

July 17, 1962

S. TUTTLE

3,044,259

WATER JET PROPELLING DEVICE

Filed Aug. 16, 1960

3 Sheets-Sheet 1

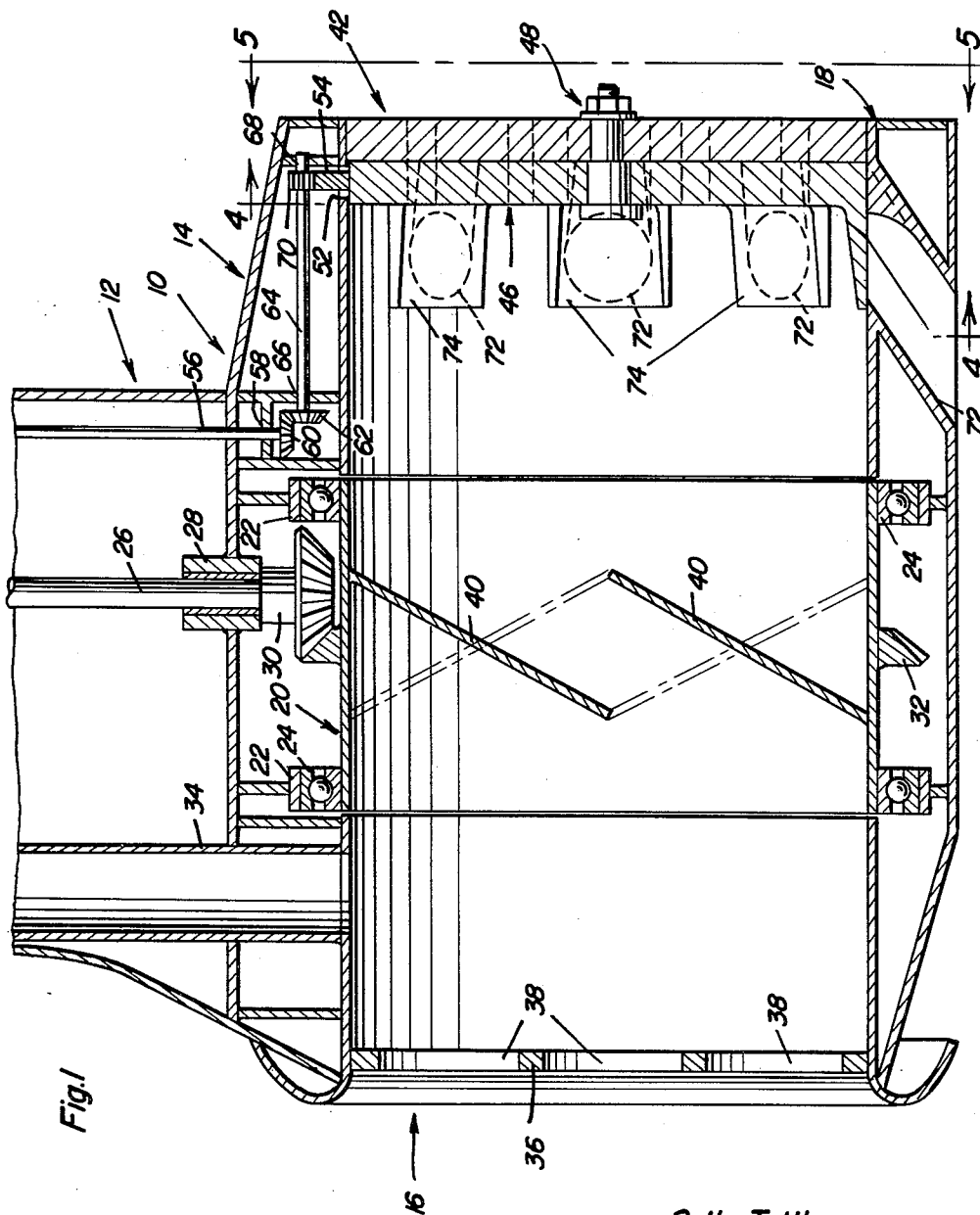


Fig. 1

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Fig.3

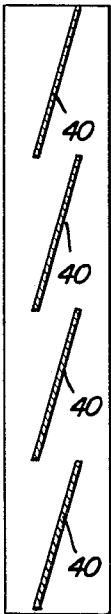


Fig.2

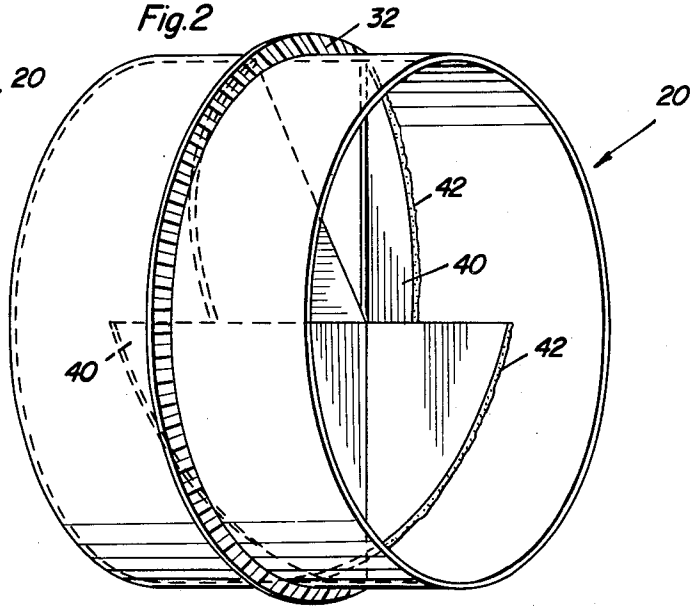


Fig.6

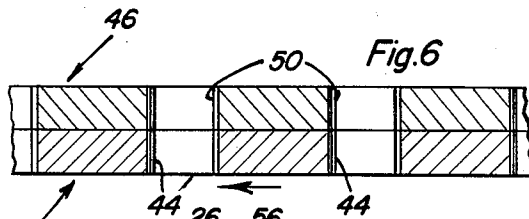
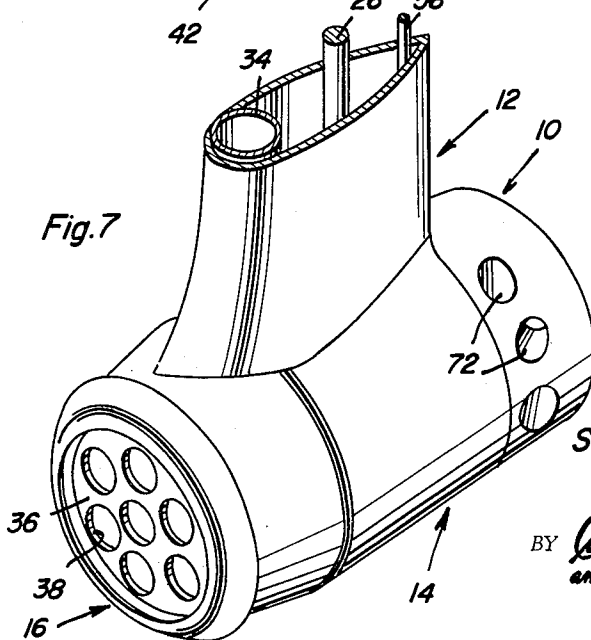


Fig.7



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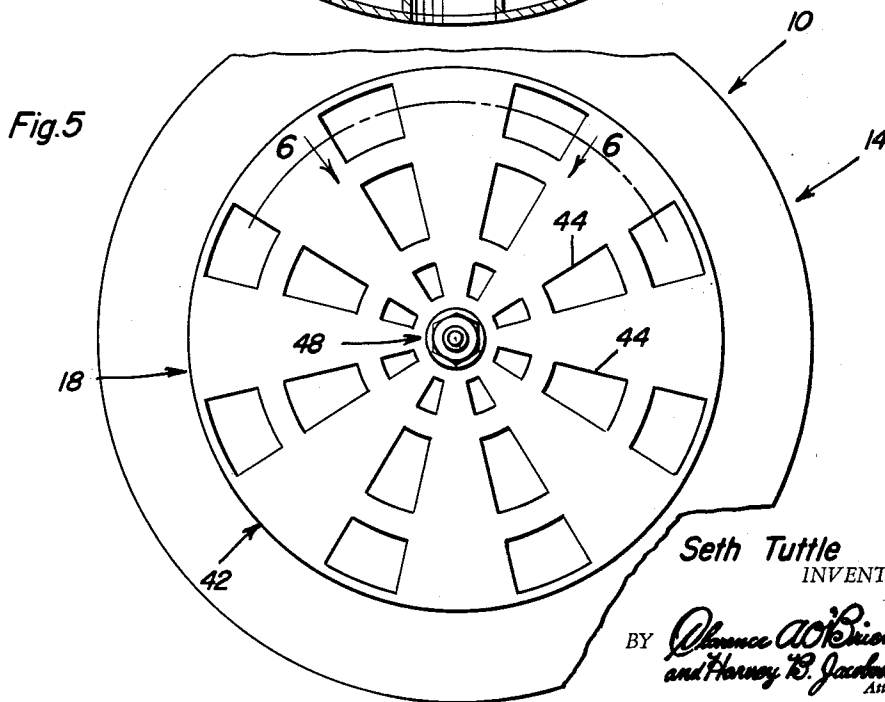
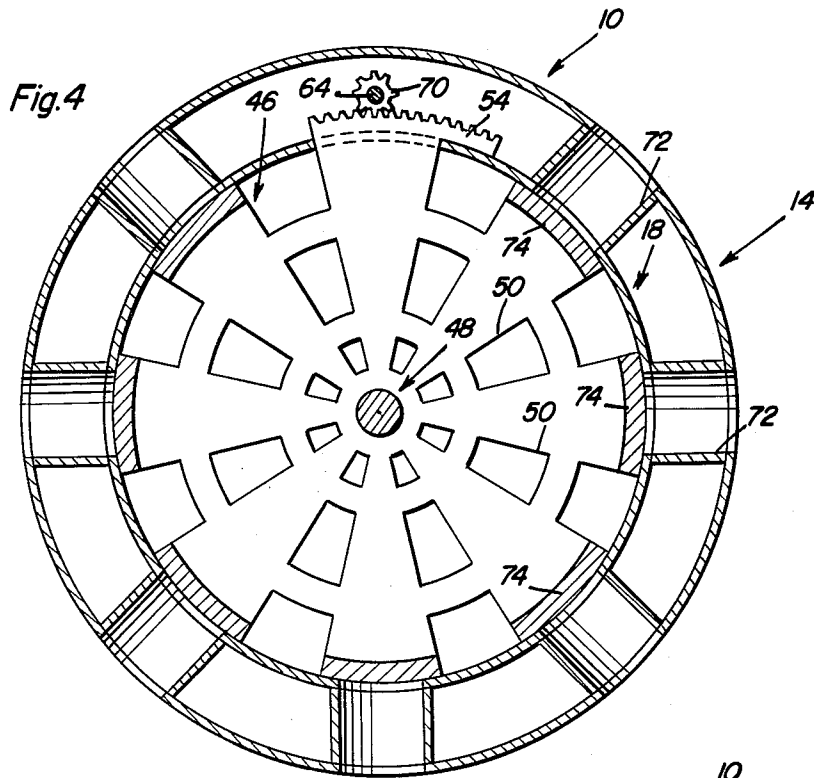
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WATER JET PROPELLING DEVICE

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3,044,259

WATER JET PROPELLING DEVICE

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6 Claims. (Cl. 60—35.54)

This invention relates to a novel and useful water jet propelling device, and more particularly to a propelling device equally adapted to receive its driving force from either inboard or outboard power sources.

The propelling device of the instant invention consists of a support housing sleeve which may either be carried by the lower end of a support housing of an outboard motor or fixedly secured in depending relation to the bottom of a boat and powered by a driving shaft operatively connected to an inboard power source. The support housing sleeve has a drive sleeve disposed in nested relation therein and journaled for rotation about an axis extending longitudinally of the support housing sleeve. The drive sleeve is provided with a plurality of propeller blades for effecting a jet of water upon rotation of the drive sleeve and the latter is provided with an outer circular spur gear for engagement by suitable gearing disposed on the output end of a driving shaft. The rear end of the support housing sleeve is provided with an exhaust disk having a plurality of exhaust openings formed therein and a closure disk is mounted for rotation relative to and in surface to surface contacting relation with the exhaust disk and is provided with a plurality of openings therein movable into and out of registry with the openings of the exhaust disk upon rotation of the closure disk. Suitable means is provided for adjustably positioning the closure disk relative to the exhaust disk whereby the exhaust openings in the exhaust disk may be opened and closed for throttling the discharge of the drive sleeve.

The support housing sleeve is provided with a plurality of outwardly and forwardly directed exhaust ports having their inner ends positioned rearwardly of the drive sleeve and forwardly of the exhaust disk. The closure disk includes closure doors extending forwardly therefrom which are movable into and out of registry with the innermost ends of the exhaust ports in the support housing sleeve upon rotation of the closure disk. The closure doors are mounted on the closure disk in a manner whereby the movement of the openings in the closure disk out of registry with the openings in the exhaust disk will effect proportional movement of the closure doors into registry with the inner ends of the exhaust ports. Thus, an outlet for the water jet effected by the driving sleeve is constantly provided and the amount of water emitted from the exhaust openings and the exhaust ports may be varied as desired to provide a forward thrust only, a rearward thrust only and a balanced forward and rearward thrust with the latter defining a neutral position. In this manner, the water jet propelling device may be adjusted to vary the amounts of forward and rearward thrust and to equalize the forward and rearward thrust as desired independently of the speed of the driving means drivingly connected to the drive sleeve. Thus, the water jet propelling device is readily adaptable to substantially every type of drive means to which a rotating drive shaft can be operatively connected and is not in any way limited to the speed at which the drive means is operating during adjustment of the jet propelling device to change a forward thrust to a rearward thrust.

Conventional types of outboard motors utilizing a conventional propeller and shift means for effecting a change in forward thrust to a rearward thrust must be operating at slow speeds during the gear change in order to prevent damage from being inflicted upon the gearing in the transmission. Thus, outboard motors of conventional design

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are limited to the use of a power source capable of idling at relatively slow speeds in order that gear changes may be effected. With the water jet propelling device of the instant invention, power sources such as gasoline turbine engines having relatively high idling speeds may be used and therefore the water jet propelling device of the instant invention is more readily adaptable to obtaining its power from a larger variety of power sources.

The main object of this invention is to provide a water jet propelling device for boats that may be readily adjusted to provide either a forward or a rearward thrust independently of the speed of the power source for the propelling device.

A further object of this invention, in accordance with the preceding object, is to provide a water jet propelling device which may be readily adjusted to provide an equal forward and rearward thrust simultaneously thereby providing a means whereby the propelling device may be in effect placed in neutral independently of the speed of rotation of the power source of the propelling device.

And a final object to be specifically enumerated herein is to provide a water jet propelling device which will conform to conventional forms of manufacture, be of simple construction and easy to operate so as to provide a device that will be economically feasible, long lasting and operable by even unskilled operators.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a vertical sectional view of the water jet propelling device of the instant invention taken substantially upon a plane passing through the longitudinal center line of the water jet propelling device and showing the manner in which the latter may be secured to the lower end of an outboard motor support housing;

FIGURE 2 is a perspective view of the driving sleeve of the water jet propelling device;

FIGURE 3 is a flat view of the driving sleeve of the water jet propelling device shown with the propeller blades attached thereto;

FIGURE 4 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 4—4 of FIGURE 1;

FIGURE 5 is an end elevational view taken substantially upon the plane indicated by the section line 5—5 of FIGURE 1;

FIGURE 6 is a longitudinal sectional view taken substantially upon the plane indicated by the section line 6—6 of FIGURE 5; and

FIGURE 7 is a perspective view of the water jet propelling device illustrated in FIGURE 1 of the drawings on somewhat of a reduced scale.

Referring now more specifically to the drawings the numeral 10 generally designates the water jet propelling device of the instant invention which is shown in FIGURES 1 and 7 of the drawings secured to the lower end of a support housing generally referred to by the reference numeral 12 of a conventional type of outboard motor (not shown).

The water jet propelling device 10 includes a support housing sleeve generally referred to by the reference numeral 14 including a stationary front end inner sleeve generally referred to by the reference numeral 16 and a rear end stationary inner sleeve generally referred to by the reference numeral 18. A driving sleeve generally referred to by the reference numeral 20 is journaled for rotation within the support housing sleeve 14 in alignment with the front and rear stationary sleeves 16 and 18. The support housing sleeve 14 includes a pair of

bearing mounts 22 in which are seated a pair of bearings 24 by which the driving sleeve 20 is journaled for rotation. The support housing 12 has the lower end of a driving shaft 26 journaled in bearing journal 28 and a bevel gear 30 is secured to the lowermost end of the drive shaft 26 in any convenient manner. A circular spur gear 32 is carried by the outer surfaces of the drive sleeve 20 and the bevel gear 30 meshes with the spur gear 32 to effect rotation of the drive sleeve 20 upon rotation of the drive shaft 26. It is to be understood that the upper end of the drive shaft 26 may be drivingly connected to any suitable power source.

The support housing 12 also includes an exhaust tube 34 whose lower end opens into the front stationary sleeve 16 for directing the exhaust gases from the power source (not shown) operatively connected to the driving shaft 26 into the front sleeve 16 and in alignment with the driving sleeve 20. The forward end of the front sleeve 16 is provided with a screening disk 36 having a plurality of openings 38 formed therein for providing a means for the entrance of water into the front stationary sleeve 16.

A plurality of blades 40 are secured within the drive sleeve 24 and have their outer peripheral edges fixedly secured to the inner surfaces of the drive sleeve 20 in any convenient manner such as by welding 42, see FIGURE 2. Thus, upon rotation of the drive shaft 26 a jet of water will be directed either forwardly or rearwardly of the support housing sleeve 14 depending upon the direction of rotation of the driving shaft 26.

The rear end of the rear stationary sleeve 18 has a water jet exhaust disk generally referred to by the reference numeral 42 secured therein. The jet exhaust disk 42 extends across the entire diameter of the rear stationary sleeve 18 and is provided with a plurality of openings 44, see FIGURE 5, for providing a means whereby the jet of water effected by rotation of the drive sleeve 20 may exit from the rear end of the support housing sleeve 14. A closure disk generally referred to by the reference numeral 46 is mounted for rotation relative to and in surface to surface contacting relation with the exhaust disk 42 by means of an axle pin assembly generally referred to by reference numeral 48 secured through the water jet exhaust disk 42. The closure disk is provided with a plurality of openings 50 movable into and out of registry with the openings 44 upon rotation of the closure disk and thereby provides a means whereby the exhaust openings 44 may be opened and closed. The rear stationary sleeve 18 is provided with a circumferential slot 52 through which an arcuate rack gear 54 carried by the outer marginal portion of the closure disk projects. A first shift shaft 56 has its lower end journaled for rotation in the support housing sleeve 14 as at 58 and is provided with a bevel gear 60 meshed with the bevel gear 62 carried by the adjacent end of the second shift shaft 64 whose opposite ends are journaled for rotation within the support housing sleeve 14 as at 66 and 68. The end of the second shift shaft 64 adjacent the rack gear 54 is provided with a circular gear 70 meshed with the rack gear 54 for effecting rotation of the closure disk 46 upon rotation of the first shift shaft 56.

The support housing sleeve 14 is provided with a plurality of exhaust ports 72 which open forwardly and outwardly of the support housing sleeve 14. The inner ends of the exhaust ports 72 open into the rear stationary sleeve 18 immediately forward of the closure disk 46 and rearwardly of the drive sleeve 20. The closure disk 46 is provided with a plurality of forwardly projecting arcuate closure doors 74 which lie in a plane extending at right angles to the longitudinal axis of the support housing sleeve 14. The inner ends of the exhaust ports 72 also lie in the same transverse plane and the closure doors 74 may be moved into and out of registry with the inner ends of the exhaust ports 72 upon rotation of the closure disk 46. It will be noted that rotation of the closure disk 46 to move the openings 50 out of registry with the open-

ings 44 will effect a proportional amount of movement of the closure doors 74 in registry with the inner ends of the exhaust ports 72. Thus, the closure disk 46 may be positioned to enable the water jet propelling device to effect a balanced amount of forward and rearward thrust as well as full forward and rearward thrusts. In this manner, and independently of the speed of rotation of the driving shaft 26, the closure disk 46 may be selectively positioned to effect a complete forward thrust, a complete rearward thrust, and proportional amounts of forward and rearward thrusts. It will thus be readily appreciated that the water jet propelling device 10 is readily adaptable to substantially all types of power sources having rotating output shafts regardless of the minimum speed obtainable by the output shaft of the power source.

It is to be noted that any convenient means may be utilized to provide a bearing surface between the exhaust disk and the closure disk such as a Teflon coating on either one or both of the disks. Additionally, although the water jet propelling device 10 has been shown in the drawings supported by the lower end of support housing of an outboard motor, it is to be noted that the water jet propelling device 10 is also readily adaptable for use in connection with inboard power sources.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A water jet propelling device comprising a support housing sleeve, a drive sleeve, means journaling said drive sleeve within said support housing sleeve, a plurality of blades secured in said drive sleeve for rotation therein, drive means operatively connected to said drive sleeve and adapted for connection to a power source for actuation thereby, a water jet exhaust disk carried by and extending across the rear end of said housing sleeve, a plurality of exhaust openings formed in said exhaust disk, and closure means mounted for selective movement into and out of registry with said exhaust openings for controlling the water jet of said propelling device independently of the drive means, outwardly and forwardly directed circumferentially spaced exhaust ports formed in said support housing having their inlet ends positioned rearwardly of said drive sleeve, disposed in a plane extending transversely of said housing and forwardly of said exhaust disk, said closure means including a closure disk mounted for rotation forwardly of, relative to and in surface to surface contacting relation with the forward face of said exhaust disk, said closure disk having a plurality of openings formed therein movable into and out of registry with the openings of said exhaust disk upon rotation of said closure disk and including means operable to close a given area of said exhaust openings while opening an approximate proportional amount of area of said exhaust ports thereby at all times providing an outlet for the water stream effected by said driving sleeve and reducing the possibility of the latter producing cavitation, said closure means including a plurality of forwardly projecting and circumferentially spaced closure doors carried by the outer marginal portions of said closure plate movable into and out of registry with the inlet ends of said exhaust ports.

2. The combination of claim 1 including means for adjustably positioning said closure disk relative to said exhaust disk.

3. The combination of claim 1 wherein said water propelling device is adapted to be drivingly connected to a combustion engine, said support housing sleeve having an exhaust tube formed therein with the outlet thereof opening into the interior of said housing sleeve forwardly of said driving sleeve.

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4. A water jet propelling device comprising a support housing sleeve, a drive sleeve, means journaling said drive sleeve within said support housing sleeve, a plurality of blades secured in said drive sleeve for rotation therewith, drive means operatively connected to said drive sleeve and adapted for connection to a power source for actuation thereby, a water jet exhaust disk carried by and extending across the rear end of said housing sleeve, a plurality of exhaust openings formed in said exhaust disk, and closure means mounted for selective movement into and out of registry with said exhaust openings for controlling the waterjet of said propelling device independently of the drive means, outwardly and forwardly directed circumferentially spaced exhaust ports formed in said support housing having their inner ends positioned rearwardly of said drive sleeve disposed in a plane extending transversely of said housing and forwardly of said exhaust disk, said closure means including a closure disk mounted on said exhaust disk for rotation forwardly of, relative to and in surface to surface contacting relation with said exhaust disk, said closure disk having a plurality of openings formed therein movable into and out of registry with the openings of said exhaust disk upon rotation of said closure disk, said means for closing said exhaust ports including a plurality of forwardly projecting and circumferentially spaced closure doors carried by the outer marginal portions of said closure disk.

5. The combination of claim 4 wherein the inner ends of said ports open in a plane extending at right angles to the axis of rotation of said closure disk and lying in the path of movement of said closure doors.

6. A water jet propelling device comprising a support housing sleeve, a drive sleeve, means journaling said drive sleeve within said support housing sleeve, a plurality of blades secured and fixed in said drive sleeve for rotation therewith, drive means operatively connected to said

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drive sleeve and adapted for connection to a power source for actuation thereby, a water jet exhaust disk carried by and extending across the rear end of said housing sleeve, a plurality of exhaust openings formed in said exhaust disk, and closure means mounted for selective movement into and out of registry with said exhaust openings for controlling the waterjet of said propelling device independently of the drive means, outwardly and forwardly directed circumferentially spaced exhaust ports formed in said support housing having their inner ends positioned rearwardly of said drive sleeve, disposed in a plane extending transversely of said housing sleeve and forwardly of said exhaust disk, said closure means including a closure disk mounted on said exhaust disk for rotation forwardly of, relative to and in surface to surface contacting relation with said exhaust disk, said closure disk having a plurality of openings formed therein movable into and out of registry with the openings of said exhaust disk upon rotation of said closure disk, said means for closing said exhaust ports including a plurality of closure door means carried by and spaced circumferentially about said closure disk and selectively movable into registry with the inner ends of said exhaust ports upon rotation of said closure disk relative to said exhaust disk moving said closure disk openings in registry with said exhaust disk openings.

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