July 23, 1946. D. HANDELAN 2,404,705

COMBINATION HEATER AND REFUSE BURNER

Filed Aug. 27, 1943 3 Sheets-Sheet 1

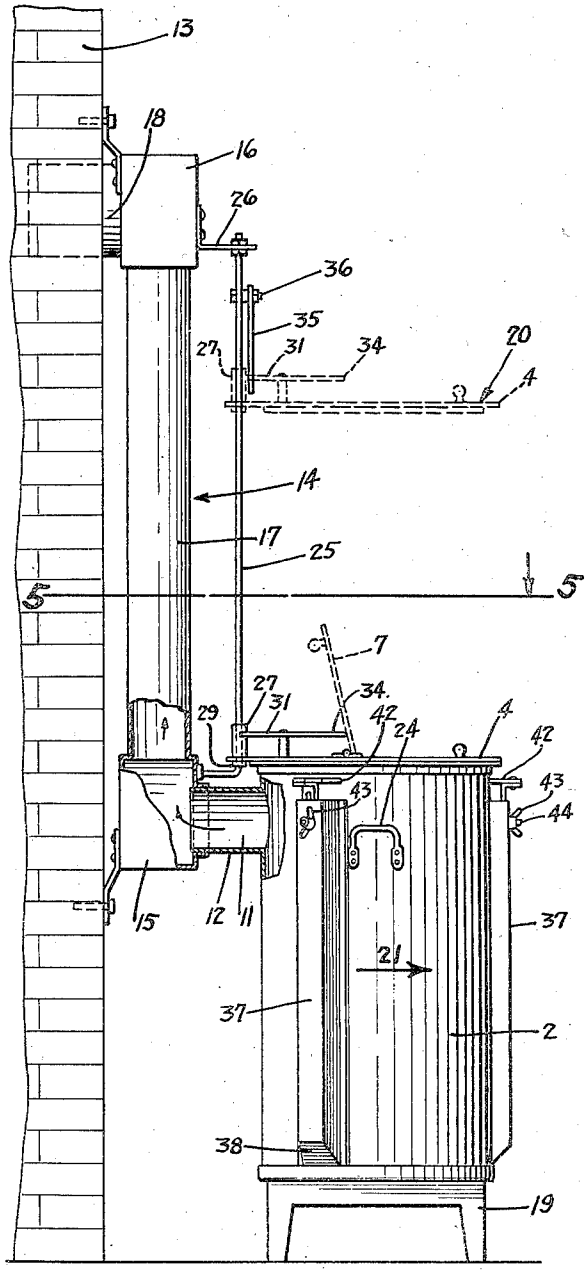



FIG. 1

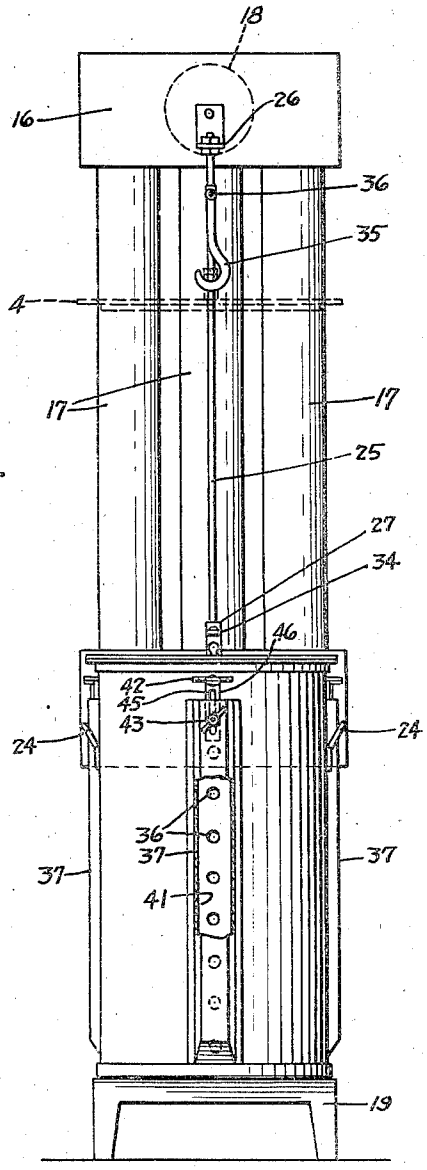



FIG. 2

INVENTOR
DANIEL HANDELAN
By Paul, Paul & Moore
ATTORNEYS

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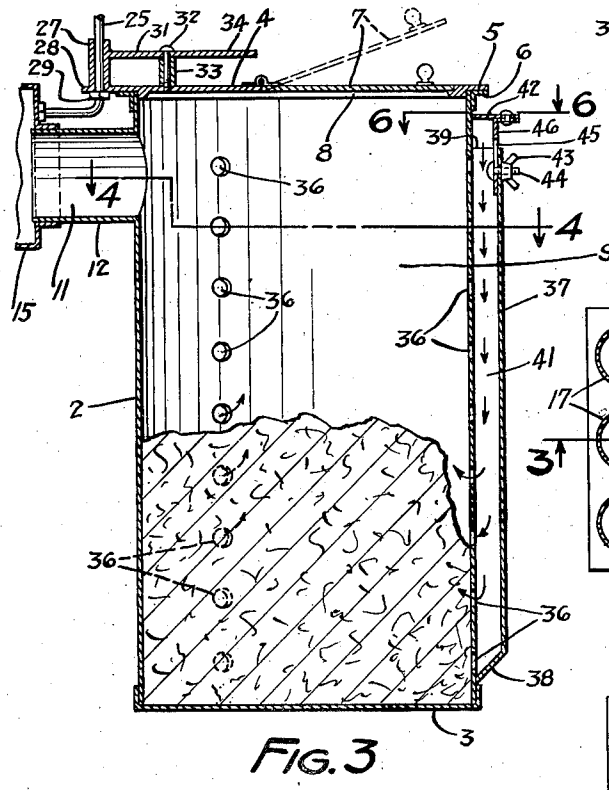



FIG. 3

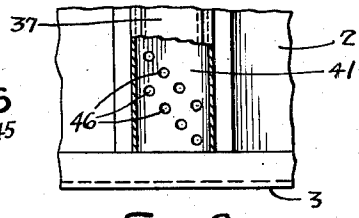



FIG. 8

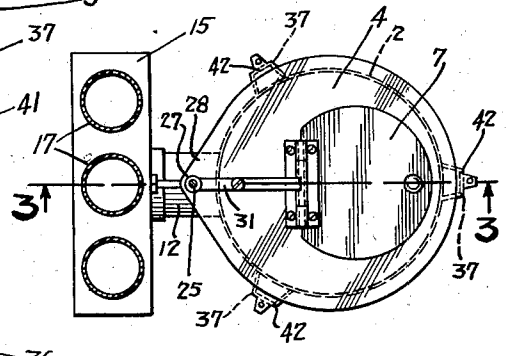



FIG. 5

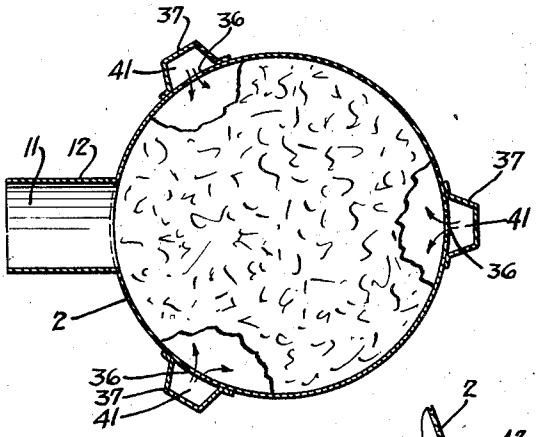



FIG. 4

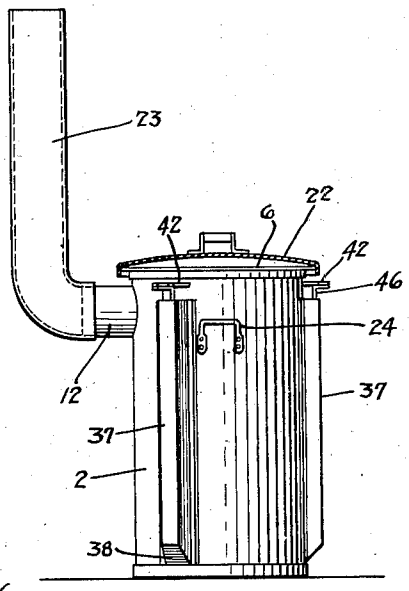



FIG. 7

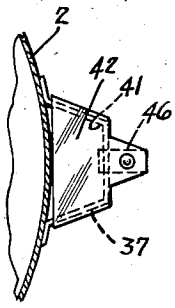



FIG. 6

INVENTOR
DANIEL HANDELAN
By Paul, Paul & Moore
ATTORNEYS

July 23, 1946. D. HANDELAN 2,404,705

COMBINATION HEATER AND REFUSE BURNER

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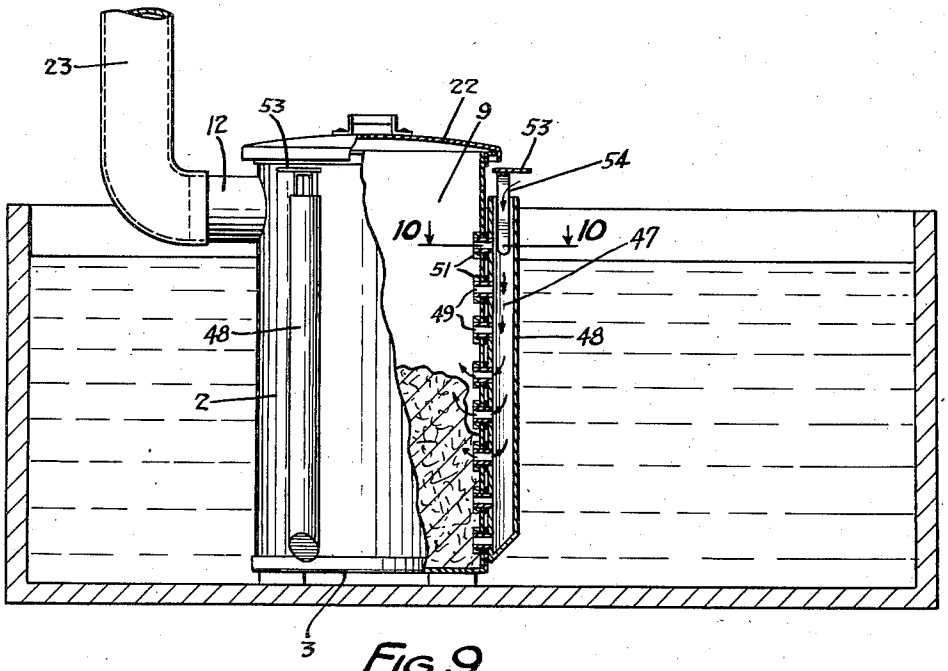



FIG. 9

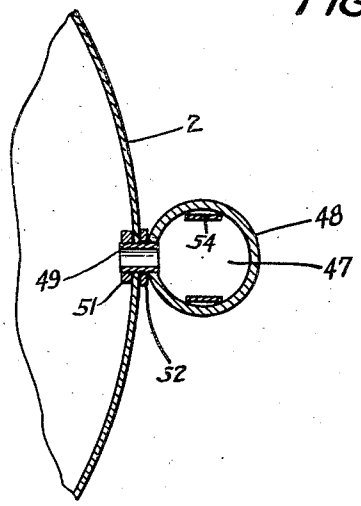



FIG. 10

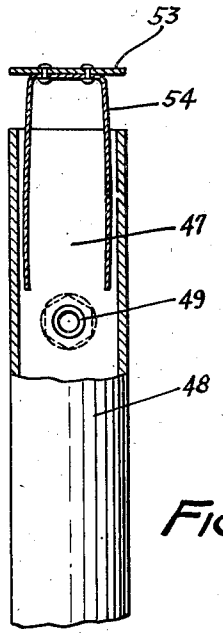



FIG. 11

INVENTOR
DANIEL HANDELAN
By Paul, Paul & Moore
ATTORNEYS

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# UNITED STATES PATENT OFFICE

2,404,705

## COMBINATION HEATER AND REFUSE BURNER

Daniel Handelan, Minneapolis, Minn., assignor of one-half to Elvin H. Wilson, Minneapolis, Minn.

Application August 27, 1943, Serial No. 500,229

1 Claim. (Cl. 110—8)

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This invention relates to an improved combination heater and refuse burner and more particularly to such an apparatus which may be operated within a building or exteriorly thereof, as may be desired.

An object of the present invention is to provide a combination heater and refuse burner which is capable of burning non-liquid fuels, and all combustible refuse materials such as garbage, sweepings, waste paper, and other debris which may accumulate about a home or building.

A further object is to provide such an apparatus comprising a hollow body forming a combustion chamber and provided at its upper end with an opening for receiving the material or fuel to be burned, said body being removably supported upon a suitable base and having a smoke outlet at its upper portion adapted for connection with a flue or chimney.

A further object of the invention is to provide an apparatus of the class described comprising a casing defining a combustion chamber, and said casing having a plurality of vertically disposed draft ducts provided on the exterior thereof and arranged in circumferentially spaced relation, each draft duct being in direct communication with the combustion chamber through a series of horizontally disposed air passages spaced apart in a direction lengthwise of their respective draft ducts, whereby adequate supplies of oxygen may be furnished the combustion chamber to support combustion at any level therein.

A further object is to provide an apparatus of the character described comprising a casing defining a combustion chamber and said casing having groups of vertically spaced air passages in its wall, which groups are spaced apart around the circumference of the casing, and a plurality of channel-like members being secured to the wall of the casing and each overlying and concealing a group of said air passages, said channel-like members being open at their upper ends only and forming upright draft ducts through which atmospheric air may be drawn into the combustion chamber through the upper ends of said channels and through certain of the air passages concealed by said channels, said channels and air passages causing the fuel or other material delivered into the combustion chamber to readily burn from the top thereof in a downward direction, after being ignited, the atmospheric air or oxygen drawn into the combustion chamber as a result of combustion therein, always being delivered into the combustion chamber at substantially the uppermost level of the fire or fuel bed

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whereby complete and thorough combustion is obtained with little ash.

A further object is to provide a burner of the character described comprising a combustion chamber having a smoke outlet adjacent its upper end, and the wall of said chamber being provided with a plurality of groups of vertically disposed air passages, the passages of each of said groups being concealed by a channel member whose upper ends are open to the atmosphere and said channel members so proportioned with respect to the size of the smoke outlet that when ignition has been started, atmospheric air or oxygen will be supplied to the combustion chamber in the correct amount to support efficient combustion, and whereby all of the consumable or burnable material within the combustion chamber may be slowly consumed without regulation of dampers and without danger of over-heating the walls of the burner.

A further object resides in the novel arrangement of the draft ducts on the exterior of the burner wall and in the spaced air passages for establishing communication between the draft ducts and the combustion chamber, said draft ducts and air passages being so arranged that the fresh air or oxygen delivered into the combustion chamber will cause the fuel or combustible matter in the combustion chamber to gradually burn in an inward direction without damper regulation, toward the center of the burner, once ignition has been started, until all of the fuel is consumed, even though the fuel may be rather moist or wet when introduced into the combustion chamber, and whereby garbage and other similar materials and refuse which may contain a relatively high percentage of moisture, may readily be burned in the apparatus so that such materials may be utilized as a fuel in combination with other fuels to heat a basement room, or other rooms in which the apparatus may be installed.

A further object is to provide a novel portable burner or heater having its fuel intake opening or door, and also its smoke outlet and draft openings disposed in the upper portion thereof, whereby the burner may be partially submerged in a tank of water as, for example in a stock-watering tank, and operated to warm or heat the water therein to prevent it from freezing in extremely cold weather.

Other objects of the invention resides in the simple and inexpensive construction of the burner, as a whole, which comprises no dampers or check drafts, the draft or air passages provided in the wall thereof and the channels enclosing

said openings being of fixed size and so proportioned with respect to the smoke outlet, as to provide an adequate supply of fresh air or oxygen to support efficient combustion at all times without overheating it; in the portability of the burner whereby it may be readily removed from its supporting means within a building, and taken outside for burning waste paper, leaves, and other refuse which may accumulate in the yard, and whereby the operation of emptying the burner of ashes is greatly facilitated; and in the construction of the novel means provided for supporting the cover whereby the cover may readily and quickly be moved to an inoperative position clear of the heater, when it is desired to introduce fuel or other burnable material into the combustion chamber.

Other objects of the invention will appear from the following description and the accompanying drawings and will be pointed out in the annexed claim.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claim which follows:

In the drawings:

Figure 1 is a view showing my novel burner connected to a conventional chimney with a heat saver interposed between the burner and chimney;

Figure 2 is a front view of Figure 1;

Figure 3 is a vertical sectional view on the line 3—3 of Figure 5;

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 3;

Figure 5 is a sectional plan view on the line 5—5 of Figure 1;

Figure 6 is an enlarged detail sectional view on the line 6—6 of Figure 3;

Figure 7 is a view showing the burner detached from the chimney as when used for burning rubbish;

Figure 8 is an enlarged detail sectional view showing a different arrangement of the air passages for establishing communication between the draft ducts and the combustion chamber;

Figure 9 is a view showing the heater placed in a tank of water for heating the water therein;

Figure 10 is an enlarged detail sectional view on the line 10—10 of Figure 9; and

Figure 11 is a detail sectional view of the intake end of one of the draft ducts of the heater shown in Figure 9.

The novel burner herein disclosed is shown comprising a cylindrical casing 2 having an imperforate bottom wall 3. The upper end of the casing 2 is preferably open and is normally closed by a suitable cover 4, normally seated upon an annular seat 5 which may be conveniently formed by a suitable angle iron 6. The cover is shown provided with a small hinged lid 7 which normally closes an inspection opening 8 provided in the door 4, and whereby the operation of the burner may readily be noted by opening the lid 7. Small particles of fuel or rubbish may also be introduced into the combustion chamber 9 through the inspection opening 8, if desired.

The casing 2 is shown provided at its upper portion with a smoke outlet 11 defined by a cylindrical collar 12 adapted to be connected to a conventional chimney 13. In Figures 1 and 2 the collar 12 is shown connected to one end of



a device 14, commonly known as a "heat saver" whose opposite end is suitably connected to the chimney 13. The heat saver 14, as is well known in the art, is provided at its lower end with an elongated casing 15 having an opening in its wall to which the collar 12 is connected as shown in Figure 1. A similar elongated casing 16 is provided at the upper end of the heat saver whose interior is in communication with the interior of the casing 15 through a plurality of upright tubes 17. The upper casing 16 is connected to the chimney in the usual manner as shown at 18 in Figure 1.

The novel burner herein disclosed because of its efficiency, may be made relatively small in size, and is preferably removably supported upon a suitable base 19. The collar 12 has a slip fit in an opening provided in the wall of the casing 15, whereby when the cover 4 is elevated as shown at 20 in Figure 1, the entire burner may readily be removed from the base 19 by slightly pulling the burner outwardly in the direction indicated by the arrow 21 in Figure 1, until the collar 12 disengages the casing 15 of the heat saver. When the collar is thus disengaged from the casing 15 the burner as a whole may be readily and conveniently carried about from one place to another as, for example, when it may be desired to use it as a rubbish burner exteriorly of the building, as shown in Figure 7. When thus used a conventional garbage can cover 22 may be utilized for closing the open top of the burner, and a short length of stove pipe 23 may be attached to the collar 12 as shown. Suitable carrying handles 24 are provided on the burner casing 2 to facilitate carrying it about from place to place.

To facilitate removing the cover 4 from the burner I have shown the cover slidably supported upon a rod 25 having its lower end secured to the casing 15 of the heat saver and its other end secured in a bracket 26, suitably fixed to the upper casing 16 of the heat saver.

A guide 27 is shown secured to a rearward extension 28 of the cover 4 and slidably receives the rod 25. A suitable abutment 29 may be provided adjacent the lower end of the rod for limiting downward movement of the cover 4 thereon. A horizontally disposed bar 31 has one end secured to the tubular guide 27 and its intermediate portion is secured to the cover by a bolt or rivet 32 which passes through a spacer 33 serving to space the bar from the top of the cover. The over-hanging end portion 34 of the bar 31 serves as a handle whereby the operator may readily elevate the cover from its closed position on the burner to the open position shown at 20 in Figure 1.

To support the cover 4 in its elevated position, a suitable hook 35 may be pivotally supported on the rod 25 by a suitable bolt or pivot pin 36. The hook 35 is adapted to engage the inner end of the bar 31, as indicated in dotted lines in Figures 1 and 2, thereby to support the cover in its elevated position. By reference to Figure 1 it will also be noted that the over-hanging portion of the bar 31 serves as a limit stop for the lid 7, when the latter is swung to open position, as indicated in dotted lines in Figure 1.

An important feature of the present invention resides in the novel means provided for supplying atmospheric air or oxygen to the combustion chamber to support combustion therein.

In burners of conventional design, it is customary to provide draft openings in the lower portion of the combustion chamber which are usually provided with suitable doors whereby the

size of the draft openings may be varied to control the draft. One of the distinguishing features of the novel burner herein disclosed over conventional burners is that no draft openings or dampers of any kind are provided in the lower portion of the burner.

To permit air or oxygen to enter the combustion chamber to support combustion, a plurality of groups of horizontally disposed air passages **36** are provided in the wall of the casing **2** of the burner as best illustrated in Figure 3. The groups of such air passages are spaced apart around the circumference of the burner casing **2**, as best shown in Figure 4. Each group of air passages **36** is enclosed within a channel member, generally designated by the numeral **37**, which has its side walls suitably secured to the wall of the casing in substantially leak-tight relation. The channel members **37** are closed at their lower ends as shown at **38** in Figure 3, and their upper ends are open to the atmosphere as shown at **39** in Figure 3. Each channel member thus cooperates with a portion of the wall of the casing to provide a draft duct **41** which is in direct communication with the combustion chamber **9** through its respective horizontal air passage **36**. The air passages **36** are preferably spaced equidistant apart and extend substantially the full length of the draft ducts **41**, as will readily be understood by reference to Figure 3.

A suitable cover plate or closure **42** is provided at the upper end of each draft duct **41** and is adapted for vertical adjustment by means of a wing nut **43** and bolt **44**, the bolt being received in an elongated opening or slot **45** provided in a bracket **46** secured to the plate **42**.

In actual operation I have found the plate or cover member **42** may be secured in fixed position with respect to the upper end of the draft duct **41**, whereby they function merely as a means for preventing foreign matter from accidentally dropping into the draft ducts.

In the operation of the novel burner herein disclosed, any quantity of fuel or rubbish, within the capacity of the burner, may be introduced into the combustion chamber. When starting a fire in the burner the fuel is ignited by suitable means from the upper end of the burner. In other words, the fuel is ignited at the top of the fuel bed, conversely to the usual manner of igniting a fuel bed.

The horizontal air passages **36** and the vertical draft ducts **41** are so proportioned with respect to the smoke outlet **11** that ample oxygen or air is supplied to the fuel bed to support efficient combustion without danger of over-heating the wall of the burner.

The burner may be utilized for burning substantially any form of solid fuel and rubbish of all kinds, including garbage. The fire burns from the outside of the fuel bed in an inward direction, as indicated in Figure 4, and because of the supply of fresh air always being supplied to the combustion chamber at the combustion level, the fire will receive sufficient oxygen to cause it to burn slowly and steadily without danger of flaring up to an intense heat and without danger of going out. It is also to be understood that the fire burns from the top of the fuel bed downwardly regardless of the amount of fuel in the combustion chamber.

When combustion is started within the fuel bed, fresh air is drawn into the combustion chamber through the draft ducts **41**, which air enters the fuel bed substantially at the level thereof, or at the point where maximum combustion takes place. As the fuel is gradually consumed and the fuel bed lowers in the combustion chamber, new air passages **36** are continuously being opened as the level of the fuel bed drops in the combustion chamber, whereby the fresh air is always supplied at the combustion level, thereby assuring that all of the fuel and other combustible material introduced into the combustion chamber will be consumed by the fire without the utilization of open drafts in the lower portion of the casing.

I have also found that when the fuel bed has been ignited in the combustion chamber, the fuel sometimes burns with greater intensity at one group of air ducts **36** than at the others. Such variation in the intensity of the fire at the various groups of air passages tends to create a slight whirling action to the air current within the combustion chamber which improves combustion and creates uniform distribution of the heat to all portions of the burner casing.

As hereinbefore stated the apparatus provides a very practical device for burning garbage and other waste materials in that even though the material introduced into the combustion chamber may contain a relative high moisture content, it will eventually be consumed substantially without leaving any residue. If the burner is to be used for burning rubbish, leaves and other waste materials which may accumulate exteriorly of a building the burner may be readily lifted from its foundation or base **19**, and carried out of the building into the yard, as hereinbefore stated. The apparatus therefore has great utility, in that it may be used as a heater, a garbage burner, or as a portable rubbish burner.

In Figure 8 I have shown a burner wherein each draft duct **41** is in communication with the combustion chamber through a plurality of horizontal air passages **46** shown arranged in groups, and the various groups of such passages being inclined to the vertical.

In Figures 9, 10 and 11 there is shown a construction wherein draft ducts **47** are formed by tubular members or pipes **48**, each having a plurality of aligned openings in the wall thereof. Suitable pipe nipples **49** each have one end secured in one of the openings provided in the wall of the tubular member **48** and have their other ends extending through openings in the wall of the casing **2** and secured in place therein by suitable lock nuts **51** and **52**. A protecting cover or plate **53** is provided at the upper end of each draft tube **48** to prevent foreign matter from entering the interior of the draft tube. The cover **53** may be retained in position by suitable spring clips **54** secured to the plates **53**. The form of heater shown in Figure 9 functions in a manner identical to the one illustrated in Figures 1 and 2.

Because of the burner having no draft openings or other openings in the lower portion thereof, the casing **2** of the burner may be placed in a tank of water as illustrated in Figure 9, after which a fire may be started in the combustion chamber which will burn as readily in the heater, when thus submerged in water, as when supported as shown in Figure 7. Thus the heater provides a very convenient device for heating water in tanks, and it may be found particularly useful on stock farms where water tanks are located outside, to prevent the water from freezing therein in extremely cold weather.

From actual experience I have found that a very practical and efficient burner may be con-

structed with a casing approximately 16 inches in diameter and 24 to 30 inches high. Such a casing may be made comparatively light in weight, whereby it may readily be moved about from place to place as, for example, the positions shown in Figures 1, 7 and 9.

Where I have herein shown the casing 2 as being cylindrical in cross section, it is to be understood that it may be otherwise shaped if desired, and any number of draft ducts suitable for the purpose may be provided without departing from the scope of the invention. The entire apparatus may also be made of sheet metal whereby it may be manufactured at low cost, and also whereby it will be extremely light in weight which is highly desirable in an apparatus of this particular type.

It will be apparent to those skilled in the art that I have accomplished at least the principal objects of my invention, and it will also be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiments are illustrative only, and that my invention is not limited thereto.



I claim as my invention:

In an apparatus of the class described, a casing having a closed bottom and providing a combustion chamber, said casing having a fuel-receiving opening at its upper end normally closed by a suitable closure, means providing a series of vertically disposed air ducts adjacent to the wall of the casing, said ducts being spaced apart circumferentially of the casing and each duct extending substantially the full height of the combustion chamber, the wall of each duct having a plurality of vertically spaced draft openings therein comprising the only communication between said ducts and the combustion chamber and whereby each duct is in communication with the combustion chamber at various levels substantially the full height of the combustion chamber, each of said ducts being open to the atmosphere exteriorly of the casing at one of its ends and serving to supply fresh air to said draft openings to support combustion at various levels in the combustion chamber, and whereby a bed of fuel within the combustion chamber may be ignited at the top of the fuel bed and will burn slowly in a downward direction.

DANIEL HANDELAN.