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THE THERMOPHOTE, OR SELF-REGISTERING PHOTOMETER.

The apparatus illustrated in the cut accompanying this article has recently been invented by Dr. T. O'Conor Sloane, of this city. It is founded on the theoretical identity of radiant heat and light. By a long series of experiments it was found that the heat radiated by a gas flame varied in proportion to the illuminating power. Thus a differential thermometer properly arranged and adjusted was found to be a reliable instrument for indicating the candle power emitted by a gas flame.

This much being determined, the next step was to arrange for the production of a flame consuming a definite and regulated amount of gas. This was secured by the peculiar form of gas meter and regulator shown in the cut. To the back of a gas meter is attached a cylindrical case communicating with its interior, and containing a float. The case is so connected that the water contained within it stands at the level of the water inside the drum of the meter. As the water within the drum falls, carrying with it the float, a valve is closed cutting off the gas. If the water rises, the valve, by the opposite action, is opened.

To the drum shaft an escapement is geared, working a heavy pendulum. If the drum tends to go faster than permitted by the pendulum, the level of the water inside the drum falls and shuts off gas. If it goes slower, the water rises, and the reverse action raises the float, opens the valve, and admits more gas. Thus by the application of the world's time measurer, the pendulum, the meter is made to run at an invariable rate of speed, and with an almost unvarying water level inside the drum. The gearing thus kept in rotation is made to perform two additional services. It rotates a disk of paper, seen on the top of the meter, once every twenty-four hours. It also by a cam motion raises the hammer, seen extending from the bottom to a point above the meter case, every few minutes, letting it suddenly fall as drawn toward the paper disk by a spring.

The differential thermometer is a two-bulbed curved tube hermetically sealed, and containing a few inches of mercury. It is balanced on knife edges. One of the bulbs is blackened on its posterior surface, and occupies a position about one inch from the chimney of the Argand burner. If the mercury runs out toward the end, as the air in the blackened bulb expands under the influence of heat, the tube balances downward. If the heat is less, and the mercury runs back toward the center, the tube rises upward. The first of these effects corresponds in a general way to richer gas, the second to poorer gas.

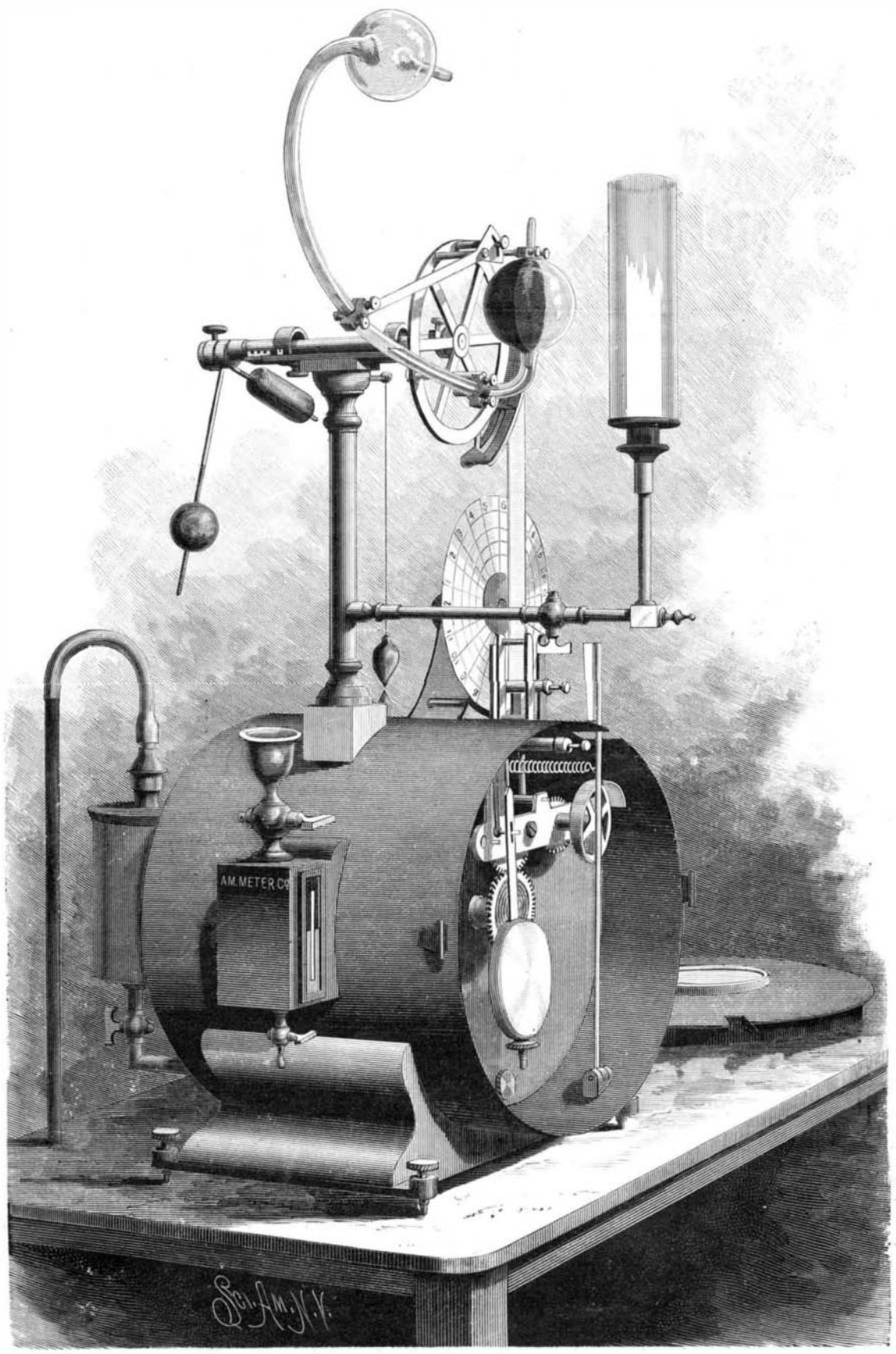
To register these movements the axis of the thermometer bears a quadrant. A ribbon working over this quadrant carries a needle contained in a socket. As the hammer alluded to above falls, it strikes the head of this needle, causing its point to perforate the card. Then the needle is immediately withdrawn by the action of a spring in its socket. As the position of the needle with reference to its distance from the center of the disk is, so is the candle power. Circles are drawn on the card corresponding to different candle powers. As the card rotates once in twenty-four hours, twenty-four radii are drawn, one for each hourly division. Thus the card, when removed at the end of the day, shows this candle power for all times of the day, by the positions of the series of punctures produced by the needle.

In experiments made by the American Meter Co., of this city, the instrument was found wonderfully exact.

The bar photometer, though the standard now, and destined to remain such, is not scientifically accurate. The different colors of the lights, candles, coal gas, and water gas, that are compared, make its readings somewhat uncertain. Manipulation, too, may cause considerable errors. Thus it is on record that Dr. Letheby, in his day one of the highest authorities on gas testing, photometered gas at 17·36 candles which Dr. Hofmann testified was of only 14·63 candle power. The record is contained in evidence given on the Birmingham and District Gas Consumers' Bill before the Lords' Committee, March, 1864, in England. Dr. Letheby, it is said, had been using the same system for ten years.

To-day it is better. Gas on the whole is accurately examined. But in the thermophote is presented an instrument void of personal error. It creates a standard for itself, and in the case of very white gases, such as water gas, it is questionable if its readings are not more reliable than those of the Bunsen photometer. To carry its accuracy a degree farther, an alum or water cell may be placed between the flame and the thermometer bulb. For practical work this was felt to be a needless complication.

The use of such an instrument at the gas works enables the engineer to know whether his men are doing their duty, whether the exhauster is run properly, etc.. At the office of the company, within the district, it gives the consumer the best guarantee that his interests are being looked after, and that the gas is photometered not only by day, but by night, during the hours of consumption.



THE THERMOPHOTE, OR SELF-REGISTERING PHOTOMETER.

Boring for Oil in Pennsylvania.

Enthusiastic oil operators are still boring away through granite near Pakesburg, Chester County, in search of oil. It is innocently stated that it will be "some time yet before they reach the depth for oil." According to a contemporary from that region, the borers have evidently taken no account of geological levels, or "horizons," but measure from the surface of the ground, whatever it may be. But, according to geologists, they started their drills below the surface for oil, and are simply going farther and farther away from it with every advance of their drills. They will probably end with a sufficient object lesson in geology to give them a little more faith in a very well established science, and considerably less faith in the "surface indications" so dear to the practical miner—dear alike to his heart and to his pocket.

F. A. GOWER lately read a paper before the Royal United Service Institution on a "System of Air Torpedoes." The author proposed to launch against an approaching army aerostats carrying 100 pound shells of gun cotton, which would explode at a given time.