Oct. 31, 1950 E. S. JEFFERIES, SR 2,527,934

AIR-COOLED INCINERATOR WITH HOT-AIR HEATING MEANS

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Fig. 1.

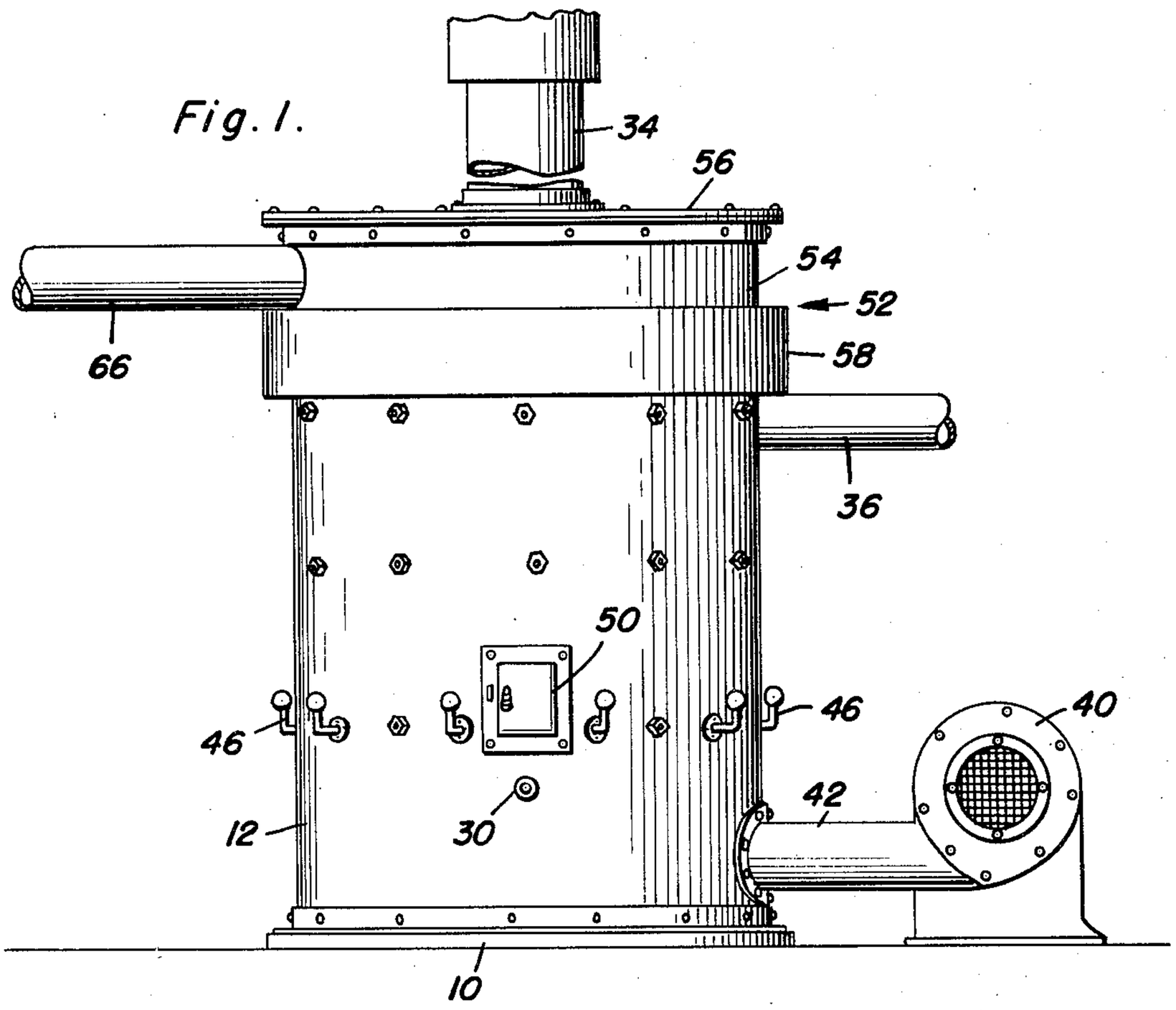

Fig. 5.

Fig. 3.

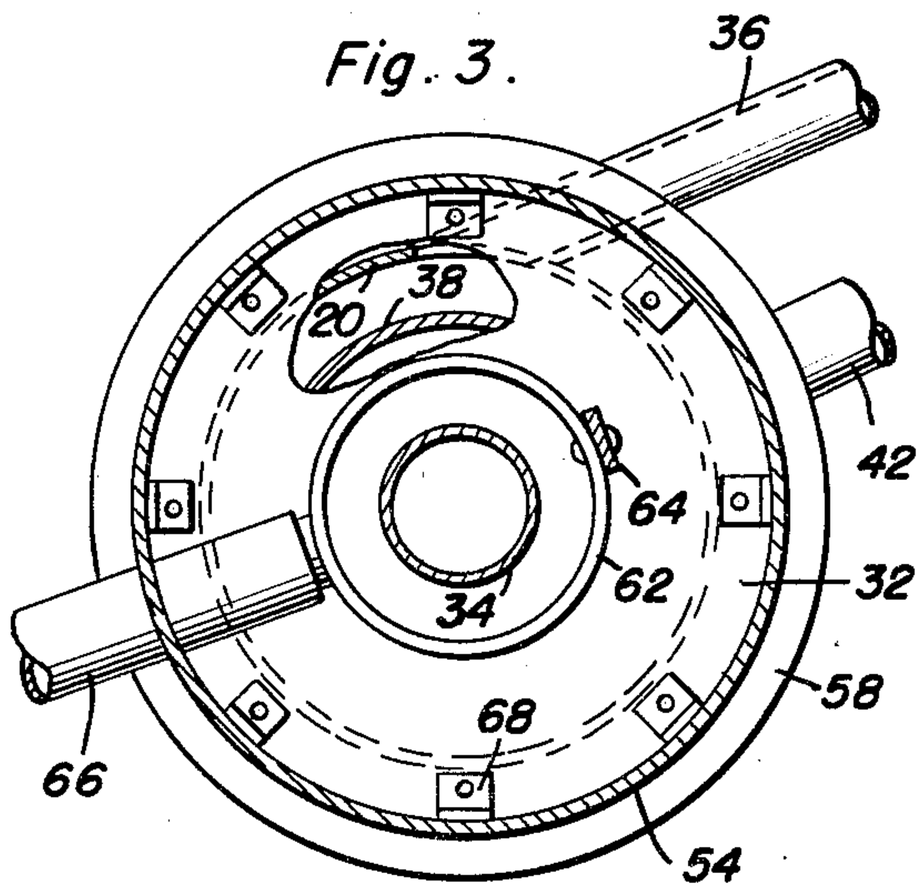

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Fig. 2.

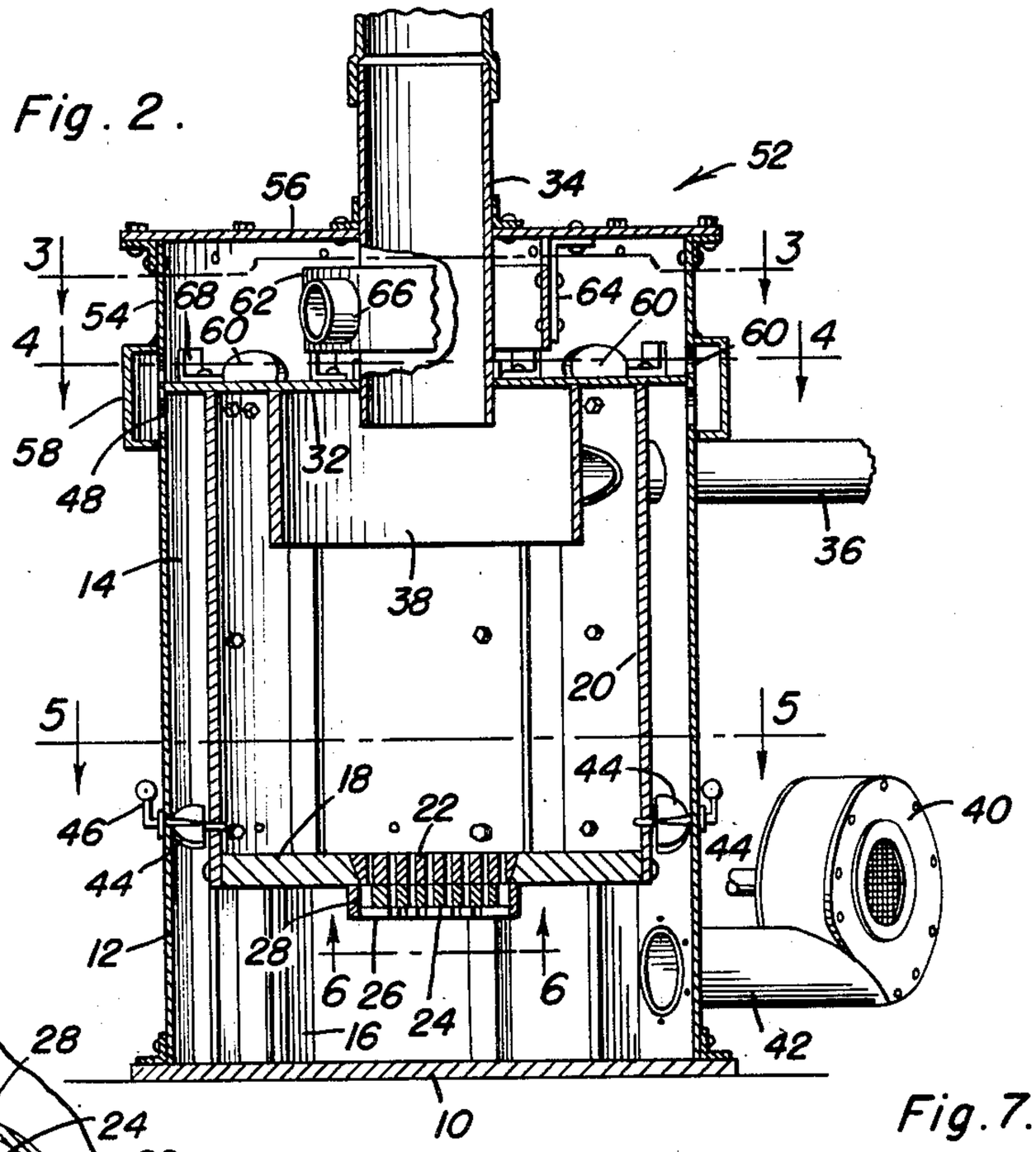


Fig. 6.

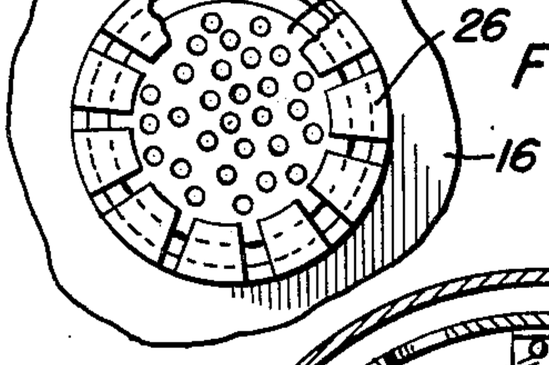


Fig. 4.

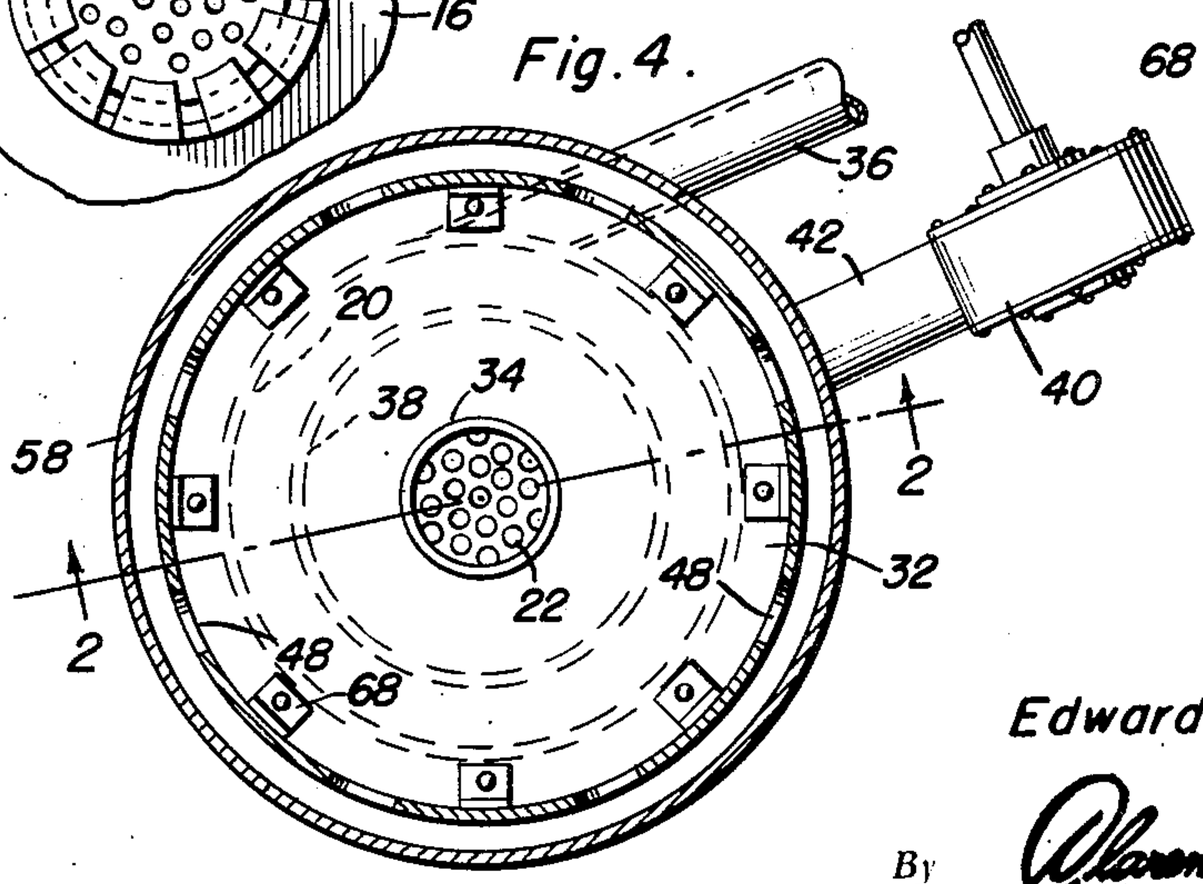
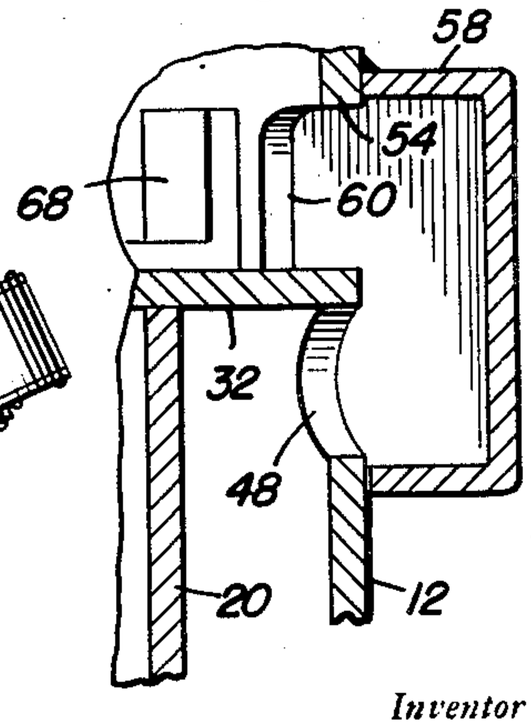


Fig. 7.



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Patented Oct. 31, 1950

2,527,934

UNITED STATES PATENT OFFICE

2,527,934

AIR-COOLED INCINERATOR WITH HOT-AIR HEATING MEANS

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Application August 15, 1949, Serial No. 110,373

4 Claims. (Cl. 126—99)

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This invention relates generally to incinerators and heat exchangers, and more particularly to the type of such device in which the combustible waste will ordinarily be blow into the burner.

A primary object of this invention is to provide a burner or incinerator construction which functions also as a heat exchanger inasmuch as heat generated by the burning of the waste is employed to heat air which can be used in a drying kiln to be used for drying lumber, potatoes and a very wide variety of materials.

Another object of this invention, ancillary to the preceding object, is the provision of an incinerator construction in which the walls of the incinerator are cooled by a draft of air and this same air, after receiving the heat from the said walls, is further heated by contact with the flue of the incinerator and finally released as hot air for use in drying materials, this draft of air thus serving to cool the incinerator and lengthen the useful life thereof while comprising a variable source of heat.

Another object of this invention is to provide means of the general type mentioned above wherein the incinerator is easy to ignite and to operate, there being provided simple means for controlling the draft of air, both through the combustible waste in order that proper oxygen supply can be assured, and around the walls of the incinerator so that these walls will not become unduly hot.

Still another object of this invention is to provide improved means for preventing the carrying of unburned waste material into the stack or flue of the incinerator.

And a last object to be mentioned specifically is to provide a device of the character mentioned above which is relatively inexpensive and practicable to manufacture, which can be used as an incinerator per se or as a heat exchanger, which is safe and convenient to use, and which will give generally efficient and durable service.

With these objects definitely in view, this invention resides in certain novel features of construction, combination and arrangement of elements and portions as will be hereinafter described in detail in the specification, particularly pointed out in the accompanying claims, and illustrated in the accompanying drawings which form a material part of this application, and in which:

Figure 1 is a side elevational view of the assembled device;

Figure 2 is a vertical sectional view of the structure shown in Figure 1;

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Figure 3 is a horizontal sectional view taken substantially upon the section line 3—3 in Figure 2 and looking downwardly;

Figure 4 and Figure 5 are similar horizontal sectional views taken on the respective section lines in Figure 2;

Figure 6 is a fragmentary enlarged lower plan view of the grate and the fire chamber draft regulation control means, the view being taken substantially on the line 6—6 in Figure 2 and looking upwardly; and

Figure 7 is an enlarged fragmentary vertical sectional view designed particularly to show the relationship of the outer shell and ring plate and the skirt carried by the ring plate, the terms used being those employed hereinafter in the specification.

Similar characters of reference designate similar or identical elements and portions throughout the specification and throughout the different views of the drawings.

Referring now to the drawings in detail, the embodiment of this invention illustrated in the drawings includes a base 10, an outer shell 12 extending vertically from the base 10 and secured thereto, and a plurality of vertical channel members 14 will be arranged in regular spaced relation within and secured to the outer shell 12. Somewhat similarly, vertically disposed angle members 16 will also be secured to the base 10, inwardly of the channel members 14 and these angle members are shorter than the channel members 14 and support a grate holder of plate form, indicated at 18. This grate holder may be circular and supports an inner shell 20 disposed vertically and coaxially with the outer shell 12, as will be clearly understood from a consideration of Figure 2. The grate holder also supports a vertically perforated grate member 22, preferably centrally thereof, and a draft regulating lower grate plate 24 is slidably mounted under the grate member 22, by means of a plurality of inwardly turned lugs 26 which may be integral with depending flange portions 28 rigidly secured as by welding to the under side of the grate holder 18, it being understood that a handle 30 will be rigidly secured to the lower grate member 24 and will extend through the front of the incinerator, as indicated in Figure 1, to facilitate the regulation of air draft into the fire chamber above the grate assembly. The said handle 30 is also represented in Figures 5 and 6 and, in the embodiment represented, the lower grate member 24 can be shifted slightly to vary the degree of registration of apertures therein with the aper-

tures in the grate member 22, an aperture being provided in the outer shell 12 to allow such adjusting movement of the handle 30.

A top plate 32, ordinarily circular, will be secured to the upper end of the inner shell 20 and will extend radially for connection to the outer shell 12, and this top plate 32 is apertured centrally to receive a flue 34. An inlet flow pipe 36 for waste material is entered through both the shells 12 and 20, near the top of the incinerator but beneath the top plate 32 and a baffle 38 is secured to the top plate 32 between the inner end of the inlet 36 and the flue 34. It should be carefully noted that the inlet flow pipe 36 is disposed substantially tangentially to the baffle 38 which is of ring plate character and open at the bottom with its top welded or otherwise firmly secured to the top plate 32. This construction prevents waste material from being blown directly into positions within the incinerator from which the waste might be carried into the flue without first being burned.

A blower 40 will be suitably mounted near the base of the device to drive fresh air through a fresh air inlet pipe 42 into the space within the outer shell 12 beneath the grate holder 18 and grate assembly. Since the channel members 14 are regularly spaced, vertical channels are provided between the inner shell 20 and the outer shell 12, and a similar number of air valve members or dampers are mounted on horizontal axis members integral with manual control handles 46 and rotatably mounted on and between the said shells. These dampers 44 are best illustrated in Figures 2 and 5, and it will be clear that the amount of air travelling upwardly through the different channels between the shells can be controlled so that any tendency for unequal heating of the inner shell 20 can be corrected by manipulation of one or more of the valve members or dampers 44. At the top of the outer shell 12 there are provided regularly spaced air outlets 48, to allow escape of the air which has been heated by contact with the shells during movement thereof upwardly through the said channels. An access door 50 opening through the outer shell 12 and the inner shell 20 will be provided, although it will be understood that this access door will be used primarily for lighting the waste and will not ordinarily be used for fueling the device.

The converter head, indicated as an entirety by the numeral 52, is comprised of a vertical ring plate 54 disposed coaxially with the shells, and preferably exactly equal in diameter to the outside shell 12, together with parts described immediately hereinafter. The said parts include a cover plate 56 closing the upper end of the ring plate 54 and apertured to receive an intermediate portion of the flue 34. The ring plate 54 also carries a skirt 58 of channel form, which may be welded to the lower outside portion of the ring plate and which extends downwardly over the air outlet 48 in the outer shell 12. The lower edge portion of the ring plate 54 is also provided wtih apertures 60 to allow hot air from the outlet 48 to be deflected by the skirt 58 through the apertures 60 into the space above the top plate 32 and within the ring plate 54. A ring baffle 62 is suspended coaxially of the flue 34, suspension means being indicated at 64 as simple brackets securing the ring baffle to the cover plate 56. A hot air exhaust pipe 66 leads from the ring baffle 62 outwardly through the ring plate 54, as indicated best in Figure 3. The assembly referred to as the converter 52 can be

removed from the remaining portion of the device when it is not desired to use the hot air generated in the burning of the waste materials blown in through the pipe 36, and simple angle brackets 68 may be used to secure the ring plate 54 to the top plate 32.

The operation of this invention will be clearly understood from a consideration of the foregoing description of the mechanical details thereof, taken in connection with the drawings and with the above recited objects of this invention. In recapitulation, fresh air is driven into the incinerator by the blower 40 and the air is divided according to the desire of the operator of the device to move in part directly upwardly through the channels controlled by the valves or dampers 44, and in part through the grate assembly. The initial lighting of the waste material entering through the pipe 36 may be accomplished by the use of the access door 50 and it is presumed that this device will always be used for continuous operation during at least considerable periods of time. The flue gases will, of course, pass upwardly into the flue 34 and escape. The air travelling up past the valves 44 will move through the air outlets 48 and through the apertures 60, thence into the space between the flue 34 and the ring baffle 62 and finally out through the hot air exhaust pipe 66. As before explained, the air moving as described immediately above has a dual function in cooling the inner shell 20 to prevent excessive oxidation thereof, while the air heated during this cooling operation will be used for such purposes as drying lumber and potatoes, and the like.

Due to the comparatively simple nature of this invention, further description would appear unnecessary.

Having described the invention, what is claimed as new is:

1. A heat exchanger comprising an incinerator having a base, an outer shell supported vertically on the base, a grate holder horizontally supported within the outer shell in spaced relation to said outer shell and to said base, an inner shell vertically supported on said grate holder in spaced relation to said outer shell, a draft regulating grate in said grate holder, an imperforate top plate closing the upper end of the inner shell and extending radially for connection to said outer shell, a waste inlet pipe leading through contiguous upper portions of the shells, a flue extending through the top plate from within the inner shell, a baffle between said pipe and said flue to prevent waste from entering said flue, an air inlet in the outer shell adjacent the base and air outlets in an upper portion of said outer shell, a converter head secured to said top plate and comprising a vertical ring plate coaxial with and having a diameter similar to the outer shell, said ring plate having openings at its lower edge and a skirt over said openings and depending over said air outlets in the outer shell, a cover plate for said ring plate apertured to receive said flue, a ring baffle suspended on said cover plate coaxially of the flue and spaced from the flue, and a hot air exhaust pipe leading from said ring baffle.

2. A heat exchanger according to claim 1 and wherein the space between said inner and outer shells is divided into vertical channels, and air valves mounted on the shells and controlling said channels.

3. A heat exchanger according to claim 1

and wherein said first-mentioned baffle is a depending flange on said top plate, circular in horizontal cross-section and coaxial with said flue.

4. A continuously operating waste incinerator having a base, an outer shell supported vertically on the base, vertical members on said base and within said outer shell, a grate holder of plate-like character horizontally supported within the outer shell in spaced relation to said outer shell and on top of said vertical members, an inner shell vertically supported on said grate holder in spaced relation to said outer shell, a grate in said grate holder, an imperforate top plate closing the upper end of the inner shell and extending radially for connection to said outer shell, a waste inlet pipe leading through contiguous upper portions of the shells, a flue extending through the top plate from within the inner

shell, a baffle between said pipe and said flue to prevent waste from entering said flue, an air inlet in the outer shell adjacent the base and air outlets in an upper portion of said outer shell.

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