hot air conduit and steam jets are arranged to discharge at the will of the operator into this pit. The mixture of steam and hot air that serves the best purpose in burning can be ascertained.

Clinkering and Pulling Down Doors.—The operation known as "clinkering" is that of clearing the furnace of a burnt charge. As soon as the whole charge is considered thoroughly burned through, it should be drawn out, and this is done in the following manner: The blast is shut off from the particular furnace to be clinkered, and the clinkering door is elevated. The firemen with slices, pokers and rakes with long handles pull out the burnt charge in the form of clinker into barrows or tip wagons, leaving only odds and ends of incandescent or red hot pieces on the grate. The clinkering door is then lowered, and the charge from the drying hearth pulled down upon the grate through the pulling down door with long handled rake. As soon as the new charge is evenly spread about, three or four inches thick, the blast is turned on and more refuse pulled down as the fire increases in brightness until the limit (about six or seven inches of clinker' is reached, when the furnace is clinkered again.

It is essential in the operators of an incinerator plant to "charge" and "clinker" the furnaces in a regular cycle, so that the hot gases from advanced fires assist in the combustion of the gases given off from a new charge burning up.

Reverberatory Arch.—The furnace is covered by a fire-brick arch which plays a similar part to the reverberatory arch in other furnaces. This arch can be kept at a very high temperature throughout with care and expeditious handling, and the less it is cooled in process of feeding and clinkering the quicker will the fire rekindle.

Type of Furnace.—The foregoing particulars have reference only to the unit furnace, which is capable of destroying 12 to 20 cubic yards per working day of 12 hours with a grate area of about 30 square feet. In order to burn the refuse of a town or city provision has to be made for a set of furnaces. The continuous furnace as separate from the separate "cell" type has proved itself far more economical in first cost and repairs, and is the type I would recommend. By a continuous furnace type is meant the arrangement of furnace units side by side with an opening at the side connecting one with the other, so that the gases from furnace No. 1 are discharged into furnace No. 2, and these form 1 and 2 combined into No. 3, and so on. Four furnaces connected in this manner would constitute the limit, and I am of opinion that three furnaces only should be so connected. By this means the heated gases of advanced fires will materially assist fires in a less advanced stage, if proper regard is had to a cycle of operation. In the "cell" type each cell has its own flue.

Combustion Chamber.—The gases from the furnaces are discharged into a combustion chamber. This chamber has no particular shape or design, but is simply a large enclosed flue where the gases intermingle and carry on further incineration which the furnaces have left incomplete. The temperature maintained in the combustion chamber is the index of efficient burning. There should never be a less temperature than 1,500 deg. F. in this chamber, and much better results will be obtained if the temperature is kept at 1,800 to 2,000 deg. F. In the winter such a temperature is easily maintained, but in the summer it is probably only the lower temperature that can be raised. The combustion chamber also acts as a dust pocket, and mattress, slaughter house offal and dead animal, burning chamber. A large door is provided, preferably at the top for the purpose of admitting these larger articles. A door about 3 ft. 9 ins. by 3 ft. is usually found large enough to take a horse. Two outlets from this chamber are provided, the one leading to the boiler, the other to the by-pass flue. Each of these outlets should be provided with a damper to regulate the direction of the hot gases.

Boiler.—A water tube boiler with the ordinary setting and with a bridge and baffles so arranged as to direct the gases through the spaces between the tubes is usually provided in connection with incinerator plants. It is essential that a grate be provided under the boiler so that steam can be raised by a coal fire to start up the works after shutting down or after Sundays or where the power is entirely depended upon, as a stand-by. Description of the boiler and its setting is superfluous here. Superheaters and economizers may be added.

Air Regenerator.—The gases after passing through the boiler are led to the air heater. The gases if by-passed also lead to this apparatus. In the regenerator which is usually a cast-iron or steam tube arrangement of pipes so arranged as to expose the maximum amount of surface to the gases, the air for working the blasts is heated. The air is drawn from the upper parts of the building so as to take any escaped fumes or smoke, by a fan or positive blower and discharged into the regenerator and led to a concrete conduit below the furnaces. Each furnace is provided with a valve for admission of the blast. The air should be heated to from 500° to 600° Fah.

Main Flue.—After leaving the regenerator the gases are discharged into the main flue which carries them to the base of the stack.

In the main flue a dust pocket should be introduced. A right angle turn at the base of the stack with an extended flue, the floor of which is depressed about 3 feet, will answer this purpose. A door should be fitted to this pocket, for the periodical removal of dust.

Stack or Tall Chimney.—The usual remarks for furnace chimneys apply here. A stack from 60 to 100 feet high lined with fire-brick up to 60 feet is sufficient. The height of the chimney largely depends upon the aesthetic side of the question. With a good quality of garbage and a well handled plant and not too much cooling of gases for power production, a 60 ft. shaft is sufficient, but having regard to the occasional lack of care and other matters, I would suggest 100 feet as the height. A damper should be provided at the base of the stack, and for test purposes a piece of wrought iron tube should be left in, connecting with the inside of the stack.

Flues Generally.—In all flues provision must be made for expansion and contraction of the firebrick linings. Test or "peep" holes should be built into the flues at intervals for observations.

Firebrick Work.—The furnaces should be constructed of firebrick throughout. The best quality of firebrick should be used, as the varying temperatures are a severe test. Poor quality bricks will crack and fall out. Arches should be formed with radiated bricks, the taper being formed in the length of the brick. Fine ground fireclay should be used for mortar with the addition of sodium silicate in proportion of 1 to 20 by volume. The addition of fine powdered glass in proportion of three of fireclay to one of glass by volume has proved very successful in furnace building. The glass forms a flux at high temperatures and attaches itself to the bricks. The life of furnace brickwork is extended materially in this way.

The combustion flue should have a lining of best quality firebrick 9 inches thick. The boiler and all flues should be lined with firebrick (not necessarily best quality) 4½ inches