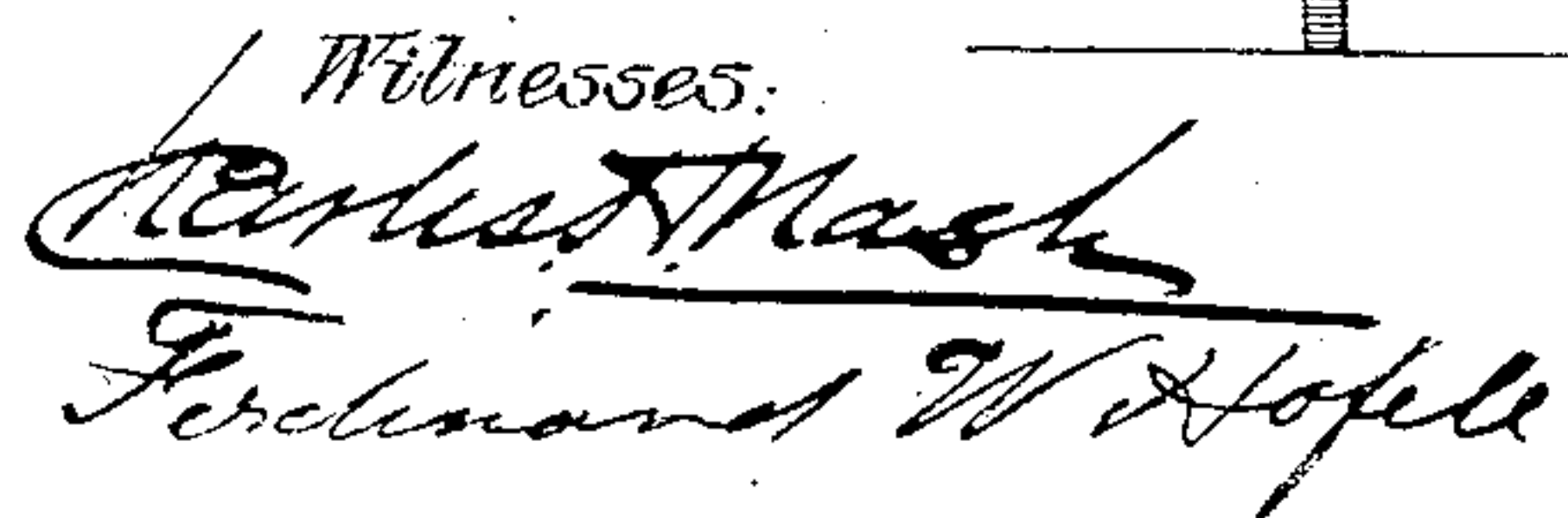


3 Sheets—Sheet 1.

Patented Jan. 29, 1884.

No. 292,515.



Inventor
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(No Model.)

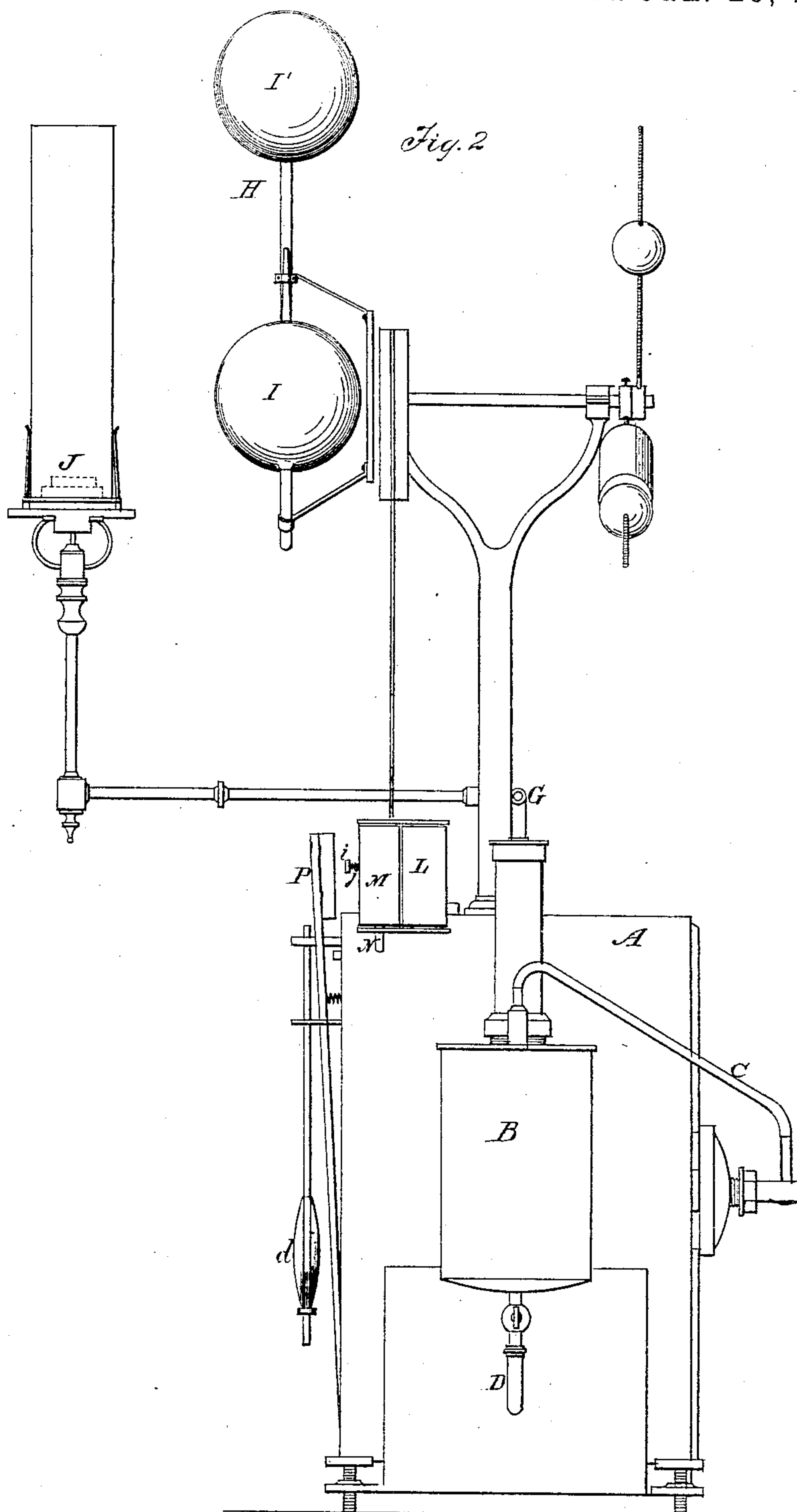
T. O'CONOR SLOANE.

3 Sheets—Sheet 2.

PHOTOMETER.

No. 292,515.

Patented Jan. 29, 1884.



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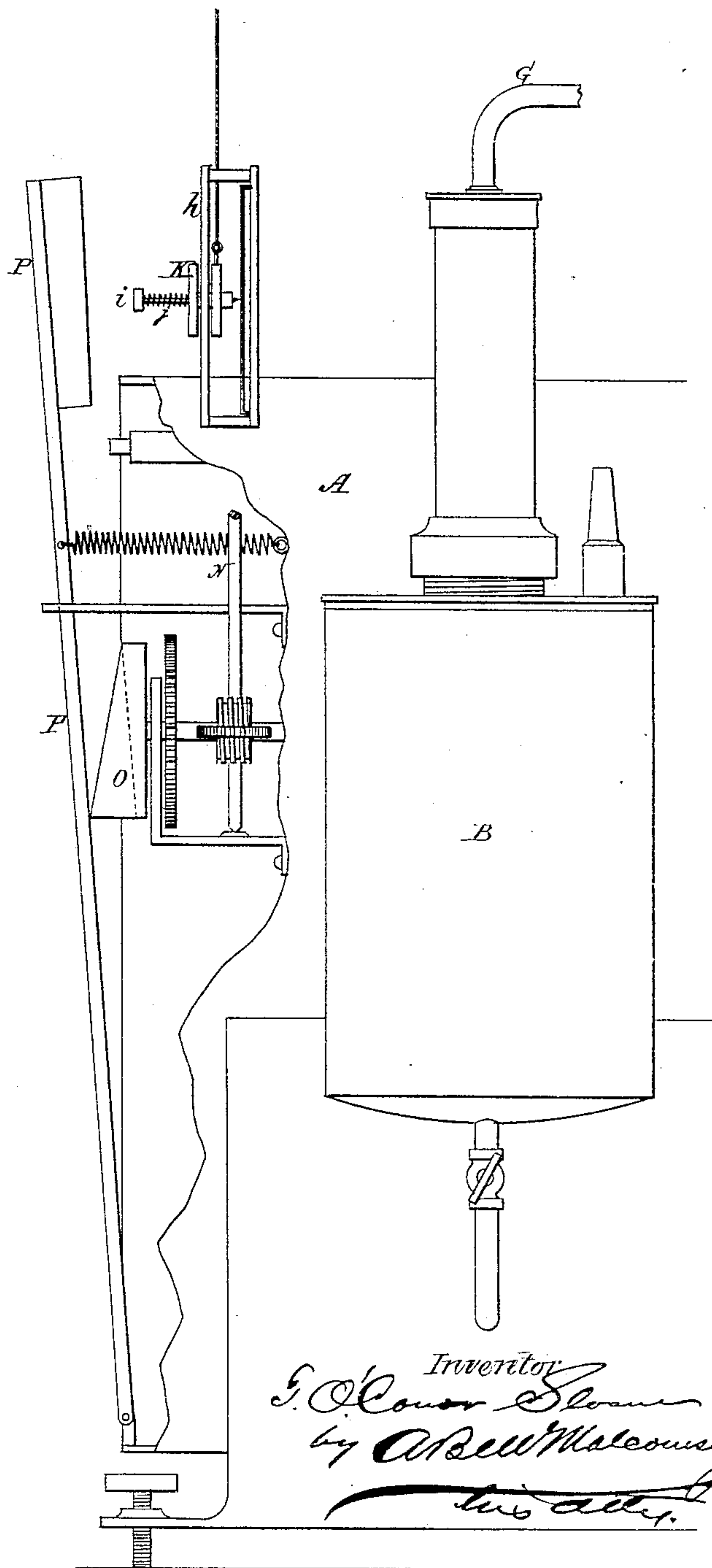
3 Sheets—Sheet 3.

PHOTOMETER.

No. 292,515.

Patented Jan. 29, 1884.

Fig. 3



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UNITED STATES PATENT OFFICE.

THOMAS O'CONOR SLOANE, OF BROOKLYN, NEW YORK.

PHOTOMETER.

SPECIFICATION forming part of Letters Patent No. 292,515, dated January 29, 1884.

Application filed January 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, THOMAS O'CONOR SLOANE, of the city of Brooklyn, in the county of Kings and State of New York, have made
5 and invented certain new and useful improved apparatus for indicating and registering the illuminating-power of gas, which may be known as a Self-Registering Photometer; and I hereby declare the following specification to
10 be a full and clear description of the same, reference being had to the accompanying drawings.

In consequence of the fact that the illuminating-power of gas varies greatly from time
15 to time, it has become desirable to test its quality often, which is now done by the different styles of photometers at present in use, all of which are designed to indicate the illuminating-power by ocular demonstration only to
20 any one present at the apparatus, but in no way register for future reference the different changes in illuminating-power.

One of the principal features of my invention consists in indicating the different de-
25 grees of illuminating-power of a jet of burning gas by the action of its heat, and registering at short intervals by positive action the different changes, as I have found by experiment that the illuminating-power varies in
30 proportion to the heat radiated by the jet of gas when arranged substantially in the manner described hereinafter. In order to obtain the best results, the entire apparatus should consist of the different parts shown in the
35 drawings, although some may be omitted and good results obtained.

The main feature shown in the drawings consists of a meter adapted to regulate exactly
40 the amount of gas which passes through it in a given space of time, irrespective of the pressure. To this meter is attached a burner of any suitable pattern, preferably an Argand burner. In close proximity to the burner is placed a
45 differential thermometer (preferably an air-thermometer similar to that shown, as being easiest made) so constructed and placed that the heat of the burning gas will create an expansion and consequent external movement of some kind, which may be readily communi-

ated by appropriate mechanism to a register- 50
ing device operated by the passage of the gas through the meter, or by any auxiliary mechanism.

In the drawings, Figure 1, Sheet 1, is a front view, with the governor-chamber in section. 55
Fig. 2, Sheet 2, is a side elevation. Fig. 3, Sheet 3, is a detail view of the registering mechanism.

A is the body, containing the drum of the meter, having any of the usual arrangements 60
for turning an indicating-wheel, which in this case is connected with a shaft bearing a wheel, *a*, working into a clock-escapement wheel, *b*, which takes into a pallet, *c*, with pendulum *d*, or a balance-wheel, so as to form a regular es- 65
capement, such as is used in clocks.

At one side of the drum A is a chamber or reservoir, B, containing a governor for use in
a wet or dry meter. This reservoir is connected by a pipe, C, with the interior of the 70
drum, and by the pipe D with the surrounding water in the case, so that the water in the reservoir will be at the same level as the water inside the drum or measuring-compartments, and
will vary with it. 75

In the reservoir B is placed a float, E, connected by a wire rod with a cone-shaped valve or stopper, *f*, made to fit on the seat *g*. The
gas, on entering the meter, passes through the feed-pipe G, and is regulated in quantity by 80
the opening or closing of the valve *f g*. In case a dry-meter is used this same reservoir, B, may be used filled to the proper height with
water; but the pipe D will be connected to the case above the level of the water in the res- 85
ervoir. The proportions and relations of the meter and escapement movement should be so adjusted that when the pendulum is working with its regular beat any given quantity—
say five feet an hour—of gas will pass through 90
the meter. Should a greater quantity attempt to pass by reason of greater pressure, the drum would have to revolve more rapidly, and the escapement movement would resist this accelerated motion and produce a difference of 95
pressure more or less considerable between the gas inside the measuring-compartments and that on the outside, causing a consequent low-

ering of the water-level both in the measuring-compartments and the reservoir B, which would result in a fall of the float E and closing of the valve *f* on the seat *g* until the flow of gas is reduced to the proper quantity. Instead of the cone, any form of cock may be used, and in a dry-meter any analogous apparatus may be used, the desired object being obtained when the rotation of the drum or movement of the diaphragms of a gas-meter works an escapement movement controlled by pendulum or balance-wheel, and the variations in pressure caused by the resistance which such escapement offers to any acceleration of motion operates to partially close the feed-pipe, and thereby maintain a uniform supply of gas.

H is an air-thermometer, which, for convenience, is made in the shape shown in the drawings, and consists of two bulbs, I I', connected by a bent tube, the tube being partially filled with mercury or other fluid. This thermometer H is balanced on a suitable support, so as to readily swing whenever the mercury or other fluid changes position in the tube. The back of one of the bulbs, I, may be blackened, and in front of it, at a fixed distance, is situated the flame of gas, J, to be tested, an Argand burner being preferably used to produce the flame.

To one end of the thermometer or indicator, or to a segment, S, attached to it, is connected by a string the sliding nut K, running in uprights *h h*, carrying a needle, *i*, adapted to be projected under pressure and returned to position by a coil-spring, *j*. The rollers M L carry a strip of paper or other suitable substance, which is passed through the openings in the uprights back of the needle and between the rollers M L, which are turned by the rod N, connected by gear-wheels with the escapement mechanism, so as to regularly feed the strip of paper between the rollers past the needle.

At one side of the rod N is a gear-wheel, O', carrying a cam or eccentric disk, O, which acts upon a spring-bar, P, in such a manner that it will slip and forcibly strike the nut K, thereby causing the needle to puncture the paper strip at each revolution of the disk.

For exactness and certainty of action, the pivot-bar to which the thermometer is attached may be nicely balanced by additional weights at the rear.

In operation the heat of the flame expands the air in the bulb I and forces the mercury or other fluid along the tube, causing the thermometer to swing on its pivot and the bulb I to rise or fall in accordance with the heat produced, the needle-carrier K being raised or lowered in proportion. The strip of paper between the rollers is lined, and at each revolution of the disk or cam O it is punctured by the needle and drawn between the rollers M L. Gas of an ascertained illuminating-power being used as a standard for regulat-

ing the apparatus, all variations will be indicated by the position of the thermometer and registered upon the paper by the needle.

I do not intend to confine myself to the particular form or construction shown of the different parts of the apparatus, as they may be varied for purposes of convenience or economy and all the essential features of the invention preserved, the main object being to use the heat of a flame to indicate, through suitable mechanism, its illuminating-power, and where a record is desirable to register the amount of illuminating-power thus indicated by combining therewith a registering mechanism such as shown, or some other similar mechanical device—such, for instance, as is used in self-registering pressure-gages.

If it is not required to register the different degrees of illuminating-power, the thermometer may be made to indicate on a graduated scale, and the registering mechanism may be dispensed with; and, if desired, any other form of differential thermometer may be employed, its registrations being effected by electricity or other means.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for determining the illuminating-power of gas, a differential thermometer constructed as described, and balanced and arranged in combination with a gas-meter, substantially as shown and described.

2. In an apparatus for determining the illuminating-power of gas, a differential thermometer constructed as described, and balanced and arranged so as to indicate changes in the relative quantity of radiant heat developed by a flame of gas, and transmit such changes to a recording mechanism, substantially as shown and described.

3. In an apparatus for determining the illuminating-power of gas, a differential thermometer balanced and arranged as described, in combination with an Argand burner, as and for the purposes shown and described.

4. In an apparatus for determining the illuminating-power of gas, a differential thermometer balanced and arranged to indicate the changes in the heat of the flame, and operated in combination with an Argand burner receiving gas from a meter provided with a governor which regulates the pressure and maintains an even flow of gas, substantially as shown and described.

5. In an apparatus for determining the illuminating-power of gas, the combination of a differential thermometer, balanced and arranged as shown, with the sliding nut *k*, carrying a needle arranged to receive the stroke of the spring-rod P, actuated by the cam O, all working together substantially as and for the purposes shown and described.

6. In combination with an Argand burner and a differential thermometer arranged in

the manner shown, and a gas-meter provided with a regulating-escapement and pendulum, an auxiliary chamber connected with the water-space in a wet-meter by a pipe, D, at a point below the water-line, and also with the inlet of the meter by pipe C, or to the inlet and outlet of a dry-meter by tubes corresponding to C and D, such chamber containing a float adapted to open and close the inlet by its rise and fall, substantially as shown and described. 10

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Witnesses:

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