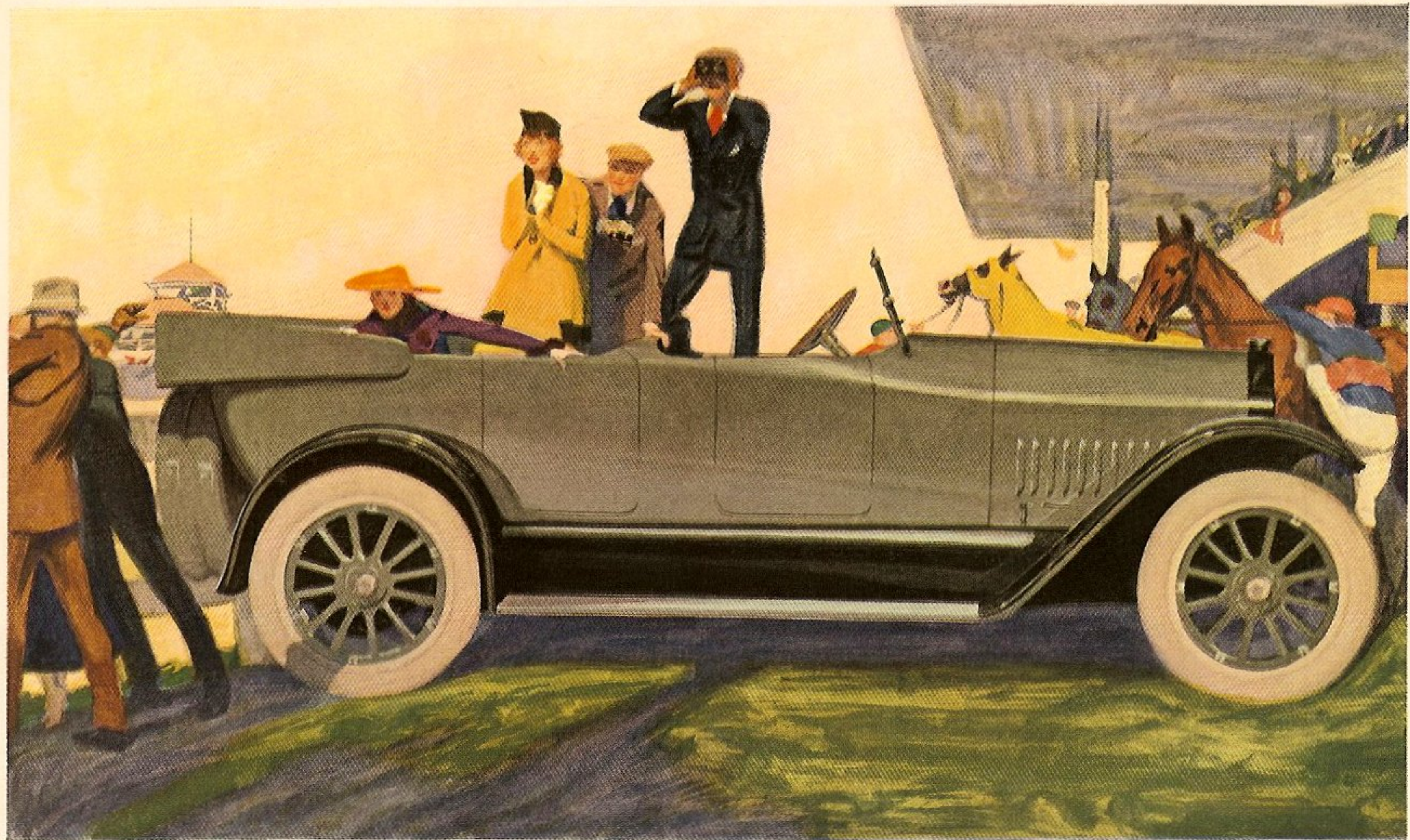




National

HIGHWAY TWELVE
CYLINDER CARS

"America's best looking Cars"



The National Highway Twelve

YOU have but to suggest, and the Highway Twelve is defined in performance terms. You will marvel at its apparent insolent mastery of the road, its nonchalant habit of topping grades without effort; its vast reserve of silken power.

But the answer to that is two-times-six.

National engineers have smoothed out the power intermissions. In a six-cylinder motor the crankshaft received three propulsions every time it turned over. Seemingly this was sufficient for an even flow of power. This would be true but for one reason. The cylinders of the six motor must be large in order to generate a sufficient volume of power. When one of these cylinders gives the crankshaft a shove it is an ungentle, unmannerly shove.

With the Twelve, the crankshaft receives six propulsions with every revolution. Thus the power stream is unbroken. The individual cylinders are smaller—the explosions less brutal.

In other words, the superiority of the Highway Twelve is that of the trained athlete over primal force.

Vibration has become obsolete in the National Twelve; that power-wasting car-racking bogie that marks the "one-year" automobile has been routed.

Full seventy horse power, or any part of it, is developed without vibration or strain.

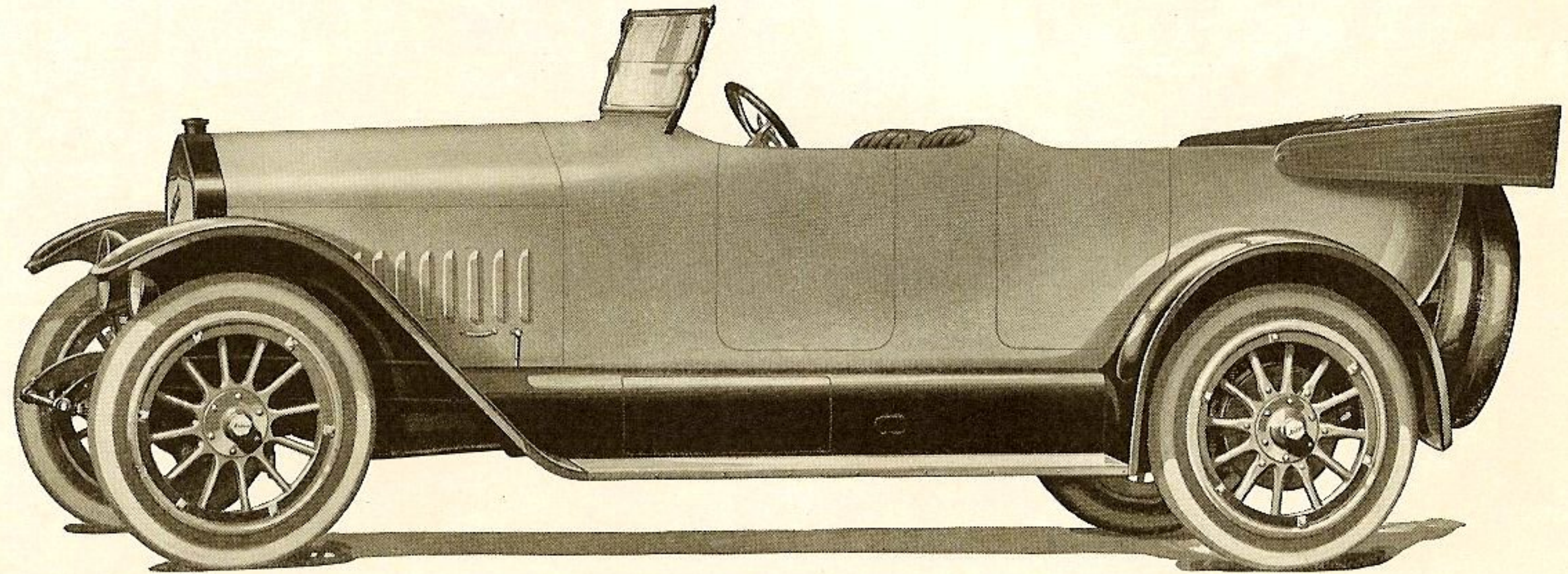
The National Twelve, most accessible of all V-type engines, carries the valves outside the V. A single carburetor impartially supplies both sets of cylinders, and, nestled away snugly in the center of the V, high, dry and warm, it handles low grade fuels efficiently.

If the twelve-cylinder car possessed no advantages other than the increased safety which it affords it would still be a decided advancement. With the twelve-cylinder, quick starting and quick stopping is possible, and at the same time a high rate of speed can be sustained within the safety zone of operation. The increased number of cylinders gives a smoothness of action and application of power that counteracts the bad effects to be found in cars of yesterday.

It is hard to realize unless one has toured in a twelve-cylinder car. Then its great possibilities are appreciated, when one sees that this point of safety speed has been greatly advanced by this wonderful improvement in the design of motor car engines.

National Motor Car & Vehicle Corporation

Indianapolis, Indiana, U. S. A.



The Highway Twelve Touring Car (seven passenger) has aisleway front seats. Color—option of Highway blue or Highway grey

Twelve Cylinder Advantages

Power Without Over-exertion: There are six power impulses to each revolution of the motor—six gentle pushes rather than two or three blows or jerks. These six impulses give a constant power pressure.

Eliminates Vibration: The continuous flow of power eliminates the vibration that eventually shakes to pieces other types of motors. The smooth operating of the Twelve means longer life for the entire car.

Less Gear Shifting: The steady power gained by having twelve small cylinders instead of fewer large ones eliminates nearly all of the gear shifting. It's difficult to "stall" a Twelve motor.

Indicates Car Character: A Twelve is immediately known as a high grade car. Its standing is the best. A large percentage of all high grade cars sold now have motors of the V type.

Efficient with Low Grade Fuel: The smaller cylinder and the overlapping impulses give efficient motor operation with the prevailing low grade of gasoline.

Power Without Bulk: The twelve small cylinders give more power than six cylinders of double their size. Therefore without increasing the total piston displacement, the Twelve gives more power than is had from the same size motor of less cylinders.

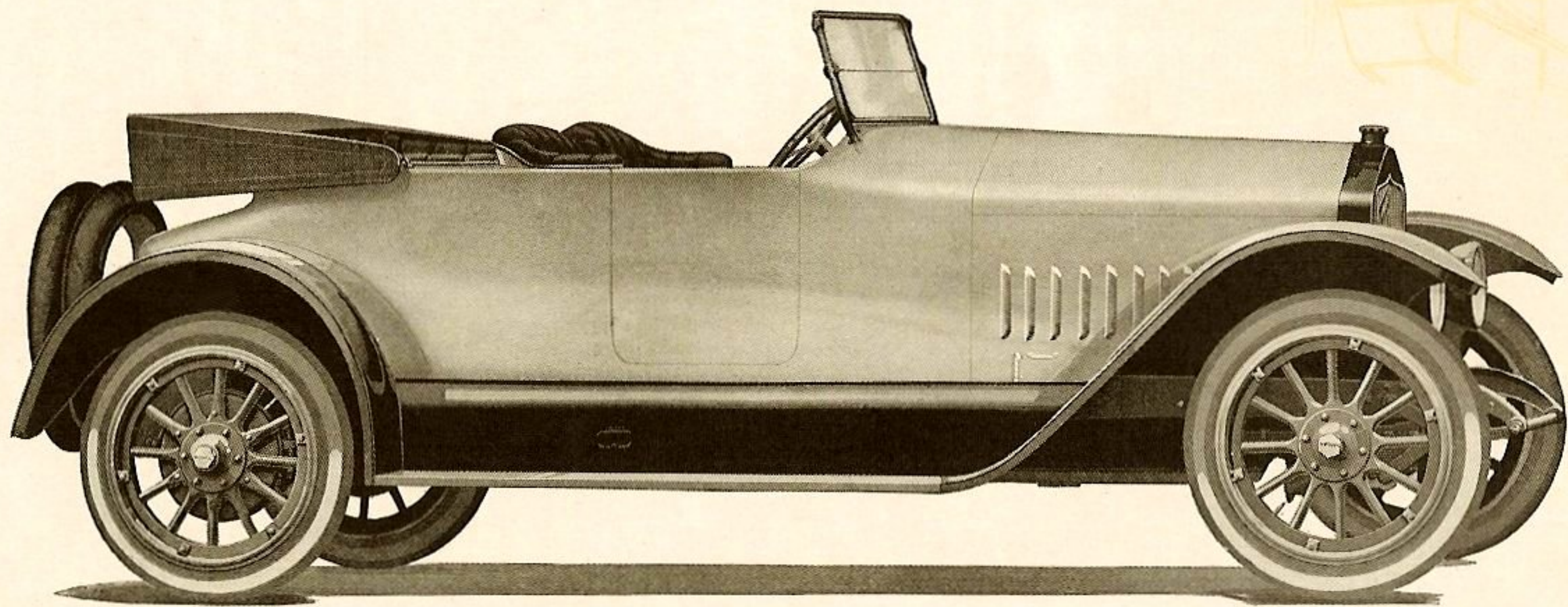
Smooth Riding: By eliminating the vibration, the passengers have more comfortable riding. That nervous strain and shake is done away with. With a Twelve you are not continually conscious of the car speed, because the "shake" is gone.

Luxury and Quality Without Extravagance: The National Twelve gives every luxury and style at a price much less than obtainable elsewhere.

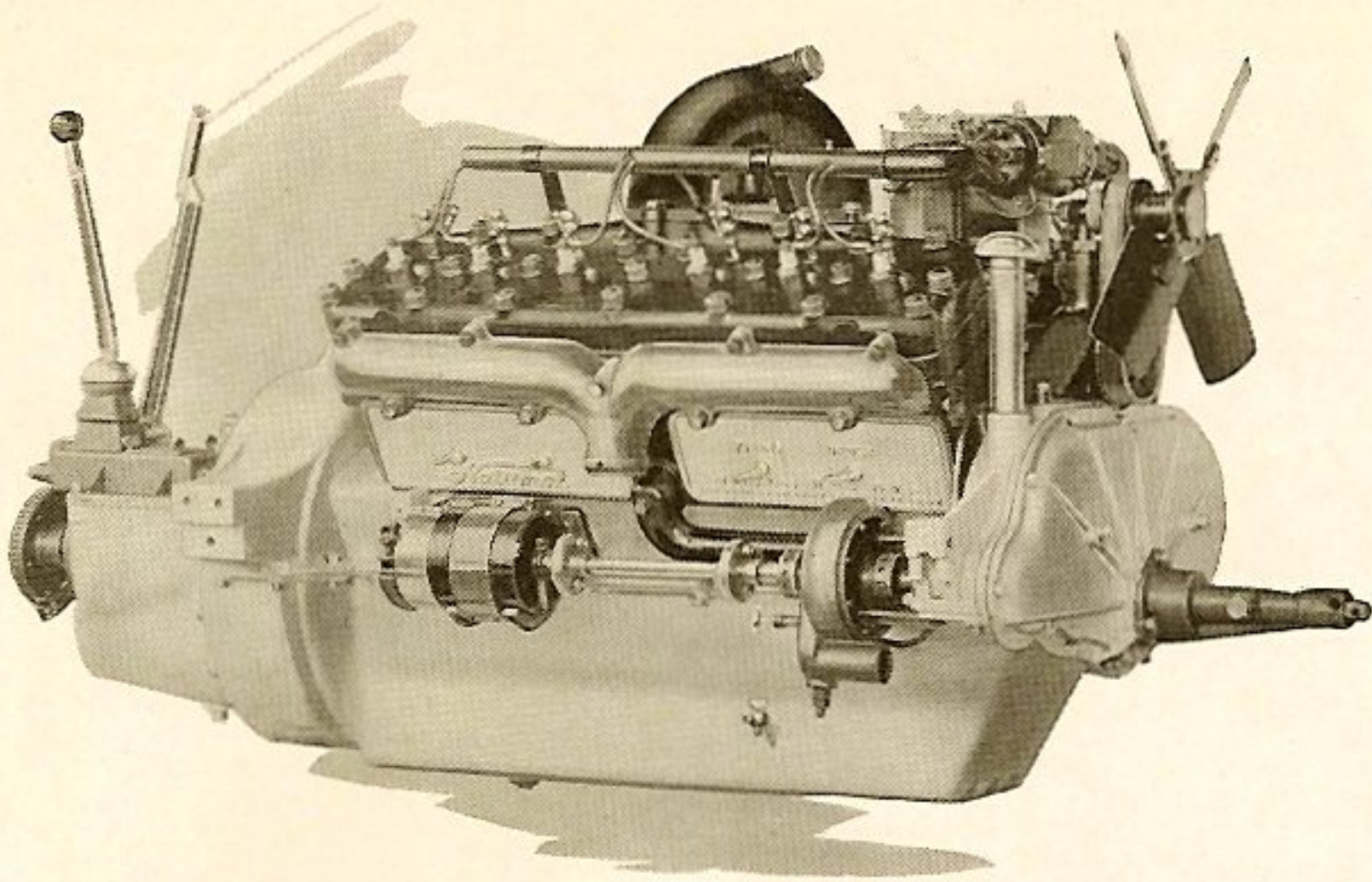
Since the very inception of the automobile business, the progress of National built motors has always been abreast, and generally a little ahead, of the industry. When four cylinders were the proper thing, National built the world's champion Fours. When sixes came into vogue, it was National that built the first American Sixes, and National was the pioneer in the latest type—the Twelve-cylinder.

National Twelve-cylinder cars are today in operation in every state in the Union and in eleven foreign countries. Owners everywhere testify to the success of the Twelve.

The same corps of engineers who have produced previous successes have within the last year concentrated on improvements for this second National Twelve.



The Highway Twelve Roadster seats four comfortably. Color—option of Highway blue or Highway grey



National motors have a world-wide reputation for power and endurance

Basically, there was nothing to be changed on the Twelve motor. Several improvements have been added in the way of accessibility, increased power, and greater economy.

The most notable improvement to be found on the new Twelve is the removable cylinder heads, so made to facilitate cleaning and inspection. The bore of the cylinders has been increased to $2\frac{7}{8}$ inches, resulting in a corresponding increase in power. Counterweights have been added to the crankshaft—another power increasing improvement.

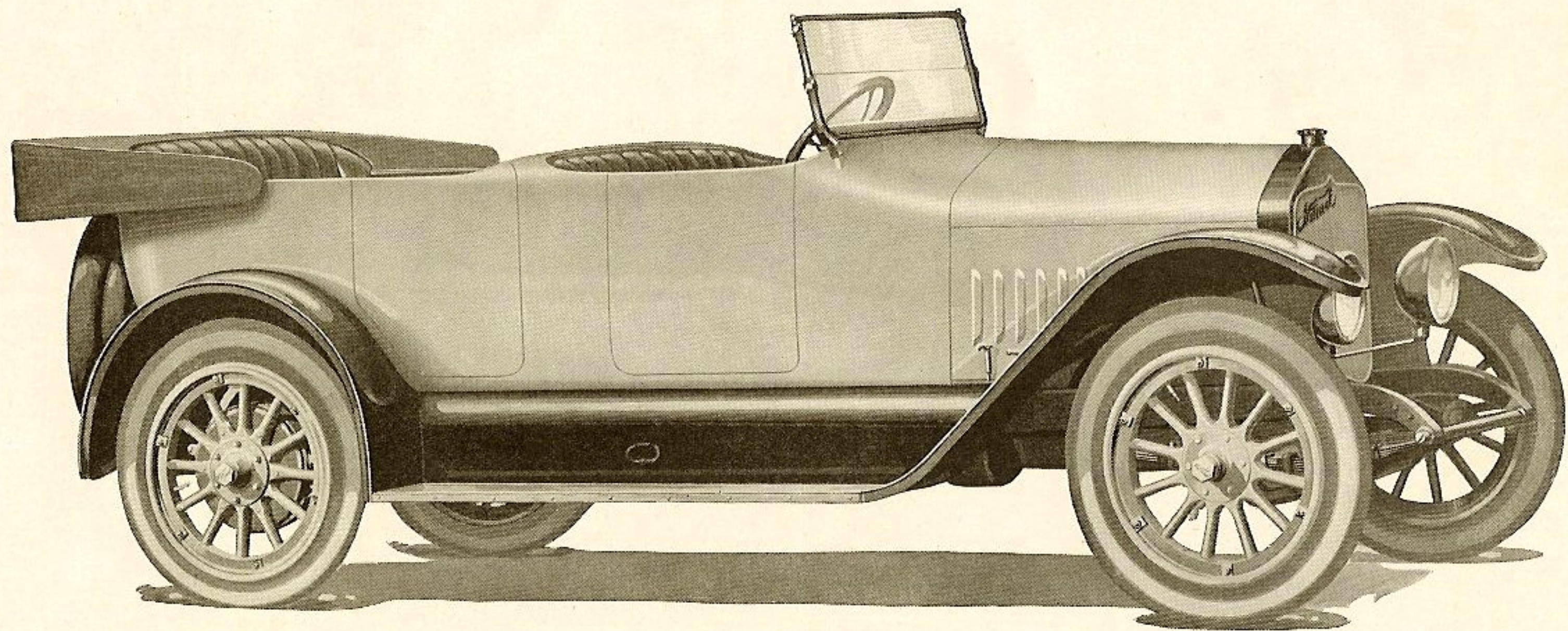
All the hot water from the cylinders now goes through the intake manifold on its way to the radiator. This feature, with the National design manifold, insures efficient and even distribution of the mixture. Low grade gasoline is now handled effectively, giving more miles per gallon and increased economy.

Vibration has been reduced to the lowest point practicable by increasing the length of the crankshaft main bearings and the addition of forked connecting rods. Bronze babbitt lined bearings are used throughout.

The National Twelve has always been the most accessible V-type motor. This feature has been furthered by the new arrangement for removing the valve lifters without tearing down the motor. The National design of having the valves accessible on the outside of the V and not down in the middle has been continued, as has the National arrangement of the double camshaft.

The Bijur separate unit system for starting and lighting and the Delco system for ignition have been added.

These improvements, coming as they do on the most advance type of motor, makes the National Twelve the most ideal gasoline motive power to be had.



The four-passenger Highway Twelve "Sport" Phaeton has a Newport cabinet. Color—option Highway blue or Highway grey

The Seven-Passenger Touring Car

With a body of generous proportions, built for the accommodation of seven passengers, the new Highway Twelve is a stately car. Folding auxiliary seats tuck away in the backs of the front seats when not in use.

For the use of Madame while shopping, two compact parcel compartments are fitted snugly in the back of each front seat and guarded with lock and key.

The windshield is tilted to a rakish angle. This decreases wind resistance, and banishes annoying reflections.

The lights and the ignition switch are guarded by lock and key. The gasoline cap filler is placed at the extreme right and hinged to prevent misplacement.

Mere tribute to par-excellence in balance and good breeding will halt you before the window of a National show room. A step inside, an examination of finish, upholstery and seating arrangement and you are a prospect.

Aisleway seats, a National attribute for four years, converts the car into a real drawing-room on pneumatics.

The Four-Passenger Roadster

Although it is a roadster, this Highway model is a full four-passenger car. The rear seat is wide and deep. The back comes up as high as the backs of the front seats. This extra seat is not a makeshift of the ordinary clover-leaf variety, but is fully as comfortable and roomy as the front seats. In this car, all four passengers are "in" the party, and no one is slighted.

The passage way makes the front seats veritable armchairs. There is plenty of room for "bag and baggage" in the carrying compartment in the rear deck. The tools are carried in specially fitted pockets in the door at the driver's left. A Yale lock protects the spare tires.

The Four-Passenger Phaeton

With its straight sides, smart appearance, rakish lines and tilted windshield, the four-passenger Phaeton is the "Sport" type of the National line.

Long and narrow, yet roomy and comfortable. One-piece seat, and cushion, in front with body fitting back. Broad center cowl. The rear seat is deep, and being nearer to the car center, is extremely comfortable when touring.

The handy and well designed Newport cabinet in the tonneau makes the Phaeton an ideal cross-country car. This cabinet is divided into three sections. The two smaller ones open from the tonneau dash which is of walnut, the same as the dash in front. Below is a real compartment designed to accommodate a full sized suitcase. The sides of the Newport cabinet are covered with black leather to match the upholstery.

For four-passenger touring, the National Phaeton with its Newport cabinet renders as much increased comfort and convenience over the conventional type touring car as the Pullman drawing-room gives over the ordinary berth.

Details of Construction

PRICES

All cars sold f. o. b. Indianapolis. Prices include equipment

National Highway Twelve Touring Car, 7-passenger	\$2150
National Highway Twelve Roadster, 4-passenger	2150
National Highway Twelve Phaeton, 4-passenger	2150
National Highway Twelve Coupe, 4-passenger	2800
National Highway Twelve Touring Sedan, Convertible (<i>Springfield type</i>)	2750

Illustrated Booklet on Closed Cars sent on request

Motor

TYPE—V-type construction, 12 cylinders in sets of 6 on each side, at an angle of 60 degrees.

SIZE—Bore $2\frac{7}{8}$ inches; stroke $4\frac{3}{4}$ inches. Total piston displacement 370 cubic inches. Horsepower—S. A. E. rating 39.7 H. P. Dynamometer test 72 H. P.

CYLINDERS—L-head type, cast in two blocks of six each. Intake manifolds are integral. Cylinder heads are removable, permitting easy access for cleaning and inspection.

PISTONS—Pistons are ground and lapped into cylinders. Fitted with four rings. One ring is located at bottom of piston, and keeps excess oil out of cylinder.

CONNECTING RODS—Strong drop-forgings, machined by experts to small but exact size, reducing reciprocating weight to the minimum. Forked ends on connecting rods to give large bearing surface and increased rigidity.

CRANK SHAFT—Large in diameter with large bearing surface so as to hold the light reciprocating parts in perfect alignment. Six cylinder type of crank shaft with three main bearings. Crank shaft drilled with oil leads to all bearings.

VALVES—All valves are located on the outside of the V, and not down in the middle as in most multiple cylinder cars. The National Twelve is as accessible as any Six. Separate cam shaft is provided for each set of cylinders. This greatly simplifies manufacturing, and insures perfect cams. Valve lifters are removable without tearing down the motor. Detachable cover completely encloses the valve mechanism.

CRANK CASE—Crank case is of aluminum alloy, and suspended from main frame by four strong arms, thus increasing the rigidity of the frame and

reducing frame weave. Lower part of crank case is ridged, giving more cooling surface for the oil. Lower section of crank case is removable without disturbing bearings, clutch, or timing gear cover.

TIMING GEARS—Water pump and generator shaft and both cam shafts are driven by quiet spiral gears. Drive for the Delco ignition is by means of a silent chain.

EXHAUST—Each set of cylinders is provided with separate exhaust manifold, pipes and muffler.

CARBURETOR—One carburetor supplies an even mixture to both sets of cylinders. It is located in the middle of the V, where it is warmed by the cylinders and well protected. The main intake manifold is hot water jacketed. The mixture is distributed to the individual cylinders through integral manifolds extending full length of the cylinders. This method of keeping the mixture warm permits the use of low grade gasoline, gives greater economy, and more efficient performance at all speeds.

IGNITION—Ignition is provided by the reliable Delco system. Separate unit from the Bijur Starting Motor.

LUBRICATION—Oiling of the National twelve-cylinder motor is a positive pressure system which is entirely automatic. The oil reservoir is in the lower part of the crank case. A gear pump forces the oil through an oil strainer and through leads to the drilled crank shaft, where it is carried, under pressure, to all the main bearings. Separate leads go to the cam shaft bearings, timing gears in front, and the cylinder walls. An automatic pressure release controls the pressure at all times.

COOLING—Cylinders are provided with ample water jackets. The water is circulated by a centrifugal pump. This pump is of the double type. It pumps a stream of water to each set of cylinders. On its

Details of Construction (continued)

way from the cylinders to the radiator, the hot water circulates around the intake manifolds.

CLUTCH AND TRANSMISSION—Cone clutch combined with transmission in unit power plant. We believe that the new National clutch operates better, with less pressure, and with more even and gradual engagement than any other make. Annular ball bearings throughout transmission. Three forward speeds.

ELECTRICAL SYSTEM—Lights controlled by one switch on the dash. Switch can be locked in place. Headlights are fitted with small bulbs for dimming. Bijur electrical system is entirely automatic. Dynamo is separate from starter motor. Battery concealed behind running board splash and is instantly accessible. Starter motor geared to fly-wheel.

AXLES—Front—I-beam, steel forgings. Large adjustable roller bearings in hubs. Ball thrust bearing at top of steering knuckles. Rear—Full-floating axle, with large roller bearings, spiral ring gear and pinion.

BRAKES—Two sets, size 15" x 2". Operated by foot pedal and hand lever.

WHEELS, TIRES AND FRAMES—Wheelbase 128 inches. Tread 56 inches. Tires—size 34" x 4½", option of Goodrich, Firestone, or Kelly-Springfield. Wheels—regular equipment, wood wheels fitted with Firestone demountable tires. Wire wheels optional and extra charge.

SPRINGS—Front—semi-elliptic, length 38 inches. Fitted with Hartford shock absorbers. Rear—National (flat) cantilever. Length 51 inches. Bronze bushed eyes on spring bolts and lubricant pockets on each spring leaf keep springs quiet.

GASOLINE SYSTEM—Eighteen-gallon tank built on the main frame in rear. Filler handily located at extreme right by the fender. Hinged cover cap. Vacuum gasoline feed.

FENDERS—Fenders and hood are made of rigid sheet steel, carefully fitted to prevent squeaks. Leather or rubber inserts placed between all metal trim-

ings to do away with all noises. Radiator splash guards in front and rear of radiator and in the frame extension to keep out all mud and water.

CONTROL—Left drive with levers in center. Clutch and brake pedals operate with small pressure. Corrugated rubber pads on pedals to prevent foot from slipping.

TURNING RADIUS—All Highway Twelve cylinder models will turn in a 39-foot circle.

BODY SUSPENSION—Low body suspension with standard road clearance. Cars "hang" to the road. The low center of gravity and the well balanced cars are big factors of safety.

FRONT SEATS—"Aisleway" front seats, introduced by National four years ago, give separate seat for driver; permits passengers to change seats readily and gives better ventilation for both the front and rear seats.

FINISH—Painting, option of Highway blue or Highway grey. Upholstering—best grade genuine leather (black). National plaited upholstery does away with dust catching tufting. Exposed upholstery nails or tacks are eliminated by the new National binding. Genuine hair carpet in tonneau. Instrument board of dark walnut. All metal parts black enameled or nickered.

EQUIPMENT—Top—one-man top made of "Neverleak" water-proof material. Side curtains may be arranged to open with doors, by means of a stanchion, which is quickly put in place. Ventilating and rain-vision type of windshield. Ammeter—electric horn—Warner speedometer with 75-mile per hour gauge. Hartford shock absorbers, in front. Power tire pump mounted on transmission, accessible without raising the hood or floor boards. Double tire carrier in rear provided with Yale lock. Full complement of tools. Special pockets in left front door for small tools.

MONOGRAM—No charge for monogram if done at factory.

NATIONAL MOTOR CAR & VEHICLE CORPORATION

Seventeenth Successful Year

INDIANAPOLIS, INDIANA, U. S. A.



Seventeen years ago the first National car was built, with one thought behind it, for the man who is not satisfied with the commonplace. You have but to turn back to the pages of motor history to see how closely National has held to that course. While the National has never been extravagantly priced, yet with it cost has ever been secondary. With the name and the radiator has always been associated a legend of speed, great power and the finest bodies of the carriage-builder's craft.

Shisler-Bidlack Auto Sales Co.
Agents and Distributors
High Street and Sixth Ave.