No. 686,002. Patented Nov. 5, 1901.

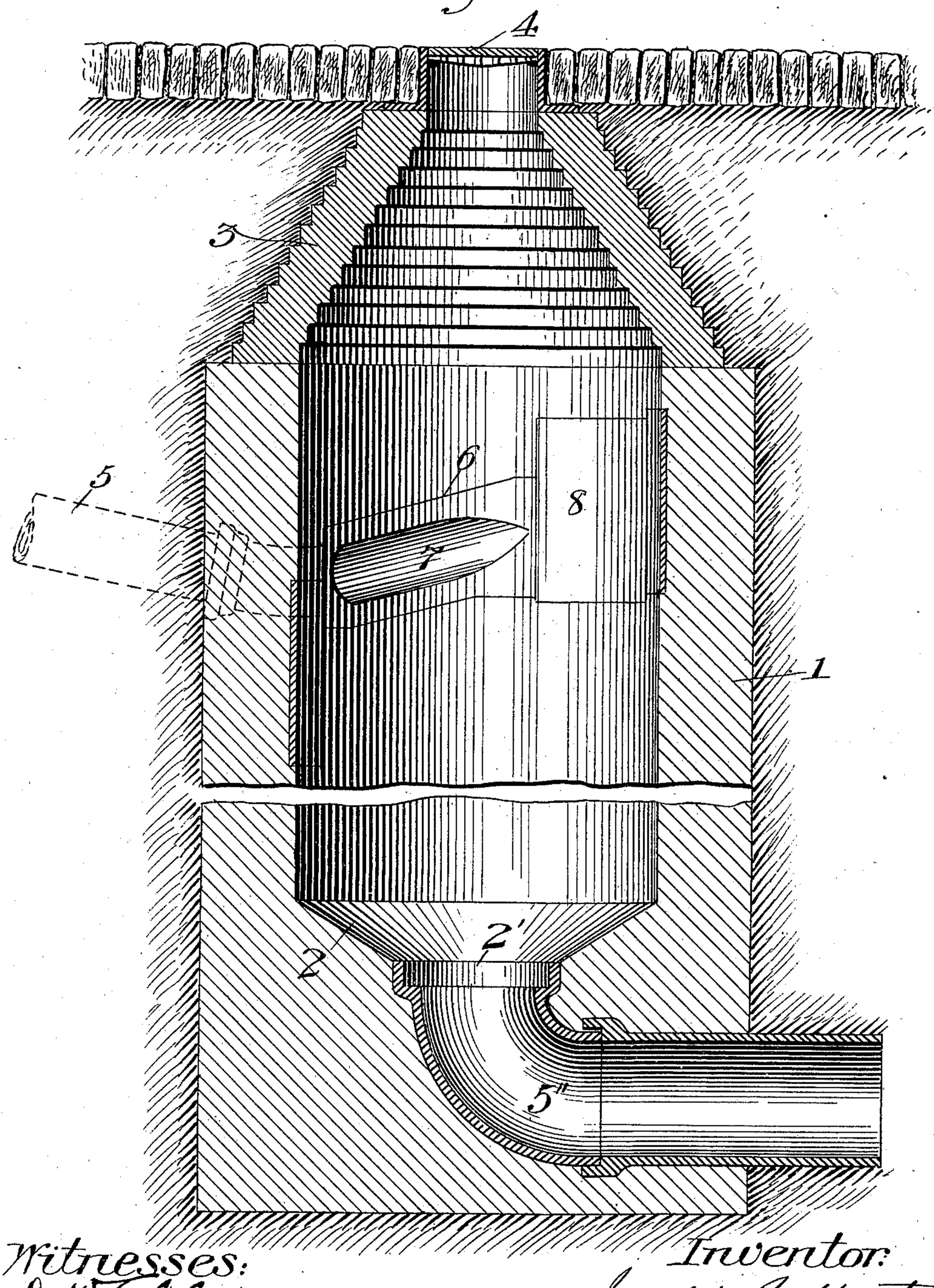
J. P. MONTY.

SYSTEM OF DRAINAGE, SEWERAGE, OR THE LIKE.

(Application filed May 28, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

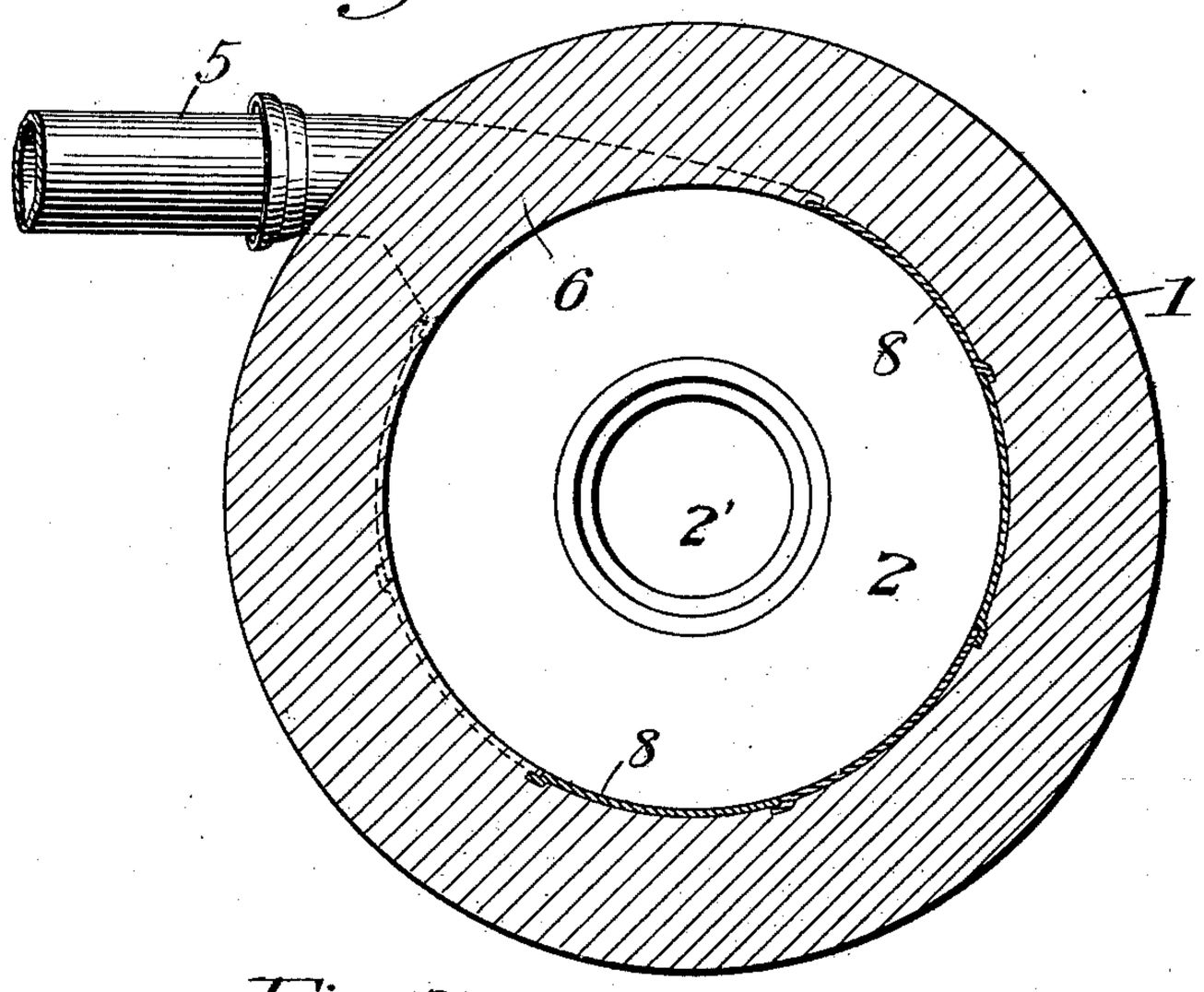
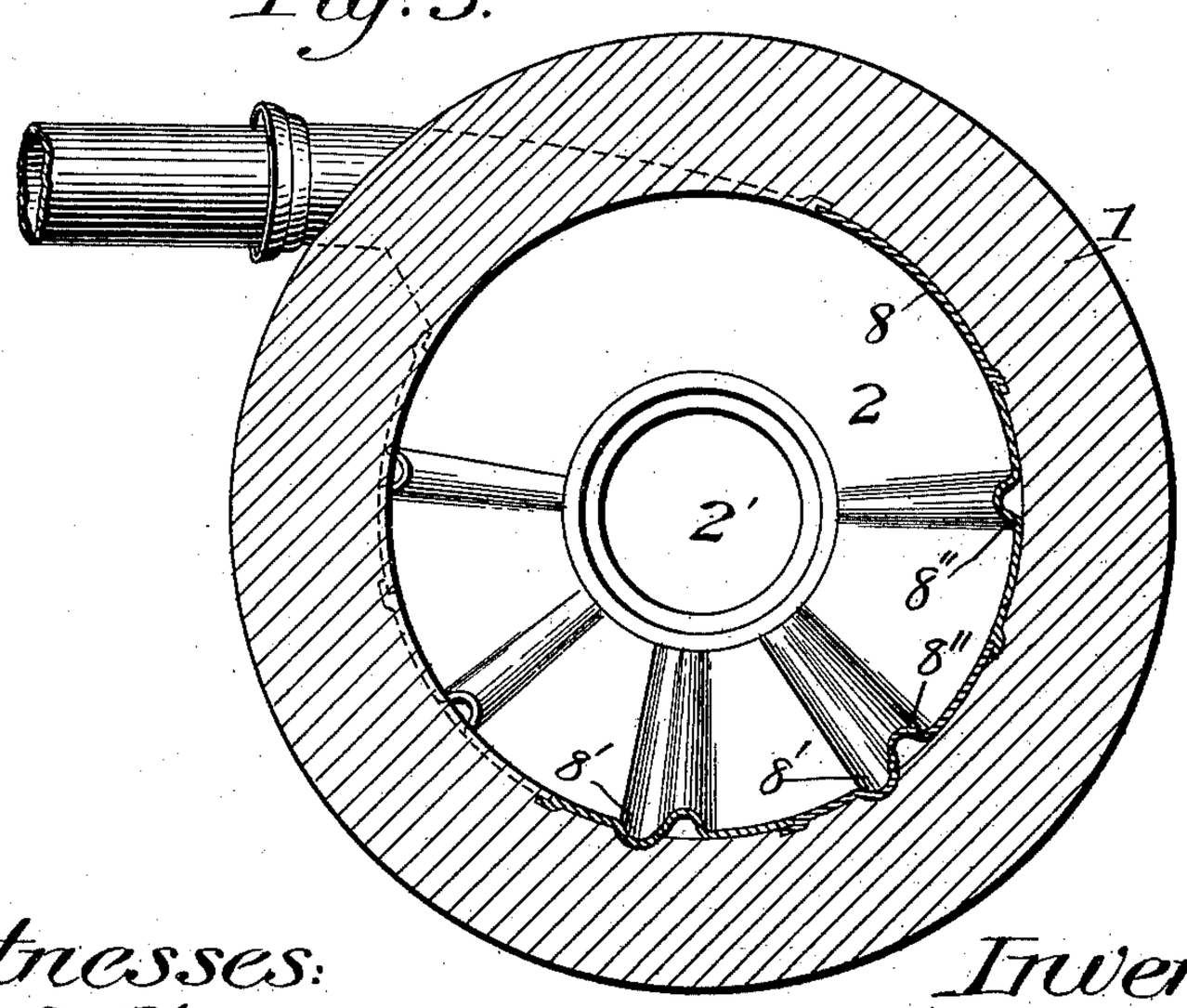


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

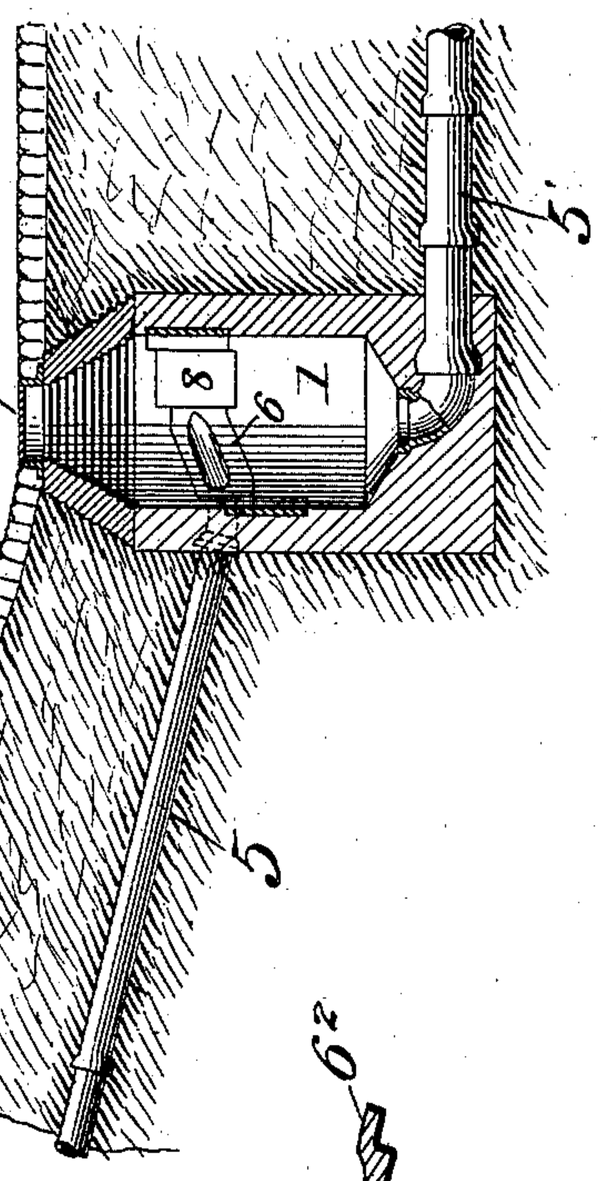
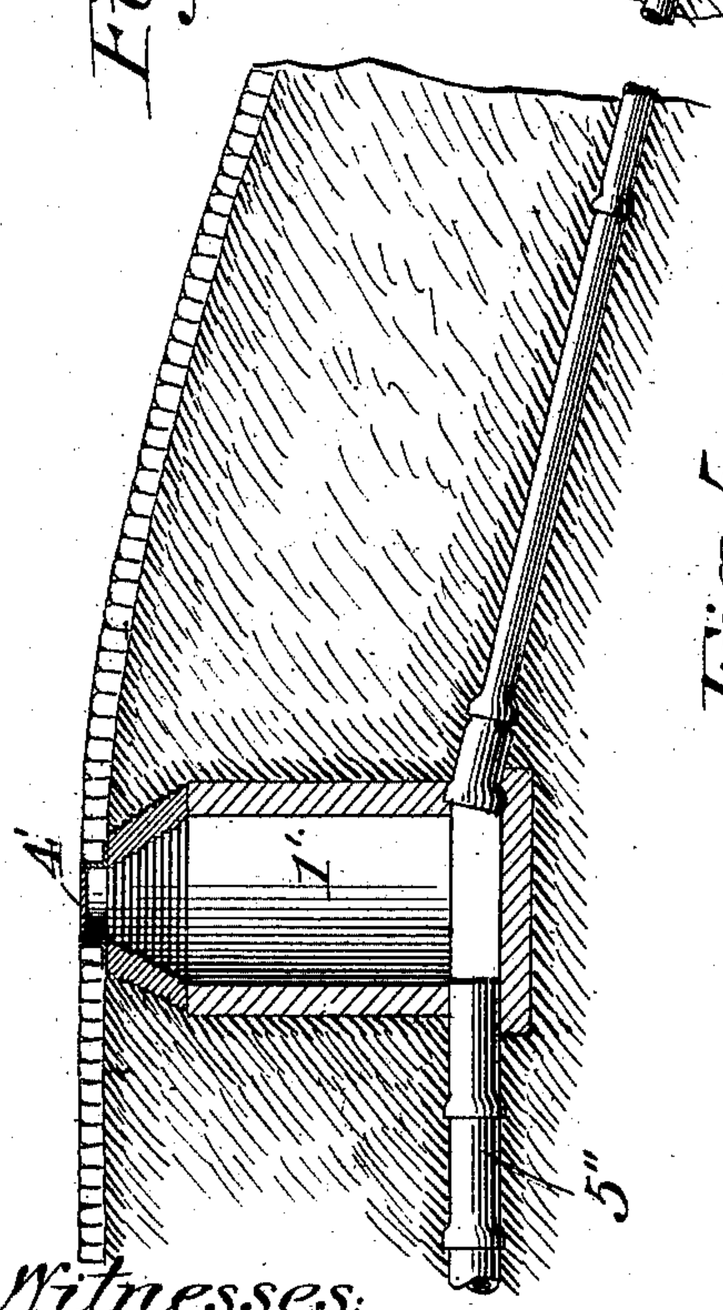


Fig. 4.



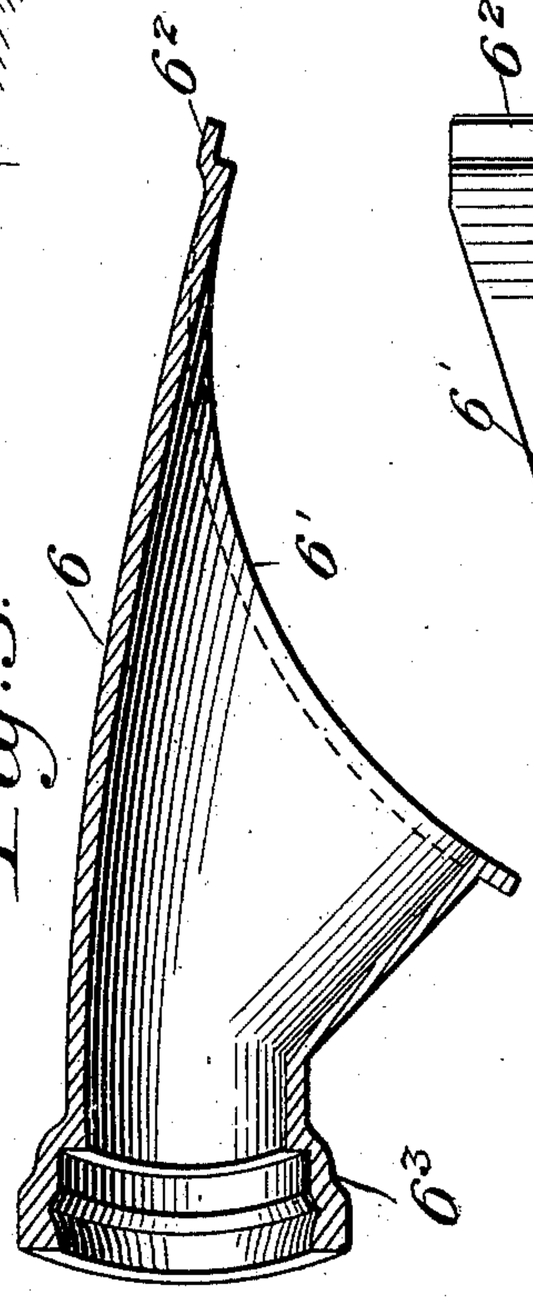


Fig. 5.

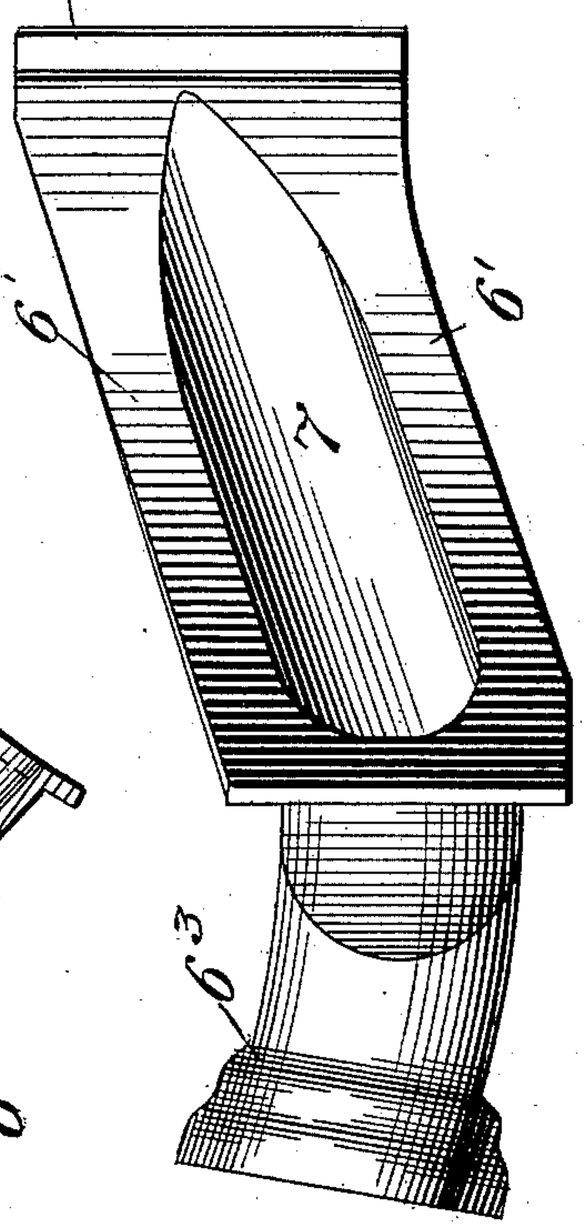


Fig. 6.

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UNITED STATES PATENT OFFICE.

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SYSTEM OF DRAINAGE, SEWERAGE, OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 686,002, dated November 5, 1901.

Application filed May 28, 1901. Serial No. 62,246. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH P. MONTY, a citizen of the United States, residing at Sandyhill, county of Washington, State of New York, have invented certain new and useful Improvements in Systems of Drainage, Sewerage, or the Like; 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 art to which it appertains to make and use the same.

My invention relates to certain improvements in systems of drainage, sewerage, and the like wherein the flow is maintained in conduits or pipe lines, and has for its object to provide means to arrest the velocity of flow at desired points, and thereby relieve the system from corrosion of the pipe-line and the shattering effects due to impact of a rapidly-moving body of liquid or semiliquid matter.

In the construction of systems of drainage, sewerage, and the like as heretofore practiced it has been necessary to prevent the possibility of the flow attaining a great velocity when heavy grades were encountered by laying the conduits at a great depth below the surface at the head of the incline to afford a slight "fall" throughout the length of the conductor between the head and the foot of the incline. Under such conditions it has been necessary to incur great expense in labor and materials in excavating for and constructing the conduit, as well as in the avoidance of serious accidents to the workmen and to the structure. In many instances where the grade is excessive the cost of a properly-constructed conduit under the old system has been prohibitive, and in the alternative the structure has either been abandoned or the line laid with such steep gradients as to inevitably result in the rapid deterioration and the ultimate destruction of the conduit at points where it receives the full impact of the high-velocity flow.

It is the purpose of my invention to provide a system that is cheap in first cost of material and labor, that is subject to none of the difficulties that surround the deep-trench uniform-gradient conduits, and that is simple in construction, effective in operation, and inexpensive in maintenance. To these ends my system comprises a conduit-line, preferably of iron pipe-sections of the desired dimensions, which is laid in shallow trenches following the contour of the ground or where practicable and permissible is laid along the surface of the ground, and in either event following the contour of the land which it traverses. It will be apparent that an immense saving in the cost of labor and material will result from such a system and that as it presents none of the insuperable engineering difficulties which are inherent in the old systems it is adapted to any locality. It is of course apparent that when the line follows a steep declivity the velocity of flow would be disastrous to even an iron structure of the character employed; but I effectually avoid the effect of such a flow by receiving the flow in a specially-constructed chamber where the velocity is gradually arrested and reduced to a point where it is no longer dangerous. This chamber is preferably constructed as a masonry or concrete manhole having an inlet from the pipe-line tangentially disposed with respect to its walls and an outlet placed at a point in the manhole where the velocity of the whirling water is sufficiently reduced.

The preferred forms of my invention are illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of my "velocity-reducer," comprising a manhole with a tangential inlet and bottom outlet. Fig. 2 is a transverse section through said manhole. Fig. 3 is a similar view to that in Fig. 2, illustrating certain modifications. Fig. 4 is a view illustrating my system as applied to a sewer laid on a sharp incline. Figs. 5 and 6 are enlarged detail views of the tangential inlet-nozzle.

Referring to the drawings, 1 represents a cylindrical manhole which is preferably built of concrete or cement to afford a smooth interior wall terminating in an inclined bottom 2, having a central outlet 2′. The top of the manhole is finished off with the usual tapering crown 3, surmounted by a flanged rim-plate and cover 4, flush with the surface of the ground. Embedded in the side of the manhole structure is an inlet which consists of a cast-metal pipe-section 6, having a laterally-flaring opening 7, surrounded by wings

6′, which lie in and conform to the interior wall of the manhole, the whole constituting a tangential delivery-nozzle through which the increasing flow is injected into the manhole in such manner as to cause it to follow the sides thereof and then gradually move with a constantly-decreasing velocity toward the center. In order that the first complete revolution of the jet may be maintained in a substantially horizontal plane, to subject the jet to the full retarding effect of the frictional resistance offered by the quieter flow toward the center and to keep the line of resistance offered by the side of the arrester in as near a horizontal plane as possible, the nozzle-orifice 7 is directed in an upwardly-inclined direction, as shown.

To receive the impact of the jet and avoid any scouring or abrading effect upon the sides of the manhole, rabbeted metal plates 8 are laid in and conform to the surface of said manhole. The first of these plates abuts the rabbeted edge 6^2 of the nozzle 6 and is in turn engaged by the next plate of the continuing series, which may be carried entirely around the surface to provide a smooth belt or wear surface in the path of the jet. Under certain conditions I prefer to further retard the velocity of flow and break up the jet as it follows the walls of the manhole. For this purpose I may provide the plates 8 with a series of grooves 8′ or ridges, or a combination of both, as illustrated in Fig. 3. When it is found desirable, I also form similar grooves or ridges, or both, in the surface of the manhole, both on the sides and inclined bottom thereof. These ribs and grooves in addition to the above-mentioned function serve as channels to catch and conduct all heavy solid matter that is thrown out against the sides and immediately conduct the same to the outlet, thereby preventing such matter rubbing and abrading the sides under the influence of the swirl of the jet.

An outlet 2′ connects the bottom of the manhole with the pipe-line and is preferably located in the axial line of the manhole and joins the pipe-line by an easy bend. In applying my "velocity-arrester" manhole, as above described, to my system I lay the conduit, preferably consisting of a series of metal pipe-sections of the usual commercial form. in a shallow trench following approximately the contour of the ground. This conduit of course is of a size and capacity to meet the requirements of hydraulic engineering practice, and may be connected at desired points with manholes, catch-basins, and branches in the usual manner. When an incline is reached I find it desirable to reduce the diameter of the conduit or pipe-line, and prefer to make the reduction through the intermediacy of an ordinary manhole, as 1′, Fig. 4, located at the top of the incline, connected on the intake side with the pipe-line 5″ and on the outlet side with the pipe-line 5 of reduced section, which latter is carried down the incline and connected to the coupling-flange 6^3 of the tangential nozzle 6 of a velocity-arrester manhole placed at or near the bottom of the incline. If the descent be especially long or steep, it is obvious that one or more "arresters" may be interposed in the line between the top and bottom of the incline. The outlet from the arrester-manhole is enlarged and communicates with a continuation of the pipe-line 5′, which is of the same or larger capacity than the portion 5″ at the top of the grade.

The flow in the conduit should be sufficient to carry off all matter introduced into the system. Hence in the level reaches of ground the line will be given the normal fall required by good engineering practice. When the line reaches the top of an incline, as at 1′ in Fig. 4, the velocity of flow increases and is constantly accelerated on the grade until the contents are discharged into the manhole 1 at the bottom of the incline. The tangential nozzle directs the flow against the side of the manhole without sudden shock, and the water takes up a whirling motion about the inside of the manhole, with an easy and gradual subsidence of the velocity until the center is reached, when it flows out at the enlarged outlet 2 into the pipe-line 5′.

While I have shown the velocity-arrester as a vertically-disposed cylindrical manhole with a tangential jet entering about midway of its height and an axial bottom outlet, it is obvious that the arrester may be constructed as a chamber of any other suitable form and may be disposed in a horizontal or inclined position, with the tangential nozzle and the outlet located as expediency or efficiency of action may dictate.

What I claim is—

1. In a pipe-line system for sewerage and the like, a pipe-line, and means to arrest the velocity of flow at desired points in said system, comprising a receiving-chamber, a tangential inlet from said pipe-line into said chamber, and an outlet for said chamber.

2. In a pipe-line system for sewerage and the like, a pipe-line, and means to arrest the velocity of flow at desired points, comprising a receiving-chamber, a tangential inlet from said pipe-line discharging in a direction inclined upwardly in said chamber, and an outlet from said chamber.

3. In a pipe-line system for sewerage and the like, a pipe-line, and means to arrest the velocity of flow at desired points in said system, comprising a receiving-chamber a tangential inlet from said pipe-line into said chamber, and an outlet from said chamber located in the line of reduced flow.

4. In pipe-line systems for sewerage and the like, a pipe-line, and means to arrest the velocity of flow in said system, comprising a receiving-manhole located at the bottom of each inclined section of said pipe-line, tangential inlets from said pipe-line sections into the respective manholes, each inlet having an enlarged nozzle conforming to the inner

surface of the respective manholes, and an outlet from each manhole to the succeeding section of the pipe-line.

5. In a pipe-line system for sewerage and the like, a pipe-line, said pipe-line being of reduced cross-section on inclines, a manhole at the bottom of each incline, a tangential inlet connecting each inclined section with its respective manhole, and an outlet from each manhole into the succeeding pipe-line section, whereby the velocity of flow down each incline will be arrested by a centrifugal whirl in the manhole at the foot of said incline.

6. In systems of sewerage and the like, a velocity-arrester comprising a manhole having a curved cross-section, a tangential inlet-nozzle therefor, and an outlet-pipe leading from said manhole at a point out of the direct line of flow from said inlet, whereby the velocity of flow from said inlet will be gradually retarded.

7. In systems of sewerage and the like, a velocity-arrester comprising a manhole having a curved cross-section, a tangential inlet-nozzle therefor, lining-plates in said manhole disposed in the path of the jet from said inlet-nozzle, and an outlet-pipe in the axial line of said manhole.

8. In a system of sewerage and the like, a velocity-arrester comprising a concrete manhole having a curved cross-section, a flaring inlet-nozzle tangentially disposed in said manhole, lining-plates in the inner surface of said manhole in the line of flow from said nozzle, and an outlet disposed in the axial line of said manhole.

9. In a system of sewerage and the like, a velocity-arrester comprising a concrete manhole having a curved cross-section, a flaring upwardly-directed inlet-nozzle tangentially disposed in said manhole, lining-plates in the inner surface of said manhole in the line of flow from said nozzle, and an outlet disposed in the axial line of said manhole.

10. In a system of sewerage and the like, a velocity-arrester comprising a manhole having a curved cross-section, a tangential inlet-nozzle opening therein, lining-plates having surface obstructions on the inside of said manhole in the line of flow from said nozzle, and an outlet from said manhole.

11. In a system of sewerage and the like, a manhole 1 having a curved cross-section, a tangential inlet-nozzle 6 having a flaring orifice 7, a series of lining-plates 8, and an inclined bottom 2 having a central outlet-orifice 2′.

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

JOSEPH P. MONTY.

Witnesses:

CHARLES R. PARIS,

LEO W. DONNELLY.