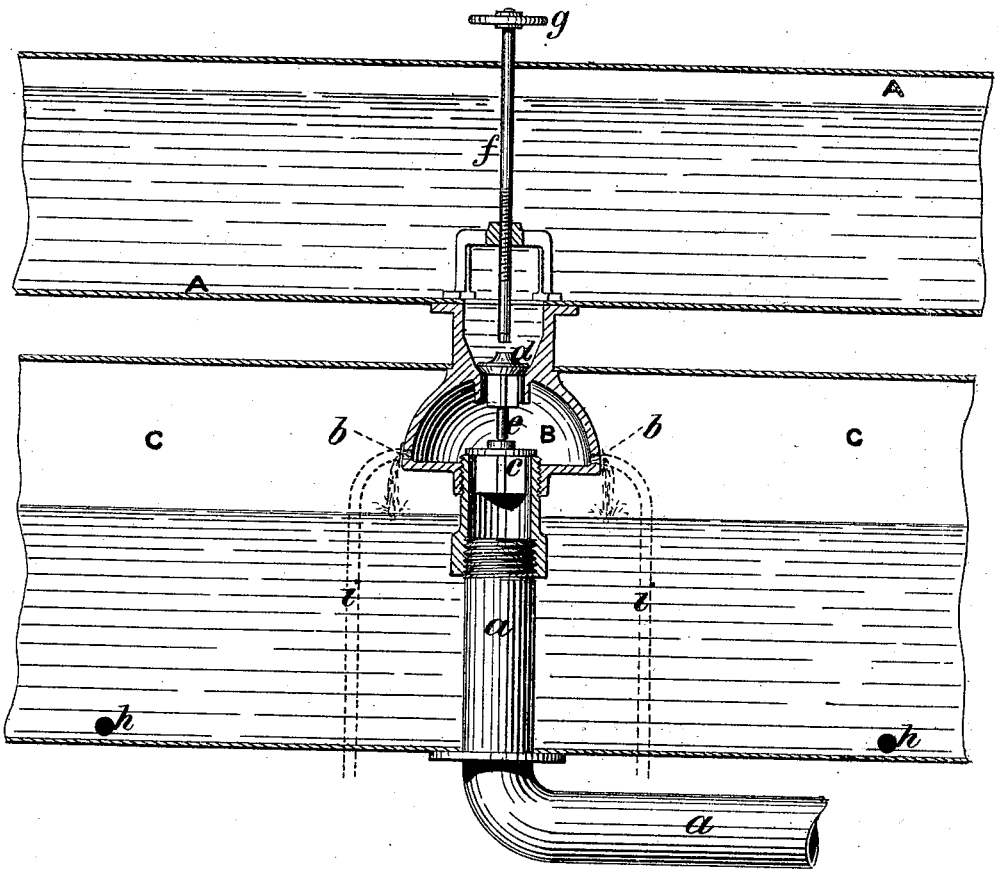
H. HUGHES.

CONDENSERS FOR LOCOMOTIVES.

No. 180,345. Patented July 25, 1876.



Witnesses
Harry Hayson Jr.
Harry Smith

Henry Hughes
by his Attorneys
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UNITED STATES PATENT OFFICE.

HENRY HUGHES, OF LEICESTER, ENGLAND.

IMPROVEMENT IN CONDENSERS FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. **180,345**, dated July 25, 1876; application filed April 29, 1876.

To all whom it may concern:

Be it known that I, HENRY HUGHES, of Leicester, in the county of Leicester, England, have invented Improvements in Condensers, of which the following is a specification:

My invention relates to locomotive-engines to be used principally on tramways or on ordinary roads; and consists more particularly in the employment of means, as hereinafter described, of effecting the condensation of the exhaust steam discharged from the cylinders after having performed its duty therein, whereby not only is such exhaust steam completely condensed, but its caloric may be utilized in heating the feed-water, while at the same time the noise and inconvenience occasioned by the escape of the steam, when allowed to pass in an uncondensed condition into the atmosphere, are entirely obviated.

And in order that my said invention may be fully understood, I shall now proceed more particularly to describe the same, and for that purpose shall refer to the annexed drawing, which represents a longitudinal section of a portion of a locomotive-engine adapted for use on tramways, and with my invention applied thereto.

A is a tank containing cold water. B is a cooler or condenser, consisting of a chamber communicating at its upper end with the cold-water tank A, and at its lower end with suitable pipes or conduits (one of which, marked *a*, is shown in my drawing) for conducting the exhaust steam from the cylinders, and with passages *b* leading to a receiving-tank, C. The communications between the condenser B and the cold-water tank A and exhaust pipes or conduits *a* are controlled conjointly and simultaneously by means of two valves, *c d*, arranged in such a manner that the valve *c* of the exhaust-pipe *a* shall be lifted or opened by the pressure of the exhaust steam, and that when this action takes place the valve *d* of the cold-water tank A shall be also lifted or opened, whereby the cold water from the tank will be brought into intimate contact with the exhaust steam simultaneously admitted into the cooler or condenser B, and the complete condensation of such exhaust steam will thus be effected.

The valves *c* and *d* may be mounted on one and the same spindle, or in any suitable manner, so as to obtain the required simultaneous action, but I prefer the arrangement shown in the drawing, in which the spindle *e* of the valve *d* rests upon the top of the valve *c*, a washer of india-rubber being interposed between the two surfaces.

By means of the apparatus hereinbefore described the cold water is only supplied to the cooler or condenser B when the exhaust steam is passing, and admitted thereto in such quantity only as is required.

The variation in the pressure of the head of water and the supply is automatically regulated by the descent in the level of the column of water above, and the consequent diminution of pressure to be overcome by the exhaust steam.

The lift of the valves may be regulated by means of the adjusting-screw *f*, the stem of which is carried up through the tank A, and is surmounted with a hand-wheel, *g*, for the facility of turning the screw.

The mixture of the condensing-water and water of condensation passes through the passages *b* into the receiving-tank C for the supply of the boiler, and any surplus water may be discharged through passages *h* onto the wheels of the engine, or onto the rails, during the journey or at its close; or I may dispense with the receiving-tank C and discharge the water direct from the condenser B onto the wheels of the engine, or onto the rails through pipes *i i*, as shown by the dotted lines in the figure.

I claim as my invention—

1. The combination of the cold-water tank, condensing-chamber, and exhaust-steam pipe, and an automatic valve or valves, by which the exhaust steam is caused to regulate the admission of cold water to said chamber.

2. The combination of the cold-water tank A, exhaust-pipe *a*, and condensing-chamber B with the valves *c d*, in contact with or connected to each other, as set forth.

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

HENRY HUGHES.

Witnesses:

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