

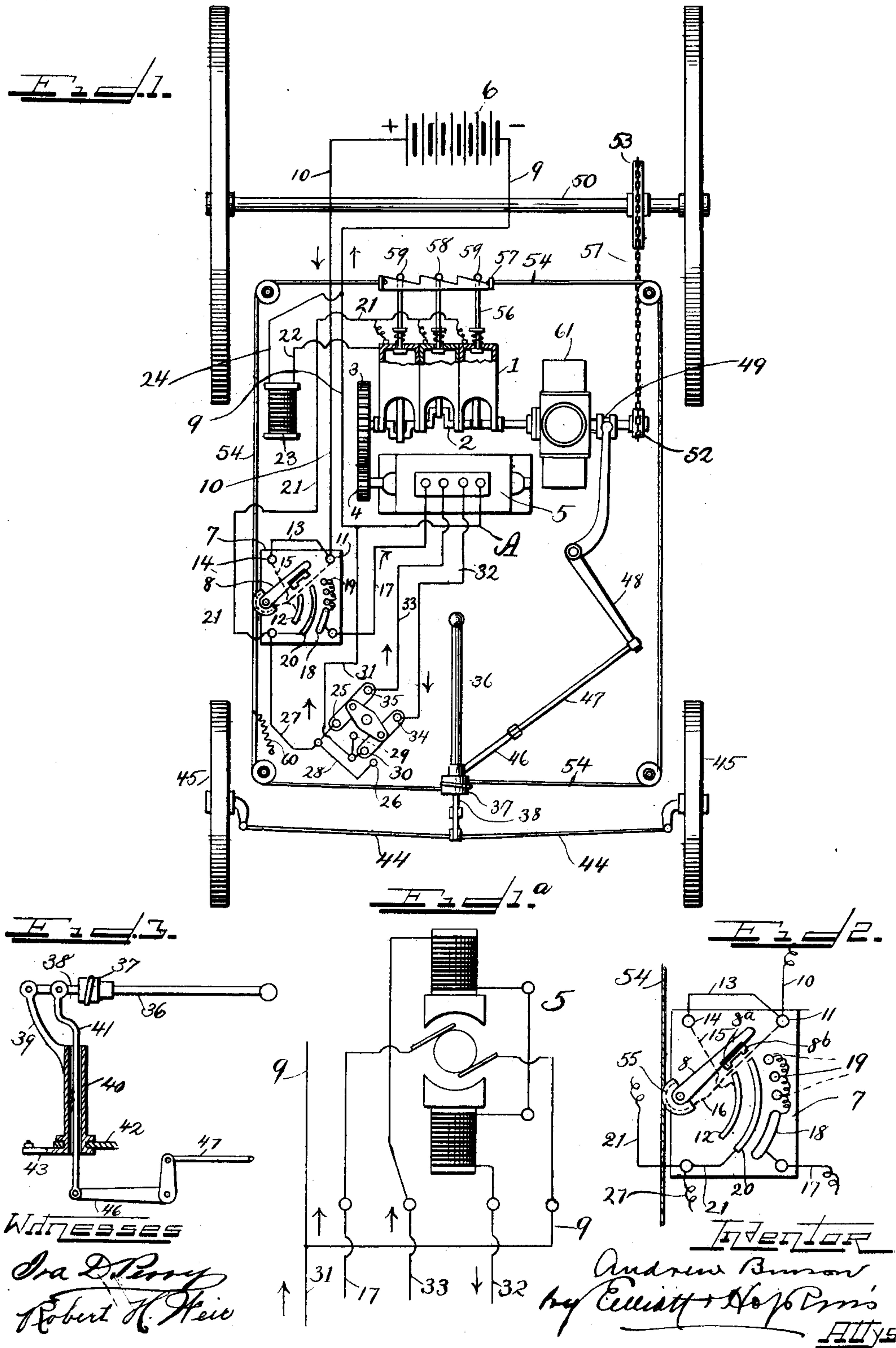
No. 675,848.

Patented June 4, 1901.

A. BENSON.
MOTOR.

(Application filed Jan. 31, 1901.)

(No Model.)



UNITED STATES PATENT OFFICE.

ANDREW BENSON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
ROBERT P. PRICE AND JOHN P. PRICE, OF SAME PLACE.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 675,848, dated June 4, 1901.

Application filed January 31, 1901. Serial No. 45,409. (No model.)

To all whom it may concern:

Be it known that I, ANDREW BENSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Motors, of which the following is a full, clear, and exact specification.

My invention relates more particularly to motors for propelling vehicles and vessels; and it has for its primary object to provide improved means whereby an explosive-engine may be started in either direction or stopped and reversed without turning the crank-shaft thereof by hand and as readily and with the same degree of certainty as may be done with a steam-engine.

Another object of my invention is to provide an automobile with improved means whereby different movements of a single controlling-handle may be utilized for governing the speed of the vehicle and the speed of the engine independently or for stopping and starting the engine and the electric motor synchronously or for steering the vehicle and controlling its speed independently of the speed of the engine.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a diagrammatic plan view of my improvements as applied to an automobile. Fig. 1^a is a diagram showing the shunt-wound motor connections hereinafter described. Fig. 2 is an enlarged diagrammatic plan view of the starting-box and connections; and Fig. 3 is a detail of the steering and controlling mechanism in side elevation and partly in section, hereinafter described.

In the accompanying drawings I have shown my invention as applied to a vehicle only; but the alterations necessary for its application to a vessel will be obvious to all skilled in the art.

1 represents a gasoline or explosive engine,

shown in the drawings as comprising three cylinders and having its crank-shaft 2 provided with a gear-wheel 3, which meshes with a pinion 4 on the armature-shaft of an electric motor 5, or any other suitable mechanical connection between the shaft of the engine and the armature of the motor that will impart the movement of one to the other may be employed.

6 represents a storage battery or other suitable source of electric energy, and 7 is a starting-box having a controller 8. The negative pole of the battery 6 is connected by conductor 9 with one terminal of the armature-coils—that is to say, with one of the brushes—while the positive pole of the battery is connected by conductor 10 with a binding-post 11 of the starting-box 7, and this post is connected to a contact-plate 12 in any suitable way, the connections shown in the drawings consisting of conductor 13, leading to binding-post 14, which is connected by conductor 15 (shown in dotted lines) with the plate 12. Binding-post 11 is also connected by conductor 16 with the controller 8. The other brush of the armature is connected by conductor 17 to plate 18, which is considerably elongated and is so arranged that while the controller 8 is in contact with the plate 12 it will also be in contact with the plate 18. The plate 18 is connected at one end to a series of resistances having contact-buttons 19 arranged within the arc described by the controller 8 and adapted to be impinged by the latter. Arranged between the contact-plates 12 18 or at any other suitable point is a third contact-plate 20, which is also elongated like plates 12 18, and this plate 20 is connected by conductor 21 to one electrode of the electric igniter of each of the cylinders of the gasoline-engine, while the other electrode is connected, through the metallic parts of the engine or any other suitable way, to a conductor 22, which constitutes one terminal of a cored coil 23, whose other terminal, 24, is connected to the negative pole of battery 6 through the conductor 9. The plate 20 is also connected to two contact-buttons 25 26 by means of conductors 27 28, and the conductor 9 is connected to two contact-buttons 29 30

by conductor 31. The terminals 32 33 of the field-coils are connected, respectively, with the ends of parallel switches 34 35, which are so pivoted that their opposite ends will contact with buttons 25 30, respectively, as now appears in Fig. 1, or with 29 26 when shifted to the right.

With the parts and connections arranged as in Fig. 1 the motor and the electric circuit of the engine-igniter are cut out; but should the controller 8 be advanced to contact with the plates 12 20 it will be seen that the field-coils of the motor 5, which is of the shunt-wound type, so as to serve as both a motor and a generator, will be energized from the battery 6 through 10, 11, 13, 14, 15, 12, 8^a, 8^b, 20, 27, 25, 35, 33, 32, 34, 30, 31, and 9, the parts 8^a 8^b on controller 8 being two contact-points which are connected together, but insulated from the controller 8, and consequently connect plates 12 20 electrically when the controller is advanced. It is also evident that the ends of contact-plates 12 20 being connected by contacts 8^a 8^b before the end of the controller touches either of the resistance-buttons 19 the field-coils of the motor will be energized in advance of the passage of any current through the controller 8 to the resistance-buttons 19, which are interposed in the circuit controlling the armature-coils. Hence the field-magnets may be energized in advance of energizing the armature-core and the armature will be started by the action of the magnetized field-core in advance of the armature-core being energized—a feature which is essential to the operation of a shunt-wound dynamo as a motor. It will also be seen that a part of the current passing through the field-coils will also pass through the coil 23 and the igniters of the engine via conductors 27, 21, 22, 24, and 9, and thus enable the electrodes of the igniters to close the igniter-circuit and produce a spark when they separate in the usual way.

The explosive-engine 1 being so constructed as to be capable of running in either direction, according to the direction in which it is started, it will be seen that the rotation of the armature of the motor in either direction will cause the piston or pistons of the explosive-engine to draw in a charge, which will be ignited at the proper time by the igniters, thus starting the engine by the movement of the controller 8 without the necessity of turning the engine-shaft by hand. Assuming the engine to be running and it should be desired to reverse it, it is simply necessary to stop the engine in any suitable way, but preferably by opening the igniter-circuit, which is accomplished synchronously with the opening of the circuit passing through the field-coils, both being accomplished by moving the controller 8 away from the plates 12 20 and contact-buttons 19, thus also stopping the motor. If now the conductors of the motor-circuit be crossed, so that the current will

pass through the motor in the opposite direction and reverse the movement of the motor as soon as the controller 8 is again thrown into operative position, the explosive-engine will also be reversed and started in the reverse direction by the movement of the motor, as before described. As a means for accomplishing this crossing of the conductors of the motor-circuit, or, in other words, reversing the direction of the current through the motor, I employ the parallel switches 34 35, before described, it being understood that when the free ends of these switches are moved from their present positions to the contacts 29 26, respectively, the direction of the current through the field-coils will be reversed and instead of passing in through the conductor 33 will pass in through 28 26 34 32 and return through conductor 33 to contact-button 29 and thence to the negative pole of the battery via conductors 31 and 9.

After the engine gets under way a part of its power may be utilized for driving the electrical apparatus as a generator or dynamo for replenishing the battery 6, and thus keeping up a sufficient store of electricity therein to start the engine whenever desired.

36 represents a handle or lever for steering the vehicle and which according to my invention is also made to serve as a means of controlling the speed of the vehicle independently of the speed of the engine, controlling the speed of the engine independently of the speed of the vehicle, and for controlling the current to the motor. This handle 36 has three distinct movements—to wit, an up-and-down movement, a rotary movement on its longitudinal axis, and a lateral or side-to-side oscillation. In the drawings this is shown diagrammatically, and any suitable construction for accomplishing these movements may be employed. In the diagrammatic illustration the handle 36 is provided at one end with a hub or drum 37, which is swiveled on an arm 38, so as to turn thereon and at the same time be capable of deflecting said arm either up and down or from side to side. The outer end of the arm is pivoted to the upper end of a bracket 39, which is supported on a rotary sleeve 40, while at an intermediate point the arm is pivoted to a stem 41, passing through the sleeve 40. The sleeve 40 may be swiveled in any suitable support 42, so as to be capable of rotating, but incapable of vertical movement, and its lower end is provided with a crank-arm 43, which is connected to the inner ends of the rods 44, which govern the steering-wheels 45. The lower end of the stem 41 is pivoted to one arm of a bell-crank lever 46, whose other arm is connected by rod 47 with one arm of a second bell-crank 48, whose other arm engages a collar 49, which controls a clutch 61 for imparting the movement of the engine-shaft 2 with greater or less force to the driving-axle 50 through the intermediary of any suitable connection, as a

chain 51 and sprockets 52 53. By this means it will be seen that the up-and-down movement of the operating-handle 36 will deflect the collar 49 to one side or the other and by thus affecting the clutch will vary the speed of the vehicle independently of the speed of the engine, while the lateral or side-to-side motion of the handle 36 will steer the vehicle to the right or to the left.

10 In order now that the rotary or twisting motion of the handle may be utilized for controlling the speed of the engine independently of the speed of the vehicle and for also closing the igniter and motor circuits, and thereby
15 by starting the engine, I pass around the drum 37 a cord, cable, or other suitable connection 54, which is secured to a segment 55 at the pivoted end of the controller 8 in such a manner that the movement of the cable 54
20 in one direction will close the controller 8 and in the opposite direction will open it. This cable is also connected to any suitable means for controlling the inlet-valves 56 of the engine 1, so that when the cable is pulled in one
25 direction the valves will be permitted to open to their full limit and when pulled in the other direction will be throttled down in a greater or less degree. As a means for accomplishing this I employ a bar 57, connected
30 to the cable 54 and having an incline 58 for each of the valves 56 and against which inclines rest lugs or antifriction-rollers 59, connected with the valves 56, respectively. Thus it will be seen that when the narrow
35 part of the incline is under or in engagement with the lug 59 the suction of the engine will cause the valve to open its full extent, it being closed in any of the well-known ways, and when the wider part of the incline is in en-
40 gagement with the lug 59 the valve will be more or less prevented from opening.

When the electrical apparatus 5 is being driven as a generator or dynamo, it is of course not desirable to interpose the resistances 19 in the circuit connecting it with the battery; but it is frequently necessary during such periods to vary the speed of the engine, or, in other words, to shift the bar 57 in one direction or the other for suiting the
50 speed of the engine to the work to be done, and as this movement of bar 57 imparts motion to the controller 8 the latter would of necessity jump back and forth along the contact-buttons 19, and thus resist the charging
55 of the battery were it not for the elongated contact-plate 18, along which the end of the controller plays throughout a considerable range during the adjustment of the bar 57 without increasing or varying the resistance
60 in the charging-circuit.

60 is a spring or other equivalent device connected to the cable 54 or to any other suitable part for causing the controller 8 to resume its inoperative position, as shown in Fig. 1, as soon as the handle 36 is released.

The clutch before referred to for imparting the power of the engine-shaft 2 with greater

or less degree to the axle 50, and which clutch is designated in Fig. 1 generally by the reference-numeral 61, constitutes the subject-matter of the claims of my copending application, Serial No. 45,410, filed January 31, 1901, allowed March 22, 1901, to which reference may be had for an understanding thereof.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. The combination of a reversible explosive-engine, an electric motor, a mechanical operative connection between the engine-shaft and armature of the motor whereby they will rotate in unison, a source of electricity connected with the motor, means for checking the speed of the engine and means for reversing the current through the motor, substantially as set forth.

2. The combination of a reversible explosive-engine, a combined electric generator and motor having its armature operatively connected mechanically with the engine-shaft, means for checking the speed of the engine, a storage battery, means for conducting the current of the generator into said battery, means for conducting the current of the battery to the motor and means for reversing the latter current through the motor, substantially as set forth.

3. The combination of a reversible explosive-engine, an electric motor having its armature mechanically connected with the engine-shaft, means for simultaneously stopping the engine and the motor and means for reversing the motor, substantially as set forth.

4. The combination of an explosive-engine having an electric igniter, an electric motor having its armature-shaft mechanically connected with the engine-shaft, means for controlling the speed of the engine, a starting-box having a controller and a series of resistance-buttons for controlling the current to the motor, means for moving said controllers synchronously with said means for controlling the speed of the engine, and an elongated contact-plate interposed in circuit with said buttons and adapted to contact with said controller whereby the controller may move back and forth as the speed of the engine is varied without varying the current to the motor, substantially as set forth.

5. The combination of a reversible explosive-engine having an electric igniter, an electric motor having its armature mechanically connected with the engine-shaft, electric circuits for supplying said igniter and motor respectively, means for synchronously opening said circuits and means for reversing the motor-circuit through the motor, substantially as set forth.

6. The combination with a vehicle of a reversible explosive-engine, an electric motor having its armature mechanically connected with the engine-shaft, means for controlling

the speed of the engine independently of the
speed of the vehicle, means for controlling
the speed of the vehicle independently of the
speed of the engine, means for reversing the
5 electric motor, an operating-handle having
two distinct movements and means for im-
parting said movements to said means for con-

trolling the engine and means for controlling
the speed of the vehicle respectively, substan-
tially as set forth.

ANDREW BENSON.

Witnesses:

EDNA B. JOHNSON,

F. A. HOPKINS.