be found on the ground of the general theorem (21.13) that for a closed loop (as our coil) the motional and motional-transformer induced tensions are equal.

48.4. THE BUL-CUB MOTOR.

For the force acting on a unit of length of the wire in the yoke's and magnet's gaps we shall have

$$F_{yo} = I\times B = I\hat{x}\times B\hat{z} = - IB\hat{y}, \qquad F_{ma} = I\times B = (-I\hat{z})\times B\hat{x} = IB\hat{y}. \qquad (48.6)$$

The moments of force with respect to the coil's axis, applied to a unit of length of the wires cd and ab, will be, respectively,

$$M_{yo} = R\times F_{yo} = R\hat{z}\times(-IB\hat{y}) = IBR\hat{x}, \qquad M_{ma} = r\times F_{ma} = r\hat{z}\times IB\hat{y} = - rIB\hat{x}, \qquad (48.7)$$

where **R** is the radius of the coil taken as vector and **r** is an arbitrary vector-distance along it taken from the coil's axis. The average moment of force applied to a unit of length of the wire will be

$$M_{ma} = - (1/2)IBRx. \qquad (48.8)$$

As the length of the wires ab in the magnet's gap is twice the length of the wires cd in the yoke's gaps (see Sect. 48.3), we conclude that the net moments of force acting on the wires in the magnet's and both yoke's gaps are equal and oppositely directed, so that the coil will not rotate.

As the magnet (magnet+yoke) and coil (coil+core) can be considered as two independent circuits, the force and consequently the torque with which the coil acts on the magnet will be the same.

48.5. UNEFFECTIVE AND EFFECTIVE BUL-CUB MACHINES.

Thus formulas (48.4) and (48.5), one one hand, and formulas (48.7), on the other, show that the BUL-CUB machine can neither generate electric tension, nor be driven as a motor and I call it the UNEFFECTIVE BUL-CUB MACHINE.

To make the BUL-CUB machine EFFECTIVE, I applied to following trick: I made the upper parts of the wires cd naked and I put brushes in parallel to both yoke's wings, so that the latter short-circuited all wires which are in the yoke's gaps. This short-circuiting can be made by a non-contact way by using magnetic anchors with springs (as in the electric bells) which will be attached by the yoke's wings when they pass over the anchors (in the case of a rotating magneto-yoke) or the anchors pass under the yoke's wings (in the case of a rotating coil). An elegant and industrially prospective way is to make the insulation between the wires cd by a magneto-resisting material, so that the short-circuiting of the wires cd will be made by the magneic field in the yoke's gaps. One must find a material with an optimal ratio R_0/R_B, where R_0 will be the resistance for $B = 0$ and R_B for $B \neq 0$. If this problem can be solved technically, the BUL-CUB machines can win the competition with the other d.c. machines, as it has no collector and for the case of a coil at rest no sliding contacts at all.

My BUL-CUB generator with naked cd-wires is shown in fig. 31, driven by an electromotor: the produced continuous d.c. tension is taken from the two rings on the axle by the help of sliding contacts. If the coil should be at rest and the magneto-yoke should be rotated, no sliding contacts for taking the generated tension are needed.

If the driving motor in fig. 31 will be taken away and d.c. will be sent to the coil via the sliding rings, the coil has to begin to rotate. In my machine shown in fig. 31 the torque was so feeble that it could not overwhelm the friction and for this reason I constructed the second variation shown in fig. 32 where the wires of the coil are in sections which are led to a collector and the brushes which make the short-circuiting of the cd-wires slide on this collector. In the variation in fig. 32 the coil is fixed to the magnet and only the yoke can rotate on ball-bearings. The coil is connected in series with the magnet's coil and the common current is sent via the vertical supports of the coil+magnet, so that when sending current the yoke with the short-circuiting brushes which are attached to it begins to rotate.

The detailed report on my BUL-CUB machine is published in Ref. 6, p. 132.

49. THE DEMONSTRATIONAL CLOSED HALF POLAR FARADAY-BARLOW MACHINE (FAB)

To be able to clearly determine the seats of the electromotive and ponderomotive forces, I constructed the closed half polar machine, the diagarm of which is given in fig. 33 and the photograph in fig. 34. I called this the DEMONSTRATIONAL FARADAY-BARLOW MACHINE (FAB), as the Faraday and Barlow disk of the open half polar machine is its fundamental element.

The machine has three parts which can rotate independently one of another: 1) the magneto-yoke consisting of two ring magnets and yoke of soft iron, 2) the Faraday-Barlow disk of soft iron, and 3) six bar conductors of aluminium crossing the yoke through holes large enough, so that a limited motion of the bars with respect to the yoke (and vice versa) can be realized. The yoke rotates on the first and third small ball-bearings, the disk rotates on the second small ball-bearings, and the bar conductors rotate on the middle and on the big ball-bearings (the inner race of the big ball-bearing is solid to the Faraday-Barlow disk).

The current (when the machine is used as a motor) goes from the positive electrode of the battery through the second small ball-bearing, crosses the disk, the big ball-bearing, the bar conductors, and through the middle ball-bearing reaches the negative electrode. The bars can be made solid to the magnet by the help of a plastic "cap" shown on the left of the diagram. The magnet can be made solid to the disk by the plastic "spoke" shown in the upper part of the drawing. The bars can be made solid to the disk by the help of the plastic "cap" shown in the lower part of the drawing which blocks the big ball-bearing. The disk can be made solid to the lab by the help of a "spoke" (not shown in the figure!) which blocks the second small ball-bearing. The magnet and the bar can be made solid to the lab by hand. The effects observed are presented in table 49.1.

Table 49.1

	Rotation or possibility for rotation of: Disk	Bars	Magnet	GENERATOR EFFECTS Induced tension	kind of induction	seat of induction	MOTOR EFFECTS torque on the	reaction on the
1	0	0	0	0			0	
2	m	0	0	U.	motional	disk	disk	magnet
3	0	m	0	0			0	
4	0	0	m	U	mot.-tr.	bars	magnet	disk
5	m	m	0	U	motional	disk	disk	magnet
6	m	0	m	0	motional opp. mot.-tr	disk bars	0	
7	0	m	m	U	mot.-tr.	bars	magnet	disk
8	m	m	m	0	motional opp. mot.-tr	disk bars	0	

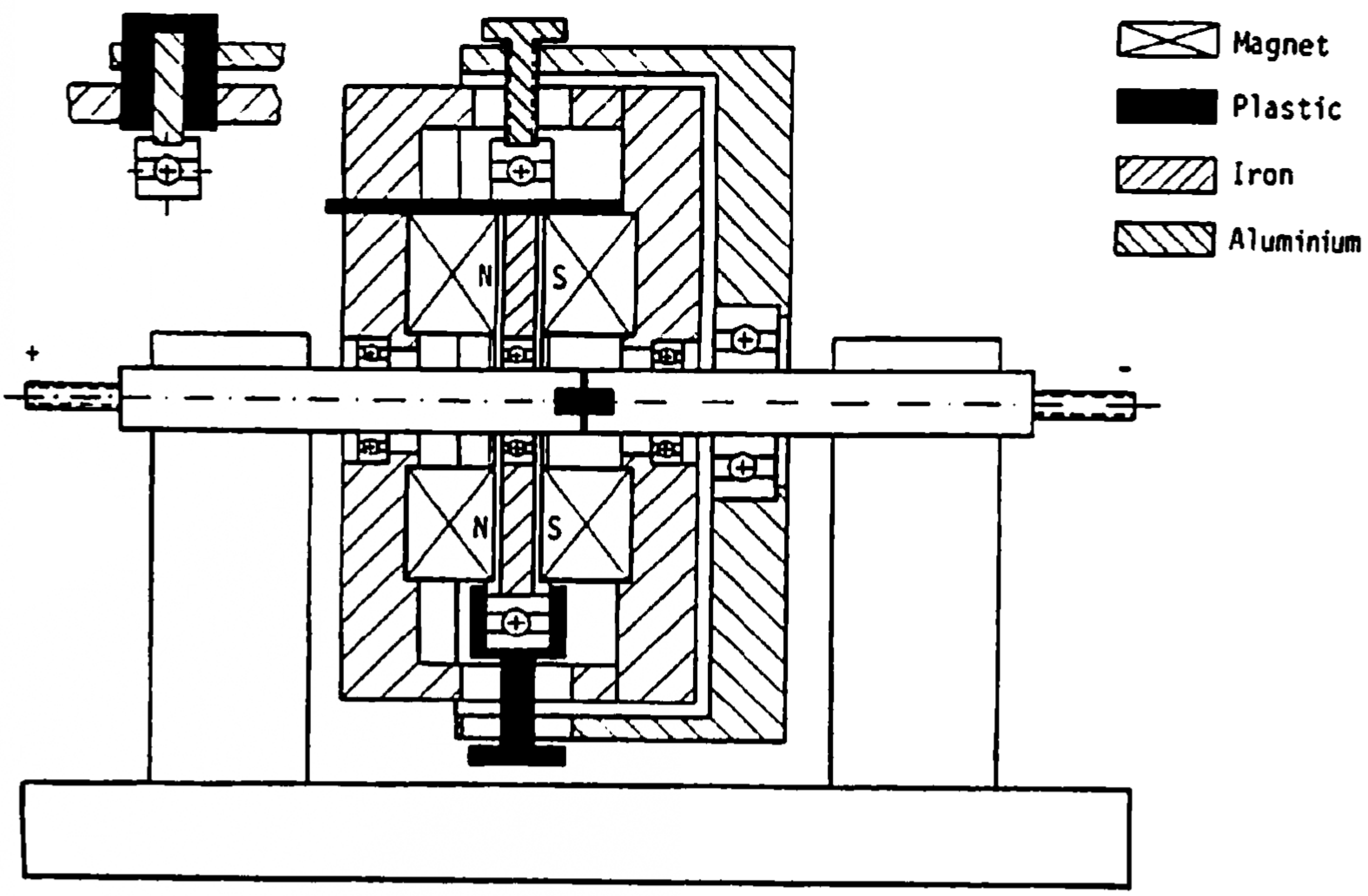

Fig. 33. Diagram of the demonstrational closed half polar Faraday-Barlow machine.

When comparing table 49.1 with table 48.1, we see that the tensions induced in the different cases are exactly the same. There are differences only in the seats of the induced tensions, namely in the seats of the induced motional-transformet tensions.

For the cases 4,6,7,8 the seat of the induced motional-transformer tension in Müller's machine is in the wire ab, while in FAB it is in the bars (which correspond to the wire bdc in Müller's machine).

Why this difference does appear? - Assuming that the holes through which the bars cross the yoke are very small, we see that the field of the magnetic potential across the disk has an absolute cylindric symmetry. Such a cylindrically symmetric magnetic potential field cannot induce motional-transformer tension at rotation of the magnet. In the "limiting case" of Müller's machine, we can consider the yoke as very slim, and in such a case the field of the magnetic potential across the gap between the magnet and the core becomes highly asymmetric. This leads to the induction of motional-transformer tension for the case where the magneto-yoke, or only the yoke, in fig. 29 rotates.

The seats of the induced motional-transformer tension in tables 48.1 and 49.1 are given for the two limiting cases: a very slim yoke in fig. 29 and a cylindrical yoke in fig. 33. For a yoke between these two extremities there will be motional-transformer induction both in the disk (wire ab) and in the bars (wire bdc).

Very interesting is case 7 in table 49.1. Here, at a continuous rotation of the magnet and the bars, a constant tension is generated, although the seat of this tension is in the bars where the magnetic intensity B is equal to zero.

The last fact can be patently seen when we compare cases 6 and 7: the rotation of

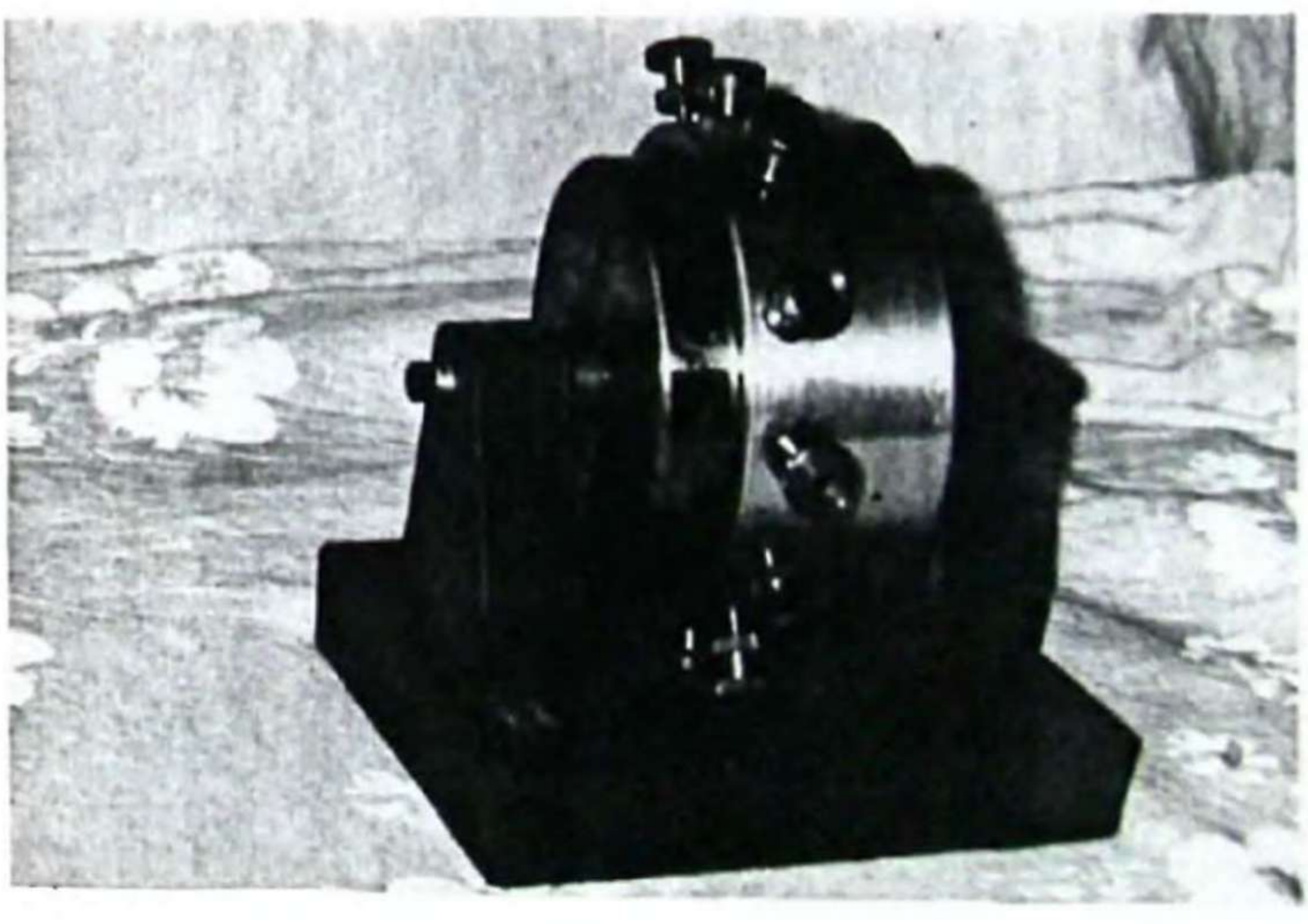

Fig. 34. Photograph of the demonstrational Faraday-Barlow machine.

the bars is immaterial for the tension induced in the bars, of importance is only the rotation of the magneto-yoke which leads to a continuous change of the magnetic potential in the reference point taken with respect to the laboratory (absolute space), not with respect to the bars, as the magnetic potential in the bars for co-moving bars and magneto-yoke remains constant.

For the relativity blind all these deductions and considerations will be a Chinese grammar, but as Marx considered Hegel's dialectic as "the algebra of revolution", so they have to begin to consider equations (21.1) - (21.4) as "the algebra of induction".

The report on my demonstrational Faraday-Barlow machine was published in Ref. 39.

50. THE ANTI-DEMONSTRATIONAL CLOSED HALF POLAR MACHINE ACHMAC

The mentioned in Sect. 48.1 differences between tables.48.1 and 49.1 became entirely clear to me only after the construction of the machine ACHMAC.[37,38]

I thought that the magnetic intensity and magnetic potential fields in the gap of the closed half polar machine shown in fig. 25 preserve their cylindric symmetry relevant for a very long circular, or even toroidal, solenoid. Thus, I thought, that at at rotation of the magnet in fig. 25, a motional-transformer tension can be induced only in the wire de of the coil when it is near to the magnet. But when it is far from the magnet (as in fig. 25), a motional-transformer tension cannot be induced.

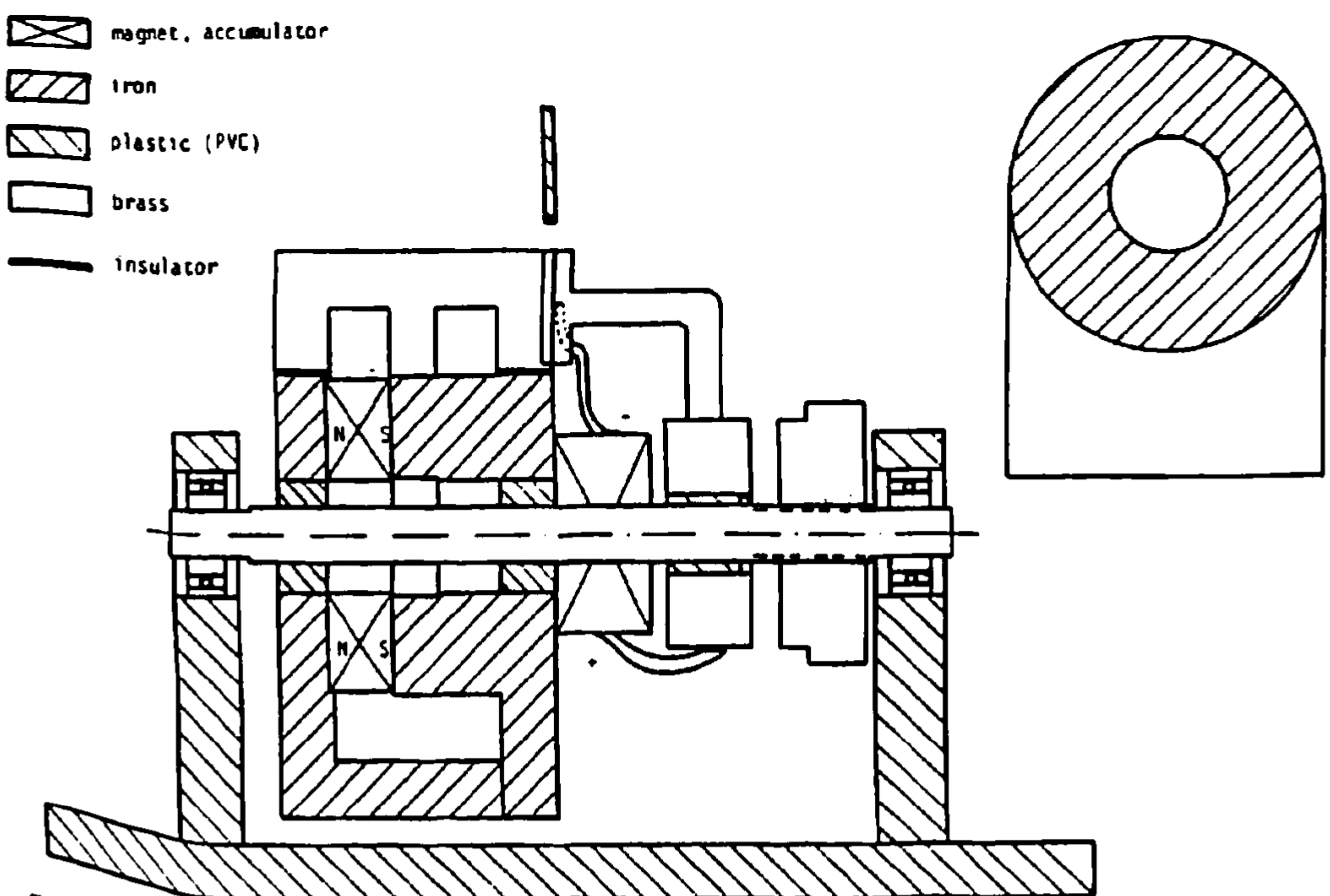

Fig. 35. Diagram of the anti-demonstrational closed half polar machine ACHMAC.

This, of course, is true, but I did not expect that motional-transformer tension will be induced also in the wire ab. Thus I came to the conclusion that by rotating the whole system in fig. 25 about the axis, a tension will be induced in the coil. And I expected further that by sending current in the coil, the whole rigid system will begin to rotate, as a torque will act on ab but no reaction will act on the magnet.

Although all this seemed highly incredible, I constructed the MACHINE ACHMAC (Autonomous Closed Half polar MAChine) to see which will be the answer of the Divinity. The diagram of the machine is shown in fig. 35 and the photograph in fig. 36.

As neither tension was generated nor torque was observed, I understood that the magnetic intensity and magnetic potential fields in the gap in fig. 25 have no circular symmetry, so that, on one side, there will be motional-transformer tension induced in the disk's radius and, on the other side, a current going along the disk's radius and the axial wire will exert a torque on the magnet.

The construction of the machine ACHMAC and its expected (!) functioning is clear from the figures. I do not enter into these deteil here, as the machine has not demonstrated the expected effects. For this reason I called the machine "anti-demonstrational".

I should like to add that an eventual rotation of the machine ACHMAC was expected also proceeding from the speculation that there is no a theorem asserting that the net torque of interacting closed current loops must be null (see in Sect. 24 the text after formula (24.6)). Thus the machine ACHMAC is one more experimental support in favour of this (quite sure!) theorem for the case when closed loops are involved (see in Sect. 63 the violation of this theorem for open current loops).

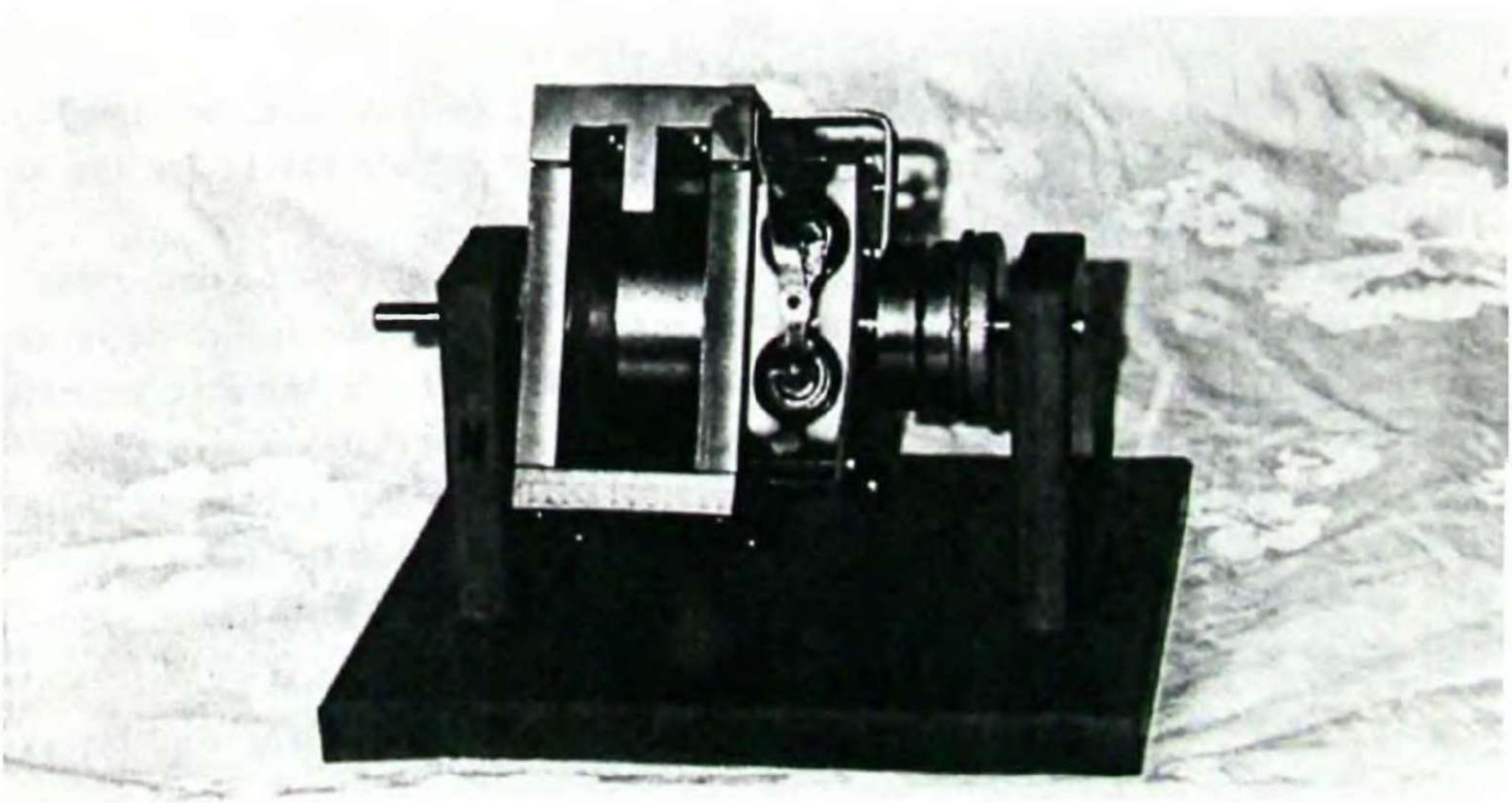

Fig. 36. Photograph of the machine ACHMAC.

51. THE DEMONSTRATIONAL UNIPOLAR MARINOV-MOLLER MACHINE (MAMUL)

If we wish that the students can quickly grasp the essence of electromagnetism, the demonstrational Faraday-Barlow machine must be available in every college.

Another such didactic machine is the unipolar MARINOV-MOLLER MACHINE (MAMUL) which I have constructed (fig. 37). I gave to it Müller's name, as its essential part is the magnetic Müller's ring (see fig. 26) on which Müller has carried out many induction experiments allowing to clear the problem about the seat of the induced tensions (see Ref. 6, p. 239), and my name, as with this Müller's ring I did ponderomotive experiments allowing to clear the problem about the seat of the ponderomotive forces.

The machine MAMUL is constructed and functions as follows (fig. 37):

On a metal axle four ball-bearings are mounted. A "magnetic belt", i.e., a magnetic Müller's ring, consisting of many slab magnets with a square cross-section and arranged tightly one to another with their negative poles pointing to the axle, is mounted on the outer races of the external bearings. The outer races of the internal bearings are connected with metal sticks. One can also connect the outer races by a metal cylinder but the sticks are more convenient from a didactic point of view. The axle on which the ball-bearings are mounted consists of two electrically insulated pieces. The electric circuit goes to the left axle piece, crosses the left internal ball-bearing, the sticks, the right internal ball-bearing and goes out from the right axle piece. The external wires of the circuit contain an amperemeter if electromotive effects are to be observed or a battery if ponderomotive effects are to be observed. In this experiment the ball-bearing motor effects based on the current thermal dilatation effect (see Sect. 63) will be neglected.

The machine shows the following electromotive effects:

1) When rotating the metal sticks keeping the magnetic belt at rest, an elecric intensity is induced in the sticks according to the third formula (21.1) for the motional induction and current flows through the amperemeter.

2) When rotating the magnetic belt keeping the sticks at rest, no current flows through the amperemeter, as in such a case the motional-transformer induction is zero. Indeed, at the rotation of the magnetic belt no changes in the magnetic potential generated by the magnets do appear as in a cylindrical reference frame with axis along the axis of the cylindrical belt the magnetic potential does not depend on the azimuthal angle ϕ. As in such a frame the components of the velocity of the belt will be $\mathbf{v} = (v_\rho, v_\phi, v_z) = (0, v, 0)$, we obtain for the motional transformer induction according to formula (21.4)

$$E_{mot-tr} = (\mathbf{v}.\text{grad})\mathbf{A} = \{v_\rho \partial/\partial\rho + (v_\phi/\rho)\partial/\partial\phi + v_z \partial/\partial z\}\mathbf{A} = (v/\rho)\partial A(\rho,z)/\partial\phi = 0. \quad (51.1)$$

3) When belt and sticks rotate together, the same current as in the first case flows through the amperemeter because this case is a superposition of the cases 1)

and 2).

The machine shows the following ponderomotive effects when sending current through the sticks by the help of external battery:

1) When the external bearings are blocked and the internal are free to rotate, the sticks are set in motion. The effect is described by the third formula (21.1) if putting there $\mathbf{v} = Idr/q$, where I is the flowing current, dr is the current element of the stick pointing along the current, and q are the charges transferring current in this current element, so that E_{mot} is the potential force acting on the wire element dr.

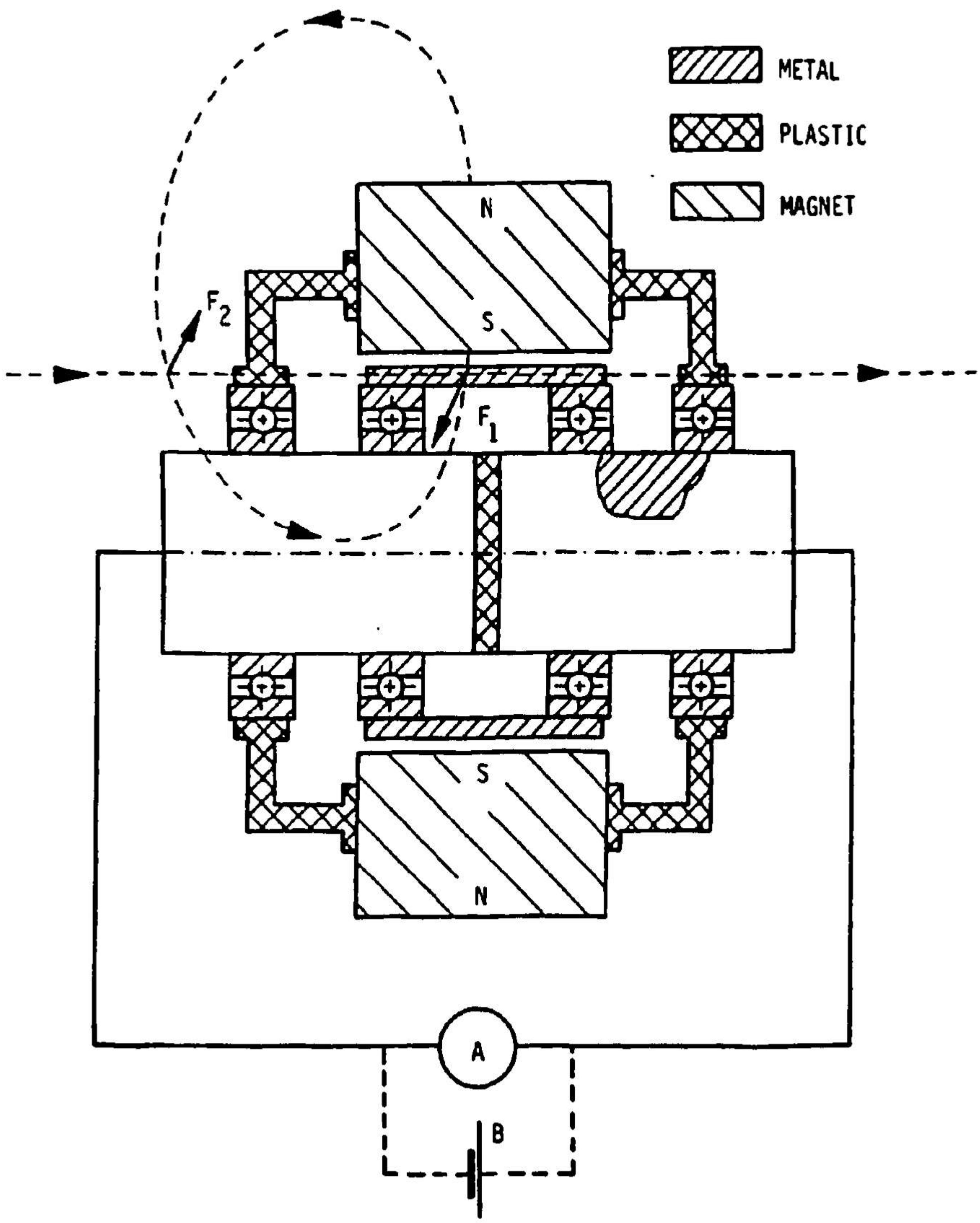

Fig. 37. Diagram of the demonstrational unipolar Marinov-Müller machine.

2) When the internal bearings are blocked and the external are free to rotate, the magnetic belt does not come into motion. This case is rather complicated to be explained by a simple formula as one must make integration of the elementary potential forces acting on all current elements of the magnet caused by all current elements of the circuit (not only by the current elements of the sticks). Thus I am impelled here to use the Faraday-Maxwell language with the "force lines" which I definitely consider of having no physical substance. In my concepts, I repeat, the force lines are a "model" alowing an easier, if not calculation, at least evaluation. The right and exact calculation is to be done only proceeding from the current elements of the interacting systems. The consideration of the "force lines" as physical reality was a desastrous trend in physics. But at situations where the magnetic systems are complicated and it is difficult to make an integration, one has no other choice than to search for an explanation of the observed effects by the help of the "force lines".

For simplicity I shall consider the "outer circuit" as wires representing continuations of the sticks to the left and to the right to infinity (see fig. 37). I have drawn in fig. 37 one of the force lines of the magnet along which the magnetic intensity is tangential to the line. As this force line acts on the current in the stick and on its continuation with a force perpendicular to the current and to the line, the force F_1 acting on the stick will point to the reader for current flowing from left to right and the force F_2 acting on the "continuation" will point from the reader. As the same number of lines cross the whole horizontal wire downwards and then upwards, the net moment of force acting on the whole wire with respect to the axis of rotation will be zero. According to Whittaker's formula (24.3), the current in the wire acts with the equal and oppositely directed forces on the force line. Consequently the net moment of force acting on the force lines, i.e., on the magnet, will be zero. I repeat, it is an absurdity to think that a pressure can be executed on the force lines. The forces are always acting on the current elements of the magnet. The substitution of the action over the current element by an action over the force lines is only a "mnemonic trick", nothing else. Everybody who seraches here something more than a mnemonic trick enters into the realm of fictions. Every physicist has strictly to evade to do this.

God always has been presented by the help of idols. But anyone who begins to believe in idols soon, very soon, becomes a sinner.

3) When the external and internal bearings are free to rotate, the sticks come into rotation as in case 1), but the magnetic belt remains at rest. If the outer races of the external and internal bearings are solidly fixed, both sticks and belt come into rotation exactly as in case 1).

This report on the demonstrational Marinov-Müller machine was published in Ref. 40.

52. THE OPEN HALF POLAR MACHINE ADAM

Bruce de Palma[41] reported of having observed that the mechanical braking power of a cemented Faraday disk (see Sect. 47) is less than the generated electric power. Many people have then reported of having observed this effect too, and some of having not observed.

To check whether these claims are real, I constructed my MACHINE ADAM (Apparatus Discovered in Austria by Marinov) which was a cemented Faraday disk as generator coupled with a motor invented by me, to which I gave the name the KÖNIG-MARINOV MOTOR, as it was a development of the historic König apparatus.[42]

The diagram of the machine is shown in fig. 38 and the photograph in fig. 39.

The cemented Faraday disk, which has two permanent ring magnets, is above, the König-Marinov machine, which has an electromagnet, is beneath. The electromagnet with the axle of the apparatus is solid to the laboratory. The yoke of the König-Marinov machine, to which the Faraday disk is solid, can rotate on the two ball-bearings.

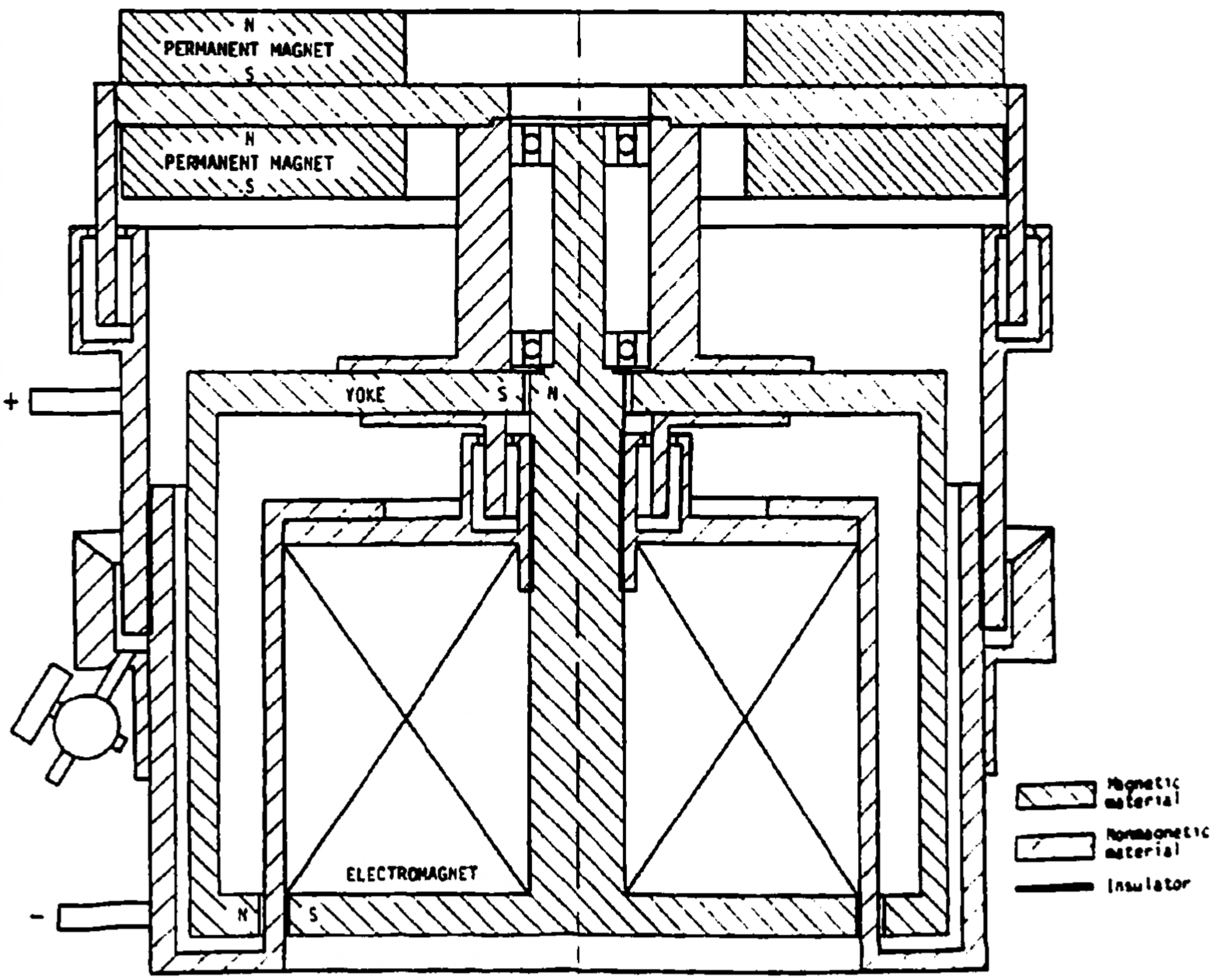

Fig. 38. Diagram of the open half polar machine ADAM.

Let us see first how the machine works as a motor, supplying a driving tension to it as shown in fig. 38. The current goes from the positive electrode up through the large upper mercury trough, then along the radii of the disk (which now serves as a Barlow disk), then down through the small mercury trough, and reaches the negative electrode. It is easy to see that the torque will be anti-clockwise (if looked from above), while the torque on the yoke will be clockwise. Thus the machine will rotate in this direction in which the torque is stronger.

Let us then see how the machine works as a generator, rotating it by an external torque (I used a boring machine as shown in fig. 39). If the torque is anti-clockwise, the Faraday disk will drive the positive charges to the positive electrode, while the König-Marinov machine will drive the positive charges to the negative electrode. Thus current will flow in this direction in which the induced tension is stronger.

In my machine the stronger tension was induced in the Faraday disk and thus when rotated by an external torque the tension induced in the circuit was the difference between the tensions induced in the Faraday disk and in the König-Marinov machine. The idea of the machine was to run it as a perpetuum mobile if the driving torque produced by the König-Marinov machine would be more than the sum of the braking magnetic torque produced by the Faraday disk generator and the friction torque.

Fig. 39. Photograph of the machine ADAM.

The experiments carried out with the machine ADAM were the following: I set the machine in motion with a certain definite angular velocity and I measured the coast-down times once when the circuit was open and current was generated and then when the circuit was closed. Because of the produced heat energy, due to the ohmic losses in the circuit, according to the energy conservation law, in the second case the coast-down time must be shorter.

With my solid Faraday disk of copper, the coast-down times in the second case were always shorter and thus it was not possible to say whether energy was produced from nothing.

However, I exchanged the copper Faraday disk by a disk filled with mercury. With such a liquid Faraday disk I measured coast-down times at a closed circuit longer than the coast-down times at open circuit. This was a clear indication that energy was produced from nothing (see the data in Ref. 6, p. 324). The differences, however, were too small, and in 1985 I took the decision that·it will be extremely difficult (perhaps impossible, because of the big heat losses) to "close the energetic circle" and to make ADAM or another similar machine runnig as a perpetuum mobile. Thus since 1985 I have no more experimented with cemented Faraday disks but I follow actively the experimental activity of other researchers (Bruce de Palma, whom I visited in 1985 and then invited twice at conferences in Europe, the Dillingen group, Tewari, etc.).

According to my concepts, whether the Faraday disk is cemented or uncemented, nothing changes in the appearing electromagnetic forces. Thus, according to me, the observed violation of the energy conservation law is due to the "mechanism" of generation of current in the rotating disk and to the transmission of the ponderomotive forces acting on the generated current to the "ions' lattice" of the bulk metal. And my experiments showed that if the current is generated not in solid but in liquid metal, the braking mechanical effect is less.

The detailed report on my machine ADAM (which is now sold in England) is published in Ref. 6, p. 324, but between the hundreds of constructors of cemented Faraday disks (or N-MACHINES, according to de Palma's terminology) there is no single one who has done his Faraday disk of mercury except me.

53. THE NONPOLAR MACHINE MAMIN COLIU

The Faraday disk generator is a machine with generator and motor effects but there are suspicions (confirmed by me only for the case of a liquid Faraday disk) that when used as generator the produced electric power is more than the appearing braking mechanic (i.e., "ponderal") power.

My nonpolar MAMIN COLIU MACHINE (MArinov's Motional-transformer INductor COupled with a LIghtly rotating Unit) is a generator without motor effect, so that when the machine generates electric power the braking mechanic power is zero.

I constructed six variations of MAMIN COLIU (their diagrams and photographs are given in Ref. 43, p. 84), but I was unable to "close the energetic circle" and to run it as a perpetuum mobile (the reasons are given beneath).

The explanation why a violation of the energy conservation law appears in the MAMIN COLIU machine certainly is to be searched in the non-linear character of magnetization of iron (see beneath).

The scheme of the MAMIN COLIU machine with toroidal yoke (the first four variations were with toroidal yokes) is shown in fig. 40 and with cylindrical yoke (the last two variations were with cylindrical yokes) in fig. 41 which was the drawing serving for the construction of the fifth model (MAMIN COLIU V). The photograph of MAMIN COLIU V is given in fig. 42 and MAMIN COLIU V dismounted is shown in fig. 43.

I shall give the principle of action referring to fig. 40 which is the most simple.

In the gap of a torus of soft iron with permeability μ there are two similar disks consisting of an equal number of sectors of axially magnetized magnets. In the space between the sectorial magnets there are sectors of non-magnetic material (in my first

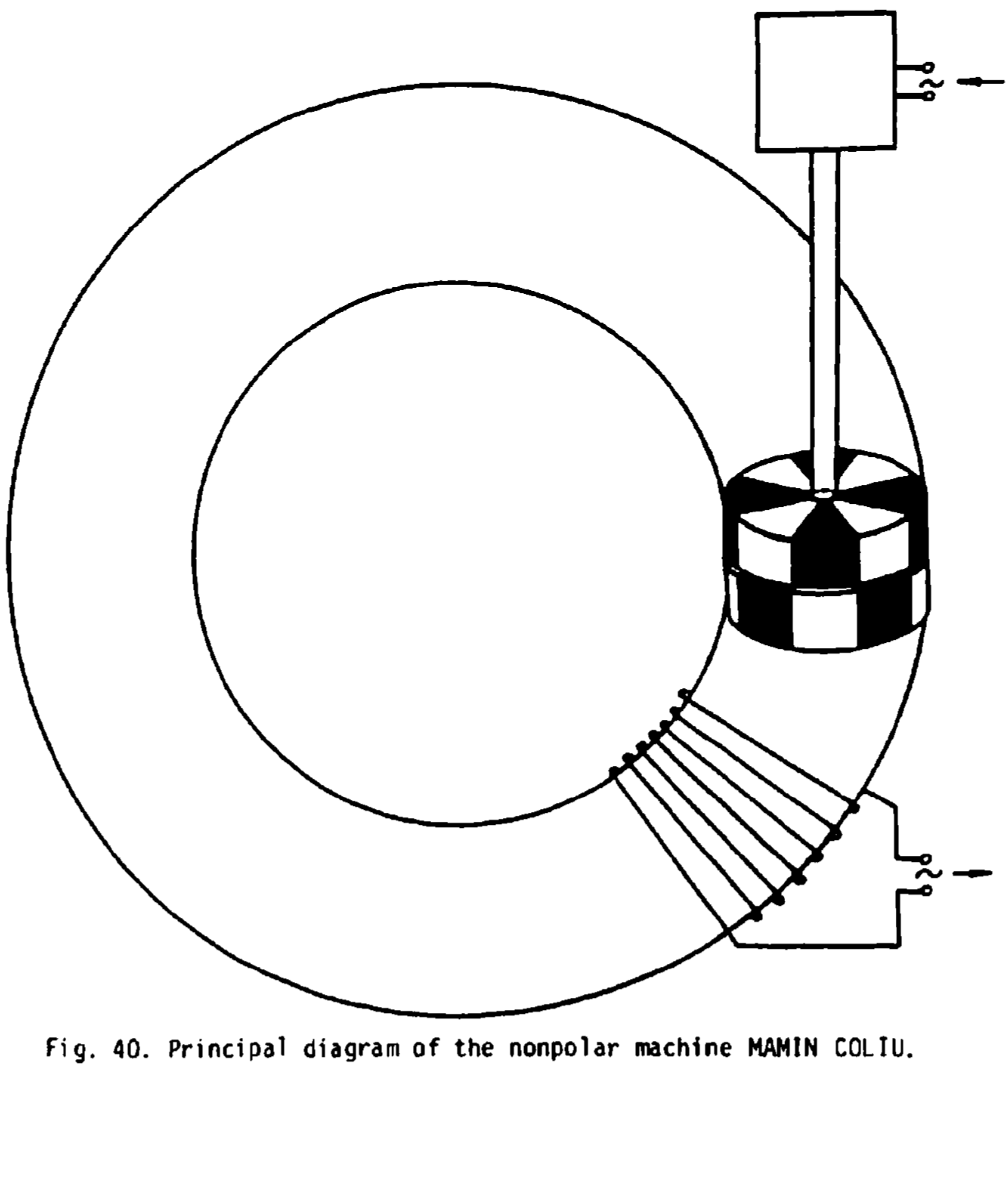

Fig. 40. Principal diagram of the nonpolar machine MAMIN COLIU.

variations I used bronze). The one disk is solid to the torus and the other can be rotated by an electromotor. When the sectorial magnets of the rotating disk overlap the bronze sectors, there is a certain magnetic flux Φ in the torus and when the sectorial magnets overlap the solid sectorial magnets, there is another flux Φ' in the torus. Because of the changing magnetic flux, a tension is induced in the coil and if short-circuiting it, current flows. However, if sending current to the coil, because of the complete symmetry (nonpolar machine), there is no motion of the rotor.

To make some simple calculations, let us suppose that the half of the rotor and of the solid disk is a permanent magnet and the other half bronze and that the torus has a very large radius. To make the analysis still more pure, let us consider the two half circular magnets as electromagnets generating magnetic tension U_m every one.

According to formula (20.11), when the rotating magnets overlap the stationary bronze sectors, the magnetic flux generated by any of them will be $\Phi_1 = U_m/R_m$, where R_m is the reluctance of the torus and is given by formula (20.13), so that the common flux will be $\Phi = 2\Phi_1 = 2U_m/R_m$. When the rotating magnets overlap the stationary magnets, their common magnetic tension will be $2U_m$ and the generated magnetic flux will be $\Phi' = 2U_m/R_m = \Phi$, if R_m will remain the same. However in the second case the magnetic intensity in one half of the torus will be higher and in the other much lower (in the ideal case equal to zero). As μ depends in a very complicated way on the magnetic intensity, the reluctance R_m (see formula (20.13)) does not remain constant and $\Phi' \neq \Phi$. This difference in the magnetic fluxes leads to the induction of electric tension in the coil. I even can not say whether Φ or Φ' is larger, I measured only induced tension and induced current and I noted that this induced current has no braking action (i.e., zero Lenz effect - see Sect. 54.2).

The electric tension generated in VENETIN COLIU VI reached at high velocities of the rotor 50 V. Because of the complete symmetry of the system (see fig. 41), the current induced in the coil could not produce a torque on the magnets. Thus the electric power generated by the coil was produced from nothing.

As I used magnets whose hysteresis loop was not an ideal rectangle, there was a feeble torque acting on them when big current was sent in the coil because the material of the magnets with a differential permeability (see fig. 3) different from unity introduced certain assymetry. But if the magnets should be ideal, say, electromagnets, no torque can appear.

In figs. 41 and 42 one sees how have I neutralized the attractive and repulsive forces between the magnets in the stationary and rotating disks (the four rotating magnets and the two stationary magnets are clearly seen in fig. 43). For this aim I added another system of stationary and rotating disks with permanent magnets (above in fig. 41) identical to the initial system of stationary and rotating disks generating the variable magnetic flux (below in fig. 41). The upper system serves only to balance the forces between the permanent magnets in the lower system, as when the upper magnets attract one another the lower magnets repel each other (and vice versa). So the axle rotates very easily and a small 6-volt motor (see it in fig. 42 on the top) smoothly rotates the axle.

In the machine MAMIN COLIU VI both systems of stationary and rotating magnets are "in the iron" and thus both systems generate variable magnetic flux (fig. 44). Here

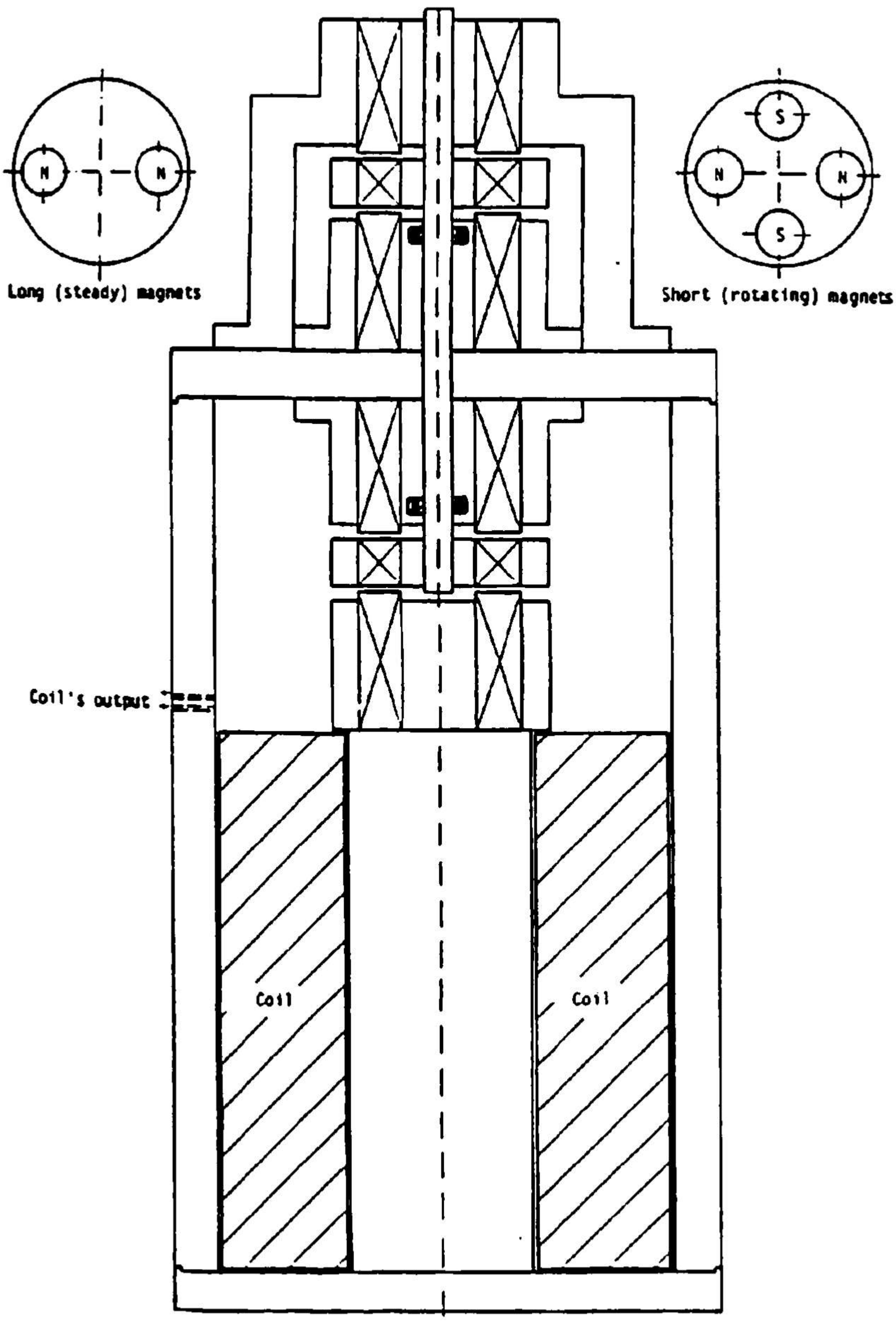

Fig. 41. Diagram of the machine MAMIN COLIU V.

Fig. 42. Photograph of the machine MAMIN COLIU V.

the a.c. output is sent directly to a coil which attracts and repulses synchronously the four small permanent magnets fixed to the rotor and at sufficient output power will rotate the machine eternally.

Unfortunately I had laminated iron only in the second and fourth variations where the toroidal form of the yoke led to other asymmetrical effects. MAMIN COLIU V and VI were with a perfect cylindrical symmetry, but I had no money to make the yoke deprived of eddy currents (by using laminated iron, or ferrite, or the material corovac of the company VACUUMSCHMELZE) and the current produced was very low (milliamperes), so that the power was not enough to run the driving motor. This was the only reason which did not allow me to run MAMIN COLIU as a perpetuum mobile.

Exhausting thoroughly my financial resources with the construction of the six variations of MAMIN COLIU, I interrupted in 1988 the construction of this type of machines for the time when enough money will be available.

Thus if the iron in MAMIN COLIU would be deprived of eddy currents, the generated output power, after rectification, can be sent to the driving motor as shown in fig. 42, and the machine can be run as a perpetuum mobile. I repeat once more, the reason that I could not do this was only one: the lack of money.

I published the description of MAMIN COLIU in two paid advertisments[44,45], however nobody in the world tried to construct this simple machine and to see that it has generator effect but no motor effect.

In comments to the second advertisment, S. A. Hayward wrote[46] that I am a "mad scientist". Perhaps Mr. Hayward was right, as only a mad man can publish the exact

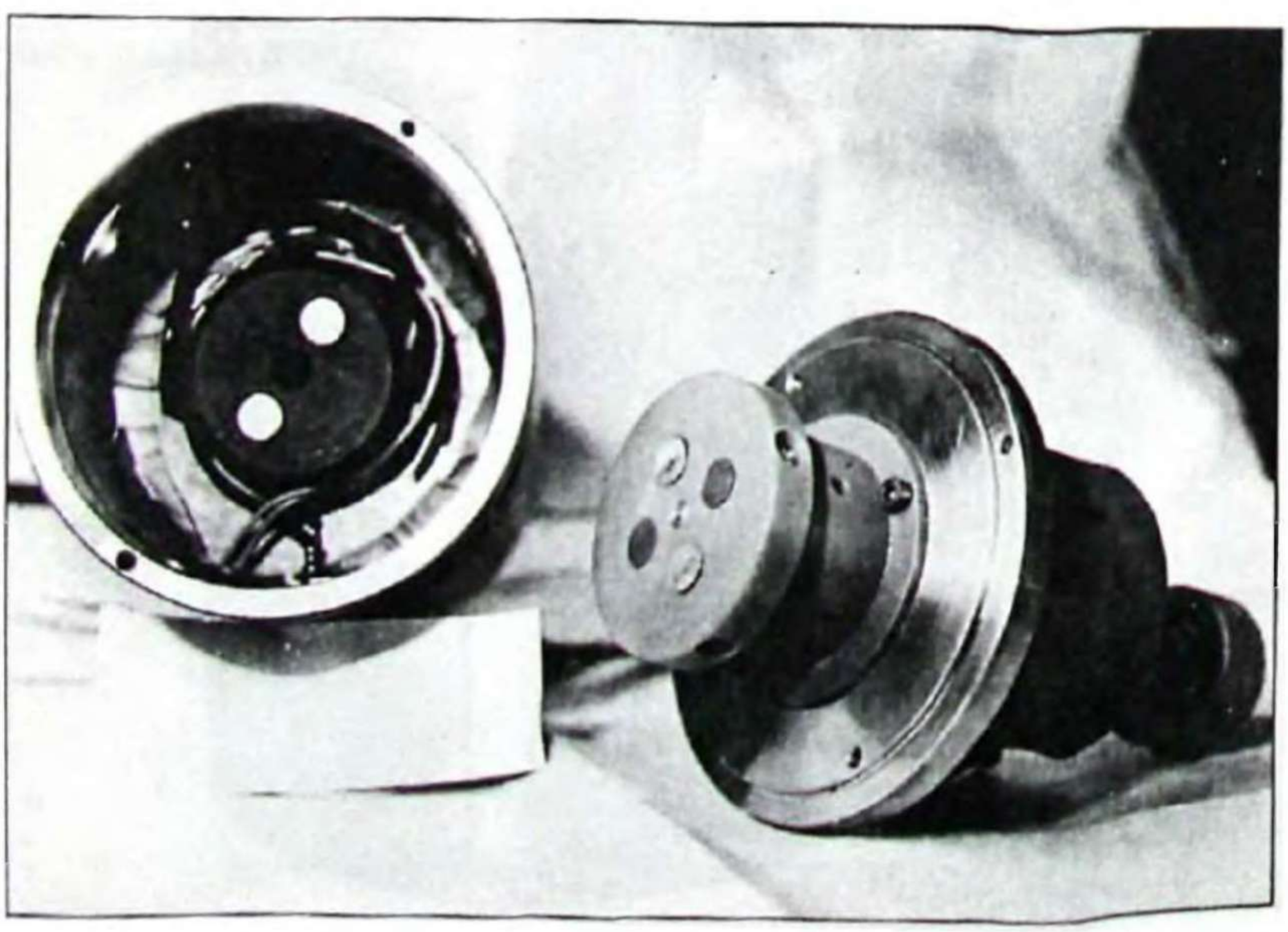

Fig. 43. The machine MAMIN COLIU V dismounted.

description of a perpetual motion machine by paying 3.942 English pounds, instead to use this money for its construction. Only after publishing the advertisements, I read the following words of Gorgias (483 - 380): "Nothing can be known at all; and if it could be known, it cannot possibly be communicated; and if it could be communicated, it will never be understood or believed" and concluded that two millenia have changed nothing in human mind.

Fig. 44. Photograph of the machine MAMIN COLIU VI.

54. THE TWO POLAR MACHINE VENETIN COLIU

54.1. INTRODUCTION.

In 1990 Manuele Cavalli and Bruno Vianello, who have read in an Italian magazine about my electromagnetic experiments and machines, invited me to visit them and to discuss the matter. I started immediately with pleasure for their town Treviso "*in dem Land wo die Zitronen blüh'n*" and after having spent a couple of days in their and their charming wives' company, I left them the machine MAMIN COLIU VI, which I took with me (25 kg) to demonstrate the effects, as they promised to dedicate time and money for its further development.

Having done their own measurements on VENETIN COLIU VI and on other electromagnetic generators, they informed my of having found some generators which not only that have no magnetic braking torque, but when generating current obtain, at certain conditions, a torque supporting the rotation.

These generators were not specially constructed: Cavalli and Vianello observed the self-accelerating effect first in the Bosch ignition coils which produce the electric alternating tension activating the high voltage used for ignition of the sparks in the benzine car cylinders (I give the whole description of these generators to show the dinosauric character of today's technology), then in stepper motors.

After doing measurements on the generators suggested by Cavalli and Vianello and then on similar generators constructed by me, I understood that every electromagnetic generator diminishes its braking magnetic torque when its phase angle ϕ (see beneath) approaches $\pi/2$. This character of the electromagnetic generators can easily be explained and calculated. The effect of changing the braking torque to supporting torque, with the increase of the current frequency, is not so clear and needs more profound theoretical and experimental analysis.

I decided to call any generator working with ϕ near to $\pi/2$ and losing its braking torque the VENETIN COLIU MACHINE (in Italian NICOLINO VENETO), throwing in this way a bridge to the generator MAMIN COLIU where there is no braking magnetic torque at any velocity of the rotor (i.e., at any current frequency). The term "VENETIN" comes from "Veneto", the Italian province where Cavalli and Vianello live.

In the last years I have no more experimented with MAMIN COLIU and dedicated my whole time and scarce money to VENETIN COLIU, as it seemed to me that it was easier to construct a VENETIN COLIU machine with a closed energetic circle, i.e., to run it as a perpetuum mobile.

The story of my contacts with Cavalli and Vianello (with many photographs) is well documented in Ref. 47, p. 8.

54.2. THEORETICAL BACKGROUND.

Let us consider the most ordinary two polar generator (later an example will be given) in which a magnet performing periodic motion generates in a coil at rest a tension

$$U_{gen} = U_{gen-max}\sin(\omega t), \qquad (54.1)$$

where $U_{gen-max}$ is the maximum value of the generated tension, $\omega = 2\pi/T$ is its circular frequency and T is the period of motion of the magnet (the time in which it returns to its initial state).

Putting (54.1) into (19.15), we shall have

$$U_{gen-max}\sin(\omega t) = RI + L(dI/dt), \qquad (54.2)$$

where R is the resistance of the coil, L its inductance and I the flowing current.

This is a differential equation with respect to I and the solution can be searched in the form

$$I = I_{max}\sin(\omega t - \phi), \qquad (54.3)$$

where I_{max} and ϕ are two positive (as we shall see later) constants.

Indeed, substituting (54.3) into (54.2), we obtain

$$U_{gen-max}\sin(\omega t) = RI_{max}\sin(\omega t - \phi) + \dot{L}I_{max}\cos(\omega t - \phi). \qquad (54.4)$$

This equation can be written in the form

$$(U_{gen-max}/I_{max})\sin(\omega t) = (R\cos\phi + \omega L\sin\phi)\sin(\omega t) - (R\sin\phi - \omega L\cos\phi)\cos(\omega t). \qquad (54.5)$$

Obviously it must be

$$R\sin\phi - \omega L\cos\phi = 0, \qquad (54.6)$$

so that

$$\tan\phi = \omega L/R \qquad (54.7)$$

and

$$U_{gen-max}/I_{max} = R\cos\phi + \omega L\sin\phi = (R^2 + \omega^2L^2)^{1/2}. \qquad (54.8)$$

The quantity

$$Z = (R^2 + \omega^2L^2)^{1/2} \qquad (54.9)$$

is called IMPEDANCE of the circuit and ωL is called INDUCTIVE REACTANCE.

The quantity

$$\phi = \arctan(\omega L/R) = \arccos(R/Z) \qquad (54.10)$$

is called PHASE ANGLE and shows the angular delay in radians with which the maximum of current appears after the maximum of the generated tension. As T is the period of the generated tension, then $\Delta t = (\phi/2\pi)T = \phi/\omega$ is the time after which the maximum of the current appears after the maximum of the generated tension.

Let us consider the most simple generator consisting of a solenoidal coil and a permanent magnet which will be pushed in the coil and then pulled out (figs. 45 and 46). In fig. 47 I give the generated in the coil magnetic flux Φ, when it has a co-sinusoidal character. Such a character of the generated flux can be obtained if we assume that at the farthest position of the magnet the flux in the coil is zero, at the nearest position when the magnet points with its north pole to the coil, it is maximum positive, and that when reaching again the farthest position after half of the period, we turn round the magnet momentarily, so that during the second half of the period it faces the coil with its south pole.

The tension generated in the coil is to be calculated from the formula (19.14)

$$U_{gen} = - \partial\Phi/\partial t \qquad (54.11)$$

and to have the generated tension (54.1), the magnetic flux must be a cosinusoidal function of time

$$\Phi = \Phi_{max}\cos(\omega t). \qquad (54.12)$$

In fig. 47 I have chosen $R = 1\ \Omega$, $L = \sqrt{3}\ \Omega$, so that, according to formula (54.8)

$$I_{max} = U_{gen-max}/(R^2 + \omega^2L^2)^{1/2} = 0.5U_{gen-max}, \qquad (54.13)$$

and according to (54.2) we obtain for the amplitudes of the ohmic and induced tensions

$$U_{max} = RI_{max} = 0.5U_{gen-max},$$
$$U_{ind-max} = LI_{max} = (\sqrt{3}/2)U_{gen-max} = 0.87U_{gen-max}. \qquad (54.14)$$

Thus equation (54.4) can be rewritten in the following form, giving the graphs of U_{gen}, U_{ind} and U,

$$U_{gen-max}\sin(\omega t) - 0.87U_{gen-max}\cos(\omega t - \phi) = 0.5U_{gen-max}\sin(\omega t - \phi). \qquad (54.15)$$

The phase angle has the value

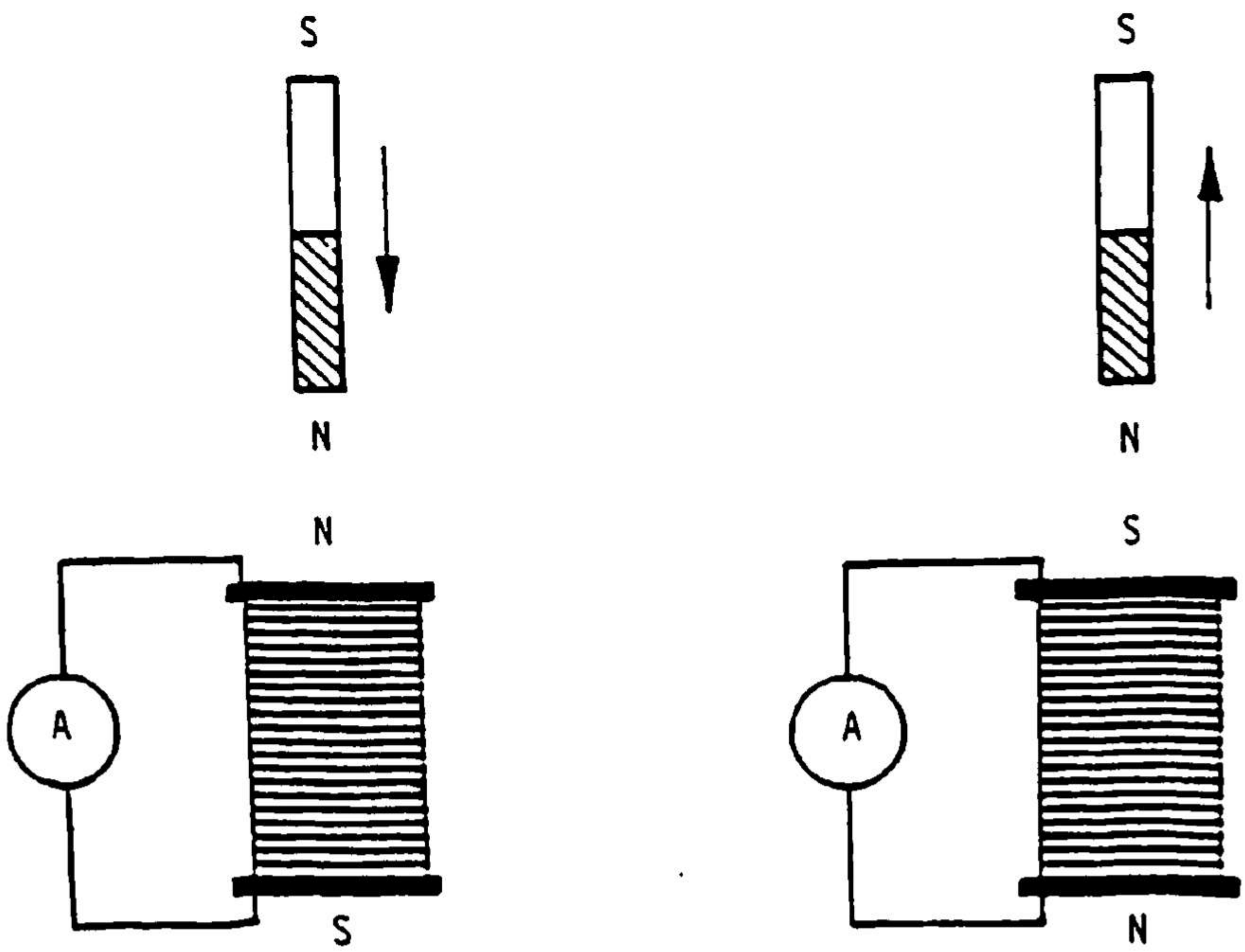

Fig. 45. The polarity obtained by a cylindrical coil when a permanent magnet is pushed in and pulled out.

$$\phi = \arctan(\omega L/R) = \arctan\sqrt{3} = 1.05 \text{ rad} = 60^{0}. \quad (54.16)$$

The positive current in fig. 47 (i.e., the current above the x-axis) produces south pole at the upper end of the coil in fig. 45, and the negative current produces north pole.

The motion of the magnet is as follows:

a) during the time t_1-t_2 a push motion with the south pole pointing to the magnet,

b) during the time t_2-t_3 a pull motion with the south pole pointing to the magnet,

c) during the time t_3-t_4 a push motion with the north pole pointing to the magnet,

d) during the time t_0-t_1 a pull motion with the north pole pointing to the magnet.

If at a given moment the magnetic action of the current flowing in the coil opposes the motion of the permanent magnet, I call this MOMENTARY LENZ EFFECT; if however it supports the motion of the permanent magnet, I call this MOMENTARY ANTI-LENZ EFFECT (if precision is necessary, the Lenz effect will be called also NORMAL Lenz effect). The effect of opposing (supporting) the motion of the permanent magnet for the whole period of motion is called INTEGRAL LENZ EFFECT (INTEGRAL ANTI-LENZ EFFECT). If for the whole period the motion of the magnet is neither opposed nor supported, I call this INTEGRAL ZERO LENZ EFFECT. The MOMENTARY ZERO LENZ EFFECT appears when the current in the coil is zero.

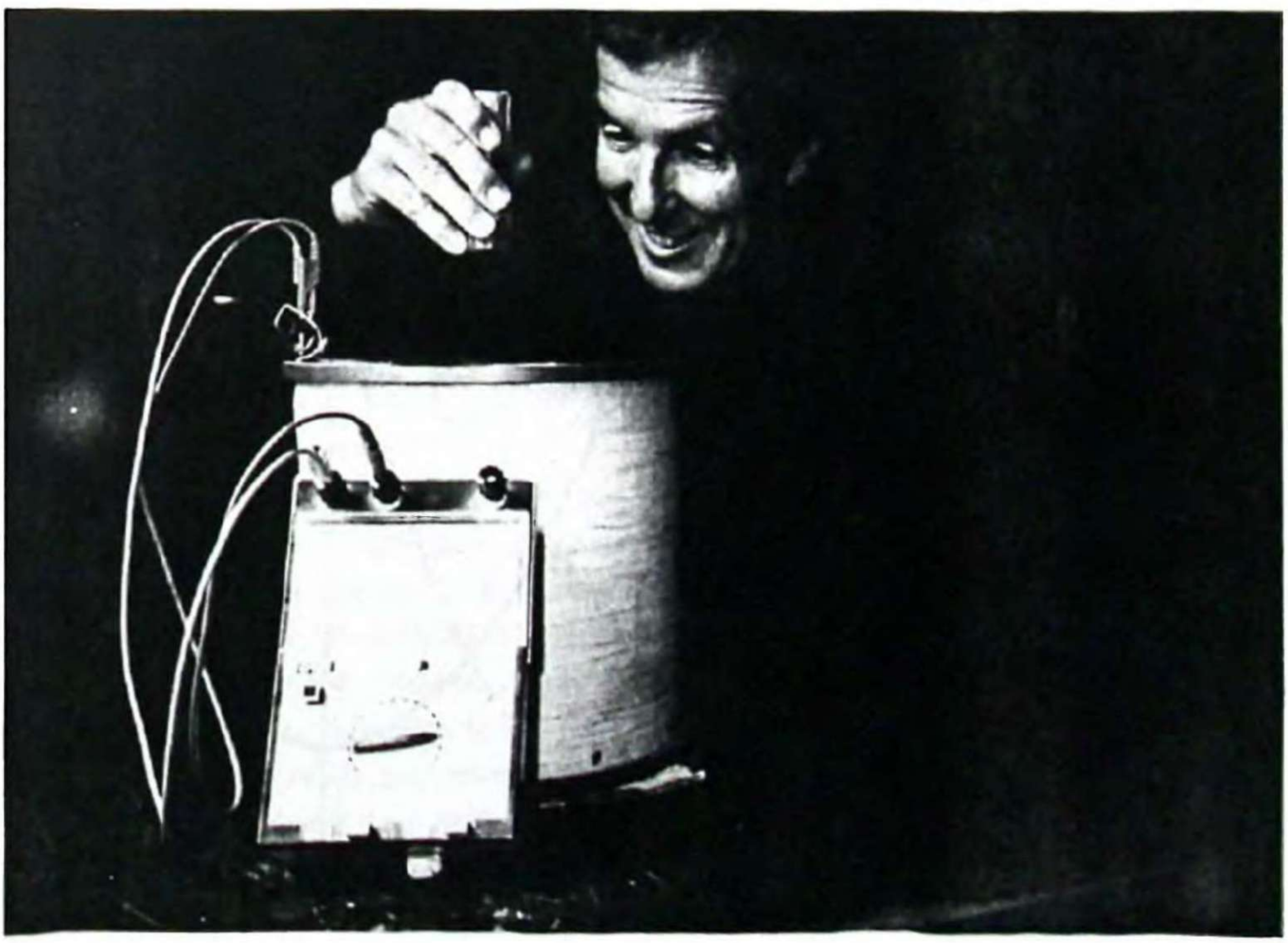

Fig. 46. Photograph of my big cylindrical coil and strong permanent bar magnet.

Let me note that if there will be a condenser with capacitance C inserted in series in the circuit, we have to use not the differential equation (19.15) but the differential equation (19.21). Now putting (54.1) into (19.21), we shall have

$$U_{gen-max}\sin(\omega t) = RI + (1/C)\int I dt + L(dI/dt). \quad (54.17)$$

Searching again the solution in the form (54.3), we shall have

$$U_{gen-max}\sin(\omega t) = RI_{max}\sin(\omega t - \phi) - (1/\omega C)I_{max}\cos(\omega t - \phi) + \omega L I_{max}\cos(\omega t - \phi). \quad (54.18)$$

This equation can be written in the form

$$(U_{gen-max}/I_{max})\sin(\omega t) =$$

$$\{R\cos\phi + (\omega L - 1/\omega C)\sin\phi\}\sin(\omega t) - \{R\sin\phi - (\omega L - 1/\omega C)\cos\phi\}\cos(\omega t). \quad (54.19)$$

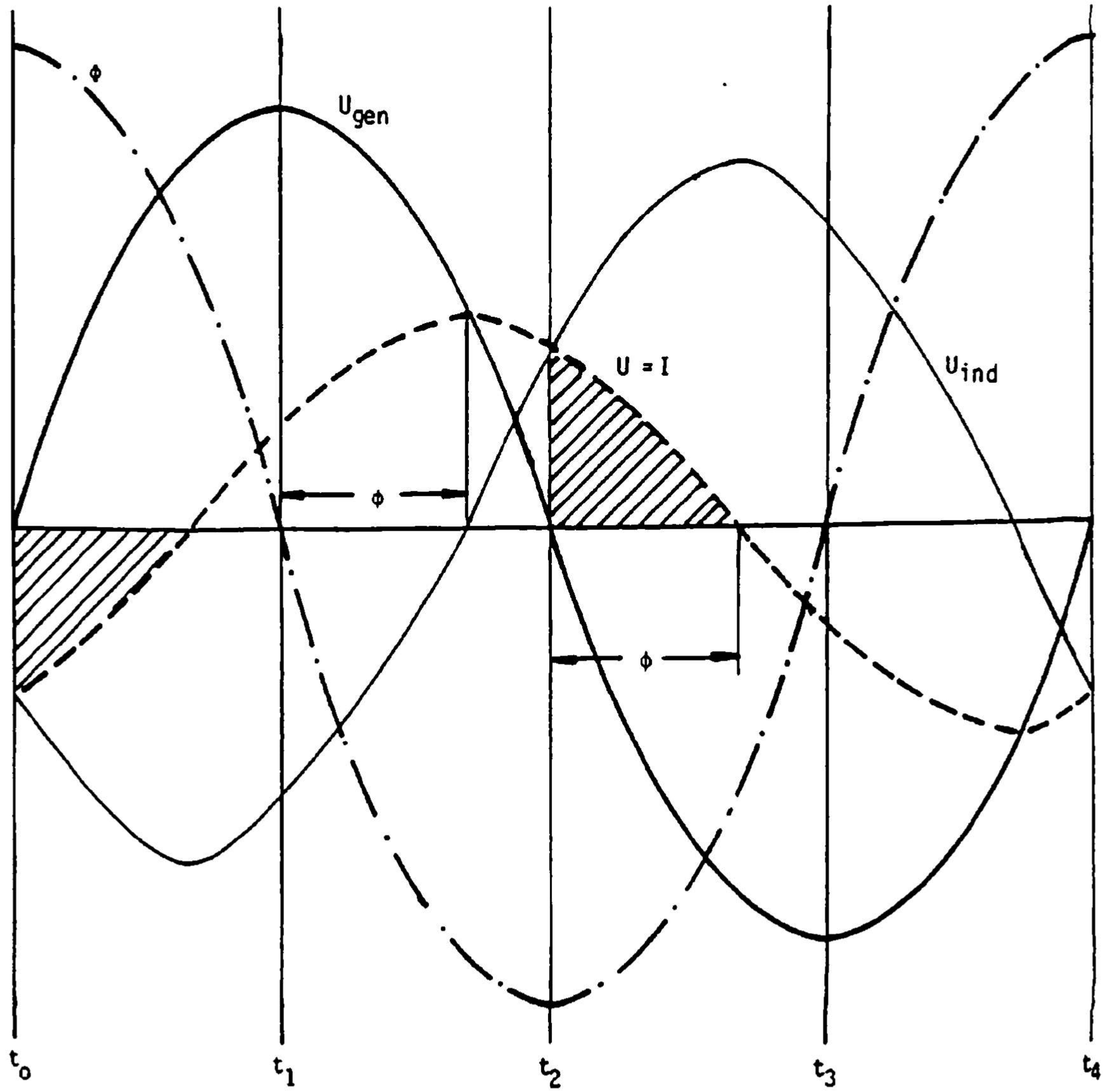

Fig. 47. Graph of the generated in the coil magnetic flux Φ, of the generated tension U_{gen}, of the self-induced tension U_{ind}, of the ohmic tension U, and of the current I (at the assumption R = 1 Ω).

Now the phase angle will be

$$\tan\phi = (\omega L - 1/\omega C)/R \tag{54.20}$$

and the impedance

$$Z = \{R^2 + (\omega L - 1/\omega C)^2\}^{1/2}. \tag{54.21}$$

The quantity $1/\omega C$ is called CAPACITIVE REACTANCE.

For

$$\omega L - 1/\omega C = 0, \quad \text{i.e., for} \quad \omega^2 = 1/LC \tag{54.22}$$

there is the so-called RESONANCE: the impedance is equal to the resistance, $Z = R$, and the phase angle is zero, $\phi = 0$.

54.3. HOW THE ANTI-LENZ EFFECT CAN BE DEMONSTRATED BY AN AMPEREMETER.

One can very easily demonstrate the momentary anti-Lenz effect, i.e., one can demonstrate that at certain moments the current induced in the coil supports the motion of the magnet and does not brake it, as Lenz(48) generalized in 1834 formulating his famous LENZ RULE.

I made such demonstrations (see figs. 48 and 49) with my big coil which has 140,000 turns of wire with thickness 0.3 mm, ohmic resistance R = 20,000 Ω and inductance L = 3,700 H. My permanent magnet was of neodymium (VACODYM 335) produced by the plant Vacuumschmelze in Hanau, Germany. This was a cylindrical magnet with diameter 3 cm and length 10 cm.

First I registered the generated tension by a d.c. voltmeter when pushing and pulling the permanent magnet. The pointer of the voltmeter always "followed" the motion of my hand.

Then I registered the flowing current by an amperemeter when pushing and pulling the permanent magnet. I could easily see that the pointer of the same apparatus "followed" with a delay the motion of my hand.

In figs. 48 and 49 there are two photographs which can persuade the reader in the authenticity of my observations: I chose such ranges of the voltmeter and amperemeter that the deviations of the pointer were quite the same when pushing and pulling the magnet exactly in the same manner. This signified that always the same current has passed through the coil of the measuring instrument and the delays in the motion of the pointer due to mechanical and electrical causes of the measuring instrument were exactly the same. However, when using the measuring instrument as voltmeter, a big resistance was inserted in series with the coil of the measuring instrument, while when using it as amperemeter, a small resistance was inserted in parallel to the coil of the measuring instrument.

I took the photographs always when pulling out the magnet from the coil (after having pushed it). As fig. 48 shows, when my big induction coil was closed by a big resistance, the flowing current at the pull motion had such a direction (note that the bottom "+" was pressed) that the current opposed the motion of the magnet.

However, as fig. 49 shows, when my big induction coil was closed by a small resistance, the flowing current at the moment of taking the picture during the pull motion had such a direction (note that the bottom "-" was pressed) that the current supported the motion.

54.4. HOW THE ANTI-LENZ EFFECT CAN BE DEMONSTRATED ON AN OSCILLOGRAPH.

With the aim to observe the time delay of the current flowing in the coil of a generator with respect to the generated tension, I fixed the rotors of two stepping motors to a common axle and drove them by a d.c. motor (fig. 50).

But first I should like to make clear to the reader what a stepping motor is, considering one of the motors in fig. 50 which were of the type KP4M4, produced in India for IBM computers.

In fig. 51 one of these motors is presented open. The rotor consists of two fixed one to another parallel cogged disks with 25 strongly magnetized cogs each, so that the cogs of the one disk have north magnetism and the cogs of the other disk south magnetism. The angular distance between two neighbouring cogs is $\alpha = 360:25 = 14^{\circ}.4$. The cogs of the two disks are displaced at an angle $\alpha/2 = 7^{\circ}.2$, so that when looking at the generatrix of the cylindrical surfaces of the disks one sees the cogs of the

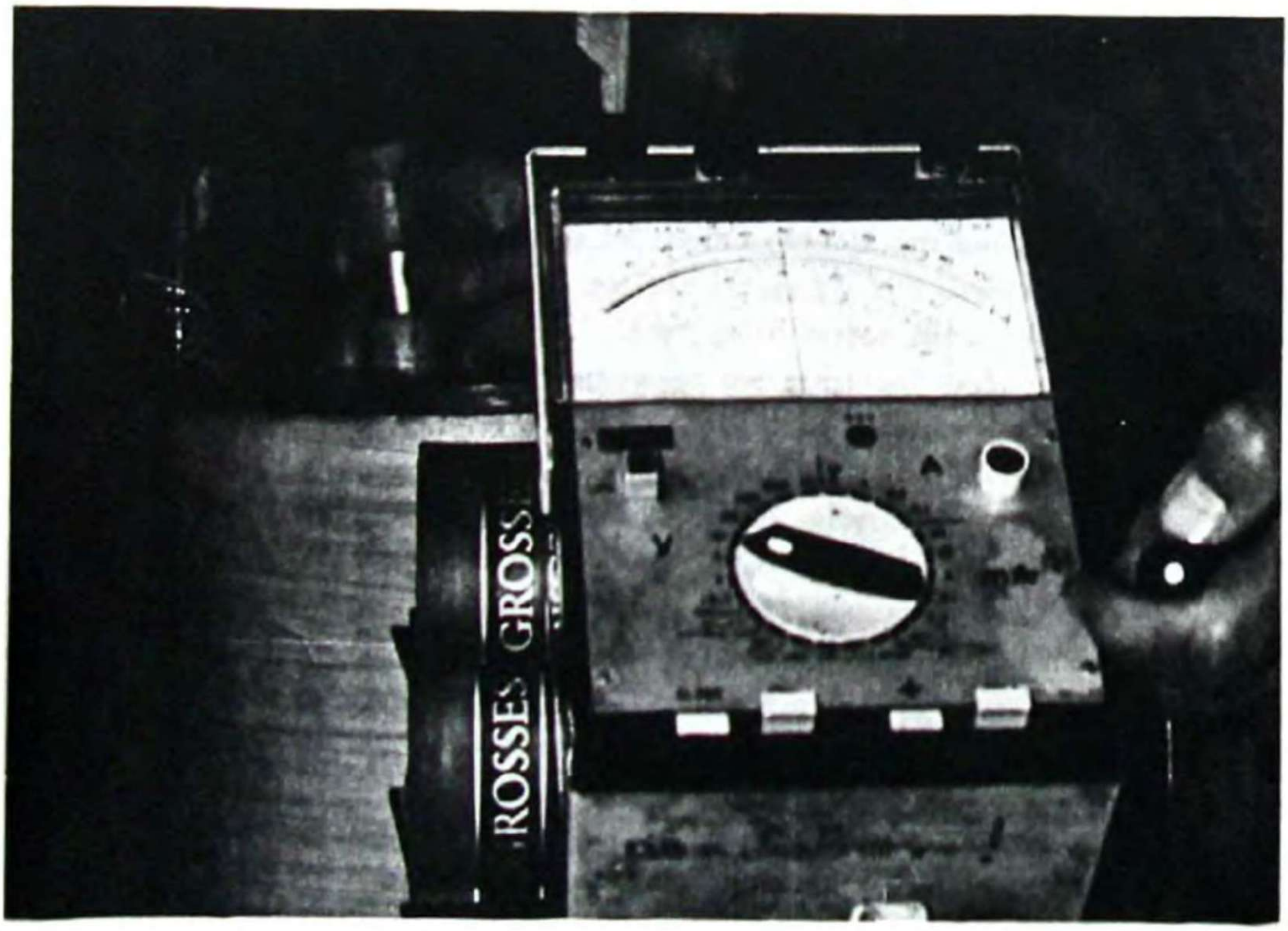

Fig. 48. Momentary Lenz effect when pulling the permanent magnet (after having pushed it) and the measuring instrument is a voltmeter, i.e., $R \gg \omega L$.

one disk in front of the notches of the other.

The stator has four cores, any of which has four cogs, so that in the space between two neighbouring cores there are "missing" $n_0 = (25 - 16):4 = 2.25$ cogs. Around the cores four double coils are wound in such a way that every one of these double coils is connected in series with one of the double coils wound around the opposite core.

Thus there are eight issues. Four of these eight issues are connected to a common point (a black issue) and the other four (coulored) issues are the free ends of the four coils (any of which, I repeat, is wound about two opposite cores). Every such coil has ohmic resistance $R = 80\ \Omega$ and inductance $L = 0.04$ H.

I present in fig. 52 a very simplified diagram of the stepping motor, from which one can easily grasp the principle of tension generation when rotating the rotor.

I reduced in fig. 52 the cogs of the rotor to 13 and the cogs on every core to two. Then I have drawn only two opposite cores, omitting the two other cores.

At the situation shown in the figure the anterior (north) upper cogs of the rotor come in front of the cogs of the upper core, while the posterior (south) lower cogs of the rotor come in front of the cogs of the lower core. Thus the magnetic intensity in the upper core increses in direction up (and reaches its maximum when the north

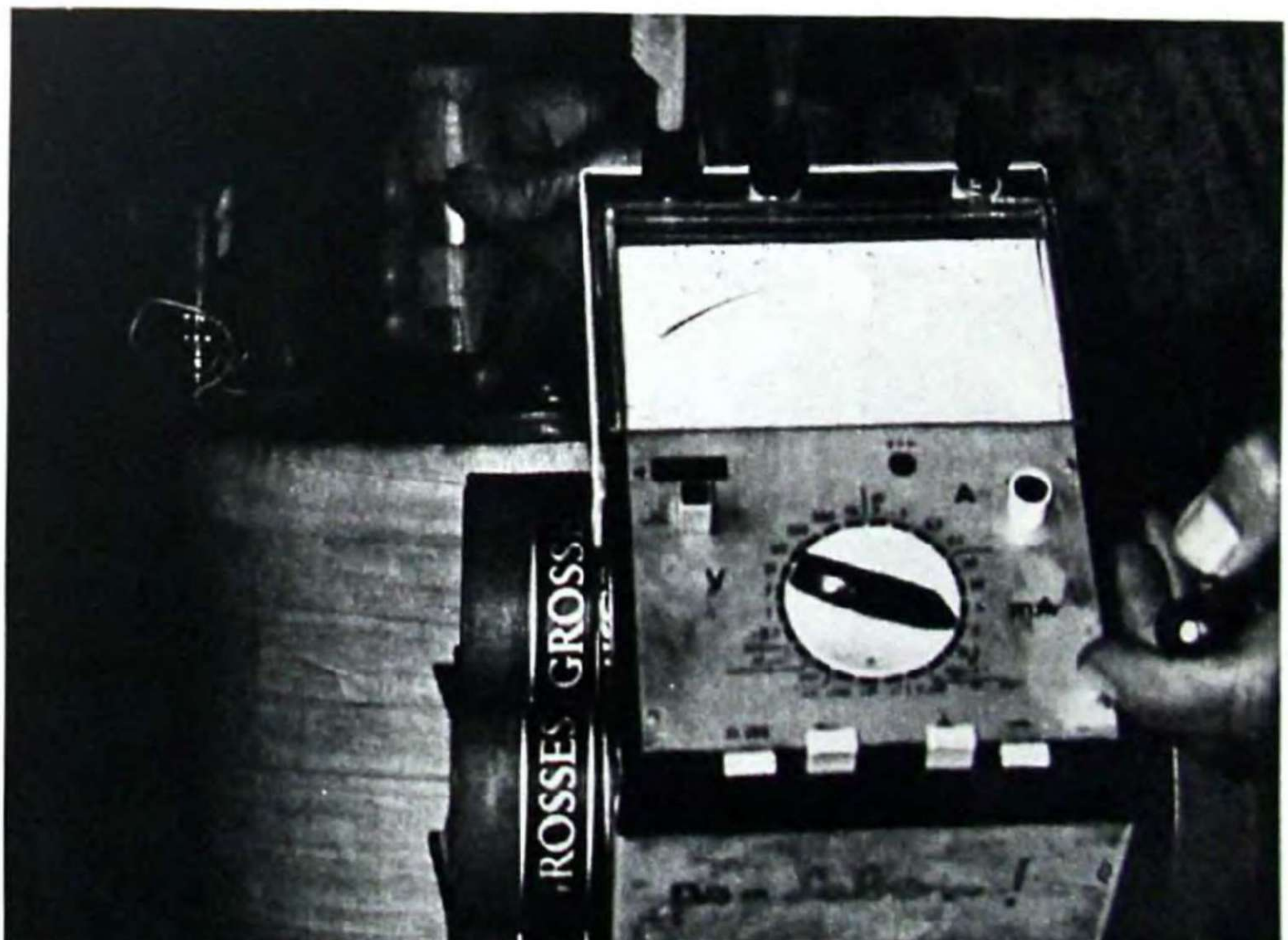

Fig. 49. Momentary anti-Lenz effect when pulling the permanent magnet (after having pushed it) and the measuring instrument is an amperemeter, i.e., $R \ll \omega L$.

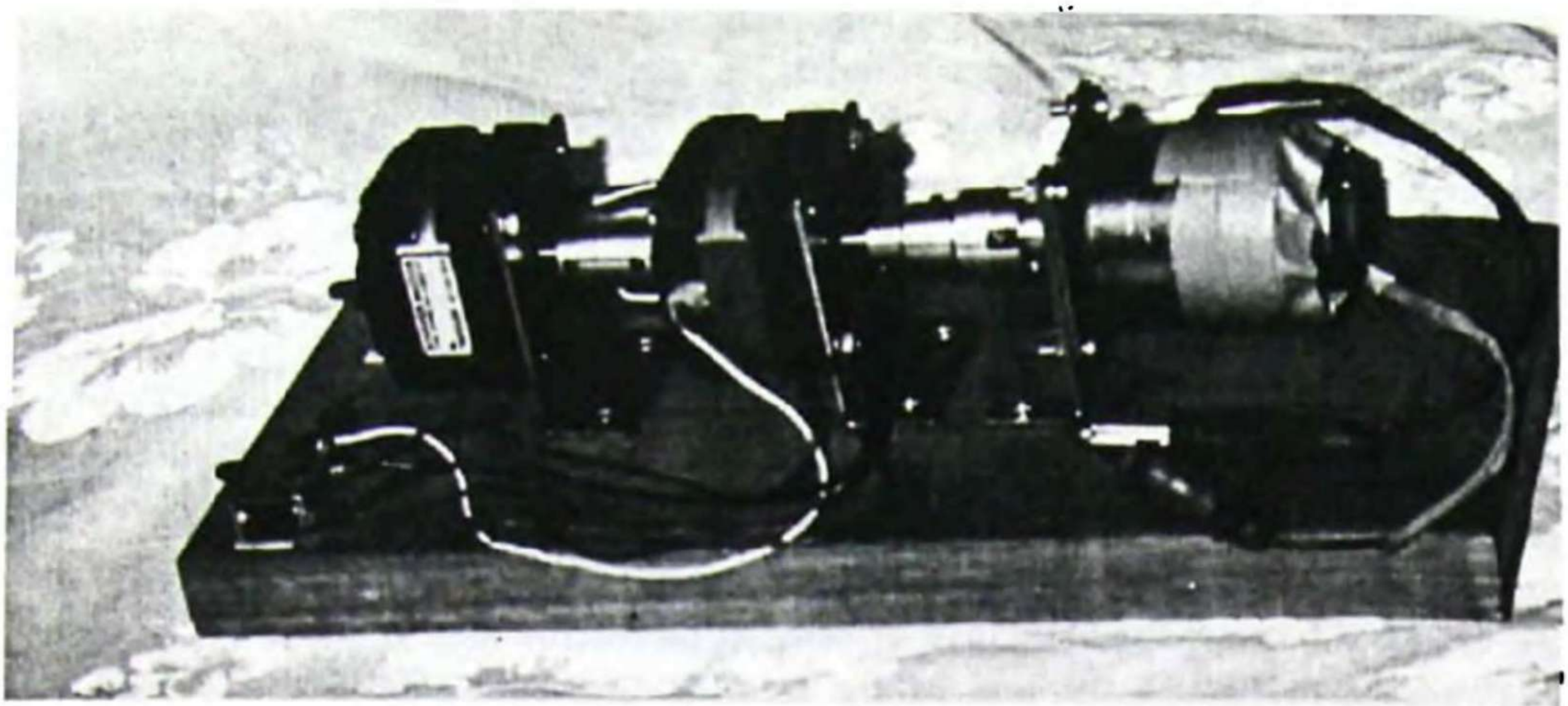

Fig. 50. Two mechanically coupled stepping motors (used as generators) driven by a common d.c. motor.

upper rotor's cogs will be exactly in front of the upper stator's cogs), while the magnetic intensity in the lower core increses also in direction up (and reaches its maximum when the south lower rotor's cogs will be exactly in front of the lower stator's cogs).

The tension induced in the windings of the upper and lower coils will be such that the magnetic intensity, generated by the current flowing in the windings, must point down, as it must oppose the change of the magnetic intensity in the core (I apply the Lenz rule at the condition $\phi \cong 0$!). Thus the direction of the induced

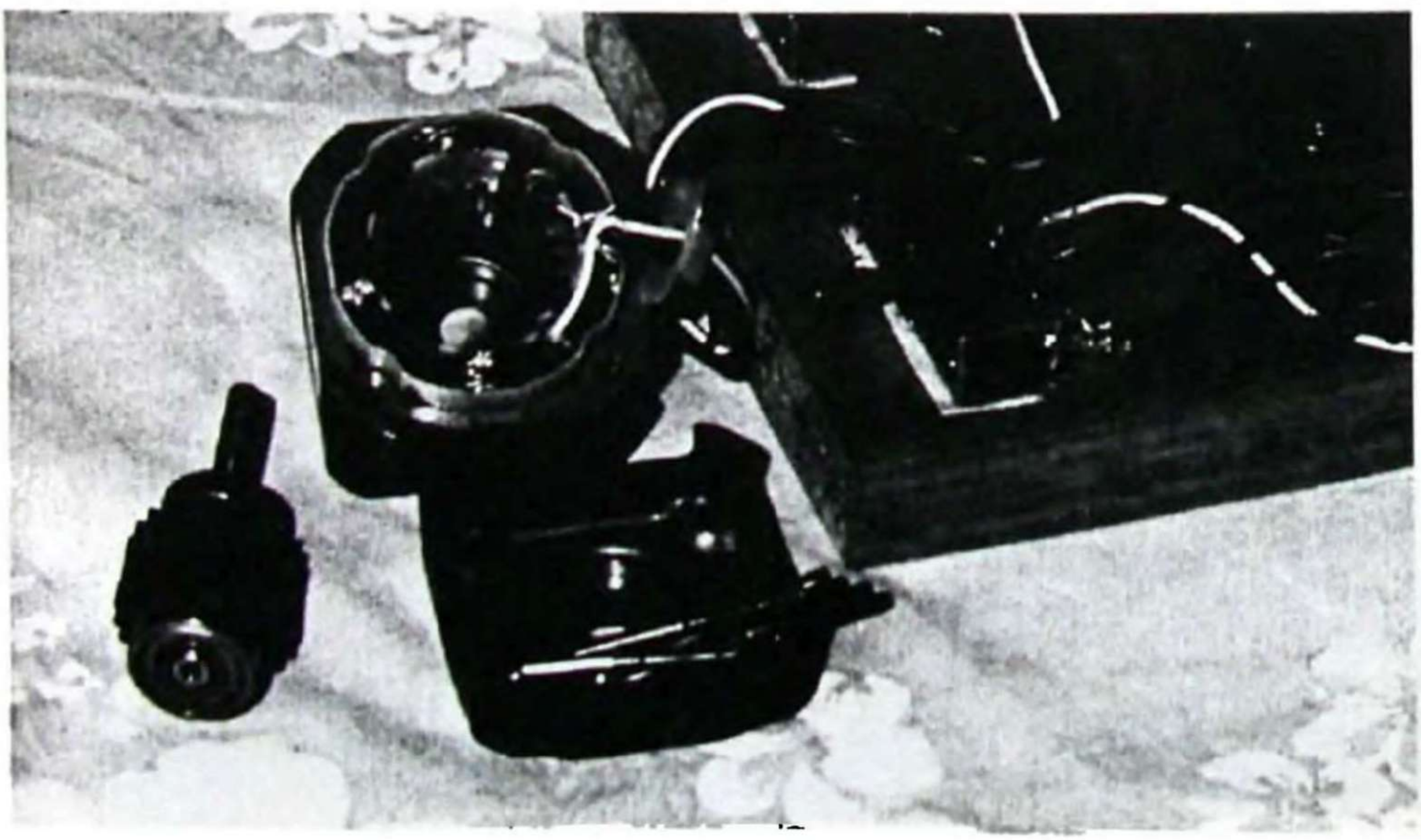

Fig. 51. A stepping motor open.

current will be as shown in the figure. There are two parallel such coils. In fig. 52 their initial points are connected but in my motor (fig. 51) the final point of the one parallel coil was connected with the initial point of the other one.

Thus when (at $\phi \cong 0$) the upper north rotor's cogs approach the stator's cogs, the current in the upper half of the coil has the indicated in fig. 52 direction, becoming zero when the north rotor's cogs are exactly in front of the stator's cogs. When the north rotor's cogs go away from the stator's cogs, i.e., when the upper south rotor's cogs approach the upper stator's cogs, the current in the upper half of the coil has the opposite direction, becoming zero when the south rotor's cogs are exactly in front of the stator's cogs. Consequently, at a rotation on "one cog" the induced tension (and induced current) complete one cycle. The time, T, for this cycle is called period. The quantity $\nu = 1/T$ is called LINEAR FREQUENCY and the quan-

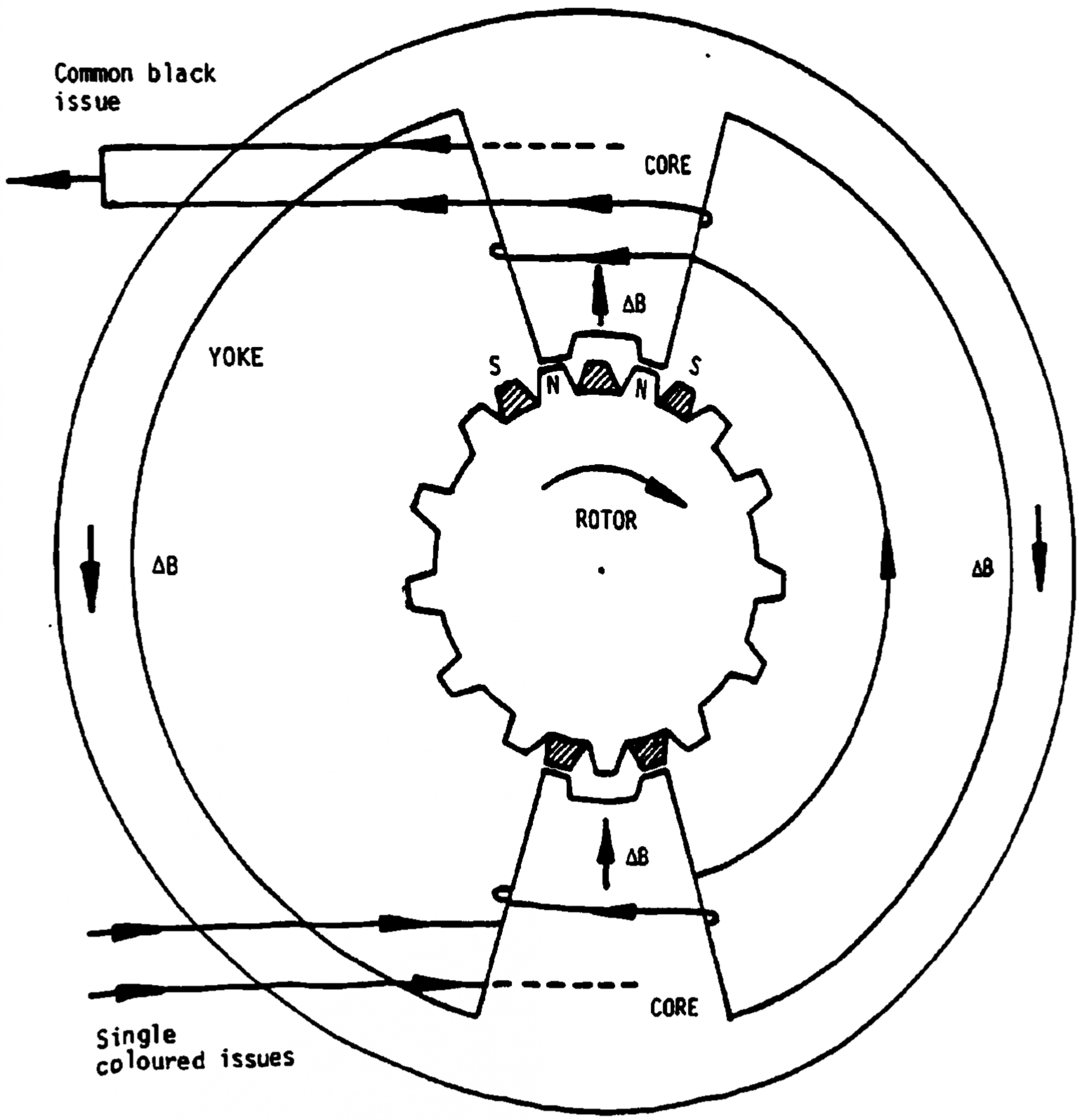

Fig. 52. Diagram of a stepping motor.

tity $\omega = 2\pi\nu$ is the circular frequency.

As the rotor has $n = 25$ cogs, at a rotation with N rev/sec, the circular frequency will be

$$\omega = 2\pi nN = 50\pi N. \qquad (54.23)$$

The inductive reactance of the coil will be

$$\omega L = 50\pi NL. \qquad (54.24)$$

The phase angle is

$$\phi = \arctan(\omega L/R) = \arctan(50\pi NL/R) = \arctan(0.08N). \qquad (54.25)$$

Thus at $N = 12.5$ rev/sec we have $\phi = 45^o$.

In fig. 53 one sees the oscillogram of the tensions generated by two coils of the two stepping motors shown in fig. 50 whose rotors were rotated on a common axle by a d.c. motor. The tensions were conducted to the two channels of a double-beam oscilloscope.

The oscillogram shows that the minimum of the tension generated by the coil of the second stepping motor (second channel) comes with $74^o.5$ before the minimum of the tension generated by the coil of the first stepping motor (first channel).

Then I closed the second coil by a resistance of 10 Ω and led the electric tension acting on this resistance to the channel 2 of the oscilloscope (see fig. 54).

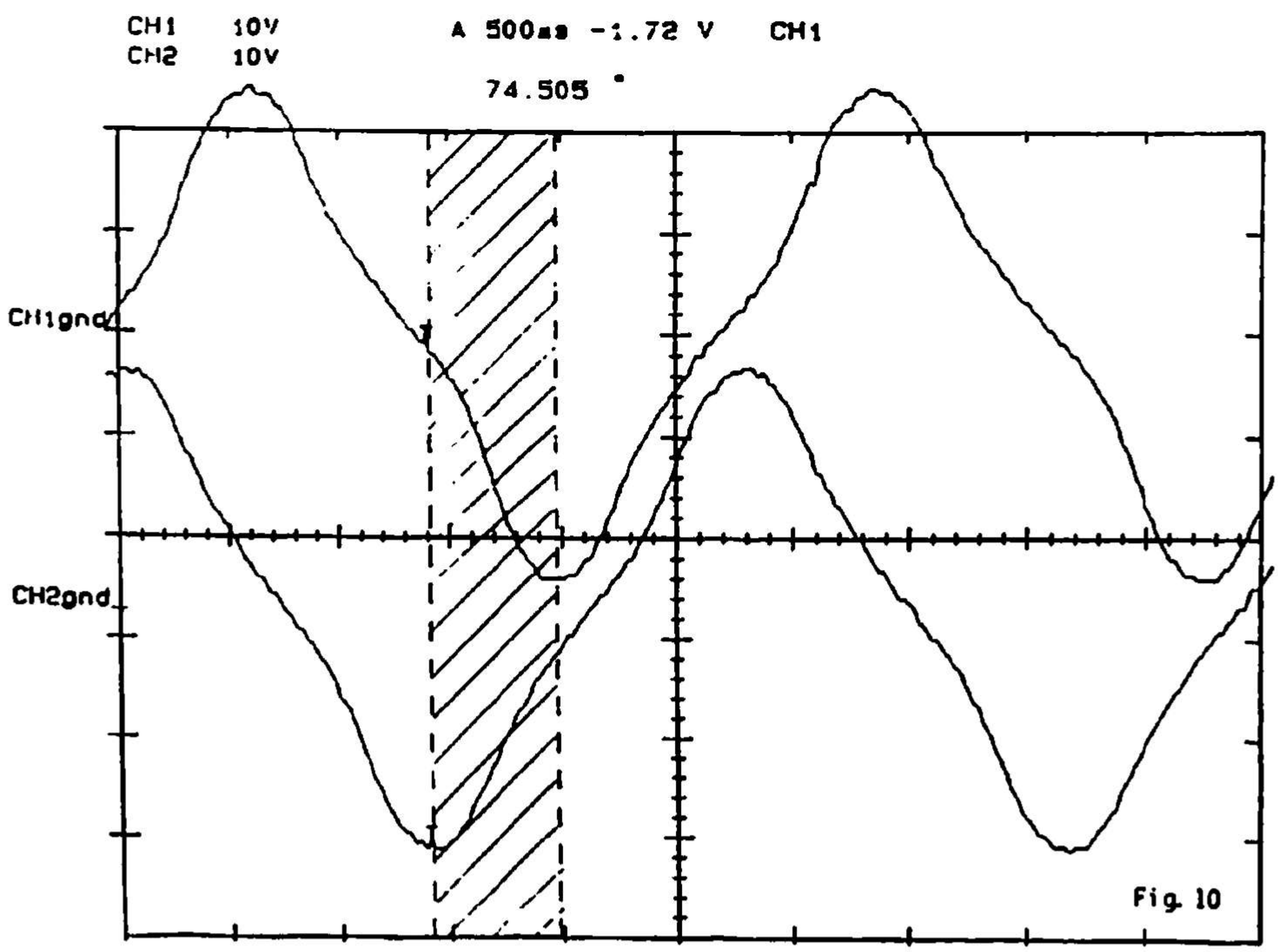

Fig. 53. Graph of the time correlation between the tensions induced in the first and second stepping motors (oscillogram).

The tension from the resistance was taken in such a way that on the oscilloscope it was inverted with 180^0 with respect to the induced tension (this inversion could be evaded if I had earthed not the "left" end of the resistance but its "right" end!). Now we see that the maximum of the current (as a matter of fact, the minimum of the current if the 180^0-inversion was evaded!) appears with $180^0 - 164^0.9 = 15^0.1$ before the minimum of the tension generated by the coil of the first stepping motor.

Thus the retardation of the current in the second coil with respect to the tension generated in it, i.e., the phase angle, was

$$\phi = 74^0.5 - 15^0.1 = 59^0.4. \qquad (54.26)$$

According to formula (54.25) this phase angle corresponds to the following rate of rotation

$$N = 12.5 \tan 59^0.4 = 21 \text{ rev/sec.} \qquad (54.27)$$

The measurement gave indeed this number for the rotational rate.

Fig. 47 which is drawn for $\phi = 60^0$ shows the relation between generated tension, induced tension and flowing current (i.e., ohmic tension) which were established in the coil of my stepping motor at a rotation with 21 rev/sec.

The coincidence between theory and experiment was complete.

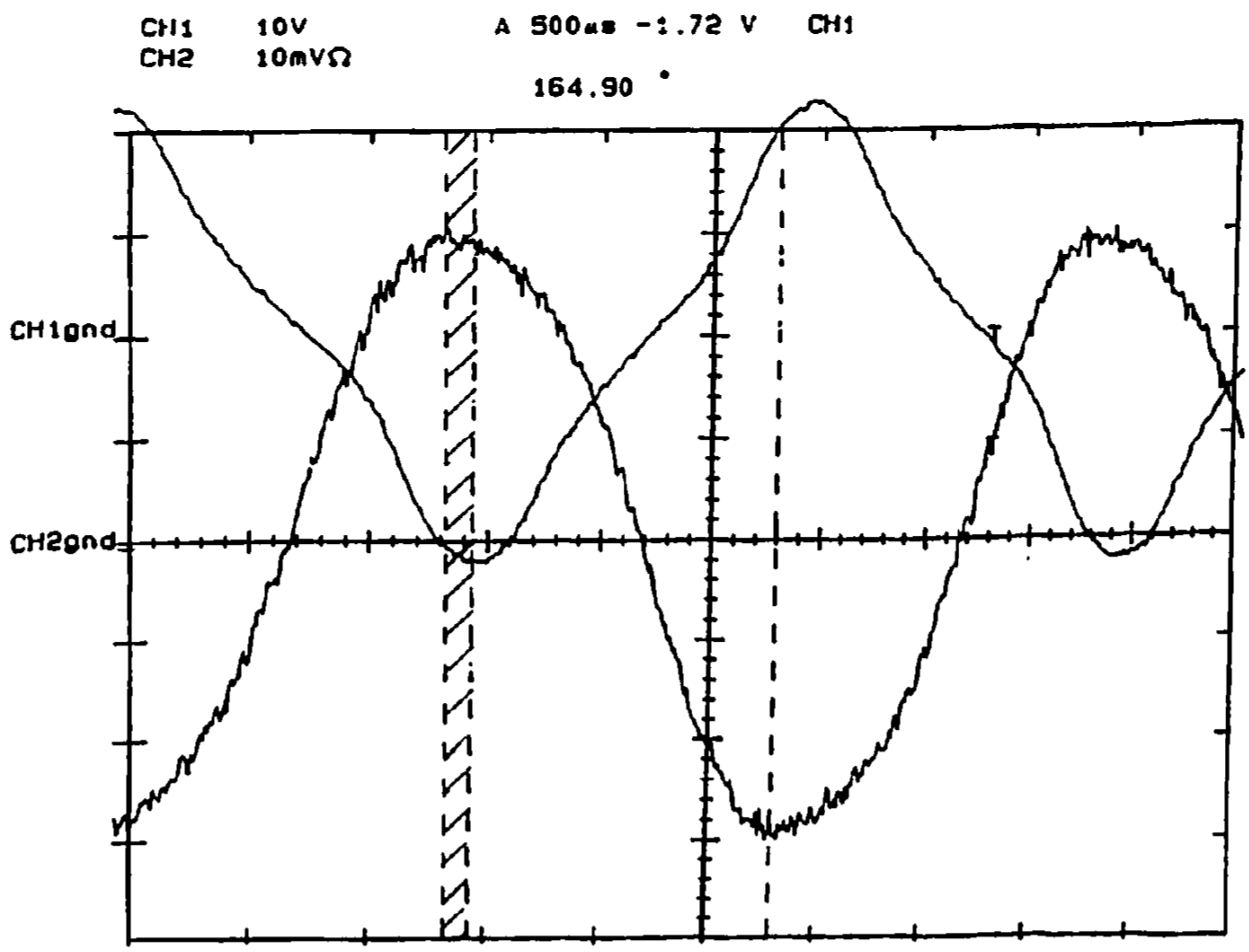

Fig. 54. Graph of the time correlation between the tension induced in the first stepping motor and the current induced in the second one (oscillogram).

§4.5. GENERAL ANALYSIS OF THE ANTI-LENZ EFFECT.

It is clear when looking at fig. 47 that the magnetic field generated by the hatched current supports the rotation and only the magnetic field generated by the unhatched current brakes the rotation, or to put it shortly, the hatched current produces anti-Lenz effect and only the unhatched current produces normal Lenz effect.

For $\phi = 0$ the whole generated current produces Lenz effect, for $0 < \phi < \pi/2$ the Lenz effect is prevailing over the anti-Lenz effect and we have integral normal Lenz effect. For $\phi \to \pi/2$ the Lenz effect becomes equal to the anti-Lenz effect and we have integral zero Lenz effect. Thus the machine VENETIN COLIU can reach at the most an integral zero Lenz effect.

However, at short-circuiting of the coils in our VENETIN COLIU machines we observed that the consumption of the driving motors diminished and the rate of rotation increased. Thus we observed an integral anti-Lenz effect.

Now I shall show that a part of this effect, i.e., a part of the acceleration of the rotor, was due not to the production of energy from nothing but to the decrease of certain "friction energy", namely to a decrease of the energy losses due to the eddy currents.

EDDY CURRENTS are the currents induced in massive conductors when the magnetic flux through the conductors varies. There is no principal difference between the currents induced in wires and the eddy currents, only the calculation of the effects related to addy currents is more difficult, as they are "hidden" in the massive conductors.

One can accept that the eddy currents are always "in phase" with the generated tension, as the inductance of massive conductors is extremely low. Thus the eddy currents will "follow" in fig. 47 the generated tension and their magnetic field will always (at low and high velocities of the rotor) brake the rotation. (Note, however, the R of eddy currents is also very low!).

If at $\phi \cong \pi/2$ we short-circuit the coil of the generator, the magnetic intensity generated in the coil will produce magnetic flux exactly opposite to the magnetic flux Φ produced by the moving rotor's magnet. Thus the resultant magnetic flux through the coil will be less. This will lead to a lower tension $(U_{gen})_{eddy\ curr.}$ which generates the eddy currents. Consequently the braking action of the eddy currents will be less and the braking torque acting on the rotor will be less.

The effect of the rotor's acceleration due to such a decrease of the eddy currents is not interesting for us and we have to search to build VENETIN COLIU machines without eddy currents which are only a parasitic phenomenon. If there are no eddy curtnets, the only losses which we have to cover with energy produced from nothing (because of the integral zero Lenz effect) will remain the mechanical friction losses. As the friction losses can be made very low, a part of the energy produced at the zero Lenz effect which can be extracted from the machine can cover them.

However my experiments showed quite clearly that if disregarding the eddy currents, there is still a self-accelerating torque acting on the rotor at short-circuiting of the coil (see the data below).

I could not find a firm and clear explanation of this integral anti-Lenz effect and I presume that it can be due to the EWING EFFECT.

The effect observed for the first time (to the best of my knowledge) by Ewing[49] has many different names: magnetic viscosity, magnetic after affect, time effect in magnetization. Recently my friend Ch. Monstein[50] revived this almost forgottrn but very important effect with a series of beautiful experiments.

The Ewing effect consists in the retardation of the magnetization of a magnetic slab if the magnetizing intensity is applied to the one of its extremities and we look for the magnetization at the other extremity. This time is pretty large, of the order of tens of milliseconds per meter.

Thus I made the hypothesis that, because of this retardation in the magnetization of the iron in our VENETIN COLIU machines, the magnetic flux in the coil reaches its maximum (when the length of the yoke is not negligible) not for the moment when the moving magnet reaches the neutral position (the moments t_0, t_2, t_4 in fig. 47) but with some retardation. Thus the graph of the flux Φ will be displaced at a certain angle α to the right in fig. 47. Consequently all other graphs will be displaced at the same angle, as the variations of Φ determine the variations of the induced tension. It is evident that in such a case the currents generating anti-Lenz effect will prevail over the currents generating Lenz effect.

Additional theoretical and experimental work is needed for the acceptance (or rejection) of this hypothesis.

54.6. THE MACHINE VENETIC COLIU V.

The first four variations of the VENETIN COLIU machine built by me are presented with their diagrams and photographs in Refs. 51 and 52.

I call VENETIN COLIU V every stepping motor, as every stepping motor has a very pronounced self-accelerating effect when used as generator and the rate of rotation is not low. Thus the stepping motor in figs. 50 and 51 can be considered as my VENETIN COLIU V machine.

In table 54.1 a series of measurements with VENETIN COLIU V is given.

The table is self-explanatory and I shall give only some short remarks:

The lowest tension applied to the driving motor was 6 V, as at 5 V the motor stopped at short-circuiting of the coil because of the huge normal Lenz effect (very low phase angle ϕ). The normal Lenz effect is clearly seen at low velocities, i.e., at low driving tension of the motor. At U_m = 10 V there is integral zero Lenz effect and at U_m = 30 V there is a considerable (52.3%) anti-Lenz effect. One has to take into account that in stepping motors the eddy currents are very high (see

Table 54.1

Tension applied to the motor	Current consumed by the motor		Power consumed by the motor		Increase of the consum. power	$\frac{\Delta P_m}{P_m}$	Tension induced in the coils	Current flowing in the coils	Power produced by the generator	$\frac{P_g}{P'_m}$
	at open coils	at closed coils	at open coils	at clos. coils						
U_m (V)	I_m (mA)	I'_m (mA)	P_m (W)	P'_m (W)	ΔP_m (W)	%	U_g (V)	I_g (mA)	P_g (W)	%
6	123	220	0.74	1.32	+0.58	+78.4	7.2	20	0.13	9.8
10	160	160	1.60	1.60	0	0	14.5	42	0.56	35.0
20	224	124	4.48	2.48	-2.00	-44.6	30.0	43	0.59	23.8
30	260	124	7.80	3.72	-4.08	-52.3	49.0	43	0.59	15.9

the high power consumption at open coils when the driving torque has to overcome only the friction (which is low) and the braking torque of the eddy currents), but nevertheless it seems highly improbable that such a considerable decrease in the power consumed is due only to the decrease of the eddy currents.

54.7. THE MACHINE VENETIC COLIU VI.

With the aim to exclude the action of the eddy currents, I constructed the machine VENETIN COLIU VI with ferrite magnets and soft ferrites which had low eddy currents.

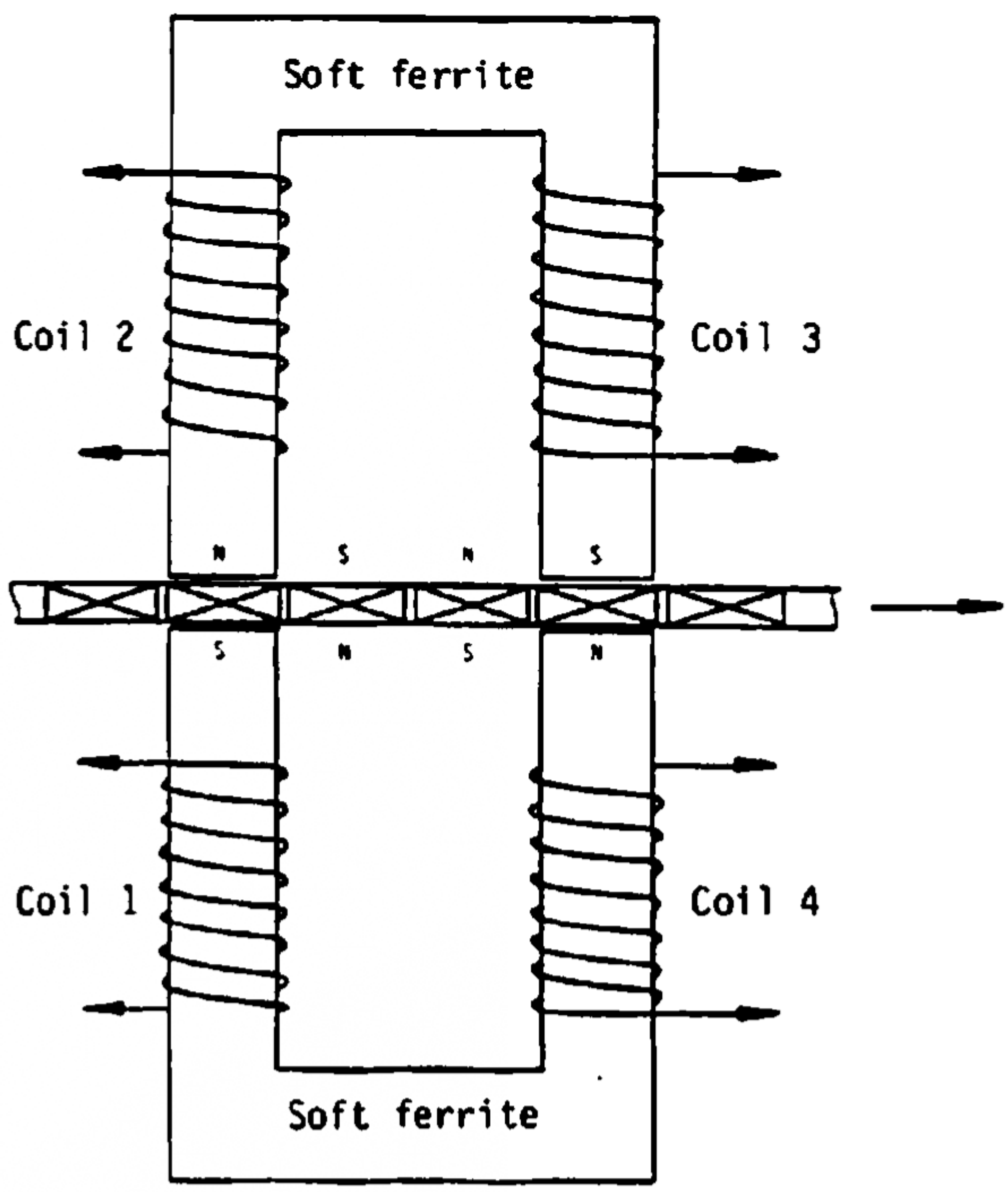

Fig. 55. Schematic diagram of the two polar machine VENETIN COLIU VI.

(Let me note that my machine VENETIN COLIU II was also built only with hard and soft ferrites and the machine VENETIN COLIU III with soft ferrites[51].)

I went specially to a plant in former East Germany to buy them, as it was promised to me that the ferrites will be thoroughly without eddy currents. This was not the case as the reader will see: the ferrites had eddy currents, but low.

A detailed report on VENETIN COLIU VI is given in Ref. 53. Here only a short account:

The schematic diagram of one generator knot of VENETIN COLIU VI is given in fig. 55 and the photograph of the machine with three generator knots is given in fig. 56. The VENETIN COLIU VI machine with only one generator knot is shown in fig. 58. Further I shall speak and give data for the machine with only one mounted generator knot. The description of the machine is the following:

Along the rim of the rotating disk with diameter 180 mm there are arranged 24 cylindrical magnets with diameter 19 mm and height 6 mm. Every Π-form yoke (which can be see in the middle of fig. 57) has the following dimensions: length 80 mm and height 90 mm. The disk is fixed to an axle with diameter 4 mm which can rotate on two ball-bearings fixed to the upper part of the machine. When the upper yoke with its two coils is fixed to the upper part, the disk is fixed to the axle at a respective distance from the coils (about 1 mm). Then the upper part is put on the four brass columns and, by letting it fall micrometrically down, the distance between the

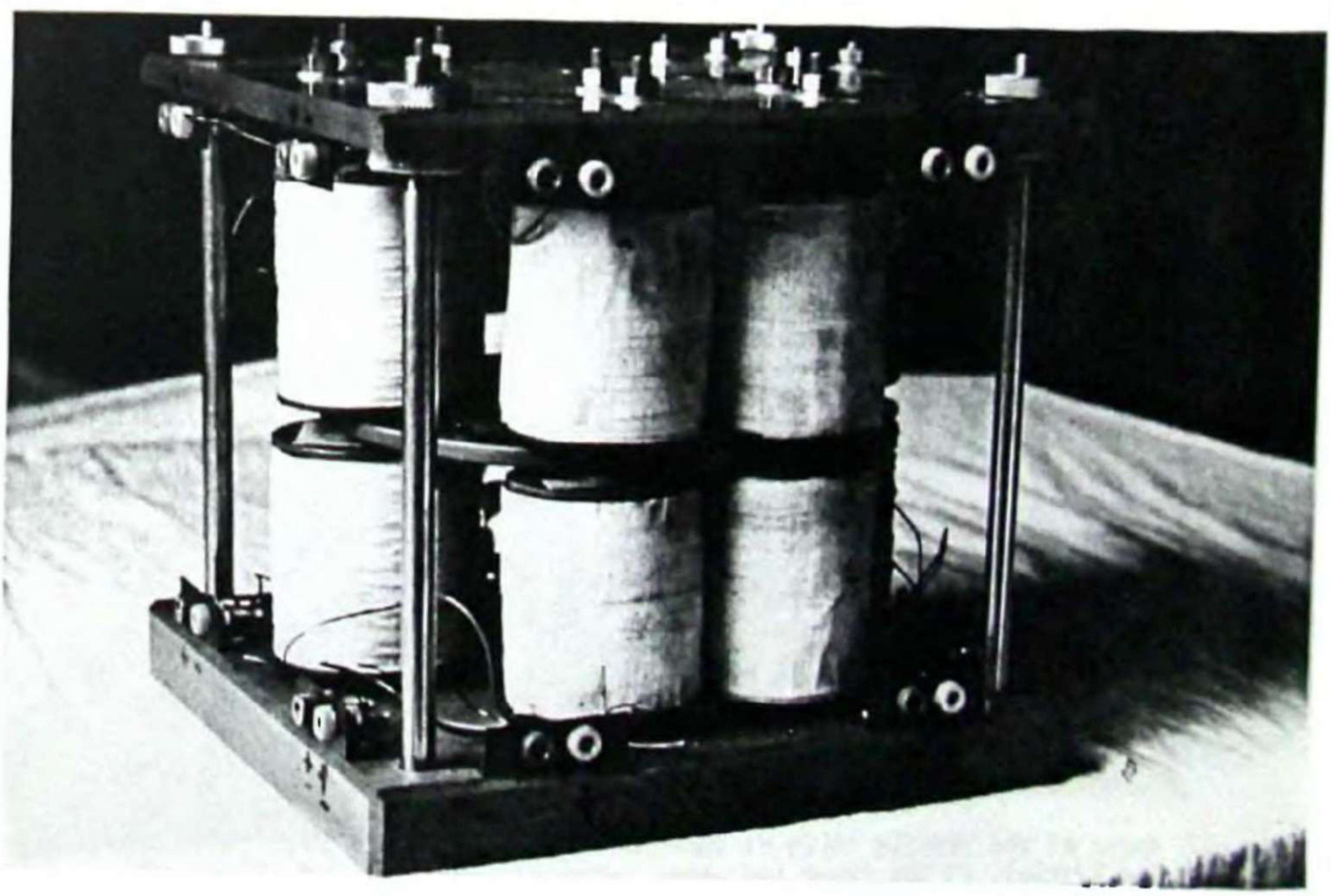

Fig. 56. Photograph of the machine VENETIN COLIU VI (with three generator knots).

disk and the lower coils is fixed at the respective 1 mm.

I made coils with different thickness of the wire, beginning with thickness 1.8 mm. The best results, of course, were obtained with coils having the thinest wire, as their inductance was the highest. I shall describe the measurements only with such coils.

Thus I made four coils with wire of thickness 0.2 mm, 23,000 turns and resistance R = 1600 Ω each. Here the phase angles were the highest and the anti-Lenz effect also the highest. Let me note that the currents in the different coils, because of the appearing mutual inductances, depended strongly one on another. So I measured the following currents in coil 1 (see fig. 55):

I = 7.4 mA when coils 2,3,4 were open,

I = 5.4 mA when coil 2 was closed and coils 3,4 open,

I = 6.2 mA when coil 3 was closed and coils 2,4 open,

I = 5.1 mA when coil 4 was closed and coils 2,3 open,

I = 3.7 mA when all coils 2,3,4 were closed.

The measurements are presented in table 54.2.

The driving tensions, U_{mot}, are given in the first column, the currents I_0 consumed by the motor when the disk rotated alone are given in the second column, the currents I_{00} consumed by the motor when the coils are mounted without the yokes (and even without the wires) are given in the third column. I show in fig. 57 (at the left) how the coils without the yokes were mounted. Comparing columns 2 and 3

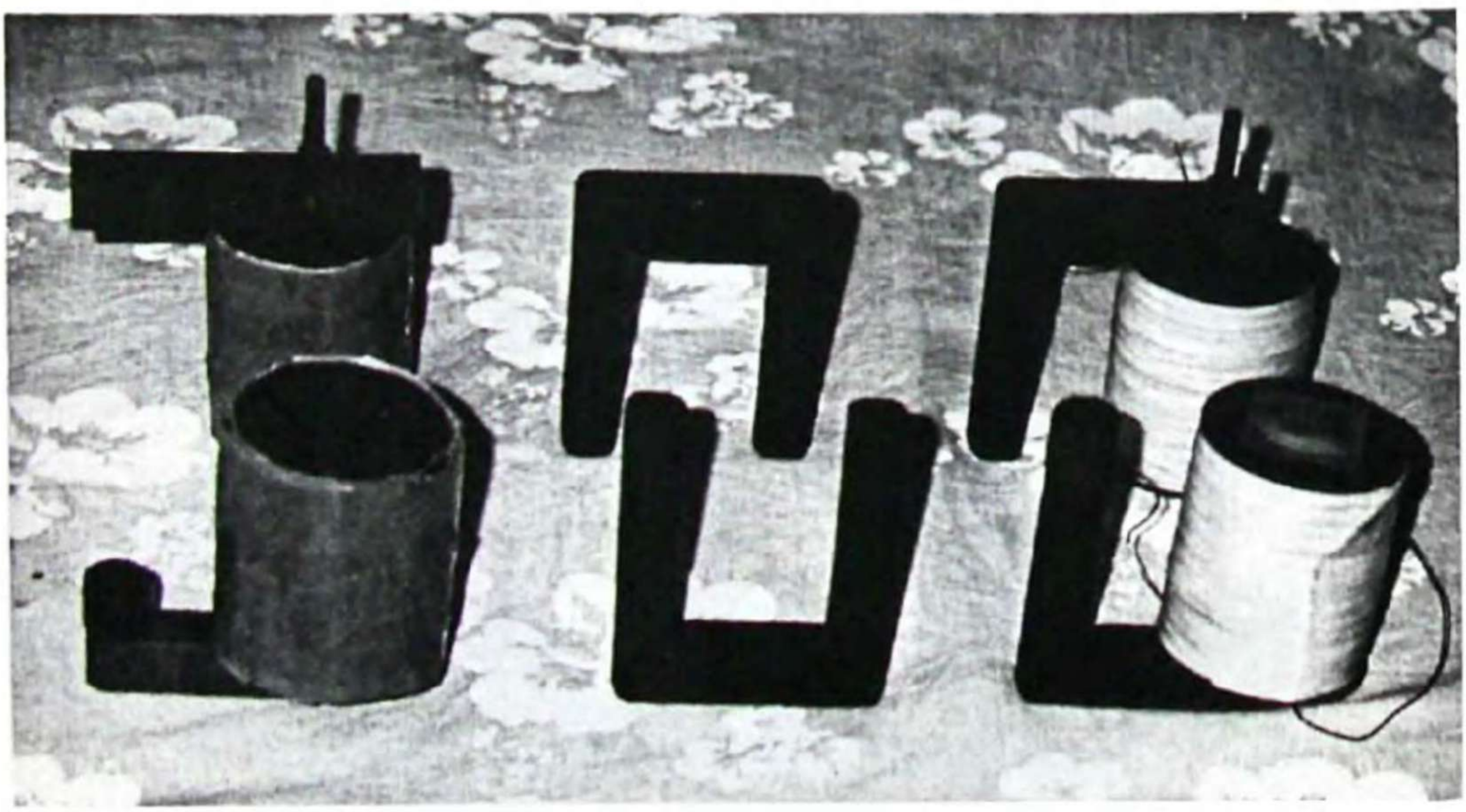

Fig. 57. Parts of the VENETIN COLIU VI machine: 1) the yokes of soft ferrites (in the middle), 2) the lower and upper yokes on every one of which only one coil is mounted (at the right), 3) mounting of the lower and upper coil's supports without wire (at the left).

Table 54.2

Driving tension	Driving current				Current difference	Current change	Power change
	without yokes without coils	without yokes with coils	with yokes with coils (open)	with yokes with coils (closed)		ΔI =	
U_{mot} (V)	I_0 (mA)	I_{00} (mA)	I (mA)	I' (mA)	$I-I_0$ (mA)	$I'-I$ (mA)	ΔP (mW)
5	33	33	38	53	5	15	75
10	46	46	53	54	7	1	10
15	65	65	80	70	15	-10	-150
20	88	89	104	91	16	-13	-260

Generated current: I_{gen} = 3.7 mA, Generated power: $P_{gen} = 4I^2_{gen}R_5$ = 88 mW

one sees that the friction in the air when the coils are mounted is so feeble, that it can be neglected. The currents, I, consumed by the motor when the coils are mounted with the yokes of soft ferrites are given in the fourth column, for the case where the coils are open. The currents, I', for the case where the coils are closed (i.e., short-circuited) are given in the fifth column. The differences of the currents I and I_0 are given in the sixth column. The changes $\Delta I = I' - I$ of the currents at closed and open coils are given in the seventh column. The changes ΔP =

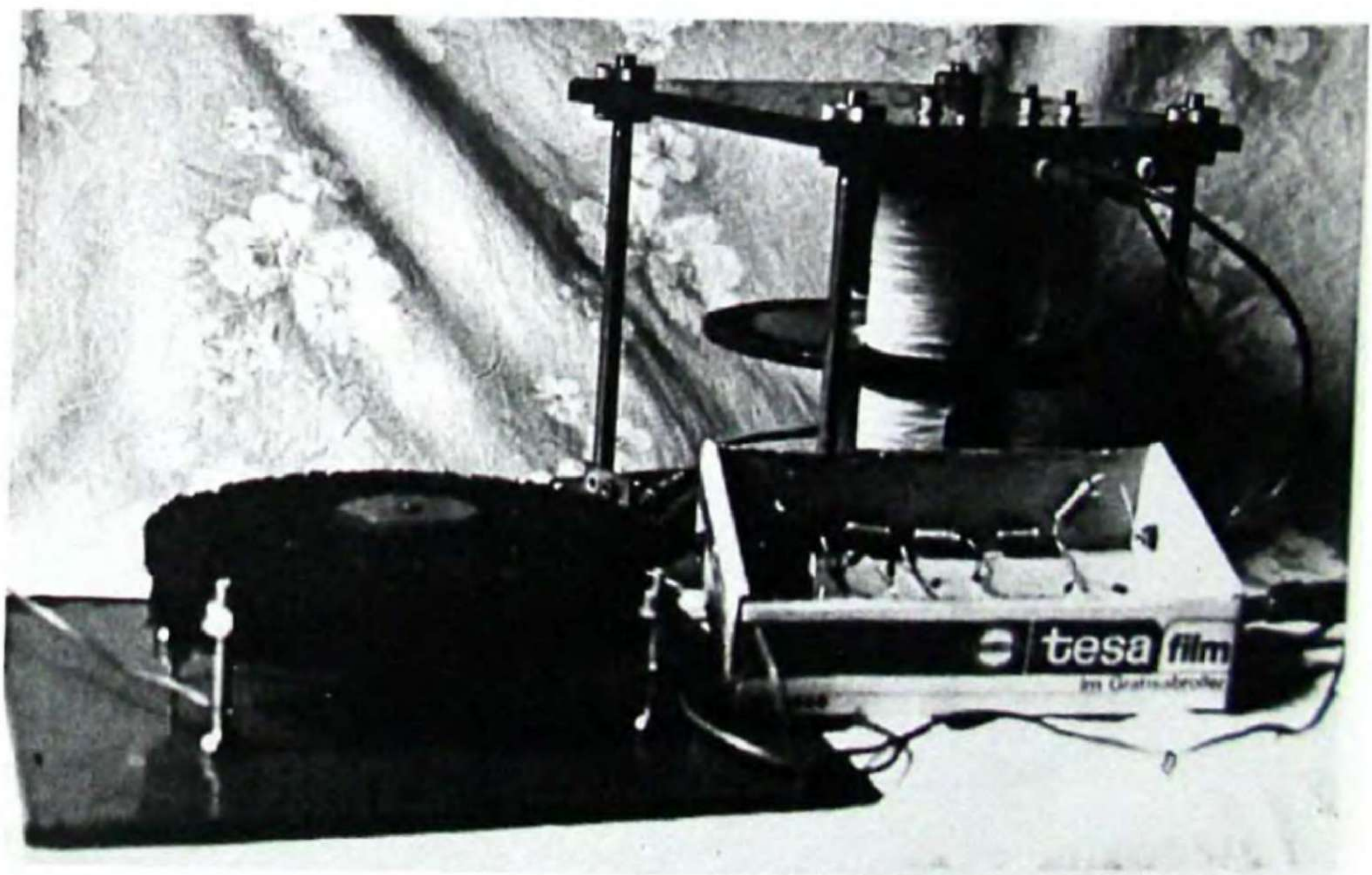

Fig. 58. Driving a corona motor by the output of VENETIN COLIU VI increasing the tension via a cascade (on the machine one generator knot is mounted).

$U_{mot}(I' - I)$ in the driving power are given in the eighth column.

If considering the last line of this table, we see that the law of energy conservation is violated. Indeed, at U_{mot} = 20 V and closed coils the driving current is 91 mA. Of this current I_{oo} = 89 mA are spent for overwhelming the mechanical friction and only $I' - I_{oo}$ = 2 mA or $P' - P_{oo}$ = 40 mW are spent for producing electric energy. Meanwhile only the electric power produced as heat in the wires of the coils is P_{gen} = 88 mW. To this power one must add also the heat power of the remaining eddy currents (which, unfortunately, cannot be measured).

If at eddy currents equal to zero, we can still have an integral anti-Lenz effect, then one can run the VENETIN COLIU machine as a perpetuum mobile by short-circuiting its coils.

If we can arrive at the most at a zero Lenz effect, then to run the machine as a perpetuum mobile, a part of the produced electric energy is to be sent to the driving motor.

I established[54] that the electrostatic CORONA MOTOR needs less electric power for its rotation than the delivered mechanic power. In fig. 58 a corona motor is shown driven by the tension generated by the VENETIN COLIU VI machine which was enhanced to about 10,000 V direct tension by the help of a cascade shown in the photo-

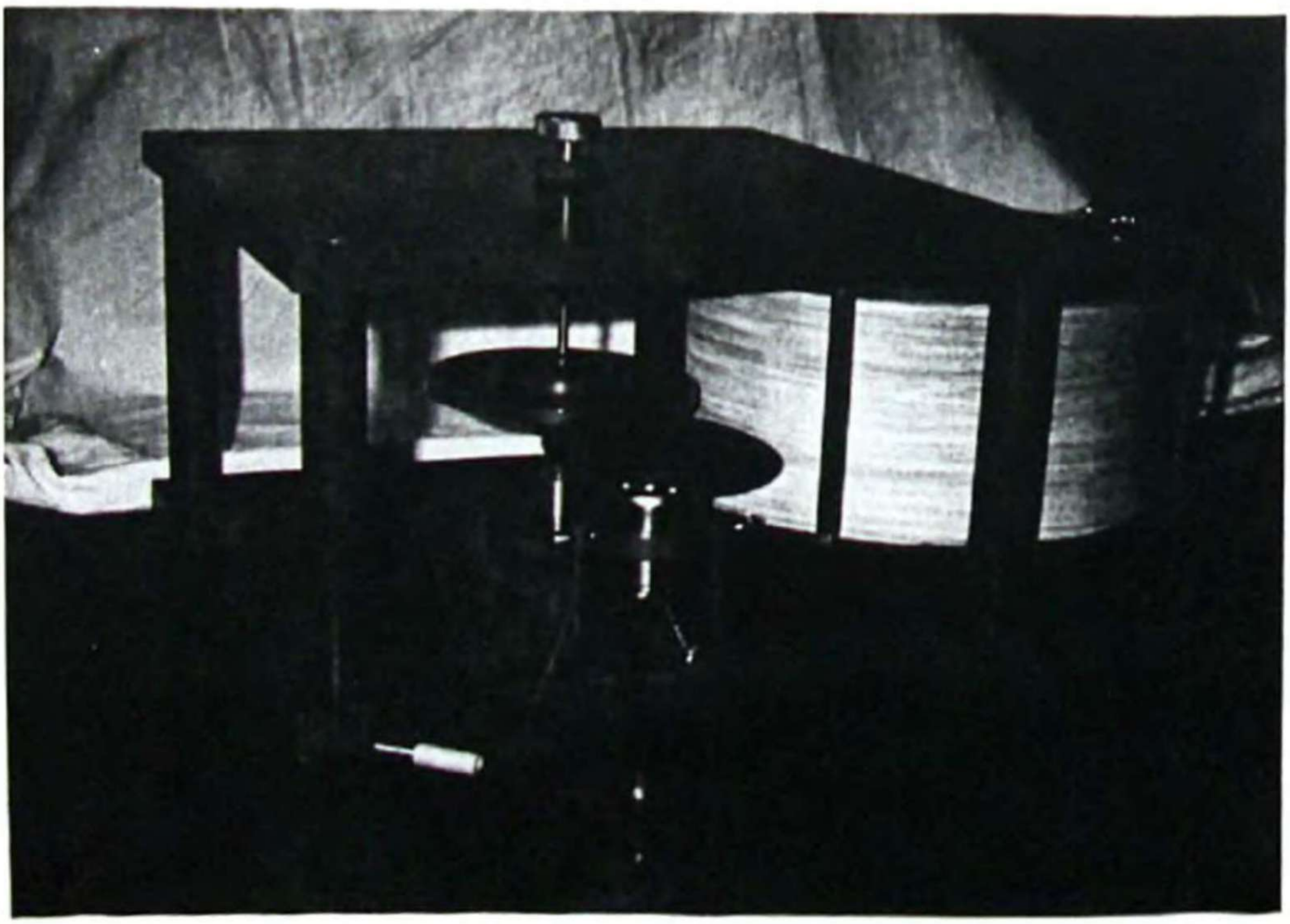

Fig. 59. Photograph of the machine VENETIN COLIU VII.

graph (later I made four such blocks). At rotation or non-rotation of the corona motor the input of the driving motor remained exactly the same. The rotation of the corona motor was powerful but much more feeble than the rotation of the driving motor. However the losses in the cascade, done by the most cheap diodes and condensers, consumed a considerable power from the generator. At a cascade without losses there are no problems to drive the VENETIN COLIU machine with low friction (see Sect. 54.8) and without eddy currents by a corona motor.

54.8. THE MACHINE VENETIN COLIU VII.

VENETIN COLIU VII is constructed exactly in the same manner as VENETIN COLIU VI and with the same (bad!) hard and soft ferrites (fig. 59). The difference is that the rotor of VENETIN COLIU VII is suspended on jewel axle and the earth attraction is balanced by a magnetic repulsion (see Sect. 59), so that the mechanical friction is reduced practically to zero. There is only one coil in a generator knot (we can have three such knots, as one side in the apparatus must be left free for the driving motor - see fig. 59). I made only one coil with thickness 0.6 mm, 27,300 turns and resistance R = 730 Ω.

The yoke for this big coil was much longer and this increased the Ewing effect.

Fig. 60. The stand of the pupils on the "anti-Lenz effect" at the regional middle school competition in Münster.

Now, however, because of the much longer yoke, the reluctance became too high and the magnetic flux was considerably diminished.

I hope that with good ferrites (without eddy currents, with larger cross-sections outside the coil, possibly with higher permeability) and stronger magnets (also without eddy currents) I shoul be able to run VENETIN COLIU VII as a perpetuum mobile with the coil and the rotor suspension shown in fig. 59.

54.9. THE ANTI-LENZ EFFECT AND THE CHILDREN.

Official science makes as if my theory, experiments, machines and publications do not exist. The same do all professors and students all over the world, as even the minds of the students are already deformed by the existing scientific dogmas.

But the minds of the pupils in the middle schools are free. So the pupils in the *Friedensschule* in Münster, Germany, reproduced my ball-bearing motor (see Sect. 64) and won with it the first prize at the competition *Schüler experimentieren* for the year 1989.

The pupils of the same school made also demonstrations of the anti-Lenz effect on stepping motors and presented their experiments at the regional competition *Schüler experimentieren* for the year 1993. The pupils received however the second prize, as if the first prize would be awarded, they would have the right to present their experiments at the national competition. This, surely, would anger the national Jury of eminent German high-school professors.

Thus official science is afraid even of the experiments of the pupils in the middle schools and makes all possible to suppress their research and to silence their observations.

The stand of the pupils at the regional competition is shown in fig. 60.

55. MOLLER'S SIMPLE EXPERIMENT REVEALING THE ROLE OF IRON CORES IN THE ELECTROMAGNETIC MACHINES

Fr. Müller carried out[36] the following experiment which he presented in a simplified form[55] shown here in fig. 61.

The current in the rectangular loop generates a certain magnetic intensity field. On the loop there is a cylindrical core of soft iron in whose hole a wire ab (very long) passes. At the end points of the wire there are sliding contacts and the wire can be moved at right angles to its length in the cylindrical hole of the iron. The cylindrical iron can also be moved, alone, or together with the wire.

In Müller's experiment the following electromotive and ponderomotive effects can be observed (Müller has observed only the electromotive effects):

If the wire is moved but the shield and the loop are at rest, there will be no induced tension because there is rotA = 0 in the domain of the wire's location. If sending current through the wire ab and only ab has a freedom of motion, there will be no motion of ab, as rotA = 0.

If the wire ab is at rest and the shield is moved with a velocity v, a motional-transformer electric intensity will be induced in ab because we shall have (v.grad)A ≠ 0. If also the wire ab moves with the same velocity as the shield, the induced tension will remain exactly the same, as the motion of ab in a domain where rotA = 0 is immaterial.

If the shield has a freedom of motion (resp., the shield and the wire solidly fixed to the shield have freedom of motion), there will be motion of the shield (respectively, there will be motion of the shield and the wire). The explanation of this motor effect is the following: At the right side of fig. 61 are designed the lines of the magnetic intensity (i.e., the lines of the magnetic induction). If we look from point a to point b, then, at the indicated direction of the current in the rectangular loop, the lines of the magnetic intensity (induction) will be pointing from down to up. Let us now suppose that along the wire ab current flows from the reader (i.e., from point a to point b). In such a case the magnetic intensity lines of the wire's current are to be added to the existing lines of magnetic intensity. As at the right from the wire ab the magnetic lines generated by the wire's current will be opposite to the existing magnetic lines, the resulting lines will become more rare; similarly at the left from the wire ab the resultant magnetic lines will become more dense. As the magnetic lines can be considered as "elastic strings", forces will appear pushing the shield to the right tending to equalize the density of the resulting magnetic lines at the right and at the left of the wire ab. Thus the shield will be pushed to the right.

I have to emphasize once more (see Sect. 51) that there are no magnetic lines and it is senseless to imagine that some "elastic tensions" exist between the magnetic lines. The magnetic lines and the "elastic tensions" are only a symbolical language. But with this symbolic language Faraday, who was not a mathematician, could give right predictions to many effects in electromagnetism. Although this figurative

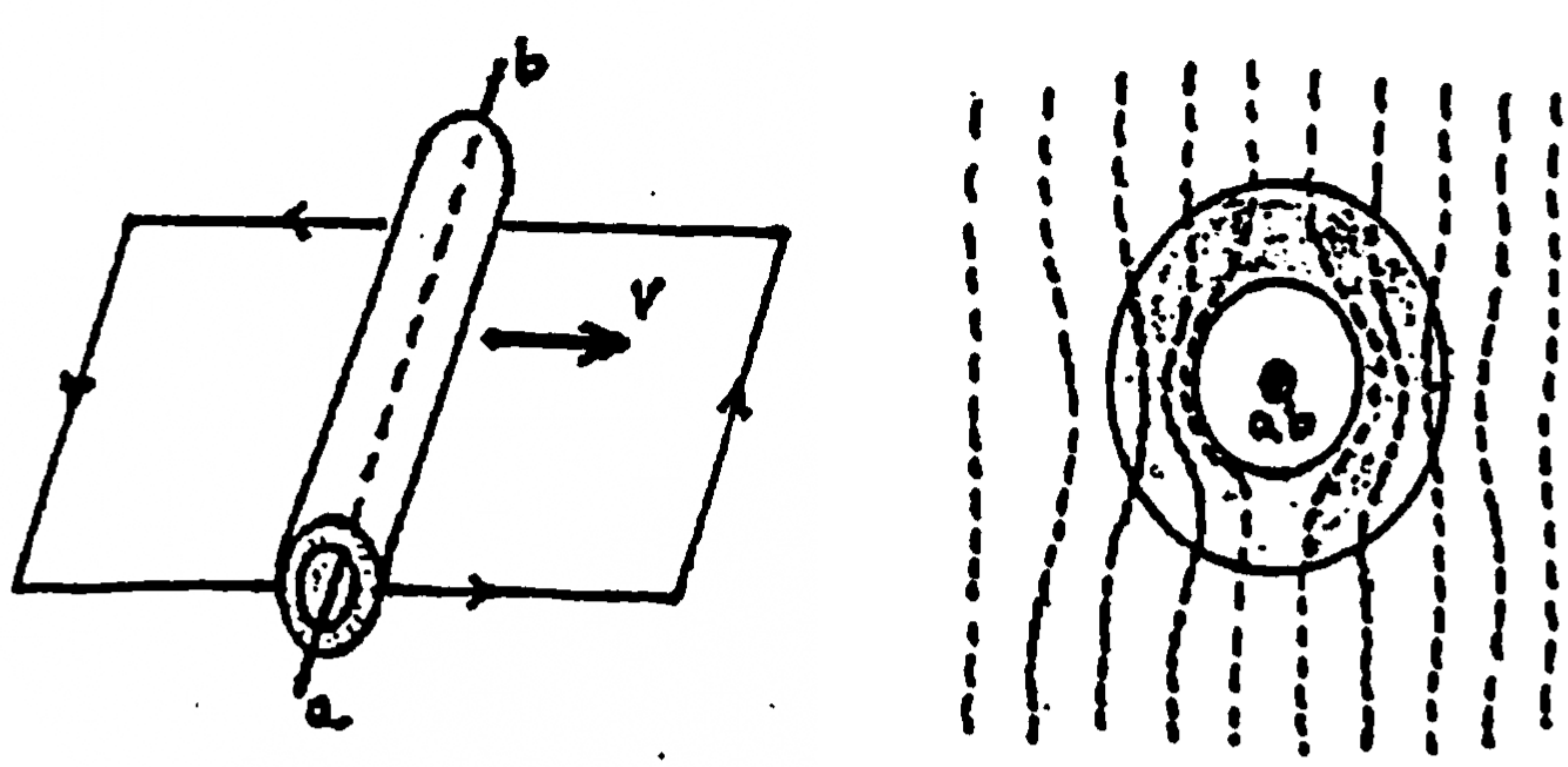

Fig. 61. Müller's experiment revealing the role of iron cores.

Faraday language has no some material (physical) background, I use it too to be able to explain with a couple of sentences pretty complicated effects which one observes. If one would like to give an adequate physical explanation, one has to describe the interaction between the single current elements (in the rectangular wire, in the wire ab, but also in the iron of the shield) and then to integrate. This way is cumbersome and we can give a quick qualitative answer by using Faraday's symbolic language. This is the whole "puzzle" with the forces which act on the shield but do not act on the wire.

The explanation of the above effects allows to explain the effects in the rotors and stators of the electromagnetic machines where the current wires are put in the holes of iron cores. Official physics is unable to present logical physical explanation of these effects, as it ignores the notion "motional-transformer induction" and the notion "absolute space" in which all electromagnetic phenomena are to be described.

56. THE ANTI-DEMONSTRATIONAL ROTATING AMPERE BRIDGE (RAB) EXPERIMENTS

The story with my ROTATING AMPERE BRIDGE (RAB) EXPERIMENT was very dramatic. Because of a wrong calculation when proceeding from Whittaker's formula, I came to the wrong conclusion that, according to Whittaker's formula (24.3), RAB must rotate.

I constructed several RAB-MACHINES all of whom, more or less, showed some acting torques. I became actively involved in the construction of RAB-machines, as their executions were relatively easy and cheap and I hoped[21,56,57] to demonstrate in this way the validity of Whittaker's formula.

However, later I established that all effects of rotation which I have observed were due to side effects and that there is no magnetic torque acting on the rotating Ampere bridge. Thus all my RAB-experiments are, as a matter of fact, anti-demonstrational (null) experiments.

I shall present here the photographs of some of my RAB-experiments, as I have dedicated time, money (and hopes) for their expecution and to the mother's heart not only the successful children are cherished. And I shall point out at the side effects which led me astray.

My most simple rotating Ampere bridge with two symmetric shoulders (to exclude the magnetic action of the Earth's magnetic field if constant current is sent through the bridge) is shown in fig. 62. I observed oscillations of the bridge when sending current pulses of some 10 A with a frequency equal to the own frequency of oscillations of the system. The bridge began to oscillate. Later I understood that the reason for the oscillations was in the thermal deformations of the suspension wires.

I express here my thanks to my friend, Prof. Pappas, who, during my sojourn in his house in Los Angeles, helped me in revealing this thermal effect.

I began to construct rotating Ampere bridges in the late eighties when Whittaker's formula was still unknown to me. At that time I thought that Grassmann's formula (24.4) is the right one and that Ampere's formula (24.5) is wrong. To give an experimental support to this my conviction, I constructed the machine whose drawing is in fig. 63 and the photograph in fig. 64. As according to Grassmann's formula, on the Π-form wire ABB'A' in fig. 14 there must be a force pushing it in the direction AB (A'B'), I decided to put sliding contacts at the points A and A', to make the wires OA and O'A' current conducting disks, and to observe the "propulsive" motion of the Amepere bridge ABB'A', which because of the motional limitations will become rotational.

The machine was done and it rotated in the direction "predicted" by Grassmann's formula. With the aim to be able to measure the induced electric tension and to make also energetic measurements with this "rotating Ampere bridge", I coupled the bridge with the Faraday disk generator shown on the left side of figs. 63 and 64 and called the whole machine "Rotating Ampere bridge with sliding contacts coupled with a Faraday disk generator" or shortly the RAF-MACHINE The detailed description of this beautiful machine with all data of the observed electromotive, ponderomotive and energetic effects is presented in Refs. 22 and 58.

Later, however, I understood that the driving torque was due not to the "Grassmann's forces" allegedly acting on the Π-form rotating bridge, but to the forces ge-

Fig. 62. The anti-demonstrational RAB-machine with two shoulders.

nerated by the currents solid to the laboratory. The diagram explaining why a torque acts on the rotating Ampere bridge with sliding contatcs is shown in fig. 65 and the detailed explanation of the appearing forces and torque according to Whittaker's formula (Nicolaev's formula will not lead to some substantial changes) is given in Ref. 56.

When I realized that in the rotating Ampere bridge suspended on a wire the thermal side effects lead to a torque, I decided to make an autonomous rotating Ampere bridge where such thermal forces will be eliminated. In such an AUTONOMOUS ROTATING AMPERE BRIDGE (ARAB) EXPERIMENT also a violation of the angular momentum conservation law would be observed, according, I repeat, to the wrong calculations done by me when proceeding from Whittaker's formula.

The photograph of my first ARAB-MACHINE is shown in fig. 66. The source of the direct current are the 18 Cd-Ni accumulators arranged radially on the bottom and connected in parallel producing current of hundreds of ampere. The current leaving the positive electrode of the accumulators, goes up along the six vertical peripheral columns to the upper metal disk. By screwing down the top central massive nut bolt (of which on the photograph only the lower part is seen), one makes contact and the current crossing downwards the rotating Ampere bridge (with four shoulders) returns to the negative electrode of the accumulators.

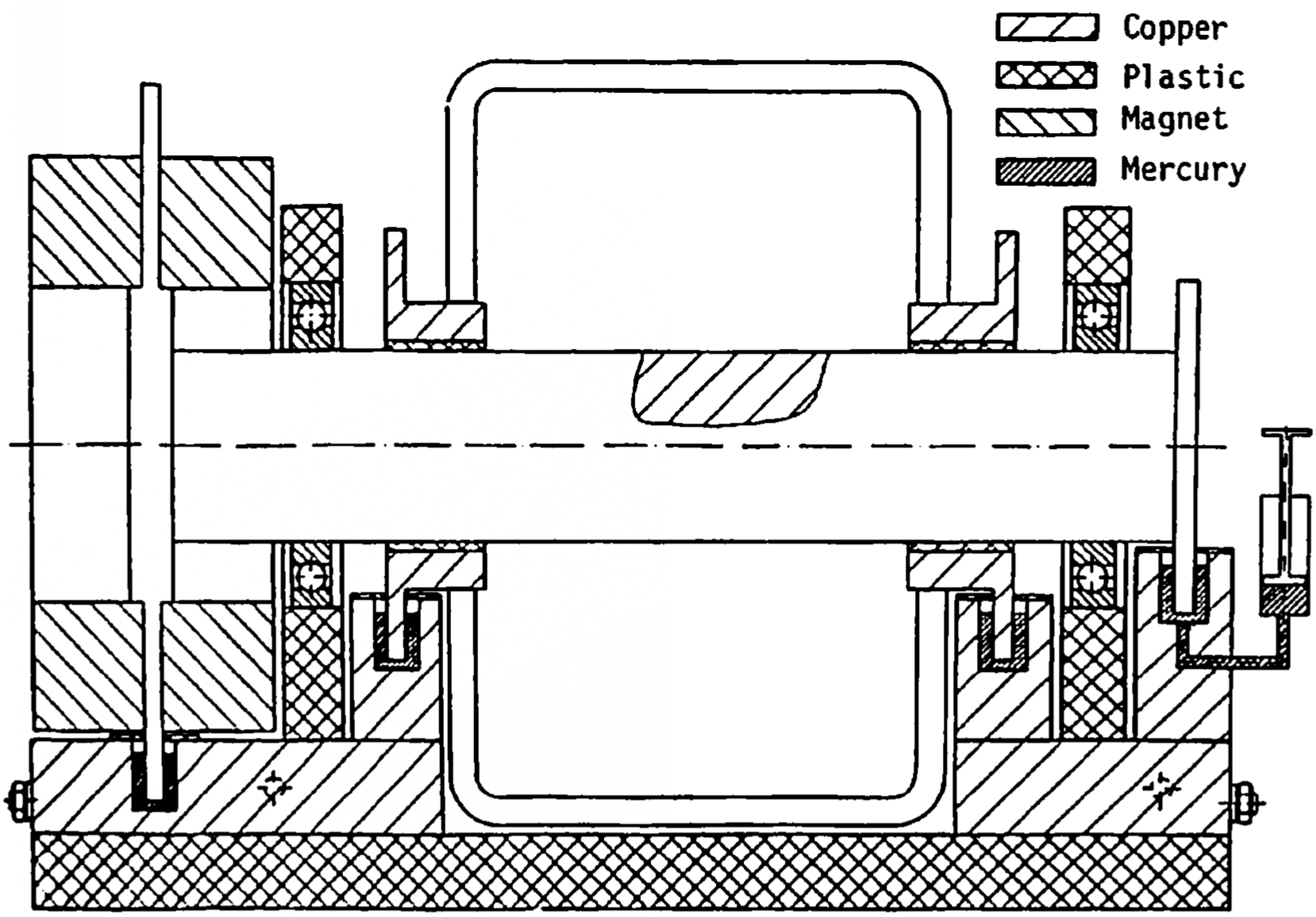

Fig. 63. Diagram of the rotating Ampere bridge with sliding contacts coupled with a cemented Faraday disk generator (RAF-machine).

The ARAB-machine, indeed, came into rotation, as I reported in Ref 56. Later, however, I understood[57] that the reason for the rotation of my ARAB-machine was the interaction with the Earth's magnetic field.

The Earth's magnetic field, however, cannot set the ARAB-machine in rotation but only in oscillation about a certain neutral position. Meanwhile I observed rotation. The explanation of this effect came after many experiments carried out during about two months as I charged the batteries once or twice in a day. The explanation of this rotational effect was the following: When switching on the circuit, the current produced by the accumulators was maximum and rapidly decreased. Thus the initial push (due to inevitable current assymetries in the columns) was the most powerful, the heavy body, because of its big inertia, could overwhelm the opposite torque, as the current producing the opposite torque was substantially less, and so I observed a continuous rotation.

To exclude the action of the Earth's magnetic field, I put the ARAB-machine in an iron "saucepan", manufactured specially for this aim (fig. 67), but the thin iron walls of the "saucepan" could not screen effectively enough the Earth's magnetic

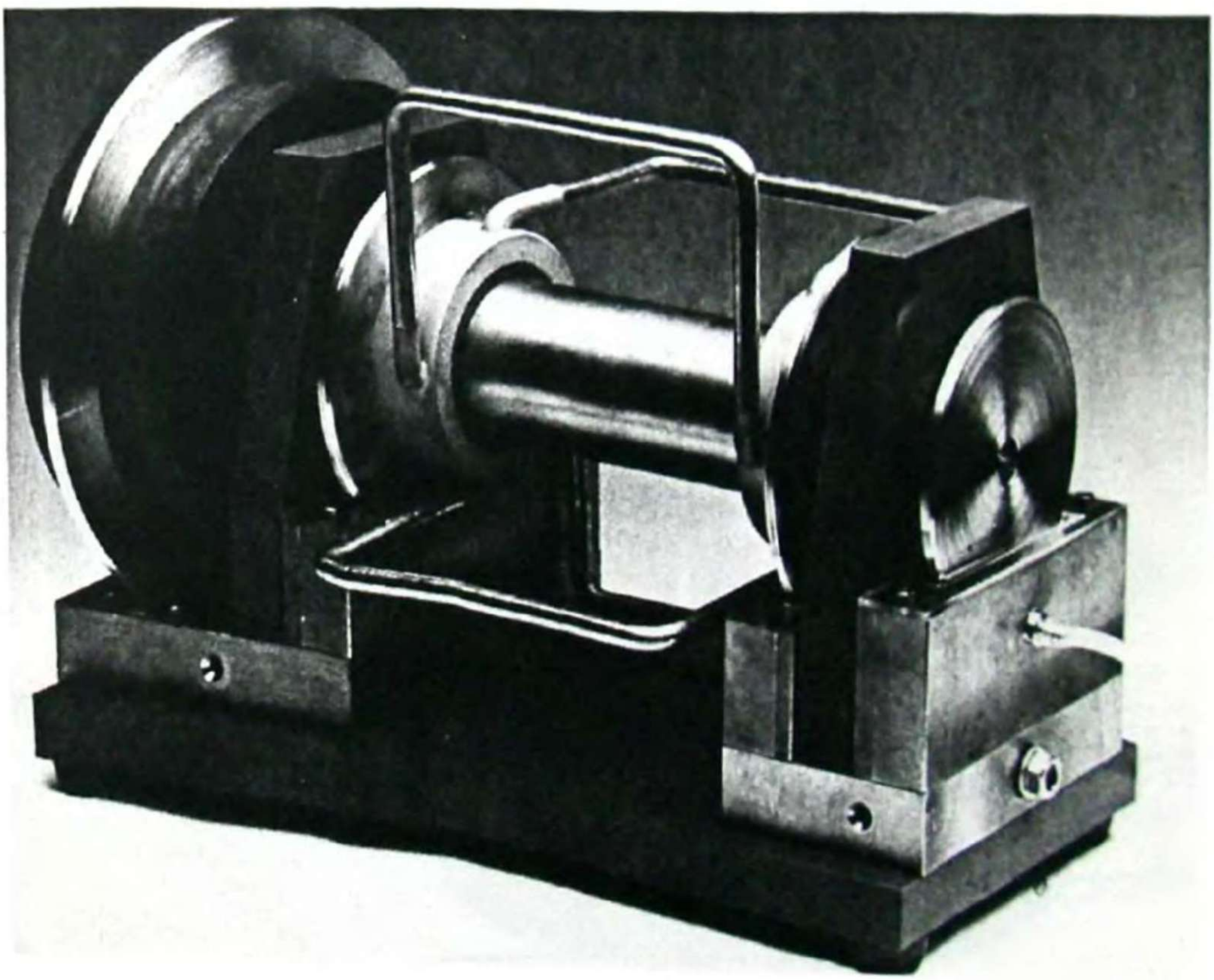

Fig. 64. Photograph of the RAF-machine.

field.

The best way was to send alternating current in the ARAB-machine, but I could not mount on it a source supplying such a big current. Thus I constructed the second ARAB-machine shown in fig. 68 suspending it on strings. Here many wires (about 20) have been wound as one can see on the photograph and the mains supplied alternating current of tens of amperes. Absolutely no oscillation has been observed.

To esclude the thermal effects of the suspension, also the second ARAB-machine shown in fig. 68 was put to swim in water and the current conducting wires were loosely connected with the body of ARAB, so that no torque due to thermal deformations could be communicated. One the other side, as the current conducting wires were bifilar (i.e., going and returning), their magnetic action was null.

Finally I constructed a "rotating Ampere bridge" not with linear but with circular arms (fig. 69) sending to it direct and alternating current. Absolutely no rotation has been observed. If the current conducting wires in this machine will be very long,

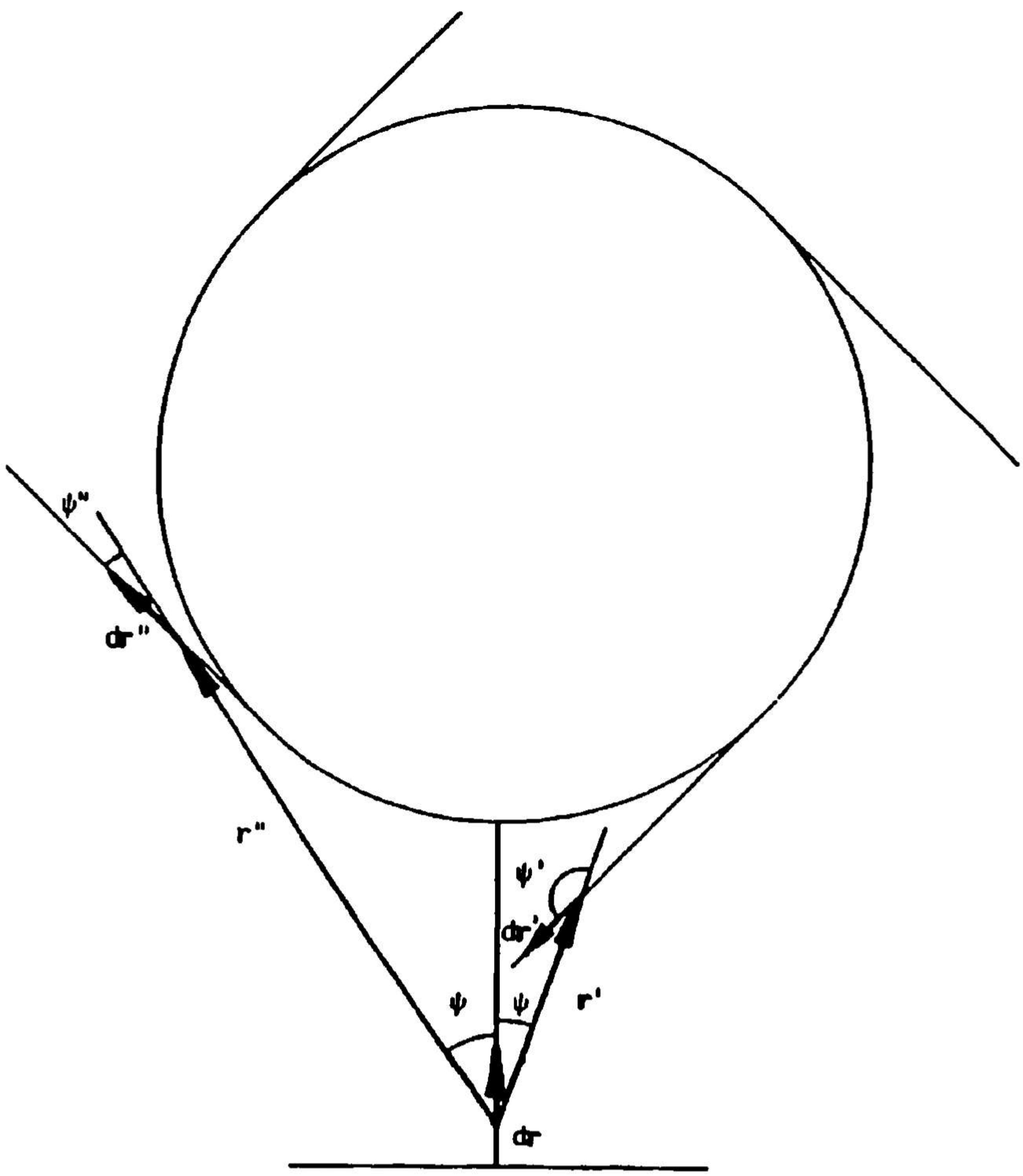

Fig. 65. Diagram for explanation of the torque acting on the rotating Ampere bridge with sliding contacts which is the motor part of the RAF-machine.

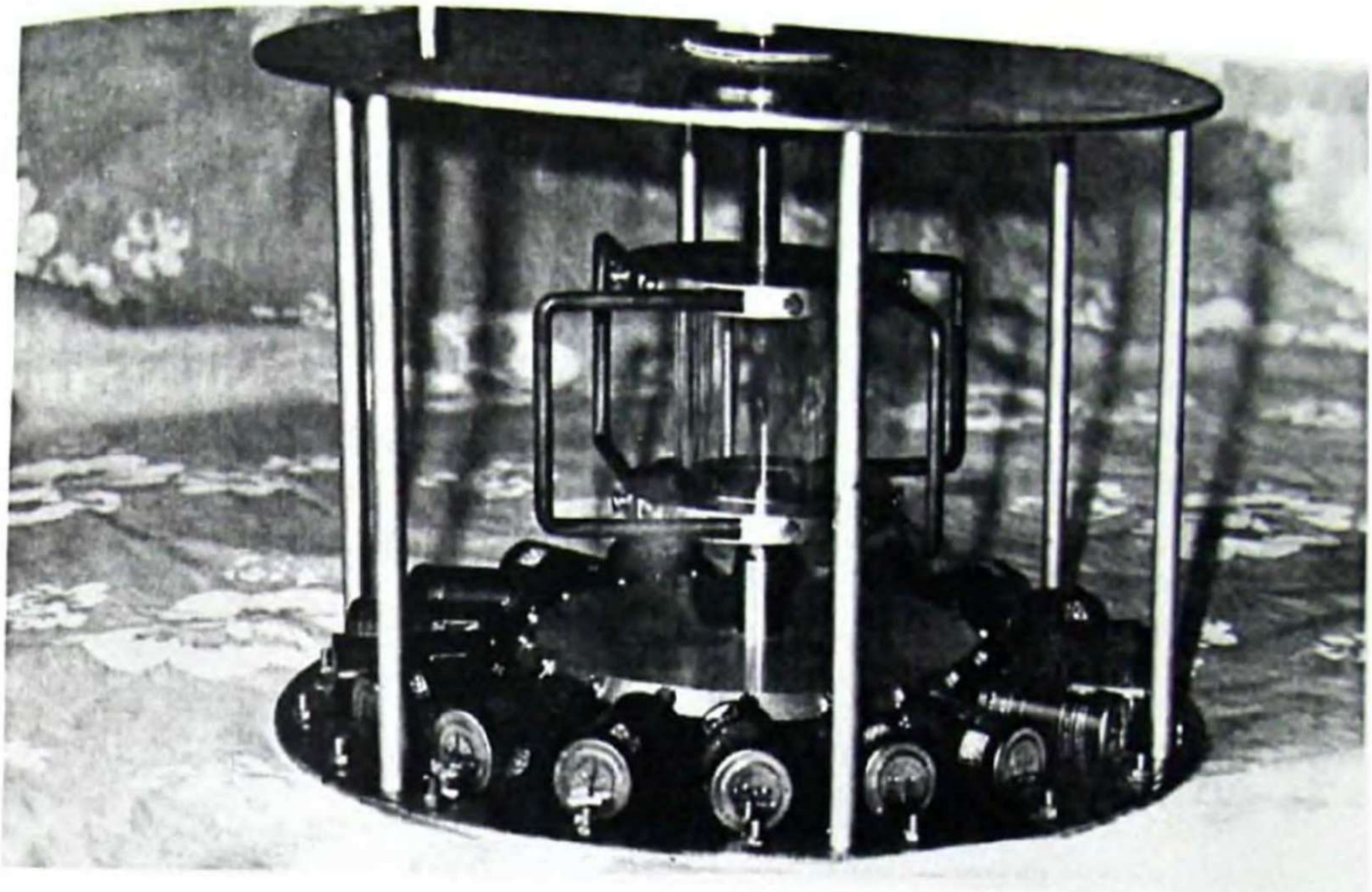

Fig. 66. Photograph of the anti-demonstrational ARAB-machine.

Fig. 67. The ARAB-machine put in an iron saucepan for screening Earth's magnetism.