

Fisher & Reid,
Cut Off Valve Gear.
No. 110,223. Patented Dec. 20, 1890.

Fig. 1.

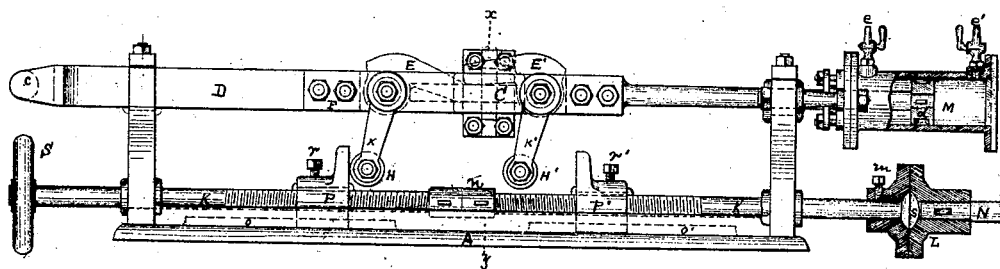


Fig. 2.

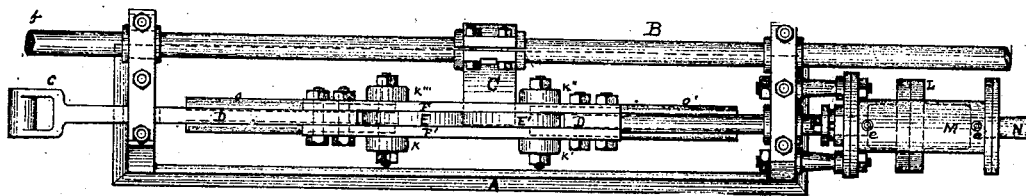
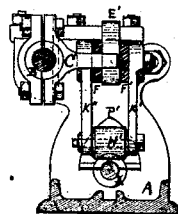


Fig. 3.



Witnesses.

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GEORGE W. FISHER AND HUGH REID, OF ST. LOUIS, MISSOURI, ASSIGNORS TO GERARD B. ALLEN & CO., AND HUGH REID, OF SAME PLACE.

Letters Patent No. 110,223, dated December 20, 1870.

IMPROVEMENT IN CUT-OFF VALVE-GEARS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, GEORGE W. FISHER and HUGH REID, both of the city and county of St. Louis, and State of Missouri, have invented a new and useful Improvement in Cut-off Valve-Gear, of which the following is a full, clear, and exact description, reference being had to the annexed drawing making a part of this specification, and in which—

Figures 1 and 2 represent, respectively, a side elevation and top plan of our apparatus.

Figure 3 represents a transverse section of fig. 1 at *x y*.

Similar letters indicate like parts.

Our improvement relates to the devices by which the valve is made to "cut off," and does not contemplate any change in the valve itself or its ordinary connections, as will be seen hereafter.

Our object is to enable the engineer to cut off the steam at any desired point of the stroke, so as to regulate the degree of expansion to correspond to the power required of the engine, and to do this without interfering with the motion of the engine, and while it is under full headway.

Our device is applicable to all stationary and marine engines.

A stand, A, figs. 1, 2, 3, bolted to the cylinder-timbers or engine-bed, gives support to the various parts of our apparatus. This stand may be conveniently placed between the engine and the main shaft, but about twice as far from the latter as from the former.

The cam-rod B, figs. 2, 3, passing, as seen, through the uprights in the frame A, is attached at one end to the ordinary full stroke or exhaust-cam now used on all engines on the western rivers, while the forward end *b* connects with the ordinary rocker arm of the exhaust-valve.

A second rod, D, figs. 1, 2, made in two parts and connected by plates F F', figs. 2, 3, and F, fig. 1, so as to leave a slot between them as seen in fig. 2, has its bearings in the uprights of A, and at one end a handle, *c*, which connects by the ordinary cam-rod and hook with the rocker-arm of the steam-valve, while the other end is connected with the piston *d* of the air-cylinder M.

This cylinder is provided with ports, *e e'*, as seen, and is constructed in the ordinary manner, with the usual stuffing for the piston-rod, packing for the piston, &c.

On the rod B is firmly fixed a plate, C, which works through a slot in the plate F, as seen in figs. 2, 3.

On pivots passing through the plates F F' are keyed the arms E E', figs. 1, 2, and E', fig. 3, which work in the slot between these plates; while to the outer ends of these pivots or rock-shafts are keyed, at right angles to E E', the arms *k k' k''*, fig. 2, *k k'*, fig. 1, and *k k''*, fig. 3. These latter are connected, two and two, by friction-wheels H H', fig. 1, H', fig. 3.

Directly beneath the rod D is another rod, K, figs. 1, 3, formed of two parts connected by a coupling, *n*, fig. 1. On one part is cut a right-hand screw and on the other is cut a left-hand screw. On each screw is placed a tappet, P P', fig. 1, P' fig. 3, working in guides, *o o'*, figs. 1, 2, on the stand A, as seen.

On one end of this rod is a hand-wheel, S, and on the other a button, *s*, working loosely in the coupling L; one-half of this coupling being keyed to the forward end of the cam-rod N, figs. 1 2, which leads to the ordinary eccentric on the main shaft of the engine.

Set-screws, *r r'*, keep the tappets in position; and a set-screw, *m*, prevents the rod K from revolving.

The operation of the apparatus is as follows:

The drawing represents the various parts in their position when the engine has just passed the center, and the full-stroke cam has moved the rods B D in the direction of *b*, and is at rest, holding both the steam and exhaust-valves open. In the mean time the rod K is, by the action of the eccentric on the main shaft, drawn in the opposite direction, bringing the tappet P in contact with the friction-roller H, which throws up the arm E, releasing the plate C from its pressure, which deprives the valve of its support, causing it to fall immediately, pushing the bar D back the same distance it was moved forward in raising the valve, and allowing the arm E' to fall behind the plate C in the slot, as already shown. The apparatus is now ready for the return stroke of the engine, during which the movements already described are repeated by the other tappet and arm.

When the valve falls it is "cushioned" by the action of the air-cylinder M on the rod D, so that neither the valve nor its seat may be injured by the concussion which would otherwise be occasioned.

By adjusting the size of the ports *e e'* of the cylinder, the pressure may be regulated in its action on the rod.

To change the point of cutting off, it is only necessary to adjust the tappets P P' by the hand-wheel so that they will trip the arms E E' at one point or another in the stroke, as at one-eighth or seven-eighths stroke.

Among the advantages of this apparatus are the following:

By using the exhaust-cam we get a more prompt and rapid opening of the steam-valves, and prevent the steam "wire-drawing" and cutting out the valve and seat.

From the peculiar motion of the exhaust-cam, the valve is thrown open to its fullest capacity, and held thus till the completion of the stroke.

By the action of the arms and tappets the position of the valve is not disturbed till it is entirely released, when it falls instantly and makes a sharp cut-off to the steam, thus attaining two most desirable results, to wit: A prompt and well-sustained opening into the

cylinder, and a sharp cut-off at any point from one-eighth to seven-eighths of the stroke.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The slotted rod D, with its arms E E' and k k' k'', and cam-rod B, with its plate C, arranged for joint operation with each other and the valves and main shaft of the engine, and constructed and operated as and for the purpose shown and specified.

2. The slotted rod D, with its arms E E' and k k' k'', and cam-rod B with its plate C, and air-cylinder M, arranged for joint operation with each other and the valves and main shaft of the engine, and constructed and operated as and for the purpose shown and specified.

3. The rod K, having a right and left-hand screw and adjustable tappets P P', in combination with the cam-rod N and the eccentric on the main shaft of the engine, and constructed and operated as and for the purpose shown and specified.

4. The slotted rod D, with its arms E E' and k k', &c., cam-rod B with its plate C, rod K having a right and left-hand screw and adjustable tappets P P', arranged for joint operation with each other and the valves and main shaft of the engine, and constructed and operated as and for the purpose shown and specified.

5. The slotted rod D with its arms E E' and k k', &c., cam-rod B with its plate C, rod K having a right and left-hand screw and adjustable tappets P P', and air-cylinder M, all arranged for joint operation with each other and the valves and main shaft of the engine, and constructed and operated as and for the purpose shown and specified.

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Witnesses:

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