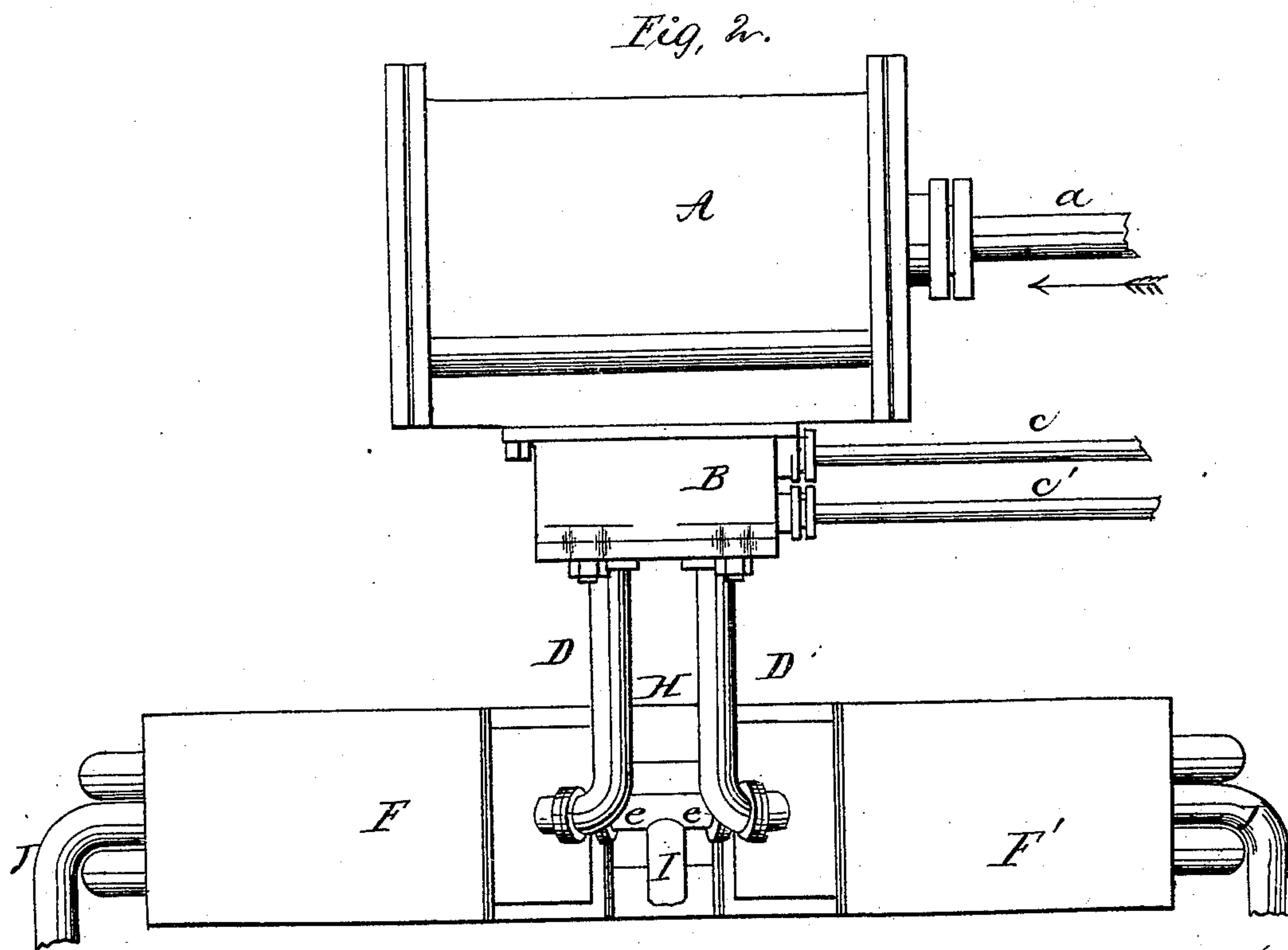
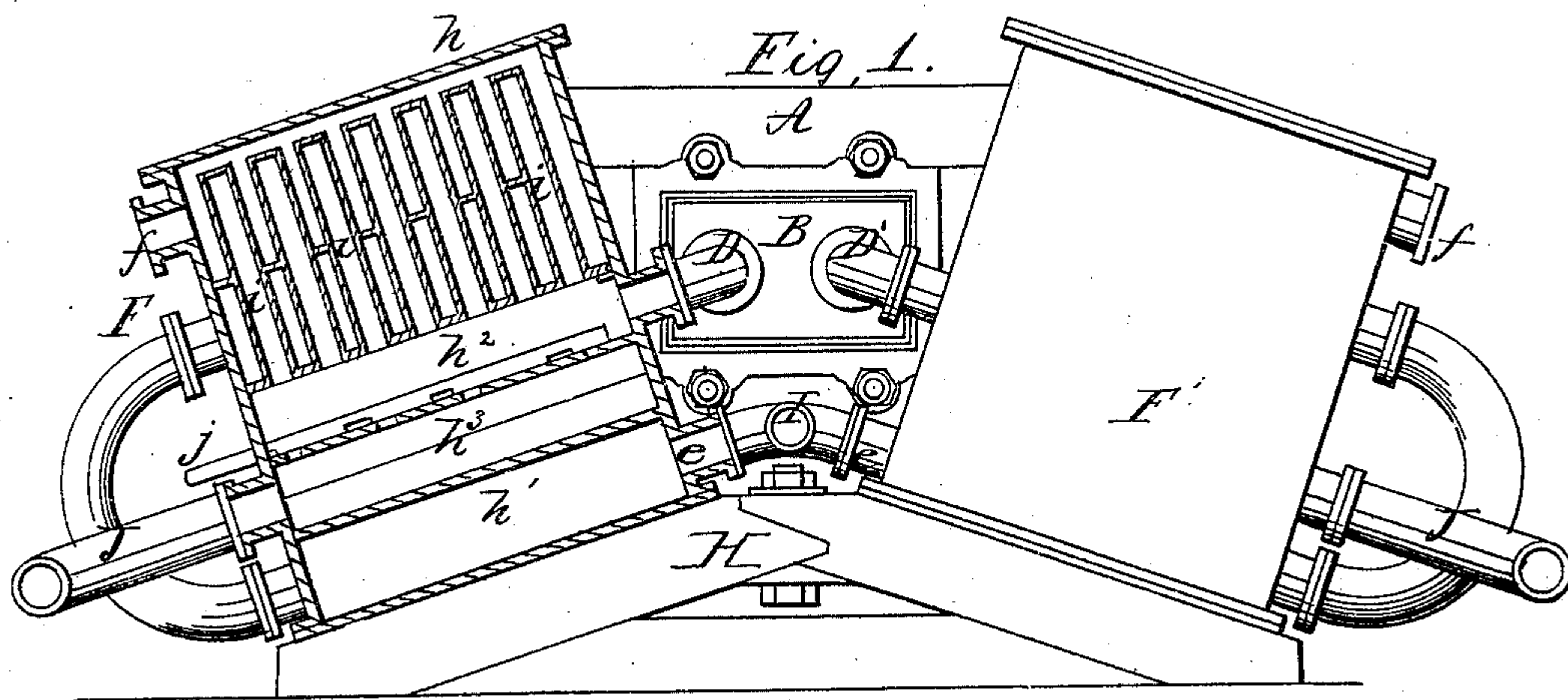


*J. Hought*

*Steam Boiler Condenser.*

*N<sup>o</sup> 90,266.*

*Patented May 18. 1869.*



*Witnesses,*  
*Wm. A. Steel*  
*John Parker*

*Inventor*  
*John Hought*  
*by his Attorney*  
*Henry S. Howson*



# United States Patent Office.

JOHN HOUP, OF SPRINGFIELD, PENNSYLVANIA.

Letters Patent No. 90,266, dated May 18, 1869.

## IMPROVED CONDENSING STEAM-ENGINE.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, JOHN HOUP, of Springfield, county of Bucks, State of Pennsylvania, have invented certain Improvements in Condensing Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists in the combination, with a single steam-cylinder, of condensers, which are arranged to operate as hereafter described, so that while the engine can be driven at a higher rate of speed, and with a higher pressure of steam than has heretofore been considered practicable with condensing-engines, each condenser shall have sufficient time to cool and to perform its duty effectively.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 is a side elevation, partly in section, of a portion of a steam-engine with my improvements, and Figure 2, a plan view of the same.

A represents a steam-cylinder, of which *a* is the piston-rod; B, the steam-chest; and *c*, the valve-rod.

Besides the usual slide-valve, there is, within the steam-chest, a second, which is so operated by a rod, *c'*, driven by an eccentric on the main shaft of the engine, that it shall direct the exhaust steam from one end of the cylinder into a pipe, D, and from the opposite end of the cylinder into a similar pipe, D'.

The former of these pipes communicates with the steam-space of a condenser, F, and the latter pipe with a condenser, F', both condensers being, in the present instance, secured in inclined positions upon a suitable base, H, in close proximity to each other.

The supply of cold water for the condensers is furnished from a single pipe, I, through branches *e e*, this water, after having performed its duty, passing off through pipes *f f*.

The water of condensation is drawn off through the pipes J J, which lead to the air-pump.

The condensers shown in the drawing are similar to that for which Letters Patent were allowed to me on the 16th day of November, A. D. 1868, the interior of each of them being separated into water-chambers, *h* and *h'*, a steam-space, *h''*, and a chamber, *h'''*, for the collection of the water of condensation before it is drawn off by the air-pump.

Vertical or inclined tubes, *i i*, closed at their upper ends, are contained in the water-chamber *h*, and communicate with the steam-space *h''*, and the partition between the latter and the chamber *h'''* is perforated with a number of holes, which can be opened or closed by means of a valve, *j*, operated in any suitable manner, the object of the said valve being to debar all steam from the chamber *h'''* until it is properly condensed.

When the condensers are arranged as above, their operation is as follows:

The valve connected with the rod *c'* is so operated that when the piston of the engine is moving in the direction of the arrow, the exhaust steam shall pass from the cylinder to the pipe D, and thence to the condenser F, which produces a vacuum in front of the piston, as usual. Then, as the motion of the piston is being reversed, the first pipe D is closed, and the exhaust steam from the opposite end of the cylinder permitted to pass through the pipe D' into the second condenser F', the condenser F becoming, in the mean time, perfectly cooled, and ready for a second charge of steam when the piston is again reversed.

It will be evident that an engine, when thus provided with two condensers, arranged to work alternately, can be driven at a much greater rate of speed, and with a more perfect condensation than usual; but as each condenser has to receive a full charge of steam from its own end of the cylinder, it must be of the same capacity, as though but a single condenser were employed.

It should be here understood, although I have described a specific kind of surface-condenser, that jet-condensers, or any of the well-known condensers, whether tubular or not, may be used in carrying out my invention.

When more than two condensers are used, their operation may be as follows:

The valve in the passage to one of the condensers should be opened just before the crank of the engine reaches the dead-centre, in order that this condenser may reduce the pressure of the steam in its own end of the cylinder. Then, as soon as the crank has passed the dead-centre, and just as the motion of the piston is being reversed, the valve of the first condenser is closed, and that of the second condenser, at the same end of the cylinder, opened, the latter condenser receiving the remainder of the charge of steam, and producing the required vacuum in front of the piston.

The other pair of condensers operates in a similar manner in exhausting the steam and producing a vacuum at the opposite end of the cylinder, when the piston is again reversed.

When an abundant supply of fresh water can be obtained, and two jet-condensers are employed, an engine can be worked with a high pressure of steam by arranging the said condensers to receive the exhaust steam from both ends of the cylinder in the same manner that each pair of surface-condensers, above described, received the steam from one end only of the cylinder.

The jet-condenser will thus perform double the duty of the surface-condensers, but this is rendered practicable on account of their more rapid operation and cooling.

The object of thus passing the steam from each end



of the cylinder into two condensers, is to enable the pressure and temperature of the steam before the piston to be reduced by the first condenser, while the second condenser, having but little steam to withdraw and condense, forms a much more perfect vacuum in the cylinder than is usually obtained.

It will be evident, without further description, that by the employment of several condensers instead of one, as heretofore, an engine can be driven at a higher rate of speed, and with a higher pressure of steam than usual, while each condenser will have sufficient time to cool and to perform its duty properly.

I claim as my invention, and desire to secure by Letters Patent—

In combination with a single steam-cylinder, a plurality of condensers, arranged to operate substantially as described, for the purpose specified.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN HOUPPT.

Witnesses:

JOHN WHITE,  
HARRY SMITH.