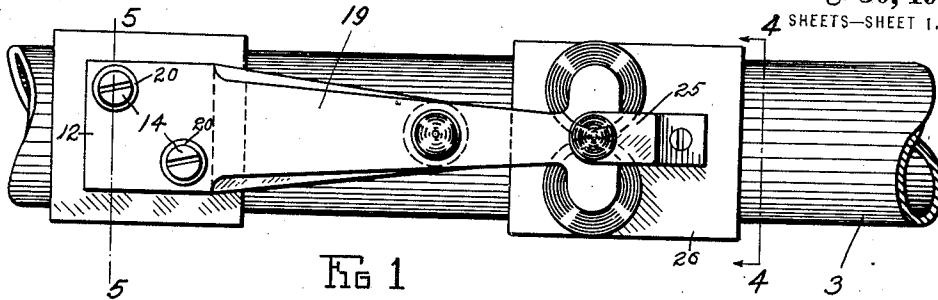
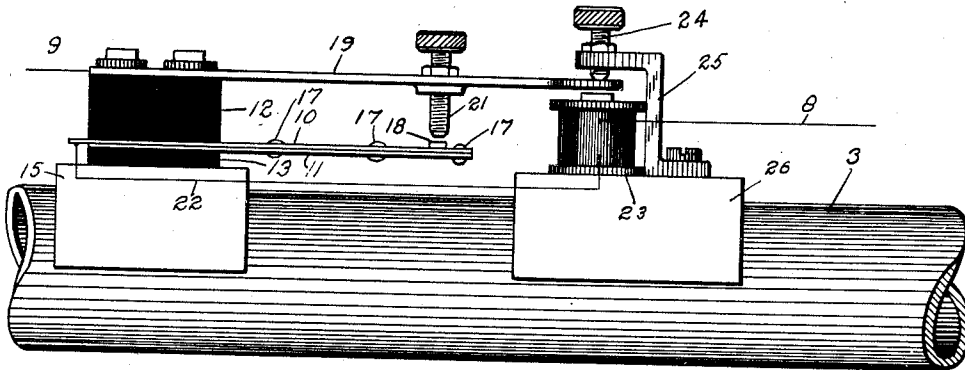
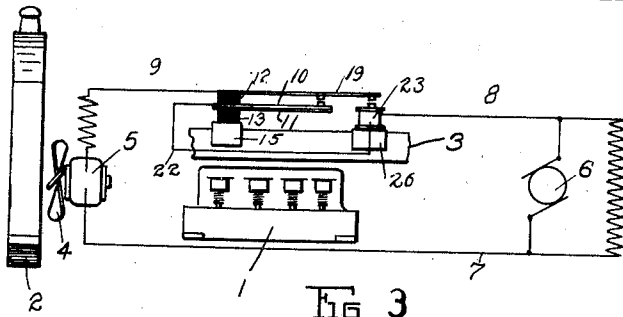
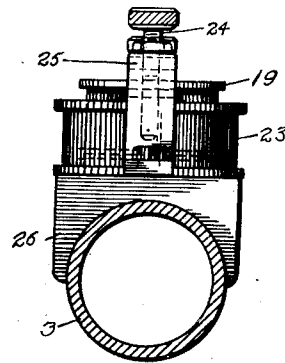
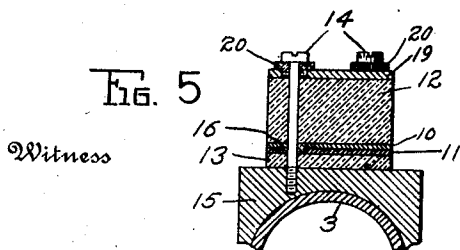


H. R. STUART.
COOLING DEVICE FOR EXPLOSIVE ENGINES.
APPLICATION FILED OCT. 6, 1916.

1,389,395.

Patented Aug. 30, 1921.

4 SHEETS—SHEET 1.



Witness

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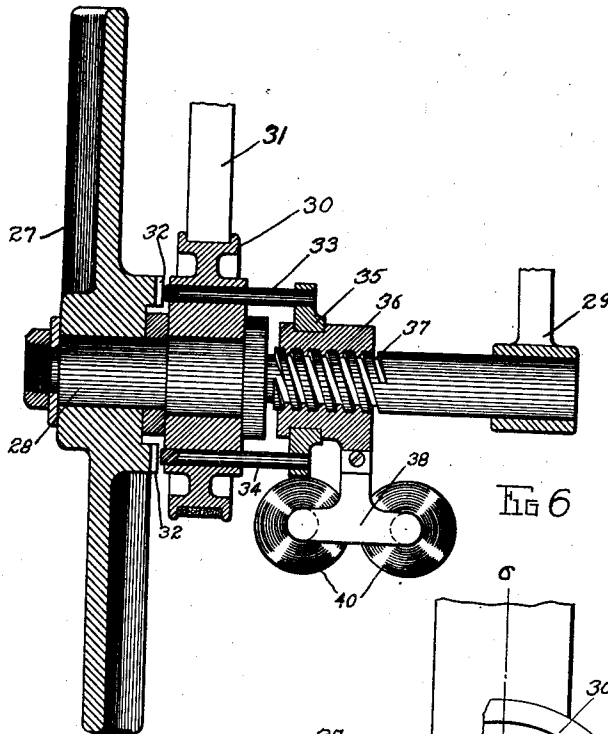
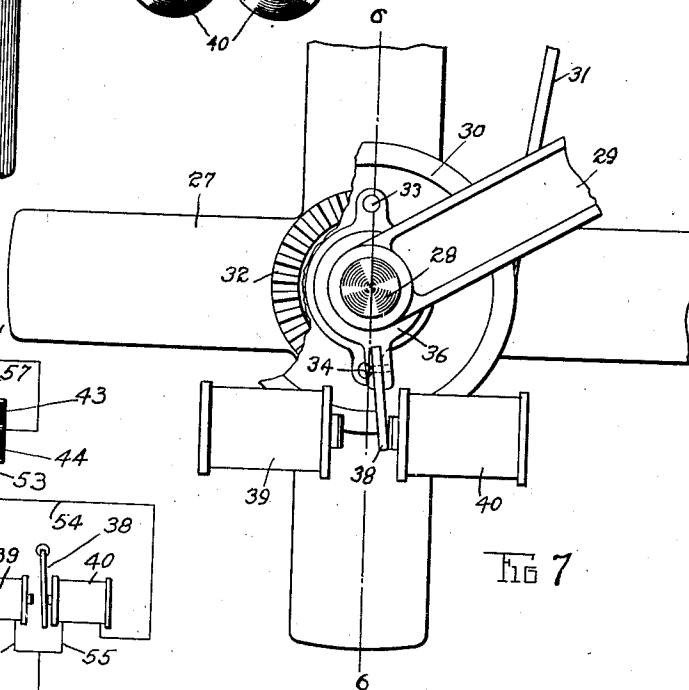
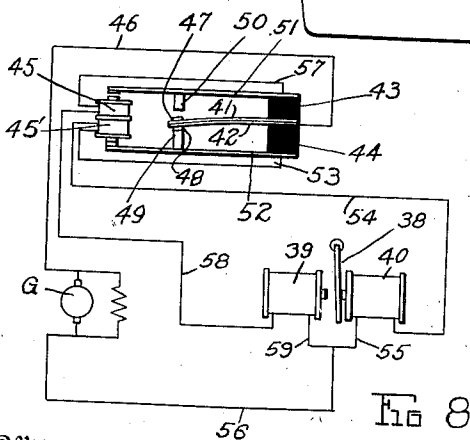
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

HARVE R. STUART, OF SPRINGFIELD, OHIO.

COOLING DEVICE FOR EXPLOSIVE-ENGINES.

1,389,395.

Specification of Letters Patent.

Patented Aug. 30, 1921.

Application filed October 6, 1916. Serial No. 124,157.

To all whom it may concern:

Be it known that I, HARVE R. STUART, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Cooling Devices for Explosive-Engines, of which the following is a specification.

This invention relates to improvements in devices for cooling explosive engines, and more particularly relates to devices of this character which are thermostatically controlled through the medium of electrical operating devices.

The object of the invention is to provide simple and effective controlling devices for the fan of the air cooling system, whether it be a fan which induces a circulation of air through the radiator of a water cooling system or a fan which forces a circulation of air through an air jacket in an air cooling system.

A further and more specific object of the invention is to devise a construction in which electrical operating devices are employed for starting and stopping the cooling fan, together with simple and effective thermostatic means for controlling the operating devices.

In the accompanying drawings:—

Figure 1 is a top plan view of the thermostatic controlling device.

Fig. 2 is a side elevation of the same.

Fig. 3 is a diagrammatic view of all of the mechanism embodying my improvements, including the fan and a portion of an internal combustion engine.

Fig. 4 is a section on the line 4—4 of Fig. 1.

Fig. 5 is a section on the line 5—5 of Fig. 1.

Fig. 6 is a section on the line 6—6 of Fig. 7 showing a modification.

Fig. 7 is an end view of the parts shown in Fig. 6 partly broken away.

Fig. 8 is a diagrammatic view of the circuits employed in the modification.

Referring to Fig. 3 of the drawings, 1 represents an internal combustion engine, 2 the radiator of the water cooling system and 3 the usual water manifold. The fan which is employed in connection with such a cooling system is represented by 4 and in the present case I employ a small electric motor 5 to the shaft of which the fan is directly connected.

The motor 5 is operated from the generator 6, which may be the generator employed in the electrical system of the motor

vehicle upon which the improvements are installed, one pole of the generator being connected to one pole of the motor by the conductor 7 and the opposite pole of the generator to the opposite pole of the motor by conductors 8 and 9 and thermostatic controlling devices now to be described.

I preferably locate these thermostatic controlling devices upon the manifold pipe of the cooling system when my improvements are used in connection with a water cooling system, although the devices may be located at any other suitable point where they may be acted upon by the rise and fall of the temperature of the engine. The controlling devices consist essentially of two movable normally open contacts. One of these contacts is formed of two flat metal strips 10 and 11 having different expansible and contractible properties, the upper one being formed of such metal as iron which has a low coefficient of expansion and the lower one being of such metal as zinc or brass which has a high coefficient of expansion. These metal strips are secured together between the insulating blocks 12 and 13 by the screw-bolts 14 which connect the two blocks together and also to a metal base 15 which may be secured in any suitable manner to the manifold pipe 3; the bolts being insulated from the strips 10 and 11 by sleeves 16 of insulating material as shown in Fig. 5. The strips 10 and 11 are further secured together by rivets 17 and have a contact point 18. The other contact member is represented by 19 and has one end thereof secured to the upper insulating block 12 by the bolts 14 which are insulated therefrom by the sleeves 20 of insulating material as shown in Fig. 5. The contact member 19 is provided with an adjustable contact point 21 which may be adjusted in suitable relation with the contact point 18. The contact member 19 is connected to the conductor 9 and the contact plate 10 is connected to the conductor 8 through the medium of the wire 22 and the coil of a magnet 23.

The result of this arrangement is that when the temperature rises sufficiently to affect the plates 10 and 11 by conductivity and radiation the difference in expansion of the plates will cause them to bow slightly and move the contact point 18 into contact with the one 21, thus establishing a circuit between the generator and motor and starting the fan which will continue to operate

until the temperature lowers sufficiently to break the connection of the contacts 18 and 21 by the contraction of the plates 10 and 11. In order that the contact members may not be affected by the vibration of the vehicle when in motion and that a good electrical connection may be maintained between the contact points 18 and 21, I have provided for holding these contacts together so soon as the circuit is established by means other than the mere expansible action of the plates 10 and 11. For this purpose the contact member 19 is extended so as to form the armature of the magnet 23 which, as before stated, is in the circuit between the motor and generator. So soon as the circuit is established by the closing of the contacts 18 and 21 the magnet 23 will be energized and draw down the contact member 19 and maintain it in that position until the circuit is again broken, whereupon the member 19, which is resilient in character, will spring back against the adjustable stop 24 in the bracket 25 which is secured to a base-plate 26 on the manifold 3, this base-plate also supporting the magnet 23, thus causing a quick break between the contacts 18 and 21 to obviate sparking.

Referring to Figs. 6, 7 and 8, there is shown a modification in the manner of controlling the fan, the fan, which is represented by 27, being journaled upon a stationary shaft 28 secured in the bracket 29. Loosely mounted upon the shaft 28 is a belt pulley 30 which receives motion from the crank shaft of the engine through the medium of the belt 31. The hub of the fan is provided with a clutch face in the form of a series of serrations 32 and the pulley 30 carries a pair of clutch members 33 and 34 which are in the nature of round pins slidably mounted in the pulley having their forward ends shaped to form teeth which will engage the serrations 32 of the fan hub. The rear ends of these pins are secured to a collar 35 which is loosely mounted in the groove of a sleeve 36 which is threaded upon a screw-threaded portion 37 of the shaft 28. The sleeve 36 has secured thereto a plate 38 which extends between and acts as an armature for two pairs of magnets 39 and 40. Provision is made for magnetizing the respective pairs of magnets thermostatically in the following manner:—

Referring to Fig. 8, 41 and 42 represent two strips of metal having different expansible and contractible properties as described in connection with the plates 10 and 11. These plates are secured together at one end by the insulating blocks 43 and 44 and have those ends in circuit with the generator G through the conductor 46. The other ends of the plates 41 and 42 may also be secured together and have contact points 47 and 48 arranged to cooperate with contact points

49 and 50 on elastic contact members 51 and 52 one end of each of which is secured to the respective insulating blocks 43 and 44 and the other end of each of which extends to a double ended magnet 45 and 45'. In the normal cold condition of the mechanism the contacts 48 and 49 will be together so that a circuit will be established through wire 46, plates 41 and 42, contacts 48 and 49, wire 53, magnet 45', wire 54, magnets 40, wire 55 and wire 56 to the other pole of the generator, thus energizing the magnets 40 and attracting the armature 38, causing the sleeve 36 to ride on the screw 37 in a direction to withdraw the clutch members 33 and 34 from the clutch face on the fan. So soon as the temperature rises sufficiently to cause the plates 41 and 42 to bring the contacts 47 and 50 together, a circuit will be established from the generator through wire 46, plates 41 and 42, contacts 47 and 50, wire 57, magnet 45, wire 58, magnets 39, wire 59 and wire 56 back to the generator, thus magnetizing the magnets 39 and attracting the armature 38 so as to cause the sleeve 36 to ride in the opposite direction on the screw 37 and cause the clutch members 33 and 34 to engage the clutch face 32 of the fan so as to cause the fan to revolve with the pulley 30.

When the magnet 45 or 45' is energized it will attract the contact member 51 or 52 as the case may be so as to maintain the contact point thereof in proper relation with the corresponding contact of the thermostatic plates 41 and 42 regardless of vibration, and when deenergized will cause a quick break of the contacts to prevent sparking.

Having thus described my invention, I claim:—

1. In a cooling system for explosive engines, the combination of a fan, a driving member for said fan, clutch devices between said driving member and fan, electrically operated devices for operating said clutch devices, and thermostatic means for controlling said electrically operated devices to start and stop said fan.

2. In a cooling system for explosive engines, the combination of a fan, a rotatable pulley, a clutch for connecting said pulley with said fan rotatable with said pulley, electrically operated devices for operating said clutch, and a thermostat for controlling said devices to start and stop said fan.

3. In a cooling system for explosive engines, the combination of a rotatable fan, a rotatable pulley, clutch devices for connecting and disconnecting said fan and pulley, magnets for operating said clutch devices, a generator in circuit with said magnets, and thermostatic means for breaking and making the circuit.

4. In a cooling system for explosive engines, the combination of a rotatable fan, a rotatable pulley, clutch devices rotatable

with said pulley but capable of movement relative thereto to permit them to be thrown into and out of engagement with said fan, a screwthreaded member, a collar threaded
5 on said member connected with said clutch devices, electric magnets having their armatures connected with said collar, a generator in circuit with said magnets, and a thermostat for controlling the circuit between said
10 generator and magnets.

5. In a cooling system for explosive engines, the combination of a rotatable fan, a rotatable pulley, clutch devices associated with said fan and pulley comprising a rotatable member arranged to revolve upon the
15 same axis as said pulley, magnets for throw-

ing said clutch devices in operative relation with each other, a generator in circuit with said magnets, and thermostatic means for making and breaking the circuit.

6. In a cooling system for explosive engines, the combination of a fan, a rotatable driving member, an electrically operated clutch between said fan and driving member, and a thermostat for controlling the circuit to said clutch.

In testimony whereof, I have hereunto set my hand this 25th day of September, 1916.

HARVE R. STUART.

Witnesses:

ALICE M. BENSON,
ROBT. C. RODGERS.