

UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y., ASSIGNOR TO JOSEPH A. DAVIS, OF SAME PLACE.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 413,908, dated October 29, 1889.

Application filed April 9, 1889. Serial No. 306,537. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a perspective view of my improved steam-generator. Fig. 2 is a vertical section, enlarged, through one of the vertical subdivided legs, showing portions of the tubes broken away. Fig. 3 is a horizontal diametrical section through a duplex tube and its pipe. Fig. 4 is a cross-section through the duplex tube, taken in the plane indicated by dotted line xx , Fig. 3. Fig. 5 is a detail sectional view illustrating the manner of packing the shaft of the pump.

My invention relates to tubular steam-generators, and my object is to improve the construction of such generators by so constructing and connecting the parts thereof that ample allowance is made for unequal expansion and contraction of the parts and each section of the generator and tubes can be independently connected or removed for repairs. This object is effected by the devices which are hereinafter clearly described and claimed.

Referring by letter to the drawings, A designates a casing within which is my improved steam-generator. This casing preferably has its walls composed of an internal lining of fire-brick a , a layer b of asbestos paper or other refractory material, a layer c of porous or pulverized fire-brick, and an external shell d of cast plates or boiler-iron. The top of the casing is double, the external shell rising above the wall proper thereof, leaving a space W , and this top has a man-hole A^3 in it leading into said chamber and closed by a plate A' . I prefer to fill the space W with mineral wool or other non-conducting material.

B designates a horizontal transverse pipe or drum, which is sustained substantially

upon the floor of the casing A within the same by means of a pedestal B' , which is preferably cast hollow to contain water, and may be incased with masonry, if desired, for additional protection from the heat. This pipe is cast with screw-tapped couplings b' and it is connected at one end to a feed-pipe B^2 , that extends through the wall of casing A to any suitable supply of water.

Into each one of the couplings b' , I screw a vertical leg C, and I prefer to use a jam-nut b^2 and suitable packing to hermetically seal the joint. Each one of the legs C is constructed with a vertical diaphragm C' , which forms two chambers C^2 C^3 , closed at b^3 and b^4 . The leg C is also constructed with couplings c^2 , into which are screwed horizontal tubes J, the outer or free ends of which are hermetically closed by caps j . These tubes J are supported by means of sectional partitions arranged as shown in Fig. 1, for the purpose of causing the heated products of combustion to take a zigzag course through the case A on their way to the outlet O, and thus circulate through every part of the chamber within said case. Inside of each tube J is a smaller tube H, which is open at both ends and screwed or properly secured to the diaphragm C' at one end and centered by a spider s' at or near the other end, as clearly shown in Fig. 3. The upper terminal portion C^4 of each leg C is at right angles to the longitudinal axis thereof and communicates with a horizontal transverse pipe E in space W by means of a short pipe D. The pipe E by a coupling F communicates with a steam-dome G, provided with a safety-valve G' and a steam-pipe G^2 , leading to an engine. The steam-drum communicates with a water-forcing engine M by means of a pipe L, and this engine communicates with the pipe B by means of a pipe K. The engine is used to give a forced mechanical circulation to the water in the generator, sending the latter through the legs, tubes, and drum; but the engine might in some instances be dispensed with and the natural circulation of the water depended upon.

When the generator is in use, the water and steam pass from the pipe B through the

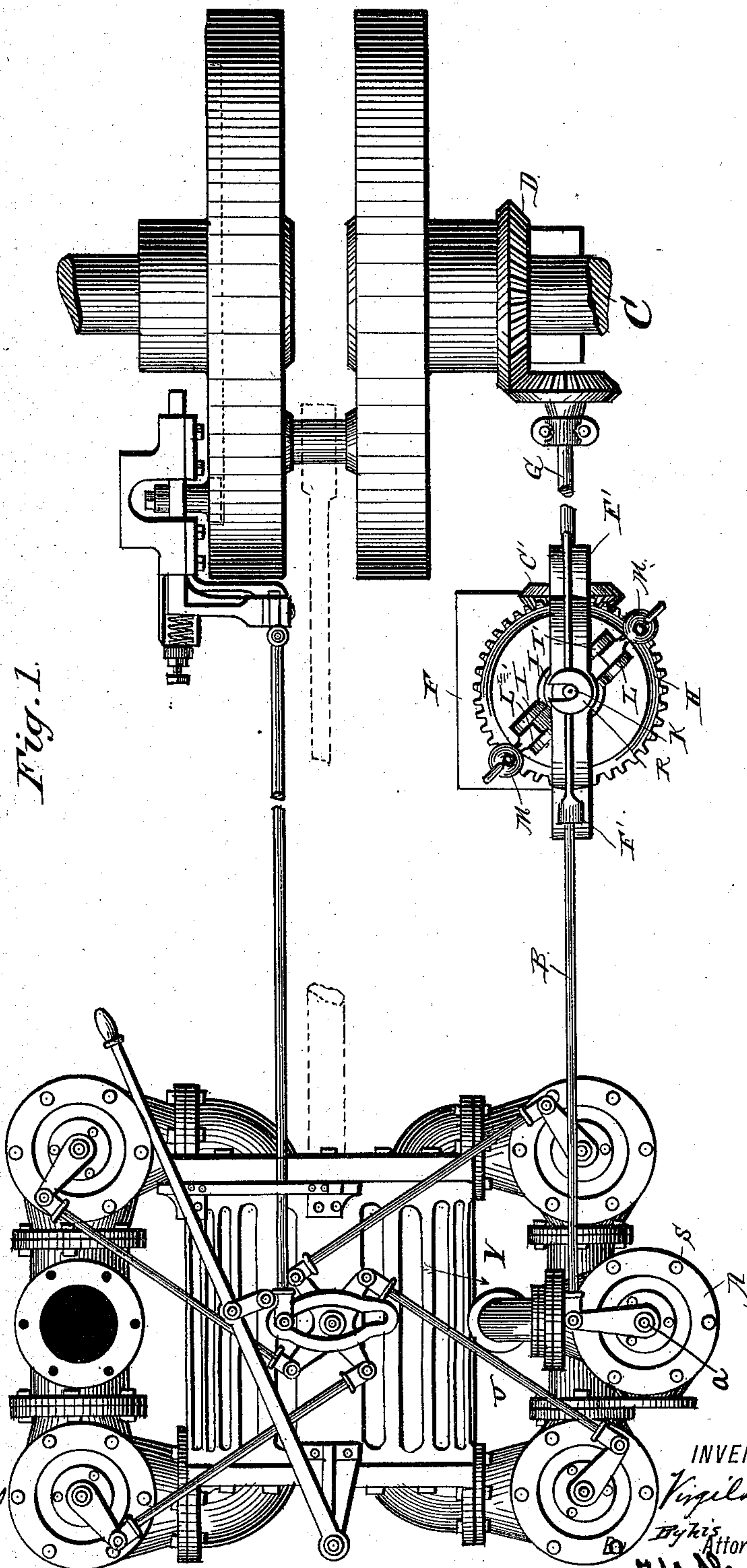
(No Model.)

2 Sheets—Sheet 1.

V. W. BLANCHARD.
STEAM GOVERNOR.

No. 413,909.

Patented Oct. 29, 1889.



WITNESSES

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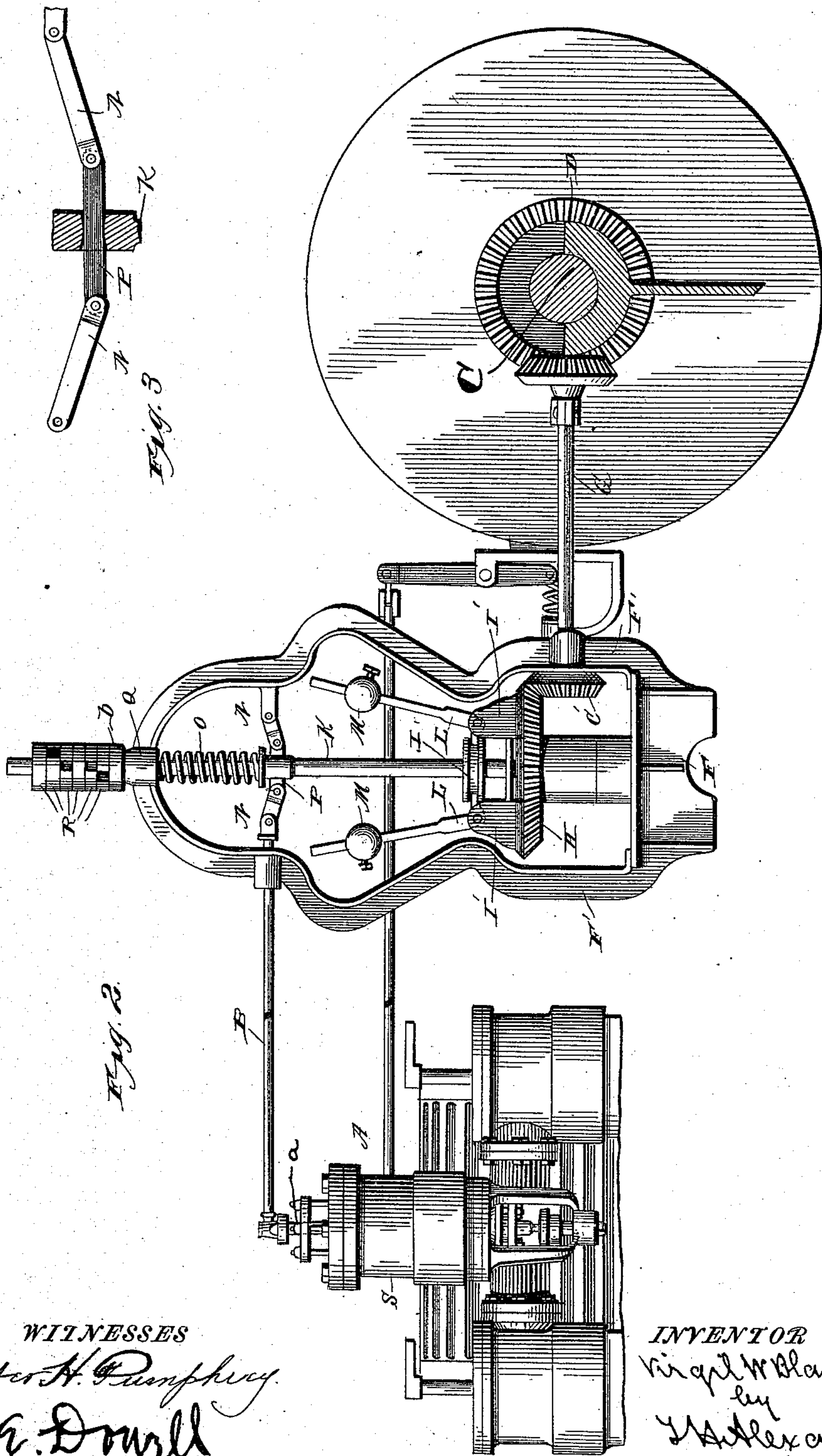
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2 Sheets—Sheet 2.

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STEAM-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 413,909, dated October 29, 1889.

Application filed April 10, 1889. Serial No. 306,638. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county of New York and State of New York, have invented certain
5 new and useful Improvements in Steam-Governors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of
10 this specification, in which—

Figure 1 is a plan view of my steam-governor, showing its connection with the valve-action of an engine and the crank-wheels on
15 the main shaft. Fig. 2 is a side view thereof, part of the throttle-valve being broken away. Fig. 3 is a side view of the toggle which connects the governor-spindle to the rod which actuates the spindle of the throttle-valve.

20 This invention relates to novel and valuable improvements on self-governing steam cut-offs.

By the invention, which will be fully understood from the following description when taken in connection with the annexed drawings,
25 I obtain a self-governing steam cut-off at once so rapid, delicate, and efficient in action that under the most irregular conditions of load upon the driving-pulley a sufficient and only
30 a sufficient volume of steam will enter the cylinder at any portion of the stroke as is required to maintain a certain uniform velocity of piston speed in the engine.

The oscillating steam-valves, the crank-wheel on the main shaft, and the cam-wheel
35 which works in a cam-groove in said crank-wheel are not herein claimed.

In Fig. 2 of the annexed drawings the relative working position of the cut-off valve to
40 the two port-valves, as well as the relation of both the port and exhaust valves to the cylinder of the engine, are clearly shown.

In Fig. 1, let A designate the oscillating steam-valve above referred to, which is so
45 constructed that it has an almost imperceptible movement in its action.

F designates the base of my centrifugal governor, which should be rigidly secured to the supporting-frame of my engine.

50 F' F' designate two curved arms rising

from said base, and forming at their juncture above, the bearing Q for the upper part of the vertically rising and falling spindle K.

H indicates a miter gear-wheel running loose on the spindle K, the latter extending
55 downward into the base F as a guide. It will be observed that the upper surface of the gear-wheel H is provided with ears I' I', rising from it on opposite sides of its center, in which are pivoted angular arms L L, provided with governor-balls M M, which, by means of set-screws, are adjustable vertically on their arms.
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I designates a wheel rigidly secured to the spindle K, and provided with a deep groove
65 in its periphery, as shown in Fig. 2, which groove is entered on opposite sides in a horizontal direction by the free ends of the short lateral arms of the centrifugal governor-ball arms L L. As these angular arms L L, with
70 their centrifugal balls, are jointed to the upper surface of the gear-wheel H by the ears I' I', it becomes evident that when rotary motion is communicated to the aforesaid wheel the centrifugal action of the balls M M, by means
75 of the angular arms L L and grooved wheel I, will tend to elevate the spindle K in a vertical direction, and that this tendency will be increased or diminished in proportion as the rotary motion of the gear-wheel is hastened
80 or slackened.

G designates a shaft provided at one extremity with a toothed wheel gearing with the toothed wheel D, keyed on the main shaft
85 C of the engine, and at its other extremity with a wheel G', gearing with the miter-wheel H.

N N designate two short arms forming a toggle-joint with the connecting-link P, the latter occupying a mortise in the spindle K,
90 so that a movement of the latter in a vertical direction upward will, through the aforesaid toggle-joint, actuate a connecting-rod B by the connection shown, and through this rod the spindle a of the steam-valve A.
95

O designates a stiff coiled spring actuating the spindle K downward, and R a series of weights bearing on a collar b, rigidly secured to the spindle K, said spring serving as an auxiliary to the weights R to depress the
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