Oct. 26, 1954 L. L. LEACH 2,692,642

PRESSURE AIR POSITIONED FURNACE LIGHTER WITH AUTOMATIC PRESSURE AIR PURGING

Filed Nov. 16, 1950 3 Sheets-Sheet 1

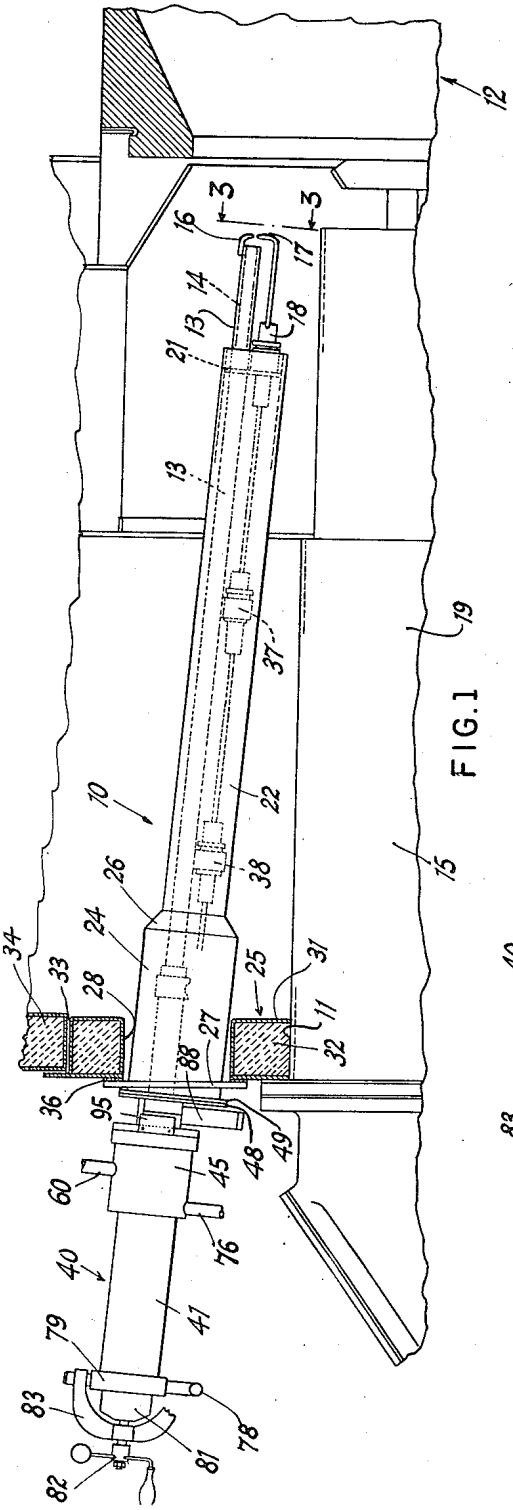

FIG. 1

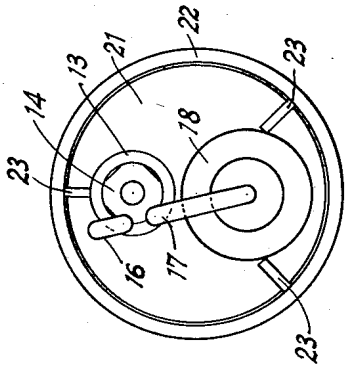

FIG. 3

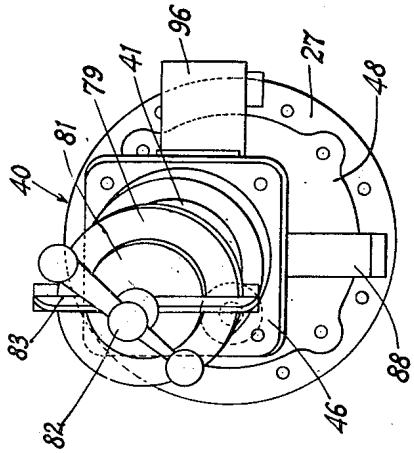

FIG. 2

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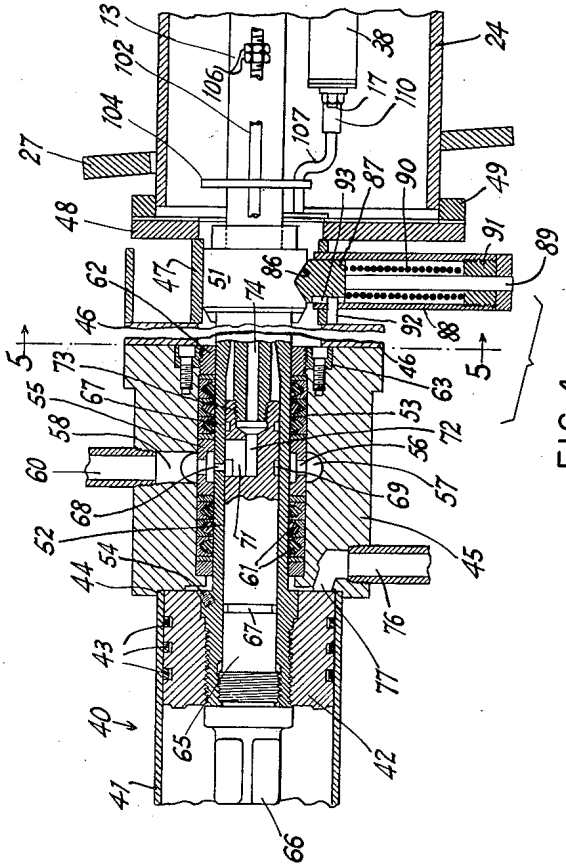

FIG. 4

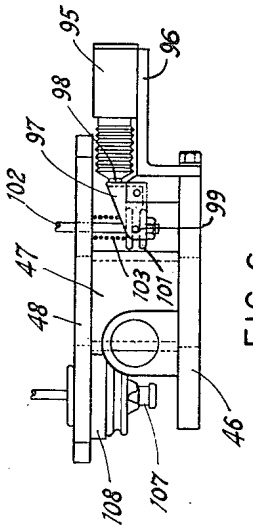

FIG. 6

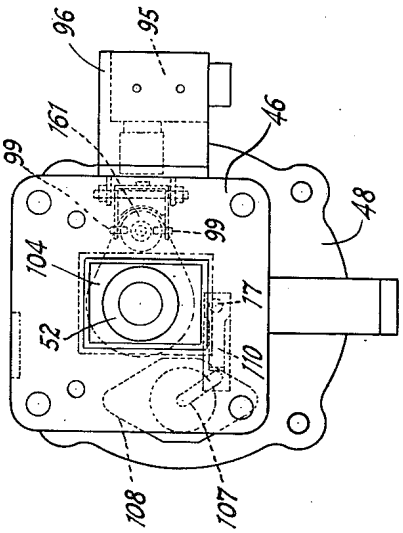

FIG. 5

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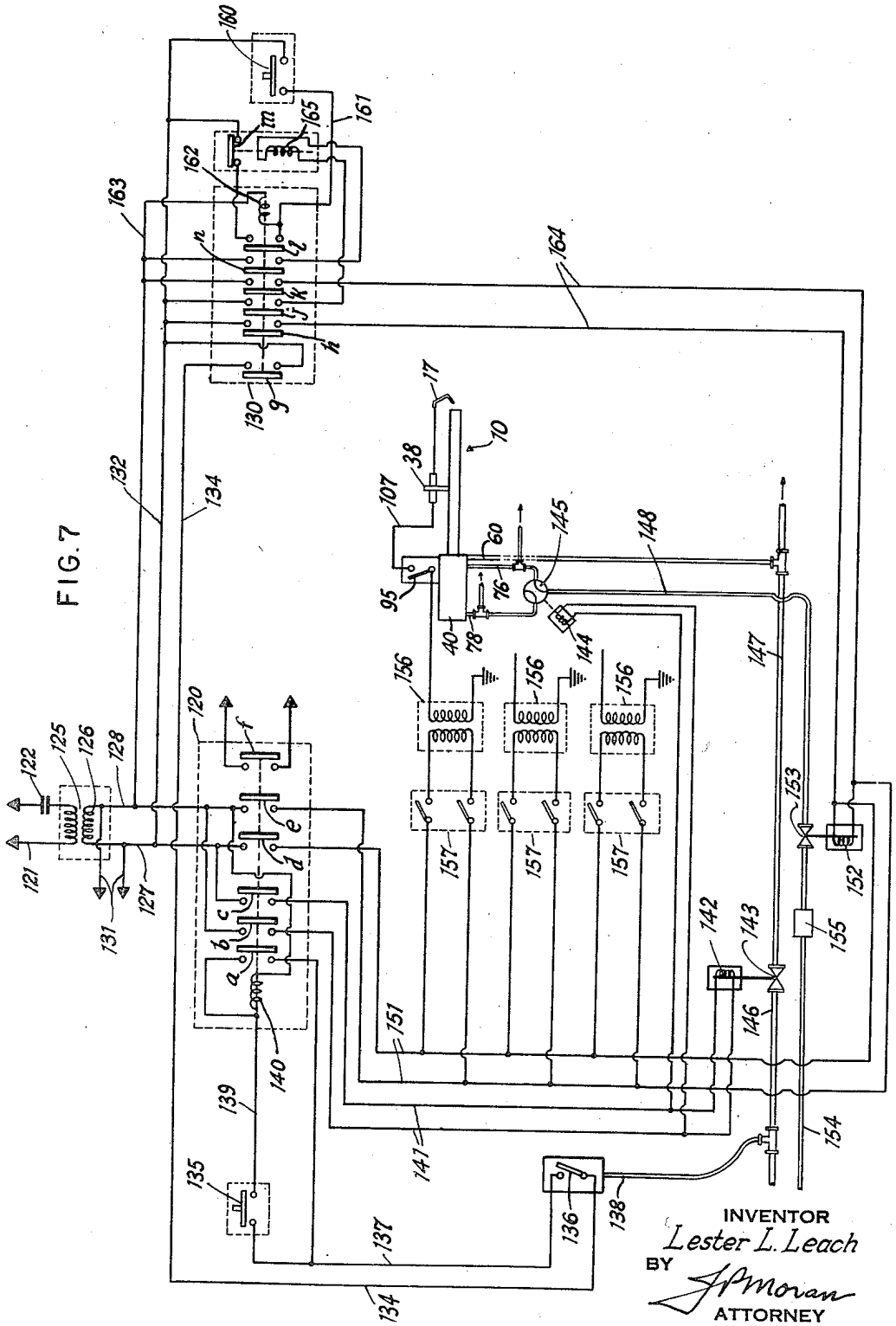
FIG. 7



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UNITED STATES PATENT OFFICE

2,692,642

PRESSURE AIR POSITIONED FURNACE LIGHTER WITH AUTOMATIC PRESSURE AIR PURGING

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Application November 16, 1950, Serial No. 195,993

12 Claims. (Cl. 158—28)

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This invention relates to ignition apparatus and, more particularly, to a retractable furnace lighter embodying novel means for effecting a predetermined operational sequence and automatic purging.

With the increase in the size of furnace, particularly for steam power plants, manual lighting of the furnaces has become hazardous and impractical. This is particularly so in the case of furnaces burning liquid, gaseous or pulverized fuel, and it has been proposed to light or "touch off" these furnaces by means of remotely controlled mechanical lighters, usually of the type including a liquid fuel atomizing nozzle and associated ignition electrodes.

However, the development of such mechanical lighters and operating mechanism and controls therefor has presented problems due to the necessity of assuring a predetermined procedural sequence in lighting the furnaces. For example, the operating mechanism for such mechanical lighters must be so designed that the lighters are normally withdrawn from the vicinity of the fuel burner to prevent damage to the lighters by the heat of the furnace. The lighter must be fully projected or inserted into the furnace adjacent the main fuel burner when fuel from the latter is to be ignited, or else there is danger of non-functioning of the lighter arrangement due to its not being in close enough relation to the burner. The fuel supply to the lighter should not be initiated until the lighter is in proper position, and should be turned off, and the lighter fuel line purged, before the lighter is fully retracted following ignition of the main burner.

To accomplish the desired operational sequence, prior art mechanical atomizing liquid fuel lighters have included cylinder and piston arrangements for advancing and retracting the lighter assemblies. Various means, such as solenoid controlled valves or mechanically interlocked valves, have been used to control the piston operation, admission and cutoff of fuel, and flow of purging fluid, generally air, through the atomizer. The pistons have been operated by high pressure air or by the fuel under pressure, and the purging has been effected prior to the lighter projection or upon retraction.

The lighter of the present invention includes a mechanical atomizer construction reciprocable

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by an air operated piston. The reciprocating structure has a port so arranged that, in the operative or fully extended position of the lighter, the port comes into operative relation with the fuel supply. During retraction, and before the reciprocating structure is fully retracted, the port comes into operative relation with the pressure air supply for the piston. Thus, the atomizer construction is automatically air purged during its retraction.

More specifically, the fuel pipe and its enclosing lighter barrel are secured in unitary relation with a piston and extend through the end of a cylinder in the same manner as a piston rod. Surrounding the lighter barrel just beyond the cylinder is an annular fuel chamber embracing the barrel. The inner end of the fuel pipe communicates with a port in the side of the barrel and this port registers with the fuel chamber only when the lighter barrel is fully extended. When the pressure fluid (air) is selectively applied to move the piston toward the retracted position, the port in the side of the barrel moves into the cylinder and the pressure air, which is also acting against the piston, enters the fuel pipe through the port and is discharged through the nozzle to purge residual fuel therefrom.

A pair of ignition electrodes are associated with the atomizer nozzle and one of these electrodes is connected to a source of electric potential through a switch which is operated through a lost motion connection to the lighter barrel only when the barrel has been fully extended.

For an understanding of the invention principles, reference is made to the following description of a typical embodiment thereof as illustrated in the accompanying drawings.

In the drawings:

Fig. 1 is an elevation view of a lighter embodying the invention as mounted in a furnace end in the extended or operative position;

Fig. 2 is an outer end elevation view of the lighter;

Fig. 3 is an inner end elevation view of the lighter;

Fig. 4 is a composite longitudinal sectional view of the lighter illustrating the fuel admission arrangement of the lighter, with the operating mechanism, to the left of the section line 5—5 in the "advanced" position and the elements to

the right of section line 5—5 in the "retracted" position;

Fig. 5 is a view on the line 5—5 of Fig. 4;

Fig. 6 is a plan view of the lighter elements shown in Fig. 5; and

Fig. 7 is a schematic diagram illustrating the controls for the lighter.

Referring more particularly to Figs. 1 through 5 of the drawings, a lighter assembly generally indicated at 10 is shown in operative relation to a main fuel burner 15 mounted adjacent an aperture 11 in a wall of a furnace 12.

Main burner 15 is illustrated as a well known pulverized coal burning type including a primary air and coal pipe 19, and the detailed construction thereof forms no part of the present invention, being familiar to those skilled in the art.

Lighter assembly 10 is a mechanical liquid fuel atomizer unit, of a well known construction, having a barrel 13 enclosing a fuel pipe or conduit 14 and extending forwardly. A pair of ignition electrodes 16 and 17 are arranged in operative association adjacent the fuel atomization tip of pipe 14. Electrode 16 is preferably welded or brazed to barrel 13, whereas electrode 17 is supported on barrel 13 through an insulator 18.

Both barrel 13 and insulator 18 are mounted through a substantially circular supporting plate 21, fitting within a tubular guiding casing 22 of the atomizer unit, and having slots receiving radially projecting elongated guide runners 23 which bear on the inner surface of casing 22.

The outer end of casing 22 is secured to a somewhat larger cylinder housing 24, the juncture therebetween being formed by a frustoconical transition piece 26. A mounting plate 27 embraces and is secured to housing 24. The housing 24 extends through an aperture 28 in wall section 25 of the secondary air chamber surrounding pipe 19. Wall section 25 includes a metallic casing, generally indicated at 31, surrounding refractory insulating material 32. The secondary air chamber and the main burner housing 19 are mounted in an aperture 33 in the outer wall 34 of furnace 12. Plate 27 is secured against the outer surface of wall section 25, a suitable gasket 36 being interposed between flange or plate 27 and the wall section. It will be noted that plate 27 is so disposed on housing 24 that lighter assembly 10 extends in converging relation to main burner 15 so that the inner ends of assembly 10 and burner 15 are in relatively close relation in the operative or extended position of the lighter.

The barrel 13 extends through casing 22 and housing 24, and its outer end is secured to mechanism for advancing and retracting the barrel and fuel pipe relative to the inner end of casing 22 and the inner end of main burner 15. The electrodes 16 and 17 are arranged to move as a unit with the lighter barrel, electrode 16 being secured directly to the barrel and electrode 17 being supported in insulators 18, 37 and 38 secured to the lighter barrel.

The operating mechanism, generally indicated at 40, includes a pressure air cylinder 41 having therein a piston 42 provided with rings 43. The inner end of cylinder 41 is fitted in a recess 44 in a relatively heavy tubular fuel supply and guide member 45, described more fully hereinafter. The inner end of member 45 is bolted to a flange 46 of a supporting bracket including a sleeve 47 and an inner flange 48 in turn bolted to a collar 49 on the outer end of housing 24.

The inner end of barrel 13 is secured into a latch block 51 secured to the end of a hollow piston rod 52 extending through an axial passage 53 in member 45 and threaded into piston 42. A set screw 54 locks rod 52 to piston 42.

Intermediate the ends of member 45, an annular fuel admission chamber member 55 is mounted in passage 53 and sealingly embraces tubular piston rod 52. Chamber member 55 is an inwardly facing channel in cross section, the base of the channel being formed with ports 56 which register with a circumferential fuel admission passage 57 formed in the surface of passage 53. Fuel enters passage 57 through a radial fuel port 58 having the end of a fuel supply pipe 60 threaded thereinto. Sealing rings 61 are disposed in passage 53 embracing rod 52 and are held in place by a clamping ring 62 threaded into a ring 63 bolted into a recess in the inner end of member 45.

Fuel enters pipe 14 from chamber 55 in the following manner. An elongated plug 65 is threaded into the outer end of hollow rod 52, a nut head 66 being provided for this purpose. Plug 65 has grooves 67 for receiving suitable sealing packing and, in the projected position of barrel 13, the inner end of plug 65 is beyond fuel chamber 55. Rod 52 has a port 68 which, in the fully projected position of barrel 13, registers with fuel chamber 55. Plug 65 has a circumferential groove 69 registering with port 68. Radial passages 71 connect groove 69 to a central passage 72 which communicates with a threaded opening 73 in the inner end of plug 65. The outer end of fuel pipe 14 is threaded into opening 73 thus communicating with port 68.

Operating air for mechanism 40 is provided, for movement to the lighter retracting position, by means of a pipe 76 threaded into a port in member 45 connected by a passage 77 to the interior of cylinder 41. Air for projecting the lighter assembly is provided by a pipe 78 which communicates with the interior of the cylinder through a cylinder head 79 on the outer end of cylinder 41. The outer end of the cylinder is closed by a head 81 clamped against the end of the cylinder by a pressure clamp 82 mounted in a U-shaped bracket 83 pivoted on flange or head 79. It should be noted that fuel pipe 14 fits through barrel 13 and is of less diameter than piston rod 52. Hence, by releasing clamp 82, swinging bracket 83 to one side, and turning the head 66 to unscrew plug 65 from rod 52, the assembly of plug 65 and fuel pipe 14 may be withdrawn through the outer end of lighter assembly 10 for inspection, repair, cleaning, or replacement of the components.

Latch block 51 has a notch 86 cooperable with a keeper 87 mounted in a tube 88 secured to sleeve 47. The keeper has a guide stem 89 extending downwardly through a plug 91 in bracket 88, and is biased to the locking position by a spring 90. A pin 92 engaging a longitudinal groove 93 in the side of keeper 87 maintains the latter properly aligned with notch 86. When retracted, the assembly is automatically latched by keeper 87 engaging in notch 86 of block 51.

Application of electric potential to electrode 17 is accomplished in the following manner, referring more particularly to Figs. 5 and 6. A source of potential is connected to one terminal of a normally closed switch 95 mounted on a bracket 96 secured to flange 46. This bracket serves as a pivot support for a channel shaped operator 97 engaging the stem 98 of switch 95. Operator 97 has pins 99 fitted in an outwardly

channeled ring 101 secured to the end of a rod 102. A spring 103 surrounds rod 102 and is disposed between ring 101 and flange 48 to bias rod 102 outwardly. The rod 102 extends inwardly through flange 48 and through a plate 104 secured to barrel 13, nuts 106 being secured to the rod inwardly of plate 104. The nuts 106 are so adjusted on rod 102 as to be engaged by plate 104 just before the assembly reaches its fully extended, or operative, position. Thereby, switch 95 is closed only when the lighter assembly is fully extended.

The other terminal of switch 95 is connected to the end of a conductor 107 mounted through an insulator 108 secured in flange 48. Conductor 107 is bent laterally and then parallel with electrode 17. The end of this electrode beyond insulator 38 is electrically connected to a spring brush 110 bearing against conductor 107. Thus, as the electrode assembly is advanced and retracted, the sliding contact 110 maintains connection between conductor 108 and electrode 17.

The operation of the elements so far described is as follows: With the assembly in the retracted position, air is admitted to cylinder 41 through pipe 76. This moves piston 42 to the right, or inwardly. As the piston reaches its limit of movement, port 68 in rod 52 registers with fuel admission chamber 55 and fuel is thereby admitted to pipe 14, being sprayed from the atomizing tip of the fuel pipe. At the same time, plate 104 will have engaged nuts 106 to pull rod 102, compressing spring 103 and swinging operator 97 to close switch 95. This applies a high potential between electrodes 16 and 17 to provide the ignition spark.

In retracting the assembly, the fuel supply is interrupted and air is supplied to pipe 76. As piston 42 moves outwardly, 104 disengages nuts 106 allowing switch 95 to open. At the same time, port 68 is moved out of registry with fuel chamber 55. At a point intermediate the extended and retracted positions of the assembly, port 68 passes beyond the outermost sealing rings 61 and is in communication with the inner end of cylinder 41. Some of the pressure air being supplied to this end of the cylinder enters through port 68 into pipe 14 and is discharged outwardly through the atomizing tip. This pressure air purges the fuel pipe and its tip of any residual fuel or foreign matter. Furthermore, such purging takes place automatically during each retraction of the assembly without use of any mechanical or electro-mechanical air valves being needed. Thereby, defective operation due to failure of control valves under conditions of high temperature is completely avoided, thus increasing the reliability of the lighter assembly.

The control arrangements for the lighter are illustrated in the schematic diagram of Fig. 7. Referring to this figure, control is effected through the medium of a "start" contactor 120 and a "stop" contactor 130. Power is supplied from a supply line 121 having in one leg a switch 122 which is interlocked with the draft fan control of the furnace in such manner that transformer 125 will be energized only when the draft fan controls are started.

Secondary winding 126 supplies power to conductors 127, 128 for one group of lighter assemblies 10. Leads 131 may be provided for the energization of additional lighter assemblies. The "start" contactor 120 is operated by means of push button 135. One terminal of push button 135 is connected to conductor 127 through conductor 132, normally closed contact g of the "stop" contactor 130, conductor 134, a pressure operated switch 136 and conductor 137. Switch 136 is operated by the pressure of the fuel oil supply effective in branch line 138, and is so set that the switch will be closed only when the fuel oil pressure is at a predetermined value, such as 100 p. s. i. The other terminal of switch 135 is connected by a conductor 139 to one terminal of the contactor operating coil 140 whose other terminal is connected to line 128. When button 135 is depressed, contactor 120 is operated closing its several normally open contacts.

Closure of contact a keeps a holding circuit around push button 135 so that the latter may be released. Contacts b and c connect the secondary potential to conductors 141 across which are connected the operating coil 142 of a solenoid operated oil valve 143 and the operating coil 144 of an air selector 145. When valve 143 is open, oil under pressure is supplied from inlet line 146 to main 147 and pipe 60 connected to member 45 and in communication with fuel chamber 55. Energization of coil 144 rotates valve 145 90° counterclockwise from the illustrated position to connect air pipe 78 to air line 148 and connect air pipe 76 to exhaust. Closure of contacts d and e connects the secondary line potential to conductors 151. Connected across these conductors is the operating coil 152 of an air valve 153 disposed between air line 148 and air supply pipe 154, a filter 155 being provided in advance of valve 153. The ignition transformers 156 are also connected to lines 151 through the medium of safety switches 157. Switches 157 provide for disconnection of the lighter assemblies from the electric potential source so that the assemblies may be inspected, cleaned, or repaired without risk of electric shock to the maintainer. However, potential is not applied to the electrodes until such time as switch 95 has been closed by inward movement of the lighter assembly to connect conductor 107 to its ignition transformer. Contacts f are included in an interlock arrangement with the push button control for the energizing circuit of the pulverizer supplying fuel to the main burner 15, the arrangement being such that, when the pulverizer has been started by contacts f, the circuit will remain closed even though contacts f are reopened.

Retraction of the lighter assembly is effected by depressing push button 160 to energize "stop" contactor 130. Push button 160 has one terminal connected to line 127 through conductor 132. A conductor 161 connects the other push button terminal to the operating coil 162 of the "stop" contactor, the other terminal of the energizing coil being connected to line 128 through a conductor 163. When coil 162 is energized, it opens normally closed contacts g and closes contacts h, j, k and l. Opening of contact g breaks the holding circuit of the "start" contactor. Contacts h and k, which are connected to the secondary transformer circuits 132 and 163, energize the air valve coil 152 through conductors 164. Air valve 145, when the "start" contactor is deenergized, will have returned to the position illustrated in Fig. 7 in which pipe 76 is connected to the pressure air and pipe 78 is vented. Thus, the mechanism 40 will retract the lighter assembly, with the pressure air discharging through fuel pipe 14 after the assembly reaches a position intermediate its operative and inoperative positions. Such retraction will also open the switch 95 to dis-

connect the energizing potential from electrode 17. The normally closed contact *m* is a slow release contact controlled by a coil 165. This coil is energized when contacts *j* and *n* are closed, contact *l* in series with contact *m* completing a holding circuit for "stop" contactor around the push button 160. After a preset interval, which is determined in accordance with the desired length of air purge time, contact *m* opens breaking the holding circuit for the "stop" contactor and restoring all of the elements to the position shown in Fig. 7.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the invention principles, it will be understood that the invention may be otherwise embodied without departing from such principles.

I claim:

1. A fuel lighter comprising, in combination, a fuel pipe; pressure fluid operating means operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said operating means; a source of fuel; means operable only in the operative position of said fuel pipe to establish a connection between said source of fuel and said fuel pipe; and means operable, when said pressure fluid is acting on said operating means to retract said fuel pipe toward said retracted position and said fuel pipe is in a position intermediate said retracted and extended positions, to establish communication between said source of pressure fluid and said fuel pipe to purge the latter of residual fuel.

2. A fuel lighter comprising, in combination, a fuel pipe; pressure fluid operating means operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said operating means; a source of fuel; means operable only in the operative position of said fuel pipe to establish a connection between said source of fuel and said fuel pipe; and means, including said operating means operable, when said pressure fluid is acting on said operating means to retract said fuel pipe toward said retracted position and said fuel pipe is in a position intermediate said retracted and extended positions, to establish communication between said source of pressure fluid and said fuel pipe to purge the latter of residual fuel.

3. A fuel lighter comprising, in combination, a fuel pipe; a pressure fluid operated cylinder and piston arrangement operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said cylinder on either side of said piston; a source of fuel; means operable only in the operative position of said fuel pipe to establish a connection between said source of fuel and said fuel pipe; and means operable, when said pressure fluid is acting on said piston to retract said fuel pipe toward said retracted position and said fuel pipe is in a position intermediate said retracted and extended positions, to establish communication between said cylinder on the pressure side of said piston and said fuel pipe to purge the latter of residual fuel.

4. A fuel lighter comprising, in combination, a fuel pipe having port means therein; a cylinder; a piston in said cylinder connected to said fuel pipe and operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said cylinder on either side of said piston; a source of fuel; and means operable only in the operative position of said fuel pipe to establish a connection between said source of fuel and the port means in said fuel pipe; the fuel pipe port means communicating with the interior of said cylinder when said fuel pipe is between said retracted position and a position intermediate said retracted and extended positions whereby, when the pressure fluid is acting on said piston during the latter portion of the retraction stroke of said piston, pressure fluid will enter said fuel pipe to purge the latter of residual fuel.

5. A fuel lighter comprising, in combination, a fuel pipe having port means therein; a cylinder; a piston in said cylinder connected to said fuel pipe and operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said cylinder on either side of said piston; a source of fuel; and a fuel chamber embracing said pipe beyond said cylinder and connected to said source of fuel, said chamber being so located as to register with said port means only in the extended position of said fuel pipe; the fuel pipe port means communicating with the interior of said cylinder when said fuel pipe is between said retracted position and a position intermediate said retracted and extended positions whereby, when the pressure fluid is acting on said piston during the latter portion of the retraction stroke of said piston, pressure fluid will enter said fuel pipe to purge the latter of residual fuel.

6. A fuel lighter comprising, in combination, a fuel pipe having port means therein intermediate its ends and a fuel passage extending from the port means to the outer end of the fuel pipe; a cylinder; a piston in said cylinder connected to said fuel pipe and operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said cylinder on either side of said piston; a source of fuel; and a fuel chamber embracing said pipe beyond said cylinder and connected to said source of fuel; said port means being so located relative to said cylinder and fuel chamber as to register with said chamber only in the extended position of the fuel pipe and to communicate with the cylinder interior when the fuel pipe is between its retracted position and a position intermediate its retracted and extended positions; whereby fuel will enter said pipe only in the extended position of the latter and, when the pressure fluid is acting on said piston during the latter portion of the retraction stroke of said piston, pressure fluid will enter said fuel pipe to purge the latter of residual fuel.

7. A fuel lighter comprising, in combination, a fuel pipe having port means therein intermediate its ends and a fuel passage extending from the port means to the outer end of the fuel pipe; a cylinder; a piston in said cylinder connected to said fuel pipe and operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective

communication with said cylinder on either side of said piston; a source of fuel; a fuel chamber embracing said pipe beyond said cylinder and connected to said source of fuel; said port means being so located relative to said cylinder and fuel chamber as to register with said chamber only in the extended position of the fuel pipe and to communicate with the cylinder interior when the fuel pipe is between its retracted position and a position intermediate its retracted and extended positions; whereby fuel will enter said pipe only in the extended position of the latter and, when the pressure fluid is acting on said piston during the latter portion of the retraction stroke of said piston, pressure fluid will enter said fuel pipe to purge the latter of residual fuel; fuel ignition means in operative relation with the outer end of said fuel pipe; a source of electric potential; a normally open switch connected between said potential source and said ignition means; and a switch operator controlled by said fuel pipe and operable to close said switch only when said fuel pipe is fully extended.

8. A fuel lighter comprising, in combination, a fuel pipe; pressure fluid operating means operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said operating means; a source of fuel; means operable only in the operative position of said fuel pipe, to establish a connection between said source of fuel and said fuel pipe; means operable, when said pressure fluid is acting on said operating means to retract said fuel pipe toward said retracted position, to establish communication between said source of pressure fluid and said fuel pipe to purge the latter of residual fuel; fuel ignition means in operative relation with the outer end of said fuel pipe; a source of electric potential; a normally open switch connected between said potential source and said ignition means; and a switch operator controlled by said fuel pipe and operable to close said switch only when said fuel pipe is fully extended.

9. A fuel lighter comprising, in combination, a fuel pipe; pressure fluid operating means operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said operating means; a source of fuel; means operable only in the operative position of said fuel pipe, to establish a connection between said source of fuel and said fuel pipe; means operable, when said pressure fluid is acting on said operating means to retract said fuel pipe toward said retracted position and said fuel pipe is in a position intermediate said retracted and extended positions, to establish communication between said source of pressure fluid and said fuel pipe to purge the latter of residual fuel; releasable latch means associated with said pipe and operable to releasably latch the pipe in its retracted position; fuel ignition means in operative relation with the outer end of said fuel pipe; a source of electric potential; a normally open switch connected between said potential source and said ignition means; and a switch operator controlled by said fuel pipe and operable to close said switch only when said fuel pipe is fully extended.

10. A fuel lighter comprising, in combination, a fuel pipe having port means therein intermediate its ends and a fuel passage extending from the port means to the outer end of the fuel pipe; a cylinder; a piston in said cylinder connected to said fuel pipe and operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said cylinder on either side of said piston; a source of fuel; a fuel chamber embracing said pipe beyond said cylinder and connected to said source of fuel; said port means being so located relative to said cylinder and fuel chamber as to register with said chamber only in the extended position of the fuel pipe and to communicate with the cylinder interior when the fuel pipe is between its retracted position and a position intermediate its retracted and extended positions; whereby fuel will enter said pipe only in the extended position of the latter and, when the pressure fluid is acting on said piston during the latter portion of the retraction stroke of said piston, pressure fluid will enter said fuel pipe to purge the latter of residual fuel; releasable latch means associated with said pipe and operable to releasably latch the pipe in its retracted position; fuel ignition means in operative relation with the outer end of said fuel pipe; a source of electric potential; a normally open switch connected between said potential source and said ignition means; and a switch operator controlled by said fuel pipe and operable to close said switch only when said fuel pipe is fully extended.

11. A fuel lighter comprising, in combination, a fuel pipe having port means therein intermediate its ends and a fuel passage extending from the port means to the outer end of the fuel pipe; a cylinder; a piston in said cylinder connected to said fuel pipe and operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said cylinder on either side of said piston; a source of fuel; a housing secured to the outer end of said cylinder and having an axial passage receiving said fuel pipe; a fuel chamber within the housing passage and embracing the fuel pipe; means connecting said chamber to said source of fuel; a fuel chamber embracing said pipe beyond said cylinder and connected to said source of fuel; said port means being so located relative to said cylinder and fuel chamber as to register with said chamber only in the extended position of the fuel pipe and to communicate with the cylinder interior when the fuel pipe is between its retracted position and a position intermediate its retracted and extended positions; whereby fuel will enter said pipe only in the extended position of the latter and, when the pressure fluid is acting on said piston during the latter portion of the retraction stroke of the piston, pressure fluid will enter the fuel pipe to purge the latter of residual fuel.

12. A fuel lighter comprising, in combination, a fuel pipe having port means therein intermediate its ends and a fuel passage extending from the port means to the outer end of the fuel pipe; a cylinder; a piston in said cylinder connected to said fuel pipe and operable to advance and retract said fuel pipe between a retracted inoperative position and an extended operative position; a source of pressure fluid in selective communication with said cylinder on either side of said piston; a source of fuel; a housing secured to the outer end of said cylinder and having an axial passage receiving said fuel pipe; a fuel chamber within the housing passage and embracing the

fuel pipe; means connecting said chamber to said source of fuel; and sealing means in said passage engaging the surface of said fuel pipe; a fuel chamber embracing said pipe beyond said cylinder and connected to said source of fuel; said port means being so located relative to said cylinder and fuel chamber as to register with said chamber only in the extended position of the fuel pipe and to communicate with the cylinder interior when the fuel pipe is between its retracted position and a position intermediate its retracted and extended positions; whereby fuel will enter said pipe only in the extended position of the latter

and, when the pressure fluid is acting on said piston during the latter portion of the retraction stroke of the piston, pressure fluid will enter the fuel pipe to purge the latter of residual fuel.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,047,523	Scranton et al.	July 14, 1936
2,382,483	Holden	Aug. 14, 1945
2,596,944	Shellenberger et al.	May 13, 1952