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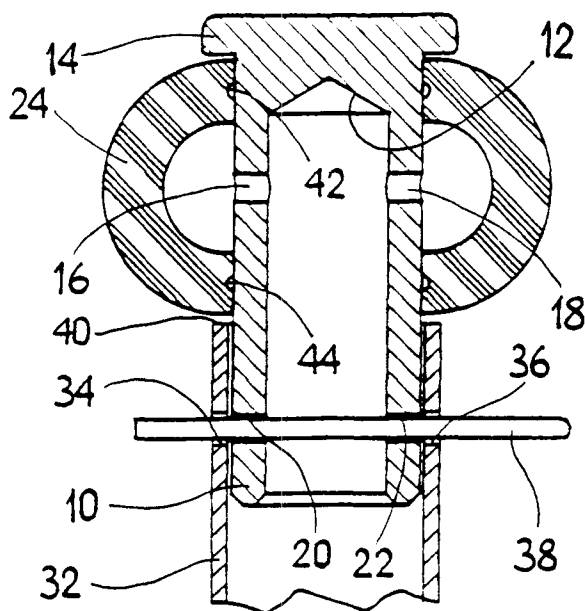
**EUROPEAN PATENT APPLICATION**

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**I-12010 Peveragno (CN) (IT)****(54) Cleaning sprinkler for food processing machines**

(57) A cylindrical sleeve (10) made of steel is externally smooth, is closed at one end (12) and has one or more radial bores. A roundish hollow shell (24) is axially bored and is rotatably supported on the sleeve. The

shell has an arched slit (30) along a plane which is parallel and askew to its axis. The sleeve can be attached to a delivery pipe (32) of a detergent liquid by means of a nail (38) passing through aligned radial bores in the ends of the sleeve and the pipe.

**Fig. 3**

## Description

This invention is concerned with a cleaning sprinkler for food processing machines, such as cheese processing machines, machines for processing fruit, vegetables, meat, etc.

Automatic cleaning techniques, known as "cleaning-in-place", or CIP, have become widespread in machines and equipment for food processing. In such cleaning techniques, the machine is internally sprinkled with detergent or sterilizing solutions, hot water, etc., by means of cleaning sprinklers which are placed at suitable places in the machine and are supplied by a hydraulic circuit. As known, such cleaning procedures substantially avoid the toil and discomfort of the previously followed manual cleaning.

Conventional cleaning sprinklers have typically comprised ball-shaped riddled roses, which would spray the cleaning liquid around. However, the outflow holes of those roses become quickly choked with calcareous incrustations and have to be frequently disassembled and cleaned.

More recently, sprinkling devices have been proposed which comprise booms carried by swiveling joints, and which have skew nozzles at their moving end, whereby the reaction of the jet sprayed by the nozzle will rotate the boom, thus changing continuously the direction of the jet and ensuring that the water is sprayed in all directions.

On the other hand, such swiveling-boom devices are quite bulky and expensive, and they are also liable to incrustations, due to the small size of their outflow nozzles, which have the task of adjusting the flow of the sprayed water. Furthermore, they have to be sized depending on the required flow of the cleaning liquid; therefore, both the manufacturers and the users have to manufacture or stock a range of sizes, if they are to face every situation.

Another disadvantage of the known cleaning sprinklers is that they are difficult to clean and, more generally, that they are inadequately protected from contamination, since they have fissures and pockets, particularly in the swiveling joints. Their constructional complexity makes it impossible for them to comply with authoritative international norms in the field of food processing machines, such as, e.g., the USDA norms.

This invention therefore has the object of providing a cleaning sprinkler with rotating jet, or turbine, which is substantially immune from obstruction due to incrustation.

Another object is to provide such cleaning sprinkler so that a single model can be easily adjusted to the desired flow.

Another object is to provide such cleaning sprinkler so that it complies with the severest international norms concerning cleanliness of food processing machines, such as, more particularly, the USDA norms.

Another object is to provide such cleaning sprinkler

so that it can be manufactured cheaply.

The above and other objects and advantages, such as will appear from the following disclosure, are attained by the invention with a turbine-like cleaning sprinkler for food processing machines, characterized in that it comprises an externally smooth cylindrical sleeve which is closed at one end and has at least one radial bore; a roundish hollow shell which is axially bored and is rotatably supported on the sleeve, and which has a slit along a plane which is parallel and askew to its axis; and means for attaching the sleeve to a delivery pipe for a detergent liquid.

A few preferred embodiments of the invention will now be described by way of non-limiting example, with reference to the attached drawings, wherein:

Fig. 1 is a lateral elevation view of a turbine cleaning sprinkler, installed on a delivery pipe, according to a preferred embodiment of the invention;

Fig. 2 is an end view in the direction of arrow II on Fig. 1;

Fig. 3 is a view in axial cross-section, made on line III on Fig. 2; and

Fig. 4 is an end view in the direction of arrow IV on Fig. 1.

With reference to the Figures, a sprinkler according to the preferred embodiment of the invention comprises a stainless-steel, cylindrical sleeve 10, which is closed at one end 12 and is provided with a peripheral rib 14. Sleeve 10 is preferably made by turning a solid cylinder, although it could be manufactured by other techniques, such as sintered metal. The lateral wall of the sleeve has two pairs of aligned bores 16, 18 and 20, 22.

A shell 24, having an axis of rotational symmetry, and having a substantially elliptical axial cross-section, is axially bored in 26, 28, so that it couples rotationally on sleeve 10, and therefore embraces a ring-shaped internal cavity between its own wall and the sleeve, in alignment with the pair of bores 16, 18 in the sleeve. Shell 24 (see Figs. 2 and 3) also has a slit 30 that is parallel, though askew, to its axis.

Shell 24 is preferably made of a high-wear synthetic material such as high-density, polyethylene or other similar polymer.

The unit comprising sleeve 10 and shell 24 is inserted in the end of a pipe 32 for delivery of water or of a detergent solution, which has been installed at a desired suitable location in the machine (not shown), and which also has a pair of aligned transverse bores 34, 36, which can be aligned with bores 20, 22 of sleeve 10. An R-shaped spring clip 38 is then inserted through said bores to prevent uncoupling of the sleeve from the delivery pipe 32.

Bores 16, 18 of the sleeve and bores 34, 36 in the

delivery pipe are located so that the edge 40 of pipe 32 is close to shell 24, to build an abutment which, in co-operation with rib 14 on the sleeve, keeps shell 24 in a well-defined axial position.

When pressured water or a detergent solution is supplied to pipe 32, water issues from bores 16, 18 to the ring-shaped cavity embraced by shell 24, and then emerges to the outside through slit 30 as a laminar jet which, due to the slit, extends over an arc of 180°. Furthermore, the unsymmetrical position of slit causes the shell to spin around its axis by the effect of reaction, and the laminar jet consequently sweeps the entire surrounding space.

In order to facilitate the rotation of shell 24, on the one hand bores 26, 28 in the shell are sized to obtain a loose coupling with the sleeve, and, on the other hand, two grooves 42, 44 are made in the coupling surfaces of the shell, so that a dynamical lift effect is created.

Furthermore, according to the invention, bores 16, 18 are sized to act as chokes on the transiting liquid to regulate its flow. The slit may therefore have a relatively large width, say 2.5 mm. Such a wide section prevents incrustations that would choke the slit.

In order to be able to have different flows, only bores 16, 18 are sized to desired sections, while the shell and its associated slit are left unchanged. However, at least insofar as replacement parts are concerned, it is preferable to design a single version of sleeve 10, having minimal-size bores 16, 18, the bores being broadened to the desired section at the time of installation, by means of a simple reaming step, easy to carry out on site. In this way the stock is substantially reduced, both for the manufacturer or reseller and for the final user.

The turbine constructed as described above comprises only two easily machined parts (except for spring clip 38), and is therefore quite cheap. Moreover, the turbine can comply with all the sanitary rules set by even the more severe standards, such as the USDA standards, on the one hand, because it can be fully disassembled by pulling out clip 38, and, on the other hand, because it has no proliferation nests, due to its smooth and rounded surfaces and to its freedom from threads, gaskets, undercuts and the like.

## Claims

1. Turbine-like cleaning sprinkler for food processing machines, characterized in that it comprises an externally smooth cylindrical sleeve, which is closed at one end and has at least one radial bore; a roundish hollow shell which is axially bored and is rotatably supported on the sleeve, and which has a slit along a plane which is parallel and askew to its axis; and means for attaching the sleeve to a delivery pipe of a detergent liquid.

2. The cleaning sprinkler of claim 1, characterized in

that said slit has a width of 2 to 3 mm.

3. The cleaning sprinkler of claim 1 or 2, characterized in that the sleeve has an integral peripheral rib at the closed end of the sleeve, acting as an axial retaining abutment for the shell.
4. The cleaning sprinkler of any of claims 1 to 3, characterized in that said sleeve has two aligned radial bores.
5. The cleaning sprinkler of any of claims 1 to 4, characterized in that the shell has peripheral grooves in the surfaces sliding on the sleeve.
6. The cleaning sprinkler of any of claims 1 to 5, characterized in that said attachment means comprise a clip crossing through two aligned radial holes in the sleeve near its open end and alignable with corresponding holes made in the end of said pipe for delivering cleaning liquid.
7. The cleaning sprinkler of any of claims 1 to 6, characterized in that said shell has a substantially oval profile in axial cross-section.
8. The cleaning sprinkler of any of claims 1 to 7, characterized in that said sleeve is made of steel.
9. The cleaning sprinkler of any of claims 1 to 8, characterized in that said shell is made of a synthetic material.
10. The cleaning sprinkler of claim 9, characterized in that said synthetic material is a high-density polyethylene.

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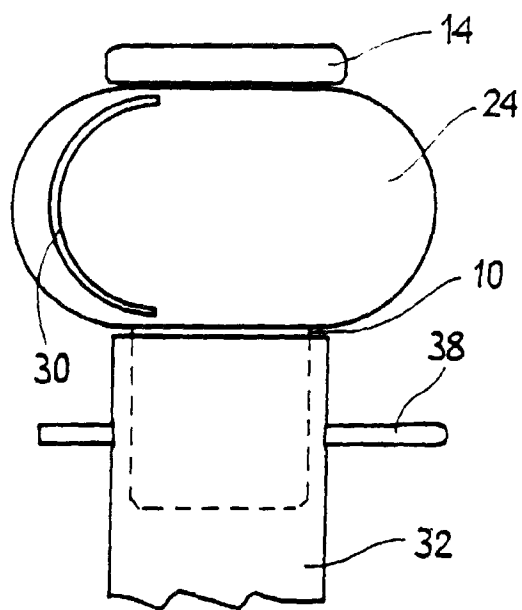


Fig. 1

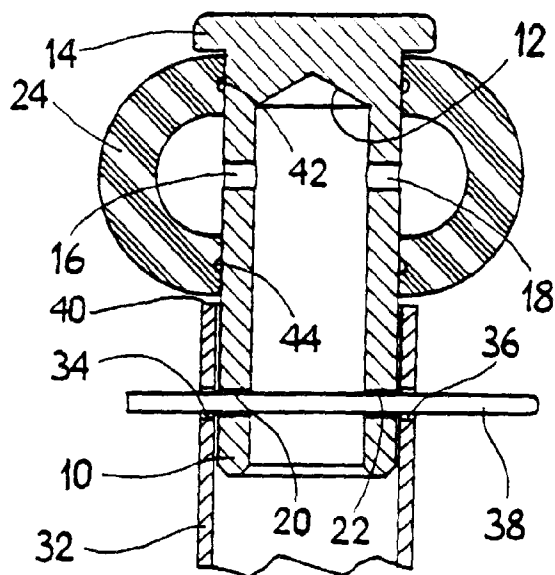


Fig. 3

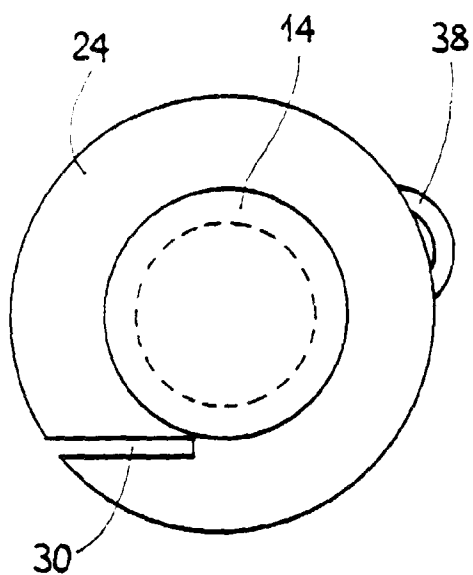


Fig. 2

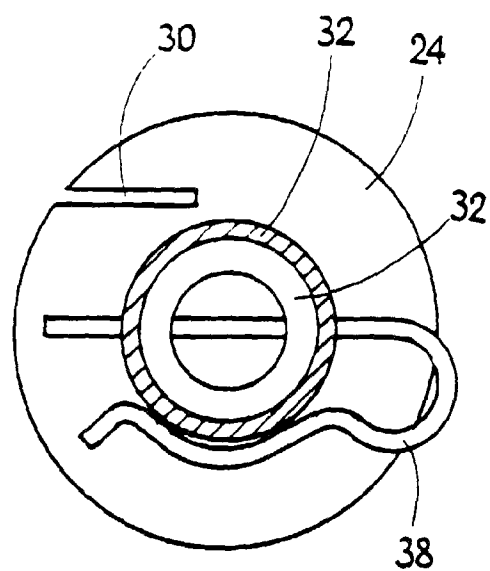


Fig. 4



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## EUROPEAN SEARCH REPORT

Application Number  
EP 96 20 1345

| DOCUMENTS CONSIDERED TO BE RELEVANT  |  |   |  |
|--|--|---|--|
| Category   | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim   | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X  | US-A-5 316 218 (S.D. BOWEN)<br>* column 3, line 7 - column 4, line 31 *<br>---   | 1,2,4,<br>7-10  | B08B9/093<br>B05B3/06                        |
| X  | FR-A-2 500 334 (FIRMA SUSANNE SCHRAMMEL<br>HANDEL MIT CHEM. TECHN. PRODUKTEN)<br>* page 5, line 14 - page 7, line 3 *<br>--- | 1,3,4   |  |
| Y  |  | 6   |  |
| Y  | GB-A-2 188 255 (BRECONCHERRY STEEL LTD)<br>* page 1, line 54 - line 71 *<br>---  | 6   |  |
| A  | EP-A-0 494 075 (EDO CORP./FIBER SCIENCE<br>DIVISION)<br>* column 2, line 56 - column 3, line 29 *<br>-----                   | 1,3,4,7,<br>8   |  |
|  |  |   | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.6)      |
|  |  |   | B08B<br>B05B                                 |
| The present search report has been drawn up for all claims   |  |   |  |
| Place of search<br>THE HAGUE   |  | Date of completion of the search<br>6 September 1996  | Examiner<br>Lilimpakis, E                    |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |  | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>-----<br>& : member of the same patent family, corresponding document |  |

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