70267

The Jentzsch Priming-Value Tester.

The Jentzsch priming-value tester is of the ignition block type. The crucible is made of rustless steel and situated in an electric furnace. He has four chambers of equal size and arranged symmetrically. One of the chambers acts as a thermometerpocket, whilst the remaining three are used as ignition chambers. These may be looked upon as engine cylinders in which the compression temperature is provided by heating, the pressure by the admission of oxygen, and the scavenging of the chambers by means of an easely removable evaporation plate of rustless steel. Each of the 3 ignition chambers is supplied with oxygen through a passage down the centre of the crucible connecting at the bottom with three auxiliary channels, each one of which leading to an ignition chamber. The oxygen is taken from ordinary source of supply passing its way through a control valve and an oxygen bubble counter.

The ideal Diesel cycle depends as much on the amount of ~~XXXXXXX~~ oxygen involved as on the heat of compression. Jentzsch therefore contends that the number of oxygen bubbles corresponds to a definite oxygen density in the compression space of the engine.

The spontaneous ignition temperature is the lowest temperature at which an oil drop will selfignite in the presence of a rich oxygen stream. Jentzsch ascertained from a large number of tests, that several substances may have the same self-ignition temperature, whereas the number oxygen-units required for ignition varies from 1 to 10. The inclination of all ignitable substances to ignite depends on their surface area, the temperature and the amount of oxygen involved. The dimensions of the surface areas may always be kept alike by using identical sizes of globules or equal quantities. The ignition temperature as determined by a rich oxygen stream is more constant and the probability of faulty results ascertained accurate is very much more lessened than when using an air stream. The determination of the oxygen required by measuring the number of oxygen bubbles supplied per minute allows the calculation of the priming-value which is a measure of the tendency to ignite, according to the following formula:

$$\text{l.p.v.} = \frac{t}{b + 1}$$

269 A

l.p.v. is the lowest priming-value ; t is the selfingnition point ; b the number of oxygen bubbles per minute. 60 bubbles per minute corresponds to 5 cm^3 oxygen.
The higher priming-value corresponds to that temperature, where the fuel drop will ignite without importation of oxygen.

$$h.p.v. = \frac{t}{0 + 1} = \frac{t}{1} = t$$

The <u>characteristic-priming-value</u> is obtained by the following formula:

$$c.p.v. = \frac{t_h - t_l}{b + 1}$$

The c.p.v.of all aliphatic hydrocarbons is higher than 1,whilst the c.p.v.of all aromatic hydrocarbons is lower than 1.

It has already been found by Jentzsch himself that the ignition temperatures for the gases and vapours of liquid fuels heated in this ignition-tester coincide with those of the liquid fuel drops themselves. This fact has been taken as definite evidence that it is never a liquid wich becomes ignited or burns,but always its respective vapour or gas.Although the relatively high oil-vapour ignition-temperatures have been taken as proof that the ignition is initiated by the gas or vapour layer surrounding the heated fuel drop.Visible evidence of this procedure has been furnished by taking records of the ignition phases for various fuels with and without oxygen stream.

It has been said that the time element inside the engine is too short to permit any previous gas formation or vaporasition.In this connection the Jentzsch method made it possible to measure the ignition lag which occurs between the drop reaching the ignition zone and the actual ignition,to observe the subsequent volumetric reduction in the size of the drop during vaporisation and gasification,and to record its total disappearance.

<u>The Ignition-Lag</u> .

An other characteristic mark of Diesel- and heating-fuels is the ignition-lag which occurs between the drop reaching the ignition-zone and the actual ignition.At a permanent temperature of 300°C and a permanent number of bubbles = 120 per minute a good Diesel-fuel has an ignition-lag less then 3 seconds.

<u>The Boiling-Number.</u>

The highest compression in a standard Diesel-engine (CFR-Motor) is measured to 32 atm., the tempeature which belongs to that pressure is about 500°C. Therefore the furnace is heating up to a permanent temperature of 500°C, three cubic centimetres of the fuel in a glass measure come in one of the chambers and should remain there exactly 4 minutes.When cooled the evaporated portion of the fuel corresponds to the boiling-number.

 70269

Example: 3 cm² = 100 %
1,8 " = $\frac{1,8 \times 100}{3}$ = 60 % = boiling-number.

Good Diesel-fuels have b.n. = 50 to 70 %
" heating- " " " = 20 " 30 "

The Jentzsch - Comparison - Number:

As a result of his investigations Jentzsch found with the aid of a help-table containing the boiling-number, the selfignition-point, a subsidiary line and the characteristic priming-value, the comparison-number which corresponds to the ceten-number induced in the CFR-motor.

Good Diesel-fuels have J.c.n. = 50 to 70
" heating-fuels " " = 20 " 30

Corrections of the Jentzsch Comparison-Number.

It is a fact, that the viscosity of a fuel is decisive for using in a Diesel-engine. A good Diesel-fuel should have a viscosity of 1,5°E at a temperature of 20°C. A good heating-fuel should have no more than 7°E. Jentzsch constructed a simple viscosimetre for use on board to determine the viscosity rapidly. The apparatus can be used to reach from 1 to 900 E. This viscosimetre should be used in combination with the priming-value tester.

The correction of the J.comparison-number necessary by the viscosity of the fuel will be made by the following formula:

$$J.c.n._{corr.} = \frac{1,5}{E_{20^\circ}} \times J.c.n._r$$

$J.c.n._{corr.}$ is the corrected comparison-number
$J.c.n._r$ " " regulare "
1,5 " " wanted viscosity at 20°C
E_{20° " " viscosity of the prooved fuel.

Details in relation of the comparison-number to viscosity are given in the description of the apparatus.

The Effect of Attitude:

The effect of attitude on anti-knock requirements of cars is well known. The same effect is to be found when testing a fuel in the priming-value-tester. The highest location in Germany at which the priming-value-tester was applied, was near the Zugspitze in a hight of 2500 m, the lowest location was at sea level at Kiel. There were two series of test fuels, 4 benzene and 5 Diesel-fuels. The results of the investigation correspond to those, Mac Coul,

Hollister and Crone found in their investigations described in "The Oil and Gas Journal" Nov. 12th 1937 page 130.
In the following tables the corrections of the comparison-number caused by the effect of altitude are contained:

Table 1.

mm Hg.	Jentzsch-comparison-numbers for benzene					
700	53	60	67	74	82	88
720	46	54	62	70	78	86
740	38	47	56	65	75	83
760	30	40	50	60	70	80
770	26	37	47	57	68	78

Table 2.

mm Hg	Jentzsch-comparison-numbers for Diesel-fuels						
700	33	39	45	52	57	62	68
720	35	43	49	57	64	71	77
740	37	46	54	64	72	80	88
760	40	50	60	70	80	90	100
770	41	52	63	74	84	95	106

Determination of Fuel-Coke in the Priming-Value-Tester.

It is well known that the value of a Diesel-fuel varies with its tendency of production of coke. Proving this, 0,2 g of fuel are put into a small cup of rustless steel and heated in a chamber of the tester at 500°C for two minutes. When cooled the coke will be determined in known manner. On board 12 drops of fuel are put into a cup, heated at 500°C for two minutes and, after cooling the coke will be placed on a subsidiary apparatus and compaired with optical scales.
Good fuels should have no more than 2 to 3 % coke. The results found in this manner are corresponding to those found in the conradson - tester.

The Jentzsch - Oxydation - Test: (Age-Test).

Heat and air cause all fuels to form more or less asphaltic and carbonaceous materials. These products of oxydation cause sludging and piston-ring-sticking. To determine this 1 cm^3 of the fuel will be poured into a boiling-glass and heated up to 250°C for 10 minutes (lubricatin oil 15 minutes; heating fuels 5 minutes φ). 12 drops of the heat fuel were poured into a cup and coked at 500°C in the described manner. The rest of the liquid fuel is added to 10 cm^3 normal-benzene, stirred up for some time and than left to rest for 15 minutes. Now the height of the sludge should be determinated.
A good Diesel fuel should have no more sludge than 3 mm.

φ in the meanwhile 300 bubbles of oxygen are lead into the glass.

272A

The best lubricating oil has no sludge.

Vaporization-Time:

It was found, that a good Diesel-fuel has a short vaporization-time when 0,2 g at a temperature of 500°C are brought into a cup of rust-less steel in the priming-value-tester. On board 12 drops of fuel are poured into the cup. The test is finished as soon as no more vapor rises out of the chamber. The testing is to be repeated every 5 seconds by means of a small air-pump.

Good Diesel fuel has no more than 25 to 30 sec.
" heating " " " " " 40 " 60 "
" lubricating oil should have **more** than 60 sec.

Residue at 350°C.:

Its a fact, that a good Diesel-fuel at a temperature of 350°C has no residue, when 0,2 g are brought into the priming-value-tester in the same manner as described above to remain there for the time of 5 minutes. Good heating-oils have no more than 3 % of residues. On board 12 drops of a fuel or oil should be used.

Determination of Ash:

For the determination of ash the crucible will be heated up to 600°C and 0,2 g or 12 drops of fuel, brought into a chamber in the same manner discribed above. The fuel should remain there for the time of 5 minutes. One minute after the cup has reached the bottom of the crucible a stream of 300 bubbles of oxygen are lead into the cup with the aid of a small sized glass tube for the time of 2 minutes. When cooled, the ash will be determined in known manner or on board with the aid of a subsidiary apparatus.

Good fuels and oils should have no ash.

Determination of the Residues of Benzenes:

If any quantity of residues is on the piston cover of a Diesel-engine, its valves or pipes the source of these residues can be determined by the following method:

Take as much as possible of the residues with aid of a clean scraping-tool and put them in a clean glass or cup. Mix them with 100 cm³ benzole and shake the combination thouroughly. After evaporation of the benzole put one drop of the residue in the priming-value-tester, heated up and adjusted to 280°C. After a time of 20 sec. let a short burst of oxygen into the crucible and repeat this operation continously with intervals of 5 sec. If the residues originate from Diesel-fuel only the results will be no more than 3 to 4 self-ignitions.

273A

If they originate from lubricating oil, only the results will be up to 25 and more self-ignitions. Blends of fuel-oil and lubricating-oils ignites according to the quantity of lubricating-oil that may be more or less.

__Speedy Method for determine Fuels on Bord XXX with the aid of the Jentzsch-Priming-Value-Tester.__

When a war-ship sails into a foreign harbour, it is often necessary to select the right kind of fuel from a great many kinds at hand by testing in a very short time. The test in the priming-value-tester is to be made after the following method:

Assumed that the fuel used until then on board has:

self-ignition-point	=	280°C
number of oxygen bubbles per min.		32
ignition-delay at 300°C	=	3 sec.
residue at 350°C	=	no more than a minimum
" " 500 "	=	" " " " "
vaporization-time at 500°	=	30 sec.
boiling-number	=	40 %
viscosity at 20°	=	1,5 °E (= 5½ sec.)

Assumed that there are delivered 12 samples of fuel marked from number 1 to 12 they will be tested in the following succession:

test	temperature of the crucible °C	number of oxygen bubbles per minute	time XXXX
self-ignition-point	280	300	30 sec.
number of bubbles	"	32	" "
ignition-delay	300	120	3 "
residue at 350°	350	0	5 min.
" " 500°	500	0	2 "
vaporizating-time	"	0	30 sec.
boiling-number	"	0	4 min.
viscosity	20	0	5½ sec.

__Note:__ For determination of residues and boiling-numbers there can be tested 3 samples at the same time. All samples that correspond to all or some of these demands receive a + in the following table, the others receive a / .

__Test Table.__

test	number of the samples 1	2	3	4	5	6	7	8	9	10	11	12
XXXXXX XXXXXX												
s.i.p.	+	+	+	/	+	/	+	/	/	+	+	/
n.o.b.	+	+	/	/	+	/	+	/	/	/	+	/
i.d.	/	+	+	/	/	/	/	/	/	+	/	/
r.350	/	+	+	+	/	/	+	/	/	+	/	/
r.500	+	+	+	+	/	/	+	/	/	+	+	/
v.t.	+	+	+	+	/	/	+	/	/	+	+	/
b.n.	/	+	+	+	/	/	+	/	/	/	/	/
v.20	/	+	/	+	+	+	/	+	/	+	/	/

__remark:__ the / at s.i.p. corresponds to ignition delay in the engine
" " " n.o.b. " " black smoke, standstill
" " " i.d. " " white smoke, high temperature
" " " r.350 " " residues, oil-coke

the / at r.500 corresponds to residues,oil-coke
" " " v.t. " " XXXXX smoke,high consum of fuel
" " " b.n. " " XXXXX " " " " "
" " " v.20 " " XXXXX " " " " "
The fuel number 2 will guarantee that the engine is running true to form.

Heating-fuels will be tested in the same manner taking the fuels used on board as a standard of womparison.

Fuels for aeroplans or motor-cars will be tested in the following succession: (example)

test	temperature of the crucible °C.	number of oxygen bubbles per minute	time
self-ignition-point	300	300	30 sec.
number of bubbles	"	96	" "
ignition-delay	320	120	3 "
boiling number	300	0	more than 40 % in 1,5 sec.
residue at 200°C	200	0	0 after 30 minutes.

Lubricating oils will be tested in the following succession:

oil sort:	transf. oil	turbine oil	Diesel l.oil	l.pr.air compr.oil	h.pr.air compr.oil	hot vapor cylinder oil
s.i.p.	260	270	270	280	280	300
l.b.n.	52	54	90	140	280	300
r.500	0	0	0	0	0	no more than 2%
vaporis. time	60	60	60	70	80	100

The testing of "Solid Substances" with the aid of the priming-value.

The testing of solid substances with the aid of the priming-value-method principle is to be caried out in the same manner as used for liquid fuels.But the manner to put the substances into the tester differs.The small vaporisations-plates are provided with a stalk and the substances either are to be measured with the aid of a small spoon or formed into small balls.Whilst some materials do not reach their higher priming-value until the temperature of the crucible is higher than 500°C, others ignite at tempertures as low as about 300°C. It is obvious that such materials are not suitable for use on board of ships,aeroplanes or railways-carriages,and that the Technical Regulations should stipulate a definite priming-value for these purposes.

The"Jentzsch-Flash-point" of fuels,Oils and Solid Substances:

The determination of the"Jentzsch-Flash-Point" with the aid of the priming-value-tester is to be carried out in the following manner:

275 A

Put in each of the side-chambers of the crucible gas of the interme-diate pieces (cylinders of rustless steel) and fill some of the small cups with fuel or oil up to the lower ringmark.Heat the crucible up to a temperature demanded by the technical regulations and place the cup into a side-chamber so that the brim of the cup and the brim of the crucible are in the same hight.After a time of 1 minute either a small gas-flame or an electric spark is iquited close to the oil-sur-face respectly every 5 seconds until the oil vapors flashed up.If there is not any flash after 3 minutes the oil or fuel corresponds to the technical regulations.

Determinations of Fuel Oil in Lubricating Oil:

Its a fact,that the flash-point of a lubricating oil is lowered if the oil is blended with fuel oil.The following table shows the re-sults of blending the two fluids:

Lubricating-oil	Diesel-fuel	Flash-point
100 %	0 %	193°C
99 "	1 "	178 "
98 "	2 "	169 "
97 "	3 "	162 "
96 "	4 "	155 "
95 "	5 "	150 "
94 "	6 "	144 "
0 "	100"	68 "

Recording a Self-Ignition-Curve.

When testing petrols,mineral-oils,lignite-tar-oils,lignite-dust etc. the self-ignition-point is ascertained,and the furnace first heated __without oxygen__ feed until the higher priming-value has been found. As a rule the testing material need not be introduced until a tem-perature of about 500°C has been reached.If self-ignition takes place up to 600°C or sooner __without__ oxygen feed,the furnace is switched off,and the testing material added in this __decreasing__ tem-perature at every drop of __10°C__ , into the centre-ignition-chamber successively,until the ignitions cease. Everey ignition is registered by means of a cross in the column provided for this pur-pose in formula A, missfires beeing recorded by a line.After the ignitions have ceased,the temperature is raised again to the point at wich the last ignition took place,and any desired number of oxy-gen bubbles is fed.This number is also noted in formula A. The temperature is again permitted to fall,and at each difference __20°C__ a drop or corresponding quantity of the testing material is in-troduced into the __centre__-ignition-chamber. The exchange of the vaporizer-plates should invariably be effected by replacing the used plate from the centre-chambre with a clean one from the right-and left-chambers alternately, these side-chambers receiving fresh clean plates. In this manner the centre-ignition-chamber invariably receives preheated plates; the frequent changing has the additional advantage that residues of gas are pumped out of the ignition-chambers. When fuels which give off especially heavy vapours are beeing tested, bisulphide of carbon for instance, then the change of vaporizer-plate alone does not suffice to remove every trace of gas from the ignition-chambers. In such cases it is advisable to blow out the chambers with the aid of a small airpump. Since such materials are often charcterised by ignition-delay, the temperature rise must be adjusted at one minute or less as soon as a temperature has been reached at which ignitions may be expected.

The pipette or glass-rod must not take up more material then is absolutely required, and must therefore not be dipped in too deeply. It is held horizontally untill the middle of the ignition-chamber is reached, and then lowered slowly untill the drop falls off. When this happened, pipettes used for petrol or benzole should be withdrawn at once, in order to prevent their contents from catching fire. For this same reason receptables containing the test materials should not be brought too close to the furnace.

In the case of unknown materials it is advisable to begin with an oxygen stream of 60 bubbles per minute. With this number of bubbles the trial are continued until either self-ignition once more takes place after a series of missfires, or the self-ignition-point is reached. The ignition-gap, discovered by Jentzsch in 1923, observable by an increased demand for oxygen within a certain range of temperature above the self-ignition-point, is a characteristic of open (aliphatic) hydro-carbons such as petrol etc. When self-ignitions take place each time the test material is introduced and the number of bubbles remaining constant, the top of the curve has been reached. As soon as a series of trials is completed, the number of bubbles is in- or decreased and other temperatures at which self-ignition takes place are sought. With regard to the introduction of testing-material the directions applying to the determination of the lower-priming-value should be observed.

The values obtained are now transfered from formula A to formula B, and the separate points connected with the self-ignition-curve. As a general rule the determination of the higher-and lower-priming-values, the maximum point, and two or three suitably distanced intermediate points, is sufficient for the drawing of a curve. The prece-

preceding illustrations in the " Selbstentzündungseigenschaften und chemische Konstitution" by Zerbe and Eckert furnishes examples. The position and extent of the self-ignition-range limited by the vertical and by the rising line of the curves gives for carburator-motors a basis upon which a judgment may be formed with regard to the inclination to motor knocking. This range has been designated the premature-ignition-range. The larger and more low-lying this range is, the greater is the inclination to knock. If it is desired to ascertain the suitability of an offered or existent fuel for a certain motor, this can be done in the first place with the aid of self-ignition-curve of the fuel hitherto employed, and working satisfactorily in the motor. Should the curve of this fuel not have beeing recorded in the manner above described, and no sample of it is obtainable, then the compression pressure of the motor must be measured. In formula B the corresponding compression figures will be found opposite the number of oxygen bubbles, the like ignition effect beeing thus ascertainable.

In order to avoid premature ignition, the range of it must lie little or not at all beneath the ascertained pressure. It should here be noted that in the case of well cooled or extremely rapidly running engines, or engines with light metal pistons, fuels with somewhat lower lying self-ignition-curves may be used. Knocking fuels can be improved by the addition of anti-knock media. Such additions should only be made up to the point at wich the actual pressure, - not the pressure founded by the compression-ratio of the engine - in the engine has been reached, as otherwise the motor will soot in consequence of lack of oxygen.

In selecting fuels for <u>Diesel-engines</u> and <u>incandescent-ignition-motors</u>, the best basis is the curve of a motor-oil which has already been proved satisfactorly.

It should however be pointed out here that the nature of the pulverisation is of decisive importance for the disintegration, ignition and combustion of motor-fuels. Coarsely pulverised materials inveriably require a larger amount of oxygen then finely atomized ones. Motor-oils requiring excessive amounts of oxygen cause the motor to soot and come to a standstill. Motor-oils requiring too little oxygen work uneconomically.

<u>Some Empirical Values for Lubricating-and Heating Oils:</u>

The following values may serve as basis for testing lubricating- and heating-oils:

1.) Lubricating-oils for combustion-engines, low pressure compressors, and compressors, transformers and oil-switches, should not have priming-values over 3.

2.) Lubricating-oils for high pressure compressors and superheated steam cylinders should only be used with priming-value under 2.

3.) Heating-oils for boiler-plants with insufficient ventilation (samall oxygen supply) must have high priming-values, on the other hand boiler-plants with powerfully working ventilation (ample oxygen supply) require heating-oils with low priming values.

General.

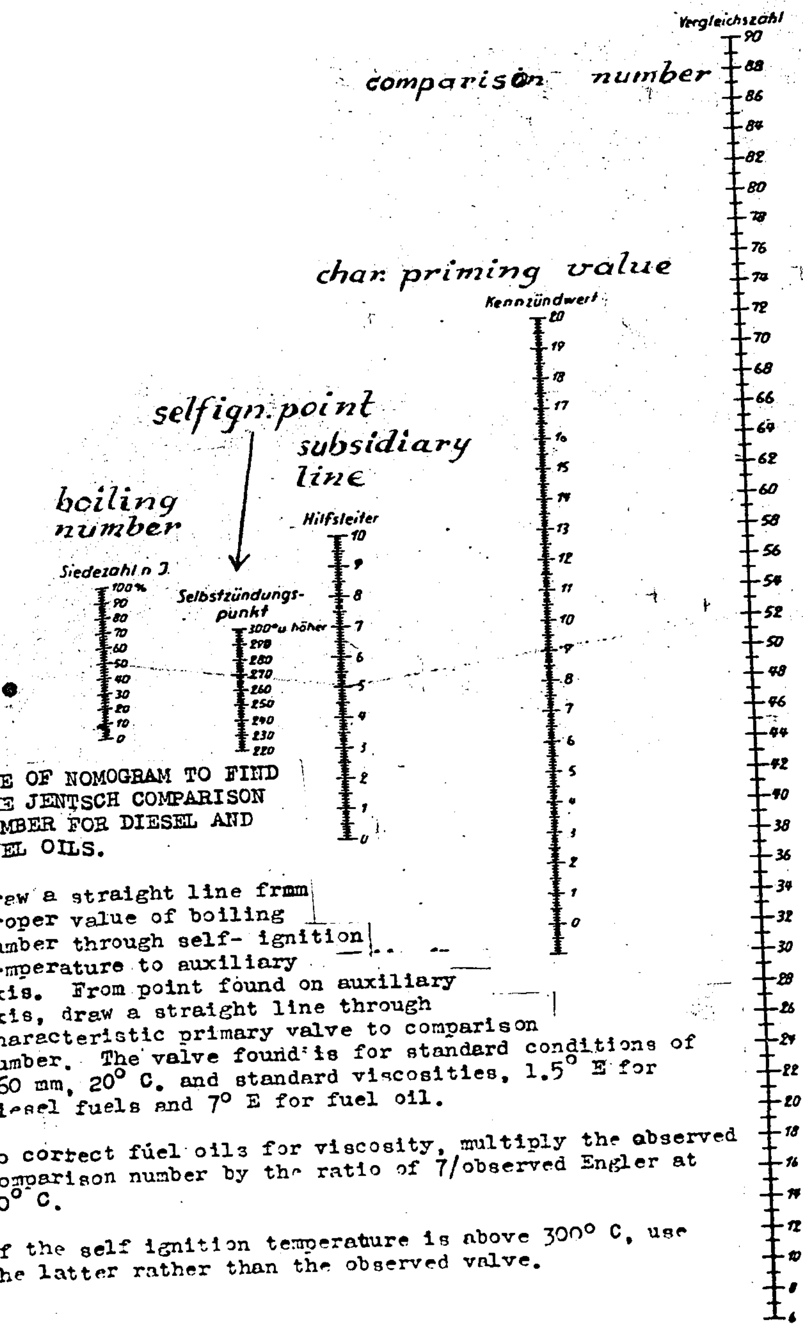
In all experiments unusual phenomena should be carefully noted, for instance excessive smoke, especially violent detonations, large amount of residue etc. Formula A provides a special column for notes.

If the influence of heat on some material - for instanse packing material - is to be tested, the material is first weighed with the utmost exactitude, and then at times exposed for 15 minutes at temperatures of about 120 ; 350 and 500°C, an oxygen stream of 300 bubbles beeing sent through the crucible. After exposed the testing material at a temperature of 120 °C the moisture content of it is ascertained; by weighing after exposure to 350°C gives the gum content; at a temperature of 500°C the content of other combustible constituents. In the case of asbestos packing materials the fibres should be recognisable after the third heating. Filling materials fall into dust when rubbed.

Used vaporizer-plates are exposed to a temperature of 500°C in the priming-value-tester with a stream of 300 bubbles of oxygen, so that all combustible residues are thereby destroyed. After the plates have cooled off the residues can be easily removed by a wire brush.

Frequently pulverised fuels are the objekt of experiment, often dust penetrates into the oxygen-channels. This dust is removed by a simple air pump attached to the three-way cock of the oxygen-counter.

If a vaporizer-plate has turned over, it can be raised in the same manner with the aid of the air-pump. The channels connecting the other ignition-chambers are to be shut off in this case with the aid of the small steel cups, in order to provide for a powerful stroke of the pump. It is obviously necessary to hold the steel cups in place by means of the pincette.



USE OF NOMOGRAM TO FIND THE JENTSCH COMPARISON NUMBER FOR DIESEL AND FUEL OILS.

Draw a straight line frmm proper value of boiling number through self- ignition temperature to auxiliary axis. From point found on auxiliary axis, draw a straight line through characteristic primary valve to comparison number. The valve found is for standard conditions of 760 mm, 20° C. and standard viscosities, 1.5° E for Diesel fuels and 7° E for fuel oil.

To correct fuel oils for viscosity, multiply the observed comparison number by the ratio of 7/observed Engler at 20° C.

If the self ignition temperature is above 300° C, use the latter rather than the observed valve.

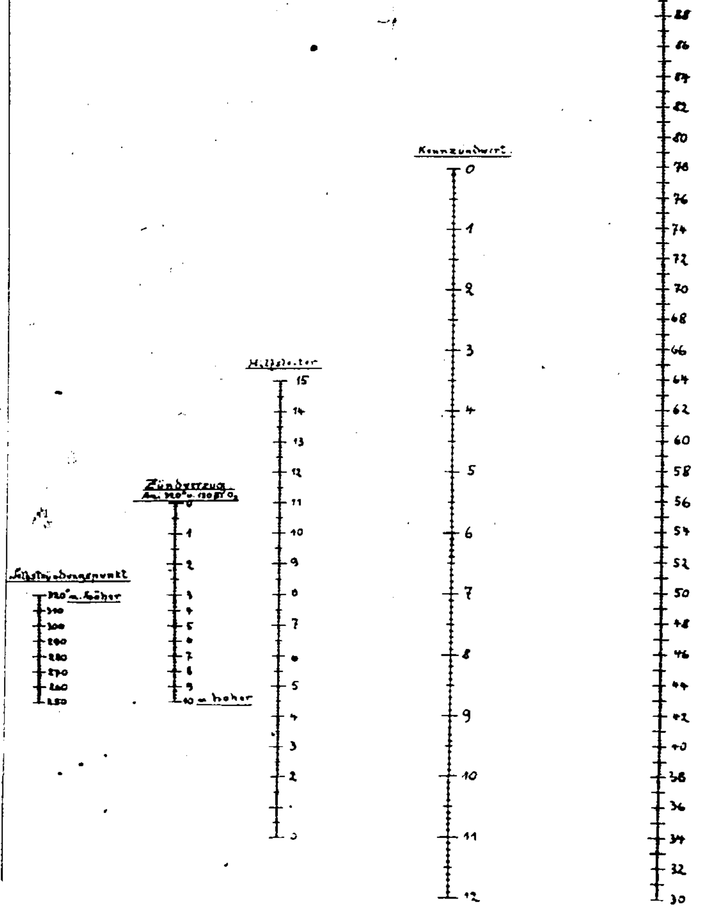
70279

Nomogramm

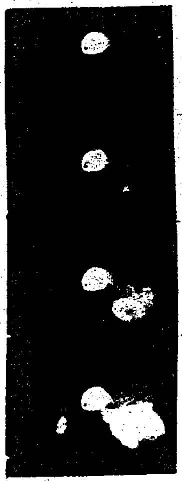
zur Ermittelung von Vergleichszahlen für Benzine u.s.w.

nach Jentzsch

Anweisung: Man lege ein Lineal von dem im Zündwertprüfer gefundenen Selbstzündungspunkt über den Zündverzug zur Hilfsleiter, merke sich den Schnittpunkt und lege das Lineal dann vom Schnittpunkt über den zugehörigen Kennzündwert zur letzten Leiter. Der Schnittpunkt auf dieser gibt die „Vergleichszahl n. J." – Zündwert-Oktanzahl – des untersuchten Stoffes.



281A

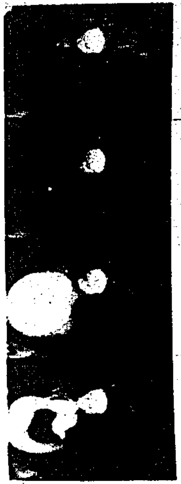


1
2
3
4

J - Schf
TL - 1930

Zündverhalten eines
Benzintropfens
bei 300 °C
im
Zündwertprüfer von
Jentzsch
im Sauerstoffstrom

Film T.L.
V 23/2
80 Bild/sec



J - Schf
TL - 1930

Zündverhalten eines
Gasöltropfens
bei 300 °C
im
Zündwertprüfer von
Jentzsch
(im Sauerstoffstrom)

2

T.L. V 23/1
80 B[illegible]

J - Schf
TL - 1930

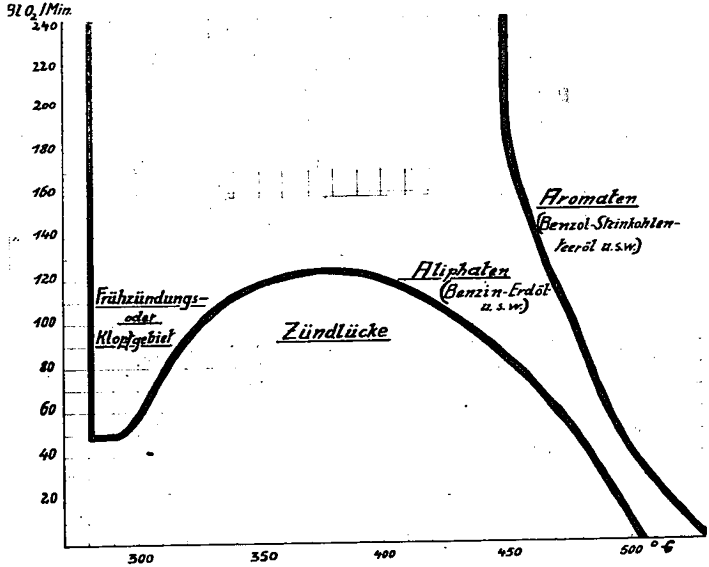
Zündverhalten eines
Gasöltropfens
bei 600 °C
im
Zündwertprüfer von
Jentzsch
(ohne Sauerstoffzufuhr)

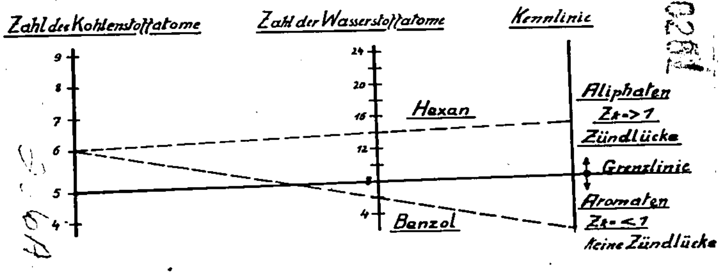
5

282 A

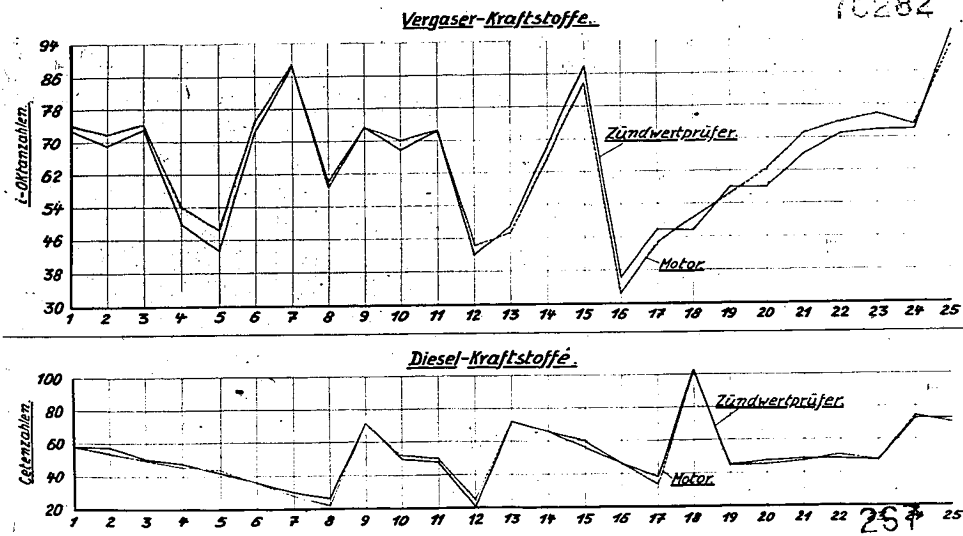
TC280

Selbstzündungskurven nach Jentzsch





7C282

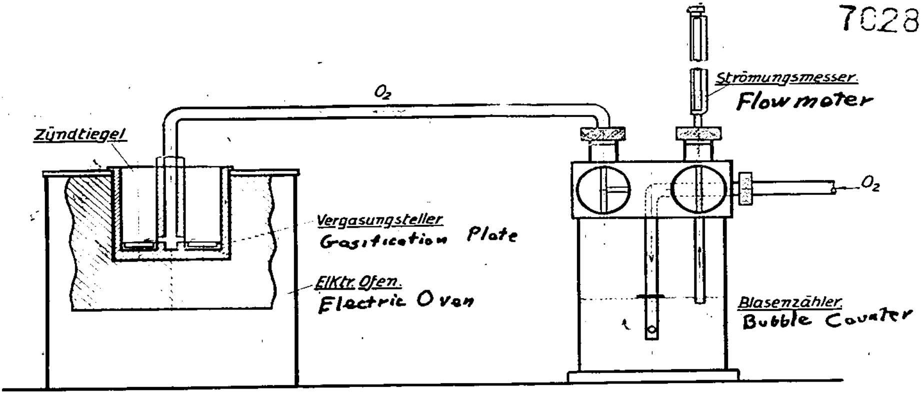


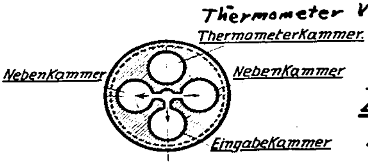
257

Brennstofferprobungen im Zündwertprüfer und im Prüfmotor.

260 A

70283



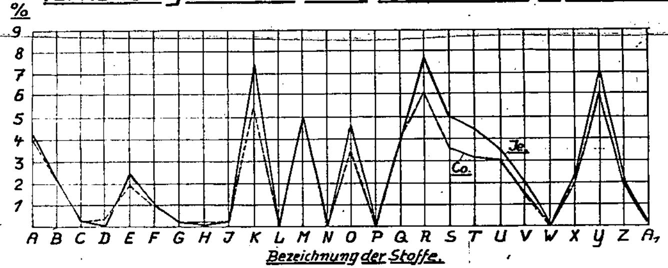


Zündwertprüferschema.

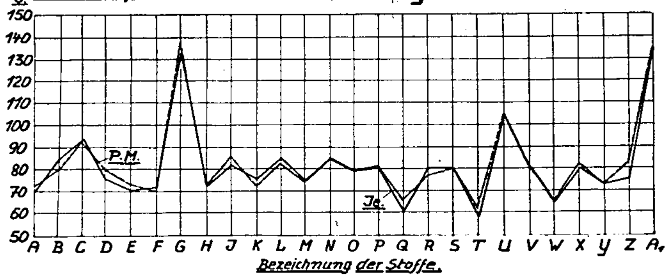
Flow Sheet of Priming Value Tester

Schnitt durch den Zündtiegel.
Cross Section through Ignition Chamber

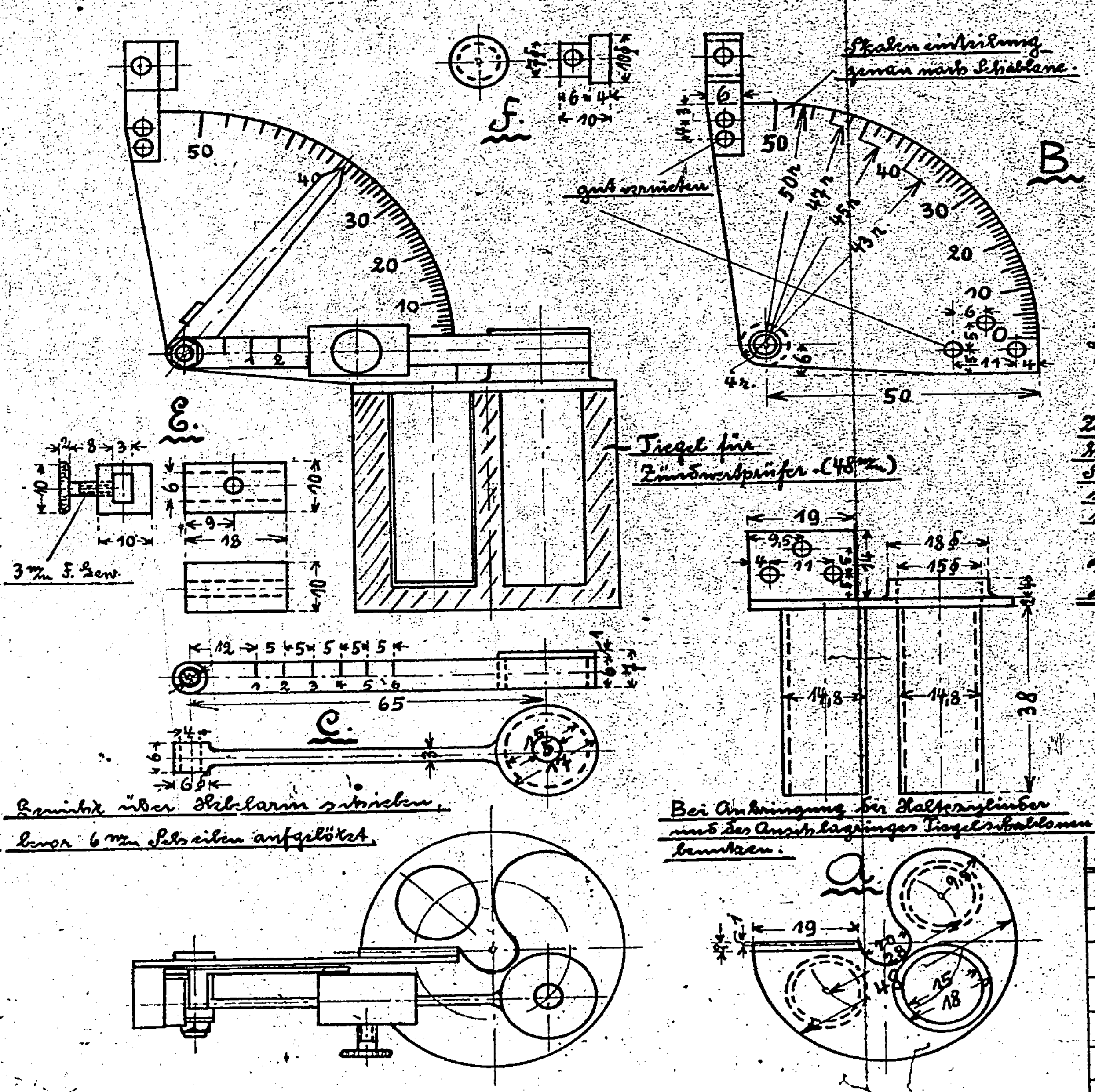
Verkokungszahlen nach Conradson u. Jentzsch

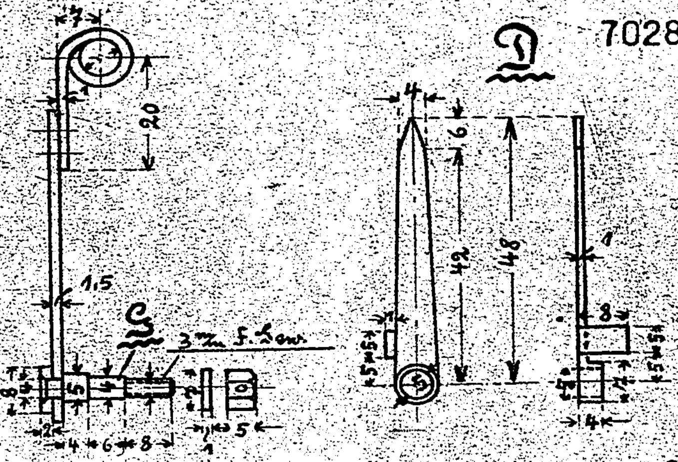


Flammpunkte nach Pensky-Martens u. Jentzsch.



70285





Zeiger und Druckaufnehmer sollen seitlich geringe Lose haben. Sie sind mit ihren Bohrungen derart auf die Skalenwelle aufzupassen, daß der Zeiger in jeder Stellung stehen bleibt, während der Aufnehmer durch sein Eigengewicht seine Lage verändern kann.

Zünddruckmesser n. Fentzsch.

1:1.

Aufgabe für 1 Stück:

Bez.	Stück	Gegenstand	Material
a	1	Grundplatte	Messing vernickelt
B	1	Skala m. Anschlag	" "
C	1	Druckaufnehmer	" "
D	1	Blindzeiger	" "
E	1	Laufgewicht	" "
F	1	Puffer	Gummi
S	1	Welle m. Mutter u. Scheibe	Nickel.

Vermerk: Lötungen nur unter Anwendung von Hartlot.

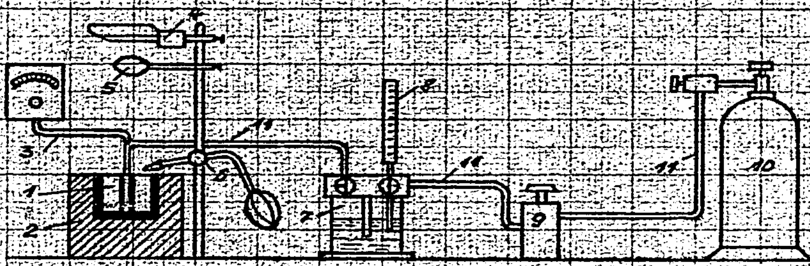
Fentzsch. 29./IX. 1928.

Z83A

70286

Anlage 1.

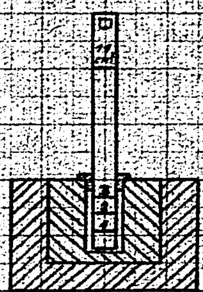
I.



1 = Zündtiegel
2 = Heizofen
3 = Thermoelement
4 = Beleuchtung
5 = Beobachtungsspiegel
6 = Spülung
7 = Blasenzähler
8 = Strömungsmesser
9 = Feinstellventil
10 = Sauerstofflasche
11 = Sauerstoffleitungen.

Schema eines Zündwertprüfers.

II.

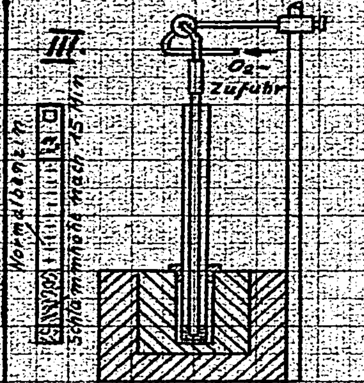


Benötigte Stoffmenge = 3 cm³

Versuchsdauer:
Benzin u.ä. = 1½ Min
Gasöl u.ä. = 4 "

Einrichtung z. Best. der Zeitsiedezahl

III.

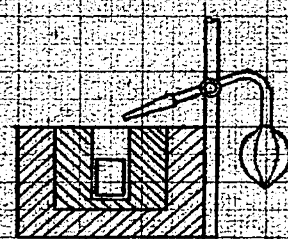


Benötigte Stoffmenge = 1 cm³

Versuchsdauer:
Heizöl = 5 Min.
Treiböl = 10 "
Schmieröl = 15 "

Einrichtung z. Best. des Alterungswertes.

IV.

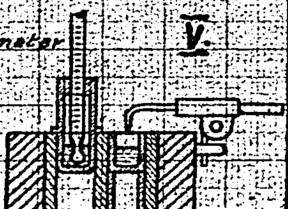


Benötigte Stoffmenge = 0,2 g

Versuchsdauer:
R 350 = 5 Min.
R 500 = 2 "

Einrichtung z. Best. des Rückstandes

V.

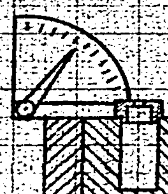


Benötigte Stoffmenge = 1 cm³

Versuchsdauer = 3 Min.

Einrichtung z. Flammpunktbestimmung.

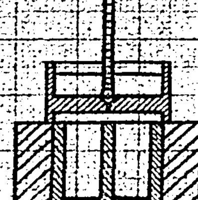
VI.



Benötigte Stoffmenge: 1 Tropfen

Einrichtung z. Zünddruckmessung

VII.



Benötigte Stoffmenge = 25 cm³

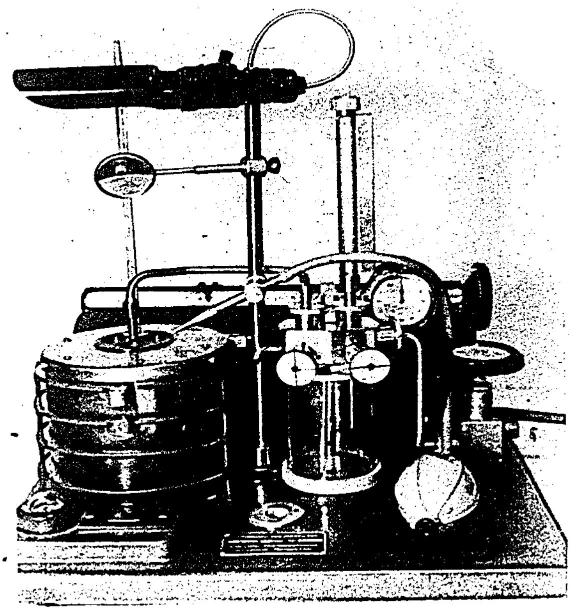
Versuchsdauer 1–5 Min.

Einrichtung z. Zähflüssigkeitsmessung.

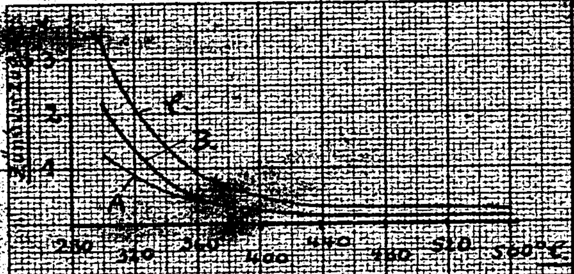
Der Zündwertprüfer nach Jentzsch und seine Zusatzgeräte.

256 A

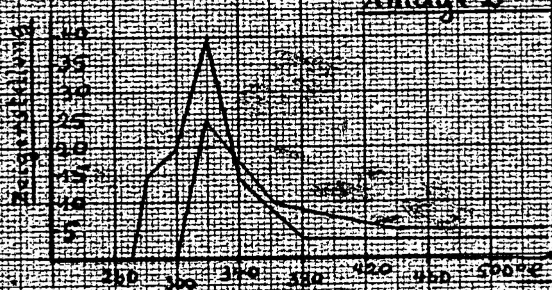
Jc.



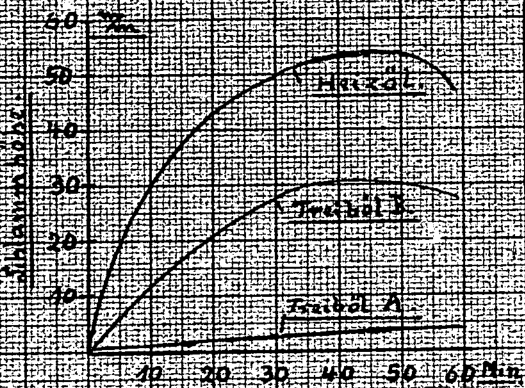
Anlage 2



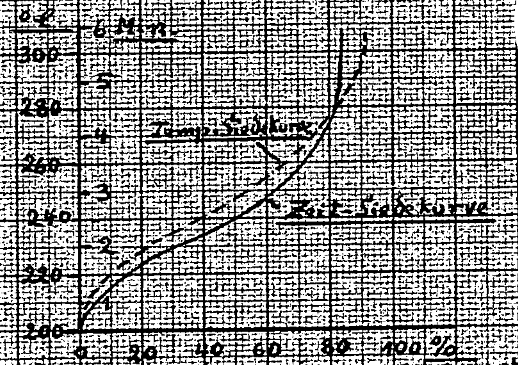
Zündverzugskurven von Dieseltreibölen nach Jentzsch.



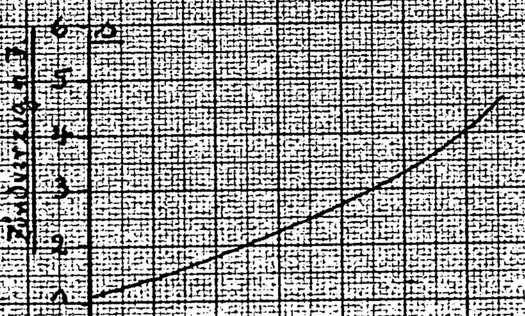
Zünddruckkurven n. J.



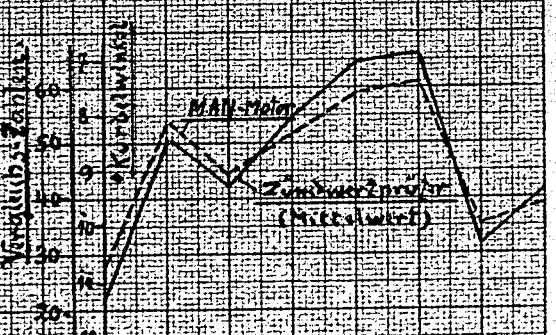
Alterungskurven v. Treib- u. Heizölen n. J.



Temperatur-Siedekurven n. Engler und Zeit-Siedekurven nach Jentzsch.

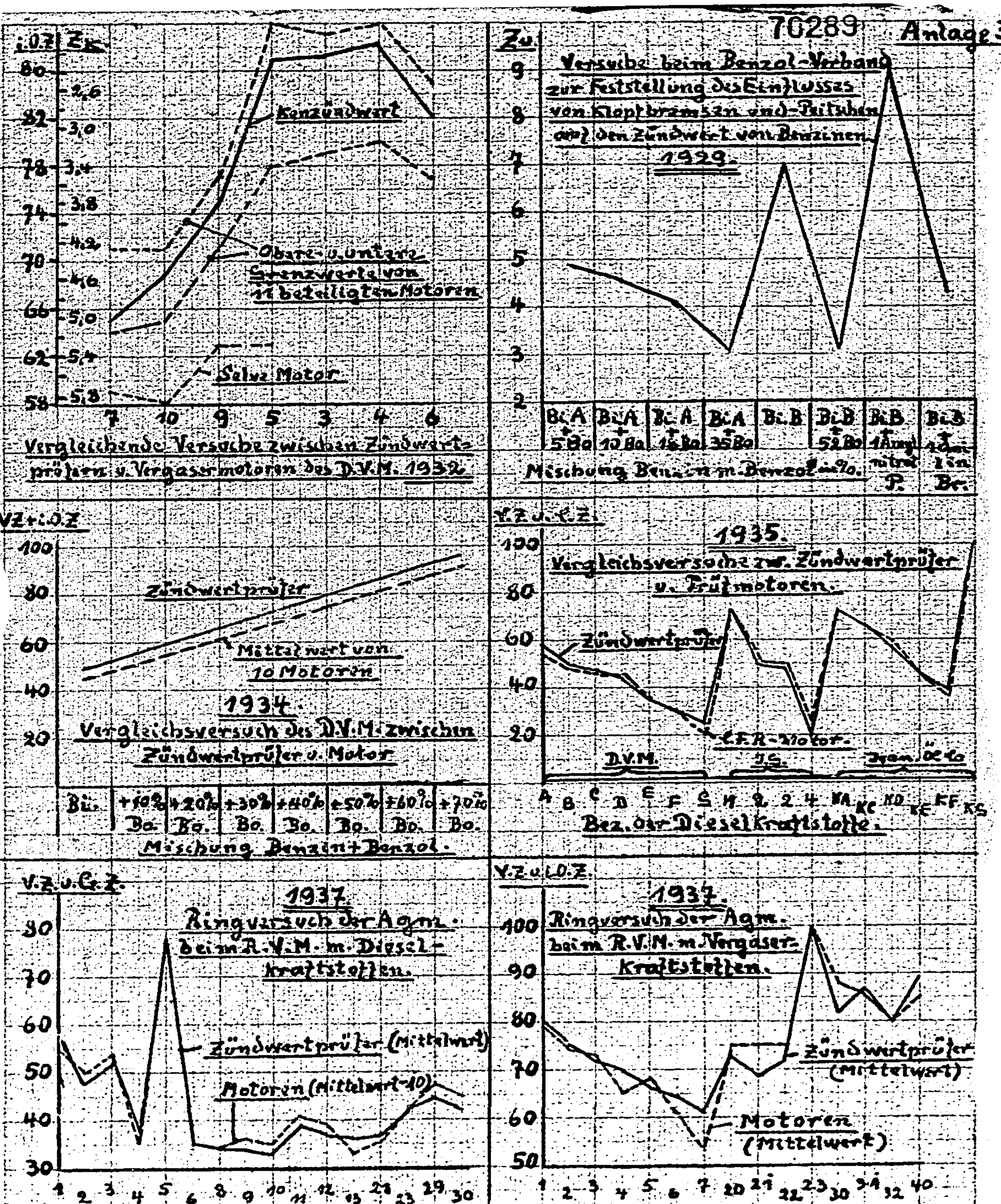


Ringversuch der Agm zum R.V.M. mit Diesel-Treibölen 1937.

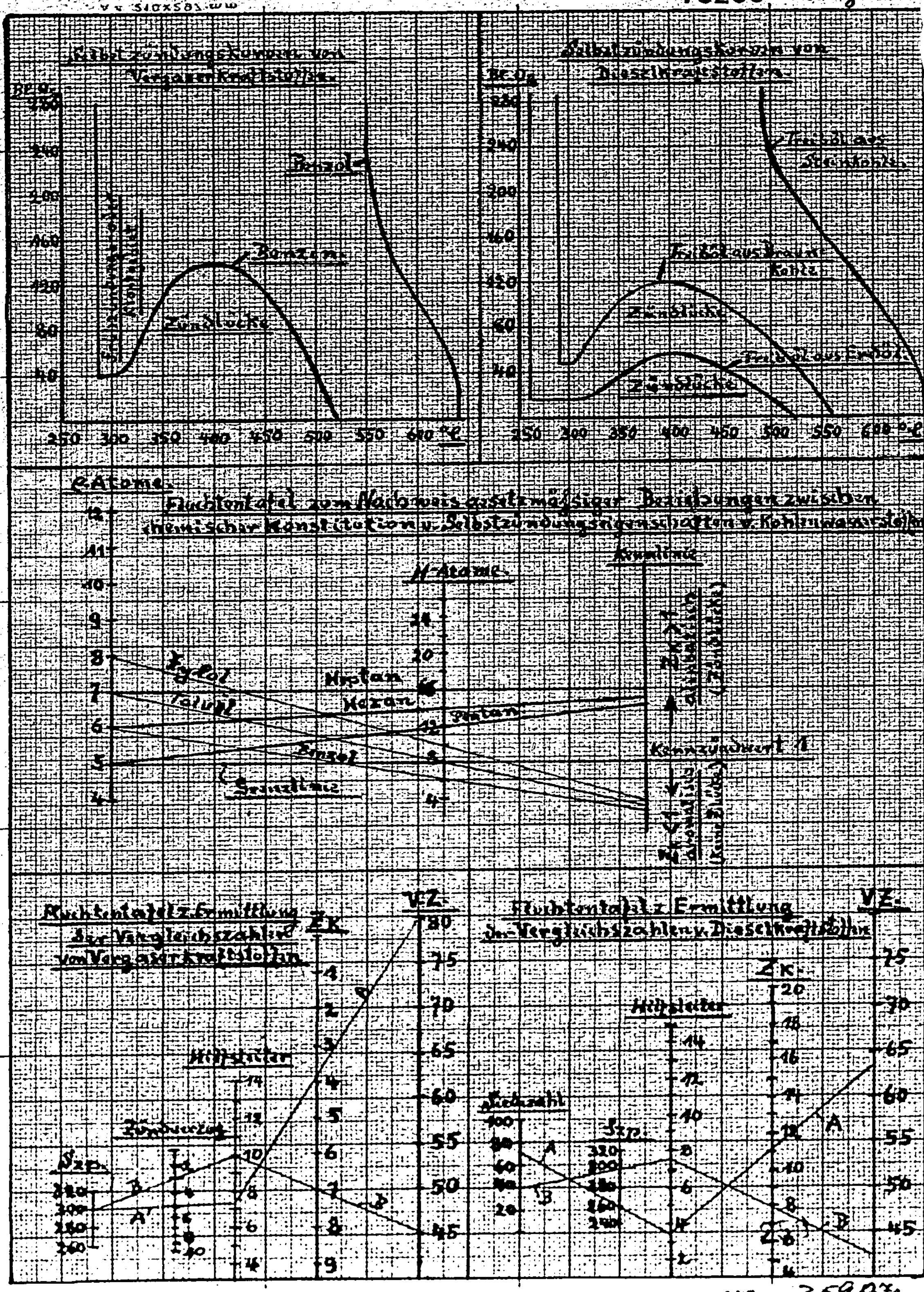


Ringversuch des R.V.M. mit Dieseltreibölen 1938.

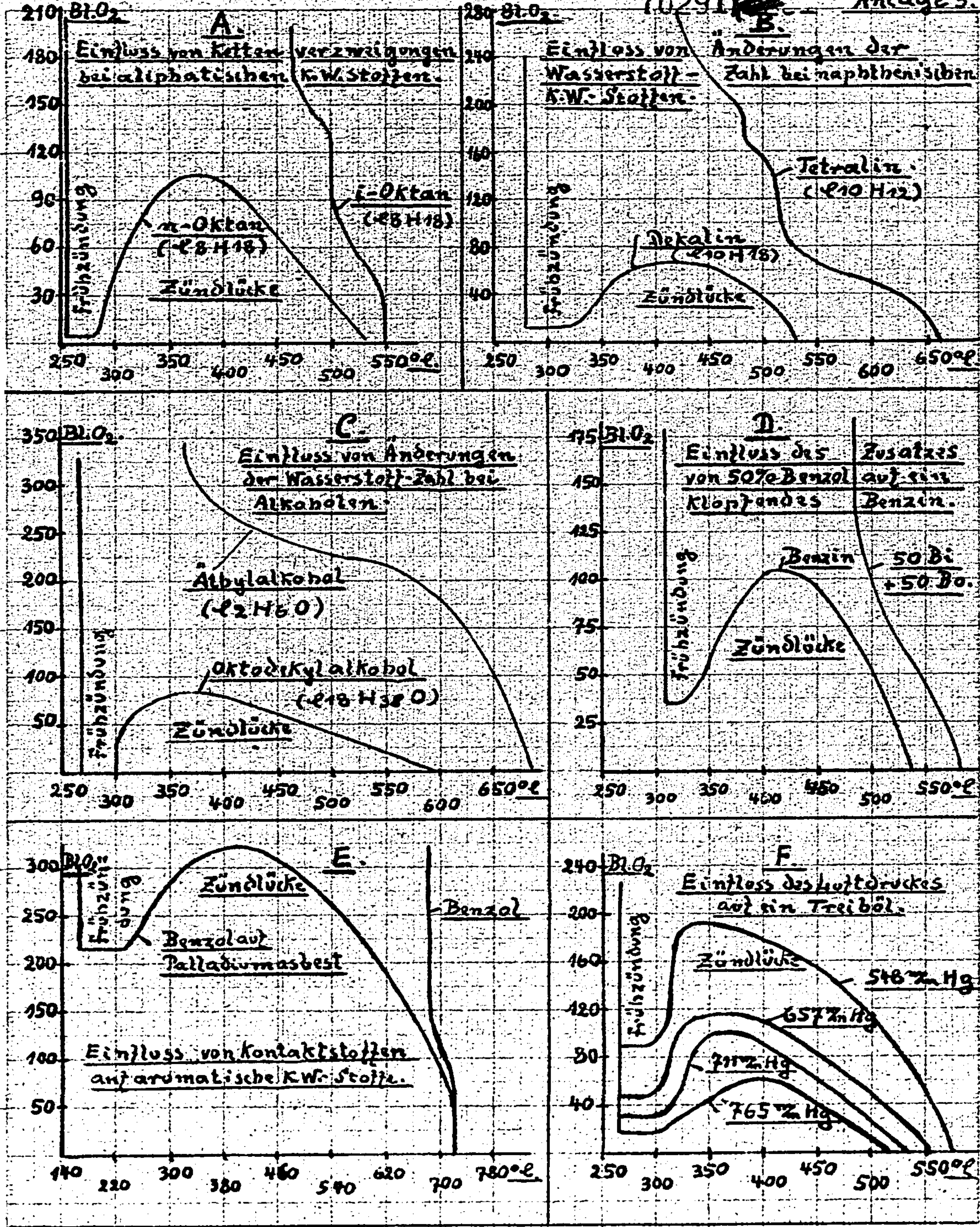
Kurvenmässige Darstellung einiger Stoffeigenschaften von Treibölen nach dem Zündwert-Verfahren.



Einige Vergleichsversuche zwischen Zündwertprüfern und Prüfmotoren in den Jahren 1929–1937.

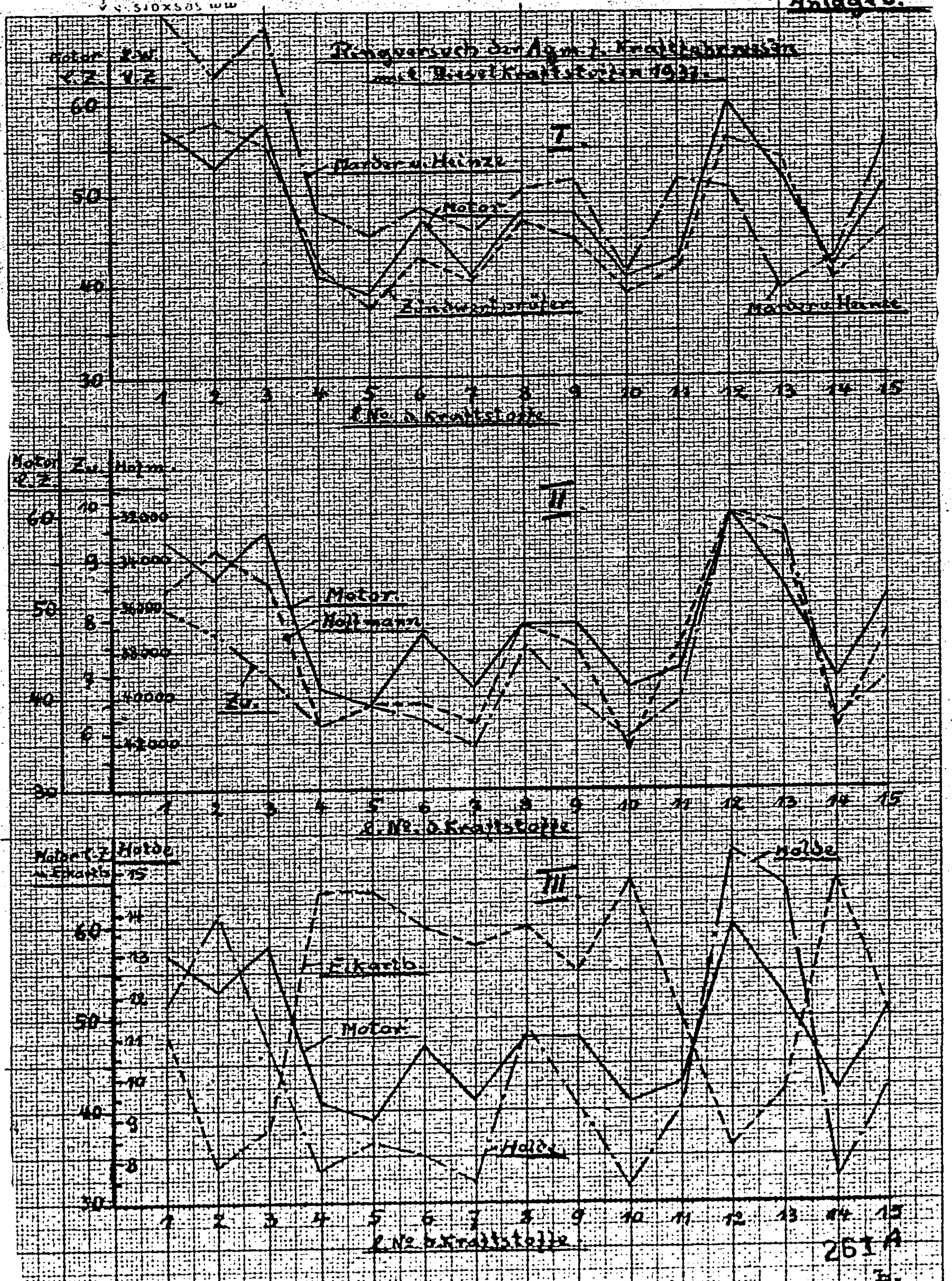

Selbstzündungskurven von Vergaserkraftstoffen.
Benzol
Benzin
Zündlücke
Selbstzündungskurven von Dieselkraftstoffen.
Treiböl aus Steinkohle.
Treiböl aus Braunkohle
Zündlücke
Treiböl aus Erdöl.
Zündlücke
°C
C Atome
Fluchtentafel zum Nachweis gesetzmäßiger Beziehungen zwischen chemischer Konstitution u. Selbstzündungseigenschaften v. Kohlenwasserstoffen
H Atome
Xylol
Toluol
Heptan
Hexan
Pentan
Benzol
Grenzlinie
Kennzündwert K
Fluchtentafel z. Ermittlung der Vergleichszahl von Vergaserkraftstoffen
VZ
ZK
Hilfsleiter
Zündverzug
Fluchtentafel z. Ermittlung der Vergleichszahlen v. Dieselkraftstoffen
Hilfsleiter
Siedezahl

70291 Anlage 5.



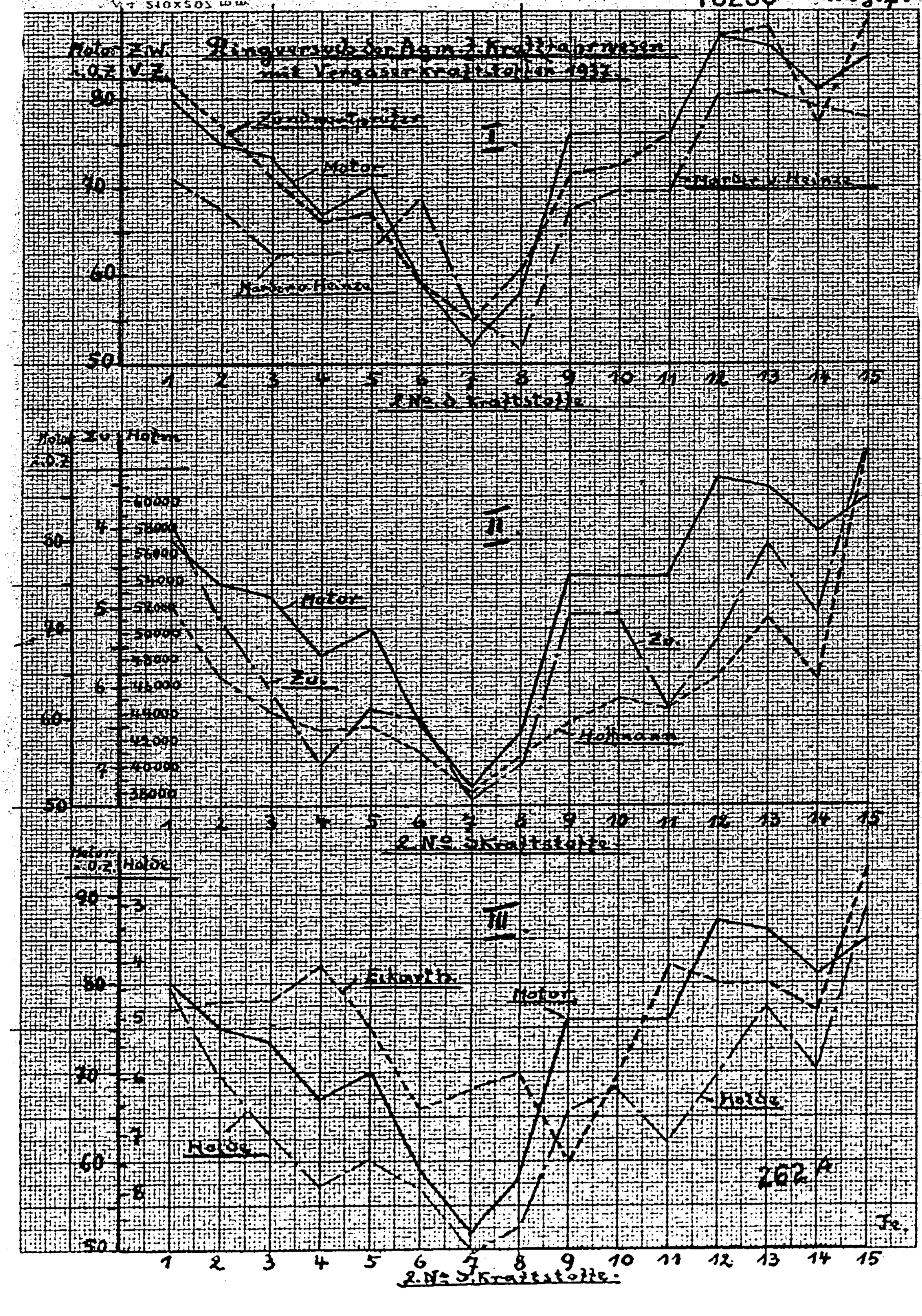
Nachweis der gesetzmäßigen Abhängigkeit des Verlaufs der Selbstzündungs=Kurven nach Jentzsch von verschiedenen Einflüssen.

 Anlage 6.



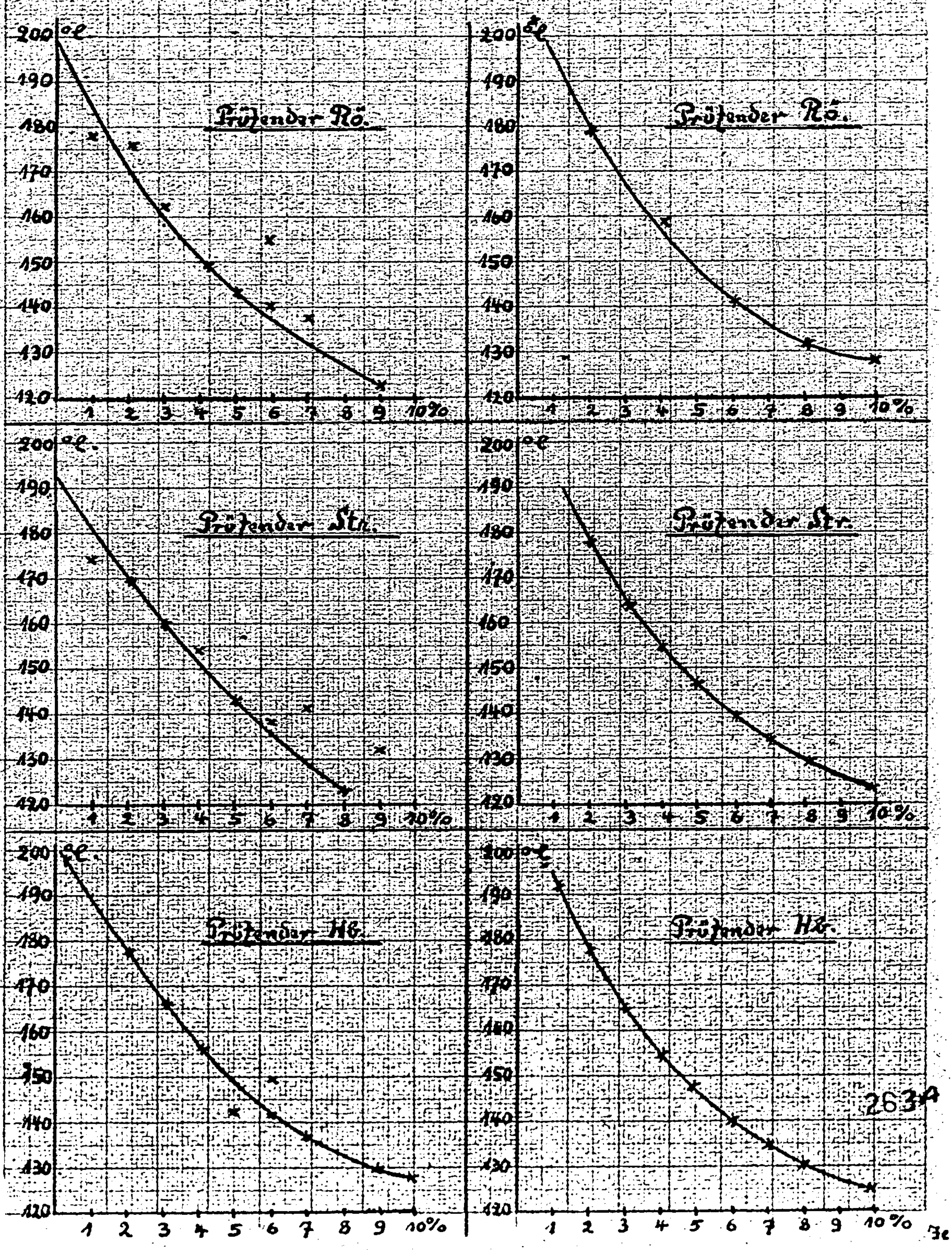
26 I A

L.

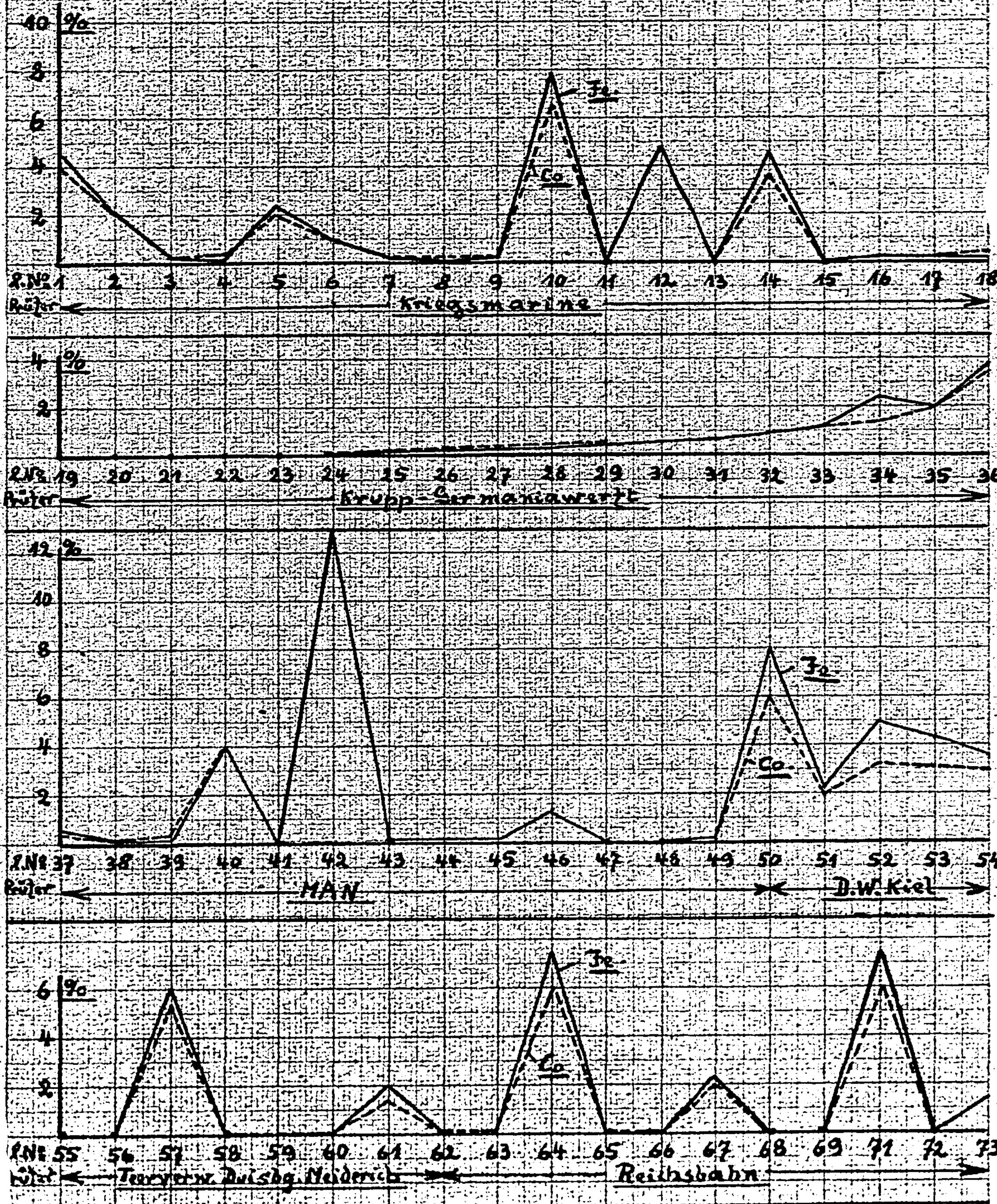

I
Motor
II
Motor
III
Motor
Holde
Fe.

70294 Anlage 8.

Flammpunkte eines Schmieröles mit Treibölzusätzen.



263A



Bestimmung des Verkokungsrückstandes nach Jentzsch und nach Conradson.

264 A.