

(No Model.)

G. ABRAMS & N. NILSON.

VALVE GEAR.

No. 329,525.

Patented Nov. 3, 1885.

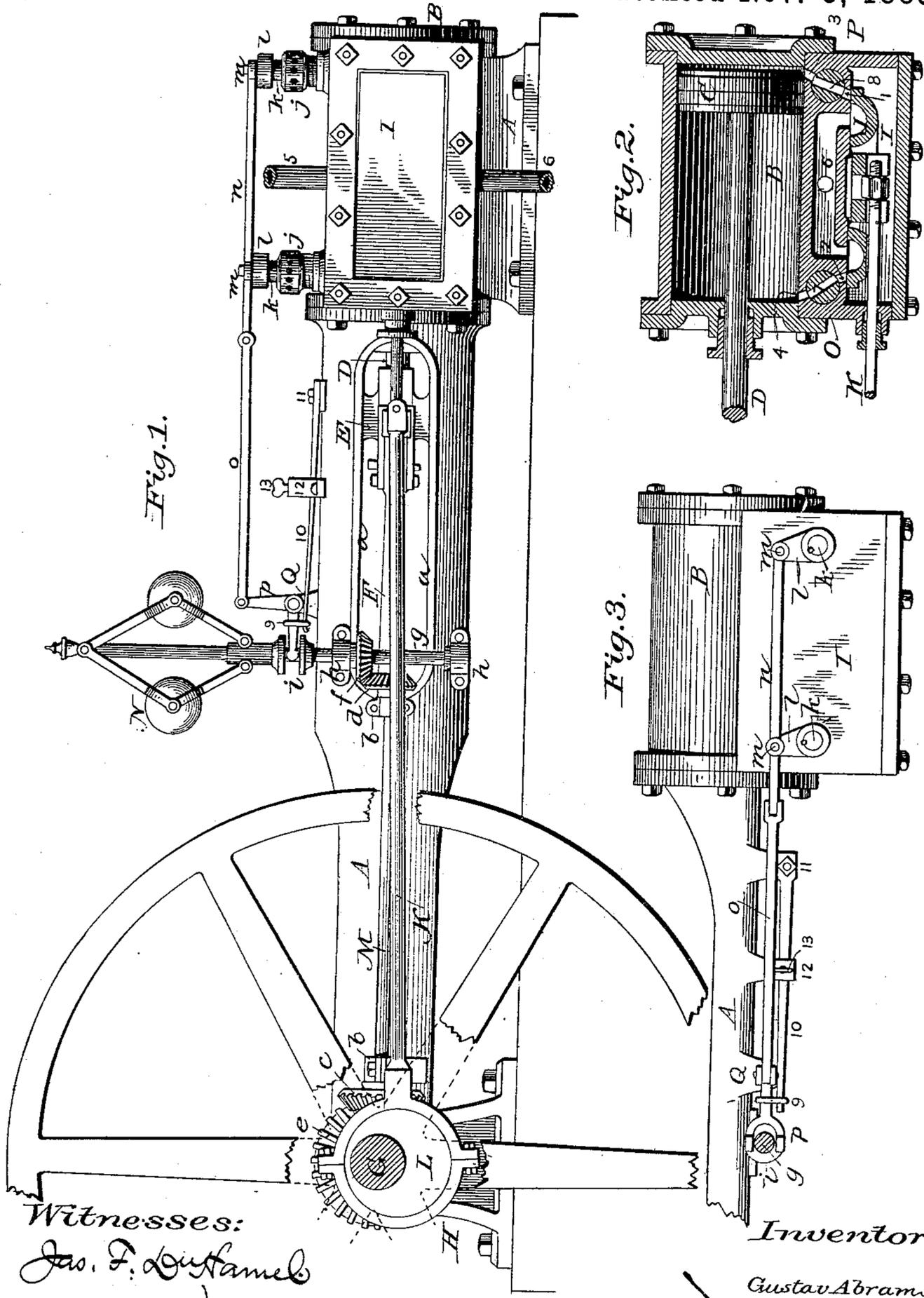


Fig. 1.

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 329,525, dated November 3, 1885.

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To all whom it may concern:

Be it known that we, GUSTAV ABRAMS and NILS NILSON, of Dassel, in the county of Meeker and State of Minnesota, have invented certain new and useful Improvements in Valve-Gear for Steam-Engines, of which the following is a specification.

This invention relates to an automatic cut-off device for steam-engines; and it consists in a novel construction and arrangement of the parts thereof, as hereinafter fully set forth.

In the drawings, Figure 1 is a side elevation of an ordinary reciprocating engine with our improvements applied thereto; Fig. 2, a horizontal central section through the cylinder and steam-chest; and Fig. 3 is a top plan view of the mechanism employed for operating the cut-off valves.

The object of this invention is to simplify and cheapen the construction of the engine and to render positive the action of the cut-off valve for controlling the admission and discharge of steam to and from the cylinder and steam-chest.

A indicates the framing of an ordinary horizontal reciprocating engine, which may be of any usual and well-known construction, except as to features hereinafter explained, said framing being connected at one end with the cylinder B, provided with piston C and piston-rod D. The piston-rod D is carried by a cross-head, E, moving in guides or ways *a* in the frame A, as shown in Fig. 1, the cross-head E being also connected with a driving-rod or pitman, F, by which rotary motion is communicated to the main shaft G, carried in bearings H, as usual.

I indicates the steam-chest, preferably cast with the cylinder, as shown in Figs. 1 and 2, and in which is an ordinary double-D slide-valve, J, actuated through valve stem or rod K by an eccentric, L, placed on the main shaft G.

M is a shaft carried in hangers or brackets *b*, bolted or otherwise secured to the side of the engine-frame A, provided at its ends with bevel-gears *c d*, the former to mesh with and receive motion from a similar pinion, *e*, on the main shaft, and the other adapted to impart motion to a gear, *f*, on the governor-spindle *g*, as shown in Fig. 1. Spindle *g* is journaled in bearings *h* upon the side of frame

A, and carries at its upper end the governor N, provided with a grooved sleeve or collar, *i*, which is raised and lowered as the speed of the engine is increased or diminished, as usual.

We would here state that so far the engine does not differ from others patented and now in use, and that we do not claim operating the cut-off valves of a steam-engine by the governor; but we believe that our arrangement and operation of the cut-off valves, now to be described, are new and possess advantages over those hitherto employed. The steam-chest I is provided with the usual ports, 1 2, communicating with the ports 3 4 in the cylinder, and also with exhaust-port 5 and inlet or supply pipe 6. The base of the steam-chest—that is to say, that portion adjacent to the cylinder—is made somewhat deeper than usual, in order to receive the two vertical rocking valves O P, provided with ports 7 8, respectively, said valves O P having their stems extended upward above the top of the cylinder, and provided with adjustable packing-glands J. The valves O P have their stems K provided with crank-arms *l*, having pins *m* at their ends, said arms being connected one with the other by a rod, *n*, as shown in Figs. 1 and 3, whereby both valves O P are caused to rock or turn simultaneously and to the same degree. Rod *n* is jointed to a similar rod, *o*, which latter is connected to the upright end of an elbow or rocking lever, *p*, pivoted in a bracket, Q, upon the upper side of the frame A, as shown in Figs. 1 and 3. The elbow-lever *p* has its lower arm bifurcated to straddle the collar *i* of the governor, said lever *p* being also provided with an eye or loop, 9, in which the end of a spring, 10, bears to exert a downward force upon the lower bifurcated end of lever *p*. The bifurcated end fits in a groove in the collar *i*, and is moved up and down thereby. Spring 10 is secured at its other end by screw 11 to the engine-frame, and is guided and adjusted by means of loop 12 and set-screw 13, as clearly shown in Figs. 1 and 3, thus permitting the adjustment of the spring while the engine is running. The maximum rate of speed which the engine is allowed to assume before the cut-off valves are brought into action can be regulated by the tension-screw 13, bearing on the spring 10. From this construction it will be seen that the spring 10 in a measure coun-

teracts the action of the governor—that is to say, that the governor-collar would rise at the attainment of a certain predetermined speed of the engine were it not for the spring, which latter will prevent the collar rising until the engine attains a slightly higher speed. Should the speed of the engine exceed that desired, the collar *i*, carried by the governor *N*, will rise and tip or rock the elbow-lever *p* upon its pivot, overcoming the resistance offered by the spring 10. This rocking motion of the lever *p* moves the rods *on* longitudinally, and also rotates the valves *O P* to a greater or less extent, according to the speed of the engine. The valves *O P*, when thus partially rotated, control the amount of steam admitted to the cylinder from the steam-chest, and this, too, while the slide-valve has its regular throw and the ordinary amount of steam is in the steam-chest. The action of the valves *O P* is entirely independent of the slide-valve, which latter continues its movement as before, except as to speed.

The rocking valves *O P* are cylindrical throughout their length; but in order to compensate for wear they may be made slightly tapering or conical.

We are aware that cut-off valves have been interposed between the slide-valve and the cylinder of a steam-engine to regulate and control the admission of steam to the cylinder, and this idea we do not claim, broadly.

Having thus described our invention, what we claim is—

1. In a steam-engine, the combination of a frame, a cylinder, a steam-chest, a slide-valve therein actuated by the engine-shaft, rocking valves interposed between the steam-chest and cylinder, to govern the supply of steam to the latter, a bar or rod connecting said valves, a governor actuated by the engine-shaft, an elbow lever upon the frame adapted to be rocked by the rise and fall of the governor, and a rod connecting the elbow-lever with the valves, as and for the purpose set forth.

2. In a steam engine such as shown and described, the combination of the following elements, to wit: a frame, a cylinder provided with a piston, a steam-chest, a slide-valve therein, rocking valves interposed between the steam-chest and cylinder, a rod connecting

said valves, a governor, an elbow-lever mounted on the frame of the engine and adapted to be rocked by the governor, and a rod or bar connecting said lever with the rocking valves, all arranged as shown, whereby when the speed of the engine unduly increases or diminishes the rocking valves will be rotated to compensate for the same.

3. In an engine substantially such as described, the combination of a governor, rocking valves interposed between the cylinder and slide-valve for controlling the admission of steam to the cylinder and provided with crank-arms, a rocking lever actuated by the governor, and a rod connecting said lever and the valve-arm.

4. The combination, in a steam-engine, with a cylinder, piston, steam-chest, and slide-valve, of rocking valves interposed between the slide-valve and cylinder and actuated by the engine-governor through a rocking lever, and a spring bearing upon the latter and adapted to act in opposition to the governor, as set forth.

5. The combination, in a steam engine, with a cylinder, piston, steam-chest, and slide-valve, of rocking valves interposed between the cylinder and slide-valve and actuated by the engine-governor, a spring arranged to act in opposition to the governor, and a set-screw for varying the action of the spring, as and for the purpose set forth.

6. In combination with a steam-engine, its governor *N*, and cut-off valves *O P*, lever *p*, connected with the governor and with the valves, spring 10, connected with said lever *p*, guide 12, and set-screw 13, all combined and arranged to operate substantially as explained.

7. The herein-described engine, consisting of frame *A*, cylinder *B*, steam-chest *I*, slide-valve *J*, rocking valves *O P*, interposed between the slide-valve and cylinder, rod *n*, connecting the valves *O P*, governor *N*, rocking lever *p*, actuated thereby, and rod *o*, connecting the lever *p* and the rod *n*, as and for the purpose set forth.

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