March 7, 1967 H. O. PEDERSEN 3,307,290

TOY HYDROJET OUTBOARD MOTOR

Filed June 9, 1964

FIG 1

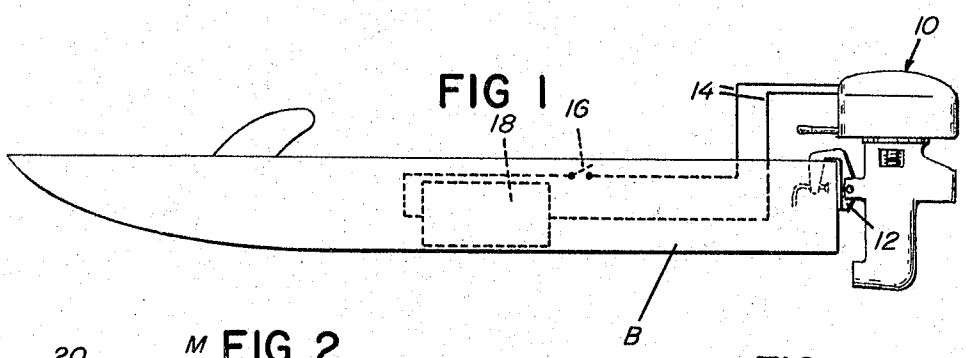


FIG 2

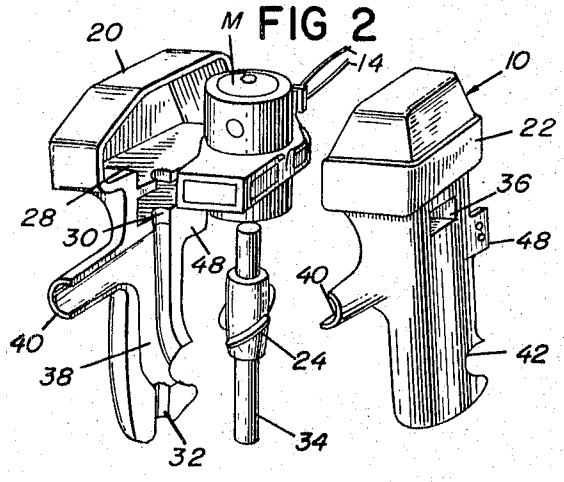


FIG 3

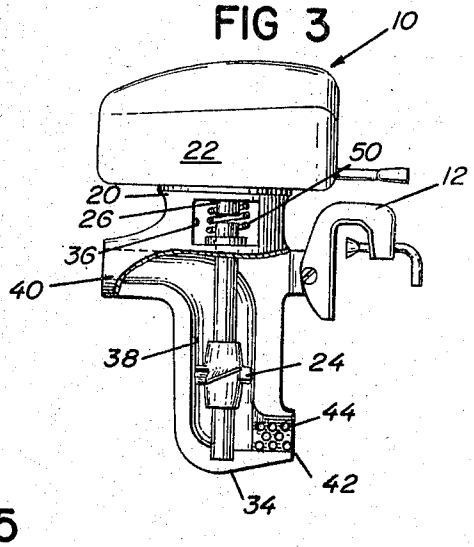


FIG 4

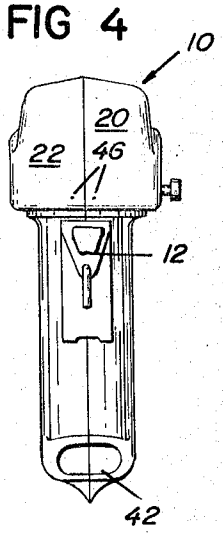


FIG 5

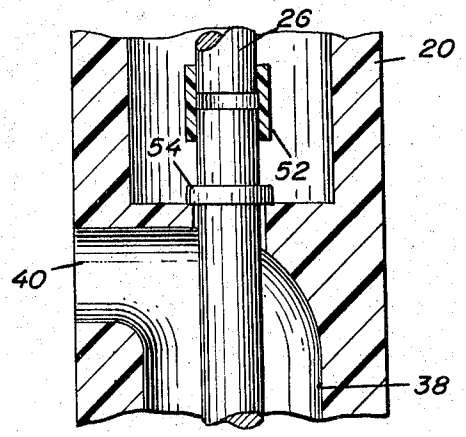
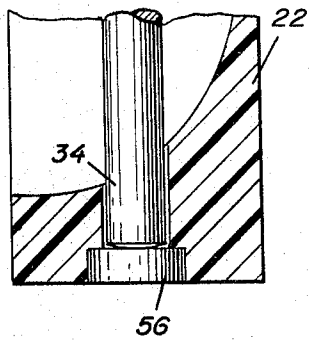


FIG 6



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TOY HYDROJET OUTBOARD MOTOR

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This invention relates generally to aquatic toys and more particularly to a toy hydrojet outboard motor for use with toy boats.

Toy outboard motors for toy boats are known in the art but as a whole, are characterized by one or more objectionable features: among these are: a complexity of design requiring many small parts, each subject to early failure and a propeller which is easily bent or broken by children; a special toy boat modification or design where jet propulsion is used and/or added structure such as steam generators to force water through the jets; a poor design in general so that the inherent hydraulic losses in pump and conduits absorb the major portion of the provided power with resultant inadequate propulsion of even a toy boat; the use of invisible underwater jets so as to be less attractive to a child than a spinning propeller blade; and an impractical construction rendering the toy overly expensive, difficult to manufacture and assemble, and fragile and of short life in use.

Accordingly, the main object of the present invention is to provide an improved toy outboard motor for toy boats which will obviate the above and other objectionable features characterizing known structures.

An important object of the present invention is to provide a toy outboard motor for toy boats which will provide improved propulsion therefor and at the same time be more attractive to children.

Another important object of the present invention is to provide a toy hydrojet outboard motor for toy boats in which the jet stream is visibly discharged therefrom above the surface of the water so as to constitute a more animated toy and constitute an added attraction for children.

A further important object of the present invention is to provide an improved toy hydrojet outboard motor for toy boats which comprises an absolute minimum number of parts so as to be readily and economically manufactured, and sturdy and of long life in use.

A still further important object of the present invention is to provide an improved toy hydrojet outboard motor for toy boats which comprises a casing defining a fluid conduit including an underwater inlet and an above water outlet nozzle, a support for a driving motor including a shaft, and an enclosure for a fluid pump fixed to the shaft as a part of the fluid conduit.

Another important object of the present invention is to provide an improved toy hydrojet outboard motor for toy boats comprising a pair of connected, longitudinal, symmetrically opposite, complementary halves cooperating to define bearing supports and an enclosure for an axial flow impeller, the enclosure having communication with a below water inlet and above water discharge nozzle, and a support for a driving motor connected to the impeller.

Other objects and advantages of the present invention will become apparent during the course of the following description.

In the drawings I have shown several embodiments of the invention. In these showings:

FIGURE 1 is a side elevational view of the invention in operative position for propelling a toy boat in the water;

FIGURE 2 is an exploded perspective view to an enlarged scale of the invention showing its symmetrically opposite complementary casing halves;

FIGURE 3 is a side elevational view with a part of one of the casing halves omitted to show the mounting of the impeller in the axial flow passage;

FIGURE 4 is a rear elevational view of the invention;

FIGURE 5 is a fragmentary, central sectional view of a modified form of shaft coupling; and

FIGURE 6 is a similar view of a modified form of thrust washer.

Referring to FIGURE 1 of the drawings, numeral **10** designates the toy outboard motor as a whole which is adapted to be attached by a clamp **12** to the transom of a boat B. While the outboard motor may be powered by a model airplane engine, for purposes of illustration, it is shown herein as powered by a small D.C. motor M electrically connected by wires **14** and a switch **16** with one or more batteries **18** mounted in the boat B.

As illustrated in FIGURE 2, the outboard motor **10** comprises a casing formed of two longitudinal symmetrically opposite, complementary halves **20, 22** (so that only one need be described); the motor M; an axial flow impeller **24** mounted on the shaft **26** of the motor; and the mounting clamp **12**, a total of four major parts.

Each casing half as indicated by the half **20** is formed to include its respective half of an enclosure for and a supporting shelf **28** for the motor M; an upper bearing **30** to accommodate the vertical motor shaft **26**; a lower bearing **32** to accommodate the lower end **34** of the impeller shaft; a side opening **36** to form a shaft leakage drainage path so that water will not be forced into the motor M; an enclosure **38** for the impeller **24** which also constitutes a low hydraulic loss flow path between the outlet discharge nozzle **40** and the inlet opening **42**, which may be provided with an inlet screen **44** to prevent particles from entering the flow path and jamming the impeller; motor enclosure openings **46** for the wires **14**; and a bracket **48** for reception of the clamp **12**.

It will be appreciated that all of the parts with the exception of the motor M, may be readily injection molded from a suitable plastic to include the described structural features and thus provide a maximum of simplicity and economy of structure and in its manufacture.

The impeller **24** may be directly mounted on the motor shaft **26** as shown in FIGURE 2, or a flexible coupling may be employed to eliminate any possibility of binding of the impeller shaft due to any misalignment of the shafts. One form of such coupling is disclosed in FIGURE 3 wherein a spring **50** is employed to couple the motor shaft **26** and the shaft of the impeller. Another form of such coupling is illustrated in FIGURE 5 wherein a section of plastic shrink tubing **52** is employed.

As seen in FIGURE 5, a thrust collar **54** is fixed to the shaft of the impeller **24** to position it axially and to form a face seal for the purpose of reducing the amount of water leaking out along the shaft from the impeller enclosure **38**. However, a preferred means of taking up the shaft thrust is disclosed in FIGURE 6 in the use of the thrust washer **56** which is fixed to and within the lower end **34** of the impeller shaft. This simplifies the impeller shaft structure which also is thus subject to less rotary friction losses although there is more leakage of fluid to the outside or opening **36**.

As is readily apparent from the drawings, when the outboard motor **10** is assembled and the two halves **20, 22** bonded together, the motor **10** presents a streamlined airfoil-type cross-section offering a minimum drag in the water.

In operation, as is believed to be apparent, when the switch **16** is closed to operate the driving motor M, the impeller **24** draws in water at the bottom inlet opening **42** and visibly expels it at high velocity through the

discharge nozzle **40** which is above the water line, thus generating a forward thrust which propels the toy boat B through the water.

As used in the specification and claims, the term "boat" is intended to include any toy raft, float, etc., to which the toy outboard motor **10** may be attached to propel it through or on the surface of water.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departure from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A toy hydrojet outboard motor for attachment to toy boats to propel them in water comprising, in combination; a casing formed of a pair of longitudinal, symmetrically opposite, complementary abutting halves defining an upper enclosure, a lower enclosure having a communicating inlet positioned below the surface of the water and a discharge nozzle visibly positioned above said surface; an axial flow impeller rotatably mounted in said lower enclosure; and a driving motor supported in said upper enclosure and connected to said impeller to rotate said impeller, draw water in the inlet, and expel it at high speed through said nozzle to provide a forward impelling thrust; said casing including means forming an

opening spacing said upper and lower enclosures to form a water drainage path to protect said motor against water leakage from said lower enclosure.

2. The combination recited in claim **1** wherein a flexible coupling connects said impeller and said driving motor to eliminate binding upon their misalignment.

3. The combination recited in claim **2** wherein said coupling comprises a coil spring.

4. The combination recited in claim **2** wherein said coupling comprises plastic shrink tubing.

5. The combination recited in claim **1** wherein a thrust collar is fixed to said impeller and bears against said lower enclosure to prevent leakage of water to said driving motor from said enclosure.

6. The combination recited in claim **1** wherein a thrust washer is mounted in said lower enclosure, and said impeller is rotatably supported thereon.

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