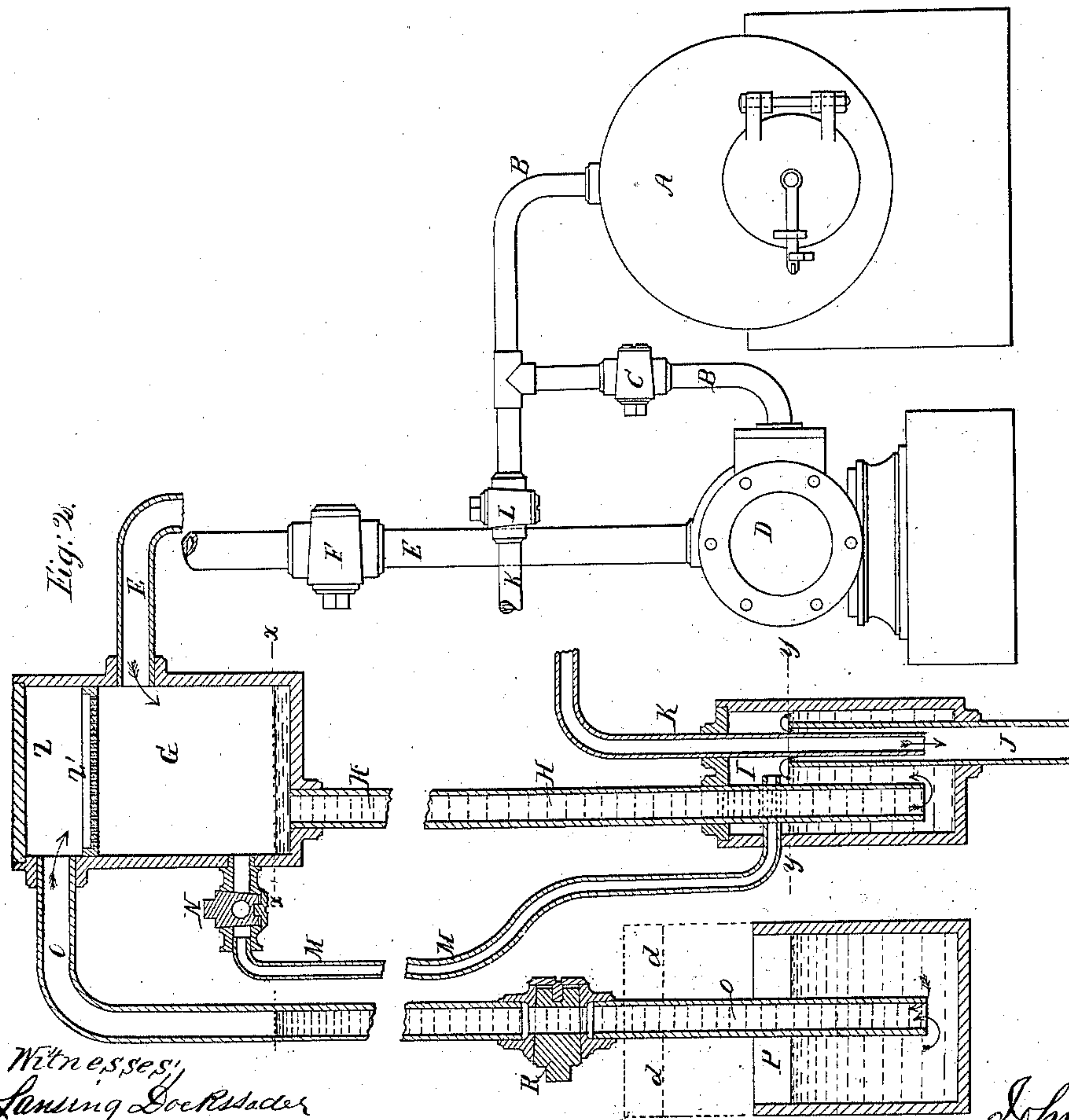
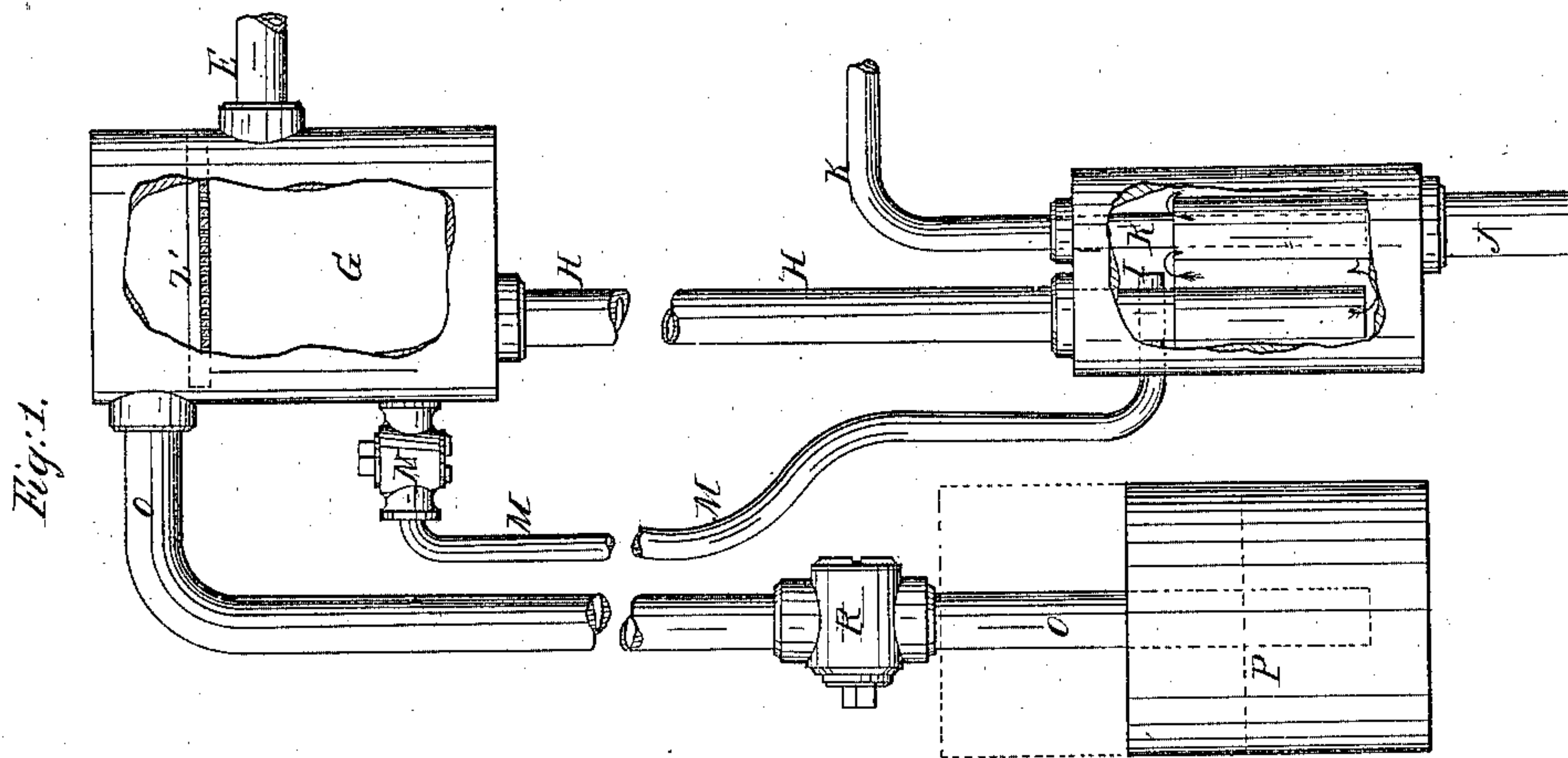


J. Absterdam,

Steam-Boiler Condenser.

N^o 58,362.

Patented Oct. 2, 1866.



*Witnesses,
Lansing Dockwiler
Attest*

*Inventor,
John Absterdam*

UNITED STATES PATENT OFFICE.

JOHN ABSTERDAM, OF NEW YORK, N. Y.

IMPROVEMENT IN CONDENSERS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 58,362, dated October 2, 1866.

To all whom it may concern:

Be it known that I, JOHN ABSTERDAM, of the city, county, and State of New York, scientific and mechanical engineer, have invented a new and useful Mode of Condensing Steam for Steam-Engines and other purposes, and do hereby declare the same is fully described and represented in the following specification and the accompanying drawings.

The object and nature of my invention consist in a condenser for condensing the exhaust-steam of steam-engines or other steam-vessels, wherein a vacuum is produced and maintained by the direct action of one or more jets of steam from a steam boiler or generator, thereby condensing said exhaust-steam *in vacuo*, and creating and maintaining the vacuum in said condenser by the direct action of steam instead of the ordinary air-pump, as will be further explained in the following specification.

It consists also in a condenser for condensing the exhaust-steam of steam-engines and other steam-vessels, wherein the vacuum is produced and maintained by the direct action of one or more jets of steam aiding the columns of water of injection and discharge, as will be fully understood in the following specification.

To enable others skilled in the art to make and use my invention, I will proceed to describe its application and operation.

In the drawings accompanying the said specification Figure 1 represents an elevation of my invention. Fig. 2 represents a longitudinal section of the same, in connection with a steam engine and boiler, of which—

A represents the boiler; B, the steam-supply pipe; C, a stop-cock in same; D, the steam-cylinder; E, the exhaust-pipe; F, a stop-cock in said exhaust-pipe; G, the condenser. Z' is the strainer in the condenser. Z is the water-space in the same; H, the discharge-pipe for discharging the water from the condenser; I, the hot-well; J, the waste-pipe; K, the direct-steam pipe passing through the waste-pipe J; L, a stop-cock in the direct-steam pipe K; M, the exhaust-air pipe, with its stop-cock N; O, the injection-pipe through which the water for injection is conveyed from the cistern P, and in which the lower end of the said injection-pipe is inserted; and R is a stop-cock in said injection-pipe.

The operation of my invention is as follows, viz: The creating and maintaining a vacuum in the condenser of steam-engines by condensing and discharging the exhaust-steam thrown off from the cylinder of steam-engines while the same are at work I accomplish by the two following distinct operations:

First operation: When it is impracticable to place the condenser in an elevated position—as, for instance, on board sea-going steamers or other infeasible places—I dispense with the water columns altogether in aiding in the production of the vacuum, and use only the direct action of the jet or jets of steam for discharging the water from the condenser, and for creating and maintaining the vacuum therein.

In this operation, the pipes connecting the hot-well to the condenser may be diminished in length, and the exhaust-air pipe M dispensed with, as in this case the air and water are discharged through the pipe H; but the direct-steam pipe K may project into the pipe H in the direction of its mouth, instead of being inserted in the pipe J, and passed through the hot-well, and the hot-well also may be dispensed with and the water in the condenser may be discharged direct through the pipe H, and the end of the pipe O may be immersed directly in the water, or in the river in case of steamboats supplying the injection in the ordinary manner.

When it is desired to set the condenser in action, I commence by blowing some of the exhaust-steam through the condenser, thereby expelling the air contained therein, and I immediately open the stop-cock L, and cause the steam to rush from the pipe K through the waste-pipe J, (or H, as the case may be.) I again close the stop-cock F for a moment, and open the stop-cock R of the injection-pipe, and allow the water to flow into the condenser, and when the water is flowing in the condenser, it is immediately discharged through the pipe H by the suction produced by the steam issuing from the pipe K. Thereby a continuous vacuum is maintained in the condenser while the injected water is flowing in the condenser. I re-open the cock F and start the engine in the usual manner, and the exhaust-steam, in entering the condenser, is immediately condensed by the spray of the injection-water, and is discharged with it through

the pipe H by the continuous action of the direct steam issuing from the pipe K; or the engine may be started directly by blowing the direct steam from the pipe K through the pipe J or H, which will produce a vacuum within the condenser, and start the engine in the usual manner.

Second operation: When it is convenient or desirable to place the condenser sufficiently high or elevated to allow of the formation of a column of water of discharge, I arrange the condenser and connect the pipes, as shown in the drawings, and I set the condenser in action as in the first operation, with the exception that when the water of injection is flowing into the condenser I check to some extent, or regulate the flow of steam through the pipe K by means of the cock L, so as to diminish its pressure, so that the water of injection and condensation, instead of being completely discharged from the condenser, as in the previous operation, is now allowed to remain suspended in the pipe H to any desirable height by the pressure of the atmosphere, so that in this operation I maintain a vacuum in the condenser by the weight or gravitation of the column of water aided by the direct action of steam.

If air from the steam should accumulate in the condenser so as to diminish the vacuum, as indicated by the vacuum-gage, I open the stop-cock N of the exhaust-air pipe M, and the air is exhausted out of the condenser by the direct action of steam. When this operation takes place, which lasts but a moment, all the water contained in the condenser and in the pipe H falls below the mouth of the pipe H, and is blown out by the steam, the cock L being opened sufficiently to allow an increased flow of steam through the pipe K for that purpose, and for that short space of time the vacuum is maintained by the direct action of the steam alone, and as soon as the air is exhausted from the condenser the stop-cock N is again closed, and the flow of steam is again checked or regulated by the stop-cock L, so as to allow the water of injection and condensation to re-establish its column in the pipe H.

There are many advantages to be gained by my invention. Among them may be stated that I wholly dispense with the air-pump and its appendages, thereby augmenting the working effect of the engine, reducing its cost, and obviating the liability to derangement resulting from the valves and packing of the air-pump, as now used, besides effecting a great economy of space on board of steamers.

In addition, also, the vacuum may be produced and maintained without starting the engine, and the use of this mode of condensation relieves the engines from the power now required to work the air-pumps, because the steam is taken direct from the boiler. The cost also is very inconsiderable when compared with the cost of air-pumps, and it is free from the liability of derangement to any of its parts.

Furthermore, my invention will be found profitable in its application to high-pressure steam-engines, for it is well known that it is not profitable to use an air-pump and condenser in connection with high-pressure engines because of the large volume of steam to be condensed, the large quantity of water to be injected, and the large amount of power of the engine in working the air-pump lost in discharging the water from the condenser, while with my mode of condensing steam I can immediately convert a high-pressure engine into a condensing-engine, as I can discharge a body of water from the condenser sufficient to condense the largest amount of steam, however high the pressure; and this I accomplish without reducing the working effect of the engines, but, on the contrary, gain a large amount of power, as I take the steam direct from the boiler, besides effecting a great saving of fuel; and my invention will be found of the greatest benefit when applied to river and lake steamers, which ply in shallow or in muddy waters, as in such cases the water is continually laden with sand and grit, which tends in its use as injecting-water to destroy both air-pump and valve.

I wish it to be understood that I do not limit myself to any particular shape or form of the devices which I employ for carrying out my invention, as the shape and form of the devices may be varied according to the circumstances of each case, or as the desires of those using my invention may require; and I may also remark that the condenser may be placed at any desired distance from the engine or the direct-steam pipe, and the discharge-pipe may be placed at any desired distance from the condenser.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A condenser for condensing the exhaust-steam of steam-engines and other steam-vessels, wherein the vacuum is produced and maintained by the direct action of one or more jets of steam from a steam boiler or generator, thereby condensing the exhaust-steam *in vacuo*, and creating and maintaining a vacuum in said condenser by the direct action of steam instead of the ordinary air-pump, substantially as above described.

2. A condenser for condensing the exhaust-steam of steam-engines and other steam-vessels, wherein the vacuum is produced and maintained by the direct action of steam aided by the columns of water of injection and discharge, dispensing with the use of the air-pump, substantially as herein specified and set forth.

In testimony whereof I have hereunto set my signature.

JOHN ABSTERDAM.

Witnesses:

LANSING DOCKSTADER,
A. NEILL.