

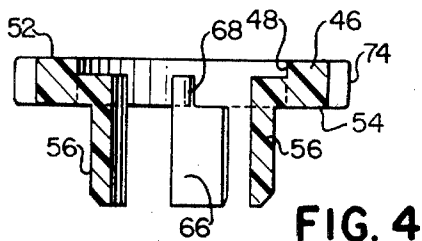
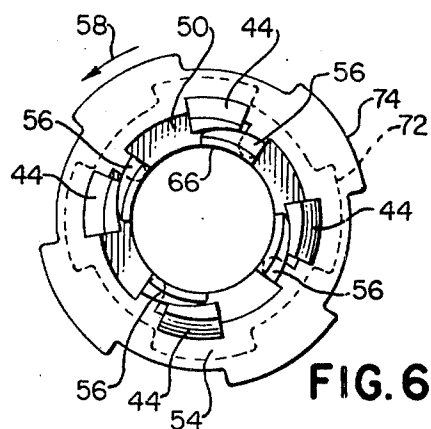
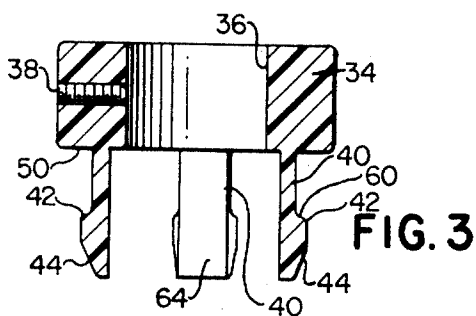
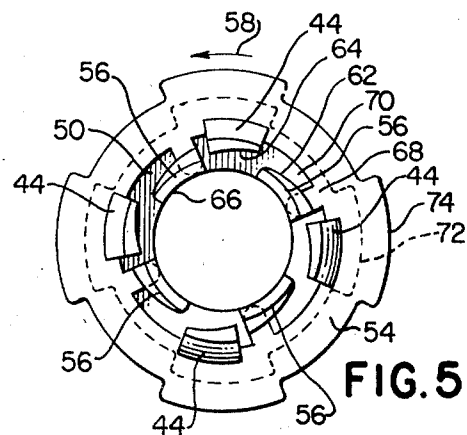
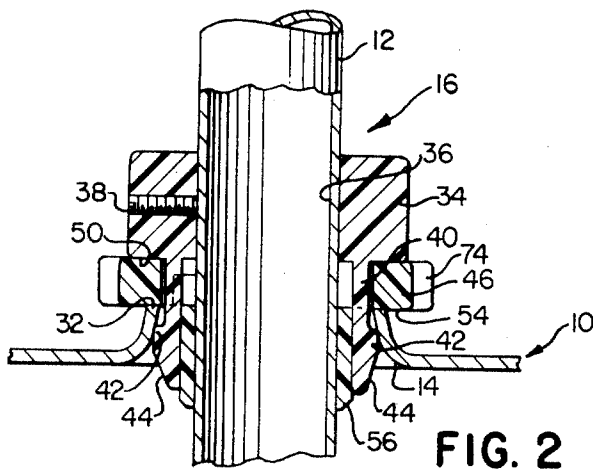
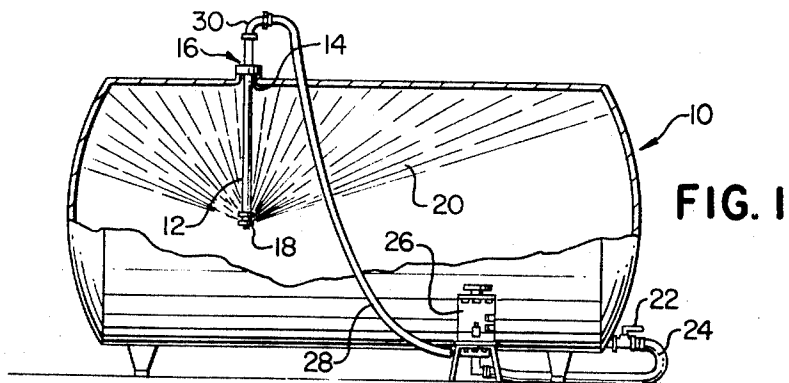
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3,514,129

SANITARY CONNECTOR WITH LOCKING MEANS THEREON

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3,514,129

SANITARY CONNECTOR WITH LOCKING MEANS THEREON

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7 Claims

ABSTRACT OF THE DISCLOSURE

A sanitary connector having resilient fingers depending from one side thereof and adapted to be inserted into a neck-type opening in a tank to be cleaned. The fingers spring outwardly away from the center of the opening after being inserted therethrough to engage said opening on the inside of said tank. A lock member, having camming fingers thereon, is then rotated to position the camming fingers in radial alignment with the resilient fingers to prevent their movement towards the center of the opening, thereby locking the connector on the tank.

CROSS-REFERENCES AND RELATED APPLICATIONS

This application is a continuation-in-part of copending United States patent application Ser. No. 504,482, filed on Oct. 24, 1965, by the applicant of the instant application, now U.S. Pat. No. 3,405,958.

BACKGROUND OF THE INVENTION

This invention relates to a connector for detachably securing a cylindrical element to another object, like a tank, and is particularly concerned with a sanitary connector which is especially adaptable for detachably securing a cleansing spray stick to a tank, like a milk storage tank, which requires thorough and effective cleaning.

In order to clean a tank after use, the spray stick, which is hollow, is inserted into the interior of the tank, and cleaning solution is forced through the stick and a nozzle on the end thereof, which is inside the tank. The nozzle is provided with a plurality of holes which are arranged therein to direct a spray of cleansing solution therefrom to the interior of the tank. The cleansing solution is then collected at the bottom of the tank and is directed to a pump which recirculates it to the spray nozzle, from which it is again sprayed. The spray stick is supported in an aperture in the top of the tank by a sanitary connector during the cleaning operation.

One of the basic problems in attaching a spray stick to the tank to be cleaned is that the stick must be secured to the tank from the outside thereof because the opening in the tank is generally only large enough to permit the passage of the spray stick and the nozzle therethrough. This prevents the use of connectors which utilize portions positioned on opposed sides of the aperture of the tank to secure the connector thereto. The connector of the instant application is especially adapted to be secured to the tank solely from the outside thereof and to be locked thereon.

Another problem of the prior-art sanitary connectors is that they do not adequately seal the opening in the tank through which the spray stick is inserted, and, as a result, much of the cleansing solution used in cleaning the tank is lost, resulting in improper or ineffective cleaning of the tank. Another problem with the prior-art connectors is that they do not adequately support the spray stick while permitting the area adjacent to the hole in the tank to be

effectively cleaned. The connector of the instant application is an improvement upon the connectors of the prior art and the connector disclosed in said copending application, in that a lock member is provided to positively lock the connector to the tank being cleaned.

SUMMARY OF THE INVENTION

The sanitary connector of the instant application includes a cylindrical member having an aperture therein through which a cleansing pipe is inserted. The cylindrical member has resilient finger means depending from one side thereof, which finger means are concentrically positioned relative to said aperture. The finger means have nose portions on the outer perimeter thereof which are adapted to engage a neck portion associated with an opening in a tank to be cleaned when the connector is positioned thereon. The connector also includes a lock member which is rotatably mounted on said finger means and which lock member also has cam means depending from one side thereof, with said cam means extending in the same axial direction as said finger means. When the lock member is in the unlock position, the cam means are out of radial alignment with the finger means, permitting the finger means to be inserted on and removed from the tank on which it is mounted. When the lock member is rotated to the lock position, the cam means thereof are in radial alignment with the finger means, thereby preventing their movement towards the longitudinal axis of said cleansing pipe to thereby secure the connector to the tank.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view, partly in cross-section, showing a tank being cleaned by a spray stick which is inserted into the tank and locked thereon by the sanitary connector of this invention.

FIG. 2 is an enlarged cross-sectional view of the connector of this invention shown in the locked position on a tank for supporting a spray stick.

FIG. 3 is a view similar to FIG. 2 but showing only the cylindrical member of the connector with the finger means depending therefrom.

FIG. 4 is a view similar to FIG. 2 but showing only the lock member of the connector with the cam means depending therefrom.

FIG. 5 is a bottom view of the connector shown in FIG. 2, but with the lock member in the unlocked position.

FIG. 6 is a view similar to FIG. 5, but the lock member is shown in the locked position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a typical storage tank 10 and the equipment used in cleaning it. The equipment includes a spray stick 12, which is inserted through a neck-type opening 14 in the top of the tank 10. The spray stick 12 is detachably supported in the opening 14 by the sanitary connector 16.

The lower end of the spray stick 12 is provided with a spray nozzle 18, which is perforated to direct a spray 20 of cleansing fluid to the interior of the tank 10 as shown. The spray nozzle 18 may be of the type shown in the United States Patent to Donald R. Holdren, No. 3,104,672, which issued on Sept. 24, 1963.

The cleansing fluid collects in the bottom of the tank 10 and passes out through a drain valve 22 and a conduit 24 to a pump 26. The cleansing fluid, under pressure from the pump 26, is then recirculated by the conduit 28 to the top of the spray stick 12, where a known connector 30 is used to connect the conduit 28 to the spray stick 12. The cleansing fluid is recirculated in the manner described until the interior of the tank 10 is cleaned.

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FIG. 2 shows an enlarged cross-sectional view of the sanitary connector 16 of this invention in position on the tank 10. The tank 10 is provided with the neck-type opening 14, which terminates in an annular rim 32. The connector 16 is shown in the locked position in FIG. 2.

The sanitary connector 16 (FIG. 2) includes a cylindrical member 34 (FIGS. 2 and 3), which has therein an aperture 36, through which the spray stick 12 may pass; a fastener 38 is used to secure the stick 12 to the connector 16, so that the lower end thereof may be adjustably positioned at desired levels in the tank 10. The cylindrical member 34 has resilient finger means depending from one side thereof, which comprises a plurality of resilient finger members 40, which are equally and circumferentially spaced thereon in concentric relation with the aperture 36. The finger members 40 each have a nose portion 42, which is adapted to engage the neck-type opening 14 on the interior of the tank when the connector is positioned thereon. These finger members have chamfered sides 44, which facilitate the insertion of the connector 16 into the opening of the tank 10.

The sanitary connector 16 also includes a lock member 46, which is rotatably mounted on the finger members 40, as is best shown in FIG. 2. The lock member 46 has an opening 48 (FIG. 4), whose diameter is smaller than the diameter of an imaginary circle which has the nose portions 42 lying on the circumference thereof, so that the lock member 46 will be retained on the cylindrical member 34 when positioned between the annular surface 50 thereof and the nose portions 42. In positioning the lock member 46 on the cylindrical member 34, the finger members 40 are simultaneously pushed towards the longitudinal axis of the cylindrical member 34, and the lock member 46 is pushed in an axial direction until the nose portions 42 spring outwardly to retain the lock member thereon. The annular surface 50 of the cylindrical member 34 is made flat to mate with a flat annular surface 52 on the lock member 46 when the two surfaces engage each other, as shown in FIG. 2. The lock member 46 also has a second flat annular surface 54, which is in sealing engagement with the annular rim 32 when the connector 16 is positioned on the tank 10. The thickness of the lock member 46 (as measured between its surfaces 52 and 54) and the distance of the nose portions 42 away from the annular surface 50 on the cylindrical member 34 are selected so that the nose portions 42 will engage the neck portion of the neck-type opening 14 when the connector 16 is positioned thereon. As best seen in FIG. 4, the lock member 46 has a plurality of cam members 56 depending from the lower side thereof, and these cam members cooperate with the finger members 40 to lock the connector 16 on the tank 10.

As previously mentioned, the lock member 46 is rotated between lock and unlock positions on the finger member 40. When the lock member 46 is in the unlock position, the cam members 56 are out of radial alignment with the finger members 40, as shown in FIG. 5. Being out of radial alignment with the cam members 56 enables the finger members 40 to be pushed towards the longitudinal axis of the spray stick 12 to permit the nose portions 42 to pass through the annular rim 32 (FIG. 2) of the neck-type opening 14. When the connector 16 is positioned on the tank 10, the lock member 46 is rotated in the direction of the arrow 58 to the lock position, shown in FIG. 6. In the lock position, at least a portion of each cam member 56 is positioned in radial alignment with its associated finger member 40. When the cam members 56 are positioned in radial alignment with the finger members 40, the nose portions 42 thereof cannot be moved towards the longitudinal axis of the spray stick 12 (best seen in FIG. 2), and, consequently, the connector 16 is secured to the tank 10 and cannot be removed therefrom until the lock member 46 is rotated to the unlock position.

To detach the connector 16 from the tank 10, the lock

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member 46 is simply rotated in a direction opposite to the arrow 58 shown in FIG. 6 to rotate the cam member 56 out of radial alignment with the finger members 40, as shown in FIG. 5. When the cam members 56 are out of said radial alignment, the connector 16 is simply pulled upwardly (as viewed in FIG. 2) to withdraw it from the tank 10. In pulling upwardly, the nose portions 42 are cammed towards the longitudinal axis of the spray stick 12 by chamfers 60 adjacent to said nose portions to permit the nose portions to pass through the neck-type opening 14 in the tank 10.

As best seen in FIG. 5, each of the cam members 56 has an arcuately-shaped cam surface 62, which cooperates with a complementary cam surface 64 on its associated finger member 40. In the embodiment shown, there are four finger members 40 and four associated cam members 56. The innermost surface 66 (FIGS. 4, 5, and 6) of each cam member 56 is arcuately shaped, so as to conform to the outer diameter of the spray stick 12. Each cam member 56 is secured to the lock member 46 by an extension 68 (FIGS. 4 and 5), which provides sufficient clearance in the area 70 (FIG. 5) to permit that cam member to be moved in radial alignment with its associated finger member 40.

The cylindrical member 34 and the lock member 46 are each provided with projections 72 and 74 respectively (best shown in FIGS. 5 and 6) on the periphery thereof to facilitate the rotation thereof. These members 34 and 46 are formed of a plastic, like nylon, which minimizes scratch and scoring on the related spray stick 12 and tank 10. As is apparent from FIG. 2, the nose portions 42 of the connector 16 are the sole portions of the connector 16 which engage the interior of the tank 10 generally along a line contact when positioned thereon. The neck-type opening 14 of the tank 10 may be formed by any conventional forming tool or by the forming tool disclosed in said copending application; however, the resulting annular rim 32 of said opening should lie in a plane which is perpendicular to a vertical line, so that the spray stick 12 will be vertically mounted on said tank 10 when the connector 16 is secured thereto.

What is claimed is:

1. A sanitary connector for detachably securing a cleansing pipe to a tank having a neck portion terminating in an opening having an annular rim therearound, said connector comprising:

a cylindrical member having an aperture therein through which said pipe is inserted and having resilient finger means depending from one side thereof and concentrically positioned relative to said aperture;

said finger means having nose portions axially spaced from said one side and being located on the outer periphery of said finger means; and

a lock member rotatably mounted on said finger means for movement between lock and unlock positions thereon, and having circumferentially spaced cam means depending from one side thereof, with said cam means extending in the same axial direction as said finger means and being concentrically positioned relative thereto;

said cam means being out of radial alignment with said finger means when said lock member is in said unlock position to enable said nose portions to be moved towards said longitudinal axis, and being in radial alignment with said finger means when said lock member is in said lock position to block the movement of said nose portions towards said axis.

2. The connector as claimed in claim 1 in which said finger means and said cam means have complementary camming surfaces thereon which engage one another when said lock member is in said lock position.

3. The connector as claimed in claim 2 in which said lock member is mounted on said finger means between said nose portions and said one side of said cylindrical

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member, and in which said lock member has first and second sides which are perpendicular to said longitudinal axis;

said first side being in sealing engagement with said one side of said cylindrical member, and said second side being in sealing engagement with said annular rim when said connector is secured to said tank; said nose portions being spaced from said second side when secured to said tank so as to enable said nose portions to engage said neck portion on the inside of said tank.

4. The connector as claimed in claim 2 in which said finger means comprises a plurality of finger members with each said finger member having one of said nose portions thereon, said finger members depending from said cylindrical member in equally-spaced relationship.

5. The connector as claimed in claim 4 in which said cam means are in equally-spaced relationship with one another and are equal in number to the number of finger members.

6. The connector as claimed in claim 5 in which each said nose portion lies in a general plane which is perpendicular to said longitudinal axis and which nose por-

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tions form the sole contact of the connector with said neck portion on the inside of said tank when the connector is secured thereto.

7. The connector as claimed in claim 5 in which each said cam means has an arcuately-shaped side opposite to its camming surface to engage said pipe.

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U.S. Cl. X.R.

285—210; 287—20