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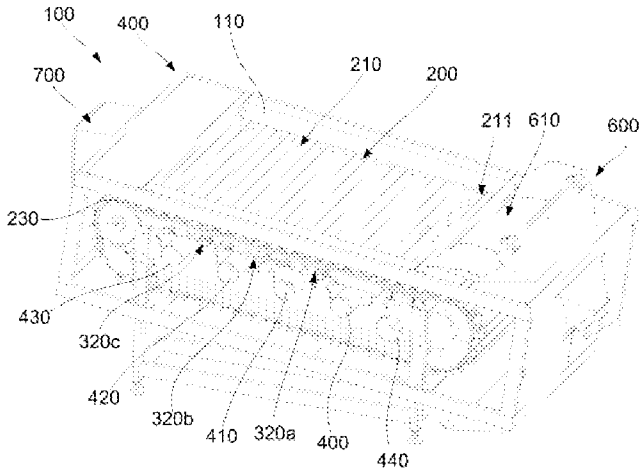
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(54) Title **Sorting apparatus for alive fish**

(57) Abstract

Sorting apparatus (100) for alive fish making use of a revolving sorting assembly (200) comprising multiple tiltable sorting members (210) arranged in transversal direction thereof forming receiving funnels (211) for alive fish to be sorted, wherein the tiltable sorting members (210) are arranged to a sorting manipulation assembly (300) manipulating a sorting gap (214) at lower end of the receiving funnels (211) for sorting according to desired sorting preferences/properties.



Sorting apparatus for alive fish

The present invention is related to a sorting apparatus for alive fish, according to the preamble of claim 1.

Background

Within the fish industry it is often required to sort fish into batches according to size, number, etc., i.e. grading, wherein the number of fishes in a batch and size-range are variable. There have over the years been proposed different solutions for sorting, grading, counting, etc. within the fish industry. When sorting alive fish, it is a requirement that the solutions should be able to process large amounts of fish over a short time interval. Further, a biomass of alive fish, due to the properties and behaviour of the alive fish, behaves different than any other object, organism or item, hereunder dead, anaesthetized or stunned fish that do not move, that are graded or sorted.

Presently, there is also an increasing focus on fish welfare, and there are now requirements, as, e.g., described in:

https://nofima.no/wp-content/uploads/2021/05/FISHWELL-Welfare-indicators-for-farmed-Atlantic-salmon-November-2018.pdf and

https://nofima.no/wp-content/uploads/2021/05/Welfare-Indicators-for-farmed-rainbow-trout-Noble-et-al.-2020.pdf,

defining welfare indicators also related sorting, hereunder grading, that have to be meet by fish industry.

The closest prior art to present invention is found in FI8235U1 and FR975679A.

In FI8235U1 is described a sorting apparatus for sorting products and items, such as e.g. fish, the sorting apparatus comprising a supply unit supplying products or items to be sorted to a sorting device. The sorting device is formed by motor-driven endless chain and multiple tubes or poles extending with their longitudinal direction in transversal direction of the endless chain (and moving direction thereof) arranged in a raised plane above the mentioned chain. The tubes or poles are arranged to the chain by means of respective vertical supports arranged at both transversal sides of two adjacent chain links, positioning the tubes or poles at a distance above the chain. The mentioned vertical supports also form side walls of the sorting path of the sorting apparatus.

The chain is further so arranged that the chain path enables the spacing between the tubes or poles to increase in the moving direction of the chain.

The solution of FI8235U1 may be used for sorting fish, but is related to dead fish for, e.g., deep-frying, and not alive fish that may move during the sorting process. Further, the solution is not designed for fish welfare and to avoid damages/mechanical affection/wear during the sorting process. E.g., in the FI8235U1 solution, the fish might become hanging after the head over a longer time. The solution of FI8235U1 further suffer from that the solution will not be accurate, due to the sorting is based on vertical supports arranged to the links of the chain. Slack in the chain or wear on the links or vertical supports will affect the accuracy of the sorting/grading. In addition, the wear or slack on different sides of the chain links or vertical supports may result in different sizes of the spacing and thus different sorting/grading close to the respective sides of the sorting device.

In FR975679A is described a method and device for sorting bodies, more particularly dead bodies, such as fish. The device comprises a mobile grid circulating around two drums, wherein the grid comprises transversal tubes or bars arranged parallel to each other, extending between respective links of two chains. The links are designed such that the mentioned tubes or bars are allowed to move in elongated slots of the links via pins. The mentioned tubes or bars are further associated with a lever solution designed to be affected by cams or similar, arranged in connection with the chain, such that when the chains travel in moving direction, the cams affect the lever solutions affecting the tubes or bars to move in the elongated slots of the links, thus increasing the spacing/gap between the adjacent tubes or bars. In this manner an increasing gap between adjacent tubes or bars is achieved as the mobile grid is rotated in the moving direction, enabling sorting of fish of larger size into different receiving units as the mobile grid travels.

The solution of FR975679A suffer from the above-mentioned drawbacks of FI8235U1. Further, the solution requires many movable parts to enable the change in the spacing between the adjacent tubes or bars, that will be exposed to mechanical wear, but also exposed to dirt and other objects that may come into the mentioned elongated slots and lever solution, affecting the grating/sorting accuracy.

Accordingly, there is a need for a sorting apparatus enabling accurate sorting of alive fish.

There is further a need for a sorting apparatus for alive fish that meets the requirements of fish welfare.

There is also a need for a sorting apparatus for alive fish that do not expose the alive fish to any mechanical affection/wear during a sorting process.

Object

The main object of the present invention is to provide a sorting apparatus for alive fish partly or entirely solving the mentioned drawbacks and lacks of prior art.

An object of the present invention is to provide a sorting apparatus for alive fish designed to ensure that the fish welfare is met.

It is an object of the present invention to provide a sorting apparatus for alive fish enabling accurate sorting and grading of alive fish.

An object of the present invention is to provide a sorting apparatus for alive fish ensuring that the fish is not exposed to any mechanical affection/wear during the sorting process.

It is an object of the present invention to provide a sorting apparatus for alive fish enabling efficient sorting of large amounts of alive fish in a short period of time, resulting in that the alive fish is quickly returned into water again.

Further objects of the present invention will appear from the following description, claims and attached drawings.

The invention

A sorting apparatus for alive fish according to the present invention is defined by the technical features of claim 1. Preferable features of the sorting apparatus are described in the dependent claims.

A sorting apparatus for alive fish according to the present invention comprises at least one revolving sorting assembly, wherein the revolving sorting assembly comprising multiple sorting members arranged in transversal direction thereof, wherein adjacent sorting members form receiving funnels for alive fish to be sorted.

In accordance with the sorting apparatus according to the present invention, the sorting members are arranged to a sorting manipulation assembly manipulating a sorting gap at lower end of the receiving funnels.

The sorting members according to the present invention have an elongated rectangular shape and at distal longitudinal ends thereof are tiltably arranged to a pair of revolving chains or belts at upper side and arranged in engagement with the sorting manipulation assembly at lower side for manipulation of the sorting gap by manipulating tilting angle of the sorting members.

In accordance with one embodiment of the sorting apparatus according to the present invention, the sorting members are tiltably arranged to the revolving chains or belts by means of rotational joints arranged on the revolving chains or belts and upper rotation members protruding from distal longitudinal ends of the sorting members and into engagement with the rotational joints.

According to one embodiment of the sorting apparatus according to the present invention, the sorting members are arranged in engagement with the sorting manipulation assembly by lower tilting members protruding from distal longitudinal ends of the sorting members and into engagement with the sorting manipulation assembly.

In accordance with one embodiment of the sorting manipulation assembly according to the present invention, the sorting manipulation assembly comprises multiple manipulation members arranged in series in longitudinal direction of the revolving sorting assembly.

According to one embodiment of the sorting manipulation assembly according to the present invention, the manipulation members are adjustable in the vertical plane, exhibit a fixed inclined angle in relation to the horizontal, or extends in the horizontal plane.

In accordance with one embodiment of the sorting manipulation assembly according to the present invention, comprises a first manipulation member extending in the horizontal plane providing the sorting members with a fixed tilted angle in a receiving and dewatering section, wherein the separation gap of the funnels is of a size preventing received alive fish from leaving.

In accordance with one embodiment of the sorting manipulation assembly according to the present invention, the manipulation members are hinged to each other at respective adjoining ends thereof.

According to a further embodiment of the sorting manipulation assembly according to the present invention, the hinged manipulation members are arranged to respective controllable actuators arranged such that they affect the inclination of both adjacent manipulation members.

In accordance with one embodiment of the sorting apparatus according to the present invention, the sorting manipulation assembly is configured to gradually increase the tilting angle of the sorting members in moving direction in sorting section of the revolving sorting assembly, increasing the sorting gap of the funnels in accordance with desired sorting properties.

According to one embodiment of the sorting apparatus according to the present invention, the sorting apparatus further comprises sorting channels and sorting outlets arranged in association with separation sections of the revolving sorting assembly for extracting sorted (and graded) fish that pass through the sorting gap of the funnels.

In accordance with a further embodiment of the sorting members according to the present invention, the sorting members at distal longitudinal ends are provided with flanges protruding perpendicularly from a front side thereof, acting as guides preventing alive fish from leaving the funnels.

In accordance with one embodiment of the sorting apparatus according to the present invention, the pair of endless revolving chains or belts are arranged to revolve about respective elongated guide tracks with respective rotation axes spaced apart in the longitudinal direction of the revolving sorting assembly.

According to one embodiment of the present invention, at least one of the rotation axes is formed by respective cog wheels arranged to a common rotation shaft, and wherein the endless revolving chains or belts are arranged to the rotation axis via the cog wheels and powered by a motor. The motor may be electrically, pneumatically or hydraulically driven. A non-limiting example of a suitable motor is an electric gear motor.

The revolving sorting assembly according to the present invention can be arranged with the longitudinal extension in the horizontal plane or with an inclined angle upwards from the horizontal plane from a supply end.

By the present invention is thus provided a sorting apparatus comprising at least one revolving sorting assembly using tiltable sorting members, wherein the tilting angle thereof is adjustable such that the sorting gap of the funnels can be altered according to desired sorting preferences/grading preferences.

The sorting apparatus according to the present invention enables sorting of alive fish meeting the requirements of fish welfare, as discussed above.

The present invention provides a sorting apparatus enabling accurate sorting and grading of alive fish.

By the design and properties of the sorting apparatus according to the present invention is ensured that the alive fish is not exposed to any mechanical affection/wear during the sorting process.

The present invention further provides a sorting apparatus for alive fish enabling efficient sorting of large amounts of alive fish in a short period of time, resulting in that the alive fish is quickly returned into water again.

The sorting apparatus according to the present invention is further ensuring that one will not experience incidents where the alive fish become hanging after the head (for a longer period of time) in connection with the sorting process.

The sorting apparatus according to the present invention is applicable for sorting any kind of alive fish and of any size.

The sorting apparatus according to the present invention may also be used for sorting dead fish or other aquatic animals that can be sorted by size.

Further preferable features and advantageous details of the present invention will appear from the following example description, claims and attached drawings.

Example

The present invention will below be described in further detail with references to the attached drawings, where:

Fig. 1a is a principle drawing of a sorting apparatus for alive fish according to one embodiment of the present invention,

Fig. 1b is a principle drawing of details of the sorting apparatus in Fig. 1a,

Fig. 2a-b are principle drawings of an embodiment of a rectangular sorting member according to one embodiment of the present invention, and

Fig. 3 is a principle drawing of a sorting manipulation assembly according to one embodiment of the present invention.

Reference is now made to Fig. 1a-b showing principle drawings of an embodiment of a sorting apparatus 100 according to the present invention. The sorting apparatus 100 according to the present invention comprises at least one revolving sorting assembly 200.

The revolving sorting assembly 200 according to the present invention comprises multiple sorting members 210 arranged extending with their longitudinal direction in transversal direction thereof, i.e. in transversal direction of the moving direction of the revolving sorting assembly 200.

In accordance with the present invention, adjacent sorting members 210 form receiving funnels 211 for alive fish to be sorted.

According to one embodiment of the present invention, the revolving sorting assembly 200 comprises a pair of endless revolving chains 220a-b or belts arranged to revolve about respective elongated guide tracks 221a-b with respective rotation axes 222a-b spaced apart in the longitudinal direction of the revolving sorting assembly 200. The mentioned elongated guide tracks 221a-b are spaced apart with a distance corresponding to the length of the sorting members 210 and a desired spacing such that the mentioned sorting members 210 will not be in direct contact with the revolving chains 220a-b or belts.

At least one of the mentioned rotation axes 222a is formed by respective cog wheels 223a-b arranged to a common rotation shaft 224, and wherein the mentioned endless revolving chains 220a-b or belts are arranged to the mentioned rotation axis 222a via the cog wheels 223a-b. The common rotation shaft 224 is further arranged to a motor 225, electrically, pneumatically or hydraulically powered, for driving the mentioned endless revolving chains 220a-b or belts to rotate/revolve about the mentioned rotation axes 222a-b/guide tracks 221a-b together.

Reference is now made to Fig. 2a-b showing principle drawings of a sorting member 210 according to one embodiment of the present invention. In accordance with the present invention, the sorting members 210 has an elongated rectangular shape, such as a rectangular plate, and exhibit a considerable length in height direction to form the mentioned receiving funnel 211 with adjacent sorting members 210 enabling receding a volume/number of alive fish to be sorted. The mentioned sorting members 210 further a planer front surface 212 and a profiled rear surface 213.

The mentioned rectangular sorting members 220 thus extends in transversal direction of the revolving sorting assembly 200, between the mentioned endless revolving chains 220a-b or belts and wherein the sorting members 210 at distal ends thereof are tiltably arranged to the respective

endless revolving chains 220a-b at upper side thereof by rotational joints 230 (Fig. 1a) arranged on the revolving chains 220a-b or belts by fixation devices 231 (Fig. 1b).

In accordance with one embodiment of the present invention, the sorting members 210 are arranged to the mentioned rotational joints 230 of the endless revolving chains 220a-b or belts by means fixation brackets 240 arranged at the profiled rear side 213 at distal ends thereof. The fixation brackets 240 extend with their longitudinal direction in transversal direction of the rectangular sorting members 210. In accordance with the shown embodiment, the fixation brackets 240 exhibit a profile adapted to be received and accommodated in the profiled rear side 213 of the sorting members 210. The fixation bracket 240 is by a planar side 241 thereof in engagement with a planar surface of the rear side 213 of the sorting member 210 and is further fixed to the sorting member 210 by appropriate fixation means 242.

The mentioned fixation brackets 240 are further provided with an upper rotation member 243, such as a shaft, bar or rod, and lower tilting member 244, wherein the mentioned upper rotation member 243 and lower tilting member 244 protrude from the distal ends of the rectangular sorting members 210. The upper rotation member 243 is configured be received and accommodated in the mentioned rotational joint 230 of the revolving chains 220a-b or belts, arranging the sorting members 210 tiltably at upper side to the revolving chains 220a-b or belts. The mentioned lower tilting member 244 will be used for controlling the tilting angle of the rectangular sorting members 210 in relation to the horizontal plane of the revolving chains 230a-b or belts, further described below.

The mentioned revolving chains 220a-b or belts are accordingly provided with rotational joints 230 arranged outer circumference thereof and distributed at the outer circumference thereof by a distance corresponding to the height of the mentioned rectangular sorting members 210 and with a small spacing, such that when the mentioned rotation members 210 are arranged thereto and positioned horizontally, there is only a small gap between adjacent rectangular sorting members 210.

Reference is now made to Figure 3 showing a principle drawing of a sorting manipulation assembly 300 configured to manipulate the sorting settings of the at least one revolving sorting assembly 200 by controlling the tilting angle of the respective sorting members 210 in relation to the horizontal plane of the revolving chains 220a-b or belts.

In accordance with one embodiment of the present invention, the sorting manipulation assembly 300 is formed by multiple manipulation members 310a-n, n being an integer number larger than 1,

arranged in series in longitudinal direction of the revolving sorting assembly 200, in moving direction from an inlet end towards an outlet end. The manipulation members 310a-b provides a manipulatable continuous sliding/engagement surface in the sorting section of the revolving sorting assembly 200 for engagement with the lower tilting members 244 of the sorting members 210, enabling adjustment of the tilting angle of the sorting members 210 in moving direction of the revolving sorting assembly 200. The total number of manipulation members 310a-n corresponds to the number of sorting classifications the sorting apparatus 100 according to the present invention is to sort or grade, as well as an initial receiving and dewatering section. In the shown embodiment of the sorting apparatus 100 according to the present invention in Fig. 1a, the sorting apparatus 100 is configured to sort a total of four different sizes of alive fish and guide the sorted alive fish to associated sorting outlets 400-430 in communication with respective sorting channels (not shown) positioned under the moving sorting device 210.

The mentioned manipulation members 310a-n are extending with their longitudinal direction in the longitudinal direction of the upper side of the respective guide tracks 221a-b in the sorting section of the revolving sorting assembly 200, and are positioned at a lower level than the revolving chains 220a-b or belts. The mentioned manipulation members 310a-n are according to the present invention either fixed or controllable. In the latter embodiment, the manipulation members 310a-n are arranged to respective controllable actuators 320a-c, manually, pneumatically, hydraulically or electrically powered. In the shown embodiment in Fig. 1a of the sorting apparatus 100 according to the present invention, the first manipulation member 310a is fixed, while the second 310b, third 310c and fourth 310d are controllable by the mentioned respective controllable actuators 320a-c.

According to the shown embodiment, the mentioned manipulation members 310a-d are arranged in series by being hinged 330 to each other at respective adjoining ends thereof and wherein the controllable actuators 320a-c are such arranged that they affect the inclination both adjacent manipulation members 310b-n, except for the first manipulation member 310, which in the shown embodiment is fixed.

In accordance with the present invention, the manipulation members 310a-n are arranged to be movable in the vertical plane to enable a tilting angle thereof in relation to the horizontal plane of the revolving chains 220a-b or belts, and in this manner control the vertical position of the lower tilting member 244 in the vertical plane, i.e. the vertical distance between the upper rotation member 243 and lower tilting member 244 in the vertical plane.

Accordingly, the mentioned manipulation members 310a-n of the sorting manipulation assembly 300 thus forms a path extending in the longitudinal direction of the sorting section of the revolving sorting assembly 200 enabling adjustment of the sorting specifications/properties of the sorting apparatus 100.

Accordingly, as the revolving chains 220a-b or belts move in the moving direction, which in Fig. 1a and 3, is from right to left, with the sorting members 210 tiltably arranged at upper side to the revolving chains 220a-b or belts, the lower tilting member 244 slides in engagement with the mentioned sorting manipulation assembly 300, and as the manipulation members 310a-n are adjustable in the vertical plane, the tilting angle of the sorting members 210 will be adjusted as they travel in the moving direction of the revolving sorting assembly 200.

In accordance with one embodiment of the present invention, the sorting manipulation assembly 300 at a first section, i.e. by the first manipulation member 310a, at the supply/inlet side of the revolving sorting assembly 200, is configured to arrange the mentioned sorting members 210 at an initial tilted angle in relation to the horizontal, wherein a sorting gap 214 at lower end of the funnel 211 formed by adjacent sorting members 210 are so small that no alive fish is allowed to pass.

The tilted adjacent sorting members 210 thus forms transversally extending receiving funnels 211 for receiving alive fish from a supply unit 600 to be sorted and in this first section further allows most of the water to be removed via a water channel (not shown) and a water outlet 440.

According to one embodiment of the sorting apparatus 100 according to the present invention, the subsequent manipulation members 310b-d, exhibit the same or similar inclined angle in relation to the horizontal, such that as the revolving chains 220a-b or belts travels in the moving direction, the respective sorting members 210, as they enter the subsequent sections manipulated by the respective manipulation members 310b-d, gradually is provided with a larger tilting angle in relation to the horizontal, wherein the sorting gap 214 between the adjacent sorting members 210 gradually increases and enables sorting of alive fish of a desired (increasing) size into associated sorting channels (not shown) and to the respective sorting outlets 400-430.

In accordance with one embodiment of the present invention, the last section is preferably close to vertical to provide a maximal sorting gap 214 ensuring that all alive fish present in the receiving funnel 211 have been sorted before the end of sorting section where the revolving chains 220a-b or belts changes direction.

The mentioned manipulation members 310a-n thus form adjustable sorting (and grading) sections in the moving direction of the at least one revolving sorting assembly 200 enabling sorting of alive fish of increasing (desired) size in the moving direction of the revolving sorting assembly 200.

By the mentioned manipulation members 310a-d, the size of the sorting gap 214 in lower end of the receiving funnel 211 formed between adjacent sorting members 210 can be manually or automatically adjusted to achieve desired sorting preferences/settings.

In accordance with a further embodiment of the present invention, the sorting apparatus 100 comprises a support structure 400 that the at least one revolving sorting assembly 200 according to the present invention is arranged to.

According to one embodiment of the sorting apparatus 100 according to the present invention, the revolving sorting assembly 200 is arranged with the longitudinal direction in the horizontal plane.

In accordance with one embodiment of the sorting apparatus 100 according to the present invention, the revolving sorting assembly 200 is arranged with an inclined angle in relation to the horizontal, as shown in Fig. 1a, such that the revolving sorting assembly 200 extends in longitudinal direction with an angle upwards from the horizontal plane from a supply/inlet end. By arranging the revolving sorting assembly 200 in an inclined angle, the gravity and increased total angle of the sorting members 210 will enhance the sorting process and ensure that the alive fish in the receiving funnels 211 is moving towards the sorting gap 214 for sorting.

The alive fish is supplied to a supply/inlet end of the revolving sorting assembly 200 by a supply unit 600 connected to a system for pumping water and alive fish, known *per se*, and requires no further description herein. In accordance with one embodiment of the present invention, the supply unit 600 comprises a distribution nozzle 610 distributing the flow of alive fish and water supplied to the sorting apparatus 100 according to the present invention in transversal direction of the revolving sorting assembly 200, i.e. in longitudinal direction of the receiving funnels 211 formed between adjoining tilted sorting members 210.

In accordance with a further embodiment of the present invention, the sorting apparatus 100 comprises a control unit 700 configured, by being provided with means and/or software, to control at least the movement of the revolving sorting assembly 200 by controlling the motor 225, and/or actuators 320a-c to control the sorting properties and/or supply unit 600. The control unit 700 may be provide with a user interface and/or provided with communication means for communication with a remote control unit for controlling the sorting settings of the sorting apparatus 100.

Reference is again made to Fig. 2a-b. In accordance with a further embodiment of the present invention, the sorting members 210 are provided with flanges 215 protruding perpendicularly from the distal ends of the front surface 212, which flanges 215 work as guides preventing alive fish from leaving the funnel 211.

Reference is now made to Fig. 1a. According to a further embodiment of the present invention, the sorting apparatus 100 further comprises longitudinally extending guide members 110 arranged at each side of the sorting section of the revolving sorting assembly 200 to hold the alive fish in the funnels 211 as well as protecting the alive fish from coming into contact with the revolving chains 220a-b or belts.

In accordance with a further embodiment of the present invention, the sorting apparatus 100 comprises two or more revolving sorting assemblies 200 arranged in parallel.

In a further embodiment of the present invention, the two or more revolving sorting assemblies 200 are stacked above each other in a support structure 400.

Claims

1. Sorting apparatus (100) for alive fish, the sorting apparatus (100) comprising at least one revolving sorting assembly (200), the revolving sorting assembly (200) comprising multiple sorting members (210) arranged in transversal direction thereof, wherein adjacent sorting members (210) form receiving funnels (211) for alive fish to be sorted, wherein the sorting members (210) are arranged to a sorting manipulation assembly (300) manipulating a sorting gap (214) at lower end of the receiving funnels (211), wherein the sorting members (210) have an elongated rectangular shape and at distal longitudinal ends thereof are tiltably arranged to a pair of revolving chains (220a-b) or belts at upper side and arranged in engagement with the sorting manipulation assembly (300) at lower side for manipulation of the sorting gap (214) by manipulating tilting angle of the sorting members (210).

2. Sorting apparatus (100) according to claim 1, wherein the sorting members (210) are tiltably arranged to the revolving chains (220a-b) or belts by means of rotational joints (230) arranged on the revolving chains (220a-b) or belts and upper rotation members (243) protruding from distal longitudinal ends of the sorting members (210) and into engagement with the rotational joints (230).

3. Sorting apparatus (100) according to claim 1, wherein the sorting members (210) are arranged in engagement with the sorting manipulation assembly (300) by lower tilting members (244) protruding from distal longitudinal ends of the sorting members (210) and into engagement with the sorting manipulation assembly (300).

4. Sorting apparatus (100) according to claim 3, wherein the sorting manipulation assembly (300) comprises multiple manipulation members (310a-n) arranged in series in longitudinal direction of the revolving sorting assembly (200).

5. Sorting apparatus (100) according to claim 4, wherein the manipulation members (310a-n) are adjustable in the vertical plane, exhibit a fixed inclined angle in relation to the horizontal, or extends in the horizontal plane.

6. Sorting apparatus (100) according to claim 5, wherein the sorting manipulation assembly (300) comprises a first manipulation member (310a) extending in the horizontal plane providing the sorting members (210) with a fixed tilted angle in a receiving and dewatering section, wherein the separation gap (214) of the funnels (211) is of a size preventing received alive fish from leaving.

7. Sorting apparatus (100) according to claim 4-6, wherein the manipulation members (310a-n) are hinged (330) to each other at respective adjoining ends thereof.

8. Sorting apparatus (100) according to claim 7, wherein the hinged manipulation members (310b-n) are arranged to respective controllable actuators (320a-c) arranged such that they affect the inclination of both adjacent manipulation members (310b-n).

9. Sorting apparatus (100) according to any preceding claim, wherein the sorting manipulation assembly (300) is configured to gradually increase the tilting angle of the sorting members (210) in moving direction in sorting section of the revolving sorting assembly (200), increasing the sorting gap (214) of the funnels (211) in accordance with desired sorting properties.

10. Sorting apparatus (100) according to any preceding claim, wherein the sorting apparatus (100) comprises sorting channels and sorting outlets (400-430) arranged in association with separation sections of the revolving sorting assembly (200).

11. Sorting apparatus (100) according to any preceding claim, wherein the sorting members (210) at distal longitudinal ends are provided with flanges (215) protruding perpendicularly from a front side (212) thereof, acting as guides preventing alive fish from leaving the funnels (211).

12. Sorting apparatus (100) according to any preceding claim, wherein the pair of endless revolving chains (220a-b) or belts are arranged to revolve about respective elongated guide tracks (221a-b) with respective rotation axes (222a-b) spaced apart in the longitudinal direction of the revolving sorting assembly (200).

13. Sorting apparatus (100) according to claim 12, wherein at least one of the rotation axes (222a) is formed by respective cog wheels (223a-b) arranged to a common rotation shaft (224), and wherein the endless revolving chains (220a-b) or belts are arranged to the rotation axis (222a) via the cog wheels (223a-b) and powered by a motor (225).

14. Sorting apparatus (100) according to any preceding claim, wherein the revolving sorting assembly (200) is arranged with the longitudinal extension in the horizontal plane or with an inclined angle upwards from the horizontal plane from a supply end.

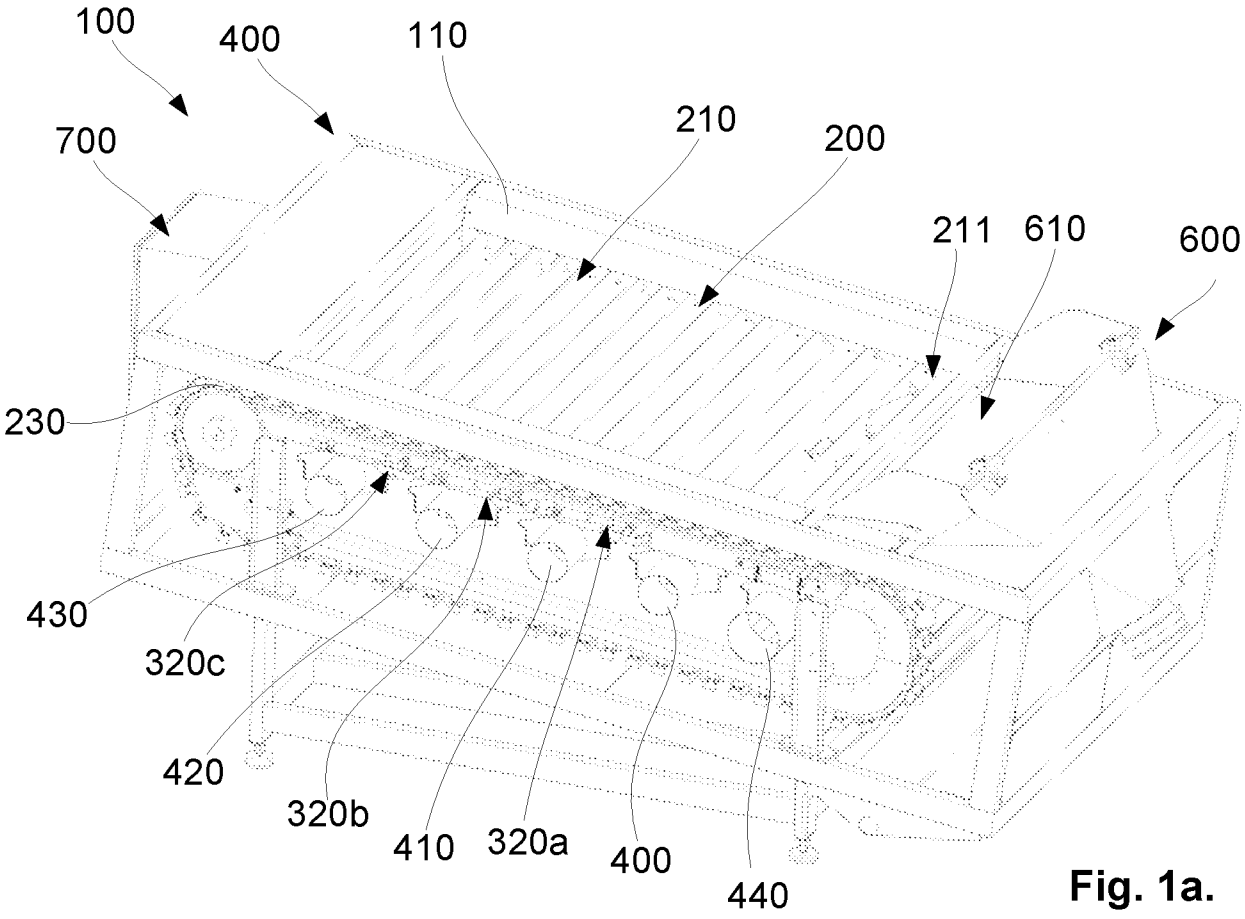

100
400
110
210
200
700
211
610
600
230
430
320c
420
320b
410
320a
400
440

Fig. 1a.

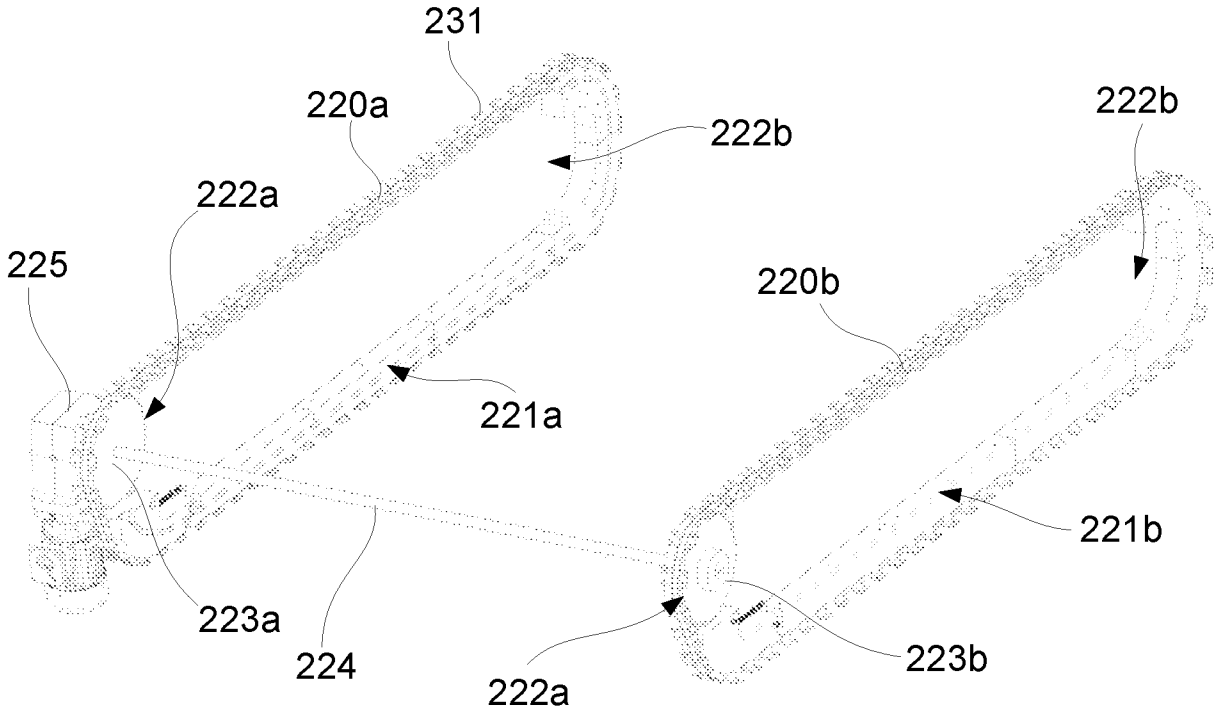

231
220a
222b
222a
225
221a
223a
224
222a
220b
222b
221b
223b

Fig. 1b.

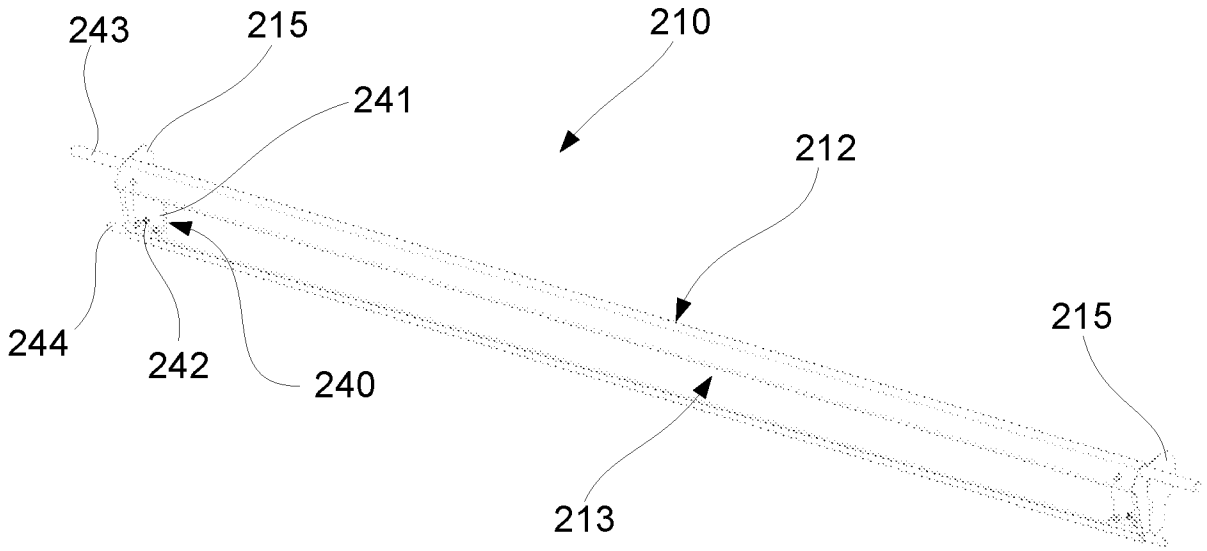

243
215
210
241
212
244
242
240
215
213

Fig. 2a.

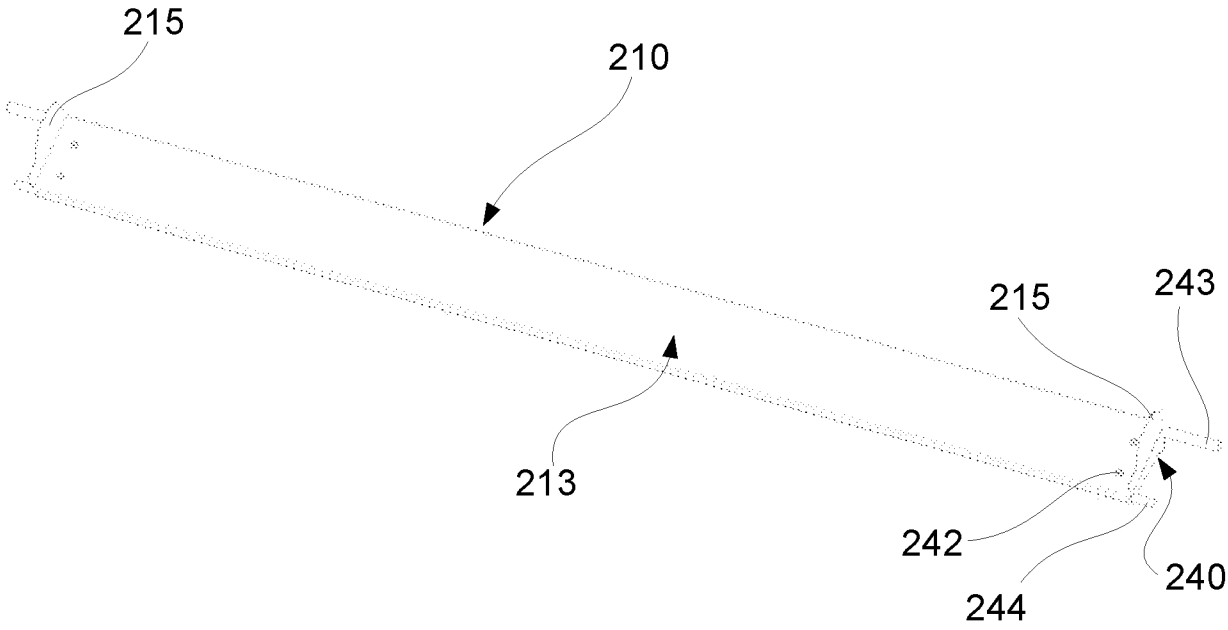

215
210
215
243
213
242
244
240

Fig. 2b.

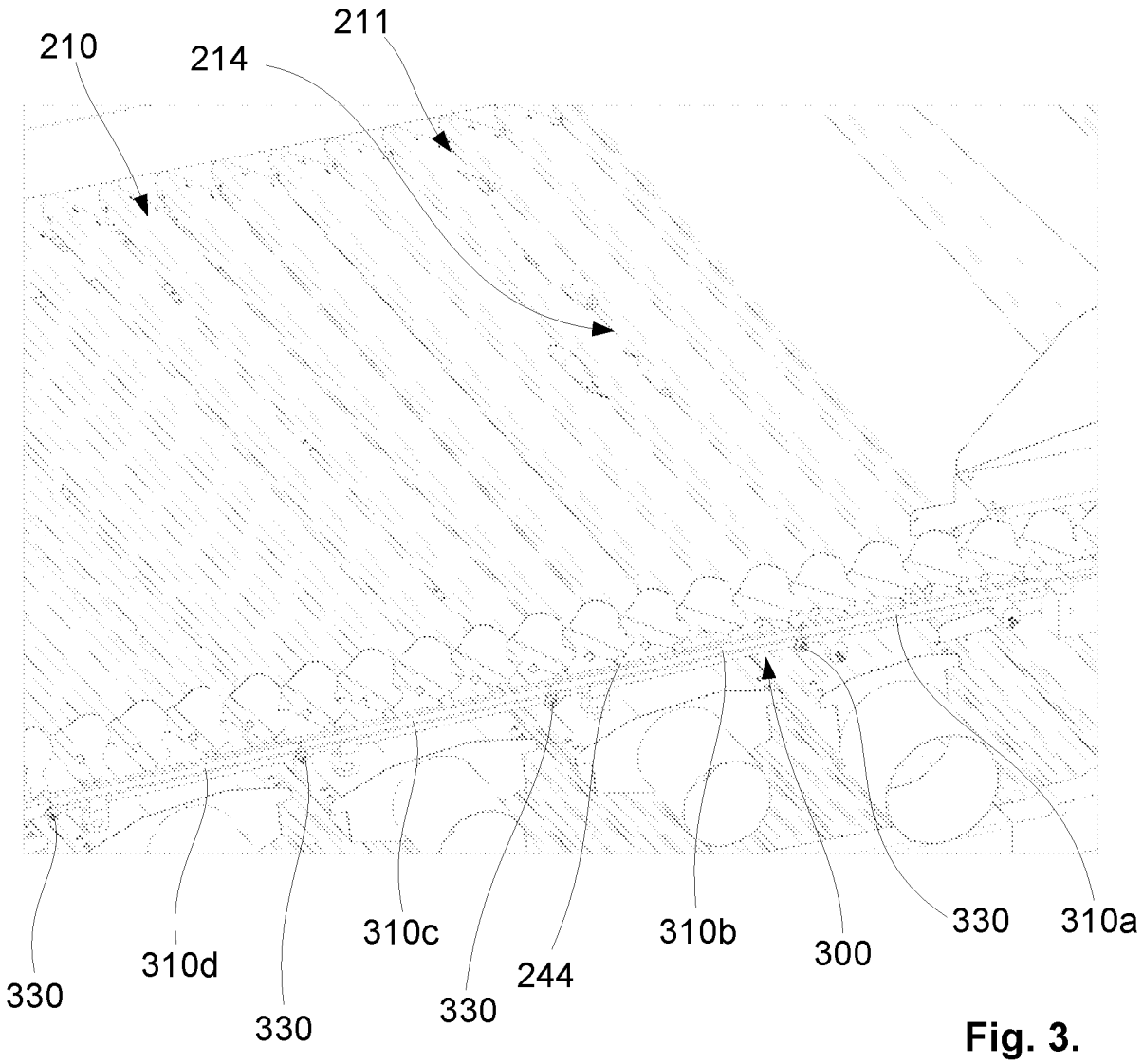


Fig. 3.