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Even more interesting than the spinning egg was the exhibition of planetary motion. In this experiment one large, and several

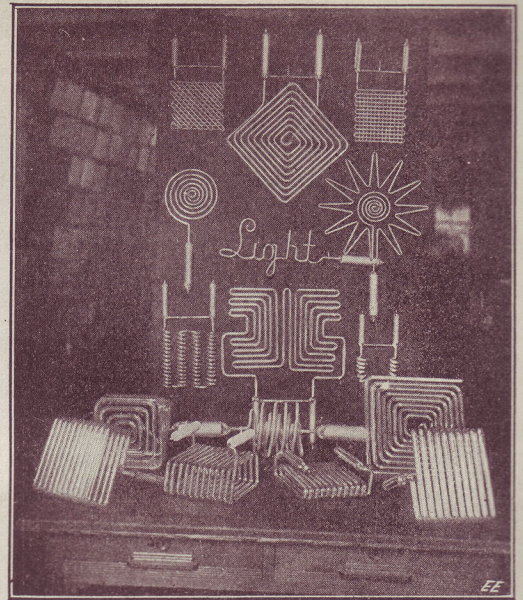


Fig. 4. This photograph represents a collection of a few of Tesla's wireless lamps, such as he proposes to use in lighting isolated dwellings all over the world from central wireless plants. The two lamps at either corner at the bottom are illuminated, owing to the fact that a high frequency oscillator was in operation some distance away when this photograph was being taken. These tubes were filled with various gases for experimental research work in determining which was most efficient.

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But any student interested in these phenomena can repeat all the classical experiments of Tesla by inexpensive apparatus. For this purpose it is only necessary to make two slip ring connections on an ordinary small direct current motor or dynamo and to wind an iron ring with four coils as indicated in diagram Fig. 3. No particular rule need be given for the windings but it may be stated that he will get the best results if he will use an iron ring of comparatively small section and wind it with as many turns of stout wire as practicable. He can heavily copper plate an egg but he should bear in mind that Tesla's egg is not as innocent as that of Columbus. The worst that can happen with the latter is that it might be,—er—over ripe! but the Tesla egg may explode with disastrous effect because the copper plating is apt to be brought to a high temperature thru the induced currents. The sensible experimenter will, therefore, first suck out the contents of the egg—thus satisfying both his appetite and thirst for knowledge.

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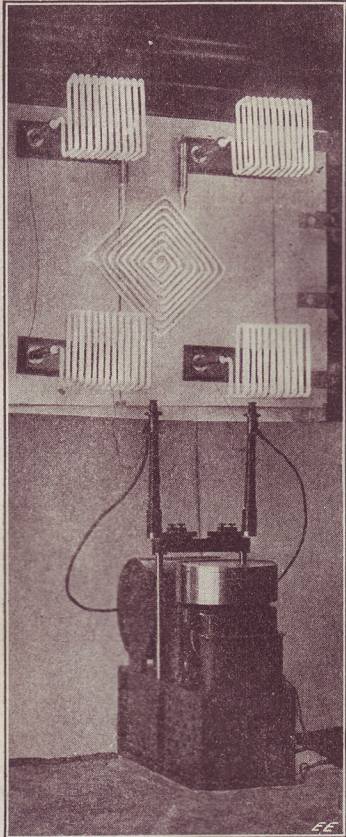


Fig. 5. This illustration shows one of Tesla's high frequency oscillation generators and a bank of his high frequency lamps lighted by the same. These highly evacuated, gas filled tubes were operated in different ways. In some cases they were connected to one wire only; in other instances to two wires, in the manner of ordinary incandescent lamps. Often, however, they were operated without any connection to wires at all, i.e., by "wireless energy", over quite appreciable distances, which could have been greatly extended with more power. The oscillator comprises a Tesla high potential transformer which is excited from a condenser and circuit controller, as described in his patents of 1896. The primary exciting element comprised a powerful electro-magnet actuating an armature, and this circuit was connected with 110 volt, 60 cycle A.C. or D.C. When the oscillator was put into operation, the interrupter actuated by the electro-magnet connected to the 110 volt circuit, became simultaneously the spark gap for the high potential exciting circuit, which included this vibrator, spark gap, a high tension condenser and the primary of the high frequency Tesla transformer. The lamps were connected to the secondary of the latter, the terminals of which are seen in the rear of the machine.

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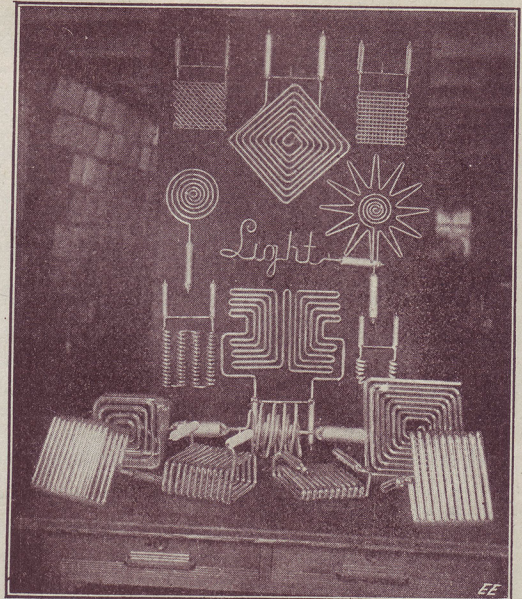


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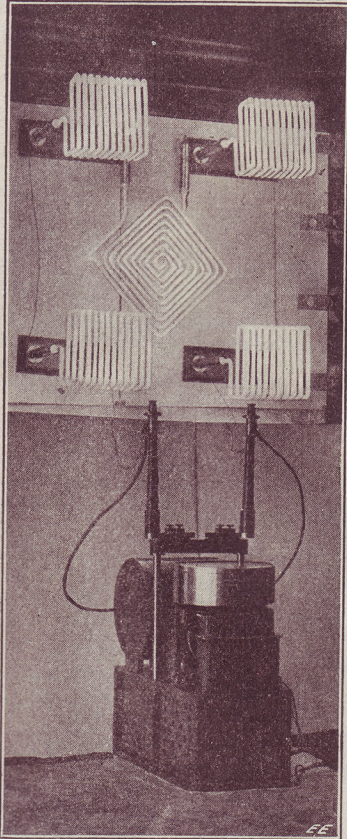


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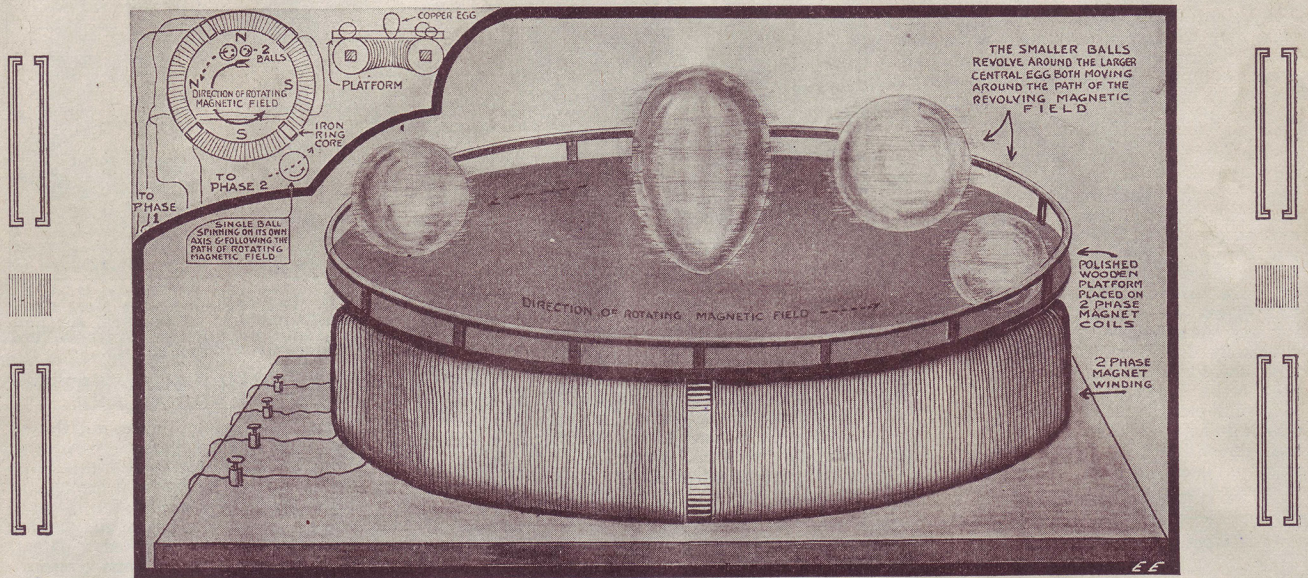
Tesla's Egg of Columbus

How Tesla Performed the Feat of Columbus Without Cracking the Egg

PROBABLY one of the most far-reaching and revolutionary discoveries made by Mr. Tesla is the so-called *rotating magnetic field*. This is a new and wonderful manifestation of force—a magnetic cyclone—producing striking

with any speed desired. Long ago, when Tesla was still a student, he conceived the idea of the rotating magnetic field and this remarkable principle is embodied in his famous *induction motor* and system of transmission of power now in universal use.

In this issue of the *ELECTRICAL EXPERIMENTER* Mr. Tesla gives a remarkable account of his early efforts and trials as an inventor and of his final success. Unlike other technical advances arrived at thru the usual hit and miss methods and hap-



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Fig. 2. Illustrating the Polyphase Coil and Rotating Magnetic Field Which Caused Copper Eggs to Spin. Fig. 3. Insert: Detail of Coil Apparatus Showing Coil Connections to Different Phases.

phenomena which amazed the world when they were first shown by him. It results from the joint action of two or more alternating currents definitely related to one another and creating magnetic fluxes, which, by their periodic rise and fall

Fig. 1. This hitherto unpublished photograph is extremely interesting as it shows not only "Tesla's Electric Egg" apparatus in the center of the background, but also a comprehensive view of a corner of his famous Houston Street laboratory of a decade ago. At the left may be seen a number of Tesla's oscillators or high frequency generators, while in the rear may be noted a large high frequency transformer of the spiral type, the diameter of which was a little over nine feet. The electric egg apparatus comprising a two-phase A.C. circular core and winding, rests on a table, and this particular model measured about two feet across. In making the demonstrations, Tesla applied as much as 200 H.P. from a two-phase alternator to the exciting coils, and so intense was the revolving magnetic field created in the surrounding space, that small delicately pivoted iron discs would revolve in any part of the hall, and a great many other devices could be simultaneously operated from this

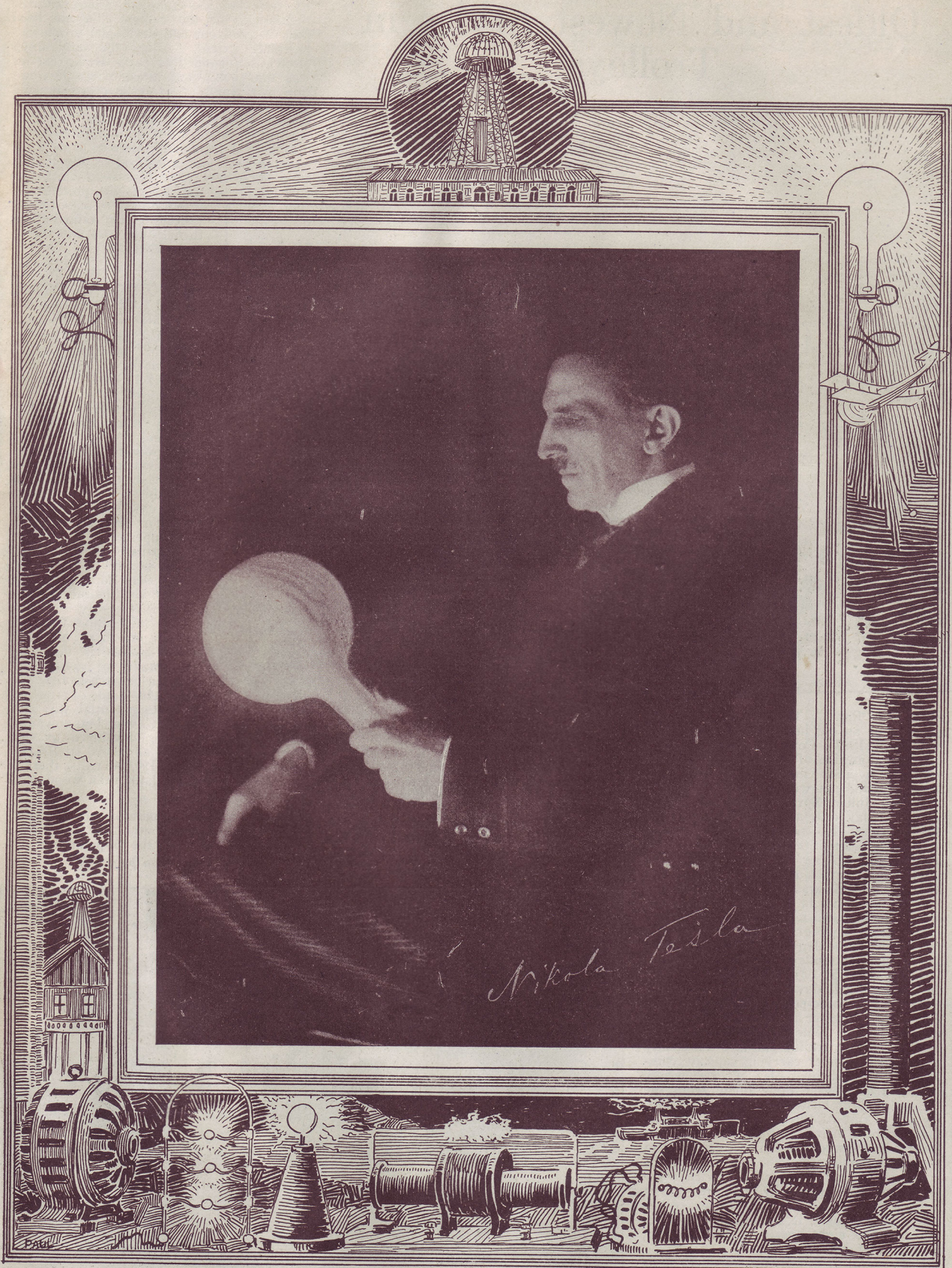
according to a mathematical law, cause a continuous shifting of the lines of force. There is a vast difference between an ordinary electro-magnet and that invented by Tesla. In the former the lines are stationary, in the latter they are made to whirl around at a furious rate. The first attracts a piece of iron and holds it fast; the second causes it to spin in any direction and



hazard experimentation, the rotating field was purely the work of scientific imagination. Tesla developed and perfected, entirely in his mind, this great idea in all its details and applications *without making one single experiment*. Not even the

magnetic field when thus excited. The frequency of the two-phase A.C. energizing the coils, was varied from 25 to 300 cycles, the best results being obtained with currents of from 35 to 40 cycles. This laboratory was lighted by Tesla's vacuum tubes, several of which may be seen on the ceiling, and each of which emitted 50 C.P. The coil resting on three legs and observed in the immediate foreground is the primary of a resonant Tesla transformer which collected energy from an oscillatory circuit encircling the laboratory, no matter in what position the transformer was placed. A low tension secondary of one or two turns of heavy cable (not visible) was provided for stepping down the energy collected by "mutual induction," and supplied the current to incandescent lamps, vacuum tubes, motors and other devices. When the circuit around the hall was strongly excited, the secondary furnished energy at the rate of about three-quarters of one horse-power.

usual first model was used. When the various forms of apparatus he had devised were tried for the first time they worked exactly as he had imagined and he took out some forty fundamental patents covering the whole vast region he had explored. He obtained the first rotations in the summer of 1883 after five years of constant and intense thought on the subject and then undertook



An interesting study of the great inventor, contemplating the glass bulb of his famous wireless light. A full description of the invention will appear shortly in the ELECTRICAL EXPERIMENTER. This is the only profile photograph of Mr. Tesla in existence. It was taken specially for the ELECTRICAL EXPERIMENTER.

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