Aug. 20, 1946. J. M. HAIT 2,406,290

AMPHIBIAN

Filed Sept. 20, 1944 2 Sheets-Sheet 1

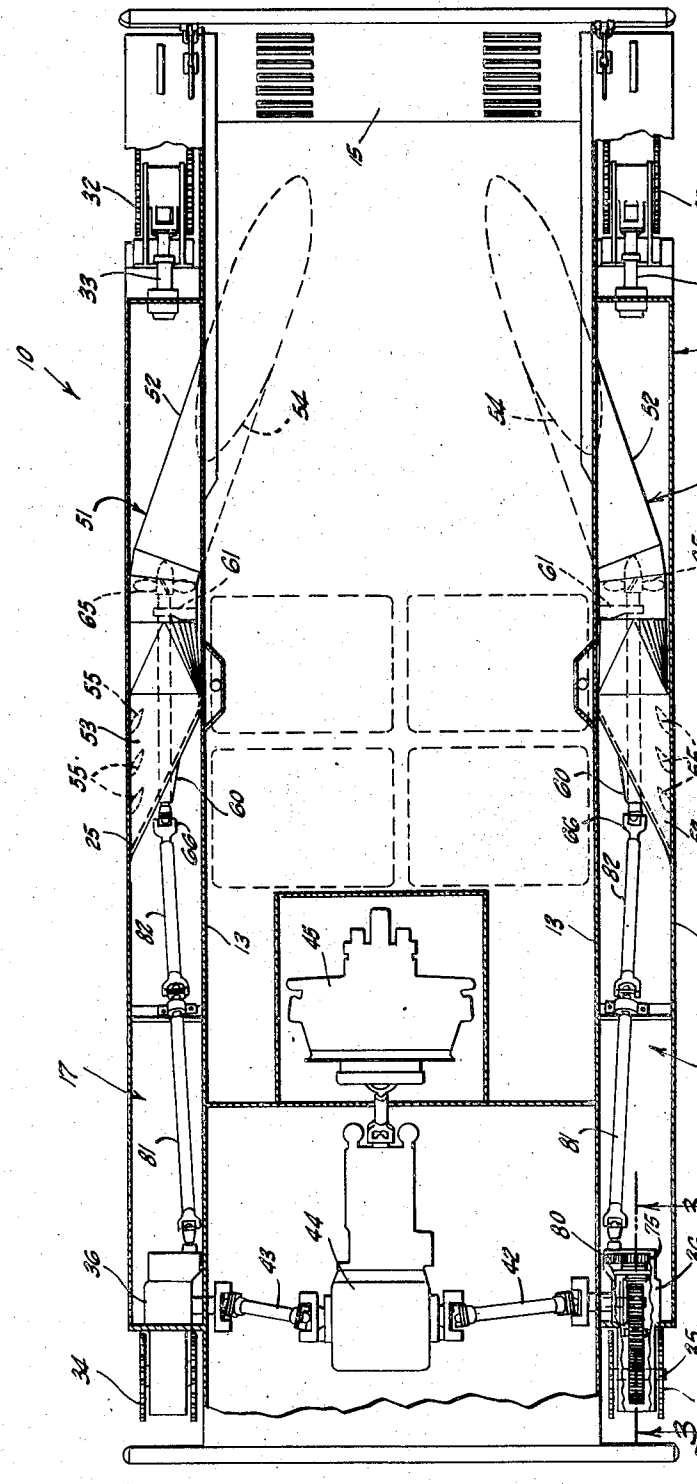

FIG. 1

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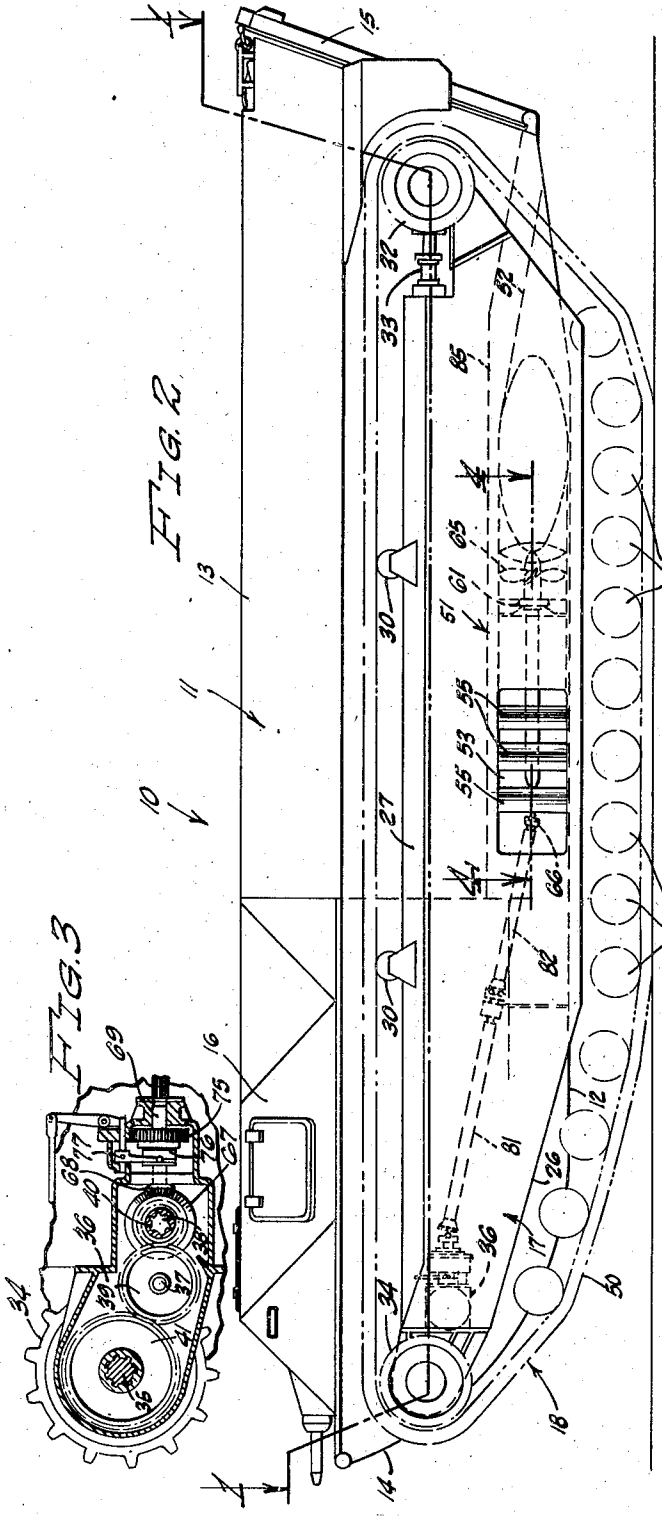

FIG. 2

FIG. 3

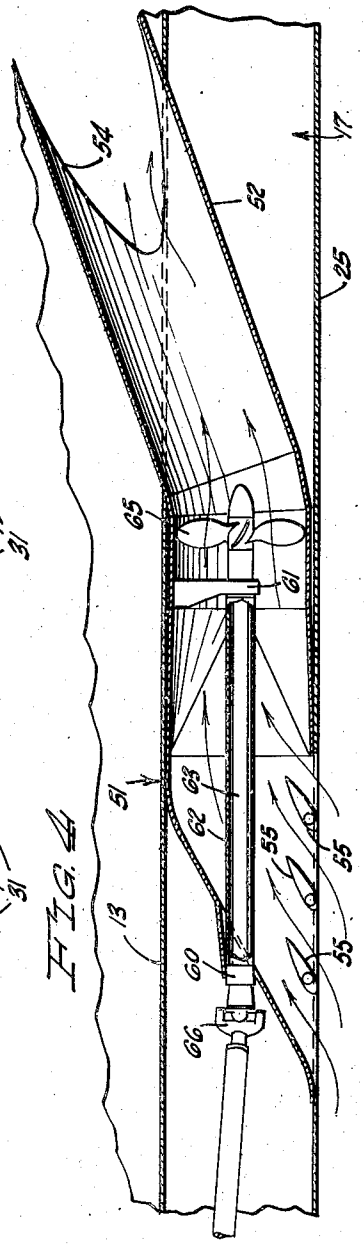

FIG. 4

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AMPHIBIAN

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4 Claims. (Cl. 115—1)

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This invention relates to amphibians and is particularly useful in amphibians for carrying assault forces ashore in amphibious military operations.

It is an object of this invention to provide an amphibian having a novel auxiliary propulsion device.

While the invention may be used with various types of amphibians, it is especially adaptable for use with the tractor type amphibian in which track laying mechanisms on opposite sides of the hull are employed for supporting and propelling the craft on land and which have heretofore been depended on for driving the craft in water.

When going ashore in amphibious landing operations, the progress of the amphibian is often obstructed by reefs or by artificial obstacles located beneath and close to the surface of the water. When the track laying mechanisms of tractor amphibians are depended upon for propulsion in the water, the tracks thereof are operated at relatively high speed and when these strike reefs or other solid obstacles under the water, considerable damage is done to the tracks before they can be slowed down to a suitable speed for lifting the amphibian over the obstacle.

It is a further object of my invention to provide an amphibian of the tractor type having an auxiliary propulsion means which transmits into thrust a sufficient portion of the power of the amphibian motor that the tracks which support the amphibian on land need not be relied upon for propulsion of the craft in water and can be run at a relatively slow speed while the craft is traveling in water.

Another object of the invention is to provide such an amphibian in which no special attention need be paid by the pilot to the auxiliary propulsion device of the invention for such device to come into operation when the amphibian goes from land into the water or from the water on to the land.

It is a further object of my invention to provide a tractor type amphibian with an auxiliary propulsion device including propulsion units on opposite sides of the craft, each of which is driven in conjunction with one of the track laying mechanisms.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a plan view of a preferred embodiment of the invention with a certain portion thereof

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broken away and shown in section as indicated by the line 1—1 of Fig. 2.

Fig. 2 is a side elevational view of Fig. 1 taken in the direction of the arrow 2.

Fig. 3 is an enlarged diagrammatic sectional view of the forward sprocket drive and propeller power takeoff mechanism, this view being taken on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged fragmentary sectional view of one of the auxiliary propulsion units of the invention and is taken on the line 4—4 of Fig. 2.

Referring specifically to the drawings, an amphibian 10 shown therein includes a hull 11 having a bottom 12, sides 13, a curved bow plate 14, and a stern gate 15. Provided in the hull is a pilot's compartment 16, while mounted on opposite hull sides 13 are pontoons 17 on each of which is mounted a track laying mechanism 18.

Each pontoon 17 is preferably hollow, the inner wall thereof being formed by the adjacent side 13 of the amphibian, the pontoon also having an outside wall 25, a bottom wall 26 and a top wall 27.

Each track laying mechanism 18 may be described as including a pair of idlers 30 mounted on the pontoon top wall 27, a series of bogie wheels 31 which are mounted in any suitable manner on the bottom wall 26 of the pontoon 17 and a double idle sprocket 32 which is mounted on the rear end of the pontoon 17 and which is adjustable by the operation of a jack 33 for a purpose to be made clear hereinafter.

The mechanism 18 also includes a double drive sprocket 34 having a shaft 35 which is journaled in a gear box 36, the latter being mounted on the bow end of the adjacent pontoon 17. Also journaled in the gear box 36 are shafts 37 and 38 which are parallel with shaft 35 and have gears 39 and 40 which mesh with each other, the gear 39 also meshing with a gear 41 on the sprocket shaft 35. The shafts 38 of the two mechanisms 18 are selectively driven through drive rods 42 and 43 from a gear box 44 which is supplied with power from an engine 45.

The track laying mechanism being described also includes an endless track 50 which may be of any suitable flexible construction and which is generally equipped with grousers to give good traction on the ground when the amphibian 10 is traveling on land and to engage the water when it is afloat so that operation of the mechanisms 18 will propel the amphibian through the water. Track 50 is trained about the idlers 30, bogie wheels 31 and idle and drive sprockets 32 and 34, as shown in Fig. 2 and is tightened or loosened by operation of the jack 33.

Embodied with each pontoon 17 is a propeller unit 51 comprising a water passage forming conduit 52 having an intake opening 53 formed in the outer pontoon wall 25 and a water outlet opening 54 which is formed in the bottom 12 of the hull 11. Provided in the intake opening 53 is a series of water guide vanes 55 which prevent the admission of large obstacles into the conduit 52. Mounted in the walls of the conduit 52 are bearings 60 and 61, these bearings being connected by a tube 62 enclosing a shaft 63 which journals in said bearings. Mounted on the rear end of said shaft is a water propeller 65. Fixed on the front end of the shaft 63 is a universal joint 66.

Provided on the shaft 38 in the gear box 36 is a bevel gear 67 which meshes with a pinion 68 on the inner end of a shaft 69 which journals in suitable bearings provided on the gear box 36. This shaft has a gear 75 which is freely rotatable thereon and a clutch 76 splined on the shaft 69 and controlled by a yoke 77 so as to connect the gear 75 to the shaft 69 or disengage such connection at will.

Gear 75 meshes with a pinion gear 80 (see Fig. 1) which connects through drive rods 81 and 82 with the universal joint 66 of the propeller shaft 63. Thus, with the clutch 76 connected, the propeller 65 is rotated whenever the sprocket 34 is driven and at a speed in direct proportion to the speed of this sprocket.

The amphibian 10 has cargo floor 85 which is disposed above and covers the conduits 52.

Operation

While in practice, the clutches 76 controlling the driving of the propellers 65 on opposite sides of the amphibian 10 may be thrown out, excepting when the amphibian enters the water, ordinarily no harm will result from permitting the propellers being connected to the drive mechanism while the amphibian 10 is operating on land.

The propellers 65 have no function, of course, except when the amphibian 10 is in water. The drive of these propellers is so geared, however, that as soon as the amphibian is afloat, the propellers 65 will absorb so much power and will produce such a thrust as will permit the amphibian to maintain its maximum speed while running the track laying mechanisms 18 at a relatively slow rate. The advantage of having the tracks 50 traveling at a fairly slow rate while the amphibian is moving through water, is evident in light of the remarks at the opening of the specification.

Obstacles such as reefs, rocks, wrecks, tank traps, and the like which may be encountered just below the surface of the water, accomplish relatively little damage to the tracks 50 when these are traveling slowly, as is the case in the operation of the amphibian 10 in water. Thus it is unnecessary to change gears or, in fact, make any change in the operation of the amphibian 10 when a reef is encountered. The tracks 50 merely take hold of the reef and propel the amphibian 10 over this without any change in the speed of the amphibian or of the tracks 50.

In view of the fact that each propeller 65 is driven conjointly with the track mechanism with which it is mounted, the method by which the operator steers the amphibian 10 is no different from the method in common use in steering tractor amphibians. In this method the operator separately controls the track laying mechanisms 18 on the starboard and port sides of the craft, the mechanism on the inside of the turn being slowed up and that on the outside of the turn speeded up to steer the craft to port or starboard.

What I claim is:

1. In a track laying amphibian the combination of: a hull for supporting the craft in water; pontoons formed on the side walls of said hull; track laying mechanisms mounted on said pontoons said mechanisms embracing idle and drive sprockets, a series of hull supporting bogie wheels, and an endless flexible track trained about said sprockets and bogie wheels; means forming a propeller passage through each of said pontoons; a water propeller mounted in each of said passages; means for separately and selectively driving said mechanisms; and means for driving the starboard propeller conjointly with the starboard mechanism and the port propeller conjointly with the port mechanism.

2. A combination as in claim 1 in which the water intake openings for said propeller passages are formed in the outer walls of said pontoons and in which the discharge openings for each of said passages extend inwardly, downwardly and rearwardly.

3. In a track laying amphibian the combination of: a hull; starboard and port track laying mechanisms mounted on opposite sides of said hull, each of said mechanisms including an endless track and means about which said track is trained and by which said track is driven; propellers, one of which is mounted within the space surrounded by the endless track of each of said track laying mechanisms; and means for conjointly driving each of said propellers and the mechanism within which it is mounted.

4. In a track laying amphibian the combination of: a hull; starboard and port track laying mechanisms provided on opposite sides of said hull, each of said mechanisms including a flexible endless track and means about which said track is trained including a drive sprocket; propellers, one of which is disposed within the space surrounded by the track of each of said mechanisms; means for shielding said propeller from damage by obstacles through which said amphibian may travel; means for selectively driving said drive sprockets to facilitate the steering of said amphibian when traveling on land or when afloat; and means connecting the drive means for each of said sprockets with the propeller on that side of the amphibian to cause said propeller to be driven so that selective driving of said sprockets will selectively drive said propellers thus contributing, when the craft is afloat, to the steering thereof.

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