National

"40"

$2,500 National "40"

NATIONAL MOTOR VEHICLE CO.

INDIANAPOLIS, INDIANA

Licensed Under Selden Patent.

F. W. RAMALEY,
Sales Agent.
Grand Ave. - St. Paul, Minn.


National
National

The Building of a Good Car

THE National "40" is not the work of a day, nor of a year. Cars of the first grade are not produced that way.

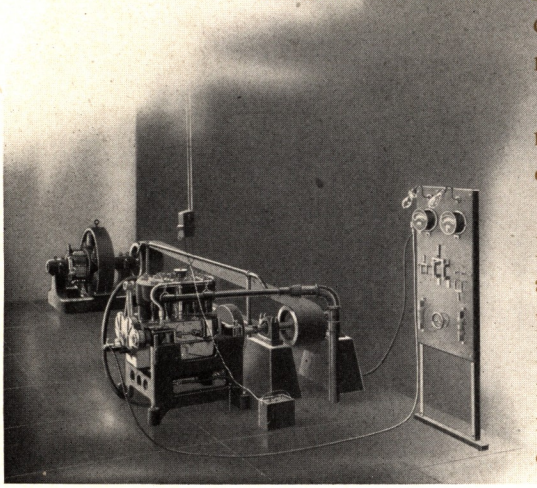
The engineer who designs the car may be the best in the world, but until what he has on paper has been worked out in metal, until the completed whole has been tested, neither he nor anybody else can know what he has. It is not alone correct design that accomplishes the purpose, though that design be the result of all the experience of the motor car industry to date. Nor does the whole thing lie in correct design plus the best selected material for each particular purpose, dictated by the experience of years and purchased regardless of cost. The intelligence, the experience and the skill of each workman engaged in the multifarious operations involved are most important factors. And then comes the final test. Motor, transmission, rear system, etc., have, of course, been tested on the block, but the assembled car as a whole, must be put on the road and show what it can do.

The National "40" is the evolution of eleven years. Not only the same engineering force and the same buyers of materials, but nearly all the same workmen that built the first National, are engaged in producing the present model. They know how. Their conscience, their pride, as well as their hands and brains are in the work. The "40" has proven the wonder of the track since it was put in commission last summer, and there is as much enthusiasm over its performance, in every corner of the factory, as in the front office.

That the National has kept abreast of the rapid progress of motor car design and con-

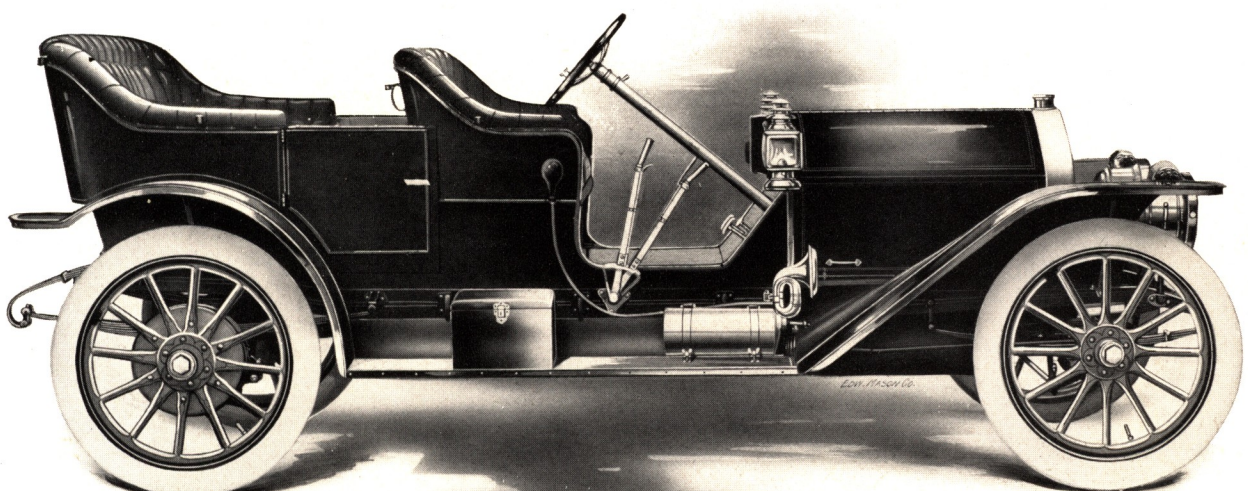
struction, that it is built of the best of materials and equipped with the best of accessories, goes without saying. The same may be said of a number of other cars. The point we make is that a harmonious, intelligent manufacturing organization, trained through eleven years of experience in the continuous effort to build the best motor car in the world, is producing results that would be impossible under other conditions.

The National is fortunate in having at its door, the Indianapolis Motor Speedway where every car it turns out, can be subjected to the merciless test of speed at seventy miles per hour or better. Nothing will develop any latent weakness of material or workmanship so surely as this terrific strain of top speed —and such test is not possible on streets or roads. Of two cars of the same design and the same measurements, made by the same workmen, one may be perfect, while the other may have hidden somewhere in its mechanism a defect of material or workmanship that would in the end give trouble. If any test can bring it out in the beginning, terrific speed will do it, and when any weakness develops in this test of a National car, it is, of course, remedied before the car leaves the factory for sale.

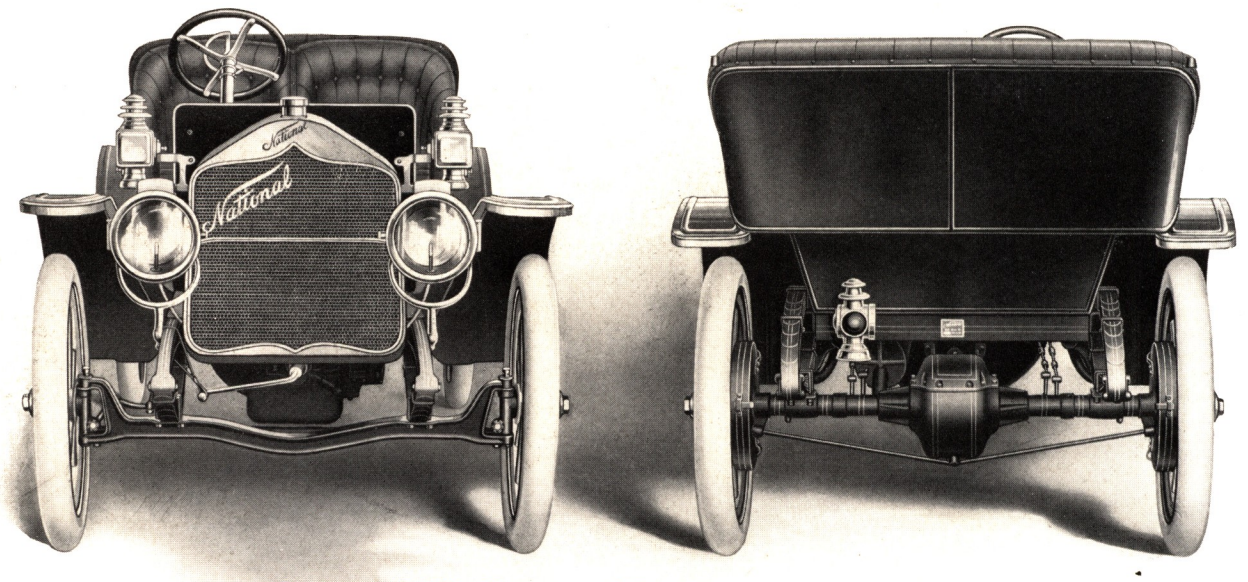


The National "40" has proved to be the marvel of motordom, developing power and speed heretofore known only in racing cars of special design and construction.

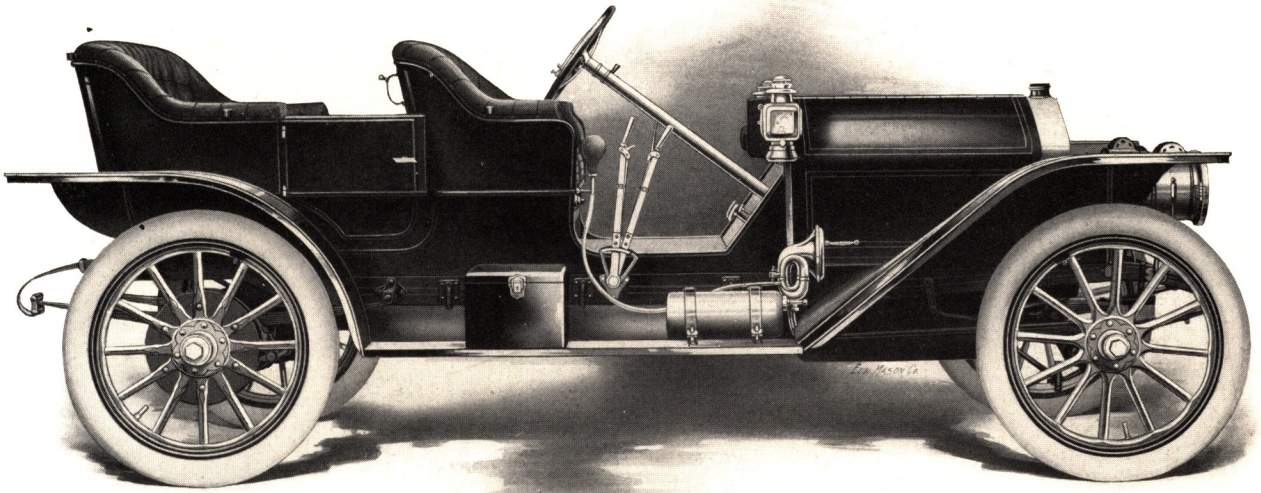
That a car as big, as powerful, as luxurious as the National "40", developing as high as seventy horsepower and holding its unequalled speed records, should sell at a price so moderate as $2,500, has excited much comment in the trade—but "how-can-we-do-it" questions do not interest you as a buyer. The big fact before you is that in the National "40" a remarkably fine and fast car is offered at a very moderate price.



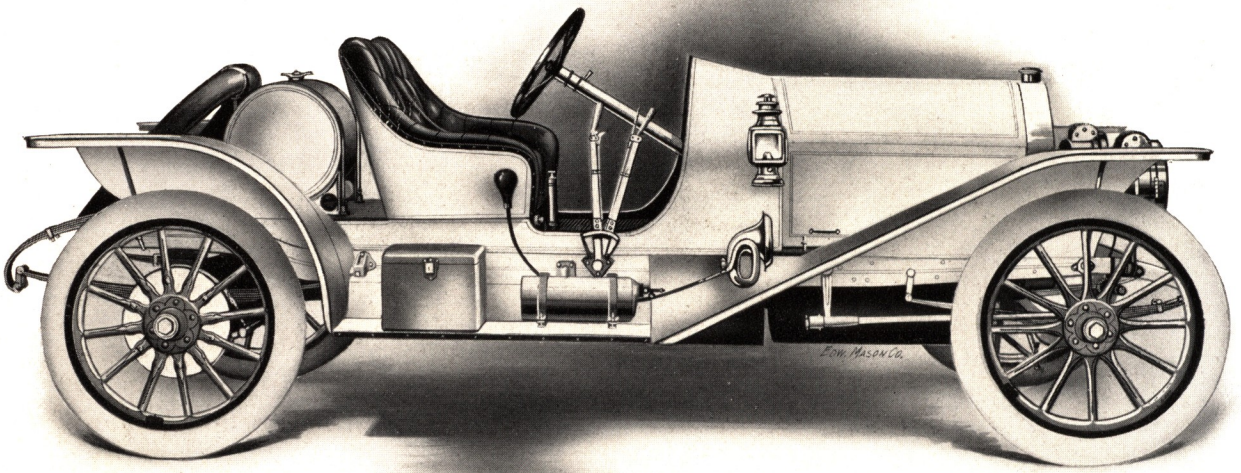
National "40" Five-Passenger Touring Body
Price $2,500



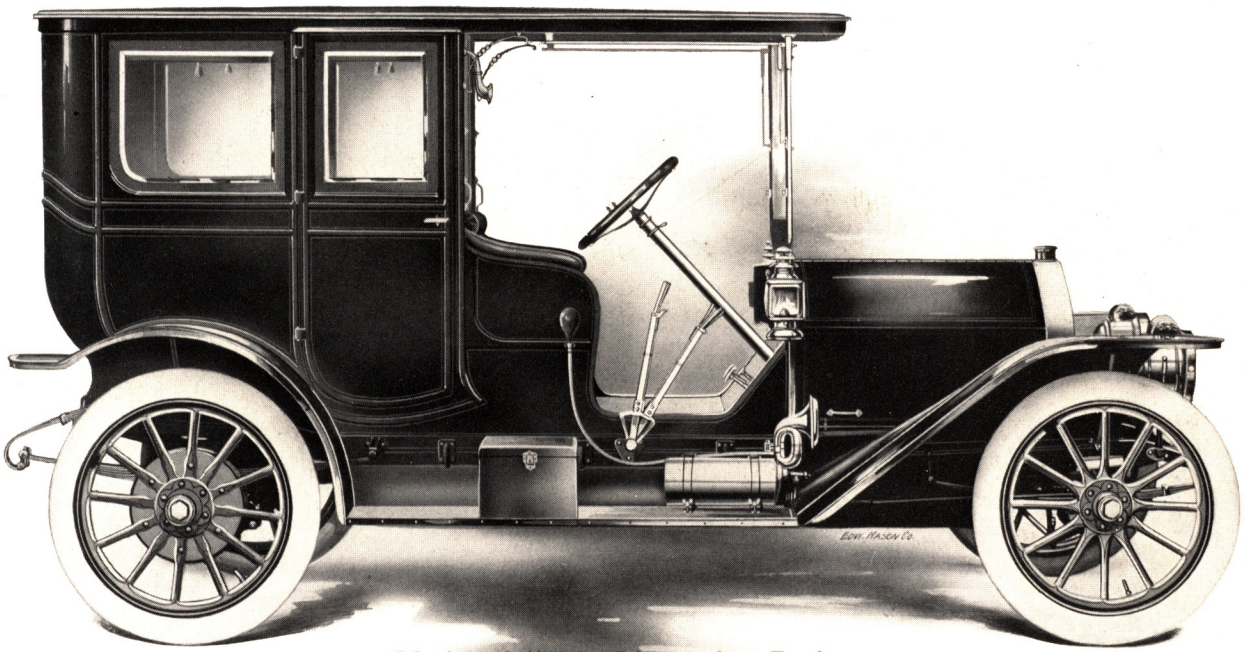
National "40" Front and Rear of Touring Body



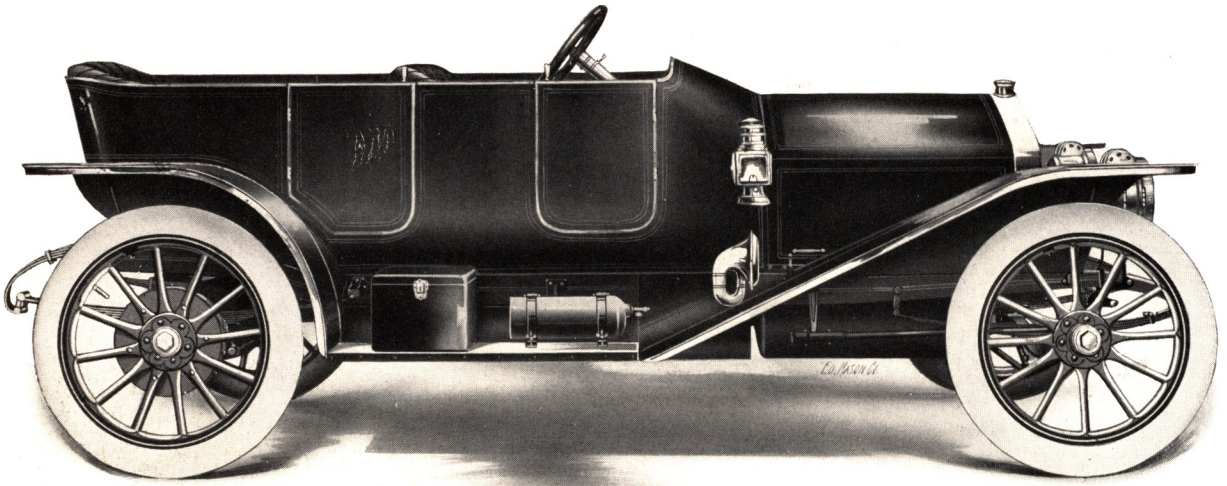
National "40" Toy Tonneau Body
Price $2,500



National "40" Speedway Roadster
Price $2,500



National "40" Limousine Body
Price $3,750



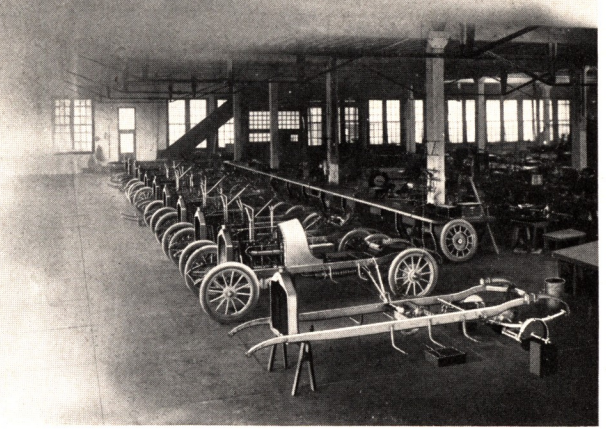
National "40" Torpedo Type Body
Price $2,800

National Construction

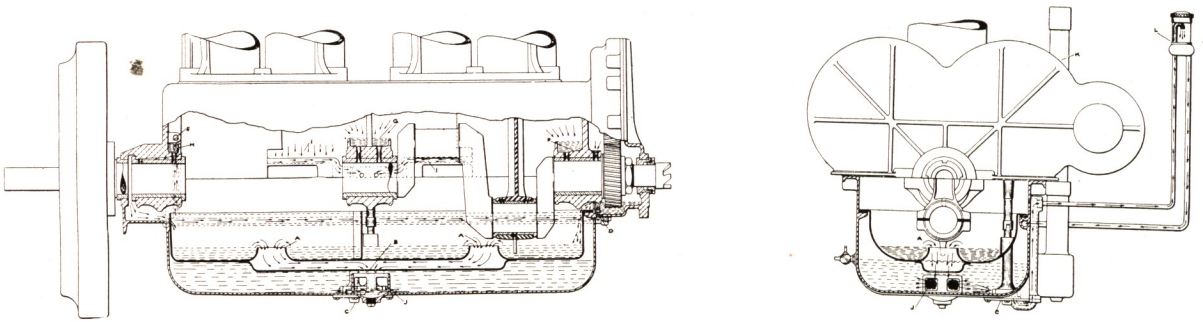
TO build one or two special cars for racing purposes is one thing; to build five hundred cars, any one of which is capable of withstanding the fierce strain of speed around seventy miles per hour is quite another proposition. It involves not only absolutely correct design and the best of materials obtainable, but an organization of high priced mechanics, giving the most careful individual attention to the shaping and fitting of every part. We know of no other manufacturing organization in which the human element of experience, intelligence and conscientious care is more of a factor than in the National shops.

Motor

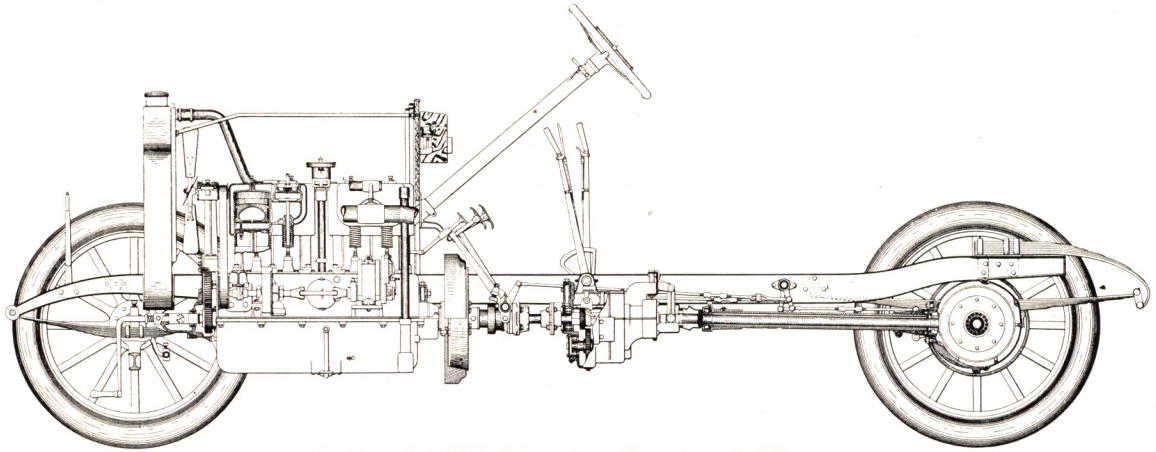
National motors are of the four-cycle, high compression type, water cooled, cylinders in pairs with water jackets integrally cast, mounted on the upper half of the aluminum crank case. The cylinders are of a special mixture of iron of very high tensile strength. After the first machining both cylinders and pistons are thoroughly annealed, thus producing a closer grain, and relieving the metal of all strain, after which they are finished and ground to a perfect fit. Nickel steel admission and exhaust valves of extremely large diameters are located on opposite sides of the cylinders, and are operated by separate cam shafts. Each cam shaft can be removed without disturbing the crank case, and the cams, being of exceptionally large dimensions, are not susceptible to wear. The valve lifters have an unusual amount of wearing surface, and are adjustable to wear. National valve action is never noisy.



The wide-faced spiral gears operating the cam shafts are encased in a separate compartment accessibly located in the front end of the crank case. Specially selected steel is used in the crank shaft, and all its bearing surfaces are accurately ground to within one-thousandth of an inch, and



National Oiling System



National "40" Chassis Sectional View

run in Parson's white bronze bearings of ample proportions. The lower half of the crank case can be removed without disturbing the crank shaft or its bearings. Tapered and ground nipples are used in attaching the admission, exhaust and water pipes, thus eliminating the troubles due to packing. The removal of the yokes on each side of the engine detaches the admission, exhaust and water systems as desired.

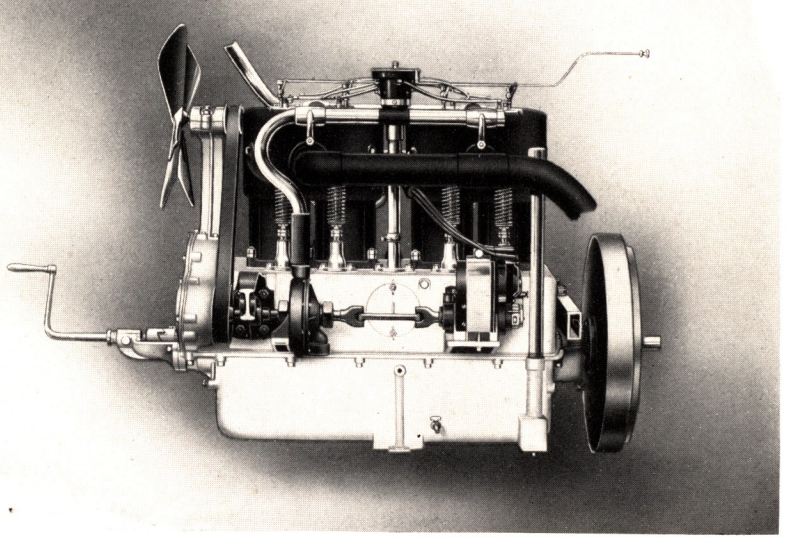
The valve caps over both the intake and exhaust have a tapered seat, and ground in. They are held in place by bronze threaded rings, thus avoiding troublesome leaks and loss of compression. Each cylinder is equipped with relief, drain and priming cocks.

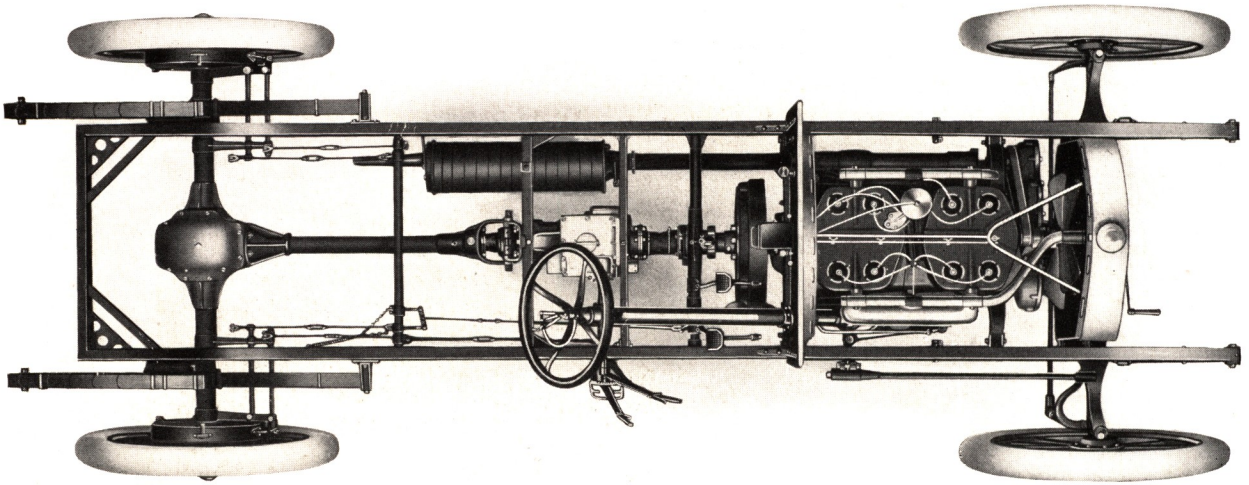
The pistons are fitted with exceptionally large, hardened hollow wrist pins and have four compression rings, each of which is carefully ground on three sides. The exhaust pipe is so constructed as to eliminate all trouble from expansion and contraction due to its changes in temperature. To dispense with troublesome key-ways, the fly-wheel is bolted to a flange on the crank shaft.

Lubrication

The National oiling system is thoroughly efficient and automatic, requiring no attention. The oil-tight aluminum crank case is partitioned into compartments, effectually preventing an excess accumulation of oil at one end of the case in ascending or descending a steep grade.

The bottom of the crank case is a separate compartment holding several gallons of lubricating oil which is forced into the various compartments of the



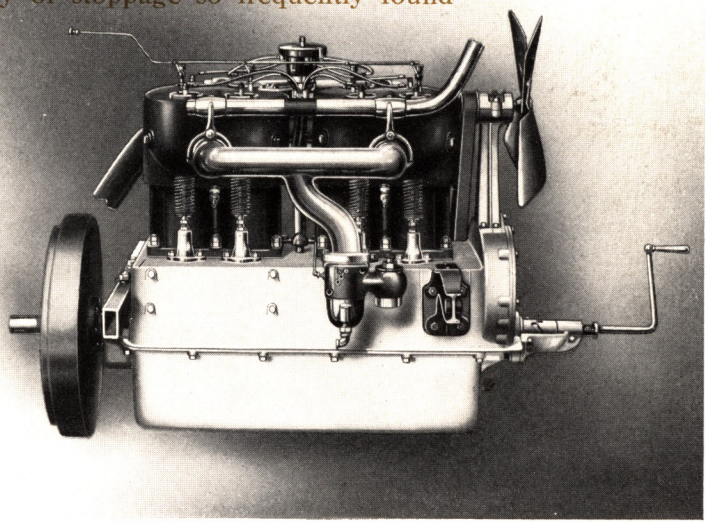


National "40" Plan View of Chassis

crank case proper by a gear pump driven off the lower end of the distributor shaft. The pump, being let into the bottom of the crank case where it is readily accessible, forms an integral part of the case and eliminates all possibility of leaks. The large flow of oil from the pump is forced through a sight feed on the dash, a portion of it going through the gears in the motor, keeping them flooded with oil. The remainder of the oil flows to the main bearings and to the various compartments of the motor, where vertical stand pipes in the center of each compartment maintain a constant oil level in the crank case proper, regardless of the grade or road conditions and carry the surplus oil back to the reservoir at the bottom of the case.

Deep pockets in each compartment catch all sediment in the oil and prevent its return to the reservoir. Long spoons on the end of each connecting rod produce an oil spray which lubricates the cylinders and all bearings, and in fact penetrates all working parts of the motor.

This system of lubrication is self-contained, absolutely automatic, requiring no adjustment, and eliminates all possibility of stoppage so frequently found where numerous small pipe leads are used.



Ignition

The double system of jump spark ignition is used with two separate sets of spark plugs. Bosch high-tension, gear-driven magneto is used for operating the car, and the auxiliary system consists of storage battery with single vibrator coil and distributor. The operator can use either or both of these systems at will. The wiring in each system is thoroughly insulated and protected. The spark plugs are located in the valve caps in the cylinder heads,

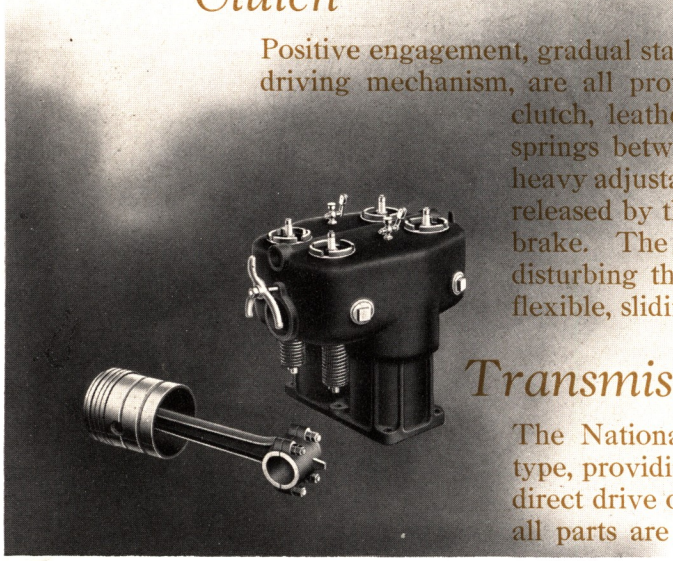
where they are least susceptible to fouling, one set being placed over the admission, and the other set over the exhaust valves. The storage battery is carried in a water tight metal case, located on the running board on the right side of the car where it can easily be examined or removed.

Cooling System

Unusual cooling efficiency is insured by the immense radiating surface of the new National straight line radiator and by a powerful air current from a large ball-bearing fan equipped with eccentric belt tightener. The water pump is shaft-driven, insuring constant water circulation, and is located on the left side on the motor in a remarkably accessible position. The lines of the radiator give the front of the National a very graceful appearance.

Clutch

Positive engagement, gradual starts, and the elimination of sudden shocks to the driving mechanism, are all provided for in a self-contained aluminum cone clutch, leather faced and spring cushioned, with eight flat springs between the leather and the face of the clutch. A heavy adjustable spiral spring keeps the clutch engaged until released by the clutch pedal or by the application of the foot brake. The clutch may be removed from the car without disturbing the transmission, due to the arrangement of the flexible, sliding, double universal clutch coupling.



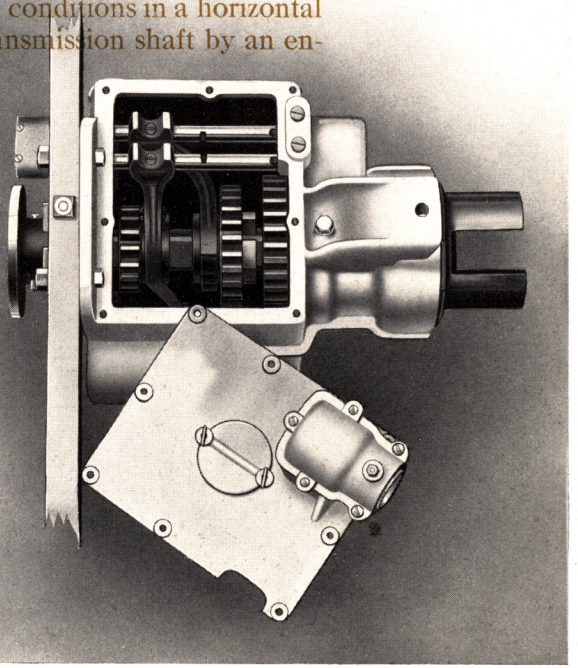
Transmission

The National transmission is of the selective sliding gear type, providing three speeds forward and one reverse, with direct drive on high speed. The entire transmission, though all parts are completely enclosed and dust proof, is readily

accessible through the floor of the car, and by lifting the inspection plate, the shafts, gears and bearings of the transmission are easily removed without disturbing the case. The main shaft and countershaft are in the same vertical plane, the former mounted on three and the latter on two large annular ball-bearings. The gears are submerged in oil or hard grease. By case-hardening the tooth edge to a sufficient depth and maintaining a soft core, the National gears are given both the elasticity to protect against breakage and a hard surface to resist wear on the teeth.

Driving Shaft

The National driving shaft is maintained under normal conditions in a horizontal line. The driving shaft is connected to the main transmission shaft by an enclosed, sliding universal joint, which is automatically lubricated from the transmission case. The strain at this point is relieved by a special swivel device bolted to the center cross member of the main frame, and supporting the universal joint, the driving shaft and the heavy seamless tube in which the shaft is enclosed. Within this tube, which is rigidly attached to the gear case on the rear axle, and which is free to turn in the swivel sleeve at the front end, the driving shaft revolves on two adjustable roller bearings, one at the forward end of the tube and one at the rear end inside the gear case. At the end of the driving shaft a four-pitch, nickel steel bevel pinion engages the the large driving gear, and is readily accessible through the opening in the top of the gear case. A door in the floor of the tonneau gives easy access to the universal joint.



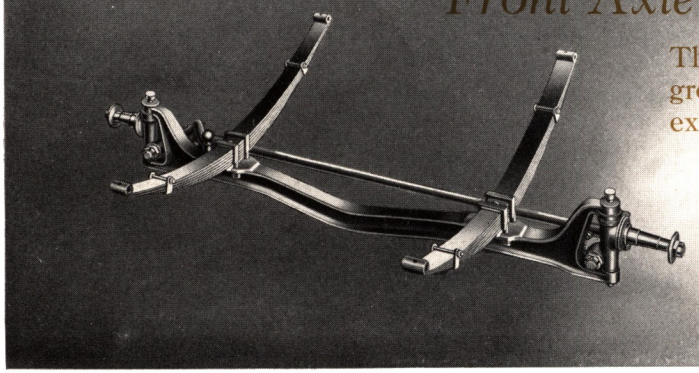
Rear Axle

The strength, rigidity, accessibility and the protection against undue friction provided in the National rear system, are points of strong and convincing appeal to those who have endured conventional rear axle troubles. The upper part of the gear case is removable, leaving a large opening through which the complete differential with the driving gear attached to it, may easily be adjusted or even lifted out without removing the propeller shaft or taking off the rear wheels. The differential is separately mounted on two large adjustable roller bearings inside the gear case, each fitted with a cap, held in place by two studs, the removal of which permits the removal of the differential and gears from the gear case,

The outer axle, of large diameter, is of cold drawn seamless steel tubing, attached to the gear case and extending through the rear wheels to the outer edges of the hubs. The wheels therefore revolve on the outer axle, on double adjustable roller bearings, removing all weight from the live inner driving axles, which extend from the differential to the hubs.

The inner axles are squared at the end, fit into squared holes in the differential and engage the outer edge of the hubs by dog clutches. The dust caps, when screwed to the hubs, hold the dog clutches securely in place, and make the bearings of the rear wheels oil-tight and dust-proof.

Front Axle and Steering



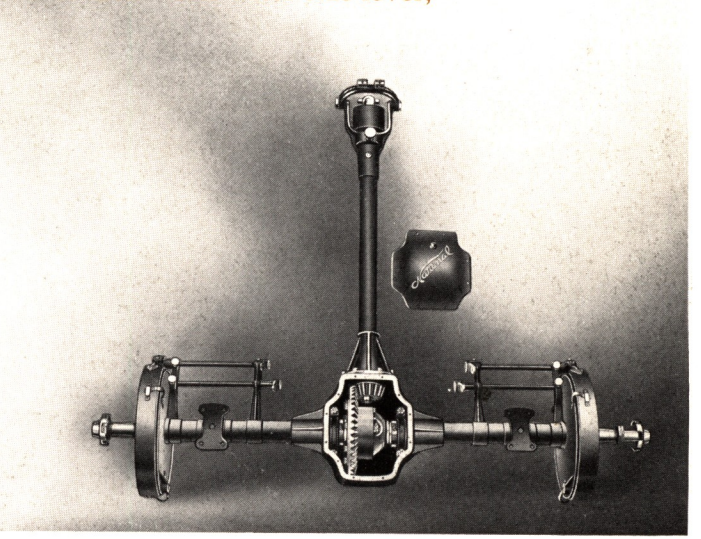
The front axle is an I-beam drop forging of great strength and rigidity, and is fitted with extra heavy forged steering knuckles and deep drop yokes. The knuckles are secured to the yokes by large steel bolts, which pass through hardened and ground steel bushings, which effectually prevents wear.

The steering knuckles are connected by an adjustable connecting rod in the rear of the axle. Each spindle of the front wheels

is equipped with two large adjustable roller bearings. The fore and aft steering is controlled by means of an inclined steering post fitted with steering chuck of the adjustable gear and sector type. The improved steering chuck and the large hand wheel combine to make the National a remarkably easy steering car.

Control

The National control is justly famed for its sensitiveness and simplicity. While running on direct drive, the speed of the car may be accelerated to any pace desired between the minimum and the maximum, by the merest pressure of the foot on a spring throttle pedal. Conveniently located on top of the steering wheel are two levers, one for setting the foot throttle for any desired minimum of speed, and the other for controlling both ignition systems. A small lever just under the steering wheel controls the air supply to the engine, admitting of a change in the mixture when more power is required. Pulling the inner side lever at the driver's right applies one set of hub brakes. The outer side lever, working in an "H" slot shifts the transmission gears, a neutral position being obtained when the lever stands in a vertical position. The left foot pedal applies and disengages the clutch. The right foot pedal operates the auxiliary brake and simultaneously releases the clutch.



Brakes

The vital question of brakes is amply provided for by the use of a double system of exceptional efficiency, consisting of four powerful, dust-proof brakes. Two are enclosed internal expanding metal to metal, and two are external contracting fabric to metal, both sets engaging fifteen-inch pressed steel drums on

the rear wheels. Two brakes are operated by a hand lever conveniently located at the driver's right, while the other two are operated by a footpush pedal.

Frame

The frame is made of deep channel section cold pressed steel with wide flanges, is tapered at each end and securely riveted together, and the corners reinforced by steel gusset plates.

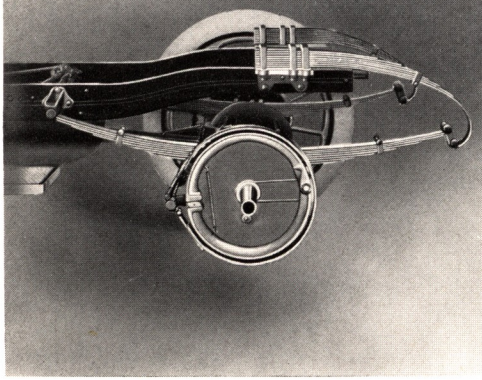
The exceptional length of the frame arms in front permits the front axle to be set well ahead of the radiator and suspends the load between the axle.

The frame is raised over the rear axle, thus lowering the car without changing the road clearance and eliminating the possibility of bumping the axle on extremely bad roads, and at the same time permits the transmission of power from the motor to the bevel gears; through the driving shaft in a horizontal line.

Springs

Supreme comfort is secured to the National's passengers by use of long, wide, flexible, three-quarter elliptic scroll springs, of the best steel alloy, in the rear and semi-elliptic springs in front.

Bodies



The new sheet metal National toy and touring car bodies, arranged with individual front seats and roomy side entrance tonneau, present a most distinguished appearance with their graceful "straight line" design and superb finish. The tonneau entrances are unusually wide, the doors swinging to the rear. The tonneau is provided with a coat rail, an adjustable foot rest, and convenient pockets in the upholstering. The tonneau of the toy body is detachable, leaving a straight platform effect when removed.

The torpedo body, also of sheet metal, is arranged with all levers on the inside which together with its straight lines from front to rear, give it a very stylish appearance.

The Speedway roadster body of sheet metal, is patterned after the bodies used on National stock cars so successfully in speed contests, and with the slight angle of the steering post and the comfortable inclined seats, makes a most desirable and attractive body for a speed car.

The National "40" Specifications

Motor—Four-cylinder, 5 x 5 11-16 inches vertical, cast in pairs, mounted on main frame, extra large mechanical valves, exhaust and admission on opposite sides and interchangeable. Two separate sets of spark plugs. Tapered nipples used on intake, exhaust and water pipes in place of packing. Extra long Parson's white bronze bearings. Gear-driven distributor. Divided aluminum crank case. Interchangeable parts.

Clutch—Self-contained aluminum cone, leather faced, spring cushioned.

Transmission—Sliding gear selective type. Three speeds forward and one reverse; direct on high. Self-contained annular type ball bearing on main and countershafts. Gears run in oil.

Wheel Base—124 inches.

Gauge—56½ inches.

Drive—Bevel gear. Through propeller shaft and flexible joint to rear axle of improved design.

Oiling—Crank case, constant level force feed oiler, oiling all working parts of motor. Capacity, four gallons. The Roadster has an auxiliary oil tank on rear deck containing seven gallons. Pressure feed to crank case.

Ignition—Two separate complete systems. One a gear-driven high tension Bosch magneto. The other a storage battery, single coil and distributor. Each system has a separate set of spark plugs.

Tires—36 x 4. Diamond, G & J, Michelin or Firestone. 36 x 4½ or 34 x 4½ wheels and tires options at extra cost.

Dust Protection—Detachable metal dust pans protect all working parts.

Guards—Continuous enclosed metal guards, front and rear. Metal dust shield between frame and running board.

Feed—Touring cars, toy tonneaus and torpedo, gravity; roadsters, pressure.

Gasoline Capacity—Touring, toy and torpedo, twenty gallons; roadster, thirty gallons.

Brakes—Two systems. Two internal expanding metal to metal hub brakes operated by foot pedal, and two brakes on outside of rear wheel drums operated by hand lever.

Frame—Pressed steel, 4½-inch channel section firmly riveted and braced and curved up over rear axle. No sub-frame.

Front Axle—I-beam steel one-piece forging.

Rear Axle—Compound construction; inner axle used only as a driver; wheels turn upon double bearings on hollow axle which carries all weight.

Body—Straight line, sheet metal, side entrances. Divided front seats. Carrying capacity—touring car, five passengers; toy tonneau, four passengers; torpedo body, four passengers; speedway roadster, two passengers.

Finish—National red, National green or National blue for body and gears.

Upholstering—Luxuriously upholstered in either dull or shiny black long grain leather. Special spring mattress cushions.

Steering System—Eighteen-inch handwheel, inclined post. Worm and gear, non-reversible chuck. Ball joint connection to steering knuckle.

Cooling System—Special straight line cooler, ball-bearing fan attached to engine base. Circulation by centrifugal pump.

Control—Single lever at driver's right controls all speeds. Three forward and one reverse. Torpedo control levers inside of body.

Springs—Half elliptic, 40-inch front; 48-inch rear, three-quarter scroll elliptic.

Tool Boxes—Under tonneau seat and metal box on running board.

Equipment—Two eight-inch Gray & Davis gas lights with Prest-O-Lite tank; side and tail oil lamps; horn, tools, jack; can Harris Medium oil.

National Racing Victories

During the last racing season—1909—National cars made a remarkable record of victories in track races and hill climbs. They won thirty-four firsts, nineteen seconds, twelve thirds and six fourths, a total of seventy-one. Incidentally they broke a good many track records.

Fort George Hill Climb, April 26, 1909

National 60 First (Aitken)	34 2-5 sec	6-cyl. cars $4,000 or over
National 60 Third	33 3-5 sec	Free-for all
National 35 Second	42 3-5 sec.	4-cyl. cars $3,001 to $4,000
National 35 Third	42 1-5 sec.	4-cyl. cars $2,001 to $3,000

Jamaica Time Trials, Jamaica, L. I., April 27, 1909

National 60 First (Merz)	48 3-5 sec	1 mile 6-cyl. cars $4,000 or over
National 60 First (Merz)	1:42	2 mile 6-cyl. cars $4,000 or over
National 60 Fourth (Merz)	44 sec	1 mile Free-for-all

Wilkesbarre Hill Climb, Wilkesbarre, Pa., May 31, 1909

National 60 First (Merz)	1:48	6-cyl. cars $3,000 or over
National 60 Second (Merz)	1:47 3-5 sec	Stock chassis 451 to 600
National 35 Second (Aitken)	2:03 4-5 sec	Stock chassis 301 to 450
National 60 Fourth (Merz)	1:48 4-5 sec.	Invitation race

Louisville Races, Louisville, Ky., June 9, 1909

National 60 First	10:50 3-5 sec	10-mile Free-for-all
National 35 Second (Aitken)		5-mile Invitation

Columbus, Ohio Races, Columbus, Ohio, July 3, 1909

National 35 First	11:29	10-mile Ohio State Championship

Ft. Wayne Races, Ft. Wayne, Ind., July 31, 1909

National 35 First (Merz)	5:38	5-mile Free-for-all
National 60 Second (Aitken)..		5-mile Free-for-all
National 60 First (Aitken)	5:15	5-mile Match Race
National 35 Second (Merz)		5-mile Handicap
National 60 First (Aitken)	55 4-5 sec	1-mile Time Trials

Lexington Races, Lexington, Ky., Aug. 9, 1909

National 40 First (Kincaid)	5:16	5-mile 301 to 450 class
National 35 Third (Merz)	6:07	5-mile 301 to 450 class
National 40 First (Kincaid)	10:55	10-mile Handicap
National 35 Second (Merz)		10-mile Handicap
National 60 Third (Aitken)		10-mile Handicap
National 60 First (Aitken)..	53:28 2-5 sec	50-mile Free-for-all

Indianapolis Motor Speedway, Indianapolis, Ind., Aug. 19-21, 1909

National 40 First (Merz)	9:16 3-10 sec	10-mile Stripped 301 to 450
National 60 Third (Aitken)	8:36 2-10 sec	10-mile Free-for-all Handicap
National 40 Third (Merz)	4:57 7-1 sec	250-mile Prest-O-Lite Trophy
National 40 Fourth (Kincaid)		250-mile Prest-O-Lite Trophy

National 60 First (Aitken)	9:26 6-10 sec	10-mile Stripped 451 to 600
National 40 Fourth (Kincaid)		10-mile Stripped 451 to 600
National 60 Second (Aitken)	8:32 6-10 sec	10-mile Free-for-all
National 60 First (Aitken)	4:25 flat	5-mile Handicap
National 40 Second (Merz)	4:25	5-mile Handicap
National 40 First (Kincaid)	14:23 5-10 sec.	15-mile Free-for-all Handicap

In the Wheeler-Schebler Trophy race, the National 60 (Aitken) made new American track records for all distances from 30 to 100 miles, as follows:

25 miles	21:27.6	75 miles	1:09 34.6
50 miles	44:21.2	100 miles	1:31 41.9

Taggart's Terror Hill Climb, French Lick, Ind., October 20, 1909

National 40 First (Fisher)	31 4-5 sec	301 to 450 cubic inches
National 40 First (Kincaid)	30 sec	Free-for-all

Atlanta Automobile Speedway, Atlanta, Ga., November 9-13, 1909

National 40 First (Aitken)	8:27 22	10-mile stock chassis 451 to 600
National 40 Second (Kincaid)	8:27.71	10-mile stock chassis 451 to 600
National 60 Third (Aitken)	8:02.41	10-mile Free-for-all Handicap
National 40 Fourth (Kincaid)	8:28.03	10-mile Free-for-all Handicap
National 60 Third (Aitken)	1:43.72	2-mile Free-for-all
National 60 Third (Aitken)	3:10.41	4-mile Free-for-all
National 40 First (Aitken)	16:42.76	20-mile stock 301 to 450
National 40 Second (Aitken)	8:22.87	10-mile stock 451 to 600
National 40 Second (Aitken)	8:50.25	10-mile Free-for-all Handicap
National 40 Fourth (Kincaid)		20-mile Free-for-all Handicap
National 40 First (Aitken)	10:07.65	12-mile stock 301 to 450
National 40 Second (Aitken)	5:11.11	6-mile stock 451 to 600
National 40 Second (Aitken)	43:11.41	50-mile Free-for-all
National 40 First (Aitken)	6:42.73	8-mile Free-for-all Handicap

New Orleans Races, New Orleans, La., November 20 and 21, 1909

National 40 First (Aitken)	5:25 2-5	5-mile Free-for-all
National 40 Second (Aitken)		10-mile Handicap
National 40 Third (Aitken)		10-mile Handicap
National 40 First (Wilcox)	5:30	5-mile Southern Championship
National 40 Second (Aitken)		20 miles

Ossining Hill Climb, Ossining, N. Y., November 27, 1909

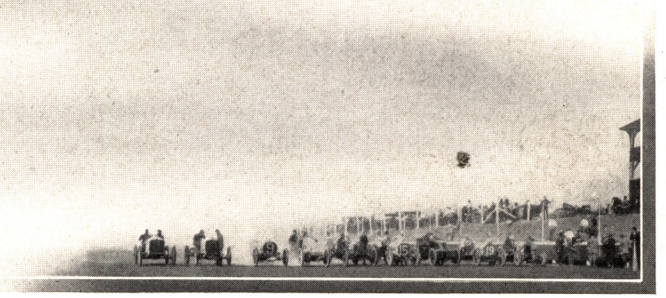
National 40 First (Kincaid)	1:03	Class C $2,001 to $3,000
National 40 First (Kincaid)	1:03	Class E stripped chassis
National 40 First (Kincaid)	1:03 3-5	Class F Free-for-all

Edgewater-Ft. Lee Hill Climb, Ft. Lee, N. J., December 4th and 10th, 1909

National 40 First (Kincaid)	56:57	Stock cars $2,001 to $3,000
National 35 Third (Hermance)	1:08 97-100	Stock cars $2,001 to $3,000
National 40 First (Kincaid)	55 sec	Stock chassis 301 to 450
National 35 Third (Hermance)	59 4-5 sec	Stock chassis 301 to 450

Indianapolis Motor Speedway, Indianapolis, Ind., December 17, 1909. Speed Trials

National 40 First (Aitkin)	49.20 sec	1 mile 301 to 450 class
National 40 Second (Kincaid)	50.00 sec	1 mile 301 to 450 class
National 40 First (Kincaid)	4:04.73	5-mile 301 to 450 class
National 40 Second (Aitkin)	4:06.56	5-mile 301 to 450 class
National 40 First (Kincaid)	8:10.61	10-mile 301 to 450 class
National 40 Second (Aitken)	8:12.10	10-mile 301 to 450 class
National 40 First (Aitken)	12:17.01	15-mile 301 to 450 class
National 40 First (Aitken)	16:18.41	20-mile 301 to 450 class



Warranty

WE WARRANT all motor vehicles manufactured by us (except tires, ignition apparatus and trade accessories, such as lamps, gas generators, speedometers, tools, etc.) against defects in materials and workmanship for six months from date of shipment from our factory. Should any part so warranted be found defective in materials or workmanship within said period, our entire liability of any kind is limited to making good said part at our factory, without additional compensation, provided that the purchaser shall send us the part alleged to be defective, carrier's charges prepaid.

We reserve the right to disclaim responsibility in connection with any motor vehicle manufactured by us if it has been altered or repaired outside of our factory, and we assume no responsibility whatever for repairs, replacements or other damages occasioned by misuse, negligence or accidents.

We do not make or authorize any warranty beyond that expressed above.