FIAT FINAL REPORT 574

FLYWHEEL MAGNETOS

R. BOSCH G. M. B. H., STUTTGART

OFFICE OF MILITARY GOVERNMENT

FOR GERMANY (US)

FIELD INFORMATION AGENCY TECHNICAL

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BY

Alfred J. POOLE

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INTRODUCTION

Due to the demand on the part of the German motorcycle makers for a combined ignition and lighting unit Bosch has for many years produced equipment which has been highly satisfactory.

Particular attention has been paid to the lighting side of the problem. The net result has been that they now produce a unit which is simple, compact, reliable, and probably superior to anything of its kind regardless of where manufactured.

As most of the motorcycles made in Germany are of the single cylinder type the ignition problem was reasonably simple. On a 2 cylinder machine a generator and a single contact breaker housed together with a distributor is used.

FLYWHEEL MAGNETOS

TYPE UE-1

This type is without lighting coils, for a 1 cylinder engine. The flywheel proper is a zinc diecasting with pole shoes and 2 magnets cast in. See Figures 1 and 2. Magnets are of AlNi steel (not ALNICO). UE-1 is made in 2 sizes but the only difference is in outside diameter. UE-1/6, 138 mm diameter, has a magnetic flux value of 16,000-18,000 Maxwells and a coming-in speed of 90 RPM using a standard 5 mm gap with needle points and ionizer. Type UE-1/8, 134 mm diameter, has a magnetic flux value of 14,000-16,000 Maxwells and a coming-in speed of 100 RPM using the same gap. This low speed characteristic is obtained with the contact breaker closed for a 130° - 230° period, and an edge distance of 7 mm. The output curves are shown in Figure 3.

The coil consists of 150 turns of .8 mm enamelled wire in the primary around the core of the pole pieces. The secondary circuit, would over the primary, consists of 11,000-12,000 turns of .05 mm enamelled wire. The high tension terminal was originally made of brass, but later of cadmium plated steel and still later of zinc plated steel.

The contact breaker lever consists of 2 steel punchings spot welded back to back on which a tungsten point is silver-copper-alloy soldered. This pivots on a brass pin with a textolite bushing pressed into the lever. This material was formerly made at the Feuerbach plant of Bosch and called "Resistex".

The cam follower is of the same material. Its wearing qualities permit 1,000 hours operation at 3,000 RPM before readjustment is required. During the war a celluloid material was used but only 500 hours wear could be obtained before adjustment was required. Adjustment of conta ct points is by the usual eccentric screw.

A condensor of .14 - .19 mf in a drawn-metal housing is held in a socket which is part of the backplate. Paper and aluminum are used, and filled with "parrafine oil". This filler is actually $C_nH_2N + 2$, derived from brown coal. The mounting, or backplate is a zinc die casting with the laminated iron pole pieces held to it by screws. Slots are provided for attaching the backplate to the engine and to permit the initial timing of the spark. The air gap between rotor and stator is 0.25 - 0.32 mm with permissible eccentricity of 0.040 mm.

The cam consists of a machined piece(Figure 4) riveted to the center of the flywheel casting. This piece also serves as the mounting hub to the engine drive shaft and it is furnished with a key way and a threaded recess for a pulling tool when removal is required. The exception to this is when these magnetos are furnished to Fichtel and Sachs, NSU, and Ilo Werke.

A felt pad, grease loaded, rests lightly on the cam. A short cable is connected to the live side of the contact breaker and brought to the outside for connecting to the switch.

TYPE UE-2

Type UE-2 is identical with UE-1 except that two high tension coils and two contact breakers are supplied. Two separate short circuiting cables are brought to the outside. See Figure 5.

TYPE ULE-1

This unit is similar to UE-1 except that a lighting coil is attached to the backplate 180° from the ignition coil. This lighting coil supplies 5 watts at 6 volts at normal speed of 2000 RPM. Sufficient current is available for a fair light at 1000 RPM. This light winding has 560 turns of 0.8 mm aluminum wire.

TYPE ULA-1CR

This is built for one cylinder engines only and carries 2 lighting coils. All coils are located 120° apart, as shown in Figure 6. The high tension coil for ignition has a primary

winding of 160 turns of 0.7 mm wire. The secondary has 9,000 turns of 0.05 mm wire. The ignition characteristic has a coming-in speed of 200 RPM with standard 5 mm gap. The generator coils supply 17 watts at 6 volts at 2100 RPM and each coil is wound with 3.20 turns of 0.75 wire. Both copper and aluminum wire has been used with very slight advantage in the copper.

The rotor is an aluminum die casting with ALNI magnets and pole shoes cast in. The contact breaker is of pressed steel, and the cam follower, bushing and pivot are as previously described.

TYPE ULD-1A

This is a heavier and more expensive unit for a one cylinder engine. Its ignition characteristics are similar to Type UE-1/6. These magnetos are furnished to Fichtel and Sachs, ILO and NSU. The lighting coils furnish 25 watts at 6 volts at 2000 RPM, and the contact breaker, condensor, etc. are similar to Type ULA-1CR. The chief difference is that ULD1A has a forged bronze rotor. A selenium rectifier located in the headlight is used by Fichtel and Sachs for charging a battery at a 0.6 amps. rate.

TYPE ULD

Type ULD was designed but was not put into production. It is for a single cylinder machine and has 3 lighting coils.

TYPE UF-1C1

This was designed many years ago, in spite of the date shown on the print.

MAGNETO CHARGERS

Bosch also made magnetizers to simultaneously magnetize all of the magnets in a magneto flysheel after assembly in the casting. An interesting method of machining the core pieces to carry the coils, and the core ends to be inserted in the flywheel, was to machine them in pairs from round "Dynamo-Eisen" stock. Some shop prints are available in Washington.

Appendix

The following samples, catalogues, prints, etc. ha been forwarded to the Joint Intelligence Objectives Agenc in Washington.

Samples

1. Magneto UE-1
2. Two magnetos ULA-1CR
3. Selenium rectifier for motorcycles

Literature

1. Catalogue, Noris Zimd-Licht AG, Motorcycle electrical
2. Catalogue, Bosch, Motorcycle generator equipment.
3. Catalogue, Bosch, Motorcycle magneto equip. (ULA-1-CR-
4. Catalogue, Bosch, Motorcycle magneto equip. (ULD-1)
5. Print, Bosch, Generator housing.
6. Print, Bosch, Generator performance curves.
7. Print, Bosch, Generator capacity table.
8. Print, Bosch, Regulator wiring diagram.
9. Sketch, Bosch, Generator loads.
10. Print, Bosch, ULA-1-D Magneto assy.
11. Print, Bosch, ULA-1-B output curves.
12. Print, Bosch, ULD-1-L Magneto assy.
13. Print, Bosch, Wiring diagram with ULD-1 magneto.
14. Print, Bosch, ULD Magneto assy.
15. Print, Bosch, Wiring diagram with rectifier.
16. Print, Bosch, Current load curves.
17. Report by Mr. Rahn of Bosch on selenium rectifier (with English summary)
18. Print, Bosch, UE-1 Magneto assy.
19. Print, Bosch, UE output curves.
20. Pamphlet, Bosch, UE 1/8 Magneto description.
21. Print, Bosch, Cam for magneto.
22. Print, Bosch, UE 2 assy.
23. Print, Bosch, ULA output curves Cu vs AC.
24. Pamphlet, Bosch, ULA ICR Magneto description.
25. Print, Bosch, Flywheel for UE-212.
26. Print, Bosch, ULA-1C assy. (2 copies)
27. Print, Bosch, Backplate assy. for ULD-1.
28. Print, Bosch, UF-1C1 assy.
29. Print, Bosch, Flywheel for ULD-1.
30. Prints, Bosch, Magnetizer assy (4 prints)

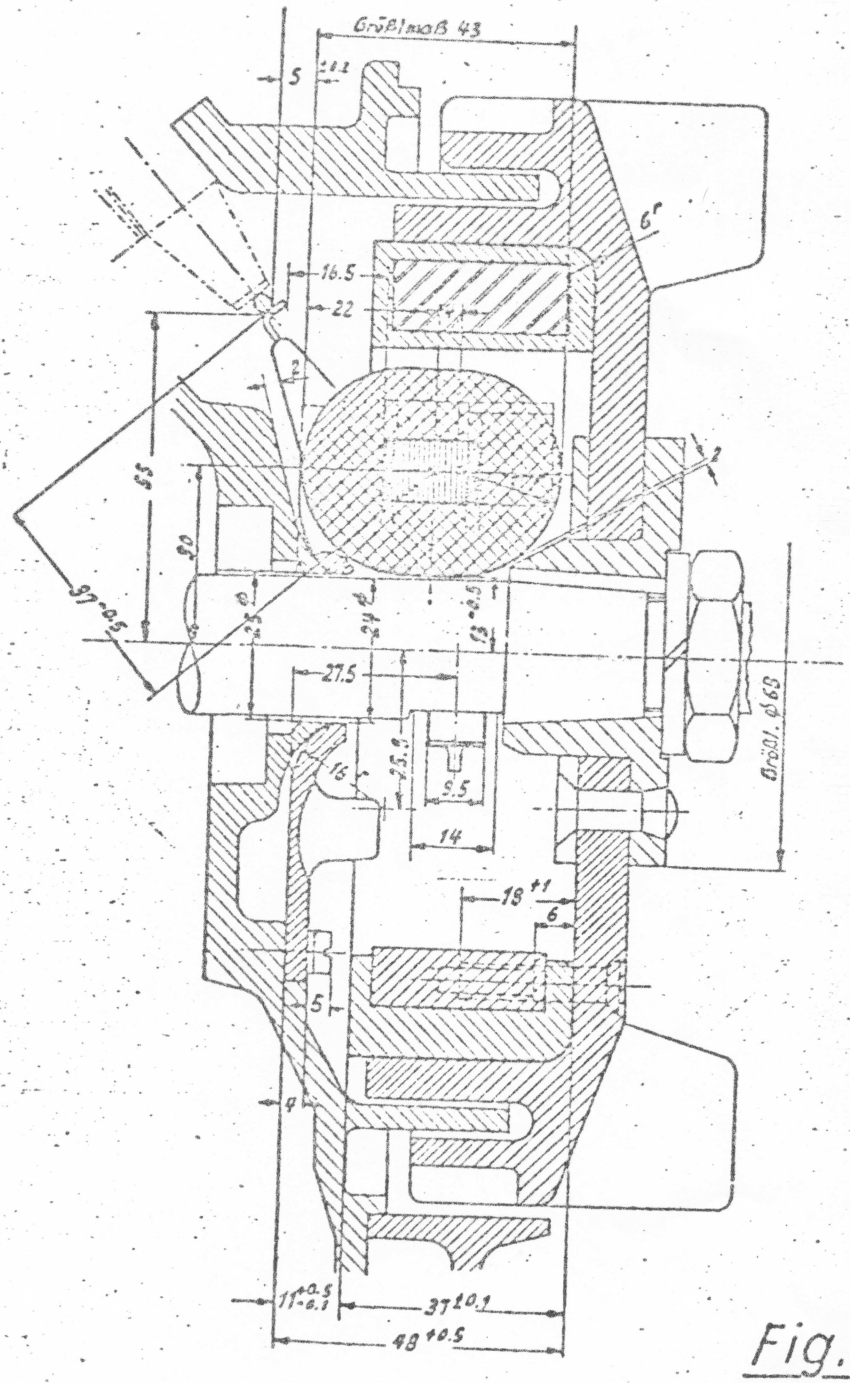

Größtmaß 43
5
16.5
22
6°
2
55
90
97-0.5
24
13
27.5
15.5
9.5
14
16
Größt. ϕ 68
18+1
6
5
4
11+0.5 -0.1
37±0.1
48±0.5

Fig. 1b

etc. have
ves Agency

ctrical equi
nt.
LA-1-CR-16).
LD-1)

er (with
summary)

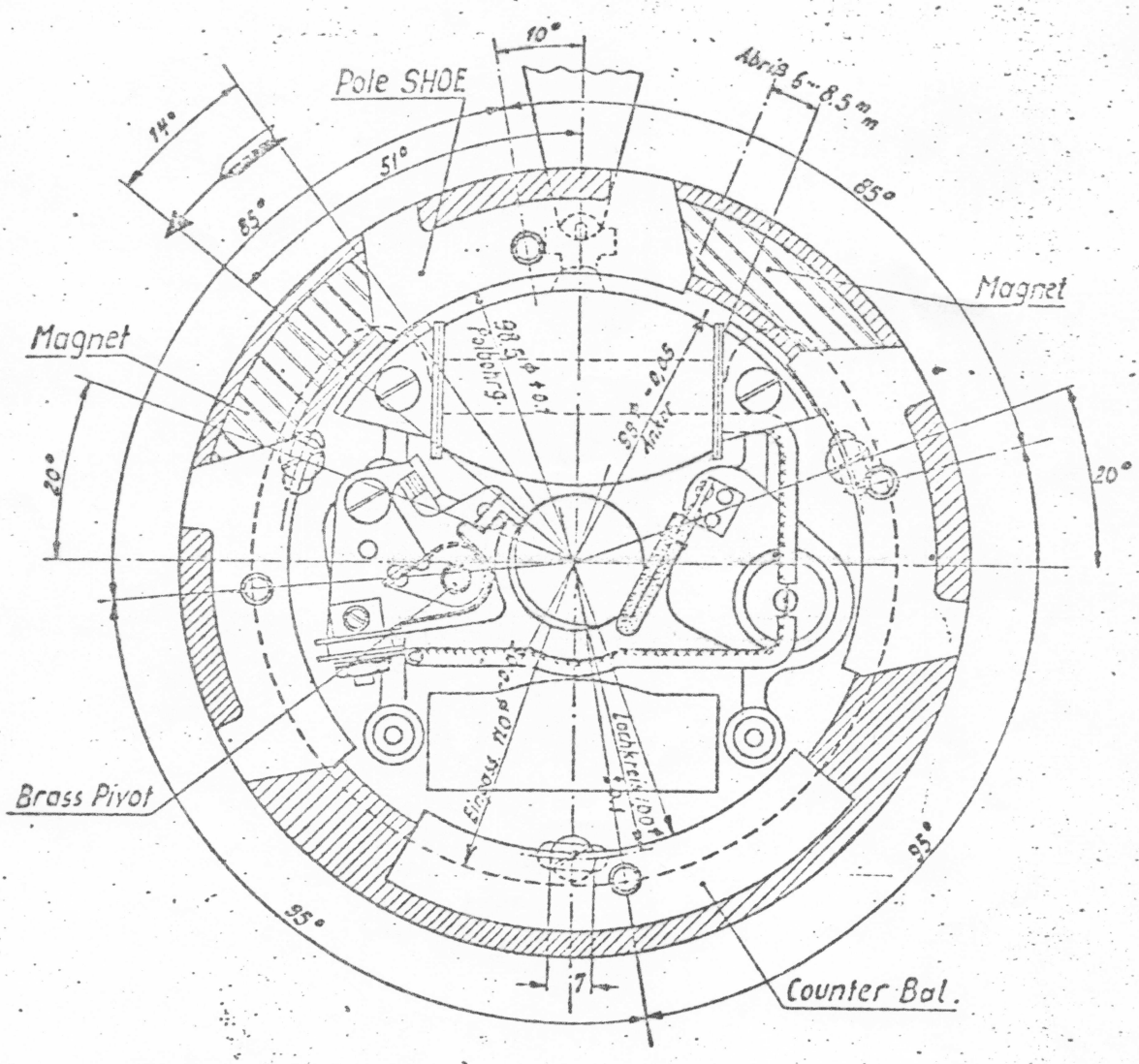


Fig. 1a

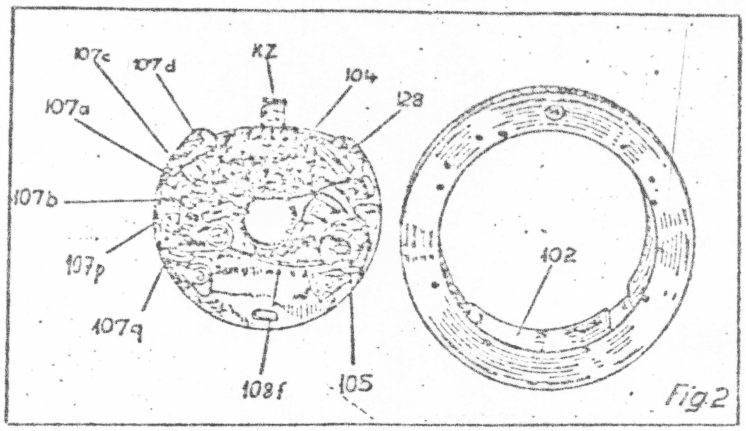


Bild I. Ankerplatte (feststehend)

Bild 2. Schwungrad mit Magneten (umlaufend)

I02 Magnetpolschuhe
I04 Wicklung
I05 Kondensator
I07a Ambosskontakt
I07b Hebelkontakt
I07c Unterbrecherhebel
I07d Gleitstuck im Unterbrecherhebel
I07p Feststellschraube
I07q Exzentrische Verstellschraube
I08f Filtdecht fuer Nockenschmierung
I28 Ankerpolschuhe
KZ Kontakt fuer Zuendstromabnehmer

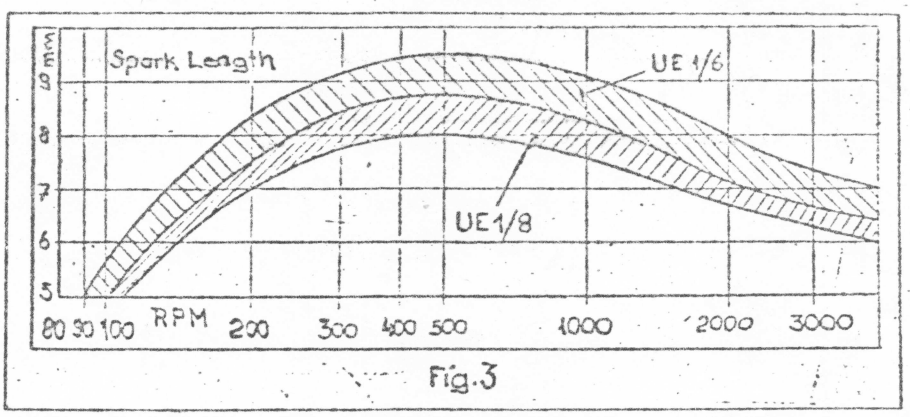


Fig.3

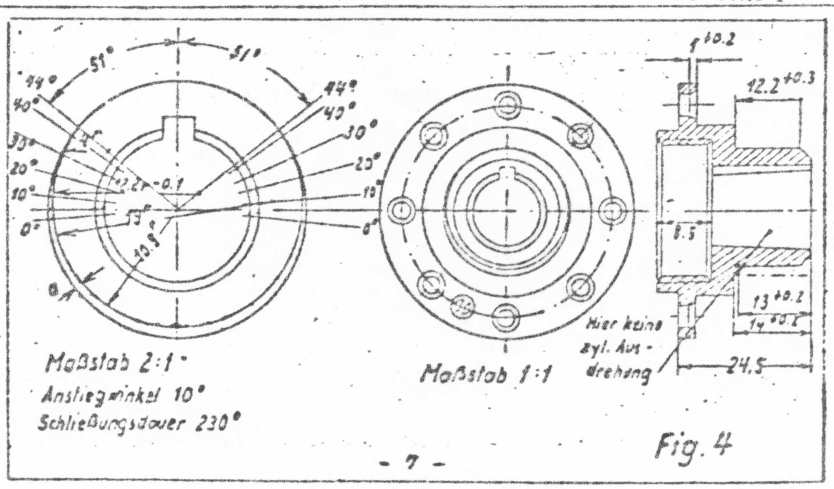


Fig. 4

1b

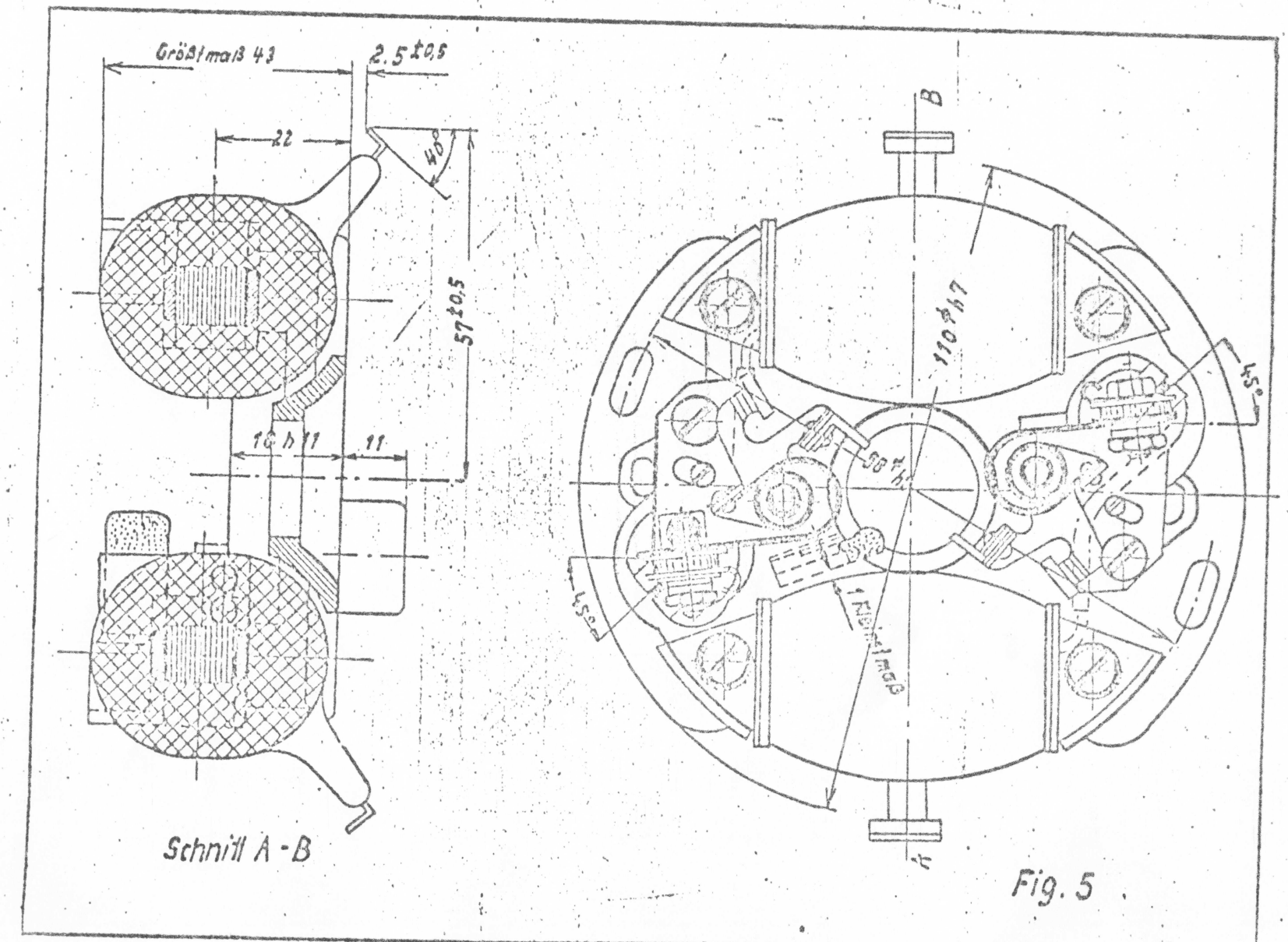

Größtmaß 43
2.5 ±0.5
22
40°
57 ±0.5
10 h 11
11
Schnitt A - B
B
110 H7
50 H7
45°
45°
A

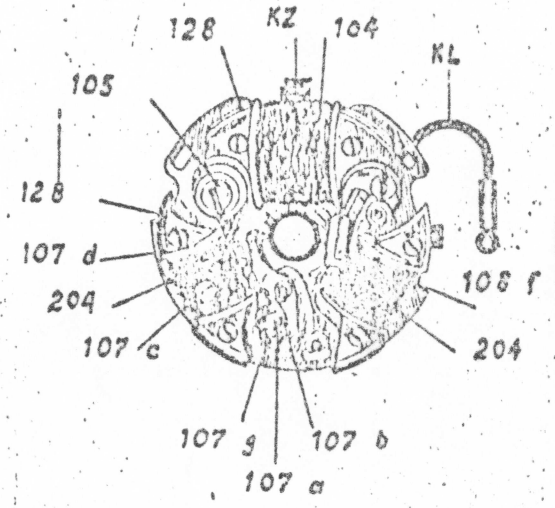
Fig. 5

Schnitt A - B

Fig. 5

BOSCH - Schwung - Lichtmagnetzuender

ULA 1 CR 13



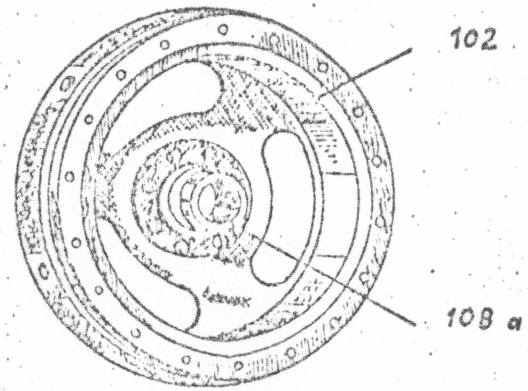


Fig. 6

Bild 1. Ankerplatte (feststehend)

102	Magnetpolschuhe
104	Wicklung des Zuendankers
105	Kondensator
107 a	Amboosskontakt
107 b	Hebelkontakt
107 c	Unterbrecherhebel
107 d	Gleitstueck im Unterbrecher - hebel

Bild 2. Schwungrad mit Magneten (umlaufend)

107 g	Gegenmutter
108 a	Schwungradnabe (Unter -
108 f	Filzdocht brechernocken)
128	Ankerpolschuhe
204	Wicklung des Lichtankers
KL	Kabel zum Lichtstromabnehmer
KZ	Kontakt fuer Zuendstromab - nehmer