No. 826,659. PATENTED JULY 24, 1906.

H. HAUGER.

APPARATUS FOR AUTOMATICALLY SIGNALING THE PRESENCE OF DELETERIOUS GASES IN THE ATMOSPHERE.

APPLICATION FILED APR. 29, 1905.

2 SHEETS—SHEET 1.

FIG. 1

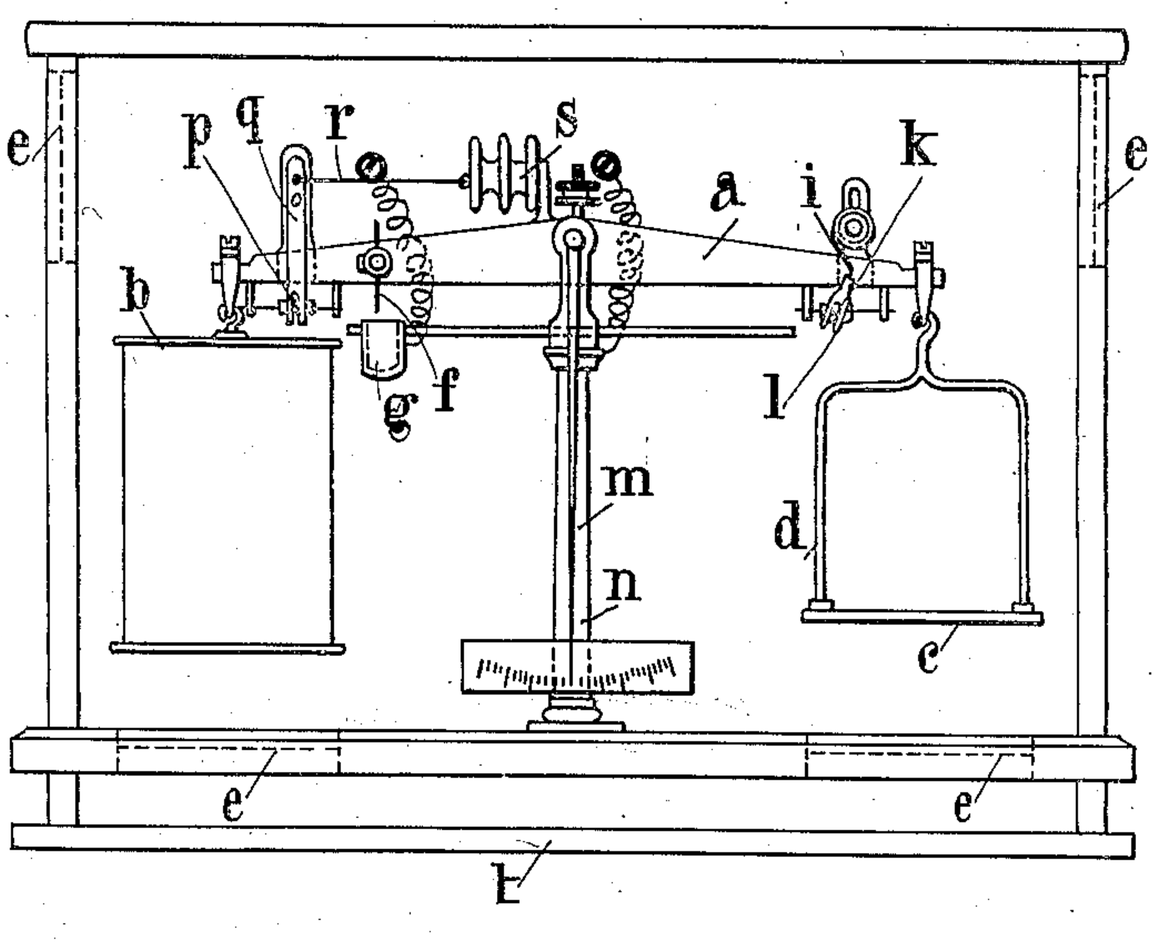
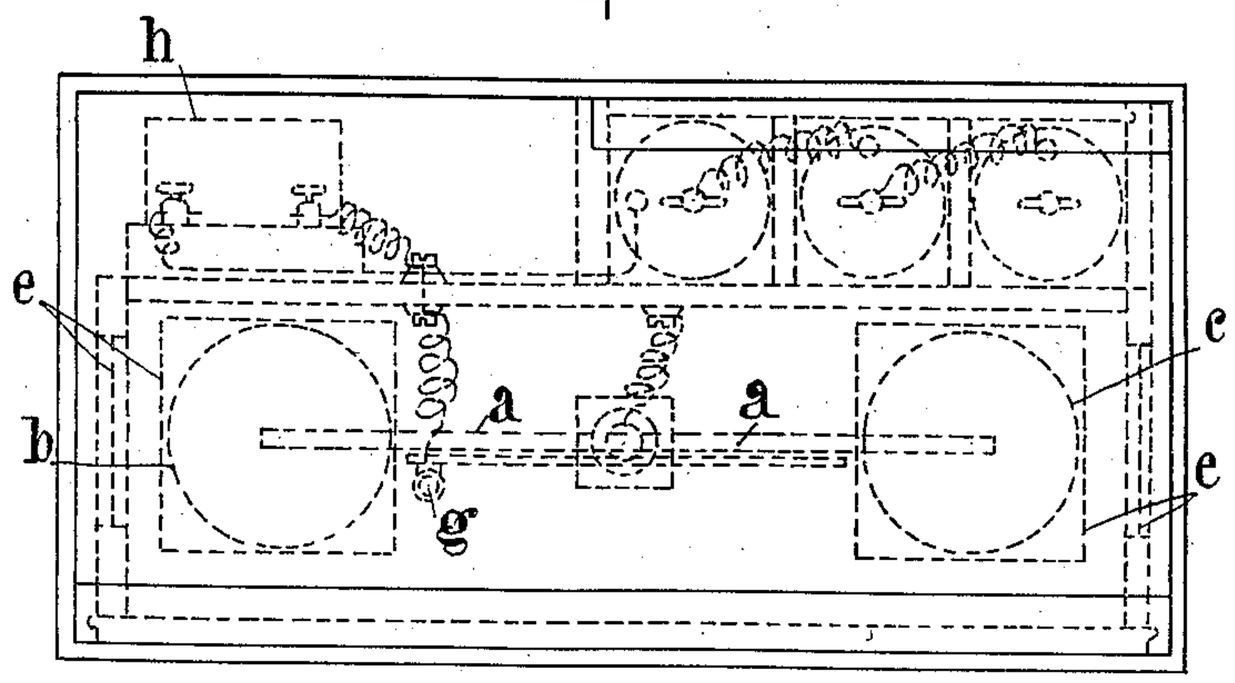


FIG. 2



WITNESSES;

George G. Schoenlank

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2 SHEETS—SHEET 2.

Fig. 3

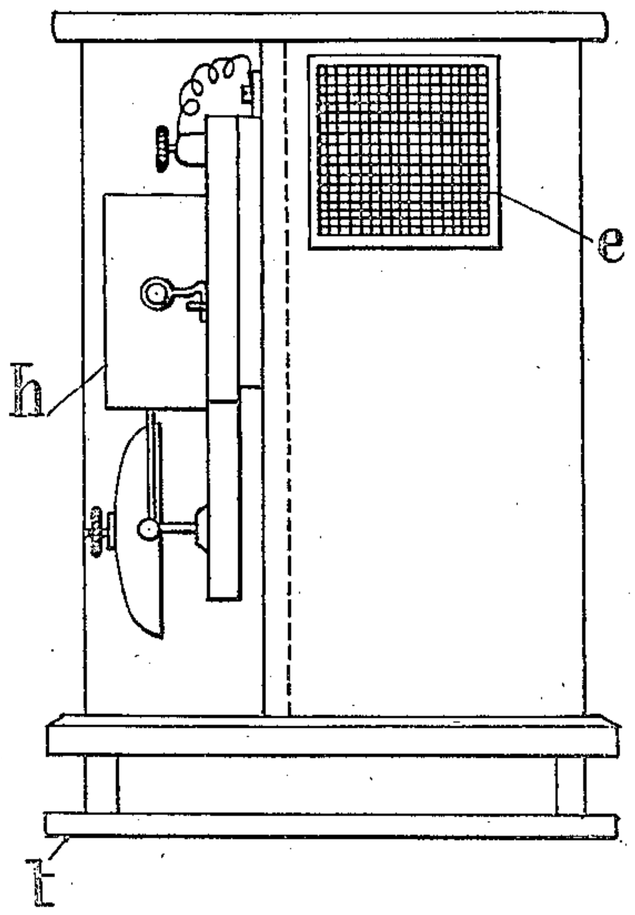
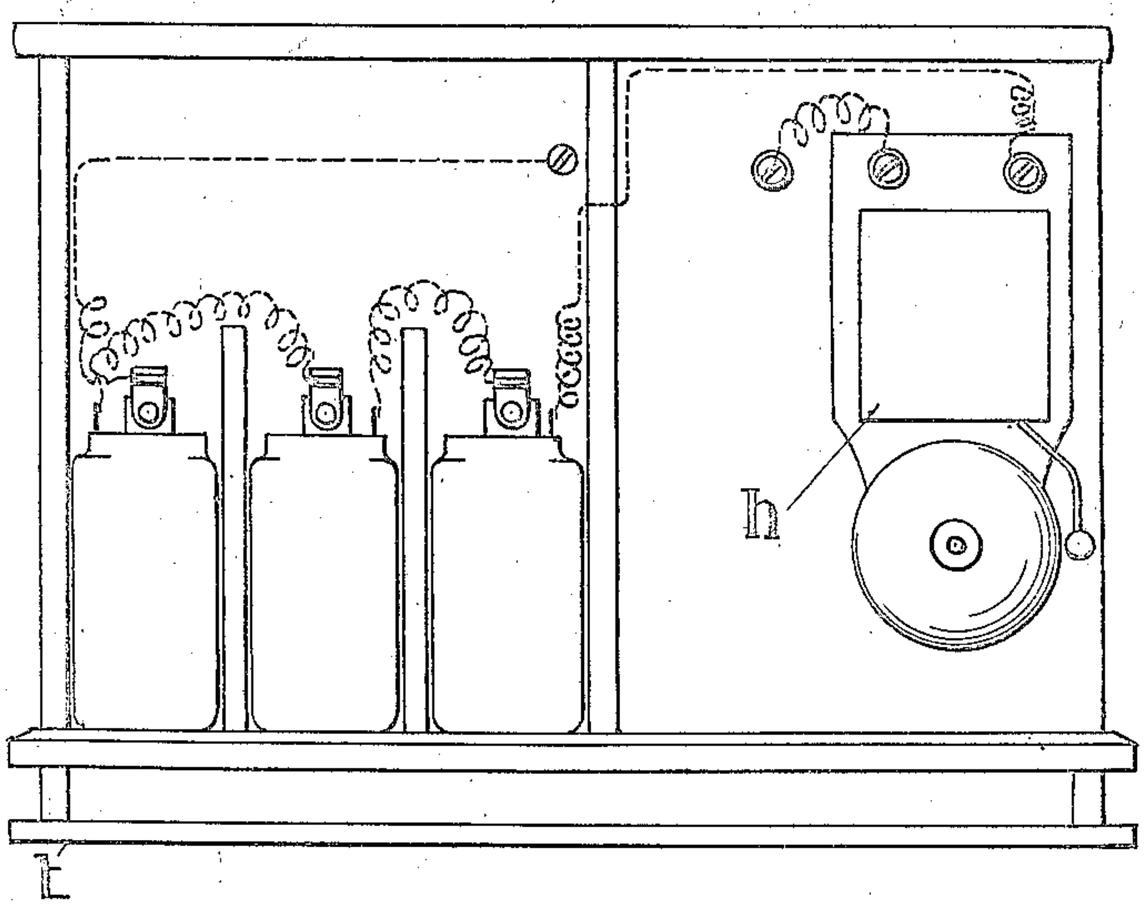


Fig. 4



WITNESSES;

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UNITED STATES PATENT OFFICE.

HENRI HAUGER, OF PARIS, FRANCE.

APPARATUS FOR AUTOMATICALLY SIGNALING THE PRESENCE OF DELETERIOUS GASES IN THE ATMOSPHERE.

No. 826,659. Specification of Letters Patent. Patented July 24, 1906.

Application filed April 29, 1905. Serial No. 258,103.

To all whom it may concern:

Be it known that I, HENRI HAUGER, a citizen of the Republic of France, and a resident of 87 Rue Notre-Dame des Champs, Paris, France, have invented an Improvement in Apparatus for Automatically Signaling the Presence of Deleterious Gases in the Atmosphere, of which the following is a specification.

This device is based on the difference of density of the gases relatively to the respirable air. Although it can serve, to a certain extent, for approximately detecting such gases, it is no apparatus for laboratory purposes, its object being to warn people, either sleeping or working, of the presence of deleterious gases either heavier or lighter than air—such as carbonic oxid, lighting-gas, and the like—in order to avoid the numerous accidents caused by such gases.

This device is shown only for purpose of illustration in the accompanying drawings.

Figure 1 is a front elevation, Fig. 2 a plan, Fig. 3 a section, Fig. 4 a back view, of the apparatus.

The same is composed of a chemical balance, very sensitive and bearing at one end of the beam *a*, as a fixed tare, a receptacle *b*, having any capacity whatever and being perfectly tight and hermetically closed, containing normal air without pressure. The other end of the beam bears a scale *c*, having an equal area, fitted to a stirrup *d* and balancing the receptacle *b* when the ambient air is in normal conditions of respirability. In this first case the balance is in equilibrium.

If any cause whatever—such as an imperfect shutting of a cock, an introduction of carbonic oxid by a defective chimney or heating apparatus, &c.—alters the composition of the ambient air by introducing such gases in an undetermined proportion, the density of said air is changed according to the proportion of extraneous gas and the air enters the apparatus through openings *e*, provided with lattice. In this second case the air contained in the receptacle *b* not having changed its density, as the perfect tightness of the receptacle prevents the introduction of extraneous gases, the equilibrium is broken. In the case where the extraneous elements are lighter than the air this latter becomes also lighter and the receptacle, having an invariable weight, will descend and carry away the beam *a* in the direction of its fall. The contrary action takes place if the extraneous gases are heavier than air.

According to the above statement, which is confirmed by a serious experimentation of the apparatus, when the beam of balance oscillates either in one or the other direction a finger *f*, secured to the beam, comes (after a previous regulation according to the proportion of deleterious gas introduced and in case of danger) to plunge into a bath of mercury *g* and close an electrical circuit driving an alarm-bell *h* and may also, if desired, move a suitable gear for opening a window-frame. Thus the device produces in an absolutely automatical manner either the simple signal of the alarm-bell or the ventilation by the movable frame and the signal by the alarm-bell simultaneously. The apparatus such as above described could, however, work either in one or the other direction without introduction of altering elements into the atmosphere, for the simple reason of the variations of temperature modifying materially the weight of the respirable air. In order to avoid this inconvenience, I fit to the end of the balance-beam *a* opposite to the end bearing the receptacle *b* a compensator of temperature *i*, consisting of a two-metal spiral driving a lever *k*, which moves longitudinally a small movable tare *l*, sliding on a thread and compensating the differences of temperature, thus rendering the apparatus insensible to thermometrical variations. A finger *m*, dependent of the balance-beam and having its point before a gradation *n*, indicates the degree of divergence of the beam relatively to the normal position, also the approximate degree of extraneous gases introduced.

What I claim, and desire to secure by Letters Patent, is—

1. Apparatus for signaling the presence of gases, comprising a lever-beam, a hollow sealed vessel containing normal air attached to one end of the beam, a counterbalance attached to the other end of said beam, a thermostat and a slidable counterweight operated thereby and both carried by the beam, and a barometer and a slidable counterweight operated thereby, said barometer and weight both carried by the lever-beam.

2. Apparatus for signaling the presence of gases, comprising a lever-beam, a hollow sealed vessel containing normal air attached to one end of said beam, a counterbalance attached to the other end of said beam, and a

thermostat and a slidable counterweight operated thereby and both carried by the beam.

3. Apparatus for signaling the presence of gases, comprising a lever-beam, a hollow sealed vessel containing normal air attached to one end of said beam, a counterbalance attached to the other end of said beam, and a barometer and a slidable counterweight operated thereby and both carried by the beam.

4. The combination with means for detecting the presence of gases, of a means influenced by variations of atmospheric pressure for compensating for such variations.

5. The combination with means for detecting the presence of gases, of an aneroid and parts operated thereby for compensating for variations of atmospheric pressure.

6. Apparatus for signaling the presence of gases, comprising a lever-beam, a hollow sealed vessel containing normal air attached to one end of said beam, a counterbalance attached to the other end of said beam and having a dust-collecting surface equal to that of the said vessel, and parts carried by the beam for compensating for variations of atmospheric pressure and for compensating for variations of temperature.

In testimony whereof I affix my signature in presence of two witnesses.

HENRI HAUGER.

Witnesses:
HANSON C. COXE,
VICTOR MATRERY.