



HARLEY-DAVIDSON

Rider's Hand Book



Harley-Davidson Motor Co.

MILWAUKEE, WIS., U.S.A.

SINGLE CYLINDER MODELS

Price 20 Cents

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E. G. Mueser INDEX

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THE Harley-Davidson Single is of simple, rugged construction. A few minutes of careful attention each week will keep it in good condition and assure you of many thousand miles of carefree service. This book will serve as a guide to assist you in giving it the required care. The arrangement of the book is as follows:

General Operating Instructions	Pages 1 to 7
Motor Lubrication	Pages 7 to 9
General Maintenance	Pages 10 to 24
The Lighting and Ignition System	Pages 23 to 30
The Magneto	Pages 30-31
Setting Up a New Motorcycle	Pages 31 to 37
Lubrication Charts	Pages 39-40

If any questions arise that are not covered by this book, get in touch with your dealer or write our Service Department.

GENERAL OPERATING INSTRUCTIONS

The Importance of Correct Lubrication

To insure long and satisfactory service from your motorcycle, lubricate it properly—especially your motor. The motor requires a special oil, because it is air cooled and operates at high temperatures.

We recommend the use of genuine Harley-Davidson oil, which is refined to our specifications. We furnish this oil for the protection of Harley-Davidson riders. Your dealer can supply you.

Don't take a chance with an oil of unknown quality.

Filling Gas and Oil Tanks

The right side tank is the main gas tank—capacity 17 pints. The left side rear tank is the reserve gas tank—capacity 8 pints. The left side front tank is the oil tank—capacity 6 pints. The oil tank has no shut off. Each gas tank is provided with a shut off cock. The cock is open when the handle is in a vertical position. The reserve tank is usually kept shut off for emergency use.

We recommend a benzol blended gasoline as a better fuel than ordinary gasoline for the Single *especially the Overhead Valve model*. Ordinary gasoline can be used satisfactorily, but the motor will run much cooler with benzol blended gas.

Become Familiar With the Operation of All Controls Before Starting Motor or Riding Machine

1. Right hand grip (Left grip on Export Sporting model) is the throttle or carburetor control; turn outward to close throttle; turn inward to open throttle.

2. Left hand grip (Right grip on Export Sporting model) is the spark control; turn inward to advance spark; turn outward to retard spark.

Fully advanced is the proper normal running position. Retard spark part way to prevent motor laboring and knocking when in high gear and pulling a heavy load at low speed, on bad hills, etc.

3. The foot pedal at left footboard (all models except Export Sporting) is the clutch pedal; rocking it backward releases clutch; rocking it forward engages clutch.

NOTE—*Export Sporting model is equipped with hand clutch control on right handlebar.*

4. Gear shifter lever is mounted on left side of tank. Shifter gate through which lever works is marked with four positions. Shifter lever must be operated in conjunction with the clutch. *Before shifting from one position to another the clutch must be fully released. Failure to do so will result in transmission trouble.* When cranking motor, shifter lever must be in NEUTRAL position and clutch engaged.

5. The foot pedal at right footboard is the brake pedal. **NOTE**—If machine is equipped with hand (extra) brake, the control is on left handlebar.

6. The kick starter is located on right side of transmission. To operate, give it vigorous downward strokes.

7. On generator equipped models the switch box 13 (Illus. 20) mounted on fork triple clamp, houses both the ignition and light switches. The left hand switch is for ignition. To operate either switch, insert key and turn switch as per markings on switch panel.

A magneto model has no switch.

8. See "The Compression Release" and The "De-compressor" below.

The Compression Release *On Side by Side Valve Motor*

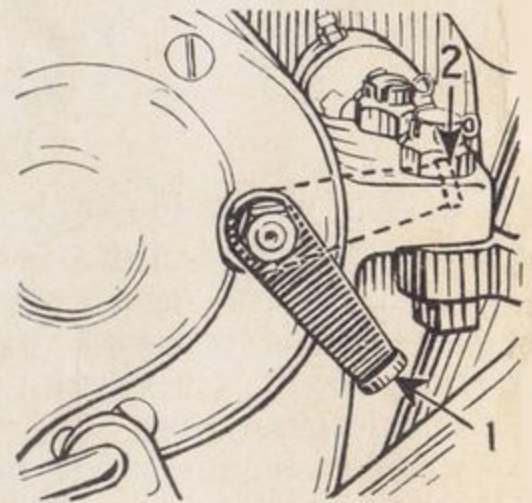
Illus. 1 shows the running position of the *Side by Side Valve motor* compression release lever, located at front end of timing gear case. Moving lever to its upward position 2 raises the exhaust valve and completely releases the compression in cylinder, allowing the motor to be cranked easily when necessary to free it or break the oil seal, preparatory to starting in cold weather.

Side by Side Valve motor cannot be started or run with lever in upward position.

The De-compressor

On Overhead Valve Motor Only

The *Overhead Valve motor* is equipped with a de-compressor which, when the operating lever is set in starting position, will open the exhaust valve during a part of each compression stroke; thereby partially releasing or lowering the compression in the cylinder, so that the motor may be cranked and started easily, especially in cold weather. The de-compressor operating lever (no Illus. shown) is located at the front end of timing gear case. The lever is in starting position when moved upward as far as it will go. It may be



Illus. 1

Compression Release Lever

1—Lever in running position; 2—Move lever to this (upward) position to release compression.

kept in this position until motor is started. Lever is in running position when moved downward as far as it will go.

It is possible for the motor to stop in such a position that the lever cannot be moved to its upward position, due to the de-compressor cam and arm (inside case) not lining up properly. If this happens, do not force the lever, but turn the motor with the starter until a position is found where the lever can be moved easily.

Carburetor High Speed Shutter

On Overhead Valve Model Carburetor Only

The carburetor on the *Overhead Valve model* is fitted with a sliding shutter (not shown in Illus. 8) with which the size of carburetor opening can be increased when maximum speed is desired. This shutter should be kept in closed position (pushed in) for all ordinary service. Open it (pull out) only when more speed is desired after throttle is fully open.

Give New Motor Pumpful of Oil Before Starting

Put a pumpful of oil into the motor with hand pump before starting. This applies only to starting a new motor the first time, as the mechanical oil pump will amply care for motor up to 40 miles an hour, thereafter. See page 8.

Use the Recommended Spark Plug

The Single—particularly the Overhead Valve model, requires an exceptionally good spark plug. A poor plug will cause pre-ignition, overheating, and loss of power and speed. The plug furnished in this motor, at the factory, is especially suited to this type of motor. When it becomes necessary to replace this plug, get a new one from a Harley-Davidson dealer, to be sure that you get a suitable plug. The number and name of this plug is: 37-09, Porcelain spark plug, metric size.

Keep the spark plug clean and properly adjusted. For a magneto equipped motor, set the plug point gap about .020 inch; for a generator equipped motor, about .035 inch, or the thickness of a dime.

To Start Motor

1. See that the gas cock below main (right side) gas tank is open.
2. Set gear shifter lever at NEUTRAL and engage the clutch.
3. Raise the lift button of carburetor low speed needle 5 (Illus. 8), and set it on the highest (second) step.

IN COLD WEATHER, in addition to lifting needle 5, set carburetor choke lever 1 at closed (inward) position and if an Overhead Valve motor, move the de-compressor lever to its upward position; then kick the motor over twice to prime cylinder. While priming, keep the ignition switch OFF on a generator model or the spark retarded on a magneto model. NOTE—Choke lever 1 must be moved to half open position before starting motor. De-compressor lever on Overhead Valve motor may be left in upward position until motor is started.

4. Set the throttle almost fully closed and the spark nearly all the way advanced.
5. Turn ignition switch ON (magneto model has no switch) and then crank the motor by giving the starter vigorous downward strokes. If the above instructions have been followed carefully, the motor should start readily.

6. As soon as motor starts, open the throttle just far enough to keep motor running. *If an Overhead Valve motor and the de-compressor lever was moved to upward position while starting, move it back to its running (downward) position.* Keep the spark advanced while motor is warming up.

7. As motor warms up or after running $\frac{1}{4}$ to $\frac{1}{2}$ mile, depending upon the weather, drop carburetor low speed needle 5 to the first step and a little later to its normal running (lowest) position. *If cold weather and choke 1 was partially closed while starting, move it to full open (outward) position before dropping needle 5.*

8. To facilitate starting in extremely cold weather, the cylinder may be primed by injecting a little gasoline directly into the cylinder through the priming cock in cylinder head.

If Motor Is Hard to Start

Hard starting and missing, especially with a new motor, is usually due to an improperly adjusted or dirty spark plug.

To Stop Motor

Stop a generator equipped motor by turning the ignition switch OFF. If the motor should be stalled or stopped in any other way than with the switch, turn the switch OFF at once to prevent the battery from being discharged through the circuit breaker points.

Stop a magneto equipped motor by turning the spark control grip all the way outward.

To Start and Stop Machine on the Road

(See "Become Familiar with the Operation of All Controls," and "To start Motor")

Keep gear shifter lever in NEUTRAL and clutch engaged until you have straddled the machine.

1. Release clutch and set gear shifter lever in forward position marked LOW; then, with spark fully advanced, engage clutch very slowly and at the same time open throttle slightly.

2. After machine has run 40 to 50 feet in LOW gear and has gained a little momentum, shift into SECOND gear. To do this, release clutch fully and at same time close throttle; then quickly pull shifter lever back to position marked SECOND. In shifting from LOW to SECOND, you will find that if you hold shifter lever against outside of slot in shifter gate, a step machined in shifter gate will stop lever at proper position. It is not necessary to take your eyes off the road. After shifting, engage clutch slowly and at same time open throttle slightly.

3. After machine has attained a speed of not less than fifteen miles per hour (depending on road conditions), shift into HIGH gear. To do this, release clutch fully and at same time close throttle. Pull shifter lever all the way back to HIGH and steady it in this position with left hand until clutch starts to engage or you feel the HIGH gear go in mesh.

Engage clutch slowly and at same time open throttle slowly until desired speed is attained.

4. When you wish to stop machine, release the clutch and apply brake. As soon as machine comes to a standstill, shift to NEUTRAL and engage clutch.

With a little practice, you will handle the clutch and shift gears with ease. You will find that you can shift from HIGH to lower gears without difficulty, when you have occasion to do so.

When running at speeds below 15 miles per hour, retard the spark or shift into SECOND gear to eliminate any tendency of the machine to jerk. Always shift to a lower gear rather than permit motor to labor and knock.

Don't let motor race when shifting gears. Learn to operate clutch and throttle together. As clutch is released, throttle must be closed.

Don't look down at your machine when shifting; it is a dangerous practice.

Don't keep motor running for more than one or two minutes at a time, while the machine is stopped.

Important Suggestions

File your registration card with the factory, promptly.

Use the recommended spark plug. See page 3.

When filling oil tank, be careful that no foreign matter that might plug up mechanical oil pump gets into tank.

Don't over-oil motor by excessive use of hand oil pump. Too much oil causes overheating and sticky valves, and forms carbon rapidly in cylinder head. Drain case occasionally and give it fresh supply of oil. See page 8 for draining instructions and for use of hand oil pump.

Use genuine Harley-Davidson oil in motor and transmission.

Don't run a new motor for long distances in low and second gear, or faster than 30 miles per hour, during first 500 miles.

Never shift gears until clutch has been fully released.

Keep drive chains properly adjusted. See page 20.

Follow carefully instructions on care of battery. See page 28.

Keep the outlet or slots in muffler cleaned out and open.

Don't use any substitute for light and horn fuse. If fuse is burned out, correct the trouble and insert a new one. See page 27.

Because of the danger of fire, if gasoline is spilled over machine when filling tanks, wipe machine off thoroughly or allow it to stand until gas has evaporated, before starting motor.

After a new machine has been run about 500 miles, tighten as tight as possible the nuts on the four bolts that secure the motor in the frame.

To Clean Machine

Wash the enamel with clear water and a chamois skin, when it becomes covered with dust and mud. Grease spots may be removed by using a soap that contains no lye. Ivory soap is recommended. Remove all traces of soap, with clear water.

Wash an oily motor and transmission with kerosene or gasoline; but never use gasoline or kerosene on enameled parts.

What To Do Every Day

Make sure that you have plenty of oil in tank for the day's run.

As long as you keep oil in the tank, the mechanical oil pump will take care of motor up to 40 miles per hour.

What To Do Twice a Week

Lubricate the fork rockers and seat post with an Alemite grease gun. A grease gun and a supply of grease can be obtained from your dealer at small cost.

What To Do Every Week

Check over machine for loose bolts and nuts.

Adjust drive chains, if necessary. See page 20.

Add oil to transmission, if needed. See page 16.

Add distilled water to battery, if needed; don't overfill. See page 28.

Grease or oil all bearings requiring lubrication, as per Lubrication Charts on pages 39-40.

What To Do Every Two Months

Inspect and if necessary adjust inlet and exhaust valve tappets. See page 12.

Inspect, clean and if necessary adjust circuit breaker points of the ignition unit. See page 27, if motor is generator equipped. See page 30, if magneto equipped.

Inspect and where necessary tighten wheel spokes.

Clean drive chains and treat them with Harley-Davidson Chain Lubricant. See page 20.

Drain old oil out of crank case and replace with fresh oil. See page 8.

To keep a single cylinder motor performing at its best, it is advisable to remove carbon and if necessary grind valves about every 1000 to 1500 miles, depending upon kind of service machine is used for. The need for this attention will be indicated by heat knocking and a loss of power and speed.

Cleaning carbon and grinding valves are simple operations that can be done in a short time by the rider. See "Removing Carbon" and "Grinding Valves" pages 10 and 11.

What To Do Every Year

Remove and clean muffler thoroughly. See page 22.

Have battery inspected and tested by a competent battery man.

Have motor, transmission, and other units thoroughly inspected and adjusted, and any worn parts replaced at an authorized Harley-Davidson service station.

License Data

Number of Cylinders.....	1
Cylinder bore (73.024 MM).....	2 $\frac{7}{8}$ inches
Piston displacement (345.72 CC).....	21.098 cu. in.
Stroke (82.548MM).....	3 $\frac{1}{4}$ inches
Horsepower.....	3 $\frac{1}{2}$
Wheel Base.....	55 inches
Weight (electrically equipped).....	265 lbs.
Model A—Standard, Side by Side Valve, Magneto equipped motor.	
Model B—Standard, Side by Side Valve, Electrically equipped motor.	
Model AA—Sporting model, Overhead Valve, Magneto equipped motor.	

Model BA—Sporting model, Overhead Valve, Electrically equipped motor.
 Model AAE—(Export) Sporting model. Same as model AA except for handlebar clutch control, foot rests and special handlebars.
 Model BAE—(Export) Sporting model. Same as model BA except for handlebar clutch control, foot rests and special handlebars.
 Engine Number: The motor or serial number is stamped on the crank case just below the cylinder, on left, or sprocket side.

NOTE—When writing to our Service Department for information, always mention this motor number.

Standard Gear Ratios

Models	Motor Sprocket	Clutch Sprocket	Countershaft Sprocket	Rear Wheel Sprocket	High Gear Ratio
A and B.....	13	36	15	34	6.27
AA and BA.....	13	36	15	31	5.72
AAE & BAE.....					

To Find Gear Ratio

Divide product of number of teeth on rear and clutch sprockets by product of number of teeth on engine and countershaft sprockets. Result will be gear ratio, or number of motor revolutions to one revolution of rear wheel.

MOTOR LUBRICATION

Motorcycle motors, because they are air cooled and work at very high temperatures, must be lubricated with an oil prepared especially for them. The proper oil for you to use, to get the best performance from your motor for the greatest length of time, is GENUINE HARLEY-DAVIDSON OIL. This oil is refined to our specifications. We supply it for the protection of Harley-Davidson riders.

Few of the many brands of oil on the market will lubricate your motor as well as Harley-Davidson oil. Many oils that are very satisfactory for automobile motors would cause serious damage to a motorcycle motor in a short time; so don't take a chance.

Most Harley-Davidson dealers sell Harley-Davidson oil. You can purchase it by the quart as needed, or in one and five gallon sealed and trade-marked cans. If your dealer doesn't have Harley-Davidson oil in stock, he can order it for you. If you are so located that you can't get to a dealer, you can order oil directly from the factory.

Harley-Davidson oil is made in two grades—summer and winter. Use summer oil when temperature is above 15° to 20° F. Use winter oil when temperature drops below 15° to 20° F.

Motor Lubrication in Cold Weather

In some localities the temperature may go so extremely low that even winter oil will congeal (thicken) so that it will not flow. In that case, thin it slightly with kerosene, but never use more than one part kerosene to eight of oil.

In cold weather, run motor slowly until it is thoroughly warmed up; otherwise some damage may result before oil is warm enough to flow and circulate freely.

When the cylinder is primed for starting in winter, some gas gets by piston and rings to crank case. There is therefore more crank case oil dilution in winter than in summer, and case should be drained and given a fresh supply of oil often. See page 8.

When driving at speeds above 40 miles per hour, don't fail to use hand oil pump as per instruction on page 8.

Mechanical Oil Pump

The mechanically driven oil pump (Illus. 2) is adjustable to regulate amount of oil supplied to motor. When a machine leaves the factory, the pump is adjusted to supply all the oil required up to 40 miles per hour.

Pump is adjusted with washers under head of screw 1. The adjustment when machines leave the factory is as follows: Generator equipped models, one thick and two thin washers—Magneto equipped models, one thick and one thin washers. Adding washers increases oil supply, while taking off washers cuts down oil supply. Never remove the heavy washer. One thin washer makes approximately 100 miles difference to a gallon of oil.

After a new motor has been run in for 500 miles, it is permissible to remove one thin washer, for summer service. The original adjustment is best for winter service.

A machine in ordinary service should run about 800 miles on a gallon of oil. Oil mileage depends somewhat on road conditions, low and second gear running, high speed, etc.

There is no shut off in oil line between oil tank and pump; therefore, if you will keep oil in the tank and be careful that no dirt or foreign matter gets into tank and plugs up oil line, you are assured that oil is feeding to motor, whenever motor is running.

Use of Hand Oil Pump

Use the hand oil pump 15 (Illus. 20) located on left tank, to give motor an additional supply of oil when traveling at speeds above 40 miles per hour for some distance, and when bad roads necessitate traveling in low or second gear for some distance. Under these conditions give motor a little extra oil occasionally, but more than $\frac{1}{3}$ to $\frac{1}{2}$ pumpful at a time.

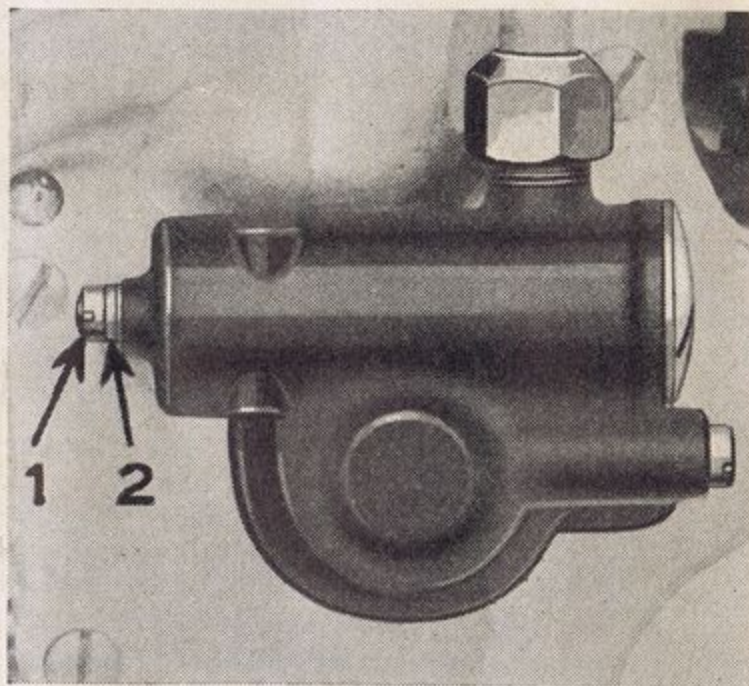
In ordinary service up to 40 to 45 miles per hour, it is not necessary to use hand pump, except to inject a fresh supply of oil when crank case is drained. See "Draining and Flushing Crank Case."

Don't forget that while feeding too much oil with hand pump is better than not enough, it is harmful and with the positively dependable Harley-Davidson mechanical oiler, unnecessary.

Draining and Flushing Crank Case

Drain and flush the crank case and give it a supply of fresh oil at least every 700 miles. Do this while motor is hot.

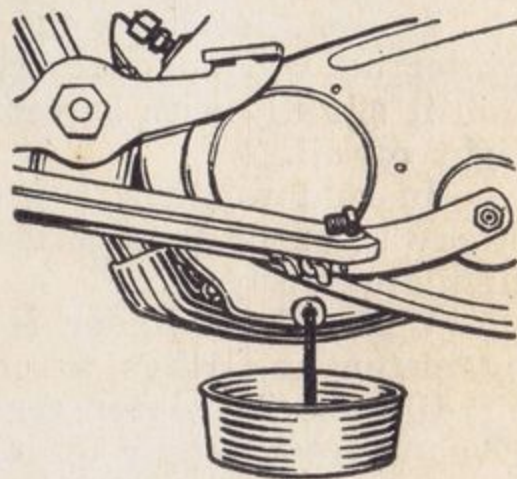
Remove drain plug and drain the case



Illus. 2

Mechanical Oil Pump

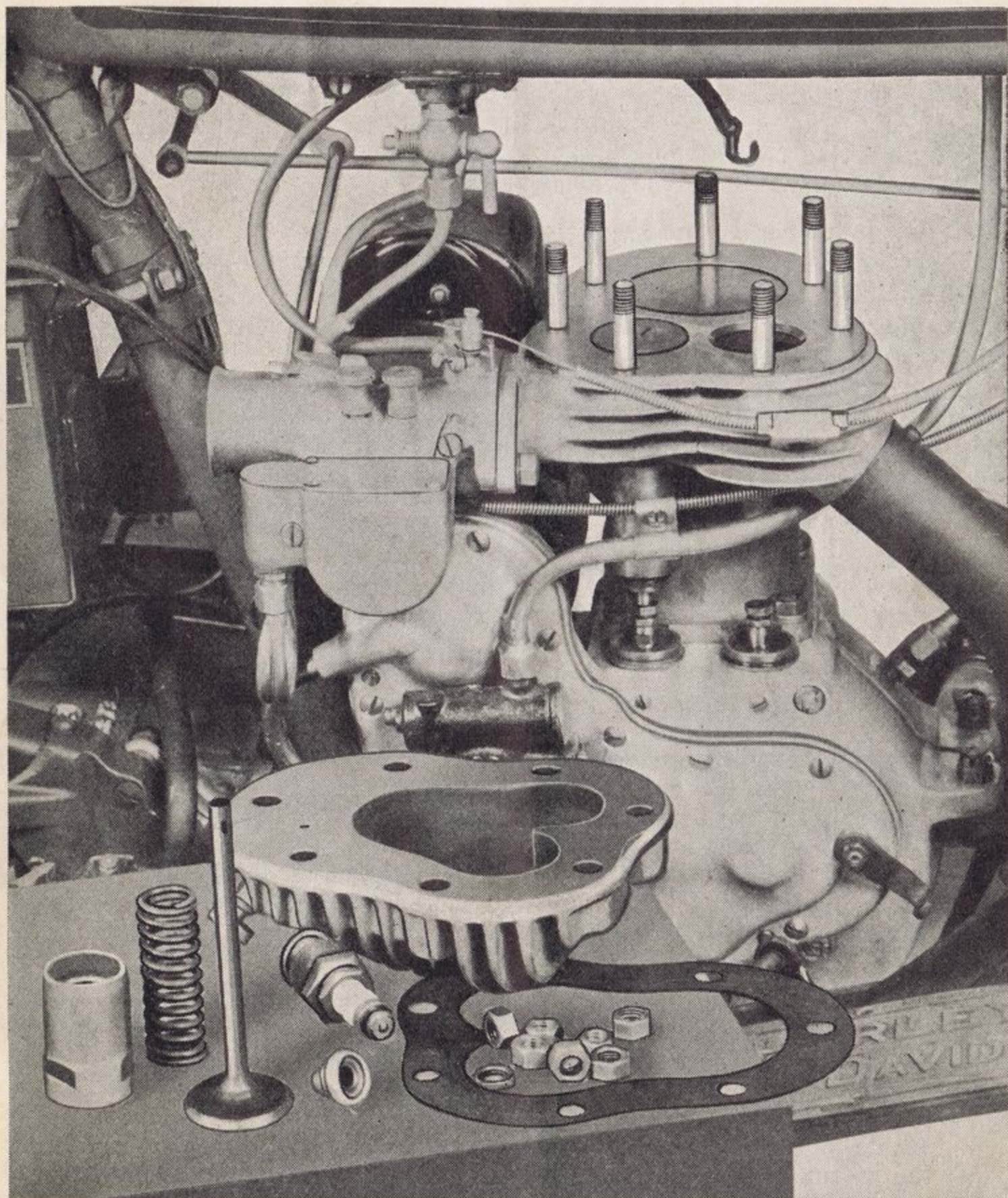
1—Adjusting screw; 2—Adjusting washers.



Illus. 3

Draining Crank Case

(Illus. 3). Replace plug and pump four or five pumpfuls of motor oil into case, with hand oil pump. Start motor and run it for one or two minutes; then remove plug and drain case again. This will flush all the old oil out of case. Replace plug, pump 2 to 2½ pumpfuls of oil into case, and motor is ready for service.



Illus. 4—Side by Side Valve Motor
Showing What Parts Must Be Removed When Cleaning Carbon and Grinding Valves.

GENERAL MAINTENANCE

When and How to Remove Carbon and Grind Valves

Remove carbon from the cylinder and piston heads and, if necessary, grind valves about every 1000 to 1500 miles, or when the motor indicates by heat knocking and loss of power and speed, that this attention is needed. These are very simple operations. Without removing the motor from the frame, the cylinder head can be removed in a few minutes, exposing the piston head and valves. The valves can then be taken out, if desired. The cylinder can be lifted off, if desired, to inspect the piston and rings. The operations connected with removing carbon and grinding valves are explained below.

Removing the Cylinder Head

Illus. 4 shows better than words how the cylinder head is removed from the cylinder on a *Side by Side Valve motor*. After removing the spark plug, remove the seven head clamp nuts. The cylinder head and copper gasket can then be lifted off. Before removing the copper gasket, mark it in some way so that you can replace it with the same side up.

If the motor is an *Overhead Valve model* (no Illus. shown), remove the head as follows: Remove right footboard and muffler. Disconnect the carburetor control wire at the carburetor and pull the control cable forward from between cylinder head flanges. Remove the gasoline pipe. Loosen the valve push rod covers, and then, using a large screw driver or some similar tool as a lever, pry the valves open far enough to allow push rods to be lifted out. (**NOTE**—If piston happens to stand at top of stroke, valves cannot be forced open far enough to release push rods). The rocker arm stud nuts on left side of cylinder head will serve as the fulcrums for lever used to pry valves open. This operation can be made easier by turning the tappet adjusting screws all the way down, or in other words, shortening the tappets, so that prying the valves only slightly open will release the push rods. Remove the cylinder head frame brace nut. Remove the four cylinder head clamp bolt nuts, and lift out the bolts. These nuts are between the cylinder flanges at bottom end of bolts. The cylinder head can now be pulled off to right side of motor. It will pull off freely unless the piston happens to stand at its highest position in the cylinder. In that case turn the motor until the piston is down in the cylinder. Before removing the copper gasket, mark it in some way so that you can replace it in the same position and with the same side up.

CAUTION—When removing a cylinder head, be very careful that the copper gasket and the smoothly ground surfaces of the cylinder and head joint are not damaged, thereby causing an oil leak.

Removing Carbon

After the cylinder head is off, carefully scrape all carbon from it. Turn the motor until the piston is at its highest position in the cylinder; then scrape all carbon from the piston head and from around the valves. A screw driver, a knife or some other sharp edged instrument will serve as a carbon scraper. Be careful that the ground surfaces of the cylinder and head joint are not scratched or nicked. While scraping carbon, some

carbon dust will work down between the cylinder and piston above the top piston ring. To remove this, lower the piston about an inch and with a clean cloth, wipe the cylinder wall clean. Repeat this operation until certain that all carbon dust has been wiped out.

Next, inspect the valves as explained below.

Grinding Valves

After removing carbon, inspect the valves and valve seats. The valves must seat perfectly. Any leakage by them means a loss of power and overheating. If there are any carbon deposits on the valves and seats, or if the valves appear burned and pitted, they should be ground in. If the valves and seats appear clean and free from carbon and the valves seem to seat perfectly, it is not necessary to grind them.

Ordinarily, the valves will not need attention oftener than when the cylinder head is removed for carbon cleaning; however, if at any time the motor loses its compression, first make sure that it is not due to tappets being adjusted too tight, and then remove cylinder head and inspect valves and valve seats.

The forward valve, concave head and marked EX., is the exhaust valve. The rear valve, flat head and marked IN., is the inlet valve. The valves are of different materials and cannot be interchanged.

Grind valves in a *Side by Side Valve motor* as follows: After loosening and lifting valve spring cover, pry the spring collar upward with a screw driver, and remove the valve key. The valve can then be lifted out and the spring cover, spring, etc., set out of the way (Illus. 4). Be careful that the paper gasket between the valve cover and tappet bushing is not lost or damaged.

After cleaning and polishing valve, particularly the stem, put a small amount of grinding compound (a carborundum and oil compound, preferably Harley-Davidson, is recommended) on the valve face and drop the valve back into its place in the cylinder. Using a screw driver in the slot in valve head, and pressing down lightly, turn the valve back and forth, lifting it occasionally and dropping it back onto its seat. It is important the valve grinding be done in this manner, to avoid cutting rings or grooves in valve face and seat. It may be necessary to add fresh grinding compound several times, depending on the condition of the valve. If valve faces and seats are in very bad condition, badly warped or burned and pitted, it is advisable to have them refaced at a Harley-Davidson service station, which is equipped with the necessary refacing tools.

Grind the valves until, when washed off with a little gas, both the valve face and the valve seat are smooth and bright all the way around. Wash every particle of grinding compound from the valves and valve seats, and flush out valve guides with gasoline or kerosene. After wiping all parts clean and dry, put a little oil on valve stems and re-assemble valves in cylinder. If valve springs are under $2\frac{3}{8}$ inches long, replace them.

If the motor is an *Overhead Valve model*, inspect and, if necessary, grind the valves in the same manner as in the Side by Side Valve motor, although different methods must be used to remove and reassemble them in the cylinder head. A very stiff double spring combination is used on each valve, and the spring collar is secured with a split ring instead of

the ordinary straight key. A valve tool, with which the spring can easily be compressed, so that split ring can be removed and valve taken out, can be obtained from your dealer. A damaged valve stem and the loss of some parts is likely to be the result of attempting to compress these springs with a screw driver or some makeshift tool. As these valve heads are not heavy enough to allow for screw driver slots, a special tool will be required for grinding them. This tool can be obtained from your dealer.

After valves have been ground and re-assembled in their proper places, replace cylinder head and adjust valve tappets.

Replacing the Cylinder Head

With a piece of very fine emery paper or sandpaper, rubbing with a rotary motion, thoroughly clean and polish the ground surfaces of cylinder and head joint. Use the same method to clean the copper gasket. Before doing this polishing, stuff a cloth into the cylinder above the piston to keep dust from getting into cylinder. After the polishing is completed, carefully blow and wipe all traces of sand or emery dust from the cylinder and the joint surfaces. Give the gasket a light coat of motor oil on both sides and place it on cylinder. If the old gasket is being used again, try to get it in the same position and the same side up to insure a tight joint. If a new gasket is being fitted, it may be fitted either side up, the first time. It is not necessary to renew gasket every time head is removed. Ordinarily with careful treatment, it may be used several times. Next, place the head on the cylinder and after putting a little oil on the studs, (bolts, if an Overhead Valve job), turn the nuts on. The head must be tightened down evenly and carefully in order to get a tight joint. First, turn all of the nuts up just snug; then tighten each of them $\frac{1}{8}$ to $\frac{1}{4}$ turn at a time until they are all pulled up tight.

To finish assembling the motor, reverse the operations performed in removing the head as explained under "Removing the Cylinder Head." After the motor has been run a few miles, go over the head clamp nuts again and see that they are all tight. Do this while the motor is normally hot.

Valve Tappet Adjustment

To get all the horsepower out of a motor, keep valve tappets properly adjusted. They must be adjusted after grinding valves and should be inspected about every 1000 miles thereafter.

The important things to be remembered when adjusting tappets are: Motor must be cold. Compression release lever (de-compressor lever on Overhead Valve motor) must be in downward position (Illus. 1). To be sure that a valve is fully closed when adjusting its tappet clearance, turn motor until other valve is held wide open. Before replacing a valve spring cover (push rod cover on Overhead Valve motor), inspect paper gasket between cover and tappet bushing. If broken or damaged, fit a new gasket to prevent an oil leak at this point.

To Adjust Inlet and Exhaust Valve Tappets

Side by Side Valve Motor

Adjust both the exhaust and inlet valve tappets so there is .004 to .005 inch clearance between the tappets 4-6 (Illus. 5) and the ends of valve stems 2-7. An accurate thickness gauge should be used to measure

this clearance. If no gauge is available, use one thickness of ordinary writing paper. To adjust, loosen lock nut 5 slightly; then hold tappet body 4—6 with one wrench and with another wrench turn adjusting screw 1 in or out of tappet body as may be necessary to obtain proper adjustment. When adjustment is completed, securely tighten lock nut 5.

To Adjust Inlet and Exhaust Valve Tappets

Overhead Valve Motor

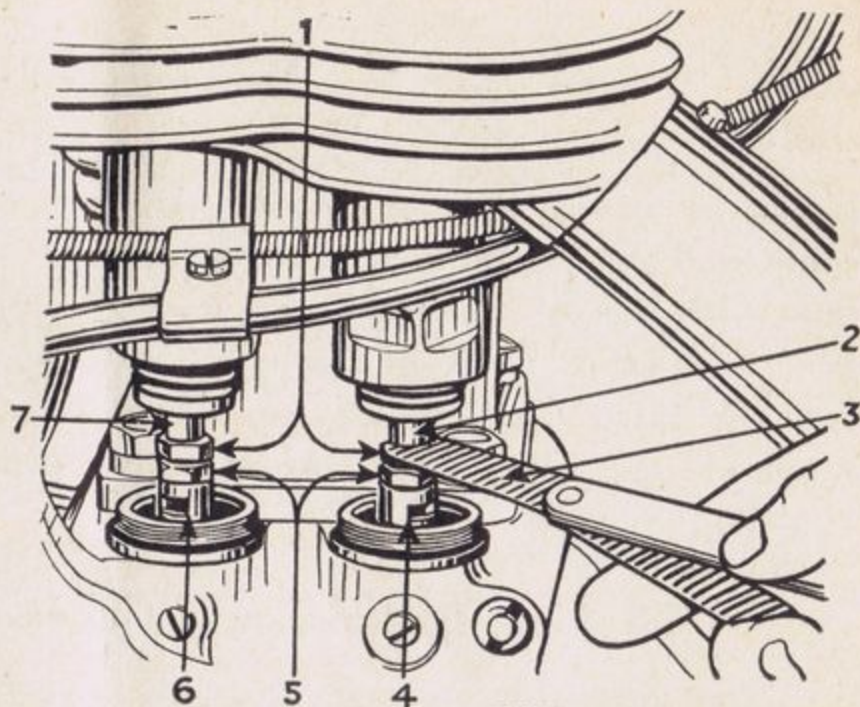
Adjust both the exhaust and inlet tappets so there is just a noticeable clearance between the end of valve stem and the rocker arm (no Illus. shown).

The tappet adjustment is made in the same manner that the Side by Side motor valve tappets are adjusted.

Loosen and lift the push rod covers to get at the tappets.

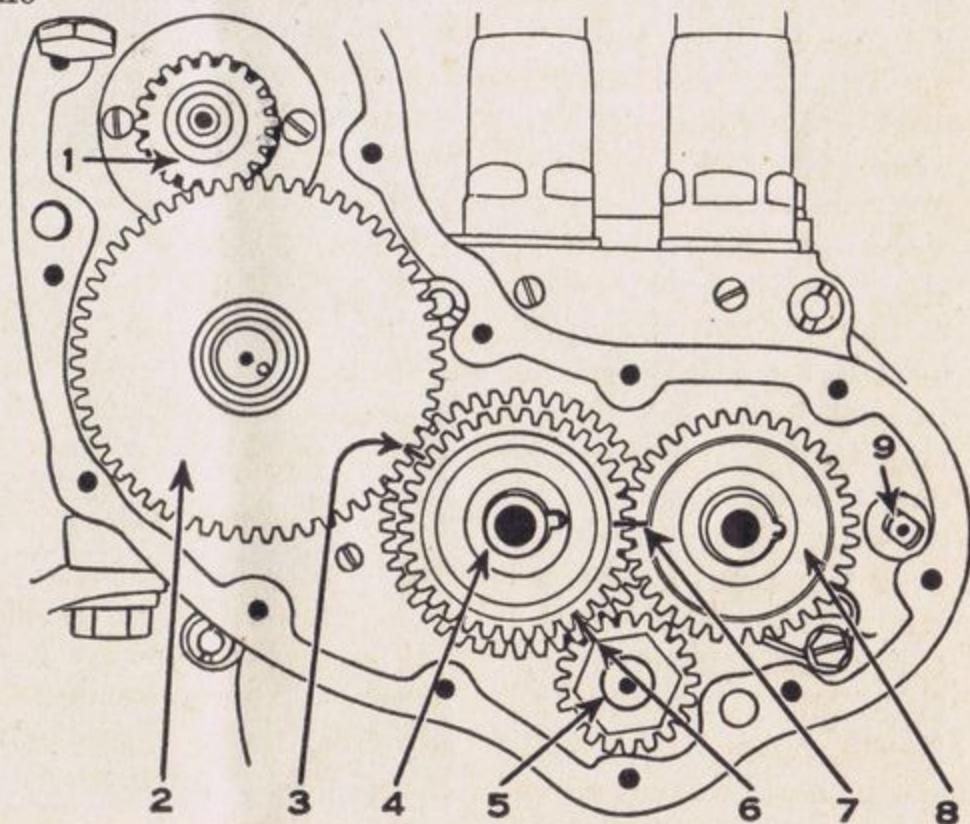
Valve and Ignition Timing

The valves are timed to open and close at the right time, and the ignition unit is timed to produce a spark at the right time, by means of a series of gears (Illus. 6) in timing gear case. Motor cannot get out of time unless some of the gears are removed or their setting disturbed. In that case, re-time the motor as per the following instructions. To get at the timing gears, remove carburetor and gear case cover.



Illus. 5—Valve Tappets Side by Side Valve Motor

1—Tappet adjusting screws; 2—Exhaust valve stem; 3—Thickness or feeler gauge; 4—Exhaust valve tappet; 5—Adjusting screw lock nuts; 6—Inlet valve tappet; 7—Inlet valve stem.



Illus. 6—Timing Gears Generator Equipped Motor

1—Generator gear; 2—Intermediate gear; 3—Mark on inlet cam gear 4, with which, marks on gears 1 and 2 are lined up in a magneto equipped motor. (Gears 1 and 2 are not marked, in generator equipped motors); 4—Inlet cam gear; 5—Pinion gear; 6—Marks on pinion gear and inlet cam gear correctly aligned; 7—Marks on inlet and exhaust cam gears correctly aligned; 8—Exhaust cam gear; 9—Compression release lever stud.

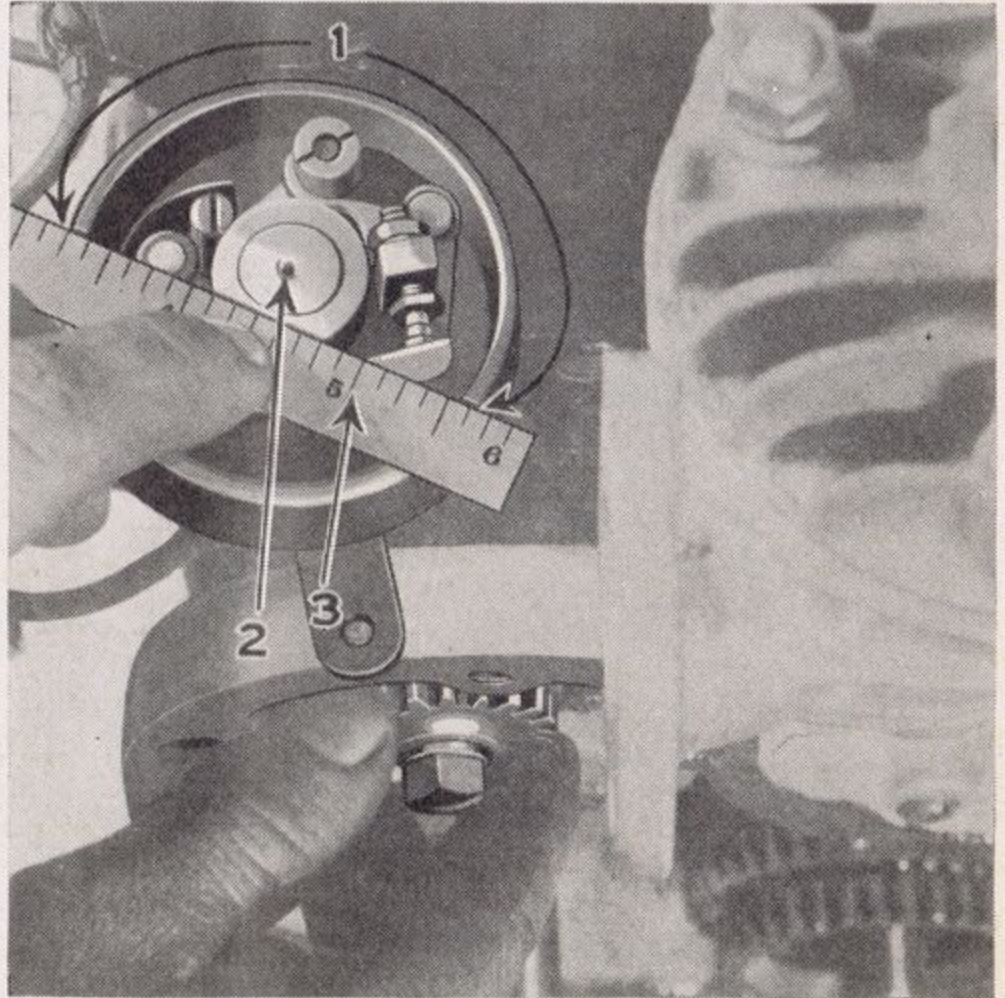
To Time Valves

The valve timing gears are marked so that if removed they can be replaced in correct time as shown in Illus. 6. The inlet cam gear 4, which is a compound gear, is marked in three places 3—6—7. Assemble the gears in the case with one of the marks on gear 4 in alignment with mark on pinion gear 5, another mark in alignment with the mark on exhaust cam gear 8, and the third mark facing gear 2. The valves are then timed correctly. Assemble the other two gears 1—2 as per instructions under "To Time Ignition."

To Time Ignition on a Generator Equipped Model

The generator gear 1 (Illus. 6) and the intermediate gear 2 are not marked, so time ignition as follows: Assemble the pinion and cam

gears 4—5—8 in the gear case with their marks in perfect alignment as shown in Illus. 6, and explained under "To Time Valves." Fit the generator gear 1 to the armature shaft. This gear is located in position on the armature shaft with a key and is provided with three keyways so that it can be located in a position that will allow exact timing. Fit any one of the keyways over the key temporarily. Turn the armature shaft nut (left hand nut) up lightly. Next, hold a 6 inch scale 3 (Illus. 7) or some small straightedge, tight and squarely against the flat side of circuit breaker cam 2, and turn the generator until the scale or straightedge is in alignment with marks 1, cut in the top edge of timer base.



Illus. 7

Setting the Circuit Breaker to Time Ignition on Generator Model

1—Timing marks cut in timer base; 2—Circuit breaker cam; 3—Six inch scale used as straightedge.

Steady the generator in this position and after observing that the marks on pinion and cam gears are still in alignment as explained above, fit intermediate gear 2 (Illus. 6) into the case. Do not move either the

generator or cam gear in order to allow gear 2 to slip into mesh. If it slips into mesh freely, the ignition is timed right. If it will not slip into mesh, change the location of generator gear 1 on the armature shaft, by removing the gear and turning it so that one of its other keyways registers with the key in the shaft. Then go through the complete timing operation again. After locating the generator gear on the shaft so that intermediate gear 2 meshes properly, tighten the armature shaft nut and replace the gear case cover.

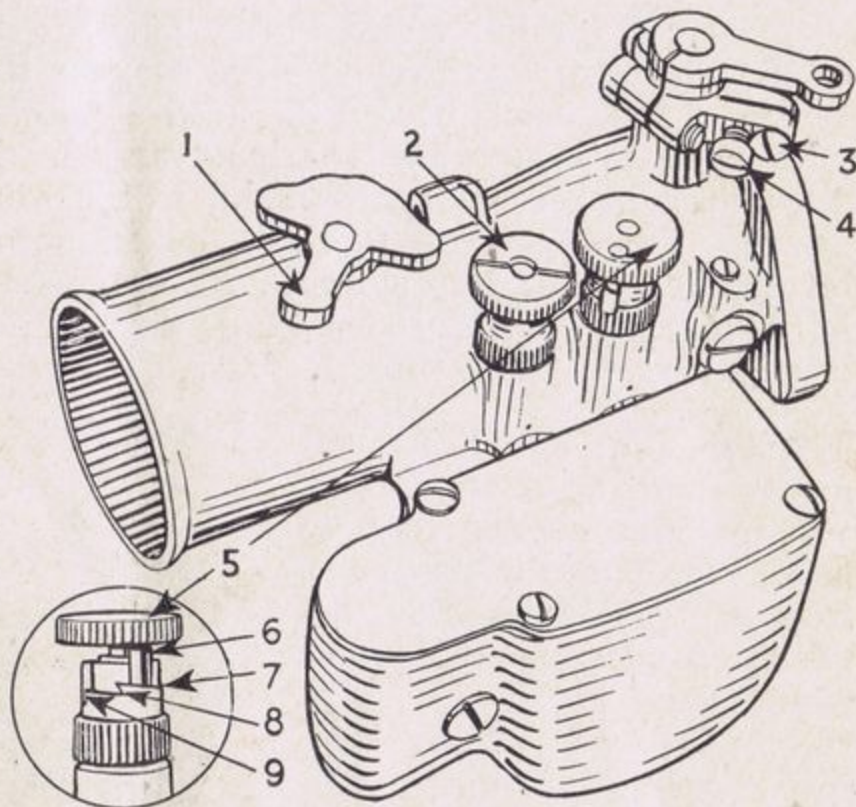
To Time Ignition on a Magneto Equipped Model

As all timing gears in a magneto equipped motor are marked, simply set the pinion and valve cam gears 4—5—8 with their marks in alignment as shown in Illus. 6, and carry the alignment of marks right through to the magneto gear.

NOTE—Illus. 6 shows the gears in a generator equipped model. Gears 4—5—8 are the same in a magneto model, but gears 1—2 are different.

The Carburetor

Don't continually tamper with the carburetor adjustment. If the motor doesn't run right, first look for the trouble elsewhere. See "General Trouble Charts" page 37. See that the spark plug is clean, properly adjusted, and that the porcelain core is not cracked. Try a new plug. See "Use the Recommended Spark Plug" page 3.



Illus. 8—Carburetor

To Adjust the Carburetor

For starting instructions, see page 3

The forward needle 5 (Illus. 8) adjusts the mixture for idling and low speed. This needle is fitted with a lift button with which it can be lifted to enrich the mixture temporarily for easy starting and warming up, as explained in starting instructions. *Lift button must be in its lowest position, when adjusting this needle.*

1—Choke lever (open in outward position—closed in inward position); 2—High speed adjusting needle; 3—Lock screw for adjusting screw 4; 4—Throttle stop screw with which the closed throttle motor speed is regulated; 5—Low speed adjusting needle (has a screw adjustment; also can be lifted to enrich mixture temporarily for easy starting); 6—Needle lift button locating pin; 7—Second (highest) step to which needle can be lifted; 8—First step to which needle can be lifted; 9—Normal running position of needle lift button (all the way down).

The rear needle 2 adjusts the mixture for acceleration and high speed.

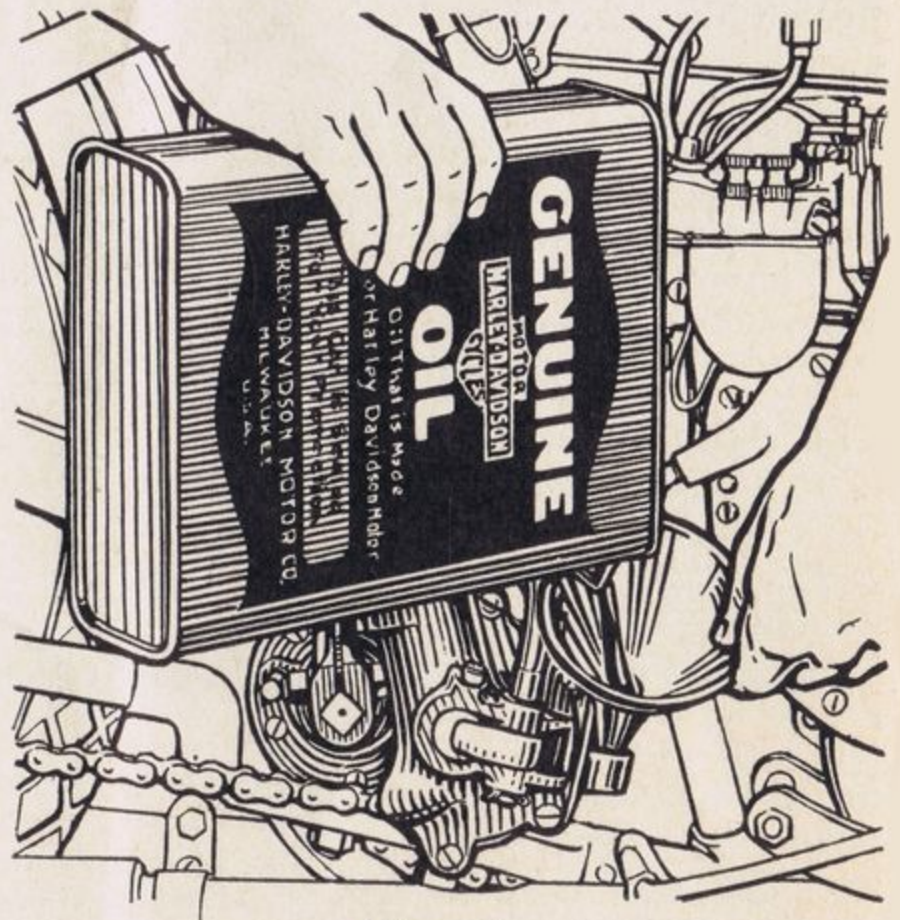
Turning the needles down (to right) makes the mixture leaner; backing them out (to left) makes the mixture richer. The needles are held in whatever position they may be turned to, by a spring and plunger which drops into notches in the needle adjusting screw.

A carburetor requires little, if any, re-adjusting. At the most, it should not be necessary to adjust the needles more than one or two notches richer or leaner to correct the mixture for a change in weather conditions.

Adjust a carburetor that is badly out of adjustment, as follows: Turn both the low and high speed needles all the way down (to the right). Then back them out (to the left) about $2\frac{3}{4}$ turns on the low speed needle 5, and about $1\frac{1}{2}$ turns on the high speed needle 2. With the needles in these positions, the motor will start but the mixture will probably be too rich. Start the motor and after it is normally hot, correct the adjustment of both needles.

Adjust for low speed first. Turn needle 5 down (to right) one notch at a time until mixture becomes so lean that motor misses and is inclined to stop; then back needle up 3 to 5 notches or until motor hits regularly with throttle closed and spark advanced. Next, adjust throttle stop screw 4 as may be necessary to make motor idle at proper speed with throttle closed. Turning screw to right makes motor idle faster. Turning screw to left makes motor idle slower. An extremely slow idling adjustment causes hard starting. Before making this idling adjustment, be sure control is adjusted to close throttle fully.

After low speed adjustments have been completed, run machine on the road to make high speed adjustment. Run at various speeds between 20 miles per hour and wide open. Have spark fully advanced. Turn high speed needle 2 down (to right) a little at a time until mixture becomes so lean that motor doesn't respond to throttle, and back-fires (spits) through carburetor; then back needle up a little at a time until motor responds to throttle, accelerates without back-firing (spitting), and hits evenly at high speeds or with wide open throttle.



Illus. 9

Putting Oil in Transmission

Care of Transmission

The transmission requires no periodical attention or adjustments other than to keep it filled to the proper level with oil. Inspect the oil level every week and add oil if

necessary (Illus. 9). Add as much oil as the height of the filler opening on the front of case will allow. Use the same grade of oil used in the motor; summer oil in summer, and winter oil in winter. Don't use heavy auto transmission grease.

Keep the transmission clamped down tight to the frame, to prevent the two bottom studs from working loose and damaging the case.

A little oil may work out through the bearings of any transmission, so don't be alarmed if, after the machine is stopped, a few drops of oil drip from various parts around the case. However, should an oil leak become so bad that little oil can be kept in case, the oil retaining washer on each side of case should be renewed. One of these washers is back of the clutch; the other, back of the countershaft sprocket. These washers can be changed in a few minutes at a Harley-Davidson service station, where the necessary special wrenches are at hand.

NOTE—When the transmission is properly lubricated, hard shifting and clashing of gears when shifting are invariably due to improper clutch adjustments rather than trouble in the transmission.

Adjusting the Clutch

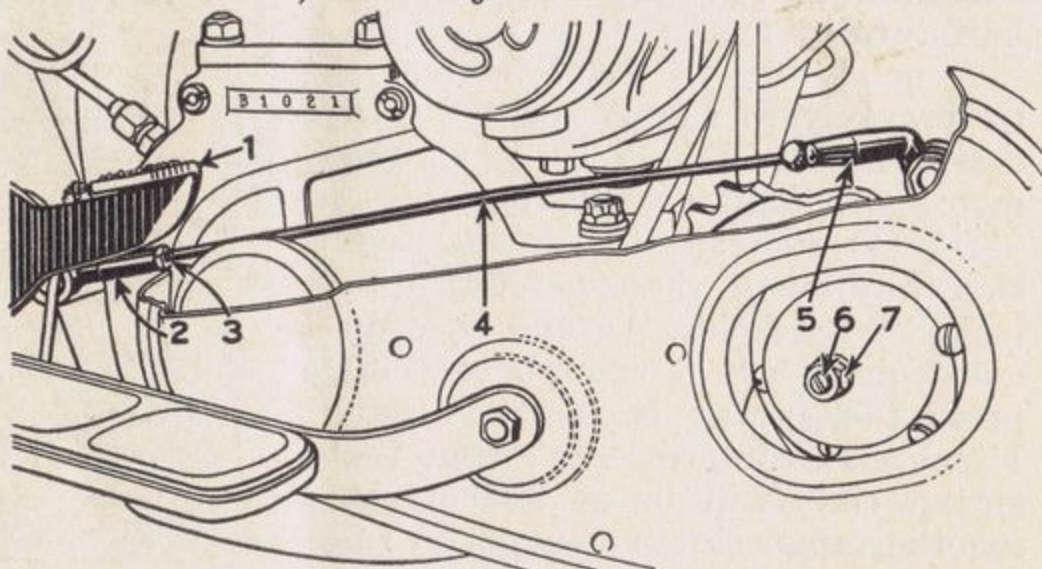
When a clutch is in need of adjustments or repairs, it is either because it does not hold under a load, or because it drags when in released position. In either case the first thing to be checked up is the adjustment of the clutch lever 5 (Illus. 10) and clutch rod 4 (handlebar control on Export Sporting model). Nearly all clutch troubles are due to improper adjustment of these controls.

To Adjust Clutch Lever and Clutch Rod

All Models Equipped with Standard Foot Controlled Clutch

Loosen left footboard and disconnect clutch rod 4 (Illus. 10) at footpedal 1. Then, loosen lock nut 7, and adjust thrust screw 6 so that clutch lever 5, when held forward at the point where it starts to act on the clutch, stands squarely across transmission. Hold screw 6 in this adjustment, with a screw driver, and tighten lock nut 7.

Next, connect rod 4 to footpedal 1, and tighten the footboard. Then, by loosening lock nut 3 and turning rod 4 further into or out of rod end 2, adjust the length of



Illus. 10

Clutch Controls (Chain Guard Cut Away)

- 1—Footpedal; 2—Clutch rod end; 3—Lock nut;
4—Clutch rod; 5—Clutch lever; 6—Thrust screw;
7—Thrust screw lock nut.

rod 4 so that lever 5 has 1/16 to 3/32 inch free movement back and forward, when footpedal is rocked forward as far as possible. After adjustment is completed, securely tighten lock nut 3. It is not necessary to remove chain guard when making these adjustments.

CAUTION—If clutch lever 5 has no free movement as explained above, clutch will not hold properly. If too much free movement is allowed, clutch will drag when in released position, and consequently the gears will shift hard, clash, and eventually become damaged. This caution applies to the handlebar controlled clutch also.

To Adjust Clutch Lever and Clutch Handlebar Control

Export Models Equipped with Handlebar Controlled Clutch

(No Illus. of handlebar control is shown). Loosen clutch control cable nuts, which secure cable in cylinder base cable clamp, and lift the cable out of clamp. Then, loosen lock nut 7 (Illus. 10) and adjust thrust screw 6 so that clutch lever 5, when held forward at the point where it starts to act on the clutch, stands squarely across transmission. Hold screw 6 in this adjustment, with a screw driver, and tighten lock nut 7.

Next, place control cable back into cylinder base cable clamp, and by means of the two nuts on cable—one on each side of clamp—locate the cable in clamp so that when clutch handlebar lever is free, the clutch lever 5 (Illus. 10) has just noticeable free movement back and forward. Check the adjustment after cable nuts are securely tightened.

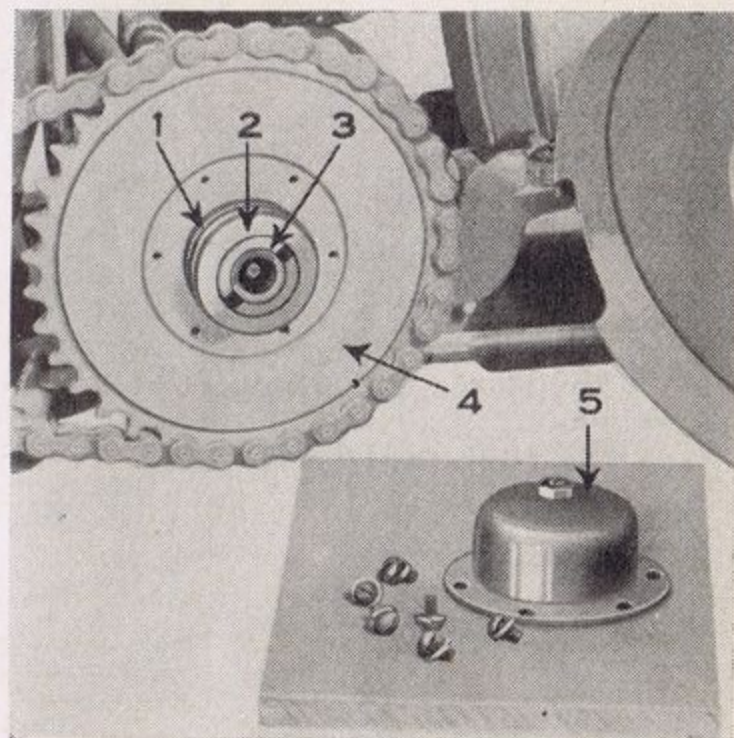
To Adjust Clutch Spring Tension

If clutch slips, *after clutch lever and clutch rod (handlebar control on Export Sporting model) adjustments are correct*, increase the spring tension as follows: After removing the front chain guard, remove thrust cap 5 (Illus. 11), exposing the clutch spring 1 and spring adjusting nut 3. Tighten (turn right) nut 3 one-half turn at a time until clutch holds, testing clutch after each half turn of nut.

A good way to test a clutch is to crank the motor. Usually a clutch that will hold to crank the motor will hold on the road.

Do not increase the spring tension any more than necessary to make clutch hold. In any case do not tighten nut 3 enough to compress the spring to shorter than 1 inch. If compressed shorter, the spring coils will be so near tight together that clutch cannot be released.

If increasing the spring tension will not make the clutch hold, disassemble it and inspect the friction discs.



Illus. 11

Clutch with Thrust Cap Removed

1—Clutch spring; 2—Spring collar;
3—Spring tension adjusting nut; 4—
Outer clutch disc; 5—Thrust cap.

To Disassemble Clutch

After removing the chain guard and thrust cap 5 (Illus. 11), turn nut 3 all the way off the shaft. The clutch discs, sprocket, etc., are then free to come apart. Inspect the asbestos friction discs. If they are oil soaked but otherwise in good condition, drop them in a pan of gasoline for a few minutes; then burn off the gas and oil and dry them with a blow torch or over an open flame. Clean the glazed surfaces of the discs with sandpaper and wipe them clean and dry. After washing all oil and dirt from the metal parts with gasoline, and drying them thoroughly, re-assemble the clutch. Put a few drops of oil in the roller bearing in the center of the sprocket. Be sure that the sprocket is assembled right side out as per marking "This Side Out" on one side of sprocket. Put a little grease on the convex side of nut 3, so that self-aligning spring collar 2 will adjust itself to the spring. Turn nut 3 on the shaft and adjust it so the spring is compressed to from 1 to 1-1/16 inch, measuring from face of outer disc 4 to inside face of spring collar 2.

Before replacing thrust cap 5, put a little grease on the ball inside the cap. After clutch is assembled, check the adjustment of clutch lever and clutch rod (handlebar control on Export Sporting model).

The Clutch Footpedal Friction

The clutch footpedal is fitted with friction discs and a spring which will hold it in any position. Some pressure with the foot should be required to rock the pedal either forward or back. If the pedal does not hold properly, when rocked backward, dis-assemble it and with a file, smooth off any high or rough spots on the discs. Renew the discs if they are badly worn. To dis-assemble the pedal, remove large cap screw which secures pedal to pedal crank.

To Adjust Gear Shifter Lever

Correctly adjusted, the shifter lever will stand 1/16 to 1/8 inch from the end of slot in shifter gate when the gears are shifted into HIGH. This adjustment must be accurate to avoid running with gears only partially meshed.

To adjust, disconnect shifter rod 17 (Illus. 20) where it connects to shifter lever, and then shorten or lengthen the rod as may be necessary, by loosening lock nut and turning rod end further on or off rod.

The Gear Lock Plunger

A spring plunger, fitted into an adjustable bushing in front of transmission case near bottom of case, drops into notches in the gear lock plate (inside of case), and locates and holds the transmission sliding gear in exact mesh or alignment with whichever gear it may be shifted to, (*provided gear shifter lever is properly adjusted so that gear is shifted to correct position*). The plunger spring tension adjustment can be changed by turning plunger bushing further into or out of case.

The factory adjustment of bushing should not be changed unless absolutely necessary, because the bushing is eccentric, and turning it, not only changes the spring tension, but also changes the position of plunger and consequently the mesh of the gears.

If it should be necessary to disturb the setting of the plunger, be sure that it is re-set in such a position that the gears will mesh fully when shifted into any position. The mesh of the gears can be inspected through the inspection hole in top of transmission.

Care of Drive Chains

Inspect the adjustment of chains every week and re-adjust them, if necessary. Chains should not be allowed to run loose enough to strike the chain guards, because when that loose, they cause machine to jerk when running at low speed, and there is excessive wear on chains and sprockets. *Adjust chains so that they have about $\frac{1}{2}$ to $\frac{3}{4}$ inch free movement up and down, midway between sprockets. If adjusted tighter, chains are likely to be noisy, especially the front chain.* Inspect them for broken rollers and worn or damaged links. If any are found, make repairs or renew the chains. To remove a chain, find connecting link and remove spring clip; then chain will come apart.

At least every 1000 miles, brush off dirt that has accumulated on chains, especially rear chain, and apply Harley-Davidson Chain Lubricant to the surface of chains. The composition of this lubricant is such that it will work into the chain bearings.

To Adjust Front Chain

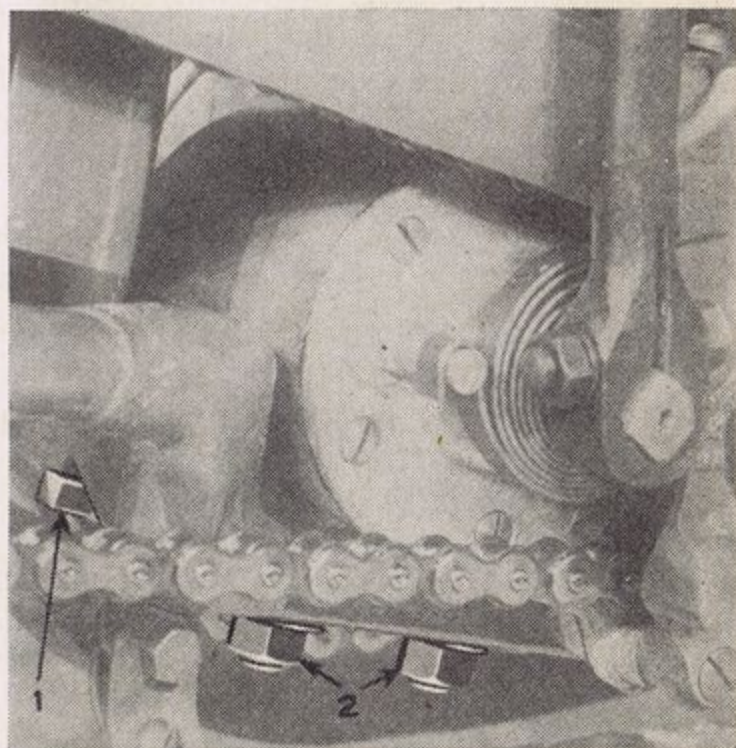
The front chain is adjusted by moving the transmission backward or forward, by means of adjusting screw 1 (Illus. 12). After loosening the two nuts 2 which clamp the transmission to the frame, turn adjusting screw 1—to the right to tighten chain—to the left to loosen chain. When the correct adjustment is obtained, securely tighten clamp nuts 2. Adjusting front chain changes the adjustment of rear chain; so both must be adjusted.

After adjusting front chain several times, check the adjustment of clutch lever and rod (handlebar control on Export Sporting model). See pages 17 and 18.

To Adjust Rear Chain

Loosen the rear wheel axle nuts, the two axle adjusting screw lock nuts, and brake arm clamp bolt nut; then, by means of the axle adjusting screws in frame at each end of axle, move the axle as much as necessary to adjust the chain properly. Turn each of the adjusting screws an equal number of turns in order to keep rear wheel aligned. See that tire runs about midway between rear frame forks, and that sprocket does not ride one side of chain.

After adjusting the rear chain, the brake may be too tight and if a speedometer is used, the gear teeth may be out of proper mesh. Adjust



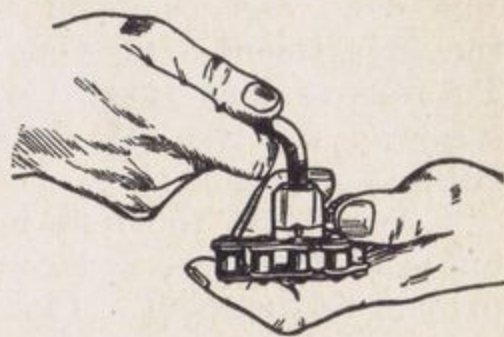
Illus. 12—Transmission Clamp Nuts & Adjusting Screw

1—Adjusting screw; 2—Clamp nuts.

brake rod and speedometer gear as may be necessary. See "To Adjust Foot Brake" and "To Adjust Hand Brake."

To Repair a Drive Chain

When necessary to repair a chain, remove damaged links by pushing out the riveted link pins, with chain repair tool (Illus. 13). Then fit the necessary repair links. A chain tool can be obtained from your dealer.



Illus. 13
Repairing a Chain

The Cushion (Motor) Sprocket

The motor is fitted with a cushion sprocket which absorbs the shocks of the power impulses; consequently the machine runs very smoothly at low speeds and the chains run quietly. This sprocket is fitted with four rubber blocks which may need to be renewed occasionally. Worn out rubber blocks will allow the sprocket to act so freely that a jerky action will be noticeable when running at low speed and when accelerating.

The sprocket bearing is automatically lubricated by the motor and should need no attention. If, for any reason this bearing should tighten or seize, preventing the sprocket from cushioning properly, the front chain may become noisy, particularly when slowing the machine down from medium to low speed.

To dis-assemble the sprocket so that the bearing may be inspected or the rubber blocks renewed, remove the sprocket from the motor and remove the spring ring from the back side of sprocket. The sprocket will then come apart, exposing the rubber blocks and the bearing.

To Adjust Foot Brake

The standard foot brake is adjusted by lengthening or shortening the brake rod, as may be necessary. Simply disconnect the brake rod at rear end and turn rod end further on or off the rod. Adjust brake rod so that brake does not take effect until foot pedal is pushed downward about 1 inch. Turn rear wheel to make sure that brake is not too tight and dragging.

To Adjust Hand Brake

Adjust the hand brake by shifting brake control cable in cable clamp, on frame tube just ahead of rear wheel. By loosening the cable nut on one side of clamp and tightening nut on the other side, shift cable *forward* to tighten brake or *back* to loosen brake. Adjust cable so that brake does not take effect until hand lever is compressed about $\frac{1}{3}$ of its full movement. Turn rear wheel to make sure that brake is not too tight and dragging.

Front and Rear Wheel Bearings

Both the front and rear wheel hubs are ball bearing type hubs. They are fitted with Alemite grease gun connectors and should be lubricated every 500 miles. Inspect the adjustment of the bearings two or three times a year and re-adjust them, if necessary. When the bearings are properly adjusted, just a trifle of play or shake can be detected and the wheel must turn freely.

To adjust the front hub bearings, first remove wheel from the machine, and then remove the cone lock nut and washer from either side of hub. The cone can then be turned to obtain the proper adjustment. Check the adjustment after cone lock nut has been replaced and securely tightened. To remove and inspect the cones and balls, turn either of the cones all the way off the axle bushing. There are 28, $\frac{1}{4}$ inch balls in the front hub, 14 on each side.

To adjust the rear hub bearings, loosen the right (sprocket) side axle nut and the cone lock nut. The cone can then be turned to obtain the proper adjustment. Check the adjustment after cone lock nut and rear axle nut have been securely tightened. To remove and inspect the cones and balls, remove wheel from the machine and turn the right (sprocket) side cone all the way off the axle. There are 22, $\frac{3}{8}$ inch balls in rear hub, 11 on each side.

Inflating Tires

Inflating tires to the recommended pressure means safest riding, best control of your machine, and utmost efficiency from your tires. Inflate 26 inch by 3.30 inch balloon tires (standard equipment) as follows: Front tire 12 to 15 lbs; rear tire 15 to 20 lbs.

To Adjust Seat Post

If the standard seat post spring combination is found to be too weak for some of the heavier riders, a stronger long spring (3127-25 standard twin spring) can be fitted.

Saddle position can be raised or lowered somewhat by removing clevis pin which secures saddle to end of seat post, and then turning seat post plunger up (to left) or down (to right); however, turning plunger way down to lower saddle is likely to compress the springs to the point where saddle rides hard.

To Remove Seat Post

Remove seat post clamp nut which is located underneath frame at bottom end of seat post tube; seat post assembly can then be pulled out. When seat post assembly is inserted into frame tube, see that flat side machined on seat post rod nut registers in flat sided hole in bottom of tube.

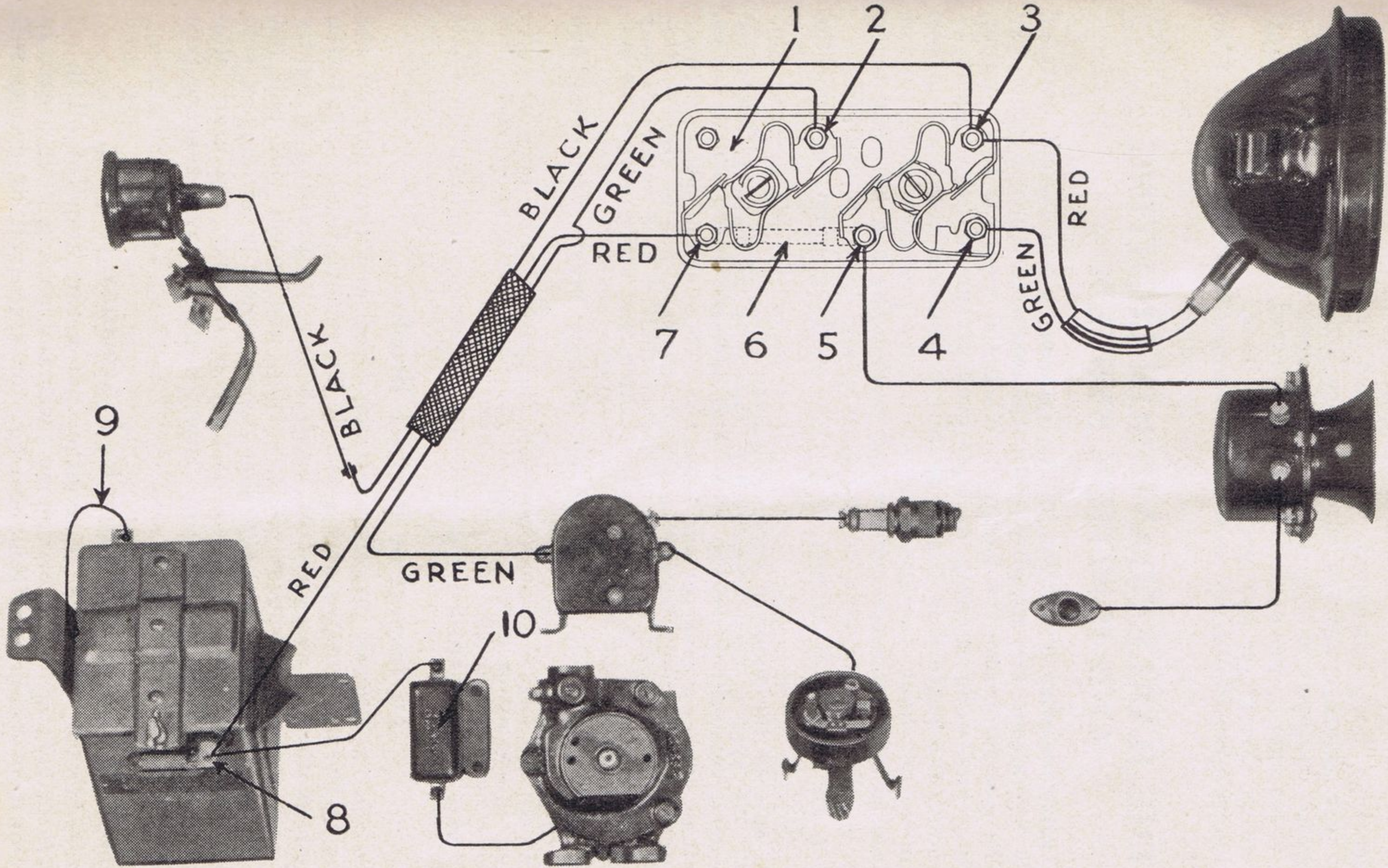
To Replace a Broken Control Wire

Remove grip sleeve by cutting about a $\frac{3}{4}$ inch hole in end of rubber grip, and then backing out handle bar end screw. The slot in this screw is wide enough so that the edge of a tool kit wrench will serve as a screw driver. Remove the two small rollers and pull out roller pin; then the plunger to which wire is attached can be pushed out through open end of bar.

Attach new wire, re-assemble grip, and adjust the control. See pages 32-36.

To Clean Muffler

Clean the slots in outer muffler tube often, with a piece of wire. Once or twice a year, remove the outer tube and clean the slots in inner tube. The outer tube can be pulled or driven off, after loosening the bolts in the frame clamp. A short stud in the frame clamp registers with a hole in the outer tube and holds it in place. A clogged muffler will cause back-pressure and overheating.



23

Illus. 14—Wiring Diagram

1—Switch box with levers and cover removed; 2—Green wire from ignition coil; 3—Black wire from tail lamp, also red wire from head lamp; 4—Green wire from head lamp; 5—Horn wire; 6—Light and horn fuse on back of switch box; 7—Red wire from battery; 8—Positive battery terminal; connect with red wire of three wire cable, also wire from cutout terminal marked BAT (lower terminal); 9—Battery ground wire; connected to negative terminal of battery and grounded to battery case (except when machine is equipped with an ammeter, see page 25); 10—Automatic cutout switch, see page 25.

Lubrication of Bearings Requiring Grease

All bearings best lubricated with grease are fitted with Alemite grease gun connectors or grease cups. There are 8 Alemite connections on all magneto equipped models, and 9 on all generator equipped models. Overhead Valve motor rocker arm studs are fitted with 2 grease cups. See Lubrication Charts on last pages of this book.

An Alemite grease gun and a supply of grease can be obtained from your dealer.

THE HARLEY-DAVIDSON LIGHTING AND IGNITION SYSTEM

A 6-8 volt, one wire or ground return system. The different units of the electric equipment are supplied with the required current from two sources: The generator and the battery. When the motor is not running, when starting and when running in high gear at speeds below about 15 miles per hour, the battery is supplying all the current required. Above about 15 miles per hour, the generator ordinarily produces more current than required to operate motorcycle, except when lights and horn are being used. The surplus current goes to the battery and keeps it charged.

To keep the electrical system in perfect working order, observe the following rules:

1. Give battery the required care. See page 28.
2. Look the system over occasionally, especially at battery terminals, for loose wiring connections, broken wires and damaged insulation on wires. The battery acts as a governor and keeps the voltage of the system between 6 and 8 volts. Loose connections may cut the battery out of circuit; this allows the generator voltage to go much higher than 6 to 8 volts and may result in serious damage to generator, cutout switch, and other units. The battery must be kept in circuit when motor is running.
3. Once a year or every 15,000 miles, inspect brushes for wear and renew them if necessary.
4. Lubricate the left or commutator end armature bearing once or twice a year. Don't allow oil or grease to get on the commutator or brushes. See "To Lubricate Commutator End Armature Bearing."
5. Lubricate timer shaft bearing with Alemite as per Lubrication Chart on page 39.

To Inspect or Replace Brushes

Remove the two screws in generator end cover, and then pull off the cover, exposing the commutator and brushes. To remove brushes, unfasten brush spring retainer at outer end of brush holder, by pressing it lightly downward and outward; then retainer, spring, and brush will pull out together. Brushes are worn out and should be renewed when longest side of brush measures $\frac{3}{8}$ inch. After very little more wear, the brush stop will hold brush away from commutator. Insert brushes so that concave face of brush fits curve of commutator.

To Lubricate Commutator End Armature Bearing

Remove generator end cover, and either put a few drops of oil in oil way provided in bearing cover, or remove cover and pack a little grease in bearing. Don't over-lubricate this bearing, for excess oil or grease will be thrown out and some may get on commutator.

Generator Charging Rate

The standard charging rate is 4 amperes maximum. This should keep the battery properly charged. If necessary, the charging rate can be increased or decreased. Have this adjustment made at a Harley-Davidson service station.

The Ammeter and How It is Connected

Harley-Davidson standard equipment does not include an ammeter; however, one may be attached. The purpose of the ammeter is to indicate whether battery is being charged or discharged and amount of charge or discharge. To connect an ammeter, first remove and discard battery ground wire 9, (Illus. 14) which has one end connected to negative terminal of battery and the other end grounded with a small bolt to rear bracket of battery case. Then, connect *positive* terminal of ammeter to *negative* terminal of battery, and negative terminal of ammeter to small bolt in battery case rear bracket. The terminal wires on Harley-Davidson accessory ammeters are marked: Positive is a red wire; negative is a green wire.

To Tell Whether Generator is Charging When no Ammeter is Used

After removing cutout switch cover 10 (Illus. 14), start the motor, and observe the action of cutout. The generator is charging, if cutout closes properly (see "The Cutout or Relay Switch"). If it does not close, either the generator is not charging or cutout is out of order.

If Generator Refuses to Charge Battery

1. Inspect cutout switch (see "The Cutout or Relay Switch").
2. Inspect brushes and commutator. See that brushes are not worn short and held away from commutator by brush stops. They must seat firmly on commutator. If oil or grease has worked out of bearing and on to commutator, wipe it off with a rag moistened with gasoline and clean it out from between segments with a knife point.
3. See that brush pig-tail connections and other generator wiring connections are tight.
4. If these inspections show everything apparently alright but the generator still refuses to charge, take the machine to a Harley-Davidson service station and have the generator tested.

The Cutout or Relay Switch

The cutout switch 10 (Illus. 14) mounted on front of battery case, automatically connects the generator in circuit with the battery and disconnects it at the proper time. The wire leading from bottom of generator is connected to upper (unmarked) cutout terminal, and a wire leading from positive post of battery is connected to lower cutout terminal, which is marked (BAT). When the generator is turning fast enough to produce current, the cutout automatically closes and connects the generator in circuit with the battery and other electric equipment. When the motor is stopped, or at any time when the generator is not producing current, the cutout opens and disconnects generator from the circuit; this prevents the battery discharging through generator. The cutout operates at about 15 miles per hour. It is entirely automatic in operation and requires no particular attention from the rider.

The cutout has absolutely nothing to do with the ignition circuit or starting and stopping of motor. The ignition circuit is controlled by ignition switch on fork triple clamp (see "The Ignition and Lighting Switches").

If cutout refuses to operate properly, look for one of the following troubles:

CAUTION—When necessary to inspect cutout, remove cover carefully to avoid damaging cutout. Use a screw driver to pry cover loose, then pull it straight off.

1. Wires leading from battery and generator must be correctly connected to cutout, as explained above.

2. Inspect for loose wiring connections at cutout and battery terminals.

3. The cutout must be grounded to frame to operate; therefore see that its base is securely clamped to mounting bracket.

4. The proper gap between cutout contact points is .015 to .025 inch. This adjustment is made by bending the stop above contact blade.

5. If, after making these inspections, cutout still refuses to operate properly, have generator tested for charging rate, etc., at a Harley-Davidson service station.

The Ignition and Lighting Switches

The switch box 13 (Illus. 20) mounted on fork triple clamp, houses both the ignition and light switches. The left hand switch is for ignition and right hand switch for lights. To operate either switch, turn switch lever until slot in lever is in alignment with slot in top of post; then insert key, and switch will be operated when lever is turned. Turn the switch levers as per markings on switch panel. They may be turned either way and all the way around without damage to the switches.

CAUTION—Ignition switch must be turned to one of its OFF positions when motor is not running; otherwise battery will be discharged through the circuit breaker points.

Switch box must be securely clamped to fork triple clamp, for it requires a ground. If switch box is not grounded, the large bulb in headlamp cannot be lighted. To get at wiring connections or inspect switch contacts, remove switch levers and switch box cover. Switch levers can be lifted off after removing a small screw in each lever. A screw at each end secures the cover. To make wiring connections in switch, see Wiring Diagram on page 23.

Headlamp Connector Plug

A metal cap is threaded on to connector plug and must be backed off a few turns to allow plug to be inserted far enough into lamp socket so plug can be turned and connection made. After making connection, turn cap up snug against lamp socket, and connection will be held rigid. The plug cannot come out until cap is loosened.

CAUTION—Connector plug must be properly fitted to lamp socket. Insert plug in socket and turn light switch to ON. If only large bulb is lighted, connection is alright. If both large and small bulbs are lighted at the same time, remove plug from socket, give it $\frac{1}{2}$ turn, and insert it back into socket.

To Adjust Headlamp

To get the greatest efficiency from your headlamp and to meet the requirements of the law, adjust headlamp as follows: Make adjustments at night. Have machine standing 25 feet away from, and headed directly toward, side of a building or any upright surface. Remove lamp glass (lens); then light large bulb. Next, turn focusing screw on back of lamp to right or left as may be necessary, to make the round spot of light projected on upright surface, as small and bright as possible. Replace lamp glass (lens). The light should now appear as a horizontal band of light, free from dark spots.

Take machine on a level road to complete lamp adjustment. Both wheels of machine must be on the road. By bending the lamp brackets with a large monkey wrench, adjust the lamp to direct the main beam of light so that it gives the best driving light. However, when the light is thrown on any upright object, any distance ahead of the machine, the top of main beam of light must not be more than 42 inches above the road. Bend both lamp brackets alike to avoid twisting the lamp and directing the light to one side of the road.

Fuse Protection

One 20 ampere fuse 6 (Illus. 14) located on back of ignition and light switch box, protects the battery from being discharged, in case a short circuit occurs in the light or horn circuit. The horn and all lights, including any properly connected extra lights (see "To Connect Extra Lights"), draw current through this fuse; therefore, a short circuit in any one of them or in wires leading to them will burn out the fuse.

If the fuse burns out, inspect the wiring, correct the trouble, and put in a new 20 ampere fuse. Don't replace a burned out fuse with a wire or something similar; doing so may seriously damage battery and wiring. An emergency fuse can be made by wrapping tin foil (from a cigarette package) around burned out fuse.

To Connect Extra Lights

If any extra lamps (spot lamps, etc.) are attached, connect one terminal wire to the same horn terminal to which the horn wire from switch box is connected, and if a two wire lamp, ground one wire to frame of motorcycle. Some extra lamps have only one wire. Equipment so connected will draw current through the fuse and the battery will be protected in case of a short circuit.

To Adjust Horn

After removing horn cover, loosen the lock nut on adjusting screw in back of vibrator assembly, and turn adjusting screw as may be necessary to adjust horn to desired tone. After adjustment is completed, securely tighten lock nut.

Cleaning and Adjusting Circuit Breaker Points

To clean points, use a tungsten point file or a piece of fine sand paper. To adjust points, turn motor until cam 1 (Illus. 15) is holding the points at their widest opening; then adjust gap between points to .020 to .025 inch. A .022 inch gauge is attached to breaker point wrench in tool kit.

Starting Motor with a Discharged Battery

If battery is completely discharged or disabled, but generator is in good condition, it is possible to start and operate machine as follows: Disconnect battery ground wire, turn ignition switch on and set transmission in second gear. Then, with clutch disengaged, coast down hill, or push machine and after it is in motion, engage clutch. As soon as machine is moving fast enough (about 12 miles per hour) to start generator charging, motor will start. After motor starts, connect battery ground wire; otherwise, generator may be seriously damaged.

Care of Storage Battery

The care given a battery determines its life much more than the amount of time and miles in service. Don't neglect it.

1. Inspect battery every week. Add pure distilled water as often as necessary to keep the solution above the plates (see "To Add Water to Battery").
2. Don't overload with extra lights, to a point where battery is constantly kept in a discharged condition.
3. Remove battery and have it given a charge from an outside source, when the hydrometer shows that it is needed (see "Use of Hydrometer"). Allowing battery to remain in a discharged condition for any length of time, shortens its life.
4. Keep battery clean and terminal connections tight.

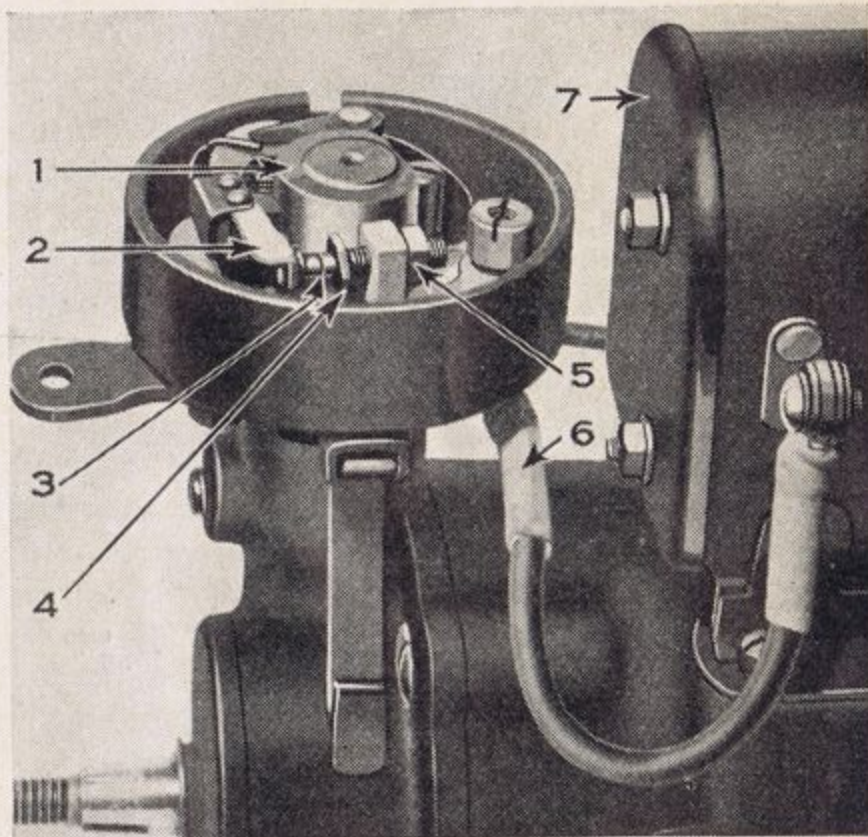
To Get at Battery or Remove it From Case

Removing the battery case cover exposes the battery so that water may be added, and also allows the battery to be removed from case. To remove cover, disconnect battery ground wire at negative terminal of battery and loosen the wing nut which secures cover; then pull upward on cover clamp bracket. Cover will hinge off to the left (Illus. 16).

To Add Water to Battery

After removing the battery case cover, remove the three battery filler plugs, which can be lifted out after turning them about $\frac{1}{4}$ turn to the left. Then, with a hydrometer or syringe (Illus. 16) add enough water to each cell to raise the level of the solution to about $\frac{1}{2}$ inch above the plates.

CAUTION—If battery is filled to a higher level, some of the solution will be forced out through vent holes as soon as generator starts to charge.



Illus. 15—Circuit Breaker

1—Circuit breaker cam; 2—Circuit breaker lever; 3—Circuit breaker contact points; opened and closed at the proper time by the action of cam 1. When cam 1 is holding them at their widest opening, the gap between the points should be about .020 inch; 4—Adjustable contact screw with which the gap between the points can be adjusted; 5—Adjusting screw lock nut; 6—Low tension wire; 7—Ignition coil.

This will damage the battery case.

Do Not Add Acid

Only the water evaporates from battery solution. No acid should be added, except in case some of the solution has been spilled out. In that case, the amount of acid necessary to balance the solution can be determined only by a competent battery repairman.

Use of Hydrometer

The hydrometer reading indicates the state of charge of a battery. Take a reading of each cell occasionally, *just before adding water*. After reading is obtained, return the solution to cell from which it was taken.

1.275 or above indicates full charge; 1.200 to 1.225 indicates half charge; 1.150 to 1.175 indicates discharged. If the hydrometer readings repeatedly indicate that the battery is in a low state of charge, have it charged from an outside source; also have the generator tested for charging rate. If necessary, the charging rate can be increased. See page 25.

Charging From an Outside Source

Charging from an outside source requires a special device to control the charging current. When your battery needs charging, take it to a Harley-Davidson service station or some other reliable battery service station.

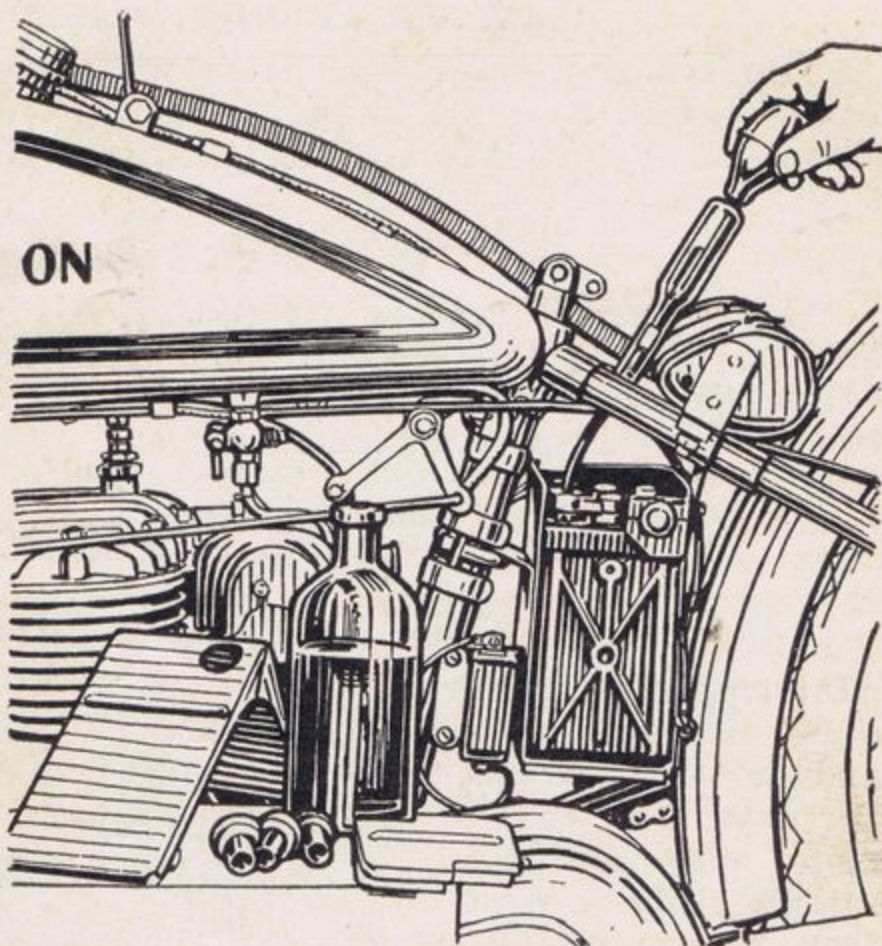
Normal Charging Rate 1 Ampere

When charging a battery from an outside source, the charging rate is constant and should not be allowed to go over 1 ampere. A higher rate will heat and damage the battery. Don't allow your battery to be charged in the same line with automobile batteries, at a high charge rate.

Winter Care of Battery

A battery must be kept in a fair state of charge in cold weather, because of the danger of damage by freezing. A fully charged battery will not freeze, but a fully discharged battery is very likely to freeze. A frozen battery is worthless and beyond repair. Take hydrometer readings often and check them against the table of freezing points below:

Specific Gravity	Freezing Point
1.150 discharged	16° F. (above zero)
1.215 half charged	4° F. (below zero)
1.275 fully charged	-56° F. (below zero)



Illus. 16

Adding Water to Battery

When Adding Water in Winter

Do not add water to battery while machine is idle, for water may freeze before it is mixed with solution. When necessary to add water, always do it just before starting for a ride, so water will be thoroughly mixed with solution.

Winter Storage

If a machine is taken from service for more than a month, remove battery, have it fully charged, and store it in a cool, dry place. While battery is out of service, have it given a freshening charge at least every two months. Inspect it occasionally to see that solution is above the plates.

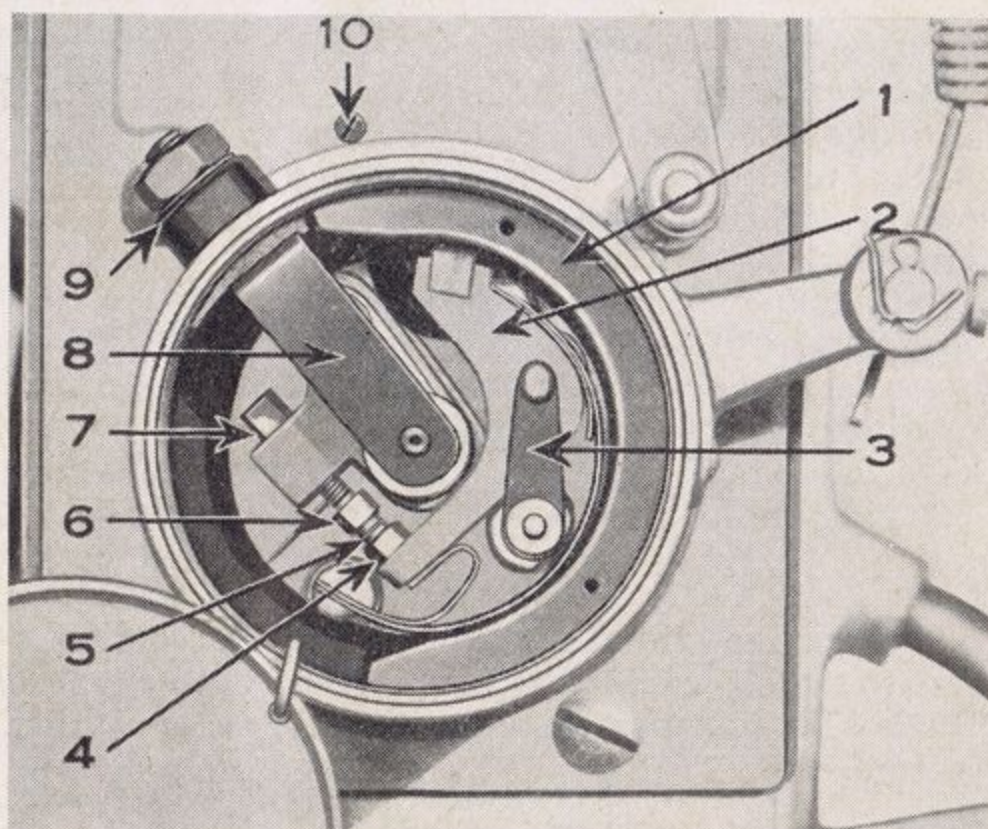
THE MAGNETO

To Clean and Adjust Interrupter Points

Interrupter points require little attention and should not be tampered with as long as motor starts and runs satisfactorily. When they require cleaning and smoothing up, use a platinum point file, but don't file away any more of the points than absolutely necessary.

To adjust points, turn motor until the fibre block in interrupter lever 2 (Illus. 17) is in the center of cam 1, attached to interrupter housing. Points will then be held at their widest opening. Loosen lock nut 7, and turn adjusting screw 6 as may be necessary, to adjust the gap 5 between points to .014 inch. A gauge of the proper thickness is attached to magneto wrench in tool kit. After adjustment is completed, tighten lock nut 7.

Interrupter points must be accurately adjusted; otherwise motor may start hard and miss. Don't allow oil to get on points; it will damage them and cause missing.



Illus. 17—Magneto

1—Interrupter cam; 2—Interrupter lever; 3—Interrupter lever retaining spring; 4—Interrupter lever platinum point; 5—Gap between points; should be .014 inch when points are held at their widest opening by cam 1; 6—Adjusting screw and platinum point; 7—Adjusting screw lock nut; 8—Short circuiting spring; 9—Short circuiting contact blade; 10—Short circuiting contact screw; when spark is fully retarded, blade 9 makes contact with screw 10; this short circuits the magneto and consequently stops motor.

Magneto Short Circuiting Device

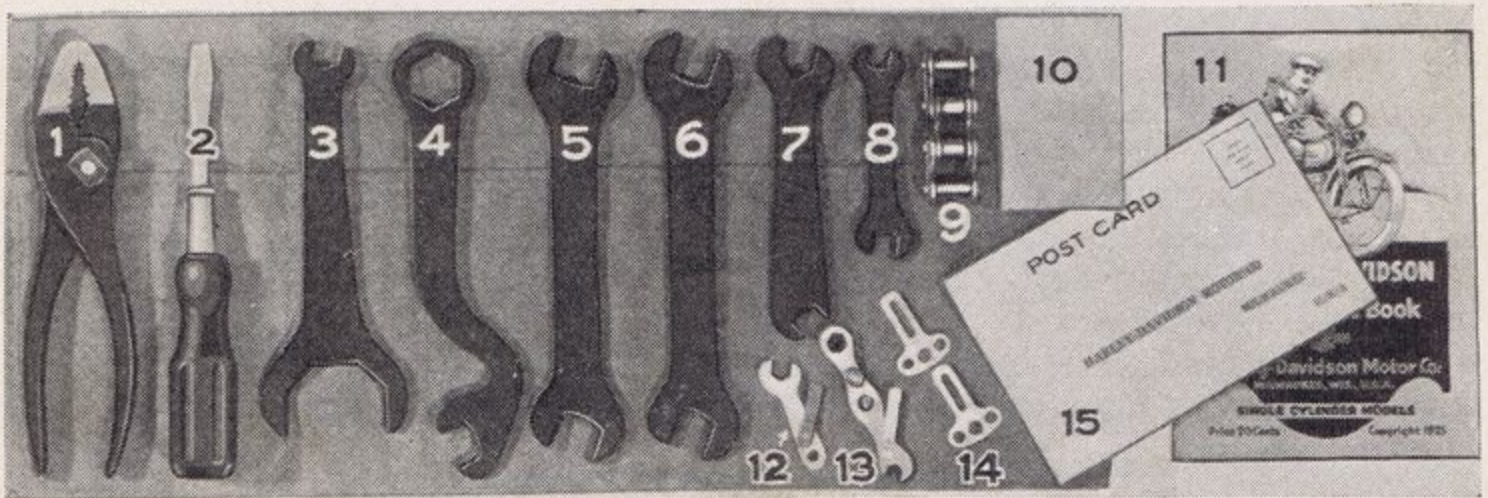
When spark is fully retarded, a flat spring attached to interrupter housing, short circuits the magneto; therefore motor will not run or start with spark fully retarded.

Locating Ignition Trouble

Before inspecting the magneto, when trying to locate the trouble in a motor that doesn't start and run properly, refer to "General Trouble Charts" and make sure that the trouble is not elsewhere than in the ignition unit. When certain that the trouble is ignition trouble, try a new spark plug and inspect plug cable for faulty insulation. Inspect for dirty, badly worn, or improperly adjusted interrupter points. Interrupter lever 2 (Illus. 17) must work freely. If its action is sluggish, remove it and polish its bearing. Remove brush holder and inspect for a badly worn brush or a cracked brush holder. See that collector spool and brush are free from oil. An oily collector spool can be cleaned with a cloth moistened with gasoline, through brush holder opening.

If the above inspection shows everything alright, but the magneto still refuses to function properly, have it inspected and tested at a Harley-Davidson service station or an authorized magneto service station.

SETTING UP A NEW MOTORCYCLE



Illus. 18

Key to Tool Kit and Equipment Furnished with Every New Motorcycle

1—Pliers; 2—Screw driver; 3—Wrench for valve tappet covers, tappet adjusting screws and lock nuts and other small nuts; 4—Wrench for cylinder head clamp nuts and rear wheel axle nuts; 5—Wrench for transmission clamp nuts, fork spring plunger nuts, mechanical oil pump pipe connection and fork rocker rear stud nuts; 6—Wrench for front wheel axle nuts, fork rocker stud nuts, footboard nuts, gas and oil pipe nuts, battery box clamp nuts, cylinder head and base clamp nuts, carburetor clamp screws, and other bolts and nuts; 7—Valve tappet wrench, fits tappet adjusting nuts and side by side valve tappet body, also fits other small nuts; 8—Wrench for rear axle adjusting screws and lock nuts, transmission adjusting screw and top of tank screws; 9—Chain repair links; 10—Tire patches; 11—Rider's Hand Book; 12—Circuit breaker point adjusting wrench (with generator equipped models only); 13—Bosch magneto point adjusting wrench (with magneto models only); 14—Ignition and light switch keys (with generator equipped models only); 15—Registration card.

To Fit Forks and Front Wheel

This paragraph applies to Export motorcycles only

A cloth sack containing the head bearing balls and other small fittings, will be found attached to motorcycle. After putting some grease in the upper and lower head cups, put 16 balls in each cup. Insert the fork stem through the frame head, and fit the head cone, wire guard (with wire clamp forward), lock washer and cone lock nut. Adjust head cone so that after lock nut is securely tightened, there is no noticeable shake in the bearing, but the forks must turn freely. If head bearing is adjusted too tight, machine will be hard to guide. Next, fit the front mudguard and front wheel. Pass the cable of switch box 13 (Illus. 20) between the fork side and frame head, and then fit triple clamp 12 onto the fork tubes. Attach switch box to back of triple clamp with triple clamp bolts. **NOTE**—*No wire guard, switch box, or wiring on magneto models.*

To Fit Handlebars, Headlamp, Etc.

Loosen the two bolts in triple clamp 12 (Illus. 20) and start the handlebars into fork tubes. With a hammer and a block of wood, drive the stems all the way in, and then securely tighten triple clamp bolts. Next, fit the left footboard (footrests on Export Sporting models), saddle, starter crank, and if a generator equipped model, the headlamp and horn.

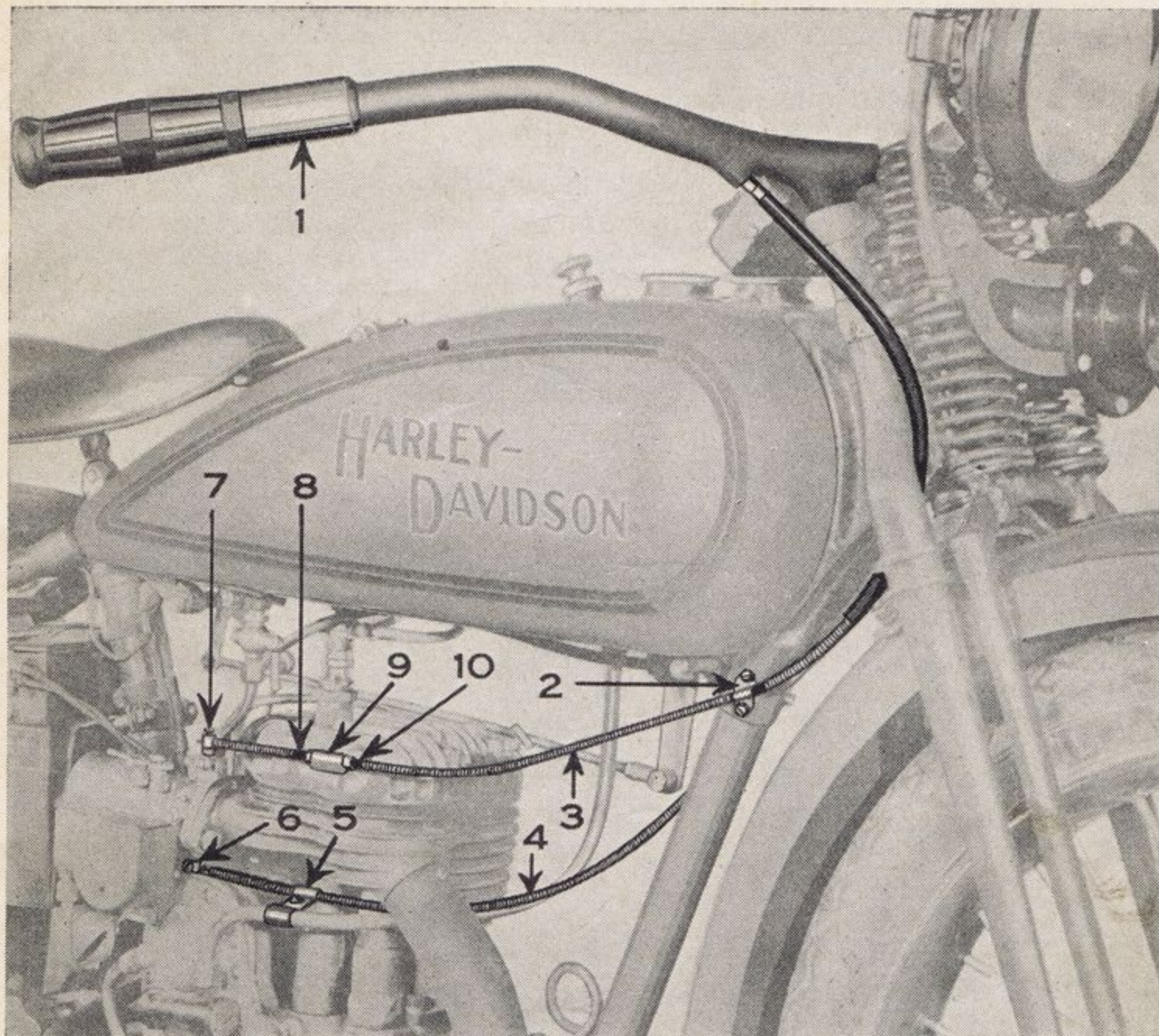
To Fit Starter Crank

Remove the crank pinch bolt and start the crank about $\frac{1}{8}$ inch onto the starter shaft on right side of transmission, in such a position that the pinch bolt hole will line up with radius cut in one corner of shaft. Turn crank to the left until it stands a little past straight up, or until it clears the upper crank stop, then drive it onto the shaft far enough to allow the pinch bolt to be inserted. Securely tighten the pinch bolt nut. If the starter spring is properly fitted to the squared end of starter shaft, the starter crank when not in use, will be held firmly against its upper stop, and can be pushed downward to its bottom stop, without winding up the spring to the point where the spring coils tighten and bind.

To Connect Throttle (Right) Control

On Side by Side Valve Models

Pass control wire and cable 3 (Illus. 19) through the forks as shown and insert end of control wire through wire connector block 7, attached to throttle lever. Locate and secure cable under frame clamp 2 and in clamp 9 on cylinder head, with black paint marks on cable showing just in front of clamp 2 and on each side of clamp 9. After tightening nuts 8—10 to secure cable in clamp 9, bend the tips of clamp 9 slightly with a pair of pliers, to prevent the nuts from loosening. Next, turn right handlebar grip **OUTWARD** as far as it will go; then back it up slightly. With grip held in this position, move the carburetor throttle lever **FORWARD** as far as possible and tighten the wire clamping screw in connector block 7. Throttle must open and close fully, with inward and outward grip movement.



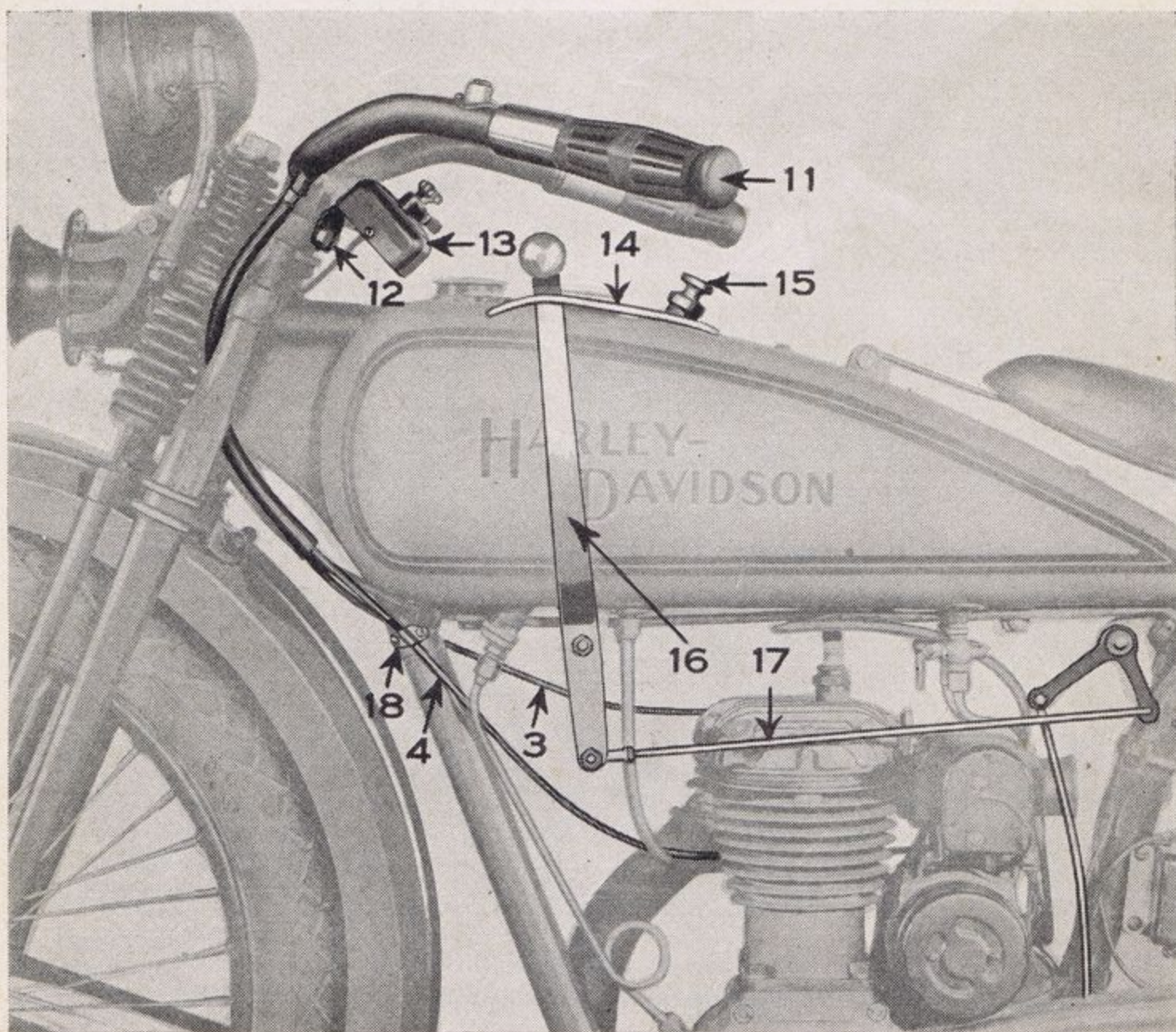
**Illus. 19—Right Side Controls
Side by Side Valve Model**

1—Throttle (carburetor) control grip; 2—Cable clamp; 3—Throttle control wire and cable; 4—Spark control wire and cable; 5—Control cable clamp on oil pipe; 6—Wire connector attached to spark lever on timer base; 7—Wire connector block attached to throttle lever; 8 & 10—Cable clamp nuts each side of clamp 9; 9—Cable clamp attached to cylinder head.

To Connect Throttle (Right) Control *On Standard Overhead Valve Models*

No illustration of this model is shown. Pass control wire and cable through the forks as illustrated on Side by Side Valve model, and then between the flanges on top of cylinder head, keeping it below the small screw through flanges. Insert end of control wire through wire connector block attached to carburetor throttle lever. Locate and secure cable under clamp on front frame tube, with the black paint mark on cable showing just in front of clamp. Next, turn right handlebar grip **OUTWARD** as

far as it will go; then back it up slightly. With grip held in this position, move the carburetor throttle lever FORWARD as far as possible and tighten the wire clamping screw in connector block. Throttle must open and close fully with inward and outward grip movement.



**Illus. 20—Left Side Controls
Side by Side Valve Model**

3—Throttle (carburetor) control wire and cable; 4—Spark control wire and cable; 11—Spark control grip; 12—Fork triple clamp; 13—Ignition and light switch box; 14—Gear shifter gate; 15—Hand oil pump (see page 8); 16—Gear shifter lever; 17—Gear shifter rod; 18—Cable clamp.

To Connect Throttle (Left) Control

Overhead Valve Export Sporting Models Only

No illustration of this model is shown. Pass the control wire and cable through the forks and on the left side of front frame tube as illustrated on Side by Side Valve model. Next, pass the cable between the flanges on top of cylinder head, keeping it below the small screw through flanges. Insert end of control wire through wire connector block, attached to carburetor throttle lever. Locate and secure cable under clamp on front frame tube, with the black paint mark on cable showing just in front of

clamp. Next, turn left handlebar grip **OUTWARD** as far as it will go; then back it up slightly. With grip held in this position, move the carburetor throttle lever **FORWARD** as far as possible and tighten the wire clamping screw in connector block. Throttle must open and close fully with inward and outward grip movement.

To Connect Spark (Left) Control

On All Generator Equipped Models Except Export Sporting Model

Pass control wire and cable 4 (Illus. 20) through the forks as shown, and then to right side of machine, back of exhaust pipe, and through clamp 5 (Illus. 19) attached to oil pipe. Insert end of control wire through wire connector 6, attached to spark lever on timer base. Locate and secure cable under frame clamp 18 (Illus. 20) and in oil pipe clamp 5 (Illus. 19), with black paint mark on cable showing just in front of clamp 18 (Illus. 20). Next, turn left handlebar grip **OUTWARD** as far as it will go; then back it up slightly. With grip held in this position, move the spark lever to the **REAR** as far as possible and tighten the wire clamping screw in wire connection 6. Spark lever must advance and retard fully with inward and outward grip movement.

To Connect Spark (Left) Control

On all Magneto Equipped Models Except Export Sporting Model

No illustration of magneto equipped model is shown. Pass control wire and cable through the forks as illustrated on generator model and after removing one of the two nuts that will be found on cable, push cable through sleeve attached to rear of cylinder head on left side. Turn the nut back onto the cable and insert end of control wire through the wire connector block attached to magneto interrupter housing lever. Locate and secure cable under clamp on front frame tube, with black paint mark on cable showing just in front of clamp. The two nuts on cable can then be turned up snug against each end of cable sleeve. Next, turn left handlebar grip **OUTWARD** as far as it will go; then back it up slightly. With the grip held in this position, move the interrupter housing lever **DOWNWARD** as far as possible and tighten the wire clamping screw in lever connector block. Spark must advance and retard fully with inward and outward grip movement.

To Connect Spark (Right) Control

On Generator Equipped Export Sporting Model Only

No illustration of this model is shown. Pass the control wire and cable through the forks as illustrated on Side by Side Valve model, and then back of exhaust pipe and through the cable clamp attached to oil pipe. Insert the end of control wire through the wire connector attached to spark lever on timer base. Locate and secure cable under clamp on front frame tube and in oil pipe clamp, with black paint mark on cable showing just in front of clamp on frame tube. Next, turn right handlebar grip **OUTWARD** as far as it will go; then back it up slightly. With grip held in this position, move the spark lever to the **REAR** as far as possible and tighten the wire clamping screw in wire connector. Spark lever must advance and retard fully with inward and outward grip movement.

To Connect Spark (Right) Control

On Magneto Equipped Export Sporting Model Only

No illustration of this model is shown. Pass the control wire and cable through the fork and on right side of front frame tube as illustrated on Side by Side Valve model. Then, after removing one of the two nuts that will be found on cable, pass the cable to left side of motor and through the sleeve attached to rear of cylinder head. Turn the nut back onto the cable, and insert the end of control wire through the wire connector block attached to magneto interrupter housing lever. Locate and secure the cable under clamp on front frame tube, with black paint mark on cable showing just in front of clamp. The two nuts on cable can then be turned up snug against each end of cable sleeve. Next, turn right handlebar grip OUTWARD as far as it will go; then back it up slightly. With the grip held in this position, move the interrupter housing lever DOWNWARD as far as possible and tighten the wire clamping screw in lever connector block. Spark must advance and retard fully with inward and outward grip movement.

To Make Headlamp and Horn Connections

On Generator Equipped Models

The headlamp cable is attached to switch box 13 (Illus. 20) mounted on fork triple clamp. Insert plug on end of cable into lamp plug socket as per instructions on page 26.

Connect single wire leading from switch box, to either of the two terminals on bottom of horn. Connect wire leading from handlebars, to the other horn terminal.

To avoid the possibility of the fork springs chafing the insulation on lamp and horn wires and thereby causing a short circuit, arrange the wires as follows: Wires leading to horn terminals should be twisted around each other once. Both horn wires and the main cable from battery to switch box should be placed in the wire guard attached to fork stem. The slack in headlamp cable should be pulled back underneath switch box.

CAUTION—Switch box must be tightened securely to triple clamp to effect positive ground; otherwise large bulb in lamp will not light.

Connect Battery Ground Wire

On Generator Equipped Models

Machines are shipped with the battery ground wire disconnected at negative battery terminal. Loose end of wire is taped to frame. Motor cannot be started until this wire is connected. *Unfilled batteries are furnished in Export machines. Battery must be filled to proper level with electrolyte and initial charge given.*

To Connect Clutch Handlebar Control

Export Sporting Models Only

The clutch hand lever, with control wire and cable, is attached to RIGHT handlebar $\frac{3}{8}$ to $\frac{1}{2}$ inch ahead of grip. Pass the control cable between the rigid fork side and frame head, on right side of head above

the spring fork bracket. Then, pass cable downward between the spark and gas control cables, underneath the frame head, and to left side of machine. The cable should be kept forward of front frame tube. Attach the end of control wire to clutch lever 5 (Illus. 10) on top of transmission, by means of clamp attached to end of control wire. After removing clamp bolt, this clamp can be forced over the lever. It should be secured to lever, just back of knob on end of lever. Next, by means of two nuts on cable, locate and secure cable in clamp attached to cylinder base. When correctly located, a black paint mark on cable will show just in front of cable clamp nut on forward side of clamp. For further instructions on clutch adjustment, see page 18.

To Attach and Connect Hand Brake Control

Extra Equipment—Furnished Only When Ordered

Attach the brake hand lever to the LEFT handlebar, just ahead of horn button on a generator equipped model and about one inch ahead of grip on a magneto equipped model. Pass the control wire and cable between the rigid fork side and frame head on left side of head above the spring fork bracket, then underneath the left gas tank, up between the frame rear fork tubes just back of seat post, and down along the left side of frame to the brake. Attach the clevis on end of control wire to brake lever which extends upward from internal brake band assembly. Next, attach the cable clamp to upper frame tube about five inches ahead of rear axle, and then locate and secure cable in this clamp, by means of two nuts on cable. The location of cable in this clamp determines the brake adjustment. When cable is correctly located, the brake will start to take effect when hand lever is compressed about $\frac{1}{3}$ of its full movement. Turn the rear wheel to make sure that brake is not too tight and dragging.

GENERAL TROUBLE CHARTS

The following charts will serve as a guide, when trying to locate the trouble in a motor that doesn't start or run right.

Missing at High Speed

Missing at high speed is usually due to poor carburetion—carburetor not properly adjusted or some of the vital parts loose or worn out; however, it may be due to any one of the following causes:

Defective spark plug—porcelain cracked, point gap adjusted wrong, or fouled and in need of cleaning. Try a new plug.

Gasoline pipe clogged, or the cock partly closed.

Air vent (small hole) in gasoline tank filler cap plugged.

Sticking valves, due to carbon in valve guides.

• Broken or weak valve springs.

Valve tappets improperly adjusted. See page 12.

Circuit breaker points out of adjustment. See pages 27 and 30.

Circuit breaker points worn away.

Insufficient circuit breaker lever spring tension.

Defective ignition coil.

Discharged or broken down battery.

Loose wiring connections around battery, generator, ignition coil and circuit breaker.

Chafed or poor insulation on wiring, causing a short circuit. Don't use a nail or wire for a fuse.

Magneto trouble. See page 31.

Missing at Low Speed

May be due to any one of the causes described under "Missing at High Speed," but more likely due to one of the following:

Spark plug fouled, or the point gap set too close. See page 3.

Carburetor adjusted too lean or too rich.

Carburetor loose on cylinder or carburetor throttle shaft badly worn, causing air leaks.

If the Motor Refuses to Start

Failure to start is likely due to one of the following causes:

No gas in tank, or gas not getting to carburetor.

Carburetor loose on cylinder.

Fouled spark plug; clean and adjust.

Defective spark plug; try a new plug.

No spark; see if a spark will jump from end of plug cable.

Dirty, worn out, or improperly adjusted circuit breaker points on the generator or magneto.

Storage battery discharged; possibly generator is not charging.

Storage battery disconnected; look for loose wiring connections or broken wires.

Damaged insulation on wiring, causing a short circuit.

Ignition coil wet around high tension terminal (under metal cover).

Magneto water soaked.

Defective ignition coil or magneto.

Compression release lever in wrong position (Illus. 1).

Valves or ignition timed wrong.

Clutch slips and prevents motor from being turned.

If it is impossible to turn the motor over with the starter, the trouble may be that the machine has been run without enough oil, until the piston or piston rings have become seized in the cylinder.

See if you can locate any of the faults mentioned under "Missing at High (Low) Speed".

If the Motor Shows Loss of Power and Overheats

Overheating and loss of power are likely due to one of the following causes:

Spark lever does not advance all the way.

Improper carburetor adjustment; probably adjusted too lean.

Excessive carbon deposits on cylinder and piston heads. See page 10.

Poor compression due to bad valve seats, worn out piston rings or a scored cylinder.

Weak valve springs.

Valve tappets not adjusted properly; probably too close.

Defective spark plug.

Clutch slips or brake drags.

A poor grade of lubricating oil is being used.

Either too much or not enough oil in crank case; drain and give fresh supply. See page 8.

Muffler clogged—keep the slots cleaned out. See page 22.

Back Firing or Popping in the Carburetor

Carburetor lift needle and choke returned to normal running position too soon after starting, or before the motor is sufficiently warmed up.

Carburetor adjustment wrong; mixture too lean.

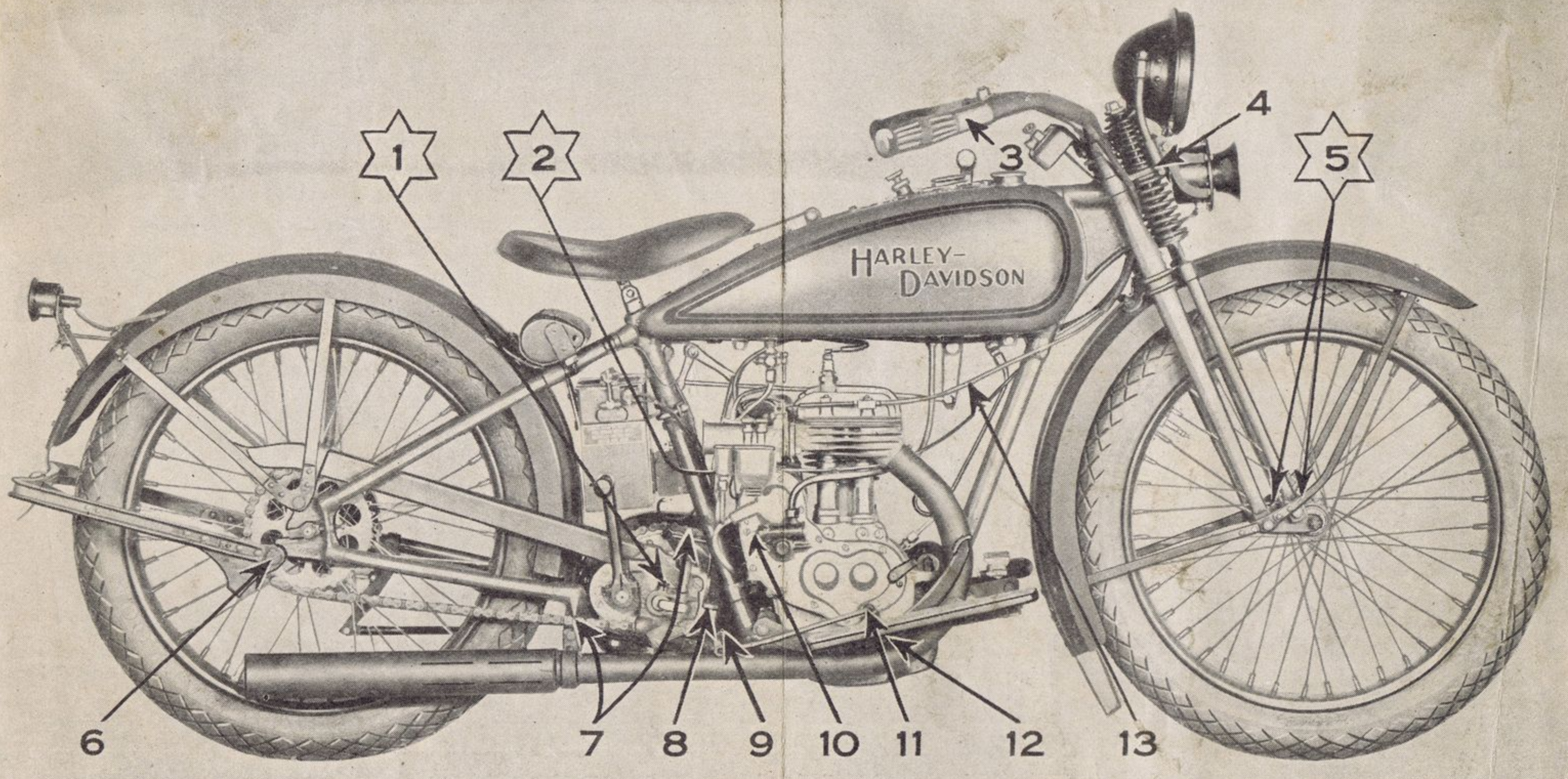
Inlet valve tappet adjusted too tightly.

Exhaust valve tappet adjusted too loosely.

Weak inlet valve spring.

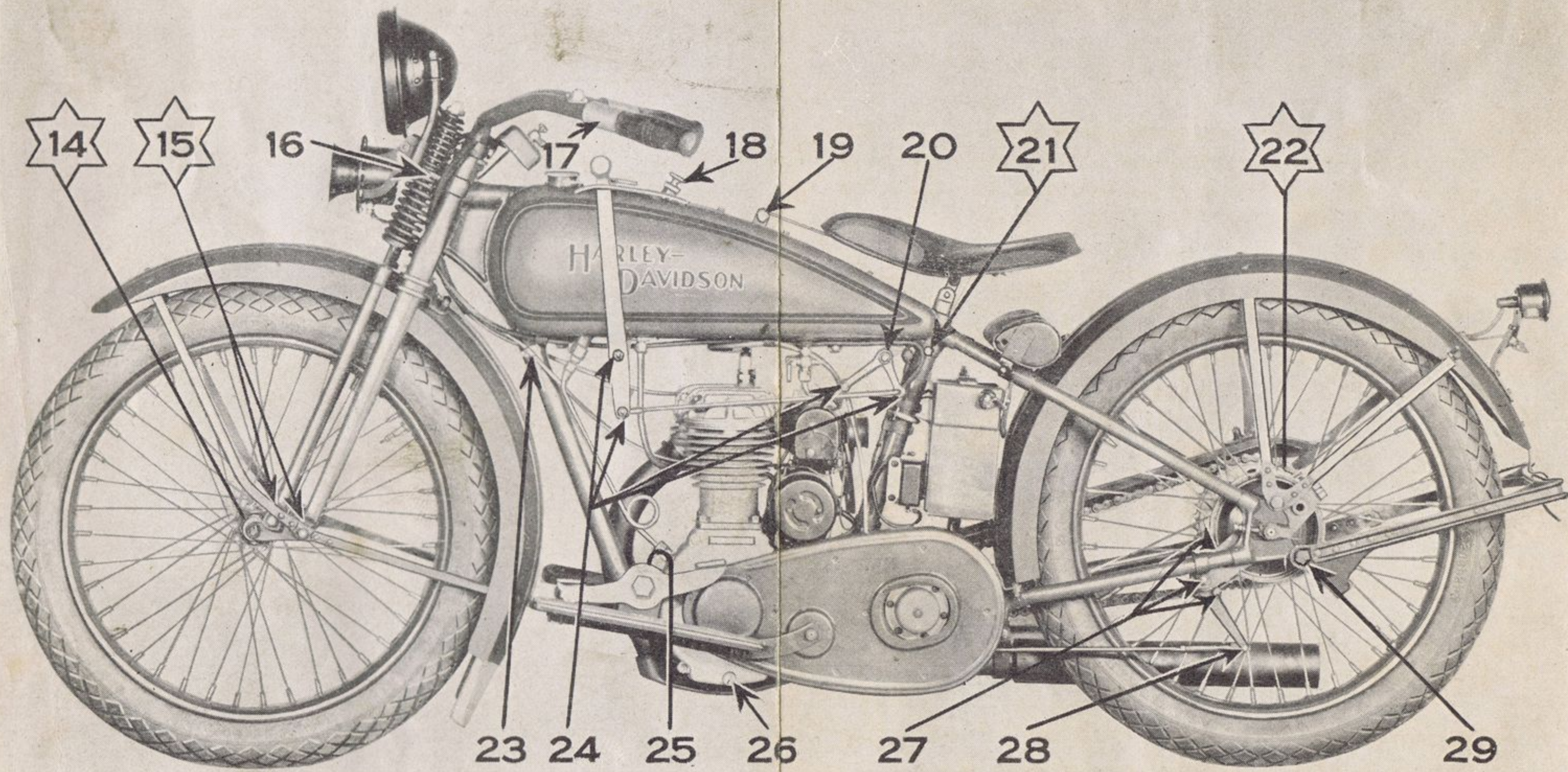
Faulty ignition, or ignition timing wrong.

Muffler clogged.



Illus. 21—Right Side Lubrication Chart *Stars Indicate Alemite Grease Gun Fittings

Lubricate with	No.	Part of Motorcycle	Lubricate with	No.	Part of Motorcycle
Alemite Twice a week	5	Fork rocker bearings	Motor oil Every week	8	Transmission case
Alemite Every 500 miles	1	Clutch thrust bearing	Motor oil Every 500 miles	9	Brake shaft bearing in frame
	2	Timer shaft (requires little grease)		11	Brake rod joint
Grease Once or twice yearly	3	Right handlebar grip		12	Brake pedal bearing
Harley-Davidson Chain Lubricant Every 1000 miles	7	Front and rear chains (See page 20)	Motor oil Occasionally See page 8	13	Throttle control cable
				4	Spring fork plunger bearing
				6	Stand hinge bearing
				10	Mechanical oiler adjusting screw



Illus. 22—Left Side Lubrication Chart *Stars Indicate Alemite Grease Gun Fittings

Lubricate with	No.	Part of Motorcycle	Lubricate with	No.	Part of Motorcycle
Alemite Twice a week	15	Fork rocker bearings	Motor oil Every 500 miles	19	Seat bar hinge
Alemite Every 500 miles	21	Seat Post		20	Shifter bell crank bearing
Harley-Davidson grade A grease Twice a week	14	Front wheel bearings		24	Shifter control joints and shifter lever bearing
	22	Rear wheel bearings		25	Clutch pedal bearing
		Valve rocker arms on Overhead Valve Motor (Grease cups not shown in illustration).		27	Brake lever bearing and band connections
Grease Once or twice yearly	17	Left handlebar grip		28	Brake rod clevis joint
See page 8	18	Hand oil pump	See page 8	23	Spark control cable
			Motor oil Occasionally	26	Crank case drain plug
				16	Spring fork plunger bearing
				29	Stand hinge bearing

Your Harley-Davidson Dealer Is Always at Your Service

YOUR Harley-Davidson dealer wants you to get the thousands of carefree miles of riding joy that were built into your motorcycle at the factory. He is ready to help you at anytime should an emergency arise.

He has special factory designed shop tools. These tools enable him to do a better job in less time and for less money. This is a service you can get only at an authorized Harley-Davidson dealer.

Most Harley-Davidson dealers or their mechanics are graduates of the factory service school. They are trained experts and know exactly how to take care of your Harley-Davidson.

Your dealer sells only Genuine Parts that are designed by Harley-Davidson engineers and are built to fit and to stand the wear they get in service. For the protection of Harley-Davidson riders the following Genuine Parts are put up in trade-mark sealed, orange and black boxes. Get your parts from your Harley-Davidson dealer.

*These Genuine Harley-Davidson Parts are
sold in sealed Orange and Black Boxes*

- | | |
|--------------------------|------------------------------|
| 1. Fork Springs | 9. Bronze Crank Case Bushing |
| 2. Inlet Valves | 10. Flywheel Shafts |
| 3. Inlet Housings | 11. Roller Bearings |
| 4. Exhaust Valves | 12. Pistons |
| 5. Inlet Valve Springs | 13. Piston Rings |
| 6. Exhaust Valve Springs | 14. Piston Pins |
| 7. Oil Caps | 15. Piston Pin Bushings |
| 8. Gas Caps | |

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