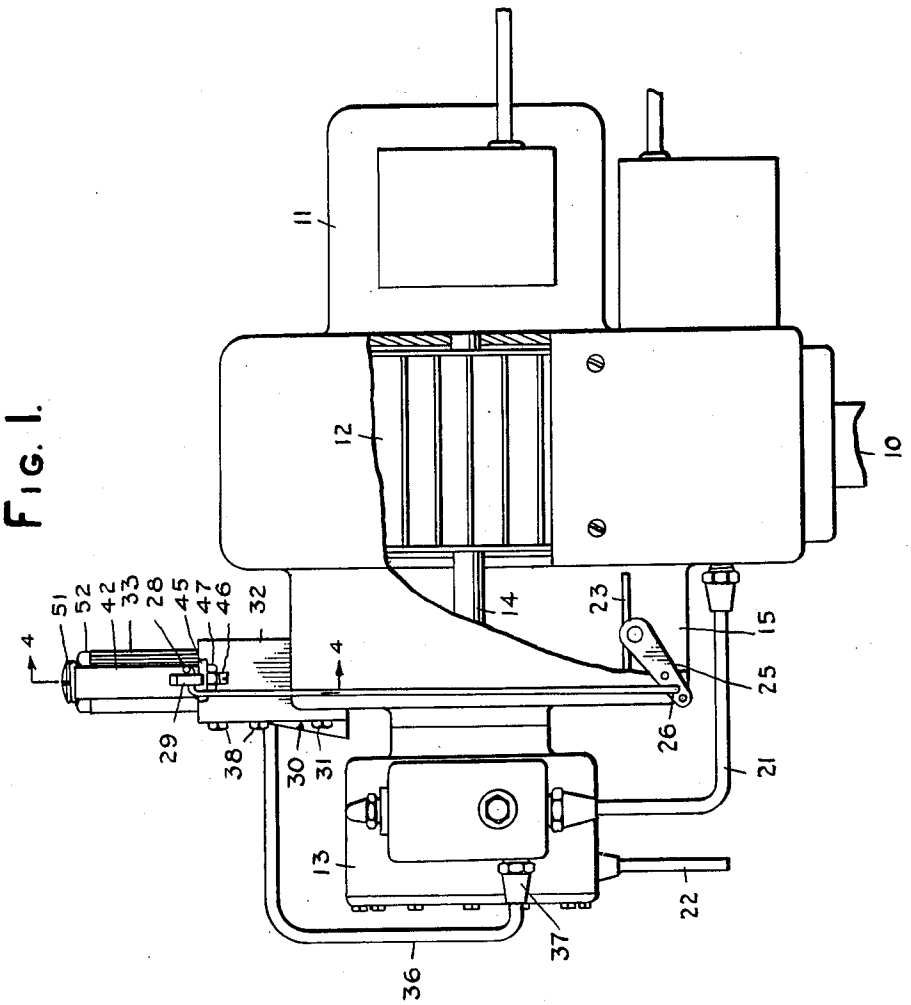
Feb. 22, 1955 M. F. GAMBLE 2,702,589

OIL PRESSURE OPERATED DRAFT CONTROL FOR OIL BURNERS

Filed March 25, 1952 2 Sheets-Sheet 1

FIG. 1.



INVENTOR
M. F. GAMBLE

BY

ATTORNEY

Feb. 22, 1955 M. F. GAMBLE 2,702,589

OIL PRESSURE OPERATED DRAFT CONTROL FOR OIL BURNERS

Filed March 25, 1952 2 Sheets-Sheet 2

FIG. 2.

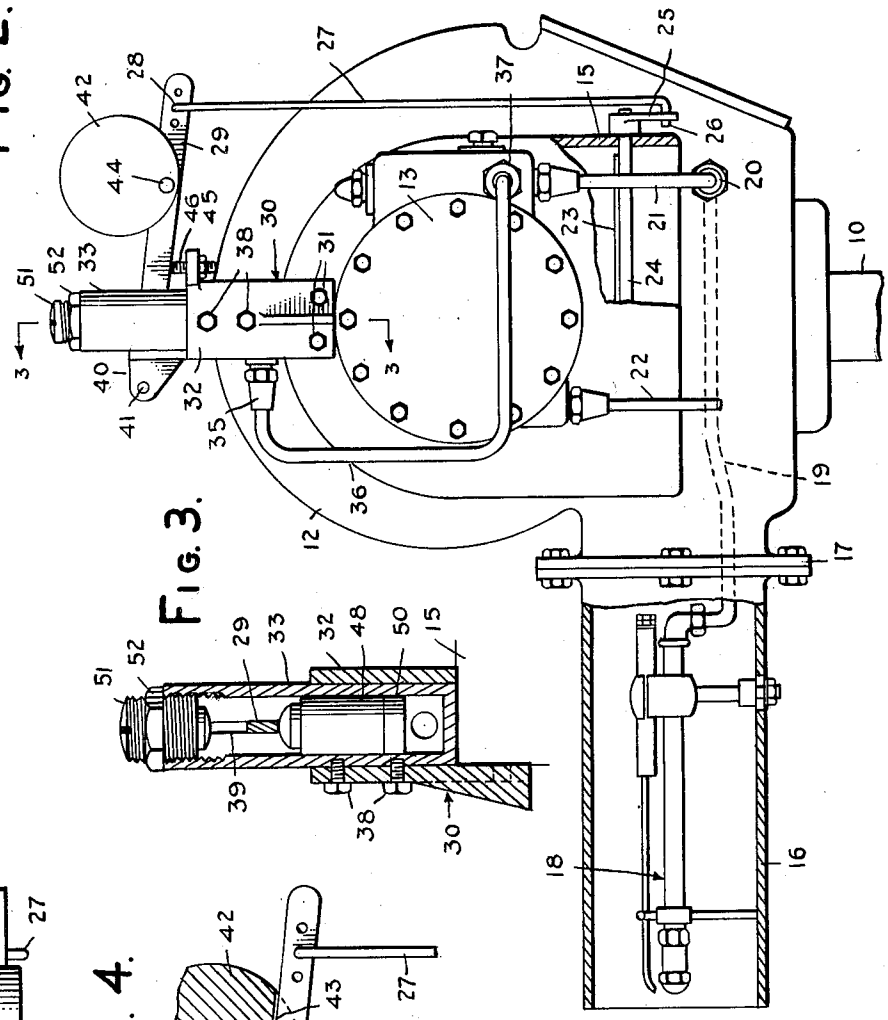


FIG. 3.

FIG. 5.

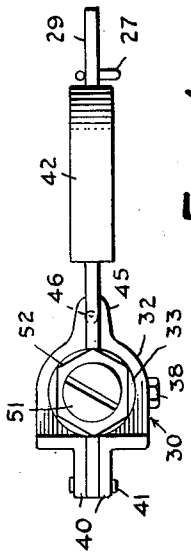
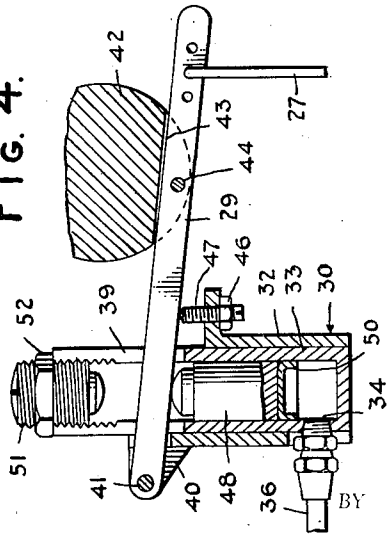


FIG. 4.



INVENTOR
M. F. GAMBLE

BY

ATTORNEY

United States Patent Office 2,702,589 Patented Feb. 22, 1955

2,702,589

OIL PRESSURE OPERATED DRAFT CONTROL FOR OIL BURNERS

Morgan F. Gamble, Winston-Salem, N. C.

Application March 25, 1952, Serial No. 278,383

4 Claims. (Cl. 158—28)

My invention relates to oil burners.

An important object of the invention is to provide a positively operated automatic draft control device for oil burners which will admit air to the burner fan while the oil burner is in operation, and which will prevent air from circulating through the fire box of the furnace while the oil burner is inoperative.

A further object is to provide a control device of the above-mentioned character which may be readily installed on oil burners presently in use, or built into new oil burners as an integral part of the same.

A further object is to provide draft control apparatus for oil burners which is actuated by oil pressure from the oil pump of the burner, the apparatus being positive in operation and adjustable to limit the extent of opening and closing of the air passage to the fan of the burner.

A further object is to provide draft control means of the above-mentioned character which will prevent cooling of the furnace fire box while the oil burner is not running and thereby save the fuel necessary to heat the fire box when the burner is again started, as would be the case if cool air were allowed to flow into the fire box while the oil burner is idle.

A still further object of the invention is to provide oil burner draft control means which are reliable and efficient in operation, and quite inexpensive to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is an end elevation of an oil burner embodying my invention, part broken away and part in section,

Figure 2 is a side elevation of the oil burner, part broken away and part in section,

Figure 3 is an enlarged fragmentary vertical section on line 3—3 of Figure 2, parts omitted.

Figure 4 is a similar section on line 4—4 of Figure 1, parts omitted, and,

Figure 5 is a fragmentary plan view of the device, as shown in Figure 4.

In the drawings, where for the purpose of illustration is shown a preferred embodiment of my invention, the numeral **10** designates a portion of the base or pedestal of a gun type oil burner comprising an electric motor **11**, fan or blower **12**, and a fuel pump and pressure regulator **13**, as shown. The motor **11**, blower **12** and pump **13** have a common shaft **14**. The fan has a downwardly opening air inlet sleeve or casing **15** integrally secured thereto at one side of the fan and arranged between the rotor housing of the fan and the pump, as shown. The parts thus far described constitute an integral unit supported by the base or pedestal **10**.

A horizontal air blast tube or sleeve **16** is bolted to a flange **17** formed upon one side of the fan housing, and the tube **16** receives the blast of air produced by the fan **12**. A nozzle and igniter assembly **18** of the type shown in United States Patent 2,330,191 is rigidly mounted within the tube **16**, as shown. A fuel supply pipe **19** has one end connected with the nozzle and its other end connected through a fitting or nipple **20** with a pipe **21**, leading to the outlet side of the

pump **13**. A suitable fuel supply pipe **22** is connected with the intake side of the pump **13** to supply the same with oil or the like from a suitable source.

The construction thus far described is that of a conventional gun type oil burner, the construction and operation of which are well known.

I provide means responsive to the starting and stopping of the oil burner to regulate the passage of air into the bottom of the housing **15**. Such means comprises a butterfly valve or plate **23**, rigidly secured to a rock shaft **24** having its ends journalled upon the sides of the housing **15** near and above the lower end of the same. The butterfly valve **23** extends entirely across the housing **15** and is adapted to substantially entirely close or block off the opening in the bottom of the housing, when arranged in the horizontal position shown in Figure 1.

A crank arm **25** is rigidly secured to the forward end of the rock shaft **24**, exteriorly of the housing **15** and this crank arm is connected at **26** with the lower end of a substantially vertical operating rod **27**, having its upper end connected at **28** to the forward end of a vertically swingable lever **29**.

A mounting bracket **30** is bolted at **31** to the end of the housing **15**, near the top of the housing and this mounting bracket includes a vertical sleeve portion **32**, integral therewith and receiving therein a vertical cylinder or barrel **33**. A fitting or nipple **34** is connected in the lower end of the cylinder **33**, and further connected with a coupling **35** of a pipe **36**, the other end of which is connected at **37** to the fuel pump **13**. The lower end of the cylinder **33** may rest upon the top of the housing **15**, as shown, and the fitting **34** may serve to hold the cylinder **33** against vertical displacement and turning relative to the sleeve **32**. Additional screws **38** may be provided for further rigidly connecting the cylinder **33** and bracket **30**. The screw threaded openings in the cylinder **33** for the screws **38** do not break into the bore of the cylinder **33**, so that there is no leakage of oil from the cylinder at the screws **38**.

The cylinder **33** extends above the top of the sleeve portion **32** for a substantial distance, and is provided in its upper end with a vertical slot **39** receiving the vertically swinging lever **29**. Spaced ears or lugs **40** are integrally formed upon the top of the sleeve portion **32**, at the rear side of the same, and the rear end of the lever **29** is pivotally connected at **41** between the ears **40**, as shown. A weight **42** is carried by the pivoted lever **29** near its forward end, and this weight is provided in its bottom with a slot **43** receiving the lever **29** which is pinned or bolted to the weight at **44**. An integral extension or lug **45** is formed upon the top of the sleeve portion **32** at its forward side, and this lug carries a vertically adjustable screw stop **46** having a lock nut **47**. The weight **42** urges the pivoted lever downwardly, and the screw stop **46** contacts the bottom of the lever **29** to limit its downward swinging movement.

I prefer to adjust the screw stop **46** so that when the oil burner is idle, the butterfly valve **23** will be in the horizontal position shown in Figure 1 for completely closing the entrance to the casing **15**.

A piston **48** is mounted within the cylinder **33** for reciprocation below the lever **29**, and the lower end of this piston carries a suitable sealing ring **50**, as shown. The top end of the piston **48** contacts the bottom of the lever **29** to urge the same upwardly when oil under pressure enters the lower end of the cylinder **33** from the pipe **36**.

The upper end of the cylinder **33** is internally screw threaded for the reception of an adjustable screw plug **51**, carrying a lock nut **52**. The adjustable screw plug **51** contacts the lever **29** to limit its upward swinging movement, responsive to upward movement of the piston **48**, and this, in turn limits the extent of opening of the butterfly valve **23**. By adjusting the screw plug **51**, the butterfly valve **23** may be adjusted to entirely open or partially open the air passage into the casing **15** and blower.

In operation, whenever the oil burner is started by

starting the electric motor 11, the blower 12 and fuel pump 13 are likewise started, since they are connected with the motor by the common shaft 14. The pump 13 will begin to pump fuel oil to the nozzle and igniter assembly 18 by way of the pipes 21 and 19. Simultaneously, the pump will supply oil under pressure to the cylinder 33, by way of the pipe 36. This will cause the piston 48 to move upwardly a distance limited by the position of the adjustable part 51, and the pivoted lever 29 likewise swings upwardly. This elevates the operating rod 27 and turns the crank arm 25 upwardly or clockwise in Figure 1, thus shifting the butterfly valve 23 to a wholly or partially opened position, as soon as the oil burner is started. This is desirable, since air must now enter the casing 15 and pass to the fan or blower 12, which is supplying air to the blast tube 16.

When the oil burner is shut off, the operation of the pump 13 ceases and the weight 42 causes the lever 29 to assume its lowered position and contact the screw stop 46. This will instantly return the butterfly valve 23 to its closed or horizontal position shown in Figure 1, and the flow of air into the casing 15 is now blocked. When the weight 42 forces the arm 29 downwardly, whatever oil is in the bottom of the cylinder 33 will be forced outwardly through the pipe 36, through the pump 13 and then to the nozzle assembly 18.

With the oil burner idle, and the butterfly valve 23 in the closed position, air cannot be drawn through the casing 15 and blower to the fire box of the furnace, which would otherwise occur due to the natural updraft through the furnace. This is advantageous, since air flowing through the fire box rapidly cools the same, and each time the oil burner is started, oil is consumed for reheating the fire box. With my positively operated valve 23, the fire box will contain its heat during the period in which the oil burner is idle, and upon restarting of the burner a considerable saving of fuel is effected.

I wish to emphasize the positive action of the butterfly valve 23, both in opening and closing. Whenever the oil burner is started, the pressure responsive piston 48 moves upwardly and swings the butterfly valve 23 to an opened position. The action of the piston 48 and associated elements is positive, and the butterfly valve cannot fail to open. Whenever the oil burner is shut off, and the pump ceases to pressurize the cylinder 33, the weight 42 positively shifts the butterfly valve to the closed position of Figure 1.

It is to be understood that the form of my invention, herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a gun type oil burner, a blower provided with a downwardly opening air inlet sleeve, a substantially horizontal air blast tube extending beyond a side of the blower for projection into a furnace, a fuel nozzle unit mounted within the air blast tube, a fuel pump, a pipe connecting the fuel pump and fuel nozzle unit, a substantially vertical cylinder mounted upon the oil burner above the downwardly opening air inlet sleeve and having an opening to receive oil under pressure, a piston disposed within the cylinder above the opening thereof for reciprocation, pipe means connecting the opening of the cylinder and fuel pump of the oil burner, a vertically swingable lever pivotally connected with the cylinder and adapted to be engaged by the piston and elevated when the piston moves upwardly within the cylinder, a weight carried by the lever to urge the same downwardly, a draft control plate rockably mounted within the downwardly opening air inlet sleeve for controlling the passage of air into the blower, and a linkage connecting the lever and draft control plate so that the same will move in unison.

2. In a gun type oil burner, a blower provided with a downwardly opening air inlet sleeve, a substantially horizontal air blast tube extending beyond a side of the blower for projection into a furnace, a fuel nozzle assembly mounted within the air blast tube, a fuel pump, a pipe connecting the fuel pump and fuel nozzle assembly, a substantially vertical cylinder mounted upon the oil burner above the downwardly opening air inlet sleeve and adapted to receive oil under pressure from the fuel pump, pipe means connecting the fuel pump with said cylinder for supplying oil under pressure to the cylinder, a piston mounted within the cylinder for reciprocation and including a seal to prevent the oil under pressure from entering the portion of the cylinder above the piston, the cylinder being provided above the piston with a slot, a vertically swingable arm pivotally connected with the cylinder and passing through the said slot above the piston and adapted to be engaged and elevated by the piston when the piston moves upwardly, adjustable stop means to limit the swinging movement of the arm in both directions, a weight carried by the arm and urging the same downwardly, a pivoted closure element for the downwardly opening air inlet sleeve of the blower, and a linkage connecting the closure element with said vertically swingable arm so that movement of the arm will effect adjustment of the pivoted closure element.

3. In a gun type oil burner, a blower provided with a downwardly opening vertical air inlet sleeve, a horizontal air blast tube extending beyond one side of the blower, a fuel nozzle assembly mounted within the air blast tube, a fuel pump, a pipe connecting the fuel pump and nozzle assembly, a substantially vertical cylinder mounted upon the oil burner above the downwardly opening air inlet sleeve and provided near its lower end with an opening, a pipe connecting said opening with the fuel pump so that oil under pressure may be supplied to said cylinder, a piston mounted within the cylinder above the opening thereof and carrying a seal to prevent the passage of oil to the portion of the cylinder above the piston, the cylinder being provided near its upper end with a transverse slot extending therethrough, a vertical swingable arm pivoted to the oil burner and extending through the transverse slot of the cylinder and beyond one side of the cylinder and adapted to be engaged and elevated by the piston, adjustable stop means associated with the cylinder to regulate the extent of movement of the arm, a weight carried by the arm to urge the same downwardly with the piston, a butterfly valve pivotally mounted within said downwardly opening air inlet sleeve to regulate the flow of air into the blower, a crank connected with the pivoted butterfly valve and arranged exteriorly of the air inlet sleeve, and a generally vertical connecting rod between said crank and vertical swingable arm.

4. In a gun type oil burner, a blower provided with a downwardly opening air inlet sleeve, a horizontal air blast tube extending beyond a side of the blower, a fuel nozzle assembly mounted within the air blast tube, a fuel pump, a pipe connecting the fuel pump and nozzle assembly, an upright mounting sleeve secured to the oil burner near and above the downwardly opening air inlet sleeve, a substantially vertical cylinder held within the mounting sleeve and extending for a substantial distance above the same, the cylinder being provided above the mounting sleeve with a transverse slot, a piston mounted within the cylinder below the slot for reciprocation, conduit means connecting the lower portion of the cylinder with the fuel pump for supplying oil under pressure to the cylinder below the piston, a vertically swingable arm extending through the slot of the cylinder above the piston and having one end pivoted to said mounting sleeve near a side of the cylinder, the arm extending beyond the other side of the cylinder, an adjustable screw threaded stop element mounted within the upper portion of the cylinder above said arm to regulate the upward movement of the arm in response to the elevation of the piston, adjustable stop means to regulate the downward movement of the arm, a movable closure element for the downwardly opening air inlet sleeve, and linkage means connecting the closure element and said arm.

References Cited in the file of this patent

UNITED STATES PATENTS

1,651,060	Janette	Nov. 29, 1927
1,684,079	White	Sept. 11, 1928
1,690,329	Baxter	Nov. 6, 1928
1,873,656	Meacham	Aug. 23, 1932
2,049,730	Bersey	Aug. 4, 1936
2,330,191	Beckett	Sept. 28, 1943

FOREIGN PATENTS

403,473	Great Britain	Dec. 28, 1933