

No. 658,695.

Patented Sept. 25, 1900.

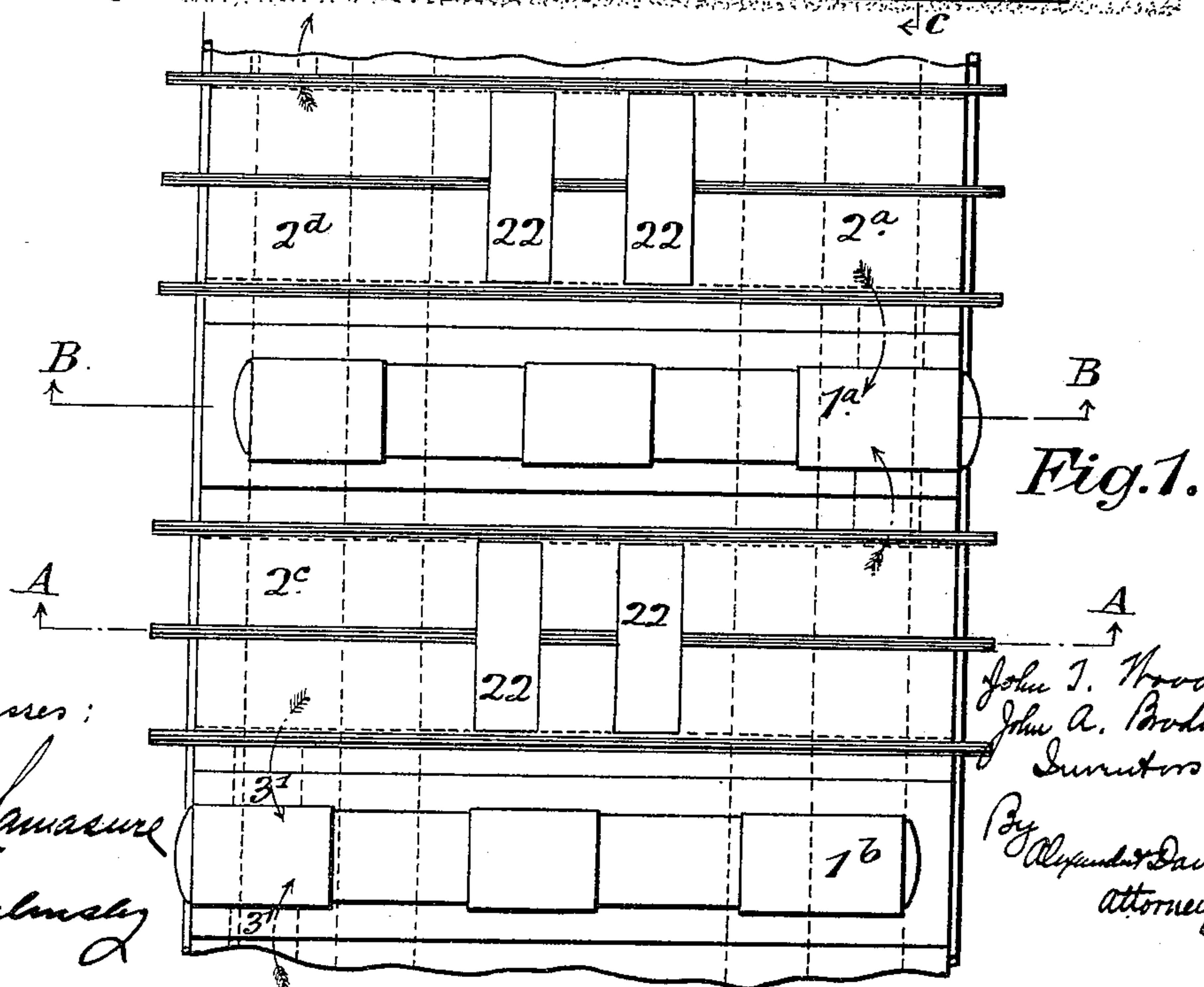
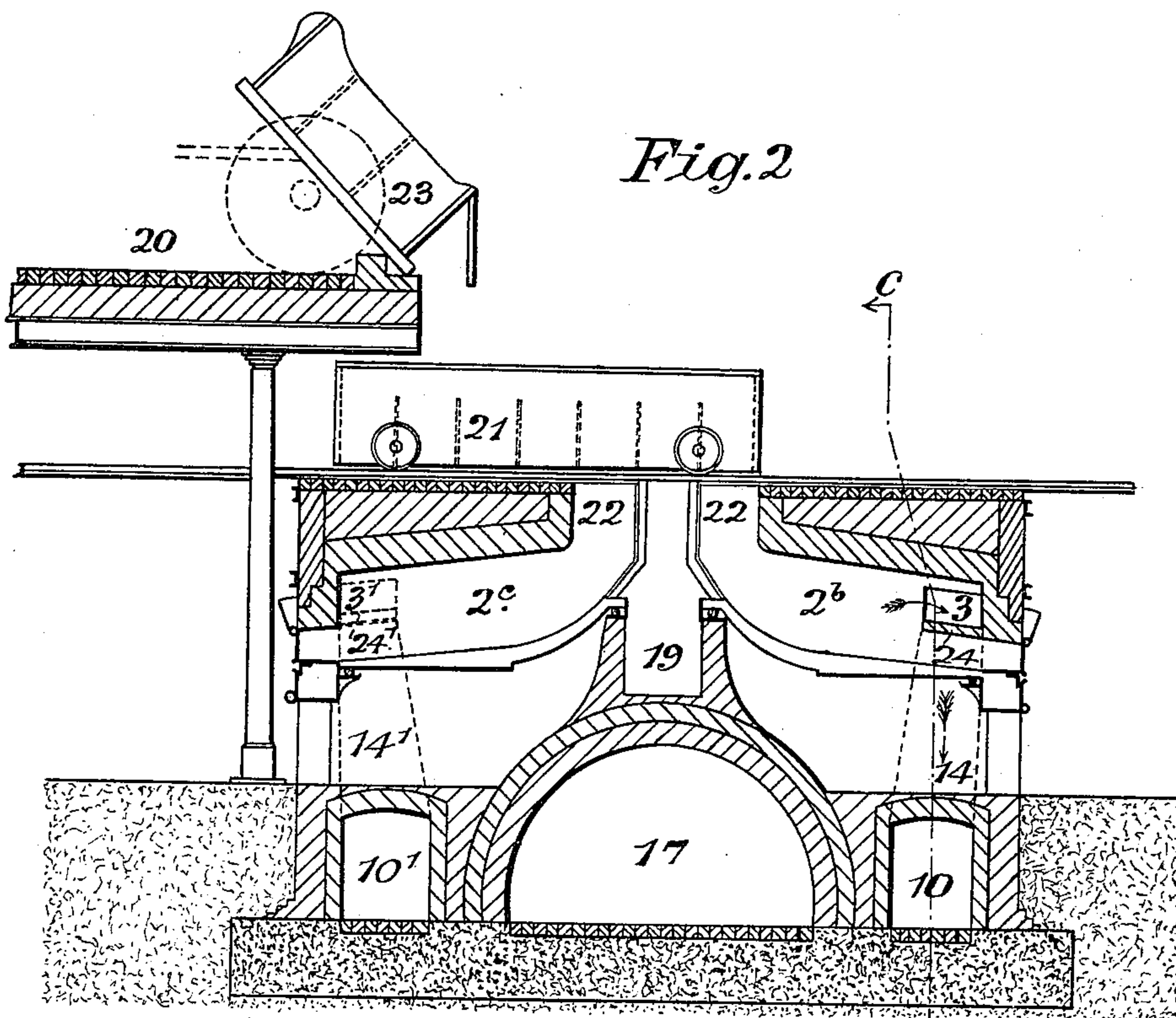
J. T. WOOD & J. A. BRODIE.

COMBINED REFUSE DESTRUCTOR AND STEAM GENERATOR.

(No Model.)

(Application filed Dec. 23, 1897.)

2 Sheets—Sheet 1.



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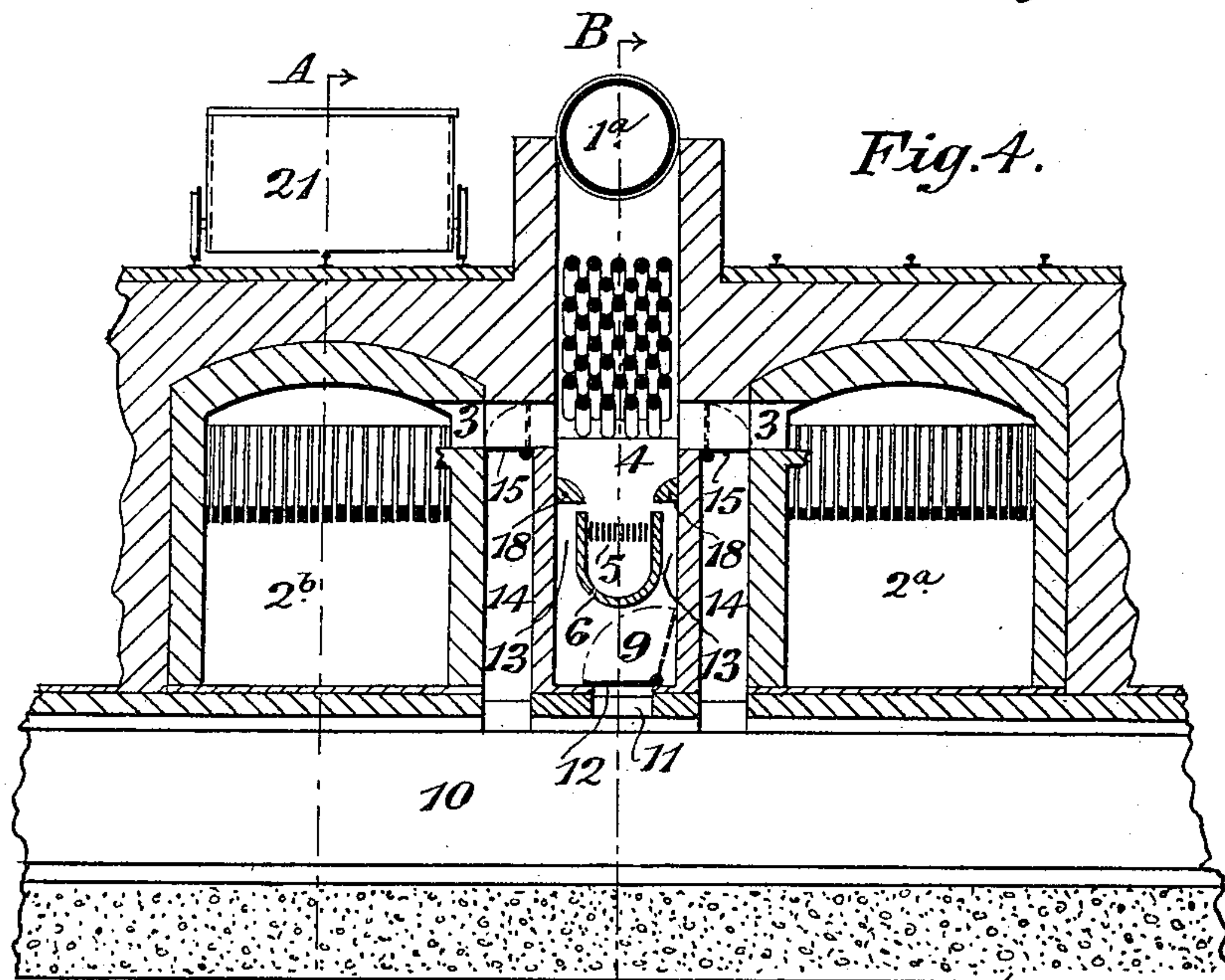
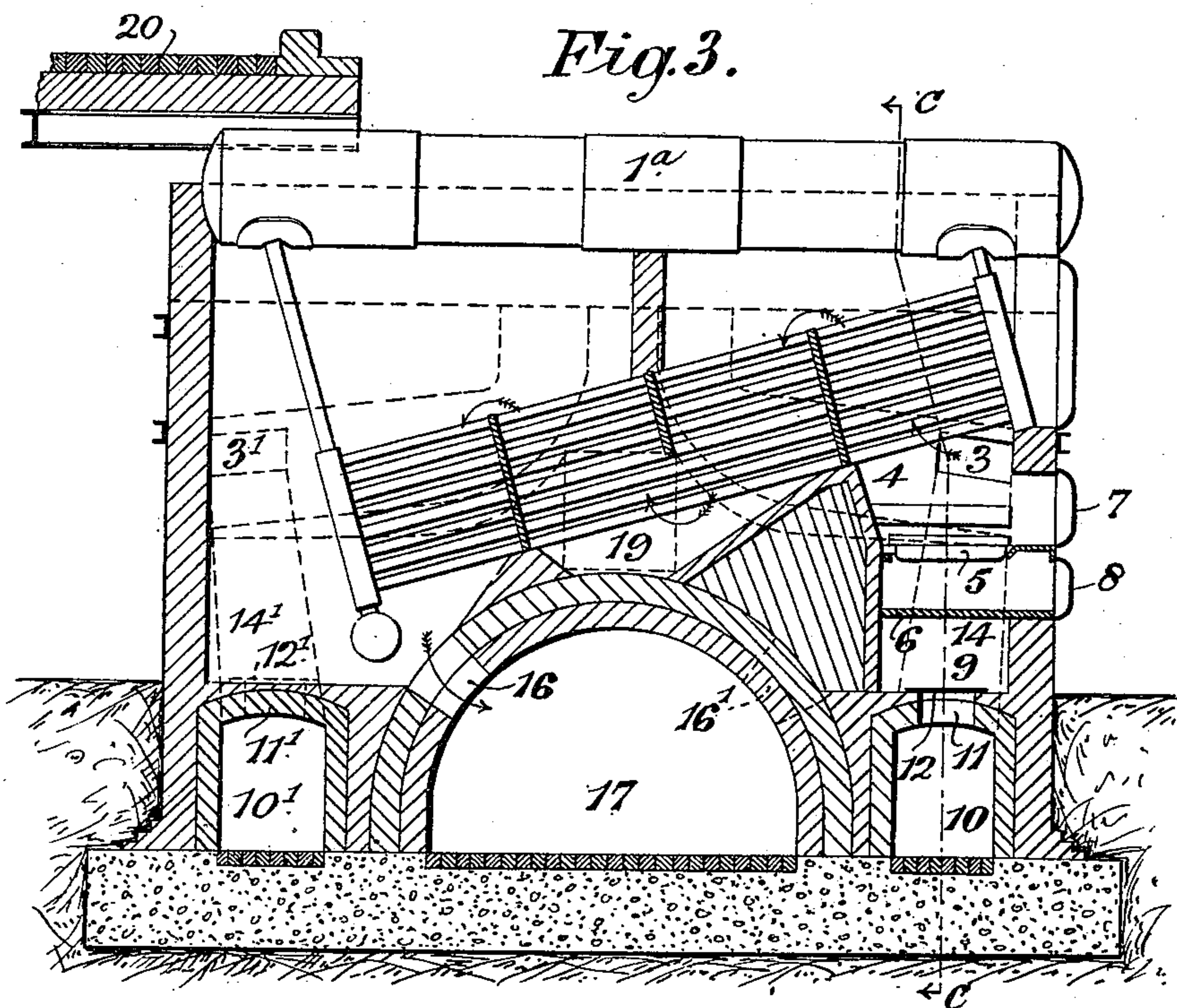
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

JOHN THOMAS WOOD AND JOHN ALEXANDER BRODIE, OF LIVERPOOL,  
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## COMBINED REFUSE-DESTRUCTOR AND STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 658,695, dated September 25, 1900.

Application filed December 23, 1897. Serial No. 663,135. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN THOMAS WOOD and JOHN ALEXANDER BRODIE, subjects of the Queen of Great Britain and Ireland, residing at Liverpool, in the county of Lancaster, England, have invented Improvements in and Relating to a Combined Refuse-Destructor and Steam-Generator, of which the following is a specification and which was patented in Great Britain April 1, 1893, No. 6,842.

This invention relates to combined refuse-destructors and steam-generators; and it has for objects, first, to so arrange the destructor-cells and generators that while insuring a complete combustion and mixture of the gases in the former they may be led with as little reduction of temperature as possible to the heating-surfaces of the latter; second, to arrange the flues of a set of destructor-cells and generators so that individual generators or destructor-cells may be taken out of action for repair, &c., and so that the cooled gases may be reduced in velocity and the deposited dust removed; third, to provide arrangements for the combustion of coke in the generators for auxiliary heating or to serve as fume-cremators; fourth, to provide in the case of the back-to-back destructors a space between the destructors for the purpose of inspection and cleaning and for the convenience of fitting the steam-jet at the back instead of at the front of the destructors, and, lastly, to arrange the destructor-cells, generators, and charging-platform so that the portable storage and charging trucks described in the specification of another application for Letters Patent of even date herewith, Serial No. 663,146, may be employed to charge the destructor-cells.

Figure 1 of the accompanying drawings is a part plan illustrating combined refuse-destructors and steam-generators according to this invention. Fig. 2 is a vertical transverse section through a pair of destructor-cells on the line A A of Figs. 1 and 4. Fig. 3 is a vertical transverse section through a steam-generator space on the line B B of Figs. 1 and 4, and Fig. 4 is a section on the line C C of Figs. 2 and 3.

Throughout the drawings the same parts

are indicated by the same reference-figures, and in the case of sections the direction in which they are viewed is indicated by the small arrows placed adjacent to the letters denoting the plane of section.

The arrangement shown in the drawings comprises a set of back-to-back destructor-cells and tubulous steam-generators. The destructor-cells and generators may be of usual type, and the arrangement consists in placing each steam-generator, such as 1<sup>a</sup>, between two destructor-cells, such as 2<sup>a</sup> and 2<sup>b</sup>, so that in the set there are twice as many destructor-cells as steam-generators, and there are between each pair of steam-generators, as 1<sup>a</sup> and 1<sup>b</sup>, two destructor-cells, as 2<sup>b</sup> and 2<sup>c</sup>.

The fire-grates of the steam-generators are preferably arranged, as shown, with the fire-grates at opposite ends alternately, so that the generator 1<sup>a</sup>, whose fire-grate is to the right, is supplied with gases from the adjacent cells 2<sup>a</sup> and 2<sup>b</sup> through the passages 3 at the right-hand side, while the generator 1<sup>b</sup>, whose fire-grate is to the left, is supplied from the cell 2<sup>c</sup> and a second cell beyond the limits of the drawings through the passages 3' at the left-hand side. At each end of the set a single destructor-cell is placed instead of a pair back to back, so as to preserve the ratio of cells to generators.

It will be seen that the brickwork of the cells serves to form the setting for the generators.

The arrangement of one of the steam-generators 1<sup>a</sup>, whose fire-grate lies to the right, is shown in Figs. 3 and 4, the arrangement of the other generators being symmetrically similar. 4 is the generator-furnace, and 5 are the fire-bars thereof, carried by a trough 6, of refractory material, which forms the ash-pit. The furnace 4 is provided with a fire door 7 and the trough 6 with an ash-pit door 8, through which the ordinary air-supply enters. The space 9 below the trough 6 communicates below with the common hot flue 10 through a passage 11, controlled by a damper 12, and it also communicates above with the furnace 4 through passages 13 at the sides of the trough 6. 3 are passages leading directly from the adjacent destructor-cells to the heating-surfaces of the steam-generator, and 14 are pas-



sages leading to the common hot flue 10. 24, Fig. 2, are deflectors, of refractory material, to prevent as far as possible the entry of cold air into the passages 3 when the cell-doors are open, these parts 24 extending inward from a point over the cell-doors sufficiently far to deflect any cold air that might gain access through said door inward over the grates, whereby the cold air will be heated.

With the arrangement described if it be desired to pass the hot gases directly from the adjacent destructor-cells to the steam-generator the dampers 15 and 12 are placed in the positions indicated in full lines in Figs. 3 and 4. The gases then flow through the passages 3, circulate around the heating-surfaces of the steam-generator, are cooled thereby, and then pass through the passage 16 to the common large cold flue 17, where the velocity is so reduced that any dust remaining in suspension is deposited before the gases finally pass out of the chimney.

If it be desired to put the steam-generator out of action, it is only necessary to keep the damper 12 closed and to turn the dampers 15 into the position shown in dotted lines in Fig. 4. The gases from the adjacent destructor-cells, if they be in action, then pass down the passages 14 to the common hot flue 10 and are available for heating some of the remaining generators. If it be desired to heat the steam-generator from some of the cells other than those adjacent to it, the dampers 15 are turned into the positions shown in dotted lines, and the corresponding damper 12 is opened. The hot gases then flow from the hot flue 10 into the space 9 up the passages 13 and over the fire-grate 5 into the furnace 4, the deflectors 18 being provided to bring the gases into intimate contact with the fuel on the fire-grate. From the furnace 4 the gases pass, as before, to the common cold flue 17 through the passage 17.

It will be seen that the arrangement of the common hot flue and passages enables any generator to be put out of action, the hot gases from its corresponding cells then entering the common hot flue and so being distributed among the remaining steam-generators. In the same way any individual cell may be taken out of action for repair, cleaning, or other purpose.

The independent furnaces 4 may be kept in action continuously or as circumstances dictate. They serve the double purpose of acting as fume-cremators and as sources of heat independent of or auxiliary to that of the destructor-cells.

The arrangement of the alternate generators, as 1<sup>b</sup>, with their furnaces 4, passages 3, 9, 11, 13, and 14 and hot flue 10 is, as already stated, symmetrically similar to that already described, the corresponding parts, where shown, being indicated by corresponding reference-figures with dashes appended.

19 is a space between the backs of the destructor-cells, which is found to be of great

service for the inspection of the tubes of the generators and for the removal of the fine dust deposited below the tubes. It is also useful when the mechanism for operating the fire-bars of the cells requires to be at the back thereof and for enabling the steam-jets used in connection with the air-supply of the cells to be fitted at the back of the cells instead of the front thereof, where they are objectionable on account of the hissing noise they produce.

The charging-platform 20 is placed laterally above the cells, and the storage and charging trucks 21 and charging-holes 22 are arranged in accordance with the said other specification hereinbefore referred to, so that the refuse can be tipped from a cart 23 into the trucks and transferred into the destructor-cells with a minimum of labor.

Although the invention has been described with respect to a set of double or back-to-back destructor-cells, it is clear that it may with equal facility be adapted to a set of single cells, in which case only a single common hot flue is required.

We are aware that combined refuse-destructor cells and steam-generators have been used prior to our present invention, and, further, that auxiliary furnaces have been fitted to the steam-generators, the said furnaces being adapted to serve also as fume-cremators, and to such broadly we make no claim.

What we claim is—

1. In a refuse-destructor, the combination of a steam-generator and its furnace, two destructor-cells, placed on opposite sides of and contiguous to the said generator, a hot flue, passages for establishing communication between each of the said destructor-cells and the combustion-chamber of the said furnace both direct and through the said hot flue, and valves to the said passages for causing the gases of combustion of each of the said cells to pass in either of the directions mentioned as desired.

2. In a refuse-destructor, the combination of a steam-generator and its furnace, two destructor-cells placed on opposite sides of and contiguous to the said generator, a hot flue, passages for establishing communication between each of the said cells and the combustion-chamber of the said furnace and the said hot flue, a passage for establishing communication between the said hot flue and spaces below and lateral to the grate of the said furnace, and valves to the said passages for enabling the gases of combustion of each of the said cells to be passed as desired either directly into the said combustion-chamber or indirectly thereto through the said hot flue and the said spaces.

3. In a refuse-destructor, the combination of a steam-generator and its furnace, two destructor-cells placed on opposite sides of and contiguous to the said generator, a hot flue, the grate of the said furnace being provided with a trough forming the ash-pit thereof



and allowing communication between the spaces above and below the said trough, passages for establishing communication between each of the said cells and the combustion-chamber of the said furnace and the said hot flue, a passage for establishing communication between the said hot flue and spaces below and lateral to the grate of the said furnace, and valves to the said passages for enabling the gases of combustion of each of the said cells to be passed as desired either directly into the said combustion chamber or indirectly thereto through the said hot flue and the said spaces.

4. In a refuse-destroyer, the combination of a steam-generator and its furnace, two destructor-cells placed on opposite sides of and contiguous to the said generator, a hot flue, the grate of the said furnace being provided with a trough forming the ash-pit thereof and allowing communication between the spaces above and below the said trough, means for deflecting gases passing up from the space below the said trough to the space above the same so as to bring them into intimate contact with the fuel on the said grate, passages for establishing communication between each of the said cells and the combustion-chamber of the said furnace and the said hot flue, a passage for establishing communication between the said hot flue and the space below the said trough and valves to the said passages for enabling the gases of combustion of each of the said cells to be passed as desired either directly into the said combustion-chamber or indirectly thereto through the said hot flue and the said spaces substantially as set forth.

5. In a refuse-destroyer, the combination of two or more steam-generators each provided with a furnace, a destructor-cell at one side of and contiguous to each of the said generators, a hot flue, a cold flue with which each of the said generators communicates, passages for establishing communication between each of the destructor-cells and the combustion-chamber of an adjacent generator-furnace directly, between each of the said cells and the said hot flue, and between the said hot flue and the combustion-chamber of each of the generator-furnaces, and valves to the said passages for causing the gases of combustion of each of the said cells to pass as desired into the combustion-chamber of an adjacent furnace or into the said hot flue, and the gases of combustion in the said hot flue to pass as desired into any of the furnace combustion-chambers.

6. In a refuse-destroyer, the combination of two or more steam-generators each provided with a furnace, a destructor-cell at one side of and contiguous to each of the said generators, a hot flue, a cold flue with which each of the said generators communicates, passages for establishing communication between each of the destructor-cells and the combustion-chamber of an adjacent genera-

tor-furnace directly, between each of the said cells and the said hot flue, and between the said hot flue and spaces below and lateral to the grate of each of the furnaces, and valves to the said passages for enabling the gases of combustion to be passed as desired into the combustion-chamber of an adjacent furnace or into the said hot flue, and the gases of combustion in the said hot flue to be passed as desired into the said spaces of any of the said furnaces.

7. In a refuse-destroyer, the combination of two or more steam-generators each provided with a furnace, a destructor-cell contiguous to and at one side of each of the said generators, a cold flue with which each of the said generators communicates, a hot flue, the grate of each generator-furnace being provided with a trough forming the ash-pit thereof and allowing communication between the spaces above and below the said trough, passages for establishing communication between each of the destructor-cells and the combustion-chamber of an adjacent generator-furnace directly, between each of the said cells and the said hot flue, and between the said hot flue and the space below the trough of each of the said furnaces, and valves to the said passages for enabling the gases of combustion to be passed as desired into the combustion-chamber of an adjacent furnace or into the said hot flue, and the gases of combustion in the said hot flue to be passed as desired into the said spaces of any of the said furnaces.

8. In a refuse-destroyer the combination of two or more steam-generators each provided with a furnace, a destructor-cell contiguous to and at one side of each of the said generators, a cold flue with which each of the said generators communicates, a hot flue, the grate of each generator-furnace being provided with a trough forming the ash-pit thereof and allowing communication between the spaces above and below the said trough, means for deflecting the gases passing up from the space below the said trough to the space above the same so as to bring them into intimate contact with the fuel on the said grate, passages for establishing communication between each of the destructor-cells and the combustion-chamber of an adjacent generator-furnace directly, between each of the said cells and the said hot flue, and between the said hot flue and the portion of each of the furnaces below the grate thereof, and valves to the said passages for enabling the gases of combustion to be passed as desired into the combustion-chamber of an adjacent furnace or into the said hot flue, and the gases of combustion in the said hot flue to be passed as desired into the portion of any of the said furnaces below the grate thereof.

9. In a refuse-destroyer, the combination of an exit-flue for the products of combustion, a fire-grate in said flue, a trough extending below said fire-grate, forming an ash-pit there-



for, and spaced from the walls of said flue so as to allow communication between the space above the fire-grate and that below said trough, a destructor-cell, and means for establishing communication between the said cell and the space below the said trough substantially as described.

10. In a refuse-destructor, the combination of an exit-flue for the products of combustion, a fire-grate in said flue, a trough extending below said fire-grate, forming an ash-pit therefor, and spaced from the walls of said flue so as to allow communication between the space above the fire-grate and that below said trough, means for deflecting gases passing up from the space below the said trough to the space above the fire-grate so as to bring them into intimate contact with the fuel on the said grate, a destructor-cell, and means for establishing communication between the said cell and the space below the said trough substantially as described.

11. In a refuse-destructor, the combination of two or more steam-generators each provided with a furnace, the furnaces of adjacent generators being at opposite ends of the generators, a destructor-cell at one side of and contiguous to each of the said generators and at the same end of the generator as the furnace thereof, a cold flue with which each of the said generators communicates, two hot flues arranged at opposite ends of the generators, passages for establishing communication between each generator-furnace and an adjacent destructor-cell direct, between each destructor-cell and the adjacent hot flue, and between each furnace combustion-chamber and one of the hot flues, and valves to the said passages for causing the gases of combustion of each of the said cells to pass as desired into the combustion-chamber of an adjacent furnace or into the corresponding hot flue, and the gases of combustion in each of the said hot flues to pass into any of the corresponding furnace combustion-chambers.

12. In a refuse-destructor, the combination

of two or more steam-generators each provided with a furnace, the furnaces of adjacent generators being at opposite ends of the generators, two destructor-cells placed on opposite sides of and contiguous to each of the said generators, and at the same end of the generator as the furnace thereof, the two cells between each two adjacent generators being back to back, a cold flue with which each of the said generators communicates, two hot flues arranged at opposite ends of the generators, passages for establishing communication between each generator-furnace and two adjacent destructor-cells direct, between each destructor cell and the adjacent hot flue, and between each furnace combustion-chamber and one of the hot flues, and valves to the said passages for causing the gases of combustion of each of the said cells to pass as desired into the combustion-chamber of an adjacent furnace or into the corresponding hot flue, and the gases of combustion in each of the said hot flues to pass into any of the corresponding furnace combustion-chambers.

13. In combination with the destructor-cells and steam-generators, the arrangement of the independent furnaces and the troughs and the passages leading from the hot flue, whereby the said furnaces in addition to serving as auxiliary furnaces to the steam-generators are also adapted to act as fume-cremators, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN THOMAS WOOD.

JOHN ALEXANDER BRODIE.

Witnesses to the signature of John Thomas Wood:

CHAS. R. ALLEN,  
JOSEPH HOWARD.

Witnesses to the signature of John Alexander Brodie:

J. W. ALSOP,  
ALFRED WILKINSON.