July 15, 1958 H. B. SNYDER 2,843,197

BURNER

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Fig. 1.

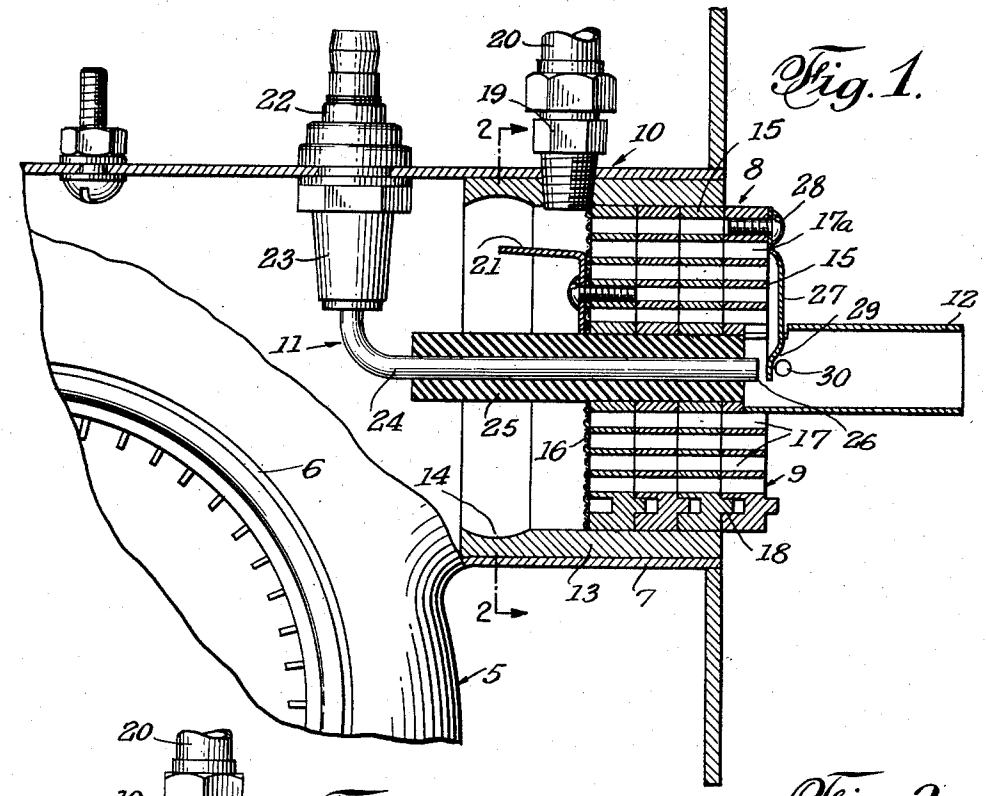


Fig. 2.

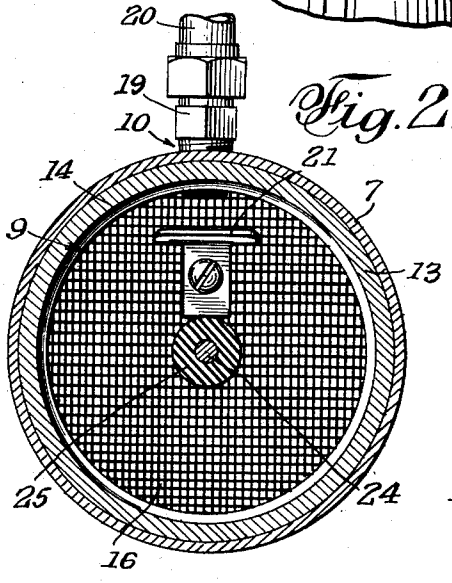
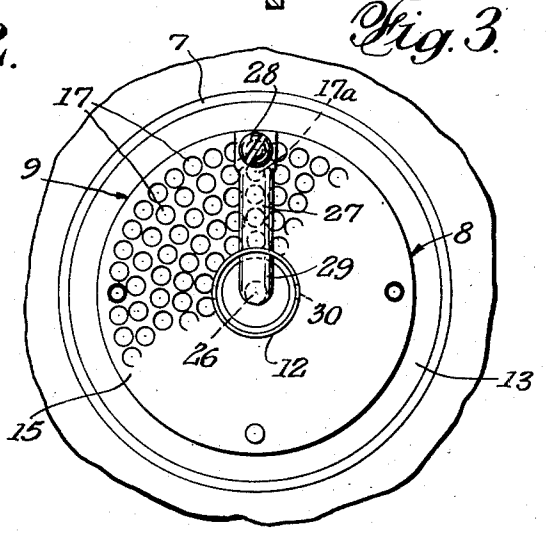


Fig. 3.



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Fig. 4.

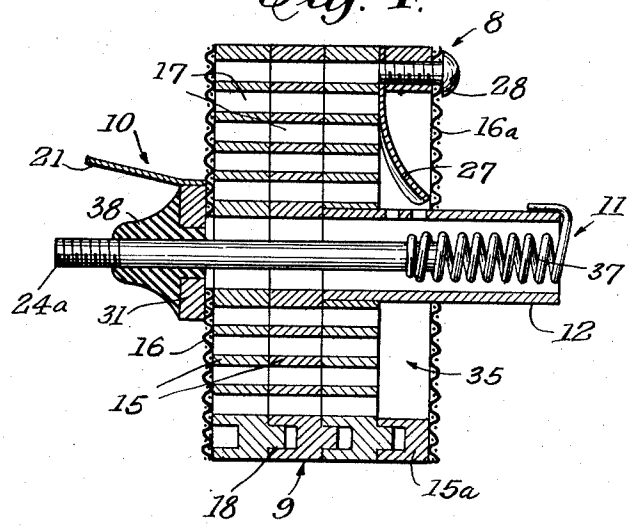


Fig. 5.

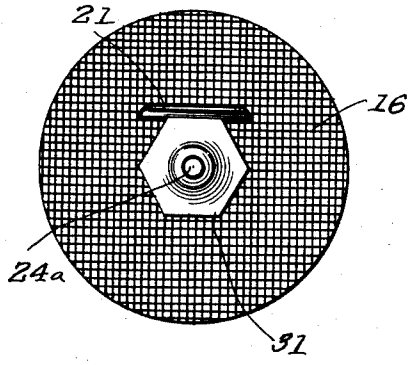
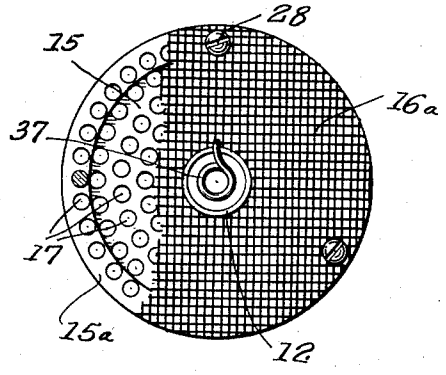


Fig. 6.



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BURNER

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Application December 13, 1954, Serial No. 474,687

2 Claims. (Cl. 158—28)

This invention relates to a burner construction, the same having a variety of uses and being more particularly adapted as a burner to provide the heat in a heat exchanger as may be used in means to pre-heat the cooling water of an internal combustion engine, for instance, of an automotive vehicle. In subfreezing temperatures, the cooling water is advantageously heated before starting engine operation, the present burner being provided for such an analogous purpose.

An object of the present invention is to provide an open-flame burner of compact and efficient form that is adapted to be embodied in the outlet or pressure end of a fan or blower and which, with little expenditure of fuel, provides an open flame for the general purposes above indicated.

Another object of the invention is to provide a burner that can be quickly started up and as quickly creates the flame heat desired in heating a liquid medium, as in a heat exchanger.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively, simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawing merely shows and the following description merely describes, preferred embodiments of the present invention, which are given by way of illustration of example only.

In the drawing, like reference characters designate similar parts in the several views.

Fig. 1 is a fragmentary sectional view, partly in elevation, showing a burner of the character above indicated as embodied in the outlet of a blower.

Fig. 2 is a cross-sectional view as taken on line 2—2 of Fig. 1.

Fig. 3 is an end view as seen from the right of Fig. 1.

Fig. 4 is a sectional view in the plane of section of Fig. 1 and showing another form of burner.

Figs. 5 and 6, to a reduced scale, show opposite face views of said burner.

The present burner construction comprises, generally, a blower or fan 5 having the usual central air inlet 6 and a tangential air outlet 7, and a burner 8 disposed in the outlet 7 and, therefore, subject to the flow of air directed to outlet 7 by said blower. Said blower is generally conventional of centrifugal blowers and the same may be varied as to type and construction.

The burner 8 comprises, generally, a body 9 disposed in blower outlet 7 and formed to pass the air directed under pressure by the blower, fuel-supplying means 10 for providing fuel in the path of the air stream passing through body 9, means 11 to ignite said fuel, and a flame generating tube 12 extending from said body and into a heat exchanger or other device to be served by said flame.

The burner body 9 is shown in Figs. 1, 2 and 3 as comprising a steel adapter tube 13 lining outlet 7 and having an annular trough 14 formed in its inner internal end for the purpose of collecting excess fuel or spillage, as will later be seen, a set of metal discs 15 in stack formation and fitting within said tube 13, and a screen 16 against said stack on the blower side thereof. Said stack is so fitted into tube 13 that the trough 14 of the latter is inward of the innermost disc 15 and of the screen 16. The discs forming the stack are preferred because of simplicity of production and flexibility in building up the body to desired length by use of a desired number of discs. Hence, said stack of discs may be replaced by a single elongated member fitting tube 13.

The discs 15, or the elongated member used alternatively, are provided with a multiplicity of apertures 17 that extend transversely through the discs and constitute a means that separates the air stream from blower 5 into a multiplicity of finely divided streams. Said apertures are retained in alignment as shown as by pin and socket means 18 provided in said discs.

The screen 16 may be a mesh screen, as shown, or the same may be a finely-orificed plate. In any case, the primary purpose of the screen is to serve as a flame arrester in the case of back fire. The apertures 17, in a large measure, serve the same purpose.

The fuel-supplying means 10 is shown as a jet fitting 19 extending into the blower outlet 7 and through the tube 13 between the inner side of body 9 and the trough 14 in said tube. A conduit 20 conducts fuel, such as gasoline, diesel oil, propane, etc., to jet 19, the latter releasing the fuel in atomized or finely-divided form across the flow of air from the fan. Said means 10 further includes a splash plate 21 that is fastened to the inner side of the body and is substantially horizontally disposed in the path of fuel being discharged by jet fitting 19.

Depending on the amount of fuel supplied, the same, by splashing on plate 21, is disseminated over and in front of the screen 16 to be picked up by the rapidly-moving air stream and conducted through said screen and the perforations of the discs 15. Thus, the air is carburated and passes out of the body 9 as a multiplicity of small streams of carburated air.

It will be clear that said small streams of air are in condition to support combustion on the outlet side of the burner. The means 11 is provided for igniting the burner so that combustion may be continued so long as fuel is supplied by conduit 20 to jet 19 and thence to the burner.

The burner igniting means 11 of this first form is shown as an igniter plug 22 carried by the blower housing inward of the burner body 9, the same being provided with an insulator 23 from which extends an electrode 24. An insulating tube 25 extends centrally through body 9 and has a passage through which said electrode extends, the same terminating at 26 on the outlet side of said body.

The igniting means 11 further includes a metallic terminal member 27 that is fastened at one end to the body 9 as by a screw 28 and has its other end 29 in spaced relation to the end 26 of electrode 24. Since member 27 is fastened to the body, the same is grounded. Hence, high-tension current supplied to plug 22, in the same way that current is supplied to an ordinary spark plug, will create a spark across the gap between electrode end 26 and terminal end 29. It follows, then, that any carburated air in the vicinity of said gap will be ignited by the spark there across.

To insure a concentration of fuel at or near the spark gap, the terminal member 27 is formed as a trough so that the same will conduct carburated air, that flows from splash plate 21 in the particular perforations 17*a*, directly to the spark gap. Thus, quick ignition is contemplated.

The tube **12** extends forwardly from body **9** and surrounds the spark gap. Thus, said tube, first, serves as a collector of fuel to hasten ignition and then serves to conduct the resultant flame away from the burner body. Said tube **12** is provided with apertures **30** that serve to laterally direct the flame from tube **12**, also, and cause pilot flames that ignite the carburated air exiting from the other apertures **17** to effect complete ignition of the burner.

Any fuel splashing from plate **21** and not incorporated in the air stream will collect in trough **14** from which the same will either be blown through body **9** by the pressure air, or will be evaporated and the evaporation carried by said air, or both.

In the form of the invention shown in Figs. 4, 5 and 6, the body **8** comprises a plurality of discs **15**, as before, except that the burner side of the body is provided with a ring or annulus **15***a* and a screen **16***a*, similar to screen **16**, encloses the inner space **35**. Thus, screen **16***a*, rather than the outer face of the stock or body **9**, becomes the surface on which combustion is supported.

In this case, the splash plate **21** of the fuel-supplying means **10** is shown as being carried by a nut **31** at the center of the body **9** on the inner side thereof.

In this latter form, the ignition means **11**, instead of a sparking device as in the earlier form, comprises a glow plug **37** that is grounded at one end to tube **12** and, at the other end, is connected to a central rod **24***a* which extends through and is insulated from nut **31** by insulation **38**. Thus, the plug **22** may represent a terminal that is insulated from the fan housing and is connected to glow plug **37** to conduct current thereto.

The form of Fig. 1 may use the glow plug for ignition purposes as well as the screen **16***a*. The latter reduces carbonaceous clogging of apertures **17** because the flame produced is directed from the surface thereof. The interstices of the screen **16***a*, being smaller than the apertures **17**, are more readily blown clear of carbon by the stream of forced air induced by fan **5**. Thus, said surface is kept quite clean and operates efficiently therefore.

While the foregoing has illustrated and described what are now contemplated to be the best modes of carrying out the invention, the constructions are, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular forms of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A burner structure comprising an air-moving blower having an outlet, said outlet being tubular, a liner tube fitted into said outlet and provided at the end thereof directed toward the blower with an annular liquid fuel-spillage collecting trough, a radial fuel inlet to the interior of said liner tube on the downstream side of the trough, a longitudinally-apertured burner body fitted into the liner tube on the downstream side of the fuel inlet, a splash plate carried on the inner side of said burner body in position to intercept fuel discharged by the inlet, said plate being sloped to guide fuel toward the burner body and being substantially narrower than said body whereby liquid fuel, in excess of what passes into the body apertures, falls gravitationally in front of the body apertures and in position to be picked up by the air stream directed through the outlet, a screen between the apertured body and the splash plate to divide the air stream and the liquid fuel carried thereby into a multiplicity of smaller air streams thereby disseminating the air thus carbureted over the face of said screen and through the apertures in the body, means to ignite the carbureted air as the same leaves the downstream side of the body, said means being carried by the apertured body, and a member in the path of movement of at least part of said smaller air streams to intercept the same and conduct carbureted air in a direction toward the ignition means.

2. A burner structure according to claim 1 in which the air-igniting means is carried by the apertured body substantially centrally thereof and the air stream intercepting member is disposed in radial relationship between the upper portion of the body and the ignition means.

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