

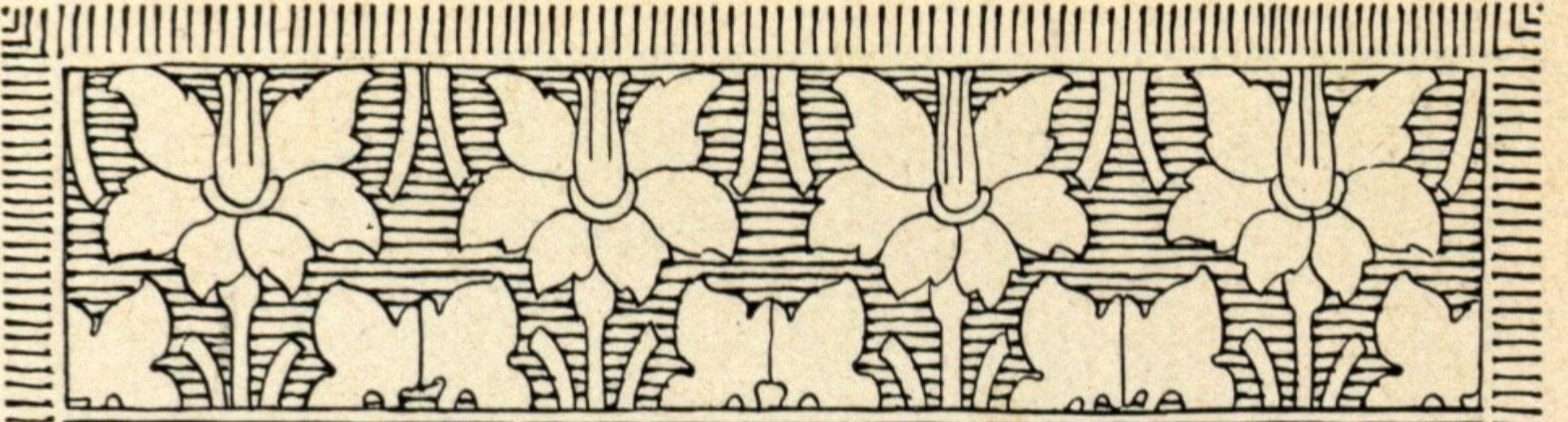
1916



National
"HIGHWAY"
TWELVE



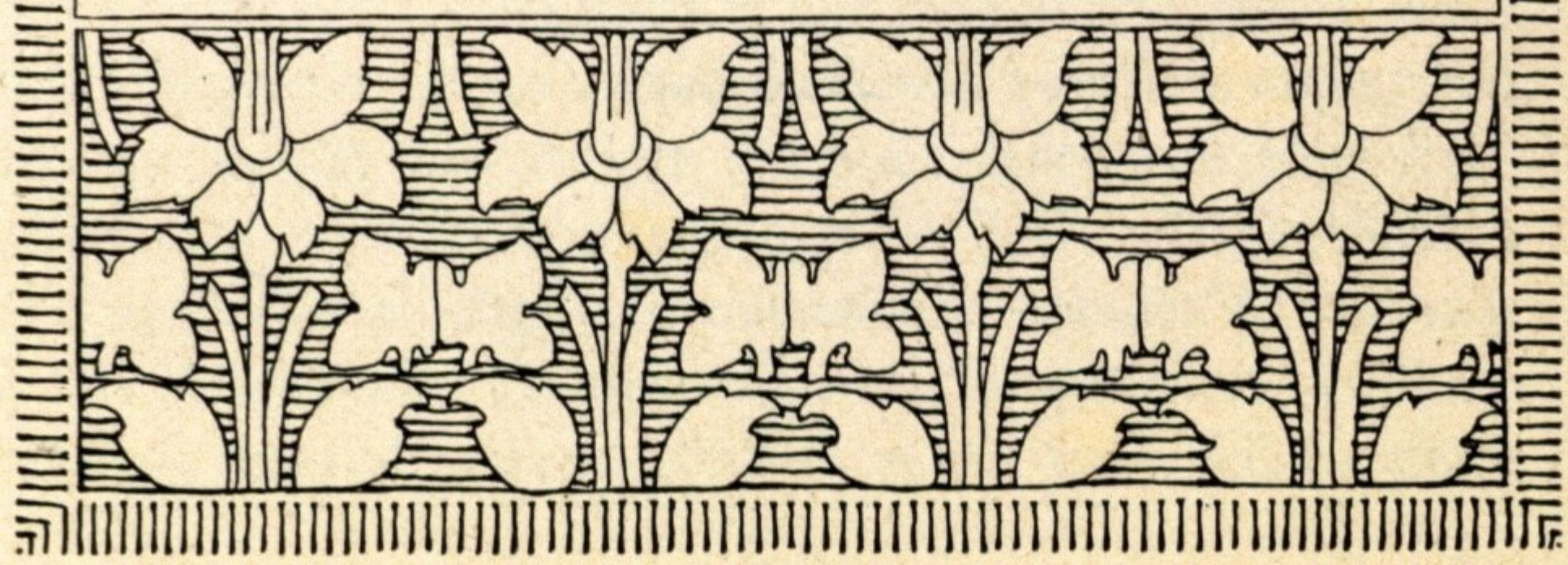
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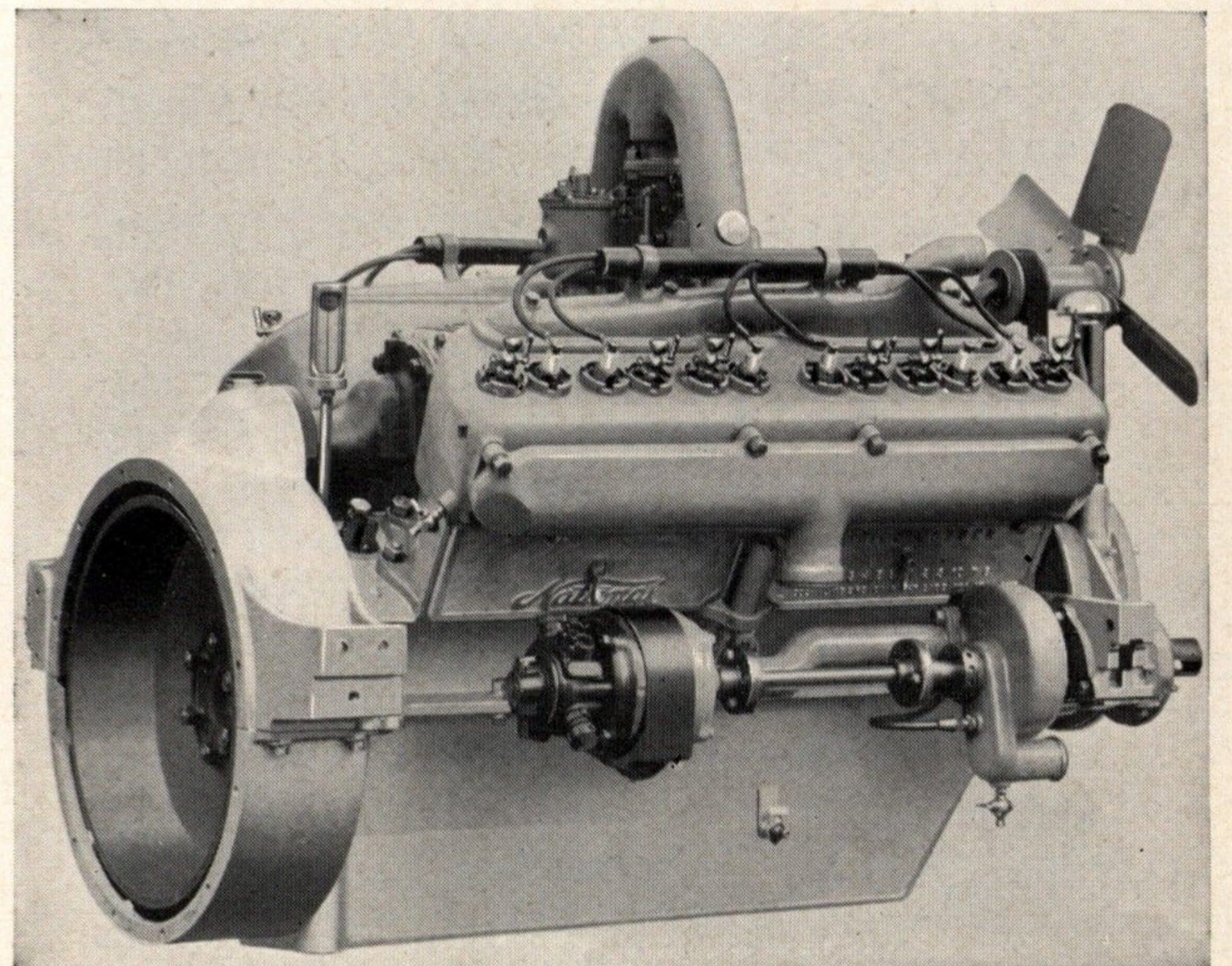
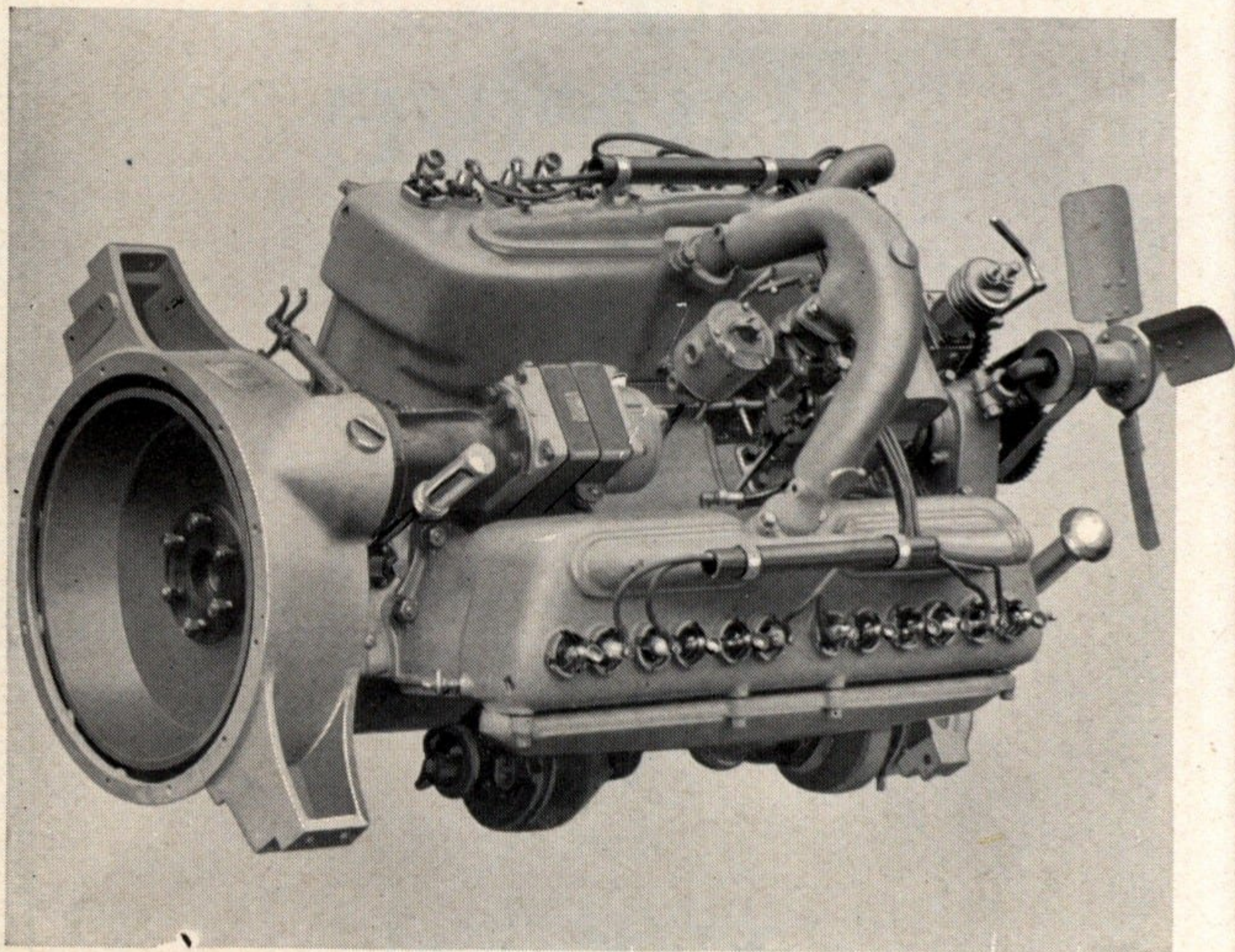
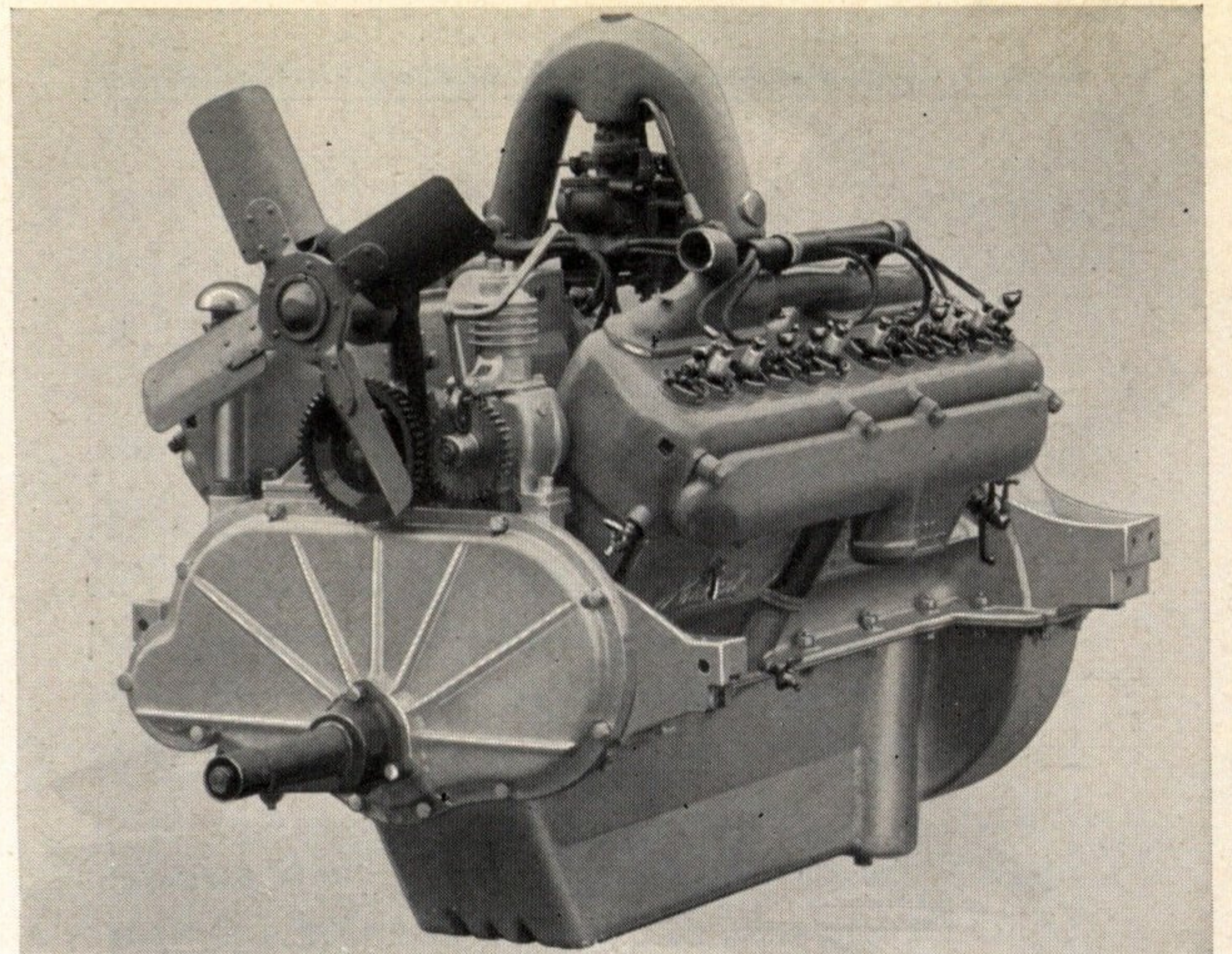
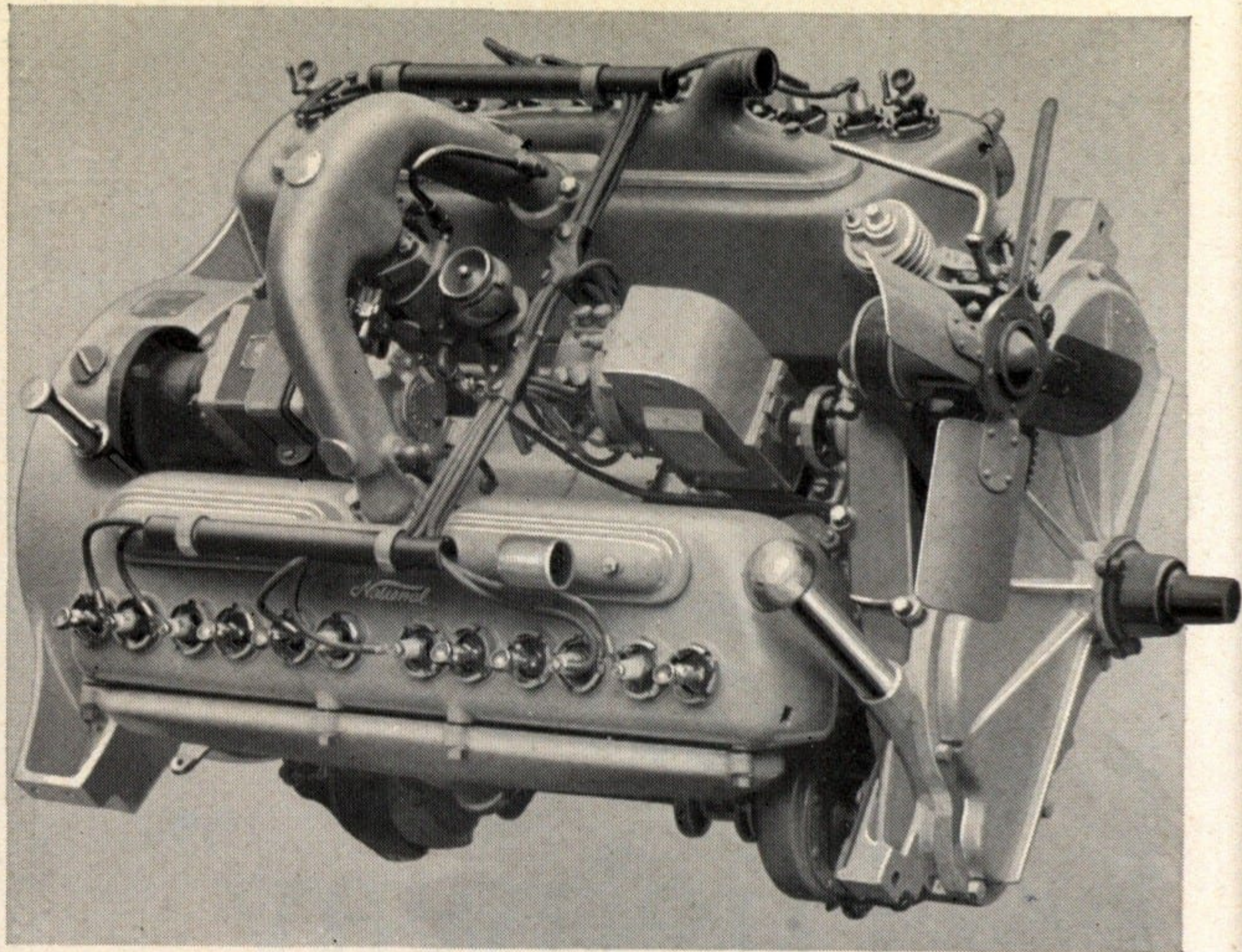


National
"Highway"
Twelve

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

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The National "Highway" twelve-cylinder motor is really two mighty sixes merged perfectly into one, a marvel of mechanical compactness and cleanliness. A power is produced, the volume and flexibility of which no motorist can imagine until he has sensed it at his own finger-tips.

Gear shifting is made unnecessary, and an adequacy for hills heretofore unknown in a motor car is realized. An entire absence of vibration is recognized also for the first time. The twelve is self-preservative.

One superiority of the National Twelve over all other "V" type motors is that the valves are placed on the outside of the "V" in a position perfectly accessible. Another National distinction is high-tension magneto ignition, much more reliable than the battery ignition upon which most other multiple cylinder cars depend.

The flickering oil street lamp and the powerful electric arc which has displaced it! The squawk of the first music box and the soft melody of the modern phonograph! The labored, ineffective chug of the one-cylinder car and the silent symphony of the powerful twelve! It is given to us all to see the working of wonders.

Is the twelve logical? Have we not all, in our own time, witnessed its evolution! The twelve was prophesied in the first two-cylinder car ever made, unsatisfactory because of the interval between explosions, yet far superior to the one-lunger that preceded it. The four came nearer, and the six nearer yet. PROGRESS TOWARD the twelve has been cautious, still every move has been in its direction. The twelve is the arrival of an ultimate.

THE NATIONAL "HIGHWAY" TWELVE

THE pressure of steam is constant and even. It never lets up. The power of gasoline is explosive and intermittent. Automobile engineers have tried for a long time to find some way to take the intermissions out of gasoline. They have tried to find some way to keep gasoline from letting up. They have wanted for years to make a smooth, even, flexible power out of gasoline—a power that would flow instead of throb, and a power that would not tear up the machinery by which it was created.

In the National "Highway" Twelve this ideal has been attained.

The ideal is fairly well attained in the six-cylinder car, but there are several reasons why the twelve is better than the six.

The crank shaft of the six-cylinder motor gets three propulsions every time it turns over—three shoves to every revolution. This seemingly would give a smooth flow of power, and it would if it were not for one thing. The cylinders of a six-cylinder motor are large. They have to be large in order to manufacture a good volume of power. When one of these cylinders gives the crank shaft a shove it is a very vigorous shove.

The twelve motor gives its crank shaft six shoves to every revolution instead of three. The twelve-cylinder motor exerts its power at practically every angle around its crank shaft. The balance of power application becomes almost perfect. The cylinders are smaller than in the six, so that the explosions are less terrific.

There is more brain work in the twelve and less brute force. The application of power is

"persuasive" instead of violent. The action is much like the action of steam. The ideal of the engineers has been realized.

This more constant application of power eliminates vibration in the National Twelve motor. It is possible, therefore, to construct the motor of lighter materials—aluminum pistons, etc. The total weight of the National Twelve motor is less than that of a six-cylinder motor of equal piston displacement.

Automobiles heretofore have been their own worst enemies. In the National "Highway" Twelve self-destructiveness of motor cars comes to an end. A vibrationless motor not only means a long-lived motor; it means a long-lived car. The owner of the National "Highway" Twelve need charge very little to annual depreciation. Twelves are going to last longer than cars have lasted in the past.

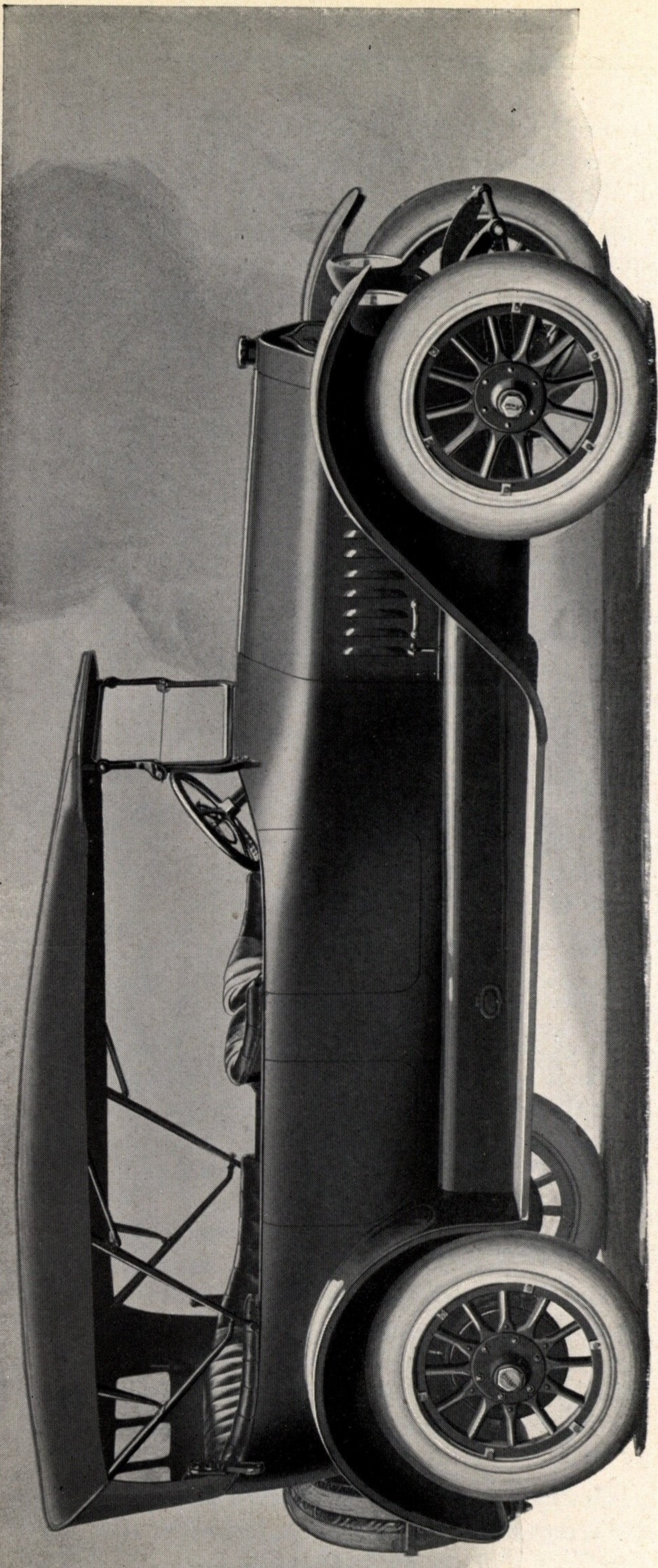
This one fact of economy assures the National "Highway" Twelve of future popularity. Every experienced motorist knows the importance of depreciation as an item of expense in connection with an automobile.

The National Twelve motor develops 70 horsepower without any evidence of being forced. The cylinders are placed in two rows of six each, at an angle of 60 degrees, which is considerably nearer to perpendicular than the angle of eight-cylinder motors. The twelve motor may be placed under a hood as short as that of the six, and in a frame of the same width.

The cylinders are $2\frac{3}{4}$ x $4\frac{3}{4}$.

The National Twelve is the most accessible of all "V" type motors, the valves being on the outside of the "V" instead of down in the middle, as in most multiple cylinder cars. The National Twelve is as accessible as any four or six.

One carburetor supplies an even mixture to both sets of cylinders. It is located in the



NATIONAL "HIGHWAY" TWELVE TOURING CAR, \$1990. FROM ONE TO SIXTY MILES AN HOUR WITHOUT GEAR SHIFT

middle of the "V" in the way of nothing, and is as easily reached as the radiator cap of the car. In its position between the sides of the "V" it stands high, dry and warm at all times.

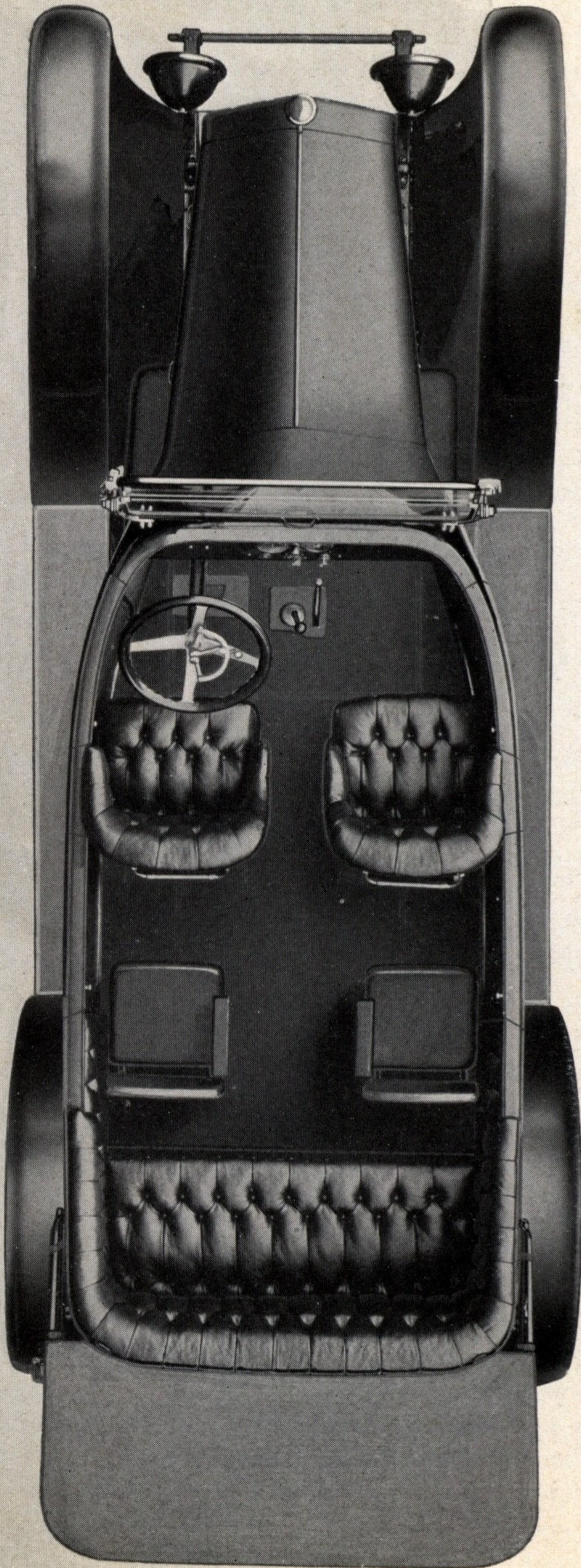
Ignition for the National "Highway" Twelve is furnished by a high-tension magneto. Magneto ignition has been generally admitted to be superior to any other type, but until this time all motor cars of more than six cylinders have depended upon batteries altogether. The National Twelve is the first car of more than six cylinders to use magneto ignition.

NATIONAL "HIGHWAY" TWELVE TOURING CAR

THESE are millions of automobiles that look pretty much the same. You can take the first ten cars of which you think, in the "thousand-dollar" class, for instance, and the difference in their appearance will be minor. And any one car that you think of will be different from year to year. There are very few automobiles that have a consistent, lasting, recognizable personality. Automobiles are much like people in this respect: there are lots of them and very few that stand out.

The National car acquired the keynote of its character in its early racing days. Every individual National car is somewhat reminiscent of the race track. The lines of this latest National "Highway" Twelve are lines that bespeak good, blue-blooded breeding. They give to the National car a look of strength and cleanliness and aggressiveness that no other car begins to possess.

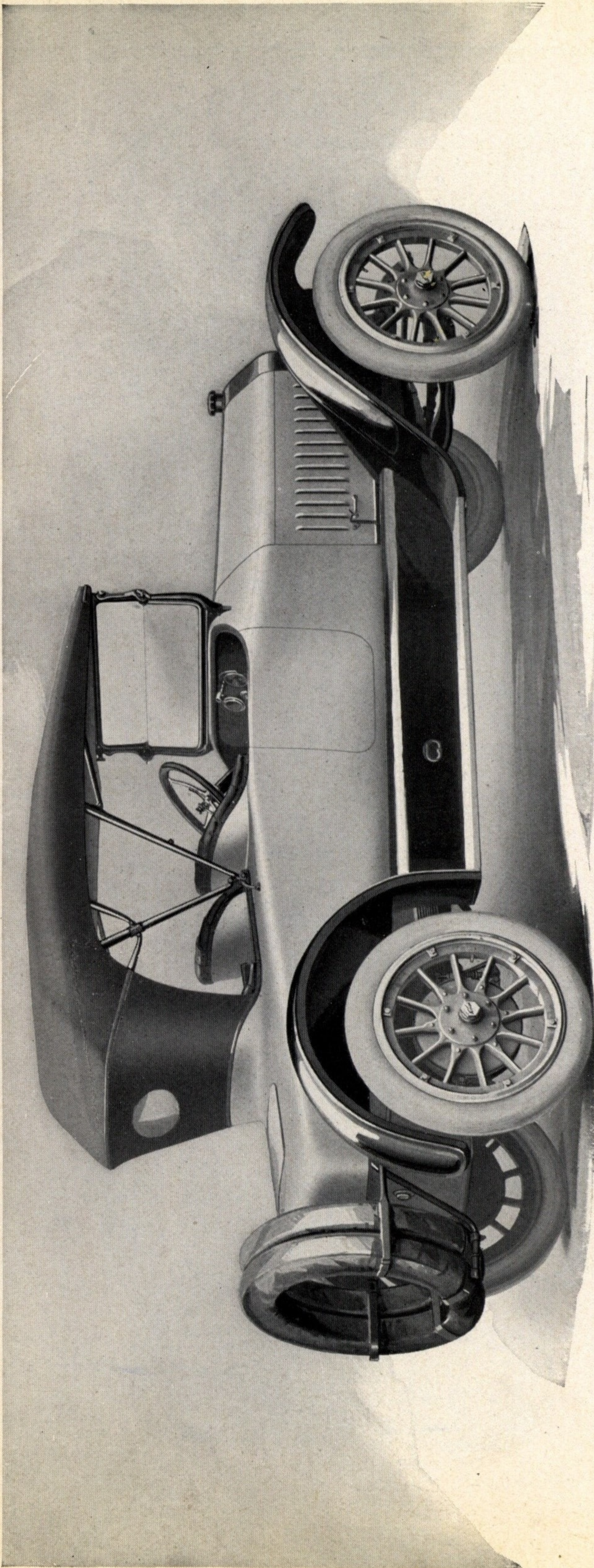
There are other high-class cars, to be sure, but in none of them is correct, thoughtful design combined with unmistakable evidence of a fighting ancestry. It might be said that the National seems not only aristocratic, but *athletic*.



THE NATIONAL TOURING CAR HAS AISLEWAY FRONT SEATS. THE TWO AUXILIARY SEATS \$30 EXTRA

The National "Highway" Twelve has many desirable conveniences, some of which are found in many high-grade cars at this time and some of which are exclusive with the National company. Aisleway front seats, which the National company has used for three years, throw the car into one comfortable, livable room, provide a separate seat for the driver, afford perfect ventilation for the front and rear apartments, and make the "one-man top" true to its name.

The car is supplied, if desired, with two extra folding arm-chairs at a slight additional cost. Though the car, with the auxiliary seats, is called a six-passenger car, the rear tonneau seat will carry three, so that in emergency there is really a seven-passenger capacity.



NATIONAL "HIGHWAY" TWELVE, THREE-PASSENGER ROADSTER, \$1990. FOR INTERIOR ARRANGEMENT, SEE NEXT ILLUSTRATION

NATIONAL "HIGHWAY" TWELVE ROADSTER

IN THE National "Highway" Twelve roadster the racing strain of National cars is even more evident than in the touring car. The roadster is usually a man's car, so National designers have not held back in their desire to build a car with an appearance of vigor. The Twelve roadster will remind you of the National car which holds the World's Stock Car Championship. The lines are indeed different, but the fighting look is there.

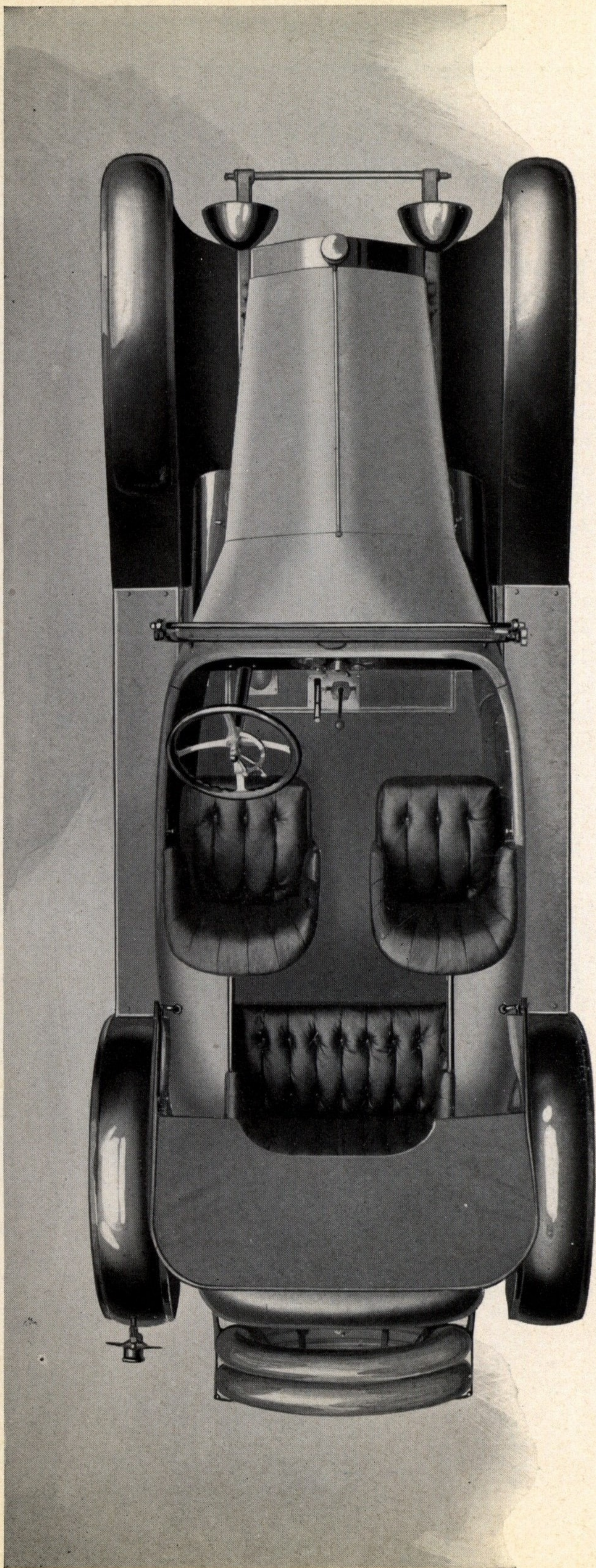
This is a car that will not lag at the get-away, and a car that will eat any roadway with a ferocity to suit any man. The motor delivers fully 70 horsepower when you let it out, though it may be throttled down to a snail's pace—such is the versatility of the twelve motor.

It is a car with "pep," power and pugnacity.

The arrangement is unusual. Commodious seats are provided for three people, with the top extending over all. There is a big trunk-like compartment in the rear, for touring convenience.

National cars were about the first to use cantilever springs in this country, and to-day the National company stands very far in advance of most motor car companies in its application of the cantilever spring principle. The National follows the foreign practice of using an extra long cantilever spring and having it practically horizontal.

All National models are extraordinary in their comfort.



THREE COMMODIOUS SEATS MAKE THE NATIONAL "HIGHWAY" TWELVE ROADSTER A MOST COMFORTABLE PARTY CAR

SPECIFICATIONS

NATIONAL "HIGHWAY" TWELVE TOURING CAR AND ROADSTER

MOTOR—The National twelve-cylinder motor was designed and developed and is built in the National factory. The National Company built the first "stock" American-made six-cylinder cars, also the World's Stock Champion four-cylinder motors. The National twelve-cylinder motor is "V" type, with six cylinders en bloc on each side. Cylinders are placed at an angle of 60 degrees, which permits a narrow frame and short hood. The bore is $2\frac{3}{4}$ inches, the stroke $4\frac{3}{4}$ inches, giving a piston displacement of 338 cubic inches. Full 70 horsepower, or any part of it, is developed without vibration or strain.

The pistons are made of aluminum alloy, and fitted with three rings; the connecting rods are drop forged and carefully machined. Thus the weight of all the reciprocating parts has been reduced to a minimum. Connecting rod bearings of opposite cylinders are placed side by side on the crank shaft. This insures perfect lubrication and permits easy bearing adjustment.

The crank shaft is of large diameter, so as to hold everything rigid. It is supported by three large main bearings. The center of the crank shaft is drilled with oil leads to the connecting rod bearings.

All valves are located on the outside of the cylinder blocks and are therefore as accessible as the valve of any Six. Two cam shafts are provided, one for each set of cylinders. The valves being on the outside, there is plenty of room between the cylinder blocks for the permanent accessories, such as the magneto, the carburetor and the starting motor. Any one of these units can be easily reached without disturbing any other part.

The design of the National Twelve motor allows a short crank case. It is supported from the frame by four strong arms, which increases sturdiness and reduces frame weave. The bottom of the crank case, which holds the oil, is ribbed to facilitate the cooling of the oil. The lower section of the crank case may be easily removed without disturbing the bearings.

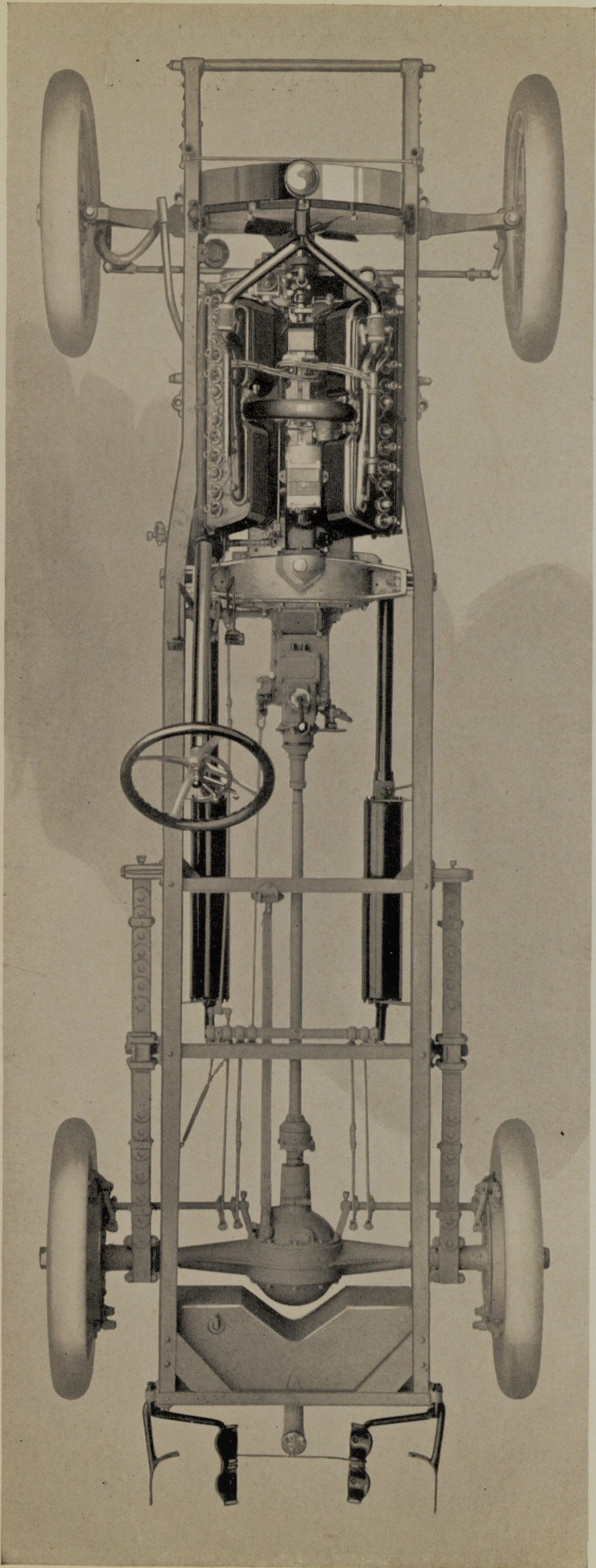
The timing gears are helical cut to insure quietness. The magneto drive is by a silent chain.

Each set of cylinders has a separate exhaust manifold, pipe and muffler.

LUBRICATION—National Twelve lubrication is by a positive high pressure feed system, which forces the oil through the hollow crank shaft to each of the main bearings and to the connecting rod ends on crank shaft. Separate leads pass to the cam shaft bearings and to the timing gears in front.

CARBURETOR—One automatic carburetor supplies both cylinder blocks. It is located between the cylinders at the highest point of the motor, where it is kept dry and warm. Gas passes through one manifold to both cylinder blocks, and is then distributed to individual cylinders through a manifold cast integral with the cylinders. Manifolds are hot-water jacketed.

IGNITION—The National Twelve is the first motor of more than six cylinders to offer high-tension magneto ignition. A high-tension magneto is located between the



THE NATIONAL "HIGHWAY" TWELVE CHASSIS IS STURDY AND SOLID. NOTE THE LONG, FLAT CANTILEVER SPRINGS

cylinder blocks, high and dry at all times. The magneto is entirely independent of all battery connections, making it the most reliable of all ignition methods.

Magneto ignition is generally conceded to be the best for a motor car, but until the advent of the National Twelve cars of more than six cylinders have been at the complete mercy of batteries for their spark.

CLUTCH AND TRANSMISSION—The clutch is an aluminum cone, faced with durable material, operating in fly-wheel of motor.

Transmission is of unit construction, combined with clutch and motor. It is the selective type, with three forward speeds, and has annular ball bearings throughout.

ELECTRICAL SYSTEM—*Lights*—Controlled by one switch on the dash. The two powerful headlights are also fitted with small bulbs. Lighting system is entirely automatic. Westinghouse system. Dynamo is separate from starter motor, eliminating possibilities of troublesome "shorts." Battery is concealed behind running board splash and is accessible by means of easily removed cover.

Starter—Westinghouse system of separate units. Built and guaranteed by the well-known Westinghouse company. Starter motor located on top of engine and very accessible. Starting is effected by a small but powerful electric motor geared to the fly-wheel. Ammeter on dash.

AXLES AND BRAKES—*Front*—I-beam, one-piece steel forging. Large adjustable roller bearings in hubs. Ball, thrust bearing at top of steering knuckles. *Rear*—Full-floating axle, with large roller bearings. Driving pinion and ring gear have spiral cut teeth. These helical bevel gears are silent.

Drive—From motor to rear axle by straight line tubular shaft. Strong torsion member relieves shaft from strains.

Brakes—National brakes stop car gently without jerks or noise. Service brakes easily operated by foot pedal. Contract on rear wheel drums. Size, 15 x 2. Emergency brakes (internal expanding) are instantly applied by convenient hand lever.

WHEELS, FRAME AND SPRINGS—*Wheelbase*—128 inches. *Tires*—Size, 36 x 4½. Option of Firestone, Goodrich or U. S. *Rims*—Firestone demountable (Q. D.) rims. Extra rim included.

Frame—Pressed steel, five-inch channel section. Well braced and strong. Curved up over rear axle to allow low suspension of body. Frame narrowed in front to permit a short turning radius of thirty-five feet.

Springs—*Front*. Semi-elliptic, length, 38 inches. *Rear*. National (flat) cantilever, giving soft-riding qualities. Length 51 inches.

EQUIPMENT—*Top*—One-man top made of "Never-leak" waterproof material, fitted with Jiffy curtains. Ventilating and rain-vision type of windshield. Speedometer (Stewart) driven from drive shaft. Horn, underhood type of electric horn, large button in center of steering wheel. Tire pump mounted on motor, long tube to reach all tires. Tire carrier (for two tires) in rear. Gasoline gauge on tank. Full complement of tools, carried in specially fitted pocket located in the front door.

PRICE AND COLOR—All prices are F.O.B. Indianapolis. "Highway" Twelve Touring Car, \$1990. Two extra folding seats \$30 additional. "Highway Twelve" Roadster, \$1990. Standard color National blue (very dark) body and wheels.

THE NATIONAL COMPANY

THE National Motor Vehicle Company has been building motor cars for over *fifteen* years, which makes it a pioneer in the automobile field. The ownership and management of the National company have not changed in these fifteen years, and many of the department heads and factory foremen have been with the company all this time.

The National company is a big, reliable organization, with a large, modern, well-equipped factory, recently doubled in size by the erection of a two-acre (two-story) addition of reinforced concrete and steel. It is a company financially strong, operated under consistent and conservative policies, and enjoying a high credit rating.

The business man who takes the "manufacturer behind the car" into consideration when making his purchase will be made comfortable in his selection of a National car by his knowledge of the solidity of the National company. It will assure him that the value of his own car will not be precipitated downward some day by the sudden vaporization of its manufacturer; and it will assure him also of a continued service, which is of considerable importance these days in the choice of an automobile.

The development of the National car has been slow and scientific. No sporadic, mushroom improvements are made overnight for the mere sake of sales impetus. The same conservatism that pervades the business administration of the National company prevails throughout the National factory.

National Motor Vehicle Company

Indianapolis, Indiana, U. S. A.

Sixteenth Year



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