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ELECTRIC CONTROL SYSTEM FOR POWER BOATS

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Fig. 1.

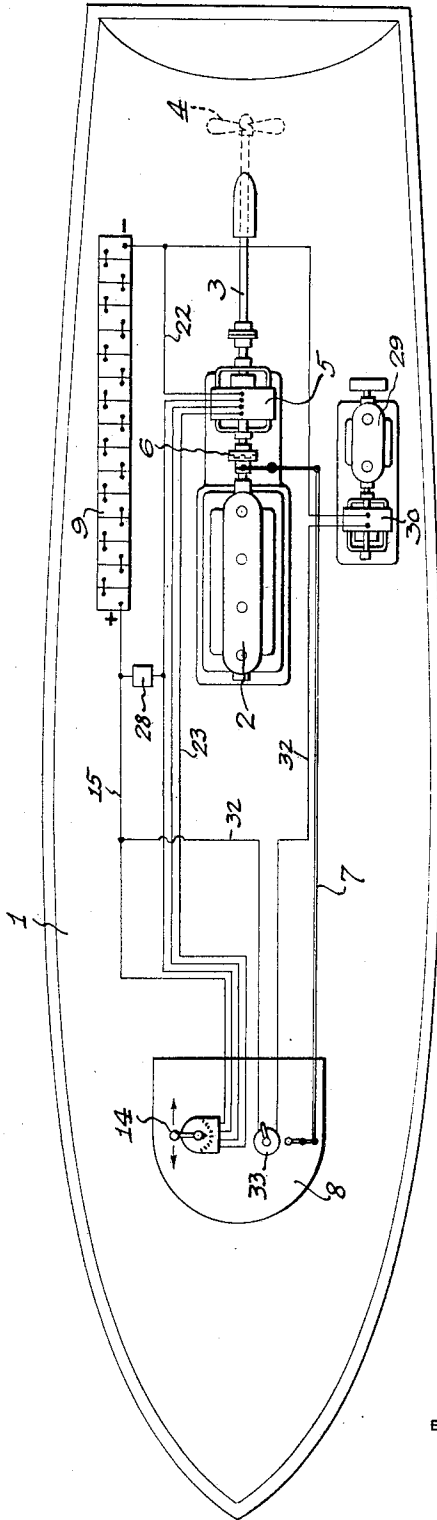
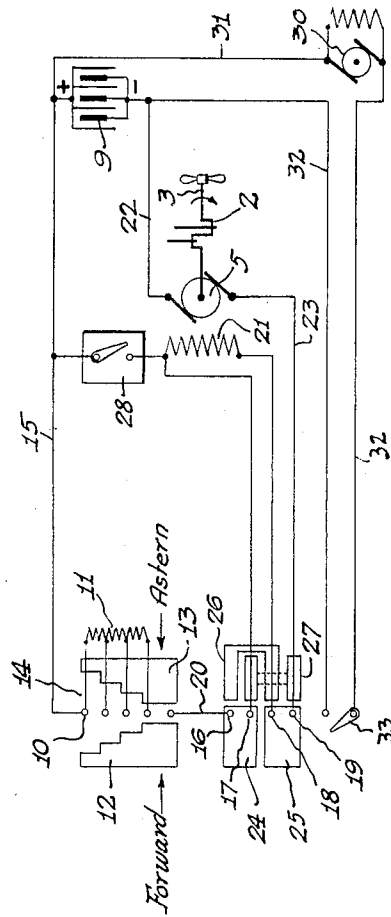


Fig. 2.



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ELECTRIC CONTROL SYSTEM FOR POWER BOATS

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1 Claim. (Cl. 172—8)

The present invention pertains to a novel electrical control system for power boats, particularly those driven by an internal combustion engine.

5 The principal object of the invention is to provide such a system wherein the engine may be initially turned over by a motor-generator which later operates as a generator when the propeller shaft attains a predetermined speed. Another object is to assure the direction in which the engine starts, inasmuch as it is known that two-cycle engines often start oppositely to the intended direction, thus causing collisions especially in close quarters. Moreover, the system according to this invention enables the vessel to be propelled by the motor-generator alone, for example when it is desired to run at lower speeds than permitted by the engine or when the engine is disabled. In the use of the motor-generator alone as the source of power, the battery for running the same may be charged by means of an auxiliary engine driving another generator. The latter system also is used for charging the battery when current is being consumed while the motor-generator is not in operation, as in lighting, heating or cooking aboard the craft while at anchor.

The invention is fully disclosed by way of example in the following description and in the accompanying drawing, in which—

30 Figure 1 is a plan view of a power boat equipped with a control system according to the invention; and

Fig. 2 is a wiring diagram.

35 Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

40 In Figure 1 is shown a power boat indicated generally by the numeral 1 and adapted to be driven normally by an internal combustion engine 2 such as a Diesel engine. A propeller shaft 3 extends from the engine in the usual manner and carries a propeller 4 at the stern end. A reversible motor-generator 5 is also operable on the shaft 3, and a clutch 6 is inserted in the shaft between the engine and the motor-generator. A suitable linkage 7 for operating the clutch extends therefrom to the pilot house 8.

45 A battery of cells 9 is provided for driving the motor-generator to start the engine. A control for this apparatus is mounted in the pilot house and includes a series of fixed contacts 10 connected to various points of a starting resistance 11. The rotary element of the control includes two stepped contacts 12 and 13 at opposite sides of the fixed contacts 10. The control is actuated

by means of a pivoted handle 14. When the handle is turned, the movable contacts turn in the opposite direction because of the pivotal mounting of the handle, as indicated in Figure 2. The contacts 12 and 13 are symmetrical with respect to the line drawn therebetween, and both operate in like manner in cutting out the starting resistance 11 progressively, regardless of the direction in which the handle 14 is turned. One of the end contacts 10 is joined by a conductor 15 to the positive terminal of the battery 9.

In the controller are also embodied four additional fixed contacts 16, 17, 18 and 19. The contact 16 is connected by a line 20 to the remaining end conductor 10. The intermediate conductors 17 and 18 are connected respectively to the ends of a field 21 for the motor-generator 5. One of the terminals of the generator is connected by a line 22 to the negative terminal of the battery 9, and the other side of the generator is joined by a conductor 23 to the fixed contact 19.

The rotary element of the controller carries a pair of contacts 24 and 25 in line with the member 12. The contact 24 is adapted to bridge the fixed contacts 16 and 17, and the contact 25 to bridge the fixed contacts 18 and 19 when the handle 14 is pulled forward to drive the engine forward. In fact, the contacts 24 and 25 are in this position when the controller is in neutral, but at this time the circuit is broken at the starting resistance 11; but the length of the contacts 24 and 25 is such that they remain in engagement with the fixed contacts while the controller is being brought to full forward driving position. With the contact 12 bridging any or all of the fixed contacts 10, a circuit is formed from the positive side of the battery 9, through conductor 15, contacts 10 and 12, conductor 20, contacts 16, 24 and 17 to the field 21, thence through contacts 18, 25 and 19 to one of the terminals of the motor-generator 5, and from the remaining terminal thereof to the negative side of the battery 9.

The part of the controller for effecting a reverse drive includes a contact 26 of reversed C-shape adapted to engage the contacts 16 and 18, and another contact 27 of I-shape adapted to engage the contacts 17 and 19.

When the handle 14 is turned to put the engine 2 in reverse, the aforementioned position of the contacts 26 and 27 is effected, while the contacts 24 and 25 are freed from the fixed contacts 16, 17, 18 and 19. A circuit through the battery 9 and motor 5, similar to that already described, may now be traced. This circuit will however

include the contacts 26 and 27, the effect of which is to reverse the flow of current through the field 21, whereupon the engine 2 is reversed.

In starting in either forward or reverse, the motor 5 cranks the engine and continues to operate on the shaft 3 until the latter attains a certain predetermined speed. When this speed is reached, the motor-generator commences to function as a generator to charge the battery 9, through the action of an automatic switch device 28 connected across the conductor 15 and field 21 and thereby adapted to short circuit at least a part of the controller. This device is of standard construction and is likewise adapted to operate the member 5 as a motor when the shaft 3 falls below a predetermined minimum speed, whereupon it is maintained in rotation, and the engine 2 is prevented from stalling.

An auxiliary engine 29 is also provided on the boat and is connected to a generator 30 which in turn is adapted to charge the battery 9 through conductors 31 and 32. The charging however is controlled by a switch 33 inserted in one of the conductors and positioned in the pilot house 4.

The engine 29 may be cranked by hand, or the member 30 may be a motor-generator adapted first to crank the engine and then transform itself automatically into a generator driven by the engine.

The various uses of this system will now be described. In starting the engine 2 through the motor-generator 5, the direction of rotation is definitely and positively determined by the operation of the handle 14 at the controller. This is a distinct advantage in connection with a two-cycle engine, wherein the direction of rotation is often opposite to that intended. In maneuvering in close quarters, rotation in the wrong direction due to a defect such as a sticking valve, often results in a collision.

It may also be desired to run the craft at lower speed than permissible by the engine 2, especially if the latter is a Diesel engine. In such case, the desired low speed is available through the motor-generator 5, and the clutch 6 may be opened through the linkage 7 to avoid starting the engine 2.

The auxiliary engine 29 and generator 30 charge the battery 9 when current is being consumed while the engine 2 is idle, as for lighting, heating or cooking aboard the vessel at anchor. Also, if the engine 2 should become disabled, the vessel may be run into port by the motor-generator 5, in which case the battery 9 may be continuously charged from the generator 30.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention, as indicated by the appended claim.

What I claim is:—

An electrical control system for power boats comprising an engine, a propeller shaft extending therefrom, a reversible motor-generator connected to said shaft, a battery for driving said motor-generator and starting said engine, said battery being adapted to be charged by said motor-generator, a reversing switch for said motor-generator, automatic means for causing said motor-generator to operate as a generator to charge said battery on attainment of a given speed, an auxiliary engine normally independent of said shaft, and a generator coupled thereto and connected to said battery for charging the same.

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