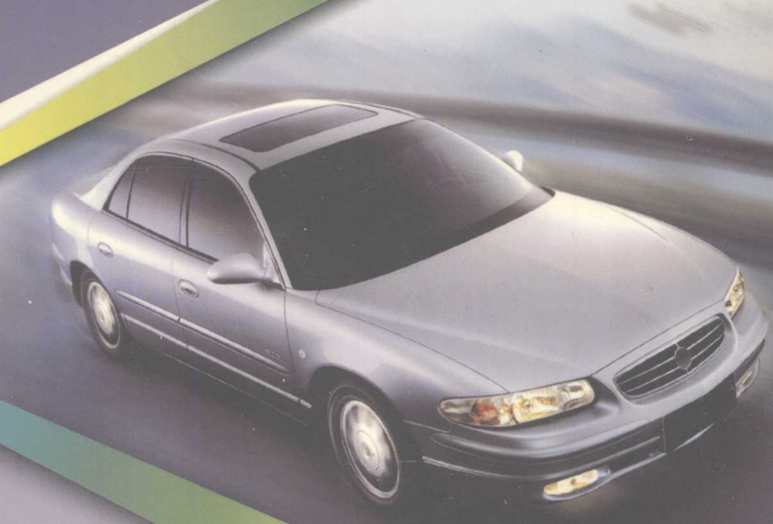
高职高专规划教材
Gaozhi Gaozhuan Guihua Jiaocai

汽车商务英语

主　编　张金柱
主　审　孙凤英　崔秀敏



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本书以汽车构造和汽车商务知识为主，选编有关汽车发动机、汽车底盘、汽车电子技术、汽车商务等方面的文章，共25单元，包括课文、词汇、注释、练习和阅读翻译材料。书后附有汽车常用缩写词、汽车技术术语和商务英语缩写词。

本书可作为高职高专汽车贸易专业及相关专业的英语教材，亦可供有一定英语基础的汽车销售、维修和管理人员自学参考。

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前　　言

中共中央、国务院在第三次全国教育工作会议上做出了“关于深化教育改革，全面推进素质教育的决定”的重大决策，明确提出要大力发展高等职业教育，培养一大批具有必备的理论知识和较强的实践能力，适应生产、建设、管理、服务第一线急需的高等技术应用型专门人才。为此，教育部召开了关于加强高职高专教学工作的会议，进一步明确了高职高专是以培养技术应用型专门人才为根本任务，以适应社会需要为目标，要体现地区经济、待业经济和社会发展的需要，即用人的需求。

“教书育人，教材先行”，教育离不开教材。为此，机械工业出版社组织全国 11 所职业技术学院中有多年高职高专教学经验的老师编写了高职高专汽车电子技术专业、汽车贸易专业两套教材。

两套教材是根据高中毕业 3 年制（总学时为 1600~1800），同时兼顾 2 年制（总学时为 1100~1200）的高职高专教学计划需要编写的。在内容上突出了基础理论知识的应用和实践能力的培养，突出针对性和实用性，强化实践教学。

本书是为高职高专汽车贸易及相关专业学生编写的专业英语教材。通过一定学时的专业英语学习，使学生掌握一定的专业词汇、汽车商务英语文章的语法结构及文体方面的知识，提高英语应用能力，能做到以英语为工具获得专业所需的信息。本教材也可供从事汽车贸易、汽车维修等方面的管理人员和技术人员使用。

课文内容以汽车构造和汽车商务为主，并选编了有关汽车说明书翻译练习方面的文章。在课文的编排上尽量照顾到专业知识的系统性，包括课文、词汇、注释、练习和阅读翻译材料。有的课文和阅读材料配有附图，并针对课文和阅读材料中的长难句加注了语法分析和翻译，还附有汽车常用缩写词和商务英语缩写词。

本教材由黑龙江工程学院张金柱主编，孙凤英、崔秀敏主审。参加编写的还有王悦新，韩玉敏，臧杰等同志。

由于作者水平所限，书中错误和不当之处在所难免，敬请读者指正。

高职高专汽车类专业系列教材编委会

Content

Chapter 1 Automobile Engine

Unit One

Internal Combustion Engine Basics

The basics

The engine is, of course, the heart of every car. At the most basic level, the engine develops the power to move it. This section discusses the different types of engines in use, as well as the fundamental concepts behind internal combustion engine.

There are many types and variations of automobile engines. The most common type is the internal combustion engine. It is so named because combustion takes place inside the engine.

The engine is mounted to the car frame. An internal combustion engine is like a container into which we put air and fuel and then start them burning. The air and fuel is burned in the engine container, or cylinder. A cylinder is a metal tube closed at one end. A movable plug, called piston, is installed inside the cylinder. There is a small space between the piston top and the top of the cylinder. This space, called the combustion chamber, is where the burning takes place. If several drops of gasoline are placed into this space, and the piston is pushed up in the cylinder, the gasoline and air in the combustion chamber will be tightly squeezed together. When the mixture is squeezed as tightly as possible, it is ignited by an electric spark. The burning, or combustion, increases the pressure in the combustion chamber and pushes the piston down the cylinder. with great force.

In order to use the power developed by the moving piston, the connecting rod is connected to the bottom of the piston. When the piston moves downward, this rod also moves downward. The downward movement of the piston and connecting rod is changed to circular or rotary movement by a part called the crankshaft. The crankshaft is a shaft with its ends mounted in such a way that it can rotate. The middle of the crankshaft is offset, and the lower end of the connecting rod is connected to the middle of the offset part. The upper end of the connecting rod is joined to the piston by a pin called the wrist or piston pin. This pin allows the connecting rod to follow the motion of the crankshaft (See Fig. 1-1).

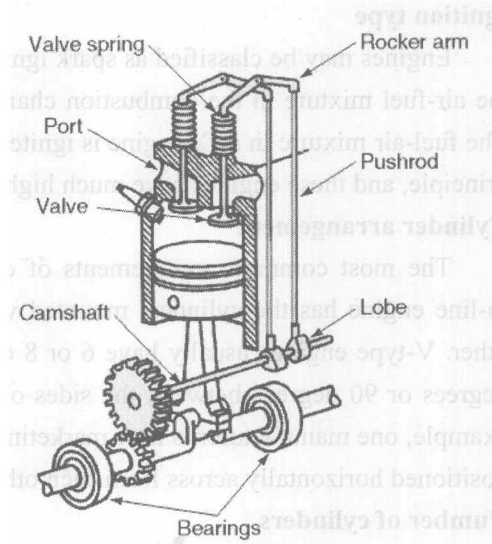

Fig. 1-1 The construction of an engine

One additional part is required to complete a basic engine. Because it is necessary to push the piston down the cylinder more than once, in between down strokes it must be returned to the top of the cylinder. To do this, a heavy flywheel is mounted to the end of the crankshaft (As shown in Fig. 1-2). When the piston is forced down, the crankshaft turns, and the flywheel turns with it. Because the flywheel is heavy, it does not slow down easily. Its momentum keeps the crankshaft turning. The rotation of the crankshaft then pushes the piston back up to the top of the cylinder.

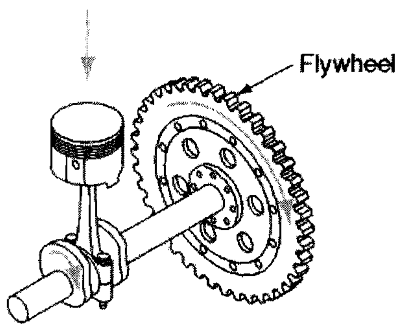

Fig. 1-2 The flywheel provides weight or inertia to keep the crankshaft turning

Engine types

Automotive engines may be classified in several different ways according to these design features:

Valve arrangement

Engines may be classified according to the location of the valves and the number of valves per cylinder. Many engines have the valves located in the cylinder head, and these engines are referred to as overhead valve engines. The majority of engines have two valves per cylinder, but engines with four valves per cylinder have become increasingly popular in recent years.

Camshaft location

Engines with a single camshaft positioned above the valve train on the cylinder head may be referred to as single overhead camshaft (SOHC) engines. Other engines have two camshafts located above the valve train in the cylinder head, and these engines are called dual overhead camshaft (DOHC) engines. V-type engines may have dual camshafts located above each cylinder head. Some SOHC engines, or DOHC engines have the camshaft located in the cylinder head rather than above the valve train. Other engines have the camshaft positioned in the cylinder block.

Ignition type

Engines may be classified as spark ignition (SI), or compression ignition (CI). In an SI engine, the air-fuel mixture in the combustion chamber is ignited by a spark at the spark plug electrodes. The fuel-air mixture in a CI engine is ignited by the heat of compression. Diesel engines use the CI principle, and these engines have much higher compression than SI engines.

Cylinder arrangement

The most common arrangements of engine cylinders are in-line, V-type, and opposed. An in-line engine has the cylinders mounted vertically and positioned in a line directly behind each other. V-type engines usually have 6 or 8 cylinders located in a V formation with an angle of 60 degrees or 90 degrees between the sides of the block. Other V-type engines have been used; for example, one manufacturer is now marketing a V10 engine. In an opposed engine, the cylinders are positioned horizontally across from each other.

Number of cylinders

Engines are designed with 3, 4, 5, 6, 8, 10, or 12 cylinders.

Cycles

Most automotive engines operate on the four-cycle principle. Since the two-stroke engine is lighter and may be designed to produce more power than an equivalent size four-stroke engine, the two-stroke engine may experience widespread use in the near future. All of the big-three automotive manufacturers have two-stroke engines under development.

Words

combustion n. 燃烧
fundamental adj. 基础的，基本的
automobile n. 汽车
cylinder n. 气缸，柱面
piston n. 活塞
combustion chamber 燃烧室
car frame 汽车车架
metal tube 金属圆管
movable adj. 可移动的
connecting rod 连杆
crankshaft n. 曲轴
piston pin 活塞销
stroke n. 冲程
flywheel n. 飞轮
momentum n. 动量
valve n. 阀，气门
cylinder head 气缸盖
overhead valve 顶置式气门
camshaft n. 凸轮轴
valve train 气门组
single overhead camshaft 单顶置式凸轮轴
dual overhead camshaft 双顶置式凸轮轴
cylinder block 气缸体
ignition n. 点火，点燃
spark plug n. 火花塞
electrode n. 电极
equivalent adj. 相等的，相当的，同意义的

Notes

1. This section discusses the different types of engines in use, as well as the fundamental concepts behind internal combustion engine. 本节讨论所用的不同类型的发动机，以及有关内燃机的基本概念。

2. It is so named because combustion takes place inside the engine. 之所以这样命名，是因为燃烧发生在发动机内部。

3. The middle of the crankshaft is offset 曲轴的中部是偏心的。

4. Engines with a single camshaft positioned above the valve train on the cylinder head may be referred to as single overhead camshaft (SOHC) engines. 采用一根凸轮轴，且凸轮轴位于气缸盖和气门组之上的发动机称为单顶置式凸轮轴发动机。

Exercises

1. How does the internal combustion engine work?
2. How are the automotive engines classified?
3. What is the main difference between the SOHC and DOHC?

Reading Material

How Does the Engine Work?

The engine is the source of power that makes the car moves. The burning of gasoline in the engine cylinder produces the power. The power is then carried from the engine through the power train to the car wheels so that the wheels turn and the car moves.

The fuel system plays a vital part in the power-producing process since it supplies the gasoline to the engine cylinders. In each engine. cylinder, a mixture of gasoline vapor and air enters the cylinder, the piston pushes up into the cylinder to compress the mixture, and then an electric spark ignites the compressed mixture so that the piston is forced downward. Of course, in the engine the piston is not blown completely out of the cylinder, the piston simply moves up and down in the cylinder—up to compress the mixture, down as the mixture burns. The piston straight-line motion must be changed to rotary motion before it can be used to make the car wheel rotates. A connecting rod and a crank on the engine crankshaft make this change.

The engine valves get the burned gasoline vapor out of the engine cylinder and bringing fresh charge of gasoline vapor and air into the cylinder. There are two openings, or ports, in the enclosed end of the cylinder, each containing valve. The valves are accurately machined plugs on long stems. When they are closed, or seated (that is, moved up into the ports), the ports are sealed off and gas cannot pass through the ports. When the valve is open, gas can pass through the port.

The valves are opened by cams on the engine camshaft. The cam has a high point, or lobe; every time the cam rotates, the lobe comes around under the valve lifter and moves it upward. The lifter then carries this upward movement through the pushrod to the rocker arm. The rocker arm pivots on its support and pushes down on the valve stem, causing the valve to move down, that is ,to open. After the cam has turned enough to move the lobe out from under the lifter, the heavy valve spring pulls the valve back into its seat. The spring is attached to the upper end of the valve stem by a spring retainer and lock. There is a cam for each valve (two cams per cylinder)on the engine camshaft. The camshaft is driven off the crankshaft by gears or by sprockets and a chain.

When the entire cycle of events requires four piston strokes (two crankshaft revolutions), the engine is called a four-stroke-cycle engine, or a four-cycle engine. The four strokes are intake, compression, power, and exhaust.

On the intake stroke (As shown in Fig. 1-3), the

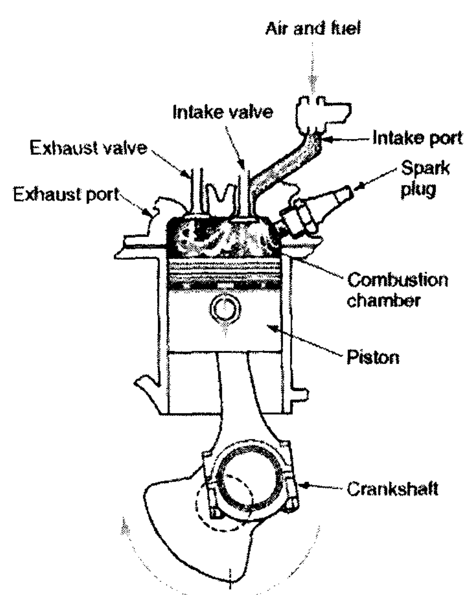

Fig. 1-3 The intake stroke

intake valve open, the piston moves down, pulled by the rotation of the crankshaft. This piston movement creates a partial vacuum in the cylinder, and air rushes into the cylinder past the intake valve to "fill up "this vacuum. As the air moves toward the cylinder, it must pass through the carburetor. There it is charged with gasoline vapor that rushes into the cylinder as the piston moves down on the intake stroke.

After the piston moves down to the bottom dead center on the intake stroke, the intake valve closes. The lobe on the cam controlling the intake valve has moved out from under the valve lifter. Since the other valve is also closed, the upper end of the cylinder is sealed. Now, as the piston is pushed up by the rotating crankshaft, the mixture of air and gasoline vapor that has been drawn into the cylinder is compressed(As shown in Fig. 1-4). By the time the piston has moved up to the top dead center, the mixture is compressed to a seventh or an eighth of its original volume. That is like taking a gallon of air and compressing it to a pint. The result is high pressure in the cylinder.

About the time the piston reaches the top dead center on the compression stroke, an electric spark occurs at the cylinder spark plug. The spark plug is essentially two heavy wire electrodes: the spark jump between these electrodes. The spark is produced by the ignition system. It ignited, or set fire to, the compressed air-gasoline-vapor mixture. Rapid combustion takes place; high temperatures and pressure result. At this instant, the downward pressure on the top of the piston may amount to as much as 2 tons. This powerful push forces the piston down (As shown in Fig. 1-5), and a power impulse is transmit to the crankshaft through the connecting rod and the crank.

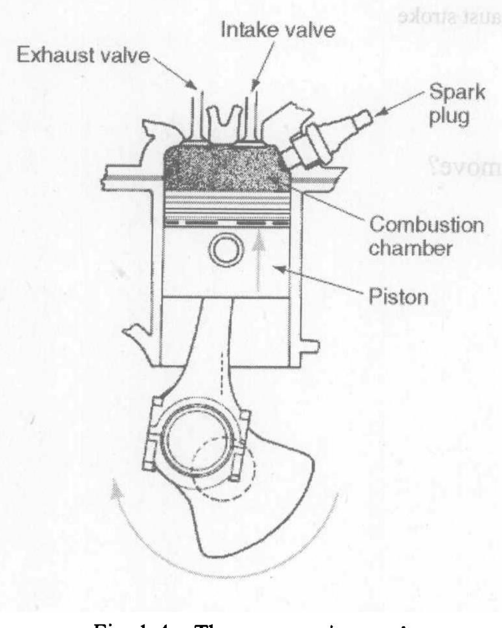

Fig. 1-4 The compression stroke

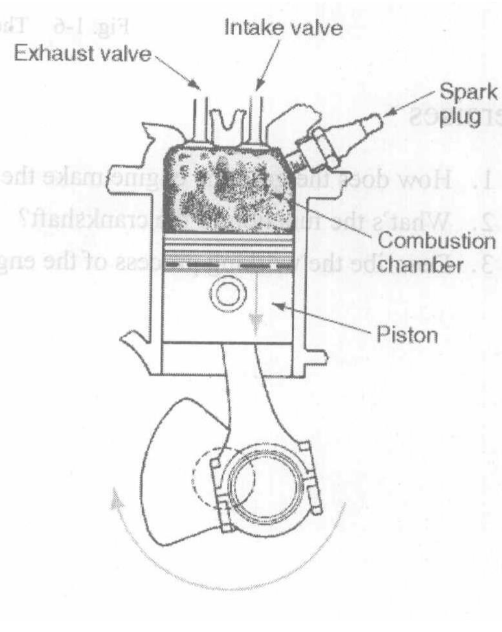

Fig. 1-5 The power stroke

The piston is forced down by the pressure of the burning gasoline vapor during the power stroke. When the piston reaches the bottom dead center, the exhaust valve opens. Now, as the piston starts back up again, it forces the burned gases from the cylinder (As shown in Fig. 1-6). By the time the piston has reaches the top dead center the cylinder is cleared of the burned gases. The exhaust valve closes and the intake valve opens. Then, the piston starts back down again on the next intake stroke. The four cycles, or piston strokes, are continuously repeated while the engine is running.

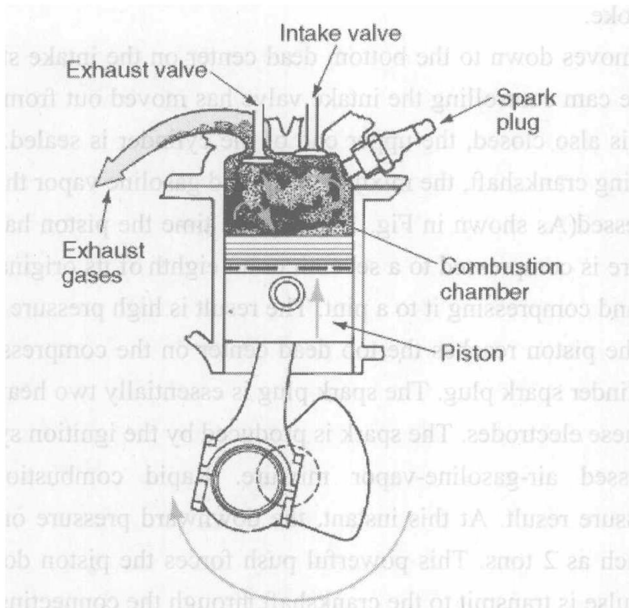

Fig. 1-6 The exhaust stroke

Exercises

1. How does the gasoline engine make the car move?
2. What's the function of the crankshaft?
3. Describe the working process of the engine.

Unit Two

The Fuel Delivery System

The fuel delivery system consists of all the components which supply the engine with fuel. This includes the tank itself, all the lines, one or more fuel filters, a fuel pump (mechanical or electric), and the fuel metering components (carburetor or fuel injection system).

Fuel tank

Fuel tanks are normally located at the rear of the vehicle, although on rear or mid engine vehicles they are usually located at the front. The tank contains a fuel gauge sending unit, a filler tube and on most fuel injected vehicles, a fuel pump. In most tanks, there is also a fine mesh screen "sock" attached to the pickup tube. This is used to filter out large particles which could easily clog the fuel lines, fuel pump and fuel filter.

Since the advent of emission controls, tanks are equipped with a control system to prevent fuel vapor from being discharged into the atmosphere. A vent line in the tank is connected to an activated carbon or charcoal filled canister in the engine compartment. Vapors from the tank are stored in this canister, until they can be purged later for combustion in the engine. On many carbureted engines, the float bowl is also vented to this canister.

Fuel pumps

Mechanical pumps

Mechanical pumps are usually found on carbureted engines or on engines that utilize a mechanical fuel injection system.

Mechanical fuel pumps on carbureted engines are usually mounted on the side of the engine block or cylinder head and operated by an eccentric on the engine's camshaft. The rocker arm of the pump rests against the camshaft eccentric, and as the camshaft rotates, it actuates the rocker arm. Some engines use a pushrod between the rocker arm and camshaft eccentric. Inside the fuel pump, the rocker arm is connected to a flexible diaphragm. A spring, mounted underneath, maintains pressure on the diaphragm. As the rocker arm is actuated, it pulls the diaphragm down and then releases it. Once the diaphragm is released, the spring pushes it back up. This continual diaphragm motion causes a partial vacuum and pressure in the space above the diaphragm. The vacuum draws the fuel from the tank and the pressure pushes it toward the carburetor or injection pump. A check valve is used in the pump to prevent fuel from being pumped back into the tank. Certain mechanical fuel injection systems also utilize a mechanical fuel pump, typically some diesel engines and early gasoline fuel injection systems. Many of them use a fuel pump essentially identical to the carbureted fuel system's. Some, however, use a vane type fuel pump mounted directly to the injection pump/fuel distributor assembly. The injection pump/fuel distributor assembly is driven by the timing belt, chain or gears which in turn drives the fuel pump. The vanes draw the fuel in through the inlet port then squeeze the fuel into a tight passage. The fuel then exits pressurized through the outlet port.

Electric pumps

There are two general types of electric fuel pumps: the impeller type and the bellows type. Electric pumps can be found on all types of fuel systems (As shown in Fig. 1-7).

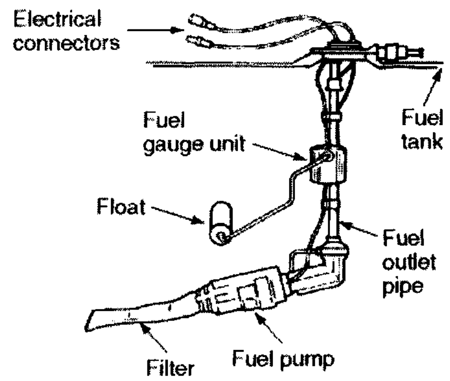

Fig. 1-7 Fuel pump assembly

The impeller type pump uses a vane or impeller that is driven by an electric motor. These pumps are often mounted in the fuel tank, though they are sometimes found below or beside the tank. The vanes or impeller draw the fuel in through the inlet port then squeeze the fuel into a tight passage. This pressurizes the fuel. The pressurized fuel then exits through the outlet port.

The bellows type pump is rare. This pump is ordinarily mounted in the engine compartment and contains a flexible metal bellows operated by an electromagnet. As the electromagnet is energized, it pulls the metal bellows up. This draws the fuel from the tank into the pump. When the electromagnet is de-energized, the bellows returns to its original position. A check valve closes to prevent the fuel from returning to the tank. The only place for the fuel to go now is through the outlet port.

Fuel filters

In addition to the mesh screen attached to the pickup tube, all fuel systems have at least one other filter located somewhere between the fuel tank and the fuel metering components. On some models, the filter is part of the fuel pump itself, on others, it is located in the fuel line, and still others locate the filter at the carburetor or throttle body inlet.

Carburetor

The carburetor is the most complex part of the entire fuel system (As shown in Fig. 1-8). Carburetors vary greatly in construction, but they all operate the same way. Their job is to supply the correct mixture of fuel and air to the engine in response to varying conditions.

Principal sub-assemblies on most carburetor models include a bowl cover, carburetor body and throttle body. A thick gasket between the throttle body and main body retards heat transfer to the fuel in order to help resist fuel percolation in warm weather. To correctly identify the carburetor model, always check the part number stamped on the main body or attached tag. The carburetor includes four basic fuel metering systems. The idle system provides a mixture for smooth idle and a transfer system for low speed operation. The main metering system provides an economical mixture for normal cruising conditions (and a fuel regulator solenoid/vacuum modulator on feedback systems). The accelerator system provides additional fuel during acceleration. The power enrichment system provides a richer mixture when high power output is desired.

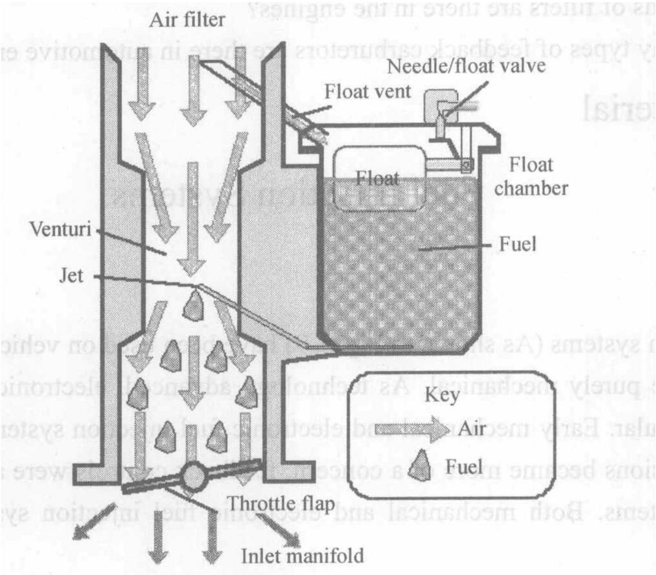

Fig. 1-8 Cutaway view of a carburetor

Words

filter n. 滤清器，过滤器
metering n. 测量，计量，记录
carburetor n. 化油器，汽化器
injection n. 注入，注射，喷射
gauge n. 规，表，计
sending n. 发送
mesh n. 网孔，网丝，网眼，圈套,啮合
screen n. 滤网
advent n. (尤指不寻常的人或事)出现，到来
vent n. 通风孔，出口，通路
activated adj. 有活性的
carbon n. 碳,碳素
charcoal n. 木炭,活性炭,炭
canister n. 罐，金属罐，金属容器，滤毒罐
float bowl 浮子室
eccentric adj. 偏心的,不同心的 n. 偏心轮，偏心器
flexible adj. 挠曲的，可曲的，柔性的，韧性的，可弯曲的
diaphragm n. 薄膜,膜片
check valve n. 单向阀，止回阀
vane n. 翼，叶片，风标
distributor n. 分电器，配电器
impeller n. 叶轮，转轮，桨叶
bellows n. 波纹管，波形膜，风箱
electromagnet n. 电磁铁
de-energize n. 断电，断开，关断

Notes

impeller 驱动叶轮：用做离心泵的旋转元件，将机械能量转化为流体能量。

Exercises

1. What are the main parts of the fuel delivery system?

2. How does the mechanical pump operate?
3. What kinds of filters are there in the engines?
4. How many types of feedback carburetors are there in automotive engines?

Reading Material

Fuel Injection Systems

Introduction

Fuel injection systems (As shown in Fig. 1-9) have been used on vehicles for many years. The earliest ones were purely mechanical. As technology advanced, electronic fuel injection systems became more popular. Early mechanical and electronic fuel injection systems did not use feedback controls. As emissions became more of a concern, feedback controls were adapted to both types of fuel injection systems. Both mechanical and electronic fuel injection systems can be found on gasoline engines.

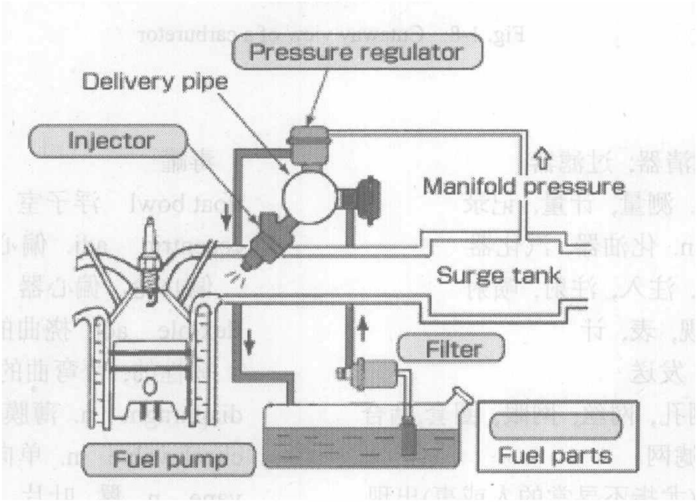

Fig. 1-9 Fuel injection system

Multi-port fuel injections

This is the most common type of fuel injection system found today (As shown in Fig. 1-10). Regardless of the manufacturer, they all function in the same basic way. On these systems an equal amount of fuel is delivered to each cylinder.

These systems all use sensors which transmit operating conditions to the computer. Information from these sensors is processed by the computer which then determines the proper air/fuel mixture. This signal is sent the to fuel injectors which open and inject fuel into their ports. The longer the injector is held open, the richer the fuel mixture. Most fuel injection systems need the following information to operate properly: