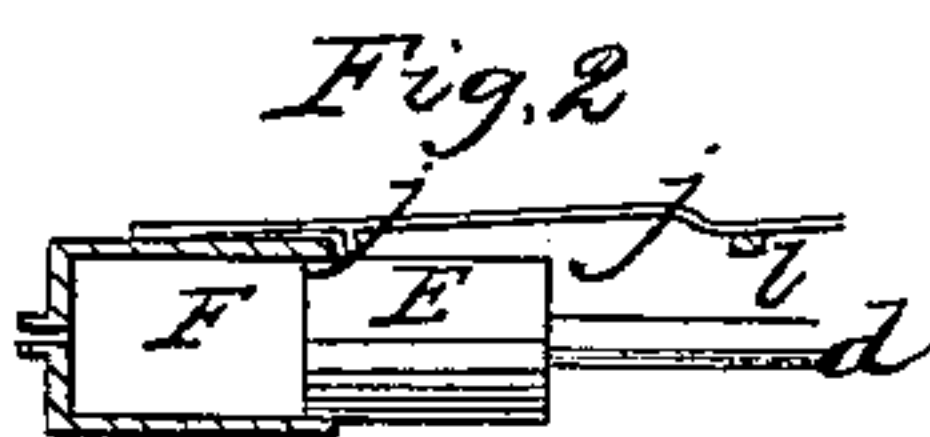
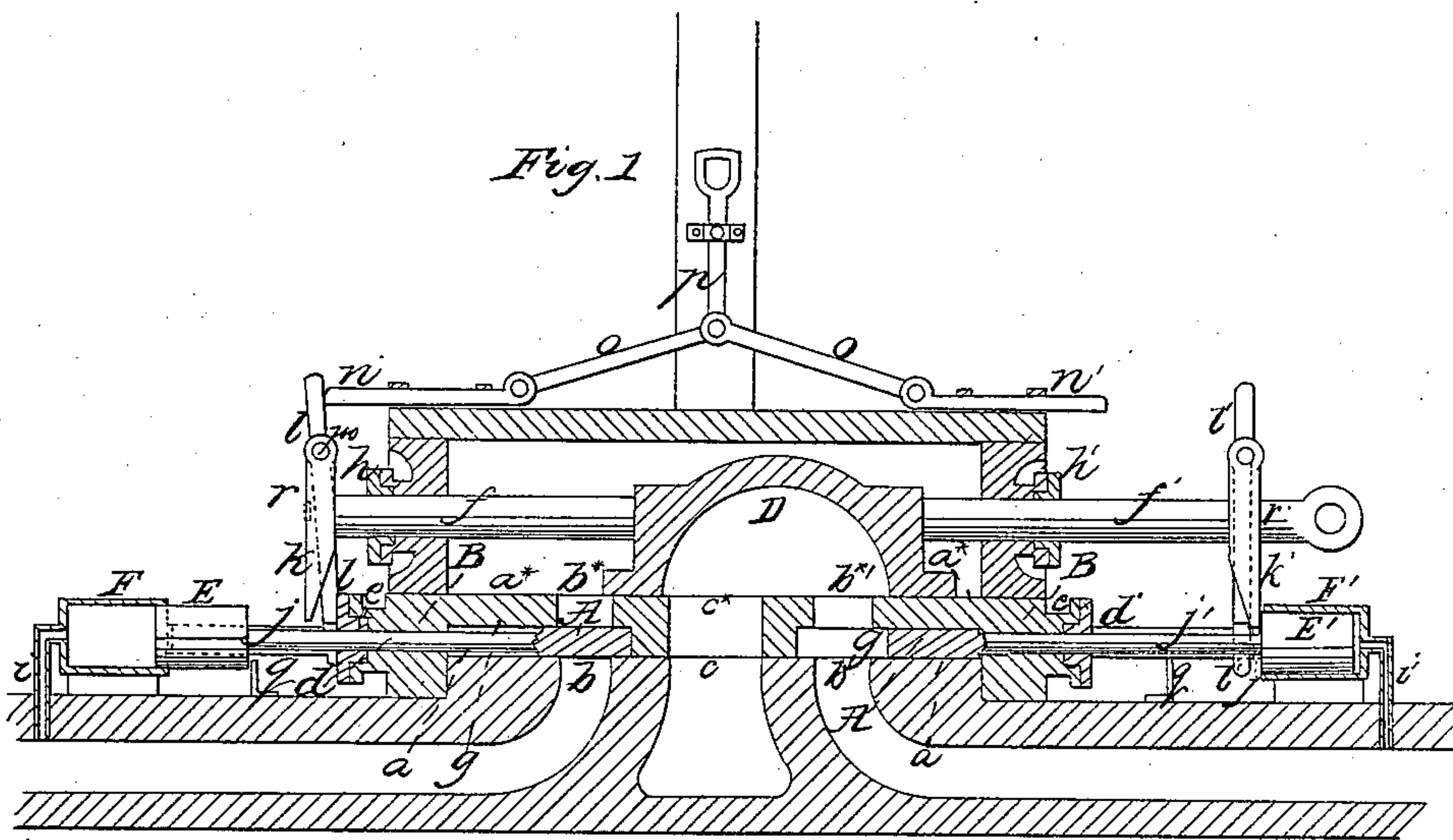


J. F. Allen,
Steam Cut-Off.

No 16,781.

Patented Mar. 10, 1857.



UNITED STATES PATENT OFFICE.

JOHN F. ALLEN, OF NEW YORK, N. Y.

IMPROVEMENT IN CUT-OFFS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 16,781, dated March 10, 1857.

To all whom it may concern:

Be it known that I, JOHN F. ALLEN, of the city, county, and State of New York, have invented a new and useful Improvement in the Cut-Offs of 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 longitudinal central section of the steam-chest, valve-seat, slide-valve, and cut-off of a steam-engine illustrating my improvement. Fig. 2 is a detail view of a part of the cut-off.

Similar letters of reference indicate corresponding parts in both figures.

This invention consists in a certain mode of applying and operating the cut-off of a slide-valve engine for the purpose of cutting off the steam instantaneously without any previous unnecessary contraction of the opening of the port at any point between the commencement of the stroke and the half-stroke of the piston.

To enable others skilled in the art to apply my invention, I will proceed to describe its construction and operation.

$a\ a$ is a seat resembling the slide-valve seat of any short slide-valve engine with the usual arrangement of the two steam-ports $b\ b'$ and exhaust-port c .

$A\ A'$ are the cut-off valves, consisting of flat plates of metal of sufficient length and width to cover the ports $b\ b'$, respectively, with an amount of lap at the sides and ends sufficient to insure the perfect closing thereof.

B is a box having on its upper or outer face another valve-seat $a^* a^*$, of similar form to a and containing a similar arrangement of steam-ports $b^* b^*$ and exhaust-port c^* . This box is bolted to the top or exterior of the seat a , with the port b^* exactly opposite the port b , and the port b'^* opposite the port b' . It contains suitable cavities $g\ g$, to receive the valves $A\ A'$ and admit of their traveling a sufficient distance to open and close the ports $b\ b'$ in the lower or inner seat a . These valves open the ports $b\ b'$ by movements toward the ends of the box B , and close them by movements in an opposite direction.

$d\ d'$ are stems attached to the valves $A\ A'$ and working through stuffing-boxes $e\ e'$ in the ends of the box B .

D is the main slide-valve, constructed like any short slide-valve, fitted to the seat $a^* a^*$ and working over the ports $b^* b'^*$ in the usual manner, receiving motion from an eccentric or such other device as is generally employed to work the slide-valve of an engine, or through any suitable mechanical means connected with its stem f' . This valve is furnished with an additional stem f at the opposite end to f' , working through a stuffing-box h in the steam-chest C , which incloses the valve D in the same manner as the steam-chest of an ordinary short slide-valve engine.

$E\ E'$ are pistons attached to the valve-stems $d\ d'$ and fitted into two stationary cylinders $F\ F'$, which receive steam at their outer ends through pipes $i\ i'$ from the ordinary steam-passages of the engine, each cylinder receiving steam from the passage to which belongs the valve A or A' , to which its own piston is attached for the purpose of admitting steam to the cylinder to close the valve to cut off the steam.

$j\ j'$ are two spring-catches, attached one to each of the cylinders $F\ F'$, for the purpose of holding the pistons back in the cylinders, and thus holding open the cut-off valves till the proper time for the pistons to be operated upon by the steam to close the said valves. These catches rest against the side of the pistons when the valves are closed in the manner shown in Fig. 2, which exhibits a top view of the piston E and its respective catch j and a section of the cylinder F .

$k\ k'$ are foot-pieces attached rigidly to each of the stems f and f' of the slide-valve for the purpose of pushing back the pistons $E\ E'$ in the cylinders $F\ F'$ to open the cut-off valves.

$l\ l'$ are two small levers pivoted by fulcrum-pins $m\ m'$ to the heels or upper parts of the foot-pieces and working against the inner faces of the spring-catches $j\ j'$ as the slide-valve works back and forth.

$n\ n'$ are two sliding pieces fitted to slide in guides upon the back of the steam-chest C , opposite the levers $l\ l'$, and connected by two links $o\ o'$ with a sliding bar p , which moves perpendicularly to the movement of the valves opposite the center of the steam-chest. The object of the sliding pieces $n\ n'$, which are adjusted both together toward or from the two levers $l\ l'$ by lowering or raising the sliding bar p , is to stop the upper arms of the levers in the move-

ment of the said levers with the slide-valve, to give an increased movement to the lower arms of the levers, to make them operate on the curved portions near the extremities of the spring-catches $j j'$, to throw the said catches off the pistons $E E'$, to liberate the cut-off valves and allow them to be closed by the pressure of the steam on their pistons $E E'$. The curved form of the ends of the spring-catches is illustrated in the top view, Fig. 2, where the lever l is exhibited in section as bearing against the said curved portion of the spring-catch j and holding the tooth j^* of the said catch off the piston E .

$q q'$ are stops secured to the engine-cylinder to stop the pistons $E E'$ when the cut-off valves are closed by the pressure of the steam on the pistons. These stops may be fitted with buffers or elastic cushions.

$r r'$ are two small stop-pieces, (shown dotted in Fig. 1,) one on each foot-piece k and k' , for the levers $l l'$ to rest against during a portion of the operation.

The operation is as follows: The slide-valve D operates upon the seat $a^* a^*$ in the same manner as an ordinary slide-valve works upon its seat. While it is making the necessary movement to open the port b^* or b'^* , leading to either end of the engine-cylinder, the toe or lower end of the foot-piece at the opposite end of the valve to that port comes in contact with the piston E' or E of the cut-off valve of the port b' or b , leading to the opposite end of the cylinder and drives the said piston back in its cylinder F' or F , and opens the cut-off valve A' or A , ready for the succeeding stroke of the engine-piston, but the valve-piston is not operated upon by the foot-piece till after the half-stroke of the valve, when there is no steam in action on the valve-piston. At the same time the lever l or l' belonging to that cut-off valve A or A' whose respective port is being opened by the slide-valve remains against the stop-piece r or r' of its respective foot-piece till the upper end of the said lever strikes the adjustable sliding piece n or n' and is thereby arrested, when the continued movement of the foot-piece and the fulcrum-pin m or m' of the said lever causes the lower end of the lever to move on faster than the foot-piece and by the action on the bent part of the spring-catch j or j' to throw the tooth of the catch off its respective piston E or E' , which has up to this time been held back by the said catch with its respective valve A or A' open, but which, being exposed to the pressure of the steam admitted through its pipe i or i' , is now consequently forced forward with a very sudden movement, thus instantaneously closing its respective cut-off valve and cutting off the steam. It will be seen that the time of cutting off depends upon the position of the sliding pieces $n n'$, which are stationary, except when operating to vary the time of the cutting off, which is earlier or

later in the stroke of the engine-piston, according as the said pieces are forced farther apart or drawn nearer together. In Fig. 1 the slide-valve D is supposed to be just completing its stroke to the right and the piston E' to have been pushed back in its cylinder F to open the valve A' and just caught by the catch j , the engine-piston to have arrived at half-stroke to the right, and the lever l to have struck the sliding piece n , and the piston E to have been liberated by the action of the said lever and the steam cut-off at the left-hand port by the valve A . As the slide-valve D moves to the left, the lever l' comes into contact with the sliding piece n' , and at a suitable time after the half-stroke of the slide-valve D , and the commencement of the movement of the engine-piston to the left is caused to operate on the catch j' to liberate the piston E' and allow the valve A' to be closed by the pressure of the steam on said piston, and the foot-piece k pushes back the piston E to open the valve A , ready for the admission of steam to the port b at the proper time for the commencement of the stroke of the engine-piston to the right. The sliding bar p , by which the sliding pieces $n n'$ are adjusted, is intended to be either set by hand to adjust the said pieces $n n'$ to cut off at any fixed point in the stroke of the engine-piston, or to be connected with a governor and operated thereby to control the speed of the engine by the variations of the cut-off. A pair of cams may be substituted for the sliding pieces $n n'$, and would operate on the levers $l l'$ in an equivalent manner.

This invention may be adapted to any slide-valve engine at present in use at small expense, using the same steam-chest and slide-valve.

Having thus fully described my invention, I will proceed to state what I claim and desire to secure by Letters Patent:

1. The arrangement of the sliding cut-off valves $A A'$ to work on a separate seat arranged inside of the seat of the main valve and having a precisely-similar arrangement of ports to the seat of the main slide-valve, substantially as herein described.

2. Though I do not claim the closing of the cut-off valves by steam-pressure, I claim the foot-pieces $k k'$ and levers $l l'$, attached to opposite ends of the main slide-valve and operating in connection with pistons $E E'$, that are attached to the cut-off valves and work in cylinders connected with the main steam-passages and with spring-catches $j j'$, that retain the said pistons, and adjustable sliding pieces $n n'$ or their equivalents, substantially in the manner herein specified.

JOHN F. ALLEN.

Witnesses:

W. TUSCH,
HENRY T. BROWN.