

No. 750,813.

PATENTED FEB. 2, 1904.

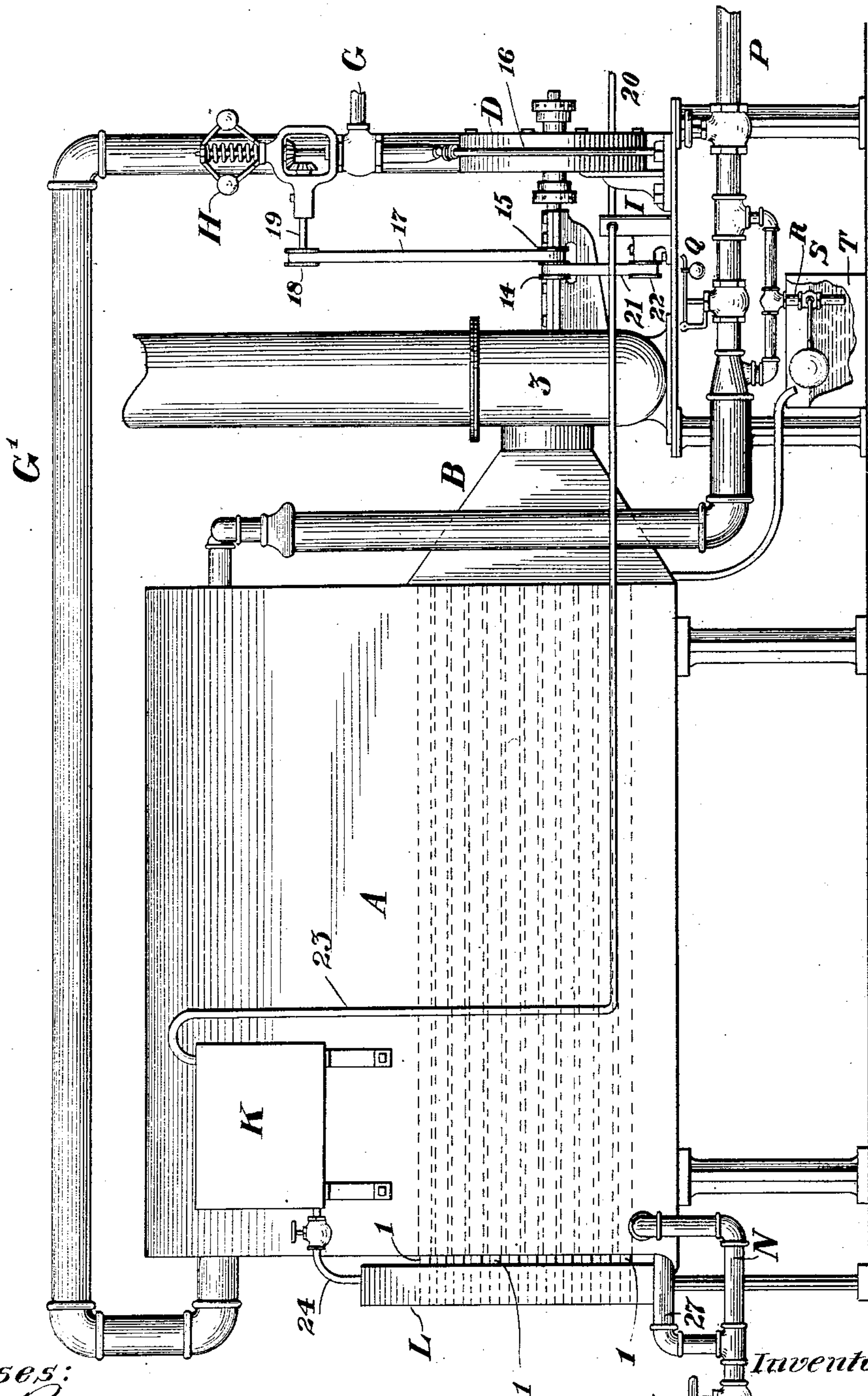
W. S. COLWELL.
APPARATUS FOR CONDENSING VAPOROUS FLUID.

APPLICATION FILED JUNE 6, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

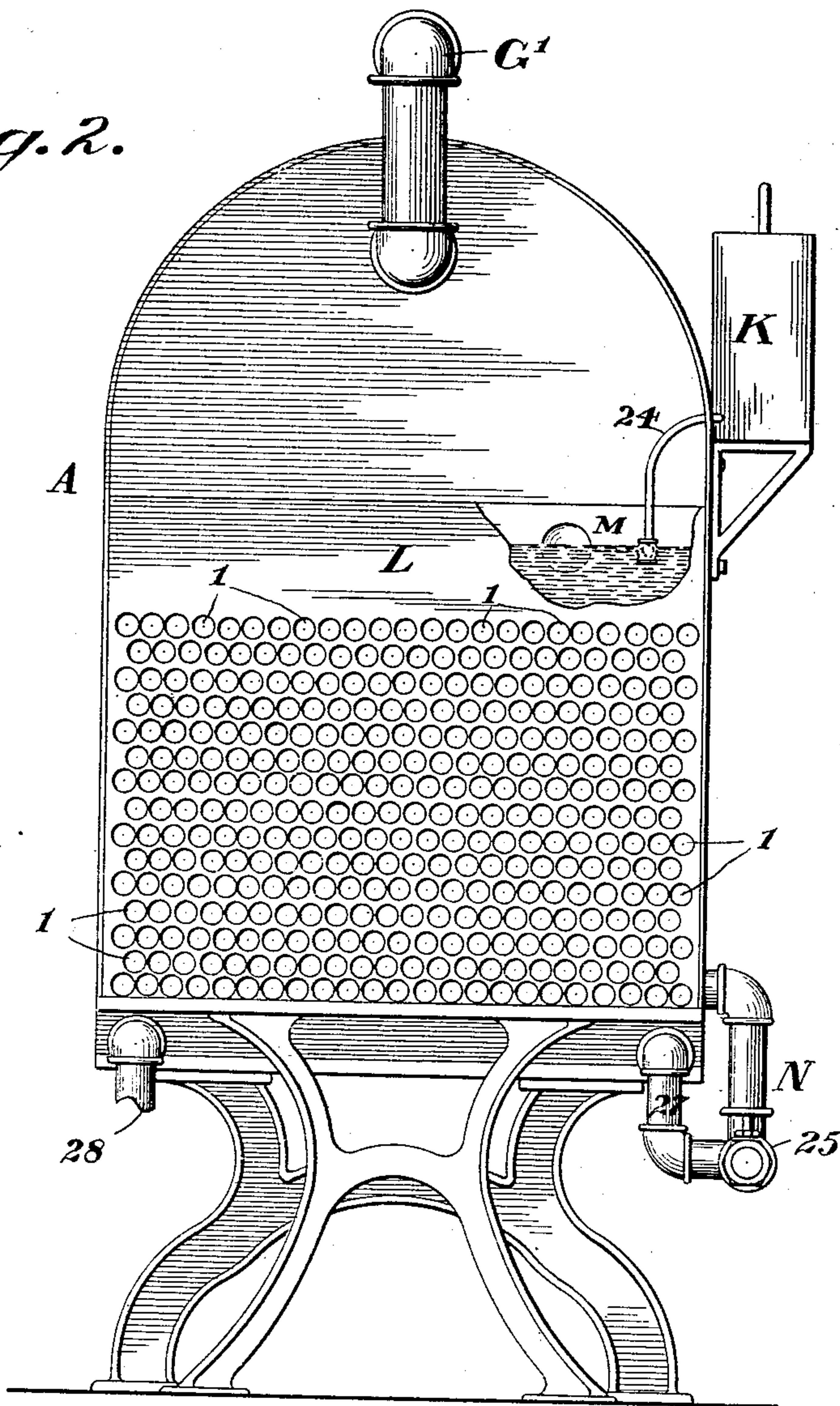
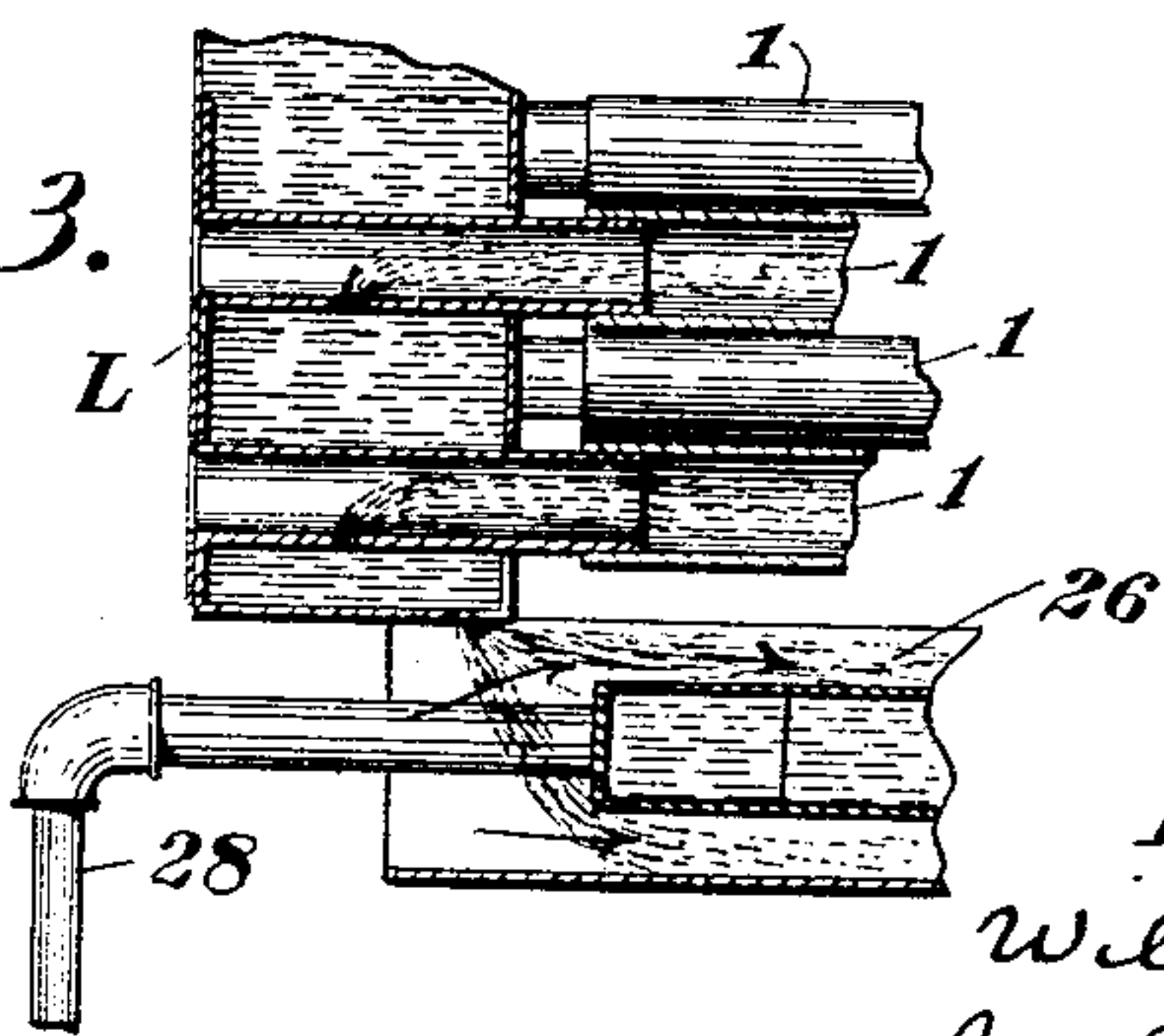


Fig. 3.



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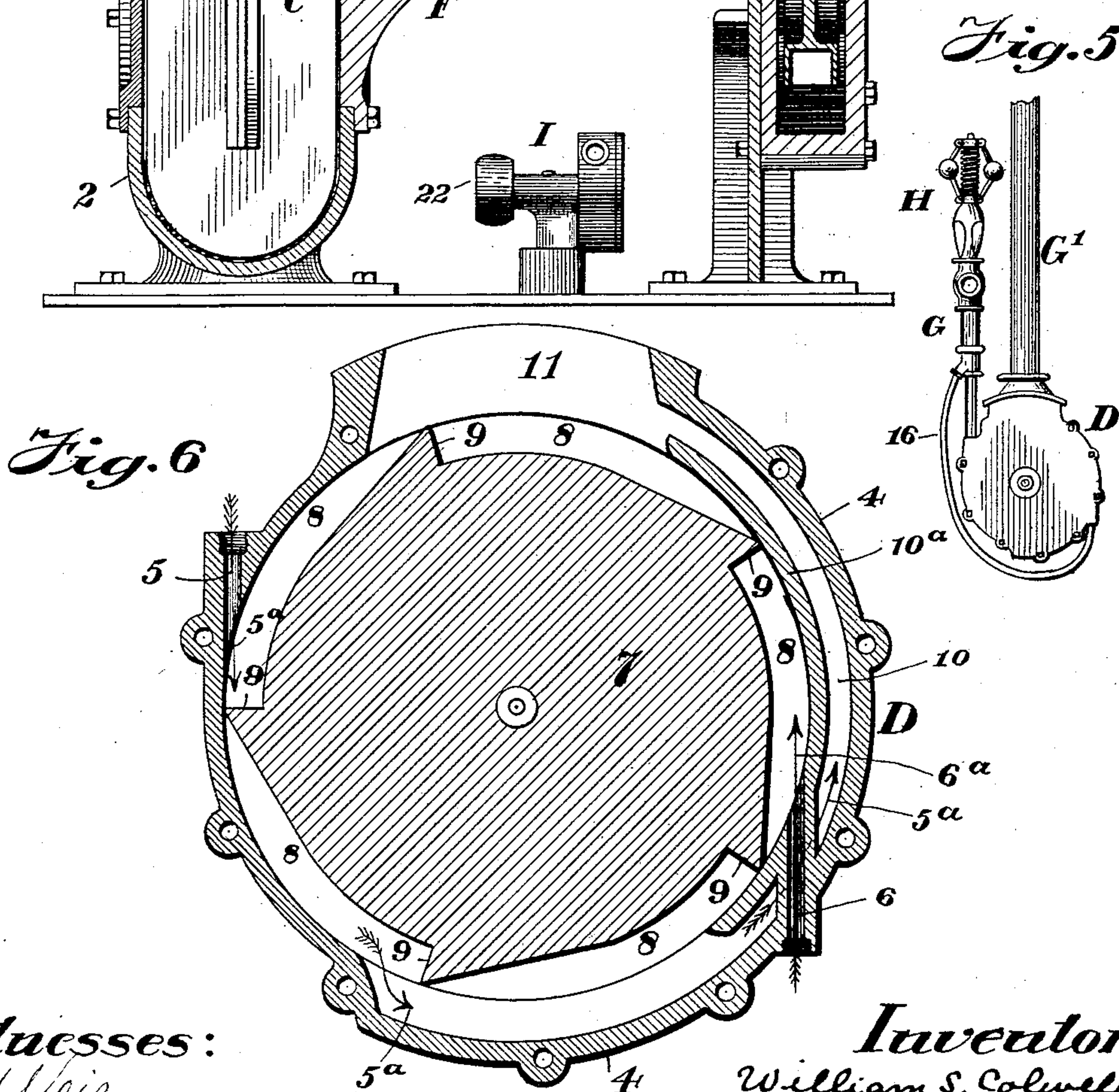
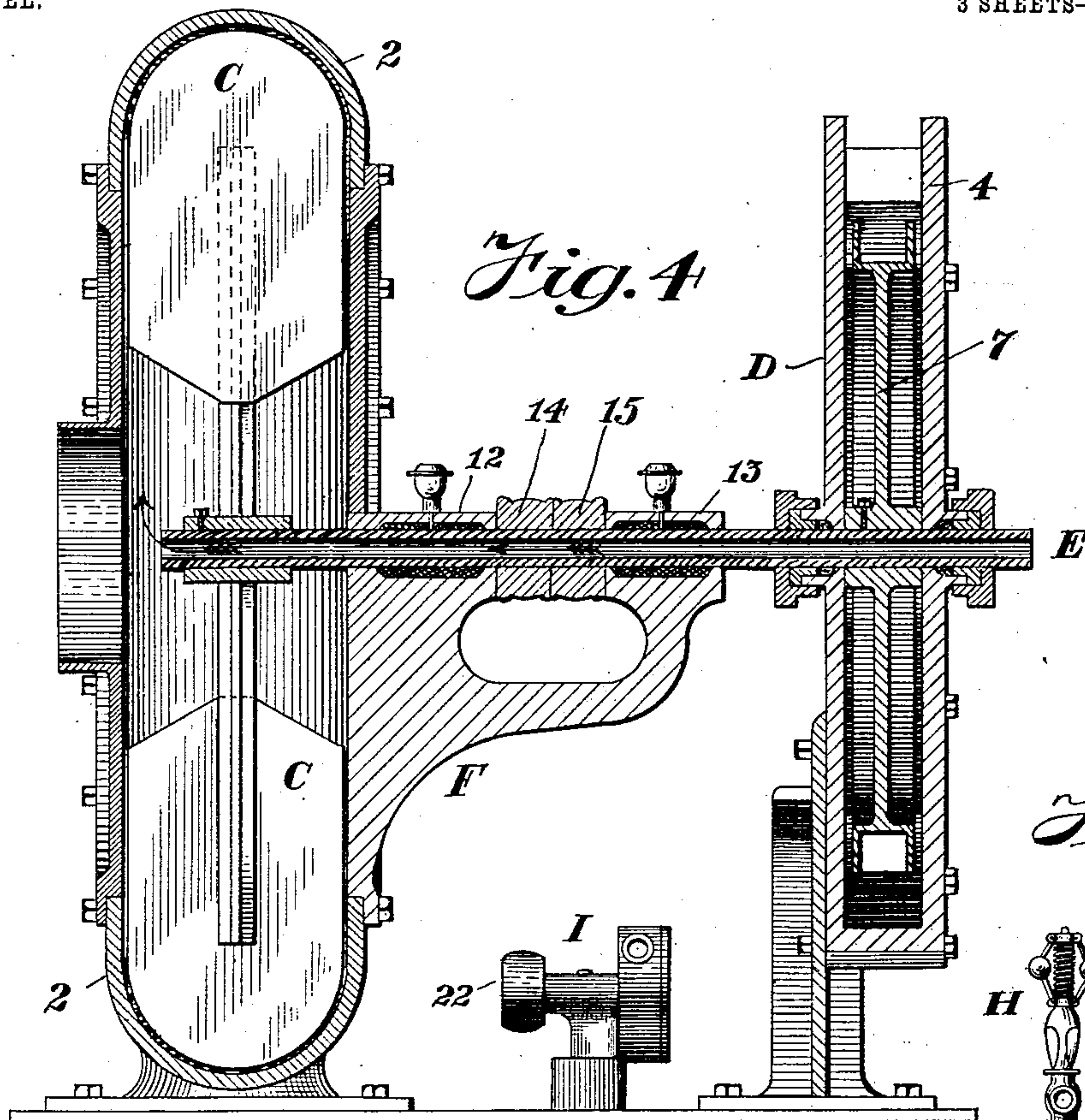
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NO MODEL.

3 SHEETS—SHEET 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM S. COLWELL, OF CHICAGO, ILLINOIS.

APPARATUS FOR CONDENSING VAPOROUS FLUID.

SPECIFICATION forming part of Letters Patent No. 750,813, dated February 2, 1904.

Application filed June 6, 1902. Serial No. 110,473. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. COLWELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Apparatus for Condensing Vaporous Fluid, of which the following is a specification.

In an apparatus characterized by my improvements steam from a boiler or generator is conducted through a suitable passage to a condenser containing a cooling-pipe system. Air-currents are induced through the cooling-pipe system by a rotary exhaust-fan, and water in jet form is admitted into the cooling-pipes for the purpose of saturating the air-currents which are induced through such pipes or tubes.

Prominent objects of my invention are to dispense with the use and expense of an ordinary steam-engine for operating the exhaust-fan, to avoid the waste of water incident to the employment of an ordinary steam-engine, and without contaminating the steam passing from the generator to the condenser to provide an arrangement whereby steam on its way from the generator to the condenser may furnish power for operating the rotary fan.

Further objects are to automatically control the flow of steam and the speed of the rotary exhaust-fan, to dispense with all need for high pressure as a means for supplying water to the cooling-pipe system, to utilize the power employed for driving the fan as a means for actuating a governor and a pump, to avoid waste of water, to cool certain bearings hereinafter mentioned, and to provide a simple, economical, and efficient apparatus.

To the attainment of the foregoing and other useful ends steam on its way from the boiler or generator to the condenser operates a rotator from which the exhaust-fan, the pump, and the governor are driven. The rotator comprises a passage forming a portion of the passage-way from the generator to the condenser and containing a light-running revoluble member which is operated by the passing steam. The pump serves to supply a tank, and the latter supplies a water-distributing

chamber through which perforated inlet end portions of the cooling-pipes extend.

In the accompanying drawings, Figure 1 is a side elevation of an apparatus embodying my invention, the generator or boiler being omitted for convenience of illustration. It is understood, however, that such boiler or generator may be of any known or suitable construction. Fig. 2 shows the apparatus in end elevation with a portion of the water-distributing chamber broken away for convenience of illustration. Fig. 3 is a section through a portion of the water-distributing chamber and the end portions of several of the cooling-pipes extending through the same. Fig. 4 is a vertical central section through the exhaust-fan and the rotator on a larger scale than in preceding figures. Fig. 5 is a side elevation of the rotator on a reduced scale. Fig. 6 is a vertical central section through the rotator of Fig. 4, the plane of section being transverse to the section plane of said figure.

The condenser A is provided with a cooling system comprising suitably-arranged passages extending through the condenser and adapted to conduct induced currents of air saturated with water, a simple and preferred arrangement being a set of horizontally-disposed pipes or tubes 1, extending through the condenser and opening at opposite sides thereof, as indicated in dotted lines. With such arrangement the pipes or tubes of the cooling pipe or tube system open at one side of the condenser into the external atmosphere, as in Fig. 2, while at the opposite side of the condenser the pipes or tubes open into a hood B, which connects with the fan-chamber of a casing 2, containing a rotary exhaust-fan C. This exhaust-fan serves to induce air-currents through the cooling-pipe system and has its chamber provided with a suitable outlet, such as a stack-pipe 3.

Steam which is admitted to the condenser and therein cooled and condensed is taken from a suitable source of supply, such as a boiler or generator, and on its way from the source of supply to the condenser it is utilized as a means for operating a rotator D, which in turn serves to operate such running mech-

anism or mechanisms as it may be desirable to employ.

The rotator comprises a suitable shell or housing containing a revoluble member which is actuated by the passing current of steam, the arrangement shown being a housing or casing 4, having oppositely-arranged inlets 5 and 6 and inclosing a disk wheel 7, having a peripheral series of pockets 8 with end faces or abutments 9, against which the steam impinges for the purpose of driving the wheel. Where oppositely-arranged inlets 5 and 6 are provided, the casing or housing may have a segmental passage 10 arranged as in Fig. 6, whereby the inflowing currents of steam will respectively take the directions indicated by the arrows—that is to say, steam entering by way of inlet 5 will pass around between the wheel and the housing to the segmental passage 10 and thence through such passage to the outlet 11, as indicated by arrows 5^a, while steam entering by way of inlet 6 will pass between the wheel and the inner wall 10^a of the passage 10 on its way to the outlet 11, as indicated by arrows 6^a.

The rotary member of the rotator D is suitably connected with and serves to operate the exhaust-fan. By such arrangement the passage-way or space affording a passage-way for steam within the casing or housing of the rotator, whether subdivided, as shown, or otherwise, forms a portion of the passage-way which takes live steam from the boiler or generator and conducts it to the condenser, the revoluble member of the rotator being arranged within such passage-way or passage.

As an extremely simple and compact arrangement the fan-wheel and the rotary member of the rotator are both secured upon a rotary shaft E, Fig. 4, and in order to keep the bearings cool the shaft E is made hollow, so that during operation the fan will induce a current of air through the hollow shaft, as indicated by arrows. With this simple and compact arrangement the fan-casing may have a bracket F, adapted to provide bearings 12 and 13 for the shaft E at opposite ends of a pair of belt-pulleys 14 and 15, which are provided for taking power from the revoluble shaft for certain other purposes hereinafter mentioned.

Steam is conducted from the source of supply to the rotator by way of pipe G, connecting with inlet 5 and having a branch pipe 16, Fig. 5, connecting with the inlet 6, and from the outlet 11 of the rotator the steam is taken by pipe G', and thence conducted to the condenser, whereby the pipes G G' and the casing or housing of the rotator provide between the generator and the condenser a steam-conducting passage in which the revoluble member of the rotator is arranged.

The flow of steam is automatically regulated by a governor H, Fig. 1, and as a simple and convenient arrangement the governor

is operated from the rotator by a driving-belt 17, arranged to connect pulley 15 on the rotator-shaft E with a pulley 18 on a rotary shaft 19, which serves to actuate the governor. In this way the rotator, which is actuated by steam passing from the boiler or generator to the condenser, serves to operate both the exhaust-fan and the governor, which latter automatically controls the flow of steam, and thereby regulates the speed of the rotator and of the fan. The rotator is also employed to operate a small pump I, arranged for pumping up water into a tank K, whereby a supply of water for saturating the air-currents induced through the cooling-pipe system is provided. The pump I derives its supply from any suitable source through a pipe 20 and may be of any ordinary or desired construction, a pump of the rotary type being preferable. With a pump of such type its rotary member can be driven from the rotator by a driving-belt 21, arranged to connect a pulley 22 on the rotary pump member with pulley 14 on the rotator-shaft E. Water is conducted from the pump to the tank K by way of a pipe 23, and as a convenient arrangement the tank can be positioned upon the condenser.

In order to saturate the air-currents induced through the condenser and also to avoid waste of water, the apparatus is provided on one side with a water-distributing chamber L, arranged below the level of the supply-tank K and connected therewith by a suitably-valved pipe 24. With this arrangement the cooling-tubes 1 project outwardly from one side of the condenser and extend through the water-distributing chamber, as best shown in Fig. 3, in which the projecting end portions of the pipes or tubes 1 are formed by pipe or tube sections coupled to the main lengths of the pipes or tubes and extended through the shell or casing of the water-distributing chamber. The portions of the pipes thus extending through the water-distributing chamber are apertured or perforated, whereby water from the chamber will enter the pipes in spray or jets, as indicated in dotted lines, and in order to secure the best results the apertures or perforations in the pipes are formed through the lower sides thereof, whereby the water must pass upwardly into the pipes.

In order to automatically check the flow of water from the supply-tank to the water-distributing chamber when the water has risen to a determinate height within the latter, the pipe 24 is provided with a float-valve M, arranged within the water-distributing chamber.

The water of condensation can be drawn off from the condenser by a pipe N, having a valve 25, and, if desired, the main shell or casing which provides a condensing-chamber may have a passage 26 arranged below the condensing-chamber and containing a cooling device, such as illustrated in my application, Serial No. 91,904, filed January 30, 1902. With such ar-

5 rangement passage 26 will open at one end into the atmosphere and its opposite end open into the hood B, and the bottom portion of chamber K will be perforated or apertured to permit water in spray form to pass into the inlet end portion of passage 26, as in Fig. 3. The cooling device understood to be arranged in passage 26 has an inlet-pipe 27, connecting with pipe N at a point back of the valve 25, and a suitable outlet-pipe 28. (Shown in Fig. 2.)

10 In Fig. 1 I have shown a steam-supply pipe P, having a governor-valve Q and a by-pass R, connected with an injector S, arranged for taking up water from a drip-trap T and passing the water thus taken up into the steam-supply pipe. This arrangement is fully described in my said application, Serial No. 91,904, and hence it need not be herein described in detail, it being understood that it may be either employed or omitted, as may be desired.

What I claim as my invention is—

1. In an apparatus in which steam is generated for condensation to obtain pure water, and in which the steam thus generated is conducted from the boiler or generator to a condenser containing a cooling-pipe system through which currents of air saturated with water are induced by a rotary exhaust-fan; a rotator comprising a chamber formed by an expanded portion of the steam-passage between the boiler or generator and the condenser and a rotary member arranged within said chamber and actuated by the steam on its way from the boiler or generator to the condenser; and power-transmitting connection between said rotary member and the rotary exhaust-fan.

2. In an apparatus for condensing vaporous fluid, a condenser having a cooling-pipe system; a rotary fan for inducing air-currents through the cooling-pipe system; a passage for conducting steam from a boiler or generator to the condenser; a rotator operated by the steam flowing from the boiler or generator to the condenser, and in turn operating the rotary fan; and a governor operated by the rotator and arranged to regulate the flow of steam to the condenser and thereby control the speed of both the rotator and the rotary fan.

3. In an apparatus for condensing vaporous fluid, a condenser having a cooling-pipe system; a rotary fan for inducing air-currents through the cooling-pipe system; a passage for conducting steam from a boiler or generator to the condenser; and a rotator operated by the steam flowing from the boiler or generator to the condenser, and comprising a casing or housing containing a rotary steam-actuated member, said rotary member and the rotary fan being mounted upon a rotary shaft common to both.

4. In an apparatus for condensing vaporous fluid, a condenser having a cooling-pipe system; a rotary fan for inducing air-currents

through the cooling-pipe system; a passage for conducting steam from a boiler or generator to the condenser; and a rotator operated by the steam flowing from the boiler or generator to the condenser, and in turn operating the rotary fan, the revoluble portion of the rotator being mounted upon a hollow shaft having its bore connected with the fan-chamber, whereby a current of air is induced through the hollow shaft when the rotator and fan are in operation.

5. In an apparatus for condensing vaporous fluid, a condenser having a cooling-pipe system; a rotary fan for inducing air-currents through the cooling-pipe system; a passage for conducting steam from a boiler or generator to the condenser; and a rotator applied to operate the rotary fan and comprising a casing or housing containing a rotary disk wheel, said casing or housing being provided with one or more inlets and an outlet all connected with the steam-passage from the boiler or generator to the condenser and arranged whereby a portion of said steam-passage is formed through the rotator.

6. In an apparatus for condensing vaporous fluid, a condenser having a cooling-pipe system; a rotary fan for inducing air-currents through the cooling-pipe system; a passage for conducting steam from a boiler or generator to the condenser; a rotator operated by the steam passing through said passage; a rotary shaft upon which the fan-wheel and the revoluble member of the rotator are both mounted; and a governor arranged to control the flow of steam through the passage and connected with and driven from the rotary shaft.

7. In an apparatus for condensing vaporous fluid, a condenser having a cooling-pipe system; a rotary fan for inducing air-currents through the cooling-pipe system; a passage for conducting steam from a boiler or generator to the condenser; and a rotator operated by the steam passing through such passage, and operating the rotary fan, and comprising a housing or casing having a segmental passage 10, oppositely-arranged inlets and an outlet, and a rotary wheel having faces or abutments 9; the inlets and outlet being connected up in the main passage which conducts steam from the boiler or generator to the condenser.

8. In an apparatus for condensing vaporous fluid, a condenser having a cooling-pipe system; a rotary fan for inducing air-currents through the cooling-pipe system; and a water-distributing chamber through which the inlet end portions of the cooling-pipes extend, the parts of the pipes within the water-distributing chamber being perforated to permit water to enter the cooling-pipes.

9. In an apparatus for condensing vaporous fluid, a condenser having a cooling-pipe system; a fan for inducing air-currents through the cooling-pipe system; a supply-tank and means for taking water from such tank and

distributing it in the cooling-pipes; a pump for supplying the supply-tank; means for supplying steam from a boiler or generator to the condenser; and a rotator operated by the steam
5 thus supplied to the condenser, and serving to operate the pump.

10 10. In an apparatus for condensing vaporous fluid, a condenser; a set of cooling-pipes extending through the condenser; a rotary fan for inducing air-currents through the cooling-pipes; a rotator D; a revoluble shaft common to both the fan and the rotator; a steam-supply passage arranged to conduct steam from a boiler or generator and also permit it to op-
15 erate the rotator; a governor arranged to control the flow of steam through said supply-passage; and power-transmitting connection between the revoluble shaft and the governor.

20 11. In an apparatus in which steam is generated for condensation to obtain pure water, a condenser containing a set of cooling-pipes; a rotary exhaust-fan arranged for inducing air-currents through the cooling-pipes and comprising the fan-casing containing the rev-

25 oluble fan and provided with a laterally-arranged bracket; a rotator comprising a shell or casing forming an expanded portion of the steam-conducting passage between a generator and the condenser and containing a revoluble member 7; and a rotary shaft carrying the
30 revoluble member 7 and the fan and supported by the lateral bracket on the fan-casing.

12. In an apparatus in which steam is generated for condensation to obtain pure water, a condenser containing a set of cooling-pipes; 35 a rotary fan for inducing air-currents through the cooling-pipes; means for supplying spray-water to the cooling-pipes; a rotator operated by steam passing from a generator to the condenser; a rotary shaft common to the fan and 40 the rotator; and a governor and a supply-pump both belt-connected with said rotary shaft.

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Witnesses:

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