

(No Model.)

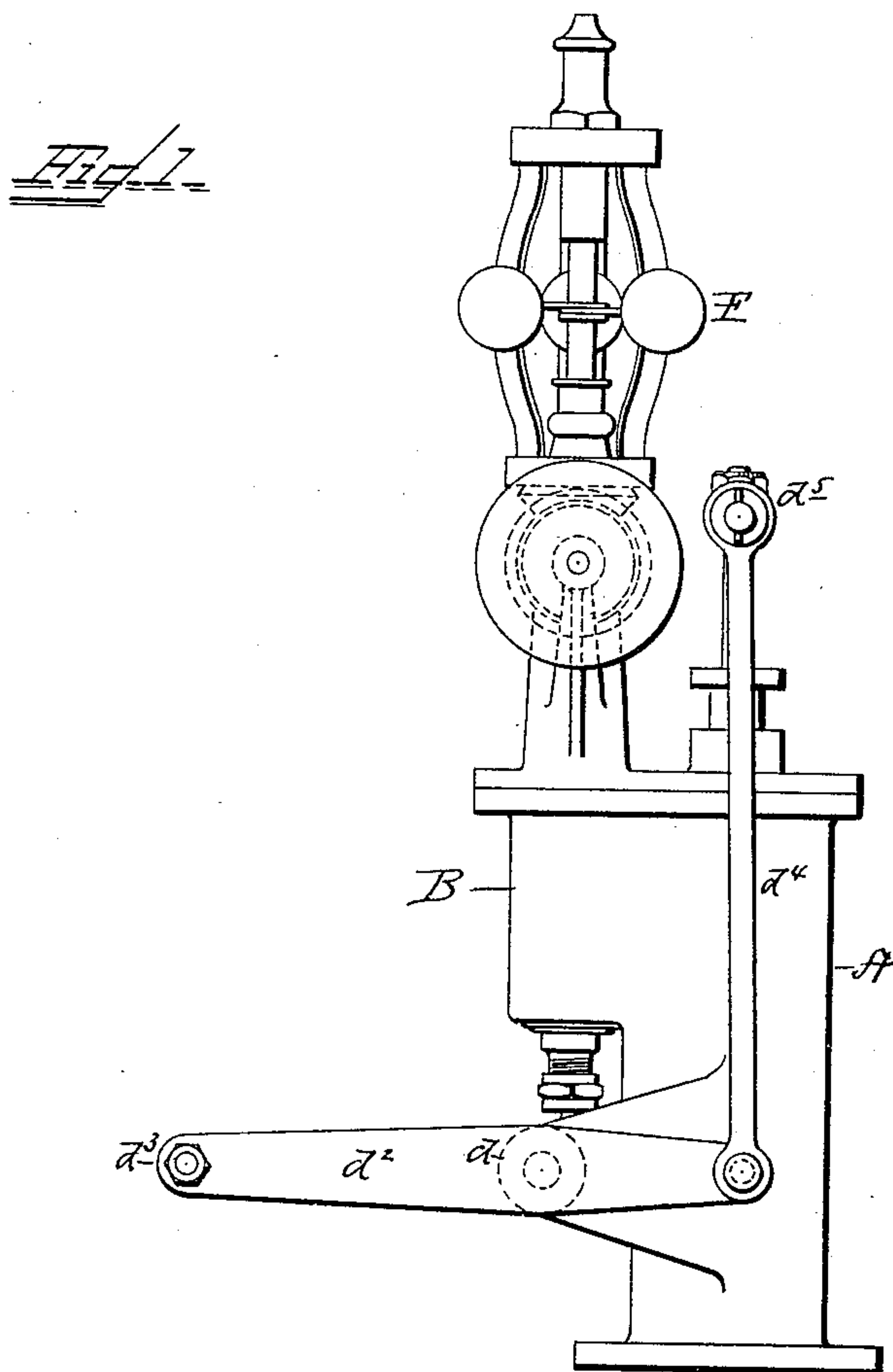
2 Sheets—Sheet 1.

W. MILLER & F. E. FREY.

STEAM ENGINE GOVERNOR.

No. 353,957.

Patented Dec. 7, 1886.



WITNESSES

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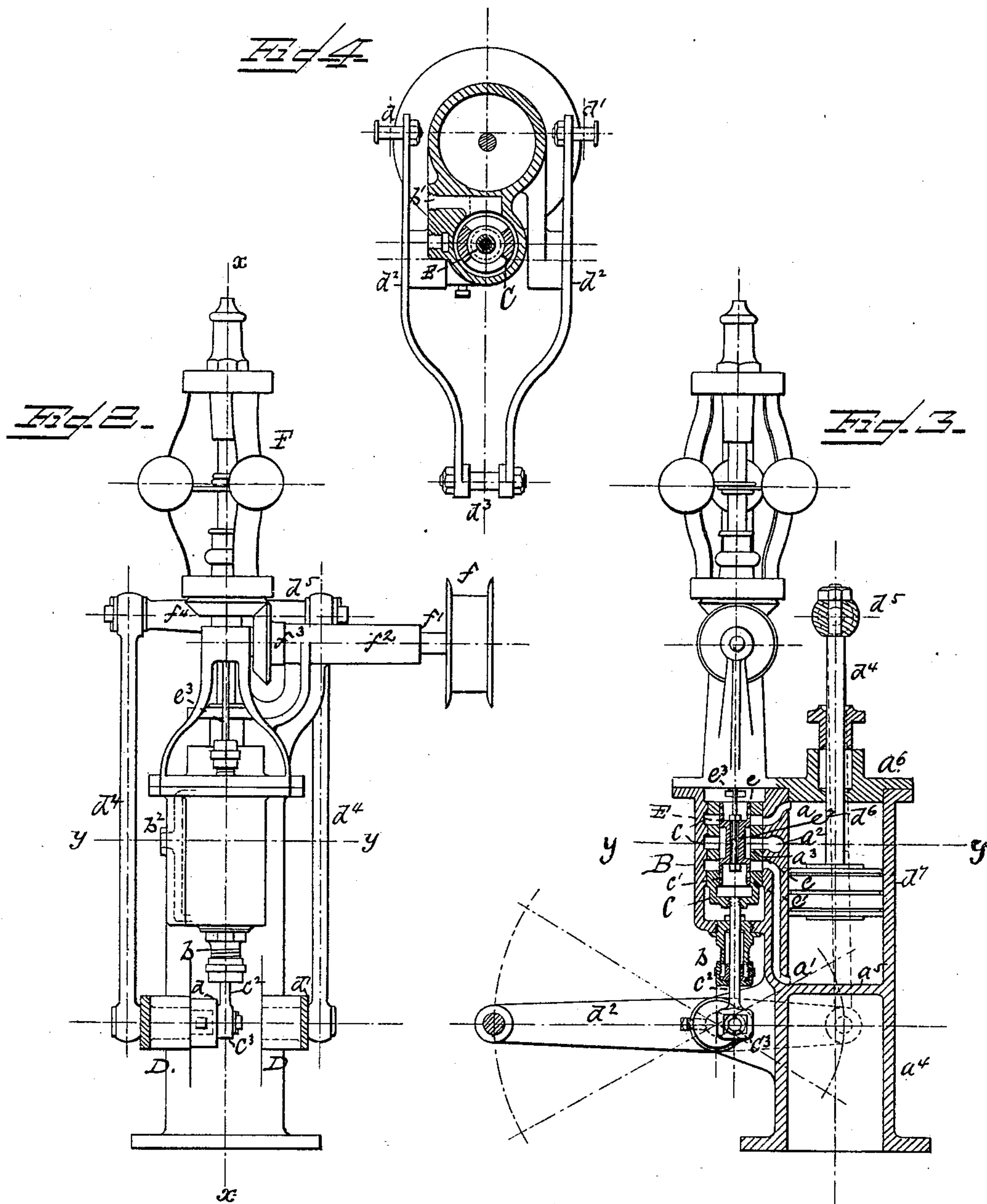
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*by A. G. Heyman, Attorney*

2 Sheets—Sheet 2.

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Witnesses:  
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# UNITED STATES PATENT OFFICE.

WALTER MILLER, OF CLEVELAND, AND FREDERICK E. FREY, OF BUCYRUS,  
OHIO.

## STEAM-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 353,957, dated December 7, 1886.

Application filed October 7, 1885. Serial No. 179,179. (No model.)

*To all whom it may concern:*

Be it known that we, WALTER MILLER, of the city of Cleveland, in the county of Cuyahoga, in the State of Ohio, and FREDERICK E. FREY, of the town of Bucyrus, in the county of Crawford, in the State of Ohio, citizens of the United States of America, have invented a new and useful Steam-Engine Valve, of which the following is a specification.

Our invention has relation to improvements in steam-engine governors of that class wherein the flow of steam to the piston-cylinders is controlled by the automatic action of a governing-valve by the governor; and the object is to provide a certain, safe, and simple valve for controlling and regulating the flow of steam to the piston cylinder of the engine which is applicable to steam-engines of any class, marine, portable, or stationary.

Our invention consists in the novel arrangement and combination of parts, as hereinafter described, and especially as specifically pointed out in the claims hereto.

We have fully illustrated our invention in the accompanying drawings, forming a part of this specification, and wherein Figure 1 is a side view in elevation. Fig. 2 is a front elevation. Fig. 3 is a central vertical view taken through the cylinder, steam-chest, and valves on the line  $x x$  of Fig. 2; and Fig. 4 is a cross-sectional view taken on the line  $y y$  of Figs. 2 and 3.

In these illustrations like parts of the mechanism are identified by the same letters of reference.

The illustrations show our improvements arranged as applied to a vertical-acting steam-engine, with the governor mounted on and over the end of the steam chest or valve-box.

The letter A designates the piston-cylinder, formed with steam channels or ports  $a a'$ , leading to the interior from the valve-seat, and also having the usual exhaust-port,  $a^2$ . A valve-seat,  $a^3$ , is formed on the exterior of the cylinder, on which the main valve slides. The cylinder-shell is preferably cast integral with the base  $a^4$  and head  $a^5$ , and provided with the detachable head  $a^6$ . The last-named may be cast together with the cap to the steam or valve chest.

The letter B designates the steam-chest,

which is cast to the cylinder with open end, and provided with a packing-box,  $b$ , for the valve-rod of the main valve, and also provided with steam-pipe  $b'$  and escape-pipe  $b^2$ .

The letter C designates the main valve fitted to the interior of the steam-chest and formed with steam-channels  $c$ , to close and open with the steam-channels in the cylinder. This valve is bored out in the center to form the seat for the governor-valve, as indicated at  $c'$ , and is connected to the valve-stem  $c^2$ , which stem has its outer end connected to the wrist-pin  $c^3$  on the gudgeon  $d$  of the rocker-arm.

The letter D designates brackets or bearing-arms cast on the cylinder-frame, and formed with suitable bearings wherein are disposed the gudgeons  $d d'$  of the rocker-arms  $d^2$ . These rocker-arms are extended in both directions from their bearings  $d d'$ , and at their outer or free ends are formed or bent to approach each other, substantially as shown in Fig. 4 of the drawings, and at their approaching ends are connected by a cross-pin,  $d^3$ , to which the mechanism to be moved is connected—such as the tiller of the vessel, the axle of the road-engine, the link, the reverse-lever, or cam-rod of an engine. To the other ends of these rocker arms are pivotally connected the pitmen-rods  $d^4$ , having a cross-head,  $d^5$ , in the middle of which is formed a bearing for the piston-rod  $d^6$ , suitably connected to the piston  $d^7$  in the cylinder.

The letter E designates the governor-valve, fitted to the bore of the main valve, which serves as its seat, and is formed with steam-channels  $e e'$  and central exhaust channel or port,  $e^2$ , each end of the governor-valve being cored out, substantially as shown, and the central portion having a rod-hole through which the valve-rod  $e^3$  is passed and secured in the valve.

The letter F designates the governor, which is here shown as of a well known and approved kind, having connections to the valve-rod of the valve E, and actuated by connection with the power through the pulley  $f$  on shaft  $f'$ , mounted in sleeve  $f^2$ , and carrying beveled gear-wheel  $f^3$ , which meshes with the bevel gear-wheel  $f^4$  on the governor stem or spindle.

Having thus described the construction of



the machine and stated the relation of the several parts, the operation may be given as follows: The steam being admitted from the boiler to the steam-chest through the steam-pipe *b'*, and thence to the cylinder, and movement to the engine communicated thereby and to the governor, the action is as follows: The motion imparted to the governor throws the balls outward and moves down the governor-valve within the main valve, and thus admits steam through the upper steam-channel into the cylinder, throwing the piston downward, which carries the pitmen with it and moves the rocker-arm, giving motion to the gudgeons, to one of which the wrist-pin is eccentrically attached and connected to the valve-rod of the main valve. This action or movement draws downward the main valve in the same ratio as the governor-valve is depressed. The result of these movements is that as the governor-valve is moved downward it tends to open the upper steam channel; but the movement being in the direction of the movement of the main valve the latter prevents the port from being entirely opened.

The induction-ports of the main valve are made and arranged to admit the steam at either end of the cylinder. Now, as the governor-valve moves within its seat just according as the force of the governor shall depress it, the ports or steam channels are correspondingly opened or closed, and the course of the steam thus regulated and maintained.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with a steam-cylinder and piston, of the pitmen *a'*, extending vertically parallel with and on opposite sides of the cylinder, and having the cross-head *a''* connected to the end of the piston-rod, and the rocker-arms *a'''* pivotally supported at their middle on gudgeons, having bearings on the steam-cylinder, and having one end pivotally connected to the pitmen, and the other end

provided with a cross-pin to connect them with the resistance, substantially as described.

2. In combination with the steam-cylinder and the steam-chest, having a valve-seat with steam-channels to the steam-cylinder, of the piston, the pitmen connected together and to the piston-rod by a cross-head, the rocker-arms, the wrist-pin eccentrically fixed to the gudgeon of one of the rocker-arms, and the main valve within the steam-chest, having its valve-rod connected to the wrist-pin of the rocker-arm, substantially as described.

3. In combination with the steam-cylinder and the steam-chest, having a valve-seat with steam-channels to the steam-cylinder, the piston, the pitmen connected to the piston-rod, the rocker-arms having gudgeons mounted on bearings on the cylinder, a wrist-pin fixed to the gudgeon of one of the rocker-arms, the main valve within the steam-chest, connected to the wrist-pin of the gudgeon of the rocker-arm, and the governor-valve seated within the main valve and moved by the variable movements of the governor, substantially as described, and for the purpose stated.

4. In combination with the steam-cylinder and the steam-chest formed with a valve-seat having steam-channels to the steam-cylinder, the main valve connected by a stem to and actuated by a rocker-shaft connected to the piston, and the governor-valve seated within the main valve and moved in relation thereto by the vertical movement of the governor, substantially as described, and for the purpose set forth.

In testimony whereof we have hereunto set our hands in the presence of two attesting witnesses.

WALTER MILLER.  
FREDERICK E. FREY.

Attest:

A. L. BESWICK,  
MARK W. NELSON.