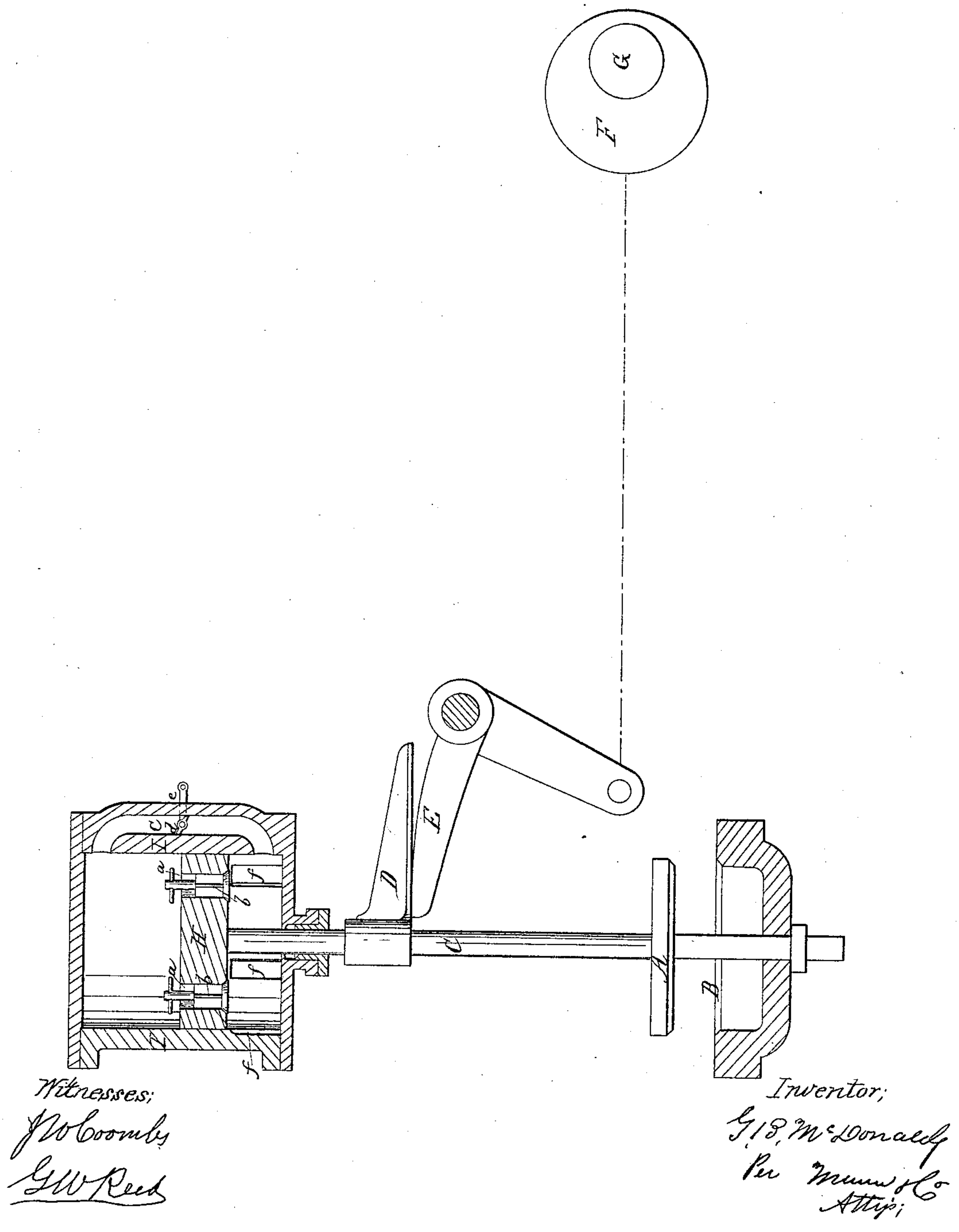


*G.B. McDonald,*  
*Steam-Engine Valve-Gear.*  
*N<sup>o</sup> 41,083.                      Patented Jan. 5, 1864.*



# UNITED STATES PATENT OFFICE.

GREEN B. McDONALD, OF LOUISVILLE, KENTUCKY.

## IMPROVED METHOD OF OPERATING CUT-OFF VALVES.

Specification forming part of Letters Patent No. 41,083, dated January 5, 1864; antedated January 2, 1864.

*To all whom it may concern:*

Be it known that I, GREEN B. McDONALD, of Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful Improvement in Variable Cut-Offs for 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, said drawing representing a vertical section showing the application of my invention to one of the induction-valves of a steam-engine.

This invention relates to what are known as "drop cut-offs," in which the closing of the induction-valve, or other valve employed for cutting off the steam, is effected by the weight of the valve itself or by a weight or spring connected therewith after such valve has been liberated from its opening mechanism.

It consists in certain novel means of regulating the closing of the said valve after its liberation, either by means of a manual adjustment or under the control of a governor.

To enable others skilled in the art to make and apply my invention, I will proceed to describe its construction and operation.

A is the induction-valve, and B its seat. C is the valve-stem, furnished with a lifter, D, which is raised to open the valve by a toe, E, operated by an eccentric, F, on the main shaft G, in a well-known manner. I prefer that the toe shall be so constructed and arranged as to produce the whole opening movement of the valve during about one-sixteenth part of the revolution of the main shaft. H is a piston secured to the valve stem and fitted to work easily within an upright cylinder, I, containing oil or other liquid. This piston has provided in it one or more openings, *a a*, each fitted with a valve, *b*, which opens downward, and the cylinder is furnished with an outside pipe or passage, *c*, which forms a communication between its upper and lower parts, and the said pipe or passage is fitted with a butterfly or other valve or cock, *d*, the spindle of which is furnished outside of the said pipe or passage with a lever, *e*, by which it is adjusted by hand in a more or less open position, or connected with a governor in such a that its

opening is increased by the rise of the governor at the commencement of any increase in the speed of the engine, and *vice versa*. The whole of the space within the cylinder I not occupied with the piston H should be filled with oil or other liquid.

As the valve A is lifted to admit steam to the engine and the piston H rises with it, the valves *b b* open to allow the free passage of liquid through the openings *a a*, from the upper to the lower side of the piston. As soon as the descent of the lifter E commences, and the valve A and piston H commence to descend by their own weight, with or without the aid of additional weights or springs, the valves *b b* close and prevent the return of the liquid through the piston, but the pressure of the piston upon the surface of the liquid below it forces the said liquid up through the passage *c* and the valve *d*, according as it is more or less open, checks in a greater or less degree the transit of the liquid through the said passage from the upper to the lower side of the piston, and so more or less checks the descent of the piston and the descent and closing of the valve A, causing the said valve to remain open, and admit steam to the engine during a greater or less portion of the stroke, thereby regulating the speed of the engine.

When the invention is applied directly to the induction-valve, a separate valve is used for each end of the cylinder, and a separate cylinder, I, and piston H are applied in connection with each valve; but in case of its application in connection with a single independent cut off valve, one cylinder, I, and piston H, will be sufficient.

*ff* are upright grooves formed in the lower part of the interior of the cylinder I, extending from the bottom thereof up to a height somewhat greater than the depth or thickness of the piston H. When the said piston has descended low enough to bring its upper side below the tops of the said grooves, the said grooves constitute passages for the liquid in the lower part of the cylinder to pass up to the upperside thereof. The object of the said grooves is to enable the piston in all cases to descend quickly, and the valve A to close as quickly after the said piston has descended



below the upper ends of the said grooves, thereby preventing what is termed the "wire-drawing" of the steam.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The piston H, fitted with a valve or valves, *b b*, and the cylinder I, furnished with a side passage, *c*, and valve or cock *d*, and containing oil or other liquid, applied in combination with each other and with the induction or other cut off valve A, to operate sub-

stantially as and for the purpose herein specified.

2. The passages *ff* in the said cylinder I, arranged and operating in combination with the said piston H, substantially as and for the purpose herein described.

G. B. McDONALD.

Witnesses:

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