T. Stewart,

Rotary Steam Valve.

No. 21,579. Patented Sep. 21, 1858.

Fig. 1.

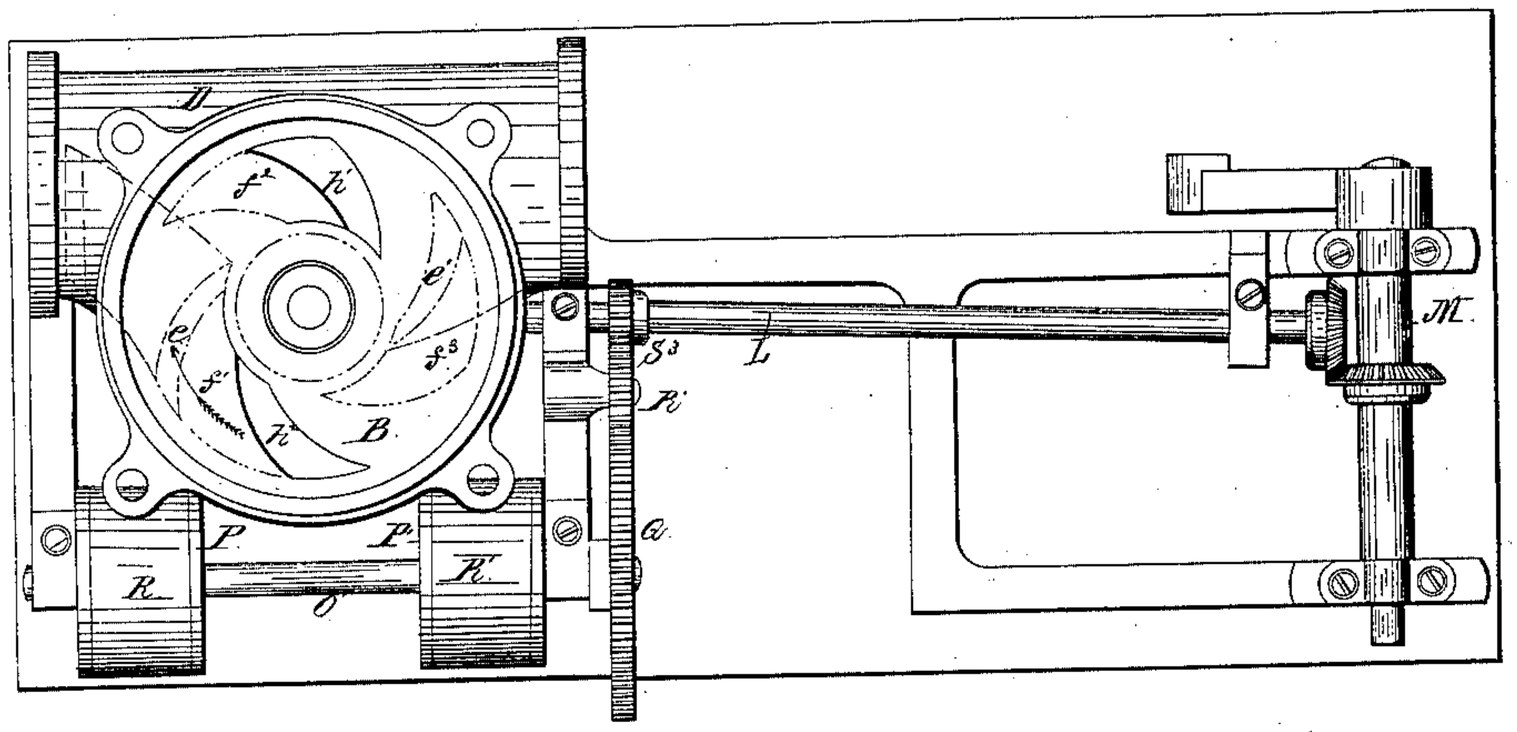
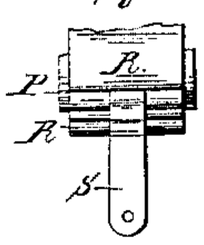


Fig 2.

Fig: 4.

Fig. 5.

Fig: 6.



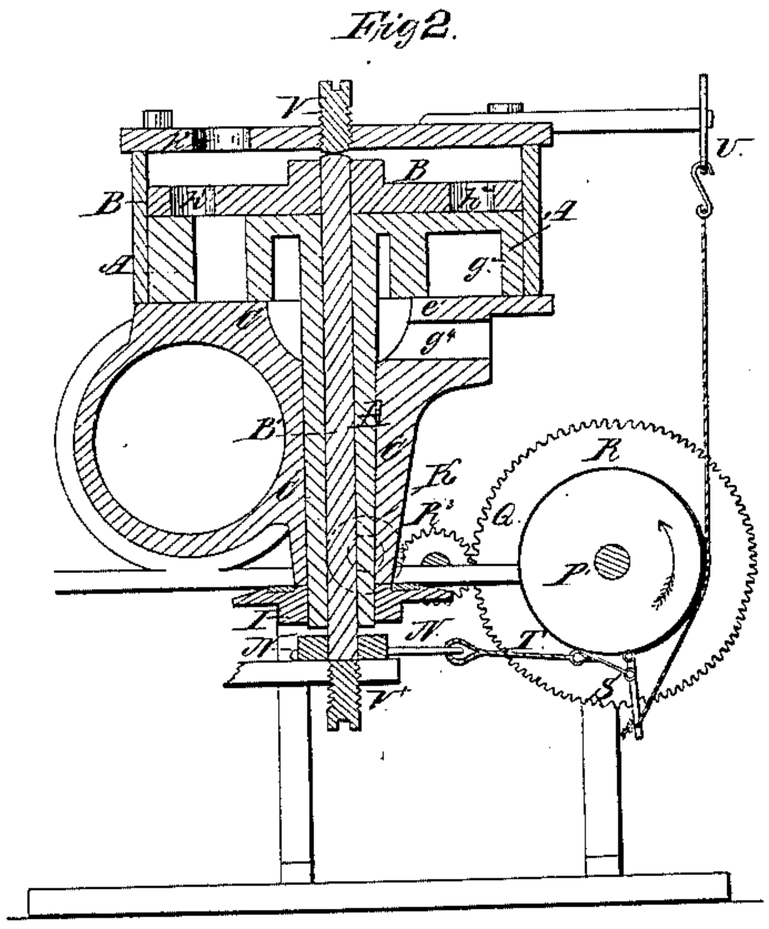
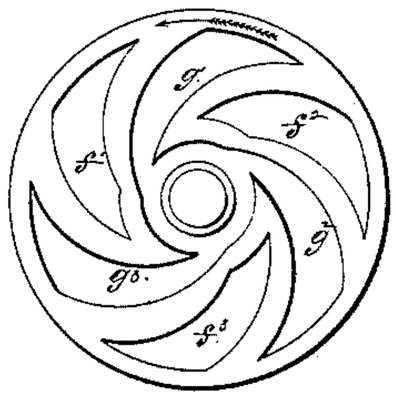


Fig: 3.



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UNITED STATES PATENT OFFICE.

THOS. STEWART, OF PHILADELPHIA, PENNSYLVANIA.

ROTARY VALVE FOR STEAM-ENGINES.

Specification of Letters Patent No. 21,579, dated September 21, 1858.

To all whom it may concern:

Be it known that I, THOMAS STEWART, of the city of Philadelphia, in the State of Pennsylvania, have invented a new and Improved Rotary Cut-Off Valve for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a plan view of the cut-off and valve as applied to the middle of the cylinder of an engine, the cap of the steam chest being removed; Fig. 2, a vertical transverse section through the middle of the same; Fig. 3, a plan view of the under side of the valve disk; and Figs. 4, 5, and 6, sectional representations of actuating parts of the cut-off—like letters in the different figures indicating the same objects.

The nature of my invention consists in making the disk of a rotary valve, with two or more sets of ports or steam ways therein, for the induction and eduction of the steam, in such a manner as to allow of the said steam being cut off at any required position of the piston in the cylinder without producing any connection with the opposite side of the said piston when the steam is cut "short" off; and in so constructing and operating the cut-off as to cause it to work independently of the said valve.

Referring to the drawings, A, is the rotary valve; B, the cut-off; and C, the valve-seat, or bottom of the steam chest. The valve-seat is cast with the cylinder, D, and has its ports leading therefrom into the respective ends of the cylinder, as shown by the red lines in Fig. 1, and also with a boss or mass of metal, C′, projecting down from the middle of the under side of the same which, being bored, receives the stem A′, of the valve (A), and also affords the exhaust way g^4 as shown by the red lines in Fig. 2. The stem A′, of the valve (A) is also bored and receives the stem B′, of the cut-off. The two ports through the valve-seat which open into the cylinder (D) are indicated by the red lines e and e' in Fig. 1; and in the same figure, the supply ports f' f^2, f^3, of the valve (A) are indicated in blue lines; but these ports, as also the exhaust ports or ways, g', g^2, g^3, are more fully shown in Figs. 2 and 3.

h', and h^2, are the ports in the cut-off, and, h^3, the entrance opening in the cap of the steam chest.

I, is a bevel wheel which is fast on the lower end of the valve stem (A′), and into which gears a bevel pinion, K, which is fixed on the inner end of a shaft, L, which connects, by a pair of bevel wheels with the crank shaft M. The stem (B′) of the cut off projects through the stem of the valve (A) and has an equal-armed lever, N, fixed thereon. Parallel with the steam cylinder (D), a shaft, O, having two cylinders, P and P′, and a spur wheel, Q, fixed thereon, is connected by the pinions, R^3 and S^3, with the shaft (L) so as to be rotated thereby. These cylinders are each surrounded with a thin, metallic, spring-band, R and R′, which has its two ends jointed to a lever, S′, so that when the said lever is operated, the band can be made to clutch upon the cylinder so as to be carried thereby. The lower or inner ends of these bands (R and R′) are connected by a chain or wire rope T and T′, respectively with the arms of the horizontal lever (N), while the power-ends of each of the levers, S and S′, are connected by a like chain or wire rope, respectively to the ends of an equal-armed lever, U, which is placed above and so as to be vibrated upon its fulcrum, by means of a lever connecting it at, W, with the usual governor of the steam engine. The cut-off (B) is adjustable vertically by means of the two set screws V and V′. The gear wheels for giving motion to the valve (A) are made so as to cause the latter to make one third of a rotation for every full rotation of the crank shaft (M), and are arranged relatively so as to cause the valve to commence opening the ports to the cylinder as the crank passes the dead point.

Operation: When steam is admitted into the valve chest and sufficient rotation given to the crank shaft to open either port, the steam would afterward continue to be admitted and exhausted alternately to and from each side of the piston; but the cut-off (B) being previously arranged in connection with the usual governor so as to cut off the steam at any required position of the piston, it is obvious that any irregularity in the speed of the engine will instantly be communicated to the said governor through the media of the lever (U) and either the one or the other of the cylinders (R, R′) connected therewith so as to cause the cyl-

inder carrying the friction clutch to draw on the lever (N) and thus partially to rotate the cut-off and so regulate the size of the opening for the steam, to suit the requirements of the engine, because the cylinders (P and P′) being always rotating in the direction of the arrow it is manifest that when one of the friction clutches is caused by the governor to grasp its cylinder, the other, by the same motion of the governor, is caused to release the other cylinder until the cut-off is sufficiently turned by the cylinder to produce the equalization required in the speed of the engine; while at the same time, the cut-off being adjustable vertically upon the valve (A) by means of the set screws (V and V′) the valve can thereby be packed or balanced so as to diminish the friction very materially, and thus save power without allowing steam to pass between their faces.

The arrangement of the openings or ports of the valve (A) as described, allows of the steam being cut off at any required position of the piston without producing any connection with the opposite side of the said piston; and hence the action of the cut-off upon the valve may be termed universal—the two being adapted together so as to admit, cut off, and work the steam expansively and exclusively on either side of the piston at any position of the same in the cylinder. Besides, the construction and arrangement of the several parts are simple, inexpensive, and not liable to get out of order from use.

Having thus fully described the construction and operation of my invention I proceed to state that I do not claim generally, a rotary valve for the induction and eduction of steam; neither do I claim generally, mounting an independent cut-off upon the upper side of a valve; but

What I claim as my invention and desire to secure by Letters Patent is—

1. I claim making a rotary valve with an independent cut-off applied thereto, constructed, arranged and operating substantially in the manner herein set forth.

2. I claim constructing the said rotary valve with two or more sets of ports or ways therein as described for the induction and eduction of the steam, so as to enable me to cut off the said steam at any required part of the stroke without producing any connection with the opposite side of the piston, when the steam is cut off "short" as set forth and described.

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