Sept. 20, 1971 H. W. LEACH 3,606,610

FUEL BURNER ASSEMBLIES

Filed Oct. 3, 1969 4 Sheets-Sheet 1

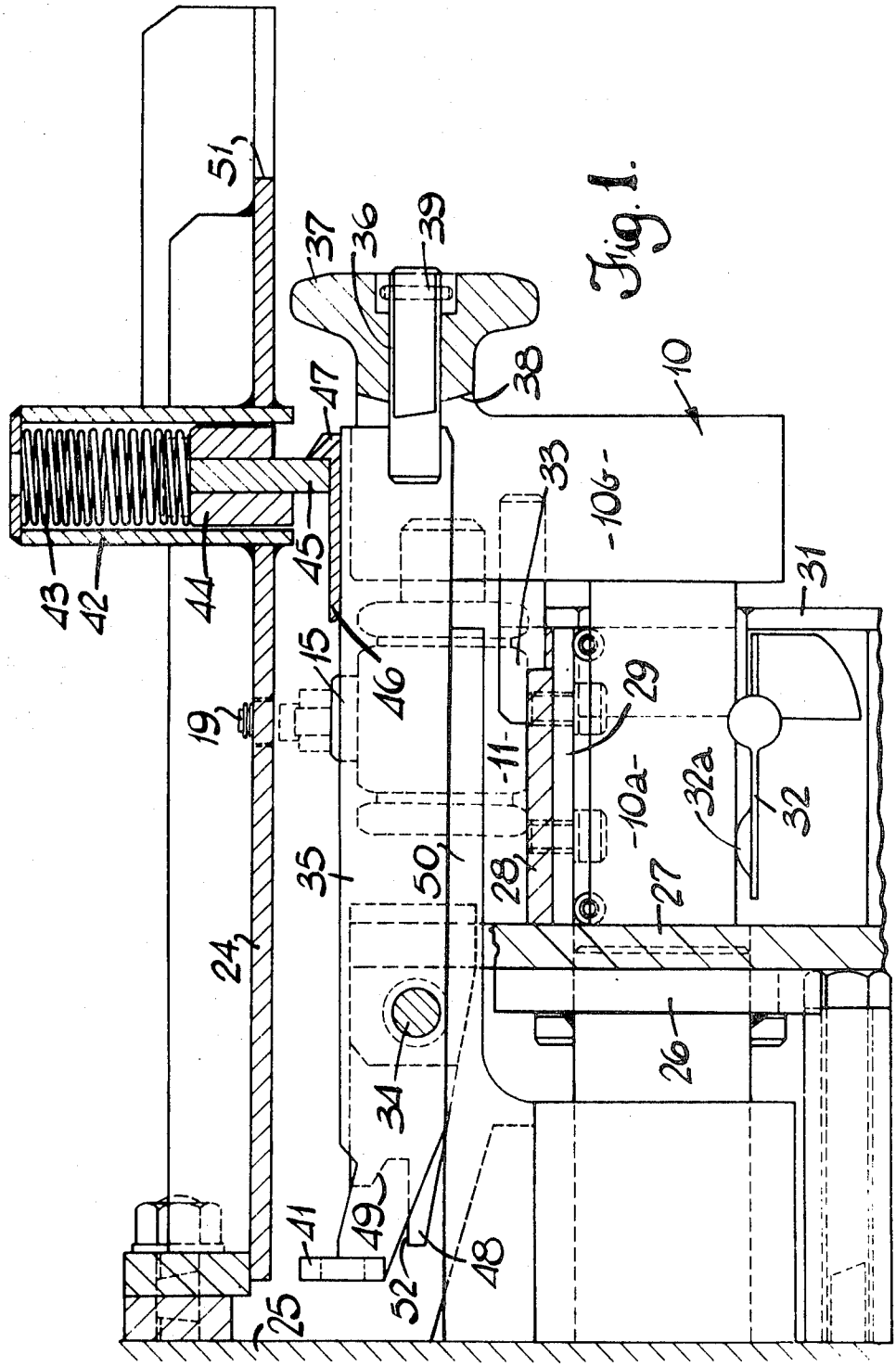


Fig. 1.

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FUEL BURNER ASSEMBLIES

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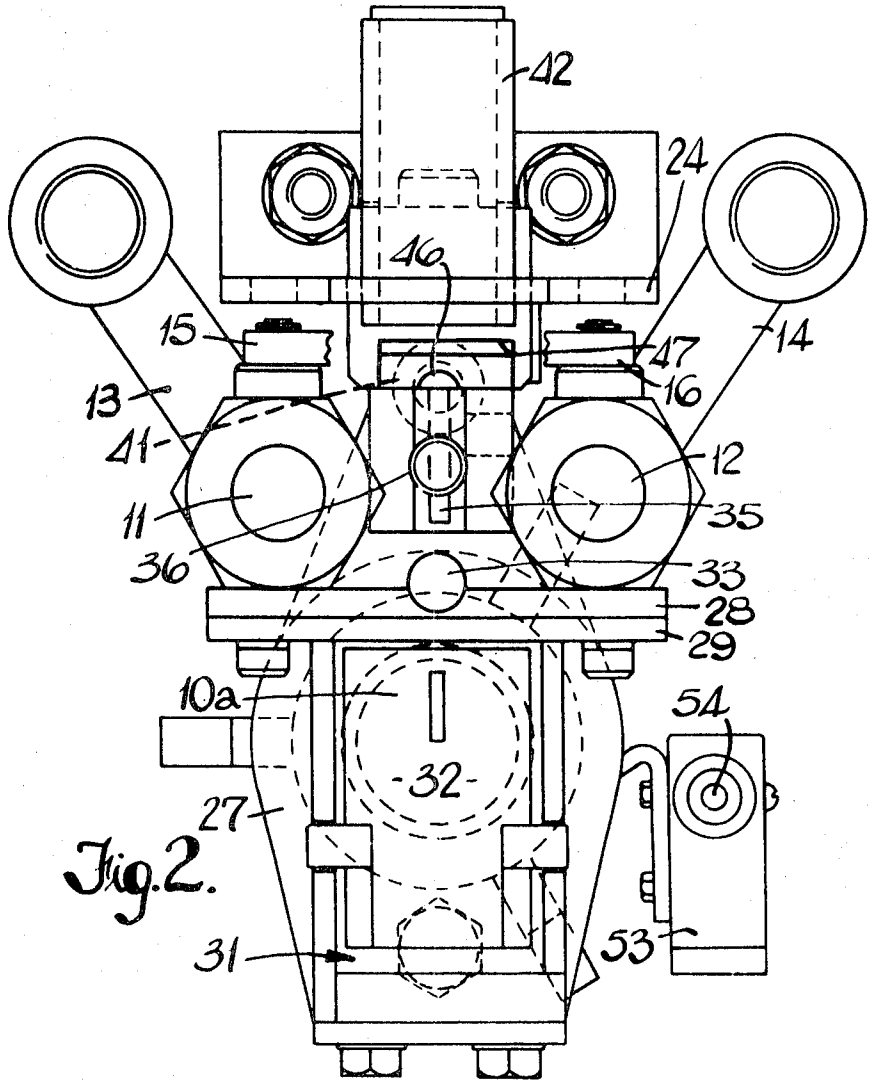


Fig. 2.

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FUEL BURNER ASSEMBLIES

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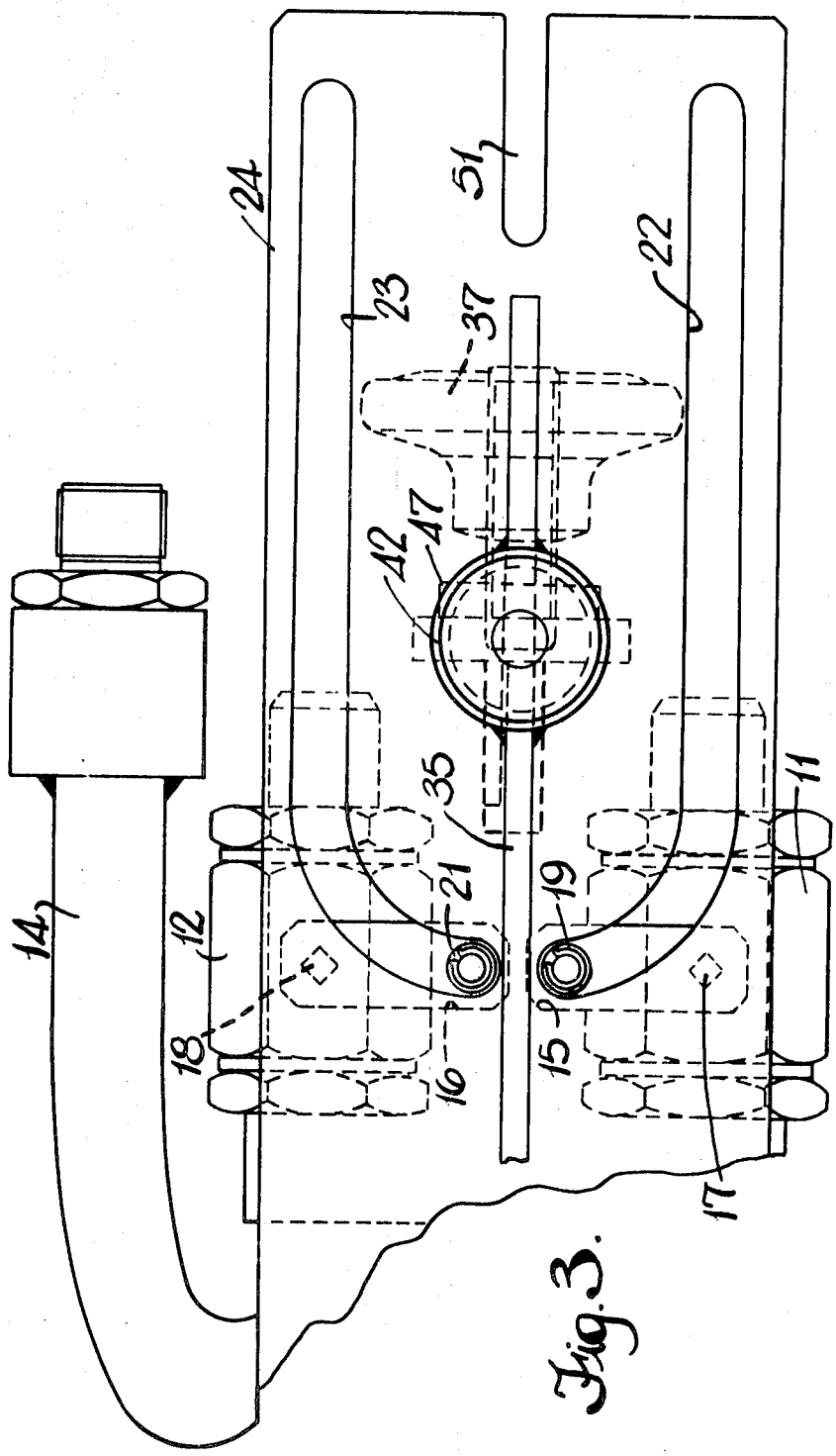


Fig. 3.

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FUEL BURNER ASSEMBLIES

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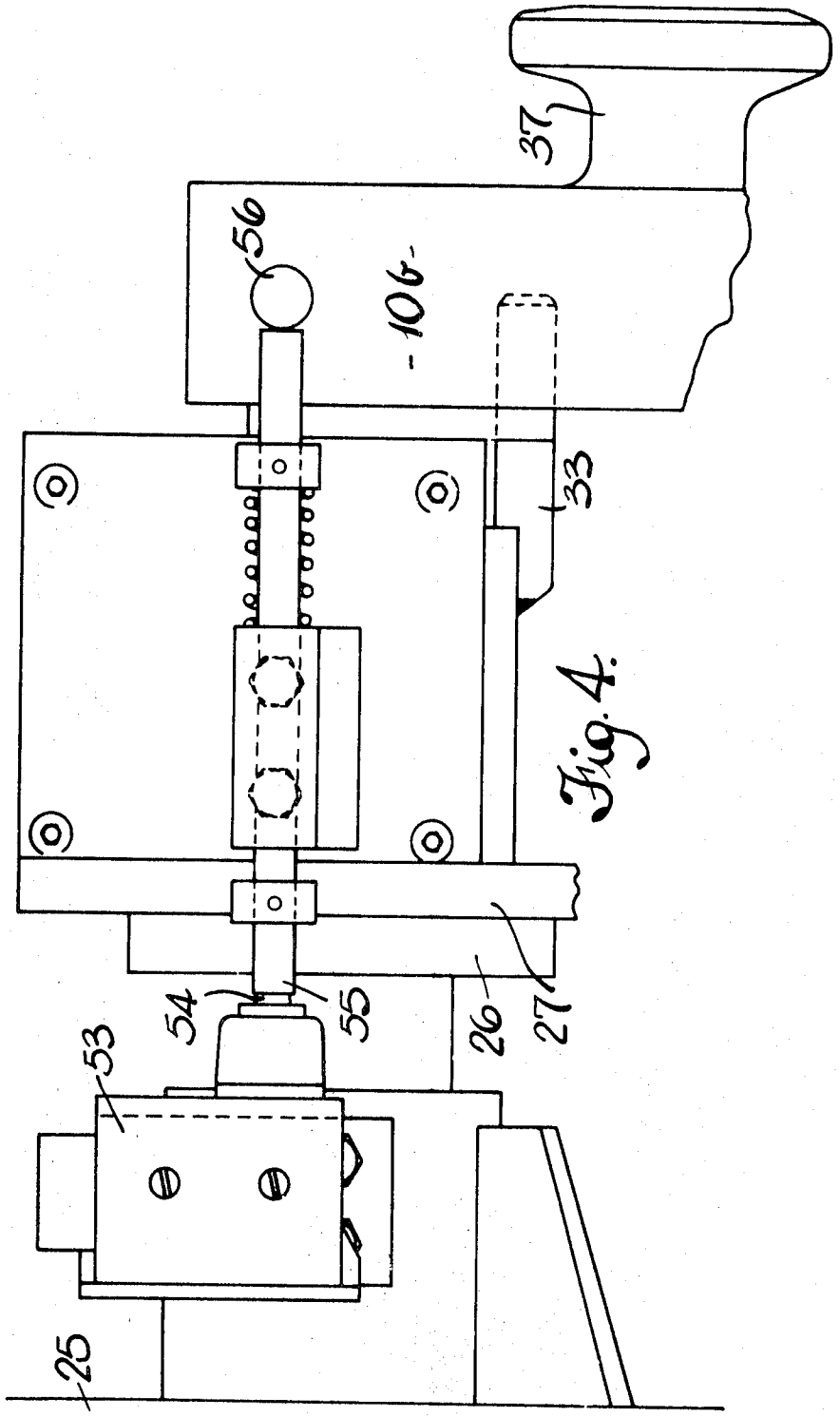


Fig. 4.

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3,606,610

FUEL BURNER ASSEMBLIES

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Int. Cl. F23d 11/36
U.S. Cl. 431—153 7 Claims

ABSTRACT OF THE DISCLOSURE

A fuel burner assembly comprising a burner, a support structure for the burner and a fixed structure on which the support structure is mounted, the support structure and burner being movable between a first position in which the burner is in the hot zone of a boiler and in which position the burner cannot be removed from the support structure since a clamp cannot be released, and a second position in which the burner can be removed from the support structure by releasing the clamp, and the fixed structure and support structure carrying respective parts whereby the burner cannot be inserted into the support structure unless the latter occupies its second position, the support structure carrying a valve which is only in the on position when the burner and support structure are in the first and operative position.

This invention relates to fuel burner assemblies for supplying liquid fuel to boilers and has particular, though not exclusive reference to oil burning boilers for ships. The assembly of burners and air chests is usually referred to as an air register.

In air registers of the kind to which the invention relates, it is necessary that any individual burner shall be withdrawable from the boiler for replacement or maintainance without shutting down the entire boiler. For safety reasons it must not be possible for a supply of fuel to reach the burner or its support structure unless the burner is correctly fitting in its support structure and is, furthermore, in its operating position. It is also, however, required that an individual burner shall be retractable from its operative position to a further position at which the burner nozzle end is out of the hot zone of the boiler. Retraction to this further position must be accomplished by cutting off the fuel supply to this burner.

The object of the invention is to provide a fuel burner assembly of the kind referred to in a form in which the requirements mentioned can be met.

In accordance with the present invention a fuel burner assembly comprises a burner, a support structure on which the burner is mounted, the support structure being adapted for mounting on a fixed structure and a fuel control valve on the fixed structure, the support structure being capable of occupying a first position in which the burner is in an operative position, and a second position in which the burner can be withdrawn from the support structure, the support structure having, in combination, a burner engaging clamp pivotally mounted on it, the clamp only being releasable when the support structure occupies the second position, means for preventing reengagement of the clamp when the support structure is in any position except the second position, a valve operating element arranged to open the fuel control valve on the fixed structure only when the support structure is moved to its first position, and a gravity operated flap for closing an access opening in the support structure for the burner, when the burner has been withdrawn therefrom.

The invention will now be described by way of example with reference to the accompanying drainings in which:

FIG. 1 is a side elevation, part cross-sectional view of

a burner assembly constructed in accordance with the invention,

FIG. 2 is an end elevation view of the assembly,

FIG. 3 is a plan view of the assembly, and

FIG. 4 is a view of a switch mechanism associated with the assembly.

The assembly illustrated is a liquid fuel supply burner for use in an air register for a ships burner, such a boiler having a plurality of these burners arranged with their axes substantially vertically and extending through the top of the boiler.

The burner assembly comprises a burner proper which is indicated generally by numeral **10** in the drawings, this comprises a tubular portion **10***a* which terminates at the left hand end, as viewed in FIG. 1, in a spray nozzle. The other or outer end of the tubular portion **10***a* is secured to a block **10***b* in which is provided a fuel passage (not shown) which, when the burner is in its operative position (as illustrated), communicates with a valve **11** mounted upon fixed structure of the boiler, as shown in FIGS. 2 and 3 there is another valve **12** which is also connected to the block **10***b* of the burner proper this valve **12** being connected in a spill passage to a reservoir in the associated system.

The pumping apparatus (not shown) in the system provides a quantity of fuel in excess of requirements and the excess is drained through the valve **12**. Pipes **13**, **14** are illustrated in FIG. 2 communicating with the valves **11** and **12** respectively.

The valves **11**, **12** have respective operating arms **15**, **16** which can be moved through an angle of 90° between on and off position. The valve closure members **15**, **16** carry at positions spaced from their pivotal axes **17**, **18** respective rollers **19** and **21**. The rollers **19** and **21** engage in respective shaped slots **22**, **23** in a plate **24**. The plate **24** is fixed to the fixed structure of the boiler which is indicated at **25** in FIG. 1.

The slots **22**, **23** in the plate **24** are shaped so that when relative movement between the valves **11**, **12** and the plate **24** takes place lengthwise of the assembly, the valve operating arms **15**, **16** will be moved through 90°. In the positions of the parts illustrated the valves are open and movement of the valves **11**, **12** (in a manner to be described) in a direction to the right as viewed in FIGS. 1 and 3 will result in swinging of the arm **15**, **16** so that they lie parallel with the right hand end portions of the slots **22** and **23**.

The burner proper **10** is mounted in support structure of which the valves **11**, **12** are also mounted, this support structure including plates **26**, **27** through which the burner tubular portion **10** may extend. Fixed to the plates **26**, **27** are two further plates **28**, **29** bolted together and a housing **31**, which is disposed at the opposite side of the tubular portion **10***a* of the burner proper **10** from the plates **28** and **29**.

It is on to the plates **28**, **29** that the valves **11**, **12** are secured. Contained within the housing **31** is a weighted flap **32** which tends to move by gravity towards a position in which it will close off the tubular opening defined through the housing for reception of the tubular portion **10***a* of the burner proper **10**. As shown, however, with the burner in position the flap **32** is deflected. In FIG. 2 the flap is shown in its alternative position which it occupies when the burner has been withdrawn so as to prevent the escape of fumes from the interior of the boiler when one of the burners have been removed.

The plate **28** also carries a spigot **33** which is disposed to engage in a hole in the block portion **10***b* of the burner proper for location purposes.

Pivotally mounted upon the support structure for the burner about an axis **34** is a burner engaging clamp. This comprises an arm **35** which at one end has connected to

it a screw-threaded spigot **36**. Engaging upon the spigot **36** is a hand wheel **37** having a convex surface **38** which is concentric with the screw-threaded spigot **36** and which engages with a correspondingly concave portion on the block **10***b* of the burner proper **10**. A transverse pin **39** limits travel of the hand wheel **37** with respect to the spigot **36**.

By unscrewing the hand wheel **37** as far as the pin **39** the convex and concave surfaces of the hand wheel and of the block **10***b* respectively become disengaged, so that the hand wheel and arm **37** can be swung about the pivotal axis **34** in an upward direction as viewed in FIG. 1.

At the opposite end of the arm **35** and on the side of the pivot **34** remote from the hand wheel **37** there is secured a ring **41**. Defined between the ring **41** and the side face of the arm **35**, which is uppermost in FIG. 1, there is defined a generally D-shaped opening.

Mounted upon the fixed plate **24** is a tubular housing **42** containing a compression spring **43** urging a piston **44** downwardly as viewed in FIG. 1. The piston **44** carries a spigot **45** which, at its outer end, carries as perpendicularly disposed D-cross-section part **46** as well as a shaped block **47**. The D-shaped part **46** extends from the axis of the piston in the direction of the nozzle end of the burner and the block **47** extends outwardly in the opposite direction from the piston spigot **45**.

An extension **48** of the plate **27** of the support structure for the burner has its end shaped at **49** to correspond with the shape of the block **47**. This block **47** is provided with an inclined surface which can engage with the correspondingly inclined surface of the shaped end **49** of the extension **48**, for a purpose to be later explained.

Extending from the fixed structure **25** is an abutment bar **50** which is disposed adjacent to the arm **35** to lie against one edge of it when in the position illustrated. This bar **50** prevents swinging of the arm **35** about the axis **34**.

The burner proper is intended to occupy either of two positions. The first position is that shown in which the burner proper **10** and the support structure are moved as far as possible to the left as viewed in FIG. 1 so that the nozzle end of the burner is disposed in the hot zone of the boiler. The valves **11** and **12** are open and are engaged in their respective passages in the block **10***b* of the burner proper **10**. From this position it is not possible to relieve the clamp by unscrewing the hand wheel **37** and swinging the hand wheel end of the arm **35** upwardly, because the hand wheel **37** itself will engage with the underside of the plate **24**. Furthermore, the abutment bar **50** prevents this swinging movement.

The second position which the assembly can occupy, however, is that from which the burner can be withdrawn. To reach this position the burner and support structure are drawn to the right as viewed in FIG. 1, to a position in which the D-shaped part **46** will engage with the ring **41**. The hand wheel **37** will have reached a position in which it will pass the end of the plate **24** and the end portion of the arm **35** will enter a slot **51** formed in that plat **24**. The arm **35** will, furthermore, no longer be prevented from swinging by the abutment bar **50**.

Having swung the hand wheel **37** and lever **35** out of the path of the burner proper **10**, the latter can be withdrawn simply by pulling it to the right. The valves **11, 12** will have been closed during travel of the entire assembly to the right so that no spillage of fuel will take place.

When the burner proper **10** is fully withdrawn the flap **32** will swing under the action of its weight to close the opening, but when it is desired to reinsert the burner proper **10**, its end portion will engage a projection **32***a* on the flap **32** to move it out of the path of the burner proper.

When the burner proper **10** is out of the assembly and the support structure is in its second position, the block **47** with the spigot **45** will have moved downwardly under the action of the spring **43** and onto a surface **52** of the extension **48**. If now an attempt is made to move the

support structure to the left, the block **47** will engage in the formation **49** preventing such movement. This also prevents movement of the arm **35** to secure block **10** without first retracting the moving structure fully to the right as shown in FIG. 1.

It is therefore impossible to move the support structure, without the burner being present, to a position in which the valves **11, 12** can be turned on.

As an additional safety measure to ensure that the fuel cannot be turned on when the burner is in any position but the first operative position, there is an electrical switch **53** which is arranged in a circuit for controlling a valve (not illustrated) in the fuel supply system. The switch is secured to the fixed structure **25** of the boiler and has an operating member **54** engaging a rod **55** carried by the support structure plate **27**. The rod **55** is spring loaded such that its end is urged away from the switch **53**, but its opposite end engages a stop **56** which is carried on the side of the block portion **10***b* of the burner proper.

It will be observed that when the burner is in its operative position the fuel will be turned on, but any movement of the burner and support structure to the right as viewed in FIG. 1, will result in turning off the valves **11, 12** and causing the circuit through the switch **53** to become broken. No fuel can thus reach the burner unless it is in its fully operative position. If it is desired to withdraw the burner from the boiler and to remove the burner proper from the support structure, the assembly is moved to the second position and the clamp can then be released. The support structure cannot, when the burner has been removed, be moved in the first position because the clamp will prevent this occurrence, as will the block **47** of the piston **44**.

If, however, it is desired simply to withdraw a burner from the boiler without removing the burner proper from the support structure, the burner is simply moved to its second position.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A fuel burner assembly comprising a burner, a support structure on which the burner is mounted, the support structure being adapted for mounting on a fixed structure and a fuel control valve on the fixed structure, the support structure being movable between a first position in which the burner is in an operative position, and a second position in which burner can be withdrawn from the support structure, the support structure having, in combination, a burner engaging clamp pivotally mounted on it, the clamp only being releasable when the support structure occupies the second position, means for preventing reengagement of the clamp when the support structure is in any position except the second position, a valve operating element arranged to open the fuel control valve on the fixed structure only when the support structure is moved to its first position, and a gravity operated flap for closing an access opening in the support structure for the burner, when the burner has been withdrawn therefrom.

2. A fuel burner assembly as claimed in claim **1** in which the fixed structure has a part which obstructs the releasing movement of the clamp when the support structure is in its first position.

3. A fuel burner assembly as claimed in claim **1** in which the means for preventing reengagement of the clamp when the support structure is in any position except the second position comprises an extension on the support structure and a member carried by the fixed structure and engageable with a formation on said extension to prevent reengagement of the clamp except when the support structure carries the burner and is in the second position, movement of the support structure towards the first position, when the burner has been removed, also being prevented by said member and formation.

4. A fuel burner assembly as claimed in claim **3** in which the member carried by the fixed structure comprises a spring loaded piston which is urged by its spring

loading in a direction which is transverse to the direction of movement of the support structure relatively to the fixed structure, said piston carrying a part which is engageable with said formation on the support structure.

5. A fuel burner assembly as claimed in claim 1 in which the valve element is a slot formed in a plate forming part of the fixed structure, and a pin carried on the valve and engaging in the slot, the valve being carried by the support structure so that movement of the support structure between the first and second positions serves to move the valve between its on and off positions.

6. A fuel burner assembly as claimed in claim 1 in which there are two valves having respective valve operating elements, one of the valves controlling the supply of fuel to the burner and the other controlling the spill of fuel in excess of requirements.

7. A fuel burner assembly as claimed in claim 1 in which an electrical fuel supply switch is arranged only to permit fuel supply to reach said valve when the support structure occupies its first position.

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