



(51) International Patent Classification:

A01K 61/00 (2017.01) A61D 7/00 (2006.01)

(21) International Application Number:

PCT/TR2023/051157

(22) International Filing Date:

18 October 2023 (18.10.2023)

(25) Filing Language:

Turkish

(26) Publication Language:

English

(30) Priority Data:

2022/016504 01 November 2022 (01.11.2022) TR

(71) Applicant: **KANYONSAN TARIM VE HAYVANCILIK SANAYİ TİCARET LİMİTED ŞİRKETİ**
[TR/TR]; Güllük Mahallesi 346 Sokak Arslangiray Apt.
No:2/c Milas, 48670 Muğla (TR).

(72) Inventors: **ÖZKURT, Ahmet**; Güllük Mahallesi 346 Sokak Arslangiray Apt No:2/c Milas, Muğla (TR).
YILDIRIM, Tarkan; Güllük Mahallesi 346 Sokak Arslangiray Apt. No:2/c Milas, Muğla (TR).

(74) Agent: **DESTEK PATENT, INC.**; Odunluk Mah. Akademi Cad. Zeno İş Merkezi, D Blok, K:4, 16110, Nilüfer/Bursa (TR).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH,

(54) Title: FISH VACCINATION MACHINE

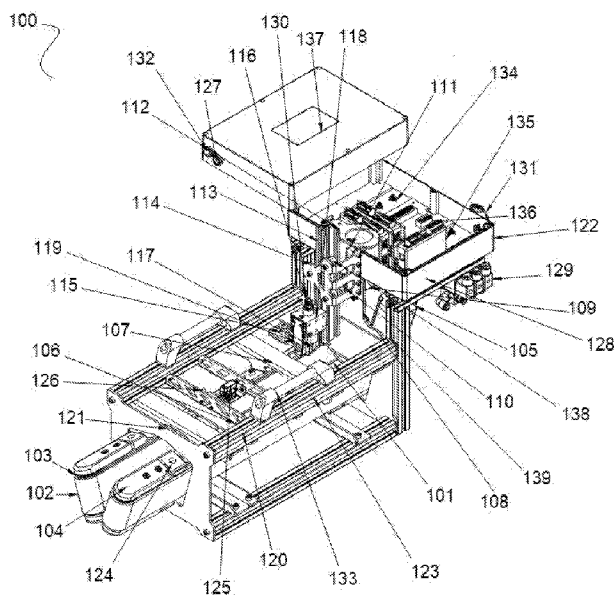


Figure-1

(57) Abstract: The invention is a fish vaccination machine (100) developed to perform the vaccination and counting of live fish in cultured fisheries (Sea Bass, Bream, Trout, etc.), wherein the said machine comprises a conveyor belt (102) positioned in the front part, which acts as a conveyor; a drum (103) connected to the body profile (101) to adjust the eccentricity of the conveyor belt (102); an injector motor (109) that moves the injector; a pinion (110) positioned on the injector motor (109) that holds the injector to be used for vaccinating the fish; a toothed rack (111) positioned between the pinion (110) and the injector motor (109); a vaccine holding apparatus (112) that holds the injector to be used for vaccinating the fish, positioned at the top, where the vaccine to be administered is placed; an injector tube (116), where the vaccine inserted into the vaccine holding apparatus (112) is connected to the serum hose; a scale cleaning apparatus (115) for cleaning the remaining flakes attached to the injector head; a color sensor (125) for distinguishing black and white color; an omron sensor (126) for counting and adjusting the position of the fish; a motor driver (135) positioned in the junction box (122), which commands the rotation of the belt motor (105) and the injector motor (109); a display screen (137) for monitoring the



TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

- (84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

implemented actions.

FISH VACCINATION MACHINE

Technical Field

The invention relates to a fish vaccination machine developed to perform the
5 vaccination and counting of live fish in cultured fisheries (Sea Bass, Bream, Trout, etc.).

State of the Art

Culture fishing is the cultivation of aquatic creatures for food or other purposes in ocean
and sea waters, special cultivation carried out in closed sections of the oceans, in tanks
and ponds filled with seawater. Instead of overfishing practices that disrupt the balance
10 of marine life and threaten the natural ecosystem, culture fishing is being used to meet
increasing demand while leaving the natural aquatic ecosystem undisturbed. Culture
fishing practices vary depending on the location and type of food involved. Fish and
other aquatic creatures are farmed in natural bodies of water in ponds, lakes, swamps
(freshwater farming) or in the ocean (marine fishing). Culture fishing is also carried out
15 in man-made tanks, which are usually located in fish hatcheries.

In recent years, the use of vaccines against various bacterial and viral diseases in
aquaculture has been gradually increasing. Commonly used injection and/or immersion
vaccines are prepared from a bacterial vaccine obtained by inactivating its agent with
formaldehyde. Vaccines are effectively used in the fight against bacterial infections
20 (Vibrio spp. Aeromonas spp., Yersinia spp., Pasteurella spp., Streptococcus spp.) and
viral infections (Viral Hemorrhagic Septicemia (VHS), Infectious Hematopoietic Necrosis
(IHN), Infectious Pancreatic Necrosis (IPN), etc.), which are a problem especially in fish
cultured in inland waters and seas. Vaccination methods in fish are grouped under 3
main methods as immersion, oral and injection. Immersion is an effective, safe and
25 easily applicable vaccination method. It is especially preferred in the first vaccinations,
causing less loss in small size or juvenile fish. Oral methods ensure that antigens
prepared by special methods [Antigen Protection Vehicle (APV)] are protected from the
harmful effects of the stomach and reach the intestine and absorbed into it. The vaccine
can normally be given with all fish foods.

30 The injection vaccination method, which is mainly used extensively in the salmon and
trout industries, can provide optimal protection with minimal side effects. In other

species, the application of this type of vaccination technique is usually described as having high protection time, low unit cost and being practical. With this method, mono and multivalent vaccines prepared by inactivating bacterial cell stimulation, exotoxins or endotoxins can be administered with or without adjuvants in both mammals and fish.

5 As in every branch of agricultural cultivation, mechanization has been initiated in culture fisheries in order to increase production, save time and labor, and reduce the cost of production. In recent years, large-capacity culture fishing facilities have been established in our country and various machines have been used. Fish are counted automatically in the fish counting system, which can be used in combination with the
10 fish grading system. Counting fish by hand leads to considerable labor and time loss. With the fish counting machine, it is possible to find out the exact number of fish (in the cage, in the pool, in the tank), the density of fish in pools, cages and the like, calculate the correct amount of feed, know the exact number for fish transportation and sales.

Various studies have been carried out and new machines and systems have been
15 developed today for faster and more effective vaccination of fish by injection in cultural fisheries. One of these studies is the invention that is the subject of the patent application numbered CN114982692A. The invention relates to a spindle-shaped fish vaccine injection smart grading system and smart grading method. The grading method of the invention uses a deep learning method to obtain the morphological parameters of
20 the offspring by establishing a model and algorithm of the morphological parameters and injection position, the weight of the method directly identifies the injection site, shape size.

Another study is the invention that is the subject of a patent application numbered CN111317591A. The invention relates to an automatic vaccine injection device for
25 fusiform fish and a method for automatically finding the injection location of a young fish. The device mainly comprises a control module, an injection device, an image acquisition device, a transport device, a detection device, a fish pushing device, and a positioning and release mechanism. Vaccine injection of fusiform fish can be performed with automatic vaccine injection device.

30 Today, as a result of the distraction of personnel working in injection and counting operations, there is a risk of incorrect counting and injection into the wrong area and personnel having a workplace accident. Therefore, the existence of the need for a fish

vaccination machine that eliminates the disadvantages present in the current technique and the inadequacy of existing solutions made it necessary to make a development in the relevant technical field.

Brief Description of the Invention

5 The present invention relates to a fish vaccination machine developed to perform the vaccination and counting actions of live fish in cultured fisheries (Sea Bass, Bream, Trout, etc.), which meets the requirements mentioned above, eliminates all the disadvantages and provides some additional advantages.

Starting from the known state of the technique, the objective of the invention is to
10 provide a fish vaccination machine to enable the personnel performing the application to determine the area where the injection should be made and to prevent the imbalance in the application intensity of the injector by means of the developed fish vaccination machine.

The objective of the invention is to ensure the elimination of such drawbacks as
15 incorrect counting and injection into the wrong area and personnel having a work accident as a result of distraction of the personnel working in injection and counting operations by means of the fish vaccination machine.

Another objective of the invention is to ensure that the injection errors caused by
20 manual injection are prevented by the fact that the injector kept in the fish vaccination machine automatically performs the vaccination process.

The structural and characteristic features of the invention and all its advantages will be understood more clearly by means of the figures given below and the detailed description written by making references to these figures, so the evaluation should be made taking into account these figures and detailed descriptions.

Brief Description of the Figures

In order to understand the structure of the present invention and its advantages together with the additional elements in the best way, it should be evaluated together with the figures described below.

Figure-1 is the schematic overview,

30 Figure-2 is the schematic overview.

Reference Numbers

	100.	Fish vaccination machine
	101.	Body profile
	102.	Conveyor belt
5	103.	Drum
	104.	Drive plate
	105.	Belt motor
	106.	Sensor frame
	107.	Support apparatus
10	108.	Middle motor frame
	109.	Injector motor
	110.	Pinion
	111.	Toothed rack
	112.	Vaccine holding apparatus
15	113.	Strut profile
	114.	Injector frame
	115.	Scale cleaning apparatus
	116.	Injector tube
	117.	Injector head magnet and spring
20	118.	Injector body
	119.	Injector lug
	120.	Profile housing
	121.	Profile connection frame
	122.	Junction box
25	123.	Cable duct
	124.	Tensioning apparatus
	125.	Color sensor
	126.	Omron sensor
	127.	Reset button
30	128.	Motor and sensor sockets
	129.	Solenoid valve
	130.	Air connector
	131.	Supply socket

- 132. Start button
- 133. Plastic holding apparatus
- 134. Input sockets in the box
- 135. Motor driver
- 5 136. Main board
- 137. Screen
- 138. V slot wheel
- 139. Drum shaft

Detailed Description of the Invention

10 In this detailed explanation, the subject of the invention, the fish vaccination machine (100), developed to perform vaccination and counting of live fish in cultured fisheries (Sea Bass, Bream, Trout, etc.), is described only as an example for a better understanding of the subject and in such a way that does not create any limiting effects.

The said fish vaccination machine (100) has been developed in order to eliminate the errors made by the personnel working in manual counting in the field they work. Fish
15 vaccination machine (100) prevents errors made by the personnel who perform the application repeatedly in determining the area where the injection should be performed and the imbalances in the application intensity of the injector, it also prevents mistakes in manual injection. A conveyor belt (102) is positioned in the front part of the said fish
20 vaccination machine (100), which acts as a conveyor. The said conveyor belt (102), preferably measuring 40x80 mm, is connected to the body profile (101) made from sigma profile, which is mounted on the profile frame (120), which forms the main body of the fish vaccination machine (100), and the profile connection frame (121), where the front and rear part of the profile frame (120) are fixed. The movement of the mentioned
25 conveyor belt (102) is provided by the belt motor (105). In order to adjust the eccentricity of the mentioned conveyor belt (102), a drum (103) is connected to the body profile (101). A drive plate (104) is used for adjusting and fixing the said drum (103). The said drive plate (104) is adjusted by means of the tensioning apparatus (124). The conveyor structure comprises the tensioning apparatus (125) positioned in front of the
30 said drive plate (104) and the belts (101) attached to the fixed drum (103) are connected to the profile frame (120) and the profile connection frame (121) from the lower and upper part by means of the support apparatus (107) made of aluminum

material. The injector used for vaccinating the fish is held by the pinion (110), moved by the injector motor (109) and the vaccine is attached to the vaccine holding apparatus (112). A middle motor frame (108) is positioned to support the injector motor (109), which provides injector movement. A toothed rack (111) is positioned between the said pinion (110) and the injector motor (109). The said pinion (110), toothed rack and V slot wheels (138) move in the strut profile (113). The said injector is made a set by the injector frame (114). The scales that remain attached to the said injector head are cleaned by the scale cleaning apparatus (115). A solenoid valve (129) is used for injecting the vaccine and removing the scales. The injector is positioned in the injector tube (116). The injector capsule is seated on the injector body (118), the injector head is fixed to the injector lug (119). The injector head magnet and spring (117) are positioned on the injector. In the said fish vaccination machine (100), a color sensor (125) is used to distinguish between black and white colors, and an omron sensor (126) is used to adjust the counting and positioning of the fish. There is a reset button (127) to reset the received number at the end of the day and set the fish vaccination machine (100) for the next day. The said color sensor (125) and omron sensor (126) are fixed by the sensor frame (106) made of aluminum material. In the said fish vaccination machine (100), all electrical connections are collected in the junction box (122). The cables of the color sensor (125) and the omron sensor (126) are routed from the cable duct (123) to the junction box (122). There are motor and sensor sockets (128) for receiving power in the said junction box (122). There are input sockets in the box (134) corresponding to the socket where the belt motor (105), injector motor (109), valve socket, color sensor (125) and omron sensor (126) are installed. A supply socket (131) is provided for the electrical energy supply to the fish vaccination machine (100) and the air connector (130) is provided for the fixing of the air hoses. There is a start button (132) on the fish vaccination machine (100) to start the process. Plastic holding devices (133) are positioned on the profile housing (120) for transporting the said fish vaccination machine (100). The motor driver (135) positioned in the junction box (122) commands the belt motor (105) and the injector motor (109) to rotate. In the said junction box (122), there is also a main board (136) that controls the entire operating system, and a display screen (137) on which the operations are monitored. The V slot wheel (138), which moves on the said strut profile (113), allow the injector to move. The drum shaft (139) passing through the drum (103) is fixed to the bearings.

The said fish vaccination machine (100) prepares the platform for the fish to be injected. Energy is supplied to the main board (136) connected to the junction box (122) located on the fish vaccination machine (100) via adapters (24-48V DC). Then, the vaccine to be administered is placed in the vaccine holding apparatus (112) located on the fish vaccination machine (100). The inserted vaccine is connected to the injector tube (116) with the help of a serum hose. After checking the dose caliber of the vaccine whose connection has been completed, by pressing the start button (132) located on the junction box (122), the injector tube (116) positions itself with the help of the V slot wheels (137) located on the strut profile (113) by means of the toothed rack (111) located on the injector frame (114), the pinion (110) located on the injector motor (109) and the motor drive (135) controlling the movement of these building elements.

The conveyor is completed with the profile housing (120) of the fish vaccination machine (100) and the body profile (101) mounted on the profile connection frame (121), the drum (103) on this body profile (101), the drive plate (104) on which the drum (103) is fixed, the tensioning apparatus (124) located in front of the drive plate (104) and the conveyor belts (102) mounted on the fixed drum (103). The prepared conveyor fixes the belt motor (105) by means of the drum shaft (139) passing through the drums (103). After the conveyors are fixed to the frame from the upper and lower part with the support apparatus (107), the conveyor, which is fixed to the belt motors (105), starts its movement with the help of the motor driver (135) located in the junction box (122). The conveyor belts (102), whose movement has been initiated, begin to rotate inwards parallel to each other. The personnel who are present start throwing the anesthetized fish in front of them one by one to the conveyors of the fish vaccination machine (100) with their hands. The thrown fish come to the color sensor (125) connected to the sensor frame (106) by passing in front of the counting sensor (27) connected to the aluminum sensor frame (6) by means of moving conveyors. Subsequently, data is preferably transmitted to the 4.3-inch touch screen (137). The main board (136) that processes the data stops the conveyor belts (102) by giving a command to the positioned injector tube (116). Injector motor (109) lowers the injector tube (116) to the fish located between the standing conveyor belts (102) via the strut profile (113) and the V slot wheel (138) with the help of toothed rack (111) and pinion (110), the air connector (130) connected to the descending injector tube (116) sends 5 bars of air to the injector

tube (116) through the pneumatic air hose with a diameter of 4 mm that comes from the solenoid valve (129). By means of this air the vaccine is injected into the fish.

5 The fish that has completed the injection process is taken from the fish vaccination machine (100), while the injector tube (116) is placed back in position for the other incoming fish. With the pneumatic 4mm diameter air hose connected to the scale cleaning apparatus (115) from the valve to the injector tube (116), which is in position, it sprays air for 1 second for cleaning the scales that may remain in the injector head magnet and spring (117). Thus, a healthy vaccination and counting process is carried out.

10 After the fish that have been vaccinated and counted are finished, the fish vaccination machine (100) is turned off by pressing the start button (132). The reset button (127) is checked to prepare the closed fish vaccination machine (100) for the next vaccination process, so the total number on the screen (137) is reset and made ready for the new vaccination. The fish vaccination machine (100), which has been cleaned and reset
15 after the end of the work, can be carried by holding it from the plastic holding apparatus (133).

CLAIMS

1. A fish vaccination machine (100) developed to perform the vaccination and counting of live fish in cultured fisheries (Sea Bass, Bream, Trout, etc.), **characterized by comprising;**
 - 5 - a conveyor belt (102) positioned in the front part, which acts as a conveyor;
 - a drum (103) connected to a body profile (101) to adjust the eccentricity of the conveyor belt (102);
 - an injector motor (109) that moves the injector;
 - 10 - a pinion (110) positioned on the injector motor (109) that holds the injector to be used for vaccinating the fish;
 - a toothed rack (111) positioned between the pinion (110) and the injector motor (109)
 - a vaccine holding apparatus (112) that holds the injector to be used for vaccinating the fish, positioned at the top, where the vaccine to be
15 administered is placed;
 - an injector tube (116), where the vaccine inserted into the vaccine holding apparatus (112) is connected to the serum hose;
 - a scale cleaning apparatus (115) for cleaning the remaining flakes attached to the injector head;
 - 20 - a color sensor (125) for distinguishing black and white color;
 - an omron sensor (126) for counting and adjusting the position of the fish;
 - a motor driver (135) positioned in a junction box (122), which commands a belt motor (105) and the injector motor (109) to rotate;
 - a display screen (137) for monitoring the implemented actions.
- 25 **2.** The fish vaccination machine (100) according to claim 1, **characterized by comprising;** a profile housing (120), which forms the main body of the fish vaccination machine (100), and a profile connection frame (121), on which the front and rear part of the profile housing (120) are fixed.
- 3.** The fish vaccination machine (100) according to claim 1, **characterized by**
30 **comprising;** a body profile (101) connected to the conveyor belt (102), connected to on the profile housing (120) and on the profile connection frame (121).

4. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; the belt motor (105), which gives the movement to the conveyor belt (102).
5. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a drive plate (104) for adjusting and fixing a drum (103).
6. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a tensioning apparatus (124) positioned in front of the drive plate (104) for adjustment of the drive plate (104).
7. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a conveyor comprises the tensioning apparatus (124) positioned in front of the drive plate (104) and the belts (101) attached to the fixed drum (103).
8. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a support apparatus (107) connecting the conveyor structure from the upper and lower parts to the profile housing (120) and the profile connection frame (121).
9. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a middle motor frame (108) for supporting the injector motor (109).
10. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a strut profile (113) on which the pinion (110), the toothed rack and the V slot wheels (138) move.
11. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; an injector frame (114) for making the injector a set.
12. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a solenoid valve (129) for injecting the vaccine and removing the scales.
13. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; an injector body (118) where the injector capsule is seated.
14. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; an injector lug (119) where injector head is fixed.

15. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; an injector head magnet and spring (117) positioned on the injector.
- 5 16. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a reset button (127) for resetting the received number at the end of the day and adjusting the fish vaccination machine (100) for the next day.
17. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a sensor frame (106) for fixing the color sensor (125) and the omron sensor (126).
- 10 18. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a junction box (122) where all electrical connections are collected.
19. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a cable duct (123) carrying the cables of the color sensor (125) and the omron sensor (126) to the junction box (122).
- 15 20. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; motor and sensor sockets (128) positioned on the junction box (122) for receiving power.
21. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; input sockets in the box (134), which correspond to the socket where the belt motor (105), injector motor (109), valve socket, color sensor (125) and omron sensor (126) are installed.
- 20 22. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; plastic holding apparatus (133) positioned on the profile housing (120) for transporting the fish vaccination machine (100).
- 25 23. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a supply socket (131) for electrical power supply.
24. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; an air connector (130) for fixing the air hoses.

25. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; a main board (136) positioned in the junction box (122) to control the entire operating system.
- 5 26. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; V slot wheel (138) moving on the v slot profile for the injector to move.
27. The fish vaccination machine (100) according to claim 1, **characterized by comprising**; drum shaft (139) passing through the drum (103).

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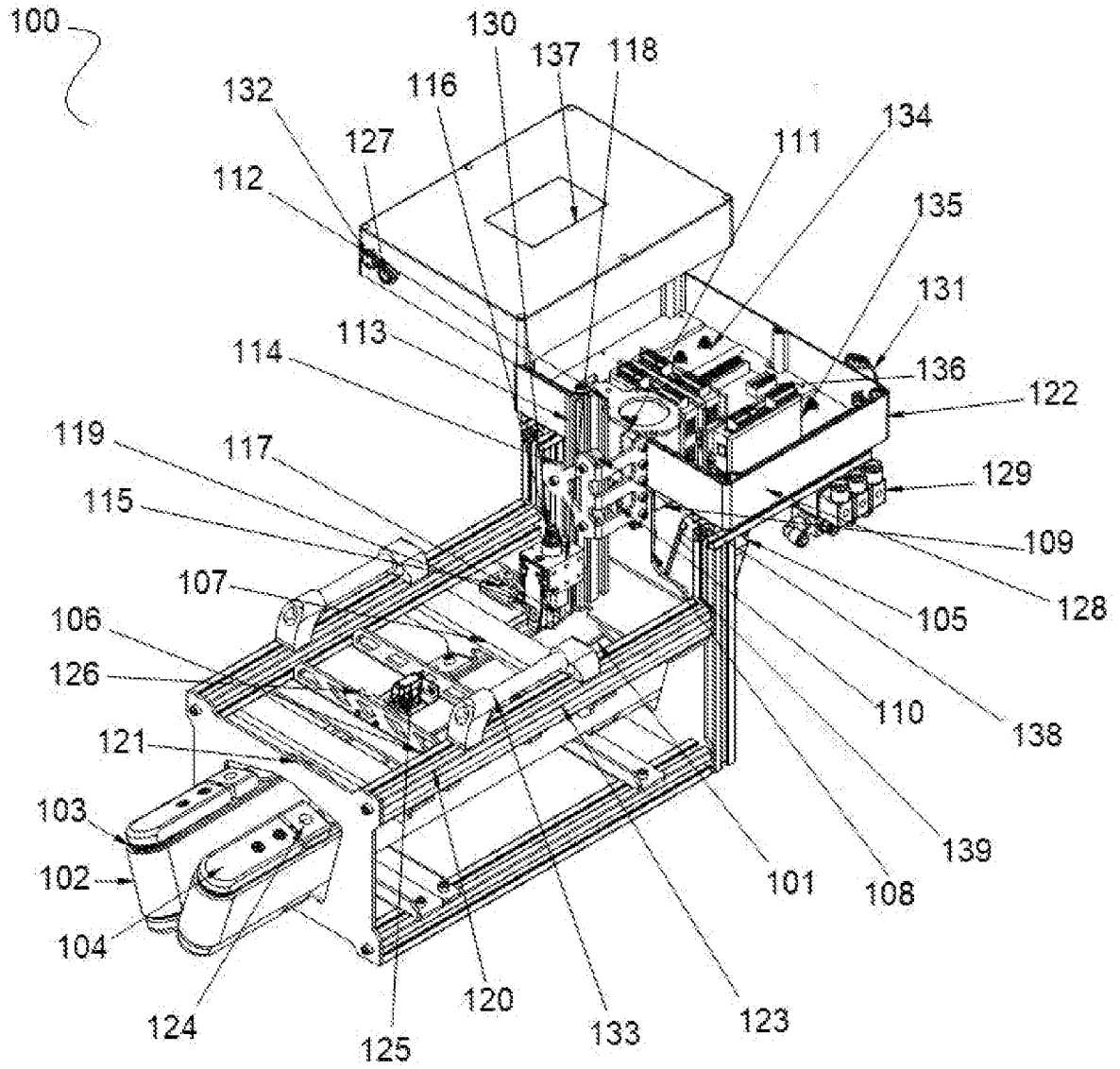


Figure-1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/TR2023/051157

A. CLASSIFICATION OF SUBJECT MATTER		
A01K 61/00 (2017.01)i; A61D 7/00 (2006.01)i		
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) A01K; A61D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched TURKPATENT Database		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, EPO English Full-text databases		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2601167 A (AQUALIFE SERVICES LTD [GB]) 25 May 2022 (2022-05-25) Abstract, Description: page 7-9, 12, 13, Figures	1-27
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<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
<p>* Special categories of cited documents:</p> <p>“A” document defining the general state of the art which is not considered to be of particular relevance</p> <p>“D” document cited by the applicant in the international application</p> <p>“E” earlier application or patent but published on or after the international filing date</p> <p>“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>“O” document referring to an oral disclosure, use, exhibition or other means</p> <p>“P” document published prior to the international filing date but later than the priority date claimed</p> <p>“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>“&” document member of the same patent family</p>		
Date of the actual completion of the international search 17 January 2024		Date of mailing of the international search report 17 January 2024
Name and mailing address of the ISA/TR Turkish Patent and Trademark Office (Turkpatent) Hipodrom Caddesi No. 13 06560 Yenimahalle Ankara Türkiye Telephone No. +903123031000 Facsimile No. +903123031220		Authorized officer Şafak PAK BEYİN Telephone No. +903123031213

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