

(No Model.)

5 Sheets—Sheet 1.

W. D. MARKS.

GOVERNOR.

No. 350,595.

Patented Oct. 12, 1886.

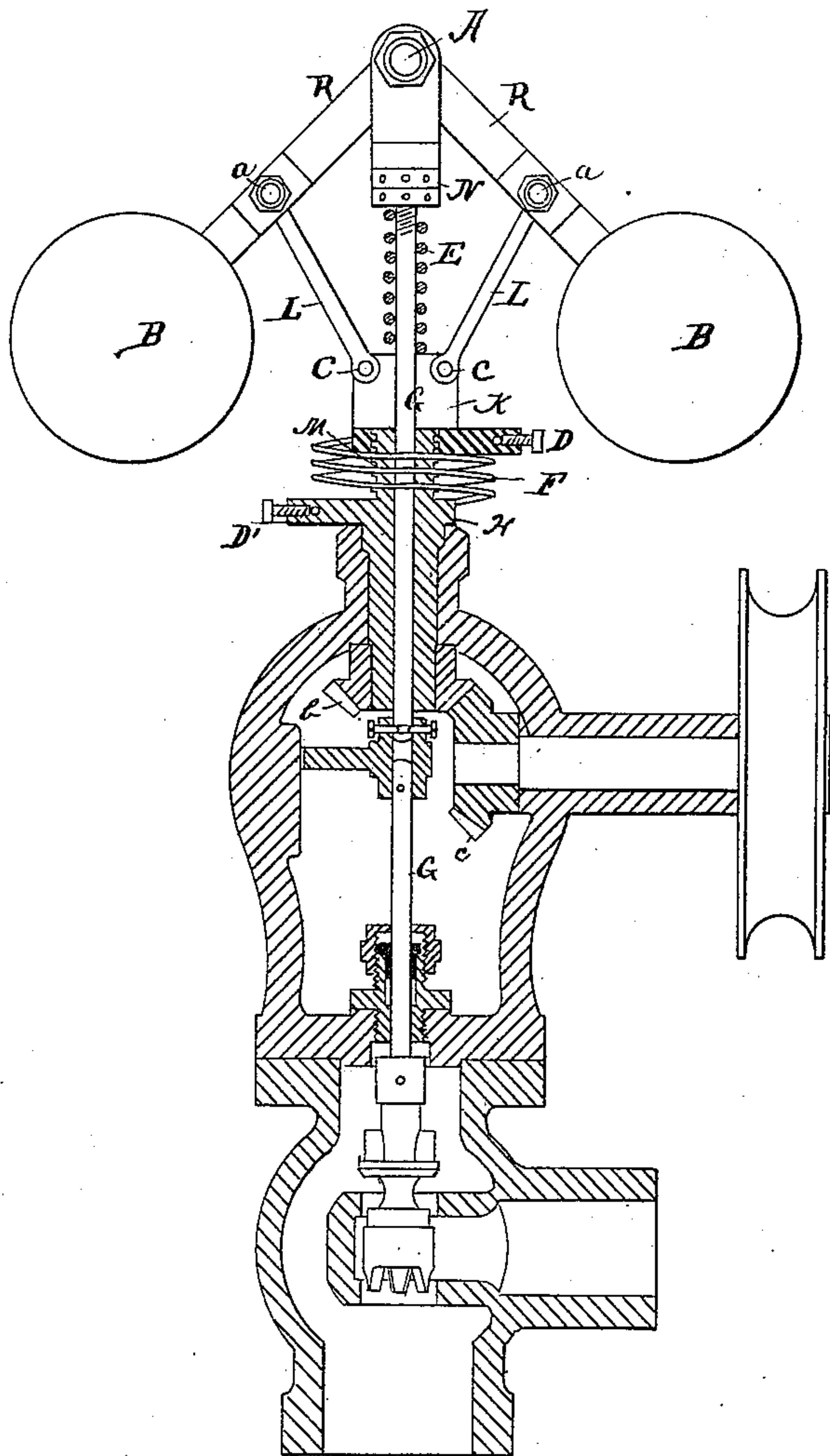


Fig. 1.

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by his attorney
Chas. A. Rutter

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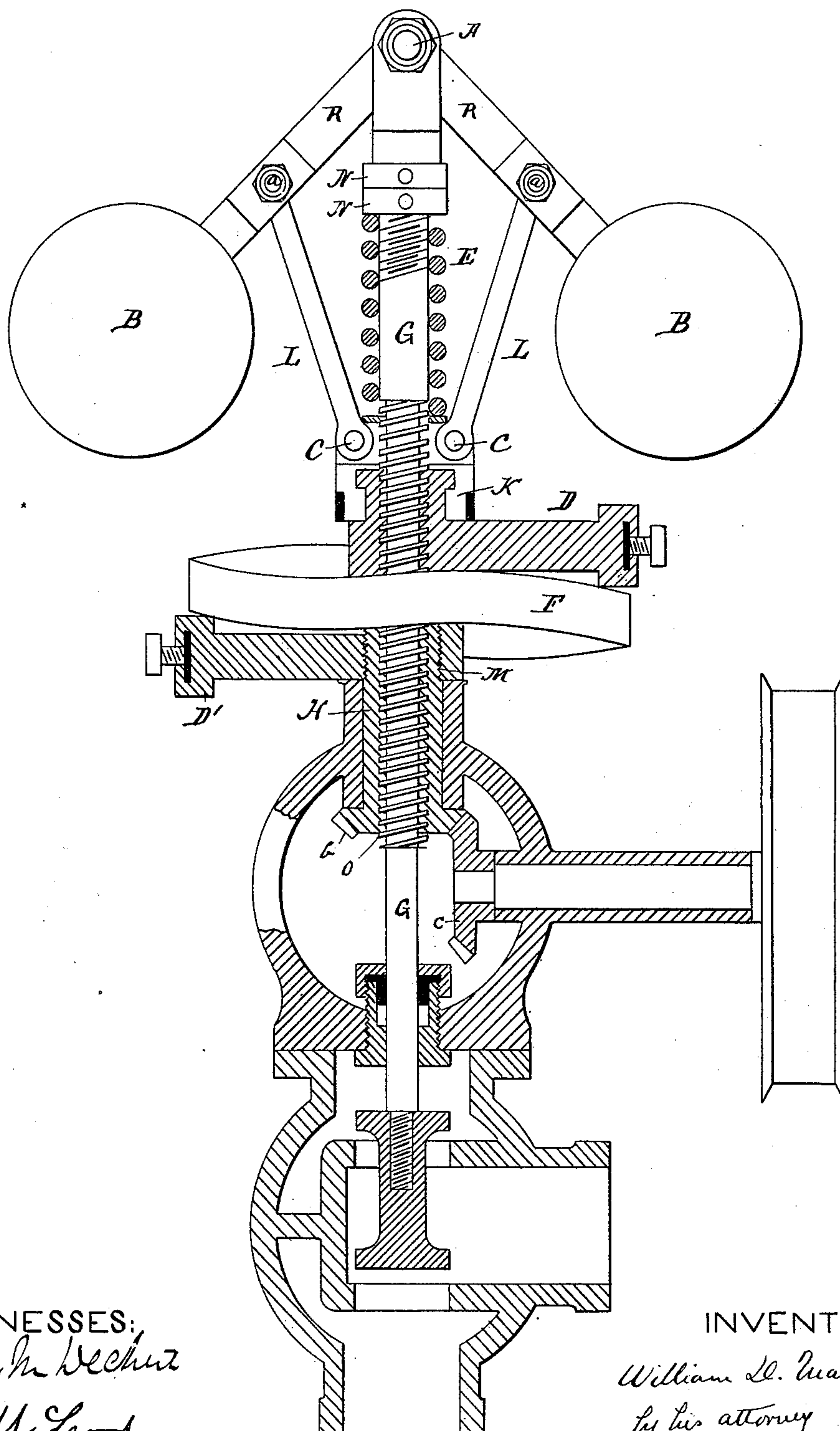


Fig. 2.

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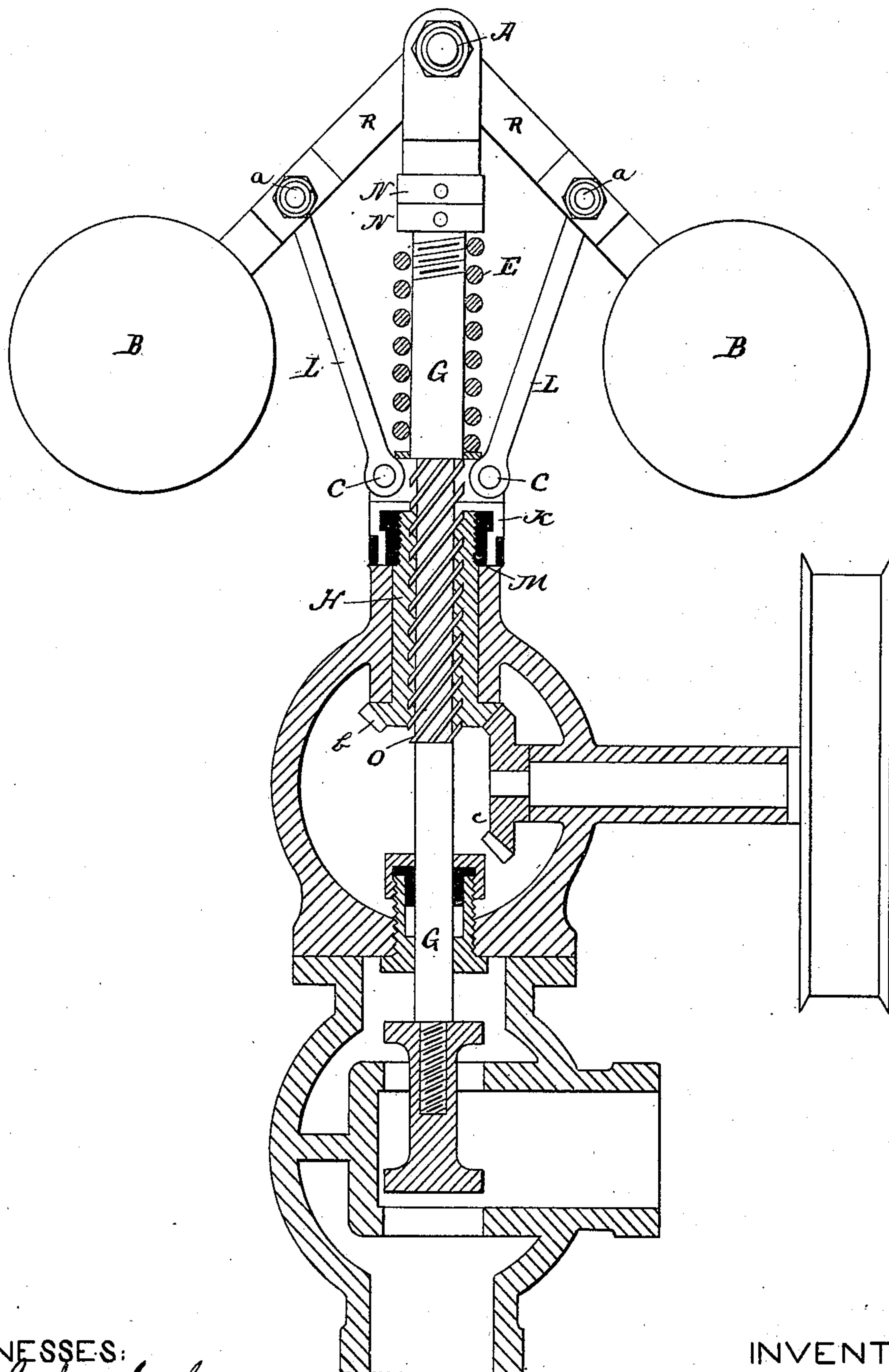


Fig. 3.

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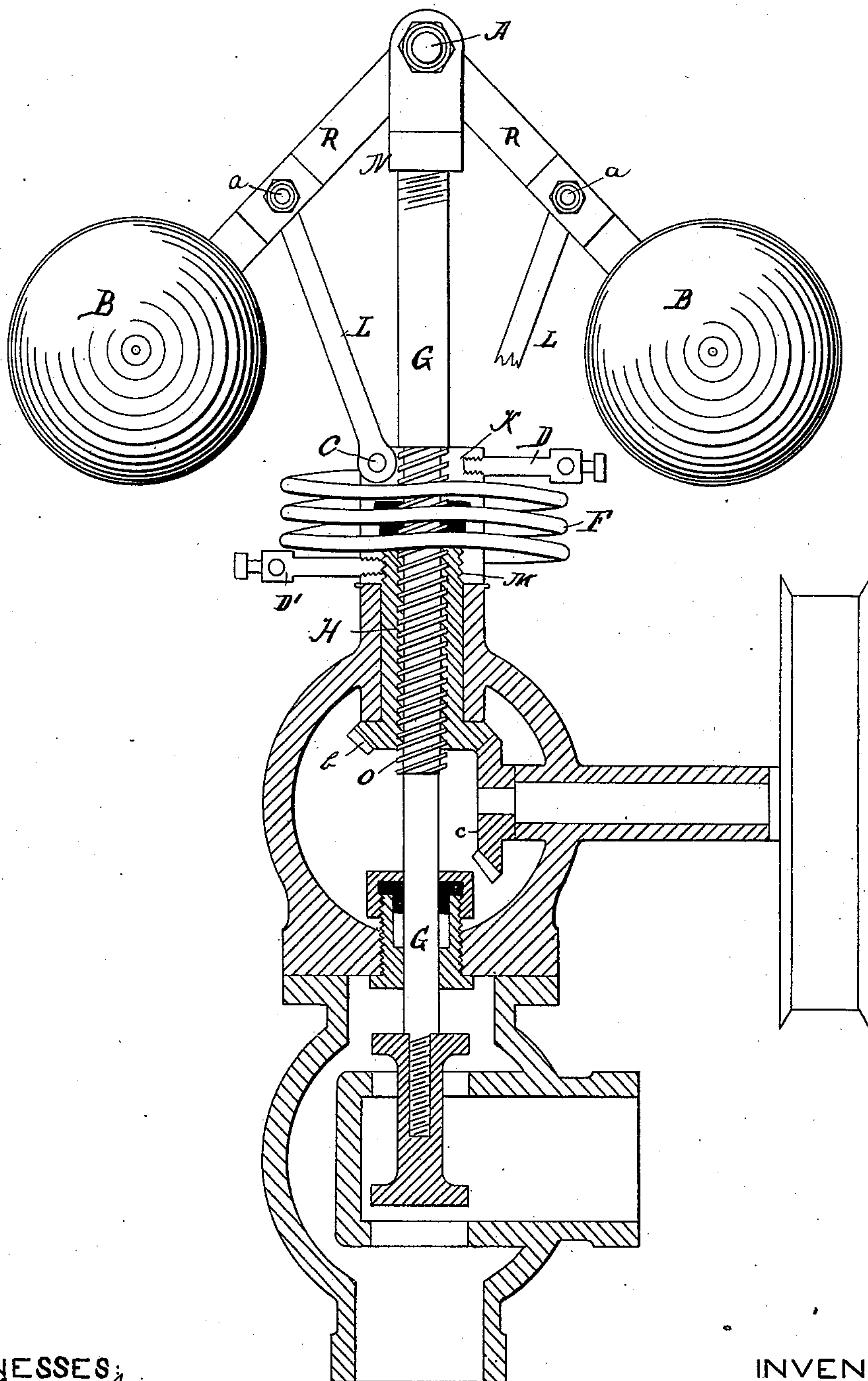


Fig. 4.

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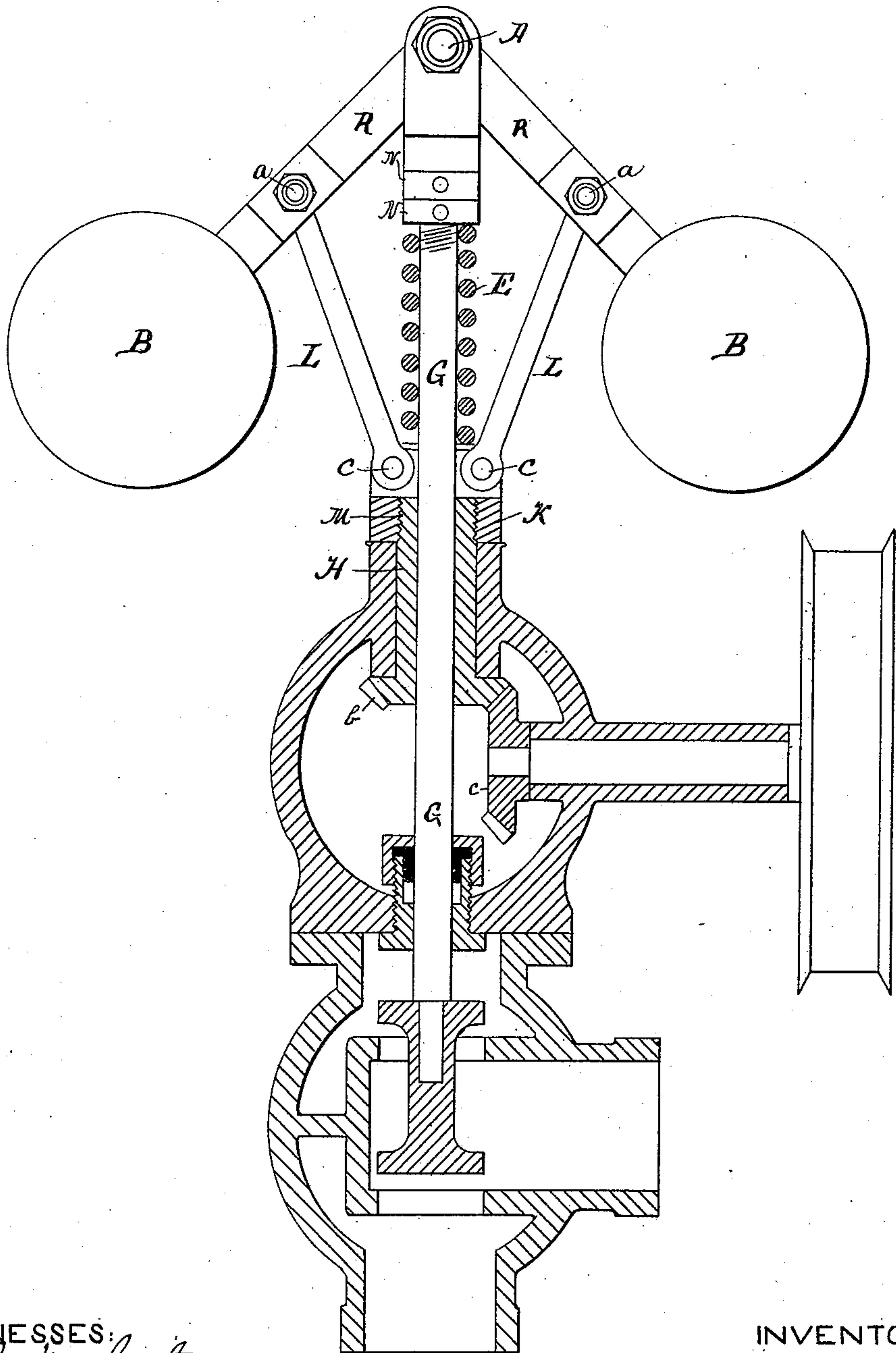
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Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM D. MARKS, OF PHILADELPHIA, PENNSYLVANIA.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 350,595, dated October 12, 1886.

Application filed April 9, 1886. Serial No. 198,397. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. MARKS, a citizen of the United States, and a resident of the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Governors, of which the following is a specification.

The object of my invention is to cause in a steam-engine governor a movement of the valve before any change of speed occurs in the governor-balls. This is accomplished by the inertia and the centrifugal force of the balls conjointly. This was attempted in my patent of June 22, 1875, No. 164,745, by means of inertia alone, but did not prove effectual because too sensitive, and because it would not allow of a large range of adjustment. The larger adjustment of the valve's position, or of other attachment to the governor, is made by means of the centrifugal force, while the adjustment for sudden changes of speed in the engine, or for slight and temporary variations, is effected by means of the inertia of the balls in advance of any change of speed in their revolution.

In the accompanying drawings, forming part of this specification, and in which similar letters of reference indicate similar parts throughout the several views, Figure 1 is a central sectional elevation of my invention, and Figs. 2, 3, 4, and 5 sectional elevations of modifications of the same.

The balls B B are secured to the lower ends of arms R R, the upper ends of which are pivoted to the upper end of spindle G at A. The links L L are pivoted to the arms R R at a and to the nut K at c c. The distance from center of balls B to center of pivot A is bisected, and this half-length is made equal to the length of the links L L. As the point A is free to rise and fall vertically, and the points c c are relatively fixed, the balls move out in a straight line, thus eliminating the force of gravitation in their action, and the balls revolve in a given horizontal plane which passes through the points c c in all positions and at all speeds, their tendency to move outward being restricted by the spiral spring E, and the spindle G, playing freely up and down, makes the large adjustment of the valve's position by means of centrifugal force alone. The nut K

has a female thread cut in it, and an arm, D, projecting from it. The prolonged hub H of the upper miter-wheel, b, has a projecting arm, D', and a male thread, M, entering the nut K. The arms D D' are joined by means of the spiral spring F, and the power to turn the governor-balls is transmitted through miter-wheels c and b to arm D', to spring F, and by this spring to the arm D. Should the engine attempt to go faster, the spring F will close in proportion to its sensitiveness, because of the inertia of the balls, and thus screw down the nut K and lower the point A, thus closing the valves. Should the engine attempt to go slower, the balls B B, by virtue of their inertia, will not instantly change their speed, and therefore the spring F will open in proportion to its sensitiveness or elasticity, screwing the nut K up and raising the point A, and with it the valve or other attachment.

The advantages of this governor are, first, the avoidance of the diminution of sensitiveness at great angles of the arms R R, since the balls do not rise and are not affected by gravity, as is the case with the ordinary centrifugal governor; second, the ability to make the preliminary adjustment of the height of the valve above its seat by means of the nut K and screw M; third, the use of centrifugal force and inertia in conjunction enable a very strong governor of very great sensitiveness, as the movement of the valve due to inertia is made by means of a screw-thread, M, of great power, handled by an extremely-sensitive spring, F. By means of the lock-nuts N the tension of the spring E can be adjusted for different speeds without diminishing the sensitiveness of the governor, which is dependent on the tension of spring F. The arrangement shown in Fig. 2 is similar to that shown in Fig. 1, with the exception that the spindle G is threaded, instead of the nut K. The nut is recessed merely to hold upper arm, D, in place, while still permitting it to turn. In Fig. 3 the action is substantially the same, except that a thread, O, preferably of very steep pitch, is cut on the spindle G and the nut K recessed to hold hub H of upper miter-gear, b, while still permitting it to turn. The inertia of the balls will tend to screw the spindle G down against the tension of spring E, which also resists the cen-

trifugal force of the balls. Fig. 4 is substantially the same as Fig. 1, except that the spindle G has a thread cut upon it, and the nut K is recessed to hold hub H of upper miter-gear,

- 5 b. The nut K can turn around hub H, and the spring F serves to resist the pull due to the combined action of the centrifugal force and inertia of the balls.

Fig. 5 is a plain centrifugal governor in
10 which is introduced the hereinbefore-described parallel motion for the purpose of eliminating gravity.

Having thus described my invention, I claim—

1. In a governor in which the inertia and 15 the centrifugal force of a revolving pendulum are conjointly used to control the valve, the combination of the pendulum, the spindle, and the springs, substantially as shown and described.

20 2. The combination of spindle G, nut K, hub H, arms R R, balls B B, links L L, arms D D', spring F, and spring E, all substantially as and for the purposes set forth.

WM. D. MARKS.

Witnesses:

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FREDERICK S. DICKSON.