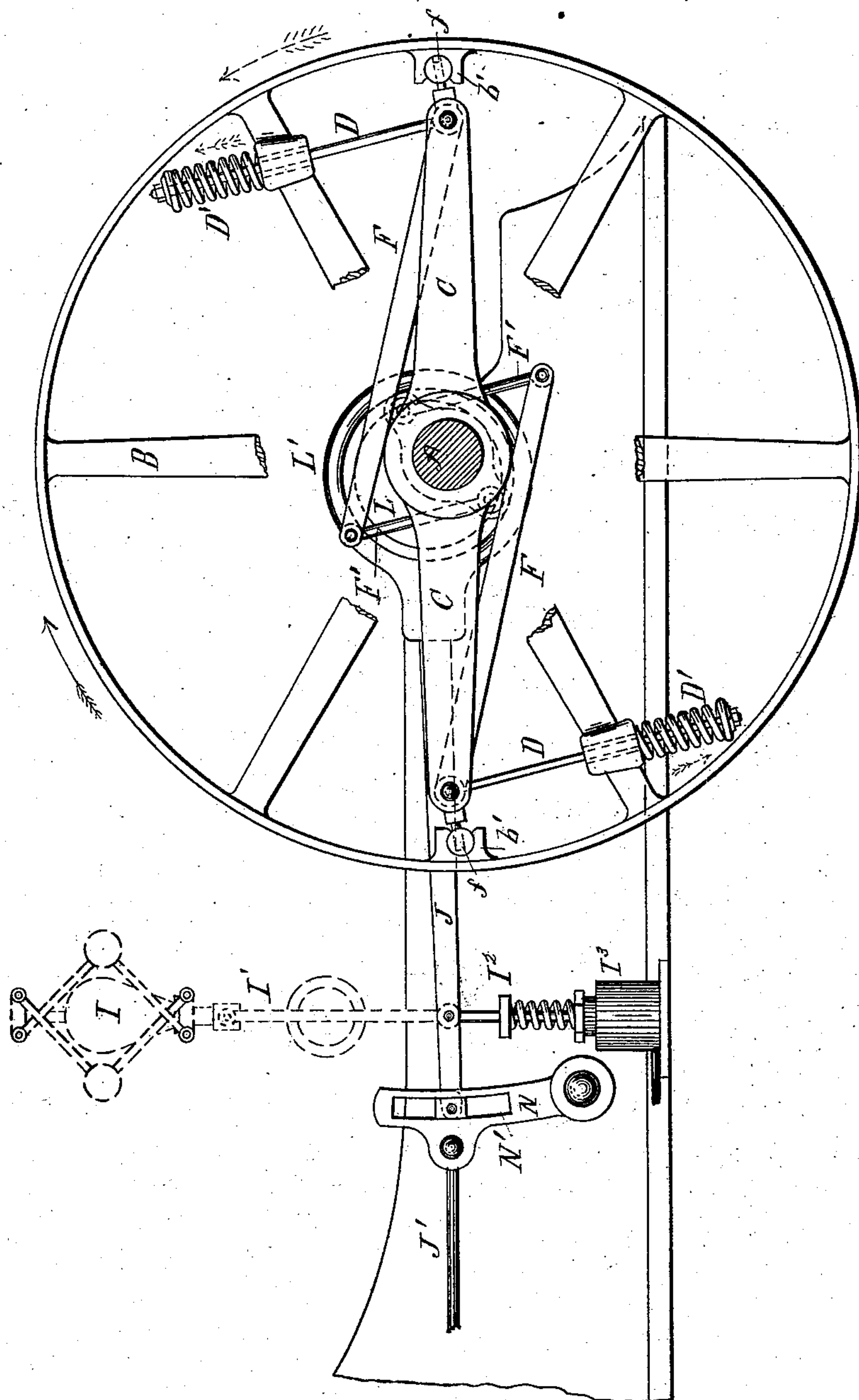


(No Model.)

E. F. SPAULDING & J. K. HALLOCK.  
CUT-OFF VALVE GEAR.

No. 281,313.

Patented July 17, 1883.



Witnesses:  
W. R. Edelen.  
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# UNITED STATES PATENT OFFICE.

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ASSIGNORS OF ONE-THIRD TO ELMER S. SMITH, OF SAME PLACE.

## CUT-OFF-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 281,313, dated July 17, 1883.

Application filed May 11, 1883. (No model.)

*To all whom it may concern:*

Be it known that we, ELIJAH F. SPAULDING and JOHN K. HALLOCK, citizens of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in the Automatic Cut-Off-Valve Gear of Steam-Engines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to automatically-variable cut-off-valve gears for steam-engines; and it consists in combining a dynamometrical regulator operating a shifting eccentric on the engine-shaft with some other form of regulator adjusted off of the shaft, which will govern the engine against increased or decreased speed from the changes in steam-pressure. This valve-gear is composed of two well-known methods of varying the cut-off combined in one operative gear. It is old to govern an engine by a shifting eccentric on the shaft, and it is old to shift said eccentric by a dynamometrical regulator. It is also old to govern an engine by a link-movement in which the variations are effected automatically by some type of regulator; but the combination of the two methods in one valve-gear is new and constitutes the essential feature of this invention.

The invention is illustrated in the accompanying drawing in a single figure, which is a side view of part of an engine and a valve-gear embodying our invention.

A is the engine-shaft.

B is the drive-wheel, which is mounted loosely on the shaft A, and is connected with the cross-arm C, which is fixed to the shaft by springs and rods D D', so that it is carried flexibly and will change its position relatively to the arm C as the load changes.

F F are levers which are moved as the wheel B changes its position relatively to the arm C.

The position of parts shown is that which they occupy when the full load of the engine is on. The full-line arrow shows the direction of revolution of the drive-wheel, and the dotted arrows show the movement of parts when the load is thrown on.

L is the eccentric, which is connected by rods F' with the levers F in such a manner that when the said levers change their position the eccentric will be rolled on the shaft and is thus shifted. This device constitutes what we have above referred to as a dynamometrical regulator, which shifts the eccentric on the shaft. The construction just described may be varied, so that the eccentric can be shifted by being moved diametrically across the shaft, if it is properly constructed so to be shifted. The action of a shifting eccentric on the shaft is well known to be to vary the reciprocations of the valve-rod or eccentric-rod, which in this case is the rod J.

N is a rocking link with the usual link-slot, N', and J' is the valve-stem. The operation of a link-movement is too well known to need description, further than to say that in this case, as usual, the variation of the position of the reciprocating valve-rod in the link-slot varies the degree of reciprocation. In the construction shown the rod J is made variable in the slot N' by the action of a steam-pressure regulator, I', (or it might be by the speed-governor I, shown in dotted lines.) This steam-pressure regulator is acted upon from the steam in the boiler or supply-pipe, and hence registers the condition of the steam upon the valve-gear.

It will be seen from the foregoing that the reciprocation of the link N is varied by two regulators, as follows: If the load changes, the eccentric is shifted, and so the reciprocation of the link is changed, and if the steam-pressure changes (or when the regulator I is used, if the speed changes) the position of the rod J is changed in the link N, and this changes the vibration of said link also. Now, as the valve-stem is moved from the link N, its vibrations are varied as the vibrations of the link vary. So it will be seen that we have a valve-gear in which the variations are effected by two governors acting together in one valve-gear, one of which is on the shaft and acts dynamometrically, and the other is off of the shaft and is actuated from other forces than the load.

We do not claim in this application two regulators operated from different forces and con-



5 nected together by gearing which is variable  
 from the action of one or both of said regu-  
 lators, and is moved by the action of either of  
 said regulators, and is in operative connection  
 10 with the variable cut-off-valve gear of said en-  
 gine, so that the action of said gearing will  
 automatically vary the cut-off-valve gear; nor  
 regulators, one of which may act dynamomet-  
 15 rically in such a combination; nor regulators,  
 one of which may act dynamometrically and the  
 other by steam-pressure in such a combina-  
 tion. Nor do we claim a variable cut-off-valve  
 gear which is acted upon to automatically vary  
 the cut-off by two separate regulators which  
 20 coact to perform said office while each is free  
 to act independently of the other, and one of  
 which is mounted on the driving-shaft of the en-  
 gine and acts dynamometrically, and the other  
 mounted off of the shaft and is operated to regu-  
 25 late the speed of the engine. Nor do we claim  
 such a cut-off-valve gear and regulators, one  
 of which acts dynamometrically, and mount-  
 ed on the driving-shaft, and the other by the  
 direct action of the steam, and mounted off of  
 30 the shaft. Nor do we claim a dynamometric-  
 al regulator on the shaft of the engine, gear-  
 ing adjusted off of said shaft, and connected to  
 be operated from said dynamometrical regu-  
 lator, and a steam-pressure regulator mounted  
 35 off of the shaft of the engine, and also con-  
 nected with said gearing, so that the move-  
 ment of said regulator will not only move said  
 gearing, but also qualify its movements from  
 the other regulator. Nor do we claim a dyna-  
 40 metrical regulator which shifts a collar on  
 the engine-shaft, a rock-shaft or crank-shaft  
 adjusted off of said engine-shaft, and having  
 one of its arms variable, and connected by it to  
 be operated from the said sliding collar, a sec-  
 ond regulator mounted off of said engine-shaft,  
 and adapted to vary the said variable arm of  
 said crank-shaft, and, finally, for moving the  
 variable cut-off-valve gear of said engine from  
 the rock-shaft. Nor do we claim a cut-off-valve

rod, a pivoted link rocked by the action of 45  
 the eccentric, in which link the said rod is  
 movable for the purpose of varying the cut-  
 off of the valve, and gearing for varying the  
 position of said rod in said link, which is act-  
 uated from a dynamometrical regulator on the 50  
 shaft of the engine, and a second regulator,  
 which is adjusted off of the shaft of the engine,  
 which two regulators act independently of each  
 other upon said gearing, while one qualifies  
 the effect of the action of the other. Nor do we 55  
 claim a dynamometrical regulator on the shaft  
 of the engine and some other type of regu-  
 lator off of the shaft, said regulators being  
 geared together to coact in the automatic reg-  
 ulation of the variable cut-off-valve gear of 60  
 said engine. Nor do we claim a variable cut-  
 off-valve gear which is acted upon to auto-  
 matically vary the cut-off by two separate reg-  
 ulators, one of which is mounted upon the  
 shaft of the engine and acts dynamometrically 65  
 to regulate from the changes of the load, and  
 the other mounted off of the shaft of the en-  
 gine and operated to regulate the speed of the  
 engine, as such subjects-matter form the sub-  
 jects-matter of applications filed on an even 70  
 date with this application.

What we claim as new is—

In a steam-engine, an automatically-vari-  
 able valve-gear for regulating the cut-off, which  
 consists of a shifting eccentric on the shaft 75  
 which is operated upon by a dynamometrical  
 regulator, and a link-movement off of the shaft  
 which is operated upon to vary the cut-off by  
 a second regulator mounted off of the shaft,  
 substantially as and for the purposes men- 80  
 tioned.

In testimony whereof we affix our signatures  
 in presence of two witnesses.

ELIJAH F. SPAULDING.  
 JNO. K. HALLOCK.

Witnesses:

ROBT. H. PORTER,  
 JACOB F. WALTHER.