terials at the destructors is done by hand, and consists merely of removing the pieces of iron and other large incombustible materials.

The following is a description of the cells in which the tests were made, taken from Dr. Cameron's paper;

"The cells are placed back to back and fed from the top. The material passing over a bull-nose division to the two sets of cells, passes on to the concave side of an arc of a circle of fire brick. At the lower part of the curve the material reaches the fire-bars. These are sloped at an angle of about 30°, and have an area of 7 feet wide by 5 feet long. The walls of the furnace are lined with fire-brick, and just above the bars a strip of iron is fixed, but not in contact with the brickwork, to prevent the clinkers from fusing into the latter."

Underneath the fire-bars steam jets are introduced, two to each cell. These jets are made of two frustums of cones joined at the small ends, at which point they are 6 inches in diameter; at the larger ends they are 9 inches in diameter, the total length being 3 feet. The jets of steam vary in size from ⅛ inch in diameter to ½ inch, with the boiler pressure of 60 lbs. per square inch. Dr. Cameron continues as follows:

EXPERIMENTS IN 1894 WITH DESTRUCTOR CELLS AT LEEDS, ENGLAND, BY MESSRS. DARLEY & PUTMAN.

(Area of grate bars, 7 × 5 feet; jets, 2 to each cell; pressure, 60 lbs.; wages at rate of 5 shillings for 8 hours.)*

Date	No. cells.	Duration of expert tests.	Diameter steam jets.	Frequency clinkering once in.	Tons burnt.	Temperature fire.	Men employed.	Wages fireman.	Tons burnt.	——Per cell day—— Men employed.	Wages paid.	Wages per ton burnt.	Clinker.
1. June 12.....	4	12	⅛-in.	2 hrs.	20.4	1,500° F.	3	$3 75	10.20	1 5	$1 87	$0 17	36 5%
2 June 13.....	4	12	None	2 "	16.3	1,050 "	3	3 75	8 25	1.3	1 87	0 21	35.5%
3. June 25 and 26 ..	4	24	⅛-in.	1 hr.	63.1	2,000 " †	12	15 00	15.78	3 0	3 75	0 23	35 4%
4. June 26 and 27 ..	4	24	¼-in.	1 "	60.15	2,000 " †	12	15 00	15 04	3.0	3 75	0 24	32 2%
5. June 27 and 28 ..	4	24	¼-in.	1 "	54.35	1,500 "	12	15 00	13.59	3.0	3 75	0 26	37.0%
6. June 28 and 29 ..	2	24	½-in.	½ "	53.50	2,000 " †	12	15 00	26 75	6.0	7 50	0 27	35 9%

*Figures for cost have been reduced to American money by allowing 23 cts. per shilling, and 2 cts. per pence. The tons are doubtless long tons. †Frequently 2,100° F., i.e., melted copper.

"In 1891 experiments were made at the Kidacrestreet destructor to ascertain, amongst other things, what the difference in temperature was with the steam jets and without, with the following result: The experiments extended over two periods of 24 hours each, similar material being used on each occasion (19 hours dry ash-bin refuse and five hours wet ash-bin refuse), and temperatures taken hourly. It was found that the ten cells burned 6.2 tons per cell without, and 6.7 tons per cell with steam jets. The same number of men were working in each case. The temperature without the jets averaged 1,118° F., counting three observations when the pyrometer index touched its maximum as 1,500° F. With the jets the average was 1,464° F., but these included 17 observations when the pyrometer could register no higher. It is possible that the excess of temperatures of 346° F would have been more like 500° if we could have registered it."

These temperatures are presumably in the cells, although the record of the experiments does not say so.

In Liverpool, H. Percy Boulnois writes me that a set of temperatures recently taken in his destructors gave the following values:—

	Degrees F.
Temperature in the cells	900 to 1,000
In flue close to cells	900 " 1,000
In flue before cremator	600 " 700
In cremator	1,500 " ....
In base of chimney	675 " ....

They have a natural draft only, from a tall chimney.

Quoting again from Dr. Cameron's paper on the tests at Leeds —

"The amount of work done by our destructors in 1894 was equivalent to the burning of 63,132 loads of rubbish, weighing 65,151 tons.* Some of the cells were not working full time, but the quantity named was burned in 11,644 cell-days, which is equivalent to nearly 5.6 tons per cell per day."

The experiments made in June, 1894, by Messrs. Darley & Putman, at the request of Mr. Hewson, City engineer, were conducted under the following general conditions:

"The furnaces . . . had a grate area per cell of 35 square feet were in full go, and were clinkered immediately before the commencement of the tests. The tipping floor was cleared; all the material placed upon it afterwards was weighed, the material at the end of the experiment being weighed and deducted from the gross amount placed there. The clinker removed was also weighed, but no computation was made as to the increase or decrease in the amount of flue dust. The experiments lasted for either 12 or 24 hours each, and ended with a clinkering of the cells. The wages were calculated at the rate of five shillings per working day of eight hours. The steam jets (used in all experiments but one) were two for each cell.

"The general lesson from these experiments, not carried out for the purpose of exploiting any patent, but merely to test our own existing plant, is to the following effect: 'The amount consumed per cell increases with the frequency of clinkering, but the cost per ton burned is increased at a more rapid ratio. The frequency of clinkering can be rendered practicable by increasing the rapidity of combustion. This can be done by steam jets, and the most frequent clinkering and the greatest amount burned per cell was accomplished with two ½-inch jets at 60 lbs. boiler pressure. The cost in firemen's wages, however, in obtaining these tremendous results (26¾ tons per cell, per day) was nearly 53 per cent. higher per ton burned than when the clinkering was every two hours and the consumption ten tons per cell per day. It must also be added that the wear and tear of the plant is much greater at the higher output, though exactly in what proportion the experiments do not enable us to say. On the whole, the high output method of working the destructors is not economical.'"

The writer visited these works (Leeds) last December, and was informed that the most economical rate of combustion appeared for them to be about 6½ tons per cell per day, but that the rate would vary greatly with the varying composition of the refuse. On market days, for instance, it would not burn nearly so well as when it was ordinarily dry and contained much coal. The stuff which they were called upon to dispose of varied considerably; sometimes they would have large quantities of spoiled canned goods and occasionally large quantities of condemned meat. On one occasion they had a lot of condemned hogs which they put into the furnace whole. They burned very rapidly, a whole hog disappearing into ashes in about half an hour.

In Cambridge, England, the writer visited the new destructors built under the direction of John Wood, C.E., of Liverpool. These furnaces are remarkable in the results obtained in the development of power from the burning of garbage. It must be said that the composition of the garbage is very favorable for such purposes, containing, in the writer's opinion, a large quantity of paper, straw, rags, wood, unburned coal and cinders. The destructors are arranged so as to develop the greatest possible heating qualities for the purpose of generating steam, to pump the sewage of the city to the farm, two miles distant, where it is spread over the surface. The destructors are alternated with Babcock & Wilcox boilers in such a manner that each boiler has two destructors to furnish it heat. Cremator fires can also be built in the fire-boxes under the boilers, in order to destroy the unconsumed gases resulting from the loss of heat in heating the boilers and to supply extra heat for the boilers if necessary. The work which they get from their plant is sufficient at present to pump 1,250,000 gallons of sewage per day, with a lift of 40 ft. The pumps are in duplicate, made by Hawthorne, Davey & Co., of Leeds, and are of about 70 h.p. each. They

*This is equivalent to about 325 lbs. of refuse per person per annum.