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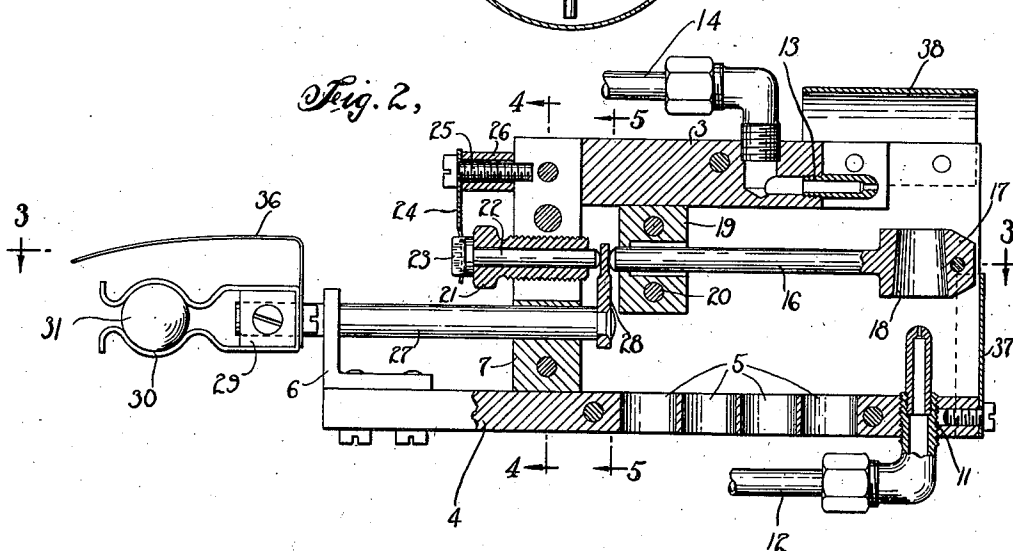
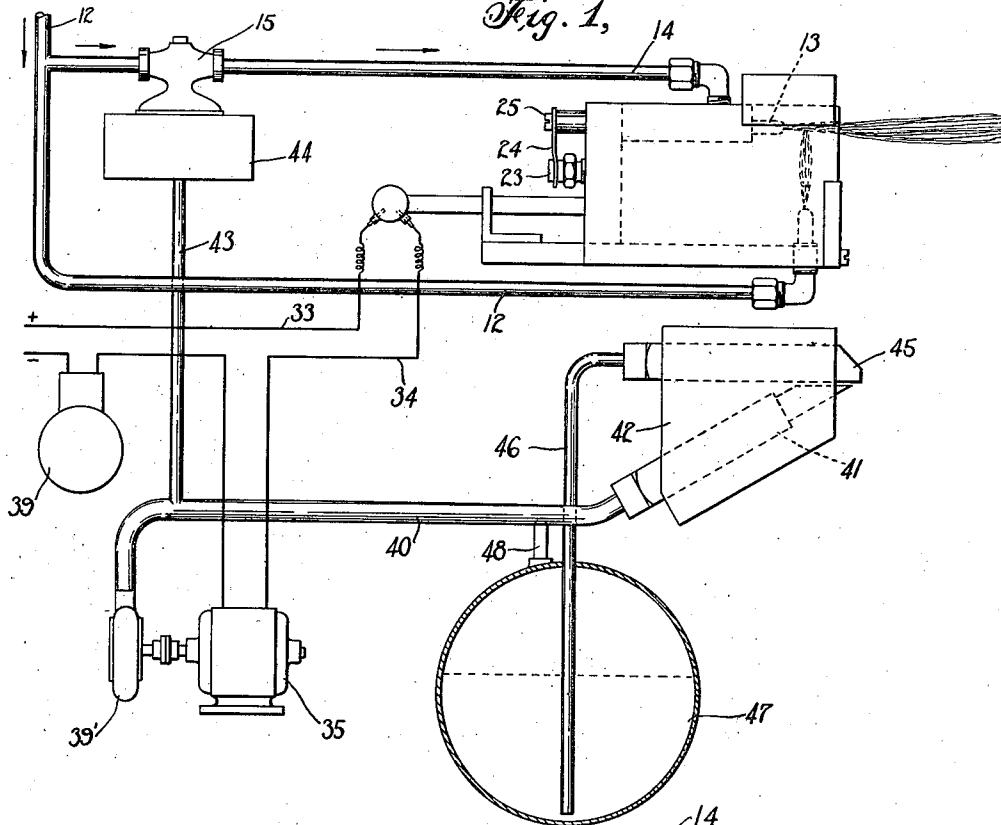
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J. S. STRING

HYDROCARBON BURNER SYSTEM

Filed Aug. 11, 1926

2 Sheets-Sheet 1



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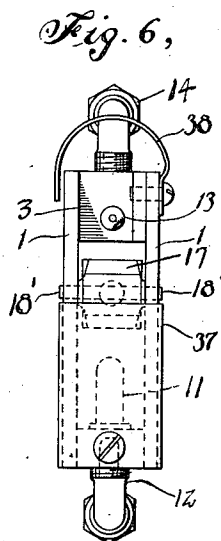
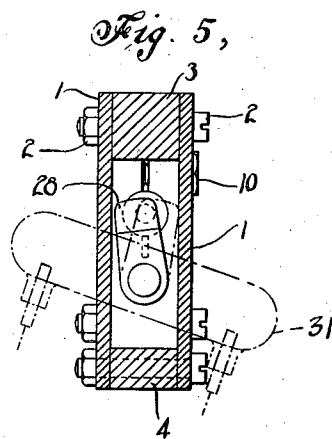
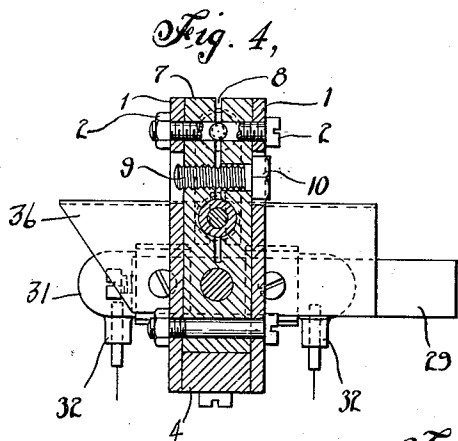
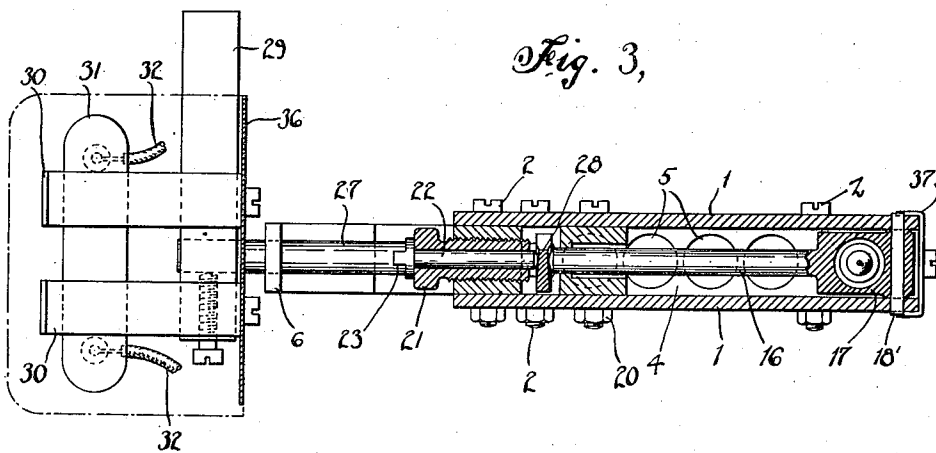
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UNITED STATES PATENT OFFICE.

JOSEPH S. STRING, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO J. S. & J. F. STRING INCORPORATED, OF NEWARK, NEW JERSEY, A CORPORATION OF CONNECTICUT.

HYDROCARBON-BURNER SYSTEM.

Application filed August 11, 1926. Serial No. 128,536.

This invention relates to that type of hydrocarbon burner systems in which the fuel is exteriorly atomized by means of air or steam or any other expansive fluid and more particularly to those systems in which the fuel igniting device employs two pilots, a major and a minor one, the latter of which remains lighted at all times and is used simply to light the major one while the major one is used to ignite the atomized fuel.

The principal object of the invention is the production of a novel igniting device in a burner system of the type described so constructed as to immediately and automatically shut off the supply of fuel and air to the burner proper and the supply of gas to the major pilot or either of them if the flame of the minor pilot for any reason becomes extinguished.

A further object of the invention is the production of a hydrocarbon burner system in which one pilot light only is used and which provides for the automatic shutting off of the air and fuel or either of them when the light is extinguished.

Further and other objects and advantages of the invention will appear from the accompanying description the invention consisting in the novel hydrocarbon burner system and igniting device and parts thereof hereinafter more particularly described and then specified in the claims.

In the accompanying drawings illustrating a practical embodiment of the invention:

Fig. 1 is a diagrammatic view of the various parts of the system.

Fig. 2 is a section taken through the igniting device with its safety attachment.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 2.

Fig. 4 is a vertical cross-section on the line 4—4 of Fig. 2.

Fig. 5 is a vertical cross-section on the line 5—5 of Fig. 2.

Fig. 6 is an end elevation of the igniting device.

Referring to the drawings:

1 indicates the side plates, preferably of steel, of the casing of the igniting device having a safety attachment to be presently described. Said side plates are tied together at various points by a plurality of bolts and nuts 2 one or more of which ex-

tend through an upper wall 3 comprising a squared bar and one or more of which extend through a lower wall 4 comprising a rectangular flat bar provided with a plurality of air openings 5 therein. The lower wall 4 extends outwardly beyond the rear edges of the side plates 1 and has an angle piece 6 secured thereto as clearly shown in Fig. 2.

The rear wall of the device comprises the square bar 7 secured intermediate the side walls 1 by one or more of the nuts and bolts 2. Said rear wall is split centrally thereof for a certain distance downwardly as shown at 8 (Fig. 4), said split portions being held against spreading by a screw 9 the head of which is indicated at 10 and which lies within a suitable opening in one of the side plates 1.

The lower wall 4 at or adjacent its forward end carries a minor gas pilot 11 connected by a pipe 12 with any source of gas supply while the upper wall 3 carries a major gas pilot 13 connected by a pipe 14 to a gas valve 15 of any conventional type, said valve being also connected to the pipe 12. The major gas pilot 13, it will be noted, extends forwardly in a direction at right angles to the minor gas pilot 11.

16 indicates a thermal rod of a material such as brass having a high coefficient of expansion which is provided with a head 17 having an opening 18 extending vertically therethrough in alignment with the minor gas pilot 11. Said head is also provided at either side thereof with pins 18' extending through suitable openings in the side walls 1 and providing a support for the headed end of said thermal rod. The rear end of said thermal rod extends loosely through an opening in a supporting block 19 which is detachably secured intermediate the side walls 1 by bolts and nuts 20. The rear wall 7 is provided with a screw-threaded opening therein approximately centrally thereof and forming a part of the slot 8 which receives a screw-threaded bolt 21 provided with an opening therein extending centrally and longitudinally therethrough which slidably receives a pin 22 the forward end of which is in alignment with the rear end of the thermal rod 16.

The rear end of said pin 22 is headed and has a reduced portion 23 of a configuration

5 permitting it to be received by the slotted
 end of a spring 24 the upper end of which
 is perforated and receives the shank of a
 screw 25 extending through a stud 26 and
 10 threading within a suitable screw-threaded
 opening in the rear wall 7. The action of
 the spring 24 tends to press the pin 22 for-
 wardly in the bolt 21 to retain its end in
 15 proximity to the rear end of the thermal
 rod 16. To adjust the position of the end
 of the pin 22 as respects the rear end of the
 thermal rod 16 it is merely necessary to
 turn the screw-threaded bolt 21 in the prop-
 20 er direction, the forward position of said
 pin 22 being limited by the head of the
 bolt 21 which contacts with the head 23
 of the pin 22 by the action of the spring
 24. The screwthreaded bolt 21 may be
 25 locked in any desired adjusted position by
 means of the screw 9 which is tightened by
 its head 10 and which acts to squeeze to-
 gether the bisected parts of the upper end
 of the wall 7 forming the slot 8.

25 The rear wall 7 and the angle piece 6 are
 provided with suitable openings forming
 bearings for a tumbler rod 27 carrying a
 wedge-shaped eccentric portion or detent 28
 on its forward end which normally is fric-
 30 tionally held intermediate the forward end
 of the pin 22 and the rear end of the ther-
 mal rod 16 all as more clearly shown in
 Fig. 2. Said tumbler-rod 27 and detent
 together constitute a switch-actuator. The
 35 rear end of said tumbler rod extends through
 and is detachably secured to a weighted bar
 29 provided with spring clips 30 removably
 holding a glass mercury tube 31 containing
 mercury and constituting an electrical switch
 40 which is provided with electrical terminals
 or binding posts 32, one wire 33 from which
 leads to a source of current supply while the
 other wire 34 leads to and is connected with
 a terminal of an electric motor 35 as shown
 in Fig. 1.

45 The weighted bar 29, if so desired, may
 carry a protective shield 36. Secured to the
 forward end of the wall 4 and extending
 around for a certain distance on the side
 walls 1 is a removable wall 37 acting to pro-
 50 tect the space intermediate the head of the
 tumbler rod 16 and the minor gas pilot 11
 from air currents and drafts while the
 space over the major gas pilot 13 is protected
 by a shield 38 which is detachably secured
 55 to one of the side walls as clearly shown in
 Fig. 6.

60 The other terminal of the motor 35 is
 electrically connected to a thermostat 39 of
 any suitable construction, said thermostat
 being in turn electrically connected to a
 source of current supply. The motor is
 adapted to actuate an air blower 39' which
 is connected by an air or other atomizing
 fluid pipe line 40 to the atomizing fluid pas-
 sageway 41 of a burner 42, said air line 40

also being connected by an air pipe 43 to an
 air chamber 44 which communicates with
 and is adapted to open by air pressure the
 valve 15 in the gas pipe 14. The burner 42
 also carries a fuel nozzle 45 which is con- 70
 nected by the pipe 46 with an oil or other
 fuel tank 47, said tank being also connected
 by pipe 48 with the air pipe 40.

When the device is operating the motor
 35 is running and it may be turned on and 75
 off either by automatic operation of the
 thermostat 39 caused by changes of temper-
 ature or by any form of switch. This actu-
 ates the air blower 39' which forces air into
 the air chamber 44 and opens the gas valve 15 80
 to permit gas to flow through the pipe 14 and
 through the major pilot 13. As the minor
 pilot 11 always has a free communication
 with the source of gas supply through the
 pipe 12, it is constantly kept lighted. As 85
 soon as the gas however flows through the
 major gas pilot 13 it is lighted by the flame
 from the minor pilot 11. Simultaneously
 air is being forced through the pipe 40 by
 the blower 39' through the atomizing fluid 90
 passageway 41 and also into the tank 47
 through the pipe 48. The pressure in the
 tank forces the oil or other fuel therein up
 through the pipe 46 and out of the nozzle
 45 where it is atomized by the air forced 95
 through the passageway 41. The atomized
 fuel is ignited by means of the flame from
 the major pilot 13, these parts, however, not
 being shown in operative relation in Fig. 1
 as that figure is a diagrammatic one as has 100
 heretofore been explained.

When the device is functioning properly
 the eccentric portion or detent 28 of the
 tumbler rod 27 is frictionally held interme- 105
 diate the forward end of the pin 22 and
 rear end of the thermal rod 16. When in
 this position the mercury tube 31 is substan-
 tially in a horizontal position as shown in
 Fig. 4 and the electric current flows through
 one terminal 32, through the mercury and 110
 then through the other terminal of the tube.
 This frictional contact of the eccentric por-
 tion of detent 28 between the pin 22 and
 thermal rod 16 is maintained by the expan- 115
 sion of the thermal rod 16 after it has be-
 come heated by the flame from the minor
 pilot 11. Should the flame become extin-
 guished, however, from the minor pilot, the
 thermal rod 16 cools and contracts thus re-
 leasing the detent or eccentric portion 28 and
 causing the tumbler rod 27 to rotate by rea-
 son of the weight of the bar 29. The mer-
 cury tube 31 is then thrown to a position at
 an angle from the horizontal, as shown in
 Fig. 5, causing the mercury therein to flow 1
 to one end thereof and thereby breaking
 the electric circuit of the system. When the
 circuit is broken the motor 35 stops running
 thus releasing the air pressure generated by
 the blower 39' and causing the valve 15 to

close to prevent gas flowing through the pipe 14 and shutting off any further flow of fuel or oil through the jet 45 and air through the air passageway 41 in an obvious manner. In some cases a considerable loss of fuel and gas would thus be prevented, the only loss being that of the gas flowing through the minor pilot.

It will be noted that the side walls of the head 17 of the thermal rod contact at a small portion thereof only with the side walls 1, thus permitting only a slight loss of heat by radiation from said thermal rod to said side walls.

It will be noted, furthermore, that the thermal rod is heated by the flame from the minor pilot light intermediate its fixed end and its operative end, thus giving the thermal rod the opportunity to become fully expanded. Should it become unduly expanded the spring 24 permits the pin 22 to move rearwardly without affecting the proper operation of the device.

Furthermore, inasmuch as the rear end or effective point of the thermal rod engages the tumbler rod, that is, its eccentric portion or detent, at a point eccentric to the axis of rotation of the tumbler rod, very little heat is required to expand the thermal rod to sustain the load and in consequence a small minor pilot light may be used and a saving of gas effected.

I claim as my invention:

1. An igniting device for a hydrocarbon burner system comprising a pilot light, a thermal rod adapted to expand by the heat from said pilot light and having a free end and a pivoted end, said ends being so located that the heat of said pilot light will strike said rod intermediate thereof, a switch actuator frictionally engaging said thermal rod and a device constituting an electric switch associated with said switch actuator and adapted to function automatically upon disengagement of said switch actuator with said thermal rod.

2. An igniting device for a hydrocarbon burner system comprising a pilot light, a thermal rod adapted to be expanded by the heat from said pilot light, a switch actuator having an eccentric portion frictionally engaging said thermal rod, means for yieldingly holding said eccentric portion into engagement with said thermal rod and a device constituting an electric switch carried by said switch actuator and adapted to function automatically upon disengagement of said eccentric portion with said thermal rod.

3. An igniting device for a hydrocarbon burner system comprising a pilot, a rod made of expansible metal adapted to be heated by the flame of said pilot, a detent frictionally engaging said rod and a device constituting an electric switch connected

with said detent and adapted to function automatically upon disengagement of said detent with said thermal rod by the action of gravity.

4. An igniting device for a hydrocarbon burner system comprising a pilot, a thermal rod having one end fixed and the other end free and provided with a head having an opening therein in alignment with said pilot, a detent frictionally engaging said thermal rod when it is expanded by the heat of the flame from said pilot and an automatic electric switch connected to said detent and adapted to be thrown into inoperative position when said detent is disengaged from said thermal rod.

5. An igniting device for a hydrocarbon burner system comprising a pilot, a thermal rod adapted to be heated by the flame from said pilot and having one end fixed and the other end free, a pin mounted in alignment with the free end of said thermal rod, a detent frictionally held intermediate said pin and said free end, means for yieldingly permitting movement of said pin upon expansion of said thermal rod and a device constituting a switch connected to said detent.

6. An igniting device for a hydrocarbon burner system comprising two side plates in spaced relation, a thermal rod mounted therein and provided with a head a restricted portion only of which engages said side plates, a switch actuator frictionally engaging said thermal rod, a pilot the flame of which is adapted to expand said thermal rod to assume an operative position as respects said switch actuator and a device constituting an electric switch operatively engaging said switch actuator.

7. An igniting device for a hydrocarbon burner system comprising a thermal rod, a pilot light for expanding the same, a split support, a bolt having an opening mounted in said support, a pin extending through said opening in alignment with said thermal rod, means for drawing the split portions of said support together to hold said bolt in varying positions of adjustment, a tumbler rod frictionally held intermediate said thermal rod and pin and an electric switch carried by said tumbler rod.

8. An igniting device for a hydrocarbon burner system comprising a thermal rod, a pilot light for expanding the same, a pin, a switch actuator frictionally held between said pin and thermal rod and adapted to rock to become released from said frictional engagement upon cooling of said thermal rod and an electrical switch adapted to automatically function upon rocking of said switch actuator.

9. An igniting device for a hydrocarbon burner system comprising a thermal rod, means for expanding the same to hold it in

operative position, a switch actuator having a portion thereof frictionally engaging said thermal rod at a point eccentric to the longitudinal axis of the body of said switch actuator and adapted to move from disengagement with said thermal rod upon contraction of said thermal rod and an electric

switch adapted to automatically function upon such disengagement.

Signed at Newark, in the county of Essex 10
and State of New Jersey, this 9th day of
August, A. D. 1926.

JOSEPH S. STRING.