Dec. 5, 1950 J. L. BREESE 2,532,831

COMBUSTION CHAMBER AND TURBINE ARRANGEMENT

Filed Jan. 27, 1945

Fig. 1

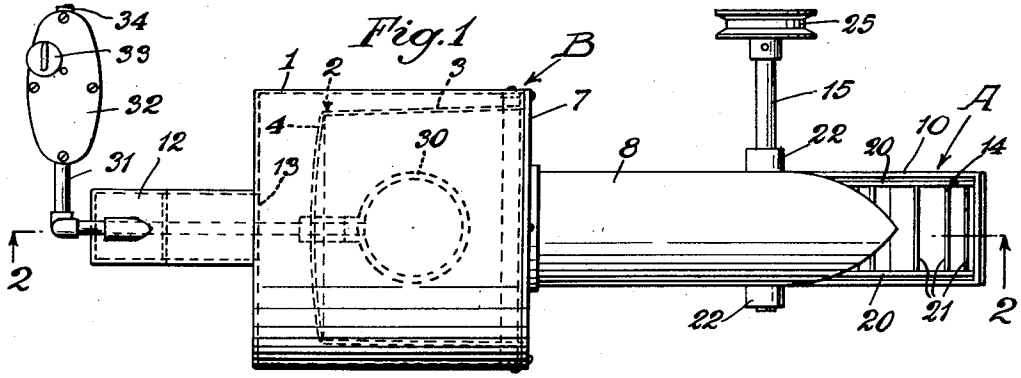


Fig. 2

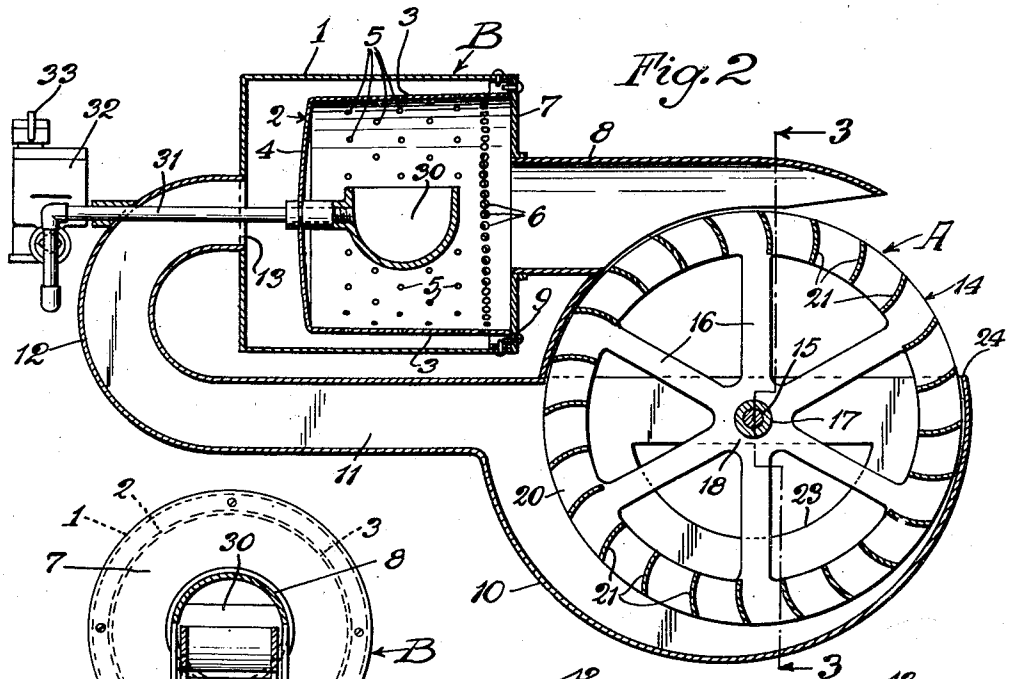


Fig. 3

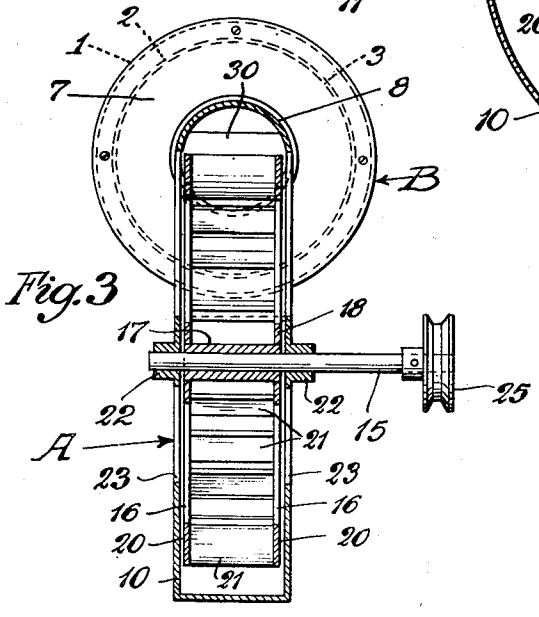
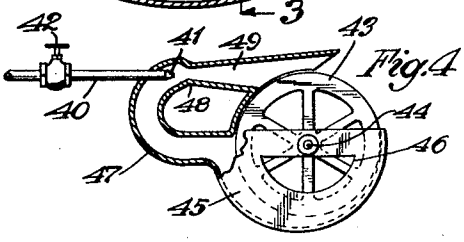


Fig. 4



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COMBUSTION CHAMBER AND TURBINE ARRANGEMENT

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4 Claims. (Cl. 60—41)

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My invention relates to an improvement in burners and is shown as applied to a dynamotor type liquid fuel burner.

One purpose is to provide a burner having a turbine component.

Another purpose is to provide a burner in which air pressure for the burner is built up by a turbine component of the burner.

Another purpose is to provide a method of burning a fluid fuel which includes inducing a flow of air by the acceleration of the combustion of the fluid or gases burned.

Other purposes will appear from time to time in the course of the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawing, wherein:

Figure 1 is a plan view;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2; and

Figure 4 is a side elevation with parts in section illustrating a variant structure.

Like parts are indicated by like symbols throughout the specification and drawing.

Referring to the drawing 1 generally indicates an outer housing in which is positioned a burner pot generally indicated as 2, having a circumferential side wall 3 and a closed end wall 4. The side wall is provided with a plurality of primary air inlets 5 located at various distances from the ends of the pot. Adjacent the open ends of the pot I illustrate a row of secondary air inlets 6 larger in size and more closely spaced than the primary inlets and inclined toward the open end of the pot. The open end of the pot is partially closed by a plate or end wall 7 from which extends a central tube 8 which serves to guide or deliver the flame and byproducts of combustion. The space between the pot and the housing wall 1 is closed to the outside air by the top flange 9 of the pot which underlies the partition or end wall 7 of the housing 1. 10 generally indicates any suitable housing or cowl from which extends a passage 11 which is recurved as at 12 and is in communication with the space within the housing 1 through the aperture 13. A turbine wheel generally indicated as 14 is mounted on an axle 15 and is shown as including spokes 16 extending radially outwardly from the central hub 17. The spokes, together with the central connecting portion 18 may if desired be formed unitarily from sheet metal, and carry rim portions 20. Extending between

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the rim portions 20 are a plurality of turbine buckets or vanes 21. The shaft 15 may be mounted in any suitable bearings 22 which may be mounted on the cowl structure 10. Note also that the cowl structure has air inlets 23 and terminates at an upper edge 24 slightly above the axis of the shaft 15. The shaft may carry any suitable pulley 25. It will be understood that rotation of the turbine wheel and thus of the pulley 25 may be employed to do work.

In the particular embodiment of my invention herein shown, I employ a horizontally axised hydroxylating pot. 30 is a fuel vaporizing cup positioned within the pot. 31 is a liquid fuel supply duct on the inner end of which the cup 30 may be mounted. The duct 31 passes through the aperture 13 and outwardly through the recurved wall portion 12 of the air duct 11. 32 indicates any suitable means for controlling the rate of flow of liquid fuel along the duct 31 to the cup 30. I illustrate a conventional float chamber assembly having any suitable manual control member 33 and a liquid fuel supply duct 34 extending to any suitable supply of liquid fuel not herein shown.

In Figure 4 I illustrate a variant form of the device in which gas may be employed. I illustrate for example a gas supply pipe 40 ending in a supply nozzle 41 and provided with any suitable valve or control means 42. The turbine rotor generally indicated as 43 is rotatable about the axis 44. 45 is any suitable cowl partially surrounding the rotor and provided with said air inlet apertures 46. 47 is a return duct extending from the cowl and recurved to the throat or venturi 48 which is aligned with the gas jet 41. 49 is an expansion passage beyond the venturi which is adapted to deliver the flame and byproducts of combustion to the turbine rotor 43.

It will be realized that whereas I have shown my invention as applied to a horizontally axised hydroxylating burner it may be applied also to other types of burners. It may for example be applied to a vertically axised burner pot in which liquid fuel is delivered directly to the bottom of the pot.

The use and operation of the invention are as follows:

I illustrate a burner turbine structure including the turbine rotor generally indicated as A and the burner assembly generally indicated as B. The rotor is partially surrounded by the cowl shroud 10. The burner delivers flame and byproducts of combustion more or less tangentially against a portion of the circumference of the

turbine rotor. If desired, the path of the flame and gases may be directed or limited or controlled by the member 8 which may be shaped in a variety of ways. Liquid fuel is delivered to the cup 30 along the duct 31 and is there vaporized. It is mixed with air flowing inwardly through the primary air inlets 5 to produce a primary mixture of vaporized fuel and air. This primary mixture is completed by the secondary air delivered through the apertures 6 and final combustion takes place at and beyond the open end of the burner pot. The flame and products of combustion, guided or directed by the passage 8, strike the vanes 21 of the turbine rotor and cause it to rotate at high speed. The lower half of the rotor is effective to draw air inwardly through the air inlet apertures 23 of the cowl 10 and to deliver air along the passage 11, 12 to the interior of the housing 1. At the same time some gases or byproducts of combustion will be recirculated. The turbine rotor in practice will rotate at varying speeds. As the rate of flow of liquid fuel is increased, and the amount of fuel burned increases, the speed of rotation of the rotor tends to increase. A result of the rotation of the rotor is the delivery of air at substantial velocity along the passage 11, 12 with a consequent increase in pressure within the housing 1 and an increase in the rate of air delivery through the air inlets 5 and 6. The accelerated movement of the jet of flame delivered by the burner is employed to rotate the turbine rotor. And the rotation of the turbine rotor delivers air under pressure to the interior of the burner pot.

In the form of Figure 5 I substitute a conventional gas burner for the pot type liquid fuel burner shown in Figures 1 to 3 but the mode of operation is substantially the same. In both forms the speed of rotation of the rotor and the rate of combustion may be varied by varying the rate of flow of the liquid or gases useful to the burner.

The turbine rotor may also be employed to perform work. For example it can be used to drive a generator of electric power or to operate a pump or to run farm machinery, or even to pump fuel, as in cases where a fuel tank is relied upon for gravital feed.

I claim:

1. In a burner, turbine structure, a horizontally axised burner pot having a closed end and a circumferential side wall provided with a plurality of air inlet apertures, means for vaporizing a liquid fuel within said pot, a flame ring and a flame guide member adapted partly to close the otherwise open end of the pot, a turbine rotor rotatably mounted adjacent said pot and having buckets the line of movement of which extends into the path of delivery of flame and gases from said pot and guide, a power takeoff for said turbine rotor, a housing surrounding said pot and a return passage extending from said rotor to said housing, said housing being closed except for said passage.

2. In a burner, turbine structure, a burner pot having a closed end and a circumferential side wall provided with a plurality of air inlet apertures, means for vaporizing a liquid fuel within said pot, a flame ring and a flame guide member adapted partly to close the otherwise open end of the pot, a turbine rotor rotatably mounted adjacent said pot and having buckets the line of movement of which extends into the path of delivery of flame and gases from said pot and guide, a power takeoff for said turbine rotor, a housing surrounding said pot and a return passage extending from said rotor to said housing, said housing being closed except for said passage.

3. In combination, a turbine wheel, a burner having a flame discharging aperture and an air supply aperture and a fuel supply, a flame guide extending from the air discharge aperture and enclosing a portion of the periphery of the turbine wheel, an air hood enclosing a portion of the periphery of the turbine wheel angularly spaced from that portion enclosed by the flame guide, an air passage joining the air hood and the air intake aperture of the burner, that portion of the periphery of the turbine wheel not enclosed by the guide and hood being exposed to the ambient atmosphere and being adapted to serve as an air intake for the turbine.

4. In combination, a turbine wheel, a burner having a flame discharging aperture and an air supply aperture and a fuel supply, a flame guide extending from the air discharge aperture and enclosing a portion of the periphery of the turbine wheel, an air hood enclosing a portion of the periphery of the turbine wheel angularly spaced from that portion enclosed by the flame guide, an air passage joining the air hood and the air intake aperture of the burner, that portion of the periphery of the turbine wheel not enclosed by the guide and hood being exposed to the ambient atmosphere and being adapted to serve as an air intake for the turbine, means for controlling the fuel supply for continuous combustion in the burner.

JAMES L. BREESE.

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