

No. 725,885.

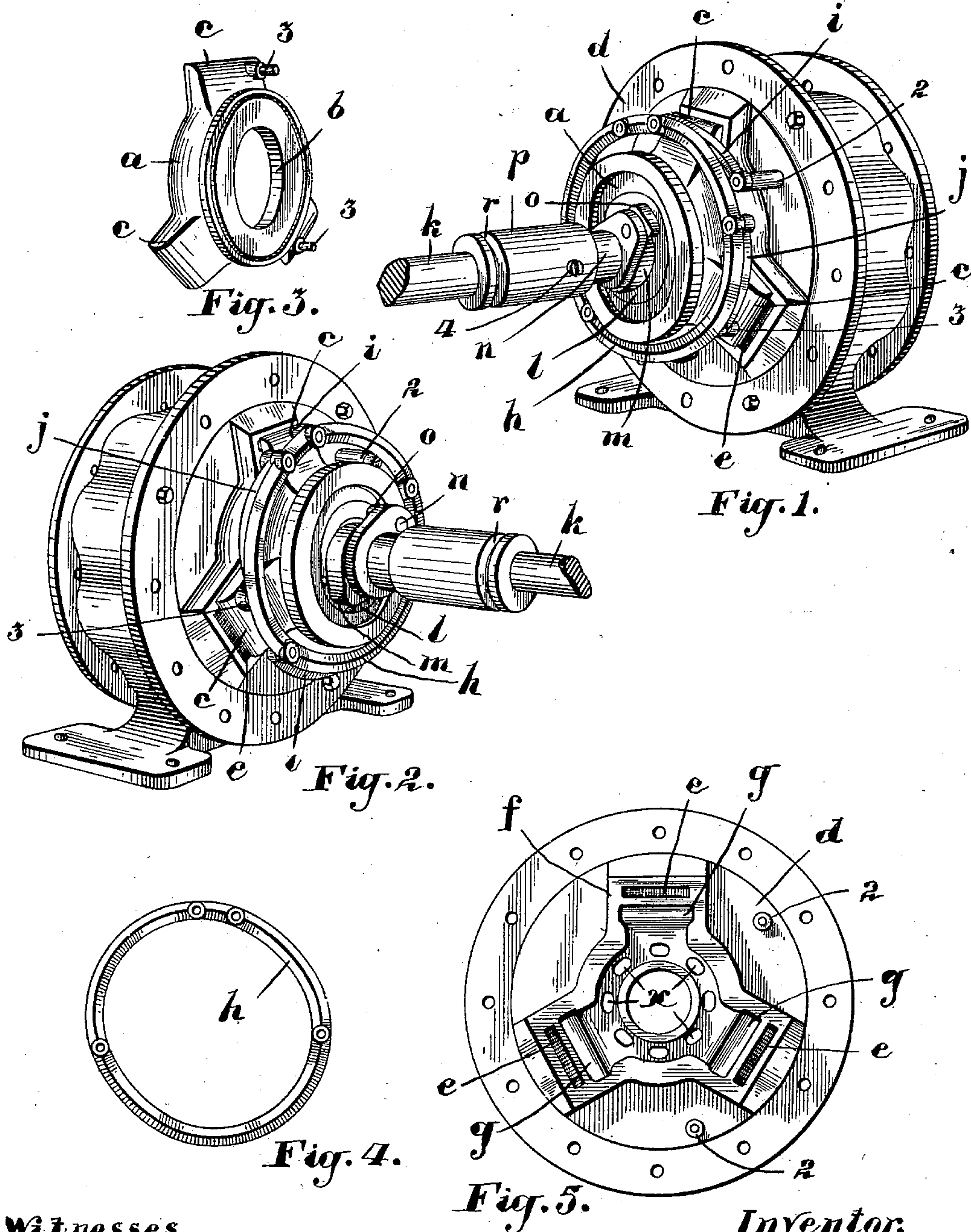
PATENTED APR. 21, 1903.

F. H. SLEEPER.
ENGINE VALVE.

APPLICATION FILED JULY 18, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.

Lloyd Blackmore

Robert Trotter

Inventor.

F. H. Sleeper
by Fetherstonhaugh & Co.
Attys

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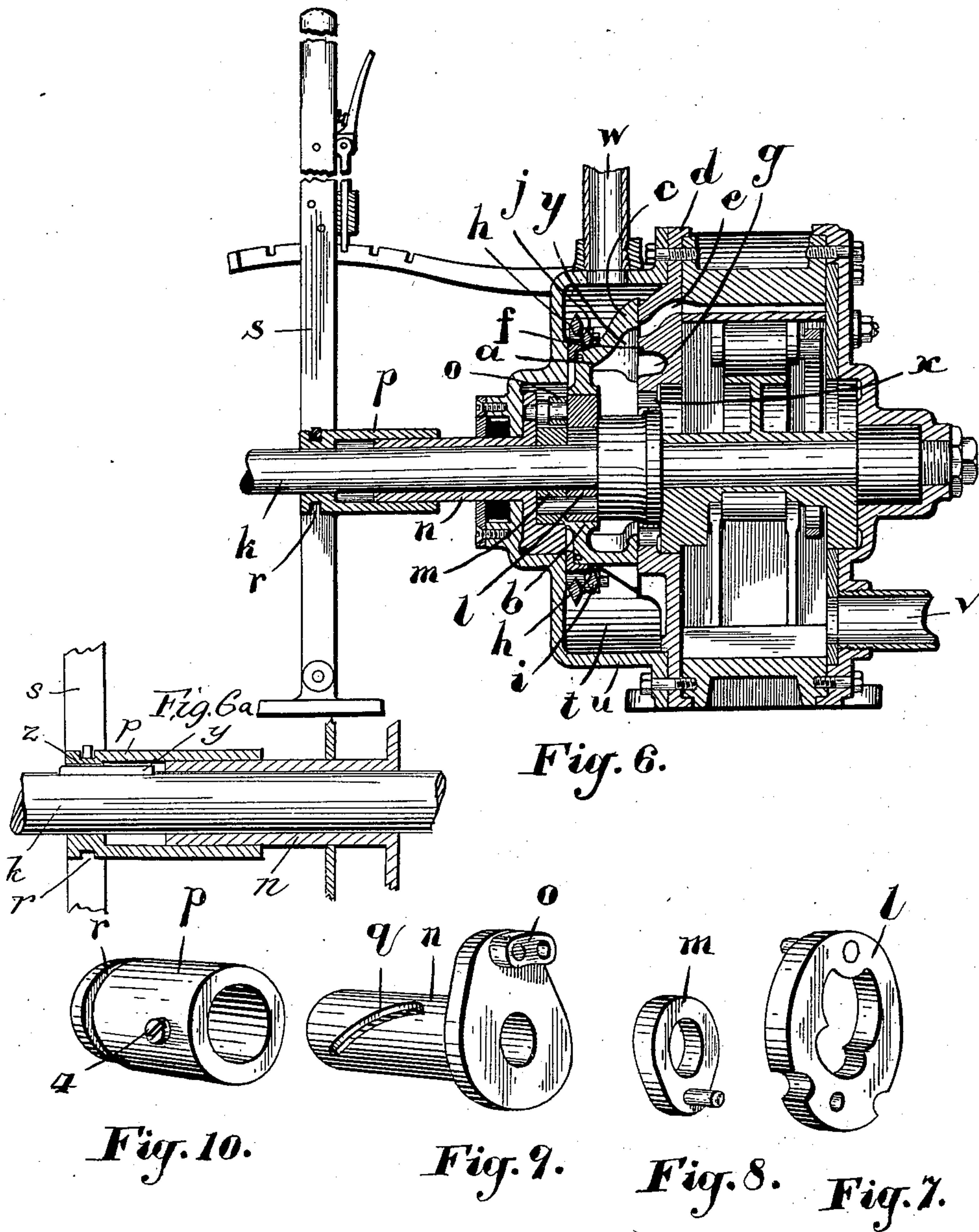
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UNITED STATES PATENT OFFICE.

FRANK HENRY SLEEPER, OF MONTREAL, CANADA.

ENGINE-VALVE.

SPECIFICATION forming part of Letters Patent No. 725,885, dated April 21, 1903.

Application filed July 18, 1902. Serial No. 116,111. (No model.)

To all whom it may concern:

Be it known that I, FRANK HENRY SLEEPER, a subject of the King of Great Britain, residing at Montreal, in the district of Montreal, Province of Quebec, Canada, have invented certain new and useful Improvements in Engine-Valves, of which the following is a specification.

My invention relates to improvements in engine-valves and gear therefor; and the object of the invention is to provide a valve and gear whereby the valve at a minimum travel will be quick and positive in its action and effect an early cut-off and whereby simplicity and economy will be secured in the construction thereof; and it consists, essentially, of a valve with its under side surface-finished where it abuts the seat and otherwise internally recessed, an eccentric and a strap therefor fixedly attached to the valve, and an oval ring secured by suitable arms to the engine-head and by suitable arms to the valve and designed to retain the valve in a defined parallel position notwithstanding the travel caused by the rotation of the eccentric, the various parts being constructed in detail, as hereinafter more particularly described.

Figure 1 is a perspective view of my device, showing an engine having three expansion-chambers and my valve and gear attached to the head thereof. Fig. 2 is a perspective view of a similar engine with my valve and gear from another position. Fig. 3 is a perspective view of the valve. Fig. 4 is a plan view of the ring. Fig. 5 is a plan view of the engine-head, showing the ports for the admission and exhaust of the steam. Fig. 6 is a sectional view of an engine having my valve and gear attached thereto and a reversing mechanism. Fig. 6^a is a detail view of sleeve *p* and connections. Fig. 7 is a perspective view of the eccentric. Fig. 8 is an intervening ring between the eccentric and reversing mechanism designed to hold the eccentric in the desired position in relation to the shaft. Fig. 9 is a sleeve having a suitable linked connection to the eccentric. Fig. 10 is a sleeve sliding over the sleeve shown in Fig. 9.

Like characters of reference indicate corresponding parts in each figure.

a is a valve which is constructed with the ring or strap *b*, surmounting the hollow or interior portion, and the projections *c*, surface-finished on their inner sides, designed to cover and uncover the ports.

d is an engine-head provided with the ports *e* equidistant radially from the center and preferably through the raised valve-seats *f*, which are surface-finished.

g represents recesses in the head in proximity to the ports *e*.

x represents entrance-ports to engine-chamber from the chamber *y* under the recessed portion of the valve.

The valve *a* is held against the engine-head *d*, so that the projections *c* in the valve may cover the ports *e*.

h is an oval ring secured by the pivotally-connected arms *i* to the engine-head at 2 and the pivotally-connected arms *j* to the valve at 3. The arms *i* and *j* are so arranged as to insure a permanent defined parallel position of the valve, so that no matter in what direction the valve may travel the defined parallel position will be the same, and yet allow the valve a limited free movement as may be directed.

k is the engine-shaft projecting from the engine and directly connected to the valve.

l is the eccentric, held to its eccentric position with the shaft *k* by its attachment to the revolving ring *m* and encircled by the strap *b*.

n is a sleeve connected to the eccentric by the link *o* diametrically opposite to the connection of the eccentric with the ring *m*.

p is a sleeve encircling the sleeve *n* and provided with a set-screw 4 in a periphery, which is designed to enter the spiral slot *q* in the sleeve *n*.

r is an annular groove made in the sleeve *p*.

The ring *m*, the sleeve *n*, and the sleeve *p* are all designed to encircle the shaft adjacent to the valve *a*.

s is a reversing-lever of an ordinary type and is designed to move the sleeve *p* longitudinally on the shaft, and thereby draw the eccentric *l* over to a different position by means of drawing the set-screw 4 along in the spiral slot *q* in the sleeve *n*.

t is the steam-chest inclosed by the outer cover or casing *u*.

v is the final exhaust-port.

w is the steam-inlet pipe.

y is a feather projecting from the shaft *k*.

z is a longitudinal groove cut in the inner periphery of the sleeve *p*. The sleeve *p* is thus prevented from any movement circumferentially on the shaft *k*.

Having described the various parts in detail, I shall now more particularly explain the operation thereof.

10 The steam is turned on to enter the steam-chest *t* from the steam-inlet pipe *w* and, finding one of the ports *e* open, enters an expansion-chamber. The position of the valve directly connected to the strap which encircles
15 the eccentric must always leave one port open—that is, providing the reversing-lever *s* is properly set. The steam admitted to the steam-chest and further admitted to the expansion-chamber in the engine causes the rotation of the shaft *k* to commence. This will
20 necessarily cause the eccentric *l* to turn, and as the eccentric *l* turns in the strap *b*, fixedly attached to the valve *a*, the latter assumes different positions as the eccentric continues
25 to turn. In the course of the revolution of the eccentric, the valve *a* moves over to close the open port *e* at which the steam was admitted, and opens one of the other ports *e*, through which the steam in the chest now
30 may enter. In the meantime the steam in the first chamber having reached its maximum expansion begins to exhaust through the same port *e*, which subsequent to the admission becomes the exhaust-port. The exhaust-steam thus finds egress through the
35 same port as it entered by reason of the valve *a* moving on its seat sufficiently to allow the exhaust-steam through the port *e* access to the interior or hollowed portion of the valve
40 *a* or specifically the chamber *y*. This exhaust-steam is now directed through the various parts in the interior of the engine, lubricating them in its passage, passing through the ports *x*, and eventually finding egress
45 through the final exhaust-port *v*. The steam is thus utilized not only for expansion, but for lubrication, and in this device it will be found that the one port answers equally well for exhaust as well as admission. The de-
50 fined parallel position of the valve is of course essential to the successful operation, and with this in view I have provided the oval ring *h*. This oval ring is moved constantly with the valve through its connection
55 thereto by the arms *j*. The connection is pivotal both to the valve and to the ring, thus allowing a limited free movement of the ring. It will be seen that the movement of the ring is controlled by the valve, while the parallel
60 position of the valve is controlled by the ring through the latter's connection to the engine-head by the arms *i*, also pivotally attached in each case. The arms attaching the ring to the valve and engine-head work in pairs *i*
65 and *j*, and as they are arranged substantially at right angles one to the other the movement of the ring is fixed in one direction, forward

and back—that is to say, while the valve assumes the different positions imparted to it by the revolution of the eccentric the ring
70 will not follow the valve in its movements, but will nevertheless have such movements as it makes controlled by the operation of the valve. This is accomplished by the right-an-
75 gular pivotal arrangement of the arms, and as the oval ring will not deviate from the parallel because of its fixity of direction in the movement the valve will also be prevented
80 from deviating from the parallel in relation to the ring through the operation of the afore-said arms in pairs. This arrangement of the
85 oval ring and the arms will probably be more clearly understood by stating that each pair of arms *i* and *j* in turn allow the valve to swing away from the ring, and as the arms
90 are stiff they will retain the valve in the same parallel position as the ring—that is, they hold it in its upward position rigidly. The recesses *g* are provided to ease the pressure on the valve of the exhaust-steam.

The reversing of the engine is accomplished in a very simple manner—namely, by pulling or pushing the lever *s*—and consequently by means of the engagement of the teat *y* in the
95 annular groove *r* move the sleeve *p* along the shaft, and as the set-screw 4 through the periphery in the sleeve *p* enters the spiral slot *q* in the sleeve *n*, the pulling or pushing
100 of the lever having connection with the sleeve *p* in the groove *r*, the set-screw will travel one way or the other along in the spiral slot and in doing so turn the sleeve *n* on the shaft,
105 and as the sleeve *n* has linked connection with the eccentric the latter is thrown over. The eccentric being now open in a different bearing position, the strap and consequently the
110 valve are moved, so as to open a different admission-port. This will insure action on the shaft from a different point, and thus cause it to revolve in the opposite direction.

The reversing mechanism here described, is shown with particular reference to my valve and gear, though I am aware that the different
115 parts and the movement thereof are not entirely novel. However, the arrangement is new, and it is essentially a salient feature to apply a successful means of reversing to a
120 valve and gear as herein described and illustrated, and to an engine of the class to which this valve is particularly applicable.

What I claim as my invention is—

1. In a valve and gear, the combination with an engine having an expansion-chamber and a port leading thereinto, of a valve having a surface-finished under side designed to
125 abut the seat and an internally-hollowed central portion terminating in a ring or strap, an eccentric, an oval ring, suitable arms pivotally connecting it to the engine-head and the valve and designed to be operated in pairs ar-
130 ranged substantially at right angles, as and for the purpose specified.

2. In a valve and gear, the combination with an engine having a series of expansion-

chambers and single ports leading thereinto, of a valve having a surface-finished under inner side, designed to abut the valve-seats surrounding the aforesaid ports, and an internally-hollowed central portion terminating in a ring or strap, an eccentric, an oval ring and arms pivotally connecting it to the engine-head and the valve, and designed to be operated in pairs arranged substantially at right angles, as and for the purpose specified.

3. In a valve and gear, the combination with an engine having expansion-chambers and single ports leading thereinto, of a valve having a surface-finished under side designed to abut the seat, and an internally-hollowed central portion, a strap or ring rigidly attached or forming part of the valve, an eccentric, an oval ring suitable arms pivotally connecting it to the engine-head and the valve, and designed to be operated in pairs arranged substantially at right angles, as and for the purpose specified.

4. In a valve and gear, the combination with an engine, having expansion-chambers and single ports leading thereinto, of a valve having a surface-finished under side designed to abut the valve-seats, and an internal recess terminating in a circular opening at the top of the valve, an eccentric designed to revolve with the engine-shaft and to turn in the aforesaid opening, a ring and arms pivotally connecting it to the engine-head and the valve and arranged in pairs substantially at right angles, as and for the purpose specified.

5. In a device of the class described, in combination an engine having one or more expansion-chambers and a single port leading into each chamber, a valve having a surface-finished under side designed to abut the valve seat or seats, an exhaust-chamber formed by the central recessed portion of the valve and the engine-head and having a suitable outlet therefrom, an eccentric revolving with the engine-shaft, a ring or strap surrounding the eccentric and fixedly attached to the valve or forming part thereof, and a ring pivotally secured to the engine-head and to the valve substantially at right angles, as and for the purpose specified.

6. In a device of the class described, a valve having a surface-finished under side, a hollowed central portion, a ring or strap, surrounding the said central portion and surrounding an opening therein, an eccentric designed to turn in the said opening and revolving directly with the engine-shaft, a ring having pairs of arms designed to pivotally connect the valve and the engine-head respectively from each side of the ring and to be arranged substantially at right angles, as and for the purpose specified.

7. In a device of the class described, a valve

having a surface-finished under side designed to abut the seat and a raised and hollowed central portion, a strap surrounding the circular opening in the said central portion and fixedly attached to the valve, means for holding the valve closely to its seat, and means for preventing the rotation of the strap, as and for the purpose specified.

8. In a device of the class described, a valve having a surface-finished under side designed to abut the seat, and a raised central portion internally recessed and provided with a circular opening therein, an eccentric, and means for preventing the movement of the valve rotatively on the eccentric, as and for the purpose specified.

9. In a device of the class described, the combination with an engine having a series of expansion-chambers therein and a suitable port to each chamber through the engine-head, of a series of valves extending from a raised and hollowed central portion having a circular opening therein, an eccentric provided with an alternate bearing and pin held by the ring in its eccentric position to the shaft, a sleeve having a spiral slot and linked connection with the eccentric, a sleeve having the annular groove and the set-screw designed to reach into the slot and a lever engaging the sleeve in the annular groove, as and for the purpose specified.

10. In a device of the class described, the combination with a ring or strap having one or more projections from its outer periphery surface-finished on their inner sides and designed to open and close admission and exhaust ports in the engine-head, an eccentric and means for preventing the movement of the valve rotatively on the eccentric, as and for the purpose specified.

11. In a device of the class described, a reversing-gear comprising a lever, the sleeve having the annular groove and the set-screw, the sleeve having the spiral slot and securely attached to a tongued ring, and the eccentric linked to the said tongued ring and provided with an alternate bearing and held in an eccentric position by the ring, as and for the purpose specified.

12. In a device of the class described, a series of valves emanating from a raised and hollowed central portion having a central opening therein designed to encircle an eccentric and suitably held to the engine-head and to their respective ports, as and for the purpose specified.

Signed at Montreal, in the district of Montreal, in the Province of Quebec, Canada, this 16th of July, 1902.

FRANK HENRY SLEEPER.

Witnesses:

LLOYD BLACKMORE,
MAY MADDEN.