

J. KNOWLSON.
CUT-OFFS AND GEARS.

No. 176,141.

Patented April 18, 1876.

Fig. 1.

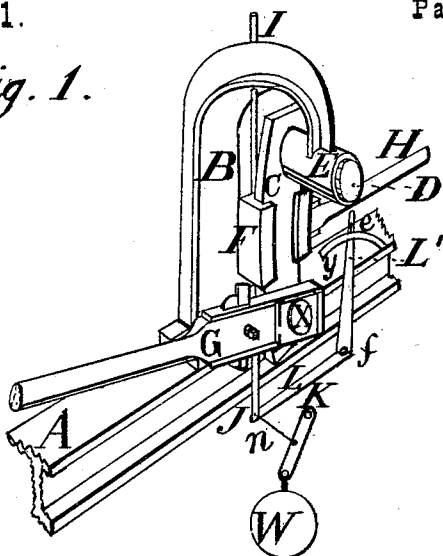


Fig. 2.

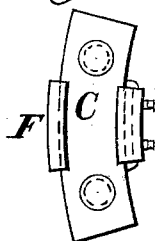


Fig. 3.

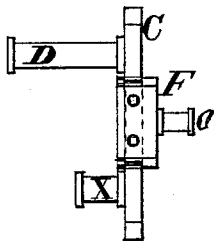


Fig. 4.

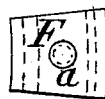
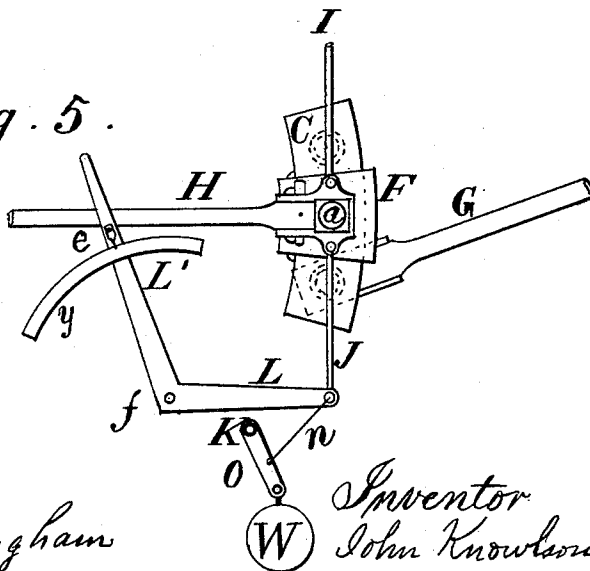


Fig. 5.



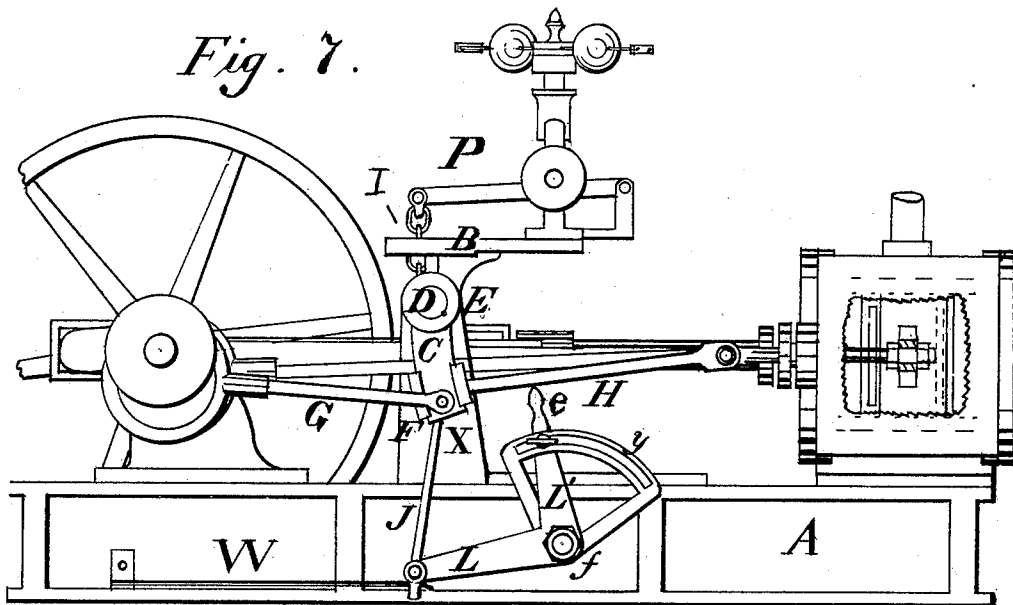
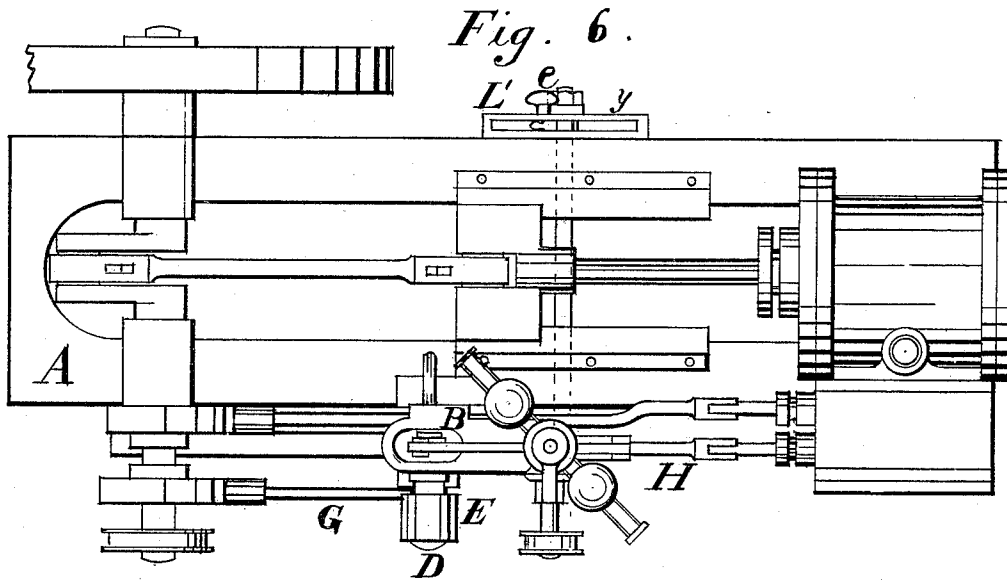
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UNITED STATES PATENT OFFICE.

JOHN KNOWLSON, OF TROY, NEW YORK.

IMPROVEMENT IN CUT-OFFS AND GEARS.

Specification forming part of Letters Patent No. **176,141**, dated April 18, 1876; application filed January 27, 1876.

To all whom it may concern:

Be it known that I, JOHN KNOWLSON, of the city of Troy, in the county of Rensselaer and State of New York, have invented an Improved Cut-Off Attachment for Steam-Engines, of which the following is a specification.

The object of my invention is to readily regulate the point of cut-off in the stroke of the piston working in the steam-cylinder, and to give the full force of the steam at the opening of the ports from the steam-chest. Its nature, construction, and mode of operation will fully appear in the annexed description and specification.

On Sheet 1 of drawings, Figure 1 is a front view of my device in perspective when in proper position, the valve and eccentric rods being shown in section. Fig. 2 is a front view of segment C, with slide-block thereon. Fig. 3 is a side view of the same, showing suspension cross shaft or pin, D, eccentric wrist-pin X, and cut-off connection-pin *a* on slide-block F. Fig. 4 is a face view of the slide-block F and pin *a*. Fig. 5 is a back view of Fig. 1, showing the operative parts of my device, viz., the eccentric rod G to the right and the cut-off rod H to the left of the figure, in sections, and also the different connecting parts of my device. On Sheet 2 of my drawings, Fig. 6 is a plan view of my device in position on the engine, and showing quadrant Y, in which the regulating lever operates, on the side opposite from which the remaining parts of the cut-off attachment are placed. Fig. 7 is a side elevation of my device in position on the engine, showing the regulating-lever L' on the same side with the remaining parts of my cut off attachment, and showing a mode of connection with the lever P of my improved governor.

My device can be readily adapted to operate the main or sliding valve of the steam-chest, or to engines employing the ordinary sliding and cut-off valves. When used with my improved governor, (shown in Fig. 7,) the pendent rod or chain I is connected by one end of the lever P by knuckle-joint, and as steam is admitted by the ports into the steam-cylinder from the steam-chest, the motion of the main shaft by its connections operates the governor,

and the lever L' being left free, my device is under the control of the governor; or, in emergencies requiring it, or when desired, my device (the improved cut-off attachment) would regulate and control the admission of steam without the use of the governor, and yet give steadiness of motion to the engine. To do this I set the lever L' at some desired point of cut-off, (indicated on the quadrant Y) the same being indexed or numbered according to the number of inches of the stroke of the piston, and from the point of cut-off the expansion of steam would do the required work. Again, by moving and setting the lever L', by means of the thumb-screw *e* (seen in Fig. 6,) to the extreme left of the quadrant, no steam would be admitted into the steam-cylinder.

My improved cut-off attachment may be adjusted to the steam-engine, as seen in Fig. 1, or as more fully shown in Fig. 7, or in any other manner as will give the operating parts free action, and when the regulating-lever L' is not set it will be automatic in operation.

The construction and arrangement of my device would be substantially as follows: For illustration, the operative parts may be seen detached from the engine in Fig. 5, and in position on the engine in Fig. 1, Fig. 6, and Fig. 7. The eccentric rod G is made in the usual manner, and is operated from the main shaft, and said rod is jointed on the eccentric pin X, which is cast to or inserted near the top of the segment C, which has also a wrist-pin, D, cast to or inserted near to the top of the segment, which pin passes through the journal-box E, attached to the supporting-standard. On the segment is placed a sliding block, F, nicely adjusted by suitable gibs and set-screws, and having attached thereto the pin *a*, which is jointed with the cut-off-valve rod H. The form and proportion of the segment and sliding block are seen in detached views in Fig. 2, Fig. 3, and Fig. 4, and in length and curve is about twice the travel or throw of the eccentric, and the pins are inserted at such points as will give proper swing in operation. The long eccentric rod, operating the sliding valves adjacent to the ports into the steam-cylinder, is made in the usual manner; and the cut-off valves, attached to the rod H, by means of my de-

vice, open and close the ports from the steam-chest, alternately with the inner adjacent valve worked by the long eccentric rod. From the strap or shoulder of the cut-off-valve rod H is linked the connecting-rod J, having a forked end jointed with the elbow-lever L L'. From the lower joint of the rod J, Fig. 5, the link-rod n is connected, at or near the center, with the strap O, which is jointed on the plate of the engine at K. To this strap O is hung the counter-weight W; or the weight W may be dispensed with, and its equivalent (the spring W', Fig. 7,) fastened at a suitable point to the base of the engine, may enter into the stirrup attached to the lower end of the rod J, and used in its place. The spring W', or its equivalent, regulates and brings down the rod J and its connections, when the speed of the engine is too great, and the effect is substantially as follows: When the spring is drawn up, the ports are partially closed and the engine slowed; and when the spring draws the connections down, it gradually opens the ports and gives increased power to the engine, while the elbow-lever L', its arm L being left free to act in the stirrup on the rod J, moves automatically in the quadrant Y, and the full force of the steam, unchecked, operates on the piston.

This regulating-lever L', without change of principle of operation, may be placed on the same side with my cut-off attachment, of which it forms a part, as seen in Fig. 7; or that part of the lever marked L may be jointed

with cross-shaft (indicated by dotted lines, seen in Fig. 6,) to the opposite side, where it has a fixed joint-connection with the lever L', and in either position, by setting the lever L' by thumb-screw within the quadrant at any point of the graduated arc, the steam is cut off at a corresponding point in the stroke of the piston, and the length of the stroke, and the alternate opening and closing of the ports by the sliding and cut-off valves, are accurately determined and regulated to perform the allotted amount of work required by the engine.

I claim—

1. In combination with a governor and cut-off-valve rod, the reciprocating segment C, slide F, spring or weight W, connections I J, and lever P, all substantially as shown and described.

2. In combination with a governor and cut-off-valve rod, the reciprocating segment C, slide F, connections I J, spring or weight W, and adjustable elbow-lever L L', all substantially as shown and described.

3. In combination with a governor and cut-off-valve rod, the reciprocating segment C, slide F, connections I J, spring or weight W, eccentric rod G, and elbow-lever L L', all substantially as shown and described.

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Witnesses:

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