H. N. LEASK.

REFUSE DESTRUCTOR.

APPLICATION FILED SEPT. 4, 1909.

1,054,850.

Patented Mar. 4, 1913.

7 SHEETS—SHEET 1.

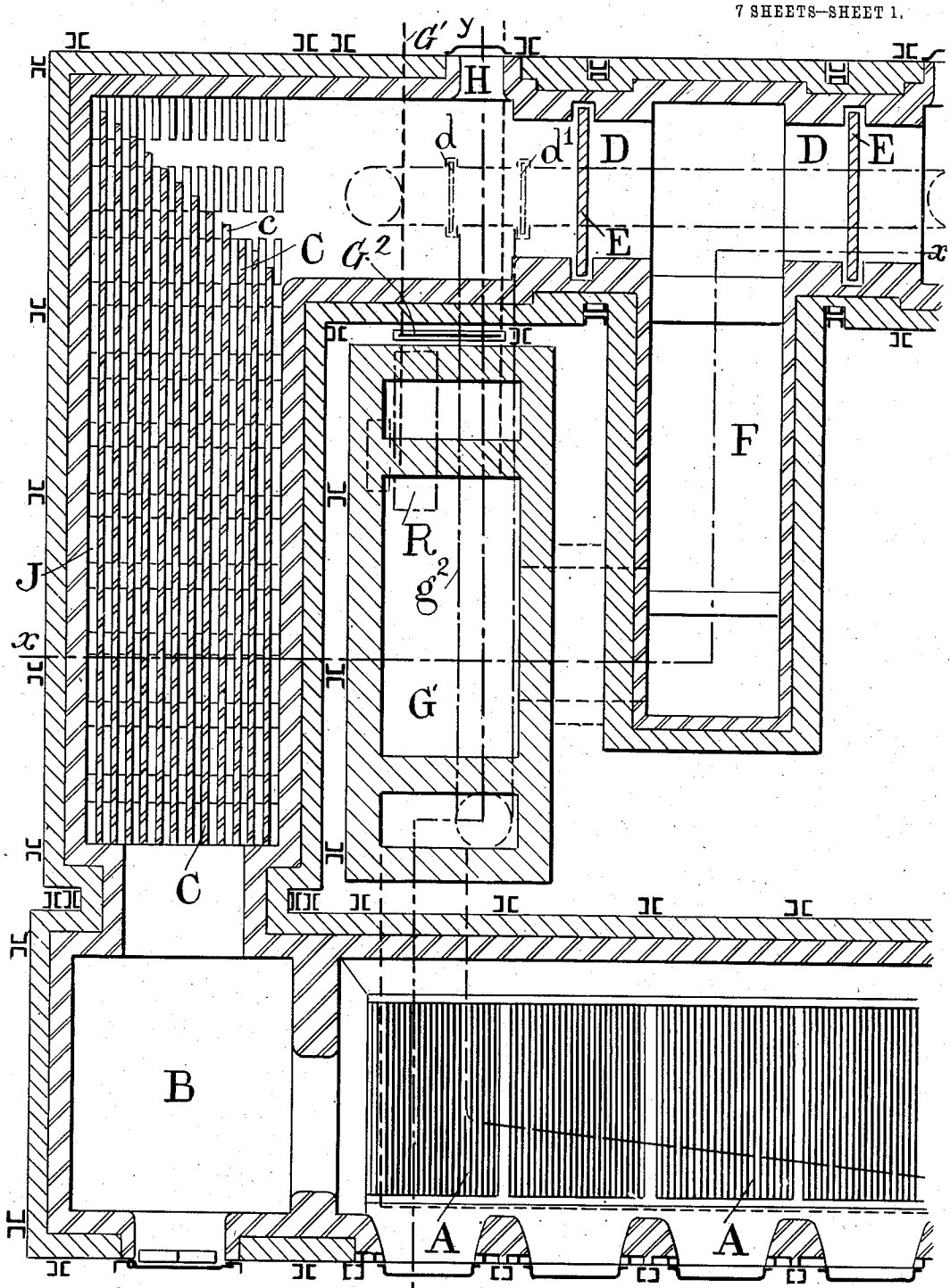

Fig. 1.

WITNESSES.

Bert. C. Sandman.

J. S. Dunham

INVENTOR.

H. N. Leask

by his attorneys,

Kerr, Page Cooper & Hayward

H. N. LEASK.

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7 SHEETS—SHEET 2.

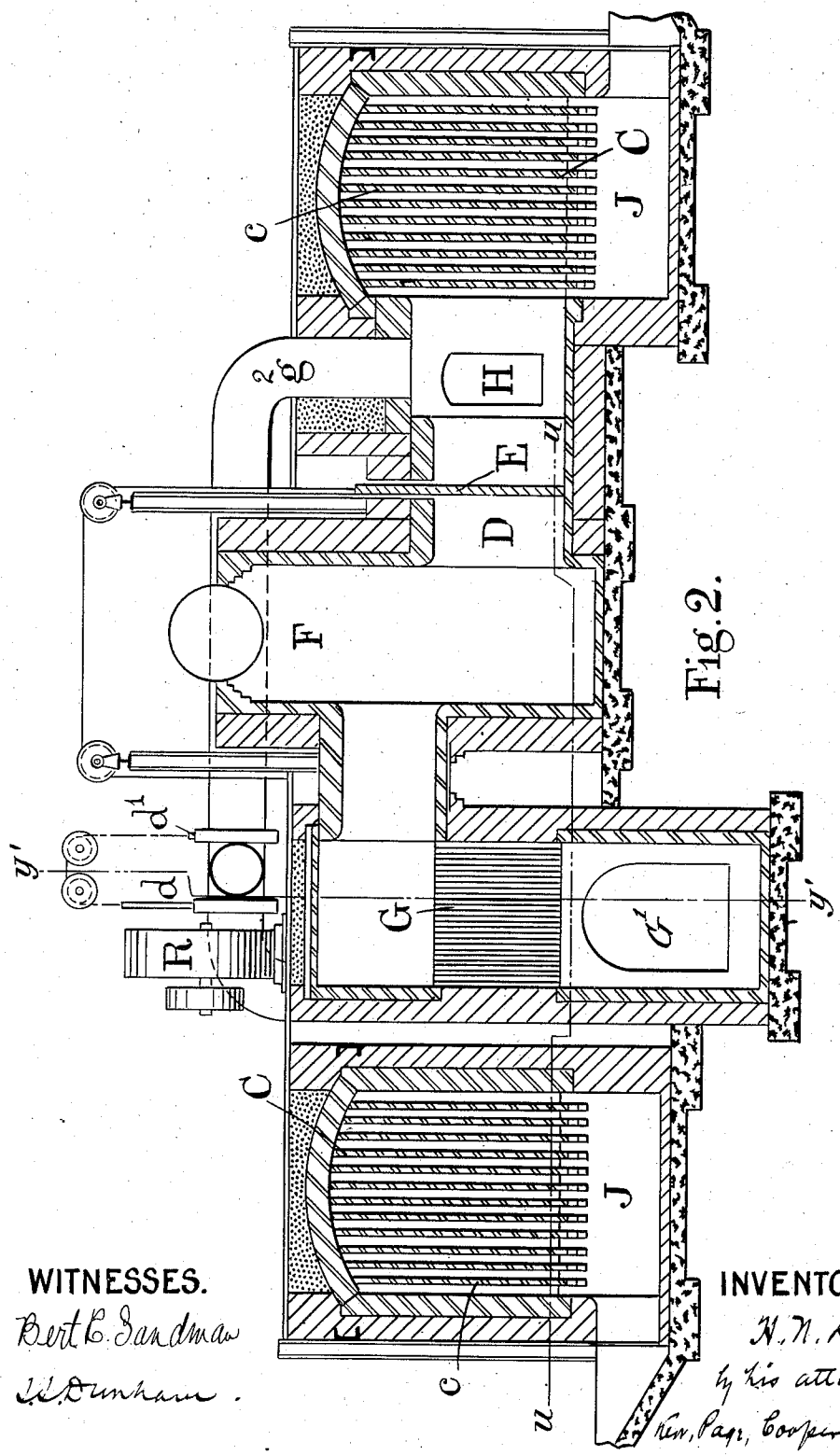

Fig. 2.

WITNESSES.

Bert E. Sandman

J. E. Dunham.

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H. N. LEASK.

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7 SHEETS—SHEET 3.

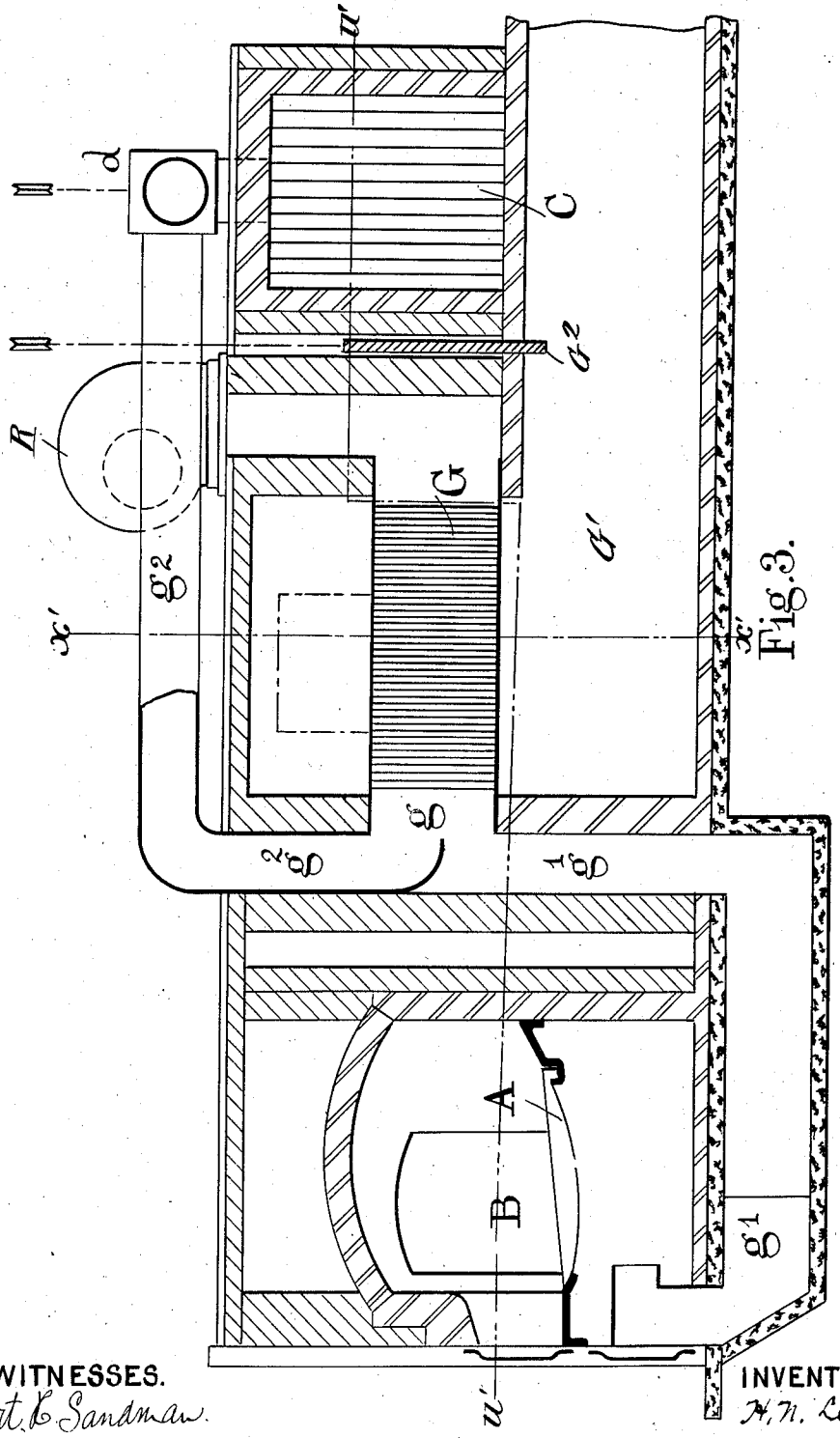

Fig. 3.

WITNESSES.

Bert L. Sandman.

C. E. Dunham

INVENTOR.

H. N. Leask

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H. N. LEASK.

REFUSE DESTRUCTOR.

APPLICATION FILED SEPT. 4, 1909.

1,054,850.

Patented Mar. 4, 1913.

7 SHEETS—SHEET 4.

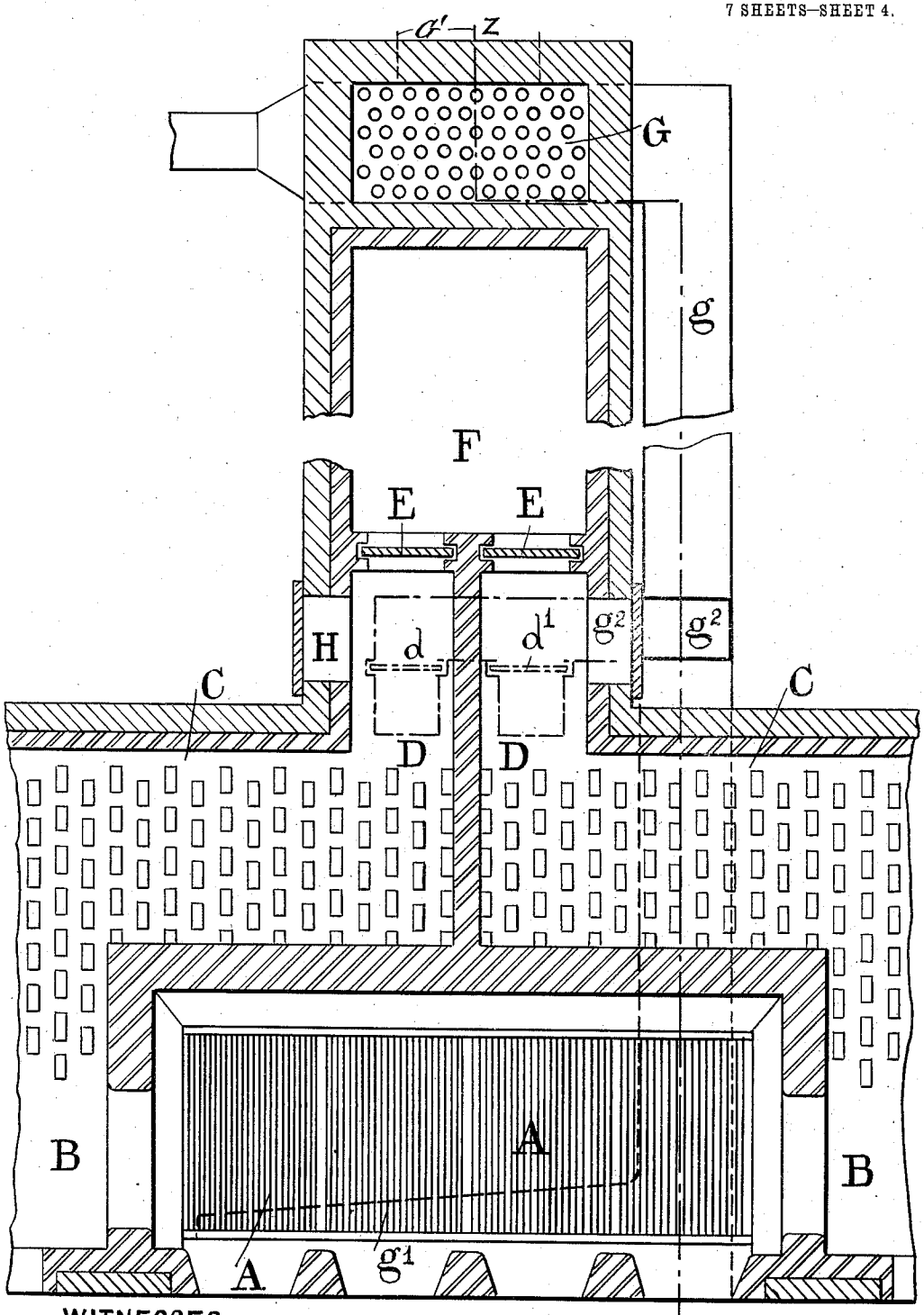

Fig. 4.

WITNESSES.

Bert. C. Sandman

A. Dunham.

INVENTOR.

H. N. Leask

by his attorneys

Kerr, Page, Cooper & Hayward

H. N. LEASK.

REFUSE DESTRUCTOR.

APPLICATION FILED SEPT. 4, 1909.

1,054,850.

Patented Mar. 4, 1913

7 SHEETS—SHEET 5.

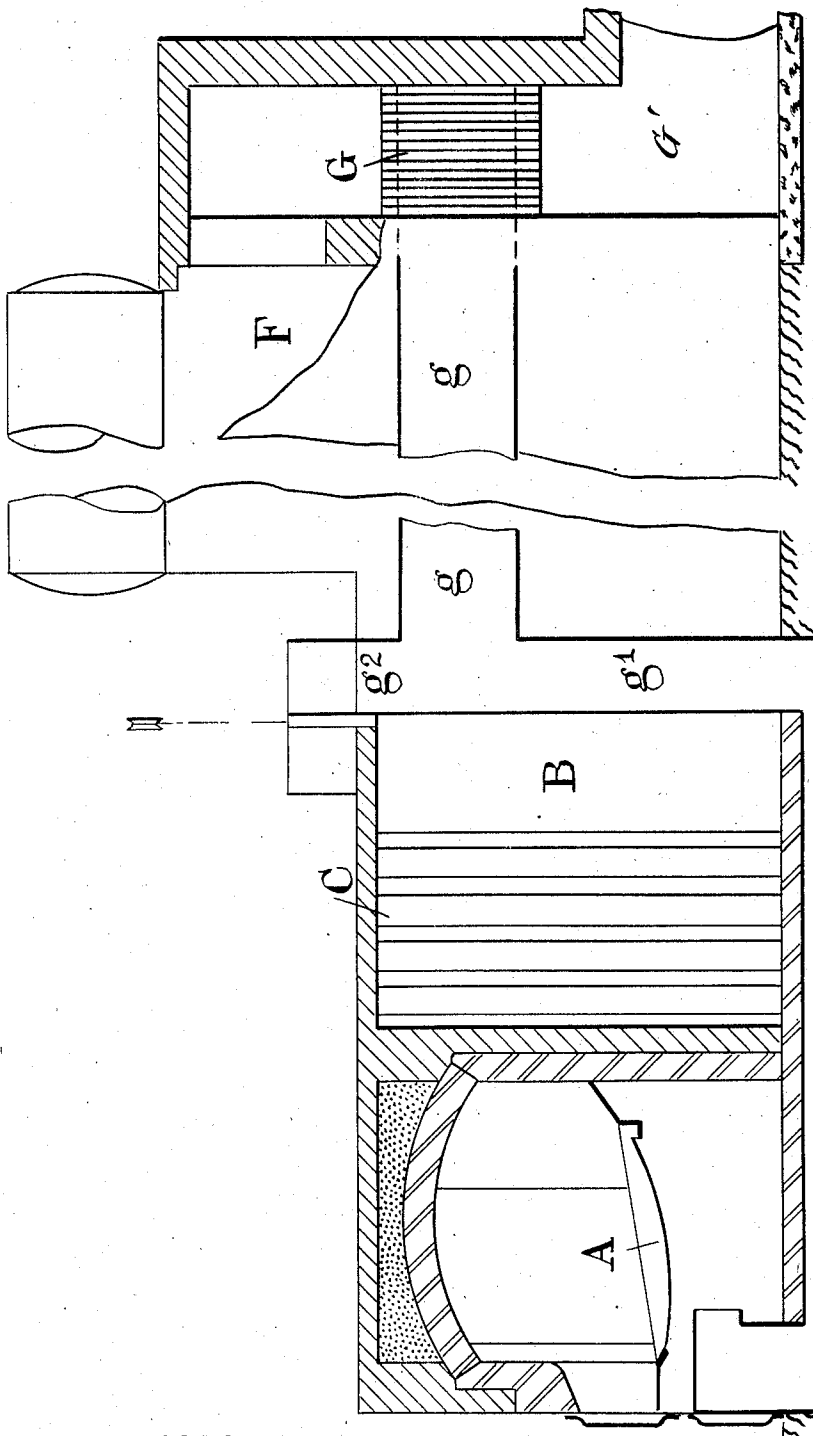

Fig.5.

WITNESSES.

Bert. E. Sandman.

A. A. Dunham.

INVENTOR.

H. N. Leask

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Kerr, Page, Cooker & Hayward

H. N. LEASK.

REFUSE DESTRUCTOR.

APPLICATION FILED SEPT. 4, 1909.

1,054,850.

Patented Mar. 4, 1913.

7 SHEETS—SHEET 6.

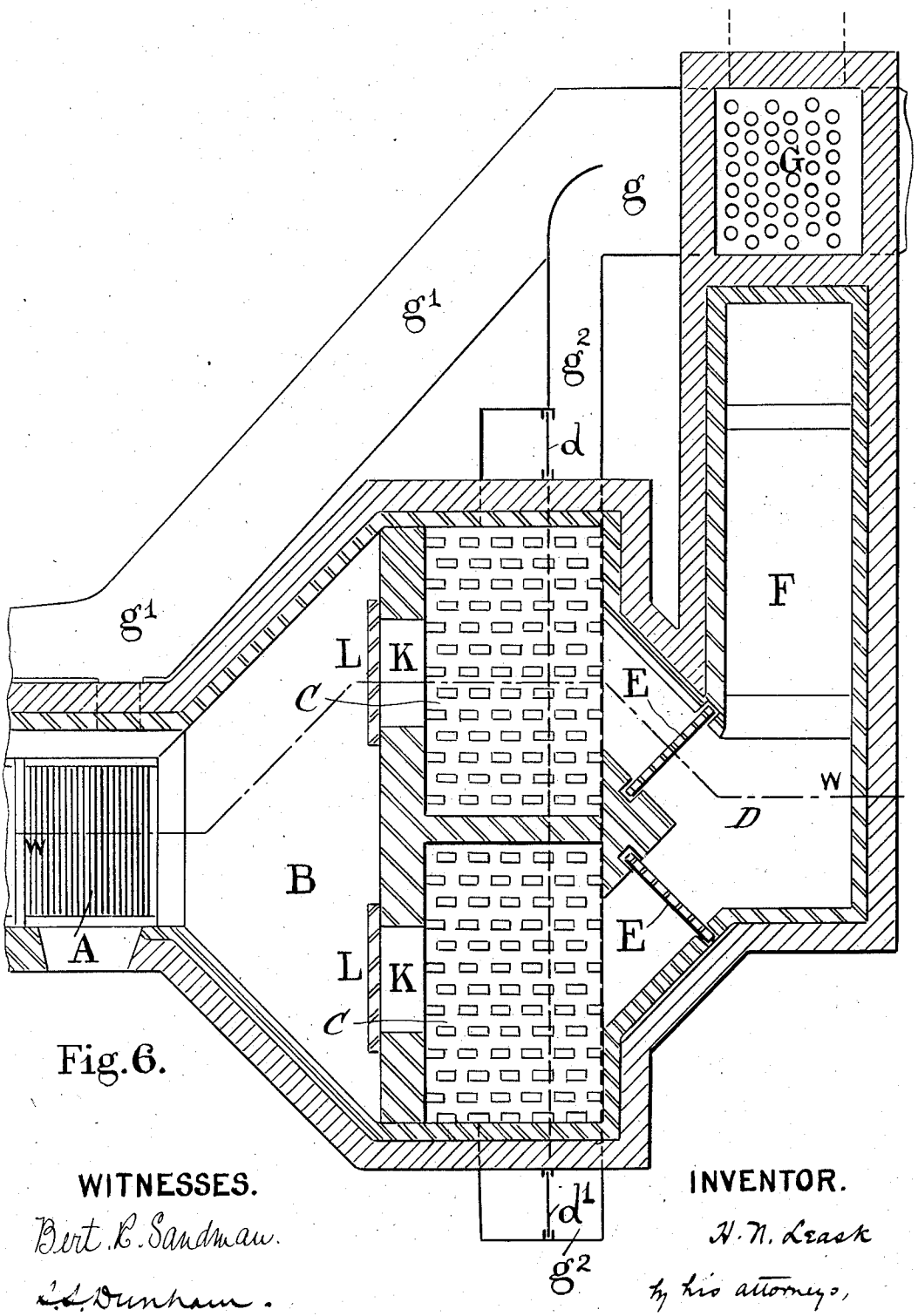

Fig. 6.

WITNESSES.

Bert. C. Sandman.

L. L. Dunham.

INVENTOR.

H. N. Leask

by his attorneys,

Rector, Page, Cooper & Hayward

H. N. LEASK.

REFUSE DESTRUCTOR.

APPLICATION FILED SEPT. 4, 1909.

1,054,850.

Patented Mar. 4, 1913.

7 SHEETS-SHEET 7.

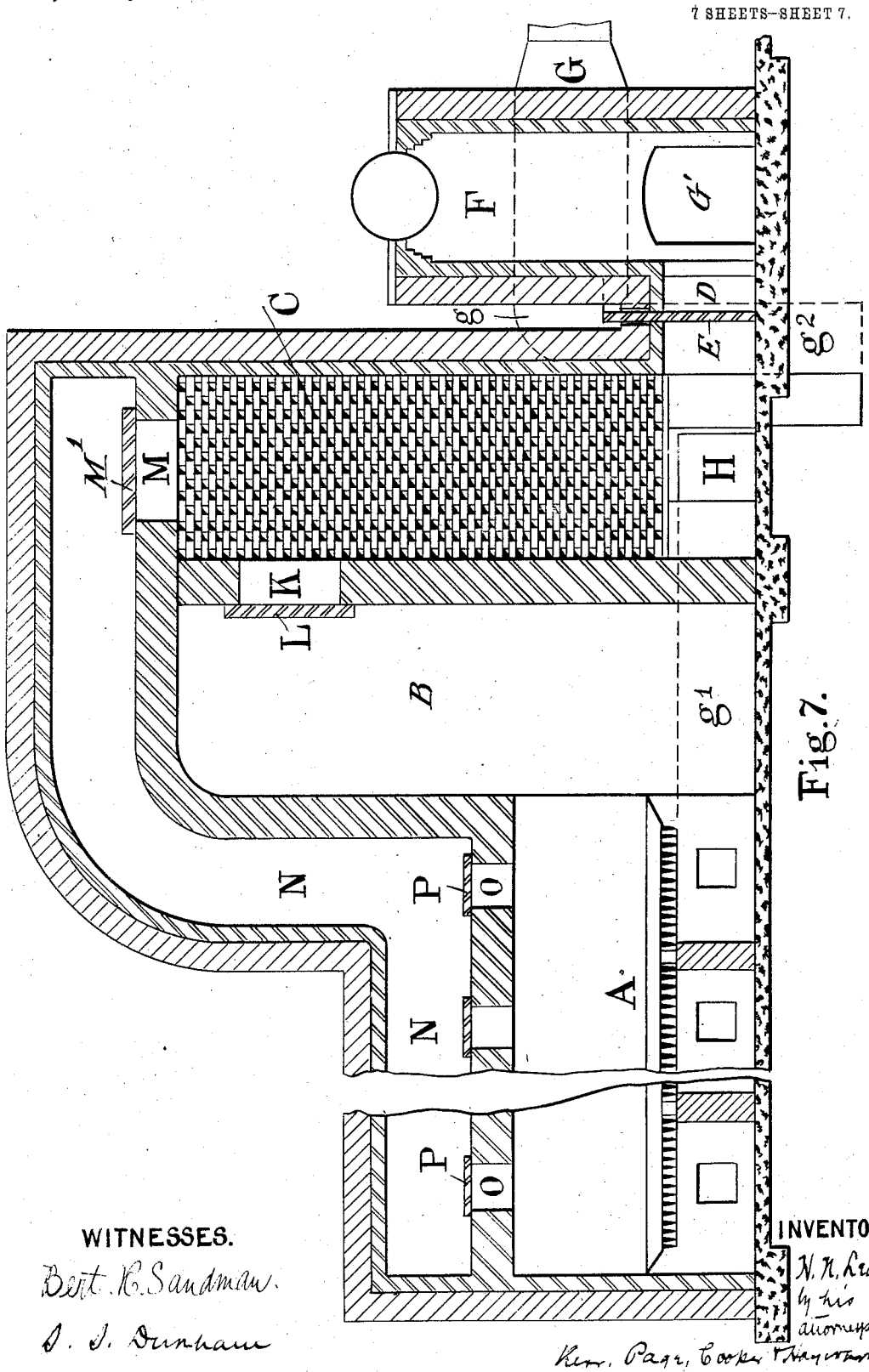

Fig. 7.

WITNESSES.

Bert. K. Sandman.

D. J. Dunham

INVENTOR

N. N. Leask

by his

attorneys

Kerr, Page, Cooper & Hayward

UNITED STATES PATENT OFFICE.

HENRY NORMAN LEASK, OF MANCHESTER, ENGLAND.

REFUSE-DESTRUCTOR.

1,054,850. Specification of Letters Patent. Patented Mar. 4, 1913.

Application filed September 4, 1909. Serial No. 516,210.

To all whom it may concern:

Be it known that I, HENRY NORMAN LEASK, a British subject, residing at Manchester, county of Lancaster, England, have invented certain new and useful Improvements in Refuse-Destructors, of which the following is a specification.

This invention relates to refuse destructors for burning town's refuse of low calorific value of the class in which a pair or series of regenerators are provided through which the hot gases and products of combustion from the furnace are passed alternately and air is then forced through the regenerator and therein heated to supply the furnace and support combustion therein.

It is designed to provide an improved compact and effective construction and arrangement of destructor wherein high temperatures and thorough combustion are obtained and in which regenerators are placed behind the furnace to heat to a high degree a secondary air supply to be delivered above the furnace grate, and a recuperator is placed beyond the boiler to heat the primary air supply to be delivered below the furnace grate.

The invention will be described with reference to the accompanying drawings, in which—

Figure 1 is a sectional plan view of a refuse destructor constructed according to my invention, the section being taken substantially on line *u*—*u* and *u'*—*u'* of Figs. 2 and 3 respectively. Fig. 2 is a sectional elevation, taken substantially on lines *x*—*x* and *x'*—*x'* of Figs. 1 and 3 respectively. Fig. 3 is a transverse sectional elevation, taken substantially on lines *y*—*y* and *y'*—*y'* of Figs. 1 and 2 respectively. Fig. 4. is a sectional plan of modified arrangement of destructor. Fig. 5. is a transverse sectional elevation on line *z*—*z* Fig. 4. Fig. 6. is a sectional plan of another modified arrangement. Fig. 7. is a longitudinal vertical section through same, on line *w*—*w* Fig. 6.

In the arrangement shown in Figs. 1, 2 and 3 the actual furnace consists of a unit comprising a number of cells or grates A of any ordinary construction arranged side by side, each cell communicating with the next. At each end of the unit a combustion chamber B is constructed and connected with each combustion chamber is a regenerator C, which extends backward and communicates by suitable flues D closed by dampers E with the boiler chamber F, which is arranged between the regenerators, and in the flue beyond the boiler chamber F a recuperator or air heater G is placed through which the air supply for the furnace is forced by a fan R and is heated but to a comparatively low temperature by the waste gases before such gases escape to the chimney. The escape of the waste gases from the recuperator G is afforded by the duct G', which may be closed by a damper G^2. An air duct *g* leads from the air heater G and divides into two ducts *g'* g^2. The air duct *g'* delivers a portion of the heated air from the heater G beneath the grate of the furnace A for primary combustion and the duct g^2 delivers a portion of the air to one of the regenerators C in which alternately the air is heated to a high degree and subsequently delivered above the furnace at a high temperature to promote secondary combustion.

The direction of the heated gases through the regenerators C is controlled by dampers E and the direction of the air by the dampers *d d'* which are opened and closed as desired and doors H are provided for cleaning purposes.

In the arrangement shown in Figs. 4 and 5 the regenerators C are placed immediately behind the furnace and the boiler chamber F extends backward behind the regenerators and the air heater G is placed beyond the boiler chamber F. From the recuperator or air heater G the waste gases escape through a flue shown at G', Fig. 5, and indicated by dotted lines at G' in Fig. 4. Dampers E are placed between the regenerators C and the boiler chamber F to open and close the connections between them and control the flow of the hot gases. Clearing doors H are also provided. An air duct *g* leads from the air heater G and divides into two ducts *g'* g^2. The air duct *g'* delivers a portion of the heated air from the heater G beneath the grate of the furnace A for primary combustion and the duct g^2 delivers a portion of the air to one of the regenerators C in which alternately the air is heated to a high degree and subsequently delivered above the grate at a high temperature to promote secondary combustion.

In the arrangement shown in Figs. 6 and 7 the direction of the flow of the gases away from the furnace A is always in the same direction. At one end of a "unit" of cells or grates A a combustion chamber B is

formed connecting with two vertical regenerators C arranged side by side with a vertical dividing wall. Both regenerators C are provided with inlets K at their upper ends for the inlet of the hot furnace gases and each inlet K is provided with a damper L. The lower ends of the regenerators C communicate by the flue D and dampers E with the boiler chamber F and the air heater or recuperator G is placed beyond the boiler chamber. From the air heater or recuperator the waste gases escape through the flue G'. At the top of the regenerators are also formed openings M which communicate with a passage N formed over the furnace and provided with openings O over the cells which are preferably capable of being closed by dampers P. The openings M at the top of the regenerators C are also provided with dampers M'. An air duct g leads from the air heater G and divides into two ducts g' g^2. The air duct g' delivers a portion of the heated air from the heater G beneath the grate of the furace A for primary combustion and the duct g^2 delivers a portion of the air to one of the regenerators C in which alternately the air is heated to a high degree and subsequently delivered above the grate at a high temperature to promote secondary combustion.

The regenerators C (in any of the arrangements shown) may be constructed of a number of parallel walls or partitions as in Fig. 2 at c of firebrick or other suitable material with narrow passages between them for the flow of the hot gases, and such walls may be solid or checker work, that is with spaces left between the bricks longitudinally. Or they may be formed with cross walls of checker work or in any other suitable manner adapted to take up the heat from the hot gases and subsequently yield it up to the cold air. Pits J are preferably arranged under the regenerators to collect any dust that may pass along with the hot gases.

In operation the hot furnace gases and products of combustion pass from the furnace A alternately through one or other of the regenerators C to the boiler chamber F the regenerator C being highly heated and air is blown by the fan R through the air heater G, and from it by the duct g' below the furnace grate for primary combustion and by the duct g^2 through one of the regenerators C above the furnace grate for secondary combustion. This latter regenerator having been previously heated by the passage of the hot gases through it the inflowing air is highly heated before it reaches the furnace, so that it materially aids combustion in the furnace. When the first regenerator is heated the direction of flow of the gases is reversed by closing the damper E of the first regenerator and opening that of the second, and the direction of the air is reversed by closing the damper d of the second regenerator and opening the damper d of the first. When the second regenerator is again heated up the direction of flow is again reversed and so on. The change of direction of the gases does not affect the air heater G beyond the boiler F.

Where there is not sufficient heat in the fuel to heat a boiler the latter may be omitted and the gases pass direct from the regenerators C to the air heater G.

The regenerators C are preferably adapted to heat a comparatively small amount of air to a very high temperature for secondary combustion over the furnace grate and the air heaters G are adapted to heat a large amount of air to a moderate temperature a portion of which is delivered direct to the furnace below the grate for primary combustion and a portion is delivered to the regenerators to be highly heated.

What I claim as my invention and desire to protect by Letters Patent is:—

1. In a refuse destructor, in combination, a furnace having a grate; a boiler chamber; a flue for conveying furnace gases from the furnace to the boiler chamber; air heaters in said flue, adapted to be alternately highly heated by the furnace gas flowing therethrough; means for controlling the flow of gases from the flue to the boiler chamber; an air heater to receive the gases from the boiler chamber; means for passing air through the first-named air heaters alternately and delivering the same to the furnace above the grate; and means for continuously passing air through the second-named air heater and delivering the same to the furnace below the grate.

2. In a refuse destructor, in combination, a furnace having a grate, air heaters arranged to alternately receive furnace gases from the furnace and be highly heated thereby, an air heater arranged to receive furnace gases from the first-named heater and be temperately heated thereby, means for passing air through the second-named air heater, means for delivering a portion of the air from said second-named heater to the furnace below the grate, and means for passing a portion of the air from the second-named air heater through the first-named heater and delivering the same to the furnace above the grate said air passing through the chamber in said first heater formerly traversed by the hot products of combustion.

3. In a destructor furnace, in combination, a furnace having a grate, a regenerator opening into the furnace above the grate to receive gases of combustion from the furnace and be highly heated thereby, a boiler chamber to receive the gases from the regenerator, a recuperator to receive the gases from the boiler chamber, an air flue leading from

the recuperator to the furnace below the grate, an air flue leading from the recuperator to the regenerator, and means for creating a current of air through the recuperator, the flues, and the regenerator to the furnace, delivering air from the recuperator to the furnace below the grate and from the regenerator to the furnace above the grate.

4. In a destructor furnace, in combination, a furnace having a grate, a regenerator at each side of the grate to receive furnace gases from above the grate, a boiler chamber between the regenerators to receive furnace gases from each, dampers for cutting off the flow of gases to the boiler chamber from either regenerator at will, a recuperator to receive the gases from the boiler chamber, a flue for the escape of the gases from the recuperator, means for creating a current of air through the recuperator, an air duct to convey air from the recuperator to the furnace below the grate, air ducts to convey air from the recuperator to the regenerators, dampers for cutting off the supply of air to either of the last-named air ducts at will, and air ducts for conveying air from the regenerators to the furnace above the grate.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY NORMAN LEASK.

Witnesses:
I. OWAEN O'BRIEN,
HARRY BARNFATHER.