

Jan. 16, 1945.

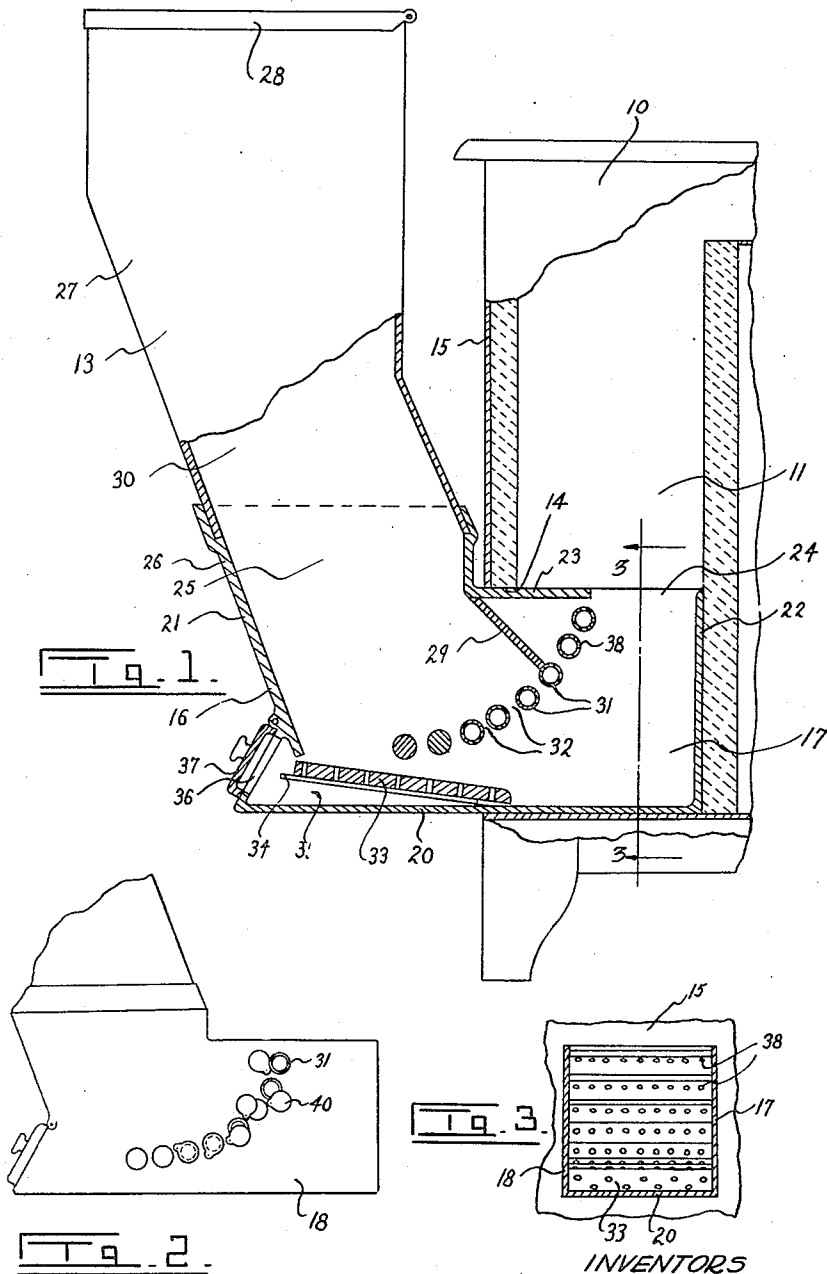
T. R. LEWERS ET AL

2,367,590

BURNER UNIT

Filed June 18, 1942

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

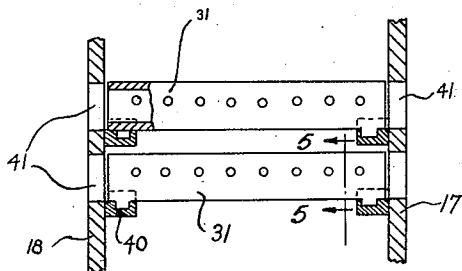


Fig. 4.

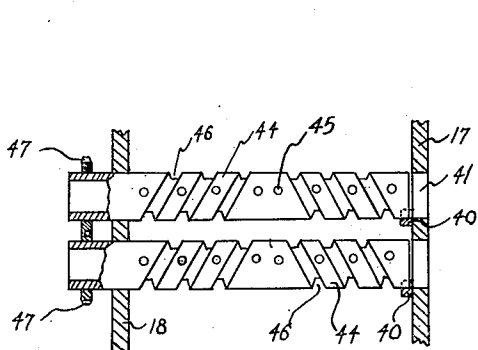


Fig. 7.

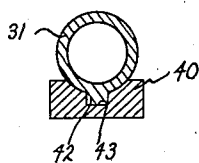


Fig. 5.

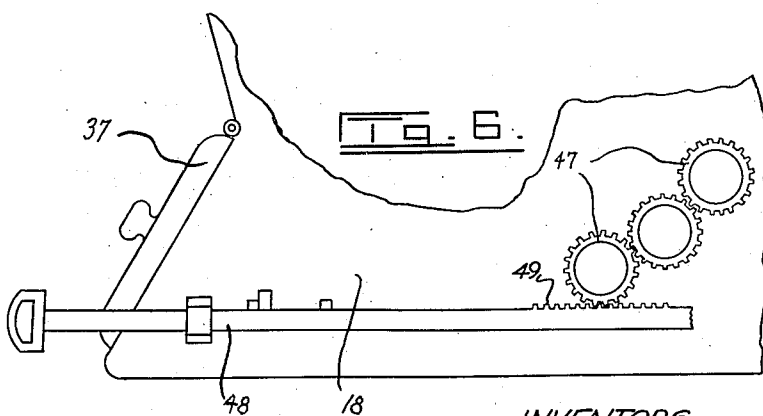


Fig. 6.

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UNITED STATES PATENT OFFICE

2,367,590

BURNER UNIT

Thomas Russell Lewers, deceased, late of Kelowna, British Columbia, Canada, by Mary Louise Lewers, administratrix, Kelowna, British Columbia, Canada, and Gordon Cairns, Kelowna, British Columbia, Canada, assignors of thirty-three and one-third per cent to George Salem Pettapiece, Vancouver, British Columbia, Canada

Application June 18, 1942, Serial No. 447,557
In Canada June 23, 1941

10 Claims. (Cl. 110-7)

This invention relates to a burner unit particularly for burning sawdust and similar fuels.

An object of the present invention is the provision of a sawdust burner in the form of a complete unit which may be used in connection with heating devices of various types, such as ranges, water heaters, domestic and industrial furnaces, and the like.

Another object is the provision of a burner unit in which substantially complete combustion of the fuel takes place.

Another object is the provision of a burner unit for sawdust and similar fuels in which most of the fuel is converted into a gas and then ignited.

A further object is the provision of a sawdust burner with which there is no soot, creosote or other objectionable by-products to clog the pipes.

A still further object is the provision of a device of the nature described of very simple and inexpensive construction.

With these and other objects in view, the present invention consists essentially of a burner unit comprising a casing adapted to communicate with the combustion chamber of a heating device, a hopper for directing fuel to the casing, means in the casing underlying a portion of the hopper for supporting fuel from the latter above the bottom of the casing, a plurality of openings in the supporting means, a grate beneath the hopper and underlying at least a portion of the supporting means, said grate receiving fuel from the hopper, and means for supplying air to the fuel on the grate, whereby the fuel on the grate may be burned to heat the fuel on the supporting means to form a gas which is ignited by the flame of the burning fuel, as more fully described in the following specification and illustrated in the accompanying drawings, in which

Figure 1 is a vertical section through a burner unit attached to a heating device,

Figure 2 is a side elevation of the unit alone, Figure 3 is a vertical section taken on the line 3-3 of Figure 1,

Figure 4 is a detail of an alternative form of fuel supporting means in the unit,

Figure 5 is a section taken on the line 5-5 of Figure 4,

Figure 6 is a side elevation of an alternative unit, and

Figure 7 is a detail of the fuel supporting means in the unit shown in Figure 6.

This burner unit may be attached or connected to any type of heating device and a range 10 is illustrated by way of example in the draw-

ings. This range has the normal combustion chamber 11 which is connected to a flue (not shown) and it may or may not have a water jacket therein.

The burner unit 13 is connected to the heating device 10 in any suitable manner, and in this case, an opening 14 is cut in the side wall 15 of the heating device adjacent the bottom thereof.

The burner unit 13 comprises a casing 16 having side walls 17 and 18, a bottom 20, and a sloping outer wall 21. The inner end of the casing may be open or it may have an inner wall 22, as shown.

The casing also has a top 23 with an outlet opening 24 extending across the casing adjacent its inner end, and an inlet opening 25 at its outer end. A collar 26 projects upwardly from the top 23 around the opening 25 and a hopper 27 re-

movably fits into the top of the collar, said hopper may or may not have a cover 28 hinged or removably mounted thereon. This hopper is adapted to direct the fuel 30, preferably sawdust, through the opening 25 to the casing 16.

Suitable means is provided for supporting fuel from the hopper above the bottom of the casing. This supporting means is preferably in the form of a plurality of bars 31 extending transversely of the casing and arranged to underlie a portion of the hopper at an angle to the bottom 20. These bars are spaced apart to form a plurality of openings or slots 32 therebetween and they are preferably arranged in an arc curving downwardly from a point beneath the top 23 adjacent the outlet 24 to a point spaced above the bottom 20 beneath the hopper 27.

A grate 33, preferably in the form of a perforated or slotted plate, as shown, is mounted beneath the hopper 27 and underlies at least some of the bars 31. This grate is preferably inclined and it may slidably rest on rails 34 (see Figure 1) formed on the inner surface of the side walls 17 and 18 and/or the grate may be provided with legs 35 adjacent its outer end while its inner end rests on the bottom 20.

Of course, the inner end of the grate may be supported above said bottom, if desired.

The grate 33 receives fuel from the hopper 27, said fuel being directed to the grate by the sloping outer wall 21. A draft inlet 36 having a control door 37, is provided in the casing 16 adjacent the outer end of the grate 33, said inlet directing air to the fuel on the grate.

One or more of the bars 31 may be hollow and each hollow bar has a plurality of openings or

slots 33 formed therein. The openings of each bar are arranged in a horizontal line and extend from end to end thereof. The openings 38 of the lowermost hollow bar, adjacent the grate 33, are located near the bottom thereof, while the openings of each succeeding bar are progressively higher than the next preceding bar, so that the openings of the uppermost bar are situated near the top thereof.

The bars 31 extend through the side walls 17 and 18 of the casing so that the outer ends of the hollow bars open out to the atmosphere. Thus, air is directed through these bars and the openings 38 thereof to the interior of the casing. If desired, suitable means may be provided for controlling the amount of air entering each bar or for preventing such entrance. One simple means for doing this is illustrated by way of example in Figure 2, in which a cover 40 is pivotally mounted on the side wall adjacent the end of each bar 31 and each cover may be pivoted partially or completely to cover the end of its bar.

If desired, a plate 29 may slope downwardly from the opening 25 to one of the upper bars 31.

In this example, the unit 13 is attached to the heating device 10 by inserting the casing 16 through the opening 14, of the side wall 15. The casing extends to the opposite wall of the heating device which, if the inner wall 22 is omitted, would form the inner wall of the casing. The casing is sealed in the heating device in any suitable manner and the interior of said casing communicates with the combustion chamber 11 of the device through the outlet 24.

In operation, the bars 31 support the greater part of the fuel from the hopper 21 above the bottom of the casing while some of said fuel is directed onto the grate 33 and as the latter underlies at least some of the bars, a quantity of fuel is positioned beneath said bars. The fuel at the inner end of the grate is ignited and air is supplied to the fire through the inlet 36 and through and around the grate. This fire heats the fuel resting on the bars to form a gas which passes through the openings or slots 32 to be ignited by the flame of the burning fuel. Air entering through the hollow bars mixes with the gas thus formed to create a highly combustible mixture which will burn completely and, at the same time, this air keeps the flames away from the bars and the fuel thereon. The mixture of air and gas burns as it passes through the combustion chamber 11. In this way, air from the bars is mixed with the bases formed by the heat and also with the products of combustion from the fire in the grate to ensure substantially complete combustion of the fuel.

In Figures 1 and 2, the hollow bars 31 are shown as extending through the side walls 17 and 18 but this need not necessarily be so. In Figures 4 and 5, the bars are seated on yokes 40 mounted on the inner surfaces of the walls 17 and 18 beneath orifices 41 formed in said walls. The ends of the bars are retained in registry with said orifices, and each bar is provided at its opposite ends with lugs 42 which are adapted to fit into corresponding slots 43 in the yokes 40. By fitting these lugs into their corresponding slots, the bars are always retained with their openings or slots 33 in their proper positions.

Other fuel, such as coal, may be used in this burner unit and with the arrangement described above. It is preferable, however, to use the construction illustrated in Figures 6 and 7 for coal. In these figures, the bars 31 are replaced by hol-

low, open-ended bars 44 which are rotatably mounted at one end on yokes 40 and maintained in registry with the orifices 41 in the wall 17. These bars are provided with openings or slots 45 arranged in the same manner as the openings or slots 38 of the bars 31. These bars may be formed with spiral grooves 46 in their surfaces.

The opposite end of each bar extends through and beyond the wall 18 and has a gear 47 mounted at the end thereof. The gears of the bars 44 mesh with each other, as seen in Figure 6, and a shaker bar 48 is slidably mounted on the side wall of the casing 16 and has teeth 49 adapted to mesh with the lowermost gear 47.

With this arrangement the bars 44 may be shaken by means of the shaker bar 48 to cause any ashes thereon to drop down to the bottom of the casing 16. Actually, these bars may be shaken in any desired manner, the construction shown in Figures 6 and 7 being an example of a simple method of doing this.

While this unit has been described as being attached to a range, it will be understood that it may be connected to water heaters, domestic and commercial furnaces, and the like. In the case of a water heater, the casing would communicate with the chamber containing the coils or water jackets and this is intended to be covered by the term "combustion chamber" as used in the description of the heating device.

From the above, it will readily be seen that a burner unit of simple construction has been provided in which most of the fuel is converted into a gas to be burned and in which substantially complete combustion takes place.

Various modifications may be made in this invention without departing from the spirit thereof or the scope of the claims, and therefore, the exact forms shown are to be taken as illustrative only and not in a limiting sense, and it is desired that only such limitations shall be placed thereon as are set forth in the accompanying claims.

What we claim as our invention is:

1. A burner unit comprising a casing adapted to communicate with the combustion chamber of a heating device, a hopper for directing fuel to the top of the casing, a plurality of spaced bars extending transversely of the casing and underlying a portion of the hopper, said bars supporting fuel from the hopper above the bottom of the casing, a grate beneath the hopper and underlying at least some of the bars, said grate receiving fuel from the hopper, said grate projecting below the bars whereby the fuel on the grate may be burned under the bars to heat the fuel supported thereon.

2. A device according to claim 1 in which at least some of the bars are hollow and communicate with the atmosphere outside the casing, and each of said hollow bars has at least one opening therein for directing air to mix with the fuel thereon.

3. A burner unit comprising a casing adapted to communicate with the combustion chamber of a heating device, a hopper for directing fuel to the top of the casing, a plurality of spaced bars extending transversely of the casing and underlying a portion of the hopper, said bars being arranged in an arc curving downwardly from a point beneath the top of the casing adjacent one end thereof and the heating device to a point spaced above its bottom beneath the hopper away from the heating device to support fuel from the hopper, an inclined grate beneath the hopper and underlying at least some of the bars,

said grate receiving fuel from the hopper, and means for supplying air to the fuel on the grate, whereby the fuel on the grate may be burned to heat the fuel on the bars to form a gas which is ignited by the flame of the burning fuel.

4. A device according to claim 1 in which at least some of the bars are hollow and communicate with the atmosphere outside the casing, said hollow bars having openings therein for directing air into the casing.

5. A burner unit comprising a casing adapted to extend into a heating device, said casing having an outlet opening in the top thereof adjacent its inner end communicating with the combustion chamber of the device, a hopper for directing fuel to the top of the casing at its outer end, a plurality of spaced bars extending transversely of the casing and underlying a portion of the hopper, said bars being arranged in an arc curving downwardly from a point beneath the top of the casing adjacent the outlet opening thereof to a point spaced above its bottom beneath the hopper to support fuel from the latter, means for supplying air to at least some of the bars which are made hollow for that purpose, an inclined grate beneath the hopper and underlying at least some of the bars, said grate receiving fuel from the hopper, said grate projecting be-

low the bars whereby the fuel on the grate may be burned under the bars to heat the fuel supported thereon.

6. A device according to claim 1 in which the bars are removably mounted in the casing.

7. A device according to claim 1 in which at least some of the bars are rotatably mounted, and including means for rotating said bars.

8. A device according to claim 1 in which at least some of the bars are hollow and communicate with the atmosphere outside the casing, said bars having openings therein for directing air into the casing with the openings of the lowermost hollow bars located near the bottom thereof and the openings of each succeeding bar progressively higher than those of the next preceding bar.

9. A device according to claim 1 in which at least some of the bars are rotatably mounted and have spiral grooves formed in their surfaces, and including means for rotating said bars.

10. A device according to claim 1 in which the bars are arranged parallel to each other and form a grate inclined to the bottom of the casing.

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GORDON CAIRNS.