

P. W. McKenzie,
Rotary Steam Valve.
No 13,527. Patented Sep. 4, 1855.

Fig. 1.

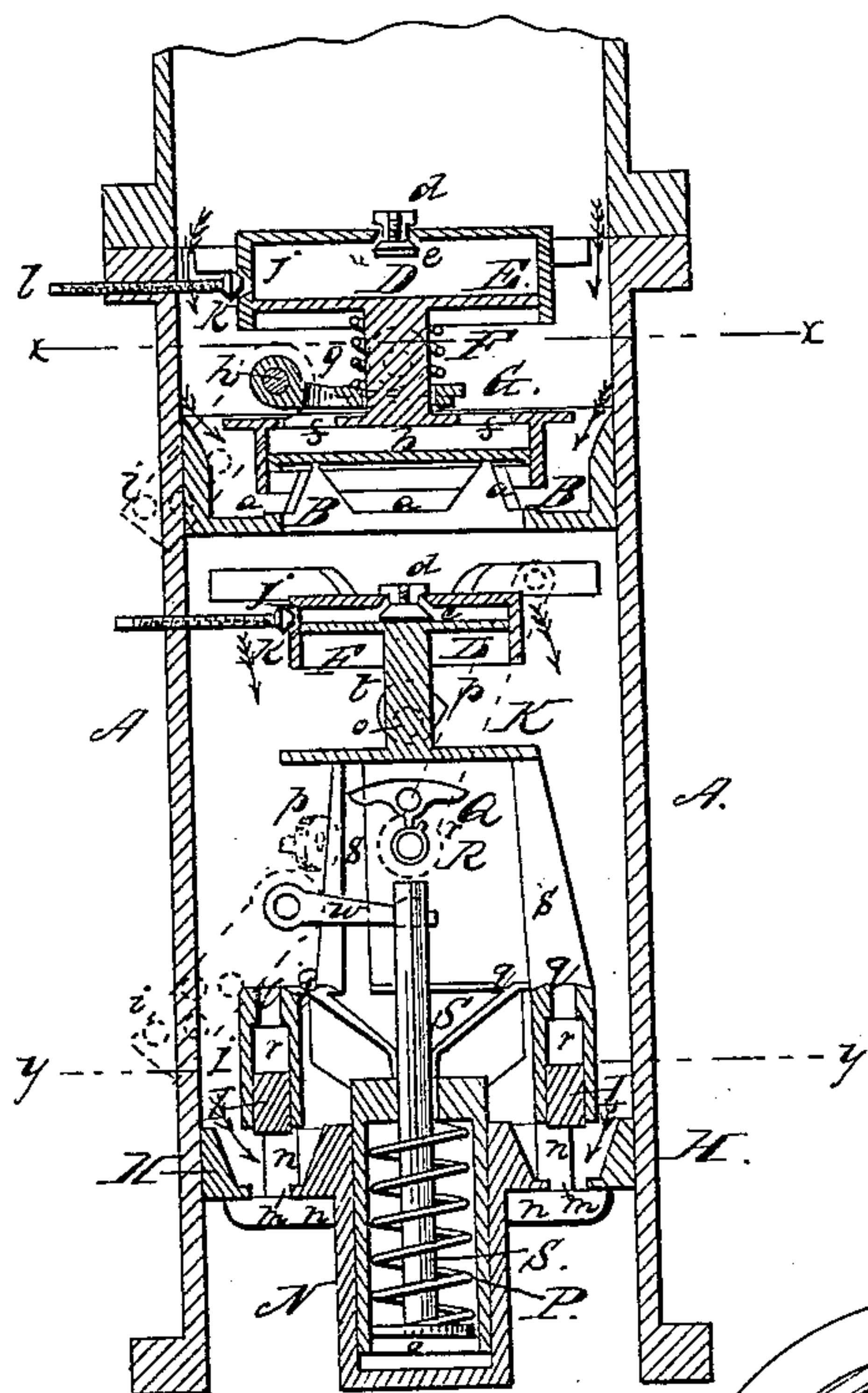


Fig. 2.

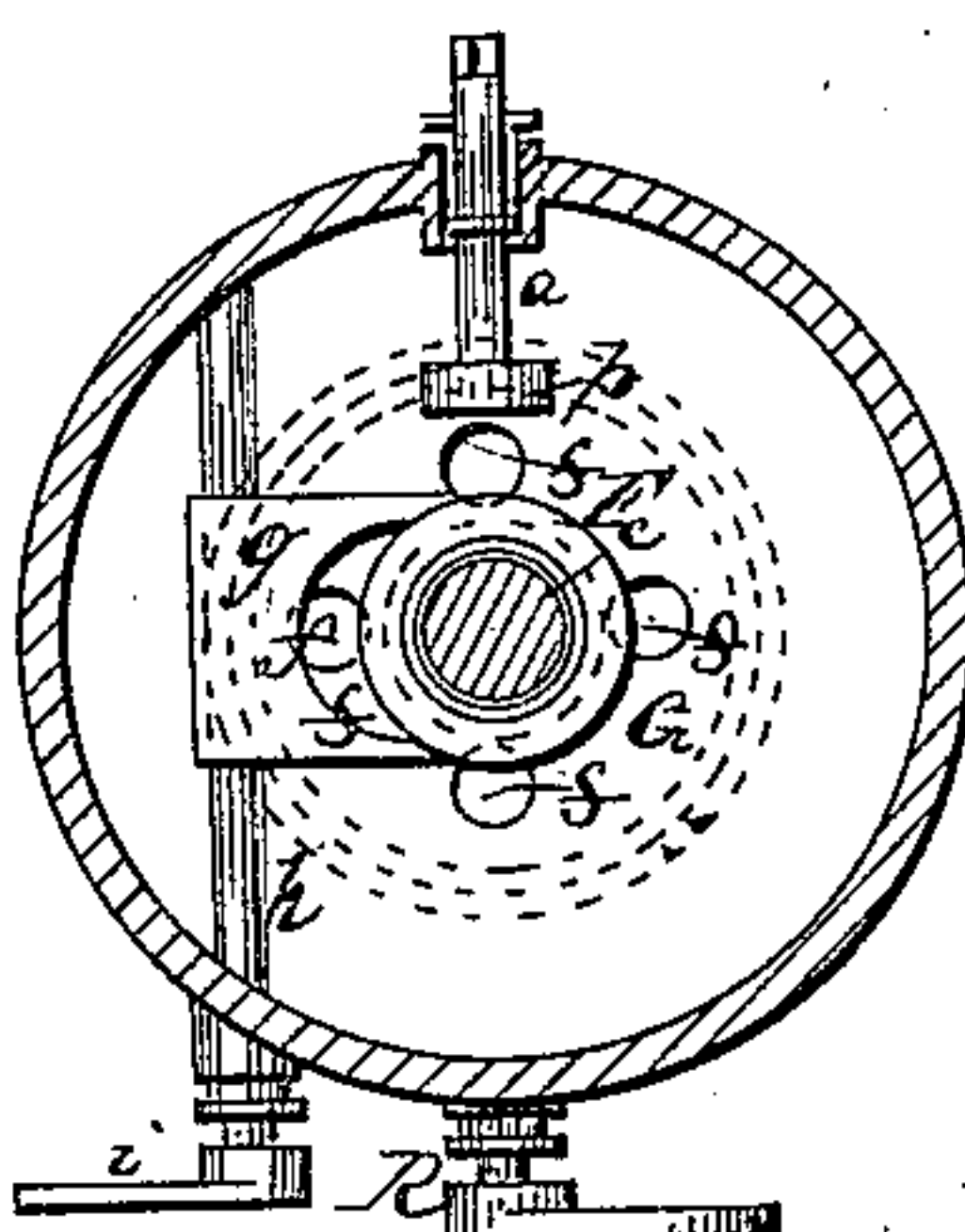


Fig. 4.

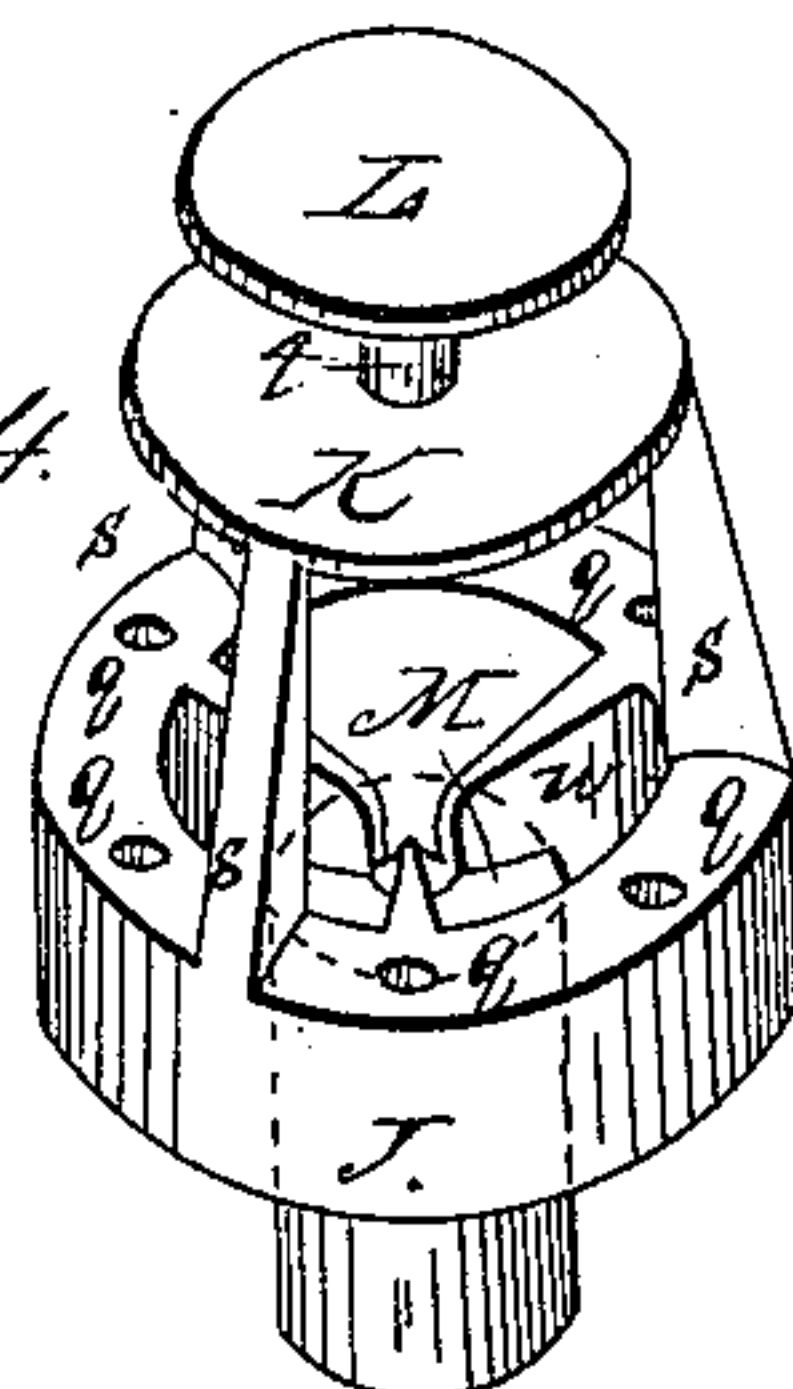
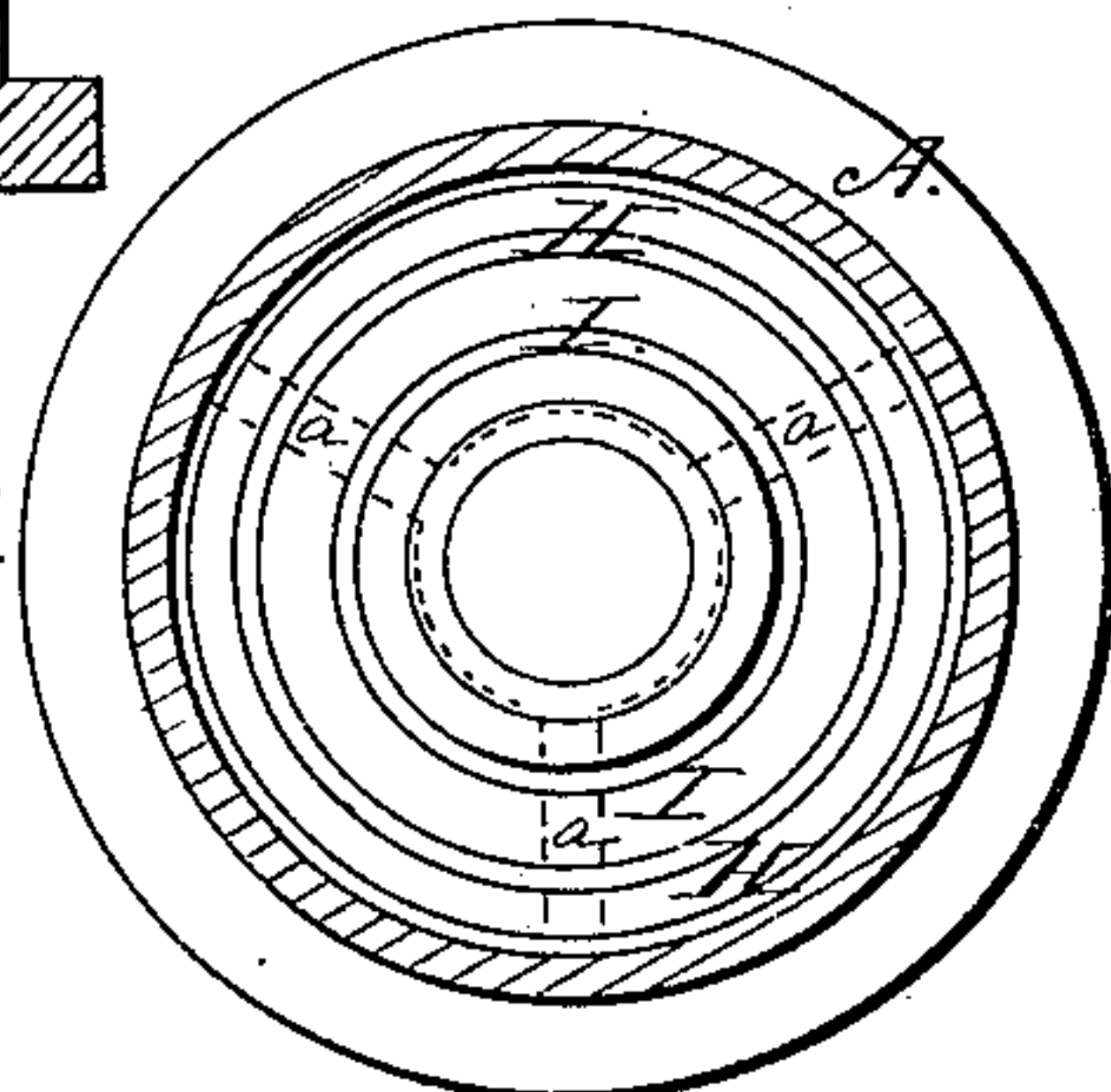


Fig. 3.



UNITED STATES PATENT OFFICE.

P. W. MACKENZIE, OF JERSEY CITY, NEW JERSEY.

VALVE FOR REGULATING STEAM-ENGINES.

Specification of Letters Patent No. 13,527, dated September 4, 1855.

To all whom it may concern:

Be it known that I, PHILIP W. MACKENZIE, of Jersey City, in the county of Hudson and State of New Jersey, have invented
5 a new and useful apparatus for regulating the speed of steam-engines by the velocity of the current of steam in the steam-pipe or passage between the boiler and the engine; and I do hereby declare that the following is a full, clear, and exact description
10 of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

15 Figure 1 represents a vertical section of the apparatus; Fig. 3, a horizontal section in line y, y , of Fig. 1 which is just above the cut off valve seat, the cut off valve being removed, and Fig. 4 a perspective view of
20 the cut off valve and its appendages detached.

Similar letters of reference indicate corresponding parts in the several figures.

A is the steam pipe down which the steam
25 passes from the boiler to the cylinder.

H, m , I is the cut off valve seat. This consists of a tapered channel H, extending all around the pipe and having an opening
30 m , around the middle of its bottom and a ring I, with parallel sides, supported above the middle of said channel by two or more stands n, n . The cut off valve which is shown in perspective in Fig. 4 as well as
35 in the section in the Fig. 1 consists of a ring j , with a cavity r , to fit and work freely over the ring I, of the seat and with a number of openings q, q , in the top, to admit steam into the cavity r , above the ring I. Above the valve is a disk K, which may
40 be termed the lifting plate which is connected to the valve by arms s, s , and to the lifting plate a piston is connected by a stem t ; in the center of and partly below the valve, there is attached to it by means of
45 arms u, u , a hollow guide M, which works in a fixed guide N, below the valve seat. The piston L, fits into a cylinder E' having a valve e' , and an opening j' , in one side, furnished with a valve k ; the cut off valve
50 rests on a spring P, which is coiled within, the hollow guide M, around the rod s , and is supported by a piston v , which is secured to the bottom of said rod and fits loosely in the guide M. The rod, is supported
55 from an arm w , on transverse shaft L, which works through a stuffing box in

one side of the pipe A, and is furnished outside with an arm z' , shown in blue outline in Fig. 1. The spring tends to lift the valve and open wide the passage under the ring
60 J. The valve and its appendages, viz, the piston and the lifting plate, (except when the valve is closed and resting at the bottom of the channel H,) are exposed on all opposite points to an equal pressure of
65 steam and are only acted upon by the current of steam passing through the pipe from the boiler to the engine. At the commencement of the stroke of the engine the cut off valve is raised to the highest position to
70 give the greatest width of opening which is regulated by an eccentric stop p' , on a spindle o' , which passes through a stuffing box at the side of pipe.

When the stroke of the engine piston first
75 commences the current of steam through the pipe A, taking the direction of the arrows is slow and insufficient to overcome the spring P, and move the cut off valve,
80 but its velocity and consequently its force increases as the piston progresses and by the time the piston has attained the desired speed its force is sufficient to drive the valve
85 down to the bottom of the channel H, and entirely shut off the steam. When the valve has reached this position, the pressure of the steam acting on a surface equal to the area of its bottom face will be sufficient to keep it closed in which condition it must
90 remain until the slide or other induction valve covers the port of the engine. In order to open the valve ready for the commencement of the next stroke of the engine piston it is only necessary (the induction
95 valve being closed) to raise it in the least degree from the bottom of the channel H, to admit steam under it and it will be immediately opened full by the spring P. The raising of the valve is effected by means of
100 the lifter Q, acting under the lifting plate K. This lifter is placed loosely on a transverse spindle secured in pipe A, and it is furnished with a tooth 6, to be operated upon by a tooth 7, attached to a rock shaft
105 R, which passes through the pipe and derives its motion from the engine. The tooth 7, comes into operation at the proper time on the tooth 6, and the lifter starts the valve. The too rapid opening of the cut
110 off is prevented by the cushioning of the steam in the cylinder E' . This said cushioning of steam is produced by the valve d ,

closing the opening *e*, and causing the steam to escape only at the opening, *j*, in the side of cylinder *E*, which is furnished with an adjustable valve, *k*.

5 The cut off valve being closed when the steam reaches a certain velocity, it is obvious that when the pressure increases in the boiler or the resistance to the engine is diminished the piston will attain the speed
10 desired earlier in the stroke and cut off the steam, and when the pressure in the boiler diminishes or the resistance of the engine increases the opposite effect is produced.

The lifter *Q*, and the mechanism for operating it may be dispensed with by the employment of an adjustable stop *p*², like *p*, on *p'*, below the lifting plate *K*, as shown in red outline in Fig. 1 the said stop to be so
20 adjusted as to prevent the cut off valve from coming close down on its seat. When the slide or other induction valve covers the ports, sufficient steam is allowed to pass under the cut off valve to charge the steam chest, and the valve will open by the action
25 of the spring *P*, to admit steam for the stroke of the piston. This automatic cut off valve may be used with or without a common governor. If a governor, be employed it may be connected to the lever *i*, on the
30 shaft *h*, in such a manner that as the speed increases it lowers the rod *S*, and thereby weakens the spring *P*, and if the speed is diminished the opposite effect would be

produced. If no governor is used some manner of securing the lever *i*, must be employed, and the said levers may be adjusted by hand to give the engine more or less power.

I claim—

1. The construction and arrangement of the cut off valve *J*, and its seat *H*, *m*, *I*, and the disk *K* and the application to the said valve of a variable spring *P*, or their equivalents substantially as described, whereby the valve is made to cut off the
45 supply of steam by the action of the current of steam in the passage from the boiler to the engine when it has attained the desired speed.

2. The employment in connection with the cut off valve, of the piston *L*, working in the cylinder *E*, which is provided with a valve *d*, and adjustable valve *k*, to prevent the too sudden opening of the said valve, the said piston, cylinders, and valves
55 operating substantially as herein set forth.

3. Providing for the opening of the cut off valve by means of the spring *P*, as soon as the slide or other induction valve covers the port of the cylinder, by the employment
60 substantially as described of a stop *p*², to prevent the entire closing of the said valve.

PHILIP W. MACKENZIE.

Witnesses:

JOHN F. WARD,
JOSEPH C. DAY.