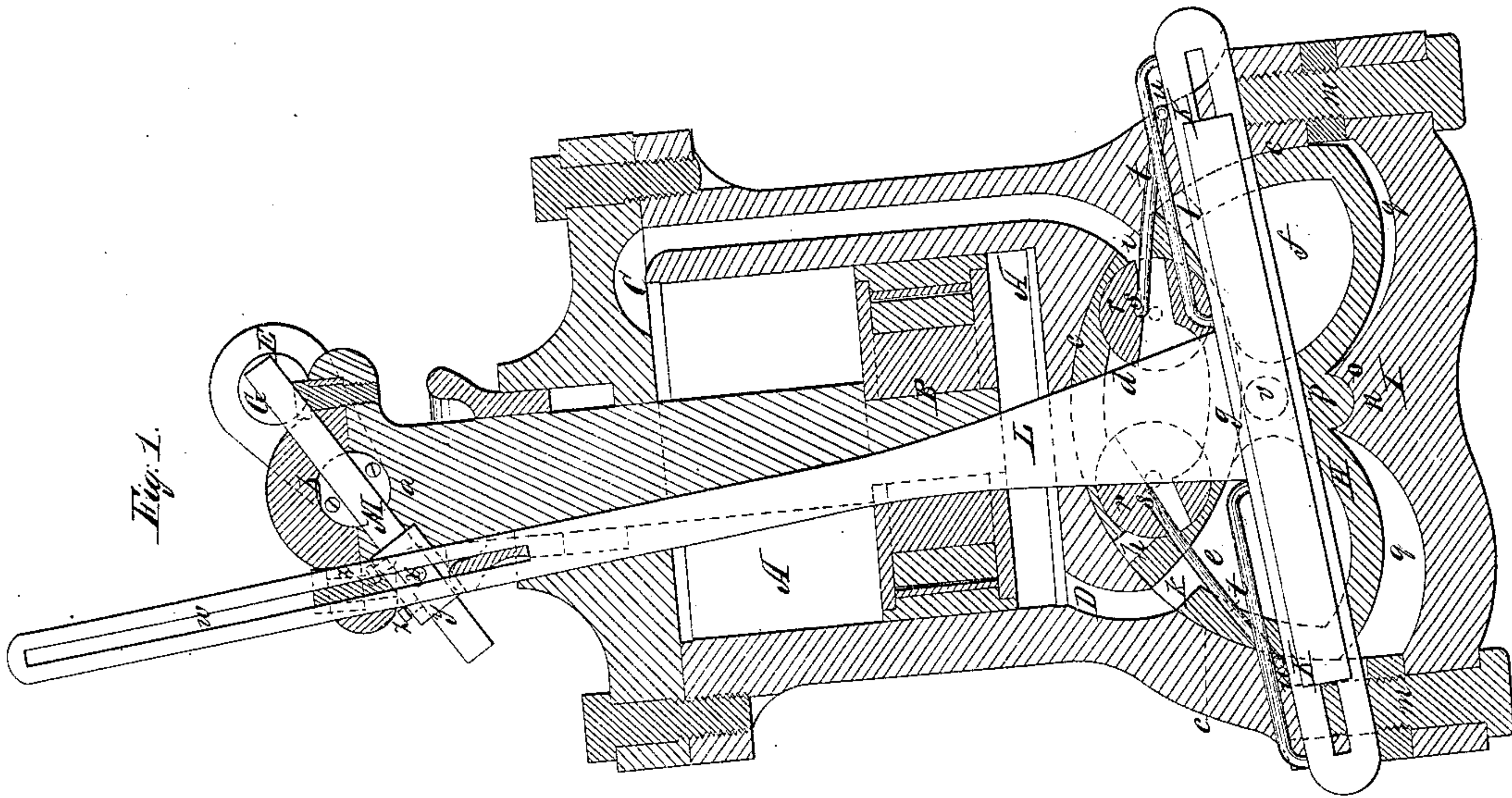
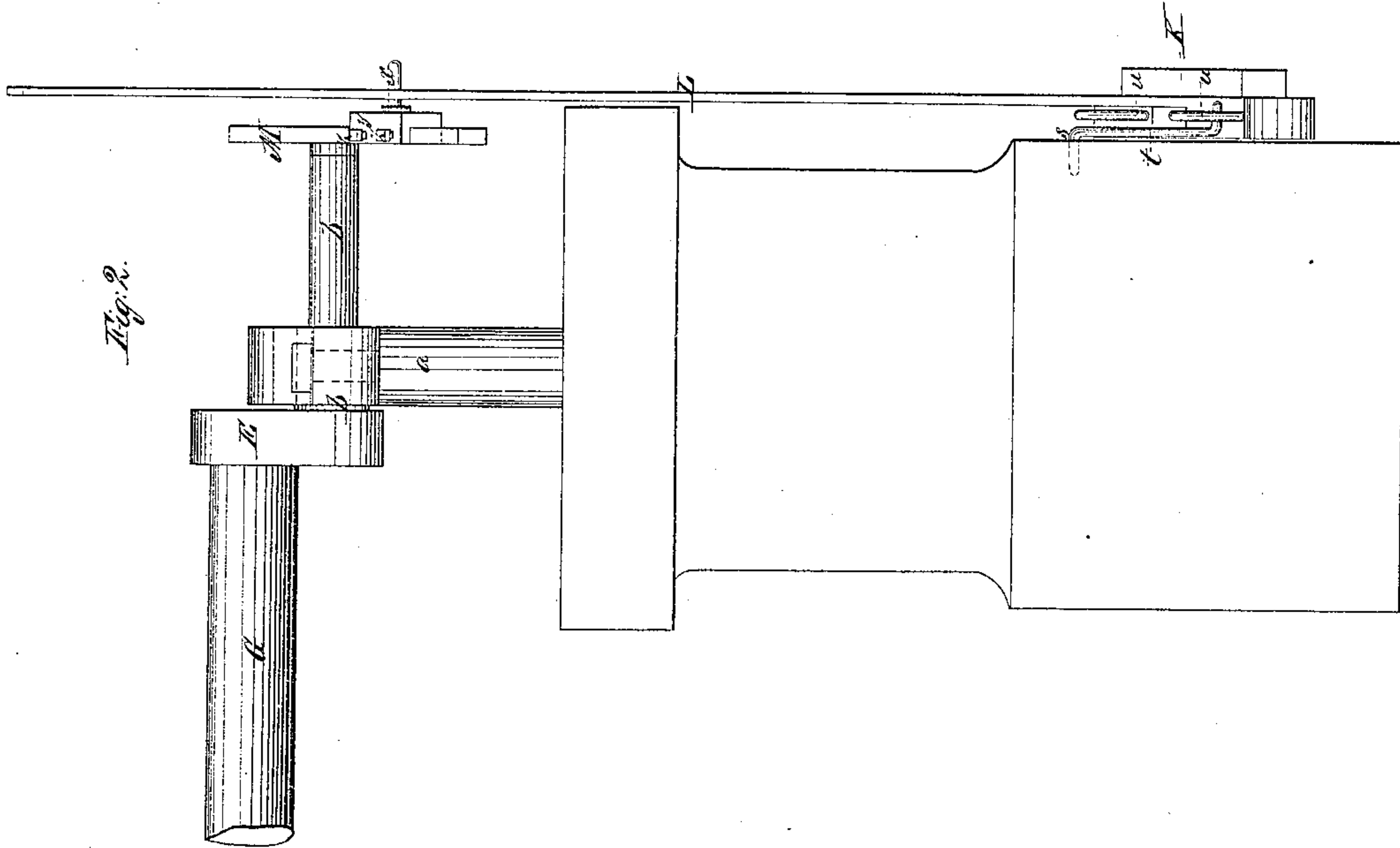


J. S. Barden,
Oscillating Steam Engine.

N^o 19,464.

Patented Feb. 23, 1858.



UNITED STATES PATENT OFFICE.

JOHN S. BARDEN, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO HIMSELF, AND AARON W. ROCKWOOD, OF BOSTON, MASSACHUSETTS.

OSCILLATING STEAM-ENGINE.

Specification of Letters Patent No. 19,464, dated February 23, 1858.

To all whom it may concern:

Be it known that I, JOHN S. BARDEN, of the city and county of New Haven and State of Connecticut, have invented an Improved
5 Oscillating Steam-Engine; and I do hereby declare that the same is fully described and represented in the following specification and the accompanying drawings, of which—

Figure, 1, denotes a sectional view of it.
10 Fig., 2, is a side view of the primary crank, the piston, the secondary crank and its adjustable wrist, which will be hereinafter described.

In Fig., 1, of the said drawings, A represents a steam cylinder provided with a piston, B, and constructed with steam passages, C, D, leading out of its opposite ends and arranged so as to open through the curved bottom of the cylinder as shown in said
20 Fig. 1. The upper part of the piston rod, *a*, turns on the wrist, *b*, of a crank, E, which for the sake of convenience, may be termed the "primary crank" as it is intended to extend from the main driving shaft represented at G in the drawing. The lower part
25 or bottom of the steam cylinder is constructed with a semi-cylindrical seat, *c*, *c* to rest and turn on a semi cylindrical steam chest, H, which is constructed as shown in
30 Fig., 1, with three chambers, *d*, *e*, *f*, formed in it by means of a curved partition, *g*, extending across it as shown in the drawing. The upper or middle chamber, *d*, is the steam induction chamber, and should be directly
35 connected with the boiler or steam generator of the engine so as to receive steam therefrom. Each eduction chamber, *e*, or, *f*, may either open into the atmosphere or it may be connected with a steam condenser.
40 While, the chamber *d*, has two ports, *h*, *i*, each of the chambers, *e*, *f*, is provided with a single port, *k*, or, *l*, the said ports, *h*, *i*, *k*, *l*, being arranged with respect to the partition *g*, and the steam passages, C, D, as
45 shown in the drawings. The upper surface of the stationary steam chest, H, is semi-cylindrical and serves as a bearing for the curved seat, *c*, *c*, of the cylinder A such cylinder while the engine is in operation
50 having an oscillating motion on the steam chest.

In order to connect the steam cylinder and steam chest in such manner as to preserve them in a proper relation to one another
55 during the operation of the engine, I make

use of a yoke or bar I, formed as shown in Fig., 1, and connected to the cylinder by screw bolts arranged as shown at *m*, *m*, in the said figure. The yoke or bar I, is constructed with a projection, *n*, furnished with
60 a small arched socket, *o*, which receives and rests against a semi cylindrical projection or bearing, *p*, arranged concentrically with respect to the upper curved surface of the steam chest H. Spaces, *q*, *q*, are arranged
65 on opposite sides of the projection, *p*, and between the yoke, I, and the steam chest, H, in order that the yoke may oscillate or vibrate on its bearing *p*, in accordance with the oscillatory movements of the cylinder on
70 the steam chest.

By the above method of applying the yoke to the steam chest, a large amount of friction is saved in comparison to what would result, were we to make the steam
75 chest entirely cylindrical, and construct the yoke so as to extend around and fit to it as shown in Letters Patent of the United States, granted to me and numbered respectively 14,335 and 18,718. When steam is
80 suffered to flow into the induction chamber of the steam chest it will pass therefrom through one or the other of the ports thereof, and operate the piston, the waste steam which escapes from the cylinder being re-
85 ceived into one or the other of the eduction chambers.

In order that the engine may act through the expansion of the steam let into the cylinder, I provide the induction chamber with
90 two rotary cut offs or valves, *r*, *r*, arranged at opposite ends of it, and so as to work against the ports, *h*, *i*, each of the said cut offs being furnished with a crank, *s*, which should project from it and be arranged out-
95 side of the steam chest. The wrists, *t*, *t*, of these cranks should extend respectively into slots *u*, *u*, applied to or formed in a rocker lever, K whose fulcrum is at its middle part as represented by the dotted line at, *v*, in
100 Fig., 1. From the middle of the said lever K a bar L, extends upward as shown in Fig., 1, and has a long straight slot, *w*, formed through its upper part and for the purpose of receiving the wrist *x* of a sec-
105 ondary crank or slide bar, M, affixed to and extending in opposite directions from the wrist of the primary crank, E, as shown in the drawings. The wrist, *x*, projects from a slider, *y*, so fitted to the bar or crank, M, 110

as to slide upon it longitudinally and be fixed in any position thereon by one or more clamp screws *z, z*.

The secondary crank rotates with the
 5 primary crank, its wrist revolving in a path concentric to that of the wrist of the primary crank. During its revolution, the secondary crank will impart a reciprocating vibratory motion to the bar *L*, and through
 10 it a reciprocating movement to the lever or rocker bar, *K*, that is on the fulcrum of the latter. This movement of the rocker bar, *K*, will produce the necessary movements of the cut offs to open and close the ports
 15 of the induction chamber. It will be evident that as we move the wrist of the secondary crank either farther from or nearer the axis of rotation of the primary crank, we shall effect a change in the extent of ro-
 20 tary movement of each cut off so as to cause it to shut off the passage of steam into the cylinder at whatever position of the piston in the cylinder we may desire to have the interruption of the steam take place. The
 25 slider of the wrist of the secondary crank may be so connected with a "ball governor" as to be moved on the secondary crank, *M*, by such ball governor, and thus the steam from time to time may be cut off
 30 from entering the cylinder in proportion to the variation of the amount of resistance which the engine has to overcome.

An oscillating steam engine made in the above described manner, is not only simple
 35 in construction, but very effective in operation. By reason of its cylinder being supported and made to turn on the stationary steam chest, very little wear of the rubbing surfaces can take place.

40 I do not claim applying the cylinder and the steam chest of a steam engine together in such manner that the cylinder may turn on the steam chest. Nor do I claim confin-

ing them together under such circumstances, by means of an arched bar or strap to ex- 45 tend and turn around or slide on a semicylindric surface of the same radius as that of the curved outer surface of the steam chest, such being shown in the drawings of Letters Patent granted to me by the Gov- 50 ernment of the United States of America and numbered 14,335, and 18,718, but

What I do claim is—

1. Combining with the semicylindrical steam chest, *H*, and the yoke or bar, *I*, sub- 55 stantially in manner as specified, a small rocker bearing *p*, socket, *o*, and spaces, *q, q*, arranged between or with respect to the valve chest and bar essentially as set forth.

2. I also claim the above described ar- 60 rangement of the induction and eduction chambers and their ports in the semicylindric steam chest.

3. I also claim the application and arrangement of the two separate rotary cut 65 offs *r, r*, within the induction chamber, *d*, and with respect to its two sub-ports *h, i*, as specified.

4. I also claim the combination of mechanism for operating the two cut offs, the 70 same consisting of the secondary crank, *M*, the slotted rocker lever, *L*, the cranks, *s, s*, and the connection bar, *K*, or its mechanical equivalent.

5. I also claim applying the wrist of the 75 secondary crank, *M*, to the wrist of the primary crank so that the former may be adjustable with respect to the axis of the primary crank as and for the purpose specified.

In testimony whereof I have hereunto 80 set my signature.

JOHN S. BARDEN.

Witnesses:

R. H. EDDY,
 F. P. HALE, Jr.