普通高等教育汽车服务工程专业规划教材

汽车服务工程专业英语

QICHE FUWU GONGCHENG ZHUANYE YINGYU

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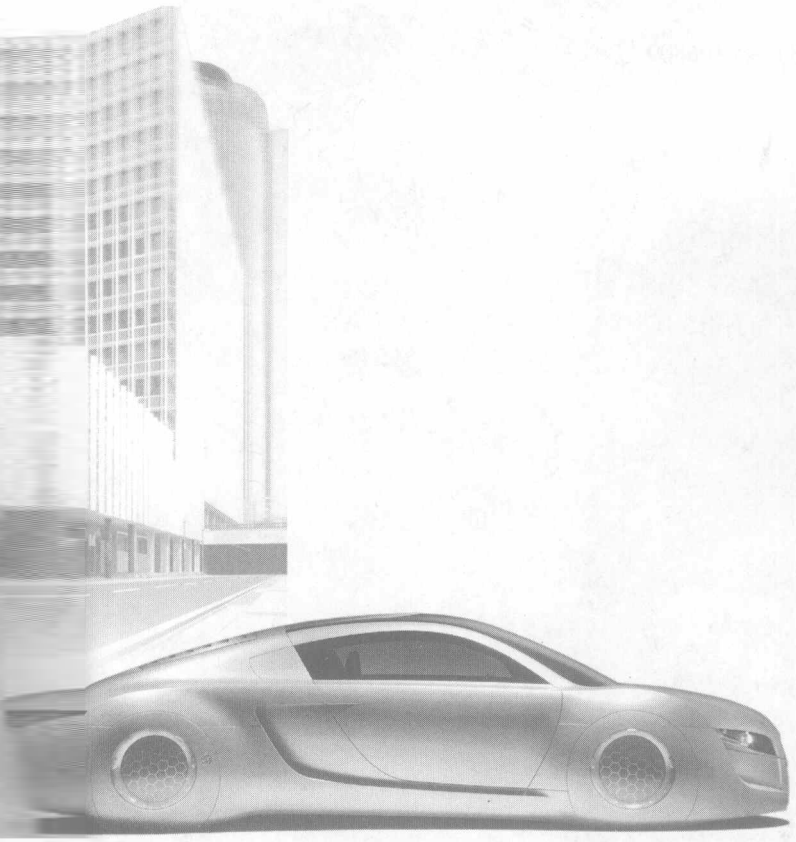

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内 容 提 要

本书由汽车服务工程专业教学指导委员会组织编写，主要内容包括汽车构造与基本原理、汽车检测与维修、汽车营销与售后服务、汽车保险、汽车评估等五方面。内容模块化，有利于按需施教；并附参考译文和词汇表，便于教学和自学。

本书供汽车服务工程专业和其他相关汽车专业本科教学使用，也可供汽车维修、汽车营销、汽车保险和汽车评估专业英语培训和有关专业的中高层读者使用。

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前　言

Qianyan

进入21世纪以来，伴随国家汽车产业发展政策的调整，我国汽车产业进入健康、持续、快速发展的轨道。在汽车工业大发展的同时，汽车消费主体日益多元化，广大消费者对高质量汽车服务的渴求日益凸现，汽车厂商围绕提升服务质量的竞争业已展开，市场竞争从产品、广告层面提升到服务层面，这些发展和变化直接催生并推进了一个新兴产业——汽车服务业的发展与壮大。

当前，我国的汽车服务业正呈现出“发展快、空间大、变化深”的特点。“发展快”是与汽车工业本身的发展和社会汽车保有量的快速增长相伴而来的。“空间大”是因为我国的汽车普及率尚不够高，每千人拥有的汽车数量还不及世界平均水平的1/3，汽车服务市场尚有很大的发展潜力，汽车服务业将是一个比汽车工业本身更庞大的产业。“变化深”一方面是因为汽车后市场空前繁荣，蓬勃发展，大大拉长和拓宽了汽车产业链。汽车技术服务、金融服务、销售服务、物流服务、文化服务等新兴的业务领域和服务项目层出不穷；另一方面是因为汽车服务的新兴经营理念不断涌现，汽车服务的方式正在改变传统的业务分离、各自独立、效率低下的模式；向服务主体多元化、经营连锁化、运作规范化、业务集成化、品牌专业化、技术先进化、手段信息化、竞争国际化的方向发展。特别是我国加入WTO汽车产业相关的保护政策均已到期，汽车服务业实现全面开放，国际汽车服务商快速进入，以上变化必将进一步促进汽车服务业向纵深发展。

汽车工业和汽车服务业的发展，使得汽车厂商和服务商对高素质的汽车服务人才的需求比以往任何时候都更为迫切，汽车服务业将人才竞争视作企业竞争制胜的关键要素。在这种背景下，全国高校汽车服务工程专业教学指导委员会(筹)顺应时代的呼唤，组织全国高校汽车服务工程专业的知名教授，编写了汽车服务工程专业规划教材。

本套教材总结了全国高校汽车服务工程专业的教学经验，注重以本科学生就业为导向，以培养综合能力为本位。教材内容符合汽车服务工程专业教学改革精神，适应我国汽车服务行业对高素质综合人材的需求，具有以下特点：

1. 本套教材是根据全国高校汽车服务工程专业教学指导委员会审定的教材编写大纲而编写，全面介绍了各门课程的相关理论、技术及管理知识，符合各门课程在教学计划中的地位和作用。教材取材合适，要求恰当，深度适宜，篇幅符合各类院校的要求。

2. 教材内容努力做到由浅入深，循序渐进，并处理好了重点与一般的关系；符合认知规律，便于学习；条理清晰，文字规范，语言流畅，文图配合适当。

3. 教材努力贯彻理论联系实际的原则。教材在系统介绍汽车服务工程专业的科学理论与管理应用经验的同时，引用了大量国内外的最新科研成果和具有代表性的典型例证，分析了发展过程中存在的问题，教材内容具有与本学科发展相适应的科学水平。

4. 教材的知识体系完整，应用管理经验先进，逻辑推理严谨，完全可以满足汽车服务行业对综合性应用人材的培养要求。

《汽车服务工程专业英语》是汽车服务工程专业规划教材之一。由全国高校汽车服务工程专业教学指导委员会(筹)组织编写，供汽车服务工程专业和其他相关汽车专业本科生教学使用，也可供汽车维修、汽车营销、汽车保险和汽车评估专业英语培训和汽车专业的中高层读者使用。《汽车服务工程专业英语》具有以下特点：

1. 专业方向明确，针对性强。本书紧密结合汽车服务工程专业的培养目标而编写，共有五个单元。主要内容涉及汽车构造与基本原理、汽车检测与维修、汽车营销与售后服务、汽车保险、汽车评估等五个方面。以使学生熟悉汽车服务工程专业常用英语词汇，初步掌握有关知识的英语表达方法，培养专业翻译能力。为了培养学生的自学能力，每一单元都留有一定的自学内容，根据所定自学内容的多少，本教材可以满足 30～50 学时的教学需要。

2. 内容新颖、翻译准确。课文主要选自国内外相关领域的最新英语科技资料，既包含相关专业的基本知识；又包含有关的最新技术。各单元参考译文全部经专业老师审阅修改，翻译准确，专业术语规范。

3. 结构安排合理，便于教学。本教材注意与公共英语以及专业课的衔接，课文难度由浅入深，各单元所涉及的专业知识与所学专业课相对应，系统性强；内容弹性化、模块化，有利于按需施教。对课文中的语法难点、专业词汇和短语进行了注释，并给出复习思考题和参考译文，最后附总词汇表，便于教学和自学。

本书由山东交通学院于明进、赵培全、吴芷红，上海师范大学刘建房和山东大学于群共同编写。于明进任主编，赵培全、吴芷红任副主编；长安大学陈焕江教授主审。具体编写分工：于明进编写第 1～8 课，吴芷红编写第 9～14 课，赵培全编写第 15～21 课和第 26 课，于群编写第 22～25 课，刘建房编写第 27～

31 课。

在本书编写过程中，参阅了国内外有关的书籍杂志和网页，得到了中国重汽集团公司、山东交通学院汽车系和长安大学陈焕江教授的大力支持和帮助。在此对有关单位和个人表示衷心感谢。

本书作为普通高等学校汽车服务工程专业的规划教材，将对汽车服务工程专业和相关专业(方向)的教学起到促进作用。此外，本书也可以作为国内汽车服务业就业群体学习提高和职工培训的教材或参考读物使用。

由于时间仓促，本套教材定有许多不足之处，敬请广大读者和同仁使用后批评指正，以便教材再版时修正。

全国高校汽车服务工程专业教学指导委员会(筹)

2008 年 8 月

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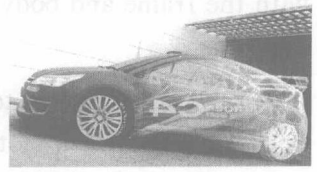

Unit One Fundamentals of Automobile

Lesson 1 Structure of Automobile

In order to study automobiles, it is important to review the basic parts of an automobile. See Fig. 1-1. An automobile can be subdivided into several major categories:

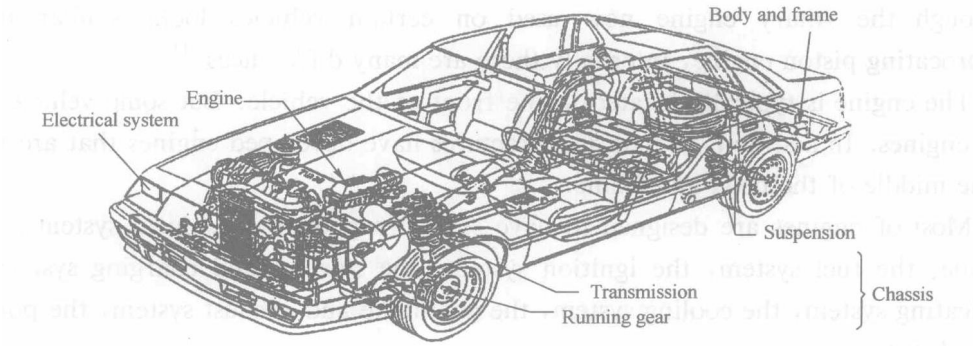

Fig. 1-1 Basic parts of an automobile

the body and frame, the engine or power source, the chassis and the electrical equipment.

Body and Frame

The body and frame section of an automobile is the basic foundation of the vehicle. All other components and systems are attached to the body and frame. The frame supports the vehicle body, engine, and the driveline. Fig. 1-2 illustrates the body and frame of a typical vehicle.

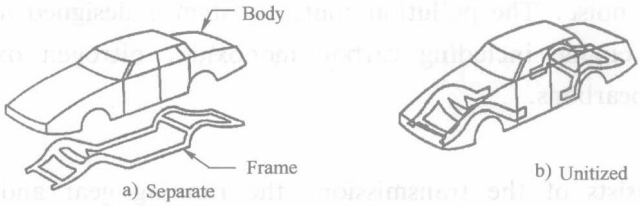

Fig. 1-2 Body and frame

There are two types of body and frame configuration. The separate body and frame construction illustrated in Fig. 1-2a) has been used for a long time. The second type of construction is called the unitized body. See Fig. 1-2b). This type of vehicle is designed

with the frame and body in one unit. The unitized body is used in most cars today.

Engine

The engine is used to power the vehicle. The engine is also called the power source or motor. The word motor is defined as that which imparts motion. So a motor can be any device that produces power. However, the power source in the automobile is usually referred to as the engine.

Most automobiles use the gasoline engine as a power source. However, other power sources are being tested and introduced every year. For example, the diesel engine is also being used as a power source today, and has been used in commercial vehicles widely. In addition, some automotive engineers predict the use of gas turbines and Stifling engines for future power sources in the automobile.

Most automobiles use the reciprocating piston or Otto cycle engine. However, certain car manufactures also offer rotary design engines as an optional power source. Although the rotary engine now used on certain vehicles looks similar to the reciprocating piston engine, internally there are many differences [1].

The engine is typically located in the front of the vehicle. But some vehicles have rear engines. In addition, certain manufactures have developed engines that are placed in the middle of the body and frame.

Most of engines are designed to have several supporting technical systems. These include: the fuel system, the ignition system, the starting and charging system, the lubricating system, the cooling system, the air intake and exhaust system, the pollution control system.

The fuel system is designed to mix the air and fuel in the engine. This mix will produce an efficient combustion process. The ignition system is designed to ignite the air and fuel that has been mixed. The starting and charging system is designed to start the engine and to keep the battery charged during operation. The lubricating system is designed to keep all engine moving parts lubricated so that friction is reduced internally. The cooling system is designed to keep the engine at the most efficient operating temperature. The air intake system is designed to get air into the engine efficiently and without dirt. The exhaust system is designed to clean the exhaust gases and to reduce the sound of the exhaust noise. The pollution control system is designed to reduce various emissions from the engine including carbon monoxide, nitrogen oxide (oxides of nitrogen), and hydrocarbons.

Chassis

The chassis consists of the transmission, the running gear and the suspension system. It is shown in Fig. 1-3.

The transmission is defined as those components that transmit the power from the engine to the wheels. This action will propel the vehicle in a forward or reverse direction. The transmission includes components such as the clutch, gearbox, drive

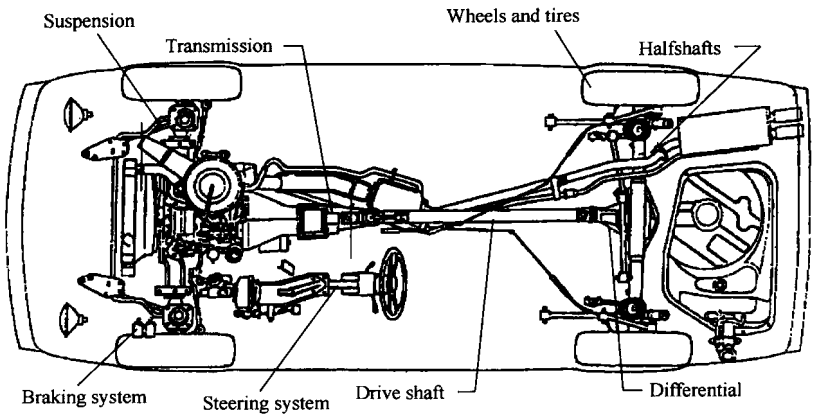

Fig. 1-3 Chassis of a car

shaft, differential, and halfshafts etc.

There are two methods in which the transmission can be designed: the rear wheel driveline system and the front wheel driveline system. In rear wheel driveline system, the engine is in the front of the body and frame. The power is then transmitted to the rear of the vehicle for propulsion. The front wheel driveline system is used on most cars today. In this system the engine is in the front of the vehicle. The driveline can be also in the front of a vehicle. Both systems have advantages and disadvantages and are equally reliable in their operation.

The running gear consists of the wheels, tires, braking system and steering system. The braking system is used to reduce the speed of the vehicle and hold it stationary as necessary. The steering system is used to provide the means by which the vehicle is directionally turned.

The suspension system on the automobile includes such components as the springs, shock absorbers, struts, torsion bars, axles, and connecting linkages. These components are designed to support the body and frame, the engine, and the driveline on the road. Without suspension system, the comfort and ease of driving would be reduced. The springs and torsion bars are attached to the axles of the vehicle. The two types of springs commonly used are leaf spring and coil spring. Torsion bars are made of long spring steel rods. One end of the rod is connected to the frame, while the other end is connected to the movable parts of the axles. As the axles move up and down, the rod is twisted and acts as a spring. Shock absorbers are used to slow down the upward and downward movement of the vehicle. This action occurs when the car goes over a rough road. The axles and connecting linkages are those components that connect the springs, torsion bars, and shock absorbers to the vehicle frame and to the wheels.

Electrical Equipment

The electrical equipment comprises mainly the battery, alternator, lights, instrumentation, electrical devices and electronic control systems etc.

New Words

subdivide['sʌbdi'vaid]	vt.	细分(细区分,再划分,重分,叠分,分小类)
frame[freim]	n.	骨架结构,框架,框子;【机】架,座身;(人或物的)骨骼,身躯
chassis['ʃæsi](pl. chassis, chassises)	n.	底盘,底架,底板[座]
configuration[kənˌfigju'reiʃən]	n.	结构,布局,形态[计算机]配置
impart[im'pɑ:t]	v.	给予(尤指抽象事物),传授,告知
turbine['tə:bin,-bain]	n.	涡轮
reciprocate[ri'siprəkeit]	v.	互换,交换,报答,【机】使往复运动;上下移动
lubricate['lu:brikeit]	v.	润滑,涂油
hydrocarbon['haidrəu'kɑ:bən]	n.	烃,碳氢化合物
transmission[trænz'miʃən]	n.	传递;移转;传播;传播之物;【机】传动装置;变速器[箱];联动机件
clutch[klʌtʃ]	v.	抓住,攫住;n. 离合器
differential[ˌdifə'renʃəl]	adj.;n.	差别的,微分的,【机,物】差动的,差速的;【数】微分;【机】差动;差动齿轮;差速器
halfshaft	n.	半轴
driveline	n.	传动系统,驱动管路
friction['frikʃən]	n.	摩擦,摩擦力
tire['taiə]	n.	轮胎
strut[strʌt]	n.;v.	高视阔步,支柱,抗压材;趾高气扬地走,用支柱支撑
torsion['tɔ:ʃən]	n.	扭,[物][机]扭转,转矩
alternator ['ɔ:ltə(:)neitə]	n.	交流发电机

Phrases and Expressions

drive shaft	传动轴
running gear	行走装置,行驶系
carbon monoxide	一氧化碳
nitrogen oxide	氮氧化物

Notes

[1] Although the rotary engine now used on certain vehicles looks similar to the reciprocating piston engine, internally there are many differences.

虽然现在某些汽车使用的转子式发动机与往复活塞式发动机看起来转子式相似,但本质上有许多不同。

Review Questions

1. What does an modern automobile consist of?

2. Do you know what differences there are between a rotary engine and a reciprocating piston engine?

3. What systems or components are included in the automobile chassis?

4. What are the main functions of the braking system in an automobile?

5. Please list the main components that the suspension system on an automobile includes.

参考译文

第一课　汽车的构造

为了研究汽车，了解汽车的基本组成是非常重要的。如图 1-1，汽车被分为几大主要部分：车身和车架，发动机或动力源，底盘和电气设备。

车身和车架

车身和车架是汽车的基本构成部分。其他所有部件和系统都与车身和车架相连。车架支撑着车身、发动机、传动系、行驶系。典型车辆的车身和车架如图 1-2 所示。

车身和车架的结构有两种类型，分离式车身和车架已使用了很长时间，如图 1-2a)所示。第二种被称为整体式车身，车辆的车身和车架设计成一体，如图 1-2b)所示。整体式车身在今天的大多轿车中使用。

发动机

发动机为汽车提供动力，因此发动机又被称为动力源或马达。马达是产生运动的源泉，因此马达可以是提供动力的任何装置，但是，汽车的动力源通常是指发动机。

大多数汽车使用汽油发动机作为动力源，但是每年都有其他动力源被试验和引进。比如，今天的柴油发动机也被当作动力源，已经广泛应用于商用车。另外，有些汽车工程师预测将来燃气轮机和斯特林发动机也将被作为汽车的动力源。

许多汽车使用往复活塞式或奥托循环发动机，但是，有些汽车制造商提供转子式发动机作为任选的动力源。虽然现在某些汽车使用的转子式发动机与往复活塞式发动机看起来转子式相似，但本质上有许多不同。

发动机一般置于汽车前部，但是一些汽车采用后置发动机。另外，还有一些制造商已开发了中置发动机即发动机置于车身和车架的中部。

绝大多数发动机都有几个专门的系统，包括：燃料供给系统、点火系统、起动和充电系统、润滑系统、冷却系统、进气和排气系统、排放控制系统。

燃料供给系统在发动机内将空气和燃油混合，混合气将产生高效的燃烧过程。点火系统的作用是将混合的空气和燃油点燃。起动和充电系统的作用是起动发动机和在运行期间为蓄电池充电。润滑系统的作用是保持发动机运动件之间的润滑，减少内部摩擦。冷却系统的作用是保持发动机在高效的运行温度下工作。进气系统的作用是使洁净的空气高效地进入发动机，排气系统的作用是排出废气、减小排气噪声。排放控制系统的作用是减少发动

机各种排放物，包括 CO、NO_x 和 HC。

底盘

底盘由传动系统、行驶系统、悬架组成，如图 1-3 所示。

传动系统是那些将发动机动力传给车轮的部件，其作用是驱动汽车前进或倒车。传动系统包括离合器、变速器、传动轴、差速器和半轴等。

传动系统有两种设计方法：后轮驱动系统和前轮驱动系统。后轮驱动系统，发动机置于车身和车架的前部，动力传到汽车后轴产生驱动。目前许多车使用前轮驱动系统，这种系统发动机置于汽车的前部，传动装置也在前部。这两种系统都各自存在优缺点，运行时可靠性相差不大。

行驶系统由车轮、轮胎和控制汽车的制动系统、转向系统组成。制动系统用来使车辆减速，必要时使车辆保持静止。转向系统用来实现车辆转向。

汽车的悬架系统包括悬架弹簧、减振器、导向机构、扭力杆、车轴、连接装置。这些部件的作用是支撑车身和车架、发动机、连接装置。没有悬架系统，乘坐的舒适性就会变差。弹簧和扭力杆与车桥相连，常用的两种弹簧：钢板弹簧和螺旋弹簧。扭力杆由长弹簧钢棒制成，一端与车架相连，而另一端与车桥的活动部件相连。随着车轴上下活动，钢管被扭转弹簧起作用。减振器的作用是缓冲汽车的上下振动，这种作用在恶劣的行驶条件下就发挥出来。车桥和连接装置是将弹簧、扭力杆、减振器与车架和车轮相连接的那些部件。

电气设备

电气设备主要包括蓄电池、交流发电机、灯光、仪表、电动装置和电子控制系统等。

Lesson 2 Basics of Four-stroke Cycle Engine

The fundamental parts of the conventional engine are shown in simple diagrammatic form in Fig. 2-1 which shows a cross-section through the cylinder, piston and connecting rod of the engine. In the figure, a flywheel is mounted on the end of the crankshaft and the crank is of the double-web type with a bearing on each side of the crank.

Cylinder. The ideal form consists of a plain cylindrical barrel in which the piston slides, the movement of the piston or "stroke" being, in some cases, somewhat longer than the bore, but tending to equality or even less[1]. This is known as the stroke: bore ratio.

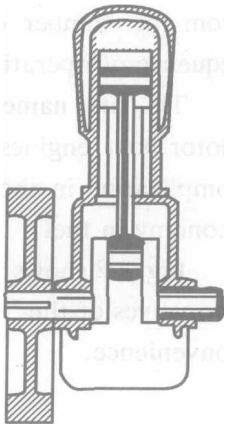

Fig. 2-1

The upper end consists of a combustion or"clearance" space in which the ignition and combustion of the charge take place. In practice it is necessary to depart from the ideal hemispherical shape in order to accommodate the valves, sparking plug, etc., and to control the process of combustion.

Piston. The usual form of piston for internal combustion engines is an inverted bucket-shape, machined to a close (but free sliding) fit in the cylinder barrel. Gas tightness is secured by means of flexible "piston rings" fitting closely in grooves turned in the upper part of the piston.

The pressure of the gases is transmitted to the upper end of the connecting rod through the"gudgeon pin" on which the "small end" of the connecting rod is free to swing.

Connecting Rod. The connecting rod transmits the piston load to the crank, causing the latter to turn, thus converting the reciprocating motion of the piston into a rotary motion of the crankshaft. The lower end, or "big end", of the connecting rod turns on the crank pin.

Crankshaft. In the great majority of internal combustion engines this is of the double-web type, the crank pin, webs and shaft being usually formed from a solid forging. The shaft turns in two or more main bearings (depending on the number and arrangement of the cylinders) mounted in the main frame or "crankcase" of the engine.

Flywheel. At one end the crankshaft carries a heavy flywheel, the function of which is to absorb the variations in impulse transmitted to the shaft by the gas and inertia loads and to drive the pistons over the dead points and idle strokes[2]. In motor vehicles the flywheel usually forms one member of the clutch through which the power is transmitted to the road wheels.

The foregoing are the fundamental and essential parts by which the power developed by the combustion is caused to give rotation to the crankshaft, the mechanism described being that of the single-acting engine, because a useful impulse is transmitted to the crankshaft while the piston moves in one direction only[3].

It is now necessary to describe the sequence of operations by which the combustible charge is introduced, ignited and burned and finally discharged after it has completed its work.

There are two important cycles or operations in practical use, namely, the "four-stroke", or "Otto" cycle as it is sometimes called (after the name of the German engineer who first applied it in practice), and the "two-stroke", or "Clerk" cycle, which owed its early development largely to Sir Dugald Clerk. The cycles take their names from the number of single piston strokes which are necessary to complete a single sequence of operations, which is repeated continuously so long as the engine works.

The first named is by far the most widely adopted except for small motorcycle and motor boat engines, and for large diesels, for though it leads to greater mechanical complication in the engine, it shows higher thermal efficiency, and therefore greater economy in fuel.

Fig. 2-2 shows in a diagrammatic manner a four-stroke engine cylinder provided with two valves of the "mushroom" or "poppet" type. The cylinder is shown horizontal for convenience.

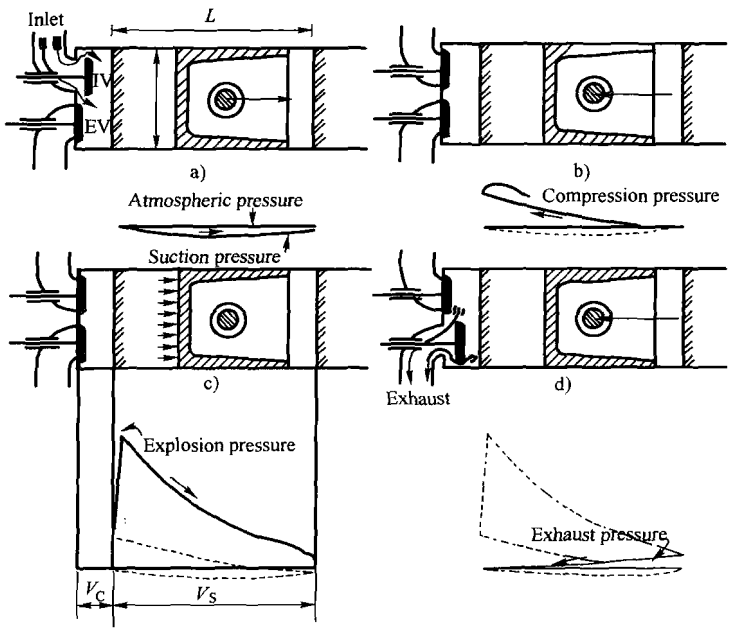

Fig. 2-2

The inlet valve communicates through a throttle valve with the air filter, from which air is drawn. The exhaust valve communicates with the silencer through which the burnt gases are discharged to the atmosphere. These valves are opened and closed at suitable intervals by mechanisms.

The four strokes of the complete cycle are shown at Fig. 2-2a), b), c) and d).

Below the diagrams of the cylinder are shown the corresponding portions of what is known as the indicator diagram, that is to say, a diagram which shows the variation of pressure of the gases in the cylinder throughout the cycle. In practice such diagrams can be automatically recorded when the engine is running by a piece of apparatus known as an indicator, of which there are many types.

The four strokes of the cycle are as follows:

a) Induction stroke—exhaust valve closed, inlet valve open

The momentum imparted to the flywheel during previous cycles or rotation by hand or by starter motor, causes the connecting rod to draw the piston outwards, setting up a partial vacuum which sucks in a new charge of mixture from the intake manifold. The pressure will be below atmospheric pressure by an amount which depends upon the speed of the engine and the throttle opening.

b) Compression stroke—both valves closed

The piston returns, still driven by the momentum of the flywheel, and compresses the charge into the combustion head of the cylinder. The pressure rises to an amount which depends on the "compression ratio", that is, the ratio of the full volume of the cylinder when the piston is at the outer end of its stroke to the volume of the clearance space when the piston is at the inner (or upper) end[4]. In ordinary petrol engines this ratio is usually between 8 and 10 and the pressure at the end of compression is about 0.8 to 1.1 MPa, with full throttle opening.

c) Combustion or working stroke—both valves closed

Just before the end of the compression stroke, ignition of the charge is effected by means of an electric spark, and a rapid rise of temperature and pressure occurs inside the cylinder Combustion is completed while the piston is practically at rest, and is followed by the expansion of the hot gases as the piston moves outwards. The pressure of the gases drives the piston forward and turns the crankshaft thus propelling the car against the external resistances and restoring to the flywheel the momentum lost during the idle strokes. The pressure falls as the volume increases.

d) Exhaust stroke—inlet valve closed; exhaust valve open

The piston returns, again driven by the momentum of the flywheel, and discharges the spent gases through the exhaust valve. The pressure will be slightly above atmospheric pressure by an amount depending on the resistance to flow offered by the exhaust valve and silencer.

It will thus be seen that there is only one working stroke for every four piston strokes, or every two revolutions of the crankshaft, the remaining three strokes being referred to as idle strokes, though they form an indispensable part of the cycle. This has led engineers to search for a cycle which would reduce the proportion of idle strokes, the various forms of the two-stroke engine being the result. The correspondingly larger number of useful strokes per unit of time increases the power output relative to size of engine, but increases thermal loading.