

INSTRUCTIONS AND HINTS
FOR THE
MAINTENANCE
OF THE

B M W
MOTOR CYCLES



BAYERISCHE MOTOREN WERKE A. G.
MUNICH 13, GERMANY



Original
aus dem BMW
Archiv

B M W

MOTOR CYCLES

TOURING MODELS:-

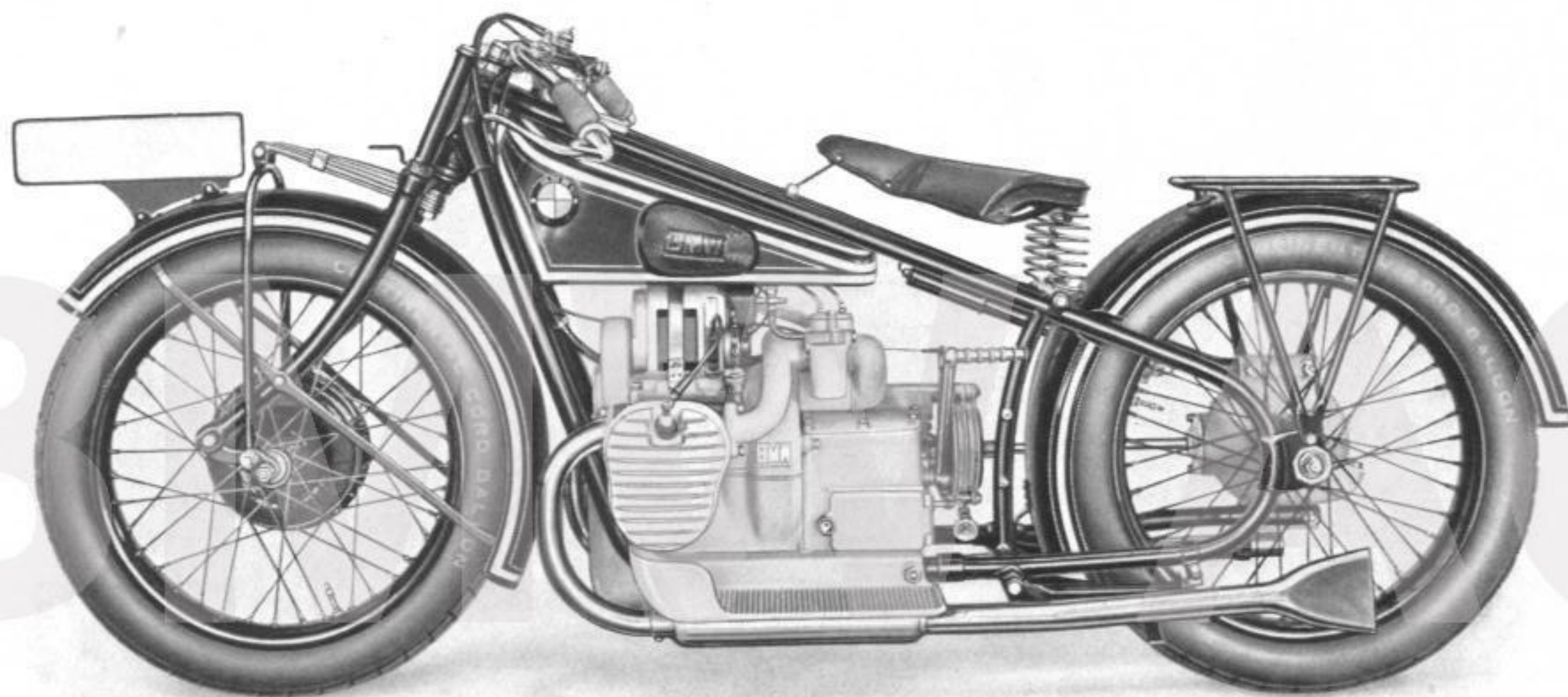
R 52 (500 c. c.)

R 62 (750 c. c.)

SPORTING MODELS:-

R 57 (500 c. c. OHV)

R 63 (750 c. c. OHV)



Ill. 1. The R 62 seen from the kickstarter side.

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Foreword.

We have always endeavoured to obtain not only efficiency and reliability for our machines, but also absolute simplicity, and the result is that any child can learn to ride a BMW. But even the simplest of machines requires attention and the object of this booklet is to enable a rider to become thoroughly acquainted with his mount, and to help him to overcome any little difficulties with which he may meet.

Never forget that, in spite of the high standard of mechanical efficiency attained by BMW, no two machines are exactly alike. Every machine has its own "personality" and must

receive individual care. If you have any troubles difficult to diagnose, get into touch with the nearest BMW Agent or write us direct, and we shall be only too pleased to give you all the information and advice you require.

When ordering spare parts, do not forget to mention not only the serial numbers given in the Spare Parts List, but also the numbers of the engine and frame, which are stamped on every machine, and you will save yourself a lot of unnecessary trouble and delay.

The models described in this booklet incorporate the very latest principles of motor cycle engineering and their elegance, unquestionable efficiency and absolute reliability make them a source of unlimited pleasure for every rider.

Munich, May 1929.

**Bayerische Motoren Werke
Aktiengesellschaft.**

General Specifications

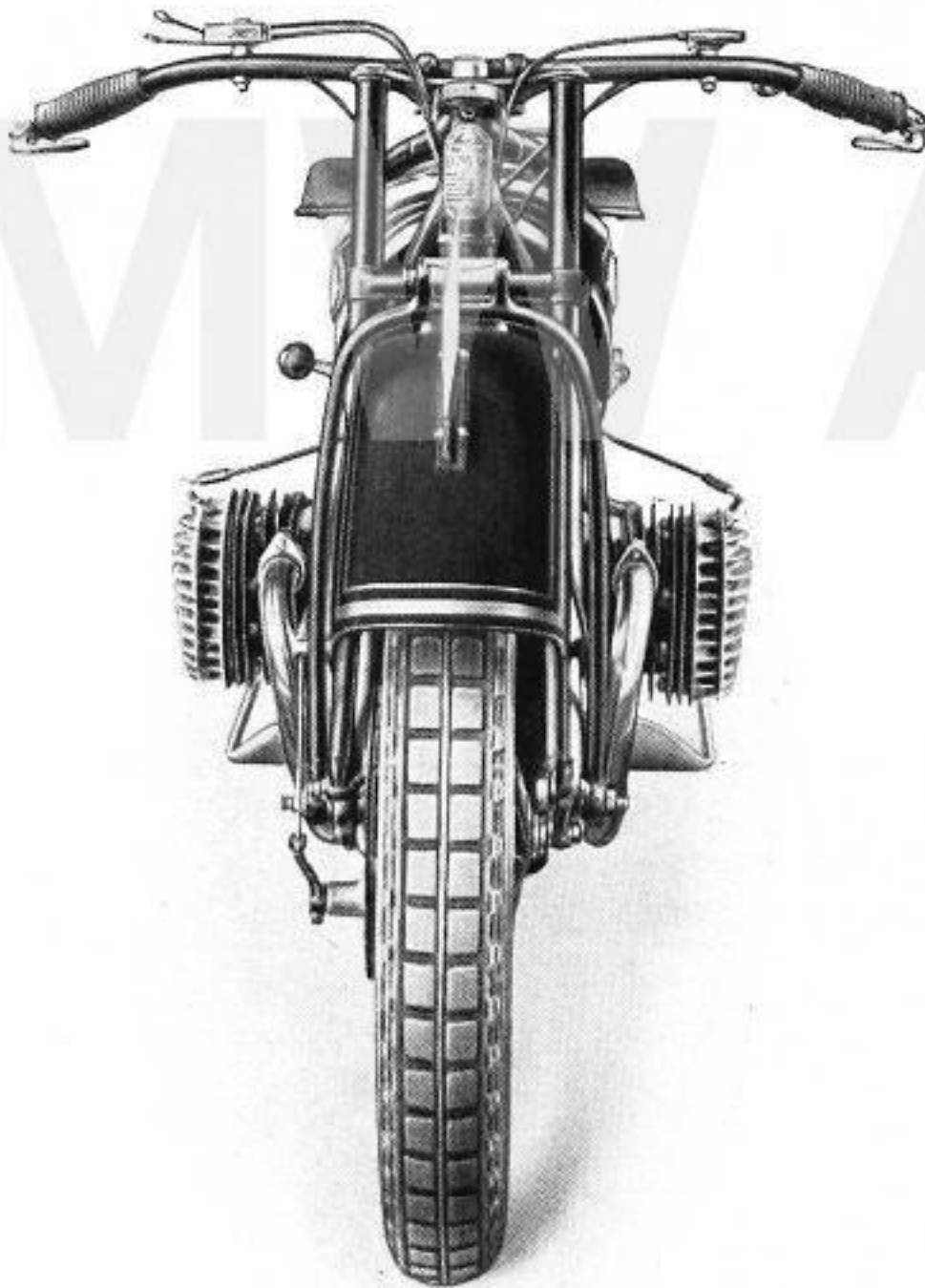
Model	R 52	R 62	R 57	R 63
No. of cylinders	2	2	2	2
Arrangement	transverse	transverse	transverse	transverse
Bore mm	63	78	68	83
Stroke mm	78	78	68	68
Capacity cc	482	740	490	731
Normal engine speed r. p. m. appr.	3400	3400	4000	4000
Effective output BHP	12	18	18	25
Capacity of petrol tank gall. appr.	2 ³ / ₄	2 ³ / ₄	2 ³ / ₄	2 ³ / ₄
litres	12 ¹ / ₂	12 ¹ / ₂	12 ¹ / ₂	12 ¹ / ₂
Capacity of oil tank: pints appr.	4 ¹ / ₂	4 ¹ / ₂	4 ¹ / ₂	4 ¹ / ₂
litres	2 ¹ / ₂	2 ¹ / ₂	2 ¹ / ₂	2 ¹ / ₂
Fuel consumption m. p. g. appr.	80	56	80	56
litres per 100 km	3 ¹ / ₂	5	3 ¹ / ₂	5
Oil consumption m. p. pint appr.	225	180	225	180
litres per 100 km	.15	.2	.15	.2
Saddle height	27 ¹ / ₂ "	27 ¹ / ₂ "	27 ¹ / ₂ "	27 ¹ / ₂ "
cm	70	70	70	70
Overall length	82 ¹ / ₂ "	82 ¹ / ₂ "	82 ¹ / ₂ "	82 ¹ / ₂ "
cm	210	210	210	210
Overall breadth	31 ¹ / ₂ "	31 ¹ / ₂ "	31 ¹ / ₂ "	31 ¹ / ₂ "
cm	80	80	80	80
Overall height	37 ¹ / ₂ "	37 ¹ / ₂ "	37 ¹ / ₂ "	37 ¹ / ₂ "
cm	95	95	95	95
Wheel base	55"	55"	55"	55"
cm	140	140	140	140
Gear ratios for solo work . .	5.2-7.4-13.4	4.4-6.3-11.5	5.2-7.4-13.4	4.4-6.3-11.5
Gear ratios for combination work	6.2-8.9-16.1	5.2-7.4-13.4	6.2-8.9-16.1	5.2-7.4-13.4
Tyre sizes (wired)	26" × 3 ¹ / ₂ " low pressure or 26" × 3 ¹ / ₄ " high pressure, both on well-base rims			
Weight of machine complete, but without oil or petrol lbs appr.	335	342	335	344
kg appr.	152	155	152	156
Carrying capacity of machine lbs appr.	463	463	463	463
kg appr.	210	210	210	210
Gross weight of machine packed in crate lbs appr.	445	452	445	454
kg appr.	202	205	202	206
Gross weight of machine in oversea packing lbs appr.	644	650	644	653
kg appr.	292	295	292	296
Dimensions of oversea case cm	88 ⁵ / ₈ " × 28 ³ / ₈ " × 42 ¹ / ₂ " 225 × 72 × 108		88 ⁵ / ₈ " × 29 ¹ / ₂ " × 43 ¹ / ₄ " 225 × 75 × 110	88 ⁵ / ₈ " × 29 ¹ / ₂ " × 42 ¹ / ₂ " 225 × 75 × 108

Description of the BMW Motor Cycle.

Frame.

The BMW frame is a very rigid, duplex cradle type of triangular form made of high grade steel tubes without any joints or connections except at the steering head. The latter is a broad and particularly strong design and the front fork girders reach right up to it, offering an absolutely safe steering mechanism. There is sufficient room for fitting snow chains on the balloon tyres.

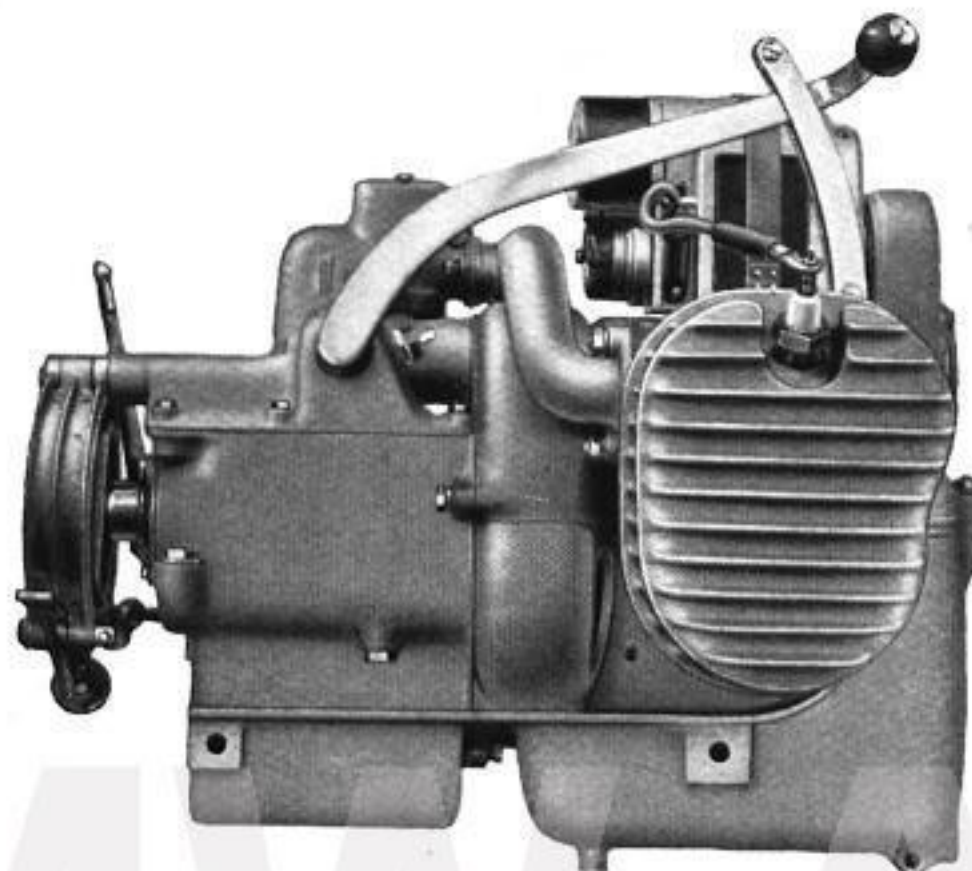
The wheels are fitted with 19" $\times$ 3" well-base rims of international repute. They are generally made to take 26" $\times$ 3,5" wired type balloon tyres but can also be supplied fitted with 27" $\times$ 2,75" high pressure tyres, using 21" $\times$ 2,5" well-base rims.



Ill. 2. Front View of the R 62.

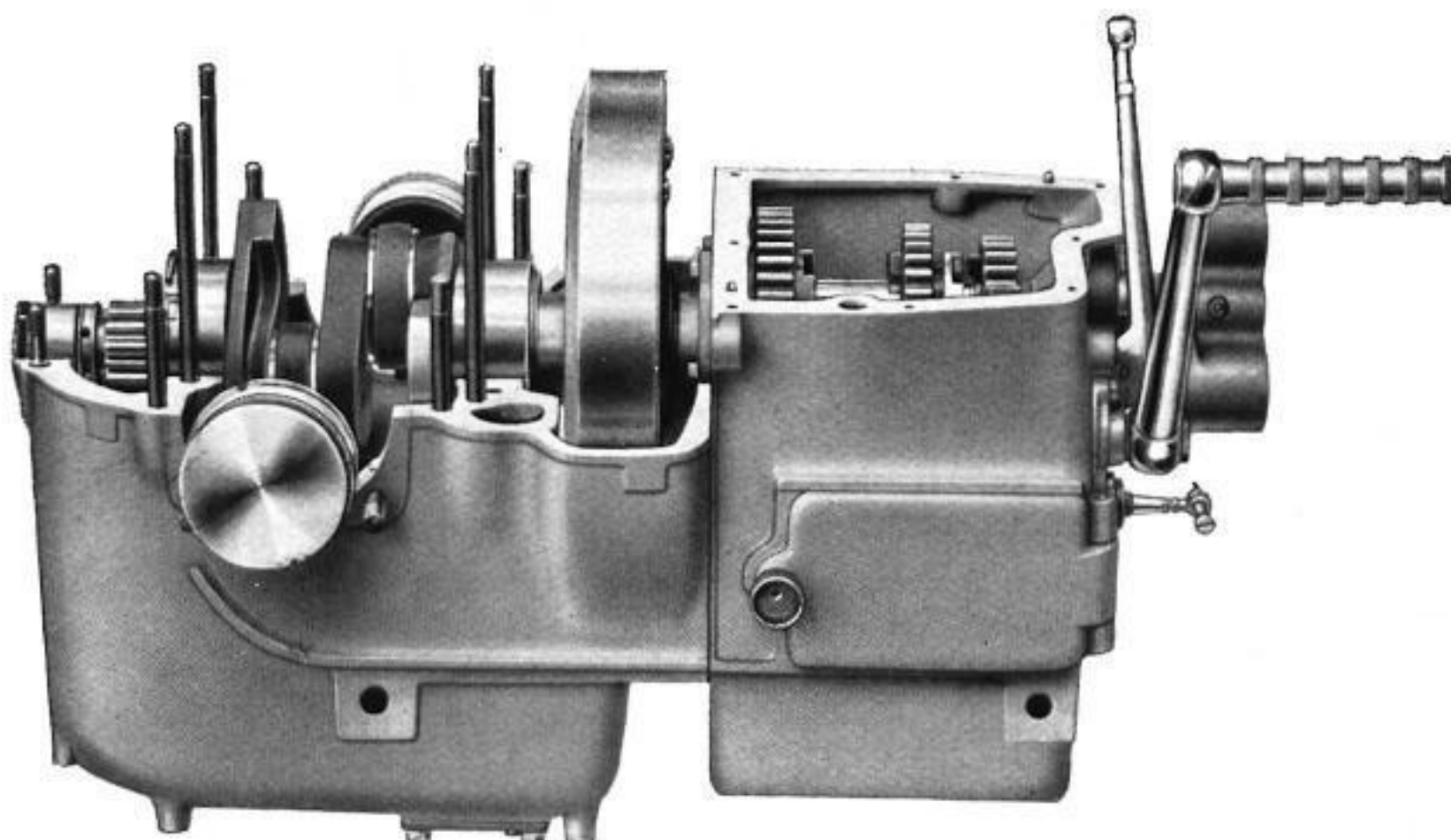
The rear brake is of the external contracting type, with pedal control, and acts direct on the shock absorber drum. The front wheel brake is an extra large diameter internal expanding brake, controlled by a lever on the right handle-bar. Both brakes are Ferrodo lined and easily adjustable.

Unit Block Engine and Gear Box.



Ill. 3.

The engine is incorporated in one unit with the gear box and the clutch (Ill. 3), being fitted to the bottom tubes of the frame with two long through-bolts.



Ill. 4.

All parts are easily accessible without dismantling either the engine or the gear box. The cylinders project on either side of this unit block and may readily be removed by merely unscrewing the holding-down nuts and disconnecting the induction and exhaust pipes. The pistons and connecting rods will then be free for inspection. The entire internal mechanism may be examined by simply removing the upper crank case half (Ill. 4). Further details on the dismantling of the engine will be found on pages 22—27.

Carburetter.

Ill. 5 shows sections and partial views of the carburetter with float chamber. It is fitted immediately above the gear case and draws the air required for combustion from the crank chamber, where it has previously been heated and cleaned. The carburetter is composed of the carburetter body proper H 1 and the float chamber H 101. The latter contains a float H 104 which acts on

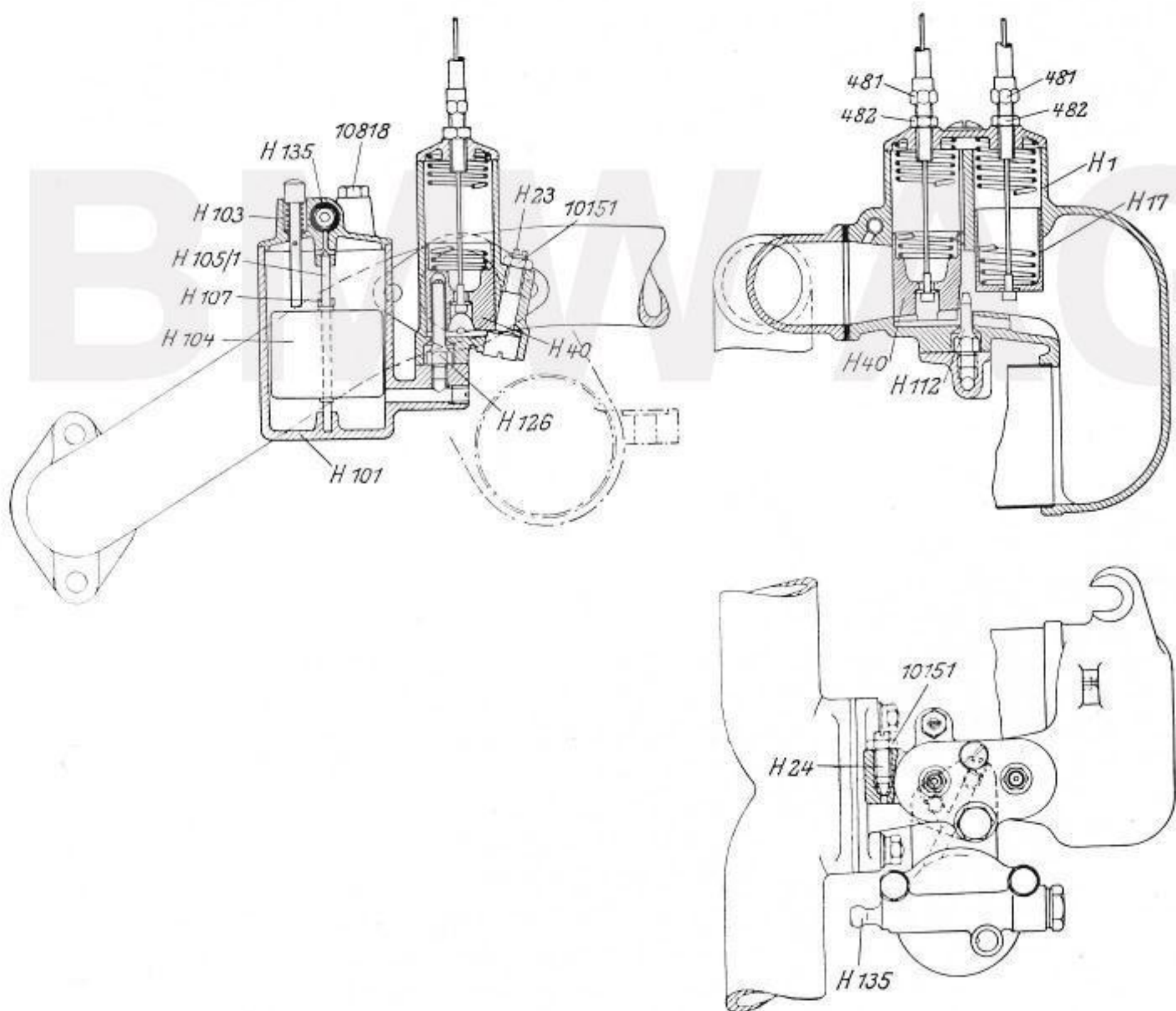


Fig. 5. BMW Carburetter with Float Chamber

the valve needle H 105/1 and maintains the fuel entering at H 135 at constant level, i. e. a few millimeters under the orifice of the main jet H 112.

The float is adjusted on the float spindle by means of the nut H 107. A strainer H 135 fitted in the float chamber cover H 103 retains all sediments before the fuel enters the float chamber. The fuel strainer H 135 is easily removed and should be cleaned at regular intervals with a small quantity of petrol.

In order to obtain good slow running and easy starting, the carburetter is provided with a pilot jet H 126. The slow running adjustment may further be altered to suit any grade of fuel by merely turning the adjusting screw H 23 to modify the air valve lift H 24, regulating the compensating air.

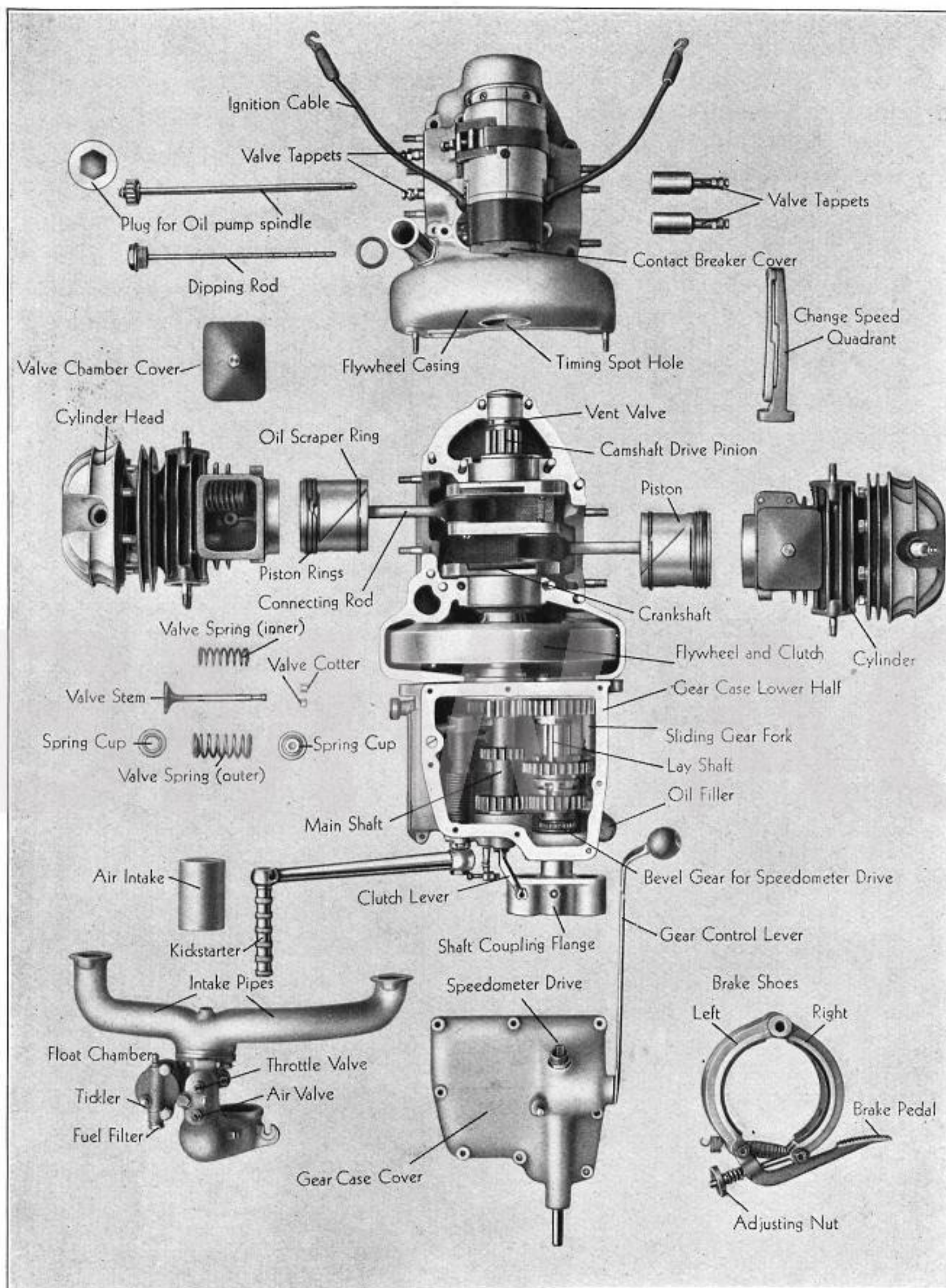
Every jet is stamped with the diameter of the bore in hundredths of a millimeter. The carburetter is fitted with jets suitable for the usual fuels on the market, but for special purposes bigger and smaller jets will be supplied on request.

The gauged diameter of the jets may never be enlarged or reduced. Should a jet be clogged, it is only necessary to unscrew bolt No. 10818 and to remove the float chamber. The jets may then be taken out of the carburetter and cleaned by blowing through them. On no account should sharp tools be used for this purpose, as they would only increase the diameter of the bore and impair the fuel economy of the engine.

The combustion mixture is regulated by the throttle-valve H 40 and the necessary air is admitted by the air valve H 17. For slow running an extremely small hole is arranged in the bottom of the throttle valve H 40. This provides a narrow passage just above the pilot jet, when the throttle itself is fully closed. Through this channel the engine draws the necessary combustion mixture required for slow running or "ticking over".

To obtain correct slow running adjustment, first unscrew the locknut 10151, then adjust the throttle valve H 40 by carefully turning the adjusting screw H 23 a little way up or down, as the case may be. Do not forget to tighten the locknut again after the adjustment has been made. The correct strength of the idling mixture is obtained by adjusting the screw H 24, after previously loosening its locknut 10151. When doing this, the ignition should be fully retarded and the air valve fully open. After this adjustment has been made, the locknut 10151 should also be screwed down firmly.

Care should be taken to see that the Bowden wires are correctly adjusted by means of the set screws 481 on the carburetter cover. The adjustment will be found to be correct if the valve sleeves close right down to the stop without having too much lost movement,



III. 6.

The Main Parts of the R 62 Engine.

otherwise the accuracy of the valve position will suffer. Should the adjustment of the valve sleeves have altered after fitting new Bowden wires, the position must be corrected by means of the two adjusting screws 481, first slackening the two corresponding locknuts 782 and tightening them again after correct adjustment has been effected.

Breather.

A rotary valve B 4 (Fig. 7), driven by the front end of the crank shaft, ventilates the crank case, allowing the air compressed by the return of the pistons to escape via the passage "a", which is cast integral with the crank case. In this way a slight vacuum is produced in the crank case, preventing the oil from leaking out at the joints

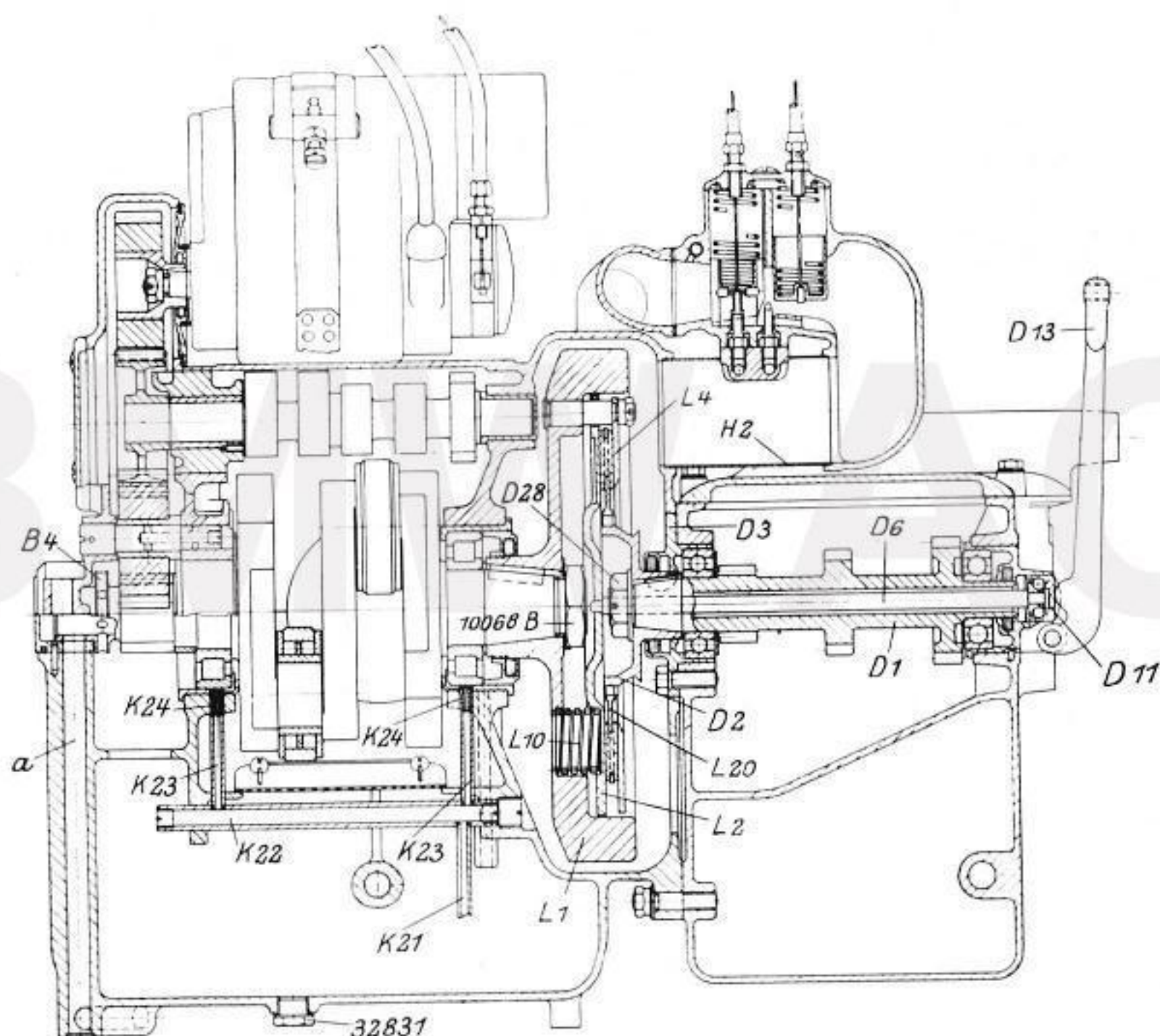


Fig. 7

Ignition.

The usual system employed for the ignition of the combustion mixture is a Bosch type magdyno, for the maintenance of which we refer to the accompanying booklet. The spark is controlled by means of the ignition lever situated on the left handle-bar (Ill. 22). In place of the magdyno a high tension magneto can be supplied on request.

Oil Pump.

The lubricating system, which is of the high pressure type, is entirely automatic and similar to that used in modern car practice. It provides sufficient oil even under the most severe riding conditions. A gear type pump is incorporated in the lowest part of the crank chamber (Fig. 8), consisting of 2 spur wheels K 4 and K 5. The latter is driven via a spindle K 6 and a worm wheel K 7 from the worm E 1 on the camshaft. These two wheels draw the oil through a strainer K 8 and deliver it via a hole in the cover K 3 to the delivery pipe K 21, whence it passes by way of the distributing pipe K 22,

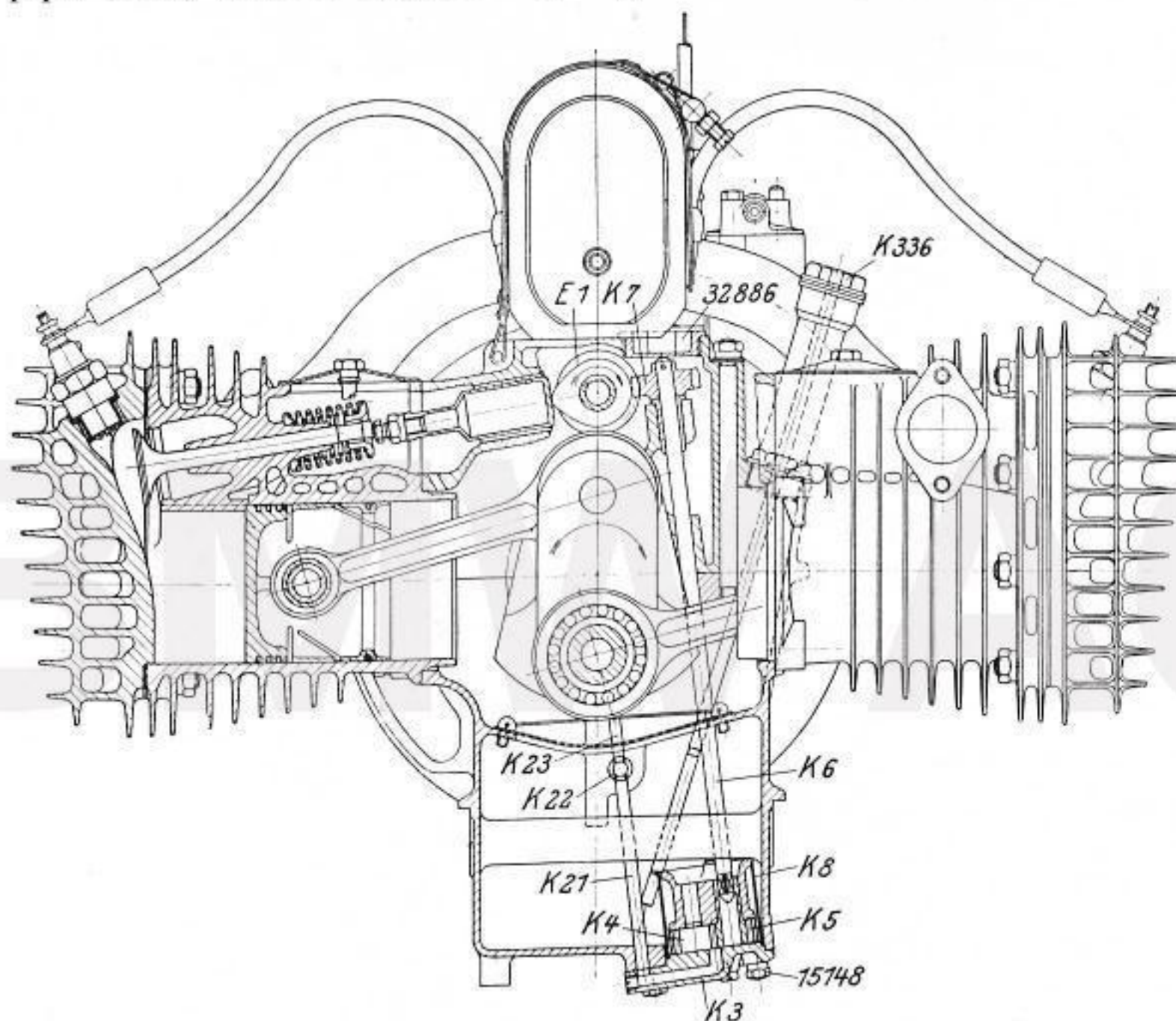
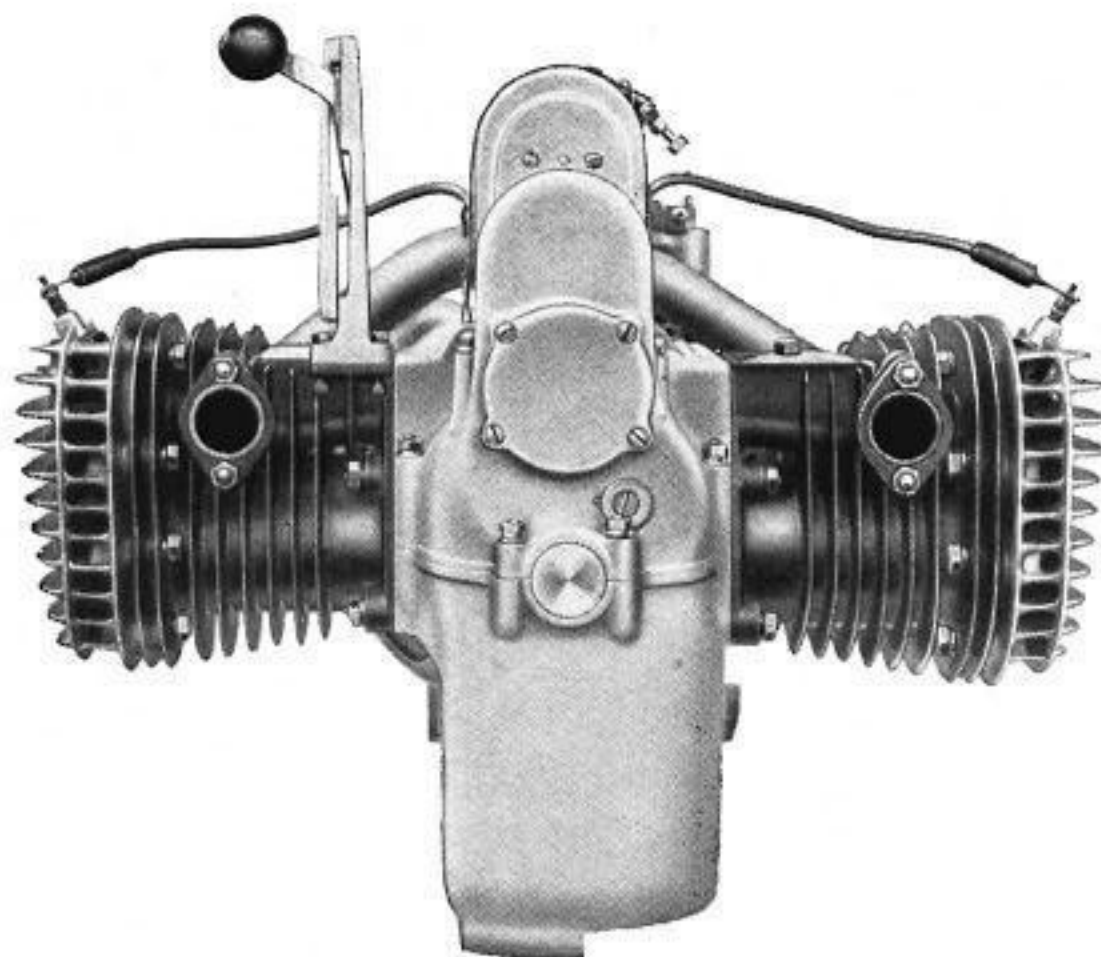


Fig. 8

the vertical pipes K 23 and the gauged oil jets K 24 (Fig. 7) to the crank shaft bearings. Through the hollow crank pins and webs and corresponding channels the oil is delivered to all the other bearings. The oil splashed by the crank shaft against the cylinder walls lubricates the pistons and gudgeon pins.

Important. Before separating the 2 crank case halves, plug 32886 should be unscrewed and the spindle K 6, together with the worm wheel K 7, removed with the help of a pair of pliers. Thereafter the two crank case halves may be taken apart.



Ill. 9. Front View of the R 62 Engine.

To control the oil level in the crank case, the lower part of which serves as an oil tank, a dipping rod K 336 with a hexagonal head is fitted in the filler on the left side of the crank case. The oil level should be flush with the upper mark on the rod, but never above it, nor should it be allowed to sink below the bottom mark. The oil should only be filled into the crank case through a funnel provided with a fine strainer. Should the oil be too thick, in winter, for instance, it must be slightly warmed before use. To drain off the oil, remove plug 32831 at the bottom of crank case.

Clutch.

The control lever for the clutch is fixed to the end of the left handle bar (Ill. 22) acting through the medium of a Bowden wire on the clutch operating lever D 13 (Ill. 7) at the gear end of the unit block. Declutching and taking the power off the gear is effected by pressing the control lever on the handle bar, thereby removing the spring cup disc L 2 from the friction plate L 15 by means of the rod D 6.

Transmission.

In Fig. 10 the principle of the BMW transmission is demonstrated in a simplified manner. A is meant to represent the clutch built into the flywheel B, and C the crank shaft which carries the pinion D for the timing gear drive. The speed gear is driven by the main shaft E, which revolves continuously when the clutch is engaged, and

the fixed pinions F, G, and H. Parallel to the main shaft is the lay shaft J on which the pinions K and L are free to rotate, meshing continually with pinions F and H, but turning at a different speed owing to the difference in size. On the lay shaft there is further the sliding pinion M which always turns with the shaft, but can slide along it. It has dogs on both sides, which may be meshed with the corresponding dogs of the pinions K and L, according to the backward or forward movement of the gear change lever N. As these pinions are continually driven by the main shaft E, they transmit their movement onto the

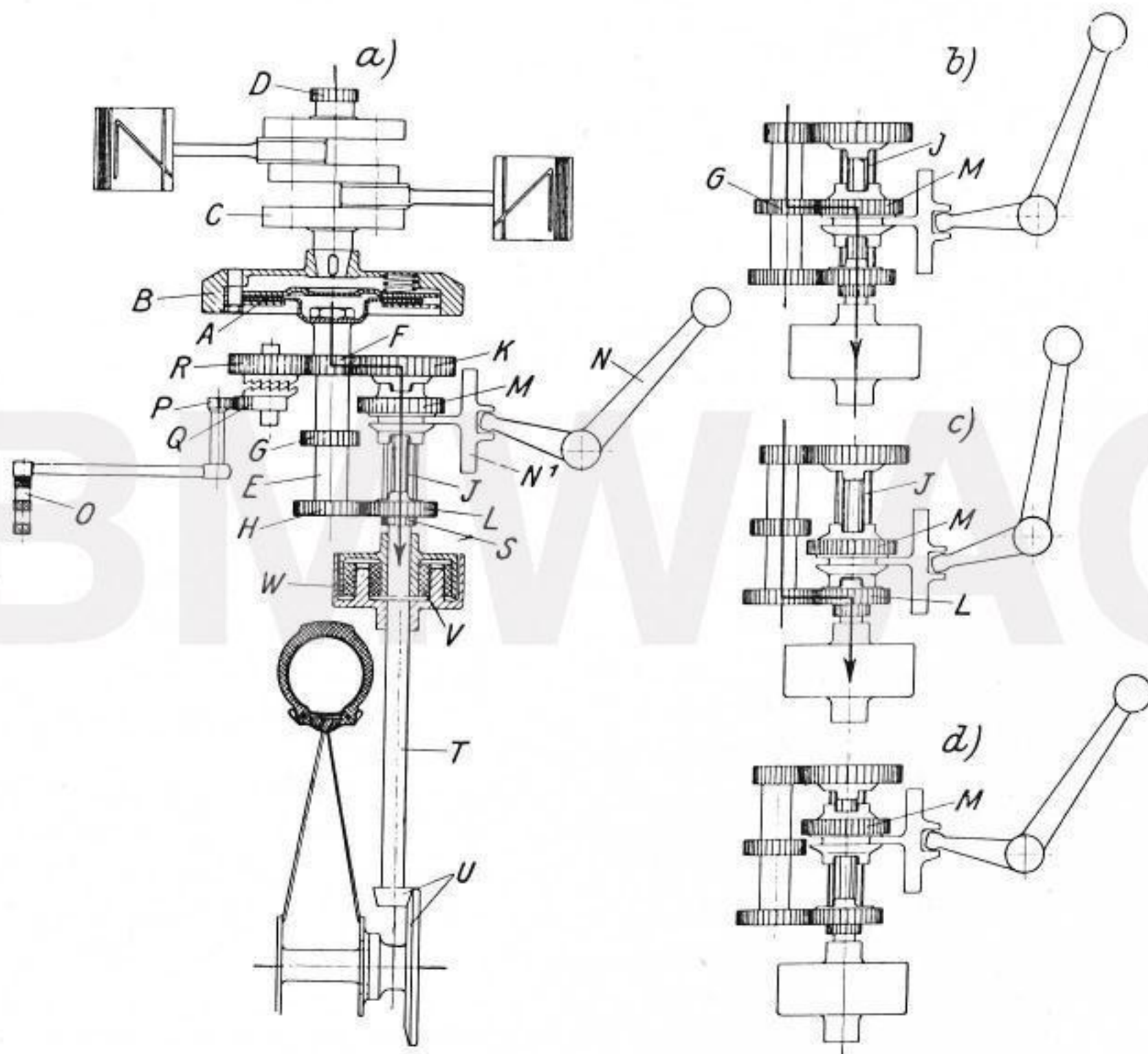


Fig. 10. The Principle of the BMW Transmission.

sliding pinion M, which in turn drives the shaft J. On changing from neutral to the first or low gear, by means of the gear lever N, and the fork piece N 1, (Fig. 10a) the dogs of the sliding pinion M engage with the dogs of the pinion K which rotates relatively slowly, driving the lay shaft J at low speed. For the second or inter-

mediate gear (Fig. 10b), the connection is made by the teeth of the sliding pinion M, and those of the pinion G, transmitting a medium speed to the lay shaft J. The third gear is the top or direct gear. This is obtained by meshing the dogs of the sliding pinion M with those of the small pinion L (Fig. 10c) turning at high speed, which is transmitted to the lay shaft J. The neutral position is depicted in Ill. 10d. In this position the sliding pinion M does not mesh with the first and the second gear pinions. The arrow in the different sketches shows the direction of the power transmission at the various speeds.

The various positions of the change-speed lever for the different speeds can be seen in Fig. 11.

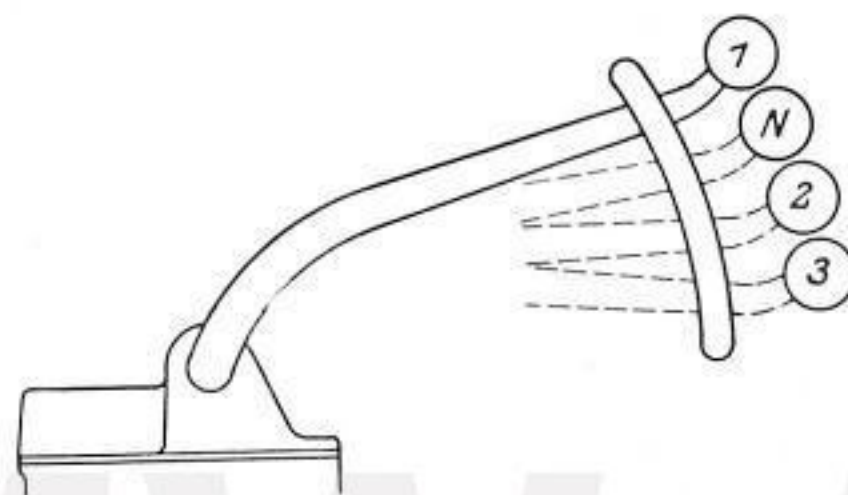


Fig. 11. The various Positions of the BMW Change-Speed Lever.

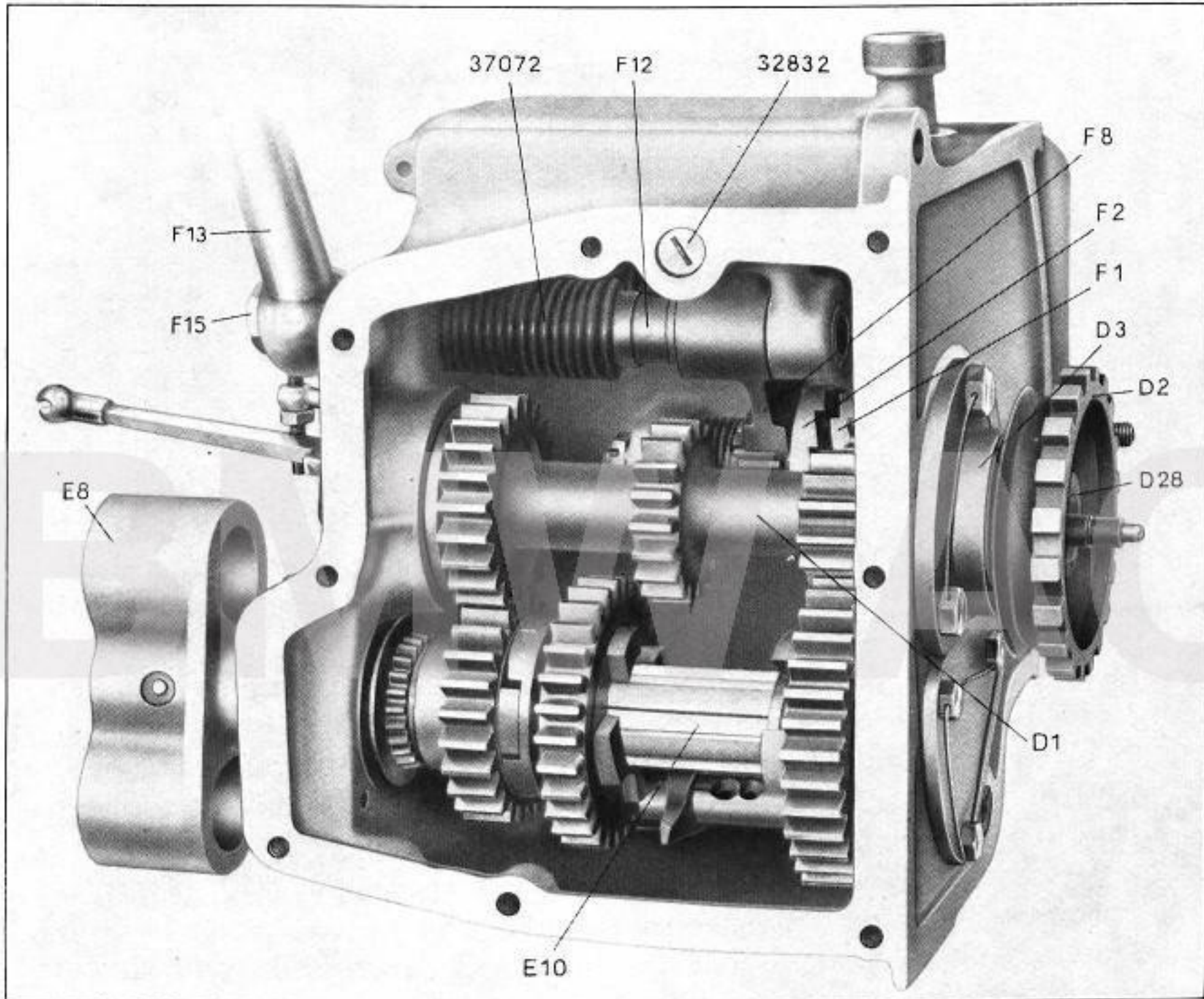
The engine is started by means of the kickstarter O, (Fig. 10) the segment P and the 2 pinions Q and R which carry the coupling dogs. By pressing the kickstarter O smartly downwards, thus driving the main shaft E and the clutch A, the engine is turned over quickly for a few revolutions and starts immediately.

The lay shaft J carries a small bevel pinion S, which drives the speedometer gear situated in the gear box cover. An oil filler is provided on the right side of the gear case in front of the foot brake drum and an oil drain plug is fitted just above the right footboard. The gear box should always be filled with the very best engine oil, almost flush with the top of the filler tube.

The rotation of the engine is transmitted by the gear box through a shaft T and a pair of silent spiral type bevel gears U to the rear wheel. The elastic shock absorber V, which is fitted between the gear box and the shaft, takes up all shocks transmitted from the rear wheel to the engine, which would otherwise be liable to damage the working parts or to cause discomfort to the rider. The main gear shaft is joined to the rear wheel drive shaft by means of a flange coupling which forms the brake drum W for the external contracting foot brake acting on the drive shaft.

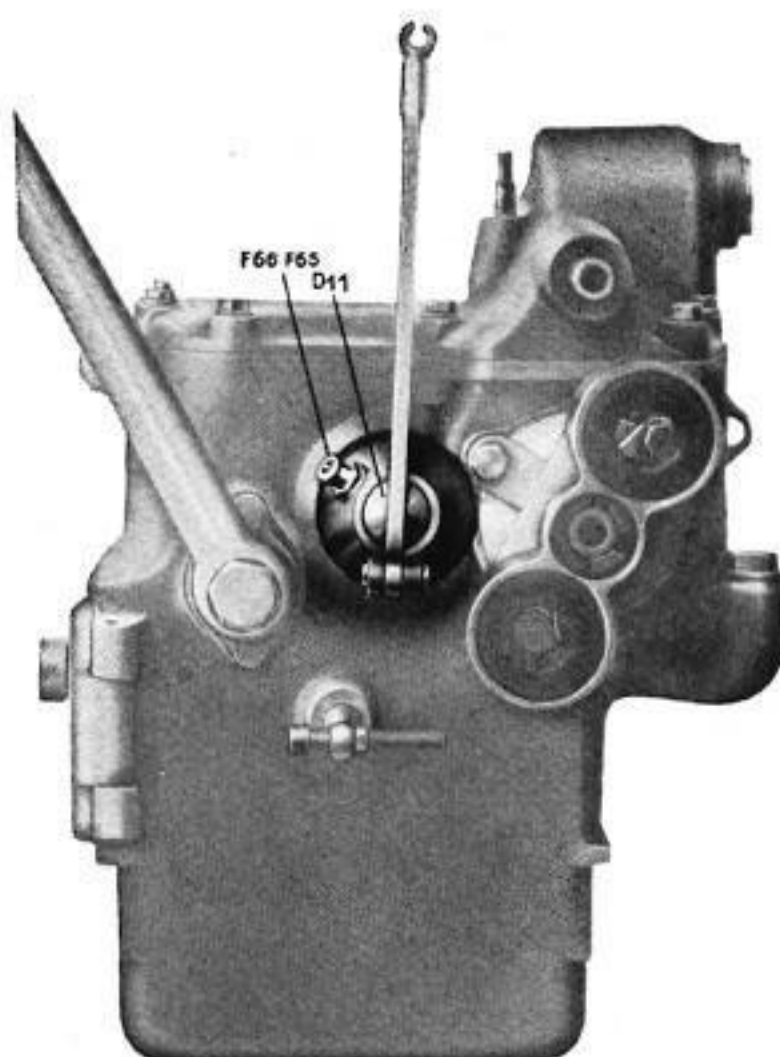
Lubrication.

Immediately after completion of a longer trip, particularly in wet weather, the lubricators should be provided with fresh grease, using the high pressure grease gun supplied with every machine for this purpose. This gun must be filled with the best grade of lubricating grease. The periods and mileage after which these lubricators and other parts should be lubricated, are indicated in the lubrication chart facing page 18.



Ill. 12. The R 62 Gear Box.

The space behind the pressure button D 11 of the clutch (Ill. 13) must be lubricated with the help of a grease gun every 1200 miles, so that the balls, the cone and the pressure button always have sufficient lubrication. The gun is applied to the nipple F 66/F 65 and given only one turn, as too much lubricant would make the clutch slip. The gear is filled with the same grade of oil as is used for the engine. The oil is filled in after removing the filler cap, the oil level being flush with the lower threads of this orifice. With new motor



Ill. 13. Lubrication of Clutch Mechanism.

cycles it is advisable to drain off the oil after the running-in period i. e. after 600 miles (1000 km), replenishing with clean, fresh oil. Thereafter, the oil level in the gear case should be controlled after every 600 to 1200 miles (1000 to 2000 km) and, if necessary, replenished. Under normal conditions the oil supply in the gear box should last about 6000 miles (10000 km).

The oil contained in the rear wheel bevel gear casing (Ill. 14) should be replenished after every 600 miles (1000 km) approximately. This is done by removing the plug 573 A on the bevel gear casing 561 B. At every annual overhaul this oil should be drained off entirely and replaced by fresh oil; to do so, remove the cover 562 of the bevel gear case, washing the inside of the casing thoroughly with plenty of paraffin. After replacing the cover and tightening up the corresponding nuts, the casing should be filled with engine oil again almost flush with the top of the filler hole.

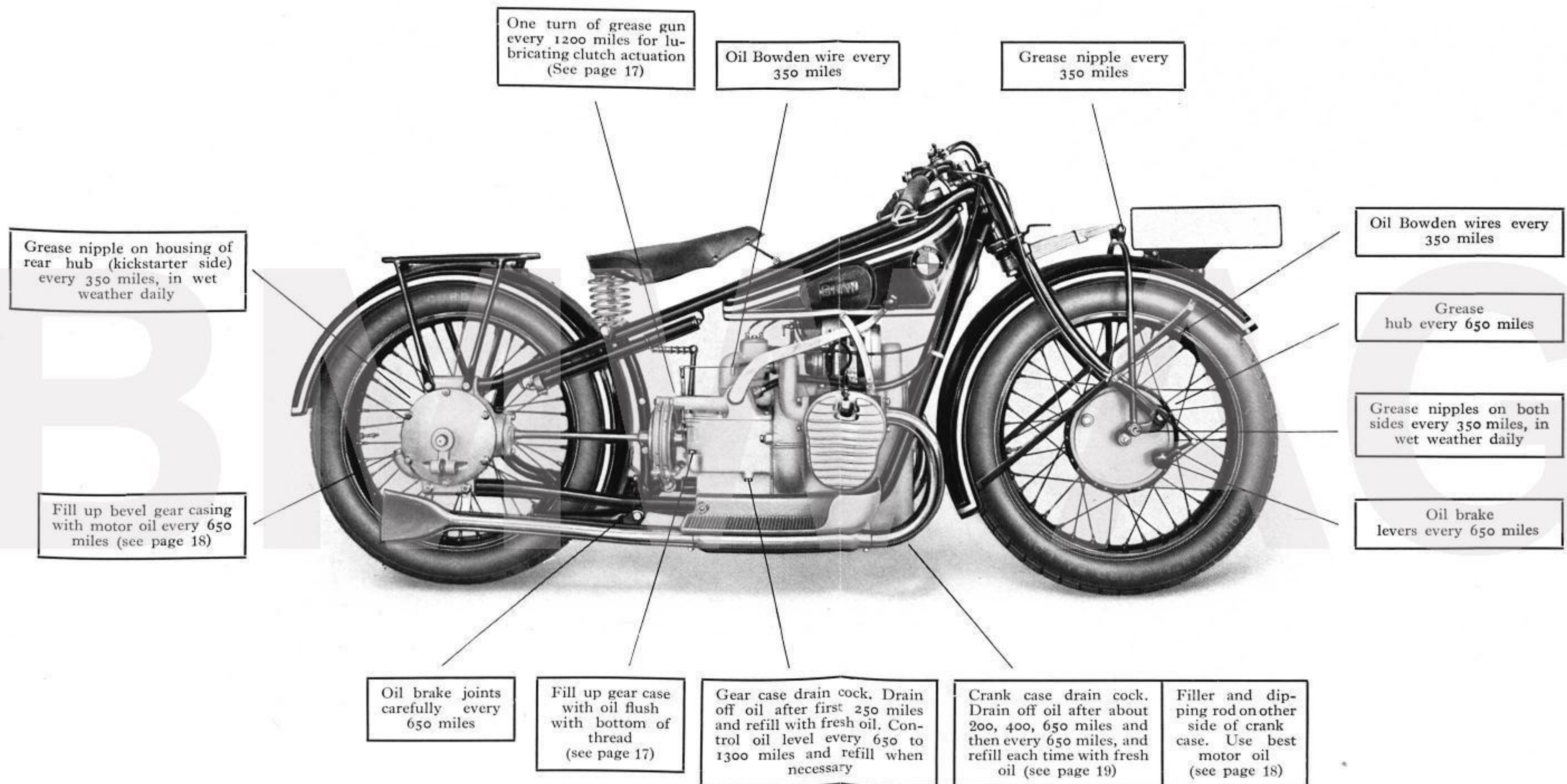
The Bowden wires of all control levers should be carefully lubricated with grease or oil. This is particularly important when fitting new wires.

It is advisable to subject the motor cycle and the engine to a thorough inspection at least once a year. At this opportunity all bearings and lubricators should be filled with new grease, not forgetting the thrust bearings of the front fork in the steering head.

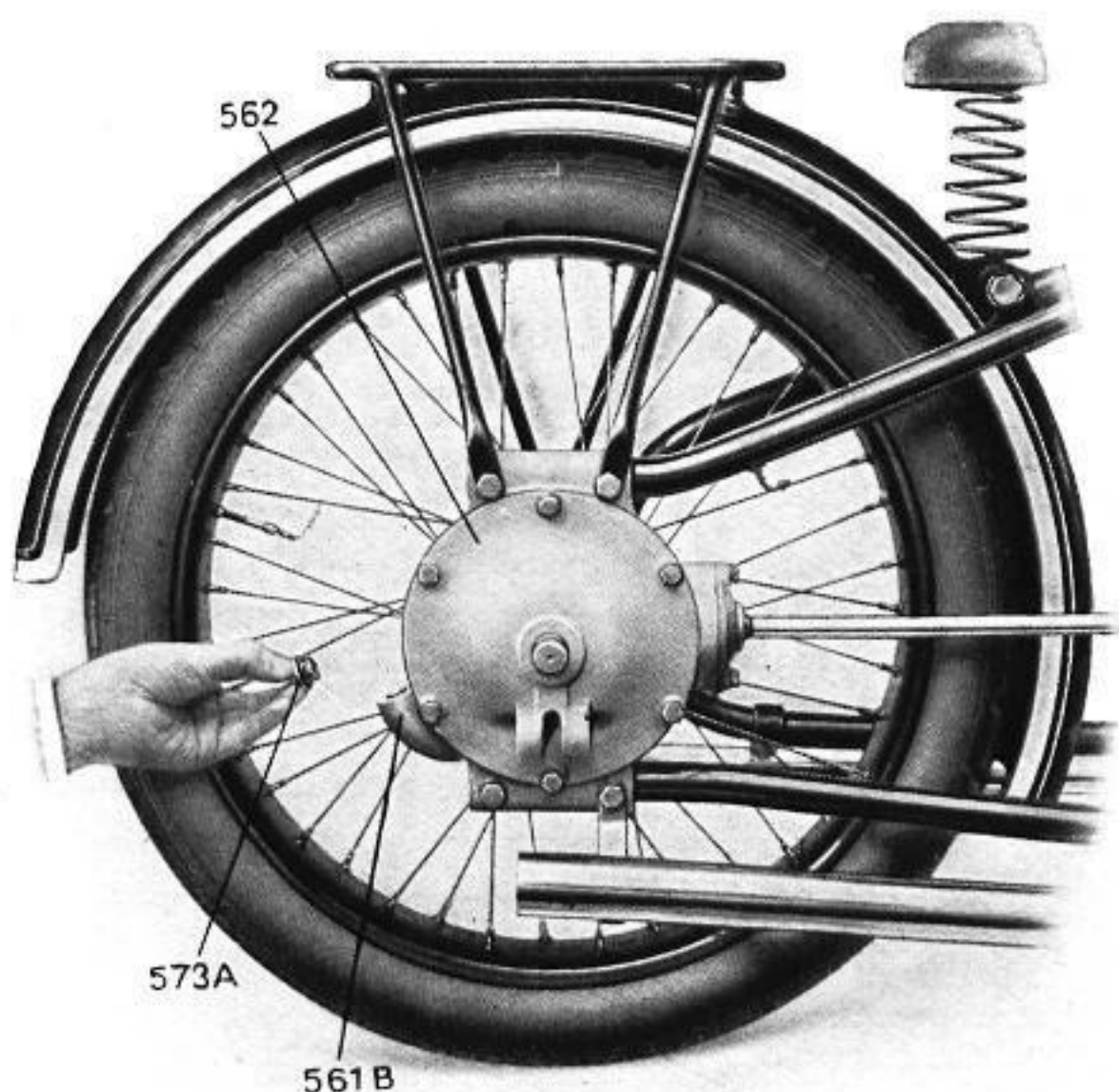
Only perfect mineral oil should be used for lubricating the engine. The oil employed in winter should be thinner than that used in summer,

Lubrication Chart.

BMW AG



The BMW Touring Model, Type R 62, seen from Transmission Side.



Ill. 14.

as the viscosity increases with the cold. When using Gargoyle Mobil Oil, for instance, grade B and D should be used in summer and grade TT in winter.

For racing purposes, oils containing one third castor oil may also be used for lubricating the engine. However, the use of castor oil should be limited to racing events only, as it has a tendency to form carbon deposits on the pistons etc.

Particular care should be taken, when filling oil into the crank case, to prevent impurities and sediments from entering the oil jets and clogging them. The filling funnel must be provided with a fine gauze strainer, the oil being filled to the upper mark of the dipping rod. **After about 150, 300 and 600 miles (250, 500 and 1000 km) and thereafter on completion of every 600 miles (1000 km) all the oil should be drained off from the crank case and replaced by fresh oil (also see lubrication chart, Page 18).**

To drain off the old oil remove the drain plug 32831 (Fig. 7) at the bottom of the crank case.

After draining off the oil, and before filling in fresh lubricant, it is advisable to wash the crank case thoroughly with paraffin. The oil leads should then be rinsed with about half a pint of clean oil, taking care to see that all the paraffin is removed. The cleaning oil must also be drained off before the crank case is replenished.

As already mentioned, only very good vaseline grease should be pressed into the lubricators, particular care being taken to see that this grease contains no water.

General Maintenance Hints.

Fuel.

As regards fuel, the best results are obtained with an equal mixture of petrol and benzole. Should the engine be inclined to knock when using the ordinary commercial petrol, it is advisable to add about $\frac{1}{3}$ to $\frac{1}{2}$ benzole. Furthermore, as soon as the engine starts knocking, the spark should be retarded until the knocking stops. When full engine power is needed, as for instance on long gradients or for fast touring work with side-car and in races, the usual commercial petrol should always be mixed with $\frac{1}{3}$ to $\frac{1}{2}$ benzole, as otherwise hot spot ignition will take place, which naturally influences the output of the engine.

Only spark plugs made by well known manufacturers should be employed; these plugs should not give rise to self-ignition (hot-spot ignition) even when the engine is subjected to the very heaviest duty. This may be controlled by cutting out the ignition with the short-circuiting button, whereupon the engine should stop immediately.

The short circuiting button may only be used for stopping the engine in case of emergency. Generally, the engine speed should simply be controlled by the gas lever, unnecessary explosions in the silencer thus being avoided.

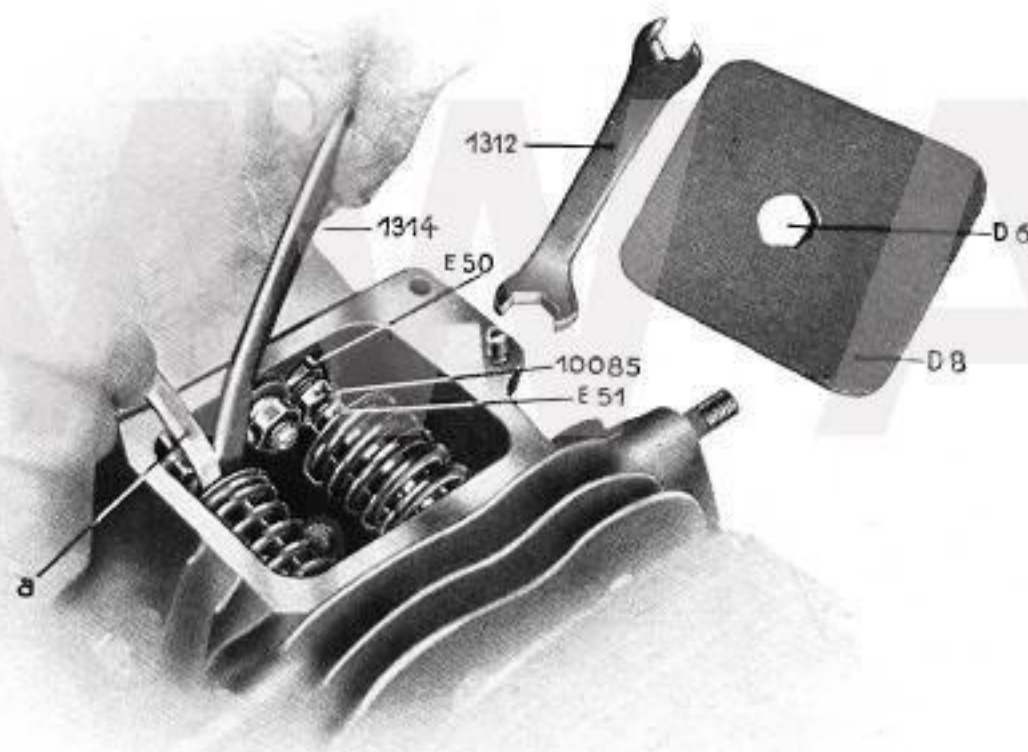
The air lever should be opened as soon as the engine has warmed up after starting, and should also be fully open when the engine is idling. On the other hand, when changing from town speed to faster speed, or if a quick get-off or special acceleration is required, the air lever may be half closed temporarily. This is only done in the aforesaid instances and applies solely to correctly and economically adjusted mounts. In all new machines, the carburetter should often be cleaned, removing the fuel strainer, jets, float chamber and float needle when doing so. This little attention will give a steady and sufficient supply of petrol, ensuring correct atomizing of the fuel. It is particularly important to clean the float needle, as any obstruction at this point would make the needle stick and the fuel overflow. Smooth and regular slow running or idling can only be obtained if the engine is run on a fully retarded spark. As soon as the engine is stopped the fuel tap should be closed.

In the beginning, all nuts and bolts should be controlled and tightened up at short intervals. This is very advisable when examining **wheel spindles, cylinder heads and intake pipes**. Besides this,

on all new machines the taper roller bearings of the front wheel spindle should often be examined and adjusted. Do so by tightening the two adjusting nuts situated on the left side of the spindle, using the correct key.

Brake Adjustment.

At this point we wish to draw the attention of riders to the fact that even the best brake needs a certain amount of conscientious attention. Specially oily brake linings are a frequent cause of brake trouble. The adjustment of the rear wheel brake may be made by means of the adjusting nut mounted on the brake pedal (Ill. 6); however, this is rarely required. The adjustment of the front wheel brake may, to a certain extent, be effected by tightening the adjusting screw No. 480 (Ill. 20) on the right fork girder. More important adjustments are made by loosening the clamping bolt No. 345 of the small brake lever No. 342 on the front part of the brake drum. When renewing the brake linings the front wheel must be detached and the brake cover 327 removed.



Ill. 15. Valve Adjustment.

Valve Adjustment.

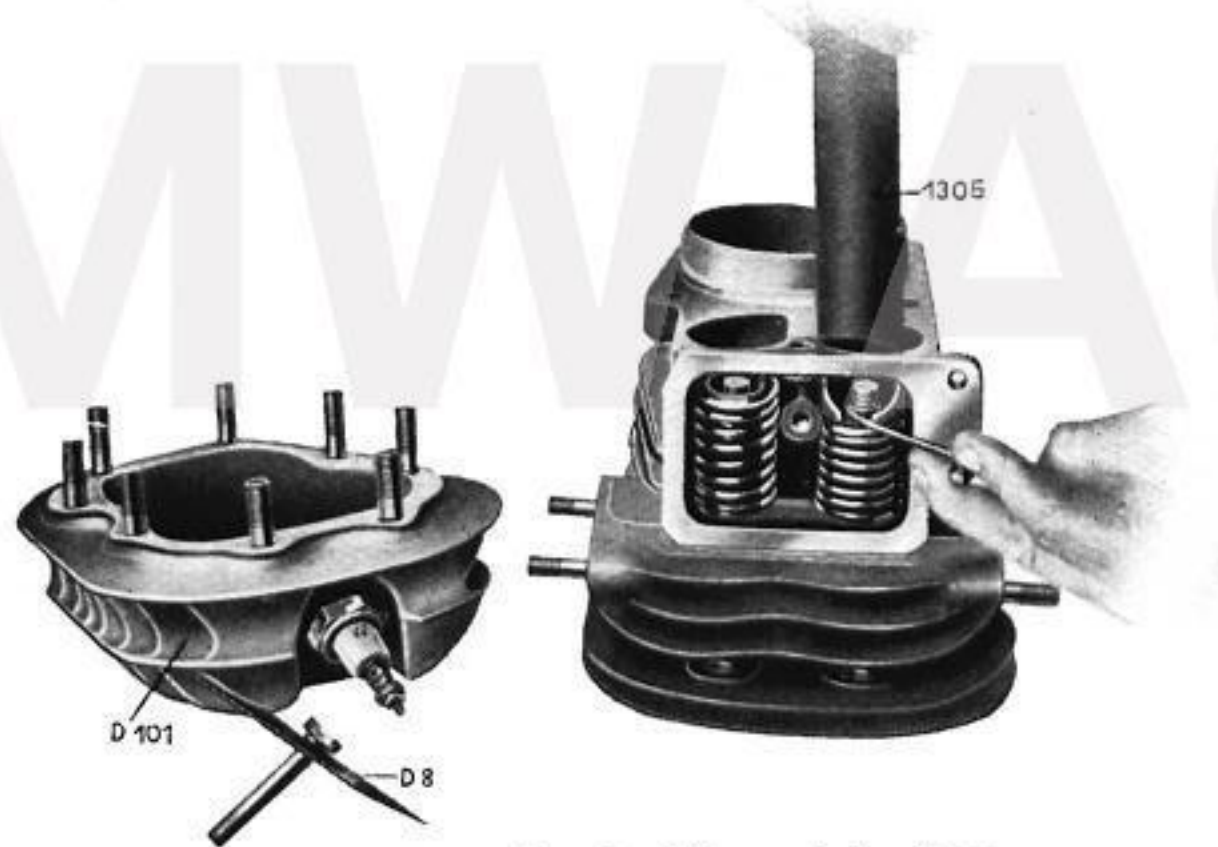
It will further be necessary to examine the valve play from time to time, as indicated in Fig. 15 and described hereunder.

On loosening the hexagonal bolt D 6 which is fixed to the cover D 8, the small chamber in which the valves and tappets are situated will be accessible with the aid of key 1312, supplied in the tool kit. Hold the tappet tightly, and unscrew the lock nut 10085 on the tappet with the second key 1314. The push bolt in the tappet E 51 may then

be adjusted until the play between the latter and the valve shaft end is about .1 mm. This play corresponds approximately to the thickness of a sheet of writing paper, which should slip without difficulty between the valve shaft end and the push bolt E 51. As soon as this play is correctly set, the lock nut 10085 must be tightened up again and the valve housing closed with cover D 8. Before adjusting the valves, care should be taken to see that the tappet is resting on the base circle of the cam, and not on the up or down cam curve. This is easily tested by turning the crank shaft a short way backwards and forwards, on doing which the tappet may not lift or return.

Regrinding Valves.

The valves should also be examined after about 1800 to 3000 miles (3000 to 5000 km), or earlier, if trouble is experienced, to see that the seat is still correct. The valve faces and the valve seats must be perfectly smooth and should close tightly. Carbon and similar deposits are easily removed by turning the valve on its seat several times,



Ill. 16. Removing the Valves of the R 62

taking hold of the valve shaft when doing so. Should this not be sufficient, the valve must be reground, removing it and proceeding as described below.

First remove the induction and exhaust pipes and the valve housing cover D 8 (Ill. 16) then carefully withdraw the cylinder from the crank case, after unscrewing the holding-down nuts. To remove the cylinder head D 101, unscrew the 8 fixing nuts. Then place the cylinder with the valves on a solid support (a block of hard wood). Take key No. 1305 which is supplied with the tool kit, and press down the valve

cups until the keys in the upper part of the valve shafts are free; after removing these keys with a wire hook, the valve may easily be withdrawn. For grinding the valve, spread a mixture of very fine emery powder and oil on the seat, and after replacing the valve, turn the shaft to and fro, alternately releasing and pressing on it when doing so. Continue this movement until the head and the seat are sufficiently ground to ensure an exact fit. Then grind once more with a little clear oil, and replace the valve, after having removed every vestige of grinding paste from the valve itself, the valve housing, and the cylinder. Reassemble in the reverse order.

The gas-tight fit of the valve is controlled by pouring a small quantity of petrol into the valve housing. A proper gas-tight fit should not allow any petrol to pass into the cylinder. After having replaced the cylinder, the valve play must once more be adjusted (see page 22). Care should also be taken to see that the joints of the intake pipe and those between the cylinder and the head are perfectly tight, as the engine would otherwise draw too much air through these cracks, causing explosions in the intake pipe and carburetter and causing loss of power.

The bolts of the cylinder heads should always be tightened up once or twice during the first 300 miles (500 km) in the order shown in the following sketch (Fig. 17).

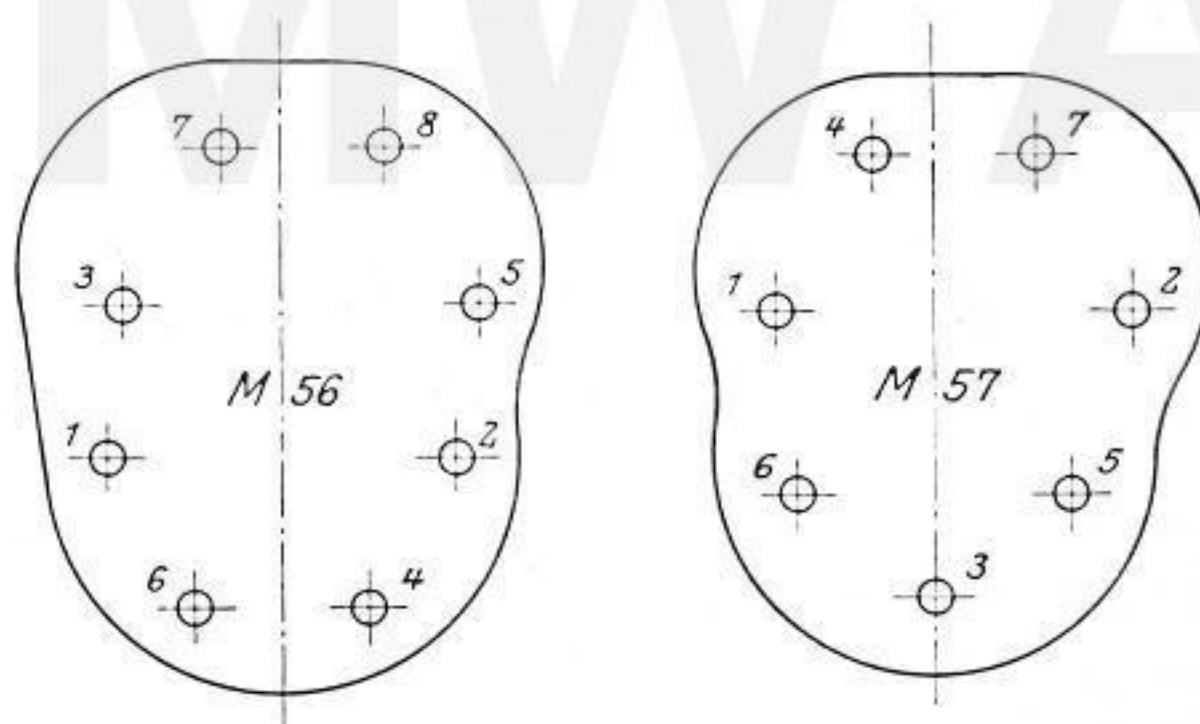
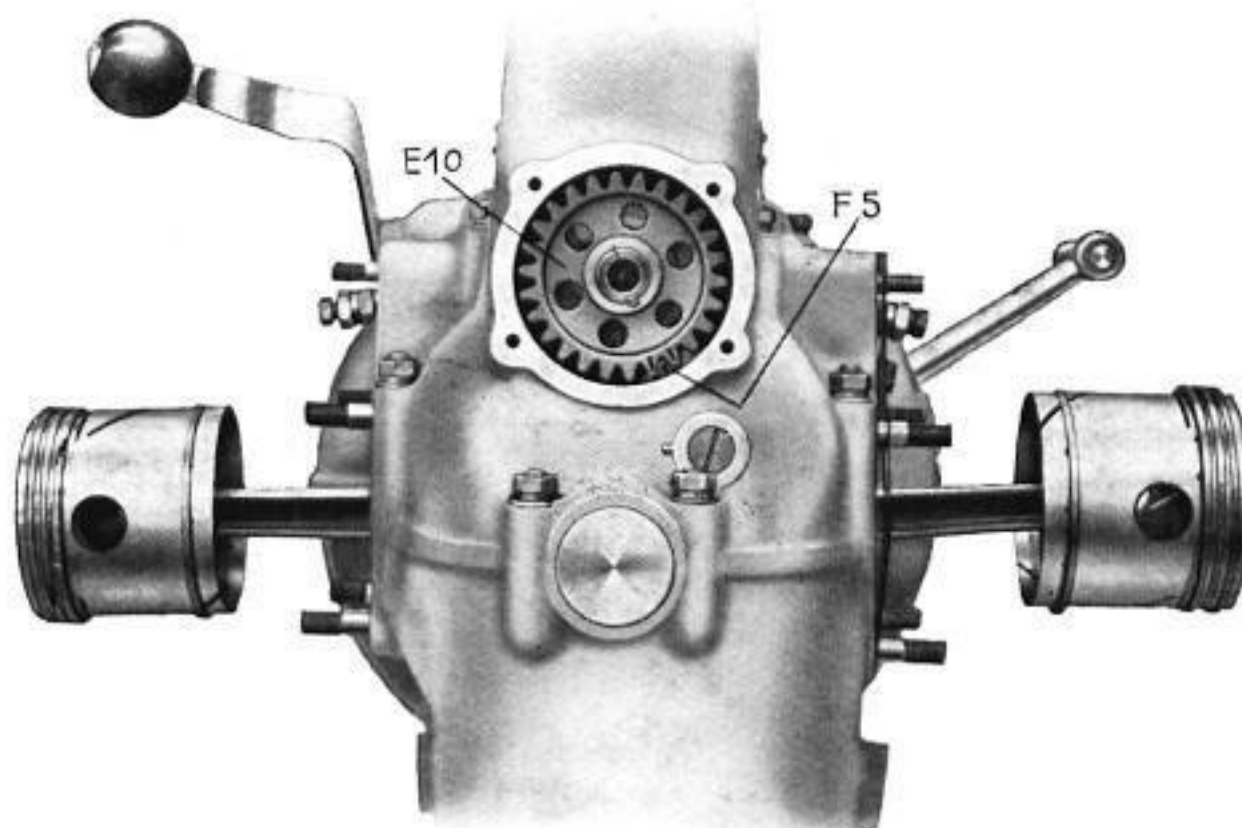


Fig. 17.

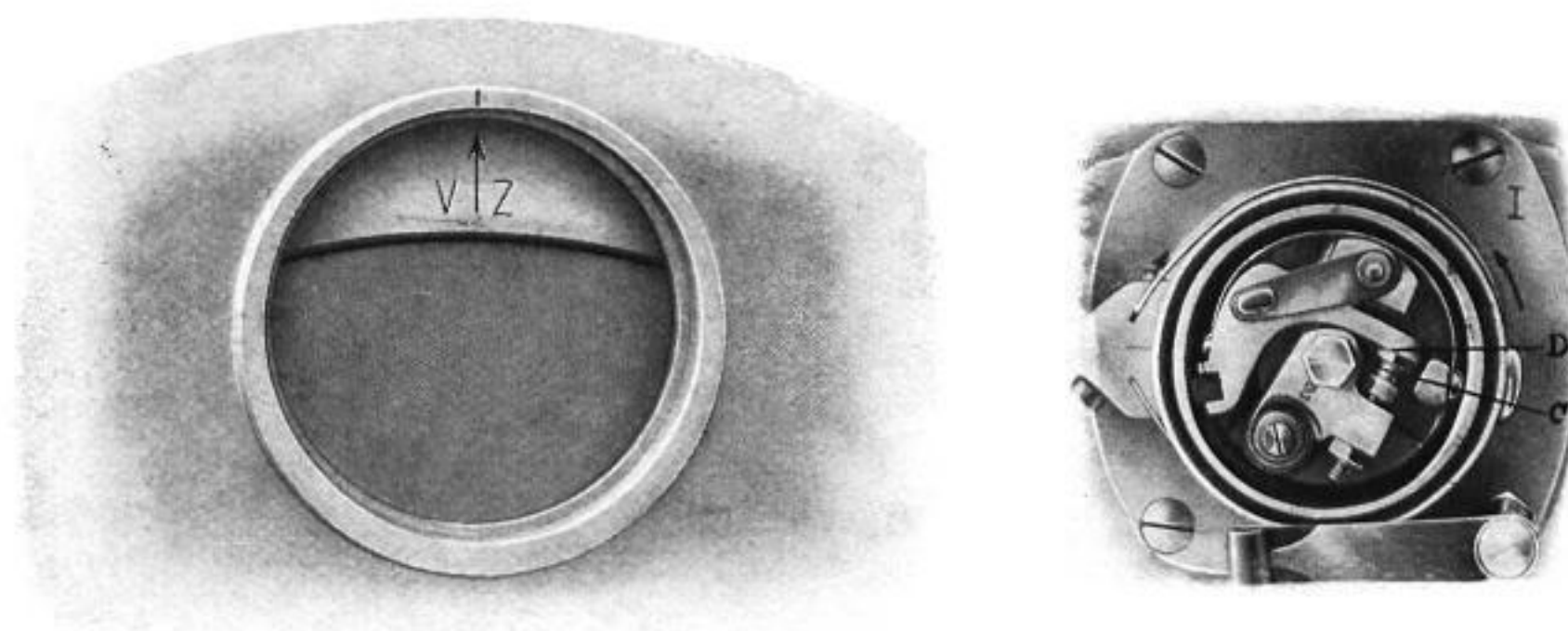
Should it be necessary to remove the crank shaft for any particular reason, care must be taken on replacing it that the marked tooth of the intermediary gear wheel F 5 (Ill. 18) meshes with the marked teeth of wheel E 10 on the camshaft, as this is the only correct position of the gears to ensure exact valve timing. The adjustment should be made when the pistons are at their upper dead centre (Fig. 18).



Ill. 18

Timing.

On replacing the magdyno or the magneto, take care that, after the breaker cover (Ill. 19) has been removed, the apparatus is set to the pre-ignition position i. e. 9 to 12 mm of piston stroke from the upper dead centre, the lever of the contact breaker pointing downwards. The interruptor should be adjusted to a point just before breaking contact i. e. the platinum contact of the lever D should just be beginning to separate from the fixed contact C. After having previously removed the carburetter and float, together with the intake pipes, from the gear case cover, turn the engine by means of the kickstarter or the shaft coupling until the marks "O. T." (upper dead



Ill. 19.

centre) or "V. Z." (advance) appear on the flywheel and align with the mark on the inspection hole of the crank chamber (Ill. 19). The right cylinder, viewed from the rear wheel, should, in this case, be in the compression stroke position (both valves closed). Then mesh the gear wheel of the magdyno with the pinion of the camshaft, taking care that the mark "V Z" appears in the inspection hole simultaneously with the opening of the breaker contact.

The fuel strainer in the float chamber should be removed and cleaned after, say, every 1200 miles (2000 km). On this occasion the valve needle should also be examined. To do so, remove the cover of the float chamber and rinse it thoroughly, removing all sediments accumulated at the bottom with a little petrol. Examine the fuel pipe leading from the fuel tank to the float chamber at the same time and remove all sediments and dirt.

The kickstarter lever is provided with serrated teeth to permit any desired adjustment on the kickstarter shaft.

Tyres.

Tyres should be examined before every ride. We recommend testing the tyre pressure by means of a suitable gauge which should show the following pressures: Low pressure tyres, front wheel 1.5—1.75 atm (or 21—25 lbs. per sq. in.) rear wheel 1.75—2 atm (or 25—28 lbs. per sq. in.).

The following instructions should be strictly observed when fitting wired-on tyres on well-base rims. The patent rim lining should first be placed on the base of the rim, taking care to place the hole in the lining exactly on the air valve aperture in the rim. At this point the lining is rather thin, whereas on the opposite side it is thick enough to be on a level with the curved recess into which the wire fits, providing a perfectly smooth surface. The inner tube may then be inflated with a little air and placed inside the cover. Thereafter, the air valve should be pushed through the hole in the rim, and the valve nut screwed on a few turns. The air valve is then pushed back as far as the nut, and one of the wires in the cover is pushed down to the lowest point of the rim base near the valve hole. The wire on the opposite side is then levered onto the rim. The first wire being inside the rim, it will be possible to begin fitting the opposite wire. This is done by pressing it down to the lowest point of the base and lifting the other side opposite the valve onto the rim, similar to what was done when fitting the first wire. Both wires will now be inside the rim. Dismantling is done in the reverse order:

- 1) open valve and let air escape,
- 2) push wires from their seats on both sides,
- 3) unscrew nut and push back air valve as far as possible.

Then press one wire down at the lowest part of the rim base near the valve and lift the same wire out of the rim on the opposite side. This wire will then be outside the rim on the whole circumference and the inner tube may easily be removed. When lifting out the second wire proceed as before. In order to prevent the inner tube from slipping in the rim and to ensure a good seat of the tyre, care should be taken that the air pressure indicated above is maintained. On the other hand, too much pressure should also be avoided, as it will only damage the tyre and impair its shock absorbing efficiency.

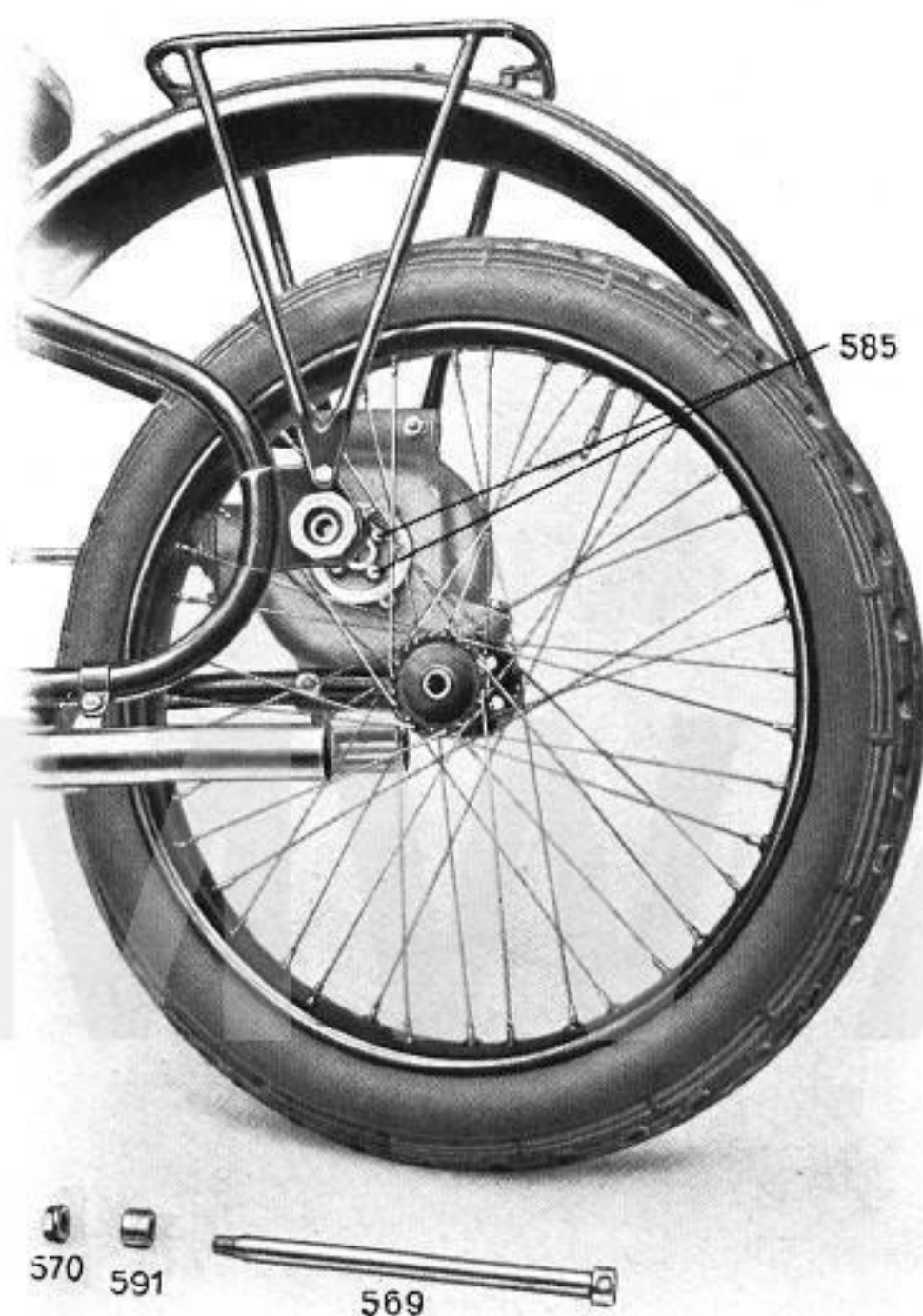
Removing front Wheel.

To detach the front wheel, tilt the machine sideways on one of the foot-boards, or set it on the front stand. Use a pair of pliers to withdraw the end of the Bowden wire from the slotted pin 348 fitted in the small brake lever 342 until the latter is absolutely free. The pin 348 may then be withdrawn and after having removed the two spindle nuts 370 and lock washers 316, the wheel may be pulled out (Ill. 20). When refitting the front wheel, particular care should be taken to begin by tightening up the right spindle nut 317 (see Ill. 20),



III. 20

adjusting the roller bearing before tightening the left spindle nut 317. The left roller bearing is adjustable, the adjustment being made by means of the two nuts on the spindle between the hub and the links, using key No. 1311 supplied with every machine. The inner nut makes the necessary adjustment, whereas the outer nut serves as a locknut for its fellow.



Ill. 21.

Removing rear Wheel.

The removal of the rear wheel, a very disagreeable job with most other motorcycles, is child's play with the BMW machine. The machine is merely set on the rear stand, and the spindle 569 is readily withdrawn after previously unscrewing the locknut 570 and the distance piece 591 between the left side of the hub and the frame. The wheel must then be disengaged from the driving dogs 585, and falls to the ground. After this, the machine should be tilted over to the right and the wheel removed from under the mud guard and out of the frame as shown in Ill. 21. This job takes just about one minute.

Driving Instructions.

Controls.

All control levers are fitted on the handle bars (Fig. 22) except the gear change lever, which is situated on the right side of the machine just below the tank. On the right handle-bar are fitted the gas and air control, the inverted lever for the front wheel brake, and a small lever for dimming the headlamp. This latter is combined with a push button for the horn. On the left handle-bar are the spark control and the inverted clutch lever, as well as a push button for short-circuiting the ignition. Besides these controls on the handle-bars, there is a foot pedal for the transmission brake acting on the shock absorber drum just behind the right foot board.

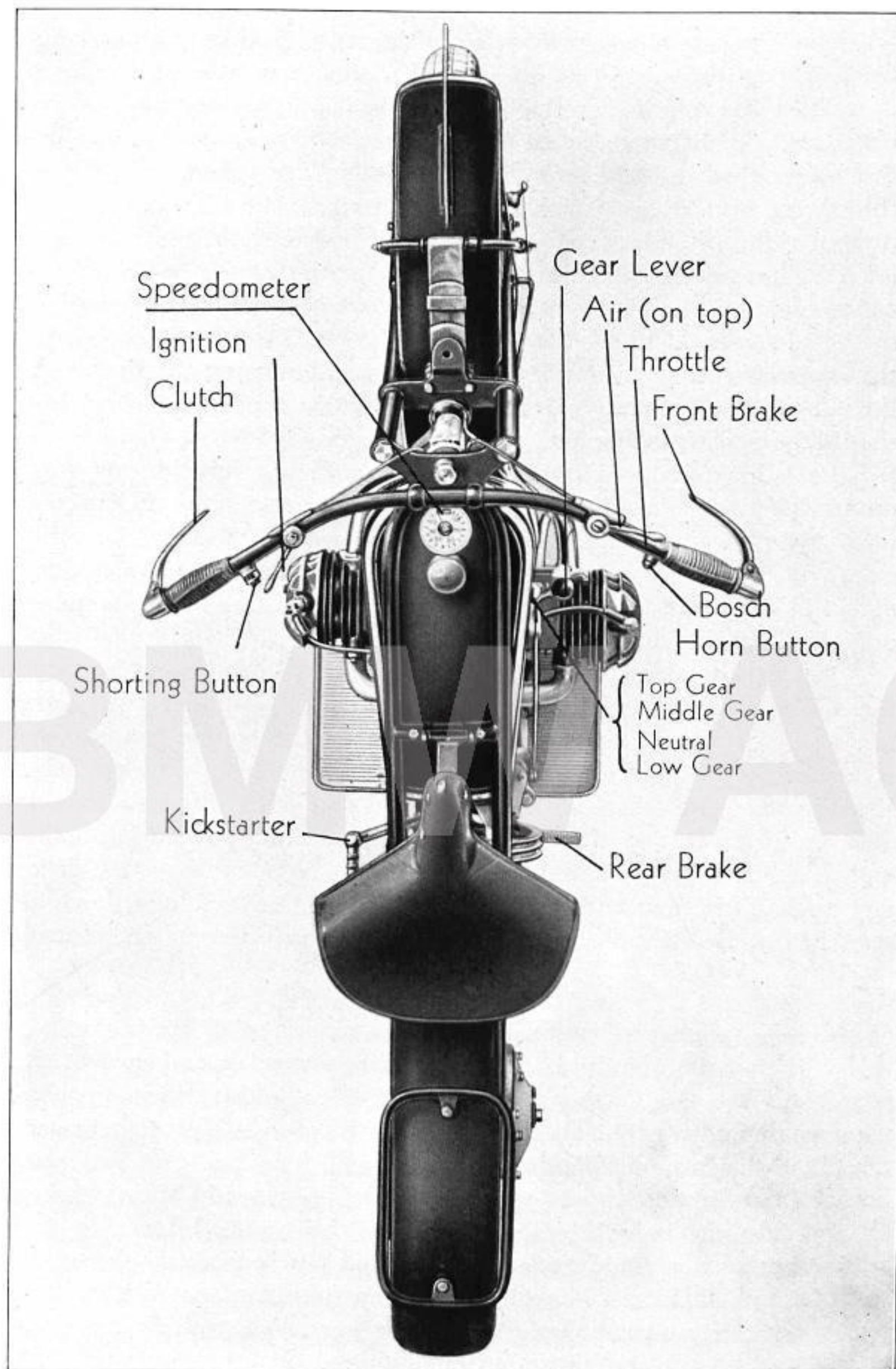
With the exception of the foot brake and the gear change, all controls are actuated by levers and Bowden wires acting directly on the respective parts. Correct use of all controls is of the utmost importance, as the power developed by the engine and its economical working depend to a very considerable extent on the care with which the levers are handled.

Levers and their proper use.

The throttle lever acts on the throttle valve sleeve of the carburettor, while the air lever actuates the corresponding air valve. The air lever (upper lever) may generally be closed when starting the engine, but as soon as the latter has made a few revolutions, it should immediately be opened half way, as the engine would otherwise obtain too rich a mixture. When idling, the throttle should be closed altogether.

When riding full speed on level roads the air lever should be opened as far as regular running of the engine will permit, advancing the spark accordingly. On the other hand, on climbing hills, a richer mixture is necessary and is obtained by pushing back the air lever. Should the engine knock, particularly on gradients, the trouble may easily be remedied by retarding the spark. If the knocking does not disappear it may be possible that the fuel used is not suitable for air cooled engines, and about 50% benzole should then be added. It may finally also happen that too much carbon has deposited in the cylinder, causing self-ignition and over-heating. In this case the cylinder heads should be removed, and the carbon deposits scraped off. This should be done about every 3000 miles (5000 km).

The attention of riders is particularly drawn to the fact that not every kind of sparking plug is suitable for our engines. Many sparking plugs incline to self-ignition at maximum power. Such plugs may not be used for fast riding (also see page 20).



Ill. 22. The Controls on the BMW.

Braking.

The push button for short circuiting the ignition, besides being used to stop the engine at the end of a trip, may also be employed to reduce the speed rapidly, i. e. when taking curves or avoiding obstacles. Furthermore, when some sudden danger arises, the machine can be stopped quickly, even at a relatively high speed, by pressing this push button and operating both brakes simultaneously. For normal riding, however, the speed should only be reduced and regulated by means of the throttle lever, using the clutch lever only as occasion requires. If these instructions are followed, all explosions in the silencer will be avoided, which, of course, is not the case when the short circuiting button is used. The instructions on the use of the throttle and clutch are particularly important for town riding and should be strictly observed.

Both brakes are extremely effective, sufficing for side-car work on any ground. We recommend using both brakes simultaneously as far as possible in order to warrant uniform wear. On longer downhill rides, however, it is advisable to use the front and rear brake alternately in order not to overheat them both at the same time. In curves only the foot brake should be used.

When riding downhill, it is advisable to cool the engine by using the short circuiting button, thus scavenging the cylinders with cool air. This, of course, is only necessary when the engine has become somewhat overheated on a long hill. Very steep downward gradients should always be taken on the first or second gear, using the engine as a brake. In this way, i. e. with the engine acting as a strong brake, and using both brakes simultaneously, it will be possible to ride down any kind of gradient without the least danger. On very long downhill stretches, it is advisable to close the fuel tap in order to save petrol.

Gear Changing.

Gear changing always needs a little practice for beginners, but this will soon be acquired. Particular care should be taken that the gear teeth are not damaged, and the clutch should always be used when changing from one speed to another. As soon as a gear is engaged, the clutch lever should be gradually released. The first gear may only be used for starting and in very heavy traffic. Shortly after starting, change into the second gear, which may be retained for riding in streets with an average amount of traffic. By judiciously using the throttle and declutching slightly at opportune moments, a walking pace may easily be kept up on the first gear. When all is clear, the third gear should be used and maintained on the open road. On this gear and on level roads, the speed should not drop below 18 miles (30 km) per hour. When taking hills or under heavy loads, it should

not be slower than about 20 miles (35 km) per hour. Longer rides on the second gear with average engine speed will not harm either the engine or the gear. The different positions of the control rod for the various speeds can be seen in Fig. 11 (page 16).

On gradients, as already remarked, the engine should be given a richer mixture by suitably adjusting the air lever. It will then be possible, especially if it is a short climb, to take a hill on top gear; otherwise the second must be used, and on very steep hills even the first. Hills should never be forced on top gear if the engine does not take them easily. This is bad riding practice and will ultimately cause too much wear in the rotating parts. On bad ground with pot-holes, ruts, stones etc. the machine should be slowed down to a reasonable speed in order to avoid excessive shocks, which would harm both the rider and the motorcycle.

Important. When taking delivery of a machine brand new from the factory, or of a totally overhauled engine, the first 300—600 miles (500—1000 km) should only be ridden at moderate speed (not more than 30 miles (50 km) per hour), avoiding steep climbs as far as possible. This is an absolutely necessary precaution which must be observed in order to give the working parts of the engine and gears a chance to run in. Although every machine is run in before leaving the works, the actual running in process takes a much greater mileage before it is really completed, and it is consequently very important not to have the machine going at full speed before it has performed a certain number of miles.

Starting.

When preparing for a ride begin by filling fuel into the tank, placing a piece of chamois leather or silk in the filler to strain the petrol. Then fill the crank case with a good grade of oil, flush with the upper mark on the dipper rod, and finally test all nuts and bolts to see if they are screwed tight. The machine is then ready for use.

Open the fuel tap under the tank, setting it vertical, close the air lever entirely, open the throttle slightly, and then retard the ignition to avoid backfiring. After having ascertained that the control rod is in the neutral position i. e. between the 1st and 2nd gear (see Fig. 11) give the starter a few powerful kicks. As soon as the engine has started and the first explosions have taken place, the air lever should be pushed forward, just a little in advance of the throttle lever, so as to ensure regular running. With the throttle closed and the air lever open, a warm engine should run smoothly when idling or ticking over.

In order to facilitate starting the engine at low temperatures, it is advisable to "tickle" the carburetter by pressing down the tickler protruding from the float chamber cover. This will admit a small quantity of fuel into the intake pipe.

After having taken a seat in the saddle, declutch by pulling the clutch lever on the left handle bar, push the gear lever to the first gear without releasing the clutch and take hold of the right handlebar. If the first gear does not mesh, push the machine a little backwards or forwards or release the clutch lever slightly, in order to make the dogs mesh correctly. The clutch lever should be released slowly, the clutch itself then coming into operation and the machine will take off at a moderate speed without any shock. As soon as the motorcycle has picked up speed, declutch and change to the second gear. The gas lever should then be opened a little and the spark advanced. After having changed to top gear, more gas should be given and the spark advanced further. It is not advisable to change right through from the first to the third gear or vice-versa.

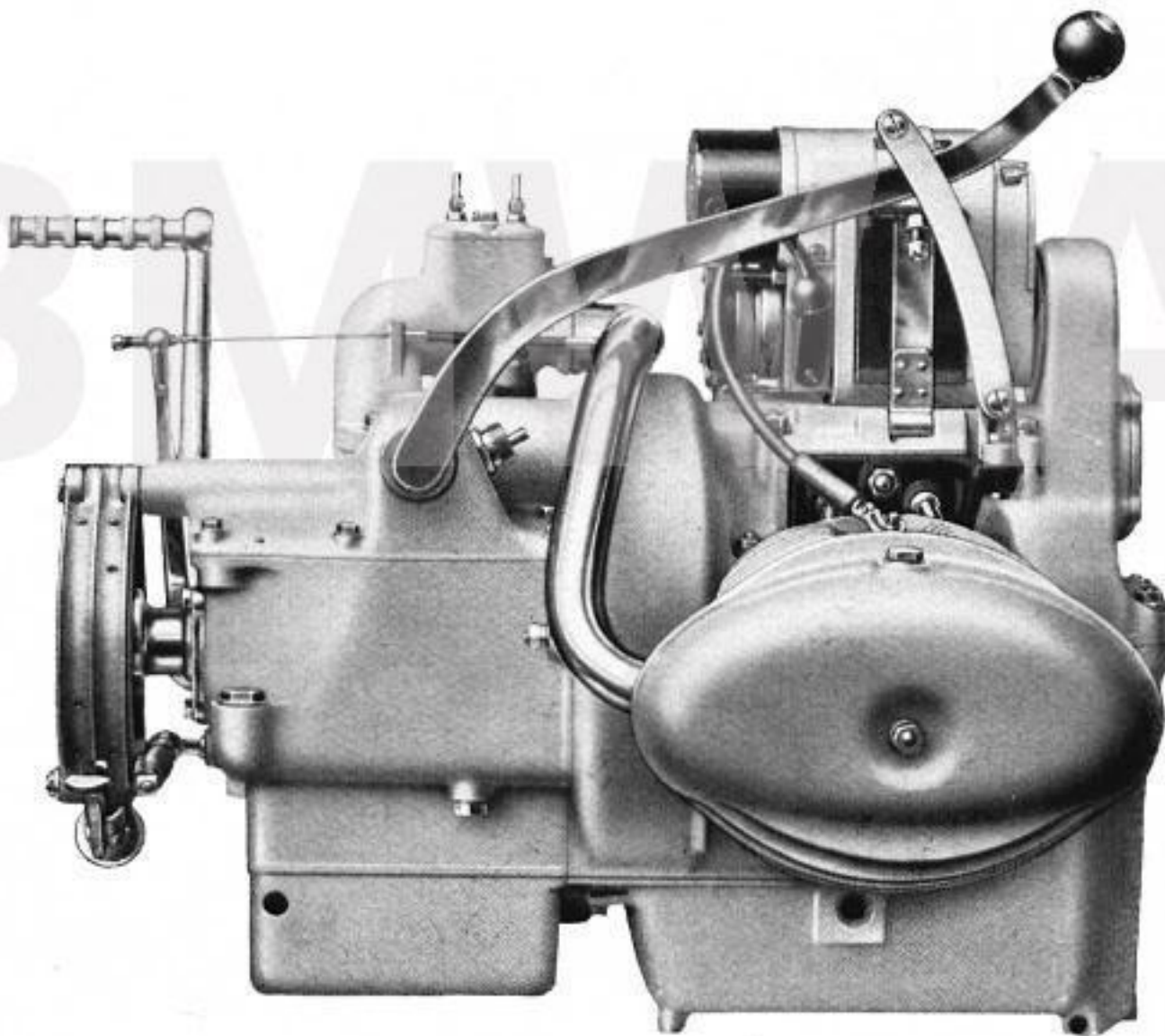
Do not on any account slip the clutch on a hill instead of changing down. This only ruins the clutch and is a sure sign of bad driving.

The speed of the machine may be regulated according to circumstances by simply controlling the throttle or the air lever and adjusting the ignition. Stop the machine by closing the throttle and pulling the clutch lever. The cycle will slowly come to a standstill with the engine "ticking over" on the idling jet. In case of danger, operate the brakes and the short circuiting push button simultaneously. This will stop the machine very quickly, even at high speed. Care should, however, be taken not to brake too suddenly as the wheels would be blocked i. e. they would simply skid. As a matter of fact, the action of the brakes reaches a maximum when the wheels are braked just enough to let them continue rotating without skidding. The engine itself is stopped by pressing the short-circuiting button.

SPECIAL FEATURES
OF THE
BMW SPORTING MODELS

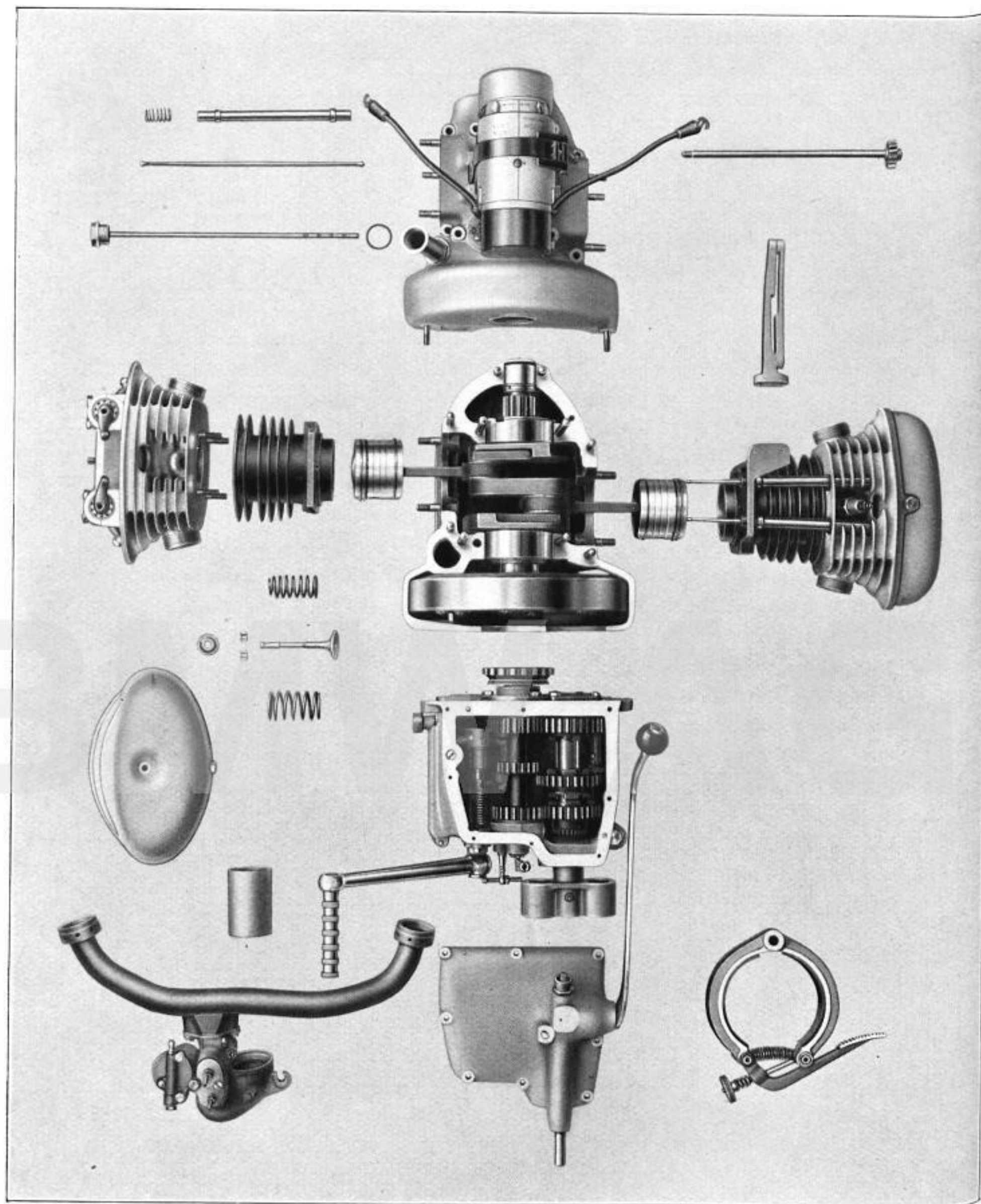
R 57 (500 c. c. OHV)

R 63 (750 c. c. OHV)



Ill. 23.

Engine and Gear Box of the BMW Sporting Machine.



Ill. 24.

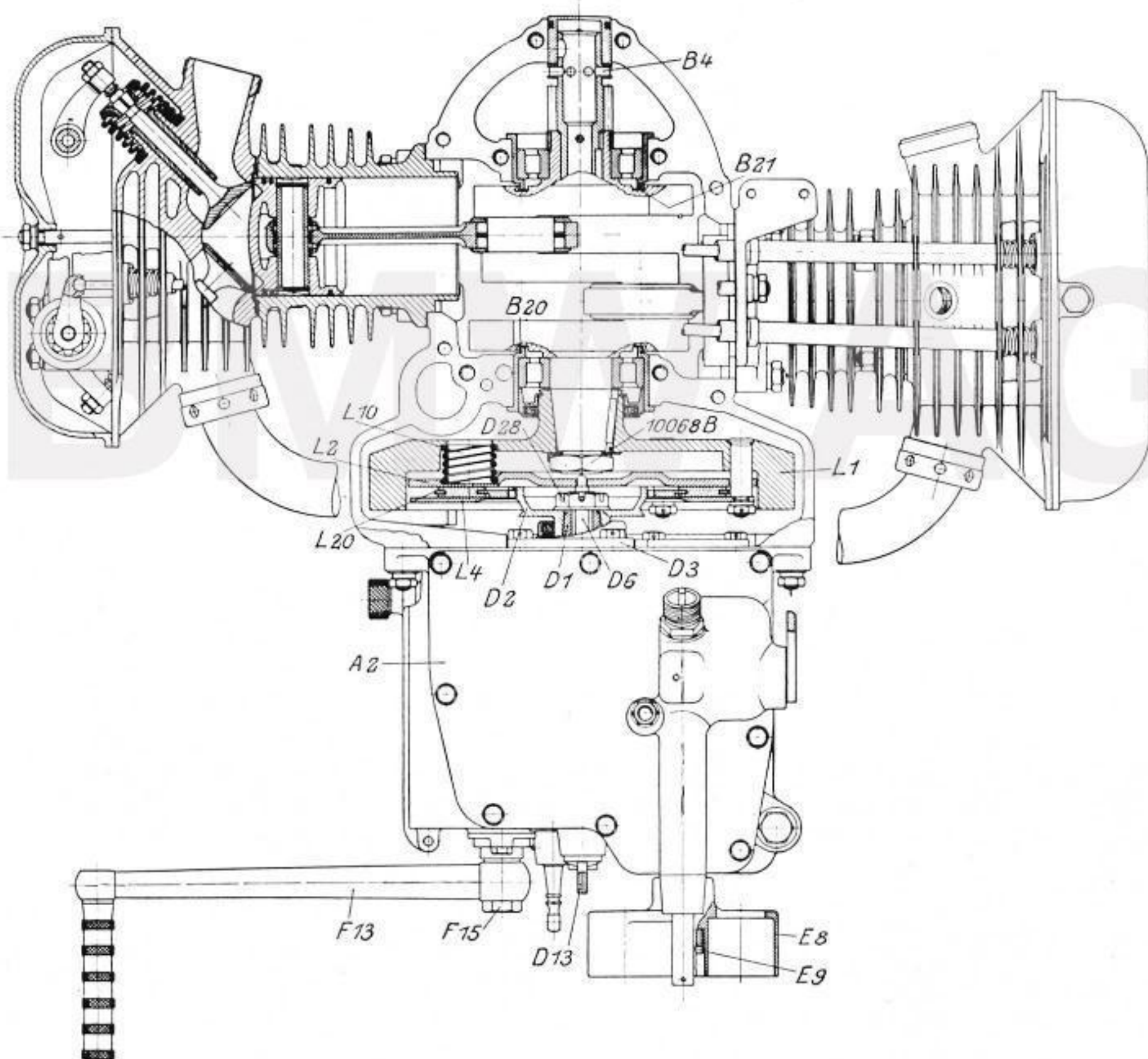
The Main Parts of the BMW Engine, Sporting
Model R 57.

The BMW Sporting Models.

The main difference between the BMW Touring Models and the Sporting Models is to be found in the arrangement of the valves, which are of the O. H. V. type in the Sporting Models. A general view of the O. H. V. engine with gear box is to be seen in Ill. 23 while Ill. 24 shows the same engine dismantled.

The general arrangement of the engine and specially the valves and valve rockers is shown in Ill. 25.

The front end of the crank shaft is provided with a particularly broad pinion for driving the cam shaft and the magneto. Between

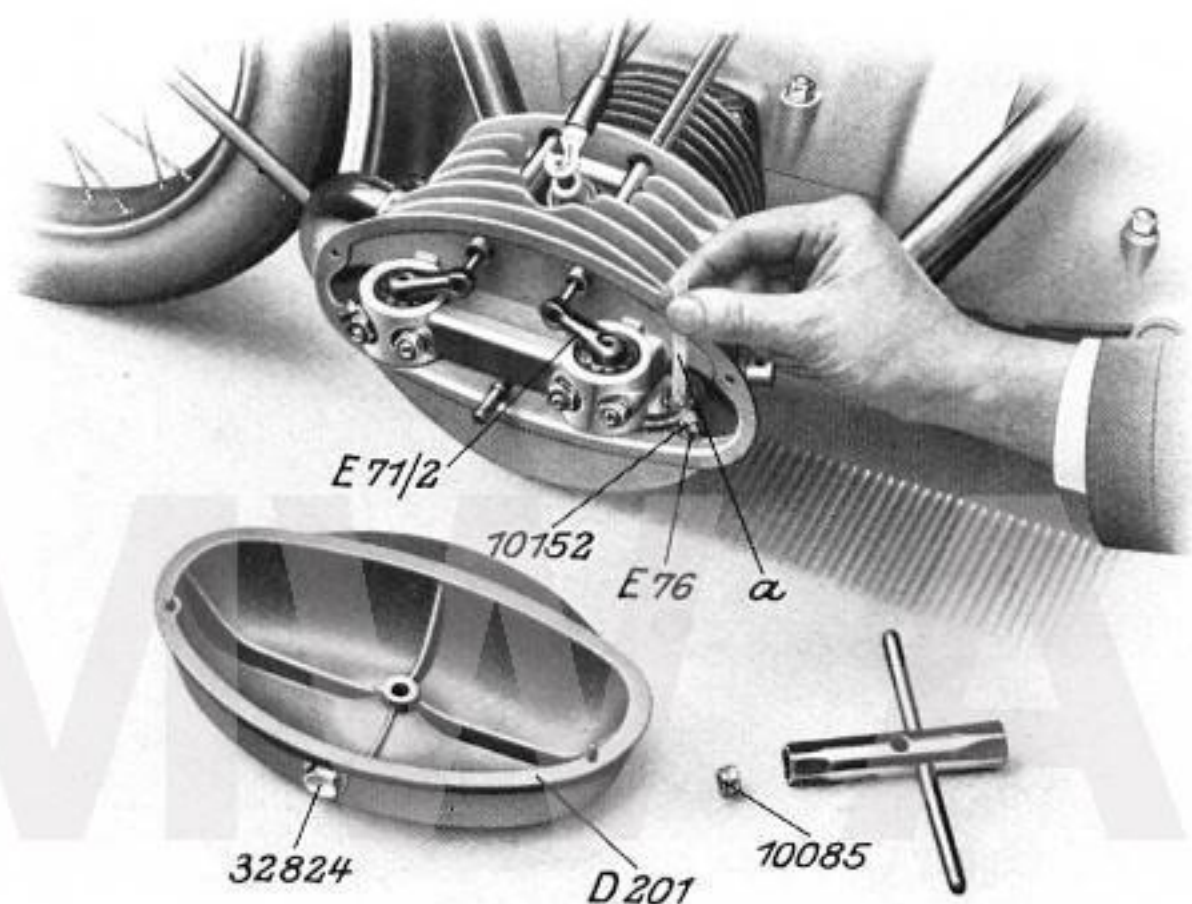


Ill. 25. General arrangement of the BMW Sporting Model Engine.

this pinion and the cam shaft is a second pinion, designed to reduce gear noises to a minimum.

The adjustment of the valves, which is necessary from time to time, should be carried out as follows :-

As already mentioned in the chapters dealing with the Touring Models, the play between the end of the valve shafts and the rocker screws should be measured with the help of a sheet of writing paper (about .1 mm thick). Ill. 26 shows how the inlet valve is adjusted. After unscrewing the nut 10085 the cylinder head cover D 201 is



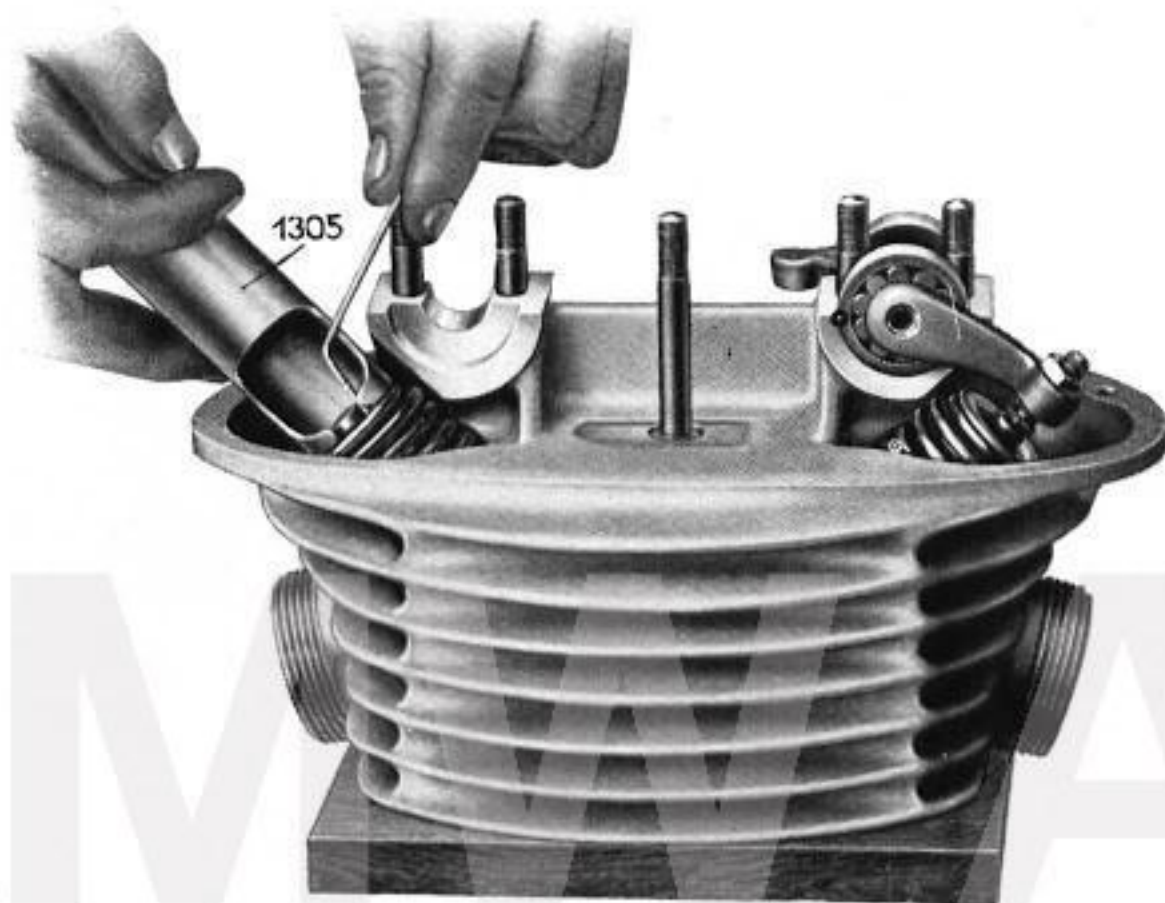
Ill. 26.

removed from the cylinder head. The engine should then be turned with the help of the kickstarter until the rockers A 71/72 make their maximum movement. Then loosen the locknut 10152, adjust the rocker screw E 76 with the help of a slip of paper "a" until the distance between it and the end of the valve shaft is correct, and then tighten up the locknut 10152 again. After replacing the cylinder head cover D 201 and tightening up the nuts holding it, two or three spoonfuls of oil should be poured in. This can be done by removing the plug 32824. This oil serves to lubricate the rockers etc. and should be controlled every 1000 miles and replenished when necessary.

As is the case with the Touring Models, the valves must also be examined after about 1800—2000 miles, or earlier, if trouble is ex-

perienced, in order to see that the seat is still correct. If the valves require to be reground, they must be removed as follows :—

After removing the cylinder head cover and the cylinder head, the upper half of the rocker bearings must be taken off. The rockers with their roller bearings have then to be removed carefully. The cylinder head should then be placed on a solid support (a block of hard wood, for instance). It is better, however, to grip the cylinder head in a vice, so that both hands are free. The valve cups are then pressed downwards with the help of the key No. 1305, until the keys



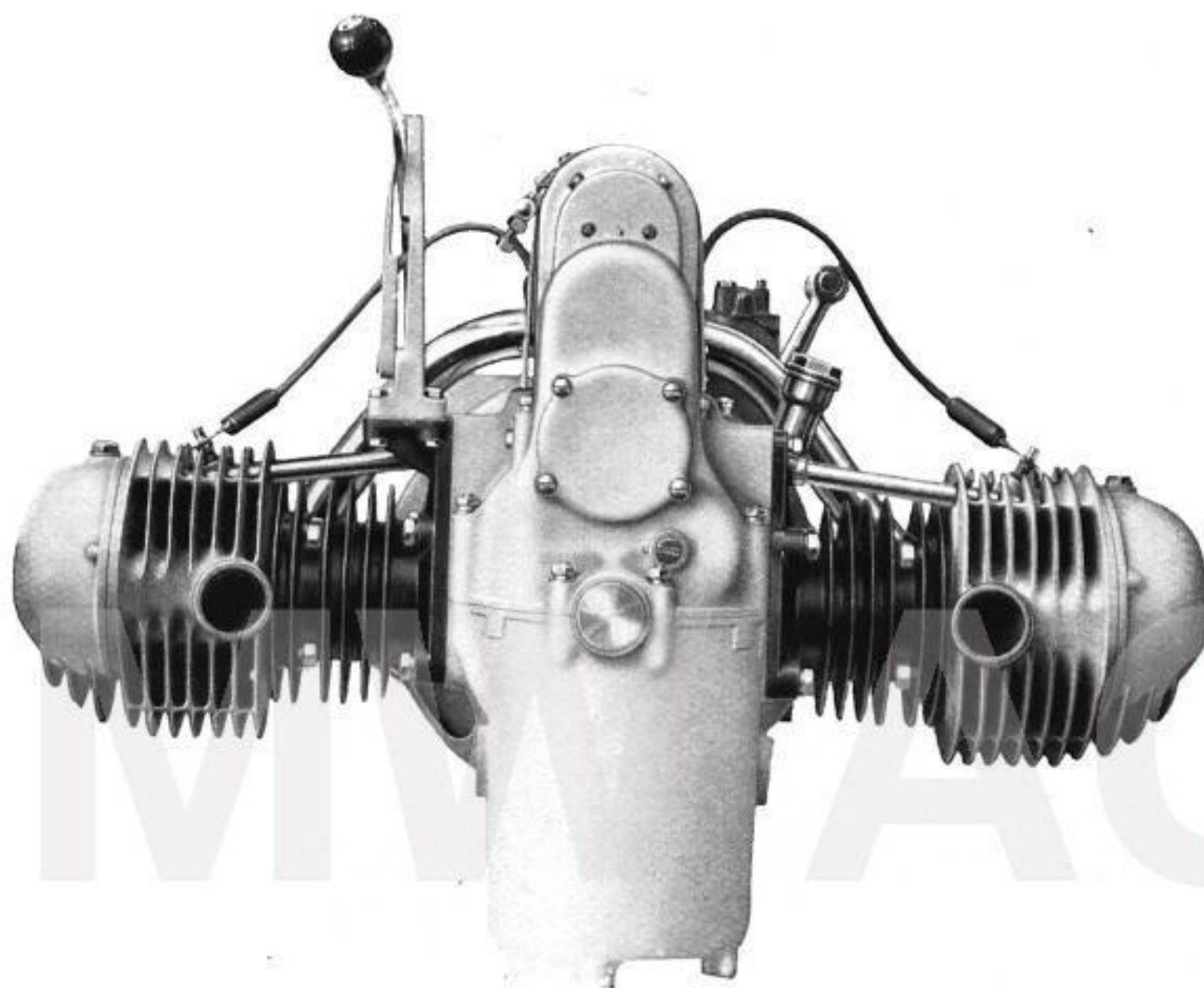
Ill. 27

at the top of the valve shafts are free. The keys can then be removed with the help of a wire hook, as shown in Ill. 27. The valve cups and springs can now be lifted out without further trouble, while the valves themselves must be pushed down through the cylinder head and taken out from below. If any difficulty should be experienced in separating the valve cups from the keys, a few light strokes with a wooden hammer should have the desired effect. The valves are reground in exactly the same way as with the Touring Models and must be replaced as described above, but, of course, in the reverse order.

Special attention should be paid to the packing rings for the induction pipes and those between the cylinders and the cylinder heads. They must be absolutely gastight, as the engine would otherwise get too much air, this of course leading to a reduction of the engine power.

The timing of the Sporting Model Engine is performed in exactly the same way as with the Touring Models (see page 24).

The Trouble Chart given at the end of this booklet is applicable to both the Touring Models and the Sporting Models, so that little or no difficulty will be experienced in dealing with any troubles met with.



Ill. 28.

Front view of the BMW Sporting Engine.

Trouble Chart.

Generally speaking, the BMW machines practically never give rise to trouble. For the facility of riders, however, such little difficulties as could be met with are enumerated in the following chart, together with the corresponding remedies, which can usually be carried out on the spot.

Engine does not start.

Cause	Remedy
Empty tank	
Fuel tap closed	
Fuel jet clogged	Take out jet and clean by blowing through it.
Fuel pipe clogged	Clean pipe.
Fuel strainer clogged	Unscrew and clean strainer.
Excessive carbon	Unscrew plugs.
Carbonised, oily or wet plugs	Carefully clean electrodes with petrol; verify if electrodes have the correct distance (.3—·4 mm).
Faulty plugs	Replace by new.
Ignition cables loose	Tighten up cables.
Bowden wires damaged	Repair Bowden wires.
Intake pipe leaks	Tighten up intake pipe on cylinder; if necessary, renew joints.
Short circuiting cable is making contact with machine	Fix short-circuiting cable properly.

Engine stops after a few revolutions.

Cause	Remedy
No fuel, owing to clogged jet or fuel pipe	Clean jet or fuel pipe, as the case may be.

Engine runs irregularly.

Cause	Remedy
Intake pipe leaks	Tighten up intake pipe on cylinder; renew joints if necessary.

Spark plug loose	Tighten up sparking plug.
Insulation of sparking plug cracked	Replace sparking plug.
Spark plug electrodes too far apart	Correct electrode distance to (.3—·4 mm.)
Too much oil or carbon on sparking plugs	Clean sparking plugs with petrol.
Insufficient fuel supply owing to clogged jet or clogged fuel pipe	Clean jet or fuel pipe.
Combustion mixture too rich (this may be recognised by the black exhaust gases)	Open air lever.

Loss of power in engine.

Cause	Remedy
Insufficient compression, due to badly fitting or damaged piston rings	Change piston rings.
Insufficient compression owing to leaky valves	Examine valve and tappet adjustment; if necessary, valves should be ground at very next opportunity.
Bad fuel	Use fuel recommended on p. 20.
Obstructions in silencer or exhaust pipe	Clean exhaust pipe or silencer.
Insufficient lubrication due to clogged oil strainer	Take out oil strainer and clean.
Insufficient fuel owing to clogged jet or fuel pipe (this may be recognized by explosions in the carburetter)	Clean jet or fuel pipe.
Cylinders worn out after long periods of service and heavy duty, 9000—18000 miles (15 000—30 000 km)	Re-grind cylinders.

Engine knocks.

Cause	Remedy
Too much spark advance	Retard spark; if necessary, make new adjustment (see page 24).

Fuel not suitable
 Badly fitting piston rings
 Electrodes of sparking plugs red
 hot (in this case the engine
 does not stop as soon as
 ignition is short-circuited)
 Lubricating oil not suitable

 Carbon deposits in cylinder

Add $\frac{1}{3}$ to $\frac{1}{2}$ benzole.
 Change piston rings.
 Clean sparking plugs; if neces-
 sary replace by new.

 Drain and replace by better oil
 according to instructions on
 page 17.
 Remove cylinder heads and
 scrape, together with the
 piston heads.

Float Chamber overflows.

Cause	Remedy
Float leaks and is consequently full of petrol	Fit new float.
Valve needle does not close tightly	Remove obstructions or re-grind needle and seat.

Clutch slips.

Cause	Remedy
Not enough free movement in clutch lever	Unscrew adjusting bolt on Bowden wire a few turns.
Oil in clutch	Remove carburetter to gain ac- cess to clutch and clean by injecting a little petrol. Greasy clutch linings should be re- newed. Clean drain hole at bottom of clutch casing with a nail or some pointed tool.

Fuel burns in carburetter.

Cause	Remedy
Inlet valve sticks and mixture continues to burn, due to using unsuitable fuel or pre- sence of carbon deposit in cylinder	Close fuel tap immediately. Open gas lever fully. Do not cut off ignition, but let engine run at full speed until it stops of its own accord through lack of fuel. Let carburetter cool down, remove cause of con- flagration and start engine again.

Extract from the general Terms for sale and Delivery.

All obligations, legal and otherwise, resulting from the purchase of goods from the BMW must be settled by both parties in Munich.

Prices are subject to alteration without notice and are net, without any reduction. All expenses are charged to the account of the purchaser. Payment is due when the machines are ready for despatch and has to be made before the same leave our works.

The BMW retains full ownership of all goods until full payment has been made.

Delivery:- The BMW does its utmost to deliver goods within the promised time, but orders can only be cancelled when the delay in the delivery exceeds 3 months. No compensation or interest on the deposit will be paid. Lockouts, strikes and disturbances in their own works or in those of their suppliers, war, mobilisation, or any other "force majeure" release the BMW from its obligation to deliver the goods ordered.

The BMW reserves the right of making alterations in the design, even during the term of delivery. In the catalogues, all data pertaining to weights, etc., and all other figures are approximate and not binding.

The purchaser is entitled to examine the machine before accepting the same. If the examination is omitted, expressly or tacitly, the machine is considered as accepted on leaving the works.

All goods are consigned at the purchaser's risk and expense. The machines are wrapped in paper and packed in strong crates for consignment. All claims arising from damage to the machine, or thefts during the transport have to be made to the Railway Company.

Complaints can only be considered if made in writing within a week after receipt of the machine.

Guarantee:- The BMW guarantees its goods for six months only, dating from the day of delivery, and undertakes to replace or repair, free of charge, any parts which may have proved defective as a result of faulty material or workmanship.

No compensation whatsoever will be paid for any damages arising directly or indirectly from the defective parts.

The guarantee for such parts as are not manufactured by the BMW (magnetos, speedometers etc.) is limited to the claims which the BMW can make on the manufacturer of the parts in question.

The guarantee expires if repairs are carried out by other persons or firms, except, of course, in cases of emergency.

Any repairs or replacements made under our guarantee in no way affect the sale or the price of the goods in question. All expenses incurred by the despatch of replacement parts have to be covered by the purchaser.

BMW AG