2 Sheets. Sheet 1.

L. W. Langdon,

Oscillating Steam Engine.

No. 30,826. Patented Dec. 4, 1860.

Fig: 1.

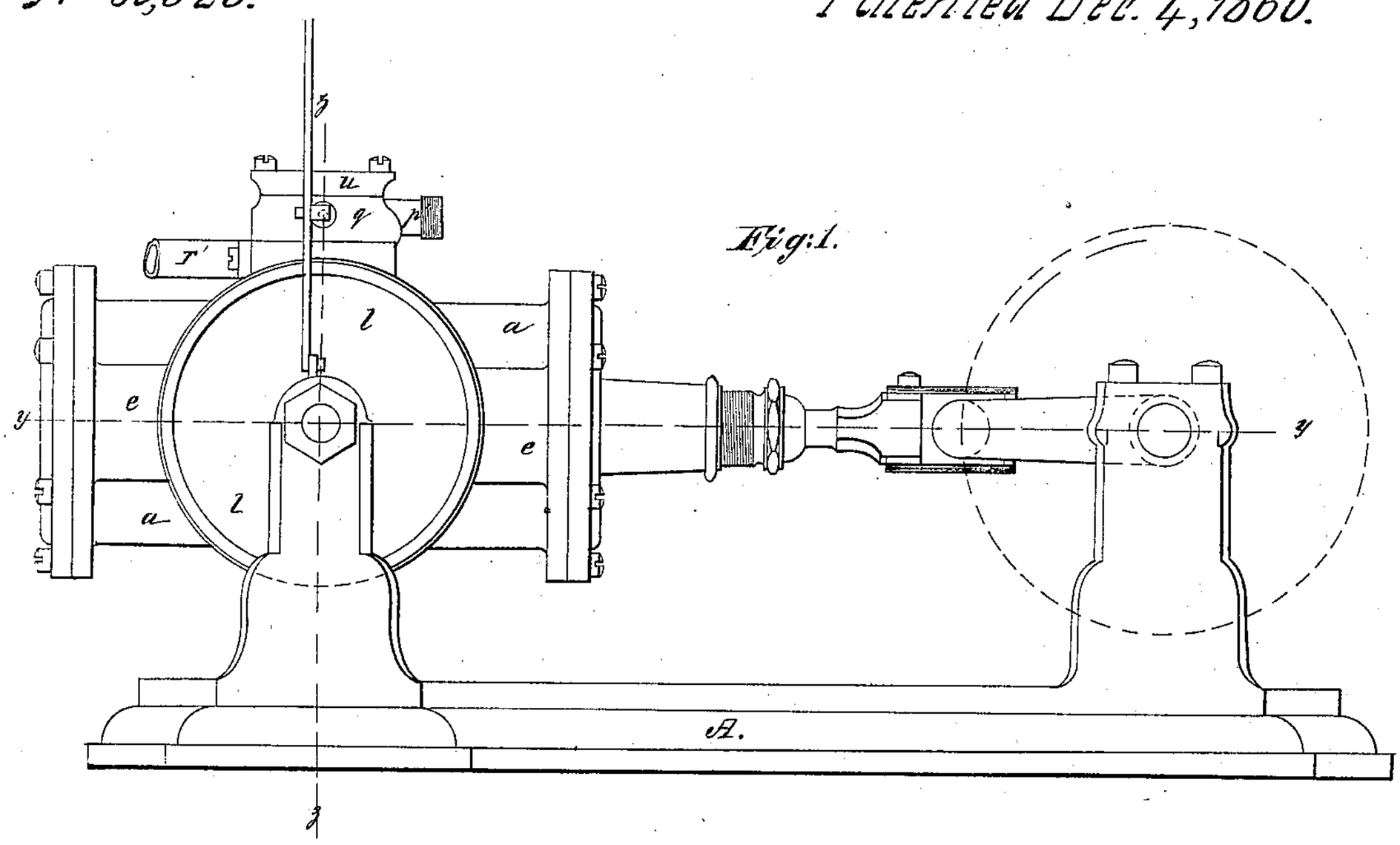
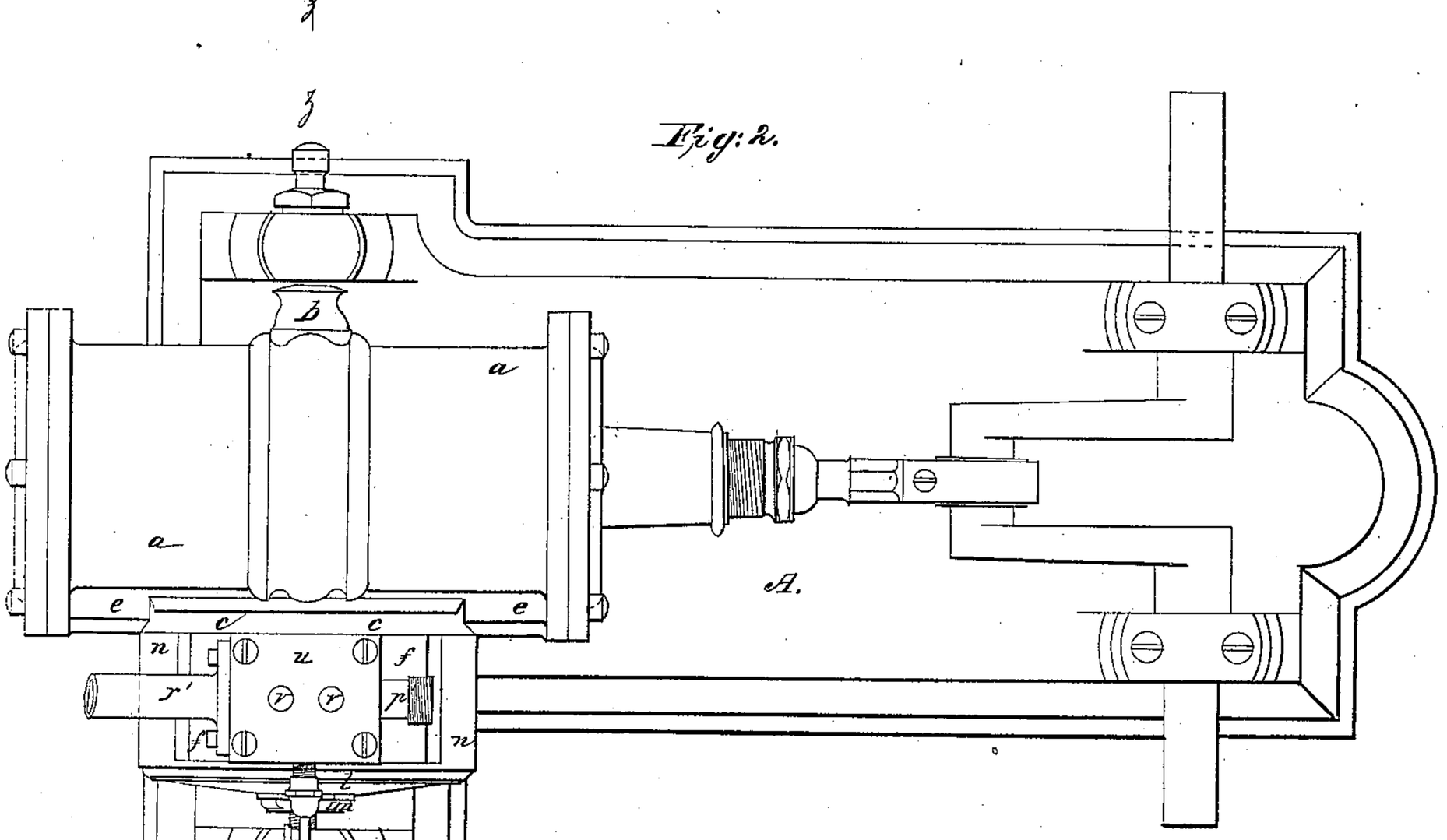


Fig: 2.



Witnesses:
J. B. Crosby
G. N. Fleming

Inventor:
L. W. Langdon

2 Sheets. Sheet 2.

L. W. Langdon,

Oscillating Steam Engine.

No. 30,826. Patented Dec. 4, 1860.

Fig: 3

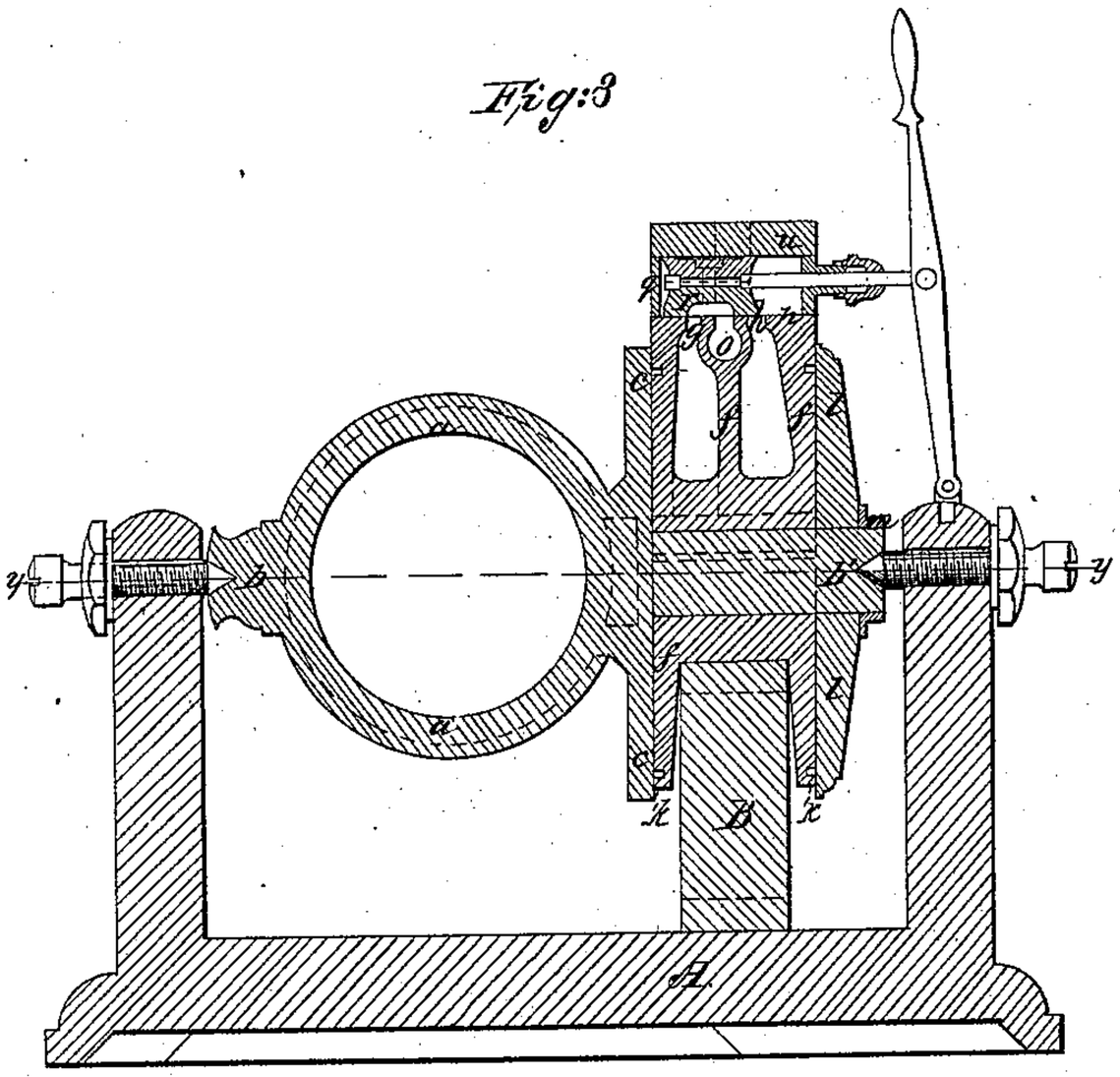


Fig: 4.

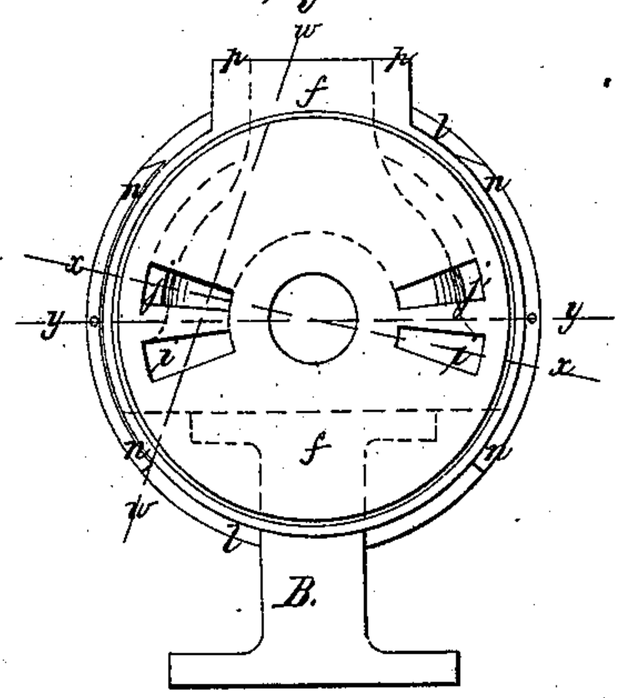


Fig: 5

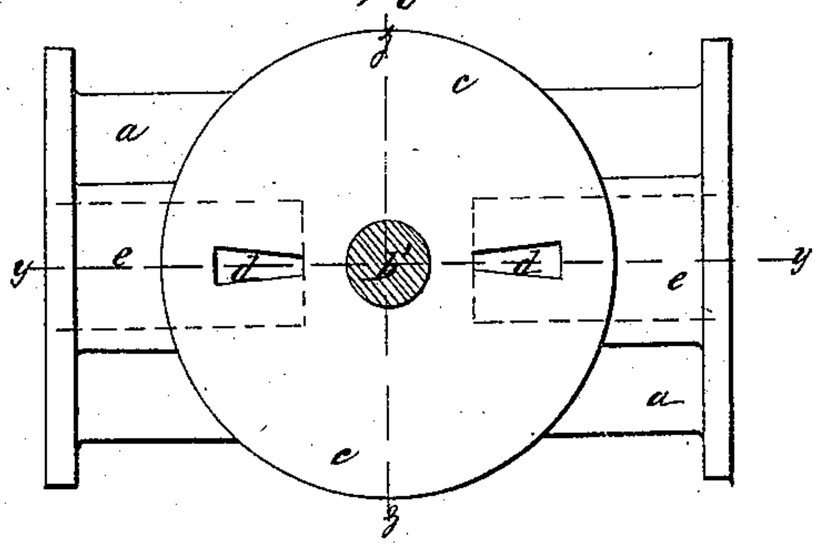


Fig: 6.

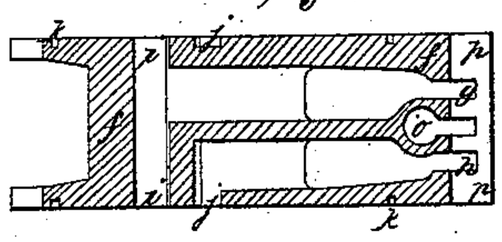


Fig: 7.

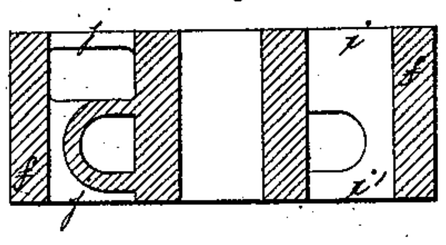
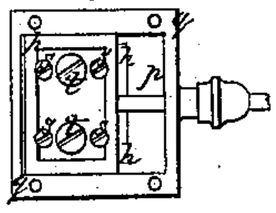


Fig: 8.



Witnesses:

J. B. Cowly
D. N. Perkins

Inventor:

L. W. Langdon.

UNITED STATES PATENT OFFICE.

L. W. LANGDON, OF NORTHAMPTON, MASSACHUSETTS.

VALVE OF OSCILLATING ENGINES.

Specification of Letters Patent No. 30,826, dated December 4, 1860.

To all whom it may concern:

Be it known that I, LEANDER W. LANGDON, of Northampton, in the county of Hampshire and State of Massachusetts, have invented certain new and useful Improvements in Oscillating Steam-Engines; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention so full and exact as to enable those skilled in the art to practice it.

In the different figures of the drawings similar letters refer to similar parts.

The steam cylinder *a* is cast with solid trunnions *b*, *b'*, which are pivoted or are sustained by suitable bearings. The cylinder is also provided with a large flange or plate *c* parallel with the axis of the bore of the cylinder and at right angles with the axis of the trunnions, in the center line *y*, *y*, of which plate the ports *d*, *d'*, are formed, which communicate with the opposite ends of the cylinder by steam passages formed in *e*. The trunnion *b'*, is made of sufficient length to pass through the steam chest, *f*, before resting in or upon its bearing. The steam chest is formed with two passages, *g* and *h*, which pass either full or exhaust steam, as will be hereafter explained.

The passage, *g* connects with the ports *i*, *i'*, and the passage *h*, with the ports *j*, *j'*. The boundaries of the ports *d*, *d'*, *i*, *i'*, *j*, *j'*, are radial from and concentric with, the axis of oscillation. The hole which is formed in the center of the steam chest, being concentric with boundaries of the ports *i*, *i'*, *j*, *j'*, and fitting upon the trunnion *b'*, keeps the outer and inner boundaries of the said ports and the ports *d*, *d'*, concentric with each other.

The plane surfaces of the chest, *f*, are faced parallel with each other, and have grooves formed in them at *k*, for the reception of packing, when this is needed to make steam tight joints between the chest and the flanges *c*, and *l*. The flange *l*, by means of the screw and nut *m* on the end of trunnion *b'*, serves to keep the chest pressed up to the flange *c*, while the projections *n* upon *l*, prevent the chest from being pinched between *c*, and *l*. The post B, which is fixed to the chest *f*, and to the bed plate A, prevents *f*, from oscillating with the cylinder, and also relieves the trunnions from the weight of the chest. Between *g*, and *h*, an exhaust passage *o*, is formed which receives the exhaust steam from either *g*, or *h*, by means of the D formed valve which can slide upon the valve seat *p*, and within the valve chest *q*. The said valve, which is marked *r*, is divided parallel with the valve seat into two pieces, which can be separated by the screws *s*, and are held together by the screws *t*, by which adjustment, the surface of the valve opposite the valve face on *p*, is kept in contact with the inner surface of the chest cover *u*. This upper surface of the valve is recessed, as shown, leaving only a narrow edge or border around the valve to come into contact with *u*, through which holes are formed at *v*, communicating with the atmosphere and the recess formed in the top of the valve.

By inspection of the drawings it will be obvious that the direction of the rotation of the engine will be changed, or that the engine will be "reversed," according as the steam is made to enter the passage *h*, or *g*, and that the steam can be made to enter either of these by changing the position of the valve *r*. In Fig. 3, the valve *r*, is shown so placed that the steam which enters the chest *q*, through the steam pipe *p'*, passes into the passage *h*, and through *j* or *j'*, according to the position of the piston in the cylinder, making the crank rotate in the direction indicated by the arrow No. 1 while the exhaust steam passes alternately from one end of the cylinder or the other into the ports *i*, *i'*, through the passage *g*, and the D passage in the valve *r*, into the exhaust passage *o*, and from the engine through the exhaust pipe *r'*. It will be evident that by shifting valve *r*, so that the steam can enter passage *g*, the crank will be made to rotate as indicated by the arrow, No. 2, the steam entering the cylinder through ports *i*, *i'*, and exhausting through *j*, *j'*, into passage *h*, and thence from the engine as before described. The ports *i*, *i'*, and *j*, *j'*, are made to continue through the chest, and are of equal area upon each of the plane surfaces of the chest, in consequence of which it will be evident that between the chest *f*, and the flanges *c*, and *l*, there will be no unbalanced pressure occasioned by the presence and passage of steam through the chest into the cylinder, and that consequently the oscillating surfaces *c*, and *l*, in contact with the stationary

surfaces of the steam chest will be subject to very little wear from the movement of the cylinder.

As steam presses equally in all directions it will be obvious that the pressure, both of the steam and of the exhaust (if under back pressure) acts equally in both directions in the axial line of the trunnions, and does not therefore crowd the cylinder against the trunnion bearing opposite to the side on which the steam enters, but is neutralized so far as its effect to move the cylinder laterally is concerned. The valve *r*, as herein shown and described fills the functions of a shut off steam valve, a throttle valve, and a reversing valve, and it is evident that it may be made to act as a cut off valve by imparting to it requisite degrees and times of movement. It is also practically a balanced valve, as it will be seen that while the steam has free passage around its vertical sides it does not press the valve down upon the valve seat.

The object of the recess in the top of the valve, and the apertures in the chest cover, is to avoid the pressure of the valve upon the valve face which may occur through the pressure of the steam upon the thin film of water which may exist in the joint between the valve and the cover, *u*, but which pressure I relieve by leaving the valve from its edges open to the atmosphere. When the valve becomes sensibly worn between its seat and the chest cover the escape of steam into the air through *v*, *v*, gives notice of the fact, and the valve can then be adjusted to prevent such leakage by the means before described. The proper opening and closing of the ports *d*, *d'* by the oscillation of the cylinder is already well understood by those skilled in the art and therefore needs no description herein.

In my arrangement of the valve chest, *f*, with its ports *i*, *i'*, *j*, *j'*, the main steam valve may be said to be the flange *c* upon the cylinder, in which the ports *d*, *d'*, are formed. In my invention the steam in passing into the cylinder, makes use of one set of ports and passages in the steam chest, and in exhausting passes from the cylinder by another set, and these ports and passages may be used interchangeably by shifting the position of the valve *r*, which operation "reverses the engine."

The ports and passages in my steam chest are not used, as is the common practice, at every double stroke of the piston first to convey full and next exhaust steam by which the passages are cooled to nearly the temperature of the exhaust steam at every revolution of the engine which causes unnecessary condensation of the full steam; but they are used constantly, so long as the engine continues one direction of rotation, one set to convey full and the other exhaust steam. My invention differs also from such engines as use separate steam and exhaust valves and passages, inasmuch as these are not interchangeable in their functions by any means.

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

1. The combination of a valve *r*, with passages *i*, *i'*, and *j*, *j'*, arranged so as to operate interchangeably, simply by altering the position of *r*, to conduct either full or exhaust steam substantially as described for the purpose of changing the direction of the rotation of the crank.

2. The combination of the flange *l*, when it is made to oscillate with the cylinder, with the stationary chest *f*, having ports *i*, *i'*, *j*, *j'*, substantially as described operating to relieve the cylinder and chest joints from lateral pressure.

L. W. LANGDON.

Witnesses:
J. B. CROSBY,
D. W. PICKERING.