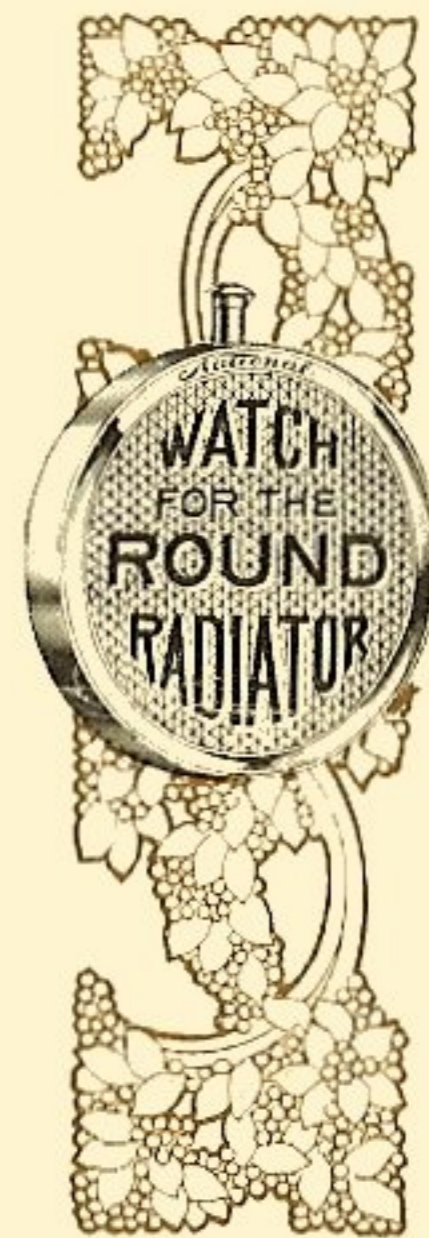
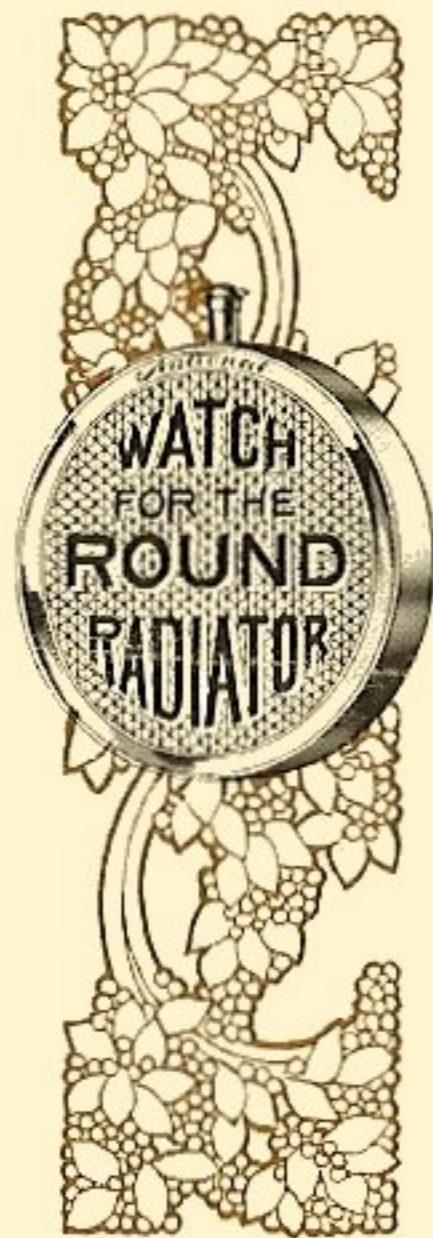


National



National

MOTOR CARS



NATIONAL MOTOR VEHICLE CO.

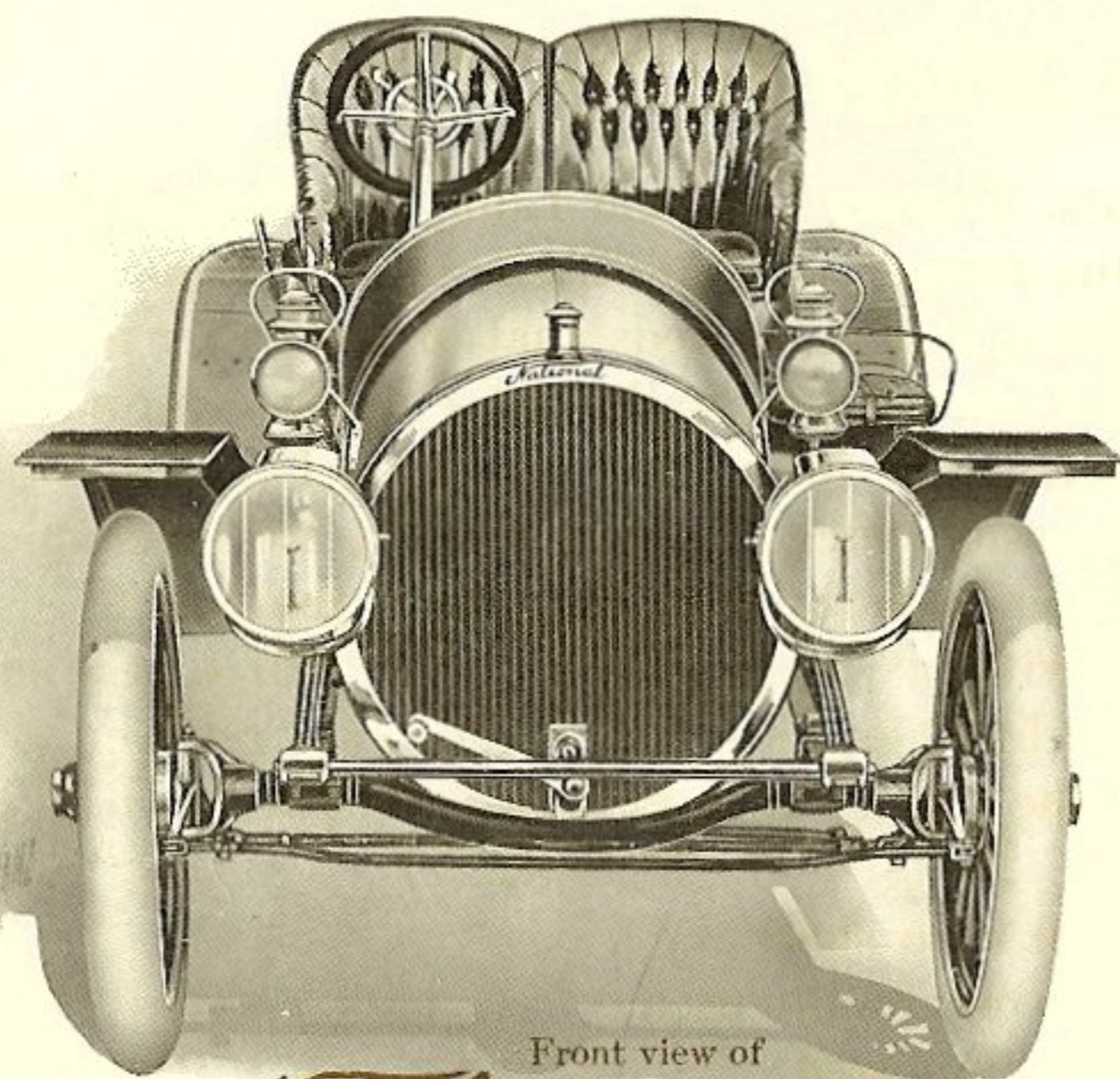
INDIANAPOLIS, IND., U. S. A.

General Offices and Main Factory: E. 22d St. and Monon R. R.

Factory No. 2: W. 23d St. and Belt R. R.

MEMBERS AMERICAN MOTOR CAR MANUFACTURERS ASSOCIATION, NEW YORK

Cable Address: "Automobile" Indianapolis, "A. B. C." Code, Fourth Edition,
Western Union Code.



National

Front view of
6-Cylinder Model L
Runabout

National

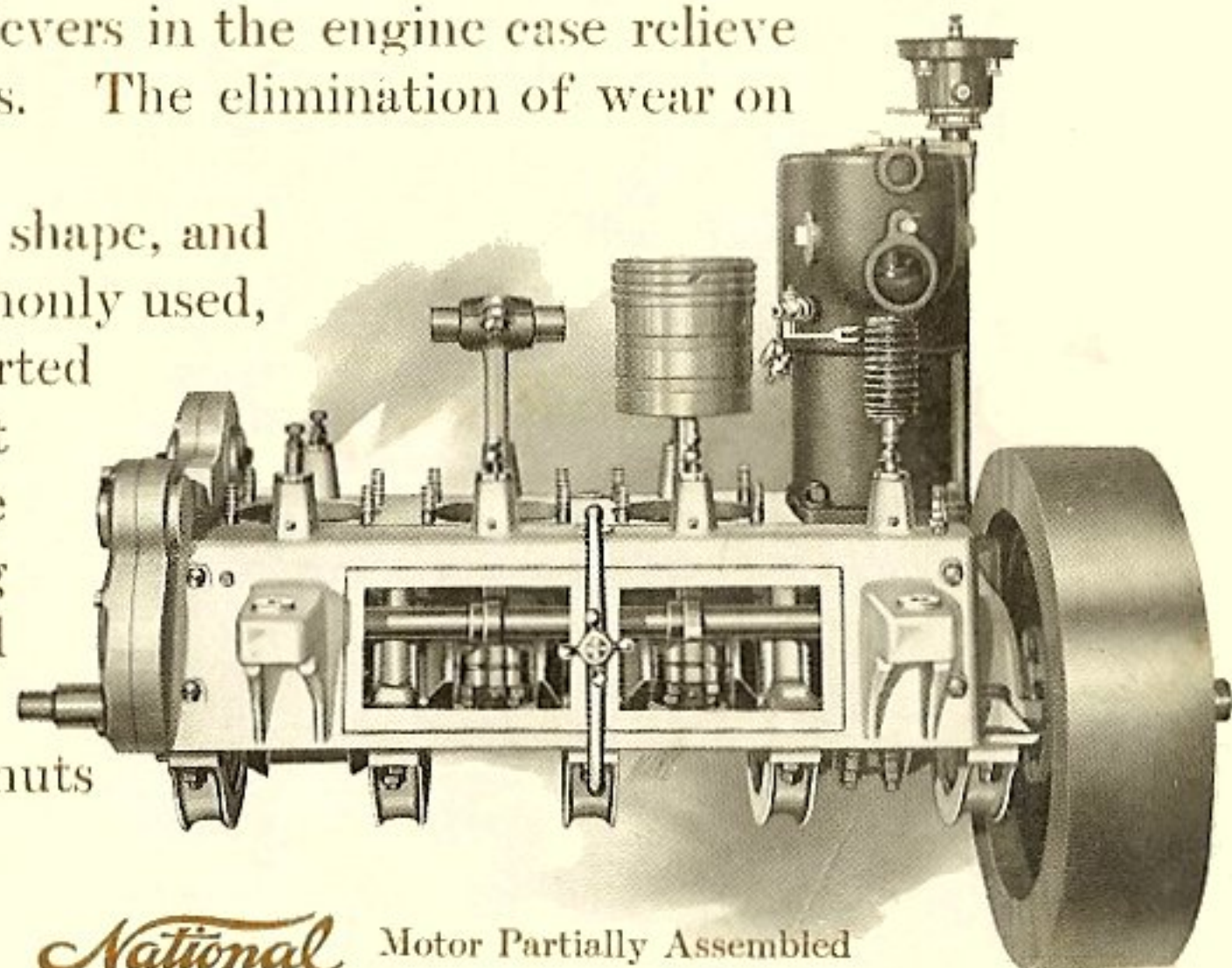
*Runabouts, Touring Cars and
Limousines, Models H and L*

are designed along the most approved lines of strictly high-grade American and foreign motor car construction, and combine comfort, luxury and accessibility. They will meet every requirement of the most exacting purchaser in speed, endurance, hill climbing, durability, cost of maintenance and comfort. They have wonderful power, are remarkably easy to control, and are practically noiseless, while their beautiful outline, superb finish, and many distinctive and meritorious features give them striking individuality.

National 4-Cylinder, Model H, 50 H. P.

Motor: The motors used in the Model H Runabouts, Touring Cars and Limousines are of the four cycle, high compression type, mounted on the pressed steel sub-frame under the hood in the front of the car. The ratio of power to the area of the cylinders exceeds that of any other motor on the market. They have four $4\frac{7}{8}$ x 5-inch vertical, water cooled, integrally cast cylinders, individually mounted on the upper half of the aluminum crank case. The interchangeable nickel steel admission and exhaust valves, each $1\frac{7}{8}$ inches in diameter, on opposite sides of the cylinders, are mechanically operated by two separate ball bearing cam shafts. Each cam shaft revolves inside of the engine case in three annular type ball bearings and can be removed without removing the lower half of the crank case. The valve lifters are adjustable to wear, and valve lifter levers in the engine case relieve them of all side thrust and strain due to the action of the cams. The elimination of wear on these parts insures silent running after long service.

The crank shaft is a steel bar, hammered and bent into shape, and consequently is much superior to the drop forged shafts so commonly used, or to those cut out of solid slabs. It revolves in five large imported D. W. F. annular ball bearings and has a ball thrust bearing at its forward end. Each bearing is held in place by a cap and the lower half of the crank case can be removed without disturbing the 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 four nuts



National Motor Partially Assembled

on each side of the engine releases the yokes and detaches admission, exhaust and water systems as desired.

After the first machining the cylinders and pistons are put in an oven and annealed to relieve the castings of all strain, after which they are finished and ground.

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

The oil tight aluminum crank case is partitioned into four compartments, effectually preventing an excess accumulation of oil at one end of the case in ascending or descending a steep grade.

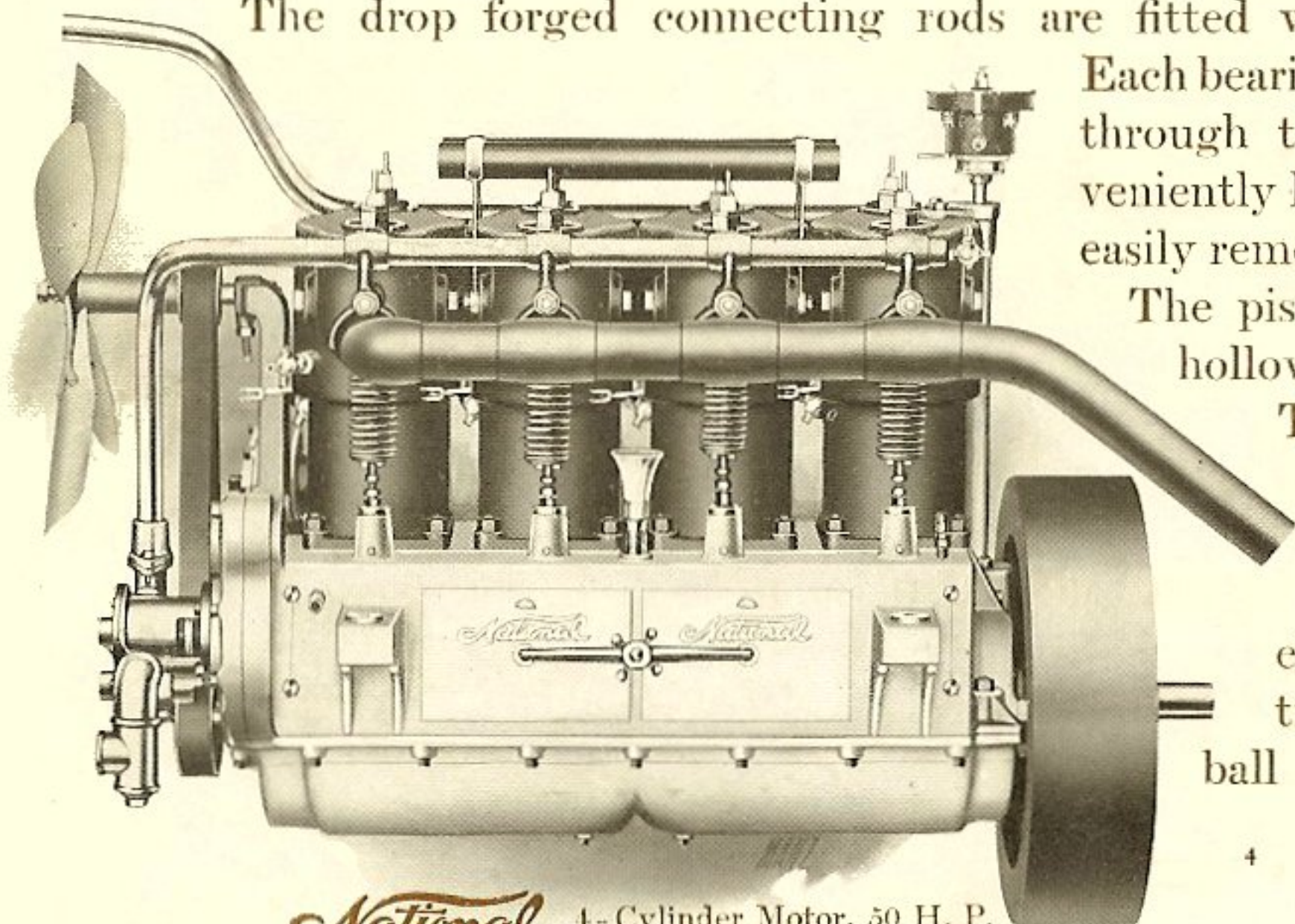
The drop forged connecting rods are fitted with Parsons white bronze adjustable bearings.

Each bearing is held by four studs, which are readily accessible through two inspection ports of liberal dimensions conveniently located in the side of the crank case, which may be easily removed by releasing a single hand wheel.

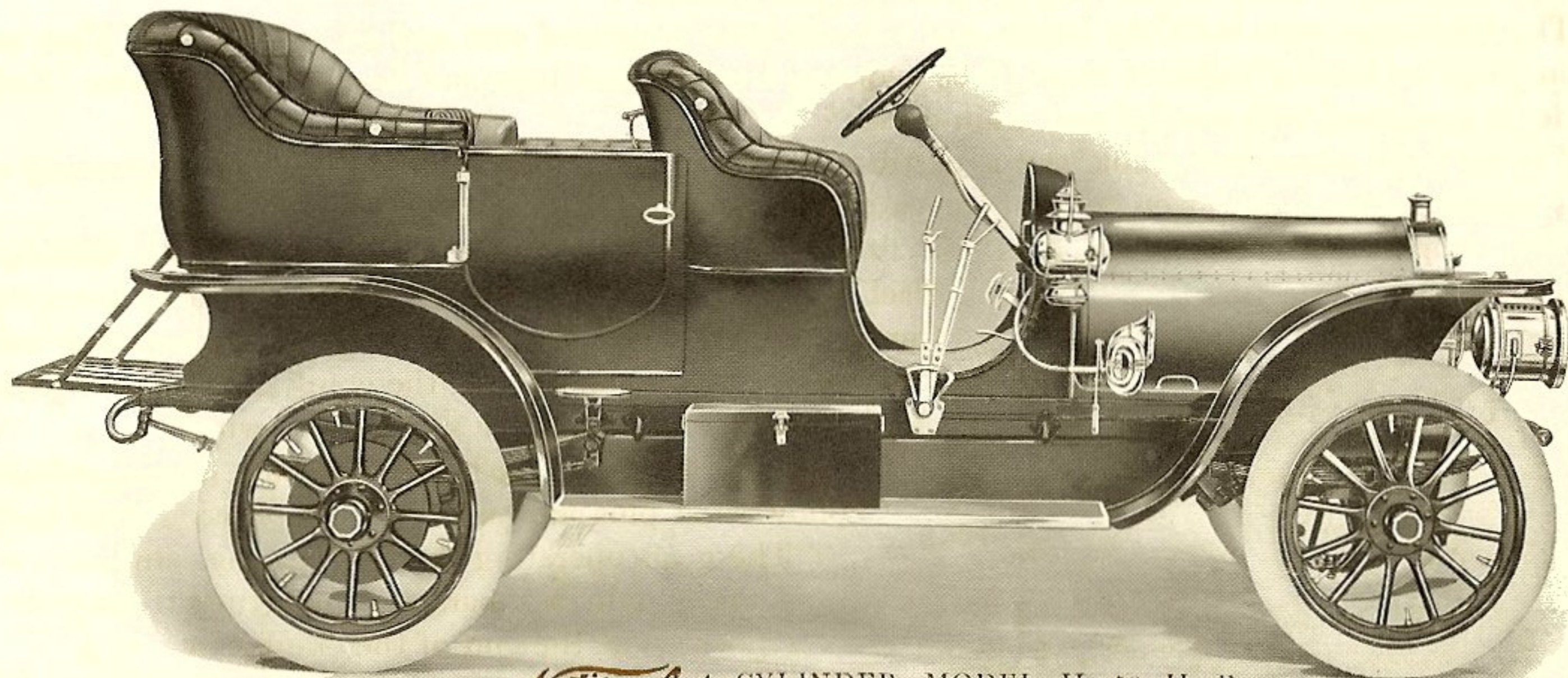
The pistons are fitted with exceptionally large, hardened hollow wrist pins and have four compression rings each.

The gears operating the ball bearing cam shafts are encased in a separate compartment, accessibly located at the end of the crank case.

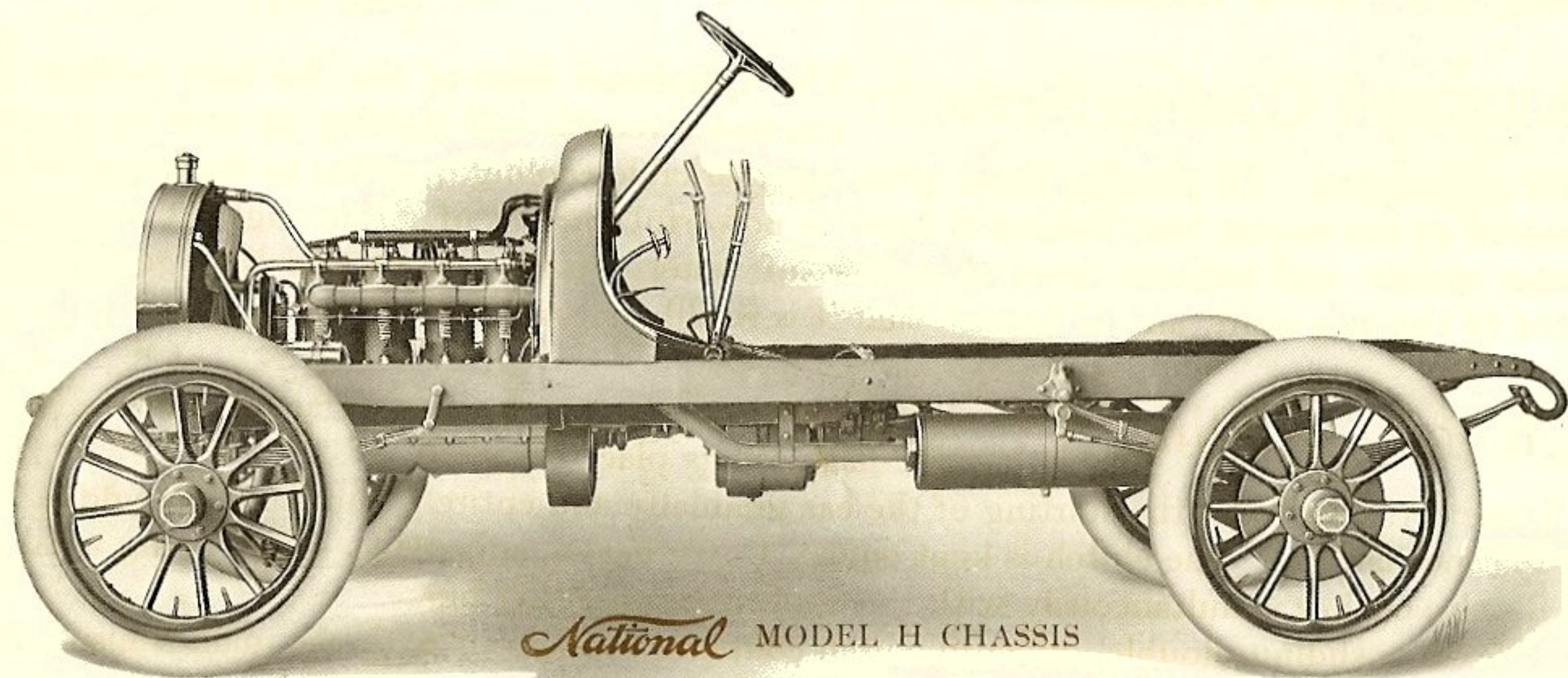
The exhaust pipe is so constructed as to eliminate all troubles from expansion and contraction due to its change in temperature. The use of ball bearings on the crank shaft and cam shafts



National 4-Cylinder Motor, 50 H. P.



National 4-CYLINDER, MODEL H, 50 H. P.



National MODEL H CHASSIS

materially increase the power by reducing friction. They require no adjustment, are very economical of oil, and allow of extremely long connecting rod bearings in a short motor.

To dispense with the troublesome key-ways the fly wheel is bolted to a flange on the crank shaft.

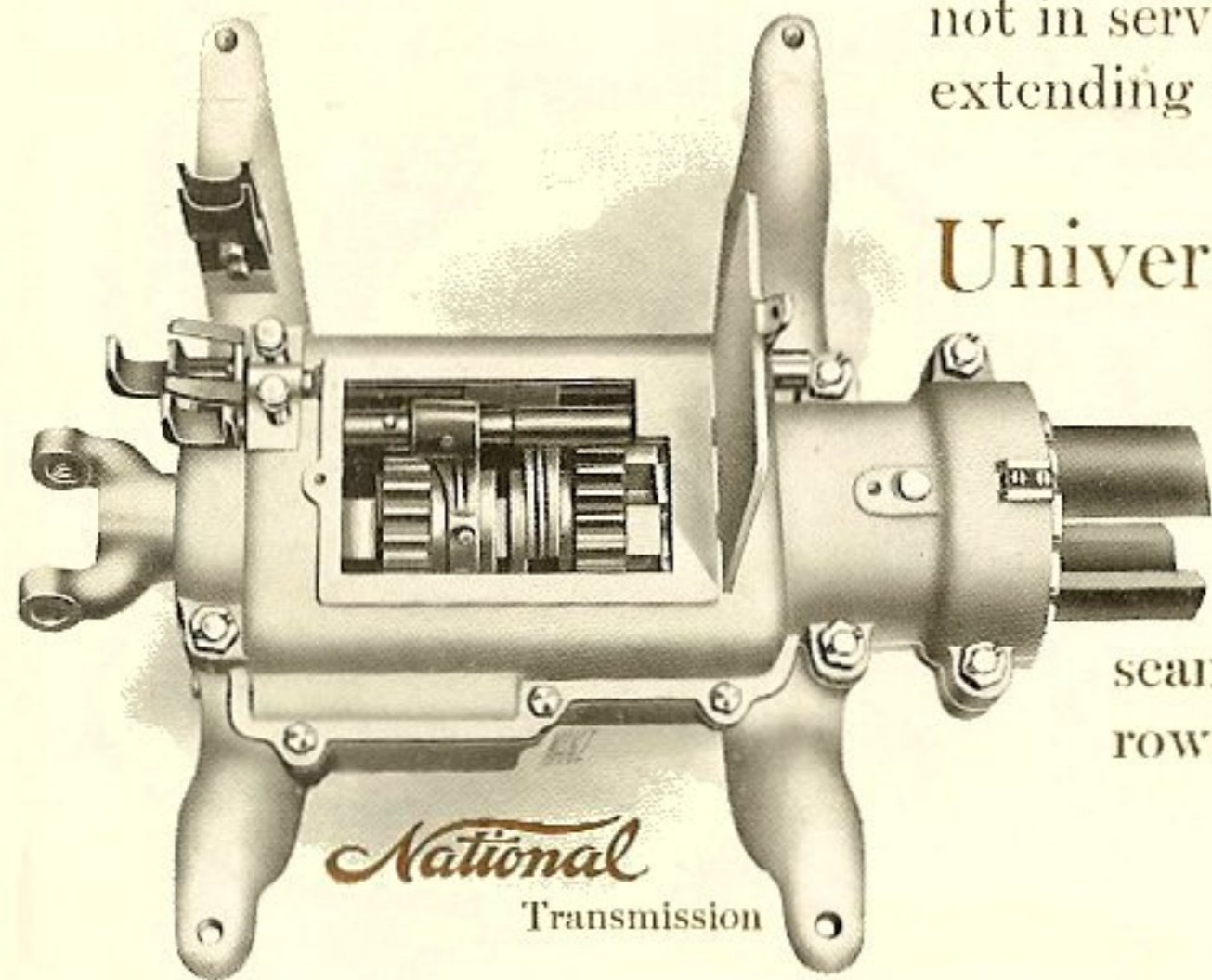
Radiator and Cooling System: The cylindrical form of the flat tube radiator gives it unusual strength and rigidity as well as a novel and attractive appearance. Its peculiar shape gives it remarkable cooling qualities as the large ball bearing fan mounted on the engine base behind it draws a powerful current of air throughout its entire area. The water system and radiator carry $6\frac{1}{2}$ gallons of water, which is circulated by a gear pump direct connected to the cam shaft, and so located that it is readily accessible.

Clutch and Coupling: The self-contained, aluminum, leather surfaced cone clutch is fitted with eight flat springs placed under the leather in recesses cut in its face. These springs permit the starting of the car gradually and entirely eliminate all sudden strain on the driving mechanism. The clutch is kept engaged by a heavy, adjustable, spiral spring until released by the clutch pedal or simultaneously with the application of either brake.

The flexible, sliding, double universal clutch coupling connects it with the main transmission shaft and permits of the removal of the clutch without disturbing the transmission.

Transmission: The transmission is of the selective, sliding gear type, with three speeds forward and one reverse, giving direct drive on high speed. The main and countershafts being in the same vertical plane, are each mounted on two large annular type non-adjustable ball bearings. The rear bearings on the main shaft are self-contained in a tubular cylinder and the whole enclosed in an oil tight aluminum case. The case is fitted with a large hinged inspection plate, accessible through the floor of the car and is so divided that the main and counter-shafts, with their gears and bearings, may be readily removed without detaching the case from the sub-frame to which it is bolted. The gears, which are of ample proportions and are submerged in oil or heavy grease, are made of high grade machine steel, case hardened to a sufficient depth to give a very hard exterior, while maintaining a soft core, thereby providing a hard wearing surface and eliminating the danger of breakage.

The double reduction reverse, which allows a very slow backward speed, remains disengaged when not in service. Each of the two sliding pinions is shifted by separate shafts extending from the front of the transmission case through packing boxes.



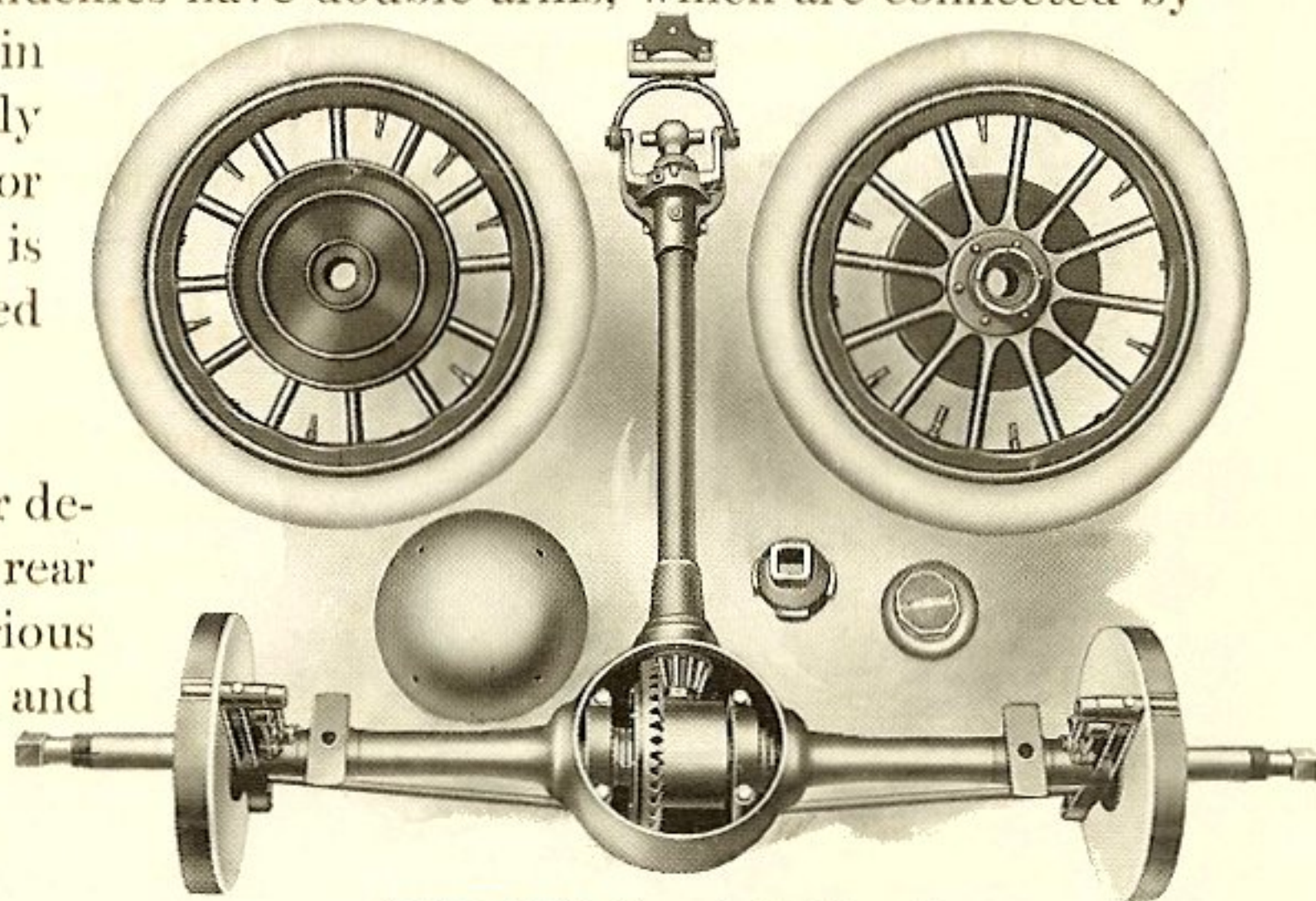
Universal Joint and Driving Shaft: An enclosed, sliding, universal joint connects the main transmission shaft and the driving shaft, transmitting power from the motor to the rear axle in nearly a horizontal line.

The driving or propeller shaft is enclosed in an extra heavy seamless tube brazed into the spherical gear case, and revolves on two rows of large annular type ball bearings; one bearing is inside of the

gear case, with a ball thrust bearing back of it, and the other at the forward end of the tube, where the shaft, tube and universal joint are supported by a special swivel device bolted to the center cross member of the main frame in such a way that all strain is relieved in traveling over rough roads. A four-pitch nickel steel bevel pinion fitted to the driving shaft, inside of the gear case, engages the large driving gear and is readily accessible through the opening in the top of the gear case.

Front Axle: The front axle, of heavy, seamless, cold drawn tubing, is fitted with extra heavy drop forged steering knuckles and yokes. The knuckles are secured to the yokes by 15-16 inch steel bolts, which pass entirely through both yoke and knuckle and are securely fastened by a nut and cotter pin at their lower ends. The steering knuckles have double arms, which are connected by two adjustable connecting rods, one in front and one in rear of the axle. These double connecting rods not only lend rigidity to the steering, but also add a large factor of safety to the operation of the car. The steering is controlled by means of an inclined steering post fitted with a non-reversible steering gear.

Rear Axle and Gear Case: The peculiar design of the rear system is one of the most attractive and meritorious features of the car. It not only affords great strength and rigidity, but places the driving gears and differential

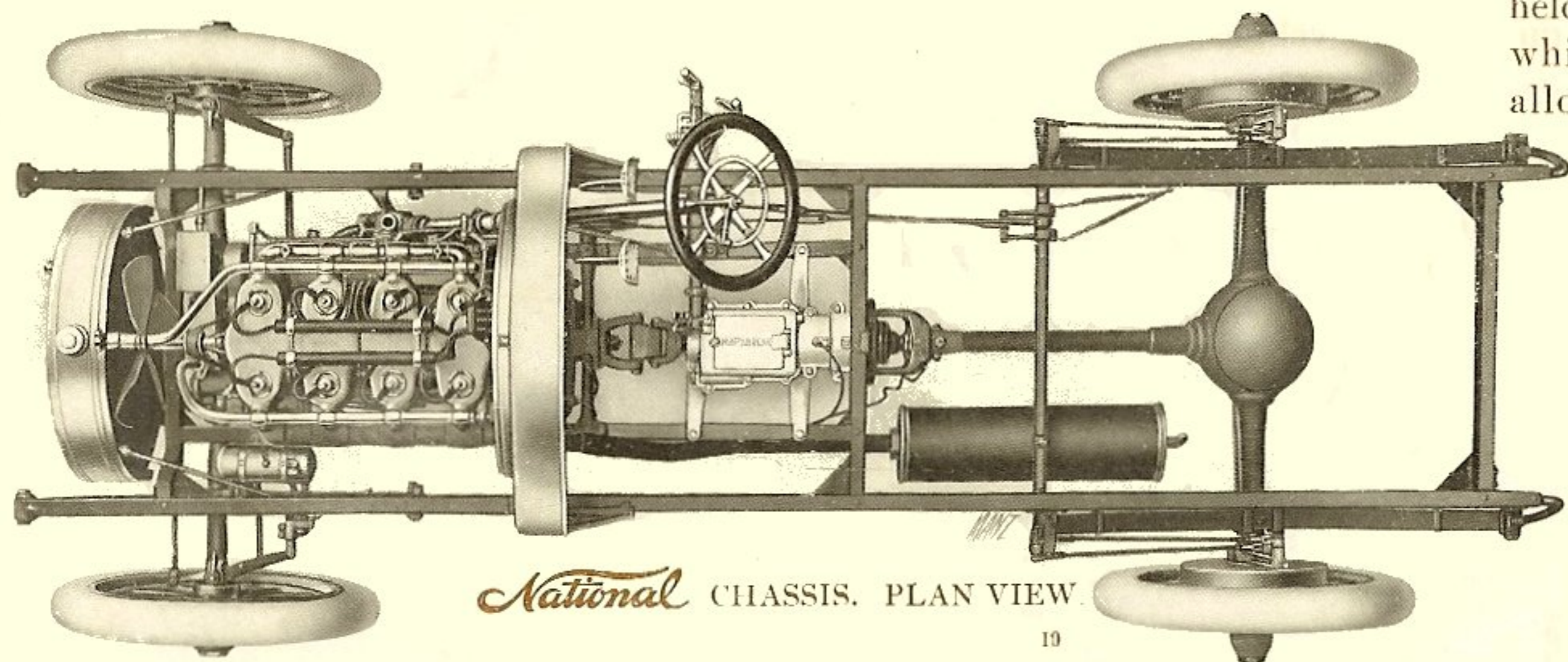


National Rear Axle, Gear Case and Wheels

in such an accessible position that they may be inspected, adjusted or even removed without removing the propeller shaft or taking off the rear wheels, which revolve on double rows of large annular type ball bearings, thus reducing to a minimum the strain and friction at this vital point.

The spherical gear case is divided near the top in a horizontal plane, and is fitted with a screw cap, which when removed leaves an opening of sufficient size to allow the withdrawal of both driving gear and differential. The exterior axle is constructed of two sections of cold drawn seamless steel tubing, securely brazed into the gear case. These tubes extend through the rear wheels to the outer edges of the hubs. This puts the load entirely on the outer axle, removing all weight from the inner live axle. The differential with the large four-pitch bevel driving gear attached is separately mounted on two large annular type ball bearings inside of the gear case. Each of these bearings is fitted with a cap,

held in place by two studs, which when removed allows the withdrawal, through the opening in the gear case, of the driving gear and differential complete. The inner live axles are squared at each end and fit into squared holes in

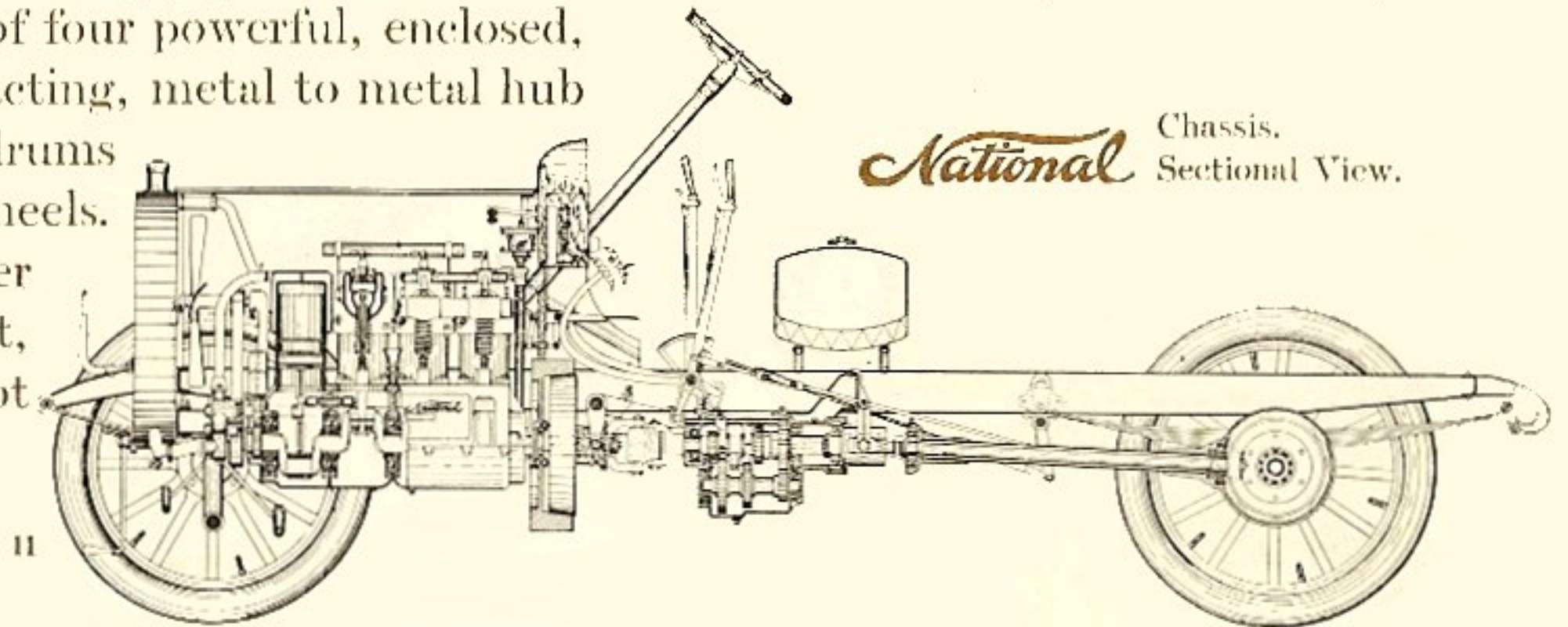


National CHASSIS. PLAN VIEW.

the differential, transmitting power to the wheels by means of dog clutches, engaging corresponding clutches on the hubs. Large semi-spherical dust caps screwed to the hubs and locked in position hold the dog clutches securely in place and make the bearings of the rear wheels oil tight and dust proof.

Frame: The frame is constructed of $4\frac{1}{2}$ -inch channel section cold pressed steel $3\text{-}16$ -inch thick with $1\frac{1}{2}$ -inch flanges, and is tapered at each end. Three cross members unite the two side members; the front and center cross members supporting a $2\frac{1}{2} \times 1\frac{1}{2}$ -inch pressed steel sub-frame, upon which both the motor and transmission are mounted. The sub-frame is supported at the center by pressed steel drops from the main frame, the main and sub-frame being securely riveted together and the corners reinforced by steel gusset plates. The use of the sub-frame permits the lowering of the engine and transmission so the center of gravity is below the center of suspension, thus power is transmitted from the engine to the bevel gears in nearly a horizontal line.

Brakes: The vital question of brakes is amply provided for by the use of a double system of exceptional efficiency, consisting of four powerful, enclosed, dust proof, internal expanding, double acting, metal to metal hub brakes, engaging 11-inch and 15-inch drums cast integral with the hubs of the rear wheels. Two of these are operated by a hand lever conveniently located at the driver's right, while the other two are operated by a foot push pedal.



National Specifications *4-Cylinder, Model H, 50 H. P.*

MOTOR — 50 H. P. four-cylinder, vertical, individually mounted on sub-frame. Mechanical valves, exhaust and admission on opposite sides and interchangeable. Ball bearing crank shaft and ball bearing cam shafts. Two separate sets of spark plugs. Tapered nipples with clamps used on intake, exhaust and water pipes. No packing at any joint. Extra long Parsons white bronze bearings on connecting rods. 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 bearings on main and counter shafts. Gears run in oil.

WHEEL BASE — 112 inches.

DRIVE — Bevel gear through ball bearing propeller shaft and flexible joint to rear axle of improved design.

BEARINGS — Annular type ball bearings throughout.

OILING — Seven feed Crandall mechanical gear driven oiler, oiling direct to each cylinder of engine, transmission, clutch and rear system.

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

GASOLINE CAPACITY — 17 gallons.

WATER CAPACITY — 6½ gallons.

WHEELS — Wood, artillery pattern, twelve 1½-inch spokes front and rear.

TIRES — 34 x 4½. Diamond or G. & J.

BRAKES — Two systems. Four dust proof internal expanding metal to metal hub brakes. Hand lever applies one set. Foot push pedal applies the second set.

DUST PAN — Metal dust pan under all working parts.

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

FRAME — Pressed steel 4½-inch channel section, with sub-frame firmly riveted and braced.

FRONT AXLE — Seamless, cold drawn steel tubing, heavy gauge, forged yokes.

REAR AXLE — Compound construction, inner axle used only as a driver. Wheels turn upon double annular type ball bearings on hollow axle, which carries all weight.

BODY — Cast aluminum, removable tonneau, platform type, side entrances. Divided front seats. Carrying capacity, seven passengers, two on folding seats in tonneau.

BODY FINISH — Coach carmine, black stripes.

GEAR FINISH — Coach carmine, black stripes.

UPHOLSTERING — Luxuriously upholstered in bright or dull black leather. Special spring mattress cushions.

STEERING SYSTEM — Hand wheel, inclined post, double screw and nut. Non-reversible chuck. Ball joint connections to double connecting rods, front and rear of forged steering knuckles.

COOLING SYSTEM — Cylindrical cooler, vertical tubes, ball bearing fan attached to engine base. Circulation by direct driven gear pump.

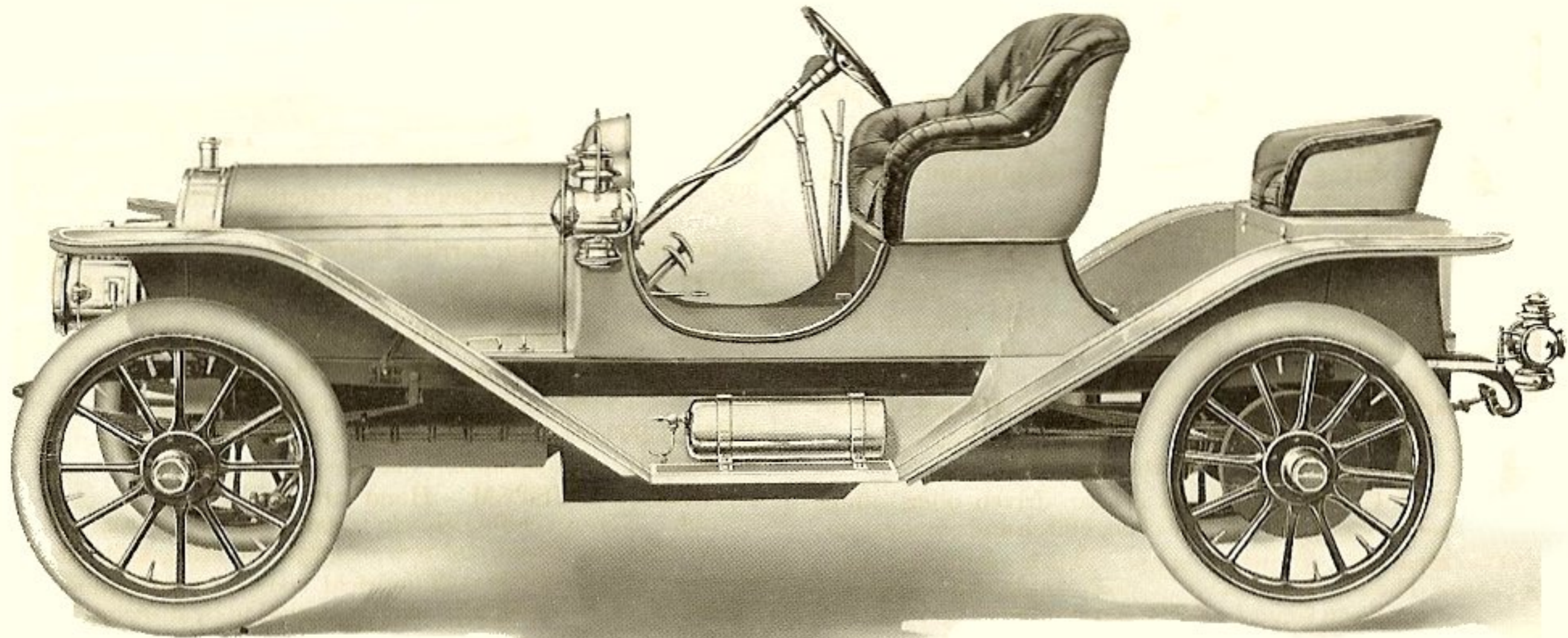
CONTROL — Single lever at driver's right controls all speeds. Three forward and one reverse.

SPRINGS — Half-elliptic; 40-inch front, under frame; 50-inch rear, outside of frame.

TOOL BOXES — Under tonneau seat and metal box on running board.

EQUIPMENT — Two 8-inch Rushmore searchlights with generator; Ham's "Cold Blast" side and tail lamps. Storm aprons, horn and tools.

PRICE — \$3,500, F. O. B. Indianapolis.



National 4-Cylinder Runabout

Model H, 4-Cylinder, 50 H. P. Runabout carries three passengers, has a wheel base of 110 inches, is equipped with 34 x 4-inch tires, and a chassis of the same general design as the Model H touring cars.

Price \$3,500.

Ignition and Wiring: Two systems of jump spark ignition with two separate sets of spark plugs are supplied. One system consists of a gear driven magneto, with its high tension coil, supplying one set of plugs, the other system consisting of a storage battery with single vibrator coil and distributor, the latter located at the top of a vertical shaft driven by spiral gears from one of the ball bearing cam shafts. The operator can use either of these systems, or a third combination by switching the battery current through the distributor of the magneto.

The wiring in the entire system is thoroughly insulated in lead covered cables or fibre tubing. 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 and the coil for the magneto are carried in a water-tight metal case, located on the running board on the right side of the car, where they can be easily examined or removed.

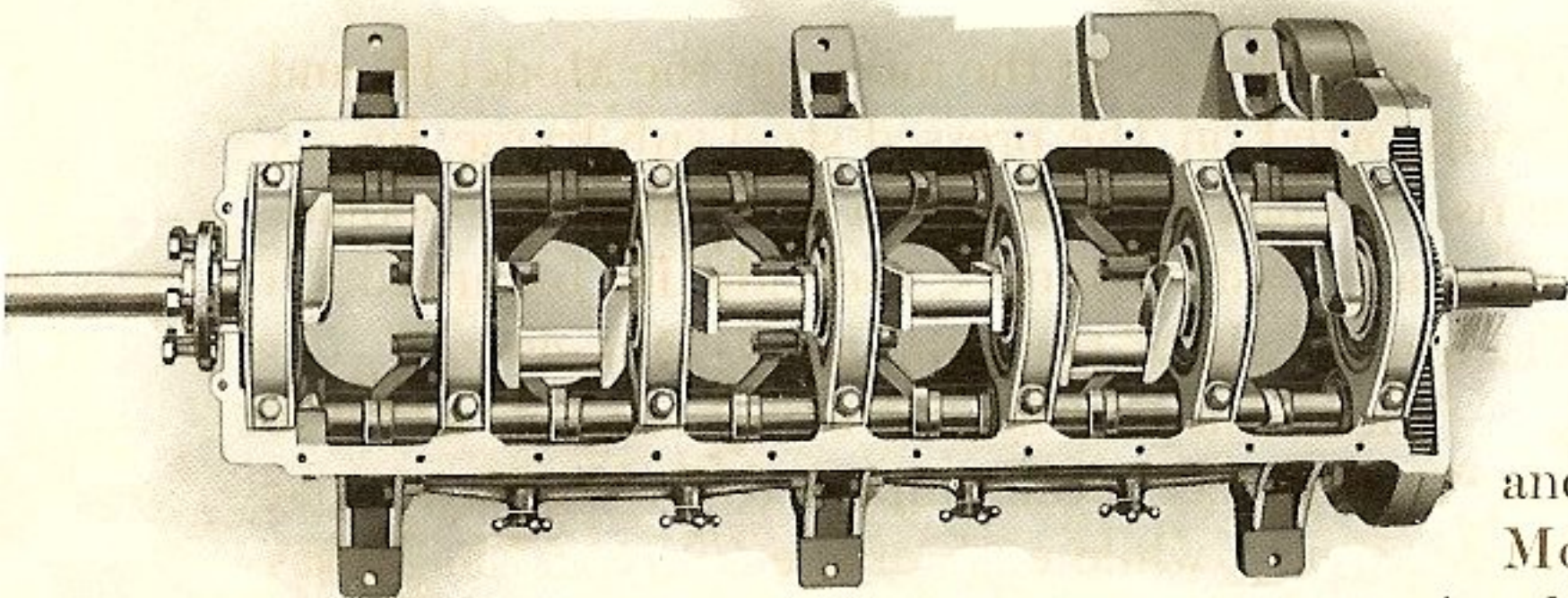
Control: The National has the simplest and most sensitive control of any car on the market. The merest pressure of the foot on a spring throttle pedal speeds the car up from four to sixty miles an hour when running on direct drive.

A lever is provided on the steering wheel for setting the foot throttle for any given speed, also a spark lever for controlling both ignition systems. Of the two levers at the driver's right, the inside one applies the hub brakes and simultaneously releases the clutch, and the one outside, working in an "H" slot, shifts the transmission gears, giving the low and intermediate geared speeds and the direct drive speed forward; also a very low double reduction reverse speed. A neutral or power-off position is obtained when the lever stands in a vertical position. The clutch is disengaged by the left foot push pedal. The right foot push pedal operates the auxiliary brake and releases the clutch at the same time.

Dash: A hollow aluminum dash, lined with wood, effectually protects the spark coil, switch and oiler from the weather.

Lubrication: The lubricating oil is carried in a copper tank beside the gasoline tank, under the front seats, and is distributed to the various bearings through seven sight feed oilers on the dash by means of a gear driven, mechanically operated, adjustable Crandall oiler, mounted on the sub-frame at the front of the engine.

Body: The body of the touring car presents an artistic appearance with its beautiful outline and symmetrical curves, being arranged with individual front seats and a roomy, detachable, side entrance tonneau, which seats five passengers comfortably, three on the rear tonneau seat and two on a very convenient folding seat. It is made of cast aluminum, is elegantly finished and luxuriously upholstered in a fine grade of leather, with soft, comfortable spring backs and cushions. Convenient pockets are supplied in the upholstery of the tonneau. The side doors swing to the rear and afford unusually wide entrances. A large locker space is located under the rear seat and is readily accessible through a door in the rear of the tonneau or through a trap door under the cushion. A trunk carrier is attached to the rear of the frame. The tonneau is equipped with a coat rail and an adjustable foot rest.



National Motor, with lower half of Crank Case removed, showing Crank Shaft and Bearings

National

6-Cylinder, Model L, 75 H. P.

The 6-cylinder Model L National Touring Cars and Limousines are worthy successors to the 6-cylinder Model E National of last season, which was a pioneer in its class, and which, as originally prophesied, is being extensively copied in high powered touring car construction.

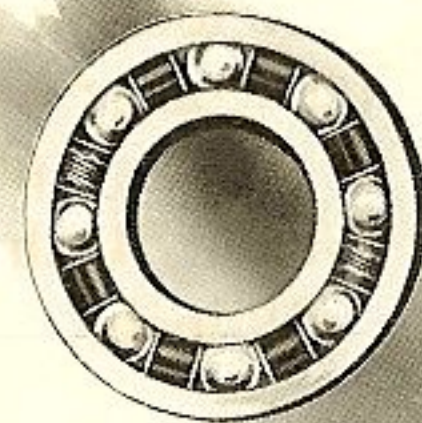
It is designed to supply a demand for a high powered commodious touring car of extremely flexible control, in which vibration is reduced to a minimum.

The Model L is similar in general design to the Model H, but all of its component parts are made proportionately heavier, and it has a six-cylinder motor in place of a four.

The use of six cylinders in the engine gives it a greater number of impulses to each revolution, and permits of the car being driven on high gear at a remarkably slow speed, and also facilitates rapid acceleration of speed in ascending grades and in heavy going.

The body is made to seat seven passengers comfortably, two on the front seats, two on revolving chairs in the tonneau, and three on the rear tonneau seat. The seats of the revolving chairs are so arranged that they may be folded up, leaving an ample passageway from the tonneau doors to the rear seat.

The six-cylinder motor is of the four cycle, high compression type, similar



National

Crank Shaft Bearing



National Model L Crank Shaft and Bearings

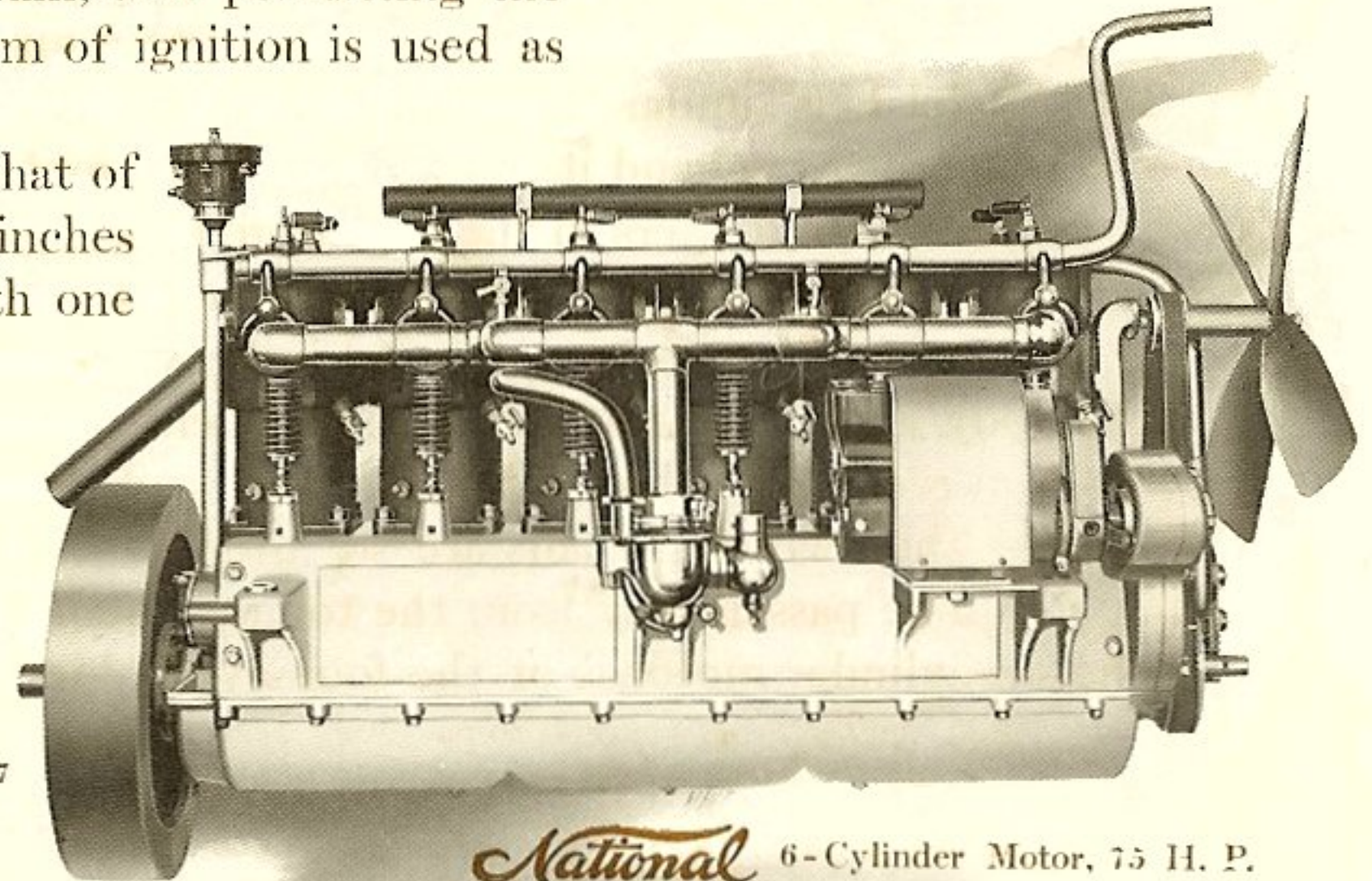
The cranks of the crank shaft are set at angles of 120 degrees, giving three impulses to each revolution, thereby reducing the vibration to a minimum, and permitting the use of a much lighter fly wheel. The same system of ignition is used as on Model H.

The frame is of the same general design as that of the Model H, the channel section being five inches deep, seven thirty-seconds ($7\text{-}32$) inches thick, with one and three fourths ($1\frac{3}{4}$) inch flanges.

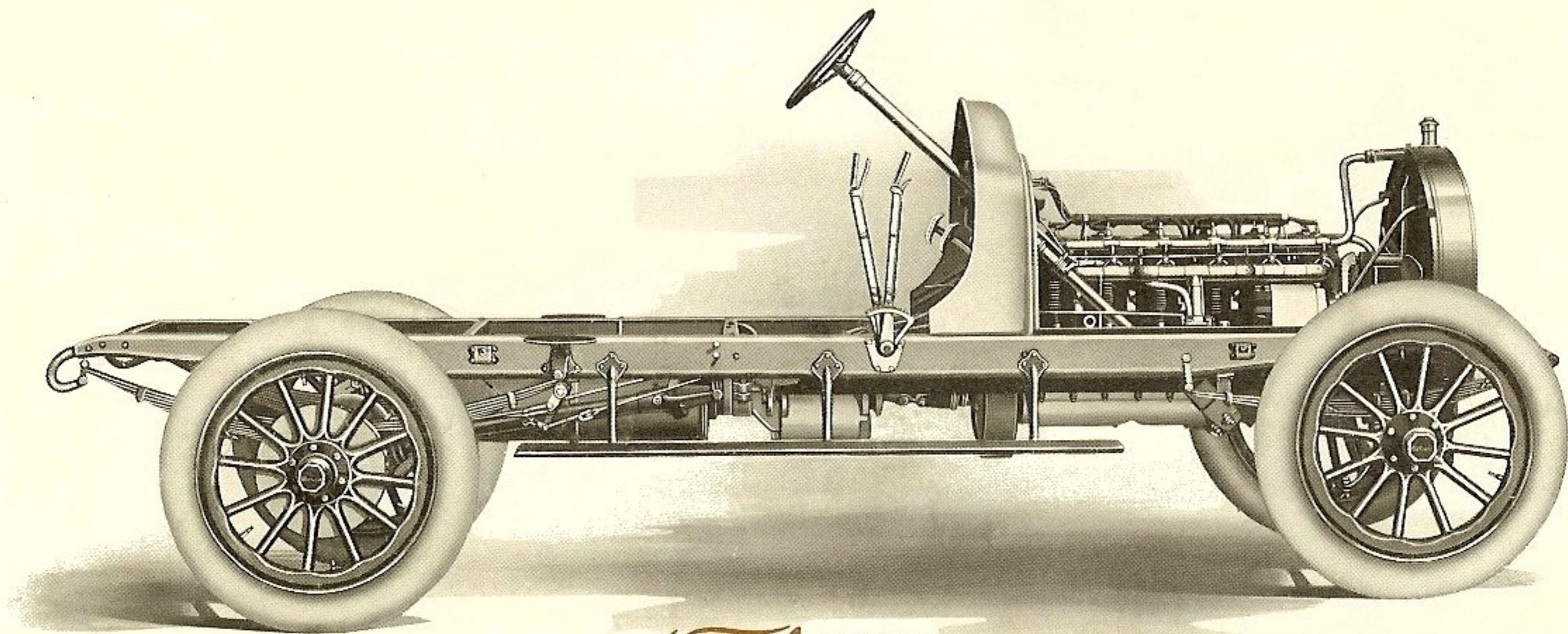
The equipment of Model L is quite similar to Model H except that the tires are 36 x 5 inches and 9-inch Rushmore head lights are used in place of 8-inch.

in all of its details to the motor in the Model H, and is supported on the pressed steel sub-frame by six arms. It has six $4\frac{7}{8}$ x 5-inch vertical, water-cooled, integrally cast cylinders, individually mounted on the upper half of the aluminum crank case.

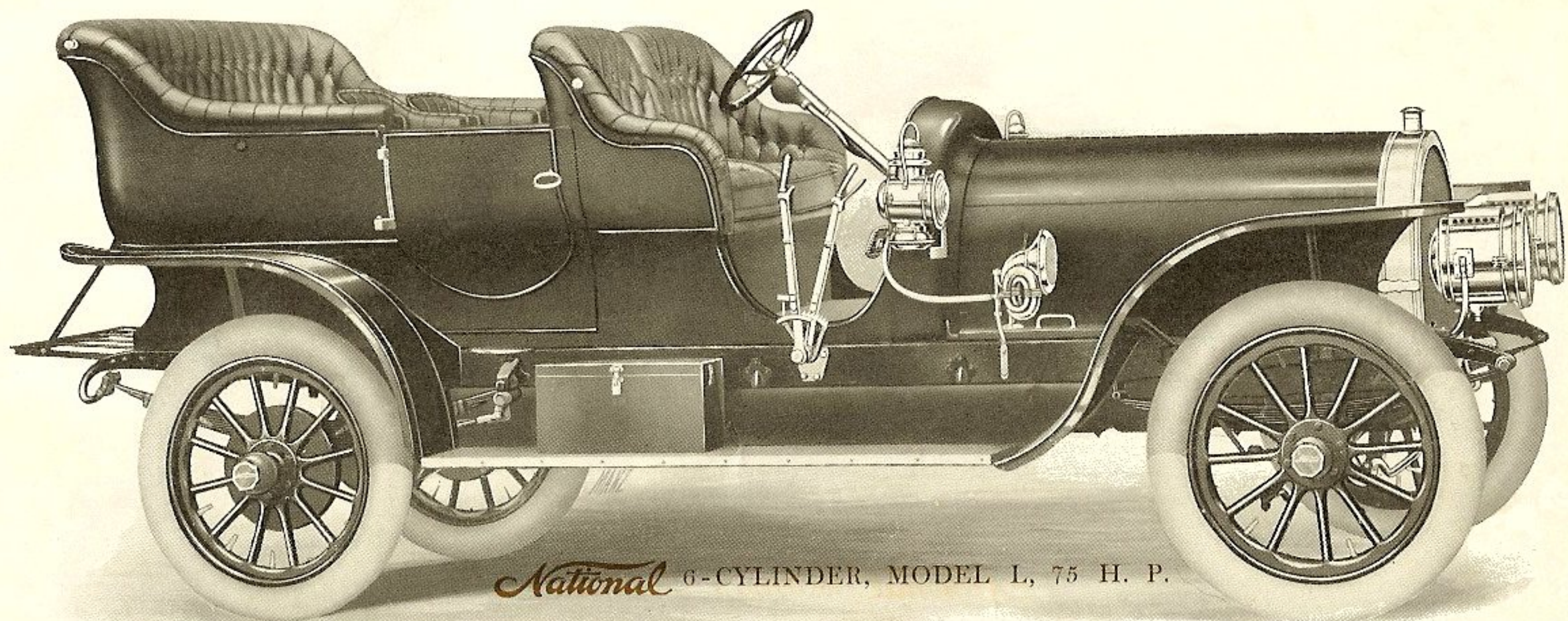
The crank case has six compartments and the crank shaft has seven imported D. W. F. annular ball bearings, while each of the two cam shafts has four ball bearings.



National 6-Cylinder Motor, 75 H. P.



National MODEL L CHASSIS



National 6-CYLINDER, MODEL L, 75 H. P.

National Specifications 6-Cylinder, Model L, 75 H. P.

MOTOR—75 H. P. six-cylinder, vertical, individually mounted on sub-frame. Mechanical valves, exhaust and admission on opposite sides and interchangeable. Ball bearing crank shaft and ball bearing cam shafts. Two separate sets of spark plugs. Tapered nipples with clamps used on intake, exhaust and water pipes. No packing at any joint. Extra long Parsons white bronze bearings on connecting rods. 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 bearings on main and counter shafts. Gears run in oil.

WHEEL BASE—127 inches.

DRIVE—Bevel gear through ball bearing propeller shaft and flexible joint to rear axle of improved design.

BEARINGS—Annular type ball bearings throughout.

OILING—Nine feed Crandall mechanical gear driven oiler, oiling direct to each cylinder of engine, transmission, clutch and rear system.

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

GASOLINE CAPACITY—20 gallons.

WATER CAPACITY—8 gallons.

WHEELS—Wood, artillery pattern, twelve $1\frac{3}{4}$ -in. spokes front and rear.

TIRES—36 x 5. Diamond or G. & J.

BRAKES—Two systems. Four dust proof internal expanding metal to metal hub brakes. Hand lever applies one set. Foot push pedal applies second set.

DUST PAN—Metal dust pan under all working parts.

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

FRAME—Pressed steel, 5-inch channel section, with sub-frame firmly riveted and braced.

FRONT AXLE—Seamless, cold drawn steel tubing, extra heavy gauge, forged yokes.

REAR AXLE—Compound construction, inner axle used only as a driver, wheels turn upon double annular type ball bearings on hollow axle which carries all weight.

BODY—Cast aluminum, side entrances, removable tonneau, platform type. Divided front seats. Carrying capacity, seven passengers, five carried in tonneau.

BODY FINISH—Coach carmine, black stripes.

GEAR FINISH—Coach carmine, black stripes.

UPHOLSTERING—Luxuriously upholstered in bright or dull black leather. Special spring mattress cushions.

STEERING SYSTEM—Hand wheel, inclined post, double screw and nut. Non-reversible chuck. Ball joint connections to double connecting rods front and rear of forged steering knuckles.

COOLING SYSTEM—Cylindrical cooler, vertical tubes, ball bearing fan attached to engine base. Circulation by direct driven gear pump.

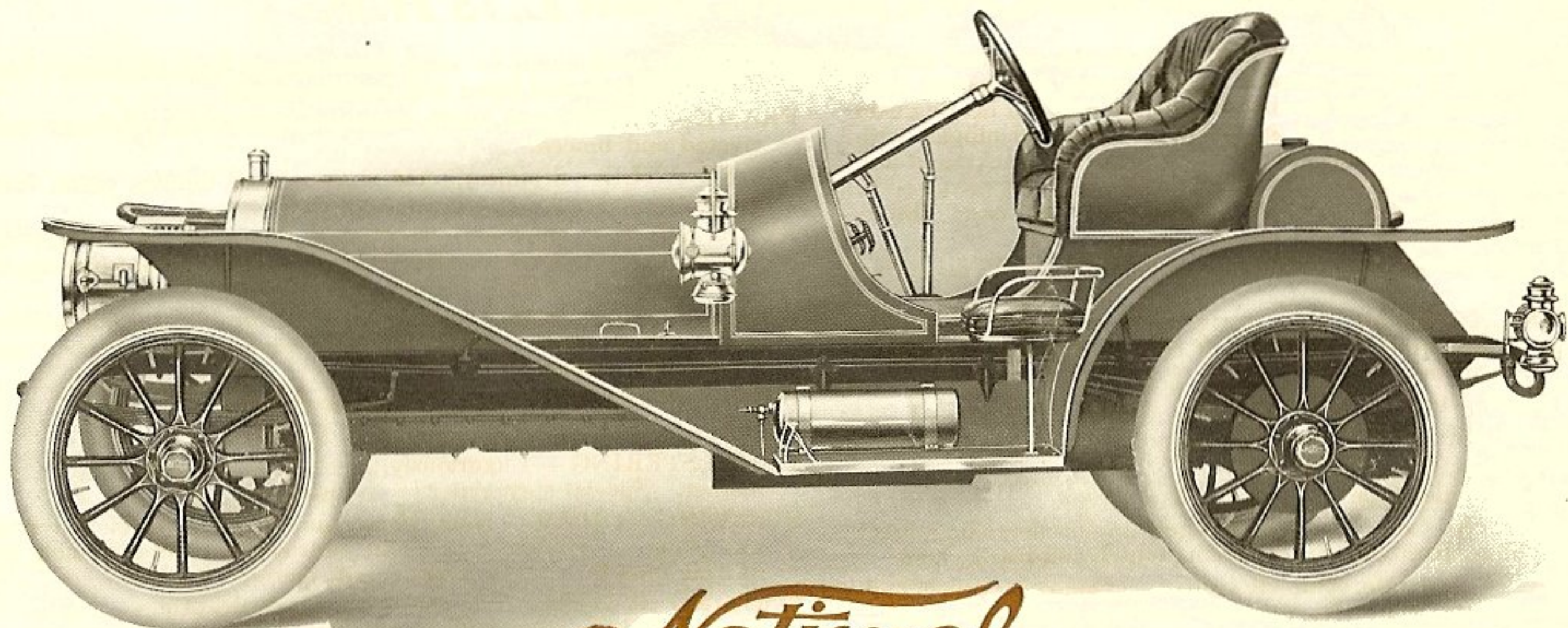
CONTROL—Single lever at driver's right controls all speeds. Three forward and one reverse.

SPRINGS—Half elliptic; 44-inch front, under frame; 56-inch rear, outside of frame.

TOOL BOXES—Under tonneau seat and metal box on running board.

EQUIPMENT—Two 9-inch Rushmore searchlights, with generator, Ham's "Cold Blast" side and tail lamps. Storm aprons, horn and tools.

PRICE—\$5,000, F. O. B. Indianapolis.



National

Model L, 6-Cylinder Runabout (Semi-Racer)

Carries two passengers in the regular seats and has an extra seat on the running board for an additional passenger or a mechanic.

The chassis is of the same general design as that of the Model L touring car, only much shorter.

It has a wheel base of 120 inches and is equipped with 36 x 4½-inch tires.

Price \$5,000.



National Limousines

Model H, 4-Cylinder, 50 H. P.
Sheet aluminum body, capacity 7 passengers.
Price \$4,800.

Model L, 6-Cylinder, 75 H. P.
Sheet aluminum body, capacity 9 passengers.
Price \$6,500.

National Association of Automobile Manufacturers

Standard Warranty

Adopted August 12, 1902

We Warrant all goods furnished by us for sixty days following the date of their shipment, based upon the date of invoice covering the goods, this warranty being limited to the replacement in our factory of all parts giving out under normal service in consequence of defect of material or of workmanship. If the circumstances do not permit that the work shall be executed in our factory, this warranty is limited to the shipment, without charge, of the parts intended to replace those acknowledged to be defective.

It is, however, understood that we make no warranty whatever regarding pneumatic tires or the batteries.

We cannot accept any responsibility in connection with any of our motor cars when they have been altered or repaired outside of our factory. We are not responsible to the purchaser of our goods for any undertakings and warranties made by our distributors beyond those expressed above.

We wish it distinctly understood that we make no warranty of our goods except as stated above, but desire and expect that customers shall make a thorough examination of our goods before purchasing.

WORLD'S RECORDS
MADE BY

National

STRIPPED STOCK
CARS

100 miles, . . .	1 hour, 53 minutes, 21 4-5 seconds	800 miles, . . .	17 hours, 17 minutes, 26 1-5 seconds
150 miles, . . .	2 hours, 52 minutes, 32 4-5 seconds	850 miles, . . .	18 hours, 23 minutes, 44 2-5 seconds
650 miles, . . .	14 hours, 8 minutes, 51 2-5 seconds	900 miles, . . .	19 hours, 44 minutes, 48 1-5 seconds
700 miles, . . .	15 hours, 10 minutes, 29 3-5 seconds	950 miles, . . .	20 hours, 54 minutes, 50 3-5 seconds
750 miles, . . .	16 hours, 20 minutes, 25 2-5 seconds	1000 miles, . . .	21 hours, 58 minutes, 4-5 seconds
	1050 miles, . . .		23 hours, 7 minutes, 42 seconds

1094 3-16 Miles in 24 Hours Exceeding the previous World's Record
by 78 9-16 miles

The average speed maintained while running was 51.9 miles per hour.

Manz Engraving Company
The Hollister Press
Chicago

