

(No Model.)

3 Sheets—Sheet 1.

J. H. TANGYE & W. JOHNSON, Jr.
CUT-OFF MECHANISM FOR SLIDE VALVES.

No. 380,955.

Patented Apr. 10, 1888.

Fig 1.

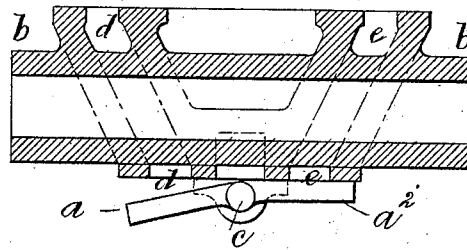


Fig 2.

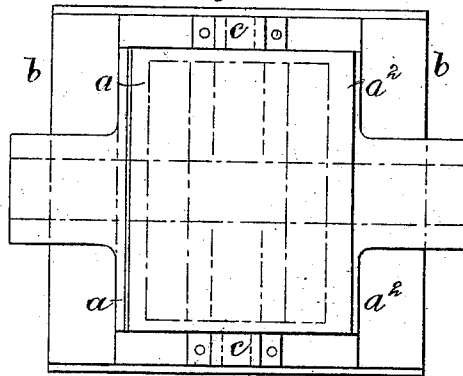
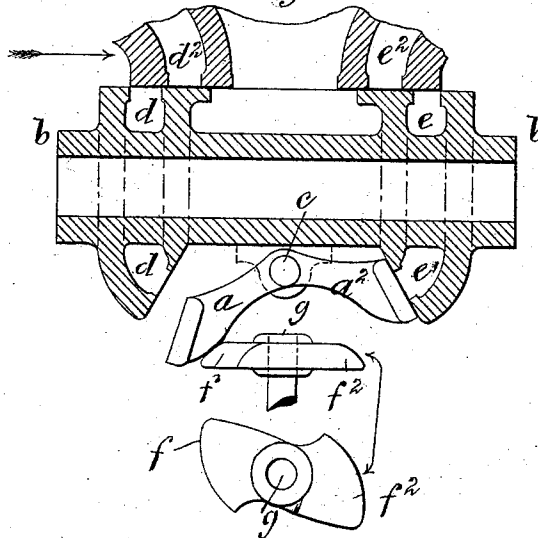


Fig 3.



Witnesses:-

George Shaw.
Richard Kerrett.

Inventors:-

John Henry Tangye
William Johnson junr

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Fig 4.

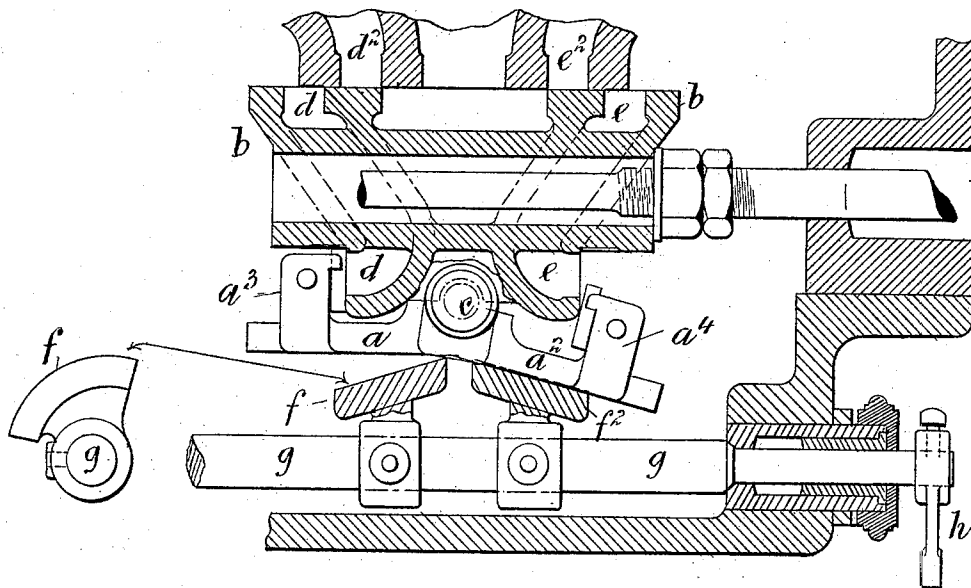
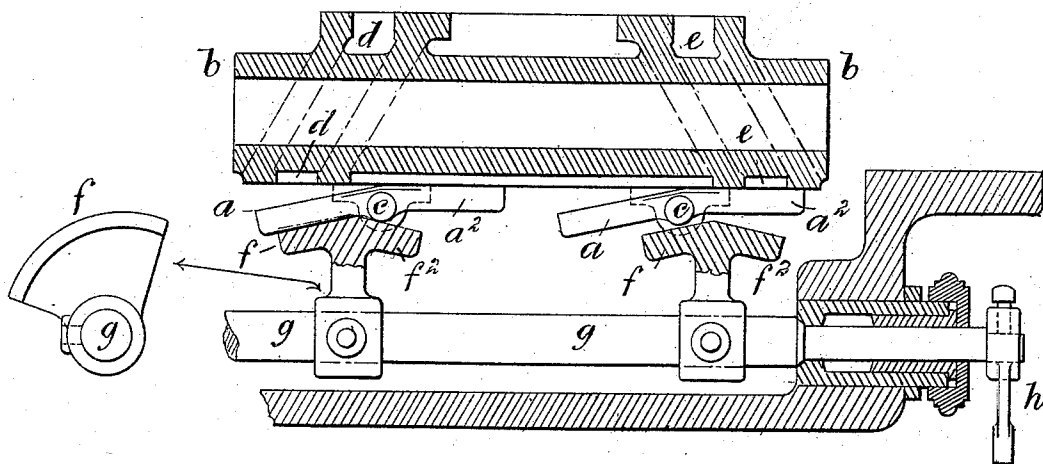


Fig 5.



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(No Model.)

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J. H. TANGYE & W. JOHNSON, Jr.
OUT-OFF MECHANISM FOR SLIDE VALVES.

No. 380,955.

Patented Apr. 10, 1888.

Fig 6.

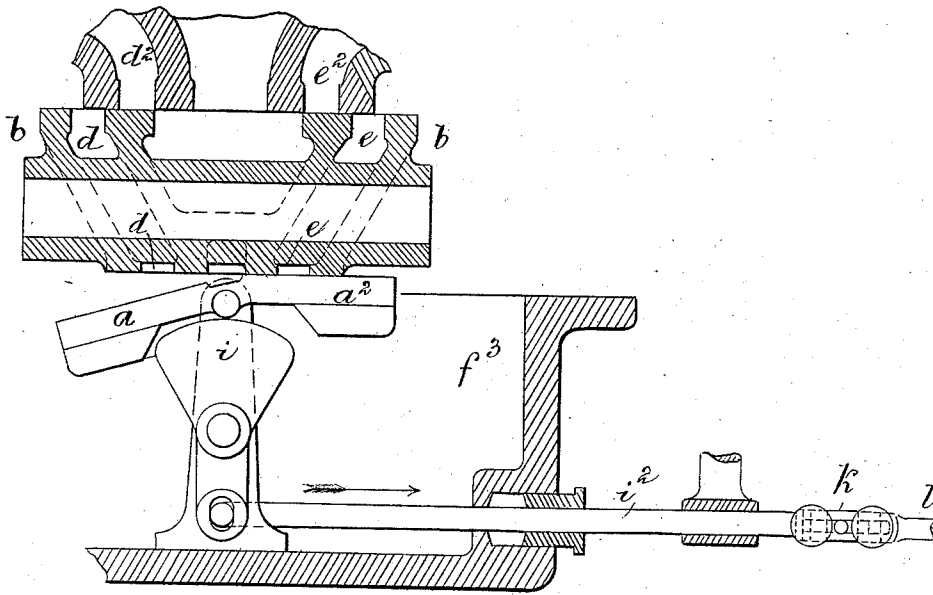
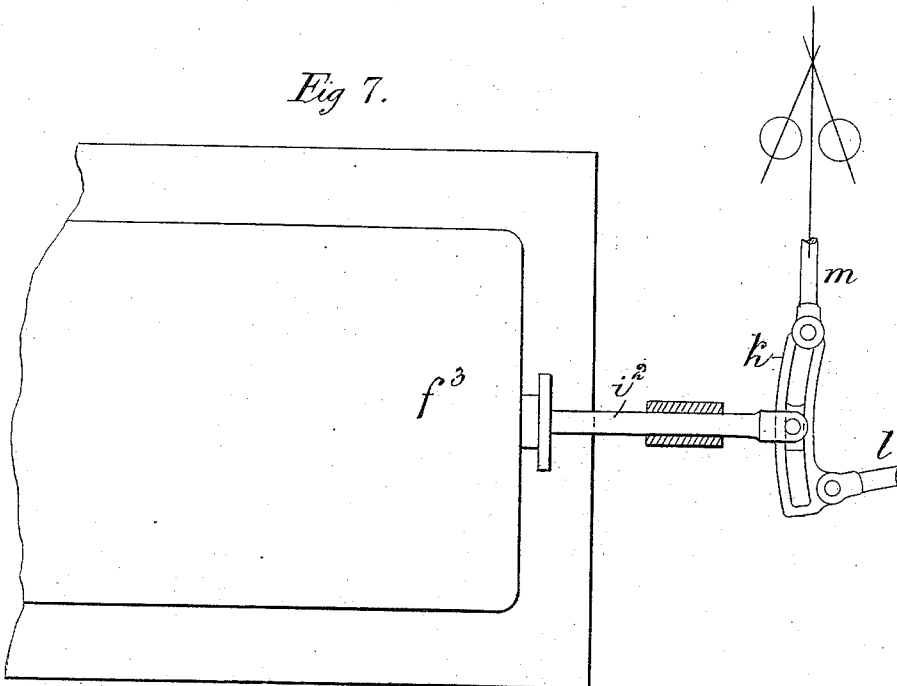


Fig 7.



Witnesses;—
George Shaw.
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UNITED STATES PATENT OFFICE.

JOHN HENRY TANGYE, OF SOHO, AND WILLIAM JOHNSON, JR., OF MOXLEY,
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CUT-OFF MECHANISM FOR SLIDE-VALVES.

SPECIFICATION forming part of Letters Patent No. 380,955, dated April 10, 1888.

Application filed November 22, 1887. Serial No. 255,906. (No model.) Patented in England February 18, 1885, No. 2,230; in France November 18, 1885, No. 172,367; in Victoria August 9, 1886, No. 4,662, and in New South Wales October 6, 1886, No. 1,939.

To all whom it may concern:

Be it known that we, JOHN HENRY TANGYE, of Soho, in the county of Stafford, England, and WILLIAM JOHNSON, the younger, of Moxley, in the county of Stafford, England, subjects of the Queen of Great Britain, have invented Improvements in Automatic Cut-Off Mechanism for the Slide-Valves of Steam-Engines and Compressed-Air Engines, (for which we have obtained a patent in Great Britain, No. 2,230, dated February 18, 1885; a patent in France, No. 172,367, dated November 18, 1885; a patent in Victoria, No. 4,662, dated August 9, 1886, and a patent in New South Wales, No. 1,939, dated October 6, 1886,) of which the following is a specification.

Our invention consists in combining with the slide-valves of steam-engines and compressed-air engines an oscillating valve (or valves) and the appliances hereinafter described for the purpose of automatically cutting off the steam or compressed air at any desired position of the stroke of the slide-valve, and thereby using the steam or compressed air expansively and regulating the speed of the engine.

We will describe our invention as applied to a horizontal steam-engine.

We mount upon the slide-valve of the steam-engine an oscillating flap-valve, the arms of which are slightly cranked and are situated over or opposite the steam-ports in the slide-valve. By the motion of the oscillating valve upon its joint or center one of the steam-ports in the slide-valve is opened and the other steam-port at the same time closed. Situated in the steam-chest and near the oscillating valve is a regulator acted upon by the governor of the engine. Opposite this regulator the arms of the oscillating valve travel, and it is by the action of the said regulator that the tilting or starting motion of the oscillating valve is effected for opening one port and closing the other port in the slide-valve.

An oscillating flap-valve may be situated over each port, each valve being operated by a regulator, and instead of the oscillating flap-valve being jointed to and traveling with the

slide-valve, the oscillating flap-valve may turn in a bearing fixed in the steam-chest and be operated from the shaft of the engine.

Figure 1 of the accompanying drawings represents in horizontal section, and Fig. 2 in plan, the slide-valve of a steam-engine to which an oscillating flap-valve is applied, the faces of the two steam-ports in the slide-valve being situated in the same plane. Fig. 3 represents in horizontal section a slide-valve carrying an oscillating flap-valve in combination with a regulator in connection with the governor of the engine, the faces of the two steam-ports in the slide-valve being inclined to one another. Fig. 4 represents in horizontal section a modification in which the faces of the steam-ports in the slide-valve are turned from one another, and the ends of the arms of the oscillating flap-valve are furnished with covers for closing and opening the said steam-ports. Fig. 5 represents in horizontal section another modification, in which each steam-port in the slide-valve is provided with an oscillating flap-valve. Fig. 6 represents in horizontal section, and Fig. 7 in plan, the arrangement in which the oscillating valve is not carried by the slide-valve, but turns on a bearing fixed in the steam-chest and is operated from the shaft of the engine.

In Figs. 1, 2, 3, 4, and 5 of the drawings the oscillating flap-valve is marked a a' , the said valve being mounted upon the slide-valve b and turning upon the center c . The slide-valve b has a reciprocating motion given to it in the ordinary way from the shaft of the engine. In the slide-valve b are the usual steam-ports, d and e .

d' e' (see Figs. 3, 4, and 6) are the passages in the fixed steam-chest, communicating, respectively, with the ends of the steam-cylinder of the engine. The oscillating flap-valve a a' has a slightly-cranked figure—that is, its two arms are not in the same line, so that by the motion of the valve upon its center c one of the arms of the valve closes one of the ports d or e , and the other arm at the same time opens the other port.

The regulator represented in Fig. 3 is car-

ried by the horizontal axis or shaft g , connected by suitable gearing with the governor, so that an angular motion can be given to the regulator when required for changing the speed of the engine. The regulator consists of two arms, $f f^2$, having the form represented in the drawings. As the slide-valve b moves in one or other direction, the oscillating flap-valve $a a^2$, carried with it, is caused to oscillate at the proper times upon its joint c by the arms of the said flap-valve traveling over the arms $f f^2$ of the regulator for alternately opening and closing the steam-ports $d e$ in the said slide-valve b .

In Fig. 3 the slide-valve b is represented as moving in the direction of the arrow, the steam-port e being closed by the raised arm a^2 of the oscillating valve and the steam-port d opened by the other arm, a , of the said oscillating valve. Before the motion of the steam-piston in the cylinder is reversed the arm a of the oscillating valve has reached and travels upon the regulator-arm f , thereby raising or starting the said arm a . At the same time the port d in the slide-valve is opened to the passage d^2 to the cylinder, and steam from the steam-chest passes by the open port d and passage d^2 to the cylinder, the other port, e , being at the same time opened to the exhaust. By the pressure of the live steam escaping from the steam-chest through the port d the arm a of the flap-valve, which has been lifted or started by the regulating-arm f , is fully raised by the said steam and closes the port d , the other port, e , being opened by the descent of the other arm, a^2 , of the flap-valve. The steam in the steam-chest is thus cut off from the cylinder, the steam supplied to the cylinder being used expansively. The motion of the slide-valve being reversed, the same action takes place at the opposite side of the oscillating valve—that is, the now depressed arm a^2 of the oscillating valve is, when the slide-valve makes its return-stroke, lifted or started by traversing the arm f^2 of the regulator, and by the pressure of the live steam escaping from the steam-chest through the port e the arm a^2 of the flap-valve, which has been lifted or started by the regulating-arm f^2 , is fully raised by the said steam and closes the port e . So long as the engine is working at its normal or arranged speed the steam is automatically cut off at the proper times by the action of the oscillating valve $a a^2$ and regulator $f f^2$; but when the speed of the engine exceeds its normal speed the regulator $f f^2$ is operated upon by the governor and turned through such an angle as will cause the steam to be cut off earlier and the speed of the engine thus regulated.

In the modification Fig. 4 the regulator f

f^2 (which for convenience of manufacture is formed in two parts) for operating the oscillating valve has the shape represented, and is mounted on the shaft g , connected with the governor through the gearing at h , and the ends of the arms of the oscillating valve are provided with covers $a^3 a^4$ for closing the steam-ports $d e$.

In the modification Fig. 5 an oscillating flap-valve, $a a^2$, is applied to each steam-port $d e$ in the slide-valve b , each valve having a separate regulator, $f f^2$, for operating it, mounted on the shaft g , connected with the governor.

In the modification Figs. 6 and 7, where an oscillating flap-valve, $a a^2$, is situated in the steam-chest, the said oscillating valve is actuated by a regulator in the form of a tappet or lever-arm, i , jointed to the bearing in the steam-chest f^3 . A reciprocating or rocking motion is given to the said tappet or lever-arm i through the rod i^2 , on the end of which the link k works, the latter being connected through the rod l with an eccentric on the shaft of the engine. The link k is also raised and lowered by the action of the governor, which is geared to it through the rod m and other connections. After the slide-valve has made a portion of its stroke from left to right the action of the eccentric moves the rod i^2 in the direction of the arrow in Fig. 6 and turns the tappet or lever-arm i upon its center. The head of the said tappet is thereby made to lift the arm a of the flap-valve and close the port d , the other arm, a^2 , opening the port e . In this way the steam is cut off at the required position of the stroke of the slide-valve. The length of the travel of the tappet or lever-arm i is determined by the position of the link k , the position of the latter being regulated through the governor of the engine.

Having now particularly described and ascertained the nature of our invention and the manner of performing the same, we declare that we claim as our invention of improvements in automatic cut-off mechanism for the slide-valves of steam-engines and compressed-air engines—

The combination, with a reciprocating slide-valve, of an oscillating flap-valve pivoted between its ends below the valve, and a movable regulator connected with a governor and acting alternately on the said opposite ends of the pivoted valve, substantially as described.

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Witnesses:

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