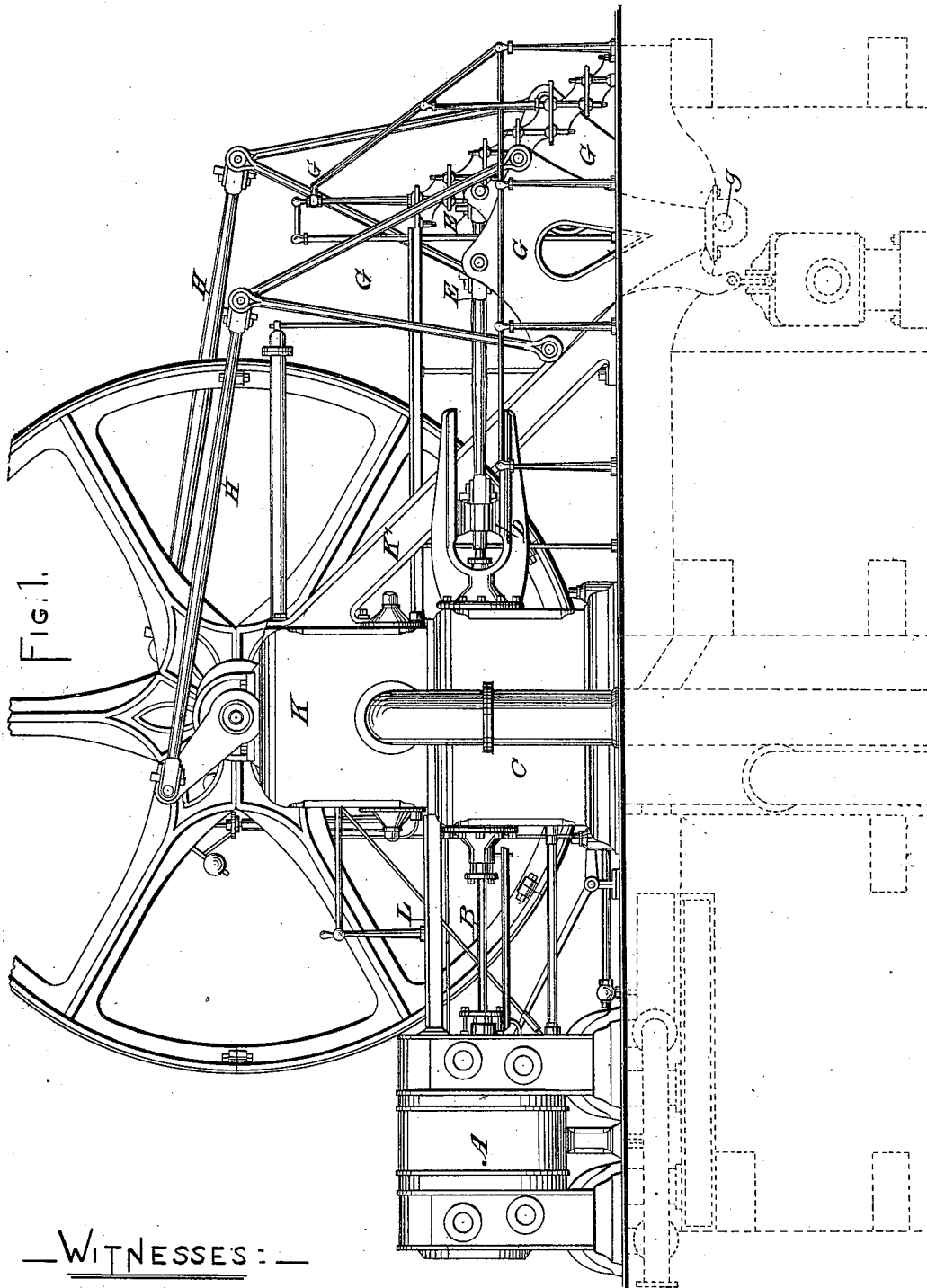


G. H. CORLISS.
Pumping-Engine.
No. 215,803. Patented May 27, 1879.



—WITNESSES:—

W. Colborne Brooks

E. B. Bolton

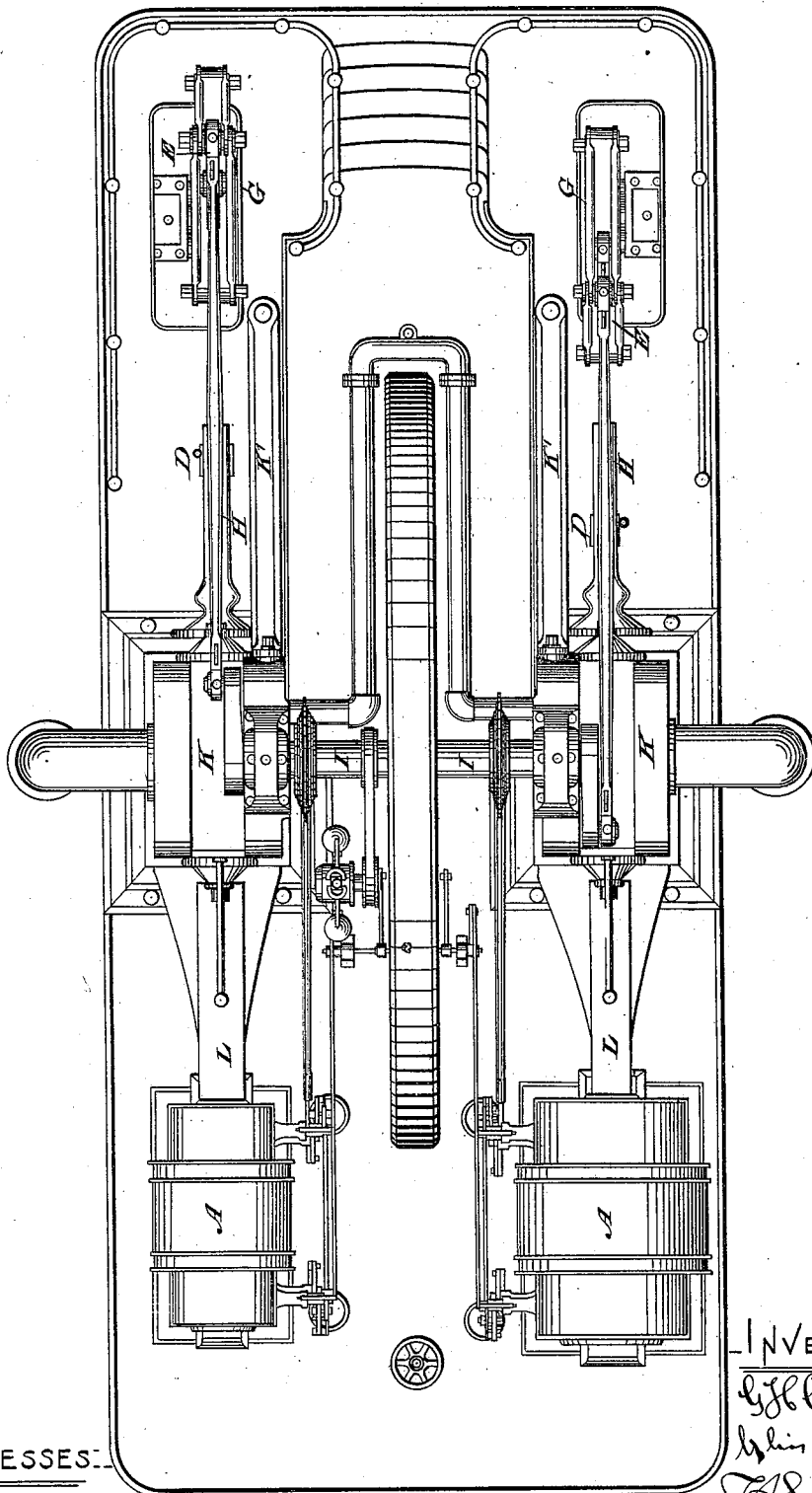
George H. Corliss.
his atty., J. S. Eaton

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Fig. 2.



WITNESSES:

W. Colborne Brooks
Chas. B. Stetson

INVENTOR:

G. H. Corliss
by his attorney
E. S. Corliss

UNITED STATES PATENT OFFICE.

GEORGE H. CORLISS, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN PUMPING-ENGINES.

Specification forming part of Letters Patent No. **215,803**, dated May 27, 1879; application filed December 27, 1878.

To all whom it may concern:

Be it known that I, GEORGE H. CORLISS, of Providence, in the State of Rhode Island, have invented certain new and useful Improvements relating to Pumping-Engines; and I do hereby declare the following to be a full and exact description thereof.

In the present instance I embody my invention in two cylinders, operated on the compound principle, connected to separate cranks placed at right angles on a crank-shaft. I mount each steam-cylinder in line with its pump, and extend the piston-rod through its pump-box, and connect it by a link to the middle of an upright lever oscillating on an axis at its lower end. The crank-shaft, carrying a fly-wheel, is mounted directly above the pumps, and is supported in bearings upon the pump-boxes. The crank-shaft and the upper end of the upright lever being carried up to the same level, a horizontal connecting-rod is used to form a connection between the lever and the crank. The air-pump is worked by a short arm from one of the levers, while the other lever works the feed-pump by a similar arm.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a side elevation, showing the parts which appear above the floor. Other parts which are below the floor are indicated by dotted lines. Fig. 2 is a plan, showing the arrangement embodying the compound principle.

Similar letters of reference indicate corresponding parts in both the figures.

A is a steam-cylinder having my improved system of valve mechanism attached. The piston-rod B extends from the cylinder into and through the pump C. The cross-head D, guided in suitable slides, is connected by a link, E, with the upright lever G, oscillating on a fixed axis, *g*. To the upper end of the lever G is attached a connecting-rod, H, the other end of which is attached to the pin of a crank which is secured to the shaft I. On this shaft is a comparatively light fly-wheel of large diameter. The fly-wheel is mounted in the middle of the length of the shaft I. The pillow-blocks which support the shaft I are

mounted on the pump-boxes K K, which are thus made to answer a double purpose—that of supporting the crank-shaft and at the same time inclosing the pump-barrel with its appurtenances.

The castings K K are connected by rigid inclined braces K' K' to the bearings *g g*, upon which the levers G G oscillate. Horizontal braces L L connect the body of the pump-boxes K K with the cylinders A A.

The two steam-cylinders are connected by a receiver, which, with its appurtenances, forms the subject of another application for a patent.

The pumps are of the plunger variety. Their plungers, which are pointed at each end and keyed to their rods B B, embody peculiarities of construction which also are the subject of application for a separate patent.

Peculiarities in the fly-wheel, in the upright levers, in the barrels of the pumps, the valves of the pumps, the valves of the engine, and the means for working them embody improvements which are also the subjects of separate applications for patents.

A portion of the steam-power applied to the pistons is directly utilized in working the pump-plungers by means of the continuous piston-rod; but in working steam at the high rates of expansion indispensable to the attainment of the best economic results, there must necessarily be applied to the pistons during certain parts of the stroke an amount of steam-power largely in excess of that required to overcome the nearly uniform resistance of the water-pressure on the plungers. As, in the regular operation of the engine, this excess is immediately transmitted to the fly-wheel to be applied to the plungers before the termination of each stroke, it is of vital importance that this transmission of power to and from the fly-wheel through the necessary intervening mechanism should be attended with the least possible loss by friction. I diminish this loss in an important degree by the introduction of the upright levers herein described, which enables me to give to this intervening mechanism a length of throw twice that of the pump-plungers, thereby reducing, by about one half, the weight of the mechanism in question, and lessening the friction and wear at all the journals in approximately the same ratio.

Various modifications may be made in the form of many of the parts of the engine.

I have in some experiments made use of solid upright levers in place of the skeleton-topped form herein described, and have also varied the form of the pump-box and other parts.

Instead of a double engine compounded, I can use a single engine or two cylinders not compounded.

In the present instance the power for pumping is applied directly to the pump-rod; but I have, with good effect, applied that power near the top of the oscillating lever by means of a connecting-rod working on the side of the lever opposite to the crank-connection. I prefer the present arrangement mainly on account of its giving greater compactness to the general design as a system of pumping machinery.

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

An oscillating lever having a fixed axis at one end, and a connection with crank and fly-wheel at the other end, in combination with a reciprocating pump piston or plunger connected to said lever at a convenient point between its ends, thereby giving to the crank and its connection an increased stroke as compared with that of the pump.

In testimony whereof I have hereunto set my hand this 19th day of December, 1878, in the presence of two subscribing witnesses.

GEO. H. CORLISS.

Witnesses:

JESSE WALRATH,
GEO. W. KENNEDY.