

# MILK and FOOD SANITATION

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## Some New Ideas for Cleaning Dairy Plant Equipment\*

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UNDOUBTEDLY sanitarians today are more aware than ever of the effect of the sanitary condition of equipment upon the quality of dairy products. Hence, the prime importance of the cleaning operation in a dairy plant is now keenly recognized and therefore receiving the thought and attention it has so long warranted and needed.

A careful study of the cleaning operation by Sealtest showed that while considerable progress had been made in the development of satisfactory cleaning compounds, there was an urgent need for improvement in available cleaning equipment and for the development of altogether new cleaning equipment. It was readily discernable that satisfactory cleaning using the primitive pail, nondescript brush, and clumsy, heavy, and inefficient free running hose which delivered water of an indeterminate temperature, was obtained only as a result of painstaking, arduous, and generally distasteful effort. Some new ideas for cleaning dairy plant equipment were conceived and a number of new devices were developed which were designed to make possible really satisfactory cleaning, to remove the distaste from the cleaning operation, and to improve its efficiency and economy. These devices have been designated as New Cleaning Aids.

### TEMPERED WATER WITH CONTROLLED TEMPERATURE

During the course of the study the need for rinsing water of the correct temperature became evident. Mixing

steam and cold water or hot and cold water at hose stations seldom gives an issuing water with a satisfactory temperature for rinsing. Hence it was decided to deliver automatically to the hoses, water with a temperature of 115° F. since water with such a temperature was warm enough to move butterfat and not high enough in temperature to "fry on" non-fat solids. Water with such a temperature was satisfactorily delivered to the hose stations by resort to a reservoir type of hot water generator with an indirect heating element equipped with a thermostatic control and one or more specialized "tempering" valves.

Where water with a controlled temperature of 115° F. is delivered to hose stations it has been unnecessary, except in rare instances, to also deliver cold water to them. If "hot" water is needed at one or more locations in the plant it can be delivered there by cutting a supply line into the main hot water line between the hot water generator and the tempering valve.

Frequently the water pressure at hose stations is greater than necessary and desirable. Where such is the case the pressure can be maintained at the optimum point by means of a pressure regulating valve. Because the pressure often varies from hose station to hose station it is desirable to have a pressure regulating valve at each hose station.

### THE SPECIALIZED HOSE STATION UNIT

The Strahman-Perry Hose Station Unit is comprised of a cabinet with a removable stainless steel cover which can be affixed to a wall. The cabinet

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is vermin-proof and can be so attached to a wall that nothing can get between the back of the cabinet and the wall. The cabinet houses a piston type valve, a strainer, a pressure regulator, a pressure gauge and fittings. The dial of the pressure gauge can be seen through a window in the cover of the cabinet. The water supply pipe enters the cabinet either through its bottom or through its back as may be desired. The cabinet is equipped with one or two specially designed hose racks depending on whether or not it is desirable to have one or two hoses at the hose station.

The Strahman-Perry Hose Station Unit is compact and attractive in appearance. The cover is so fastened that it can not be removed except by someone who has a proper wrench for unscrewing the small nuts which hold it in place.

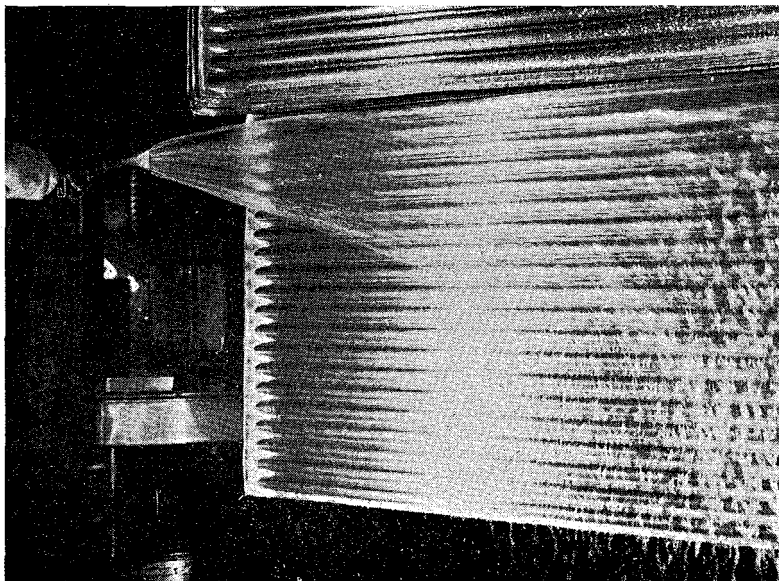
If desired, the unit can be obtained with a flush front and with the body of the cabinet made to be sunk into the

wall. This second type of cabinet is, of course, even better-appearing than the first type described.

#### THE SHUT-OFF VALVE

The Shut-Off Valve is attached to the end of the rinse hose and is intended to obviate the running of water except when it is desired to rinse or fill receptacles. This device gives the one who uses the hose complete control of the flow of water from it.

This valve has been specially designed. Where desired it can be locked in the open position. It is sturdily made and covered with a heavy coating of Neoprene which is very strongly bonded to the metal. Preferably, tempered water with a temperature of 115° F. is used. The standard nozzle, which is part of the shut-off valve assembly, delivers a blade of water. For normal rinsing, when this nozzle is used, a pressure of 15# per square inch is adequate. However, higher



The shut-off valve equipped with the standard nozzle delivering a "blade" of water

pressures may be used if desirable. A special round nozzle is also supplied and with this nozzle it is possible to have a small or large stream of water, either round or feathered. Whatever pressure is necessary may be used. The round nozzle housing is so designed that a variety of nozzle tips can be used with it. This makes it possible to obtain virtually any type of stream desired. The blade of water delivered by the standard nozzle is ideal for rinsing either smooth or uneven surfaces. The blade of water has a very large coverage which permits rapid rinsing. When the standard nozzle is used the operator can stand very close to the surface he is rinsing without being splashed. The blade of water also rinses down when the nozzle is held in either the down or the side position so that the soil is carried off the surface being rinsed and does not flow back onto it as is often the case when a round stream of water is used.

The special round nozzle is useful when it is necessary to throw a rinsing stream relatively long distances in order to rinse under platforms and bottle washers or the insides of tubes in internal tube heaters or coolers.

#### LIGHT WEIGHT HOSE

Normally, a special light  $\frac{1}{2}$ " Neoprene coated hose is used with a shut-off valve. When this special hose is used a Whip-End about two feet long is attached to the Shut-Off Valve. The hose used in the Whip-End is a little heavier than the special  $\frac{1}{2}$ " hose so that it will flex in a relatively large arc and not crack and leak. The special light weight hose weighs approximately one-third as much as standard creamery hose. It is flexible, delivers ample water, is easily handled, and costs about half as much as creamery hose. Nevertheless, the special light weight hose has been found to have at least as long a life as creamery hose when the latter is utilized in the usual manner.

#### THE SANITARY FITTINGS CLEANER

The Sanitary Fittings Cleaner is designed for cleaning sanitary tees, ells, 2-C bends, and various small parts. It is comprised of a double compartment "sink" with two drain boards.

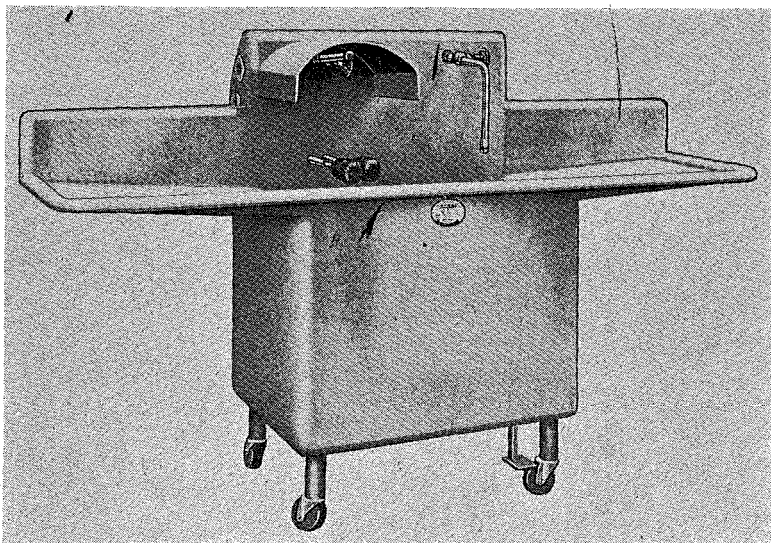
Over one compartment are two special scrubbing brushes, both moving upward and toward each other, one moving clockwise and the other counterclockwise. Above the two brushes is a perforated pipe from which cleaning solution is dropped onto the brushes along the line where their bristles mesh. A small motor is used to rotate the brushes and the centrifugal pump which delivers the cleaning solution. The cleaning solution is contained in the compartment under the brushes and is maintained at a temperature of 115° F. by means of thermostatically controlled electric heating element.

Over the rinse compartment, and attached to the end of a pipe is a special rinsing nozzle. This nozzle is supplied with tempered water having a temperature of 115° F. The flow of the water is controlled by means of a foot pedal which operates a quick action valve.

When a sanitary fitting is cleaned it is preferably brought up on a sanitary fittings buggy and deposited on the drain board at the left. It is picked up from the drain board on the left and scrubbed, both inside and outside, at the same time with the two brushes. After scrubbing the fitting is held under the nozzle and rinsed with a spray of water. After rinsing the sanitary fitting is placed upon the drain board on the right from which it is later removed to the Sanitary Fittings Buggy.

Rinse water is used only once so that the rinse compartment has an open drain which leads to the sewer.

When this unit is used it is unnecessary, except in rare instances, to soak



The Sanitary Fittings Cleaner

any of the parts which are cleaned with it.

It has been found desirable to use a specially designed refillable brush with the sanitary fittings cleaner. Satisfactory cleaning is possible with a short shank bottle brush but somewhat better cleaning is possible with the special brush.

Because the bottle brush has a wooden shaft which when the brush is used becomes soaked with water, the shaft breaks after it has been used for a short time either at the mandrel or among the bristles. Generally, the shaft breaks when the unit is in use which militates against satisfactory cleaning. On the other hand the shaft of the special brush is of metal and will not break even under heavy usage. While the initial cost of the special brush is, of course, much greater than that of the bottle brush, nevertheless the former is so long-lived that it is far more economical to use. Two of these special brushes presently in use

were installed about ten months ago and have not yet been refilled. Had these special brushes not been installed and bottle brushes been used instead, it is probable that not less than 70 brushes would have been used by this time.

#### THE SANITARY PIPE CLEANER

The Sanitary Pipe Cleaner is comprised of two parts. The one part has the brushes for scrubbing and the other part the nozzles for rinsing. Cleaning solution is contained in a tank at the rear of the unit where it is maintained at a constant temperature of 115° F. by means of a thermostatically controlled electric heater. Rinsing is done with tempered water having a temperature of 115° F.

The scrubbing assembly consists of a brush which cleans the interior of the sanitary pipe and an assembly of three brushes that scrub the outside of the sanitary pipe. The "internal" brush is attached to the end of a shaft

housed in a tube through which cleaning solution is fed to the brush. The shaft to which the "internal" brush is affixed is rotated by means of a motor which also drives the cleaning solution pump. Both the "external" brushes and the "internal" brushes scrub with the tips of their bristles. The external brush assembly is driven by a separate motor and can be adjusted to clean sanitary pipe of various sizes.

Excess cleaning solution from the brushes and sanitary pipe drops into a trough that carries it back to the cleaning solution tank.

The rinsing assembly consists of a pipe with a rinsing end through which water is sprayed onto the inside of the sanitary pipe and an "external" rinsing ring from which sprays of water are delivered which rinse the outside of the sanitary pipe. The flow of the rinse water is controlled by means of a limit switch and a solenoid valve so that the rinse water flows only when sanitary pipe is being passed between the rinsing ring and the rinsing nozzle. The used rinse water drops into a trough that carries it to the rear of the unit and through a drain pipe to the sewer.

The entire working end of the sanitary pipe cleaner is covered. There are two openings in the cover, one in front of the brushes and the other in front of the rinsing assembly.

A special brush has been designed for cleaning the inside of sanitary pipe. This brush is comprised of a metal shaft with bundles of bristles thrust through it. This brush is so designed that the cleaning solution can readily mix with the bristles while the sanitary pipe is being scrubbed. Also the design of this brush is such that the diameter of the brush is somewhat greater than the inside of the diameter of the sanitary pipe so that the brush has a relatively long life and will scrub satisfactorily until the bristles are well worn.

Where this unit is used it is unneces-

sary, except in rare instances, to soak the sanitary pipe.

When the Sanitary Pipe Cleaner is in use sanitary pipe is preferably brought up to the unit on a Sanitary Pipe Truck, scrubbed, rinsed, and replaced on the sanitary truck.

#### THE SEPARATOR DISC CLEANER

The Separator Disc Cleaner is constructed somewhat like the Sanitary Fittings Cleaner. It will, of course, clean either separator or clarifier discs.

When this unit is used, cleaning is done from right to left instead of from left to right as in the case of the Sanitary Fittings Cleaner. Brushes with relatively short bristles are used and are set close enough together so they will spin the discs. Cleaning solution is delivered against one of the two brushes and carried by this brush onto the other brush and while a separator disc is being cleaned onto its surface.

The cleaning solution is maintained at the proper temperature by means of a thermostatically controlled electric element.

The rinsing compartment has four rinsing nozzles, one facing down and the other three facing downward and toward the center of the compartment. Tempered water is used for rinsing and its flow is controlled by means of a foot pedal which operates a quick action valve.

When separator or clarifier discs are cleaned they are placed upon the drain board on the right and removed one at a time by the operator's right hand. The edge of the disc is thrust between the two brushes which scrub it as it whirls. After a disc has been completely scrubbed it is removed by the operator's left hand, is run through the rinsing sprays and placed upon the drain board on the left. Each disc is rinsed with a fresh charge of water. The water after it has once been used runs through the open drain and to the sewer.

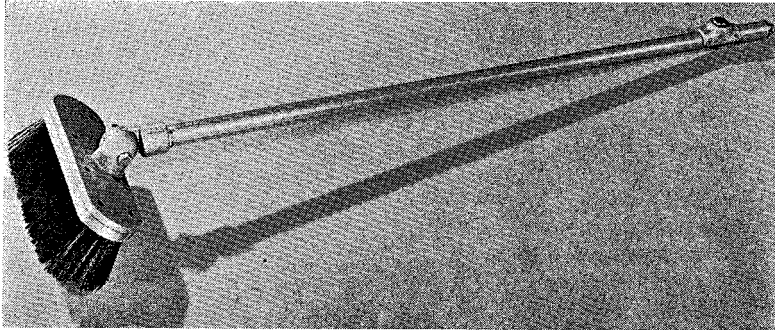
### THE SOLUTION FED BRUSH

The Solution Fed Brush is made in three forms. The different forms are so designed that it is possible by using the three of them to scrub virtually all standard equipment found in milk or ice cream plants. Of course when it is desired to scrub in special openings such as thermometer openings, vat outlets, etc., special size brushes must be used. When these latter are used, cleaning solution can be supplied to the surfaces being scrubbed or onto the brush by means of a small Shut-Off Valve.

brush is designed for cleaning surfaces where hard scrubbing is necessary.

The third Solution Fed Brush is a hand brush. It is designed particularly for scrubbing such things as the inside of heating vats and the surfaces of heater plates.

All of these brushes have cleaning solution supplied to them by means of light hose from a Cleaning Solution Tank. The cleaning solution is maintained at a temperature of 115° F. by means of a thermostatically controlled electric heater. The flow of the cleaning solution is controlled by means of a small button valve in the handle of



The Solution Fed Brush

There is a two-handed brush with a relatively large brush-head designed for scrubbing the inside of product storage tanks. This brush is equipped with an adjustable feature so that the brush-head may be set at any desired angle. It is equipped with relatively long bristles of a relatively small diameter. The stiffness of the bristles is sufficient to effect proper cleaning of cold product surfaces.

The second brush is like the first one described except that it has a smaller head and shorter bristles which are more openly spaced than in the case of the brush first mentioned. This

brush. Cleaning solution flows through a tube in the handle of the long handled brush to the brush-heads and thence out onto the surface through orifices on both sides of the brushheads. In the case of the hand brush the cleaning solution goes directly into the brushhead through a button valve located inside of the brush-head. The flow of cleaning solution in this brush is controlled by means of a lever on the side of the brushhead which opens or closes the valve inside of the brushhead.

At the present moment a power driven solution fed brush is being

developed. This brush is being developed in two forms. In one form it is used for cleaning the inside of heater and cooler tubes. In the other form it is used for scrubbing flat or irregular surfaces. The brush is rotated by means of a so-called air motor which is in reality an air turbine. In the case of the brush used for cleaning tubes the cleaning solution is fed through the air line. Where this brush is used the brush and air motor assembly, which is attached to an air line, are both run through the tubes being cleaned.

The brush assembly for cleaning flat or irregular surfaces looks something like a pistol. Air comes into the assembly through the handle and behind the trigger. The cleaning solution is fed into the assembly in front of the trigger and goes through the shaft to which the brush is attached. This brush is also operated by an air motor located in the assembly which at full speed develops 0.9 of a horsepower. Both of these brushes are designed for hard scrubbing. They revolve at high speed and are light and easy to handle.

#### THE CLEANING SOLUTION TANK

The Cleaning Solution Tank normally is comprised of a cylindrical tank equipped with a sight glass and thermostatically controlled electric heaters on one end. The tank is filled with cleaning solution and the cleaning solution is fed to the brushes by means of air pressure. The air pressure normally runs between 5 and 10 lbs. per sq. in. This unit can be either stationary or portable as desired. It may be supplied with air from an air line or from an individual air compressor unit.

Where the power driven *tubular* brush is used a special type of cleaning solution tank must be employed which has a needle valve control. Where this tank is used the pressure utilized in the tank is much greater than in the case of the first type of tank described.

#### THE SPRAY STERILIZING UNIT

The Spray Sterilizing Unit advocated was not designed by the speaker but has been modified in certain details in accordance with his suggestions. It is comprised of a specialized gun for delivering the "chlorine" solution in a satisfactory form, the necessary hose, and a "chlorine" solution tank. Both chlorine solution and air are delivered to the gun where they are mixed. The gun can be set to deliver a spray of the desired character and will project it far enough so that the surfaces to be sterilized can be completely covered. The "Spray Gun" is a very important item where sterilizing is done by means of a chemical agent. The gun described is the only one presently known which is entirely satisfactory.

#### ECONOMIES

Although it has not yet been possible to accumulate a large quantity of data about the New Cleaning Aids, nevertheless some data of a highly indicative nature have been accumulated.

In one plant where Shut-Off Valves were installed it was found that after they had been installed only  $\frac{1}{3}$  as much water as was formerly used in cleaning was consumed.

In another plant where Shut-Off Valves were installed records covering eleven months operation showed a reduction in heating oil consumed of approximately 30 percent.

In a milk plant where a Solution Fed Brush was put into use it was found that whereas before the brush was put into use, approximately 20 lbs. of cleaning compound were used for cleaning product storage tanks, approximately  $1\frac{1}{2}$  lbs. were used after the brush had been put into use.

The Sanitary Pipe Cleaner, the Sanitary Fittings Cleaner and the Separator Disc Cleaner all not only effect better cleaning but also reduce the wear and

tear on the equipment, reduce fatigue of the workmen, and make possible faster cleaning.

#### AUXILIARY EQUIPMENT

Certain auxiliary pieces of equipment such as hot water generators, tempering valves, specialized brushes, and pressure reducing valves are needed if a truly satisfactory performance is to be done by the New Cleaning Aids. These auxiliary pieces of equipment, except for the specialized brushes, are

of standard make and can be obtained from the usual sources. The auxiliary pieces of equipment will be found beneficial from an economic and operational standpoint, even though New Cleaning Aids are not installed.

#### CONCLUSION

New Cleaning Aids are presently being used in a number of plants and the principles included in their design have been proven to be sound and desirable in these plants.