Before

HEAT ENGINES

STEAM—GAS—STEAM TURBINES—AND THEIR AUXILIARIES

CHAPTER I

HEAT

1. Heat being the source of energy for the devices considered in this book, a short discussion of the nature and the more important properties of heat will assist the student to a better understanding of the subject-matter of this text. These phenomena will be considered only as they affect perfect gases, steam, and water.

2. Theory of Heat.—The accepted theory of heat at the present time is that it is a motion of the molecules of a body. Physical experiments indicate this to be the fact. The intensity of the heat, or the temperature, is supposed to depend upon the velocity and amplitude of these vibrations.

Most bodies expand when heated. This expansion is probably due to the increased velocity of the molecules which forces them farther apart and increases the actual size of the body. The vibration may become so violent that the attraction between the molecules is partly overcome and the body can no longer retain its form. In this case the solid becomes a liquid. If still more heat is added, the attraction of the molecules may be entirely overcome by their violent motion, and the liquid then becomes a gas.

The phenomena of heat is then a form of motion. This is often stated in another way, viz., heat is a form of kinetic energy. As heat is a form of motion, it must be possible to transform heat into mechanical motion. In the following pages, therefore, the most important methods of making this transformation will be discussed.

3. Temperature and Temperature Measurement.—The velocity of the vibration of the molecules of a body determines the intensity of the heat, and this intensity is measured by

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