

No. 810,055.

PATENTED JAN. 16, 1906.

R. C. HOLMAN.
ENGINE VALVE.

APPLICATION FILED SEPT. 18, 1905.

2 SHEETS—SHEET 1.

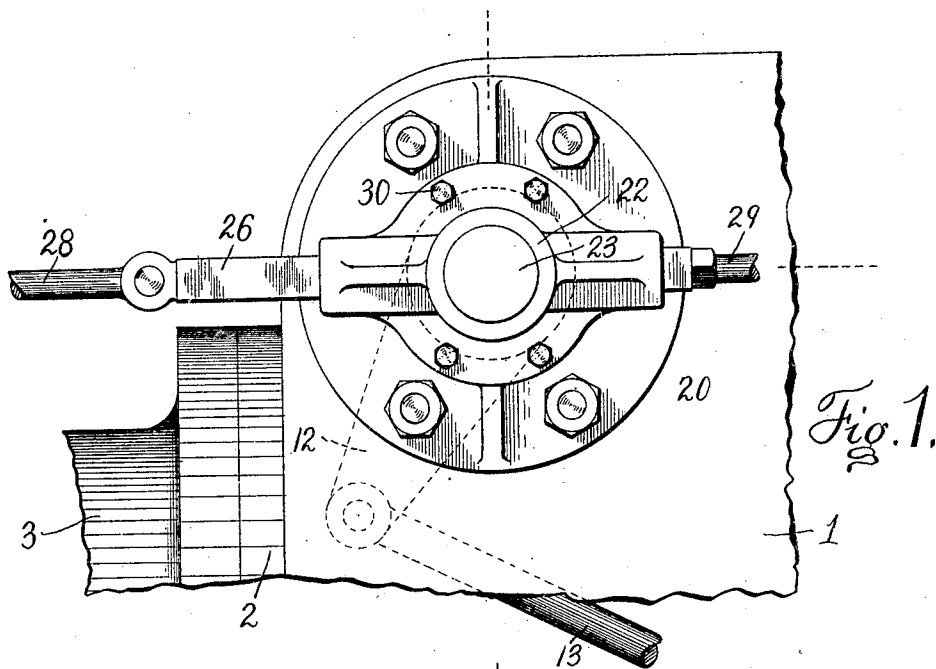


Fig. 1.

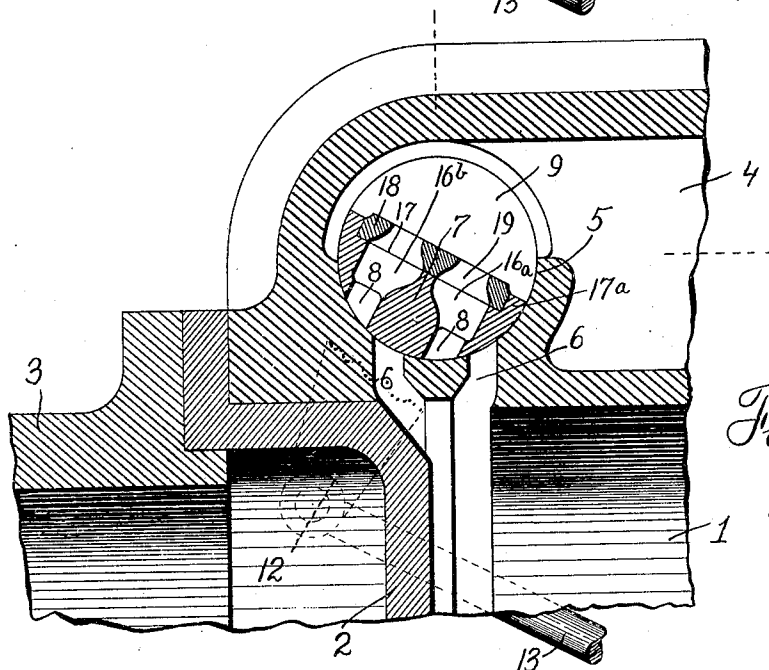


Fig. 2.

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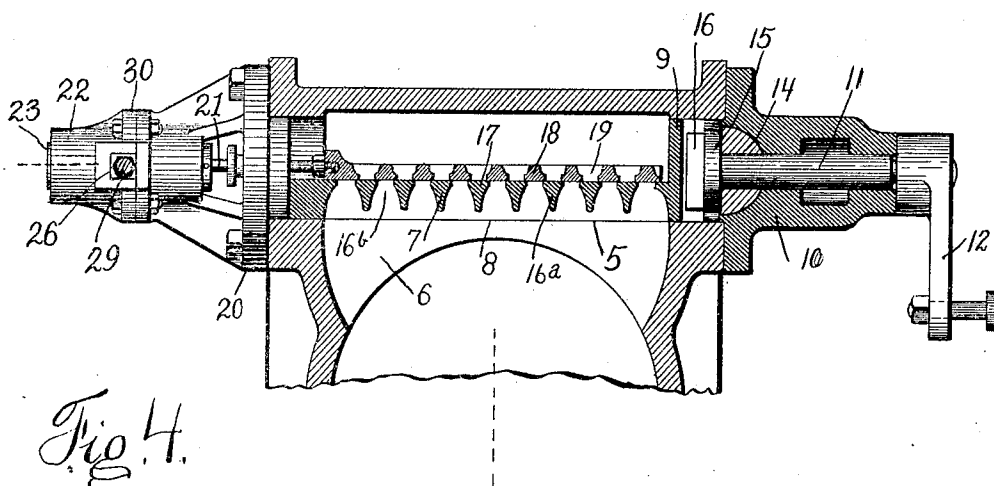
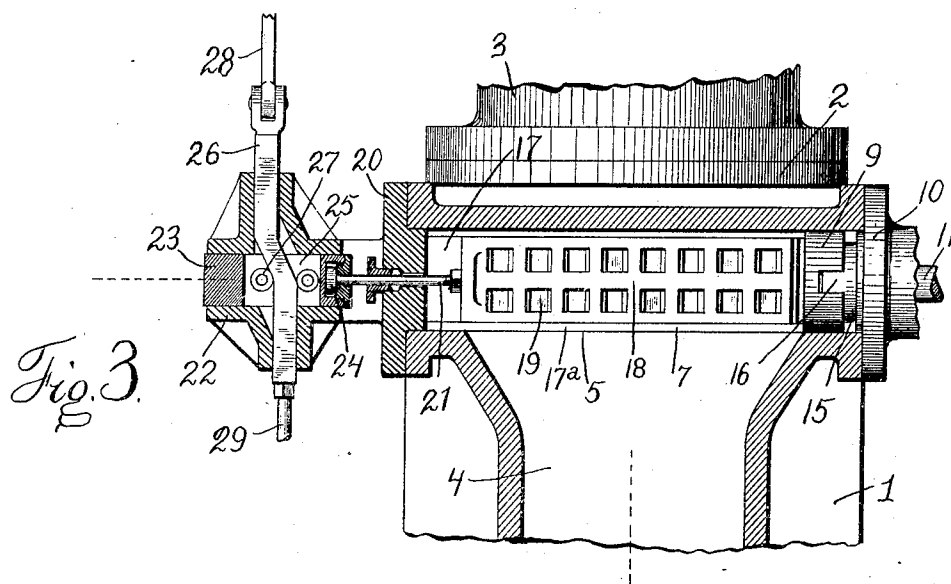
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UNITED STATES PATENT OFFICE.

ROBERT CLAUDE HOLMAN, OF HAMILTON, OHIO.

ENGINE-VALVE.

No. 810,055.

Specification of Letters Patent.

Patented Jan. 16, 1906.

Application filed September 18, 1905. Serial No. 278,866.

To all whom it may concern:

Be it known that I, ROBERT CLAUDE HOLMAN, a citizen of the United States, residing at Hamilton, Butler county, Ohio, (post-office address Box 290, Hamilton, Ohio,) have invented certain new and useful Improvements in Engine-Valves, of which the following is a specification.

This invention, pertaining to improvements in cut-off valves for engines, will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a portion of an engine-cylinder provided with a cut-off valve exemplifying my invention; Fig. 2, a vertical section of the same in a plane parallel with the axis of the cylinder; Fig. 3, a horizontal section in a plane parallel with the axis of the cylinder, and Fig. 4 a vertical section in a plane at right angles to the axis of the cylinder.

In the drawings, 1 indicates the cylinder; 2, the front cylinder-head; 3, the engine-frame; 4, the steam-passage for leading live steam to the steam-valves at opposite ends of the cylinder; 5, a circular valve-seat disposed across and above the cylinder near one of its ends and typical also of a similar seat to be at the other end of the cylinder; 6, the steam-port leading from the valve-seat into the cylinder, this port being double or formed of two parallel ports separated by a bridge in order that a large port-opening may be secured by means of a limited movement of the valve; 7, the main valve rocking in the valve-seat 5; 8, ports through the body of the main valve whereby when the valve is rocked to cause ports 8 to register with ports 6 the cylinder will be in communication with steam-passage 4; 9, the rear head of the main valve, being in the form of a disk having an outwardly-open diametrically-disposed slot; 10, the rear bonnet of the valve-seat, the words "front" and "rear" being herein used in a merely relative sense; 11, the main-valve stem journaled in the bonnet 10; 12, the rocker-arm on the main-valve stem; 13, the link connected to the rocker-arm to serve in oscillating the main valve, as through the medium of the usual wrist-plate worked by an eccentric; 14, a hemispherical collar having its convex face seating in a hemispherical recess in the inner face of the bonnet 10, the inner end of the main-valve stem being journaled in this collar; 15, a disk on the inner

end of the main-valve stem seating outwardly against the flat face of the collar, and 16 a tongue projecting from the inner face of disk 15 and engaging the groove in the head 60 of the main valve.

All of the parts thus far described are or may be of the form and arrangement usual in the valve construction of engines of the Corliss type. The main valve 7 is rocked in its seat by the action of main-valve stem 11 through the medium of tongue 16, as usual.

As thus far mentioned the ports 8 through the main valve have been considered merely as parallel slots adapted to register with the cylinder-ports 6, and considering the main valve merely as an admission-valve such slot form would be all sufficient; but in the present case the main valve coöperates with a riding cut-off valve and the ports through the main valve are modified accordingly, as will be explained.

Proceeding with the drawings, 16^a indicates transverse bridges in the ports through the main valve; 16^b, the two lines of short ports through the main valve as resulting from the presence of the bridges; 17, the upper face of the main valve, the same forming a valve-seat extending lengthwise of the main valve, the ports 16^b forming lines of perforations through this seat; 17^a, a longitudinal guide-rib at each side of the valve-seat formed upon the upper face of the main valve; 18, a cut-off valve in the form of a plate sliding upon the top of the main valve between the guide-ribs thereon; 19, lines of ports through the cut-off valve, these ports being of such size and disposition that under one condition of adjustment of the cut-off valve endwise relative to the main valve these ports will register with the ports 16^b of the main valve, while in another position of the cut-off valve relative to the main valve these ports in the cut-off valve will be closed by the bridges 16^a; 20, the front bonnet of the main-valve seat; 21, a cut-off valve-stem passing through this bonnet in the line of the axis of the main valve, the inner end of this stem being secured to the cut-off valve; 22, a housing disposed forward of and supported by the bonnet 20, this housing having a guideway, preferably cylindrical, in the line of the axis of the main valve; 23, a plug fitted to slide longitudinally in the housing 22; 24, a coupling uniting the outer end of the cut-off valve-stem with the plug 23; 25, a mortise extending horizontally through plug 23; 26,

a cam-bar passing through the mortise in the plug and fitted to slide horizontally in the housing of the plug, this bar presenting inner and outer cam-surfaces at the mortise in the plug; 27, antifriction-rolls mounted in the plug within the mortise and straddling the cam-bar; 28, an actuating-rod connected with the cam-bar and adapted to impart reciprocating motion to it, as from an eccentric on the engine-shaft; 29, a rod connected with the cam-bar and adapted to serve in transmitting motion from the cam-bar to a similar cam-bar pertaining to the valve at the other end of the cylinder, and 30 a bolted joint of separation in the housing 22 in a plane at right angles to the axis of the valve.

In the operation of the device the main valve and cut-off valve rock in unison, the rocking motion of both valves being derived from main-valve stem 11. The main valve performs its function of periodically admitting steam to the cylinder, as usual. If cam-bar 26 be assumed as stationary and in its farthest inward position, the opposite of that shown in Fig. 3, the ports through the main valve will be uninterfered with by the cut-off valve, and the distribution of steam to the cylinder would be exclusively under the control of the main valve. If, on the other hand, the cam-bar be in the outward position, (indicated in Fig. 3,) the ports through the main valve will be closed by the cut-off valve and no steam can reach the cylinder. If, however, when the main valve opens the ports to the cylinder the cam-bar is in its inward position, so that the ports through the main valve were open, steam may pass to the cylinder, and if at any time after the main valve has thus admitted steam to the cylinder the cam-bar be shifted to its outer position the cut-off valve would close the ports through the main valve and no more steam would be admitted to the cylinder. The cam-bar is to be reciprocated once at each oscillation of the main valve, the result being that when the main valve opens the cylinder-ports the flow of steam is uninterfered with by the cut-off valve, but later, before the main valve closes, the ports through it are closed by the cut-off valve and the flow of the steam to the cylinder is arrested. The point of cut-off will thus depend upon the time at which the cut-off valve is shifted to its cut-off position, and this time may be under the control of an ordinary governor.

The outer member of the housing 22 may be removed, thus permitting the ready inspection and dissection of the parts exterior to the bonnet 20. It is preferable that cut-off valve-stem 21 be secured firmly in the cut-off valve and be swiveled in the plug 23 by means of the coupling 24, so that the cut-off valve-stem may rock with the valves. The cut-off valve may be withdrawn from the valve-seat when bonnet 20 is removed, and

the main valve may be withdrawn when either bonnet is removed. In the illustration the ports through the main valve and the ports in the cut-off valve are arranged in two lines, the purpose being to secure liberal port-openings with comparatively small valve movements. Two lines of ports are likely to be found adequate under most all practical conditions and under all conditions will be found preferable to a single line of ports.

I claim as my invention—

1. In a valve-engine, the combination, substantially as set forth, of a cylindrical valve-seat having a port leading to a cylinder, a bonnet closing one end of the valve-seat, a main valve fitted to rock in said seat and provided with a longitudinal line of ports extending through it and having a valve-seat formed upon its back, a cut-off valve fitted to slide longitudinally upon the seat formed on the back of the main valve and having a longitudinal line of ports extending through it, a valve-stem connected with said cut-off valve and projecting through said bonnet, and means for rocking the two valves in unison and for reciprocating the cut-off valve relative to the main valve.

2. In an engine-valve, the combination, substantially as set forth, of a cylindrical valve-seat having a port leading to a cylinder, bonnets closing the ends of said seat, a main valve fitted to rock in said seat and provided with a longitudinal line of ports extending through it and having a valve-seat formed upon its back, a cut-off valve fitted to slide longitudinally upon the seat formed upon the back of the main valve and having a longitudinal line of ports extending through it, a valve-stem connected with said cut-off valve and projecting through one of said bonnets, a cam-bar mounted for reciprocation in a line at right angles to the axis of the main valve, connections for reciprocating the cam-bar, and connections between the valve-stem and cam-bar whereby the reciprocations of the cam-bar effect the reciprocation of the cut-off valve relative to the main valve.

3. In an engine-valve, the combination, substantially as set forth, of a cylindrical valve-seat having several parallel ports leading to a cylinder, bonnets closing the ends of said seat, several main valves fitted to rock in said seat and provided with several longitudinal lines of ports extending through it and having a valve-seat formed upon its back, a cut-off valve fitted to slide longitudinally upon the seat formed upon the back of the main valve and having a longitudinal line of ports extending through it, a valve-stem connected with said cut-off valve and projecting through one of said bonnets, a cam-bar mounted for reciprocation in a line at right angles to the axis of the main valve, connections for reciprocating the cam-bar,

and connections between the valve-stem and cam-bar whereby the reciprocations of the cam-bar effect the reciprocation of the cut-off valve relative to the main valve.

5 4. In an engine-valve, the combination, substantially as set forth, of a cylindrical valve-seat having a port leading to a cylinder, longitudinal guide-ribs carried by the main valve at each side of the valve-seat
10 formed upon its back, a cut-off valve fitted to slide longitudinally between the guide-ribs and upon the seat formed upon the back of the main valve and having a longitudinal line of ports extending through it, a valve-stem connected with said cut-off valve and projecting through one of said bonnets, a cam-bar mounted for reciprocation in a line at right angles to the axis of the main valve, connections for reciprocating the cam-bar,
15 and connections between the valve-stem and cam-bar whereby the reciprocations of the cam-bar effect the reciprocation of the cut-off valve relative to the main valve.

5 5. In an engine-valve, the combination, substantially as set forth, of a cylindrical valve-seat having a port leading to a cylinder, bonnets closing the ends of said seat, a main valve fitted to rock in said seat and provided with a longitudinal line of ports extending through it and having a valve-seat formed upon its back, a cut-off valve fitted to slide longitudinally upon the seat formed upon the back of the main valve and having a longitudinal line of ports extending through it, a valve-stem connected with said cut-off valve and projecting through one of said bonnets, a housing having a guideway in prolongation of the line of said stem, a plug mounted for reciprocation in said guideway, connections
20 between said valve-stem and plug, a cam-bar mounted for reciprocation in said housing in a plane at right angles to the axis of the main valve, and connections between the cam-bar and plug whereby the reciprocations of the cam-bar effect the reciprocation of the cut-off valve relative to the main valve.

6 6. In an engine-valve, the combination, substantially as set forth, of a cylindrical valve-seat having a port leading to a cylinder, bonnets closing the ends of said seat, a main valve fitted to rock in said seat and provided with a longitudinal line of ports extending through it and having a valve-seat formed upon its back, a cut-off valve fitted to slide longitudinally upon the seat formed upon the back of the main valve and having a longitudinal line of ports extending through it, a valve-stem connected with said cut-off valve and projecting through one of said bonnets, a housing having a guideway in prolongation of the line of said stem, a plug mounted for reciprocation in said guideway, a swivel-coupling uniting said valve-stem and plug, a cam-bar mounted for reciprocation in said housing in a plane at right angles

to the axis of the main valve, and connections between the cam-bar and plug whereby the reciprocations of the cam-bar effect the reciprocation of the cut-off valve relative to the main valve.

7 7. In an engine-valve, the combination, substantially as set forth, of a cylindrical valve-seat having a port leading to a cylinder, bonnets closing the ends of said seat, a main valve fitted to rock in said seat and provided with a longitudinal line of ports extending through it and having a valve-seat formed upon its back, a cut-off valve fitted to slide longitudinally upon the seat formed upon the back of the main valve and having a longitudinal line of ports extending through it, a valve-stem connected with said cut-off valve and projecting through one of said bonnets, a housing having a guideway in prolongation of the line of said stem, a transversely-mortised plug fitted to slide in said guideway, connections between said valve-stem and plug, a cam-bar fitted to slide transversely through said housing and mortised in a path at right angles to the axis of the main valve, and antifriction-rollers carried by said plug and straddling said cam-bar.

8 8. In an engine-valve, the combination, substantially as set forth, of a cylindrical valve-seat having a port leading to a cylinder, bonnets closing the ends of said seat, a main valve fitted to rock in said seat and provided with a longitudinal line of ports extending through it and having a valve-seat formed upon its back, a cut-off valve fitted to slide longitudinally upon the seat formed upon the back of the main valve and having a longitudinal line of ports extending through it, a valve-stem connected with said cut-off valve and projecting through one of said bonnets, a housing having a guideway in prolongation of the line of said stem and having also a guideway at right angles to and intersecting the first-mentioned guideway, a mortised plug sliding in the first-mentioned guideway, a connection between said valve-stem and plug, a cam-bar mounted to slide in the last-mentioned guideway and through the mortise in the plug, engaging surfaces carried by the plug and straddling the cam-bar, and a bolted joint of separation in said housing at right angles to the axis of the first-mentioned guideway and in the general plane of the last-mentioned guideway.

9 9. In an engine-valve, the combination, substantially as set forth, of a cylindrical valve-seat having several parallel ports leading to a cylinder, a first bonnet closing one end of said seat, a main valve fitted to rock in said seat and provided with several longitudinal lines of ports extending through it and having a valve-seat formed upon its back, a main valve stem journaled in said bonnet and engaging said main valve within said valve-seat, a rocker-arm on the outer portion of

said main-valve stem, a cut-off valve fitted to slide longitudinally upon the seat formed upon the back of the main valve and having several longitudinal lines of ports extending
5 through it, a second bonnet closing the remaining end of said valve-seat, a cut-off-valve stem connected with said cut-off valve and projecting outwardly through said second bonnet, a housing supported by said second
10 bonnet and having a first guideway in prolongation of the line of said cut-off-valve stem and having a second guideway at right

angles to and intersecting the first guideway, a mortised plug fitted to slide in the first guideway, a coupling uniting the cut-off- 15 valve stem with the plug, a cam-bar fitted to slide in the second guideway, and rolls carried by said plug and straddling the cam-bar.

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