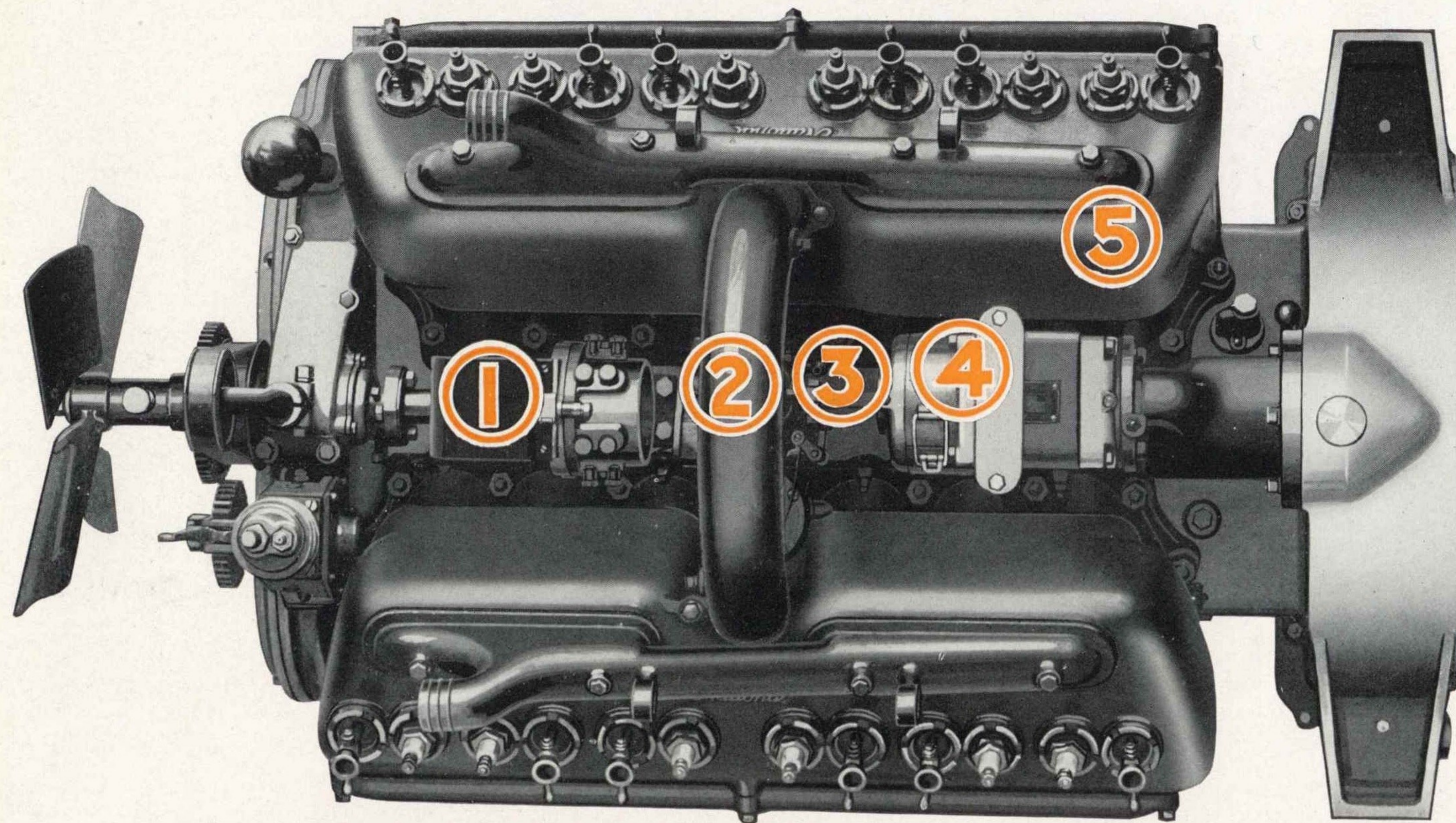


National

HIGHWAY

"12"

*The twelve cylinder car
\$1990*



NATIONAL "TWELVE" MOTOR

Imagination can give no idea of the operation of the National Twelve. The action of no automobile motor that has been made in the past can begin to suggest the manner in which the National Twelve exerts its power.

One ride behind the National Twelve motor will prove the reason for its existence. One intimate experience with this new kind of automobile power will reveal the reason for the multiplicity of cylinders.

The twelve motor has been accepted in the industry without argument or doubt, and motorists have taken to it in such a way as to assure its position as *the ultimate motor*.

The National Twelve-cylinder motor has several distinct advantages over all other V-type motors. Foremost of these is *accessibility*. By placing the valves on the outside of the V, rather than down in the middle of it, National

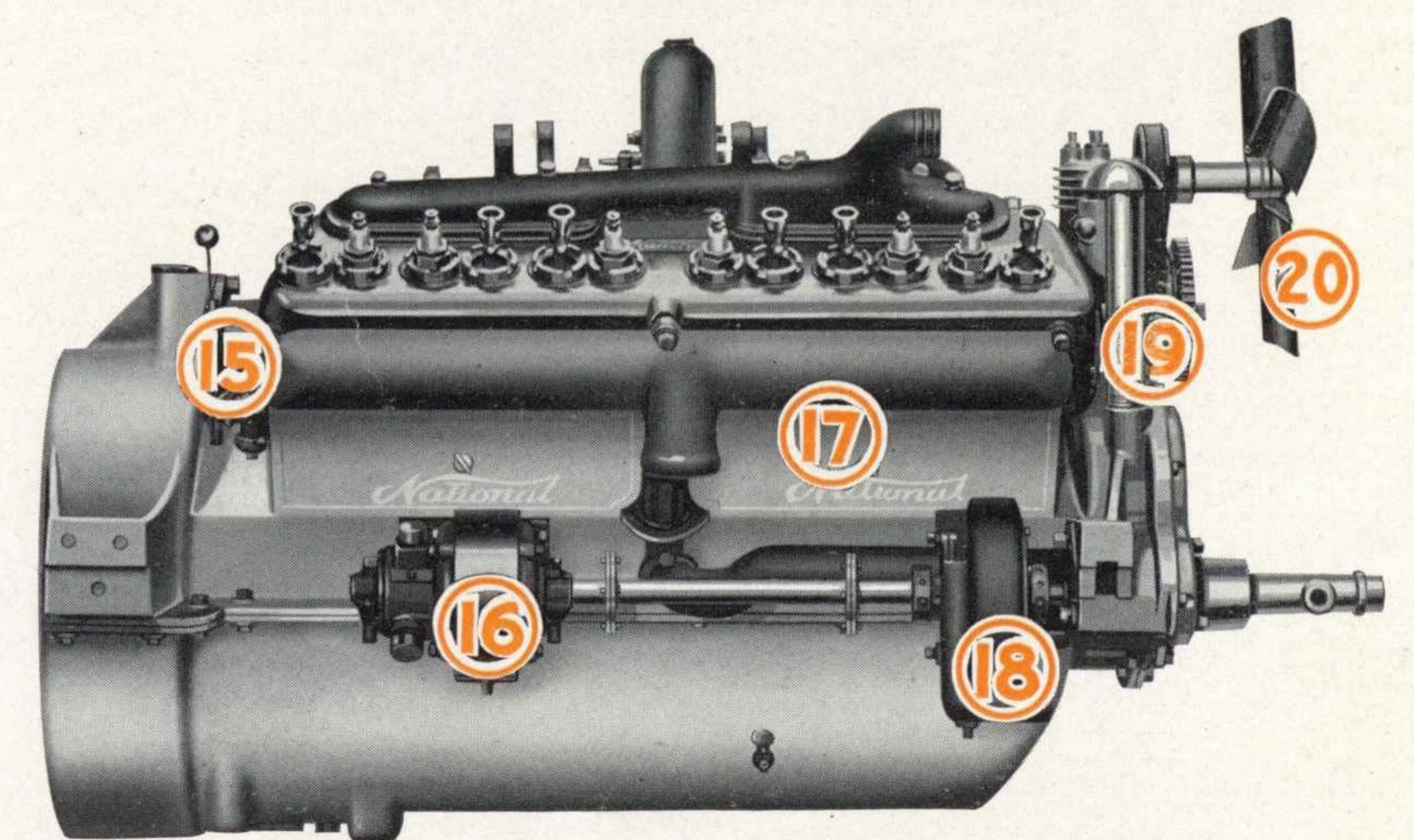
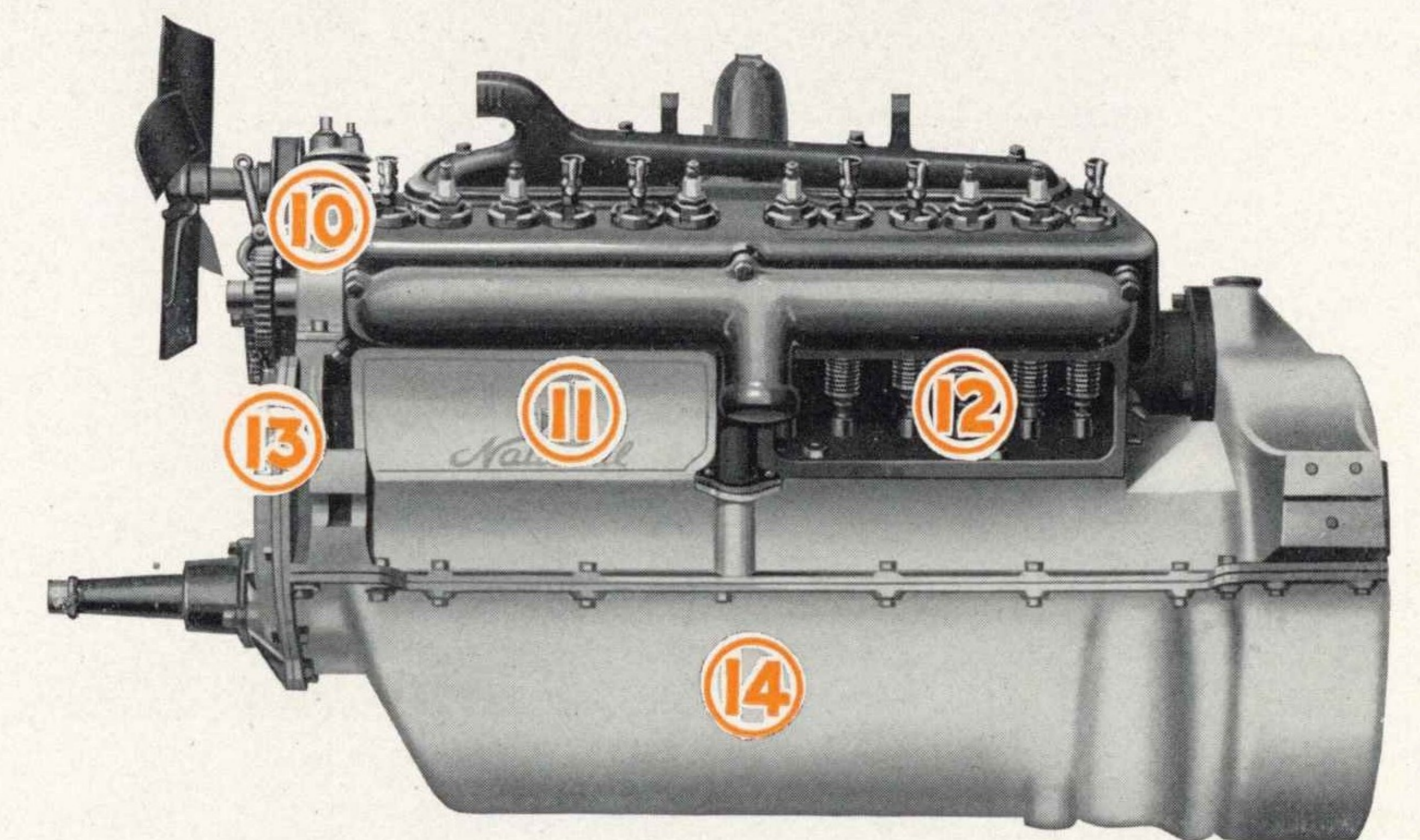
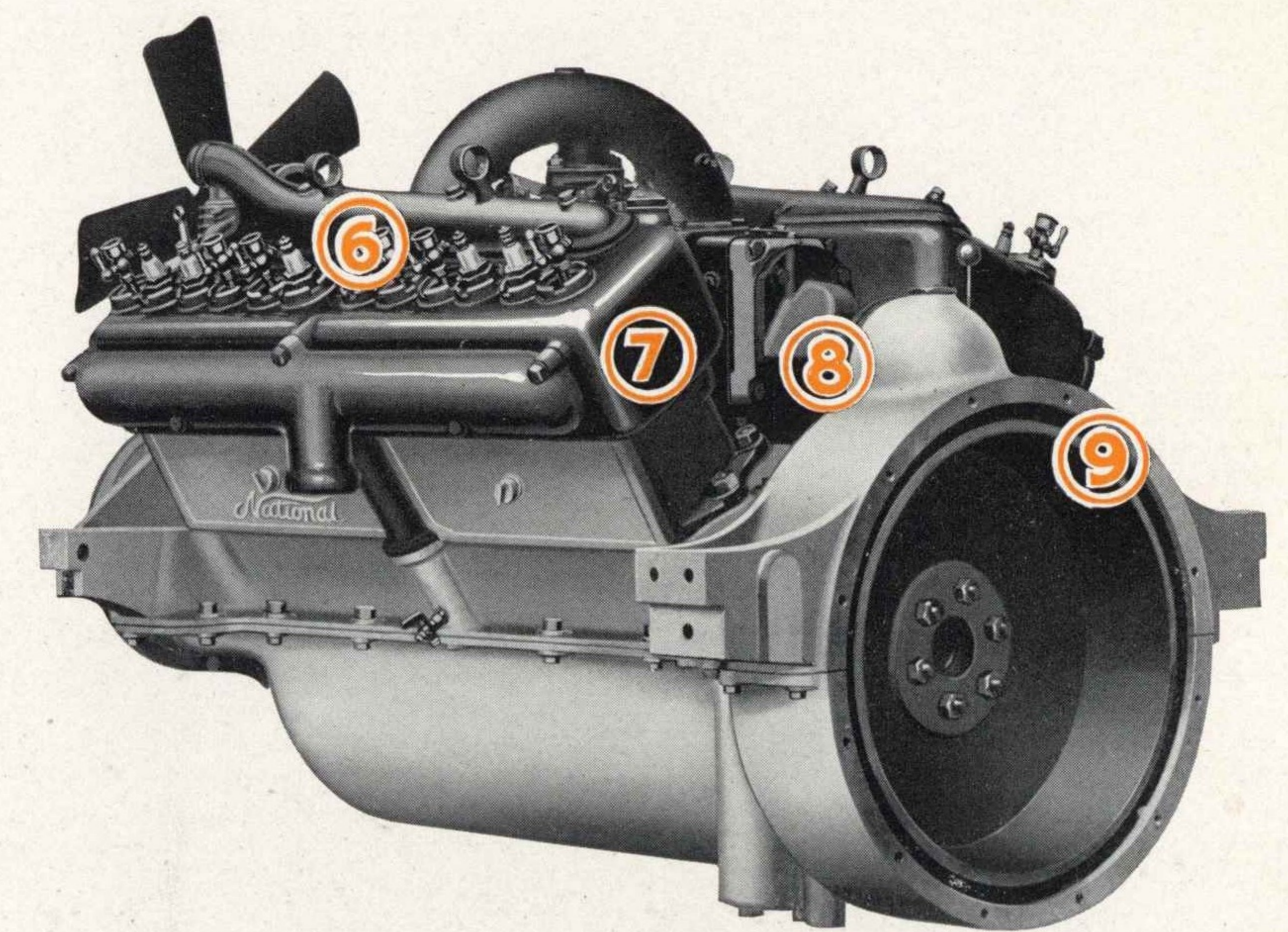
engineers have made the National Twelve fully as accessible as any four or six cylinder motor. The National Twelve is unusually *compact*. Cylinders are cast in blocks of six and placed at an angle of sixty degrees, which permits the use of a narrow frame and as short a hood as in the Six. With twelve cylinders, size $2\frac{3}{4} \times 4\frac{3}{4}$, the National motor develops full 70 *horsepower*, without vibration or strain.

Ignition for the National Twelve is supplied by a high tension magneto. Magneto ignition has been generally admitted to be superior to any other type, but until this time all motor cars of more than six cylinders have depended upon batteries only. With the advent of the National Twelve comes magneto ignition on cars of more than six cylinders for the first time. That the National should be first to offer this vital improvement is a rare compliment to National engineering.

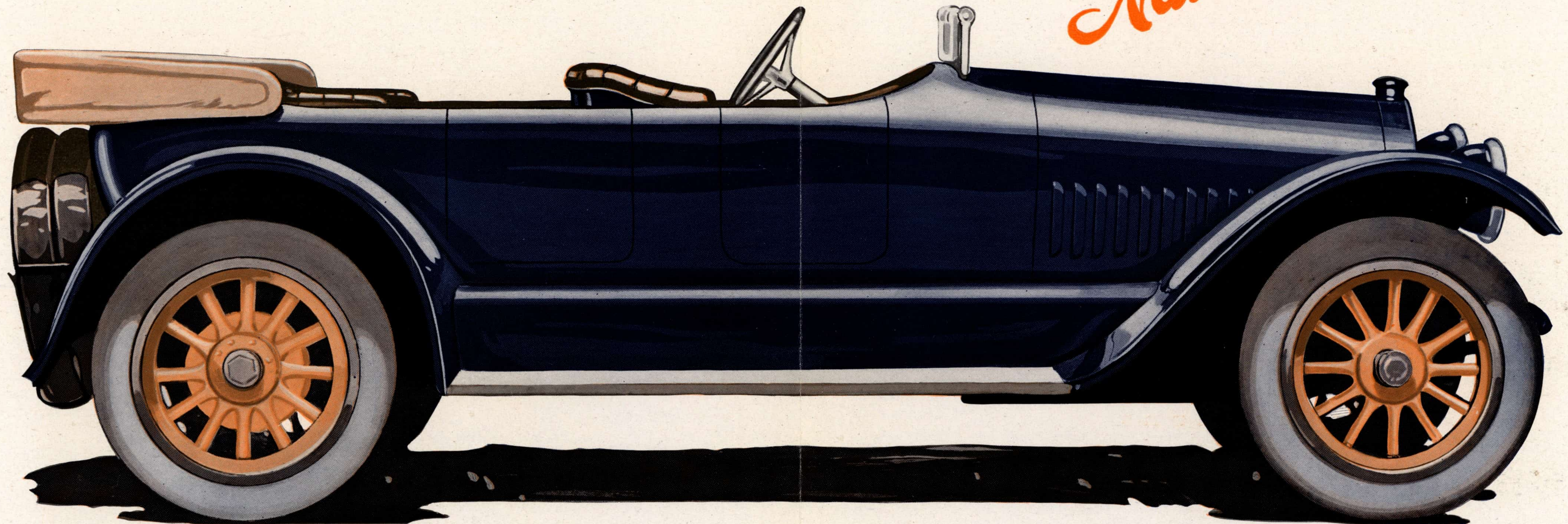
NATIONAL HIGHWAY "12"

POINTS OF INTEREST IN THE NATIONAL "12"

1. *High-Tension Magneto*. The first automobile motor of more than six cylinders to have this highest type of ignition. Easily accessible.
2. *Intake Manifold* leads direct to both sets of cylinders from one carburetor. Hot water jacketed to insure perfect carburetion.
3. *Carburetor* is located between the cylinder blocks. It is automatic and through one manifold provides even mixture to all cylinders.
4. *Starting Motor*. Westinghouse System. Entirely separate from generator and magneto. Sets engine to spinning by touching button on floor board. Easily accessible.
5. *Cylinders*. Cast in blocks of six and placed V shape at 60-degree angle. Entire motor very compact, permitting use of same size hood as for six.
6. *Water Manifolds* on top of each set of cylinders lead to radiator. Each set of cylinders on same water system (pump), insuring even cooling.
7. *Cylinder Size*, $2\frac{3}{4}$ bore by $4\frac{3}{4}$ stroke. Total piston displacement 338 cubic inches. Develops 70 horsepower. Aluminum piston and light weight connecting rods permit high speed.
8. *Starting Transmission* geared direct to flywheel. Engagement and release is entirely automatic. All enclosed and very quiet.
9. *Flywheel* with cone clutch is enclosed. Unit type construction. Clutch cone is leather faced. Flywheel unusually light, because of number and even distribution of power impulses.
10. *Tire Pump* is located forward and easily accessible. It is power driven and very efficient. Long tube fitted with gauge reaches all tires.
11. *Valve Cover Plate* covers the push rods and springs. Easily accessible on both sides of the motor. Valves are operated by two cam shafts.
12. *Outside Valves*. All valves located outside the V and therefore as easily accessible as on four or six cylinder. This is a distinctive feature of the National Twelve.
13. *Timing Gears* are helical cut to insure quietness. Silent chain drive for magneto.
14. *Oil Reservoir* is in the lower crank case. Pressure feed to main bearing through hollow crank shaft. Pressure feed to all other parts, including cam shaft, piston pins and cylinders.
15. *Oil Indicator*. Shows amount of oil in motor. Gauge on dash shows oil pressure.
16. *Generator*, Westinghouse System. Supplies electric current for lights, and starter. Entirely separate from starting motor and magneto. Easily accessible.
17. *Exhaust Pipes* are on outside of both sets of cylinders. Separate muffler for each set.
18. *Water Pump* is of "double" type. Pumps water evenly to both sets of cylinders. Note absence of water piping.
19. *Oil Filler Pipe* is easily accessible. All necessary oil for the motor is put in here. All oiling is then automatic and positive.
20. *Fan* is driven by short belt. Fan operates on large bearings and is noiseless.



National Highway "12"
\$1990



STEAM pushes. Gasoline explodes. Herein has lain the difference between the steam engine and the gasoline motor. It has long been the ambition of automobile makers to find a way to make gasoline *push*. They have sought for a power that would flow instead of throb; a power that might be controlled with the utmost flexibility; a power that would not rack the machinery by which it was created.

In the National Highway "12", twelve cylinders operate on one crank shaft, and there is a continuous overlapping of impulses—so that at last a

steam effect has been attained in a gasoline motor, for the first time in all history.

No automobile ride that you have ever had may be used as a basis for the formation of an idea as to the manner of movement of the National Highway "12".

At the first touch of the throttle, the car responds powerfully. Its getaway is strong and immediate. The driver feels instantly that he has a primal force at his command.

And then there is such road dominancy! The car devours hills, hesitates not one jot in sand or mud, and glides smoothly on the straightaway.

The National Highway "12" is a car which seldom needs to be thrown out of high gear. The lower ratios are used only in extreme cases, such as starting on an incline, or pulling out of deep mire.

The National Highway "12" has been so named because it has been made for the long, hard road. It is a car with which to whip mountains, and conquer a desert. It is a car in which to strike from coast to coast.

The National "12" motor is built in the National factory at Indianapolis, a successful institution since 1901—the home of a long line of famous

racing cars—and the father of the car which holds the record of the world's stock champion.

The National factory was a pioneer in the building of six-cylinder motors. The first National six was marketed in 1905—and in that year evolution toward the National twelve began. The twelve is born of the six.

The ownership, management and policy of the National Company is the same as it was in 1901. The company has had an enviable record. It has been noted for solidity and for conservatism.

This same solid, cautious, conservative company now offers the National Highway "12" as a

tried, practical, pleasurable car for you to own and drive.

The National "12" motor consists of two sets of six cylinders, arranged in the shape of the letter "V".

Unlike other "V"-shaped motors, the National motor has *the valves on the outside of the "V"*—and not down in the middle.

Owners of double-four motors have found it difficult to get down into the middle of the "V" to reach parts that need adjustment. This engineering error does not exist in the National "12".

The National twelve-cylinder motor weighs less than a six-cylinder motor of fifteen per cent. less piston displacement. It develops 64 horsepower without fuss or vibration. Each cylinder is $2\frac{3}{4} \times 4\frac{3}{4}$ in size.

In cars of few cylinders a heavy fly-wheel is necessary to provide a momentum to over-

come intervals between explosions. In the National "12", the fly-wheel is light—since the intervals have been obliterated.

The comfort that originates in the motor of the National Highway "12" has inspired a comfort throughout the car.

The front seat is divided by an aisleway, which makes one livable room of the entire car.

National cantilever springs and a full-floating rear axle, with silent spiral gears, are more mechanical and more fundamental contributions to passenger comfort.

Two auxiliary seats are supplied at an additional charge, and give the car a full six or seven passenger seating capacity.

The special design of the National front axle permits the unusually narrow turning radius of 35 feet.

The price of the National Highway "12" is \$1990.

Specifications

MOTOR—Built in the National shops. Twelve cylinders, $2\frac{3}{4} \times 4\frac{3}{4}$. Sixty-four horsepower. L-head cylinders cast in blocks of six. Placed "V" shape at an angle of sixty degrees. All valves on the outside, easily accessible. High-pressure oil feed at all bearings and to each cylinder. High-tension ignition. Double cam shaft. National automatic carburetor.

CLUTCH—Aluminum cone, faced with durable material.

TRANSMISSION—Three forward speeds. Annular ball bearings throughout.

GASOLINE CAPACITY—Seventeen-gallon tank in rear of car. Vacuum system feed.

ELECTRICAL SYSTEM—National-Westinghouse design. Separate starting motor and generator. Combination head lamps. Electric starter operated by small button on floor.

WHEELBASE—128 inches.

TIRES—36 x $4\frac{1}{2}$ all around. Option of Firestone, Goodrich or U. S.

RIMS—Demountable (Q. D.) rims and extra rim. Double tire carrier in rear of car.

BRAKES—Size, 15 x 2 inches.

SPRINGS—Front, semi-elliptic; length, 38 inches. Rear, famous National cantilever; length, 51 inches.

COLOR—Standard color. National blue (very dark).

AXLES—Front I-beam. Large adjustable roller bearings. Special design axle permits short turning radius. Rear axle, full floating, roller bearings. Silent, spiral differential gears.

EQUIPMENT—One-man top, with jiffy curtains. Windshield. Speedometer. Electric horn. Power tire pump. Tools, etc.

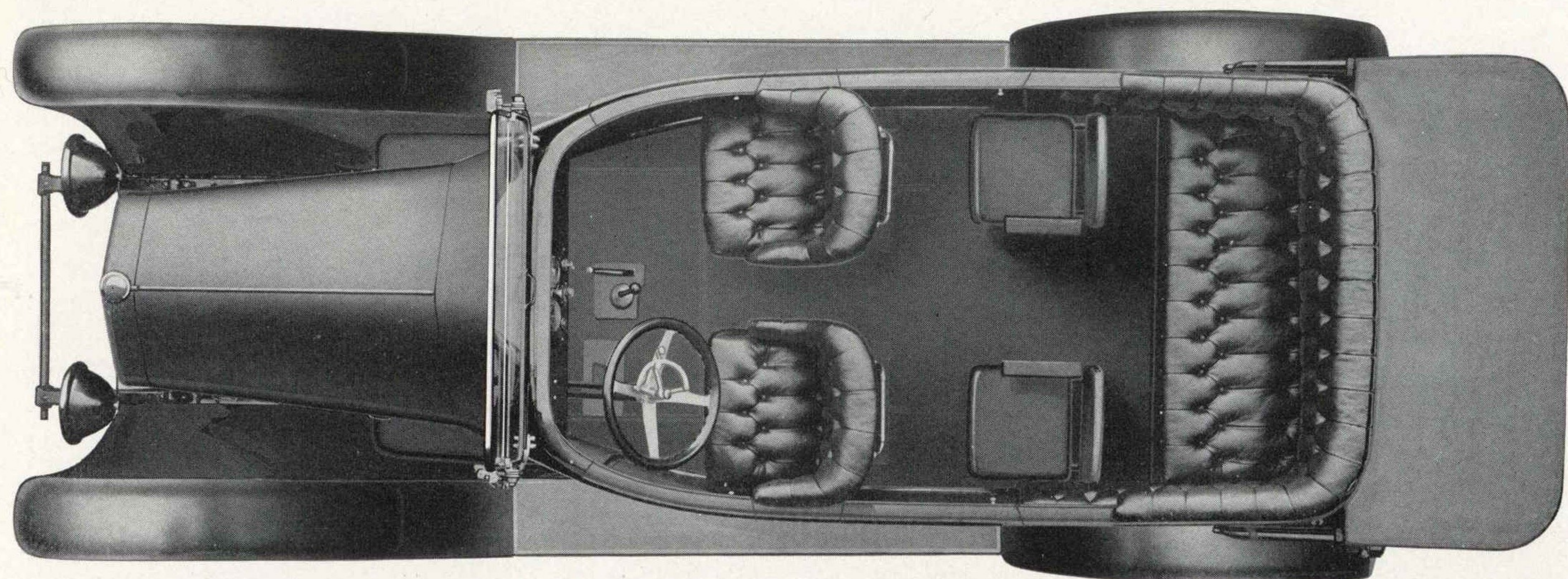
PRICE—\$1990 F.O.B. Indianapolis.

National Motor Vehicle Company, Indianapolis, U.S.A.

For Fifteen Years Successful Builders of High-Grade Cars.

1916

68-NP467



A MOST COMFORTABLE CAR

In 1905 the National factory built and marketed the first American stock six-cylinder car, and in that year the evolution of the Twelve began. The Twelve is born of the Six.

For fifteen years, which goes back to the very infancy of the automobile industry, the National company has produced high grade cars successfully.

The ownership, management and policy of the National Company are the same as they have always been. The company has an enviable record. It has been noted for solidity and conservatism.

This same solid, cautious, conservative company now offers this National Highway Twelve as a tried, practical and pleasurable car. The design and development of the National Twelve motor have had the continuous, concentrated thought of many experts. Tests on the Indianapolis Speedway, journeys through rugged Tennessee and Kentucky mountains, research and study of foreign practice, have all been chapters in the history of the creation of this motor.

National ideas have found highest expression in the design and plan of the National Highway Twelve.

The car is as much of a car as the motor is a motor.

The Highway Twelve is comfortable.

To ride in this National is to enjoy drawing-room comfort on wheels—to go out into the highway in your library chair. The National "aisleway" front seats are veritable armchairs. To imagine motoring with all the comforts of home is one thing; to find a car whose performance will conform with your desire is another.

This "Highway" comfort is creditable to several features—absence of vibration, the roominess of the body, the location of the seats, National cantilever (flat) springs, and the even flow of power from a wonderful motor.

Comfort is inherent in the National. It is the natural result of the way the car is built. It is as much an object in the manufacture of the car as to make the wheels go round. Comfort was reckoned with in the initial conception. It dictated the design and has been built into every part.

National bodies are recognized style leaders in the automobile world, and the body of the

Highway Twelve is up to National standard in every respect.

The front seat is divided by an aisleway, which makes one livable room of the entire car. The driver's seat is movable, and therefore adjustable, so that pedals may be reached comfortably by all members of the family. Two auxiliary folding armchairs are supplied at an additional charge of \$30, to give the car a full six or seven passenger seating capacity.

It is noteworthy that you can get a National car now for \$1990. The public has wanted a lighter National car with all the sturdiness of the great Nationals of racing fame—and the "National" Company has designed and built it.

At \$1990 now, you may have a car which is exceeded by no car in the world in that quality known as "personality."

The National is known as an aristocrat among automobiles, carrying an appearance of more masculinity, perhaps, than any other extremely high grade car. As the National design has tended towards refinement, it has avoided effeminacy. The lithe, low-lined body design of the National today tells of the racing proclivities of its ancestors. The National is a car with fight in its blood and strength in its sinews, and with an outward appearance that bespeaks these inner characteristics.

There it a certain style and distinctive appearance about the National Highway Twelve that is a source of endless pride and satisfaction to the owner. On fashionable city boulevards the National will never suffer by comparison.

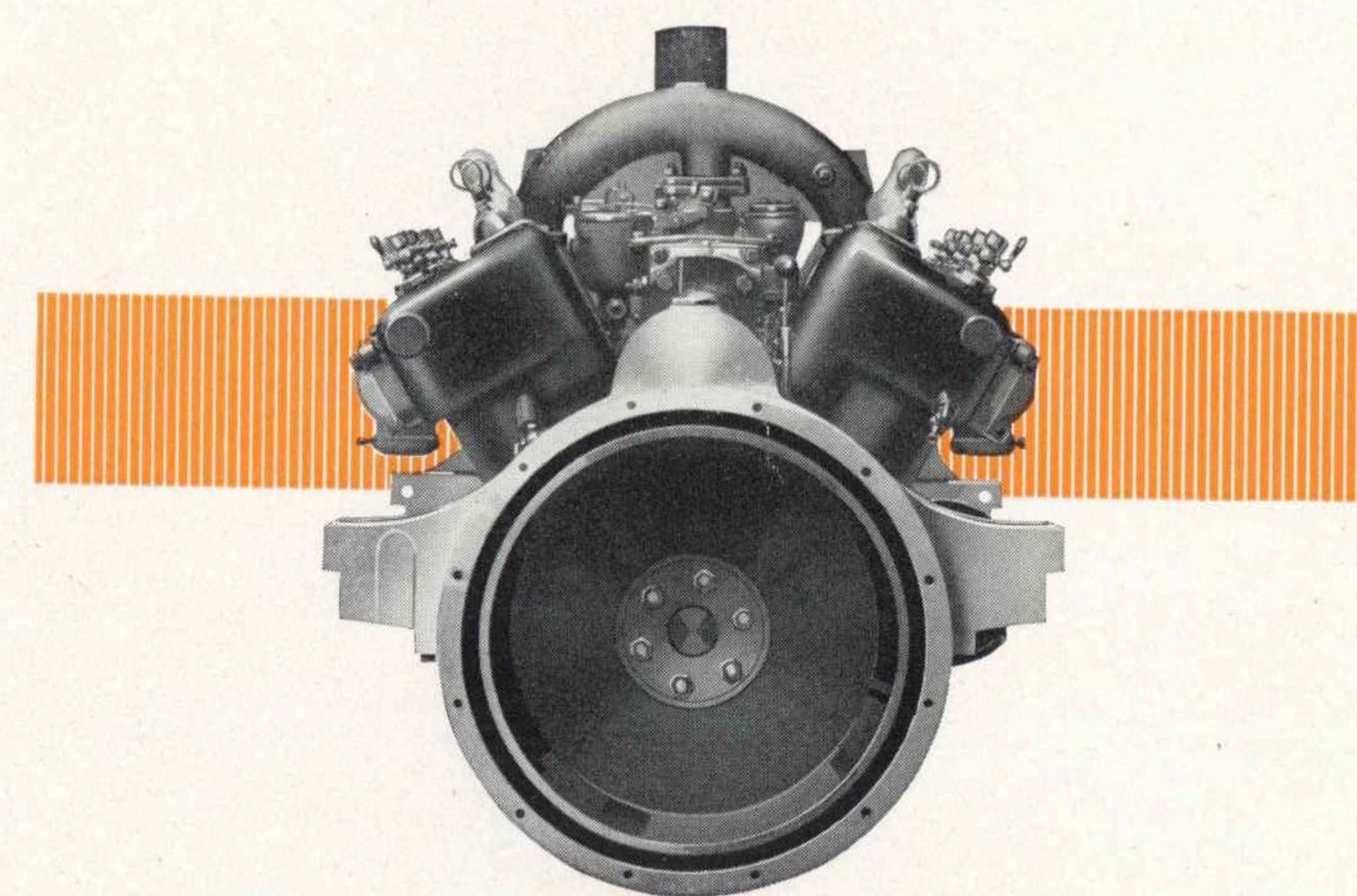
It may safely be said that the National Highway is the best possible car immediately before you cross the line into the extravagant class.

It is the force of public opinion that is making the National Highway Twelve so popular.

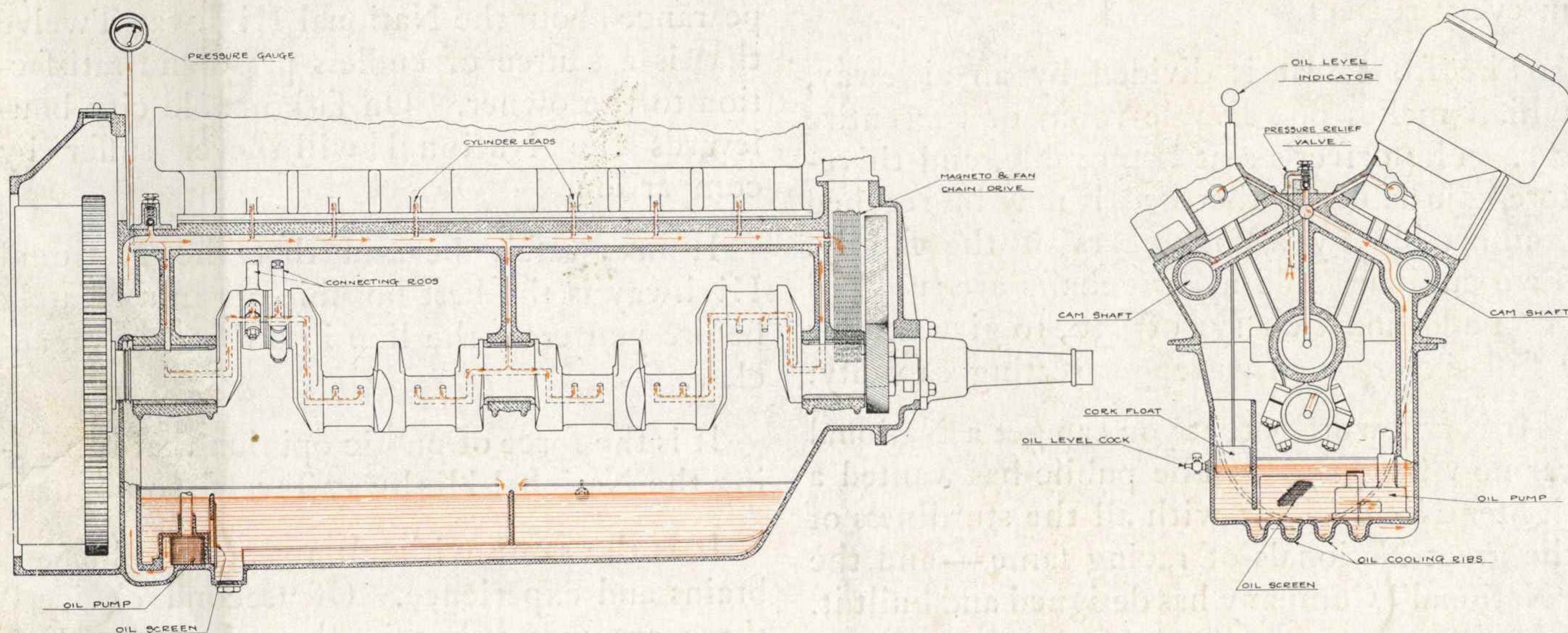
It is the same with all master products of brains and experience. Of "second choices" there are many, but in the select group of the few superior cars, the National ranks pre-eminent.

No human being is immune to the influence of public opinion—no car owner but desires to have the best in appearance, construction and performance, and owners know that it is only the reputation of the National builders for fifteen successful years that makes possible this prestige and universal recognition accorded the "National."

That this National Twelve is complete in every respect—that it is advanced in design and finish and that it is capable of years of service has been accepted as a matter of course.



NATIONAL HIGHWAY "12" MOTOR LUBRICATION



There is no guesswork about the oiling of the National Twelve motor. The oil is automatically forced to each point where lubrication is necessary. A tell-tale gauge on the dash indicates to the driver at all times whether or not everything is being properly oiled.

The above diagram explains the entire system. The red lines indicate the oil and its progress. The oil is first poured into the oil basin, located in the lower part of the crank case. By referring to the drawing at the left it will be noted that the oil passes through an oil screen before reaching the pump. From the pump it is forced through a tube up to the main oil line from which it is sent via separate leads to each of the three main crankshaft bearings. The crank shaft is hollow (as indicated), so that in addition to lubricating the main bearing the oil is forced along to the connecting rod bearing. Other leads go direct to each of the cam shaft bearings. Oil is

also carried from the main line into the front of the crank case where the timing gears and chain drive for the magneto are located.

Separate leads go to the lower part of each of the twelve cylinders and as the piston comes down the oil is forced into a corresponding groove on the piston. This groove then carries the oil to the cylinder walls as the piston moves up and down. It also forces oil upon the wrist pin bearing.

Just past the pump on the main oil line is located a pressure relief valve, which is adjustable and which automatically prevents the pressure from going above twenty-five pounds. This is a decided advantage in that it enables the driver easily to regulate the amount of oil and thus prevent excessive use of oil. On the dash board is a gauge showing the oil pressure at all times.

A ball float indicator tells the amount of oil on hand in the reservoir. The bottom of the oil basin is ribbed. This makes a veritable radiator of the bottom of the basin, and thus tends to keep the oil cool.

HIGHWAY "12" SPECIFICATIONS

Motor

Cylinders— $2\frac{3}{4} \times 4\frac{3}{4}$ —Develop 70 horsepower.
Ignition—High tension magneto.
Carburetor—Automatic—Heated manifold.
Valves—Located outside—Size $1\frac{1}{8}$ inches.
Lubrication—Pressure feed to all points.
Cooling—Double pump.
Gasoline Supply—Vacuum feed from 17-gallon tank in rear.
Bearings—Three main crankshaft bearings. Connecting rod bearings, side by side.
Pistons—Aluminum with three rings.

Clutch and Transmission

Clutch—Aluminum cone, leather-faced. Unit construction.
Transmission—Unit with clutch, three forward speeds. Annular bearings.

Electrical System

Lights—Westinghouse System. Independent of ignition.
Starter—Westinghouse System. Geared to fly-wheel.

Wheels

Wheelbase—128 inches.
Tires—Size $36 \times 4\frac{1}{2}$. Option of Firestone, Goodrich or U. S.
Rims—Firestone demountable.

Frame

Frame—Pressed steel; solid, and well braced. Curved up in rear to allow low body suspension.
Turning Radius—Special design frame and axle permits narrow turning radius—35 feet.

Brakes

Service—Contract on wheel drums. Operated by pedal. Size 15×2 .
Emergency—Expanding type, operated by hand lever.

Springs

Front—Semi-elliptic. Length 38 inches. Hartford shock absorbers.
Rear—National (flat) cantilever. Length 51 inches.

Control

Steering Column—On left side. Enter car from both sides.
Levers—In center at driver's right.
Control Buttons—On dash. Starter button on toe board.

Axles

Front—I-beam steel forging. Adjustable roller bearings in hubs. Ball thrust bearings at top of steering knuckles.
Rear—Full floating. Spiral bevel gears.
Drive—From unit power plant to rear axle through tubular shaft.

Bodies

Seating Capacity—Touring car four or five passenger. Two extra folding seats at additional charge of \$30.
Color—National blue (very dark).
Upholstering—Genuine leather.

Equipment

Top—One-man style. "Neverleek" material. Jiffy curtains.
Windshield—Ventilating and rain vision style.
Speedometer—Set flush in dash. Stewart.
Horn—Electric, under hood type.
Tire Pump—Power pump mounted on motor.
Tire Carrier—Double carrier in rear.
Tools—Carried in special pockets of front door.
Meters—Ammeter and oil pressure gauge on dash. Gasoline gauge on rear tank.
Price—\$1990 F.O.B. Indianapolis. Extra seats additional.

National Motor Vehicle Company

INDIANAPOLIS, INDIANA, U.S.A.