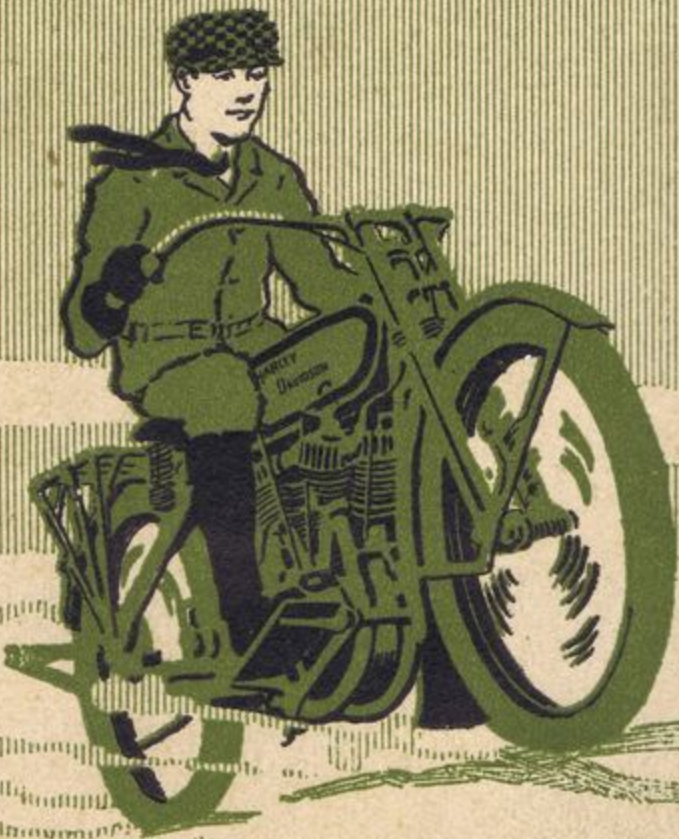


Harley-Davidson



Harley-Davidson

T. H. OATES
CYCLE MOTOR
MANUFACTURER
& IMPORTER
PHONE 1490
75 Willis St. WELLINGTON



Harley-Davidson Leadership

IT is natural that every manufacturer should claim his product to be the best, but, after all, the final analysis of real value or quality is clearly demonstrated by continued progress—by increased business. The growth of the Harley-Davidson business has been the talk of the motorcycle industry. It is a matter of general knowledge that the increase in Harley-Davidson business for 1914 over 1913 was greater than the combined increase of all other motorcycle manufacturers in America.

During the 1915 season Harley-Davidson dealers in 10 of the big cities of the United States sold 1130 Harley-Davidsons in the same period of time in which they sold but 777 1914 Harley-Davidsons the previous year. This is an average increase in these 10 cities alone of 45%.

This is a fair criterion of the possibility for bigger business for Harley-Davidson dealers in the smaller cities and towns, where the opportunities for increased sales are greater.

Growth of Harley-Davidson Business

Sales act as a barometer of popularity, and popularity is nothing but an appreciation of value received, or service rendered.

The Harley-Davidson automatic plant has been operated day and night for the past 22 months, and parts of the main plant have been operated day and night for 15 of the past 22 months, to handle the ever increasing business. During the

1915 season the Harley-Davidson factories employed steadily more than 1800 employees—every one engaged exclusively in the production of Harley-Davidson motorcycles and sidecars.

All this is directly traceable to a good machine, fast and powerful, embodying original and exclusive features, and backed up by a live, progressive organization awake to the riders' demands.

Promises Alone Will Not Build Up Any Business

It is possible to stir up a certain amount of business on promises. If the goods lack quality or the firm back of them fails to live up to the promises the business will not endure.

Years ago the Harley-Davidson Motor Company realized that its dealers were its stock in trade, that if it lost its dealers or in any way disappointed them, it would go out of business. It realized that the whole future of its business depended on *how* Harley-Davidsons were made and not alone on how *many* were made.

The many makers (21 in all) who have quit business during the past four years have paid silent tribute to this truth.

The Harley-Davidson Motor Company has built up its business with the idea in mind that Harley-Davidson riders must be satisfied—satisfied with their machines—satisfied with the service rendered when service is required. No permanent business is possible without satisfied customers. Harley-Davidson buyers *are* satisfied. They come back year after year. They do more—they tell their friends and acquaintances about Harley-Davidson motorcycles and service.

Quality and Satisfaction—Requisites of a Permanent Business

A satisfied owner is, after all, the best kind of advertisement, and satisfaction is possible only as a direct result of genuine quality.

Catalogs and other printed matter are soon forgotten if the product does not stand up to the printed description.

On the other hand, if any manufacturer's goods *do* stand up to claims buyers will believe that the statements in his catalogs and other literature are truthful and not exaggerations or deceptions. The policy of the Harley-Davidson Motor Company has always been to manufac-

ture the kind of goods that stand up, and it has made and sold this class of product ever since it has been in business.

Like previous Harley-Davidson catalogs, we have aimed to make this a catalog that will give the reader a true description of the Harley-Davidson product. We have tried to publish it without a single mis-statement, exaggeration or deception, believing that this policy will create more confidence in the Harley-Davidson products—that's the Harley-Davidson way of doing business.

The Unexcelled Harley-Davidson Organization

A motorcycle, to be popular today, must have more to recommend it than mere specifications, equipment, or horsepower rating. It must have a name and reputation. Its builders must provide satisfactory service stations throughout the country.

The Harley-Davidson has all this to offer—and more. In the United States alone nearly 2,000 dealers are equipped to render service to Harley-Davidson owners. As near perfect as it is, this organization is being rapidly extended.

Harley-Davidson success has been built around the fact that the same men have been responsible for the Harley-Davidson and have stood back of it, since the very beginning. The same men have tried to make the Harley-Davidson better each year, have continually tried to better every feature of Harley-Davidson service.

Our service system, brought to its present state of perfection more than a year ago, provides an eight-hour service from the factory and our branches. It has taken years to build up this organization.

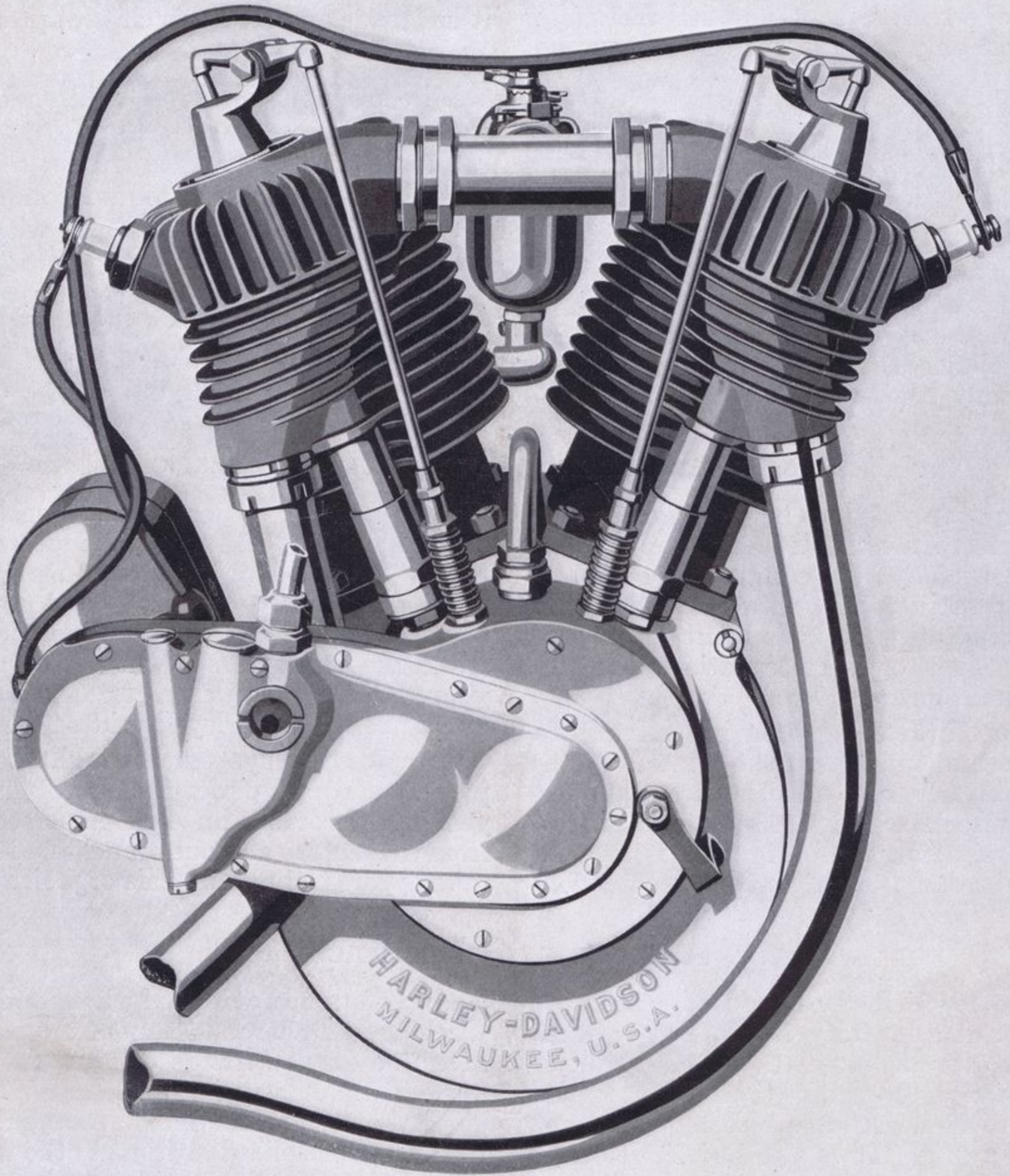
A Product of Experience

The 1916 Harley-Davidson is not the result of a solitary inspiration or idea. It is a development—the direct result of fourteen years' production of high grade motorcycles. A great building is not put up in a day. It is the culmination of years of experience of great engineers. Careful designing and planning must precede the actual construction. Experience gained from previous work guides the engineers, architects and mechanics.

So it is with a motorcycle. A perfected motorcycle cannot be produced in a day.

Years of production of thousands of machines, and careful study of the results attained in the hands of thousands of owners under varying conditions, must guide the designers. Skilled mechanics—the finest specialized artisans in the world must finally produce the finished article.

A good motorcycle must be an ingenious blending of good material, good design, and good workmanship. Should a manufacturer slight any one of these requisites, then the finished product will suffer.



11 Horsepower High-Speed High Duty Twin Cylinder Motor

Mechanical Description of High Speed High Duty Twin Cylinder Motor

Type—Long stroke, high speed, four cycle.

Horsepower—Eleven horsepower guaranteed.

Bore—84.1 millimeters ($3\frac{5}{16}$ inches).

Stroke—88.9 millimeters ($3\frac{1}{2}$ inches).

Piston Displacement—988.83 cubic centimeters (60.34 cubic inches).

Cylinders—Close grained gray iron cast to special formula. Final grinding operation on cylinder wall gives it a mirror finish. Cylinder and cylinder head are cast in one piece, eliminating any possibility of leaks through gaskets or joints.

Pistons—Special heat treated gray iron. Light weight. Final operation leaves pistons with mirror finish. Piston heads are polished to eliminate excessive carbon deposits.

Piston Rings—Pistons are fitted with three rings with step joints in place of the usual diagonally cut type. These rings will hold compression after thousands of miles of hard road service. The rings are ground on three sides.

Piston Pins—Special steel carefully heat treated and then ground to absolute size. Piston pins, being hollow, are very light.

Intake Valves—The unusually large mechanically operated intake valves are made of nickel steel. Intake valves have 45 degree seats.

Intake Valve Operating Mechanism—All steel construction designed to provide very efficient action capable of handling gas properly at both high and low speeds. All working parts carefully hardened. Each intake valve is readily removable as a unit with the housing by taking out one lock nut and loosening one set screw. The rocker arm with its mounting is removable at the same time. Each intake housing is secured in its cylinder in such a manner as to make an absolutely gas tight fitting without the use of gaskets. Intake cam is cut integral with the secondary gear and exhaust cam, although the intake and exhaust cams are of course independent of each other.

Intake Valve Lifters—Readily adjustable.

Intake Valve Springs—Made of genuine vanadium steel, entirely enclosed.

Exhaust Valves—Unusually large valves, genuine tungsten steel with 45 degree seats.

Exhaust Valve Lifters—Readily adjustable.

Exhaust Valve Springs—Made of genuine vanadium steel, entirely enclosed.

Exhaust Valve Operating Mechanism—The entire valve actuating mechanism is made of steel, each part carefully heat treated and hardened. Bearing surfaces are ground to micrometer accuracy. Unusual attention has been given the lubrication of the valve mechanism on the Harley-Davidson motors, and this is one of the reasons why they give such dependable results in actual service.

Connecting Rods—Modified "I" beam section of heat treated special high carbon drop forged steel. Connecting rods are very light in weight but by means of the Harley-Davidson process of heat treating are given remarkable strength. In the twin motor a tie boss across the bottom of the forked connecting rod makes a very rigid construction at this point. To make a smooth running, vibrationless motor the connecting rods are carefully balanced with respect to the pistons and fly wheels.

Connecting Rod Bearings—The connecting rod bearing unit is a special four row high duty Harley-Davidson roller bearing composed of two independent sets of rollers, of two rows each, one set for each connecting rod, but both sets running on one crank pin, of course. The roller bearings run in hardened steel bushings fitted to the ends of the connecting rods.

Timing Gears—By machining the secondary gear in one piece with the exhaust and intake cams positive valve action is assured for the life of the motor. Inasmuch as no keys or pins are employed in the valve actuating mechanism, there is nothing to come apart or get out of order.

Compression Relief—Substantial all steel construction designed for hard service. This neat and efficient relief has been used for several years on all Harley-Davidson twin motors, and has proved to be very satisfactory.

Piston Pin Bearings—Piston pin bearings are of special high duty phosphor bronze cast to Harley-Davidson specifications. It is essential to have an unusually good grade of bronze for this work on account of the heat from the pistons these bearings are subjected to. Ample provision is made for lubricating these bearings. Double spiral grooves act as distributors for oil, while slots at the top of the bearings serve as oil troughs for catching and retaining the oil.

Crank Pin—1" in diameter, $1\frac{3}{4}$ " long. Of special chrome nickel steel alloy hardened and ground to micrometer accuracy.

Crank Shaft Bearing on Drive Side—High duty self-aligning annular type ball bearing.

Crank Shaft Bearing on Gear Side—High duty phosphor bronze.

Crank Shafts—Special steel carefully hardened and ground to micrometer accuracy. Crank shaft 1" diameter on drive side and $\frac{15}{16}$ " diameter on gear side.

Fly Wheels—Very carefully balanced with respect to pistons and connecting rods. The method of mounting the Harley-Davidson fly wheels makes it possible to keep them in permanent alignment, a very important point in building a smooth running, vibrationless motor.

Crank Case—Highly polished aluminum that will not tarnish. All joints are made absolutely oil tight, keeping the oil inside where it belongs and where it is needed for lubrication, instead of allowing part of it to leak out and soil the rider's clothing.

Crank Case Breather Valve—Large gear driven rotary breather valve in the crank case eliminates the hissing noise noticeable on many twin motors. This valve also serves to reduce the crank case pressure on the down stroke of the pistons. Being closed on the up stroke of the pistons the valve makes it impossible for road dust to reach the inside of the crank case through the breather pipe. The breather pipe is located so that any oil spray from same is directed on to the short drive chain, thereby keeping it well oiled.

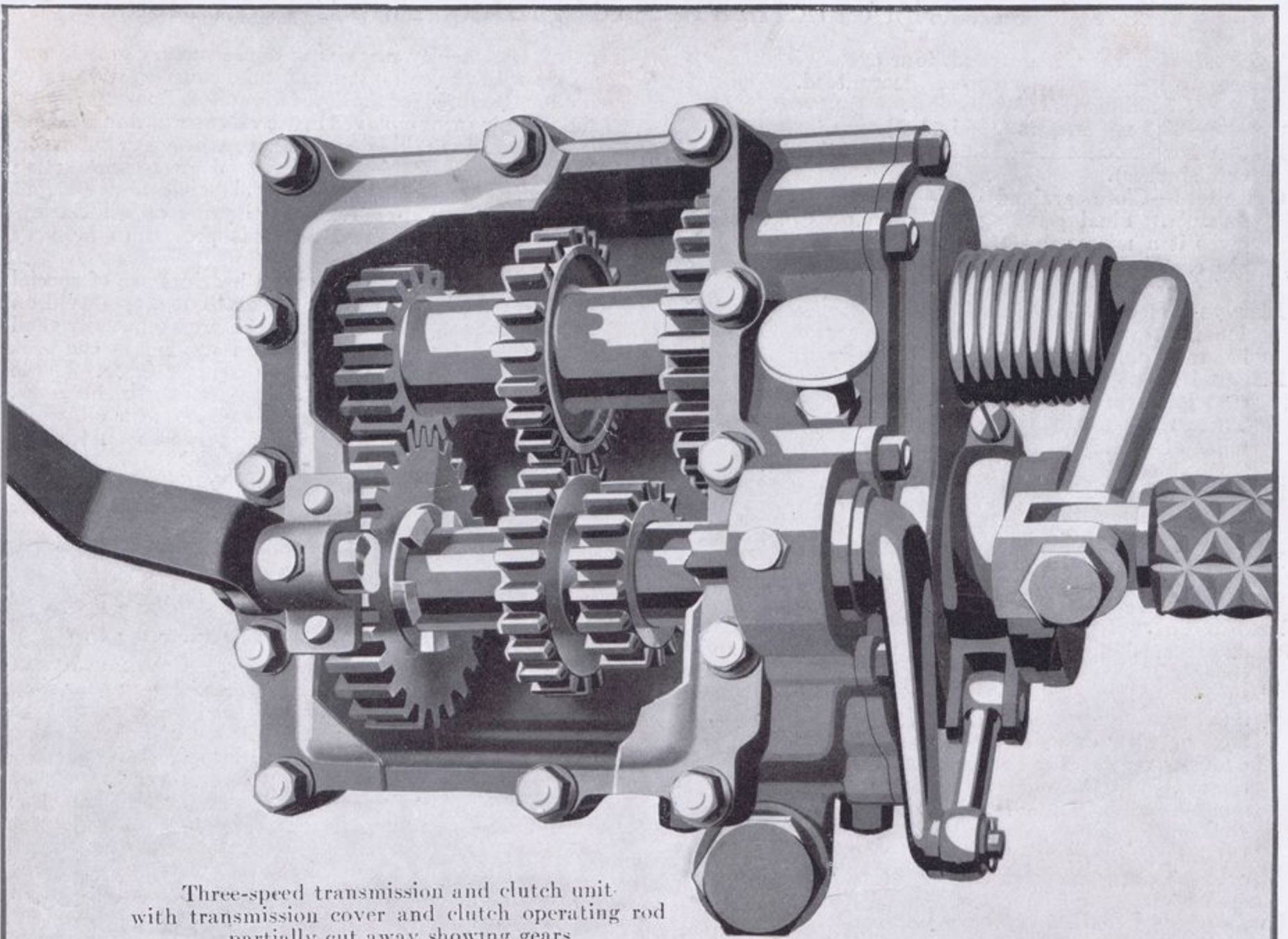
Cylinder Primers—Improved leak-proof type. No ground joints, no springs, no washers or cotter pins. A compression leak in these primers is impossible.

Priming Gun—Made in one piece with gasoline tank filler cap.

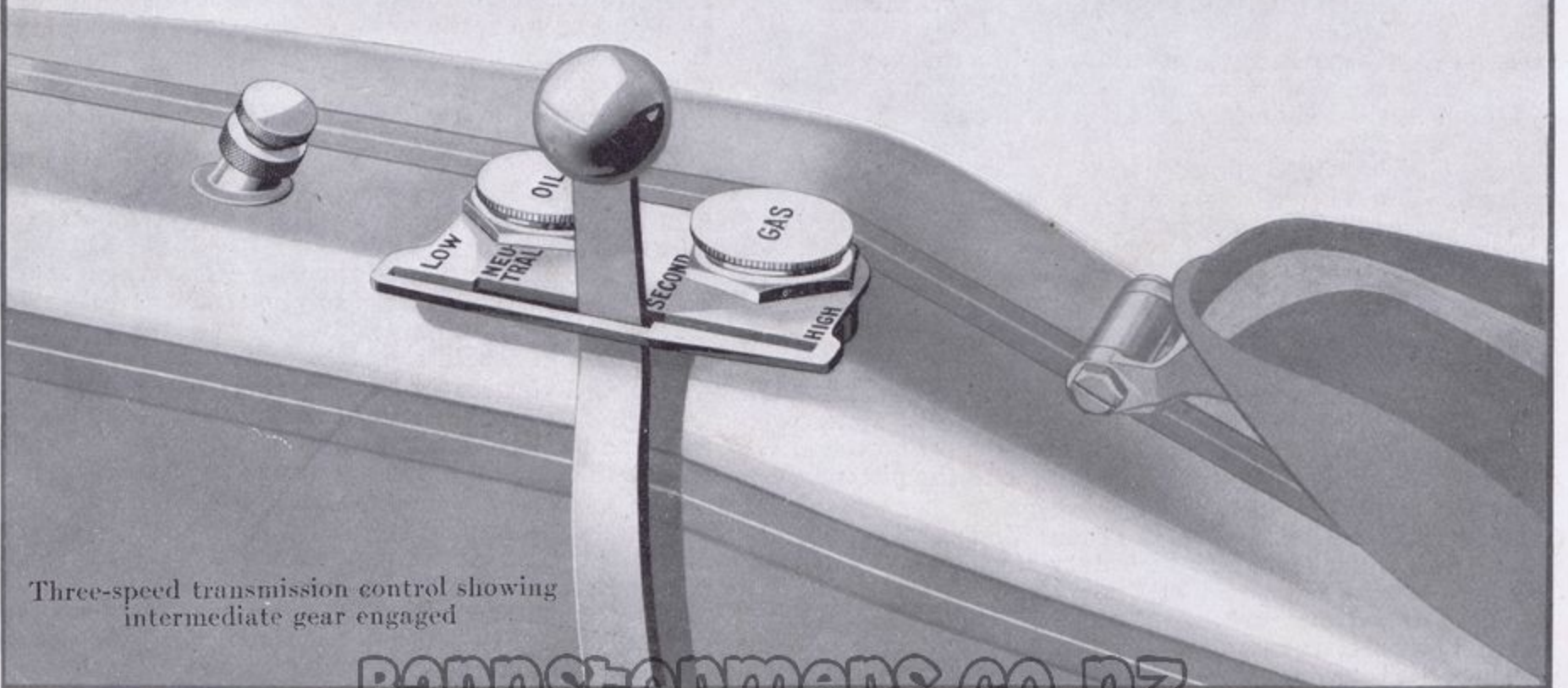
Magneto and Generator Mounting—The magneto or generator, whichever the case may be, is mounted directly back of the motor on a very substantial base, which is cast as a unit with the right half of the crank case.

Magneto and Generator Drive—This drive is obtained through a train of hardened steel gears, so carefully made as to be absolutely silent in operation. These gears run on hardened and ground steel bearings.

Finish of Motor—Crank case highly polished aluminum. Exhaust pipes nickel plated and polished. Cylinders nickel plated, satin finish. Intake pipe nickel plated and polished. Intake valve push rods nickel plated and polished. Exhaust valve spring casing nickel plated and polished. The Harley-Davidson motor throughout is finished in the most attractive manner possible and in keeping in every way with the balance of the machine.



Three-speed transmission and clutch unit
with transmission cover and clutch operating rod
partially cut away showing gears



Three-speed transmission control showing
intermediate gear engaged

Three-Speed Sliding Gear Transmission

One of the basic principles of gasoline engineering is that in order to develop power, the motor must attain a certain speed. To obtain this motor speed under the varying conditions met with in motorcycle touring an efficient three-speed gear practically is a necessity.

The Harley-Davidson three-speed transmission is scientifically designed throughout and is manufactured entirely in Harley-Davidson plants. It offers correct gear ratios for the three speeds. The second speed, or intermediate gear, may be used in rough going mile after mile if desired. In heavy roads if the rider shifts from high gear into intermediate he will find that this will ease all motor strains and that it provides just the right gear ratio for this work.

Where only two speeds are provided, as in the former types of transmission in general use on motorcycles, the low gear was either too low for continuous running or too high for use on very bad hills. With the three-speed a correct gear ratio is provided for all needs and under no conditions of road service is there any necessity for racing the motor.

In low gear the Harley-Davidson twin will go anywhere. It will climb a 45% grade with sidecar and passenger and, ridden solo, it has taken a 60% grade without faltering.

An ingenious interlocking device in the Harley-Davidson three-speed transmission makes it impossible to shift the gears until the clutch is released, doing away with any chance of stripping gears.

Built to stand up indefinitely, this transmission has no small parts to break or wear out. Big generous ball bearings carry the main transmission shaft. The

jack shaft, which transmits the power in low and intermediate gear, runs on two special high duty Harley-Davidson roller bearings. On high gear the transmission is free running.

The only care or attention the transmission requires is the maintenance of the proper oil level in the gear box. A little oil now and then—that's all. No adjustments are necessary. The Harley-Davidson engineers have aimed to make this transmission fool proof and trouble proof. It is not necessary to tighten up anything—and there is nothing to continually adjust.

All transmission gears are of highest grade special chrome nickel steel, accurately cut and finished. Each lot of raw stock used for gears is carefully analyzed by the Harley-Davidson metallurgist before any work is done on the stock. After each machining operation each gear is carefully measured and inspected. After the final heat treatment another inspection and rigid test for strength makes it necessary for every gear to be up to Harley-Davidson standard before it is put into the transmission.

The Harley-Davidson transmission throughout is built to stand up under the hardest conditions of service and if the lubrication is properly looked after from time to time, as mentioned, the device will last indefinitely.

The transmission housing is made of aluminum.

The extremely high grade workmanship put into the Harley-Davidson three-speed transmission is evident from the fact that it is impossible for the passenger riding in the sidecar to tell whether low gear, high gear, or intermediate is being used. In operation this transmission is absolutely soundless.

The Two Harley-Davidson Step-Starters

The first essential of any mechanical motor starter is to make it possible to start the motor without lifting the machine on the stand, and of course for sidecar use a starter is indispensable, but to be satisfactory, a starter must have some means to take care of any accidental back-kick.

Both types of Harley-Davidson step-starters incorporate an ingenious device, so that when a back-kick does occur, (which sometimes happens when a beginner advances the spark control too far and opens the throttle too wide) the starter is automatically disengaged, doing away with any possible injury to the starting mechanism. This is an important feature, and the Harley-Davidson starter release is covered by broad patents.

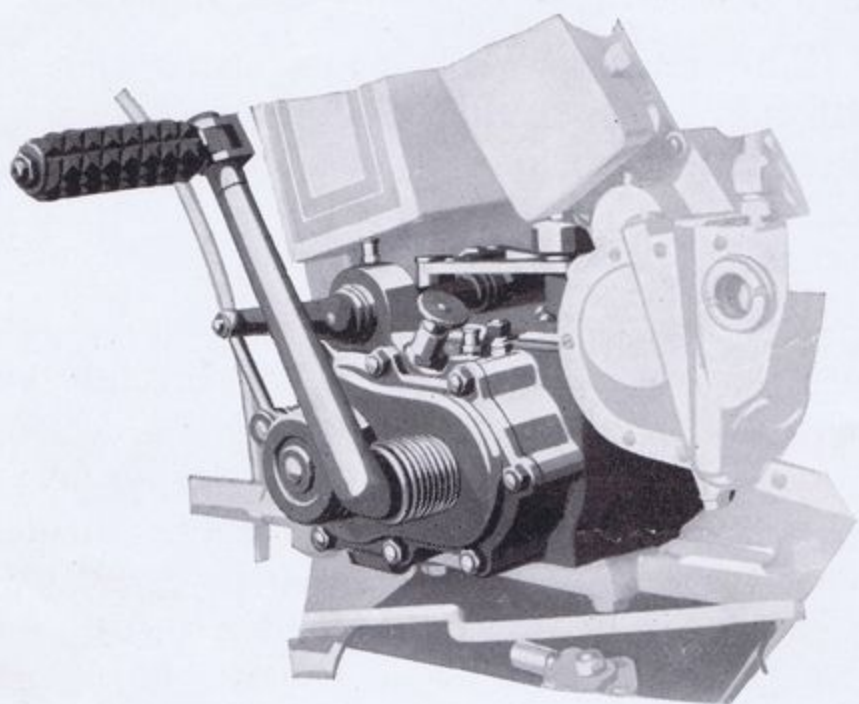
A starter will make or mar many motorcycle trips. When a rider starts on a tour he wants to have a starter that is absolutely dependable at all times and under all conditions of travel. He wants a

starter that is not in any way affected by rain, snow, sleet, mud, or sand. In short, he wants a thoroughly protected starter, and one which will give extended service without trouble or adjustment. Both Harley-Davidson starters answer all these requirements to the very letter.

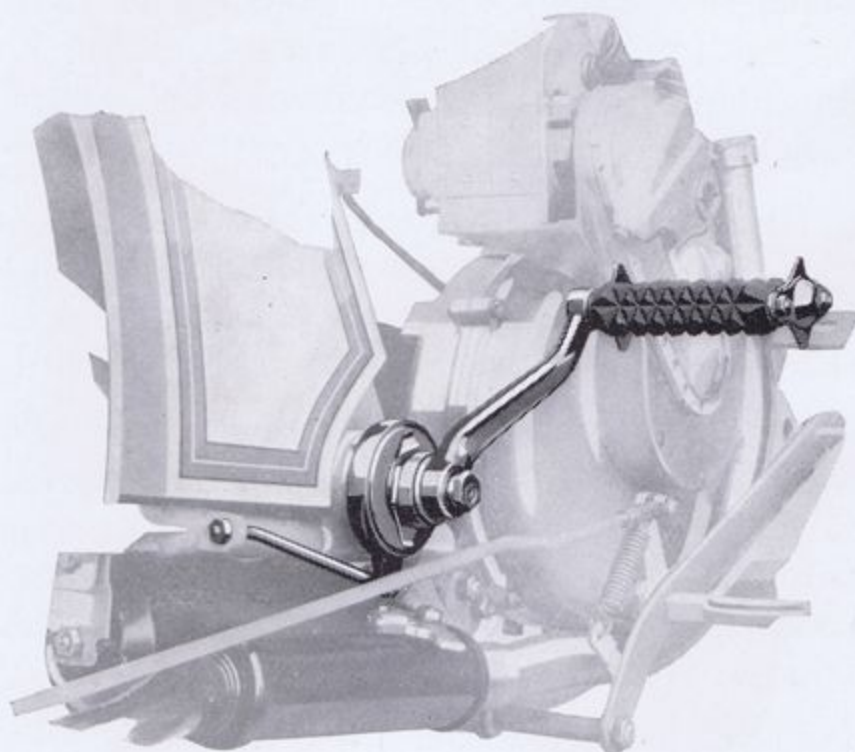
Buyers of three-speed models are offered the choice of the new rear stroke step-starter or the forward stroke pedal step-starter, which has been standard equipment on the Harley-Davidson for two years.

The new rear stroke step-starter is put into action with a backward stroke. Immediately upon completion of the starting stroke a spring returns the pedal to its original position in readiness for use again. The starter pedal itself folds up out of the way when not in use.

The single geared models 16-E and 16-B are equipped with a pedal step-starter, no option being offered on starters for these models.

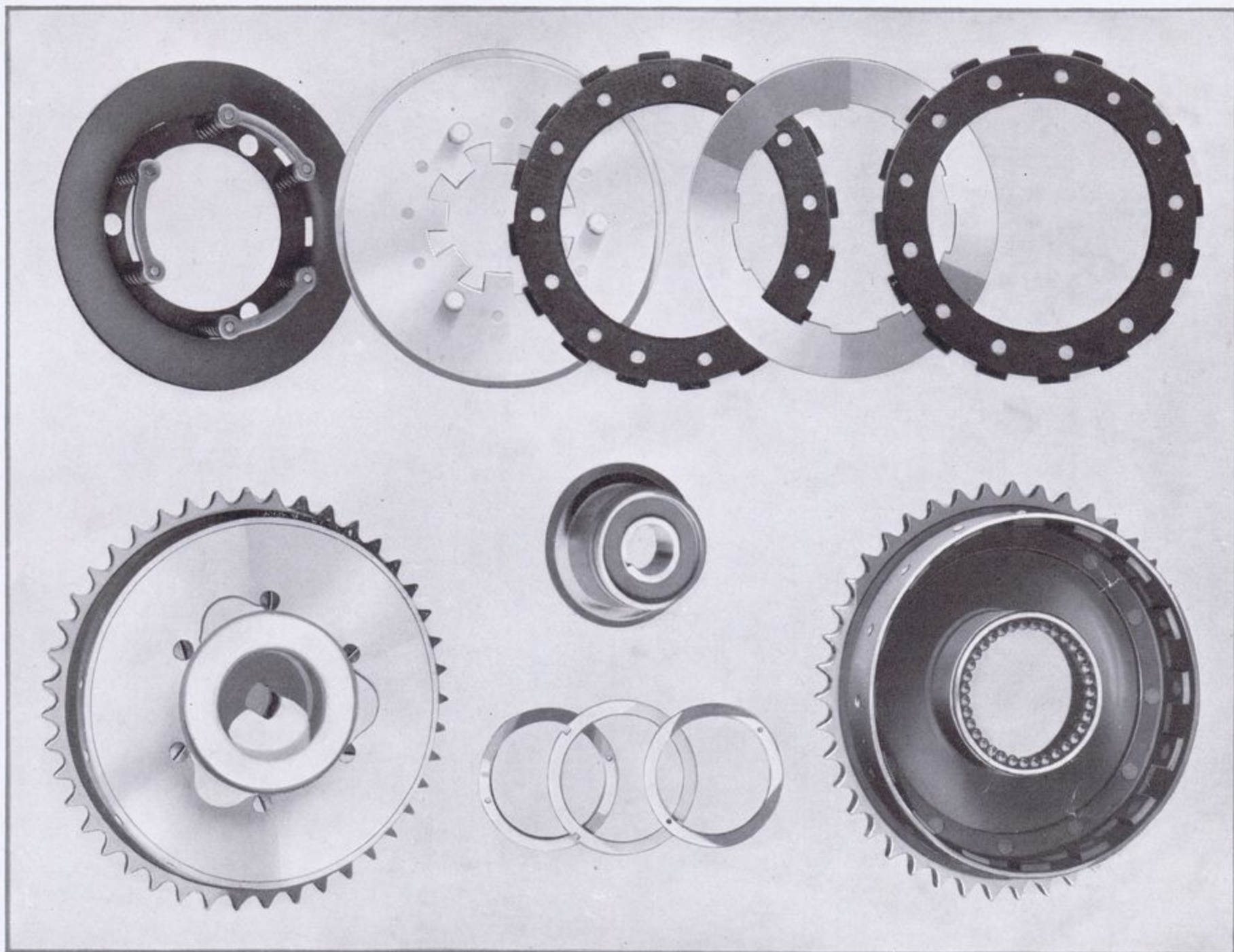


Rear stroke step-starter pedal in position
for starting motor



Forward stroke pedal step-starter in position
for starting motor

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The Harley-Davidson Clutch

The power is transmitted through the multiple disc dry plate clutch by means of four carefully hardened and ground steel discs working against a special composition facing.

These contact discs are of large size ($6\frac{23}{32}$ " outside diameter) and have a contact surface of 63 square inches, more than sufficient to take care of the requirements under any road conditions.

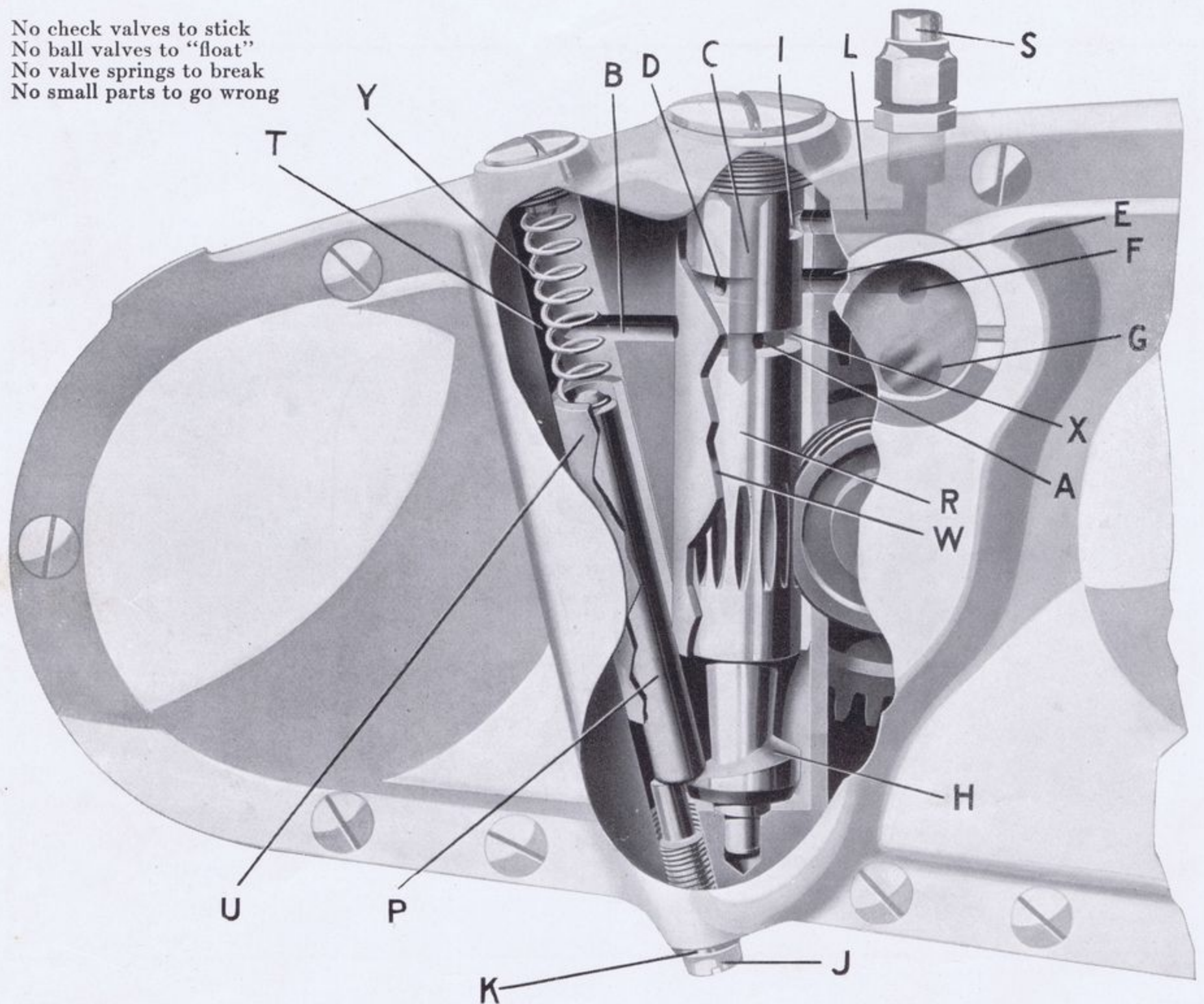
The Harley-Davidson clutch has remained unchanged in principle for four years, which shows that it long ago passed the experimental stage. The clutch is ball-bearing, the ball races being 3 inches

in diameter, fitted with $\frac{1}{4}$ " balls. The thrust is taken up with a ball-bearing collar.

A wide range of clutch adjustment is provided, and this adjustment, though seldom necessary, is very easily made. All working parts are carefully hardened. The ball races are ground to micrometer accuracy. The balls are of the best grade, and the thrust bearing has received unusual attention. The clutch throughout has been given the consideration it deserves.

Double clutch control makes it possible to operate the clutch by either hand or foot.

No check valves to stick
 No ball valves to "float"
 No valve springs to break
 No small parts to go wrong



Operation of Harley-Davidson Automatic Mechanical Oil Pump

In the illustration the rotary valve member R rotates in an anti-clockwise or left hand direction, looking at it from the top.

After the cam H has raised the plunger P to its highest point the spring Y returns the plunger, drawing a charge of oil from the tank through the supply pipe S, and through the intake system, as follows:

Through the channel L oil reaches the intake port I in valve member. The port I is connected with the hollow center C of distributor R. From C the oil passes through the opening A into distributor channel X, then through channel B to pump chamber T.

Just after the completion of the intake stroke of plunger P the intake port I closes and discharge port D opens, lining up with channel E. As soon as the plunger is raised by cam H the oil in chamber T is discharged through the channels B, X, A, C, D (D is now opposite E), E and F to the sight feed. From the sight feed the oil is forced to the motor through the opening G, still under pressure, of course, as the sight feed is constructed of heavy glass made oil tight with a special packing nut.

Although the highest crank case pressure registered to date in any Harley-Davidson motor was 4 pounds to

the square inch, the Harley-Davidson oil pump will operate against a pressure of 70 pounds if necessary. It is absolutely infallible in its operation. There are no small parts to break or go wrong, no check valves or ball checks whatsoever. The pump has but two moving parts, the plunger P and the distributor valve member R, rotated by a worm gear made integral with one of the magneto drive gears.

The amount of oil delivered to the motor may be increased by lengthening the stroke of the plunger P through the substitution of a thicker washer at K, which lowers the adjusting screw J. Likewise the supply of oil delivered to the motor may be reduced by the substitution of a thinner washer at K, thereby shortening the stroke of the plunger P.

The pump is carefully adjusted at the factory to feed plenty of oil, because a new motor requires more oil than one which has been used, but after a few hundred miles of running the oil supply generally can be cut down a little by substituting a thinner washer at K, as mentioned.

Washers of various thicknesses will be found in the tool box of each machine, with full instructions for the adjustment of the oil supply.

The Harley-Davidson Automatic Oil Pump Insures Perfect Motor Performance

The Harley-Davidson oil pump is designed to feed just the right amount of oil to the motor. With oil in the tank, a scarcity of oil in the motor is impossible. Neither can the pump feed an over-supply. This makes for great economy.

More advantageous than this economy of oil is the fact that perfect lubrication eliminates excessive carbonization of the motor and all the attendant evils. Strange as it may seem at first thought, too much oil, while not so serious as an under-supply, will eventually wear out any motor, and Harley-Davidson engineers found that the only way to prevent an over-supply was to lubricate the motor by an automatic mechanically driven pump with large, positively operated rotary valves working independently of temperature conditions and unaffected by varying consistencies of different oils. When a motor becomes carbonized tiny particles of carbon gradually work into the cylinder walls, piston face and piston rings, acting as an abrasive, eventually causing wear to these parts.

Some of this carbon works past the pistons into the crank case, where the circulation of oil carries this destructive mixture to other moving parts. If the rider neglects to clean out the crank case occasionally, this mixture of fine carbon and oil causes the crank pin, crank shafts, gears and valve action to wear long ahead of their time.

Much so-called motor trouble is caused by improper carburetor adjustment. To offset the poor running of the motor, due to heavy oil vapor in the combustion chamber as a result of an over-supply of oil, the rider will adjust the carburetor so that it feeds an excessively rich mixture

to the motor. This mixture not only rapidly deposits carbon, but makes a slow burning or poorly combustible gas, tending to over-heat the motor and causing a material loss of power. The rider in attempting to remedy this over-heated condition will give the motor more oil, making matters worse than ever.

Summed up briefly, proper lubrication means sustained speed and power, prolonged motor life and uniform gas mixture. It means the end of most so-called motor troubles, due to fouled spark plugs, burnt, pitted or warped valves, and other results of an improperly adjusted carburetor, furnishing too rich a mixture to offset the effects of too much oil.

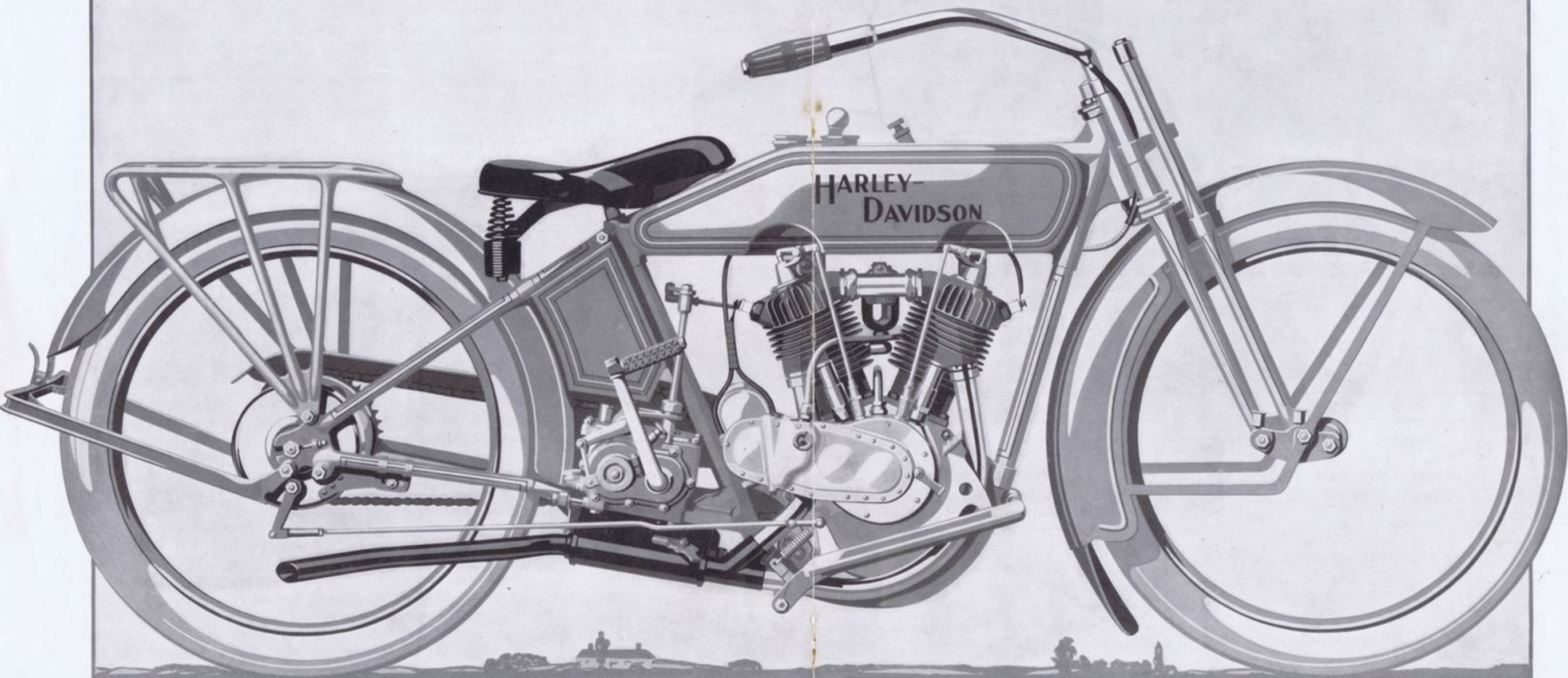
The Harley-Davidson motors are almost carbonless. By doing away with excessive carbon the premature wear of pistons, piston rings, cylinder walls and other motor parts is eliminated.

It is sometimes advisable to give the motor a little extra oil by means of the hand pump when negotiating a long steep hill, or when going through stretches of heavy mud or sand, especially if the machine is carrying a sidecar and an extra passenger. After the rider flushes out the motor crank case with kerosene, which is advisable from time to time, a pumpful or two of oil should be fed to the crank case. A conveniently located hand pump is available when needed for these special purposes.

The crank case drain plug is located at the side of the casing, near the motor base, making it a simple matter to flush out the crank case. This operation does much to make a smooth running motor.

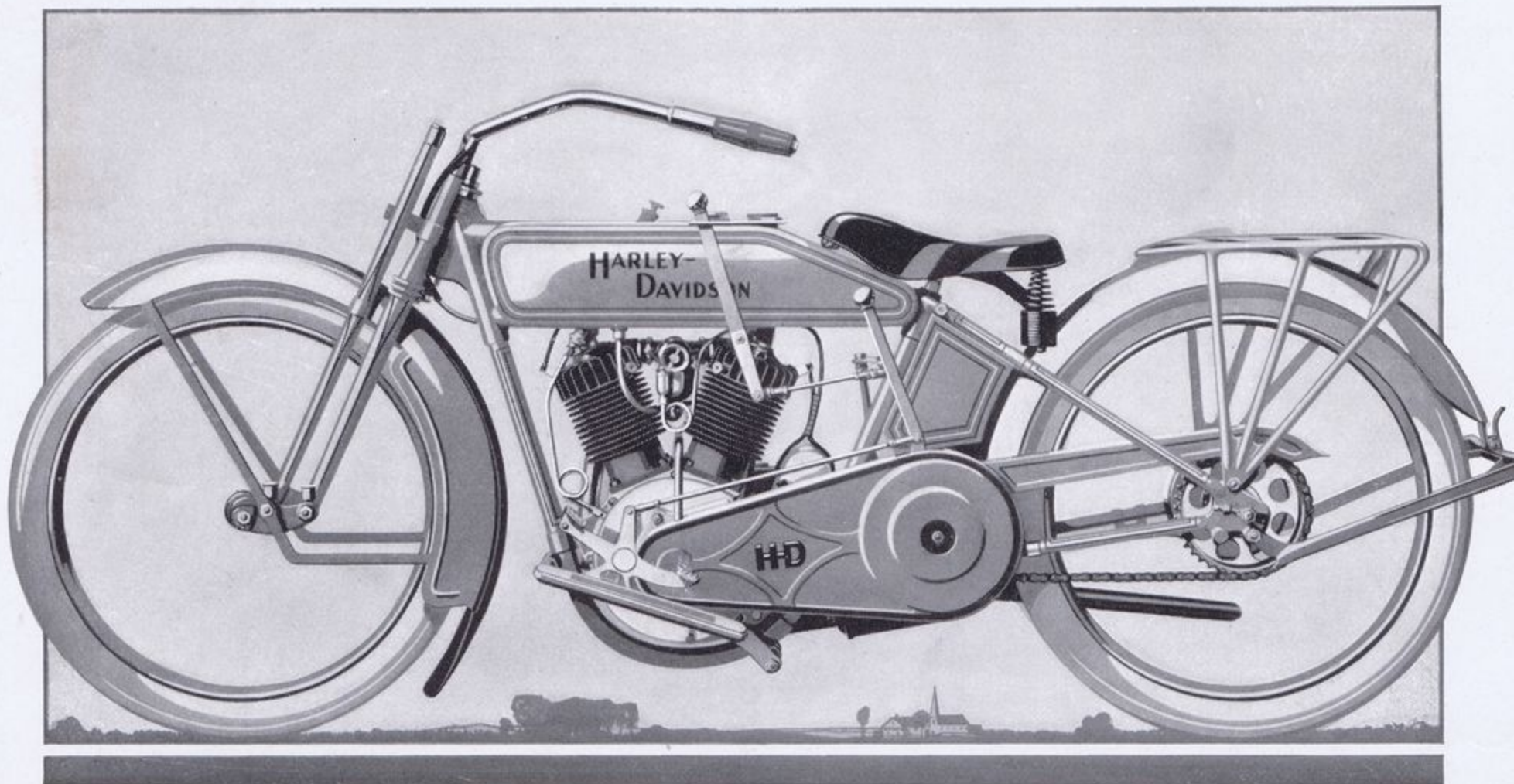
The hand pump is supplied only for special purposes and it should not be used under ordinary conditions.

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PHONE 1400
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11 Horsepower Twin Cylinder Three-Speed Model 16-F



11 Horsepower Twin Cylinder Three-Speed Model 16-F

Ignition—By waterproof, high tension Bosch magneto.

Transmission—Three-speed sliding gear transmission.

High Gear Ratio—3.84 to 1.

Intermediate Gear Ratio—5.76 to 1.

Low Gear Ratio—8.64 to 1.

Motor Starter—Rear stroke Step-Starter.

Clutch—Clutch located on transmission countershaft.

Other specifications given under general specifications of all models.

The Popular Three-Speed Twin

Such was the reception given the three-speed Harley-Davidson following its announcement last year that more than nine times as many three-speed twins were sold during the 1915 season as any other Harley-Davidson model.

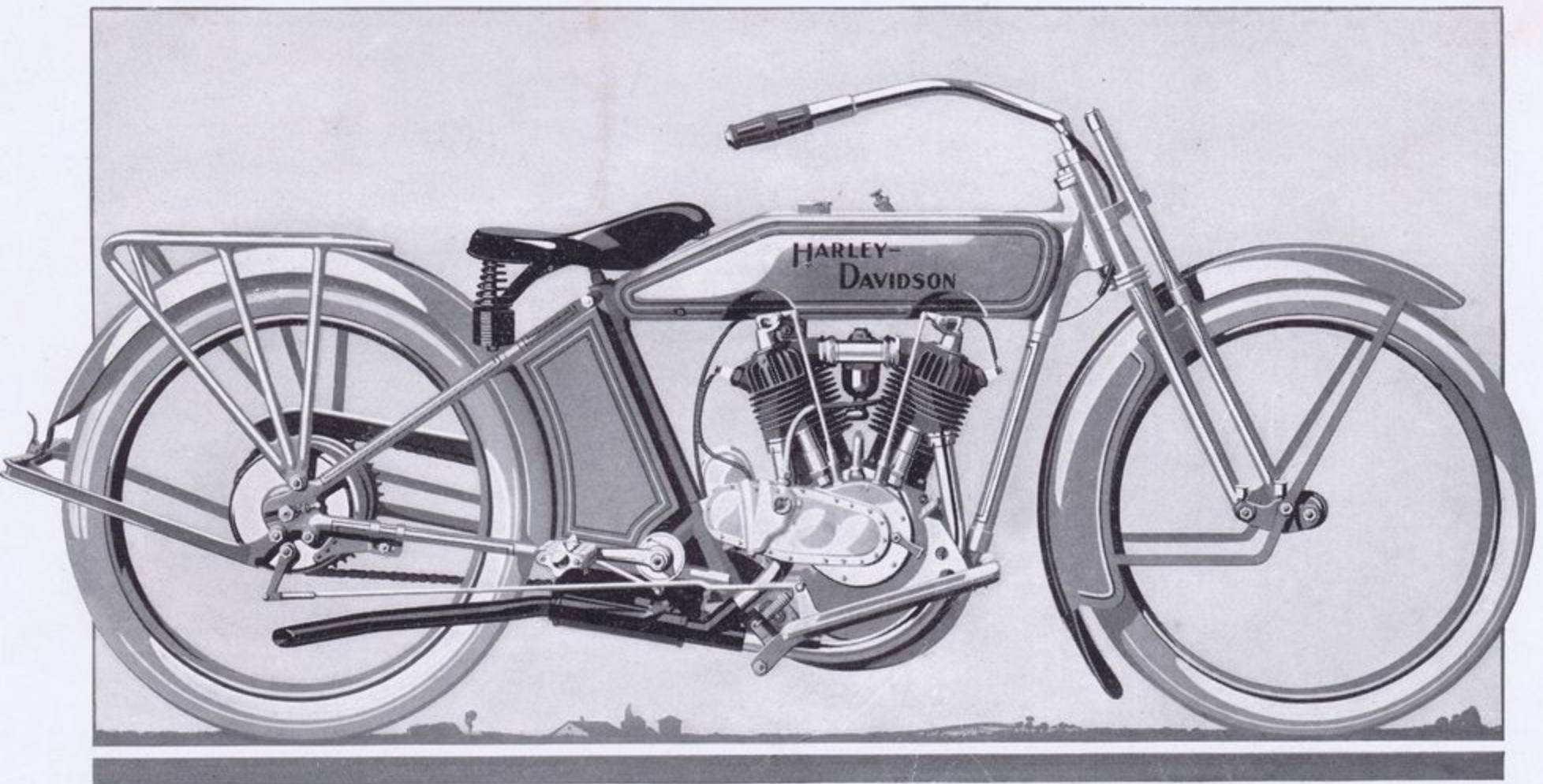
This record speaks for itself.

The three-speed twin is the most satisfactory all-purpose motorcycle which has been produced to date. It is the logical touring machine—the logical sidecar machine—in fact, the logical machine for all-around general usefulness.

Ridden solo it is nothing for the three-speed twin to climb a 60% grade. With a Harley-Davidson sidecar and passenger it will take a 45% grade, and do it without a whimper.

The experienced motorcycle rider who does any amount of extended touring invariably chooses the three-speed twin. Many motorcyclists made the transcontinental to the Panama-Pacific Exposition, and almost without exception they rode three-speed twins.

In the most strenuous endurance contests on record the Harley-Davidson three-speed twin with sidecar has shown



11 Horsepower Twin Cylinder Single Geared Model 16-E

Ignition—By high tension Bosch magneto.

Motor Starter—Harley-Davidson forward stroke Step-Starter.

Clutch Location—On rear hub.

Gear Ratio—4.07 to 1.

Tool Box—Metal tool box located between seat mast tube and rear fender. Tool box door is fitted with a lock.

Other specifications given under general specifications of all models.

that it can satisfactorily negotiate roads which but a few years back would have been considered impassable for any motor driven vehicle.

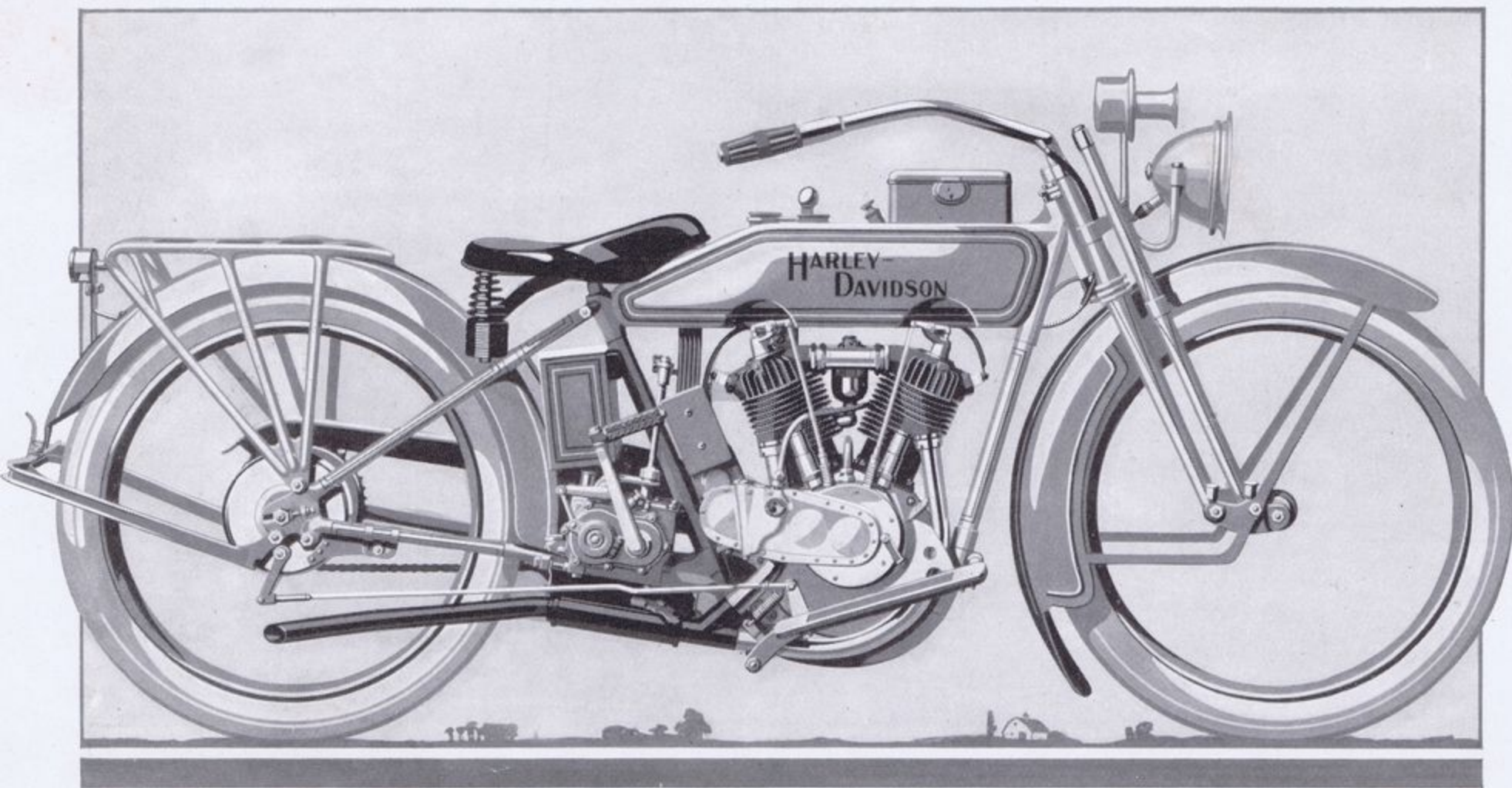
In the rural mail service Harley-Davidson three-speed twins equipped with sidevans are rendering remarkable service. This equipment has shown repeatedly that for this service it is, in many ways, superior to any other vehicle.

A sidevan outfit is light and fast and may be operated at a cost of but a few dollars per month—only a fraction of the cost of operating an automobile, and far less than the upkeep of horses and rig.

With a Harley-Davidson three-speed twin and sidevan the owner really has

three equipments in one. The sidevan may be detached in a few minutes time and the motorcycle can be ridden solo, or it is possible to replace the sidevan body with a pleasure body, so that the sidecar outfit may be used for a pleasure run in the evening or after working hours.

The 1916 Harley-Davidson three-speed twin is the finest motorcycle the Harley-Davidson factories have ever produced. It has every refinement which has suggested itself in fourteen years' manufacture of high grade motorcycles. It incorporates not one single experimental feature, but embodies many important points obtainable in no other motorcycle built.



Electrically Equipped 11 Horsepower Twin Cylinder Three-Speed Model 16-J
 Incorporating the Harley-Davidson Electric Lighting, Ignition and Signal System

Ignition—High tension ignition from special generator.

Electric Headlight—2 bulb headlight, 7 volt 12 candle-power bulb for regular lighting, with auxiliary 7 volt 2 candle-power bulb.

Tail Light—7 volt 2 candlepower bulb mounted so as to light license number.

Lighting Switch—Both headlight bulbs and tail light are controlled with a single switch, having three positions. First position turns on large headlight and tail light. Second position turns on small headlight and tail light. Neutral position turns off all lights. A switch key is provided which may be carried by the owner.

Electric Warning Signal—The compact, efficient horn is controlled from the left handlebar.

Transmission—Three-speed sliding gear transmission.

High Gear Ratio—3.84 to 1.

Intermediate Gear Ratio—5.76 to 1.

Low Gear Ratio—8.64 to 1.

Clutch—Clutch located on transmission countershaft.

Motor Starter—Harley-Davidson rear stroke Step-Starter.

Other specifications given under general specifications of all models.

The Harley-Davidson Electric Lighting System

The headlight has two bulbs, one for regular lighting, the other an ordinance light of low candle power for use when the machine is standing or where blinding headlights are prohibited.

The Harley-Davidson Step-Starter provides a separate starting system, mechanical and not electrical.

One key switch controls the lights, another key switch controls the various

other electrical functions, including the cutting out of the electric horn, making it impossible to operate it while the machine is standing at the curb.

The special Exide battery used is as nearly indestructible as a storage battery can be built, and may be laid on its side without leaking.

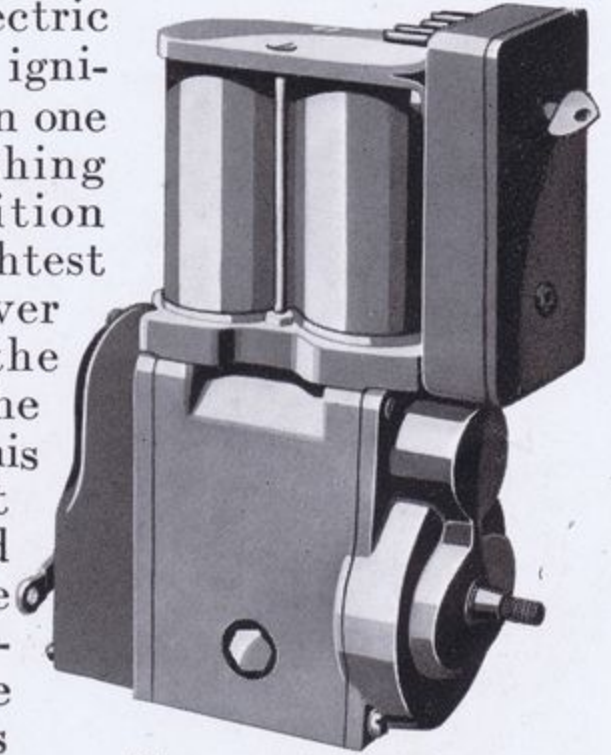
Of course a complete electrical system requires a little attention from time to

time. To keep the storage battery up to capacity, distilled water must be added every week or so, to keep the solution at the proper level, as a certain amount is lost through evaporation. However, distilled water only must be added, as the other constituents of the electrolyte solution in the battery are not reduced by the evaporation of the water.

The Harley-Davidson generator supplies ample current to take care of a small sidecar light of 2 candle power, and when the machine is used for sidecar work, all the lights are controlled from the one lighting switch. The electrical system must not be abused by overloading through the use of larger bulbs than those supplied on the machine.

After two years of extensive work by the Harley-Davidson engineering department the Harley-Davidson electric lighting ignition and signal system was introduced a year ago. This system proved to be so satisfactory and made such a profound impression, especially upon experienced riders, that for 1916 it is continued in an improved form, a number of important refinements having been worked out during the past season when the Harley-Davidson engineers had an opportunity of seeing the Harley-Davidson system in operation on several

thousand Harley-Davidson motorcycles. This electric lighting system is not an attachment, but a built-in feature—a combined electric lighting and ignition system in one unit, furnishing perfect ignition and the brightest road light ever placed on the market. The principle of this system is that of sustained light. At the end of an evening run the light is just as bright as at



The compact Generator

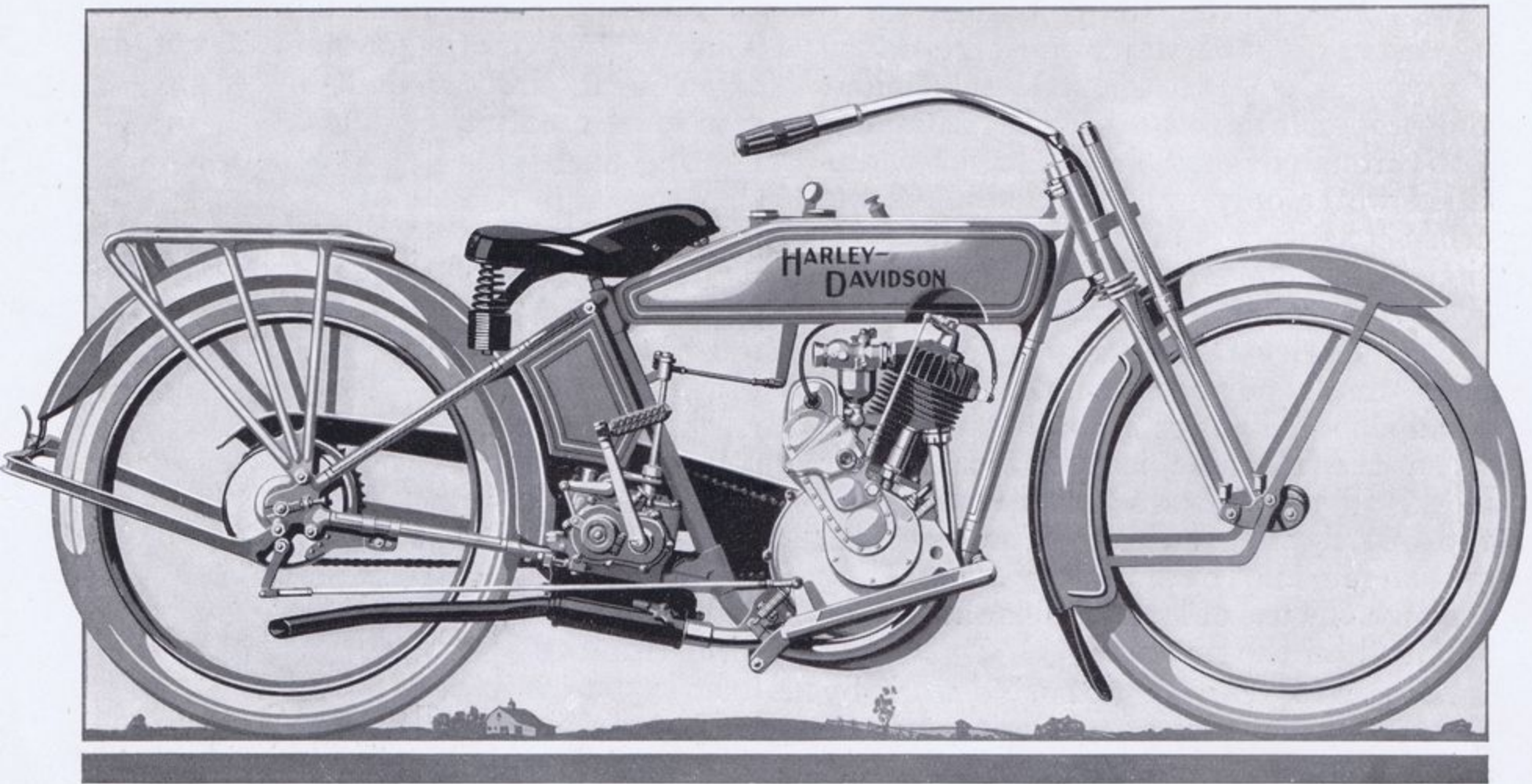
the start, because the generator automatically keeps the storage battery fully charged.

The generator weighs but little more than the conventional type of magneto, while the Exide storage battery which completes this system, furnishing light when the machine is standing still, is lighter than a gas tank. This compact gear driven generator furnishes high tension alternating current for ignition and low tension 6 volt direct current for lighting and for the warning signal, as well as for keeping the storage battery charged.

With the generator it is possible, if necessary, to start the motor with an absolutely dead storage battery, and the generator lighting system will also furnish light with dead storage battery if need be. On the other hand, the storage battery offers a source for ignition entirely adequate in itself if the occasion demands it. These features eliminate weaknesses inherent in most electrical systems.



The most powerful motorcycle electric lighting system



6 Horsepower Single Cylinder Three-Speed Model 16-C

Ignition—By high tension Bosch magneto.

Transmission—Three-speed sliding gear transmission.

High Gear Ratio—4.75 to 1.

Intermediate Gear Ratio—7.12 to 1.

Low Gear Ratio—10.68 to 1.

Motor Starter—Rear stroke Step-Starter.

Clutch Location—On transmission countershaft.

Other specifications given under general specifications of all models.

Mechanical Description of High Speed High Duty Single Cylinder Motor

Type—Long stroke, high speed, four cycle.

Horsepower—Six horsepower guaranteed.

Bore—84.1 millimeters ($3\frac{5}{16}$ inches).

Stroke—101.6 millimeters (4 inches).

Piston Displacement—564.92 cubic centimeters (approximately 35 cubic inches).

Cylinder—Close grained gray iron cast to special formula. Final grinding operation gives cylinder wall a mirror finish. Cylinder and head are cast in one piece eliminating any possibility of leaks through gaskets or joints.

Piston—Special heat treated gray iron. Light weight. Final operation gives piston a mirror finish. Piston head polished to eliminate excessive carbon deposit.

Piston Rings—Piston fitted with three rings in place of customary two. Step joints are used in place of the usual diagonal cut type. Rings are ground on three sides. Harley-Davidson rings will hold compression after thousands of miles of hard road service.

Piston Pin—Special steel carefully heat treated and then ground to absolute size. Piston pin, being hollow, is very light.

Intake Valve—The unusually large mechanically operated intake valve is made of nickel steel with a 45° seat.

Intake Valve Operating Mechanism—All steel construction designed to provide very efficient action capable of handling gas properly at both high and low speeds. All working parts carefully hardened. Intake

valve readily removable as unit with housing by taking out one lock nut and loosening one set screw. Rocker arm, with its mounting, is removable at same time. Intake housing is secured in cylinder in such a manner as to make an absolutely gas tight fitting without the use of gaskets. The intake cam is cut integral with one of the gears of the magneto drive train.

Intake Valve Lifter—Readily adjustable.

Intake Valve Spring—Made of genuine vanadium steel, entirely enclosed.

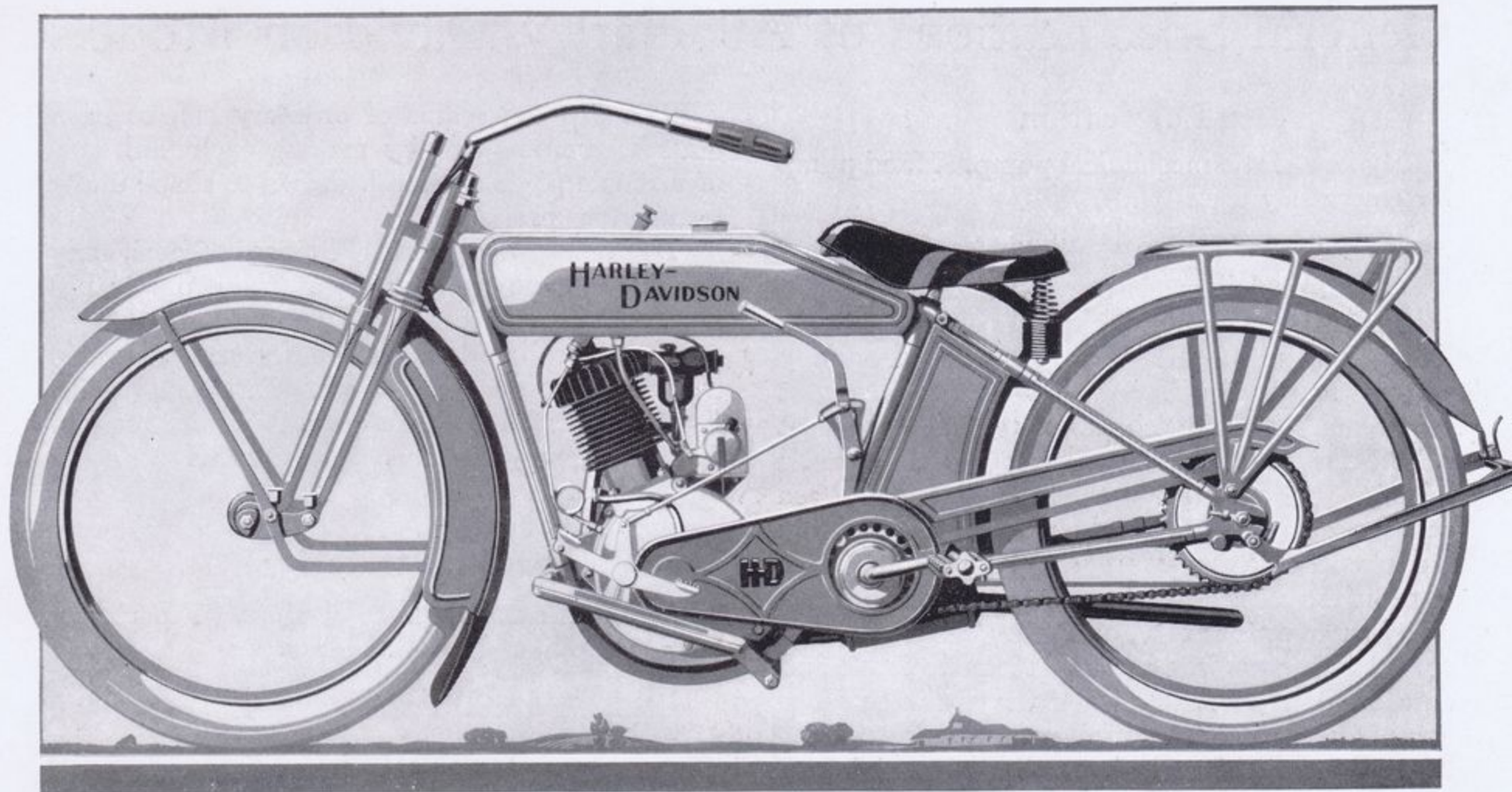
Exhaust Valve—Oversize, of genuine tungsten steel with 45° seat.

Exhaust Valve Operating Mechanism—All steel construction. All working parts carefully hardened. Bearing surfaces ground to micrometer accuracy. Lubrication of the valve mechanism has been given careful attention and this is one of the reasons why this action gives such dependable results in service.

Timing Gears—By machining the secondary gear in one piece with the exhaust cam positive valve action is assured for the life of the motor. Inasmuch as no keys or pins are employed in the valve action parts which might sheer off or cause trouble, there is nothing to come apart or get out of order.

Exhaust Valve Lifter—Readily adjustable.

Exhaust Valve Spring—Made of genuine vanadium steel, entirely enclosed.



6 Horsepower Single Cylinder Single Geared Model 16-B

Ignition—By high tension Bosch magneto.

Clutch Location—On rear hub.

Gear Ratio—4.75 to 1.

Motor Starter—Harley-Davidson forward stroke Step-Starter.

Other specifications given under general specifications of all models.

Mechanical Description of High Speed High Duty Single Cylinder Motor—Continued

Compression Relief—All steel construction substantially made to give satisfactory service.

Piston Pin Bearing—Special high duty phosphor bronze. Ample provision is made to keep this bearing properly lubricated. Double spiral grooves act as distributors for the oil, while a slot in the top of the bearing surface acts as an oil trough for catching and retaining the oil thrown up by the fly wheels.

Connecting Rod—Modified "I" beam section of heat treated special high carbon drop forged steel. Connecting rod is very light in weight and balanced with respect to the piston and fly wheels to make a smooth running vibrationless motor.

Connecting Rod Bearing—Special three row high duty Harley-Davidson roller bearing running in carefully hardened and ground steel bushing fitted into connecting rod.

Crank Pin— $\frac{7}{8}$ " diameter, $1\frac{1}{8}$ " long, of special chrome nickel steel alloy carefully hardened and ground to micrometer accuracy.

Crank Shaft Bearing on Drive Side—High duty phosphor bronze.

Crank Shaft Bearing on Gear Side—High duty phosphor bronze.

Crank Shafts— $\frac{15}{16}$ " diameter of special steel carefully hardened and ground to micrometer accuracy.

Fly Wheels—Carefully balanced with respect to piston and connecting rod. The method of mounting the

Harley-Davidson fly wheels makes it possible to keep them in permanent alignment, a very important point in building a smooth running motor.

Crank Case—Highly polished aluminum that will not tarnish. All joints made oil tight. The Harley-Davidson crank case keeps the oil inside where it belongs and where it is needed for lubrication, instead of allowing part of it to leak out and soil the rider's clothing.

Crank Case Breather Valve—Automatic breather valve constructed of steel throughout.

Cylinder Primer—Harley-Davidson leak proof type.

Priming Gun—Made in one piece with gasoline tank filler cap.

Magneto Mounting—Magneto mounted directly back of the motor on a very substantial base which is cast as a unit with the aluminum magneto drive case housing.

Magneto Drive—By means of a train of hardened steel gears so carefully made as to be absolutely silent in operation.

Finish of Motor—Crank case highly polished aluminum, exhaust pipe nickel plated and polished, cylinder nickel plated, satin finish, intake pipe nickel plated and polished, intake valve push rod nickel plated and polished, exhaust valve spring casing nickel plated and polished. The Harley-Davidson motor throughout is finished in the most attractive manner possible, in keeping in every way with the balance of the machine.

General Specifications of All Harley-Davidson Models

Lubrication

By automatic mechanical pump. Hand pump for emergency use.

Ignition

On all models excepting electrically equipped model 16-J, ignition is by means of high tension Bosch magneto. This magneto is absolutely waterproof and will not foul in the heaviest rainstorm. The Bosch magneto is the highest priced magneto on the market and it is used because it is positively the best that has been produced to date. It is ballbearing and absolutely trouble proof in every way, and the only attention it requires during the season is a drop of oil every three or four thousand miles. The magneto cutout is incorporated in the magneto itself and cuts out automatically when the spark advance lever is brought back to full retard.

Ignition on electrically equipped model 16-J by special generator.

Carburetor

Automatic float feed, with separate gasoline and air adjustments. Warm air for low speeds is taken directly off the cylinder walls, while cold air for high speeds is introduced directly into the mixing chamber above the nozzle. The auxiliary air valve is fitted with an easy starting shutter to facilitate starting in cold weather.

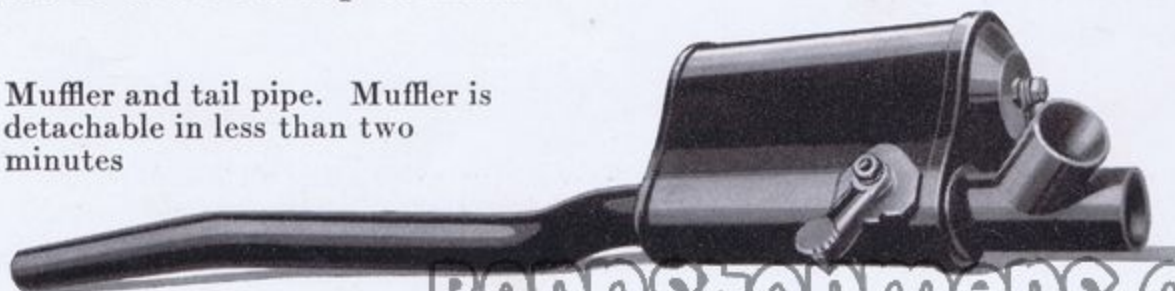
Muffler

An unusually large muffler fitted with a long tail pipe extension reduces the exhaust of the Harley-Davidson motor to a mere whisper. Muffler shell is entirely constructed of pressed steel, and fitted with a direct opening cutout operated by a foot controlled trip. With the Harley-Davidson muffler there is no appreciable back pressure.

Tanks

The new type of symmetrically rounded, stream line gasoline and oil tanks have no exposed seams and no sharp corners.

Muffler and tail pipe. Muffler is detachable in less than two minutes



The exposed seams of ordinary construction have been eliminated by making each tank side of a single piece of metal, drawn to shape under tremendous pressure.

By doing away with exposed seams, any possible chance for leakage at these points has been entirely overcome.

Two gasoline tanks have for several years been a feature of the Harley-Davidson twins. For 1916 this feature is incorporated in all models. The emergency tank is a refinement which is often found useful.

Tank Capacity

Main gasoline tank 16½ pints. Emergency tank, 5½ pints. Total 22 pints.

Oil Tank 8 pints.

Tank Filler Caps

Very large tank filler caps for 1916 will be much appreciated as it is a great convenience to be able to use the ordinary garage funnel in filling. For 1916 the tank openings are 1½ inches—a full half inch larger than the openings previously used.

Gasoline Tank Shutoff

A new type of gasoline shutoff valve is located beneath the tank, making a very neat appearance, as there are no unsightly needle valves to mar the appearance of the top of the tank.

Power Transmission

By roller chain of ¾ inch width and 5/8 inch pitch. Front and rear drive chains are independently adjustable.

Chain Guards

Substantial pressed steel chain guards are fitted over both chains.

Foot Boards

The large comfortable folding foot boards permit the rider to shift the position of his feet from time to time, a point which is much appreciated by owners

who do any great amount of extended touring. The rider is liable to become cramped if the construction of his motorcycle necessitates keeping his feet in one position all the time. The Harley-Davidson foot boards are located so as to enable a tall man or a short man to be comfortable at all times. The foot boards are of light but sturdy construction, being made of pressed steel and fitted with rubber covers.

Saddle

Troxel Jumbo padded saddle.

Seat Post

Patented Harley-Davidson Ful-Floteing seat post designed not only for extreme comfort, but to give the lowest possible saddle position. The construction of the Harley-Davidson seat post is such that it may be adjusted to the weight of any rider.

Frame

Double bar loop frame, with continuous tube from steering head to seat post, serving as the loop tube. Frame fittings are special pressed steel or high carbon drop forgings. The now almost universal use of sidecars made it advisable to reinforce the frames throughout even more than heretofore, so that the Harley-Davidson owner when attaching a Harley-Davidson sidecar might rest assured that he would not be troubled by the motorcycle frame getting out of alignment after a month or so of service. Right here it might not be out of place to say that the Harley-Davidson Motor Company does not bind itself to make good its guarantee if any sidecar is used other than the Harley-Davidson sidecar. The Harley-Davidson engineers designed the Harley-Davidson sidecar for use with the Harley-Davidson frame only, and in building the frame it is natural that they figured only on the strains and stresses it would be subjected to when used with the Harley-Davidson sidecar.

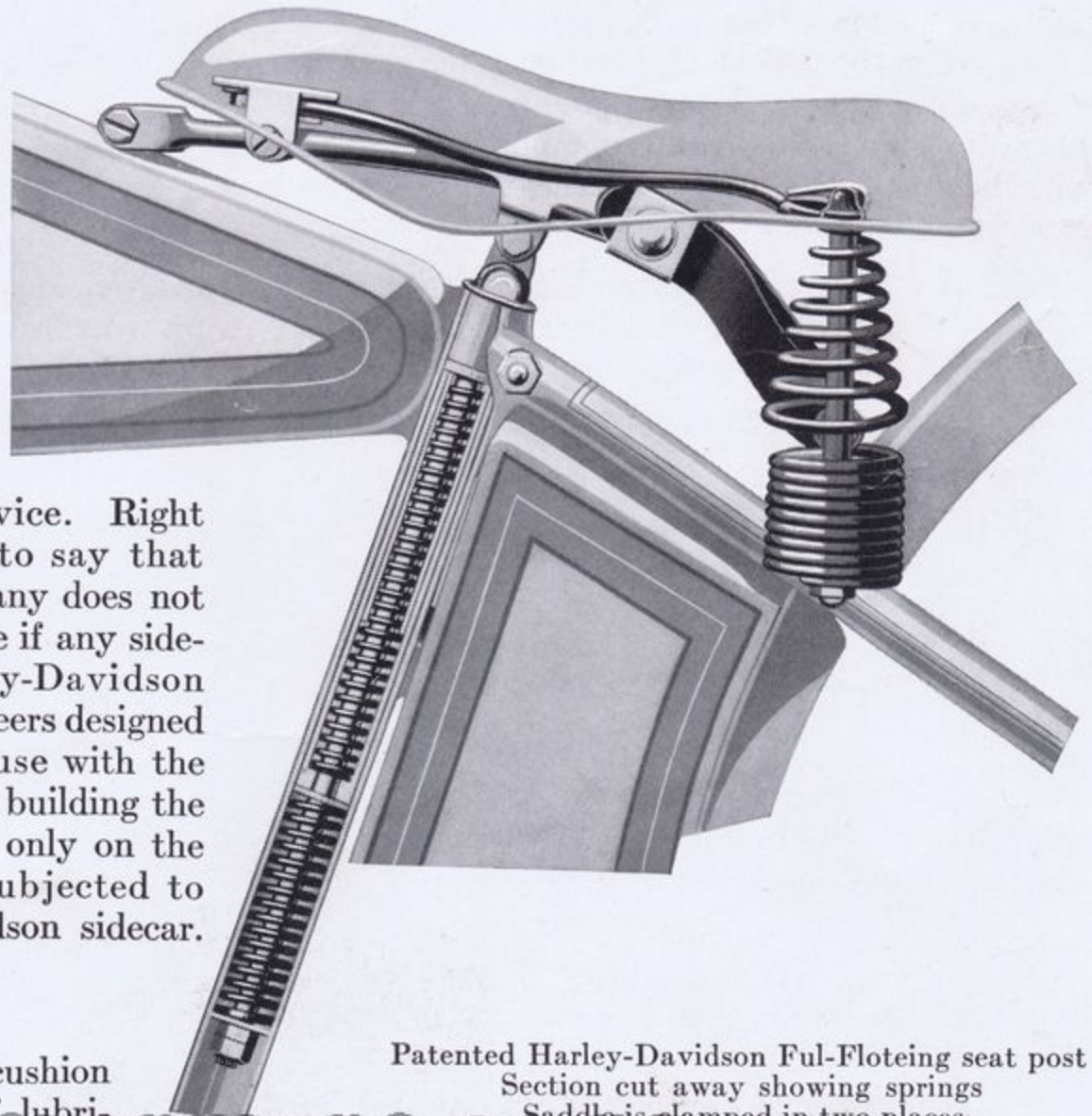
Cushion Front Fork

Double stem Harley-Davidson cushion fork. All springs enclosed, and self lubri-

cating. Recoil springs of genuine vanadium steel. In keeping with the greater clearance given the rear tire, the front fork has also been widened and the forksides made longer to allow considerable more clearance for the front tire, so that a tire chain may be fitted to the front tire also, when traveling over extremely muddy roads. The forksides have been strongly reinforced for 1916, to do away with any possibility of mis-alignment from extended sidecar use. A new type of extra large self-aligning head fittings, made of special steel and designed by Harley-Davidson engineers, is used for 1916. All ball races are curved surfaces, doing away with so-called "point contacts," which carry the loads in ordinary cup and cone bearings. The fork turns on $\frac{1}{4}$ " balls.

Front Fork Rocker Plates

Drop forgings of special heat treated nickel steel. Both rocker plate bearings are carefully hardened steel bushings which may be replaced if they show wear after extended service. The rocker plate studs are also of hardened steel. Grease cups take care of the lubrication of the rocker plate bearings.



Patented Harley-Davidson Ful-Floteing seat post
Section cut away showing springs
Saddle is clamped in two places

Lamp Bracket Lug

A substantial lamp bracket lug is made as a unit with front fork, to facilitate a satisfactory mounting for a headlight.

Handlebars

The Harley-Davidson handlebars are 1 inch in diameter, of pressed steel, tubular in shape and by actual test 100% stronger than the ordinary type of tube construction in common use. By making the handlebars of pressed steel instead of tubes all brazed joints have been eliminated, thus doing away with any possible chance of breakage of this important part. Handlebars are beautifully nickel plated, nickel being put on over a substantial copper plate.

Grip Control

Enclosed within the handlebars. A double acting wire control working in a cable sleeve provides the simplest and at the same time a very strong and satisfactory control. Where the cable sleeve is exposed it has been neatly covered with leather. The rider depends upon his grip control to regulate the speed of his machine, and the Harley-Davidson engineers have given this proposition the care it deserves. A careful examination will show that the Harley-Davidson grip control is very substantially made.

On the twin cylinder models the right grip controls the throttle, while the left grip controls

the spark advance and compression relief. On the single cylinder models the right grip controls the throttle and compression relief, and the left grip controls the spark advance.

Front Hub

Harley-Davidson ballbearing front hub, fitted with $\frac{3}{8}$ " balls and knockout axle $\frac{7}{16}$ " in diameter. This hub is specially designed to handle the strains incidental to sidecar use.

Rear Hub

Harley-Davidson ballbearing rear hub, fitted with $\frac{3}{8}$ " balls and a $\frac{5}{8}$ " axle. Like the front hub, the rear hub has been made amply strong to take care of the strains imposed upon it by the use of a sidecar.

Band Brake

The large Harley-Davidson dust-proof internal expanding double acting band brake operates on a steel drum $7\frac{5}{16}$ " in diameter, with a $\frac{7}{8}$ " face.

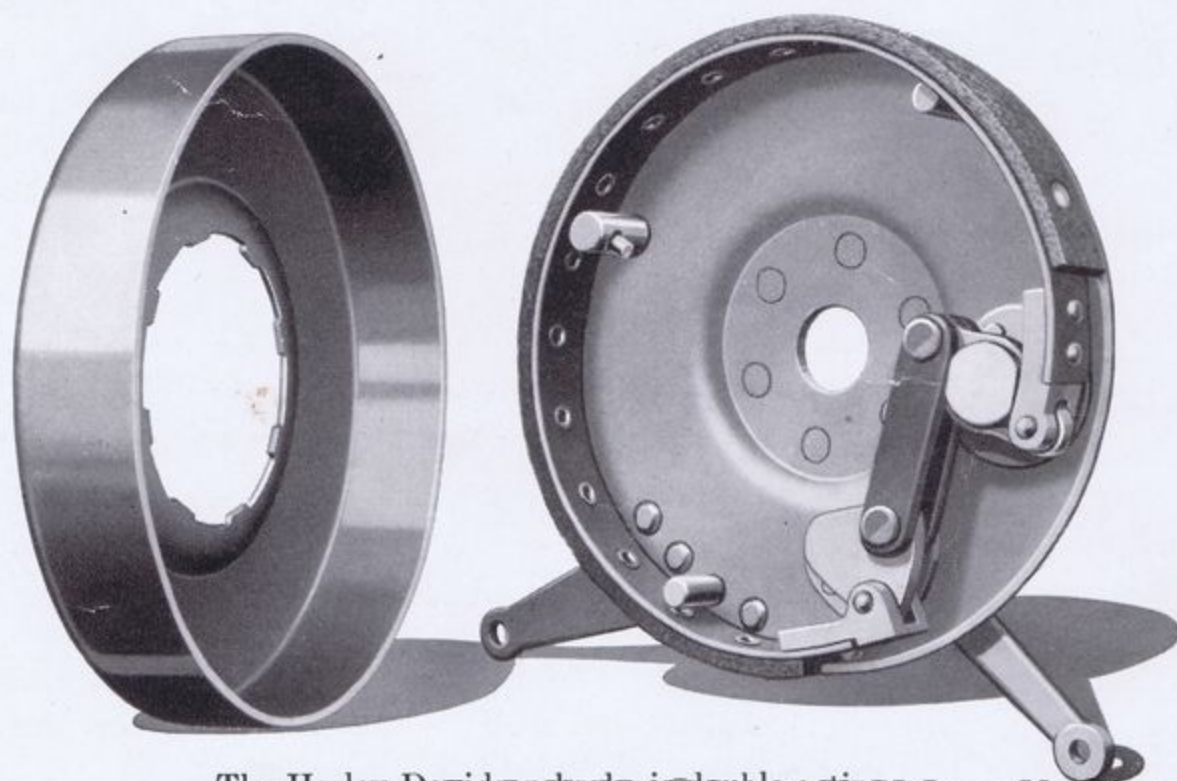
This band brake is a Harley-Davidson product throughout, being entirely manufactured in Harley-Davidson plants. It is built double acting and strong enough to hold a loaded sidecar in either direction. The internal construction is self-adjusting. In fact, no adjustment is possible in the brake proper. One simple adjustment on the outside, where it is easy to get at, will take up wear from time to time.

Brake Control

By foot lever on right footboard. The brake control is designed to give the proper leverage on the brake drum so that the full capacity of the brake may be called into service when necessary.

Front Fender

Of cold rolled steel, very wide for 1916, being $5\frac{1}{4}$ " from edge to edge. Front fender extends farther forward than heretofore, and is provided with two sets of stays. A large splasher flap and extension sides protect the rider from mud, sand, etc., thrown up by the front wheel.



The Harley-Davidson brake is double acting

Rear Fender

5 $\frac{1}{4}$ " wide. Rear section of rear fender is removable to facilitate tire repairs on the road.

Tire Clearance

The Harley-Davidson fenders for 1916 are so designed as to allow considerably more clearance for the tires. While it was possible to use tire chains previously, there is now plenty of clearance so that tire chains may be used even in the very heaviest mud without danger of the mud packing in between the tires and the fenders.

Stand

The Harley-Davidson stand is substantially made of steel throughout. It is mounted independently of the rear axle, facilitating ready removal of the rear wheel.

Stand Catch

The Harley-Davidson stand catch is a patented device which does away with the necessity for soiling the gloves or shoes when dropping the stand.

Luggage Carrier

Made of very rigid construction, entirely of steel, and mounted independently of rear axle.

Wheel Base

The wheel base for 1916 is 59 $\frac{1}{2}$ ".

Wheels

28" in diameter, 40 spokes front and rear.

Rims

Standard CC type, but made of special high carbon steel. These rims by actual test are 50% stronger than the ordinary CC rim.

Tires

28"x3". Choice of United States Chain Tread, Goodyear Blue Streak All-Weather Tread, or Firestone Non-Skid Tires, is offered.

Finish

Beautiful Harley-Davidson gray enamel, artistically striped. The enamel is very carefully put on, each coat being oven baked. After the last coat of enamel has been baked and the striping applied a coat of high grade transparent copal varnish is given as a final finish, this also being baked.

The last coats of enamel are most carefully applied by hand to insure an even distribution over all parts. Each coat of enamel is very carefully hand-rubbed by expert finishers.

The final finish is the finest it is possible to produce and is unsurpassed by any other motorcycle made.

Nickel Plating

Special attention is called to the excellent nickel plating evident throughout the Harley-Davidson product. By operating its own nickel plating plant the Harley-Davidson Motor Company is able to turn out its product with nickel plate far above the average. Nickel plating on steel parts is put on over a heavy plate of copper to prevent unsightly peeling of the plating or oxidizing of the steel itself. Good nickel plating adds materially to the attractive appearance of any motorcycle, and the way Harley-Davidson plating stands up under the hardest kind of service is indeed a tribute to the factory.

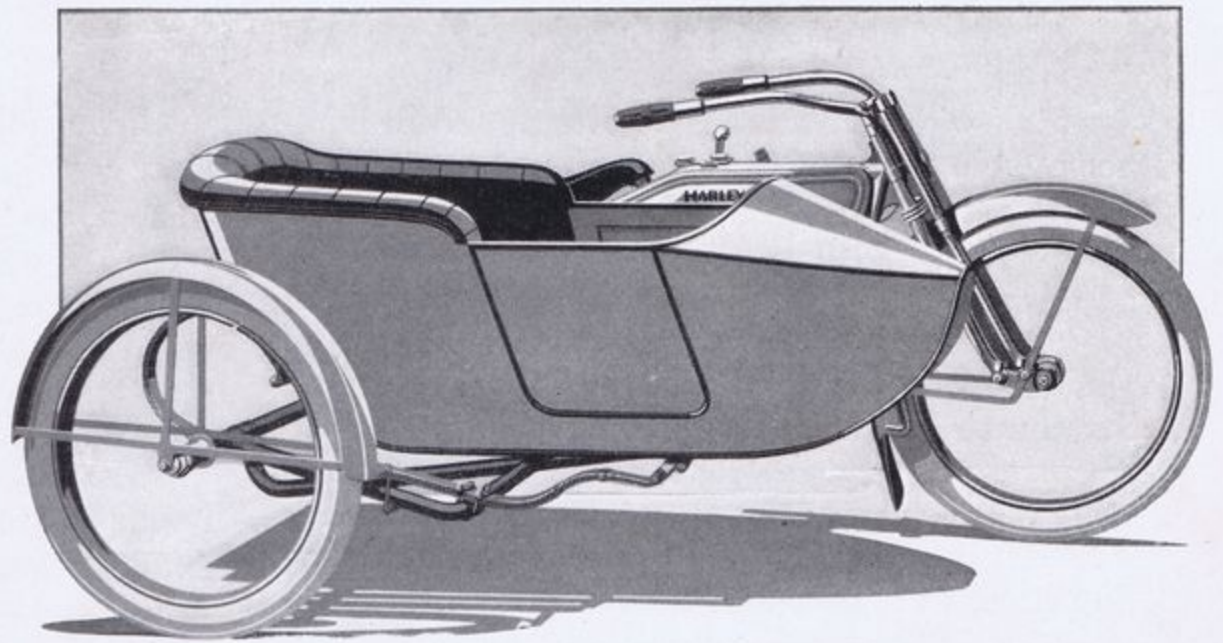
Tool Box

A neat metal tool box fitted with a lock is located between the seat mast tube and rear fender on all models excepting the electrically equipped model 16-J. On the electric model the tool box is conveniently located on top of the tank.

Equipment

Complete tire repair kit and complete tool equipment, including a large tire pump and several special wrenches.

The Harley-Davidson Sidecar has a true stream-line body of sheet steel throughout. The seat, back and arm rests are generously upholstered in beautiful guaranteed fabric. The arm rests are well padded, and the entire sidecar body is comfortable to the extreme. The 1916 body is 2" wider inside than the 1915 model. The large foot rest is rubber covered. A ratchet brake lock is supplied with every sidecar, which may be attached to the regular brake pedal in one minute. This lock will hold the sidecar in either direction when machine is left standing. The sidecar body, fender, rim, frame and springs are enameled in gray. Body



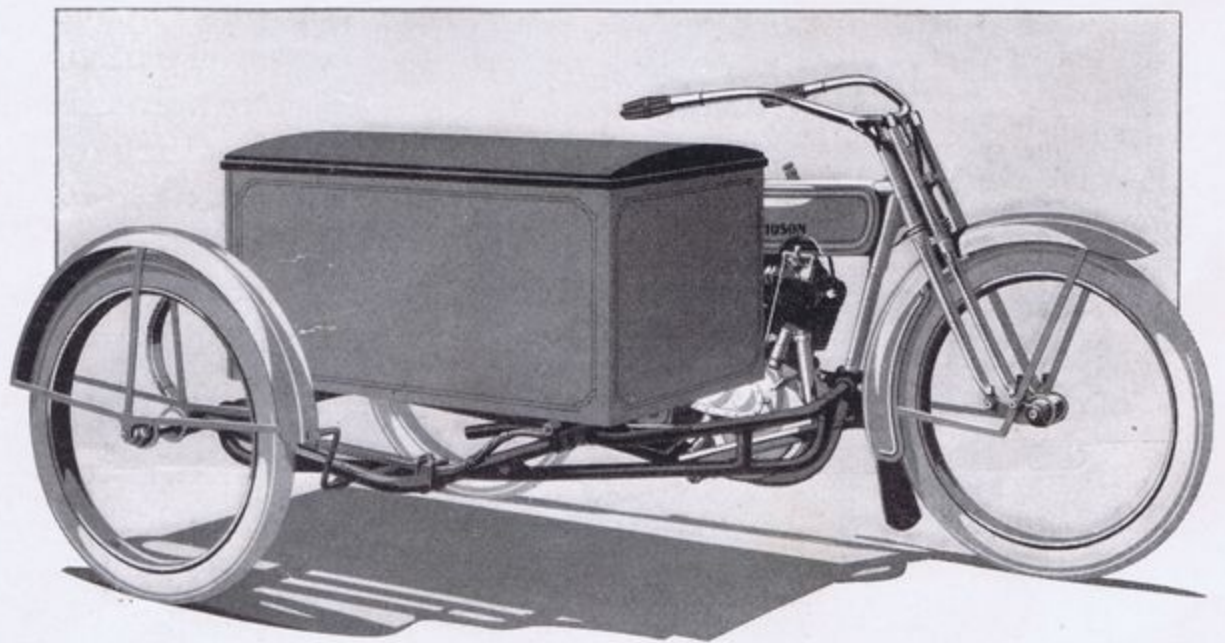
Model 16-L—Harley-Davidson Standard Sidecar

May be attached in a few minutes
to any 1914, 1915 or 1916 Harley-Davidson Twin Model
Tread readily adjustable for 44 inches or 56 inches

is trimmed with handsome dark striping. A detachable apron which completely covers the car when unoccupied and serves as a lap robe when occupied, can be furnished at an additional cost.

Inside dimensions of body— $36\frac{3}{4}$ inches long, $21\frac{3}{4}$ inches wide, 18 inches high at center of box, $15\frac{5}{8}$ inches high at sides.

The body is substantially made of wood, every piece carefully selected air dried lumber, afterward specially kiln dried. This double seasoning process precludes any possibility of warping. The top, which is made of whitewood over a white ash frame, is hinged at the side so that it may be opened from the driver's seat, an important point which means considerable saving of time during a day's use. The body may be lettered at the factory at a cost of ten cents per letter. A ratchet brake lock is supplied with every sidecar,



Model 16-M—Harley-Davidson Sidevan

Chassis same as used on standard Sidecar. Body interchangeable with standard Sidecar body

Tread readily adjustable for 44 inches or 56 inches
Capacity, 300 pounds

which may be attached to the regular brake pedal in one minute. This brake lock will hold the sidecar in either direction when machine is left standing.

1916 Models and Prices

Model 16-F 11 horsepower, three-speed, twin cylinder, with step-starter _____

Code Word—Egg

Model 16-J 11 horsepower, three-speed,
twin cylinder, with complete electrical equipment _____

Code Word—Exquisite

Model 16-E 11 horsepower, single geared, twin cylinder, with step-starter _____

Code Word—Emerald

Model 16-C 6 horsepower, three-speed, single cylinder, with step-starter _____

Code Word—Energy

Model 16-B 6 horsepower, single geared, single cylinder, with step-starter _____

Code Word—Eagle

Model 16-L Sidecar—including 28x3-in. tire on sidecar wheel . . . _____

Code Word—Empress

Model 16-M Sidevan—including 28x3-in. tire on sidevan wheel . . . _____

Code Word—Elk





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