

(No Model.)

2 Sheets—Sheet 1.

E. F. SPAULDING & J. K. HALLOCK.

CUT-OFF VALVE GEAR.

No. 281,315.

Patented July 17, 1883.

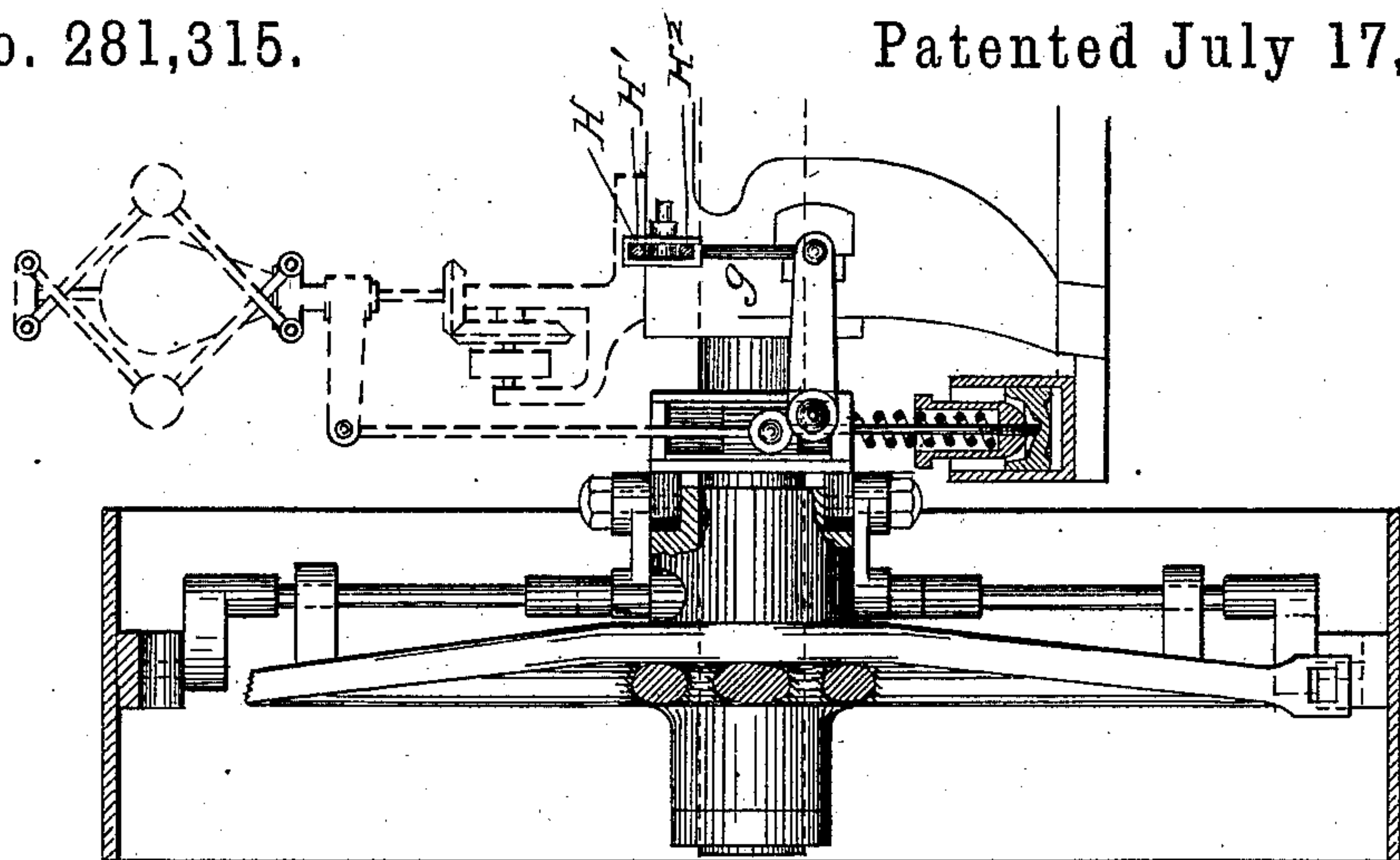


Fig 2.

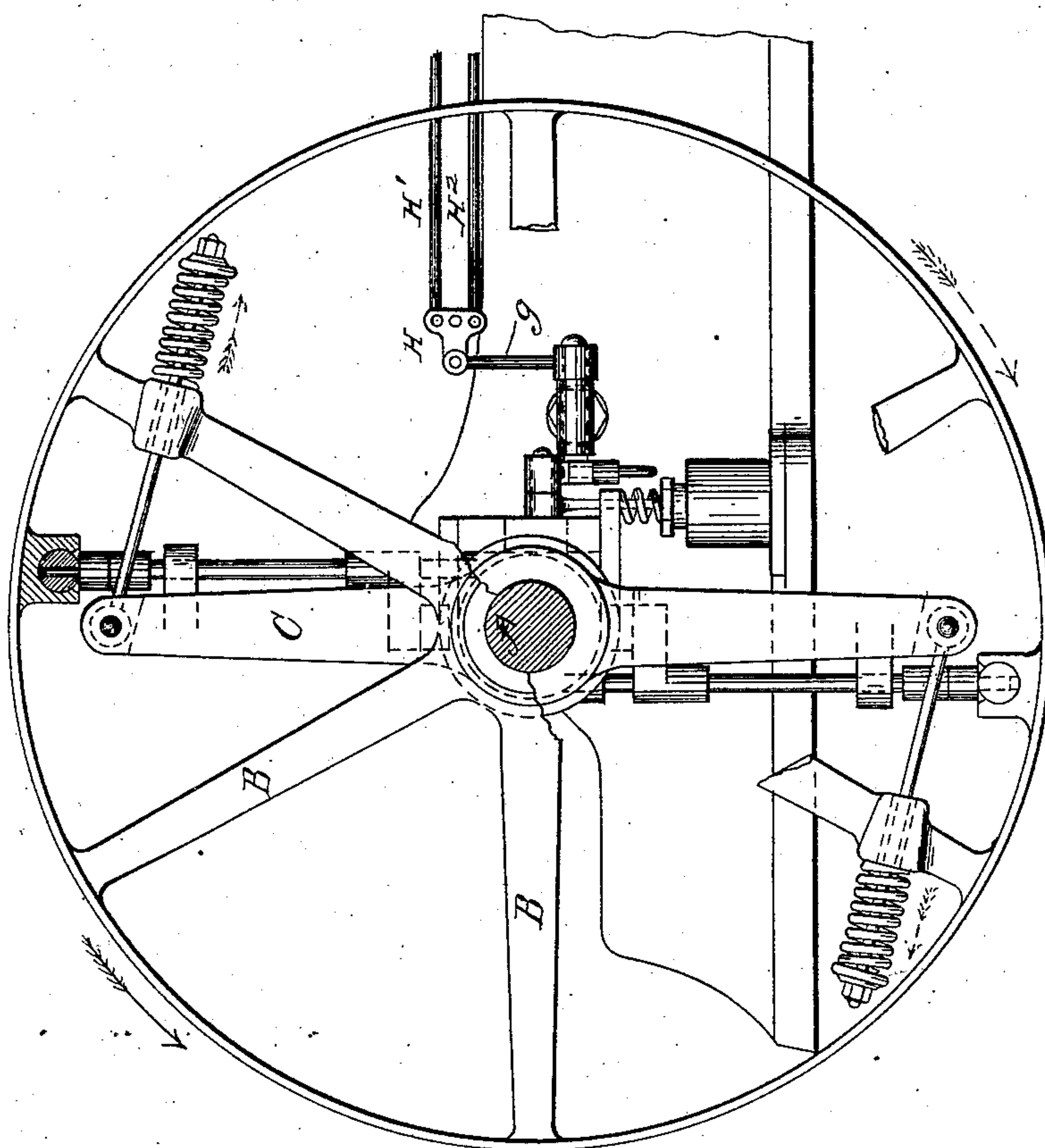


Fig 1.

Witnesses
W. R. Edelen.
Robt. H. Porter

Inventors
E. F. Spaulding
J. K. Hallock

(No Model.)

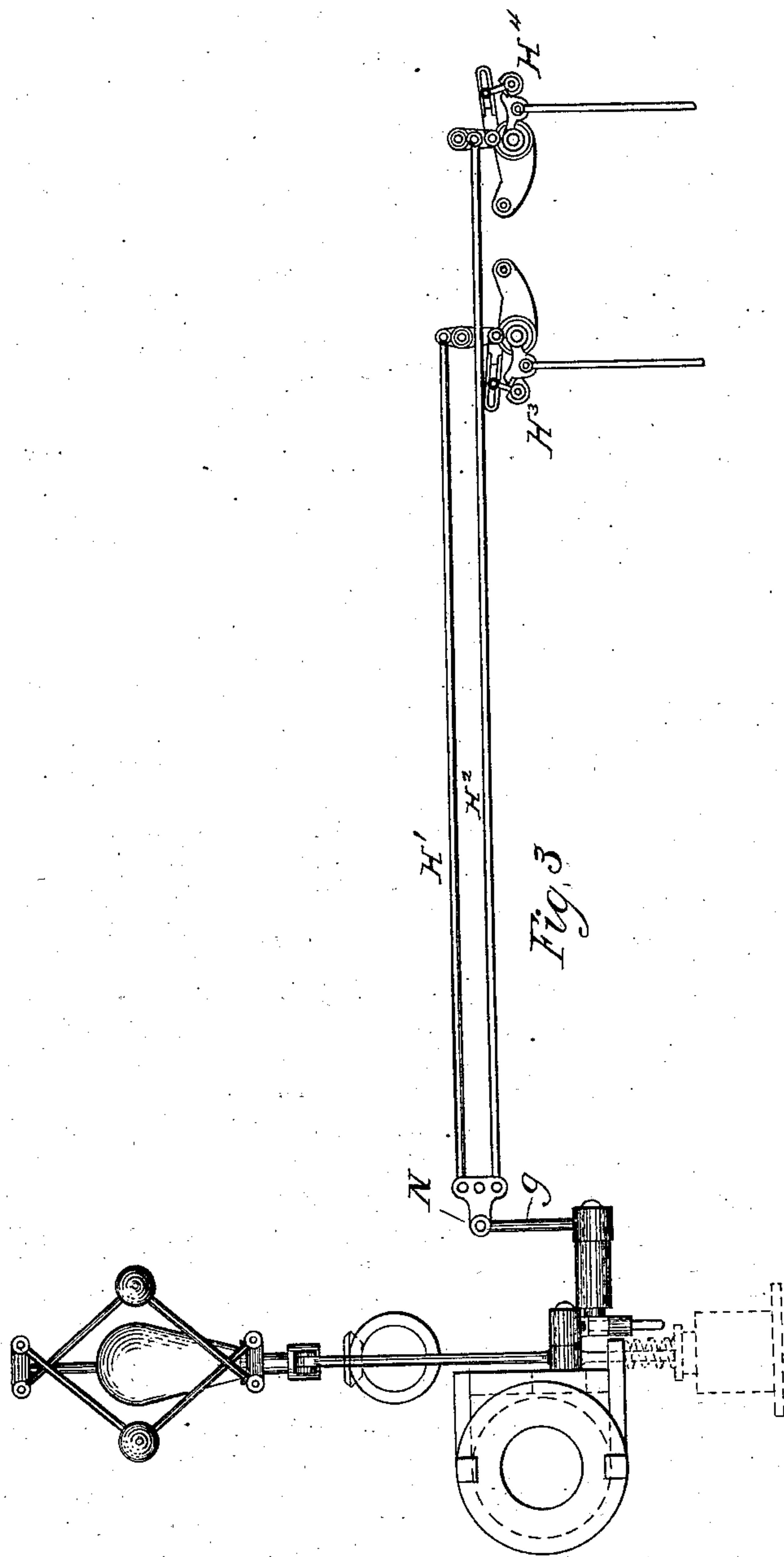
2 Sheets—Sheet 2.

E. F. SPAULDING & J. K. HALLOCK.

CUT-OFF VALVE GEAR.

No. 281,315.

Patented July 17, 1883.



Witnesses:
W. R. Eddison
Robt. H. Porter

Inventor
E. F. Spaulding
J. K. Hallock

UNITED STATES PATENT OFFICE.

ELIJAH F. SPAULDING AND JOHN K. HALLOCK, OF ERIE, PENNSYLVANIA,
ASSIGNORS OF ONE-THIRD TO ELMER S. SMITH, OF SAME PLACE.

CUT-OFF-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 281,315, 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 steam-engine valve-gears; and it consists in providing new and improved means for automatically regulating the cut-off action of that type of cut-off-valve gear which is generally known and designated as "Corliss."

The object of the invention is to provide that type of cut-off gear with a regulator which is operated from the resistance of the load dynamometrically as well as by the speed of the engine or the energy of the steam. Broadly, this has been before accomplished, (see Patent No. 215,802, to G. H. Corliss, May 27, 1879, for pumping-engines,) but only in engines applied to pumping when the dynamometrical effect was accomplished through a pressure-regulator operated upon from the pressure of the fluid being pumped. Nothing was there provided by which an engine performing any other work than pumping could be governed dynamometrically, while by this invention means are provided for doing this in any of the many styles of Corliss gear.

This invention is illustrated in the accompanying drawings as follows:

Figure 1 is a side elevation of the regulator. Fig. 2 is a front view of the same. Fig. 3 is a side view of the regulator with the dynamometrical wheel removed, and also shows the valve-gear.

In these figures there is shown, in Fig. 1, a steam-pressure regulator in connection with the dynamometrical regulator, and in Fig. 2 a speed-regulator is shown in dotted lines, to show how it may be used, and in Fig. 3 the steam-pressure regulator is shown in dotted lines and the speed-regulator is in full lines. The object in thus illustrating the devices is to show that it is wholly optional, which style of regulator is combined with the dynamomet-

rical regulator. The regulator device consisting of these combinations is the subject of another application of even date herewith, and therefore will not be as fully described here as if it formed of itself a part of this invention. The real invention here presented is in the combination of this governor device to the type of valve-gear above named.

The dynamometrical regulator here shown consists of a fixed arm, C, on the engine-shaft, to which the drive-wheel B is connected flexibly by springs D' and the rods D; radial crank-shafts F, which are pivoted on the fixed arm and connected with the rim of the drive-wheel in such a manner that any variation of the relative position of the drive-wheel to the fixed arm, by reason of any change in the strain of the load on the belt, will rock said crank-shafts; and, finally, a sliding collar, E, on the shaft, which is connected with the said crank-shafts, and is shifted as the said shafts are rocked. On the side of the engine-frame, next to the shaft, and at right angles to the said engine-shaft, is a second crank-shaft, G, which is connected by one of its arms, G³, which is movable or, rather, extensible, with a block, E², which is movable in a slot in the face of the collar E. Any shifting of the collar E will rock the shaft G. The degree or length of arc in which the said shaft G will rock will depend, first, on the amount of the lateral movement of the collar; and, second, on the length of the said arm G³. The said arm G³ is varied in length by a second governor or regulator, which may be either the steam-pressure regulator I³ or the speed-regulator I, or, if so desired, by both of them, if both should be employed; or any other type of regulator which will regulate the speed of the engine may be used in the conjunction shown. The manner in which this arm is varied in length from this regulator is by having both the arm and the stem of the regulator, or a rod from the regulator, attached to the said sliding block E². Now, it will be seen that the action of each regulator, the dynamometrical and the other, affects the position of the arm G³, and the degree of movement of that arm from the movement of the collar E; or, in other words, the action of the two regulators is joint and several both, and one qualifies the action of the other.

In the application referred to above there

are several modifications in the construction of this regulator device, any of which may be applied here, but need not be here described.

From the rock-shaft G the movements are communicated, through the arm G¹ and rod g, to the valve-gear proper. Some types of Corliss gear are actuated from the governor by reciprocating and some by rocking rods. We have shown the reciprocating type; but it is obvious to a mechanic that the rocking type can as easily be operated.

H³ and H⁴ are the cut-off gears on the valves, and H¹ and H² are the reciprocating rods, which are moved from a two-armed bell-crank, H, which is operated from the rod g.

The action of the governor upon the valve-gears is the same as in the common constructions of such types of cut-off gears, and it may be connected to operate upon any of the various styles of connecting-gearing, or any of the various forms of valves used in this class of engines, as will be quickly seen by any skilled mechanic after examining the construction above shown.

We do not claim in this application two regulators operated from different forces and connected together by gearing which is variable from the action of one or both of said regulators, and is moved by the action of either of said regulators and is in operative connection with the variable cut-off valve-gear of said engine, so that the action of said gearing will automatically vary the cut-off valve-gear, nor regulators one of which may act dynamometrically in such a combination, nor regulators one of which may act dynamometrically and the other by steam-pressure in such a combination; 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 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 engine and acts dynamometrically and the other mounted off of the shaft, and is operated to regulate the speed of the engine; nor do we claim such a cut-off-valve gear and regulators one of which acts dynamometrically and mounted on the driving-shaft and the other by the direct action of the steam and mounted off of the shaft; nor do we claim a dynamometrical regulator on the shaft of the engine-gearing off of said shaft and connected to be operated from said dynamometrical regulator, and a steam-pressure regulator mounted off of the shaft of the engine, and also connected with said gearing, so that the movement of said regulator will not only move said gearing, but also qualify its movement from the other regulator; nor do we claim a dynamometrical 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 second 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 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 actuated from a dynamometrical regulator on the shaft of the engine, and a second regulator which is adjusted off 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 claim a dynamometrical regulator on the shaft of the engine and some other type of regulator off of the shaft, said regulators being geared together to coact in the automatic regulation of the variable cut-off-valve gear of said engine; nor do we claim a variable cut-off-valve gear which is acted upon to automatically vary the cut-off by two separate regulators one of which is mounted upon the shaft of the engine and acts dynamometrically to regulate from the changes of the load and the other mounted off of the shaft of the engine and operated to regulate the speed of the engine; nor do we claim the combination of an eccentric-strap and pin and a link pivoted to the engine-shaft and operated from said pin, which works in a slot; nor do we claim the combination of a dynamometrical regulator which moves a sliding collar on the engine-shaft, a rock-shaft or crank-shaft adjusted off of said engine-shaft and connected to be operated from said sliding collar, and means for moving the variable parts of the variable cut-off-valve gear of said engine from said rock-shaft; nor do we claim a dynamometrical regulator consisting of a drive-wheel loose upon the shaft and flexibly connected with a fixed cross-arm on the shaft, which cross with radially-arranged shafts whose outer arms are pivotally connected with said drive-wheel, and whose inner arms act to shift a collar on the engine-shafts, as these devices form the subject-matter of separate applications filed on an even date with this application.

What we claim as our invention is as follows:

In a steam-engine having independent cut-off valves at each end of the cylinder, the combination, in the valve-gear for automatically varying the movement of said valves to vary the cut-off, of two separate regulators acted upon by different forces, each of which coacts with the other in the performance of said office, and one of which is a dynamometrical regulator and is mounted on the engine-shaft, and operated substantially as and for the purposes set forth.

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.