

DISASSEMBLING AND ASSEMBLING ENGINE

2 EN

Special Tools:

- | | | | |
|-------|--|----------|---|
| P 1 a | Electric piston heater | P 43 | Puller for V-belt pulley |
| P 2 | Piston pin drift | P 44 | 36 mm SW socket 25 mm hexagonal drive to loosen and tighten flywheel gland nut. |
| P 3 | Spark plug socket | VW 102 | T-handled 14 mm SW wrench for crankcase nuts |
| P 5 | 15 mm SW socket 1/2 in. drive | VW 106 | T-handled 10 mm SW wrench for oil pump and oil sump cover |
| P 8 a | Piston ring compressor, 82.5 mm dia. (3 1/4 in.) (for 1600 and 1600 S) | VW 118 | Torque wrench 6 mkg (44 ft. lb.) capacity, general purpose |
| P 23 | Carburetor wrench, 12 mm SW (for 1600 S) | VW 126 a | Fuel pump wrench |
| P 42 | Torque wrench 50 mkg (360 ft. lb.) capacity, to loosen and tighten flywheel gland nut (25 mm hexagonal drive for P 44) | VW 307 | Fixture for engine and gearbox |

Disassembly

It is suggested that the engine be dismantled in the following sequence:

1. Drain engine oil.

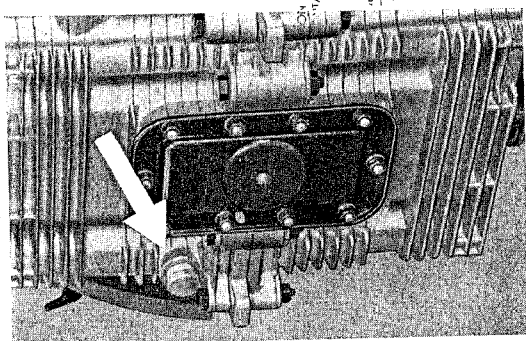


Fig. 25

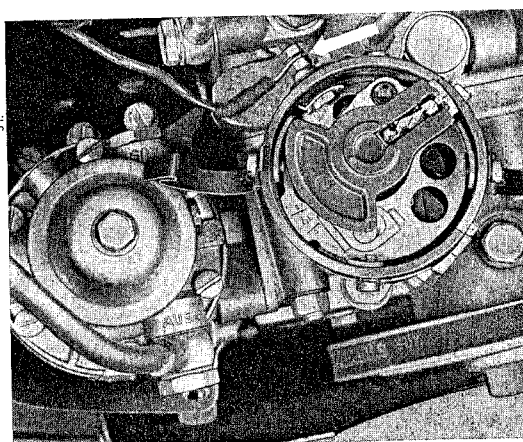


Fig. 27

2. Remove front, rear, and side duct plates (3 EN).
3. Remove muffler with heater assembly (10, 11 EN).
5. Remove air filter.
6. Remove fuel lines and throttle linkage.
7. Remove carburetor.

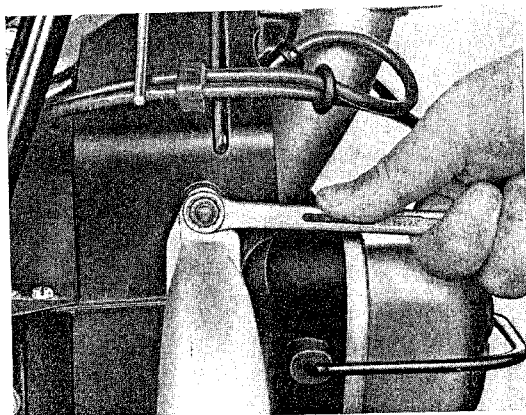


Fig. 26

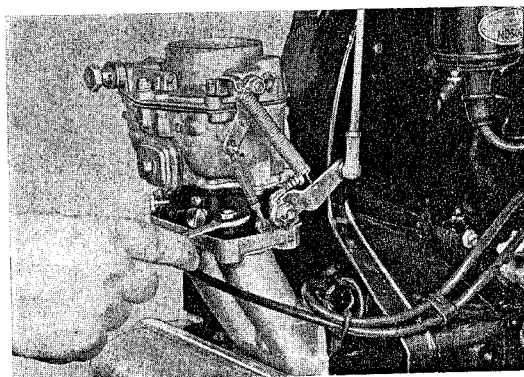
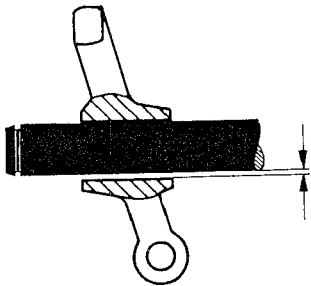
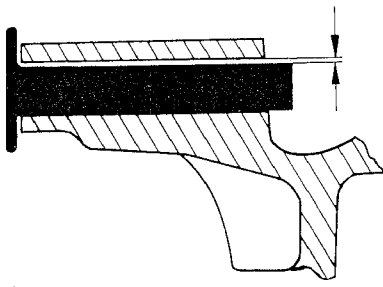
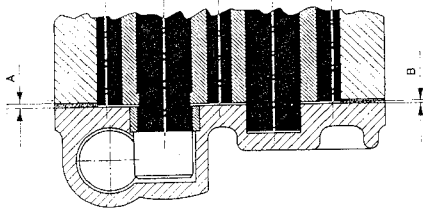


Fig. 28

Measuring point		Tolerance (new) mm	Wear limit mm	
29. Rocker arm bushing Rocker arm spindle	Inside dia. dia.	16.000 – 16.018 15.984 – 15.973	16.035 15.965	_____
	Rocker arm / Rocker spindle clearance	0.016 – 0.045	0.070	
30. Crankcase bore for tappet Tappet	dia. dia.	12.000 – 21.018 11.966 – 11.984	12.060 11.945	_____
	Tappet bore / tappet clearance	0.016 – 0.052	0.100	
31. Compression test at open throttle, warm engine, all spark plugs removed, and engine turned by starter.		1600 Engine kg/cm ² (psi) 1600 S Engine kg/cm ² (psi)	7–8 (100–114) 8–9 (114–128)	5.0 (71) 6.0 (85)
32. Oil pump: Pump gears extend beyond housing Compressed gasket thickness A Gear end play with gasket and lid secured B		0.06 – 0.125 0.16 0.035 – 0.10	0.20	
Gear backlash		0.030 – 0.080	—	_____

8. Remove V-belt.
9. Disconnect oil filter lines.

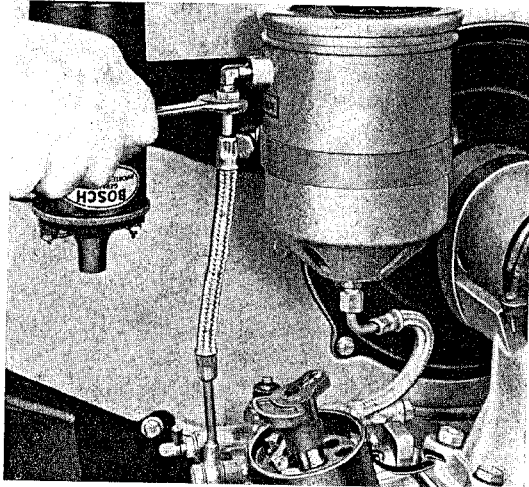


Fig. 29

10. Remove oil breather pipe.

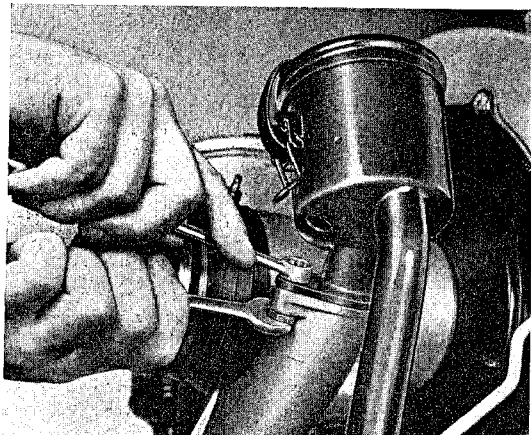


Fig. 30

11. Remove duct plates (3 EN).
12. Remove generator clamp.
13. Remove fan housing and generator as a unit (3 EN).
14. Remove cover plates and lower air channel.

E 8

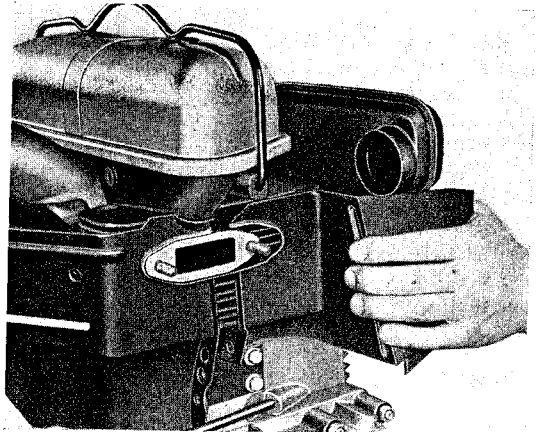


Fig. 31

15. Remove fuel pump.
16. Remove distributor and distributor drive pinion (37 EN).
17. Remove generator bracket.

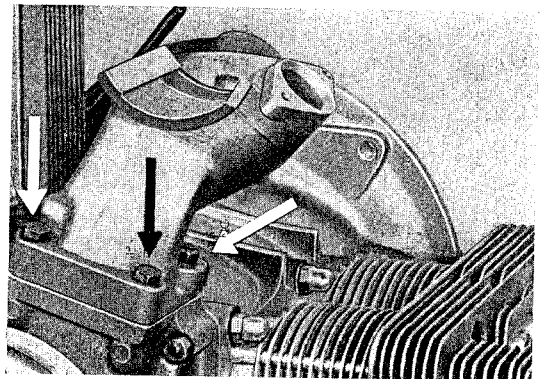


Fig. 32

18. Remove rocker box covers.
19. Remove rocker arm bracket (19 or 21 EN).

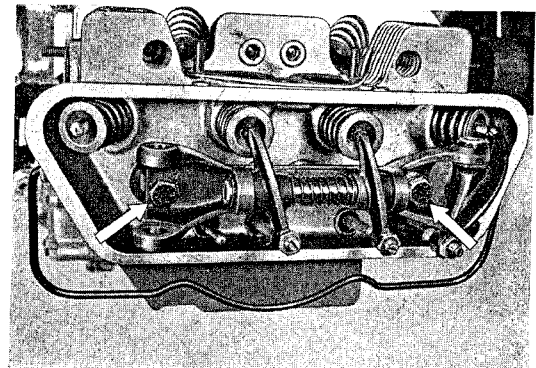


Fig. 33

20. Remove push rods.
21. Remove intake manifold.

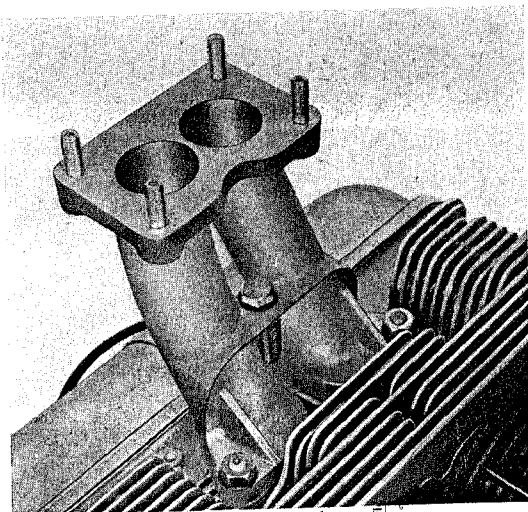


Fig. 34

22. Remove cylinder heads (23 EN).
23. Remove push rod tubes and deflector plates.

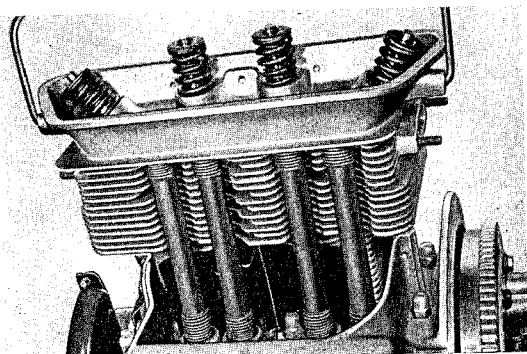


Fig. 35

24. Remove cylinders and pistons and number each (32, 34 EN).

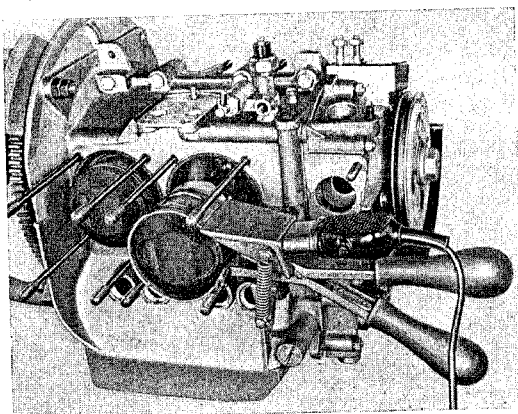


Fig. 36

25. Remove V-belt pulley and extract woodruff key (42 EN).

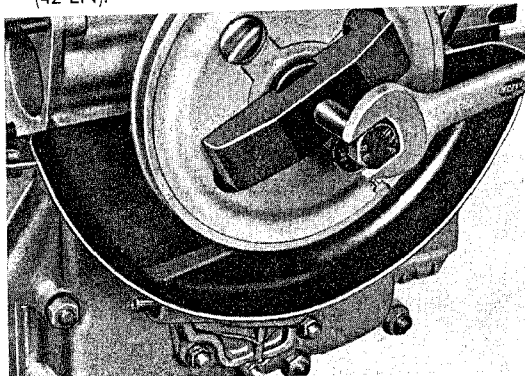


Fig. 37

26. Remove oil pump cover and tachometer drive (17 EN).

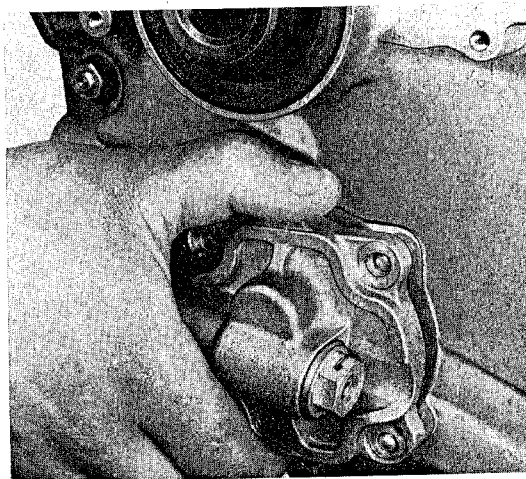


Fig. 38

27. Remove oil pump gears.

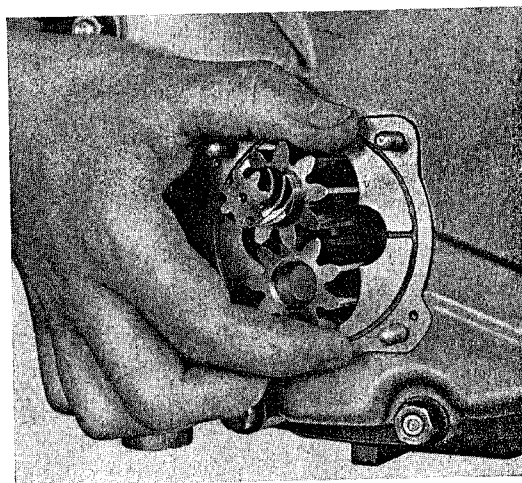


Fig. 39

28. Remove timing case cover (40 EN).

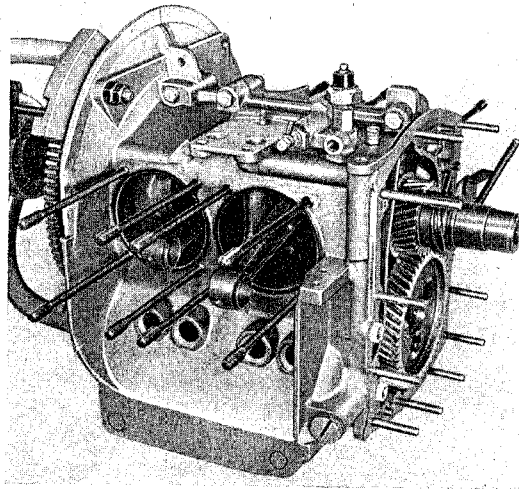


Fig. 40

29. Remove clutch assembly (57 EN).

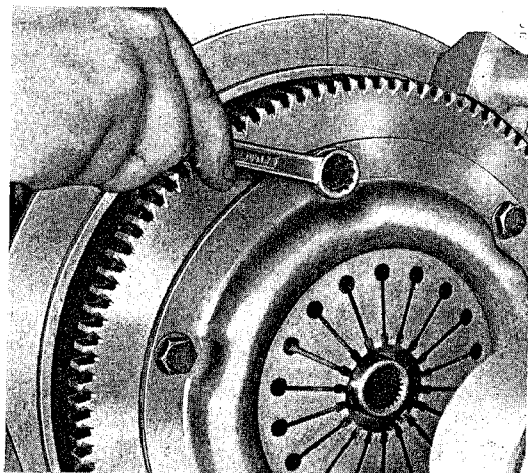


Fig. 41

30. Remove Flywheel.

31. Remove oil strainer cover plate with magnetic filter (14 EN).

32. Disassemble crankcase (note that the camshaft bearing bolts in the flywheel housing must first be removed) (36 EN).

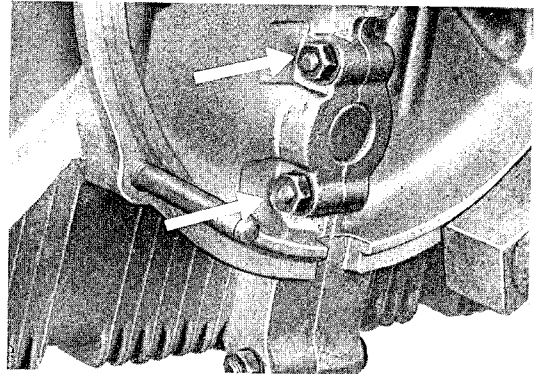


Fig. 42

33. Remove crankshaft and camshaft.

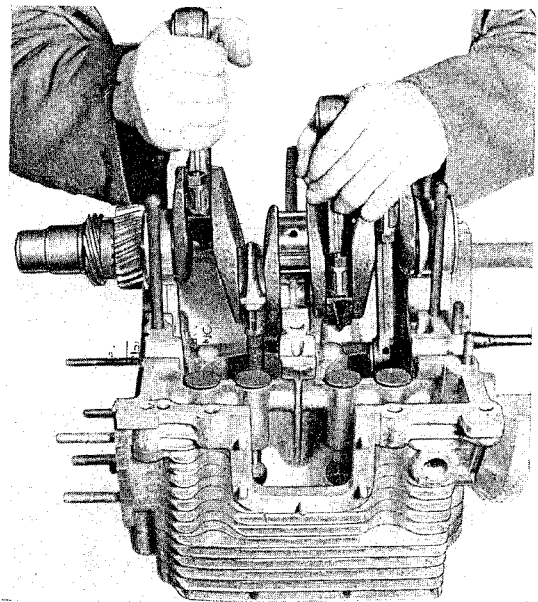


Fig. 43

34. Remove tappets.

35. Remove No. 2 bearing inserts.

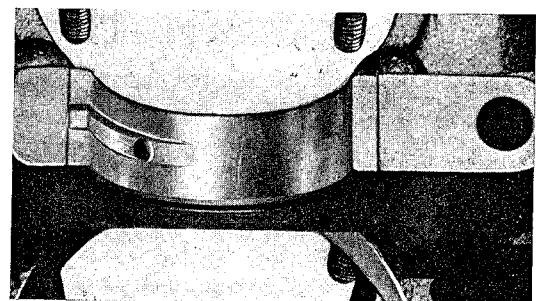


Fig. 44

36. Remove main bearing dowel pins.

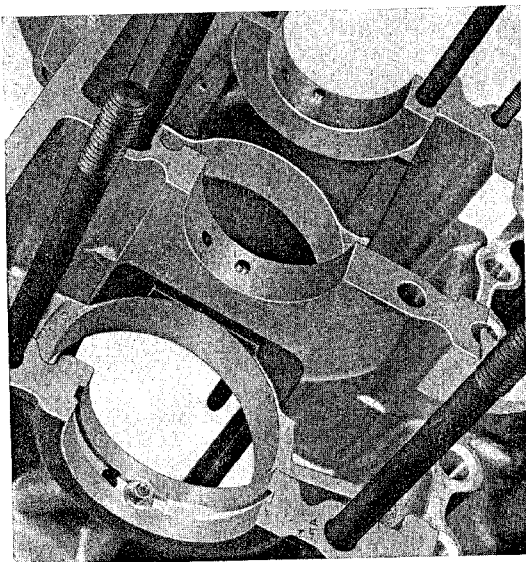


Fig. 45

37. Remove the oil seal, bearing No. 4, and pressure relief valve from the timing case cover.

Assembly

The engine is assembled in the reverse order of the disassembly observing the following points:

1. Thoroughly clean the crankcase sections flushing the oil passages with cleaning solvent and install drain plug.
2. Insert the bearing dowel pins making certain that they do not protrude farther than the recesses in the bearing shells (approx. 1.8 mm, .071 in.).
3. Install bearing inserts of No. 2 bearing into the crankcase halves.

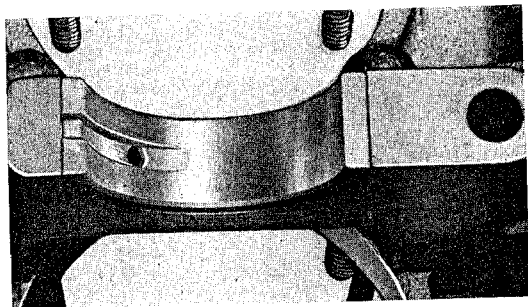


Fig. 46

4. Lubricate with graphite oil and install the tappets.

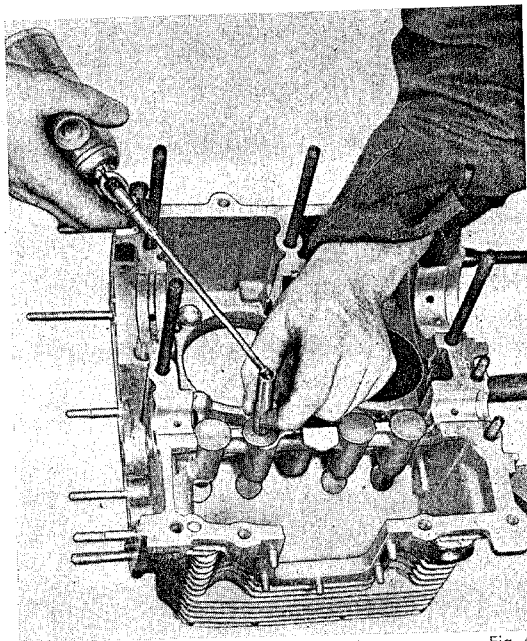


Fig. 47

5. Install complete crankcase assembly (45 EN).

6. Install camshaft observing timing marks (44 EN).

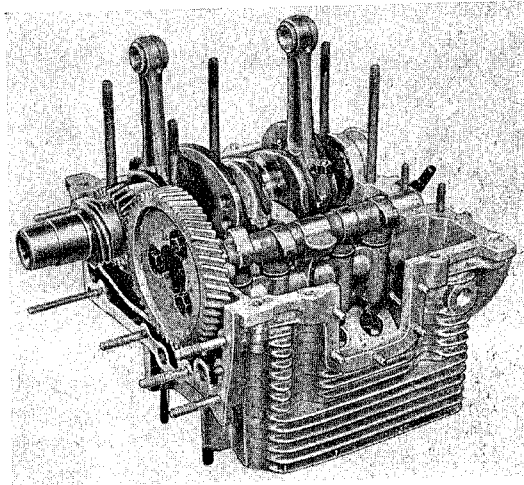


Fig. 48

7. Install thrust washer and oil seal.
8. Install camshaft end plug.

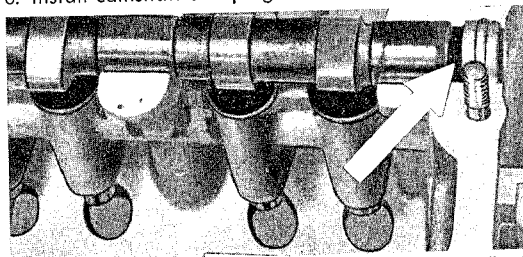


Fig. 49

9. Assemble crankcase (36 EN).

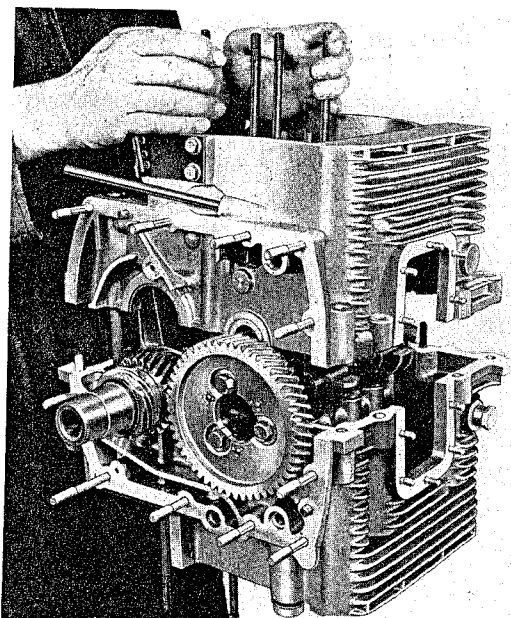


Fig. 50

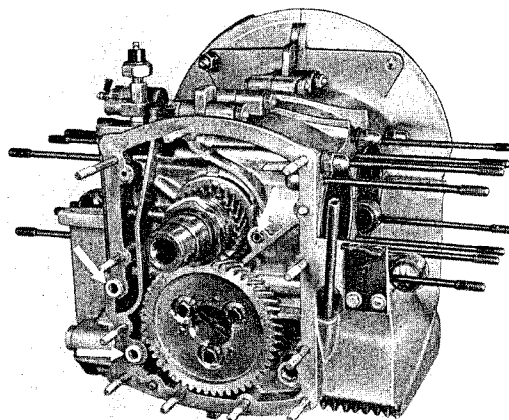


Fig. 52

14. Install V-belt pulley cover.

15. Install V-belt pulley (42 EN).

16. Install distributor drive shaft with spring and thrust washer (37 EN).

10. Install flywheel (41 EN).

17. Install distributor and fuel pump push rod guide.

11. Install clutch assembly (57 EN).

18. Install oil cooler (16 EN).

12. Install oil strainer and magnetic filter (14 EN).

13. Install No. 4 bearing, oil seal, by-pass valve, by-pass valve activating oil line, and oil pump in the timing case cover. Install timing case cover (39 to 40 EN) and check whether No. 4 bearing retaining screw is secure.

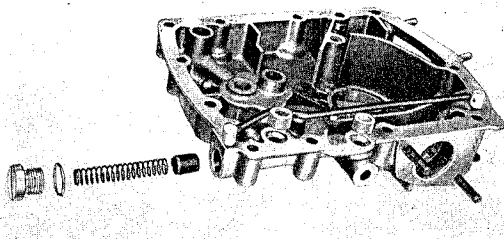


Fig. 51

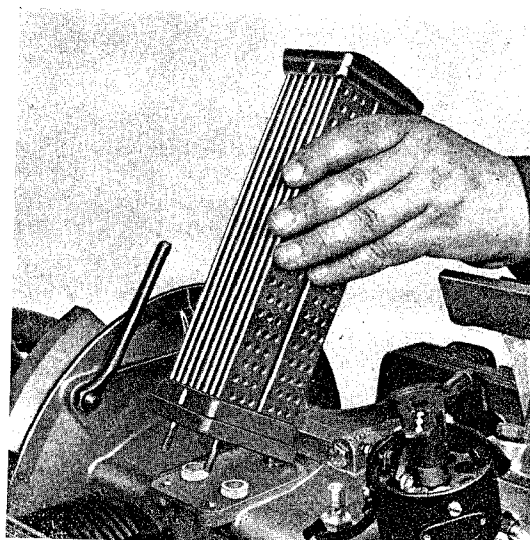


Fig. 53

19. Install pistons and cylinders using cylinder base gasket (32 to 35 EN).

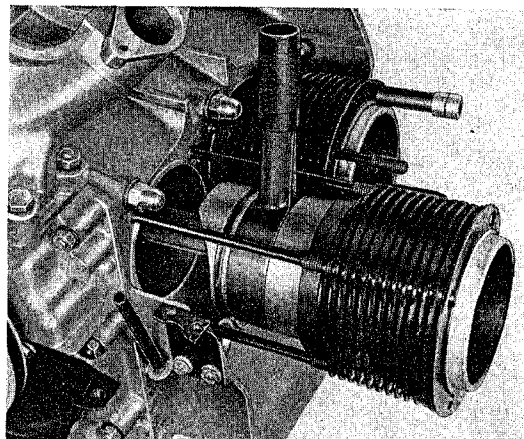


Fig. 54

20. Fasten cylinders to crankcase using spacers P 18.

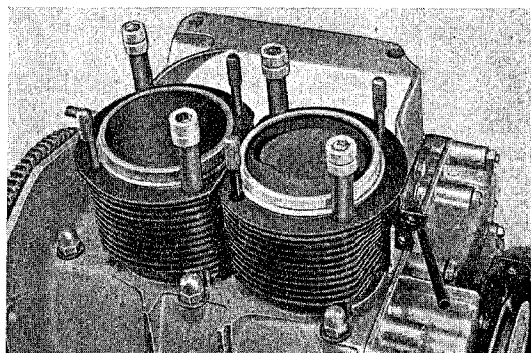


Fig. 55

21. Install deflector plates and retaining springs (23 EN).

22. Install push rod tubes with oil seals.

23. Remove spacers P 18 and install cylinder heads (23 EN) noting correct position of deflector plates.

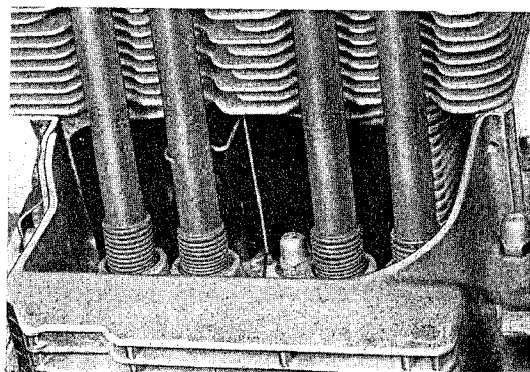


Fig. 56

24. Oil and install push rods.



Fig. 57

25. Install rocker arm assemblies (19 or 21 EN).



Fig. 58

26. Adjust valve clearance and install rocker box covers.

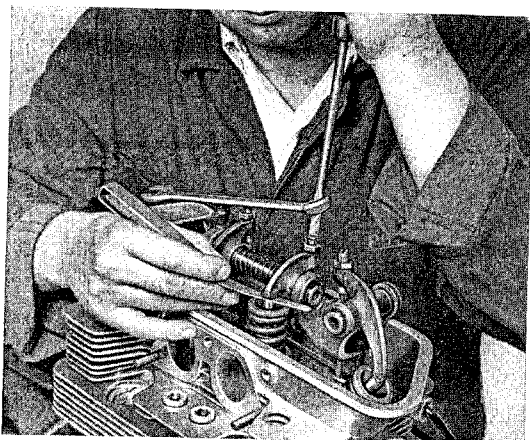


Fig. 59

27. Install spark plugs.
28. Install intake manifolds insuring proper gasket fit.
29. Install cover plate on No. 3 cylinder.
30. Install fan housing and generator.

35. Connect oil lines to oil filter and install pressure indicator sending unit.
36. Fasten generator clamp and check free rotation of blower impeller.

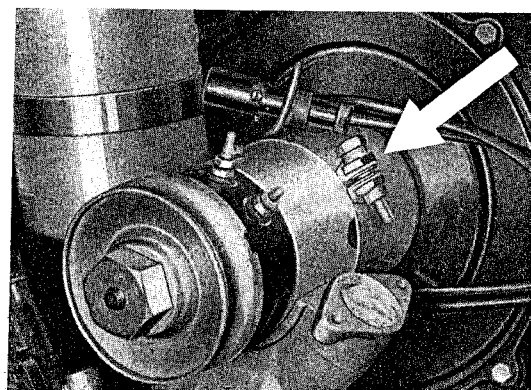


Fig. 61

37. Install V-belt.
38. Connect ignition cable to ignition coil and distributor.
39. Grease fuel pump push rod and install in push rod guide with rounded end toward crankshaft.
40. Grease fuel pump base with high temperature grease and install using a new gasket.
41. Connect fuel line and carburetor linkage.
42. Install oil filler pipe with a rubber gasket.
43. Install air cleaners.
44. Connect spark plug wires.
45. Install exhaust system (10 EN, 11 EN).
46. Fill crankcase with 4.5 l (4¾ qt.) motor oil, after short test run check and add oil if necessary.

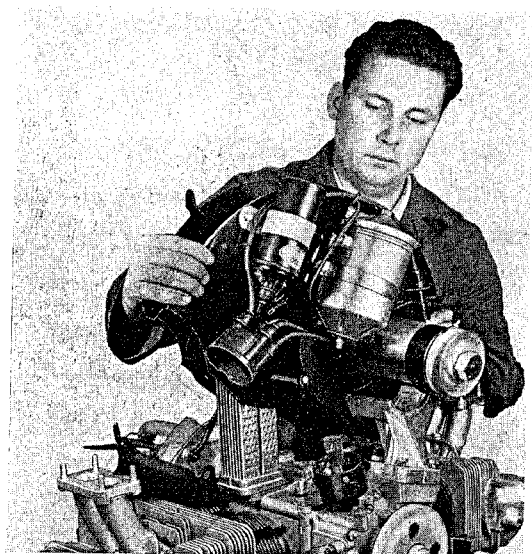


Fig. 60

31. Install cylinder cover plates.
32. Install fuel pump cover plate.
33. Install lower air channels (3, 7 EN).
34. Install side cover plates.