

W. S. Mackintosh,

Oscillating Steam Engine.

N^o 26,852.

Patented Jan. 11, 1860.

Fig. 1.

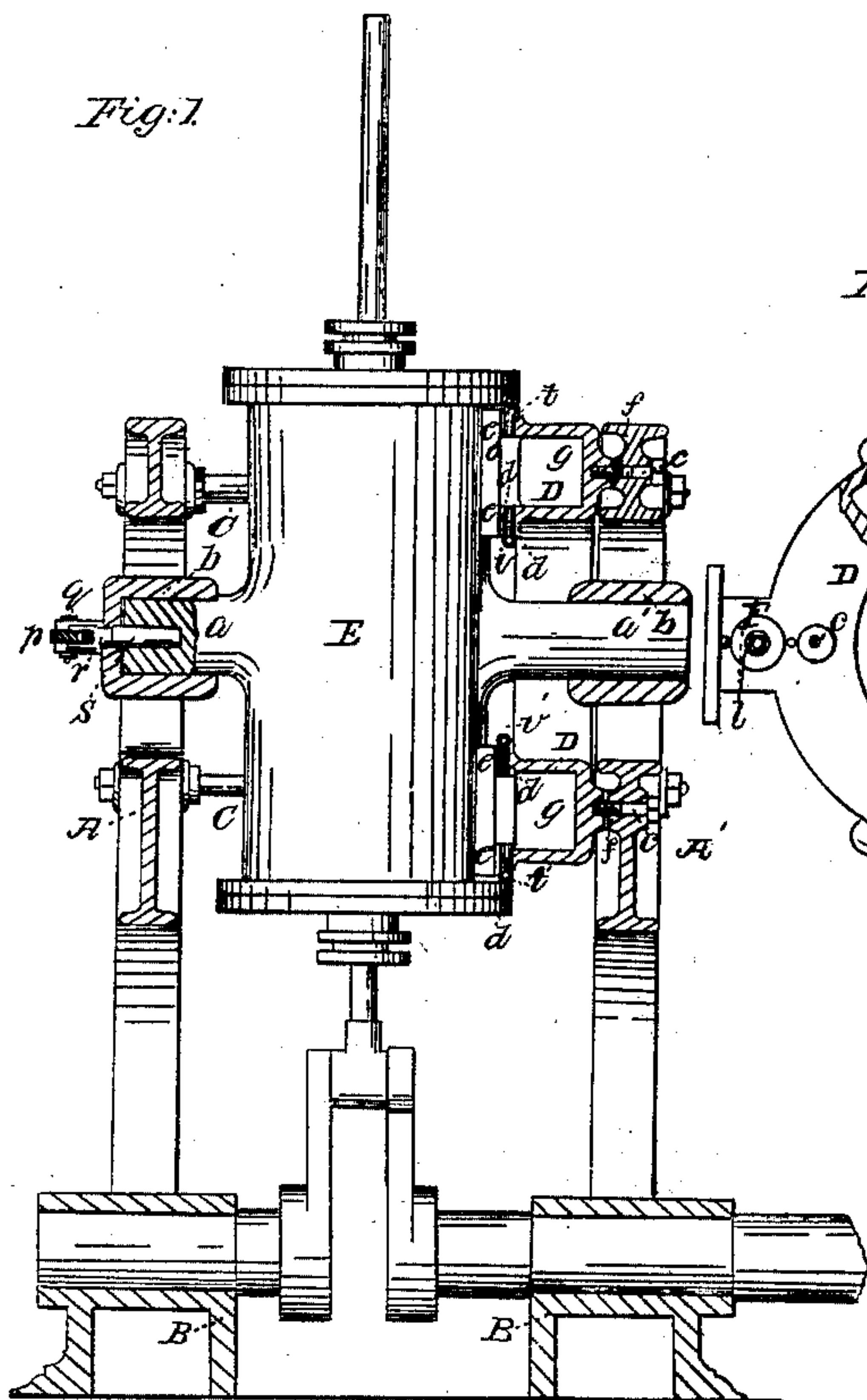


Fig. 3.

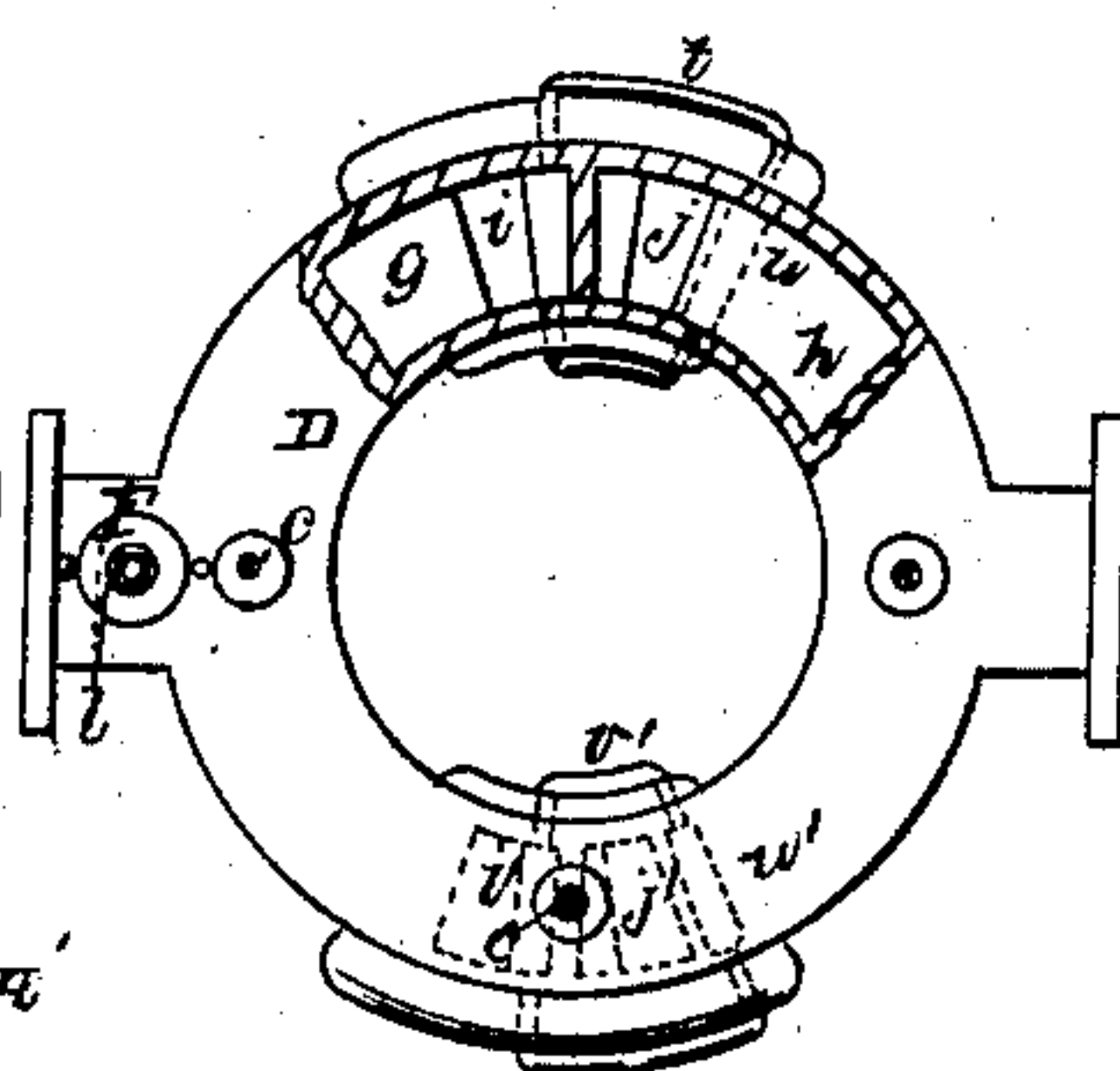


Fig. 2.

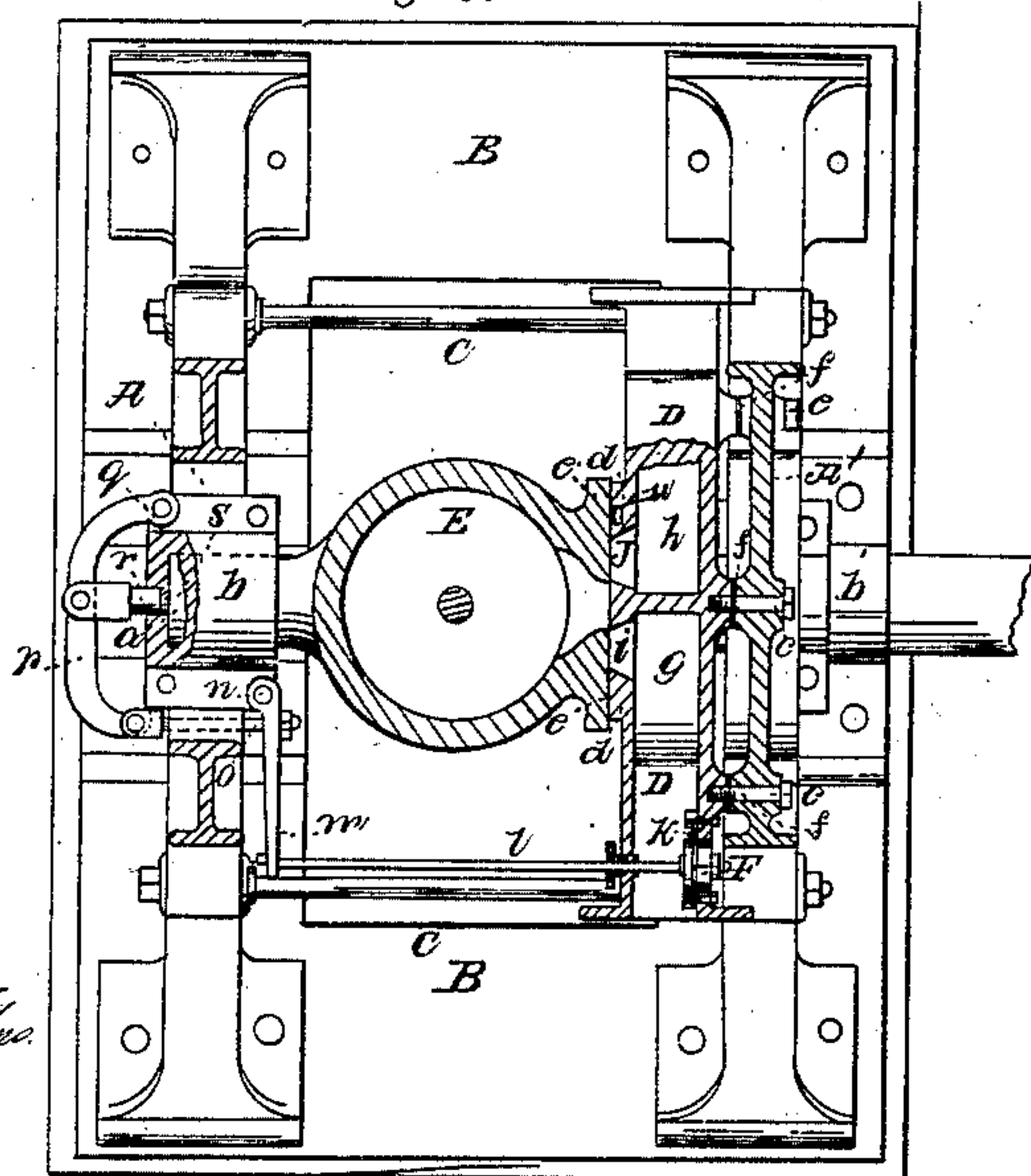
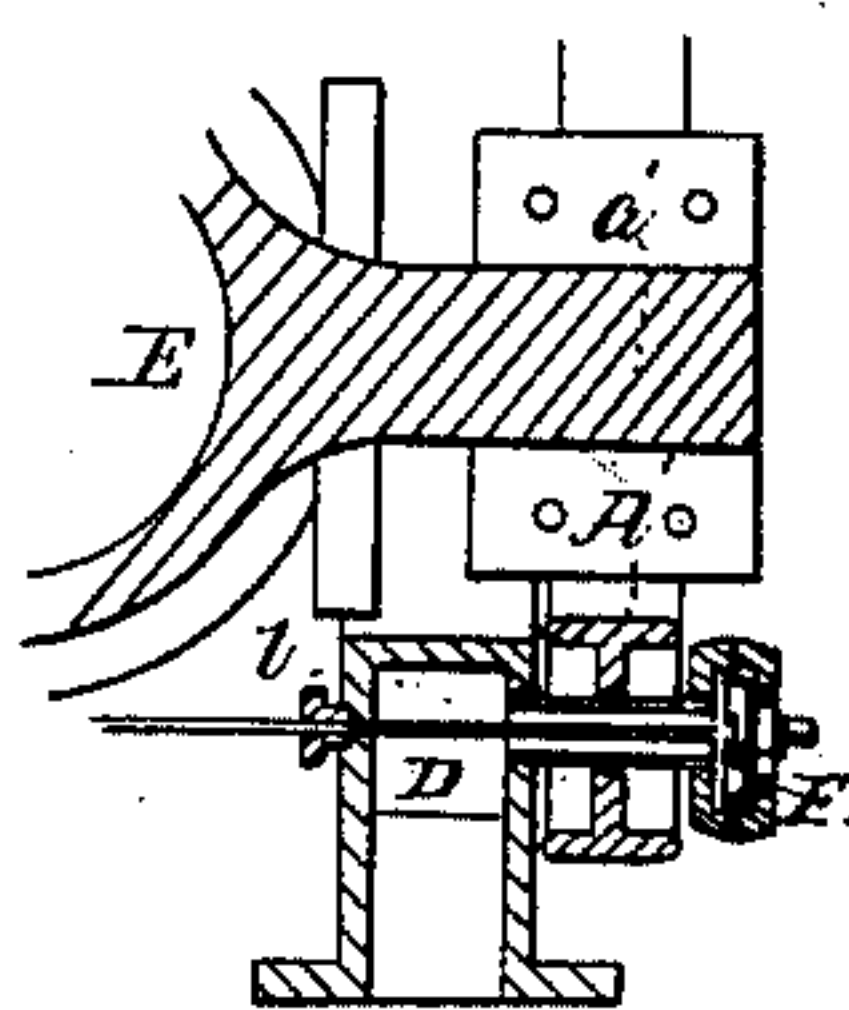


Fig. 4.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM S. MACKINTOSH, OF PITTSBURG, PENNSYLVANIA.

OSCILLATING STEAM-ENGINE.

Specification of Letters Patent No. 26,852, dated January 17, 1860.

To all whom it may concern:

Be it known that I, WILLIAM S. MACKINTOSH, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain Improvements in Oscillating Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a vertical section of an oscillating engine with my improvements. Fig. 2, is a horizontal section of the same. Fig. 3, is a side view of the side pipe partly in section. Fig. 4, is a horizontal section of part of an engine illustrating a modification of my invention.

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

My invention relates to that class of oscillating engines to and from which the induction and eduction of steam is effected through ports in a side pipe. In this class of engines there is always a greater or less tendency of the steam acting between the side pipe and the receiving face of the cylinder to force apart the valve faces, and this tendency increased or diminishes in force with the variations of pressure in the boiler and with the more sudden variations produced in the side pipe by the action of the governor, so that such variations in pressure have heretofore rendered it difficult to accommodate or adjust the means used to resist the effects of such pressure, and hence when the pressure has been very high the valve faces have been forced apart, and permitted a leakage of steam and when the pressure has been low there has been too much friction between the said faces, causing a serious loss of power and an undue degree of wear of the said faces. The first part of my invention is designed to overcome this difficulty, and to this end it consists in a certain mode of producing on the end of the trunnion on the opposite side of the cylinder to the side pipe, a pressure varying in proportion to the pressure on the receiving face of the cylinder. Another difficulty to be encountered in this class of oscillating engines results from the unequal expansion and contraction of those parts of the working face of the side pipe through and in contiguity to which the inducted or live steam passes and those parts through and in contiguity with which the cooler ex-

haust steam passes, and the second part of my invention consists in providing for a constant supply of live steam from the induction chamber of the side pipe to a cavity formed within that part of the face of the said pipe which is contiguous to the eduction chamber or within the walls of the eduction chamber, for the purpose of producing as nearly practicable a uniform temperature of and consequently a uniform expansion and contraction of the metal in all parts of the face of the side pipe.

To enable others to make and use my invention I will proceed to describe its construction and operation.

A, A', (Figs. 1 and 2) are the side frames of the engine bolted to a bedplate B, and secured together by horizontal stretchers C, C.

E, is the cylinder having solid trunnions a, a' , working in bearings b, b' , in the side frames A, A'.

D, is the side pipe bolted to the side frame A', by four bolts c, c, c, c , and adjusted to bring its face d, d , in proper relation to the working face e, e , of the cylinder by means of washers f, f, f, f , applied around the bolts c, c, c, c , between the side pipe and side frame A'.

g , is the induction chamber of the side pipe and i, i' , the induction ports, h , is the eduction chamber and j, j' , the eduction ports.

F, (Fig. 2) is a valve or piston fitted to an opening in the exterior side of the induction chamber of the side pipe and having its outer face exposed to the atmosphere. This piston may be packed with a diaphragm packing k , of india rubber or gutta percha or made steam-tight in any other way that will enable it to work with very little friction. To this valve or piston is attached a rod l , which passes through a stuffing box m , in the inner side of the side pipe and is connected with a lever n , which works on a fulcrum n , secured to the side frame A. This lever n , is connected by a rod o , with a lever p , which works on a fulcrum q , secured to the frame A, and to this lever is attached a steel faced pin r , which is arranged opposite to another steel faced pin s , that is secured in the end of the trunnion a . The pressure of the steam upon the piston or valve F, tends to force it outward from the steam chest k , and the said piston is thus caused to act through the rod

5 *l*, lever *m*, rod *o*, and lever *p*, upon the pin
r, and so force the said pin against the pin
s, that is fast in the trunnion *a*, and the
 area of the valve *F*, and length of the levers
 10 *m*, *p*, being properly proportioned, the pres-
 sure thus produced upon the said trunnion
 counteracts the tendency of the steam acting
 on the receiving face of the cylinder to
 force apart the cylinder and side pipe; and
 15 as the pressure upon the piston or valve *F*,
 varies equally with the pressure against the
 opposite side *e*, of the cylinder, the pressure
 against the trunnion *a*, is always in propor-
 tion to the pressure against the side *e*, and
 20 hence the faces *e*, *d*, are kept always tight
 without excessive friction. This contrivance
 operates independently of all expansion and
 contraction of the cylinder and side pipe.
l, *l'*, (Figs. 1, and 3,) are two small pipes
 25 leading from the induction chamber *g*, to
 two cavities *u*, *u'*, (shown in dotted outline
 in Fig. 3, and in section in Fig. 2,) that are
 formed in the inner wall of the eduction
 chamber *h*, close to the and at the outer sides
 30 of the eduction ports *j*, *j'*; and *v*, *v'*, are re-
 turn pipes to keep up a circulation of hot
 live steam from the induction chamber *g*,
 through the said cavities *u*, *u'*, for the pur-
 pose of heating those parts of the face *d*, of
 35 the side pipe near the eduction ports and
 causing them to expand equally or nearly so
 with the parts near the eduction ports, and
 so preserve an even bearing all over the said
 faces under all variations in the pressure
 40 of the steam. The cavities *u*, *u'*, may open
 into the faces *e*, *e*, provided the faces *e*, *e*,
 and *d*, *d*, are wide enough not to let the said
 cavities be uncovered in the working of the
 cylinder, or they (the said cavities) may be
 45 entirely closed except to the pipes *t*, *t'*, and
v, *v'*. Instead of the pipes *t*, *t'*, and *v*, *v'*,

passages may be formed in the wall of the
 side pipe by covering the mold in which it
 is cast.

In the modification of my invention repre- 45
 sented in Fig. 4, the piston *F*, and dia-
 phragm *k*, are fitted to a box that is ar-
 ranged at some distance from the principal
 portion of the side pipe but connected there-
 with by an open throat or tube through 50
 which the rod *l*, passes. This modification,
 it will be readily seen, in no way changes
 the character of the invention; the box con-
 taining the piston being essentially a part
 of the side pipe or steam chest. 55

I do not confine myself to an arrange-
 ment of levers like that herein described,
 and represented in the drawings as the sys-
 tem of levers may be very considerably
 varied, but 60

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

1. The within described arrangement for
 counteracting the pressure of the steam
 against the side of the cylinder next the side 65
 pipe, by means of a piston or valve applied
 within the side pipe or steam chest and
 connected by a system of levers, with a
 pin or its equivalent arranged to press
 against the trunnion in the opposite side of 70
 the cylinder substantially as herein de-
 scribed.

2. Providing cavities near the exhaust
 ports of the side pipe, and pipes or passages
 communicating between the said cavities 75
 and the induction chamber, substantially as
 and for the purpose herein specified.

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Witnesses:

C. P. CAUGHEY,
 WM. K. HART.