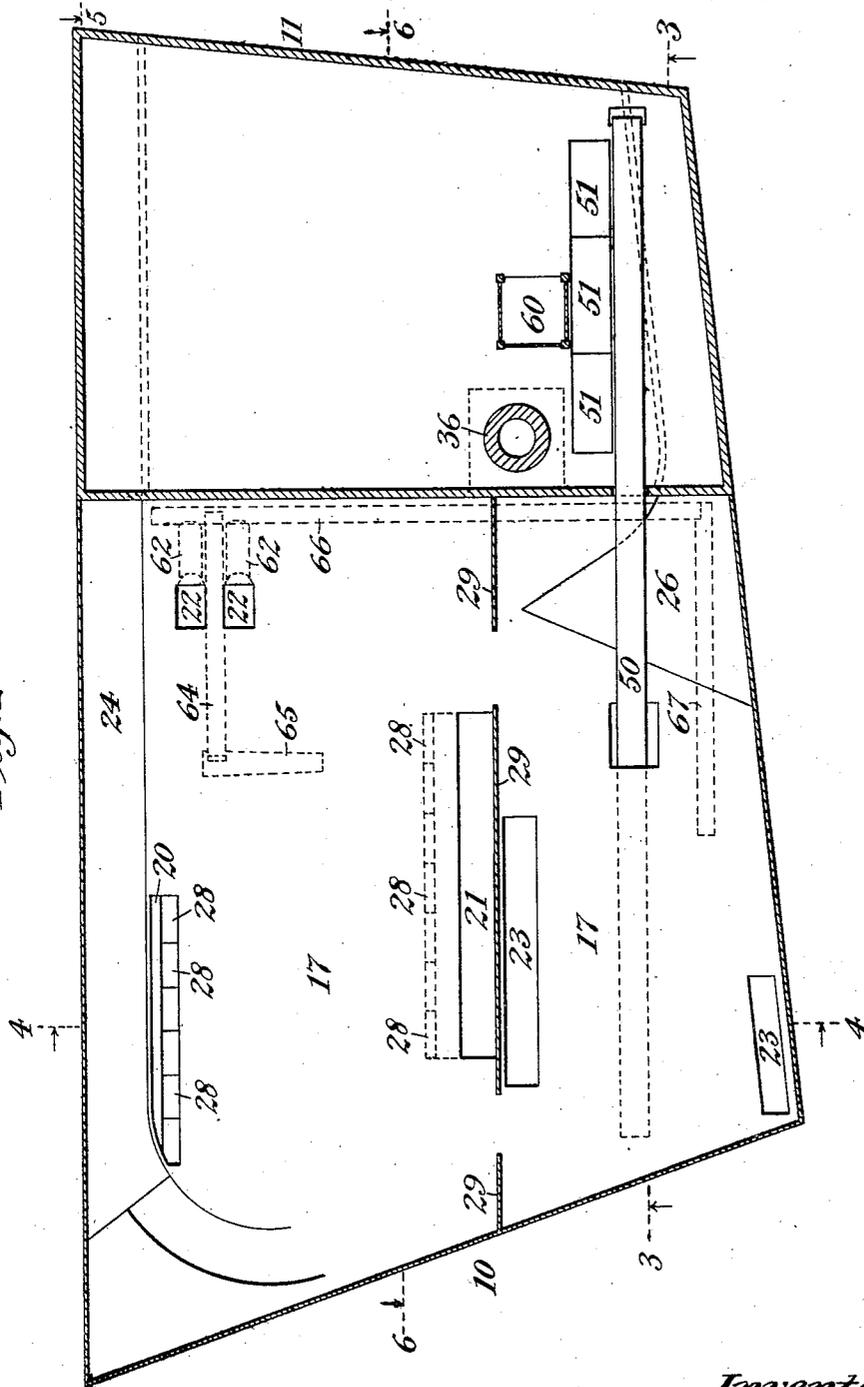


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SYSTEM OF REFUSE DISPOSAL.  
APPLICATION FILED JAN. 21, 1907.

Fig. 1

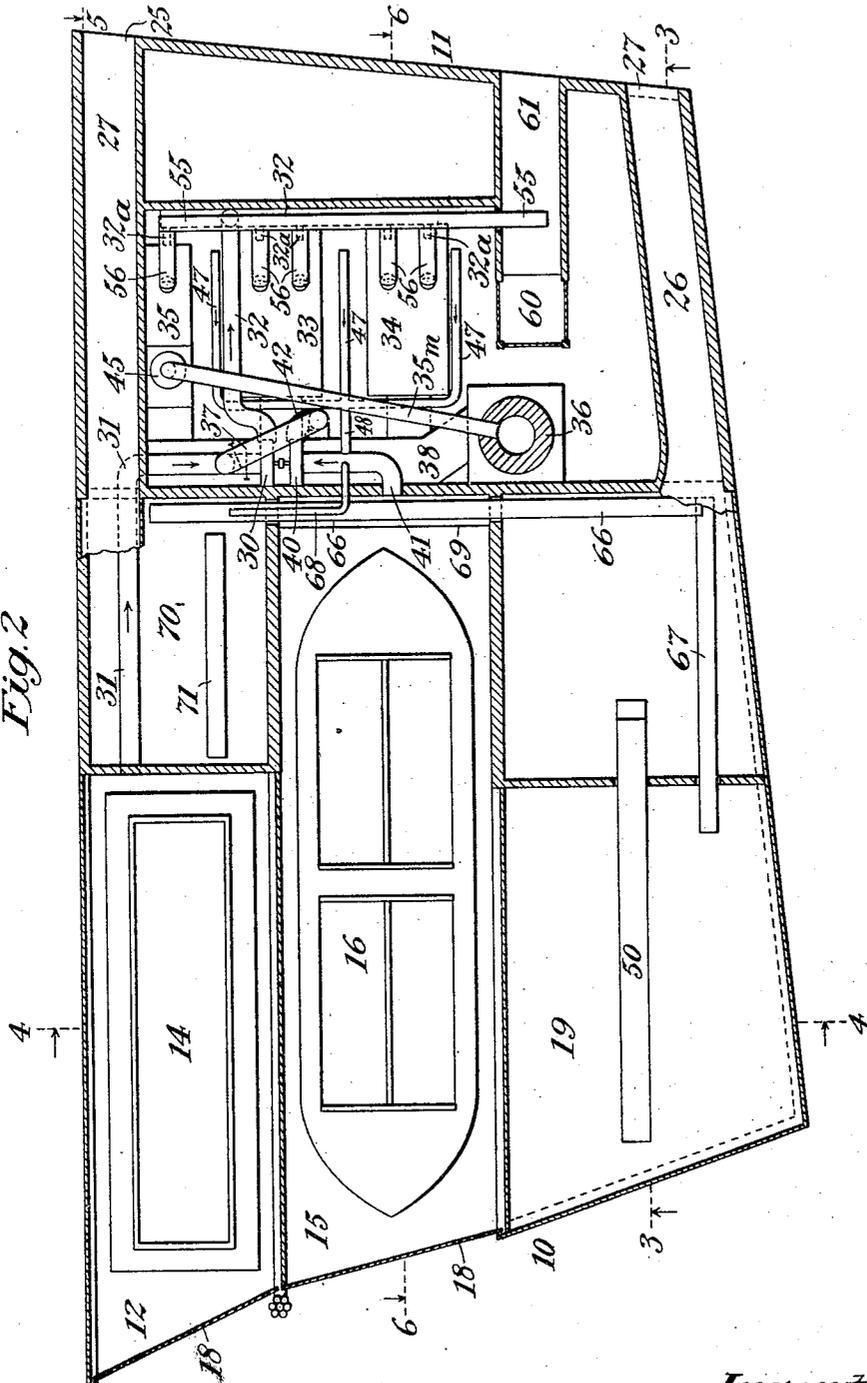


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Fig. 2



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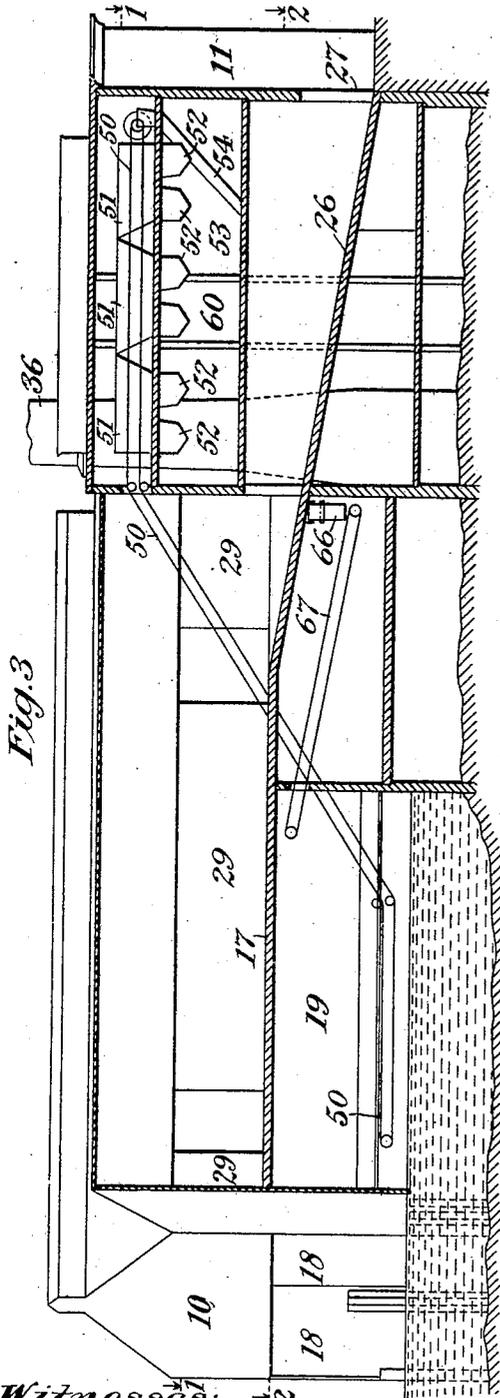


Fig. 3

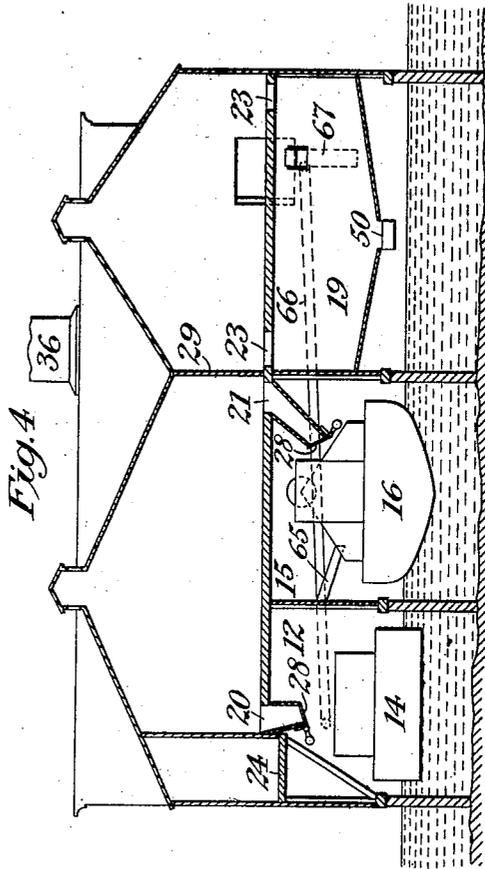


Fig. 4

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5 SHEETS—SHEET 4.

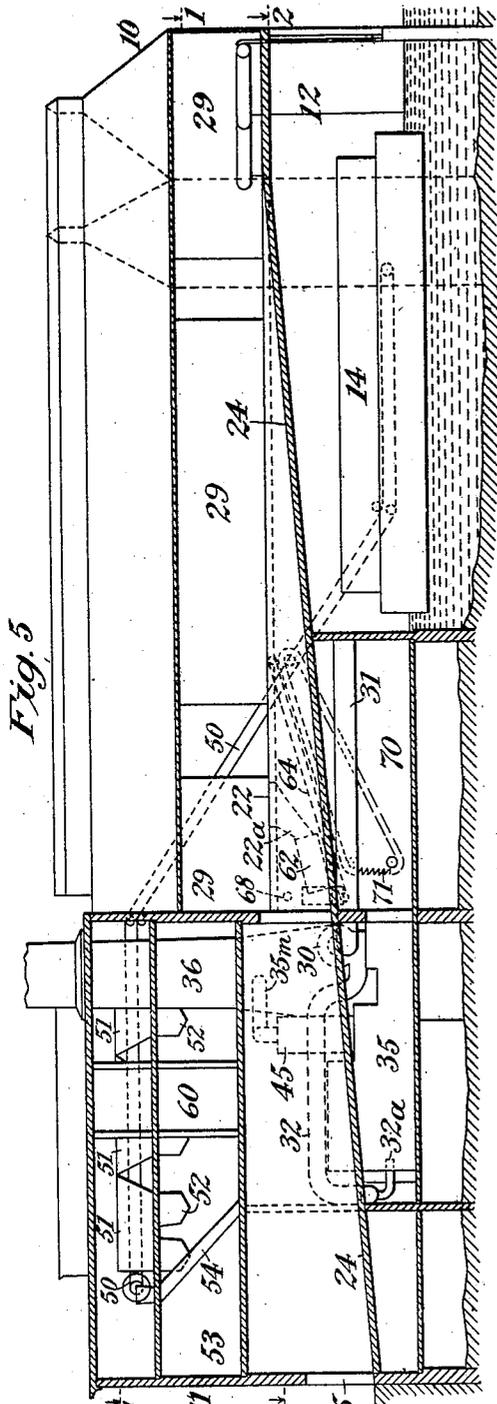


Fig. 5

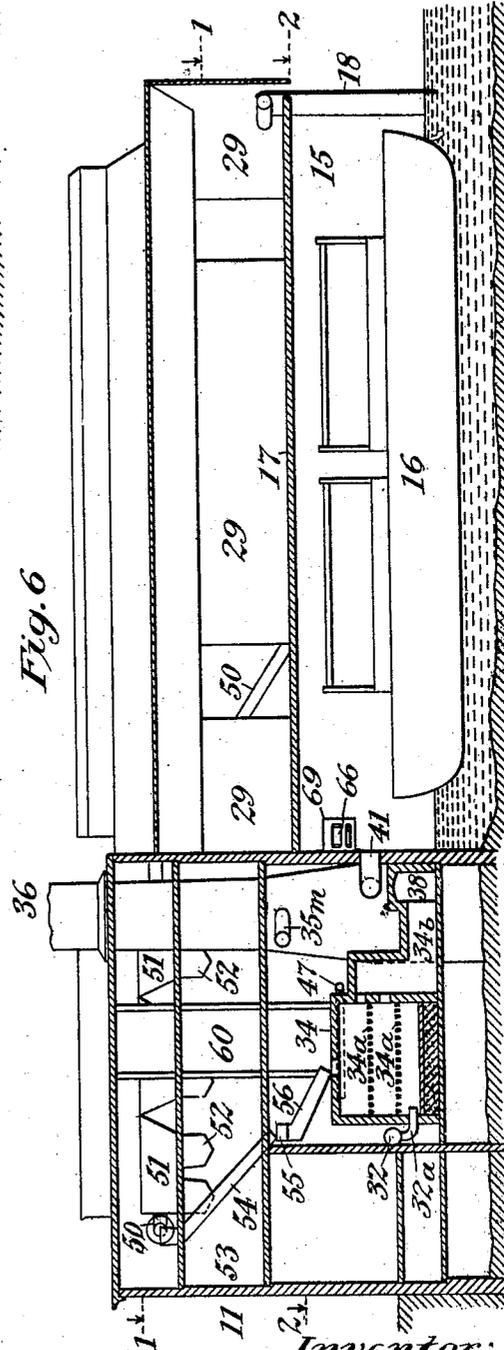


Fig. 6

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5 SHEETS—SHEET 5.

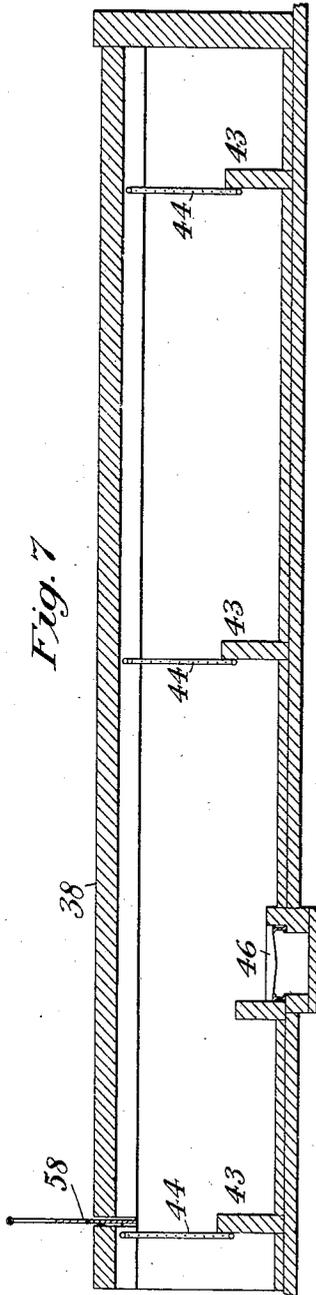


Fig. 7

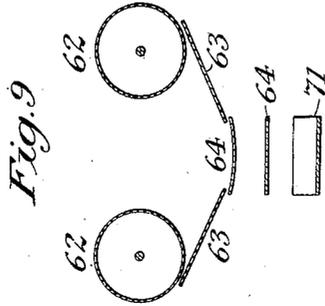


Fig. 9

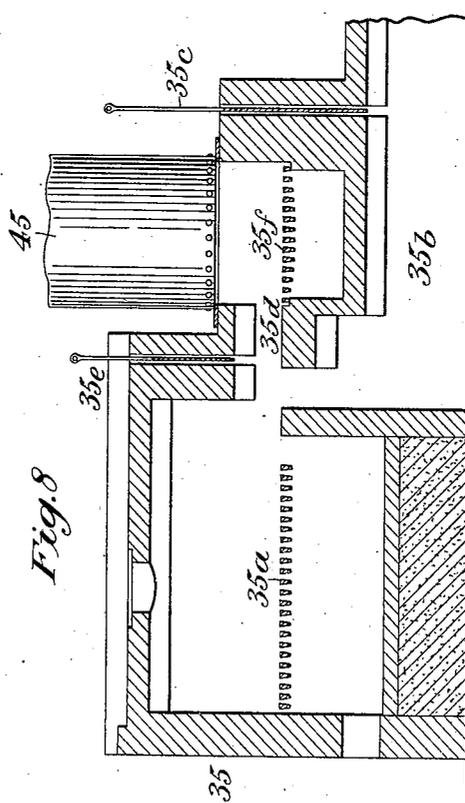


Fig. 8

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# UNITED STATES PATENT OFFICE.

ARTHUR N. PIERSON, OF WESTFIELD, NEW JERSEY.

## SYSTEM OF REFUSE DISPOSAL.

No. 865,427.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed January 21, 1907. Serial No. 353,173.

To all whom it may concern:

Be it known that I, ARTHUR N. PIERSON, a citizen of the United States, residing at Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Systems of Refuse Disposal, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

My invention relates to the disposal of refuse, particularly the refuse of large cities, and consists of an improved system of refuse disposal.

My invention has for its objects the disposition of all city refuse, such as garbage, ashes and what is known as paper rubbish, without creating any nuisance whatsoever.

My invention also has for its objects the diminution of the amount of hand labor required in the disposition and sorting of the refuse, the salvage of recoverable material and the destruction of burnable unrecoverable material, and increased efficiency in all such work.

My invention also has other objects and advantageous features which will appear from the following description.

My invention includes the provision of a refuse disposal plant which may be located along the water front and which comprises sealed berths for garbage-scows and ash-scows and means for receiving the loads dumped from the garbage-carts and ash-carts without creating a nuisance even in the dumping room or rooms.

My invention also includes the provision in such a plant of means for the reception of loads from the paper-carts and of loads of mixed paper and ashes, and for the sorting, recovery and destruction of the various constituents of the paper rubbish.

My invention also includes various improvements in the construction and combination of parts.

I have shown in the accompanying drawings a complete refuse disposal plant consisting of an inclosed pier and connected building provided with means for an effective reception, destruction, etc., of the various kinds of refuse and with improved means for the utilization of so much as is desirable of the heat rising from the burning of the burnable waste. I will now describe such construction in detail and will thereafter point out my invention in claims.

Figure 1 is a sectional plan view of the plant taken just above the dumping floor in the pier portion of the plant and through the picking room at the land end thereof, as indicated by the lines 1—1, Figs. 5 and 6.

Fig. 2 is also a sectional plan view taken just below the dumping floor and above the furnaces, as indicated by the lines 2—2, Figs. 5 and 6. Fig. 3 is a vertical longitudinal section taken through the paper bin, exit-ramp and picking and baling rooms, as indicated by the lines

3—3, Figs. 1 and 2. Fig. 4 is a transverse vertical section taken through the dump rooms, scow-berths and paper bin, as indicated by the lines 4—4, Figs. 1 and 2. Fig. 5 is a longitudinal vertical section taken through the entrance-ramp, garbage scow-berth and ash-room, as indicated by the lines 5—5, Figs. 1 and 2. Fig. 6 is a similar view taken through the ash scow-berth and one of the large furnaces, as indicated by the lines 6—6, Figs. 1 and 2. Fig. 7 is an enlarged central vertical section, taken longitudinally, of the common connecting conduit 38, which is arranged transversely of the building. Fig. 8 is an enlarged central longitudinal vertical section of the steam generating waste-burning furnace. Fig. 9 is an enlarged detail of the revolving separators for ashes and paper and their adjacent guides and conveyers.

The refuse disposal plant shown in the drawings is an inclosed pier and building of which the end 10 is the water-front and the end 11 the land-front. Two inclosed berths are provided with openings at the water-front, the berth 12 for a garbage-scow 14 and the berth 15 for an ash-scow 16. These berths are entirely inclosed and sealed, at the land ends and sides by permanent walls, at the top by the dumping floor 17 and at the water ends by roll-up curtains 18. The scows may be suitably moored by means not shown. Alongside of the scow-berths on the pier part of the structure, is the paper-bin 19, this also being located below the dumping floor and being inclosed at the sides and ends by permanent walls and covered at the top by the dumping floor.

Above the dumping floor two large inclosed rooms are provided, one of which, the ash and garbage dump-room, has in its floor the dump-opening 20 for garbage, the dump-opening 21 for ashes and the dump-openings 22 for mixed ashes and paper rubbish, and the other room, the paper dump-room, having in its floor the dump-openings 23 for paper rubbish. An inclined roadway or ramp 24 leads from the entrance 25 on the land-front to the garbage and ash dump-room, the two dump-rooms are connected by large openings in the dividing wall 29, and a ramp 26 leads from the paper dump-room to the exit 27, also on the land-front. Thus the carts all enter at a common entrance, go to their proper places in the dump-rooms, dump their loads and drive out at a common exit, so that the plant can receive and discharge a procession of carts without confusion and without other delay to each cart than the time required to dump its load.

The garbage dump-opening 20 and the ash dump-opening 21 are at the top of chutes which are closed at their lower ends by automatic or yielding and self-closing trap-doors 28 (see Fig. 4) shown as counter-weighted so that they will be opened by the weight

of the material deposited upon them and will return to closed positions as soon as the material has fallen from them into the scows, the bottom of each chute being closed by a plurality of trap-doors 28 side by side (see Fig. 1) so that only a portion of the bottom of each chute is opened for each load dumped down a chute. Thus communication between the dump-rooms and the scow-berths is opened only momentarily at intervals and at fractional portions of the bottoms of the chutes for the discharge of the loads from the chutes, and at all other times remains closed, with the scow-berths sealed from the dump-rooms. The odors from the garbage and the dust from the ashes are not, however, permitted to collect or remain in the scow-berths, as each berth is connected with exhausting means for withdrawing the foul or dust laden air from the berth, and the result of the exhaustion of the sealed berths is that practically all odors and all ashes are sucked down through the chutes with the loads, so that the air of the dump-rooms is uncontaminated.

The exhausting means for the garbage-berth 12 comprise the rotating exhausting fan 30, of ordinary construction, the conduit 31 extending from the shore end of the scow-berth 12 to the exhauster 30 and the conduit 32 extending from the exhauster 30 to the furnaces 33, 34 and 35, wherein the unrecoverable paper rubbish is consumed, the conduit 32 having a plurality of outlet orifices 32<sup>a</sup> which enter the furnaces at the ash pits or below the grate bars thereof, so that the fumes and odors which are drawn from the garbage scow-berth by the exhauster will pass through the burning materials in the furnaces with the resulting destruction of all germs, organic material and noxious odors, while at the same time carrying with them into the furnaces a supply of oxygen which will intensify the combustion therein. The final discharge to the atmosphere of these heat-purified gases is through the common stack or chimney 36 of the three furnaces. I provide also a by-pass 37 extending from the conduit 31, to the connecting conduit 38 which connects the several furnaces with the stack, so that by the manipulation of suitable dampers, which are indicated in the drawings (see Fig. 2), the garbage scow-berth may be directly connected with the stack. This connection will be desirable at night when the exhauster is not in operation, the highly heated condition of the walls of the connecting conduit 38 and the stack 36 being then relied upon to maintain the draft for the withdrawal of odors from the garbage scow-berth and to heat the same sufficiently to mitigate or destroy their objectionable characteristics. I also provide in the common connecting conduit 38 (see Fig. 7) a separate fire-bed of grate-bars 46 upon which a coal or other fire may be built at any time to maintain or intensify the heated condition of the conduit 38 and the chimney 36.

The exhausting means for the ash scow-berth comprise the rotating exhausting fan 40, of ordinary construction, the conduit 41 extending from the shore end of the ash scow-berth to the exhauster, and a short conduit 42, which joins with the by-pass 37 from the garbage-berth exhaust conduit 31 and enters the connecting conduit 38, above referred to, which leads to the stack 36. This connecting conduit 38 is also a depositing

chamber, wherein the dust carried by the air withdrawn from the ash scow-berth and any unconsumed floating particles are deposited by the action of steam screens or curtains and detention walls. This connecting conduit is separately shown in Fig. 7. The detention walls 43 extend upward from the bottom of the conduit a substantial distance so as to act to check the movement and set up eddies and form centers of deposit for the deposited material, and the steam screens 44 extend upward from the tops of the detention walls to the top of the conduit and comprise a suitable arrangement of pipes with jet-orifices so as to form in effect a curtain of steam through which the gases and particles are compelled to pass with moistening of the particles such as will cause them to be deposited in a pasty or muddy condition.

The steam-screens may be supplied with steam in any usual manner and I provide a boiler 45, which receives heat from the smaller furnace 35 and which supplies steam for the steam curtains, for steam heating when desired, and for the operation of an engine which works the blowers and may operate a lighting plant, etc., the details of steam connection being omitted from the drawings.

The detention walls 43 and steam-screens 44 are located in the connecting conduit 38 just beyond the entrances thereto of the draft-flues from the several furnaces, so that all the air and gases which enter this connecting conduit are subjected to the cleansing and depositing action of the steam-screens and detention walls before their escape to the stack. I also provide in the connecting conduit 38 the fire-bed of grate-bars 46, above referred to, whereon a coal or other fire may be kindled to augment the draft or to maintain the draft at night when the plant is not in operation, particularly when the weather conditions are such that the normal draft provisions are inadequate. I also provide for the withdrawal of dust-laden air which may result from the handling of the ashes and unconsumed material from the furnaces when the furnaces are being cleaned out, and this withdrawal of dust-laden air takes place through the branch conduits 47, one from the side of each furnace and each joining a common conduit 48 which enters the exhaust conduit from the ash scow-berth.

As above described the paper rubbish is dumped through the opening 23 in the dumping floor 17 and enters the paper-bin 19. The dumping of this material is not accompanied by dust or noxious odors and therefore no means are provided for closing the dump-openings. The floor of the paper-bin 19 slopes to a longitudinal central line at which is located a belt-conveyer 50 extending along below the floor of the paper-bin so that the material may be readily placed upon it by an attendant or fork-man whose duty is to place the material upon the conveyer with such distribution that it will be properly carried by the conveyer. The conveyer 50 rises to a picking room at the top of the building in which are located a plurality of hoppers 51 into which the different grades of recoverable material are thrown by attendants, and below these hoppers are chutes 52 entering a baling room 53 just below the picking room wherein the sorted and recovered material is baled. A chute 60 carries the bales to receiving wagons which may be backed into the passage

61. The unrecoverable paper rubbish drops from the end of the conveyer 50 into an inclined chute 54 from which it drops upon the furnace-feed conveyer-belt 55 arranged transversely over the several furnaces.

5 The furnaces are fed from this feed-conveyer by means of individual chutes 56 leading to openings in the tops of the furnaces. The material may be deflected to these feed-chutes by suitable manually operatable inclined guides or pushers (not shown) or in any well known manner. In the operation of the system the furnaces are usually charged, fired and cleaned out in succession, so that at least one furnace is being charged at all times during the operation of the plant.

The particular construction of the individual furnaces is not claimed in the present application, but the furnaces are generally shown in the drawings. The smaller furnace 35 is the steam generating furnace and, as above described, the steam-boiler 45 receives the hot gases from this furnace. This furnace has a single row of grate-bars 35<sup>a</sup> (see Fig. 8) and has an exit flue 35<sup>b</sup> leading to the common connecting conduit 38 and closable by a damper 35<sup>c</sup> and also has an exit flue 35<sup>d</sup> leading to the flues of the boiler 45 and closable by a damper 35<sup>e</sup>; a flue 35<sup>m</sup> leading from the top of the boiler directly to the stack 36 (see Fig. 2). An additional fire-bed is provided by grate-bars 35<sup>f</sup>, on which a coal or other fire may be built to increase the heat or accentuate the draft under bad weather conditions or to provide a source of heat independently of the consumption of rubbish for operation of the steam plant at any time when the rubbish is not being consumed or is insufficient. The larger furnaces 33 and 34 are provided with two superposed fire-beds provided by two rows of grate-bars. The furnace 34 is shown in longitudinal section (see Fig. 6) with its two rows of grate-bars 34<sup>a</sup> and its exit-flue 34<sup>b</sup> leading to the common connecting conduit 38. The furnaces 33 and 34 are of exactly the same construction. The unconsumed refuse from the furnace is removed by stokers after each firing and is carried into an ash-room 70 by suitable cars or carts (not shown) and from these cars or carts it is taken up by an elevator conveyer 71 which discharges it into an auxiliary ash-chute 65 leading to the ash-scow.

In the handling of city refuse, the separation of ashes and papers by the householder cannot always be relied upon and for this and other reasons there will be occasional loads of mixed ashes and paper rubbish. The dump openings 22, as above stated, are for the reception of such mixed material. Chutes 22<sup>a</sup> lead from these dump openings 22 into the mouths or ends of revolving perforated cylinders 62 (see dotted lines in Fig. 5) and these revolving perforated cylinders separate the ashes which drop through their perforations and fall upon inclined guides 63 leading to a belt-conveyer 64 (see also Fig. 9) and this belt-conveyer dumps its ashes upon the auxiliary ash chute 65 which, as above described, also receives the ashes and unconsumed refuse from the furnaces. The paper rubbish is retained within the revolving cylinders 62 and drops from the lower ends of these cylinders upon a conveyer-belt 66 which conveys it transversely across the building to a second conveyer-belt 67, the latter carrying it to the paper-bin 19. The paper conveyer-belt 66 is suitably housed by a casing 69 where it passes through the land end of the ash scow-berth just above the exhaust opening of such

berth (see Fig. 6). A small exhaust pipe 68 leads from above the cylinder 62 to the exhaust conduit 41 and operates to remove any dust incident to the dumping or separating action.

In the operation of the plant above described the natural draft of the stack resulting from the combustion in the furnaces may at times be relied upon, in favorable weather or other conditions, to afford the desired low pressure or exhaust for the various exhaust conduits. The draft may be regulated by the damper 58 (see Fig. 7) located near the exit end of the common flue conduit and depositing chamber 38. It is to be noted, however, that the irregularity in the quality and quantity of the refuse fuel, as well as the variations in weather conditions, make it necessary to provide for the maintenance of effective working conditions by the forced exhausts and the forced drafts resulting therefrom, as above described.

It is obvious that various modifications may be made in the construction shown and above particularly described within the principle and scope of my invention.

I claim:—

1. In a system of refuse disposal, the combination of an inclosed garbage scow-berth, an exhaust, a furnace, and an exhaust conduit leading from the berth and controlled by the exhaust and entering the furnace in advance of the seat of combustion therein. 90
2. In a system of refuse disposal, the combination of a garbage scow-berth, an exhaust, a furnace, an exhaust conduit leading from the berth and controlled by the exhaust and entering the furnace in advance of the seat of combustion therein, a draft-conduit from the furnace, a by-pass leading from the exhaust conduit to the draft-conduit, and means for closing the exhaust conduit or by-pass. 95
3. In a system of refuse disposal, the combination of a garbage scow-berth, an exhaust, a refuse-consuming furnace, an exhaust conduit leading from the berth and controlled by the exhaust and entering the furnace in advance of the seat of combustion therein, a draft-conduit from the furnace, a by-pass leading from the exhaust-conduit to the draft-conduit, the draft-conduit having a fire-bed therein, and means for closing the exhaust conduit or by-pass. 100
4. In a system of refuse disposal, the combination of an inclosed ash scow-berth, an exhaust, a depositing chamber, an exhaust conduit leading from the berth and controlled by the exhaust and entering the depositing chamber, and means in the depositing chamber for separating dust from the air conveyed to the chamber by the exhaust conduit. 105
5. In a system of refuse disposal, the combination of an inclosed ash scow-berth, an exhaust, a depositing chamber, an exhaust conduit leading from the berth and controlled by the exhaust and entering the depositing chamber, and a fluid-screen in the depositing chamber in the path of the dust laden air therein. 110
6. In a system of refuse disposal, the combination of an inclosed ash scow-berth, an exhaust, a depositing chamber, an exhaust conduit leading from the berth and controlled by the exhaust and entering the depositing chamber, and a fluid-screen and detention wall in the depositing chamber in the path of the dust laden air therein. 115
7. In a system of refuse disposal, the combination of an inclosed ash scow-berth, an exhaust, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and controlled by the exhaust and entering the combined flue and chamber, a furnace the exit-flue of which enters the combined flue and chamber, and means in the combined flue and chamber for separating dust from the air conveyed thereto by the exhaust conduit and separating floating particles from the products of combustion from the furnace. 120

8. In a system of refuse disposal, the combination of an inclosed ash scow-berth, an exhauster, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and controlled by the exhauster and entering the combined flue and chamber, a furnace the exit-flue of which enters the combined flue and chamber, and a fluid screen in the combined flue and chamber in the path of the dust-laden air and products of combustion. 5
9. In a system of refuse disposal, the combination of an inclosed ash scow-berth, an exhauster, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and controlled by the exhauster and entering the combined flue and chamber, a furnace the exit-flue of which enters the combined flue and chamber, and a fluid screen and detention wall in the combined flue and chamber in the path of the dust-laden air and products of combustion. 10
10. In a system of refuse disposal, the combination of an ash scow-berth, an exhauster, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and controlled by the exhauster and entering the combined flue and chamber, a refuse-consuming furnace the exit-flue of which enters the combined flue and chamber, a fire-bed in the combined flue and chamber, and means in the combined flue and chamber for separating dust from the air conveyed thereto by the exhaust conduit and separating floating particles from the products of combustion from the furnace. 20
11. In a system of refuse disposal, the combination of an ash scow-berth, an exhauster, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and controlled by the exhauster and entering the combined flue and chamber, a refuse-consuming furnace the exit-flue of which enters the combined flue and chamber, a fire-bed in the combined flue and chamber, and a fluid-screen in the combined flue and chamber in the path of the dust-laden air and product of combustion. 25
12. In a system of refuse disposal, the combination of an ash scow-berth, an exhauster, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and controlled by the exhauster and entering the combined flue and chamber, a refuse-consuming furnace the exit-flue of which enters the combined flue and chamber, a fire-bed in the combined flue and chamber, and a fluid-screen and detention wall in the combined flue and chamber in the path of the dust-laden air and product of combustion. 30
13. In a system of refuse disposal, the combination of a dump-floor, an inclosed scow-berth, the dump-floor having an opening leading to the scow-berth, and means for exhausting air from the inclosed scow-berth. 50
14. In a system of refuse disposal, the combination of a dump-floor, an inclosed scow-berth, the dump-floor having an opening leading to the scow-berth, yielding self-closing means controlling such opening, and means for exhausting air from the inclosed scow-berth. 55
15. In a system of refuse disposal, the combination of an inclosed garbage scow-berth, an exhaust conduit leading from the berth and means for exhausting the air and gases from the scow-berth and subjecting them to heat. 60
16. In a system of refuse disposal, the combination of an inclosed garbage scow-berth, a furnace, an exhaust conduit leading from the berth and entering the furnace, and a draft-stack for the furnace. 65
17. In a system of refuse disposal, the combination of an inclosed ash scow-berth, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and entering the combined flue and chamber, means in the combined flue and chamber for separating dust from the air conveyed thereto by the exhaust-conduit, a furnace the exit-flue of which enters the combined flue and chamber, and a draft-stack from the combined flue and chamber. 70
18. In a system of refuse disposal, the combination of an inclosed ash scow-berth, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and entering the combined flue and chamber, a furnace the exit-flue of which enters the combined flue and chamber, and a fluid-screen in the depositing chamber in the path of the dust-laden air and products of combustion. 75
19. In a system of refuse disposal, the combination of an inclosed ash scow-berth, a combined furnace flue and depositing chamber, an exhaust conduit leading from the berth and entering the combined flue and chamber, a furnace the exit-flue of which enters the combined flue and chamber, and a fluid-screen and a detention wall in the depositing chamber in the path of the dust-laden air and products of combustion. 80
- In testimony whereof I have affixed my signature in presence of two witnesses. 85
- ARTHUR N. PIERSON.
- Witnesses:  
BERNARD COWEN,  
WM. ASHLEY KELLY.