

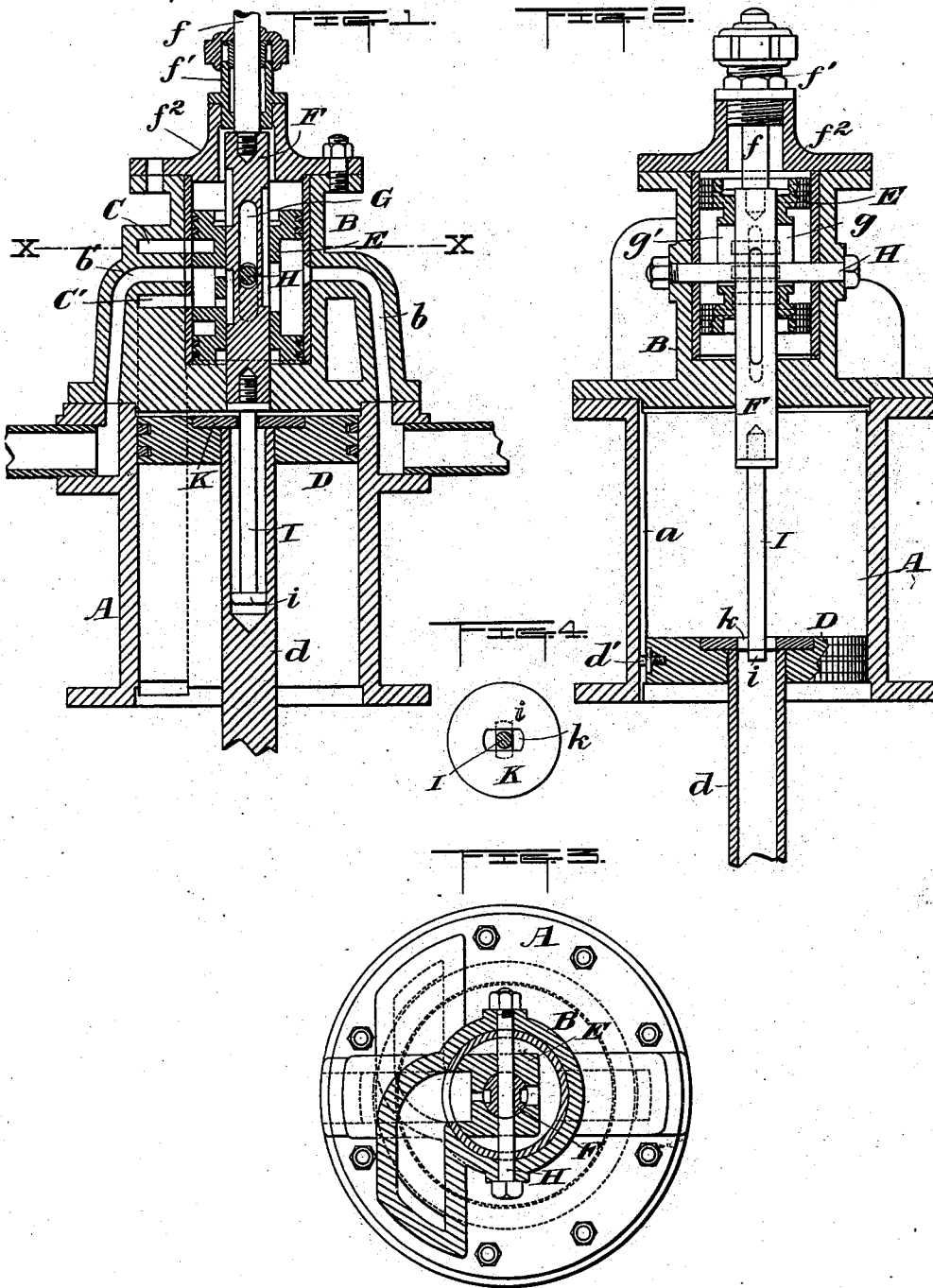
(No Model.)

W. CRAIG.

VALVE GEAR FOR DIRECT ACTING ENGINES.

No. 506,359.

Patented Oct. 10, 1893.



Witnesses.
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UNITED STATES PATENT OFFICE.

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VALVE-GEAR FOR DIRECT-ACTING ENGINES.

SPECIFICATION forming part of Letters Patent No. 506,359, dated October 10, 1893.

Application filed August 3, 1893. Serial No. 482,321. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM CRAIG, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful
5 Improvement in Valve-Gear for Direct-Acting Engines, of which the following is a specification.

My invention relates to an improvement in valve gear for direct-acting engines in which
10 a main valve actuated by the motor fluid for the induction and eduction of said fluid to the cylinder on opposite sides of the piston is under the control of a spindle or auxiliary valve connected with the piston.

15 The object of my invention is to provide improved means for securing the valve spindle or auxiliary valve and the main valve which slides thereon in their proper position within the steam-chest and to further provide an im-
20 proved connection between the engine piston and the pilot-rod connected with said spindle or valve.

A practical embodiment of my invention is represented in the accompanying drawings, in which—
25 which—

Figure 1 is a central longitudinal sectional view of the cylinder and steam-chest of an engine, showing the main valve and the auxiliary valve in section. Fig. 2 is a view of the
30 same in longitudinal section in a plane transverse to that in which Fig. 1 is taken, showing the main valve in section and the auxiliary valve in elevation. Fig. 3 is a transverse section approximately in the line $x x$
35 of Fig. 1. Fig. 4 represents a transverse section of the pilot-rod and a plan of the plate by which it is connected to the engine piston.

A designates the engine cylinder.

The main steam-chest is denoted as a whole
40 by B and is secured at the end of the cylinder A as is usual. A steam inlet port b enters the side of the steam-chest and ports C, C' lead from the side of the steam-chest to opposite ends of the cylinder A for the trans-
45 mission of steam to the opposite sides of the engine piston D. An exhaust port b' leads from the side of the steam-chest intermediate of the ports C and C'.

50 The main valve actuated by the motor fluid is denoted by E. It is located within the chest B and slides therein upon a vertically movable spindle F which as represented con-

stitutes the auxiliary valve. The said spindle or valve F has a connecting rod f at its top which extends through a stuffing box f' 55 at the top of the cap f^2 which covers the top of the steam-chest. The valve E is provided as usual with ports for transmitting the steam from the inlet port b to the ports C and C' and with a suitable recess for connecting each
60 of said ports C and C', alternately with the exhaust b' . The said valve E and spindle or auxiliary valve F are also provided with co-acting ports for admitting the steam to and
65 exhausting it from the opposite ends of the chest or casing B to slide the said valve E within the chest or casing as is common. These general features may be seen for ex-
70 ample in United States Letters Patent No. 485,787, granted to me November 8, 1892.

In my present structure the spindle or auxiliary valve F is provided with an elongated slot G, extending centrally through it, the slot being of sufficient length to permit its
75 necessary vertical movement. The main valve E has also formed through it, upon opposite sides of the spindle or valve F, with elongated slots g, g' , adapted to register with the slot G in the said spindle or valve. The
80 said spindle or auxiliary valve and main valve are held in their relative positions by means of a stationary bolt H which extends through their respective slots and also through
85 the opposite walls of the chest or casing B, as is clearly indicated in Fig. 2. The said bolt being supported at both ends in the steam-chest makes a substantial guide for
90 both the main valve and the spindle or auxiliary valve which may be readily renewed whenever it becomes worn and which is not liable to become broken or otherwise dis-

95 arranged. The bottom of the spindle or auxiliary valve F is connected by means of a pilot-rod I and catch-plate K with the rod d of the engine piston D. This connection is made with
100 a view of rendering the removal of the pilot-rod from the piston rod d simple and convenient without cutting away the plate or piston-rod at the face of the piston to any in-
jurious extent and without the removal of the steam-chest E. This connection is made as follows: The piston rod d is made hollow for a considerable distance from the face of

the piston D, as is usual, and at the face of the piston D the catch-plate K is secured to the piston over the hollow end of the rod *d*. The plate K is provided with an oblong slot *k* and the pilot-rod I which is attached to the spindle F to be turned therewith is provided with an oblong head *i* adapted, when turned in a direction to bring its longest diameter in a plane with the longest diameter of the slot *k*, to pass readily through the slot *k*, but when turned at right angles to the slot the said elongated head *i* will engage the plate K upon opposite sides of the slot *k* and will thereby lock the said pilot-rod in position with its head within the hollow piston-rod *d*. The slot *k* is arranged to extend lengthwise in the direction in which the bolt H is passed through the spindle F and main valve E, so that the said spindle with the pilot-rod attached thereto may be readily inserted in position when the cap *f*² is removed, by simply sliding the spindle with its pilot-rod down through the valve E, the said spindle being turned one-quarter way around from its normal position in which its longest diameter crosses the longest diameter of the slot *k* and after the head of the pilot-rod I has been passed through the slot *k* in the plate K, turning the said spindle and the pilot-rod back into normal position and locking the said parts by passing the bolt H through the elongated slots G, *g* and *g'*. To permit the disconnection and reconnection of the pilot-rod and piston it is only necessary to remove the cap *f*² and take out the bolt H when the spindle F and pilot-rod may be turned by taking hold of the rod *f* outside of the said cap and the valves may be lifted out from the steam-chest.

40 To prevent the piston D from working around within the cylinder A so as to bring the head *i* of the pilot-rod I to again register with the slot *k*, I provide the interior of the

cylinder A with a groove *a* and set a guide stud *d'* in the edge of the piston D with its end projecting from the edge of the piston into the groove *a*. The tendency of the piston D to rotate while reciprocating is very slight so that the wear upon the stud *d'* and walls of the groove *a* will be inconsiderable, but it is deemed necessary as a matter of precaution to provide against any possible disarrangement of the parts.

The operation of the apparatus is so well understood that a recital thereof is not thought necessary.

What I claim as my invention is—

1. The combination with the steam-chest, the reciprocating valve and the longitudinally reciprocating valve spindle within the chest, the valve and the spindle being provided with registering elongated slots, of a bolt extending through the slots in the spindle and valve and through the walls of the steam-chest and supported at both ends in the latter, substantially as set forth.

2. The combination with the engine cylinder, the piston, the steam-chest, the main valve for controlling the admission of steam to the cylinder and a central reciprocating valve-spindle on which said main valve slides, of a pilot-rod attached to said spindle and having an elongated head, a plate at the face of the piston provided with an elongated slot opposite the hollow end of the piston-rod, the said slot being arranged at right angles to the normal position of the head of the pilot-rod, and means for preventing the piston, the valve-spindle and the valve from turning from relatively normal positions, all substantially as set forth.

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Witnesses:

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