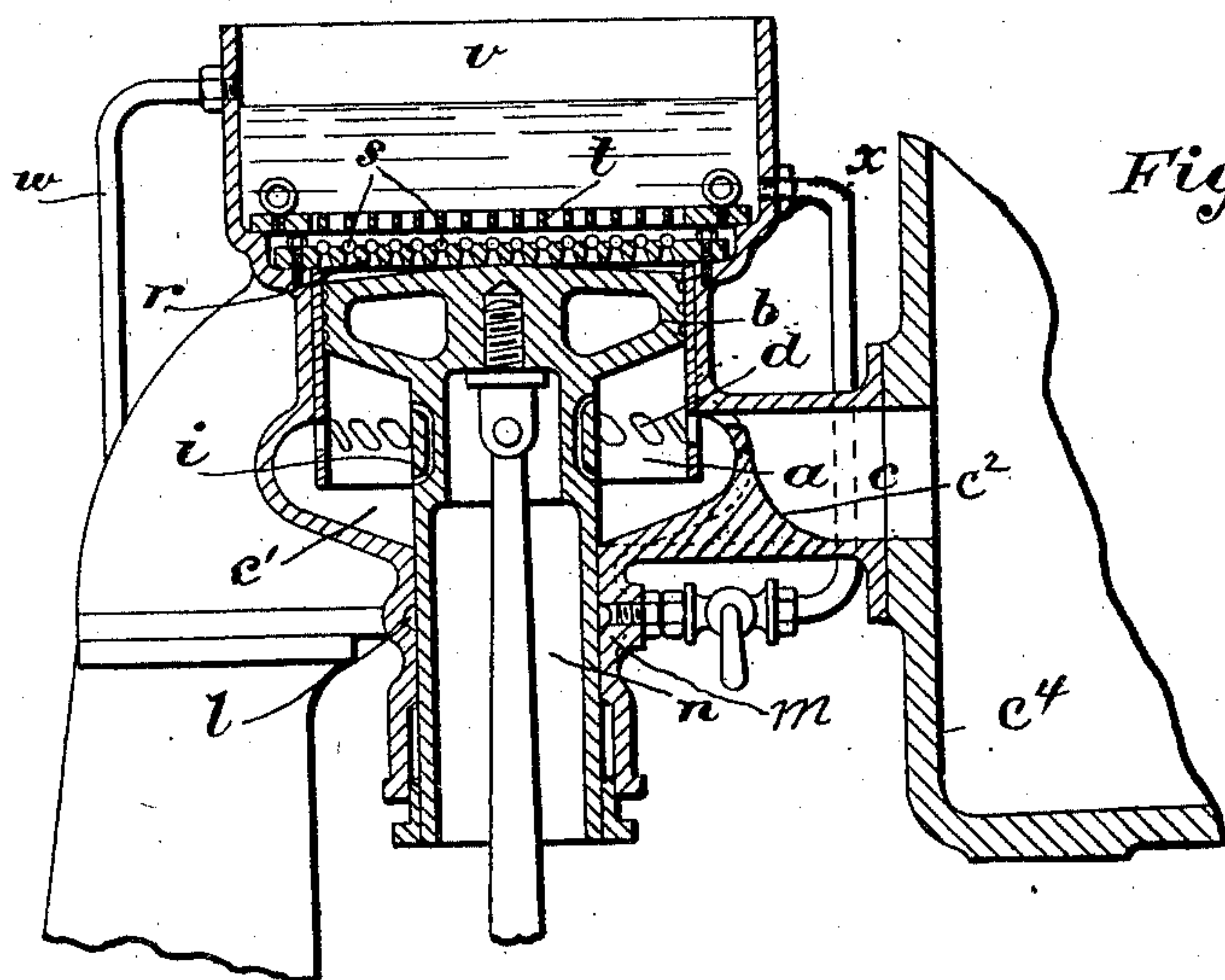
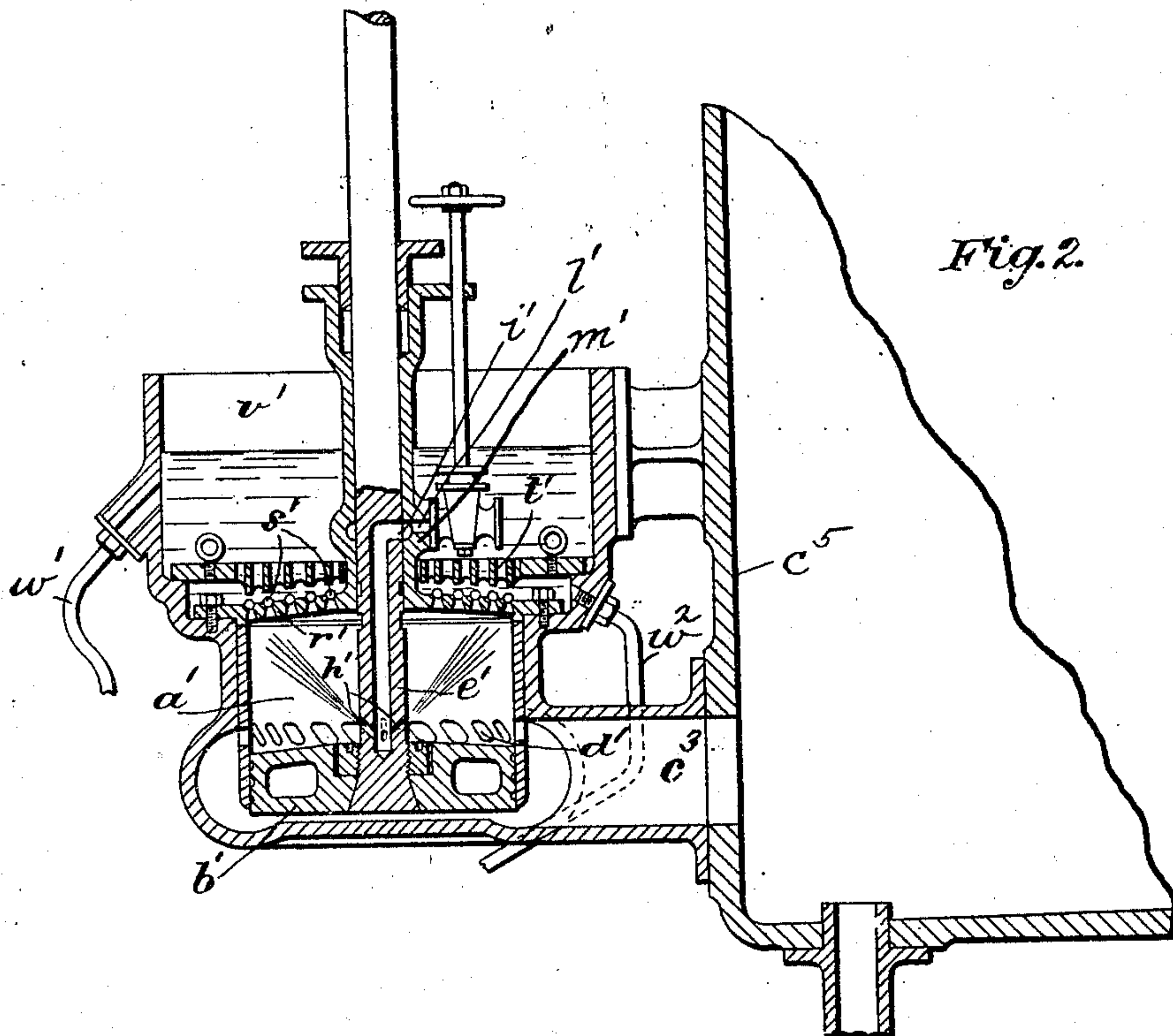


T. THOMPSON.
STEAM ENGINE AIR PUMP.
APPLICATION FILED MAR. 31, 1900.

967,860.

Patented Aug. 16, 1910.



Witnesses.

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THOMAS THOMPSON, OF BLACKHEATH, ENGLAND.

STEAM-ENGINE AIR-PUMP.

967,860.

Specification of Letters Patent. Patented Aug. 16, 1910.

Application filed March 31, 1900. Serial No. 10,962.

To all whom it may concern:

Be it known that I, THOMAS THOMPSON, a subject of the Queen of Great Britain and Ireland, residing at "Arlicote," Westcombe Hill, Blackheath, in the county of Kent, England, have invented certain new and useful Improvements in or Connected with Steam-Engine Air-Pumps, (for which I have made application for patent in Great Britain, No. 1,923, dated January 30, 1900;) 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.

This invention for improvements in or connected with steam engine air pumps relates to pumps of the class known as valveless pumps and in which the air or vapor and the water are separately dealt with, and consists in forcing or admitting water immediately before the commencement of the upstroke on to the top of the piston to form a packing or water seal, in forcing a small quantity of water together with the air through the delivery valves and in arranging above the valves a water chamber in which the water is kept at a constant level.

The amount of water admitted at each stroke of the piston is regulated by a stop cock adjusted so that the amount admitted slightly exceeds the amount sufficient to keep the piston sealed and the water level in the water chamber constant. Any excess passes off by the overflow.

By this invention the air pump can be driven at a much higher speed than pumps that deal with both the air and water from the condenser while the advantages of such pumps are retained. The water in the condenser is removed by a separate pump and is thus dealt with practically continuously and not by shocks at the end of the air pump stroke.

The invention consists in the novel construction, arrangement and combination of parts as hereinafter fully described, illustrated in the drawing and pointed out in the appended claims.

In the drawing:—Figure 1 is a vertical central section of a steam engine air pump constructed according to this invention. Fig. 2 is a similar view showing a slightly modified construction.

The vertical air pump cylinder *a* is provided with a piston *b* whose upper surface

forms the working face. The lower end of the cylinder *a* is connected by the ports *d* and passage *c* with the condenser *c*⁴ at some point well above any water likely to remain in the condenser. The ports *d* are of such height in the cylinder that they are above and completely uncovered by the piston *b* when in its lowest position as clearly shown. The piston rod is provided with passages *i*.

m is a tubular extension of the cylinder for the trunk piston rod *n* and is provided with a groove or channel *l*.

v is a small chamber arranged immediately over the cylinder *a* and provided with an overflow *w* at a suitable level. The upper end of the cylinder *a* is surmounted by a perforated plate *r* whose perforations are closed by balls *s* kept in position by the movable cover plate *t*. The passages *i* on the trunk piston rod *n* working in conjunction with the groove *l* are arranged to deliver the water under pressure below the piston *b* at the end of the down stroke and as it completes such stroke the piston forces this water, and any water that leaked past it during the previous upstroke, around itself and on to its upper face through the ports *d*. Any sealing water leaking past the piston collects in the bottom of the pump and is returned to the top of the piston at the end of its down stroke as above stated. In this arrangement the water supply is taken from the chamber *v* above the delivery valves by a pipe *x* so that the same sealing water is used over and over again, the waste being made up from a supply controlled by any suitable means such as a ball or float valve.

In the modification shown in Fig. 2 the piston rod *e*' is above the piston and the passage *i*' in the piston rod *e*' working in conjunction with the groove on channel *l*' in the tubular extension *m*' of the cylinder are arranged to deliver the water direct from the chamber *v*' to the top of the air pump cylinder when the piston is at the bottom of its stroke. *w*' is an overflow pipe for the chamber *v*' and *w*² is a drain pipe leading from said chamber. *c*⁵ is the condenser. *a*' is the air pump cylinder; *c*³ the passages and *d*' the ports connecting the cylinder with condenser *c*⁵; *b*' the piston; *m*' the tubular extension on the cylinder, *r*' perforated plate on cylinder *a*'; *t*' the cover plate keeping the balls *s*' in position, which balls close the perforations in plate *r*'; *h*' are outlet passages from the piston rod.

It will be noticed that the leakage of air into the pump past the piston rod, is entirely prevented by the water gland constituted by the passage *l* filled with water, which thus forms a kind of packing, the excess pressure of water in the gland being equivalent to the vacuum in the condenser added to the head of sealing water.

When the piston in Fig. 1 is near the bottom of its stroke the water flows just below the piston into the annular enlargement *c'*. The water cannot flow into the condenser on account of the abutment *c*². The source of the original supply of fluid in chamber *v* may be an entirely separate water supply controlled by a stop-cock or the water may be supplied from the separate water pump on the condenser.

I am aware that fluids have been admitted into the cylinders of air pumps for sealing and other purposes and I do not claim to do this broadly.

What I claim and desire to secure by patent is:—

1. In an air pump of the character described, the combination with a vertical cylinder, of a piston movable therein, said cylinder being provided with perforations at such a height therein that they will be completely uncovered when the piston is at the lowest point, a piston rod, a water chamber

arranged above the cylinder, a condenser, a connection intermediate the latter and the cylinder and in constant communication with the perforations in the cylinder and means for placing the water chamber in communication with the interior of the cylinder when the piston is at the lowest point of its stroke.

2. In an air pump of the character described, the combination with a vertical cylinder, of a piston movable therein, said cylinder being provided with perforations at such a height therein that they will be completely uncovered when the piston is at the lowest point, a water chamber arranged above the cylinder, a piston rod provided with a port or passage adapted to communicate at its ends with the interior of the water chamber and the interior of the cylinder when the piston is at the lowest point of its stroke, a condenser, and a connection intermediate the latter and the cylinder and in constant communication with the perforations in the cylinder for the purpose set forth.

In testimony whereof I affix my signature, in presence of two witnesses.

THOMAS THOMPSON.

Witnesses:

ALBERT JONES,
W. M. HARRIS.