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primary fields of the apparatus. This development was carried out merely empirically and due to the lay procedure without recording measurements or making diagrams.

This apparatus was the subject of numerous examinations by scientists and practical engineers, who in their reports, almost without exception, had to admit an energy surplus or energy multiplication without being able to explain the process by present knowledge. The inventor also could not give an explanation due to lack of sufficient knowledge of the activities in the apparatus. (See reports by Professors Kloss and Schumann on record at the OKM).

Due to unpleasant differences with the financiers, mostly foreigners, and a nervous breakdown of Coler because of these, the apparatus and original theories were lost.

Upon resumption of the experiments at a later date the effect was occasionally successfully reproduced, (see report by Dr. Modersohn concerning events at New Year 1936-7) which, however, eventually due to disturbance of the adjustments, could not be maintained because sufficient measurements were not taken.

The outbreak of war then put a temporary end to the experimental work.

2. Intervention of the OKM

In 1942 Coler and Dr. Modersohn made an application to the OKM to supply them with materials for further work, hoping that by simple technical means, the apparatus could be made to work.

Their aim was to produce a working apparatus, which could be shown to the Fuhrer of Germany, leaving the measurement of all activities of the apparatus to a later date.

The OKM approved the application and sent sufficient materials to build the apparatus and lent the inventor ordinary ampere-meters, voltmeters, and necessary tools. It was found, however that due to the overload of work upon them at this time, their spare time work was not sufficient to secure quick results.

The OKM therefore procured their release from other work, to allow a more intensive, and, due to the cooperation of Dr. Frohlich, who had experience in physical measurements., a more scientific approach.

The newly developed apparatus could not be made to work, however, because of the lack of thorough knowledge of the activities in the apparatus which now appeared to be very

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complicated. Valuable knowledge and promising signs, however, were obtained.

3. Short description of the apparatus

The apparatus consists of three principle circuits which are inter-wound and intercoupled (verkoppelt) in a peculiar way. Some of these are divided again into single subsidiary circuits which evidently have all to be brought into resonance with one another.

The principle circuits (called the anchor) in which the energy gain probably occurs, consists of metal plates between which transformer coils are connected, the whole being connected to one large plate coil (Plattenspule).

On each of the single windings on this is coupled a large flat coil (Flachspule) (called field).

These flat coils are interwound in two groups, these groups represent the turns of a transformer.

This couples, on one hand on the flat coils of the other group (as secondary coils), and on the other hand on the anchor-plate coil, which is placed between them.

The third electrically independent circuit (called the directing circuit) (Steuerkreis) regulates this transference.

Figure 1 shows diagrammatically and in plan these interwound parts (anchor in red, field in green, directing circuit in blue).

Figure 2 the so called basic diagram, shows the connections between these different parts. This basic diagram shows the conditions necessary for self-interruption.

In consequence of this arrangement, different types of current are created in different conductors (pulsed direct current, alternating current, etc.)

The transformer coils, connected between the anchor plates, are connected in a peculiar way through thin permanent magnet rods. Their main object seems to be to pre-magnetize the transformer cores, it is, however, very probable that they are also connected with the Barkhausen effect, which will be mentioned later.

4. Experiments carried out

From the reflections which led to the diagram of the apparatus described above, the reality of some physical effects was assumed, which partly from the inventor himself, and partly also from the scientists who had examined the working apparatus, were stated as a possible or probable explanation of the phenomenon observed.

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As these hypotheses had not been examined by measurements, it seemed suitable, for further development of the apparatus, to clarify these questions by further experiment, so far as was possible with the means at our disposal.

The experiments carried out are described below.

Experiment 1

If a single layer solenoid is connected to a battery, a current begins to flow at the moment of connection, which is known to rise exponentially, until it reaches a constant maximum determined by the voltage of the battery and resistance of the circuit.

Every point on the current/time curve corresponds to a magnetic field, which is dependent upon the dimensions of the solenoid.

At the moment of connection the electrons do not begin to flow at the same time in all parts of the coil, because the electromagnetic wave (Störungswelle) travels with the velocity of light.

The electromagnetic field at different parts of the coil also builds up with a corresponding time difference.

Now in a right hand wound coil a north pole is produced at the end where the current enters (the current direction is taken now and hereafter to be the direction of flow of the electrons, i.e. from negative to positive), in a left hand coil a south pole is similarly produced.

In the first case the building up of the magnetic field proceeds from the north pole to the south, in the second case from the south to the north, or in other words: The direction of the building up of the field is in one case with the direction of flow of the field and in the other against it.

- **Question:** Is the velocity of the building up of the field different in these two cases, although the data of the coils is the same except for the direction of winding? This means, is there a difference in the time in which the currents are reaching their maximum value?

If such an effect could be found, it must show itself in one of the following ways:

(a) The coils must have different apparent resistances (scheinwiderstand). By measurements of voltage and current the apparent resistance of ten right-handed and ten left-handed coils tested with a Philips-Schwebungs-Summer. The apparent resistances were the same within an experimental error of about $\pm 1\%$.

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(b) Other conditions being the same the coils must induce different potentials across a secondary coil, when connected to a battery. Measurements were made with a cathode ray oscillograph from Siemens and Halske. The induced potentials were the same. It can therefore be taken as proved that no such effect exists.

Experiment 2

Given a solenoid consisting of two windings, one upon the other, of the same length and number of turns, enclosing a soft iron cylindrical core. Firmly attached to one end of the core is a pre-magnetized steel rod. If an alternating current is passed through one of these coils, acting as primary, the residual magnetism of the steel rod is strengthened during one half cycle, through the magnetism induced in the core, during the other half cycle it is weakened. If now the other winding is connected in series with the pre-magnetized steel rod - as secondary coil - in such a way that the secondary current must pass through the magnet, one half cycle of the secondary current must be more or less subdued, in other words a rectifying effect must be created. (It may be remembered that according to measurement by Professors Kloss and Schumann a high frequency pulsed direct current - about 180 Kc - is flowing in the output resistance of the apparatus, for the creation of which no other explanation seems possible).

Unfortunately the testing of these effects could only be made with tuned frequency (Tonfrequent) alternating current, with the use of which no such phenomenon could be seen when using measuring instruments and a cathode ray oscillograph.

The question is open whether, and if so in what way, an influence on the electron movement exists through the oscillation of the magnet molecules by high frequency alternating fields, especially of such an impulse-like character.

Experiment 3

Previous measurements, from the year 1937, made by the inventor and his assistant, Dipl. Ing. Rudolf Hingst, had shown the following effect. Given two solenoids each consisting of two coils one upon the other, of the same length and number of turns, one winding of one solenoid is connected in series with one winding of the other, wound in the same sense, and an intermittent direct current is passed through them.

The remaining windings, which are to be considered as secondary coils, are also connected in series but wound in opposite sense to one another. The induced secondary currents are therefore

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similarly in opposition, and would, due to the equal dimensions of the coils eliminate one another.

The measurements referred to above are said to have given the result that in such a secondary circuit a considerable direct current component exists which can be strengthened by means which we shall not go into here. And this strengthening to a degree such that the "secondary direct current" is comparable to the primary current.

Testing the results of these measurements, however, did not confirm them.

Experiment 4

Besides the above questions, uncertainty existed as to what part the above described plate and flat coil unit plays in the function of the apparatus, how great is the mutual influence of the flat coils upon one another?

Of the flat coils upon the plates? And finally of the plates between them? As the plates are not only charged as condensers, but also have directed currents passing through them it had to be assumed that their mutual influence not only consisted of a condenser effect, but that they also created a magnetic field.

It must first be stated that the frequency of the "Summer" at our disposal (0-12Kc) was not sufficient to measure the mutual electromagnetic influence of the plates, due to the low apparent resistance.

This examination should be carried out with high frequency alternating current. It was, however, possible by the use of a highly sensitive oscillograph as a valve voltmeter to measure the potential induced by the flat coils on the individual plates, to discover the induction currents in the plates, and also to determine the value of the potential induced by the flat coils on the plates in proportion to the currents created in the plates from the current induced in the anchor coils (the directing current was used as a primary winding in these measurements, being connected to the Schwebungs-Summer).

It appeared that the "Ankertrakte" AC or BD (See Fig. 1) are not all to be considered as oscillating circuits, but that the single group systems, consisting of plate - to anchor coils - plate, already represent independent oscillation circuits. **According to this the apparatus contained ten such oscillation circuits.**

The individual frequency of these circuits **and possible differences existing between them** could unfortunately not be measured, because, as already mentioned, up to now only tuned frequency for excitation was at our disposal.

In order to make the apparatus work the harmony of all oscillating circuits in their individual frequencies would evidently be

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necessary - at least within certain limits determined by the suppression in question.

Such an adjustment can of course not be secured by the means at our disposal at the present.

The previous occasional success must be considered as due to chance.

The mutual influence of the flat coils upon one another could on the other hand easily be examined because, despite the great distance between the windings (25 mm), they have remarkably great apparent resistance (about 200 ohms at 10 Kc).

It appeared that the power factor (Übertragungs-faktor) of both of the flat coils wound 1 : 1, in consequence of their peculiar interwinding

(See Fig. 1) have the astonishingly high value of 0.85. The value of the power factor was at a maximum at 10 Kc, at which frequency the most favourable matching of the impedance of the Summer was obtained.

The assumption could easily be made that the power factor of the flat coils upon the plates is still more favourable, but this measurement can only be made with high frequency alternating current.

Apart from the great number of alternative arrangements and connections between the different parts, - during the period covered by this report eight different circuit diagrams were tested in addition to the experiments above - the following so far unsolved problems are hindering success in making the apparatus work:

- (a) The influence of the pre-magnetization and of the magnetizing effect due to the battery current, upon the individual frequency of the oscillating circuits.
- (b) The influence of the Barckhausen effect on the phase conditions of the oscillations in the individual circuits and on the mutual magnetic and electrical processes.
- (c) The influence on the movement of electrons in the pre-magnetized steel rods by the high frequency pulse-like field variations, through the oscillations of the molecules of the magnets.
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5. Conclusions

After experience previously gained on the working apparatus, and on the basis of the technical measurements and examinations mentioned above, the picture of the way in which the apparatus works is as follows.

Due to the connecting of the batteries, a current impulse is induced in the anchor circuit which charges the plates. The discharge current from the plates causes electrical interruption of short duration of the battery current in the field circuit, which furthermore inductively interrupts, or changes the direction of, the battery current in the directing circuit for a short time.

The electromagnetic field induced by this process in the directing circuit by its dissipation, induces over the field circuit a current in the anchor circuit recharging the plates, and so forth.

Due to the influence of the Barckhausen effect each single process has an impulse-like character, and, the necessary change of phase is produced to allow the regularity of the process.

Due to a source, up to the present not investigated, and not explainable by existing scientific theories, an additional quantity of energy is freed during each cycle which leads to a continual raising of the amplitude of the mutual processes, until the magnetic cores are saturated.

From the fact that, in the resistance of the apparatus pulsed direct current is flowing (see Report by Professors Kloss and Schumann) there is possibly an up to now unknown rectifying effect, or alternatively the gain in energy is produced only during one half of the cycle, either during the charging or discharging of the plates. The activity in the apparatus must take place **in the ten oscillation circuits in a phase-like manner**. As mentioned above no technical means were available to make the necessary tuning adjustments.

It is clear from the above that the success of the inventor up to now could only be to chance, or happy accident. The necessity, therefore, arises to transfer the apparatus from the state of empirical development, with sufficient technical means and based on results of an exact basic research, to a state of working procedure which can be controlled.

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6. Further Procedure

In a simple apparatus, possibly only consisting of one oscillation circuit, the problems mentioned in paragraph 4 should be cleared up. The excitation of the oscillating circuit being caused by an appropriate valve circuit.

After clearing these problems a second oscillation circuit may be added, which will allow the examination of the conditions necessary for the mutual building up of effects.

It will then be possible for the first time to go from external excitation to self interruption and a solely electro-magnetic basis, with the aim of bringing the apparatus in question to work systematically.

Berlin, 27 September 1943

(Coler)

(Dr. Frohlich)

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APPENDIX V

Extract from Statement by Coler relating to Frohlich experiments

These fundamental researches, which have made the first real and large breach in the citadel of present scientific belief, will now be described in detail.

The installation shown in Figure 14 was used in the experiments.

A transformer, with a ratio of 1 : 1 was connected on its primary side through a periodic make-and-break X to a D.C. source U. Great care was taken, to ensure that the make and break functioned smoothly, without backlash and uniformly, at high frequencies and thus produced as clear and unambiguous a result as possible.

On the secondary side the coil S was connected with resistance R, a reversible rectifier G, and a highly sensitive hot-wire ammeter, to form a circuit.

The resistance R was large compared with the apparent resistance of the coil S.

Switch Sch allowed the switching of the rectifier G to be carried out in such a manner, that in one case the half-wave of the opening impulse, and in the other that of the closing impulse, was transmitted.

In order to prevent any possible objection, that the iron had any influence on the results, the whole transformer was cut out during the experiments and an iron-free flat coil arrangement used as the inductor during these experiments. This eliminated all interference and had excellent transmission properties. The required sensitivity was attained in these measurements by using a thermopile with the most sensitive milliammeter. After many trials, the motor-driven driven interrupter of a Bosch ignition magnet was used as make-and-break. This gave very uniform and smooth interruption with a frequency of 100 c/s. The result obtained with this experimental arrangement, which already eliminated all the possible causes of later objections, was the clear proof of a considerably larger energy during opening (intake), compared with closing impulses.

The energy was determined by i^2 from the measured current intensity, and as the resistance R is large compared to the apparent resistance of the coil, the objection, that the opening impulse had a frequency spectrum of considerably higher value than the closing impulse, could not hold good.

In order to counter all other plausible and possible objections the processes were recorded by an oscillographic method. Unfortunately the light strength of the available cathode ray oscillograph tubes (Braun's tubes - it was during war time) did not suffice to produce perfect oscillogramms. Consequently,

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for the time being at least, this aid, which would have completely removed all objections, had to be dispensed with and a Siemens' loop oscillograph was therefore used.

By choosing suitable loops, sources of error were eliminated as far as possible, or at least kept within very small limits.

The most careful planimetric measurements again gave the same results as those obtained with the experimental installation described above, at least in principle, even though the percentage difference of the quantity of energy in the opening and closing impulses was slightly less in the measurements of the oscillogram than those obtained from the thermopile. It still amounted to an average of 10% compared with 50% in the measurements, so that errors in the planimetric measurements are not to be assumed.

Also, if this had been merely a scattering of the results, a difference in favour of the closing impulse must have occurred at least once. However the difference was always in favour of the opening impulse. Any possible errors in the planimetric measurements controlled and avoided, by carefully cutting out the figures produced and weighing them on a most sensitive and accurate balance.

Consequently this observation can also be considered as a proof of the fact that an energy difference exists.

The circumstance that the percentage of this inequality appears smaller in the oscillographic measurements than in the thermal, which at a power frequency of 100 c/s assuredly yield a sufficiently accurate mean value, allowing also for the resistance ratios of the rectifier, can readily be explained by the lag of the oscillograph used, which is not even capable of recording the considerable, but extremely short, energy peak of the opening impulse.

Although, therefore, the inertialess cathode ray tube was not used in these measurements as a final proof, I can consider my discovery of the energy difference between the opening and closing impulse as proved on the basis of Frohlich's experiments.

As this also proves simultaneously, that my intuitively derived view, based on my most primitive experiments, of these processes has proved correct, the reader will forgive me, if I consider my other two results as correct, until new, and above all better explanations are found for the phenomena described. This all the more, as my development of the "Space energy receiver" was based on this and was successful.

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