(No Model.) 2 Sheets—Sheet 1.

J. J. STORER.

APPARATUS FOR AND PROCESS OF TREATMENT OF CITY REFUSE PREPARATORY TO CREMATION.

No. 538,606. Patented Apr. 30, 1895.

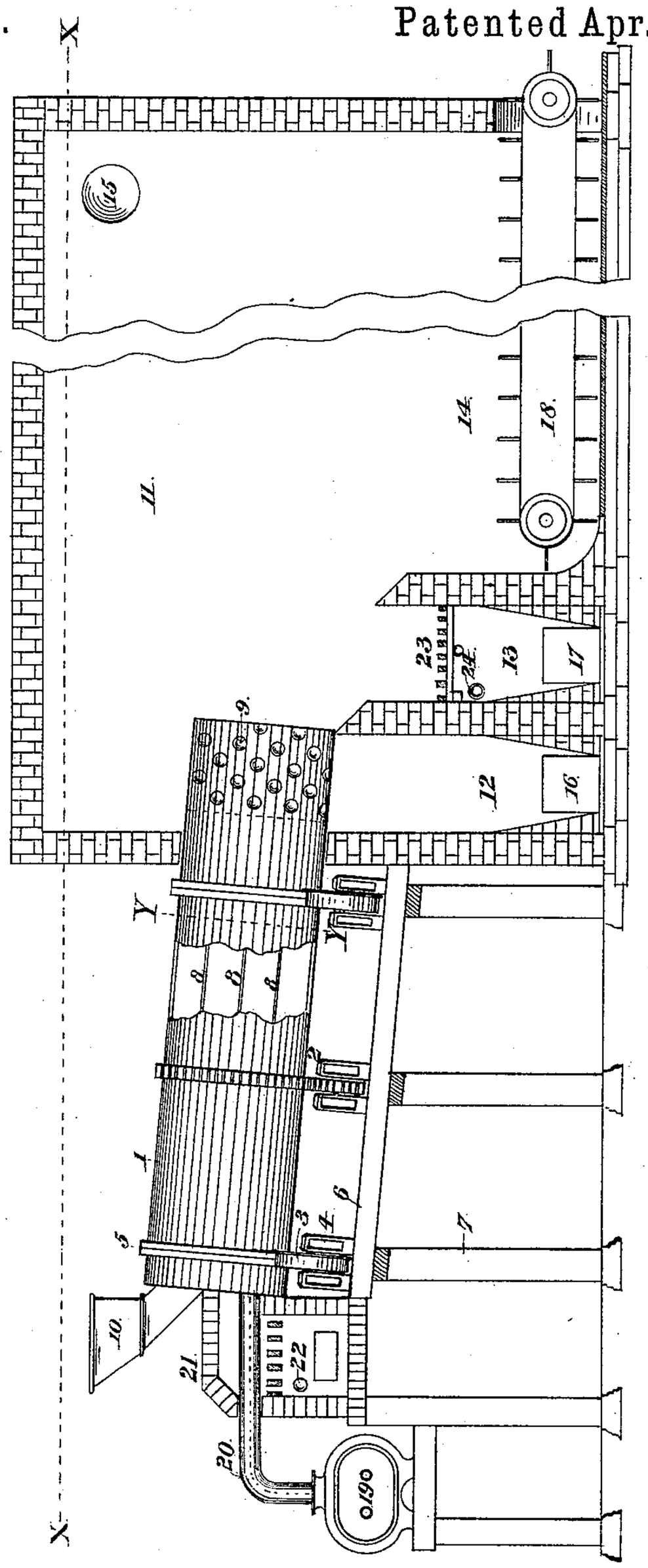

Fig. 1.

Witnesses
Frank A. Martin
James F. Shuster

Inventor:
Jacob J. Storer.

(No Model.) 2 Sheets—Sheet 2.

J. J. STORER.

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Fig. 2.

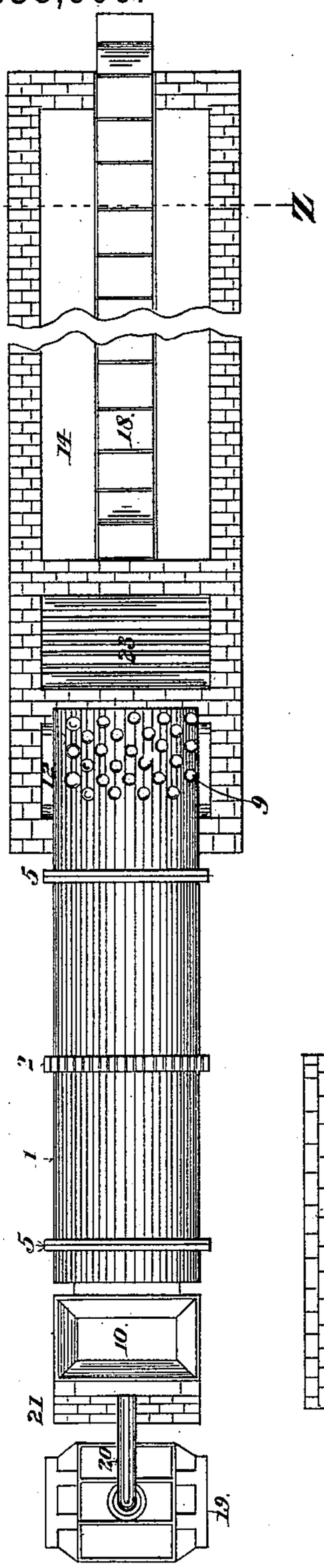


Fig. 3.

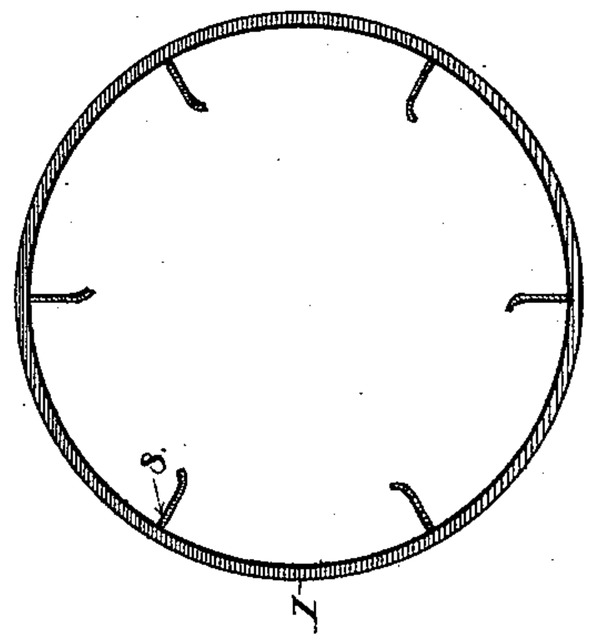
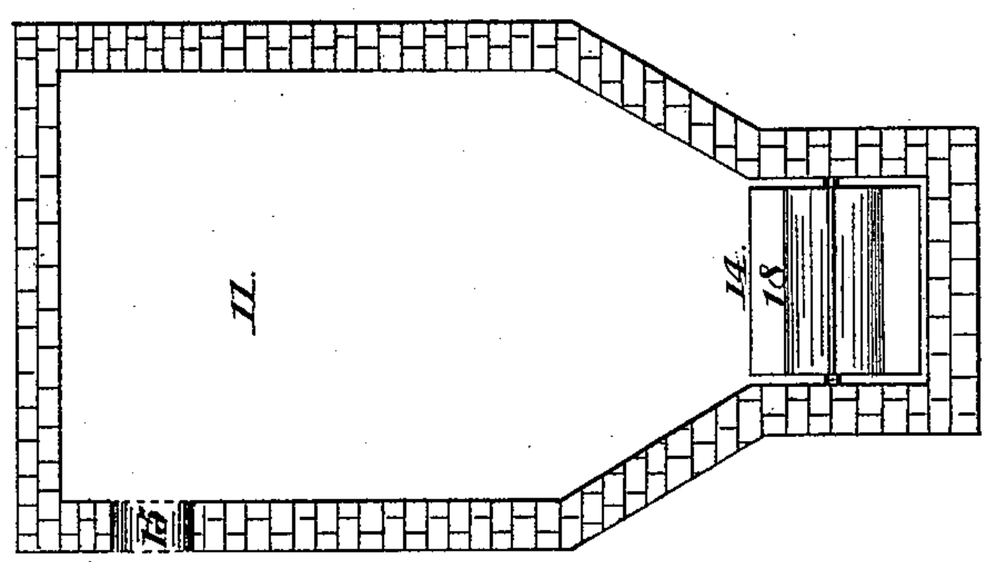


Fig. 4.



Witnesses:
Frank Mareque
James F. Chester

Inventor:
Jacob J. Storer.

UNITED STATES PATENT OFFICE.

JACOB J. STORER, OF HELENA, MONTANA, ASSIGNOR TO THE ECONOMIC-SANITARY COMPANY, OF MONTANA.

APPARATUS FOR AND PROCESS OF TREATMENT OF CITY REFUSE PREPARATORY TO CREMATION.

SPECIFICATION forming part of Letters Patent No. 538,606, dated April 30, 1895.

Application filed June 19, 1893. Renewed October 1, 1894. Serial No. 524,676. (No model.)

To all whom it may concern:

Be it known that I, JACOB J. STORER, of Helena, county of Lewis and Clarke, and State of Montana, have invented certain new and useful Improvements in Apparatus for and Process of Treatment of City Refuse Preparatory to Cremation, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the numerals of reference marked thereon.

A very serious obstacle, in most instances, to the economical and efficient treatment of city refuse by cremation, lies in the fact that the garbage—the putrescible matter—is generally permitted to be mixed with the ashes, and so mixed, they are delivered to the crematories.

In many cities the sanitary authorities find it impossible to enforce regulations requiring the deposit, in separate receptacles, of the ashes, garbage and other waste, and the result, in those places, is that garbage crematories are able to operate only with great difficulty, and rarely satisfactorily; for as ashes constitute the greater bulk of city refuse, when the mixed mass is introduced upon the fires of any cremating furnace, it extinguishes or so smothers them and retards their operation as to make the process of cremation impracticable, or at best, difficult, slow, and costly; for no method or mechanism has yet been devised for separating the bulk of the ashes clean from its mixture of garbage and other waste, preliminary to the cremation of the latter.

In the city of New York, for instance, there are annually collected about one million five hundred thousand cubic yards of ashes, and three hundred thousand of garbage, besides the street sweepings and other waste, and no attempt is made to keep them separate. Hence, without a proper preliminary treatment or manipulation of the mass, for the purpose of cleanly separating the bulk of the ashes, the whole of the one million eight hundred thousand cubic yards must be passed through the furnaces in order to cremate the three hundred thousand cubic yards of garbage and make the ashes clean enough to be safely used for land-filling purposes.

The object of this invention is to provide a suitable apparatus and process for the treatment or manipulation of city refuse preparatory to cremating the putrescible and combustible constituents thereof.

The apparatus consists of a revoluble cylinder, which is preferably circular in cross section, but may be polygonal, set at a slightly downward inclination from the receiving to the delivering end; of a pressure blower for forcing air through the cylinder; of an ashes-receiving chamber, at and about the lower end of the cylinder; and of a receptacle therein for the reception of the refuse falling from the discharging end of the cylinder; all combined and arranged substantially as shown; and it embraces certain other minor devices convenient and desirable for the most effective operation of the system.

The process consists in continuously and mechanically agitating the mixed ashes and other city refuse by lifting and dropping, and simultaneously giving it a lateral and forward or spiral movement (whereby it is made in a given time or distance to expose more surface to the air blast), while exposed to a blast of air under pressure; and in continuously collecting the air-borne portion of the refuse in one chamber or receptacle, and the heavier portion in another, whence they may be continuously removed; and it further consists in applying to the mixed ashes and other refuse, while thus agitated, a blast of air, of a temperature sufficiently high to expel most or all of the moisture from the wet ashes which may be contaminated by liquid garbage, or even to incinerate the refuse rags, paper, and other quick burning materials, and of pressure sufficient to force the ashes, separate from the heavier refuse, into the ashes receptacle.

Reference is to be had to the accompanying drawings, forming part of the specification, in which similar numerals of reference indicate corresponding parts in all of the figures.

Figure 1 represents a partly-sectional side elevation of my improved apparatus with parts broken away to exhibit other parts. Fig. 2 is a partly-sectional plan of the same on line X X, Fig. 1. Fig. 3 is an enlarged sec-

tional elevation of the revoluble cylinder on line Y Y, Fig. 1. Fig. 4 is a sectional elevation of the ashes-receiving chamber on line Z Z, Fig. 2.

The cylinder 1, which is of iron, and may be lined with some refractory material, is set at a slightly downward inclination from the upper or feed to the lower or discharging end, and is designed to be revolved, preferably, by spur gear, as indicated at 2, and is supported in position, so as to revolve with but little friction, by flanged friction wheels 3, fixed in suitable standards 4, and bearing against the peripheries of the cylinder rings 5, said standards being supported on timbers 6, beneath which are supporting piers 7. Upon the inner face of this cylinder are fixed a number of parallel, longitudinal ribs 8, converging toward the axis thereof, and designed for lifting, as the cylinder revolves, the material contained in it. The lower end of the cylinder is preferably provided with a number of perforations 9, as shown, the purpose of which will be hereinafter set forth. At the upper end of the cylinder is fixed a hopper 10, through which the mixed garbage, ashes and other refuse matter, are fed into the cylinder, as the latter revolves. The lower end of the cylinder extends into a capacious ashes-collecting chamber 11, in the bottom of which are, preferably, three receptacles or pits, *i. e.*, receptacle 12 for the reception especially of particles of coal, coke, &c., that may fall through the perforations 9, in the lower section of the cylinder; receptacle 13, for the reception of what other refuse will not be carried farther forward by the air blast; and receptacle 14, for the reception of the ashes and other substances or constituents of the refuse which may be carried there by the air current passing through the cylinder. In the upper part of this chamber 11, which is made large to permit of the expansion of the introduced air, so that the air-borne ashes, &c., may readily deposit, is an air opening 15, through which the air may escape; and the escaping air may, by means of a pipe or conductor, (not shown,) be conducted off into the open air, or into any convenient flue or smoke stack.

Material collecting in receptacles 12 and 13 may be removed therefrom by any convenient method, through openings 16 and 17 respectively, while preferably, the ashes will be continuously removed from receptacle 14 by means of a traveling conductor 18, (a chain or link conveyer being best adapted for the purpose,) that fills the space between the sloping sides of said receptacle, as best shown in Fig. 4, and extends slightly beyond the end thereof where it will continuously deliver its contents.

Though in most instances the perforations in the lower section of the cylinder and the receptacle 12 are, for the purpose stated, desirable, they may be dispensed with without departing from my invention, and in such cases, the refuse not carried by the air blast into receptacle 14, will fall into receptacle 13, from whence it may be removed for subsequent cremation, or other disposal.

In order to separate the ashes from the mass of refuse as it is tumbled about and made to move forward by the revolutions of the cylinder, a pressure blower 19, is set near the rear or feed end of the cylinder, with its exit pipe 20 entering the end thereof below the feed hopper 10, as best shown in Fig. 1. Cold air drawn from the surrounding atmosphere, or heated air drawn from any convenient source, may be forced into the cylinder by the said blower; a supply of hot air being most desirable when the ashes and other refuse are wet by exposure to rain, or by an excess of liquid garbage. In many cities and towns the collection of the refuse is often suspended for two or three days at a time during rainy weather, and then every effort is made for a rapid gathering and disposal of the accumulated matter. As no accumulation of the refuse should, for sanitary reasons, be permitted at a crematory, their furnaces and apparatus should be competent to handle, on such occasions, this excess of material as fast as received. To meet such extra demands upon the capacity of the ashes separator, I construct a fire-place 21, at the feed end of the cylinder, for furnishing supplementary heat to the air passing through blower pipe, and if deemed necessary I apply an air blast up through the fire through pipe 22. (The fire-place 21 and pipe 22 may be dispensed with when a cold blast is applied by the blower 19;) and a further advantage is secured by setting a dumping and shaking grate 23, in the receptacle 13, upon which grate the material not carried out of the cylinder by the blast shall fall, and a blast of air through pipe 24, will operate to still more thoroughly separate the ashes from the heavier matter which may intermittently be dumped into the receptacles below, whence they may be removed for subsequent cremation; and preferably they would be removed, while still hot, continuously, by a conveyer into the cremating furnace.

It will be seen that the refuse introduced into the feed end of the inclined cylinder, as the latter revolves, whether the cylinder be of circular cross section and provided with inward-projecting ribs, as shown, or whether it be of polygonal cross section, must be continuously lifted and dropped and simultaneously given a lateral and forward or spiral movement. It is evident also that a blast of cold air forced under sufficient pressure through the cylinder from the feed end, will partially dry, and carry the dried ashes, paper, rags, and other so-called "paper-stock" materials, into the ashes-collecting chamber, whence they may be continuously removed by a proper conveyer, while the heavier constituents of the refuse will drop from the lower end of the cylinder into a separate receptacle.

A blast of air of a sufficiently high temperature and pressure, such as may easily be obtained, applied to the agitated mass of material in the cylinder, may, especially if supplemented by the products of combustion from the fire-place, be made to dry the wet street sweepings, ashes and garbage, and even to incinerate most if not all of the paper, rags and other quick burning material, and to blow their ashes into the ashes-collecting chamber, and a further drying and separation of the residuum falling from the discharge end of the cylinder, may be affected on the grate located beneath, by means of a hot or cold blast applied from below.

By this simple apparatus and process the fifty per cent. to seventy-five per cent. of the city refuse which does not require to be cremated may be cleanly separated from the residuum, which will thereby be put in best condition for inexpensive, rapid and complete cremation.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The apparatus, substantially as shown and described, for the treatment or manipulation of city refuse preparatory to the cremation of its putrescible constituents, consisting of the following elements; a revoluble cylinder for receiving and agitating the mixed refuse; a pressure blower for forcing air through the cylinder; an ashes-receiving chamber at the lower end of the cylinder; and a receptacle for the heavier refuse matter discharged from the cylinder; all arranged as set forth.

2. As a means for separating the ashes and other light constituents from the heavier portions of city refuse, the combination with a revoluble cylinder set at a downward inclination from the feed to the discharge end, and provided with interior ribs, of a hopper for the introduction of the mixed refuse into the cylinder; a fire-place at the feed end of the cylinder; a pressure blower for forcing a blast of hot air through the cylinder; an ashes-receiving chamber for the collection of the ashes and other light substances forced through the cylinder by the hot air blast; a receptacle provided with a shaking and dumping grate, located at the discharge end of the cylinder for the reception of the heavier portions of the refuse falling from the cylinder, and a blast pipe beneath said grate; all arranged and operated as set forth.

3. The process, substantially as described, for the preliminary treatment or manipulation of city refuse, consisting in applying to the mixed ashes and other refuse, while being introduced, lifted, dropped and simultaneously given a lateral and forward or spiral movement in a suitable vessel, a continuous blast of air under pressure, whereby the lighter constituents are continuously separated and removed from the heavier constituents of the refuse, and air-borne into a collecting chamber, whence they are continuously removed by suitable conveyer while the heavier constituents are continuously deposited in a separate receptacle.

4. The process, substantially as described, for the preliminary treatment or manipulation of city refuse, consisting in applying to the mixed ashes and other refuse, while being introduced, lifted, dropped, and simultaneously given a lateral and forward or spiral movement in a suitable vessel, a continuous blast of hot air under pressure, whereby the lighter constituents are continuously dried, separated and removed from the heavier constituents of the refuse, and air-borne into a collecting chamber, whence they are continuously removed by suitable conveyer while the heavier constituents are continuously deposited in a separate receptacle, as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, in the presence of two witnesses, this 13th day of June, 1893.

JACOB J. STORER.

Witnesses:

FRANK MARTIN,

JAMES F. CHESTER.