(No Model.) 2 Sheets—Sheet 1.

# A. J. PEIRCE.

## STEAM ENGINE VALVE.

No. 366,870. Patented July 19, 1887.

Fig. 1.

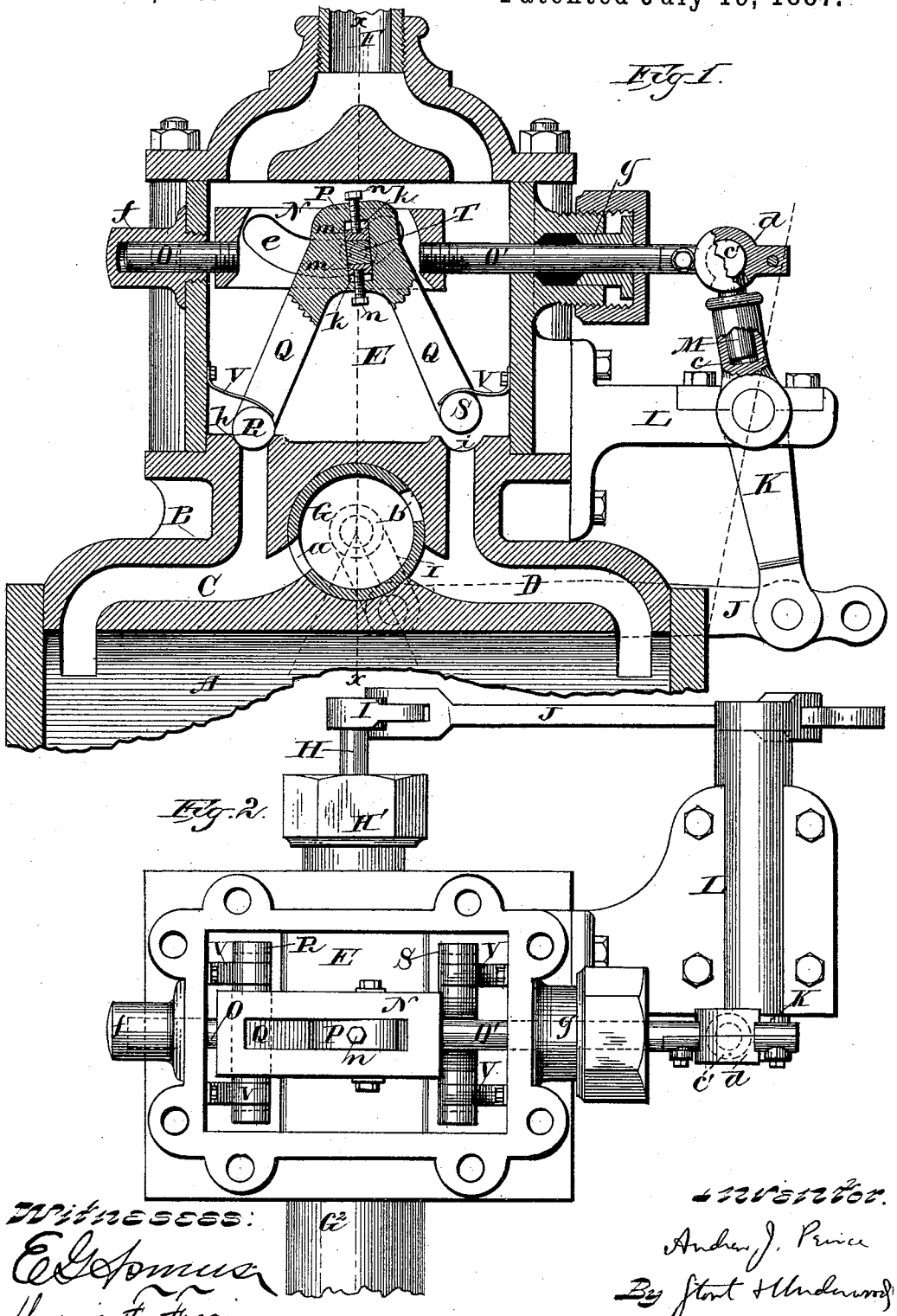


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

# A. J. PEIRCE.

## STEAM ENGINE VALVE.

No. 366,870. Patented July 19, 1887.

Fig. 3.

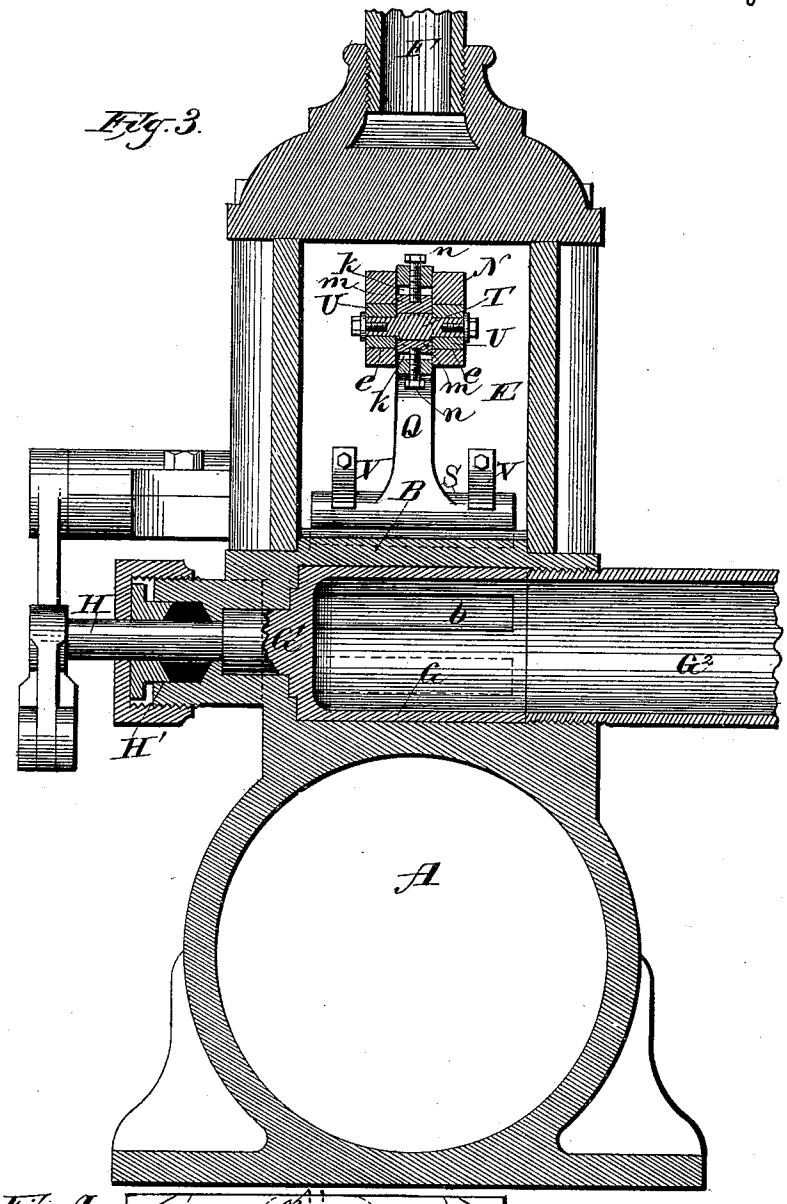
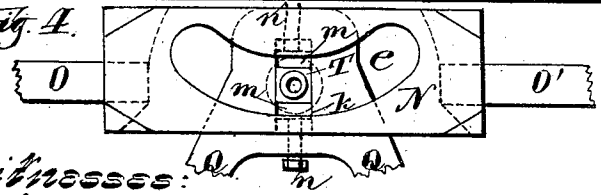



Fig. 4.




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# UNITED STATES PATENT OFFICE.

ANDREW J. PEIRCE, OF MADISON, WISCONSIN.

## STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 366,870, dated July 19, 1887.

Application filed October 14, 1886. Serial No. 216,230. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW J. PEIRCE, of Madison, in the county of Dane, and in the State of Wisconsin, have invented certain new and useful Improvements in Steam-Engine Valves; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to steam-engine valves; and it consists in certain peculiarities of construction, as will be hereinafter described with reference to the accompanying drawings, and subsequently claimed.

In the drawings, Figure 1 represents a vertical longitudinal section of my invention; Fig. 2, a plan view of the valve-gear, the chest-cover being removed; Fig. 3 a vertical transverse section on line *x x*, Fig. 1; and Fig. 4 a detail view of the valve-stem.

Referring by letter to the drawings, A represents a steam-cylinder having its upper portion or bridge, B, provided with ports C D, that lead from a steam-chest, E, the latter being connected by a pipe, F, with a boiler. The upper portion or bridge, B, of the cylinder A is transversely bored out to receive a tubular section, G, that is provided with apertures *a b*, said section serving as an exhaust-valve.

One end of the tubular section G is provided with a head, G′, that has a stem, H, extended outwardly therefrom and connected by means of a link, I, with a pitman, J, that is designed to be flexibly joined to an eccentric-rod, said stem operating in a suitable stuffing-box, H′.

The transverse bore in the upper portion or bridge, B, of the cylinder has fitted therein a pipe, $G^2$, that is equal in diameter to the tubular section G and is brought into close register therewith to receive and carry off the exhaust-steam.

Pivotally connected to the pitman J is a crank-arm, K, having its bearing in a box, L, the latter being bolted or otherwise suitably secured to the cylinder A and steam-chest E.

The crank-arm K is ⌐-shaped and has its upper terminus recessed, as shown at *c*, to receive the shank of a pintle, M, the round head *c′* of the latter being socketed in a suitable box, *d*, at the outer end of a rod that forms part of the valve-stem. The valve-stem consists of a rectangular hollow part or box, N, that has its sides provided with cam-slots *e*, and to the respective ends of this hollow part are secured rods O O′, that operate in bearings *f g*, fitted to the steam-chest, said rod O′ being suitably packed, as shown in Fig. 1.

Inclosed within the box N is the head P of a bifurcated rocker, the bifurcations Q of the latter terminating in cylindrical valves R S, that have their respective seats *h i* at the upper terminus of the ports C D, leading from the steam chest to the cylinder. The head P of the rocker is provided with a slot, *k*, that receives the squared central portion of an axle, T, the outer extremities of this latter part forming journals for friction-rollers U, that operate in the cam-slots *e* of the box N. In order to adjust the axle when fitting the parts together, or to compensate for any wear that may occur between the valves R S and their seats, I provide follower-blocks *m*, that fit the slot *k* in the rocker-head P, and are caused to impinge against the square central portion of said axle by means of adjusting-screws *n*, having their bearings in said head.

Springs V are secured upon the inner sides of the steam-chest E and exert their force upon the valves R S, in order to overcome the pressure of any exhaust-steam that may find its way to said valves.

In the operation of my invention the chest E is supplied with steam through the pipe F, and the pitman J being actuated by the eccentric rod, to which it may be jointed, the valve-stem is operated through the medium of the crank-arm K. The ball-and-socket joint formed by the round-headed loose pintle M and the box *d* permits an easy movement of the valve-steam, for the reason that when the upper terminus of the crank-arm K passes the line of its vertical axis in either direction said pintle will be drawn out of its socket *c* in proportion to the length of stroke, a reverse movement taking place when the crank-arm on its return movement approaches toward said line of its vertical axis. The valve-stem being actuated toward the left, as shown in Fig. 1, the cam-slots *e* in the sides of the box N that forms part of said stem will act on the friction-rollers U to operate the bifurcated rocker, and thereby raise the valve S from its seat *i*, and consequently open the port D leading to the cylinder, the port C being kept closed by the valve R, that remains in its seat *h* while the above-

described operation takes place. Simultaneously with the movement of the valve-stem to operate the rocker, whereby the port D is opened, the tubular section G, through its connection with the pitman J, is also operated to bring the aperture *a* into register with the port C, thereby permitting the steam on that side of the piston (not shown) to pass into and exhaust through the pipe $G^2$ without entering again into the chest E, as is the case in valves of the usual construction. The return-stroke of the valve-stem actuates the bifurcated rocker to raise the valve R, and thereby open the port C, while at the same time the tubular section G is operated to bring its aperture *b* into register with the port D.

The operation just described seats the valve S, thereby cutting off the port C from the tubular section or exhaust-valve G.

It will be noticed that the faces of the cam-slots *e* in the box N are approximately level for a certain distance each side the vertical center of said box, and by this construction the friction-rollers U run for a certain time on a horizontal plane and the bifurcated rocker remains stationary, thus enabling me to seat both the valves R S for a brief period at each throw of their stem, thereby insuring an entire exhaust from the cylinder at the end opposite the stroke of the piston before steam is again admitted to said cylinder.

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

1. The combination, with a steam-chest, a cylinder provided with suitable ports leading from the chest, and an exhaust-valve, of a bifurcated rocker carrying valves for the cylinder-ports and having friction-rollers journaled to its head, a valve-stem having a portion thereof in the form of a hollow box, the sides of which are provided with cam-slots to engage the friction-rollers, and means for actuating said stem, substantially as and for the purpose set forth.

2. The combination, with a steam-chest, a cylinder provided with ports leading from the chest, and an exhaust-valve, of a bifurcated rocker carrying valves for the cylinder-ports, an axle adjustably secured in the rocker-head, friction-rollers journaled on the extremities of said axle, a valve-stem having a portion thereof in the form of a hollow box, the sides of which are provided with cam-slots to engage said rollers, and means for actuating the valve-stem, substantially as and for the purpose set forth.

3. The combination, with a steam-chest, a cylinder provided with ports leading from the chest, and an exhaust-valve, of a bifurcated rocker carrying valves for the cylinder-ports, an axle having a square central portion fitted in the rocker-head, friction-rollers journaled on the extremities of said axle, a valve-stem having a portion thereof in the form of a hollow box, the sides of which are provided with cam-slots that engage the friction-rollers, and means for actuating said stem, substantially as and for the purpose set forth.

4. The combination, with a steam-chest, a cylinder provided with ports leading from the chest, and an exhaust-valve, of a bifurcated rocker carrying valves for the cylinder-ports and having friction-rollers journaled to its head, a valve-stem that has a portion thereof in the form of a hollow box, the sides of which are provided with cam-slots to engage the friction-rollers, these slots having approximately level faces for a certain distance each side their vertical center, and means for actuating said stem, substantially as and for the purpose set forth.

5. The combination, with a steam-chest, of a cylinder having a transverse bore in its bridge and ports leading from said chest, a bifurcated rocker carrying valves for the cylinder-ports, a valve stem operatively connected to the rocker-head, an exhaust-valve loosely fitted in the bridge-bore and provided with apertures that are arranged to come in and out of register with said ports, and means for simultaneously actuating the valve-stem and exhaust-valve, substantially as and for the purpose set forth.

6. The combination, with a steam-chest, a cylinder provided with ports leading from the chest, a suitable valve for the cylinder-ports, and an exhaust-valve, of a crank-arm having a ball-and-socket joint at one extremity with the valve-stem and pivotally connected at its other extremity with said exhaust-valve, substantially as and for the purpose set forth.

7. The combination, with a steam-chest, a cylinder provided with ports leading from the chest, a suitable valve for the cylinder-ports, having one end of its stem provided with a box, an exhaust-valve operatively connected with a pitman, a crank-arm having one extremity thereof provided with a recess and its other extremity pivoted to said pitman, and a pintle loosely fitted in said recessed extremity of the crank-arm and having a round head socketed in the box at the end of the valve-stem, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

ANDREW J. PEIRCE.

Witnesses:
S. S. STOUT,
N. E. OLIPHANT.