No. 755,662. PATENTED MAR. 29, 1904.

E. E. HILL.

GARBAGE CREMATORY.

APPLICATION FILED JUNE 10, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

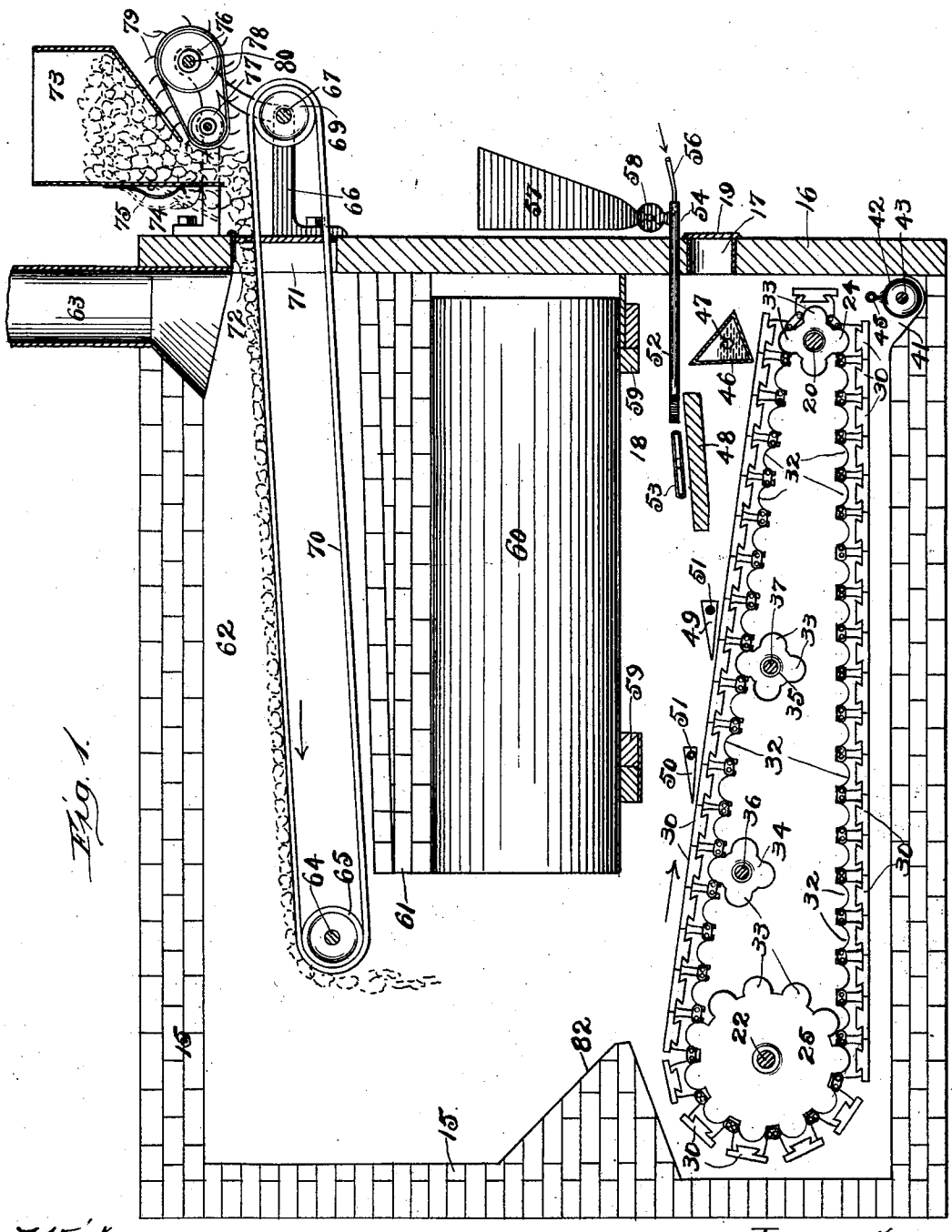

Fig. 1.

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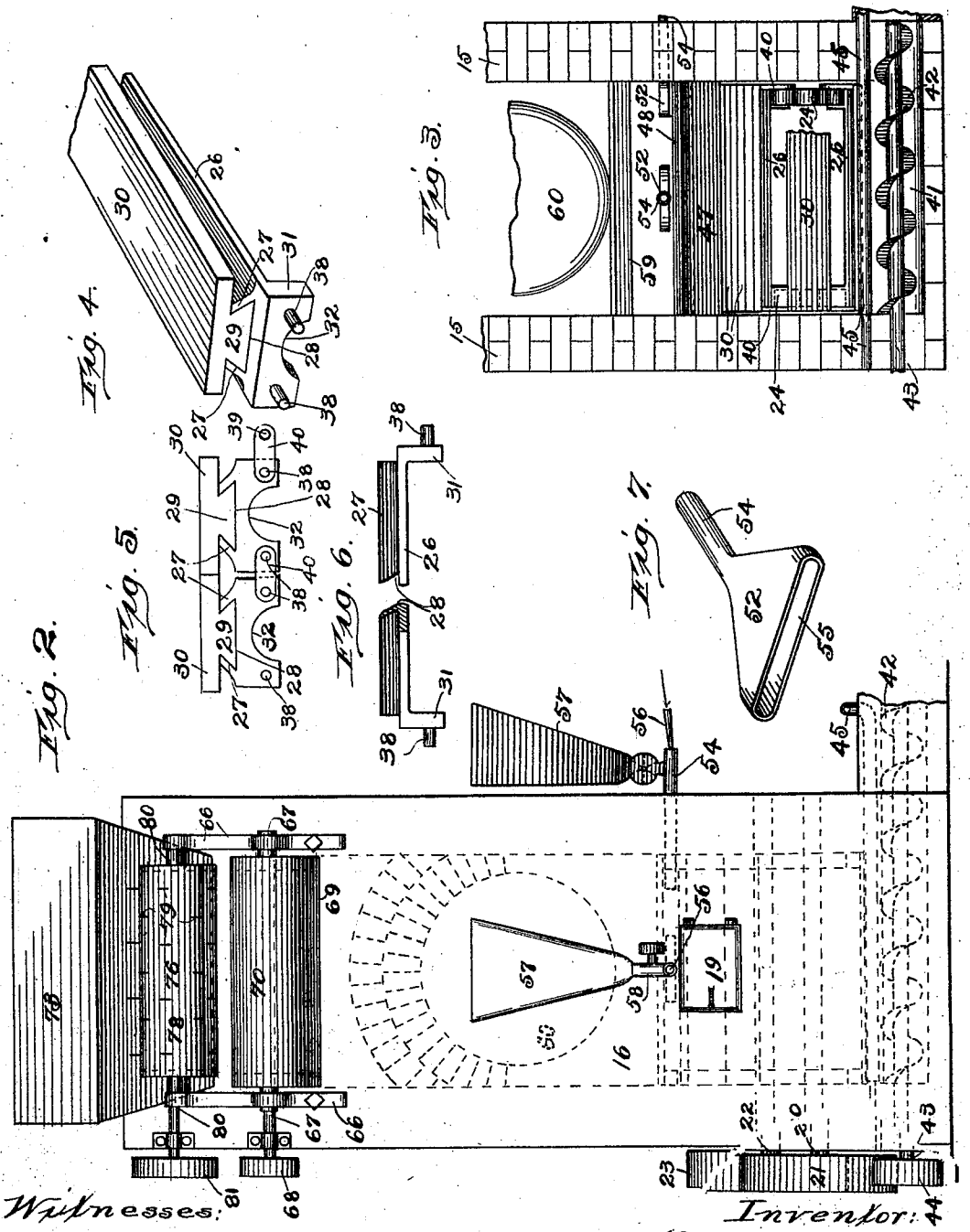

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UNITED STATES PATENT OFFICE.

EDWARD E. HILL, OF CHICAGO, ILLINOIS.

GARBAGE-CREMATORY.

SPECIFICATION forming part of Letters Patent No. 755,662, dated March 29, 1904.

Application filed June 10, 1903. Serial No. 160,841. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. HILL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Garbage-Crematories, of which the following is a specification.

This invention relates to improvements in an apparatus to be used for consuming garbage and other refuse matter and for utilizing the heat generated by the consumption of the garbage for heating water and producing steam in a boiler; and it consists in certain peculiarities of the construction, novel arrangement, and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The principal object of the invention is to provide an apparatus for the consumption and destruction of garbage and refuse matter as it is taken from the garbage-wagons or without it having been previously prepared for burning, which shall be of such a construction and operation that the heat generated from the burning of the garbage in the lower part of the furnace will be utilized for drying the refuse matter as it enters the upper part of the furnace, and the heat may also be utilized for heating water or generating steam in a boiler located in the furnace.

A further object of the invention is to so construct and arrange parts of the apparatus as to facilitate the burning of the garbage by causing its position to be shifted as it is carried into the retort by a traveling grate and at the same time to inject into the retort air under pressure laden with finely-comminuted coal or coal-dust.

A still further object of the invention is to provide means for sprinkling or spraying and removing the ashes from the furnace.

Other objects and advantages of the apparatus will be disclosed in the subjoined description and explanation.

In order that the invention may be fully understood by those skilled in the art to which it pertains, I will now proceed to describe the same, referring to the accompanying drawing, in which—

Figure 1 is a vertical sectional view of a crematory embodying my invention, showing some of the parts in elevation. Fig. 2 is a front view in elevation of the apparatus. Fig. 3 is a front view of the lower portion of the furnace with the front wall thereof removed. Fig. 4 is a detached perspective view of a portion of the traveling endless grate. Fig. 5 is an end view of a portion of said grate. Fig. 6 is a side view of one of the grate-bars, showing it shortened for the convenience of illustration; and Fig. 7 is a perspective view of one of the coal-dust feeders or blowpipe-nozzles.

Like numerals of reference refer to corresponding parts throughout the different views of the drawings.

The reference-numeral 15 represents the walls of a furnace, which may be of any suitable size, form, and material, but preferably of brick and rectangular in shape, as shown in the drawings. The front 16 of the furnace is provided in its lower portion with an opening 17 for the passage of fuel used in starting the fire in the retort 18 or front lower portion of the furnace, which opening is closed by a door 19, suitably hinged to the front thereof. Transversely journaled in the side walls of the furnace at its front end is a shaft 20, on one end of which is mounted a pulley 21, and similarly journaled in said walls near their rear ends is another shaft 22, which carries on one of its ends a pulley 23, as is clearly shown in Figs. 1 and 2 of the drawings. Mounted on the shaft 20 within the furnace near each of its side walls is a sprocket-wheel 24, and mounted on the shaft 22 within the furnace and near each of its side walls is a sprocket-wheel 25, which wheels engage and carry the endless grate, as will be presently explained. This grate comprises a series of transverse bars 26, each of which has on its upper surface a pair of parallel ribs 27, inclined toward each other at their tops, so as to form a dovetailed groove 28 to receive the correspondingly-shaped projections 29 on the lower surface of each of the slabs or bars 30, which may be made of any suitable material, but are preferably formed of fire-clay to render them more durable. The ends of each of the bars 26 are formed or provided with downward extensions 31, each of which is provided

with a curved recess 32 in its lower edge to receive the projections 33 on the sprocket-wheels 24 and 25, as well as those on the idlers 34 and 35, which are mounted on shafts 36 and 37, respectively, which shafts are transversely journaled in the side walls of the furnace between the shafts 20 and 22, as is clearly shown in Fig. 1 of the drawings. Projecting outwardly from each of the extensions 31 on the bars 26 are pins 38, used to enter openings 39 in links 40, employed to loosely connect the bars 26 together. When the said bars are thus united at their ends and placed in position on the wheels 24 and 25, which are arranged in pairs at the front and rear portions of the furnace, it is apparent that the projections or sprockets 33 on said wheels, as well as those on the idlers 34 and 35, will engage the recesses 32, thus causing the endless grate, when said wheels are rotated, to travel at its upper portion in the direction of the front of the furnace. As this grate when its parts are united together as above stated will be quite heavy, the idlers 34 and 35, which are located in pairs on the shafts 36 and 37, respectively, will support its upper portion, so as to prevent its sagging. The lower front portion of the furnace is formed with a transverse depression or trough 41, to be used as an ash-pit, from which the ashes will be conveyed by means of a worm 42, located in said trough, the shaft 43 of said worm being suitably journaled and having on one of its ends a pulley 44, to which power may be applied for operating the worm. Located parallel with the worm and above the same is a water-pipe 45, which leads to a source of water-supply and may be provided with a series of openings for the discharge of water in sprinkling or spraying the ashes, for which purpose the said pipe is employed. Located transversely between the side walls of the furnace just above the front portion of the grate is a water-front 46, which is preferably triangular in cross-section, as shown in Fig. 1, and is supplied with water through a pipe 47, which communicates at its other end with a source of water-supply. (Not shown.) Horizontally secured between the side walls of the furnace and located to the rear of the water-front 46 is a retort-plate 48, which may be of any suitable material, and is slightly rearwardly inclined, as shown. Transversely located between the side walls of the furnace and in parallelism with one another are water-receptacles 49 and 50, each of which has communicating therewith a pipe 51, leading to a source of water-supply, and said receptacles are located just above the upper portion of the grate and have their rear edges angular, as shown, so that as the grate travels toward the front portion of the furnace the garbage thereon will be lifted therefrom by means of said water-receptacles, thus causing the garbage to be stirred or its positions shifted in order that the coal-dust and air which is discharged through one or both of the feeders 52 and 53, and which dust is ignited on the retort-plate 48, to permeate or be incorporated with the garbage, thus causing its consumption. Each of the feeders 52 and 53 comprises a tubular portion 54, which is located in and extends through the furnace, and a flattened open portion 55, which lies in a horizontal plane above the retort-plate. In the outer end of each of the tubular portions 54 of the feeders or blowpipe-nozzles is secured a tube or pipe 56, which communicates with a supply of air under pressure. Located above each of the tubular portions 54 and communicating therewith is a hopper 57, in the lower portion of which is located a rotary star-feed 58 for supplying the coal dust or powder to the tube 54, from which it is forced through the feeder 52, and thereby discharged with great force in a sheet-like form. By supplying the receptacles 46, 49, and 50 with water it is apparent that they will be protected against the heat of the retort, and, besides, if it be desired, they may be used for heating water for any desired purpose. Located on suitable transverse supports 59 between the walls of the furnace is a boiler 60, which may have water-supply pipes and steam-outlet pipes communicating therewith. Located above the boiler is a horizontal wall or partition 61, which, together with the top of the furnace, forms a channel or passage-way 62 for the smoke and gases, which are conducted from the furnace through a flue 63 in the front upper portion thereof. Transversely journaled in the rear portion of the side walls of the furnace near the rear end of the partition 61 is a shaft 64, on which is mounted a roller or drum 65. Journaled on suitable brackets 66 at the front end of the furnace is a shaft 67, which has on one of its ends a pulley 68, to which power may be applied for driving the same. Mounted on the shaft 67 is a roller 69, over which and the roller 65 passes an endless conveyer 70, which passes through an opening 71 in the upper portion of the furnace. Pivotally secured at the upper end of the opening 71 is a door 72, which swings inwardly when in contact with the garbage or material on the conveyer 70, but will normally hang vertically, so as to close the opening 71, as is apparent. Suitably mounted at the front of the furnace is a hopper 73 for holding the garbage, which hopper has its lower end open and its rear portion provided with a yielding door 74, which is pressed by a spring 75 to normally contract the opening in the hopper, yet will allow the door 74 to yield sufficiently to permit of the free passage of the garbage therefrom. Suitably journaled below this hopper are two rollers 76 and 77, over which passes a belt or conveyer 78, which is provided with a series of teeth 79, used to engage the garbage and cause it to pass from the hopper 73 onto the conveyer 70. The

outer end of the shaft 80, on which the roller 76 is mounted, is provided with a pulley 81, to which power may be applied for operating the picker-belt 78, as is obvious. The rear wall of the furnace is preferably provided with an inwardly and downwardly inclined extension 82 to cause the garbage as it falls from the conveyer 70 to pass therefrom to the upper surface of the grate.

By applying power by any suitable means to the various pulleys above mentioned it is evident that the picker-belt 78 will release or assist in discharging the garbage from the hopper 73, from which it will pass to the conveyer 70, by means of which it will be carried through the channel or passage-way 62 to the rear end of the partition 61, from which point it will be discharged from the conveyer, so as to be caused to fall on the grate, which, as before stated, travels at its upper portion toward the front of the furnace. In this operation the garbage will be subjected to the fire in the retort, which may be started by placing a quantity of waste or other material on the retort-plate 48 and igniting the same, when by forcing air through one or both of the feeders 52 the coal-dust from the hoppers 57 will be discharged over the plate 48 and ignited thereon, thus producing intense heat, to which the garbage is subjected. As the heat passes from the retort to the rear of the boiler and through the channel 62 to the outlet-flue the garbage on the conveyer 70 will be dried thereby, so as to be in good condition for consumption by the flames when it reaches the grate. In the forward movement of the upper portion of the grate if any unconsumed portions of the garbage should pass the plate 48 it will be checked until it is burned by reason of the water-front 46, which is used for this purpose as well as for heating the water. From the front of the grate the ashes will fall into the trough 41 and be conveyed therefrom by means of the conveyer 42, as before explained. The star-feeds 58, used in the lower portion of the hoppers 57, may be of the ordinary or any well-known type and may be driven in any suitable manner.

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

1. In a garbage-crematory, the combination with a furnace having an inlet for the garbage and an outlet for the smoke and gases, of a forwardly-movable endless grate located in its lower portion, a feeder for comminuted material and air located in the front part of the furnace just above the grate, means to hold and supply comminuted material to the feeder, and means to force air under pressure through the feeder, substantially as described.

2. In a garbage-crematory, the combination with a furnace having an inlet for the garbage and an outlet for the smoke and gases, of a forwardly-movable endless grate located in its lower portion, a plurality of feeders for comminuted material and air located in the front part of the furnace just above the grate, means to hold and supply comminuted material to the feeders, and means to force air under pressure through the feeders, substantially as described.

3. In a garbage-crematory, the combination with a furnace having an inlet for the garbage and an outlet for the smoke and gases, of a forwardly-movable endless grate located in its lower portion, a feeder for comminuted material and air located in the front part of the furnace just above the grate, a water-front located transversely in the lower front portion of the furnace, a supply-pipe communicating with said water-front and with a source of water-supply, means to hold and supply comminuted material to the feeder, and means to force air under pressure through the feeder, substantially as described.

4. In a garbage-crematory, the combination with a furnace having an inlet for the garbage and an outlet for the smoke and gases, of a forwardly-movable endless grate located in its lower portion, a feeder for comminuted material and air located in the front part of the furnace above the grate, means to hold and supply comminuted material to the feeder, means to force air under pressure through the feeder, a water-front transversely located in the front lower portion of the furnace, water-receptacles transversely located in the furnace near the upper surface of the grate, and means to supply said receptacles, and water-front with water, substantially as described.

5. In a garbage-crematory, the combination with a furnace having an inlet for the garbage and an outlet for the smoke and gases, of a forwardly-movable endless grate located in its lower portion, a plurality of feeders for comminuted material and air located in the front part of the furnace above the grate, means to hold and supply comminuted material to the feeders, means to force air under pressure through the feeders, a retort-plate transversely located in the furnace between the feeders and grate, a water-front transversely located in front of said plate, and water-receptacles transversely located in parallelism with one another in the furnace near the upper surface of the grate, substantially as described.

6. In a garbage-crematory, the combination with a furnace having in its lower front end a transverse depression and in its upper portion a horizontal partition to form a channel between said partition and the top of the furnace, said furnace having an inlet for the garbage and an outlet for the smoke and gases, of a forwardly-movable endless grate located in its lower portion, a worm located in said transverse depression, and means located above

the partition and extending through the inlet to convey garbage rearwardly through said channel, substantially as described.

7. In a garbage-crematory, the combination with a furnace, having an inlet for the garbage and an outlet for the smoke and gases and provided with a horizontal partition in its upper portion to form a channel between said partition and the top of the furnace, of a forwardly-movable endless grate located in its lower portion, a rearwardly-movable endless conveyer located in the channel above the partition and extending through the inlet, and means located above said conveyer to hold and supply garbage thereto, substantially as described.

8. In a garbage-crematory, the combination with a furnace having a horizontal partition in its upper portion and provided with an inlet for the garbage and an outlet for the smoke and gases, of a forwardly-movable endless grate located in its lower portion, a feeder for comminuted material and air located in the front part of the furnace just above the grate, means to hold and supply comminuted material to the feeder, means to force air under pressure through the feeder, a rearwardly-movable conveyer located above the said partition and extending through the inlet of the furnace, means to hold and supply garbage to the conveyer, substantially as described.

9. In a garbage-crematory, the combination with a furnace having a horizontal partition in its upper portion and provided with an inlet for the garbage and an outlet for the smoke and gases above said partition, of a forwardly-movable endless grate located in its lower portion, a feeder for comminuted material and air located in the front part of the furnace just above the grate, means to hold and supply comminuted material to the feeder, means to force air under pressure through the feeder, a water-front transversely located in the front portion of the furnace above the grate, a conveyer located above the partition and extending through the inlet for the garbage, and means to hold and supply garbage to the conveyer, substantially as described.

10. In a garbage-crematory, the combination with a furnace having an inlet for the garbage and an outlet for the smoke and gases and provided with a horizontal partition in its upper portion, of a forwardly-movable endless grate located in its lower portion, a feeder for comminuted material and air located in the front part of the furnace just above the grate, means to hold and supply comminuted material to the feeder, and means to force air under pressure through the feeder, a water-front transversely located in the front portion of the furnace above the grate, a retort-plate located between the feeder and grate, water-receptacles transversely located near the upper surface of the grate and in parallelism with one another, a rearwardly-movable conveyer located in the channel above the partition and extending through the garbage-inlet, and means to hold and supply garbage to the conveyer, substantially as described.

11. In a garbage-crematory, the combination with a furnace having in its lower front portion a transverse depression and in its upper front part an inlet and an outlet, said furnace being provided with an internal horizontal partition, of a boiler located in the furnace below said partition, a worm located in the said depression, a perforated pipe located above said worm, a forwardly-movable endless grate located in the lower portion of the furnace, a feeder for comminuted material and air located in the front part of the furnace just above the grate, means to hold and supply comminuted material to the feeder, means to force air under pressure through the feeder, means located above the partition and extending through the inlet to convey garbage to the rear of the partition and boiler, substantially as described.

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