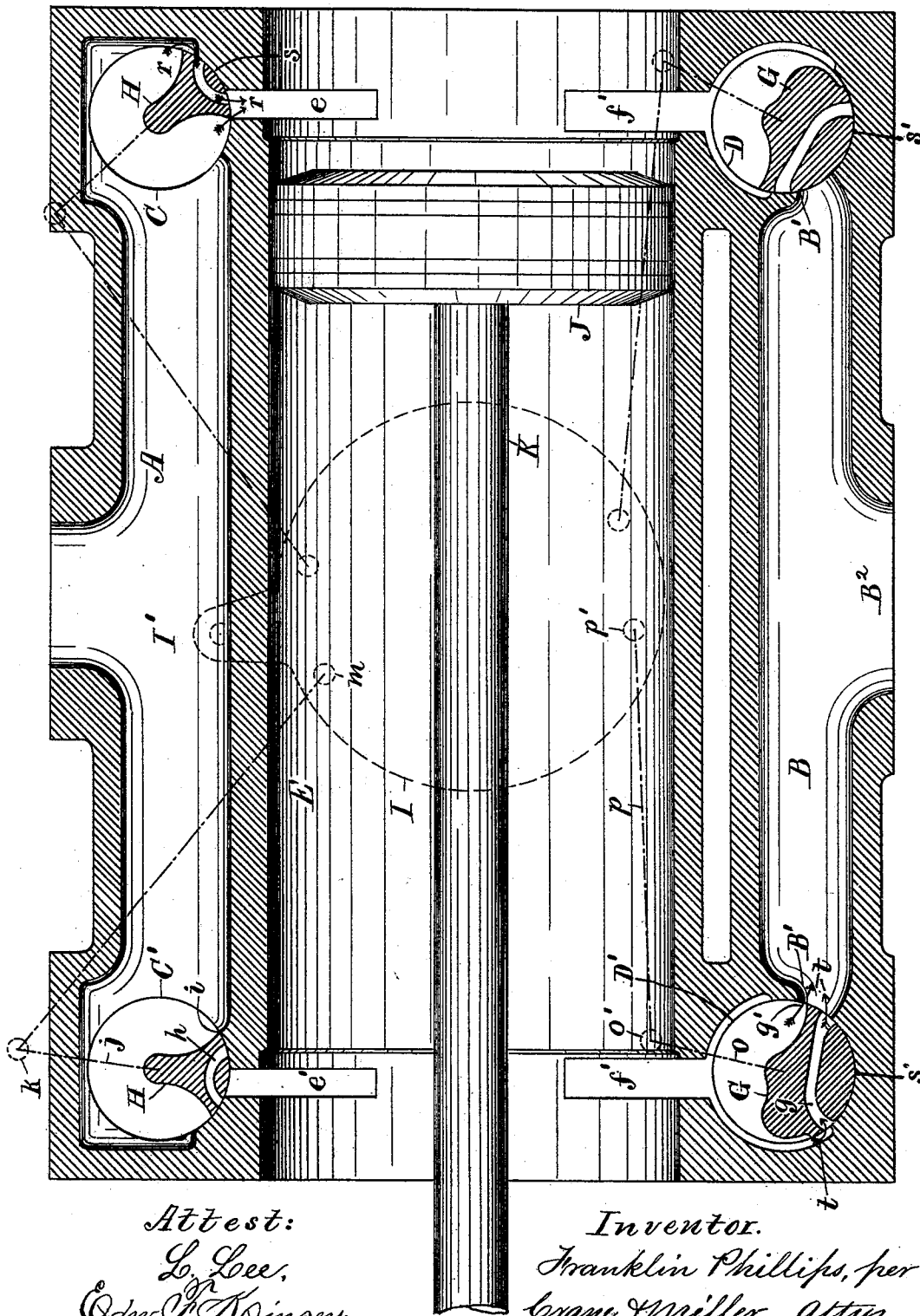


(No Model.)

F. PHILLIPS.
VALVE FOR ENGINES.

No. 500,271.

Patented June 27, 1893.



Attest:
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UNITED STATES PATENT OFFICE.

FRANKLIN PHILLIPS, OF NEWARK, NEW JERSEY.

VALVE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 500,271, dated June 27, 1893.

Application filed February 15, 1893. Serial No. 462,415. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN PHILLIPS, a citizen of the United States, residing at Newark, Essex county, New Jersey, have invented certain new and useful Improvements in Valves for Corliss Engines, fully described and represented in the following specification and the accompanying drawing, forming a part of the same.

10 This invention relates to that class of oscillating valves which are formed with a solid cylindrical face fitted to an imperforated cylindrical seat, and adapted to admit the steam to a single port by the movement of one edge
15 of the valve over such port. Such valves are used in Corliss engines, in which four valves are used, two to admit steam at opposite ends of the cylinder, and two for discharging the exhaust from opposite ends of the cylinder;
20 but the exhaust valves are, in such construction, moved always through a given stroke, while the steam valves are released from the driving mechanism by a detachable latch regulated by a governor. As such latches, and
25 the means for actuating the same, are already well known, it is not necessary to illustrate their construction to explain my invention; as the latter relates exclusively to the construction of the valve and its seat within the
30 valve chamber. In a Corliss engine each valve is seated in a chamber from which there is a single outlet port, such port leading from the steam valves into the cylinder, and from the exhaust valves into an exhaust chest. In
35 engines where the load is light, the steam ports are seldom opened more than one half or one fourth of their width, and the steam is thus compelled to pass through a very narrow passage.

40 The present improvement consists in the combination, with each valve, of an internal passage opening at both ends upon the valve face, an imperforate seat at one side of the port proportioned to admit the steam to one
45 end of the passage when the edge of the valve first opens the connected port. The port is thus supplied with steam at the edge of the valve, and through the internal passage simultaneously; by which construction the cylinder
50 is supplied with steam more quickly under a given movement of the valve, and the valves themselves may have a smaller

movement to deliver the same volume of steam. By diminishing the movement of the valves the jar upon the links which operate
55 the valves is diminished, the friction of the entire valve driving mechanism is reduced, and the dash pots operate with much less noise or concussion. Such internal passages have been heretofore applied both to flat slide
60 valves and to such oscillating valves as are used for admitting steam to and discharging it from one end of the steam cylinder by means of a single valve; but they have never
65 been applied to Corliss engines, in which the steam induction valve is closed by a spring or weight, and in which the exhaust valves discharge the steam from a lateral passage so as to permit of a valve seat beneath the
70 center of the valve to sustain its weight. My invention therefore relates to the special constructions which I have devised for the valves and the valve seats in a Corliss engine.

The invention will be understood by reference to the annexed drawing, which shows a
75 longitudinal section of the steam cylinder E of a Corliss engine, with a steam chest A upon its upper side, an exhaust chest B upon its lower side, and valve chambers at the ends of such chests. The steam induction valves
80 are seated in the chambers C, C', and the exhaust valves in the chambers D, D'. The cylinder ports *e*, *e'* lead from the valve chambers C, C' into the cylinder E, and corresponding ports *f*, *f'* lead from the cylinder
85 downward to the valve chambers D, D', which are provided at the bottom with imperforate seats *g* to receive the exhaust valves G. Exhaust ports B' lead from the chambers D, D' into the exhaust chest B, from whence the
90 steam is discharged by outlet B² in the usual manner.

The face of each steam valve H is made rather more than twice the width of the cylinder port, and the internal passage *h* is
95 curved so that both its ends open upon the valve face adjacent to its edges.

The disk I for oscillating the valves is indicated by a dotted circle, with an arm at the top carrying a pin I' by which the disk would
100 be connected to the eccentric.

A line *j* is extended from each steam valve to a pin *k* which is connected by a line *n* with a pin *m* upon the disk, to indicate the con-

nections for actuating the valves, the latch for releasing the valves not being shown as it is already well known. In like manner a line *o* is extended from each exhaust valve to a pin *o'*, which is connected by a link *p* with a pin *p'* upon the disk, and such connections oscillate the exhaust valves through the same stroke at each movement of the disk. The steam is admitted to the cylinder ports *e, e'* at the edge nearest to the middle of the cylinder, and upon the outer side of such ports seats *s* are formed of suitable length to close the outer end of the passage *h* until the edge *i* of the steam valve first opens the port. The steam valve is shown in such position at the right hand end of the cylinder with an arrow *r* indicating the admission of steam past the edge of the valve, and an arrow *r'* indicating the admission of the steam simultaneously at the outer end of the passage *h*. As the inner end of the passage opens upon the face of the valve adjacent to the edge *i*, the steam entering at the outer end of such passage thus has free access to the cylinder port *e* when such port is first opened; and thus supplies twice the amount of steam with a given opening of the valve, as in similar valve constructions.

As the exhaust ports *B'* open at the side of the chambers *D D'*, the exhaust valves may be provided with very wide bearing seats *s'* directly under the centers of the valves, and the wearing surface and its durability is thus greatly increased. The internal passage *g* in such valves is made of suitable length to receive the steam, at its outer end, coincident with the opening of the cylinder port by the edge *g'* of the valve, as indicated by the arrows *t* upon the exhaust valve at the left hand end of the cylinder. With this construction the volume of steam discharged from the cylinder at the beginning of the exhaust stroke is thus doubled, and any back pressure upon the piston is diminished in a corresponding degree. In practice I find that this construction enables me to operate the valves with less movement than has heretofore been possible, thus greatly diminishing the movement, the friction, and the wear of the valve-driving mechanism, and permitting a higher velocity in the piston without derangement of the valve gear. As the valves in the Corliss engine are connected each with only a single port, it is obvious that the valve face is a solid cylindrical face excepting where the ends of the passage open thereon, and that the seats *s'* at the outer side of each port may be entirely imperforate and hold the passage closed until the edge of the valve opens the port as desired.

Each of the valve chambers *C'* and *D'* is provided with an outlet port, the ports *e, e'* serving such purpose for the chambers *C, C'* and the ports *B'* discharging the steam from the chambers *D, D'*. The edge of such port, against which the valve cuts off steam, is that which I have termed the inner edge, and

the seat which regulates the admission of steam to the internal passage of the valve is adjacent to the outer edge of such port. Such seat is shown over the outer end of the passage, and therefore closing the same, in the exhaust chamber *B'* at the right hand end of the cylinder, and in the steam chamber *C'* at the left hand end of the cylinder. A piston *J* with part of its piston rod *K* is shown at the right hand end of the cylinder, in readiness to move toward the left, and the valves in the four valve chambers are shown in corresponding positions. The valve *H* in the steam chamber *C* at the right hand end of the cylinder is shown just opening the port *e*, and the valve *G* at the left hand end of the cylinder is shown partially opened to discharge the exhaust steam from the cylinder. The steam valve *H* would, in a Corliss engine, be opened to supply the desired volume of steam, and, when the piston has moved a suitable distance, the valve would be released from the driving mechanism and would be closed by a spring or weight.

I am aware that gridiron valves have been used to increase the area of the steam passages, as in United States Patent No. 271,729, dated February 6, 1883. I am also aware that internal passages have been used in connection with such gridiron valves, and for the purpose of connecting two adjacent ports formed in the same cylindrical seat. The valve seat is necessarily constructed with bridges when gridiron valves are used, and such valves cannot therefore be applied to Corliss engines already in use and formed with a single port. My invention is intended to obviate the necessity of casting the valve chamber and its ports with such bridges; and the fitting of the valve to two or more ports in the same valve chamber. I do not therefore claim these constructions, but

What I do claim, and desire to secure by Letters Patent, is—

1. In a Corliss engine having the steam valves closed by a weight or spring, the combination, with the cylinder *E*, its steam chest *A* with valve chambers *C, C'* having each a single outlet port *e'*, an exhaust chest *B* with valve chambers *D, D'* having each a single outlet port *B'*, of the oscillating valves *G* and *H* having each a cylindrical face and an internal passage with both ends opening upon such face, with the outlet end of the passage adjacent to the edge of the valve, and an imperforate seat at the outer side of the outlet port, of suitable length to admit steam to the inlet end of the passage, coincident with the opening of such port, substantially as herein set forth.

2. In a Corliss engine, the combination, with the cylinder *E* and exhaust chest *B*, of the chambers *D, D'* for the exhaust valves with the single exhaust port from one side of each to the chest *B*, the exhaust valves *G* having each the internal passage *g* with both ends opening upon the face of the valve, with its

outlet end adjacent to the edge of the valve,
and the imperforate seat *s'* at one side of the
port and beneath the center of the valve, of
suitable length to admit steam to the inlet
5 end of the passage when the valve first opens
the exhaust port, substantially as herein set
forth.

In testimony whereof I have hereunto set my
hand in the presence of two subscribing wit-
nesses.

FRANKLIN PHILLIPS.

Witnesses:

JACOB R. WILLIAMS,
THOMAS S. CRANE.