L. M. GILBERT.

Improvement in Valves of Steam Pumping Engines.

No. 115,726. Patented June 6, 1871.

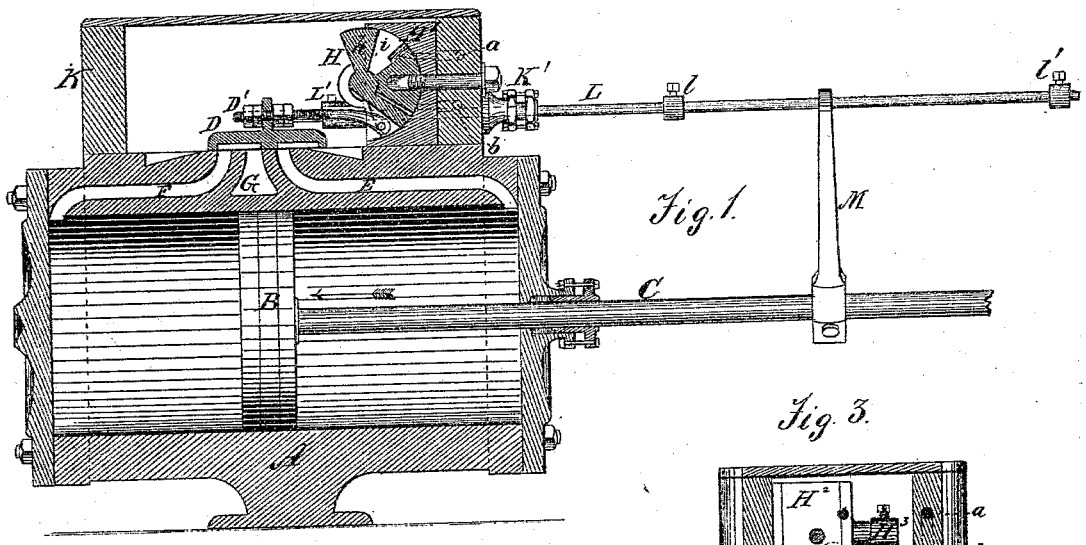


Fig. 1.

Fig. 3.

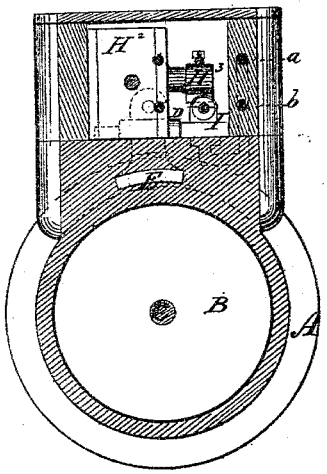


Fig. 2.

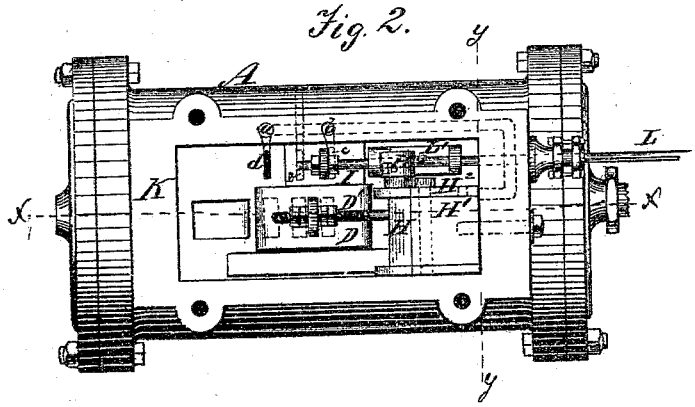


Fig. 4.

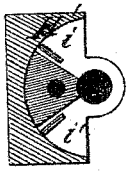


Fig. 5.

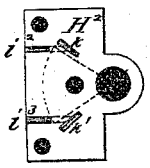


Fig. 6.

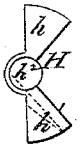
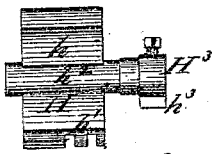


Fig. 7.



Witnesses.
C. F. Clausen
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Lucien M. Gilbert
Inventor.
per Edson Bros
Pts Atty

# UNITED STATES PATENT OFFICE.

LUCIEN M. GILBERT, OF COW RUN OHIO.

## IMPROVEMENT IN VALVES OF STEAM PUMPING-ENGINES.

Specification forming part of Letters Patent No. 115,726, dated June 6, 1871.

*To all whom it may concern:*

Be it known that I, LUCIEN M. GILBERT, of Cow Run, in the county of Washington and State of Ohio, have invented an Improvement in Valves of Steam Pumping-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making part of this specification, in which—

Figure 1 is a vertical longitudinal section on line *x x* of Fig. 2. Fig. 2 is a plan view of the steam cylinder and chest, with the cover of the latter removed to show the arrangement of the valves. Fig. 3 is a transverse section on line *y y* of Fig. 2. Figs. 4 to 7 are detail views of the oscillating valve.

The same letters of reference are employed in all the figures in the designation of identical parts.

This invention relates to an improvement in that class of steam pumping-engines in which the main slide-valve of the steam-cylinder is operated by an auxiliary valve which is moved by live steam solely, so that the engine will start automatically on the admission of steam to the chest, no matter in what position the piston was left. My improvement consists in the employment of a double-winged oscillating valve for this purpose, in place of the ordinary reciprocating plunger or piston, as will be generally described in the following description, and specifically pointed out in the claims.

A in the annexed drawing designates the steam-cylinder; B, the piston; and C, the piston-rod. The cylinder has the ordinary steam-passages E and F, and exhaust G, which are covered by the main slide-valve D. The latter is hitched, by an adjustable rod, D′, to the lower wing of the double-winged oscillating valve H, which is arranged in the casing or chest H′, in one end of the main steam-chest K. This casing H′ covers two steam-passages, *a* and *b*, which are formed in the walls of the main chest, and connect, respectively, with the ports *c* and *d* in the top of the cylinder. These ports are opened and closed alternately by a secondary slide-valve, I, which also covers the exhaust *e*, which is located midway between the ports, and may connect with the exhaust G of the cylinder. The valve I is shifted by a tappet, M, on the piston-rod, which strikes, just before the completion of the stroke of the piston in either direction, one or the other of the adjustable collars *l* and *l′* on the rod L, to which said valve is adjustably connected, the rod working through a stuffing-box, K′, of the steam-chest. The valve H has two segmental wings, *h* and $h^1$, radiating from its axis $h^2$, by which it is hung in the open end of the casing $H^1$ in bearings formed on opposite sides thereof, as shown. The casing is divided by a segmental partition to form an upper chamber, *i*, in which the wing *h* of the valve works, and a lower chamber, $i^1$, for the wing $h^1$. The passage *a* in the steam-chest communicates, by the channel $i^2$ and port *k*, cut in the removable side $H^2$ of the casing, with the chamber *i* and the passage *b* by a similar channel, $i^3$, and port *k′*, with the chamber $i^1$. In the position of the valves shown in Fig. 1, steam passes through the passage E into the cylinder, and drives the piston in the direction of the arrow. The chamber $i^1$, behind the lower wing of the oscillating valve, brought into communication with the exhaust *e* at the end of the preceding stroke of the piston, by means of the secondary valve I, steam was exhausted therefrom at the same time that live steam entered the chamber *i* behind the upper wing, so that the preponderance of pressure upon the outside of the lower wing drove it into its chamber, carrying with it the main slide-valve the required distance to shut off steam from the passage F, and connecting it with the exhaust G, and opening the passage E for the admission of steam. To prevent the hammering of the wings of the oscillating valve against the diaphragm of the case, the ports *k* and *k′* are cut a short distance in advance of said diaphragm, as best seen in Fig. 4. In this manner, as each wing is driven alternately into its respective chamber, a pocket is formed between its inner side and the diaphragm, in which sufficient steam is caught to form a cushion between them. Just before the piston completes its stroke in the direction of the arrow, the tappet M comes in contact with the collar *l* on the rod of the secondary slide-valve I, and moves the latter over the port *d*, opening the port *c*. The chamber *i* being thus connected with the exhaust *e*, steam will be exhausted from it, and the upper wing of the valve H being suddenly relieved of pressure upon its inner face, the

pressure of the steam in the chest upon its outer face will drive it into its chamber, and in thus oscillating the valve open the port $k'$ for the admission of live steam into the chamber $i^1$ to balance the lower wing. The oscillation of the valve H, which in extent corresponds exactly with the required throw of the main slide-valve, slides the latter on its seat so as to shut off steam from the passage E and admit it to the passage F to drive the piston in the opposite direction. The oscillating valve H has an overhung end on one of its journals, on which a collar, $H^3$, with a short downwardly-projecting arm, $h^3$, is secured. Its arm enters a recess in a thimble, L′, on the valve-rod L, by the ends of which it is struck each time the slide-valve I is shifted, for the purpose of starting the valve H, should it stick from any cause.

In engines of this class it is of prime importance that the valve which is used for shifting the main slide-valve should move with the greatest ease and the least friction, to insure the proper working of the engine. These requirements are fully met by the oscillating valve heretofore described, whereas the reciprocating plunger now in use, having a long bearing-surface, and being, consequently, subject to much friction, is very apt to stick, especially if the engine has been in disuse for any length of time.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with the main slide-valve of a steam-engine, the oscillating valve H, arranged in a casing, $H^1$, in the steam-chest, and operated by the steam in the latter, substantially as set forth.

2. The combination of the main slide-valve D, oscillating valve H $H^1$, steam-passages *a* and *b*, exhaust *e*, and secondary slide-valve I, substantially as set forth.

3. The combination of the recessed thimble L′ on the rod of the secondary slide-valve I, and the collar $H^3$ $h^3$ on the journal of the oscillating valve H, substantially as and for the purpose set forth.

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

LUCIEN M. GILBERT.

Witnesses:

WM. P. ROSE,

JOHN P. CAMPBELL.