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INSTRUMENTOS E MÁQUINAS

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Measuring instruments for the meteorology, biology and limnologie

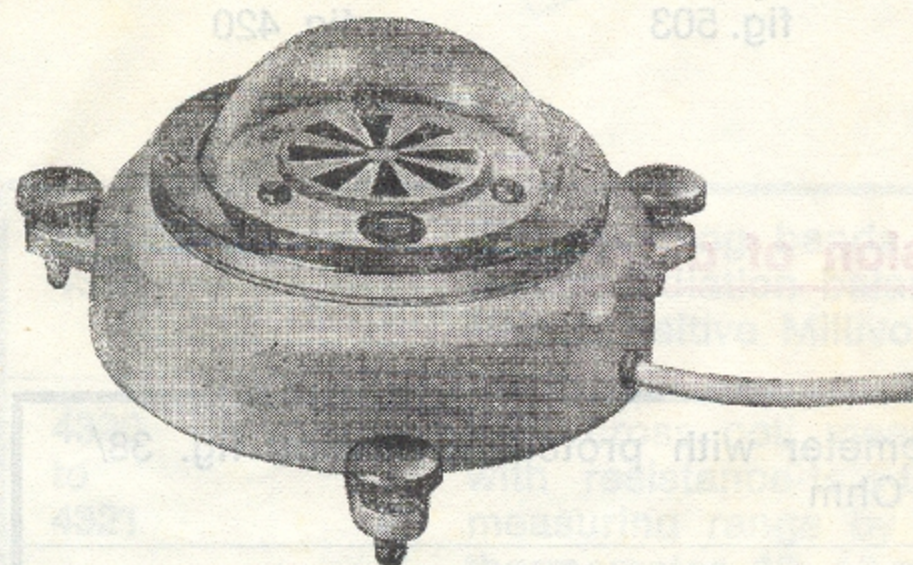


fig. 194
starpyranometer

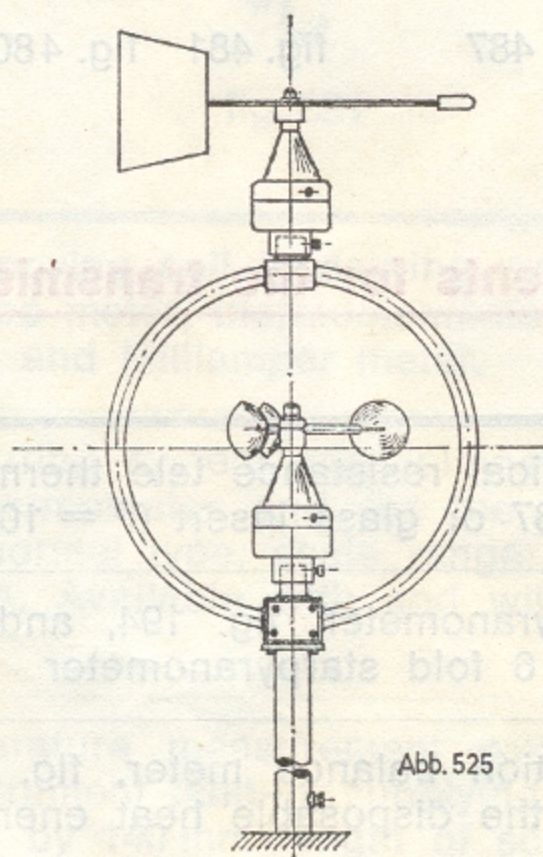


Abb. 525
Windintensity and
direction combined

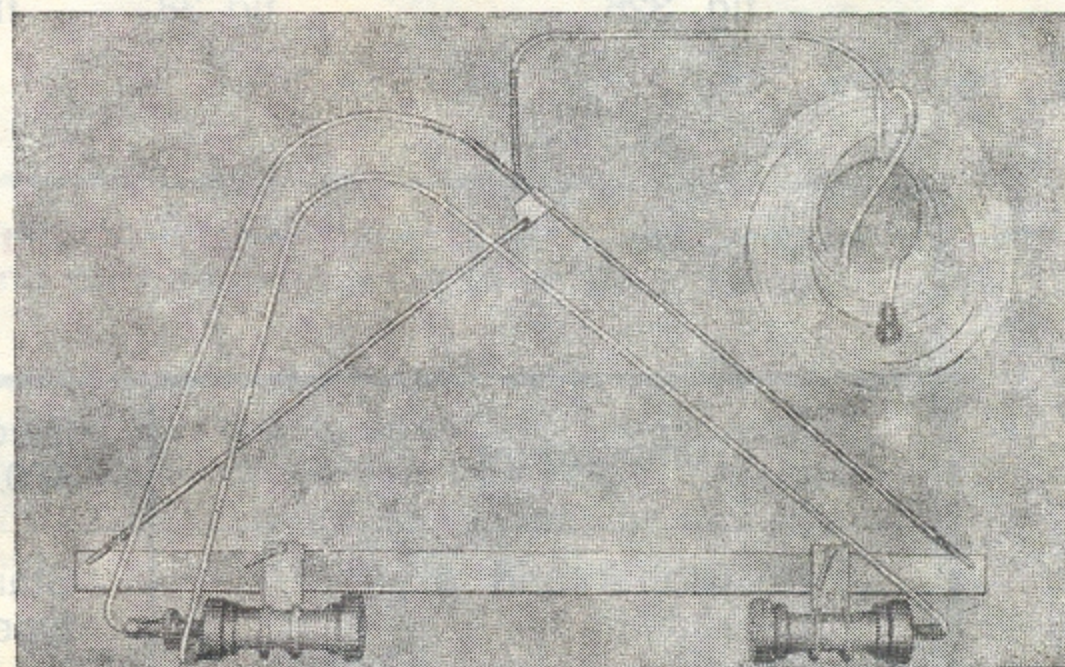


fig. 319
transparency meter
detector instrument.

We describe a very important file of special instruments for the measurement, which gave very good results since years, in the scientific researches. We have so many types that we describe only the most important types and we like to inform you that we are at your disposal for further informations. We have constructed for the teletransmission from the measuring datas, special measuring systems, which give even by the smallest measuring tension an extended scale graduation. It is therefore, possible besides the well known measuring system for the tension and resistance measurements, to offer a measuring current amplifier with a very high precision and stabil current instruments, which elevated the present measuring technic. To obtain the maximum results in the measurements, it is necessary to plan exactly the installation of the necessary sensor and detector and the connected indicator and recording instruments. Therefore, we need in the case of an order the maximum of details and informations.

For this reason, we advice by important measurements the building of electronical add. instruments and measuring current amplifier for the measurement in compensation process without loss and you obtain by strong measuring system, advantageous maniability and sensitivity.

Measurements in free areas

Within the last years, we have had the possiblity, to develop an interesting type from one- and multi channel recorder, for measurements in free areas and in high altitude a. s. o. The all functions of the instrument will be operated from a dry cell 1,5 V which is easy to be changed and has a longevity from appr. 3-4 weeks. For the researches in the nature it is very precious because those measurements have to be made mostly in free areas. Only for the supplying of **bridge feed motion amplifier** and for the tele transmission to a multi channel recorder, etc., a measuring battery from 12 V is mostly necessary. By working with a **cross coil** 4-6 V direct current are sufficient, and here too the simplest alternatingcurrent demodulator can be used for the connection on a net tension.

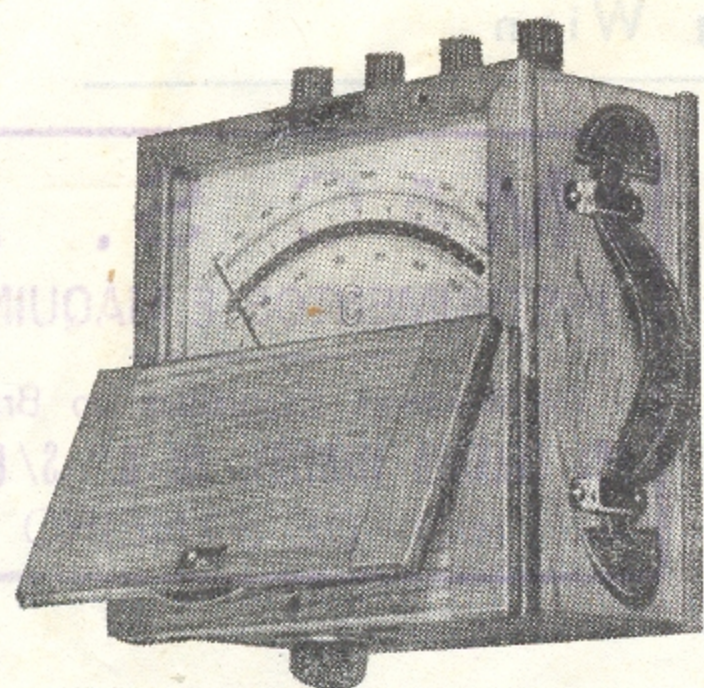


fig. 326

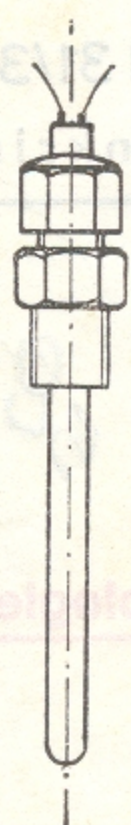


fig. 38

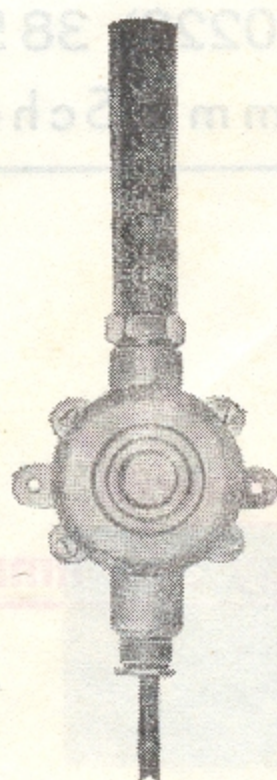


fig. 487

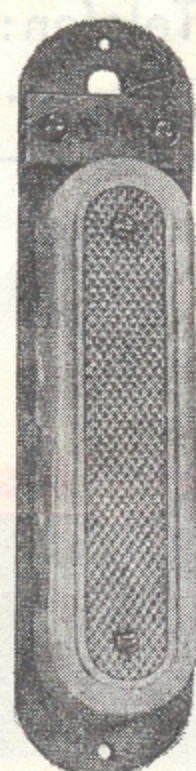


fig. 481

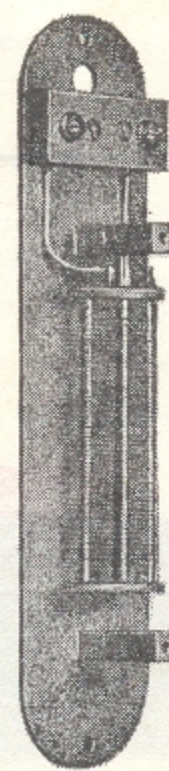


fig. 480

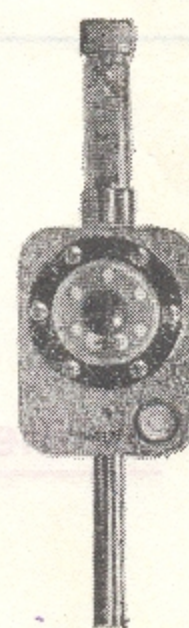


fig. 503

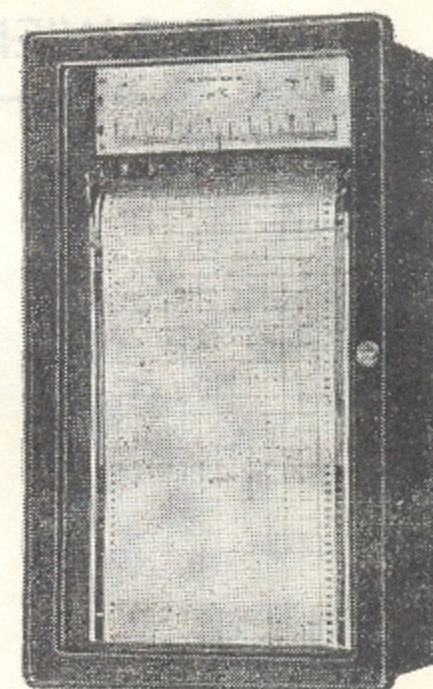


fig. 420

Detector instruments for the transmission of datas

1	Temperature	Electrical resistance tele thermometer with protecting fittings fig. 38/480/487 or glass insert 0° = 100 Ohm
2	Global and sky radiation	Starpyranometer, fig. 194, and schema 509/510, sheet L 1, L 3, new type: 6 fold starpyranometer
3	Radiation balance	Radiation balance meter, fig. 503 and 509/10 for the measurement from the disposable heat energy
4	Wind intensity and direction	Fig. 525, sheet L 4 with electrical tele measurement on recording instruments, wind way registration etc.
5	Intensity of the light	Photo elements to complete the radiation measurements
6	Air — pressure	detector instrument for the tele transmission of pressures in Torr or Millibar on recording instruments
7	Humidity measurement	Psychrometer from a very high precision for the measurement in free areas fig. or Lithium-chlorid humidity sensor fig. 526
8	Researches in water	Transparency meter, after Dr. Sauberer and for the turbidity of the air in the tunnel, sheet M 2
9	Repartition of the light in the water	Underwater photo meter for the measurement of the spectral light repartition in the water, fig. 317

The detectors give either, a measuring current for transmission to a portable table instrument or multi channel recording instruments or, they are provided with electrical tele sender. Measuring current amplifier or stabilizers need a current connection from 220 V/50 Hz or 12 V accu.

For the evaluation of the datas we deliver:

1. Portable table instruments in many types and
 2. one and multi-color-point-recorder.
- Also line recorder with synchronous motor drive system, are available, overleaf we describe those instruments, the types which are mostly required.

We call your attention on the fact that the measuring instruments from the fig. 326 can be delivered for measurement in free areas, with loading measuring battery 12 V. It can be charged over night on the next net plug. Indication of the net tension is necessary.

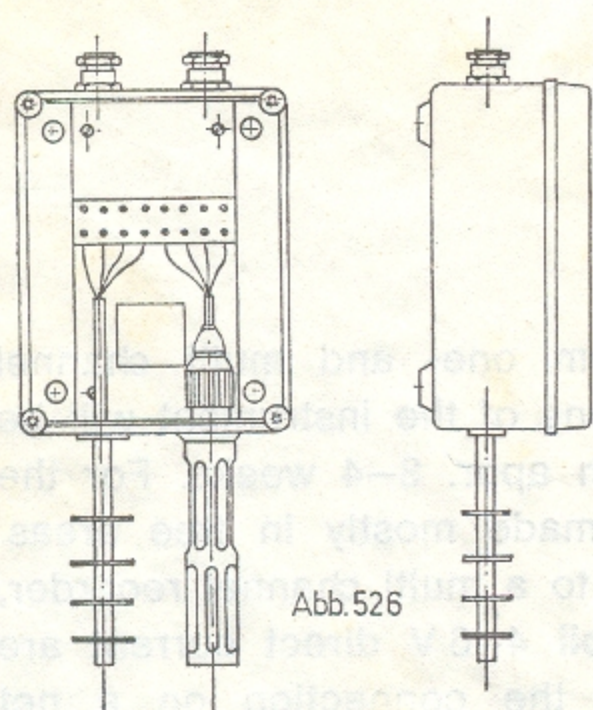


Abb. 526

Li-Cl-Feuchtegeber

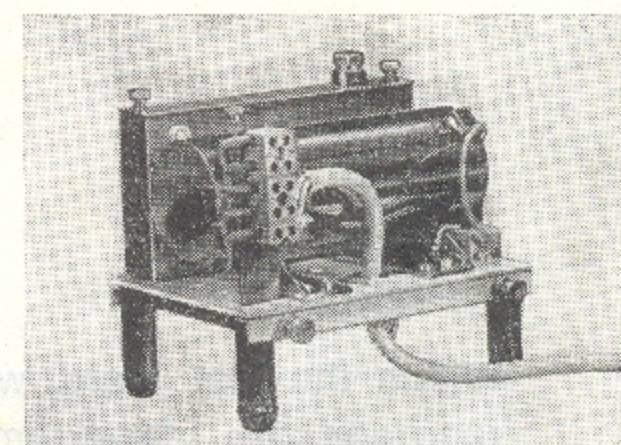


fig. 539

I. PORTABLE TABLE INSTRUMENTS

with mirror bow and indicating file in oakwood case with folding lid



fig. 326, sheet C 22

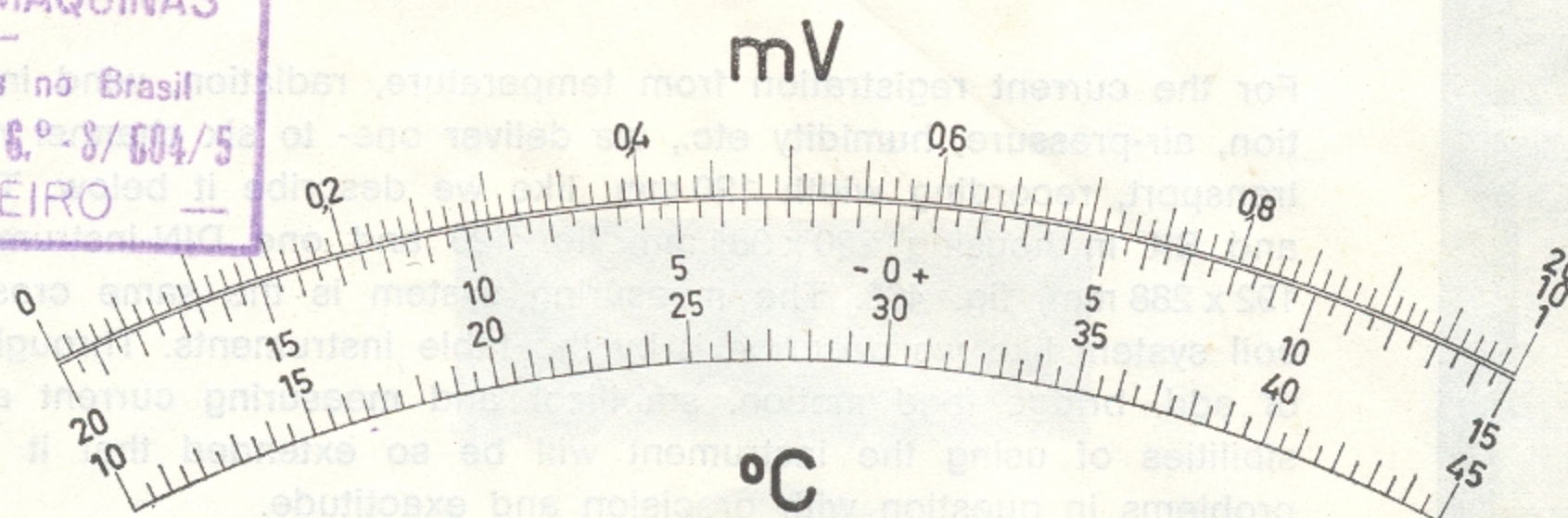


fig. 521

List. Nr. 4315	With hanging bands moving coil measuring system for the connection on a starpyranometer, radiation balance meter, thermoelements and all detector, which give up a tension. Very sensitive Millivolt and Milliampere meter.
4320 to 4321	With cross coil measuring system, special instrument for the temperature measurement with resistance-tele-thermometer and for the connection on a tele detector. Smallest measuring range by normal type, scale range 30°C, consumption of current in the tele-thermometer 10–13 mA. Available with and without dry battery 4–6 V or loading Deac-battery built-in.
4315a to d 4316a/b	For every fine temperature measurement with bridge moving coil measuring system with stabil current instrument built-in, supplying of current like above mentioned, 2–5 mA. Measuring range 10°C by 140 mm length of scale. Also for the connection from tension detector. With separated measuring battery 12 V or Deac-accu chargeable built-in, fig. 519.
4325 to 4329	Moving coil measuring instrument with special strong measuring system through the construction of a measuring current amplifier L. Nr. 4211 to 4216 for the carrying through of measurement without loss in compensation process, input resistance higher as 100 kOhm. Therefore it is possible to build a smaller measuring range f. i. fig. 521 by a scale length of 140 mm. Especially recommended for the exact radiation measurement by low sun position very sensitive Millivolt and Milliampere meter.
4360 to 4364a	Double Indicating instrument with amplifier and bridge feed motion fig. 326, with stabil current instrument for sensitive tension measurement and temperature measurement with resistance telethermometer, switch schema fig. 520. 2 accu from 12 V necessary or also with 2 loading Deac-accu built-in.

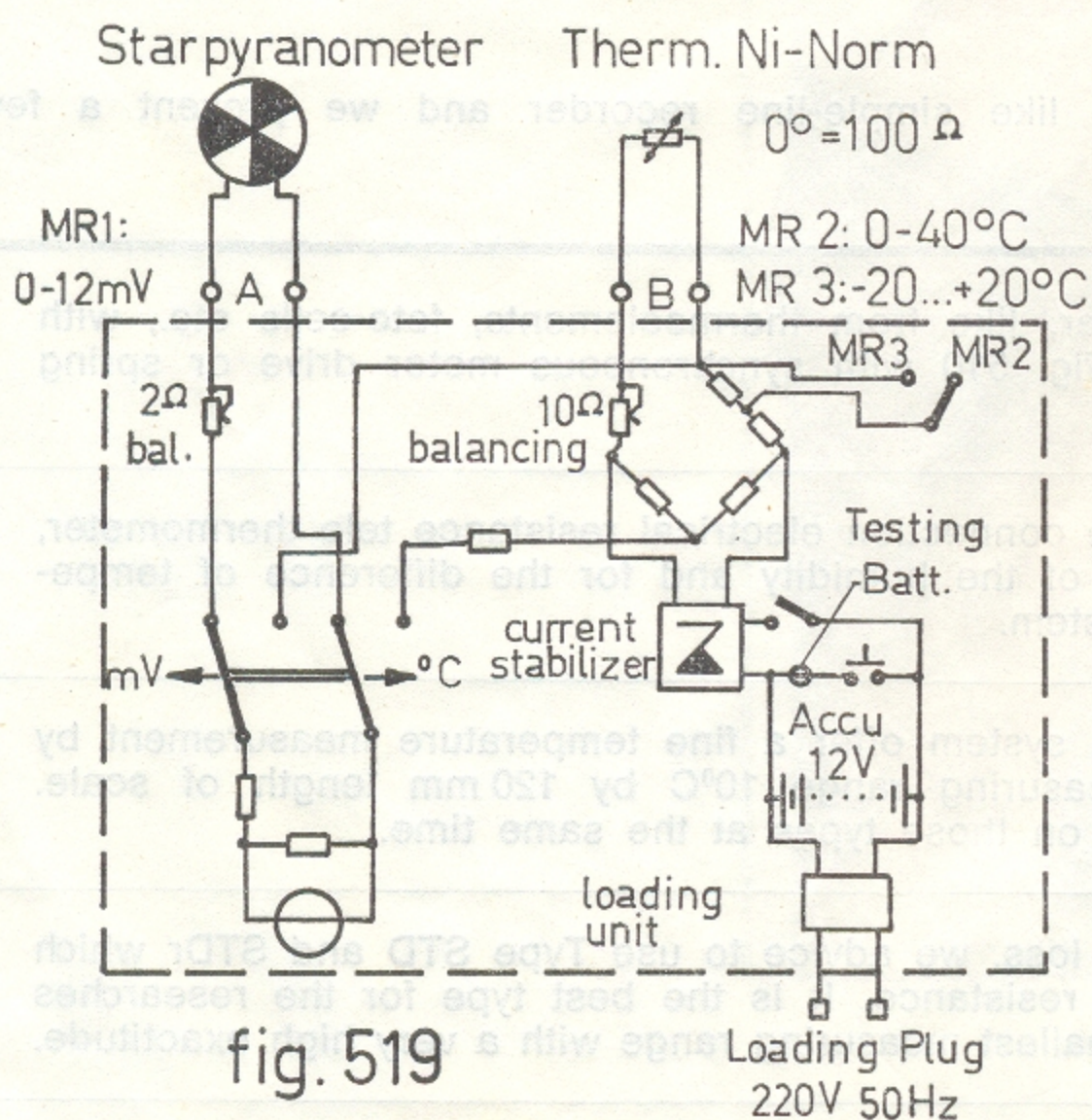


fig. 519

fig. 519

table instrument for Millivolt and temperature measurement, measuring battery built-in which can be loaded

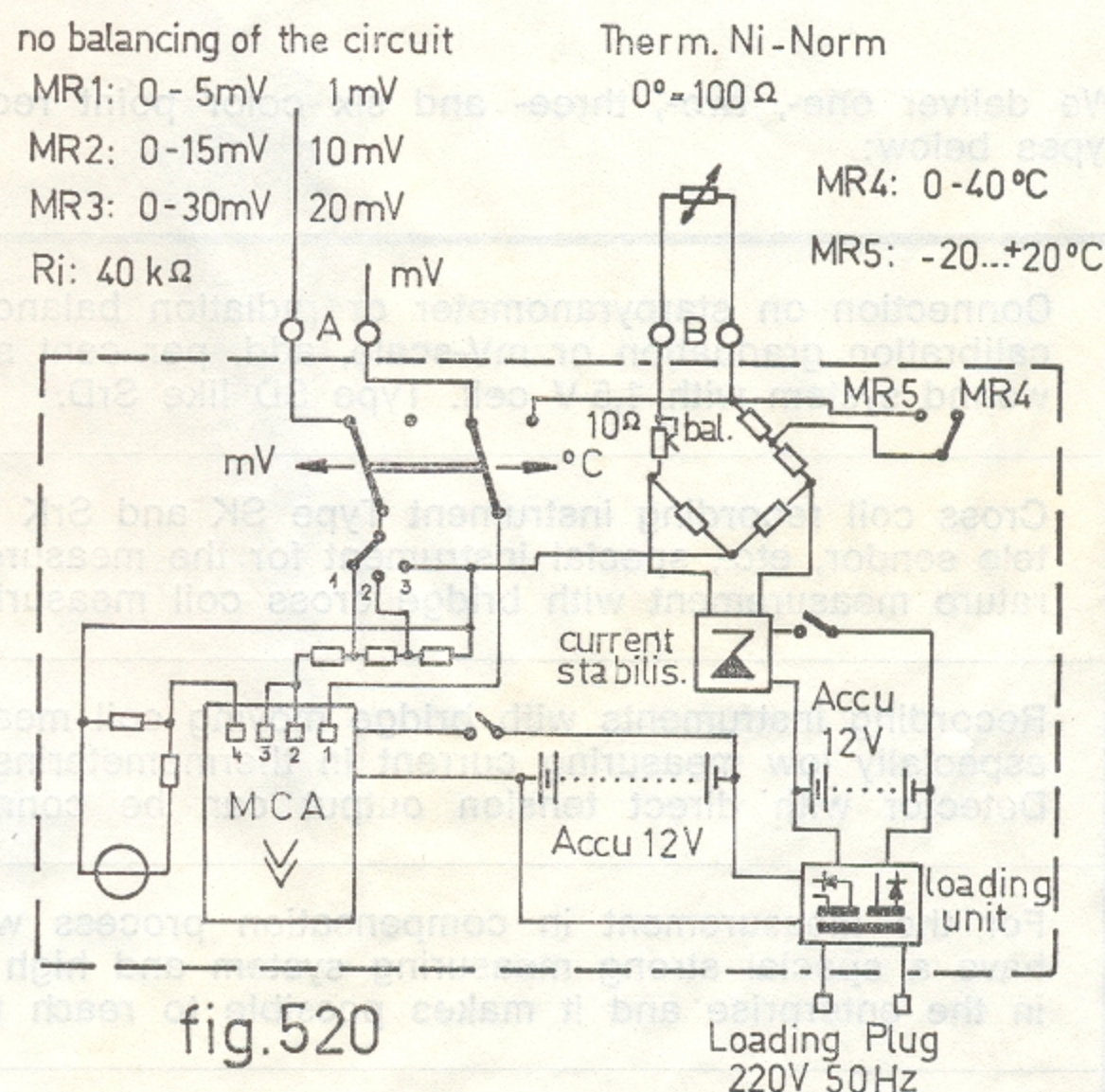


fig. 520

fig. 520

table instrument, tension and temperature with amplifier and battery built-in. Measurement without loss.

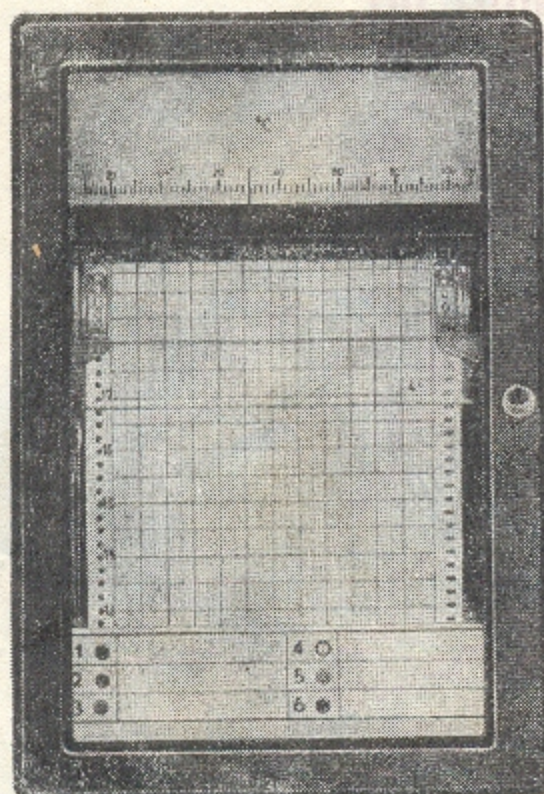


fig. 408

II. ONE- AND MULTI-COLOR-RECORDING-INSTRUMENTS

fig. 408 and 420 sheet G 3/4/5

For the current registration from temperature, radiation, wind intensity and direction, air-pressure, humidity etc., we deliver one- to six channel recorder with strip transport, recording width 120 mm, like we describe it below. The large type SD and SK in housing 220 x 384 mm fig. 420 and one DIN-instrument SrD and SrK 192 x 288 mm, fig. 408. The measuring system is the same cross coil or moving coil system like we describe it by the table instruments. Through the construction of add. bridge feed motion, stabilizer and measuring current amplifier, the possibilities of using the instrument will be so extended that it can solve all the problems in question with precision and exactitude.

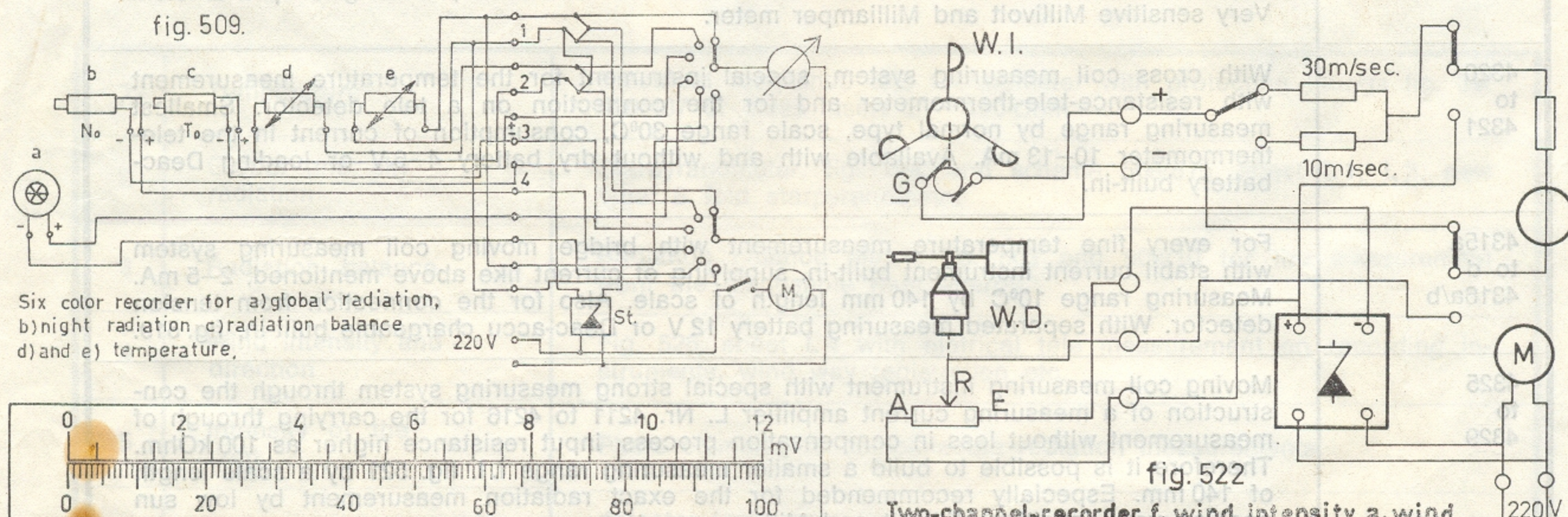


Fig. 510 Scale calibration for global radiation and radiation balance, $\frac{2}{3}$ natural size.

AVAILABLE TYPES

We deliver one-, two-, three- and six color point recorder, like simple-line recorder and we present a few types below:

Connection on starpyranometer or radiation balance meter, like from thermoelements, foto-cells etc., with calibration graduation or mV-scale, add. per cent scale, fig. 510 with synchronous motor drive or spring wound system with 1,5 V cell. Type SD like SrD.

Cross coil recording instrument Type SK and SrK for the connection electrical resistance tele thermometer, tele sender, etc., special instrument for the measurement of the humidity and for the difference of temperature measurement with bridge cross coil measuring system.

Recording instruments with bridge moving coil measuring system offer a fine temperature measurement by especially low measuring current in thermometer inset, measuring range 10°C by 120 mm length of scale. Detector with direct tension output can be connected on those types at the same time.

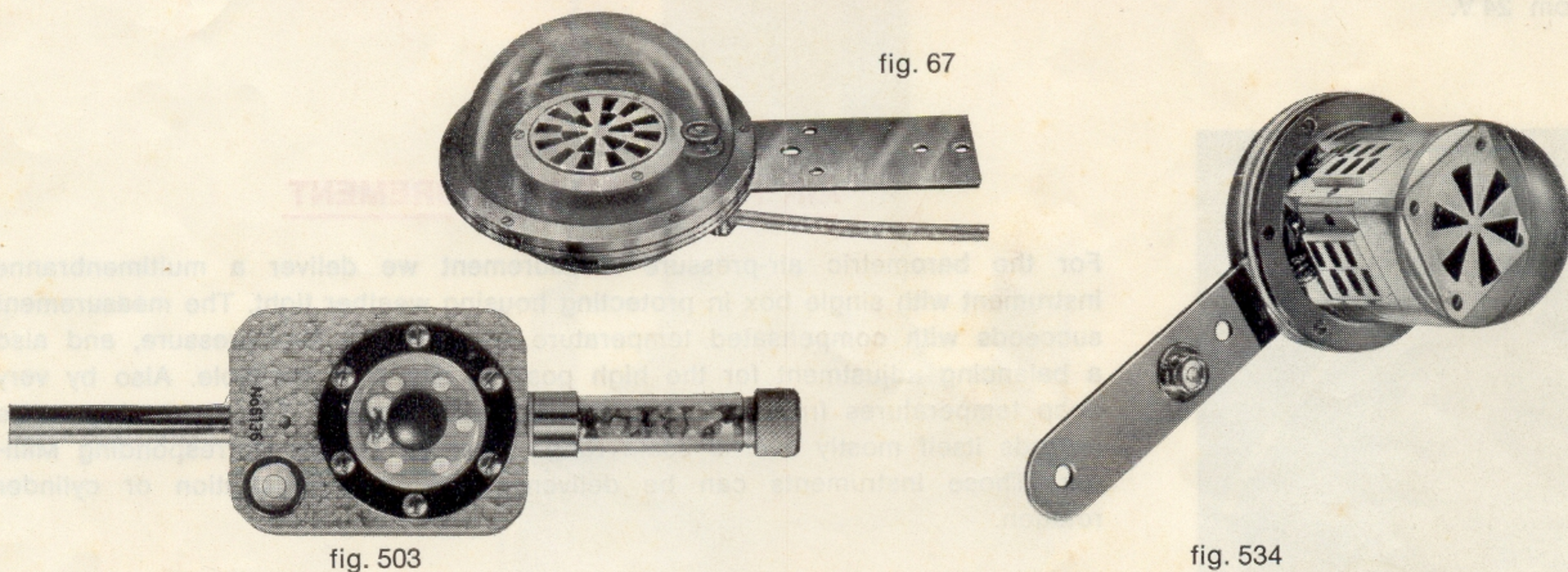
For the measurement in compensation process without loss, we advice to use Type STD and STDr which have a special strong measuring system and high input resistance. It is the best type for the researches in the enterprise and it makes possible to reach the smallest measuring range with a very high exactitude.

For the installation of different measuring ranges, we deliver the bridge moving coil recorder with measuring current amplifier and stabil current source. This type is suitable for a lot of installations and it gives reliable measuring values in compensation process.

FURTHER INFORMATIONS FOR THE RECORDING INSTRUMENTS

Measuring junction	We deliver: one-, two-, three- and six channel-chopper-bar-point-recorder and simple servo-line recorder.
Housing	Standard housing 220 x 384 mm, large type, DIN standard housing 192 x 288 mm appr. 16 kg and 10 kg net weight.
Strips transport	Synchronous motor, 220/110 V or spring wound system with 1,5 V dry cell, 4 weeks longevity or hand wound 3 ½ days.
Recording width	120 mm, with chart strips running down.
Point sequence	20 sec. 10 and 30 sec. by quick recorder with measuring current amplifier built-in also 4 sec., then strip transport with battery system not possible.
Speed	20 mm/h, further 10, 30, 40, 60, 120 mm/h and more.
Measuring system	Discharged hanging band-moving coil or cross coil system, add. instruments bridge feed motion, stabilizer, measuring current amplifier.
Measuring range	1 fundamental measuring range and 3 additional ranges, where the tensions and resistance measurement can be simultaneously built-in.

STARPYRANOMETER AND RADIATION BALANCE METER



The two radiation measuring instruments fig. 194/290/503 give a direct current from appr. 7 mV per 1 gcal, where it must be expected by highest sun-position appr. 1,8 gcal or appr. 12 mV end value of the scale on the table or recording instrument.

The new starpyranometer have an inside resistance R_i from appr. 32 Ohm in mean. To complete old installations we can deliver also stars with $R_i = 5$ Ohm and appr. 3 mV/gcal. By the calibration we take always two values, the highest mV-value with compensated instruments measured without loss, the lowest value with normal reading or recording instrument. Our instrument without amplification are also balanced on 200 Ohm for a consumption of current from 60 microamper. For the conduction are 2 Ohm thought. All the instruments obtain a second scale graduation 0...100 partition line, which is then very important if f.i., a certain amount of stars have to be connected to table instrument. See our connecting sheet Ba 406. The connection of a summing up instrument is also possible. For the measurement of the flow from the energy in horizontal and vertical direction we use the new type six-fold starpyranometer.

MEASUREMENT OF TEMPERATURE

For the ground temperature measurement we deliver a special thermometer, similar to fig. 38, with tighter cable type. For the recording of the air-temperatures for heatbalance measurement we advice to use small insets melted in the glass without protecting fitting DIN $0^\circ = 100$ Ohm, fig. 480 and 487 are resistance thermometer for air temperature, last type in fittings for humid-room, first instrument free winded with higher sensitivity. In addition to it all the necessary table instruments fig. 326 and recording instruments fig. 408 and fig. 420.

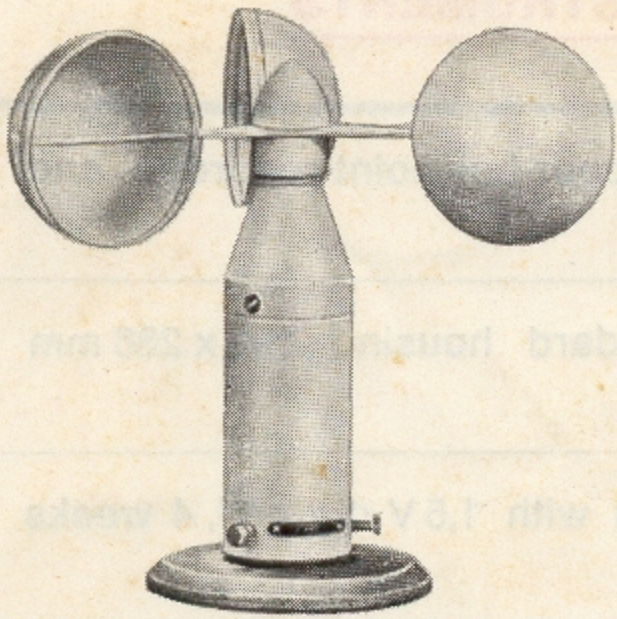


fig. 88

WIND INTENSITY AND WIND DIRECTION

see sheet L 4

Fig. 88 shows the outside presentation of a wind intensity detector and fig. 525 a complete measuring station with intensity and wind direction detector. The first deliver proportionally to the movement of the wind a direct current tension, which can be transferred to the indicator or recording instrument. The wind direction will be taken over in the potentiometer which is built-in the detector and is supplied with a constant tension. The fig. 522 shows the switch schema of a wind intensity and a wind direction measurement, with two channel recorder. It is possible to record in the form of point with a common moving coil measuring system, or with a double line recorder for wind direction and wind intensity. Like we mentioned, it is possible to measure the way of the wind with

a wind intensity indicator. The recording width of the strip, will be put on a special length f. i. 10 km, and starts after ea. 10 km to design up the zero position. It is possible to see how long you need for 10 km, and from the inclined position the velocity.

HUMIDITY MEASUREMENT

For the measurement of the humidity in the air, with tele registration comes the Lithium-Chlorid-humidity-sensor in question, like it is sketched, by fig. 526. It measures the absolute humidity, the amount of steam g/m^3 , and in this combination also the temperature of the air. Further, the measurement of the humidity will be made after the method of the Hairhygrometer, quiet often, but in that case it is necessary to built-in additionally a tele sensor, for the tele-registration on a six-channel-recorder. The highest exactitude can be reached by measurement after the two thermometer method and the statement of the psychrometrical difference, but in that case one must help himself with schedules. With the Lithium-chlorid humidity detector and a bridge cross coil recording instrument it is possible to measure the relative humidity. But it needs an alternating current connection from 24 V.

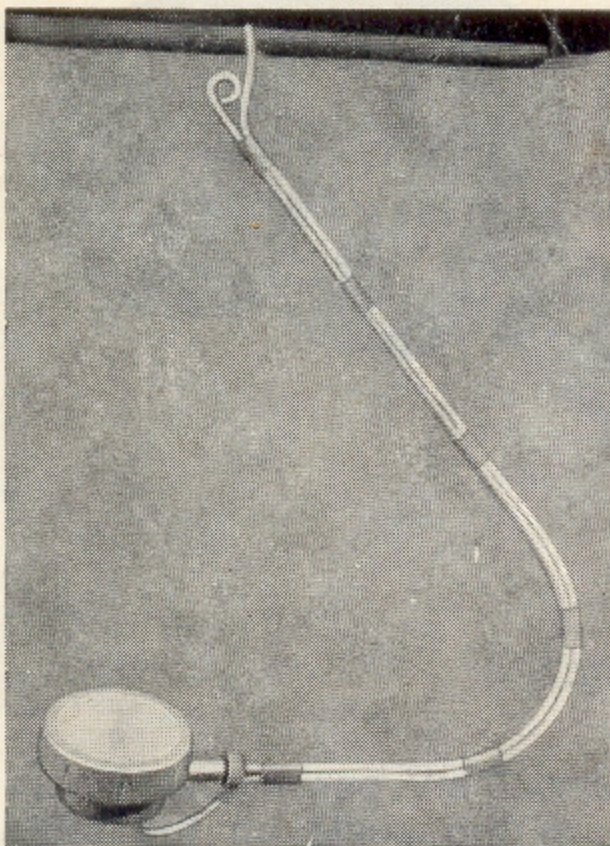


fig. 317

Underwater-photometer

AIR PRESSURE MEASUREMENT

For the barometric air-pressure measurement we deliver a multimenbranne instrument with single box in protecting housing weather tight. The measurement succeeds with compensated temperature and secured over-pressure, and also a balancing adjustment for the high position like it is available. Also by very deep temperatures from -20 it is running with security. The measuring range extends itself mostly over a scale range from 80 Torr or corresponding Milli-bar. Those instruments can be delivered with tele registration or cylinder rotation.

TRANSPARENCY METER AND UNDER WATER PHOTOMETER

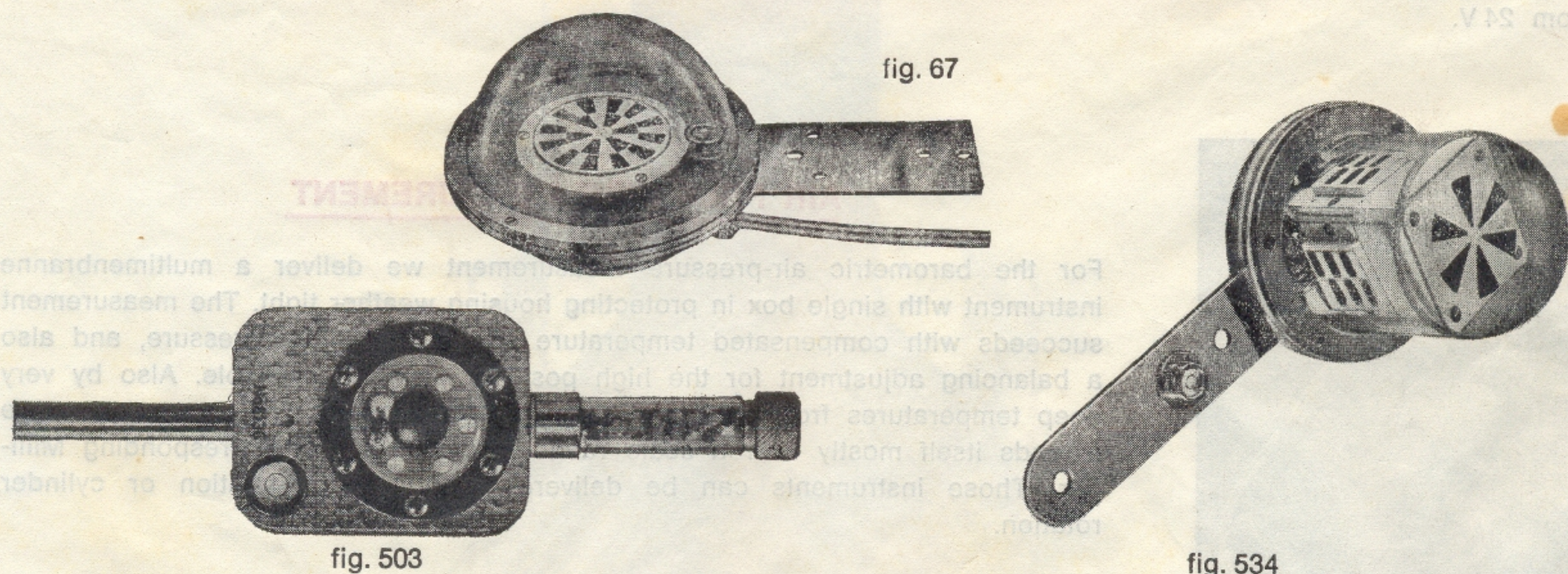
The turbidity meter fig. 319, side 1, is used in the water researches since years, and is made from a complete indicator with the photo cells and lampshousings, pressure tight 50 kp/cm^2 , enclosing portable rails and cable circuit. Further, from the measuring case in which all the instruments, potentiometer, switcher and amplifier installation are built-in, fig. 526, sheet M2. fig. 317 indicates the underwater-photometer for the determination of the spectral light repartition in the water. In addition to it we can deliver a simple control instrument.

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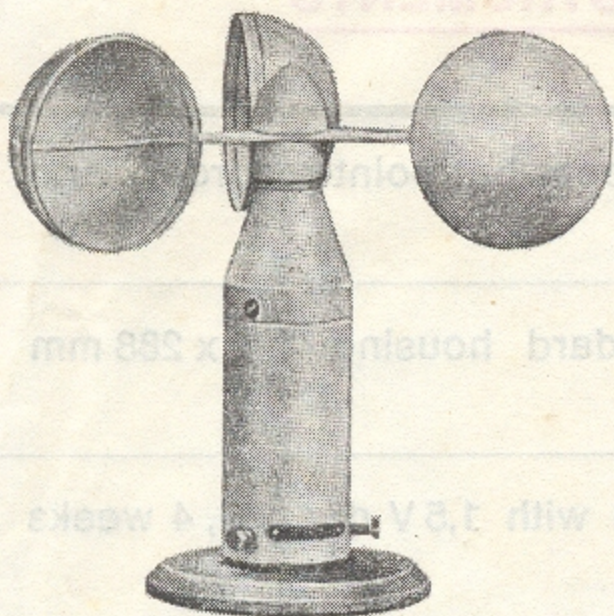


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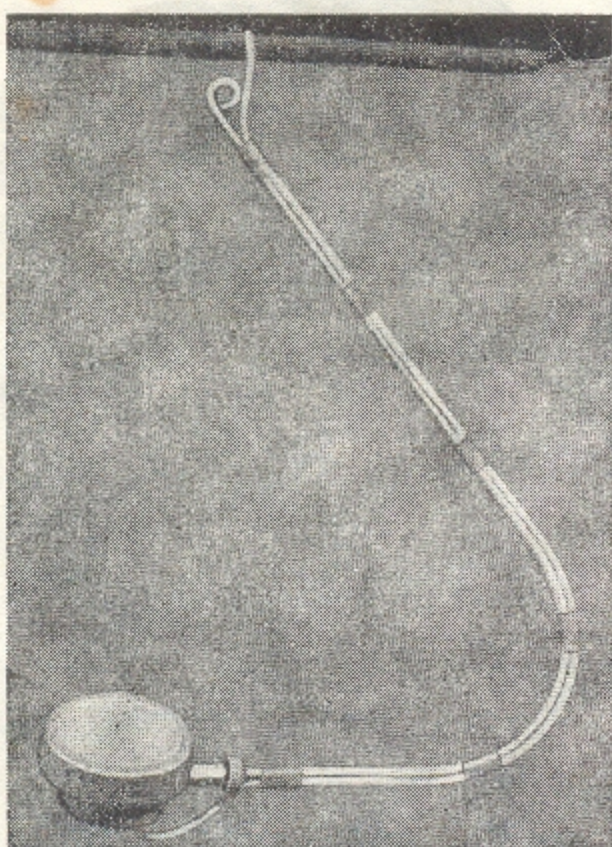


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