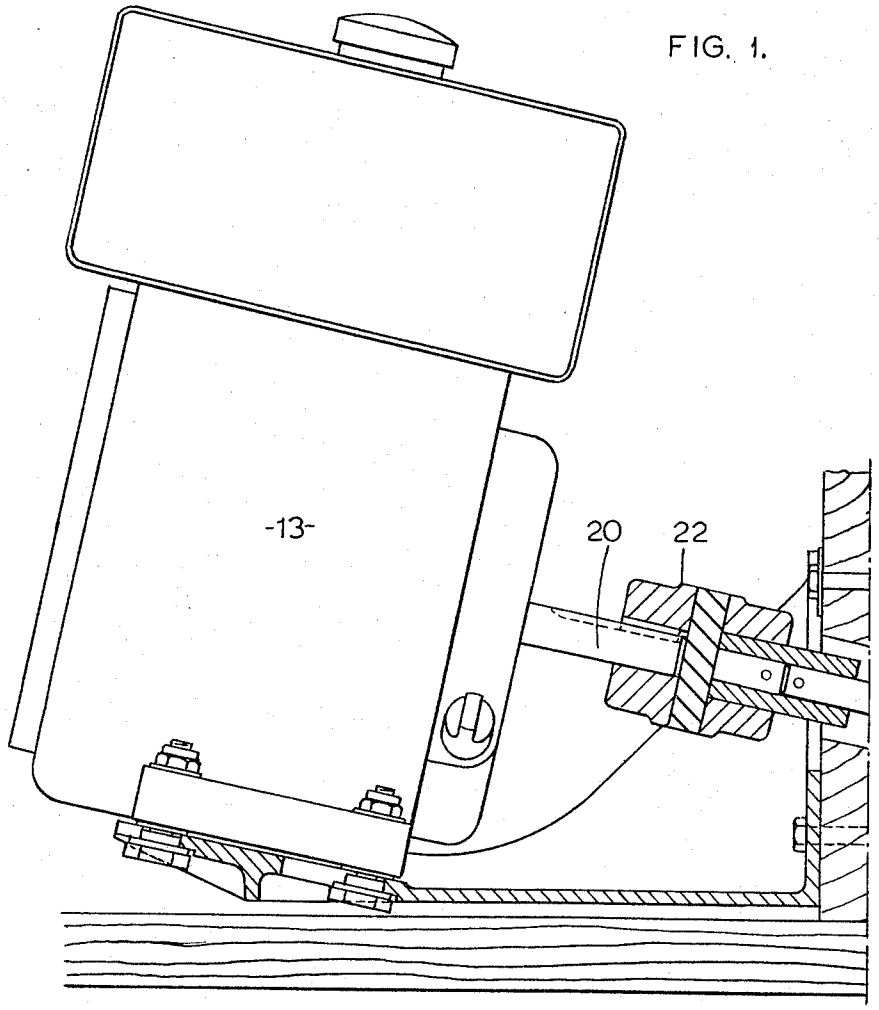
Oct. 18, 1966 W. G. McILWRAITH 3,279,180

JET PROPULSION UNIT

Filed Dec. 22, 1964 3 Sheets-Sheet 1

FIG. 1.



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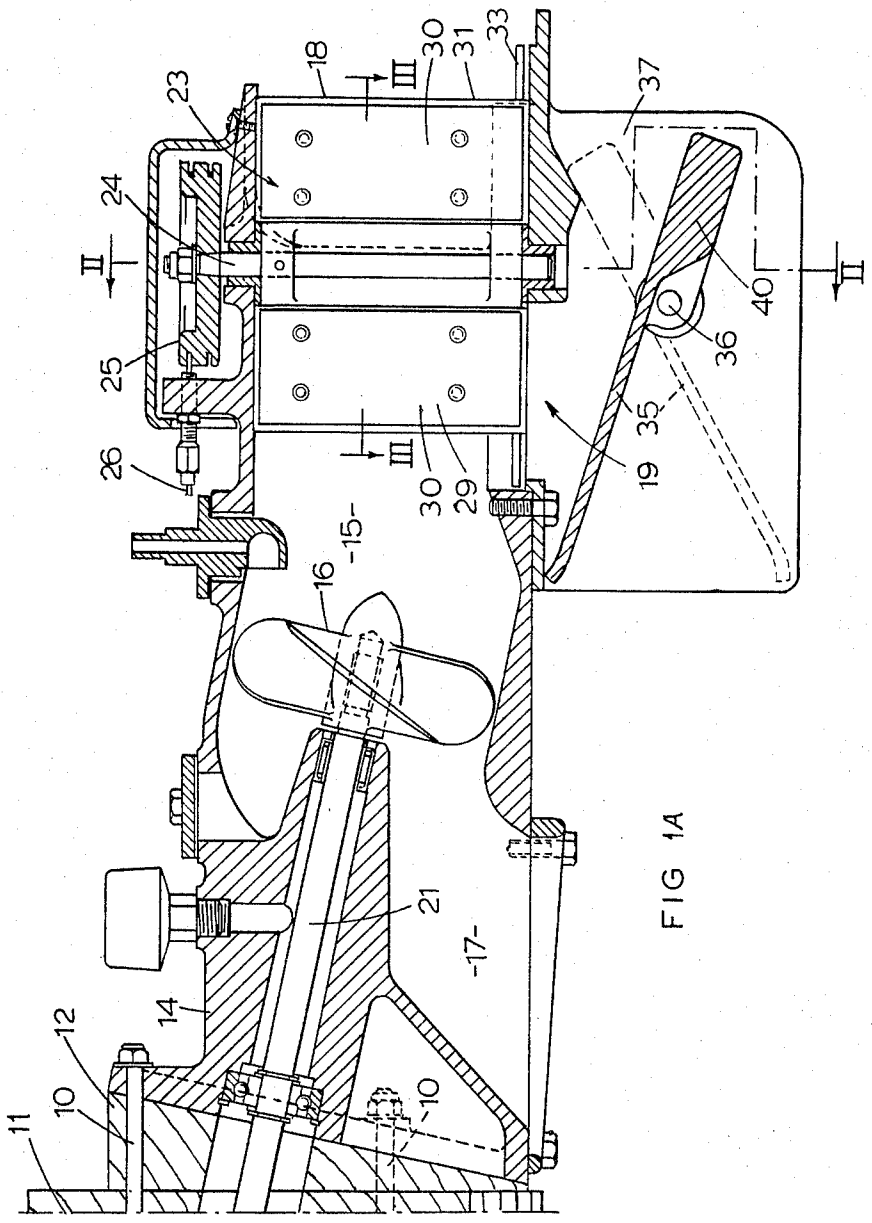


FIG 1A

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FIG. 2.

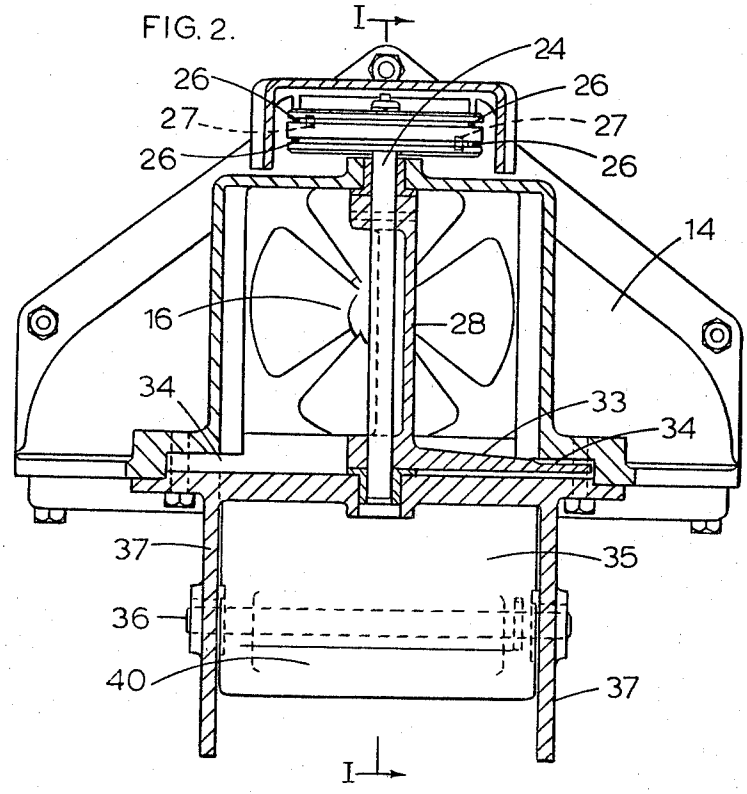
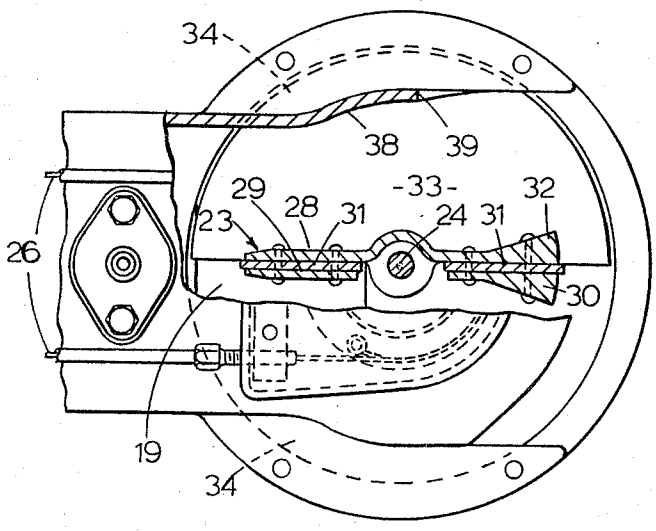


FIG. 3.



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3,279,180

JET PROPULSION UNIT

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Claims priority, application Great Britain, Aug. 27, 1964, 35,219/64
11 Claims. (Cl. 60—222)

This invention relates to jet propulsion units for boats.

It is an object of the present invention to provide a jet propulsion unit for boats, which gives forward and reverse drive with steering and which provides a "neutral" drive.

According to the present invention there is provided a jet propulsion unit for boats, comprising a rotary impeller; a housing accommodating the rotary impeller and defining a fore-and-aft conduit formed with a front inlet ahead of said impeller, a rear end outlet and a base opening located between the rear end outlet and the impeller; a vane mounted on an upright pivotal axis at the rear of the housing to control fluid flow through the rear end outlet and so effect steering; means to effect turning of said vane; a lateral flange formed at the base of one face of said vane to extend forwardly and cover said base opening when the vane is in a neutral-drive position across said conduit to close said rear end outlet, and a flap mounted at said opening to direct forwardly fluid flow from said opening when the vane is in a reverse-drive position across said conduit to close said rear end outlet and with said flange extending rearwardly to leave said base opening unobstructed.

Preferably, the flap is mounted, between a pair of upright walls, on a transverse axis located towards the rear end of the flap which is weighted to act as a lever arm in urging the flap upwardly during normal forward drive.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURES 1 and 1A are sectional side elevations showing a jet propulsion unit mounted on a boat, the section being on the line I—I of FIG. 2;

FIG. 2 is a sectional rear elevation, on the line II—II of FIG. 1.

FIG. 3 is a fragmentary plan view, partly sectional on the line III—III of FIG. 1.

Referring to the drawings, the jet propulsion unit is attached by means of bolts **10** to transom **11** of a boat, a wooden wedge **12** being provided as required to position the unit correctly. An inboard motor **13** is provided to power the unit.

The jet propulsion unit comprises a housing **14** which defines a fore-and-aft conduit **15**. A rotary propeller **16** is arranged in the conduit which is formed with a front inlet **17**, a rear end outlet **18** and a base opening **19** arranged between the outlet **18** and the propeller. The propeller **16** is driven by the inboard motor **13**, through shafts **20** and **21** which are joined by a flexible coupling **22**, and is arranged to draw water through the inlet **17** for normal discharge through the rear outlet **18**.

A vane **23** is pivotally mounted on a central vertical spindle **24** and acts to control the direction of water flow through the rear outlet **18** and so effect steering of the boat in the forward direction.

A grooved pulley **25** is secured to the top of spindle **24** and turning of the vane is effected by means of a pair of cables **26** which lie in the pulley grooves and are anchored in the pulley by nipples **27**. The cables **26** extend forwardly, encased in sheaths, to a steering wheel or tiller (not shown).

The vane **23** comprises a vane member **28** and a front plate **29** and a rear flared plate **30** are riveted to the member **28**, rubber seal plates **31** being sandwiched between the member **28** and plates **29** and **30**. The member **28** is flared at its normally trailing end **32** and this, together with plate **30**, acts to urge the vane to the "straight ahead" position shown in the drawings.

The vane member **28** is formed at the base of one face with a lateral flange **33** of semicircular shape. During normal forward drive, as shown in FIG. 2, this horizontal flange **33**, which has part of its periphery housed in one of a pair of side channels **34** of the housing **14**, has little if any effect on the water flow. When the vane **23** is turned to lie across the conduit with the flange **33** extending forwardly, the flange closes the base opening **19** and as the vane closes also the rear outlet **18**, no water flow takes place apart from possible leakage; thus a "neutral" drive is provided.

A flap **35** is pivotally mounted under the base opening **19** on a horizontal shaft **36** which extends transversely between a pair of rectangular vertical walls **37**. When the vane **23** is turned to lie across the conduit **15** with the flange **33** extending rearwardly, water flow is directed, by the vane, downwardly through the unobstructed base opening **19**. The flap then falls, to the position shown in broken lines in FIG. 1, to act as a chute in directing the water flow forwardly, and thus a reverse drive is provided.

The side walls of the conduit **15** are curved, at vertical edges **38**, at the rear outlet **18** and terminate, at edges **39**, just rearwardly of the spindle **24**. Thus, during reverse drive if the vane **23** is turned through a small angle, water escapes laterally between the vane and a rear edge **39**, to effect steering. Alternatively, the conduit walls may extend to or towards the trailing end of the housing **14** and be ported just rearwardly of the spindle **24** to provide a similar reverse-steering effect.

When the vane **23** returns to a forward-drive position, the flap, which is weighted at its rear end **40**, pivots upwardly out of the path of the normal water stream and shields the base opening, as shown in full lines in FIG. 1. It is to be noted that the shape of the underside of the housing **14** produces an external water reaction which urges the flap upwardly towards its closing position.

In a modification a chute, pivotally mounted at its rear end, is arranged under the base opening and a member extends as a lever arm from the chute to be engaged by fluid flow to or through the rear outlet to pivot the chute upwardly during normal forward drive. This movement may be facilitated by providing a plate at the forward edge of the base opening to derive a suction effect from the normal water flow which will act to draw the chute upwardly and hold the chute in that position.

The above constructions are primarily intended for application to small boats. The invention can, however, be adapted for other uses to control a jet stream of fluid, such as gas and liquid mixture or even gas itself.

I claim:

1. In a jet propulsion unit, a housing to receive a rotary impeller and defining a fore-and-aft conduit formed with a front inlet, a rear outlet and a base opening located between said impeller and said rear outlet, a pivotal vane mounted at the rear of the housing to control fluid flow through said rear outlet and so effect steering, means to effect turning of said vane, a lateral flange provided at the base of said vane to extend forwardly and cover said base opening when the vane is in a neutral-drive position across said conduit to close said rear outlet, and a flap mounted at said opening to direct forwardly fluid flow from said base opening when the vane is in a reverse drive position across said conduit to close said rear outlet and with said flange extending rearwardly.

2. A jet propulsion unit for boats, comprising a rotary

impeller; a housing accommodating the rotary impeller and defining a fore-and-aft conduit formed with a front inlet ahead of said impeller, a rear end outlet and a base opening located between the rear end outlet and the impeller; a vane mounted on an upright pivotal axis at the rear of the housing to control fluid flow through the rear end outlet and so effect steering; means to effect turning of said vane; a lateral flange formed at the base of one face of said vane to extend forwardly and cover said base opening when the vane is in a neutral-drive position across said conduit to close said rear end outlet, and a flap mounted at said opening to direct forwardly fluid flow from said opening when the vane is in a reverse-drive position across said conduit to close said rear end outlet and with said flange extending rearwardly to leave said base opening unobstructed.

3. A jet propulsion unit according to claim 2, wherein a pair of upright fore-and-aft walls are mounted below said base opening and said flap is pivotally mounted between said walls on a transverse axis located towards the rear part of the flap, said rear part being weighted to act as a lever arm in urging the flap upwardly during normal forward drive.

4. A jet propulsion unit according to claim 2, wherein said flange is of semicircular shape and channels are provided in said housing to accommodate the periphery of said flange.

5. A jet propulsion unit according to claim 2, wherein said housing includes upright walls which define sides of said conduit adjacent said vane, said upright walls being curved to provide for sealing contact with said vane and terminating just rearwardly of said vane axis to provide for steering during reverse drive.

6. A jet propulsion unit according to claim 2, wherein said housing includes upright walls which define sides of said conduit adjacent said vane, said upright walls being curved to provide for sealing contact with said vane and being ported just rearwardly of said vane axis to provide for steering during reverse drive.

7. A jet propulsion unit according to claim 2, wherein said vane is flared at its trailing end to urge the vane to a straight ahead position during forward drive.

8. A jet propulsion unit according to claim 5, wherein said vane comprises a plate-like vane member and at least one seal plate to promote close engagement with said curved upright walls.

9. A jet propulsion unit according to claim 2, wherein said vane comprises a plate-like vane member, a front plate, a rear plate and a pair of rubber vane seals sandwiched respectively between said plates and said vane member, said vane member and said rear plate being flared at their trailing ends to urge the vane to a straight-ahead position during forward drive.

10. A jet propulsion unit according to claim 2, wherein an upright spindle carried said vane, a grooved pulley is secured at the top of said spindle and forwardly extending cables are anchored in the grooves of said pulley for effecting turning of the vane.

11. A boat, a jet propulsion unit as claimed in claim 2 mounted on said boat, and an inboard motor mounted in said boat to drive said impeller.

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