

amount of change from the lower end of the tubes. When the knob is released it resumes its place at the front by a spiral spring, located within the tube of the knob, and drops the dollar inside the box in plain view of the driver. There being four fingers on this plate, it will be seen that whenever the money stops in the rack it will push one of these little drawers in front of it, giving back change to the amount placed in the inclined tube from a dime up to a dollar. This inclined tube is also provided at the lower end with another inclined plane, which has slots of different diameters, so that nothing but a 5-cent piece will enter the fare box, and a 1 or 2-cent piece will be handed back to the depositor.

#### WATER-HAMMERS.

Water-hammer, in steam pipes, is a sort of concussion of water in the pipes, and is caused by the condensation of steam giving rise to a vacuum. This permits the water to flow from different directions toward the vacuum, the momentum being such, when another body of water, or a bend in the pipe is struck, as to produce a heavy blow, and to break the pipes apart. This effect usually takes place when steam is first turned into cold pipes, for then a quantity of water resulting from the condensation is driven ahead of the steam; but as the latter is much quicker in its movements than water, it will get into the pipe first, and there form a separate body of water. The waters of two different temperatures then rushing along, they will meet with, and be divided by, the imprisoned steam. Condensation will quickly follow, and the partial vacuum formed in consequence will increase the speed at which the water is moving, until its momentum comes into collision with a bend in the pipe and causes a rupture. Accidents have sometimes occurred in which the pipes have been broken in several places, and, indeed, have been rendered leaky in nearly every joint.

#### THE IMPERIAL INSTITUTE.

In connection with the Imperial Institute which has just been established in London, in order to show to the world the various resources of the British Empire and to extend the trade relations between the Colonies and the Mother Country, circulars have been issued appealing to the manufacturers of Canada to send in suitable exhibits. Separate spaces have been reserved for each of the provinces, with the object of showing the natural resources and manufactured products of each to the best advantage. It is hoped also that owing to the Institute being always open to the public, there will result a large increase in the flow of immigration into Canada. Exhibitors are requested to forward with their exhibits, price lists and circulars giving full information, which will be judiciously distributed by the officials in charge. The curator will carefully attend to any instructions with regard to the position and manner of displaying the goods. Cost of transport and of suitable show-cases will be defrayed by the Government. In arranging the exhibits, an attempt will be made to afford full, scientific, practical and commercial information relating to the sources, nature and applications of Canada's natural products, and of the industrial and commercial condition of the country. The Imperial Institute building itself is one of the most elaborate and elegant in the World's

Metropolis." There will be an increasing interest in the institution as time goes on, and Canadian manufacturers who are cultivating a foreign trade will do well to be represented there. It is the outcome of the Colonial and Indian Exhibition of 1886, at which Canada made such a fine display and from which many Canadian manufacturers developed a foreign trade which has gone on increasing to this day.

The curator of the Canadian section is Harrison Watson, Imperial Institute, Imperial Institute Road, London, to whom all packages should be addressed. Information regarding exhibits from the Province of Quebec will be given by S. C. Stevenson, 76 St. Gabriel street, Montreal.

#### LUMINOUS AIR.

The rays coming from the cathode of a Geissler tube, which are capable of exciting phosphorescence, can be made to pass through thin metal; and, provided a sheet of metal foil can be found thick enough to be opaque and air-tight, yet thin enough to admit these rays, it is possible to allow them a passage into the open air by closing an opening in a discharge tube with a piece of foil. Dr. Lévard having been struck with this idea, has constructed an ingenious apparatus with a hammered and extremely thin plate of aluminum. This plate forms a sort of window, and, though impermeable to sunlight and air, lets the rays from a cathode penetrate it freely from a distance of 12 centimeters. These rays give to the surrounding atmosphere a slightly luminous appearance.

#### LITERARY REVIEW.

THE ELECTRIC TRANSMISSION OF INTELLIGENCE AND OTHER ADVANCED PRIMERS OF ELECTRICITY. By Edwin J. Houston, A.M. New York: The W. J. Johnston Co., Limited, 41 Park Row. London: Whittaker & Co. 1893. 330 pages, 88 illustrations. Price, \$1.00.

The third and concluding volume of Prof. Houston's Advanced Primers of Electricity is devoted to the telegraph, the telephone, electrolysis, electro-metallurgy, the storage battery, electro-therapeutics, electro-annunciators and alarms, electric welding, electricity in warfare, and several miscellaneous applications of electricity. The primers on multiple and cable telegraphy and telephony will be particularly appreciated by those who have had no previous knowledge of electricity, as the author places these subjects in such a light as to make them easily understood by any reader. The quadruplex and other systems of multiple telegraphy, as well as the principles of cable and time telegraphy need not therefore remain mysteries to the intelligent public in the future as they have in the past. The other subjects are handled in the admirable and lucid manner that characterizes the writings of Prof. Houston, and his recent election as president of the American Institute of Electrical Engineers shows that his electrical attainments are appreciated in the higher circles of the electrical profession. The extracts from standard authors at the end of each primer is a feature that has been highly praised in the preceding volumes and has been retained in the present one. Each primer is, as far as possible, complete in itself, and there is no necessary connection between the several volumes of the series, of which the present one is third and last.

Among the new exchanges that have come to our table this month is *Paving and Municipal Engineering*, published at Indianapolis, Ind. It is neatly printed in magazine form, and makes a specialty of road improvements. As a good deal of attention is now devoted to this subject in Canada, we commend this paper to our readers.

The *Canadian Advertiser* is the name of a new monthly journal devoted to the subject of advertising. The idea of the paper is to give advice and practical hints to advertisers, not only in the selection of mediums through which to advertise, but in the preparation of advertisements. The paper is neatly printed, and contains a good many useful points. It is issued by the Canadian Advertiser Company, 75 Yonge street, Toronto.