Feb. 20, 1940. L. C. CHADIMA ET AL 2,191,272

FLUID FUEL BURNER

Filed June 27, 1938 2 Sheets-Sheet 1

Fig. 1

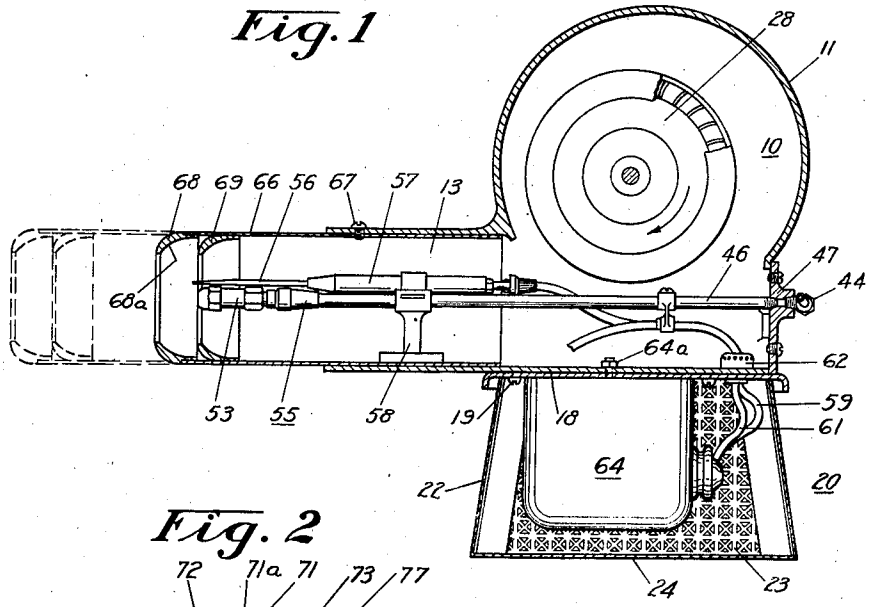


Fig. 2

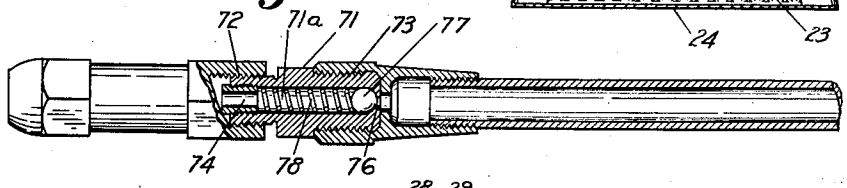
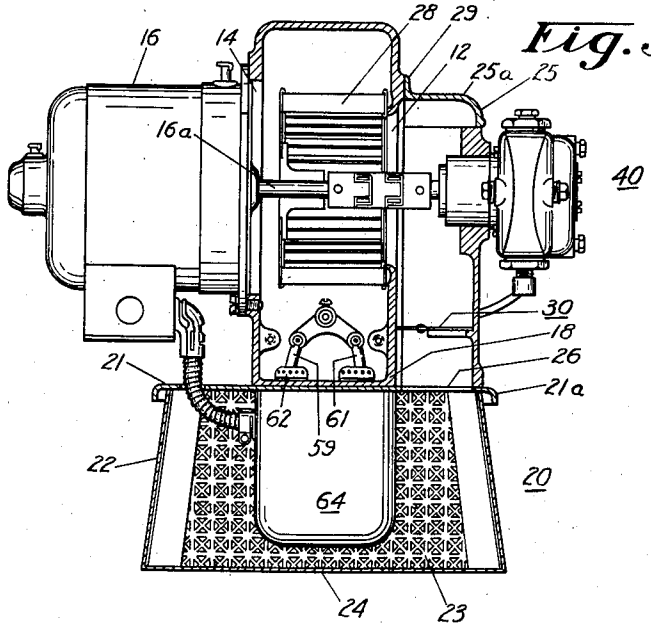


Fig. 3



INVENTORS:
LESTER C. CHADIMA
ROBERT C. ILTEN
ERVIN L. JOHNSON

BY Flournoy Corey
ATTORNEY

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Fig. 4

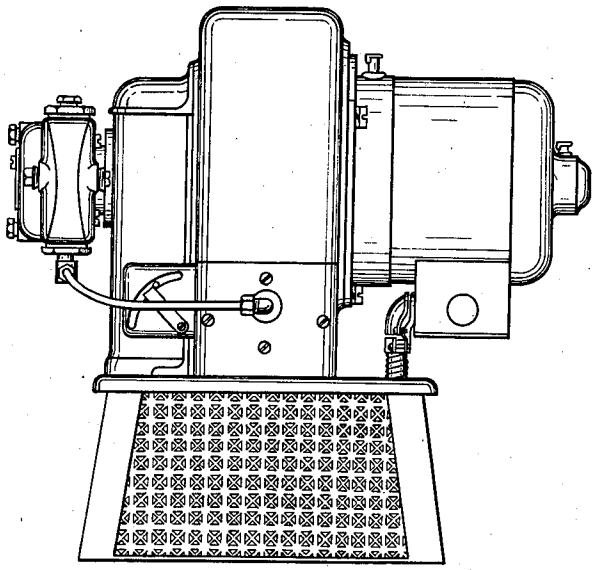


Fig. 5

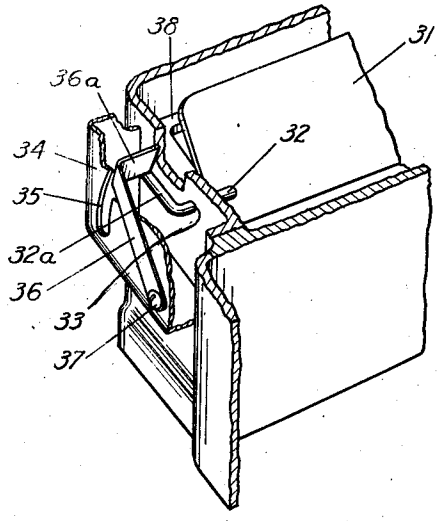
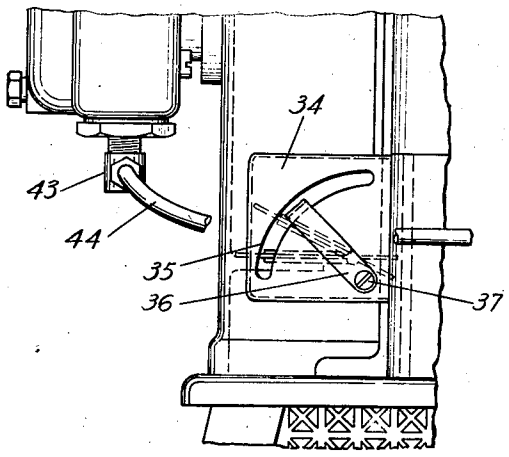


Fig. 6



INVENTORS.
LESTER C. CHADIMA
ROBERT C. ILTEN
ERVIN L. JOHNSON
BY
Flournoy Corey
ATTORNEY.

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2,191,272

FLUID FUEL BURNER

Lester C. Chadima, Robert C. Ilten, and Ervin L. Johnson, Cedar Rapids, Iowa, assignors to Hubbard Ice and Fuel Company, Cedar Rapids, Iowa, a corporation of Iowa

Application June 27, 1938, Serial No. 216,166

3 Claims. (Cl. 230—114)

This invention relates to improvements in oil burners, and particularly to the so-called gun type of oil burner.

Oil burners on the market today, especially the gun type designed and built for domestic heating, have certain deficiencies which it is an object of our invention to correct.

Some of these shortcomings are noticeable during the installation of the burner and become apparent during installation of the burner. Other of these shortcomings are noticeable during the operation of the burner and frequently years after the burner has been installed.

Oil burners, especially that type adapted for domestic use, must be installed in a great variety of types and sizes of heating plants. It has been the practice in the past to make it possible to adapt a given burner to a wide variety of applications by providing either an exceptionally long draft tube or a detachable draft tube available in a number of lengths. Either of these methods has its drawbacks. The oil burner having a long draft tube, when used in making an installation actually requiring a short tube, extends well out in front of the burner or boiler, thus taking up considerable space.

Oil burners using detachable draft tubes make it necessary that a stock of various sized tubes be kept on hand by the oil burner dealer. Otherwise a special size must be ordered from the factory each time an installation is made.

It is, therefore, one of the objects of our invention to provide an oil burner having an extensible draft tube whereby any given burner may be accommodated to the construction of or the conditions found in any installation.

Such an extensible draft tube makes it preferable that ignition leads be furnished which are long enough for use with the draft tube in its maximum extended position, and it is, therefore, another object of our invention to provide a base in which the excess ignition cable may be coiled up. The ignition cable must otherwise be cut to fit each individual job, or must be stored in the draft tube where it, of course, interferes with and obstructs the passage of air.

It is still another object of our invention to provide a base in which the ignition transformer may be concealed and protected from mechanical injury and to provide means for cooling of the transformer by air being drawn into the blower.

It is a further object of our invention to provide a means in such a base for filtering the air entering the blower to prevent the larger portion of lint and dust in the air from accumulating in the vanes of the blower wheel, blast tube and around and on the electrodes.

It is a still further object of our invention to provide such a filtering means of a capacity large enough that a season's accumulation of lint and dust will not materially decrease the volume of air necessary for proper combustion or such volume of air as is determined by the setting of the air intake valve.

It is a further object of our invention to provide a safeguard in the form of an auxiliary nozzle shut-off valve. This auxiliary nozzle shut-off serves several purposes. It ordinarily will prevent the dribbling of oil into the fire box or combustion chamber after the burner has shut down due to the expansion from the heat of any air trapped in the oil line. It also helps to prevent pulsations and explosions, after the burner is shut down.

Furthermore, our auxiliary nozzle shut-off is an added safeguard in the event that the pressure regulating valve shut-off fails to close tightly when a burner shuts down. In such a case our valve prevents oil from passing through the regular valve and into the furnace by reason of the pressure of the oil in the oil supply line.

By preventing dribbling of oil into the fire pot after the burner has been shut down and by providing a quick, sharp cut-off, our valve will act to prevent the accumulation of carbon on the nozzle and on the tips of the electrodes, thereby helping to prevent late ignition and resulting explosions.

It is a further object of our invention to provide a mixing head employing two combustion rings at the outer end of the draft tube of an oil burner. Such a mixing head is particularly suitable for use with nozzles of a small out-put. Our construction of a combustion head permits a more intimate mixture of the supply of air and oil vapor when the oil out-put is small.

It is an acknowledged fact in the heating industry, and one easily understood, that air passing through an intermittently fired heating plant during an off period will absorb and carry off a large amount of the heat remaining in the heating plant.

After a heating plant, including the chimney, has been thoroughly warmed up, a large quantity of air will pass through the plant and out the chimney due to natural draft, and as long as there is any heat present in the furnace. The temperature of all of this air is raised as it passes through the furnace and over the heated surfaces, and the residual heat of the plant is lost.

It is, therefore, an object of our invention to prevent the circulation of air through the burner and the heating plant during the "off" periods of the burner.

It is a further object of our invention to supply an air intake valve which will not only serve to close the air intake during the "off" period, but which may be adjusted to regulate the maximum amount of air permitted to pass through the burner.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawings and following specifications, wherein is disclosed a single exemplary embodiment of the invention, with the understanding, however, that such changes may be made therein as fall within the scope of the appended claims, without departing from the spirit of the invention.

In the drawings:

Figure 1 is a view partly in elevation and partly in section of an oil burner constructed according to one embodiment of our invention.

Figure 2 is a view partly in elevation and partly in section illustrating a nozzle shut-off valve constructed according to our invention.

Figure 3 is an elevational view, partly in section, illustrating the burner shown in Figure 1 as viewed from the draft tube end.

Figure 4 is a view in elevation of the oil burner shown in Figures 1 and 3 as viewed from the rear.

Figure 5 is a detailed view in perspective, partly in section, illustrating an air shutter valve and adjustment means constructed according to our invention, and

Figure 6 is a view in elevation illustrating the shutter valve and adjustment means shown in Figure 5.

Referring now to the drawings:

We have shown in Figures 1, 3 and 4 the application of our invention to an oil burner. The burner is otherwise of standard construction and includes a blower housing **10** having an inlet opening **12**, an outlet opening **13**, a blower wheel **28**, a motor **16** mounted on the side of the blower housing, and a flange mounted pump unit **40**. The pump is aligned with the motor shaft **16***a* and is driven by the motor along with the blower wheel.

The blower housing **10** is supplied with a flattened portion, as indicated at **18**. This flattened surface of the blower housing is attached by means, such as screws **19**, to a pedestal or base member, indicated generally at **20**. This base may comprise a single casting including a top and legs with inserted perforated side panels, or the base may be built up of sheet metal with the top of sheet metal preferably rolled at the edges, as indicated at **21***a*, and angle iron legs **22** electrically welded or otherwise attached to the top member **21**. The side and end walls **23** are preferably made of an ornamental perforated sheet metal such as that illustrated, and may be held in place against the inner surfaces of the legs by means such as spot welding or riveting. A bottom plate **24** may be supplied if desired, but this is not necessary.

A shutter housing, indicated generally at **25**, is attached to the side of the blower housing over the air intake opening by means such as bolts (not shown). This shutter housing **25** is open at the bottom. The side walls project downwardly as shown in Figures 3 and 4, and about the top surface of the pedestal cover. The open bottom of this air shutter coincides with an opening **26** in the top of this pedestal cover, permitting air to enter the base through the perforated side panels or grills **23**. The air is then drawn up through the opening **26** in the pedestal cover, through the air shutter housing, through the air intake opening **12**, and into the blower wheel by which it is expelled through the outlet opening **13** of the blower housing. An air shutter, indicated generally at **30**, regulates the volume of air drawn through this air shutter housing.

The shutter housing may, of course, be cast integral with the blower housing. If this is done, it is preferable that a removable cover **25***a* be supplied to permit easy access to the fan to permit cleaning.

The pump unit **40** is preferably of the combination type comprising a strainer unit, a pumping unit, a pressure regulating and cut-off valve, and of course inlet and return openings, none of which are indicated in any particular manner. The nozzle outlet opening **43** is connected by means of pipe fitting and tubing indicated at **44** to a nozzle pipe **46**.

We have provided a removable inspection plate **47** at the lower portion and back side of the blower housing through the center of which the oil tube **46** enters the draft tube.

The oil pipe **46** is supplied at its inner end with a nozzle **53** and an auxiliary shut-off valve indicated generally at **55**. This shut-off valve will be described in more detail hereafter.

An ignition assembly is supported by the oil pipe in accordance with standard practice and includes ignition points **56**, insulating supporting sleeves **57**, and a supporting member **58**.

Ignition cables **59** and **61** are connected to the electrodes by means of spring clips and are inserted through insulated bushings **62** in the flattened portion of the blower housing into the base portion where they connect with the terminals of a transformer **64**. The transformer may be supported within the base by screws and nuts **64***a*.

The outlet opening **13** of the blower housing is provided with a smooth bore to permit a tube member **66** to be moved in or out as desired. The tube **66** may be held in any desired position by means such as screws, as indicated at **67**.

We have provided, in the end of this extensible draft tube, a combustion head **68** curved inwardly, as indicated at **68***a*, to direct the blast of air inwardly and across the path of the oil spray emerging from the nozzle. We have also provided an auxiliary ring **69** in a form similar to the combustion head **68**. This ring, however, is of a size to permit it to slide inside the tube **66**. This combustion ring is held in the tube by means of screws or rivets (not shown) and in a position spaced about one inch inside the outer combustion head.

The inner ring is preferably utilized only when nozzles of small capacity are used in the burner, as in a small heating plant. The dual combustion rings serve to create a turbulence of the air and the oil spray, that causes them to mix thoroughly.

The air shutter housing and shutter means is shown in detail in Figures 5 and 6. The shutter plate **31** is of a shape to fit in a horizontal position within the shutter housing at a point as shown in Figure 3. This plate is pivotally mounted off-center on a shaft **32**, which is mounted in a hole **33** in the wall of the shutter housing. A similar shaft is provided on the opposite end

of the shutter plate. It is preferable that this shaft be fastened to the shutter plate by means such as screws to permit removal if necessary. The shaft **32** extends beyond the outer surface of the shutter housing and is bent over a right angles and substantially parallel with the shutter plate, as shown at **32***a*.

An adjustable shutter stop in the form of a strap member **36** is provided with an inwardly extending portion **36***a* against which the lever arm **32***a* comes to rest as the shutter is drawn open by the suction of the blower each time the burner is started. This adjustable stop **36** is pivoted, as at **37**, by a means such as a screw.

This adjustable stop may be pivoted directly on the outer surface of the shutter housing, but is preferably supported by a separate member **34**. A slotted hole is supplied in this member, through which the inwardly extending portion **36***a* of the adjustable stop may extend. It is apparent that this stop member may be rotated about its pivotal point, and held in any position by tightening down on the screw **37**, thereby permitting the maximum amount of opening of the shutter to be regulated as desired.

The shutter **31** is located on its pivotal shaft **32** in an off-center position as before stated, so that the weight of the shutter normally causes it to close when the blower is inoperative. The shutter plate closes against a rib **38** extending inwardly from the side of the shutter housing and forms a comparatively tight joint.

Referring now to Figure 2 illustrating our nozzle shut-off valve, the valve there shown comprises a main body portion **71** threaded at both ends to permit connection with the oil pipe at one end and the nozzle at the other end. The body portion is provided with a bore **71***a* extending from end to end. The wall of the bore is threaded at one end to receive a threaded tubular member **74** and is formed with a restricted portion at the other end to form a seat for a ball member **77**. A spring **78** extends between the tubular member **74** and the ball **77** to hold the ball in place against the seat. The spring is of such a design and the tubular member is screwed into the threaded portion of the bore so as to exert a pressure of approximately 20 pounds per square inch on the ball. As the oil pump is energized and the pressure reaches 20 pounds per square inch or over, the ball will be lifted, against the spring pressure and off the seat, and will permit oil to pass the ball and enter the nozzle.

It is apparent that we have provided an improved oil burner which is simple in construction and positive of action, and provides for easier installation and service and improved operation of the oil burner.

Although we have described a specific embodiment of our invention, it is apparent that modifications thereof may be made by those skilled in the art. Such modifications may be made without departing from the spirit and scope of our invention as set forth in the appended claims.

We claim as our invention:

1. In a blower having an intake housing, a shutter plate within the housing, a means of pivoting the air shutter, said shutter balanced to open due to the suction of the blower and to close due to its own weight when the blower is de-energized, the pivotal means comprising a shaft extending through an opening in the side of the housing and bent over in the form of a lever arm, and a means of adjustably limiting the opening of the shutter plate comprising a limiting arm pivoted to the housing and bearing against the lever arm.

2. In a blower having an intake housing, a sealing and regulating means within the housing comprising a shutter plate pivotally balanced so as to open only under the suction of the blower, a shaft on which the shutter is pivoted projecting through the side of the housing and bent at right angles to form an operating lever arm, and a means for limiting the motion of this arm comprising a strap member pivoted at one end to the housing, the other end of same bearing against the lever arm.

3. In a blower having an air intake housing, a sealing means in the housing including a shutter pivotally mounted therein, a shaft on which the shutter is mounted projecting outwardly beyond the shutter housing, an angular extension on the shaft, and an adjustable stop, one end being pivotally mounted on the shutter housing and the other end bearing against the angularly extended shaft, said shutter mounted in an off-center position so as to close the air intake when the blower is inoperative and open due to suction of the blower.

LESTER C. CHADIMA.
ROBERT C. ILTEN.
ERVIN L. JOHNSON.