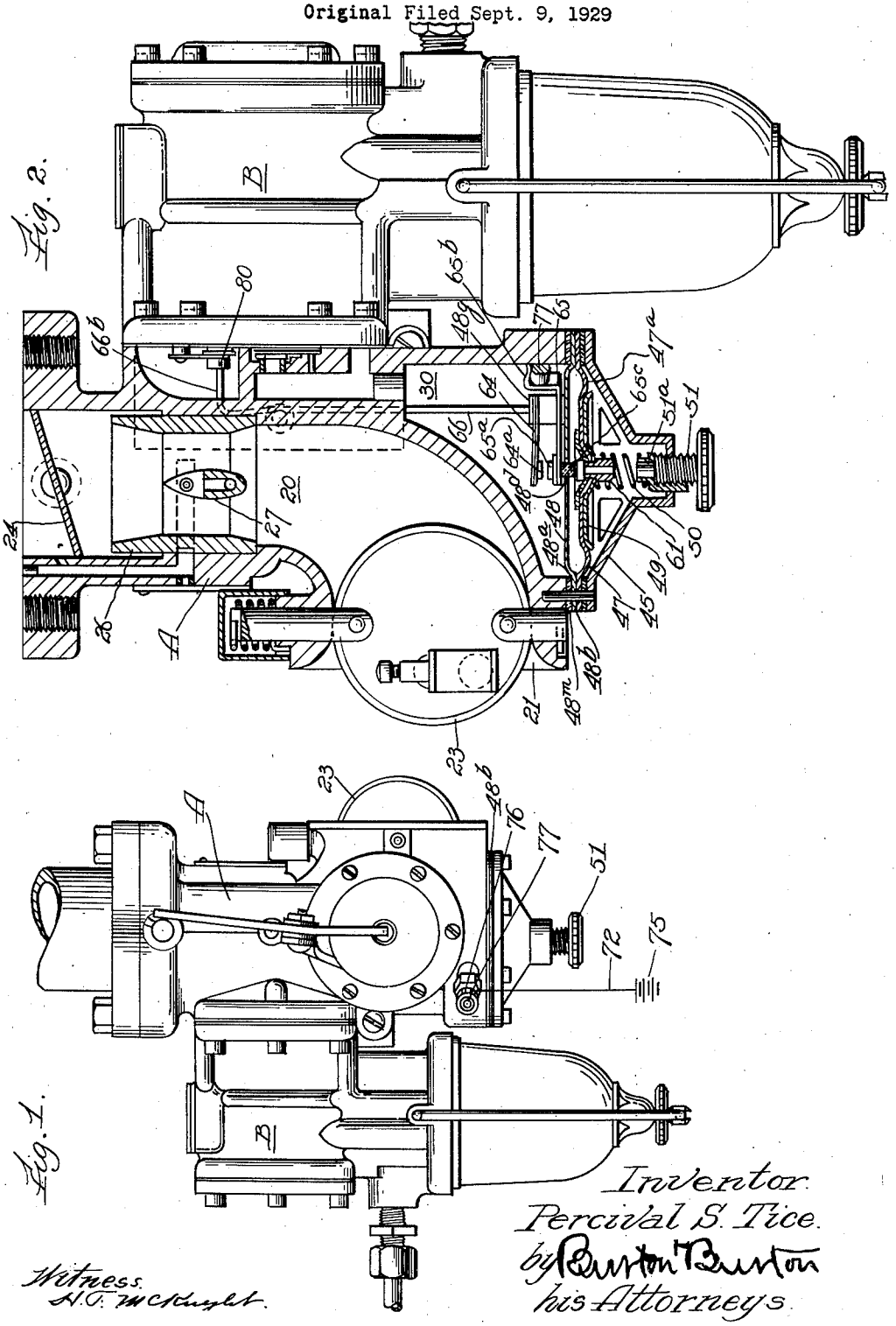
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CARBURETOR

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CARBURETOR

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4 Claims. (Cl. 158—37)

This application is a division of my pending application Serial No. 390,602, filed September 9, 1929, the purpose of the invention to be defined in this divisional application being to provide an improved fuel feeding system for internal combustion engine carburetors. It consists in the elements and features of construction shown and described as indicated in the claims.

In the drawing:

Figure 1 is a side elevation of a carburetor construction embodying this invention.

Figure 2 is a partly sectional elevation of the side opposite that seen in Figure 1, section being made through the fuel accumulating chamber and fuel mixture intake passage, axial with respect to the latter.

The carburetor construction shown in the drawing comprises a body member, A, having an air and fuel mixture conduit, 20, leading from the air inlet, 21, at which the air enters, substantially horizontally with a 90 degree bend upwardly to the upper end of said body member, at which the latter is adapted for mounting at the engine intake for discharge into the intake manifold, a choke valve, 23, being provided at the entrance, and the throttle valve, 24, being mounted at the upper discharge end.

In the upwardly extending part of said conduit there is mounted a Venturi sleeve, 26, having formed integrally with it a nozzle member, 27, of special construction, the details of which are not part of the present invention. The body member comprises also a fuel chamber, 30, extending adjacent the upwardly extending part of the air and fuel mixture conduit at the side opposite the air inlet and choke valve, said chamber extending down around and under the convex side of the 90 degree bend mentioned.

The fuel chamber extending to the lower end of the body member, A, is closed at that end by a bottom skeleton cap, 45, conical in general form with its conical cavity at the upper side, and having a marginal exteriorly protruding flange mated in dimensions with the lower end of the body member for clamping between said lower end of the flange and said body member a flexible diaphragm, 47, which thereby becomes effectively the capacity-limiting bottom of the fuel chamber; and above said diaphragm a damping plate, 48, which is a metal stamping flexed upwardly as seen at 48^a, at the central area within the clamped margin, 48^b, and insulated from the body member, A, by an interposed packing gasket 48^m.

The diaphragm, 47, has at its under side a sheet metal disk, 49, reenforcing the diaphragm at a relatively large central portion of its area, limiting its flexure to the annular area, 47^a, outside said central reenforced area.

There is provided at the under side of the diaphragm a coil spring, 50, reacting between the metal disk, 49, and the diaphragm, 47, and an adjusting screw, 51, which is screwed into the lower end of the bottom cap, 45, said spring being centered at its upper end upon the nut, 61, by which the disk, 49, is clamped to the diaphragm, the lower end of the spring being centered upon the reduced upper end, 51^a, of the tensioning screw, 51.

The damping plate, 48, has a central aperture, 48^d, affording restricted access to the diaphragm, of the fuel in the stand pipe or level-governing chamber 30. Said damping plate carries an insulating post, 48^g, on the end of which there is secured one end of a lower spring contact member, 65, said contact members both extending into alignment with the axis of the diaphragm where they are provided with contact buttons, 64^a, 65^a, respectively facing each other, the spring contact member, 65, having a non-conductive pin, 65^c, projecting down through the aperture, 48^d, in the damping plate, 48, for restricting said aperture and for encounter with the diaphragm, 47, at the center of the latter.

The electric circuit in which the electro-magnetic pumping device, hereinafter described, is energized, comprises a current wire indicated at 72 leading from a source of current indicated at 75 to a binding screw, 76, of which the threaded post, 77, is insulatedly mounted laterally of the body, A, at the lower end thereof and protruding into the fuel chamber, 30, closely above the damping plate, 48, as seen in Figure 2, where the terminal of said insulated binding post is in contact with the end of the spring contact member, 65, with which contact is maintained by the resiliency of the end portion, 65^b, of said contact member which is suitably flexed for bearing against said binding post, as seen in Figure 2.

From the contact member, 64, the circuit is continued through a conductor, 66, hereinafter more particularly described.

From the foregoing it may be understood that in the intended operation the accumulation of fuel in the stand pipe, 30, to a predetermined degree of hydrostatic pressure determined by the adjustment of the spring, 50, will operate the diaphragm for separating the contacts, 64^a and 65^a, opening the energizing circuit of the electro magnetic pumping apparatus, and interrupting

the fuel supply until the engine consumption causes the fuel level in the chamber, 30, to be reduced, reducing the hydrostatic pressure on the diaphragm, whose spring, 50, will thereupon react and cause the diaphragm to move the contact, 65^a, for closing the circuit.

In the construction shown, the upper contact member, 64, is a bi-metallic bar comprising two strips of metal having different co-efficients of expansion and contraction under temperature change, the lower strip having the higher co-efficient so that the bar 64 tends to be flexed upwardly at the end carrying the contact button, 64^a, upon rise of temperature due to the fuel in the chamber, 30, becoming heated in the running of the engine.

The primary purpose of this feature of the construction is to cause the hydrostatic pressure for fuel delivery to be somewhat greater when the fuel is cold than when it is hot which is desirable for the reason that a richer mixture is needed when starting with the engine, and thereby the fuel, cold, than when the engine is warmed up by running and the fuel is correspondingly heated.

In modern engines, the engine becomes heated so quickly after starting that the normal condition may be properly considered to be the heated condition, and the above described features of the carburetor structure determining the normal depth of fuel in the carburetor fuel chamber are designed to ensure that depth with the engine heated.

Without the control afforded by the thermo-responsive contact carrier, 64, the level in the fuel chamber would be lower with the fuel cold and higher with the fuel hot, which is the reverse of the requirement of modern engines on modern cars, in which the provision of automatic temperature controlled radiator shutters and the like, causes the properly heated condition of the engine to be obtained so quickly at the starting of the engine, that the normal condition for which the level determining features are designed, is the heated and not the cold condition; and the devices described afford the necessary correction of level from normal to higher than normal when the engine, and thereby the fuel, is cold, or below what may properly as above stated be considered the normal temperature.

Accordingly, the normal form and position of the contact carrier, 64, may be considered to be its condition and form when flexed upwardly as seen in Figure 2, for holding the contact button, 64^a, at a position requiring least hydrostatic pressure on the diaphragm in order to separate the contact, 65^a, from said contact, 64^a. And the abnormal condition may be regarded as that at which the part, 64, is straight or slightly flexed downward.

This feature also serves a secondary, but not negligible, purpose concerned with the increase of fluidity and reduction of viscosity which is concurrent with rise in temperature of the fuel. By reason of the increase of fluidity and reduction of viscosity which attend rise in temperature, the fuel will be discharged more freely, and so in greater quantity, through a given passage which is restricted so as to cause substantial friction when the fuel is hot than when it is cold.

And to maintain the desired uniformity of mixture, the pressure must decline as the temperature rises, which is the result of making the contact-carrying member, 64, bi-metallic, so that rise of temperature causes the contact button, 64^a, to move in the direction for earlier opening of the circuit, i. e., opening with less depth of fuel in the fuel chamber.

Circuit connection to the upper spring contact member, 64, is made as above mentioned by a spring circuit wire, 66, which is mounted rigidly in a conductive sleeve, which in turn is mounted in the post, 48^g, above which said upper contact member is secured, the upper end of said sleeve being peened over the contact member, 64, for securing the latter on the post as above described. Said spring contact wire extends up in the chamber, 30, and at the upper end is bent laterally, as seen at 66^b, for projecting into contact with a contact button, 80, pertaining to the electric circuit in which is energized the fuel supply pump contained in the casing, B, and by which the fuel is supplied to the carburetor. The construction and operation of this electric pump is fully shown and described in my said parent application, and no description of the same is necessary for the understanding of the invention to which this divisional application is directed.

I claim:

1. In a carburetor comprising a fuel accumulating chamber and electrically energized pumping means for supplying fuel thereto, a switching apparatus operable by the hydrostatic head of fuel to control the energizing circuit of the pumping means and having one of its cooperating circuit-making-and-breaking contact-carrying members located in the fuel accumulating chamber in position for exposure to the temperature of the fuel content of the chamber, said member being constructed for response to change of temperature of the fuel to move its contact in a direction toward or away from the other contact of said switching apparatus.

2. In a carburetor comprising a fuel accumulating chamber, electrically energized means for furnishing fuel to said chamber, means responsive to the pressure of the fuel accumulating in the chamber for controlling the energizing electric circuit, said means including a temperature-responsive contact-carrying member of a circuit-controlling switch, said switch member being located in the fuel accumulating chamber exposed to the temperature of the fuel content and adapted to carry its contact out of circuit-closing position upon the temperature derived from the fuel reaching a predetermined degree, said temperature-responsive switch member and the cooperatng switch member being associated with the pressure-responsive element for breaking the circuit by the movement of said pressure-responsive member upon the pressure exceeding a predetermined degree.

3. In a carburetor comprising a fuel accumulating chamber, electrically energized means for furnishing fuel to said chamber, a circuit in which the same is energized and a switch controlling said circuit, means operated by the hydrostatic pressure of the fuel accumulated in said chamber beyond a predetermined depth for operating the switch in circuit-breaking direction for de-energizing the fuel furnishing means, the switch being located in the fuel accumulating chamber exposed to the temperature of the fuel therein, and comprising a temperature-responsive contact-carrying member arranged to be flexed by temperature change for carrying its contact in circuit-breaking direction upon the temperature exceeding a predetermined degree, one of the cooperating members of the switch being associated with the diaphragm for move-

ment thereby relatively to the other switch member in circuit-breaking direction upon the diaphragm being flexed in circuit-breaking direction.

4. In a carburetor comprising a fuel accumulating chamber having a flexible diaphragm constituting part of its enclosing wall at the lower part of said chamber, means reacting resiliently on said diaphragm in opposition to the pressure of the fuel content of the chamber for resisting the outward flexing of the diaphragm and adapted to yield for permitting such outward flexure upon said pressure reaching a predetermined degree, electrically energized pumping means for supplying fuel to said chamber, and a switch controlling said pump-energizing means, one of the switch members being located in said chamber in exposure to the temperature of the fuel content thereof so as to alter its position according to said temperature and mounted and arranged with respect to said diaphragm and the cooperating switch member for its circuit opening movement upon said outward flexure of the diaphragm.

PERCIVAL S. TICE.