

water-line in both boilers is at the same level, in which case it is necessary to valve off only the coal boiler to prevent the heating of the water in the coal boiler when it is not in use.

The gas boiler should be set as close to the coal boiler as practicable, and the flows and returns should cut into the flows and returns of the coal boiler as near to the latter as possible.

CHAPTER XII

AUTOMATIC HEAT CONTROL

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TEMPERATURE regulation is a vital function in the human body. We all carry about with us remarkably effective automatic heat control equipment. In the best functioning of many social and commercial services, automatic temperature regulation is proved to be necessary, not only to comfort and health, but also to the prevention of waste and to the perfection of manufacturing processes.

Temperature control is usually achieved by preventing overheating. It follows that *automatic heat control* is a better term than automatic temperature regulation, and it is obvious that automatic heat control in itself must always effect an economy.

All heating apparatuses must be sufficient in capacity to render acceptable service under the most arduous conditions. The most arduous conditions, especially as to extreme cold outside, are in effect only a small part of the heating season. It may surprise many people to realize that in Chicago, for instance, the most extreme cold prevails only on about six days per year. Hence there is ample ability and strong probability for overheating during the major part of each heating season unless automatic control of the heating apparatus is provided.

Ventilating systems without automatic heat control give trouble from drafts.

Rooms heated by radiators can be cooled more quickly by opening windows than by shutting radiator valves, so that it is found that great heat waste occurs through open windows and open radiator valves, unless automatic heat control is furnished.

Gas and oil heaters and similar devices using quickly responsive fuels become prohibitively expensive for fuel unless automatic heat control is used.

Service hot-water heaters must have automatic control, not only for economy and satisfaction, but also to prevent scalding the bodies of users.

Thermostats are very simple mechanisms. Almost every physical thing expands or changes under the influence of heat and so can be made into a more or less effective thermostat. Liquids can be compounded which will become gases at any reasonable temperature desired. Metals having different rates of expansion can be harnessed together so as to give a greatly increased thermostatic movement. Common air is an excellent thermostatic medium, and is used extensively.

There are two general divisions into which devices for automatic heat control may be grouped, as follows:

1. The simpler class includes the type in which the thermostats and the valves and dampers which they operate are self-contained without any outside power, gaining