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W. ROHN

INSTRUMENT FOR MEASURING AND INDICATING THE INTENSITY OF A GAS CURRENT

Filed April 28, 1941

Serial No. 390,768

3 Sheets-Sheet 1

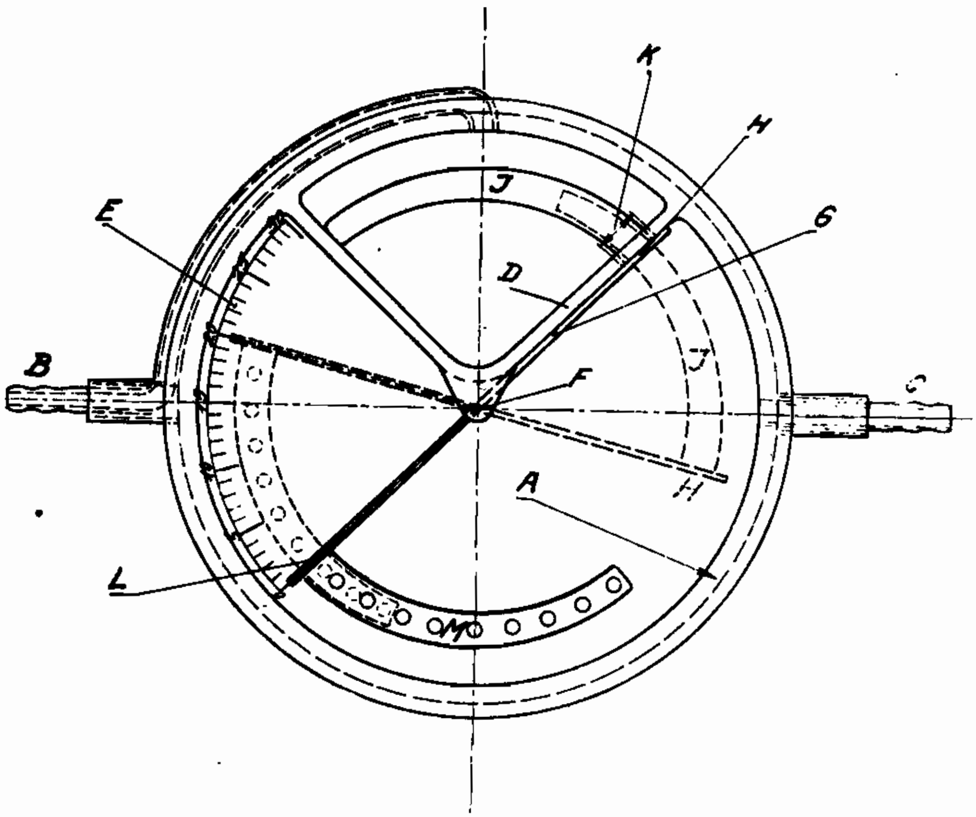

Fig. ~~Abb.~~ 1.

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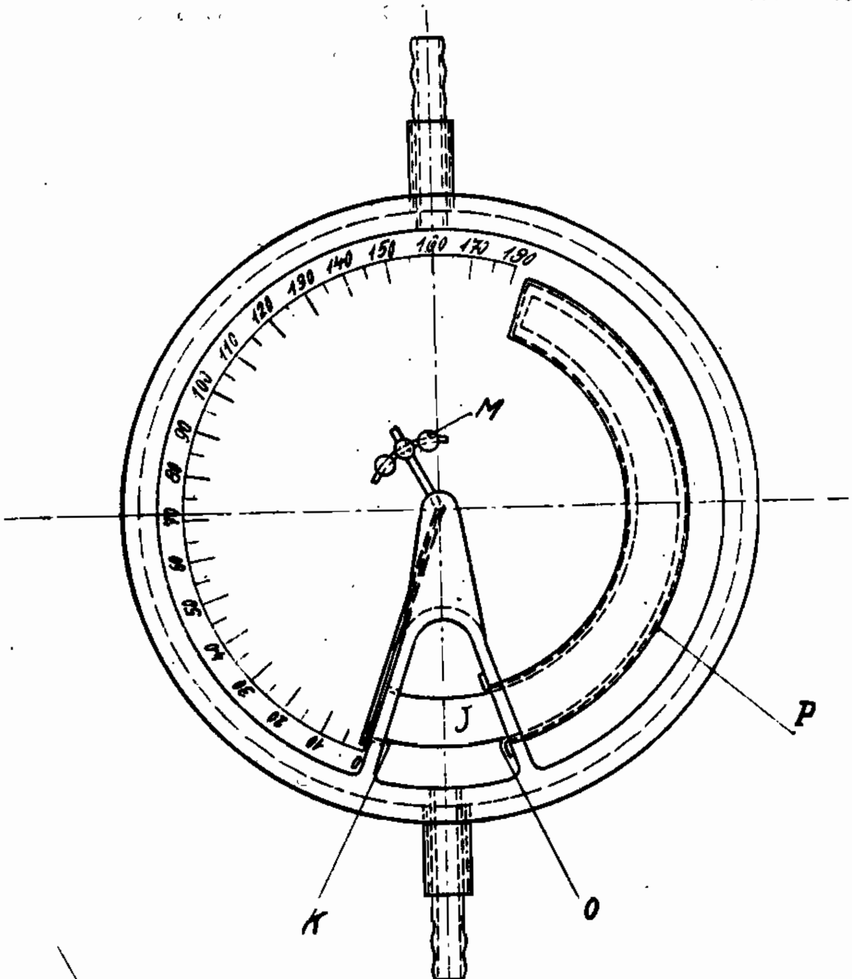

Fig. ~~Abb.~~ 2.

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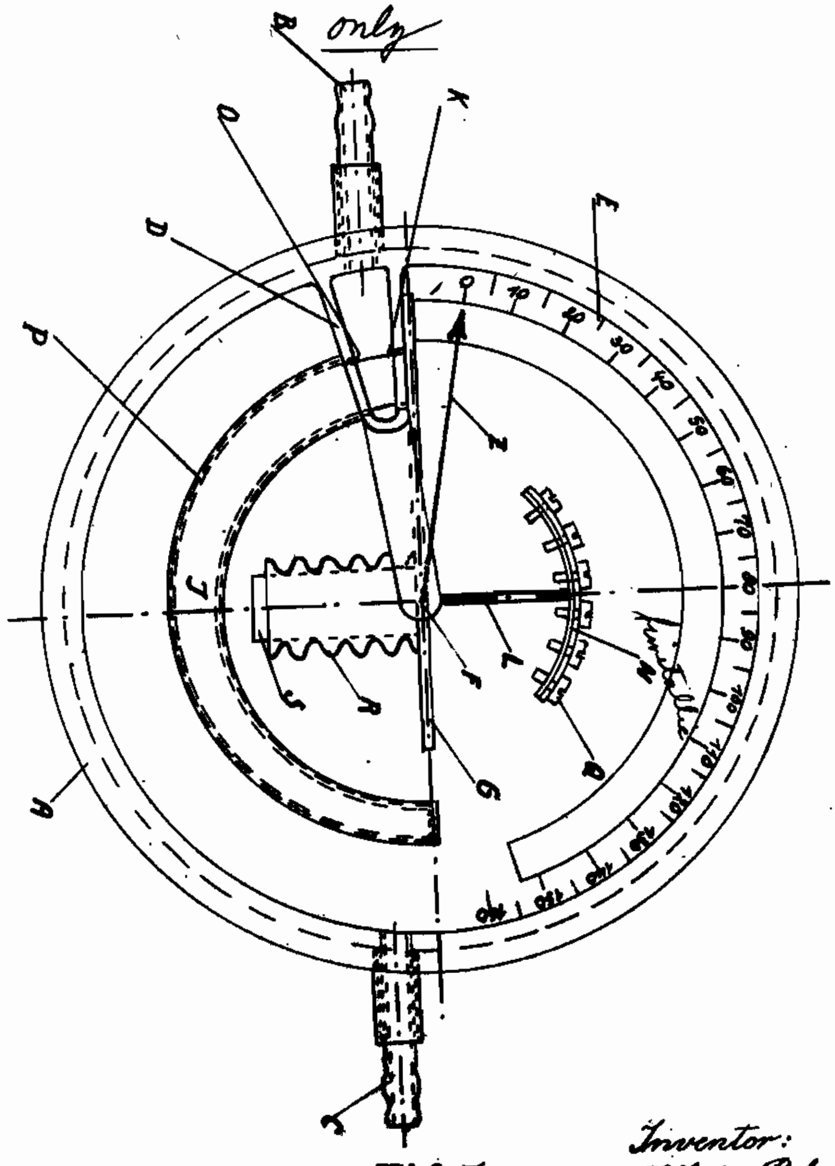

Fig.3

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ALIEN PROPERTY CUSTODIAN

INSTRUMENT FOR MEASURING AND INDICATING THE INTENSITY OF A GAS CURRENT

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Application filed April 28, 1941

This invention relates to an instrument for measuring and indicating the intensity of gas currents. For this purpose commonly revolving gas-meters or the like devices are used, and only some expensive types of instruments are available from which the volume of a gas flowing through a gaspipe per unity of time can be read off.

The object of my invention is to provide an instrument of this type which is simple and cheap and nevertheless gives exact and reliable results.

The instrument forming the object of my invention is illustrated in the accompanying drawings of which

Fig. 1 is a side view;

Fig. 2 is a similar view showing a modification;

Fig. 3 is a side view showing a similar instrument provided with temperature and pressure compensation.

The same reference letters are used in all figures to denote analogous parts.

A is a box-like casing consisting of a short piece of pipe and provided at B and C with sockets for inserting the instrument into a pipe-line in which a gas current flows the intensity of which is to be measured and indicated. A partition D arranged in the casing confines an approximately rectangular sector. The two front sides of the casing may be covered with glass plates one of which may carry the scale E.

In the middle of the casing the axis F is provided which may be journaled in the usual manner in two jewels and carries a lever G. To this lever is secured a circular horn-like member J projecting into the separated sector through a hole K of the partition D. At the opposite end of the lever G a similar member M is arranged extending to the opposite side of the lever, or a counter-weight of suitable dimensions is connected with the lever in a suitable position so as to hold the lever with a small directive force in the position shown. This directive force may be adjusted by suitably gauging the overweight of member M.

When the gas to be measured enters the sector at B it attempts to pass over to the other part of the casing through the hole K and to leave it at C. Herewith it presses the horn J out of the hole K and shifts the lever G into the position shown in dotted lines. As the horn-like member J tapers toward its free end, the annular gap between the horn J and the periphery of the hole K increases in width in accordance with the declination of the lever G, and one stable position exists for each intensity of the gas current within the range of indication of the instrument which intensity can be read off from the scale. By suitably choosing the taper of the horn-like member J and the overweight of the counter-weight M the measuring range of the instrument can be ohosen at will. As a rule the axis of rotation F of the instrument will be placed in a horizontal position; by turning the measuring instrument about the axis of the sockets B and C, so as to bring the axis F into a vertical position, the measuring system may be more or less approached to its labile position. Hereby it is possible to vary the sensibility of the instrument within wide limits. By arranging the inlet socket B and the outlet socket C on a horizontal line and providing them with stuffing boxes one and the same instrument may be used for different measuring ranges.

Instead of an overweight at the lower end of lever G also a spring may be used to produce the required directive force.

In Fig. 1 the sector into which enters the gas to be measured is shown to be approximately rectangular; as the length of the lever G nearly equals the diameter of the casing, the scale of the instrument can only comprise about 90°. An angular range of the scale comprising more than 90° may be obtained by offsetting against one another the horn J, its counterpart M and the corresponding part of the lever G in two different planes so that the sector can be given an angle of more than 90°, the sector then being made to extend only over one half of the height of the casing and the member M swinging across the sector.

In Fig. 2 I have illustrated another possibility of giving the scale an angular range up to about 180°. In this case the second half of the lever carrying the counterweight that balances the horn J is considerably shortened and the sector encompassed by the partition is also reduced in size so that the counterweight M when swinging can pass by the sector. The part of the partition lying opposte the hole K is then likewise provided with a hole O which is closed by a horn-like extension P or sheath into which the horn J projects.

The instrument described above measures the intensity of a gas current under the conditions of pressure and temperature prevailing during the measurement. In some cases, however, it may be desirable to read off from the instrument the gas volumes reduced to normal conditions, that is to a pressure of 760 m. m. mercury and a temperature of 0° C. To this end the instrument may be provided with compensating devices. As a means compensating for the influences of temperature a weighted and preferably fore-bent bimetallic strip may be used which bends in dependence on the temperature. To compensate for the pressure a weighted corrugated tube may be employed. These two modifications are described hereafter with reference to Figure 3.

Fig. 3 shows an instrument based on the same principles as that shown in Fig. 2. A is again the box-like casing, B and C are the sockets for admitting and withdrawing the gas to be measured. D is the partition separating a sector from the casing A. E is a scale from which may be read off the position of the lever G which is arranged rotatably about the axis F. The lever G carries the horn-like member J which is movable through the hole K. L is the counter-lever carrying, according to the invention, as a counterweight and, at the same time, as a temperature compensator, a bimetallic strip N which may be weighted by screws or the like Q disposed at different points of the strip N. For instance, pins or screws of different weight may be put into holes distributed over the strip N. O is a hole in the partition D opposite the hole K, and P is an extension or sheath into which the horn-like member J projects. Z is a pointer or index connected with the lever G. The bimetallic strip N is composed of two metallic materials having different maduli of thermal expansion; it has such dimensions that it bends more or less on heating. Hereby the weights Q arranged on the strip are more or less approached to the axis F, and consequently the directive force exerted on the lever is decreased or increased according as the acting weights are above or below the axis F. This means that the lever G with the horn-like member J is less deflected by the gas from the partition D than it would be the case with the starting position of the strip N with the weights Q, and with a gas expanded by elevated temperature a relatively smaller volume of gas and therewith the exact volume corresponding to normal conditions is indicated. If desired the scale may be gauged in kilograms per hour.

The lever G further carries a corrugated tube R closed at both sides and weighted by the body S. This tube serves for pressure compensation. Its action depends upon its property of being compressed by increasing pressure. Thereby the center of gravity of the weight S is displaced toward the axis F and exerts a smaller directive force on the lever G, whereby the deflection of the lever G including the horn-like member J secured thereto is increased. The corrugated tube R and the weight S may have such dimensions that the increased deflection of the lever G under the action of the pressure just compensates for the decrease of the gas volume to be indicated.

By arranging the corrugated tube below the axis of rotation the overweight producing the directive force on increase of the pressure (or increasing the directive force in the case of a spring being employed) may be diminished; by arranging the corrugated tube above the axis of rotation the directive force may be increased on increase of the pressure, according as required by the problem of measuring to be solved.

The same rules apply to bimetallic temperature compensation.

WILHELM ROHN.