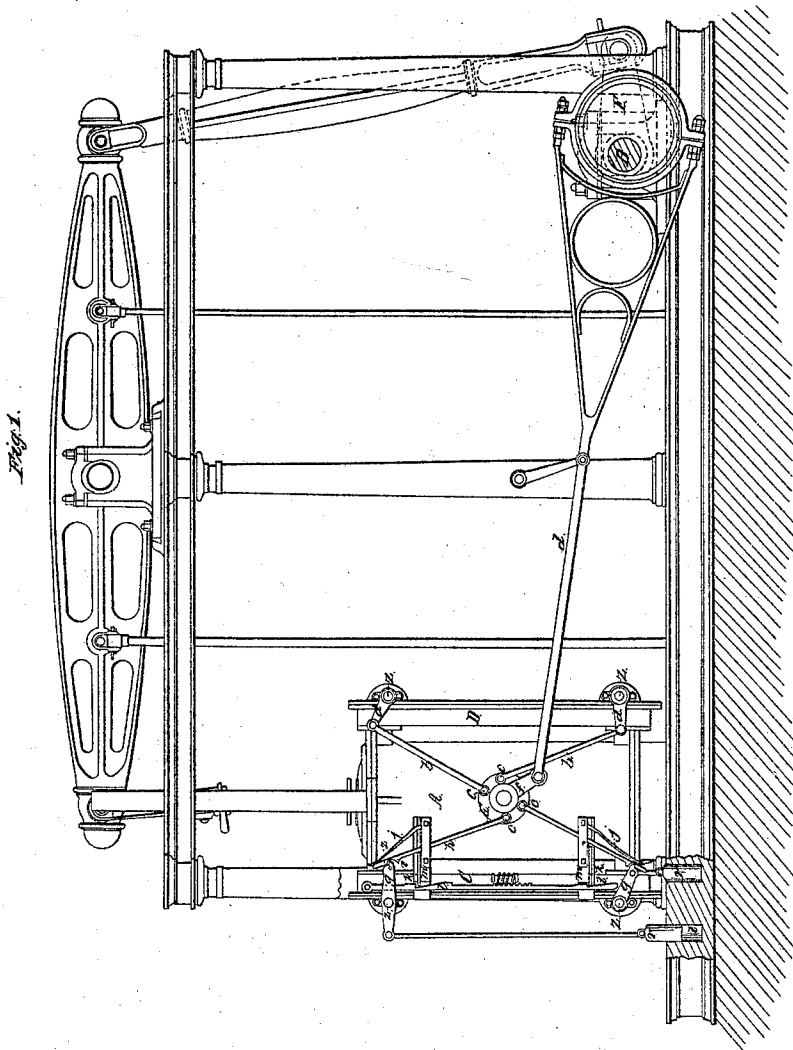


G. H. Corliss, *2 Sheets, Sheet 1.*

Steam Cut-Off.

N^o 8253.

Patented July 29, 1851.



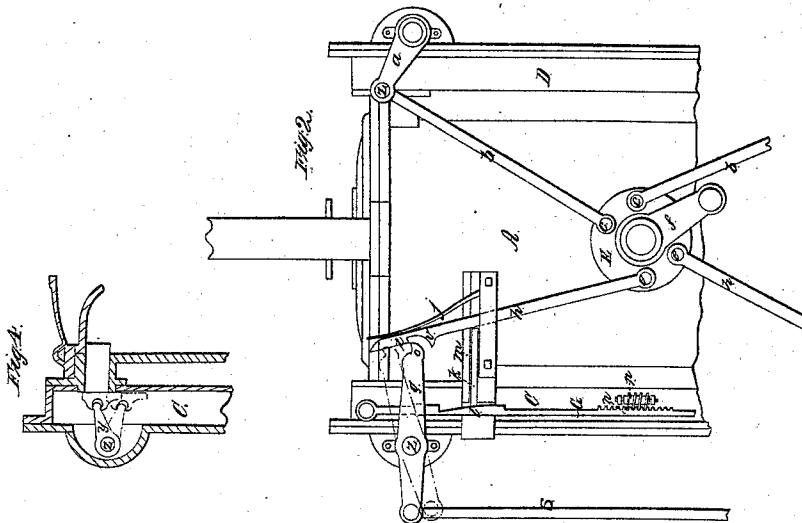
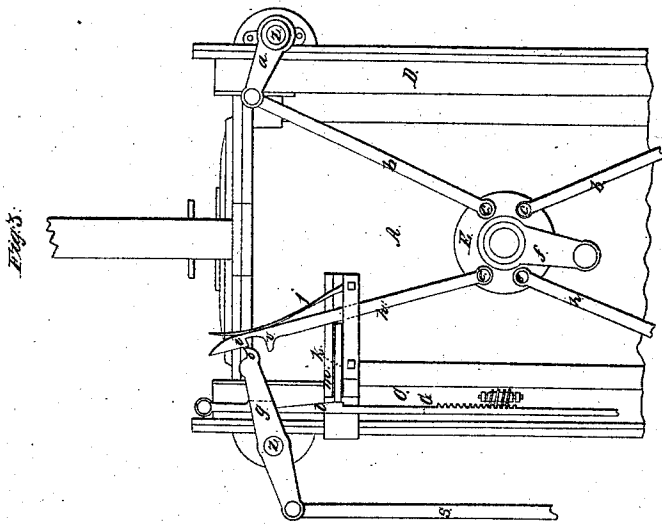
2 Sheets, Sheet 2.

C. H. Corliss,

Steam Cut-Off.

N^o 8,253.

Patented July 29, 1851.



UNITED STATES PATENT OFFICE.

GEORGE H. CORLISS, OF PROVIDENCE, RHODE ISLAND.

CUT-OFF GEAR.

Specification forming part of Letters Patent No. 8,253, dated July 29, 1851; Reissued July 26, 1859, No. 780.

To all whom it may concern:

Be it known that I, GEORGE H. CORLISS, of the city and county of Providence and State of Rhode Island, have invented a new and useful Improvement in the Method of Actuating Variable Cut-Off Valves for Steam and Gas 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, which form part of this specification and in which—

Figure 1 represents a side elevation of a beam engine with my valve-gear applied thereto; Figs. 2 and 3 are fragmentary side elevations of the steam cylinder and valve-gear; and Fig. 4 is a section of one of the valve chests and the parts adjacent thereto.

My improvement has reference to that class of cut-off valve motions in which the connection between the valve and the eccentric or the equivalent thereof, which opens the valve, is broken to allow the valve to move independently of the eccentric and close its steam port before the piston has completed its stroke; and my improvement consists in effecting this disconnection of the valve and the eccentric gear, or the equivalent thereof, by imparting to the lifting rod a lateral movement which is limited and controlled by an adjustable stop and spring; so that the lifting rod not only performs the duty usually imposed upon it of opening the valve but also performs the office of a catch or latch in connecting and disconnecting the valve with the eccentric gear.

In the accompanying drawings A is the steam cylinder and B the crank shaft of the engine. The steam cylinder is fitted with two side pipes C, D, which form the valve chests in which the valves are contained. That side pipe C farther from the crank shaft B, contains the steam valves and is connected with the steam pipe which conveys the steam from the boiler; the other side pipe contains the exhaust valves and is connected with the exhaust pipe through which the exhaust steam from the cylinder is discharged. The steam and exhaust

valves are in this instance of the slide variety, and each is moved to open and close its respective ports by an arm *y* which projects from a short rock shaft *z*. These rock shafts extend transversely through stuffing boxes in the sides of their respective valve chests and their projecting extremities are fitted with arms *a a*, *b b*. The arms *a a*, of the exhaust valves are connected by means of lifting rods *b*, *b*, with separate crank wrists *c c* secured to a disk plate E to which a rocking motion is imparted by the eccentric F through the intervention of the eccentric rod *d*, and a crank *f*, secured to the disk-plate E. The connection of these exhaust valves with the crank wrists of the disk plate and thence with the eccentric are permanent, and hence the exhaust valves will be alternately opened and closed with a regular movement, the opening of one exhaust valve being simultaneous with the closing of the other.

The arms *g g* of the steam valve rock shafts terminate in toes *o o*, and are operated by lifting rods *h h*, which are pivoted to suitable crank wrists *e e* upon the disk plate E. These lifting rods terminate in hooks *i i*, which engage with the toes *o o* of the rock shaft arms, and are kept engaged with them by springs *j j* which bear upon the backs of the lifting rods; hence as long as these hooks continue engaged with the toes of the rock shaft arms the steam valves will be opened and closed with a regular movement in the same manner as the exhaust valves; while if the hooks of the lifting rods be disengaged from the toes at any portion of the stroke, the connection of the steam valves with the eccentric will be broken and the steam valves will be free to close and thus cut off the passage of steam to the steam cylinder. In order to effect this disengagement of the lifting rods which communicate the movement of the eccentric to the steam valves, each rod is fitted with an adjustable stop *k k*, against which the face of the rod bears in moving, and which can be moved to cause the hooked extremity of the rod to detach itself from the respective toe of the rock shaft arm when the

steam piston has accomplished any required portion of its stroke. These stops are constructed to slide in blocks m, m , secured to the framework or other convenient portion of the engine; their extremities bear against two inclined blocks l, l which are secured to a rod G , by raising or lowering which the stops are moved to effect the disengagement of the lifting rods when the piston has accomplished a less or greater portion of its stroke. This sliding rod G in the examples represented in the drawing is constructed to be moved by hand through the intervention of a rack n and worm p ; the last of which is turned by hand to screw up or screw down the sliding rod; but the sliding rod G may be moved by the engine itself, by connecting it with the slide of the governor so that as the latter is moved the point at which the cut-off is effected will be varied.

The inclined blocks, l, l , are of such form that when they are raised to their highest positions, as at Fig. 3, the stops k, k , will be so far projected that the lifting rods, h, h , bearing upon them, will in moving disengage from the toes of the rock shaft arms before the valves have moved sufficiently to open their respective ports; while if the inclined blocks are depressed by the rod G to their lowest positions, as at Fig. 1, the stops, k, k , will recede in their slide blocks, m, m , sufficiently to have no action upon their respective lifting rods, and hence the latter will continue engaged with their respective toes throughout the whole extent of the stroke. If the inclined blocks be set between these two extreme positions, as at Fig. 2, the stops will be more or less projected, to detach the lifting rods sooner or later, as may be required to regulate the amount of steam admitted to the steam cylinder.

In order to effect the closing of the steam valves after they are disconnected from the eccentric gear, the rock shaft arms appertaining to each of them, has a weight r suspended from it by a rod s . These weights are sufficiently heavy to effect the instantaneous closing of the valve whenever its appropriate lifting rod is disengaged from the toe of the rock shaft arm. In order to prevent the slam and jar that would result from the sudden closing of the valves, these weights are fitted to move easily in appropriate sockets formed, in the present example, in the bed plate of the engine. The weights moving in the sockets act as pistons to compress the air therein and thus retard their descent, and as air cushions to prevent the slam or jar. If the compression of the air was continued throughout the whole descent of the weight its motion would be too much retarded to enable it to close the valve with the requisite speed; an orifice, t , Fig. 1, is therefore made in each socket near its

lower extremity to permit the free entrance and exit of air; this orifice is in such a position that the weight in descending passes it and thus cuts off the escape of the air remaining in the socket just before the valve closes its port, when the air, caught, or shut up in the socket, being compressed, will retard the further movement of the weight and will act as an air cushion to prevent the slam or jar.

When the stops are acting, the lifting rods are alternately disengaged in their inward movement toward the center of the disk plate, to allow the valves to close under the action of their respective weights, as each lifting rod is moved outward, its extremity being pressed by its appropriate spring j against the toe of its respective rock shaft arm is caused to reëngage therewith in time to open the valve at the returning rock of the disk plate in order to insure the closing of each steam valve before it is reopened a curved snug v is projected from the face of each lifting rod h , which in the outward movement of the latter would strike against the lower side of the toe of the rock shaft arm and thus close the latter if by any accident it was not previously closed by its appropriate weight.

In order to lessen the wear of the toes and the hooks of the valve gear, their rubbing faces are faced with hardened plates of steel which when worn can be readily replaced.

The arrangement of the lifting rods and the method of operating them by the disk plate, as represented in the accompanying drawings, is peculiarly suited to this method of effecting the disengagement of the valves from the mechanism by which they are opened, for the disk plate imparts a transverse motion to the connecting rods, which causes them to rock upon the stops and thus slide off their respective toes on the rock shaft arms. But while I prefer this arrangement of eccentric gear I wish it to be understood that I do not restrict myself to its employment as my improvement may be applied to many other systems of mechanism by which valves are opened; as such systems may not possess the peculiar rocking motion I have mentioned, it will be necessary in some cases to disengage the lifting rods by a positive movement which may at the proper moment be imparted to the lifting rods by some moving member of the engine through the intervention of any convenient and suitable mechanical device.

I claim—

In combination with the reciprocating motions communicated to the lifting rods by the eccentric gear, I claim imparting a lateral movement to the free extremities of said lifting rods to disconnect them from the valves and permit the latter to close to cut

off the steam or other expansive fluid by which the engine may be driven, whereby these rods are made to perform their usual duty of opening the valves and in addition
5 that of catches or latches in alternately connecting the valves with and disconnecting them from the mechanism by which they are opened, thus greatly simplifying the construction of the valve gear rendering the

same more durable and less liable to get out 10 of order.

In testimony whereof I have hereunto subscribed my name.

GEORGE H. CORLISS.

Witnesses:

THOMAS A. GENEKE,
WM. H. HENDERSON.

[FIRST PRINTED 1913.]