

(No Model.)

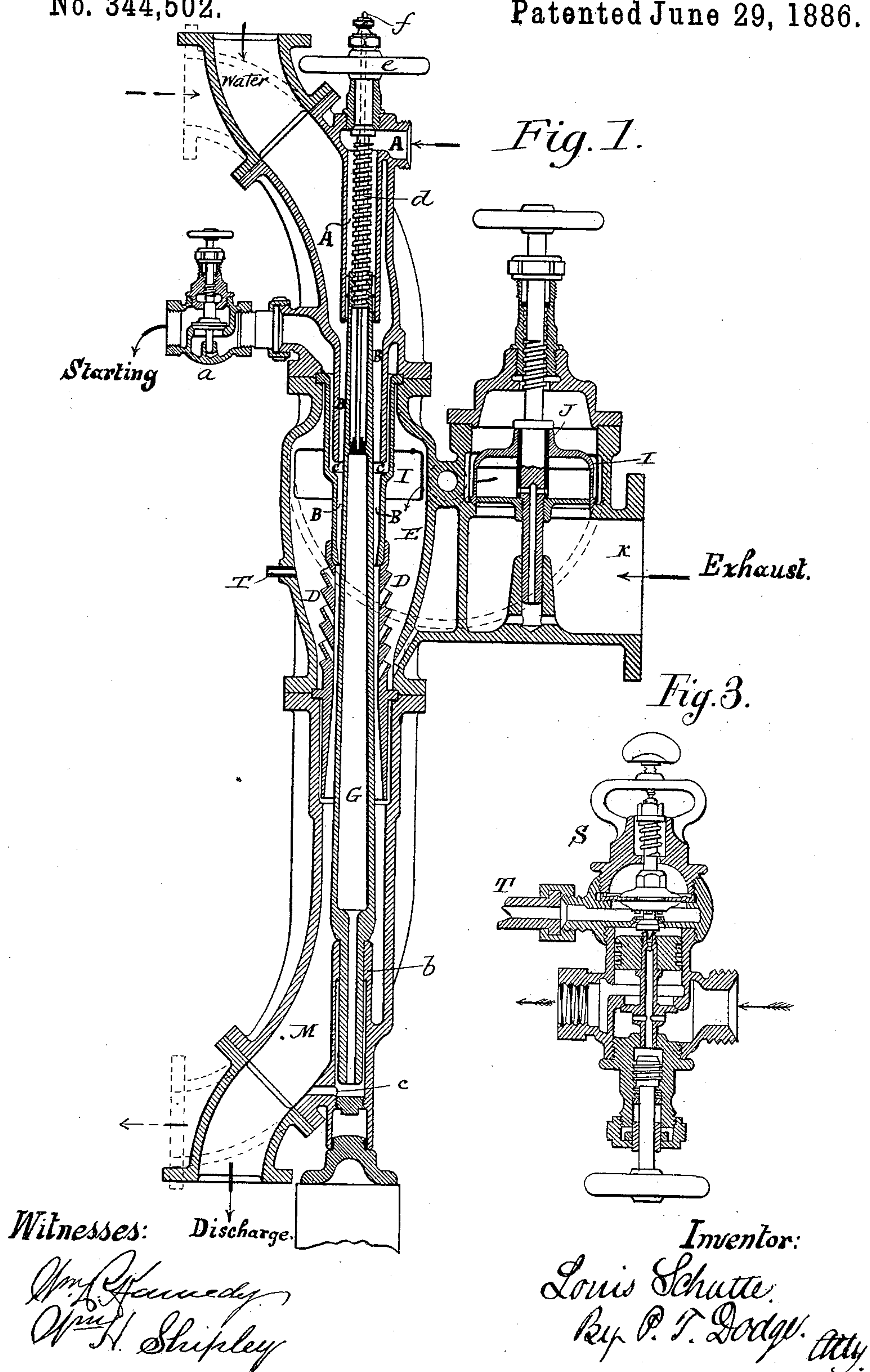
2 Sheets—Sheet 1.

L. SCHUTTE.

JET CONDENSER.

No. 344,502.

Patented June 29, 1886.



(No Model.)

2 Sheets—Sheet 2.

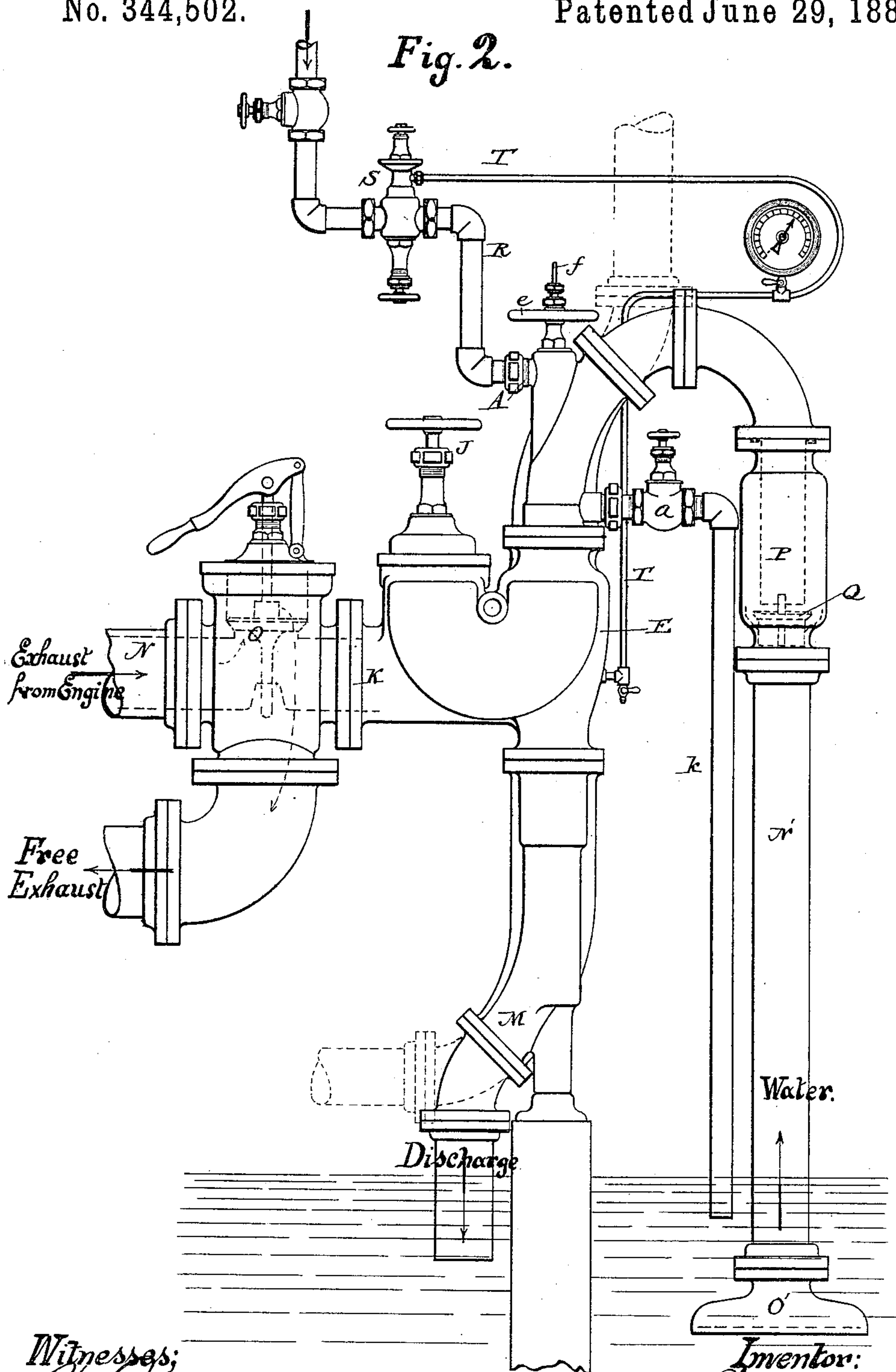
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Fig. 2.



Witnesses;

Wm. Kennedy
Wm. H. Shipley

Inventor:

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By P. T. Dodge. Attorney

UNITED STATES PATENT OFFICE.

LOUIS SCHUTTE, OF PHILADELPHIA, PENNSYLVANIA.

JET-CONDENSER.

SPECIFICATION forming part of Letters Patent No. 344,502, dated June 29, 1886.

Application filed March 6, 1886. Serial No. 194,255. (No model.)

To all whom it may concern:

Be it known that I, LOUIS SCHUTTE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain
5 Improvements in Jet-Condensers, of which the following is a specification.

My present invention relates to improvements in the construction of jet-condensers, and to the addition of parts which render the
10 same generally applicable under varying conditions.

The improvements are designed more particularly for application to condensers of the type represented in Letters Patent of the
15 United States granted to me on the 10th day of November, 1884, No. 330,157. In the patent referred to the live steam for the purpose of bringing water to the apparatus to inaugurate its operation or to assist induction
20 while the apparatus was in operation was delivered in an annular jet within the water-nozzle, while the guide of the central adjusting ram or spindle surrounded the latter. In my present apparatus I locate the steam-noz-
25 zle centrally within the apparatus and make use of the same as a guide for the ram. I also provide in the water-nozzle a communication with the atmosphere through a check-valve, in order to obtain a stronger suction for the
30 purpose of priming or starting the instrument. I also provide, in connection with the water-supply pipe, a strainer having openings corresponding to the narrowest part of the water-passages, and also a second strainer with
35 larger openings, to keep out the larger floating matters, which would tend to clog the apparatus, if admitted. To prevent the stoppage of the action in the event of the inflow of low-pressure or exhaust steam being stopped from
40 the action of the engine-governor or from other causes, I provide an automatic valve, through which live steam will be admitted to maintain the action of the apparatus when necessary. I also provide the apparatus with
45 a free exhaust-valve, which will open outward and permit the exhaust-steam to pass to the atmosphere, provided the operation of the condenser ceases.

Referring to the accompanying drawings,
• 50 Figure 1 represents a longitudinal vertical section through the center of the condenser proper; Fig. 2, a side elevation of the same,

together with its connections. Fig. 3 is a sectional view of the automatic valve for regulating the live-steam supply.

The body of the apparatus is constructed of substantially the usual form.

A represents an inlet-nozzle for live steam, its inner end arranged, as shown, to direct the same centrally through the apparatus in the
60 direction of the discharge.

B represents the water-inlet nozzle, located under the delivery end of the steam-nozzle. At an intermediate point in its length this nozzle is divided transversely, so as to form
65 a radial opening, C, which communicates through an annular passage with an outlet valve or cock, a, opening to the atmosphere. This is preferably, as shown in the drawings, a check-valve provided with a hand-screw, by
70 which it may be fastened in a closed position.

D represents the combining-tube, into which the steam and water jets are delivered. This tube is provided, as in Patent No. 330,157, with a series of openings extending inward
75 and forward in the direction of the delivery, for the purpose of admitting the exhaust-steam from the surrounding chamber E (communicating by a side passage, I, with a check-valve, J) to the central annular water-jet, the
80 chamber communicating in turn with the flanged mouth K, to which the pipe from the engine or other source of low-pressure steam is attached.

The check-valve J in the drawings is of the
85 form represented in Letters Patent of the United States, No. 328,979, granted to me on the 27th day of October, 1885.

Centrally through the combining-tube and the water-tube I extend the tapered regulating-spindle G, having a construction and mode
90 of operation substantially identical with that in my Patent No. 330,157. The upper end of this spindle, instead of being guided as in the previous apparatus, is inserted within and
95 guided by the live-steam nozzle A. That portion of the spindle which enters the nozzle is ribbed externally, made of angular section, or otherwise formed so that the live steam may pass around it into the apparatus. The lower
100 end of the spindle is seated in and guided by a step, b, formed in one side of the discharge pipe or mouth of the apparatus M. The spindle is usually cast in a hollow or tubular form,

with a small opening through its lower end. An opening, *c*, is commonly extended from the step or guide *b* into the delivery-pipe of the apparatus, to permit the escape of any fluid which may find its way into the interior of the spindle.

For the purpose of adjusting the spindle longitudinally, I make use of a screw, *d*, entering its upper end and passing at the top through the body or casing to a hand-wheel, *e*, in the outer end.

For the purpose of indicating the position of the spindle, a rod, *f*, is attached to its upper end and passed centrally through the adjusting-screw, so as to project on the outside, the projecting nut being provided with suitable marks or graduations.

To the inlet-pipe *N*, which delivers the exhaust-steam, I connect the valve *O*, communicating with the atmosphere. This may be an ordinary check-valve opening outward from the steam-supply pipe; or it may be constructed in any other appropriate manner, provided only that it remains closed during the time that a vacuum is maintained within the apparatus, but that it will yield to the external pressure and permit the escape of the steam to the atmosphere whenever the operation of the condenser stops, so that a vacuum no longer exists.

To the starting-valve *a*, before alluded to, I connect a pipe, *k*, the mouth of which is sealed by immersion in water, as shown in Fig. 2. This pipe is used as an additional safeguard against leakage of air through the valve *a*, and to cause the condensation of the steam which may escape in starting the apparatus. At its upper end the water-inlet nozzle is fashioned into or communicates with a water-supply pipe, *N'*, which is carried downward below the surface of the water and provided at its lower end with a strainer, *O'*, having very coarse openings or inlets. I also provide the pipe *N'*, at any suitable point above its mouth, with a second strainer, *P*, having smaller openings. If desired, a check-valve, *Q*, may be placed in the pipe at a suitable point to maintain the water therein when the apparatus is not in action.

To the live-steam nozzle *A*, I connect the live-steam pipe *R*, provided with the automatic valve *S*. This valve may be of either of the known forms adapted to be operated by the pressure of fluid applied from an external source; but I recommend a valve of the particular construction represented in my application for Letters Patent filed of even date herewith, No. 188,941, and shown in Fig. 5.

To the operating or controlling chamber of this valve I connect a pipe, *T*, passing to the chamber *E*. Whenever the supply of exhaust-steam is sufficient to maintain the operation of the apparatus and to maintain a vacuum or partial vacuum in the chamber *E*, the valve *S* remains closed, thus preventing the admission of live steam. When from any cause the operation of the condenser ceases, so that a

vacuum no longer exists in the chamber *E*, the variation in the pressure or in the vacuum, communicated through the pipe *T*, will cause the opening of the valve *S*, thereby admitting live steam, to maintain the flow of water through the condenser until the exhaust-steam is again supplied.

It will be observed that under this arrangement the variations in the pressure or in the vacuum in chamber *E* are applied to control the admission of live steam.

While I prefer to employ the devices represented in the drawings to this end, it is to be distinctly understood that I may make use of a valve of any suitable character, opened or closed by external fluid-pressure derived from any appropriate part of the condenser.

For convenience in connecting the apparatus I form the ends of the body into flanged mouths standing in planes at forty-five degrees to its axis, and to each of these I bolt a short pipe-section, curved in the arc of a circle embracing an angle of forty-five degrees, so that by turning or reversing the end sections the mouth may be presented in position to connect with horizontal or vertical pipes, as required.

Having thus described my invention, what I claim is—

1. In a jet-condensing apparatus, as a means of automatically supplying live steam to maintain the action during the cessation of exhaust-steam, the combination, substantially as described, of a steam jet condenser and a live-steam-supply valve connected by operating appliances with the vacuum-chamber of the condenser and controlled by variations in the vacuum or pressure therein.

2. In combination with a condenser of the type herein described, to be operated by exhaust or low-pressure steam, a valve to admit live steam to continue the action of the apparatus during the temporary failure of exhaust-steam, and devices to open and close said live-steam valve, connected with and controlled by the vacuum in the condenser, substantially as described and shown, whereby the live steam is automatically shut off during the continuance of the vacuum by the exhaust-steam.

3. In combination with the combining-tube, its encircling-chamber, the water-nozzle, and the live-steam nozzle, the automatic valve *S*, controlled by fluid-pressure through an auxiliary piston, and a pipe connecting the same with the interior of the condenser, as described.

4. In a condenser to be operated by exhaust or low-pressure steam, the combination of the combining-tube with inlet-openings, as described, its inclosing-chamber, the water-admission nozzle, the passage leading from the middle of the water-nozzle to the atmosphere, and a valve for closing said passage.

5. In a jet-condenser of the type herein shown, the water-inlet nozzle, combined with the passage leading outward from an intermediate point in the length of said nozzle, and the dip-pipe connected to said passage, to

prevent the admission of air and the diffusion of steam.

6. In a steam-jet apparatus, the combination of the inlet-nozzle and the regulating ram
5 or spindle having one end guided by said nozzle.

7. In combination with a jet-condenser of the type herein described, an outwardly-opening exhaust, O, to permit the free escape

of the incoming steam when the condensing action ceases.

In testimony whereof I hereunto set my hand, this 11th day of December, 1885, in the presence of two attesting witnesses.

LOUIS SCHUTTE.

Witnesses:

DANIEL HILDRETH,
FRANK SPILLIN.