

No. 671,841.

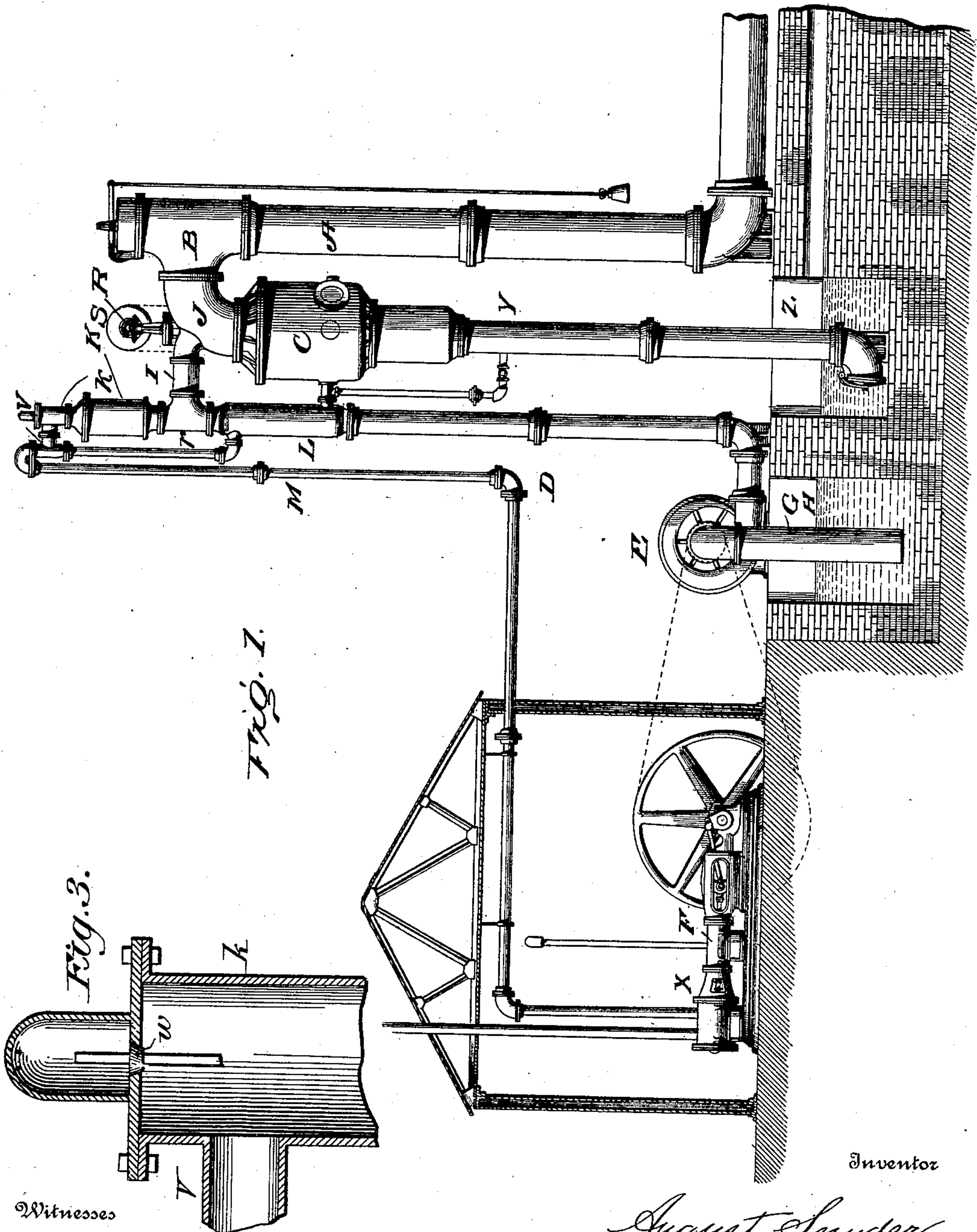
Patented Apr. 9, 1901.

A. SNYDER.
CONDENSER.

(Application filed June 9, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Inventor

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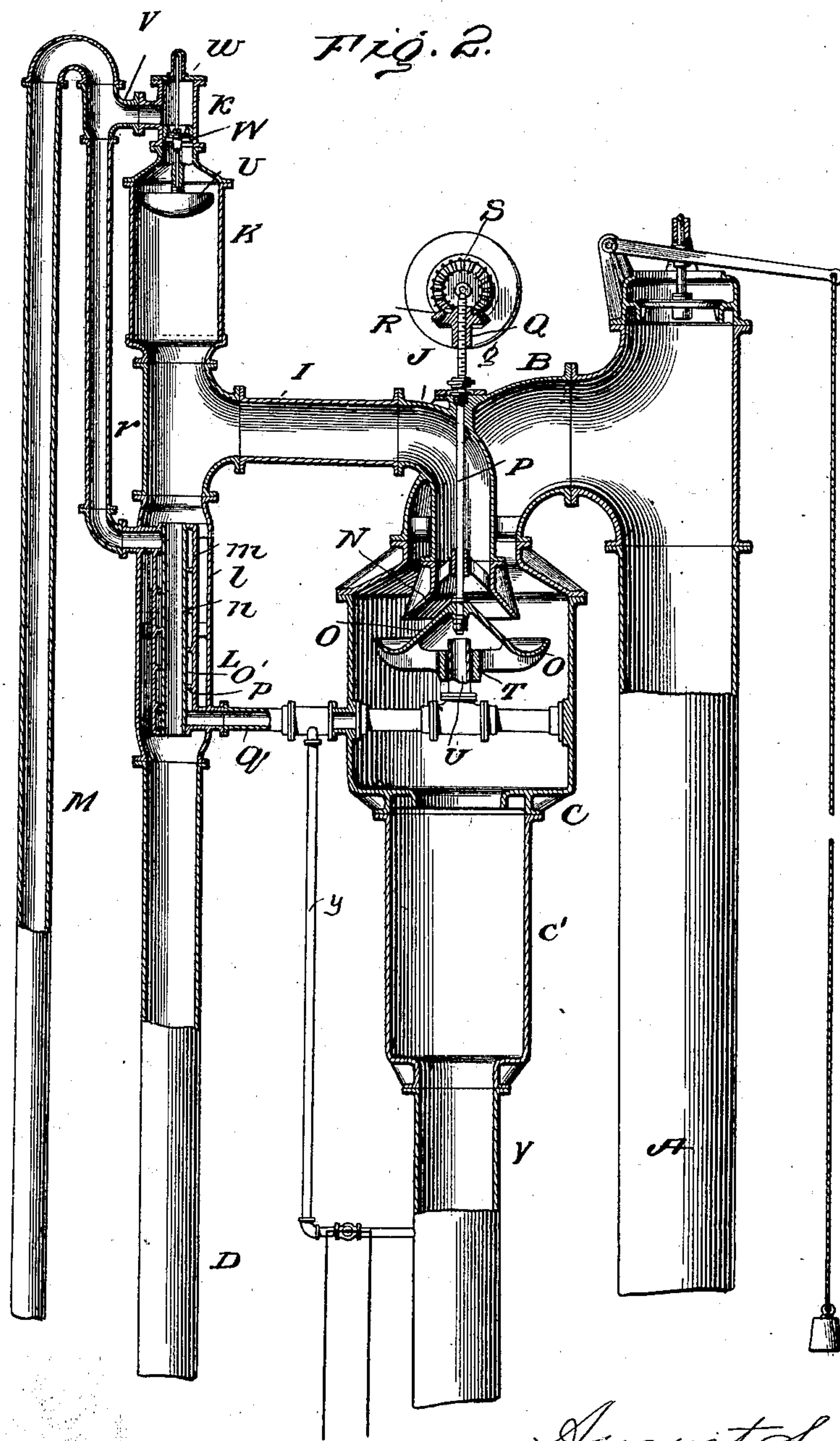
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UNITED STATES PATENT OFFICE.

AUGUST SNYDER, OF ALLEGHENY, PENNSYLVANIA.

CONDENSER.

SPECIFICATION forming part of Letters Patent No. 671,841, dated April 9, 1901.

Application filed June 9, 1900. Serial No. 19,747. (No model.)

To all whom it may concern:

Be it known that I, AUGUST SNYDER, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Condensers; 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 has relation to the condensation of steam and other vapors, and has for its object the provision of an apparatus for the condensation of steam and other vapors by the condensing action of a body of water with which the steam from the exhaust of a steam-engine or the like is brought into contact, the water being forced from a source of supply by a suitable apparatus to the upper end of a stand-pipe into which the steam is drawn, the condensed steam and water dropping down the stand-pipe, whereby a vacuum is formed, tending to forcibly suck the steam from the exhaust of the engine or other apparatus with which the condenser is connected, thereby greatly increasing the efficiency of said apparatus.

In apparatus of the class above referred to it has been found necessary in order to produce the best effect to draw off from the steam and water any air which may be carried into the condenser with the steam and water; and my invention has for its especial object the provision of novel means for effecting the removal of all the air from the steam and water, so as to produce as nearly perfect a vacuum as possible.

My invention has for its further object the provision of novel means for preventing any steam or water from being drawn from the condenser into the air-pump which is employed to draw off the air from the condenser.

My invention consists in the novel construction, combination, and arrangement of parts hereinafter described and claimed.

Referring to the accompanying drawings, Figure 1 is an elevation of a condenser embodying my improvements and showing the air-pump and water-elevating appliances. Fig. 2 is a vertical sectional view of the con-

denser alone, and Fig. 3 is a detached view in section of a part of the apparatus shown in Fig. 2.

A designates the exhaust-pipe leading from the exhaust of an engine or a number of engines or from other apparatus to the condenser. The pipe A has an elbow B near its top, that is connected to the top of a condensing-chamber C.

D designates the water-delivery pipe, which is connected to a water-elevating apparatus, such as a rotary pump E, receiving motion from an engine F.

A water-induction pipe G leads to the rotary pump E from a reservoir H, supplied with cold water from any suitable source.

The water-delivery pipe D has a branch I, that connects with an elbow J, passing into the elbow B of the exhaust A, the elbows J and B being, preferably, a single casting formed with suitable flanges for connection with the pipes I A and the condenser-chamber C.

At the upper end of the water-delivery pipe D an air-chamber K is arranged, and at a point below the lateral branch I a supplementary condenser L is arranged, the purpose of which is to condense any steam that may be drawn off with the air from the condenser C. The supplementary condenser L consists of the concentric cylindrical walls lm and the interior pipe n , which is arranged centrally in the supplementary condenser, a spiral space o being formed by means of a spiral rib p . On the inner surface of the wall m a pipe q leads from the lower end of the spiral passage p into the main condenser C, and a pipe r leads from the upper end of the spiral passage p to the air-exhaust pipe M.

The elbow J of the lateral branch I of the water-delivery pipe terminates within the condenser-chamber C in a funnel-shaped mouth N, and below the mouth N is a suspended bell O, having an upturned lip o , the bell O being sustained upon a rod P, which has a screw-thread on its upper end that works through a nut Q, which is turned by meshing bevel-gears R S. The bell O has a bushing T at its center, which receives a vertical pipe U, branching from the pipe q , the

purpose of the pipe U being to provide for drawing off any air that may from time to time accumulate within the bell O.

Upon the upper end of the air-chamber K a small supplementary chamber *k* is arranged and is connected by a coupling V with the air-suction pipe M. A downwardly-opening valve W is arranged between the air-chamber K and the supplementary air-chamber *k*, and the stem of the valve W has on its upper end a small upwardly-opening valve *w*, while a float *v* is attached to the bottom of said valve W.

Y designates the tail-pipe leading from the bottom of the condenser-chamber C into the hot-well Z, and *y* designates a small drain-pipe leading from the pipe *q* to the tail-pipe Y, said pipe *y* being provided for the purpose of leading into the tail-pipe any water that may be produced by the condensation of steam in the spiral passage *p*.

X designates a vacuum-pump or dry-air pump, which is operated from the steam-engine F and serves to draw the air from the condenser through the air-pipe M.

Operation: The engine F being in operation, the vacuum-pump X sucks the air from the condenser through the air-suction pipe M, and the engine F also drives the rotary pump E, which takes water from the cold well H and forces it up the water-delivery pipe D and into the condenser-chamber C through the lateral branch I and the elbow J. The water issuing from the elbow J through the funnel-mouth N falls upon the bell O and striking the lip *o* is spread and falling over the lip and down the sides of the condenser-chamber C passes into the tail-pipe Y. The steam from the exhaust-pipe A passing into the condenser-chamber C through the elbow B meets the water flowing from the funnel-mouth N and over the bell O and is rapidly condensed by the water and in its condensed state falls into the tail-pipe Y. As the water from the pump E passes up the delivery-pipe D the air is separated from the same and accumulates in the air-chamber K, from whence it is drawn off through the open valve W into the air-suction pipe M. Any air that may accumulate in the condenser-chamber B will be drawn off from under the bell O by the pipe U and pass through pipe *q* to the spiral passage *p* and up through the latter, where any steam that may be mixed with it will be condensed by the cold walls of the spiral passage *p* and conveyed to the tail-pipe through drain-pipe *y*, and the dry air will pass to the air-suction pipe M through the pipe *r*.

The air-chamber K, it will be noticed, is above the highest point of the condenser-chamber C and of the water-delivery pipe D, and hence any air that may be drawn in with the water or that may accumulate in the condenser-chamber will rise into the chamber K, from whence it will be drawn off by the air-suction pipe M. The location of the air-chamber K at a point above the highest point

of the water-delivery pipe and the air-condenser constitutes an important feature of novelty, and by means of the supplementary condenser L any air that may find its way into the condenser C and which is drawn off through the pipe U from beneath the bell O is separated from any steam that may be drawn off with it by the condensation of the latter in the spiral passage *p* and drawn into the air-suction pipe through the pipe *r*.

If for any reason the water-supply through the delivery-pipe D should become excessive and the water should rise in the air-chamber K, the float *v* will rise with the water and close the valve W, thus preventing any water from getting into the air-suction pipe M. At the same time that the valve W is closed by the rising of the float *v* the valve *w* will be opened and air admitted at that point, so as to break the air-vacuum and allow the valve W to open when the water sinks in the air-chamber K.

The condenser-chamber C has bolted to its lower end a chamber C' of somewhat smaller diameter than the chamber C, and the tail-pipe Y is bolted to the lower end of the chamber C'. The purpose of the chamber C' is to receive part of the standing water from the tail-pipe, and it is provided in order to reduce the agitation of the water in the tail-pipe by providing an enlarged surface greater than that of the tail-pipe, as otherwise the fluctuation of the water in the tail-pipe would produce a fluctuation of the vacuum.

It will be observed that there are two distinct passages for the air to the suction-pipe, one being directly through the air-chamber K and the other from below the bell through pipe U and branch *q*, thence through the supplementary condenser L, and from there to the air-suction pipe M through the pipe *r*, thus passing from beneath the bell in the condenser-chamber and wholly outside the air-chamber to the air-suction pipe. The advantage of this arrangement is that if the valve W is closed by the rising of water in the air-chamber there will still be a free passage of air from the condenser-chamber to the air-suction pipe.

Having described my invention, I claim—

1. In a condenser, the combination with a condenser-chamber, a tail-pipe leading therefrom, an exhaust-pipe leading into said chamber, and a water-pipe leading into the same, the exhaust and water pipes both leading into the condenser-chamber from above and the water-pipe being centrally located with relation to the steam-pipe and having a water distributing or spreading device consisting of a bell having an upturned outwardly-flaring lip arranged below its mouth, substantially as described.

2. In a condenser, the combination with a condenser-chamber, and exhaust and water-delivery pipes leading thereto, of a supplementary condensing apparatus comprising concentric walls and a spiral passage, said

passage being connected with the condenser-chamber, and an air-suction pipe and located wholly within the water-delivery pipe, substantially as described.

5 3. In a condenser, the combination with a condensing-chamber, a tail-pipe and exhaust and water-delivery pipes leading into said condensing-chamber from above the top thereof of an air-chamber located on the water-deliv-
10 ery pipe above its point of connection with the condensing-chamber, an air-suction pipe connected to said chamber, a float in said air-chamber, and a valve arranged between the air-suction pipe and the air-chamber and con-
15 nected to said float and adapted to be closed by the rise of water in the air-chamber, substantially as described.

4. In a condenser, the combination with a condensing-chamber and water-delivery pipe
20 leading thereto and having an air-chamber at its upper end, of an air-suction pipe leading into the top of said air-chamber, a valve located between the air-chamber and the air-suction pipe, a second valve leading from the
25 air-suction pipe to the outer air, and a float connected to both said valves and adapted to operate the same so as to shut off the passage from the air-chamber to the air-suction pipe

and to open a passage from the air-suction pipe to the open air when the water rises in
said air-chamber, substantially as described. 30

5. In a condenser, the combination with a condenser-chamber, exhaust and water-deliv-
ery pipes leading thereto, and a bell within
said chamber, of an air-chamber located on 35
the water-delivery pipe, an air-suction pipe connected to said air-chamber, and an inde-
pendent pipe leading from beneath the bell
in the condenser-chamber to the air-suction
pipe and wholly outside of the said air-cham- 40
ber, substantially as described.

6. In a condenser, the combination with a condensing-chamber, a tail-pipe and exhaust
and water-delivery pipes leading into said
condensing-chamber, of a water-distributing 45
device consisting of a hollow bell having an upturned edge and an air-suction pipe lead-
ing into said chamber and having an upturned
end projecting into the hollow of the bell, sub-
stantially as described. 50

In testimony whereof I have affixed my sig-
nature in presence of two witnesses.

AUGUST SNYDER.

Witnesses:

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B. Z. LEIPART.