Sept. 7, 1965 C. A. GONGWER 3,204,699

PROPELLER

Original Filed Feb. 10, 1961 2 Sheets-Sheet 1

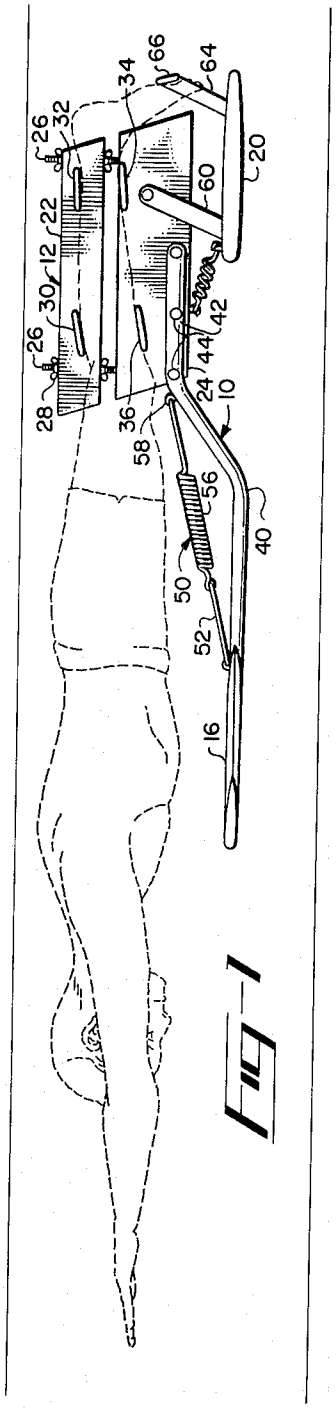


Fig. 1

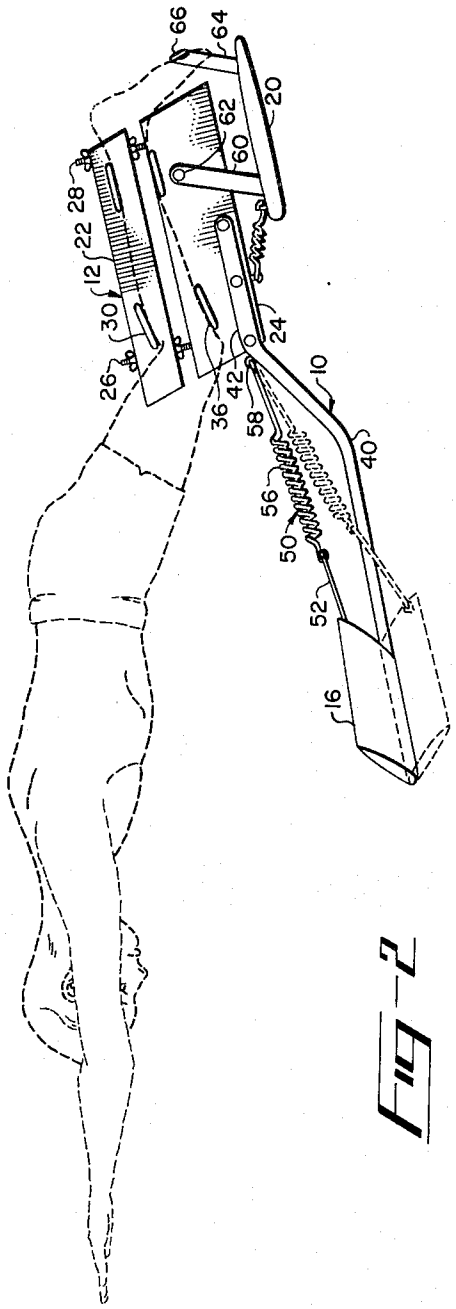


Fig. 2

INVENTOR.
CALVIN A. GONGWER
BY Edward O. Ansell
William E. Hiller
ATTORNEYS

Sept. 7, 1965 C. A. GONGWER 3,204,699

PROPELLER

Original Filed Feb. 10, 1961 2 Sheets-Sheet 2

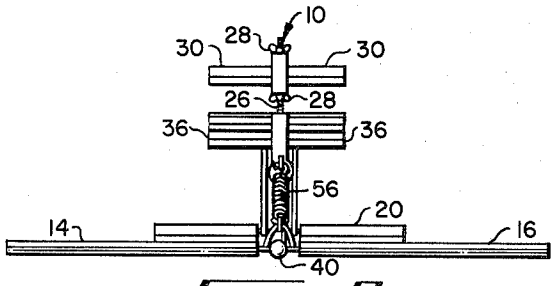


Fig-3

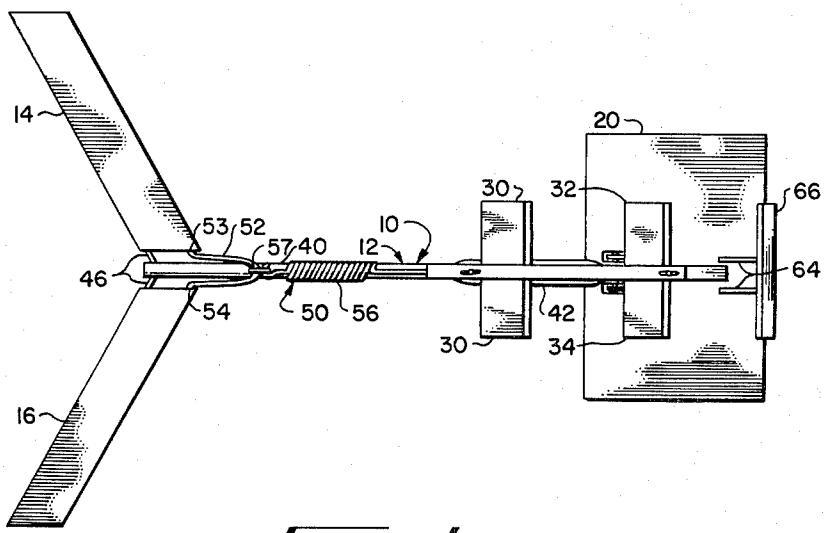


Fig-4

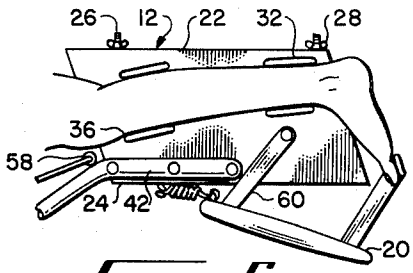


Fig-5

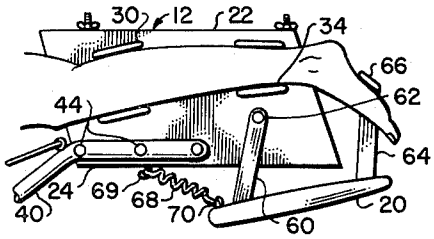


Fig-6

INVENTOR.
CALVIN A. GONGWER
BY Edward O. Ansell
William E. Hiller

ATTORNEYS

United States Patent Office 3,204,699 Patented Sept. 7, 1965

3,204,699

PROPELLER

Calvin A. Gongwer, Glendora, Calif., assignor to Aerojet-General Corporation, Azusa, Calif., a corporation of Ohio

Original application Feb. 10, 1961, Ser. No. 88,554, now Patent No. 3,122,759, dated Mar. 3, 1964. Divided and this application Feb. 28, 1964, Ser. No. 348,249

3 Claims. (Cl. 170—135)

This application is a division of my copending application Serial No. 88,554, filed February 10, 1961, now U.S. Patent 3,122,759 issued March 3, 1964, and entitled "Swimmer's Propulsion Device."

This invention relates to swimmer propulsion devices and has for its object to provide a swimming device operating on a fishtail-like propulsion principle.

Heretofore, swimmer's aids have primarily been based upon the principle of enlarging the effective area of the hands and feet. It has been noted that the Australian crawl flutter kick is used by most swimmers, and it tends to be quite smiliar to the action of a fishtail. However, the swimmer is limited upon the endurance of the individual muscles used in this swimming stroke. Fin systems previously known in the art were adapted to be located and were operable at or near the feet of the swimmer. A principal objection of former devices was the unsatisfactory oscillation of the body, that is, the body "wagged," rather than the fins.

The present invention however eliminates this objectionable oscillation of the body by virtue of its novel construction. In its broadest aspect, the present invention comprises a plate adapted to be engaged to legs of a swimmer below the knee. A pair of fins are pivotally attached to an extension of the plate.

A principal feature of the present invention is the transverse reactions, of the fins which are perpendicular to the propulsive reactions, are directed through the approximate center of gravity of the body since the fins are positioned immediately adjacent to the torso. Therefore, the body maintains its attitude despite these transverse forces.

Another feature resides in the stabilizing wing that can be adjusted by the swimmer during use to aid in diving or surfacing.

Another feature resides in the provision of a swimming device operable by the lower body, leaving the arms free to perform work while underwater.

Other features and advantages not specifically enumerated above will be apparent after consideration of the following detailed description and the appended claims. The preferred form which the invention may assume is illustrated in the accompanying drawings in which:

FIGURE 1 is a side elevation of the present invention in use by a swimmer in a relaxed position;

FIGURE 2 is a side elevation of the present invention similar to FIGURE 1 with the swimmer in a kick position;

FIGURE 3 is a front elevation of the present invention;

FIGURE 4 is a plan view of the present invention;

FIGURE 5 is a partial side elevation of the present invention shown with a swimmer's foot holding the rear stabilizing wing in a diving attitude; and

FIGURE 6 is a partial side elevation of the present invention, similar to FIGURE 5, shown with the swimmer's foot holding the rear stabilizing wing in a surfacing attitude.

A swimming device **10** incorporating the present invention is shown in FIGURES 1–4. Three principal elements form the swimming device **10** and constitute:

the leg plate **12** straddled by the swimmer, the forward oscillating fins or vanes **14, 16** and a rear stabilizing wing **20.**

The plate **12** which may be broadly characterized as an energy engine is generally flat and oblong in configuration and constructed from an upper portion **22** and a lower portion **24.** A plurality of bolts **26** are fixedly attached to the lower portion **24** of plate **12** and pass through a plurality of passageways (not shown) in the upper portion **22.** Wing nuts **28** are threadedly received by the bolts **26** and are positioned on opposite sides of the upper portion **22.** Adjustment of the wing nuts **28** allows the upper portion **22** to be adjusted in relation to the lower portion **24.**

The plate **12** has a plurality of projections **30, 32, 34, 36** extending laterally therefrom, the projections **30, 32,** lying in one row and projections **34, 36** lying in a second row, thus providing a pair of rows of such projections. The position of the projections **30–36,** as shown in FIGURES 1 and 2, illustrates the support around the leg and calf of a swimmer. Padding may be provided around the projections **30–36** to avoid possible discomfort to the legs of the swimmer while in use. The projections **30–36** are adjustable by the wing nuts **28** to allow swimmers of different leg sizes to use the same swimming device.

A frame member comprising a curved rod or bar **40** having a bifurcated end portion **42** is fixedly attached to the plate **12** by a plurality of rivets **44,** or the like, and extends forwardly of the plate and lies in the plane of the plate **12.** A pair of vanes **14, 16** are pivotally mounted on the forward portion of the curved rod **40** on the stub shaft **46** which extends in generally opposite directions from the rod as seen in FIGURE 4. Stub shaft **46** is fixedly attached to the rod **40** and rotatively received by the vanes **14, 16.** The plate **12** straddled by the swimmer, the projections **30, 36** on the plate and rod **40** constitute a frame means for transmitting motion from the swimmer to the oscillating fins **14, 16.**

In the embodiment shown in FIGURES 1 and 2, a harness and coil spring arrangement is used to center the fins **14, 16.** The fins are near the center of gravity of the swimmer's body in FIGURE 1 to reduce to a minimum the waggle or other movement of the swimmer's body in response to a component of force incident to oscillatory motion of the fins. The direction of this component is transverse or lateral to the direction of motion of the swimmer through the water. Although a spring is shown as a centering device in this embodiment, other components may be used, such as torsional springs acting on the fins **14, 16** and positioned between the fins **14, 16** and the rod **40.** A U-shaped harness **52** is pivotally attached to the fins **14, 16** at pivot points **53, 54,** respectively. A coil spring **56** engages the U-shaped harness **52** at point **57** (FIGURE 4) and the eye bolt **58** that is fixedly attached to the rod **40.** Adjustment in tension of this spring to suit the strength and speed of a swimmer by varying the amount of feathering action may be provided by a turnbuckle or the like (not shown).

A stabilizing fin or wing **20** is provided in the rearmost portion of the plate **12.** A link **60** is pivotally mounted on the plate **12** by a rivet, and is fixedly mounted to the wing. The link **64** is fixedly attached to the wing **20** and terminates in a pedal-like projection **66** which can be used by the swimmer to adjust the position of the wing **20.** FIGURES 5 and 6 show the movement of the wing **20** from the diving to the surfacing position when manipulated by the swimmer's toes or foot. A spring **68** engages the eye bolt **69** which is attached to the plate **12** and the eye bolt **70** which is attached to the wing **20.** It is within the scope of the present invention

to use either a stabilizing wing **20** which is stationary or to use a wing which may be adjusted prior to putting the device in water. The purpose of the stabilizing wing is to hold the swimmer's body in a level attitude. It is also conceivable that the wing may be completely removed and that the swimmer use his arms to stabilize the attitude of the body while swimming. Stabilization may also be achieved by conventional swim fins attached to the feet which may be tilted in much the same manner.

In operation, the swimmer straddles the device **10** by placing a leg on each side of the plate **12** and inserting the lower leg and calf between the plurality of projections **30–36**. The device is usually mounted while the swimmer is within the water of such a depth so that the device may be immediately used. The swimmer assumes the prone position as illustrated in FIGURES 1 and 2 and begins the swimming stroke which is as follows: the knees are dropped in relation to the torso forcing the fins **14, 16** downwardly in the water to the position seen in FIGURE 2. The forward edges of the pivoted fins **14, 16** lead the rear edges during downward movement thereof since the downward force exerted by the swimmer is transferred directly to the forward edges of the fins and the water resistance underneath the fins retards downward movement of the rear edges. This movement of the fins **14, 16** starts their feathering or oscillating stroke. When the swimmer's legs are thereafter straightened causing the fins **14, 16** to move upwardly to the position in FIGURE 1, the fins will be pivoted about the stub shaft **46** to a position as shown in phantom lines in FIGURE 2, the water above the fins resisting upward movement of the rear edges of the fins. The spring **56** constantly urges the fins **14, 16** to the center position and aids in causing the fishtail or oscillating motion to reoccur and propel the body through the water. The arms of the swimmer may be held directly in front of the head with the hands extended to aid in directing the swimmer. The hands may be manipulated to act as vanes to cause yaw or roll. The feet may also manipulate the stabilizing wing **20**, FIGURES 5 and 6, to cause the swimmer to dive or surface upon the will of the swimmer. The swimmer thereafter repeats the knee action stroke to cause the fishtail motion thereby propelling the body through the water.

It will be recognized that modifications may be made within the scope of this invention. For example, the device may be operated by using the hands rather than the legs to cause the oscillating fishtail motion of the fins. It is also possible to adjust the tension of the springs on the propulsive fins to gain maximum efficiency.

It is also possible to remove the stabilizing fin or wing entirely and allow the manipulation of the swimmer's arms to hold the body in a level attitude. My invention is not to be limited to the single embodiment illustrated, which is given for illustration rather than limitation, and is limited only by the scope of the appended claims.

I claim:

1. A fluid propeller comprising a frame member adapted to partake of to and fro motion, a pair of vanes respectively disposed on opposite sides of said frame member in symmetrical relationship with respect to each other and with respect to said frame member, a shaft fixedly attached to said frame member and extending outwardly from the opposite sides thereof, each of said vanes being respectively mounted on said shaft for pivotal movement about an axis disposed forwardly of the longitudinal axis of said vane and parallel thereto, and an elastic member connecting a corresponding point of each of said vanes rearwardly of the longitudinal axis thereof to said frame member for resiliently urging said vanes to respective normal center positions, said vanes pivotally oscillating about said shaft in response to a to and fro motion being imparted to said frame member in a direction substantially perpendicular to the resulting relative fluid flow developed by the pivotal oscillation of said vanes.

2. A fluid propeller as set forth in claim **1**, wherein said frame member comprises a rigid bar constrained at the end thereof remote from said shaft for oscillatory to and fro motion in a plane substantially perpendicular to the resulting relative fluid flow developed by the pivotal oscillation of said vanes.

3. A fluid propeller as set forth in claim **1**, further including an energy engine adapted to be actuated by a propellable body to assume an oscillatory to and fro motion in a direction substantially perpendicular to the resulting relative fluid flow developed by the pivotal oscillation of said vanes, and said frame member comprising a rigid bar fixedly attached at the end thereof remote from said shaft to said energy engine for oscillatory to and fro motion with said energy engine.

References Cited by the Examiner

UNITED STATES PATENTS

1,706,974	3/29	Beckert	9—305 X
3,078,482	2/63	Crowder	115—28 X

FOREIGN PATENTS

72,055	7/16	Austria.

JULIUS E. WEST, *Primary Examiner.*