G. H. REYNOLDS.

Valve-Gear for Steam-Engines.

No. 162,101. Patented April 13, 1875.

Fig. 1.

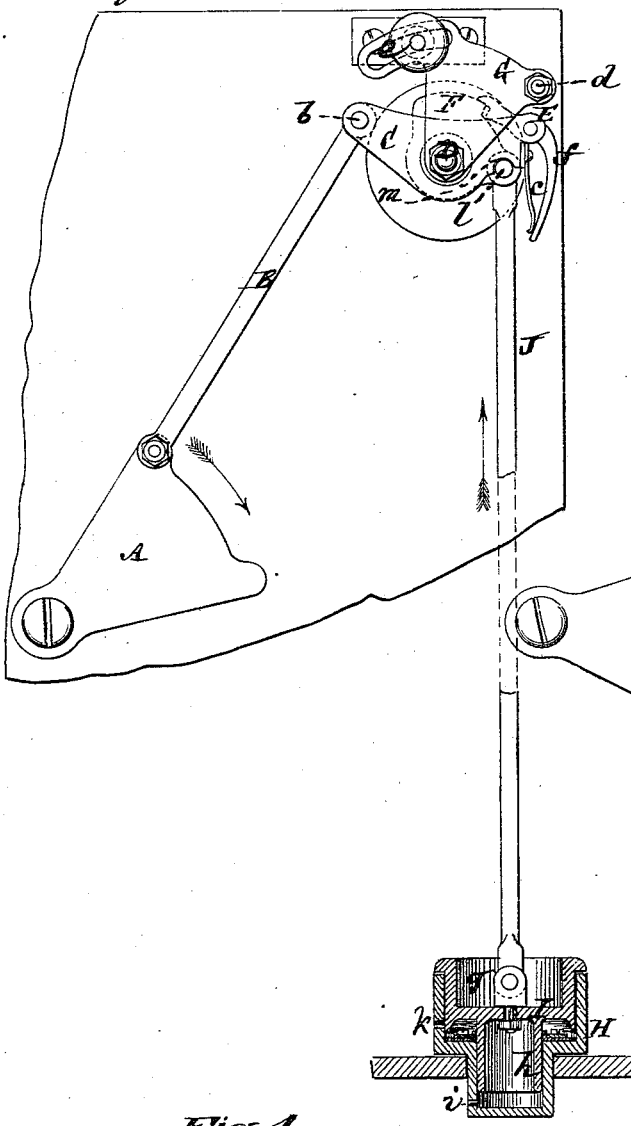


Fig. 2.

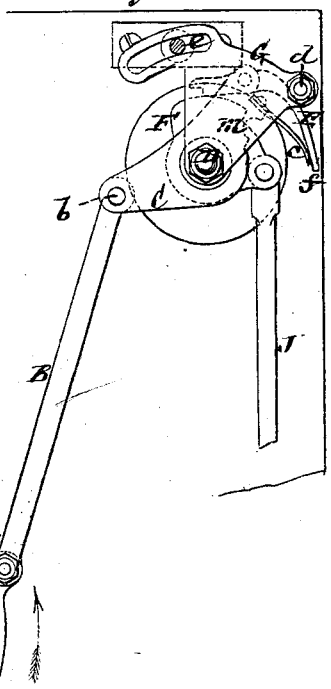


Fig. 3.

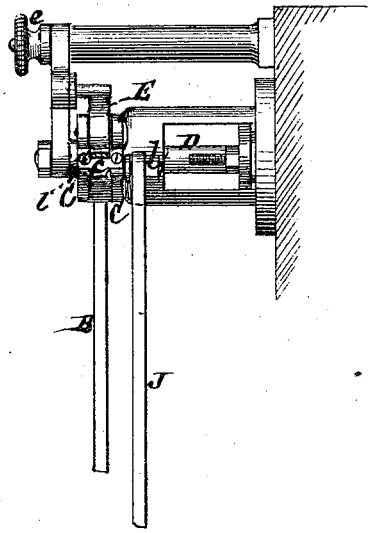
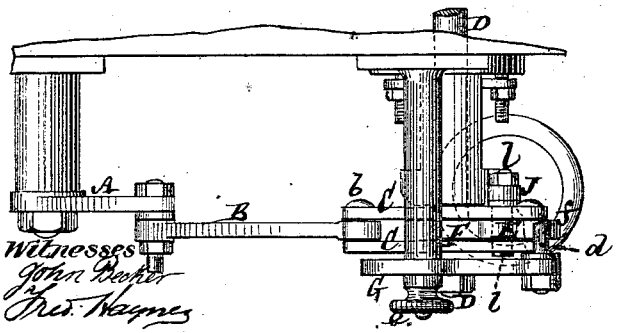


Fig. 4.



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THE CRAPHIC CO. PHOTO.-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF HIS RIGHT TO CORNELIUS H. DELAMATER AND GEORGE H. ROBINSON, OF SAME PLACE.

IMPROVEMENT IN VALVE-GEARS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **162,101**, dated April 13, 1875; application filed March 4, 1875.

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, of the city, county, and State of New York, have invented certain new and useful Improvements in the Valve Motions 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 drawing forming part of this specification.

This invention more particularly relates to what is known as the Corliss engine, in which separate induction and eduction oscillating or rolling valves are used at opposite or both ends of the cylinder, and in which the steam-valves are both induction and cut-off valves, and have their opening motion controlled by a vibrating hook, which is tripped to effect the cut-off, and the valves closed by a weight, or its equivalent, subject to the cushioning action of a dash-pot.

The invention consists in a combination of levers carrying the hook with the cam or device with which the hook engages, to open either steam-valve arranged within or between said levers, whereby that lateral strain and racking of parts which are incidental to a single loose lever on the valve-stem having the operating-hook on one side of it is avoided, and a smoother or more perfect action, free from all binding of the parts, is obtained. The invention also consists in a combination of a stud or projection connected with the plunger-rod of the dash-pot of the lever or levers carrying the actuating-hook, whereby, in case of any tendency of the valve to stick or not close when released by the hook, as frequently occurs in starting the engine after it has stood idle for any length of time, it is closed by a positive motion of the lever or levers carrying the actuating-hook. The invention likewise consists in a certain combination of a peculiarly-constructed dash-pot with its plunger, for operation of the latter not only against a cushion of air, but in connection with a vacuum on the under or closing side of the plunger, as produced by the attachment of the dash-pot with the condenser.

Figure 1 represents a side elevation of a valve motion of the character hereinbefore referred to, and as applied to a single combined induction and cut-off valve, with my improvements attached, and showing the parts in position ready for opening the valve. Fig. 2 is a similar view, in part, showing the valve motion in a reverse position. Fig. 3 is an elevation at right angles to Fig. 1, and Fig. 4 a plan of the same devices in part.

A is the usual vibrating wrist-plate deriving its motion from an eccentric on the main or driving shaft of the engine. B is one of the rods connected with said wrist-plate for operating the valves. This rod is pivoted, as at *b*, to and between two levers, C C, arranged parallel with each other and fitted to turn loosely on the spindle D of one of the induction and cut-off valves. Said connected levers carry between them at their opposite end to that at which the rod B is attached the hook E, that by its engagement with a cam or notched plate, F, fast on the valve-spindle D, serves to open the valve—that is, when the parts move in the direction indicated by arrows in Fig. 1. By means of these combined levers C C receiving their motion as described, and carrying between them the hook E, which opens the valve, all lateral strain and racking of the parts, as when only a single lever having the hook pivoted to one side of, is avoided, and a much steadier and smoother action is obtained, thereby giving greater freedom to the valve and to the release or engagement of the hook. Said hook E is held by a spring, *c*, in contact with the cam or notched plate F, and is tripped at the desired time by a stud, *d*, attached to an adjustable plate, G, which may have its center of motion concentric with the valve-spindle, and which may either be adjusted by screw and slot, as at *e*, or which may be adjusted automatically by the governor of the engine, the adjustment in either case serving to bring the stud *d* sooner or later into contact with the cam-shaped tail *f* of the hook E, when the parts move as indicated by the arrows in Fig. 1, so as to trip the hook from engagement with the cam or notched

plate F, when, or after which, the valve is reversed to cut off or close by an independent action, and which is usually a weight operating in connection with a dash-pot, to ease the closing of the valve. H is the dash-pot for such purpose, and I the plunger thereof, both of which are of peculiar construction, and by which I avail myself, as under other arrangements, of atmospheric pressure as against a vacuum in the place of a weight to close the valve. Thus, the plunger I, which is connected by a rod, J, with the outer or tail end of the notched plate F, has its upper portion *g* of larger diameter than its lower portion *h*, and the dash-pot H, in which said plunger works, is constructed of different diameters to correspond. The lower portion of said dash-pot is connected by an aperture, *i*, with the condenser of the engine, whereby atmospheric pressure is brought to bear upon the plunger to close the valve, while the upper portion of the dash-pot has an aperture, *k*, which serves to admit air during the ascent of the plunger beneath the upper portion *g* of the latter, but which is closed during or toward the close of the descent of the plunger, and so forms an air-cushion to ease the closing of the valve, the effect of the vacuum beneath or within the smaller portion of the plunger assisting such action, and insuring the prompt closing of the valve. Connected with the plunger-rod J, either directly or indirectly through the intervention of the cam or notched plate F, is a stud or projection, *l*, which may be the pivot or pin used to connect said rod with the cam. This stud or projection *l* is so arranged that in case of the plunger of the dash-pot not acting promptly to close the valve when the hook is released, the lever or levers C strike or engage with the stud, as at *m*, when said lever or levers move in the reverse direction to that illustrated for them in Fig. 1, and so start the closing action of the valve by a positive motion from the engine.

I claim—

1. The combination of the pair of connected levers C C, arranged loosely upon the valve-stem D, the hook E, carried by and between the pair of levers, and the cam or notched plate F, connected with the valve-stem between the levers, substantially as described, and for the purposes set forth.

2. The combination, with the hook-carrying lever or levers C, of the stud *l*, connected with the plunger-rod J of the dash-pot, substantially as described, whereby in case of the valve sticking it is started in its closing action by a positive motion from the engine, as specified.

3. The dash-pot H, of different diameters, as described, and provided with an air-inlet, *k*, and aperture *i*, leading to the condenser, in combination with the plunger I, of different working diameters to correspond with the dash-pot, substantially as shown and described.

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