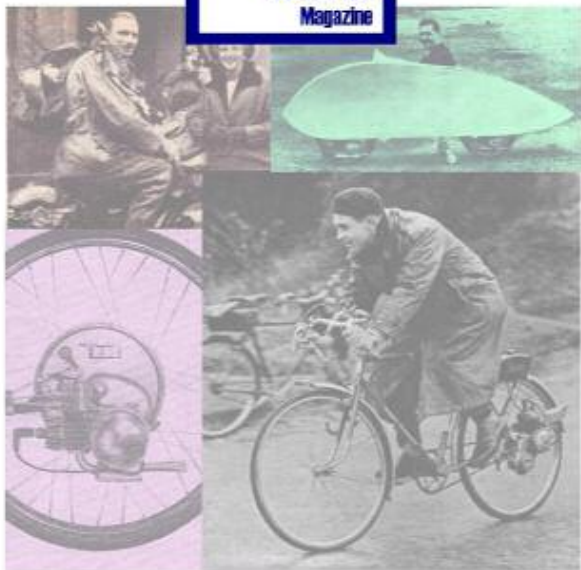


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Operating directions

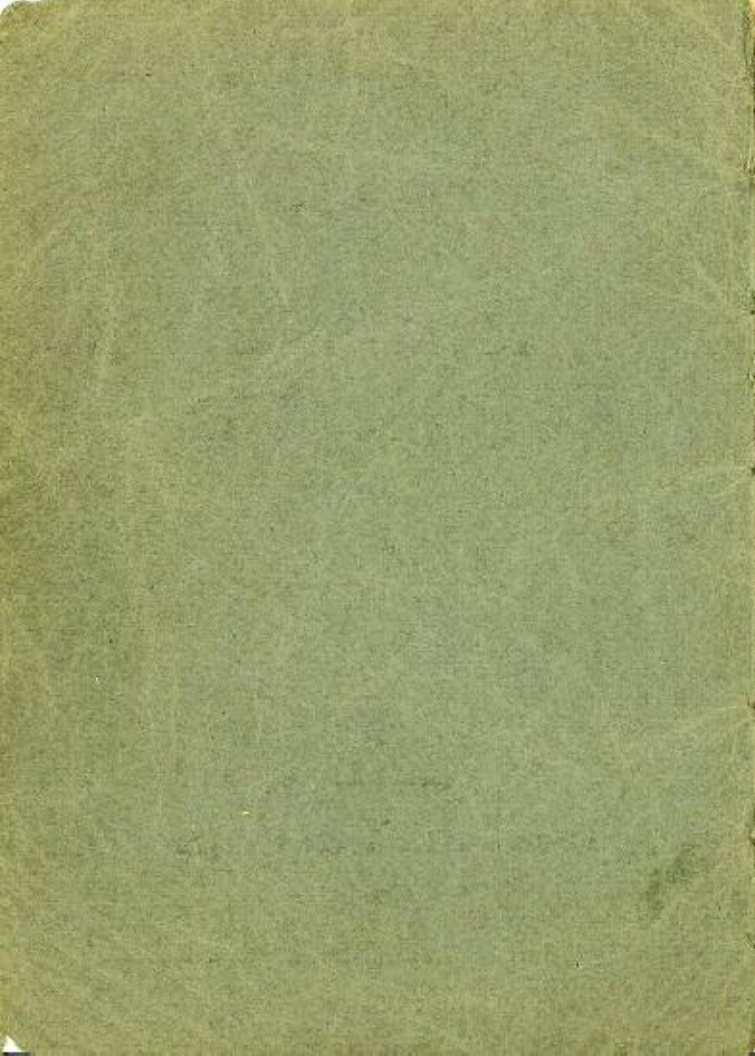
# LOHMANN BICYCLE MOTOR

Type 500 • Model 51

October 1951 Edition



**LOHMANN MOTOREN**  
GEBELLSCHAFT  
HAMBURG 1



Operating directions

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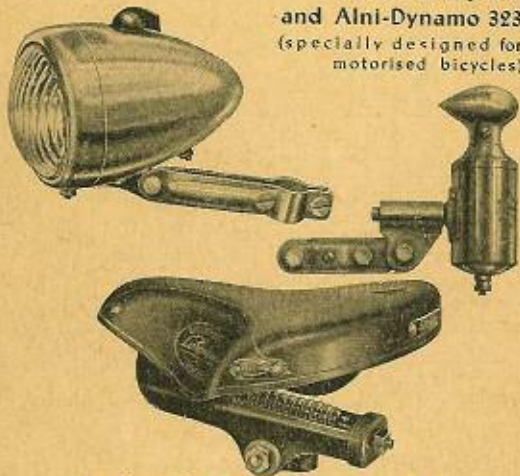
**LOHMANN MOTOREN**  
GESELLSCHAFT

HAMBURG 1

# LOHMANN

PRODUCERS OF SPECIAL GEAR FOR  
BICYCLES WITH AUXILIARY ENGINE

Head-lamp 354  
and Alni-Dynamo 323  
(specially designed for  
motorised bicycles)



adjustable swing saddle 280  
for motorised bicycles



**LOHMANN WERKE AG BIELEFELD**

## The principle of the Lohmann-motor:

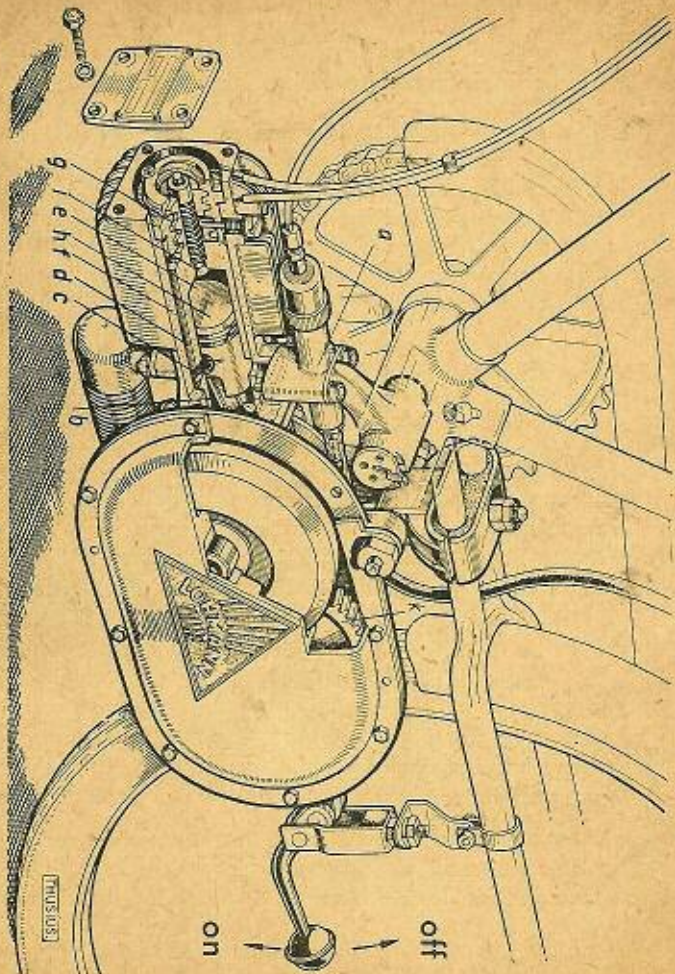
The Lohmann motor is different from the Diesel engine as well as from the Otto (petrol) motor in essential constructive characteristics for which numerous patents and patent applications exist both in Germany and abroad. Its construction has made it possible to eliminate complicated and delicate devices, such as electric ignition and fuel pump.

Under the principle of the Lohmann motor which is based on the two-cycle system, the air-fuel-mixture taken in is so highly compressed and heated that it ignites by itself. The Lohmann motor is thus a mixture-compressing self-igniting two-cycle motor.

Through an uncomplicated mixer (see "a" on sectional drawing) fuel and air reach the crank case ("b"). The air-fuel mixture is pre-compressed here and pressed via the transfer ports ("c") of the sleeve ("d") into the combustion chamber ("e"). Ignition is effected here by high compression. While starting the cold motor requires the highest possible compression ratio, it must be reduced with increasing working temperature in order to reach also then the best ignition point corresponding to the progress in temperature.

In other words: In operation the compression must also continuously be adjustable dependent on outside temperature, fuel, speed and load. The Lohmann

Lohmann bicycle motor (Sectional model)



[TRADE MARK]

on

off

motor principle meets this requirement by having the sleeve movable axially in the cylinder box ("f"). Over a trapezoid thread ("g") the driver can reduce or increase by the left-hand twist grip the size of the compression chamber between the piston ("h") working in the cylinder sleeve and the bottom of the sleeve. Hereby the bottom of the sleeve either nears the upper dead centre of the piston or withdraws.

A special characteristic of the Lohmann motor is the radially cut transfer ports ("c") which make possible intensive lubrication and cooling of the piston by the fresh gases. Because of the high pressures developing in the combustion chamber the crankshaft and the connecting rod are overdimensioned.

For the reduction of the relatively high compression load when starting the motor, a decompression valve ("i") is fixed at the head of the cylinder sleeve which opens automatically at the initial position of the compression twist grip and lets escape the compression load.

The gear of the Lohmann motor consists of a pair of gear wheels ("k") only through which the revolutions of the crankshaft are reduced through helically geared spur wheels at a ratio of 3:1.



## Technical data:

cylinder volume .....	18 cm <sup>3</sup>
bore .....	28 mm
stroke .....	30 mm
revolutions .....	5000 r. p. m.
compression .....	variable
permanent output .....	$\frac{3}{4}$ H. P.
speed .....	25 km/h (abt. 15,5 m/h)
normal fuel consumption ..	$\frac{3}{4}$ litre per 100 km (abt. 375 miles for 1 Imp. Gallon)
hill-climbing ability .....	8% without treading
weight .....	5 kg
fuel .....	pure kerosene
ratio of mixture .....	with motor oil 1:25; for the first 300 km 1:20
shifting gear .....	} none
electric ignition .....	
fuel pump .....	
power transmission .....	driving pulley of special rubber on rear wheel.

## How the motor is fitted:

Every normal bicycle is fitted for the mounting of the Lohmann motor. Of course, it is essential that it is in perfect condition and that especially the rear wheel shows no eccentricity or side beat. If necessary, it must carefully be centered in order to avoid unnecessary wear and tear of the tyre. In any case the rear wheel tyre shall be perfect and the tube must be well inflated. Para rubber or soap rubber tyres are not suitable for driving pulley operation. To date

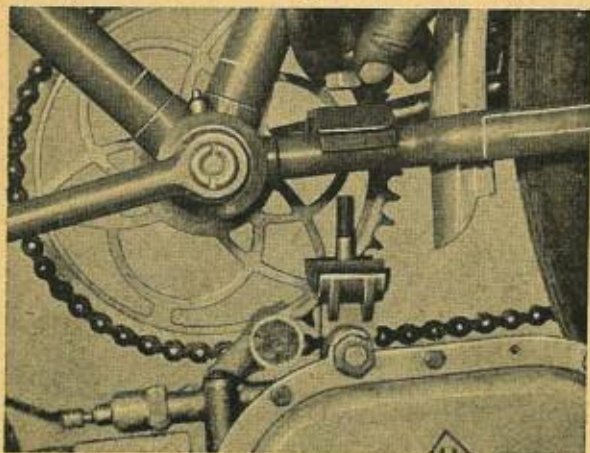
Fitting of the fuel tank



standard rubber tyres with cross profiles showed the best results. Balloon tyres cause too great friction losses.

The tank is introduced from above between saddlepost and mud guard after taking off the cover plate until it fits closely on both sides. If the tank cannot be introduced in this interspace from above, the rear wheel must be removed and the rear wheel mud guard be loosened for the mounting. It is suggested to cover the frame tube with insulating tape at both clamp spots. The tank cover plate will then be put on and the four lens head countersunk screws be screwed on.

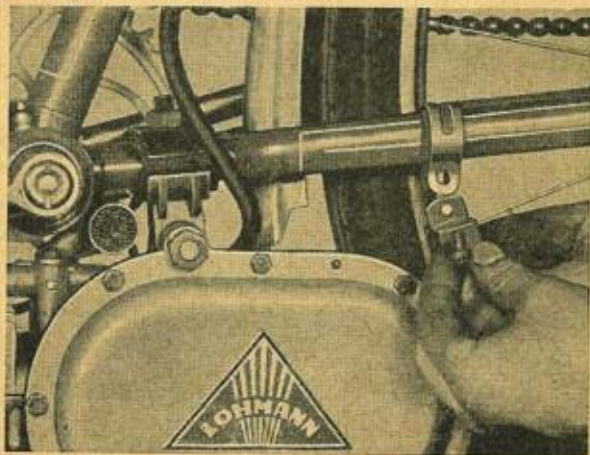
The suspension of the motor being fitted under the frame



The motor is mounted behind the bottom bracket bearing with the suspension at both frame tubes. Care must be taken that the rubber shims, the lower supporting plate of the suspension as well as the upper mounting strap embrace well the frame tubes. The hexagon nut will then be screwed on and secured by the pawl nut (securing sheet).

The clip for the motor disengaging device is pushed over the left-hand strut of the bottom forks. A shim of soft material (leather or rubber) must not be forgotten. The supporting strap which must have a slight forward dip, is taken up in this clip and screwed on.

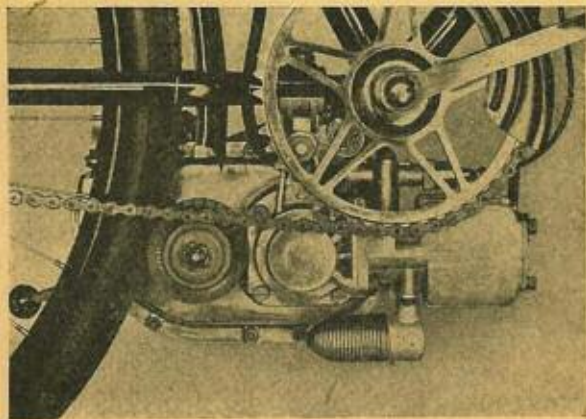
The fitting of the disengaging device



When the disengaging lever is turned upward, the driving pulley must not touch the rear tyre. The lever downward the driving pulley will be pressed slightly against the tyre, thus being moved when the rear wheel turns.

With the rear tyre always being well inflated the pressure of the driving pulley shall be kept as low as possible. Wet roads require a somewhat higher pressure of the driving pulley which can be adjusted easily at the fine adjustment device. If the driving pulley impresses the rear tyre too much, the higher friction loss impedes the work of the motor and affects the output adversely.

The driving pulley side of the motor



Before the nut at the suspension bolt is fastened, the right position of the motor can easily be attained by pushing it forward or backward. Attention must be paid to the fact that the motor in driving position shall either be horizontal or inclined slightly to the rear.

In case the tread cranks of an older bicycle will rub the motor, experience showed that these can easily be bent off. It is of special importance that the rear tyre does not rub the back side of the gear box.

After mounting the motor the twist grips are fixed to the handle bar. The twist grip with the two bowden cables which effects the changes in the compression ratio, is shoved on the left arm of the handle bar. On the right arm of the handle bar the throttle twist grip with one bowden cable is shoved. (Take off pasteboard shell first!) In case of a strongly curved handle bar the twist grip must not be shoved on too far in order to avoid hindering tension in the handle cases.

The twist grips are firmly attached to the handle bar through the set screws in the twist grip cases which must be tightened uniformly. If after fixing the throttle twist grip excessive free motion in the throttle bowden cable is ascertained, this must be reduced to about 1 mm by unscrewing the bowden cable adjustment screw at the mixer. The counter-nut must be loosened first.

With the cable straps supplied the bowden cables are attached to the frame in such a way as not to form buckles or sharp bends.

After the mounting of the motor is finished, the left twist grip will be turned outward completely up to the initial point. It must now be possible to push the bicycle easily with engaged engine because at this position of the turning handle the compressed air can easily escape from the compression chamber through the opened decompression valve.

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***When ordering spare parts,  
always mention serial number  
of the motor***

## Operation:

Appropriate operation is the basic requirement for excellent functioning of the Lohmann motor.

The use of the right fuel is the most important requirement with the Lohmann motor, the same as with any other motor.

Because of its high ignition quality — expressed in the Cetene number of fuels — we suggest to use nothing but pure kerosene. Tractor fuel (T.V.O.) is suitable for the Lohmann motor only when it is not ethyled. It is true that ethyled fuels have a higher Octane number which is desirable for Otto (petrol) motors, but a smaller Cetene number. Their self-ignition is thus slower and they are, therefore, less suitable for the use in self-ignition motors. Furthermore, commercial Diesel oil contains more or less sulphur and in the combustion process together with condensation water it forms sulphurous acid which strongly attacks the inner parts of the motor.

Because the Lohmann motor is a two-cycle motor in which the lubrication of the driving parts (crank shaft, connecting rod and piston) is effected by the fuel mixture, a good two-cycle motor oil of the viscosity SAE 40—50 must be added to the kerosene. It is recommended to use special oils, the so-called Premium or HD oils, which contain a certain percentage of decarbonizing components (additives), such as Mobiloil BB in the original two-cycle can. This oil



must be mixed with the kerosene at a ratio of 1:25 (during the running-in period of the first 300 km at 1:20). The 10-cm<sup>3</sup>-measure in the tank stopper serves as the measuring device for the oil. Thus, four measures of oil (for the first 300 km five measures) must be added to each litre of kerosene before the fuel is poured into the tank. Fuel and oil must be mixed well in a separate container. If the unmixed motor oil is poured into the tank, it settles in the lower part of the tank because it is heavier than kerosene, and thus blocks the fuel supply.

When filling the tank for the first time, care must be taken that the fuel hose is de-aerated. This is achieved by pulling it off the cock and filling it drop by drop.

Controlling the motor is effected by the two twist grips at the handle bar. While the right handle controls the supply of fuel and air, the left handle controls the compression ratio and, thus, the setting of the ignition point.

The bicycle is first started by treading, both twist grips remaining at their initial positions. The motor now shows little compression only because the decompression valve is open. The next action is to turn the throttle twist grip completely in inward direction beyond the spring resistance which marks the full-throttle position, until the starting position is reached. When the bicycle is running fast, the com-

pression handle is quickly turned inward until the first ignitions take place; the throttle handle to remain in starting position.

After the first ignitions the compression handle is turned back by a few millimeters. When the working temperature of the motor increases which is noticeable through higher output, the throttle twist grip is slowly taken back from the starting position to the normal range and the compression twist grip set for the best ignition point.

To relieve the motor the rider must tread slightly immediately after the start until the motor runs at its own. Every experienced driver will expect power of his motor only when the right working temperature exists.

The compression must be set neither too high nor too low when the motor is warm from working. In both cases the output would drop considerably. Smooth running of the motor is the safest indication that the compression (left handle) is set correctly. It is suggested as a rule to go with as little compression as possible. Irregular ignitions which happen when the compression is set too low and which are indicated by back-firing in the exhaust, must be avoided in any case, however, because they affect unfavorably the combustion in the motor.

The motor is treated especially carefully when assisting it at steep hills through slight treading. It is advisable

not to exceed a speed limit of 25 km/h (15,5 miles/h). Exceeding the limit would affect adversely the life of both bicycle and motor.

When going a long time at even speed it is advisable to give additional lubrication and cooling to the piston by temporarily turning the throttle to the starting position. This prolongs the life of the piston. When simultaneously turning the compression twist grip to the initial position briefly, the compression adjustment device at the head of the cylinder box will be lubricated because fuel can reach the thread parts through the opened decompression valve.

At the end of the trip both twist grips must be turned back to their initial positions and the stop cock at the tank shut.

\*

Thus, the operating directions to be followed can be summarized as follows:

1. Open the fuel cock.
2. At the start leave both twist grips at their initial positions at first, i. e. turn them outward up to the stop.

3. When the bicycle runs, first turn inward the right handle up to the stop (starting position) and then turn inward the left one quickly until the first ignitions take place.
4. After the motor started, take back outward first the left and then the right handle until the motor runs smoothly.
5. When going up-hill take back the compression slowly, i. e. turn back outward the left handle at your discretion until the motor runs smoothly and shows hill-climbing eagerness.
6. When going down-hill also take back the compression slightly but leave the throttle half-open in order that the piston may not run dry.
7. Only a motor well broken in has its full efficiency. Efficiency and service life of the motor will benefit from slow and careful breaking in during the first 300 km.

It is suggested to have a speedometer attached to the bicycle in order to control the speed all the time. The first 300 km must in no case be gone at a speed exceeding 20 km/h.

8. In case of more serious repairs which require the dismantling of the motor, a specialist should always be called upon.

## Care and maintenance:

The same as the operation care and maintenance of the motor are of course tasks which ought to be given special attention.

To them belongs first of all the changing of the gear oil which must first be done after 300 km and afterwards after every 1500 kilometers. The used oil is let off at the oil inlet when the engine is warm. To do this the drain plug is unscrewed and the front wheel lifted by about 80 cm. The plug and the surface next to it must first be cleaned of dirt. Attention must be given that nothing of the used oil remains in the gear box. It is suggested to wash the gear box with wash oil.

The new oil is filled into the gear box with the rear wheel lifted. Not more than 40 cm<sup>3</sup> of light motor oil, viscosity SAE 10—20, shall be used (e. g. Mobile oil „ARCTIC“ or „ARCTIC SPECIAL“). Too much and too heavy oil in the gear box would interfere with the running of the motor and would reduce its output.

When replacing the drain plug, do not forget the washer. The prescribed oil level and the firmness of the drain plug must be checked at regular intervals.

The bearing bolt of the motor suspension must be greased with good commercial grease every 250 km. (Use grease gun!)

The airfilter cartridge which will be pushed out of the airfilter box sidewise, ought to be washed in petrol about every 500 km, dependent on dust conditions, and will then slightly be soaked in light motor oil. Without sufficient care the retained dust will be sucked into the motor and besides loss in output it will cause premature wear to the sleeve, the piston and the bearings.

The muffler shall also be checked every 300 to 500 km and be cleaned, if necessary. In case due attention is given to a good combustion of the fuel through correct setting of the compression and throttle, the depositing of refuse in the muffler will remain small.

The compression adjustment device at the head of the cylinder bloc shall be lubricated every 500 km with light motor oil or a light oil-graphite mixture. For this the covering plate with the four hexagonal head bolts will be unscrewed. Please, fasten the screws tightly again!

To protect the motor from dirt it is suggested to put an additional dirt-trap over the front wheel mud guard.

The bowden cables must be checked from time to time and must be oiled the same as the twist grips. First of all the compression bowden cable must receive oil inside the turning handle at the cable guide and where the cable emerges; the turning handle to be turned for oiling.

In case the bowden cables have lengthened so much that a noticeable back lash exists, they must be tightened by unscrewing the bowden cable adjustment screws. Please, loosen the counter-nuts first! The set screw for the compression bowden inner cable at left twist grip shall always fit tight.

As is wellknown the regular checking of nuts and screws of new motors is of the greatest importance. Please, see to it that all nuts and screws of the motor are tightened the first after 100 km. This also refers to the screws and nuts of the motor suspension.

The factory sets the mixer differently for the running-in time. It must be checked by the Lohmann service organization after 300 km. The change from one ratio to another ratio of the kerosene-oil-mixture also requires a change in the setting of the mixer.

### Troubles:

Before thinking of motor trouble check first whether the following requirements for its operation are met:

1. Is the fuel cock opened?
2. Is the tank filled?
3. Is the right fuel being used? We repeat again that the right tank filling consists of pure kerosene or non-ethyled tractor petroleum, well mixed at the ratio of 1:20 or 1:25 with two-cycle motor oil of viscosity SAE 40—50 (e. g. Mobil oil BB from the two-cycle can) before being filled into the tank.

### A. Starting trouble, motor shows no output:

- |  |   |
|--|---|
| 1. Air vent in tank stopper clogged.                         | Clean the tank stopper.   |
| 2. Sieve at stop-cock clogged.                               | Unscrew the stop-cock and clean the sieve. When putting it back, watch the good seat of the packing.  |
| 3. Muffler clogged.  | Clean the muffler.  |
| 4. Mixer dirty through water or mud (hindering fuel supply). | Operate the throttle handle several times when stop-cock is opened. If not corrected, loosen the screwed cap at the mixer, pull out the piston slide valve and open the stop-cock briefly. The pouring fuel will then flush the nozzle and the mixer casing. The piston slide valve must be cleaned with a rag. |
| 5. Too much back lash in the throttle bowden cable.          | Reduce the back lash to one millimeter at the mixer by unscrewing the bowden cable adjustment screw.  |
| 6. Pressure of the driving pulley is too high.               | Reduce the pressure with the fine adjustment device. Rule: Keep the pressure as low as possible.  |



7. Too much oil in the gear box.

Let surplus oil flow out of the oil inlet after motor is warm. Rule: There must not be more than 40 cm<sup>3</sup> light motor oil of viscosity SAE 10—20 in the gear box (e.g. mobile oil „ARCTIC“ or „ARCTIC SPECIAL“).

8. Rear wheel rubs at the gear box of the motor and shows much eccentricity.

Rear wheel must be centered carefully.

9. Compression insufficient.

When the turning handle is set for full compression the sleeve must sit firmly on the finished surface of the crank case. This is noticeable through resistance in the turning handle shortly before the stop. In this position there must be a space of 2 mm between the stop pin of the turning handle and the rest which holds the grub screw for the clamping of the bowden cable.

If this is not the case, the attachment screw for the bowden cable must be loosened and the clamping spot changed accordingly.

If this does not help, please see the Lohmann service organization.

10. Decompression valve will not close.

Set compression correctly (see No. 9). If this does not help, please see the Lohmann service organization.

11. Airfilter clogged.

Push the airfilter cartridge out of the airfilter box, wash it in petrol, soak it with light motor oil and put it back.

When ordering spare parts, always mention serial number of the motor.

### **B. Bowden cables:**

1. Bowden cables lengthened or bowden shells pressed.

Adjust bowden cables by unscrewing the bowden cable adjustment screws in the compression handle case or at the mixer (loosen counter-nut first).

2. Compression bowden cable slips in the handle.

Tighten attachment screw (Watch correct compression position).

3. Bowden cable split up.

Have bowden cable renewed.

### **C. Driving pulley slips:**

1. Pressure of driving pulley insufficient.

Increase pressure through fine adjustment device or push the suspension of the motor closer to the rear wheel.

2. Tyre pressure insufficient.

Inflate tyre.

### **D. Fuel tank leaks:**

1. Packing ring at stop-cock fits badly.

Unscrew stop-cock and re-screw it with new packing ring and packing paste.

## Parts of the Lohmann bicycle motor:

No.	Nomenclature:
110	cylinder
120	cylinder sleeve
130	adjustment device
140	compression twist grip, complete
150	covering plate
160	airfilter cartridge
210	crankshaft with
220	connecting rod
230	piston, complete
310	crank case
410	reduction gear casing
420	reduction gear casing cover
440	flywheel with pinion
460	gear
510	driving pulley
610	fuel tank
613	tank stopper
620	mixer
640	throttle twist grip, complete
650	airfilter
710	suspension
720	bearing bolt
730	suspension accessories
810	disengaging device
910	muffler

***When ordering spare parts, always  
mention serial number of the motor.***

KOMPRESSORSETZ

KOMPRESSORSPIRALEN

MISCHFAHRL

MISCHERSPIRALE

ENZELTEILE MISCHER 610

140

640

810

720

710

730

420

650

150

620

160

130

460

440

410

610

120

230

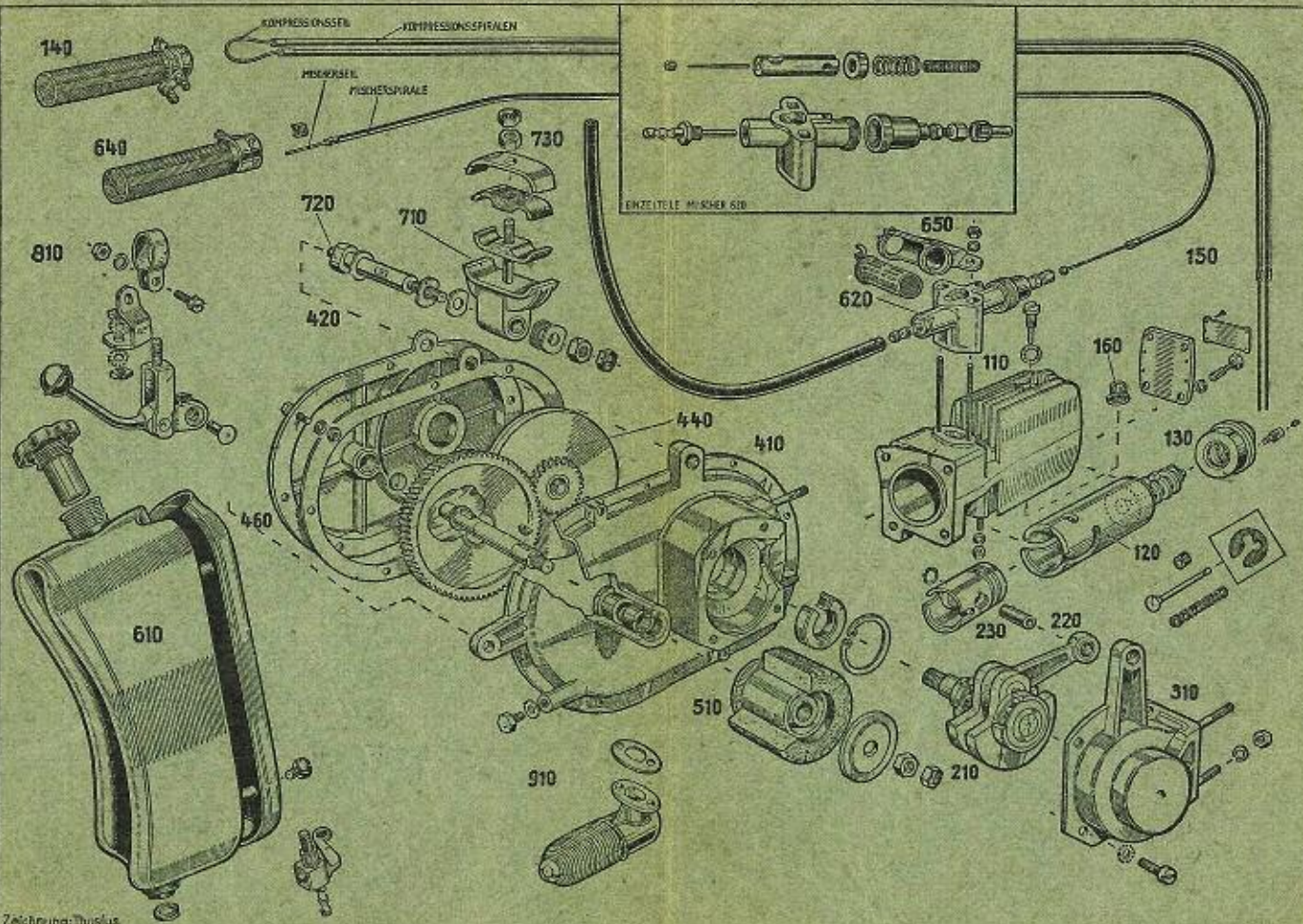
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310

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210

910



Kröger, Hamburg