temporarily replace the dome cover while the spray assembly is in operation, and which base plate is securely anchored or held on the dome by the same means which normally holds the cover of the dome in place. FIG. 1 illustrates that a gasket 15 is interposed between the flange 12 and the base plate 14 to effect a seal while the spray assembly is in place and in operation.

The base plate is provided with a central opening and on the underside thereof is provided with a nut member 16 welded to the underside of the base plate as indicated by the reference character 17, and which nut threadedly receives the threaded upper end of an elongate tube 18, the major portion of which depends below the base plate 14 substantially as is shown.

The threaded upper end 19 of the tube 18 extends completely through the base plate and projects somewhat thereabove and has its upper extremity surrounded by the depending skirt portion of a cap 20, thus effecting a guard over the open upper end of the tube. A lever 21 includes an internally threaded boss portion 22 which is threadedly engaged on the threaded upper extremity 19 of the tube 18 below the cap 20 and has a set screw 23 associated therewith for selective blocking engagement against the tube 18 to prevent rotation of the tube with respect to the lever 21. The handle 24 of the lever projects radially from the tube 18 and extends through an anchor member 25 rigidly affixed to the upper side of the base plate 14, thus preventing relative movement between the lever 21 and the base plate. The purpose of the lever is to permit the tube 18 to be rotated to vary the pattern of the spray head unit indicated generally by the reference character 26 which is carried at the lower end of the tube 18. This adjustment is described in detail hereinafter.

The base plate 14 also serves as a mount for a motor indicated generally by the reference character 27 which, in the particular instance shown, is an electric motor mounted with its driving shaft vertically disposed and projecting upwardly out of the motor casing, such drive shaft being indicated by the reference character 28. The drive shaft has attached thereto a driving pinion indicated by the reference character 29, which is in mesh with a spur gear 30 having a hub 31 received on the upper end of a pipe 32 and rigidly fixed thereto by means of a set screw 33 carried by the hub and engaged against the surface of the pipe 32.

The pipe 32 extends concentrically through the tube 18 and is journaled therewithin by means of a pair of roller bearings or ball bearings 34 and 35 which also serve to locate the pipe 32 axially with respect to the tube 18. The cap 20, previously mentioned, surrounds the pipe 32 as shown in FIG. 2, and the upper extremity of the pipe is connected through a suitable swivel coupling 36

to a flexible conduit 37 which leads to a source of water under pressure.

The swivel coupling 36 is preferably of conventional or standard design such as are readily available. Such joints in general consist of a cup 38 fitting over the upper open end of the pipe 32 and having a radial annular flange 39 as shown. The pipe 32 is provided with an annular groove 40 immediately below the flange 39 and a pair of C-shaped plates 41 and 42, see particularly FIG. 4, have their inner edges received in such groove, the plates 41 and 42 being secured as by fasteners 43 and 44 to the underside of the flange 39. Thus, the swivel 36 permits the pipe 32 to rotate relative thereto.

The lower extremity of the tube 18 carries a ring gear 45 whose hub 46 is recessed as at 47 to receive the lower extremity of the tube and there being a set screw 48 serving to secure the ring gear to the tube and prevent rotation of the ring gear relative to the tube 18. The central portion 49 of the ring gear 45 is provided with an opening larger than the pipe 32 and through which opening the lower extremity of the pipe projects. This opening receives a suitable grease or oil seal 50 to retain lubricating medium within the confines of the tube 18 and prevent it leaking out the lower end of the assembly, and to prevent the admission of cleaning solution or other contaminants into the bearings 34 and 35.

That portion of the pipe 32 which projects through the ring gear 45 is provided with a transverse bore through which is fitted a branch pipe 51, such branch pipe being welded thereto as indicated by the reference characters 52 and 53. The branch pipe is provided with a blind bore 54 closed at its open end by the plug 55, and with transverse bores 56 and 57 which communicate with the interior of the pipe 32. Thus, the end 58 of the branch pipe, which is remote from the pipe 32, is solid and terminates in a reduced end portion 59 having external threads 60 receiving a nut 61 and conical spacer 62 which bears against one side of a thrust bearing 63 which is on the branch pipe portion 58.

The spray head 26 consists of a hollow body including opposite circular end plates 64 and 65 sandwiching therebetween a cylindrical portion or body element 66 and providing a chamber therewithin. The cylindrical portion 66 is provided with a plurality of radially extending bores into which are fitted jet nozzles 67 and 68 for example. The spray head 26 is journaled on the branch pipe and is free to rotate relative thereto, the body plate 64 bearing against the opposite side of the thrust bearing 63 through the medium of the spacing collar or hub 70.

A pinion 71 is also journaled on the branch pipe and has its hub portion 72 welded as at 73 to the spray head body plate 65 so that the pinion and spray head rotate as a unit on the branch pipe 51.

In operation, the base plate 14 is clamped onto the dome in the manner shown in FIG. 1, with the spray head thus being disposed within the interior of the tank car body. The electric motor 27 is energized which will rotate the pipe 32 and thus cause the branch pipe 51 to turn therewith. However, since the pinion 71, which is rigid with the spray head 26 and meshes with the fixed ring gear 45, causes rotation of the spray head, the spray head also rotates so that a compound movement of the spray head is effected. That is to say, the spray head simultaneously rotates about the axis of the branch pipe 51 and swings around the axis of the main pipe 32. This compound movement causes the water discharged from the various jets 67 and 68 to be impinged all over the interior area of the tank car to thoroughly wash and cleanse the same.

The branch pipe 51 is provided with openings, such as those indicated by the reference characters 80 and 81 communicating the bore of the branch pipe with the interior of the spray head.

The purpose of the lever 21 is to permit the pattern

effected by the spray head 26 to be altered so that all of the interior of the tank or container with which the assembly is used may properly be cleaned. In this connection, it will be noted that the pattern of spray coverage effected by the spray head 26 is determined by the ratio of the motor drive pinion 29 to the pipe drive gear 30 and by the ratio of the lower stationary gear 45 to the pinion gear 71. These ratios, being fixed, determine the number of revolutions that the spray head will turn about the axis of tube 18 before the fixed pattern of the spray head will repeat itself. In order that the pattern may be made to cover the whole of the interior of the tank or container, lever 21 can be moved slightly to correspondingly rotate the tube 18 and, consequently, displace the spray pattern a predetermined amount. In other words, it will be appreciated that were the number of teeth on the gear 45 an even multiple of the number of teeth on the gear 71, the spray head 26 would assume the same position upon each revolution of the tube 32. However, if the number of teeth on the gear 45 is not divisible by a whole number by the teeth on the gear 71, the angular dispositions of the spray head nozzles 67, 68 will be altered upon each revolution of the tube 32 until they complete one cycle of operation and return to the initial position from which they started. This pattern, however, is fixed and the patterns can be infinitely varied by slightly moving the lever 21 and, consequently, the tube 18. To this end, the bracket 25 permits of slight angular adjustment of the tube 18 about its axis, the adjustment being held by the thumb screw S once having been made.

While the foregoing description of the invention has been directed to the invention as applied to a railway tank car, it will be understood that the invention may effectively be used for the cleaning of any large tanks or containers and that accordingly the illustration and description of the same in association with a tank car is by way of example only, as indicated in the first paragraph of column 1, lines 7-10.

I claim:

1. A tank cleaning assembly comprising a base plate adapted to rest upon and be secured to and over an opening in the tank, a tube mounted on said base plate and depending therefrom for extension into the tank, a pipe concentrically disposed within said tube and journaled therewithin and extending at its extremities beyond the opposite extremities of said tube, a motor mounted on said base plate, means connecting said motor and the upper extremity of said pipe for rotating the pipe in response to operation of said motor, a branch pipe fixed to the lower extremity of said pipe and projecting laterally therefrom, a spray head journaled adjacent the free end of said branch pipe and being in communication, through said branch pipe, with said pipe, the upper extremity of said pipe being adapted for connection to a source of water under pressure, means connecting the lower extremity of said tube and said spray head for causing rotation of said spray head about the axis of said branch pipe as said pipe is rotated about its axis by the motor, and means for selectively altering the rotational position of said tube relative to said base plate so as to alter the spray pattern of said spray head.

2. A tank cleaning assembly comprising a base plate adapted to rest upon and be secured to and over an opening in the tank, a tube mounted on said base plate and depending therefrom for extension into the tank, a pipe concentrically disposed within said tube and journaled therewithin and extending at its extremities beyond the opposite extremities of said tube, a motor mounted on said base plate, means connecting said motor and the upper extremity of said pipe for rotating the pipe in response to operation of said motor, a branch pipe fixed to the lower extremity of said pipe and pro-

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jecting laterally therefrom, a spray head journalled adjacent the free end of said branch pipe and being in communication, through said branch pipe, with said pipe, the upper extremity of said pipe being adapted for connection to a source of water under pressure, means connecting the lower extremity of said tube and said spray head for causing rotation of said spray head about the axis of said branch pipe as said pipe is rotated about its axis by the motor, means for selectively altering the rotational position of said tube relative to said base plate so as to alter the spray pattern of said spray head, the last mentioned means including a positioning lever surrounding the upper extremity of said tube and extending radially therefrom, means on said base plate for fixing said lever thereto, and means on said lever engaging said tube preventing rotation of said tube relative to the lever.

3. Cleaning apparatus for tanks comprising a base plate adapted to be positioned upon and secured to a tank over an opening in the tank, a tube mounted on said base plate and depending therefrom for extension into the tank, a pipe journalled concentrically within said tube and extending beyond the opposite ends thereof, a motor mounted on said base plate and having means drivingly connecting the motor with said pipe for rotation of the pipe in response to operation of said motor, a branch pipe fixed to the lower extremity of said pipe and extending laterally therefrom, a spray head journalled on said branch pipe adjacent the free end thereof, a pinion journalled on said branch pipe and connected to said spray head, a ring gear fixed to the lower end of said tube meshing with said pinion whereby the spray head is rotated about the axis of said branch pipe as said pipe is rotated about its own axis, and means for selectively

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altering the rotational position of said tube relative to said base plate so as to alter the spray pattern of said spray head.

4. Cleaning apparatus for tanks comprising a base plate adapted to be positioned upon and secured to a tank over an opening in the tank, a tube mounted on said base plate and depending therefrom for extension into the tank, a pipe journalled concentrically within said tube and extending beyond the opposite ends thereof, a motor mounted on said base plate and having means drivingly connecting the motor with said pipe for rotation of the pipe in response to operation of said motor, a branch pipe fixed to the lower extremity of said pipe and extending laterally therefrom, a spray head journalled on said branch pipe adjacent the free end thereof, a pinion journalled on said branch pipe and connected to said spray head, a ring gear fixed to the lower end of said tube meshing with said pinion whereby the spray head is rotated about the axis of said branch pipe as said pipe is rotated about its own axis, and a positioning lever surrounding the upper extremity of said tube and extending radially therefrom, means on said base plate for fixing said lever thereto, and means on said lever engaging said tube preventing rotation of said tube relative to the lever.

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