

(No Model.)

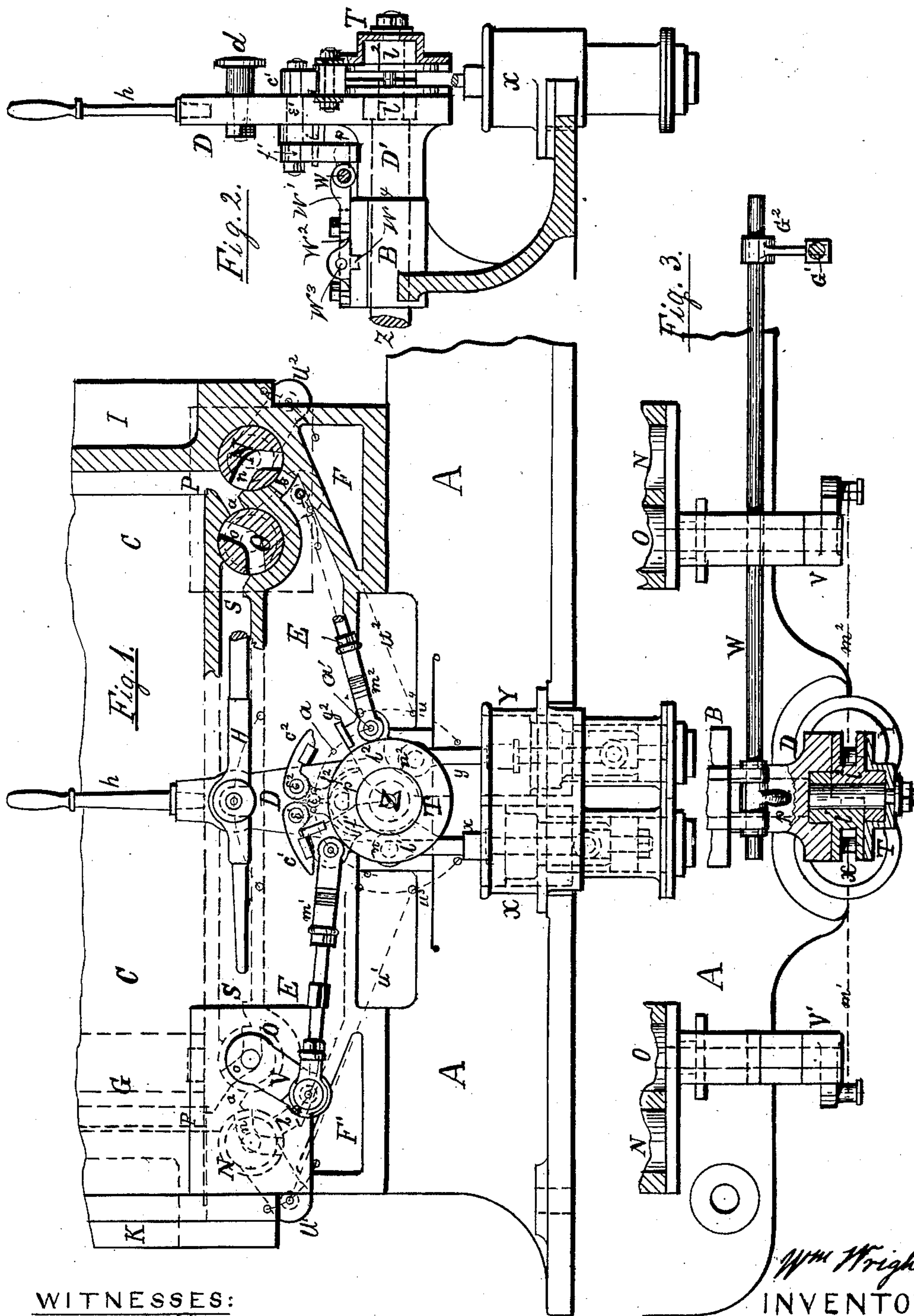
2 Sheets—Sheet 1.

W. WRIGHT.

VALVE GEAR.

No. 358,913.

Patented Mar. 8, 1887.



WITNESSES:

L. C. Hill,
H. S. Duval

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INVENTOR:

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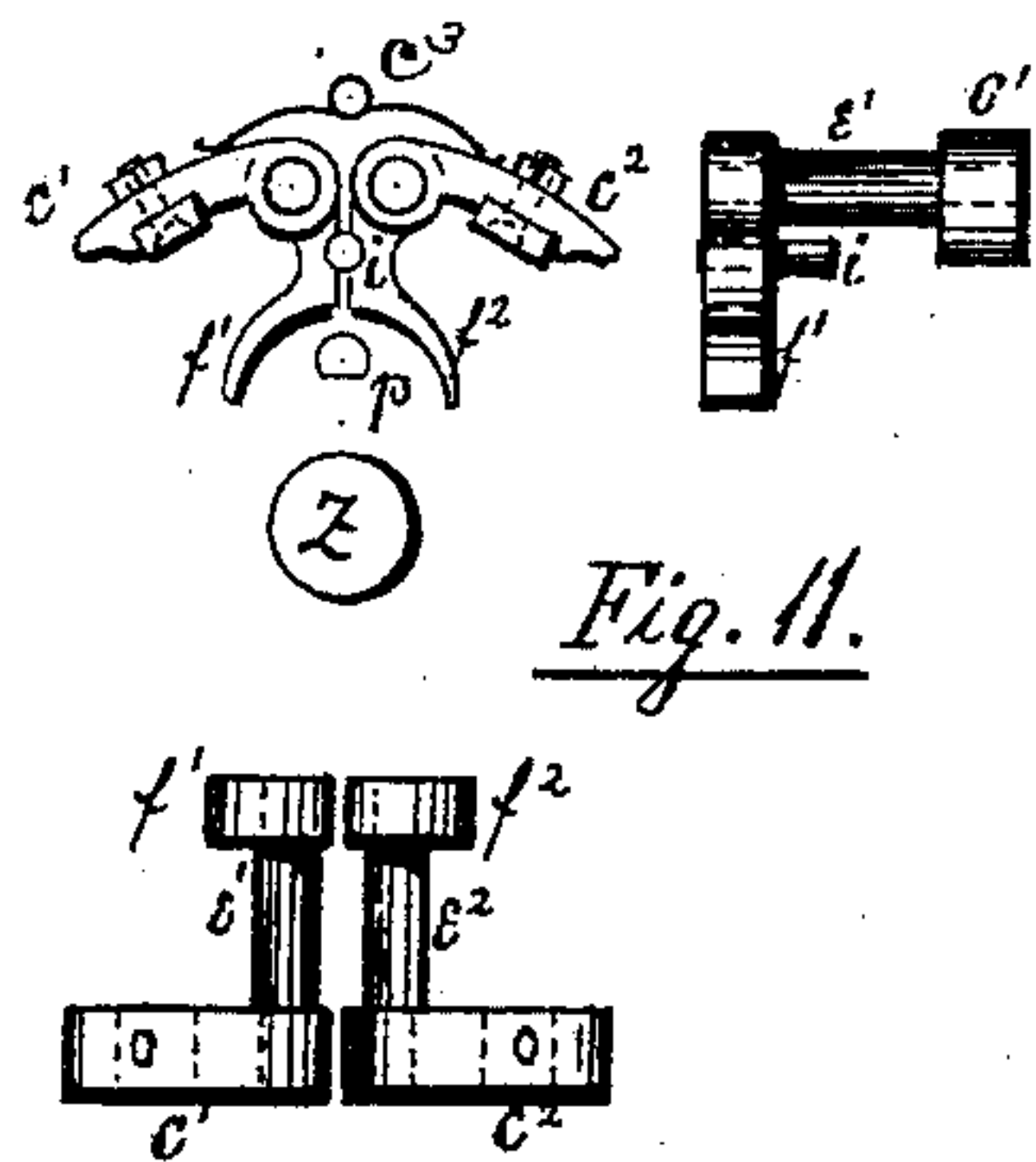
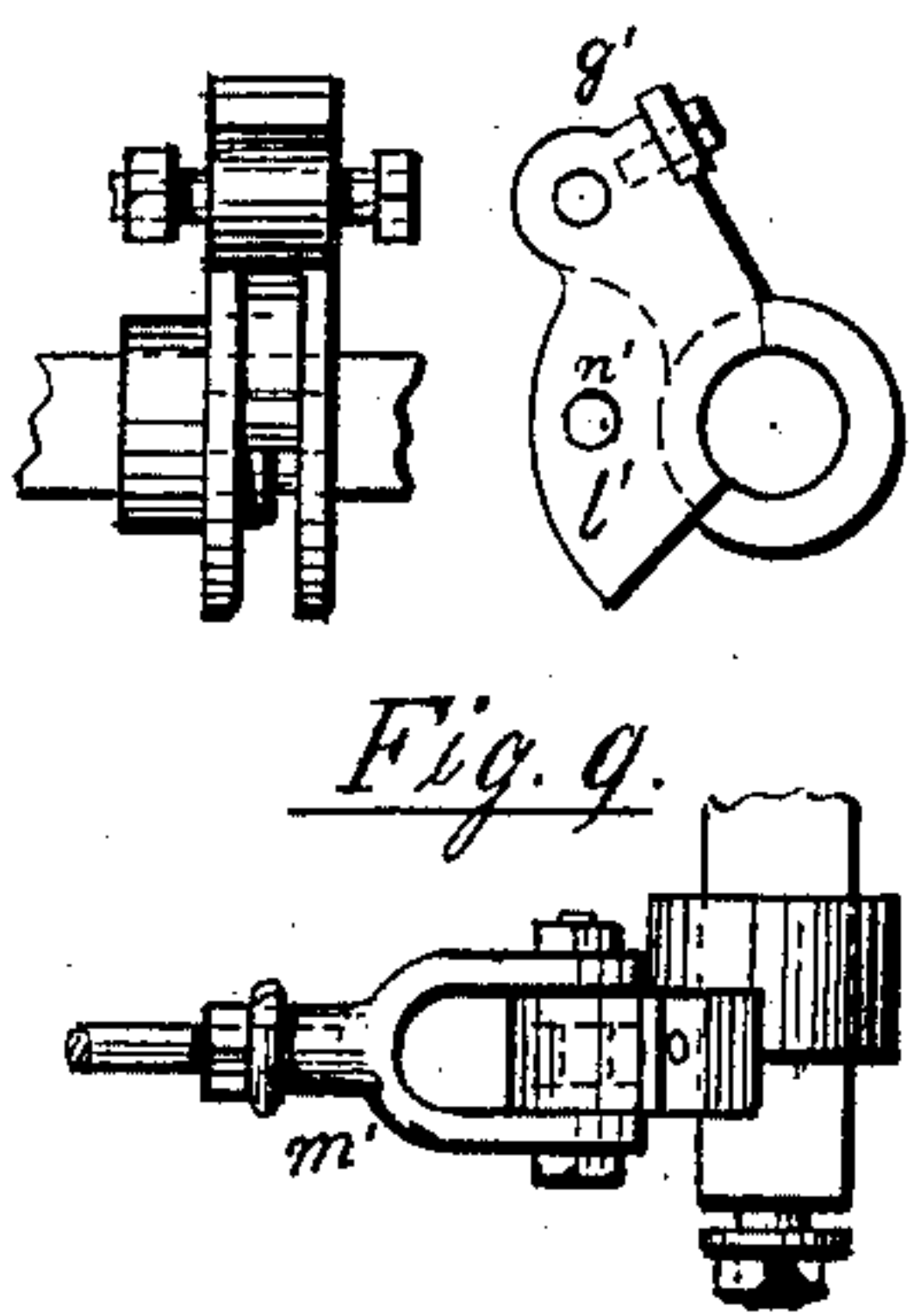
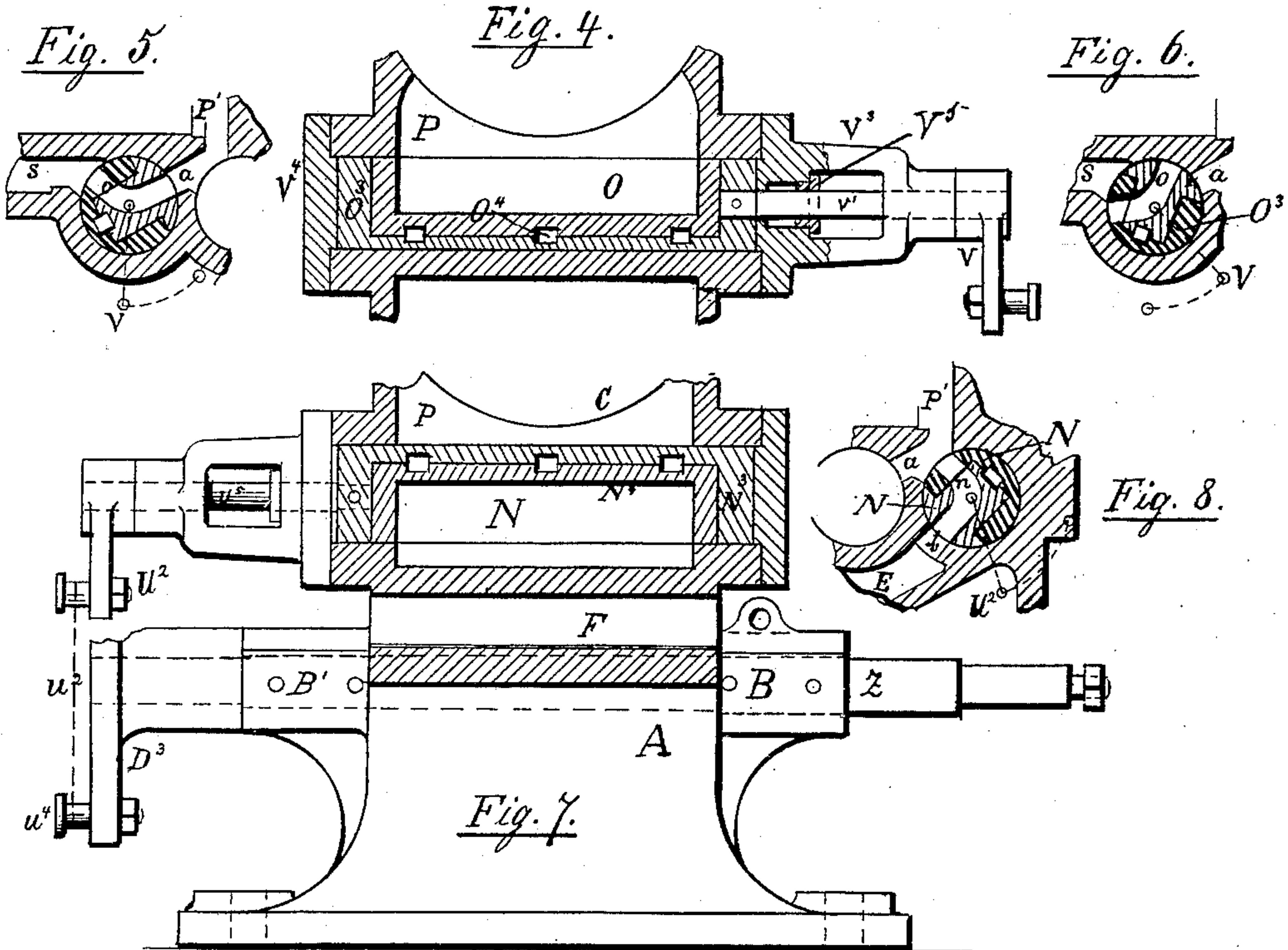
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2 Sheets—Sheet 2.

W. WRIGHT.
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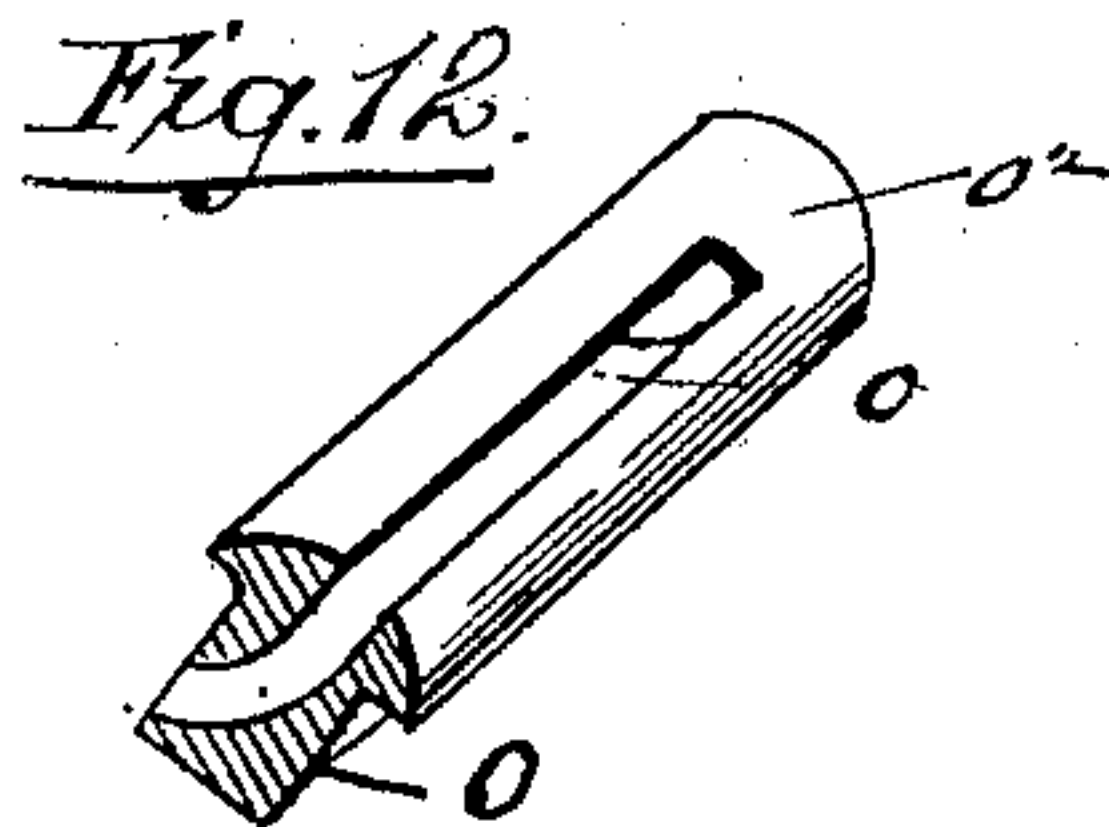
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UNITED STATES PATENT OFFICE.

WILLIAM WRIGHT, OF NEWBURG, NEW YORK.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 358,913, dated March 8, 1887.

Application filed August 27, 1886. Serial No. 212,032. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WRIGHT, a citizen of the United States, residing at Newburg, in the county of Orange, State of New York, have invented certain new and useful Improvements in Valve-Gear, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has relation to an automatic cut-off valve and gear for controlling the supply of steam to the cylinder of an engine in such a manner that the engine will run at a uniform speed of rotation without regard to the amount of work it is required to perform, so that when the load is suddenly increased or diminished the supply of steam is increased or diminished automatically, and as a consequence of the increase or diminishing of the load.

Another object in view is to provide cut-off valves of such construction as to increase their serviceability by lessening the tendency to wear in their seats, especially at or near the ports communicating therewith.

Another purpose of the invention is to devise means which shall operate the valves controlling the supply of steam without disengaging their connections with the wrist-plate and to reduce the broken connections necessarily involved to a single point in the mechanism employed.

Another feature of my invention is that the valves and valve-controlling mechanism are all located below the cylinder, the latter being provided with a single port at each end, which, by subordinate passages, communicates with either valve and with the live-steam passage or exhaust-chamber in accordance with the position of the valve.

By the construction and arrangement of parts just mentioned usual waste-room in the cylinder is reduced to a minimum, and the arrangement of the parts as a whole is exceedingly compact.

Other objects and advantages of my invention will appear in the following description, and the novel features will be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a side elevation of a cylinder and bed provided with my improved cut-off mechanism. Fig. 2 is a

side elevation of the rocker-arm, wrist-plates, and dash-pot, with a portion of the bed in section. Fig. 3 is a plan of a portion of the bed, the dash-pots, and live-steam valve-stems, a rock-shaft connected with a governor, and a horizontal section through the rocker-arm and wrist-plates. Fig. 4 is a longitudinal section of the live-steam valve, its stem and arm, together with a transverse section of the lower part of the steam-cylinder. Figs. 5 and 6 are cross-sections of the steam-valves, open and closed, respectively. Fig. 7 is a transverse section of the lower part of the cylinder, a longitudinal section of the exhaust-valve, its stem and arm being in side elevation, and the relative location of the rocker-shaft and the bed, the latter in end elevation and partly in section. Fig. 8 is a cross-section of the exhaust-valve with the port open. Fig. 9 is a group showing edge and side views and a plan of the left sectional wrist-plate. Fig. 10 is a group showing similar views of the other sectional wrist-plate. Fig. 11 is a group showing front and side views and a plan of the trip-catches, and Fig. 12 is a perspective of a portion of the valve-block.

Like letters of reference indicate like parts in all the figures of the drawings.

A represents the bed of the engine, and it has cast thereon bearings B B, at opposite sides thereof, and supports the cylinder C, which in this instance has the head I cast thereon and is provided with the opposite head K, secured in any desired manner.

G is the piston, and H the usual eccentric-rod. There is a single port, P, at each end of the cylinder, a live-steam passage, S, and an exhaust-chamber, E, with communicating passages, hereinafter described.

N N are the exhaust-valves, and O O are the supply-valves, and these are arranged so that one of each communicates at each end of the cylinder with the port P thereat, and the supply-valve O and exhaust-valve N are arranged as close to each other as practicable without weakening the construction of the cylinder. The valves are all cylindrical and fitted in bored seats arranged transversely of the cylinder, whereby the fitting of the parts is accomplished with a minimum of hand-labor and with the accuracy of machine-work.

Referring more particularly to Figs. 4, 7, and 11, a detail description of the construction of the valves will be readily understood, and a description of one will answer for all, as they are alike, except that the stems of the supply-valves project from one side, the front, (see Fig. 1,) of the engine, while the stems of the exhaust-valves project from the rear side. (See Fig. 7.) The seats having been bored below the ports P, there remains solid metal at all points, except directly at the port and its communicating passages. A cap or head, V^4 , Fig. 4, closes one end of the valve seat or bore, and the stem v' , together with a valve-shell, o^3 , which is a true cylinder, serves, by the cheaper and more accurate fitting by the lathe, to fill the bore, and has such an extended bearing beyond the port that all wear by contact with the edges of the port is avoided.

Within the cylindrical valve-shell is fitted a substantially-oblong block, O, having a port, o, which registers with a similar port in the shell. The upper portion, o^2 , of the valve-block is convex, and so set into the shell as to constitute a portion of its periphery, whereby the shell and block jointly constitute, exteriorly, the cylindrical valve which fits the cylindrical bore or valve-seat formed across the cylinder. The block, like the shell, extends beyond the longitudinal dimensions of the port P, and therefore it, like the shell, is not worn by contact with the edges of the port, and whatever wear that does occur on the convex face of the block is compensated for by one or more springs placed in grooves o^4 , formed in the bottom of the block, which constantly act to force the block against the walls of the valve-seat. A hood, V^3 , is secured in any suitable manner to the cylinder, over the end of the valve-seat, and is provided with a bearing for the valve-stem, so that it and the valve may be rocked or oscillated by its arm V.

When the valve is open, its port o communicates with the port P by means of the passage a, and directly with the live-steam passage S. These ports and passages are so relatively arranged that communication may be entirely cut off, as shown in Fig. 6, when each of the exhaust-valves communicates with the port P by means of the port n, the passage a and a passage, b, leading to the exhaust-chamber E. Suitable glands, V^5 , are provided in each of the hoods for making a steam-tight joint on each of the valve-stems.

I will now proceed to describe the mechanism which I have devised for operating the supply and exhaust valves, and this with a view of controlling the operation of the engine, to the end that its speed may be uniform notwithstanding any ordinary change in its load; or, in other words, to maintain a constant control of the supply and exhaust of steam in accordance with the requirements of the work to be performed, which may, and ordinarily does, constantly vary.

Let G' , Fig. 3, represent any rod which is

so connected with a governor as to be raised and lowered, as usual, by the action of the governor. This motion of the rod G' is communicated to a tappet or cam projection, p , by means of a rock-shaft, W, on which the tappet and a rock-arm, G^2 , are mounted. These parts are arranged contiguous to and operate upon the valve-controlling devices.

Z, Figs. 1, 2, and 7, represents a rock-shaft mounted beneath and at a right angle to the cylinder C in the bearings B, and said shaft is provided at the rear side of the cylinder with a rigidly-secured wrist-plate or rock-arm, D^3 , Fig. 7, the wrist-pins $u^3 u^4$ of which are connected to the wrist-pins $U^1 U^2$ of arms mounted upon the exhaust-valve stems by adjustable connecting-rods $u^1 u^2$, (see dotted lines, Fig. 1,) similar to the connecting-rods $m^1 m^2$. (Shown in full lines in said figure.) On the front side of the cylinder the arms V of the supply-valves O are connected by rods $m m'$ to segmental or sectional wrist-plates $l^1 l^2$, (details of which are shown in Figs. 9 and 10,) which are loosely mounted upon the shaft Z, and by means of weights or their equivalents, the dash-pots X Y (connected by rods $x y$ to the wrist-pins $n^1 n^2$ of said sectional wrist-plates) are quickly thrown in one direction to close the supply-port when demanded by the action of certain other devices, (to be described,) which determine when sufficient steam has entered the cylinder to keep the engine at the desired uniform speed regardless of any change in its work.

Each of these sectional wrist-plates is provided with a steel latch-keeper, $g' g^2$, respectively, and their hubs are offset, so as to bring the plates into a common plane when mounted on the shaft Z.

Behind the wrist-plates there is mounted rigidly upon the shaft Z a rocker-arm, D, the hub D' of which abuts against the bearing B. The arm D is provided with a wrist-pin for the connection therewith of the eccentric-rod H, which is understood to extend from an eccentric on the main shaft of the engine. It is also provided with a removable starting-bar, h .

Upon the face of the rocker-arm are two latches, $c' c^2$, rigidly secured to shafts $e' e^2$, passing through the arm and having at their rear ends depending arms $f' f^2$, which are arranged over and astride of the cam projection or arm p of the rock-shaft W, which, as before described, is connected with the governor. The contour of the arms $f' f^2$ should be such as to permit of the oscillations of the rocker-arm D within certain limits without lifting the latches $c' c^2$ from the sectional wrist-plates $g' g^2$; as this function of the arms is brought into operation by the cam p through the operation of the governor.

The rod W is supported by a bracket, W' , which is adjustably mounted upon the bearing B, the bracket being slotted at W^2 , Fig. 2, and mounted upon the plate, having opposite lugs W^3 and a rib, W^4 , fitted in transverse grooves formed in the upper surface of the bearing,

whereby the position of the cam projection p with relation to the arms f' f'' of the latches c' c'' may be adjusted in order to give accuracy and sensitiveness to the operation of these devices in tripping the latches, as hereinafter described.

A coiled or other spring, c^3 , Fig. 11, may be arranged above the latches with its opposite ends resting upon the latches outside of their pivots, so that instead of depending upon gravity alone to cause the latches to fall such motion thereof will be rendered more positive.

The operation of the mechanism above described is as follows: The rocker-arm D is oscillated by the eccentric-rod H and moves in like manner the shaft Z, upon which it is rigidly mounted, which shaft, by means of the arms D³ thereon and the connections u' u'' , operates the exhaust-valves N N by the arms U' U'', while the supply-valves O O are operated by the arms V, secured thereto and connected by the adjustable rods m' m'' of the sectional wrist-plates l' l'' when either one of the same is connected to the rocker-arm by means of one of the latches c' c'' , pivoted thereon. The action of these connecting-rods (by reason of their relative proportions and positions to the position of the axial line of the shaft Z and of the point of the pivotal connection of the rods of the sectional wrist-plates) is in the nature of a toggle-lever, in that as the wrist-plate and the connecting-rod approach a straight line extending from the center of the shaft Z to the center of the arm V of the valve the speed of movement decreases, so that the supply is quickly cut off while the exhaust-port is slowly closed. So, also, when either of the latches are tripped, as hereinafter described, there is a quick action in the cut-off. As the wrist-plate pivot n' n'' , Fig. 1, is suddenly forced down by the dash-pot Y, or its equivalent, a weight, the point of pivotal connection of the connecting-rod m' with the sectional wrist-plate quickly moves from the point a to the point a' , thereby utilizing the rapid movement of the toggle-connection in suddenly closing the supply when the latch c'' is raised from the catch g'' of the wrist-plate l'' . Suppose, for example, that the engine is running at a uniform speed with a uniform load, and that the latch c'' is in contact with the catch g'' , and suppose that a sudden decrease in the load occurs. Now, the governor immediately responds to the increased speed of the engine, which is a natural consequence of the decrease of the load, and the said governor causes the rock-shaft W to rise, bringing the cam projection p thereof into contact with the arm f'' of the latch c'' , so that in the oscillation of the rocker-arm said latch is thrown out of connection with the catch g'' of the sectional wrist-plate l'' , which, by the action of the dash-pot, is suddenly brought down to cut off the supply. The latches and their arms being duplicated, this action of cutting off the supply will occur, when required, during the oscillation of the rocker-arm in either direc-

tion, so that either supply-valve is always under control of the governor.

It is apparent that I may locate the shaft Z at any other place than below and at the center of the cylinder, and yet employ other novel features of my invention therewith—such as, for example, my continuously valve-connected sectional wrist-plates, together with means for connecting and disconnecting the same from a moving element operated by an eccentric, whereby the valves and their controlling devices are detachably connected at but one point, and that a central one common to all.

Having thus fully described my invention and its operation, what I claim is—

1. A cylinder provided with a single port at each end and with two transverse completely cylindrical valve-seats, a live-steam passage communicating with one valve-seat, an exhaust-chamber communicating with the other valve-seat, and subordinate passages communicating the one with the port and live-steam valve-seat and the other communicating between the exhaust-valve seat and exhaust-chamber, substantially as specified.

2. A cylinder provided with transverse completely cylindrical valve-seats at each end and below its bottom and with communicating live-steam and exhaust passages, in combination with a transverse shaft connected at one end with the exhaust-valves and provided at the other end with sectional wrist-plates connected with the supply-valves, and sectional wrist-plate-operating devices connected with and operated by an eccentric-rod, substantially as specified.

3. The combination, with the exhaust and supply valves of a cylinder, of a transverse shaft arranged below the cylinder and directly connected with the exhaust-valves, a rocker-arm mounted upon the shaft and provided with latches, and sectional wrist-plates mounted loosely on the shaft and connected with the supply-valves, and connecting devices arranged between the governor and the latches to release the same, substantially as specified.

4. In an engine, the combination of a rock-shaft arranged below the cylinder and carrying sectional wrist-plates connected with the supply-valves, a rocker-arm carrying latches and connected with the eccentric-rod, a dash-pot or its equivalent connected with each sectional wrist-plate, and devices arranged between the latches and governor for automatically operating said latches, substantially as specified.

5. The combination, in a governor, of a rock-shaft provided with a cam projection arranged in the path of latches pivoted to a rocker-arm connected with an eccentric-rod, and plates connected with the supply-valves and arranged on the rocker-arm shaft under the latches, substantially as specified.

6. A valve consisting of a substantially cylindrical body portion having a rectangular opening therein, a valve-block adapted to fit

said opening and to complete the cylindrical contour of the valve as a whole, the body portion and block being provided with a registering-port, substantially as specified.

- 5 7. The combination, with the cylinder having a port at the end thereof and having a completely cylindrical valve-seat arranged transversely of the cylinder and extending at each end beyond the port, of a valve comprising a completely cylindrical body portion or shell extending at each end beyond the port, and having an oblong opening terminating within the ends of the valve, a valve-block adapted to fit said opening and to complete the cylindrical contour of the valve, and
10 15 a spring for forcing the valve-block against the valve-seat, substantially as specified.

8. The combination, with the eccentric-rod and with the governor of an engine, of a rocker-shaft connected with the eccentric-rod, sectional wrist-plates connected with the supply-valves, latches mounted on the rocker-arm above the wrist-plates, dash-pots connected with the wrist-plates, and a latch-operating rocker-shaft connected with the governor, whereby steam may be cut off independently of the eccentric, substantially as specified. 20 25

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

WM. WRIGHT.

Witnesses:

REEVE KETCHAM,
W. F. CASSEDY.