

C. J. H. WOODBURY.

SPEED-GAGE.

No. 175,809.

Patented April 4, 1876.

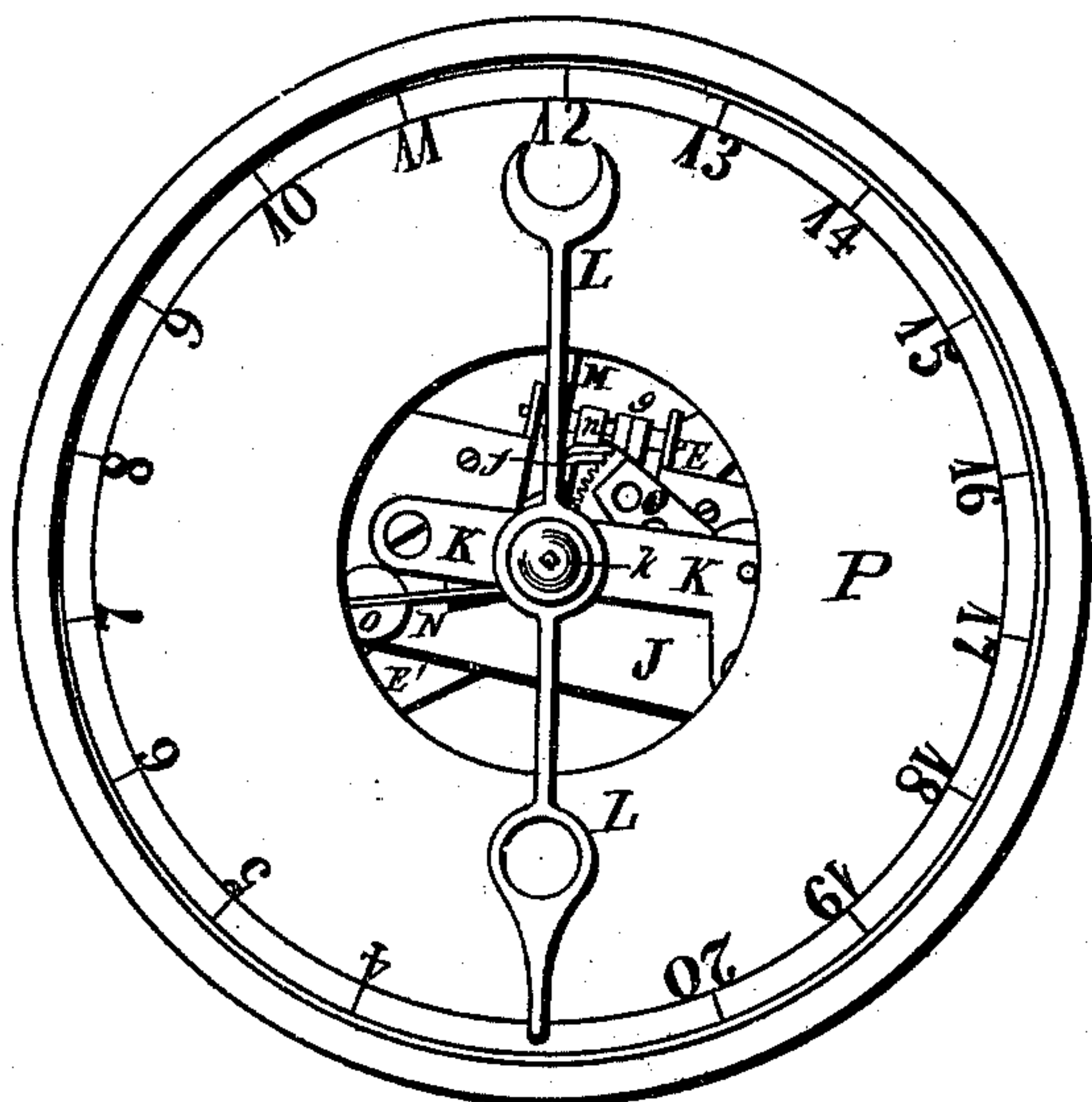


FIG. 1.

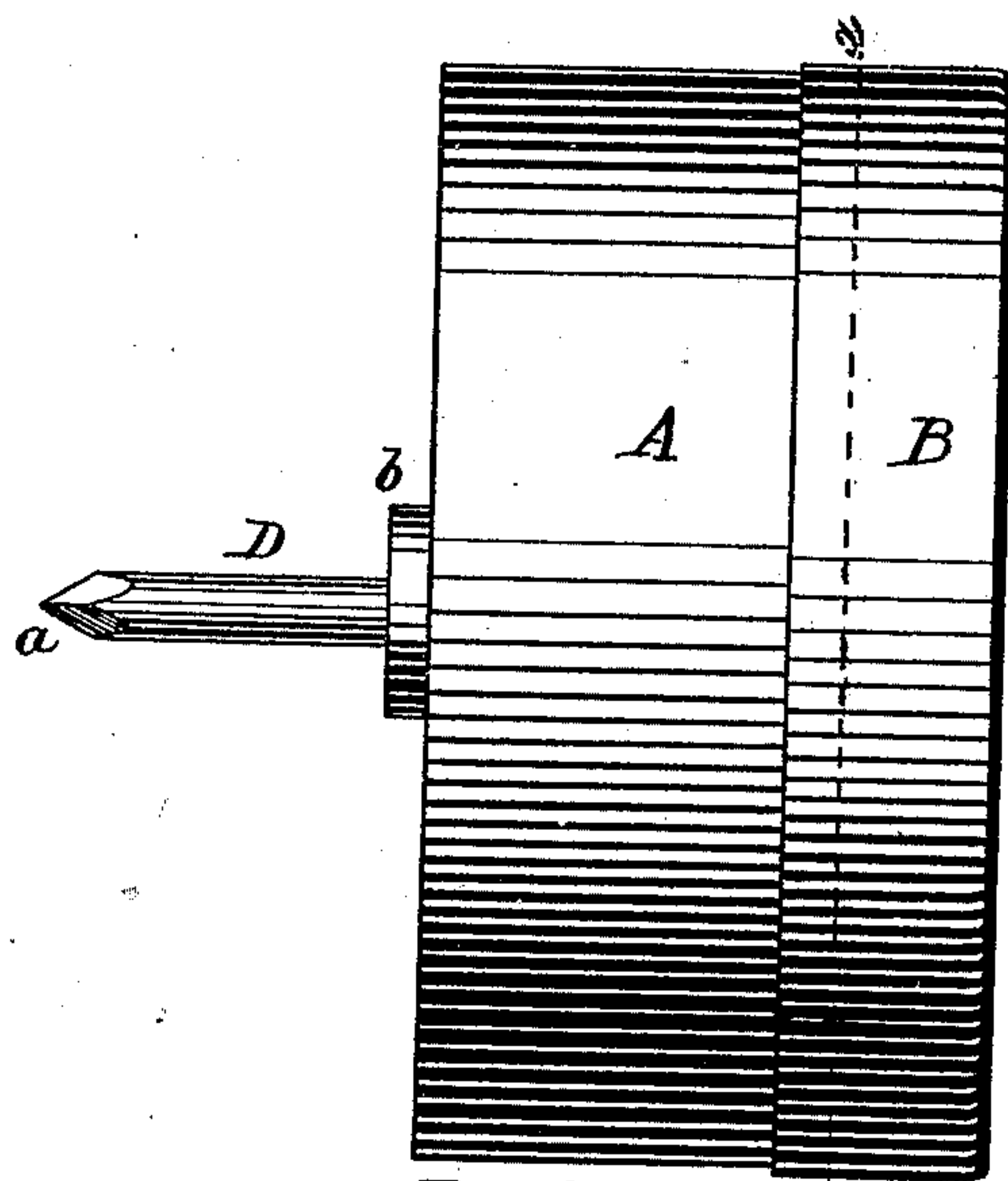


FIG. 2.

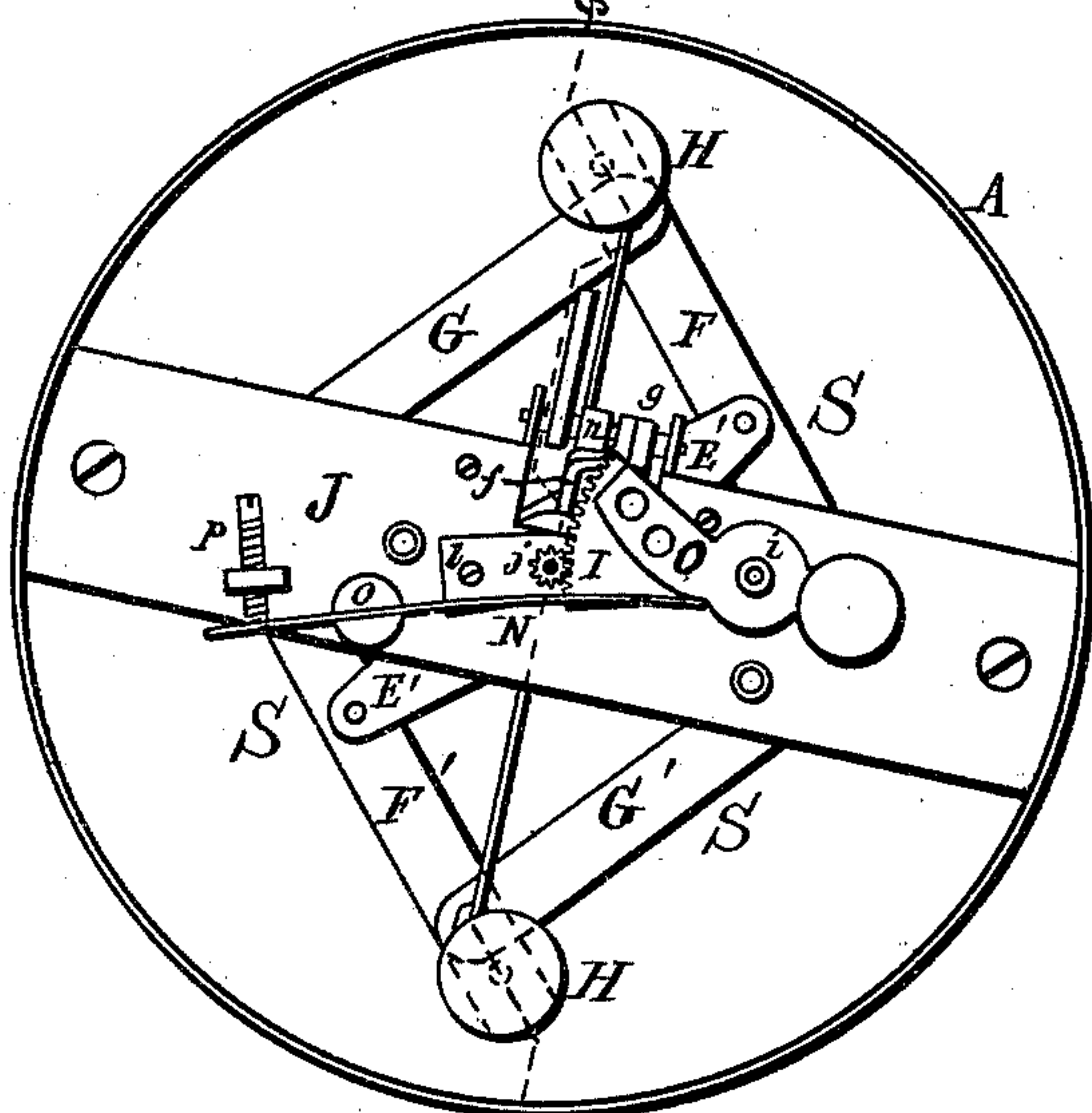


FIG. 3.

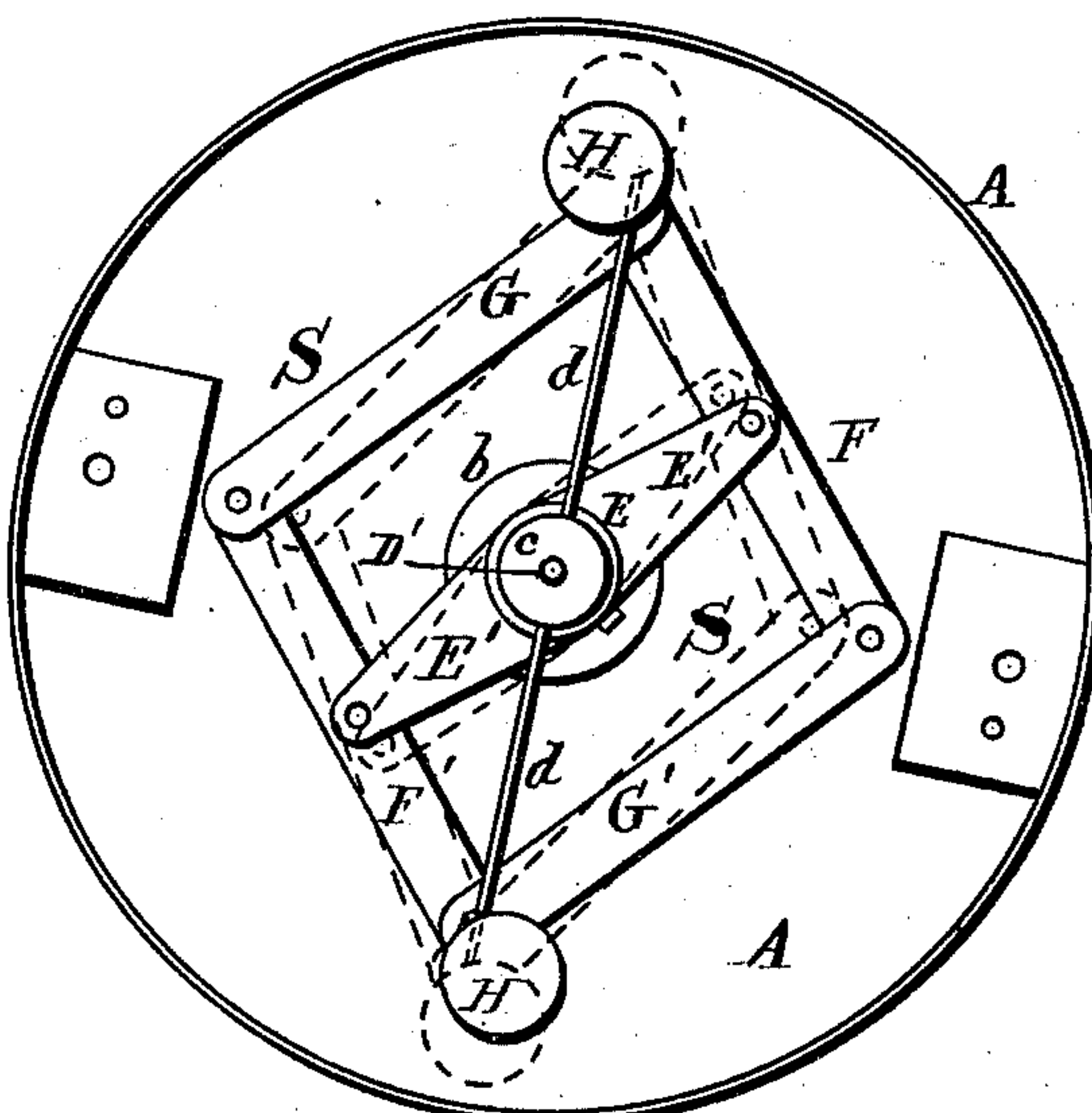


FIG. 5.

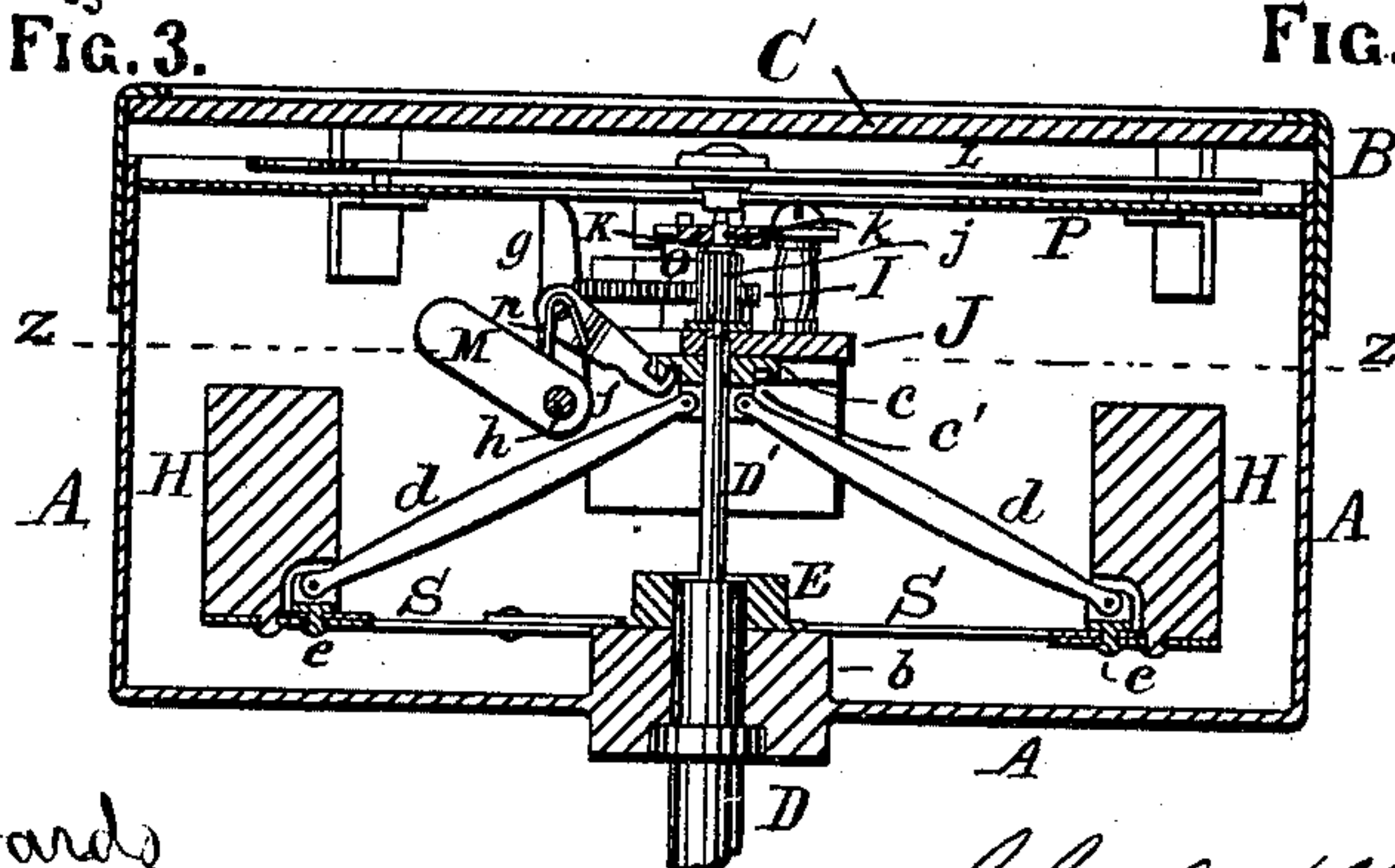


FIG. 4.

WITNESSES.

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CHARLES J. H. WOODBURY, OF LYNN, MASSACHUSETTS.

IMPROVEMENT IN SPEED-GAGES.

Specification forming part of Letters Patent No. **175,809**, dated April 4, 1876; application filed December 22, 1875.

To all whom it may concern:

Be it known that I, CHARLES J. H. WOODBURY, of Lynn, in the county of Essex and State of Massachusetts, have invented a new and useful Speed-Gage, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to a device for indicating upon a graduated dial, by means of an index-hand, the speed of revolution of shafting or other rotary objects, at any given moment of time, without the necessity of timing it or keeping it in contact with the shaft or other object the speed of which is to be measured, for a specified or given period of time; and it consists, first, in the use of a light jointed frame, consisting of four bars or rods, of equal length, pivoted together at their ends, so as to form a four-sided frame, all of said pivots being so fitted that each of the joints of said frame may be readily and easily moved, said frame being connected by the center of two opposite bars or rods to the ends of two arms projecting from, and secured to, the driving-spindle, so as to compel said frame to revolve with said spindle in a plane at right angles to the axis of the spindle, and also provided with weights secured to opposite diagonal corners thereof, which, when revolved by the revolutions of the driving-spindle, will be thrown outward, by virtue of the centrifugal action or tendency to fly off, at a tangent to the line of revolution, moving radially from the axis of the spindle, with equal ease in all parts of their motion, and also connected to a collar, mounted upon a central spindle, forming an extension of the driving-shaft, and connected to the weights upon the jointed frame, or to the pivot-pins in opposite diagonal corners of said frame near said weights, by two light links or connecting-rods, in such a manner that the radial motion of the weights will cause a motion of said collar along its spindle toward the jointed frame, and by suitable connections leading therefrom to the spindle of the index hand, cause said hand to be deflected a greater or less amount, according to the speed of revolution of the driving-spindle.

My invention further consists in the use, in combination with the jointed frame and slid-

ing collar, of a clutch-hook, adapted to engage with said collar at one end, and secured at the other end to a pivoted lever, adapted to bear against and move a gear-segment, which engages with a pinion on the index-spindle.

My invention further consists in combining with said clutch-hook and lever a counter-weight and spring, adapted to balance and control said parts, so that the machine can be run in any position.

My invention further consists in the use of a gear-segment, the teeth of which engage with the teeth of a pinion on the index-spindle, and having secured to or formed upon it a cam-shaped surface, in combination with a spring, adapted to press upon said cam-surface at a greater or less distance from the axis of said segment, according to the amount of vibratory motion imparted to said segment, the office of said spring being to return the parts to their normal position when the rotary motion ceases, and also to serve as a retarding force to prevent a too sudden movement of the weights in a radial direction, and by virtue of its varying tension, due to the change of bearing upon the segment, serve as a regulator, by which the index-hand is made to move through a given arc for a given increase of speed of revolution.

My invention further consists in the use, in combination with said segment and reaction-spring, of a regulating-screw, adapted to act upon said spring to increase or diminish its tension.

Figure 1 of the the drawings is a front elevation of my improved speed-gage. Fig. 2 is a side elevation. Fig. 3 is a section of the casing on line *x x*, on Fig. 2, and showing the interior mechanism in elevation, with the cap-plate K removed. Fig. 4 is a section on line *y y*, on Fig. 3; and Fig. 5 is a section through casing on line *z z*, on Fig. 4, with bar J, and mechanism mounted thereon, removed, and showing the jointed frame in elevation.

A is the casing, provided with a cover, B, having a glass front, C. D is the driving-spindle, provided with a triangular point, *a*, in the usual manner, and having a bearing in the central hub *b* of the casing A. To the inner end of the spindle D is firmly secured, so as to revolve with it, the hub or collar E, from

opposite sides of which project the arms E' E' , the outer ends of which are loosely pivoted to the middle of the lengths of the bars or rods F and F' , which, in turn, are loosely pivoted at their ends to the ends of the bars or rods G and G' , as clearly shown in Fig. 5. H H are two weights, secured to opposite corners of the rectangular frame S , made up of the bars F , F' , G , and G' , and adapted to be moved radially to the axis of the spindle D , with equal ease in all parts of their motion. The rhombic frame S surrounds the spindle D and revolves edgewise in a plane at right angles to the axis of said spindle, and when its form is changed by the action of centrifugal force, two of its corners move toward the spindle and the other two away from it. D' is an extension of the spindle D , reduced in size and having mounted thereon the collar c , having an annular groove, c' , formed in its under side, and so fitted that it is free to move lengthwise upon the spindle D' , said collar being connected to the jointed angular frame by means of two light links or connecting-rods, d d , pivoted at one end to said collar, upon opposite sides thereof, and at their other ends to the joint-pins e e , at opposite diagonal corners of said frame, in close proximity to the weights H H , all so arranged that a radial motion of the weights H H will cause the collar c to be moved along the spindle D in the direction of its length toward the jointed frame, or away from it, according as the weights H H are moved toward or from the axis about which they revolve. The collar c engages with the clutch-hook f , which is pivoted to the lever g secured upon the rocker-shaft h , and arranged to bear against the edge of the gear-segments I pivoted at i , the teeth of which engage with the pinion j secured to the short spindle k , arranged in line with the spindle D D' , and having its bearings in the thin plate l , secured to the upper side of the bar J , and in the cap-plate K , the outer end of said spindle k being made rectangular to receive the index-hand L . A counterpoise weight, M , is secured to the rocker-shaft h , and serves to counterbalance the hook f , and in conjunction with the spring n insures the proper engagement of the hook f with the collar c in whatever position the gage may be held while in operation. N is a spring, pivoted at o to the bar J , with its rear or butt end bearing against the point of the regulating-screw p , and its movable end resting against the cam-shaped edge of the plate O , secured to the upper side of the segment I , all so arranged that when the weights H H are thrown outward and the centrifugal force is increased, the resistance to the movement is correspondingly increased by transferring the point of contact between the spring N and the cam-surface on the segment I farther from the axis of said segment and nearer to the fixed point of the spring N . P is a dial, graduated and figured to represent hundreds of revolutions per minute—*i. e.*, 4 stands for four hundred, 5

for five hundred, and 6 for six hundred revolutions per minute.

The operation of my speed-gage is as follows: The end of the spindle D is placed in contact with the end of the shaft that it is desired to test, with its axis in line with the axis of said shaft, in which position it is only necessary to hold it for an instant of time. The spindle D immediately commences to revolve at the same rate of speed as the shaft with which it is in contact, and the weights H H are thrown outward by centrifugal force, changing the shape of the jointed frame to which these are attached, as indicated in dotted lines in Fig. 5. This outward motion of the weights H H causes the collar c to be moved toward the collar E , and, acting through the clutch-hook f and lever g upon the segment I , moving it about its axis, bending the spring N , and revolving the pinion j and the index-hand L till its point indicates the speed per minute at which the shaft is running. The amount of radial motion which is imparted to the weights H H , and consequently the motion of the collar c , the segment I , and index-hand L , is exactly proportioned to the speed at which the spindle D is made to revolve.

This device should not be confounded with speed-indicators that act upon the principle of a counter registering upon the dial each individual revolution of the shaft, and which require to be kept in contact with the shaft for a given period of time, necessitating the use of a watch and more or less figuring to obtain the result sought, *i. e.*, the speed per minute. This device works upon an entirely different principle, the result being given instantly upon the dial as quick as the gage is placed in contact with the shaft, without timing or figuring.

This device may be applied to locomotives. The spindle D being connected by suitable gearing to one of the axles, and the dial being properly graduated, the index-hand will indicate the speed of progression.

It will be noticed that by the arrangement of the jointed frame and the collar c and clutch-hook f it makes no difference which way the spindle D is revolved, the index-hand always moving around the dial in the same direction.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The jointed rhombic frame S surrounding the spindle D , and weighted at opposite diagonal corners, and adapted to revolve with the driving-spindle in a constant plane at right angles to the axis of the spindle, and to have its form changed by the action of centrifugal force, substantially as described.

2. The combination of a jointed rhombic frame, S , weighted at opposite diagonal corners, arranged to surround the spindle D and adapted to revolve therewith in a plane at right angles to the axis of said spindle, the collar c and connecting-rods d d , so connected

to said frame that a radial motion of its weights will cause a movement of the collar *c* lengthwise of the spindle around which all of the parts revolve, as and for the purposes described.

3. The combination of the weighted and jointed rhombic frame *S*, collar *c*, clutch-hook *f*, and lever *g*, all arranged as set forth, and co operating to impart an oscillating motion to the segment *I*, as and for the purposes described.

4. The combination of the collar *c*, provided with the annular groove *c'*, clutch-hook *f*, lever *g*, counter-weight *M*, and spring *n*, all arranged and operating as set forth, to insure the operation of the gage in any desired position, substantially as described.

5. The segment *I*, having secured thereto the plate *O* provided with a cam-shaped edge, in combination with a spring, *N*, arranged to bear against said cam-shaped edge of the plate *O*, as and for the purpose described.

6. The combination of the segment *I*, reaction-spring *N*, and regulating-screw *p*, arranged and adapted to operate as and for the purposes described.

Executed at Boston this 18th day of December, 1875.

CHARLES J. H. WOODBURY.

Witnesses:

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