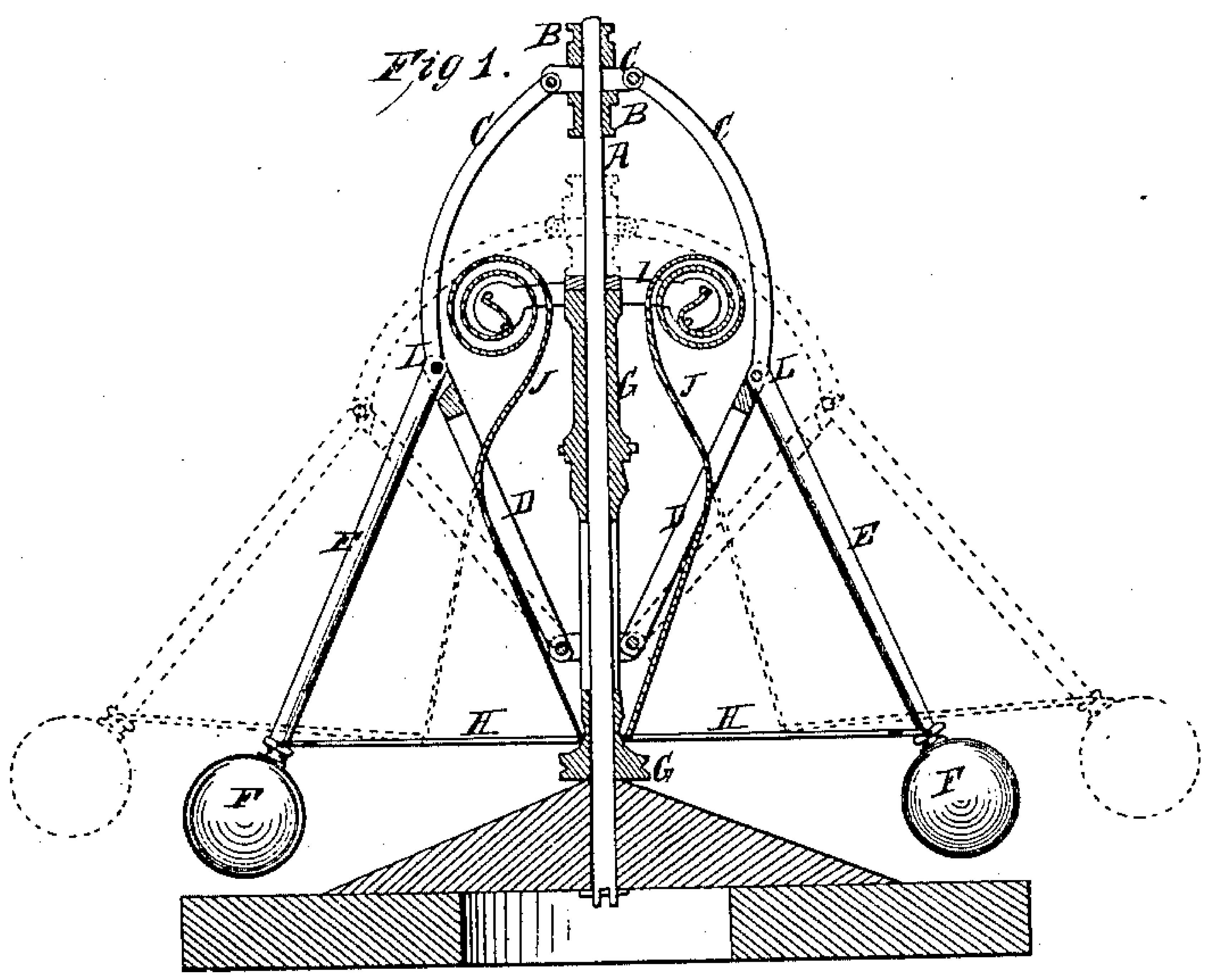
S. H. MILLER.

GOVERNOR.

No. 29,986. Patented Sept. 11, 1860.

Fig 1.



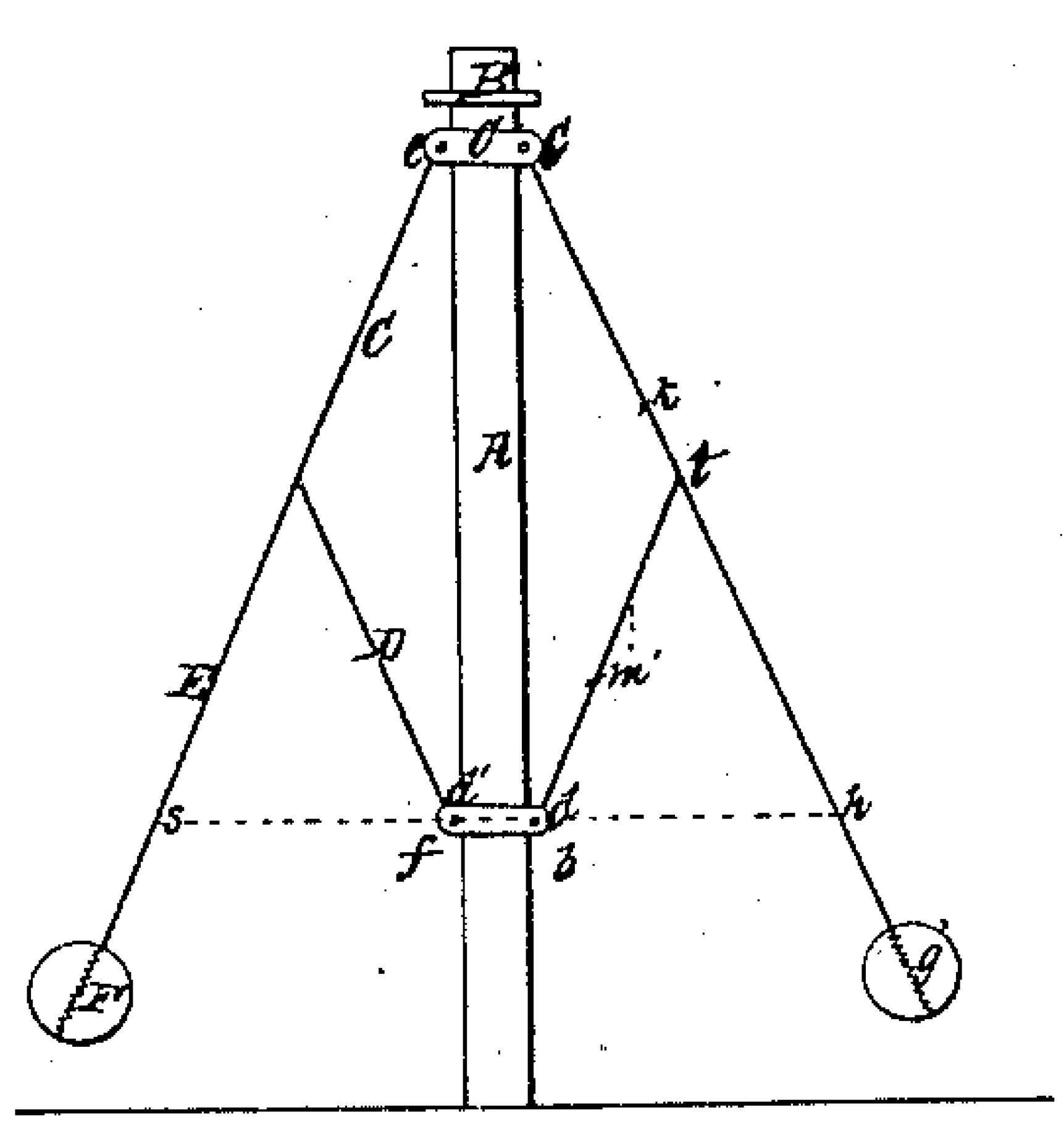
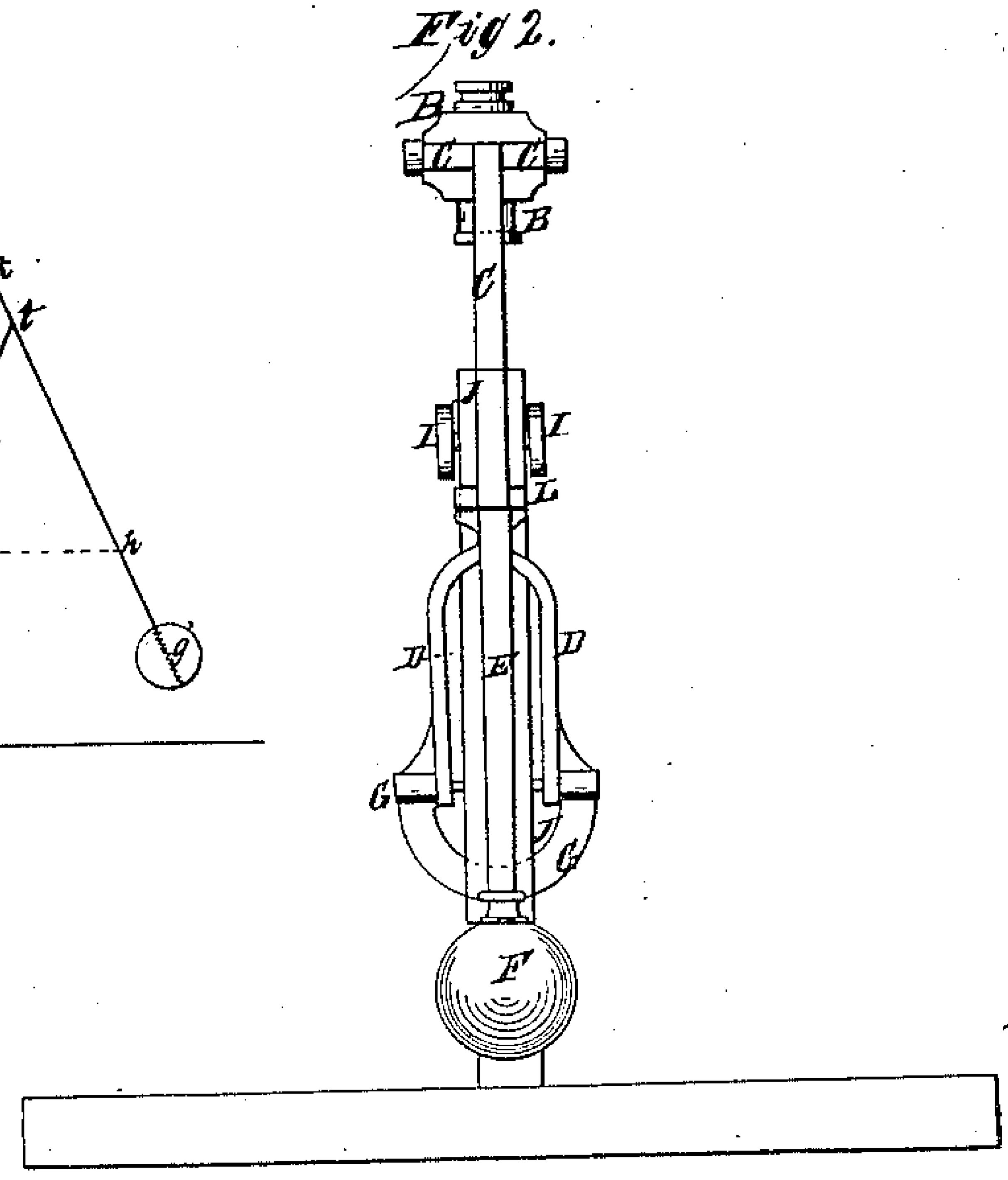


Fig 2.



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UNITED STATES PATENT OFFICE.

S. H. MILLER, OF HANOVERTON, OHIO.

GOVERNOR FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 29,986, dated September 11, 1860; Reissued March 4, 1862, No. 1,285.

To all whom it may concern:

Be it known that I, S. H. MILLER, of Hanoverton, in the county of Columbiana and State of Ohio, have invented a new and useful Improvement in Marine Governors; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1, represents a vertical central section and Fig. 2, a side view of the apparatus.

Similar letters of reference, in each of the several figures indicate corresponding parts.

The nature of my invention consists, 1st, in the balancing bar and springs, in combination with a governor as hereinafter to be described.

It consists, 2nd, in the arrangement of a sliding top collar, linked arms and rods and governor balls, in combination with a balancing bar and springs, in the manner and for the purposes to be described.

The object of my invention is to construct a governor for marine purposes, the balls of which will not fly out irregularly so as to vitiate their proper action on the machine in consequence of the rolling and pitching motion of a ship at sea.

To enable others, skilled in the art, to make and use my invention, I will proceed to describe its construction and operation.

The governor consists of a vertical shaft A, upon which are arranged a bottom collar G, and a top collar B. Both the collars are free to revolve upon the shaft, and the top collar has an additional sliding motion in a vertical direction.

Arms C, C, are pivoted to the top collar and arms D, D, are pivoted to the bottom collar. Each of the arms C, is joined to its arm D, by pivot L, and a rod E, with a governor ball F, at its lower end, is hung to each of the two pivots L.

Connecting rods H, H, extend one from each of the balls F, F, toward the center shaft, their inner ends being held by the ends of springs J, J. These springs are made in spiral shape at their upper ends and are there secured to the opposite ends of a bar I, which at its center is pivoted to the upper part of the bottom collar G. It will be seen that whenever one of these springs should possess a greater tension or, on account of the ship's motion be pressed upon harder than the other spring by the momentum of its ball, the bar I, will thereby be caused to move on its pivots so as to deviate from its position at right angles to the line of the center shaft. This change of position of bar I, will unwind a small portion of one of the spirals while it will wind up a corresponding portion of the other spiral so as to equalize the tension and pressure of both springs.

To increase the sensitiveness of the balancing apparatus, it is necessary that the ends of the springs should act directly upon the balls instead of any other intermediate part between the balls and the governor links. The balls are therefore connected to the ends of the springs by the rods H, H, the top collar is made to slide instead of the bottom collar in order to arrange the parts and obtain results as hereinafter described.

e, *c*,=*f*, *b*, also *c*, *t*,=*t*, *b*, and distance *e*—*c*,=*d*, *d*; take the point *h*, on the arm so that *t*, *h*,=*t*, *b*, then it is obvious that the points *s*, *f*, *b*, and *h*, will always be in the same straight line, whatever position the sliding collar is in. Then suppose that *c*, *h*,=ten inches, *c*, *t*,=5 inches and *t*, *b*=5 inches and suppose that the center of gravity of *c*, *h*, and one half of the sliding collar be at *k*, six inches from the point *h*, and the weight of the same to be 13, and suppose the center of gravity of *b*, *t*, be at *m*, 2 inches from *b*, and its weight equal 8. Then if the sliding collar be permitted to descend one inch, the point *k*, will fall $\frac{6}{10}$ inch, that is; a weight of 13 descends $\frac{6}{10}$ inch, which is the same as a weight $\frac{78}{10}$ descending 1 inch. Under the same circumstances, the center of gravity *m*, of the arm *t*, *b*, whose weight is 8, will descend $\frac{2}{10}$ inch, which is equivalent to a weight of $\frac{16}{10}$ descending 1 inch. Adding the two effects, we have the mechanical force generated by the parts above the line *s*, *h*, represented by a weight of $\frac{94}{10}$ moving 1 inch; now this force must be expended in moving a weight of $\frac{94}{10}$ 1 inch in the opposite direction, or its equivalent. For this purpose, the arm *g*, *c*, extends below the line *s*, *h*.

Suppose we wish the common center of gravity of the part of the arm below the line

s, h, and the ball to be at g, two inches from the point h, then when the collar descends one inch, the point g, will rise $\frac{2}{10}$ inch; then the weight of that part of the arm and the ball must=$\frac{9}{2}\frac{4}{}$. For a weight of $\frac{9}{2}\frac{4}{}$, moving $\frac{2}{10}$ inch, is equivalent to $\frac{9}{1}\frac{4}{0}$ moving one inch. In this manner by making the relative proportions of the apparatus as above described, the balls, links and collar B, will be perfectly balanced whatever the position of the ship and center shaft A, may be.

The governor constructed as above described will always be exactly balanced and will work with equal regularity no matter how violent the motion of the ship may be.

What I claim as my invention and desire to secure by Letters Patent, is—

1. The balancing bar I, and springs J, J, in combination with a governor, substantially as and for the purposes set forth.

2. The arrangement of a sliding top collar B, linked arms C, D, and rods E, and governor balls F, in combination with a balancing bar I, and springs J, substantially as and for the purposes set forth.

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