(No Model.) 2 Sheets—Sheet 1.

H. H. WESTINGHOUSE & A. G. BROWN.

STEAM ENGINE GOVERNOR.

No. 303,085. Patented Aug. 5, 1884.

Fig. 1.

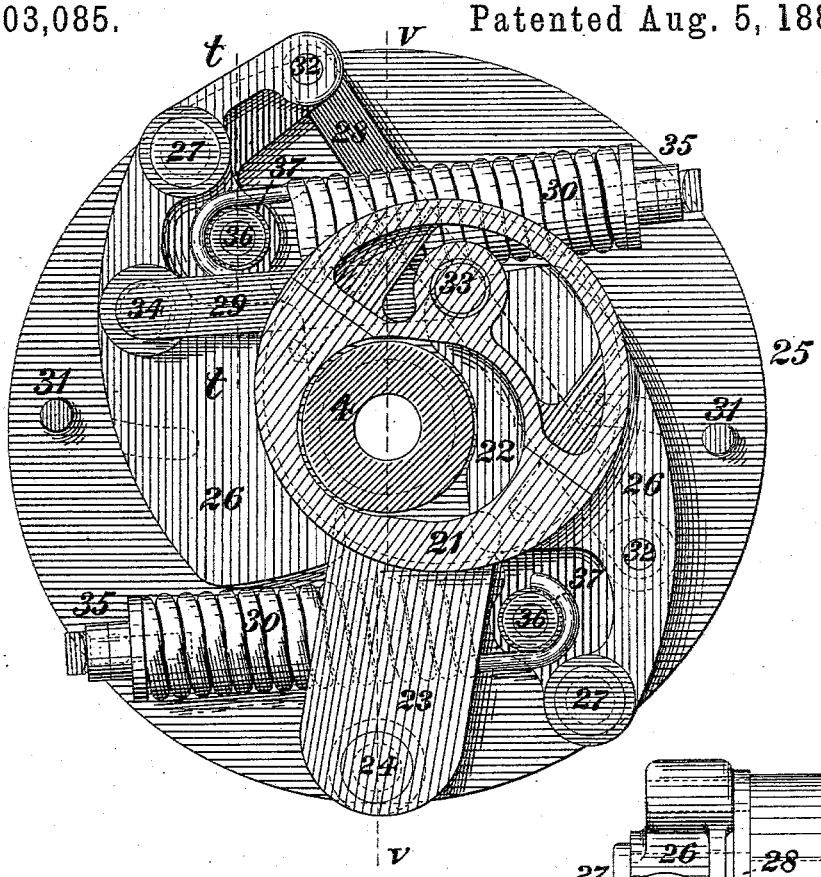
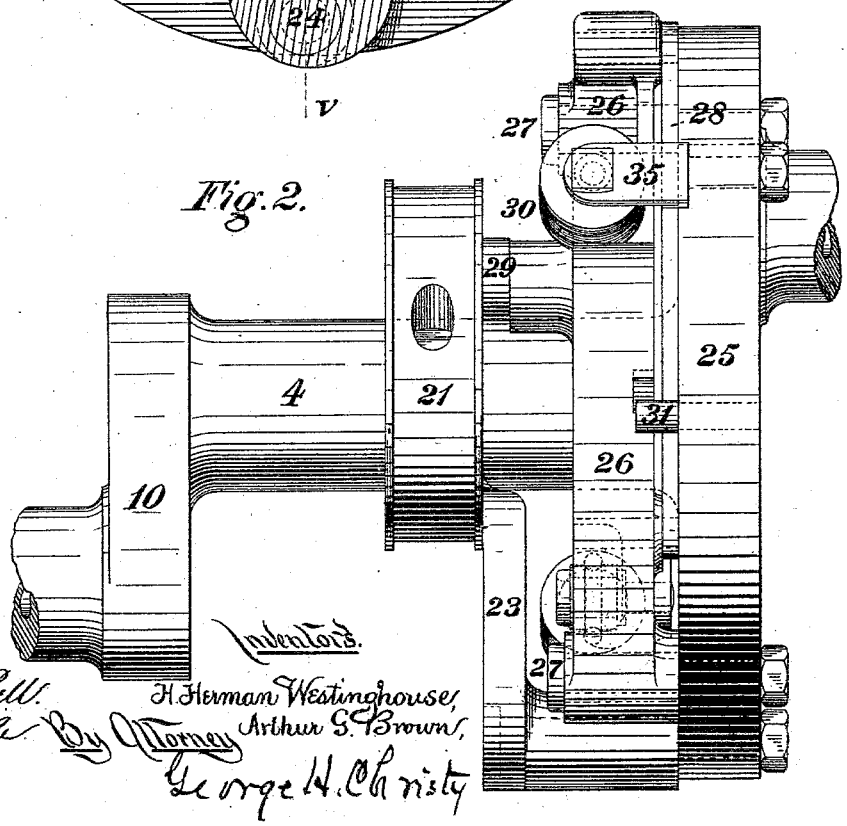


Fig. 2.



Witnesses
J. Snowden Bell.
A. M. Clarke

Inventors.
H. Herman Westinghouse,
Arthur G. Brown,
By Attorney
George H. Christy

(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

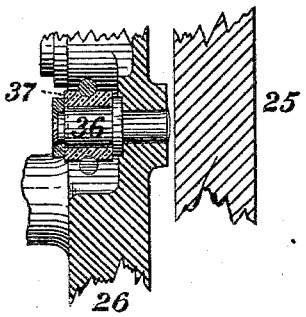


Fig. 4.

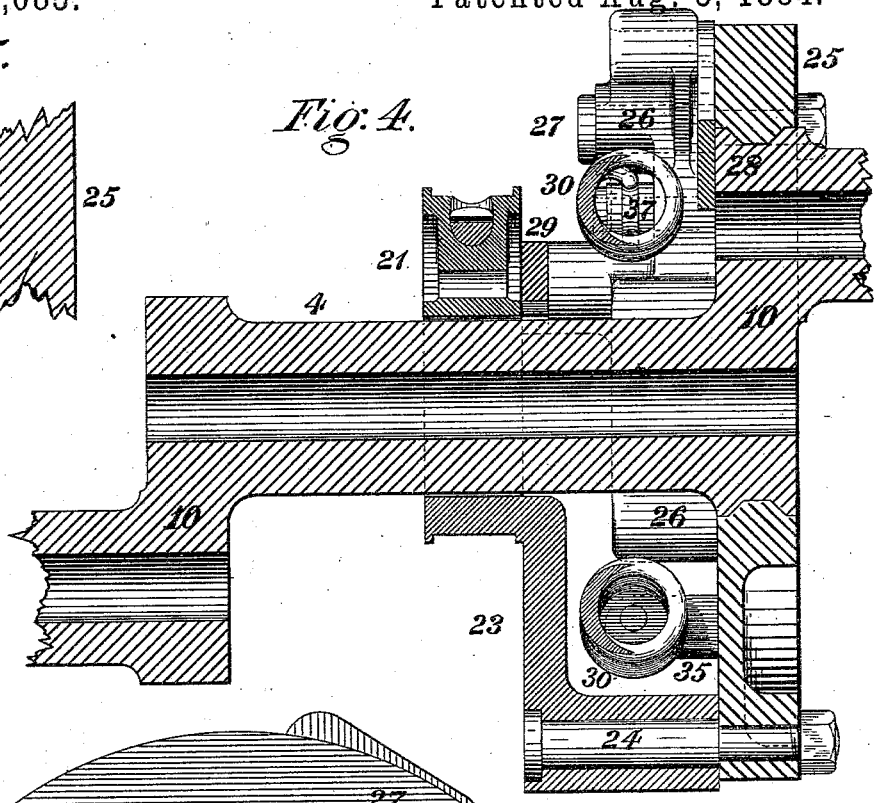
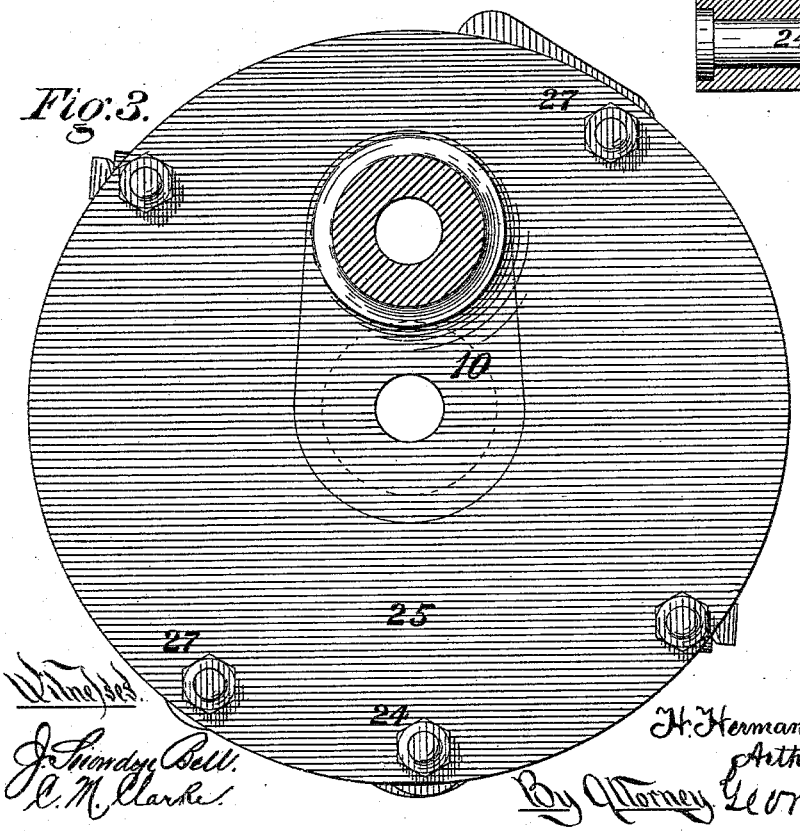


Fig. 3.



Witnesses.
J. Thornton Bell.
A. M. Clarke.

Inventors.
H. Herman Westinghouse.
Arthur G. Brown.
By Attorney George H. Christy

UNITED STATES PATENT OFFICE.

H. HERMAN WESTINGHOUSE AND ARTHUR G. BROWN, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO THE WESTINGHOUSE MACHINE COMPANY, OF SAME PLACE.

STEAM-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 303,085, dated August 5, 1884.

Application filed February 16, 1884. (No model.)

To all whom it may concern:

Be it known that we, H. HERMAN WESTINGHOUSE and ARTHUR G. BROWN, citizens of the United States, residing at Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Steam-Engine Governors; and we do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a face view in elevation of a steam-engine governor embodying our invention as seen from the left side of Fig. 2; Fig. 2, a side view in elevation of the same; Fig. 3, a face view as seen from the right; Fig. 4, a vertical section at the line *v v* of Fig. 1, and Fig. 5 a partial section at the line *t t* of Fig. 1.

Our invention relates to centrifugal governors or regulators of the class in which the regulating mechanism is mounted upon the main or driving shaft of the engine and acts to maintain a uniform speed of rotation thereof by varying the position of an eccentric fitted freely thereon, and thereby varying the conditions of steam admission and exhaust in correspondence with variations of steam-pressure or load, or both.

The object of our present invention is to provide a governor of such character, which shall satisfactorily fulfill the requirements of stability and sensitiveness in operation, and which, from the simplicity and compactness of its construction and the facility of its adjustment, shall be specially applicable to double-cylinder engines having a valve-chest located between the cylinders, as illustrated in a separate application for Letters Patent by H. Herman Westinghouse, of even date herewith, Serial No. 120,960.

The improvements claimed are hereinafter fully set forth.

In the practice of our invention we suitably secure upon the crank-shaft 4 of the engine, as closely as may be to the eccentric 21, which actuates the main or distribution valve, a disk, 25, which serves as a support of the several members of the governor. The disk 25 is in this instance connected directly to one of the cranks 10, but may obviously occupy any other desired position on the shaft. A pair of weights or pendulums, 26, is pivoted by pins 27 to the disk 25 at points adjacent to its periphery and at equal distances, diametrically, from its center, said weights having the capacity of vibration about the axes of the pins 27 within a range limited outwardly by stops 31, fixed on the disk 25, and inwardly by the crank-shaft 4, or by stops adjacent thereto. The action of gravity upon the weights 26 is eliminated and their conjoined outward movement, under the influence of centrifugal force, effected by coupling them together by a link, 28, the ends of which are journaled on pins 32, fixed to the weights, the coupling-pin 32 of one weight being located between its pivot 27 and its free end, and that of the other weight being secured in an extension thereof beyond its pivot, and on the opposite side of the pivot center to that on which the main body of the weight is located. The distance between centers of pivot-pins and coupling-pins is equal in both weights, and it will therefore be seen that both outward and inward vibration of the weights must be coincident and through equal arcs, and also that the action of gravity intending to vibrate either one of the weights upon its pivot will be counteracted by an equal force acting in an opposite direction upon the other weight, so that in operation outward movement of the weights will be induced only by the centrifugal force resultant upon the speed of rotation of the crank-shaft. Each of the weights is connected by a helical spring, 30, to a standard, 35, secured upon the disk 25, the resilience of said springs exerting a centripetal action upon the weights of such proper and determined degree as to maintain the requisite equilibrium with their centrifugal force for desired rates of speed of the engine. The pins 36, to which the springs are connected, are located upon the weights adjacent to their pivots 27, and, in order to diminish wear and obviate tendency to cramping or binding, the pins 36 are provided with circular or segmental sleeves or bearings 37, around which the ends of the springs 30 are hooked or bent, as shown in Fig. 1, the

sleeves being preferably grooved or recessed on their peripheries to receive the ends of the springs, as seen in Figs. 4 and 5. Wearing-surfaces of ample size are thus provided, and the centripetal action of the springs is exerted upon the weights in line with the axes of the pins 36, irrespective of the position or angle of vibration of the weights.

The eccentric 21, which operates the main or distribution valve of the engine, is formed in two sections, which are connected by bolts, and is adapted to fit freely on the crank-shaft, with the capacity of movement transversely thereto, in accordance with vibrations of the weights 26 about their pivots 27. To this end an opening or shaft-recess, 22, is formed in its body of diameter and length proper to admit of the degree of transverse movement required, and one of its sections is formed in one piece with or secured to an arm, 23, the opposite end of which is journaled on a pivot, 24, secured to the disk 25. A link, 29, is coupled at one end to a pin, 34, on one of the weights 26, and at the other to a pin, 33, on the eccentric, which, through such connection, is, by movement of the weights in either direction, moved transversely to the crank-shaft upon the pivot 24 as a center, its eccentricity, and consequently the length of traverse which it imparts to the valve with which it is connected, being varied coincidently with the movements of the weights and proportionately to the range of said movements.

The drawings illustrate the position of the parts when the engine is at rest, the eccentric having its greatest degree of eccentricity and imparting the maximum travel to the valve. The outward movement of the weights, under the influence of centrifugal force sufficient to overcome the centripetal action of the springs, moves the eccentric toward the left, correspondingly reducing its eccentricity, which is least when the weights are moved to the limit of their outward range, and the intermediate positions of the eccentric as required to effect different degrees of expansion are determined by the preponderance of force exerted as between the centrifugal action of the weights and the centripetal action of the springs under variations of pressure and load, or either.

It will be seen that the effect of the regulating mechanism is transmitted directly to the eccentric, and that the construction and arrangement of the members are such that they may be located within a comparatively small compass without impairing the facilities for making such adjustment or renewal of parts as may from time to time become necessary.

We claim herein as our invention—

1. In a centrifugal governor, the combination, substantially as set forth, of a disk adapted to be fixed upon the main or crank shaft of an engine, a pair of weights pivoted to said disk on opposite sides of its center, a coupling-link connecting said weights at points within and without the centers of their pivots, respectively, a pair of springs, each connected at one end to the disk and at the other to one of the weights, an eccentric which is slotted to surround the crank-shaft, with the capacity of movement transversely thereto, an arm secured at one end to said eccentric and pivoted at the other to the disk, and a link connecting the eccentric with one of the weights.

2. In a centrifugal governor, the combination, substantially as set forth, of a disk adapted to be fixed upon the main or crank shaft of an engine, a weight pivoted to said disk and coupled by a link with an eccentric fitting freely on the shaft, and a spring connected at one end to the disk and having its opposite end bent or hooked around a segmental sleeve or bearing on the weight.

In testimony whereof we have hereunto set our hands.

H. HERMAN WESTINGHOUSE.
ARTHUR G. BROWN.

Witnesses:
J. SNOWDEN BELL,
WM. LEE CHURCH.