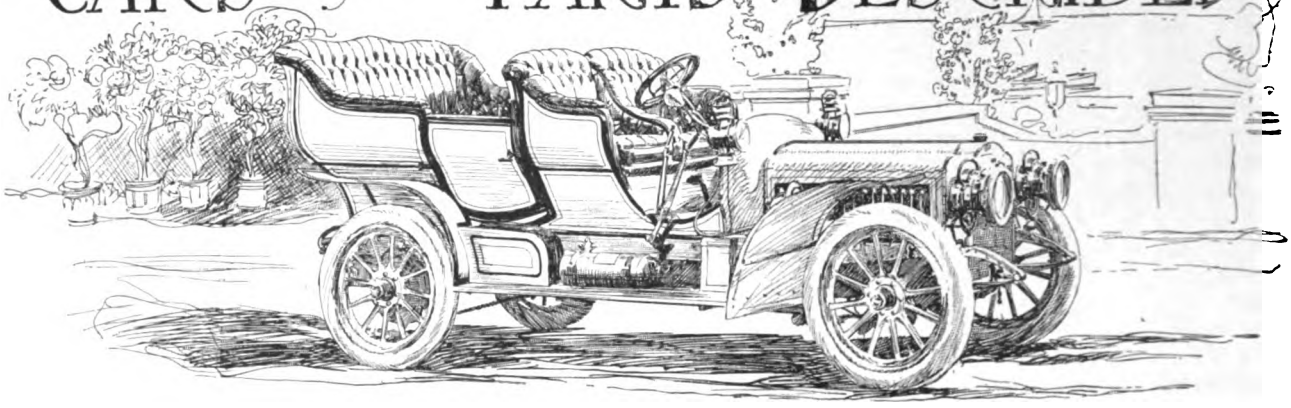
CARS AND PARTS DESCRIBED



THE 1906 THOMAS FLYER, SEATING SEVEN PERSONS

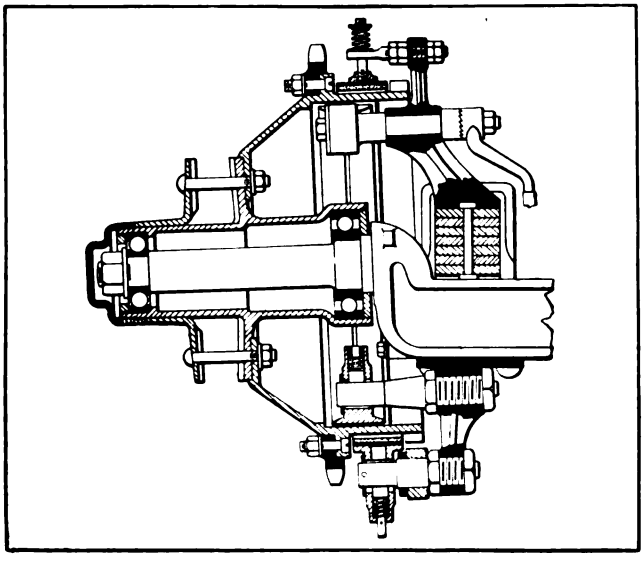
INTERCHANGE OF STORAGE BATTERIES

The New England Motor Company, of Lowell, Mass., has placed upon the market a line of light, inexpensive ignition storage batteries and contemplates establishing depots in the principal cities of the country, whereby the delay ordinarily caused by the recharging of such batteries may be obviated by a system of interchange of discharged batteries for charged ones, by the payment of nominal fees. The batteries, according to the plan, to be interchanged must be of the same series; that is, a 1906 battery will be exchanged for another 1906 battery, while a year-old battery may be exchanged for one of the current year by the payment of a small additional fee, the one obtained in its turn becoming interchangeable with other batteries of the current year. In this way a customer is insured in exchange a battery equal to the one he returns, without having to wait for his own to be recharged. The purchase of a battery of this company, of course, does not necessitate the handling of the recharging in this manner, but it is expected that the system will be voluntarily accepted as the preferable one by customers. The company will cater to motor boat users as well as to automobilists.

THE NEW THOMAS FLYER

Each year the development of Thomas cars has been marked by a decided increase in power and size, and for 1906 there is no exception to the rule, the new 50-horsepower Thomas Flyer being a pretentious vehicle, indeed.

The wheel base is 117 inches and the tread standard. The wheels are 34 inches in diameter, of the usual artillery pattern, are fitted with 4½-inch tires and all run on Hess-Bright ball bearings. All springs are semi-elliptical, 2¼ inches wide and 52 inches long, with 9-inch openings. The spring hangers, front and rear of both sets of springs, are steel forgings, and the rear hangers are so fashioned that they serve to brace the rear frame corners.



THOMAS REAR HUB AND BRAKES

The final drive of the car being by double side chains, the rear axle is stationary, and hence both front and rear axles are I-section drop forgings. The front axle is depressed in the center by a double curve at each side, to give an intermediate level for the support of the springs. The Elliott pattern steering knuckles are integrally forged with the axle, and the stub axles are slightly inclined to give the front wheels a certain amount of rake to facilitate steering. The steering mechanism is of the worm and sector pattern, with the usual connections, including drag link ahead of the axle.

The frame itself is of pressed steel, of the usual channel section, the side bars tapering in depth toward both ends and being curved inward at the dash to give a narrow front end and consequently a wide steering wheel range. There are three cross members in the frame, one at the extreme rear, one at the middle and one between these two. All corners are riveted and braced with the usual gusset plates. There is no cross bar at the front end, as the motor is hung directly on the side bars and it and the radiator frame serve to connect the forward ends of the side bars.

The four-cylinder vertical motor is of equal bore and stroke, 5½ inches, and is rated at 50 horsepower at its normal speed. The four cylinders are cast separately, with the heads, water jackets and valve chambers integral, and with the exhaust and inlet valves on opposite sides, the inlets being on the right and the exhausts on the left. The spark plugs enter the inlet valve chambers horizontally from the side.

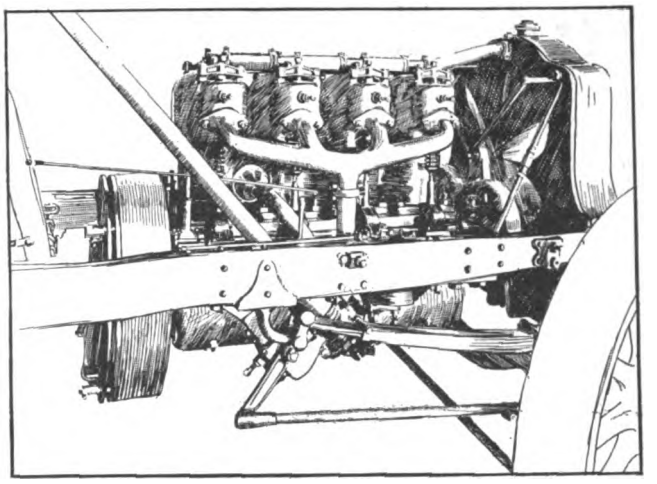
Both the inlet and exhaust valves are mechanically operated, there being a cam shaft on either side driven by partially incased fiber and steel spur gears from the forward end of the motor crank shaft, the drive being direct, or without intermediate pinions. The cam shafts are above the crank case proper, but each cam is provided with an individual cover, the portions of the shafts between these covers being exposed. The cam-engaging rollers are not directly on the bottoms of the push rods, but are on short lever arms pivoted within the cam cases, and acting as intermediaries between the cams and the push rods. The cam shafts run in babbitted bearings lubricated from within the crank chamber, with the exception of the bearings at the forward end, which are oiled from special grease cups. The valves are all interchangeable and are removable through holes in the tops of the valve cham-

bers, which are closed by caps held in place by screw fastened yokes.

The crank case is cast of aluminum and is in two sections, the upper half being the stationary or supporting member, having the arms which support it from the side bars of the main frame. The crank shaft bearings are self-contained within the upper section, so that the lower one is readily removable without disturbing any of the other motor parts. The crank shaft has five bearings, which are babbitted. The connecting rods are steel dropped forgings and at the wrist pin ends are bushed with bronze. The crank pin bearings are babbitted, but the bearings at both ends of the rods are provided with means for adjustment, and both the crank and wrist pins are hollow, for the sake of lightness, to increase the radiation of heat, and to facilitate lubrication. The lubrication of the bearings is by splash, and the two end bearings of the crank shaft are provided with oil wells and chain oilers, while the wrist pin and crank pin bearings receive oil from both the inside and outside. The oil is fed to the engine by a six-lead mechanical oiler placed on the dash board, and driven from the rear end of the inlet valve cam shaft by means of bevel gears and a shafl and universal joints. Four of the oil leads extend to the respective cylinders and the two others to the crank chamber.

The fuel is supplied through a carbureter of the typical self-compensating, float-feed, spray-nozzle variety, it being placed close to the right side of the crank case and its air being obtained from a point between two of the motor cylinders, that it may be somewhat heated before entering the mixing chamber. The mixture passes to the inlet ports through a T-manifold, of cast brass, with four substantially parallel port branches, there being no effort to maintain an equal distance between all cylinders and the carbureter. The final control of the fuel is through a throttle combined with the carbureter and operated by a lever on the steering wheel.

The water-cooling system of the motor is typical, comprising a combined cellular radiator and tank, double gear rotary pump, the usual connections and a belt-driven fan behind the radiator for creating forced draught. The radiator is rigidly mounted, being placed on a pressed steel bottom support and braced by oblique side rods extending from the corners of the radiator to the side bars of the frame. The fan is mounted on a movable bracket which allows for adjustment of the flat belt whereby it is driven from the motor shaft. The pump is driven directly by spur gears from the exhaust cam shaft, being at the middle of the left side of the motor. The circulation of water is from the bottom of the radiator to the bottoms of the water jackets, from the tops of the jackets to the top of the radiator, and thence downward through the radiator.

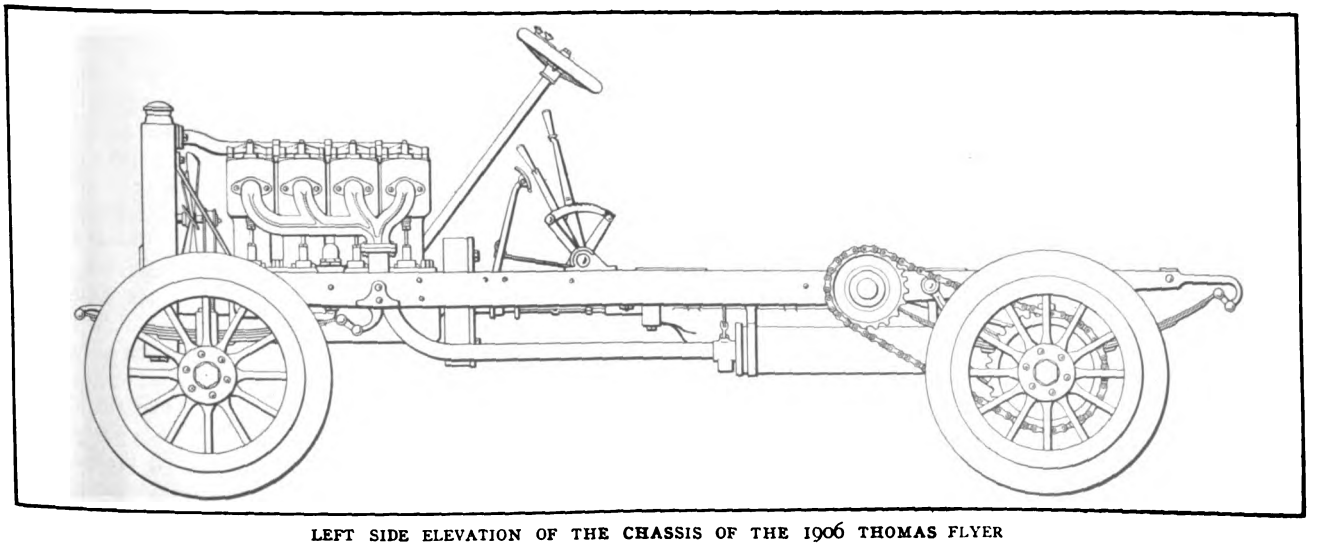


RIGHT OR INLET SIDE OF THOMAS MOTOR

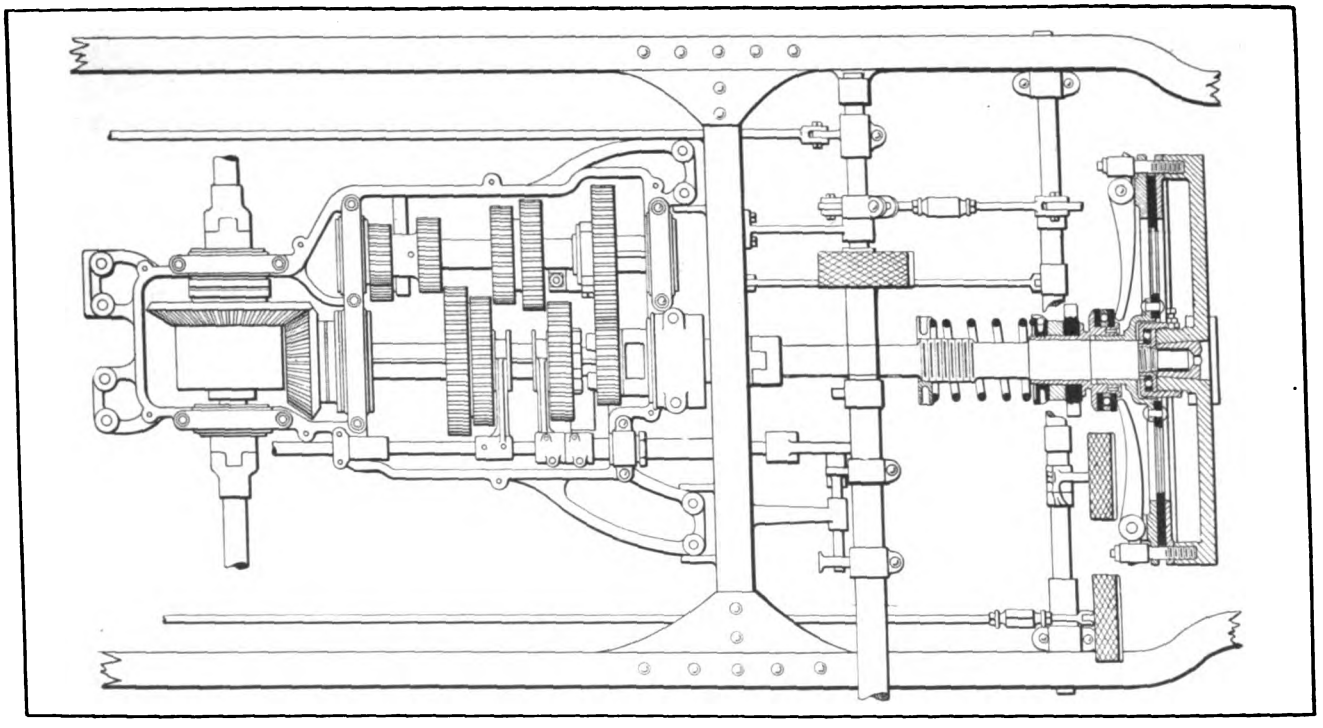
Ignition is by the jump spark system, the current for which is supplied by a storage battery carried on the running board and utilized through a single coil and a combined primary interrupter and secondary distributer, which is placed on the dash board and driven from the rear end of the exhaust cam shaft by means of bevel pinions, a shaft and a pair of universal joints, the same as the oiler. The secondary wires extend over the top of the motor through a fiber tube, and the other wires of the ignition system are inclosed within copper tubes.

The exhaust passes out of the ports through the usual cast manifold, with longitudinal radiating ribs, and thence, by a curved exhaust pipe, to the cylindrical muffler which is under the left side of the frame near the rear. The muffler consists of four expansion chambers through which the exhaust gases pass progressively. There is a foot button-actuated muffler cut-out immediately ahead of the muffler. The motor cylinder relief cocks are directly above the exhaust valve chambers and are actuated simultaneously by a longitudinal rod which extends through the radiator that the cocks may be opened by the operator when cranking the car. A coil spring closes the cocks automatically.

The clutch is of the metal-to-metal plate or disk type and is placed upon the rear of the fly wheel, which is 22 inches in diameter, weighs 120 pounds and is bolted to a flange integral with the motor shaft and also keyed to the taper end of the shaft. The end of the clutch adjacent to the motor shaft is



LEFT SIDE ELEVATION OF THE CHASSIS OF THE 1906 THOMAS FLYER



PLAN, IN PARTIAL SECTION, OF THOMAS CLUTCH, TRANSMISSION GEAR AND INTERLOCKING MEANS

squared and slidable upon it is a hub having a plate or disk of manganese bronze, which near its circumference is interposed between two cast iron rings held by bolts screwed into the rim of the fly wheel. The outer of these two rings is fitted with ears which form pivots for toggle levers, the outer arms of which engage the heads of the ring-holding bolts, and the inner ends of which engage the forward face of a sliding sleeve on the clutch shaft, this sleeve being normally pressed forward by a coil spring behind it, the action thus forcing the three disk members of the clutch together for driving engagement. The clutch shaft sleeve is fitted with a ball thrust bearing between the forward plate, which bears against the toggle levers and its base, and also with diametrically opposite trunnions to receive the usual shifter yoke whereby the sleeve may be moved backward against the tension of the springs to release the clutch, in which instance the separation of the disks is facilitated by small coil springs. There is also a ball thrust bearing on the end of the fly wheel shaft to take the pressure of the main clutch spring.

The sliding gear transmission is of the selective system, in which it is unnecessary to pass successively through the different speeds in changing from one to another. It provides four forward speeds and a reverse, with direct drive on the high speed. There is a loose jaw connection between the clutch and the main shaft of the transmission gear, to compensate for any slight misalignment between the engine and gear case. There are three sliding gears on the squared extension or second section of the main shaft, the two rear gears of which, when shifted by the rear shifter arm into engagement with the three rear gears on the secondary shaft, furnish the first and second forward speeds and the reverse being thus obtained from the forward or clutch-driven end of the main shaft, through the forward gear on the secondary shaft and the respective sliding gear combinations back to the rear section of the main shaft. The high or fourth speed forward is obtained by shifting the third forward speed sliding gear ahead so that a jaw clutch on its hub engages with its corresponding member on the initial main shaft pinion. When this connection is made a secondary shifter, interlocking with the sliding gear shifter, moves the forward gear on the secondary shaft ahead, out of mesh with the initial main shaft gear, so that on the high speed drive there are no gears in mesh or running. This action has been a feature of Thomas cars for 3 years. Both of the sliding gear shifters are, of course, operated by a single lever in a gridiron quadrant.

All gears are cut from forged steel blanks and hardened and are of number 6 pitch and of 1¼-inch face. The ratio of speeds relative to the direct drive is 3.5 for the first speed, 2.1 for the second, 1.7 for the third, while the reverse is a trifle slower than the first speed forward. The system is, of course, provided with interlocking mechanism between the transmission set and the clutch whereby it is impossible to shift the gears when the clutch is not disengaged, or to apply the clutch before the gear change has been completely made.

The gear case is of aluminum, and cast in two sections, the lower of which is provided with two widely spread arms at the front and two arms at the rear close together, so that the support, by these arms resting in bucket seats on the frame cross-bars, gives a compromise between a three and four-point suspension. The bearings are contained within the lower half of the case and all are of the Hess-Bright ball bearing type. The upper half of the case is provided with an easily removable inspection plate. At the rear of the speed changing set, and in a separate compartment, are the bevel pinion and gear whereby the power is transmitted to a spur gear differential on the transverse counter shaft, which also runs on Hess-Bright ball bearings. Immediately outside of the case this shaft is provided on each side with tongue and groove universal joints to compensate all misalignment due to frame stresses. The sprockets at the outer ends of the counter shaft are dished, that the chain pull may come directly over the center line of the ball bearings supporting the ends of the shaft. On the rear axle, also, the chain pull is so arranged that it is between the two hub bearings in each instance.

There is no brake on the transmission, but there are two brakes on each rear hub, one being an external clamping brake and the other an internal expanding brake operating on

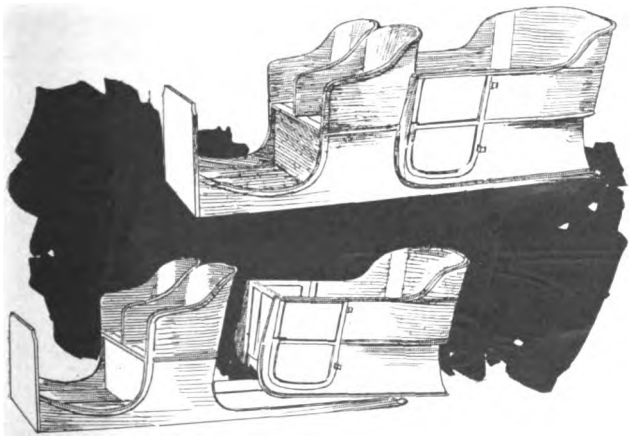
the same drum. The drum, in each instance, is bolted to the hub and carries the driving sprocket. Both brakes are supported by a bracket depending from the stationary rear axle, each being sustained on transverse horizontal studs which connect with the brake rings through coil spring connections that tend to release the brake bands when they are thrown out of engagement. The internal expanding brake, which is pedal operated and is the brake of ordinary usage, is of the metal-to-metal type, while the external clamping brake comprises a leather-lined steel band that is contracted upon the drum. This brake, which serves as the emergency, is operated by the usual side hand lever. In addition to the coil spring to release the external brake band, there is above the drum another coil spring which tends to keep the band from resting upon the drum by its own weight. Both brakes are provided with means of adjustment for wear, and in the case of both sets there is a compensating lever connection whereby the pressure of brake application is equalized upon the corresponding brakes of both wheels.

The body of the car is similar to that of the 1905 Thomas, but it is more roomy, has wider side doors and more catchy body curves. As previously, it is built of sheet steel, while the dash, which is of the curved or overhanging pattern, is of cast aluminum. There are the usual large mud guards connected by running boards. The car seats seven persons, there being in addition to the stationary rear seat two collapsible revolving seats in the tonneau.

BORBEIN BODIES AND GEARS

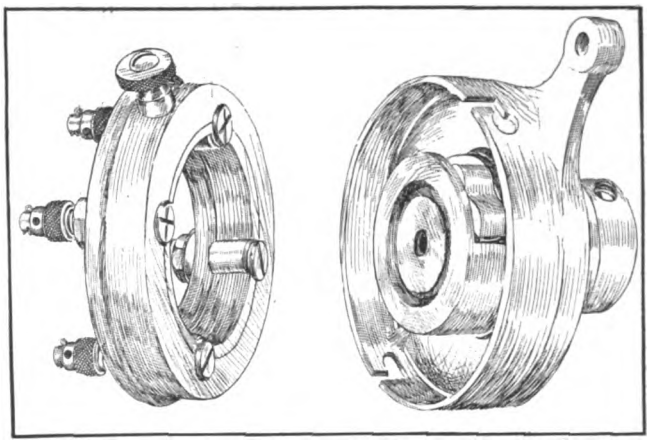
The illustration shows one of the numerous stock patterns of motor car bodies manufactured by H. F. Borbein & Company, 2109 North Ninth street, St. Louis. The peculiarity of this particular body is that it is a side-entrance tonneau of approved design with the rear seats detachable, that the car to which it is fitted may be used also as a runabout. The front seats are of the individual pattern, and the body proper is fitted with a bottom which is finished, while there is also a separate bottom in the tonneau portion, so that the passengers in the latter will not mar the paint on the original body, which is thus always presentable when the tonneau is removed. The doors have polished brass hinges and door handles. The length of the body at the bottom is 92 inches and the width 36 inches. The body is furnished either with or without a wood frame in front of the dash.

In addition to the several patterns of stock bodies, the company is prepared to manufacture bodies from special de-



BORBEIN SIDE ENTRANCE BODY

signs, and also furnishes, either with bodies or without, pressed steel running gears ready to receive the power plant. In one of the standard touring car patterns, the gear furnishes a track of 56 inches and a wheel base of either 94 or 100 inches. The front axle is 1¼ inches square, with the semi-elliptic springs attached by wrought iron hangers. The wheels are ordinarily 30 inches in diameter, with artillery hubs, hickory spokes and felloes, and with steel rims shrunk and bolted to the felloes ready to take the tires. Other sizes of wheels will be furnished upon order. All wheels have polished brass hub caps. The rear axle is of the live type with bevel gear final drive, encased and ready for the attachment



THE YOUSE IGNITION TIMER SEPARATED

of the propeller shaft. The ratio of the gearing on the rear axle is three to one, and the gear teeth are all of number 6 pitch. The live axle itself is 1½ inches in diameter and runs within a heavy steel sleeve that joins the vertically-split differential case on either side. The steering gear is of the worm-and-sector pattern and the steering knuckle drag link is ahead of the front axle, which is depressed in the middle. The frame itself is of standard pressed steel construction, with corners riveted and braced with gusset plates. Intermediate cross bars will be placed to suit specifications.

YOUSE IGNITION TIMER

The illustration shows the ignition timer manufactured by E. S. Youse, of Reading, Pa., which is made in patterns for one, two, three and four-cylinder motors, the four-cylinder motor pattern being the one illustrated. The chief feature of the timer is a wipe contact obtained between a hardened tool steel pawl and hardened tool steel contacts, the pawl being so arranged that it can be readily reversed that the timer may be operated in the opposite direction without alteration.

The main body or casing, on which is the arm for attachment of the exterior means whereby the spark lead or timing is accomplished, is of aluminum and fits over an insulating core of hard fiber. Centrally within the case, and consequently also centrally within the annular insulating member, is a phosphor-bronze spindle and pawl carrier, the pawl being held in a peripheral recess by a pin which pivots it at one end. The free end is pressed outward by a coil spring to insure its engagement with the contacts. Within this central spindle is a cavity containing an oiling wick which projects through a radial hole to lubricate the rotating parts. The contacts are tool steel bushings held by the binding screw studs and furnished with screw-driver slots, so that they can be turned in their seats should the originally exposed faces become worn.

MOTOR CAR LITERATURE

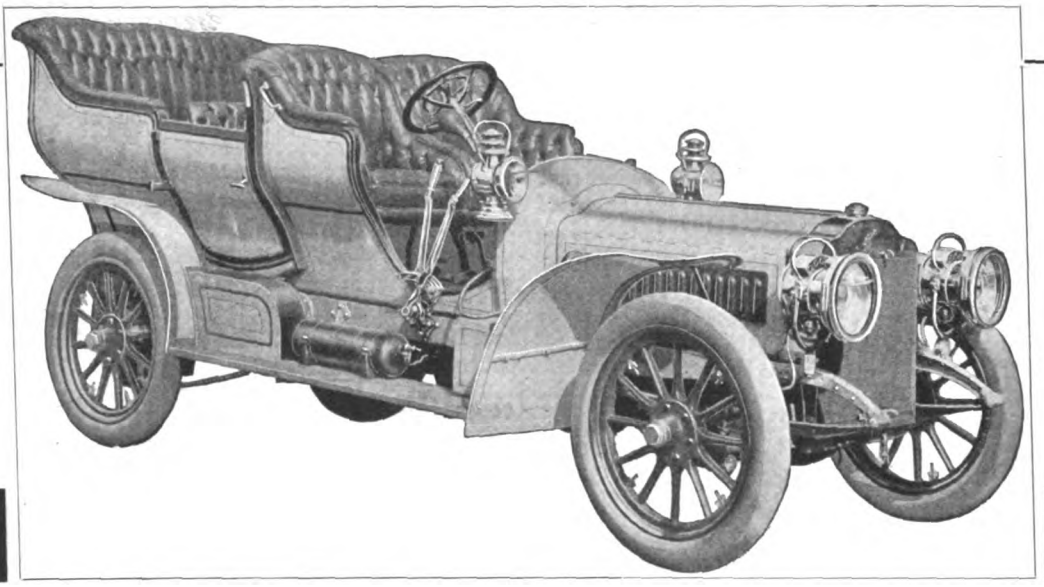
Interesting information concerning the use of gasoline is contained in a booklet issued by Charles A. Vuilee, Huntingdon, Pa., in explanation of the purpose and use of his special gasoline hydrometer.

The Chadwick touring car, which was recently described in THE MOTOR WAY, is exhaustively illustrated and explained in a catalogue just issued by the Fairmount Engineering Works, of Philadelphia.

THE NEW THOMAS

Greatly Exceeds My Most Sanguine Expectations

EXPERTS SAY IT IS A WONDER



No customer is so critical or hard to please as the manufacturer, who, regardless of cost, absolutely determines to do his utmost to build the best car in the world.

But, when an ordinary Stock Touring Car, without special preparation or intention, runs sixty miles an hour on the level and climbs a 10% grade on the high speed at forty miles per hour, within an hour after it first leaves the shops, it is something that not one car in a thousand will do.

Under favorable conditions, we should do sixty-five miles an hour.

I am more pleased than ever with its speed, hill climbing, quiet operations and mechanical superiority, and cordially urge disinterested Automobile experts everywhere to rigidly investigate our claims and compare our material; workmanship and design with the highest priced cars in the world—we will win the verdict.

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