

June 27, 1961

J. A. J. RONDOT
SUBMARINE VESSELS FOR THE TRANSPORT OF
GOODS SUCH AS PETROLEUM

2,989,937

Filed Nov. 4, 1958

2 Sheets-Sheet 1

FIG. 1

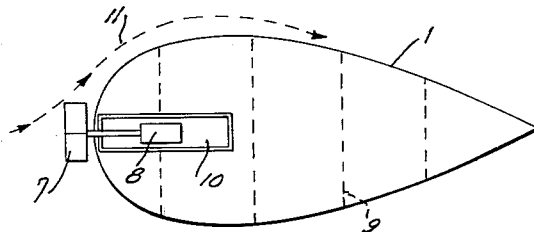


FIG. 2

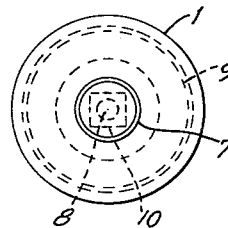


FIG. 3

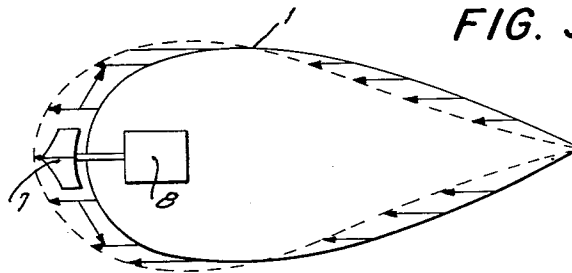
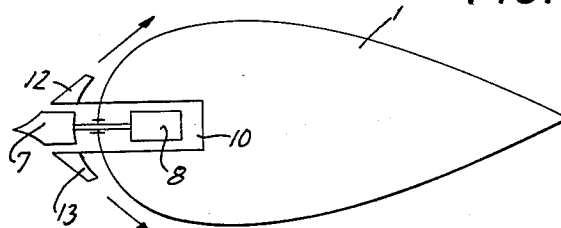


FIG. 4



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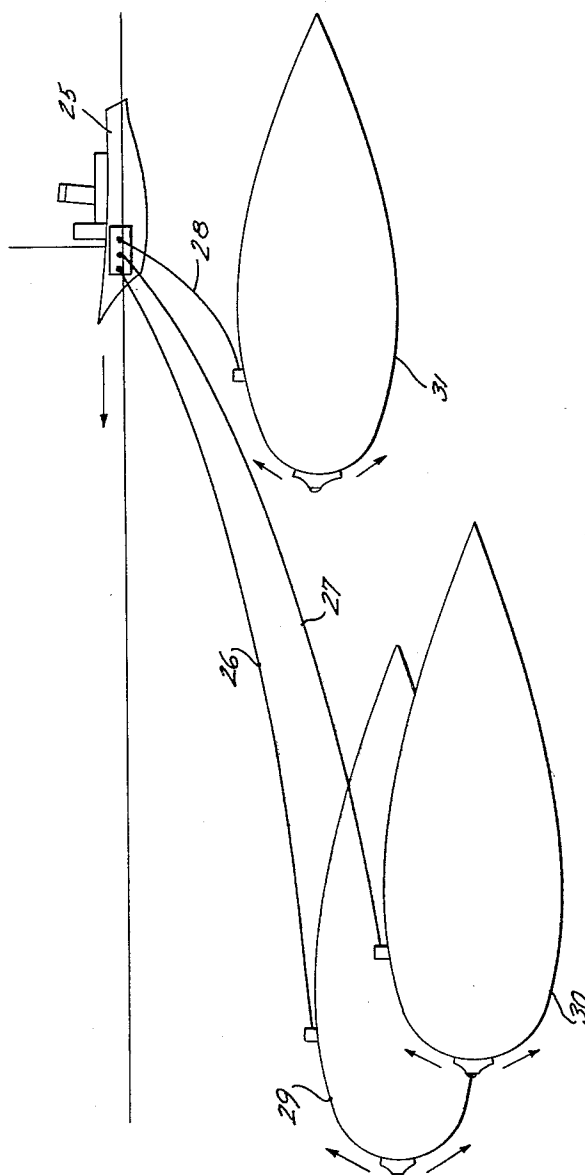
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FIG. 5



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SUBMARINE VESSELS FOR THE TRANSPORT OF GOODS SUCH AS PETROLEUM

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4 Claims. (Cl. 114-16)

The present invention relates to the submarine transportation of goods, for instance petroleum.

More particularly, the invention concerns the use, for the purpose set forth, of light and possibly flexible envelopes containing the petroleum to be transported.

As is well known, petroleum is presently transported in rigid ships which are driven by screws. The ship framework must be sufficiently strong to resist the pressure against the front of the ship.

A strong framework is also necessary to transmit the driving force from the shaft carrying the screw to the ship framework. Accordingly, the ratio of the weight of the ship's framework to the weight of the goods transported is relatively unfavorable.

Recently, it has been proposed to place petroleum to be transported within flexible bags which were towed by a surface ship. However, such bags have a tendency to snake and the bag material is subjected to constant deformation due to the motion of the surface of the sea water.

It is, therefore, an object of the present invention to provide a container for the transportation of goods, such as petroleum, adapted to be constantly immersed at a sufficient depth to prevent the container material from being subjected to constant stress and strain variations, said container being arranged in such a way that it can be self-propelled.

Another object of the present invention resides in a self-propelled submarine container for the transportation of goods, such as petroleum, the body thereof being made mainly of flexible material, such as rubber and/or plastic material, which may or may not be reinforced with additional elements.

The invention provides, according to one of its features, the use of hulls which are so shaped as to offer a minimum of resistance to movements in the water whilst permitting a cheap construction for the hull. This is made possible by the fact that the hull is intended to travel in a submarine-like manner and to be loaded and unloaded whilst the submarine container is under water. The goods may be discharged while the submarine vessel is kept at a constant depth and are replaced by an appropriate amount of sea water. Conversely, at the time of loading, sea water is expelled from the submarine container and replaced by the goods to be transported. In this way, it is possible to build hulls with a capacity of 200,000 tons or more.

A surface ship may be arranged, according to another feature of the present invention, as an electric power station adapted to transmit, besides the necessary remote controls, electrical energy to the motors of one or several transportation submarines associated with said surface ship by means of an appropriate network of cables.

According to the invention, the means for propelling the submarine vessel causes a suction or draught at the front part of the hull. For this purpose, use is made of a turbine imparting to the water a rapid rotation so that the water is forced radially outwardly by centrifugal force from the longitudinal axis of the hull and will flow along the streamlined sides to the back portion of the hull, causing thereat an overpressure. The combined effect of the underpressure at the front part of the

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hull and the overpressure at the back part of said hull will cause the hull to advance.

The present invention will be more fully described in connection with the accompanying drawings in which:

FIGURES 1 and 2 represent schematically, in longitudinal and front views, a submarine hull provided in front with a turbine-like device intended to set up an underpressure at the front part of the hull and an overpressure at the back part of the hull.

FIGURE 3 represents the pressure distribution on such a submarine hull.

FIGURE 4 represents a hull provided with a front turbine-like device with deflectors.

FIGURE 5 represents a surface craft associated with one or more transportation submarines adapted to remain constantly under water.

In the various figures, the same reference numerals designate the same or similar parts.

At the root of the present invention is the recognition of the fact that crude or refined petroleum has a density slightly lower than that of sea water and is incompressible; accordingly, to move a mass of petroleum through sea water, it is not necessary to enclose it in a thick and heavy container. A mere membrane insulating a mass of petroleum from the surrounding watery medium would theoretically be sufficient but there remains the problem of causing said mass of petroleum to move in relation to the water under economical conditions and in the undisturbed medium provided by deep sea water. Thus, the harmful effects of the waves and the swell of the sea are avoided.

Further, for the displacement of such a mass of petroleum enclosed in a light envelope, it is desirable to give to the envelope a streamlined shape. Dragging the vessel through the water does not give suitable results while the pushing force provided by the turbine-like propeller means causes progression through the watery medium without subjecting the hull to undue strain.

Referring now to the drawing, there is shown a submersible or submarine vessel comprising a hull 1 carrying at its front a turbine-like propeller 7 actuated by engine 8. The action of the rotating propeller results in forcing the water into divergent streams enclosing an angle of about 45° with the axis of the hull, as shown by arrow 11. The resultant water pressure distribution is indicated in FIG. 3.

It should be noted that the force tending to cause the advance of the hull is distributed over the whole surface of the hull.

The vessel may be divided into a number of compartments by partitions 9. The hull may be entirely or in part made of a plastic material which may be reinforced, if desired. It may be flexible. An engine room 10 may be provided and this room is, of course, of rigid construction and is suitably supported inside the flexible or semi-flexible hull 1. The engine 8 actuates the turbine 7 which produces the diverging water streams 11 and sets up an underpressure in front of the hull and an overpressure at the back, causing the forward movement of the hull.

It is obvious that the representations of FIGURES 1 to 3 are schematical and in actual practice various accessory devices should be provided. Thus, turbine 7 may be associated with deflectors 12 and 13 (FIG. 4) to balance the torque of the rotating turbine-like propeller 7.

FIGURE 5 represents a surface ship 25 moving in the direction of the arrow; this ship 25 is not only provided with conventional propelling means but also with an electric power station. The electrical energy produced by this power station is transmitted through the cables 26, 27, 28 to separate submarine transport vessels 29, 30 and 31 to operate the electric motors driving the front propellers of these vessels. As shown, a fleet of such submarine

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units may be associated with a single surface craft 25. The cables for transmitting the electrical energy may also include wires for remotely controlling said units.

What I claim is:

1. A submarine vessel for the transporation of a liquid and the like, comprising a light, flexible hull of a stream-lined shape, the hull shape being substantially maintained by the liquid contained therein, a turbine-like propeller means mounted at the front of the hull and adapted to force water in divergent streams from the longitudinal axis of the vessel when the vessel is submersed in water and the propeller means is rotated, and an engine mounted in said vessel for rotating the propeller means.

2. The submarine vessel of claim 1, further comprising a rigid engine room built into the flexible hull and fixedly attached thereto, the engine being arranged in the engine room.

3. In combination, a surface ship, an electric power source on said surface ship, a plurality of vessels submersed in water, each submarine vessel comprising a light, flexible hull of a stream-lined shape, the hull shape being substantially maintained by the liquid container

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therein, a turbine-like propeller means mounted at the front of the hull and adapted to force the water in divergent streams from the longitudinal axis of the vessel when the propeller means is rotated, an electric motor mounted in each vessel for rotating the propeller means, and cable means for transmitting electrical energy from said electric power source to each of said motors.

4. The combination of claim 3, wherein said cable means includes means for remotely controlling said vessels.

References Cited in the file of this patent

UNITED STATES PATENTS

1,301,738	Potter	Apr. 22, 1919
1,651,230	Schumaker	Nov. 29, 1927
2,727,485	Combs	Dec. 20, 1955
2,823,636	Gongwer et al.	Feb. 18, 1958

FOREIGN PATENTS

489,293	Great Britain	Jan. 22, 1937
1,156,236	France	Dec. 9, 1957
1,159,028	France	Feb. 3, 1958