Nov. 5, 1929. A. SCHRIEL ET AL 1,734,599

ELECTRICAL SYSTEM FOR OUTBOARD MOTORS

Filed Dec. 30, 1926 2 Sheets-Sheet 1

Fig. 1.

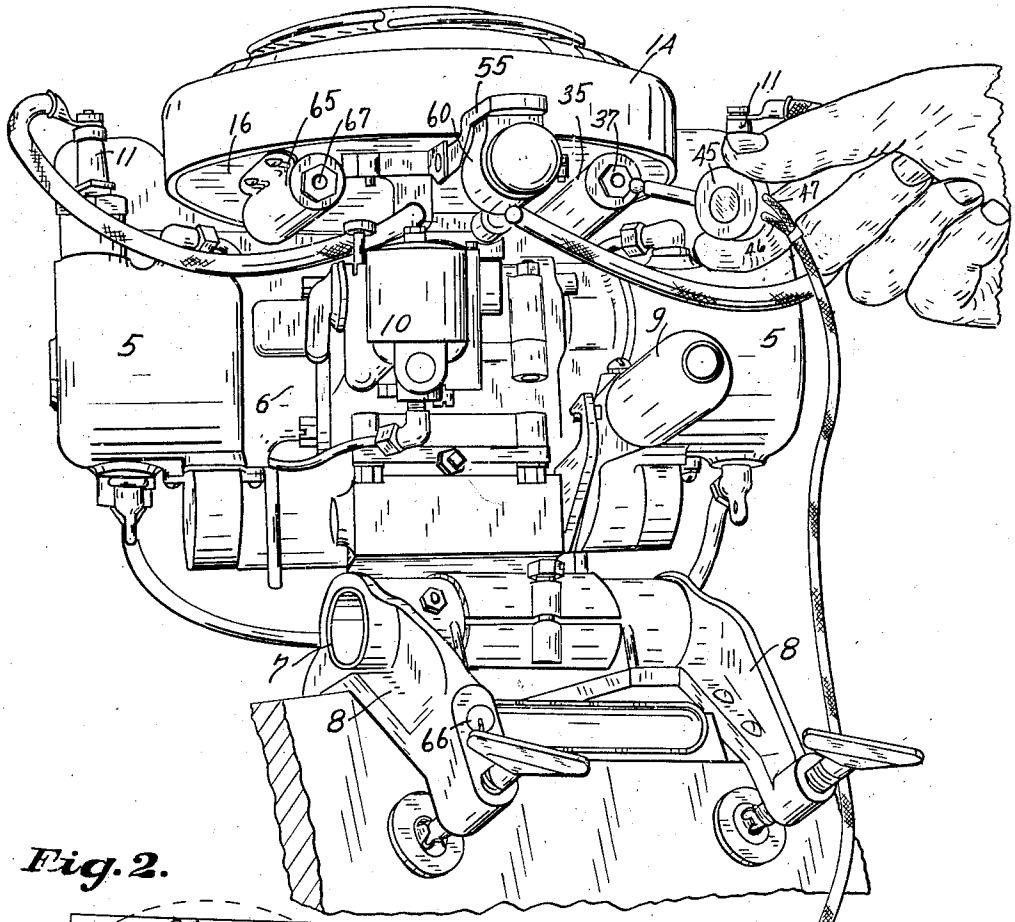
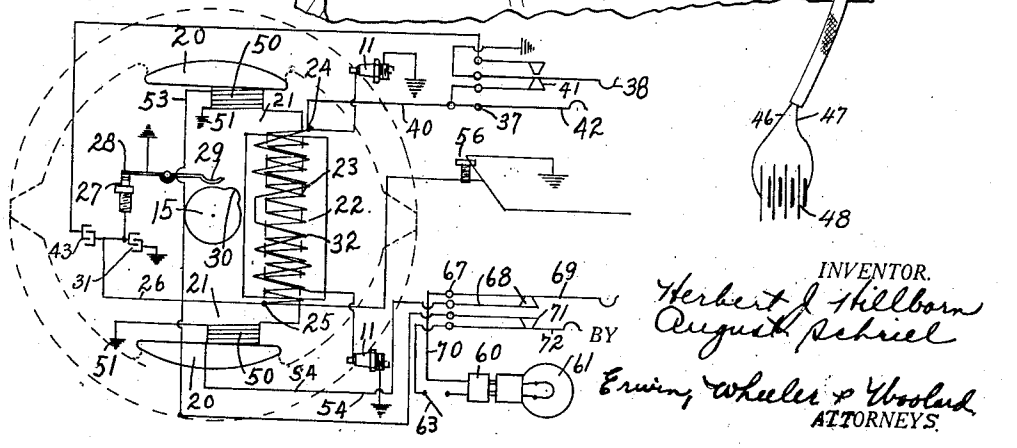


Fig. 2.



INVENTOR.
Herbert J. Hillborn
August Schriel
BY
Erwin, Wheeler & Woodard
ATTORNEYS.

Nov. 5, 1929. A. SCHRIEL ET AL 1,734,599

ELECTRICAL SYSTEM FOR OUTBOARD MOTORS

Filed Dec. 30, 1926 2 Sheets-Sheet 2

Fig. 3.

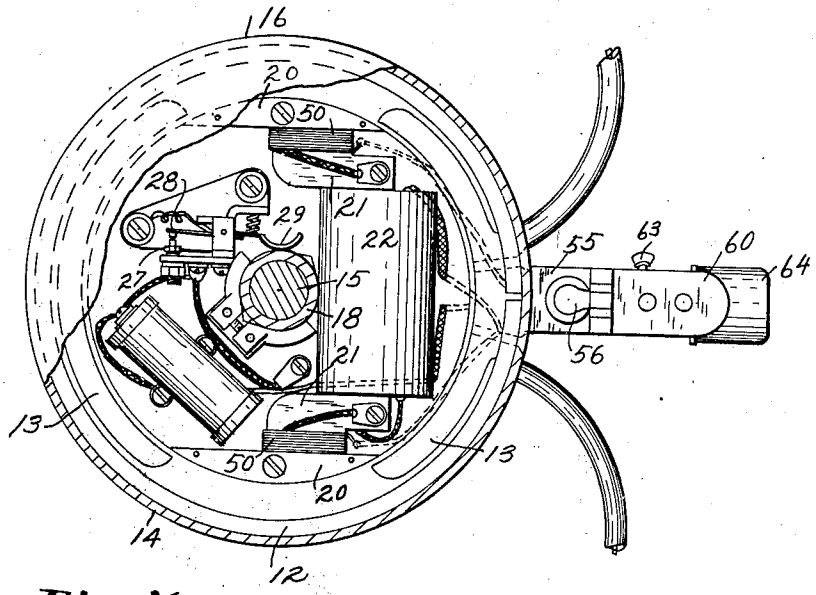
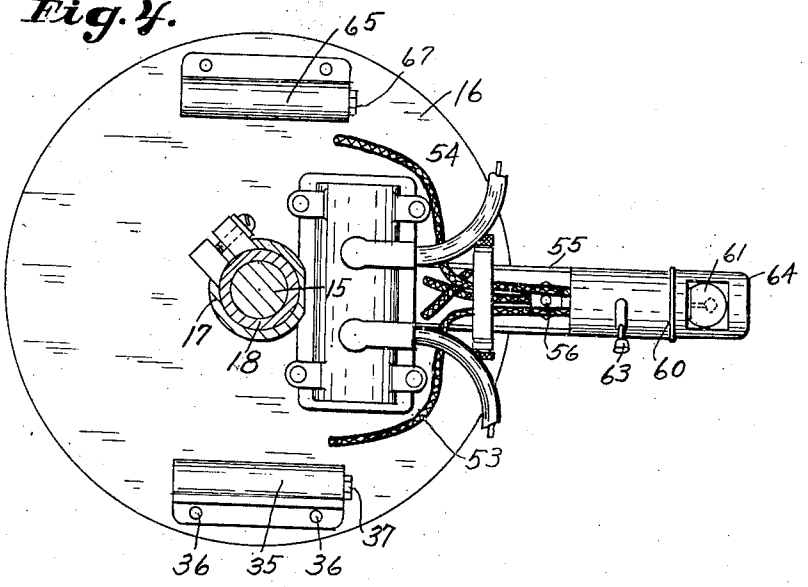


Fig. 4.



INVENTOR.
Herbert J. Hillborn
August Schriel
BY
Erwin, Wheeler & Woodard
ATTORNEY.

Patented Nov. 5, 1929 1,734,599

UNITED STATES PATENT OFFICE

AUGUST SCHRIEL AND HERBERT J. HILLBORN, OF MILWAUKEE, WISCONSIN, ASSIGNORS, BY MESNE ASSIGNMENTS, TO OUTBOARD MOTORS CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

ELECTRICAL SYSTEM FOR OUTBOARD MOTORS

Application filed December 30, 1926. Serial No. 158,057.

This invention relates to improvements in electrical systems for outboard motors.

It is the object of the invention to provide a novel and improved ignition and lighting system for an outboard motor wherein connections are arranged for the alternative use of an extraneous source of electric power either in the ignition circuit for starting purposes or in the lighting circuit when the motor is at rest, both of such circuits being normally supplied with current during engine operation from a convenient source associated with the engine, such for example as a fly wheel magneto of special design.

In the drawing:

Figure 1 is a perspective view of an outboard motor assembly embodying this invention.

Figure 2 is a diagrammatic plan view of the wiring connections employed.

Figure 3 is a plan view of the armature support of a fly wheel magneto embodying a structure in accordance with the invention and assembled with the fly wheel, portions of the fly wheel being broken away to expose the mechanism assembled on such support.

Figure 4 is a plan view of an inverted armature support embodying this invention.

Like parts are identified by the same reference characters throughout the several views.

The outboard motor selected for the purpose of exemplifying this invention includes the usual assembly of cylinders 5 and crank case 6 tiltably pivoted at 7 to a transom bracket 8. A tiller handle which also operates to control a reversal of the engine is shown at 9 and the usual carburetor appears at 10.

In order to supply ignition current to the spark plugs 11 a magneto is used, corresponding in general to the type of magneto described in Patent No. 1,147,038, issued to H. C. Mueller, on July 20, 1915.

A permanent magnet 12 having pole pieces 13 is mounted interiorly of the rim of fly wheel 14, the fly wheel being fixed in the usual way to the crank shaft 15. The pole pieces rotate adjacent an armature mounted on a plate 16 which is loosely clamped at 17 to a sleeve 18 within which the crank shaft rotates. The armature includes head members 20, offsets 21 and an intermediate portion which extends through the coil 22 for the ignition circuit. This coil includes a primary winding 23 having one end 24 which is grounded through means hereinafter to be described, and having the other end 25 connected by a wire 26 with the stationary contact 27 of the usual interrupter. A condenser 31 is connected in series between the stationary contact 27 and ground. This condenser is of a size to function satisfactorily during magneto operation and may, for example, be 1/8 M. F. D. A movable contact 28 of the interrupter is grounded and is provided with a cam follower portion 29 acted on by cam 30 on the crank shaft 15.

The impulses generated by the making and breaking of a connection at the interrupter generate a corresponding current in the secondary winding 32 which includes oppositely wound portions connected respectively to the two spark plugs 11.

The arrangement above described for supplying current from a fly wheel magneto to the spark plugs of a two cylinder engine is all standard and has been set forth briefly in order to provide a basis for the following description of the more important aspects of the present invention.

As above indicated, the present invention includes a means for supplying electric current from an extraneous source to the ignition circuit of an outboard motor. Such an arrangement is valuable in starting, particularly where the magnets in the fly wheel have become weakened so that the fly wheel magnets do not develop the full output of current. In order to accomplish this purpose of the invention, we provide at 35 on the underside of armature mounting plate 16, a cylindrical receptacle screwed at 36 to the plate and provided in its end wall with an ordinary jack 37 of the well known form shown diagrammatically in Figure 2. Spring 38 of the jack is grounded at 39 and a connection to ground is ordinarily established through the jack between coil terminal 24 and the ground by means of a conductor 40 and contact 41. Spring contact 42 of the jack is likewise connected to conductor 40 and it will

be obvious that the arrangement is such that when the ordinary plug 45 is thrust into the jack, spring 38 will be lifted from contact 41, thereby breaking the direct connection between the ground and terminal 34 of the primary winding of the magneto. Jack 45, however, is provided with current from two separate conductors 46 and 47, which, as diagrammatically shown in Figure 1, are respectively connected with the positive and negative terminals of some extraneous source of current, such for example as a six volt battery.

In consequence of this arrangement the insertion of the plug 45 into jack 37 will result in connecting the battery in series between coil terminal 24 and the ground so that the battery 48 will thereupon be available to supply current for ignition, the battery circuit being completed through the primary winding of the magneto coil through the interrupter and thence through the ground to the battery.

The withdrawal of the plug results in removing the battery from its series connection with the magneto coil and in re-establishing the direct connection of coil terminal 24 with the ground at 39. It will be obvious that when the plug is withdrawn the fly wheel magneto will function in the ordinary way and that by a mere insertion of the plug the battery will be connected in series with the primary coil to supplement the output thereof, whereby to provide greatly increased voltage.

It will be noted, furthermore, that in the use of a battery the capacity of condenser required across the interrupter differs somewhat from the accepted standard of capacity for condenser 31. Accordingly, there is provided at 43 a second condenser which may have a capacity of the order of ½ M. F. D., and this condenser is connected to a contact 44 so positioned as to be operatively engaged by the jack spring 38 as such spring moves away from contact 41 upon insertion of the plug. Thus, the insertion of the plug not only connects the battery operatively in series in the ignition circuit, but moreover, establishes automatically an additional capacity across the interrupter points.

The location of the jack housing 35 and jack 37, as illustrated, not only provides a most convenient mounting for these accessories, but also has the advantage of protecting the jack and its case from rain. It will be noted moreover that the jack and related parts are also protected from blows which might damage them if the jack were in a more exposed position. While fully protected from injury through rain or violence, the jack is nevertheless readily accessible as will be seen from the showing in Figure 1.

It has been found that without in any way interfering with the successful use of the fly wheel magneto for ignition purposes, it is possible to develop sufficient current to supply a lighting circuit. This is done, according to the separate invention of August Schriel disclosed in application Serial No. 146,960, filed Nov. 8, 1926, for magnetos, by applying a separate winding or windings at 50 to the armature, and a sufficient quantity of current for the operation of a light can be taken therefrom without requiring any modification whatever of the ignition circuit and without decreasing in any degree the amount of current available for ignition circuit. This arrangement forms the subject matter of a companion application filed by the said Schriel as previously noted but will be described herein because it leads to a more perfect understanding of the circuits involved in the present invention.

In order to render more readily available the flux which has heretofore been wasted in the armature, coils are wound at 50 on the armature offsets 21. Each of the coils 50 is grounded at 51, the grounding being at opposite ends of the coils whereby in effect the coils are connected together in series. Conductors 53 and 54 from the ungrounded ends of the coils supply current to an incandescent electric lamp suitably located.

It is customary to provide a handle at 55 for the oscillation of the entire mounting plate 16 for the armature and related parts. Such oscillation is utilized to advance or retard the spark by adjusting the cam follower 29 with reference to the path of cam 30. This handle customarily carries a switch 56 which is adapted to ground contact 27 of the interrupter and thereby to short-circuit the interrupter and to prevent ignition. This handle is a peculiarly desirable location for the socket 60 through which current is supplied to the incandescent bulb 61 onto any other desirable output line. Assembled upon handle 55 for this purpose is a special socket which houses a switch 63 and is provided with a reflector bulb. Both the reflector cap and bulb are preferably removable to enable the socket to receive a take-off plug through which other lights may be supplied with current when desired.

The location of the light at 61 on the end of handle 55 is such that it illuminates the carburetor to enable adjustments thereof to be made, and it illuminates the lock 66 for the outboard motor bracket screw, the position of tiller handle 9 and, in fact, all parts of the motor to which attention is necessary for its operation. We prefer for these reasons to mount our lighting output socket at the end of the timer handle rather than in any other of the many possible locations therefor.

It will be understood that the magneto supplies current through the special windings 50 only when the engine is in operation, whereas it is particularly necessary on various occasions to have the motor illuminated

when the engine is at rest. For this purpose we provide at 65 a cylindrical case for a jack 67. The jack is similar to the jack used at 37 in the ignition circuit, while the case 65 corresponds to case 35 and is mounted in the same manner on the under side of the armature plate 16. Conductor 54 leads to contact 68 of jack 67 and is normally in electrical connection with spring contact 69 which is connected with one of the terminals of socket 60 through a conductor 70. Conductor 53 leads to the jack contact 71 which is normally in electrical engagement with spring contact 72 which is connected through switch 63 with the other terminal of socket 60. Thus, a circuit is completed through coils 50 and jack 67 and socket 60, together with the lamp or other appliance therein, such circuit being under the control of switch 63.

The same plug 45 which is receivable into jack 37 is also receivable into jack 67, and when inserted therein has the result of lifting the spring contacts 69 and 72 from their respective contacts 68 and 71. Thereby the connection of coils 50 to the lamp is broken and in lieu thereof a connection is established through the jack from battery 48 to spring contact 69, thence to the socket 60 and the bulb 61 therein, thence through switch 63 to spring contact 72 and back through the plug to the battery.

It will be apparent from the foregoing description that the two jacks 37 and 67 are always available in a readily accessible and yet fully protected position, alternatively to receive the plug 45 which is connected to the extraneous source of electrical energy which, for the purposes of this disclosure, is a battery shown at 48. With the plug engaged in jack 67 the light at the end of handle 55 is always available under the control of switch 63 and may be used to illuminate the carburetor and other parts of the outboard motor even when the engine is stationary. It is convenient to employ the light for any preliminary adjustments of the motor incident to the starting operation, and it will be noted that the light may also be used to facilitate positioning the motor on the boat after dark or in carrying the motor through dark places on land.

After the light has been used to mount the motor and to make preliminary adjustments thereof the energy of battery 48 may be almost instantly transferred for application to the ignition circuit by merely pulling plug 45 from jack 67 and engaging it in jack 37. Thereupon the battery is connected in series with the ignition coil and boosts the voltage output thereof to effect easy starting. After the engine starts the supplemental coils 50 on the armature will again supply current which may be used in the light when desired, and, the engine being in operation, the plug 45 may be withdrawn to save further consumption of battery current and the fly wheel magneto will thereupon supply all current necessary both for ignition and lighting.

We claim:

1. The combination with ignition and lighting circuits, a magneto normally connected to supply said circuits with current and an extraneous source of electrical energy, of means for alternatively connecting said extraneous source with either of said circuits.

2. The combination with ignition and lighting circuits, a magneto normally connected to supply said circuits with current and an extraneous source of electrical energy, of means for alternatively connecting said extraneous source with either of said circuits, said means including a plug connected with said source and a jack connected in each of said circuits and adapted alternatively to receive said plug.

3. The combination with a magneto armature and a coil thereon, of a lighting circuit connected with said coil and including a jack and a plug operatively connected with an extraneous source of electrical energy and receivable in said jack, said jack being adapted, upon the insertion of said plug, to break the output circuit of said coil and to leave said lighting circuit operatively connected through said plug with said source to receive energy therefrom.

4. The combination with a magneto armature and a coil thereon, of a jack having contacts arranged to transmit the output of said coil and spring contacts normally engaging said contacts, a battery provided with a plug connected with its terminals and receivable in said jack, a lighting circuit operatively connected to the spring contacts of said jack and adapted alternatively for connection through said plug with said battery.

5. The combination with a magneto armature provided with a plurality of coils, of an ignition circuit, a lighting circuit, means normally connecting said circuits to receive current from respective coils, a battery, and switch means for connecting said battery alternatively into either circuit to supply current thereto.

6. The combination with a magneto armature provided with a plurality of coils, of an ignition circuit, a lighting circuit, means normally connecting said circuits to receive current from respective coils, a battery, and switch means for connecting said battery alternatively into either circuit to supply current thereto, said means including jacks in said circuits and a plug connected with said battery.

7. The combination with a magneto armature provided with a plurality of coils, of an ignition circuit, a lighting circuit, means normally connecting said circuits to receive cur-

rent from respective coils, a battery, and switch means for connecting said battery alternatively into either circuit to supply current thereto, said means including jacks in said circuits and a plug connected with said battery, and the jacks being adapted to place said battery in series with the coil supplying the ignition circuit when said plug is inserted in the jack of said circuit and to substitute said battery for the coil of the lighting circuit when the plug is inserted in the jack of said circuit.

8. In an outboard motor, the combination with a cylinder and crank case assembly, an armature plate thereabove, and a fly wheel magneto adjacent said armature plate and including an armature on said plate, of ignition and lighting coils on said armature, ignition and lighting circuits supplied with current from said coils, and jacks included in said circuits and adapted to receive connection with an extraneous source of energy, said jacks being mounted on the underside of said armature plate above said cylinders.

9. The combination with a magneto including an armature and independent coils thereon, of a plate supporting said armature and armature coils, jacks mounted on the face of said plate at either side and connected respectively with different coils, an ignition circuit connected through one of said jacks with its coil, a lighting circuit connected through the other of said jacks with its respective coil, a battery, and a plug receivable in either of said jacks connected with said battery to supply said circuits alternatively therefrom.

10. The combination with a magneto including an armature and independent coils thereon, of a plate supporting said armature and armature coils, and jacks mounted on the face of said plate at either side thereof and connected respectively with different coils.

HERBERT J. HILLBORN.
AUGUST SCHRIEL.