Dec. 20, 1955 H. M. COMBS 2,727,485

SUBMARINE TYPE SEA TRAIN

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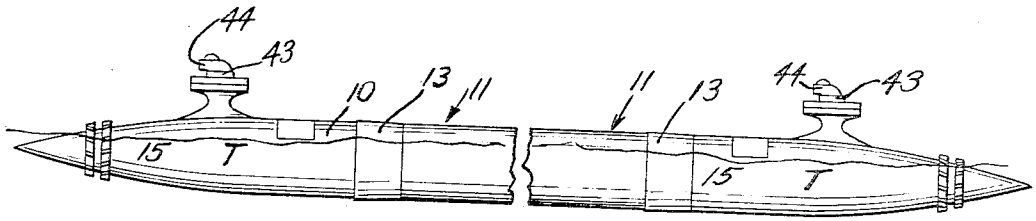


FIG. 1.

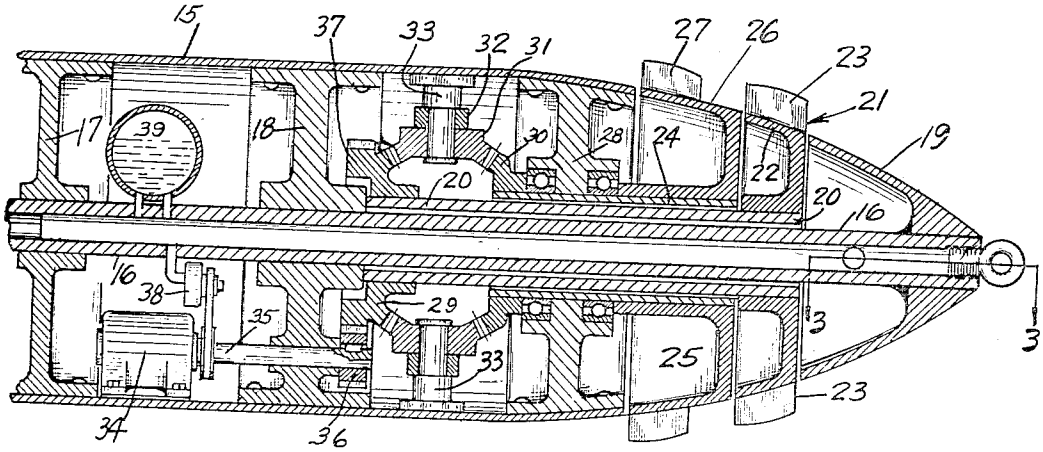


FIG. 2.

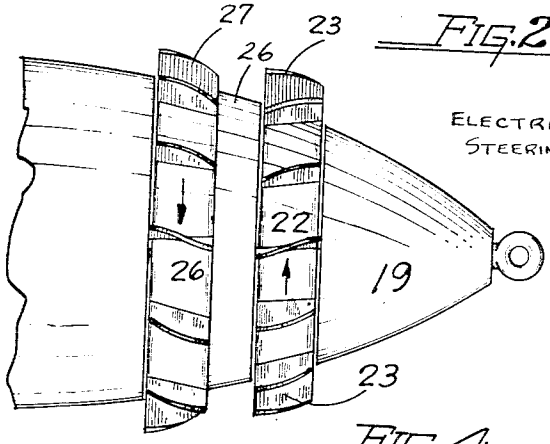


FIG. 4.

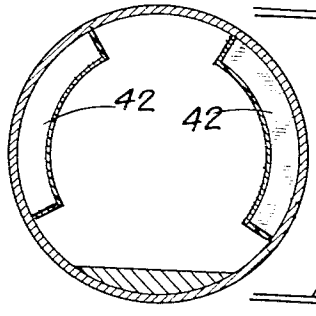


FIG. 5.

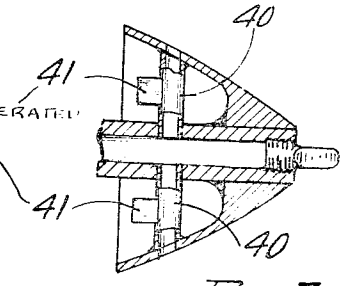


FIG. 3.

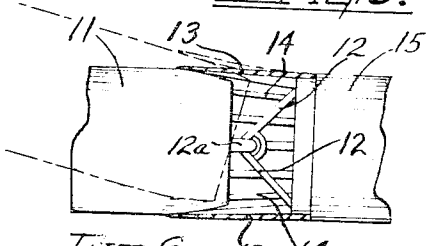


FIG. 6.

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SUBMARINE TYPE SEA TRAIN

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1 Claim. (Cl. 114—16)

This invention relates to improvements in methods and apparatus for transporting freight over bodies of water such as rivers, lakes and oceans.

Large quantities of freight are shipped daily from one country to another or from one coastal city to another. Such shipments are usually made by steam driven freighter or by combined passenger and freight steamers, and for transoceanic this method is quite satisfactory except during wars where such vessels are vulnerable to torpedo attack.

For coastwise shipping and for river transportation, cheaper and more convenient means for transportation is desirable.

It is well known that a vessel floating on water can be moved by a moderate force but the speed at which it moves is dependent on the value of the force and the time it is applied.

On rivers such as the Mississippi, much freight is shipped in barges, which, however, are not suitable for use on lakes and oceans where the water becomes very rough in case of heavy winds and storms.

It is the object of this invention to produce a vessel in the nature of a submarine that can move partly or totally submerged and which can comprise many separate units connected in tandem and pulled by a tractor unit. Such unit to be provided with suitable trim and ballast tanks under the control of the pilot so that in the event of a storm or in case of anticipated danger from war vessels the entire train can be submerged and can travel at a depth that will make it invisible from surface vessels.

The above and such other objects as may become apparent as the specification proceeds are attained by means of a construction and an arrangement of parts that will now be described, for which purpose reference will be had to the accompanying drawing in which the invention has been illustrated and in which:

Figure 1 is a side elevational view showing a train floating on the water surface, a portion having been broken away to decrease the length to fit the drawing;

Figure 2 is a vertical diametrical section through the front or power end of the tractor vessel;

Figure 3 is a horizontal section taken on line 3—3 Figure 2 and shows the steering jets;

Figure 4 is a side elevational view of the front end of the tractor element showing the propellers;

Figure 5 is a typical cross section taken on line 5—5 Figure 1, and

Figure 6 is a fragmentary side elevation showing adjacent ends of separate vessels, the interconnecting means and the flexible connector element.

Referring now to the drawing, reference numeral **10** designates the surface of the water on which the train floats. In the position shown, the train is only partly submerged. The train consists of any number of cylindrical vessels **11** articulated for universal movement. An example of such connecting means is shown in Figure 6 and will be hereinafter described.

At each end of the train there is a tractor unit T which, in addition to providing the tractive power is also of such size that it carries considerable freight. The reason for providing a tractor for each end is that the train is long, somewhat like an ordinary freight train, and since this train floats instead of traveling on rails it cannot be pushed or backed, but must always be pulled. The tractor at the rear of the train serves merely as a freight vessel when the train moves forwardly.

Referring now to Figure 6 it will be seen that the interconnecting means as shown in this view consists of two angular bars **12** and **12***a* that interlock as shown forming a universal pivot which is located nearer to the front end of the follower section **11** than to the rear of the rear end of the tractor unit **15** which feature of the construction reduces the lateral swing of the front end of section **11** which in turn reduces the lateral distortion of sleeve **13** which with its longitudinally extending angularly spaced flexible ribs **14** are attached to the rear end of the tractor unit and have a sliding engagement with the outer surface of the follower section as shown in Figure 6. The front end of section **11** is forwardly tapering which reduces the lateral distortion of the sleeve when the sections tilt relative to each other as indicated by broken lines. Sleeve **13** provides a smooth surface for the flow of water from one section to another.

Referring now more particularly to Figures 2 to 5 inclusive which show the machinery for operating the propellers and for steering, reference numeral **15** represents the outer shell. A heavy tube **16** is positioned in axial alignment with the shell and is held in a fixed position by two or more spaced supports **17** and **18** forming a forwardly projecting cantilever on which are supported the tapered prow **19**, the propellers and the transmission whose construction and operative relation will now be described.

Surrounding tube **16** is a tubular propeller shaft **20** to the forward end of which propeller **21** is attached. It is to be understood that suitable bearings either anti-friction or otherwise are provided wherever necessary or desirable. It will be observed that propeller **21** has an outer peripheral rim **22** that is curved to form a section of the shell. Projecting outwardly from the rim are a plurality of vanes **23**. The propeller hub is splined to shaft **20**. Surrounding shaft **20** is another tubular propeller shaft which has been designated by reference numeral **24**, to the forward end of which propeller **25** is splined. Rim **26** of propeller **25** is wider than the corresponding rim of propeller **21** and has propeller blades **27** along its rear edge leaving a considerable space between vanes **23** and **27**. Shaft **24** is journaled in bearing **28** which is supported from shell **15** as shown. Attached to the rear end of shaft **20** is a combination bevel and sprocket gear **29** and connected to the rear end of shaft **24** is a bevel gear **30**. The two bevel gears form part of a differential and are operatively interconnected by pinions **31** carried by ring **32** which is held from turning by an anchor means **33** as shown in Figure 2. Motor **34** has been shown as provided with a long shaft **35** that is journaled in support **18** and is provided at its front end with a pinion **36** that is in operative engagement with the spur gear ring **37**. It is now evident that when the motor rotates it will turn the propellers in opposite directions. The opposite rotation of the propellers serve to neutralize the torque that would otherwise tend to turn the tractor about its axis. A pump **38** is driven from the motor and delivers water to the interior of tube **16** and to the compressoin chamber **39**. Suitable bypass valves may be provided for the pump as is usual in such installations. Communicating the interior of tube **16** with the outside of the shell are two pipes **40** that are provided with electrically operable valves

41 which serve to control the direction of movement of the tractor. When either of the valves are opened a powerful water jet issues which produces a force tending to move the front end of the tractor to the other side. This device takes the place of a rudder. Each vessel is provided with ballast or trim tanks 42 that are used in the same manner as similar tanks in the usual submarine.

Each tractor is provided with a conning tower 43 and a ventilator 44. The tractor is, of course, provided with the usual storage battery and other means for providing light and ventilation. Since it is obviously impossible to show the machinery to the same scale as the shell, the former appears to occupy an undue amount of space, whereas the differential and other parts shown in Figure 2 are small compared to the size of the vessel.

Due to the streamlined shape of the train it offers a minimum of resistance to movement and, therefore, an immense quantity of freight can be transported with a moderate amount of power. As the speed increases the amount of power required increases faster than the speed.

What I claim is:

In an articulated submarine train having a tractor unit at each end, means for interconnecting adjacent units for universal tilting movement, comprising bars formed into angle form, attached to adjacent ends of adjacent sections, said bars being interlocked each extending through the plane of the other, the point of pivotation of the bars being closer to the follower section than to the tractor section, a cylindrical sleeve having one end rigidly attached to the rear of the tractor section and projecting over onto the follower section in sliding engagement therewith, the sleeve having a plurality of stiffening ribs attached to its inner surface in angular spaced relation, the rear ends of the ribs resting normally on the outer surface of the follower section the front end of which is forwardly tapering presenting to the ribs and sleeve a curved surface, the ribs being flexible and normally engaging the outer surface of the follower section the flexibility of the ribs permitting the two pivotally connected sections to tilt relatively to each other.

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