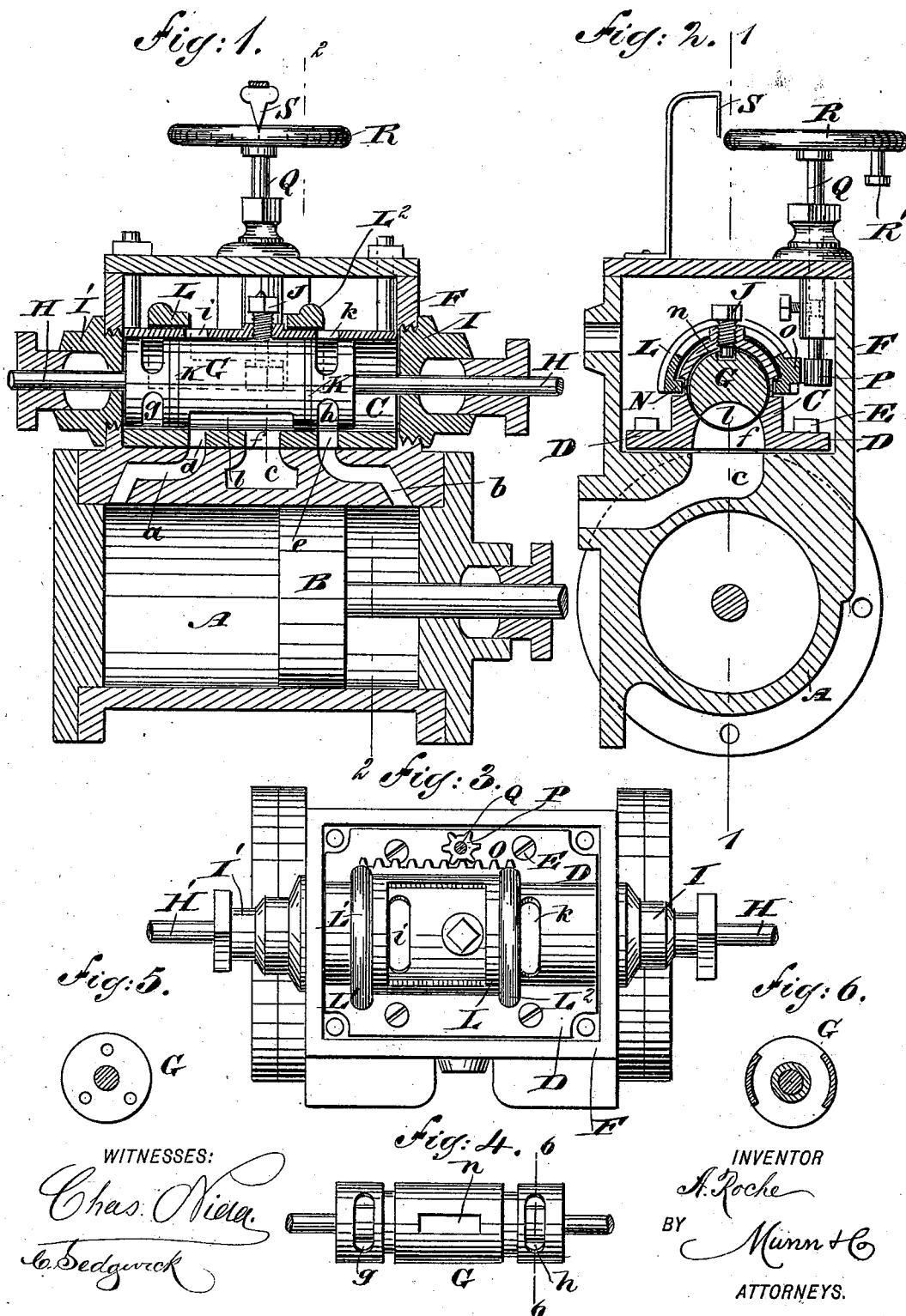


A. ROCHE.
STEAM ENGINE VALVE.

Patented Aug. 8, 1893.



UNITED STATES PATENT OFFICE.

AUGUSTIN ROCHE, OF BUTTE, MONTANA.

STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 503,001, dated August 8, 1893.

Application filed September 27, 1892. Serial No. 447,021. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTIN ROCHE, of Butte, in the county of Silver Bow and State of Montana, have invented a new and Improved Steam-Engine Valve, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved steam engine valve, which is simple and durable in construction, very effective in operation, and completely balanced, both as to the inlet and exhaust of the motive agent.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the improvement as applied. Fig. 2 is a transverse section of the same on the line 2—2 of Fig. 1. Fig. 3 is a plan view of the same with the steam chest cover removed. Fig. 4 is a plan view of the valve. Fig. 5 is an end elevation of the same; and Fig. 6 is a transverse section of the same on the line 6—6 of Fig. 4.

The steam engine on which the valve is applied is provided with the usual cylinder A, containing the piston B, connected with the main driving shaft in any approved manner. The cylinder A is provided with the steam inlet ports *a* and *b*, and the exhaust port *c*, leading to the outside. The steam inlet ports *a* and *b* register with the ports *d* and *e*, formed in the bottom of the casing C, provided with a longitudinally extending bore, and formed on its bottom with flanges D, fastened by screws or bolts E, to the bottom of the steam chest F, held on top of the cylinder A.

In the bottom of the casing C, between the ports *d* and *e*, is arranged a port *f*, registering with the exhaust port *c*. The ports *d* and *e* are adapted to register with ports *g* and *h*, respectively, formed vertically in the cylindrical valve G, mounted to slide longitudinally in the casing C. The ports *g* and *h* are adapted to register with ports *i* and *k*, formed in the top of the casing C and opening into the interior of the steam chest F. In the under side of the valve G, between the ports *g* and

h is arranged a cavity *l*, adapted to register, alternately, the port *f* with the ports *d* and *e*.

The cylindrical valve G is provided at its ends with valve stems H and H', of which one is connected in the usual manner with suitable means for imparting a reciprocating motion to the said valve G. The stems H and H' are mounted to slide in stuffing boxes I and I', respectively, screwed or otherwise secured on the ends of the steam chest F, the said stuffing boxes being of such a size that when removed from the steam chest the valve G can be passed through the apertures in the ends of the steam chest.

The casing C can be removed from the interior of the steam chest by removing the cover of the latter and then removing the bolts or screws E, after which the casing can be lifted out of the chest, it being, however, understood that the valve G was previously removed through one of the openings, in the ends of the steam chest as above described.

In order to prevent the valve G from turning in the casing C, I provide said valve, in its top, between the ports *g* and *h*, with a longitudinally-extending recess *n*, into which projects a screw J, screwing in the top of the casing C, as is plainly shown in Figs. 1 and 2.

In order to prevent leakage of the motive agent between the ports *i, k* and *g, h*, respectively, I provide the valve G with spring packing rings K, as is plainly shown in Fig. 1.

In order to control the amount of motive agent passing from the steam chest to the interior of the cylinder A, I employ a cut-off mechanism provided with a saddle L, having semi-circular cut-off flanges L' and L'', fitting the top of the casing C and provided on its sides with inwardly extending flanges N, fitted to slide in guideways formed longitudinally in the sides of the casing C. On one side of the saddle L is arranged a longitudinally extending rack O, engaged by a pinion P, held on the inner end of a vertically disposed shaft Q, mounted to turn in a suitable stuffing box or bearing held on the cover of the steam chest F. A hand wheel R, having a crank pin R', and secured on the said shaft Q permits of conveniently turning the said shaft to shift the saddle L forward or backward by the action of the pinion P and rack O. The top of the hand wheel is provided

with a graduation on which is a fixed pointer S, to indicate at all times the position of the saddle L and its flanges L' and L² relative to the ports *i* and *k* respectively in the top of the casing C. By moving the saddle forward the ports *i* and *k* are diminished in size and a less amount of motive agent is permitted to pass from the steam chest F to the cylinder A, and by moving the saddle rearward the said ports are uncovered more or less to admit more motive agent.

Instead of operating the wheel R by hand it may be actuated from a suitable governor connected with the crank pin R' of said wheel R to impart a forward and backward motion to the same, according to the speed of the engine.

The operation is as follows: When the several parts are in the position shown in Fig. 1, the piston B is on the outward stroke, and the motive agent passes to the cylinder by its port *b*, the latter being connected with the port *e*, which in turn registers with the port *h*, and the latter with the port *k*, leading to the interior of the steam chest F containing the live motive agent. When the piston B nears the end of its stroke, then the valve G moves to the right, so that the ports *h*, *k* and *e* are disconnected, and the motive agent is cut off from the port *b* and this end of the cylinder. The other port *g* of the valve G now registers with the ports *i* and *d*, so that the motive agent from the steam chest can pass through the said ports *i*, *g*, *d*, into the port *a*, leading to the left end of the cylinder, so as to force the piston B on its outward stroke. The exhaust during the inward stroke of the piston B takes place through the port *b*, the port *e* registering with the cavity *l*, the latter at the same time registering with the port *f* leading to the exhaust port *c*. On the outward stroke of the piston B the exhaust takes place through the registering port *a*, the cavity *l*, the ports *f* and *c*, as shown in Fig. 1.

It will be seen that as the valve G is inclosed in a separate casing held in the steam chest, the said valve is completely counterbalanced, both as to the live inlet steam and the exhaust. It will further be seen that the several parts of the valve can be conveniently removed from the steam chest for repairing or other purposes. It is also understood that the casing C serves to relieve the valve of the pressure of the steam entering the steam chest.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with a cylinder having a steam chest open at its top and provided with a removable cover, threaded openings in the ends of the chest, threaded stuffing boxes in said openings, and inlet ports *a b*, and exhaust port *c*, of the casing C secured in the bottom of the chest, removable through its open top and provided with ports *i k d e f*, a piston valve operating in said casing removable through said threaded openings and controlling the said ports, substantially as set forth.

2. The combination with the cylinder and its steam chest, of the casing therein having ports *i k d e f*, and longitudinal ways along its outer sides, of the saddle-like cut off on the upper side of the casing having ribs entering said ways and provided with a rack, the shaft Q having a pinion meshing with said rack, and means for operating the shaft, and the piston valve in the casing, substantially as set forth.

3. The combination with the cylinder, and steam chest having ports *a b c*, removable stuffing boxes in the ends of the chest and a removable cover for the top of the chest, of the open ended valve casing C removable through the top of the chest and having flanges bolted to the bottom of the chest, and ports *d e f* and *i k*, the cylindrical valve G in the casing removable through the openings in the ends of the chest and provided with transverse ports *g h* through its ends to connect ports *e d—k l* and recessed on its lower side to connect ports *d e* with the exhaust, substantially as set forth.

4. A steam engine valve comprising a casing adapted to be secured in the steam chest and provided with ports leading to the interior of the steam chest and registering with the cylinder ports, a cylindrical valve fitted to slide in the said casing and provided with inlet ports and an exhaust cavity, and a cut off mechanism substantially as described, for regulating the amount of motive agent passing from the steam chest to the said ports of the casing, substantially as shown and described.

AUGUSTIN ROCHE.

Witnesses:

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