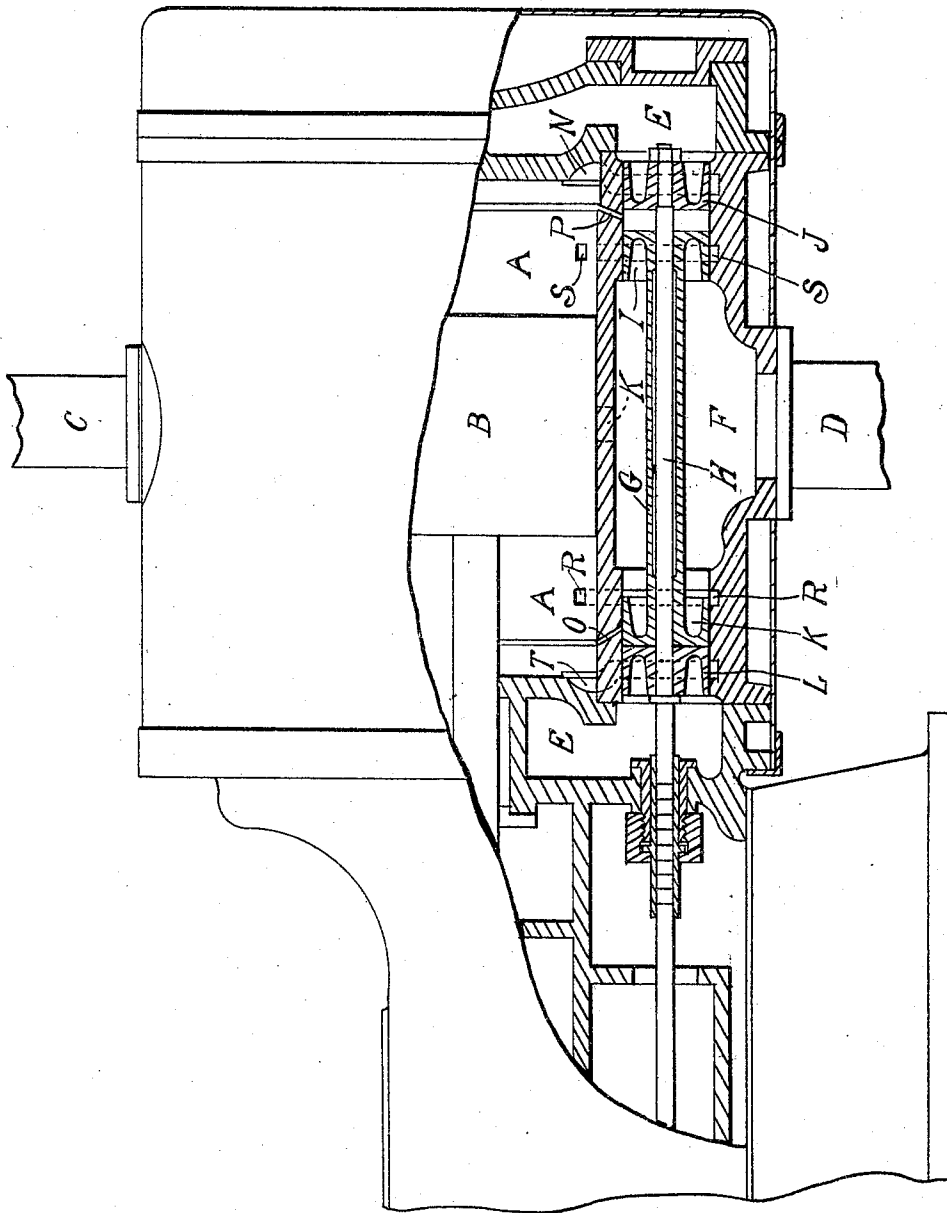


E. F. WILLIAMS.
STEAM ENGINE VALVE.
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1,076,256.

Patented Oct. 21, 1913.



Witnesses
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UNITED STATES PATENT OFFICE.

EDWIN F. WILLIAMS, OF ERIE, PENNSYLVANIA.

STEAM-ENGINE VALVE.

1,076,256.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWIN F. WILLIAMS, citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Engine Valves, of which the following is a specification.

This invention relates to steam engine valves, and is illustrated as applied to valves of the piston type, operating in connection with a steam engine cylinder having or having not a middle or main exhaust port controlled by the main piston in the cylinder, with auxiliary ports located near the opposite ends of the cylinder.

The invention comprises separate inlet and outlet valves, operating on the same seats, and mounted on the same rod, the inlet valves being rigidly connected to the rod, and the outlet valves, having a slight lost motion on the rod, whereby the exhaust valves, although operated mainly by the rod, have some freedom of movement or lost motion in the direction of the rod movement. Thereby the exhaust valves are caused to lag behind the movement of the steam valves, and this lost motion has the effect of retarding both the opening and closing of the exhaust, which is what the invention is intended to accomplish. That is it causes a later exhaust action than would occur at the same cut off with an ordinary governor mechanism, and this delayed exhaust action prevents objectionable excessive compression incident to the ordinary result of the exhaust action at the shorter cut offs.

In order to cause the exhaust valve to follow the inlet valve and to take up the lost motion at or about the end of the stroke I provide means for admitting steam into the intervening spaces between the inlet and exhaust valves when the valve movement brings them in position to register said spaces with holes communicating with the cylinder.

The accompanying drawing is a longitudinal section of the valve applied to the cylinder of an engine of the type referred to.

The cylinder is indicated at A and the piston at B.

C is the inlet pipe to the steam chambers E at the ends of the cylinder.

D is the exhaust pipe leading from the central exhaust space F which communicates with the cylinder through a middle ex-

haust port or ports K which are covered and uncovered by the piston B as it reciprocates.

T and N are the inlet ports controlled by the inlet valves L and J fixed to the valve rod H and admitting live steam from the chambers E when the ports are uncovered by said valves.

R and S are auxiliary exhaust ports between the middle port K and the ends of the cylinder, and these ports are controlled by the valves K and I which are connected by a sleeve G around the rod H, and act to cover and uncover said ports to close or open communication with the exhaust space F.

O and P are holes drilled from the cylinder to the valve seats.

The valves K and I are spaced slightly from the valves J and L, and the ports O and P communicate with these spaces when they register. The space permits a certain amount of lost motion or delay in the movement of the valves K and I as the valve rod is reciprocated, and this lost motion effects the delayed action of the exhaust.

The drawing shows the valves at mid stroke. Assuming that the valves are moving to the right and the piston B to the left, the exhaust R is about to be closed, and compression begins in the crank end of the cylinder A. The valve K is close up to the valve L, which delays the closing of the exhaust, as well as a delayed opening of the exhaust port S by the valve I at the other end, said valve I having backed or dragged away from the inlet valve J. When the valve has moved sufficiently to register the hole O with the slight space between the valves K and L, the compression will enter through said opening O and force the exhaust valves K and I to travel forwardly or follow until the valve I is nearly in contact with the valve J. The movement will be arrested by the compression between the valves I and J so that the two valves will not strike or come in actual contact. There will thus be no noise or jar produced by the movement. The advance of the valve rod opens the inlet valve L and returns the piston B, to position for reverse movement of the valves, when the operation will be repeated in the other direction.

In case the exhaust valves are not set over by the compressed steam within the cylinder (assuming that it might not be of sufficient force) it will surely be set over by the live steam admitted during the earlier expansion

as the space between the valves passes the hole O or P during the earlier part of the reverse stroke. It will be understood that when the valves K and I uncover the ports 5 It and S respectively the auxiliary exhaust takes place into the central exhaust chamber F. There is thus provided an automatic movement of the exhaust valves to produce a delayed exhaust without the necessity for 10 special controlling mechanism for that purpose.

What I claim as new is:

1. The combination with an engine cylinder having separate inlet and exhaust ports, 15 of inlet valves controlling the inlet ports, means to operate said inlet valves, and separate exhaust valves controlling the exhaust ports, said exhaust valves being movable with, and operated by the same means as, 20 the inlet valves, and having lost motion with respect thereto, to delay the operation of said exhaust valves.

2. The combination with an engine cylinder having separate inlet and exhaust ports 25 opening at the same valve seat, of separate inlet and exhaust valves controlling said ports and movable on the same seat, the exhaust valve having lost motion with respect to the inlet valve, to delay the action 30 of the former.

3. The combination with an engine cylinder having separate inlet and exhaust ports opening at the same valve seat, of separate 35 inlet and exhaust valves controlling said ports and movable on the same seat, the exhaust valve having lost motion with respect to the inlet valve, to delay the action of the former and means to take up such lost motion, after the action of the exhaust valve 40 with respect to its port.

4. The combination with an engine cylinder having separate inlet and exhaust ports, 45 separate inlet and exhaust valves controlling said ports respectively, the exhaust valve having lost motion to delay its action with respect to the inlet valve, and means to take up such lost motion by pressure admitted from the cylinder.

5. The combination with an engine cylinder having separate inlet and exhaust ports 50 to each end thereof, a reciprocating valve rod, inlet valves fixed to said rod and controlling said inlet ports, and exhaust valves mounted on said rod and operated thereby, 55 and having lost motion with respect thereto, to delay the exhaust action.

6. The combination with an engine cylinder having separate inlet and exhaust ports 60 to each end thereof, a reciprocating valve rod, inlet valves fixed to said rod and con-

trolling said inlet ports only, and exhaust valves mounted on said rod and operated thereby and controlling the exhaust ports only, and having lost motion with respect thereto, to delay the exhaust action, and 65 means to admit pressure behind said exhaust valves, to take up said lost motion, after the action thereof with respect to the exhaust ports.

7. The combination with an engine cylinder having separate inlet and exhaust ports 70 to each end thereof, of a reciprocating valve rod, piston inlet valves mounted on said rod and controlling the inlet ports only, and piston exhaust valves connected together and 75 loosely mounted on said rod between the inlet valves, controlling the exhaust ports only, the exhaust valves being spaced from the inlet valves to permit lost motion of the former with respect to the latter, as the rod 80 is reciprocated.

8. The combination with an engine cylinder having inlet and exhaust ports to each end thereof, of a reciprocating valve rod, 85 piston inlet valves mounted on said rod and controlling the inlet ports, and piston exhaust valves connected together and loosely mounted on said rod between the inlet 90 valves, and controlling the exhaust ports, the exhaust valves being spaced from the inlet valves to permit lost motion of the former with respect to the latter, as the rod 95 is reciprocating and openings communicating with said cylinder independently of the said ports and adapted to register with the 100 said spaces between said valves at a certain period during the travel of said valves, to admit cylinder pressure and take up said lost motion.

9. The combination with an engine cylinder having inlet ports at opposite ends 105 thereof, and exhaust ports spaced from each end, of a reciprocating valve rod; inlet valves thereon, controlling the inlet ports, exhaust valves loose on said rod, located between and 110 spaced from the inlet valves, and having lost motion with respect thereto, and openings communicating at one end with the cylinder between the inlet and exhaust ports and at 115 the other end with the space between the respective inlet and exhaust valves at a certain period of travel of said valves, to admit cylinder pressure to said space and take up said lost motion.

In testimony whereof, I do affix my signature in presence of two witnesses.

EDWIN F. WILLIAMS.

Witnesses:

CHARLES G. BREVILLEIER,
H. CARLSON.