T. W. ELLIS.

STARTING AND STOPPING DEVICE FOR GAS AND OTHER ENGINES.

APPLICATION FILED NOV. 17, 1908.

947,437. **Patented Jan. 25, 1910.**

Fig. 1.

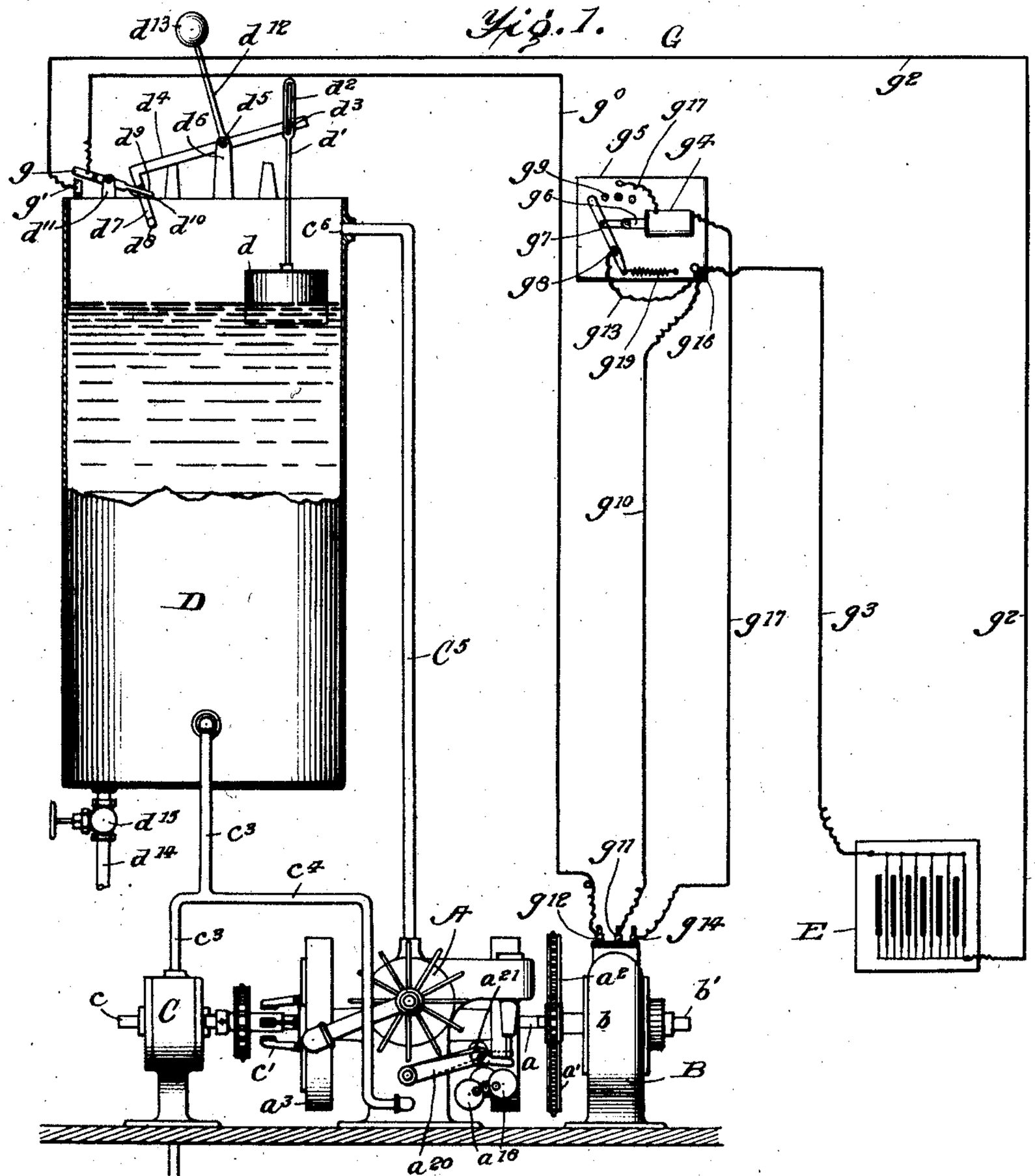
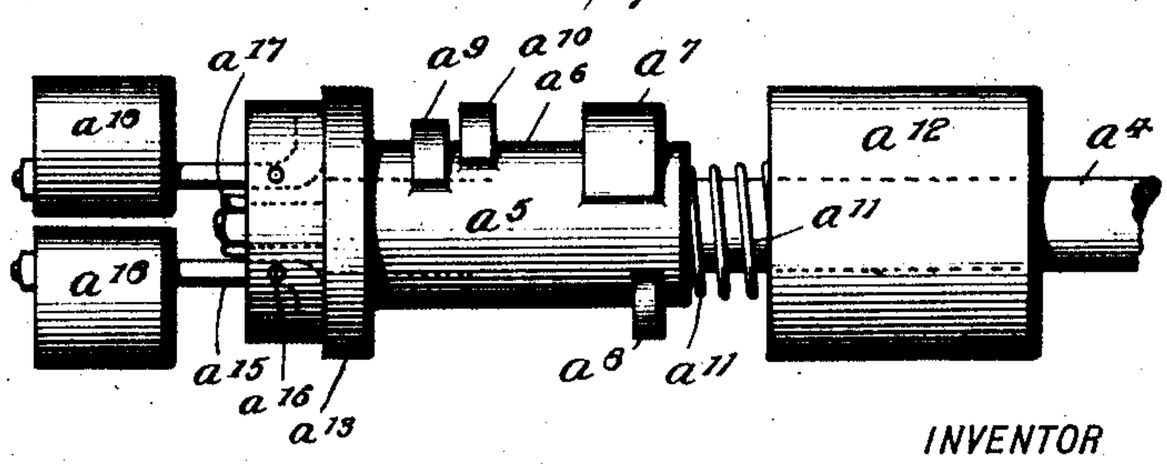


Fig. 2.



WITNESSES

L. H. Schmidt.

C. E. Trainer

INVENTOR

THOMAS W. ELLIS,

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

THOMAS WILLIAM ELLIS, OF DENISON, TEXAS.

STARTING AND STOPPING DEVICE FOR GAS AND OTHER ENGINES.

947,437. Specification of Letters Patent. Patented Jan. 25, 1910.

Application filed November 17, 1908. Serial No. 462,995.

To all whom it may concern:

Be it known that I, THOMAS W. ELLIS, a citizen of the United States, and a resident of Denison, in the county of Grayson and State of Texas, have invented certain new and useful Improvements in Starting and Stopping Devices for Gas and other Engines.

My invention is an improvement in starting and stopping devices for gas and other engines, and consists in certain novel constructions and combinations of parts hereinafter described and claimed.

Referring to the drawings forming a part hereof, Figure 1 is a diagrammatic view of the improvement, and Fig. 2 is a side view of the cam shaft of the engine.

In the present embodiment of my invention, a gasolene or other engine A, is connected on one side to a shunt wound motor B, and upon the other side to a pump C, the pump being connected by a discharge pipe with the tank D, and the motor being supplied with electricity by a storage battery E.

The main shaft a, of the engine is provided on the motor side with a pulley a', which is connected by a belt a^2, with a pulley b, on the shaft b', of the motor. The opposite end of the shaft a is provided with a fly wheel a^3, and the said shaft is in alinement with the shaft c, of the pump, and is adapted to be connected therewith by a centrifugal clutch c', of any approved construction, when the engine shall have attained a predetermined rate of speed.

The pump C is of the rotary type and is connected by a supply pipe c^2 with a source of water supply F, and a discharge pipe c^3 leads from the pump to the tank D, the said pipe being provided with a branch c^4 leading to the engine, while another pipe c^5 leads from the engine to the upper part of the tank as at c^6, the pipes c^4, c^5 being a part of the cooling system of the engine.

Within the tank is arranged a float d, having a stem d', whose upper end is slotted as at d^2, the slot being connected by a pin d^3, with one end of a lever d^4, pivoted as at d^5 to a bracket d^6, arising from the top of the tank, and the opposite end of the lever is provided with an angular portion d^7, whose sides are cut away as at d^8, for engaging a slot d^9, in one end of a lever d^{10}, pivoted to a bracket d^{11}, on the top of the tank, and the other end of the lever is provided with a contact point g coacting with a contact point g' on the top of the tank for closing a circuit G to be presently described. At its center the lever d^4 is provided with an angular arm d^{12} having on the free end thereof, a weight d^{13}.

It will be understood that when the water in the tank D falls, the float d will move downward, until the upper end of the slot d^2 engages the pin d^3. On a further fall of the water level, the float will swing the lever d^4, and when the weight d^{13} passes the dead center, the said lever will be swung quickly into a position opposite that shown in Fig. 1. This movement will swing the lever d^{10} whereby to bring the contact points into engagement with each other.

The contact points g and g' form the terminals of the circuit G, which consists of a conductor g^2 leading from the contact point g' to the storage battery, and a conductor g^0 leading from the contact point g to a binding post g^{12} connected with one brush of the motor B. A third conductor g^3 leads from the storage battery to the binding post g^{16} arranged upon a base g^5 provided with a solenoid g^4 whose core g^6 is pivotally connected with a lever g^7, pivoted as at g^8 to the base, the free end of the lever being arranged to move over rheostat buttons g^9 arranged on the base, and the rheostat is connected by a conductor g^{17} with the binding post g^{14} connected with the other brush of the motor, the winding of the solenoid being interposed in the said conductor. The conductor g^3 branches at the terminal g^{16}, one portion g^{13} thereof being connected with the lever g^7, and the other portion g^{10} leading to a binding post g^{11} connected with the field winding of the motor. When the circuit G is closed by the contact points g, g', the current from the storage battery passes through the conductor g^3 to the switch board, branching at the binding post g^{16}, a portion of the current passing through the conductor g^{10} directly to the motor, and another portion passing through the arm g^7 the rheostat and the solenoid to the binding post g^{14}.

It will be evident that the passage of the current through the coil g^4, will draw the core within the coil, thus moving the arm over the resistance buttons to give the motor a resistance start, and a spring g^{19} is connected with the arm for normally retaining it in the position shown in Fig. 1.

The cam shaft a^4, of the engine is provided with a square portion a^5, on which is slidable a sleeve a^6, which is provided with an exhaust cam a^7, and a compression release cam a^8, and with spark cams a^9, a^{10}, and the sleeve is normally retained in the position shown in Fig. 2 by a spring a^{11} arranged between the sleeve, and the bearing a^{12} for the cam shaft. At the opposite end the sleeve is provided with a disk a^{13} against whose face bear the angular portions a^{14} of levers a^{15}, pivoted within a second disk a^{16}, rotatable on the cam shaft, and retained in place by a nut a^{17}, and the outer ends of the levers are provided with weights a^{18}.

When the engine attains a speed determined by the weights on the levers, the said levers will be moved outward by centrifugal force, thus forcing the sleeve against the resistance of the spring. The cam a^{10} is arranged to spark the engine on the center, and the cam a^9 is arranged to spark at 15° ahead of the center of the engine stroke, and the cam a^{10} is in contact with the spark pawl a^{20}, until the engine attains a speed such that the rotation of the cam shaft will move the weights outwardly to shift the sleeve against the resistance of the spring, and bring the cam a^9 into position for engaging the pawl. The cam a^7 is of a width sufficient to permit the shifting movement of the sleeve without interfering with the exhaust, and the cams a^7, a^8 engage the exhaust pawl a^{21}. The cam a^8 as before stated is the compression release cam, which holds the exhaust valve open during three fourths of the exhaust until the sleeve is shifted. When the sleeve is shifted as before described, so that the cam a^9 operates the sparking device, the cam a^7 engages the exhaust, and the engine will be working on full compression with spark advanced, thus running at its full capacity, and the connection between the motor and the engine is such that when the engine is at full speed, it will rotate the motor shaft, at a 25% higher speed, that is if the rotation of the engine shaft is 400 R. P. M., the speed of the motor shaft will be 500 R. P. M. Thus the motor will be converted into a generator to recharge the storage battery. During the time that the engine is attaining the predetermined speed, it is disconnected from the pump, the centrifugal clutch c' being arranged to clutch the pump shaft when the said speed is attained, thus coupling the pump to the engine. When the water in the tank reaches the predetermined level, the circuit G will be broken, thus stopping the engine, the pump, and the motor.

I claim:

1. In a device of the class described, an explosion engine, a pump normally disconnected from the engine, a tank, a discharge pipe leading from the pump to the tank, a supply pipe in connection with the pump, an electric motor, a driving connection between the motor and the engine, a storage battery, a normally open circuit in which the storage battery and the motor are arranged in series, a float in the tank, means whereby the elevation of the float above a predetermined level will close said circuit means for connecting the pump and the engine, and means whereby the attainment of a predetermined speed by the engine will operate said means.

2. In combination an explosion engine, a motor connected therewith, a storage battery in series with the motor, a pump driven by the engine and normally disconnected therefrom, a tank for receiving water from the pump, and means whereby the attainment of a predetermined depth by the water in the tank will connect the storage battery with the motor, means for connecting the engine with the pump, and means whereby the attainment of a predetermined speed by the engine will operate said means.

3. In combination an explosion engine, a motor connected therewith, a storage battery, a pump adapted to be driven by the engine and normally disconnected therefrom, a tank for receiving water from the pump, means operated by the attainment of a predetermined depth of the water for connecting the storage battery with the motor, and means whereby the attainment of a predetermined speed by the engine will connect the engine with the pump.

4. In combination an explosion engine, an electric motor connected therewith, a storage battery, a pump driven by the engine, a tank for receiving water from the pump, a float within the tank, and means whereby the float will connect and disconnect the motor and the storage battery.

5. In combination, an explosion engine, an electric motor having a driving connection with the engine, a pump driven by the engine, a tank for receiving water from the pump, and means whereby the attainment of a predetermined depth by the water in the tank will start the motor.

6. In combination an explosion engine, a motor, a pump driven by the engine, a tank for receiving water from the pump, means whereby the attainment of a predetermined depth by the water in the tank will start the motor, a storage battery connected with the motor, connection between the motor and the engine whereby the motor is converted into a generator when the engine attains its full speed, thereby recharging the storage battery.

7. In combination, an exploison engine, a pump driven by the engine and normally disconnected therefrom, a motor having a

driving connection with the engine for starting the same, a tank supplied by the pump, means whereby the attainment of a predetermined depth of water in the tank will start the motor, means in connection with the engine for relieving the pressure in the cylinder when starting the engine, and means operated by the attainment of a predetermined speed by the engine for disconnecting said means.

THOMAS WILLIAM ELLIS.

Witnesses:
E. AD. ELKERT,
C. H. STREHORN.