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Sternberg's Electro-Magnetic Regulator for Dampers and Valves.

This is an ingenious and scientific device for the automatic regulation of the temperature of public buildings, hospitals, factories, school-houses, dwelling-houses, malt-houses, drying-houses, etc., etc., to any point desired; the automatic regulation of the temperature of any liquid undergoing the process of evaporation or distillation; the automatic regulation of the pressure of steam, so that an engine may be run at any desired pressure; and the automatic regulation of the hight of any liquid in a reservoir from which there is a variable flow, as in a steam boiler.

Fig. 1 shows its application to the regulation of heat in dwellings, public buildings, etc., as will be described below.

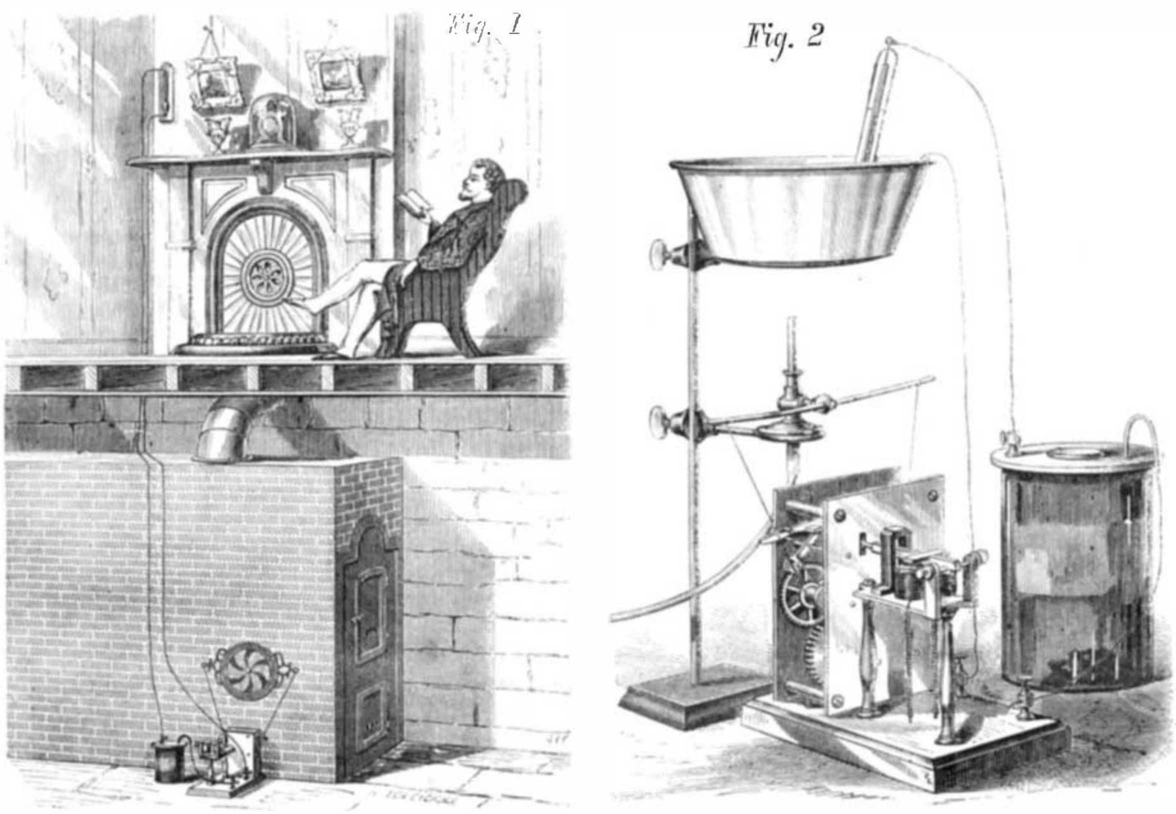
Fig. 2 shows its application to the regulation of temperature in heated liquids in chemical and pharmaceutical operations.

Fig. 3 gives a detailed view of the thermometer employed in regulating temperatures in the rooms of buildings.

Fig. 4 is a detailed view of the thermometer employed in regulating the temperature of liquids.

In the latter figure, A represents the bulb; B, a platinum wire fused into the glass, and communicating with the mercury in the bulb; C, the point of junction of the mercury in the stem with a wire, D, which passes through a small aperture in the upper part of the stem. This point of juncture can be raised or lowered as desired by raising or lowering the wire, D.

Fig. 3 represents essentially the same arrangement mounted upon a proper support, and provided with adjusting rollers at the top by which the wire, D, is conveniently raised or lowered till its lower end stands at any desired degree of the scale, and with screws to hold the conducting wires, E F. It is obvious that if the wires, D and B, are connected through conducting wires to the poles of a galvanic battery, the circuit will be made every time the mercury rises to the wire, D, and every time the mercury falls below D, the circuit will be broken.



STERNBERG'S ELECTRO-MAGNETIC REGULATOR.

In Figs. 1 and 2 these wires are shown so connected, with suitable constant batteries. The making of the circuit by the rise of the mercury to the lower end of the wire, D, previously adjusted to the required degree of temperature, develops magnetism in an electro-magnet, which, attracting an armature attached to an unlocking apparatus, releases a train of spring clock-work which operates to close the damper of a furnace, as shown in Fig. 1, or to partially close a gas tap, as shown in Fig. 2, where the operation of heating liquids by the well-known Bunsen burner, generally used by chemists, is shown in progress.

A simple arrangement, not necessary to be dwelt upon in detail, reverses the motion of the clock-work, and opens the damper, or gas tap, whenever the mercury again falls below the end of the wire, D, and the armature is released from the electro-magnet by the breaking of the circuit.

The combustion then increases, and the heat speedily raises the mercury to D, and makes the circuit again. Thus the temperature can never rise above or fall below the degree to which D is adjusted, except to a very slight and immaterial extent while the apparatus is in adjustment.

The clock-work only requires winding for every twenty-four hours of service, but of course this can be so constructed, if desired, as to run a much longer time. Twenty-four hours are, however, ample for most purposes.

It is obvious that this principle may be extended to a great variety of apparatus and operations in the industrial arts. In fact its possible and useful applications are almost beyond enumeration.

In distilling, especially in fractional distillation, in oil refineries, in green houses, hospitals, school-rooms, churches, in the drying of substances at fixed temperatures, in breweries, and malt houses, etc., etc., its use would change uncertainty to precision, and render easy what are now oftentimes some of the most difficult and critical of industrial operations.

In a sanitary point of view, its general adoption as a regulator of temperatures in dwellings and public buildings seems very desirable.

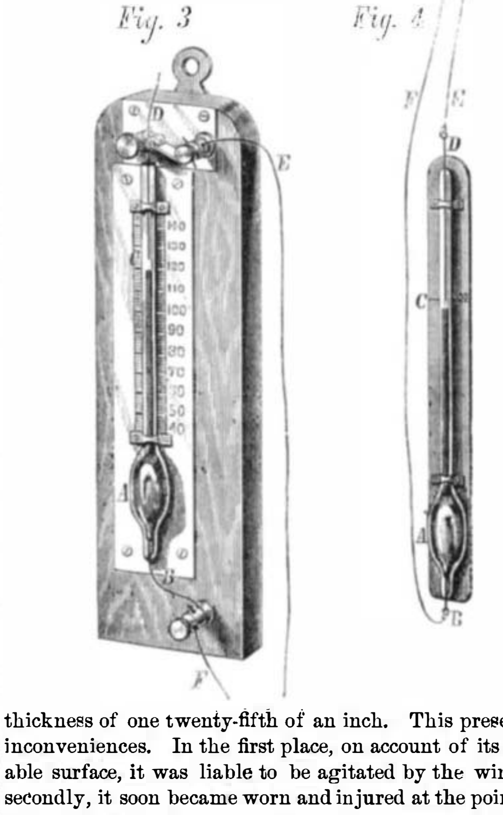
We have personally inspected the operation of this ingenious instrument in the operation of heating liquids for pharmaceutical purposes, and can vouch that in this respect it is all the inventor claims for it. We see no reason why it should not perform just as satisfactorily in regulating the heat of rooms and in other operations.

The device is covered by several patents, dating from March 1, 1870, to July 12, 1870. The patentee is Mr. Geo. M. Sternberg, No. 19 Platt street, New York city.

Hirn's Telodynamic Cable.

The following, in reference to the transmission of power by belts of wire rope and pulleys, is from Prof. Barnard's Report on the Paris Universal Exposition. We have already discussed this subject, but its importance entitles it to further consideration.

"The invention of Mr. Hirn was first applied in the transmission of moderate powers to moderate distances. Instead of a cable there was used in the beginning a band of steel, having a breadth of about two and one half inches, and a



thickness of one twenty-fifth of an inch. This presented two inconveniences. In the first place, on account of its considerable surface, it was liable to be agitated by the winds; and, secondly, it soon became worn and injured at the points where it was riveted. It served, however, very well for eighteen months to transmit a twelve-horse power to a distance of eighty meters (266 feet). A cable was then substituted, and this, first introduced in 1852, is still in good condition.

"It was in the attempt to extend the system to greater distances that difficulties and obstacles began to be encountered. At the distance of eighty meters no intermediate supports were necessary. At the distance of two hundred and forty, to which the system was next extended, such supports were found to be indispensable in order to prevent the cable from dragging on the ground. It was only when, after the many trials and failures above mentioned, a material had at length been discovered which rendered these supports indefinitely durable, that this second experiment could finally be pronounced completely successful. After this success, however, the extension of the system went on rapidly. A single firm, Messrs. Stein & Co., of Mulhouse, have applied it in more than four hundred instances with entire success. These applications have been made for the most part in France, and the department in which the invention originated, but there are some noticeable exceptions. The Government manufactory of powder at Okhta, in Russia, mentioned above, has introduced it for the transmission of the force of its turbines over a distance of one thousand four hundred meters. Several establishments in Germany employ it for distances varying from three hundred and fifty to one thousand two hundred meters. An officer of the Danish navy has made one application of it on a line of one thousand meters; and at the mines of Falun, in Sweden, a more than one hundred-horse power is transmitted by it to a distance of five thousand meters (1,608 meters make one half of our miles, so that the latter distance would be nearly three and one eighth miles).

"The invariable success of all the applications hitherto made, over distances constantly increasing, has satisfied the inventor that power can be economically carried by this method as far as to ten or fifteen miles. The experience thus far acquired has furnished data by which the loss attendant on transmission can be very closely calculated. This loss, which will of course increase with the distance, may be referred to three sources, viz.: the friction on the axles of the pulleys, the rigidity of the cable, and the resistance of the air. Experimentally it is found that, for the two great pulleys at the termini, an allowance must be made of two and one half per cent, and for the intermediate pulleys and the rigidity of the cable there must be allowed additionally one per cent for each thousand meters. Thus, for one hundred-horse power carried to a distance ef ten kilometers, or six miles, the loss will be $2\frac{1}{2}+10=12\frac{1}{2}$-horse power, or one eighth of the whole; the resistance of the air being still to be added. Mr. Hirn makes allowance for this by doubling the last sum; so that one hundred-horse power may, in his opinion, with perfect certainty, be carried six miles without losing more than twenty-five per cent. This is undoubtedly an under-estimate."

Passage of Gases in the Body.

At the concluding lecture of his course on experimental medicine for the session 1869–70, Dr. Richardson made, says the *Lancet*, a very curious experiment, which appears to show that there is a direct and almost immediate passage of substances in the gaseous form through all the tissues of the body, and especially through the coats of veins. Dr. Richardson introduced a fine tube through the nostril of a rabbit into the cranial cavity. Air, or carbonic acid gas, pumped through this tube, instantly made its appearance in the right cavities of the heart. The carbonic acid darkened the blood and stopped the systolic action. Atmospheric air rendered the blood of the right side arterial, and restored the systole. It seems, therefore, that we are not air-tight.

Improvements in Steam Navigation.

Mr. Jas. Granger, the inventor of a feathering paddle wheel for steamers, illustrated in No. 5, Vol. XIX., of the SCIENTIFIC AMERICAN, writes in answer to C. E. Haskins' query, in regard to the present stand-still in improvements in steam navigation, that the reason is mainly attributable to the fact that attention has been too exclusively directed to the improvement of the old-style wheel and screw, instead of endeavoring to construct other and better means of propulsion.