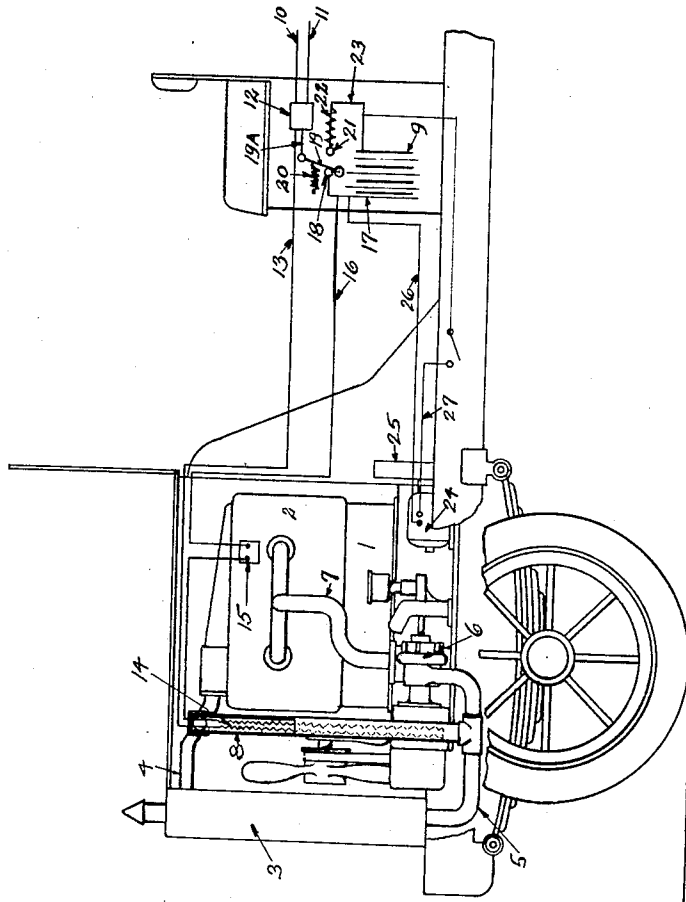


J. W. COX.
HEATING AND CHARGING SYSTEM FOR EXPLOSIVE ENGINES.
APPLICATION FILED NOV. 29, 1918.

1,372,864.

Patented Mar. 29, 1921.



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UNITED STATES PATENT OFFICE.

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HEATING AND CHARGING SYSTEM FOR EXPLOSIVE-ENGINES.

1,372,864.

Specification of Letters Patent.

Patented Mar. 29, 1921.

Application filed November 29, 1918. Serial No. 264,592.

To all whom it may concern:

Be it known that I, JOHN W. Cox, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Heating and Charging Systems for Explosive-Engines, of which the following is a specification.

This invention relates to heating and charging systems for explosive engines and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

In cold weather, particularly, difficulty is experienced in maintaining the storage batteries of automobiles fully charged both by reason of the fact that the operation of the automobile is ordinarily quite short and the current used in starting much above that in warm weather. Part of this difficulty is due to a cold engine in starting. The object of this invention is to provide convenient means for heating the engine so that starting may be made easy and also for charging the storage battery. Ordinarily the batteries on automobiles are of low voltage whereas the ordinary current available for charging the battery is of much higher voltage and it is necessary in charging the battery to interpose some resistance for reducing the voltage applied to the battery. In carrying out my invention I provide the resistance in the form of a heating element so that not only is the battery charged from the ordinary available current but the loss which usually accompanies the resistance is, in this instance, utilized for heating the engine.

The invention is illustrated in the accompanying drawing wherein a portion of an automobile is shown. In this drawing 1 marks the engine, 2 a water jacket on the engine, 3 a radiator, 4 a connection between the upper part of the water jacket and the upper part of the radiator, 5 a return pipe leading from the lower part of the radiator to the pump 6 and 7 a pipe leading from the pump to the water jacket.

9 marks the storage battery and 10 and 11 wires carrying the charging current such as is ordinarily used for domestic purposes. The wires 10 and 11 lead to a plug 12 from which a wire 13 leads to a heating element

14 arranged in a bypass 8 between the pipes 4 and 5. The return wire 16 from the heating element is carried through a thermally operated switch 15 and the wire 16 leads from this to a contact 18 with a branch 17 leading to the battery 9.

A switch and circuit breaker is provided. It comprises the switch lever 19 connected to the wire 19^a leading from the plug 12. A spring 20 holds the switch lever 19 normally in contact with the post, or contact 18. Under these conditions the current from the charging wires 10 and 11 passes by way of the line 13 through the heating element 14 and wire 16 back to the plug 12. When it is desired to include the battery in the circuit so as to charge the battery the switch lever 19 is moved to the right into contact with the post 21. A coil 22 is in series with the switch lever and operates to magnetize the contact 21 so as to hold the lever 19 against the post, or contact, 21 notwithstanding the action of the spring 20. The wire from the coil 22 leads by a wire 23 to the battery.

With the switch 19 in contact with the post, or core 21, the charging current not only operates on the heating element so as to heat the engine but also charges the battery, the heating element having a resistance sufficient to give the desired voltage to the battery.

If there should be a break, or short circuit, in the charging line, or if the charging line should carry alternating current the coil 22 ceases to affect the attraction of the switch 19 and the spring 20 snaps the lever into contact with the post 18. In this way the battery is protected. At the same time the engine may be heated if alternating current is available.

An ordinary starting motor 24 is provided which operates on the fly wheel 25 of the engine, the starting motor receiving its current from the battery by wires 26 and 27, the wire 27 being connected with the wire 23.

What I claim as new is:—

1. In a heating and charging system for explosive engines, the combination of an internal combustion engine; an electric heating element for warming the engine; a storage battery; and a charging connection in circuit with the heating element and the

battery, the heating element supplying resistance to reduce the voltage from the charging connection to the battery.

2. In a heating and charging system for
5 explosive engines, the combination of an internal combustion engine; an electric heating element for warming the engine; a storage battery; a charging connection in circuit with the heating element and the bat-
10 tery, the heating element supplying resistance to reduce the voltage from the charging connection to the battery; and a switch for throwing the battery into and out of circuit.

15 3. In a heating and charging system for explosive engines, the combination of an engine; a water cooling system for said engine; a heating element for warming the water of said system; a storage battery; and
20 a charging connection in circuit with the heating element and the battery, the heating element supplying resistance to reduce the voltage from the charging connection to the battery.

25 4. In a heating and charging system for explosive engines, the combination of an en-

gine; a water cooling system for the engine comprising a water jacket, a radiator, and pipes leading to the water jacket from the radiator and from the radiator to the jacket; 30 a bypass between said pipes; an electric heating element in said bypass for heating the water of said system; a storage battery; and a charging connection in circuit with the heating element and the battery, the heating 35 element supplying resistance to reduce the voltage from the charging connection to the battery.

5. In a heating and charging system for explosive engines, the combination of an en- 40 gine; an electric motor for starting the engine; an electric heating element for warming the engine; a storage battery; a connection between the storage battery and the starting motor; and a charging connection 45 in circuit with the heating element and the battery, the heating element supplying the resistance to reduce the voltage from the charging connection to the battery.

In testimony whereof I have hereunto set 50 my hand.

JOHN W. COX.