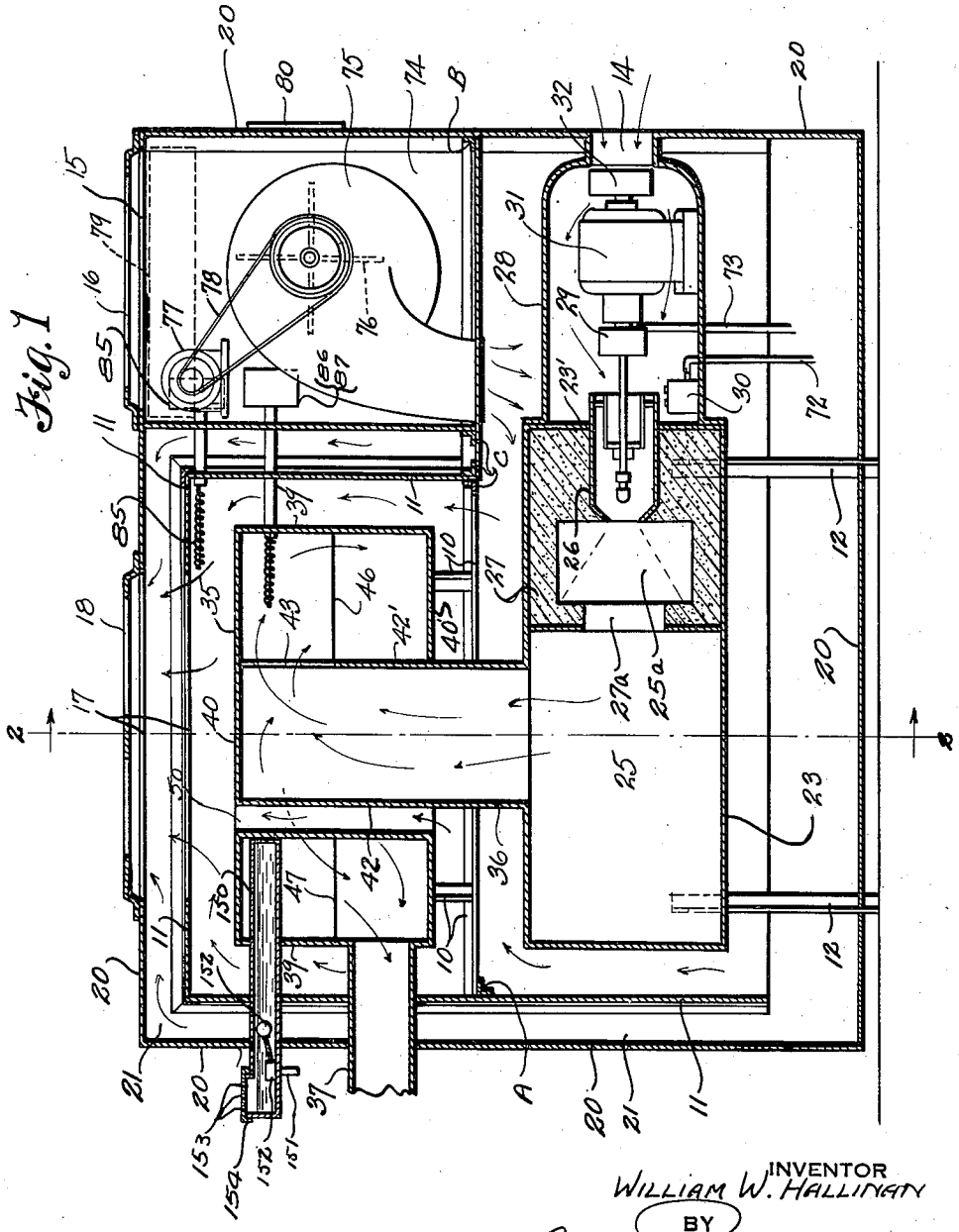
Jan. 20, 1942. W. W. HALLINAN 2,270,631

OIL BURNER

Filed May 1, 1939 2 Sheets-Sheet 1

Fig. 1



INVENTOR
WILLIAM W. HALLINAN
BY
Cook & Robinson
ATTORNEY

Jan. 20, 1942. W. W. HALLINAN 2,270,631

OIL BURNER

Filed May 1, 1939 2 Sheets-Sheet 2

Fig. 3

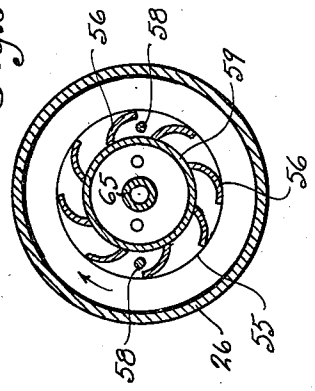


Fig. 5

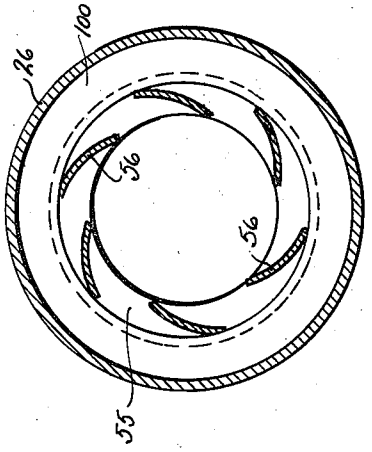


Fig. 2

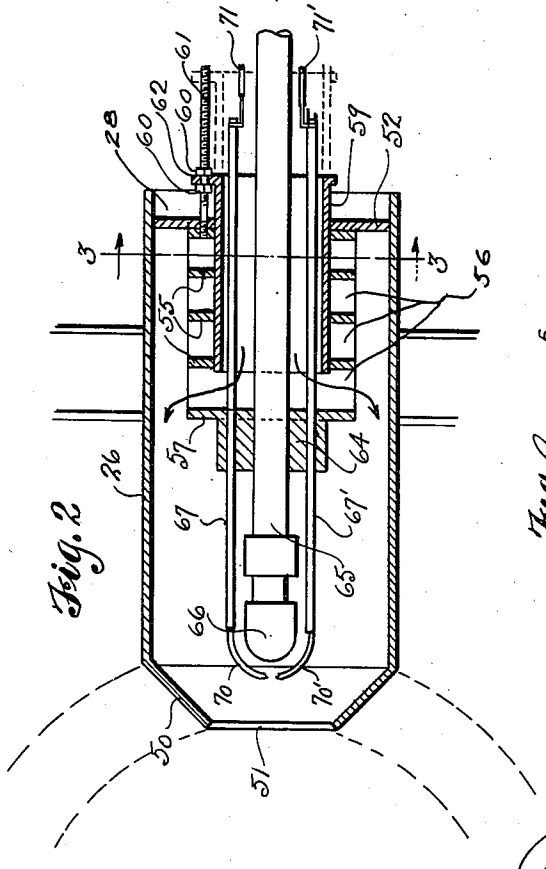
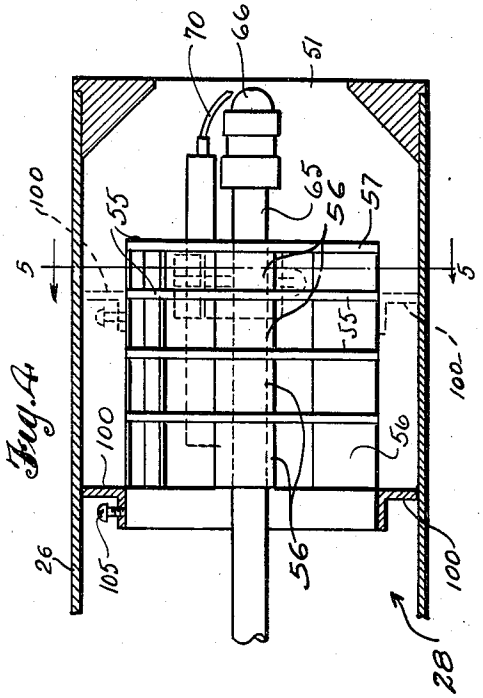


Fig. 4



INVENTOR
WILLIAM W. HALLINAN
BY
Cooke & Robinson ATTORNEY

Patented Jan. 20, 1942

2,270,631

UNITED STATES PATENT OFFICE

2,270,631

OIL BURNER

William W. Hallinan, Dowagiac, Mich.

Application May 1, 1939, Serial No. 270,967

7 Claims. (Cl. 158—1.5)

This invention relates to improvements in oil burners and has reference more particularly to burners of the pressure types using an electric motor as the operating means.

Explanatory to the invention, it will be stated that there are numerous air heating units now available on the market using various kinds of fuels, and designed for use either in the room or area to be heated, or to be operated in some place remote from this room or area, such as a basement or engine room. The main objections to the use of present-day heating units, especially in the rooms that are to be heated, are based on the danger of fire, the incident odors, lack of compactness and the unsightly appearance, especially where the various controls, filters, regulators and the like are exposed to view and high temperatures.

Another object of the invention is to provide a novel form of burner or combustion head, particularly with reference to air and fuel regulation.

Still further objects of the invention are to be found in the combination of parts, and mode of operation, as will be hereinafter fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a longitudinal section taken in a vertical plane centrally of a heater equipped with a burner embodying the present invention.

Fig. 2 is an enlarged, cross sectional view of the combustion head of the burner.

Fig. 3 is a vertical cross section of the burner mechanism as seen on the line 3—3 in Fig. 2.

Fig. 4 is a sectional view of a burner illustrating an alternative form of air control.

Fig. 5 is a cross section on line 5—5 in Fig. 4.

Referring more in detail to the drawings—

It will be noted that the heating system with which the present burner is shown, comprises an angle iron frame work or chassis, designated in its entirety by the reference numeral 10. This chassis is covered with thin metal sheets 11 to form an inner lining or casing, which is spot-welded together and to the chassis 10 to form a light, strongly constructed cabinet. Likewise, there is an outer casing or cabinet 20, similarly constructed of thin metal sheets, which is disposed outside the first casing, spaced somewhat therefrom to provide an air passage therebetween. The metal sheets which constitute this outer cabinet 20 are similarly spot-welded together in such manner as to make the joints substantially air-tight, and the cabinet is provided at the front with an opening 14 through which all the air that is used to facilitate combustion in the combustion chamber is drawn, as later will be fully described, and in the top wall, it has another opening 15 of substantial area covered by a grill 16, through which the cold or recirculated air is drawn into the housing for heating. Also, there are top openings 17 in both housings 11 and 20 covered by grills 18 through which the air, after being heated, is discharged into the room or area to be heated.

The outside sheet metal lining 20 that is spaced somewhat from the inside lining 11, provides therebetween an air space 21 which acts as an insulating means that prevents heat transfer to the outside of the cabinet, and it is contemplated that this space 21 may be filled with an insulating material such as asbestos wool or the like, should this be desired or found necessary.

Located within the lower part of the cabinet is a horizontally disposed, cylindrical drum 23 forming a combustion chamber 25, and extended into one end of this chamber through its end wall 23' is the burner or combustion head, designated in its entirety by the reference numeral 26; this burner being illustrated in enlarged detail in Figs. 6, 7, 8 and 9. It will be noted that the legs 12 are fixed to this cylindrical drum 23 which comprises the combustion chamber, and that these legs support the entire heating unit. The legs 12 may vary in their construction, in that they may be suitably braced for strength or may be insulated against heat transfer. A refractory lining 27 is applied within the drum to protect the wall of the combustion chamber at the end containing the burner against the intense heat generated at this location.

This refractory lining 27 forms a primary combustion chamber 25a provided with a restricted opening 27a, leading into the secondary combustion chamber 25. The combustion or burning of the oil fuel will initially take place in this chamber 25a, and will be completed in the secondary chamber 25 and the passage 36. This provides for or accomplishes a more complete and efficient combustion; the refractory lining 27 serving as a protection against the extreme heat of combustion, and the drum 23, the passage 36 and the radiator 35 will conduct the heat from the hot gases of combustion to the air circulating thereabout within the cabinet.

A closed housing 28 is fixed to the burner end of the drum as an extension thereof which houses

therein a fuel pump 29, an ignition transformer 30 and an electric motor 31 which, by direct connection, drives the pump and also drives an air fan 32 that is located adjacent the fresh air inlet 14 and operates to intake outside air and to forcibly deliver it to the burner for facilitating fuel combustion. In the preferred arrangement, as shown in Fig. 1, the motor is in coaxial alinement with the burner and its driving shaft has the fan 32 mounted on one end thereof in registration with the housing opening 14 and its other end has direct connection with the pump.

Located in the housing directly below the openings 17 and spaced somewhat above the drum 23 and combustion chamber 25 is a radiator 35, and this is connected to the combustion chamber by a vertical, tubular pipe 36 providing a connecting delivery passage for gases of combustion.

The combustion head, illustrated best in Fig. 2, comprises a cylindrical, air blast nozzle 26 which, at its inner end, tapers abruptly to a rather restricted opening 51. This end of the nozzle extends through the right-hand end wall of the drum 23, as seen in Fig. 1, into the combustion chamber. Fitted in the outer end portion of the nozzle or casing 26, a short distance inward from the outer end, is an annular closure plate 52, which mounts thereon, and within the nozzle, a tubular air directing structure comprising a series of parallel, coaxial annular disks 55, spaced apart by air directing vanes or deflectors 56, as noted in Fig. 3, whereby the incoming air is caused to enter the tube 26 in such direction as to whirl about the axis of the nozzle and form a hollow cylindrical tube of whirling air which will be discharged from the end of the tube through opening 51 in hollow conical form. This air directing structure is of cylindrical or tubular form and is closed at its inner end by a closure plate 57. The structure, considered as a unit, is disposed coaxially of the nozzle casing 26 and is fixedly supported from the annular plate 52 by a plurality of bolts 58 extending from end to end of the structure and through the wall 52.

Slidably contained within the tubular structure formed by the disks 55 and spacing vanes 56, is a longitudinally adjustable sleeve 59, adapted to be slid inwardly or outwardly to restrict the inflow of air to more or less of the passages provided between the spaced disks 55. This sleeve extends beyond the plate 52 at its outer end and opens into housing 28, and it is adapted to be locked at any selected position of adjustment by the setting of nuts 60—60 on a bolt 61, which is fixed to the plate 52 and extends through an ear 62 that projects from the outer end of sleeve 59. It will be understood that by moving this sleeve inwardly or outwardly, more or fewer of the passages between the annular plates or disks 55 will be uncovered.

Mounted centrally of the closure plate 57 at the inner end of the air delivery structure is a bushing 64, through which a fuel supply pipe 65 extends. This pipe is disposed centrally of the housing 26 and, at its outer end, is connected to the fuel pump 29, and at its inner end, which terminates just within the outlet 51, is provided with an atomizer tip 66 that causes the fuel oil to be discharged in a conical spray through the opening 51 into the combustion chamber.

Also mounted by the bushing 64 along opposite sides of the pipe 65 as noted in Fig. 2, are two conduits 67 and 67', which terminate just beyond the atomizer tip 66 in spaced relationship. These conduits also extend longitudinally of the adjustable sleeve 59 beyond its outer end. These two conduits contain electric circuit wires provided at their inner ends with electrode tips 70 and 70' which are so formed and so disposed as to have their outer ends in close proximity to each other, and to be within the spray of fuel oil from nozzle 66. At their outer ends, the circuit wires are connected to the ignition transformer 30 by wires 71 and 71'. A circuit wire 72 leads from the ignition transformer 30 for connection to any convenient source of current, not shown. Furthermore, a fuel supply pipe 73 extends to the fuel pump 29 from a source of supply, not herein shown.

In Fig. 4, I have illustrated an alternative structure and modification of the air control adjustment. In this device, the arrangement in general is like that of the burner shown in Fig. 2, and parts that are the same bear like reference numerals. The burner comprises the tube 26 with restricted inner end opening 51; however, the air turbulator unit of cylindrical form, made up by the spaced annular disks 55 and spacers, has a ring 100 fitted thereto and within tube 26 to regulate air inflow from the housing 28 into the combustion head 26. When disposed in the full line position of this figure, all openings are made effective for the delivery of air into the tube 26, while, if adjusted to the dotted line position, only the annular passage nearest to the burner tip is used.

Adjustment is held by means of one or more set screws 105 through the flange of the ring 100.

It is to be noted in this design also that the spaces between the disks 55 increase from the inner end of the device outwardly.

Assuming the unit to be so constructed, its use and mode of operation would be as follows:

With the motor 77 operating to drive the fan 76, air will be drawn thereby into the cold air receiving chamber 75 and discharged from the fan casing about the drum 23 and combustion chamber 25, from where it circulates upwardly about and through the radiator 35, and is discharged through the openings 17 into the room or area to be heated. With the motor 31 operating to drive the fuel pump 29 and the fan 32, fuel will be drawn into the pump and discharged through the tube 65 and sprayed into the combustion chamber 25A. The air drawn into the air supply chamber 28 by the fan 32, will be forced into the combustion head, the plates 55 acting to direct the air into the combustion head 26 in a direction perpendicular to its line of travel through the sleeve 59, and the vanes 56 are so disposed as to cause the air thus delivered to be given a rotary or swirling motion. This forms a hollow rotating stream of air inside the casing 26, which is discharged into the combustion chamber, mixing and combining with the cone shaped oil spray from the atomizer.

It will here be stated that to initiate combustion, the switch 87 in the ignition and motor circuit is closed, causing an electrical spark between the electrode tips 70—70' to ignite the fuel. With combustion taking place, the resulting hot gases circulate within the combustion chamber 25 and upwardly through the passage 36 to the radiator. Arrows are used in Fig. 1 of the drawings to indicate the travel of these gases through the radiator to the flue pipe 37

which connects to a suitable chimney, not herein illustrated.

It is contemplated as a feature of this burner that, should the flow of fuel to the combustion head be controlled either by regulating the speed of the motor 31 which operates the fuel pump 29, or manually by restricting the flow of fuel in the pipe 13 to the pump, the sleeve 59 be set accordingly to restrict or open more or less of the spaces between the plates 56 to the flow of air into the combustion head. That is, if one gallon of fuel oil is to be burned per hour, the sleeve will open the first space between the inner set of plates 55 to allow the flow of air therethrough, and if two gallons of fuel oil are to be burned per hour, the first two spaces will be uncovered by the sleeve 59 or opened to the flow of air therethrough, and so forth.

A further advantage is the fact that the housing 28 which contains the motor 31, the fuel pump 29 and the ignition transformer, directly underlies the exhaust of the fan 16, and is thereby cooled to a great extent by this stream of cold air; also the air that is drawn into the housing 28 through opening 14 by the fan 32, serves to cool the motor 31 and fuel pump 29.

It is thought that the construction and operation of the burner has been made clear in the foregoing, and that the most salient features and advantages have been pointed out. However, further advantages lie in the simple and economical construction of the device, its strength and durability, and especially the increased efficiency of the burner head that is due to its particular construction.

It is not desired that the appended claims be limited only to the details of construction herein illustrated, but that they be given an interpretation commensurate with the spirit and scope of the invention that is disclosed.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is—

1. A burner of the character described, comprising an air blast tube, fuel delivery means located in the tube, a closure in the outer end of the tube having an opening, and an air turbulator means in the tube comprising a cylindrical hollow body of lesser diameter than the air blast tube and disposed coaxially therein and extending from the closure toward the discharge end of the tube; said cylindrical body being closed at one end and having a plurality of lateral outlets spaced longitudinally thereof, and an open-ended sleeve communicating with a source of air under pressure extended through the opening of the closure and telescopically fitted within the turbulator body, and adjustable longitudinally thereof to uncover or cover the lateral outlets for determining the extent of air delivery from said sleeve.

2. A burner as recited in claim 1, wherein the lateral outlets of the air turbulator body are defined by a plurality of annular disks in spaced relationship lengthwise of the body.

3. A burner as recited in claim 1 wherein the turbulator body comprises a plurality of annular disks of equal diameter, coaxially disposed in parallel spaced relationship along the body and having the said sleeve longitudinally adjustable therein, and wherein the lateral air delivery outlets are defined by the spaces between the disks, and vanes are disposed between the disks for directing the discharged air toward a plane tangential to the disks, to induce whirling of the air stream in its delivery along and from the air blast tube.

4. A burner of the character described, comprising a cylindrical air blast tube conically tapered to a restricted discharge opening at its discharge end, a nozzle for discharge of atomized fuel into the air stream located in the tube near its discharge end, a closure plate fitted to the inlet end of the tube having a central opening and an air turbulator means located in the tube comprising a hollow cylindrical body of lesser diameter than the air blast tube to provide an annular air passage between them, extending from registration at one end with the central opening of the closure plate toward the discharge end of the tube; said cylindrical body being closed at one end and comprising a plurality of annular disks of equal diameter, coaxially disposed in parallel, spaced relationship along the body and defining lateral air delivery passages between them, a sleeve open at its ends, extending through said closure plate opening into said body and telescopically adjustable therein to cover or uncover said lateral passages, and vanes located between said disks in said passages to divert the discharged air toward a plane tangential to the disks, to set up a whirling action of air in its flow along the tube and from the restricted discharge opening.

5. A burner of the character described comprising a cylindrical air blast tube open at its outer end for reception of air under pressure and having an inner end opening for the delivery of fuel mixture, fuel delivery means located in the tube and an air turbulator means in the tube comprising a cylindrical body of lesser diameter than the air blast tube, open at its outer end and closed at its inner end, and formed with a plurality of air delivery passages opening laterally therefrom and spaced along the tube and a collar fitted about the cylindrical body as a closure between the body and the blast tube, and adjustable longitudinally of the body across said lateral openings.

6. A device as in claim 5, wherein air deflecting vanes are associated with the lateral passages of the body to divert the discharged air toward a plane tangential thereto to induce whirling of the air stream along and from the blast tube.

7. A burner of the character described comprising an air blast tube, fuel delivery means located in the tube, an air turbulator means disposed in the tube and comprising a cylindrical, hollow body of lesser diameter than the air blast tube, disposed co-axially therein and communicating at its outer end with a source of air under pressure; said turbulator body having a plurality of lateral outlets spaced longitudinally thereof, and a blast regulating means adjustable along the turbulator body to progressively increase or decrease the number of outlets through which the air under pressure is permitted to flow to the blast tube.

WILLIAM W. HALLINAN.