

No. 671,926.

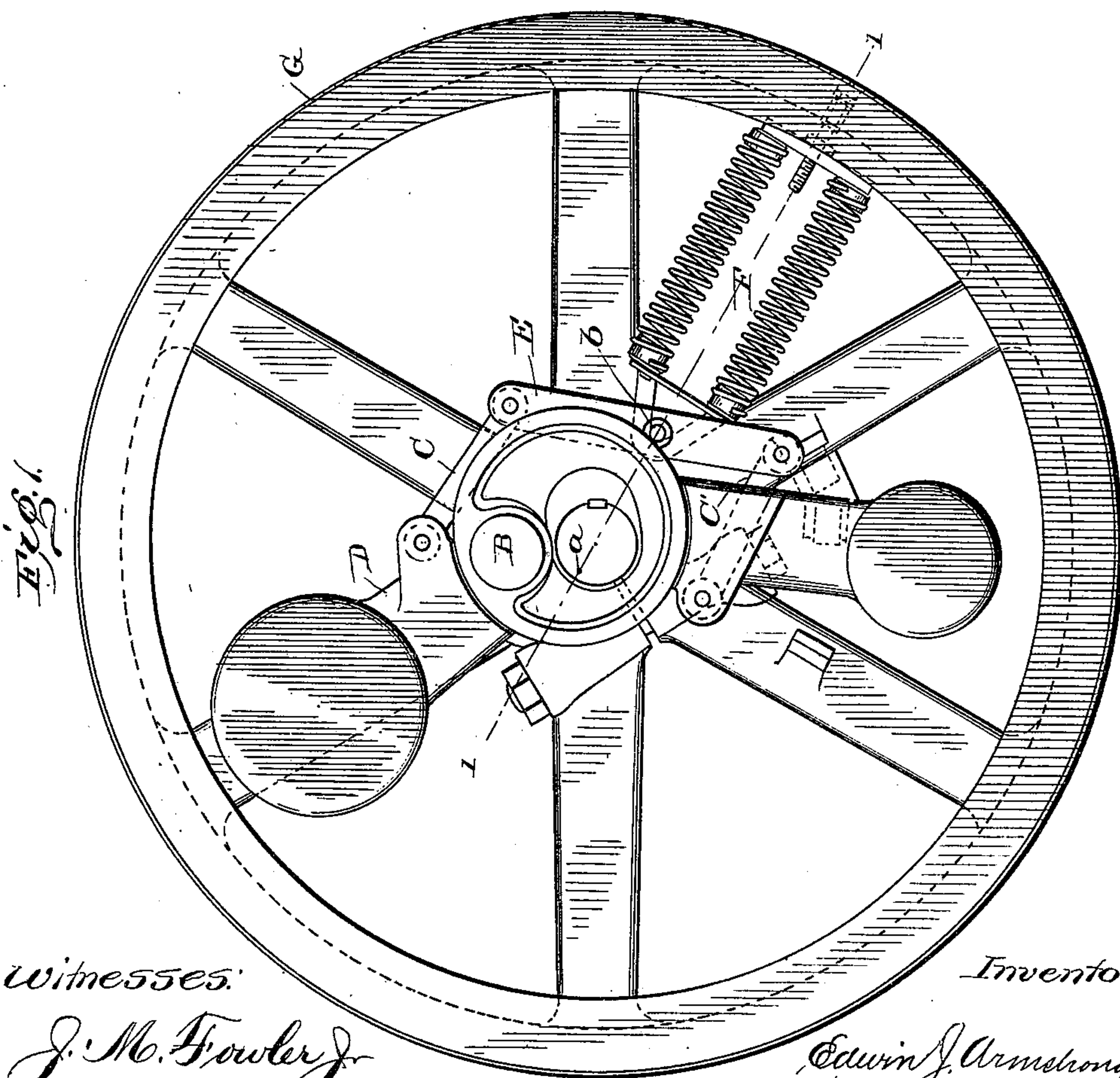
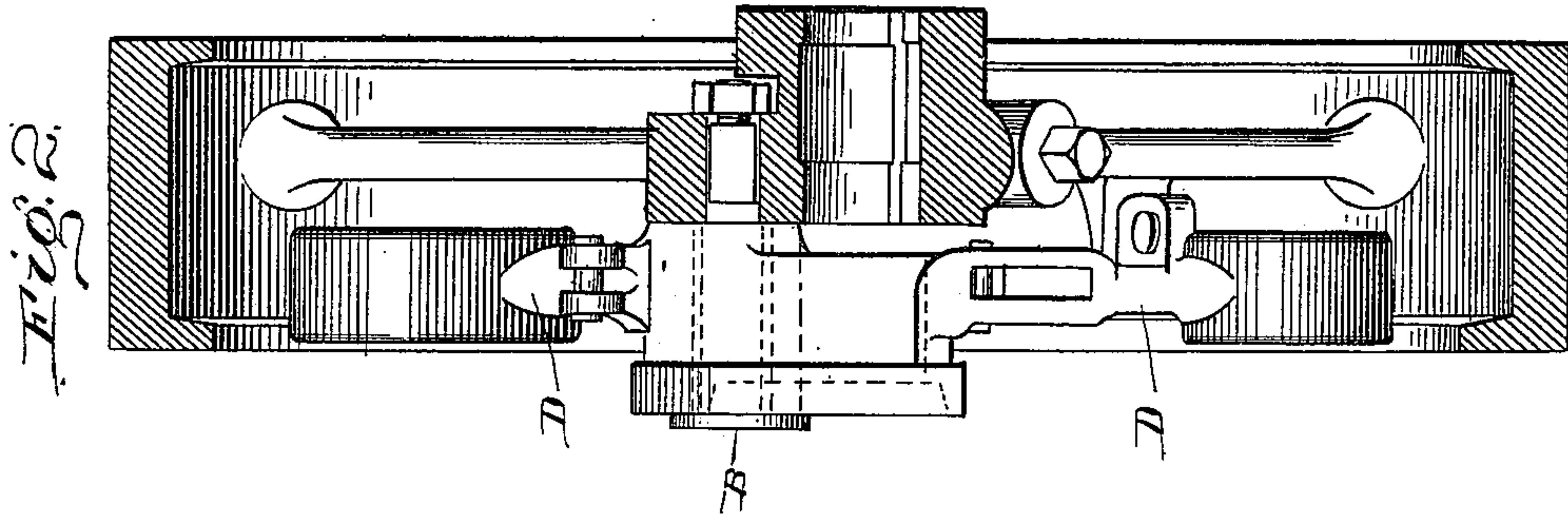
Patented Apr. 9, 1901.

E. J. ARMSTRONG.  
GOVERNOR.

(No Model.)

(Application filed Aug. 31, 1900.)

2 Sheets—Sheet 1.



Witnesses:

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2 Sheets—Sheet 2.

Fig. 4.

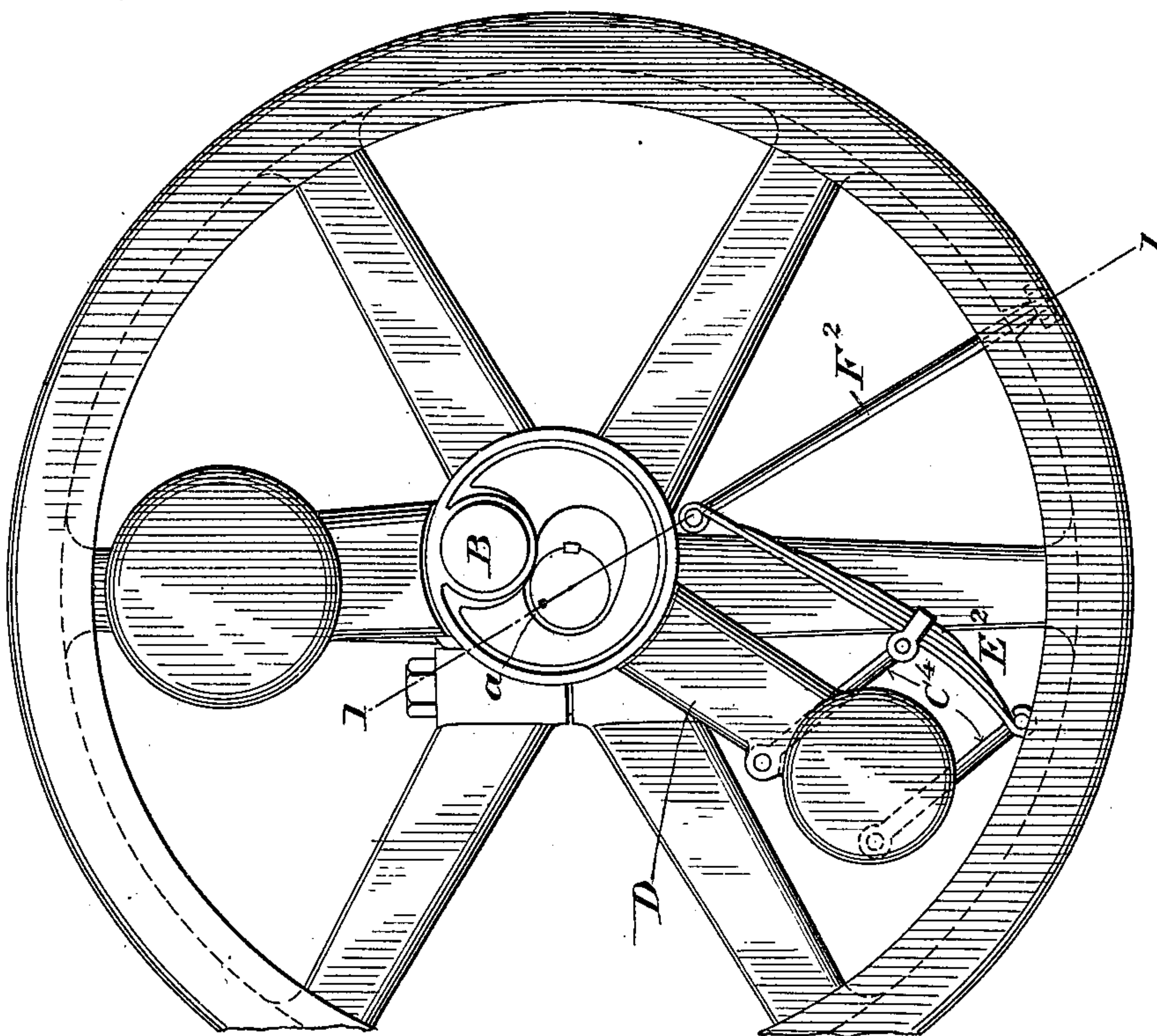
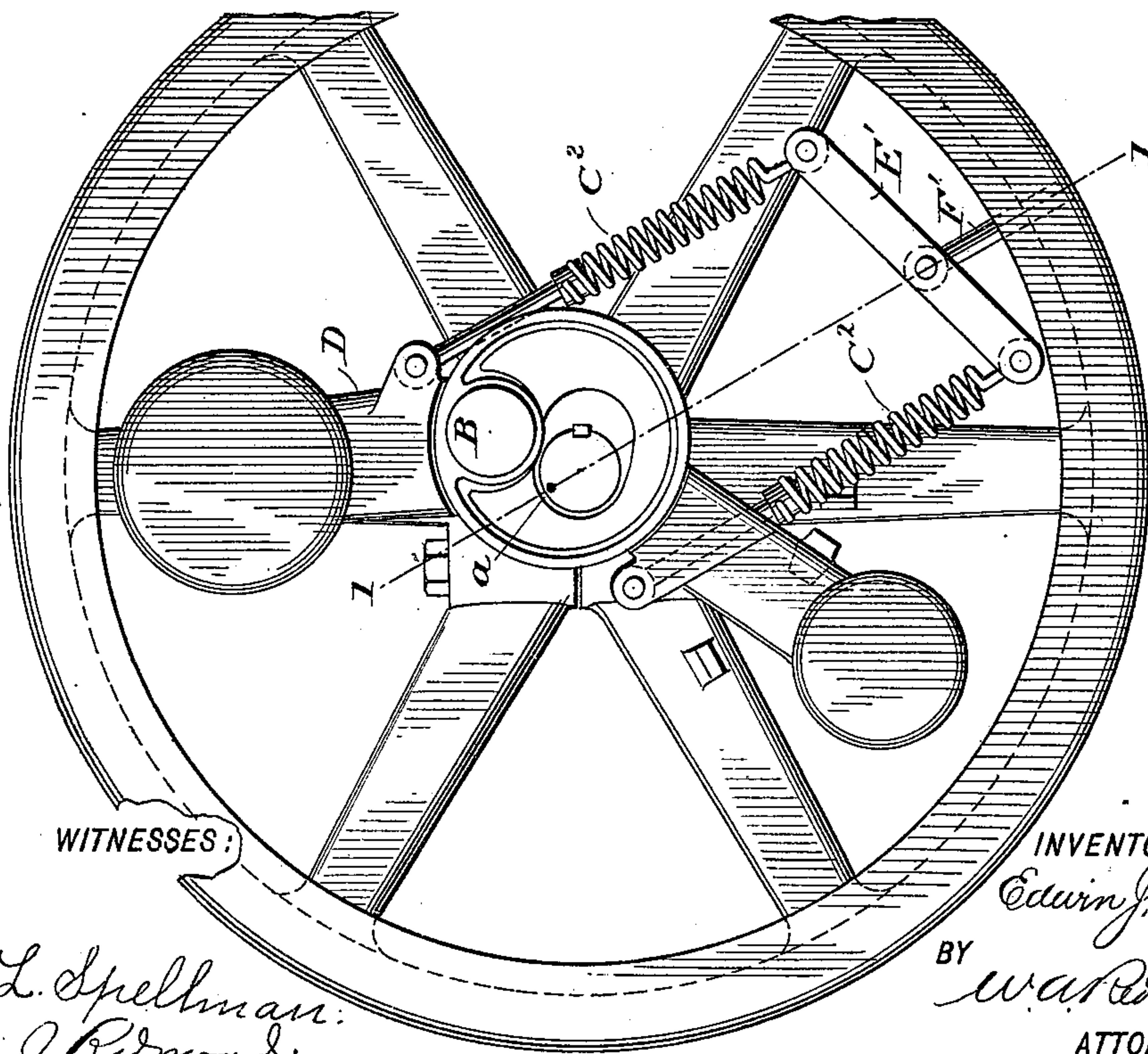


Fig. 3.



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# UNITED STATES PATENT OFFICE.

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## GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 671,926, dated April 9, 1901.

Application filed August 31, 1900. Serial No. 28,688. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN J. ARMSTRONG, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, 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.

My invention relates generally to governors or similar mechanism, and particularly to that class or type of such devices commonly known as "shaft-governors;" and it has for its object to provide a device of the character named in which all pressure is removed from the pivots thereof; and it consists of the parts and combination of parts hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation of my improved device; Fig. 2, a vertical section on the line  $xx$ , Fig. 1, with the links and lever removed; Fig. 3, a side elevation of a modified form of my invention, and Fig. 4 a similar view of another modification of my invention.

Similar letters refer to similar parts throughout all the views.

The pressure exerted on the pivots of shaft-governors is a source of great annoyance and trouble and in many cases prevents proper lubrication, thereby causing undue wear and friction, the latter being especially objectionable by reason of its preventing proper action of the governor. In a governor weight-arm of the general type shown in the drawings having its center of gravity located at the point  $a$ , Figs. 1, 3, and 4, it is evident that the centrifugal force of the weight may be considered as concentrated at said point and pulling radially from the center of the shaft or on the line  $1\ 1$ . This centrifugal force is resisted in all governors by a spring, and the resolution of the two forces—the centrifugal force of the weight and the resisting force of the spring—is the measure of the strain upon the pivot  $B$ . It is therefore evident that upon the location of the spring, as regards its point of attachment to the weight-arm and its direction of pull, de-

pends the pressure upon the pivot  $B$ . It is also evident that the pressure upon the pivot will become zero only when the pull of the spring is exerted in the same line as, but in the opposite direction to, the centrifugal pull of the weight-arm. In practice it is not convenient to attach the spring directly to the point  $a$ ; and my invention consists in means whereby the same effect is secured as though the spring were so attached.

In one form of my invention, as shown in Figs. 1 and 2, I accomplish this by links  $C\ C'$ , pivoted at one end to the governor-arm  $D$  and at their other ends to the ends of a beam  $E$ , the proportions and points of attachment of the links and beam being such that a point  $b$  on the beam will describe the arc of a circle or of a suitable curve about the center of gravity  $a$ , so that by attaching one end of a spring  $F$  to the beam at the point  $b$  and the other end to the rim of a fly-wheel  $G$  the same effect is produced—so far as the action of the governor and the pressure on the pivot  $B$  are concerned—as though the spring were attached directly to the point  $a$ .

It is obvious that the location of the lever and links may be varied through a great number of forms, and I do not desire to be limited to any particular arrangement of the same. Also, the point to which the spring is attached may be changed to one end of the beam and one link attached to the other end of the lever and the other link at an intermediate point; nor is it necessary to the successful operation of the device that the links lie parallel to each other, nor that they be of equal length, as shown; nor does the success of the device depend on the point  $b$  describing an arc of a circle relative to point  $a$ , as there are curves which are equally suitable and which can be approximated by a proper proportioning of the links and beam; nor is it necessary that the links be in the form shown, as flexible material, such as wire-rope or steel straps, may be used, and by reason of their flexibility the pivots may be dispensed with; also, one spring may be used instead of two.

In Figs. 3 and 4 I show other modifications of my invention, that shown in Fig. 3 consisting of the substitution of springs  $C^2\ C^3$  for



the links C C' of Fig. 1, said springs being pivotally attached at one end to the weight-arm and at the other to the ends of the beam E', the latter being pivotally attached to a stud F' from the wheel or carrier, while in Fig. 4 a spring E<sup>2</sup> is substituted for the beam E of Fig. 1, said spring being pivotally attached to links C<sup>4</sup>, which are pivotally attached to the weight-arm D of the governor and also to a member F<sup>2</sup>, secured to the wheel or carrier. Each of these forms embodies the essential features of my invention—viz., the links pivotally attached to the pivoted weight-arm and also pivotally attached to the lever, which latter is pivotally attached to the member connecting to the rim of the wheel or carrier. Thus it will be understood that either the links, the beam, or the member which connects to the rim of the wheel or carrier may be employed as the spring without departing from the spirit of my invention. Therefore I desire to be understood as regarding all the foregoing described modifications and changes in the details of arrangement, construction, and location of the parts of my invention as falling within the scope of the same.

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

1. In a governor, the combination with a rotating carrier, of a weight-arm so pivoted to said carrier that its centrifugal force tends to rotate it relatively to the carrier about its pivot, an eccentric connected to said arm, links pivotally connected to the weight-arm, a beam pivotally connected to said links, and a member pivotally connected to said beam and the carrier, one of said connecting parts between the weight-arm and the carrier be-

ing adapted to act as a spring to resist the centrifugal force of said weight-arm, and the relation of these parts to each other being such that the line of strain of said connecting parts will pass through, approximately, the center of gravity of the weight-arm, the center of rotation of the carrier, and the point of attachment of said member to the carrier, whereby the centrifugal force of the weight-arm and the resisting strain of the spring will neutralize each other directly, and such strain will not be transmitted through the pivotal attachment of the weight-arm to the carrier, or only so much of it as may be overcome by the gravity effect of said weight-arm.

2. In a governor, the combination with a rotating carrier, of a weighted arm pivoted at one side of the center of rotation of said carrier, an eccentric connected to said weighted arm, two links pivotally connected at separated points to said weighted arm, a beam pivotally connected to the free ends of said links, and means for connecting said beam to the carrier, one of said elements, either the links, the beam, or the connecting means, acting as a spring for elastically resisting the centrifugal force of the weighted arm, and the relation of these elements to each other being such that the line of strain thereof will pass through, approximately, the center of gravity of the weighted arm, the center of rotation of the carrier, and the point of attachment of the connecting means to the carrier.

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

EDWIN J. ARMSTRONG.

Witnesses:

L. DALESKI,  
J. F. WALTHER.