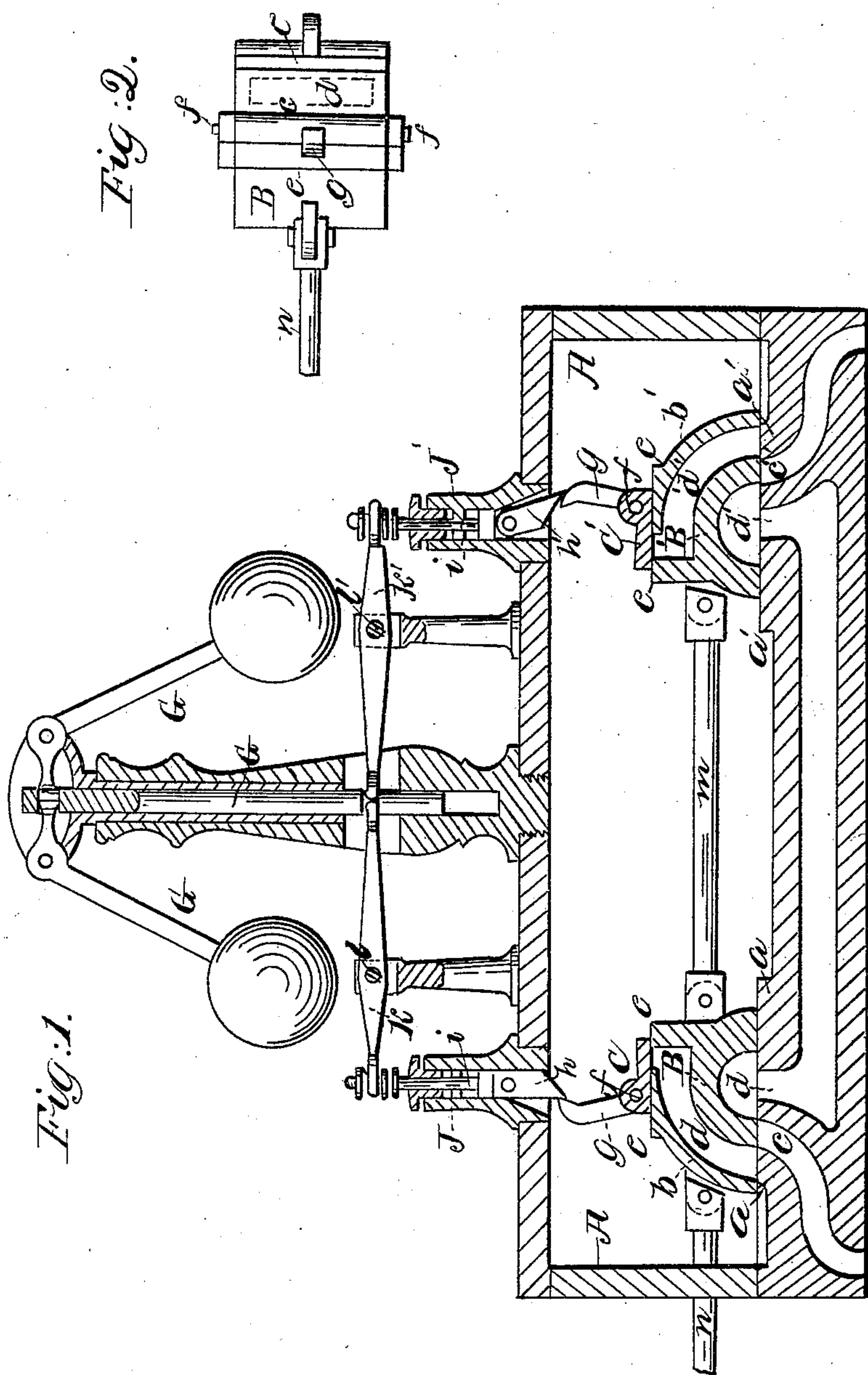


*J. M. Colman,*  
*Steam Cut-Off.*  
*N<sup>o</sup> 22,164. Patented Nov. 30, 1858.*





# UNITED STATES PATENT OFFICE.

J. M. COLMAN, OF MILWAUKEE, WISCONSIN.

## CUT-OFF VALVE OF STEAM-ENGINES.

Specification of Letters Patent No. 22,164, dated November 30, 1858.

*To all whom it may concern:*

Be it known that I, J. M. COLMAN, of Milwaukee, in the county of Milwaukee and State of Wisconsin, 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 drawings, forming part of this specification, in which—

Figure 1 is a longitudinal vertical section of the valve chest of an engine showing also the application of my cut-off in connection with a governor. Fig. 2 is a top view of one of the slide valves with its cut-off valve attached.

Similar letters of reference indicate the same parts in both figures.

This invention consists in the employment of flap valves, combined in the manner hereinafter specified with sliding induction valves, for the purpose of cutting off steam suddenly from said induction valves at such point in the stroke of the engine as may be determined by a governor or by any suitable adjustable contrivance, whereby the former are rendered capable of cutting off steam from the slide valves suddenly at such point in the stroke of the engine as may be determined by a governor or by other adjustable contrivances as hereinafter described.

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

A, is the steam chest or valve chest.

$a, a,$  and  $a', a'$ , are the valve seats containing the steam ports  $c, c'$ , communicating with the cylinder, and the exhaust ports  $d, d'$ , leading to the exhaust pipe, the arrangement of said ports being the same as is common when separate slide valves are used for induction and eduction to and from each end of the cylinder.

B, B', are the slide valves, one for each end of the cylinder, constructed as such valves usually are, but with the addition of shields  $b, b'$ , to the outer side of each, to form passages  $d, d'$ , outside the valve as usually constructed; said passage terminating in the principal or usual faces of the valves which fit the seats  $a, a,$  and  $a', a'$ , and in faces  $e, e'$ , which serve as seats to two flap valves C, C', which are hinged to the slide valves at  $f, f,$  and which are arranged to close the passages  $d, d'$ . The openings of

the passages  $d, d'$ , in the principal faces of the slide valves are of a size and form corresponding with the steam ports  $c, c'$ ; and the seats  $a, a,$  and  $a, a'$ , of said valves extend a distance beyond the outer sides of said ports equal to the width of the ports.

The flap valves are each provided with a pointed arm or lifter  $g$ , which points toward the back of the chest, and in said back of the chest, over the two pairs of steam and exhaust ports, there are two stuffing boxes  $j, j'$ , through which pass rods  $i, i$ , at the extremities of which are jointed toes  $h, h'$ , which are beveled on the sides farthest from the ends of the steam chest and fitted to their guides in the back of the steam chest in such a manner as to permit them to swing from a vertical position toward the nearest ends of the steam chest, but not in the opposite direction. The rods  $i, i$ , are connected with the ends of two levers  $k, k'$ , which work on fulcrum  $l, l'$ , outside the steam chest and whose opposite ends are connected with a governor G, in such a manner that a diminution of velocity of the said governor will cause the rods  $i, i'$ , to project their toes farther into the steam chest and an increase of velocity to produce an opposite effect.

The two slide valves are connected together by a rod  $m$ , and derive a motion such as is generally imparted to a pair of short slide valves from an eccentric on the main shaft of the engine connecting with a rod  $n$ , which passes through one end of the valve chest. The movement of the slide valves causes their respective flap valves C, C', to be opened as the former respectively move in a direction to open their respective ports by the arms  $g, g'$ , striking the toes  $h, h'$ ; but as the slide valves move in the opposite direction the toes  $h, h$ , swing and permit the arms  $g, g'$ , to pass them. The valves C, C, close by gravitation with a tripping motion as the arms  $g, g'$ , escape the toes  $h, h'$ , in moving in the direction first above mentioned, and thus cut off the steam suddenly, as the only passages for the steam from the valve chest to the cylinder are those  $d, d$ . The escape of the valve arms and cutting off the steam take place sooner or later in the stroke of the engine, according as the toes  $h$ , and  $h'$ , are projected less or more into the valve chest. During the first part of the stroke of the valves in either direction, the steam which fills the steam chest passes under the shield  $b$ , or  $b'$ , of the



slide valve B or B', whose steam port *c*, or  
*c'*, is to be opened by that stroke, and into  
the passage *d*, or *d'*, of said valve, so that  
the valve C or C', belonging to the said slide  
5 valve is exposed to the steam both above  
and below, and consequently *in equilibrio*,  
and this continues to be the case until the  
time for admitting the steam to the cylin-  
der, and hence when the valve arm *g*, strikes  
10 the toe *h*, or *h'*, the valve C, or C', opens  
without difficulty; but as soon as it leaves  
its seat and the passage *d*, or *d'* begins to  
communicate with the cylinder, the lower  
opening of said passage is closed to the steam  
15 chest by the shield *b*, or *b'*, of the valve com-  
ing on the valve seat. This cut-off is capa-  
ble of cutting off the steam at any point in  
the first half of the stroke of the piston.  
The variation, effected by the governor in  
20 the manner hereinbefore specified serves to  
control the velocity of the engine; but the  
toes *h*, *h'*, may be adjusted, if desired, with-  
out a governor, to cut off at any fixed point  
in the stroke.

The invention is represented applied to a 25  
horizontal engine, but it may be applied to  
a vertical engine, with so very trifling a  
change in the mode of application of one of  
the flap valves as will readily suggest itself,  
to make it close by gravitation; or by apply- 30  
ing a spring to make the flap valve which  
would stand above its hinge self-closing, the  
mode of applying both valves shown in Fig.  
1 may be used in an upright as well as in a  
horizontal engine, either with one or two 35  
slide valves.

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

The arrangement and combination of the  
flap valves C C', valves B, B', jointed toes 40  
*h h'*, rods *i i'*, levers *k k'*, and governor G,  
as and for the purposes herein shown and  
described.

J. M. COLMAN.

Witnesses:

G. CAMPBELL,  
G. R. SMITH.