The Canadian Engineer

VOL. X.—No. 8. TORONTO AND MONTREAL, AUGUST, 1903. PRICE 10 CENTS $1.00 PER YEAR.

The Canadian Engineer.

ISSUED MONTHLY IN THE INTERESTS OF THE

CIVIL, MECHANICAL, ELECTRICAL, LOCOMOTIVE, STATIONARY, MARINE, MINING AND SANITARY ENGINEER, THE SURVEYOR, THE MANUFACTURER, THE CONTRACTOR AND THE MERCHANT IN THE METAL TRADES.

SUBSCRIPTION—Canada, Great Britain and the United States, $1.00 per year; foreign, 6s. Advertising rates on application.

OFFICES—18 Court Sts. Toronto ; and Fraser Building, Montreal.
Toronto Telephone, Main 4310. Montreal Telephone, Main 2589.

BIGGAR-SAMUEL, LIMITED, Publishers,

All business correspondence should be addressed to our Montreal office. Editorial matter, cuts, electros and drawings should be addressed to the Toronto Office, and should be sent whenever possible, by mail, not by express. The publishers do not undertake to pay duty on cuts from abroad. Changes of advertisements should be in our hands not later than the 15th of the preceding month or if proof is desired, 4 days earlier.

CONTENTS OF THIS NUMBER :

RADIUM AND WHAT IT LEADS TO.

The discovery of the X-rays by Professor Roentgen in 1895, marks a turning point in science and the industries as important perhaps as the discovery of electricity itself. The knowledge of the radioactive properties of the metal radium now coming into the possession of the public through the press has called general attention to the new fields in the world of science to whose exploration the physicists have lately bent their energies. The early chemists working with the balance discovered many of the properties of matter, fixed upon a number of the elements and determined their specific gravities. The spectroscope by the examination of the light emitted from highly heated substances established the existence of many elements hitherto unknown, and even enabled us to determine the constituents of the blazing mass at the centre of our universe—the sun.

The electrometer, ten thousand times more sensitive than the spectrometer, has added still further to the list of known elements, and by the property of radioactivity which it has revealed in three of the elements, namely, uranium, thorium and radium, enables us to go far beyond the atom in our search into nature's secrets, to seize upon and examine inconceivably minute particles which are rushing through the air with the speed of light. We shall probably, in the view of Sir William Crookes, very shortly discover the one primordial substance from which all things have been evolved, we shall see the process by which the elements decay, and observe the facts in view of which he says: "Although the range of human experience is all too short to afford a parallax whereby the date of the extinction of matter can be calculated, the 'formless mist,' once more may reign supreme, and the hour hand of eternity will have completed one revolution."

When examining various bodies to see if any had the power of emitting rays resembling the X-rays Becquerel in 1899 experimented with salts of uranium, a phosphorescent body, and in doing so found rays sent off which traversed various screens placed between the substance and a photographic plate in the same manner as did the Roentgen rays. As this effect was found to have no connection with phosphorescence, Becquerel recognized a new phenomenon—the spontaneous emission of rays by a substance. He also observed that the radiant property was not confined to the salts of uranium, but was a property of the metal itself. He found that these rays would discharge electrified bodies, and the electrometer as well as the photographic plate became a means of studying the radiation. It was known that a gas became a conductor and would therefore discharge an electrified body when traversed by cathode rays, and the theory was advanced by J. J. Thompson, of Cambridge University, and Rutherford, of McGill University, that when a gas became a conductor under a radiation it did so by reason of the production of positive and negative ions—infinitely minute particles of matter bearing an electrified charge—throughout its mass. The investigations of the latter into the radiation from uranium confirmed this view.

In 1898 M. Schmidt and Madame Curie observed, quite independently, the radiant quality in thorium. Madame Curie having measured the ionization of a large number of minerals containing the metals thorium or uranium, announced that several minerals were more actively radiant than metallic uranium. M. Schmidt and Madame Curie concluded that there must be a more active body in the mineral than uranium and after a prolonged and most expensive series of experiments, the latter succeeded in isolating from pitch blende a very active barium, which was found to contain a new element, radium.

The investigations of Rutherford, of McGill, into