

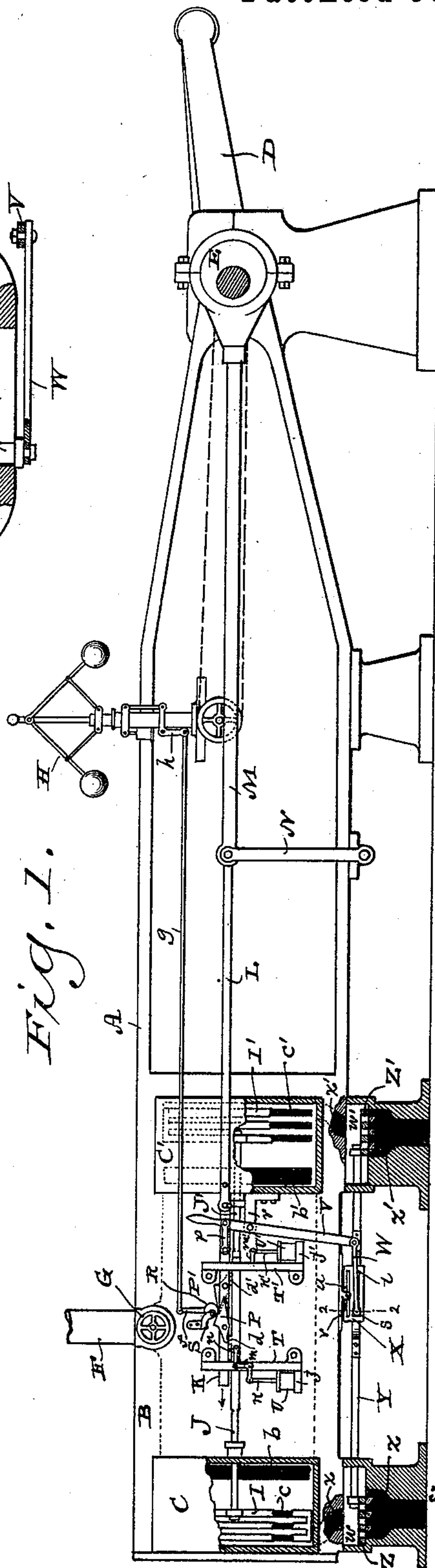
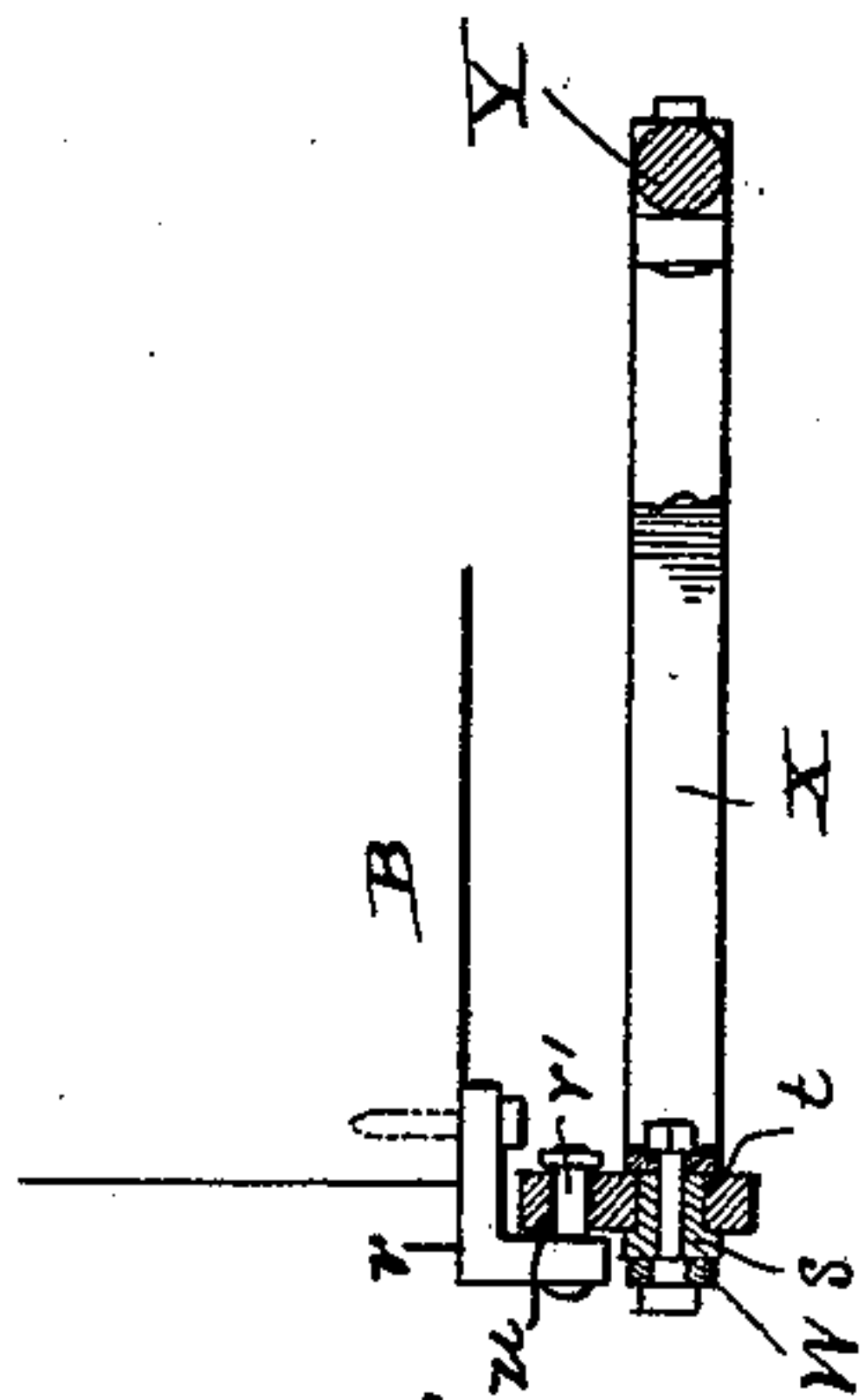
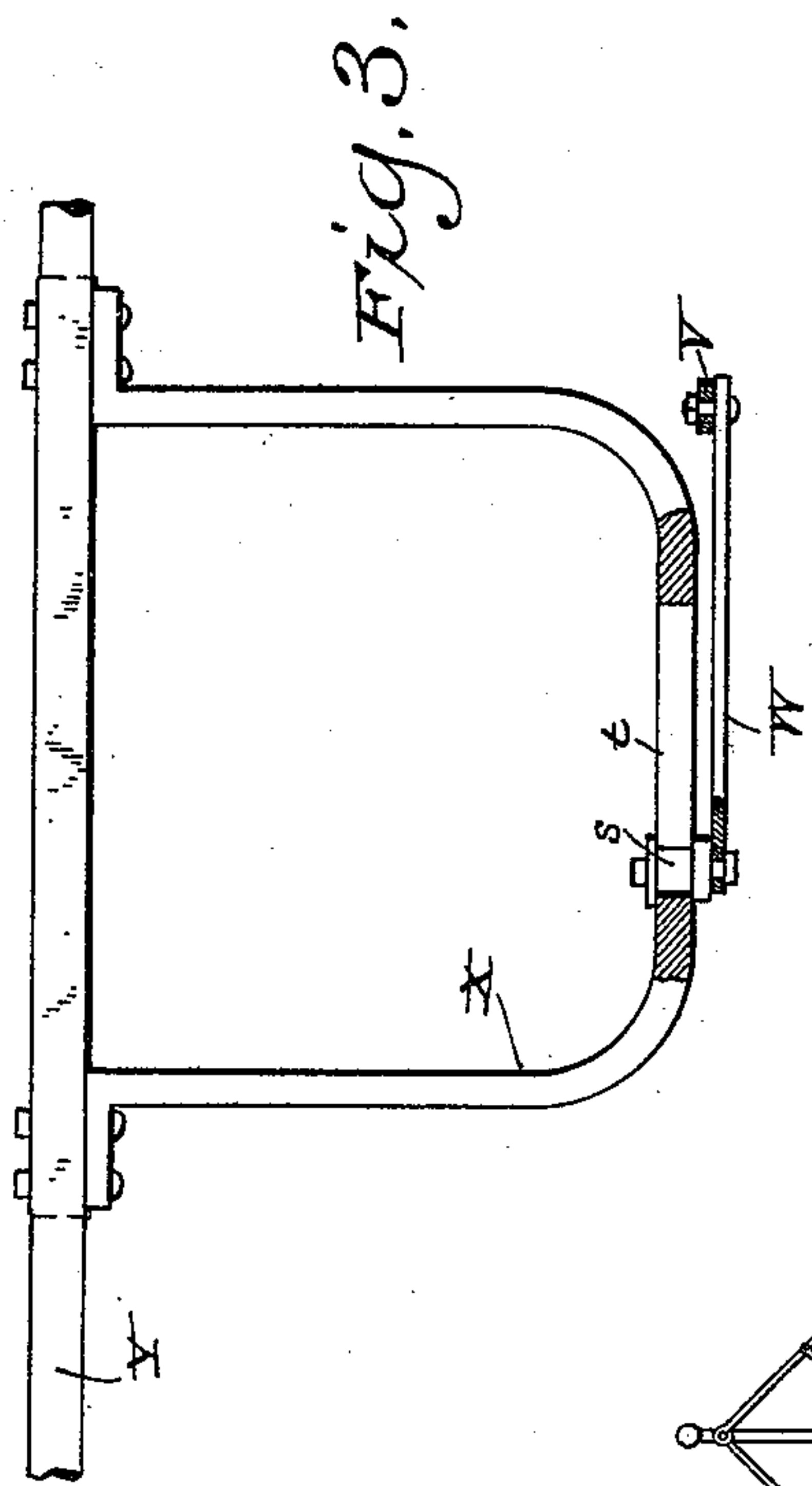
(No Model.)

2 Sheets—Sheet 1.

R. A. GOVE.
STEAM ENGINE.

No. 438,843.

Patented Oct. 21, 1890.



Witnesses
Geo. W. Young.
N. E. Oliphant

Inventor
Richard A. Gove

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Attorney

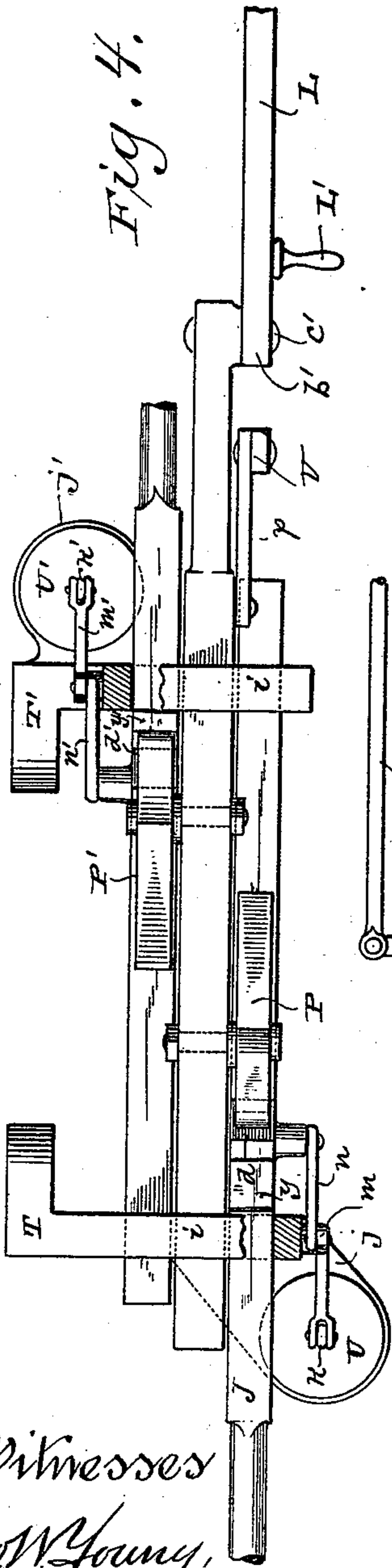
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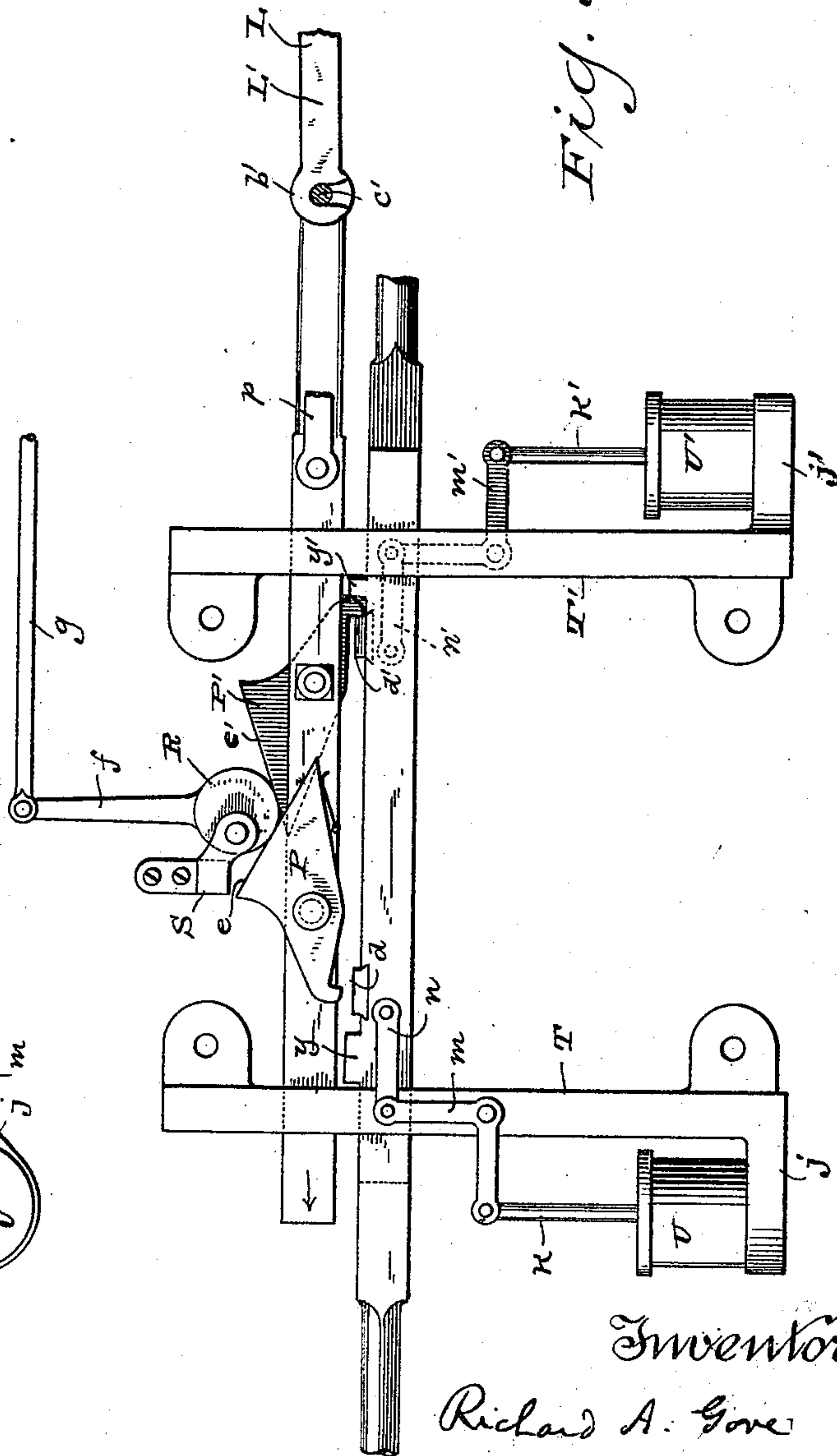
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UNITED STATES PATENT OFFICE.

RICHARD A. GOVE, OF WAUKESHA, WISCONSIN.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 438,843, dated October 21, 1890.

Application filed May 10, 1890. Serial No. 351,230. (No model.)

To all whom it may concern:

Be it known that I, RICHARD A. GOVE, of Waukesha, in the county of Waukesha, and in the State of Wisconsin, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates more particularly to slide-valve steam-engines; and it consists in certain peculiarities of construction and combination of parts to be hereinafter described with reference to the accompanying drawings and subsequently claimed.

In the drawings, Figure 1 represents a side elevation of my improved steam-engine partly in section; Fig. 2, a section on line 2 2, Fig. 1; Fig. 3, a detail plan view, partly in horizontal section, and illustrates a portion of the mechanism for controlling the exhaust-valves of the engine; Fig. 4, a similar view illustrating the valve-gear, and Fig. 5 a detail side elevation of said valve-gear.

Referring by letter to the drawings, A represents the engine-frame; B, the cylinder; C C', the steam-chests; D, the crank-shaft; E, the eccentric; F, the live-steam pipe; G, the throttle-valve, and H the governor, the latter being belt-gearred to said crank-shaft.

The steam-chest C is provided with an inlet-port *b* and a series of outlet-ports *c*, the latter leading to the cylinder B, and the steam-chest C' has an inlet-port *b'* and a series of cylinder-ports *c'*, this construction being illustrated in Fig. 1.

The outlet or cylinder ports *c c'* of the steam-chests C C' are controlled by the bars of gridiron-valves I I', and the rods J J' of these valves are arranged on opposite sides of a slide-bar K, connected by a link L with a pitman M, that is in turn connected to the eccentric E, the point of connection between said link and pitman being supported by an arm N, pivoted to the engine-frame, as shown in Fig. 1.

The valve-rod J is provided with a transverse lug *d* upon its upper side, and the valve-rod J' is similarly provided with a similar lug *d'*, said lugs being on opposite sides of a common center in the path of spring-controlled dogs P P', pivotally connected to opposite

sides of the slide-bar K, and respectively provided with a bearing-face *e e'*, these faces being inclined in opposite directions and opposed to a cam R, pivoted to a bracket S, and provided with an arm *f*, connected by a link *g* with a bell-crank *h*, controlled by the governor mechanism of the engine.

The valve-rods J J' and slide-bar K have their bearings in the horizontal arms *i* of brackets T T', secured to the engine-frame, and provided with supports *j j'* for dash-pots U U', the pistons in these dash-pots being provided with rods *k k'*, that connect with bell-cranks *m m'*, pivoted to said brackets and connected by links *n n'* to said valve-rods. A link *p* connects the slide-bar K with a lever V, that is pivoted to a bracket *r* on the steam-chest C', and the lower end of the lever is pivoted to a rod W, that carries a slide-block *s*, the latter being arranged to travel in a slot *t* cut in a bracket X, that extends out from a rod Y, and is provided with another slot *u* for engagement with a guide-pin *v'* on a bracket *v*, bolted to the under side of the cylinder, as best illustrated in Fig. 2. The rod Y has its bearings in the inner end walls of chambers *w w'*, and ports *x x'* lead from the cylinder B into said chambers. The bottom of the chamber *w* is provided with a series of ports that communicate with a conduit *z* for steam exhausted from the cylinder, and the chamber *w'* has its bottom provided with a series of ports that communicate with another exhaust-conduit *z'*, this construction being clearly illustrated in Fig. 1. The ports of the chambers *w w'* are controlled by the bars of gridiron-valves Z Z', and these valves are connected to the ends of the rod Y, as is also clearly illustrated in Fig. 1.

In Figs. 1 and 5 the engine is shown on center and the dog P disengaged from the lug *d* on the valve-rod J, while at the same time the dog P' is in engagement with the lug *d'* on the valve-rod J'. Now if the slide-bar K be moved in the direction of the arrows in said figures the dog P', drawing on the lug *d'*, will actuate the valve-rod J' and bring the bars of valve I' away from the ports *c'* of the steam-chest C' to admit steam to the corresponding end of the cylinder B. The travel of the inclined face *e'* of the dog P' against

the cam R will move said dog on its pivot to disengage the lug d' on the valve-rod J' before the slide-bar completes its stroke toward the rear, and the dash-pot mechanism connected to said valve-rod will automatically return the latter to its normal position to close the valve I', the piston (not shown) in the cylinder B being acted upon by the expansion of the steam to finish its stroke, and it will be understood that at the initial movement of the slide-bar K the lever V linked thereto moves on its pivot to actuate the rod W and thereby cause the slide-block s to travel in the slot t of the bracket r on the rod Y. Prior to the finish of the stroke of the piston in the cylinder the slide-bar K will have reached its limit of travel in the direction of the arrows above named, and in the meantime the block s on the rod w will have reached the forward end of the slot t to exert pressure against the bracket r and thereby move the rod Y in its bearings to shift the valves Z Z', thereby closing the exhaust-ports of the chamber w and opening the ones of chamber w' , this operation being an effectual preventive of back-pressure in said cylinder. The rotation of the shaft D and eccentric E causes the slide-bar K to begin its return movement the moment the valves Z Z' are shifted, and the dog P on said slide-bar coming into contact with the lug d on the valve-rod J the latter is actuated to bring the bars of valve I away from the ports c , leading from the steam-chest C into the cylinder, said dog being tripped by the cam R at the proper time and said valve closed by the action of the relative dash-pot mechanism when the trip takes place. The movements of the several parts are now in reverse to that above described in connection with the valve I', and will be readily understood without further description. The rise or fall of the governor-arms moves the cam R on its pivot, and thus the dogs P P' are tripped at longer or shorter intervals in proportion to the position of said cam with relation to the faces $e e'$ of said dogs, or, in other words, each dog is tripped at the approximate time it comes into contact with the cam.

In the position of the parts as shown in the drawings the contact of the cam R and faces $e e'$ of the dogs P P' is proportionate to the standard speed of the engine; but any increase or decrease of speed would cause the governor mechanism to change the position of said cam, and thus the trip of said dogs would be at shorter or longer intervals, as above described, and consequently no more steam enters the cylinder at any time than is absolutely necessary. It will be noticed that the link L has a hook-connection b' with a stud c' on the slide-bar K, and said link is provided with a handle L', whereby it may be readily disconnected from said slide-bar at any time. This is of especial advantage when it is desirable to warm the cylinder before starting the engine, or in case it may be

necessary to reverse the movement of said engine, the operation being accomplished by moving the lever V by hand after the disconnection of the link and slide-bar.

In addition to the lugs $d d'$ on the valve-rods J J', the latter are provided with stops $y y'$, that come against the arms i of the brackets T T' to prevent the valves I I' from being traveled too far by the action of the dash-pot mechanism, and also to be acted upon by the dogs P P' to insure the proper working of said valves prior to the time said dash-pot mechanism begins its operation, as at the time of starting up the engine.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-engine, the combination of the shaft, a slide-bar connected thereto, dogs pivoted to the slide-bar, one on each side thereof, and having bearing-faces inclined in opposite directions, twin steam-chests having ports leading to the engine-cylinder, valves controlling said ports, rods extended from the valves on opposite sides of said slide-bar, catches on the valve-rods in the paths of the slide-bar dogs, a dash-pot mechanism connected to each valve-rod, and a tripping-cam opposed to the inclined bearing-faces of said slide-bar dogs, substantially as set forth.

2. In a steam-engine, the combination of the shaft, the governor geared thereto, a slide-bar connected to said shaft, dogs pivoted to the slide-bar, one on each side thereof, and having bearing-faces inclined in opposite directions, twin steam-chests having ports leading to the engine-cylinder, valves controlling said ports, rods extended from the valves on opposite sides of said slide-bar, catches on the valve-rods in the paths of the slide-bar dogs, a dash-pot mechanism connected to each valve-rod, a pivoted tripping-cam opposed to the inclined bearing-faces of said slide-bar dogs, an arm extended from the cam, a bell-crank connected to the governor, and a link connecting the cam-arm and bell-crank, substantially as set forth.

3. In a steam-engine, the combination of the shaft, a slide-bar connected thereto, exhaust-valves connected to opposite ends of a movable rod, a slotted lateral bracket on the rod, a stationary guide engaging a slot in the bracket, a rod carrying a slide-block in engagement with another slot in said bracket, and a pivoted lever connecting the latter rod and said slide-bar, substantially as set forth.

4. In a steam-engine, the combination of the shaft, a slide-bar connected thereto, twin steam-chests having ports leading to the engine-cylinder, valves controlling said ports, rods extended from the valves, a dash-pot mechanism connected to the valve-rods, a trip mechanism for engaging and disengaging said slide-bar and valve-rods, exhaust-valves connected by a rod, a lateral bracket on the rod, a stationary guide for the bracket, a slide-

block movable in said bracket, and a pivoted lever connected to the slide-block and aforesaid slide-bar, substantially as set forth.

5 In a steam-engine, the combination of the shaft, a slide-bar connected thereto, dogs pivoted to the slide-bar, twin steam-chests having ports leading to the engine-cylinder, valves controlling the ports and provided with rods for engagement with the slide-bar dogs, 10 a dash-pot mechanism connected to the valve-rods, stops on said valve-rods in opposition to said slide-bar dogs, stationary arms opposed to the stops, and a cam for tripping the dogs out of engagement with the valve-rods, 15 substantially as set forth.

6. In a steam-engine, the combination of the shaft, a slide-bar detachably connected thereto, twin steam-chests having ports leading to the engine-cylinder, valves controlling

said ports, rods extended from the valves, a 20 dash-pot mechanism connected to the valve-rods, a trip mechanism for engaging and disengaging said slide-bar and valve-rods, exhaust-valves connected by a rod, a slotted lateral bracket on the rod, a stationary guide 25 engaging a slot in the bracket, a rod carrying a slide-block in engagement with another slot in said bracket, and a pivoted lever connecting the aforesaid slide-bar and latter rod, substantially as set forth. 30

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

RICHARD A. GOVE.

Witnesses:

N. E. OLIPHANT,
WM. KLUG.