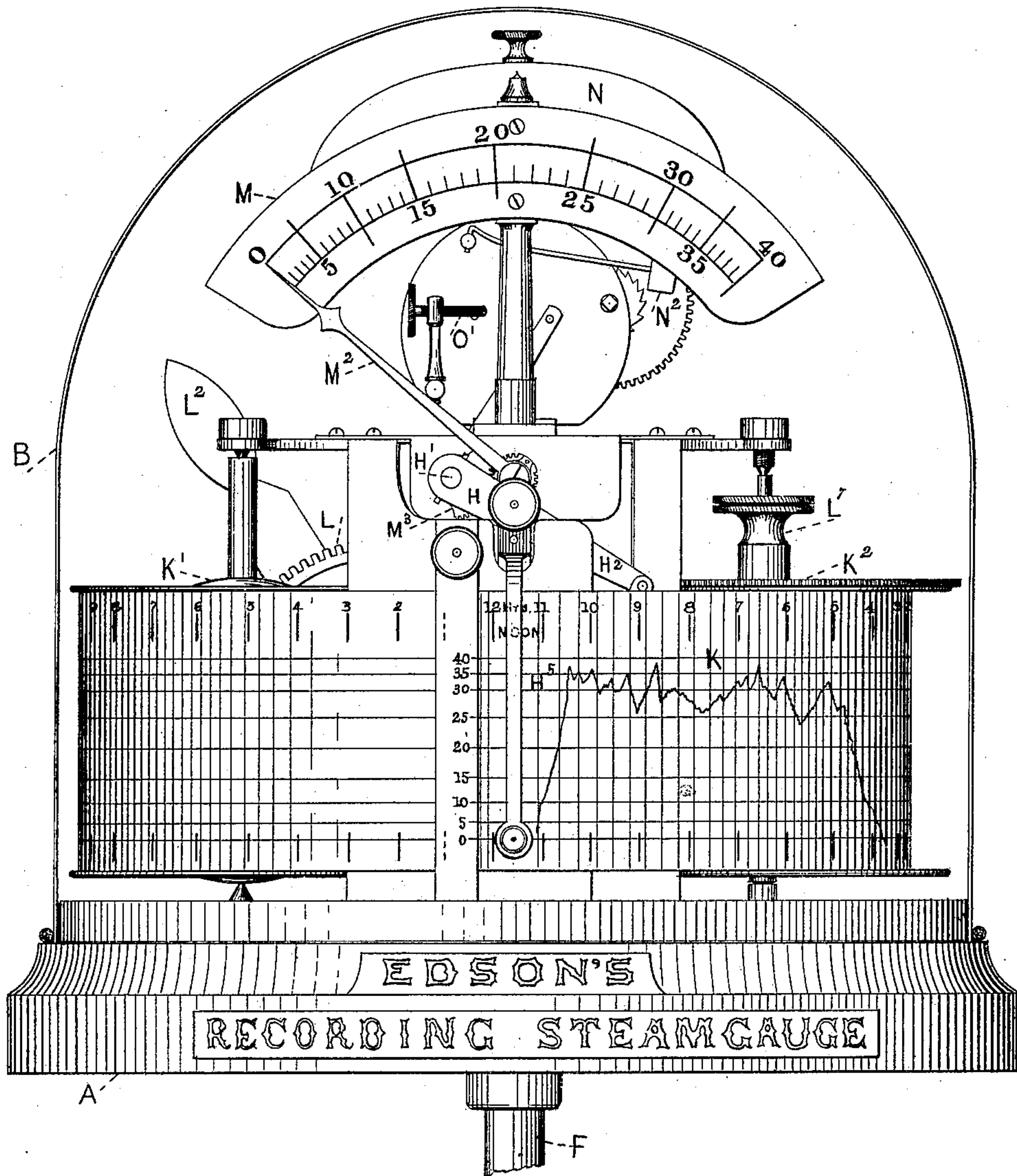


J. B. EDSON.  
RECORDING STEAM-GAGE.

No. 174,125.

Patented Feb. 29, 1876.

FIG. 1.



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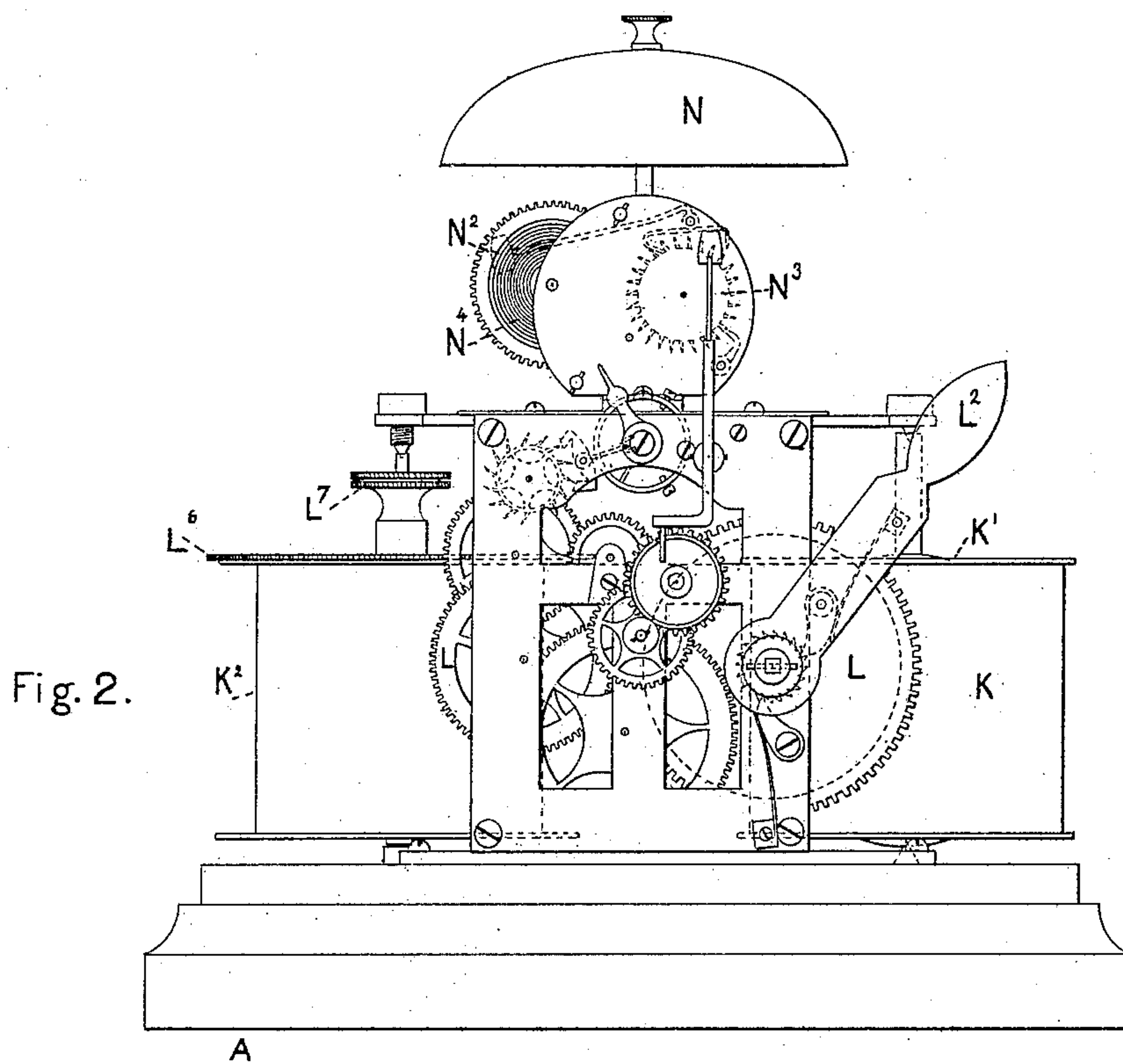
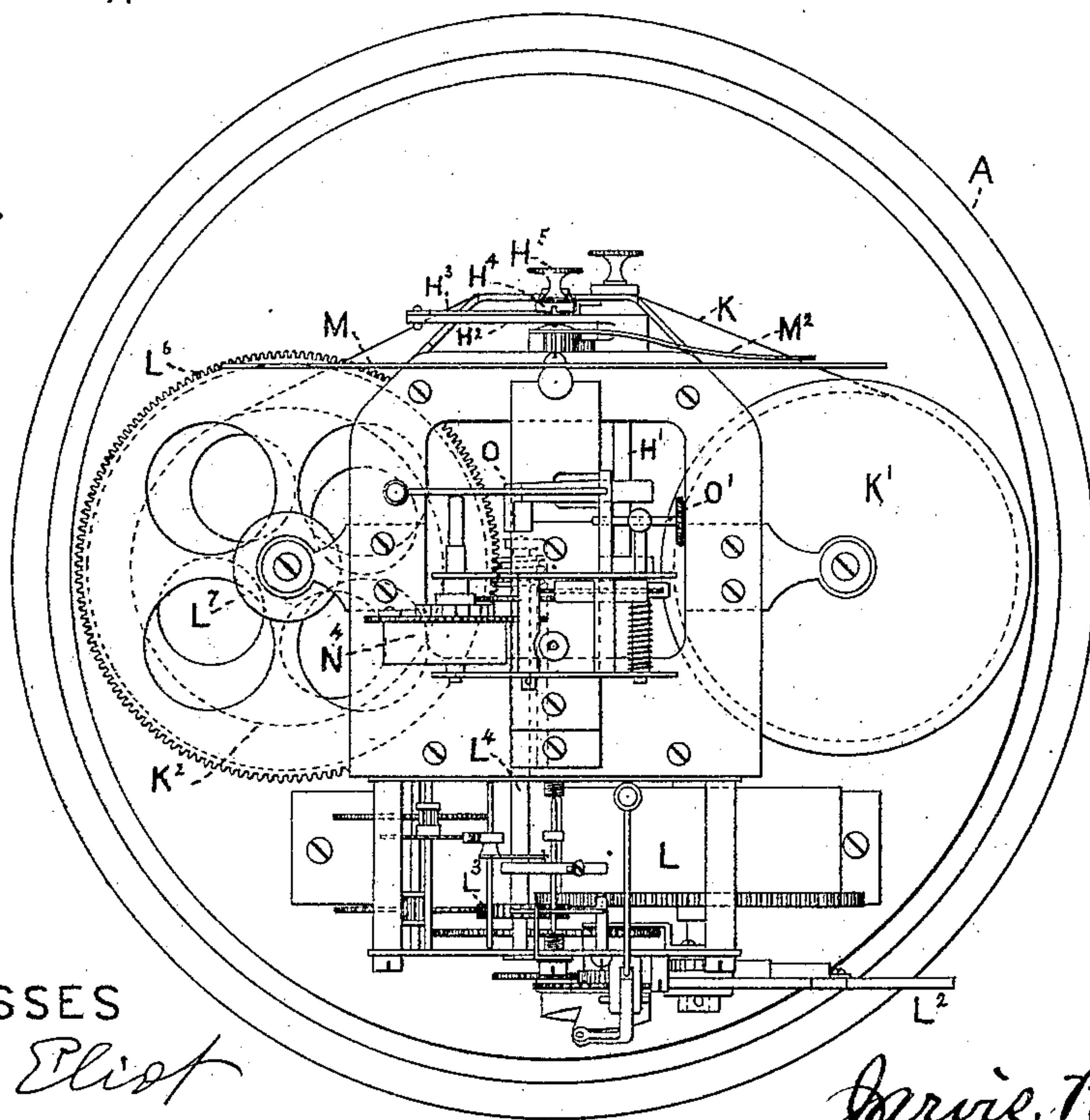


Fig. 3.



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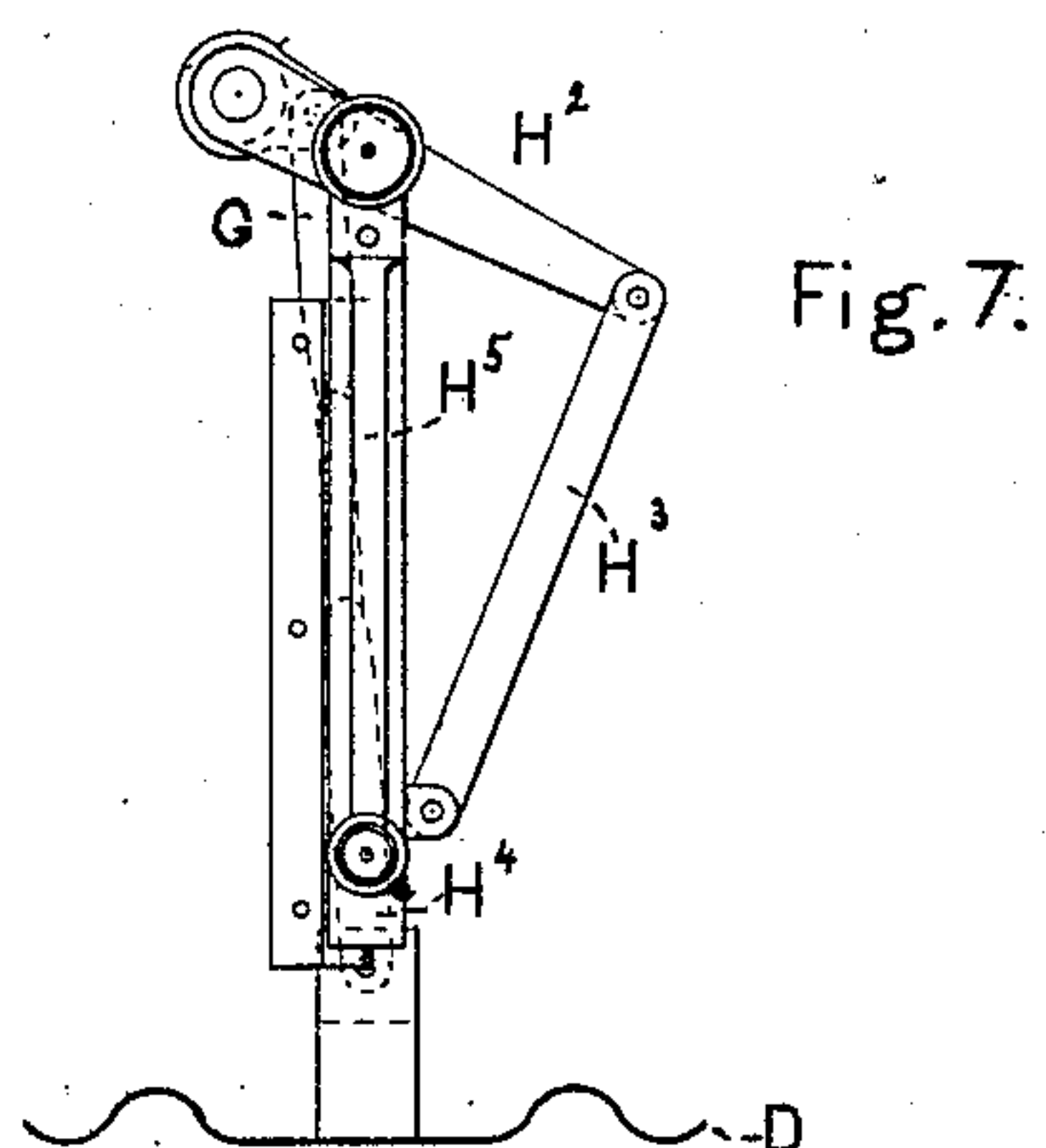
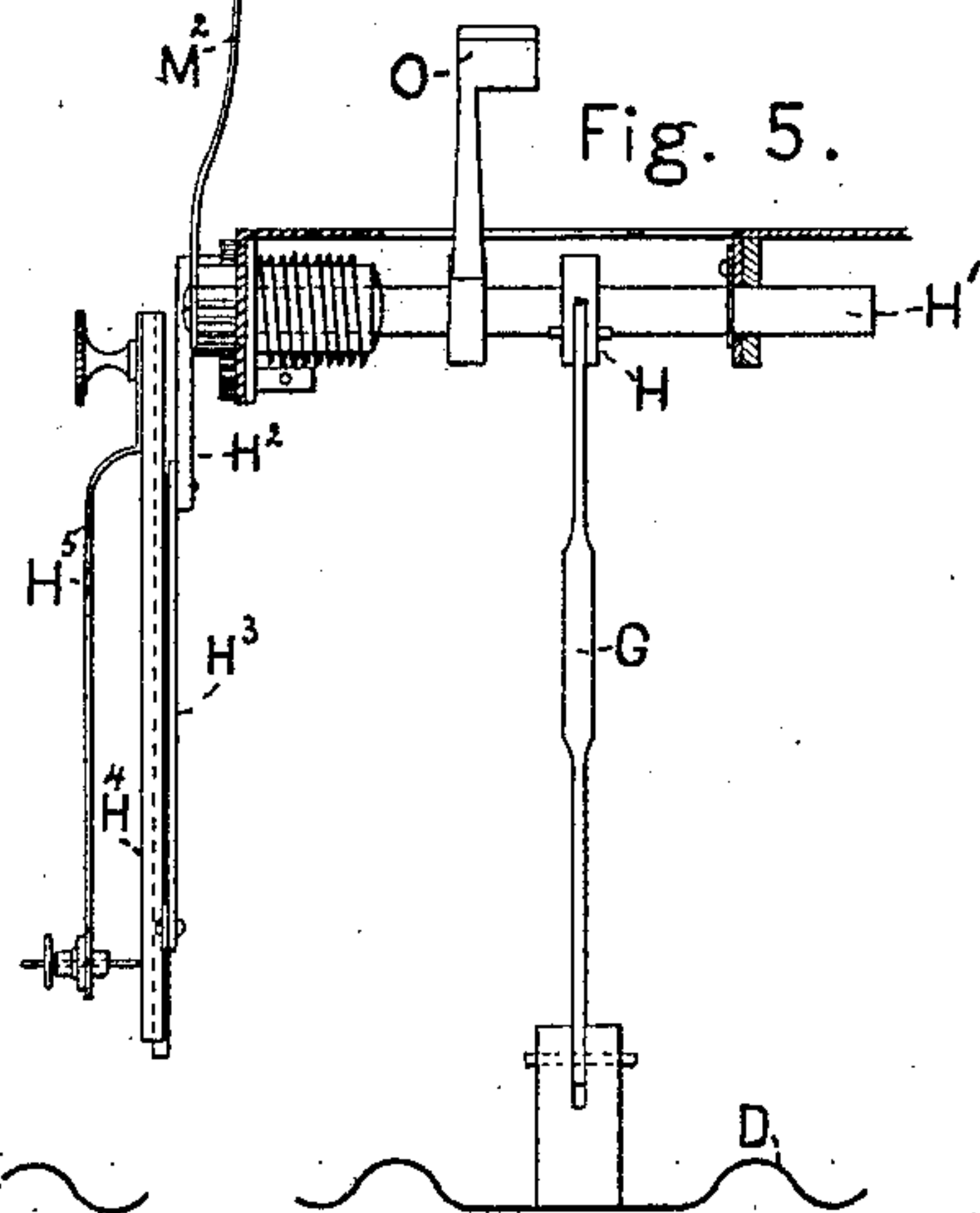
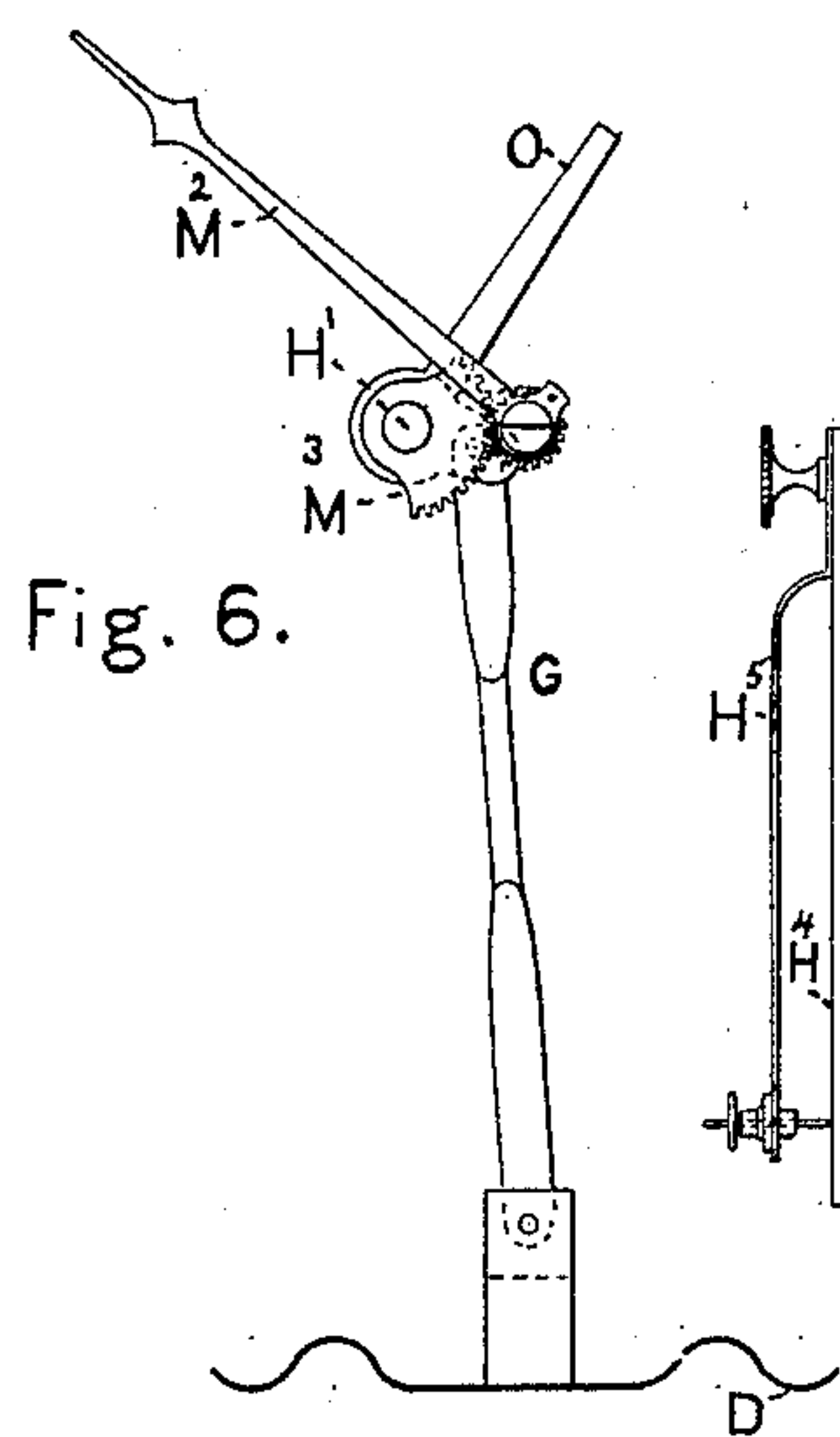
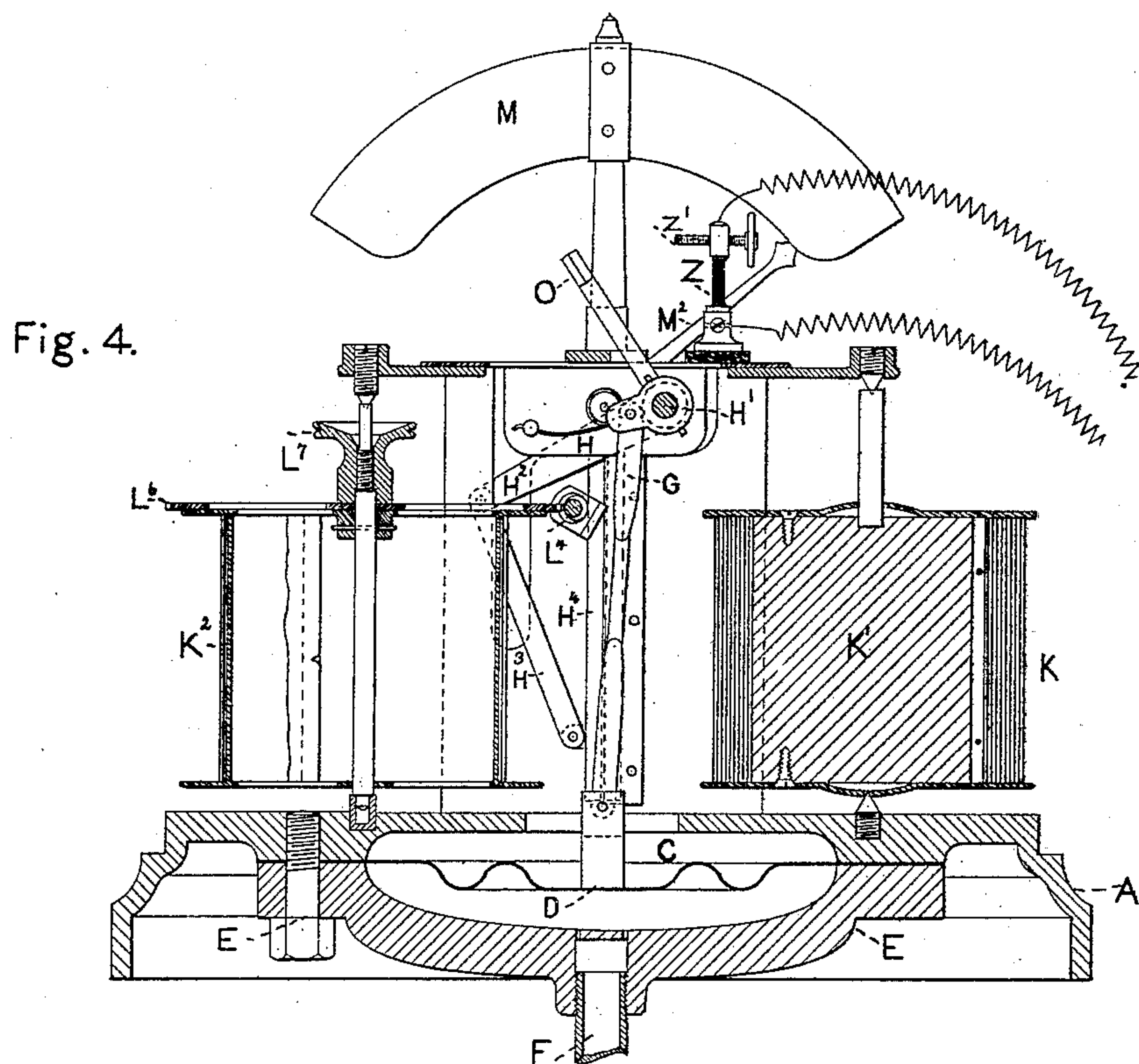
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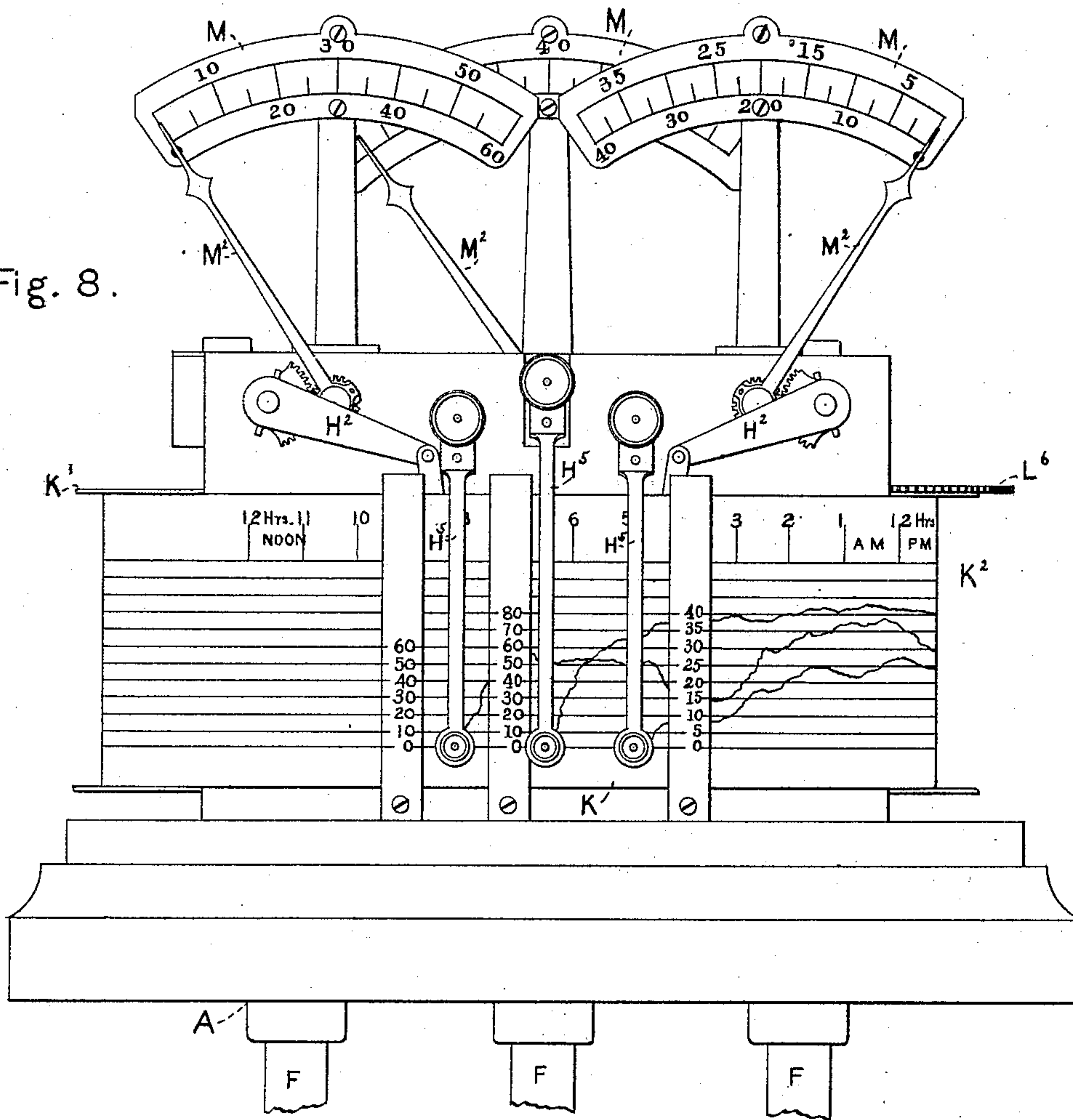


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Fig. 8.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN RECORDING STEAM-GAGES.

Specification forming part of Letters Patent No. **174,125**, dated February 29, 1876; application filed  
January 7, 1875.

*To all whom it may concern:*

Be it known that I, JARVIS B. EDSON, of the city, county, and State of New York, have invented certain Improvements in Recording Steam-Gages, of which the following is a specification:

This invention pertains to certain combinations of elements useful in making complete recording steam-gages, as will hereinafter appear in the several claims, and by a reference to the accompanying drawings, in which—

Figure 1 represents a front elevation of a gage complete and covered with a glass shade. Fig. 2 is a rear view of the same without the glass shade. Fig. 3 is a plan as seen from above the gage. Fig. 4 is a vertical section through the axis of the paper-carrying reels, and shows a section of the diaphragm-spring. Figs. 5, 6, and 7 are detailed views of certain parts which act in combination, as will hereafter appear. Fig. 8 represents several of the same elements in combination to form a triple gage, or one adapted for indicating and registering for three separate boilers.

At A is represented the base for supporting all the other parts of the gage complete, and it is preferably made in a circular form, the better to adapt it for receiving a glass or other translucent shade, as at B, Fig. 1. Said base is also made with a chambered or recessed cavity, as at C, to adapt it to receive and hold a diaphragm-spring, as at D, which is a corrugated disk of sheet metal placed in said cavity, and clamped firmly in position by a binding shell and screws, as at E, which are attached to the said base, and thereby support the spring in a horizontal position. A steam-chamber is thus formed between the spring and the outer shell E, into which the steam from the boiler is admitted through the tube F, and which, when the pressure is sufficiently great to act upon the spring D, will raise it, and thereby raise the connecting-rod, as at G, which is attached to the opposite side of the spring, as best seen at Figs. 5 and 6, and which is pivoted at the opposite end to an arm on the rock-shaft, as at H, and by which said shaft H<sup>1</sup> is partially rotated to operate the pencil or record-marker and the indicating-hand.

As the diaphragm-spring against which the

steam presses can give but little range of action, and as it is necessary that the recording-marks shall be sufficiently great to be easily seen, said rock-shaft H<sup>1</sup> is provided with an arm, as at H<sup>2</sup>, much longer than the arm H<sup>1</sup>, so that the slight vibrations of the spring will cause considerable range of motion to the extreme end of arm H<sup>2</sup>, and to which a connecting-link, as at H<sup>3</sup>, is attached at one end, and at the other to a sliding bar, as at H<sup>4</sup>, to which the pencil or record-marker is connected, as shown at H<sup>5</sup>, Figs. 1, 5, 7, and 8. Said sliding bar H<sup>4</sup> works in a vertical guide, or at a right angle to the base, and as the pencil or record-marker H<sup>5</sup> is attached thereto by a spring-arm, it also travels vertically, and rises and falls with each vibration of the diaphragm-spring, or according to the varying pressures in the boiler, and will produce a record upon the belt or strip of paper placed under or behind the point of the marker. Said belt or strip of paper is shown at K, and is provided with ruled or printed parallel lines, as shown in Fig. 1, to correspond with a scale of parts to indicate the various pressures, and said paper is wound upon a spool or reel at one side of the gage, as at K<sup>1</sup>, and thence drawn onto another spool or reel, as at K<sup>2</sup>, which is connected by suitable gearing with a chronometer movement in such a manner as to move the paper forward under the pencil or marker regularly and according to some definite intervals of time, so that the varying pressures may be recorded within certain fixed periods, as the hours or parts of days, as may be desired.

Said chronometer mechanism is shown generally at L L, Figs. 2 and 3, and as it consists merely of a regular clock movement placed at the back of the paper belt, it need not be described here farther than to say the winding-lever is shown at L<sup>2</sup>, and is provided with a pawl to engage a ratchet on the winding-stem instead of a key; but a key will answer the purpose as well when it can be found.

To make the connection of the paper-winding reel to said clock-movement, a pinion, as at L<sup>3</sup>, is mounted upon an axis, L<sup>4</sup>, in such a position as to engage with the main wheel of the clock-train, as at L<sup>5</sup>. Upon the pinion-axis L<sup>4</sup> is a worm, which works into a large



toothed wheel on the shaft of the winding-reel, as at  $L^6$ , and said toothed wheel is held in contact with the reel by friction caused by a binding-screw on the reel-shaft, as at  $L^7$ . This kind of connection with the winding-reel permits it to be easily disconnected from the train, and the paper to be unwound and removed when desired, as, for example, between the watches of the engineers, in case each one desires to keep a record during his own time on duty.

The indicating mechanism consists of the well-known elements of the graduated dial or a segment, as at  $M$ , and an index-hand,  $M^2$ , said hand being attached to a pivot or screw, and around said pivot is a small pinion fastened to the index-hand, and said pinion gears into a toothed segment, at  $M^3$ , on the rock-shaft  $H^1$ , which receives its motion from the diaphragm-spring, as already explained; consequently, as the pressures on the spring vary, the index-hand will vary in front of the dial, and show the varying pressures in the boiler connected with said spring; and it is, therefore, evident that, if a number of springs, one for each boiler, be combined together on the same base, and have connections to as many hands and record markers as there are springs, that a record will be made for each boiler independent of each other, as indicated in Fig. 8.

To prevent any confusion in the record under such a construction, the pencils or record-markers may be of different colors, so that on the same belt of paper their several degrees of pressure will be clearly shown.

In connection with the hereinbefore-described apparatus there is also combined a gong or signal-bell, as shown at  $N$ , which, in connection with suitable operating mechanism, will sound an alarm whenever the pressures rise above a certain fixed point. This gong  $N$  is mounted in the usual manner, and is provided with a hammer, as at  $N^2$ , which is operated by an escapement-wheel, as at  $N^3$ , which is set in motion by a spring and train, as at  $N^4$ , but this is allowed to operate only when the pressure rises to a point determined by the rotation of the same rock-shaft that operates the record-marker and the indicating-hand. Upon said shaft is an arm, as at  $O$ , (best seen in Figs. 4 and 5,) which vibrates with the various movements of the shaft, and as the pressure rises the free end of said arm  $O$  will be carried toward a set-screw, as at  $O^1$ , (shown in Fig. 1,) which is in the end of an arm, as at  $O^2$ , which is mounted upon an axis, which has a pawl connected with the train that operates the escapement and hammer, so that whenever the arm  $O$  is carried far enough forward to press against the set-screw and force it back the pawl will be lifted and the train and hammer set in motion and the gong will be sounded.

Another method by which the alarm may be operated and dispense with the clock is

shown in Fig. 4, at  $Z$ , where a post or support on the top of the frame is placed and insulated from the instrument, but connected with a battery by wires, and a bell or sounder of some sort, and which may be placed at any required distance, or several may be placed in the circuit. Said post  $Z$  is provided with a regulating-screw, as at  $Z^1$ , so located as to meet the end of the arm  $O$ , when the pressure rises to a sufficient height to rotate the rock-shaft to that degree to bring the arm  $O$  and the points of the screw in contact, when the circuit will be closed or broken, as the case may be, and an alarm sounded on all the instruments in said circuit. In such a case, it will be necessary to mount the said post  $Z$  on a pivoted or yielding base, so that as the pressure rises above the point of contact the point of the set-screw may yield with it. This, however, may be modified in various ways.

I am aware that many of these elements are well known in various forms of steam-gages, and I therefore do not claim them separately; but

I do claim—

1. In combination with a base, substantially as described, a diaphragm spring or springs, each with a connecting-rod,  $G$ , arm  $H$ , rock-shaft  $H^1$ , arm  $H^2$ , link  $H^3$ , bar  $H^4$ , and record-marker  $H^5$ , as and for the purposes set forth.

2. In combination with a base and spring or springs, as described, the connecting-rod  $G$ , arm  $H$ , rock-shaft  $H^1$ , arm  $H^2$ , link  $H^3$ , bar  $H^6$ , and record marker  $H^5$ , the clockwork or chronometer mechanism and chart or belt of paper, whereby a record of varying pressures may be secured at regular intervals of time, substantially as described.

3. In combination with the mechanism of a time recording steam or pressure gage, as described, the graduated ribbon or belt of paper, whereby the varying pressures are indicated, substantially as described.

4. In a recording-gage, the combination of the two reels, for carrying the ribbon or belt of paper, with a chronometer movement, as and for the purposes set forth.

5. The combination with a recording steam-pressure gage, as described, the gong  $N$  and intermediate mechanism with the rock-shaft  $H^1$ , as and for the purposes set forth.

6. In combination with a recording pressure-gage, the elements of an electric circuit closer or breaker with a sounder for alarm purposes, as described.

7. The combination, with the base of a recording steam-gage and suitable recording mechanism, of two or more diaphragm-springs, whereby a record from two or more boilers may be indicated.

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Witnesses:

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