

The total cost of the canal when completed was \$102,750,000.

The next place of interest is the city of Ismailia, situated on Lake Tamsah; this is the central point of the canal and is a comparatively large town, its inhabitants numbering about 5000 (mostly French). The homes of the pilots are situated here; there are also hotels, shops, cafés, a theater and a central railway station. The remainder of the trip is of little interest aside from camels and their masters who can be seen bound for different parts of the desert.

On arrival at Port Said we completed our journey in fourteen hours. The first thing to take the eye at this place is the activity of the port; here are assembled ships of every nation, some coaling or discharging cargo, while from seven to eight are probably awaiting their turn to enter the canal. The city of Port Said is, in comparison to cities in that part of the world, a modern place; previous to 1860 it was not in existence, but since the building of the canal, it has developed from a camping center into the "half-way house" of the East and West. At the latest census it had a population of 10,000, consisting more or less of a mixture, representing every nationality on the face of the earth. The streets are wide and very clean, and as for places of amusement, it has its share of music halls, their incomes being principally derived from travelers stopping at the place on their way through the canal. One of the principal points of interest is the light-house, a structure 180 feet high, and for many miles at sea it determines the entrance of the canal.

It was in the making of this entrance that De Lesseps found his greatest opposition; his opponents predicted that the constant supply of mud and sand brought from the interior of Africa by the Nile would block any plan devised for the canal's entrance at this place. He persisted, however, and constructed two breakwaters, one on either side of the canal to converge toward the sea entrance; these walls were made of stone carried from a great distance and at enormous cost. When partly finished, artificial stone was made on the spot and was used in its completion.

On the western breakwater about a mile from shore is situated the statue of Ferdinand de Lesseps, with his right arm raised and his hand pointing to the south; you almost imagine you can hear him say "My canal."

**The Boston-New York Motor Bicycle Endurance Test.**

The first long-distance endurance test of motor bicycles that has ever been held was that which took place on July 4 and 5 over the 254 miles of road leading from Boston to New York. The course was divided into ten controls, and each contestant was allowed a certain minimum and maximum time to cover a control. A perfect run through every control gave the contestant 1000 points, and unlike what has heretofore been the rule in other endurance tests, if he failed to make a control within the maximum time limit, he was not out of the test altogether, but, upon reaching it, was given a certain number of points.

Out of thirty-one starters, seventeen succeeded in reaching Hartford, Conn., the halfway point. Most of the machines that failed to reach this point gave out before traveling seventy-five miles of the journey. The following day, out of the seventeen survivors at Hartford, thirteen succeeded in reaching New York. This was a remarkably good showing, considering the state of the roads, which were rutty and very muddy. The test was a most severe one to riders as well as machines, and many tumbles were reported on account of the slippery roadbed. One of the contestants was so badly hurt from a fall that he had to be carried to a hospital.

The performance of the machines of several of the first motor bicycle manufacturers in the country shows that those earliest in the field have profited from their experience and are now producing perfectly practical motor bicycles, which on good roads are capable of carrying a rider at fast speeds with safety and without breakdowns. The winning of the contest by one of these manufacturers, who had entered but a single machine, speaks well for the reliability of his motor and the general construction of the bicycle.

Clothed with the authority of the Naval Appropriation Bill, Secretary Moody has given orders for the construction, at Brooklyn, by the government, of a 16,000-ton battleship. The Department will begin working out the detail plans immediately; and it is hoped that the keel-plates for the vessel will be laid in about eight months.

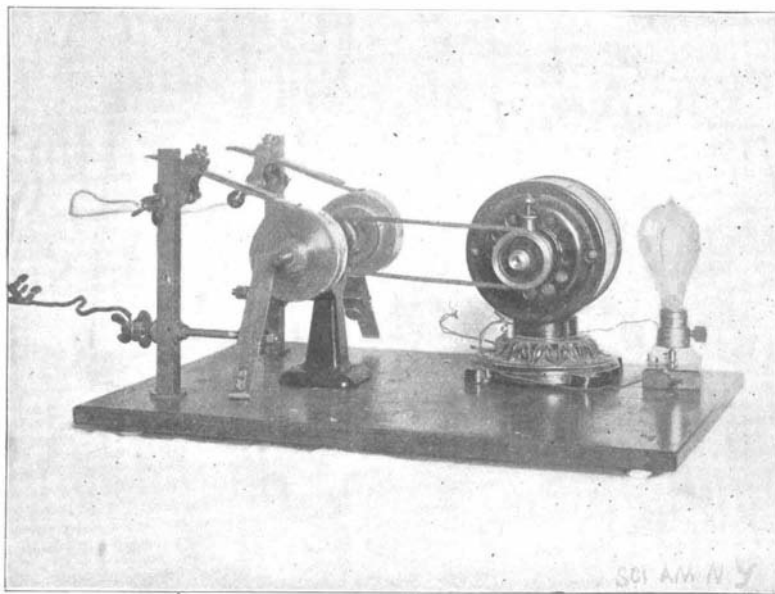
In order to determine the condition of New York city's air, Street Cleaning Commissioner Woodbury is exposing gelatine plates to collect germs.

Correspondence.

**THE GRISSON CONTINUOUS-ALTERNATING CURRENT TRANSFORMER.**

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of June 28, 1902, an illustrated description of the Grisson continuous-alternating current transformer, by Mr. A. F. Collins, occurs on page 452. Possibly some of your readers who are occupied with wireless telegraphy may care to hear further details regarding the practical working of an identically similar apparatus, independently devised by myself over four years ago to actuate an induction coil containing a primary with two circuits, so that the secondary discharge would be alternating in character. Although the apparatus was consigned long ago to the junk shelf, it happens to be still in my possession; and, as can be seen from the accompanying photograph, its plan is identical to that figured by Mr. Collins. At the time I attempted to satisfactorily employ this form of double rotary current distributor for the above-mentioned purpose, it was used in conjunction with both core transformers and induction coils in which the primary circuits were doubled, as figured by Mr. Collins. With neither type of apparatus, however, were satisfactory secondary discharges obtained, while considerable pyrotechnics always occurred at the brushes unless the current transmitted was kept below two or three amperes and two separate condensers were connected across the brushes of each wheel. With an induction coil giving normally a spark of eight inches, a spark of only one inch could be had without condensers, and one of two and a half inches when suitable condensers were used. When shunted by the condensers, the contact maker would usually run for a few moments with very slight sparking at the brushes, but frequently either at one or



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both brushes a prodigious flaming would occur, accompanied by a sudden increase in the primary current from three to forty or fifty amperes, when the 115-volt continuous current formed the source of supply. Hence the discharge was extremely irregular, and the wear and tear upon the mica insertions of the wheels so great that after very brief runs truing was required. By employing in the above-mentioned induction coil a primary wound with four layers along its whole length, which were connected so as to use the inner and outer layers in series for one circuit and the two middle layers in series for the other, thus approximately equalizing the inductances of the two circuits, the length of the spark obtainable from the secondary was increased to three and a half inches, although the behavior of the contact wheels as regards the constant tendency to flame was unimproved. When core transformers were used instead of induction coils, the results were equally as unsatisfactory. When several cells of storage battery supplied the current, the sparking at the brushes, as would be expected, was much diminished, but the performance of the induction coil was nothing like as good as when the usual spring vibrator was used to interrupt the current.

From the preceding experiences it appears that this method of directing the current first through one winding of the primary, and then leading it suddenly in the reverse direction through the other winding, does not cause a variation of the primary current at all suited to induction coils. If, however, the current through either primary winding is suddenly interrupted when at its maximum value, and suitable condensers are connected as usual across the break, the spark length of the secondary alternating discharge fully equals that obtained from the same induction coil as if it were actuated in the orthodox fashion. Although the employment of this high-potential alter-

nating discharge is found to be necessary for actuating a special form of X-ray tube used in my form of the stereo-radioscopic apparatus, it seems to me that nothing is to be gained by using it for wireless telegraphy, unless the complex method necessary to produce such a discharge absolutely eliminates all the various disturbing factors which arise when other well-known devices are used to interrupt the primary current.

R. H. CUNNINGHAM.

**Galileo Ferraris Prize for Inventors.**

The committee for the "Galileo Ferraris Award," instituted in 1898, have decided to open an international competition for the award of said prize on the occasion of the unveiling of the monument to Ferraris, in Turin, in the latter half of the month of September next. The award is 15,000 liras (\$3000), together with the compound interest accumulated since the year 1899 up to the day of the award. The prize will be granted to the inventor of some practical application of electricity likely to lead to noteworthy progress. Competitors may submit either pamphlets, projects and drawings or machines, apparatus and appliances relating to their invention. The jury has full power to cause practical experiments to be made with the inventions entered for competition, and upon the corresponding apparatus. Competitors are to file their applications and deliver their credentials appertaining to their invention not later than 6 o'clock P. M. on the 15th of September, 1902, at the office of the secretary of the committee, care of the Administrative Committee on the First International Exhibition of Modern Decorative Art in the buildings of the Chamber of Commerce and Art, 28 Via Ospedale, Turin, Italy.

**Proposed Steel Automobile Road.**

The Steel Roads Committee of the Automobile Club of America is making rapid progress in its work, and through its energy, together with the liberality of the United States Steel Corporation and the hearty co-operation of the city authorities, a thorough demonstration will very soon be made in this city of the merits of the steel highway system under various conditions of service. The chief difficulty was to get the special shape of steel rolled; none of the outside mills were willing to furnish it, or even to take an order for regular sizes requiring prompt delivery, but when Chairman Seligman of the committee met President Schwab he found him in full sympathy with the movement, and ready not only to furnish the special forms and deliver them promptly, but to contribute the steel for a mile of road as a gift. General Stone, the designer of the proposed road, has already conferred with the steel corporation's experts on the details of construction and the material will be delivered in six weeks. President Cantor has shown a warm interest in the affair, and by his direction Chief Engineer Olney is to recommend suitable locations for sections of the road. It is intended to place one in the heavy trucking region down town, another in a street of general travel, and a third on a suburban earth road. The track plates will be 12 inches wide and will be laid on special foundations of broken stones. An English engineer, who recently inspected the steel road at Valencia in Spain, reports in the highest praise of it in every particular. This road has been in use for ten years.

**The Current Supplement.**

The current SUPPLEMENT is one of the most important which has appeared in some time. The first article is an interesting illustrated description by E. C. Rost of the methods of cultivating coffee in Brazil and in the Philippines. Antarctic exploration just now is occupying the attention of many geographers. For that reason Edwin S. Balch's discussion of the subject is rather timely. A new census machine is described and illustrated. Frank C. Perkins writes entertainingly of vertical direct and alternating generators used in Switzerland. Capt. John Stephen Sewell discusses the important subject of electricity in its application to submarine mines. A very complete paper on blue-print and black-print photographic papers and their preparation, from the pen of Mr. Alfred I. Cohn, is of rare value. The new model filter plant of the city of Middletown, N. Y., is described in a handsomely illustrated article. Prof. Henry S. Jacoby read before the last meeting of the American Association for the Advancement of Science a most valuable paper on the recent progress in American bridge construction. That paper is published in full. Two technological articles, one on the "Making of India Ink" and the other on the "Recovery of Rubber," are of exceptional value. The usual Consular Notes and Selected Formulæ will be found in their accustomed places.