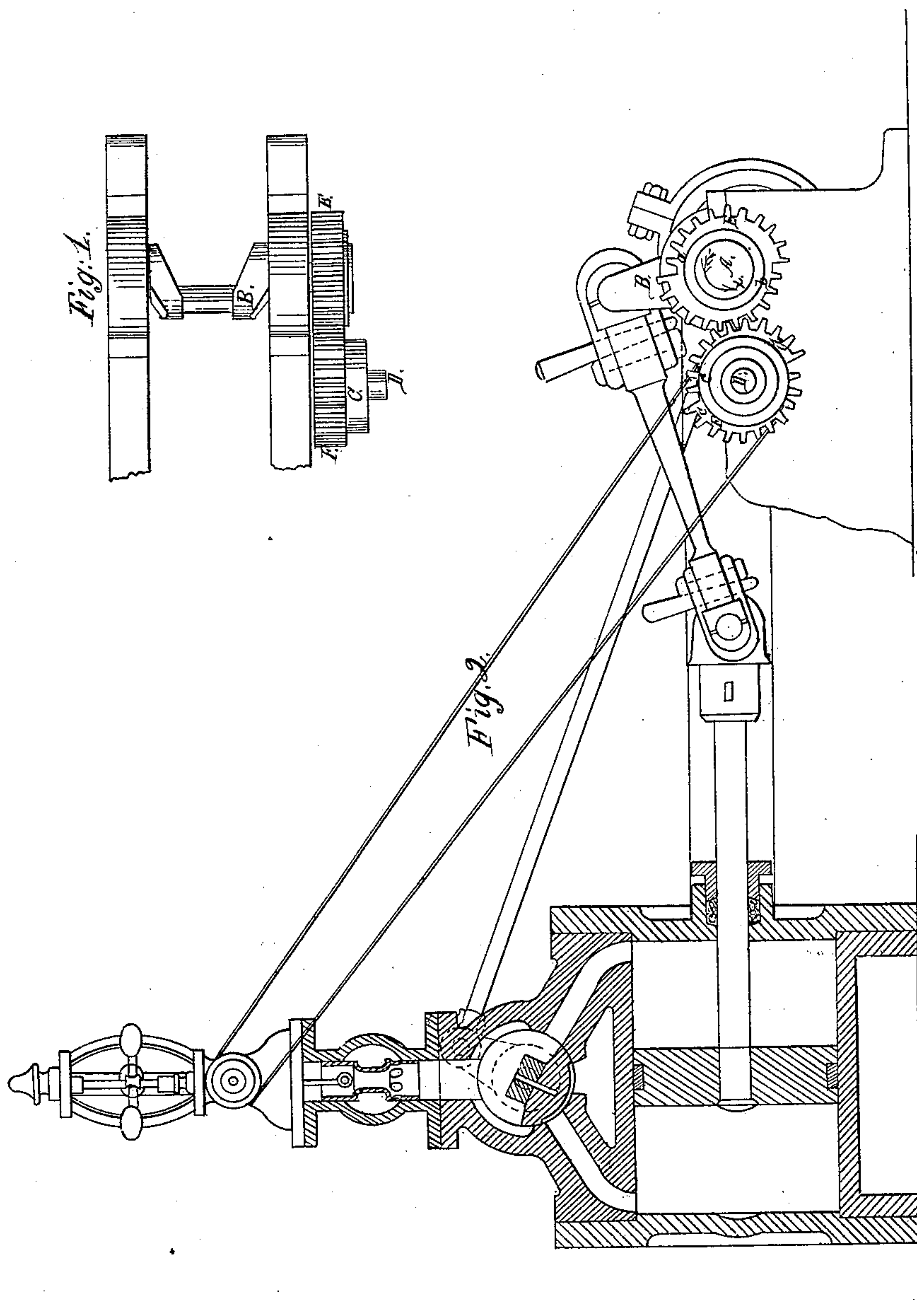


*J. B. Root.*

*Steam Engine Gear.*

*N<sup>o</sup> 95,838.*

*Patented Oct. 12, 1869.*



*Witnesses.*

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Att.*



# United States Patent Office.

JOHN B. ROOT, OF NEW YORK, N. Y.

Letters Patent No. 95,838, dated October 12, 1869; antedated October 2, 1869.

## IMPROVEMENT IN CUT-OFF GEAR FOR STEAM-ENGINES.

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

### To all whom it may concern:

Be it known that I, JOHN B. ROOT, of the city, county, and State of New York, have invented a new and useful Improvement in Cut-Off Gear for Steam-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a plan of my improved cut-off gear, and

Figure 2, a side elevation of the same in its connection (as shown by red lines) with the governor of an engine.

Similar letters of reference indicate corresponding parts.

My invention consists in so gearing the driving-pulley of the governor with the main shaft of the engine, or driving said pulley through motion derived from said shaft, as that a variable velocity is given to the governor during each stroke of the engine, in such manner as that the minimum speed of the governor takes place at the commencement of each stroke of the engine, or thereabouts, whereby the valve operated by the governor is made to open wide for the free admission of steam at the commencement of each stroke of the engine, and to cut it off, or lessen the admission, as the stroke progresses, without impairing or destroying the general action of the governor as a regulator of speed.

Referring to the accompanying drawing—

A represents the main shaft of an ordinary reciprocating engine, and

B, the driving-crank thereof.

C is the pulley, fast to a countershaft, D, for driving the governor.

Any suitable governor having a quick or sensitive action, such as those in which springs, in combination with balls or weights, are used, and any suitable regulating-valve under control of said governor, may be adopted.

E and F are double-scroll gear-wheels, the one, E, being fast on the main shaft A, and the other, F, fast on the countershaft D, or otherwise connected with the governor-driving pulley C.

The toothed scrolls *a b* and *c d* of these wheels are so pitched or set, relatively to the crank B, or stroke of the piston, as that, supposing the crank-shaft to be travelling in the direction indicated by the arrow *x*, in fig. 2, the shortest radius of the scroll *a* will fall into gear with the scroll *c*, at its longest radius, at the commencement of one stroke of the engine, and a like action of the scrolls *b* and *d* take place at the commencement of the return-stroke of the piston.

This gives a minimum velocity in a fixed or positive manner to the governor, at or about the commencement of each stroke of the engine-piston, and thereby causes the governor to establish a full or free admission of steam at such points in the stroke; but after the piston has commenced its stroke in either direction, and as said piston progresses in its stroke, a quicker or accelerating velocity, by the action of the scrolls *a c*, or *b d*, is communicated to the governor-driving pulley C, and of a consequence to the governor, thereby causing the latter to so operate the regulating-valve controlled by it as to cause said valve to diminish or cut off the admission of steam to the engine during or toward the close of the piston-stroke.

By the action of the scrolls *a b* and *c d*, it will be seen that the minimum velocity of the governor, at the commencement of each piston-stroke, is effected suddenly, thus securing, in a prompt manner, a full admission of steam at the beginning of the stroke.

Such action in no way impairs or destroys the general action of the governor as a regulator of speed, but any tendency to increase or diminish beyond the given or required velocity is promptly checked by the action of the governor on the regulating-valve, but on running the engine, faster or slower, the position of said valve is necessarily changed, and consequently the action of the cut-off gear hereinbefore described altered to cut off earlier or later in the stroke, thus establishing a variable cut-off under control of the governor, the regulating-valve being kept in constant motion, by the action of the scrolls *a b* and *c d*, to effect free admission and cut off of the steam, irrespective of the speed of the engine, or, rather, at all velocities of the latter, only varying the period of cut-off, which may be fixed at a certain point in the stroke for a given speed, by a suitable set of the regulating-valve.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination or gear of the driving-pulley of the governor with the main shaft of the engine, in such manner as that a reduced and minimum velocity is imparted to the governor at or about the commencement of each piston-stroke of the engine, at all speeds of the latter, substantially as specified.

2. The combination, with the main or crank-shaft A, of the engine and governor-driving pulley C, of the double-scroll gears E and F, essentially as herein set forth.

JOHN B. ROOT.

Witnesses:

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