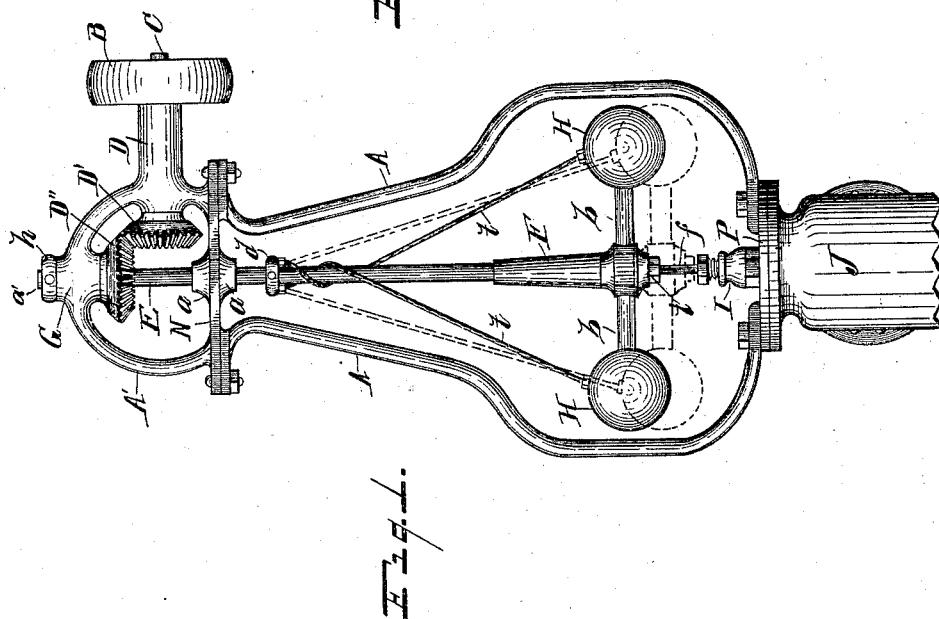


E. COURTRIGHT.  
GOVERNOR.

Patented Aug. 4, 1891.



E. Wheeler  
B. J. Wheeler

INVENTOR  
E. Courtwright  
By  
Rasco B. Wheeler  
Attorney.

# UNITED STATES PATENT OFFICE.

EDGAR COURTRIGHT, OF DETROIT, MICHIGAN, ASSIGNOR OF THREE-FOURTHS  
TO CHARLES G. DAVIES AND FRANK C. LANGLEY, BOTH OF SAME PLACE.

## GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 456,981, dated August 4, 1891.

Application filed November 3, 1890. Serial No. 370,102. (No model.)

*To all whom it may concern:*

Be it known that I, EDGAR COURTRIGHT, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Governors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in ball-governors especially adapted for controlling the speed of steam-engines; and it consists in a certain construction and arrangement of parts, as hereinafter more fully set forth, the essential features of which being pointed out particularly in the claims.

The object of the invention is to produce a governor simple of construction and possessed of a high degree of sensibility, enabling it to act quickly, and thereby maintain uniform velocity irrespective of the degree of labor performed by the engine. This object is attained by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved governor. Fig. 2 is a central vertical section through Fig. 1.

Referring to the letters of reference, A A' indicate the frame that supports the governor mechanism; B, the driving-pulley adapted to be belted to the main shaft of the engine. (Not shown.) Said pulley is mounted on the outer end of the horizontal shaft C, journaled in the arm D of the frame A', the inner end of said shaft carrying the beveled gear D', that meshes with the beveled gear D'', mounted on the vertical shaft E, the upper end of which is journaled in the head G of the frame, said shaft E being supported by the collar h on the upper end thereof, that is secured thereto by a pin or set-screw a', and which bears upon the upper face of the head G, as shown in Figs. 1 and 2. The upper portion A' of the supporting-frame is provided with the cross-head N, having the bosses a a' on its upper and under faces, through which

passes the vertical shaft E, and which forms an additional bearing and support therefor.

F indicates a sleeve, to the lower end of which is secured the horizontal arms b b, carrying on their outer ends the balls H H, all of said parts being formed integral, as clearly shown in Fig. 2. The balls H and their integral parts are suspended by flexible steel cables t t, the lower ends of which are secured to said balls and their upper ends to the collar d, adjustably secured to the shaft E, the lower end of said shaft extending freely into the vertical opening e in the sleeve F, the length of the cables t t being sufficient to confine the end of said shaft within said sleeve at all times.

f indicates the valve-stem, the upper end of which is provided with the conical head v, (see Fig. 2,) which is journaled in a recess in the lower end of the sleeve F, adapted to receive it, said head being secured therein by the screw-plug i, through which the stem passes and which forms the lower part of the bearing for the head v. By this construction the balls H may revolve without turning the stem f, and the rise and fall of said balls will impart a vertically-reciprocating motion to said stem. The valve-stem f passes through an ordinary stuffing-box I in the head P of the steam-supply pipe J, and is attached at its lower end to the cut-off valve K, having the ports c' therein, that register with the ports c in the valve-seat L, over which said valve sits, as shown in Fig. 2. While the above construction of governor-valve is shown, any suitable valve may be employed without departing from the spirit of the invention.

When the engine is not in motion, the cables t hang straight from the collar d, permitting the balls H to fall to their lowest point, as clearly shown by dotted lines in Fig. 1, in which position of parts the steam-ports are open to their fullest extent. As the engine is set in motion the shaft E is caused to revolve through the medium of the pulley B, shaft C', and gears D' D''. The balls H, being connected to the shaft E by the flexible cables t, do not start to revolve at the same rate of speed as said shaft, which causes the cables t to wind thereon, whereby the balls

H are raised and the valve K actuated to partially close the steam-supply ports *c*, as shown in Fig. 2. The winding of the cables *t* upon the shaft E continues until the balls H have attained the same rate of speed as said shaft, when the parts will retain their respective positions and the engine will run at a uniform velocity. It will now be apparent that any accelerated speed of the engine will cause the shaft E to revolve in advance of the balls H, thereby winding more of the cables *t* thereon and raising said balls, thus still further reducing the area of steam-passage, and that a diminution of the engine's speed will cause the balls H, by reason of their momentum, to revolve at a greater speed than the shaft E, when the cables *t* will unwind, causing said balls to fall and actuate the valve K to increase the area of steam-passage, as is well understood.

By the arrangement of parts as above described a highly sensitive governor is produced and one that is simple of construction, by means of which the engine is enabled to maintain a uniform speed under the varying degrees of labor performed.

While flexible steel cables are shown and described for suspending the governor-balls, any flexible cable of suitable strength and material may be used. For instance, small steel chains may be employed with equal effect.

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

1. A governor comprising a vertically-supported shaft and means for driving it, combined with a sleeve slidingly mounted on the lower end thereof, said sleeve having arms, said arms having weighted terminals, flexible agents made fast to the vertically-supported shaft, said flexible agents passing thence

downward, having their lower ends secured to the weighted terminals of the sleeve, and a valve-stem having its upper end journaled in the lower end of said sleeve, its opposite end adapted to be coupled to a valve, substantially as set forth.

2. In a governor, the combination of the frame comprising upper and under frame-sections, the vertical shaft mounted to rotate in said frame and carrying a gear-wheel, the horizontal shaft mounted to rotate in the upper frame-section and carrying the gear-wheel which meshes with the like wheel on the vertical shaft, the sleeve slidingly and revolvably mounted on the lower end of the vertical shaft, said sleeve having arms, said arms having weighted terminals formed integral, cables attached to the vertical shaft and extending downward, their opposite ends having engagement with the weighted terminals of the sleeve, the stuffing-box, and the valve-stem passing through same and having its upper end swiveled in the lower end of the sleeve, substantially as specified.

3. A ball-governor comprising the following conjoined elements: the two-part frame, the horizontal and vertical shafts journaled in the upper section of said frame, the gear-wheels on said shafts, the sleeve slidingly mounted on the lower end of the vertical shaft, the arms and ball-terminals formed integral with said sleeve, the cables attached to said ball-terminals at one end and to the vertical shaft at their opposite end, and the valve-stem journaled in the lower end of the sleeve, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EDGAR COURTRIGHT.

Witnesses:

E. S. WHEELER,  
J. B. BROOKS.