(No Model.)

P. W. WILLANS.

STEAM ENGINE.

No. 452,551. Patented May 19, 1891.

Fig. 1.

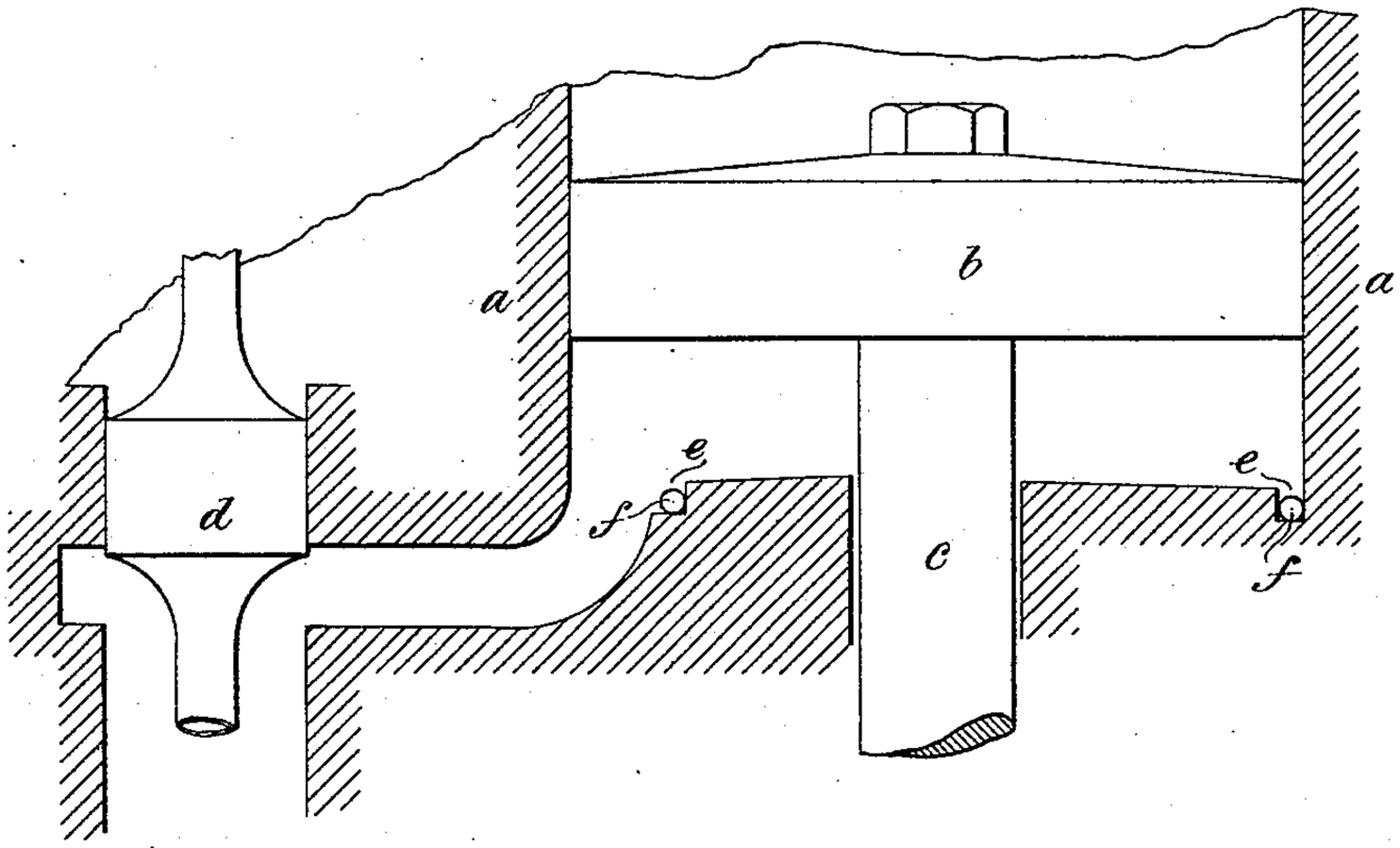
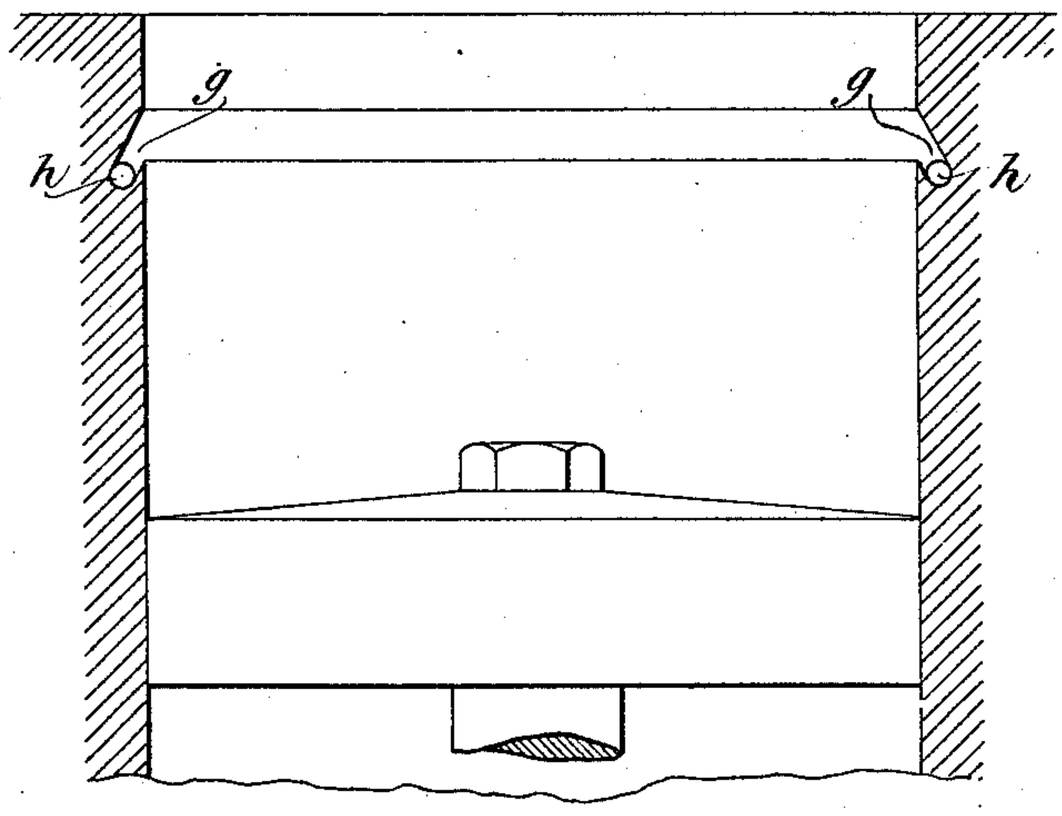


Fig. 2.



Witnesses.
Baltus de Long.
C. W. Brooke.

Inventor.
Peter William Willans
By his attys
Baldwin, Davidson & Wright

UNITED STATES PATENT OFFICE.

PETER WILLIAM WILLANS, OF LONDON, ENGLAND.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 452,551, dated May 19, 1891.

Application filed May 29, 1890. Serial No. 353,538. (No model.)

To all whom it may concern:

Be it known that I, PETER WILLIAM WILLANS, engineer, a subject of the Queen of Great Britain, residing at Ferry Works, Thames Ditton, London, in the county of Surrey, England, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

This invention has for its object improvements in steam-engines.

Water is liable to collect in the cylinders of steam-engines under certain conditions, and when this takes place the economical working of the engine is much impaired. I find that this defect can be removed by very simple means—viz., by providing heating appliances in connection with small water-receptacles in the cylinder, (either existing or specially provided,) so that any water formed by condensation in the cylinder at once passes into a receptacle which is maintained at a temperature somewhat above that of the other parts of the cylinder. The arrangement which I prefer, where the cylinder is vertical, is as follows: Around the cylinder-cover I provide a small annular gutter, and in this gutter I lay a small steam-pipe, through which steam from the boiler can be passed either continuously or when required. The small additional supply of heat thus provided locally to the part or parts of the cylinder where otherwise water would first accumulate I find to be quite sufficient to keep the cylinder free.

The annexed drawings at Figure 1 show the application of my invention at the lower end of a steam-engine cylinder. Fig. 2 shows its application at the upper end.

In Fig. 1, which is a vertical section, *a* is a portion of the cylinder. *b* is the piston; *c*, the piston-rod. *d* is the valve. A piston-valve is here shown; but a valve of any sort may be used. The valve *d* descends to admit steam to the cylinder and rises to the position in which it is shown in the figure to permit the steam to escape from the cylinder. *e* is a gutter formed around the cylinder at its lower end in such a position that any water there may be in the cylinder beneath the piston at once passes into it. *f* is a small metal pipe lying in the gutter. It is connected at its two ends with the steam-pipe, preferably on either side of the stop-valve, to favor the passage of steam through the pipe *f*. The bottom of the cylinder is slightly inclined from the center or piston-rod opening toward the gutter *e*, so that the water will readily flow into the gutter. Water entering the gutter *e* receives heat from the steam-pipe and passes off as steam and does not provoke further condensation, as it would do if it remained in the cylinder. The arrangement for the upper part of the cylinder is similar. *g* is a gutter, into which, when the piston rises, any water there may be in the cylinder above the piston is swept. *h* is a steam-pipe lying in this gutter and supplied with steam in the same way as the pipe *f*. The top of the piston is inclined from the center toward the edge to facilitate the flow of water into the gutter *g*.

What I claim is—

1. The combination, with the cylinder of an upright steam-engine which is provided with a groove or channel arranged to receive water deposited in the cylinder, of devices arranged wholly within said groove or channel, so as to be immersed in the condensed water to vaporize it, substantially as described.

2. The combination of the cylinder of a steam-engine which is provided with a narrow groove or channel and a heated body laid parallel with said groove or channel and within it, so as to be immersed in the water of condensation collected in the channel.

3. The combination, substantially as hereinbefore set forth, of the upright cylinder, the bottom of which is inclined toward its edge, a recess at the edge of the inclined bottom, and a heater arranged in said recess to vaporize any water accumulating therein.

4. The combination, substantially as hereinbefore set forth, of the upright cylinder, the piston therein, the top of which is inclined toward its edge, a recess in the cylinder, and a heater in said recess to vaporize any water accumulating therein.

PETER WILLIAM WILLANS.

Witnesses:

JNO. H. WHITEHEAD,
24 Southampton Buildings, London, W. C.

T. F. BARNES,
28 Southampton Buildings, London, W. C.