

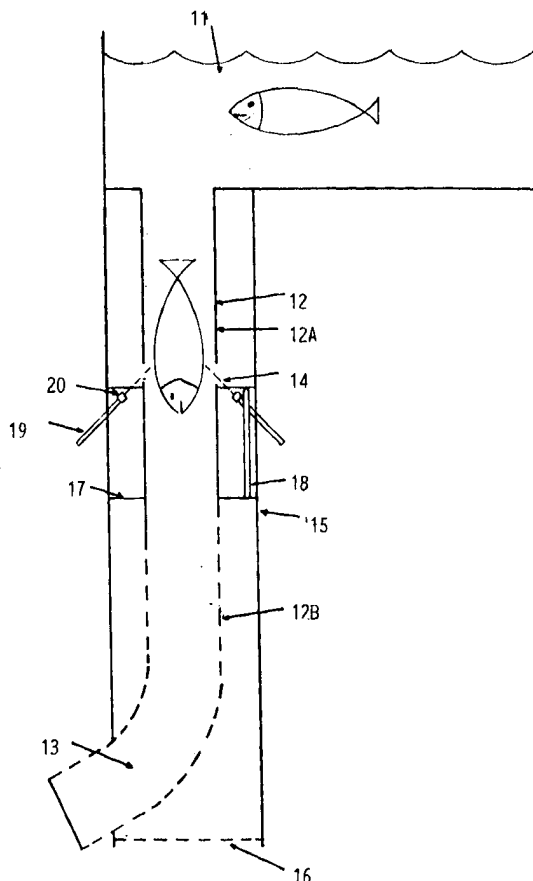


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(54) Title: METHOD AND DEVICE FOR REMOVING PARASITES FROM FISH**(57) Abstract**

A method for removal of exterior parasites from fish, especially salmon lice. The fish is led through a water current where it is exposed to nozzle water spray from nozzle heads or nozzle slits. A device is provided for carrying out the procedure comprising four or more nozzles (20) or nozzle orifices, placed in a circle close to a pipe (12) within which the fish is guided, all nozzles being connected to a water pump.



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METHOD AND DEVICE FOR REMOVING PARASITES FROM FISH

The invention relates to a method and a device for removal of exterior parasites, in particular so-called salmon lice, from salmon in fish farms.

Description of the prior art

5 Damage caused by salmon lice constitutes a large expense for fish farmers every year. Salmon lice is very widespread and traditional removal methods have led to several drawbacks.

 Use of chemical and/or pharmaceutical agents, e.g., vaccination or fodder additives, cause pollution and create a risk for undesirable side effects or long term
10 adverse.

 Mechanical removal is too time consuming. The use of wrasse, which dine on the parasites is only effective on individual fish, and can not be carried out satisfactory on a large scale.

Object

15 The main object of the present invention is to provide an effective, pollution free method and device for removal of salmon lice from salmon in fish farms. The removal must be conducted without the fish being depreciated and declassified at slaughtering. Debris, which may cause a risk for other fish or the surrounding
20 environment, must not be formed or remained in water. The removal must be conducted in a way acceptable to the market place, in order to avoid undesirable reactions among customers.

Summary of the invention

25 The invention is described in its basic form in claim 1 and 2, which state a procedure and a device respectively.

 Tests have shown that the invention provides a very satisfying removal of the exterior parasites called salmon lice. Salmon bothered by salmon lice try different methods to get rid of it. It has been known for salmon to seek out cleaning devices for
30 fishing nets, presumably to be "scrubbed". Direct jet treatment of the salmon, however will create a risk for scale loosening. This invention provides a safe and risk-free treatment, which also is environmentally sound and reasonable. The quality of the

salmon is not depreciated by the treatment.

Additional features of the invention are given in claim 3-9.

Brief description of the drawings

5 The invention is described in detail below with references to the drawings;
figure 1 shows a schematic side view of an installation with a device of the
present invention,

figure 2 shows a corresponding cross sectional view through the cleaning pipe
of fig. 1, while

10 figure 3 shows a schematic side view partly in cross-section, of a different
embodiment.

Figure 1 shows a pool 11 with fish which are to be treated. In the bottom of
this pool is an outlet to a cleaning pipe 12, which vertically extends down towards a
15 lower bend 13 directing the pipe sideways and out. The term "cleaning pipe" is used
because the fish is led through the pipe in order to be cleaned as described below.

The cleaning pipe 12 is divided into an upper part 12A and a lower part 12B
with an interval 14. The cleaning pipe 12 is surrounded by a concentric pipe 15,
extending from the bottom of the pool and down past the bend 13, with the lower end
20 closed with a filter 16 for collecting the parasites. The filter 16 can alternatively be in
the shape of a filter bag which can be removed for disposal of the collected parasites.

In the space between the two pipes 15 and 12, some distance beneath the
interval 14, there is arranged a bottom 17 with an overflow pipe 18. The overflow pipe
is adjustable for regulating the overflow level.

25 The cleaning pipe 12 is perforated on the lower side of the bend 13 allowing
the water to flow into the surrounding pipe 15.

Close to the interval 14 there are arranged four nozzle tubes 19 with nozzle
heads 20 for the injection of water jets. The nozzle tubes 19 are evenly distributed
around the circumference, i.e., by 90°. They can be attached to the surrounding pipe
30 15 to form 45° angles with the cleaning pipe axis 12, with the jet direction inwards
and upwards. The nozzle heads 20 are placed at such a distance from the cleaning pipe
12 that the water jets get a water track of, e.g., 12-15 cm, into the space 14 before they

reach the interior of the cleaning pipe. The main purpose of this placement is to reduce the risk of the water jet tearing scales loose from the fish.

More than four water jets can be used and the angle can deviate from 45° . The limit for this angle depends on the water pressure and the length of the watercourse.
5 The nozzle heads 20 are designed to form a blower-shaped jet covering a sector of the cleaning pipe circumference. This means that the water jet will get an effect like a knife-edge going into the space 14.

The nozzle tubes 19 are connected to a water pump through a valve (not shown). This provides a water supply with adequate pressure. The limits for the water
10 pressure in the nozzle tubes are not determined, but the device works satisfactorily with 140 bar water pressure and a total water supply of approximately 16 L /min.

In this device fish from the pool 11 are guided through the cleaning pipe 12. The cleaning pipe 12 is dimensioned for the type of fish to be treated, so that the largest fish nearly fills the cleaning pipe. The fish is guided headfirst down the
15 cleaning pipe. It will be in a water current in the pipe.

Figure 3 shows a modified form of the lower part of the device in figure 1 and 2. Here the outer pipe 15 is led into a filter bag 21 for a first filtering of detached parasites. The bag 21 can be removed and emptied.

The number of nozzle tubes and nozzle heads may be increased. For instance
20 several rows of nozzle heads can be fastened to two or more circular manifolds placed axially after one another in the interval 14 covered with water jets.

The distance between the nozzle heads 20 and the circumference of the pipe 12, i.e., the outer movement-area for the fish, should exceed approximately 10 cm. There ought to be enough room for formation of blower-shaped jets and a reduction of
25 the water pressure in the jet front, in such a way that scales do not loosen from the fish. The dimension of this distance will depend on the length of the water-track, the distance the water jets flow through water, which is being controlled by placement of the nozzle heads and the level of the overflow pipe 18.

The pipe 12 is placed vertically in the drawing, but a deviating arrangement is
30 also possible.

An embodiment where the nozzle heads are formed as circumference slits in the cleaning pipe 12 wall or as a circular manifold placed by it, can also be used. The

device can be operated with only three nozzles, in particular if traversing nozzles are being used, (i.e. nozzles are swinging back and forth sideways).

By an appropriate choice of nozzle form, nozzle size and water pressure, the spraying of the fish can occur without the water jet going through water.

5 It is also possible to arrange the nozzles in such a way that they spray the fish only from one flank at a time, for instance by arranging the nozzles in two groups at different levels or by guiding the fish into a channel where it is sprayed once from the top and once from the bottom, or alternating from the two sides.

Claims:

1. Method for removal of exterior parasites from fish, especially salmon lice, by a mechanical stripping,

5 **c h a r a c t e r i s e d** by guiding the fish through a water current where it is exposed to nozzle water spray, from nozzle heads or nozzle slits, towards it's body.

2. Device for carrying out the method in accordance with claim 1,
10 **c h a r a c t e r i s e d** by including four or more nozzles (20) or nozzle orifices, placed in a circle close to a pipe (12) through which the fish is guided through, all the nozzels being connected to a water pump and aimed towards the pipe axis, wherein the pipe (12) is adapted for guiding the fish and has an aperture (14) which offers room for the nozzle spray (18).

15 3. Device of claim 2,
c h a r a c t e r i s e d by containing one or more rows of manifolds or nozzle tubes with four or more nozzles (20) evenly distributed around the circumference, as the nozzles forms slits or rows of gaps that forms fan-shaped water jets.

20 4. Device according one of the claims 2-3,
c h a r a c t e r i s e d by aiming the water jets opposite to direction of movement the fish, forming a sharp angle, preferably 45° with the pipe axis.

25 5. Device according to any one of the claims 2-3,
c h a r a c t e r i s e d by the perforation of the cleaning pipe in it's lower part (12B) surrounded by an outer pipe (15) which at it's lower end has a filter or a filter bag (16) for the collection of detached parasites.

30 6. Device according claim 5,
c h a r a c t e r i s e d by the outer pipe (15) being closed with a bottom (17) beneath the nozzles (20) for the formation of a water volume in the water jet field.

7. Device according claim 6,
characterised by controlling the level of the water volume over the bottom
(17) with an overflow pipe (18).

5 8. Device according to any one of the claims 6-7,
characterised by the cleaning pipe (12) having a vertical axis.

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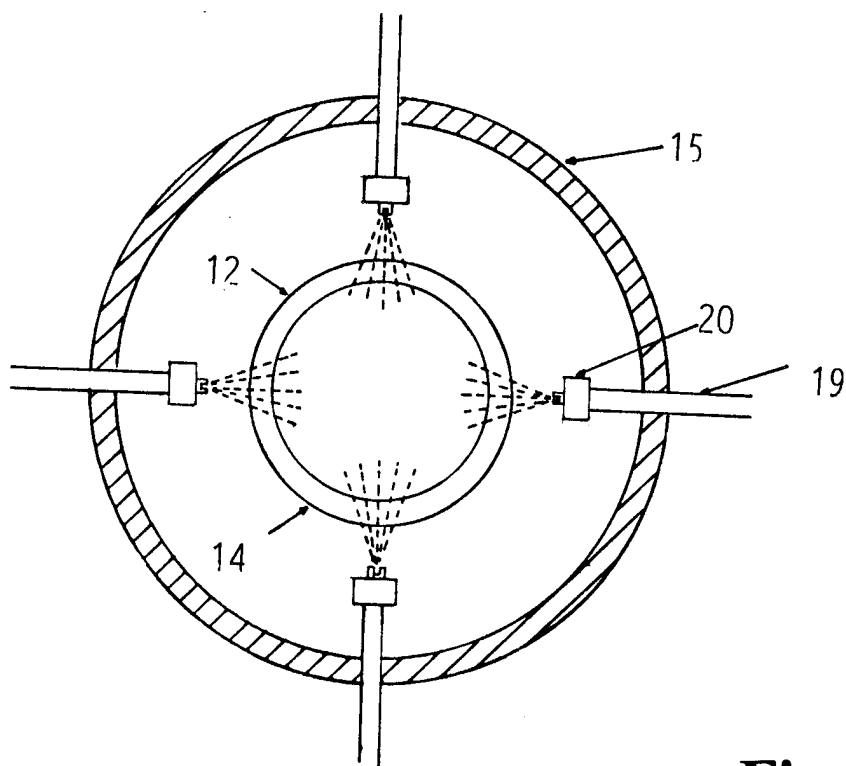


Fig.2

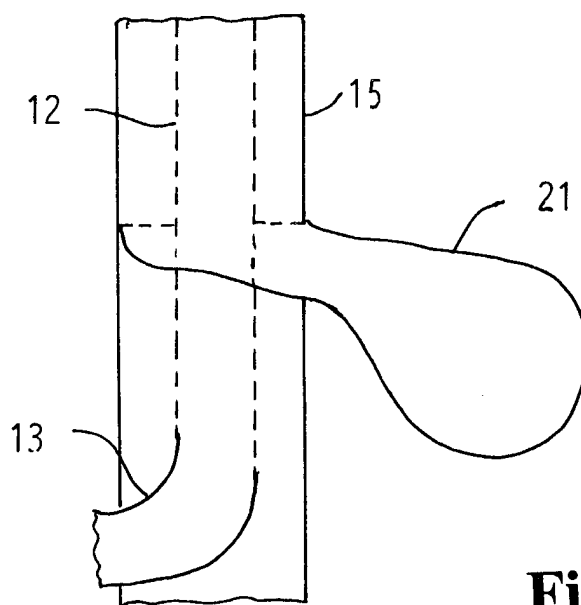


Fig.3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 97/00322

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: A01K 61/00 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: A01K		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9417657 A1 (JACKMAN, S.E.), 18 August 1994 (18.08.94), figure 1, claims 1,10 --	1,2
A	US 5313911 A (J.M. THOMASSEN ET AL), 24 May 1994 (24.05.94), figure 1, abstract -- -----	1,2
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INTERNATIONAL SEARCH REPORT

Information on patent family members

03/02/98

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Patent document cited in search report			Publication date	Patent family member(s)			Publication date
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				DK	89692	A	21/08/92
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