Feb. 28, 1939. G. G. LENNMOR 2,148,991

REFRIGERATOR

Filed Sept. 11, 1936 2 Sheets-Sheet 1

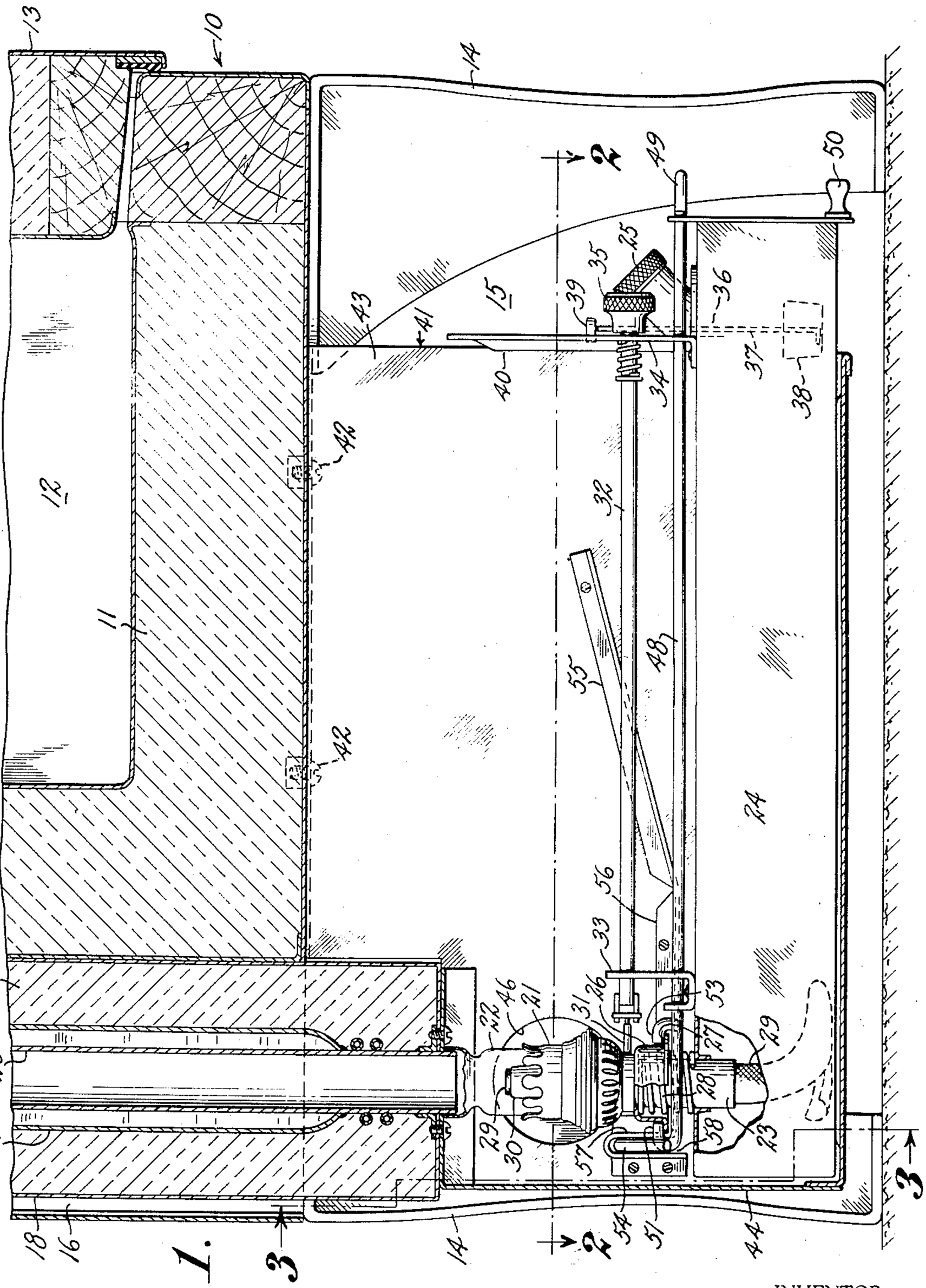

Fig. 1.

INVENTOR.
Göste Gregorius Lennmor

BY Ell Fernander
his ATTORNEY.

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Fig. 2.

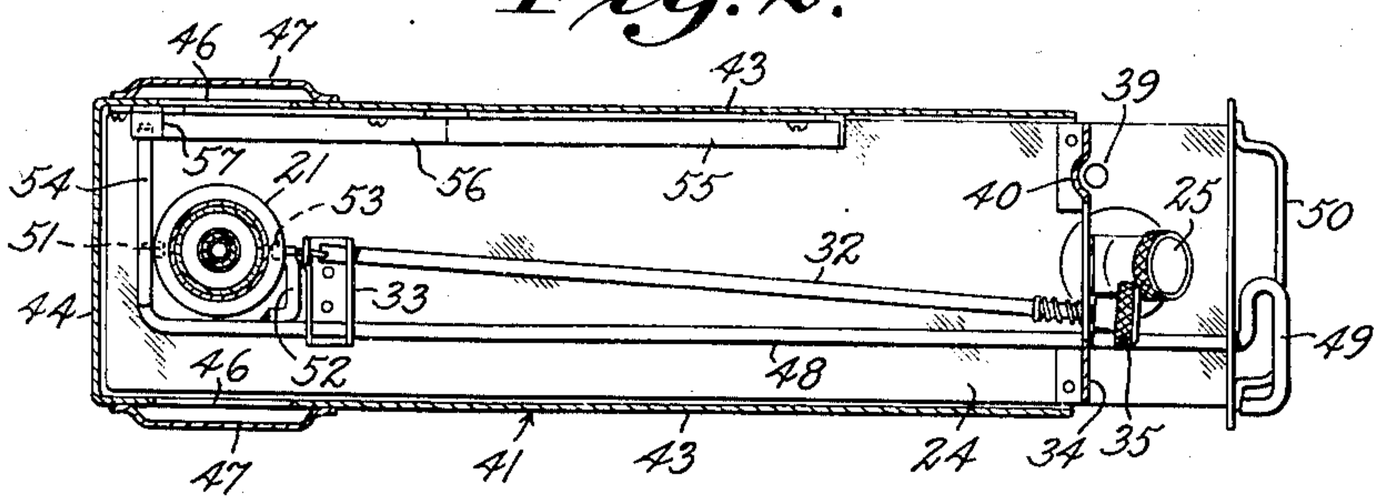
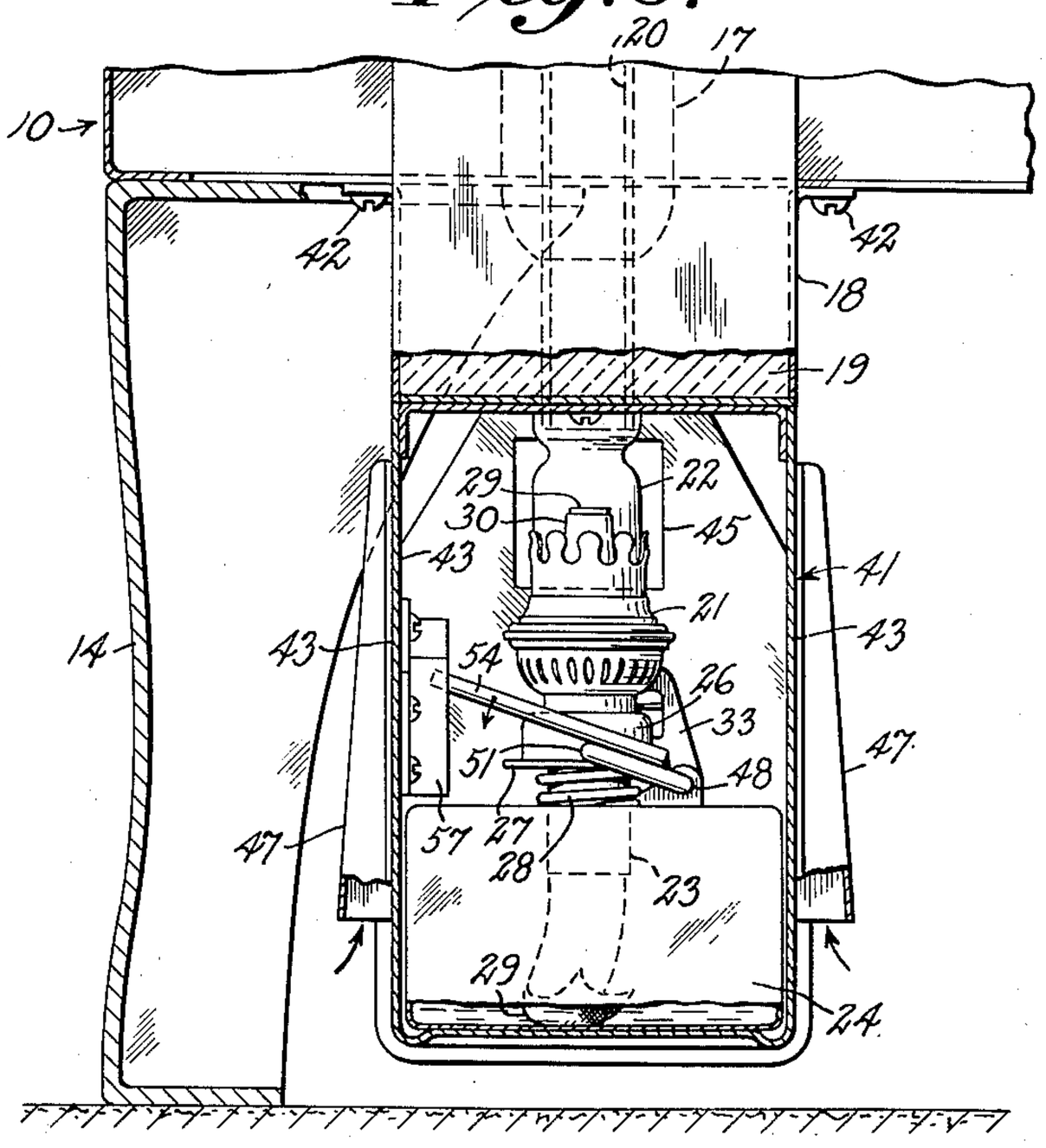


Fig. 3.



INVENTOR.
Gösta Gregorius Lennmor

BY Ell Fernander
his ATTORNEY.

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UNITED STATES PATENT OFFICE

2,148,991

REFRIGERATOR

Gösta Gregorius Lennmor, Stockholm, Sweden, assignor, by mesne assignments, to Servel, Inc., New York, N. Y., a corporation of Delaware

Application September 11, 1936, Serial No. 100,227
In Germany September 27, 1935

20 Claims. (Cl. 62—1)

My invention relates to refrigerators, and more particularly to absorption type refrigerators operated by heat.

It is an object of my invention to provide a refrigerator having a movable burner which can always be moved accurately into its operating position.

Further objects and advantages of my invention will become apparent from the following description and accompanying drawings forming a part of this specification, and of which Fig. 1 is a fragmentary side view, partly in section, of a refrigerator provided with apparatus embodying my invention; and Figs. 2 and 3 are sectional views taken on lines 2—2 and 3—3, respectively, of Fig. 1 illustrating more clearly parts of the apparatus.

Referring to Fig. 1, I have shown my invention embodied in a refrigerator including a cabinet 10 having thermally insulated walls 11 defining a storage compartment 12 into which access may be had by a door 13 hinged to the front of the cabinet. The cabinet 10 is mounted on legs 14 whereby an apparatus space 15 is provided below the storage compartment which communicates with an upward extending compartment 16 at the rear of the cabinet which houses parts of the refrigeration apparatus.

The refrigeration apparatus I preferably employ is of a uniform pressure absorption type, generally as disclosed in Patent No. 1,609,334 to B. C. von Platen and C. G. Munters. Such refrigeration apparatus comprises a cooling element or evaporator which may be arranged in the storage compartment 12. A refrigerant fluid, such as ammonia, evaporates in the evaporator and diffuses into an inert pressure equalizing gas, such as hydrogen. The resulting gaseous mixture of refrigerant and inert gas flows from the evaporator to an absorber in which the refrigerant gas is absorbed by a suitable liquid absorbent, such as water. The inert gas is returned to the evaporator, and the enriched absorption liquid is conducted to a generator 17. By heating the generator 17 the refrigerant is expelled from the absorption liquid, condensed in a suitable condenser, and then returned to the evaporator to complete the refrigerating cycle. The weakened absorption liquid from which the refrigerant has been expelled is conducted from the generator 17 to the absorber to absorb refrigerant gas.

In Fig. 1 the generator 17 is shown at the lower part of the rear compartment 16 and arranged within a metal shell 18 which contains a suitable insulating material, as indicated at 19. The absorber, condenser and other parts of the refrigeration apparatus may be supported in the rear apparatus compartment 16. In order to simplify the drawings the last-mentioned parts and the cooling element have not been shown, their illustration not being necessary for an understanding of my invention.

The generator 17 is provided with a heating flue 20 which extends vertically upward therethrough and is adapted to be heated by a burner 21 arranged so that the flame produced thereby is directed into the lower end of the flue. The burner 21 is of the well-known wick type and includes a glass chimney 22 which forms a prolongation of the flue 20 which projects downward below the bottom of the shell 18. In order to protect the chimney 22 the upper edge thereof may be provided with a suitable metal ring.

The burner 21 is provided with a depending tubular member 23 which is adapted to extend into an opening formed in a liquid fuel supply vessel 24 having a filling cap 25 at the forward end which is accessible from the front of the cabinet 10. An annular member 26 having a flange 27 at its lower end is arranged about the tubular member 23, the upper end of which is adapted to bear against a shoulder formed on the burner. Within the annular member 26 and about the tubular member 23 is disposed a helical spring 28 which is under tension and bears against the top of the supply vessel 24 and upper end of the annular member 26 to bias the burner vertically upward to maintain the latter in its normal operating position with the upper part of the chimney 22 fitting over the flue 20.

The wick 29 extends upward from the supply vessel 24 through the tubular member 23 and space between an inner conical-shaped cylindrical wall and outer conical-shaped cylindrical wall 30 at the upper edges of which the burner flame is maintained. The wick 29 is adjusted by suitable mechanism (not shown) having a shaft 31 to which is connected a rod 32 extending to the forward part of the supply vessel 24. The rod 32 extends through openings in a bracket 33 and a plate 34 mounted on the supply vessel 24, and to the outer end thereof is fixed a control knob 35 accessible from the front of the cabinet. Adjacent to the plate 34 the vessel 24 is provided with an opening through which extends a tube 36 adapted to receive a pin 37 having a float 38 secured to its lower end. The upper end of the pin 37 is provided with an enlarged head 39 which is vertically movable adjacent a curved portion 40 of the plate 34 which may be marked in a suit-

able manner whereby the quantity of fuel in the supply vessel can be readily determined.

The supply vessel 24 is adapted to be positioned in a shell 41 secured in any suitable manner, as by screws indicated at 42, to the bottom of the cabinet 10. The shell 41 comprises side walls 43 and a rear wall 44 and is open at its forward end. When the supply vessel 24 is in its normal position in the shell 41, the plate 34 mounted on the supply vessel is adjacent to the open forward end of the shell whereby the burner 21 is shielded from the forward part of the cabinet 10. The plate 34 may be provided with a glass window 45, as shown in Fig. 3, through which the burner flame may be viewed and adjustments thereof made by means of the control knob 35.

The side walls 43 of the shell adjacent to the burner 21 are provided with openings 46 which are covered with plates 47 which slope outward and are open at the bottom to insure the admission of an adequate quantity of air to the burner.

In order that the burner 21 will always be moved accurately into its operating position when the supply vessel 24 is moved rearwardly in the shell 41, I provide a rod 48 which is disposed above the vessel 24 and extends through openings in the bracket 33 and plate 34. The rod 48 extends lengthwise of the vessel 24 and at its forward end is formed a handle 49 which, with the handle 50 fixed to the front end of the supply vessel, may be employed for pulling and pushing the supply vessel out of and into the shell 41.

The rod 48, at a point to the rear of the burner 21, is provided with a U-shaped bend having the extreme end 51 thereof adapted to bear against the upper side of the flange 27 of the annular member 26. To the rod 48 is secured a short rod 52 also having an inwardly bent end 53 which is similar to the end 51 and adapted to bear against the upper side of the flange 27 at a point diametrically opposite the end 51.

To the rear end of the rod 48 is secured an extension or cross rod 54, the outer free end of which is adapted to engage a guide rail fixed to one of the side walls 43 of the shell. The guide rail may be formed of angle members and includes an upwardly inclined forward section 55, a horizontal section 56 which is substantially parallel to the top of the vessel 24, and a vertical section 57 which is curved at its upper end and bent back upon itself to form a slot 58, as shown in Fig. 1, adapted to receive the outer free end of the cross rod 54.

When it is desired to move the burner 21 forward from its operating position shown in Fig. 1, the handle 49 is turned in the direction indicated by the arrow shown in Fig. 3, whereby the inwardly bent ends or claws 51 and 53 bearing against the flange 27 are pressed downward against the tension of the spring 28 and the burner 21 is moved downward. With such turning movement of the rod 48 by the handle 49 the cross rod 54 is moved downward along the vertical section 57 of the guide rail. After the cross rod 54 has been moved below the lower surface of the horizontal section 56 of the guide rail, the vessel 24 can be pulled forward by means of the handles 49 and 50. As the vessel 24 is being pulled forward, the cross rod 54 is bearing against the underside of the horizontal section 56 of the guide rail whereby the burner 21 is maintained in its lower position to which it is moved before any horizontal movement can be imparted to the vessel 24. When the cross rod 54 is moved along the underside of the inclined forward section 55 of the guide rail the cross rod 54 moves vertically upward whereby the rod 48 is turned to raise the claws 51 and 53 and permit the burner 21 to be moved upward. With the burner 21 in its upper position at the forward end of the shell 41, the spring 28 is only under slight tension whereby the burner can be readily removed from the supply vessel 24 for cleaning and inspection.

When the burner 21 is subsequently moved back to its operating position, the burner is automatically lowered so that the chimney 22 will clear the lower part of the generator casing 18 and flue 20, and, when the cross rod 54 reaches the vertical section 57 of the guide rail, the position of the burner below the flue 20 is definitely determined. When the cross rod 54 moves upward in the slot 58, the chimney 22 of the burner will accurately fit over the lower end of the flue 20 with which it is in alignment.

In view of the foregoing, it will be understood that I have provided an improved apparatus for accurately moving the burner 21 into its operating position. By properly dimensioning the parts of the apparatus and limiting the upward movement of the burner 21 in the slot 58 the upper end of the chimney 22 may be prevented from striking the bottom of the generator shell 18 with excessive force. If desired, resilient means may be provided in the slot 58 to break or retard the upward movement of the cross rod 54 when the vessel 24 is pushed rearwardly in the shell 41.

While I have shown and described a single embodiment of my invention, such variations and modifications are contemplated as fall within the true spirit and scope of my invention.

What is claimed is:

1. In a refrigerator having a heat receiving element provided with a flue, a movable burner including a chimney, said chimney forming a prolongation of said flue when said burner is in its normal operating position, means to move said burner horizontally toward and to its normal operating position, means operated due to such horizontal movement to cause the burner to be lowered prior to reaching its ultimate operating position, and means operative due to continuing horizontal movement in the same direction to cause the burner to move upwardly when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue.

2. In a refrigerator having a heat receiving element provided with a flue, a movable burner including a chimney, said chimney forming a prolongation of said flue when said burner is in its normal operating position, means to move said burner horizontally toward and to its normal operating position, means operated due to such horizontal movement to cause the burner to be lowered prior to reaching its ultimate operating position, means operative due to continuing horizontal movement in the same direction to cause the burner to move upwardly when the upper part of said chimney is in alignment with the lower part of said flue, and means for limiting the extent of such upward movement of said burner when said chimney forms a prolongation of said flue.

3. In a refrigerator having a heat receiving element provided with a flue, a movable burner including a chimney, said chimney forming a prolongation of said flue when said burner is in its normal operating position, means to move said burner horizontally, and means operative due to said horizontal movement to cause said burner to move upward when the upper part of said chimney

is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue.

4. In a refrigerator having a heat receiving element provided with a flue, a movable burner including a chimney, said chimney forming a prolongation of said flue when said burner is in its normal operating position, means to move said burner horizontally, means operative due to said horizontal movement to cause said burner to move upward when the upper part of said chimney is in alignment with the lower part of said flue, and means for limiting the extent of such upward movement of said burner when said chimney forms a prolongation of said flue.

5. In a refrigerator having a heat receiving element provided with a flue, a movable burner including a chimney, resilient means for biasing said burner vertically upward whereby said chimney forms a prolongation of said flue when said burner is in its normal operating position, means to move said burner horizontally toward and to its normal operating position, means operative due to such horizontal movement to cause said burner to be lowered against the tension of said resilient means and means to permit said burner to move upward due to the tension of said resilient means when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue.

6. In a refrigerator having a heat receiving element provided with a flue, a movable burner including a chimney, resilient means for biasing said burner vertically upward whereby said chimney forms a prolongation of said flue when said burner is in its normal operating position, and structure including a fixed guide member and a part movable with said burner and cooperating with said guide member for moving said burner into and out of its normal operating position, said structure being so constructed and arranged that when said burner is moved horizontally toward its operating position said part and said guide member cause said burner to be lowered during such movement against the tension of said resilient means and subsequently permit said burner to move upward due to the tension of said resilient means when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said burner into prolongation of said flue.

7. In a refrigerator cabinet provided with an apparatus space below a thermally insulated storage compartment and refrigeration apparatus having a heat receiving element provided with a flue disposed at the rear of said cabinet, a movable burner adapted to be positioned in said apparatus space and including a chimney, said chimney forming a prolongation of said flue when said burner is in its normal operating position, means to move said burner rearwardly of the cabinet, means operative due to such rearward movement to cause the burner to be lowered prior to reaching its normal operating position, and means operative due to continued rearward movement of the burner to cause the burner to move upwardly when the upper part of said chimney is in alignment with the lower part of such flue, thereby bringing said chimney into prolongation of said flue.

8. In a refrigerator cabinet provided with an apparatus space below a thermally insulated storage compartment and refrigeretion apparatus having a heat receiving element provided with a flue disposed at the rear of said cabinet, a burner adapted to be positioned in said apparatus space and including a chimney, said chimney forming a prolongation of said flue when said burner is in its normal operating position, means including a part operable from the front of said cabinet for moving said burner rearwardly, and means operative due to said rearward movement to cause the burner to move upwardly to its operating position when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue.

9. In a refrigerator cabinet provided with an apparatus space below a thermally insulated storage compartment and refrigeration apparatus having a heat receiving element provided with a flue disposed at the rear of said cabinet, a burner adapted to be positioned in said apparatus space and including a chimney, resilient means for biasing said burner vertically upward whereby said chimney forms a prolongation of said flue when said burner is in its normal operating position, and structure including a fixed guide member and a part movable with said burner and cooperating with said guide member for moving said burner, said structure being so constructed and arranged that when said burner is moved rearward in said apparatus space said part and said guide member cause said burner to be lowered during such movement against the tension of said resilient means and subsequently permit said burner to move upward due to the tension of said resilient means when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue.

10. In a refrigerator cabinet provided with an apparatus space below a thermally insulated storage compartment and refrigeration apparatus having a heat receiving element provided with a flue disposed at the rear of said cabinet, a shell arranged within said apparatus space open at its forward end, a liquid fuel supply vessel adapted to be positioned in said shell, a burner adapted to be mounted on said vessel at the rear end thereof and including a chimney, resilient means for biasing said burner vertically upward whereby said chimney forms a prolongation of said flue when said burner is in its normal operating position, means for moving said supply vessel rearwardly, means operative due to rearward movement of the supply vessel to cause said burner to be lowered during such movement against the tension of said resilient means, and means operative due to further movement of the storage vessel rearwardly to cause the burner to move upwardly due to the tension of said resilient means when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue.

11. Apparatus as set forth in claim 10, in which said structure includes a part operable at the forward end of said supply vessel operative to lower said burner against the tension of said resilent means.

12. Apparatus as set forth in claim 10, including means operable at the forward end of said supply vessel for controlling said burner when it is in its operating position.

13. In a refrigerator cabinet provided with an apparatus space below a thermally insulated storage compartment and refrigeration apparatus having a heat receiving element provided with a

flue disposed at the rear of said cabinet, a shell arranged within said apparatus space open at its forward end, a liquid fuel supply vessel adapted to be positioned in said shell, a burner adapted to be mounted on said vessel at the rear end thereof and including a chimney, said chimney forming a prolongation of said flue when said burner is in its normal operating position, means for moving said vessel rearwardly, means operative due to such rearward movement to cause said burner to be moved upwardly when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue, and a plate mounted on the forward end of said vessel adapted to close the opening at the forward end of said shell when said burner is in its normal operating position to shield said burner from the front of said cabinet.

14. Apparatus as set forth in claim 13, in which said plate is provided with a window whereby said burner may be viewed when it is in its operating position.

15. In a refrigerator having a heat receiving element provided with a flue, a movable burner including a chimney, structure for carrying said burner, resilient means for biasing said burner vertically upward whereby said chimney forms a prolongation of said flue when said burner is in its normal operating position, a rod supported on said structure and rotatable thereon, said rod having offset portions adapted to cooperate with said resilient means whereby, when said rod is rotated in one direction, the tension of said resilient means is increased and said burner is lowered from its normal operating position, a fixed guide rail, said rod having an extension adapted to engage and slide along said guide rail, said guide rail and said extension being so constructed and arranged that, when said structure is moved toward the operating position of said burner, the portions of said rod adapted to cooperate with said resilient means are operative to increase the tension of the latter and lower said burner and subsequently are operative to permit said burner to move upward due to the tension of said resilient means when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue.

16. Apparatus as set forth in claim 15, in which said guide rail includes a part adapted to limit the extent of upward movement of said burner when the upper part of said chimney is in alignment with the lower part of said flue.

17. Apparatus as set forth in claim 15, in which said guide rail includes a vertical section adjacent said flue and another section extending in a horizontal direction from the lower end of said vertical section so that, when said structure is moved toward the operating position of said burner, said burner is moved upward due to the tension of said resilient means when said extension moves from the horizontal section to the vertical section of said guide rail.

18. In a refrigerator cabinet provided with an apparatus space below a thermally insulated storage compartment and refrigeration apparatus having a heat receiving element provided with a flue disposed at the rear of said cabinet, a burner including a chimney, structure for carrying said burner, resilient means for biasing said burner vertically upward whereby said chimney forms a prolongation of said flue when said burner is in its normal operating position, a rod supported on said structure and rotatable thereon, said rod having offset portions adapted to cooperate with said resilient means whereby, when said rod is rotated in one direction, the tension of said resilient means is increased and said burner is lowered from its normal operating position, a fixed guide rail in said apparatus space, said rod having an extension adapted to engage and slide along said guide rail, said guide rail and said extension being so constructed and arranged that, when said structure is moved rearward from the front of said cabinet, the portions of said rod adapted to cooperate with said resilient means are operative to increase the tension of the latter and lower said burner and subsequently are operative to permit said burner to move upward due to the tension of said resilient means when the upper part of said chimney is in alignment with the lower part of said flue, thereby bringing said chimney into prolongation of said flue.

19. Apparatus as set forth in claim 18, in which said rod extends to the forward part of said structure and is manually operable from the front of said cabinet to increase the tension of said resilient means and lower said burner from its normal operating position when it is desired to move said structure forward toward the front of said cabinet.

20. Apparatus as set forth in claim 18, in which said guide rail includes a vertical section adjacent said flue and a second section extending forward toward the front of said cabinet from the lower end of said vertical section, said burner, during rearward movement of said structure, being capable of moving upward due to the tension of said resilient means when said extension passes from said second section to the vertical section of said guide rail.

GÖSTA GREGORIUS LENNMOR.