for every \( k \leq e \). But since for any given \( k \) we can find \( e \geq k \), such that \( \mathcal{P} \) is a principal ideal (\( \pi \)), equation (2) holds for any value of \( k \). \(^1\)

Since then all the roots of the equation

\[
T_{\mathcal{P}}(x) = x^n + \tau_{n-1}x^{n-1} + \ldots + \tau_0 = 0
\]

are associated numbers, and their product = \( \mathcal{P} \), all the coefficients \( \tau_{n-1}, \ldots, \tau_1 \) are divisible by every prime ideal in corps \( \mathfrak{L} \) which divides \( \mathcal{P} \), and therefore by \( \mathcal{P} \) itself, \( H \), as was assumed, \( \mathcal{P} \) does not enter as a factor into the relative discriminant of \( \mathfrak{L} \) with respect to \( \mathfrak{O} \).

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**Demonstration of Some Alternating Current Phenomena.**

By

K. Otobe.

[Read March 15, 1914.]

1. Rotating Magnetic Field.

The rotating magnetic field is best demonstrated with three phase A.C. But in ordinary physical laboratories this is not often available. As two mains of three wire A.C. system are now generally accessible as a lighting circuit, I have contrived the following simplest possible arrangement to split the single phase current into two branches with different phases by means of a suitable inductance and lamp resistance connected as shown in Fig. 1.

- CC, 100 volt A.C. lighting mains;
- R, lamp resistance, consisting of one carbon lamp of 100 c. p. and two pairs of carbon lamps of 24 c. p. & 16 c. p.;
- L, inductance coil;
- F, rotating field coil.

\(^1\) Equality (2) has been proved by Weber (I c. p. 593) for \( k = 1 \). In his proof we miss the not unessential point, that \( \tau_0 \) is not an algebraic unity.
The inductance $L$ consists of a coil of cotton insulated copper wire (No. 16, B. W. G.) wound round an iron core made of a bundle of soft iron wires bent into the form of an anchoring ring 15 centimetres in its mean diameter.

The core of $F$ is similarly constructed but of smaller dimensions. Two pairs of coils of insulated copper wires (No. 20) are wound round the opposite quadrants of the ring core as shown in Fig. 1.

Adjust the current intensities in the two branches by the lamp resistance, so that they are nearly equal (in my experiment about 4 amperes).

2. Experiments.

a) A glass or porcelain plate is put horizontally upon the rotating field coil $F$, with a magnetic needle on it. First the lamp resistance and then the inductance is switched on to the main, and the two directions of the needle in both cases are observed to be mutually perpendicular. If now both the lamp resistance and inductance are switched on to the main, the needle will begin to rotate almost synchronously with the field.

b) A solid copper egg as well as a solid iron egg rotates in the same manner, as the magnetic needle will do. It is very interesting to observe the precessional motion of the egg at the earlier stage of the motion, until at last it rises up and rotates about the axis of symmetry. The motion is very stable, and when the field is sufficiently strong, the top will remain in one position, keeping its symmetrical axis always vertical.

c) The shell of a natural egg is pierced by a circular hole about 2 mm. in diameter, and the liquid contents are all exhausted with an air pump. Now, the shell is filled with fine iron filings mixed with paste such as gummi arabicum and well dried, and the hole is closed with cement. To a casual audience, it seems certainly like a true egg. It is striking to see the egg rotating equally well as in case of a solid copper
egg, though iron filings may be oxidised, so that the mass as a whole may offer higher resistance to Foucault's Currents.

d) Squirrel Cage Rotor (Fig. 2).

A thin copper plate (5 x 30 cm.?) is pierced by a system of rectangular parallel slits, and the two ends of the plate are soldered together, so as to form a cylindrical shell $s$; the shell is soldered to four wires $w$ radiating from the central support of cork $k$, containing an inverted glass cup $g$ (or a glass tube sealed at one end), which rests on a long vertical needle $n$, projecting from a thick wooden plate $p$. This cage when put inside the field coil $F$ rotates very well illustrating the principle of the squirrel cage rotor.

e) A hollow spherical ball is partly filled with water so that it may just float in water contained in a beaker. When the system is put in the rotating field the ball begins to rotate.

Remark: The sense of rotation is reversed, if the inductance and lamp resistance are interchanged by a Ruhmkorff's commutator, in connection with the rotating field coil $F$.

Radioactivity of Hot Springs in the Southern Part of the Province Higo.

By

Suminosuke Ono.

[Read March 14, 1914.]

There are many localities where hot springs are issuing in the southern part of the Province Higo. Of these localities, Hinagu, Yoshio and Hayashi are situated not far from the River Kuma. In the last