

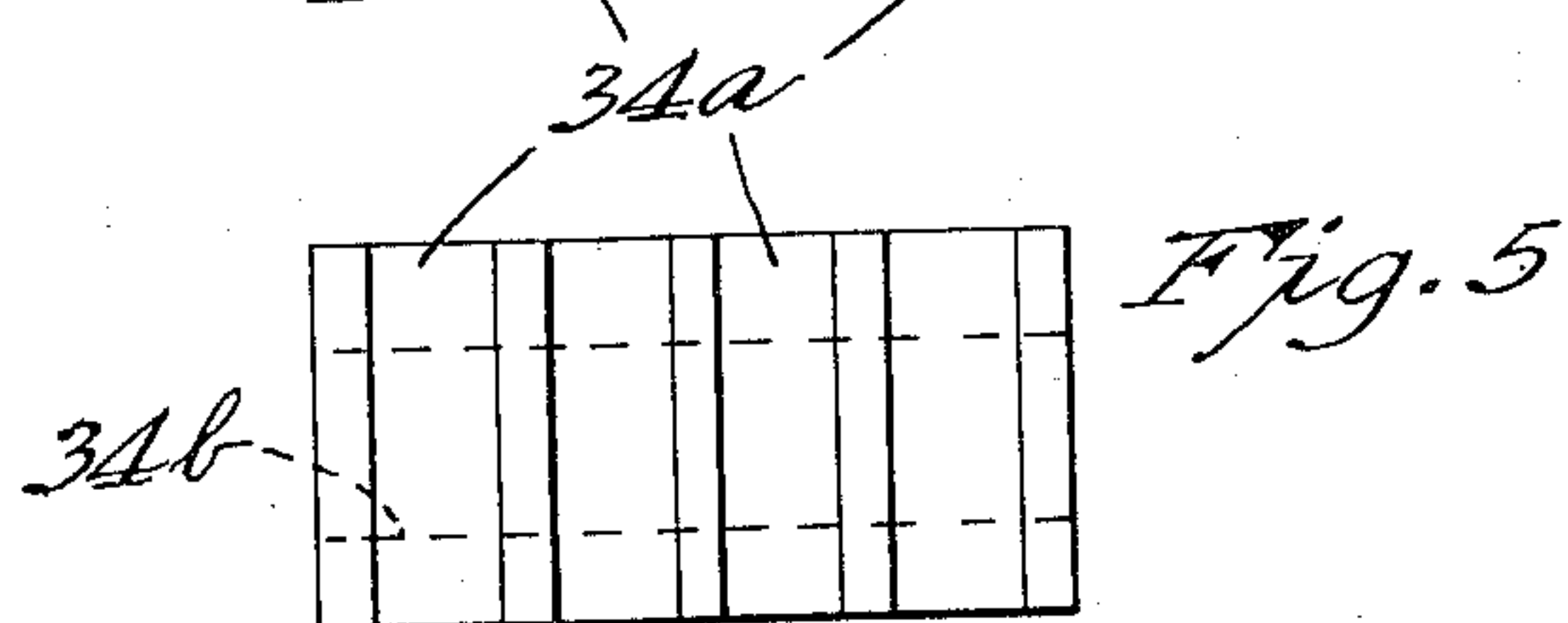
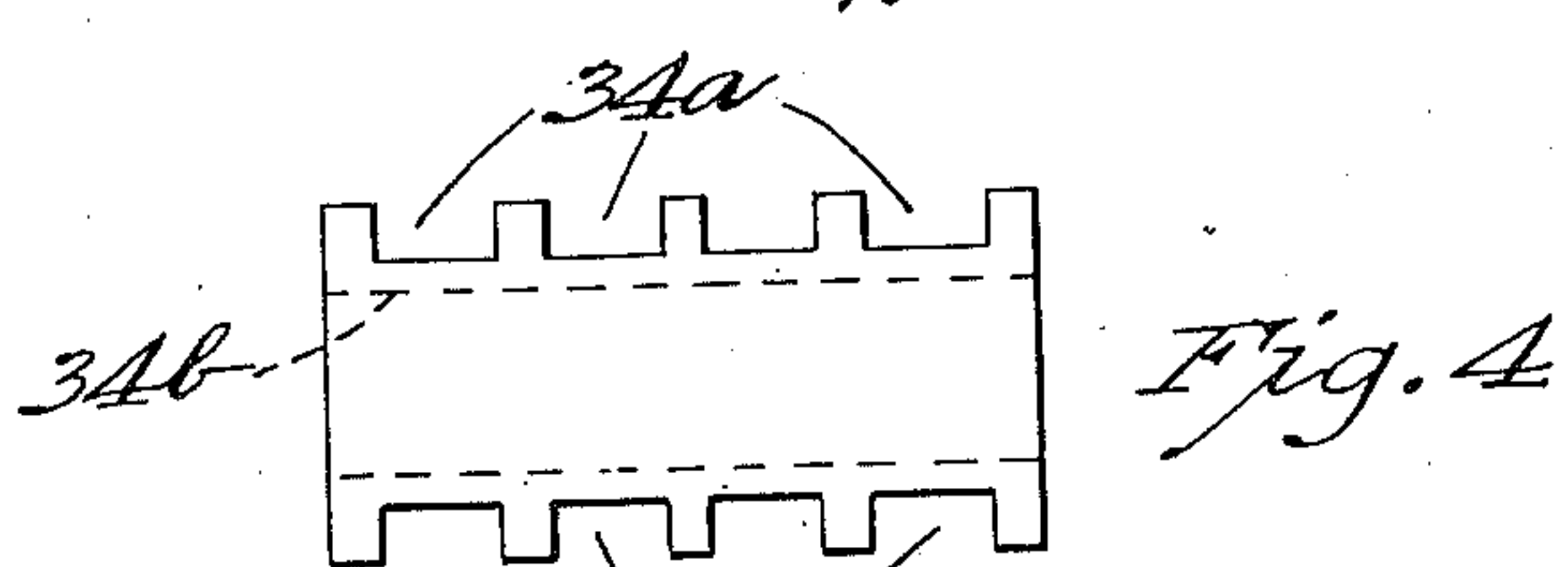
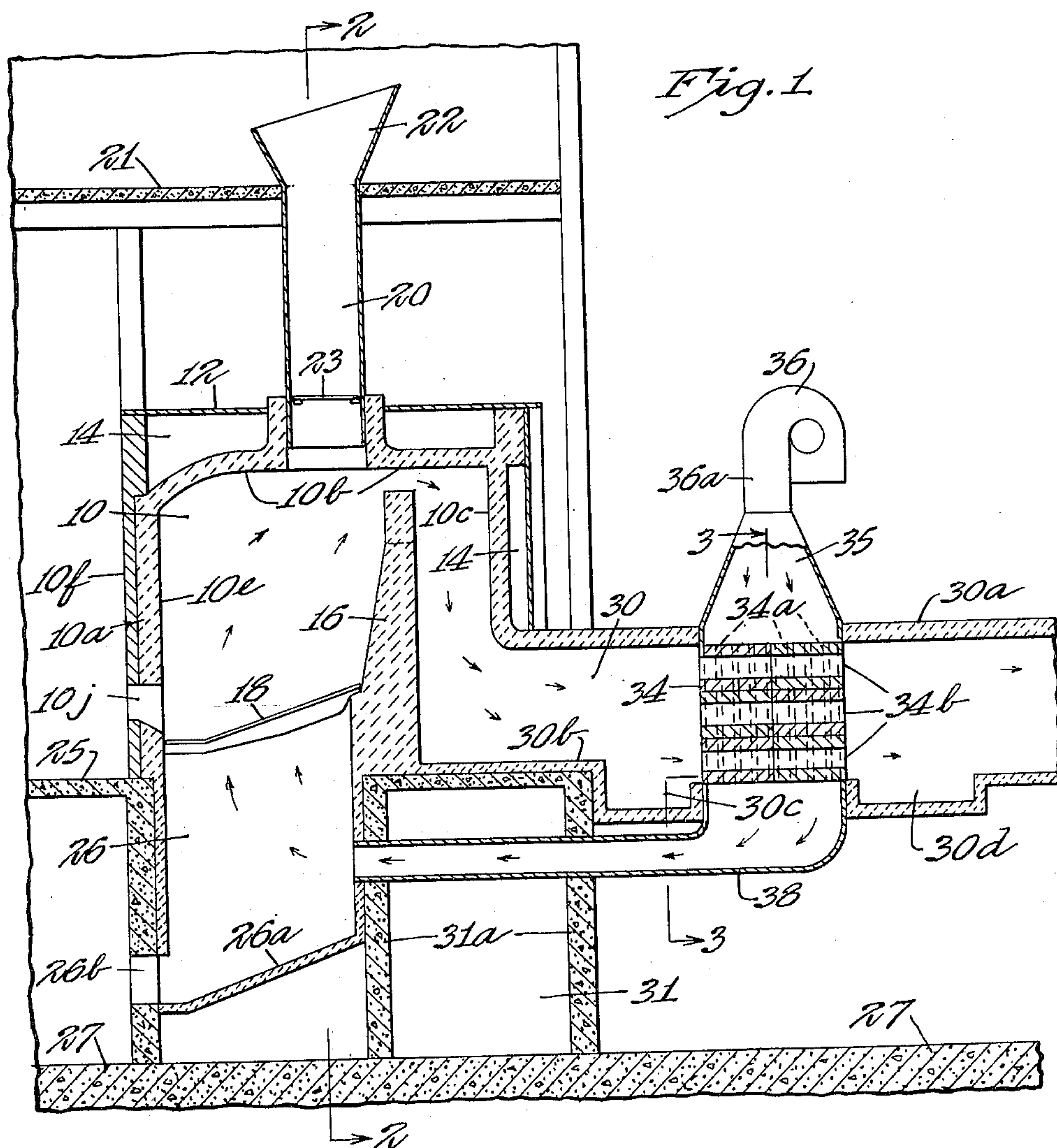
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GARBAGE INCINERATOR

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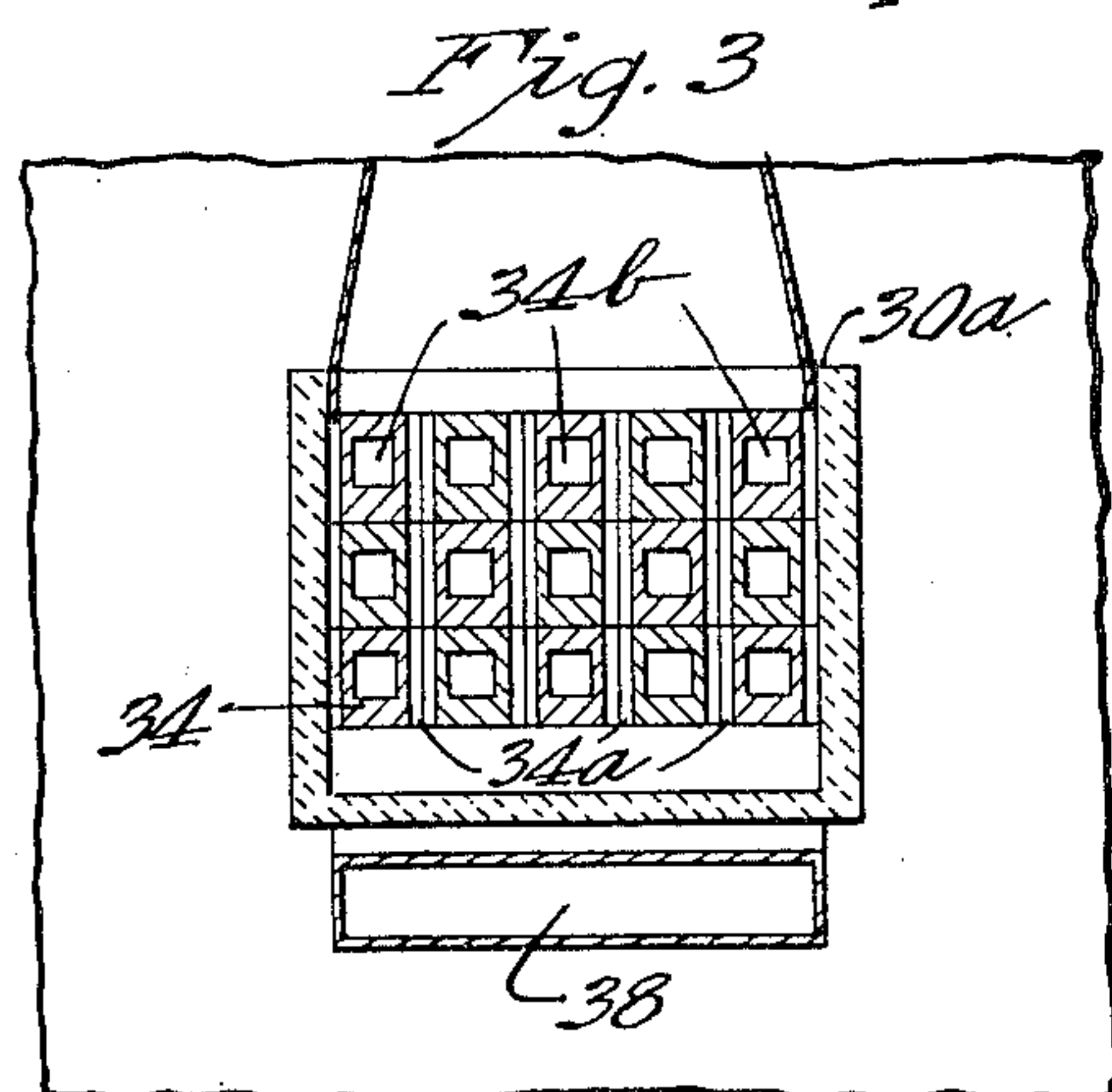
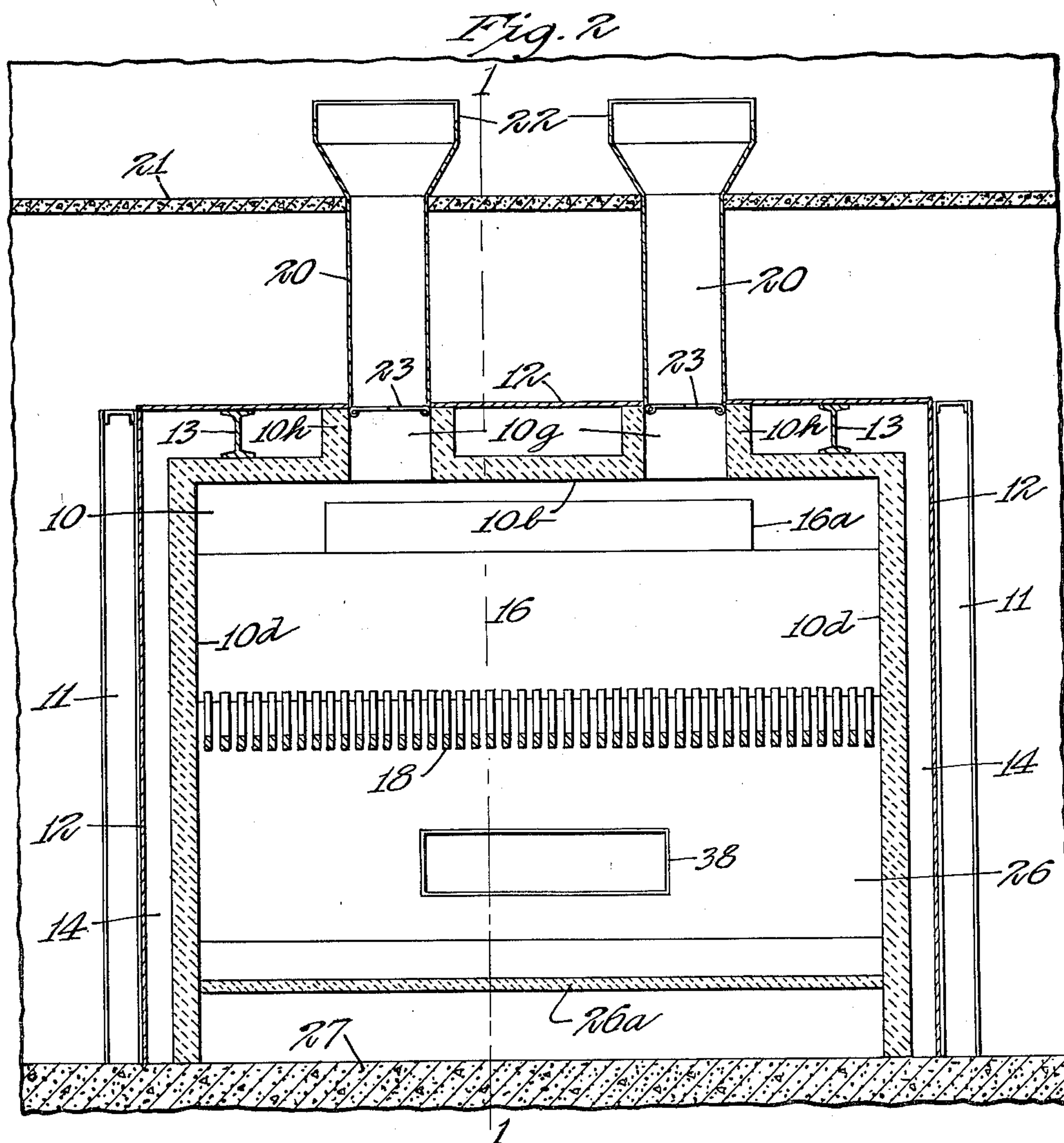


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2 Sheets-Sheet 2



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GARBAGE INCINERATOR

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1 Claim. (Cl. 110—8)

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This invention relates to a refuse or garbage incinerator. Garbage and refuse is now collected in large quantity in towns and cities and this is often disposed of by incineration. Garbage, especially that collected in the summer, has a very high content of water. It is thus quite difficult to burn it in an ordinary furnace.

It is an object of this invention to provide a structure of refuse or garbage incinerator in which a high temperature can be maintained and which will efficiently dispose of material having a high moisture content.

It is a further object of the invention to provide a garbage or refuse incinerator in which a fire is maintained by ordinary fuel such as coal and in which the garbage or refuse is also burned by said fire and in which the products of combustion are used to heat air which is supplied to said fire to maintain a high temperature.

It is another object of the invention to provide a garbage or refuse incinerator comprising a furnace chamber, said chamber having grates at the bottom thereof, an opening for charging garbage or refuse thereinto and an opening at the front and above said grates for charging fuel into said chamber, means for leading away the hot gases of combustion, means for heating air by means of these gases and means for delivering said air beneath said grates.

It is more specifically an object of this invention to provide a garbage or refuse incinerator comprising a chamber having front, side, top and rear walls, said chamber preferably having a front charging portion and a rear combustion portion, grates forming the bottom of said charging portion, a flue extending from and through said rear wall and being of much less dimension than said chamber, means extending across said flue having a plurality of passages therethrough, said means also having a plurality of passages between said first mentioned passages for the hot gases of combustion, means for passing air through said first mentioned passages to be heated by said gases of combustion and a conduit receiving said heated air and extending to a point beneath the grates in said charging chamber for delivering the heated air to the fire on said grates.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a vertical section taken substantially on line 1—1 of Fig. 2;

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Fig. 2 is a vertical section taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a vertical section taken substantially on line 3—3 of Fig. 1, said sections being taken as indicated by the arrows;

Fig. 4 is a top plan view of one of the blocks used in the heat exchange portion of said device; and

Fig. 5 is a view in side elevation of said block.

Referring to the drawings an incinerator is shown having a furnace chamber 10. Chamber 10 has a front wall 10a, a top wall 10b, a rear wall 10c and side walls 10d. Said walls will comprise an inner portion 10e which will be made of refractory material such as fire brick and said front wall has an outer portion 10f of masonry construction such as ordinary brick. The walls are supported by suitable steel columns 11 and a sheathing 12 is provided for some suitable material such as sheet metal which extends parallel to the side, top and rear walls and will be suitably supported by the columns 11 and the necessary transverse beams 13. The portion 10e of said walls will be so constructed as to withstand the expansion and contraction caused by the high temperatures in chamber 10 and may be formed as disclosed in applicant's prior Patent No. 1,932,759 granted October 31, 1933. An air-space 14 is thus formed between the sheathing 12 and the walls. The top wall 10b has spaced openings 10g therethrough and said openings are surrounded by upwardly extending portions 10h of said top wall 10b as shown in Figs. 1 and 2. The front portion of the top wall 10b is formed as an arch as shown in Fig. 1.

Preferably a bridge wall 16 is provided extending between side walls 10d, the same tapering upwardly somewhat and having its top spaced a comparatively short distance from the top wall 10b. The central portion 16a of said bridge wall is of considerably greater height than the side portions as shown in Fig. 2. Bridge wall 16 divides chamber 10 in a forward or charging portion and a rear or combustion portion. Grates 18 extend from the lower portion of bridge wall 16 to the front wall 10a and these extend from one side wall 10d to the other. Grates 18 as usual comprise spaced grate bars and these incline downwardly and forwardly for the greater part of their length as shown in Fig. 1. A fuel charging and stoking opening 10j is provided through the front wall 10a just above the front portion of grates 18. Charging spouts or chutes 20 extend upwardly from each of the charging openings 10g, the same extending upwardly to and through an upper floor or wall

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21 and are provided with receiving hoppers 22 at their upper ends. The openings 10g are normally opened and closed by doors 23 which may be pneumatically or electrically operated. The walls of chamber 10 extend to the surface of a floor 25 and front wall 10e and bridge wall 16 are continued downwardly for some distance below grates 18 to form the wall of an ash pit 26 disposed below grates 18, the same having a downwardly and forwardly sloping bottom 26a, the top surface of which aligns with the bottom of a removal opening 26b. Openings 10j and 26b will of course, be provided with suitable doors. The front wall of ash pit 26 extends downwardly to a lower floor 27. A flue 30 extends rearwardly from the rear portion of chamber 10 and has a top wall 30a which is continuous with rear wall 10c. While flue 30 could be variously formed, in the embodiment of the invention it is shown as rectangular in cross section and in practice has been made about four feet wide and five feet high. This is of much smaller dimension than the chamber 10 which is approximately 17 feet in width. Flue 30 has appropriate side walls and is shown as having a bottom wall 30b which, with the top and side walls, will be made of refractory material. The forward portion of bottom wall 30b rests on the top of floor 25 and a tunnel 31 for inspection or other purpose, is formed beneath floor 25 by the masonry walls 31a. Flue 30 has a depressed recess or pocket 30c immediately in the rear of rear wall 31a and has another depressed recess or pocket 30d some distance rearwardly of pocket 30c.

A wall or partition 34 extends across the flue 30 between adjacent ends of pockets 30c and 30d. While wall 34 could be variously formed, in practice it has been found convenient to form the same of refractory tile having openings therethrough, one of which is shown in Fig. 4. When so formed, wall 34 has a plurality or rather large number of spaced vertical passages 34a extending therethrough and has a smaller number of spaced horizontal passages 34b extending therethrough, one set of said passages being disposed between the other set. A housing or casing 35 has its lower end extending to partition 34 and has side portions aligned with the sides of said partition, said housing tapering upwardly and being connected at its upper end to the discharge end 36a of a fan casing 36 which will contain a suitable motor-driven fan. The passages 34a preferably extend through the top wall 30a. A conduit 38 has an enlarged end having sides coextensive with the sides of partition 34 at the bottom thereof and conduit 38 extends horizontally through walls 31a and the rear wall of ash pit 26 so that it delivers to said ash pit below the grates 18.

In operation, when the incinerator is operated from a completely cold condition a fire is first built on the grate 18 with a suitable combustible fuel such as coal, and this is continued until the chamber 10 and the walls thereof are well heated. A charge of garbage or refuse is then delivered to the chamber 10 and a further charge of combustible fuel is delivered to the chamber and placed on top of the garbage. The garbage is thus heated and burned, the same affording part of the combustion on the grate 18 and the remainder of the combustion being provided by the fuel. The combustible gases driven off from both the garbage and fuel pass over the bridge wall 16 and into the rear or combustion portion

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of chamber 10 where the combustion of said gases is completed. The fan in casing 36 will be driven and as the hot gases of combustion pass through flue 30 and through the openings 34b in the wall 34, air will be directed downwardly from casing 36 through the vertical openings 34a and this air will be heated to a high temperature and will be delivered through conduit 38 to the underside of the grate 18 and thus upwardly through said grates and to the fire and burning material on top of the grates. This air which has been highly heated, expedites the drying of the garbage on the grates and supplies oxygen for the combustion of the fuel and garbage. The walls of the chamber 10 become highly heated and heat is radiated directly onto the pile of garbage from the walls and particularly from the front wall and the arch at the forward portion thereof. Garbage is successively charged into chamber 10 and a bed of burning material is kept constantly in place on the grate 18. The pile of material slopes downwardly toward the front of the grate and the surface of the material is thus efficiently disposed to the heat of radiation from the front wall and other walls. This effect is secured by the downwardly sloping grate 18. Any ash or solid matter carried along with the flue gases tends to collect in the pockets 30c and 30d and provision will be made for its efficient removal. As the garbage and fuel is consumed the ashes pass through the grate 18 into the ash pit 26 and these can be removed through the opening 26b. The conduit 38 will of course, be covered with suitable insulation. The air spaces 14 about the walls of chamber 10 act efficiently to insulate said walls so that said walls can be kept at a high temperature.

It will be seen that the wall 34 with the passages therethrough constitutes a heat exchanger. The air heated in wall 34 and delivered through the grates 18 also act to cause a forced draft through the furnace and the air is thus efficiently supplied and a high efficiency of combustion is secured. The present structure is a great improvement over the structure shown in applicant's prior patent above identified. With the present structure it is not necessary to cool the walls of chamber 10 to heat the air. The furnace can thus be kept consistently at a higher temperature and more radiation effect can be secured from the heated walls. The present construction makes possible the use of much higher temperatures, and these higher temperatures are really necessary to handle the garbage having a high moisture content. In summer the garbage collected contains a great deal more moisture than that collected in the winter and there is usually also a greater volume of the garbage in the warmer seasons. With the structure shown in the prior patent the temperature of the air was only increased about 70 degrees by passing around the walls before it was delivered to the fire. With the present structure the air is increased in temperature about 300 degrees and the air is delivered under the grates from a temperature of from 400 to 450 degrees F. The furnace temperature is maintained at about 1400 degrees F. and the temperature of the gases of combustion after passing through the air heater or wall 34 is from 900 to 1000 degrees F. The present structure effects a great saving in the amount of fuel necessary to consume the garbage. This saving results from the much greater drying effect on the garbage by the highly heated air and the much more efficient combus-

tion secured on both the fuel and garbage. The garbage and refuse is completely reduced to mineral ash. No objectionable vapors or products are formed and all hazard of diseases are eliminated.

The method and apparatus have been amply demonstrated in actual practice, found to be very successful and efficient, and the same are in actual practice.

It will of course be understood that various changes may be made in the form, details, arrangement and proportions of the apparatus and in the steps and sequence of steps of the method without departing from the scope of applicant's invention, which, generally stated, consists in a method and apparatus capable of carrying out the objects above set forth, such as disclosed and defined in the appended claim.

What is claimed is:

An incinerator for burning garbage or the like containing a high moisture content having in combination, a combustion chamber having side, front, top and rear walls, said side, top and rear walls having air spaces therein throughout substantially their whole extent, a bridge wall spaced from said rear wall and extending to adjacent said top wall, a single grate forming the bottom of said chamber and extending from said front wall to said bridge wall, said top wall having a charging passage therethrough disposed to discharge on the rear portion of said grate, said front wall having a stoking opening therethrough adjacent and above said grate, said chamber having an outlet passage for the products of combustion, the top of which is formed by said top wall and the bottom of which is formed by the top of said bridge wall, a larger passage leading downwardly from said outlet passage, a second chamber beneath said grate having vertical end and side walls disposed at the sides and ends of said grate respectively whereby said chamber has substantially the length and breadth of said grate, said chamber having a forwardly sloping bottom disposed quite a great distance below said grates, said front wall of said second chamber

having an ash removal opening therein immediately above said bottom, an elongated horizontal flue leading from said last mentioned passage and disposed a considerable distance above the bottom of said second chamber, a heat exchanger composed of members disposed in said flue, said members having horizontal passages therethrough and forming vertical passages between said horizontal passages, said products of combustion passing through said horizontal passages, means for forcibly directing air from outside said incinerator vertically downward through said vertical passages for heating said air, and a conduit communicating with the bottom of said vertical passages for receiving said heated air and being disposed centrally below and substantially parallel to said flue and disposed well above the bottom of said second chamber, the same extending directly to and delivering to said second chamber at a central point transversely of said second chamber and a considerable distance above the bottom thereof whereby said heated air is forced through said grate and very high temperatures can be attained and maintained in said combustion chamber.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|-----------|----------|----------------|
| 187,013 | Jackson | Feb. 6, 1877 |
| 653,118 | Quinn | July 3, 1900 |
| 732,723 | Edgar | Sept. 22, 1902 |
| 986,594 | Rudder | Mar. 14, 1911 |
| 1,069,577 | Prescott | Aug. 5, 1913 |
| 1,877,214 | Woodman | Sept. 13, 1932 |
| 1,932,759 | Vincent | Oct. 31, 1933 |
| 1,933,025 | Oetken | Oct. 31, 1933 |

FOREIGN PATENTS

| Number | Country | Date |
|--------|---------------|---------|
| 13,197 | Great Britain | of 1895 |