No. 867,899. PATENTED OCT. 8, 1907.

D. B. ADAMS.

AUTOMATIC STOPPING DEVICE FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED MAY 23, 1902.

Fig. 1

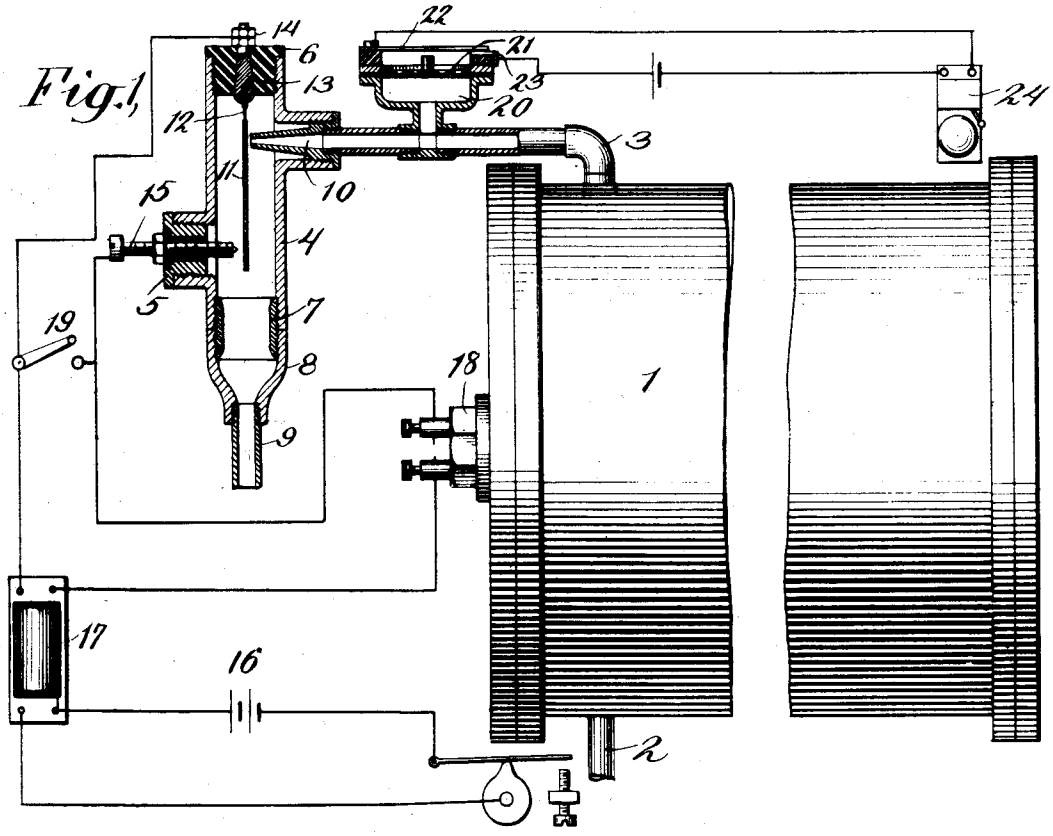


Fig. 2

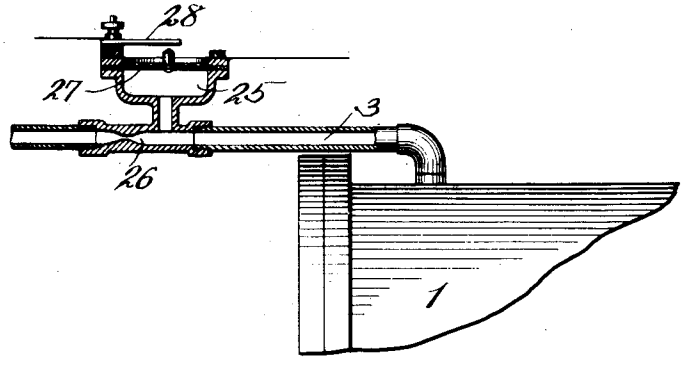
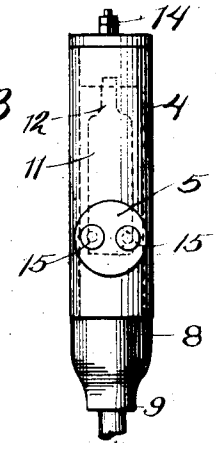


Fig. 3



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AUTOMATIC STOPPING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

No. 867,899. Specification of Letters Patent. Patented Oct. 8, 1907.

Application filed May 23, 1902. Serial No. 108,630.

To all whom it may concern:

Be it known that I, DANIEL B. ADAMS, a citizen of the United States, and residing at Summitville, in the county of Sullivan and State of New York, have invented certain new and useful Improvements in Automatic Stopping Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to automatic stopping devices for stopping the operation of gas and oil engines and the like, in case the circulation of water through the jacket of the cylinder ceases for any reason.

My invention consists in an automatic stopping device, operated by such cooling water as it flows from the jacket of the cylinder, and arranged when the circulation of such water ceases to break the ignition circuit of the engine.

My invention consists also in the novel construction of such automatic stopping device, as hereinafter pointed out.

In the operation of water-cooled explosive or internal combustion engines, it sometimes happens that the circulation of the cooling water ceases. This may happen from a variety of causes. Thus if the water be drawn from a water main, the water in said main may be turned off, or other demands on the main may be so great as to prevent the water from reaching the engine. If the circulation is produced by a circulating pump, this pump may get out of order. Or there may be a stoppage in one of the pipes, or in the jacket, or the water supply pipe may be broken. If the engine is allowed to run after the circulation ceases, the cylinder becomes over-heated, and this may result in burning out the gasket at the rear of the cylinder, or in the cracking of the cylinder. If the gasket between the cylinder and cylinder-head is burned out, the cylinder-head must be removed to replace the gasket, and this frequently involves dismounting a considerable portion of the mechanism of the engine.

The objects of my invention are, to stop the operation of the engine or other machine or apparatus to which the invention may be applied, when the circulation of cooling water fails, to render the invention applicable to gas and oil engines employing any of the different systems of ignition commonly in use, and to make the device simple, compact, reliable, and relatively inexpensive.

I will now proceed to describe my invention with reference to the accompanying drawings, in which certain forms of automatic stopping devices embodying my invention are illustrated, and will then point out the novel features in claims:

In the drawings, Figure 1 is a diagrammatic view showing a portion of the cylinder of a gas or oil engine with my improved automatic stopping device attached thereto and arranged to control an electric igniter circuit, the stopping device being shown in section. Fig. 2 is a vertical section of another form of the automatic stopping device, applied to an engine cylinder. Fig. 3 is a side view of the principal portion of the form of stopping device shown in Fig. 1.

The automatic stopping devices herein described are arranged to be actuated directly by the cooling water while it is circulating, and are preferably connected to the discharge pipe carrying the cooling water away from the jacket of the engine, so that if the flow of water through this discharge pipe ceases the operation of the engine will be stopped. Such location of the automatic stopping device is to be preferred, because stoppage of the flow of water through it indicates that there is something wrong in the circulating system. If the stopping device were connected to the water supply pipe, an obstruction in the jacket might stop the circulation, and yet, because full hydrostatic pressure would still be maintained in the supply pipe, the stopping device might not operate. Likewise, if there is a leak in the water jacket which permits the cooling water to escape, or if the drain cock with which such jackets are customarily provided is left open by mistake, a stopping device connected to the water supply pipe may not act to stop the operation of the engine, whereas if such device be connected to the discharge side of the jacket or to the discharge pipe, such device will operate to stop the engine.

Referring now to the drawings, the engine cylinder 1 is provided with a water supply pipe 2 and discharge pipe 3, both connected to the cylinder jacket. The discharge pipe is connected with the casing 4 of the automatic stopping device. The said casing is substantially a "cross" pipe fitting, having an orifice at one side for the reception of the end of the pipe 3, and at the other side for the reception of a plug 5, and having at one end an orifice for the reception of a plug 6 and at the other end an orifice for the reception of a nipple 7 connecting said casing to a reducer 8, to which reducer another discharge pipe 9 is connected.

The discharge pipe 3 preferably terminates, within the casing 4, in a contracted nozzle 10 arranged to project the water against the movable plate 11, suspended from plug 6, which is of non-conducting material. Said plate, which is of conducting material, is arranged to swing freely from its point of support, and to this end may be thin at or near its point of attachment to the plug, as indicated at 12, Fig. 1. The plate may be suspended by means of a split taper plug 13, arranged to be drawn up into a taper orifice in plug 6, by a nut 14.

Water projected from the nozzle 10 against plate 11 will deflect the same against one or both of two contact screws 15, carried by plug 5. Theoretically, one such

screw is sufficient, but preferably two are employed, so as to prevent twisting of the plate. These screws, or either of them, may form one terminal of an igniter circuit of which the other is the plug 13. Any electric system of ignition may be employed, whether low-tension or high-tension, as preferred. The particular system illustrated is a jump-spark system, comprising a generator 16, coil 17, in the primary circuit of which the generator 16 is located, and sparker 18, the automatic stopping device being included in the secondary circuit of the coil in series with the sparker. An interrupter for this primary circuit is indicated diagrammatically. In practice this interrupter will be mounted upon the crank shaft or driven therefrom by suitable gearing. A switch 19 may be provided to complete a circuit around the automatic stopping device, when starting the engine. Means may also be provided for ringing a bell or operating any other suitable alarm, when the circulation of cooling water ceases. To this end, there may be on the discharge pipe 3 a diaphragm chamber 20, the diaphragm 21 of which is arranged to be pressed outward by pressure of water in pipe 3, and when so pressed outward to hold contact lever 22 out of contact with contact point 23. There may be a bell 24 or other indicating device in an electric circuit arranged to be closed when points 22 and 23 touch. In another application for Letters Patent, filed Aug. 29, 1902, Sr. No. 121,406, I have claimed the use, in connection with an engine stopping device, of means for operating a bell or other alarm for indicating stoppage of circulation. A diaphragm may also be used to control the igniter circuit, in place of the swinging plate 11. This is illustrated in Fig. 2, in which a diaphragm chamber 25 is connected to the discharge pipe 3. There may be a contraction 26 in the discharge pipe, at a point beyond the point of connection of the diaphragm chamber thereto, so as to insure sufficient hydrostatic pressure in the discharge pipe to lift the diaphragm, 27, so long as cooling water continues to circulate. The diaphragm may form one terminal of the igniter circuit, the other terminal being a contact point 28 with which the diaphragm makes contact so long as there is sufficient pressure in pipe 3 to lift it.

The automatic stopping devices illustrated in the drawings and above described operate by decreasing the flow of current through the igniter to such an extent that ignition cannot take place. The resistance inserted in the ignition circuit by the operation of the automatic stopping device, viz., the air gap, is so great that the flow of current is decreased practically to zero; but it is obvious that to decrease the flow of current to a less extent, but to such an extent that the current remaining is insufficient to cause ignition, would be equally effective.

It is obvious that various other cooling fluids may be used beside water and where water is named in the foregoing description and following claims, I wish it to be understood that any other cooling fluid may be substituted as an equivalent.

It is obvious that the automatic stopping device herein illustrated and described is susceptible of many modifications and changes in construction and arrangement of the parts without departing from the principles hereinbefore set forth.

I do not limit myself to any particular construction of the device.

What I claim is:—

1. The combination with a water-cooled explosive or internal combustion engine having an electric igniter, of automatic stopping means operated by the cooling water in its flow and controlling the flow of current through said igniter, said automatic stopping means arranged to decrease such flow of current, upon diminution in flow of cooling water, to such an extent as to prevent ignition.

2. The combination with a water-cooled explosive or internal combustion engine having an electric igniter circuit, of an automatic stopping device controlling said circuit and operated by the cooling water as the latter flows through the engine, said automatic stopping device arranged when the flow of cooling water ceases to break said igniter circuit.

3. The combination in an internal combustion engine or the like, of a water-jacketed cylinder, electrical igniting means, and automatic stopping means comprising means for automatically breaking the circuit of said igniting means operated by diminution of the water pressure in said jacket.

4. In an automatic stopping device for water-cooled engines or the like, the combination of a water-jacketed cylinder, electrical igniting means and an element moving automatically upon a diminution of the water pressure in said jacket to decrease the flow of current through such igniting means to such extent as to prevent ignition.

5. The combination, with a water-cooled explosive or internal combustion engine having an electric igniter circuit, of controlling means adapted to complete or interrupt the igniter circuit, said controlling means comprising a movable plate located in the path of the water and arranged to be moved thereby, and forming an electric contact piece, and another contact piece with which said plate may make contact.

6. In a device of the class described, the combination with a casing having a water inlet and outlet, of a plate located in the path of the water, means operated by said plate adapted to control the operation of an engine, and a plug located in an opening of said casing and provided with means for suspending said plate.

7. In a device of the class described, the combination with a casing having a water inlet and outlet, of a plate located in the path of the water, means operated by said plate adapted to control the operation of an engine, a plug located in an opening of said casing, and a split taper plug supporting said plate and located in a taper socket of said first plug and provided with means for drawing it into said socket.

8. The combination with a water-jacketed cylinder and means for supplying water thereto, of an electric contact device located in the path of the water and comprising a plate against which the water impinges, said plate constituting an electrical contact piece, and another contact piece with which said plate makes contact while full circulation of the water continues.

9. The combination with a water-jacketed cylinder and means for conveying water thereto and therefrom, of an electrical contact device connected to the means for conveying water from the engine and comprising a casing, a movable plate therein, located in the path of the water, constituting an electrical contact piece, and another contact piece with which said plate is held in contact while full water circulation continues.

In testimony whereof I affix my signature, in the presence of two witnesses.

DANIEL B. ADAMS.

Witnesses:
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BYRON KELLAM.