

(No Model.)

3 Sheets—Sheet 1.

A. F. BLACK.
APPARATUS FOR TREATING SEWAGE.

No. 450,094.

Patented Apr. 7, 1891.

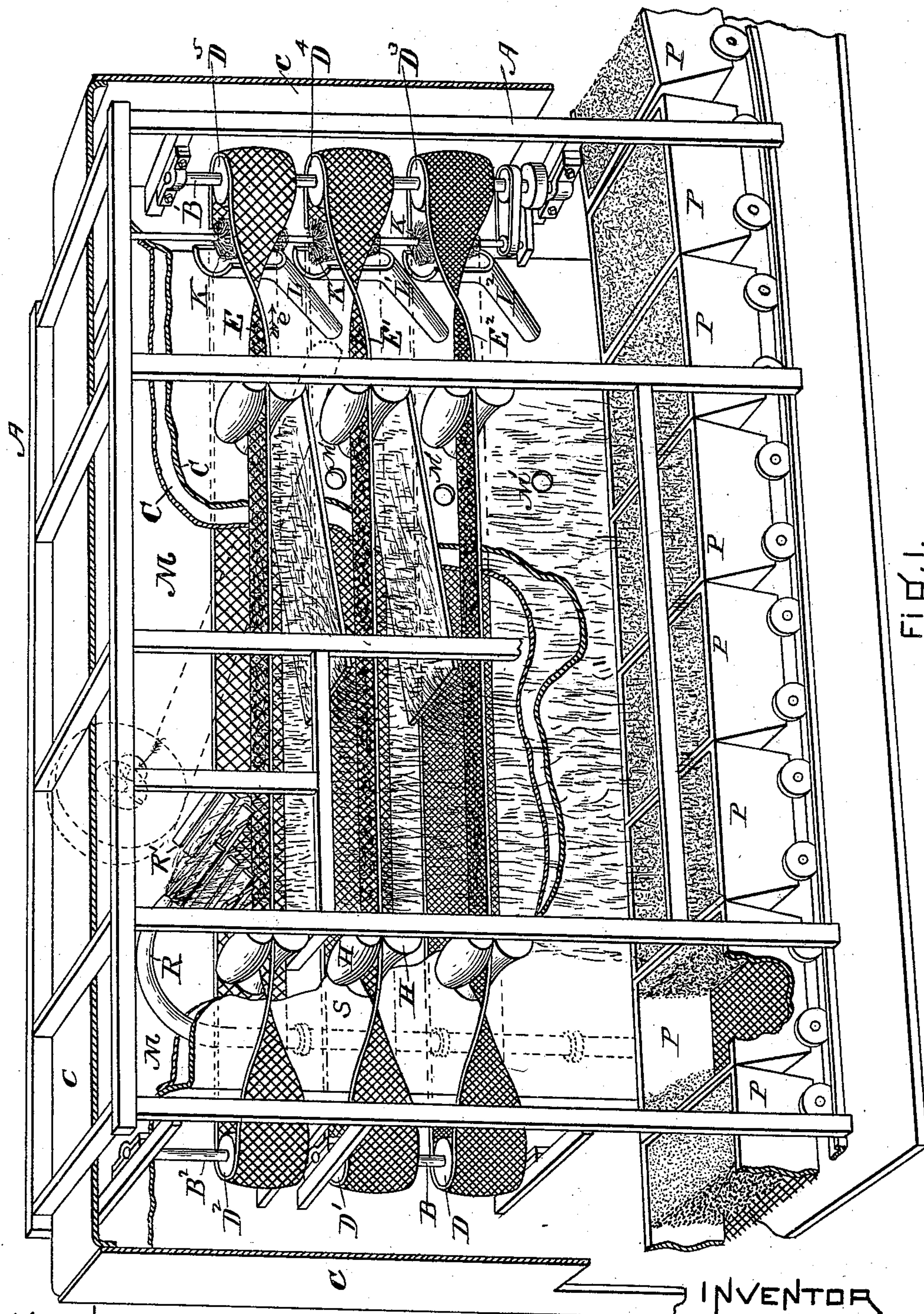


Fig. 1.

WITNESSES

Frank M. Parker
Edward S. Day

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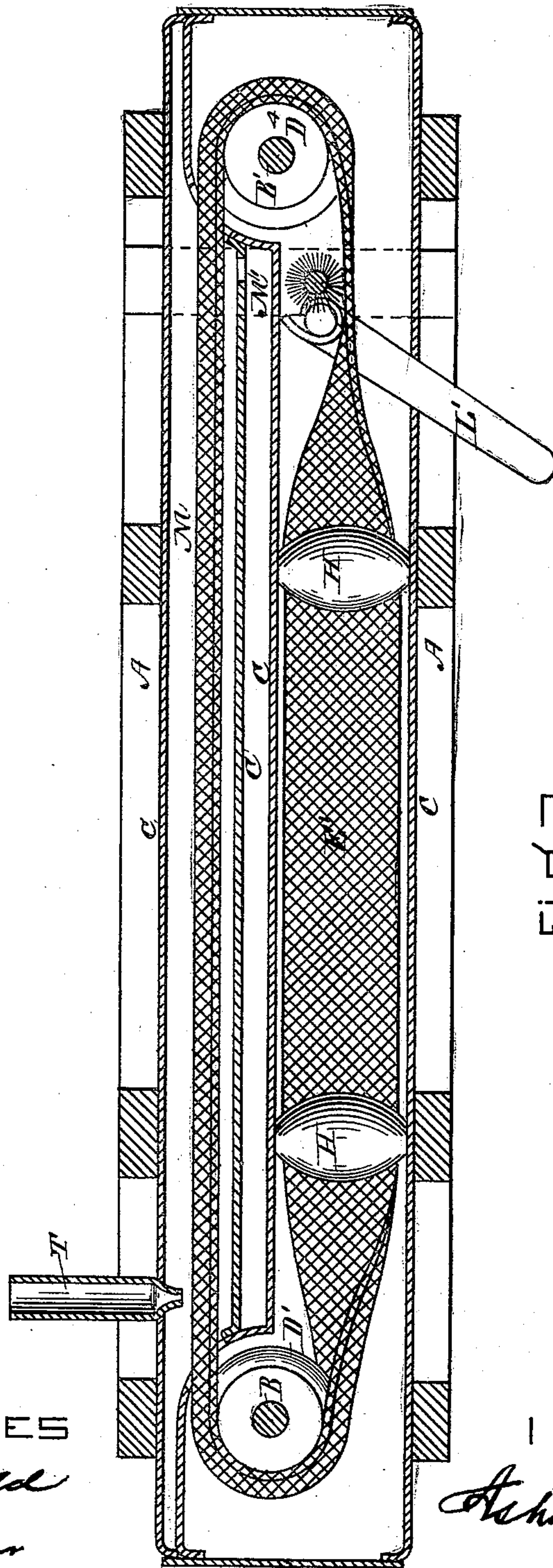
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3 Sheets—Sheet 2.

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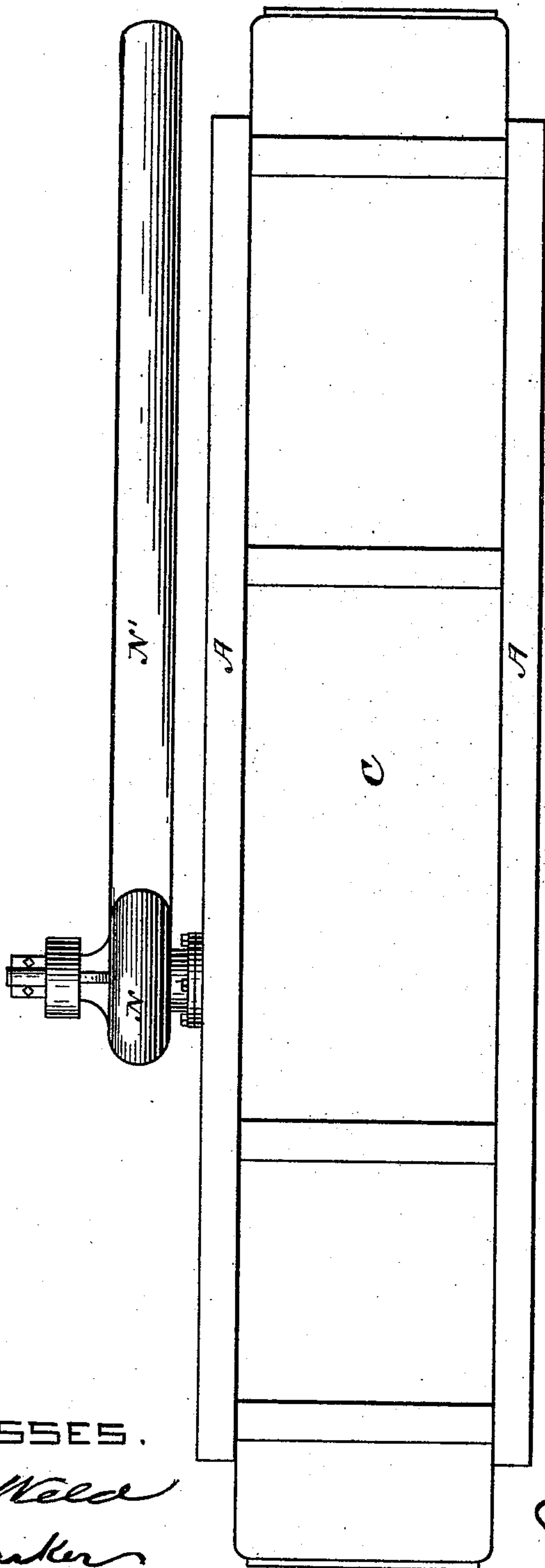


FIG. 3.

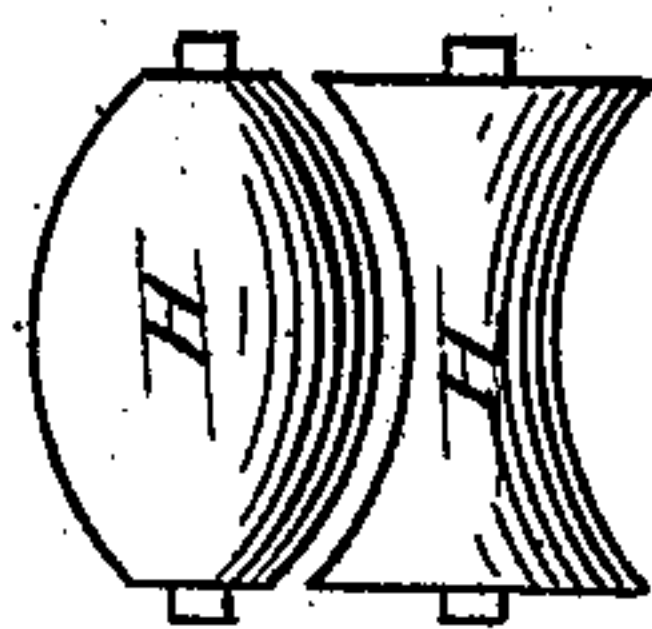


FIG. 4.

WITNESSES.

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UNITED STATES PATENT OFFICE.

ASHER F. BLACK, OF MALDEN, MASSACHUSETTS.

APPARATUS FOR TREATING SEWAGE.

SPECIFICATION forming part of Letters Patent No. 450,094, dated April 7, 1891.

Application filed May 10, 1889. Serial No. 310,314. (No model.)

To all whom it may concern:

Be it known that I, ASHER F. BLACK, of Malden, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in an Apparatus for Treating Sewage, of which the following, taken in connection with the accompanying drawings, is a specification.

The object of my invention is to so arrange and combine certain mechanisms that they may, in connection with currents of air and furnaces, to a very large extent cleanse and deodorize sewage-water. This object I attain by the mechanism shown in the accompanying drawings, in which—

Figure 1 is a perspective view of my apparatus, the front casing being removed, so as to show its interior mechanism. Fig. 2 is a horizontal section of the same. Fig. 3 is a plan view. Fig. 4 is a detail.

In using my invention the sewage-water is first raised to a sufficient height. Then it is discharged onto a distributing-grill, from which it falls in a spray onto the first belt sieve, which allows the fluid and the finer parts of the solid matter to pass through; but the coarser parts of the solid matter are lodged on the belt and conveyed by it to a chute by which they (the said coarser parts) are deposited in a drying-bin, which may be made in any desirable form and style. The sewage that passes through the first belt sieve, as above stated, drops onto a second sieve, which in turn selects the coarser solid matter and allows the fluid and finer particles to pass through, the coarse parts that remain on this belt sieve being delivered through another chute to the drying-reservoir. This action may be repeated a number of times—that is, the partially-cleansed sewage may be passed onto and through a succession of belts until cleansing by this means has been done to an extent that may be satisfactory. After the more fluid part of the sewage has passed through all of the sieves, taking with it the finer parts of solid matter, it falls into a series of filters, which by themselves constitute a tram of cars, as shown in Fig. 1, and in passing through these filter-cars from the top to the bottom of them the finer parts of the sewage are retained by the sand in the said filter-cars, and the filtered fluid that drips

from the cars is so nearly pure as to be innoxious. The foul gases are removed before the sewage reaches the filter-cars, as will be hereinafter more fully referred to.

The filter-cars above referred to may be of any suitable construction and adapted to pass under the sewage-chamber, as shown. The bottoms of the said cars are made perforated and otherwise adapted to allow of their acting as filters.

The cars are so constructed as to form a continuous filtering-bed, and may be in constant motion while the apparatus is in operation. The sludge that gathers on and in the upper part of the sand can be removed without stopping the train of filtering-cars.

The above-described filtering-cars run on a track that is circular in form, or at least forms a continuous ring, a sector of which is immediately under the sieve belts of my apparatus. The other parts of the track traverse a depositing-field from which the dripping water can be conveyed into brook or river and the sludge gathered from the cars and used as a fertilizer. While the fluid part of the sewage is descending from the grill and from sieve to sieve, and finally to the filtering-gravel, it, being in the form of spray, is met in its descent by a blast of fresh air, which will take up the noxious gases and vapors escaping from the falling spray of sewage and convey it through an exhaust-fan to a furnace, where it will become innoxious in the products of combustion.

The mechanical construction of my device is as follows:

A A represent the frame-work to which the casing C C C C C, preferably of thin metal, is attached. The belt-drums D D' are attached to a vertical shaft B, as shown in Fig. 1, the belts of which run on corresponding drums D³ D⁴, attached to the vertical shaft B'. The shaft B' also has upon it a third drum D⁵, the belt from which runs onto the drum D², which is also mounted on the vertical shaft B². The drums are made to revolve by any suitable motive power. The sieve belts E E' E² pass between pairs of rolls H H, Fig. 2, the lower ones of which are concave and the upper ones convex, as shown in Fig. 4, so that the sieve belts form longitudinal troughs, as shown, which serve to catch and hold the solid mat-

ter of the sewage and to convey it to the vertical revolving brushes K. The brushes K serve to brush off the solid matter that may adhere to the sieve belts and to cause it to fall into the chutes L L' L², by which it is delivered into a drying-reservoir, where it may be dried by artificial heat or by the natural process, as may be desired. It will be observed that the sieve belts after they leave the rollers next to the vertical brushes K gradually assume a vertical position, so as to cause the solid matter that rests upon or adheres to them to fall off or be brushed off by the vertical brushes into the chutes L L' L².

Air for drying and taking away the moisture and foul gases and vapors enters the sieve-chamber—that is, the part in which the sieve belts do the work—being drawn in from the rear chamber M (see Fig. 2) through the openings M' M', Fig. 1, and, having passed through the spray in the sieve-chamber, is drawn out through the exhaust-fan N, Fig. 3, and driven through the pipe N', Fig. 3, to a furnace, where all of the noxious gases and vapors are consumed and pass off in an innocuous condition as products of combustion. It will be observed that the chamber M, Fig. 2, appears to be separated from the main chamber of the apparatus by two partitions C C. The inner one is simply a support for the rollers H H. The space between these two partitions has no particular function, but is simply a result of the construction of the casing and supports of the apparatus.

The rear chamber M, in which the sieve belts pass after they have been freed by the brush-wheel, Figs. 1 and 2, from the solid matter, is supplied with air from any desirable source through the pipe T, Fig. 2, the said air serving to dry and purify the belts and then pass, as has been stated, into the sieve-chamber, where it will take from the spray the noxious gases and vapors and be sent by the exhaust-fan N, Fig. 3, into the consuming-furnace.

The operation of my device is as follows: The sewage is raised by pumps or otherwise to the delivery-pipe R, from which it falls upon the grill R', and is distributed in a scattered condition upon the first (and coarsest) sieve-belt E. This sieve belt, moving in the direction of the arrow e, (see Fig. 1,) conveys such of the solid matter of the sewage that cannot pass through it to the brush-wheel K, by which it is thrown into the chute L, and from thence that part is deposited in the drying-reservoir. The part of the sewage that is not detained by the first belt, as above set forth, is taken by the second belt E' and the coarser parts delivered to the chute L'. The parts of the sewage that pass the second belt E' are acted upon by the third belt E². The parts of the sewage that pass the third belt E² are filtered by the gravel or sand in the cars P. During the time that the sewage is dripping in the form of spray from the

top of the sieve-chamber S to the bottom—that is, to the gravel in the cars P P—a current of air is ascending through it and freeing it from its noxious gases and vapors, as has been stated.

In the drawings I have not shown any heating or consuming furnace, as almost any kind of a furnace will do the work. The same is true of a reservoir or pit for drying the solid matter that is thrown out by the chutes L L' L².

To insure the thorough cleansing of the sieve belts in the chamber M, I have the nozzle of the pipe T made very narrow and in close proximity to the belt, so that the blast (which should be very strong) will force itself entirely through the meshes of the sieve belt and drive out all of the entangled matter, leaving the sieve belt in as good order as it was at the first time that it entered the sieve-chamber.

If desirable, a pipe and nozzle like the one shown at T may be used in connection with each sieve belt.

Having thus described my invention, what I claim is—

1. In a device for treating sewage, the combination of sieve belts operating in a closed aerating-chamber and adapted to convey the more solid matter of the sewage to rotating brushes and to allow the fluid and finer matter to fall in a spray and be subjected to the purifying effect of the moving air in the said chamber, as described, with rotating brushes adapted to cleanse the said belts of the coarser matter and deliver the same to chutes, all substantially as and for the purpose set forth.

2. In a device for treating sewage, the combination of a series of sieve belts operating in a closed aerating-chamber, adapted to separate the solid matter and to spray the fluid part, as described, with a series of rotating brushes adapted to remove the said solid matter from the belts and deliver it into chutes, as described, and a blast-pipe adapted to force a powerful current of air against and through the sieve belts for the purpose of cleansing the same, substantially as described, and for the purpose set forth.

3. In a device for treating sewage, the combination of a series of sieve belts operating in a closed aerating-chamber, as described, with a movable filtering apparatus adapted to receive that part of the sewage that has passed through the sieve belts and filter the same, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 27th day of April, A. D. 1889.

ASHER F. BLACK.

Witnesses:

GEO. A. WELD,
WILLIAM EDSON.