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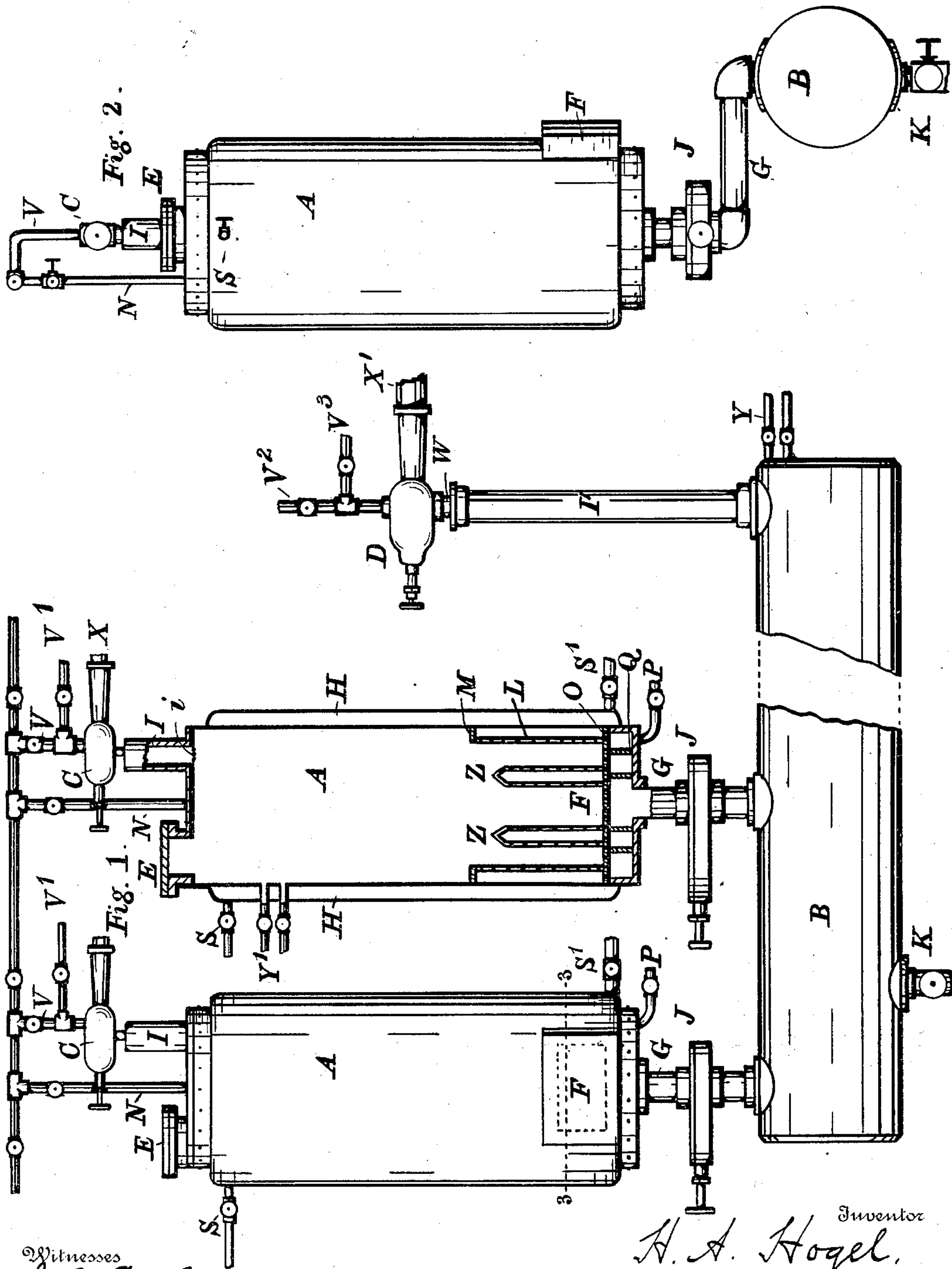
Patented Apr. 2, 1901.

H. A. HOGEI.
RENDERING APPARATUS.

(Application filed Oct. 20, 1899.)

(No Model.)

3 Sheets—Sheet 1.



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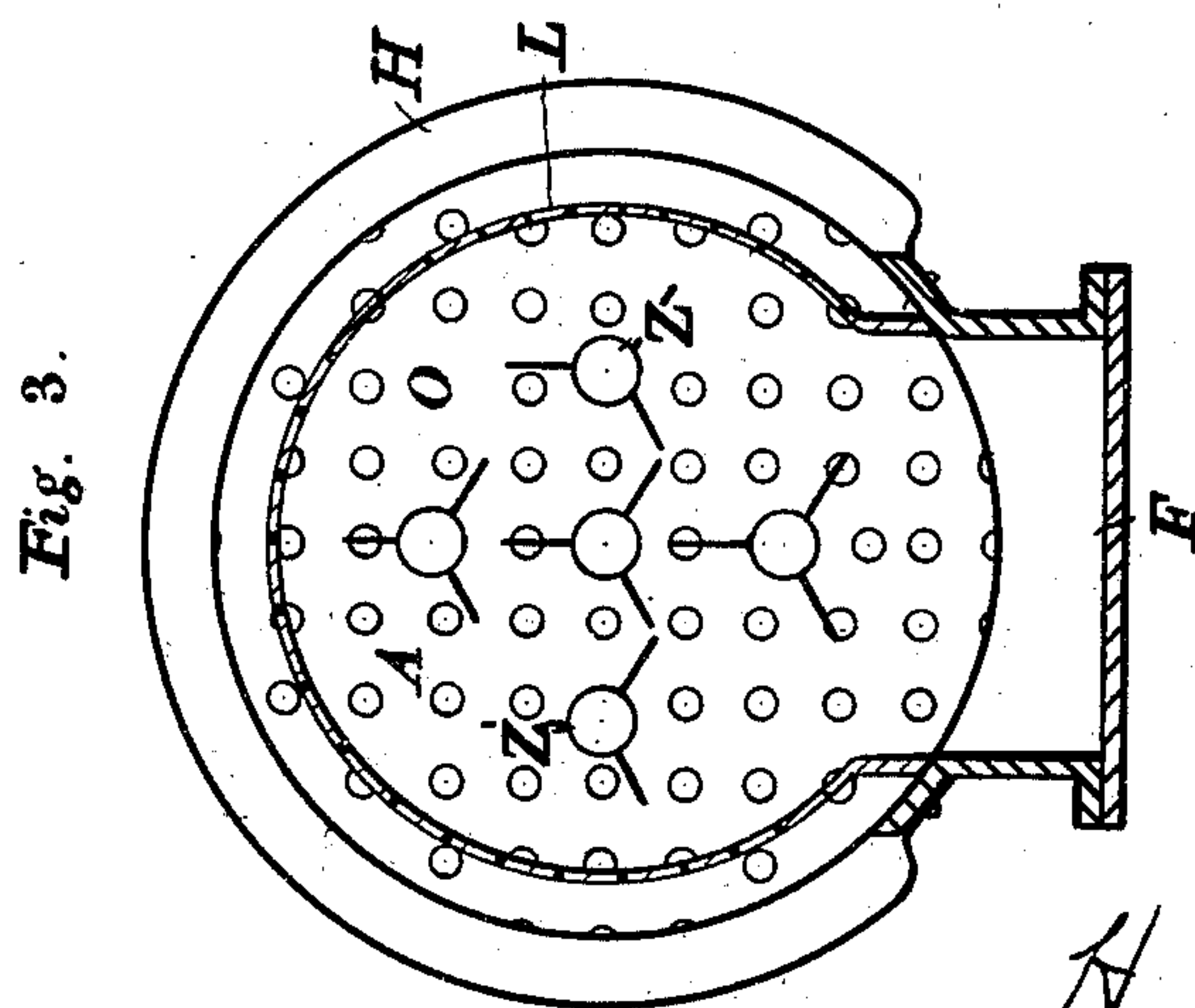
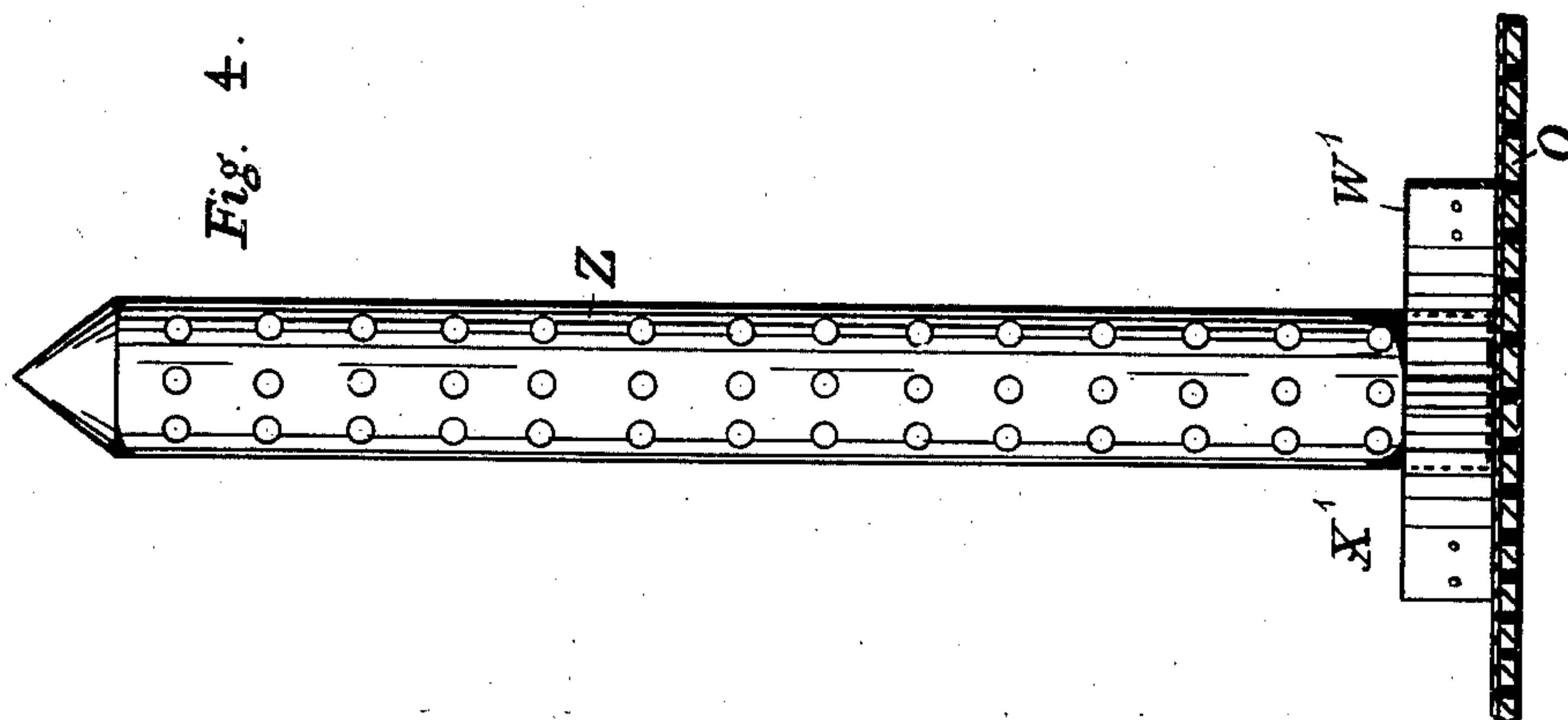
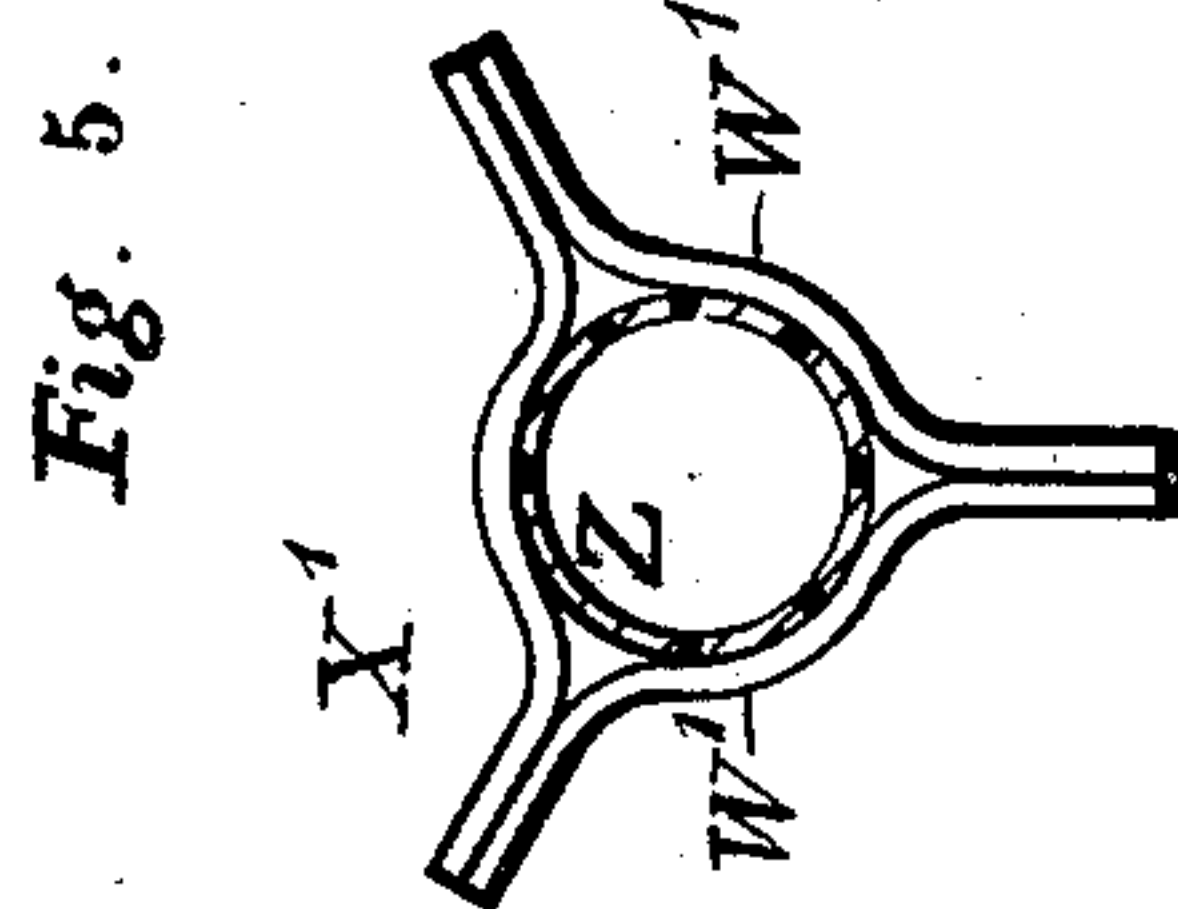
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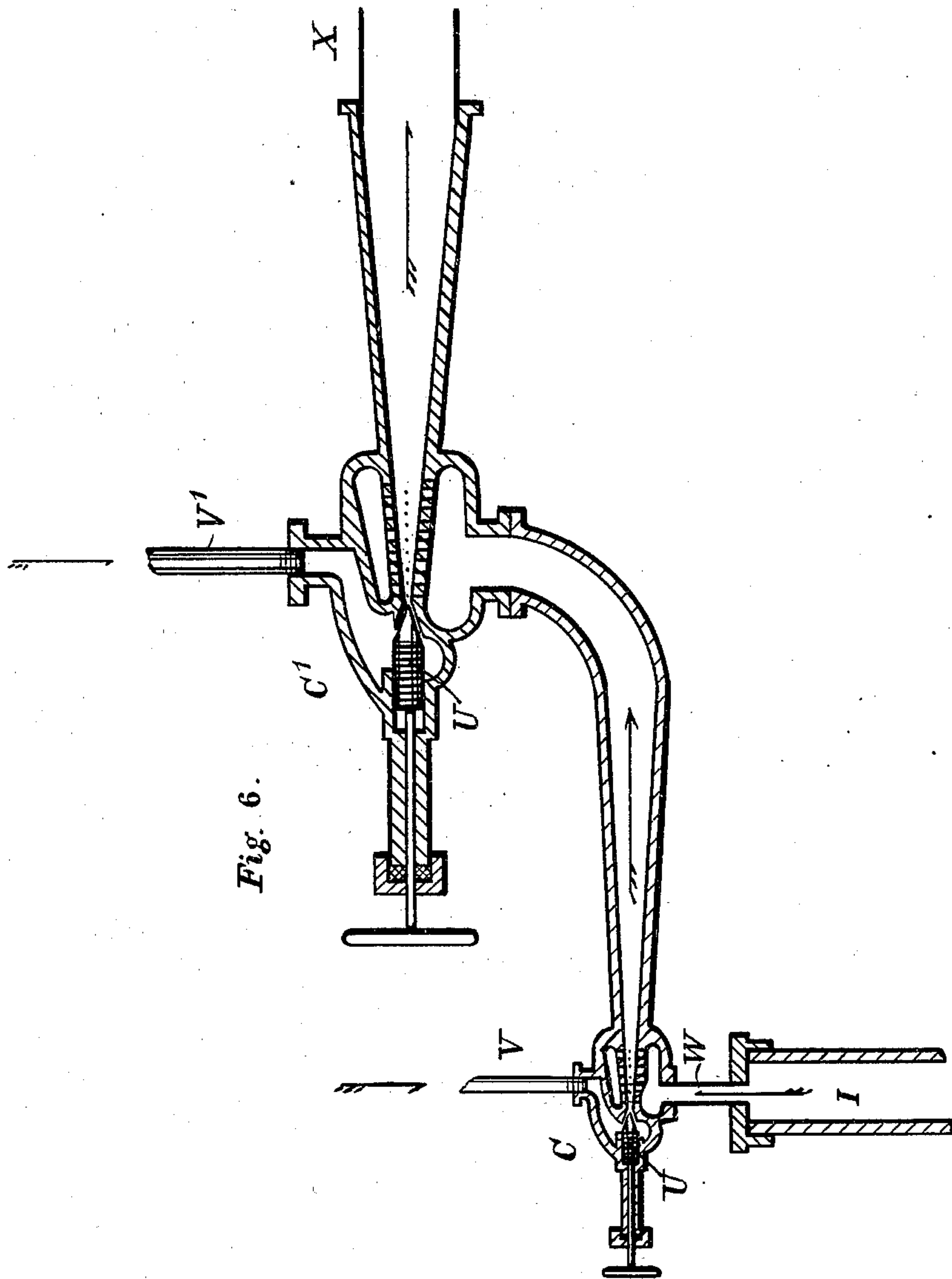


Fig. 6.

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UNITED STATES PATENT OFFICE.

HASCAL A. HOGEL, OF ROCHESTER, NEW YORK.

RENDERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 671,380, dated April 2, 1901.

Application filed October 20, 1899. Serial No. 734,222. (No model.)

To all whom it may concern:

Be it known that I, HASCAL A. HOGEL, a citizen of the United States, residing at Rochester, New York, have invented an Improved
5 Apparatus for Reducing Garbage, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improved apparatus for reducing garbage, whereby such reduction is facilitated and cheapened and the
10 products rendered more valuable.

My invention is fully described and illustrated in the following specification and the accompanying drawings, the novel features
15 thereof being specified in the claims annexed to the said specification.

Reference is had to the accompanying drawings, illustrating my invention, wherein the same letters refer to the same parts throughout the different views.

Figure 1 is a side elevation, partly in section. Fig. 2 is an end elevation. Fig. 3 is a section on the line 3 3, Fig. 1. Fig. 4 is an elevation of a drainage-tube. Fig. 5 is a section of the same, showing the footpiece in plan view. Fig. 6 is a horizontal section through the exhaustor.

In the practical application of my invention I employ one or more digesters or receptacles
30 A of adequate strength and capacity, a receiving-tank B, and the exhausters C and D. The digesters, of which any requisite number may be employed, are connected to the receiving-tank B by a pipe or pipes G, provided with a valve or valves J, preferably of
35 the straightway type. The receiving-tank may be provided with any suitable valved discharge or outlet opening K. The digesters are made of any suitable dimensions—say
40 seven feet in diameter and fifteen to eighteen feet high—and of sufficient strength to stand a steam-pressure of one hundred pounds or more. Each of the digesters is provided with a suitable manhole E, through which the garbage or other material is introduced, and a
45 discharge or outlet manhole F. These openings are closed in any suitable or preferred manner during the digesting operation. Each digester may be provided with a steam-jacket
50 H, applied in any ordinary or preferred manner and made of sufficient strength to carry steam of high pressure. The digesters are

supported in place in any convenient way, and they may be arranged in any suitable relation with the receiving-tank. Provision is
55 made for introducing steam into the upper portions of the digesters by the pipes N and into their bottoms by the pipes P. The digesters are provided with perforated false bottoms O, arranged, preferably, on a level
60 with the lower edge of the manhole-opening F and supported, if necessary, by the rings, studs, or other devices Q. This perforated plate performs the functions of a strainer and is provided with perforated pipes Z,
65 which are placed upright on the perforated plate O. These tubes or pipes are closed and made conical at their upper ends and open at the bottom and, being perforated with a series of suitable openings, afford channels
70 through which the liquids find their way to the space below the false bottom. Any suitable number of these tubes may be employed, and they may be arranged in any suitable
75 manner. They are made of such dimensions that they may be removed and replaced through the manhole F. Any suitable arrangement may be employed to secure these tubes in the upright position during the process of filling—such, for instance, as the device
80 shown in Figs. 4 and 5, which consists of the straps W', bent to the proper shape and riveted together at their ends to form the triangular support X'.

Inside the lower end of the digester the
85 perforated cylinder L may be placed. This cylinder is smaller in diameter than the inner shell of the digester, thus leaving an annular space outside of the cylinder and within the said shell, and this annular space is closed
90 at the top by the annular plate M and open at the bottom through the perforations in the plate O. This perforated cylinder serves to assist in the separation of the liquids from the solid matter, the liquids passing through
95 the perforations into the annular space and then through the plate O to the pipe G.

S S' are the steam-pipes through which steam is introduced into the jacket H and any condensation discharged.
100

C represents an exhaustor or vacuum-producing device of any suitable or preferred construction, one of which is applied to the upper part of each of the digesters. Any

suitable vacuum-pump or other similar device may be employed for this purpose; but in the construction shown I have represented an exhaustor operated by a steam or water jet of substantially the construction shown in the sectional view, Fig. 6, in which a spindle-valve U controls the discharge of steam or water supplied by pipes V or V' into the interior of the exhaustor, into which air or gases are drawn by the jet through the passage W to be discharged through X into any suitable conduit or locality. I prefer to employ a vacuum of at least twenty inches.

Y represents a series of plug or other suitable valves attached to the receiving-tank B at different levels and serving to draw off the grease or other liquid substances separated from the garbage by the digestion. Pipes Y' enter the digesters, as shown in Fig. 1, through which pipes grease may be drawn off during the process of digestion.

D is an exhaustor applied to the receiving-tank B. The exhaustors are preferably connected to large pipes I I', attached to the digesters and the receiving-tank to prevent any of the substances being operated on from being drawn into the exhaustors. These pipes may also be provided with strainers *z*. It will be observed that the exhaustors are provided with suitable supply-pipes V, V', V², and V³, connections, and valves, so that they may be operated by either steam or water under pressure. The exhaustors receive steam through the pipes V and V² and water under pressure through the pipes V' and V³. By turning steam of, say, fifty to one hundred pounds pressure into the exhaustor I can produce a vacuum of at least twenty inches in the digester in a very short time, and after this has been secured I cut off the steam and open the valve in the water-supply pipe V' and maintain the exhaustor in operation by the use of water in it as long as the digestion continues. The water condenses all the noxious gases, and as discharged from the exhaustor it is pure and inodorous and may be delivered into a stream or other suitable locality without creating objections.

It will be understood that my digesters, tanks, &c., are provided with suitable pressure and vacuum gages, safety-valves, or other devices necessary for the proper working of the apparatus.

In the practical working of my improved process for the reduction of garbage I fill one of the digesters with the garbage to be treated, preferably only partially, and having closed the manholes I start the exhaustor C into operation by admitting steam to it through the pipe V and opening the valve U. A vacuum is soon formed in the digester, and when this has attained a suitable degree I admit steam through the pipe P directly into the lower end of the digester. The pipe P may extend inside the digester, being bent around the interior and perforated. The exhaustor may be kept in operation for some

time after the admission of the steam, as condensation takes place at first amid the garbage, especially toward the top, until the whole has become thoroughly heated and it is desirable to draw off the cooled steam, or the exhaustor may be continued in operation by steam during the whole cooking process, or the steam may be shut off and the exhaustor operated by water. The time required for the requisite digestion or cooking of the garbage is very much reduced by the employment of the vacuum, and consequently less fuel is used. Steam may be admitted to the jacket H at any preferred point in the operation, even before the exhaustor is started, and it may be kept on during the whole operation or used in drying the solid material. When the digestion has been properly performed, I start the exhaustor D on the receiving-tank B and produce a vacuum therein. This exhaustor may be operated by steam or by water or at first by steam and later by water. I then open the valve J and permit the liquid substances tried out of the garbage to pass into the receiving-tank along with more or less water or condensed steam, the perforated plate O serving as a strainer to retain any solid materials in the digester. This operation can be also assisted by turning steam into the top of the digester through the pipe N, which as it condenses washes and permeates the garbage and facilitates the separation of the liquids from the solid materials. By either or both of these means the fluid or semifluid substances are allowed to flow down into the tank B, and any solid or semisolid materials which will not pass through the strainer are finally removed through the manhole F in a condition more or less approaching entire dryness, according to the character of the garbage operated on and the management of the process. The fats or grease may be discharged from the receiving tank or tanks into any suitable vats or packages for shipping through the valves Y, which permit also of the gradation of these products according to their gravity. The water or condensed steam will be finally discharged through the pipe K. In consequence of the use of the vacuum the water and grease are inodorous, all noxious gases and vapors having been removed and these materials having been maintained at a comparatively high temperature during the process of the removal of such gases, thereby preventing absorption.

The exhaustion of the digester may be produced by the exhaustor D on the receiving-tank, and in that case all the digestion or cooking may be done by steam admitted above the garbage, so that the water and grease are drawn down into the receiving-tank by the vacuum as the digestion proceeds and the solid material may be thoroughly dried in the digester.

The advantages of my invention are that by using the vacuum before the steam is ad-

mitted the time required for the cooking or digestion is reduced by more than half, with a consequent large saving of labor and fuel. The capacity of an apparatus of a given size is also materially increased, a smaller number of digesters being required to handle any given amount of garbage or other similar material. The operation is also practically odorless, since the gases or odor-producing substances are removed from the garbage by the vacuum before the admission of the steam, which drives off such materials freely in the ordinary manner of digestion. The gases in the air discharged by the exhausters are thoroughly condensed by the jet or stream of water. The exhausters are connected by suitable piping with a tank holding water under pressure, and the water is delivered into the exhausters through the valve U and operates not only to produce the vacuum, but also to condense and neutralize the various vapors and odors produced during the digestion.

In order to thoroughly dry the solid material left in the digester, I deliver a current of heated air or other gases into the digester, preferably through the pipe P, which may be fitted with suitable valves and connections for this purpose, while the vacuum is preferably maintained in the receiving-tank. The air or gases may be heated in any suitable or preferred way or the products of combustion of any suitable fuel or furnace may be employed or the hot air or gases may be admitted at the top of the digester to dry the solid material, the passage between the digester and the tank being open and the vacuum maintained in the tank, and while such heated air or gases may be introduced into the digester by a suitable blower or other pressure-producing device it is preferable to draw them through by means of a partial vacuum. By this means the solid residue left from the digestion of the garbage may be recovered quickly and cheaply in an entirely dry and inodorous condition. It may be used as a fertilizer alone or mixed with phosphate or otherwise prepared, as may be desired.

In order to facilitate the separation of the liquid or semiliquid substances from the relatively non-liquid or solid materials which remain in the lower part of the digester, it is desirable to form passages in such solid materials through which the liquids may be discharged. For this purpose I employ the perforated pipes Z, hereinbefore described, which pipes may be removed through the manhole along with the remaining solid materials and replaced before the digester is again filled for another cooking operation. These drainage-pipes are formed with conical or pointed tops, which facilitate the passage of the solid material down around them, it being easier for the material to pass a pointed top than a blunt top.

I have already mentioned that I may use the exhausters with steam alone or with water alone or first with steam and later with water.

I may also use the exhausters as shown in Fig. 6, in which one is arranged to condense the exhaust from another which is operated by steam. In this case the water-operated exhauster C' is preferably somewhat larger than the steam-exhauster C and it is attached to its exhaust-pipe, as shown. It is connected by suitable piping with a tank containing water under pressure and receives the gases or vapors drawn from the digester or the receiving-tank by the steam-operated exhauster. These gases are condensed by the water-exhauster, the discharge from which is entirely harmless and may be delivered directly into any suitable locality without offense. This arrangement may also be used during the drying operation.

It will be understood that under certain circumstances the cooking may be performed by the steam-jacket alone, which may be applied to the bottom of the tank, if preferred. It will also be obvious that instead of an exhauster on the digester operated by steam or water two exhausters may be used thereon, one for steam and the other for water. Any of the exhausters may also be operated by water alone. During the drying operation the vacuum is preferably maintained by the use of water in the exhauster. It will further be understood that my improved rendering apparatus is capable of being used in different ways—for instance, as an ordinary digester entirely closed and receiving steam at the bottom—the material in the digester being treated under pressure, as usual, and for this purpose the pipes Y', Fig. 1, through which the grease is drawn off, are brought into use, and it may also be used in connection with the exhauster on the top of the digester, the cooking being done at a low temperature with a more or less complete vacuum in the digester or with pressure therein, according as the relations of the steam-supply with the rate of the exhaustion are regulated. Thus with a small supply of steam and a large volume of exhaustion the vacuum will be more or less fully maintained and the cooking will be performed at a comparatively low temperature, and by varying these two factors any intermediate temperature and pressure may be obtained up to the full pressure of the steam entering the lower part of the digester, the exhaust then being reduced so as to only carry off the gases or vapors produced. In washing or flushing the cooked material with steam admitted at the top, the digester being open into the exhausted receiving-tank, any pressure in the digester will be avoided, as it is merely a waste of steam.

By the use of my improved apparatus provided with the means of reducing the pressure I am enabled to treat four or five batches of garbage in twenty-four hours with a great saving of fuel and labor.

I claim—

1. The combination with the digester pro-

vided with the strainer at its lower end and upright perforated drainage-tubes on the said strainer, having conical upper ends, of the steam-supply pipes connected to its upper and lower portions respectively, the exhaust-
5 on the digester, the receiving-tank and the exhaust on the tank, as and for the purposes set forth.

2. The combination with the digester arranged to be heated by steam, of the steam-exhauster and the water-jet exhauster arranged to receive and condense the exhaust from the steam-exhauster, as and for the purposes set forth.

3. The combination with the digester arranged to be heated by steam, of the steam-exhauster and the water-jet exhauster arranged to receive and condense the exhaust from the steam-exhauster, and the receiving-
20 tank and means for producing a vacuum therein, as and for the purposes set forth.

4. The combination with the digester arranged to be heated by steam, of the steam-

exhauster and the water-jet exhauster arranged to receive and condense the exhaust
25 from the steam-exhauster, and the receiving-tank provided with the steam-exhauster and the water-jet exhauster applied to the exhaust thereof, as and for the purposes set forth.

5. The combination with the digester arranged to be heated by steam, a perforated false bottom in said digester, and perforated upright pipes having conical upper ends, of the exhauster adapted to be operated by
35 steam or water, and suitable steam or water supply pipes, substantially as described.

6. The combination with the digester provided with the perforated false bottom, of the upright perforated drainage-tubes having
40 conical upper ends, and the supporting-foot-piece, substantially as described.

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