

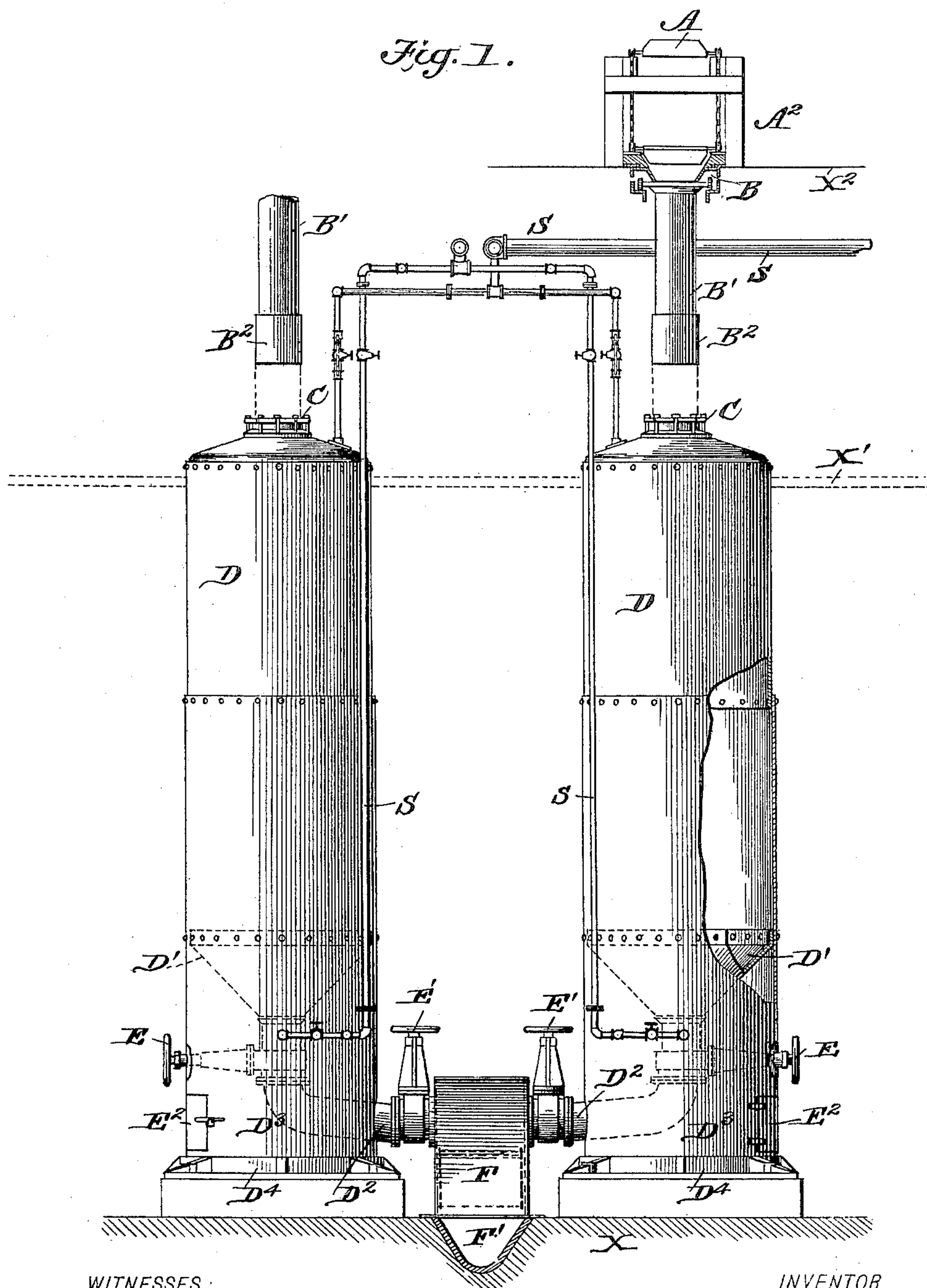
(No Model.)

4 Sheets—Sheet 1.

C. EDGERTON.
APPARATUS FOR TREATING GARBAGE.

No. 599,229.

Patented Feb. 15, 1898.



WITNESSES:

W. S. Blouall
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Charles Edgerton.

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ATTORNEYS.

(No Model.)

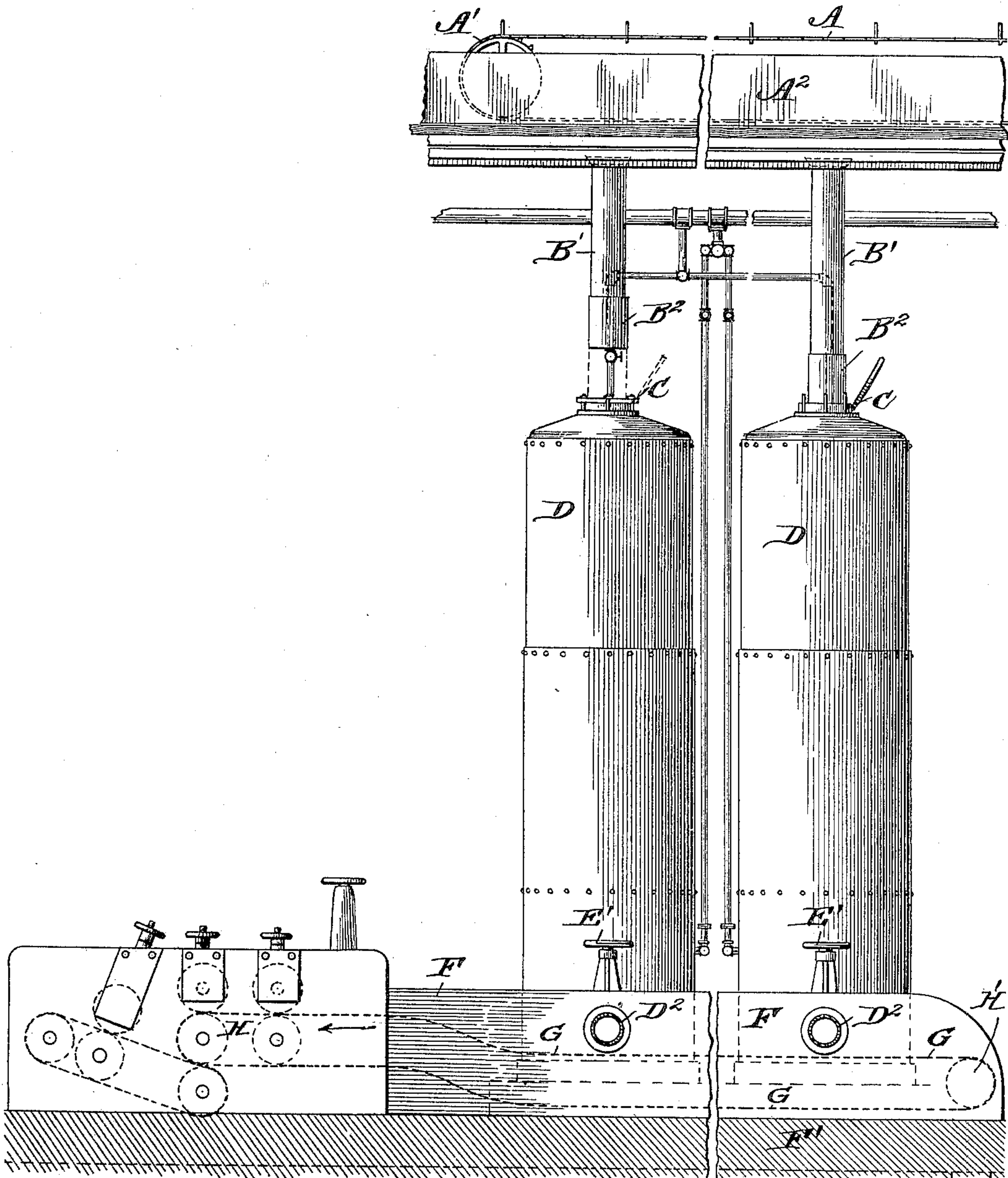
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Fig. 2.



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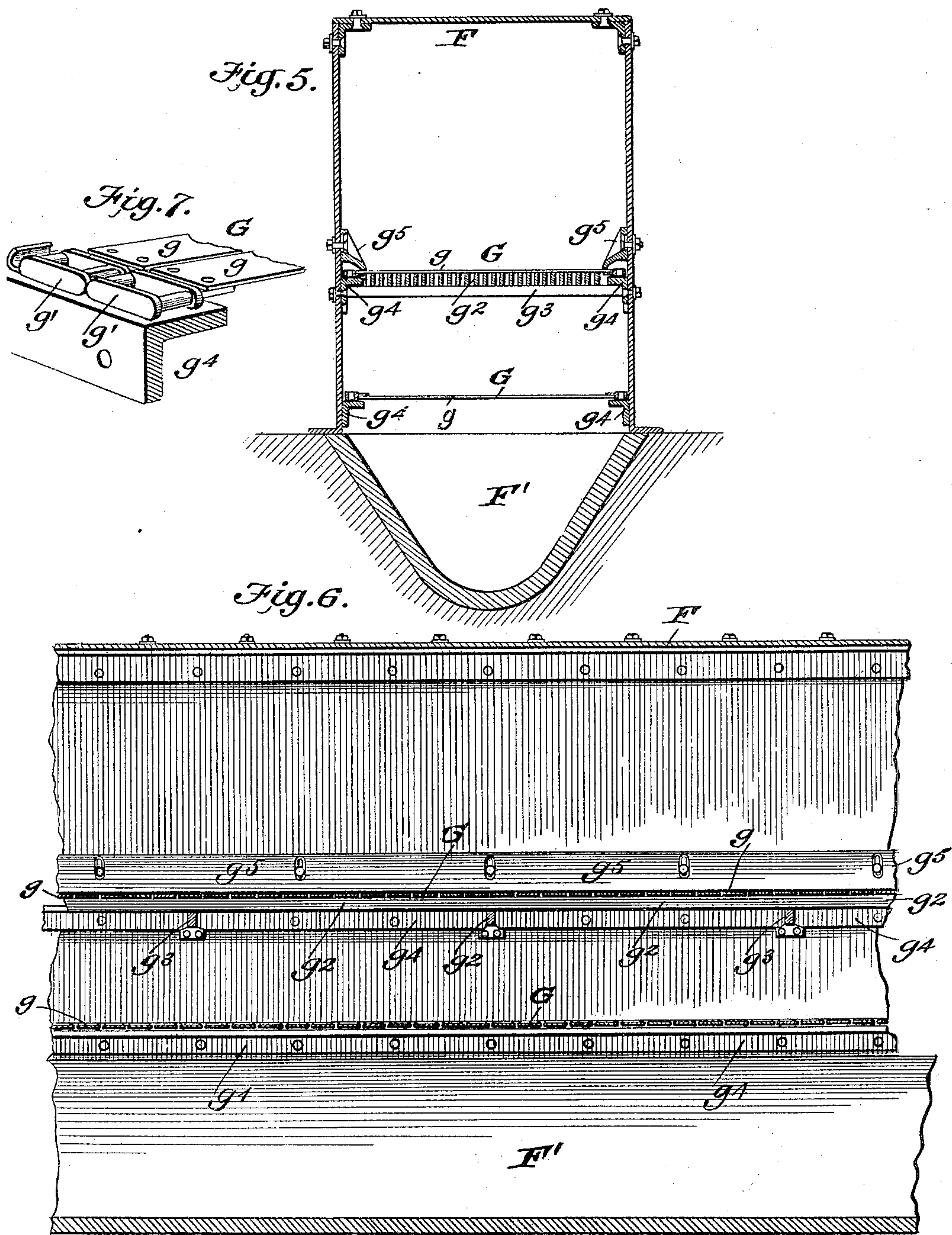
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UNITED STATES PATENT OFFICE.

CHARLES EDGERTON, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR TREATING GARBAGE.

SPECIFICATION forming part of Letters Patent No. 599,229, dated February 15, 1898.

Application filed July 23, 1897. Serial No. 645,736. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EDGERTON, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Treating Garbage, of which the following is a specification.

My invention relates to that method of rendering or reducing kitchen-garbage, slaughter-house refuse, or like material in which said material is first cooked by steam and then subjected to pressure to separate the oils and liquid matter, of which the oils or grease form a valuable product used for soap-making and various other commercial purposes, and then drying and disposing of the solid matters, commonly called "tankage," and which are used in the manufacture of fertilizers. As ordinarily carried out this process involves the use of two or more large digesters. In a large city from fifty to one hundred (50 to 100) digesters are required, each of which, as ordinarily constructed, is five to six feet in diameter and from twelve to eighteen feet in height, made of plate metal, as vertical cylinders, and having valved charging-openings in the top to receive the material to be treated from an endless conveyer and having a conical or hopper-shaped lower end, with valved outlet, through which the cooked material in the form of slush is discharged into a subjacent receptacle. This form of digester is suspended by lugs riveted to the digester along its sides, so as to leave its lower conical end suspended and accessible for discharging into adjacent tanks or into hoop-presses, as arranged in some cases. These digesters when loaded are very heavy, and a strong and expensive framework of steel or heavy timber has to be built, upon which the digesters hang by means of these lugs, which involves a special and expensive organization of the building. The sloppy nature of the cooked material and the heterogeneous character of the same make the process of pressing it a difficult matter. Where pressed in hoops, it has been found to be impossible to satisfactorily reduce the percentage of moisture contained therein. Where pressed in cloths and racks in the ordinary manner and in the open air, while the results as to moisture contained in the pressed material are satisfactory the de-

struction of the racks and cloths occasioned by hard substances—such as bones, glass, and crockeryware—is very great, and the sloppiness and the constant escape of vapor from it make the process expensive, unsanitary, and objectionable. These processes of pressing are necessarily intermittent in their operation, and consequently tedious and unsatisfactory. A continuous and rapid process carried forward in a sealed chamber is very desirable. My invention is designed to meet these requirements; and to that end it consists of a special construction and arrangement of digester and its combination with discharging devices, whereby the digester is sustained upon its own base, not being suspended high in the air, with the expensive system of construction required, and also, further, in combination with the digesters and their discharging devices, of a continuous roller-press, whereby the operation of pressing is rendered cleanly, rapid, effective, and sanitary, as will be hereinafter fully described with reference to the drawings, in which—

Figure 1 is an elevation of two series of digesters and their discharging devices between them, parts being shown in section. Fig. 2 is a side elevation of the series of digesters, showing the cooked-garbage carrier and roller-press, only the two end digesters being hereshown, but it being understood that there are others between them, the number depending upon size of plant. Fig. 3 is an enlarged vertical longitudinal section of the expressing devices. Fig. 4 is a transverse section of the same on line 4 4 of Fig. 3. Figs. 5 and 6 are enlarged sectional views of the cooked-garbage carrier, Fig. 5 being a vertical transverse section and Fig. 6 a vertical longitudinal section; and Fig. 7 is a detail perspective of a part of the steel belt of the said carrier.

Referring to Figs. 1 and 2, X represents the floor of the reduction plant, which is an ordinary floor suitably reinforced with a foundation of concrete or masonry to sustain directly the weight of the digesters.

X' is an upper floor or level near the charging ends of the digesters, and X² a still higher level, upon which the material is delivered. This material is delivered to an endless-chain conveyer A, passing around sprocket-wheels A', within a trough A², the material being

dragged by the lower flight of wings on the conveyer along the bottom of the trough A² and delivered through valved openings B into suspended pipes B', which have extensible sleeves B², by which they may be connected to the charging-inlets C of any one of the digesters D, where it is cooked by steam admitted through pipes S.

As so far described there is no novelty in this arrangement of devices. The digester is formed with a conical downwardly-converging or hopper-shaped bottom D', as usual; but instead of having the digester suspended, with its lower outlet end elevated or unsupported, I extend the outer cylindrical walls of the digester down below the conical bottom D', as shown at D³, and provide for each one an individual basic support D⁴. This avoids the great expense of a steel superstructure for suspending the digesters, avoids all vibration incident to that construction when steam is turned on, gives a strong individual basic support for each, and completely houses and incloses, air-tight, if needs be, the lower ends of the digesters, with their valves and connections, which are apt to leak when in operation.

For the purpose of properly discharging the cooked material from the digester I have connected with the conical bottom of the digester a large pipe D², which has in its vertical portion a gate-valve E, and which pipe is then bent at a proper angle and emerges laterally from the basic skirt D³ of the digester, and has another gate-valve E' opening laterally into an extended horizontal trunk or receiver F, which trunk takes the place of the subjacent receiving-tank ordinarily required for this purpose. This trunk or receiver contains a horizontal endless traveling belt G, which passes at one end around one of the rollers H of my continuous roller-press and around another roller H' at the other end, the two valves E and E' being successively opened or closed to permit of the definite regulations of the discharge and the tight closing of the digesters. The endless belt is designed to receive and carry the cooked material to the press, and the liquids, as they drip from this belt and are expressed from the press, are received into a subjacent drain F', running horizontally beneath the belt throughout its length, and these liquids are taken off from the lower end of this drain at any suitable point, as at F², Fig. 2, and the grease and oils separated from the aqueous liquids and utilized by special process.

E² are doors formed in the lower skirt portion D³ of the digester for giving access to the same for cleaning purposes or repair of the pipes and valves. Any number of these series of digesters, in connection with intermediate discharging, receiving, and conveying devices, may be used, depending upon the size of the plant.

The digesters, it will be seen, are discharged onto the belt G in the trunk F, where this belt is made to act as a filter-bed as well as a

carrier, and as it moves on to the rotary press, which also is housed within a casing, all the odors and slop of the garbage through the entire operation of reduction are perfectly housed and retained and the operation rendered cleanly and sanitary.

The garbage of a city is so heterogeneous in its nature, comprising many things which are refractory to the pressing operation—such as broken pieces of glass and crockery ware, knives, forks, metal toys, &c.—that it has been necessary to devise a special form of press and filter to meet the conditions of pressing and filtering such material without quickly destroying the pressing devices, and I have devised a special form of filter and press, of which the discharge belt or carrier forms a part and which I will now proceed to describe.

At one end of the trunk or casing F, and in open communication with it, there is (see Fig. 3) an enlarged casing M, containing my continuous roller-press. This is composed partly of the endless carrier-belt G and partly of a set of crushing-rolls and expressing devices, as hereinafter described.

The belt G is made in a peculiar way (see Figs. 5, 6, and 7) especially adapted to the uses of my invention. Its body portion is made of transverse steel bars or slats *g* one-eighth of an inch thick, Fig. 7, connected together at their ends by chain-links *g'* and separated a little distance apart. These chains run along upon flanged guide-tracks *g⁴*, secured to the sides of the trunk F, and the upper run of the belt is sustained all along its length and all the way across its width by a series of longitudinal parallel bars *g²*, (see Fig. 5,) spaced a little distance apart and forming a subjacent support for the metal bars *g* of the belt to enable them to sustain the weight of the cooked garbage delivered upon the bars without bending down or sagging. These longitudinal supporting-bars are in turn supported by cross-bars *g³*, extending across from side to side of the trunk.

Along the upper edges of the belt G there are guard-flanges *g⁵*, bolted to the sides of the trunk and extending longitudinally along and slightly overlapping the edges of the belt, so as to keep the garbage from getting into and clogging the links of the chain. This belt not only acts as a carrier for the garbage, as before described, but it forms in transit a drainage and filtering table for the garbage carried, so that a large portion of the liquids flow down between the bars *g* and *g²* into the drain F' before reaching the pressing-rolls.

As the belt passes into the casing of the roller-press (see Figs. 3 and 4) its upper run passes onto a rigid and strong metal table I', then between the rolls I I², then between rolls H and H², and passing down around H returns into the trunk F again. This belt is driven by the roll H, on whose ends are sprockets *h*, Fig. 4, which engage with the links of the chain on the belt to propel it.

The roll H is rigidly fixed to a main drive-shaft operated by a band-pulley H⁵ and is positively geared by intermeshing cog-wheels H⁶ H⁷ to the upper roll H². Similar gears (not shown) are provided for the other rolls of the press. The roll I² has a corrugated surface, and I is plain or smooth. Both are made of iron or steel, and the table I' has a concaved and tapered edge next to rolls I I², that leads the belt in between these rolls as far as practicable to the point of effective compression between the rolls. The object of these two rolls I I² is to crack and break up bones, pieces of glass, crockery, metal articles, &c., for which purpose the corrugations on the roller are necessary in order to draw into range of effective crushing action these solid articles instead of allowing them to slide in their greasy condition in the throat of the rollers. The table I' is to make the belt solid against being bent by such articles as they enter the rolls. Just before the garbage reaches the first pair of rolls it is leveled or scraped off to a uniform thickness by a vertically-adjustable gate J, which is raised and lowered by a screw-shaft and hand-wheel and serves to regulate the feed of the garbage to the rolls. The rolls H H², constituting the second pair, have both smooth peripheries, are made of iron or steel, and are designed to crush to a fine comminution any of the solid bodies preliminarily crushed by the rolls I I², so that said solid substances cannot exert any destructive influence upon the filtering and expressing devices hereinafter described. Each roller I² and H² is journaled in vertically-adjustable boxes and are moved closer to or farther from their companion rolls by screw-shafts and hand-wheels I⁴ H⁴. These rolls I² H² also have scrapers I³ H³ for dislodging from their peripheries any adhering matter that may fail to drop off. As the garbage leaves the rollers H H² it is reduced to a fairly homogeneous consistency, and a large portion of the liquid matters have become separated therefrom and have passed into the subjacent drain F. The garbage is now to be subjected to a final squeezing or expressing on a coarse-mesh fabric. For this purpose an endless belt G', passing around pulleys or drums K K, is constructed of metal slats or bars like the carrier-belt G and is covered with another endless belt G², of any coarse fabric or open-mesh surface, such as burlap. Onto this belt the non-homogeneous garbage is delivered and is carried between two squeezing-rolls L L', one or both of which have jackets of soft rubber and are made adjustable by hand-wheel L³. As the garbage passes through the remnants of liquid matters are thoroughly squeezed out through the burlap belt after the manner of water from a clothes-wringer, and the now stiff and semiplastic material passes over the upper drum K and is dislodged from the belt by a revolving cleaning-brush K², having stiff-metal spines, while a scraper L² cleans the upper roll L.

Where a fibrous or semifibrous substance is carried between rolls, it readily feeds itself; but when greasy slushy matters are to be fed between rolls the pinch of the rolls does not have a sufficient "draw" upon the material to be fed, and hence the importance of having both the carrier-belt and the expressing-belt pass through between the rolls with a positive "draw-feed" for the garbage.

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

1. An apparatus for the reduction of garbage, comprising a series of digesters, having valved outlets, an endless metal slatted belt composed of rigid transverse pieces spaced a little distance from each other and connected together for receiving the cooked garbage from said outlets, horizontal guides extending along and supporting the edges of the slatted belt, and a series of pressing-rollers for continuously separating the solid from the liquid matters substantially as and for the purpose described.

2. An apparatus for the reduction of garbage comprising a series of digesters having valved outlets, an endless metal slatted belt composed of rigid transverse pieces spaced a little distance from each other and connected together for receiving the cooked garbage from said outlets, horizontal guides extending along and supporting the edges of the slatted belt, and a series of rolls, the endless belt being passed between one or more pairs of rolls and cooperating therewith to form a crushing-surface for hard objects substantially as and for the purpose described.

3. An apparatus for the reduction of garbage, comprising a series of digesters having valved outlets, an endless metal slatted belt receiving the cooked garbage from said outlets, horizontal guides extending along and supporting the edges of the slatted belt, a series of rolls, one of which is provided with sprockets, the endless belt being provided with chain-links along its edges and passed between one or more pairs of rolls, and geared with the sprockets of one of them so as to be positively driven by it substantially as and for the purpose described.

4. An apparatus for the reduction of garbage, comprising a set of compressing-rolls, two series of digesters with valved outlets, an endless carrier-belt extending from the digesters to the rolls, and arranged between the two series of digesters, and receiving the cooked garbage on its opposite sides from the two series of digesters to distribute the garbage thereon for the rolls, and neutralize the thrust of the discharged garbage on the belt substantially as and for the purpose described.

5. In an apparatus for the reduction of garbage, a vertical digester having a conical bottom with a valved outlet-pipe opening through the said conical bottom and extended thence horizontally, said digester having a tightly-closed extension of its side walls below the

conical bottom and closely fitting the horizontal discharge-pipe, to form a sanitary housing, and to constitute an independent basic support for each digester to avoid suspending the same and prevent vibration substantially as shown and described.

6. The combination with a series of digesters having valved outlets; of an endless metal slatted belt forming a combined carrier and filter-bed, a trunk or casing inclosing and hermetically sealing said belt and having valved openings into the digesters, and a subjacent drain substantially as and for the purpose described.

7. A combined carrier-belt and filter-bed for transporting and separating the constituents of slushy substances, comprising an inclosing trunk with guideways and a subjacent drain, endless slatted belt running on said guideways, longitudinal supporting-bars for the slats, subjacent cross-bars for the longitudinal bars, and guard-flanges arranged on the sides of the trunk and overlapping the edges of the belt substantially as and for the purpose described.

8. A device for homogeneously comminuting and pressing heterogeneous substances, comprising a pair of metal rolls, one of which is corrugated and one of which is provided with

sprockets, and an endless metal slatted belt passing between the rolls and having chain-links on its sides engaging the sprockets substantially as and for the purpose described.

9. A device for homogeneously comminuting and pressing heterogeneous substances, comprising a pair of metal rolls, one of which is corrugated, and one of which is provided with sprockets, an endless metal slatted belt passing between the rolls, and a rigid supporting-table for the belt having a tapered and concave lip extending up to the tangential point of the rolls and supporting the metal belt against the crushing strain of hard substances substantially as and for the purpose described.

10. The combination with rolls for crushing the refractory substances in garbage; of an endless metal slatted belt having its slats arranged transversely and spaced as described, a fibrous or open-meshed covering for the same, and squeezing-rolls arranged on opposite sides of said belt and one or both of them having an elastic face substantially as and for the purpose described.

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Witnesses:

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