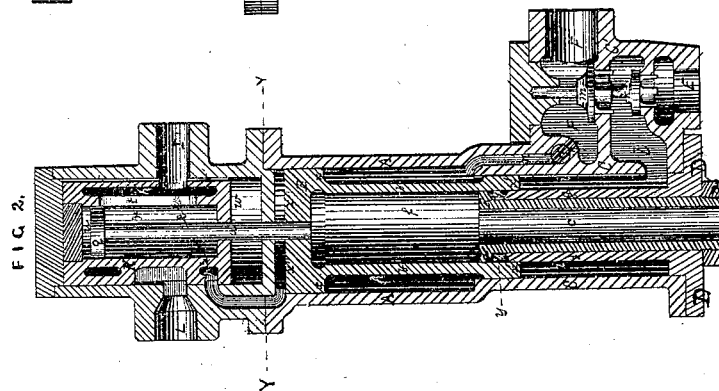
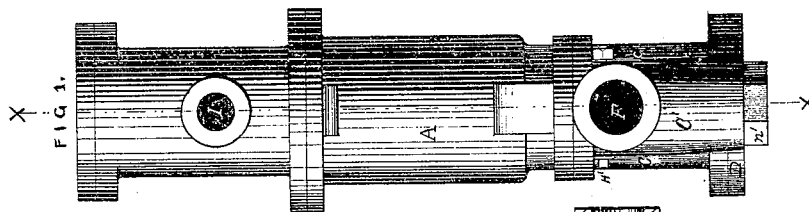
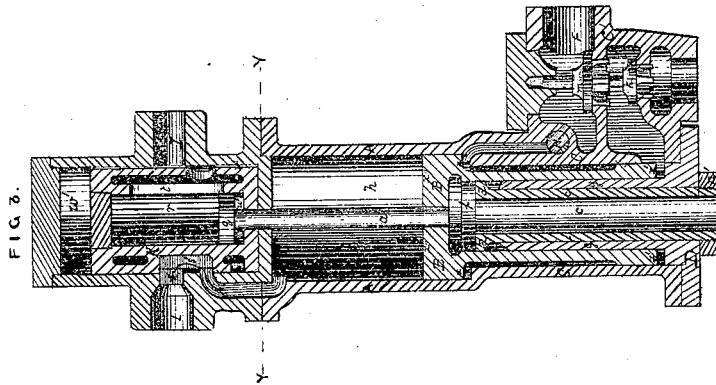
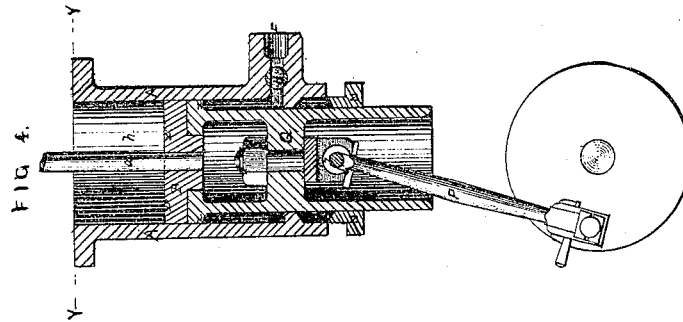


Butler & Christie,
Steam Pump.
No. 106,777. Patented Aug. 30, 1870.



WITNESSES.

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Thos. A. Christie

INVENTORS.

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UNITED STATES PATENT OFFICE.

HENRY L. BUTLER AND THOMAS A. CHRISTIE, OF PITTSBURG, PA.;
SAID CHRISTIE ASSIGNS HIS RIGHT TO SAID BUTLER.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 106,777, dated August 30, 1870.

To all whom it may concern:

Be it known that we, HENRY L. BUTLER and THOMAS A. CHRISTIE, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steam-Engines; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is an exterior vertical representation of our engine. Fig. 2 is a vertical section through *xx* of Fig. 1, showing the piston at the completion of its upstroke. Fig. 3 is a similar section, showing the piston at the completion of its downstroke. Fig. 4 is a section of an improved engine when not used as a pump, but for communicating power to other machinery.

In the several figures like letters denote similar parts.

Our improved engine may be used either as a pumping engine, for water or oil, &c., or as a working steam engine to communicate power to other machinery. It is operated by the direct action of live steam on one stroke; but the return stroke is effected by the force of water or other comparatively inelastic fluid under sufficient pressure, which passes in and out of the piston-cylinder through a cock, by regulating the opening of which the fluid is permitted to pass more or less rapidly, and thus a regular and uniform motion of the engine is secured.

To enable others skilled in the art to use our improvement in engines, we will proceed to describe the construction and operation of an engine adapted to pump water, oil, or other fluid.

In the accompanying drawing, A is the piston-cylinder, in which works the piston B, to which is attached the valve-stem *a*. The piston B has a hollow cylindrical extension, *b*, which, when used for pumping purposes, works over a stationary packing, *d*, at the upper end of the hollow cylindrical packing-rod *c*, the packing-head *d* at the upper extremity of the rod *c* fitting accurately in the cavity *f* of the extension *b*, and being seated in the

top of the cylindrical support *g*, around which the piston-extension *b* works in the pump-cylinder C. This construction furnishes an annular chamber, *h*, in the piston-cylinder, and another annular chamber, *i*, in the pump-cylinder C, into the former of which, *h*, water is forced, to raise the piston B by pressure against the under face *x* of the piston B, and the latter, *i*, is the working-barrel of the pump, of which the annular extremity *x'* of the piston-extension *b* forms the working-piston. The space *y* around the packing-head *d* is filled with metallic or other packing, which is forced outward against the cylindrical piston-extension *b* by the inclined face of the upper part of the packing-head *d*, and of the upper end of the cylindrical support *g*, when the packing-head *d* is drawn down by screwing up the nut *n'* at the lower end of the packing-rod *c*, which extends through the head-piece D of the pump-cylinder C for that purpose.

E is the opening, to which is attached the supply-pipe leading to the water or other fluid to be pumped, and *k* is the valve, opening upward, which admits the supply-water into the passage *l* opening into the bottom of the pump-cylinder C.

F is the discharge-passage for the water, which communicates with the steam-boiler below the water-line in case the apparatus is employed to feed water into the boiler; but if the apparatus is employed to supply a reservoir, or for other purpose where the discharge-pipe F can be connected with a column of water, so as to employ hydrostatic pressure, that will answer instead of the boiler-pressure.

A valve, *m*, opening upward from the supply-passage *l* into the discharge-passage F, rises on the descent of the piston-extension *b* for the passage of the water forced out of the pump-chamber *i* into the passage F, and thence into the steam-boiler or other receptacle, the reciprocating motion of the piston-extension *b* in the pump-chamber *i* acting to draw water through the valve *k* and force it through the valve *m* and passage F into the steam-boiler.

The discharge-passage F connects with the chamber *h* of the piston-cylinder by a smaller

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Paper File.

No. 106,778.

Patented Aug. 30, 1870.

Fig. 1

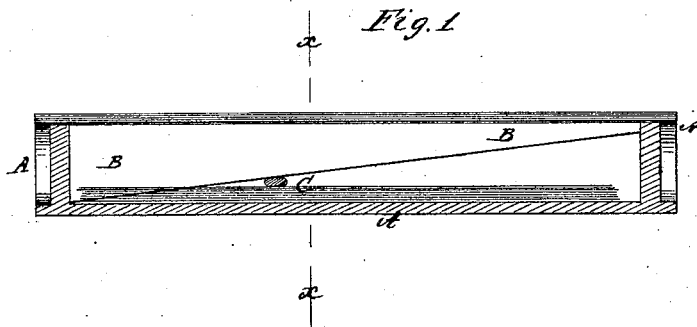
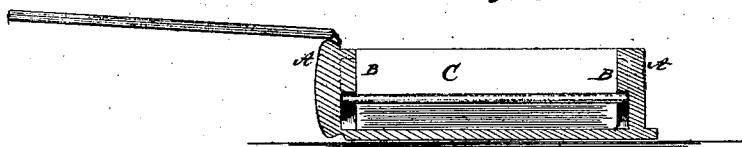


Fig. 2



Witnesses:

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