# United States Patent [19]

**Dickson**

[11] **3,812,813**

[45] **May 28, 1974**


[54] **SHOULDER PACK POWER UNIT FOR PROPELLING WATER SKIS OR SURF BOARDS**


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[22] Filed: **Nov. 6, 1972**

[21] Appl. No.: **303,680**

[52] **U.S. Cl.** ..... **115/70**

[51] **Int. Cl.** ..... **B63b 35/00**

[58] **Field of Search**..... 115/6.1, 70; 280/11.11 R, 280/11.11 E, 11.13; 224/8, 25 A; 297/230, 250, 255; 180/64 A; 128/145 A; D71/1 CC



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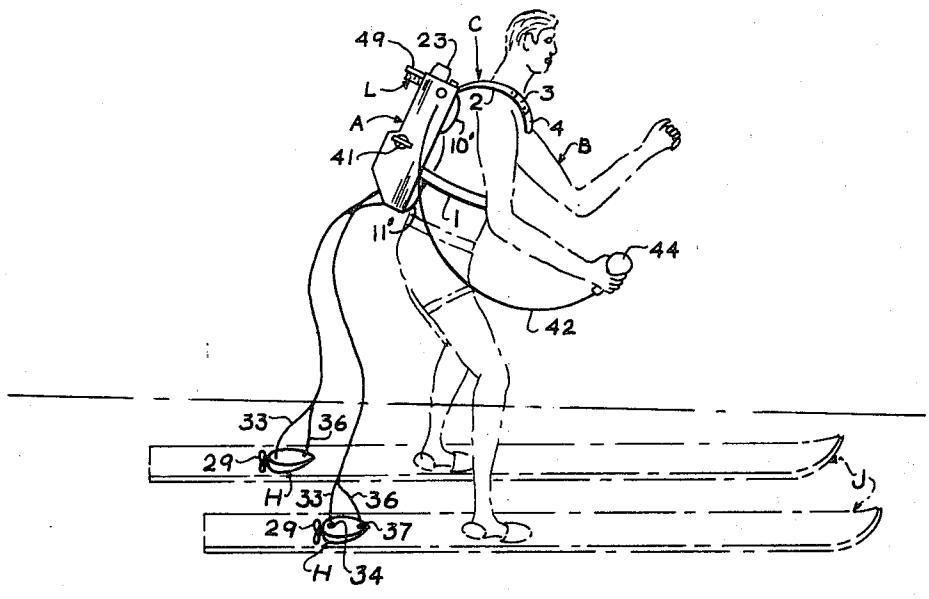
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[57] **ABSTRACT**

A shoulder pack containing a light weight engine for propelling water skis or a surf board on which the operator stands, propulsion units being mounted under the skis or surf board and novel means being provided for operatively connecting the engine to the propulsion units with hand operated means for controlling the speed of the engine, thereby controlling the speed of the skis or surf board. The novel means that connects the engine to the propulsion units can be quickly disconnected from them for freeing the propulsion units and skis or surf board from the power pack when desired. I also provide novel means for quickly freeing the shoulder pack power unit from the back of the operator in case of an emergency and the power pack is so designed that it can float in water with the air intake to the engine and its exhaust pipes being positioned above the water surface so that the engine can still keep operating if desired. Automatic float controlled check valves prevent any entrance of water into the air intake or exhaust pipes and also prevent any spillage of gasoline into the water.


**8 Claims, 12 Drawing Figures**



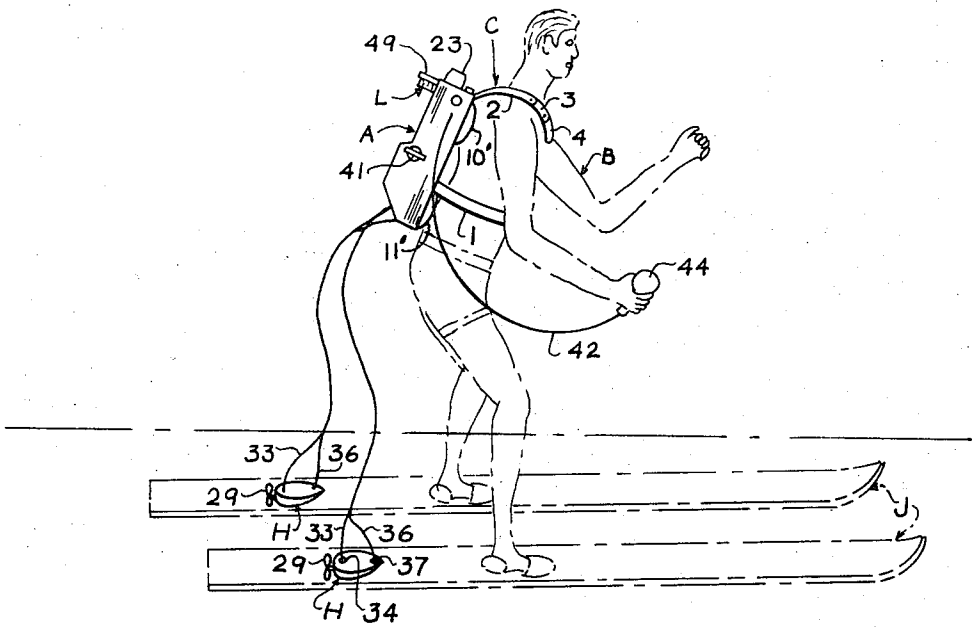



Fig-1

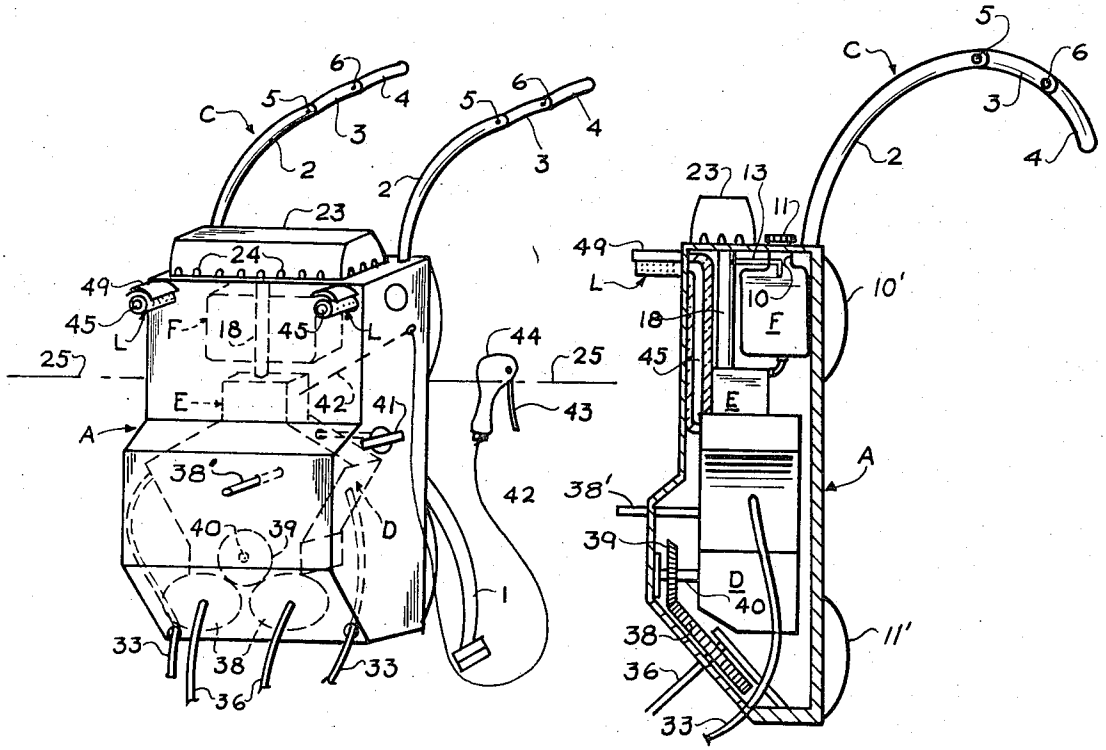



Fig-2




Fig-3

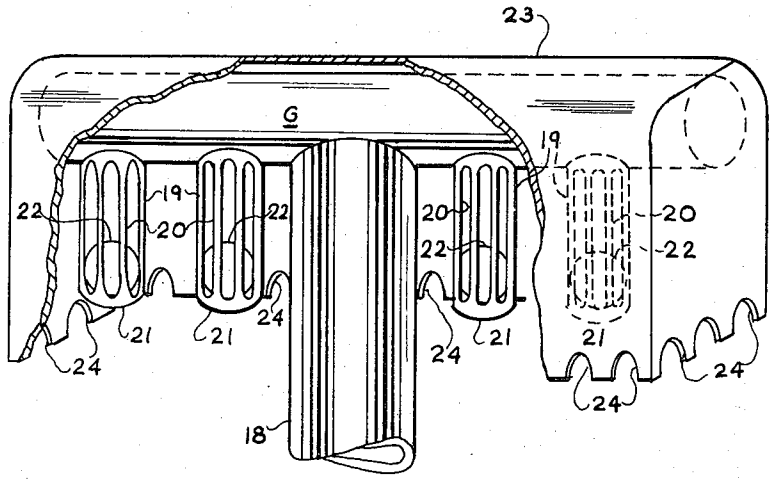



Fig - 4

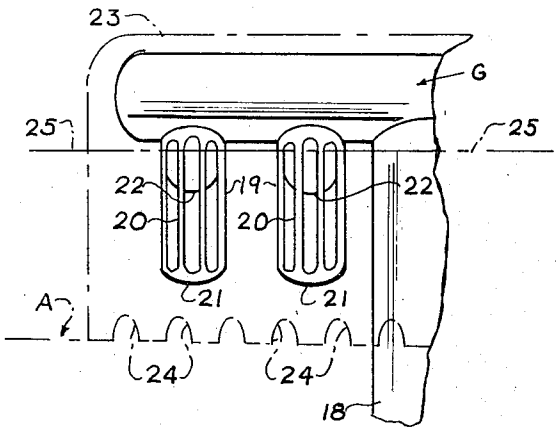



Fig - 5

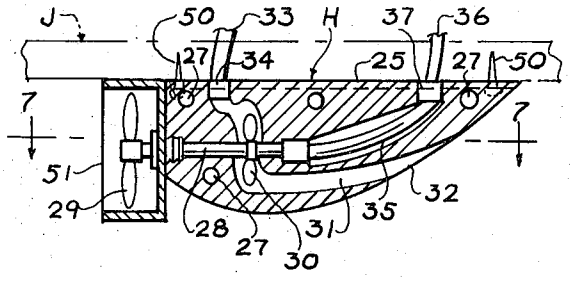



Fig - 6

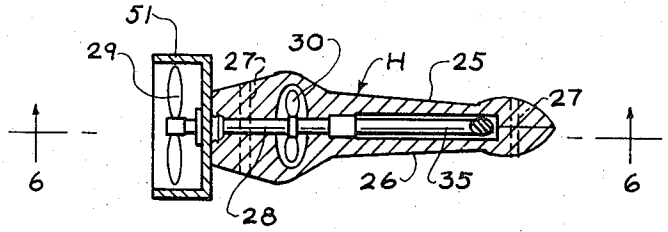



Fig - 7

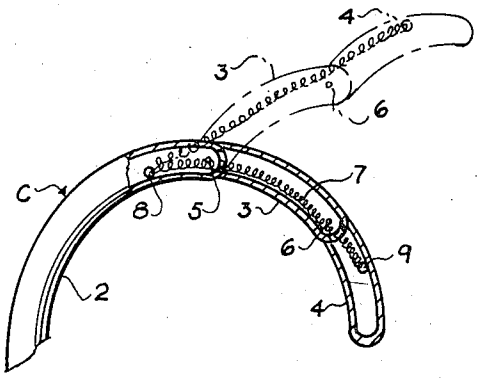



Fig - 8

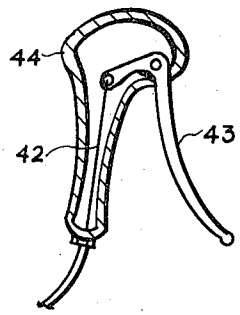



Fig - 9

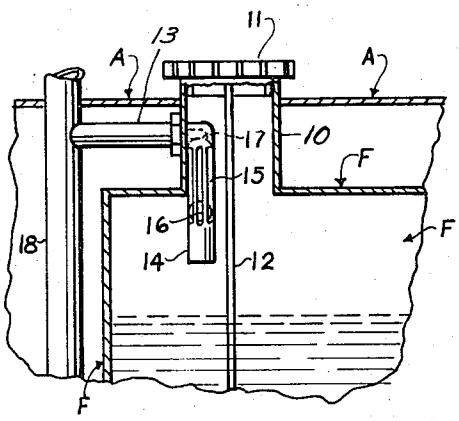



Fig - 10

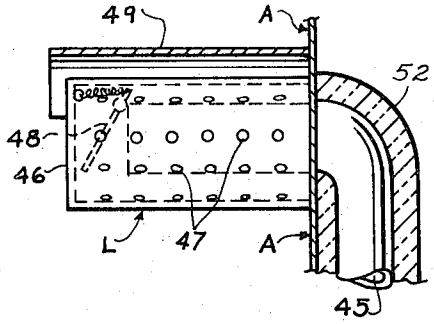



Fig - 11

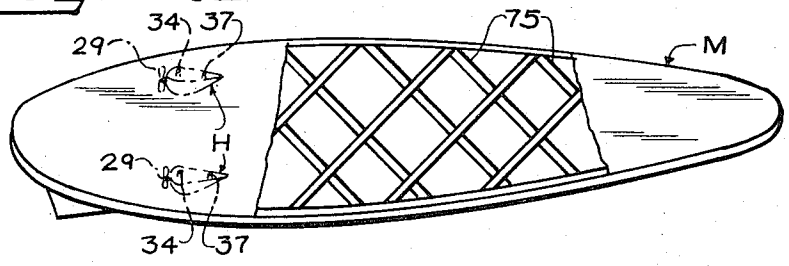



Fig - 12

# SHOULDER PACK POWER UNIT FOR PROPELLING WATER SKIS OR SURF BOARDS

## BACKGROUND OF THE INVENTION

1. Field of the Invention

In the use of water skis it is necessary that a power boat be used with a tow rope so that the skier can grasp the tow rope and thus be pulled over the surface of the water. With my invention I free the water skier on the dependence of another person using the power boat with a tow rope that the skier grasps in order to be pulled over the water. My invention makes use of a light weight engine that can be removably strapped to the skier's back and a pair of flexible shafts interconnect the engine to two propulsion units, one being mounted under each ski. The speed of the engine is controlled manually by a throttle mechanism that can be held in the hand of the skier. When my invention is used by a surfer, the pair of propulsion units are both mounted under the surf board. A great deal of time and effort could be saved by the surfer by using my invention rather than paddling out on the water to catch an incoming breaker.

2. Description of the Prior Art

The U.S. Pat. to John E. Omer, No. 3,113,550, issued on Dec. 10, 1964, and discloses a water skiing device. An internal combustion engine forms a part of a drive unit that is strapped to the skier's back and it rotates an impeller. On the underside of each ski a water intake is provided and a water supply tube leads from each water intake and communicates with the impeller. The impeller draws water from each water intake under each ski and projects this water through a discharge port that extends rearwardly from the drive unit. The water jet exerts sufficient force to propel the skier over the water while being supported by the skis.

It is doubtful whether a water jet can exert sufficient force to propel a skier forwardly while supported by the skis, especially when a portion of the water is directed through the water jacket of the engine for cooling it after which this water is projected downwardly through a water outlet for acting on the air and aiding in supporting the drive unit.

My device is more positive in its drive because I make use of propellers rather than a water jet for propulsion. Furthermore, a water jet being ejected rearwardly in the patented device would create a hazard to anyone positioned to the rear of the skier. I will point out additional features of novelty of my device over the patented one as the specification proceeds.

## SUMMARY OF THE INVENTION

An object of my invention is to provide a shoulder pack power unit that has operative connections with propulsion units secured to the undersurfaces of a pair of skis or a surf board. The operator has a manually controlled throttle lever which he holds in his hand and in this manner he can control the speed of the engine that forms a part of the power unit which in turn controls the speed of the pair of skis on which the operator stands or controls the speed of the surf board.

A further object of my invention is to provide a shoulder pack power unit that may be quickly freed from the back of the operator in case of an emergency and which will float in an upright position in the water. Novel means is provided for preventing water from entering the air intake manifold of the engine or entering



the engine exhaust pipe. Also novel means is provided for preventing water from entering the fuel tank for the engine and for preventing the accidental spillage of any of the gasoline into the water while the power pack is floating. The device is light in weight and will not hinder the operator in using the skis or surf board in the normal manner.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic illustration of my device shown operatively applied to a skier who is indicated by dot-dash lines. The skis are also shown by dot-dash lines.

FIG. **2** is a perspective view of the shoulder power unit freed from the operator and floating in an upright position in the water.

FIG. **3** is a side view of the shoulder power pack unit with the side wall of the unit removed so as to illustrate the light weight internal combustion engine and associate parts.

FIG. **4** is an enlarged perspective view of the air intake manifold for the engine and its protective hood. The automatic ball float check valves are also shown for preventing the entrance of water into the air intake manifold should the manifold accidentally become submerged in the water.

FIG. **5** is a partial view of FIG. **4** and illustrates the air intake manifold for the engine submerged in water to a point where the hollow ball floats will close the check valves and prevent any accidental flow of water into the air intake manifold.

FIG. **6** is an enlarged vertical section through one of the propulsion units and it is taken along the line **6—6** of FIG. **7**. The propulsion unit includes an impeller for forcing water to the engine for cooling purposes.

FIG. **7** is a horizontal section through FIG. **6** and is taken along the line **7—7** of that Figure.

FIG. **8** is an enlarged detail of one of the two quick release arcuate shoulder bars used for supporting the power pack unit on the back of the operator.

FIG. **9** is an enlarged sectional view through the manual throttle control for the internal combustion engine.

FIG. **10** is an enlarged sectional detail of the air vent for the fuel tank and illustrates the automatic ball float check valve for preventing water accidentally entering the tank should the tank be submerged and also preventing any fuel from accidentally spilling into the water should the power unit be submerged.

FIG. **11** is an enlarged portion of one of the exhaust pipes for the engine and illustrates a spring-biased flap valve for automatically closing the outlet end of the exhaust pipe for preventing any entrance of water into the exhaust pipe should it become accidentally submerged in water. A perforated muffler casing encloses the exhaust pipe.

FIG. **12** is a perspective view of a surf board provided with two of the propeller units attached to the underside of the surf board.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

In carrying out my invention I provide a shoulder pack power unit indicated generally at A in FIGS. **1, 2** and **3**. A strap **1** is shown in FIG. **1** as encircling the body for securing the power unit A to the back of the person B, who is using the device. A pair of quick release arcuate-shaped shoulder bars C are also shown in

FIGS. 1, 2 and 3 and in detail in FIG. 8. Each shoulder bar is composed of three arcuate sections 2, 3 and 4, pivoted to each other, the section 2 being attached to the power unit A. In FIG. 8, I show the section 3 pivoted to the section 2 at 5, and the section 4 pivoted to the section 3 at 6. A coil spring 7 is received in the hollow articulated members 2, 3 and 4 and has one end connected at 8 in the hollow member 2 and has its other end connected at 9 in the hollow member 4. The arrangement is such that when the arcuate articulated members 2, 3 and 4 are in the operative position, shown in FIGS. 1, 3 and 8, the coil springs 7 will yieldingly hold the arcuate-shaped shoulder bars C in gripping relation to the shoulders of the operator. Then when the operator wishes to quickly free himself from the shoulder bars C, he exerts a slight pull on the members 4 causing the coil springs 7 to be swung beyond dead center and the springs will snap the section members 3 and 4 into the dot-dash line position, shown in FIG. 8. The belt 1 has a quick release buckle, not shown, whereby the operator can free himself from the power unit A quickly in case of an emergency.

The shoulder pack power unit A comprises a casing in which a power unit, such as an internal combustion engine indicated schematically at D, is housed. The casing for the shoulder pack A is provided with padding 10' and 11', see FIG. 3, that bears against the back of the operator B for making it more comfortable for the operator to carry the unit. A carburetor is shown diagrammatically at E, in FIG. 3, and it is placed above the engine D so as to feed fuel to the engine by gravity. A fuel tank F will feed fuel into the carburetor E, as needed.

An enlarged section of a portion of the fuel tank F is shown in FIG. 10 for the purpose of illustrating the novel ball float check valve which permits air to enter the fuel tank so as to prevent a vacuum being formed in the tank during the feeding of fuel to the engine D while the engine is operating. The tank F has an inlet 10 through which fuel is added to the tank as needed. A removable closure cap 11 has a threaded portion permitting the cap to be secured into the inlet 10 for closing the tank. A fuel gage rod 12 is attached to the cap 11 and can be used by the operator for determining how much fuel he has in the tank F.

Again referring to FIG. 10, it will be noted that an air vent pipe 13 communicates with an air intake pipe 18 for the carburetor E, and has a ball float check valve cage 14 communicating therewith and being partially received in the inlet 10 for the fuel tank F. The cage 14 has slots 15 therein and a ball float check valve 16 is free to move in the cage and should the shoulder pack A be accidentally dropped in the water and overturn into a position where the fuel in the tank would normally spill out through the vent pipe 13, the ball float check valve 16 would be raised in the cage 14 by the fuel and would be held against a seat 17 and prevent the accidental flow of the fuel into the air vent pipe 13 and out into the water through the air pipe 18.

Air is fed to the carburetor E through the air inlet pipe 18, see FIGS. 2 and 3. Novel means is provided for preventing water from accidentally entering the air inlet pipe 18 and reference is made to the enlarged fragmentary isometric views of a portion of the pipe 18 and its associated parts in FIGS. 4 and 5. The pipe 18 communicates with an air intake manifold G, and this manifold is provided with a plurality of air inlets 19 that are slotted at 20 so as to act as check valve cages. The air inlets 19 are closed at their outer ends 21 so as to act as stops for ball float check valves 22 that are free to move within the air inlets 19. A hood 23 encloses the air intake manifold G and a portion of the air inlet pipe 18. The lower edge of the hood has recesses 24, see FIGS. 2, 3 and 4, through which air can enter the interior of the hood when the hood is clamped to the top of the pack unit A by any means, not shown.

In FIG. 4 the ball float check valves 22 are arranged in their normal positions where they will be at the bottoms 21 of the air inlets 19 and air can readily enter the hood interior through the recesses 24 and then can pass into the manifold G by passing through the slots 20 in the air inlets 19. The air will then flow from the manifold G on into the air inlet pipe 18 and thence into the carburetor E and the engine D.

In case the pack unit A becomes accidentally submerged in water, as indicated at 25 in FIG. 5, the water would enter the interior of the hood 23, shown by the dot-dash lines in this Figure, through the recesses 24 and would cause the ball float check valves 22 to rise in the inlet pipes 19 and close the openings where the inlet pipes 19 communicate with the manifold G. It is therefore impossible for water to enter the manifold G, and the air inlet pipe 18. No air could enter the air inlet 18 so long as the manifold G remains partially submerged in water and the engine D would soon stop operating for lack of air.

I will now describe how the engine D is operatively connected to propulsion units H-H that are mounted on the under surfaces of a pair of skis J, see FIG. 1, or on the undersurface of a surf board M, see FIG. 12. An enlarged detail showing of one of the propulsion units H is shown in FIGS. 6 and 7, and since both propulsion units are identical to each other, a description of one of them will suffice for both.

FIG. 7 shows that the propulsion unit is composed of two identical halves 25 and 26 and they are connected together by bolts 27 or other suitable fastening means. Each half has recesses for receiving a propeller shaft 28 which has a propeller 29 keyed thereto and also has an impeller 30 mounted thereon. The impeller 30 is mounted in a water conveying passage 31 that has a water inlet at 32, see FIG. 6. A flexible water conveying conduit 33 has a quick release coupling connection shown schematically at 34, with the water outlet for the passage 31. I will describe hereinafter how the actuation of the impeller 30 will draw in water through the inlet 32 and will deliver this water into the flexible conduit 33 which in turn will convey the water to the cooling jacket, not shown, of the engine D for cooling the engine during its operation.

The propeller shaft 28 is operatively connected to a short flexible shaft 35 that is mounted on the propulsion unit and this flexible shaft is operatively connected to a longer flexible shaft 36, see FIG. 6, by a quick release coupling connection, shown schematically at 37. In FIGS. 2 and 3, I show the flexible water conduit 33 entering the power unit A and being connected to the water jacket, not shown, of the internal combustion engine D. Also both of these Figures show a water outlet tube 38' leading from the water jacket of the engine and projecting out at the rear of the power unit A. The water thus ejected will fall back onto the body of water over which the skier is propelling himself.

Again referring to FIGS. 2 and 3, the two flexible power shafts 36 that are operatively connected to the propeller 29 and impeller 30 of each propulsion unit H, are also connected to two bevel gears 38—38 that are housed within the power unit A and are driven by a common bevel gear 39. The latter bevel gear 39 is keyed to the motor drive shaft 40. The flexible shafts 36 may be disconnected quickly from the short flexible shafts 35 mounted in the propulsion units H and the flexible water conduits 33 may likewise be disconnected quickly from connections with the water passages 31 in the propulsion units.

The internal combustion engine D is light in weight and it may be started operating by any means desired such as a pull cord and handle 41, see FIGS. 1 and 2. The operator pulls on the handle 41 to start the engine and the cord attached to the handle is wrapped around a drum, not shown, that is keyed to the engine shaft for rotating the shaft.

In FIGS. 1, 2 and 9, I show a manually controlled means for altering the speed of the engine D. A flexible throttle shaft 42 leads from the carburetor E and is connected to a hand lever 43 that extends from a small housing 44 that can be held in the hand, as shown in FIG. 1. After the engine D has been started, the throttle lever 43 can be depressed by the operator to the desired extent for controlling the engine speed and thus control the speed of the propellers 29 and the speed at which the skis travel over the water.

Referring to FIG. 3, it will be seen that an exhaust pipe 45 leads from the engine D and extends out through the rear wall of the power unit A. In FIG. 11 an enlarged detail of the exhaust pipe 45 is shown and in FIG. 2, I show that two exhaust pipes 45 can lead from the engine. The portion of the exhaust pipe 45 that extends beyond the rear wall of the power unit A is enclosed in a cylindrical muffler L that has a closed outer end 46 and a perforated cylindrical wall that will muffle the exhuast gases as they pass from the exhaust pipe 45 and through the openings 47 in the cylindrical wall. A spring-biased flap valve 48 normally closes the end of the exhaust pipe and this valve will only open when exhaust gases are escaping from the outlet end of the exhaust pipe 45. The spring biased flap valve 48 will prevent any accidental flow of water into the exhaust pipe 45 should the power unit become submerged in water. An arcuate shield 49 extends over the upper portion of the cylindrical muffler L so as to prevent any exhaust gases from passing upwardly and also protecting the operator from touching the hot muffler while the engine is operating. The exhaust pipes 45 are encased in heavy insulating material, shown at 52 in FIGS. 3 and 11, to prevent heat from reaching the fuel tank F and carburetor E. This is a safety feature.

## OPERATION

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. The power pack unit A will float upright in the water, as clearly shown in FIG. 2. The air intake manifold G and the exhaust pipes 45 would be positioned above the water line 25, thus permitting the engine D to continue running without damage until the operator is ready to start again.

I have already described how the engine D can be started and how the operator can control his speed on the skis by actuating the throttle lever 43 which he holds in his hand. In case of an emergency, the quick release shoulder bars C can be swung into released position and the strap 6 has a light pressure fastener that can be freed by the operator thus permitting the power pack unit A to float in the water, as clearly shown in FIG. 2. The floating ball check valves 22 will prevent water entering the intake manifold G, should the water level 25 rise to a point in FIG. 5 where otherwise water would flow into the manifold. Also, the spring-biased flap valve 48 will close the outlet end of the exhaust pipe 45 to prevent any entrance of water into the pipe, see FIG. 11. Then in FIG. 10, I have illustrated how the floating ball check valve 16 in the air vent 13 for the fuel tank F will prevent any leakage of the gasoline from the tank into the water should the power pack A be accidentally tilted into a position where the fuel in the tank would otherwise drain out. The propulsion units H are secured to the under surfaces of the skis J by any desired means, such as by screws 50, see FIG. 6.

## MODIFIED FORM

I have shown in FIG. 12 a surf board M that is preferably made hollow so as to be more buoyant and the hollow interior is reinforced by cross-bracing 75. The two propulsion units H are secured to the underside of the surf board. Each propulsion unit H has the quick release coupling 34 to which the flexible water conduit 33 may be attached and each unit H has the quick release coupling 37 to which the flexible shaft 36 may be attached. In all other respects the modified form of the device is similar to the preferred form and no further detailed description need be given.

The propellers 29 are preferably housed in a cylindrical perforated guard 51, see FIGS. 6 and 7, for safety to the operator in case of a spill. I do not wish to be confined to any particular type of propeller guard. The ball check valves 22 in FIGS. 4 and 5 prevent water from entering the air inlet pipe 18 and also from entering the air vent 13 for the fuel tank F. The ball check valve 15 prevents any fuel in the tank F from spilling out into the air vent 13 and the air inlet pipe 18 and out into the water should the shoulder power pack A become accidentally submerged.

The engine D, the carburetor E and the fuel tank F are all encased in insulating material, not shown, so as to prevent heat from passing from the engine to the carburetor or the fuel tank. This is a safety feature as well as preventing heat from reaching the operator to which the power pack is attached.

I claim:

1. A propulsion apparatus for water skis and/or surf board comprising:

a. a light weight power pack including an engine;

b. quick release means for mounting said power pack on the back of an operator;

c. propulsion means secured to the underside of at least one ski and/or surf board and including a propeller;

d. at least one quick release flexible shaft operatively connected to said engine and said propulsion means for rotating said propeller when said engine is operating;

e. a throttle for said engine adapted to be held in the operator's hand for controlling the engine speed;

f. said engine having a water containing jacket for cooling the engine;

g. said propulsion means including a water intake and an impeller for drawing water into said intake; and

h. at least one quick release flexible hose having one end removably connected to said propulsion means for receiving water from said impeller and having its other end removably connected to said water jacket for conveying water to said jacket, said jacket having a water outlet.

**2.** A propulsion apparatus for water skis and/or surf board comprising

a. a light weight power pack including an engine;

b. quick release means for mounting said power pack on the back of an operator;

c. propulsion means secured to the underside of at least one ski and/or surf board and including a propeller;

d. at least one quick release flexible shaft operatively connected to said engine and said propulsion means for rotating said propeller when said engine is operating;

e. a throttle for said engine adapted to be held in the operator's hand for controlling the engine speed;

f. the quick release means for said power pack including a pair of arcuate-shaped articulated shoulder bars, each one including several sections pivotally connected together; and

g. a coil spring enclosed in each shoulder bar and having its ends connected to near the extremities of said arcuate-shaped bar for yieldingly holding said bar against the shoulder of the operator as for snapping into a shoulder releasible position when the operator desires to free himself from the shoulder bar.

**3.** A propulsion apparatus for water skis and/or surf board comprising:

a. a light weight power pack including an engine;

b. quick release means for mounting said power pack on the back of an operator;

c. propulsion means secured to the underside of at least one ski and/or surf board and including a propeller;

d. at least one quick release flexible shaft operatively connected to said engine and said propulsion means for rotating said propeller when said engine is operating;

e. a throttle for said engine adapted to be held in the operator's hand for controlling the engine speed;

f. said engine having an air intake manifold mounted on the outer surface of said power pack and having an air inlet pipe communicating with the engine's carburetor;

g. said air intake manifold having at least one air inlet, each inlet having;

h. a buoyant ball check valve mounted in said air inlet for automatically closing the inlet should said air intake manifold be submerged to a point where water would enter the inlet of the manifold; and

i. said power pack when floating in water having a buoyancy for maintaining said air intake manifold above the level of water, said buoyant ball check valve closing said air inlet only to prevent the accidental entrance of water into said manifold.

**4.** A propulsion apparatus for water skis and/or surf board comprising:

a. a light weight power pack including an engine;

b. quick release means for mounting said power pack on the back of an operator;

c. propulsion means secured to the underside of at least one ski and/or surf board and including a propeller;

d. at least one quick release flexible shaft operatively connected to said engine and said propulsion means for rotating said propeller when said engine is operating;

e. a throttle for said engine adapted to be held in the operator's hand for controlling the engine speed;

f. said engine having an air intake manifold mounted on the outer surface of said power pack and having an air inlet pipe communicating with the carburetor for the engine;

g. said air intake manifold having at least one air inlet, each inlet having;

h. a buoyant ball check valve mounted in said air inlet for automatically closing the inlet should said air intake manifold be submerged to a point where water would enter the inlet for the manifold; and

i. a hood enclosing said air intake manifold with its air inlet and ball check valve, said hood having an edge contacting with the outer surface of said power pack and said edge having recesses for permitting air to enter the hood and flow into said air inlet.

**5.** A propulsion apparatus for water skis and/or surf board comprising:

a. a light weight power pack including an engine;

b. quick release means for mounting said power pack on the back of an operator;

c. propulsion means secured to the underside of at least one ski and/or surf board and including a propeller;

d. at least one quick release flexible shaft operatively connected to said engine and said propulsion means for rotating said propeller when said engine is operating;

e. a throttle for said engine adapted to be held in the operator's hand for controlling the engine speed;

f. said engine having an air intake manifold mounted on the outer surface of said power pack and having an air inlet pipe communicating with the carburetor for the engine;

g. said air intake manifold having at least one air inlet, each inlet having;

h. a buoyant ball check valve mounted in said air inlet for automatically closing the inlet should said air intake manifold be submerged to a point where water would enter the inlet for the manifold; and

i. a fuel tank mounted in said power pack for supplying fuel to said engine;

j. an airline vent extending from said air inlet pipe and communicating with said fuel tank for preventing a vacuum forming in said tank; and

k. a floatable ball check valve mounted in said airline vent for automatically closing the vent should the pack be tilted into a position for causing the tank to spill its fuel through the airline vent.

**6.** A propulsion apparatus for water skis and/or surf board comprising:

a. a light weight power pack including an engine;

b. quick release means for mounting said power pack on the back of an operator;

c. propulsion means secured to the underside of at least one ski and/or surf board and including a propeller;

d. at least one quick release flexible shaft operatively connected to said engine and said propulsion means for rotating said propeller when said engine is operating;

e. a throttle for said engine adapted to be held in the operator's hand for controlling the engine speed;

f. said engine having at least one exhaust pipe whose outer end projects beyond the outer surface of said power pack;

g. a spring-biased flap valve for automatically closing the outer end of said exhaust pipe when there is no exhaust issuing from said exhaust pipe so as to prevent water entering the exhaust pipe should said power pack become submerged in water; and

h. a cylindrical muffler enclosing the portion of said exhaust pipe that protrudes beyond the outer surface of said pack, said cylindrical muffler having a plurality of openings therein for muffling the sound of the exhaust noise as the gasses pass through the openings.

**7.** The combination as set forth in claim **1** and in which

a. a propeller guard is provided for said propeller.

**8.** The combination as set forth in claim **2** and in which

a. a quick release strap is attached to said power pack and extends around the waist of the operator.

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