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McGraw-Hill concise
encyclopedia of science &

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CONCISE ENCYCLOPEDIA OF SCIENCE & TECHNOLOGY

SIXTH EDITION



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Library of Congress Cataloging in Publication Data

McGraw-Hill concise encyclopedia of science & technology.—6th ed.
v. cm.

Includes bibliographical references and index.

Contents: v. 1. Articles A–L—v. 2. Articles M–Z.

ISBN 978-0-07-161366-8 (set : alk. paper)—

ISBN 978-0-07-161368-2 (v. 1 : alk. paper)—

ISBN 978-0-07-161369-9 (v. 2 : alk. paper)

1. Science—Encyclopedias. 2. Technology—

Encyclopedias. I. McGraw-Hill Publishing Company.

II. Title: Concise encyclopedia of science & technology.

III. Title: McGraw-Hill concise encyclopedia of science and technology.

Q121.M29 2009

503—dc22

2008050987

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1 2 3 4 5 6 7 8 9 0 CTP/CTP 0 5 4 3 2 1 0 9

ISBN: P/N 978-0-07-161368-2 of set
P/N 978-0-07-161366-8

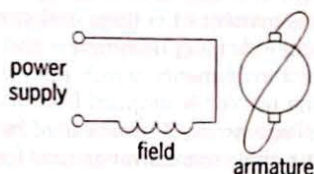
MHID: P/N: 0-07-161368-4 of set
0-07-161366-8

This book was printed on acid-free paper.

It was set in Helvetica Black and Souvenir Light by Aptara,
New Delhi, India.

China Translation & Printing Service, Ltd., was the printer and binder.

Repulsion motor An alternating-current (ac) commutator motor designed for single-phase operation. The chief distinction between the repulsion motor and the single-phase series motors is the way in which the armature receives its power. In the series motor the armature power is supplied by conduction from the line power supply. In the repulsion motor, however, armature power is supplied by induction (transformer action) from the field of the stator winding. For discussion of the ac series motor see UNIVERSAL MOTOR.



Schematic of a repulsion motor.

The repulsion motor primary or stationary field winding is connected to the power supply. The secondary or armature winding is mounted on the motor shaft and rotates with it. The terminals of the armature winding are short-circuited through a commutator and brushes. There is no electrical contact between the stationary field and rotating armature (see illustration). See ALTERNATING-CURRENT MOTOR; WINDINGS IN ELECTRIC MACHINERY.

Irving L. Kosow

Reservoir A place or containment area where water is stored. Where large volumes of water are to be stored, reservoirs usually are created by the construction of a dam across a flowing stream. When water occurs naturally in streams, it is sometimes not available when needed. Reservoirs solve this problem by capturing water and making it available at later times. See DAM.

In addition to large reservoirs, many small reservoirs are in service. These include varieties of farm ponds, regulating lakes, and small industrial or recreational facilities. In some regions, small ponds are called tanks. Small reservoirs can have important cumulative effects in rural regions.

Reservoirs can be developed for single or multiple purposes, such as to supply water for people and cities, to provide irrigation water, to lift water levels to make navigation possible on streams, and to generate electricity.

Another purpose of reservoirs is to control floods by providing empty spaces for flood waters to fill, thereby diminishing the rate of flow and water depth downstream of the reservoir.

Reservoirs also provide for environmental uses of water by providing water to sustain fisheries and meet other fish and wildlife needs, or to improve water quality by providing dilution water when it is needed in downstream sections of rivers. Reservoirs may also have esthetic and recreational value, providing boating, swimming, fishing, rafting, hiking, viewing, photography, and general enjoyment of nature. See PUMPED STORAGE; RIVER ENGINEERING; WATER SUPPLY ENGINEERING.

Neil S. Grigg

Resin Originally a category of vegetable substances soluble in ethanol but insoluble in water, but generally in modern technology an organic polymer of indeterminate molecular weight. The class of flammable, amorphous secretions of conifers or legumes are considered true resins. Water-swellable secretions of various plants, especially the Burseraceae, are called gum resins. The natural vegetable resins are largely polyterpenes and their acid derivatives, which find application in the manufacture of lacquers, adhesives, varnishes, and inks.

The synthetic resins, originally viewed as substitutes for certain natural resins, have a large place of their own in industry and commerce. Phenol-formaldehyde, phenol-urea, and phenol-melamine resins are important commercially. Any unplasticized organic polymer is considered a resin, thus nearly any one of

the common plastics may be viewed as a synthetic resin. Water-soluble resins are marketed chiefly as substitutes for vegetable gums and in their own right for highly specialized applications. Carboxymethylcellulose, hydroxyalkylated cellulose derivatives, modified starches, polyvinyl alcohol, polyvinylpyrrolidone, and polyacrylamides are widely used as thickening agents for foods, paints, and drilling muds, as fiber sizings, in various kinds of protective coatings, and as encapsulating substances. See POLYMER.

Frank Wagner

Resistance heating The generation of heat by electric conductors carrying current. The degree of heating for a given current is proportional to the electrical resistance of the conductor. If the resistance is high, a large amount of heat is generated, and the material is used as a resistor rather than as a conductor.

In addition to having high resistivity, heating elements must be able to withstand high temperatures without deteriorating or sagging. Other desirable characteristics are low temperature coefficient of resistance, low cost, formability, and availability of materials. Most commercial resistance alloys contain chromium or aluminum or both, since a protective coating of chrome oxide or aluminum oxide forms on the surface upon heating and inhibits or retards further oxidation.

Since heat is transmitted by radiation, convection, or conduction or combinations of these, the form of element is designed for the major mode of transmission. The simplest form is the helix, using a round wire resistor, with the pitch of the helix approximately three wire diameters. This form is adapted to radiation and convection and is generally used for room or air heating. It is also used in industrial furnaces, utilizing forced convection up to about 1200°F (650°C). Such helices are stretched over grooved high-alumina refractory insulators and are otherwise open and unrestricted.

The electrical resistance of molten salts between immersed electrodes can be used to generate heat. Limiting temperatures are dependent on decomposition or evaporation temperatures of the salt. Parts to be heated are immersed in the salt. Heating is rapid and, since there is no exposure to air, oxidation is largely prevented. Disadvantages are the personnel hazards and discomfort of working close to molten salts.

A major application of resistance heating is in electric home appliances, including electric ranges, clothes dryers, water heaters, coffee percolators, portable radiant heaters, and hair dryers. Resistance heating also has application in home or space heating.

If the resistor is located in a thermally insulated chamber, most of the heat generated is conserved and can be applied to a wide variety of heating processes. Such insulated chambers are called ovens or furnaces, depending on the temperature range and use. The term oven is generally applied to units which operate up to approximately 800°F (430°C). Typical uses are for baking or roasting foods, drying paints and organic enamels, baking foundry cores, and low-temperature treatments of metals. The term furnace generally applies to units operating above 1200°F (650°C). Typical uses of furnaces are for heat treatment or melting of metals, for vitrification and glazing of ceramic wares, for annealing of glass, and for roasting and calcining of ores. See ELECTRIC HEATING; FURNACE.

Willard Roth

Resistance measurement The quantitative determination of that property of an electrically conductive material, component, or circuit called electrical resistance. The ohm, which is the International System (SI) unit of resistance, is defined through the application of Ohm's law as the electric resistance between two points of a conductor when a constant potential difference of 1 volt applied to these points produces in the conductor a current of 1 ampere. Ohm's law can thus be taken to define resistance R as the ratio of dc voltage V to current