

(No Model.)

2 Sheets—Sheet 1.

T. E. KNAUSS & W. K. LIGGETT.
MECHANISM FOR RECORDING LIGHT.

No. 562,834.

Patented June 30, 1896.

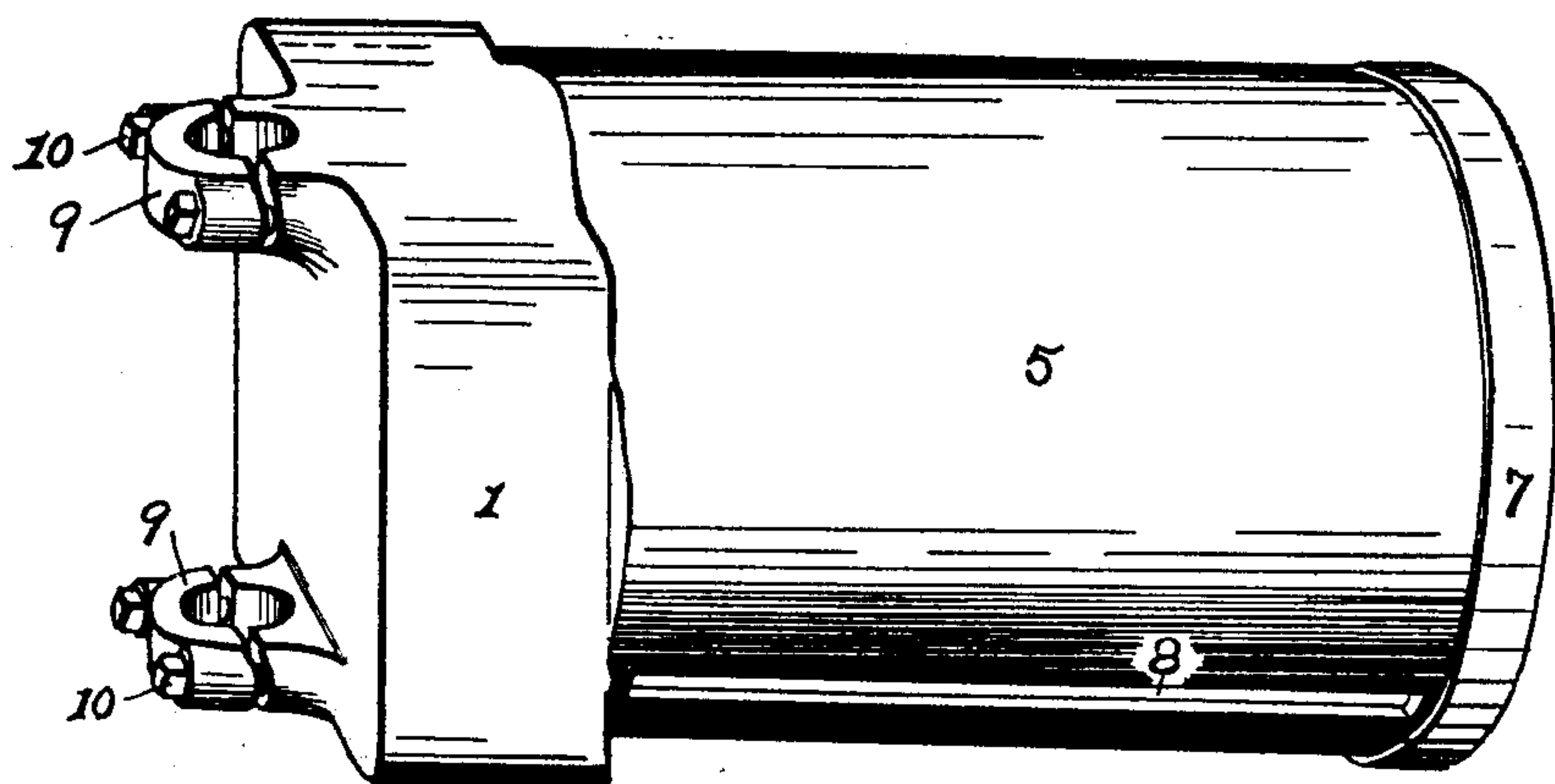


Fig. 1.

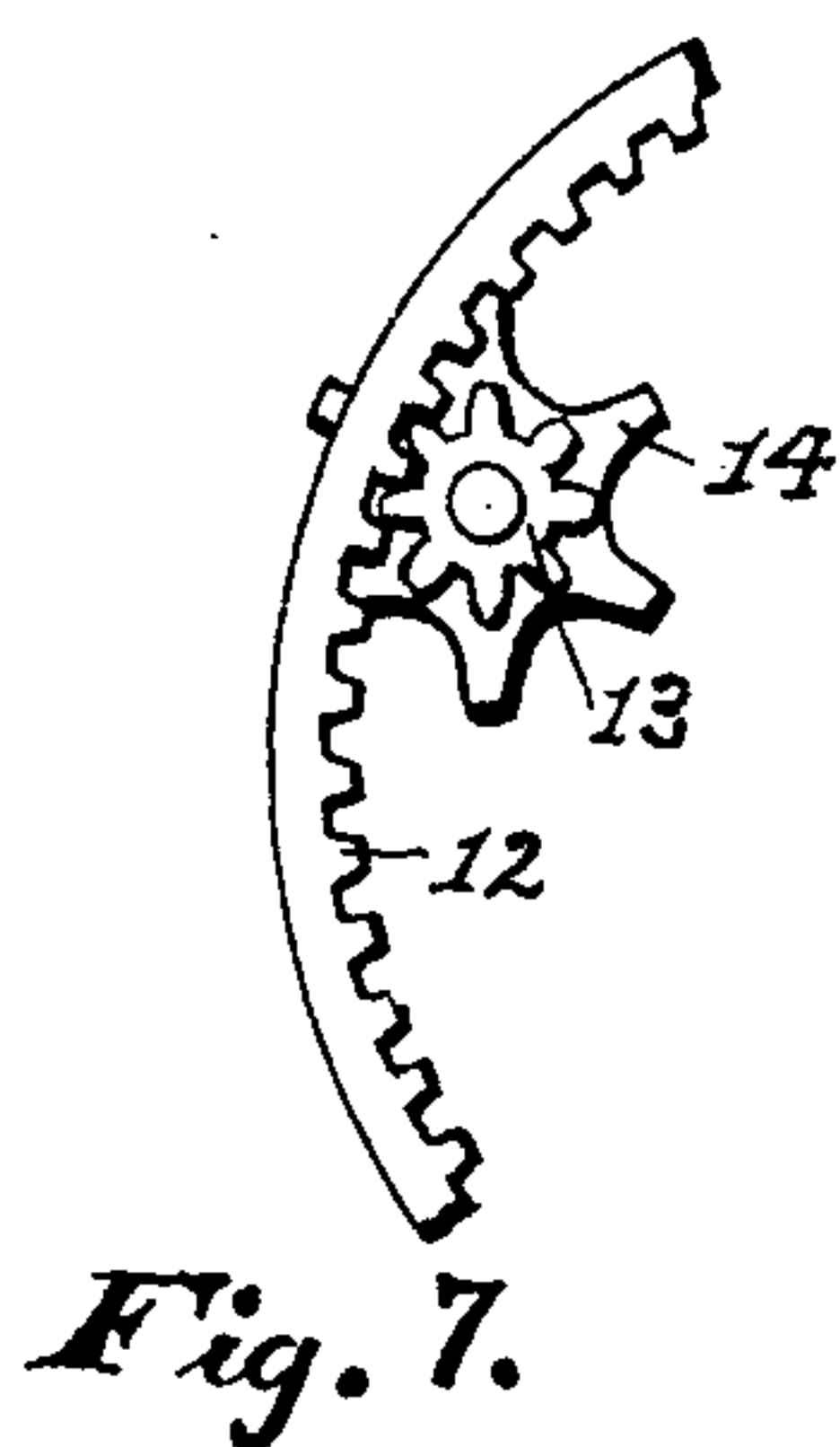


Fig. 7.

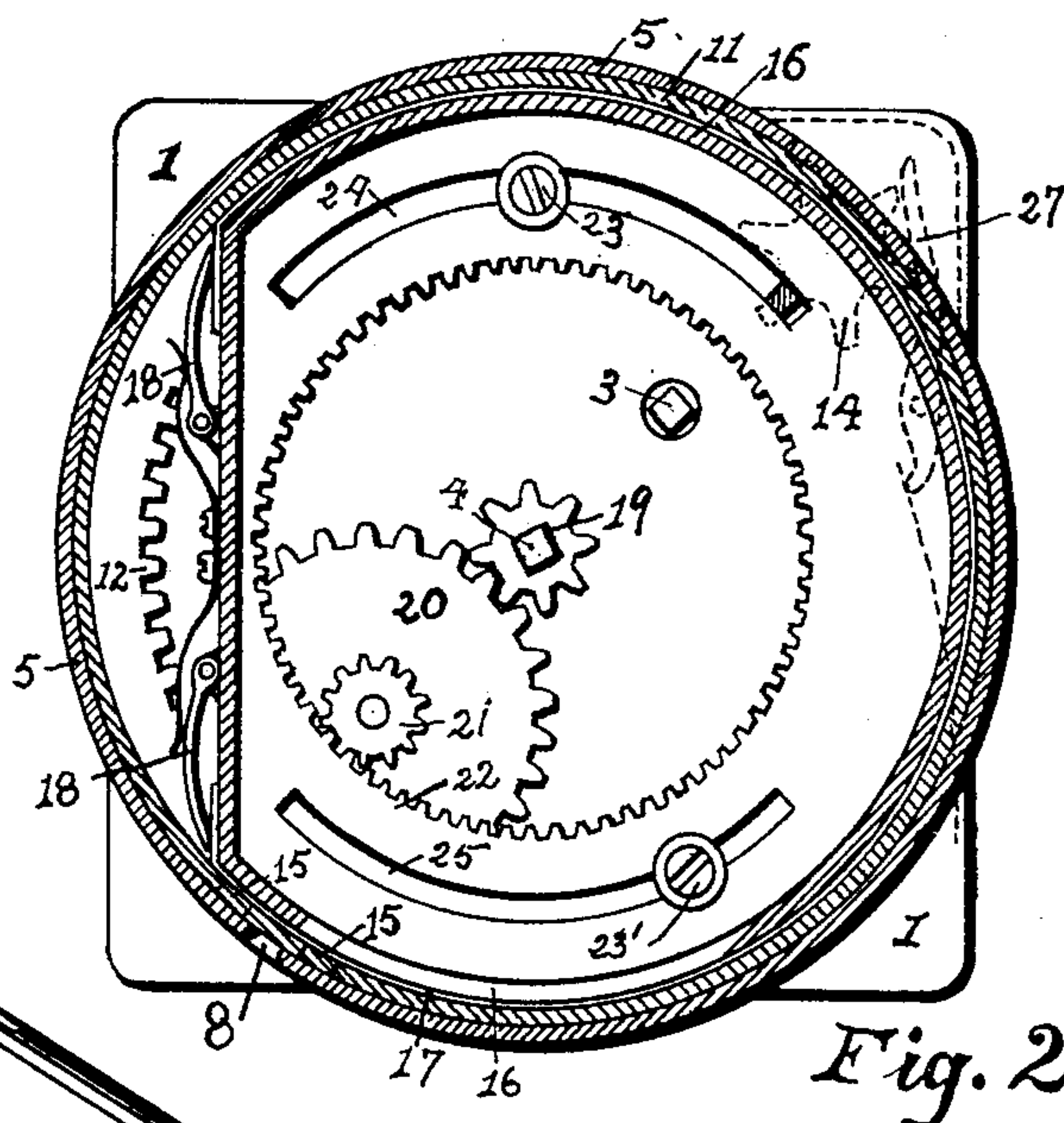


Fig. 2.

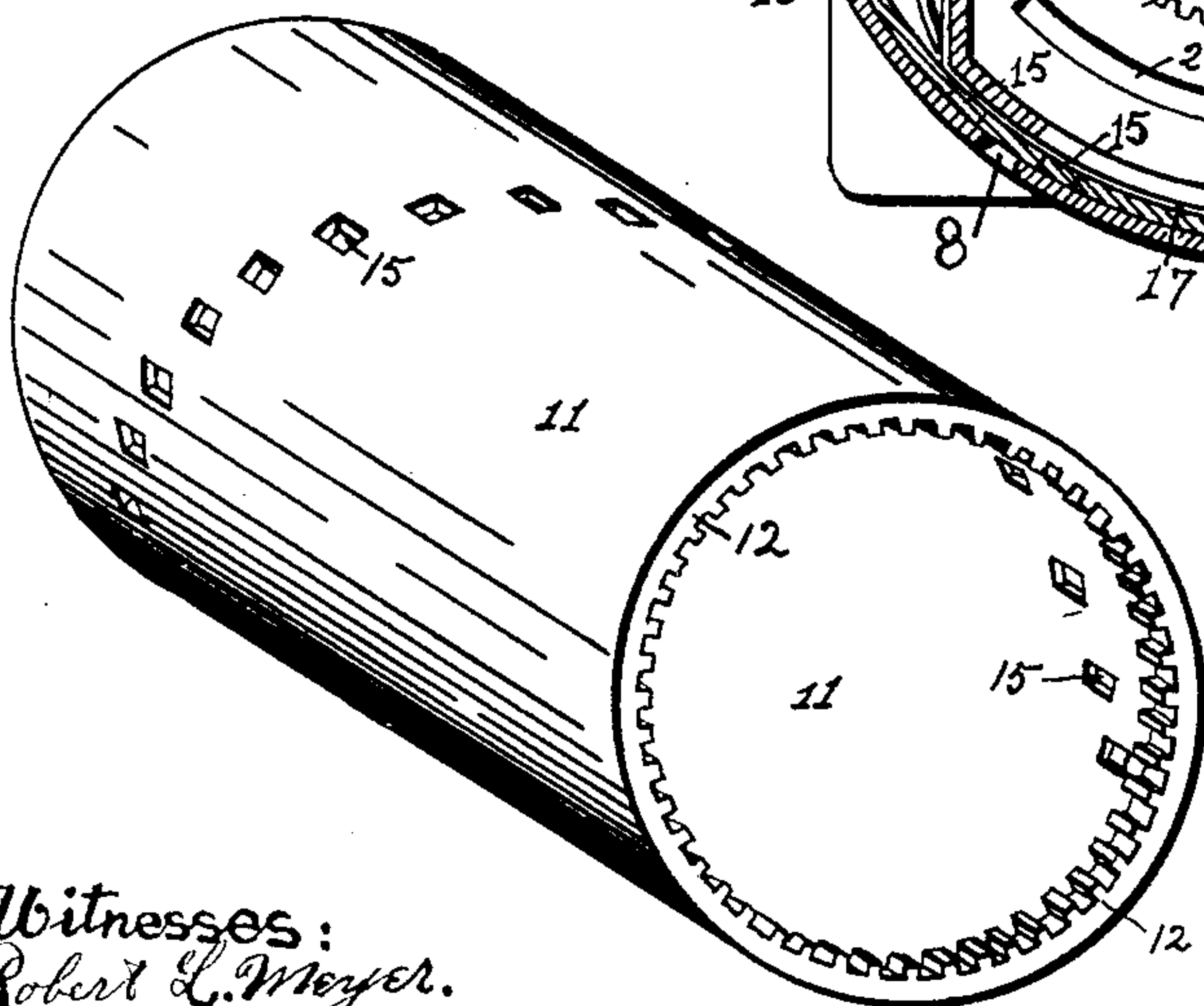


Fig. 3.

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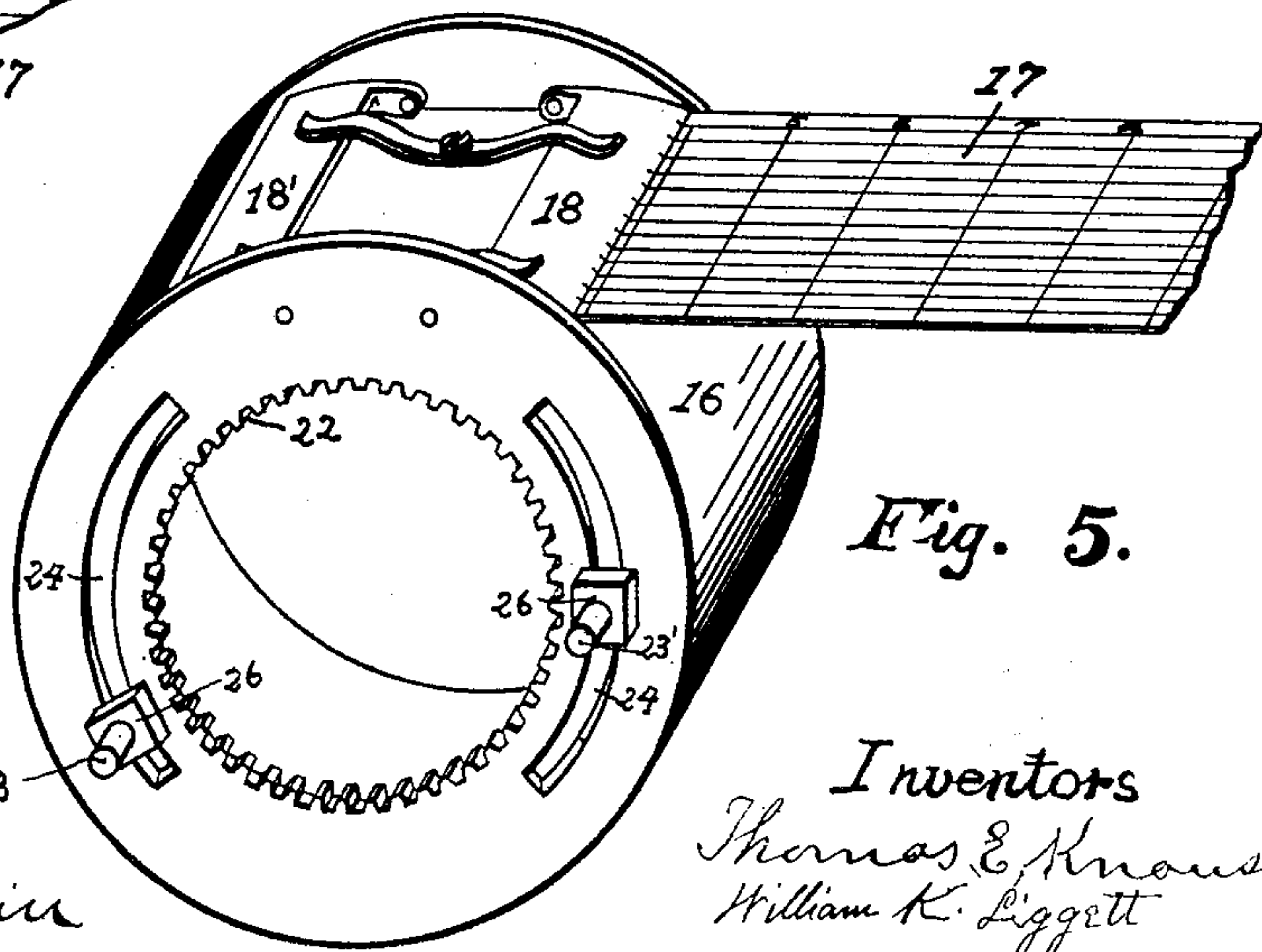
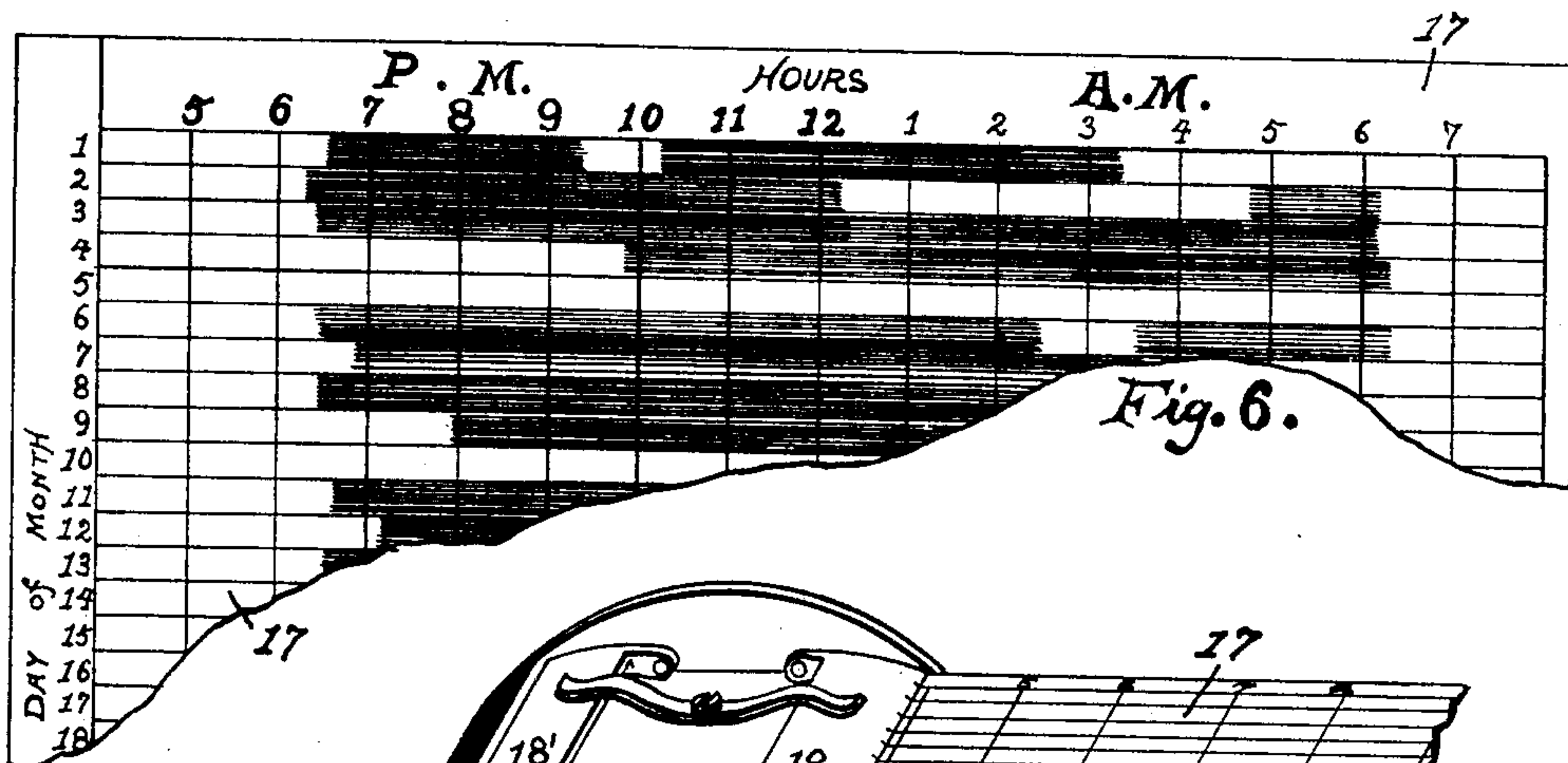
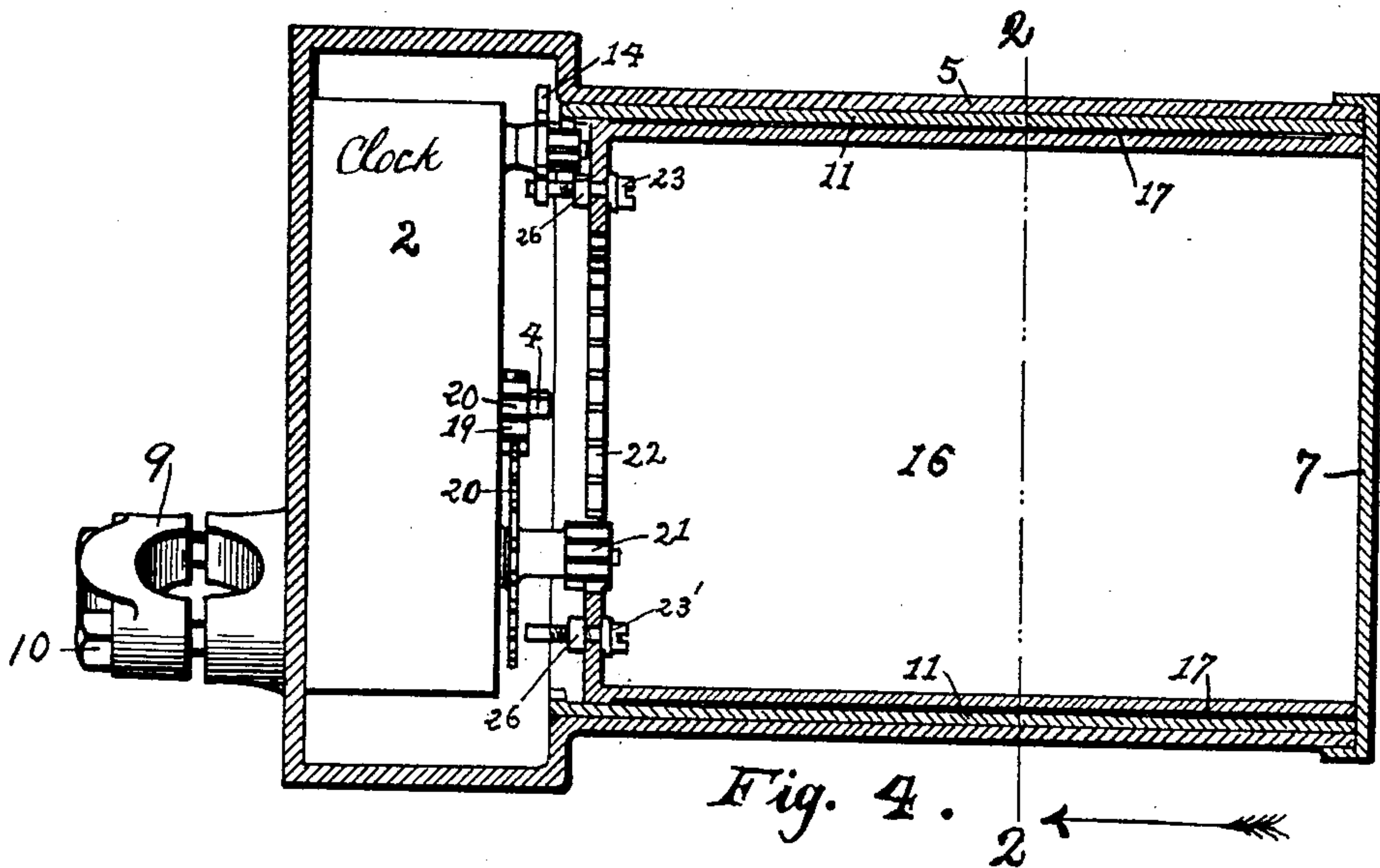
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2 Sheets—Sheet 2.

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No. 562,834.

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UNITED STATES PATENT OFFICE.

THOMAS E. KNAUSS AND WILLIAM K. LIGGETT, OF COLUMBUS, OHIO.

MECHANISM FOR RECORDING LIGHT.

SPECIFICATION forming part of Letters Patent No. 562,834, dated June 30, 1896.

Application filed April 15, 1895. Serial No. 545,744. (No model.)

To all whom it may concern:

Be it known that we, THOMAS E. KNAUSS and WILLIAM K. LIGGETT, citizens of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Mechanism for Recording Light, of which the following is a specification.

Our invention relates to that class of recording apparatus in which a sensitized surface is acted upon by the light, the change produced on said surface being proportional to the exposure to said light. While it is intended especially for the electric light, particularly the arc-lamps used in street-lighting, it may profitably be employed for other light by proper modification of parts.

In carrying our invention into practice we provide certain devices, which are shown in the accompanying drawings, in which—

Figure 1 is a perspective view. Fig. 2 is a section on the line 2 2 of Fig. 4, looking in the direction of the arrow. Fig. 3 is a view of the middle tube in oblique projection. Fig. 4 is a longitudinal section through the completed machine. Fig. 5 is a view of the inner drum or holder for the sensitized surface and parts connected thereto in oblique projection. Fig. 6 is a view of the paper-record after exposure, and Fig. 7 is a detail of the star-wheel attachment.

The same reference-signs refer to the same or similar parts throughout the several views.

One extremity of the outer case or frame 1 forms a casing in which a clock-movement 2 is fastened, with means 3 4 for winding and setting the same, identical with those commonly employed. The other portion of the case 5 is preferably cylindrical in form and has an open end 6, which may be covered by the cap 7. It also is provided with a longitudinal slot 8, so placed that the light to be recorded will always enter it. This case so constructed may be fixed to any suitable support, as the standard of an arc-lamp, by means of the lugs 9, and clamped up and held firmly by the screws 10. Inside of the cylindrical portion 5, and fitted so as to be free to rotate, is the cylindrical casing or screen 11, which is driven through the internal gear 12 and the pinion 13 by the star-wheel 14. This screen has its ends open, the gear 12

being fitted to one of them. It is opaque and is provided with perforations 15, arranged in the manner hereinafter described. Within the screen 11 is fitted the drum or holder 16, upon which the sensitized material 17 is placed and held by the spring-actuated clamps 18.

The drum or holder 16 receives a continuous and uniform movement through a train of gearing 19, 20, 21, and 22, from the clock-movement 2, and we prefer to make this movement at the rate of one rotation in twenty-four (24) hours, though any other unit of time might be employed without departing from the spirit of our invention. The screws or pins 23 23', which are adjustably fixed in the slots 24 and 25 by the nuts 26, form tappets by means of which the star-wheel 14 and the perforated screen 11 are actuated. The pins alternately strike the star-wheel and move it through the arc represented by one spoke, the wheel being meanwhile held in proper position by the spring-actuated brake 27 in the usual manner.

The perforations 14 are so arranged and of such size that, first, their width in degrees is proportional to the best time exposure for the sensitized surface, that is, if the light to be recorded gives the best results by four minutes exposure, the slots should be the width of one degree and so for any other unit of time. Second, each perforation should be in a different plane from its fellows, so that a fresh strip of paper is brought under it. The perforations are arranged in a helical line. Third, the space between the perforations is opaque and of such a width as to completely cover the opening 8 in the case 5, and admit no light when brought over it. Fourth, these perforations are so arranged that when one of the pins, say 23, strikes the star-wheel it will leave a perforation opposite the slot 8, and thus admit light to the paper; and when the other pin 23' strikes it, the opaque space comes over the slot and shuts off the light.

We prefer to have the sensitized-paper film or other substance prepared by printing upon it any required design with indelible ink. A convenient arrangement is the one illustrated in Fig. 6, in which the vertical lines represent hours and the spaces between horizontal lines are for the respective days of the

month, the card being extended downward until it has a sufficient number of these spaces, say thirty-one. For convenience we prefer to sensitize the sheet for the drum with the solution of citrate of iron and red prussiate of potassium, commonly used in preparing "blue-print paper," though any other suitable photographic preparation may be employed.

The operation of our invention is as follows: The case with the clock attached is fastened to a suitable support near the light to be recorded. The screen is so adjusted in its rotation that the proper space or perforation 15 corresponding to the day of the month will be opposite the slot 8 in the case 5. The sensitized paper 17 is placed around the drum 16 by adjusting the end under the spring-clamp 18, so that the lines on the paper are in proper relation to the lines on the drum, which is graduated for this purpose. The paper is then wrapped around the drum and the other end secured under the similar clamp 18. This drum is then slipped into place and adjusted so that the proper hour-mark (which marks are graduated on the end or internal surface near the end) is opposite the slot in the case. This may be done by placing a key on the stem 4 of the clock, which corresponds to the post to which the hands of an ordinary clock are attached, and is made and driven in the method common to all clock-movements; or this adjustment may be made by moving the drum itself, either by slipping it out of mesh with the pinion or by any other well-known means. The tappets 23 23' are then adjusted to open and close the slot at the desired time by placing them at the required points of the curved slots and clamping them tight. The cap 7 is then placed upon the end of the case, and thus the whole is made light-proof.

The clock-movement is wound and started, and at the proper time, sunset, for instance, the pin 23', coming in contact with the star-wheel, will cause the case 11 to rotate until the perforation 15 comes opposite the slot 8, thus exposing this portion of the paper to the action of the light. The internal drum continuing to rotate, at the proper time, sunrise, for instance, the pin 23 will move the screen 11 until a space between openings 15 comes opposite the slot 8 and thus shuts off all light; and so it will continue, the perforations coming successively opposite the slot, a new one every day, each perforation exposing the strip of sensitized paper corresponding with the day of the month for which the light is to be recorded, the slot being closed entirely during the day and thus shutting off all foreign light. At the end of the month, or any desired period, the case is opened, the sensitized paper taken out, and a new one put in. When the exposed paper is treated to a proper bath, it will be found to be colored in places wherever the light has fallen upon it, but will be unaffected at other points, as shown in Fig. 6. This will make a permanent record, which may be filed away for future use.

It will be evident to one skilled in the art to which this invention appertains that many alternative constructions may be employed to accomplish the results sought to be obtained by the devices herein described by us. For instance, the clock-movement may be employed to draw a long slip or ribbon of sensitized paper, contained in a light-proof case, over an ordinary aperture in said case, thus exposing it to the light; and said aperture may be periodically closed by proper devices driven from said clockwork, or by giving the ribbon an intermittent movement through a dead arc-wheel, or other common and well-known devices. Other devices may also be used for constructing and actuating the moving parts; as, for instance, the screen and drum may be mounted on a shaft or gudgeon in place of slipping within each other, and any known form of gearing may be used to actuate the same. Furthermore, other material may be substituted for the sensitized paper, and other chemical substances or mechanical mixtures may be used in place of those herein specified, without departing from the spirit of our invention.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination with an outer stationary casing having an elongated opening to admit light, of a holder for a sensitized surface within the casing and movable transversely to said opening, and an intermediate screen having openings and opaque portions, and means for moving said screen to cause the openings and opaque portions to register alternately with the elongated opening of the outer casing, substantially as described.

2. The combination with an outer stationary casing having an elongated opening to admit light, of a movable holder for a sensitized surface and means for moving the same transversely to the opening of the outer casing, an intermediate movable screen having openings and opaque portions adapted to register alternately with the opening in the outer casing, and means for moving said screen periodically, substantially as described.

3. The combination with an outer casing having an elongated opening to admit light, of a movable holder for a sensitized surface within the casing, a clockwork arranged to move said surface continuously, an intermediate movable screen having openings and opaque portions arranged to register alternately with the elongated opening in the outer casing and mechanism for moving said screen periodically, said mechanism being operated by the clockwork, substantially as described.

4. The combination with the outer casing having an elongated opening, of the holder for the sensitized surface within the casing, means for imparting a continuous movement to said holder, a screen between the holder and the outer casing provided with openings

and opaque portions, gearing for moving the screen periodically, and adjustable devices upon the holder for operating said gearing as the holder moves, substantially as described.

5 5. The combination with an outer casing having an elongated opening, of a holder or drum within the casing, a clockwork connected to said drum and arranged to move the same continuously, tappets adjustably arranged
10 upon one end of the drum, a cylindrical screen surrounding the drum and provided with openings and opaque portions adapted to register alternately with the opening in the outer casing, an internal gear and a pinion for mov-
15 ing the screen and a star-wheel for rotating the pinion periodically, said star-wheel being moved by the adjustable tappets during the rotation of the drum, substantially as de-
scribed.

20 6. The combination with the outer casing having an elongated opening to admit light, of the inner movable holder or drum adapted to receive a sensitized surface, and an intermediate opaque screen adapted to move trans-
25 versely to the opening in the outer casing and provided with a helical series of openings adapted, upon the movement of the screen, to

register successively with different portions of the elongated opening in the outer casing, substantially as described.

30 7. The combination with the outer stationary casing having an elongated opening, of a cylindrical holder or drum and means for holding a sensitized sheet thereon, a clock-
35 work and connections between the clockwork and drum whereby the latter is rotated continuously, a cylindrical screen between the drum and the outer casing, said screen being
40 opaque and provided with a series of openings arranged to register successively with different portions of the elongated opening in the
45 outer casing, a star-wheel and gearing for operating the screen periodically to cause the openings and opaque portions to register alternately with the opening in the outer casing, and tappets upon the drum for operating
the star-wheel, said tappets being adjustable to vary the times at which the star-wheel shall be operated, substantially as described.

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