IGNITION DEVICES FOR MOTORS

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WITH A CHAPTER

TREATING SPECIALLY OF

STRUCTURAL DETAILS, CHOICE, AND MANAGEMENT OF AUTOMOBILES

By S. R. BOTTONE

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ILLUSTRATIONS.

CHAPTER I.

Choice and Management of Automobiles.

MOTOR cars, tri-cars, and motor bicycles present so much matter of interest, and are entering so largely into our every-day life, that every one should have some knowledge of the principles of their construction. This knowledge, even though it be elementary, is absolutely necessary to the would-be purchaser, otherwise he may be led astray in the choice of a car by its outward appearance, instead of directing his attention to those essentials on which the proper working and convenience of manipulation depend. Although modifications and improvements are being continually introduced, yet the main features of the propelling arrangements adopted by nearly all automobile manufacturers are based on the practice of the leading makers in France, where, owing to the freedom from irksome restrictions on the road, the art of constructing and working light, powerful motors, actuated by petrol, alcohol, steam, or electricity, has reached a higher level of perfection than perhaps in any other country.

The first essential in an automobile is the power of travelling, and this power it obtains from the engine. The type of motor now almost universally adopted for the propulsion of automobiles is a modification

of that known as the "internal combustion engine." In this the power is derived from the explosion of a mixture of air and petrol vapour confined in the upper portion of a cylinder, in which travels a piston, connected by a crank to a fly-wheel, and other accessories. Petrol is an extremely volatile spirit (a hydro-carbon), obtained from petroleum by distillation. Being so volatile, it evaporates readily, and forms with air a gaseous mixture, which can readily be ignited by the electric spark. On being thus fired, it explodes, great heat and consequent expansion occurring at the same time. If, before allowing ignition to take place, the gaseous mixture be compressed, the force of the explosion is much exalted—hence, greater power is obtainable from the explosion. For this reason, in all modern gas and petrol engines, great attention is paid to obtaining a proper amount of compression before firing the mixture. The explosion is made to take place by means of a "timed" electric spark when the compression of the gaseous mixture has reached a certain predetermined point.

We reproduce two outline illustrations of a typical petrol motor (Figs. 1 and 2), in order to enable the reader to follow out the principle on which such engines act, and this principle remains the same in all, although modifications are to be found in the constructional detail of the engines turned out by the various makers. We may here mention that the fly-wheel which is shown at the back of the lower portion of Fig. 1, and to the right of Fig. 2, is usually outside the case of the engine itself; but in some of the smaller motors of the cycle pattern, it is itself

enclosed, the spindle alone projecting. Fig. 1 is a front section, and Fig. 2 a side view, of the ordinary petrol motor—in which 1 is the cylinder, 2 the cylinder cover, and 3 the chamber containing the crank. This chamber is fitted with two covers, 4 and 5, the latter of which has on it a box, 6, whence arises a stud, 7, carrying a sleeve, 8, whereon is formed the exhaust-valve cam. To this sleeve is keyed the gear-wheel, 9, which is driven by a pinion, 10, fastened to the crank-shaft, 11. Since the number of teeth on the gear-wheel, 9, is twice that of those on the pinion, 10, it revolves at *half* the speed of the crank-shaft, thus operating the exhaust-valve at every alternate in-stroke of the piston. At 12 is the piston, which is furnished with three metal rings, 13, which enable it to make a gas-tight fit in the cylinder; and 14 is the connecting-rod, fitted with brasses at each end. The valve-box, 15, is cast on the side of the cylinder, and communicates with the combustion chamber, 16, by the port. The valve-box has a water-jacket in communication with the water-jacket, 29, 30, of the cylinder, which device prevents the valve-seatings becoming unduly heated. At 17 is an inlet-valve which is automatic in its action, opening by the suction of the piston, against the light spring, 18. A stronger spring, 20, controls the exhaust-valve, 19, which therefore resists the suction stroke, but is lifted from its seat at every second revolution of the engine by the cam on the sleeve, 8. This cam raises the roller, 21, on the bell-crank lever, 22, pivoted at 23, the other end of the bell-crank lever having the push-rod, 24, jointed to it. This rod serves to lift up the exhaust-rod at the right times. The gear-wheel, 9, is made