

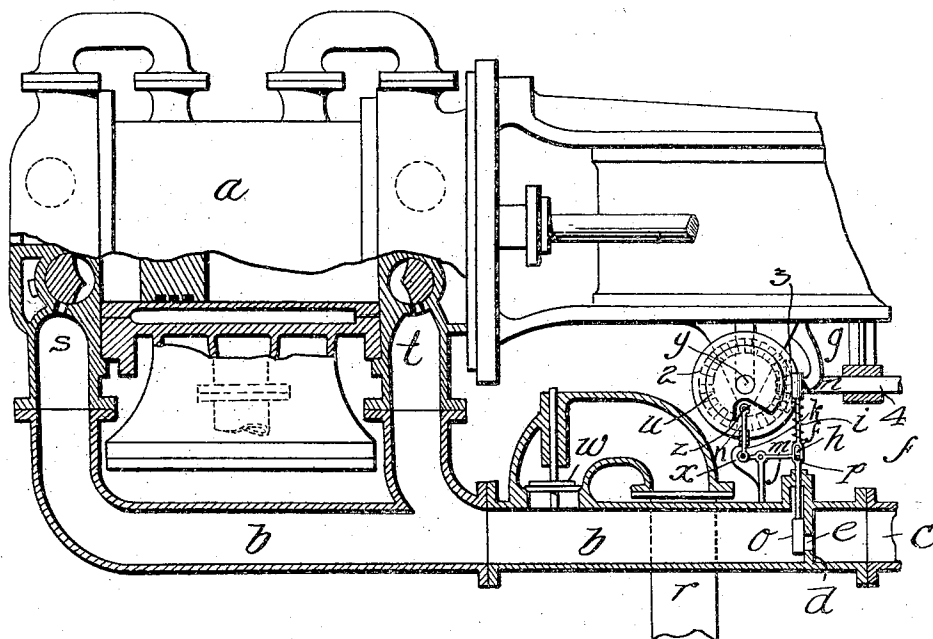
No. 767,384.

PATENTED AUG. 16, 1904.

C. CAILLE.
CONDENSER.

APPLICATION FILED JUNE 9, 1903.

NO MODEL.



attest:

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by

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CONDENSER.

SPECIFICATION forming part of Letters Patent No. 767,384, dated August 16, 1904.

Application filed June 9, 1903. Serial No. 160,754. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CAILLE, engineer, of 7 Rue des Vignes, Le Perreux, France, have invented a certain new and useful Means for the Economical Utilization of Condensers in the Working of Steam-Engines; 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.

There are numerous installations of steam-engines in which it is impossible to benefit by working by condensation, because owing to the position or volume of the water required a condenser of sufficient capacity or surface to condense the whole of the exhaust-steam cannot be employed.

The simple process and arrangement which is the subject of the present application enables a steam-engine of greater or less power to benefit by the advantages of working by condensation while using a condenser with reduced surface which cannot condense all the exhaust-steam. The arrangement may be applied to any existing installation and does not require any modification in the mechanism of the engine itself. For this purpose in the pipe which connects the engine-exhaust to the condenser is placed a valve, register, or any mechanism which can cut off and establish communication between the condenser and the engine. This valve is operated by a transmitter worked by the engine and is arranged in such a way that communication between the condenser and the engine is shut off during one or several revolutions or a fraction of a revolution of the fly-wheel every time this latter completes a certain number of revolutions.

In practice, for example, the communication may be cut off during every one revolution in five. Besides this, in the exhaust-pipe between the engine and the before-mentioned interposed valve a branch pipe is inserted which leads to the heating apparatus or any other apparatus for utilizing the waste steam, and where this pipe enters the exhaust-pipe a non-return valve is placed which opens auto-

matically or mechanically every time the obstructing-valve shuts.

The process I have invented consists, in short, in regulating the cycle of the engine by means of a small additional mechanism in such a way that it works by condensation during a certain number of revolutions; but during certain other revolutions the working by condensation is interrupted and replaced by working by non-condensation, and preferably with the escape of steam into a heater or other utilizing apparatus, after which the working by condensation is again resumed, and so on.

In the accompanying drawing I have shown as a representative example a practical form of construction and arrangement for the carrying out of this process.

a is the cylinder of a steam-engine of any known construction.

b is the exhaust-pipe, into which the steam coming from the cylinder enters through the branches *s* and *t* alternatively.

c is the pipe connected to the exhaust-pipe *b* and to a condenser of reduced capacity and surface. *b* and *c* are separated by a partition *d*, in which there is an opening *e* of the same section as that of the pipes *b* and *c*. In front of this is held normally a check-valve *o*. In the example represented this is a slide or register *o*, whose rod *f* is enlarged in one place, in which a slotway *h* is formed. Pressing against this enlargement at one end and against the guide *g* of the upper part of the rod at the other end is a spring *i*, which surrounds the rod and tends to constantly lower the register and keep it opposite the opening *e*. A two-armed lever *j k*, pivoted at *m*, carries at the end of the arm *j* a stud *p*, which fits in the slotway *h* and is connected at the end of the other arm *k* to a rod *n*, which is guided in a bracket *x*. To this rod *n* is applied a cam *u*, secured to a small shaft *v*, which is operated by means of any transmitter, such as the gearings 2 3 and the shaft 4. This transmitter, for example, can be made in such a way that the cam *u* makes one revolution while the fly-wheel of the engine makes five.

In the pipe *b* between the opening *e* and the

escape *t* is inserted a branch pipe *r*, connected, for example, to a heater for the feed-water. At the entrance of this pipe a non-return valve *w* is placed, which opens to put the
 5 pipe *b* in communication with the pipe *r*.

When the top of the rod *n* is within the notch *z* of the cam *u*, the spring *i* will hold the slide *o* opposite the opening *e*, and the exhaust-steam instead of passing into the con-
 10 denser through the pipe *c* will lift the valve *w* and flow into the heater through the pipe *r*. So long as the rod *n* is opposite the circular portion of the cam *u* the stud *p* of the lever *j*, pressing against the bottom of the
 15 slotway *h*, will lift the rod *f*, compress the spring *i*, and place the slide *o* in the position to open the communication between the pipes *b* and *c*. The valve *w* will close by its own weight and the pressure in the pipe *r*. All
 20 the exhaust-steam will then proceed through the pipe *c* into the condenser.

The hollow occupying one-fifth of the periphery of the cam *u*, the result is that communication with the condenser will be, in
 25 the example chosen, closed during one revolution in five of the fly-wheel of the engine. It is clear that the length of time of the opening and shutting of the opening *e* may be varied according to the installations and their
 30 requirements.

The process and arrangement described, in

short, permit of the whole of the exhaust-steam being utilized while employing a condenser of reduced surface and capacity, and this without altering in any way the working
 35 and mechanism of the engine itself. A short examination of the figure also shows that the additional mechanism necessary can be adapted without any trouble to any existing engine.

I claim—

Means for the economical utilization of condensers in steam-engines consisting of the exhaust-pipes leading from the cylinder to the condenser, a branch pipe connected to said
 40 exhaust-pipe, a non-return valve in said branch pipe, a valve *o* controlling the exhaust-pipe, said valve having a stem, a spring on said stem normally keeping the valve closed,
 45 a two-arm lever having one arm connected with said stem, a lever *n* connected with the
 50 other arm, a cam engaging said lever *n* and means for operating said cam whereby the valve *o* will be raised to open the pipe to the condenser.

In testimony whereof I have hereunto set
 55 my hand in the presence of two subscribing witnesses.

CHARLES CAILLE.

Witnesses:

ANDRÉ MORTIER, Senr.,
 AUGUSTUS E. INGRAM.