

(No Model.)

3 Sheets—Sheet 1.

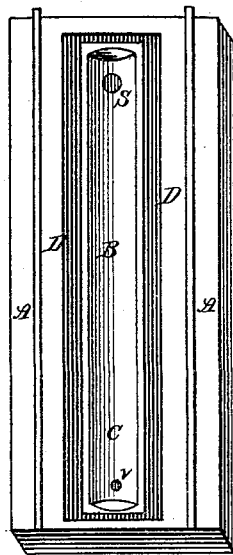
J. F. IRONS.

DEVICE FOR BURNING CRUDE OIL IN STOVES AND FURNACES.

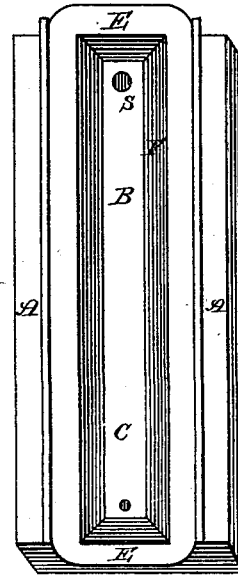
No. 266,478.

Patented Oct. 24, 1882.

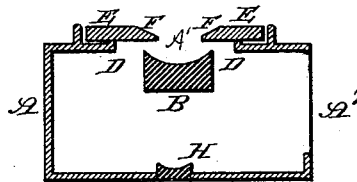
*Fig. 1.*



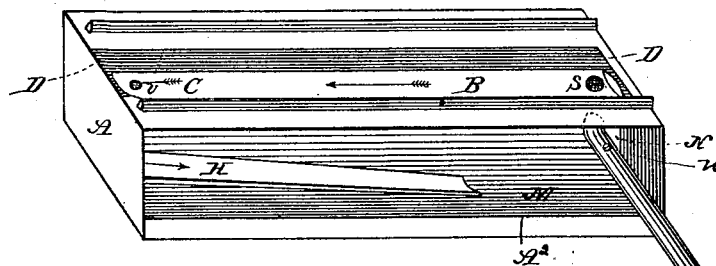
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



Witnesses:

*J. W. Garner*  
*W. S. D. Harris*

Inventor:

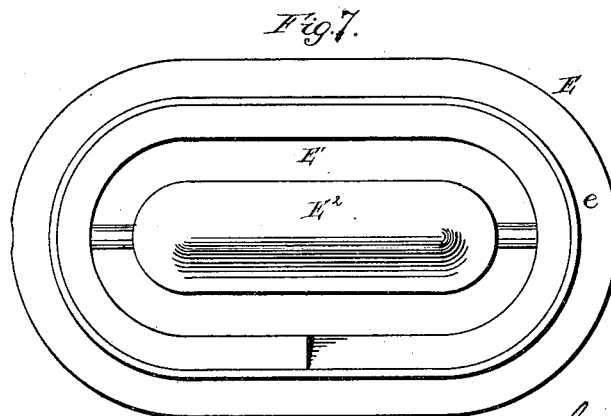
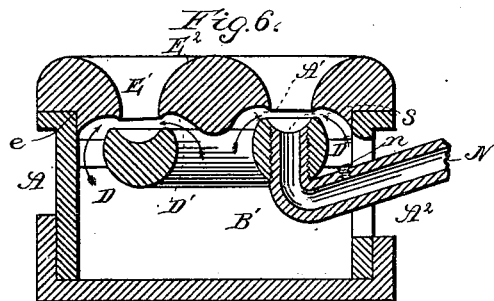
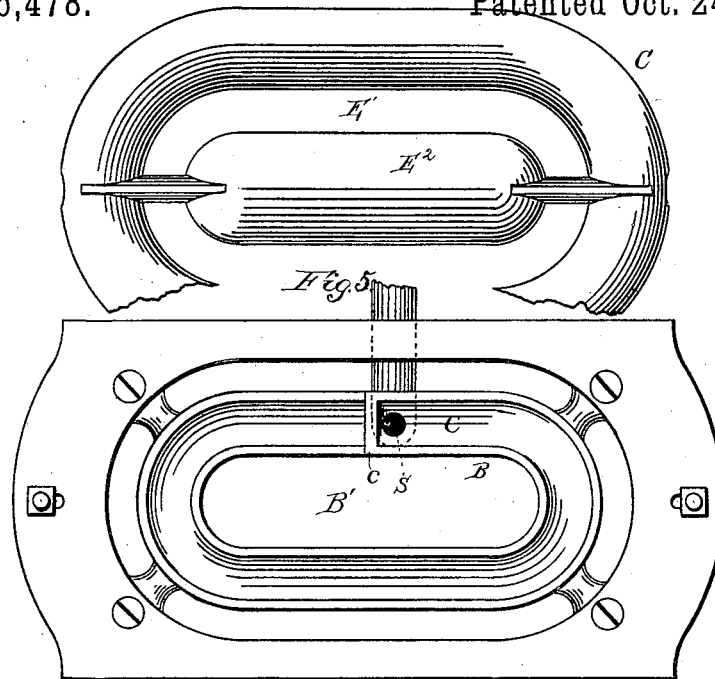
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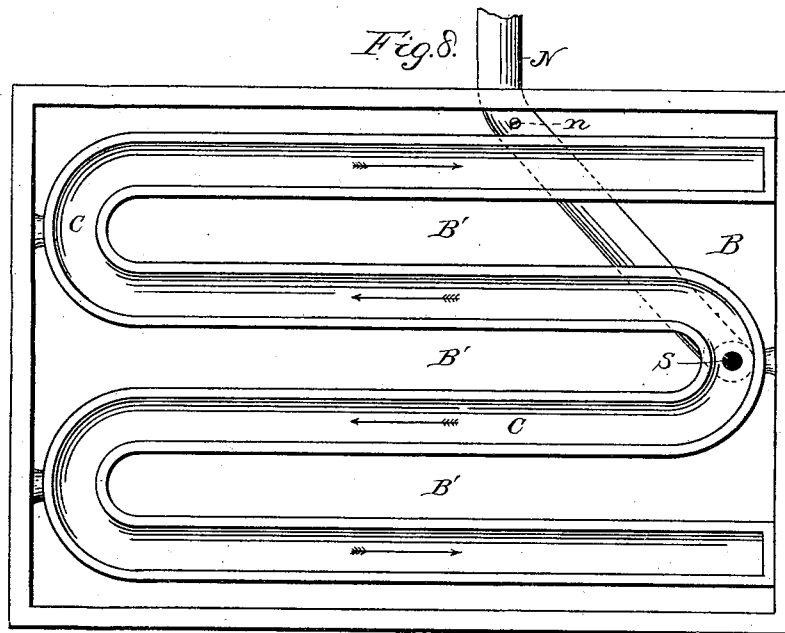
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Inventor:

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# UNITED STATES PATENT OFFICE.

JOSEPH F. IRONS, OF BRADFORD, PENNSYLVANIA.

## DEVICE FOR BURNING CRUDE OIL IN STOVES AND FURNACES.

SPECIFICATION forming part of Letters Patent No. 266,478, dated October 24, 1882.

Application filed July 3, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH F. IRONS, a citizen of the United States, residing at Bradford, county of McKean, State of Pennsylvania, have invented certain new and useful Improvements in Burning Hydrocarbon Oil in its Crude State, of which the following is a specification.

My invention relates to hydrocarbon-furnaces. It is a well-known fact that crude petroleum contains many heavy hydrocarbons—such as paraffine and dead oil—which will not burn under the ordinary conditions for burning the lighter ones, such as kerosene, gasoline, and naphtha. Many ways have been tried for accomplishing this result, but with indifferent success, as the heavier hydrocarbons clog up the passage and prevent the oil from flowing. Burners having means for mingling the crude oil with air, with steam and air, and with steam have been used; but these soon get out of order, as the heavier hydrocarbons, if present in large quantities, as is usually the case, soon incrust the head of the burner and prevent the oil from flowing in sufficient quantities to produce a serviceable flame. To obviate these defects a burner formed like a spiral scroll, with apex pointing downward, and provided upon its upper surface with a groove down which the oil flows to the apex, was devised. In practice it has been found that this burner is defective, for the reason that sufficient air could not reach the oil to produce perfect combustion. Great quantities of soot were deposited upon the plate and dammed the grooves, causing the oil to overflow and run over the sides and into the cup at the apex. The air which passed between the interstices of the spiral scroll was not heated to a sufficient degree to take up the heavier hydrocarbons, which were therefore deposited as soot. The soot accumulating in the cone soon filled up the interstices and interfered with the proper combustion of the oil in the base of the spiral to such an extent that frequent cleaning became a necessity. This cleaning interfered materially with the work to which the burner was applied.

The object of my invention is to obviate these defects, and to accomplish that object I propose to dispense with a spiral scroll and

substitute therefor a flat plate having a groove upon its upper surface. The groove preferably may be slightly inclined from the oil-feeding point to its terminus; or it may be upon the same plane from end to end. To supply a sufficient quantity of air I provide deflector-plates, which, with the burner-plates, form air-passages through which the air is drawn and impinged against each side of the base of the flame and the surface of the oil, all as will hereinafter more fully appear.

Referring to the drawings, Figure 1 represents a top plan view with deflector-plate E removed; Fig. 2, a similar view with deflector-plate in place; Fig. 3, a vertical transverse section; Fig. 4, a perspective view of the device with deflector-plate removed; Fig. 5, a plan view of an oval burner with deflector-plate at one side; Fig. 6, a vertical transverse section; Fig. 7, a bottom plan view of the deflector, and Fig. 8 a plan view of a modified form of burner-plate.

A represents the box, formed with an open side or front, A<sup>2</sup>, for the purpose of admitting air to the burner. In the upper side of the box is an opening, A'. Within the box is suspended by any suitable means a burner-plate, B, which is provided with a shallow groove, C. This groove is higher at one end than at the other, and slightly inclined between those points, so that crude oil admitted at the upper end will move slowly down the groove to its lower end. The upper end of the groove is provided with an aperture through which the oil escapes from the supply-pipe N. This pipe extends from the burner-plate to a point near the bottom of the box, from which it is bent upwardly and outwardly, so that any drip, overflow, or seepage on the pipe will run into the box. A cock for regulating the supply of oil is placed at any suitable point. In this pipe there is also an opening, n, through which oil is constantly flowing. The oil escaping through this opening is kept burning, so that the waste oil which passes to the box A will be ignited and consumed. Above the burner-plate is an air-deflector, E, which rests upon the top of the box. The form of this deflector is immaterial, but should be of such shape as to have an opening or openings above the groove or grooves for the flame to pass through, and be elevated far enough above

the burner-plate to allow a current of air to pass between said plate and deflector for the purpose of impinging a current of air against the base of the flame.

5 I am aware that it is common in lamps to use a deflector-plate above the burner for the purpose of forcing a current of air against the base of the flame from a burning wick, and to that I make no claim; but I am not aware  
 10 that crude oil has ever been burned in a groove in a burner-plate suspended within a box, and having its upper ends projecting into the opening A', with a deflector supported upon the top of the box in such a manner that the air  
 15 entering the box will be deflected against each side of the base of the flame and upon the surface of the oil. This produces an obvious advantage in that the air passing below the deflector will become heated, and will impinge  
 20 against the surface of the oil and vaporize the heavier hydrocarbonates, which otherwise would remain in the groove and stop the flow of oil. I do not limit myself to any particular form of groove, as it is evident that the plate  
 25 may be formed with grooves representing many well-known figures. In all such cases, however, I propose to slot the burner-plate in such a manner that each side of the groove will receive a supply of air. This will be ac-  
 30 complished by placing a deflector-plate over the slots. This additional deflector-plate may be formed with plate E; or it may be supported above the slot in any suitable manner. The deflector-plate is preferably made removable,  
 35 so that the burner-plate may be exposed for the purpose of removing any foreign substance that may have settled thereon.

Having now described my invention so far as it is applicable to all the forms of devices,  
 40 I propose to particularly describe the different devices shown in the drawings. In showing these I do not propose to limit myself to their exact construction, as it is obvious that many changes could be made without departing from  
 45 the spirit of my invention.

Referring to Figs. 1, 2, 3, and 4, the inclined burner-plate B is shown supported from the box A, and is provided with a supply-opening, S, at its upper end, and a small exit-opening,  
 50 *v*, at its lower end for the surplus oil to pass through and escape beneath plate B. To prevent the oil accumulating at one end of the box, I provide an inclined trough, H, which receives the oil escaping through opening *v*  
 55 and conveys it to a point near the center of the box or to a point near the opening *n*, which, as before stated, serves as a burner to light the waste oil and assist in vaporizing the heavier hydrocarbonates on plate B. Plate B  
 60 is placed in the box in such a manner that its upper edges will be above the lower edge of the walls of opening A', so that the deflector-plate E, which rests upon the top of the box, will be just above the upper side of the burner-  
 65 plate. The object of this is to provide a very narrow slit between the burner-plate and the

deflector-plate, so that a sheet of air can be projected against the base of the flame and upon the surface of the oil. The air is drawn in through the open side of the box and passes  
 70 around plate B to passages D.

It is obvious that it is not necessary to suspend the burner-plate in the manner shown, as the object is to get the deflector-plate near  
 75 the burner, so that a thin sheet of air will be impinged against the base of the flame and the surface of the oil. If desired, the deflector-plate may have its upper side inclined toward the slot where the flame passes through, to give the latter a chance to expand without hav-  
 80 ing to pass through a long tube-like slot.

Referring to Figs. 5, 6, and 7, these figures represent an oval burner-plate, B, having a central aperture, B', and groove C, and a deflector-plate, E, provided with an oval slot, E',  
 85 which registers with and is just above the groove in the burner-plate. This plate is supported from the box by any suitable means, and the upper side is nearly on the same plane as the top of the box A. About midway of  
 90 the front side of the plate, and at right angles to the longitudinal edges, is a partition, *c*, which divides the groove into two parts. The right-hand side of the groove, near the partition, is a little higher than that part on the left-hand  
 95 side of the partition, so that the intermediate part of the groove, following the circuit from right to left, may be more or less inclined, so that the oil entering the inlet S will flow more rapidly in the groove. If desired, a small ap-  
 100 erture such as shown at *v*, Figs. 1 and 4, and the inclined trough H, Figs. 3 and 4, may be used; but I prefer to dispense with them when the burner is of an oval or circular shape. Instead of having a partition, *c*, the plate may  
 105 be elevated at that point and the groove inclined downwardly on both sides from the oil-inlet S to a point upon the opposite side. The groove is preferably of a uniform depth, and to accomplish this it will be necessary to  
 110 gradually depress the top of the plate, so that the walls of the groove will be of uniform height from the bottom of the groove. If desired, the bottom of the groove may be upon the same plane; but I prefer the way above described.  
 115 The deflector-plate E is oval-shaped, and is provided with a rabbet, *e*, which fits over the top of box A. In the middle is an oval plate, E<sup>2</sup>, which is attached to oval plate E in any suitable manner, and forms, with the latter, the  
 120 opening E', which registers with groove C. If preferred, plate E<sup>2</sup> may be supported independently of plate E, as its sole object is to deflect the air rising through aperture B' into the groove C. Between the plates E' and E<sup>2</sup>  
 125 and burner-plate B are air-passages D and D'. These passages terminate over groove C. The under side of the plates may be flat; but I prefer to curve them, as shown in Fig. 6, so that the passages will decrease in size as they  
 130 approach the groove. The top end of the curve should be deflected slightly downward over

the groove, so that the air will be deflected upon the surface of the oil. This feature, however, I propose to make the subject of another application, and therefore make no claim to it in this. When the burner-plate is provided with partitions *c* and the plate depressed so as to give the groove an inclination the under side of the plate *E'* should be correspondingly depressed, so that the air-passages between the deflector and burner-plates will be of a uniform size. It is obvious that this form is a mere variation from a true circle, and as I propose to use either form I do not wish it understood that I limit myself to the form shown.

Fig. 8 represents a plan view of a burner-plate having the groove winding from one side of the plate to the other, and apertures *B'* between the parallel parts of the groove. The oil-inlet pipe *S* is located near the center of the bend in the middle line of the plate; but it is obvious that it may be placed at any other point, or that more than one inlet may be used. The deflector-plate is not shown in this view, as it is an obvious matter when taken in connection with the devices shown in the other figures. Many other forms may be constructed, such as laying plates with grooves, like that shown in Fig. 1 in parallel lines, and providing suitable deflector-plates.

The small aperture or exit *v* may be placed at the end of each of the plates, and the trough *H* used in all the devices without departing from my invention.

What I claim as new is—

1. In a device for burning crude oil, the combination, with a burner-plate having a groove for containing the oil to be burned, of a deflector-plate located above and provided with an opening of less width than and registering with the groove for the flame to pass through,

and air-passages between the deflector and burner plates, substantially as described.

2. In a device for burning crude oil, the combination, with a burner-plate having a groove for containing the oil to be burned, of a deflector-plate located above and provided with an opening of less width than and registering with the groove for the flame to pass through, and gradually-decreasing air-passages between the burner and deflector plates, substantially as described.

3. In a device for burning crude petroleum, the combination, with a burner-plate having an oval groove for containing the oil to be burned, and a central opening, of a deflector-plate located above and overlapping each side of the groove, and air-passages between the deflector and burner plates, substantially as described.

4. In a device for burning crude petroleum, a burner-plate having a groove inclined from the inlet-opening to the lower end, which is provided with an exit-opening smaller than the inlet, for the purpose set forth.

5. In a device for burning crude petroleum, the combination, with a plate having a groove provided with an inlet-opening at one end and an outlet-opening at the other, of a trough, *H*, placed obliquely below the plate and having its upper end beneath the outlet-opening, for the purpose set forth.

6. In a device for burning petroleum, the combination, with the fire-box, of a burner-plate, and an inclined supply-pipe connected to the burner-plate and having an opening, *n*, for the purpose set forth.

JOSEPH F. IRONS.

Witnesses:

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A. B. RICHMOND.