

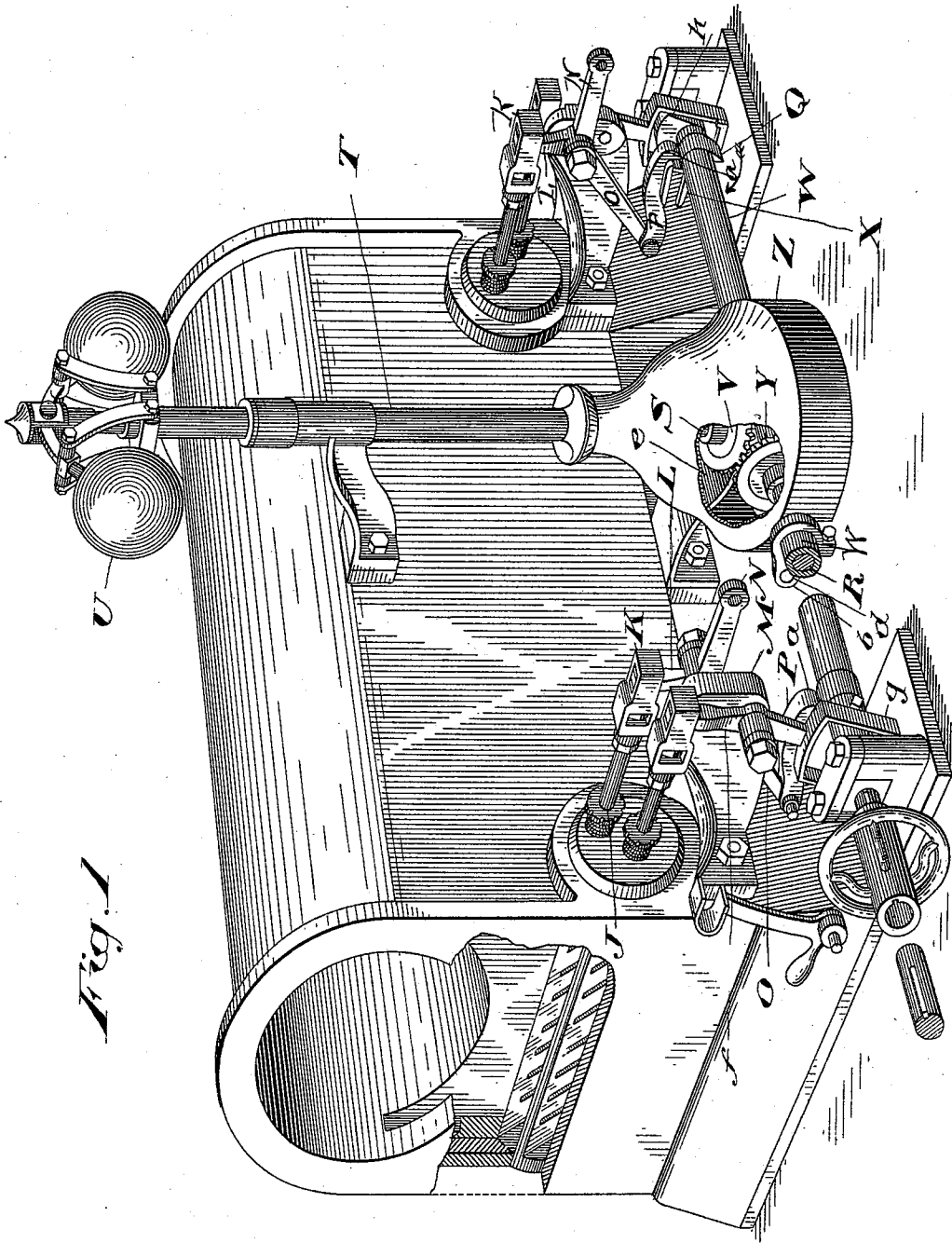
(No Model.)

2 Sheets—Sheet 1.

J. ABELL.
VARIABLE CUT-OFF ENGINE.

No. 499,493.

Patented June 13, 1893.



Witnesses

J. Edw. Mayhew
H. C. McMillan

Inventor

John Abell
by Donald H. Ridout & Co.
Attys

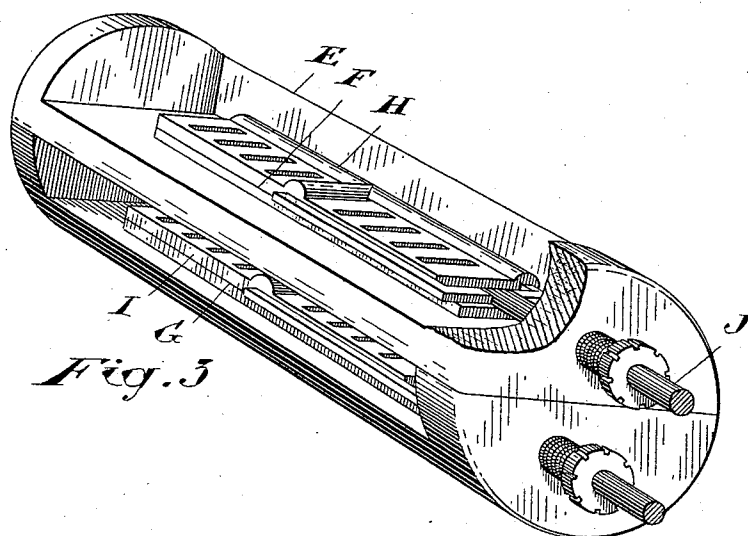
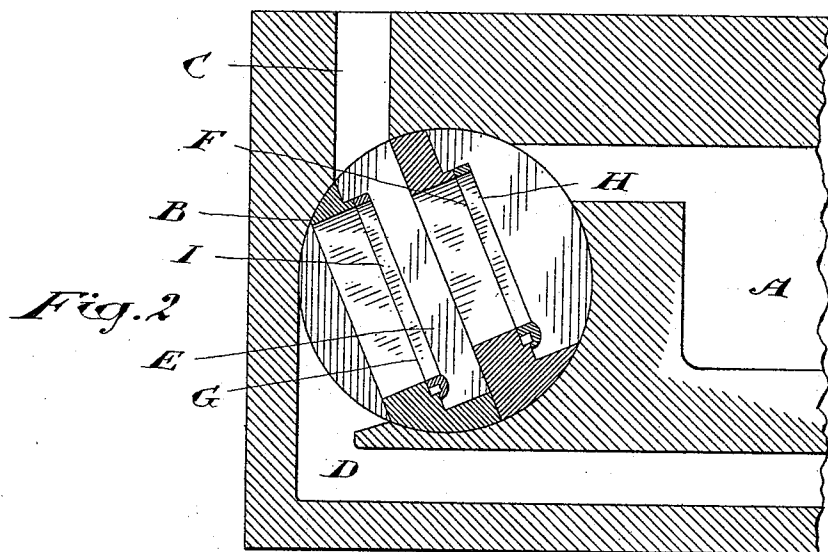
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UNITED STATES PATENT OFFICE.

JOHN ABELL, OF TORONTO, CANADA.

VARIABLE-CUT-OFF ENGINE.

SPECIFICATION forming part of Letters Patent No. 499,493, dated June 13, 1893.

Application filed August 24, 1892. Serial No. 444,003. (No model.)

To all whom it may concern:

Be it known that I, JOHN ABELL, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented a certain new and useful Variable-Cut-Off Engine, of which the following is a specification.

The object of the invention is to provide a simply constructed variable cut-off engine in which the full boiler pressure is secured and the valve seats easily kept in order, and it consists, essentially, of a cylinder provided with a steam reservoir within the body of the cylinder and in direct connection with the boiler and communicating with the interior of the cylinder through short ports located one at each end of the cylinder, removable valve seats located at each end of the cylinder at the mouth of the short ports and carrying grid iron valves operated by simple mechanism in direct connection with the governor, the whole being constructed in detail, substantially as hereinafter more particularly explained and then definitely claimed.

In the accompanying drawings Figure 1, is a perspective view of the device partially broken away to expose the interior formation. Fig. 2, is a sectional view showing the location of the valve seats at the interior mouth of the short cylinder port. Fig. 3, is a perspective detail of the valve seats and valves.

In the body of the cylinder I form in the casting what I may term a steam reservoir A, of any suitable shape and size. This reservoir communicates direct with the boiler and is lagged or otherwise protected so that there shall, practically speaking, be no condensation. At each end of this reservoir and at the end of the cylinder I form a cylindrical chamber B, which is connected by a short port C, to the interior of the cylinder and to the exhaust port D, as shown.

E, represents a plug divided into two parts and shaped to fit the chamber B, both being slightly tapered so that the plug can readily be made a steam tight fit for the chamber and at the same time be readily removed when desired.

Two valve seats F, and G, are formed in the plug E, a space being left between the two, which space communicates with the port C. Gridiron openings are formed in the seats F, and G, and the valves H, and I, with cor-

responding openings being provided. The valve H, is placed on the seat F, forming a cut-off between the reservoir A, and the short port C, as indicated and the valve I, forms a cut off between the short port C, and the exhaust D, as shown.

As indicated in Fig. 1, a single steam valve H, and a single exhaust valve I, is provided for each end of the cylinder and each pair is operated by the following simple gear.

J, is a spindle of the valve H. On the end of this spindle J, I form or connect a head K, which is connected as indicated to an arm L. This arm is pivoted on a bracket M, and has fixed to it the two arms N, and O, the arm N, being connected to a spring or dash pot, set so that its tension shall hold the valve H, closed. On the end of the arm O, a bar P, is pivoted and on the end of the bar P, a hook a, is formed.

Q, is a cam or wiper fixed to the rod R, which is connected to and revolves by some suitable moving part of the engine. This wiper revolves in the direction indicated by arrow and is designed to engage with the hook a, at each revolution drawing upon the bar P, to the extent of the engagement between the wiper Q, and hook a, the bar P, being connected to the arms O, and L, as before described. This engagement of the wiper Q, with the hook a, will open the valve H, according to the distance that the bar P, is pushed upon by the wiper Q, and the instant the wiper Q, clears the hook a that instant the valve H, is closed by the action of the spring or dash pot which is connected as before described to the arm N.

In order to make the opening in the valve H, variable to suit the load being carried at any particular time, I provide a governor gear constructed as follows:—The spindle S, of the governor is geared to the rod R, by the bevel wheels V, and Y, so as to revolve with the said rod. A sleeve T, is loosely fitted onto the spindle S, and the top of it is connected to the arms of the governor balls U, the bottom of the sleeve being connected to the housing Z, which protects the gear wheels V, and Y is supported solely by the sleeve T. A crank b, is fixed to the sleeve W, which is loosely fitted onto the rod R. A crank b, is fixed to the sleeve W, on each side of the

housing Z, and is connected to the said housing by a pin *d*. The bottom of the spindle S, rests upon a bracket *e*, which extends from the bottom of the cylinder as indicated.

5 Should the speed of the rod R, be increased beyond its normal motion, the governor balls U, will immediately act upon the sleeve T, which, being connected to the housing Z, as described, will raise the said housing, and
10 owing to the connection described, the elevation of the housing will act upon the cranks *b*, thereby causing the sleeve W, to rock on the rod R, and as there is a finger X, fixed to and extending from the sleeve W, immediately below each bar P, the rocking of the
15 sleeve W, moves the finger X, so as to raise the bar P raising its hook *a*, so that its contact with the wiper Q, will be less than when the engine is running at its normal speed, consequently each valve H, will only be opened
20 in proportion to the quantity of steam required.

The spindle of each exhaust valve I, is provided with a head similar to the head K on the spindle of the valve H, and a crank arm
25 *f*, engages with the said head, as shown. This crank arm *f*, is pivoted on the bracket M, and has a loop arm *g*, connected to it.

An eccentric or cam *h*, is placed within the
30 loop of the arm *g*, and is fixed to the rod R, the whole being arranged so that the revolving of the arm R, shall cause the cam *h*, to act on the loop arm *g*, which being connected as before described to the valve I, the said ex-
35 haust valve is opened and closed as required

What I claim as my invention is—

1. A cylindrical chamber formed in the end of the steam reservoir and communicating with the short port leading to the interior
40 cylinder and the exhaust port, a two part plug fitted tightly into the cylinder, a separate valve seat and semi-circular heads being formed on each half of the plug, a gridiron valve for each valve seat and the space be-
45 tween the two halves located so as to communicate with the short port, substantially as and for the purpose specified.

2. A pivoted arm connected to the spindle

of the steam valve and having two arms extending from it, one arm connected to a spring
50 or dash pot and the other arm provided with a pivoted bar, in combination with a revolving wiper arranged to periodically connect with a hook formed on the end of the said
55 pivoted bar, substantially as and for the purpose specified.

3. A pivoted arm connected to the spindle of the steam valve and having two arms extending from it, one arm connected to a spring
60 or dash pot and the other arm provided with a pivoted bar, in combination with a revolving wiper arranged to periodically connect with a hook formed on the end of the said
65 pivoted bar and with a lifting finger operated by a governor, substantially as and for the purpose specified.

4. A pivoted arm connected to the spindle of the steam valve and having two arms extending from it, one arm connected to a spring
70 or dash pot and the other arm provided with a pivoted bar, in combination with a revolving wiper arranged to periodically connect with a hook formed on the end of the said
75 pivoted bar and with a lifting finger connected to a sleeve deriving a rocking movement from the vertical adjustment of the sleeve of the governor spindle, substantially
as and for the purpose specified.

5. A horizontally revolving rod having fixed to it a wiper arranged to periodically connect
80 with a hook formed on the bar connected as described to the steam valve-spindle, a vertical spindle carrying the governor balls and geared to the horizontal rod, in combination
85 with a sleeve fitted onto the vertical spindle and connected to the arms of the governor balls at one end and to the housing at the opposite end, a crank *b*, connected to a sleeve fitted
90 onto the horizontal bar and connected to the vertically adjustable housing, substantially as and for the purpose specified.

Toronto, July 16, 1892.

JOHN ABELL.

In presence of—

J. EDW. MAYBEE,
W. G. McMILLAN.