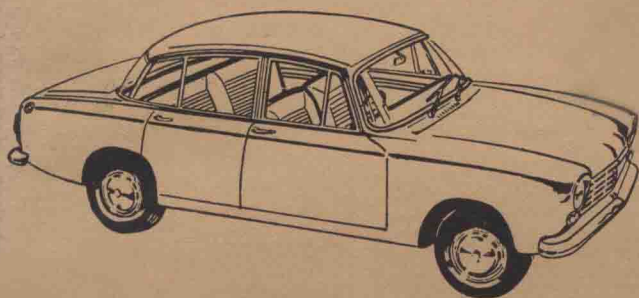


THE

Motor Car

英语科普注释读物



汽车

THE

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上海译文出版社

注释者的话

本书是一本简易英语科普读物，选自英国 Wills & Hepworth 公司出版的科普小丛书 How It Works，编写者为 David Carey。

本书简单介绍了汽车的基本构造和工作原理，附有插图，可供我国读者学习科技英语参考之用。

为了便于读者学习，我们对原文中的习惯用语、技术术语以及较难的句子，均加注说明，有些还进一步略作语法分析。书中的汽车专业术语，我们是参照目前国内通用的有关专业书籍加以译述的。由于我们水平有限，注释中难免有错误不当之处，欢迎读者批评指正。

1978 年 11 月

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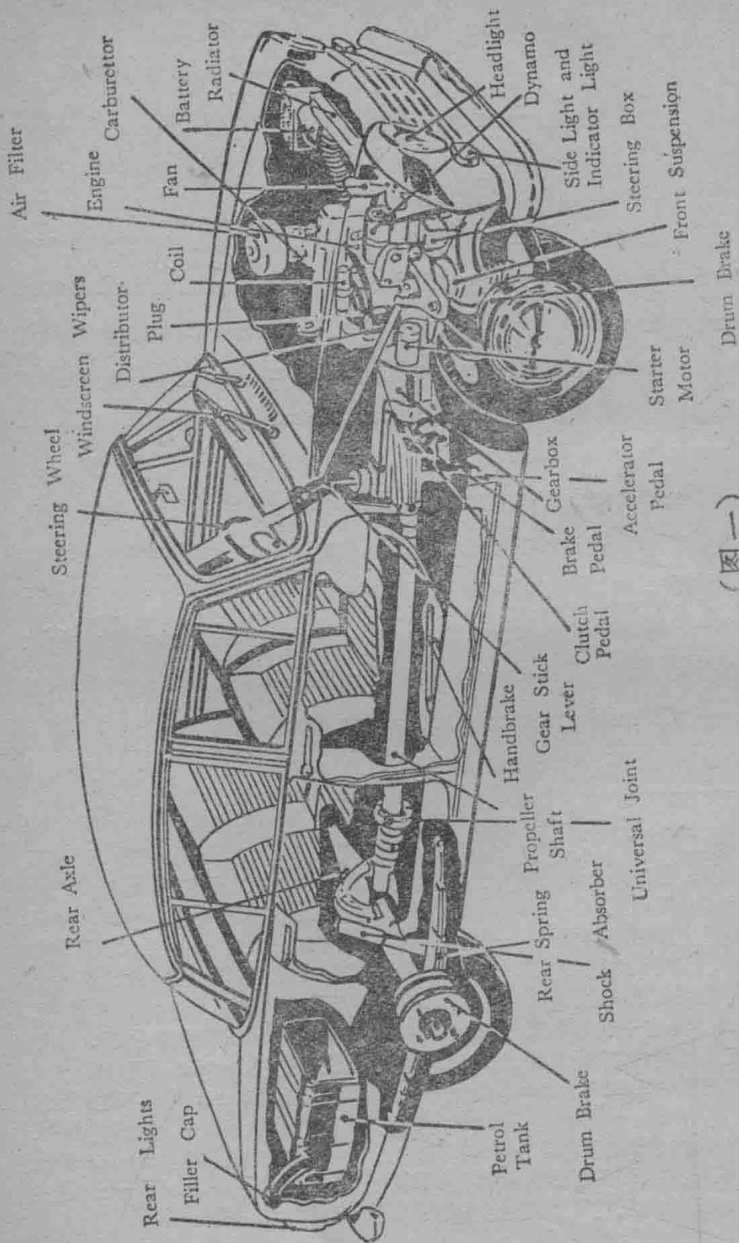
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How it works: The MOTOR CAR*

The motor car is a form of mechanical transport and it is composed of¹ many different working units and parts. To provide the energy to make it go², it has an engine which in turn³ needs electric current, petrol and air. The engine needs cooling so that it does not become too hot, and oil to lubricate the bearing surfaces.⁴

Also, there is the transmission system of clutch, gearbox, propeller shaft and axle, which transmits the power from the engine to the wheels to move the car along the road.⁵ Steering mechanism⁶ is needed to guide the car in the right direction, brakes to slow it down and stop it⁷, and suspension to smooth out⁸ most of the bumps and jolts.

*汽车的工作原理。1. 由……组成。2. 为了提供驱动它行驶的能量。动词不定式短语，作状语，说明目的。其中，又带了一个不定式短语 to make it go; 该短语是作定语用的，修饰 energy, it go 是 make 的复合宾语，make 的宾语后面的不定式(如这里的 go)一般不带 to。3. 依次；相继。4. 发动机需要加以冷却，以免机体温度过高；同时，它还需要机油来润滑轴承支承面。这里 so that 所引导的是一个目的状语从句，oil 和 cooling 并列，是 need 的宾语。5. 此外，还有一个由离合器、变速器、传动轴和驱动桥组成的传动系，它把发动机发出的动力传给车轮，使汽车在路上行驶。注意：which 所引导的非限制性定语从句是修饰 transmission system，而不是修饰 axle 的；不定式短语 to move the car along the road 在从句中作结果状语。6. 转向机构。7. (需要有)制动器来减速和停车，brakes 后面省去了谓语动词 are needed，在并列分句中，如后面分句中有与前面相同的部份，常可省略。下一分句中 suspension (悬挂)的后面同样也省略了 is needed。8. 消除。



(圖一)

A sectioned view⁹ of a typical car is shown on the preceding page and from this you can see how some of the major units fit into the general design¹⁰. In the pages that follow¹¹ we will examine each unit in turn and find out how it does its job. The engine is the most complicated unit, and several pages are used to describe simply and clearly the various operations and systems that combine to make it work¹².

The Electrical System*

Every petrol-engined car needs electricity to provide current for the lights and other electrical equipment, and to supply the necessary power for the ignition system.

The ignition system enables the engine to be started and kept running¹³, and sparking plugs¹⁴ form an essential part of this system. They are screwed into the engine at, or near, the top, usually one sparking plug for each cylinder.¹⁵ A four-cylinder engine therefore has four sparking plugs, a

9. 剖视图. 10. 从中可以看到一些主要部件在总体设计图上是如何合理布置的. how 所引导的名词性从句在句中作 see 的宾语. 11. 在后面几页中. 12. 结合在一起使发动机运转的(各种工作过程和设备系统). that 所引导的定语从句同时修饰 operation 和 systems.

* 电气设备. 13. 点火系使发动机能够起动并持续运转. to be started and kept running 这两个被动结构的动词不定式和名词 engine 一起, 作谓语动词 enable 的复合宾语. 14. 火花塞. 15. 它们从发动机的顶部或顶部附近旋入; 通常每个汽缸有一个火花塞. usually one sparking plug for each cylinder 是“名词+介词短语”型的复合结构, 在句中作方式状语.

six-cylinder engine six sparking plugs¹⁶, and so on. As the name suggests¹⁷, the purpose of a sparking plug is to make a spark, and this spark is achieved by making the electric current jump a gap between two points (known as 'electrodes') which are at the extreme end of the plug which is inserted in the cylinder¹⁸.

The spark ignites the fuel/air mixture in each cylinder, and very rapid burning and expansion results¹⁹. This process is called 'combustion' and it takes place in the 'combustion chamber'²⁰. It will be explained later just how this combustion fits into the operation of the engine.²¹

Electricity for the igniting process (ignition) is supplied by a dynamo and battery. The current is then carried to a coil (page 7), then to a distributor (page 9) and finally to the sparking plugs.

The Dynamo and Battery*

Our homes and towns are supplied with electricity which is generated in great power stations²². In a motor car the dynamo is the power station. It is usually driven by a belt

16. 六缸发动机有六个火花塞. engine 后面省略了谓语动词 has (参见第一页注 7). 17. 顾名思义. 18. 火花塞是插在汽缸内的, 塞体的下端有两个(一般称之为“电极”的)端点; 让电流击穿这两端点间的空隙, 就产生了这种电火花. 19. 引起极为迅速的燃烧与膨胀. burning (动名词) 和 expansion 在这儿是作为一体看待的, 所以谓语动词用 results. 20. 燃烧室. 21. 至于在发动机的工作循环中, 如何适当地安排这个燃烧过程, 后面会加以阐明的. it 是先行代词, 在句中作形式主语, 真实主语是 how 所引导的主语从句.

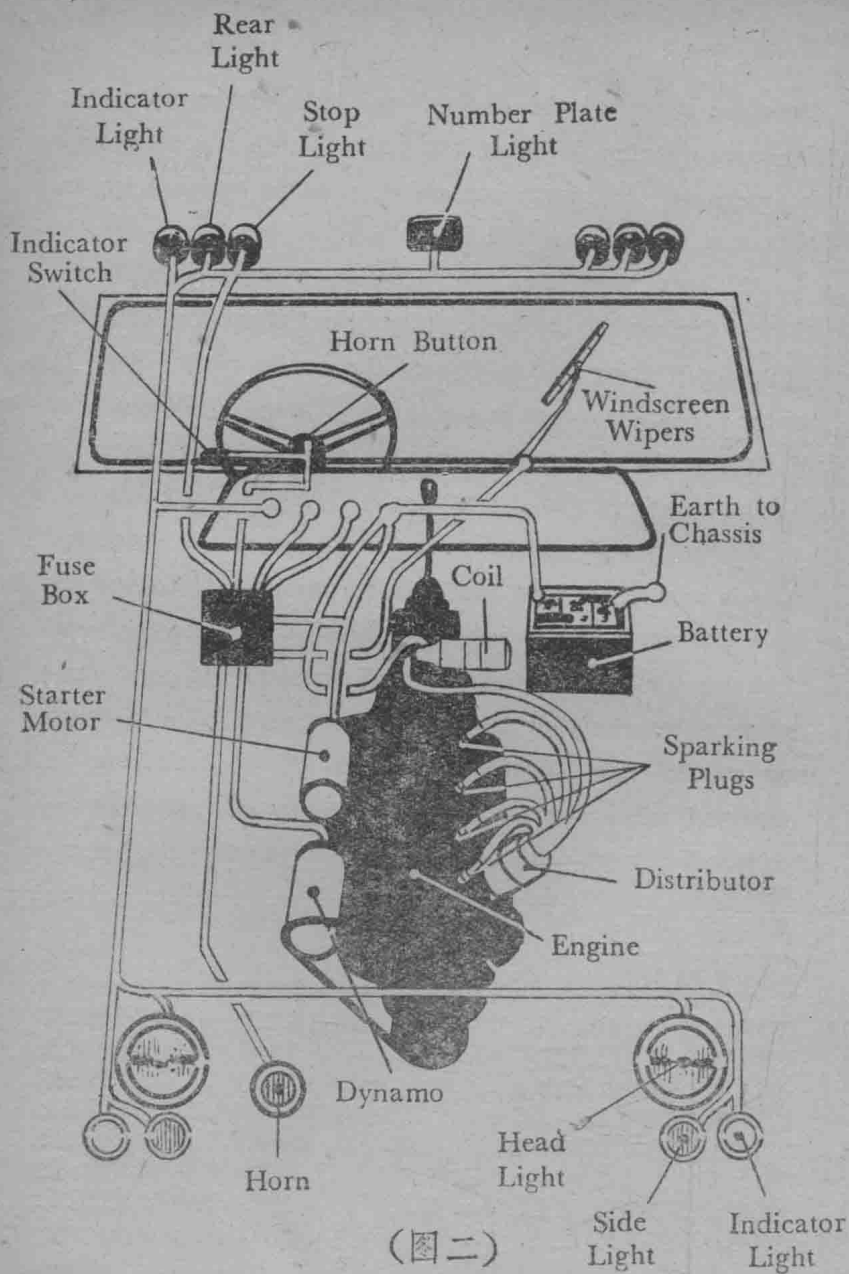
* 发电机与电池. 22. 发电站.

from the front of the engine, and only works when the engine is running.²³ When the engine is idle, no electricity is generated. On some cars the dynamo is replaced by an alternator but its function is the same.

Without electricity the ignition system would not work.²⁴ the car could not be started, and there would be no lights for parking or for driving the car at night. This is where the battery does a useful job.²⁵ It provides a means of storing electricity which can be used when the dynamo is not operating²⁶ and it must be kept well charged.

Under normal circumstances more current is generated than is needed to keep the engine running and to operate the other electrical equipment.²⁷ This extra current is used to charge the battery so that it will always be in good condition. The charging current is controlled by a voltage regulator²⁸: this ensures that less charging current is generated when the battery is well charged, and that an increase in the charging current is provided when the battery

23. 它(发电机)通常是由一根从发动机前端引出的皮带来驱动的,只有在发动机运转时才旋转发电。 24. 没有电,点火系就无法工作……。这是个表示假设情况的虚拟语气句,句中谓语动词用了“would (could)+原形动词”的虚拟结构,虚拟条件是由介词短语 without electricity 来表示的。 25. 这正是蓄电池发挥它作用的地方,这里 where 所引导的从句是表语从句。 26. 可在发电机未进行工作时供(汽车)使用的(电流)。 27. 在一般情况下,发电机的发电量比维持发动机运行以及使其它电气设备进行工作所需要的电量来得大。注意句中 than 的用法。这里的 than 起了关系代词的作用,既连接一个比较状语从句,又作该从句的主语。 28. 电压调节器;调压器。



becomes partly discharged.²⁹ This is called 'compensated voltage control'³⁰.

The dynamo and starter are bolted to the engine, and this automatically 'earths' them to the chassis.³¹

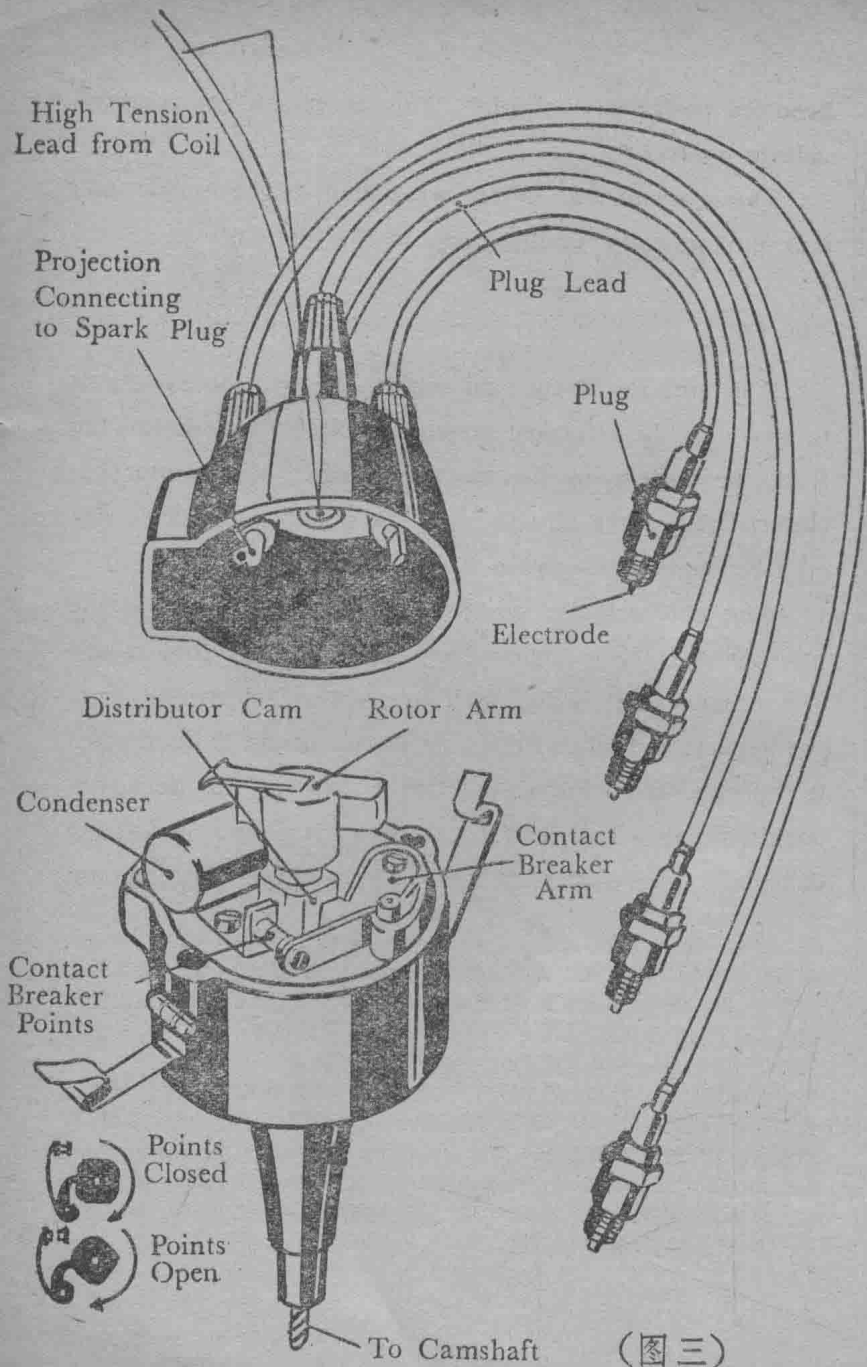
The Coil*

The purpose of the coil within the ignition system is to *step up*³² the electrical pressure (voltage) that is flowing from the battery to the sparking plugs. Most motor car batteries are of the 12 volt type, but as many as 7,000 volts may be required to give a satisfactory spark³³.

The coil actually consists of two coils of wire, the primary and the secondary, wound round an iron core.³⁴ The primary coil is fed with low voltage electricity from the battery, and when this low voltage current is interrupted it causes a very high voltage to be 'induced' in the secondary winding. This very high voltage is passed on to³⁵ the distributor and thence to the sparking plugs. The amount

29. 这样, 就能保证当蓄电池充足了电的时候, 发电机只产生较小的充电电流, 而在蓄电池放掉一部份电之后, 提供的充电电流则相应增大. 30. "电压补偿控制". 31. 发电机和起动机是(用螺栓)固定在发动机(外壳)上的, 这就自然而然使它们与底盘相连而"搭铁". earth 在这里是及物动词, 在电工术语中作"把……接地"解, 在汽车术语中作"使……搭铁"解.

* 点火线圈. 32. 升高; 逐步增加. 33. 要产生符合要求的电火花, 可能需要高达七千伏的电压. 34. 点火线圈实际上由绕在同一铁蕊上的两个绕组, 初级绕组和次级绕组所组成, the primary and the secondary 指 the primary coil 和 the secondary coil, 是 coils 的同位语, wound 是 wind 的过去分词, 在句中作定语, 修饰 coils. 35. 被输送到; 被传送到, 其中, on 是副词, 表示"进展"、"继续"的意思.



of increase in voltage is in proportion to³⁶ the number of windings in each coil. For instance, if the primary coil has 100 winds and the secondary coil has 1,000, the voltage leaving the coil would be in the proportion 100 to 1,000, or ten times the voltage entering it.

*The interruption in the flow of low voltage current in the primary winding (causing a higher voltage in the secondary winding) must occur each time the fuel/air mixture in any cylinder is ready to be ignited.*³⁷

The Distributor*

Interruption of the low voltage flow to the coil, referred to on the preceding page³⁸, is made by contact breaker points³⁹ in the distributor. This final piece of ignition equipment is mounted on the engine and driven by a spindle, or shaft, which connects to a gear on a camshaft inside the engine (page 15). At the top of the spindle is a cam which, instead of being round, has 'corners', *there being as many 'corners' as there are sparking plugs*⁴⁰. As the cam rotates, the 'corners' cause the contact breaker points to open and

36. 与……成比例。 37. (而) 切断初级绕组的低压电流 (使次级绕组产生高压), 必须选择在气缸中的燃料空气混合物准备点火这一时刻进行。关连词组 *each time* 作“每当”解, *time* 后面的 *that* 常省去, 直接引一个表示时间的状语从句。

* 分电器。 38. 前页所提到的, 过去分词短语作定语, 修饰 *interruption*。 39. 断电器触点。 40. 棱角的数目与火花塞的数目相等, 这是由 *there be* 句型变化而来的分词独立结构, 在句中作方式状语。

close, thus giving the off-on effect needed by the coil⁴¹.

The distributor also has another function, that is to distribute high-voltage electricity from the coil to each of the sparking plugs in turn⁴². A rotor arm⁴³ is fitted on top of the distributor cam⁴⁴. The rotor arm rotates with the cam, and in doing so contacts in turn the metal projections inside the distributor cap⁴⁵. Each of these projections is connected to a sparking plug so that when the rotor arm contacts a projection, high voltage electricity is passed to the plug concerned and a spark occurs at the electrodes⁴⁶.

The Petrol System*

Two elements are needed for the operation of a motor car engine: electricity and petrol. We have seen how the ignition system works to provide an electric spark at the electrodes of the sparking plugs, and we know that the purpose of the spark is to ignite a mixture of petrol and air in the combustion chambers of the engine. Now we must consider the system that delivers the petrol to be

41. 从而起到了点火线圈所需要的“接通—断开”作用。现在分词短语，在句中作结果状语。42. 就是把（点火）线圈产生的高压电按（点火）顺序分配给各个火花塞。that is 是插入语，意为“那就是”、“即”，在句中常用逗号与其他部份分开。不定式 to distribute 是前面 function 的同位语。43. 分火头。44. 分电器凸轮。45. 在这样做的时候，（分火头）就依次和分电器盖内的金属触点接触。46. 结果当分火头与一（金属）触点相接触时，高压电流即传送给相应的火花塞。（火花塞）电极间就出现电火花，so that 在这里引导一个结果状语从句。

* 汽油供给系。

ignited⁴⁷.

In cars of normal design, the petrol system consists of three main units: a storage tank⁴⁸, a pump and a carburettor.

The petrol tank is fitted at the back of the car where it is out of the way, yet easily filled at a garage.⁴⁹ Tanks vary in capacity⁵⁰ but they usually hold enough petrol for 250-300 miles running. Because the tank is at the opposite end of the car from the carburettor, which is fitted high up on the engine, a pump is needed to draw the petrol from one to the other, as it is from the carburettor that the petrol is finally fed into the engine.⁵¹ Pumps can be of two kinds; electrically operated or mechanically driven from the engine⁵².

The Carburettor*

The purpose of the carburettor is to provide a mixture of petrol and air for combustion in the engine.⁵³ The

47. 要被点火的(汽油). 这一被动结构的动词不定式是作定语用的, 修饰 petrol. 48. 油箱; 燃料箱. 49. 油箱安装在车身后部, 装在那儿(离发动机)是偏远了些, 但在车库里加起油来却很方便. out of the way 在这里作“偏僻的”、“遥远的”解. 50. 油箱容量大小不等. vary in 作“在……(方面)有所不同”解. 51. 油箱安置在车身的一端, 与汽化器遥遥相对, 而汽化器又悬挂在发动机的上方, 这就需要用汽油泵把汽油从一端(油箱)送到另一端(汽化器), 因为汽油最终是由汽化器送入发动机的. 这里 as 所引导的是原因状语从句, 该从句是“it is + 被强调成份 + that...”的强调句型, 这里强调的是地点状语 from the carburettor. 52. 由电力拖动的或由发动机(机械)拖动的.

* 汽化器. 53. 汽化器的功用是为发动机内的燃烧提供汽油和空气的混合物. 这里的动词不定式 to provide... for... (为……提供……)在句中作表语.