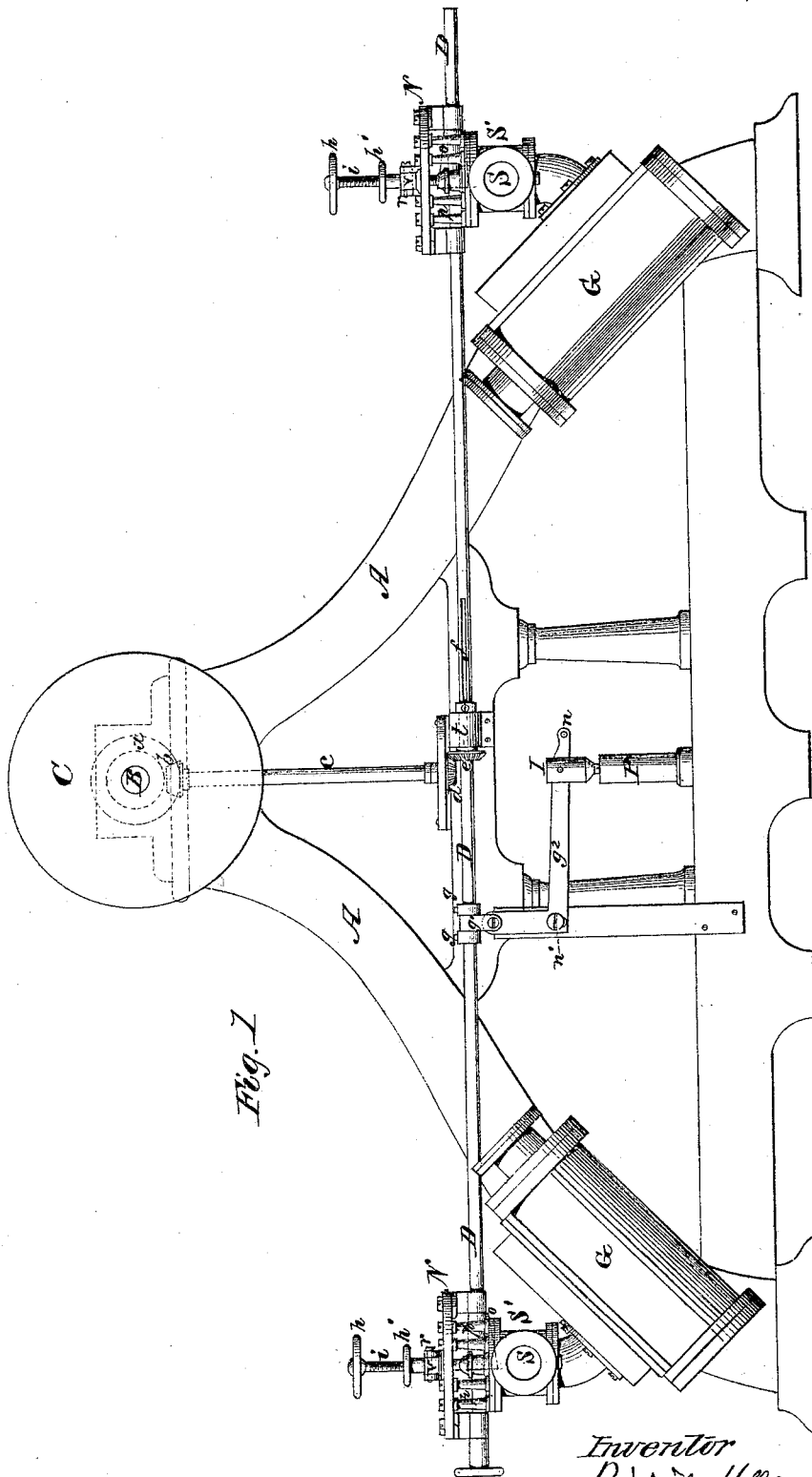


B. HOLLY.

### Improvement in Variable Cut-Offs for Engines for Water-Works.

No. 114,010.

Patented April 25, 1871.



Witnesses:  
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Fig 2

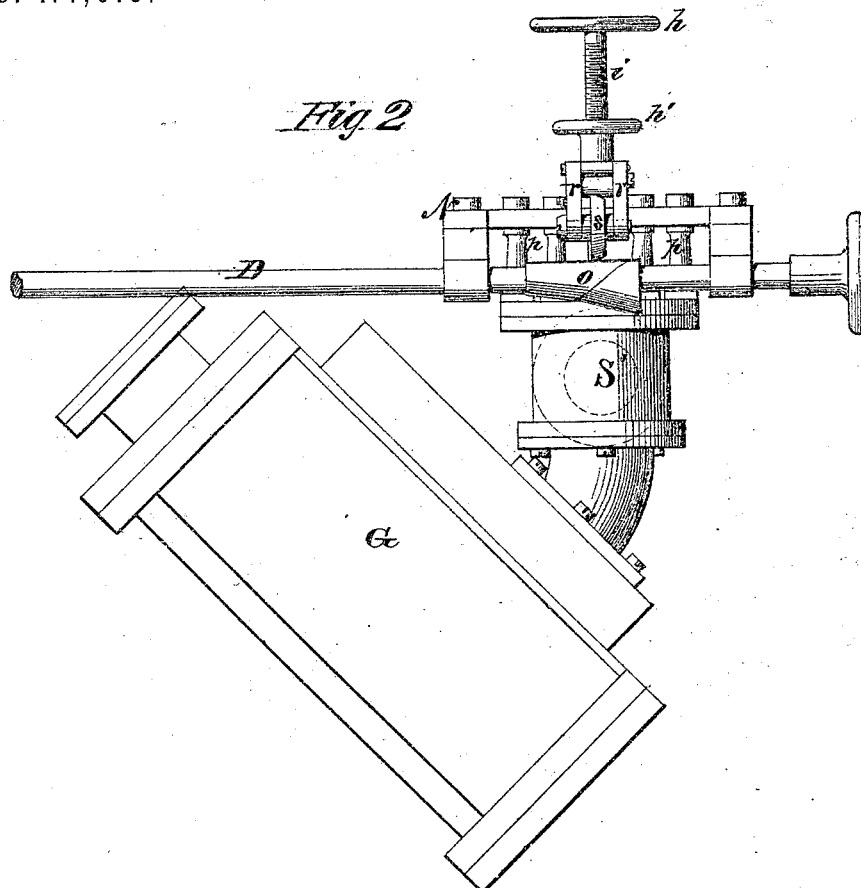
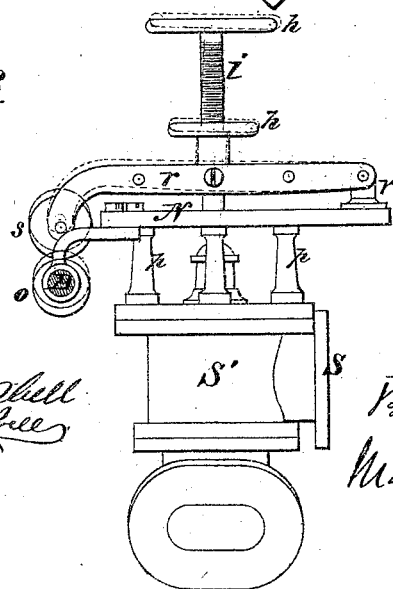


Fig 3.



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# UNITED STATES PATENT OFFICE.

BIRDSILL HOLLY, OF LOCKPORT, NEW YORK.

## IMPROVEMENT IN VARIABLE CUT-OFFS FOR ENGINES FOR WATER-WORKS.

Specification forming part of Letters Patent No. 114,010, dated April 25, 1871.

*To all whom it may concern:*

Be it known that I, BIRDSILL HOLLY, of Lockport, in the county of Niagara, State of New York, have invented a new and useful Variable Cut-Off for the Engines of Water-Works; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1, Plate 1, is a view showing my invention applied to two reciprocating engine-cylinders. Fig. 2, Plate 2, is an enlarged view of an engine-cylinder, a portion of the cone-carrying shaft, and a cone for operating the steam-inlet valve. Fig. 3, Plate 2, is an end view of Fig. 2.

Similar letters of reference indicate corresponding parts in the several figures.

The object of this invention is to automatically control the steam-inlet valves of engines which are employed for operating the pumps of water-works by means of the varying pressure of water in the mains, so that, should the pressure of water be diminished in the mains, more steam will be instantly admitted to the engines; or, should the pressure be increased from any cause, a less amount of steam will be instantly admitted to the engines.

The following is a description of one practical mode of carrying my invention into effect.

In the accompanying drawing, A represents an engine-frame, supporting two steam-cylinders, G G, and a crank-shaft, B. The piston-rods of both cylinders are connected to a wrist-pin on the face of the plate C, so that both engines operate in turning the crank-shaft. On the crank-shaft B is a bevel spur-wheel, *a*, which engages with a bevel spur-wheel, *b*, on an upright shaft, *c*, which latter gives rotary motion to a long horizontal shaft, D, by means of bevel spur-wheels *d* and *e*. The wheel *e* is applied to a bearing, *t*, on frame A, so that it cannot receive endwise play; but this wheel *e* is applied on the shaft D so that this shaft can receive endwise motion, whether it be rotating or not. The shaft D is supported at its extremities by the tubular ends of arms which are formed on horizontal plates N N, which latter are supported on pillars *p*, rising from the heads of two steam-chests, S' S'. On the shaft D cone-cams O O are applied, and ar-

anged, respectively, between the arms of plates N N, and on these cams rest anti-friction rollers *s*, which are on the free ends of vertically rising and falling arms *r*. These arms *r* are pivoted at V V on top of plates N N; and through swivel-blocks, which are applied to the arms *r*, valve-stems *i* pass, carrying on their lower ends the valves which regulate the passage of steam from the steam-chests S' into the steam-cylinders G G. The valve-stems *i* are screw-tapped and provided with hand-wheels *h*, and also with jam-nuts *h'*, thus allowing the valves to be adjusted to and set for running the engines at any given speed.

It will be seen from the above description that the cams O O will operate the valves in the steam-chests when the shaft D is rotated, and thus admit steam into both the steam-cylinders at proper times and in the required quantities.

P represents an upright cylinder, which is arranged below the shaft D, and which communicates with a water-main, into which water is forced by pumps actuated by the engines above described. In the cylinder P works a piston, the rod I of which is connected by a pivot to one arm of an angular lever, *g*<sup>2</sup>, which has its fulcrum at *n*'. The lever *g*<sup>2</sup> is adapted to have attached to it, at *n*, a suitable weight, and the upper end of this lever is connected, by a sleeve, *g*<sup>1</sup>, and fixed collars *g g*, to the horizontal shaft D, so that any movement of the piston in the cylinder P will be transmitted to the shaft D through the medium of lever *g*<sup>2</sup>, giving to this shaft a longitudinal movement.

The cams O O on the shaft D are so applied and adjusted, relatively to the movements required of the inlet-valves which they respectively operate, that when the piston in the cylinder P descends, in consequence of a diminution of pressure in the water-main, the said cams will be moved so as to admit a larger amount of steam into the cylinders G, and thus augment the speed of the engines; and, on the other hand, should the piston in cylinder P suddenly rise by an increase of pressure in the main, the cams O O will be moved so as to admit a less amount of steam into the cylinders, thus diminishing the speed of the engines. Suppose, for illustration, the pressure in the water-mains is required to be forty

pounds per square inch, and the engines adjusted for giving this pressure. If one or more fire-hydrants be opened quickly, the pressure would be reduced in the mains, and also under the piston in cylinder P. This would allow the piston to descend instantly and give an endwise movement to shaft D, thereby carrying the enlarged parts of cams O O beneath the rollers on lifting-arms r, and raise the inlet-valves to admit an additional quantity of steam into the steam-cylinders. If the pressure in the mains is increased from any cause, the steam-valves will be adjusted so as to admit less steam into the cylinders.

While I prefer to adopt the means substantially as shown and described for operating the valves of the engines by the varying pressure

of water in the mains, I do not confine myself thereto, as other means equivalent thereto may be employed for this purpose.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The means, substantially as described, for operating the cut-offs of engines by the varying pressure of water in the mains.

2. The lever  $g^2$ , when worked by a cylinder, P, which communicates with a water pipe or main, in the manner and for the purpose described.

BIRDSILL HOLLY.

Witnesses:

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