

July 1, 1930.

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1,769,082

MIXING DEVICE FOR OIL BURNERS

Filed June 9, 1926

2 Sheets-Sheet 1

Fig. 8.

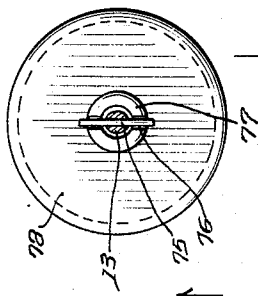
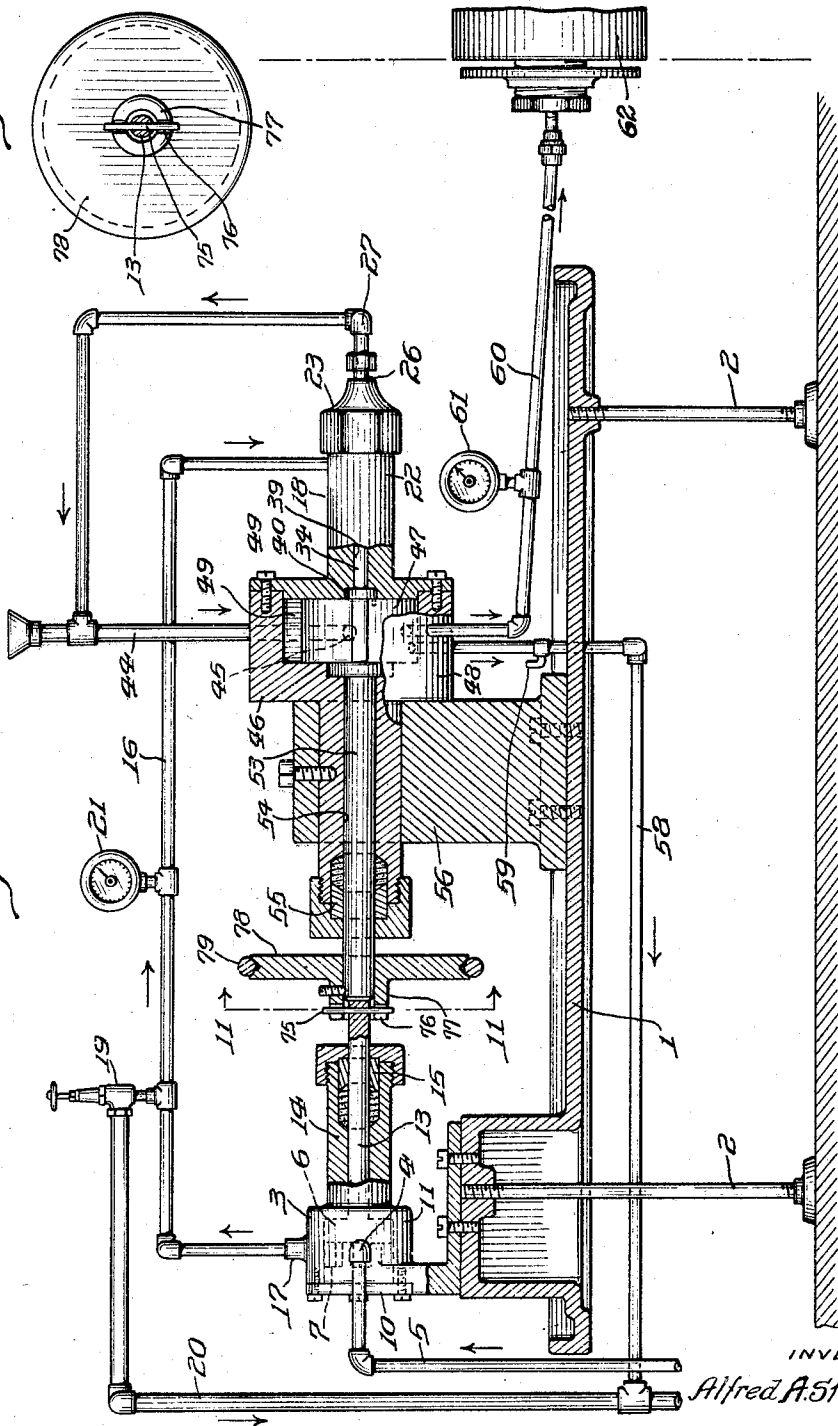


Fig. 1.



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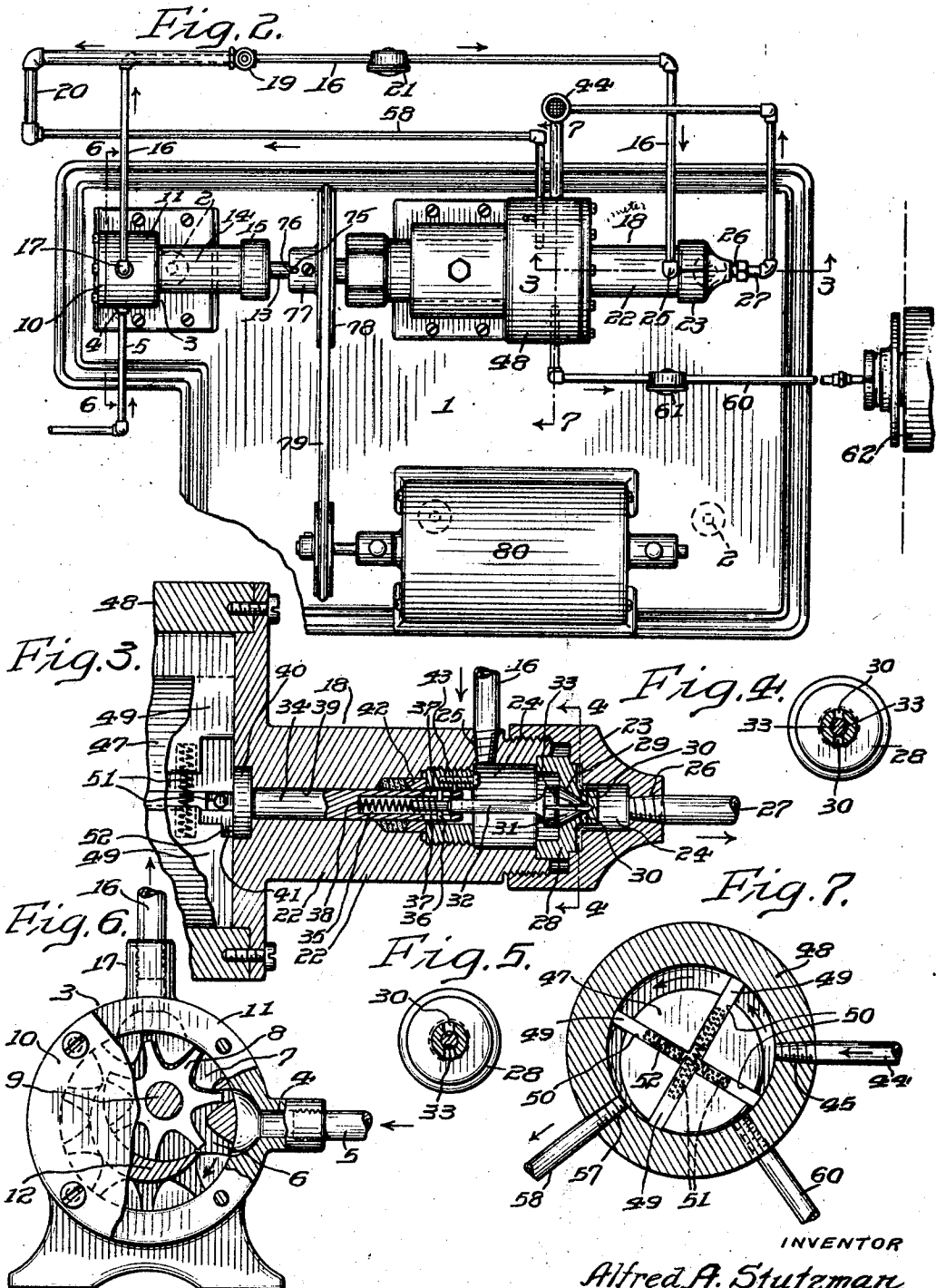
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UNITED STATES PATENT OFFICE

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MIXING DEVICE FOR OIL BURNERS

Application filed June 9, 1926. Serial No. 114,601.

My invention relates to oil burners and particularly to that type designed for use in heating houses and other buildings, and the object of the invention is to provide an improved apparatus of this character which may be employed in connection with any of the usual types of furnaces, and which is adapted to burn fuel oil of low specific gravity so as to effect a material economy in heating cost.

Another object of the invention is to provide an oil burner having improved means for metering the oil, which will effectually regulate the quantity used, and which is not likely to become clogged even when used with heavy oils, and hence maintains a steady and even flow.

A further object of the invention is to provide means for checking the flow of oil when the device is stopped, so as to prevent what is known as "flooding", which causes serious difficulties and often results in back firing.

With these and other objects in view, invention comprises various novel features of construction and arrangement of the parts hereinafter described and claimed, and illustrated in the accompanying drawings in which—

Fig. 1 is a longitudinal section of my improved oil burner;

Fig. 2 is a top plan view thereof;

Fig. 3 is an enlarged detailed sectional view thereof on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged detailed sectional view on the line 4—4 of Fig. 3 showing the metering device with the grooves out of registry with the ports;

Fig. 5 is a similar view showing the grooves in registry with the ports;

Fig. 6 is an enlarged view in end elevation, with parts in section, of the pump; and

Fig. 7 is an enlarged transverse sectional view of the atomizer, the section being taken on the line 7—7 of Fig. 2; and

Fig. 8 is a transverse section on the line 11—11 of Fig. 1.

Similar letters of reference are used to indicate similar parts throughout the respective views.

My improved burner comprises a suitable base or bed 1 which is supported, as by legs 2, at a proper elevation in front of the furnace (not shown, but indicated partly in dotted lines) to which it is applied. Mounted on this base, preferably at the end thereof remote from the furnace, is a rotary pump 3 to the inlet 4 of which is connected a supply pipe 5 leading from the storage tank (not shown) for the fuel oil.

The pump may be of any suitable construction and in the present instance is of the gear type, as shown in Fig. 6, and comprises a rotor 6 having an annular series of internal gear teeth 7 meshing with a gear wheel 8 disposed in eccentric relation thereto. The gear wheel is carried by, and mounted to rotate freely on, a pin 9 projecting inwardly from the face plate 10 of the pump casing 11. The face plate also carries a web or partition 12 which is of substantially crescent shape and extends part way around the gear wheel 8 and between the same and the gear teeth 7. The rotor is carried by a shaft 13 which is journaled in, and projects beyond, a tubular bearing 14 extending longitudinally from the pump casing on the opposite side thereof from the face plate 10, the bearing being provided at its extremity with a stuffing box 15 to prevent possible escape of oil from the interior of the pump casing.

On the rotation of the shaft 13 the pump draws the fuel oil through the supply pipe 5 and delivers it under pressure to a feed pipe 16 connected to the outlet 17 of the pump and leading therefrom to a metering device 18. Located in the feed pipe is a relief valve 19 which opens outwardly to permit excess oil to be by-passed therethrough and escape into an overflow pipe 20 that returns it to the storage tank. The valve may be suitably adjusted to regulate the pressure at which it will open and thus control the pressure within the feed pipe 16 at which the oil is delivered to the metering device. A gauge 21, mounted on the feed pipe, indicates the oil pressure. The end portion of the feed pipe 16 connected with the pump 3 extends upwardly therefrom in substantially vertical position while the intermediate portion of

the feed pipe is disposed horizontally, and the opposite end portion extends substantially vertically downwardly to connect with the metering device.

5 The casing of the metering device consists of two hollow sections 22 and 23, which are suitably secured together, as by a screw thread connection, to provide a metering chamber 24 having an inlet 25, with which
10 the feed pipe 16 is connected, and an outlet 26 in communication with a pipe 27. The metering chamber is divided between the inlet and outlet by a transverse partition or metering plate 28, which is preferably
15 clamped in position between the casing sections 22 and 23.

The metering plate is formed with a conical seat 29 facing preferably on the inlet side thereof, and with one or more ports 30 communicating both with such seat and with the metering chamber on the outlet side of the plate. In the present instance there are two
20 of these ports which are arranged diametrically opposite each other. Fitting within the seat 29 is a conical head 31 provided at one end of a metering plunger 32 and formed in its periphery with longitudinal grooves 33 preferably corresponding in number and relative position with the ports 30, so as to
25 intermittently register therewith as the head is rotated on its seat to permit small quantities of oil to escape through the metering plate 28. It is to be noted that the grooves flare gradually, or increase in width, from
30 the base of the conical head to the apex thereof, while the ports 30 are of a diameter preferably slightly greater than the width of the grooves at the point of registry. This prevents possible clogging of the metering device
35 even when heavy oil is used, and causes the device to clear itself if any solid matter in the oil tends to become lodged in the grooves or ports. The amount of fuel oil flowing through the metering device is regulated by
40 interchanging metering plates having different sized ports and plungers having different sized grooves, or by regulating the relief valve 19 to vary the pressure under which the oil is delivered to the metering device.

50 The plunger 32 extends longitudinally of the metering chamber with its end portion remote from the head 31, telescoping with a spindle 34, and received in a longitudinal socket 35 in the adjacent end thereof. A pin
55 36 passes transversely through the plunger and has longitudinal play in slots 37 extending outwardly through the spindle on opposite sides of the socket 35, whereby to permit the plunger to move longitudinally independently of the spindle, but to hold such parts against any relative turning movement. A coiled expansion spring 38 is located within the socket and exerts a longitudinal thrust on the plunger to hold the head
60 31 against its seat. The spindle 34 is jour-

nalled in a bearing 39 in the casing section 22 and terminates at its other end in a disk 40 provided with an outstanding eccentric pin 41 by means of which the spindle is rotated as hereinafter set forth. To prevent leakage through the bearing 39 a stuffing box 42 is preferably mounted therein around the spindle and has a lock nut 43 by which it is retained in position. 70

The oil discharged through the metering
75 plate is no longer under pump pressure and flows through the outlet 26 of the metering chamber and into the pipe 27. This pipe extends horizontally from the metering device and then upwardly to a height above the horizontal intermediate portion of the feed pipe 16 and thence horizontally to connect with a stand pipe 44, open at its upper end to the atmosphere, and connected at its lower end with the inlet 45 of a rotary atomizer 46. 80
85 The oil rises in and fills the pipe 27, flowing along the upper horizontal portion thereof, and overflowing into, and dropping down, the stand pipe 44 so that air and oil are fed together into the atomizer. 90

It is to be particularly noted that the feed pipe 16 and the pipe 27 are so arranged that their adjacent portions provide a substantially U shaped trap, with the metering device located in the base or central portion thereof, one leg of the trap being constituted by the vertical portion of the pipe 27 and the other leg by the adjacent vertical portion of the pipe 16, and the former extending somewhat above the latter. This arrangement is important in case the apparatus should be stopped with the grooves 33 in registry with the ports 30, and prevents an excess of oil escaping in that instance into the pipe 27 and flooding the stand pipe 44. On the stopping
100 of the device the pressure created by the pump 3 is quickly lost and if the metering device is in open position the oil tends to find its level in the trap under substantially atmospheric pressure. 105 110

The atomizer 46 is in the form of a rotary air compressor of any suitable type and preferably comprises a rotor 47 mounted eccentrically within the casing 48 and provided with a plurality of wings or blades 49 sliding in slots 50 of the rotor. As shown the slots extend diametrically through the rotor and each contains a pair of blades, between the inner ends of which are interposed coiled expansion springs 51, which project the outer ends of the blades beyond the periphery of the rotor and against the inner surface of the casing. One of these blades is formed in a side edge with a recess 52, adapted to receive the eccentric pin 41 of the spindle 34, the casing section 22 of the metering device being so united with the casing 48 of the atomizer that this pin projects into the latter. A driving connection is thus provided between the rotor 47 and the spindle 34 whereby to cause 120 125 130

the metering device to be operated from, and simultaneously with, the atomizer.

The rotor 47 is carried by a shaft 53 journaled in a tubular bearing 54, extending longitudinally from the atomizer casing 48 on the opposite side thereof from the metering device, the shaft projecting through and beyond a stuffing box 55 at the outer end of the bearing. The bearing 54 is held in a pillow block 56 which is located on the base 1 and supports the atomizer and its associated parts.

On the rotation of the rotor 47 the air and oil admitted through the inlet 45 are carried around within the casing, compressed, and forced out under pressure through the outlet 57 of the atomizer in the form of an atomized mixture in which the oil has been broken up into minute particles in suspension in the air. Beyond the outlet 57, and between the same and the inlet 45 of the atomizer, a drip pipe 58 is connected to, and communicates with, the interior of the casing 48, and provides an escape for any oil which has not been atomized, and still remains in a liquid state, the drip pipe extending downwardly and thence substantially horizontally, and connecting with the overflow pipe 20 so as to drain into the same and return the oil to the storage tank. The drip pipe is provided with a vent 59, open to the atmosphere, in order to prevent the drip pipe from creating a suction within the casing 48, which would tend to retard, or impose a drag on, the atomizer.

The outlet 57 discharges into a delivery pipe 60, which is preferably provided with a pressure gage 61, and is preferably inclined downwardly, projecting beyond the base 1 and communicating with a nozzle member 62, arranged in suitable relation to the combustion chamber of the furnace.

The ends of the shafts 13 and 53, projecting beyond the stuffing boxes 15 and 55, respectively, are suitably coupled together as by a transverse pin 75, driven through the shaft 13 with its ends seated in recesses 76 in the hub 77 of a driving wheel 78 fixed on the shaft 53. Power is suitably applied to this driving wheel as by a belt 79 driven by an electric motor 80 mounted on the base 1. The shafts 13 and 53, and the spindle 34, are all disposed in longitudinal alignment, and being coupled together, form in effect a single shaft extending lengthwise of the device, and serving to directly and simultaneously operate the pump, metering device, and atomizer, with the moving parts all revolving on the same axis. This makes for simplicity and efficiency, and reduces friction and noise in operation.

The operation of my improved oil burning apparatus, when the power is applied, will be obvious in view of the foregoing description. It will be seen that I have provided an apparatus which is simple and compact in

construction; which may be readily and inexpensively manufactured, and easily installed for use in connection with any of the usual types of furnaces; which consists of few parts and is not likely to get out of order; which is efficient, safe, and positive in operation; and which is adapted to burn heavy oils and thus produce heat on a very economical basis.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. In an oil burning apparatus, the combination of a rotary air compressor, an air intake pipe connected thereto at its lower end and open at all times to the atmosphere, a metering device, means including a rotary pump for supplying liquid fuel thereto, and a pipe extending upwardly from the metering device and communicating with and arranged to overflow into said air intake pipe at a height above the highest level of the liquid in said supplying means, whereby to form a trap to prevent the flow of liquid to the compressor when the apparatus is stopped.

2. In an oil burning apparatus, the combination of a rotary pump, a rotary air compressor and a rotary metering device, all coupled together for simultaneous rotation, and means for conducting liquid fuel from the pump to the metering device and from the metering device to the compressor, said means including a trap located between the metering device and said compressor and open to the atmosphere.

3. In an oil burning apparatus, the combination of a casing having a metering chamber and an inlet and an outlet therefor, a metering plate dividing said chamber between said inlet and outlet and formed with a tapered seat facing on one side thereof and with a port communicating both with said seat and with said chamber on the other side of said plate, a rotary metering plunger having a tapered head fitting said seat and formed in its periphery with a groove which is in continuous communication with said chamber and is adapted in the rotation of the plunger to register intermittently with said port, and means for pressing the head against said seat.

4. In an oil burning apparatus, the combination of a casing having a metering chamber and an inlet and an outlet therefor, a metering plate dividing said chamber between said inlet and outlet and formed with a tapered seat facing on one side thereof and with a port communicating both with said seat and with said chamber on the other side of said plate, and a continually rotating metering plunger having a tapered head fitting said seat and formed in its periphery with a longitudinal groove adapted to register with said port, said groove being flared toward said port.

5 5. In an oil burning apparatus, the combination of a casing having a metering chamber and an inlet and an outlet, a metering plate dividing said chamber between said inlet and outlet and formed with a tapered seat
10 facing on one side thereof and with a port communicating both with said seat and with said chamber on the other side of said plate, a continually rotating metering plunger having
15 a tapered head fitting said seat and formed in its periphery with a longitudinal groove adapted to register with said port, a spindle journaled in said casing and telescoping with said plunger, means for holding said
20 spindle and said plunger against relative turning movement, and yielding means between said spindle and said plunger for exerting longitudinal thrust on the latter to press the head against its seat.

In testimony whereof, I have signed my name to this specification.

ALFRED A. STUTZMAN.

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