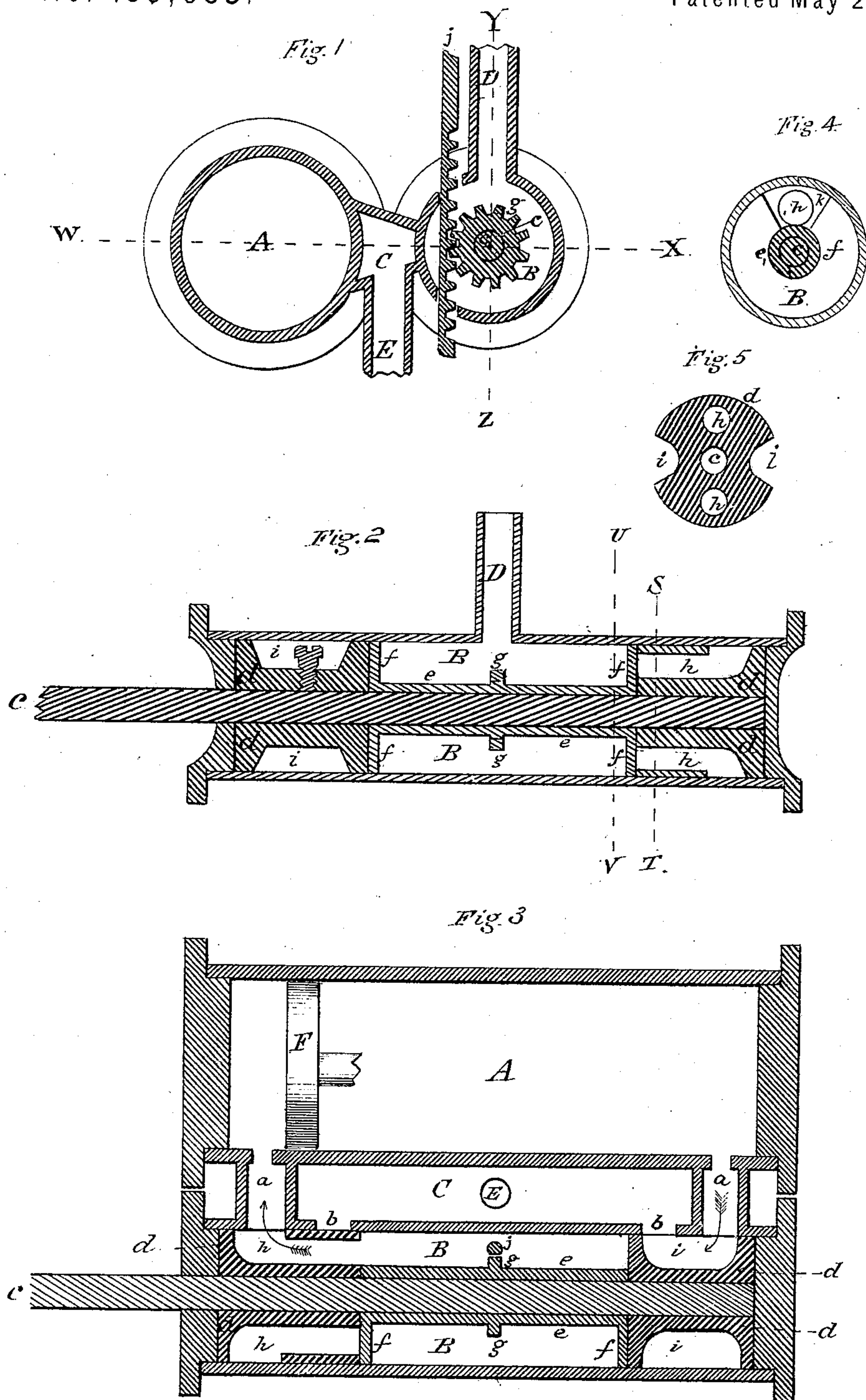


J. W. STRANGE.
Rotary Valves and Cut-Offs.

No. 139,033.

Patented May 20, 1873.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOSEPH W. STRANGE, OF BANGOR, MAINE.

IMPROVEMENT IN ROTARY VALVES AND CUT-OFFS.

Specification forming part of Letters Patent No. **139,033**, dated May 20, 1873; application filed December 5, 1872.

To all whom it may concern:

Be it known that I, JOSEPH W. STRANGE, of Bangor, in the county of Penobscot and State of Maine, have invented new and useful Improvements in Steam-Engines, of which the following is a specification:

This invention relates to the valvular devices, by which steam is intermittently inducted into and educted from the steam-cylinder, upon opposite sides of the piston; and, also, in the relation of said new devices to the steam-governor, by which not only is the amount of steam admitted to the cylinder adjusted to the work being performed by the engine, but the relation of said parts is readily so adjusted as that the steam is automatically cut off at any point of the stroke of the piston; and the invention consists in a cylindrical steam-chest, parallel with, and united to, the steam-cylinder by the inclosing walls of the steam-ports and exhaust-chamber; while a valve-rod, adjusted to rotate in said steam-chest, carries upon it two cylindrical heads, fitting the bore of the steam-chest, and formed with such recesses and passages as will, when brought alternately opposite the induction-ports of the cylinder and the eduction-ports of the exhaust-chamber, serve to conduct the steam from the induction-chamber, between said heads, to the cylinder, and from thence to the exhaust-passage—a sleeve, revolving freely on said rod, and provided with a circular disk at either end, fitting the steam-chest, and having an aperture cut in their outer periphery, so that when the passages through the revolving heads are brought in juxtaposition with said apertures and the induction-ports, the steam shall flow from the induction-pipe, which enters the steam-chest between said disks, into the cylinder; the steam-governor being connected with this sleeve, by means of a rack and pinion between said disks, so that, by lengthening the rod connecting the governor and rack, the position of the apertures in said disks will be changed relatively to the induction-passages in the rotary heads when the same are passing the induction-ports of the cylinder; whereby the amount of steam admitted at each stroke, as well as the point in each stroke at which the admission of steam into the cylinder shall cease, is regulated by

the action of the governor, as will be hereinafter more fully described.

Figure 1 is a vertical transverse section, taken through the induction and exhaust pipes, the cylinder, steam-chest, and valve-rod and rack. Fig. 2 is a vertical longitudinal section, taken through the steam-chest, valves, valve-rod, and eduction-pipe, as shown at Y Z, Fig. 1. Fig. 3 is a horizontal longitudinal section, taken on line W X, Fig. 1, and showing the cylinder, piston, steam-chest, valves, valve-rod, steam-ports, and other parts. Fig. 4 is a transverse vertical detached section, taken on line U V, Fig. 2, and showing the valve-rod, sleeve, one disk, and one valve-head, with one of the induction steam-passages in the same. Fig. 5 is a transverse section taken on line S T, Fig. 2, and showing one of the valve-heads with the recesses and steam-passages therein.

In the drawing, A is the cylinder. B is the steam-chest. C is the exhaust-chamber. D is the induction-pipe. E is the exhaust-pipe, and F is the piston. *a a* are the steam-ports, which communicate between the steam chest and cylinder; and *b b* are the exhaust-ports leading from the steam-chest to the exhaust-chamber. *c* is the valve-rod. *d d* are the heads, which are rigidly secured to the rod. *e* is the sleeve. *f f* are the disks. *g* is the pinion, secured upon the sleeve. *h h* are the induction-passages through the heads. *i i* are the exhaust-passages. *j* is the governor rod and rack, and *k* is the passage out through each disk.

The practical operation of this invention is as follows: The sleeve *e* being adjusted relatively to the governor by the rod *j*, so that the openings *k*, in the disks, are in the same horizontal plane as the steam-ports, and the valve-rod *c* being so connected with the moving parts of the engine as to be thereby steadily revolved; and supposing the position of the heads *d*, relatively to the steam-ports, to be as shown in Fig. 3; then, upon the admission of steam through pipe D into the chest, between the disks, it would flow through the passage *k*, in the disk, and the hole *h*, in the head, to the opening in the periphery of the head, opposite the port, and thence into the cylinder, as indicated by the arrow at the left hand of said Fig. 3, where it would act upon piston F; while exhaust-steam could escape

through the port at the opposite end of the cylinder into the recess *i*, cut in the periphery of the head; thence through the exhaust-port *b* into chamber *C* to the exhaust-pipe *E*. Each of the heads *d*, having two passages *h h* and two passages *i i*, and the corresponding passages in one head being at ninety degrees circumferentially with those in the other, as shown in Figs. 2, 3, and 5; therefore, when steam is being admitted into one end of the cylinder, it has free exit, as shown, at the other; thus the rotary motion of heads *d* effects the admission of steam at alternate ends of the cylinder, and the consequent reciprocating movement of the piston. If it be desired to cut off at full-stroke, the connection of the governor with disks *f*, through rack *j*, acting on pinion *g*, is so adjusted as that the openings *k*, in the disks, shall be in the same horizontal plane as the ports *a*; so that, when the passages *h* pass the ports, steam shall flow freely through the passages to the ports without obstruction from the disks; but if it is desired to cut off at any part of the stroke less than the whole, then the length of rod *j* is so adjusted as that the opening *k* shall not be in the same plane as the ports, so that the disk shall cover the passage *h* during a part of the time that it is in communication with the induction-port, there-

by restricting, to the desired degree, the amount of steam admitted to the cylinder. And the usual action of the governor serves—as the varying demands upon the engine tend to increase or diminish the speed—to increase or diminish the amount of steam admitted to the cylinder, by bringing the openings in disks *f* more or less in the plane of the ports.

The devices by which the adjustment of the disks relatively to the steam-ports may, through rod *j* and the governor, be accomplished, are so well known to every one of ordinary skill in this department of the mechanic art, that a further description is not deemed necessary.

What I claim as my invention is—

1. The combination, with the governor and rod *J*, of the sleeve *e*, with its disks *f*, when constructed and arranged to operate substantially as and for the purposes specified.

2. The combination of the rotary heads *d* and the disks *f*, when constructed and arranged to operate substantially as and for the purposes specified.

Bangor, November 26, A. D. 1872.

JOSEPH W. STRANGE.

Witnesses:

A. SANBORN,
J. D. WARREN.