

April 24, 1928.

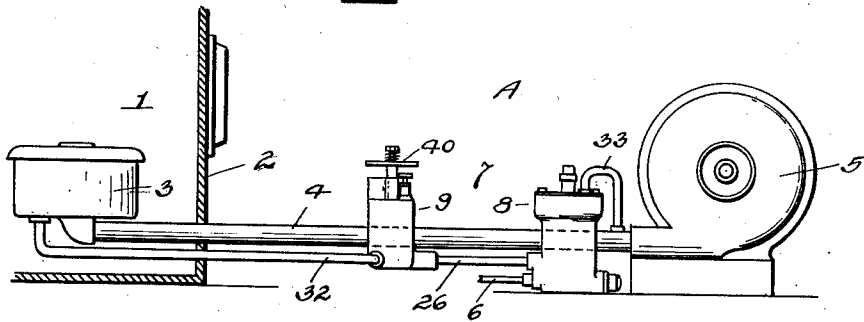
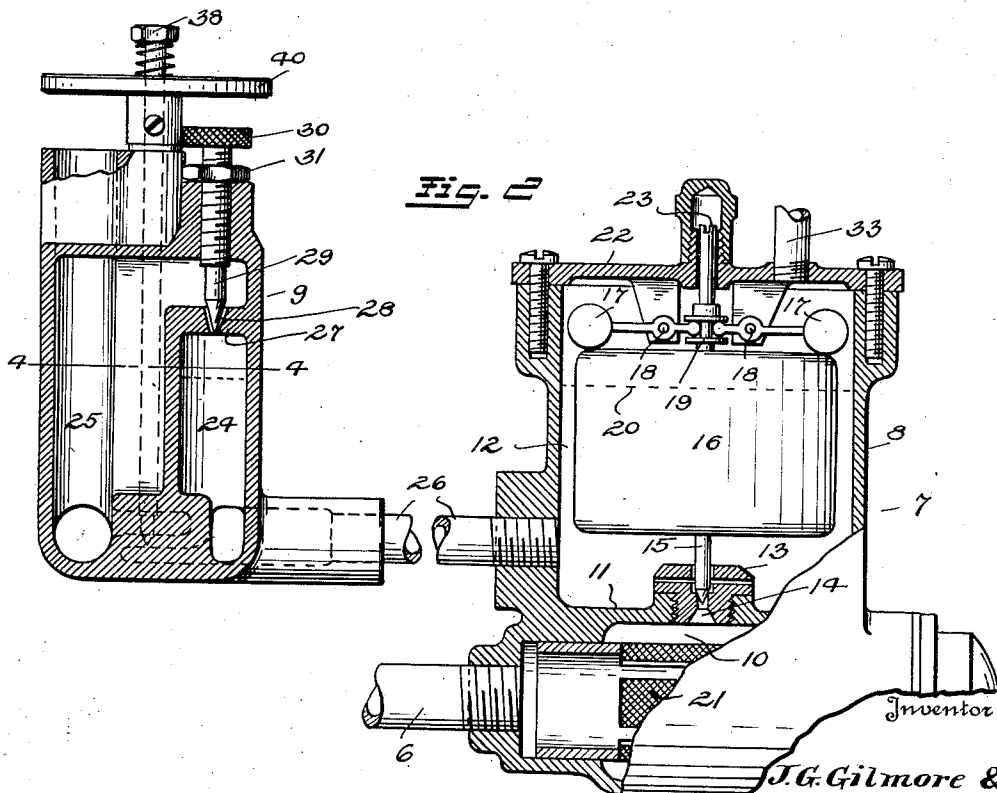
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FLOW REGULATOR FOR OIL BURNERS

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Fig. 1



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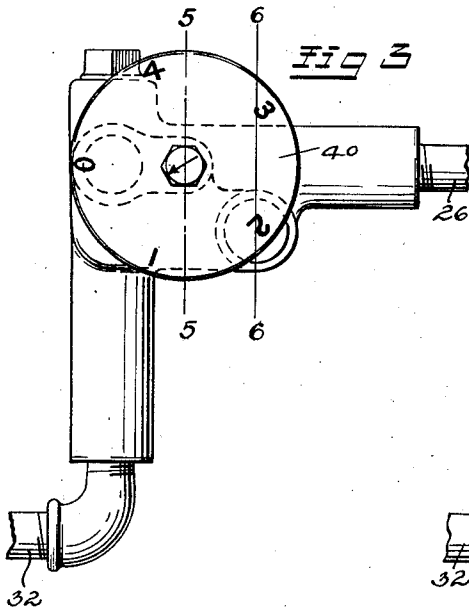
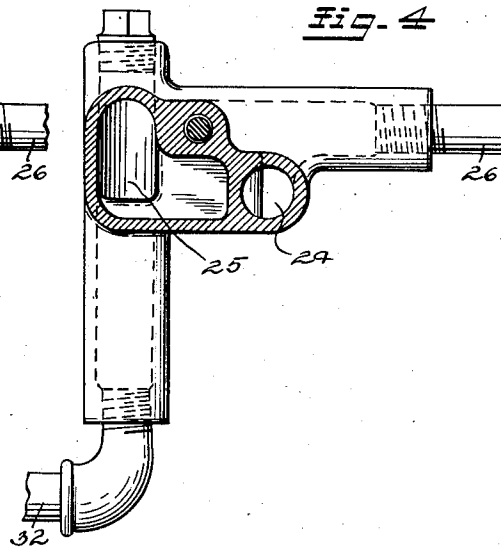
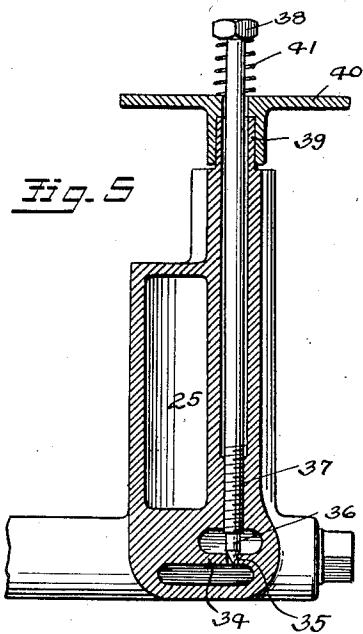
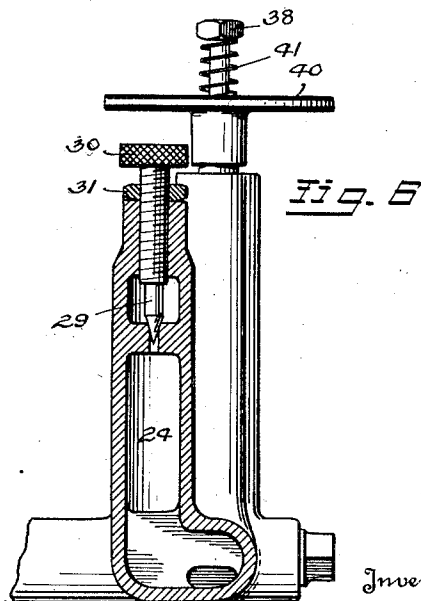
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FLOW REGULATOR FOR OIL BURNERS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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FLOW REGULATOR FOR OIL BURNERS.

Application filed September 1, 1926. Serial No. 133,056.

This invention relates to liquid fuel burning systems and more especially to systems of the type utilizing liquid hydro-carbon as a fuel and adapted for installation in the heating system of residences or other relatively small installations, the primary object of the invention being to provide in a system of this type an improved means of a simple and automatic nature for regulating the flow of the fuel to the burner proper with the end in view of supplying said burner with an adequate quantity of fuel while the burner is in active operation and when not in such operation to allow the flow of but a limited quantity of the liquid fuel so as to produce a flame of small proportion, such as a pilot flame, for the purpose of providing a low degree of heat and also to ignite the fuel upon more active operation of the burner.

In accordance with the invention there is provided a liquid fuel burning system which includes a burner proper together with a blower for supplying air under pressure to the burner, there being a fuel supply line leading to the burner and provided with an automatic regulating means with which the present invention is particularly concerned. The regulating means consists of a casing structure formed to include communicating first, second and third chambers, the fuel being passed successively through said chambers by conduits to the burner. The first chamber is provided with a valve means serving normally to maintain a common liquid level in the first and second chambers, the second and third chambers being out of substantial communication when the liquid level is maintained at said normal. In the air line leading from the blower to the burner there is provided a pipe leading to the first chamber, whereby upon the operation of the blower, to promote active combustion in the burner, air pressure will be introduced into the first chamber and exercised upon the liquid level therein so as to elevate the liquid level in the second chamber and to permit thereby of the flow of the liquid from said second into said third chamber and to pass from the latter chamber to the burner, the arrangement being such that when the operation of the blower is arrested the liquid level in the first and second chambers will return to normal thereby arresting the main flow of fuel to the burner.

Another object of the invention resides in the provision of a fuel regulator of the type aforesaid wherein there is provided a normally restricted passageway in constant communication between the second and third chambers, said restricted passageway permitting of a limited quantity of the liquid fuel to flow from the second into the third chamber so as to maintain constant combustion to a limited extent in the burner irrespectively of the introduction of air into said first chamber.

With these and other objects in view, as will appear as the description proceeds, the invention consists in the novel features of construction, combinations of elements and arrangements of parts hereinafter to be fully described and pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a view in side elevation of the oil burning system comprising the present invention, and illustrating particularly our improved regulator,

Figure 2 is a vertical sectional view taken through the regulator,

Figure 3 is a top plan view of a portion of the regulator,

Figure 4 is a horizontal sectional view taken on the line 4—4 of Figure 2,

Figure 5 is a vertical transverse sectional view on the line 5—5 of Figure 3, and

Figure 6 is a similar view on the line 6—6 of Figure 3.

Referring more particularly to the accompanying drawing the letter A indicates the oil burning system in its entirety. This system comprises essentially a burner 1, which is mounted in the fire box 2 of a furnace or the like 3. The burner may be of any suitable construction but is preferably of the type disclosed in our co-pending application Serial Number 96,025, filing date March 19, 1926. Leading from the bottom of the burner is an air supply pipe 4, which communicates, at a point exteriorly of the furnace, with a blower or other draught producing device 5. This blower may be driven by any suitable means such, for example, as an electric motor.

To control the flow of the liquid fuel to the burner there is provided a liquid supply pipe 6, which leads from a tank or other suitable reservoir, (not shown) to a fuel regulator 7, and it is to the construction and operation of this regulator that the present

invention is particularly directed. In this instance the regulator has been shown as consisting of a casing structure including conjoined casings 8 and 9, although it will be understood, as the description of the invention progresses, that the casings 8 and 9 could be formed in a unitary manner if desired. The pipe 6 enters a well 10 provided in the lower part of the casing 8, and above the well 10 the casing is provided with a horizontally disposed wall 11 which separates the well 10 from a superposed float chamber 12 found in said casings. For convenience in description, however, this float chamber will be hereinafter referred to as the first chamber. The wall 11 is provided with a threaded plug 13 in which is formed a plurality of restricted passages 14 for establishing flow communication between the well and the chamber 12. The passages 14 are shaped to provide a seat for the reception of the stem of a needle valve 15. This valve is carried by a float 16, which cooperates with weighted arms 17 pivotally mounted as at 18 in the upper part of the chamber 12. The inner ends of the arms 17 engage with a collar 19 fixed to the stem of the valve 15, and it will be seen that when the liquid level in the chamber 12 reaches the level indicated at 20 the arms 17 will be oscillated to an extent sufficient to press the needle valve on its seat so as to close the passageway 14, thereby substantially obstructing liquid flow into the chamber 12. However, as the liquid level in said chamber recedes the reverse operation takes place and the needle valve is elevated to permit of the inflow of the liquid into the chamber 12 from the underlying well 10. If desired, the well may be provided with a removable strainer 21 so as to remove impurities from the incoming oil and to prevent the collection of foreign obstructing matter in the valve passages of the regulator. The float chamber is covered by a removable lid 22, which also carries the supports upon which the arms 17 are mounted, and the axial portion of the lid is provided with an opening through which the adjusting means 23 for the float operated valve mechanism extends.

The casing 9 comprises communicating chambers 24 and 25, hereinafter referred to as the second and third chambers. The chamber 24 is in communication with the chamber 12 by means of a pipe 26 and inasmuch as this communication is of an unobstructed character it follows that the normal liquid level in the chamber 12 and that in the chamber 24 will be the same. Above the liquid level in the chamber 24 the casing 9 is provided with a horizontally extending wall 27, in which is formed a restricted port 28. Adapted to control the effective opening of the port 28 is an adjustable needle valve 29, which is threaded into the body of

the casing 9 and has its upper end provided with a knurled edge 30, permitting of the convenient adjustment of the valve, a lock nut 31 is also provided to maintain the adjusted position of said valve. By means hereinafter described liquid is permitted to flow from the second chamber 24 into the third chamber 25 by way of the port 28, and from the third chamber 25 the liquid is conducted to the burner 1 by means of a pipe 32.

The pipe 4 extending from the blower 5 of the burner 1 has connected therewith a short pipe section 33, which leads to the lid 22 of the casing 8. It will be seen that when the blower is in active operation air under pressure will be introduced into the first chamber 12, thereby exerting an influence on the liquid level in said chamber so as to cause raising of the liquid level in the second chamber 24. The level in this chamber is sufficiently elevated so as to cause the flow of the liquid through the restricted port 28 and thence to the chamber 25 as previously described, but it will be observed that this major flow of liquid takes place only when the blower is in active operation, since when the latter stops functioning normal air pressures are maintained in the chamber 12 so that no flow of liquid will obtain through the port 28. Thus the regulator is responsive immediately to the first draught supplied to the burner for regulating the main flow of oil to the burner.

The lower portions of the second and third chambers 24 and 25 are in communication to a limited extent, but which extent is manually variable, by providing the wall 34 between said chambers with an orifice 35, normally partially obstructed by the lower end of a needle valve 36. This valve is disposed axially within the casing 9 and is threaded as at 37 to permit of its retention in various positions of adjustment. The upper end of the stem is provided with a head 38. Fixed upon a boss 39 protruding upwardly from the casing 9 is an indicator disk 40 carrying numerals for disclosing various positions of adjustment of the valve 36. The head 38 is provided with an arrow pointing toward said numerals so that the operator may at a glance determine the degree of opening of the needle valve. If desired, a spring 41 may be situated between the head 38 and the disk 40 so as to insure the maintenance of the positions of adjustment of the valve 36. The operation of the valve 36 is such that when the arrow on the headed end thereof points toward the numeral 1 a sufficient volume of oil will pass into the third chamber to permit of the maintenance of a pilot light or combustion of small degree in the burner. However, as the valve is rotated so as to reach the position indicating four the orifice 35 will be opened to a sufficient extent to allow a vol-

ume of liquid to pass to the burner permitting of a degree of combustion within the latter suitable for heating purposes during fairly mild temperature conditions, such as when the system is being operated in the spring or fall, but for full heating efficiency the blower 5 is operated and the main supply of liquid fuel introduced into the burner obtained by way of the port 28 which permits of the main flow of liquid between the second and third chambers.

In view of the foregoing description it will be seen that the present invention provides a simple yet efficient regulator for controlling the admission of fuel into a burner in oil burning systems embodying means for introducing air under pressure into commingled relationship with liquid fuel. The construction eliminates the use of electrical control switches and solenoids hitherto largely used in this capacity and provides a construction, therefore, which is devoid of complications and is of a more reliable character.

What is claimed is:

1. A fuel regulator for oil burning systems comprising in combination with a fuel line and a source of air pressure, a casing including a pair of separate chambers, means situated in said fuel line for maintaining a normal liquid fuel level within one of said chambers, a valved regulated

port carried by said casing and disposed above said fuel level and serving to establish communication between the two chambers, means for introducing air into said fuel line to cause the liquid to elevate and flow through said port and into the other of said chambers, and a supplemental valve carried by said casing and serving to regulate an orifice located below said fuel level permitting of a constant flow of liquid between said chambers.

2. A fuel regulator for oil burning systems comprising a casing formed into two chambers, means arranged in connection with one of said chambers for maintaining a predetermined liquid fuel level therein, said casing being provided with a port arranged above the normal liquid level in said chamber and serving to establish communication between the two chambers when the liquid level rises and flows through said port and into the other of said chambers, a valve for said port, a supplemental valve carried by said casing and serving to regulate an orifice permitting of a constant flow of liquid between the two chambers, and means for maintaining said valves in a fixed adjustment.

In testimony whereof we affix our signatures.

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