May 29, 1928. 1,671,330

W. H. TANGEMAN

INTERNAL COMBUSTION ENGINE

Filed Sept. 13, 1924

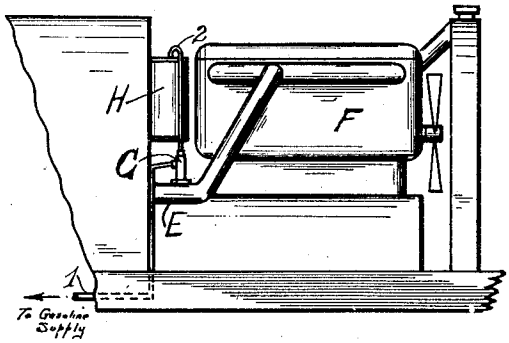

Fig. 1.

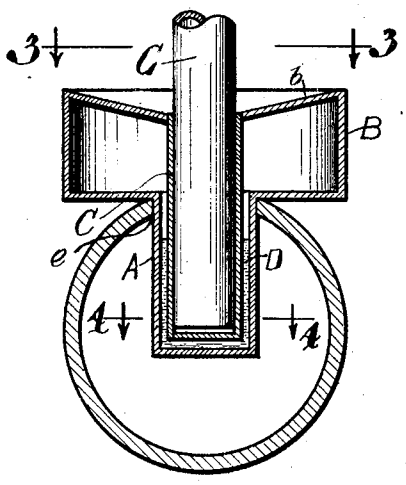

Fig. 2.

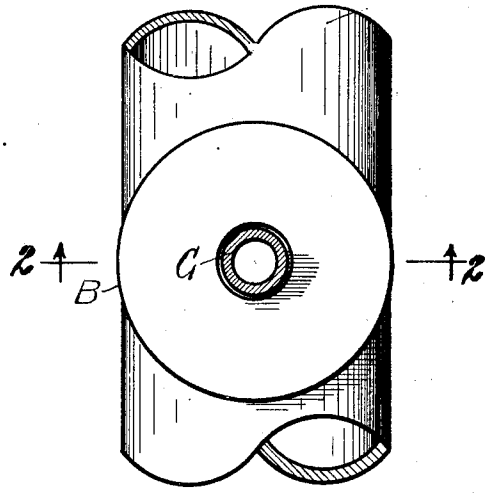

Fig. 3.

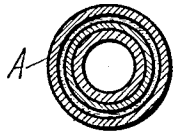

Fig. 4.

INVENTOR.
W.H. Tangeman
BY
Joseph Dugan
ATTORNEY.

Patented May 29, 1928. 1,671,330

UNITED STATES PATENT OFFICE.

WILLIAM H. TANGEMAN, OF ONTARIO, CALIFORNIA, ASSIGNOR TO JAMES V. BALDWIN AND HARRY G. MOORE, BOTH OF LOS ANGELES, CALIFORNIA.

INTERNAL-COMBUSTION ENGINE.

Application filed September 13, 1924. Serial No. 737,466.

This invention relates to internal combustion engines and more particularly to the fuel feeding mechanism thereof which involves the use of thermal pumps such as are disclosed in the United States Patent No. 1,492,147.

The general object of the invention is to provide an automatic thermostatic regulating device for pumps of the type referred to in which the thermal condition of the pump may at all times be automatically controlled regardless of the amount of heat applied to the device.

A further object is to provide an automatic regulating device of the character stated in which the heat regulating properties are dependent upon and involves the use of substances whose heat conductivity lessens as its temperature rises.

With the above and other objects in view the invention consists in the novel and useful provision, formation, construction, association of parts, members and features, all hereinafter described, shown in the drawing and pointed out in the claims.

In the drawing:

Figure 1 is a side view of a gas engine and my thermostatic regulating device applied to the engine exhaust, with the lower end of the thermal pump seated in the device;

Figure 2 is a vertical section of my regulating device and a cross section of the engine exhaust in which the device is mounted, taken on the line 2—2 of Figure 3;

Figure 3 is a plan view of my regulating device and the exhaust taken on line 3—3 of Figure 2, showing the thermal pump in horizontal section;

Figure 4 is a horizontal section of my device taken on line 4—4 of Figure 2.

In the several figures of the drawing, corresponding parts are designated by the same reference characters.

Referring with particularity to the drawing, the invention comprises the heating element in the form of a receptacle A, an expansion chamber B, and a pump receiving socket C. The chamber B is joined to the upper end of the receptacle A and in communication therewith and is of considerably larger diameter than the receptacle A, the upper wall thereof being concaved to prevent expansion and outward bulging under the influence of the expansion of any heat conducting substance used in the device. The pump socket C is secured at its upper end to the upper chamber wall *b*, extends through said wall, and depends within the receptacle A nearly to the bottom thereof, the socket being of slightly less diameter than the receptacle to provide a space *a* between the walls of the receptacle and the walls of the socket to receive mercury or other suitable substance D. In this particular case the substance used is mercury as it provides a direct metallic heat conducting contact between the walls of the receptacle and the socket at low temperatures which is broken as the temperature rises and the mercury changes from liquid to vapor.

The device as above described is mounted in the exhaust E of a gas engine F with the receptacle A extending into the exhaust through an aperture *e* in the upper wall thereof and with its chamber B resting upon said upper wall.

The lower portion of a gasoline vapor pump G fits tightly but slidably in the socket C and has its bottom slightly spaced from the bottom of said socket C, a gasoline supply pipe 1 leading into said pump and a discharge pipe 2 leading from the pump into the reservoir or carburetor well H.

The heat of the exhaust E is conducted through the wall of the receptacle A, the mercury D and the wall of the socket C to the pump part G, thereby heating the gasoline in the pump to such degree as to cause vaporization and expansion thereof as a necessary preliminary to the operation of the pump.

At low temperatures, the mercury remains in liquid form and in contact with the wall of the receptacle A and the socket C, which in turn contacts with the pump member G, thus providing a good heat conducting metallic contact between the hot exhaust gases and the pump member G. As the temperature of the exhaust rises, the mercury expands and ultimately vaporizes to break the good heat conducting metallic contact between the exhaust gases and the member G, thereby reducing the temperature of the latter. As the temperature of member G falls, the mercury vapor liquefies to establish metallic contact again, and this alternating vaporizing and liquefying of the mercury operate to keep the temperature of

the pump within the limits required for its effective operation.

The operating temperature may also be regulated by setting the pump higher or lower in the pump socket C in order to expose more or less of it to the heating action of the exhaust gases.

The invention is not to be considered as limited to the use of mercury as a heat conducting medium, since any other substance whose heat conductivity lessens as the temperature rises must be contemplated as falling within the scope of this invention.

Having thus described my invention, I claim and desire to secure by Letters Patent:

1. The combination with an internal combustion engine and a source of fuel supply therefor, of means for transferring fuel from said source to said engine and including a pump element, and a heat conducting socket member connected to said engine to be heated thereby, said pump element being seated in said socket member.

2. The combination with an internal combustion engine and a source of fuel supply therefor, of means for transferring fuel from said source to said engine and having a part adapted to cause operation of the fuel transferring means by the application of heat thereto, and a heat conducting socket member receiving said part in its socket and connected to said engine to conduct heat from the latter to said part.

3. The combination with an internal combustion engine and a source of fuel supply therefor, of means for transferring fuel from said source to said engine, and having a part adapted to operate the fuel transferring means by the application of heat thereto, a heat conducting socket member receiving said part in its socket and connected to the engine to conduct heat from the engine to said part, and means for automatically regulating the amount of heat conducted through said member.

4. In apparatus of the character described, a heat conducting element comprising a receptacle having an expansion chamber formed integral therewith, a socket member extending through said chamber into said receptacle, and spaced therefrom, a body of heat conducting substance arranged in said receptacle between the walls thereof and said socket member.

5. In combination with an internal combustion engine and a source of fuel supply therefor, means for transferring fuel from said source of supply to said engine, said means being dependent for its operation upon the application of heat to one of its parts, a heat conducting element connected to said engine to be heated thereby and having a socket to receive said part, said part being adjustable in said socket to regulate the degree of heat conducted by said element from said engine to said transferring means.

6. The combination with an internal combustion engine and a source of fuel supply therefor, of means for transferring fuel from said source to said engine and including a part adapted to be operated by the application of heat thereto, and a heat conducting element adjustably connecting said engine and said part.

7. The combination with an internal combustion engine and a source of fuel supply therefor, of means for transferring fuel from said source to said engine and including a part adapted to be operated by the application of heat thereto, a heat conducting element connected to said engine and having a socket in which said part is slidably mounted, and means for automatically regulating the heat conducted through said element from said engine to said part.

8. The combination with an internal combustion engine having an exhaust duct and a source of fuel supply therefor, of means for transferring fuel from said source to said engine, and including a part adapted to be operated by the application of heat thereto, a heat conducting element having a part thereof arranged in said duct to be heated by the exhaust gases passing therethrough, and to slidably receive the part first named.

9. The combination with an internal combustion engine and a source of fuel supply therefor, of means for transferring fuel from said source to said engine, means for adjustably connecting said engine to a part of said transferring means, the last named means including means for automatically regulating the amount of heat conducted from said engine to said transferring means.

10. The combination with an internal combustion engine and a source of fuel supply therefor, of means for transferring fuel from said source to said engine, heat conducting means adjustably connecting said engine and a part of said fuel transferring means and including thermostatically controlled means for regulating the amount of heat conducted by said means from said engine to said transferring means.

In testimony whereof I have signed my name to this specification.

WILLIAM H. TANGEMAN.