

of carriage wheels so that when they are set, the contraction of iron on cooling effectively binds hubs, spokes and rims together.

Now when we look for the sources of heat we find them resolved into three, the mechanical, physical and chemical. To the mechanical source belongs friction, pressure and percussion. The Indian producing fire by the brisk rubbing of pieces of wood together is a familiar example of heat obtained by friction. A bit of lead vigorously hammered upon an anvil grows hot by way of percussion. Meyer has calculated that if the earth were suddenly stopped in its rotatory motion the percussion or shock of its parts together would volatilise it.

Of all sources of heat the sun is indubitably the principal. There are several theories to account for the sun's great heat. The most plausible of them holds for condensation. The metals known to be present in the sun are conceived to be in a high state of fusion and in consequence give off vast amounts of nebulous gas. The heat absorbed by this gas is in a latent state. In time, as the gas moves away, it is condensed, the latent heat is released and is forced forward in continuously succeeding waves.

The earth also contains heat in its molten interior. The existence of this heat is seen best in such prodigious phenomena as volcanoes, hot springs and geysers. Borings made into the earth's crust show that the temperature increases one degree to every ninety feet of descent.

The other source of heat is the chemical. A practical example is the fire that warms and the flame that lights our houses. The invisible oxygen of the air combines with the constituents of such fuels as wood, coal, oil, illuminating gas, and what we call burning or combustion results. Heat is thereby generated. This effect had been previously prepared by the combination of molecules which in different bodies bear affinity to one another. When two bodies attract each other chemically they move together with gradually increasing velocity. At the moment of cohesion their arrested energy is converted into a heat capable of forming a new compound of the two substances. Combustion merely resolves the compound into its simple elements, and the heat that was taken up in uniting them is released for other services.

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