

1985

THE T.N.O.-GUIDE

W.

2nd ed.



CENTRAL NATIONAL COUNCIL FOR APPLIED SCIENTIFIC
RESEARCH IN THE NETHERLANDS (T.N.O.)

12, Koningskade • THE HAGUE • Telephone 77.60.90

TNO

33034

“That there be a central organization for applied scientific research, of which the task will be to ensure that this research is put to the service of the common good in the most purposeful manner possible.”

(Article 1, Chapter I of the Act dated 30th October 1930, State Circular 416)

THE T.N.O. - GUIDE

2nd edition

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Information collected and collated by Th. J. van Kasteel.

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**CENTRAL NATIONAL COUNCIL FOR APPLIED SCIENTIFIC
RESEARCH IN THE NETHERLANDS (T.N.O.)**
12, Koningskade • THE HAGUE • Telephone 77.60.90

Copies of this guide may be obtained from:

T.N.O.-Office,
12, Koningskade,
The Hague (Netherlands).

*Thinking creatively
leads to prosperity*

ABBREVIATIONS

occurring passim before Netherlands names:

Dr	=	doctor (degree title).
Dra	=	lady licentiate.
Drs	=	licentiate.
Ir	=	engineer qualified by the Technical Academy at Delft or the Agricultural Academy at Wageningen.
Mr	=	master of law.
Prof.	=	professor.

The Organization "T.N.O."

by

Prof. Dr H. R. KRUYT,

President of the Central National Council T.N.O.



Prof. Dr H. R. Kruyt

The Central National Council for Applied Scientific Research in the Netherlands (T.N.O.) is a body in which three factors are combined in cooperation: *science, trade and industry, and the State*. Its organization is characterised by a spirit of *coordinated decentralization*.

The organization is composed of a series of *Branch Councils* each working independently in its own field, but coupled together under a *Central National Council* which assumes a certain amount of general coordinating control over them in order to ensure the harmonious development of the whole.

These *Branch Councils* are:

- the National Council for Industrial Research T.N.O.,
- the National Research Council for Nutrition T.N.O.,
- the National Council for Agricultural Research T.N.O.,
- the National Research Council for Agricultural Industries T.N.O.,
- the National Defence Research Council T.N.O.,
- the National Health Research Council T.N.O.

The Boards of Control are formed after nomination of the representatives of science by scientific bodies and of the representatives of trade and industry by trade associations, whilst each ministry concerned appoints a representative for the Minister.

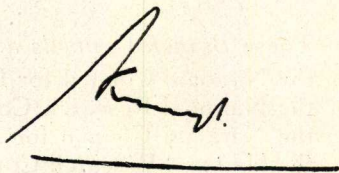
Each Branch Council arranges for the research institutes needed by trade and industry either directly or indirectly. The costs are defrayed out of a national subsidy, subsidies from industry, and payments for services rendered.

In the following pages some notes on the origin and organization of T.N.O. will be given, with a chart on pages 8 and 9 showing the Central National Council and the institutes and sections connected with it. Thereafter can be found more extensive information including a summary of the task of each institute and the principal figures concerned in them.

Some idea of the size of this Organization may be gained from the fact that its staff numbers 1500, of which about 300 have had academic training. The numerous professors and other prominent social figures performing voluntary functions on the various Boards of Control are not included in these numbers.

It goes without saying that T.N.O. serves in the first place Netherlands interests. But this does not close the door on the great interest that exists here for everything that happens abroad in this field, on the desire to cooperate, and on the need for contact with other countries whenever they show interest for what is going on in similar institutes here in the Netherlands.

For these reasons this guide has been published in a foreign language, in the hope that it may serve to improve contact with those interested outside our borders.

A handwritten signature in black ink, consisting of a large, sweeping initial 'A' followed by a cursive name, positioned above a solid horizontal line.

The Hague, August 1950.

Why and how T.N.O. was created, and its Aims

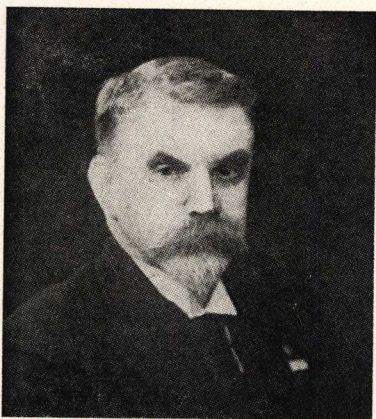


Prof. Dr F. A. F. C. Went †
President of the Central National
Council T.N.O. 1930—1935.

During the period of the first world-war the Netherlands, which had remained neutral, had not felt the stimulus of such events and the scientific capacity of the people did not expand fully in the service of the practical needs of the country's economy. The Royal Academy of Sciences, of which Prof. Dr H. A. Lorentz was then the president, threw the question onto the table as to whether it was not urgently necessary "to strain every nerve of science and experience possessed by the Netherlands to seek out ways and means of making the most effective use of the restricted raw materials and productive equipment available". A commit-

tee was set up under the chairmanship of Prof. Lorentz, but before it had reached any result, the end of the war saw the interest in it wane.

In the meantime the application of scientific research had grown tremendously in significance abroad. In Great Britain the Department of Scientific and Industrial Research was established with Research Associations for various branches of industry, and the U.S.A. set up their National Research Council. These efforts were continued undiminished into peacetime. A few large firms in the Netherlands commenced work with their own scientific laboratories, but it soon became apparent that most firms could not finance or man laboratories of sufficiently wide coverage of the subjects. At the same time the conviction grew that the national interest comprised much more than the success of a few large-scale industries: it demanded the increase of productivity in general through the wide-spread application of scientific research. This national



Prof. Dr Ir G. van Iterson
President of the Central National
Council T.N.O. 1935—1939

interest is a matter of the utmost importance for a densely populated country such as the Netherlands, poor in raw materials but rich in intellect and craftsmanship: it is the signpost pointing to better and cheaper products, vitally important to a favourable position in international competition.

In 1924 the Government established a committee under chairmanship of Prof. Dr F. A. F. C. Went and consisting of leading figures in science and business, for which the terms of reference were to make proposals for the organization of applied scientific research in the Netherlands. This "*Went Committee*" published its report in 1925 and after receiving further terms of reference, laid on the table in 1928 a draft Bill which became law in 1930 with some amendments. This is the *Act dated 30th October 1930 (State Circular 416)* which, when it came into effect on 1st May 1932, placed the duty of "*ensuring that applied scientific research is put to the service of the common good in the most purposeful manner possible*" upon the shoulders of the Central National Council for Applied Scientific Research in the Netherlands (T.N.O.), a corporation with a registered address in the Hague.

Under the provisions of article 14 of this Act, the Government can establish *special organizations*, the task of which as to scientific research is restricted to "any matter of national concern or any branch of the people's prosperity". In this way special organizations have been established up to now in the following domains: industrial research (1934), nutrition research (1940), agricultural research and research for agricultural industries (both 1943), national defence (1946) and national health (1949). The councils of these branch organizations of T.N.O., are the executive organs by which the work is coordinated and organized, advised, subsidised and supervised. The Central National Council performs the function of general coordination, and of executive organ for those fields wherein no special organization as yet exists.

In T.N.O. the Netherlands possess an organization of applied scientific research often envied abroad. It ensures *cooperation between science, industry and government*. Whilst autonomous pure scientific research (in natural conjunction with education) can always seek and follow its own ways, the T.N.O. organization forms a terrain where science and industry can meet each other whenever and wherever the needs of public economy demand. Science puts its knowledge at disposal, and industry its "know-how" and equipment, to provide a better service for the general good. The Government, representative of this same general good, furthers the work, particularly by subsidy, and exercises the supervision that its responsibility to the nation demands. On all the T.N.O. boards professor and man of practice sit together, and the Ministers concerned are represented by delegates. The T.N.O. system results in the *decentralisation of State activity*, whereby the door remains open as far as possible for every spontaneous initiative from social life. Prof. Ir Is. P. de Vooyo characterised it as "*unity under expert control*".

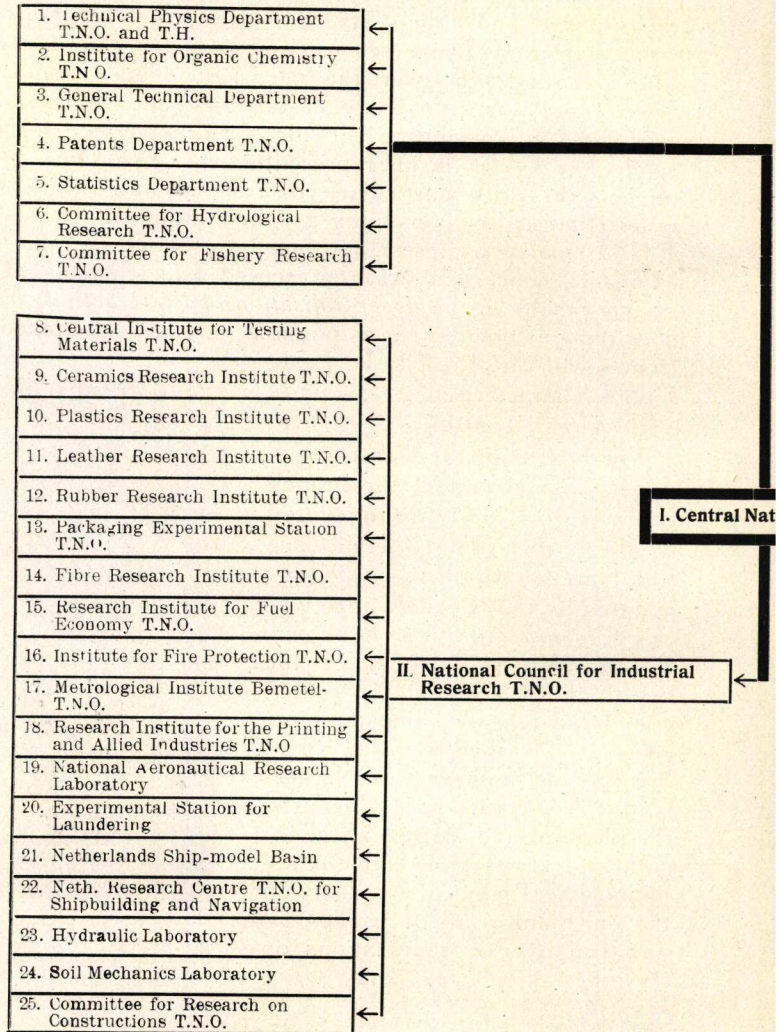
The boards of the Central National Council and of the branch councils of T.N.O. are appointed by the Crown. That of the Central National Council is half nominated by the Royal Academy of Sciences and half by the Economic Board. When members of the board of the Council for Industrial Research are being appointed, advice is taken from the Royal Institute of Engineers, the Netherlands Association of Chemists, the physical and mathematical faculties of Universities and the senate of the Technical Academy on the one hand, and of employers' and employees' organizations on the other.



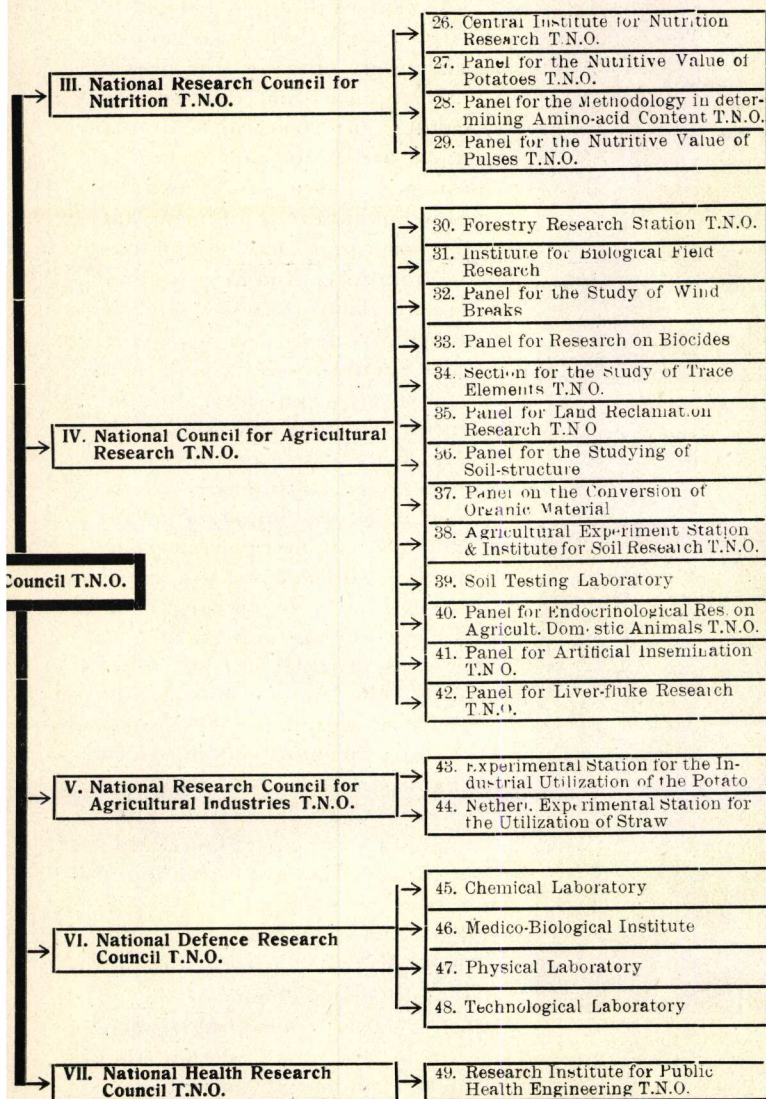
Prof. Ir Is. P. de Vooyo
one of the pioneers of applied scientific
research in the Netherlands

(Text continued: p. 10.)

Chart of the O



Organization T.N.O.





Mr Drs J. Alingh Prins
President of the Central National
Council T.N.O. 1939—1946.



Prof. Dr Ir J. Klopper
Vice-president of the Central
National Council T.N.O.

(Continued from p. 7.)

The centres of applied scientific research work, which is undertaken under control of the branch councils and in some cases directly under the Central National Council, are varied and diverse in character. There are institutes employing hundreds of men, and at the same time small committees pursuing preparatory studies. There are laboratories where the romance of new discovery surrounds intense research, and there are institutes pursuing routine scientific work in the service of practical life. Some of these units have received considerable contribution from the initiative in the branch of industry concerned, both in establishment and maintenance, but in other cases T.N.O. itself has undertaken the work and provides for its continuance. The Act permits a high measure of latitude in choosing in each case the most suitable form for its organization, and the diversity resulting therefrom has proved in practice most favourable, both from the scientific standpoint and from that of industry.

The financial position of the various T.N.O. centres shows a similar diversity. Some of the institutes enjoy considerable income from the services that they render to industry; one of them

maintains itself entirely in this way. In many cases the interested parties put up part of the necessary finance, sometimes with a generosity most satisfying, and sometimes with a measure of support rather below the desirable and reasonable mark. To ensure the execution of work of necessity to the general interest, the State makes this up with a subsidy. This is a yearly entry in the National Budget in favour of the Central National Council T.N.O., which in its turn is expected to subsidise the branch councils. The latter are responsible for seeing that financial provisions are made for the various institutes and work sections. In 1949 the total expense of T.N.O. amounted to 10 million guilders; the State subsidy, as appearing in the National Budget, was 7 million guilders. The Council for Industrial Research expended 5 millions, receiving 3 millions as a subsidy.



Ir. A. de Mooij ACzn.
1930—1949 General Secretary,
since 1930 Treasurer of the Central
National Council T.N.O.

T.N.O. is performing a function of great and still growing significance for the Netherlands' economy. Scientific circles contribute generously to this work. Industrial and commercial circles in the Netherlands are also making a contribution, in some cases a most valuable one. The Netherlands' Government shows in word and deed that it appreciates the importance of T.N.O. work. It is our hope that they will be encouraged in this by the continuous growth of understanding and interest that the Netherlands' public is showing in scientific research, and by contacts with science and trade in other nations partly resulting from T.N.O.'s activities.

* *
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A survey of the Central National Council T.N.O. and the Branch Councils T.N.O.

(The figures by the names of the councils refer to the chart on pages 8 and 9.)

I. CENTRAL NATIONAL COUNCIL FOR APPLIED SCIENTIFIC RESEARCH IN THE NETHERLANDS T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Established: 1930.

Executive committee: Prof. Dr H. R. Kruyt, chairman; Prof. Dr Ir J. Klopper, vice-chairman; Prof. Ir D. Dresden, Dr A. Polman, Prof. Dr G. J. Sizoo, Ir C. Staf.

General Secretary: Ir J. W. J. Beek.

Treasurer: Ir A. de Mooij ACzn.

Assistant Secretary: H. Buss Meyer.

Institutes and sections: page 19.

II. NATIONAL COUNCIL FOR INDUSTRIAL RESEARCH T.N.O.



Prof. Ir D. Dresden

Address: 12, Koningskade,
The Hague, tel. 77.60.90.

Established: 1934.

Executive Committee: Prof. Ir D. Dresden, chairman; Ir W. H. van Leeuwen, vice-chairman; Prof. Ir J. J. Broeze, J. L. Chaillet, Ir Z. Th. Fetter, Prof. Ir D. A. A. Koolen, Dr Ir C. E. A. Maitland, Ir W. H. Mouton, Ir H. Rinia, Ir M. J. Schoen.

Secretaries: Ir A. W. van Seters,
Dra E. C. Hageman.

Institutes and sections: page 25.

III. NATIONAL RESEARCH
COUNCIL FOR NUTRI-
TION T.N.O.

Address: 12, Koningskade,
The Hague, tel. 77.60.90.

Established: 1940.

Chairman: Dr A. Polman.

Secretary: Dra A. E. Winkel

Institute and sections: page 43.



Dr A. Polman

IV. NATIONAL COUNCIL
FOR AGRICULTURAL
RESEARCH T.N.O.

Address: 12, Koningskade,
The Hague, tel. 77.60.90.

Established: 1943.

Chairman: Ir C. Staf.

Secretary: Ir C. van der Giessen.

Assistant Secretary: M. B.
van Lennep.

Institutes and sections: page 47.

V. NATIONAL RESEARCH
COUNCIL FOR
AGRICULTURAL
INDUSTRIES T.N.O.

Address: 12, Koningskade,
The Hague, tel. 77.60.90.

Established: 1943.

Chairman: Ir C. Staf.

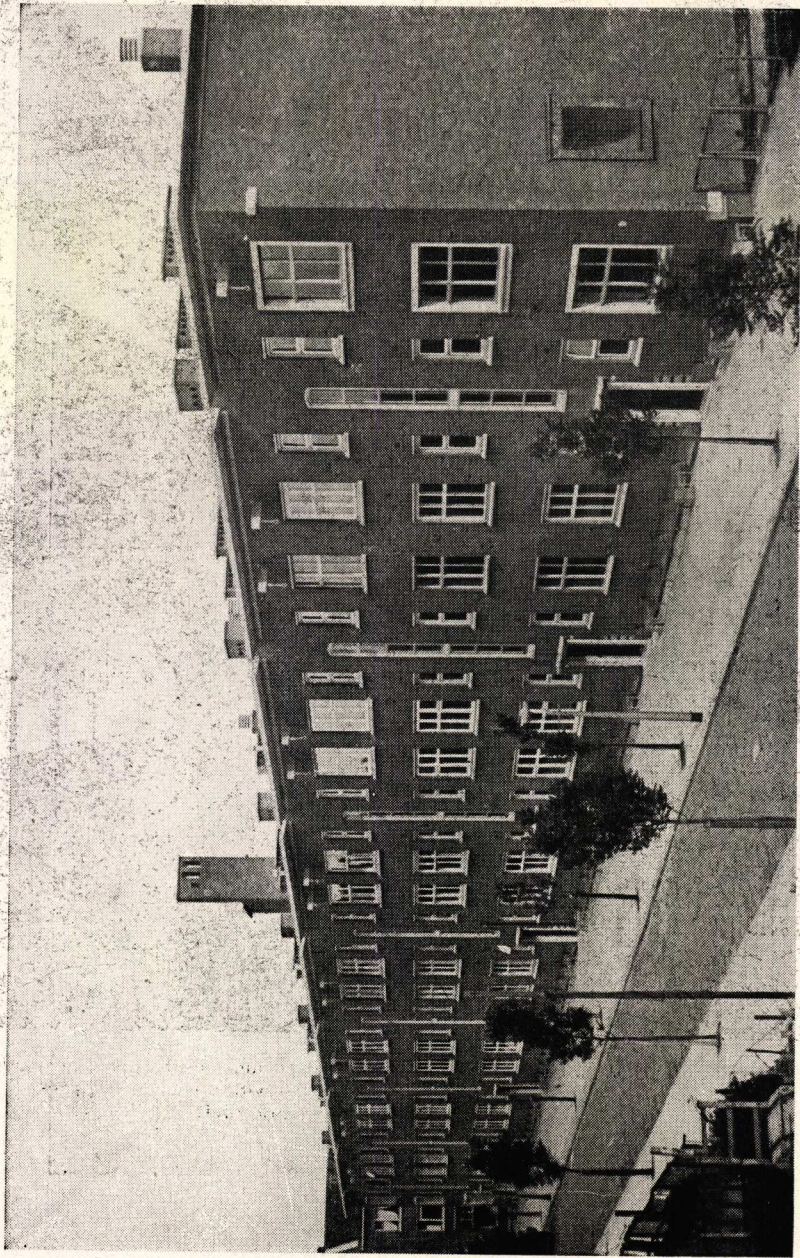
Secretary: Ir C. van der Giessen.

Assistant Secretary: M. B.
van Lennep.

Institutes: page 57.



Ir C. Staf



Block of 48 experimental dwellings at Rotterdam, built under the auspices of T.N.O. (1948). Cf. p. 63.

VI. NATIONAL DEFENCE
RESEARCH COUNCIL
T.N.O.

Address: 12, Koningskade,
The Hague, tel. 77.60.90.

Established: 1946.

Executive Committee: Prof.
Dr G. J. Sizoo, chairman;
Rear-Admiral J. J. C. C.
Bennik, (acting) Major-
General L. Ezerman.

Secretary: Mr P. F. Tanja.

Institutes: page 60.



Prof. Dr G. J. Sizoo

* *
*

VII. NATIONAL HEALTH RESEARCH COUNCIL T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

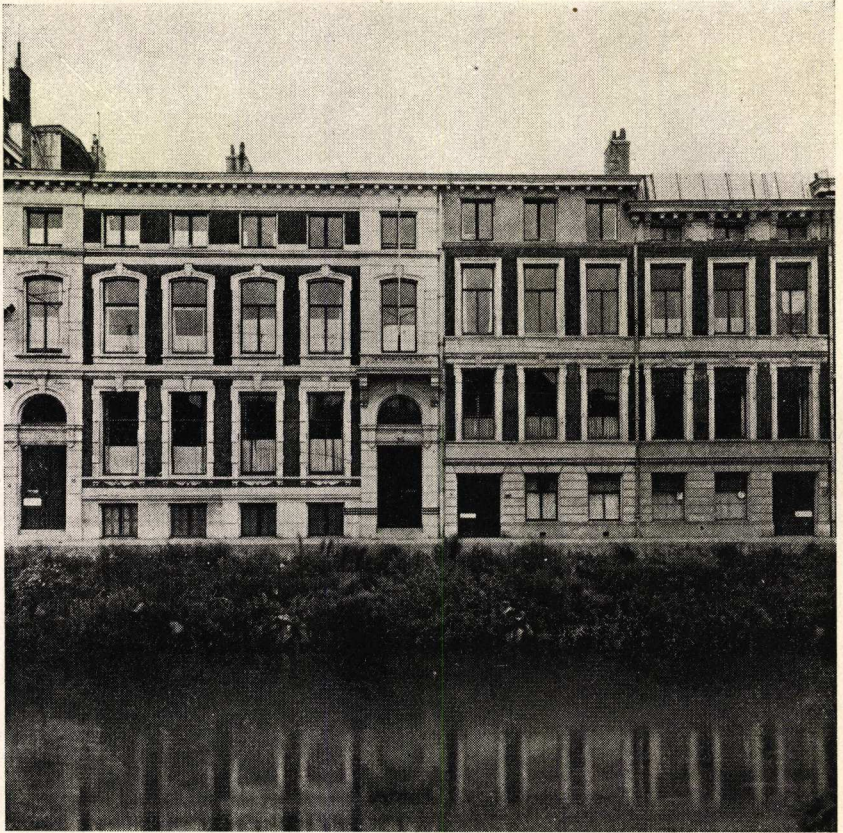
Established: 1949.

Executive Committee: Dr A. Polman, chairman; Prof. W. F.
J. M. Krul, vice-chairman; Dr C. Banning, Ph. J. van der
Burg, Dr J. M. Planteydt, Prof. Dr R. Remmelts, Mr H. J.
Woltjer.

Secretary: Dra A. E. Winkel.

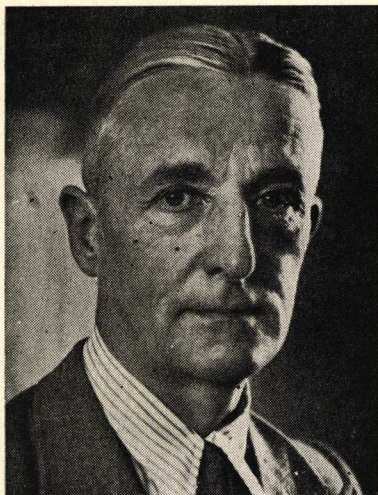
Institute: page 62.

* *
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The buildings on Koningskade, The Hague, housing the central office of T.N.O.

The Central Office of T.N.O.



Ir J. W. J. Beek
General Secretary

Address: 12, Koningskade,
The Hague, tel. 77.60.90.

Bank: Nederlandse Handelmaatschappij N.V. (Netherlands Trading Society), The Hague.

General Secretary: Ir J. W. J. Beek.

Treasurer: Ir A. de Mooij ACzn.

Assistant Secretary of the Central National Council: H. Buss Meyer.

Secretaries of the Council for Industrial Research: Ir A. W. van Seters, Dra E. C. Hageman.

Secretary of the Research Council for Nutrition and of the National Health Research Council: Dra A. E. Winkel.

Secretary of the Council for Agricultural Research and of the Research Council for Agricultural Industries: Ir C. van der Giessen;
Assistant Secretary: M. B. van Lennep.

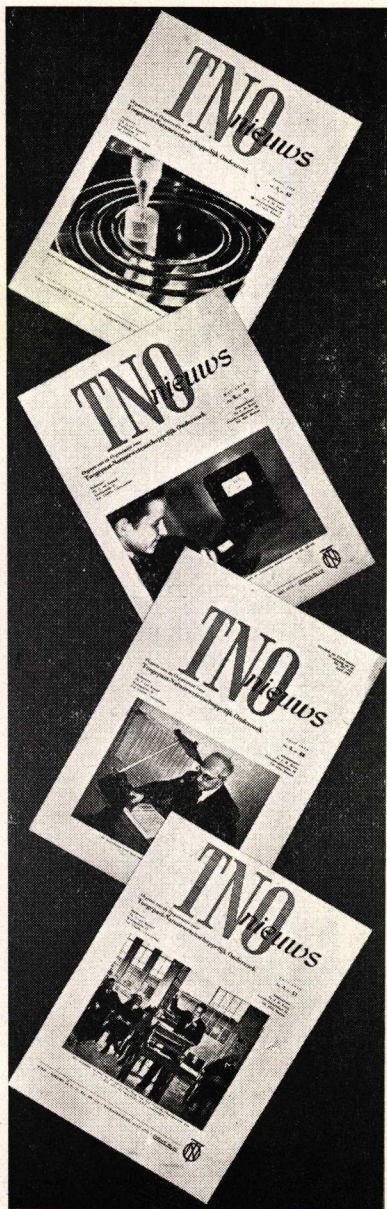
Secretary of the National Defence Council: Mr P. F. Tanja.

Library and Documentation Department: Head, Mr H. H. R. Roelofs Heyrmans.

Public Relations Department: Editor, Th. J. van Kasteel.

Financial Department: Head, A. H. de Vos.

Legal and Staff Department: Head, H. P. A. Pompe.



The T.N.O. organ

The organ of the T.N.O. Organization is the monthly periodical "T.N.O.-Nieuws" (T.N.O. News) in the Netherlands language.

Editor: Th. J. van Kasteel.
Office: 12, Koningskade,
The Hague, tel. 77.60.90.

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blishers.

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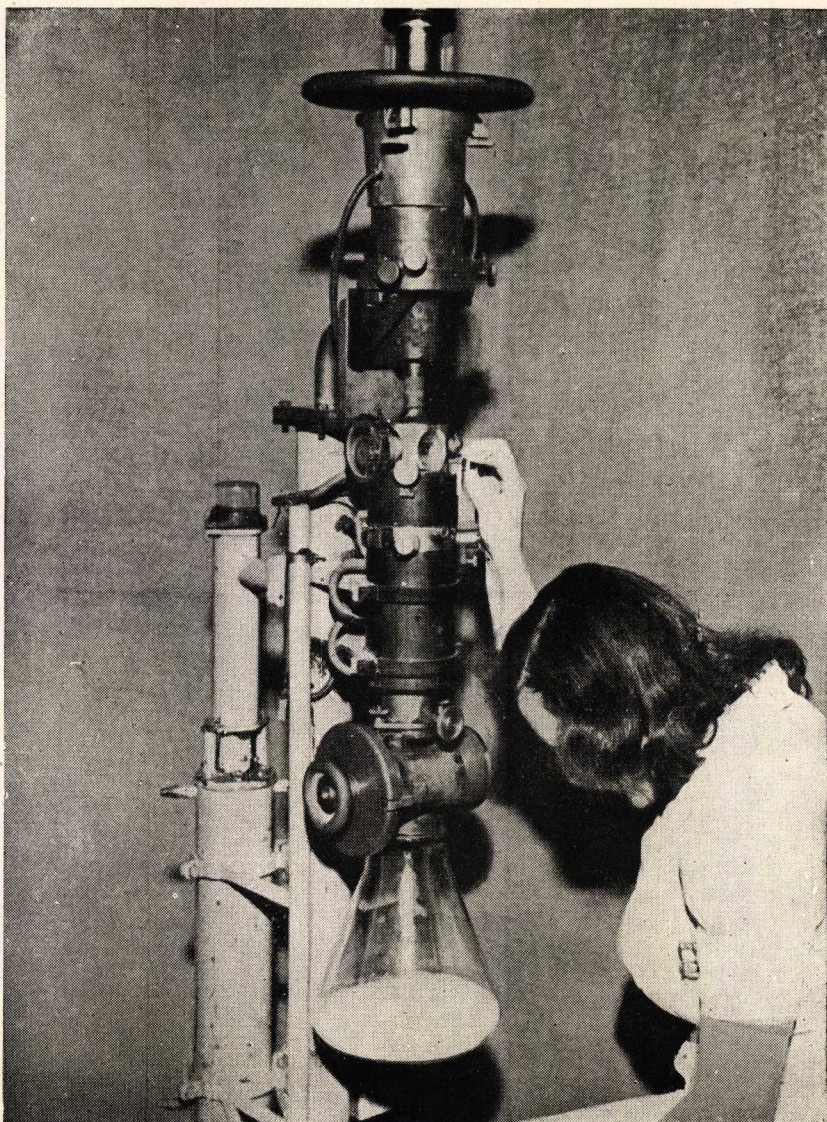
I. The Institutes and Sections grouped under the Central National Council T.N.O.

The Central National Council for Applied Scientific Research in the Netherlands T.N.O. (p. 12):

Chairman: Prof. Dr H. R. Kruyt.
General Secretary: Ir J. W. J. Beek.
Treasurer: Ir A. de Mooij ACzn.
Assistant Secretary: H. Buss Meyer.

Office: 12, Koningskade,
The Hague, tel 77.60.90.

The *numbers* by the names of the institutes and sections refer to the chart on pages 8 and 9.



The Delft Electronic Microscope

I-1. TECHNICAL PHYSICS DEPARTMENT T.N.O.
and T.H.

Address: 11, Mijnbouwplein, Delft, tel. 39.80.

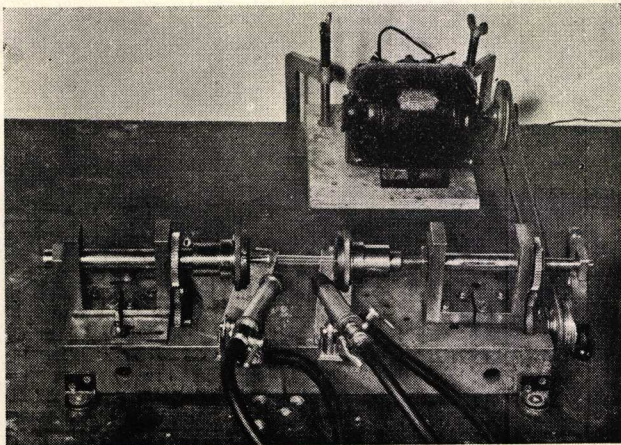
Task: To conduct physical research and render physical assistance on subjects of importance to industry, in conjunction with the Technical Physics Laboratory of the Technical Academy at Delft.

Chairmen:

of the Board of Control: Prof. Dr H. R. Kruyt;
of the Governing Board: Prof. Dr. H. B. Dorgelo.

Director: Ir H. Alting; Deputy Ir H. de Zeeuw.

Principal subjects undertaken: research and advice on acoustics; electronic microscopy; electronics (in conjunction with the Electronics Laboratory of the Technical Academy); high frequency heating; optical research and measurements (infra-red, daylight and ultra-violet); X-ray photography; ultra-sonic research; heat measurements, thermometry.



Apparatus for glass-to-metal welding.

I-2. INSTITUTE FOR ORGANIC CHEMISTRY T.N.O.

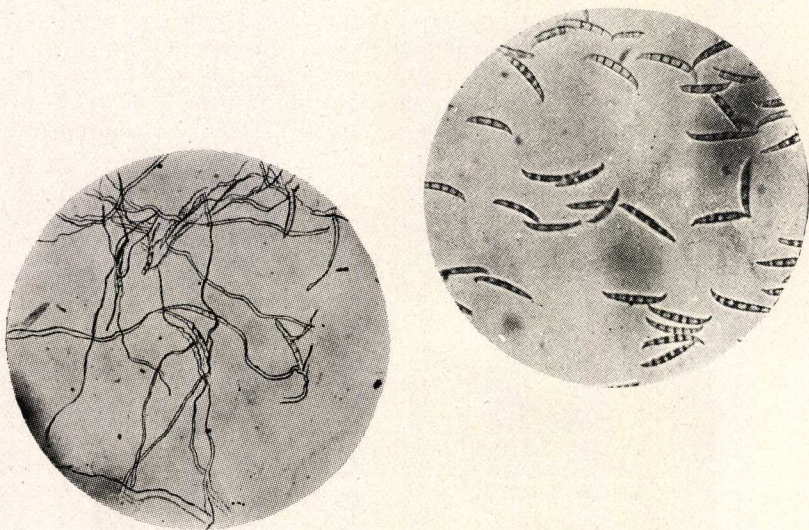
Address: 79, Croesestraat, Utrecht, tel. 2.32.41.

Task: Coordination of research into organic chemistry concerned in applied scientific research; research into organic chemistry.

Director: Dr G. J. M. van der Kerk.

Advisor: Prof. Dr F. Kögl.

Laboratory: The Institute enjoys the hospitality of the Laboratory for Organic Chemistry of the National University at Utrecht.



Traces of a mould (*Fusarium avenaceum*); left: without fungicide, showing marked germination; right: with fungicide, showing no germination.

I-3. GENERAL TECHNICAL DEPARTMENT T.N.O.
(The General Technical Department evolved in 1945 from
the Technical Department T.N.O. of 1940.)

Address: 5, Koningskade, The Hague, tel. 77.79.20.

Task:

- A. Technical activity of a general nature: information — receipt, orientation and preparatory study of problems — composition of literature and patents documentations for the industry and T.N.O. institutions — general technical problems (chemical technology; physical-technological problems such as drying, concentration, evaporation and preservation; control technique) — general technical publications.
- B. Research concerning subjects not dealt with by other T.N.O. institutions.

Chairman of the Board: Prof. Dr H. R. Kruyt.

Executive Management: Ir Jan Al, director; Ir A. Appak, Dr Ir H. A. Leniger, Ir S. G. Wiechers.

Sections: Chemical Technology (Head: Ir S. G. Wiechers), Physical Technology (Head: Dr Ir H. A. Leniger), Mechanical Technology (Head: Ir A. H. de Haas van Dorsser), Information and Technical Advice (Head: Ir A. Appak), Documentation (Head: Dr L. J. van der Wolk).

Publications: final reports (T.A.); provisional reports (T.).

* *
*

I-4. PATENTS DEPARTMENT T.N.O.

Address: 5, Koningskade, The Hague, tel. 77.79.20.

Task: Research into, advice concerning and handling of matters concerning patents, including patents documentation, on behalf of T.N.O.- and other institutions.

Head: Ir Jan Al.

I-5. STATISTICS DEPARTMENT T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Task: Assistance in the solution of scientific and practical observation problems by means of calculations (theory of probabilities, variation statistics, correlation calculation, graphs), and at the set-up of experiments.

Statistics Committee: Prof. Dr H. R. Kruyt, chairman; Prof. Dr D. van Dantzig, Prof. Ir D. Dresden, E. van der Laan.

Head of the Department: Th. J. D. Erlee.

* *
*

I-6. COMMITTEE FOR HYDROLOGICAL RESEARCH T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Purpose: Coordination and furtherance of research work concerning hydrological conditions in the Netherlands. The committee meets regularly and in addition convokes "technical meetings" of select groups with experts of the 16 corporations represented by it.

Chairman: Prof. W. F. J. M. Krul; *technical secretary:* Ir G. Santing; *administrative secretary:*

* *
*

I-7. COMMITTEE FOR FISHERY RESEARCH T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Purpose: Coordination and furtherance of research for the benefit of the fisheries.

Chairman: Ir G. J. Lienesch; *secretary:* Dra A. E. Winkel.

Netherlands Institute for the Investigation of Materials for the Fishing trade: 103, Maliebaan, Utrecht, tel. 1.32.81;
Director: Dr J. Olie.

II. The Institutes and Sections grouped under the National Council for Industrial Research T.N.O.

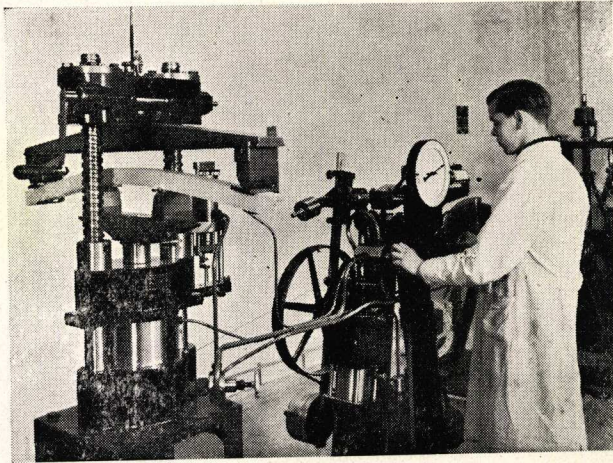
The National Council for Industrial
Research T.N.O. (p. 12):

Chairman: Prof. Ir D. Dresden.

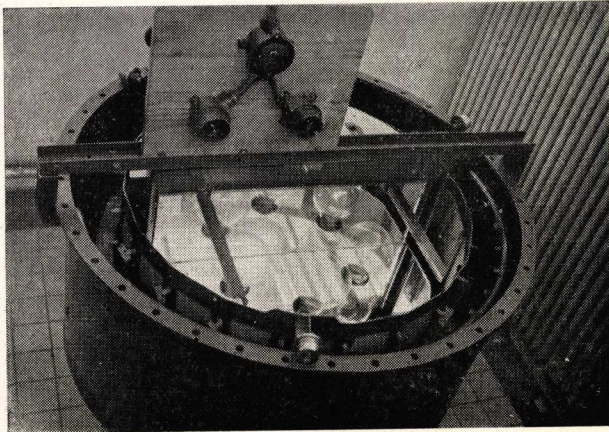
Secretaries: Ir A. W. van Seters,
Dra E. C. Hageman.

Office: 12, Koningskade, The Hague,
tel. 77.60.90.

The *numbers* by the names of the in-
stitutes and sections refer to the chart
on pages 8 and 9.



Timber research: test in bending.



Paint research: rapid weathering tank.

II-8. CENTRAL INSTITUTE FOR TESTING
MATERIALS T.N.O. ("C.I.M.O.").

Address: 5, Lange Kleiweg, Rijswijk, tel. Delft 38.71—
38.75. Post office box 49, Delft.

Task: Technical and scientific testing of materials and their properties, and rendering them practicable in application, by means of own research and by cooperation with sections, consisting of experts from State and industrial laboratories.

Director: Prof. Dr C. A. Lobry de Bruyn.

Publications: Circulars; information sheets.

DEPARTMENT FOR WOOD.

Director: Ir J. L. Bienfait.

DEPARTMENT FOR METALS.

Director: Ir R. Reitsema.

DEPARTMENT FOR PAINT.

Director: Dr H. W. Talen.

DEPARTMENT FOR BUILDING MATERIALS.

Director: Prof. Dr C. A. Lobry de Bruyn.

*DEPARTMENT FOR RESEARCH INTO
CORROSION.*

Director: Prof. Dr C. A. Lobry de Bruyn.

ANALYTICAL DEPARTMENT.

Task: Analytical research; advice concerning new methods.

Director: Dr R. Schmidt.

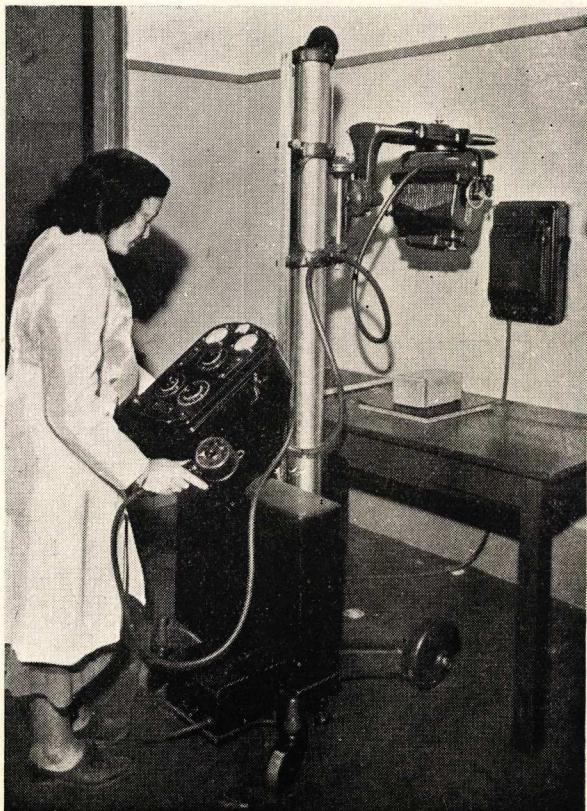
II-9. CERAMICS RESEARCH INSTITUTE T.N.O.

Address: 79, Lange Tiendeweg, Gouda, tel. 31.56.

Task: Advice and research on behalf of the ceramics industries.

Director: Dr M. J. Singer.

Publications: Information sheets.



X-ray apparatus for the detection of blind fissures in bricks.

II-10. PLASTICS RESEARCH INSTITUTE T.N.O.

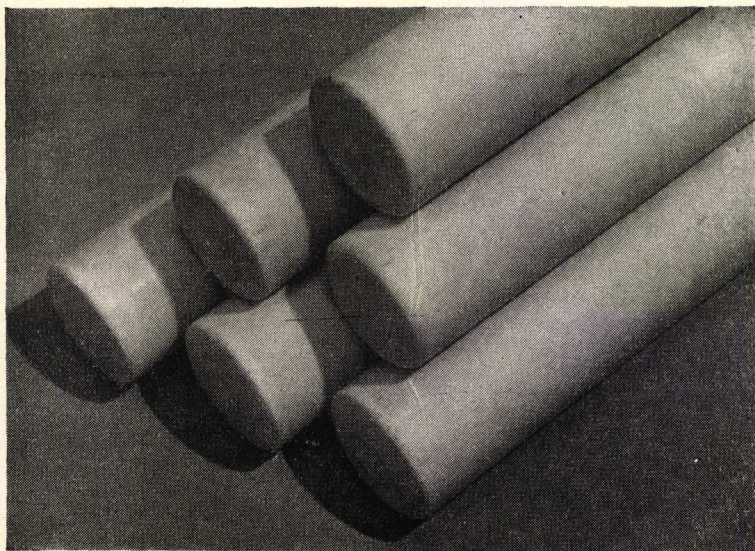
Address: 134, Julianalaan, Delft, tel. 32.00.

Task: Scientific research into plastics; furtherance of production, adaptation, manufacturing and treatment of plastics.

Director: Ir L. C. Stoutjesdijk.

Publications: Information sheets.

The monthly journal "*Plastica*" is being edited on behalf of the Institute by Ir L. C. Stoutjesdijk, Dr A. J. Staverman, Ir D. J. van Wijk, H. A. Frank and Cl. van Reenen.



Rods of cast resin.

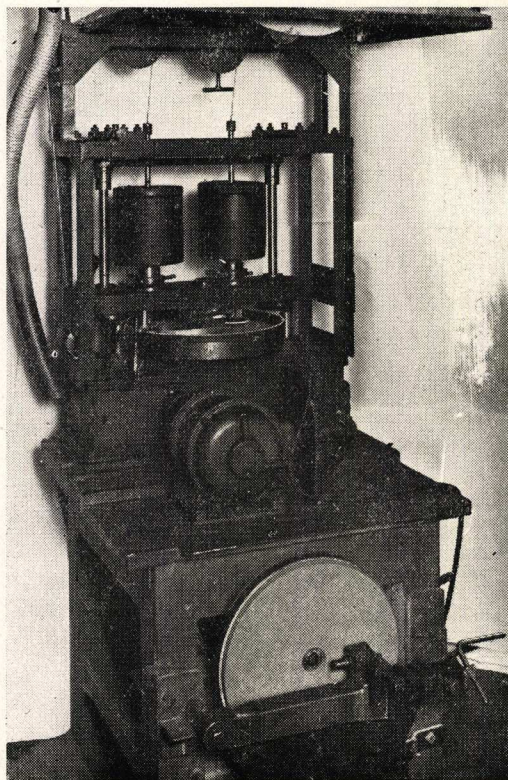
II-11. LEATHER RESEARCH INSTITUTE T.N.O.

Address: 55, Mr-van-Coothstraat, Waalwijk, tel. 34.

Task: Advice and research on behalf of the leather and footwear industries.

Director: Ir J. Roelofs Heyrmans.

Publications: Information sheets.



Apparatus for measuring the resistance to wear of sole-leather.

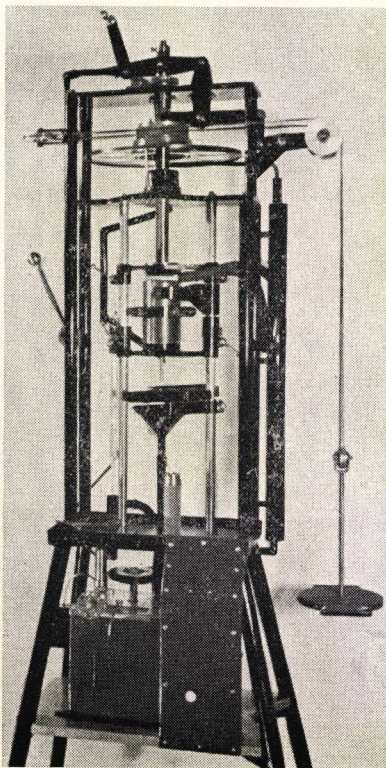
II-12. RUBBER RESEARCH INSTITUTE T.N.O.

Address: 67, Julianalaan, Delft, tel. 5.33.

Task: Advice and research on behalf of the rubber manufacturing industry.

Director: Prof. Dr Ir A. van Rossem.

Publications: Information sheets.



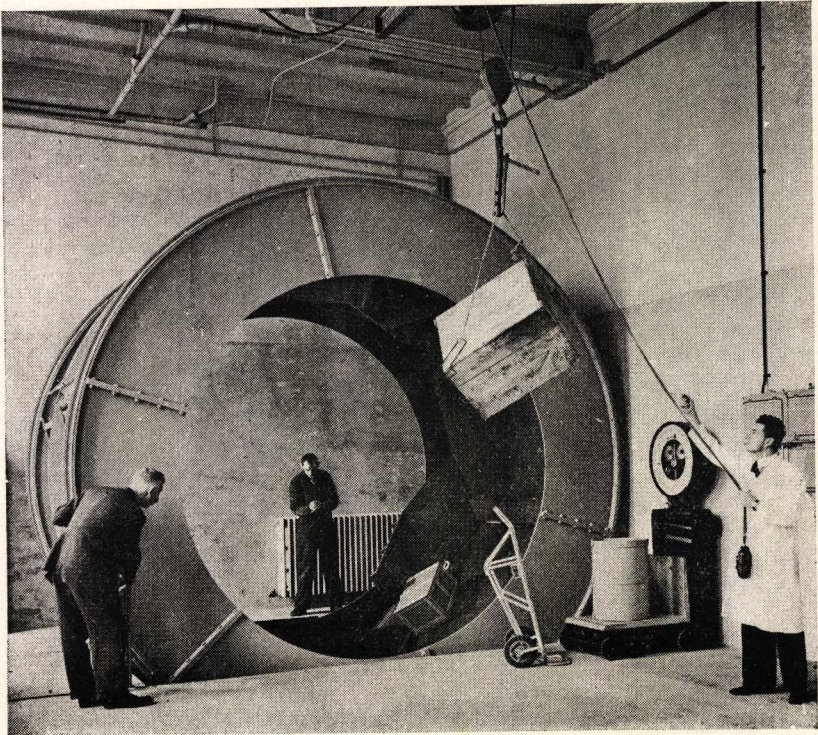
Rotation plastometer.

II-13. PACKAGING EXPERIMENTAL STATION T.N.O.

Address: 134, Julianalaan, Delft, tel. 23.23.

Task: Advice and information for producers and users of packing materials; measurement concerning the efficiency of packaging; examining new methods of packaging.

Director: C. Hillenius.



Rotating drum for trying out packing cases.

II-14. FIBRE RESEARCH INSTITUTE T.N.O.

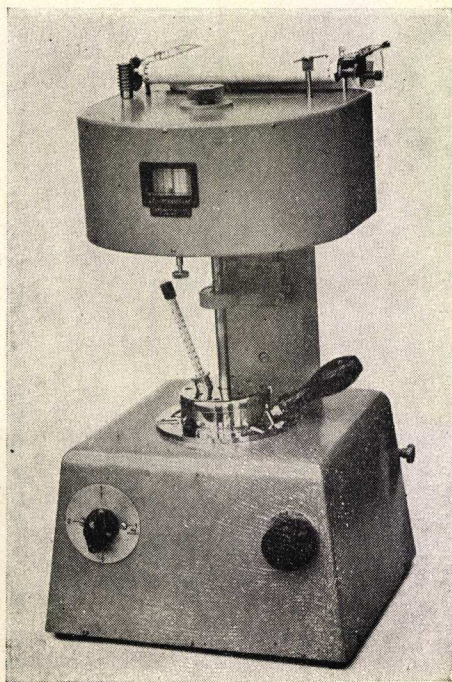
Address: 16a, Mijnbouwstraat, Delft, tel. 9.34.

Task: Scientific research and advice for the textile and paper industries and for the trade in textile and paper products.

Director: Ir J. R. H. van Nouhuys.

Laboratories: 16a, Mijnbouwstraat, Delft, and (in conjunction with the Textile Research Society "De Voorzorg":) 29, Noorderhagen, Enschede.

Publications: Information sheets; pamphlets; literature abstracts.



Fibre Research Institute viscosigraph.

II-15. RESEARCH INSTITUTE FOR FUEL ECONOMY
T.N.O.

Address: 134, Julianalaan, Delft, tel. 23.23.

Task: Research into the most economical methods for heat production and heat expenditure.

Director: Dr J. Hamaker.

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II-16. INSTITUTE FOR FIRE PROTECTION T.N.O.

Address: 134, Julianalaan, Delft, tel. 23.23.

Task: promotion of fire security through investigation into the problems connected with fire protection and through information and advice on the subject.

Director: Dr C. W. van Hoogstraten.

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*

II-17. METROLOGICAL INSTITUTE BEMETEL-T.N.O.

Address: 129, Nieuwe Achtergracht, Amsterdam C.,
tel. 5.08.56.

Task: Scientific and technical research into length, angle and pressure measurements; development of measuring apparatus; furtherance of scientific methods of measuring in industry.

Honorary Director: Prof. Dr A. M. J. F. Michels.

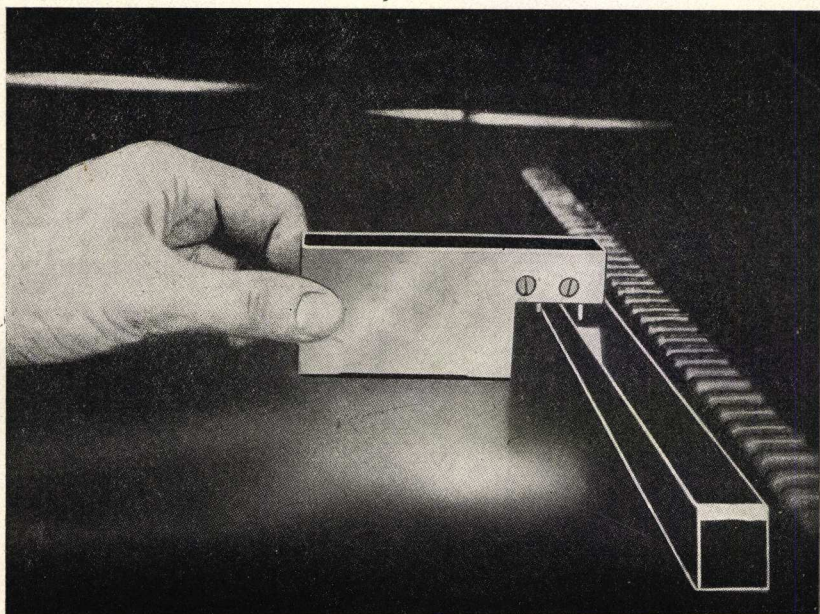
II-18. RESEARCH INSTITUTE FOR THE PRINTING
AND ALLIED INDUSTRIES T.N.O.

Address: 24, Plantage Muidergracht, Amsterdam C.,
tel. 5.27.64.

Task: Scientific research and advice in the service of
graphic technique.

Director: J. H. van der Meer.

Publication: Monthly journal "I.G.T.-Nieuws" ("I.G.T.
News"); editor and administration: the Institute.



Gauge for the measurement of frame depths.

II-19. NATIONAL AERONAUTICAL RESEARCH
LABORATORY.

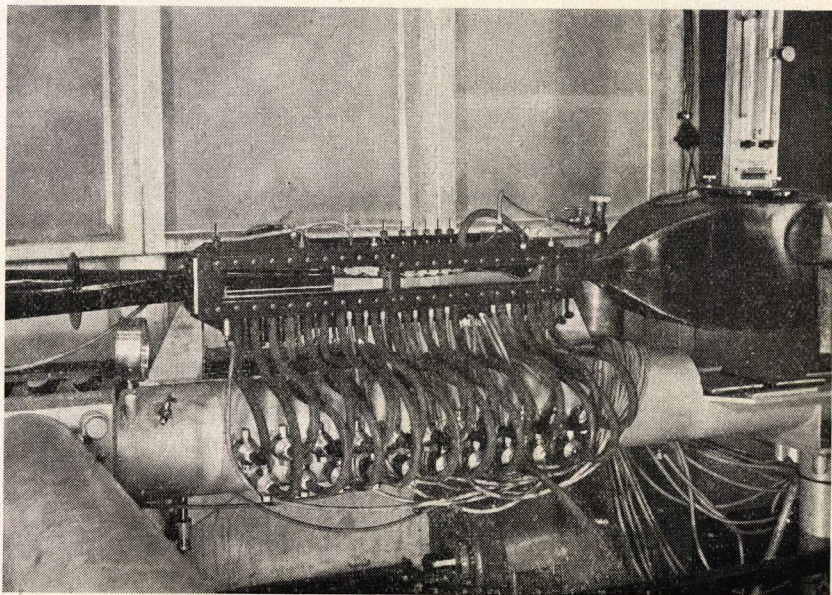
Address: 145, Sloterweg, Amsterdam W., tel. 8.08.80.

Task: The furtherance of Netherlands aviation by rendering scientific assistance to the aeronautical industry and to aircraft operators; technical and scientific research into aeronautical problems.

Management: Ir C. Koning, Scientific Director; Ir A. Boelen, Chief Engineer, temporarily in charge of the commercial management.

Publications: Reports and Proceedings of the National Aeronautical Research Laboratory; technical publications.

(See also: page 64.)



Front view of 3×3 supersonic wind tunnel.

II-20. EXPERIMENTAL STATION FOR LAUNDERING.

Address: 16a, Mijnbouwstraat, Delft, tel. 37.85.

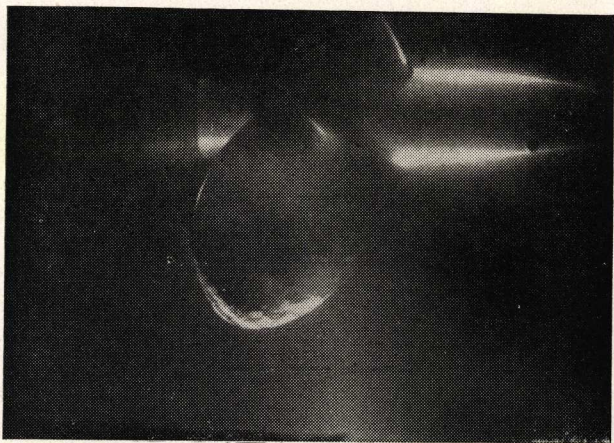
Task: Advice and research on behalf of the laundering industry.

Director: Ir R. Smit.

Publications: in the laundry industry periodical "De Witterij-Industrie", and elsewhere.



Examination by uviol-lamp of damage caused by washing.



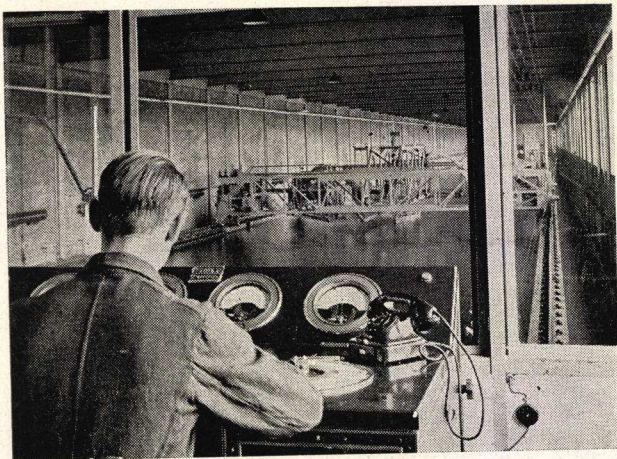
Cavitation and erosion of a ship's propeller.

II-21. NETHERLANDS SHIP-MODEL BASIN

Address: 2, Haagsteeg, Wageningen, tel. 23.91.

Task: Scientific research and advice on behalf of shipbuilding and shipping concerning resistance and propulsion of ships, by means of scale model experiments in the towing tank and the cavitation tank.

Management: Prof. Ir L. Troost, Director; Dr Ir W. P. A. van Lammeren, Assistant Director.



Towing tank with towing carriage, seen from the driver's cabin.

II-22. NETHERLANDS RESEARCH CENTRE T.N.O. FOR SHIPBUILDING AND NAVIGATION.

Address: 25, Zomerluststraat, Haarlem, tel. 1.37.42.

Task: Fundamental research into problems of shipbuilding and shipping.

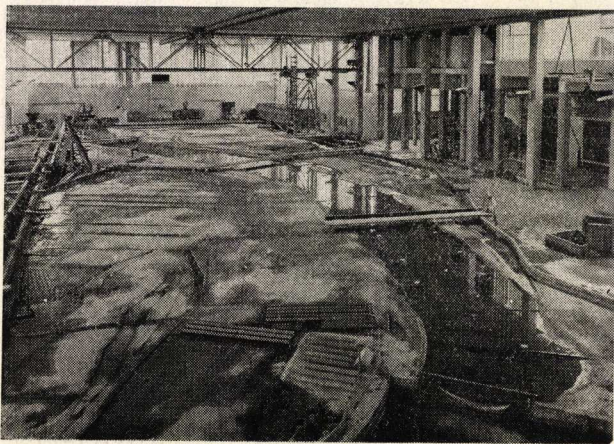
Director: Dr Ir W. J. Muller.

II-23. HYDRAULIC ENGINEERING LABORATORIES.
A. HYDRAULIC LABORATORY.

Address: 61, Raam, Delft, tel. 13.98.

Task: The study of problems concerning water and water-courses; experimental models; advice to those concerned.

Director: Prof. Ir J. Th. Thijsse.



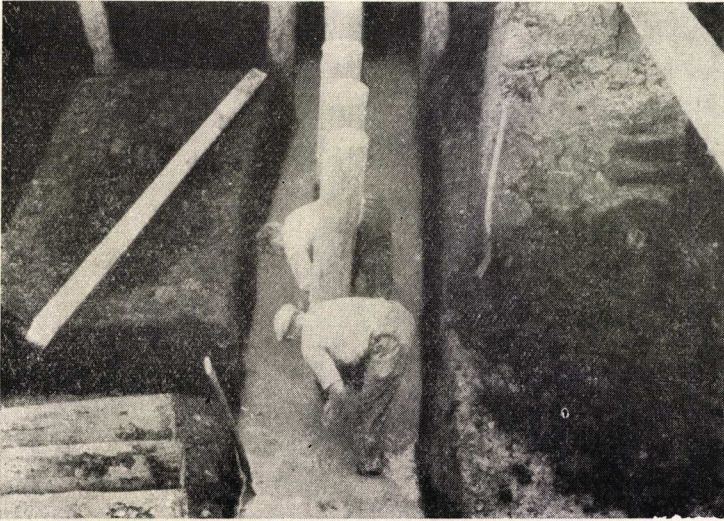
Hall containing model of the River Lek near
Wijk-bij-Duurstede.

II-24. HYDRAULIC ENGINEERING LABORATORIES.
B. SOIL MECHANICS LABORATORY.

Address: 25, Oostplantsoen, Delft, tel. 13.99.

Task: Practical and scientific research concerning the characteristics of the soil on behalf of building on and under the surface.

Director: Ir T. K. Huizinga; Deputies Ir E. C. W. A. Geuze and Ir W. C. van Mierlo.



This is how the construction of a house commences in Holland.

II-25. COMMITTEE FOR RESEARCH ON CONSTRUCTIONS T.N.O.

Address: Prof. Ir H. C. P. de Vos (secretary),
19a, Alexander-Gogelweg, The Hague, tel. 39.09.59.

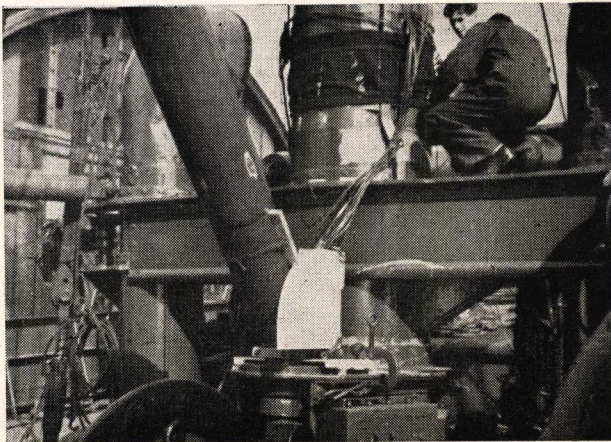
Purpose: Centralisation and expansion of research concerning constructions in various materials.

Chairmen:

of the Committee: Prof. Ir D. Dresden;

of the Section "Reinforced Concrete and Steel Constructions": Prof. Ir C. G. J. Vreedenburgh;

of the Section "Stress and Vibration Research": Prof. Dr Ir J. J. Koch.



Measurement of stresses in the derrick equipment of a ship: fixing straingauges to the foot of the mast.

III. The Institute and the Sections grouped under the National Research Council for Nutrition T.N.O.

The National Research Council for Nutrition T.N.O. (page 13):

Chairman: Dr A. Polman.

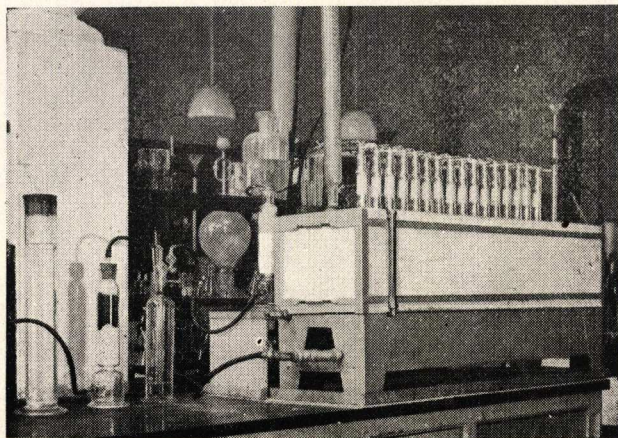
Secretary: Dra A. E. Winkel.

Office: 12, Koningskade, The Hague, tel. 77.60.90.

The *numbers* by the names of the institute and of the sections refer to the chart on pages 8 and 9.



Digestion research in vitro.



Stability determination in oils and fats.

III-26. CENTRAL INSTITUTE FOR NUTRITION
RESEARCH T.N.O. ("C.I.V.O.")

Address: 61, Catharijnesingel, Utrecht, tel. 1.39.13.

Task: The study of problems with regard to nutrition and advice to industry and public on the subject.

Director: Dr M. van Eekelen.

Departments:

- I. *Analytical Department* (Research into foodstuffs. Improvement in methods of analysis.)
- II. *Technological Department* (Grain, meal and bread research. The preserving of fish; research into deep freezing. Tenability of oils and fats; preservatives.)
- III. *Medico-physical Department* (Nutrition in healthy and ill persons; special nutrition of infants.)
- IV. *Department for General Food Problems;*
Head: Ir J. Straub.
- V. *Documentation and Library.*

The Cereals Department of the "C.I.V.O." is situated independently at Wageningen (see below).

* *
*

III-26a. CEREALS DEPARTMENT OF THE "C.I.V.O."

Address: 109a, Grindweg, Wageningen, tel. 26.80.

Head: Drs H. M. R. Hintzer.

Illustration: back of this page.

III-27. PANEL FOR THE NUTRITIVE VALUE OF
POTATOES T.N.O.

Address: 61, Catharijnesingel, Utrecht, tel. 1.39.13.

Chairman: Dr M. van Eekelen.

Secretary: Ir J. Straub.

*

III-28. PANEL FOR THE METHODOLOGY IN DETER-
MINING AMINO-ACID CONTENT T.N.O.

Address: 61, Catharijnesingel, Utrecht, tel. 1.39.13.

Chairman: Dr M. van Eekelen.

Secretary: Ir J. Straub.

*

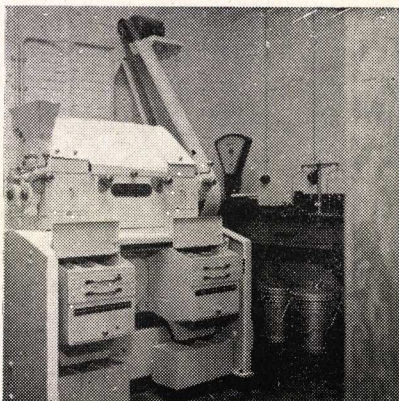
III-29. PANEL FOR THE NUTRITIVE VALUE OF
PULSES T.N.O.

Address: 61, Catharijnesingel, Utrecht, tel. 1.39.13.

Chairman: Dr M. van Eekelen.

Secretary: Ir J. Straub.

* *
*



Left: experimental flour milling; right: oven and steam prover
(Cereals Department of the "C.I.V.O.", Wageningen).

IV. The Institutes and Sections grouped under the National Council for Agricultural Research T.N.O.

The National Council for Agricultural
Research T.N.O. (page 13):

Chairman: Ir C. Staf.

Secretary: Ir C. van der Giessen.

Assistant Secretary: M. B. van Lennep.

Office: 12, Koningskade, The Hague,
tel. 77.60.90.

The *numbers* by the names of the in-
stitutes and sections refer to the chart
on pages 8 and 9.

IV-30. FORESTRY RESEARCH STATION T.N.O.

Address: "de Dorschkamp", 1, Domeinweg, Wageningen, tel. 26.51.

Task: Forestry research; furtherance of domestically grown timber.

In the *Governing Board* cooperate: the State Forest Service, the Institute for Forestry Research of the Agricultural Academy, the Netherlands Heath Reclamation Society and the private forest-owners represented by the Forestry Section of the Federation of Agriculture. Chairman: Ir F. W. Malsch.

The *Board of Control* (18 members) contacts the authorities who are concerned with forests and woods.

Director: Dr Ir H. van Vloten.



"De Dorschkamp", Wageningen.

IV-31. INSTITUTE FOR BIOLOGICAL FIELD RESEARCH
("I.T.B.O.N.").

Address: Mariëndaal, Oosterbeek, tel. 5.69.

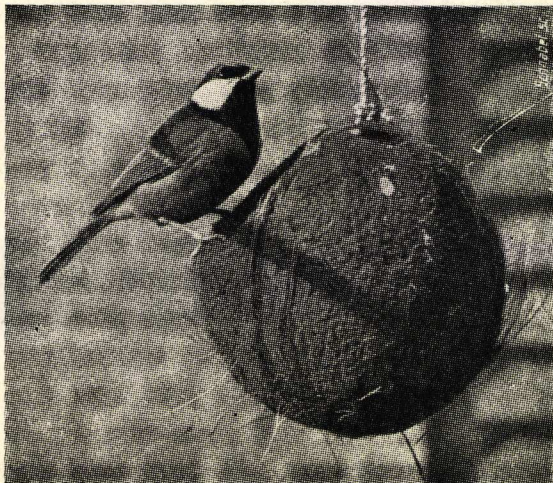
Task: Applied forestry zoology (insect plagues, hunting-problems, etc.), applied biological research into those subjects which are not destined for agriculture, horticulture or forestry; research into certain diseases of trees (elm disease).

Chairmen:

of the Central Committee: Prof. Dr G. A. van Poelje;
of the Committee for the Study and Combating of Insect
Plagues in Forestation: Ir F. W. Malsch;
of the Committee for the Study and Combating of Diseases
in Elms and Other Trees: Ir F. W. Malsch.

Director, Secretary of the Committees: Dr A. D. Voûte.

Publications: Information sheets of the I.T.B.O.N. and of
the Committees on Insect Plagues and on Disease in Elms.



Population research: titmouse, destroyer of insects
and prey of the sparrow-hawk.

IV-32. PANEL FOR THE STUDY OF WIND BREAKS.

Address: "I.T.B.O.N.", Mariëndaal, Oosterbeek, tel. 5.69.

Purpose: The furtherance of research and cooperation concerning the influence of rows of trees, hedges etc., on the biosphere and the vegetation growth.

Manager: Dr A. D. Voûte.

Secretary: Drs R. J. van der Linde.



Windbreak: row of willow trees in meadow landscape.

* * *

IV-33. PANEL FOR RESEARCH ON BIOCIDES.

Address: 6, Vondellaan, Utrecht, tel. 2.13.84.

Purpose: Fundamental investigation into the action of biocides, in particular of insecticides and fungicides.

Manager: Dr. D. Dresden.

Advisor: Prof. Dr U. G. Bijlsma.

IV-34. SECTION FOR THE STUDY OF TRACE
ELEMENTS T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Purpose: The study of the significance for agriculture and cattle-breeding of elements appearing only in small quantities in the soil (copper, manganese, molybdenum, cobalt, nickel, borium and others).

Chairman: Prof. Dr L. Seekles.

Secretary: Prof. Dr J. J. Duyvené de Wit.



Young leaves of kidney bean yellowed by
abundance of manganese.

IV-35. PANEL FOR LAND RECLAMATION RESEARCH
T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Purpose: The furtherance of research and cooperation concerning land reclamation works, in particular with regard to the thickness and nature of the clay layer in the territory ripe for reclamation. In this Section, 9 corporations are cooperating.

Chairman: Ir C. Staf.

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IV-36. PANEL FOR THE STUDYING OF SOIL-
STRUCTURE.

Address: 3, Professor-van-Hallstraat, Groningen,
tel. 2.15.35.

Purpose: The furtherance of cooperation, task distribution, exchange of information etc. between 7 institutes active in the Netherlands in the field of soil research.

Chairman: Drs P. Bruin.

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IV-37. PANEL ON THE CONVERSION OF ORGANIC
MATERIAL.

Address: 3, Professor-van-Hallstraat, Groningen,
tel. 2.15.35.

Purpose: The furtherance of cooperation and research concerning the assimilation of organic matter on and in the soil.

Manager: Drs P. Bruin.

Secretary: Dr M. A. J. Goedewagen.

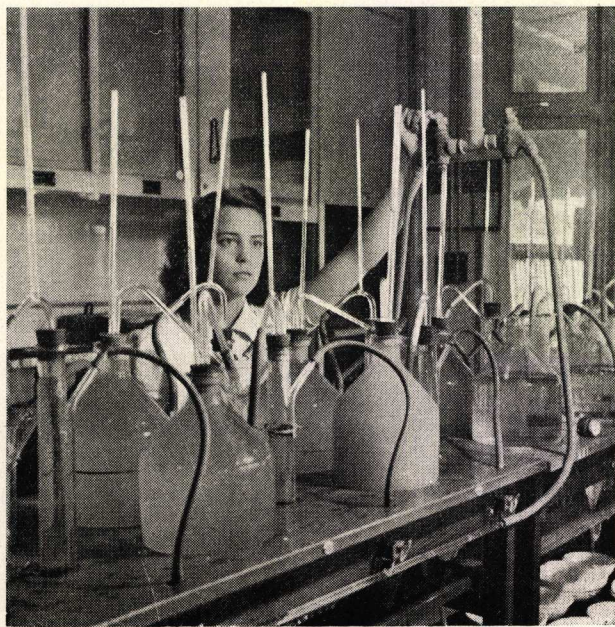
IV-38. AGRICULTURAL EXPERIMENT STATION AND
INSTITUTE FOR SOIL RESEARCH T.N.O.

Address: 3, Professor-van-Hallstraat, Groningen,
tel. 2.15.35.

Task: Research into the soil and its fertility.

Director: (acting) Drs P. Bruin, assisted in administrative
management by Dr P. A. Rowaan, chief chemist.

Principal activities: Chemical, physical and field research
of soil and tilth (chief physicist: Dr P. K. Peerlkamp);
agro-hydrological research (chief chemist: Dr S. B. Hoog-
houdt); research into the application of fertilizers and
plant nutrition (chief agricultural expert: Dr F. van der
Paauw); botanic research (chief botanicist: Dr M. A. J.
Goedewagen); micro-biological research (department
director: Dr Ir F. C. Gerretsen).



Kopecky soil-granulometry measuring instrument

IV-39. SOIL TESTING LABORATORY.

Established and maintained by the Management Association for the Soil Testing Laboratory; control and business management has been vested in the National Council for Agricultural Research T.N.O. since 1st January 1944.

Address: Mariëndaal, Oosterbeek, tel. 5.68.

Task: Large-scale testing of soil samples in the service of agriculture and horticulture; results are recorded as far as possible in cartographic form.

Director: Ir F. J. A. Dechering.

Laboratories:

A. Central laboratory: Mariëndaal, Oosterbeek, tel. 5.68.

B. Branch laboratories:

a. 3, Prof.-van-Hallstraat, Groningen, tel. 2.15.55;

Head: Ir A. W. Swets.

b. 138, Papenvoort, Geldrop, tel. 4.98;

Head: Ir H. J. C. Derksen.

c. 13, Singelstraat, Goes, tel. 26.53.



Vibrating machine used to extract soil for measurement of phosphate and potash content.

IV-40. PANEL FOR ENDOCRINOLOGICAL RESEARCH
ON AGRICULTURAL DOMESTIC ANIMALS
T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Purpose: Research concerning the possibilities inherent in the application of hormones and allied substances in large and small domestic animals (cattle, fowl etc.).

Chairman: Ir Th. J. Rijssenbeek.

Secretary: Prof. Dr J. J. Duyvené de Wit.



Female bitterling in oviposition.

IV-41. PANEL FOR ARTIFICIAL INSEMINATION T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Purpose: Research in connection with artificial insemination in cattle.

Chairman: Ir Th. J. Rijssenbeek.

Secretary: Prof. Dr J. J. Duyvené de Wit.

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IV-42. PANEL FOR LIVER-FLUKE RESEARCH T.N.O.

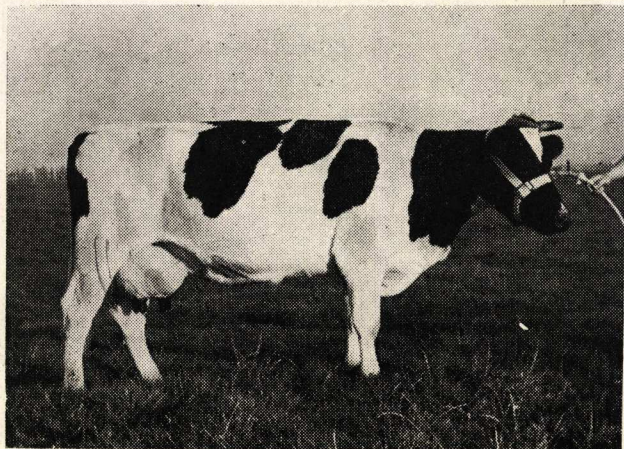
Address: 12, Koningskade, The Hague, tel. 77.60.90.

Purpose: The furtherance of cooperation and research concerning the liver fluke disease in sheep and cattle.

Chairman: Dr Ir C. K. van Daalen.

Secretary: Ir H. Verschuyt.

*



Fine specimen of Frisian-Holstein cattle.

V. Institutes grouped under the National Research Council for Agricultural Industries T.N.O.

The National Research Council for
Agricultural Industries T.N.O.
(page 13):

Chairman: Ir C. Staf.

Secretary: Ir C. van der Giessen.

Assistant Secretary: M. B. van Lennep.

Office: 12, Koningskade, The Hague,
tel. 77.60.90.

The *numbers* by the names of the institutes refer to the chart on pages 8 and 9.

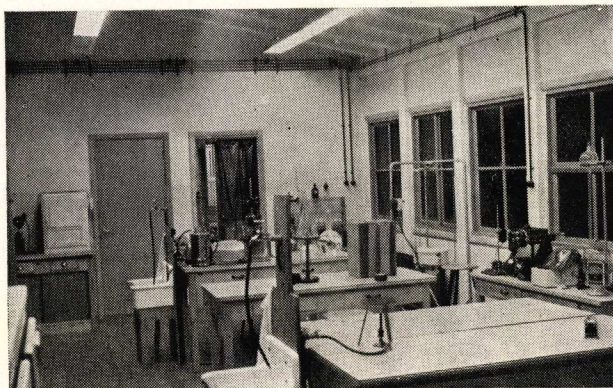
V-43. EXPERIMENTAL STATION FOR THE
INDUSTRIAL UTILIZATION OF THE POTATO.

Address: 122, Verlengde Oosterweg, Groningen,
tel. 2.33.62.

Task: The furtherance of cooperation and research concerning the utilization of the potato.

Board: Representatives of 11 corporations concerned in this subject; chairman: (acting) Prof. Ir L. H. de Langen.

Director: Prof. Dr. H. J. C. Tendeloo.



Experimental Station for the Industrial Utilization
of the Potato — laboratory.

V-44. Corporation NETHERLANDS EXPERIMENTAL
STATION FOR THE UTILIZATION OF STRAW.

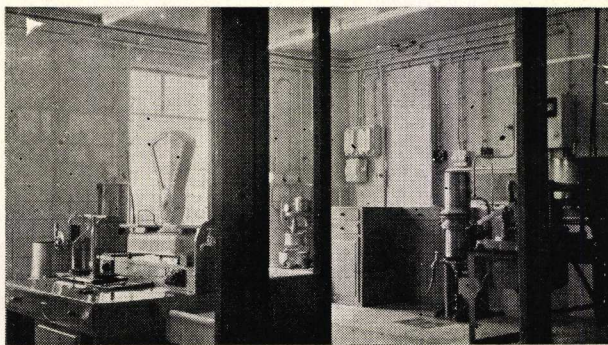
The Corporation is in regular contact with the National
Research Council.

Address: Gebouw P.E.B., Winschoterdiep, Groningen,
tel. 2.92.02.

Task: Scientific and semi-technical research into new and
existing applications of straw as a raw material.

Chairman: E. H. Ebels.

Director: Dr F. M. Muller.



Netherlands Experimental Station for the Utilization of
Straw — fibres laboratory.

VI. Institutes grouped under the National Defence Research Council T.N.O.

The National Defence Research Council T.N.O. (page 15):

Chairman: Prof. Dr G. J. Sizoo.

Secretary: Mr P. F. Tanja.

Office: 12, Koningskade, The Hague, tel. 77.60.90.

The *numbers* by the names of the institutes refer to the chart on pages 8 and 9.

VI-45. CHEMICAL LABORATORY.

Address: 134, Julianalaan, Delft, tel. 23.23.

Task: Chemical research on behalf of national defence.

Director: Drs J. van Ormondt.

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VI-46. MEDICO-BIOLOGICAL INSTITUTE.

Address: Wassenaarse weg, Leiden, tel. 2.47.83.

Task: Medico-biological research on behalf of national defence.

Head: Dr J. A. Cohen.

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VI-47. PHYSICAL LABORATORY.

Address: Vlakte van Waalsdorp, The Hague, tel. 77.44.61.

Task: Physical research on behalf of national defence.

Director: Prof. Ir J. L. van Soest.

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*

VI-48. TECHNOLOGICAL LABORATORY.

Address: 134, Julianalaan, Delft, tel. 23.23.

Task: Technological research on behalf of national defence.

Director: Ir A. J. der Weduwen.

VII. Institute grouped under the National Health Research Council

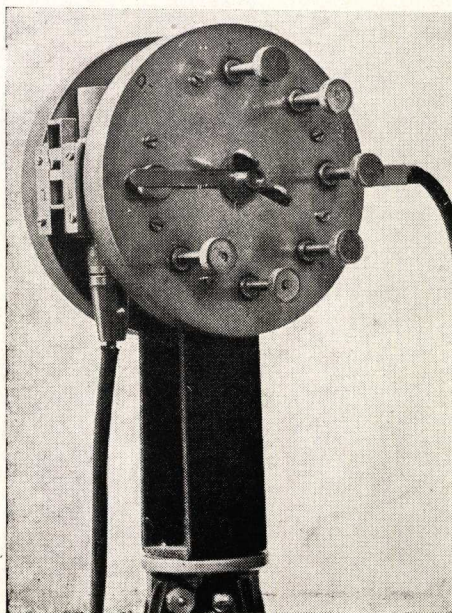
The National Health Research Council
T.N.O. (page 15):

Chairman: Dr A. Polman.

Secretary: Dra A. E. Winkel.

Office: 12, Koningskade, The Hague,
tel. 77.60.90.

The *number* by the name of the institute refers to the chart on pages 8 and 9.



Thermal precipitator for the determination of dust particles in the air.

VII-49. RESEARCH INSTITUTE FOR PUBLIC HEALTH
ENGINEERING T.N.O.

Address: 12, Koningskade, The Hague, tel. 77.60.90.

Task: The improvement of living conditions and working surroundings from the health point of view and their furtherance by cooperation between hygienists and technicians.

Chairman: Prof. W. F. J. M. Krul.

Director: Ir D. van Zuilen.

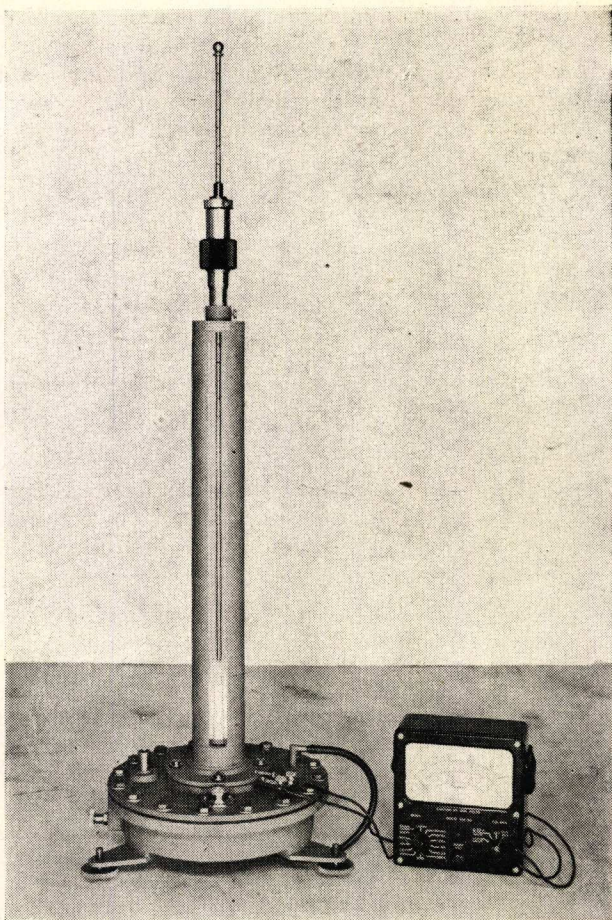
Subjects undertaken:

- a. drinking water; sewage purification; swimming pools;
- b. harmful dust and its combating;
- c. heating, ventilation and heat insulation; acoustic insulation and acoustic hindrances; medical and hygienic principles of interior illumination (in conjunction with the Netherlands Illumination Institute); removal of waste;
- d. ultra-violet radiation; electro-physical expedients in research into the heart and the nervous system.

The 48 experimental dwellings, built at Rotterdam under the auspices of the *Section on Experimental Dwellings T.N.O.* and completed in October 1948 (picture: page 14), are being utilized for investigation and measurements on heat and sound, materials and construction methods.

Publications: Information sheets.

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Precision micromanometer,
developed for its own experiments by the
National Aeronautical Research Laboratory,
now available for every investigation
in every field.

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