AN ENGINE WITH LOW-TENSION MAGNETO IGNITION.

The engine of the 35-horse-power Locomobile touring car, which is shown in the accompanying illustration, is a typical example of a 4-cylinder, vertical, water-cooled engine fitted with the simplest type ignition, namely, make-and-break, fed by current from a gear-driven magneto. The igniters are shown in the inlet chambers of the four cylinders as at *b*, while they are all operated by vertical rods, *c*, that are pushed upward by tapered cams in the crankcase, and that make a sudden descent in slipping off the cam and being pulled downward by a spring. This causes the hammer, *H*, of the igniter to be suddenly moved away from the anvil, *A*, thus breaking the contact between the points and making a large, flaming spark. The whole igniter mechanism fits in a plate, *P*, having a ground tapered seat, and which is attached to the inlet chamber by three nuts. Besides this, the insulated pole, or anvil, is made up of a separate mica plug, *C*, having a tapered steel sleeve, *B*, which fits in a tapered hole in the plate and makes a gas-tight joint. *B* is provided with a thread, *s*, that carries a large clamping nut. Washer, *w*, and nut, *n*, clamp together the mica washers that make up the core, *C*. The iridium points are set into the small arms of the anvil, *A*, and the hammer, *H*, through tapered holes in the ends of these parts. The points are then brazed into place, and the holes behind them are filled. Loss of the points is therefore impossible, and the wear upon them is so slight that each set will easily last for 10,000 miles. In the photo of the engine *a* is an insulated handle that operates a small knife switch and cuts out the igniter. These are fitted to all four igniters and are used for the purpose of testing. The four caps, *o*, seen over the inlet valves, are for the purpose of allowing these valves to be removed, if it is necessary to grind them at any time. The valve springs are attached to the valves by passing through holes in the latter. The same arrangements are duplicated on the exhaust side of the motor. The gear-driven magneto is seen at *M*, the carbureter at *C*, the auxiliary piston air valve (which has a special type of very sensitive coiled spring) at *A*, and the inlet pipes to the cylinders at *B*. At *d* is the pivot which connects the rod that runs forward from the piston throttle valve of the carbureter to the lever arm of the governor. By pressing on the accelerator pedal, *X*, the driver can throw the governor out of action.

The fan belt is shown at *e*. *O* shows a number of oil pipes that come up from the oiler (placed below the footboard and driven by a wire belt) and connect with a row of sight feeds on the dash, whence they lead to the crankcase of the engine and other points that need oiling.

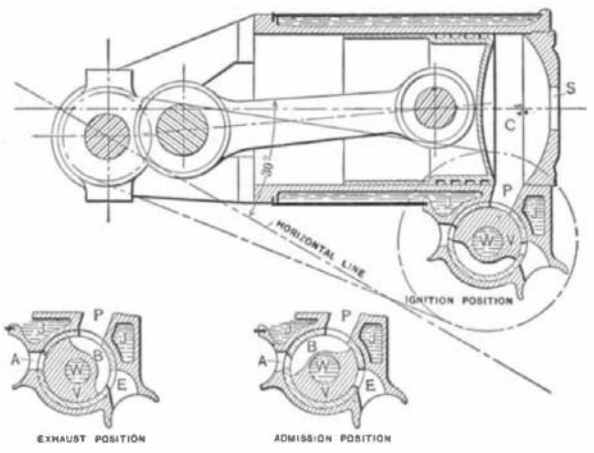
The magneto used on this car is made by the manufacturers of the latter. The magnets employed in its construction are of the very best quality obtainable, and will hold their magnetism for a very long time. All the working parts of the magneto are thoroughly protected.

The 20- and 35-horse-power models which the Locomobile Company is building this year, both have a final individual chain drive, and are fitted with Hess-Bright ball bearings in the wheels and transmission. All the features of a high-class car, such as pressed-steel frame, alloy steel in shafts, gears, and many other important parts, are found in the 1907 Locomobile touring car. The general appearance of this machine can be noted from the photograph reproduced on page *33*

AN AUTOMOBILE MOTOR WITH ROTARY VALVE.

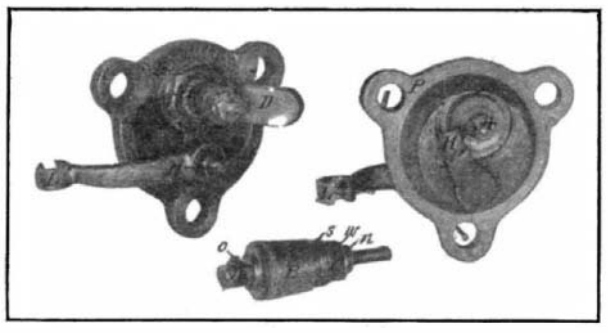
The Duryea Power Company exhibited for the first time, at the recent show in the Grand Central Palace, a decided innovation in the form of a rotary-valve triple-cylinder engine. Mr. Charles E. Duryea has been experimenting with this device as opportunity permitted for the last four years, and has been marketing it regularly to a limited extent during the past season. His experience with it thus far has been so satisfactory that he intends to push its manufacture more vigorously hereafter. This valve, as can be seen from the drawing, consists of a single revolving shaft having three

(*Continued on page 52.*)



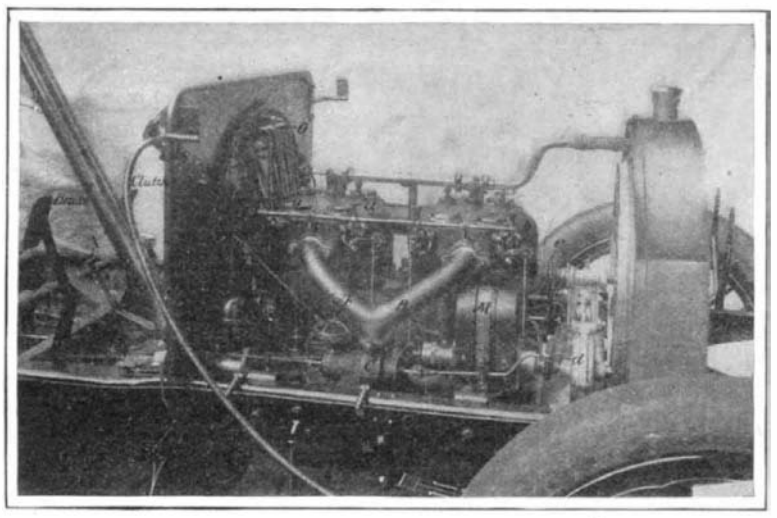
WATER-COOLED ROTARY VALVE APPLIED TO A 3-CYLINDER DURYEA ENGINE.

A. Inlet port from carbureter. *B.* Cut-away part of valve. *C.* Cylinder. *E.* Exhaust port. *J.* Water jacket around valve. *P.* Inlet port of cylinder. *V.* Rotary valve. *W.* Hole in valve for water. *S.* Spark-plug hole.



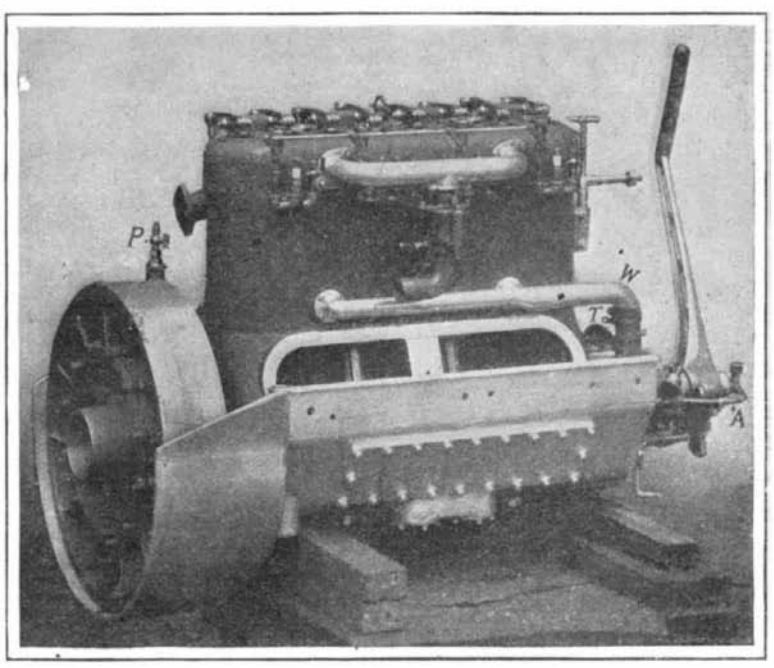
MAKE-AND-BREAK IGNITER OF THE LOCOMOBILE ENGINE.

A. Anvil. *B.* Tapered sleeve surrounding mica insulating core, *C*. *D.* Connector from insulated pole to knife switch. *H.* Hammer of movable electrode. *L.* Lever for operating hammer. *P.* Plate carrying complete igniter. *o.* Iridium point set into anvil, *A*. *s.* Thread on sleeve *B* for large nut. *w, n.* Clamping washer and nut for core, *C*.



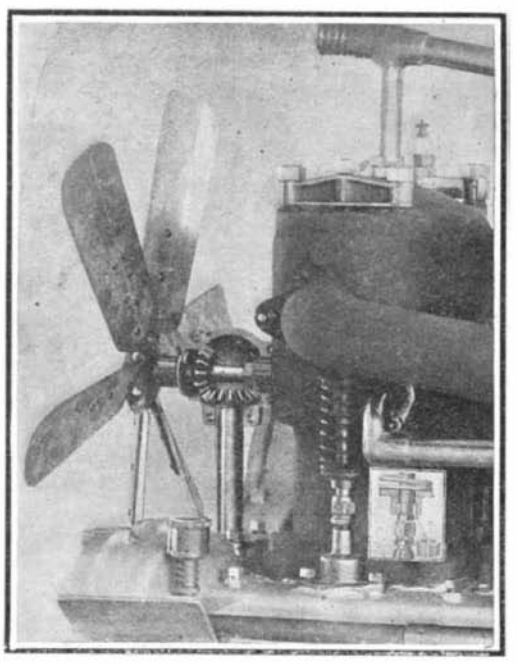
FRONT END OF CHASSIS OF LOCOMOBILE 35-HORSE-POWER TOURING CAR.

A. Auxiliary air valve of carbureter. *B.* Inlet pipe. *C.* Carbureter. *M.* Magneto. *O.* Oil pipes. *X.* Accelerator push pedal. *a.* Knife switch for igniter. *b* Make-and-break igniter. *c.* Igniter operating rod. *d.* Governor lever arm connection to throttle. *e.* Fan belt. *o.* Valve cap.



THE 50-HORSE-POWER 5 X 5½-INCH ENGINE OF THE NORTHERN TOURING CAR.

Note the air-operated clutch inclosed in the flywheel and the lever starting device used in place of a crank.



FRONT END OF THOMAS ENGINE, SHOWING BEVEL-GEAR-DRIVEN FAN.

The small sectional drawing shows method of securing valve-spring washer in place on stem by a split ring fitting into a groove on the valve stem. This simple device makes the valve spring instantly removable by prying up the washer.

ENGINE OF THE 60-HORSE-POWER THOMAS CAR.

Progressive manufacturers have sought to improve their cars for this year not only by using the best materials, but also by doing away with all features which experience has shown are liable to break down, give out, or otherwise cause trouble. Water circulating pumps have been gear-driven instead of chain-driven for some time past, and now the tendency is to do away with all belts whatsoever. This tendency is illustrated well in the accompanying photographs of the Thomas engine, which show a fan driven by bevel gears, a spiral spring (not shown) being interposed in the drive. On the opposite side of the engine is a gear-driven, high-tension magneto, while the shaft seen at the bottom of the picture driving the gear water pump is extended back through the dash (the extension having two universal joints) and used to drive a new spark generator (Atwater-Kent device) consisting of a spark coil with mechanically-operated contact arrangement and secondary distributor, which draws its current supply from four dry batteries. This contact produces a single spark only, while the contact is so very short that an almost infinitesimal current flows each time and, as a consequence, one set of dry batteries will run a 4-cylinder car from 2,500 to 3,000 miles. A special button on the containing case makes it possible to jump a spark in the cylinder that is on compression and thus, oftentimes, to start the motor from the seat. The magneto is used as the regular ignition supply, while the device just described serves as a reserve.

The lubricator, also, is driven by bevel gears. Its horizontal shaft projects through the dashboard, and a vertical shaft rises up from the engine base to drive it. There is no commutator or timer on the car, as both the magneto and generator mentioned are gear-driven and properly set.

THE 50-HORSE-POWER NORTHERN ENGINE.

The Northern 50-horse-power 5 x 5½-inch, 4-cylinder engine is a solitary example of an engine having cylinders and upper half of crank case formed of one integral casting. Another novelty about this engine is that the water jackets are galvanized, thus preventing rusting. The valves are arranged in a row in the cylinder heads and are operated by tappets and push rods from a single camshaft. This camshaft is provided at its rear end with a crank for operating the piston of an air pump the top of which is provided with a valve, seen at *P*. A connection can be made here for blowing up the tires, though the prime purpose of the pump is to provide air at 50 pounds pressure for operating the clutch and band brakes on the rear wheels. This compressed air, reduced to 2 pounds pressure, also forces gasoline from the tank to the carbureter. The air for the clutch is led through a curved pipe, *A*, into the hollow crankshaft at its forward end, and passes through the latter to the clutch (seen in the flywheel) where it presses together a floating leather disk and another attached to the flywheel, clamping between them a steel disk on a stub shaft attached to the propelier shaft through a universal joint. The power is applied to the wheels through a 3-speed transmission located at the rear axle. The bottom half of the crankcase is an aluminium casting with flaring sides that abut against the sides of the frame and are bolted to them. This casting contains an oil reservoir with inlets to the crank case controlled by a float-operated valve which is depended upon to automatically maintain the proper oil level in the case. The lubrication is entirely by splash. The upper crank case has large hand holes through which the bearings can be readily adjusted. By extending the lower crank case to the frame, Mr. Charles B. King, the designer of the Northern car, has completely closed in the engine without using a sep-

(*Continued on page 53.*)