To all whom it may concern:

Be it known that I, Geo. E. Waring, Jr., of Newport, in the county of Newport and State of Rhode Island, have invented a new and useful Improvement in Sewering and Draining Towns; and I do hereby declare that the following specification, taken in connection with the drawings, make a part of the same, is a full, clear, and exact description thereof.

The improvement hereinafter described has reference to and is predicated upon the improvement in sewerage and draining cities set forth in the Letters Patent No. 250,740, dated January 18, 1881, herefore granted to me, and to which reference may be had.

The object of the present improvement is to simplify the system described in said patent without lessening the efficiency of the system.

In the said system described in my former patent referred to, as in the present improvement upon that system, storm-water is excluded from the sewerage-pipes; but it was in said former system contemplated to use in connection with the sewers special air-inlets opening at the surface of the street, and, also, it was required to have the house soil-pipes extend through to the house-top and be without traps to cut off their direct connection with the street-pipes.

I have ascertained from experiment that while it is in many cases desirable that a system of sewerage such as I have devised should be provided with special air-inlets to ventilate the sewers, in other cases it works a disadvantage, and is liable in localities where heavy rains prevail to admit so much street-water to the sewers as to gorge them and cause back-flow into the houses connected with the sewers. I have also ascertained from experiment that while it is desirable and proper that the house-connections with the sewer should extend through to the house-top without traps between the house and the sewer, it is not indispensably necessary for the practical and efficient working of my system of sewerage that the house-connections should extend through the roof of the house, nor that trap-connections between the house-pipes and the street-sewer be omitted. In cases where the sewers are connected with untrapped drains and open soil-pipes of houses, such soil-pipes are necessarily of different heights, due to the different heights of the houses and of their locations, and this leads to a difference in barometric pressure, because the soil-pipes projecting through the roofs of the houses are differently exposed to the influence of different winds. For instance, the influence upon a soil-pipe passing through a roof having a southern exposure under a north wind would be different from that upon a soil-pipe passing through a roof having a northern exposure under the same wind. Besides, too, soil-pipes in a house are exposed to different temperatures, according to their location in the house and the temperature in the rooms in the neighborhood of which they pass. Consequently there will be upward or downward drafts through the different soil-pipes, according to circumstances, and a circulation of air will be thereby induced through the sewers. Furthermore, the discharge of water from bathtubs, water-closets, &c., induces a downward movement of air through the soil-pipe and into the sewer, and these influences vary in force with all the varying conditions under which the water conveniences are located and used. The movement of sewage through the sewer itself causes a forward movement of the air contained in it. This favors the general ventilation. Upon the discharge of the flush-tanks, the use of which my system embraces, their contents are delivered into the upper end of the sewer with which such tanks are connected, and flow through with a wave of much force, which, as it advances, drives forward the air in the pipes before it, and this air finds vent through the house-drains and open soil-pipes as the connections of the different houses are reached successively. As the wave passes such connections it causes a partial vacuum behind it, which is supplied by an indraft of air through the house-connections. These combined influences are sufficient to render special openings for the admission of air at the surfaces of the streets unnecessary, and by omitting them the danger of gorging the sewers from storm-water is removed.

In cases where an open soil-pipe is not car-
ried through the roof of the house, and where
the house-drain is separated from the sewer by
an intervening trap, the influence of the vol-
ume of water discharged from the flush-tanks
and flowing through the sewer-pipes is so great
that a very effective ventilation is secured, for
the reason that an ordinary house-trap affords
so little resistance to air-pressure that in the
absence of an open ventilated soil-pipe passing
through the roof the water in the traps will yield
and permit the passage of air through the traps by
the process known as the "siphonage of traps," and
consequent of the air will be sucked into the
house-pipes through the bowl and closet-traps
where there is a system of small sewers copi-
ously flushed by flush-tanks at the heads of the
branches, as contemplated by my system.

In the accompanying drawings, Figure 1 shew
the plans of arrangement of my improved system,
in which the branches unite consecutively and deliver
into a main sewer, a draining-tiling being laid in
the trench at the side of the sewer and flush-
tanks being placed at the upper ends of the
branches. "a a a are blocks between streets, "b
"b b b are streets, "d d d are contour lines, or lines
of equal elevation. "g g g are main and collect-
ing sewers. "h h h are branch sewers. "i i are
flush-tanks at the upper ends of the branch
sewers. The dotted lines "k k k indicate the
position of subsol-drains, which may deliver
into the sewer or to independent outlets.

Fig. 2 is a vertical section, showing the
position of the sewer P and subsol-drain R
and the connection of these with the house-
drain T and soil-pipe V and with the subsol-
drain W of the private property. "S indicates
a storm-water sewer immediately under the
surface of the street and connected with the
street-gutter.

This shows the manner of connecting two
drain-tiles with a collar of muslin or similar
fabric.

While my system comprehends the exclud-
ion of storm-water from the sewer-pipes, it is
to be understood that I mean by the statement
that storm-water is to be excluded that the
system of pipes is not to be constructed as a
whole with reference to taking care of storm-
water draining from the streets or from the
roofs of houses, and although in individual
cases the connection of a rain-water leader
with the sewer by a householder may be made,
or an occasional instance of the connection of
a street-culvert with the sewer is permitted, the
same would not change the character of my
system.

While my system comprehends the exclud-
ion of storm-water from the sewers, and is
not adapted to receive such water from any
large proportion of street or roof surface, it
will not be injured or rendered ineffectual by
the fact that the authorities of the town may
fail to enforce the rule of complete exclusion,
so that, for instance, a householder may suv-
reptitiously connect a roof-leadier with a soil-
pipe.

It will be observed that the system exhibit-
ed in the drawings is substantially the same as
that exhibited in my and former Patent No.
236, 740 so far as the general arrangement of
the main or collecting sewers and the branch
sewers and the location and combination of
the flush-tanks with the upper ends of the
branch sewers are concerned; and although
there is also exhibited an open soil-pipe ex-
tending through the roof of the house, and
an untrapped connection between such soil-
pipe and the street-sewers, the improvement
comprehends a combination of means consti-
tuting a system for sevevuring and draining in
which such open-ended soil-pipes extending
through the roof are omitted, and in which
traps in the connections between the house-
pipes and the sewers are left untrapped, and
embraces, broadly, the combination, with a sys-
lem of branch and main sewage-pipes from
which storm-water is excluded, of automatic
flush-tanks for periodically cleansing the sew-
ers, although the house soil-pipes do not ex-
tend through the roof into the outer air, and
although the house pipes are trapped, and
although there be no special air-inlets at the
street-surface communicating with the sewers.

There is also included in this system the
combination, with the sewer when it is laid
through wet ground, of a porous subsol-drain
made of drainage-tiles with permeable joints,
substantially as shown in my said former pat-
ent; but the improvement herein exhibited is
the method of protecting the joints against the
admission of earth by wrapping them with a
woven or felted fabric.

In my former patent the joint is protected
by a strip of paper wrapped around the pipe
at the joint. A better result may be obtained
by wrapping around the joint a strip of mus-
lin or similar fabric, which is much stronger
and more durable than paper. In process of
the time this cloth decays, but before it does so
the earth about the tile becomes consolidated.
The complete drainage of the ground relieves
it of the pressure of water which would cease
a strong flow into the joint, and by the time
the protection afforded by the cloth has ceased
to be effective the process of drainage is car-
ried on by a slow rising of the ground-water
into the frequent joints of the drain from the
bottom in such manner as to carry no earth
with it. Unless the joints are thus protected
when the pipes are first laid, very large am-
nings into the drain lead to the admission of
dirt during and immediately after construction
to such an extent as frequently to close the
drain entirely.

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

1. The improved system of sewerage, sub-
stantially as herein described, the same con-
sisting in sewers for the removal of sewage matter, constructed so as to exclude storm-water, in combination with automatic flush-tanks connected with the branches for periodically cleansing the sewers and for inducing ventilating-currents through the pipes and house-connections, omitting or including fresh-air inlets and untrapped house-drains, either or both.

2. The improved joint for drain-pipes, the same consisting in a strip of muslin or similar material wrapped around the joint, as described.

Witnesses:

GEO. E. WARING, Jr.
HARRY TIFFANY,
CHAS. A. NEFF.