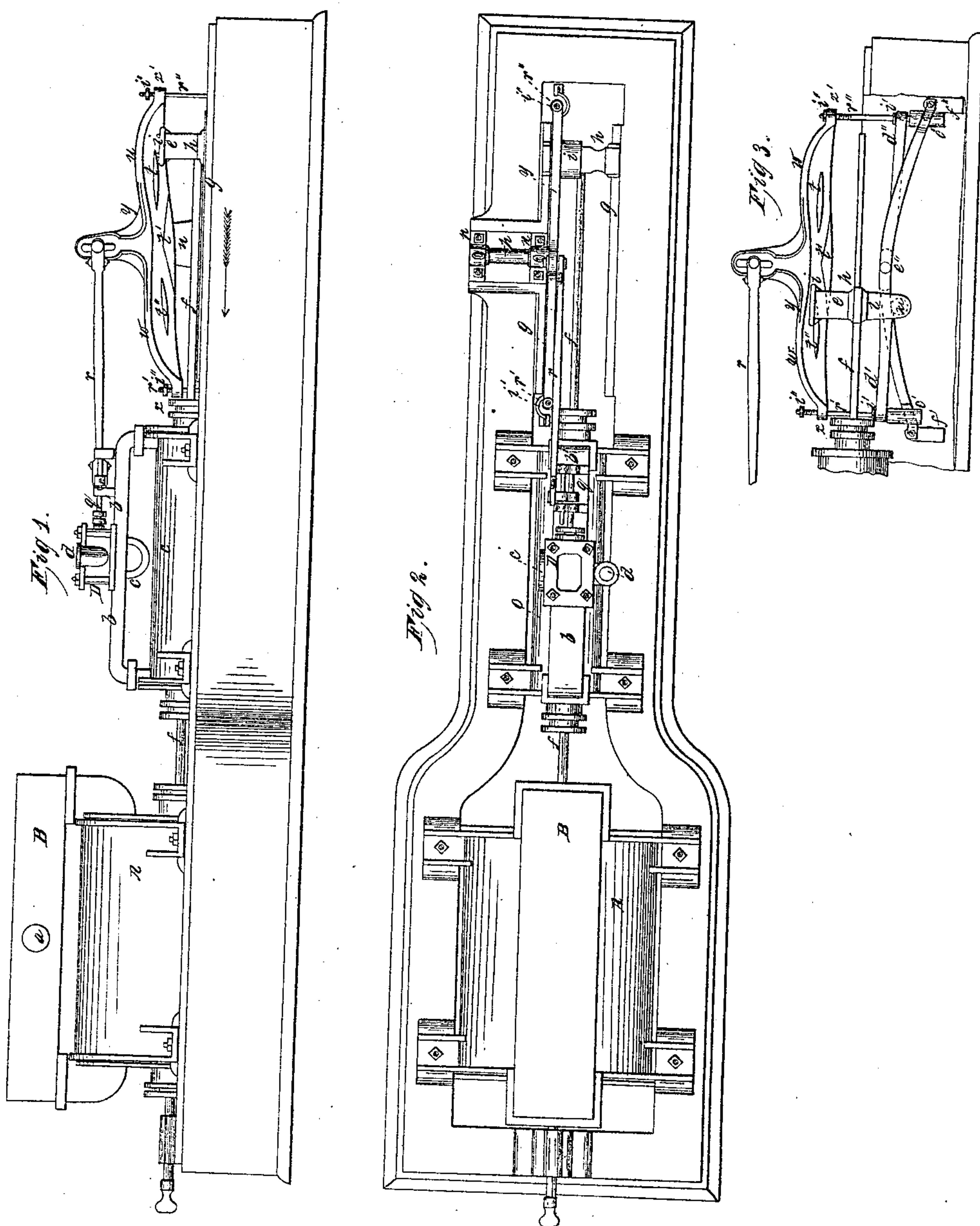


J. P. Ross,
Steam-Engine Valve-Gear.
No 14,145. *Patented Jan. 22, 1856.*



UNITED STATES PATENT OFFICE.

JAMES P. ROSS, OF LEWISBURG, PENNSYLVANIA.

MEANS FOR OPERATING THE STEAM-VALVES OF BLOWER-ENGINES.

Specification of Letters Patent No. 14,145, dated January 22, 1856.

To all whom it may concern:

Be it known that I, JAMES P. ROSS, of Lewisburg, in the county of Union and State of Pennsylvania, have invented a new and
5 useful Improvement in Means for Operating the Steam-Valves in Blower-Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing,
10 forming part of this specification, in which—

Figure 1 is a side elevation of the engine, Fig. 2 is a plan of same, and Fig. 3 is a detached elevation of cam yoke and weighted
15 levers.

Similar letters of reference in the several figures denote the same part of the engine.

The invention here considered refers to the method of regulating the supply and exhaust of blower or pumping engines; and consists in acting upon the valve rod by the oscillations of a yoke, effected by the action of the cross head upon certain cams in the face of said yoke, in connection with adjustable weights at the extremities of the same,
20 and weighted cross levers by which said adjustable weights are at times elevated, the construction and operation being as follows.

In the drawing A is the air cylinder discharging into chamber B, from which the blast proceeds by opening *a*. The steam cylinder is represented by C, communicating with the steam chest D by passages *b b'*; the ingress to the steam chest being represented
25 by *c* and the exhaust by *d*. These parts being of the usual construction and well known to persons acquainted with engines of this character, need not be dwelt upon further than is necessary to show their connection with the invention here considered.

The piston rod *f* operating, in the usual manner, the pistons of both cylinders, is attached to the cross head *h*, reciprocating on guides *g*. This cross head has an upper portion *e*, with a steel plate *i* bolted thereto,
30 and has a lower limb *l* supporting a hardened steel roller *m*.

Supported upon bearings *n* is a horizontal shaft *p* upon the inner extremity of which is the yoke *y*, the head of which is connected with the valve rod *q* by the connecting rod *r*, so that the movement of this yoke will operate the valve. On the inner face of this yoke are the steel cams *t t' t''*, and its upper
35 edge is bounded by a rim *w*, whose lower

edge is plated with steel, the yoke having such position that the steel plate *i* of the cross head will move in the grooves between the aforesaid cams and rim.

Passing through perforations in the ex-
60 tremities of the yoke *y* are rods *r' r''* to the lower ends of which are attached weights *c' c''*; the rods passing through the short arms of levers *d' d''* and connecting the weights therewith. These levers have a
65 common fulcrum at *e''* and have weights *f' f''* hung to their long arms. The weights at the respective ends of the levers are about the same, the difference in the arms causing the weights *f' f''* to lift *c' c''* when occasion
70 requires, this difference in the length of arm being necessary to overcome friction. The rods *r' r''* are prevented from slipping through the levers by nuts *i'*; and the upper
75 ends of these rods are provided with threads on which are nuts *i''* to regulate the amplitude of the downward movement of the said rods through the perforations in the ends of the yoke. The roller *m* in the lower limb of the cross head passes beneath and in contact
80 with the levers *d' d''*, as shown in Fig. 3. The action of this valve operator is as follows: Commencing with the yoke *y* and the several parts in position shown in Fig. 1,
85 with piston moving in direction of arrow, the steel head piece *i* by pressure on under edge of cam *t* lifts the right hand end of yoke *y* and through rod *r* lets on the full head of steam. The piston continuing its
90 movement the head piece *i* leaves cam *t*, passes up cam *t'*, mounts upon the upper edge of cam *t''*, and passing on encounters the under edge of rim *w*, against which it presses, slightly lifting the left hand end of the yoke in its course and producing a move-
95 ment of rod *r* which cuts off the steam, the weight *c''* acting with it to depress the opposite end of the yoke. As the head piece *i* leaves cam *t''* the weight *c''* falls to its seat, depressing the end *x'* of the yoke sufficient
100 to permit the cam *t''* to clear the head piece *i* and at the same time producing a movement of rod *r* which lets on a small quantity of steam to the opposite side of the piston,
105 which then begins its reverse travel; the upper edge of head piece *i* by action on the under edge of cam *t'* lifting end *x* of yoke and causing the full head of steam to be let on. The head piece *i* then passes over cam
110 *t*, strikes rim *w*, lifting end *x'* of yoke, and

effecting the cutting off of the steam. Then leaving cam t , weight c' drops to its seat, depressing end x of yoke sufficient to produce the letting on of steam to the opposite
 5 side of the piston, and bringing the head piece to the under edge of cam t where it effects the lifting of end x' of yoke where this description commenced.

The quantity of steam let to the piston at
 10 the change of motion which depends on the amplitude of movement of the yoke ends, is governed by the position of the nuts i'' on rods r' r'' ; as the nearer the ends of the rods they are placed, the greater will be the
 15 length of rod slipping through the yoke before the nut reached it, and consequently the yoke will receive the less motion as the weight drops to its seat. If the nut be far removed from the end of the rod the fall of
 20 the weight must carry the yoke with it, and a greater opening of the valve be produced. It will therefore be seen that by means of the nuts i'' the quantity of steam first let to the opposite side of the piston is regulated.

25 The weights f' f'' lift the weights c' c'' and elevate the rods r' r'' as their respective ends of the yoke rise, so that the nut of the elevated rod will just come in contact with the end of the yoke at the termination of its
 30 upward movement. By this construction the weights c' c'' are elevated to the position necessary for their action. The roller m acting on the under edges of the long arms of the levers, causes the cross head to

lift the counterpoise of the weight about to 35 be brought into action.

If the engine be a vertical one springs may be used instead of the weights and other modifications made in the construction which will adapt the several parts to the 40 new condition without effecting the principle of action. This construction may also be applied to pumping engines.

The advantages of this engine constructed as above described are numerous and im- 45 portant and will be readily appreciated by those acquainted with blast furnaces; the most important being the maintaining of a more uniform blast than can be effected by fly wheel engines; the sinking at the change 50 of motion being scarcely appreciable.

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

The cam yoke y in combination with the 55 adjustable weights and counterpoise levers, or the mechanical equivalents of these several parts, constructed, arranged, and operating substantially as and for the purposes 60 specified.

In testimony whereof, I have hereunto signed my name before two subscribing witnesses.

J. P. ROSS.

Witnesses:

GEO. PATTEN,
 JAS. D. CLARY.