Jan. 23, 1962 C. R. BISHOP 3,017,848

BOAT PROPULSION UNIT

Filed Nov. 14, 1960

Fig. 1

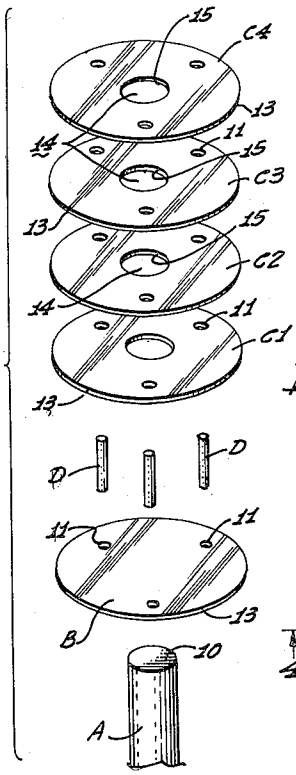


Fig. 2

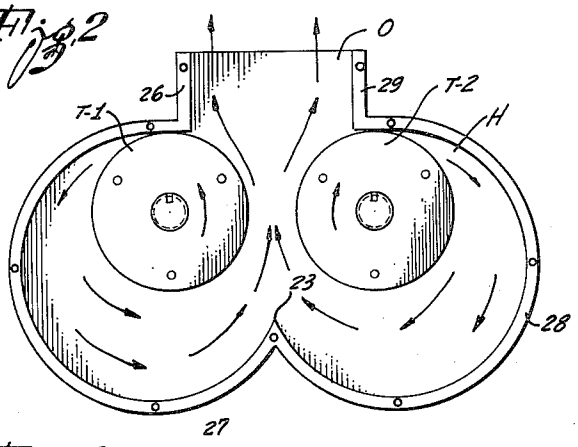


Fig. 3

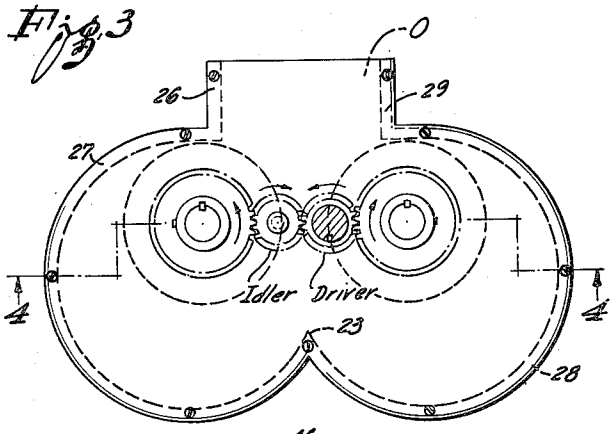


Fig. 4

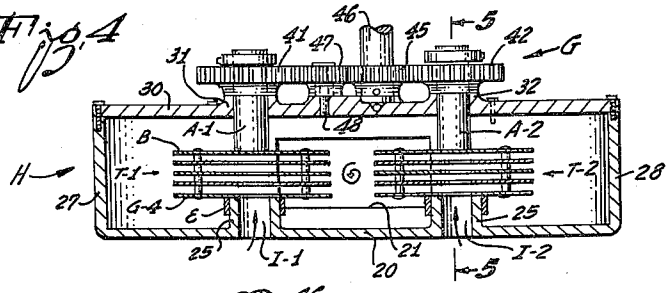
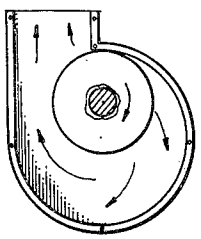


Fig. 6



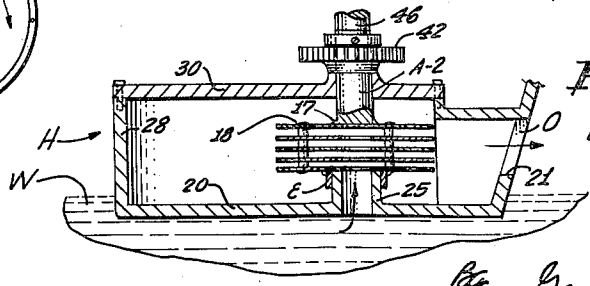


Fig. 5

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BOAT PROPULSION UNIT

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8 Claims. (Cl. 115—16)

The present invention relates to a boat propulsion unit utilizing a pair of oppositely rotating turbines which receive water from two laterally spaced positions beneath the boat, raise the water vertically, and then discharge it rearwardly in a single composite stream.

One object of the invention is to provide a novel, highly efficient boat propulsion unit.

Another object of the invention is to provide a boat propulsion unit which operates with laminar water flow and in which the moving parts are therefore not subject to cavitation.

The above and other objects and advantages of the invention will be more fully understood from the following description considered in conjunction with the accompanying drawing, in which:

FIGURE 1 is an exploded perspective view of a turbine wheel used in the invention;

FIGURE 2 is a horizontal cross-sectional view of a presently preferred embodiment of the invention;

FIGURE 3 is a top plan view of the propulsion unit of FIGURE 2;

FIGURE 4 is a vertical cross-sectional view taken on the line 4—4 of FIGURE 3;

FIGURE 5 is a vertical cross-sectional view taken on the line 5—5 of FIGURE 4; and,

FIGURE 6 illustrates an alternate form of the invention.

The propulsion unit of the present invention utilizes turbine wheels of a type that tend to throw fluid radially outwardly from the entire wheel circumference. In the embodiments of the invention presently illustrated and described a particular kind of turbine wheel has been used, sometimes known as a Tesla turbine, which will first be described in detail, with reference to FIGURE 1.

A plurality of flat circular blade members are mounted in concentrically aligned, longitudinally spaced relationship to form a turbine wheel, a shaft being attached to the blade member at one end of the wheel. Central openings are provided in at least some of the blade members to permit fluid entry or exit. An annulus-shaped fluid chamber is therefore provided between each two adjacent blade members, and fluid flows radially inwardly or outwardly through each of these chambers as the turbine wheel rotates. Spacing means are utilized for supporting each blade member from the adjacent blade member, the arrangement of the spacing means being such as to interfere very little with the fluid flow.

Referring now to FIGURE 1 of the drawing, the turbine wheel includes a shaft A attached to a first blade member B, and a plurality of other blade members C which are supported from the blade member B. Spacing pins D provide spacing as well as rigid support of the blade members C.

Shaft A has a flat end 10 which abuts one surface of upper blade member B in concentric alignment therewith, being secured by a circumferential weld 17. Blade member B is provided with three relatively small mounting holes 11 which are circumferentially spaced 120° apart and which are located rather near to the outer circumferential edge 13 of the blade member B. Blade members C are provided with similar mounting holes 11, their outer circumferential edges also being identified as 13. The various blade members C are designated C1, C2, C3, C4, the blade member C1 being next to blade member B while the blade member C4 forms the other and lower end of the turbine wheel. Each of the blade members C has a concentric opening 14 therein which forms an inner circumferential edge 15 of the blade member.

Spacing pins D are adapted to fit the mounting holes 11 rather tightly so as to support the blade members C from the blade member B. Each pin is welded on each side of each blade member by means of a circumferential weld 18.

Referring now to FIGURES 2 through 5 the over-all organization of the propulsion unit of the present invention will be described. A housing H is horizontally disposed and has a substantially flat bottom wall, the main portion of the housing forming a double involute configuration in a parallel plane above the bottom wall. A pair of turbine wheels T–1, T–2 are respectively disposed at the focal points of the involute portions of the housing, each turbine wheel being rotatably supported from a corresponding vertically disposed shaft carried by the housing H. Drive means G located external to and above the housing H is operatively coupled to both shafts for rotating the turbine wheels concurrently in opposing directions. Separate inlet openings I–1, I–2 are formed in the bottom wall of housing H beneath respective turbine wheels T–1, T–2. A single discharge or outlet port O is formed in the rearward part of housing H intermediate to the turbine wheels T–1, T–2.

While the drive means and turbine wheels could be operated in a reverse direction it is intended that they be operated in a particular direction, in which the rotation of the turbine wheels and gear drive wheels, and the flow of fluid at various points in the propulsion unit, are all as indicated by various arrows. It is considered unnecessary to identify the arrows by reference numerals, since they all indicate the same thing, namely the direction in which the turbine wheels are intended to be driven and the resulting direction in which fluid is caused to flow. Briefly, water lying beneath the propulsion unit enters the inlet openings I–1 and I–2, is raised vertically upwardly by the turbine wheels T–1 and T–2, is thrown radially outwardly in all directions from each turbine wheel, is collected and directionalized by the corresponding involute portion of the housing, and the fluid streams generated by the two turbine wheels then converge in a space between the turbine wheels and flow rearwardly in a single stream and out of the discharge port O.

In the preferred mode of using the invention, as illustrated specifically in FIGURE 5, a jet propulsion effect is achieved. As shown in FIGURE 5 the bottom wall 20 of the horizontal housing H lies somewhat below the surface of a body of water W in which the propulsion unit is utilized. At the same time the lower edge 21 of discharge port O lies somewhat above the water surface, hence the discharge stream of water is initially resisted only by atmospheric pressure of a normal value.

Each of the inlet openings I–1 and I–2 is provided by the interior wall of a vertically extending short open-ended cylinder 25 integrally formed with bottom wall 20 of housing H. A short cylindrical member E is concentrically affixed, as by welding, to the under surface of bottom blade member C4 of each turbine wheel. The inner diameter of cylinder 25 corresponds approximately to the diameter of openings 14 in the blade members, while the diameter of cylindrical member E is such as to rotate freely about the outer circumferential surface of cylinder 25. The under surface of blade member C4 adjacent opening 14 thereof also provides a bearing surface on the flat upper end of cylinder 25.

Housing H has a vertical outer wall whose various portions are identified as 26–29. Wall portions 26 and

29 extend parallel to each other at the rearward end of housing H on opposite sides of the discharge port O. Wall portions 26 and 29 are of equal length and coextensive. Cylinders 25 of the inlet openings I–1 and I–2 lie at equal distances in front of the respective wall sections 26, 29. However, the horizontal separation between the inlet openings is somewhat greater than between the wall sections 26 and 29. Wall section 27 defines an involute configuration commencing at the forward end of wall section 26 with opening I–1 as its focal point, and continues outwardly and forwardly and then inwardly and rearwardly to a point 23 which lies on the longitudinal center line of housing H. In a similar manner the wall section 28 defines an involute configuration commencing at the forward end of wall section 29 and terminating at point 23 with opening I–2 as its focal point.

Reference is now made particularly to FIGURES 3 and 4 wherein the drive mechanism G is illustrated. The shaft of turbine wheel T–1, designated A–1, extends through a bearing 31 provided in upper wall 30 of housing H, and carries on its upper end a gear wheel 41 keyed or splined to the shaft. Shaft A–2 of turbine wheel T–2 extends similarly through bearing 32 and carries a fixed gear wheel 42. A drive gear 45 carried by a drive shaft 46 directly engages gear wheel 42, and an idler gear 47 rotates upon an idler shaft 48 carried by upper housing wall 30 and engages gear wheels 45 and 41. Gear wheels 41 and 42 are identical, whereby the turbine wheels rotate at the same speed although in opposite directions.

FIGURE 6 illustrates an alternate form of the invention utilizing only a single turbine wheel, and a housing having only a single involute wall portion.

The invention has been described in considerable detail in order to comply with the patent laws by providing a full public disclosure of at least one of its forms. However, such detailed description is not intended in any way to limit the broad features or principles of the invention, or the scope of patent monopoly to be granted.

I claim:

1. A boat propulsion unit comprising, in combination: a horizontally disposed housing having a substantially flat bottom wall, the main portion of said housing forming a double involute configuration in a parallel plane above said bottom wall; a pair of vertically disposed shafts each being rotatably supported from said housing at the focal point of one of said involute portions thereof; a pair of turbine wheels that during operation thereof tend to throw fluid radially outwardly from the entire wheel circumference, each of said turbine wheels being concentrically supported from a corresponding one of said shafts; drive means operatively coupled to said shafts for rotating said turbine wheels concurrently in opposing directions, the action being such that fluid streams flowing radially outwardly from said turbine wheels converge in a space between said turbine wheels into a single rearwardly flowing stream; a separate inlet opening formed in said housing bottom wall for each of said turbine wheels; and a single discharge port formed in the rearward part of said housing intermediate to said turbine wheels.

2. A boat propulsion unit as claimed in claim 1 in which each of said turbine wheels comprises a plurality of circular flat blade members of substantially equal diameters; spacing means supporting said blade members in concentrically aligned, longitudinally spaced relationship, all except the upper end one of said blade members having aligned central openings therein whereby a plurality of annulus-shaped fluid chambers are formed which are open at both their inner and outer radial extremities; and means concentrically supporting said upper end blade member from the lower end of the associated shaft;

the corresponding inlet opening in said housing bottom wall being aligned with said central openings of said blade members.

3. A boat propulsion unit as claimed in claim 1 in which each of said turbine wheels comprises a plurality of concentrically aligned, longitudinally spaced circular flat blade members having aligned central openings formed in some of said blade members for receiving fluid from the associated inlet opening of said housing.

4. A boat propulsion unit as claimed in claim 3 in which said blade members are supported by spacing means including three elongated pins each passing through an associated opening in each blade member and welded to the circumferential edge thereof.

5. A boat propulsion unit comprising, in combination: a pair of turbine wheels that during operation thereof tend to throw fluid radially outwardly from the entire circumference of the wheel, each of said turbine wheels having a concentric supporting shaft affixed thereto; a housing enclosing said turbine wheels and rotatably supporting said shafts in parallel relationship such that said turbine wheels are spaced apart in a common plane, said housing having a substantially flat bottom wall parallel to said common plane in which a pair of horizontally separated inlet openings are formed, one for each turbine wheel, the main portion of said housing forming a double involute configuration in said common plane such that there is substantially no space between the vertical wall of the housing and the rearward peripheral edge of each turbine wheel but the spacing increases at the edge of each turbine wheel most distant from the other turbine wheel and further increases at the forward edges of the turbine wheels; drive means operatively coupled to said shafts for rotating said turbine wheels concurrently in opposing directions; and a single discharge port formed in the rearward part of said housing intermediate to said turbine wheels; the action being such that the fluid streams flowing radially outwardly from said turbine wheels converge in the space between said turbine wheels into a single stream flowing rearwardly toward said discharge port.

6. A boat propulsion unit as claimed in claim 5 in which each of said turbine wheels comprises a plurality of circular flat blade members of substantially equal diameters; spacing means supporting said blade members in concentrically aligned, longitudinally spaced relationship, all except an end one of said blade members having aligned central openings therein whereby a plurality of annulus-shaped fluid chambers are formed which are open at both their inner and outer radial extremities; and means concentrically supporting said end one of said blade members from an end of the associated shaft; the corresponding inlet opening in said housing bottom wall being aligned with said central openings of said blade members.

7. A boat propulsion unit as claimed in claim 5 in which each of said turbine wheels comprises a plurality of concentrically aligned, longitudinally spaced circular flat blade members having aligned central openings formed in some of said blade members for receiving fluid from the associated inlet openings of said housing.

8. A boat propulsion unit as claimed in claim 7 in which said blade members are supported by spacing means including three elongated pins each passing through an associated opening in each blade member and welded to the circumferential edge thereof.

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