

Dec. 7, 1954

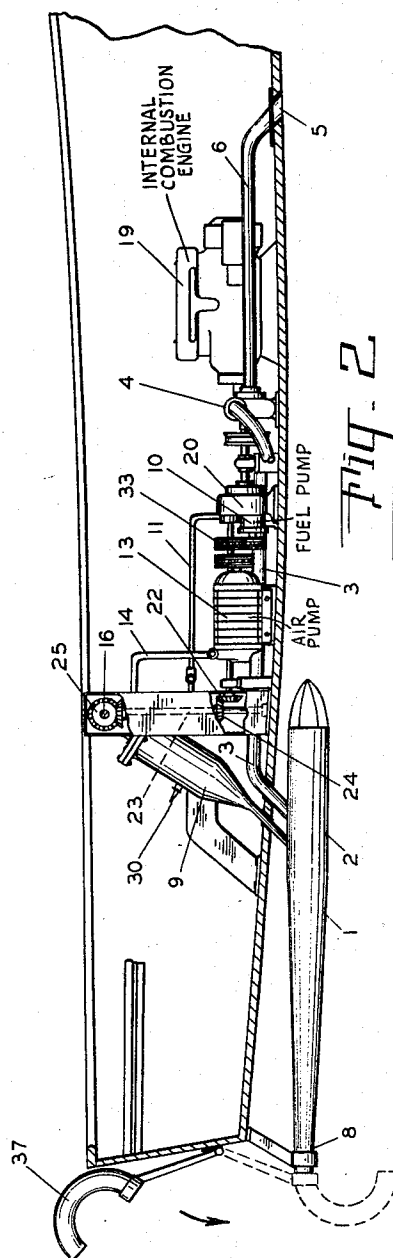
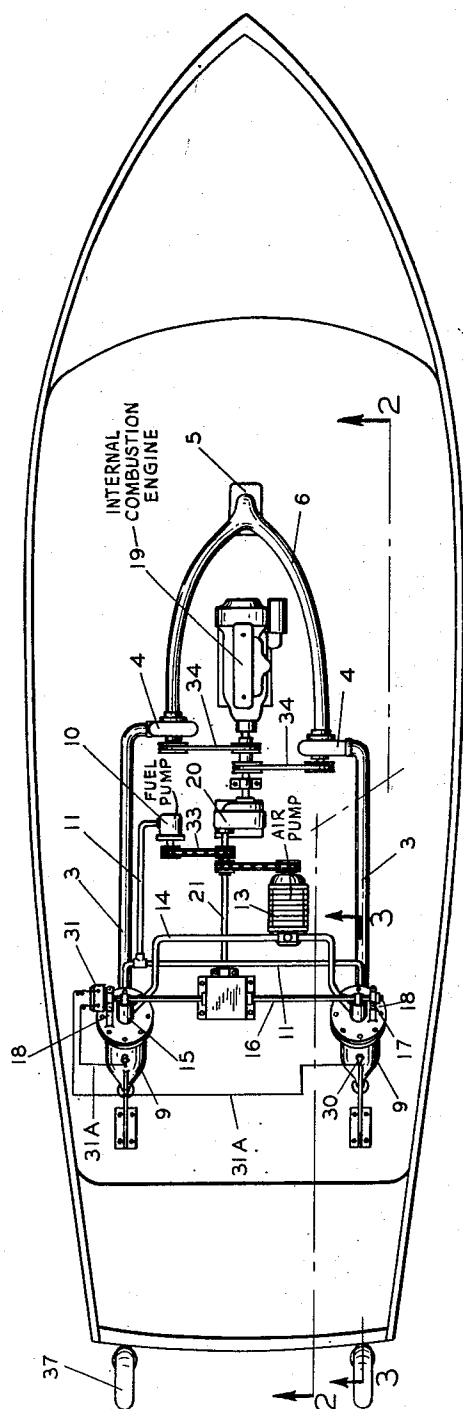
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MARINE JET DRIVE FOR WATERCRAFT

Filed Sept. 8, 1950

2 Sheets-Sheet 1



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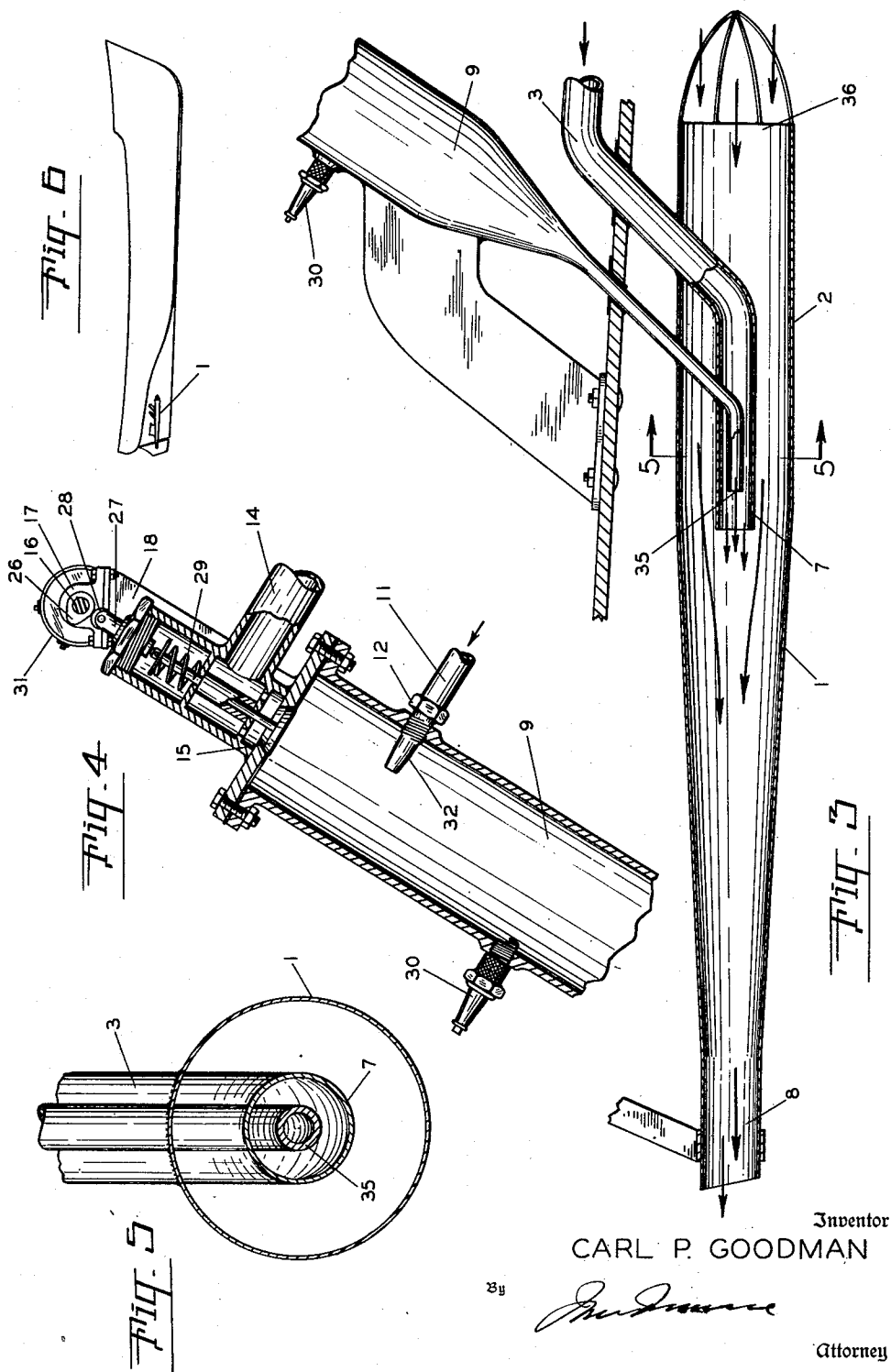
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MARINE JET DRIVE FOR WATERCRAFT

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Application September 8, 1950, Serial No. 183,807

6 Claims. (Cl. 60—35.6)

This invention relates to marine jet drives and is particularly adapted for driving or propelling water borne craft.

The primary object of my invention is to design a marine jet drive employing a combination of a high pressure gas jet and a high pressure water jet exerting a driving force against surrounding water in which the said jets are submerged.

In the carrying out of this object, a high pressure gas jet is located within an elongated cylinder, a high pressure water jet surrounds the said gas jet. The action of the water jet combines with the gas jet causing the gas to exert its pressure in a definite direction in combination with the water jet. I have found that when gas is released from a jet under water that it will expand in all directions, exerting no directional driving force, but I have discovered that by releasing the high pressure gas jet force, together with a surrounding jet of water, that the gas will exert its pressure and driving force in combination with the water jet in a definite direction.

Another object of my invention is to provide a drive for water craft wherein the said drive is so arranged that the vessel can navigate in shallow water without the said drive contacting bottom.

A further object of my invention is the reducing of the number of mechanical parts by using jet propulsion, thereby eliminating considerable mechanical troubles and first cost of installation.

A still further object of my invention is to reduce the cost of operation of water craft.

In the carrying out of the above objects, the construction of my jet propelled drive, the exposed parts lie very close to the hull of the craft so that in case the craft should get into shallow water or even become grounded, the propelling jets are protected and is in a position to operate effectively.

In the use of a jet propelled drive, considerable friction and drag losses are prevented by eliminating propeller shafts and the like.

These and other incidental objects will be apparent in the drawings, specification and claims.

Referring to the drawings:

Figure 1 is a plan view of my new and improved jet unit drive more or less laid out diagrammatically for convenience of illustration, and installed in a relatively small hull, the said hull being considerably out of proportion but sufficient to illustrate the invention.

Figure 2 is a sectional view, taken on line 2—2 of Figure 1.

Figure 3 is an enlarged fragmentary sectional view, taken through one of the jets which forms the basis of my invention, taken on line 3—3 of Figure 1.

Figure 4 is a fragmentary enlarged sectional view through the combustion booster cylinder used in connection with my new and improved jet unit.

Figure 5 is an end sectional view, taken on line 5—5 of Figure 3, through the jet unit.

Figure 6 shows a preferred way of mounting the jets to the hull of a craft.

Referring more specifically to the drawings:

I have illustrated my new and improved marine jet drive associated with a small hull for convenience of illustration. The relative proportions and so forth would be much different in larger hulls. My invention consists of securing to the underside of the hull jet units 1, but I do not wish to be limited to the number of said jet units.

My jet units consist of elongated streamline cylinders

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2, whose dimensions would conform to the size of the power plant. These cylinders taper down in size from their forward ends to their rear or jet ends, as illustrated in the drawings.

I will now describe how my new and improved jet units operate. A flow of high pressure water is pumped into the unit by way of the supply piping 3, which receives a supply of high pressure water from the pumps 4, which in turn pump the water from the water supply intake 5 by way of the piping 6. Located centrally of the cylinders 2 are primary water nozzles 7, directed to the jet ends 8 of the cylinders 2. The pumps 4 deliver a high pressure jet of water from the primary nozzles 7 towards the rear end 8 of the jet cylinders. The object of the primary nozzle will be more fully understood later on.

The force of the water being expelled out of the jets is sufficient to move the craft through the water. Combustion chamber 9 are provided for accelerating and providing a greater amount of driving pressure from the secondary nozzles 35 assisting the primary nozzles 7. The combustion chamber 9 receive their fuel supply from the high pressure fuel pump 10 by way of piping 11 and through the injectors 12. The pump and injectors are of well known practice.

The combustion chamber 9 receive their air supply from the air pumping unit 13 by way of the piping 14 and mechanically operated valves 15. A cam shaft 16 is journaled within bearings 17, the said bearings being mounted to the combustion chamber 9 by way of the brackets 18. The cam shaft 16 is driven from the internal combustion engine 19, speed reducing unit 20, drive shaft 21, bevel gears 22, said gears 22 driving the vertical shaft 23 by way of the bevel gear 24, said vertical shaft driving the cam shaft 16 by the bevel gears 25, maintaining the said cam shaft in timed relation to the driving internal combustion engine 19.

Cam lobes 26 are fixedly secured to the cam shaft 16. These lobes contact the push rods 27, which in turn opens the valves 15 when the cam contacts the said push rod roller 28. The valves 15 are maintained closed by the action of the spring 29, which is of well known structure.

Spark plugs 30 enter the combustion chamber 9 and receive their electrical energy from the distributor 31 by way of the wiring 31A. The said distributor being fixedly mounted to one of the brackets 18. The cam shaft 16 operates the distributing arm of the distributor, the said distributor being of well known structure. Fuel injector nozzles 32 also enter the combustion chamber, as best illustrated in Figure 4, and receive their fuel from the fuel lines 11 leading from the high pressure fuel pump 10.

The high pressure fuel pump is of well known construction and is timed in relation to the cam shaft 16 through the drive shaft 21, the same being driven by the drive shaft 21 through the chain 33 and air pumping unit 13 through chain 33A. The operation of the air intake valves 15, the spark plugs 30 and the fuel injectors 32 are in definite timed relation to one another.

I will now describe the operation of my new and improved marine jet drive. The internal combustion engine 19 is started driving the cam shaft 16, as above described. It will also drive the fuel pump 10 and the air pumping unit 13, charging the combustion chamber 9 with air and fuel in timed relation. Also this fuel will be ignited in timed relation as above described, delivering a high pressure impulse out through the secondary jet 35. At the same time this action takes place high pressure water is being expelled through the primary jet 7 surrounding the secondary jet 35. The flow of the high pressure water out the primary jet 7 combines with the gas pressure impulse from the combustion chamber 9, being discharged through the jet 35 giving the gas impulse a definite direction of force.

In other words, the primary water jet and the secondary gas jet assist one another in producing a high velocity driving jet. I have found that if gas is liberated through a jet without a directional surrounding high velocity water jet the gases would be expelled in all directions giving no definite directional driving force. As the craft moves through the water, the inflow of water into the end 36 of the jet tube 1, will pass by and around the primary and

secondary nozzles 7 and 35 creating a further pulling action causing both the water force and the gas force to work in unison propelling the water out through the rear end 8 of the cylinder 1 against the surrounding water area.

The high velocity stream of water maintains the gas pressures from the jet 35 in a definite direction as indicated by the arrows out through the rear end or nozzle 8 of the cylinder 1 against the surrounding water, driving the craft through the said water at the same time water enters the forward end 36 of the cylinder 1 surrounding both jets of water and gas, further maintaining a definite direction of force from the said nozzles 7 and 35.

After each explosion or gas pressure generation within the combustion chamber 9, the suction created by the water flowing out the nozzle 7 past the gas nozzle 35 creates a vacuum within the combustion chamber pulling the balance of the gas out of the cylinder exhausting the same completely after which a new fuel and air supply is injected into the combustion chamber and fired again. I do not wish to be limited to any particular mechanical means of causing the high pressure water to flow through the jet 7 or the gas to be expelled through the secondary jet 35, as any suitable means may be employed. I have only illustrated this particular arrangement to carry out the object of my invention.

Referring to Figure 2, in order to reverse the craft a return bend fitting 37 is adapted to fit over the end 8 of the cylinders 1 as indicated by dotted lines, causing the forces being expelled out of the said cylinders to be reversed in direction moving the craft in a rearward direction. I have not attempted to illustrate any particular mechanism for operating this return bend, but only to illustrate a means of reversing the craft.

Although certain specific embodiments of the invention have been shown and described, it is obvious that many modifications thereof are possible. The invention, therefore, is not to be restricted except in so far as is necessitated by the prior art and by the spirit of the appended claims.

What I claim is:

1. In a marine jet drive for water craft, means to cause expulsion of a confined gas jet under high pressure from an elongated cylinder, a pumping means to cause expulsion of a confined water jet under high velocity from a second confining chamber around said first confining chamber and confining said gas jet therein to give directional effect thereto, an elongated confining chamber around said first and second confining chambers and said expelled jets and having a discharge outlet for the combined jets in the same direction, said latter confining chamber having an inlet at its end opposite the discharge outlet and said outlet being restricted, and means to cause reverse discharge and propulsion.

2. A marine jet drive for water craft, comprising an elongated streamline cylinder restricted toward its rear discharge end, a pumping means for drawing and forcing a confined jet of water under high velocity rearwardly into the cylinder from a nozzle spaced from the rear discharge end of the cylinder and to draw water into the front end of the cylinder, means to create and discharge gas in confined jets under high pressure from a second nozzle within said first nozzle in unison into the confined jet of water in the same direction to be surrounded there-

by and to give definite directional propelling effect to the gas jets, and means to operate and control said jets.

3. A marine jet drive for water craft, comprising an elongated streamline cylinder restricted toward its rear discharge end, a pumping means for drawing and forcing a confined jet of water under high velocity rearwardly into the cylinder from a nozzle spaced from the rear discharge end of the cylinder and to draw water into the front end of the cylinder, means to create and discharge gas in confined jets under high pressure from a second nozzle within said first nozzle in unison into the confined jet of water in the same direction to be surrounded thereby and to give definite directional propelling effect to the gas jets, means to operate and control said jets, and a return bend fitting movable into and out of registry with the discharge end of the cylinder to cause reverse discharge of the combined jets and reverse propulsion of the craft.

4. A marine jet drive for water craft comprising an elongated cylinder tapering from its leading end to its rear end and positioned below the water craft in alignment with the longitudinal axis of the water craft, a pump, a supply pipe extending from said pump and terminating in said elongated cylinder, a water feed pipe connected to said pump so that water under pressure may be expelled from said supply pipe within said elongated cylinder, a combustion chamber, a fuel pump for feeding fuel to said combustion chamber, an air pump for feeding air to said combustion chamber, valve means in said combustion chamber for controlling the mixture of air and fuel in said combustion chamber, means for firing the mixture in said combustion chamber, motor driven means for operating said valve, a discharge jet for expelling gas under high pressure from said combustion chamber terminating within the outer end of said supply pipe, and said outward expulsion of said gas producing a definite directional driving force in addition to the driving force of the water expelled from said supply pipe.

5. A marine jet drive as in claim 4 wherein the suction created by the expulsion of gas and water from said elongated cylinder draws water into said elongated cylinder to increase the driving force of said gas and water.

6. A marine jet drive as in claim 4 wherein means is provided to coact with the discharge end of said elongated cylinder to provide reverse discharge and propulsion.

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