

National



National

MOTOR CARS



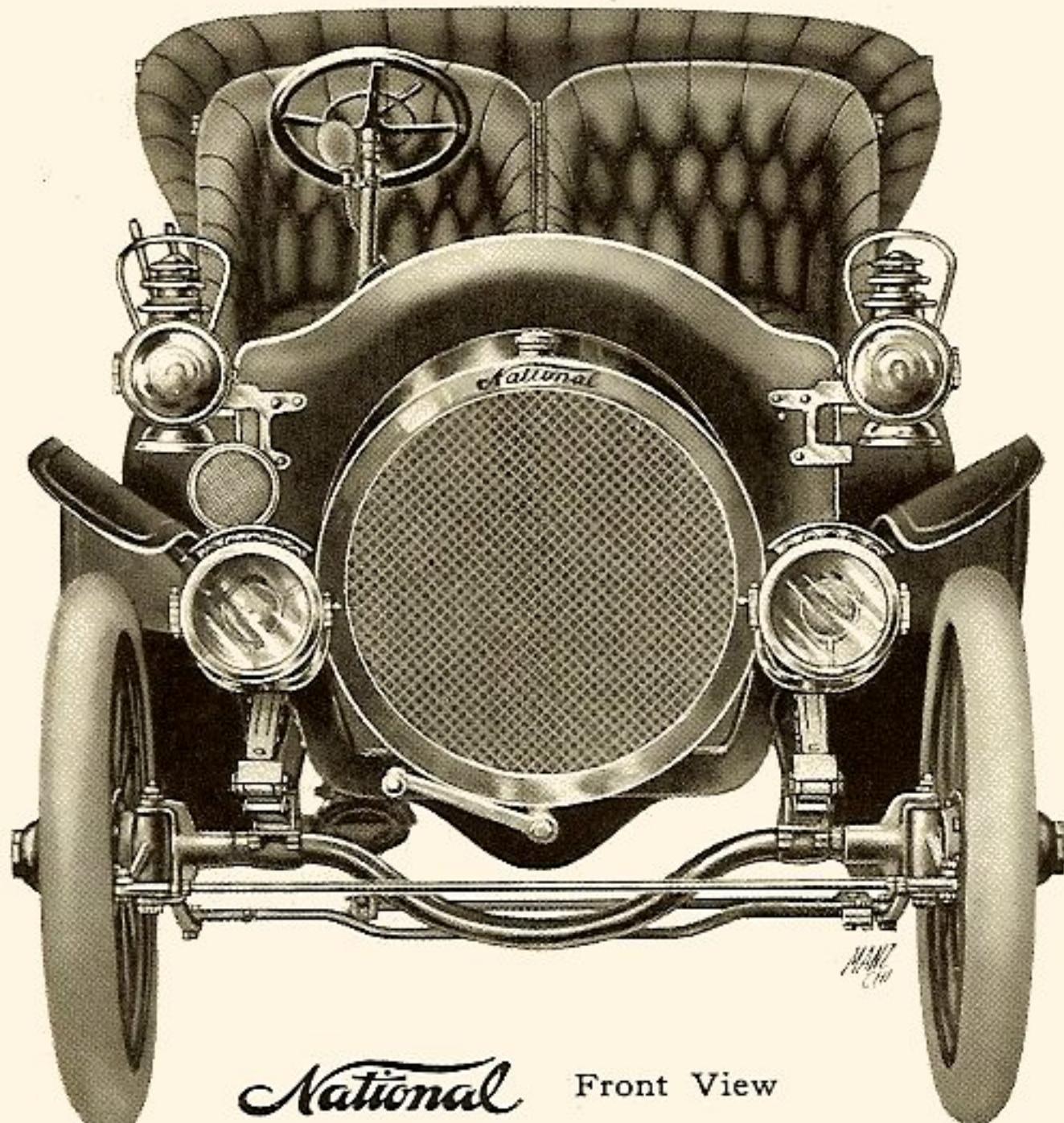
NATIONAL MOTOR VEHICLE CO.
Indianapolis, Ind., U. S. A.

General Offices and Factory:
East Twenty-second Street and Monon R. R.

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

National TOURING CARS



National Front View

IN OFFERING the National Models D and E for the consideration of the automobile driving public we endeavor, in this catalogue, to give a short and concise description of these excellent cars which must be examined and tried to be fully appreciated. They are the result of many years of energetic effort and experience in the manufacture of motor cars. They are designed along the most approved lines of high grade American and foreign motor car construction and are built with a view of combining comfort, luxury and accessibility with the highest grade of mechanical workmanship. They will stand a critical examination by the most exacting purchaser and will give an excellent account of themselves in hard service over American roads. They will meet with every requirement in speed, endurance, hill climbing, durability, cost of maintenance and comfort. They are remarkably easy to control, have wonderful power and are practically noiseless, while their beautiful outline, superb finish and many distinctive and meritorious features give them striking individuality.



4 CYLINDER—MODEL D—35-40 H. P.

MOTOR—The motor is of the four-cycle, high compression type, mounted on the pressed steel sub-frame under the hood in the front of the car. It develops one brake horse-power for each $9\frac{7}{8}$ pounds of its weight and has four $4\frac{1}{2}'' \times 5''$ vertical, water-cooled, integrally cast cylinders, individually mounted on the upper half of the aluminum crank case. The interchangeable admission and exhaust valves, each $1\frac{3}{4}''$ in diameter, are mechanically operated by plungers with large rollers, these being actuated by a single cam shaft, which revolves inside of the crank case in three long bearings, and can be removed from the engine without taking off the lower half of the crank case. The drop-forged crank shaft has five long bearings, babbitted in bronze boxes, one at each end and three intermediate bearings attached to supports in the upper half of the crank case, giving it the unusual bearing length of $14''$ in a $30''$ case, and allowing of the removal of the lower half of the case without disturbing the shaft or the adjustment of its bearings. Tapered and ground nipples are used in attaching the admission and exhaust pipes, thus avoiding the use of troublesome packing. The removal of four nuts detaches both the admission and exhaust systems.

The cylinders are equipped with relief, drain and priming cocks. The oil-tight aluminum crank case is partitioned into four compartments, effectually preventing an excessive accumulation of oil at one end of the case in ascending or descending a grade. The adjustable bearings of the drop-forged connecting rods are readily accessible through an inspection port of liberal dimensions conveniently located in the side of the crank case.

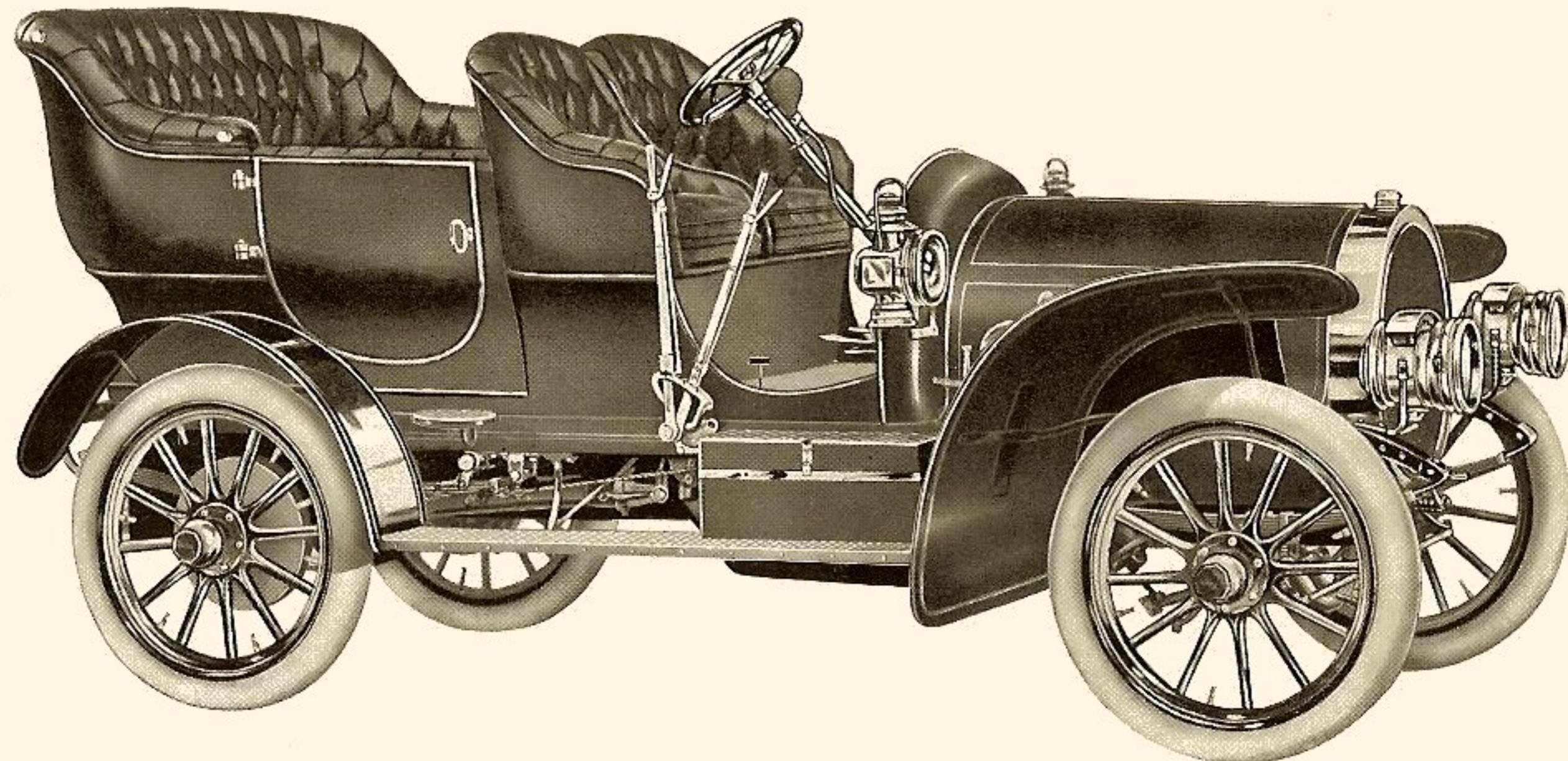
The connecting rods are also adjustable at the hollow wrist pins.

The pistons are fitted with four compression rings each.

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

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

RADIATOR AND COOLING SYSTEM—The cylindrical form of the cellular 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, six-bladed, ball-bearing fan behind it draws a powerful current of air throughout its entire area. The water system and radiator carry five gallons of water which is circulated by a gear pump direct connected to the cam shaft and so located that it is readily accessible.



National Model D. Touring Car, 4 cyl., 35-40 H. P. \$3,000

CLUTCH AND COUPLING—The self-contained, aluminum, leather surfaced cone clutch is fitted with six 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.

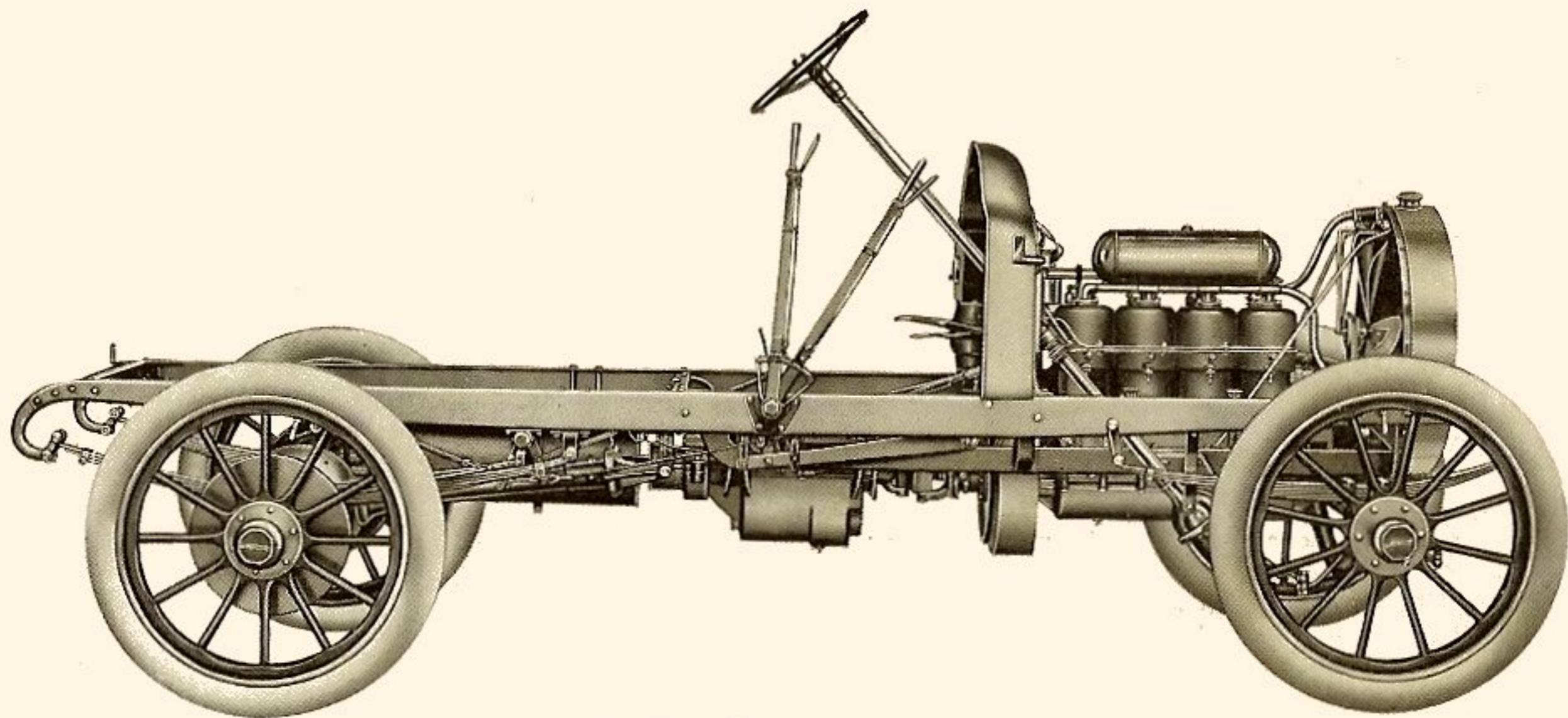
The flexible, sliding, double universal clutch coupling connects it with the main transmission shaft and permits of the removal of the clutch without disturbing the transmission.

TRANSMISSION—The transmission is of the sliding gear type, with three speeds forward and one reverse, giving direct drive on high speed. The main and counter-shafts, being in the same vertical plane, are 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.

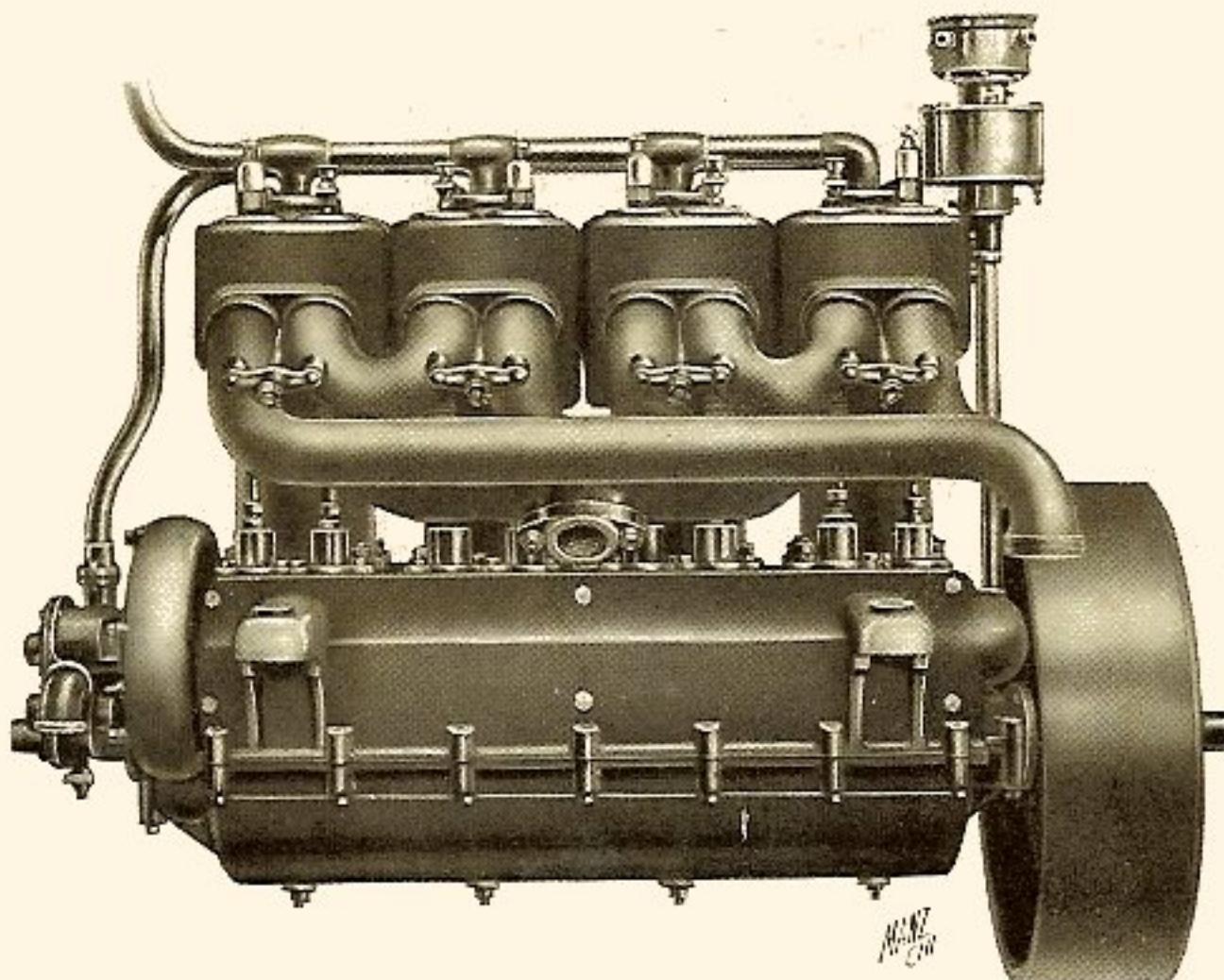
The double reduction reverse, which allows a very slow backward speed, remains disengaged when not in service.

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 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 they are relieved from all strain 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.



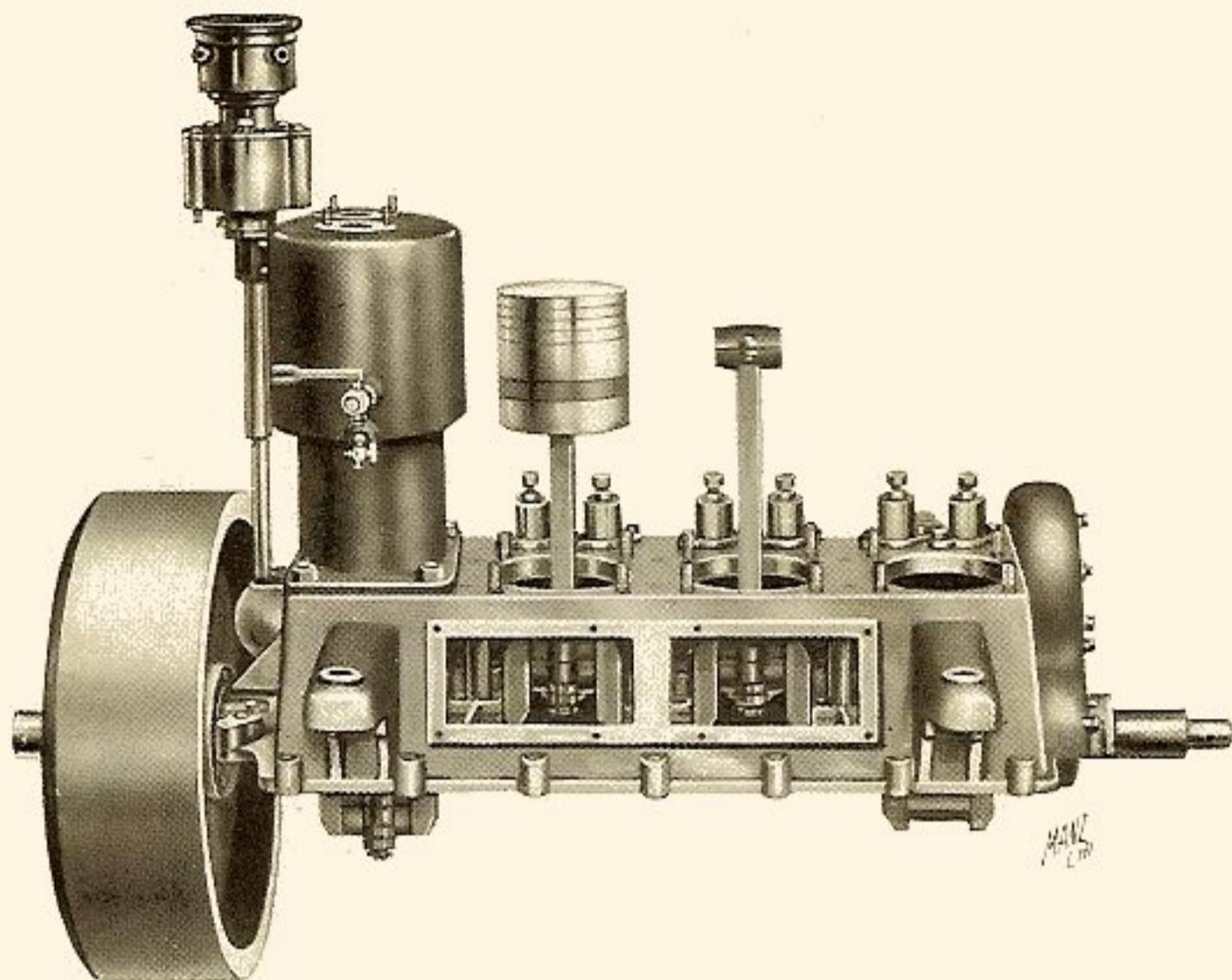
National Model D. Chassis.



National 4 cyl. Motor, 35-40 H. P.

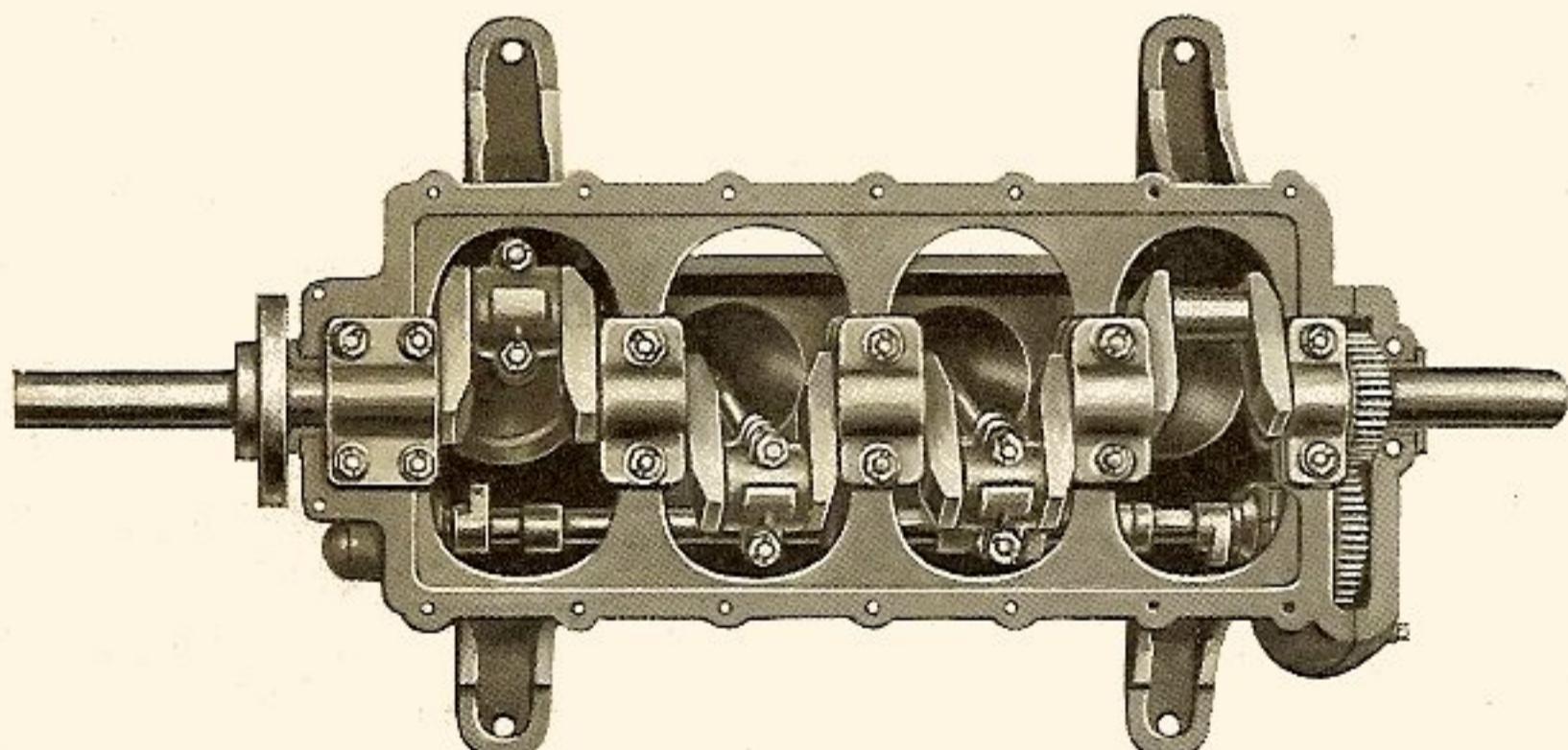
FRONT AXLE—The front axle, of heavy, seamless, cold drawn tubing is fitted with extra heavy drop-forged steering knuckles and yokes. The knuckles are secured to the yokes by 15-16" steel bolts, which pass entirely through both yoke and knuckle and are securely fastened by a nut and cotter pin at their 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 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, set seven inches apart, 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



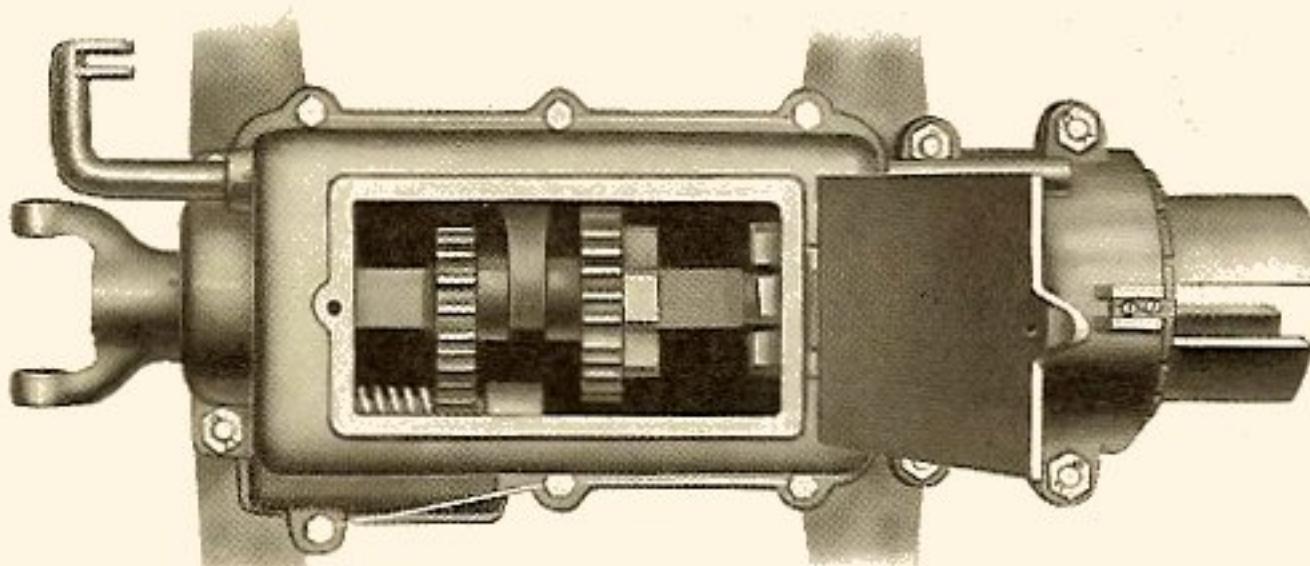
National Motor Partially Assembled

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 permits the use of two large annular type ball bearings in each rear wheel and puts the load entirely on the outer axle, removing all weight and strain from the inner live axle. The differen-



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

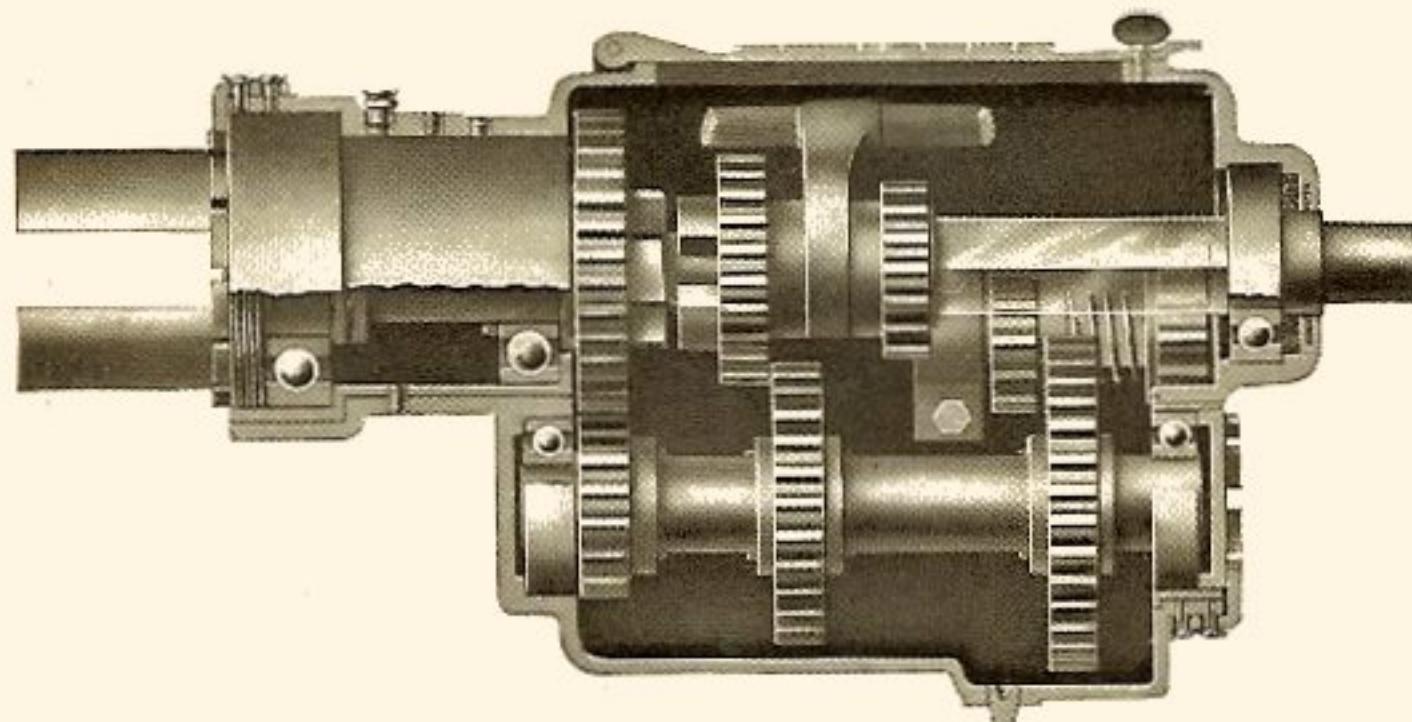
tial with the large four-pitch bevel driving gear attached is separately mounted on two large annular type ball bearings inside of the gear case. Each of these bearings is fitted with a cap, held in place by two studs, which when removed allow the withdrawal, through the opening in the gear case, of the driving gear and differential complete. The inner live axles are squared at each end and fit into squared holes in the differential, transmitting power to the rear 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.



National Transmission

FRAME—The frame is constructed of 4" channel section, cold pressed steel 3-16" thick with 1½" flanges, and is tapered at each end. Three cross members unite the two side members; the front and center cross members supporting a 2½" x 1½" 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 and allows the transmission of power 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, internal expanding, double-acting, metal to metal hub brakes, engaging 11" and 15" drums cast integral with the hubs of



National Transmission
Side View showing Sectional View of Case

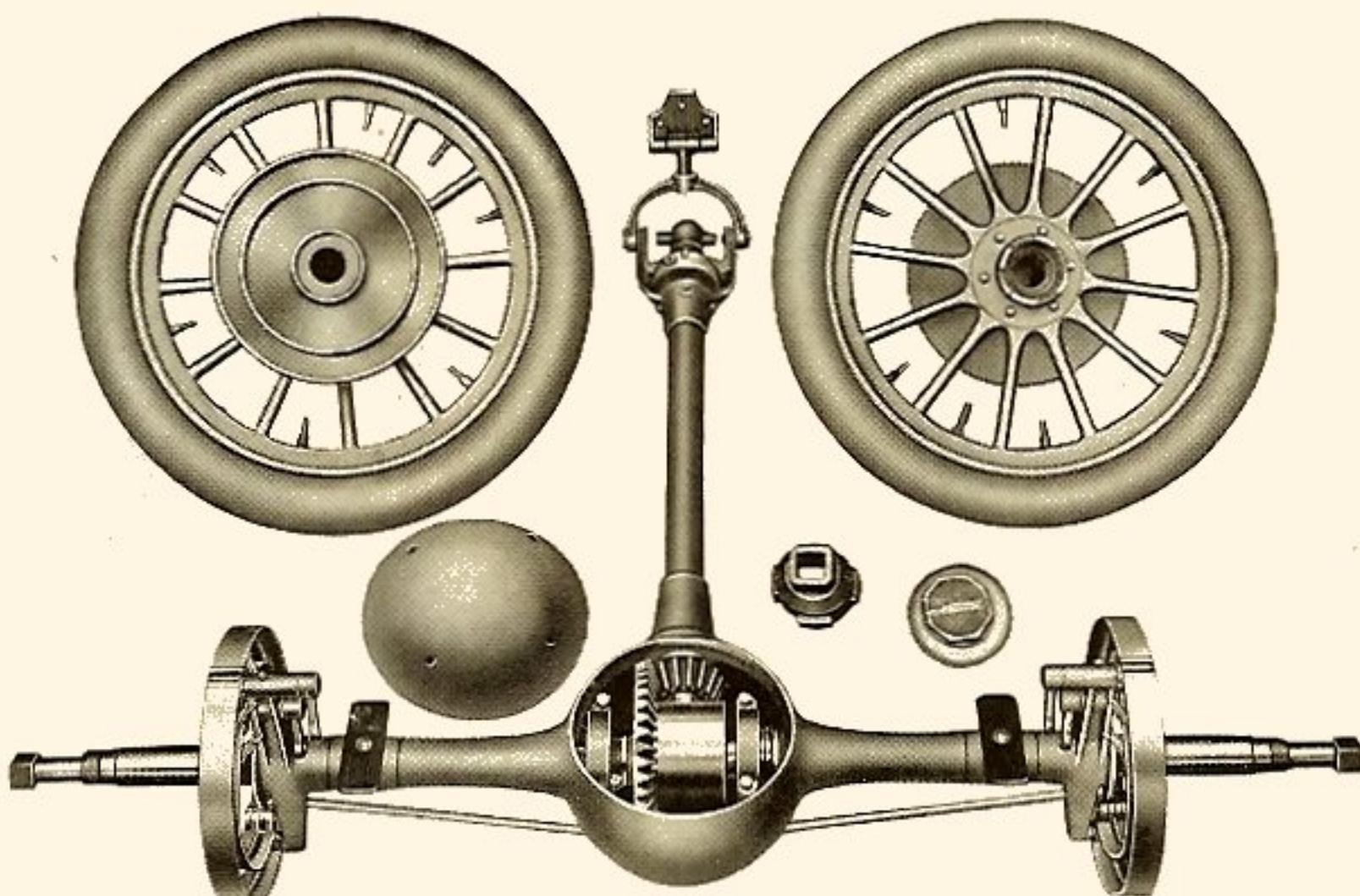
the rear wheels. Two of these are operated by a hand lever conveniently located at the driver's right, while the other two are operated by a foot pedal.

IGNITION AND WIRING—A double system of jump spark ignition with a quadruple vibrator coil is supplied; current being furnished by either a storage battery (which is kept charged by a dynamo set in the floor of the car at the base of the dash), or in emergency by a set of dry cells. The operator can use current from either of these sources by turning a snap switch conveniently located on the dash. The wiring in the entire system is thoroughly insulated in lead-covered cables and fibre tubing. The spark plugs are located in the valve caps in the cylinder heads, where they are least susceptible to fouling and may be placed over the admission or exhaust valves at will.

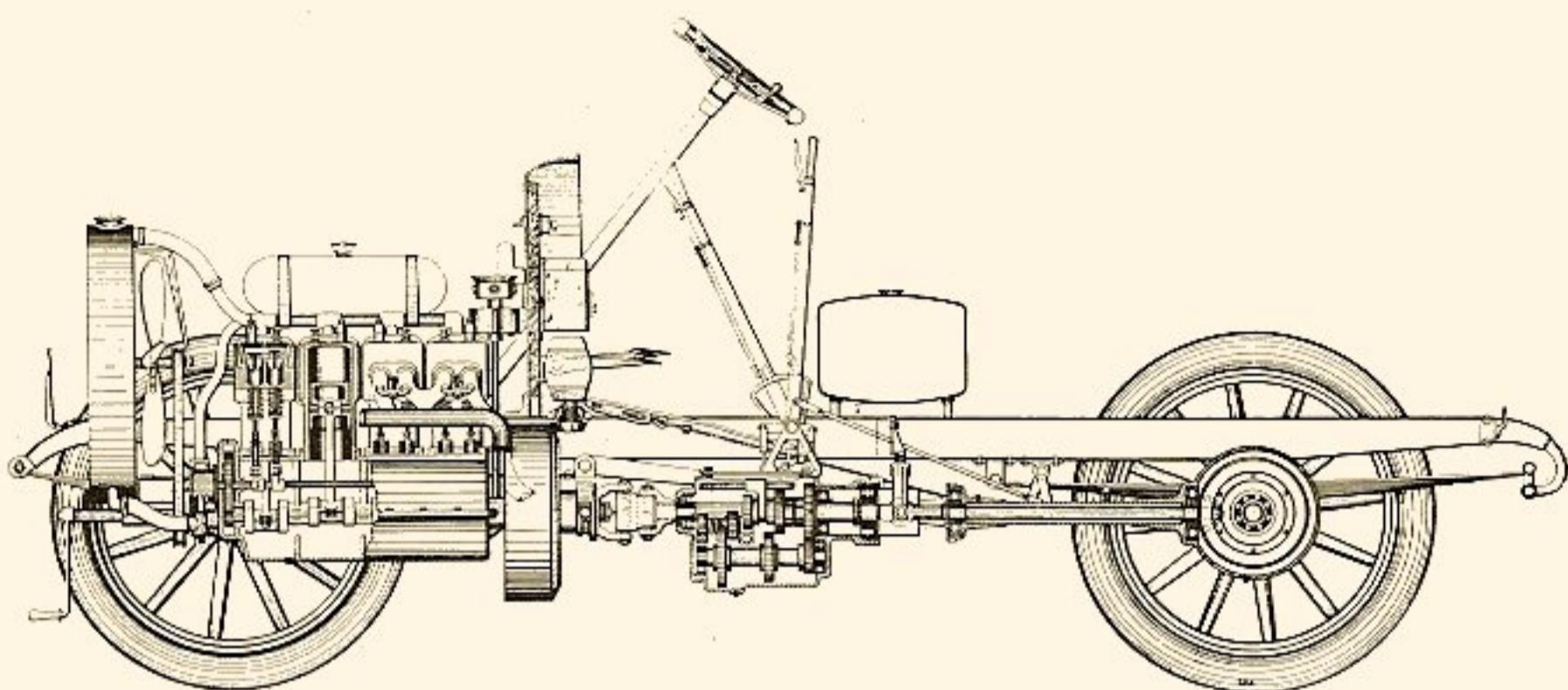
The storage and dry batteries are carried in a water-tight, metal bound case on the side of the car where they can be easily examined or removed.

The timing of the spark is controlled by a timer mounted above the governor on a gear-driven vertical shaft attached to the rear cylinder of the engine. The regulation of the spark being controlled automatically by an enclosed centrifugally-acting governor, which automatically advances or retards the sparking in direct proportion to the speed of the engine, thus eliminating the necessity of its control by hand, although a small lever on top of the steering wheel is provided.

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 fifty miles an hour when running on direct drive. The secret of this sensitiveness is due in part to the fact that the governor advances the spark in exact proportion to the opening of the throttle and the speed of the motor, thus eliminating the necessity of hand control. A lever is provided on the steering wheel for setting the foot throttle for any given speed, also an emergency spark lever for use in case of accident to the governor. Of the two levers at the driver's right, the inside one applies the hub brakes and simultaneously releases the clutch, and the outside one shifts the transmission gears giving the low and intermediate geared speeds and the direct drive speed forward; also the very low double reduction reverse speed. A neutral or power-off position is obtained when the lever stands in a vertical position. A very simple interlocking device prevents shifting the gears until the clutch is disengaged, which is accomplished by a left foot pedal, thus eliminating any possibility of stripping the gears. The right foot pedal operates the auxiliary brake and releases the clutch at the same time.



National Rear Axle, Gear Case and Wheels



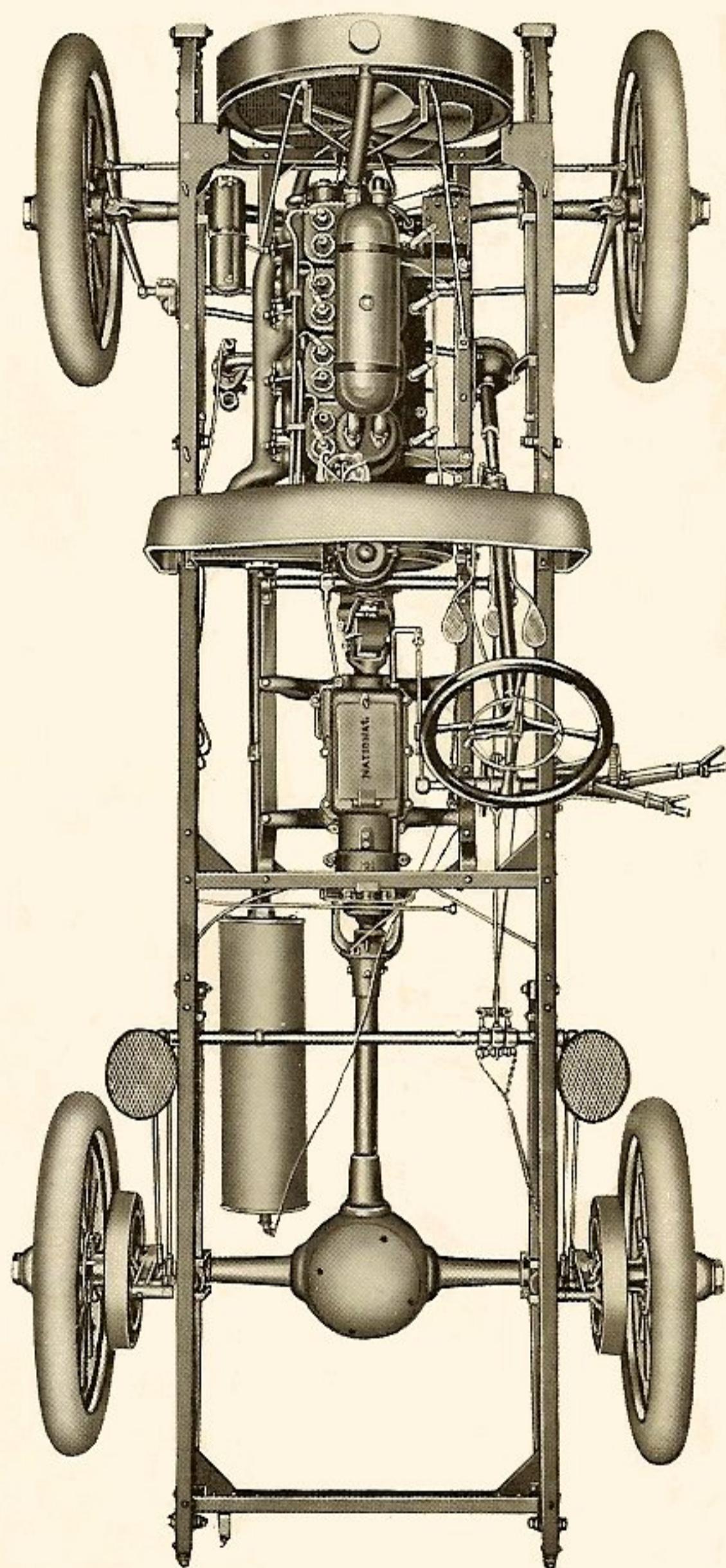
National Chassis. Sectional View

DASH—A hollow cast aluminum dash, lined with wood, effectually protects the spark coil, switch and oiler from the weather.

LUBRICATION—The lubricating oil is carried in a bullet-shaped copper tank on top of the engine, where it can not become chilled and sluggish even in cold weather, and is distributed to the various bearings through six sight-feed oilers on the dash by means of a mechanically operated adjustable Hill-Precision oiler, mounted on the sub-frame under the bonnet.

BODY—The body of the 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 three passengers comfortably.

It 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 upholstering 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. An additional locker of ample proportions is suspended under the rear of the frame.



National Chassis. Plan View.

SPECIFICATIONS

National

4 CYLINDER—MODEL D—35-40 H. P.

MOTOR—35-40 H. P. four cylinders, vertical, individually mounted under bonnet. Mechanical valves; gear pump direct driven; gear driven commutator, divided aluminum crank case; interchangeable parts.

CLUTCH—Self contained, aluminum cone, leather faced, spring cushioned.

TRANSMISSION—Sliding gear; three speeds forward and one reverse, direct on high. Self contained, annular type ball bearings. Gears run in oil.

WHEEL BASE—104 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—Six Feed Hill Precision oiler to engine, transmission and rear system.

IGNITION—Quad vibrator coil; jump spark, one set dry cells and set of storage batteries in connection with dynamo.

GASOLINE CAPACITY—Seventeen gallons.

WATER CAPACITY—Five gallons.

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

TIRES—Thirty-four by four (34x4) Diamond detachable, wrapped tread construction.

BRAKES—Two systems. Four internal expanding, metal to metal hub brakes. Hand lever applies one set of brakes in $11 \times 1\frac{1}{2}$ drums. Foot pedal applies second set of brakes in $15 \times 1\frac{1}{2}$ drums. Either brake releases clutch.

GUARDS—Plowshare front. Rear conforms to curve of wheel. Wide running boards connect the guards.

FRAME—Pressed steel 4 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 driver, wheels turn upon double annular type ball bearings, on hollow axle which carries all weight.

BODY—Cast aluminum; side entrances, removable high back tonneau, platform type, divided front seats, carrying capacity five passengers.

FINISH—Dark blue body, black mouldings with gold stripes.

GEARS—Straw color with black stripes—option blue with gold stripes.

UPHOLSTERING—Luxuriously upholstered in leather. Special spring mattress cushions.

STEERING SYSTEM—Hand wheel, inclined post, worm and gear, non-reversible chuck. Ball joint connections to double connecting rods, front and rear of forged knuckles.

SPEED—Five to fifty miles.

MUFFLER—Concentric perforated cylinders, provided with cut-out.

COOLING SYSTEM—Cylindrical cellular cooler with ball bearing fan. Circulation secured by gear pump.

BONNET—Semi-cylindrical, removable, hinged at top and sides.

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

SPRINGS—Half elliptic, 40 inch front and 50 inch rear.

TOOL BOXES—Under tonneau seat and on right running board.

EQUIPMENT—Five lamps, two parabolic-lens gas in front, complete with copper tube connection to generator; two mirror lens oil, at sides and oil tail lamp. Horn with tube, storm aprons and tools.

PRICE—\$3,000. F. O. B. Indianapolis. 25% cash with order, balance draft against bill of lading. Orders filled in rotation.

National

6 CYLINDER—MODEL E—50-60 H. P.

The six cylinder Model E National is a pioneer in its class and will undoubtedly be extensively copied in the future in high powered touring car construction.

It was placed on the market to supply a growing demand for a high powered commodious touring car of extremely flexible control, in which vibration is reduced to a minimum.

The Model E is really a larger reproduction of the famous Model D, as it is constructed along similar lines but has an engine of six cylinders in place of four.

The use of six cylinders in the engine gives 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. All of the parts in the Model E are made proportionately heavier than the same parts in the four cylinder car.

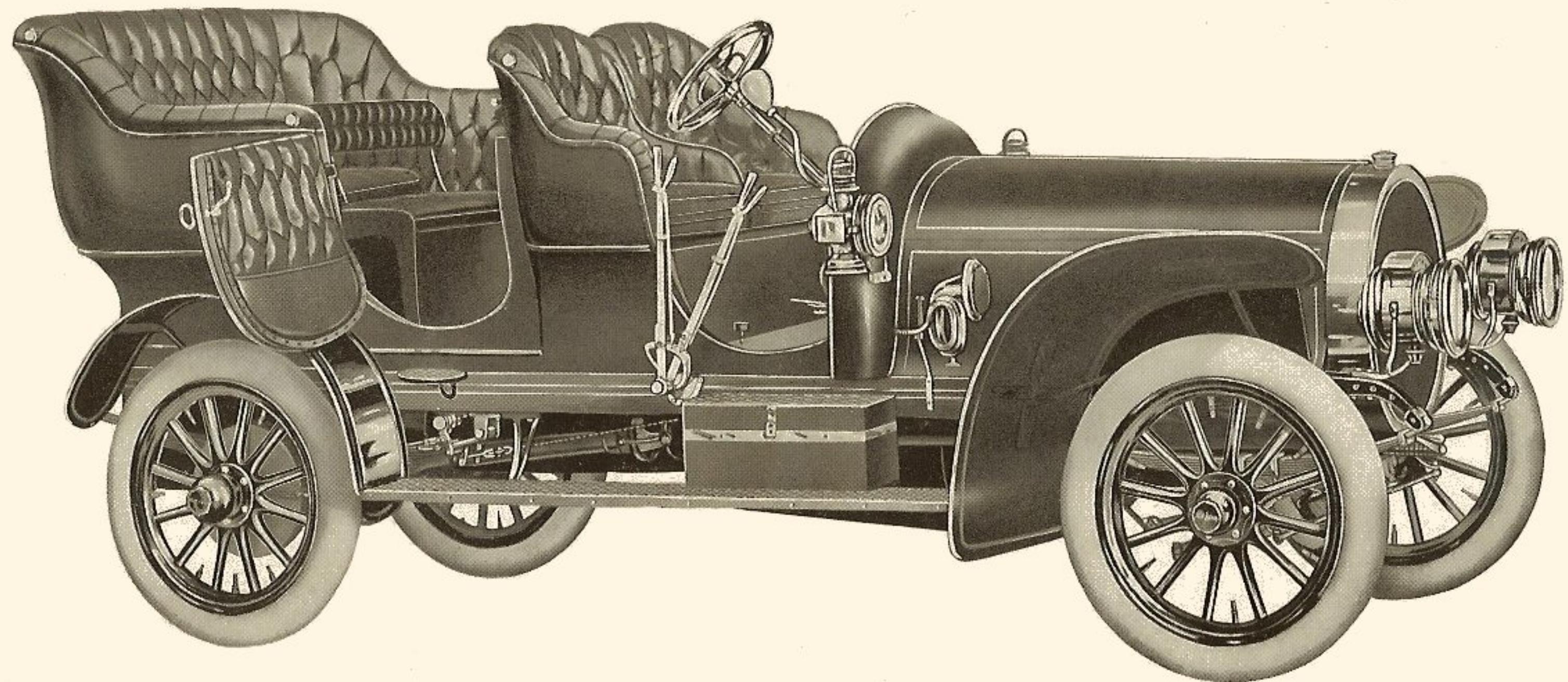
The body is made to seat seven passengers comfortably, the two extra passengers being seated in the tonneau in a comfortable folding seat which permits of all the passengers facing forward and which extra seat folds out of the way at the base of the front seats when not in use.

The six cylinder motor is of the four cycle, high compression type, supported on the pressed steel sub-frame by six arms.

It develops one brake horse-power for each $8\frac{3}{4}$ pounds of its weight and has six $4\frac{1}{2}'' \times 5''$ 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 long bearings, babbitted in bronze boxes.

The interchangeable admission and exhaust valves are mechanically operated by a single cam shaft as in the case of the four cylinder engine, though the crank shaft and connecting rods are made proportionately larger than those used in the smaller car; the cranks being set at angles of 120° give three impulses to each revolution of



National Model E. Touring Car, 6 cyl., 50-60 H. P. \$4,000

the engine shaft, thereby reducing the vibration to a minimum and permitting the use of a much lighter fly-wheel.

The details of the six cylinder engine are worked out like those on the engine of the Model D.

The same system of ignition is used on Model E, though its six cylinders necessitate the use of a sextuple coil with its corresponding number of accessories.

In place of a single storage battery and a set of dry cells, two storage batteries of three cells each are furnished, one of these batteries being also used to supply current for the electric lights.

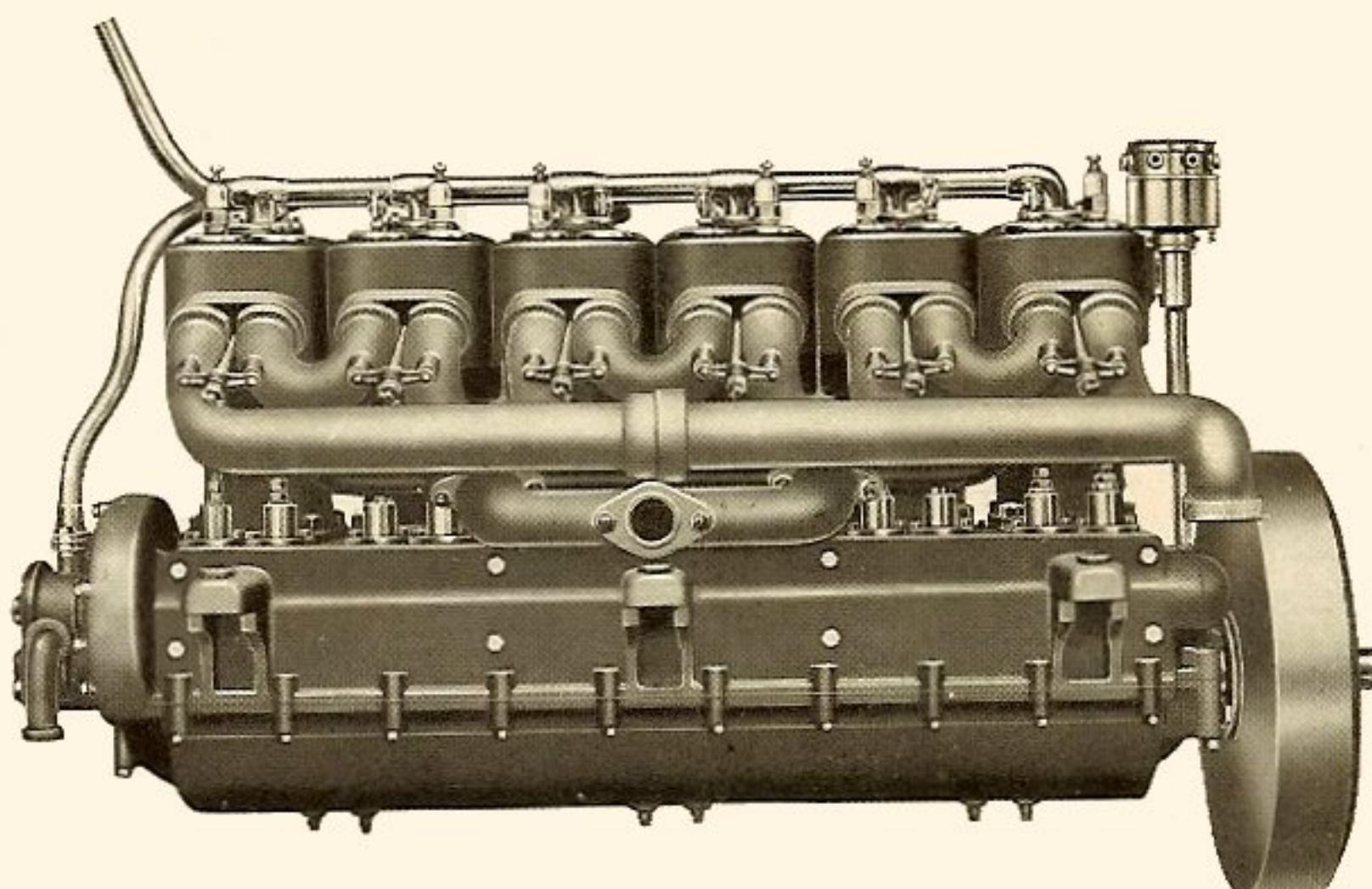
Both batteries are kept charged by the dynamo.

The governor and ball bearing timer are combined in one case, situated on the gear driven vertical shaft attached to the rear cylinder of the engine.

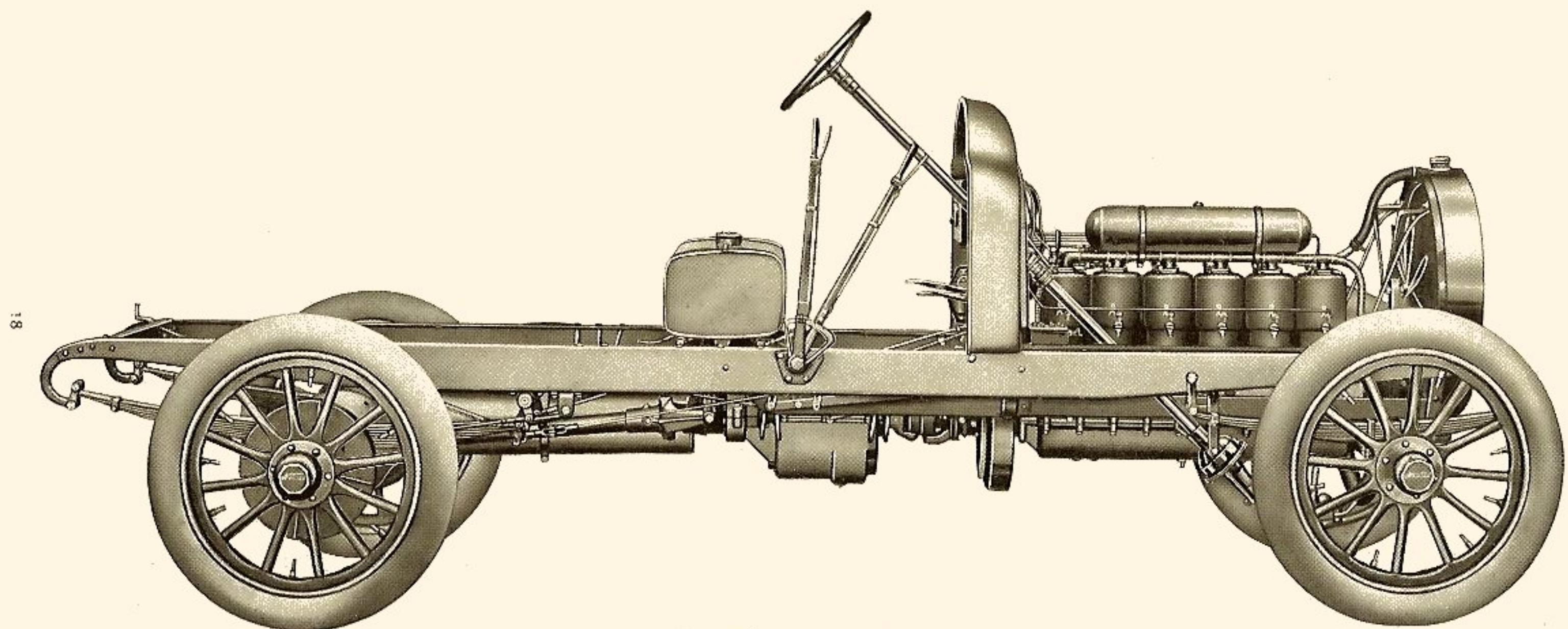
An automatic circuit breaker placed between the dynamo and the batteries prevents the discharge of the batteries through the dynamo when the latter is not generating.

A three point switch on the dash connects the dynamo with either storage battery.

In equipment, Model E is quite like Model D, except that the tires are 34 by $4\frac{1}{2}$ and the side and tail lights are combination oil and electric and the head lights are larger than those on Model D.



National 6 cyl. Motor, 50 60 H. P.



National Model E. Chassis.

SPECIFICATIONS

National

6 CYLINDER—MODEL E—50-60 H. P.

MOTOR—50-60 H. P. six cylinders, vertical, individually mounted under bonnet. Mechanical valves; gear pump, direct driven; gear driven commutator, divided aluminum crank case; interchangeable parts.

CLUTCH—Self contained, aluminum cone, leather faced, spring cushioned.

TRANSMISSION—Sliding gear, three speeds forward and reverse, direct on high. Self contained annular type ball bearings. Gears run in oil.

WHEEL BASE—121 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 Hill Precision oiler, to engine, transmission and rear system.

IGNITION—Sextuple vibrator coil; jump spark, two sets of storage batteries in connection with dynamo.

GASOLINE CAPACITY—Twenty gallons.

WATER CAPACITY—Seven gallons.

WHEELS—Wood artillery pattern, with twelve spokes front and rear.

TIRES—Thirty-four by four and one-half (34x4½) Diamond detachable, wrapped tread construction.

BRAKES—Two systems. Four internal, expanding, metal to metal hub brakes. Hand lever applies one set of brakes in 11x1½ drums. Foot pedal applies second set of brakes in 15x1½ drums. Either brake releases clutch.

GUARDS—Plowshare front. Rear conforms to curve of wheel. Wide running boards connect the guards.

FRAME—Pressed steel 5 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 driver, wheels turn upon double annular type ball bearings, on hollow axle which carries all weight.

BODY—Cast aluminum. Side entrances; removable high back tonneau, platform type, divided front seats, carrying capacity seven passengers, **all facing forward**.

FINISH—Dark blue body, black mouldings with gold stripes.

GEARS—Straw color with black stripes; option—blue with gold stripes.

UPHOLSTERING—Luxuriously upholstered in leather; special spring mattress cushions.

STEERING SYSTEM—Hand wheel, inclined post, worm and gear, non-reversible chuck. Ball joint connections to double connecting rods, front and rear of forged knuckles.

SPEED—Five to sixty miles.

MUFFLER—Concentric perforated cylinders, provided with cut-out.

COOLING SYSTEM—Cylindrical cellular cooler with ball bearing fan. Circulation secured by gear pump.

BONNET—Semi-cylindrical. Removable, hinged at top and sides.

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

SPRINGS—Half elliptic 40 inch front and 56 inch rear.

TOOL BOXES—Under tonneau seat and on right running board.

EQUIPMENT—Five lamps, two parabolic-lens, gas in front, complete with copper tube connection to generator; two mirror lens combination oil and and electric at sides, and combination tail lamp. Horn with tube, storm aprons and tools.

PRICE—\$4,000. F. O. B. Indianapolis. 25% cash with order. Balance draft against bill of lading. Orders filled in rotation.

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 can not 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
150 miles	.	.	2 hours, 52 minutes, 32 4-5 seconds
650 miles	.	.	14 hours, 8 minutes, 51 2-5 seconds
700 miles	.	.	15 hours, 10 minutes, 29 3-5 seconds
750 miles	.	.	16 hours, 20 minutes, 25 2-5 seconds
800 miles	.	.	17 hours, 17 minutes, 26 1-5 seconds
850 miles	.	.	18 hours, 23 minutes, 44 2-5 seconds
900 miles	.	.	19 hours, 44 minutes, 48 1-5 seconds
950 miles	.	.	20 hours, 54 minutes, 50 3-5 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.

