

Sept. 26, 1933.

C. GARLAND

1,928,418

AQUATIC DEVICE

Filed Jan. 6, 1933

2 Sheets-Sheet 1

Fig. 1

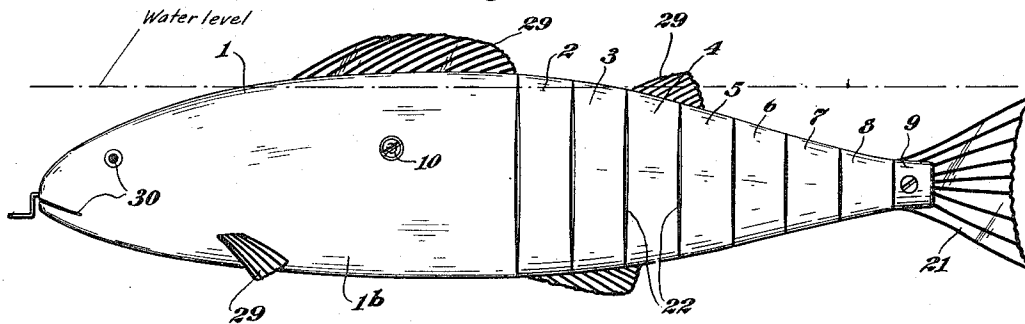


Fig. 2

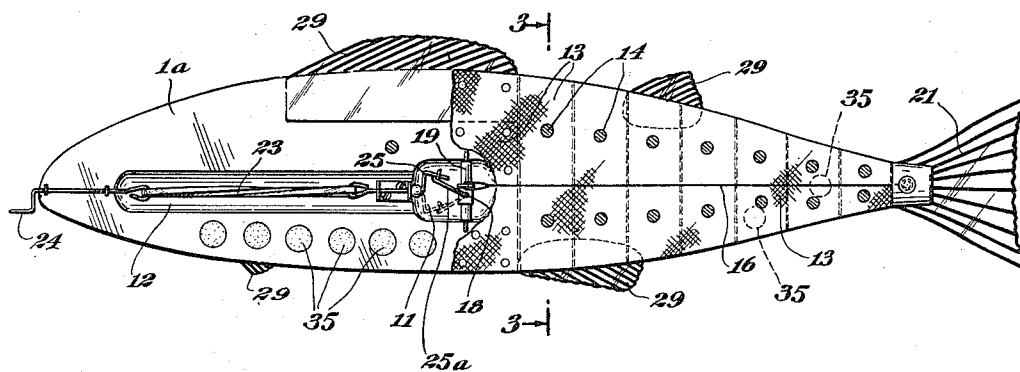


Fig. 3

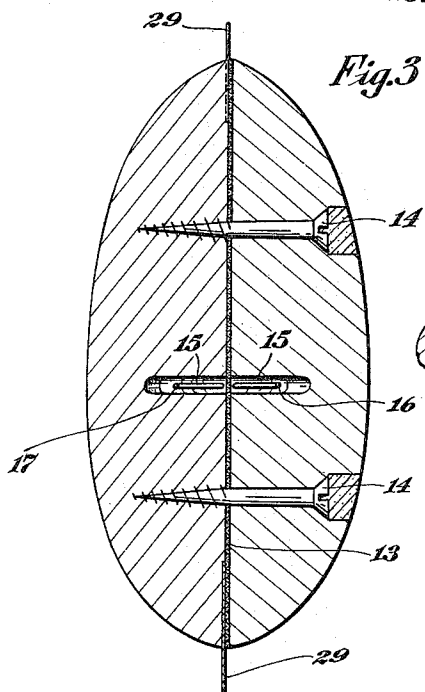
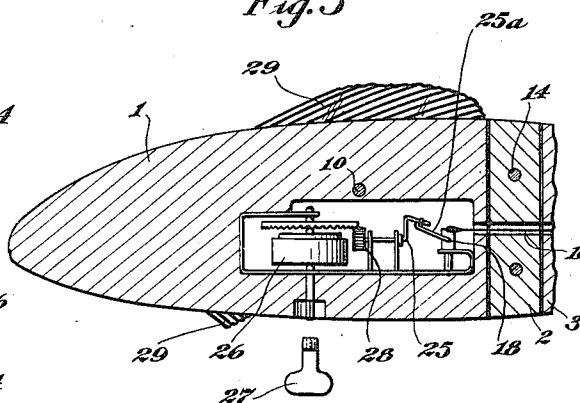


Fig. 5



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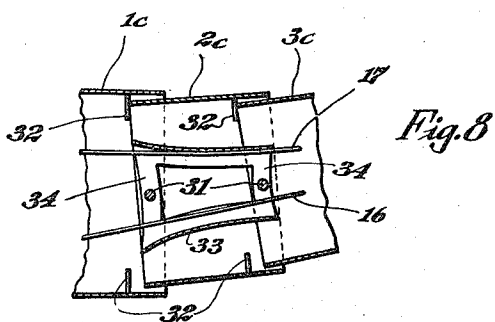
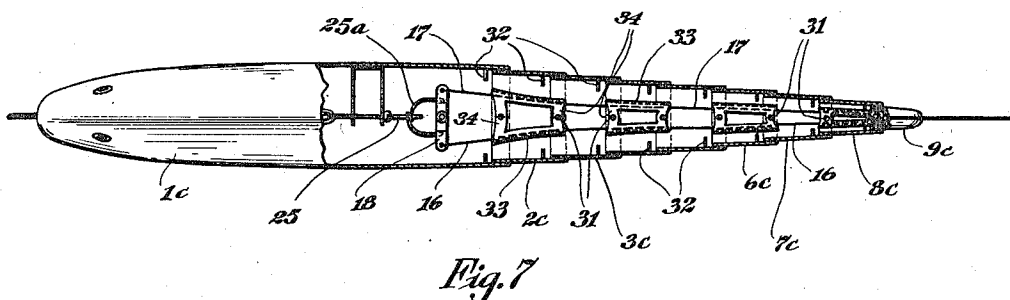
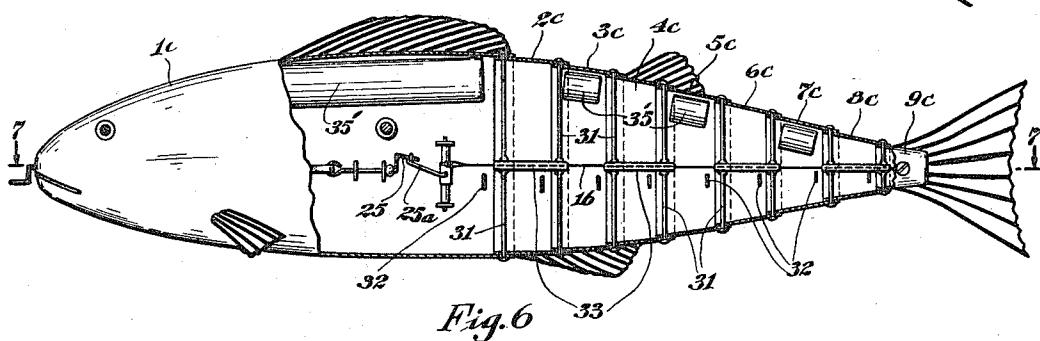
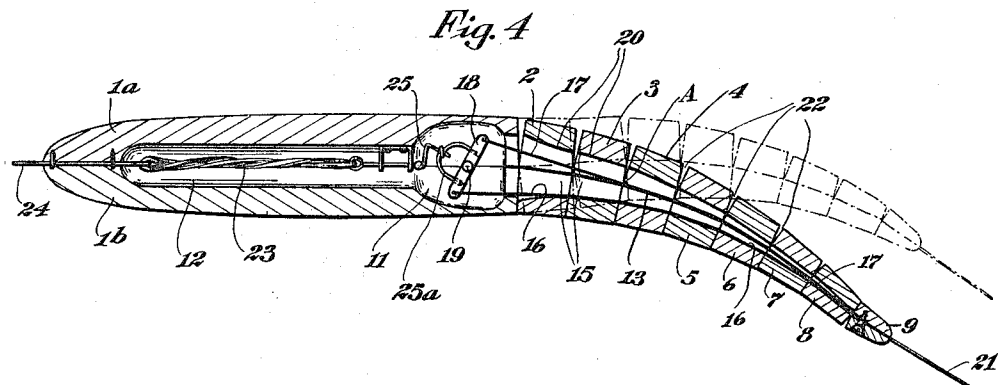
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

1,928,418

AQUATIC DEVICE

Charles Garland, Bronx, N. Y.

Application January 6, 1933. Serial No. 650,459

11 Claims. (Cl. 46—40)

My present invention relates to aquatic devices such as imitation fish and comprises a device of this type adapted to be propelled in liquid by lateral movement of parts thereof.

One object of the invention is to provide a toy fish that can be automatically propelled in water by movements closely simulating the swimming movements of real fish.

Another object of the invention is to provide in an aquatic device a novel combination of parts which may be used to insure efficient forward movement in water of the device by successive relative movements of articulated parts thereof.

A further object of the invention is to provide a toy fish that may be economically manufactured from relatively inexpensive materials.

I have found that an efficient forward movement in water or other liquid substantially simulating the swimming motion of a fish may be given to a device, such as a toy fish, if about half of the device is made up of a plurality of articulated sections and if means are provided not only to control the extent of lateral movement of each section relative to each other and to the front half of the device but also to so control the order of movement of each section as to insure successive movements of each section beginning with that adjacent the front half thereof. Although toy fishes have heretofore been proposed which were intended to be automatically propelled by lateral movement of one or of a plurality of sections, none, so far as I am aware, have been so constructed as to insure the proper succession of motions required and above briefly described for efficient forward movement simulating the actual swimming motions of fish.

For a better understanding of the invention reference may be had to the accompanying drawings of which:

Fig. 1 is a side view of a toy fish embodying the invention;

Fig. 2 is a vertical sectional view of the fish of Fig. 1;

Fig. 3 is an enlarged transverse sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a horizontal sectional view of the fish of Fig. 1, illustrating in full and dotted lines successive positions of the tail sections during forward movement of the fish;

Fig. 5 is a fragmentary view illustrating another type of motor utilizable with the fish of Figs. 1 to 4;

Fig. 6 is a vertical sectional view of a toy fish

embodying the invention and made from stamped metal parts;

Fig. 7 is a horizontal sectional view taken along the line 7—7 of Fig. 6; and

Fig. 8 is an enlarged detail view of some of the tail sections of the fish of Figs. 6 and 7, showing the parts in displaced position.

The toy mechanical fish illustrated in Figs. 1 to 4 inclusive is constructed of wood and comprises a head and body portion 1 and a plurality of tail sections 2 to 9 inclusive. The head and body portion 1 includes a right hand and left hand portions 1a and 1b respectively which are suitably secured together, when the fish is assembled as by a screw 10. Cooperating cavities within the head portions 1a and 1b provide a chamber 11 and a longitudinal central groove 12. Secured to the inner surface of portion 1a adjacent the rear thereof is a sheet of rubberized cloth or canvas 13 which extends rearwardly from the head portion and to which the tail sections 2 to 9 are secured as by screws 14.

Each tail section is so shaped externally to permit of a limited angular movement relative to the next preceding section and each section is provided internally with horizontal slots 15 extending outwardly from the junction with the flexible sheet 13. These slots are for reception and guidance of wires 16 and 17 which are secured to the end section 9 and are connected to opposite ends of the rocker arm 18 mounted in chamber 11 for horizontal movement about an axis 19. As shown best in Fig. 4 the depth of the slots 15 vary, decreasing in magnitude from section 2 to the extremity of the fish. In sections 2 and 3 the end walls of slots 15 define curved surfaces 20 concave to the surface of sheet 13. The variation in depth of the slots is provided for the purpose of taking up the slack in the wire when the tail sections are in either extremity of their range of movement and to assist in obtaining the proper sequence of movements of the tail sections. This will be apparent from a study of Fig. 4 which illustrates in full lines the position of the tail section and controlling wires at one extreme position and in dotted lines a subsequent position of the parts. With the tail swung fully to the left, as indicated, wire 16 lies along the extremities of the slots 15 and wire 17 within sections 4 to 9 lies along the surface of sheet 13 and forwardly from the point A in the plane of that part of the sheet 13 to which section 4 is secured. This position of wire 17 insures that when arm 18 is rocked by mechanism hereinafter described, section 2 and

thereafter section 3 will be rotated about the head portion 1 and section 2 respectively into the position indicated in dotted lines in Fig. 4. Sections 4 to 9 will move first with section 2 and then with section 3 but no relative movement between successive sections will occur because the pull of the wire in each of these sections was in the plane of the portion of sheet therein. When the parts assume the dotted line position, a turning moment will now be exerted upon section 4 but not upon the remaining sections within which wire 17 still lies upon the surface of sheet 13. The turning of section 4 about section 3 carries sections 5 to 9 therewith. Sections 5 to 8 inclusive are thereafter successively moved about each other in the same manner as above described for sections 2, 3 and 4. Section 9 does not move relatively to section 8 until the reverse movement of the tail is initiated at which time it swings over to its extreme position by the force of the water or other liquid in which the toy is propelled. This whole succession of motions which is initiated each time arm 18 is rocked from one to another of its extreme positions gives a powerful forward motion to the device and gives a most life-like appearance to the toy. Attached to section 9 and extending rearwardly therefrom is a caudal fin 21 of celluloid or the like, which, because of its relatively large area and also because of the powerful flipper movement given thereto by the above described successive movements of the tail sections creates the major portion of the forward push upon the fish.

To insure proper operation of the tail sections as above described the depth of slots 15 should be so proportioned with relation to the length of rocker arm 18 and with reference to the relative angular movement permitted between adjacent sections by the cut away portions 22 as to insure free lateral movement of the wires and to make provision for taking up the slack in the wires at each successive position of the tail sections.

In the particular embodiment of the invention illustrated, the means for rocking arm 18 include a crank 25 which is mounted for rotation about a horizontal axis. The arms of crank 25 form an acute angle. One arm rotates in a vertical plane and the other has slidably mounted thereon a loop of wire 25a, the opposite ends of which are connected to the ends of arm 18. This arrangement gives sufficient lost motion between crank 25 and arm 18 to insure rocking of the arm from one extreme position to the other twice for each complete rotation of the crank. Crank 25 may be rotated automatically by any suitable well-known means.

For example, as indicated in Fig. 2 the driving means may comprise a heavy elastic 23 located in groove 12 one end of which is adapted to be twisted by a winder 24 operable from the exterior of the fish and the other end of which is coupled to crank 25 to impart rotation thereto. Instead of the simple driving means above described a coiled spring type of motor 26 operable by a key 27 may be provided as indicated in Fig. 5, in which case the axis of crank 25 may carry a pinion gear 28 driven by a gear of the motor.

When the mechanical fish is of wood, as in the embodiment of Figs. 1 to 5 inclusive, it may be found necessary to weight portions of the fish not only to insure proper balance of the parts but also to prevent the fish from floating on the

surface. Weighting may be effected in any desired manner. For example, parts of the head portions 1a and 1b could be cut out and lead sections substituted therefore and lead slugs could be inserted in one or more tail sections as desired. A toy fish of wood having substantially the proportions of that illustrated in Figs. 1 to 4 inclusive and weighted as indicated at 35 in Fig. 2 was constructed and found to swim substantially submerged in water; the fish taking the position relative to the water level indicated in Fig. 1.

To increase the life-like appearance of the device celluloid or the like fins 29 may be secured thereto and eyes and mouth 30 can be painted on the external surface as indicated in Fig. 1.

In Figs. 6 and 7 a mechanical fish constructed of stamped metal parts is illustrated. In this embodiment of the invention the separate tail section 2c-9c inclusive are secured together and to the head portion 1c by vertical pins 31 about which their relative rotation occurs. To limit the extent of relative movement between the parts, ears 32 are stamped from the side walls of each section and bent inwardly to provide stops for the next succeeding section. A series of channels 33 carried by pairs of pins 31 by horizontally extending portions 34 of graduated length serve the purpose of the graduated slots 15 of Fig. 4 in guiding the operating wires 16 and 17 and in taking up the slack therein. It is ordinarily sufficient to provide channels in alternate sections only, as indicated.

The operation of the fish illustrated in Figs. 6 and 7 will be readily understood without further description as its operation is substantially identical with that of the device illustrated in Figs. 1 to 4 inclusive.

In making the device of metal, means may be required to prevent sinking in water and to balance the device properly. Such means may conveniently comprise sealed tubes 35' containing air and suitably positioned in the head portion and in one or more tail sections.

My invention has now been described with particular reference to its embodiment in toy or imitation fish of wood or metal. In each embodiment of the invention illustrated means including laterally and longitudinally movable operating wires and articulated sections having predetermined range of relative lateral movement have been provided to insure powerful forward movement of the device by successive movements of the sections. In one embodiment of the invention free lateral movement of the operating wires was provided by longitudinal slots. In the other embodiment of the invention illustrated horizontally supported guide channels provided the equivalent of the horizontal slots. These means for insuring proper forward propulsion in water or other liquid, could of course, be advantageously employed in aquatic devices other than toy fish and hence the appended claims, unless otherwise specifically limited, are intended to include any aquatic device with which the invention could be advantageously employed.

The term "wires" as used herein and in the appended claims is intended to include any flexible non-elastic means such as chains or cords.

I claim:

1. An aquatic device comprising in combination a body portion having a rocker arm therein adapted to be rocked about a vertical axis, a plurality of tail sections laterally movable relative to said body portion and to each other, and a pair

of wires extending from opposite ends of said arm through said tail sections and secured to that section most remote from the body portion, said wires being laterally and longitudinally movable within said tail sections.

2. A device according to claim 1 including means carried by said body section for automatically rocking said arm.

3. A device according to claim 1 including a crank mounted within said body portion and having arms set at an acute angle to each other, means coupling one of said arms to said rocker arm to cause rocking thereof upon rotation of said crank about an axis perpendicular to the other arm thereof and means also in said body portion for so rotating said crank.

4. An aquatic device adapted to be propelled in water by successive lateral movements of parts thereof comprising in combination a body part, a plurality of tail sections laterally movable throughout a predetermined range relative to said body portion and to each other, a rearwardly extending fin-like member secured to the section most remote from said body portion, a rocker arm within said body portion and wires secured to opposite ends of said arm and connected through said tail sections to said most remote section for causing successive lateral movement of said sections upon rocking of said arm, said tail sections being so constructed as to permit lateral movement of each of said wires outwardly from the central vertical plane thereof.

5. A mechanical fish comprising in combination a body portion, a plurality of tail sections laterally movable with respect to said body portion, a rocker arm positioned within said body portion for movement about a vertical axis, a pair of wires extending from opposite ends of said arm through said tail sections and secured to said most remote section, means in said tail sections to guide said wires upon movement of said arm to cause successive lateral movements of said tail sections and a motor within said body portion coupled to said arm for rocking the same to cause said mechanical fish to be propelled through liquid with movements simulating a live fish.

6. A mechanical fish according to claim 5 wherein said body portion and tail section are

made of wood and wherein each tail section comprises two equal parts which are mounted on a flexible vertically disposed sheet secured to said body portion, and wherein each part of each section is provided with a horizontal slot extending outwardly from said sheet and decreasing in length from front to rear of the tail, the surfaces forming the end walls of said slots together with said flexible sheet providing the said means for guiding said wires.

7. A mechanical toy fish according to claim 5 wherein said body portion and tail sections are hollow and are made of metal and wherein the sections are of graduated size and are secured together by vertical pins, said pins, together with means carried thereby serving to guide said wires.

8. A mechanical fish according to claim 5 including a fin-like sheet of celluloid or the like secured to the most rearward tail section and extending rearwardly therefrom in a vertical plane whereby, when said sections are moved, a flipper action is given to said sheet tending to push the fish forward.

9. A mechanical fish comprising a hollow body and head portion of metal and a plurality of hollow metal tail sections, vertically disposed pins so securing the sections together and to the body portion as to permit relative lateral movement therebetween, a rocker arm in said head and body section movable about a vertical axis, a pair of wires secured to opposite ends of said arm and connected to the most rearward tail section, said wires extending through said sections at opposite sides of said pins, and means within said body portion for rocking said arm.

10. A mechanical fish according to claim 9 including means within said head and body portion and within at least one tail section for adding buoyancy to said fish and for insuring balance thereof, said means including water tight tubes adapted to contain air.

11. A mechanical fish according to claim 9 wherein means within said tail sections and supported by said pins are provided for guiding said wires and for taking up the slack therein at either extreme position of said sections.

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