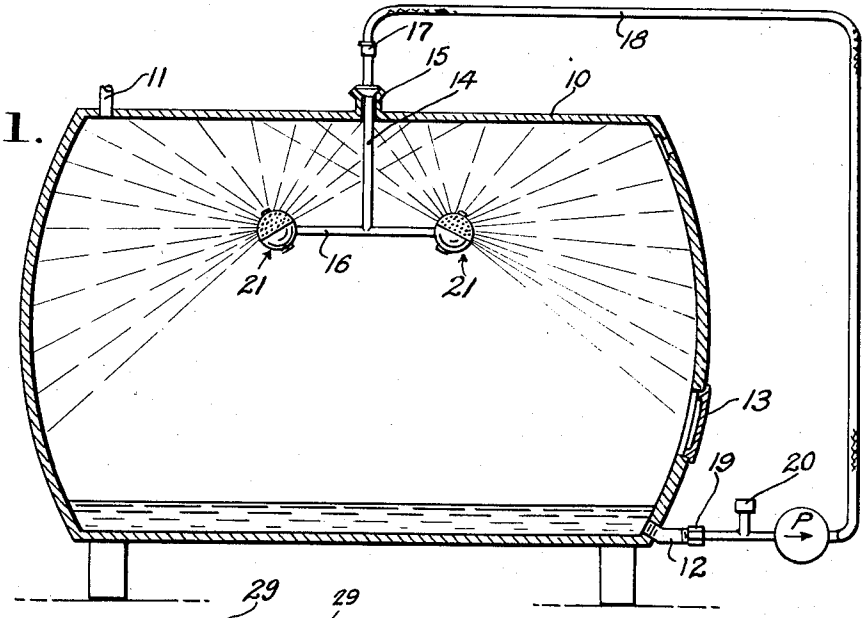
July 21, 1959 D. A. SEIBERLING ET AL 2,895,688

SPRAY NOZZLE FOR LIQUID STORAGE TANKS

Filed Dec. 28, 1956

FIG. 1.



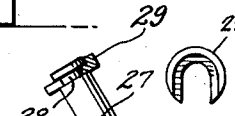


FIG. 3a.

FIG. 3.

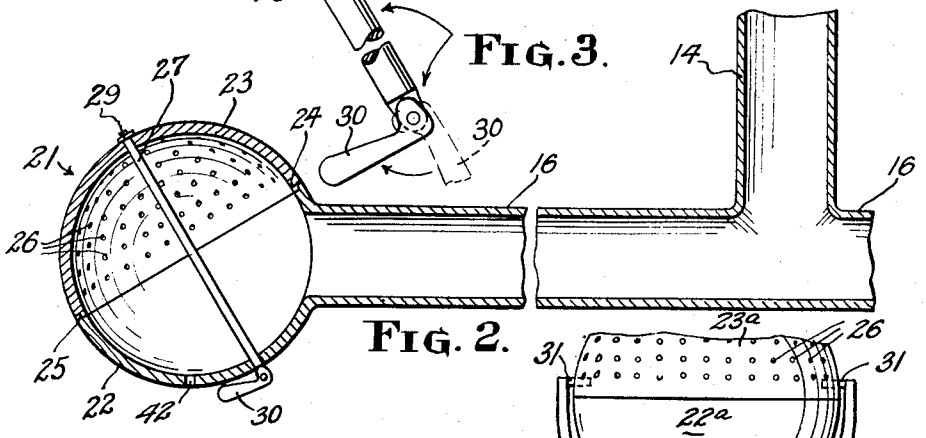


FIG. 2.

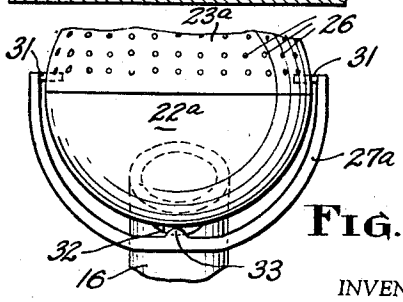


FIG. 5.

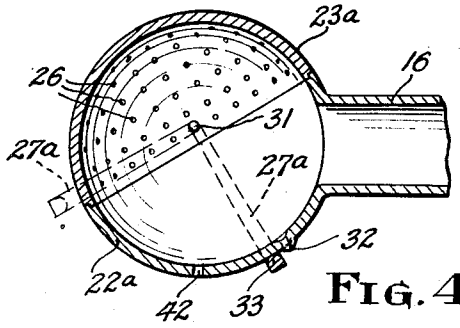


FIG. 4.

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SPRAY NOZZLE FOR LIQUID STORAGE TANKS

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4 Claims. (Cl. 239—559)

This invention relates to a spraying system. It has to do, more specifically, with a spraying system that includes a novel type of spray head or nozzle and associated supporting and fluid-supplying conduit.

It is difficult to clean the interiors of tanks which are used for the storage of milk, oil or various other substances. Ordinarily, it is necessary for a man to enter such a tank and use high-pressure hoses or hoses supplying detergents, etc. to spray the interior of the tank, or manually scrub the tank surfaces. Obviously, entrance and exit is difficult and if the tank is to remain sterile, for example in the case of a dairy tank, it is difficult to keep it sterile as the man leaves the tank. Furthermore, the cleaning operation is dangerous for the man in the tank when cleaning certain types of tanks where gases remain and in using certain types of irritating or poisonous detergents or cleaning substances. However, when permanent spraying systems are associated with such tanks according to the prior art, it is difficult to maintain such systems clean in themselves. Furthermore, with such prior art systems it is difficult to obtain the desired spray patterns within the tank.

It is the main object of this invention to provide a spraying system which includes a novel spray head or nozzle construction, which provides desired spray patterns, and which is supported in a novel manner by a conduit that supplies the fluid to be sprayed, the head and conduit being so associated that cleaning of the system is facilitated.

Another object is to provide a self cleaning spray nozzle construction composed of a pair of cooperative hemispherical, hollow casing sections carried in association with a liquid supply conduit, and wherein quick-detachable means are employed in detachably uniting said casing sections in a manner permitting ready separation or disassembly thereof for inspection purposes.

In the accompanying drawing, an example of the spray nozzle of this invention is illustrated but details thereof may vary without departing from the invention.

In the drawing:

Fig. 1 is a vertical sectional view through a tank showing a permanent-type spray cleaning system associated therewith;

Fig. 2 is a longitudinal sectional view taken through one of the spray heads and associated supporting conduit;

Fig. 3 is a detail of locking elements used in association with the separable parts of the spray head;

Fig. 3*a* is a plan view of the split washer used in the locking assembly shown in Fig. 3;

Fig. 4 is a sectional view through the spray head showing a different type of lock for the separable parts thereof;

Fig. 5 is an elevational view showing the locking arrangement of Fig. 4.

With reference to the drawing, in Fig. 1 there is illustrated a tank **10** in which is insulated a spray cleaning nozzle formed in accordance with the present invention.

This tank **10** may be employed as a reservoir for various liquids, for example, it may be a tank used in a dairy for storing milk. The tank is shown as being of substantially cylindrical form and has an inlet **11** for the milk and an outlet **12**. A manhole **13** is provided in one end of the tank for access to the interior thereof.

The spray cleaning system is shown as including a supporting and supply conduit **14** of T-form. The vertical portion of this conduit is mounted in any suitable manner within a socket connector **15** provided in the top of the tank **10** so that the horizontal arms **16** thereof are disposed in a predetermined position within the tank adjacent to but in spaced relationship to the top thereof.

The upper extremity of the T-member **14** is provided with a detachable coupling **17** for coupling to a hose **18** which is connected to the pressure side of a recirculating pump P. The suction side of this pump is connected by a coupling **19** to the tank outlet **12**. Detergents or other chemicals or cleansing liquids may, for example, be supplied to the system through an inlet branch coupling **20** connected to the suction side of the pump. Thus, a cleansing or sterilizing liquid, which is initially supplied to the system through the inlet **20**, will be pumped through the line **18** to the spraying device, which includes the T-member **14**. The sprayed liquid will collect in the bottom of the tank **10** and will be recirculated through the system, since it will be withdrawn from the tank by the pump through the outlet **12**.

As previously indicated, the spraying system includes spraying heads of novel construction and in Fig. 1 two of these spraying heads **21** are shown. These heads **21** are associated with the supporting T-member **14** in a novel manner. The specific structure of each spraying head and associated supporting conduit **14** is illustrated best in Fig. 2.

As shown in Fig. 2, one of the horizontal arms **16** of the T-conduit **14** is provided with a shell-like fixed section **22** of the spraying head. This section **22** is of hemispherical form and is formed as a continuation of the horizontal conduit arm **16**, preferably being integral therewith. This hemispherical fixed section **22**, in the example shown, is directed upwardly and outwardly. This section is preferably imperforate, with the exception of a small drain opening **42** formed in the lowermost region of the section **22**. The imperforate fixed section **22** is designed to receive a complemental removable hemispherical, shell-like section **23**. This section **23** is provided with a shouldered inner edge **24** which interfits with a complemental shouldered outer edge **25** on the fixed section **22**. These cooperating edges are machined so that they will form a substantially flush fit, while at the same time permitting a limited amount of leakage to insure self cleaning of the joint between the complemental sections **22** and **23**. The removable section **23** of the spherical spraying head **21** is provided with a plurality of spaced spray openings or orifices **26** extending therethrough and arranged in the desired manner to obtain a predetermined spray pattern. For example, in the application shown in Fig. 1, it is desirable that each spray head provided an upwardly and outwardly directed spray pattern so as to spray the top and ends of the tank **10**. The spray liquid will run down the remaining portions of the ends and sides of the tank and on its bottom so that the complete areas of the inner surfaces of the tank will be covered.

For normally locking the removable perforate hemispherical section **23** on the fixed hemispherical section **22**, various locking arrangements may be provided. In Fig. 2, there is illustrated a locking arrangement comprising a rod **27** which extends diametrically through both sections **22** and **23**. As shown in Fig. 3, one end of this locking rod **27** is provided with an annular groove **28**

which receives a U-shape stop washer **29**. The opposite end of this rod carries a pivoted cam lever **30**. The rod **27** is passed through opposed openings in the two sections **22** and **23** and the washer **29** is applied. Then, the cam lever **30** is swung inwardly from the broken line position indicated in Fig. 3 to the full line position, as illustrated to pull and hold the section **23** against the section **22**. The locking arrangement can be quickly released by moving the lever **30** outwardly with respect to the section **22** and then the washer **29** can be removed to permit complete withdrawal of the rod **27**. Thus, the section **23** is completely and readily removable from the section **22** to provide for unobstructed access to and visual inspection of the interior surfaces of the sections **22** and **23** and the branch conduits **16**.

Figs. 4 and 5 show a different type of locking arrangement. In this instance, a locking bail **27***a* is pivoted to the removable hemispherical section **23***a* at opposed points **31** adjacent the edge thereof. This bail **27***a* is swingable into association with a locking boss **32** on the fixed hemispherical section **22***a*, which boss is in substantially the same transverse plane as the pivot points **31** of the bail **27***a*. The bail **27***a* is provided with a cam lug **33** which engages the boss **32**. Thus, with this arrangement, complete removal of the hemispherical member **23***a* from the section **22***a* is permitted along with the locking bail **27***a*.

In most installations, it is preferable to use the spray heads **21** in multiples of two opposed spray heads to provide for more efficient coverage of the interior tank surfaces to be cleaned. Where two spray heads are provided, as shown in Fig. 1, the sections **23** thereof may be removed for visual inspection through one of the fixed head sections **22**, through both horizontal conduit arms **16**, and out through the other fixed spray head section **22**. If desired, a brush or inspection probe device may be passed downwardly through the vertical portion of the T-member **14** by removing the hose **18** at the coupling **17**. Thus, complete internal inspection of the spray heads and associated conduits is possible.

For the purpose of ready and easy visual inspection, it is important that the fixed section **22** of the spherical head be so positioned as not to obstruct a line of vision axially through the conduit **16** and the fixed sections.

Although this invention is not limited to an exact spherical contour for the spray heads, it is preferred that these heads be of curved sections closely approaching the spherical in order to attain the desired direction of liquid discharge from the sections **22** out through the perforations **26** of the sections **23** so as to obtain the desired spray patterns. These spray patterns can be varied by different arrangements of the perforations **26**. The fixed section will always have a wide mouth disposed at an angle to the axis of the conduit and this mouth will be of greater area than the cross-sectional area of the conduit and will overlap that area.

It will thus be apparent that this invention provides an improved spray nozzle construction particularly adapted for use in conjunction with permanently installed, re-

circulating-type tank cleaning systems. These spray heads are supported in such a manner and are formed in such a manner that the same are self-cleaning in normal operation and are readily disassembled for inspection purposes.

Various other advantages will be apparent.

We claim:

1. A spray nozzle comprising a hollow spray head and an adjoining substantially straight length of conduit for supplying fluid to said head, said head including a first, shell-like section fixed to an end of the conduit and terminating in an open mouth disposed in axial alignment with said conduit; the open mouth of said first section defining a considerably larger area than the cross-sectional area of said conduit and lying in a plane acutely angular to the axis of said conduit and overlying the cross-sectional area of said conduit, whereby to permit unobstructed visual inspection of the interior surfaces of said first section and axial access to said length of conduit; a second shell-like section of substantially identical shape and size as said first section disposed in edge-abutting closing relation to the open mouth of said first section; and manually operable, quick-releasable means detachably connecting said sections and operable to maintain the same in edge-abutting relation.

2. A spray nozzle as defined in claim 1, wherein each of said spray head sections are of hemispherical shape.

3. A spray nozzle as defined in claim 1, wherein said second section is perforated throughout substantially its full area.

4. A spray nozzle for liquid storage tanks comprising a straight length of conduit; a substantially spherical, hollow nozzle device disposed at an end of said conduit and composed of two relatively separable and abutting hemispherical sections, one of said sections being fixed to said conduit, the other of said sections being perforated throughout substantially its full area, both of said sections being formed with relatively adjoining, open mouths disposed in a plan acutely angular to the axis of said conduit and the mouths of said sections being of larger diameter than said conduit and overlying the latter, whereby said sections may be separated to provide unobstructed visual access to interior surfaces of said sections and axially of said conduit; and quick-releasable clamping means joining said sections and operable to releasably hold the same in edge-abutting relation.

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