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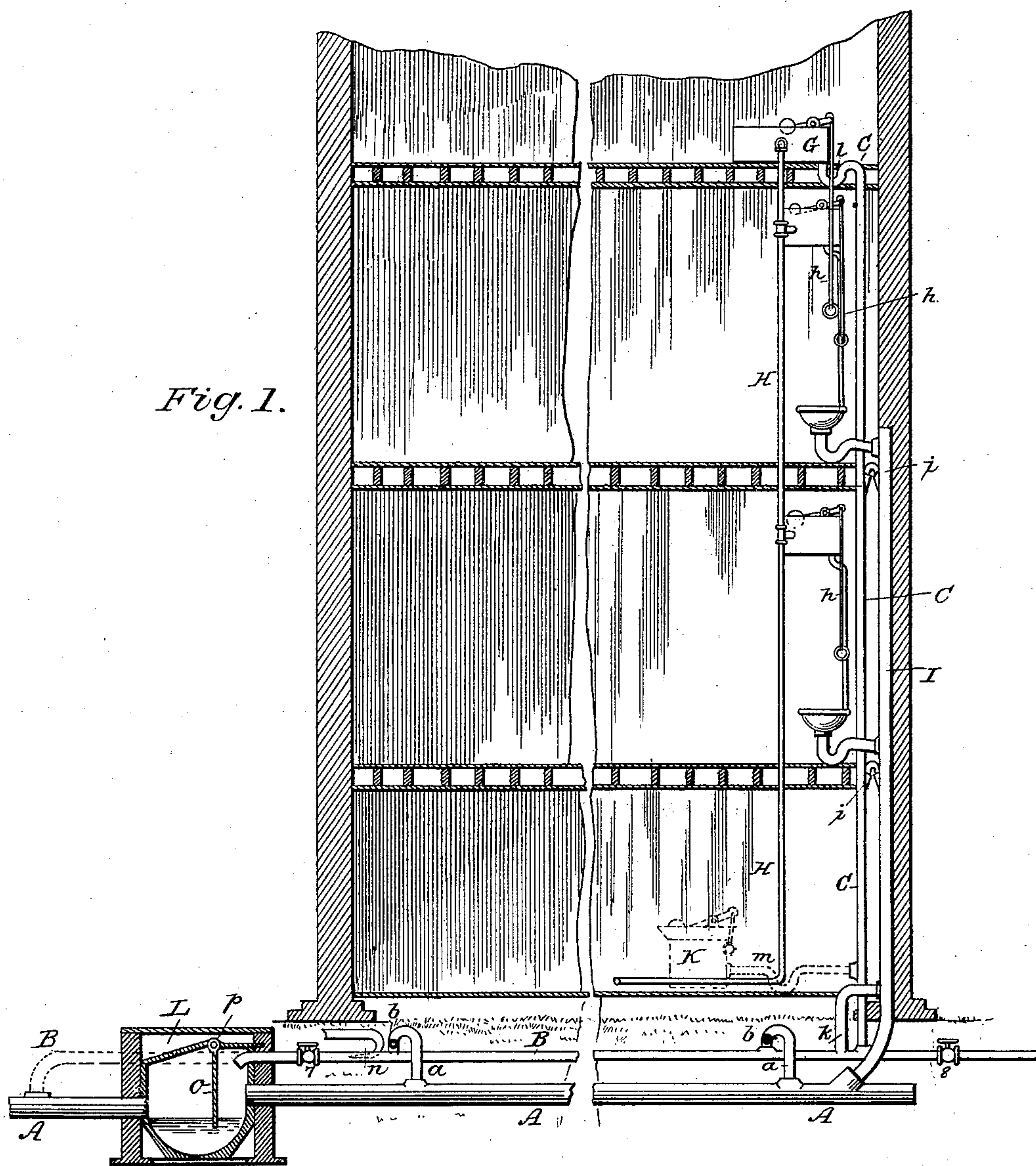
2 Sheets—Sheet 1.

T. H. DONOHUE.

METHOD OF AND MEANS FOR VENTILATING SEWERS.

No. 347,096.

Patented Aug. 10, 1886.



Witnesses
Fred G. Dieterich
Wm. E. Dyre.

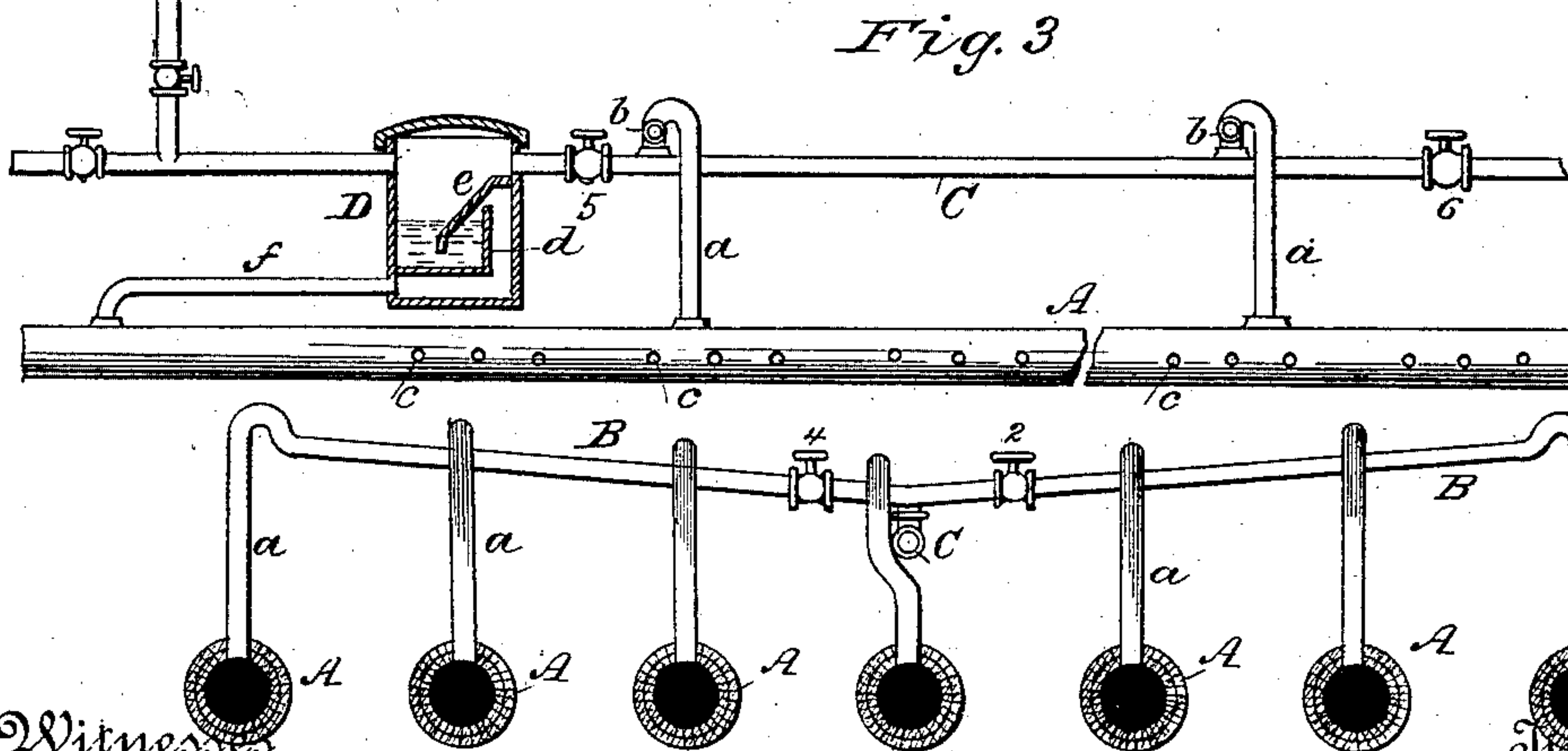
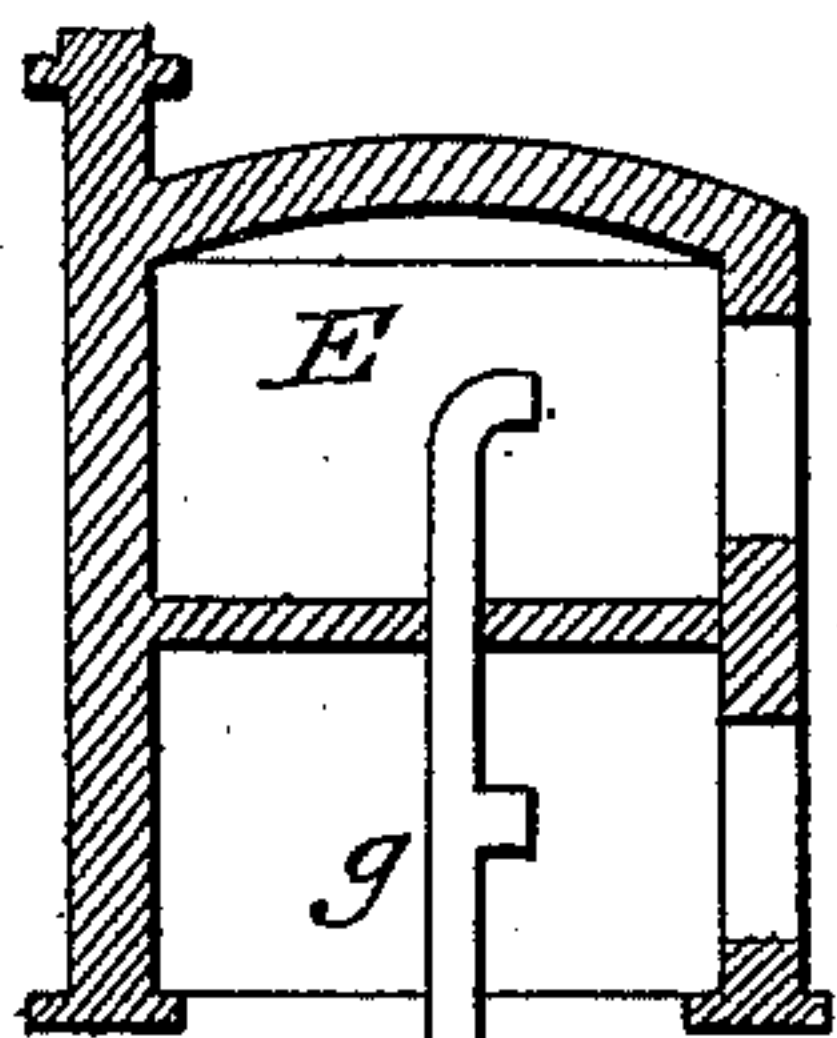
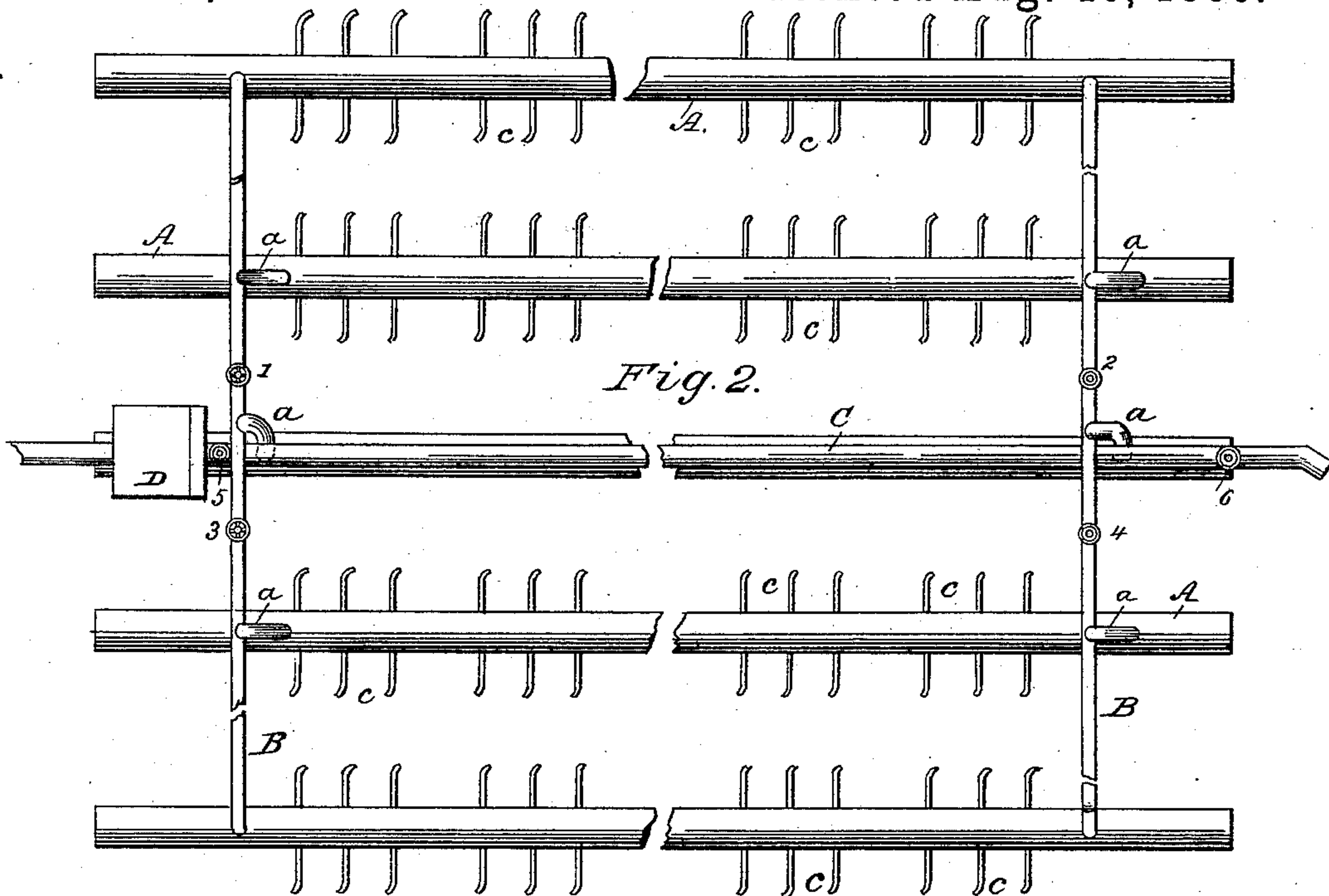
Inventor
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By his Attorneys
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Fig. 4
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UNITED STATES PATENT OFFICE.

THOMAS H. DONOHUE, OF WASHINGTON, DISTRICT OF COLUMBIA.

METHOD OF AND MEANS FOR VENTILATING SEWERS.

SPECIFICATION forming part of Letters Patent No. 347,096, dated August 10, 1886.

Application filed May 1, 1886. Serial No. 200,800. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. DONOHUE, a citizen of the United States, residing at Washington, in the District of Columbia, have
5 invented certain new and useful Improvements in Methods of and Means for Ventilating Sewers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the
10 art to which it appertains to make and use the same.

The invention relates to sewer-ventilation, and has for its object the effectual removal of gas and noxious odors from sewers, house-
15 drains, and soil-pipes.

In practicing the science of sanitary engineering many schemes have been devised for overcoming the disastrous effects attending the escape of sewer-gas into streets and dwell-
20 ing-houses. One of the earliest plans introduced was the water-sealed trap. This proved ineffectual, for the reason that the gas so completely permeated the body of water that it worked its way through the water and escaped
25 into the apartments containing the trapped vessel. Ventilating-pipes have been conducted from the soil-pipes of houses to and above the roofs thereof, and ventilating-shafts have been applied to sewers. In both instances
30 the gases were discharged into the open air, thus increasing the danger and spreading the evil by exposing many persons, instead of a few, to the death-dealing poisonous emissions.

It is a well-known fact that the gases generated and contained in large sewers and also
35 in house-drain pipes accumulate in the crown of said structures, and that under the present prevailing systems of ventilating such sewers and drain-pipes no means are provided for
40 removing the gases.

Flushing of sewers and drain-pipes has been resorted to with the vain hope of accomplishing the result; but failure only has attended such schemes. This failure is due to the fact
45 that the gases accumulated in the crown of the sewers and drain-pipes can be removed by the flushing process only by filling the sewers and pipes with a body of water; but this cannot be accomplished, for the reason that the pipes
50 relied upon to supply the water are of so much

smaller capacity than the conduits they are intended to supply with a flushing medium that they cannot possibly fill them.

It sometimes occurs under heavy rainfalls that sewers of medium capacity are filled with
55 water; but this, instead of proving a sanitary measure, has been found to result in driving the gases back through the laterals and house-drain pipes into the house or houses themselves; and closets, sinks, wash-basins, &c.,
60 have served as the means of exit into dwelling apartments. It has also been proposed to expel the gases from sewers by applying pumps thereto and force or draw them out. This has, however, proved a failure in prac-
65 tice, for the reason that, by forcing, the gases have been driven into the houses connected with the sewer; and the drawing or exhausting process has failed on account of the numerous outlets communicating with the atmos-
70 phere, which prevent the possibility of producing a vacuum in the sewer. Possibly the nearest approach to expelling gas and noxious odors from house-soil pipes has been accomplished by that class of closets having
75 large flushing-chambers attached to them; and many persons in seeking to find some means of protection for their families have torn out one or more of different styles of anti-flushing closets, and replaced them with the flushing-
80 type. A casual glance at the operation of this means of protection relied upon will reveal its utter inadequacy, and show that the evil has not been removed. A flushing-chamber attached to a closet rarely ever contains
85 more than three gallons of water as the maximum. This being discharged into a closet passes through the trap in a body; but as soon as it reaches the perpendicular soil-pipe it scatters in its descent and falls through the
90 pipe in a spray. The vacuum produced by the body of water passing through the trap and the upper end of the soil-pipe is filled by air, which in a very short time will become foul by contact with the soiled walls of the hopper
95 or trunk of the closet, and its sickening odors will be emitted into the apartment containing the closet.

From the foregoing elucidation of the state of the art to which my invention appertains, 100

it is quite evident that no practical, successful, and reliable means for removing gas from sewers has yet been made public.

With this object in view, I will now proceed to describe my invention.

In the accompanying drawings, which form a part of this specification, Figure 1 represents a section of a dwelling-house with my invention applied thereto; Fig. 2, a plan of street-sewers with my ventilating system attached thereto. Fig. 3 is a side view, and Fig. 4 an end view, of the same.

Reference being had to the drawings, and to the letters marked thereon, A in the several figures represents a sewer, and B a ventilating-pipe connected at its crown with the crown of the sewer by means of branch pipes *a*, which extend a short distance above the pipe B, and are then bent down toward the discharge end of said pipe. The object of this construction is to prevent the fluid used as a flushing medium for the pipe B from entering said branch pipes *a*; and as a further precautionary means said pipes may be provided with an upward-seating check-valve, *b*. The pipe B may be made of various diameters, according to the capacity of the sewer or drain-pipe with which it is connected, and will vary from one (1) to three (3) or four (4) inches as the maximum, capable of collecting and discharging the gas from ordinary house drains and sewers.

In applying my invention to the removal of gas from sewers, several lines of sewers may be connected to one system of ventilating-pipes, as shown in Figs. 2 and 4. In the former five (5) lines are shown connected, and in the latter seven (7.) Stop-valves 1, 2, 3, and 4 are provided for putting said sewers in communication with and cutting them off from the flushing-pipe. The pipe B in said figures need be applied to the sewers only at intervals of several squares or street-blocks, and is connected to a pipe, C, to which the motive power for expelling the accumulated gas is applied. The pipe C is provided with stop-valves 5 and 6, and terminate in a sewer catch-basin, D, into which the motive power used for flushing the pipe C, whether it be water or steam, is discharged, the water in either event falling into the tray *d*, provided with a sealing-plate, *e*, and passing off into the main sewer through pipe *f*, while the uncondensed gases are conducted to a furnace, E, by pipe *g* and burned.

The letter *c* represents a series of laterals communicating with the main sewer A.

In the application of my invention the operation is as follows: The valves 1, 2, 3, and 4 in the pipes B being open, and the gas from the several sewers having accumulated therein, the motive power is applied to pipe C, filling the same, and in its passage through said pipe draws the gas from the pipes B and carries it along into the catch-basin D, from which the uncondensed gas is conducted to the furnace E and burned, while the water passing through the basin is conducted into one of the sewers. If desired, the sewers on opposite

sides of the pipe C may be operated upon separately by cutting one of the sets off through the medium of the valves 1 and 2 or 3 and 4, when only one set will be in communication with the pipe C and subject to its action.

The flushing operation is applied as often as it may be found necessary, and the flushing medium may be drawn from the water-supply system of the town or city; or an ejector may be employed for raising water and forcing it through the pipe C, or air may be forced through said pipe.

I will now describe the application of my invention to drain-pipes of dwellings, hotels, asylums, hospitals, jails, or other buildings having one or a large number of closets, sinks, &c., to be drained.

By referring to Fig. 1, A represents a sewer; B, a ventilating-pipe connected to the sewer by branch-pipes *a*; C, a pipe extending up to the upper floor of the building and connecting with a tank, G, which is supplied with water by pipe H, and may be provided with an automatically-discharging valve, such as is common to closet-cisterns for regulating the frequency of the flushing operation; or the valve may be operated positively at pleasure to suit the necessities of the case, by pulling on the rod *h* and opening the valve. The pipe H also supplies the several closet-cisterns in the building.

I represents the soil-pipe, to which the closets, sinks, &c., of the building are attached, and is placed in communication with the pipe C by branches *i*, and with the ventilating-pipe B by a connection, *k*.

It may sometimes be found necessary to provide a flushing-tank in the lower story of the building on account of lack of pressure to conduct water to the upper story. To provide for such an emergency I have shown a tank, K, in dotted lines. The pipe C should be provided with a trap at its upper end just outside of the tank G, as shown at *l*, and the pipe *m*, leading from the tank K, is likewise tapped.

The pipe B is provided with stop-valves 7 and 8, and at its outer end communicates with a catch-basin, L, into which it discharges when water is used as the motive power for expelling the gas from said pipe. I however contemplate the use of steam in this system, to be applied by means of an ejector connected to said pipe at *n*, for forcibly drawing the gas out of said pipe B and its connections. When steam is used as the motive power, the pipe B is continued beyond the catch-basin L, as shown in dotted lines, and communicates with the sewer A, into which the gas and steam are discharged, and their return to the building prevented by the sealed dip-plate *o* of the basin. The plate *o* is hinged at *p*, to provide a ready escape of water from the basin in times of heavy rainfall, and swings up out of the way of the pipe connected to the basin at the lower side.

It will be observed that my pipe C, leading up into the building to the upper tank, G,

differs materially from any of the ventilating-pipes now in common use, in that it is sealed at its upper end by a valve in the tank, and is not therefore subject to the action of the atmosphere upon it, which frequently interferes with the performance of the function assigned to it.

The operation of this application of my invention, briefly stated, is as follows: The stop-valve 8, having been closed and tank G or K being filled with water, if provided with an automatic flushing-valve, will discharge its contents at regular stated periods; or, if operated positively, it may be discharged at will. The water fills the pipe C and flows down into the pipe B and on out into the catch-basin L, carrying with it the gas contained in said pipe, and by its descent down pipe C draws the gas and foul air from the soil-pipe I into the pipe C, from which they are expelled at the next flushing operation.

Having thus fully described my invention, what I claim is—

1. In a street-sewer system, the method of ventilating sewers, drain-pipes, &c., and discharging noxious odors therefrom, which consists in collecting and storing sewer-gas in a pipe separate from the sewer or drain pipes and periodically expelling it therefrom, substantially as described.

2. In a street-sewer system, the method of ventilating sewers, drain-pipes, &c., and discharging gas and noxious odors therefrom, which consists in collecting and storing sewer-gas in a pipe separate from the sewer or drain pipes, periodically expelling it therefrom, and burning the inflammable matter contained therein, substantially as described.

3. The combination of a sewer or drain pipe, a gas-collecting pipe separate from the sewer or drain pipe and connected thereto by branch pipes, and a supplemental pipe for applying motive power for expelling the gas from said collecting-pipe, substantially as described.

4. The combination of a sewer or drain pipe, a separate ventilating-pipe, branch pipes connecting the sewer and ventilating pipe at the crowns thereof, and a supplemental pipe for applying motive power to said ventilating-pipe, substantially as described.

5. The combination of a sewer or drain pipe, a separate gas-collecting pipe of smaller area than the sewer or drain pipe, a connected thereto by branch pipes, and a pipe for supplying a column of fluid for forcibly expelling the gas from said collecting-pipe, substantially as described.

6. The combination of a sewer or drain pipe, a separate gas-collecting pipe of smaller area than the sewer or drain pipe, a pipe for supplying a column of fluid for forcibly expelling the gas from the collecting-pipe, and a catch-basin for collecting the gas and fluid and separating the same, substantially as described.

7. The combination of a sewer or drain pipe, a separate gas-collecting pipe of smaller area than the sewer or drain pipe, a pipe for supplying a column of fluid for forcibly expelling the gas from the collecting-pipe, a catch-basin, and a furnace, substantially as described.

8. The combination of a sewer or drain pipe, a separate gas-collecting pipe, a pipe extending into a building and connected to a flushing-tank and to said gas-collecting pipe, substantially as described.

9. The combination of a sewer or drain pipe, a separate gas-collecting pipe of smaller area than the sewer or drain pipe, a pipe connected to a tank, the soil-pipe, and the gas-collecting pipe, and suitable means for forcibly expelling gas from the soil and collecting pipes, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS H. DONOHUE.

Witnesses:

S. A. TERRY,

ROBT. A. BALLOCH.