

P. F. O'SHAUGHNESSY.
FUEL HEATER FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED APR. 26, 1917.

1,336,152.

Patented Apr. 6, 1920.
2 SHEETS—SHEET 1.

Fig. 1.

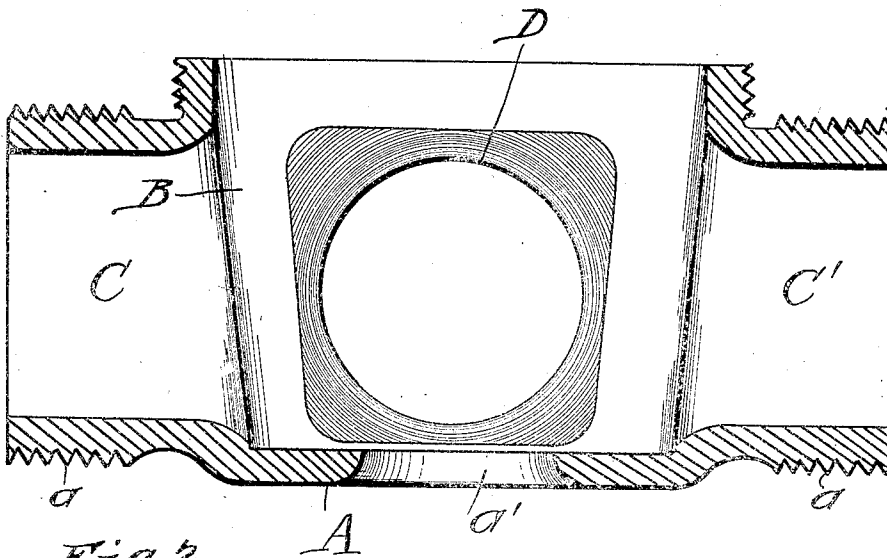
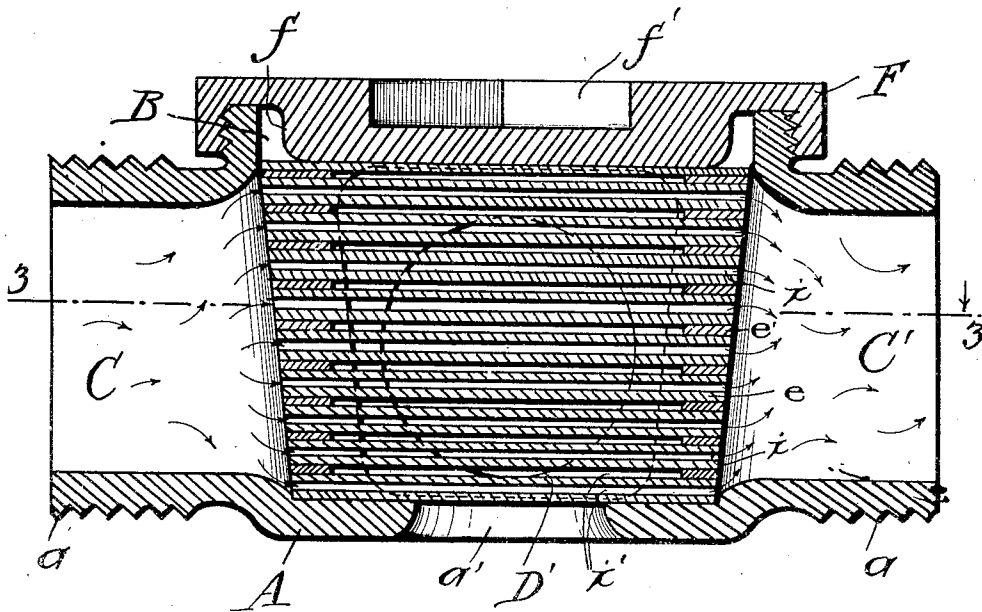


Fig. 2.

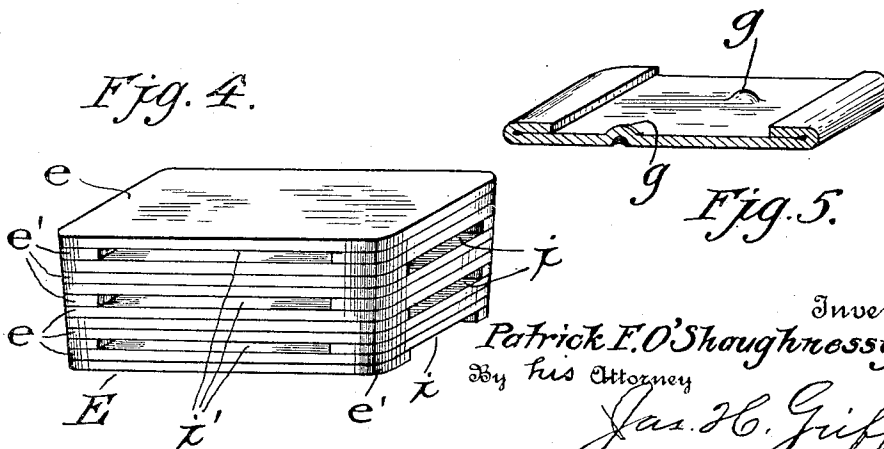
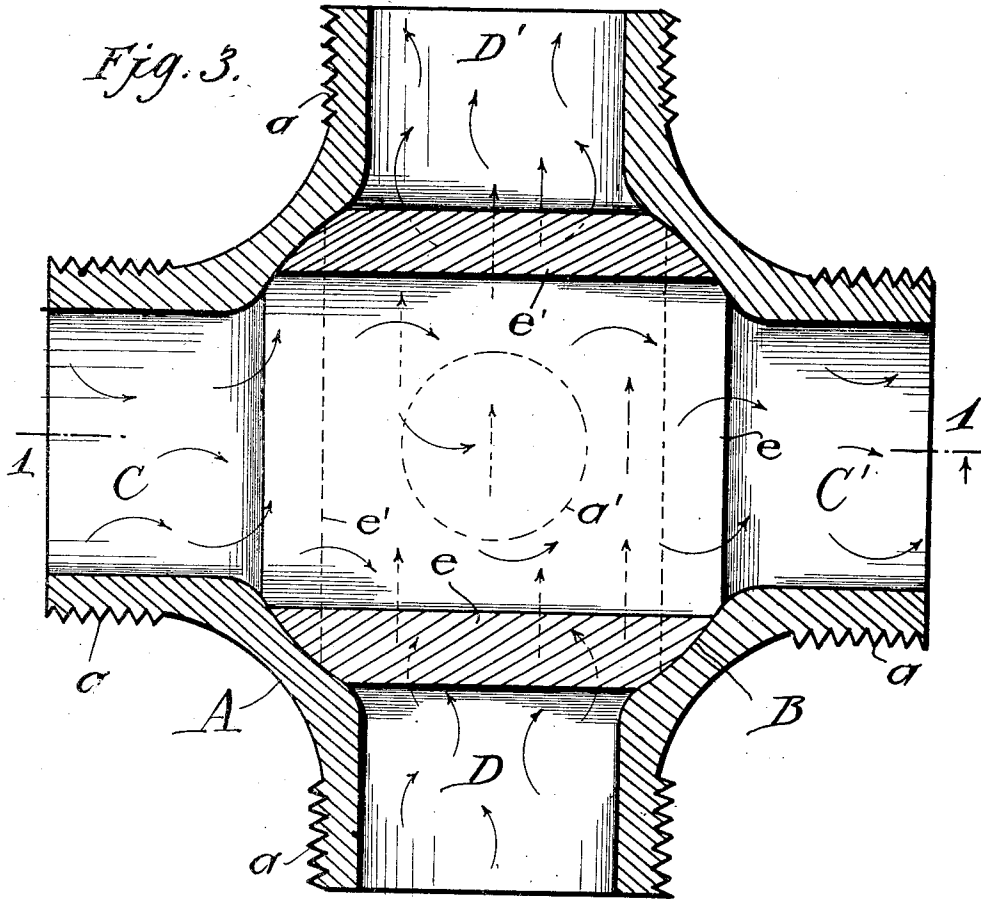
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By his Attorney
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UNITED STATES PATENT OFFICE.

PATRICK F. O'SHAUGHNESSY, OF BROOKLYN, NEW YORK.

FUEL-HEATER FOR INTERNAL-COMBUSTION ENGINES.

1,336,152.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, PATRICK F. O'SHAUGHNESSY, a citizen of the United States, residing in the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented a certain new and useful Fuel-Heater for Internal-Combustion Engines, of which the following is a specification.

10 This invention is a fuel heater for internal combustion engines and relates, more particularly, to devices of the character adapted to be interposed between the carbureter and the intake manifold of an internal combustion engine, for the purpose of heating or vaporizing the carbureted mixture during the passage thereof from the carbureter to the engine cylinder, through the utilization of the heat in the waste products of combustion from the engine.

15 Devices of this general character have been heretofore employed with varying degrees of success; however, they have possessed many disadvantages and drawbacks. Some devices have been suggested which would operate with suitable efficiency, in that they would preheat or vaporize the explosive mixture by raising it to the high temperature desired, but, in every instance, such constructions as would bring about this result are extremely complicated and expensive, since they embody a large number of parts and generally include a complex casing both difficult and expensive to cast. The simpler devices suggested, which embody much fewer parts and much simpler constructions, are found, in practice, to be deficient in their operations since, while they heat the mixture to some degree, the temperature obtained is insufficiently high for the best results.

20 With the foregoing in mind, the object of the present invention is to provide a preheater for carbureted mixture, which will vaporize the carbureted mixture with maximum efficiency and to the required degree through the employment of a structure extremely simple and embodying a minimum number of parts, none of which can get out of order, and all of which will be readily demountable to allow of the cleansing of said parts.

25 Features of the invention, other than those specified, will be apparent from the hereinafter detailed description, when read

in conjunction with the accompanying drawings.

In the accompanying drawings I have illustrated different practical embodiments of the invention, but the constructions therein shown are to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a section through a fully assembled heater and vaporizer embodying the present invention, such section being taken in the plane of the line 1—1 of Fig. 3.

Fig. 2 is a section similar to that of Fig. 1 through the casting forming the casing or body-portion of the construction, all of the movable parts associated therewith being removed.

Fig. 3 is a section through the assembled device in the plane of the line 3—3 of Fig. 1.

Fig. 4 shows a plurality of heating plates preferably employed, and

Fig. 5 shows a single plate of a slightly modified form.

Referring to the drawings, A indicates a casting which forms the body-portion of the heater. This casting is constructed to embody a central chamber B, entirely open at its top and provided on its four opposite sides with inlet and outlet passages or ducts C C' and D D', of which the ducts C D form the inlets to the chamber B and ducts C' D' the outlets thereof. These ducts are so arranged that the ducts D and D' will be in alinement with one another, and such will also be the case with the ducts C and C', as clearly shown in Fig. 3.

The portions of the casting A which house the several ducts are threaded, as at a, to receive couplings, whereby the device may be incorporated within the intake and exhaust systems of an internal combustion engine. For the purpose of illustration, it will be assumed that the duct C is coupled to the pipe leading from the exhaust manifold of the engine, and the duct C' to the pipe leading to the muffler, while the duct D is associated with the carbureter and the duct D' is coupled to the intake manifold of the engine. Thus, the central chamber B of the casting is in communication with the carbureter, the intake manifold of the engine, the exhaust manifold of the engine and the discharge to the muffler. It is within this central chamber B that the heating or vaporizing of the carbureted mixture,

through the employment of means next to be described, takes place.

Within the chamber B is positioned a heating element E of the type shown in Fig. 4, which heating element embodies a plurality of stacked or superimposed plates *e*, which are spaced apart by spacing or filler strips *e'*, which spacers are in length equal to the dimensions of plates *e* in one direction, are relatively narrow in width, and are positioned with their longitudinal edges adjacent the opposite edges of the plates. As shown in Fig. 4, the directions in which the spacers between the consecutive plates extend alternate, so that between consecutive plates passages or flues *i i'* are formed. All of the flues *i* extend in the same or parallel direction, while all of the flues *i'* extend in parallel relation to one another but in a direction at right angles to the direction of the flues *i*. In the form shown in Fig. 4, all of the plates and intermediate spacers are secured together in superimposed relation by solder or other suitable means so as to form a heating unit adapted to be handled as such in positioning the same within or removing it from, the chamber B of the body or casting A of the device.

The size of the plates *e* is such, and they are superimposed in such numbers, that, when seated within the chamber B, they will substantially fill the same and bring the passages of flues *i* into alinement with the inlet and outlet ducts C C' of said casting, and the flues *i'* into alinement with the inlet and outlet ducts D D' thereof. The corners of the plates are rounded and the interior wall of the chamber B, between the inlet and outlet ducts, is similarly formed so that the heating unit E will, at its four corners, come into substantially tight engagement with the inner wall of said chamber and preclude leakage at the points of union. In order that these joints may be made as tight as possible, it is preferred to taper the heating element E downwardly, as shown in Figs. 1 and 4, and to correspondingly shape the chamber B so that, when the heating element is inserted in said chamber and forced down tightly therein, a wedging engagement will result between the outer surfaces of said element and the interior wall of the chamber B, so that, when said element is seated within the chamber, leakage at the points specified will not result.

After the heating element has been deposited within the central chamber of the casting through the open top thereof, provided for this purpose, said open top is closed by screwing a suitable cap F in place, as shown in Fig. 1. This cap may be secured upon the casting in any desired manner and may be of various forms, but is here shown as being threaded to cooperate with external

threads on the casting and is provided with a depending portion *f* adapted to extend downwardly through the open top thereof, and engage with the uppermost plate of the heating unit when the cap is screwed upon the casing. The upper face of the cap F is shown as provided with a depressed polygonal or squared orifice *f'* to allow of the manipulation of said cap by a wrench. When the parts are associated as described, the depending portion *f* of the cap forces the heating unit to its seat within the central chamber of the casting, precludes leakage and prevents rattling. When the cover cap F is removed the heating element may be readily removed from said chamber by exerting pressure on the lowermost plate of the element through an aperture *a'* provided for this purpose.

The operation of the device will be manifest; as the flues *i* are in alinement with the intake and exhaust ducts C C' which convey the hot exhaust products of combustion from the engine, the passage of the hot products of combustion through the flues will heat the adjacent plates to a high temperature, so that the carbureted mixture passing through the intermediate flues *i'*, by way of the intake duct D from the carbureter and the outlet duct D' to the engine intake manifold, will receive the heat from the adjacent hot plates and become highly heated or vaporized to such degree as to allow the carbureted and vaporized mixture to operate the engine with maximum efficiency. In order that the proper areas may be provided for the passage of the fuel and waste products of combustion through the device, the ends of the ducts which lead into the central chamber of the casting are flared, as shown. Moreover, the plates *e* of the heating element are preferably spaced apart at such distance as to not seriously impede the flow of the currents therebetween.

It will, of course, be understood that the plates *e* which constitute the heating element may be of any suitable thickness desired, but are preferably made quite thin so that the transmission of heat from the waste products of combustion to the carbureted mixture may be carried on with maximum efficiency. Furthermore, while the flues *i* and *i'* are shown of substantially the same depth in the construction illustrated, I may, if desired, make the flues *i*, which convey the hot exhaust gases, of greater area than the flues *i'*, which convey the carbureted mixture, or vice versa.

In the construction illustrated in Fig. 4, the spacing members *e'* are shown and have been described as formed separate from the stacked plates *e*, the whole being subsequently secured together to form a unit. However, in Fig. 5 a slightly modified form of plate is illustrated. In this latter form,

the spacing members are formed by returning the opposite ends of the plate upon itself, as shown, to form said spacing members integral with the plate. A plurality of plates made in accordance with Fig. 5 may be superimposed upon one another in the same general manner as shown in Fig. 4, and secured together to form the heating unit. It is not absolutely essential that plates of the character shown in Fig. 5 be secured together, but, in practice, I recommend that this be done to prevent rattling and preclude leakage. As a further provision against rattling or bulging of the plates, each plate may, if desired, be provided on one or both of its faces with one or more protuberances *g*, as shown in Fig. 5, and this method of preventing rattling may be carried out in the plates of the construction of Fig. 4.

It appears from the foregoing description that the heater or vaporizer of the present invention is extremely simple in construction, and, in the form shown, embodies only three relatively movable elements, casting A, heating element E and sealing cap F. The device may thus be constructed at a minimum cost, may be readily assembled, and its construction is such that it cannot get out of order or become broken.

The construction hereinbefore described and shown in the accompanying drawings illustrates that form of the invention which is found to operate with great efficiency in practice. It will be understood, however, that the form shown is illustrative, only, and that details of construction may be varied without departing from the spirit of the invention, which is to be understood to be as broadly novel as is commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. A fuel heater and vaporizer for internal combustion engines embodying a casing provided with a chamber, a heating element

positioned within said chamber and embodying a plurality of superimposed metallic plates, marginal strips positioned between the successive plates to space them apart and form flues therebetween, the alternate strips extending in the same direction and the intermediate strips at right angles thereto, whereby two sets of flues are formed, one of which sets extends in one direction and the other of which extends at right angles thereto, a screw cap on the casing for forcing the heating element to a seat therein, inlet and outlet ducts communicating with one set of flues while conveying waste products of combustion of an engine through said flues to raise the temperature of the heating element and inlet and outlet ducts communicating with the other set of flues for passing engine fuel therethrough, whereby the fuel is heated and vaporized during its passage to the heating element.

2. A fuel heater and vaporizer for internal combustion engines embodying a casing provided with a tapered chamber, a heating element tapered to seat in said tapered chamber and embodying a plurality of superimposed metallic plates with intermediate marginal spacing members forming between the plates two series of flues extending at right angles to one another, means for forcing the heating element to its seat in the tapered chamber for the purpose of providing tight wedging coaction between the parts, inlet and exhaust ducts communicating with one series of flues for conveying the waste products of combustion from an engine through said flues and inlet and outlet ducts communicating with the other series of flues for conveying engine fuel therethrough, whereby the products of combustion raise the temperature of the heater which, in turn, operates to vaporize the engine fuel.

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

PATRICK F. O'SHAUGHNESSY.