March 26, 1929. R. M. G. PHILLIPS 1,706,704

SAFETY SYSTEM FOR BURNING FUEL OIL UNDER PRESSURE

Filed April 1, 1927 5 Sheets-Sheet 1

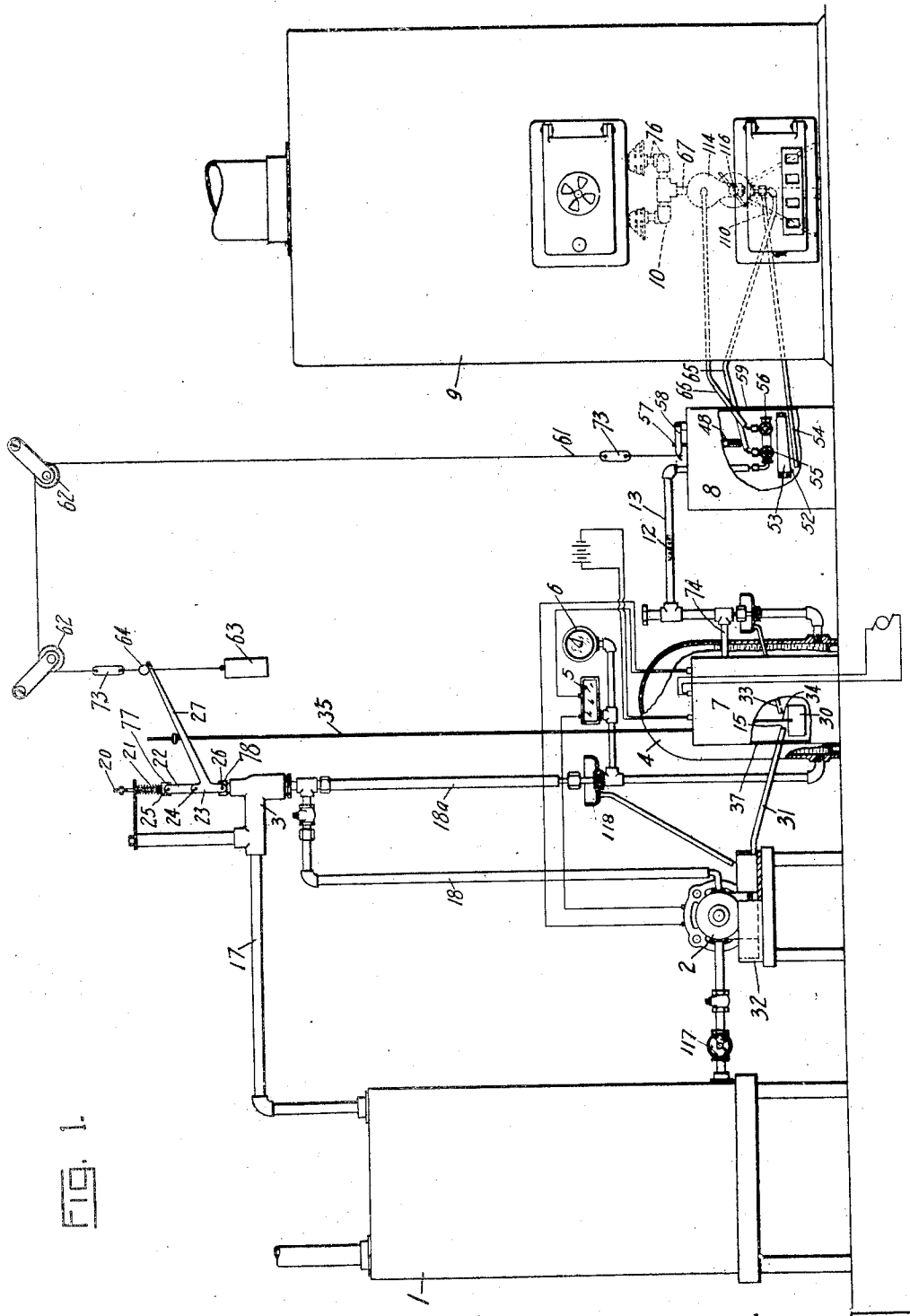


FIG. 1.

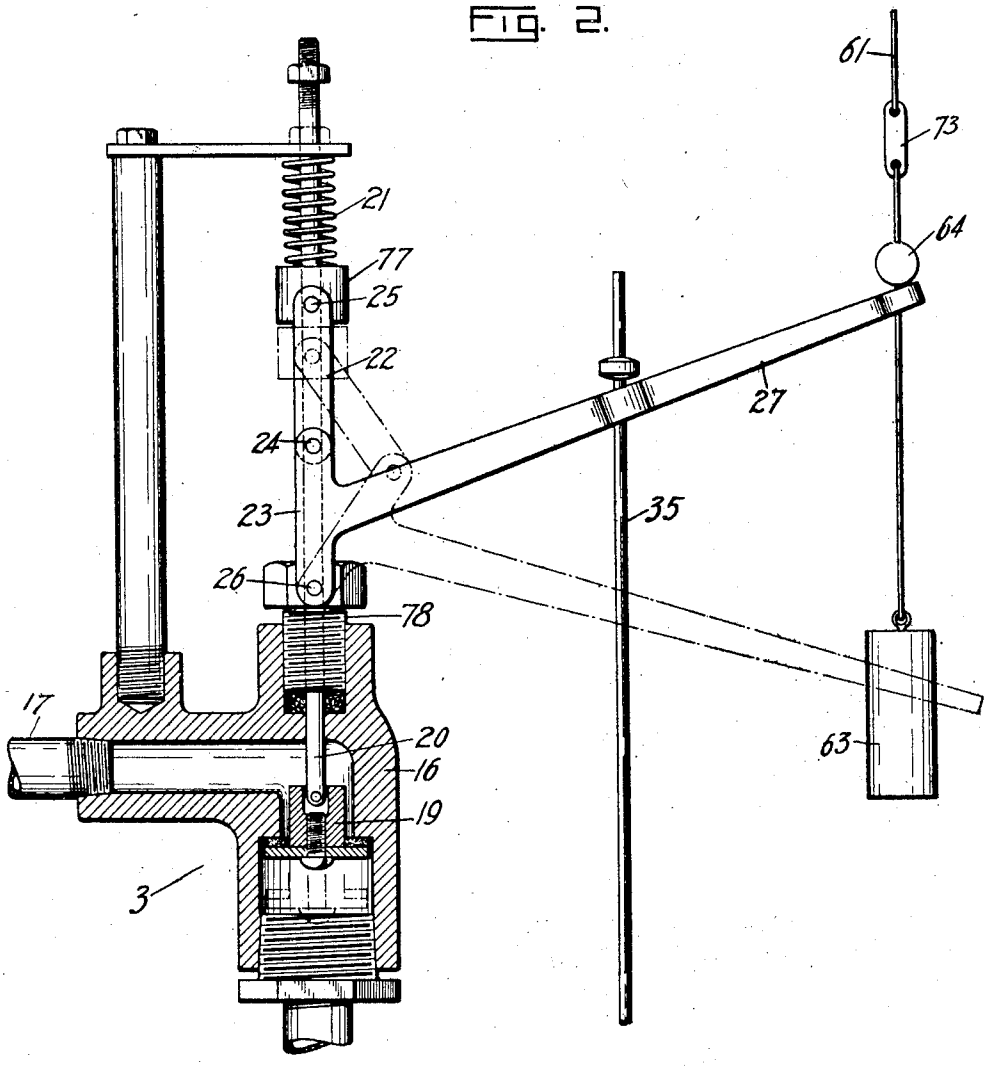
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ROSS M. G. PHILLIPS
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SAFETY SYSTEM FOR BURNING FUEL OIL UNDER PRESSURE

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Fig. 2.



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SAFETY SYSTEM FOR BURNING FUEL OIL UNDER PRESSURE

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FIG. 3A.

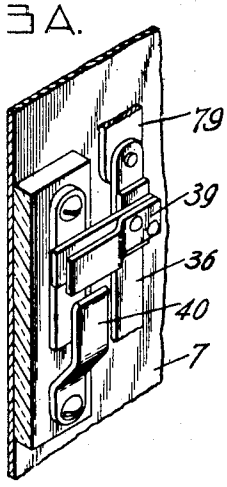
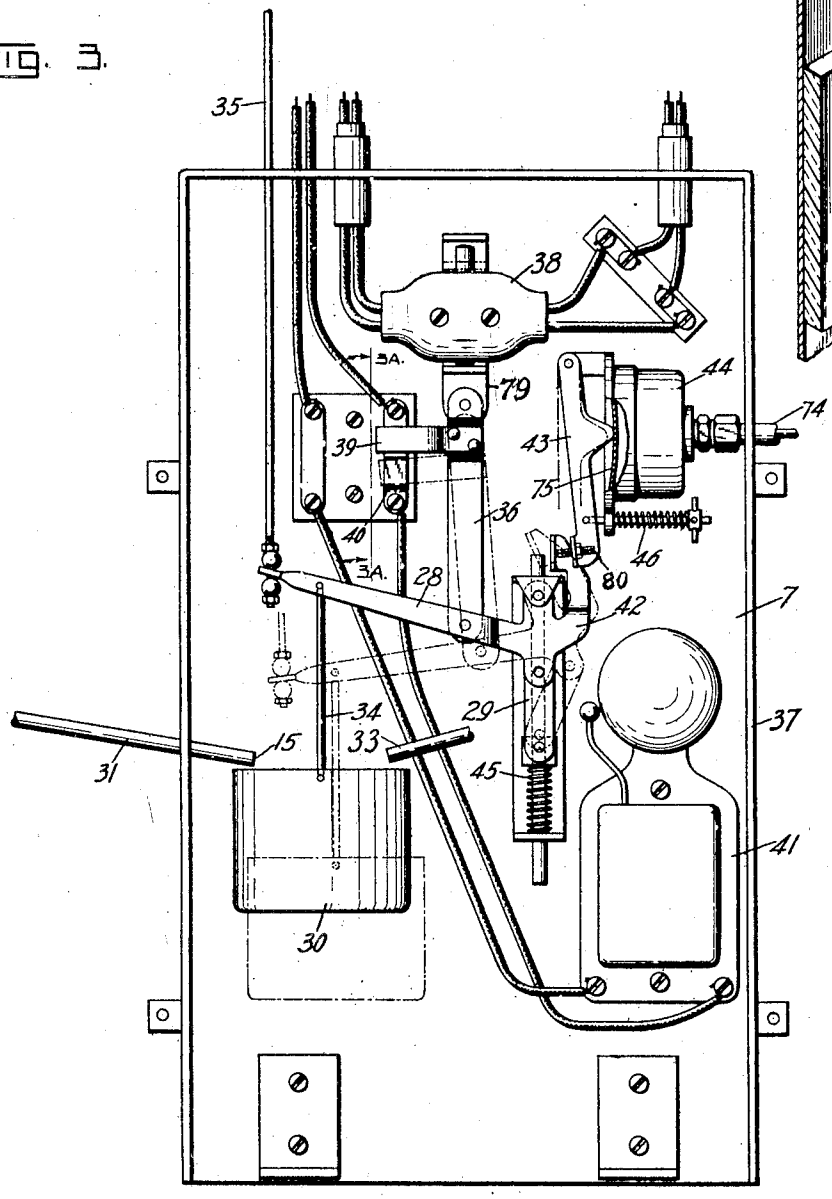


FIG. 3.



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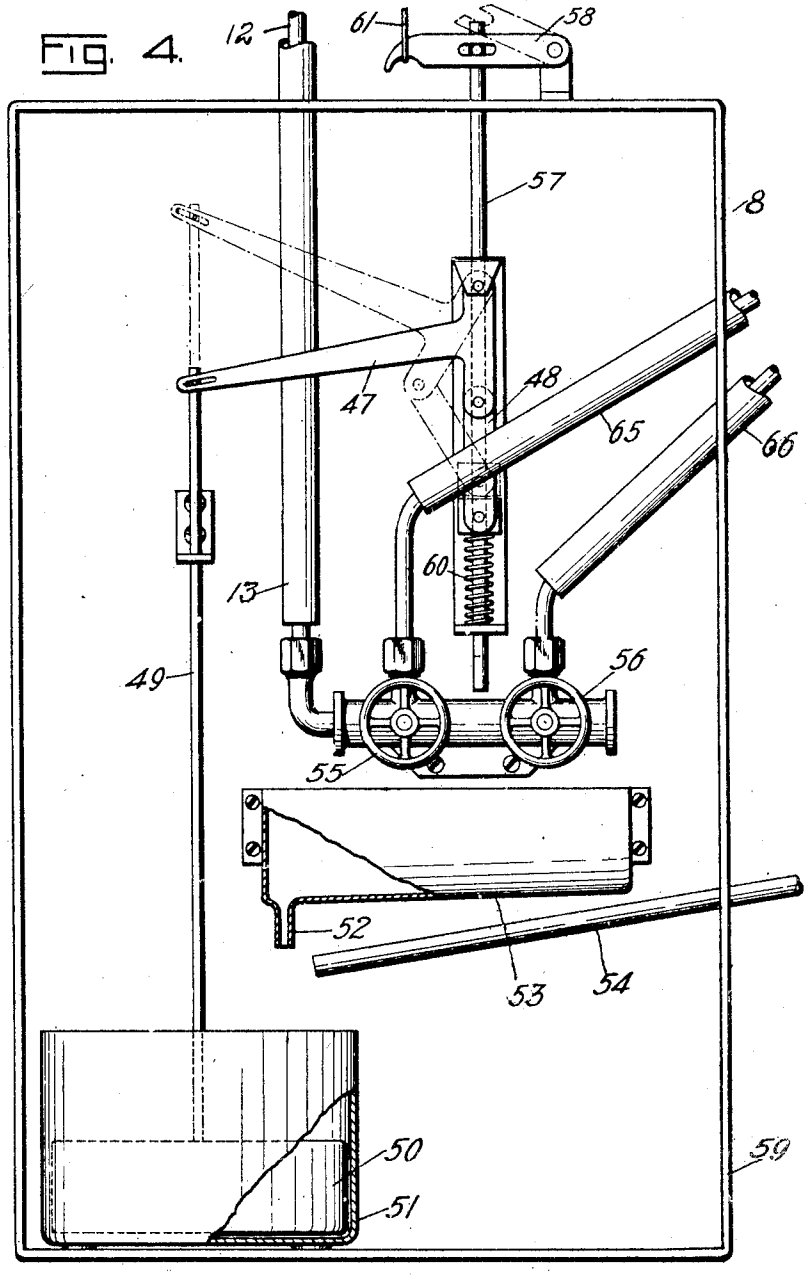
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SAFETY SYSTEM FOR BURNING FUEL OIL UNDER PRESSURE

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Fig. 4.



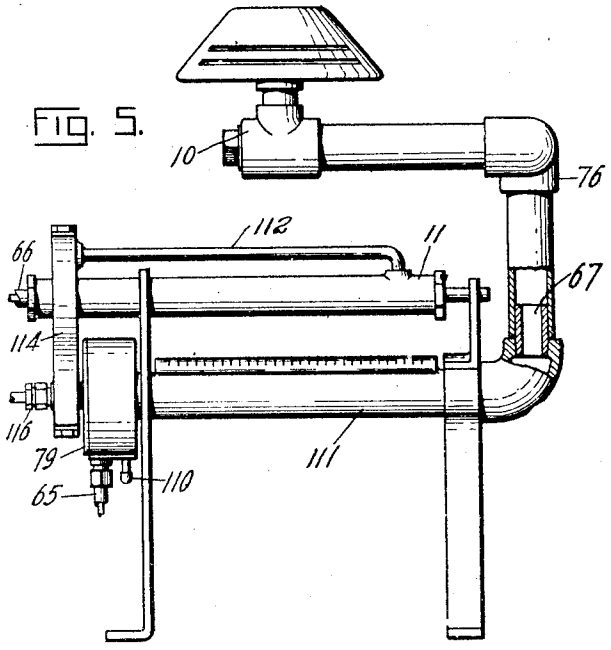
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SAFETY SYSTEM FOR BURNING FUEL OIL UNDER PRESSURE

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Fig. 5.



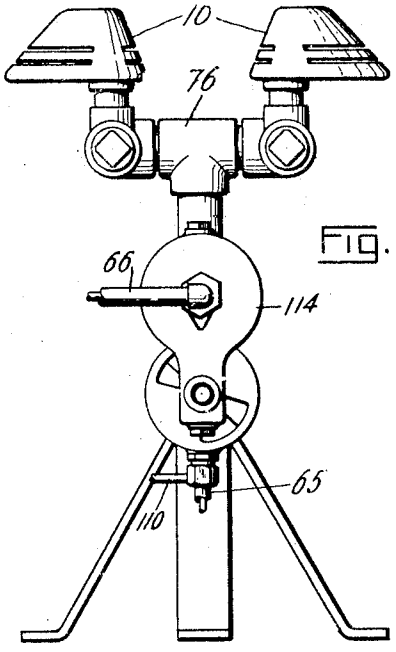


Fig. 6.

Fig. 7.

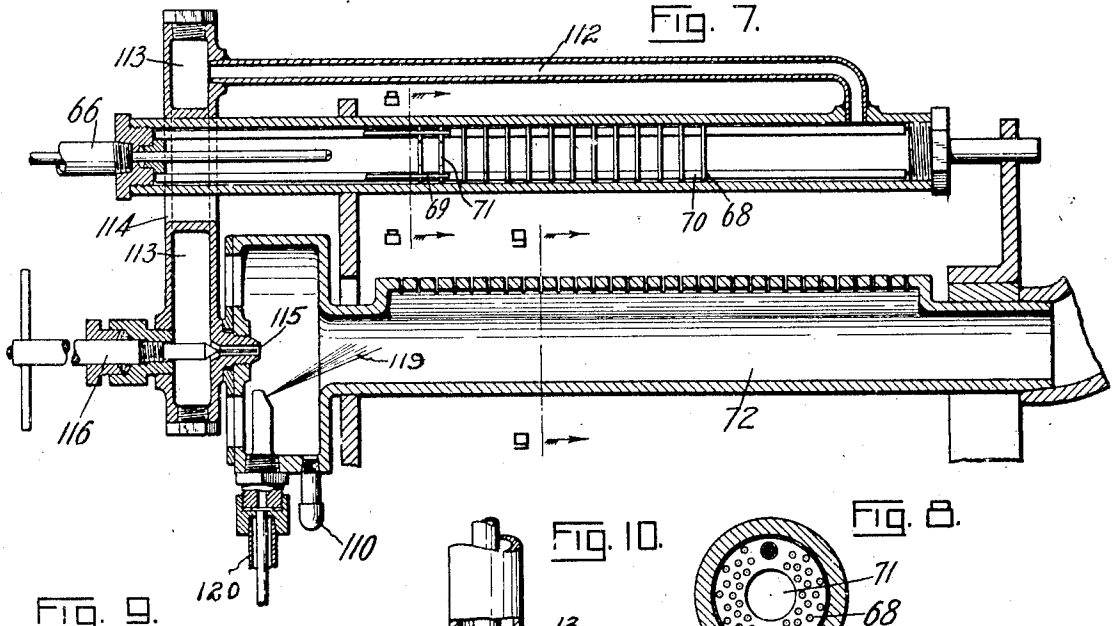


Fig. 9.

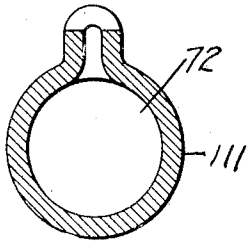


Fig. 10.

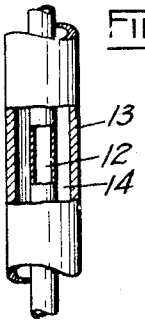


Fig. 8.

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Patented Mar. 26, 1929. 1,706,704

UNITED STATES PATENT OFFICE.

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SAFETY SYSTEM FOR BURNING FUEL OIL UNDER PRESSURE.

Application filed April 1, 1927. Serial No. 180,272.

This invention relates to improvements in safety systems for burning fuel oil under pressure, and an object of the invention is to provide a safe means whereby the burning of fuel oil under pressure may be substituted for the burning of coal or other fuel in connection with the use of furnaces and the like. In carrying out this general object, further specific objects are to provide in connection with the fuel oil source of supply and the conduit therefrom to the burner, a safety release mechanism whereby upon any irregularity in the pressure flow of the fuel oil in the conduit, such as excessive pressure, over-supply, or escape of fuel oil, said flow will be automatically diverted and returned to the source of supply; to provide a fuel oil conduit extending from the source of supply to the burner and adapted in the event of leakage anywhere therein, to care for the safe storage of the escaping fuel oil and by means of the storage thereof, to automatically operate a safety release adapted to divert and return the fuel oil from the conduit to the source of supply; to provide a gravity tripping mechanism that shall include a movable container which will receive the escaping fuel oil from the pump and the supply conduit, the predetermined weight of such fuel oil being adapted to operate through tripping mechanism a safety release to divert and return the fuel oil from the supply conduit to the source of supply; to provide, in the event of excessive pumping of fuel oil into the air pressure tank forming a part of the supply conduit, means by which a diaphragm provided by a safety pressure cylinder connected with the pressure tank may operate the gravity tripping mechanism independently of the weight of stored fuel oil within the movable container; to provide a float tripping mechanism, including a fixed container and a float therein, adapted to be raised by the storage of fuel-oil escaping from the supply conduit, the pressure oil burner, or the fuel oil supply valves to the generator and the burner, and received by the container, the raising of the float being adapted to operate by means of the tripping mechanism, the safety release to divert and return the fuel oil from the supply conduit and connected parts to the source of supply; to provide a pressure fuel oil burner adapted to be readily disassembled for easy installation through the door of and within the ash pit of a furnace of ordinary construction; to provide a generator in connection with the pressure fuel oil burner, having carbon catchers therein; and to provide electrical means whereby when the pressure flow of fuel oil is automatically diverted and returned from the supply conduit and connected parts to the source of supply through the happening of any of the contingencies provided for, an alarm will be sounded to indicate that the burner is no longer lighted.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain features of novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings and particularly pointed out wherein patentable novelty is claimed, it being understood that within the scope of what hereinafter thus is claimed various changes in form, proportion, size, and minor details of the construction, can be made without departing from the spirit or modifying any of the advantages of the invention.

The following is the description of an embodiment of the invention, reference being had to the accompanying drawings in which—

Figure 1 is an elevation of the associated elements embraced in the system;

Figure 2 is an elevation of the safety release mechanism;

Figure 3 is an elevation of the gravity tripping mechanism;

Figure 3ª is a perspective view of the slide switch, the parts in section being taken generally upon lines 3ª—3ª of Figure 3;

Figure 4 is an elevation of the float tripping mechanism;

Figure 5 is an elevation of the pressure fuel oil burner including the generator;

Figure 6 is an end elevation of the burner and generator;

Figure 7 is an elevation on an enlarged scale of the generator, partly in section;

Figure 8 is a cross sectional elevation of a portion of the generator, taken upon line 8—8 of Figure 7;

Figure 9 is a similar view taken generally upon line 9—9 of Figure 7; and

Figure 10 is a fragmentary view of a section of the fuel oil supply conduit.

Referring more particularly to the draw-

ings, in which similar parts are similarly numbered, the invention provides a pressure fuel oil burning system, which in addition to the certain well known employment of safety fuses, the destruction of which by excessive heat operates to discontinue the supply of fuel oil to the burner introduces novel means whereby oil supplied to the burner under pressure may be used as a fuel without the previously attending hazards due to the leakage in the supply conduit and connected parts, excessive pressure, overflow and other reasons. The system embraces a source of supply which is illustrated as a supply tank 1, a pump 2, a safety release mechanism 3, a pressure tank 4, a pressurestat 5, a gauge 6, a gravity tripping mechanism 7, a float tripping mechanism 8, a furnace 9, a pressure fuel oil burner 10, a generator 11, and pipe connections including that section of the supply conduit 12 which is enclosed within a larger conduit 13 providing a chamber 14 between the inner and outer conduits, which chamber 14 leads to both of the tripping mechanisms 7 and 8 hereinafter more fully described. Figure 1 illustrates generally the relation of some of these elements. The tripping mechanisms 7 and 8 form important parts of the system and while one is illustrated as operated by a gravity weight and the other by a buoyant float, it is not intended that either shall be confined to its illustrated mode of operation as a distinguishing feature. The tripping mechanism 7 is placed near the pressure tank 4 and the pump 2 as a matter of convenience; for the outlet 15 of the pipe 31 for the fuel oil escaping from the pump 2, as well as one end of the chamber 14 surrounding the supply conduit 12, a section of which is illustrated in Figure 10, terminates at and effects this mechanism as does also a diaphragm 75 of safety pressure cylinder 44 provided by the pressure tank 4. In Figure 2 the safety release mechanism 3 comprises a one-way valve 16 located at the junction of the pipe 17 connected at one end to the supply tank 1 and the supply conduit 18 leading from the pump 2. Normally this valve 16 is closed so that the impulses of the pump 2 force the flow of fuel oil past the closed valve 16 and along on its course to the pressure tank 4. Connected to the gate 19 of the valve 16 is a rod 20 which against the tension of coiled spring 21 may be made to maintain the gate 19 in closed position. The toggle mechanism comprises links 22 and 23 pivotally connected by pivot 24. The upper end of the link 22 is pivotally connected with the fixed collar 77 by pivot 25 while the link 23 is pivotally connected by the pivot 26 to an adjustable plug 78 connected with the valve 16. The arm 27 connected with the link 23 extends at an angle therefrom. When the arm 27 is operated to the position of the dotted line in the same figure the link 23 is thereby swung upon its pivot 26, its other end carrying with it the lower end of the link 22 to which the link 23 is pivoted by the pivot 24. As the links 22 and 23 can take these positions only by shortening the distance between the pivots 26 and 25, the toggle action moves the rod 20 with the aid of the spring 21 to move the gate 19 to its open position. With the valve 16 thus opened the impulses of the pump 2, if continued, will force the fuel oil along the course of the least resistance through the open valve 16 and by way of pipe 17, back to the supply tank 1; for the fuel oil in the pressure tank 4 and its connections leading to the burner 10 having been under pressure while the valve 16 was closed, reacts now that the valve 16 is open and such reaction releasing the pressure, causes the return of the fuel oil therein to the supply tank 1 as the source of supply. In Figure 3 the gravity mechanism 7 comprises an arm 28 extending from the toggle 29 of similar construction to that of the safety release toggle above described, but mounted in reverse position and adapted for the two extreme positions illustrated by full and dotted lines. Suspended from the arm 28 by the rod 34 is a container 30, the weight of which alone is insufficient to operate the arm 28 to such dotted position, when, however, a predetermined quantity of escaped fuel oil is stored therein and thus reclaimed through the medium of the pipe 31 leading from the pump overflow basin 32 and pipe 33 leading from the chamber 14 surrounding the supply conduit 12, the additional weight thereof gravitates the container 30 and moves such arm to its dotted position. This action operates the safety release mechanism through the medium of the rod 35 to divert and return the fuel oil from the pressure supply tank 4 and its connections to the supply tank 1, as above described. As the arm 28 rocks to the dotted position it actuates a sliding member 79 through the link 36 and operates an electric switch 38 to discontinue the motor, by means of which the pump 2 is operated. The electric connections for this switch are illustrated in Figure 1. Extending from this link 36 is a contact arm 39 adapted upon the movement of member 36 to which it is fixed to make an electrical connection with a switch member 40 to operate the alarm 41. The alarm mechanism is illustrated to include a bell but it may be a buzzer or any other approved form of alarm device. Independently from this gravity operation the arm 28 having an offset portion 42 adjacent to the toggle mechanism is adapted to be moved by a lever 43 mounted on the safety pressure cylinder 44 connected with the pressure tank 4 by the pipe 74 for the engagement with the offset portion 42 when the le-

ver 43 is moved through the action of the diaphragm 75, illustrated as forming the bottom of the cylinder 44. The normal action of the diaphragm is inwardly so that the abnormal compression of oil within the cylinder 44 will move the diaphragm outwardly when excessive pumping has delivered to the pressure tank 4 a greater pressure of fuel oil than the pressurestat is set for. The toggle mechanism 29 is provided with the spring 45 to aid the tripping movement and the lever 43 is provided with the adjustment spring 46 to help return such lever to its normal position. The screw 80 provides a convenient means for varying the relative timing of action of the arm 28.

In Figure 4 the float tripping mechanism 8 comprises the arm 47 associated with the toggle mechanism 48, the construction of which is similar to that of the mechanism 29.

The extreme positions of the arm 47 are illustrated by full and dotted lines. Suspended from the arm 47 by the rod 49 is a float 50 normally resting on the bottom of a fixed container 51. This container receives the escaped fuel oil which passes through the pipe 52 from the drip basin 53, thus reclaiming the escaped fuel oil from the chamber 14, the valves 55 and 56, and also through the pipe 54 leading from the burner 10 to reclaim a surplus supply. The accumulation of this fuel oil causes the float 50 to rise and when a predetermined quantity has been thus accumulated the float 50 will have risen sufficiently to lift through the medium of the rod 49, the arm 47, the toggle mechanism 48, and the rod 57, rocking the lever 58 mounted on the box 59 containing the float tripping mechanism. As the lever 58 is moved to its dotted position (see Figure 4), the cord 61 mounted on the pulleys 62 is slightly released to permit the gravity movement of the weight 63 which contacts a ball 64 or the like carried by the cord 61, with the arm 27 of the safety release mechanism 3 and thereby operates the valve 16 to divert and return the fuel oil from within the supply conduit and its connections to the supply tank 1. Connected with the valves 55 and 56 are the fuel oil supply pipes 65 and 66, respectively, leading to the electric generator (not shown) associated with the generator and the pressure fuel oil burner 10. The pressure fuel oil burner 10 is constructed for quick disassembly and assembly of the manifold for the convenience in passing the parts through the ash pit door of the furnace of ordinary construction to be readily set up within the ash pit and connected for use. For this purpose the pressure burner manifold 76 is adapted to slip over the tubing end 67. The generator 11 is provided with carbon catching disks 68 mounted on rods 69 extending through them, the disks being spaced apart by bushings 70 and having a center passage 71 therethrough. The auxiliary burner 111 is located directly under the generator 11 to furnish heat for the generation of gas for consumption by the fuel oil burner 10.

To start the heating system in operation, the pump 2 is set in motion by means of the motor attachement thereto and the supply valve 117 is opened to permit the pump to force fuel oil into the pressure tank 4, the valve 16 being closed, and from the pressure tank 4 under air pressure through the supply conduit 12 to the valves 55 and 56. The valve 55 is now opened and a supply of fuel oil passes through pipe 65 to the electric generator (not shown) of ordinary type and from thence through pipe 120 and is delivered in a vapor spray 119 to the mixing chamber 72 in the auxiliary burner 111. This is now lighted manually and permitted to burn until the generator 11 is heated. The valve 56 is now opened and fuel oil passes through pipe 66 to the generator 11. This oil is vaporized by contact with the heated generator 11, rises and travels through conduit 112 to chamber 113 in standard 114, through the jet 115 into the mixing chamber 72 and to the burner 10 through the tube 67 and manifold 76. The valve 55 is closed after the valve 56 is opened. A needle valve 116 of any preferred construction determines the volume of vapor admitted to the mixing chamber 72.

In the operation of the multiple safety means which the system introduced by the invention affords, let us first suppose that through excessive heat either of the safety fuses 73 associated with the cord 61 is destroyed. The weight 63 is thereby released, drops, and contacts the ball 64 carried by the cord 61 with the arm 27 thereby operating the safety release mechanism to open the valve 16 and therethrough and through the pipe 17 to divert and return from the pump 2 and supply conduit 12 and its connections the fuel oil back to the tank 1 and releasing all pressure in the pressure tank 4 and pipe connections to the burner 10 and putting out the fire in the burner 10. Again let us suppose that through the escaped and reclaimed fuel oil from the pump 2 or from one end of the chamber 14 surrounding the conduit the gravity container 30 receives the predetermined quantity of reclaimed fuel oil. The container 30 will then drop and through the medium of the rod 34 and the arm 28 the toggle mechanism 29 will move the rod 35 and hence the safety release mechanism 3 to open the valve 16 to divert and return from the pump 2 the supply conduit 12 and its connections the fuel oil back to the supply tank 1, and releasing all pressure in the pressure tank 4 and pipe connections to the burner 10. As the arm 28 is rocked with the drop of the container 30, the sliding member 79

is moved, its movement operating the electric switch 38 to stop the motor attached to the pump 2. This movement of the member 36 electrically contacts the arm 39 carried thereby with the switch member 40 having wired connection with the alarm device 41 to sound an alarm indicating that the burners 10 and 111 are no longer lighted, the supply of fuel oil having been discontinued through the opening of the valve 16. Should the pump 2 provide an excessive supply of fuel oil to the pressure tank 4 the diaphragm 75, provided by the cylinder 44 connected with the pressure tank 4, will be sprung outwardly by the excessive high pressure within the tank 4 and communicated to the cylinder 44. This action of the diaphragm moves the lever 43 into engagement with the offset portion 42 of the arm 28 to trip the gravity tripping mechanism 7 independently of the means of operation provided by the gravity movement of the container 30. The pressurestat 5 ordinarily controls the pressure within the tank 4 by automatically stopping and starting the motor attached to the pump 2 when the pressure reaches the normal high and low points. Let us further suppose that none of the contingencies arise for which provision is made by the safety fuses 73 or by the different ways of tripping the gravity tripping mechanism 7, but that the fixed container 51 receives the predetermined quantity of reclaimed fuel oil from the drip basin 53 or the pipe 66 from the burner 10. The float will then rise and through the rod 49 the arm 47, the toggle mechanism 48, the rod 57, the lever 58, the cord 61, the weight 63, and the ball 64, the arm 27 of the safety release mechanism 3 is operated to open the valve 16 to divert and return from the pump 2 the supply conduit 12 and its connections, the fuel oil back to the supply tank 1 and releasing all pressure in the pressure tank 4 and the pipe connections to the burner 10. Thus every contingency requiring the care of escaping fuel oil through excessive pressure, leakage, over-supply or overflow is provided for by this system in combination with the safety fuses providing for the contingency arising through excessive heat.

The tank 4 is entirely closed at the top, the bottom being riveted and brazed therein or secured by any other preferred means. Oil is admitted and discharged from the tank near the bottom thereof. Thus, as the oil is pumped into the tank its level is above the top of the inlet and outlet pipes and when the amount pumped into the tank exceeds that drawn therefrom, the level of the top of the oil is raised. In such case the air between the top of the tank and the oil is compressed and exerts its pressure to force the oil from tank to the burner, where it is consumed. With this type of tank there can be no escape of air and the only possible leakage is of oil at the bottom of the tank, and is therefore visible. Heretofore in tanks of this type the oil was admitted at the top of the tank and thus it first passes through the air chamber; and again, the air gauge, pressurestats, etc., are usually connected directly with this tank at the top. Thus several openings are required at the top of the tank to accommodate fittings, for the purpose above indicated. All of these openings are possible sources of leakage of air from the tank whereby the pressure of air therein is reduced or entirely destroyed. This leakage being of air is not readily discovered.

What I claim as new is:—

1. A safety release for a fuel oil burning under pressure system, said system embracing a supply tank, a burner, and connections, including a pump and a pressure tank, between the supply tank and the burner to conduct fuel oil under pressure to the burner, said release comprising a one-way valve provided by a pipe connected at one end to the supply tank and at the other end coupled to said connections intermediate the pump and the pressure tank, the gate of the valve being controlled by a spring-pressed rod secured to the gate and extending exteriorly of the valve casing for a sliding movement through a rigid support provided by said pipe, the spring tension tending to maintain the gate in its open position; a tripping mechanism comprising a toggle pivotally connected to the rod and to the valve casing and thus adapted when in alignment with the rod to maintain the rod in valve closed position against its spring tension, the toggle having a rigid arm extending at an angle therefrom and adapted for a rocking movement to swing the toggle upon its valve pivot to collapse the toggle and to permit the spring-pressed rod to operate the valve gate to its open position, thus providing a short course of the least resistance for the pump-forced fuel oil back to the supply tank and at the same time providing a channel of escape for the fuel oil contained in the said connections under pressure; and automatic means for the operation of the arm, and hence the tripping mechanism, upon the happening of certain contingencies requiring care for the safe continuance of the heating system.

2. A gravity tripping mechanism for a safety fuel oil burning under pressure system, said system embracing a supply tank, a safety release, a burner, and connections, including a pump and a pressure tank between the supply tank and the burner, said tripping mechanism having a toggle pivoted to an upper rigid support provided by the base plate upon which the mechanism is mounted and to a shoulder carried by a spring-pressed rod extending through both the upper support and a lower rigid support

also provided by the base plate, the toggle while in alignment with the rod being adapted to maintain the rod in a position compressing its spring means; an arm associated rigidly with and extending at an angle from the toggle, the arm being adapted for a rocking movement upon the rigid support pivot to collapse the toggle, the collapse being aided by the release of the spring-pressed rod; and a gravity container associated with the arm and adapted upon receiving a predetermined quantity of escaped fuel oil reclaimed and stored therein to rock the arm by gravity and thus collapse the toggle, the arm operating through the medium of a rod, the safety release to provide by said release a channel of escape for the fuel oil under pressure from said connections.

3. A gravity tripping mechanism for a safety fuel oil burning under pressure system, said system embracing a supply tank, a safety release, a motor attached to a pump, a source of electrical power to operate the motor, a burner, and connections, including a pump and a pressure tank, between the supply tank and the burner to conduct fuel oil under pressure to the burner, this tripping mechanism comprising a toggle pivoted to an upper rigid support provided by the base plate upon which the mechanism is mounted and to a shoulder carried by a spring-pressed rod extending through both the upper support and a lower rigid support also provided by the base plate, the toggle while in alignment with the rod being adapted to maintain the rod in a position compressing its spring means; an arm rigidly associated with, and extending at an angle from the toggle the arm being adapted for a rocking movement upon the rigid support pivot to collapse the toggle, the collapse being aided by the release of the spring-pressed rod; a gravity container associated with the arm and adapted upon receiving a predetermined quantity of escaped fuel oil reclaimed and stored therein to rock the arm by gravity and thus collapse the toggle, the arm operating through the medium of the rod, the safety release to provide by said release a channel of escape for the fuel oil under pressure from said connections; and a sliding member associated with the base plate and connected with the arm and also with an electric switch controlling the motor, said member being adapted to disconnect and connect the source of electrical power from the motor as the arm is rocked.

4. A gravity tripping mechanism for a safety fuel oil burning under pressure system, said system embracing a supply tank, a safety release, a motor attached to a pump, an electric alarm device, a source of electrical power to operate the motor and the alarm device, a burner, and connections, including a pump and a pressure tank, between the supply tank and the burner to conduct fuel oil under pressure to the burner, this tripping mechanism having a toggle pivoted to an upper rigid support provided by the base plate upon which the mechanism is mounted and to a shoulder carried by a spring-pressed rod extending through both the upper support and a lower rigid support also provided by the base plate, the toggle while in alignment with the rod being adapted to maintain the rod in a position compressing its spring means; an arm rigidly associated with and extending at an angle from the toggle, the arm being adapted for a rocking movement upon the rigid support pivot to collapse the toggle, the collapse being aided by the release of the spring-pressed rod; a gravity container associated with the arm and adapted upon receiving a predetermined quantity of escaped fuel oil reclaimed and stored therein, to rock the arm by gravity and thus collapse the toggle, the arm operating through a rod, the safety release to provide a channel of escape for the fuel oil under pressure from said connections; a sliding member associated with the base plate and connected with the arm and with an electric switch controlling the motor, said member operating the switch as the arm is rocked; and a bifurcated contact member provided by the sliding member to contact upon the rocking of the arm, with a switch member associated with the base plate and electrically wired to the alarm device.

5. A gravity tripping mechanism for a safety fuel oil burning under pressure system, said system embracing a supply tank, a safety release, a burner, and connections, including a pump and a pressure tank between the supply tank and the burner to conduct fuel oil under pressure to the burner, this tripping mechanism having a toggle pivoted to an upper rigid support provided by the base plate upon which the mechanism is mounted and to a shoulder carried by a spring-pressed rod extending through both the upper support and a lower rigid support also provided by the base plate, the toggle while in alignment with the rod being adapted to maintain the rod in a position compressing its spring means; an arm rigidly associated with and extending at an angle from the toggle for a rocking movement upon the rigid support pivot to collapse the toggle, the collapse being aided by the release of the spring-pressed rod, the arm being provided with an offset portion adjacent the toggle; and a diaphragm provided by an air cylinder connected with the pressure tank and normally sprung inwardly, being adapted to be sprung outwardly by excessive pressure within the pressure tank and to engage through the medium of a lever mounted on the cylinder, the offset portion to operate

the arm and collapse the toggle, the arm operating through a rod the safety release to thereby provide a channel of escape for the fuel oil under pressure from said connections.

6. A float tripping mechanism for a safety fuel oil burning under pressure system, said system embracing a supply tank, a safety release, a burner, and connections, including a pump and a pressure tank between the supply tank and the burner to conduct fuel oil under pressure to the burner, this tripping mechanism having a toggle pivoted to an upper rigid support provided by the base plate upon which the mechanism is mounted and to a shoulder carried by a spring pressed rod extending through a lower rigid support also provided by the base plate and through the upper support to connect with an overhead lever, the toggle while in alignment with the rod being adapted to maintain the rod in a position compressing its spring means; an arm rigidly associated with and extending at an angle from the toggle for a rocking movement upon the rigid support pivot to collapse the toggle, the collapse being aided by the release of the spring-pressed rod advancing to operate the overhead lever; a fixed container provided by the base plate; and a float member normally resting within the container and associated with the arm, the float being adapted as the container accumulates a predetermined quantity of escaped fuel oil reclaimed and stored therein, to gradually rise, rock the arm and thereby collapse the toggle, the released spring-pressed toggle rod aiding the collapse and lifting the overhead lever and permitting a weight, connected thereto by a cord, to drop and through a member carried by the cord to operate the safety release, thereby providing a channel of escape for the fuel oil under pressure from said connections.

7. A tripping mechanism comprising a base plate; a toggle pivoted to the plate and to a shoulder carried by a spring pressed rod associated with the plate, the rod while the toggle is in alignment therewith being maintained in a position compressing its spring means; an arm rigidly connected with and extending at an angle from the toggle and adapted for a rocking movement upon the toggle base pivot to collapse the toggle, such collapse being aided by the release of the spring-pressed rod; and a gravity member associated with the arm and adapted to move the arm to trip the toggle at predetermined times, the movement of the arm being communicated to auxiliary mechanism.

8. A tripping mechanism comprising a base-plate; a toggle pivoted to the plate and to a shoulder carried by a spring-pressed rod associated with the plate, the rod while the toggle is in alignment therewith being maintained in a position compressing its spring means; an arm rigidly connected with and extending at an angle from the toggle and adapted for a rocking movement upon the toggle base pivot to collapse the toggle, such collapse being aided by the release of the spring-pressed rod; a gravity member associated with the arm and adapted to move the arm to trip the toggle at predetermined times; and connecting means between one of the parts moved by said collapse and an auxiliary mechanism adapted to communicate motion thereto.

9. A tripping mechanism comprising a base plate, a toggle pivoted to the plate and to a shoulder carried by a spring-pressed rod associated with the plate, the rod while the toggle is in alignment therewith being maintained in a position compressing its spring means; an arm rigidly connected with and extending at an angle from the toggle and adapted for a rocking movement upon the toggle base pivot to collapse the toggle, such collapse being aided by the release of the spring-pressed rod; and a diaphragm associated with a pressure tank and adapted to move the arm to trip the toggle at predetermined times, the movement of the arm being communicated to auxiliary mechanism.

10. A tripping mechanism comprising a base plate; a toggle pivoted to the plate and to a shoulder carried by a spring-pressed rod associated with the plate, the rod while the toggle is in alignment therewith being maintained in a position compressing its spring means; an arm rigidly connected with and extending at an angle from the toggle and adapted for a rocking movement upon the toggle base pivot to collapse the toggle, such collapse being aided by the release of the spring-pressed rod; a diaphragm associated with a pressure tank and adapted to move the arm to trip the toggle at predetermined times; and a connecting means between one of the parts moved by said collapse and an auxiliary mechanism adapted to communicate motion thereto.

11. A tripping mechanism comprising a base plate; a toggle pivoted to the plate and to a shoulder carried by a spring-pressed rod associated with the plate, the rod while the toggle is in alignment therewith being maintained in a position compressing its spring means; an arm rigidly connected with and extending at an angle from the toggle and adapted for a rocking movement upon the toggle base pivot to collapse the toggle, such collapse being aided by the release of the spring-pressed rod; and a float member associated with the arm and adapted to move the arm to trip the toggle when a container holding the float receives sufficient fluid to raise the float, the movement of the rod being communicated to auxiliary mechanism.

12. A tripping mechanism comprising a base plate; a toggle pivoted to the plate and to a shoulder carried by a spring-pressed rod associated with the plate, the rod while the toggle is in alignment therewith being maintained in a position compressing its spring means; an arm rigidly connected with and extending at an angle from the toggle and adapted for a rocking movement upon the toggle base pivot to collapse the toggle, such collapse being aided by the release of the spring-pressed rod; a float member associated with the arm and adapted to move the arm to trip the toggle when a container holding the float receives sufficient fluid to raise the float; and connecting means between one of the parts moved by said collapse and an auxiliary mechanism adapted to communicate motion thereto.

In testimony whereof, I have hereunto affixed my signature.

ROSS M. G. PHILLIPS.