

T. HALL.
VALVE GEAR.

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1,050,213.

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Fig. 1

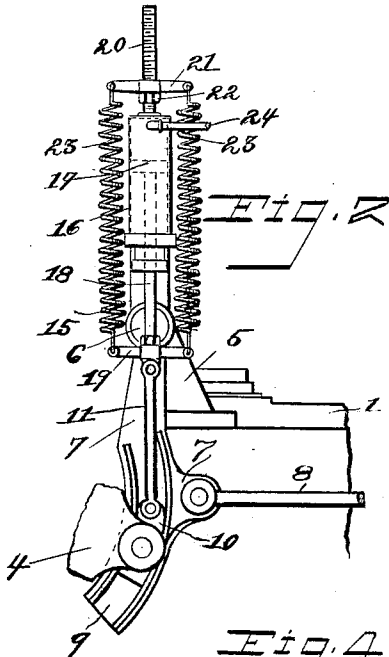
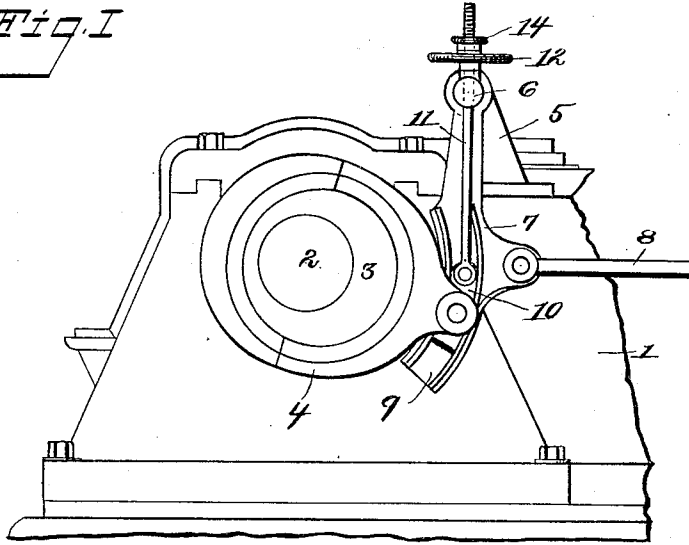


Fig. 3

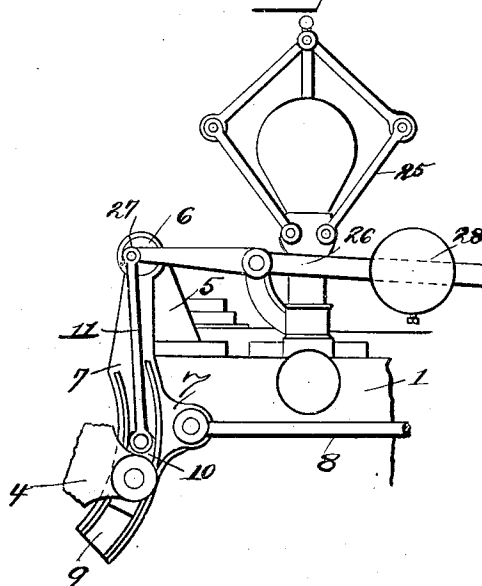
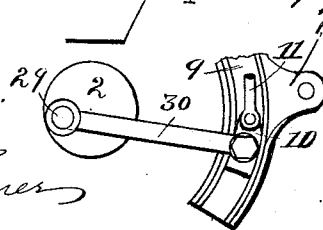


Fig. 4



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UNITED STATES PATENT OFFICE.

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VALVE-GEAR.

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To all whom it may concern:

Be it known that I, THOMAS HALL, a citizen of Canada, residing at Ridgway, Elk county, Pennsylvania, have invented certain new and useful Improvements in Valve-Gears, of which the following is a specification.

My invention relates to valve gears for steam engines, and particularly to an improved means for varying the point of cut-off in engines provided with a positive valve gear.

The annexed drawing and the following description set forth in detail approved methods of carrying out the invention, such disclosed modes, however, constituting but some of the various ways in which the principle of the invention may be used.

The invention will be readily understood from the following description taken in connection with the accompanying drawing in which:—

Figure 1 is a side elevation of part of an engine equipped with my improved device: and Figs. 2, 3 and 4 are side elevations of modified forms of the invention.

In the drawing, and referring to Fig. 1 only:—1, indicates the bed plate: 2, the shaft: 3, an eccentric fixed on the shaft: 4, the eccentric strap: 5, a bracket bolted to the bed plate 6, a shaft journaled in this bracket: 7, an arm suspended from shaft 6 and fixed thereto: 8, a rod to connect arm 7 with the valve: 9, a segmental slot provided on the face of arm 7: 10, a block slidable in slot 9, and to which is attached an extension of the eccentric strap: 11, a rod attached to block 10 and extending loosely through a slot in the outer end of shaft 6: 12, a hand-wheel threaded on rod 11 above shaft 6: and 14, a lock nut on rod 11.

Depression of rod 11 by means of the hand-wheel lowers the pivotal point of the eccentric strap in the slotted arm. This shifts the eccentric strap with relation to the eccentric, opposite to the direction of rotation of the eccentric, and, accordingly, the angle of advance is increased and cut-off will occur earlier in the stroke. Lowering of the block in the slot likewise increases the leverage of the slotted arm and thus reduces the arc of its movement, and, since the rod 8 connects the valve with the

arm at a fixed point, the travel of the valve is reduced to correspond with the variation of the point of cut-off.

Referring to the modification shown in Fig. 2:—15, indicates an extension arm of bracket 5: 16, a cylinder supported by arm 15: 17, a piston working in the cylinder: 18, the piston rod, which is connected to rod 11 by a pivot near the axis of shaft 6: 19, a cross-bar fixed on the piston rod: 20, a threaded rod projecting from the upper end of the cylinder: 21, a cross-bar loose on rod 20: 22, a nut threaded on rod 20 under cross-bar 21: 23, springs connecting cross-bars 19 and 21: and 24, a pipe to connect the cylinder with a source of fluid pressure supply.

The modification shown in Fig. 2 is designed for use where the boiler pressure or a fluid pressure produced by the engine, or otherwise, varies greatly. If the pressure increases, it will force the piston downward, thus shifting the eccentric strap backward and effecting an earlier cut-off and a decreased valve travel. By means of nut 22, cross-bar 21 may be raised or lowered, thus varying the tension of the springs and adjusting the block in the slot to give desired speed at a given pressure. The piston will then automatically maintain that speed under variations of the steam pressure.

Referring to Fig. 3:—25, indicates a fly-ball governor of a common type adapted to be driven from the shaft: 26, the governor arm: 27, a pivot at one end of the governor arm and to which is attached rod 11, this pivot being in substantial alinement with shaft 6: 28, a weight slidable on the opposite end of the governor arm.

The governor will automatically maintain a uniform speed under varying load by raising or lowering the block in the slot. The device may be adjusted to maintain any desired speed by shifting the weight on the governor arm.

It will be noted that in the adaptation of the device shown in Fig. 1, the slotted arm and the rod connected to the block oscillate about the same axis, consequently, slip of the block in the slot is avoided and the wear and the noise usually incident to such slip are entirely eliminated. While slip is not entirely eliminated in the adaptation shown in

Figs. 2 and 3, it is practically so, the point of connection of the piston rod and rod 11 in Fig. 2, and of the governor arm and rod 11 in Fig. 3, being substantially in alinement with shaft 6, therefore, the slip is reduced to a minimum.

I have illustrated and described my device in its application to a side crank engine. It is, however, equally well adapted to an engine of the center crank type. This modification is illustrated by Fig. 4, in which 29 is a pin in the end of the shaft, and forming the eccentric, and 30 is a rod connecting pin 29 with block 10, and serving as the eccentric strap.

It is finally to be noted that if the pivotal point 6 of the slotted arm be located below instead of above the horizontal center of the engine, the device is then adapted to allow the engine to run under instead of to run over as it has been illustrated.

I claim:—

1. In a valve-gear the combination of an eccentric, an arm rocking on a fixed point, a rod pivoted to the arm at a fixed point and adapted to be connected with a valve, a segmental slot in the arm, a block slidable in the slot, a strap on the eccentric and pivotally attached to the block, a fixed cylinder, a piston in the cylinder, a rod connecting the piston with the block, an open connection to the cylinder above the piston for a fluid from the same source as that controlled by said valve, a threaded rod projecting from the upper end of the cylinder, a nut threaded thereon, a cross-bar loose on the rod above the nut, a cross-bar fixed on the piston rod,

and springs connecting the two cross-bars, substantially as set forth.

2. In a valve-gear, in combination, a rotating shaft, an eccentric fixedly mounted on said rotating shaft, an eccentric strap engaged on the eccentric and rotatively adjustable thereon, an arm located closely adjacent to the eccentric strap and mounted to swing on a fixed point, said rocking arm having a segmental slot therein, a block slidably engaged in said slot, a pivot connection between the eccentric strap and the said block, a fixed cylinder, a piston in said cylinder, connections between said piston and the sliding block, springs acting on the piston to move the same in one direction, an open connection to the cylinder for admitting fluid to the cylinder of the same pressure as that controlled by the valve to move the piston in the opposite direction, whereby upon variation in pressure of the fluid admitted to the valve, the piston will be shifted and the sliding block will be moved in the segmental slot to change the point of pivotal connection between the eccentric strap and the rocking arm, and a rod adapted to be connected at one end with a valve and having its opposite end connected at a fixed point to the rocking arm so that the plane of movement of said rod will be constant irrespective of variations in the movement and the timing of the movement of the rocking arm due to the changes in pressure.

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Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."